निदेशक का प्रतिवेदन
DIRECTOR'S REPORT
2020-2021

अखिल भारतीय समन्वित सोयाबीन अनुसंधान परियोजना
ALL INDIAN COORDINATED RESEARCH PROJECT ON SOYBEAN

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All India Coordinated Research Project (AICRP) on Soybean

DIRECTOR'S REPORT
2020-21

Nita Khandekar
ACTING DIRECTOR

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Agriculture Universities for facilitating and successful implementation of the envisaged programme need special mention. I consider it as my profound duty to acknowledge and congratulate all soybean workers for successful execution of the programme and contributing towards the efforts to improve soybean productivity and production in the country.

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The assistance rendered by all the workers in compiling this report is duly acknowledged.

Place: Indore
Date: March 06, 2021

(Nita Khandekar)
Director

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निदेशक का प्रतिवेदन
Director's Report

1. Introduction

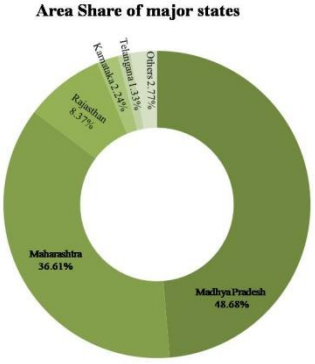
Soybean is a temperate origin crop introduced in India in the late sixties. It has a prominent place among modern agricultural commodities as the world's most important seed legume, and contributes about 25% and 65% to the global edible oil and protein concentrate for livestock feeding, respectively. It is also an important commodity for food manufacturers, pharma industry and has many other industrial uses. Soybean is the only complete high quality protein of source vegetable. Soy milk is cheaper than other vegetable sources and has a great scope of use among the increasing vegan population for consumption in various forms with varieties developed having less beany flavour. Tofu is highly nutritious and is complimentary to paneer. Soybean also has a many therapeutic usages like overcoming problems related to menopause due to presence of estrogen like compound and presence of flavones which protect from cancer. Soybean holds potential as a vegetable crop to be grown between April to July when green peas are not locally available. Indian Soybean deoiled cake, which is extensively used in feed industry being non-GMO is in high demand and accrued foreign exchange worth Rs.3349 crore during 2019-20.

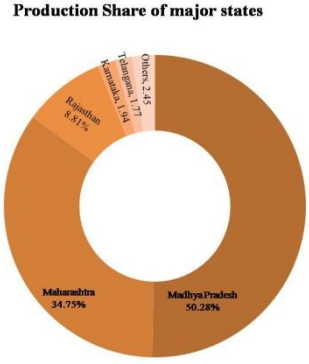
It is therefore no surprise that global soybean area (127.91 million ha) and production (370.8 million tons) in 2020 has shown an increase of 3.2% in area and 8.3% in production over 2019. This increase is mainly due to increase of area and production in USA and Brazil. For the third consecutive year the area, production and productivity of Argentina has declined.

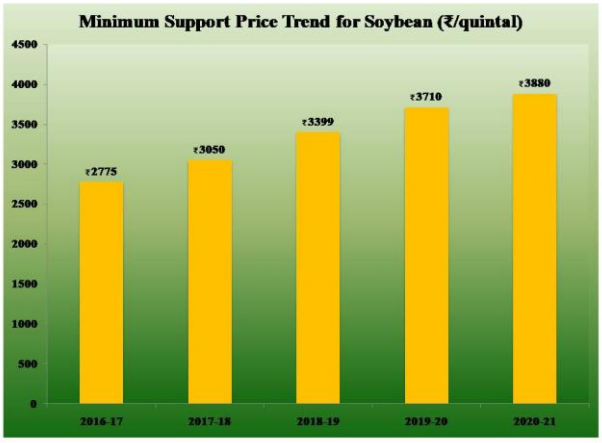
The growth trend of soybean area and production as compared to the decade of its introduction in India has been phenomenal. However, being a *kharif* season crop it does have its challenges. Over the past years there has been more or less stagnation in the area, production and productivity (Fig 1).

2. Current Scenario in India

Soybean production in India during 2020-21 is estimated to be 13.58 million tons from an area of 12.12 million ha and a productivity of 1125 kg/ha as per 1st advance estimates of DAC&FW as compared to production of 11.22 million tons from an area of 11.39 million ha and productivity of 1015 kg/ha in 2019-20. Madhya Pradesh (5.85 m ha), Maharashtra (4.32 m ha) and Rajasthan (1.1 m ha) were the major states for soybean. Karnataka, Telengana, Gujarat, and Chhattisgarh with an area of 0.332, 0.16, 0.15 and 0.08 m ha, respectively, show good promise of expansion in the future.







The Cabinet Committee on Economic Affairs has increased the minimum support prices (MSPs) of Soybean crop from Rs. 3710 per quintal to Rs. 3880 per quintal for marketing season 2020-21, i.e. 4.6percent increase over last year. Soybean traded at a price way above that in the months November 2020 onward. The rise in prices offers hope to the soybean growers since there is little scope of diversification for the farmers especially in the Malwa region which is the major area within Madhya Pradesh. In such circumstances the speedy development of suitable varieties and production technologies is essential. The year 2020 was a windfall year with 15 new varieties identified and released. With different traits being incorporated in these varieties the system has now been able to offer the farmers what is required from short duration, to disease resistant ones in the areas of their occurrence, to specialty soybean. This strengthening of the research has brought a new zeal and vigour among the AICRP worker and it is hoped to be able to offer many more suitable trait specific varieties in the coming years.

Soybean can be a potent candidate crop for diversification in the rice cultivation areas during *kharif* season in Punjab and Haryana for area expansion. It has potential to be grown as an intercrop of sugarcane not only in the southern and central zone but also in the Northern plains in off season as well as with other crops during *kharif*.

3. Major Research Accomplishments

3.1 New Varieties

MACS 1407 : Suitable for irrigated and rainfed conditions during *kharif* season in Eastern Zone, average seed yield 2100 Kg/ha, maturity 104 days, resistant to girdle beetle, leaf miner, leaf roller under field conditions and 19.8% oil

MACS 1460 : Suitable for irrigated and rainfed conditions during *kharif* season in NEHZ, EZ and SZ. Average yield NEHZ- 1958 Kg/ha; Eastern Zone 2036 Kg/ha and 2258 in SZ. Maturity EZ; 97 days; NEHZ; 101 days; SZ: 89 days; suitable for mechanical harvesting, 17.6 -18.9% oil

MACS 1520 : Suitable for irrigated and rainfed conditions during *kharif* season in EZ. Average yield 2207 Kg/ha; Resistant to charcoal rot; Maturity 98-102 days and 19% oil

IS 132 (NRC 132) : Suitable for irrigated and rainfed conditions during kharif season in SZ and EZ. First variety with less beany flavour (null lipoxygenase 2), developed through marker assisted selection, average yield SZ 2288 Kg/ha; 1652 Kg/ha EZ; maturity SZ 98 days, EZ 104 days; 18-19% oil

IS 147 (NRC 147) : Suitable for irrigated and rainfed conditions during *kharif* season in EZ and SZ. It is first variety with 42±5 % oleic acid content; it is a germplasm collected from Bihar (IC 210) average yield SZ 2362 Kg/ha, EZ 1400 Kg/ha, maturity SZ 96 days, EZ 100 days; oil content 17-19%

IS 128 (NRC 128) : Suitable for irrigated and rainfed conditions during *kharif* season in EZ and NPZ. Average yield EZ 1871 Kg/ha; NPZ 2269 Kg/ha; resistant to pod blight and Indian bud blight, maturity in EZ 106 days, NPZ 118 days;

oil 18-19%, moderate antixenosis against *Spodoptera litura*

IS 130 (NRC 130) : Suitable for irrigated and rainfed conditions during *kharif* season in Central Zone. Contains photoinsensitive allele e3; early maturity (92 days), moderate antixenosis against *Spodoptera litura*, unique brown spot on micropile. Average yield 1515 kg/ha and 17.8% oil

IS 136 (NRC 136) : Suitable for irrigated and rainfed conditions during *kharif* season in EZ. It is the first variety developed for drought tolerance, average yield 1700 Kg/ha, maturity 107 days, HR to Indian bud blight, moderate antixenosis against *Spodoptera litura* and 17.5% oil.

ISLS 1 (NRCSL 1) : Suitable for irrigated and rainfed conditions during *kharif* season in EZ, average yield EZ 1815 Kg/ha; tolerant to YMV disease, maturity 107 days, 19.5% oil, HR to Indian bud blight

RSC 11-07 : Suitable for irrigated and rainfed conditions during *kharif* season, in EZ and SZ. Average yield 1916 kg/ha, SZ 2515 Kg/ha; resistant to Indian bud blight and pod blight (ct), susceptible to rust, HR to purple seed stain, 18-19% oil, maturity; EZ 102 days, SZ 97 days

RSC 10-46 : Suitable for irrigated and rainfed conditions during *kharif* season in CZ and EZ. Average yield in EZ 2043 Kg/ha, CZ 1947 Kg/ha, maturity 102 days and 104 days, respectively; resistant to charcoal rot and Indian bud blight, 14.8-19.8 Oil

RSC l0-52 : Suitable for irrigated and rainfed conditions during *kharif* season in Central Zone. Average yield 2053 Kg/ha; maturity 101 days, resistant to charcoal rot, bacterial pustule, TLS, MLS, IBB, RAB, 18% oil

AMS 2014-l (PDKV Purva) : Suitable for irrigated and rainfed conditions during *kharif* season in EZ. Average yield 1804 Kg/ha, maturity 106 days, 18.5% oil, resistant to charcoal rot, Rhizactonia aerial blight, BLB, Alternaria leaf spot (ALS)

AMS-MB-5-I8 (Suvarn Soya) : Suitable for irrigated and rainfed conditions during *kharif* season in Central Zone. Average yield 2044 Kg/ha, maturity 100 days, 19% oil

DSb 34 : Suitable for irrigated and rainfed conditions during *kharif* season in SZ. Highly resistant to rust and purple seed stain, MR to pod blight, average yield 2655 Kg/ha, maturity 95 days, oil 18.6%

3.2 Crop Improvement

3.2.1 **Registration of long juvenile genetic stock and identification of new allele:** AGS 25 was identified as a source of long juvenility at ICAR-IISR Indore and characterized through multi-location evaluation in seven centres located in 6 zones of AICRP. QTL analysis in the RILs developed using this line identified 2 candidate genes in which one was mono-morphic in parents. A novel allele in another candidate gene was identified and correlated with long juvenility. Molecular markers for the new allele have been developed.

3.2.2 **Pre breeding and distant hybridization:** To broaden the genetic base of cultivated soybean pre breeding program has been initiated by using very early maturing (70 to 80 days) *G. soja* lines i.e PI 593983, PI 407170, PI 549046 (as male parent). These lines were crossed with late maturing highly adapted soybean cultivars JS 97-52, JS 335, JS 20-98 and early maturing cultivars JS 20-34, JS 95-60 and EC 538828. A number of advanced breeding lines with yellow mosaic virus resistance genotypes have been developed and are being evaluated for yield superiority. NRCSL1 and

NRCSL 2 derived from JS 335 x *G. soja* were evaluated under AICRPs trial which resulted in identification and release of NRCSL1 in the Eastern Zone for cultivation.

3.2.3 **Bio-fortification:** Research efforts are being made to develop specialty soybean and three varieties have been developed. The main focus has been on eliminating anti nutritional factor Kunitz trypsin inhibitor and reduction of beany flavor caused by lipoxygenase enzymes. NRC 142 is a null KTi and null lipoxygenase 2 entry was directly entered in AVT I and has given equivalent yield to that of the best checks of CZ and SZ in the AVT I and AVT ll trials. High oleic acid content variety NRC 147 and NRC 132 have been notified for cultivation in SZ and EZ for high oleic acid and reduced beany flavor, respectively. Further, number of advanced breeding lines with absence of Kunitz trypsin inhibitor and less beany flavor are being evaluated under AICRPs trials. **National hybridization Programme:** Thirteen centres contributed 48 crosses for national hybridization programme. F_1 are being advanced at soybean off-season nursery at UAS Bengaluru. Dharwad, Imphal and Adilabad centres sent 34 segregating populations to UAS Bengaluru for generation advancement.

3.2.4 **Multi-location Evaluation:** Multi-location trials were conducted to identify high yielding and disease resistant varieties of soybean. A total of 93 breeding trials were evaluated during 2020-21. At some locations, trials failed due to erratic weather conditions. Data from a few centres were not accepted either due to high CV or very poor yield. Out of 93 trials allotted to different centres, data of 87 locations was received and 69 (74%) were accepted for calculating zonal mean and judging the performance of the entries. The Table 1 indicates the category wise position of number of trials allotted, data received and finally accepted for compilation of the report.

3.2.5 **Identification of mega environment through GGE Biplot analysis:** GGE biplot grain yield analysis conducted for the mean of two year data (2019-20 & 2020-21) for 10 genotypes across 19 locations in India identified three mega environments. First mega environment comprised Ludhiana, Delhi, Morena, Adilabad, Pantnagar, Parbhani, Pune, Amravati, Raipur, Bhawanipatna, Umiam and Palampur. Second mega environment comprised Bengaluru, Almora, Ranchi, Imphal and Kasbedigraj. The third mega environment comprised two locations Jabalpur and Lokbharti. Centers in mega environments were not geographically adjacent. Ludhiana and Delhi centres had the highest discriminating ability, Amravati and Raipur were the most representative locations. Raipur centre was identified as the ideal environment for breeding for wider adaptable genotypes.

3.2.6 **Screening for water logging tolerance:** Inundation of soybean fields due to incessant rains during monsoon reduces yield to a significant level. Water logging is the common problem in NEH region. Out of thirty genotypes screened for water logging tolerance at ICAR Research Complex for NEH Region, Umiam, Meghalaya and AAU, Jorhat . JS 20-69, EC 391346, EC 456620, and NRC 37 were identified as water logging tolerant genotypes in both the centres.

Table 1: Details of trails allotted under different zones

Trial	Zone	Allocation	Responded	Accepted	Trial failed	Rejected due to	
						High CV	Yield Below 10Q
AVT 2 + 1	CZ	10	9	6	Kota	1	3
AVT 2	SZ	6	6	6	-	-	-
AVT 2 (Vegetable)	SZ	6	6	6	-	-	-
AVT I	NHZ	3	3	3	-	-	-
	NPZ	3	3	3	-	-	-
	NEHZ	3	3	2	-	-	1
	EZ	4	3	3		Trial not taken up Due to High rain at Dholi	
	CZ	10	10	7	Kota		3
AVT I Early	CZ	6	6	4		1	1
IVT	NHZ	3	3	2	-	-	-
	NPZ	3	3	3	-	-	-
	NEHZ*	3	3	3			
	EZ	4	3	3		Trial not taken up Due to High rain at Dholi	
	CZ	11	11	8	-	2	3
	SZ	6	5	5	-	Seed not received at Adilabad	
IVT (Early)	CZ	11	11	8	Kota	2	3
IVT (Vegetable)	NHZ	2	1	1	-	Trial not conducted due to late seed availability at Almora	
	EZ	2	1	1	-	Seed not received at Ranchi	
	CZ	3	2	2	Kota	Aberrant weather and late sowing due to Covid 19	
	SZ	3	3	3	-	-	-
Total		**102**	**95**	**76**			

*Seed received very late due to Covid 19. Mean yield was less than 10Q and High CV was in Umiam. Data was accepted considering prevailing Covid situations

Note: The quality of experiments was evaluated through **online monitoring** of these trials by monitoring team constituted for the purpose. The data of those locations were not accounted where the experiment conduct was not the up to the standard.

Promising Entries

On the basis of 2020-21 yield data, the entries that exhibited superiority over the best check in yield/had HR to important disease were taken forward. Food grade entries were given 5% yield advantage over the best check. EDVs were compared with their recurrent parent for yield. The mean yield (kg/ha) of the promising entries in IVT, AVT-II, AVT-II as well as best check have been given in Table 2 to 11.

Table 2: Grain Yield (kg/ha) and rank of promising entries for different zones in IVT

S. No.	Entry	Northern Plain Zone		North Eastern Hill Zone		Eastern Zone		Central Zone		Central Zone (Early)		
				Yield	Rank	Yield	Rank	Yield	Rank	Maturity (Days)	Yield	Plant Height cm)
1.	PS 1670	2312	I									
2.	KDS 1096			1177	II	2354	I					
3.	DSb 38			1226	I							
4.	DLSb 1			897	III							
5.	RVS 2011-10							2321	I			
6.	JS 22-12									90	1988	I
7.	JS 22-16									90	1901	II
8.	RVSM 2012-4									91	1837	IV
9.	NRC 181									91	1608	X
10.	JS 22-18									90	1818	V
11.	PS 1347 (c)	2115	II									
12.	JS 20-34 (C)									90	1614	42.6
13.	JS 20-116 (C)			798	VIII	2140	III	1815	IV			

Table 3: Grain Yield (kg/ha) and rank of promising entries for different zones in AVTI

S. No.	Entry	Northern Hill Zone		Northern Plain Zone		Central Zone		Central Zone (Early)			
		Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank	Maturity	Rank
1.	VLS 99	2107	I								
2.	NRC 149			2325	I						
3.	Himso 1689 (Repeat)					2099	II				
4.	JS 21-72					2219	I				
5.	NRC 152							1665	I	88.2	III
6.	NRC 165							1613	III	86.8	I
7.	VLS 63	1928	II								
8.	JS 20-34 (C)							1636	II	88.17	II
9.	JS 335 (C)					1985	III				
10.	PS 1347 (C)			2051	II						

Table 4: Mean performance of yield (kg/ha) of AVT-2 entries of *Kharif* soybean 2020

Zone: CZ

S.No.	Entry	Yield (kg/ha)			Mean	Rank
		IVT-2018	AVT I-2019	AVT II-2020		
1.	RVSM 2011-35	2034	2194	2376	2201	I
2.	NRC 138	1594	1785	1989	1789	V
3.	JS 20-34(C)	1635	1761	1752	1716	VII
4.	NRC 86 (C)	1648	2004	1933	1862	II
5.	JS 20-98 (C)	1701	1703	2005	1803	IV
6.	JS 335 (C)	1817	1781	1986	1861	III

Table 5: Mean Performance of repeat entry AMS 100-39

Zone: CZ

S. No.	Entry	Yield (kg/ha)				Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019	AVT II-2020			
1.	AMS 100-39	2164	1968	1997	2236	2091	I	97
2.	JS 335(C)	1622	1583	1819	1986	1753	III	100
3.	NRC 86(C)	2023	1584	1932	1933	1868	II	100
4.	JS 20-34(C)	1305	1686	1551	1752	1574	IV	90

Table 6: Mean Performance null lox 2 and null KTi entry NRC 142

Zone : CZ

S. No.	Entry	Yield (kg/ha)		Mean	Rank	Maturity
		AVT I-2019	AVT II-2020			
1.	NRC 142	1959	2056	2008	I	97
2.	JS 335(C)	1782	1986	1884	III	103
3.	NRC 86(C)	2004	1933	1969	II	102
4.	JS 20-34(C)	1761	1752	1757	IV	92

Table 7: Mean Performance of DSb 33

Zone : SZ

S. No.	Entry	Yield (kg/ha)			Mean	Rank	Maturity
		IVT-2018	AVT I-2019	AVT II-2020			
1.	DSb 33	2906	2555	2197	2553	I	96
2.	KS 103(C)	2514	2461	1766	2247	III	101
3.	DSb 23(C)	2830	2475	1982	2429	II	101
4.	DSb 21(C)	2767	1970	1855	2197	IV	98

Table 8: Mean Performance of repeat entry AMS 100-39 and NRCSL 1

Zone : SZ

S.No.	Entry	Yield (kg/ha)				Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019	AVT II-2020			
1.	NRCSL 1	2472	2503	1891	1669	2134	V	98
2.	AMS 100-39	2580	2409	2504	2016	2377	I	98
3.	DSb 21(C)	2270	2346	2126	1855	2149	IV	100
4.	RKS 18 (C)	2291	2260	2038	-	2196	II	96
5.	JS 335 (C)	2241	2358	2194	1901	2174	III	96
6.	JS 93-05 (C)	1955	2250	2075	-	2093	VI	92

Table 9: Mean Performance of null lox 2 and null KTi entry NRC 142

Zone: SZ

S.No.	Entry	Yield (Kg/ha)		Mean	Rank	Maturity
		AVT I-2019	AVT II-2020			
1.	NRC 142	2344	2067	2206	II	99
2.	KS 103(C)	2461	1766	2114	III	103
3.	DSb 23(C)	2475	1982	2228	I	102
4.	DSb 21(C)	1970	1855	1912	IV	101

Table 10: Mean Performance of EDV for null KTi MACSNRC 1667

Zone: SZ

S. No.	Entry	Yield (kg/ha)			Mean	Rank	Maturity
		AVTI-2018	AVT I-2019	AVT II-2020			
1.	MACSNRC 1667	2325	2148	1680	2051	IV	96
2.	MACS 450	2374	2224	1643	2080	II	99
3.	DSb 21(C)	2346	1970	1855	2057	III	99
4.	JS 335(C)	2358	-	1901	2129	I	95

Table 11: Mean Performance of vegetable entry Karune

Zone: SZ

S. No.	Entry	Green Pod Yield (kg/ha)			Mean	Rank	Mean Days to Picking
		AVTI-2018	AVT I-2019	AVT II-2020			
1.	Karune	10571	10986	10363	10640	I	70
2.	Harasoya (C)	9230	8540	7613	8461	III	80
3.	KDS 726 (C)	9472	9787	10276	9845	II	78

3.3 Plant Genetic Resources

- A total of 5114 germplasm accessions of soybean are being maintained at ICAR-IISR, Indore.
- 125 germplasm accessions were evaluated in augmented design in multi-location trials in 7 centres of 6 zones.
- Fifty germplasm accessions were evaluated at hot spots of diseases and insects and resistant ones were identified.
- Periodical germplasm rejuvenation failed at Indore during 2019 and 2020 due to erratic weather conditions. 2745 germplasm accessions are being rejuvenated in off season at UAS Bengaluru.
- For identification of germplasm suitable for spring season (for sugarcane intercropping) in NPZ, 2167 germplasm accessions have been sent to NBPGR for evaluation.

3.4 Breeder Seed Production

- As against the indent of **13107.26**q a total of **11280q** breeder seed was produced during *kharif* 2020.
- The indent comprised of 49 varieties. Major indent (80%) was given for nine most important varieties namely JS 20-34 (22.6%), JS 335 (15.5%), JS 20-98 (12.1%), JS 20-29 (9.2%), JS 95-60 (5.2%), JS 20-69 (4.6%), RVS 2001-4 (4.34%), MAUS 158 (3.39%) and MAUS 71 (3.28%).
- The compensatory breeder seed production of **1575** q at an area of 225ha is planned during Rabi/Summer 2020-21 at JNKVV, Jabalpur, UAS, Dharwad, VNMKV, Parbhani, and UAS, Bengaluru to compensate the deficit.

Table 12: Breeder seed production *kharif* 2020

Sl. No	Variety Name	Year	DAC Indent (q)	Centre	Allotment (q)	Production (q)
1	JS 20-34	2015	2963.80	JNKVV, Jabalpur**	500.00	135.92
				AU, Kota	800.00	600.00
				MPUAT, Udaipur	600.00	400.00
				RVSKVV, Gwalior	800.00	217.00
				PDKV, Akola	150.00	150.00
				VNMKV, Parbhani	100.00	0.00
				NSC	100.00	0.0
				UAS, Raichur		50.0
				Total	**3050.00**	**1552.92**
2	JS -335	1994	2037.40	RVSKVV, Gwalior	200.00	38.00
				UAS, Dharwad #	600.00	350.00
				PDKV, Akola	100.00	100.00
				MPKV, Rahuri	500.00	1300.00
				UAS, Bangalore	300.00	537.00
				UAS, Raichur	150.00	150.00
				PJTSAU, Hyderabad	150.00	200.00
				UAHS, Shivamogga	100.00	100.00
				ARI, Pune	0.00	30.00
				Total	**2100.00**	**2805.00**
3	JS 20-29	2014	1208.85	RVSKVV, Gwalior	315.00	18.00
				AU, Kota	200.00	40.00
				MPUAT, Udaipur	200.00	150.00
				Lokbharti, Sonasar	260.00	14.00
				VNMKV, Parbhani#	250.00	100.00
				Total	**1225.00**	**322.00**
4	JS 93-05	2002	252.00	RVSKVV, Gwalior	100.00	0.0
				UAS, Dharwad	50.00	60.00
				IGKV, Raipur	50.00	0.00
				MPKV, Rahuri	75.00	135.00
				PJTSAU, Hyderabad	25.00	20.00
				PDKV, Akola	75.00	75.00
				Total	**375.00**	**290.00**
5	JS 20-69	2016	602.20	JNKVV, Jabalpur	400.00	202.24
				RVSKVV, Gwalior	100.00	86.00
				VNMKV, Parbhani	100.00	100.00
				IGKV, Raipur	50.00	23.00
				IISR, Indore		25.00
				Total	**650.00**	**436.24**
6	JS 95-60	2007	684.00	RVSKVV, Gwalior	600.00	194.00
				AU, Kota	150.00	50.00
				Total	**750.00**	**244.00**
7	JS 20-98	2018	1583.70	JNKVV, Jabalpur	1050.00	245.23
				RVSKVV, Gwalior	200.00	22.00
				AU, Kota	100.00	45.00
				MPUAT, Udaipur	100.00	70.00
				IGKV, Raipur	200.00	70.00
				Total	**1650.00**	**452.23**
8	JS 20-116	2019	169.50	JNKVV, Jabalpur	170.00	142.41
9	JS 20-94	2019	203.00	JNKVV, Jabalpur	300.00	52.20
10	JS 97-52	2008	67.00	IGKV, Raipur	70.00	11.00
				BAU, Ranchi	15.00	15.00
				RVSKVV, Gwalior		15.30
				Total	**85.00**	**41.30**

11	RVS 2001-4	2014	569.80	RVSKVV, Gwalior	600.00	705.00
12	Raj Soya – 18 (Pragya)	2017	347.00	RVSKVV, Gwalior	400.00	65.00
13	RVS 2002-4	2017	320.00	RVSKVV, Gwalior	320.00	364.00
14	RKS -18	2007	3.13	AU, Kota	5.00	0.00
15	RAUS 5	2007	3.13	AU, Kota	5.00	0.00
16	DSb - 21	2014	270.80	UAS, Dharwad	300.00	225.00
17	MAUS - 612	2018	175.20	VNMKVV, Parbhani	200.00	300.00
18	MAUS - 162	2014	293.00	VNMKVV, Parbhani	325.00	450.00
19	MAUS - 158	2010	445.00	VNMKVV, Parbhani	500.00	600.00
20	MAUS - 71	2002	430.00	VNMKVV, Parbhani	500.00	550.0
21	NRC - 86	2015	120.00	IISR, Indore	140.00	35.00
22	NRC - 7	2001	2.00	IISR, Indore	2.00	0.50
23	NRC - 127	2018	2.00	IISR, Indore	5.00	7.00
24	CG Soya 1	2018	58.00	IGKV, Raipur	70.00	35.0
25	Basara	2018	50.15	PJTSAU, Hyderabad	60.00	60.0
26	MACS 1281	2016	5.00	VSI, Pune	7.00	15.0
27	MACS 1188	2013	50.00	VSI, Pune	60.00	180.0
28	KDS 726	2019	35.00	MPKV, Rahuri	40.00	550.0
29	KDS 758	2018	10.00	MPKV, Rahuri	12.00	0.0
30	KDS 344 (Phule Agrani)	2015	5.00	MPKV, Rahuri	10.00	10.0
31	(DS-228) Phule Kalyani	2006	23.00	MPKV, Rahuri	30.00	300.0
32	AMS 1001	2019	21.00	PDKV, Akola	25.00	50.00
33	PS-1480 (Pant Soya-21)	2017	5.00	GBPUAT,Pantnagar	6.00	6.00
34	PS-1523 (Pant Soya-23)	2017	5.00	GBPUAT,Pantnagar	6.00	8.00
35	PS-1477 (Pant Soya- 24)	2014	10.00	GBPUAT,Pantnagar	12.00	8.00
36	PS-1225	2009	14.00	GBPUAT,Pantnagar	16.00	60.00
37	PS 1368		4.00	GBPUAT,Pantnagar	5.00	9.00
38	Him Soya	2019	1.00	CSHPKV, Palampur	2.00	12.00
39	Hara Soya	2001	2.00	CSHPKV, Palampur	2.00	15.00
40	VL Soya 89	2019	6.00	VPKAS, Almora	6.00	9.5
41	VL Soya 65	2010	4.00	VPKAS, Almora	4.00	4.5
42	SL 958	2015	0.35	PAU, Ludhiana	1.00	2.0
43	BSS-2		2.50	BAU, Ranchi	3.00	3.00
44	Birsa Soybean - 1	1983	3.75	BAU, Ranchi	4.00	4.00
45	JS 61-24*		10.00			
46	RVS*		10.00			
47	JS 1025*		20.00			
48	KDS 753 (Phule Kimaya)			MPKV, Rahuri		300.00
	***Kharif* Total**		**13107.26**		**14038.00**	**11280.80**
	***Rabi* summer 2020-21 Prod. (Estimate)**					**1575.00**
						12855.00

*These are not notified varieties

Table 13: The seed chain varieties of soybean

Sl. No.	Variety	Year of Notification	Sl. No.	Variety	Year of Notification
1	JS 20-116	2019	23	JS 20-29	2014
2	JS 20-94	2019	24	RVS 2001-4	2014
3	KDS 726	2019	25	DSb - 21	2014
4	AMS 1001	2019	26	MAUS - 162	2014
5	Him Soya	2019	27	PS-1477 (Pant Soya- 24)	2014
6	VL Soya 89	2019	28	MACS 1188	2013
7	JS 20-98	2018	29	PS 1368	2013
8	MAUS - 612	2018	30	MAUS - 158	2010
9	NRC - 127	2018	31	VL Soya 65	2010

10	CG Soya 1	2018	32	PS-1225	2009
11	Basara	2018	33	JS 97-52	2008
12	KDS 758	2018	34	JS 95-60	2007
13	Raj Soya – 18 (Pragya)	2017	35	RKS -18	2007
14	RVS 2002-4 (Raj Soya 24)	2017	36	RAUS 5	2007
15	PS-1480 (Pant Soya-21)	2017	37	Phule Kalyani (DS-228)	2006
16	PS-1523 (Pant Soya-23)	2017	38	JS 93-05	2002
17	JS 20-69	2016	39	MAUS - 71	2002
18	MACS 1281	2016	40	NRC - 7	2001
19	JS 20-34	2015	41	Hara Soya	2001
20	NRC - 86	2015	42	JS -335	1994
21	KDS 344 (Phule Agrani)	2015	43	Birsa Soybean - 1	1983
22	SL 958	2015			

3.5 Production technology

3.5.1 Evaluation of AVT II entries under different row spacing

- Five AVT II entries of CZ were tested in row spacing trial at 3 locations for grain yield. Mean zonal performance of all entries was higher than the best check.
- Among four AVT II entries tested in row spacing trial at 3 locations of SZ mean zonal grain yield performance of all entries except Karune was higher than the best check.
- KARUNE which is the 1st vegetable type variety being tested under the SZ of AICRP had 43% higher green pod yield over the best check.
- Higher mean zonal yield was recorded under wider planting (45 cm) as compared to narrow planting (30 cm) in central as well as Southern zone.

3.5.2 Sustainable soybean production through crop diversification and tillage systems

- Soybean-maize-soybean-maize rotation yielded maximum in north plain, eastern and southern zones.
- Economic viability of minimum tillage was found better than conventional tillage in all the zones.

3.5.3 System intensification for soybean productivity augmentation under Ridge Furrow planting

- The maximum yield was recorded with either 45 x 10 cm or 45 x 5 cm spacing in all the zones.
- Between two varieties, SL 958 in north plain, RSC 10 46 in Eastern, JS 97 52 in North eastern hill, JS 20 34 in Central and MACS 1188 in southern zones performed better (9 to 29%) than other variety of respective zone.

3.5.4 Evaluation of partial factor productivity for soybean

- The omission of weed management from full package showed highest yield gap followed by the omission of either insecticides or recommended dose of fertilizers (RDF) in the entire zone.
- The highest PFP was associated with minimum cost of cultivation like seed inoculation or seed treatment.

3.5.5 Drought alleviation in soybean through foliar application of Thiourea

- The application of thiourea at 20 -25 and 50 -55 days after sowing showed beneficial effect on soybean yield.
- Between two varieties, SL 958 in North plain, RSC 10 46 in Eastern, RVS 24 in Central and MACS 1188 in Southern zones found better than other variety of respective zone.

3.5.6 Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

- Significantly higher yield of soybean was registered with the application of RDF with RPM without PSAP (T1) + PSAP @ 9g/l in North plain, Eastern, NEH, and Southern zones.
- The inconsistent results were observed with economical parameters.

3.6 Microbiology

- A total of 37 *pseudomonas* isolates were recovered from soybean rhizosphere and evaluated for drought stress tolerance characteristics *in vitro*.
- Ten potential candidate pseudomonads with four having biocontrol properties were identified based on evaluation for moisture stress tolerance, ACC deaminase activity and PGP traits.
- Two potential soybean rhizobia (*Bradyrhizobium daqingense* and *Bradyrhizobium liaoningense*) recovered from soybean nodules by IISR Indore centre were superior to commercial/local rhizobial strains of soybean across all the centres, for higher nodulation, biomass, nutrient uptake and physiological traits.
- Across all the centres, the co-inoculation of *Paenibacillus polymyxa* (HKA 15) + AM fungi at 75% RDF increased the nodule number, nodule dry mass as well as yield over farmer's practice.
- AVT II entries were evaluated for nodulation and compatibility with native homologous rhizobia in CZ and SZ.

3.7 Pathology

- Disease pressure increased in 2020, PB (Ct) appeared across the zone at all the location except Delhi at Ludhiana and YMV also appeared at all the zone, whereas RAB seviour reached at second position in 2020
- In IVT, Entry PS 1661 showed multiple resistance and HR reaction toward PB (Ct), RAB, YMV, TLS, and Coll. R diseases, and Entry RVS 2012-10 showed multiple resistance and HR reaction towards CR, YMV, BLS and TLS diseases
- In IVT early trial**,** Entry NRC 186 showed multiple resistance and HR reaction toward CR, YMV and TLS, whereas showed MR reaction towards PB (Ct) and RAB
- None of the entry in AVT I showed multiple disease resistance, entries NRC 142 was HR to YMV disease and JS 21-72 showed HR to CR disease.
- In AVT II trial, entries JS 21-71 and NRC 142 showed multiple disease resistance, HR to CR and MR to PB (Ct) disease
- JS 20-34 showed HR reaction CR in 6^{th} year of testing, EC 241780 showed HR reaction to rust at 12^{th} year of testing, SL 1123 showed resistance to YMV in 3^{rd} year of testing
- In germplasm lines, SL 525 showed multiple resistances to YMV, RAB, CR, PB (Ct) in central zone, VLS 11 showed multiple resistance to YMV and PB (Ct)

- Seed treatment with Trifloxystrobin + Penflufen @ 1g/kg of seed or Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed along with Thiamethoxam @ 2 ml/kg of seed was found effective in management of root rot complex and stem borers of soybean and enhanced the yield.
- Seed treatment with Thiphanate methyl + Pyroclostrobin @ 2ml/kg of seed could able to manage avoidable yield loss due to disease from 0 to 44.85% in susceptible variety and -0.48 to 37.04 % in resistance genotypes. Foliar foliar applications of Tebuconazole @ 625 ml/ha at 30, 45, 60 & 75 DAS could able to manage avoidable yield loss due to disease from 0 to 52.91% in susceptible variety and -9.26 to 54.13 % in resistance genotypes.

3.8 Entomology

- Total seven field/laboratory trials were conducted during *Kharif*-2020 by 11 coordinating centres.
- Twenty-one different insect species were reported to infest soybean crop.
- Infestation of stem fly was observed at all the centers. Maximum stem tunnelling (38.06%) due to stem fly maggots was reported from Prabhani.
- White fly incidence was very low during the season as compared to previous years.
- In Central zone incidence of defoliators, girdle beetle and stem fly continued to be major pests. Girdle beetle infestation was highest at Kota (37%).
- Pod damage due to *Cydia ptychora* to the extent of 52 % was observed at Dharwad center.
- High incidence of aphids (71.0/plant), leaf webber (14.67 larvae/m) and Bihar Hairy caterpillar (150.67 larvae/m) was reported from Imphal.
- Among natural bio-control agents, entomopathogenic fungi viz. *Beauveria bassiana* and *Nomurea rileyi* caused severe infection of muscardine disease in lepidopteran defoliators during August-September.
- Soybean genotypes belonging to IVT, AVT-I, AVT-II of different zones were evaluated for insect resistance.
- Considering three years' data in AVT, 36 genotypes were found to be promising with respect to resistance against stem fly, defoliators, girdle beetle and pest complex.
- Twenty nine entries from IVT (Normal genotypes) and nine from IVT (Early maturing genotypes) were found promising which will be evaluated further during coming season.
- To confirm the type of resistance, 11 AVT-II entries were subjected to novel approaches, involving food consumption and utilization indices viz. Approximate Digestibility (AD), Efficiency of Conversion Index (ECI) and Efficiency of conversion of Digested food (ECD) at Indore, Dharwad and Pantnagar. Among 11 genotypes tested, none of the entries exhibited **strong/extreme antixenosis** reaction against *S. litura* larvae. The lowest AD and ECD was found in NRC SL2 and the lowest ECI was found in AMS 100-39. These entries were found good antibiosis reaction.
- 50 germplasm lines screened against major insects at hot spots. As many as 9 lines viz., JSM 195, JSM 232, SL 525, EC 457074, SL(E) 1, JS 20-86, SL 738, MACS 171 and EC 457074 exhibited insect resistance. These lines will also be tested further during next season.
- In Integrated management of root rot complex and stem borers of soybean, it was found that seed treatment was found to be effective and economical for the management of root rot complex and seed borers of soybean.
- In management of major insect-pests of soybean through microbial consortia six microbial insecticides combinations were tested against major insect-pests of soybean at Pantnagar,

Sehore, Kota, Dharwad, Prabhani, and Imphal. The results indicated that combinations were found superior than control to reducing the insect-pests populations.

3.9 Frontline Demonstrations

- During the year, out of 23 centers, 20 centre conducted a total of 943 FLDs on farmer's fields against the target of 900 FLDs in a plot size of 0.4 ha each. The centers namely Medziphema, Bharuch and Dholi did not conduct the FLDs due to COVID 19 restriction at respective centers during cropping season.
- Of the 943 FLDs, 93 and 7% were taken up by male and female beneficiaries, respectively. The caste wise distribution showed that there were 9.75 % SC, 8.38% ST, 50.69% OBC and 31.18% general category beneficiaries. Yield as high as 3158 kg/ha could be obtained in some farmer's field with improved technology.
- Data from successful 943 FLDs on full package (all the recommended inputs and cultural practices and improved soybean varieties) revealed that the adoption of research emanated improved soybean production technology led to an increase in yield and net returns to the tune of 32.3 and 59.05%, respectively over farmers practice was realized. Which was achieved by the additional expenditure of only Rs 4205/ha.
- A summary of FLDs over 32 years (Table 14) consistently shows the benefits of improved technology over farmer's practice,

Table 14: Soybean yield (kg/ha) and yield gap II in Front Line Demonstrations

S.No.	Year	Improved technology	Farmers' practice	Yield gap II
1	1989-90	1951	901	1050
2	1990-91	1959	1280	679
3	1991-92	1991	1446	545
4	1992-93	1933	1427	506
5	1993-94	1899	1407	492
6	1994-95	1810	1360	450
7	1995-96	1839	1385	454
8	1996-97	1824	1501	323
9	1997-98	1852	1409	443
10	1998-99	1736	1245	491
11	1999-2000	1736	1292	444
12	2000-01	1540	1191	349
13	2001-02	1769	1420	349
14	2002-03	1646	1299	347
15	2003-04	1724	1444	280
16	2004-05	1743	1415	328
17	2005-06	1693	1344	349
18	2006-07	1755	1365	390
19	2007-08	1794	1439	355
20	2008-09	1702	1302	400
21	2009-10	1744	1320	424
22	2010-11	1688	1307	381
23	2011-12	1813	1438	375
24	2012-13	1881	1469	412
25	2013-14	1648	1335	313
26	2014-15	1778	1359	419
27	2015-16	1484	1061	423
28	2016-17	1848	1470	378
29	2017-18	1722	1388	384
30	2018-19	1831	1451	380

31	2019-20	1738	1321	417
32	2020-21	1663	1256	407

4. Research Thrust

- Pre-breeding efforts for widening the genetic base and transfer of traits for crop adaptation and yield QTLs.
- Genetic enhancement of yield through new and efficient plant types and incorporating resistance against major diseases like MYMV, rust, Charcoal rot, anthracnose, collar rot.
- Identification of more productive cropping system involving soybean
- Development of cost effective technologies for insect-pest management.
- Application of microbial consortia for reducing fertilizer inputs and increasing productivity.

5. New Initiatives

- Development of EDVs for null KTi, null lox 2, YMV resistance, photo-insensitivity, long juvenility, rust resistance.
- Development and sharing of early generation segregating material including the material fixed for null KTi, null lox 2, YMV resistance, photo-insensitivity, long juvenility, rust resistance for location specific breeding in different zones.
- Introduction of soybean in non-traditional areas and seasons.
- Identification of genotypes for intercropping including in off-seasonIdentification of food usage varieties

6. Budget

Year- wise and head Wise break-up of Plan Budget in respect of AICRP on Soybean under DARE/ICAR during 2020-21

(**Rs in lakh)**

Head	Expenditure (Upto 28.02.2021)	Expected Expenditure (Upto 28.02.2021)	Total (2+3)
1	**2**	**3**	
Grant in Aid salaries	769.63	334.55	1104.18
Grant in Aid General	131.97	58.43	190.40
Total	**901.60**	**392.98**	**1294.58**

7. Recommendations and Action Taken Report

S. No.	Recommendations	Action Taken
1.	Recent research advances made by the ICAR-IISR, Indore must be highlighted on institutional web site.	Complied
2.	Speed breeding must be an activity and Bangalore centre may be assigned this activity.	Complied
3.	Role of computational biology and its application in soybean improvement should be explored.	Computational biology studies have been initiated and are being used for the analysis of soybean genome and in the

		soybean improvement program
4.	Pre-breeding activity must be one of the important components in breeding programme and ICAR-IISR, Indore needs to initiate the same. *G max* X *G tomentella b*reeding lines developed by Dr R J Singh in University of Illinois should be introduced in India.	• ICAR-IISR has initiated the pre-breeding programme involving *G soja.* Early maturing *soja* lines of 70-80 days maturity have been crossed with adapted cultivars for widening of genetic base and imparting earliness from wild gene pool. • Dr R J Singh has not responded to the requests.
5.	AVT-2 entries should be compared with similar/respective maturity checks in Agronomical trials.	Similar maturity checks are being used for evaluation of AVT 2 entries in Agronomical trials.
6.	Soybean genotype NRC-132 can be used as source for antixenosis resistance and NRC 128, DSb 34, KDS 992 and MACS 1493 can be used for antibiosis resistance.	NRC 128 and NRC 132 have been utilized for hybridization in 2020.
7.	Soybean genotypes JS 20-71, JS 20-89, DS 3050 and AMS 1002 can be used as source of resistance for Charcoal rot resistance. Genotypes DSb 21, DSb 23, EC 241778, EC 241780 & EC 242104 & DSb 28 can be used for rust resistance breeding.	DSb 21, DSb 23 and EC 242104 have been utilized in breeding programme for rust resistance.

Annexure-I

List of National Released/Notified Varieties of Soybean

Sl. No.	Soybean variety	Year of release / Notification	Pedigree	Area of adaptability	Maturity (days)	Potential / Average Yield (Kg /ha)	Oil and protein content	Salient features	Reaction to insect - pests & diseases
1.	Clark 63	361 / 30.6.73	(Clark X CNS) X (Clark 6 X Blackhak)	Northern & Central zone	85-90	1500 to 2000		Purple flowers, plant height 20-30cm, resistant lodging	Tolerant to bacterial pustules
2.	Lee	440(E)/21.8 .75	S-100 X CNS	Northern hill zone	105-115	2100 to 2500		Determinate plants with purple flowers, tawny pubescence, yellow seed and black hilum	Susceptible to yellow mosaic, defoliators, bacterial pustules and girdle beetle
3.	Ankur	S.O. 786/2.2.76	SPS from composite of 22 crosses	Northern plain zone	115-120	2000 to 2500	21-23 % 41-43 %	White flowers, tawny pubescence, yellow seed coat and light brown hilum	Resistant to bacterial pustules and rust
4.	Type 49	13 / 19.12.78	Selection from indigenous material	Central zone	125-130	2000 to 2500		Purple flowers, grey pubescence, yellow seed coat, brown hilum and good germinability	Susceptible to yellow mosaic, bacterial pustules and bud blight
5.	Punjab Soybean No. 1	13/ 19.12.78	Selection form Nanking variety	Central, northern plain & northern hill zones	95-100	2000 to 2500		Semi determinate plants having purple flowers, tawny pubescence, small yellow seed and grey hilum. Highly pod shattering, early with good germinability and suitable for food uses.	Susceptible to bacterial pustules
6.	Bragg	13 / 19.12.78	Jackson x D 49-2491	Throughout India	115-120	1500 to 2000		Determinate plants with white flowers, tawny pubescence, yellow seed and black hilum.	Resistant to bacterial pustules, susceptible to YMV.
7.	Alankar	S.O. 13 dt 19.12.78	D 63-6094 x D61-4249	Northern plain zone	115-120	1800 to 2200		Determinate plants with white flowers, tawny pubescence, yellow seed coat and light brown hilum	Resistant to bacterial pustules, tolerant to yellow mosaic
8.	Shilajeet	470/ 19.2.80	Selection from EC 9309	Northern hill zone & Northern	100-105	2000 to 2500		Determinate plants with purple flowers, tawny pubescence, yellow seed and light brown hilum	Resistant to bacterial pustules, tolerant to Rhizoctonia

				plain zone					
9.	PK 327	2 (E)/3.1.83	UPSM 82 X Semmes	Northern hill zone and Northern plain zone	100-105	2000 to 2500	20.21 % 40.45 %	Determinate plants, purple flowers, grey pubescence, yellow seed and brown hilum	Resistant to bacterial pustules
10.	PK 262	499 (E)/ 8.7.83	UPSM 97 X Hardee	Northern plain zone	115-120	2500 to 3000	21.76 % 39.21 %	Determinate plants with thick stem, white flowers, grey pubescence, yellow seed and brown hilum	Tolerant to yellow mosaic and bacterial pustules
11.	SL 4	596(E) 13.08.1984	EC 7965 X Bragg	Northern Plain Zone	100-105	1600 to 2000		Purple flowers, grey pubescence, yellow seeds	Filed tolerance to YMV
12.	PK 308	295 (E)/ 9.4.85	T 31 X Hardee	Northern plain zone	110	2000 to 2500	20.23 % 40.32 %	Determinate plants with white flowers, grey pubescence, narrow leaves, yellow seed and brown hilum	Resistant o bacterial pustule
13.	PK-472	258(E)/ 14.5.86	Hardee X Punjab-1	Central zone	100-105	3000 to 3500	19.91 % 40.84 %	Determinate plants with white flowers, grey pubescence, dark green foliage and yellow seed with brown hilum	Resistant to bacterial pustules & YMV
14.	PK-416	258(E)/ 14.5.86	UPSM 534 X S 38	Northern plain zone	115-120	3000 to 3500	23.03 % 41.56 %	Semi-determinate plants having white flowers, tawny pubescence, yellow seed and brown hilum	Resistant to YMV & bacterial pustules, tolerant to Rhizoctonia.
15.	Pusa-24	834(E)/ 18.9.87	Shelby X Bragg	Northern plain & Northern hill zones	105-125	2500 to 3000		Compact plants with white flowers, tawny pubescence, yellow seed and black hilum.	Resistant to bacterial pustules, tolerant to Rhizoctonia, YMV and major insect-pests.
16.	Pusa-16	834(E)/ 18.9.87	CNS X Lee	Northern plain zone, Northern hill zone and parts of Central zone	105-115	2500 to 3000		Determinate plants, purple flowers, tawny pubescence, yellow seed and grey hilum	Resistant to Rhizoctonia, bacterial pustules, tolerant to YMV and major insect-pests.
17.	Pusa-20	10(E)/ 1.1.88	Bragg X Lee	Northern hill zone	110-120	2500 to 3000		White flowers, tawny pubescence, yellow seed and black hilum	Resistant to Rhizoctonia & bacterial pustules, tolerant to YMV and major insect-pests.
18.	MACS-58	599(E)/ 31.7.89	JS 2 X Improved	Central zone	90-100	2500 to 3000	18-22 % 38-42 %	Tall, semi-determinate plants with purple flowers, tawny pubescence, yellow seed,	Resistant to bacterial pustules and myrothecium leaf spot.

			Pelican			**2059**		light brown hilum, suitable for mechanical harvesting.	
19.	VL Soya -2	915(E)/ 6.11.89	Selection from VHC 856007	Northern hill zone	117	2500 to 2800 **2133**	22.33 % 35.86 %	Purple flowers, grey and sparse pubescence, yellow seed with brown hilum	-
20.	JS- 80-21	527(E)/ 16.8.91	JS 75-1 X PK 73-94	Central zone and North Eastern zone	105-110	2500 to 3000	20 % 41 %	Determinate plants with purple flowers, tawny pubescence, yellow seed, brown/black hilum and high seed germinability.	Tolerant to bacterial pustules, viral diseases and foliar insect-pests.
21.	Pant Soybean 564	793(E)/ 22.11.91	(UPSM 534 X Ankur)X Bragg	Northern plain zone	110-120	2500 to 3000		Determinate plants with sturdy plant type, white flowers, tawny pubescence yellow seed and brown hilum	Resistant to YMV and bacterial pustules, tolerant to Rhizoctonia.
22.	Hardee	860(E)/ 25.11.92	D 49-772 X Improved Pelican	Southern zone	105-110	1500 to 2000		Determinate plants with white flowers, grey pubescence, yellow seed and brown hilum	Tolerant to bacterial pustules, susceptible to yellow mosaic
23.	MACS-124	860(E)/ 25.11.92	JS 2 X Improved Pelican	Southern zone	95-105	2500 to 3000 **2191**	18-20 % 40-42 %	Semi-determinate plant, purple flowers, tawny pubescence, yellow seed, dark brown hilum, resistant to lodging.	Resistant to bud blight.
24.	JS 335	636(E)/ 2.9.94	JS 78-77 X JS 71-5	Central zone	95-100	2500 to 3000 **2521**	18.0 % 36.9 %	Semi-determinate habit, purple flowers, yellow seeds with black hilum. Absence of hairs on leaves, pod and stem is the most distinguishing trait.	Resistant to bacterial pustule and susceptible to YMV.
25.	Pooja (MAUS 2)	360(E) / 1.5.97	Selection from SH 84-14	Southern zone	100-105	2500 to 3500 **2721**	20.0 % 41.50 %	Semi-determinate, white flowers, grey pubescence, yellow seed and light brown hilum	Resistant to bacterial pustule and leaf spots. Moderately resistant to leaf miner, stem fly and blue beetle.
26.	Pant Soybean 1042	360(E)/ 1.5.97	Bragg X PK 416	Northern plain zone	110-119	3000 to 3500	21.54 % 38.75 %	Determinate plants with white flowers, tawny pubescence, yellow seed and brown hilum	Resistant to YMV, bacterial pustule and moderately resistant to Rhizoctonia aerial blight.
27.	Pant Soybean 1024	360(E)/ 1.5.97	PK 308 X PK 317	Northern plain zone	115	2500 to 3000	21.50 % 39.45 %	Determinate plants, white flowers, tawny, pubescence, narrow leaves, yellow seed with brown hilum	Resistant to YMV, rust and bacterial pustules

28.	Pant Soybean 1029	647(E)/9.9.97	PK 262 X PK 317	Southern zone	90-95	2500 to 3000	19.93 % 40.18 %	Determinate plants, white flowers, tawny pubescence yellow seed and black hilum	Resistant to YMV, rust, bacterial pustules and tolerant to Rhizoctonia.
29.	MACS-450	425(E)/ 8.6.99	Bragg X MACS 111	Southern zone	90-95	2500 to 4000 **2361**	19.16 %	Semi-determinate plants with purple flowers, tawny pubescence, yellow seed and black hilum.	Resistant to yellow mosaic, bacterial pustule. Resistant to defoliators
30.	VL Soya – 47	340(E)/ 3.4.2000	Selection from KHSF-3-1-1	Northern hill zone	122-125	2300 **2322**	22.87 % 39.85 %	Determinate plants with white flowers, grey pubescence, yellow shiny seeds and brown hilum.	Resistant/ tolerant to Anthracnose, Cercospora leaf spot, Bacterial leaf blight and Frog eye leaf spot. Tolerant Aphids
31.	Parbhani Sona (MAUS 47)	821(E)/ 13.9.2000	PS-73-7 X Hark	Central zone	85 - 90	2500 to 3000 **2244**	20.05 % 40.20 %	Determinate plants with purple flowers, tawny pubescence, tan to dark brown pods, yellow, round seeds and brown hilum.	Resistant to Collar rot, Anthracnose, Cercospora and Rhizoctonia. Resistant to Grey semilooper, Tobacco caterpillar, leaf miner and moderately resistant to stem fly.
32.	Ahilya 4 (NRC 37)	92(E)/ 22.2.2001	Gaurav X Punjab 1	Central zone	99-105	3500 to 4000 **2240**	17.6 % 36.9 %	Determinate, erect plants, white flowers, tawny pubescence, spherical yellow seeds with light to dark brown hilum.	Moderately resistant to collar rot, bacterial pustule, pod blight and bud blight like syndrome. Moderately resistant to stem fly and leaf miner
33.	Indira soya-9	92(E)/ 02.2.2001	Secondary selection from JS 80-21	North eastern zone	106	2200 to 2300		Semi determinate plants having grey pubescence, yellow seeds and black hilum	Resistant to rust. Moderately resistant to stem tunneling and girdle beetle and leaf folder.
34.	Samrudhi (MAUS 71)	937(E)/4.9.2002	JS 71-5 X JS 87-38	North Eastern Zone	93-100	2000 to 2500 **2278**	20.3 % 41.64 %	Semi determinate, purple flowers, glabrous leaves, yellow seed with black hilum	
35.	Pratishta (MAUS 61-2)	937(E)/4.9.02	JS 80-21 X KB-60	Central zone	100-105	2000 to 2500 **1880**	20.35 % 41.75 %	Semi determinate, purple flowers, glabrous leaves, yellow seeds, brown hilum	--
36.	Pratikar (MAUS 61)	937(E)/4.9.02	JS 71-1 X PK-73-94	Southern zone	95-100	2600 to 2800	20.27 % 41.57 %	Semi determinate, purple flowers, grey pubescence, yellow seed with brown hilum	Resistant to Myrothecium leaf spot

						2774			
37.	JS 93-05	937(E)/4.09 .02	Secon- dary selection from PS 73-22	Central zone	90-95	2000 to 2500	17.5-19% 41-42%	Semi determinate, violet flowers, lanceolate leaves, four seeded pods, glabrous stem & pods, non shattering, black hilum.	Resistant to major diseases and insect pests.
38.	MAUS 81 (Shakti)	161(E) 04.02.2004	KB-74 X JS 335	Central Zone	93-97	3278 **2095**	20.53 % 41.50 %	Semi determinate plants with dark green glabrous leaves, purple flowers, yellow oblong seed and brown to blackish hilum.	Tolerant to common diseases and pests
39.	Pusa 97-12	SO. 1566 (E) 5/11/05	Mutant of DS 74	North Plain Zone	116	2200 to 2500	17.9% 38.7%	Determinate growth habit, light green leaves, white flowers and non shattering type	Resistant to YMV, SMV, Bacterial pustules, Charcoal rot, Myrothecium leaf spot and moderately resistant to stem fly.
40.	Pusa 98-14	SO. 1572(E)20/ 9/06	Bragg x DS 93-MM-39	North Plain Zone	125	1900 to 2200		Determinate growth habit with average plant height and white flowers	Resistant to YMV, SMV, pod blight and moderately resistant to stem fly
41.	RKS 18 (Pratap Soya 2)	SO. 122(E) 6/2/2007	MACS 450 x Monetta	Southern & North Eastern Zone	91	2334 **2333.6**	18.22 % 40.2-41.0 %	Determinate variety with medium plant height. Purple flower. The plant is glabrous. Seed light yellow in colour round in medium size, Hilum gray to black.	Moderately resistant to BP, girdle beetle and leaf miner but susceptible to rust.
42.	SL 525	1178(E) /20.7.07	PK 416 x PK 1023	Northern Plain Zone	121	2303 **2727**	21.2 % 38.9 %	Determinate plants with white flower, brown hairs present on stem and pods, cream colour seeds with grey hilum, oil 21.2% and protein 38.9%.	Resistant to YMV, tolerant to stem blight and root knot nematode.
43.	Pratap Soya 1 (RAUS 5)	1703(E)/5.1 0.07	Pusa 16 X JS 335	North Eastern Zone	96-104	3000 to 3500 **2208**	20.0 % 40.7	Determinate, purple flower, yellow seed, hilum light to dark brown	Resistant to girdle beetle and moderately to stem fly and defoliators
44.	PS 1347	S.O. 2458(E) 16-10-2008	PS 1024 x PK 472	North Plain Zone	123	3100 **2542**	20 % 40 %	Determinate compact plant type, tawny pubescence and yellow bold seeds	Resistant to YMV, rhizoctonia aerial blight, bacterial pustule, SMV and charcoal rot.
45.	JS 97-52	S.O.2458(E)/ 16.10.08	PK 327 x L129	Central Zone and North Eastern Zone	100	2500-3000	20-21 % 39-41 %	While flower, tawny pubescence, large number of pods per plant, tolerance to excessive soil moisture, good seed longevity	Resistance to YMV and Collar rot, moderately resistant to Rhizoctonia aerial blight, moderately resistance to insects

46.	VL Soya 59	S.O.2458(E)/ 16.10.08	(Pb1X VLS2)X EC361336	North Hill Zone	135	2600 **2562.2**	19.35% 39.15%	Low linolenic acid, better oil quality, protein content 39.15% and oil content 19.35%	Resistant to pod blight, target leaf spot
47.	SL 688	S.O.2458(E)/ 16.10.08	PK416X SL317	North Plain Zone	125	2500 **2435**	19.4 % 40.3 %	Determinate and erect plants, brown pubescence, protein content 40.3% and oil content 19.4%	Resistant to YMV
48.	VL Soya 63	S.O.2458(E) / 16.10.08	VLS 2 X (Bragg X VHC3022)	North Hill Zone	130	2700 **2758.2**	17.91 % 41.04 %	Determinate and erect plants, protein content 41% and oil content 17.9%	Resistant to pod blight and target leaf spot, moderately resistant to frog eye leaf spot
49.	MACS-1188	S.O.2817 19.09.2013	JS(SH) 93-01 X MACS 450	Southern Zone	101 days	2500-3950 **2475**	19.10% 41%	Determinate growth habit, medium plant height, brown pod, yellow seed and black hilum	Resistant to Bacterial Pustules, Rhizoctonia aerial blight and Charcoal rot. Resistant to defoliator, pod borer, leaf folder and leaf miner.
50.	JS 20-29	S.O 1146(E) 24.04.2014	JS 97-52 x JS 95-56	Central zone	93-96 days	2125	20.90 % 41.1 %	Semi determinant white flower, Tawny pubescence, Black hilum, pointed ovate green leaf, tawny pubescence, brown pod, large seed size	Resistant to YMV and Charcoal Rot; Resistant/ tolerant to insect pests; high oil content (20%)
51.	JS 20-34	S.O 1146(E) 24.04.2014	JS 98-63 x PK 768	Central zone	86-88 days	2052	20.30 % 40.8 %	Determinate growth habit, white flower, dark green rounded ovate leaf, pod pubescence absent, yellow pod, black hilum, medium seed size	Extra early (87 days); resistant to Charcoal Rot; moderate to high resistance to girdle beetle; moderately resistant to stem fly
52.	Pooja (MAUS 2)	S.O 360(E) / 1.5.97	Selection from SH 84-14	Southern zone	100-105	2721	20.0 % 41.50 %	Semi-determinate, white flowers, grey pubescence, yellow seed and light brown hilum	Resistant to bacterial pustule and leaf spots. Moderately resistant to leaf miner, stem fly and blue beetle.
53.	DSb-21	S.O. 1228(E) 07.05.2015	JS 335 X EC 241778	Southern zone	90-95 days	2807	18.2% 38.2%	Semideterminate growth, purple flower, pubescence almost absent on stem and pods, yellow seed coat and brown hilum	Resistant to rust
54.	NRC 86	S.O. 268(E) 28.01.2015	RKS 15 x EC 481309	Central zone	95-97 days	2128	19.80 % 40.60 %	Determinate growth habit, purple flower, tawny pod pubescence, Dark Green pointed ovate leaf, brown hilum, round shaped small seed, plant height 55-59 cm	Moderately resistant to Bacterial Pustule, Pod Blight and Collar Rot; highly resistant to Charcoal Rot; Moderately resistant – highly resistant for girdle beetle;

									moderately resistant to stem fly
55.	KDS 344 (Phule Agrani)	S.O. 268(E) 28.01.2015	JS 335 x EC 241780	Southern Zone	94 days	2555	16.80 % 34.6 %	Semi determinate growth habit, violet flower, rounded ovate dark green leaf, pubescence absent on pod, brown pod, yellow green seed, brown hilum	Tolerant to rust; moderately resistant to stem fly, pod borer and leaf roller
56.	Pusa 12 (DS 12-13)	S.O. 1228(E) 07.05.2015	Mutant of DS 74	North Plain Zone	124-131 days.	2286	19.6% 37.8%	Determinate growth habit with average plant height of 76 cm, tawny pubescence, white flower, light green leaves, tawny pubescent on plant and pods, yellow seed and black hilum.	Resistant to YMV, Rhizoctonia aerial blight and Bacterial pustules
57.	MACS 1281	S.O. 2238(E) 29.06.2016	JS(SH) 93-01 X MACS 13	Southern Zone	96 days	**2519**	18.15% 40%	Determinate growth habit, purple flower, glabrous pods, round yellow seed and black hilum	Moderately resistant to Bacterial pustules and Bacterial leaf blight Moderately resistant to stem fly, defoliators, pod borer and leaf folder
58.	Raj Soya-24 (RVS 2002-4)	S.O. 1007(E) 30.03.2017	JP 120 X JS 335	Central Zone	96	**1905**	21-22.5 41	Semi determinate, medium plant height (46-48 cm), green, Pointed ovate leaf, white flower, pod pubescence absent, pod colour brown, medium seed size (10-11g test wt.), yellow coloured oval shaped and shiny seeds with black hilum.	Resistant to YMV,
59.	Pant Soya 24 (PS 1477)	S.O. 2805(E) 25.08.2017	JS 335 x PS 1024	North Plain Zone	113 days	2560	20.50 % 40 %	Determinate compact plant, dark green narrow leaflet, purple flower, tawny pubescence, yellow bold seed, brown hilum	Resistant to YMV, Bacterial Pustule, and moderately resistant to *Rhizoctonia* Arial Blight Resistant to lodging and shattering
60.	Jawahar Soybean 20-98 (JS 20-98)	**S**.O. 1379(E)/ 27.03.2018	JS 97-52 x SL 710	Central Zone	96-101 days	**2094**	19.3 % 40.9 %	Semi determinate plants with white flower, medium plant height (45,9 cm) Pointed ovate leaf, tawny pubescence present on pods and stem, blackish hilum	
61.	Kota Soya-1 (RKS 113)	**S.O. 1379(E)/ 27.03.2018**	Pratap Soya 2 x NRC 7	Eastern zone	100-102	1893	20% 38-40%	Determinate plant type, light green pointed ovate leaves, sparse pubescence with tawny colour, Purple flower, elliptical yellow seeds with brown hilum	Tolerant to bacterial pustules, bacterial blight, rust and collar rot. Tolerant to defoliator, stem fly, aphids and leaf miner.

62.	MAUS 612	**S**.O. 1379(E)/ 27.03.2018	MAUS 71 x Himso 1563	Maharashtra and South Zone	91-95 days	**2531**	20.49% 40.50%	Scared Grey Pubescence, Semi determinate with purple flower and blackish hilum	
63.	DSb. 23	**S**.O. 1379(E)/ 27.03.2018	JS-335 x EC-241780	Southern Zone	95 days	**3900**	18.63% 38.2%	Semi-determinate plants with average plant height(48cm.), purple flower, pointed ovate and medium and drak green leaves, light yellow seeds with brown hilum	Moderately resistant to defoliators, stem fly and pod borer. Highly resistant to rust.
64.	KS 103	**S**.O. 1379(E)/ 27.03.2018	JS-335 x EC-241780	Southern Zone	91-95 days	**2537**	18.10% 45.56%	Semi-determinate plants with average plant height(65cm.), violet flower, round ovate leaf, grains yellowish white and light brown hilum	Field rust resistance and resistance to pest complex.
65.	NRC 127	S.O. 6318 (E) 26.12.2018	JS 97-52 x PI 542044	Central Zone	102 days	**1807**	18.5-20% 38.0-40%	Free from Kunitz trypsin inhibitor. Semi-determinate plant with pointed ovate and medium green leaves, white flower, yellow seeds with black hilum, tawny pubescence.	Resistance/tolerance against pest complex, pod borer and lepidopteran defoliators Resistance against YMV, ALS, TLS, SCV and bacterial pustule
66.	KSD 726 (Phule Sangam)	S.O. 1498 (E) 01.04.2019	JS 93 05 x EC 241780	South Zone	96-97 days	**2442**	18.42% 38.14%	Semi-determinate plants with average plant height(49cm.), violet flower, rounded ovate leaf, yellow seeds with brown hilum	Resistant to rust (K. Digraj) and purple seed stain disease. Moderately resistance to Stem fly and defoliators.
67.	Jawahar Soybean 20-116 (JS 20-116)	S.O. 3220(E) 05.09.2019	JS 97-52 x JSM 120 A	Central Zone, Eastern zone, NE Zone	100.9 days	2122	16.32%	Semi-determinate with medium plant height (65.81 cm), white flowers, rounded ovate green leaf, glabrous pods and stem, spherical yellow seed with black hilum	Resistant to YMV and Charcoal rot,
68.	Jawahar Soybean 20-94 (JS 20-94)	S.O. 3220(E) 05.09.2019	JS 97-52 x JS 20-02	Central Zone	97.3 days	2104	20.35%	Semi-determinate with medium plant height (55.58 cm), violet flowers, rounded ovate green leaf, tawny pubescence, spherical yellow seed with black hilum	Resistant to YMV and Charcoal rot, Rhizoctonia aerial blight and alternatia leaf spot
69.	NRC 128	S.O. 500(E) 29.01.2021	JS 97-52 x (EC 389148 x PS 1042)	Eastern and Northern Plain Zone	110	2269 (NPZ) 1871(EZ)	18.88%	Semi-determinate with Tall plant height (62 cm), purple flowers, pointed ovate green leaf, pubescence on stem, leaves and pods, spherical yellow seed with dark brown hilum	Resistance to pod blight (ct) and moderately resistance to charcoal rot and MYMIV. Tolerance to water logging conditions. Slight antixenosis and good.
70.	NRC 130	S.O. 500(E)	EC 538828 x	Central Zone	92	1515	17.8%	Erect and determinate with medium plant	Absolute resistant to charcoal rot

		29.01.2021	EC 390977					height (47 cm),, dark green leaves, purple flower, glabrous, light yellow & round and bold seeds with yellow hilum with one brown spot on micropile.	and AR. Moderately resistant to TLS & Pod Blight (ct) Moderate Antixenosis against Spodoptera litura under controlled condition and resistant to stem fly, girdle beetle and defoliators in field condition.
71.	NRC 132	S.O. 500(E) 29.01.2021	JS 97-52× PI 596540	Southern and Eastern zone	104.6(EZ) 98.55(SZ)	2288(SZ) 1652(EZ)	18%&40 %(SZ) 19.2&39 .3%(EZ)	Semi determinate plant with pointed ovate and medium green leaves, White flower, yellow seeds with black hilum, brown pubescence. first lipoxygenase-2 free	NZ: HR reaction to Indian Bud Blight and MR reaction to pod blight (ct) SZ: highly resistant to purple seed stain (PSS) and moderately resistant to pod blight (ct); moderate antixenosis against S. litura, Girdle beetle
72.	NRC 136	S.O. 500(E) 29.01.2021	JS 97-52 / NRC 37	Eastern zone	107	1700	17.5%	Semi-determinate with Tall plant height (67 cm), White flowers, pointed ovate green leaf, tawny pubescence on pods, spherical yellow seed with dark brown hilum	Highly Resistant to Indian Bud Blight. Moderately Resistant to defoliators.
73.	NRCSL 1	S.O. 500(E) 29.01.2021	JS335 x SL525	Eastern zone	107	1706	19.5% 38.5%	Determinate plant with medium plant height (56 cm), pointed ovate & dark green leaf, purple flower, yellow& spherical seeds with black hilum, puberulent, Sparse and small brown hair	Tolerant to YMV and MS to PB(Ct) MR to defoliators (larva/m) at Amravati and Sehore, R to insect pest complex at Sehore, Parbhani, , R to semiloopers and MR to spodoptera litura at Parbhani, MR to stem tunneling at Parbhani and Sehore, and MR to girdle beetle damage at Amravati, Parbhani, Sehore
74.	NRC 147	S.O. 500(E) 29.01.2021		Southern and Eastern zone	96	2362	EZ 17%, SZ 19%.	Suitable for irrigated and rainfed conditions during kharif season, The first variety with 42±5 % oleic acid content; it is a germplasm collected from Bihar (IC 210)	
75.	MACS 1460	S.O. 500(E) 29.01.2021		Southern and Eastern zone	97(EZ) 89(SZ)	2253(EZ) 2085 (SZ)	17.6-18.9	Suitable for irrigated and rainfed conditions during kharif season, suitable for	

								mechanical harvesting	
76.	MACS 1520	S.O. 500(E) 29.01.2021		Central Zone	98-120	2207	19%	Suitable for irrigated and rainfed conditions during kharif season	Resistant to charcoal rot
77.	RSC 11-07	S.O. 500(E) 29.01.2021		Southern and Eastern zone	102(EZ) 97(SZ)	1916 2515(SZ)	18-19%	Suitable for irrigated and rainfed conditions during kharif season	Resistant to Indian Bud Blight and Pod Blight (ct), susceptible to rust, HR to purple seed stain
78.	RSC 10-46	S.O. 500(E) 29.01.2021	JS 335 x Bragg	Central Zone Eastern zone	102	1947	18.5% 40%	Medium plant height (54 cm), purple flowers, pointed ovate green leaf, elliptical yellow seed with black hilum	Resistant to stem borers and defoliators. Moderately resistant to Stem fly and girdle beetle. Resistant for biotic stresses like charcoal rot, Bud blights, bacterial pustules, Target leaf spots, stem borers. Moderately resistant to *Rhizoctonia* aerial blight.

Annexure-II

List of State Released/Notified Varieties of Soybean

Sl. No.	Soybean variety	Year of release / Notification	Pedigree	Area of adaptability	Maturity (days)	Potential / Average Yield (Kg /ha)	Oil and protein content	Salient features	Reaction to insect - pests & diseases
1.	Durga (JS 72-280)	19(E)/14.1.82	EC 14437 X Bragg	Madhya Pradesh	102-105	2000 to 2200 **1767**		Semi determinate, White flowers, tawny pubescence, yellow seed coat and black hilum	Tolerant to bacterial pustules.
2.	Ksb-2	19(E)/ 14.1.82	Manloxi X EC 39821	Karnataka	115-120	2300 to 2500		Semi determinate plants, purple flowers, tawny pubescence, yellow seed and black hilum	Moderately tolerant to bacterial pustules
3.	Gaurawa (JS 72-44)	19 (E)/14.1.82	D 60-9647 X EC 7034	Madhya Pradesh	104-106	2000 to 2500		Determinate, purple flowers, tawny pubescence, yellow seed coat with light black hilum	Susceptible to bud blight, defoliators, girdle beetle and stem fly
4.	CO. 1	19(E)/ 14.1.82	Selection from EC398321	Tamil Nadu	85-90	1700 to 2000	21.41 % 41.38 %	Determinate, purple flowers and yellow seeds	Resistant to stem fly & pod borer, moderately to YMV.
5.	KM. 1	19(E)/ 14.1.82	Introduction from AVRDC, Taiwan	Tamil Nadu	95-100	1200 to 1500		Plant height 40 to 50 cm, green seed	Tolerant to bacterial pustule
6.	Jawahar Soyabean -2	19 (E)/14.1.82	Selection from Tehri Garhwal material	Madhya Pradesh	95	1800 to 2000	19 % 41 %	Determinate, purple flowers, tawny pubescence, pods with dense brown pubescence yellow seed coat, brown hilum and highly shattering	Resistant to bacterial pustule, tolerant to Macrophomina
7.	Birsa Soybean 1	499(E)/8.7.1983	Spontaneous mutant of 'Sepaya Black'	Uplands of Jharkhand state	110	2000 to 2400		Determinate plants with white flowers, tawny pubescence, black seeds with black hilum	Moderately resistant to Bacterial pustule and bacterial blight, resistant to soybean mosaic, yellow mosaic and Cercospora leaf spot
8.	MACS-13	295(E)/ 9.4.1985	Hampton X EC 7034	Maharashtra	90-100	2000 to 3000	15-22 % 38-45 %	Semi determinate plants, purple flowers, tawny pubescence, brown pod, yellow seed	Resistant to bacterial pustules

								and black hilum	
9.	VL Soya –1	540(E)/ 24.7.85	Mutant of Bragg	Uttaranchal	110-113	2000 to 2500		Determinate plants with white flowers, tawny pubescence & black seed	Tolerant to Cercospora leaf spot
10.	Monetta	540(E)/ 24.7.85	Exotic variety EC 2587	Maharashtra	80-85	1500 to 2000 **1840**	21.51 % 41.0 %	Determinate, purple flowers, tawny pubescence, brown pods, yellow seed, brown hilum and highly pod shattering.	Field tolerance to insect-pests
11.	SL 96	165(E) 06.03.1987	Botato X JS 3	Punjab	110-112	1800 to 2000		White flowers, tawny pubescence, yellow seed and brown hilum	Tolerant to yellow mosaic virus
12.	JS 75-46	165(E)/ 6.3.87	Improved Pelican x Semmes	Madhya Pradesh	105	2500 to 3000 **2447**		Determinate, purple flowers, grey pubescence, yellow seed coat with brown hilum.	Tolerant to bacterial pustules, tolerant to Macrophomina
13.	JS-76-205	386(E) 15-05-1990	Kalitur X Bragg	Madhya Pradesh	105	1800 to 2200		Semi determinate, purple flowers, tawny pubescence medium tall plants with black seed and black hilum	Resistant to bacterial pustules and seed and seed ling rot
14.	Shiwalik (Himso-333)	386(E) 15.05.1990	Selection from segregating PK 73-55	Himachal Pradesh	120-125	2500 to 3200		White flowers, grey pubescence, yellow seed and dark brown hilum	Resistant to yellow mosaic
15.	JS-71-5	527(E)/ 16.8.91	Selection from Lee type exotic material	Malwa Plateau of Madhya Pradesh	90-95	2000 to 2400 **2062**		Determinate semi-dwarf, plants having 30 to 40 cms height, purple flowers, bold yellow seeds, black hilum and poor seed longevity.	Resistant to bacterial pustules and myrothecium leaf spot
16.	MACS-57	814(E)/ 4.11.92	JS 2 X Improved Pelican	Maharashtra	85-100	2500 to 3000 **2092**	20.14 % 41.0 %	Semi-determinate, purple flowers tawny pubescence, yellow seed coat, light brown hilum, suitable for summer cultivation.	Resistant to soybean mosaic bacterial pustules and bud blight.
17.	VL Soya-21	1(E)/ 1.1.96	Selection from VHC 3055	Uttaranchal	120-122	2000 to 2500 **2654**	22.5 % 38.6 %	Determinate plants with white flowers, tawny pubescence, yellow seed and brown hilum	Resistant to Cercospora leaf spot
18.	Ahilya-1 (NRC 2)	360(E)/1.5. 97	Induced mutant of Bragg	Madhya Pradesh	106	2500 to 3200 **2716**	19.18 % 39.98 %	Determinate, white flowers, tawny pubescence, yellow seed, grey to black hilum, good germinability, non lodging and heavy pod bearing	Resistant to pod blight and tolerant to Cercospora leaf spot and Anthracnose

19.	Ahilya-2 (NRC 12)	360(E)/ 1.5.97	Induced mutant of Bragg	Madhya Pradesh	99	2500 to 3000 **2273**	17.1 % 40.4 %	Determinate, purple flowers, tawny pubescence, light to dark brown hilum.	Resistant to bacterial pustules, YMV, myrothecium leaf spot and tolerant to defoliators stem fly and girdle beetle.
20.	Ahilya-3 (NRC 7)	360(E)/ 1.5.97	Selection from S69-96	Madhya Pradesh	90-99	2500 to 3500 **2123**	18.72 % 37.16 %	Determinate, purple flowers, grey pubescence, yellow seed coat, brown hilum, high oil content, resistant to pod-shattering.	Resistant to bacterial pustules Myrothecium leaf spot, tolerant to stem fly, girdle beetle green semilooper and defoliators.
21.	Sneh (KB 79)	360(E)/ 1.5.97	Hardee X Monetta	Karnataka	85-93	1700 to 1800		Determinate plants having purple flowers, grey pubescence, yellow seed and brown hilum.	Resistant to Alternaria, bacterial pustules, YMV, soybean mosaic. Moderate tolerance to Cercospora and bud blight.
22.	Co Soya-2	360(E)/ 1.5.97	UGM 21 X JS 335	Tamil Nadu	75-80	1300 to 1400 **1407**		Determinate, purple flower, dark green leaves and yellow seed.	Tolerant to YMV and leaf miner.
23.	SL 295	647(E)/ 9.9.97	PK 416 X Pant Soybean 564	Punjab	125-130	2000 to 2500 **2073**	23.2 % 34.3 %	White flower, tawny pubescence, determinate, yellow seed coat, and black hilum.	Resistant to yellow mosaic virus
24.	JS 90-41	425(E)/ 8.6.99	PS 73-7 X Hark	Madhya Pradesh	90-100	2500 to 3000 **1976**	18.5-19.5 % 39-40 %	Semi-determinate plants with purple flowers, tawny pubescence, lanceolate leaves, 4-seeded pods, greenish yellow seed and black hilum.	Moderately resistant to stem fly, semilooper and tolerant to major diseases
25.	Pant Soybean 1092 (PK1092)	821 (E)/ 13.9.2000	PK 327 X PK 416	Tarai and Babar region of Uttar Pradesh, Uttaranchal	118	2500 to 3500		Determinate, purple flower, dark green leaves, yellow seeds with black hilum	Resistant to yellow mosaic, Bacterial pustule, Cercospora leaf spot and tolerant to Rhizoctonia aerial blight
26.	Prasad (MAUS 32)	821(E)/ 13.9.2000	Selection from JS 80-21	Maharashtra	100-105	3000 to 3500 **3184**	19.0 % 41.5 %	Semi determinate, purple flowers, yellow seeds and brown hilum	Resistant to moderately resistant to common diseases and pests
27.	LSB-1	92(E)/ 02.2.2001	Selection from MACS 330	Andhra Pradesh	65-71	1200 to 1500		Determinate, white flowers, light green leaves, cream coloured seed in occasionally4 seeded pods	--

28.	Hara Soya (Himso 1563)	92(E)/ 22.2.2001	Himso 1520 X Bragg	Himachal Pradesh, Uttaranchal	108-130 days with a mean of 117 days	1500 to 2000		Semi-determinate, white flowers, dark brown pubescence on stem, leaves dark green with smooth surface. Leaves remain green in colour even at senescence. leaves and pods, pods turn black on maturity. Seed green, round, bold with black hilum	Immune to bacterial pustule, highly resistant to brown spot, bacterial blight, and resistant to frog eye leaf spot and pod blight. First ever culinary purpose variety in soybean.
29.	Indira soya-9	92(E)/ 02.2.2001	Secondary selection from JS 80-21	Madhya Pradesh	106	2200 to 2300		Semi determinate plants having grey pubescence, yellow seeds and black hilum	Resistant to rust. Moderately resistant to stem tunneling and girdle beetle and leaf folder.
30.	TAMS 38	122(E) 02.02.2005	Monetta x PK 472	Maharashtra Vidarbha region	95	2165 **2224**	19.26 % 39.13 %	Determinate plants with white flower, brown hairs present on stem and pods, cream colour seeds with grey hilum	-Resistance to bacterial pustules and myrothecium leaf spots,moderately resistance to pod blight,SVM,rhizoctonia aerial blight and tolerant to soybean rus
31.	Palam soya (P-30-1-1)	122(E) 02.02.2005		Himachal Pradesh and Uttaranchal	---	**2051**	19.5 % 42.0 %	-----	Resistant to frog eye leaf spot
32.	CO(Soy) 3	599(E)/ 25.04.2006	UGM 69 x JS 335	Tamil Nadu	85-90	1400 **1366**	24.33 % 40.25 %	Medium duration photo insensitive variety with high oil and protein content	Resistant to YMV
33.	Phule Kalyani (DS 228)	1572(E)/ 20.09.2006	JS 335 x DS-181 (PI 4623133)	Maharashtra	95-100	**2353**	17.25 % 39.38 %	Determinate plants with white flower, brown hairs present on stem and pods, cream colour seeds with grey hilum.	-
34.	TAMS 98-21	SO. 122(E) 6/2/07	Mutant of JS 80-21	Maharashtra	95-100	2200-2600 **2356**	19.95 % 39.5 %	Determinate, erect, purple flower, brown pubescence, yellow seed with hilum brown, gray pod	Moderately resistant to rust, leaf spot disease and insects
35.	JS 95-60	1178(E) 20-07-2007	Selection from PS 73-22	Madhya Pradesh	82-88	1800 to 2000	18-21 % 38-40 %	Determinate, extra earliness,high seed germinability and longevity, lodging and shattering resistance erect plant, flower color violet, glabrous pods with 4 seeds per pod, seed size bold, hilum color grey,	Resistant to stem fly and defoliators and moderately resistant to girdle and blue beetles, resistant/tolerant to root rot, bacterial pustule, RAB, TLS
36.	Swarna Vasundhara	1714(E)/ 18.07.2008		Jharkhand				Vegetable type soybean	

37.	PRS 1	S.O. 454(E), 11-02-2009	Selection from germplasm	Uttaranchal mid hills	100	2000		Determinate, pink flower colour, 100 seed weight: 13 gm.	-
38.	DSb-1	449(E), 11.02.2009	Selection from EC 172576	Karnataka	90-95	2000-2500 **2347**	18.27 % 38.49 %	Semi determinate, early maturing, white flowers, tawny pubescence on stem and pods and brown hilum	Less susceptible to soybean rust, and resistant to girdle beetle, green and grey semi-looper and stem fly
39.	PS 1225	SO 449(E)/11.2.2009		Tarai and Bhabar Region of UP and Uttarakhand	125	3000-3200	18.0 % 42.0 %	Grey pubescence, light brown hilum, Improved seed longevity. Shattering and lodging resistance.	Multiple disease resistance. Resistant to resistant YMV, bacterial pustule, collar rot anthracnose, pod blight and SMV.
40.	VL Soya 65	S.O.211 (E)/ 29.01.2010	Selection from local Collection of Village Abu, Distt Bageshwar (IC393190)	Uttarakhand	121	1542		White colour of flower Round seeded, black grain colour Leaves with 4-5 leaflets, 100 seed weight 14.65 g	Resistant to frog eye leaf spot, pod blight and leaf blight No incidence of Hairy caterpillar, Sucking Bug and girdle beetle
41.	MAUS 158	2137(E) /31.08.2010	Punjab 1 x DS 87-14	Marathwada region of Maharashtra	93-98	2260 **2190**	19.7 % 42.46 %	Purple flowers, black hilum,	Tolerant to Bacterial pustules, *Rhizoctonia* root rot and aerial blight, collar rot and charcoal rot
42.	RKS 24	SO 283(E) 7.2.11	PK-472 X PK 1024	Rajasthan	95-98 days	3000-3500	21%	Determinate growth habit, white flowers, tawny pubescence, dark green leaves and brown hilum.	Moderately resistant to bacterial pustule, collar rot and YMV. Moderately resistant to girdle beetle, stem fly and defoliators.
43.	SL 744	456(E), 16.03.2012	SL 457 x SL 459	Punjab	139 days	1842 **2142**	20.48% 41.07%	light green leaves, white flowers, brown pubescence, medium sized grains, seeds cream in colour	Resistant to yellow mosaic virus and soybean mosaic virus
44.	Pant Soybean-19 (PS 1368)	S.O. 652(E) 10.04.2013	PK 416 x PK 695	Uttarakhand	117-125 days.	2121	20% 40.2%	White flower, tawny pubescence, brown hilum, tall and sturdy plant type.	Resistant major foliar diseases, YMV, Bacterial pustule and *Rhizoctonia* aerial blight.
45.	Pratap Soya 45 (RKS 45)	S.O. 2815 19.09.2013	NRC 37 X PK 472	Rajasthan	95-98 days	3000-3500	21% 40-41%	Determinate growth habit, white flower, hairy plant type, tawny pubescence on pods at maturity, creamy yellow seed and brown	Moderately resistant to Bacterial pustules and YMV

								hilum Responsive to high fertility under irrigated condition and suitable for water stress condition	
46.	RVS 2001-4	S.O 1146(E) 24.04.2014	JS 93-01 x EC 390981	Madhya Pradesh	94	2500 **2264.5**	21.5 % 42.0%	Semi determinant white flower, glabrous, Brown hilum,	Tolerant to major leaf, pod and root diseases. Tolerant to girdle beetle and semi looper.
47.	Pooja (MAUS 2)	S.O 1146(E) 24.04.2014	Selection from SH 84-14	Karnataka	100-105	2500 to 3500	20.0 % 41.50 %	Semi-determinate, white flowers, grey pubescence, yellow seed and light brown hilum	Resistant to bacterial pustule and leaf spots. Moderately resistant to leaf miner, stem fly and blue beetle.
48.	MAUS 162	S.O. 1919(E) 30.07.2014	JS 335 X Kalitur-3	Maharashtra	100-103 days	2000-3000	21.37% 41.95%	Semideterminate growth, erect plant type, dark green leaves, purple flower, pubescence absent on pods, yellow seed, brown pod and black hilum	Tolerant against charcoal rot, Rhizoctonia root rot and Rhizoctonia aerial blight
49.	DSb-21	S.O. 1919(E) 30.07.2014	JS 335 X EC 241778	Karnataka	90-95 days	2500-3000	18.2% 38.2%	Semideterminate growth, purple flower, pubescence almost absent on stem and pods, yellow seed coat and brown hilum	Resistant to rust
50.	SL 958	S.O. 112(E) 12.01.2016	SL 525 X SL 706	Punjab	142 days	2282	19.8% 42.0%	Semi-determinate growth habit with tall plant height (87cm), light green lanceolate leaves, white flower, tawny pubescence on plant and pods, medium size light yellow oval seeds with black hilum	Resistant to YMV and SMV.
51.	JS 20-69	S.O. 2238(E) 29.06.2016	JS 97-52 X SL 710	Madhya Pradesh	93-95 days	**1852** **2300-2500**	20-22% 39-42%	Semi-determinate growth habit, white flower, pointed ovate green leaves, tawny pubescent on plant and pods, medium plant height, medium size spherical yellow and shiny seeds with black hilum.	Resistant to Yellow Mosaic Virus (YMV), Charcoal Rot (CR), Bacterial Pustules (BP), *Alternaria* Leaf Spot (ALS), Pod blight (PB) Indian bud blight (IBB), Target Leaf Spot (TLS).
52.	VL Soya 77	S.O. 3540(E) 22.11.2016	PK 472 x JS 335	Uttarakhand Hills	112-127 days	1970	18.6% 38.91%	Determinate growth habit, green pointed ovate leaf, purple flowers, tawny pubescent, tall plant type (78 cm), bold seeded (100 seed wt. 16.89 g), yellow seed with black hilum. Suitable for rainfed organic condition.	Moderately resistant to frog eye leaf spot and pod blight. Moderately resistant to girdle beetle and stem fly.

53.	VL Bhat 201	S.O. 3540(E) 22.11.2016	Local germplasm VHC 3071	Uttarakhand Hills	117 days	**1642**	15.45% 41.02%	Determinate growth habit, green pointed ovate leaf, white flowers, tawny pubescent, brown pods at maturity, black seeds, bold seeded (100 seed wt. 13.12 g) Suitable for rainfed organic condition.	Highly resistant to frog eye leaf spot, target leaf spot and moderately resistant to pod blight. Highly resistant to girdle beetle. Moderately resistant to stem fly.
54.	Pant Soya 21 (PS 1480)	S.O. 2805(E) 25.08.2017	PS 1029 x PS 1241	Uttarakhand	123-126 days	**2057**	19.25 % 40.5 %	Sturdy tall plants (68 cm), determinate growth habit, white flowers, dark green leaves, gray pubescence, yellow medium size seeds with black hilum. Resistance to pod shattering.	Resistant to Yellow Mosaic Virus (YMV), SMV & Bacterial Pustule Tolerant: *Rhizoctonia* Aerial Blight (RAB)
55.	Pant Soya 23 (PS 1521)	S.O. 2805(E) 25.08.2017	**PS 1029 x PS 1241**	Uttarakhand	112-115 days	**1915**	40.5 % 19.8 %		
56.	Raj Soya-18 (Pragya)	S.O. 2805(E) 25.08.2017	JSM 110 x JSM66	Madhya Pradesh	92 days	**1911.78**	21.55% 41%	Semi-determinate plants with average plant height(49.4cm.), white flower, narrow green leaves, yellow seeds with black hilum	
57.	Chhattisgarh Soybean-1 (CG SOYA-1)	**S**.O. 1379(E)/ 27.03.2018	JS-80-21 x RSC-4	Chhattisgarh	95-100 days	24.45	20-23 %.	Short & semi-erect and Semi -determinate plant type, light green Pointed ovate leaves, white flower, brown pubescence of pods. yellow seeds with brown hilum	Resistant to Indian bud blight, Rhizoctonia aerial blight, Myrothecium leaf spot and bacterial pustule disease. Moderately resistant to pod blight (*Collototricum truncatum*).
58.	Basara	S.O. 6318 (E) 26.12.2018		Telangana	105-115 days	**2663**	19.51%	Semi-determinate plant with 65-78 cm height, white flower, tawny pubescence present on stem, pods, yellow seed with imperfect black hilum. Tolerant to pod shattering	
59.	VL Soya 89 (VLS 89)	S.O. 1498 (E) 01.04.2019	VLS 47 x EC 361364	Himachal Pradesh and Uttarakhand.	116 days	**2324**	19.07%	Semi determinate tall plant (average 84.25cm), green pointed ovate leaves, white flower, bold (average 100 seed weight 14.41g) and yellow round seed with brown hilum, grey pubescence on plant and pods, brown pods on maturity.	Moderate Resistance against frog eye leaf spot and pod blight diseases. Moderate Resistance against *Chauliops* and resistant against defoliators.
60.	AMS	S.O.	Mutant of JS	Maharashtra	95-100	**2173**	18.93%	Determinate growth, semi erect, pointed	Resistant to root rot, YMV,

	1001	3220(E) 05.09.2019	93-05		days		49.32%	ovate dark green leaves, purple flower, pod pubescence absent, yellow spherical seeds with grey hilum, medium seed size (100 seed weight 10.48g)	Alternaria leaf spot,
61.	Shalimar Soybean-1 (AGR/538)	S.O. 3220(E) 05.09.2019	AGR/538	Jammu & Kashmir	140-145 days	2030-2560	13.56% 38.00%	Tall plant type (67.5 cm), light purple flower, leaf shape intermediate, leaf colour green, tawny colour dense pubescence on plants and pods,	Resistant to root rot and rust and moderately resistant to yellow mosaic virus as well as *Alternaria* blight

Annexure-III

All India area, production and yield of Soybean

Year	Area (000 ha)	Production (000 tonnes)	Yield (kg/ha)
1970-71	32.00	14.00	426.00
1971-72	32.318	13.728	424.7788
1972-73	33.696	27.51	816.4174
1973-74	47.37	39.355	830.8001
1974-75	66.619	51.241	769.165
1975-76	93.013	91.256	981.1102
1976-77	124.964	123.468	988.0286
1977-78	194.865	184.097	944.7412
1978-79	306.937	299.189	974.757
1979-80	496.403	283.008	570.1174
1980-81	607.6	442.2	727.7814
1981-82	622.1	466.5	749.8794
1982-83	770.2	491	637.49675
1983-84	836.2	614.3	734.63286
1984-85	1242.7	954.8	768.32703
1985-86	1339.7	1024.1	764.42487
1986-87	1526.8	891.4	583.83547
1987-88	1542.6	898.3	582.32854
1988-89	1734.1	1547.1	892.16308
1989-90	2253	1805.6	801.42033
1990-91	2564.217	2601.51	1014.5436
1991-92	3184.8	2492.03	782.47614
1992-93	3788.7	3386.9	893.94779
1993-94	4370.5	4745.2	1085.7339
1994-95	4317.9	3931.9	910.60469
1995-96	5035	5095.6	1012.0357
1996-97	5441.7	5380.2	988.6984
1997-98	5986.1	6460	1079.167
1998-99	6488.9	7140	1100.341
1999-2000	6222.4	7080	1137.825
2000-01	6416.6	5280	822.8657
2001-02	6343.1	5962.7	940.0293
2002-03	6105.5	4654.7	762.3782
2003-04	6554.7	7818.9	1192.869
2004-05	7571.2	6876.3	908.218
2005-06	7707.5	8273.5	1073.435
2006-07	8328.7	8850.8	1062.687
2007-08	8881.7	10968.2	1234.921
2008-09	9510.8	9905.43	1041.493

2009-10	9734.658	9964.477	1023.608
2010-11	9601.036	12733.7	1326.284
2011-12	10109.09	12213.51	1208.171
2012-13	10840.73	14666.45	1352.902
2013-14	11716.41	11860.82	1012.325
2014-15	10910.83	10373.8	950.7801
2015-16	11604.54	8569.795	738.4863
2016-17	11183.4	13158.73	1176.63
2017-18	10328.83	10932.97	1058.491
2018-19	11131.26	13267.52	1191.916
2019-20	12091**	11215**	927.5494
2020-21	12059*	13583*	1126.379

Source: Production-Agricultural Statistics Division, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, New Delhi

**: Forth Advance Estimate

*: First Advance Estimate

Annexure-IV

Area, production and productivity of Soybean in states of India

STATES	APY	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Madhya Pradesh	A	4255.3	4756.6	5024.4	5124.0	5349.5	5559.9	5669.1	6031.7	6308.6	5578.0	5906.0	5401.0	5010.0	5419.0
	P	4500.7	4784.9	5480.5	5849.8	6406.3	6669.8	6280.6	7800.1	5242.4	6353.0	4907.9	6649.0	5321.0	6670.8
	Y	1057.7	1005.9	1090.8	1141.6	1197.6	1199.6	1107.9	1293.2	831.0	1138.9	831.0	1231.1	1062.1	1231.0
Maharashtra	A	2347.0	2521.0	2664.0	3063.0	3019.0	2729.0	3010.0	3219.0	3520.0	3640.0	3702.0	3840.8	3694.0	4075.2
	P	2527.0	2892.0	3976.0	2756.7	2197.0	4316.0	3969.0	4670.8	4754.9	2384.2	2061.1	4586.7	3804.8	4611.1
	Y	1076.7	1147.2	1492.5	900.0	727.7	1581.5	1318.6	1451.0	1350.8	655.0	556.8	1194.2	1030.0	1131.5
Rajasthan	A	744.3	641.1	797.6	829.5	778.4	765.5	897.1	1039.8	1175.1	923.1	1204.8	1055.6	886.5	931.9
	P	856.3	771.3	1071.2	805.7	914.6	1118.1	1385.2	1468.6	974.7	956.6	998.8	1131.8	1070.0	1168.6
	Y	1150.5	1203.1	1343.0	971.3	1175.0	1460.6	1544.1	1412.4	829.4	1036.2	829.0	1072.2	1207.0	1254.0
Karnataka	A	133.0	131.0	113.0	134.0	184.0	168.0	191.0	170.0	219.0	256.0	258.0	318.0	277.0	248.9
	P	71.0	94.0	97.0	91.0	82.0	147.0	172.0	178.0	270.0	189.0	140.0	237.0	252.9	257.4
	Y	533.8	717.6	858.4	679.1	445.7	875.0	900.5	1047.1	1232.9	738.3	542.6	745.3	913.0	1034.0
Telangana									158.0		242.0	243.0	277.0	152.0	148.0
									286.0		262.0	252.0	322.0	246.8	234.4
									1810.2		1082.6	1037.0	1162.5	1624.0	1584.0
Gujarat	A	34.0	51.0	68.0	83.0	87.0	84.0	42.0	47.0	60.0	57.0	80.0	120.0	146.0	135.7
	P	29.0	26.0	26.0	58.0	70.0	68.0	33.0	47.0	44.0	43.0	54.0	86.0	115.5	173.1
	Y	852.9	509.8	382.4	698.8	804.6	809.5	785.7	1000.0	733.3	754.4	675.0	716.7	791.0	1276.0
Chhattisgarh	A	40.9	68.5	69.2	79.4	108.0	106.3	100.4	106.3	106.6	105.9	119.7	104.1	95.9	93.4
	P	36.8	68.3	79.5	78.4	103.2	124.4	75.6	128.1	93.5	79.7	69.0	72.6	46.1	65.3
	Y	899.8	997.1	1148.8	987.4	955.6	1170.3	753.0	1205.1	877.1	753.0	576.4	697.4	481.0	699.0
Nagaland	A	26.7	25.5	28.3	24.5	24.2	24.4	24.5	24.7	24.8	24.8	24.9	25.0	25.0	25.1
	P	32.0	30.6	32.5	36.7	25.0	30.4	30.7	30.9	31.1	31.1	31.2	31.4	31.5	31.6

	Y	1198.5	1200.0	1148.4	1498.0	1031.8	1245.9	1252.5	1251.7	1254.9	1254.4	1253.8	1257.4	1259.0	1260.0
Uttar Pradesh	A	3.9	8.0	4.8	11.0	7.0	11.0	18.0	14.0	26.0	52.0	36.0	11.0	14.0	23.0
	P	3.0	7.0	3.2	9.0	8.0	14.0	22.0	19.0	15.0	38.0	18.7	7.0	10.9	20.7
	Y	769.2	875.0	666.7	818.2	1142.9	1272.7	1222.2	1357.1	576.9	730.8	519.3	636.4	777.0	901.0
Uttarakhand	A	13.0	9.0	13.0	9.0	11.0	9.7	12.0	10.5	14.9	12.8	13.5	12.0	10.0	9.0
	P	15.0	10.0	19.0	14.0	18.0	14.4	18.0	20.9	22.1	16.5	18.0	13.0	11.9	9.6
	Y	1153.8	1111.1	1461.5	1555.6	1636.4	1480.4	1500.0	1984.8	1479.2	1293.1	1332.3	1083.3	1190.0	1067.0
Manipur	A						4.4	4.8	7.5	5.2	5.3	5.1	5.1	5.1	4.9
	P						4.1	5.1	0.8	4.6	4.6	4.3	4.4	4.6	4.4
	Y						927.3	1062.5	109.3	877.9	868.4	837.6	857.1	907.0	899.0
Arunachal Pradesh	A	3.8	3.8	3.6	3.3	2.6	2.6	2.7	3.0	2.8	2.8	2.8	3.1	3.1	3.1
	P	3.6	3.6	4.2	4.7	3.1	3.5	4.0	4.5	3.5	2.6	2.8	4.4	4.4	4.4
	Y	947.4	947.4	1166.7	1433.3	1183.2	1346.2	1486.9	1518.0	1272.7	922.5	991.2	1419.6	1417.0	1417.0
Sikkim	A	4.0	4.0	3.6	3.9	4.0	4.2	3.9	3.9	3.9	4.1	3.3	3.3	3.1	3.0
	P	3.3	3.3	3.2	3.3	4.1	3.7	3.5	3.6	3.7	3.9	3.2	3.2	3.0	2.9
	Y	825.0	825.0	888.9	846.2	1025.0	881.0	896.6	935.2	945.9	948.3	972.6	975.0	975.0	976.0
Jharkhand	A		2.1	0.3	0.9	0.5	0.1	0.2	0.7	0.5	1.0	0.5	1.0	1.9	6.1
	P		0.1	0.1	0.3	0.2	0.0	0.1	0.9	0.6	0.8	0.5	0.6	1.5	4.6
	Y		47.6	333.3	333.3	329.2	200.0	329.1	1194.4	1098.9	808.1	931.0	579.1	798.0	747.0
Meghalaya	A	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.6	1.7	1.7	1.9	1.9	1.9
	P	1.0	1.0	1.0	1.2	1.2	1.2	1.8	1.2	2.9	3.3	3.4	3.5	3.5	3.5
	Y	1000.0	1000.0	909.1	1090.9	1108.6	1090.9	1694.4	1099.1	1819.9	1947.4	1982.1	1891.9	1898.0	1900.0
Andhra Pradesh	A	98.0	103.0	88.0	142.0	156.0	128.0	130.0	1.0	245.0	1.0	1.0	2.0	0.5	1.0
	P	191.0	156.0	173.0	194.0	129.0	218.0	210.0	3.0	395.0	2.0	2.0	3.2	1.0	1.9
	Y	1949.0	1514.6	1965.9	1366.2	826.9	1703.1	1615.4	2990.0	1612.2	2000.0	2000.0	1612.0	1889.0	1926.0
Mizoram	A	1.4	2.0	1.7	1.0	1.3	1.4	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0
	P	2.7	2.0	0.4	1.1	2.0	2.7	1.4	1.5	1.5	1.5	1.6	1.6	1.5	1.8
	Y	1928.6	1000.0	235.3	1100.0	1603.2	1928.6	1254.4	1411.2	1479.6	1413.5	1539.1	1574.1	1525.1	1731.2

West Bengal	A	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.8	0.4
	P	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.5	0.4	0.4	0.4	0.4	0.6	0.3
	Y	500.0	600.0	600.0	600.0	602.5	567.1	1225.7	833.3	699.3	700.0	708.3	732.2	750.0	803.0
Himachal Pradesh	A	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6
	P	0.8	0.4	1.1	1.2	0.5	0.8	1.0	0.9	0.9	0.9	0.9	0.6	0.9	0.9
	Y	1333.3	666.7	1833.3	1714.3	850.2	1333.3	1587.3	1428.6	1450.0	1446.2	1676.3	980.2	1676.9	1680.0
Tripura										0.0		243.0	0.3	0.5	0.1
										0.0		252.0	0.3	0.4	0.1
										1000.0		1037.0	880.0	732.0	762.0
Odisha	A								0.3	0.3	1.1				
	P								0.2	0.2	0.7				
	Y								653.6	615.4	660.4				
Tamil Nadu	A						0.3	0.2							
	P						0.0	0.0							
	Y						0.0	0.0							
Kerala	A						0.0	0.0							
	P							0.0							
	Y							2000.0							

Note: Area (A)-Million Hectare, Production (P)- Million Tonnes & Yield (Y) - kg/ha

Annexure-V

State wise soybean varieties

S. No.	State	Varieties	
		Released in the previous 10 year	**More than 10 year old**
1.	Madhya Pradesh	NRC 130, RSC 10-46, MACS 1520, , Jawahar Soybean 20-116 (JS 20-116), Jawahar Soybean 20-94 (JS 20-94), NRC 127, Jawahar Soybean 20-98 (JS 20-98), Raj Soya-24 (RVS 2002-4), NRC 86, JS 20-34, JS 20-29, JS 20-69, Raj Soya 18, RVS 2001-4,	Type 49,Punjab Soybean No. 1, PK-472, MACS-58, JS- 80-21, JS 335, ParbhaniSona (MAUS 47), Ahilya 4 (NRC 37), Pratishta (MAUS 61-2), JS 93-05, MAUS 81 (Shakti), JS 97-52
2.	Rajasthan	NRC 130, RSC 10-46, MACS 1520, , Jawahar Soybean 20-116 (JS 20-116), Jawahar Soybean 20-94 (JS 20-94), NRC 127, Jawahar Soybean 20-98 (JS 20-98), Raj Soya-24 (RVS 2002-4), NRC 86, JS 20-34, JS 20-29, Pratap Soya 45 (RKS 45), RKS 24	Type 49,Punjab Soybean No. 1, PK-472, MACS-58, JS- 80-21, JS 335, ParbhaniSona (MAUS 47), Ahilya 4 (NRC 37), Pratishta (MAUS 61-2), JS 93-05, MAUS 81 (Shakti), JS 97-52
3.	Gujarat	NRC 130, RSC 10-46, MACS 1520, , Jawahar Soybean 20-116 (JS 20-116), Jawahar Soybean 20-94 (JS 20-94), NRC 127, Jawahar Soybean 20-98 (JS 20-98), Raj Soya-24 (RVS 2002-4), NRC 86, JS 20-34, JS 20-29,	Type 49,Punjab Soybean No. 1, PK-472, MACS-58, JS- 80-21, JS 335, ParbhaniSona (MAUS 47), Ahilya 4 (NRC 37), Pratishta (MAUS 61-2), JS 93-05, MAUS 81 (Shakti), JS 97-52
4.	Maharashtra (Marathwada and Vidarbh area)	NRC 130, RSC 10-46, MACS 1520, , Jawahar Soybean 20-116 (JS 20-116), Jawahar Soybean 20-94 (JS 20-94), NRC 127, Jawahar Soybean 20-98 (JS 20-98), Raj Soya-24 (RVS 2002-4), NRC 86, JS 20-34, JS 20-29, MAUS 612, MAUS 162, MAUS 158	Type 49,Punjab Soybean No. 1, PK-472, MACS-58, JS- 80-21, JS 335, ParbhaniSona (MAUS 47), Ahilya 4 (NRC 37), Pratishta (MAUS 61-2), JS 93-05, MAUS 81 (Shakti), JS 97-52
5.	Maharashtra (Southern Part)	DSb 34, RSC 11-07, MACS 1460, NRC 147, KSD 726 (PhuleSangam), DSb. 23, MACS 1281, KDS 344 (PhuleAgrani), DSb-21, MACS-1188, MAUS 612, MAUS 162	Hardee, MACS-124, Pooja (MAUS 2), Pant Soybean 1029, MACS-450, Pratikar (MAUS 61), RKS 18 (Pratap Soya 2)
6.	Karnataka	DSb 34, RSC 11-07, MACS 1460, NRC 147, KSD 726 (PhuleSangam), DSb. 23, MACS 1281, KDS 344 (PhuleAgrani), DSb-21, MACS-1188, MAUS 612	Hardee, MACS-124, Pooja (MAUS 2), Pant Soybean 1029, MACS-450, Pratikar (MAUS 61), RKS 18 (Pratap Soya 2)
7.	Telangana	DSb 34, RSC 11-07, MACS 1460, NRC 147, KSD 726 (PhuleSangam), DSb 23, Basara MACS 1281, KDS 344 (PhuleAgrani), DSb-21, MACS-1188, MAUS 612	Hardee, MACS-124, Pooja (MAUS 2), Pant Soybean 1029, MACS-450, Pratikar (MAUS 61), RKS 18 (Pratap Soya 2)
8.	Andhra Pradesh	DSb 34, RSC 11-07, MACS 1460, NRC 147, KSD 726 (PhuleSangam), DSb. 23, MACS 1281, KDS 344 (PhuleAgrani), DSb-21, MACS-1188, MAUS 612	Hardee, MACS-124, Pooja (MAUS 2), Pant Soybean 1029, MACS-450, Pratikar (MAUS 61), RKS 18 (Pratap Soya 2)
9.	Punjab	NRC 128, Pant Soya 24 (PS 1477), Pusa 12 (DS 12-13), SL 688, SL 744	Clark 63, Lee, Ankur, Alankar, Shilajeet, PK 262, PK 327, SL 4, PK 308, PK-416, Pusa-16, Pusa-24, Pusa-20, VL Soya 2, Pant Soybean 564, Pant Soybean 1042, Pant Soybean 1024, VL Soya –47, Pusa 97-12, Pusa 98-14, SL 525, PS 1347

10.	Haryana	NRC 128, Pant Soya 24 (PS 1477), Pusa 12 (DS 12-13), SL 688	Clark 63, Lee, Ankur, Alankar, Shilajeet, PK 262, PK 327, SL 4, PK 308, PK-416, Pusa-16, Pusa-24, Pusa-20, VL Soya 2, Pant Soybean 564, Pant Soybean 1042, Pant Soybean 1024, VL Soya –47, Pusa 97-12, Pusa 98-14, SL 525, PS 1347
11.	Delhi	NRC 128, Pant Soya 24 (PS 1477), Pusa 12 (DS 12-13), SL 688	Clark 63, Lee, Ankur, Alankar, Shilajeet, PK 262, PK 327, SL 4, PK 308, PK-416, Pusa-16, Pusa-24, Pusa-20, VL Soya 2, Pant Soybean 564, Pant Soybean 1042, Pant Soybean 1024, VL Soya –47, Pusa 97-12, Pusa 98-14, SL 525, PS 1347
12.	Uttarakhand (Tarai plain)	NRC 128, Pant Soya 24 (PS 1477), Pusa 12 (DS 12-13), SL 688, Pant Soya 21 , Pant Soya 23, Pant Soybean-19	Clark 63, Lee, Ankur, Alankar, Shilajeet, PK 262, PK 327, SL 4, PK 308, PK-416, Pusa-16, Pusa-24, Pusa-20, VL Soya 2, Pant Soybean 564, Pant Soybean 1042, Pant Soybean 1024, VL Soya –47, Pusa 97-12, Pusa 98-14, SL 525, PS 1347, PS 1225
13.	Uttar Pradesh (except Bundelkhand)	NRC 128, Pant Soya 24 (PS 1477), Pusa 12 (DS 12-13), SL 688	Clark 63, Lee, Ankur, Alankar, Shilajeet, PK 262, PK 327, SL 4, PK 308, PK-416, Pusa-16, Pusa-24, Pusa-20, VL Soya 2, Pant Soybean 564, Pant Soybean 1042, Pant Soybean 1024, VL Soya –47, Pusa 97-12, Pusa 98-14, SL 525, PS 1347
14.	Uttar Pradesh (Bundelkhand region)	Jawahar Soybean 20-116 (JS 20-116), Jawahar Soybean 20-94 (JS 20-94), NRC 127, Jawahar Soybean 20-98 (JS 20-98), Raj Soya-24 (RVS 2002-4), NRC 86, JS 20-34, JS 20-29	Type 49,Punjab Soybean No. 1, PK-472, MACS-58, JS- 80-21, JS 335, Parbhani Sona (MAUS 47), Ahilya 4 (NRC 37), Pratishta (MAUS 61-2), JS 93-05, MAUS 81 (Shakti), JS 97-52
15.	Bihar	NRC 128, NRC 147, NRCSL 1, NRC 136, NRC 132, RSC 10-46, RSC 11-07, MACS 1460, Jawahar Soybean 20-116 (JS 20-116), Kota Soya-1 (RKS 113)	Indira soya-9, Samrudhi (MAUS 71), JS 97-52, RKS 18 (Pratap Soya 2), Pratap Soya 1 (RAUS 5)
16.	Jharkhand	NRC 128, NRC 147, NRCSL 1, NRC 136, NRC 132, RSC 10-46, RSC 11-07, MACS 1460, Jawahar Soybean 20-116 (JS 20-116), Kota Soya-1 (RKS 113)	Indira soya-9, Samrudhi (MAUS 71), JS 97-52, RKS 18 (Pratap Soya 2), Pratap Soya 1 (RAUS 5)
17.	Orissa	NRC 128, NRC 147, NRCSL 1, NRC 136, NRC 132, RSC 10-46, RSC 11-07, MACS 1460, Jawahar Soybean 20-116 (JS 20-116), Kota Soya-1 (RKS 113)	Indira soya-9, Samrudhi (MAUS 71), JS 97-52, RKS 18 (Pratap Soya 2), Pratap Soya 1 (RAUS 5)
18	West Bengal	NRC 128, NRC 147, NRCSL 1, NRC 136, NRC 132, RSC 10-46, RSC 11-07, MACS 1460, Jawahar Soybean 20-116 (JS 20-116), Kota Soya-1 (RKS 113)	Indira soya-9, Samrudhi (MAUS 71), JS 97-52, RKS 18 (Pratap Soya 2), Pratap Soya 1 (RAUS 5)
19.	Chhattisgarh	NRC 128, NRC 147, NRCSL 1, NRC 136, NRC 132, RSC 10-46, RSC 11-07, MACS 1460, Jawahar Soybean 20-116 (JS 20-116), Kota Soya-1 (RKS 113), CG Soya 1	Indira soya-9, Samrudhi (MAUS 71), JS 97-52, RKS 18 (Pratap Soya 2), Pratap Soya 1 (RAUS 5)
20.	Kashmir	Shalimar Soya 1, VL Soya 63, VL Soya 59	Lee, Shilajeet, PK 327, Pusa-24, Pusa-20, VL Soya 2, VL Soya –47
21.	Himachal Pradesh	VL Soya 63, VL Soya 59	Lee, Shilajeet, PK 327, Pusa-24, Pusa-20, VL Soya 2, VL Soya –47
22.	Uttarakhand (Hills)	Pant Soya 21 , Pant Soya 23 , VL Bhat 201, VL Soya 77, VL Soya 63, VL Soya 59, Pant Soybean-19	Lee, Shilajeet, PK 327, Pusa-24, Pusa-20, VL Soya 2, VL Soya –47
23	All North Eastern States	Jawahar Soybean 20-116 (JS 20-116), KS 103	Indira soya-9, Samrudhi (MAUS 71), JS 97-52, RKS 18 (Pratap Soya 2), Pratap Soya 1 (RAUS 5)

Annexure-VI

State wise allocation of Soybean FLDs for Kharif 2021 along with verities

S.No.	States & Centres	No. of FLDs allotted	Varieties
1	**Madhya Pradesh**		
	1. ICAR-IISR Indore	5000	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52
	2. CoA, Sehore	10	
	3. SOPA, Indore	1000	
	4. Solidaridad	4000	
	5. ITC Bhopal	100	
	Total	**10110**	
2	**Maharashtra**		
	1.MAU, Parbhani	50	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69
	2.PDKV, Amravati	20	
	3.MPKV, Sangli	25	
	4.KVK Karda	100	
	5. ARI, Pune	15	
	Total	**210**	
3	**Rajasthan**		
	1.AU, Kota	30	JS 20-34, RKS 45
4	**Karnataka**		
	1.UAS Dharwad	10	DSb 21, DSb 23, DSb 34, KSB 23, Karune & JS 335
	2.Ugarkurad Sugar	50	
	3. ICAR-KLE-KVK, Belagavi	1225	
	4.Bangalore	100	
	Total	**1385**	
5	**Telangana**		
	1.ANGRAU, Adilabad	10	DSb 21, DSb 23, MACS 1460
6	**Chhattisgarh**		
	1.Raipur	100	CG SOYA, RSC 10-52 & RSC 10-46
7	**Jharkhand**		
	1.BAU, Ranchi	10	CG SOYA, RSC 10-52 & RSC 10-46
8	**Gujarat**		
	1.KVK Bharuch	15	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52
	2.DevgarhBaria	10	
	Total	**25**	
9	**Bihar**		
	1.Dholi	15	SL 958, NRC 128, NRCSL1
10	**Punjab**		
	1.PAU, Ludhiana	50	SL 958, SL 979
11	**Uttarakhand**		
	1.Almora	10	PS 1347, PS 1225, PS 25 & PS 26
	2.Pantnagar	10	
	Total	**20**	
12	**Himachal Pradesh**		
	1.Palampur	10	VLS 59, VLS 63, VLS 89
13	**Manipur**		
	1.CAU, Imphal	10	MACS 1460, DSb 19, DSb 32, JS 20-116, RKS 113
14	**Nagaland**		
	1.Medziphema	10	MACS 1460, DSb 19, DSb 32, JS 20-116, RKS 113
	Grand total	**12000**	

Annexure-VII

अखिल भारतीय समन्वित सोयाबीन अनुसंधान परियोजना
All India Coordinated Research Project on Soybean
(भारतीय कृषि अनुसंधान परिषद्)
(Indian Council of Agricultural Research)

समन्वयन एकक Coordinating Unit

भा.कृ.अनु.प.–भारतीय सोयाबीन अनुसंधान संस्थान, इन्दौर–452 001

ICAR-Indian Institute of Soybean Research, Indore-452 001

समन्वय केंद्र / Coordinating Centres

1. GB Pant University of Agriculture and Technology, Pantnagar–263 145, Uttarakhand
2. ICAR-Indian Agricultural Research Institute, New Delhi–110 012
3. RVSKV, R.A.K. College of Agriculture, Sehore–466 001, Madhya Pradesh
4. Agriculture University, Kota, Borkhera Farm, Baran Road Kota-324001 Rajasthan
5. Punjabrao Deshmukh Krishi Vidyapeeth, RRC, Amravati–444 603, Maharashtra
6. Agharkar Research Institute (MACS), Pune–411 004, Maharashtra
7. University of Agricultural Sciences, Dharwad–580 005, Karnataka
8. University of Agricultural Sciences, Bengaluru-560 065, Karnataka
9. CSK Krishi Vishwa Vidyalaya, Palampur–176 062, Himachal Pradesh
10. ICAR-Vivekanand Parvatiya Krishi Anusandhan Sansthan, Almora–263 601, Uttarakhand
11. Punjab Agricultural University, Ludhiana–141 001, Punjab
12. Central Agricultural University, Imphal–495 001, Manipur
13. Assam Agricultural University, Jorhat–785013, Assam
14. ICAR-ICAR Research Complex for N.E.H. Region, Umroi Road, Umiam–793 103, Meghalaya
15. School of Agril. Sci. & Rural Development, Nagaland University, Medziphema-797 106, Nagaland
16. Birsa Agricultural University, Ranchi-834 006, Jharkhand
17. Indira Gandhi Agricultural University, Raipur-492 012, Chhattisgarh
18. JN Krishi Vishwa Vidyalaya, Jabalpur–482 004, Madhya Pradesh
19. VN Marathwada Krishi Vidyapeeth, Parbhani–431 402, Maharashtra
20. Professor Jayashankar Telangna State Agricultural University, RRS, Adilabad-504 002, Telangana
21. RVSKV Zonal Agricultural Research Station, Morena–476 001, Madhya Pradesh

आवश्यकता आधारित परीक्षण केंद्र / Need based Testing Centers

1. GBPUA&T, Regional Research Station, Majhera-263135, Dist-Nainital, Uttarakhand
2. CSKHPKV, Regional Research Station Bajaura-175125, Dist. Kulu, Himachal Pradesh
3. Rajendra Agricultural University, Tirhut College of Agriculture, Dholi–843121, (Muzaffarpur) Bihar
4. OUA&T, Regional Research & Technology Transfer Station (RRTTS), Arkabahalipada Farm, Bhawanipatna-766011, Kalahandi, Orissa.
5. PDKV, Nagpur–440 001, Maharashtra.
6. R & D Unit, Ugar Sugar Works Ltd., Ugarkhurd–591 316, Karnataka.
7. MPKV, Agriculture Research Station, Kasabe Digraj, Sangli–416 305, Maharashtra.
8. UAS, Raichur, ARS, Bidar-585401 Karnataka
9. Tribal Research Cum Training Centre, Anand Agricultural University, Devgadh baria – 389 380 Gujarat
10. Agricultural Research Station Junagarh Agricultural University Keria Road 365601 Amreli- Gujarat.
11. Wheat Research Center, Lokbharti, Village Sanosara, Taluka Sihor, Dist. Bhavnagar 364230, Gujarat

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* I.C.A.R. Institute-based centres

Regular and Need Based Soybean Centres in Different Zones

Zone	No.	Regular Centres	Need Based Testing Centres
NHZ	3	Almora, Palampur	Majhera
NPZ	3	Pantnagar, Delhi, Ludhiana	-
NEHZ	3	Jorhat, Imphal, Umiam, Medziphema	-
EZ	4	Raipur, Ranchi,	Bhawanipatna, Dholi
CZ	11	Amravati, Jabalpur, Kota, Morena, Parbhani, Sehore	Anand, Nagpur, Amreli, Mandsaur, Lokbharti
SZ	7	Adilabad, Bengaluru, Dharwad, , Pune	Bidar, K.Digraj, Ugarkhurd

Central zone : Madhya Pradesh, Rajasthan, Gujarat, Bundelkhand region of Uttar Pradesh, Marathawada and Vidarbha region of Maharashtra
Southern Zone : Southern Maharashtra, Karnataka, Telangana, Andhra Pradesh and Tamil Nadu
North Plain Zone : Punjab, Haryana, Delhi, Uttarakhand, and Uttar Pradesh (Except Bundelkhand region)
Eastern zone : Chhattisgarh, Orissa, WB, Bihar and Jharkhand
North Eastern Hill Zone : North Eastern States
Northern Hill Zone : Himachal Pradesh, Hills of Uttarakhand

Annexure-VIII

Address of Project Coordinator & Programme Leaders
of
All India Coordinated Research Project on Soybean

Dr. Nita Khandekar
Project Coordinator
ICAR- Indian Institute of Soybean Research
Indore-452001
Phone: (Off.) : 0731-2476188, Mobile : 9448737473
Fax : 0731-2470520, E-mail : dsrdirector@gmail.com

Principal Investigator / Resource Person

S.No.	Discipline	Name and Address	Contact No.& E-mail
1.	Agronomy and Front Line Demonstration	Dr. S.D. Billore Principal Scientist ICAR- Indian Institute of Soybean Research **Indore-452001**	09977763727 (M) 0731-2700059 (R) billsd@rediffmail.com
2.	Plant Breeding	Dr. Sanjay Gupta Principal Scientist ICAR- Indian Institute of Soybean Research **Indore-452001**	07415105890 (M) sanitaishu@gmail.com
3.	Microbiology	Dr. M.P. Sharma Principal Scientist ICAR- Indian Institute of Soybean Research **Indore-452001**	09926012261 (M) 0731-6562647 (R) mahaveer620@gmail.com
4.	Plant Pathology	Dr Laxman Singh Rajput Scientist ICAR- Indian Institute of Soybean Research **Indore-452001**	07974300933 (M) laxman0742@gmail.com
5.	Entomology	Dr Lokesh Kumar Meena Scientist ICAR- Indian Institute of Soybean Research **Indore-452001**	09753318347 lokesharsnagpur@gmail.com
6.	Breeder Seed Production	Dr. Mrinal.K.Kuchlan ICAR- Indian Institute of Soybean Research **Indore-452001**	09009562694 (M) mrinal.kk@gmail.com

परीक्षणों की सारांश – तालिकाएँ
Summary Tables of Experiments

पादप प्रजनन
Plant Breeding

Principal Investigator	**Dr. Sanjay Gupta, ICAR-IISR, Indore**
Northern Hill Zone	
Palampur (Himachal Pradesh)	Dr. (Mrs.) Vedna Kumari
Almora (Uttarakhand)	Dr. Anuradha Bhartiya
Majhera (Uttarakhand)	Dr. Anjuli Agarwal
Srinagar (J&K)	Dr. M.N. Khan
Wadura, Sopore (J&K)	Dr. Ashraf Bhat
Northern Plain Zone	
Pantnagar (Uttarakhand)	Dr Kamendra Singh/Dr. Dhirendra Singh
New Delhi	Dr. S.K. Lal
Ludhiana (Punjab)	Dr. B.S. Gill
Eastern Zone	
Ranchi (Jharkhand)	Dr. Nutan Verma
Raipur (Chattisgarh)	Dr. S.K. Nag
Bhawanipatna (Orissa)	Dr. Susanta Kumar Mohanty
Dholi (Bihar)	Dr. Anil Pandey
North Eastern Hill Zone	
Jorhat (Assam)	Dr. Reecha T. Das
Imphal (Manipur)	Dr. Heisnam Nanita Devi
Umiam (Meghalaya)	Dr. Amit Kumar
Central Zone	
Indore (Madhya Pradesh)	Dr. Rajkumar Ramteke
Sehore (Madhya Pradesh)	Dr. S.R. Ramgiri
Nagpur (Maharashtra)	Dr. A.D. Bangiwar
Kota (Rajasthan)	Dr. B.L. Meena
Jabalpur (Madhya Pradesh)	Dr. Manoj Kumar Shrivastava
Amravati (Maharashtra)	Dr. Satish Nichal
Morena (Madhya Pradesh)	Dr.V.K. Tiwari
Parbhani	Dr.S.P. Mehtre
Lokbahrti (Gujarat)	Dr. C.P. Singh
Anand (Gujarat)	Dr Girish Patel
Amreli (Gujarat)	Dr Viren Akbari
Mandsaur	Dr N S Sipani
Southern Zone	
Dharwad (Karnataka)	Dr. G.T. Basavaraja
Bidar (Karnataka)	Dr. Sidramappa
Pune (Maharashtra)	Dr. Philips Verghese
Bangalore (Karnataka)	Dr. Onkarappa T.
K. Digraj (Maharashtra)	Dr. M.P. Deshmukh
Adilabad (Telangana)	Dr. M. Rajendra Reddy

Table 1.1.1

Trial : Initial Varietal Trial
Zone : NORTHERN HILL ZONE
Character : Yield(kg/ha)

S.No	Varieties	Almora#	Majhera	Palampur	Mean	Rank
1	DSb-38	864	1086	790	938	XXVI
2	DS 3105	1309	1185	1062	1123.5	XXI
3	CAUMS 2	1407	1210	1136	1173	XVII
4	JS 22-11	1185	1432	1383	1407.5	VIII
5	DLSb-2	889	889	815	852	XXVIII
6	RVSM 2012-11	667	1309	691	1000	XXIV
7	RSC 11-39	1654	1407	1111	1259	XIV
8	AS-15	568	1728	568	1148	XIX
9	PS 1664	321	1432	815	1123.5	XXI
10	VLS 89 (C)	1111	2099	1309	1704	II
11	HIMSO 1691	1284	1531	1062	1296.5	XIII
12	JS 22-14	815	1481	1136	1308.5	XII
13	DS 3144	1358	1951	1333	1642	V
14	DLSb-1	1210	1951	1062	1506.5	VII
15	NRC 128	864	1086	1037	1061.5	XXII
16	VLS 101	1802	2148	1160	1654	IV
17	RSC 11-35	1062	1580	1136	1358	X
18	PS 1661	1062	1802	1457	1629.5	VI
19	Himso- 1692	1457	2099	1284	1691.5	III
20	VLS 63 (C)	1136	2691	1185	1938	I
21	RVS 2012-10	593	1383	988	1185.5	XVI
22	PS 1670	1037	1728	1062	1395	IX
23	NRC 109	790	1185	864	1024.5	XXIII
24	MAUS 806	840	1210	1086	1148	XIX
25	RVS 2011-10	1111	1284	1309	1296.5	XIII
26	MAUS 768	1506	1432	1062	1247	XV
27	ASb 36	272	1136	-	1136	XX
28	ASb 9	74	914	-	914	XXVII
29	AUKS 207	99	568	-	568	XXIX
30	VLS 59 (C)	840	2469	914	1691.5	III
31	AUKS 206	-	247	-	247	XXX
32	MACS 1701	617	815	1062	938.5	XXV
33	KDS 1096	988	1531	1062	1296.5	XIII
34	MACS 1691	1062	1630	1185	1407.5	VIII
35	KDS 1144	1037	1679	1012	1345.5	XI
36	BAUS 96-17	741	1185	938	1061.5	XXII
37	BAUS 31-17	519	1160	-	1160	XVIII
38	TS 20-5	593	1704	-	1704	II
39	SL 1212	815	1086	1210	1148	XIX
40	SL 1250	790	1309	1037	1173	XVII
41	DS 1312	815	1556	1160	1358	X
	Mean	929.1	1446.54	1070.94		
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	13/07/2020	9/7/2020	17/07/2020		
	CD	222.22	222.22	148.15		
	CV (5%)	14.95	9.96	9.44		

Data from Almora centre was not included for the analysis due to <1000 kg/ha yield.

Table 1.1.2

Trial : Initial Varietal Trial
Zone : NORTHERN HILL ZONE
Character : Days To Flower

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	DSb-38	52	49	53	51.33	XV
2	DS 3105	52	49	58	53	XXI
3	CAUMS 2	49	48	52	49.67	XII
4	JS 22-11	52	53	58	54.33	XXIII
5	DLSb-2	52	54	57	54.33	XXIII
6	RVSM 2012-11	43	44	49	45.33	II
7	RSC 11-39	53	48	57	52.67	XX
8	AS-15	53	48	60	53.67	XXII
9	PS 1664	57	54	60	57	XXIV
10	VLS 89 (C)	49	46	52	49	X
11	HIMSO 1691	47	45	52	48	VII
12	JS 22-14	46	45	51	47.33	V
13	DS 3144	49	48	51	49.33	XI
14	DLSb-1	49	47	53	49.67	XII
15	NRC 128	54	49	58	53.67	XXII
16	VLS 101	49	46	50	48.33	VIII
17	RSC 11-35	54	49	52	51.67	XVII
18	PS 1661	54	50	53	52.33	XIX
19	Himso- 1692	54	49	53	52	XVIII
20	VLS 63 (C)	46	46	51	47.67	VI
21	RVS 2012-10	47	44	50	47	IV
22	PS 1670	54	49	60	54.33	XXIII
23	NRC 109	39	41	47	42.33	I
24	MAUS 806	46	45	49	46.67	III
25	RVS 2011-10	47	46	50	47.67	VI
26	MAUS 768	48	47	52	49	X
27	ASb 36	53	48	-	50.5	XIV
28	ASb 9	54	49	-	51.5	XVI
29	AUKS 207	49	47	-	48	VII
30	VLS 59 (C)	46	45	50	47	IV
31	AUKS 206	-	47	-	47	IV
32	MACS 1701	46	46	51	47.67	VI
33	KDS 1096	51	48	60	53	XXI
34	MACS 1691	54	64	60	59.33	XXV
35	KDS 1144	46	46	51	47.67	VI
36	BAUS 96-17	53	49	57	53	XXI
37	BAUS 31-17	54	50	-	52	XVIII
38	TS 20-5	53	47	-	50	XIII
39	SL 1212	48	47	51	48.67	IX
40	SL 1250	48	47	52	49	X
41	DS 1312	49	46	52	49	X
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	13/07/2020	9/7/2020	17/07/2020		

Table 1.1.3

Trial : Initial Varietal Trial
Zone : NORTHERN HILL ZONE
Character : Days To Maturity

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	DSb-38	132	103	116	117	XVI
2	DS 3105	134	108	116	119.33	XXIII
3	CAUMS 2	131	93	116	113.33	X
4	JS 22-11	132	102	117	117	XVI
5	DLSb-2	135	103	118	118.67	XXI
6	RVSM 2012-11	123	89	117	109.67	III
7	RSC 11-39	131	103	116	116.67	XV
8	AS-15	130	101	116	115.67	XIV
9	PS 1664	135	110	116	120.33	XXVI
10	VLS 89 (C)	131	105	118	118	XVIII
11	HIMSO 1691	128	94	118	113.33	X
12	JS 22-14	121	96	118	111.67	VI
13	DS 3144	127	102	118	115.67	XIV
14	DLSb-1	131	103	116	116.67	XV
15	NRC 128	134	107	116	119	XXII
16	VLS 101	130	100	116	115.33	XIII
17	RSC 11-35	132	109	118	119.67	XXIV
18	PS 1661	132	105	117	118	XVIII
19	Himso- 1692	132	105	118	118.33	XIX
20	VLS 63 (C)	130	105	117	117.33	XVII
21	RVS 2012-10	122	99	117	112.67	VIII
22	PS 1670	134	103	118	118.33	XIX
23	NRC 109	123	90	118	110.33	V
24	MAUS 806	122	89	117	109.33	II
25	RVS 2011-10	123	89	118	110	IV
26	MAUS 768	127	92	118	112.33	VII
27	ASb 36	125	101	-	113	IX
28	ASb 9	134	103	-	118.5	XX
29	AUKS 207	130	96	-	113	IX
30	VLS 59 (C)	125	95	118	112.67	VIII
31	AUKS 206	-	90	-	90	I
32	MACS 1701	125	94	116	111.67	VI
33	KDS 1096	129	100	116	115	XII
34	MACS 1691	128	101	117	115.33	XIII
35	KDS 1144	126	100	118	114.67	XI
36	BAUS 96-17	135	108	117	120	XXV
37	BAUS 31-17	133	114	-	123.5	XXVII
38	TS 20-5	131	109	-	120	XXV
39	SL 1212	129	104	118	117	XVI
40	SL 1250	128	108	118	118	XVIII
41	DS 1312	128	94	118	113.33	X
	N.P.S.(Sqm)	4.05	4.05	4.05		

Table 1.1.4

Trial : Initial Varietal Trial
Zone : NORTHERN HILL ZONE
Character : Plant Height (cm)

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	DSb-38	44	66	46	52	XX
2	DS 3105	45	59	38	47.33	XXVII
3	CAUMS 2	66	76	41	61	XII
4	JS 22-11	59	84	46	63	VIII
5	DLSb-2	57	82	50	63	VIII
6	RVSM 2012-11	42	66	43	50.33	XXIV
7	RSC 11-39	55	75	42	57.33	XVI
8	AS-15	55	102	48	68.33	III
9	PS 1664	57	93	43	64.33	VII
10	VLS 89 (C)	53	99	50	67.33	IV
11	HIMSO 1691	44	61	38	47.67	XXVI
12	JS 22-14	43	68	36	49	XXV
13	DS 3144	46	68	37	50.33	XXIV
14	DLSb-1	45	66	41	50.67	XXII
15	NRC 128	56	82	51	63	VIII
16	VLS 101	56	68	41	55	XVIII
17	RSC 11-35	76	109	53	79.33	I
18	PS 1661	65	85	55	68.33	III
19	Himso- 1692	58	89	40	62.33	IX
20	VLS 63 (C)	53	62	40	51.67	XXI
21	RVS 2012-10	40	55	36	43.67	XXXII
22	PS 1670	58	76	46	60	XIV
23	NRC 109	71	84	43	66	V
24	MAUS 806	65	76	52	64.33	VII
25	RVS 2011-10	63	76	42	60.33	XIII
26	MAUS 768	45	64	30	46.33	XXIX
27	ASb 36	32	72	-	52	XX
28	ASb 9	38	63	-	50.5	XXIII
29	AUKS 207	34	58	-	46	XXX
30	VLS 59 (C)	39	59	37	45	XXXI
31	AUKS 206	-	52	-	52	XX
32	MACS 1701	47	58	34	46.33	XXIX
33	KDS 1096	63	75	39	59	XV
34	MACS 1691	65	72	49	62	X
35	KDS 1144	64	66	34	54.67	XIX
36	BAUS 96-17	65	81	38	61.33	XI
37	BAUS 31-17	62	91	-	76.5	II
38	TS 20-5	55	74	-	64.5	VI
39	SL 1212	49	72	34	51.67	XXI
40	SL 1250	53	71	43	55.67	XVII
41	DS 1312	48	59	33	46.67	XXVIII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	13/07/2020	9/7/2020	17/07/2020		

Table 1.1.5

Trial : Initial Varietal Trial
Zone : NORTHERN HILL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	DSb-38	9.66	8.87	12.9	10.48	XXIX
2	DS 3105	9.38	8.82	15.47	11.22	XXII
3	CAUMS 2	10.93	9.36	13.47	11.25	XXI
4	JS 22-11	8.36	7.95	13.1	9.8	XXXV
5	DLSb-2	10.69	7.51	14.9	11.03	XXV
6	RVSM 2012-11	9.01	10.31	16.73	12.02	XIV
7	RSC 11-39	7.13	8.05	12.47	9.22	XXXIX
8	AS-15	9.39	9.68	14.4	11.16	XXIV
9	PS 1664	9.11	8.45	14.9	10.82	XXVIII
10	VLS 89 (C)	12.25	12.95	17.1	14.1	III
11	HIMSO 1691	13.94	10.98	16.7	13.87	IV
12	JS 22-14	10.19	11.59	16.13	12.64	VIII
13	DS 3144	9.53	8.76	15.63	11.31	XX
14	DLSb-1	10.66	11.61	14.47	12.25	XI
15	NRC 128	11.04	9.74	15.83	12.2	XIII
16	VLS 101	11.4	9.92	17.1	12.81	VII
17	RSC 11-35	8.93	10.29	13.63	10.95	XXVI
18	PS 1661	7.71	7.67	12.73	9.37	XXXVIII
19	Himso- 1692	12.89	12.03	16.23	13.72	V
20	VLS 63 (C)	13.12	12.67	20.13	15.31	I
21	RVS 2012-10	10.03	9.2	15.03	11.42	XIX
22	PS 1670	10.19	10.23	16.3	12.24	XII
23	NRC 109	12.04	10.81	18.1	13.65	VI
24	MAUS 806	10.8	8.7	16.57	12.02	XIV
25	RVS 2011-10	8.97	7.51	14.27	10.25	XXXI
26	MAUS 768	11.9	9.93	15.47	12.43	IX
27	ASb 36	10.73	9.44	-	10.09	XXXIII
28	ASb 9	11.97	10.41	-	11.19	XXIII
29	AUKS 207	10.11	10.25	-	10.18	XXXII
30	VLS 59 (C)	13.29	12.85	19.2	15.11	II
31	AUKS 206	-	11.75	-	11.75	XV
32	MACS 1701	9.74	9.46	15.7	11.63	XVI
33	KDS 1096	7.35	9.03	11.87	9.42	XXXVII
34	MACS 1691	7.02	7.11	12.3	8.81	XL
35	KDS 1144	11.29	9.88	15.6	12.26	X
36	BAUS 96-17	9.98	9.8	14.57	11.45	XVIII
37	BAUS 31-17	9.47	9.89	-	9.68	XXXVI
38	TS 20-5	9.53	10.22	-	9.88	XXXIV
39	SL 1212	8.05	8.63	14.2	10.29	XXX
40	SL 1250	9.49	9.52	15.73	11.58	XVII
41	DS 1312	9.97	7.8	14.9	10.89	XXVII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	13/07/2020	9/7/2020	17/07/2020		

Table 1.1.6

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya (C)	1086	1086	I
2	NRC 188	741	741	III
3	VLS 59 (C)	864	864	II
4	NRC 187	-	-	
5	Karune (C)	-	-	
	Mean	897.00		
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		
	CD	123.46		
	CV (5%)	11.14		

Table 1.1.7

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : Green Pod Yield (Kg/ha) at Picking

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya (C)	2020	2020.00	I
2	NRC 188	860	860.00	III
3	VLS 59 (C)	1058	1058.00	II
4	NRC 187	-	-	
5	Karune (C)	-	-	
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		

Table 1.1.8

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : Days To Flower

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya (C)	50	50.00	II
2	NRC 188	51	51.00	III
3	VLS 59 (C)	51	51.00	III
4	NRC 187	53	53.00	IV
5	Karune (C)	-	-	
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		

Table 1.1.9

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : Days To Picking at R6

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya (C)	87	87	III
2	NRC 188	86	86	II
3	VLS 59 (C)	86	86	II
4	NRC 187	-	-	
5	Karune (C)	-	-	
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		

Table 1.1.10

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : Days To Maturity

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya (C)	117	117.00	III
2	NRC 188	117	117.00	III
3	VLS 59 (C)	117	117.00	III
4	NRC 187	116	116.00	II
5	Karune (C)	-	-	
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		

Table 1.1.11

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : Plant Height (cm)

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya (C)	37	37.00	I
2	NRC 188	27	27.00	III
3	VLS 59 (C)	34	34.00	II
4	NRC 187	-	-	
5	Karune (C)	-	-	
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		

Table 1.1.12

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : 100 Green Seed Weight at picking

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya (C)	26	26	II
2	NRC 188	37.17	37.17	I
3	VLS 59 (C)	22.83	22.83	III
4	NRC 187	-	-	
5	Karune (C)	-	-	
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		

Table 1.1.13

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : NORTHERN HILL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Palampur	Mean	Rank
1	Hara Soya	18.10	18.10	II
2	NRC 188	23.80	23.80	I
3	VLS 59 (C)	16.40	16.40	III
4	NRC 187	-	-	
5	Karune (C)	-	-	
	N.P.S.(Sqm)	4.05		
	DOS	17/07/2020		

Table 1.1.14

Trial : Advanced Varietal Trial I
Zone : NORTHERN HILL ZONE
Character : Yield(kg/ha)

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	VLS 99	1778	1975	2569	2107.33	I
2	SL 1213	1067	1258	2546	1623.67	IV
3	VLS 89(C)	1378	1752	2330	1820	III
4	PS 1556(C)	978	1003	2369	1450	V
5	VLS 63(C)	1393	1836	2554	1927.67	II
	Mean	1318.8	1564.8	2473.6		
	N.P.S.(Sqm)	6.75	12.96	12.96		
	DOS	23/06/2020	9/7/2020	22/06/2020		
	CD	192.59	347.22	401.23		
	CV (5%)	9.39	14.48	10.63		

Table 1.1.15

Trial : Advanced Varietal Trial I
Zone : NORTHERN HILL ZONE
Character : Days To Flower

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	VLS 99	55	47	61	54.33	II
2	SL 1213	55	50	67	57.33	V
3	VLS 89(C)	53	48	64	55	III
4	PS 1556(C)	57	47	64	56	IV
5	VLS 63(C)	52	46	62	53.33	I
	N.P.S.(Sqm)	6.75	12.96	12.96		
	DOS	23/06/2020	9/7/2020	22/06/2020		

Table 1.1.16

Trial : Advanced Varietal Trial I
Zone : NORTHERN HILL ZONE
Character : Days To Maturity

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	VLS 99	112	101	125	112.67	II
2	SL 1213	115	106	125	115.33	IV
3	VLS 89(C)	112	104	123	113	III
4	PS 1556(C)	114	106	127	115.67	V
5	VLS 63(C)	112	102	123	112.33	I
	N.P.S.(Sqm)	6.75	12.96	12.96		
	DOS	23/06/2020	9/7/2020	22/06/2020		

Table 1.1.17

Trial : Advanced Varietal Trial I
Zone : NORTHERN HILL ZONE
Character : Plant Height (cm)

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	VLS 99	74	81	70	75	II
2	SL 1213	68	63	73	68	V
3	VLS 89(C)	79	98	73	83.33	I
4	PS 1556(C)	68	79	70	72.33	III
5	VLS 63(C)	65	74	66	68.33	IV
	N.P.S.(Sqm)	6.75	12.96	12.96		
	DOS	23/06/2020	9/7/2020	22/06/2020		

Table 1.1.18

Trial : Advanced Varietal Trial I
Zone : NORTHERN HILL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	VLS 99	14.5	11.77	18.07	14.78	II
2	SL 1213	7.88	7.91	17.25	11.01	IV
3	VLS 89(C)	10.57	11.62	18.63	13.61	III
4	PS 1556(C)	7.21	8.37	15.98	10.52	V
5	VLS 63(C)	11.51	12.54	21.32	15.12	I
	N.P.S.(Sqm)	6.75	12.96	12.96		
	DOS	23/06/2020	9/7/2020	22/06/2020		

Table 1.2.1

Trial : Initial Varietal Trial
Zone : NORTHERN PLAIN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Delhi	Ludhiana#	Pantnagar	Mean	Rank
1	DSb-38	0	0	0	0	-
2	DS 3105	1654	1556	1827	1679	V
3	CAUMS 2	-	568	790	679	XXVII
4	JS 22-11	765	1185	2617	1522	IX
5	DLSb-2	-	1383	593	988	XVII
6	RVSM 2012-11	444	667	765	625	XXIX
7	RSC 11-39	1506	938	2296	1580	VIII
8	AS-15	-	790	840	815	XXIV
9	PS 1664	444	1383	889	905	XXI
10	SL 955 (C)	2049	2765	1531	2115	II
11	HIMSO 1691	-	667	1037	852	XXII
12	JS 22-14	469	642	1062	724	XXV
13	DS 3144	1432	1877	1580	1629	VI
14	DLSb-1	1284	1136	988	1136	XVI
15	NRC 128	617	963	1284	954	XVIII
16	VLS 101	-	617	741	679	XXVII
17	RSC 11-35	1235	1309	2198	1581	VII
18	PS 1661	1111	1802	2914	1942	IV
19	Himso- 1692	-	593	1111	852	XXII
20	SL 1104 (C)	-	716	-	716	XXVI
21	RVS 2012-10	-	840	1012	926	XX
22	PS 1670	1012	2617	3309	2313	I
23	NRC 109	-	642	691	661	XXVIII
24	MAUS 806	-	963	691	827	XXIII
25	RVS 2011-10	568	963	1877	1136	XVI
26	MAUS 768	-	716	1951	1334	XIII
27	ASb 36	-	0	-	-	
28	ASb 9	-	0	-	-	
29	AUKS 207	-	593	-	593	XXX
30	SL 1074 (C)	1704	2667	1827	2066	III
31	AUKS 206	-	0	-	-	
32	MACS 1701	-	642	1235	939	XIX
33	KDS 1096	-	0	-	-	
34	MACS 1691	-	0	-	-	
35	KDS 1144	-	0	1358	679	XII
36	BAUS 96-17	-	0	1259	630	XIV
37	BAUS 31-17	-	0	988	494	XVII
38	TS 20-5	-	0	-	-	
39	SL 1212	938	1580	1136	1218	XV
40	SL 1250	1111	2469	642	1407	XI
41	DS 1312	1630	1481	1136	1416	X
	Mean	1109.61	1217.1	1380.47	1103	
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	#####	13/07/2020	9/7/2020		
	CD	49.38	148.15	222.22		
	CV (5%)	6.15	10.55	12.07		

Table 1.2.2

Trial: Initial Varietal Trial
Zone: NORTHERN PLAIN ZONE
Character: Days to Flower

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	DSb-38	-	-	45	45	V
2	DS 3105	52	51	51	51.33	XVI
3	CAUMS 2	-	50	47	48.5	XI
4	JS 22-11	52	53	52	52.33	XIX
5	DLSb-2	-	54	53	53.5	XXII
6	RVSM 2012-11	42	44	41	42.33	II
7	RSC 11-39	50	51	48	49.67	XIII
8	AS-15	-	53	52	52.5	XX
9	PS 1664	59	57	57	57.67	XXVI
10	SL 955 (C)	55	55	54	54.67	XXIV
11	HIMSO 1691	-	50	47	48.5	XI
12	JS 22-14	46	50	47	47.67	IX
13	DS 3144	52	52	52	52	XVIII
14	DLSb-1	46	46	45	45.67	VII
15	NRC 128	53	52	49	51.33	XVI
16	VLS 101	-	46	45	45.5	VI
17	RSC 11-35	54	54	53	53.67	XXIII
18	PS 1661	54	53	51	52.67	XXI
19	Himso- 1692	-	51	49	50	XIV
20	SL 1104 (C)	-	51	-	51	XV
21	RVS 2012-10	-	50	47	48.5	XI
22	PS 1670	53	52	50	51.67	XVII
23	NRC 109	-	43	44	43.5	III
24	MAUS 806	-	45	43	44	IV
25	RVS 2011-10	43	45	44	44	IV
26	MAUS 768	-	45	43	44	IV
27	ASb 36	-	-	-	-	
28	ASb 9	-	-	-	-	
29	AUKS 207	-	46	-	46	VIII
30	SL 1074 (C)	57	54	55	55.33	XXV
31	AUKS 206	-	-	-	-	
32	MACS 1701	-	45	43	44	IV
33	KDS 1096	-	-	48	48	X
34	MACS 1691	-	-	50	50	XIV
35	KDS 1144	-	-	49	49	XII
36	BAUS 96-17	-	-	50	50	XIV
37	BAUS 31-17	-	-	52	52	XVIII
38	TS 20-5	-	-	48	48	X
39	SL 1212	53	52	50	51.67	XVII
40	SL 1250	53	52	51	52	XVIII
41	DS 1312	49	51	49	49.67	XIII
	N.P.S.(Sqm)		4.05	405		
	DOS		13/07/2020	9/7/2020		

Table 1.2.3

Trial: Initial Varietal Trial
Zone: NORTHERN PLAIN ZONE
Character: Days To Maturity

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	DSb-38	-	-	-	-	
2	DS 3105	119	111	116	115.33	XX
3	CAUMS 2	-	105	117	111	XIII
4	JS 22-11	115	110	109	111.33	XIV
5	DLSb-2	-	110	117	113.5	XIX
6	RVSM 2012-11	103	101	105	103	III
7	RSC 11-39	112	110	111	111	XIII
8	AS-15	-	110	105	107.5	X
9	PS 1664	123	110	119	117.33	XXV
10	SL 955 (C)	121	110	118	116.33	XXII
11	HIMSO 1691	-	109	118	113.5	XIX
12	JS 22-14	105	101	107	104.33	VI
13	DS 3144	115	109	110	111.33	XIV
14	DLSb-1	110	105	111	108.67	XI
15	NRC 128	118	105	117	113.33	XVIII
16	VLS 101	-	105	118	111.5	XV
17	RSC 11-35	114	108	110	110.67	XII
18	PS 1661	115	110	111	112	XVI
19	Himso- 1692	-	109	118	113.5	XIX
20	SL 1104 (C)	-	111	-	111	XIII
21	RVS 2012-10	-	109	101	105	VII
22	PS 1670	121	111	117	116.33	XXII
23	NRC 109	-	103	109	106	IX
24	MAUS 806	-	102	100	101	II
25	RVS 2011-10	106	106	101	104.33	VI
26	MAUS 768	-	106	105	105.5	VIII
27	ASb 36	-	-	-	-	
28	ASb 9	-	-	-	-	
29	AUKS 207	-	104	-	104	V
30	SL 1074 (C)	121	112	117	116.67	XXIII
31	AUKS 206	-	-	-	-	
32	MACS 1701	-	102	105	103.5	IV
33	KDS 1096	-	-	-	-	
34	MACS 1691	-	-	-	-	
35	KDS 1144	-	-	116	116	XXI
36	BAUS 96-17	-	-	116	116	XXI
37	BAUS 31-17	-	-	117	117	XXIV
38	TS 20-5	-	-	-	-	
39	SL 1212	120	111	117	116	XXI
40	SL 1250	117	111	111	113	XVII
41	DS 1312	113	108	105	108.67	XI
	N.P.S.(Sqm)		4.05	405		
	DOS		13/07/2020	9/7/2020		

Table 1.2.4

Trial : Initial Varietal Trial
Zone : NORTHERN PLAIN ZONE
Character : Plant Height (cm)

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	DSb-38	-	-	-	-	
2	DS 3105	45	57	65	55.67	XVII
3	CAUMS 2	-	40	69	54.5	XX
4	JS 22-11	47	49	80	58.67	XII
5	DLSb-2	-	80	82	81	II
6	RVSM 2012-11	42	53	68	54.33	XXI
7	RSC 11-39	56	51	81	62.67	VIII
8	AS-15	-	58	85	71.5	V
9	PS 1664	49	56	67	57.33	XIV
10	SL 955 (C)	51	58	46	51.67	XXIII
11	HIMSO 1691	-	57	62	59.5	X
12	JS 22-14	44	53	71	56	XVI
13	DS 3144	37	49	62	49.33	XXVII
14	DLSb-1	52	60	65	59	XI
15	NRC 128	51	52	65	56	XVI
16	VLS 101	-	44	58	51	XXIV
17	RSC 11-35	69	61	85	71.67	IV
18	PS 1661	44	57	71	57.33	XIV
19	Himso- 1692	-	54	73	63.5	VII
20	SL 1104 (C)	-	45	-	45	XXIX
21	RVS 2012-10	-	47	52	49.5	XXVI
22	PS 1670	40	58	74	57.33	XIV
23	NRC 109	-	48	88	68	VI
24	MAUS 806	-	53	61	57	XV
25	RVS 2011-10	40	53	66	53	XXII
26	MAUS 768	-	48	63	55.5	XVIII
27	ASb 36	-	-	-	-	
28	ASb 9	-	-	-	-	
29	AUKS 207	-	45	-	45	XXIX
30	SL 1074 (C)	52	64	64	60	IX
31	AUKS 206	-	-	-	-	
32	MACS 1701	-	46	54	50	XXV
33	KDS 1096	-	-	-	-	
34	MACS 1691	-	-	-	-	
35	KDS 1144	-	-	58	58	XIII
36	BAUS 96-17	-	-	89	89	I
37	BAUS 31-17	-	-	75	75	III
38	TS 20-5	-	-	-	-	
39	SL 1212	40	57	50	49	XXVIII
40	SL 1250	48	60	56	54.67	XIX
41	DS 1312	34	49	47	43.33	XXX
	N.P.S.(Sqm)		4.05	405		
	DOS		13/07/2020	9/7/2020		

Table 1.2.5

Trial: Initial Varietal Trial
Zone: NORTHERN PLAIN ZONE
Character: 100 Seed Weight (g)

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	DSb-38	-	-	-	-	
2	DS 3105	6.97	8.4	7.08	7.48	XIX
3	CAUMS 2	-	6.77	7.56	7.17	XXII
4	JS 22-11	6.07	6.5	7.7	6.76	XXVIII
5	DLSb-2	-	7.27	7.27	7.27	XX
6	RVSM 2012-11	7.67	6.77	9.19	7.88	XIV
7	RSC 11-39	6.53	6.67	7.74	6.98	XXV
8	AS-15	-	6.77	6.81	6.79	XXVII
9	PS 1664	7.33	7.2	8.83	7.79	XV
10	SL 955 (C)	7.3	8.17	7.22	7.56	XVII
11	HIMSO 1691	-	8.37	9.57	8.97	V
12	JS 22-14	6.9	7.17	8.62	7.56	XVII
13	DS 3144	6.93	7.8	6.95	7.23	XXI
14	DLSb-1	7.53	8.03	8.52	8.03	XI
15	NRC 128	8.43	7.93	9.7	8.69	VIII
16	VLS 101	-	6.87	8.93	7.9	XIII
17	RSC 11-35	7.63	7.4	9.3	8.11	X
18	PS 1661	6.73	6.73	7.64	7.03	XXIII
19	Himso- 1692	-	8.07	9.67	8.87	VII
20	SL 1104 (C)	-	10.8	-	10.8	I
21	RVS 2012-10	-	6.73	8.39	7.56	XVII
22	PS 1670	9.03	8.83	9.98	9.28	III
23	NRC 109	-	7.4	10.37	8.89	VI
24	MAUS 806	-	9.73	10.03	9.88	II
25	RVS 2011-10	5.63	6.3	6.84	6.26	XXX
26	MAUS 768	-	7.53	10.48	9.01	IV
27	ASb 36	-	-	-	-	
28	ASb 9	-	-	-	-	
29	AUKS 207	-	8.87	-	8.87	VII
30	SL 1074 (C)	7.37	7.03	6.62	7.01	XXIV
31	AUKS 206	-	-	-	-	
32	MACS 1701	-	7.03	8.79	7.91	XII
33	KDS 1096	-	-	-	-	
34	MACS 1691	-	-	-	-	
35	KDS 1144	-	-	8.42	8.42	IX
36	BAUS 96-17	-	-	7.78	7.78	XVI
37	BAUS 31-17	-	-	7.55	7.55	XVIII
38	TS 20-5	-	-	-	-	
39	SL 1212	5.87	7.2	5.83	6.3	XXIX
40	SL 1250	7.13	8.57	6.94	7.55	XVIII
41	DS 1312	6.7	7.2	6.85	6.92	XXVI
	N.P.S.(Sqm)		4.05	405		
	DOS		13/07/2020	9/7/2020		

Table 1.2.6

Trial : Advanced Varietal Trial I
Zone : NORTHERN PLAIN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Delhi[#]	Ludhiana	Pantnagar	Mean	Rank
1	NRC 149	449	2898	1752	2325.00	I
2	DS 9421	819	1213	1181	1197.00	VI
3	SL 958(C)	963	2380	1073	1726.50	IV
4	SL 1074(C)	921	2412	1466	1939.00	III
5	PUSA 9712(C)	755	1278	1281	1279.50	V
6	PS 1347(C)	1380	2597	1505	2051.00	II
	Mean	881.17	2129.67	1376.33		
	N.P.S.(Sqm)	21.60	21.60	12.96		
	DOS	12/07/2020	24/06/2020	01/07/2020		
	CD	101.85	277.78	146.60		
	CV (5%)	7.81	8.71	6.92		

Data from Delhi centre was not included in the analysis due to <1000 kg/ha yield

Table 1.2.7

Trial: Advanced Varietal Trial I
Zone : NORTHERN PLAIN ZONE
Character : Days To Flower

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	NRC 149	55	62	55	57.33	III
2	DS 9421	48	57	46	50.33	I
3	SL 958(C)	52	63	56	57.00	II
4	SL 1074(C)	58	66	56	60.00	V
5	PUSA 9712(C)	48	56	47	50.33	I
6	PS 1347(C)	55	66	56	59.00	IV
	N.P.S.(Sqm)	21.60	21.60	12.96		
	DOS	01/01/1900	24/06/2020	01/07/2020		

Table 1.2.8

Trial : Advanced Varietal Trial I
Zone : NORTHERN PLAIN ZONE
Character : Days To Maturity

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	NRC 149	123	131	127	127.00	VI
2	DS 9421	110	125	117	117.33	I
3	SL 958(C)	123	130	124	125.67	IV
4	SL 1074(C)	122	131	126	126.33	V
5	PUSA 9712(C)	112	126	121	119.67	II
6	PS 1347(C)	119	126	124	123.00	III
	N.P.S.(Sqm)	21.60	21.60	12.96		
	DOS	01/01/1900	24/06/2020	01/07/2020		

Table 1.2.9

Trial : Advanced Varietal Trial I
Zone : NORTHERN PLAIN ZONE
Character : Plant Height (cm)

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	NRC 149	49	78	101	76	II
2	DS 9421	32	54	70	52	VI
3	SL 958(C)	57	76	101	78	I
4	SL 1074(C)	47	69	95	70.33	III
5	PUSA 9712(C)	36	77	86	66.33	IV
6	PS 1347(C)	38	66	66	56.67	V
	N.P.S.(Sqm)	21.6	21.6	12.96		
	DOS	1/1/1900	24/06/2020	1/7/2020		

Table 1.2.10

Trial : Advanced Varietal Trial I
Zone : NORTHERN PLAIN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	NRC 149	8.52	11	10.89	10.14	I
2	DS 9421	6.13	7.53	7.7	7.12	VI
3	SL 958(C)	8.18	9.13	9.84	9.05	II
4	SL 1074(C)	6.78	8.85	8.75	8.13	V
5	PUSA 9712(C)	6.92	8.15	10	8.36	IV
6	PS 1347(C)	8.1	9.27	9.42	8.93	III
	N.P.S.(Sqm)	21.6	21.6	12.96		
	DOS	1/1/1900	24/06/2020	1/7/2020		

Table 1.2.11

Trial : Advanced Varietal Trial I and II
Zone : NORTHERN PLAIN ZONE
Character : Oil Content

Sr. No.	Name of Variety	Location			
		Ludhiana	Pantnagar	Delhi	Mean
1	SL958	21.26	22.01	-	21.64
2	NRC149	22.05	21.65	22.86	22.19
3	PUSA97-12	19.73	22.01	-	20.87
4	SL1074	21.71	21.52	-	21.62
5	DS94-21	17.51	22.36	21.87	20.58
6	PS1347	19.82	22.50	-	21.16

- Denote the seeds not received

Table 1.3.1

Trial : Initial Varietal Trial
Zone : NORTH EASTERN HILL ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	DSb-38	1111	1235	1333	1226	I
2	DS 3105	494	1086	593	724	XI
3	CAUMS 2	914	988	519	807	VII
4	JS 22-11	420	1111	370	634	XVII
5	DLSb-2	543	963	444	650	XVI
6	RVSM 2012-11	494	914	667	692	XIII
7	RSC 11-39	741	889	321	650	XV
8	AS-15	198	914	420	511	XXVIII
9	PS 1664	-	321	617	469	XXX
10	RKS 113 (C)	395	-	-	395	XXXIII
11	HIMSO 1691	494	568	494	519	XXVII
12	JS 22-14	543	914	741	733	X
13	DS 3144	296	889	444	543	XXVI
14	DLSb-1	864	988	840	897	III
15	NRC 128	494	716	519	576	XXII
16	VLS 101	741	864	840	815	VI
17	RSC 11-35	815	1062	691	856	IV
18	PS 1661	173	296	444	304	XXXVI
19	Himso- 1692	593	914	642	716	XII
20	JS 20-116 (C)	790	617	988	798	VIII
21	RVS 2012-10	173	691	395	420	XXXI
22	PS 1670	370	716	741	609	XX
23	NRC 109	444	938	395	592	XXI
24	MAUS 806	593	790	494	626	XVIII
25	RVS 2011-10	617	494	593	568	XXIII
26	MAUS 768	691	346	593	543	XXV
27	ASb 36	-	247	-	247	XXXVIII
28	ASb 9	-	494	296	395	XXXIII
29	AUKS 207	-	198	-	198	XLI
30	MACS 1460 (C)	741	642	864	749	IX
31	AUKS 206	-	-	222	222	XXXIX
32	MACS 1701	691	667	519	626	XVIII
33	KDS 1096	1383	815	1333	1177	II
34	MACS 1691	938	296	840	691	XIV
35	KDS 1144	1185	617	765	856	V
36	BAUS 96-17	173	222	247	214	XL
37	BAUS 31-17	222	222	420	288	XXXVII
38	TS 20-5	296	296	346	313	XXXV
39	SL 1212	222	543	938	568	XXIV
40	SL 1250	321	519	370	403	XXXII
41	DS 1312	346	716	469	510	XXIX
	Mean	569.97	685.08	599.13		
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	23/08/2020	4/8/2020	7/8/2020		
	CD	98.77	222.22	641.98		
	CV (5%)	12.62	21.32	72.95		

Seed material reached late in this zone due to Covid situations and due to delayed sowing the yield of this zone reduced to <1000kg/ha. Therefore trial was considered.

Table 1.3.2

Trial : Initial Varietal Trial
Zone : NORTH EASTERN HILL ZONE
Character : Days To Flower

Sl no	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	DSb-38	42	40	44	42	XIV
2	DS 3105	38	41	43	40.67	X
3	CAUMS 2	39	42	44	41.67	XIII
4	JS 22-11	41	41	44	42	XIV
5	DLSb-2	38	44	43	41.67	XIII
6	RVSM 2012-11	38	42	39	39.67	VII
7	RSC 11-39	38	41	44	41	XI
8	AS-15	37	43	44	41.33	XII
9	PS 1664	-	40	45	42.5	XVI
10	RKS 113(C)	40	-	-	40	VIII
11	HIMSO 1691	37	37	38	37.33	II
12	JS 22-14	34	41	37	37.33	II
13	DS 3144	35	42	40	39	V
14	DLSb-1	41	43	40	41.33	XII
15	NRC 128	36	41	44	40.33	IX
16	VLS 101	38	42	43	41	XI
17	RSC 11-35	40	43	44	42.33	XV
18	PS 1661	38	37	44	39.67	VII
19	Himso- 1692	36	38	41	38.33	IV
20	JS 20-116(C)	36	43	44	41	XI
21	RVS 2012-10	41	42	38	40.33	IX
22	PS 1670	41	38	44	41	XI
23	NRC 109	38	38	34	36.67	I
24	MAUS 806	38	41	36	38.33	IV
25	RVS 2011-10	38	38	38	38	III
26	MAUS 768	39	41	41	40.33	IX
27	ASb 36	-	38	44	41	XI
28	ASb 9	-	35	43	39	V
29	AUKS 207	-	41	44	42.5	XVI
30	MACS 1460(C)	37	45	37	39.67	VII
31	AUKS 206	-	-	45	45	XVII
32	MACS 1701	37	38	40	38.33	IV
33	KDS 1096	39	42	44	41.67	XIII
34	MACS 1691	38	42	44	41.33	XII
35	KDS 1144	38	43	37	39.33	VI
36	BAUS 96-17	38	44	44	42	XIV
37	BAUS 31-17	37	38	43	39.33	VI
38	TS 20-5	39	38	43	40	VIII
39	SL 1212	37	46	38	40.33	IX
40	SL 1250	34	44	40	39.33	VI
41	DS 1312	36	43	40	39.67	VII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	23/08/2020	4/8/2020	7/8/2020		

Table 1.3.3

Trial : Initial Varietal Trial
Zone : NORTH EASTERN HILL ZONE
Character : Days To Maturity

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	DSb-38	90	95	93	92.67	VII
2	DS 3105	92	76	92	86.67	I
3	CAUMS 2	90	96	92	92.67	VII
4	JS 22-11	92	105	92	96.33	XV
5	DLSb-2	99	94	92	95	XII
6	RVSM 2012-11	94	94	91	93	VIII
7	RSC 11-39	94	103	92	96.33	XV
8	AS-15	90	106	92	96	XIV
9	PS 1664	-	103	92	97.5	XIX
10	RKS 113(C)	92	-	-	92	V
11	HIMSO 1691	90	100	91	93.67	X
12	JS 22-14	91	97	89	92.33	VI
13	DS 3144	90	112	90	97.33	XVIII
14	DLSb-1	95	114	91	100	XXV
15	NRC 128	99	103	92	98	XX
16	VLS 101	97	88	91	92	V
17	RSC 11-35	93	112	91	98.67	XXII
18	PS 1661	93	102	92	95.67	XIII
19	Himso- 1692	90	98	92	93.33	IX
20	JS 20-116(C)	93	102	90	95	XII
21	RVS 2012-10	89	111	90	96.67	XVI
22	PS 1670	93	105	93	97	XVII
23	NRC 109	93	101	90	94.67	XI
24	MAUS 806	92	103	92	95.67	XIII
25	RVS 2011-10	92	115	91	99.33	XXIII
26	MAUS 768	97	108	90	98.33	XXI
27	ASb 36	-	96	90	93	VIII
28	ASb 9	-	86	94	90	III
29	AUKS 207	-	110	-	110	XXVI
30	MACS 1460(C)	93	86	90	89.67	II
31	AUKS 206	-	-	90	90	III
32	MACS 1701	95	111	92	99.33	XXIII
33	KDS 1096	95	87	93	91.67	IV
34	MACS 1691	95	88	92	91.67	IV
35	KDS 1144	95	112	92	99.67	XXIV
36	BAUS 96-17	93	106	92	97	XVII
37	BAUS 31-17	90	107	93	96.67	XVI
38	TS 20-5	98	102	92	97.33	XVIII
39	SL 1212	95	98	91	94.67	XI
40	SL 1250	94	115	91	100	XXV
41	DS 1312	90	97	91	92.67	VII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	23/08/2020	4/8/2020	7/8/2020		

Table 1.3.4

Trial : Initial Varietal Trial
Zone : NORTH EASTERN HILL ZONE
Character : Plant Height (cm)

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	DSb-38	42	52	45	46.33	VII
2	DS 3105	29	54	33	38.67	XVIII
3	CAUMS 2	25	62	36	41	XIV
4	JS 22-11	29	85	36	50	IV
5	DLSb-2	33	54	38	41.67	XII
6	RVSM 2012-11	24	64	36	41.33	XIII
7	RSC 11-39	32	83	40	51.67	III
8	AS-15	28	73	39	46.67	VI
9	PS 1664	-	47	24	35.5	XXII
10	RKS 113(C)	26	-	-	26	XXXII
11	HIMSO 1691	25	48	29	34	XXVI
12	JS 22-14	26	54	33	37.67	XIX
13	DS 3144	20	54	29	34.33	XXV
14	DLSb-1	30	62	42	44.67	IX
15	NRC 128	24	71	39	44.67	IX
16	VLS 101	26	50	43	39.67	XVI
17	RSC 11-35	40	71	51	54	I
18	PS 1661	22	64	34	40	XV
19	Himso- 1692	25	53	33	37	XX
20	JS 20-116(C)	37	76	45	52.67	II
21	RVS 2012-10	15	49	25	29.67	XXX
22	PS 1670	25	66	34	41.67	XII
23	NRC 109	30	75	36	47	V
24	MAUS 806	29	50	39	39.33	XVII
25	RVS 2011-10	25	56	24	35	XXIV
26	MAUS 768	27	51	32	36.67	XXI
27	ASb 36	-	43	21	32	XXVIII
28	ASb 9	-	53	31	42	XI
29	AUKS 207	-	26	28	27	XXXI
30	MACS 1460(C)	27	64	37	42.67	X
31	AUKS 206	-	-	23	23	XXXIV
32	MACS 1701	27	47	39	37.67	XIX
33	KDS 1096	42	59	49	50	IV
34	MACS 1691	30	54	32	38.67	XVIII
35	KDS 1144	28	54	28	36.67	XXI
36	BAUS 96-17	24	71	44	46.33	VII
37	BAUS 31-17	26	76	33	45	VIII
38	TS 20-5	26	45	35	35.33	XXIII
39	SL 1212	19	27	25	23.67	XXXIII
40	SL 1250	23	42	27	30.67	XXIX
41	DS 1312	21	45	34	33.33	XXVII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	23/08/2020	4/8/2020	7/8/2020		

Table 1.3.5

Trial : Initial Varietal Trial
Zone : NORTH EASTERN HILL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	DSb-38	12.38	12.33	11.53	12.08	IX
2	DS 3105	11.26	12.77	9.3	11.11	XXII
3	CAUMS 2	9.67	12	9.64	10.44	XXXIII
4	JS 22-11	9.03	14.23	8.13	10.46	XXXII
5	DLSb-2	12.2	11.33	9	10.84	XXVI
6	RVSM 2012-11	14.37	14.13	9.68	12.73	VI
7	RSC 11-39	9.84	11.8	8	9.88	XXXIX
8	AS-15	11.29	13.87	8.2	11.12	XXI
9	PS 1664	-	14.1	6.04	10.07	XXXVI
10	RKS 113(C)	10.08	-	-	10.08	XXXV
11	HIMSO 1691	14.22	12.77	12.28	13.09	III
12	JS 22-14	12.89	13.9	11.53	12.77	V
13	DS 3144	8.54	14.07	10.68	11.1	XXIII
14	DLSb-1	11.65	13.33	9	11.33	XIX
15	NRC 128	12.75	13.07	10.73	12.18	VIII
16	VLS 101	14.33	12.7	10.67	12.57	VII
17	RSC 11-35	10.99	13	10.07	11.35	XVIII
18	PS 1661	9.96	12.1	9.72	10.59	XXIX
19	Himso- 1692	17.86	11.53	11.67	13.69	I
20	JS 20-116(C)	10.02	13.17	8.37	10.52	XXX
21	RVS 2012-10	10.75	11.67	12.33	11.58	XIV
22	PS 1670	10.44	13.27	9.13	10.95	XXIV
23	NRC 109	12.46	10.93	12	11.8	XII
24	MAUS 806	12.57	13.97	12.7	13.08	IV
25	RVS 2011-10	9.13	13.8	9.03	10.65	XXVIII
26	MAUS 768	12.69	13.33	10.07	12.03	X
27	ASb 36	-	11.93	6.6	9.27	XL
28	ASb 9	-	14	6.93	10.47	XXXI
29	AUKS 207	-	11.6	8.4	10	XXXVII
30	MACS 1460(C)	11.51	11.13	8.53	10.39	XXXIV
31	AUKS 206	-	-	3.6	3.6	XLI
32	MACS 1701	12.78	11.23	10.13	11.38	XVII
33	KDS 1096	10.91	14.03	9.67	11.54	XV
34	MACS 1691	10.82	13.83	8.03	10.89	XXV
35	KDS 1144	13.93	12.57	13	13.17	II
36	BAUS 96-17	11.06	13.73	10.45	11.75	XIII
37	BAUS 31-17	11.33	11.27	12.93	11.84	XI
38	TS 20-5	11.2	12.63	9.93	11.25	XX
39	SL 1212	10.51	11.63	7.63	9.92	XXXVIII
40	SL 1250	11.17	13.8	9.2	11.39	XVI
41	DS 1312	11.37	11.57	9.08	10.67	XXVII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	23/08/2020	4/8/2020	7/8/2020		

Table 1.3.6

Trial : Advanced Varietal Trial I
Zone : NORTH EASTERN HILL ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Imphal	Jorhat[#]	Umiam	Mean	Rank
1	NRC 142	2128	1343	1111	1619.50	IV
2	MACS 1460(C)	2156	810	1389	1772.50	III
3	JS 20-116(C)	2639	833	1130	1884.50	I
4	RKS 113(C)	2417	-	1241	1829.00	II
	Mean	2335.00	995.33	1217.75		
	N.P.S.(Sqm)	18.00	12.96	5.40		
	DOS	16/06/2020	18/08/2020	05/08/2020		
	CD	461.11	154.32	259.26		
	CV (5%)	12.37	12.87	13.45		

[#]Data of Jorhat centre was not considered due to < 1000kg yield /ha.

Table 1.3.7

Trial : Advanced Varietal Trial I
Zone : NORTH EASTERN HILL ZONE
Character : Days To Flower

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	NRC 142	47	47	43	45.67	II
2	MACS 1460(C)	48	45	44	45.67	II
3	JS 20-116(C)	49	47	44	46.67	III
4	RKS 113(C)	48	-	43	45.50	I
	N.P.S.(Sqm)	18.00	12.96	5.40		
	DOS	16/06/2020	18/08/2020	05/08/2020		

Table 1.3.8

Trial : Advanced Varietal Trial I
Zone : NORTH EASTERN HILL ZONE
Character : Days To Maturity

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	NRC 142	100	93	95	96.00	I
2	MACS 1460(C)	105	100	95	100.00	IV
3	JS 20-116(C)	106	97	95	99.33	III
4	RKS 113(C)	103	-	94	98.50	II
	N.P.S.(Sqm)	18.00	12.96	5.40		
	DOS	16/06/2020	18/08/2020	05/08/2020		

Table 1.3.9

Trial : Advanced Varietal Trial I
Zone : NORTH EASTERN HILL ZONE
Character : Plant Height (cm)

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	NRC 142	78	46	42	55.33	IV
2	MACS 1460(C)	90	79	46	71.67	I
3	JS 20-116(C)	92	51	47	63.33	III
4	RKS 113(C)	85	-	47	66	II
	N.P.S.(Sqm)	18	12.96	5.4		
	DOS	16/06/2020	18/08/2020	5/8/2020		

Table 1.3.10

Trial : Advanced Varietal Trial I
Zone : NORTH EASTERN HILL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	NRC 142	14.43	13.95	10.82	13.07	I
2	MACS 1460(C)	11.49	13.75	10.55	11.93	II
3	JS 20-116(C)	11.87	11.80	10.40	11.36	III
4	RKS 113(C)	12.14	-	9.73	10.94	IV
	N.P.S.(Sqm)	18.00	12.96	5.40		
	DOS	16/06/2020	18/08/2020	05/08/2020		

Table 1.3.11

Trial : Advanced Varietal Trial I
Zone : NORTH EASTERN HILL ZONE
Character : Oil content

Sr. No.	Name of Variety	Location	
		Imphal	Mean
1	NRC142	20.43	20.43
2	JS-20-116 (C)	19.97	19.97
3	RKS113 (C)	22.3	22.3
4	KDS753	21.34	21.34
5	MACS1460 (C)	20.15	20.15

Table 1.4.1

Trial : Initial Varietal Trial
Zone : EASTERN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	DSb-38	2568	1037	1827	1810.67	IX
2	DS 3105	1407	1630	1605	1547.33	XX
3	CAUMS 2	2617	1901	1235	1917.67	VII
4	JS 22-11	2000	2420	1062	1827.33	VIII
5	DLSb-2	938	914	1160	1004	XXXV
6	RVSM 2012-11	1778	1852	914	1514.67	XXI
7	RSC 11-39	2272	2963	1160	2131.67	IV
8	AS-15	1358	1679	1506	1514.33	XXII
9	PS 1664	914	1802	1704	1473.33	XXIII
10	RSC 10-46 (C)	1284	2099	1457	1613.33	XV
11	HIMSO 1691	1457	1407	1383	1415.67	XXV
12	JS 22-14	2074	1728	1531	1777.67	X
13	DS 3144	2420	1284	1210	1638	XIII
14	DLSb-1	2074	1185	914	1391	XXVI
15	NRC 128	1210	1901	790	1300.33	XXVII
16	VLS 101	2173	1111	1531	1605	XVI
17	RSC 11-35	2667	2765	1531	2321	II
18	PS 1661	1556	2099	1086	1580.33	XVIII
19	Himso- 1692	2593	864	1358	1605	XVI
20	JS 20-116 (C)	2568	2173	1679	2140	III
21	RVS 2012-10	-	1654	1605	1629.5	XIV
22	PS 1670	1630	1432	1235	1432.33	XXIV
23	NRC 109	1037	1160	1136	1111	XXIX
24	MAUS 806	889	1432	988	1103	XXX
25	RVS 2011-10	1852	2000	1309	1720.33	XI
26	MAUS 768	1951	2272	1531	1918	VI
27	ASb 36	-	815	-	815	XXXVII
28	ASb 9	-	1062	-	1062	XXXIII
29	AUKS 207	-	815	-	815	XXXVII
30	MACS 1460 (C)	2519	1778	765	1687.33	XII
31	AUKS 206	-	963	-	963	XXXVI
32	MACS 1701	2025	1728	1309	1687.33	XII
33	KDS 1096	2963	2247	1852	2354	I
34	MACS 1691	1556	1062	2025	1547.67	XIX
35	KDS 1144	2938	864	1975	1925.67	V
36	BAUS 96-17	1531	1309	1704	1514.67	XXI
37	BAUS 31-17	988	1210	1358	1185.33	XXVIII
38	TS 20-5	1086	1136	1037	1086.33	XXXI
39	SL 1212	914	1259	1037	1070	XXXII
40	SL 1250	1012	1259	914	1061.67	XXXIV
41	DS 1312	2000	1531	1259	1596.67	XVII
	Mean	1800.53	1556.15	1342.76		
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	29/07/2020	#####	23/07/2020		
	CD	444.44	197.53	271.6		
	CV (5%)	17	8.04	13.45		

Table 1.4.2

Trial : Initial Varietal Trial
Zone : EASTERN ZONE
Character : Days To Flower

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	DSb-38	40	36	42	39.33	XII
2	DS 3105	41	42	42	41.67	XVIII
3	CAUMS 2	38	31	43	37.33	VII
4	JS 22-11	41	43	41	41.67	XVIII
5	DLSb-2	41	44	41	42	XIX
6	RVSM 2012-11	37	34	39	36.67	V
7	RSC 11-39	41	41	39	40.33	XV
8	AS-15	41	42	42	41.67	XVIII
9	PS 1664	44	44	42	43.33	XXII
10	RSC 10-46 (C)	41	44	43	42.67	XXI
11	HIMSO 1691	39	34	38	37	VI
12	JS 22-14	39	37	39	38.33	IX
13	DS 3144	39	42	40	40.33	XV
14	DLSb-1	40	39	40	39.67	XIII
15	NRC 128	42	39	40	40.33	XV
16	VLS 101	38	34	39	37	VI
17	RSC 11-35	42	37	41	40	XIV
18	PS 1661	42	44	39	41.67	XVIII
19	Himso- 1692	39	42	40	40.33	XV
20	JS 20-116 (C)	40	34	41	38.33	IX
21	RVS 2012-10	-	31	38	34.5	II
22	PS 1670	41	38	42	40.33	XV
23	NRC 109	40	31	37	36	III
24	MAUS 806	39	31	42	37.33	VII
25	RVS 2011-10	38	31	40	36.33	IV
26	MAUS 768	38	31	41	36.67	V
27	ASb 36	-	42	-	42	XIX
28	ASb 9	-	41	-	41	XVI
29	AUKS 207	-	39	-	39	XI
30	MACS 1460 (C)	37	33	43	37.67	VIII
31	AUKS 206	-	32	-	32	I
32	MACS 1701	38	31	40	36.33	IV
33	KDS 1096	41	42	41	41.33	XVII
34	MACS 1691	41	44	41	42	XIX
35	KDS 1144	37	41	38	38.67	X
36	BAUS 96-17	42	44	41	42.33	XX
37	BAUS 31-17	42	40	41	41	XVI
38	TS 20-5	39	39	40	39.33	XII
39	SL 1212	40	39	40	39.67	XIII
40	SL 1250	38	41	40	39.67	XIII
41	DS 1312	38	41	39	39.33	XII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	29/07/2020	10/7/2020	23/07/2020		

Table 1.4.3

Trial : Initial Varietal Trial
Zone : EASTERN ZONE
Character : Days To Maturity

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	DSb-38	92	98	107	99	III
2	DS 3105	99	103	109	103.67	XII
3	CAUMS 2	92	91	112	98.33	II
4	JS 22-11	102	103	113	106	XIX
5	DLSb-2	103	103	111	105.67	XVIII
6	RVSM 2012-11	97	89	113	99.67	IV
7	RSC 11-39	98	101	111	103.33	XI
8	AS-15	96	101	112	103	X
9	PS 1664	100	103	112	105	XVI
10	RSC 10-46(C)	103	103	111	105.67	XVIII
11	HIMSO 1691	96	99	115	103.33	XI
12	JS 22-14	96	90	111	99	III
13	DS 3144	97	100	103	100	V
14	DLSb-1	100	101	113	104.67	XV
15	NRC 128	100	98	112	103.33	XI
16	VLS 101	98	101	112	103.67	XII
17	RSC 11-35	99	98	112	103	X
18	PS 1661	97	100	111	102.67	IX
19	Himso- 1692	99	98	113	103.33	XI
20	JS 20-116(C)	93	96	114	101	VII
21	RVS 2012-10	-	95	114	104.5	XIV
22	PS 1670	102	96	115	104.33	XIII
23	NRC 109	92	95	116	101	VII
24	MAUS 806	92	93	115	100	V
25	RVS 2011-10	93	94	113	100	V
26	MAUS 768	97	95	115	102.33	VIII
27	ASb 36	-	100	-	100	V
28	ASb 9	-	103	-	103	X
29	AUKS 207	-	103	-	103	X
30	MACS 1460(C)	94	93	115	100.67	VI
31	AUKS 206	-	92	-	92	I
32	MACS 1701	97	90	113	100	V
33	KDS 1096	94	101	116	103.67	XII
34	MACS 1691	97	103	109	103	X
35	KDS 1144	101	103	109	104.33	XIII
36	BAUS 96-17	100	104	112	105.33	XVII
37	BAUS 31-17	102	101	114	105.67	XVIII
38	TS 20-5	96	98	109	101	VII
39	SL 1212	97	98	102	99	III
40	SL 1250	98	102	114	104.67	XV
41	DS 1312	95	102	116	104.33	XIII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	29/07/2020	10/7/2020	23/07/2020		

Table 1.4.4

Trial: Initial Varietal Trial
Zone: EASTERN ZONE
Character: Plant Height (cm)

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	DSb-38	41	54	34	43	XXI
2	DS 3105	34	54	38	42	XXII
3	CAUMS 2	36	57	30	41	XXIII
4	JS 22-11	43	56	32	43.67	XIX
5	DLSb-2	59	54	32	48.33	XII
6	RVSM 2012-11	34	54	35	41	XXIII
7	RSC 11-39	42	67	41	50	IX
8	AS-15	36	70	43	49.67	X
9	PS 1664	31	62	40	44.33	XVIII
10	RSC 10-46(C)	47	67	38	50.67	VIII
11	HIMSO 1691	37	63	41	47	XVI
12	JS 22-14	43	64	45	50.67	VIII
13	DS 3144	45	58	40	47.67	XIV
14	DLSb-1	47	65	42	51.33	VII
15	NRC 128	48	65	36	49.67	X
16	VLS 101	40	65	34	46.33	XVII
17	RSC 11-35	70	69	44	61	II
18	PS 1661	38	66	42	48.67	XI
19	Himso- 1692	42	62	40	48	XIII
20	JS 20-116(C)	50	62	43	51.67	VI
21	RVS 2012-10	-	60	40	50	IX
22	PS 1670	36	63	40	46.33	XVII
23	NRC 109	45	69	35	49.67	X
24	MAUS 806	41	65	38	48	XIII
25	RVS 2011-10	44	64	38	48.67	XI
26	MAUS 768	37	63	39	46.33	XVII
27	ASb 36	-	61	-	61	II
28	ASb 9	-	63	-	63	I
29	AUKS 207	-	56	-	56	III
30	MACS 1460(C)	47	71	39	52.33	IV
31	AUKS 206	-	52	-	52	V
32	MACS 1701	38	64	39	47	XVI
33	KDS 1096	53	65	37	51.67	VI
34	MACS 1691	34	50	37	40.33	XXIV
35	KDS 1144	45	66	41	50.67	VIII
36	BAUS 96-17	38	67	37	47.33	XV
37	BAUS 31-17	46	58	41	48.33	XII
38	TS 20-5	39	55	36	43.33	XX
39	SL 1212	29	55	34	39.33	XXVI
40	SL 1250	29	53	38	40	XXV
41	DS 1312	33	52	38	41	XXIII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	29/07/2020	#######	23/07/2020		

Table 1.4.5

Trial : Initial Varietal Trial
Zone : EASTERN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	DSb-38	13.68	8.18	9.3	10.39	XXVIII
2	DS 3105	14.72	7.22	11.35	11.1	XIX
3	CAUMS 2	12.07	8.12	9.2	9.8	XXXIV
4	JS 22-11	12.11	7.2	9.39	9.57	XXXV
5	DLSb-2	13.02	6.61	10.06	9.9	XXXIII
6	RVSM 2012-11	15.12	9.46	12.38	12.32	XI
7	RSC 11-39	12.68	8.73	10.6	10.67	XXIV
8	AS-15	14.95	7.5	11.27	11.24	XVII
9	PS 1664	12.96	7.21	11.06	10.41	XXVII
10	RSC 10-46(C)	13.49	8.18	11.28	10.98	XX
11	HIMSO 1691	16.84	7.97	13.17	12.66	VI
12	JS 22-14	16.45	9.85	12.78	13.03	IV
13	DS 3144	14.14	8.4	10.82	11.12	XVIII
14	DLSb-1	16.93	9.59	11.59	12.7	V
15	NRC 128	16.13	9.52	11.47	12.37	X
16	VLS 101	17	10.3	13.11	13.47	III
17	RSC 11-35	14.18	10.55	10.38	11.7	XV
18	PS 1661	12.02	8.44	9.8	10.09	XXXI
19	Himso- 1692	21.13	9.99	13.97	15.03	I
20	JS 20-116(C)	11.72	6.14	9.63	9.16	XXXVIII
21	RVS 2012-10	-	9.48	10.39	9.94	XXXII
22	PS 1670	13.39	7.66	11.14	10.73	XXII
23	NRC 109	17.16	12.41	14.43	14.67	II
24	MAUS 806	16.04	9.97	11.39	12.47	VIII
25	RVS 2011-10	12.9	7.35	11.08	10.44	XXVI
26	MAUS 768	14.43	11.05	11.9	12.46	IX
27	ASb 36	-	6.23	-	6.23	XL
28	ASb 9	-	10.49	-	10.49	XXV
29	AUKS 207	-	10.1	-	10.1	XXX
30	MACS 1460(C)	14.08	10.53	10.87	11.83	XIV
31	AUKS 206	-	10.26	-	10.26	XXIX
32	MACS 1701	14.86	11.04	11.85	12.58	VII
33	KDS 1096	12.93	6.29	9.08	9.43	XXXVII
34	MACS 1691	11.19	6.62	9.38	9.06	XXXIX
35	KDS 1144	16.24	8.61	11.79	12.21	XII
36	BAUS 96-17	15.71	7.57	12.25	11.84	XIII
37	BAUS 31-17	15.77	5.71	11.83	11.1	XIX
38	TS 20-5	14.75	8.39	10.6	11.25	XVI
39	SL 1212	12.58	6.56	9.33	9.49	XXXVI
40	SL 1250	13.95	7.44	11.34	10.91	XXI
41	DS 1312	13.73	8.72	9.71	10.72	XXIII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	29/07/2020	10/7/2020	23/07/2020		

Table 1.4.6

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	1012	1012.00	IV
2	NRC 188	1358	1358.00	II
3	MACS 1460 (C)	1481	1481.00	I
4	NRC 187	1136	1136.00	III
5	Karune (C)	938	938.00	V
	Mean	1185.00		
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		
	CD	320.99		
	CV (5%)	14.31		

Table 1.4.7

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : Green Pod Yield (Kg/ha) at Picking

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	1223	1223.00	IV
2	NRC 188	1670	1670.00	II
3	MACS 1460 (C)	2127	2127.00	I
4	NRC 187	1440	1440.00	III
5	Karune (C)	1150	1150.00	V
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		

Table 1.4.8

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : Days To Flower

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	30	30.00	I
2	NRC 188	30	30.00	I
3	MACS 1460 (C)	38	38.00	II
4	NRC 187	30	30.00	I
5	Karune (C)	30	30.00	I
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		

Table 1.4.9

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : Days To Picking at R6

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	71	71	III
2	NRC 188	73	73	IV
3	MACS 1460 (C)	70	70	II
4	NRC 187	69	69	I
5	Karune (C)	71	71	III
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		

Table 1.3.10

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : Days To Maturity

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	90	90.00	III
2	NRC 188	89	89.00	II
3	MACS 1460 (C)	99	99.00	V
4	NRC 187	94	94.00	IV
5	Karune (C)	87	87.00	I
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		

Table 1.4.11

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : Plant Height (cm)

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	60	60	II
2	NRC 188	47	47	III
3	MACS 1460 (C)	64	64	I
4	NRC 187	37	37	IV
5	Karune (C)	33	33	V
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		

Table 1.4.12

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : 100 Green Seed Weight at picking

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	22	22.00	IV
2	NRC 188	26	26.00	II
3	MACS 1460 (C)	24	24.00	III
4	NRC 187	31	31.00	I
5	Karune (C)	26	26.00	II
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		

Table 1.4.13

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : EASTERN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Raipur	Mean	Rank
1	Hara Soya (C)	10.05	10.05	V
2	NRC 188	14.26	14.26	II
3	MACS 1460 (C)	10.92	10.92	IV
4	NRC 187	16.25	16.25	I
5	Karune (C)	12.80	12.80	III
	N.P.S.(Sqm)	4.05		
	DOS	15/07/2020		

Table 1.4.14

Trial : Advanced Varietal Trial I
Zone : EASTERN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	SL 1213	2415	1561	1682	1886.00	V
2	NRC 149	2894	1861	1258	2004.33	III
3	HIMSO 1690	2515	1139	941	1531.67	VI
4	MACS 1460(C)	2531	1689	1844	2021.33	II
5	JS 20-116(C)	2608	2100	1289	1999.00	IV
6	RSC 10-46(C)	2531	2306	1821	2219.33	I
	Mean	2582.33	1776.00	1472.50		
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	01/08/2020	26/06/2020	02/07/2020		
	CD	277.78	216.67	455.25		
	CV (5%)	7.14	8.17	20.61		

Table 1.4.15

Trial : Advanced Varietal Trial I
Zone : EASTERN ZONE
Character : Days To Flower

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	SL 1213	39	48	43	43.33	III
2	NRC 149	37	47	44	42.67	I
3	HIMSO 1690	38	46	45	43.00	II
4	MACS 1460(C)	37	47	44	42.67	I
5	JS 20-116(C)	39	45	44	42.67	I
6	RSC 10-46(C)	41	45	42	42.67	I
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	01/08/2020	26/06/2020	02/07/2020		

Table 1.4.16

Trial: Advanced Varietal Trial I
Zone : EASTERN ZONE
Character : Days To Maturity

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	SL 1213	98	101	116	105.00	IV
2	NRC 149	100	99	114	104.33	III
3	HIMSO 1690	99	98	116	104.33	III
4	MACS 1460(C)	90	99	115	101.33	II
5	JS 20-116(C)	91	96	115	100.67	I
6	RSC 10-46(C)	103	99	113	105.00	IV
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	01/08/2020	26/06/2020	02/07/2020		

Table 1.4.17

Trial : Advanced Varietal Trial I
Zone : EASTERN ZONE
Character : Plant Height (cm)

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	SL 1213	36	55	44	45	VI
2	NRC 149	66	75	49	63.33	II
3	HIMSO 1690	47	76	42	55	V
4	MACS 1460(C)	47	89	55	63.67	I
5	JS 20-116(C)	52	75	51	59.33	IV
6	RSC 10-46(C)	50	79	50	59.67	III
	N.P.S.(Sqm)	12.96	18	12.96		
	DOS	1/8/2020	26/06/2020	2/7/2020		

Table 1.4.18

Trial : Advanced Varietal Trial I
Zone : EASTERN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	SL 1213	13.41	8.73	11.02	11.05	II
2	NRC 149	15.45	8.28	11.60	11.78	I
3	HIMSO 1690	13.36	8.35	10.43	10.71	V
4	MACS 1460(C)	12.85	10.60	9.52	10.99	III
5	JS 20-116(C)	11.00	8.83	8.58	9.47	VI
6	RSC 10-46(C)	13.05	9.37	10.37	10.93	IV
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	01/08/2020	26/06/2020	02/07/2020		

Table 1.5.1

Trial : Initial Varietal Trial
Zone : CENTRAL ZONE
Character : Yield(Kg/ha)

S. No	Varieties	Amravati	Amreli#	Anand#	Indore	Jabalpur#	Kota	Lok Bharti#	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	DSb-38	-	272	1012	-	99	222	395	296	1531	-	593	-	444.5	XXXV
2	DS 3105	173	1802	1580	296	0	519	1506	222	1383	49	1556	-	1222	XXVIII
3	CAUMS 2	99	2272	1679	-	0	667	2444	272	1012	74	1012	-	1598.75	XVII
4	JS 22-11	568	2272	2049	1432	148	1259	2173	494	1037	420	864	691	1660.5	XI
5	DLSb-2	25	2074	1383	-	0	370	1975	49	815	-	568	-	1358	XXIV
6	RVSM 2012-11	99	2346	2049	173	0	963	2123	617	1407	123	1259	-	1629.5	XIV
7	RSC 11-39	370	2914	2296	1506	444	914	1827	444	1309	716	716	691	1870.25	IV
8	AS-15	49	2346	1679	-	0	494	1457	469	938	-	840	-	1370.5	XXIII
9	PS 1664	272	1358	1531	1877	0	716	1506	395	1037	-	1284	568	1098.75	XXXI
10	MACS 1520 (C)	469	2815	1605	346	0	691	1457	198	815	123	1432	-	1469.25	XXI
11	HIMSO 1691	49	2346	1704	-	0	296	1951	222	716	74	864	-	1500.25	XX
12	JS 22-14	222	2963	2370	469	0	815	1679	420	914	99	1309	-	1753	VII
13	DS 3144	148	2346	2568	-	0	519	1728	889	1284	-	1630	-	1660.5	XI
14	DLSb-1	-	3012	2864	-	0	296	2099	568	1012	-	617	-	1993.75	II
15	NRC 128	444	2370	2148	1926	0	741	1259	1185	1556	148	1086	395	1444.25	XXII
16	VLS 101	-	2247	2543	-	0	272	1407	494	914	-	914	-	1549.25	XIX
17	RSC 11-35	568	2864	2272	2296	0	864	1481	889	1185	543	815	-	1654.25	XIII
18	PS 1661	593	1877	2074	2370	0	1062	1309	864	1210	198	1259	420	1315	XXV
19	Himso- 1692	74	1506	2519	-	0	198	1111	247	864	-	864	-	1284	XXVII
20	JS 20-116 (C)	716	3383	2420	2815	0	1111	1457	1037	1877	642	914	1111	1815	V
21	RVS 2012-10	247	1802	2519	1753	296	1358	2049	1062	1037	74	1235	420	1666.5	X
22	PS 1670	370	1679	1630	2099	0	716	765	593	1136	148	765	667	1018.5	XXXII
23	NRC 109	-	2321	2049	-	741	519	1383	716	1062	-	691	-	1623.5	XV
24	MAUS 806	198	1630	1654	1136	296	1481	1679	568	840	198	1284	444	1314.75	XXVI
25	RVS 2011-10	593	2469	2741	2346	864	1605	3210	1012	1358	617	1235	914	2321	I
26	MAUS 768	346	2543	2198	790	0	1037	2519	1037	914	148	1185	296	1815	V
27	ASb 36	-	1111	247	-	0	346	1160	222	1235	-	568	-	629.5	XXXIV
28	ASb 9	-	272	543	-	0	346	642	173	1136	-	617	-	364.25	XXXVII
29	AUKS 207	74	395	272	840	247	296	123	-	1284	-	667	-	259.25	XL
30	NRC 86(C)	321	2815	2099	444	0	1210	1877	444	1481	296	1580	420	1697.75	IX
31	AUKS 206	370	123	321	370	247	543	321	-	741	74	617	-	253	XLI
32	MACS 1701	99	2074	2049	-	0	321	2296	346	1111	-	1753	-	1604.75	XVI
33	KDS 1096	-	99	1284	-	0	543	123	346	1185	-	840	-	376.5	XXXVI
34	MACS 1691	-	99	815	-	0	420	173	123	1358	-	815	-	271.75	XXXIX

35	KDS 1144	99	2074	1481	296	0	741	1160	296	1259	-	593	-	1178.75	XXIX
36	BAUS 96-17	49	2543	1926	-	0	642	3407	-	815	-	568	-	1969	III
37	BAUS 31-17	25	2296	1951	-	0	420	2568	198	1160	-	593	-	1703.75	VIII
38	TS 20-5	-	74	790	-	0	370	272	148	1333	-	790	-	284	XXXVIII
39	SL 1212	222	1432	1506	-	0	519	815	198	1086	-	667	-	938.25	XXXIII
40	SL 1250	272	1160	1531	-	74	543	1679	148	815	49	1185	-	1111	XXX
41	DS 1312	74	2247	2173	-	0	593	1975	420	1333	247	864	-	1598.75	XVII
	Mean	259.28	1869.34	1759.12	1279	84.29	672.15	1525.37	482.13	1134.02	240.95	963.61	586.42	1301.5	
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	44022	44019	44021	44013	44020	44021	44022	44016	44017	44024	44032	44019		
	CD	222.22	370.37	271.6	617.28	49.38	197.53	320.99	444.44	567.9	98.77	172.84	74.07		
	CV (5%)	75.07	11.79	9.82	60.3	28.07	18.72	12.98	61.69	30.95	43.61	11.39	28.45		

Data from only Amreli, Anand, Lok Bharthi and Jabalupur (Hot spot) centres were considered, rest of the centre data were rejected due to high C.V/<1000kg/ha yield.

Table 1.5.2

Trial : Initial Varietal Trial
Zone : CENTRAL ZONE
Character : Days To Flower

S. No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	DSb-38	47	41	39	45	40	52	46	43	41	-	40	-	43.4	XIX
2	DS 3105	50	43	46	43	44	52	46	42	44	43	41	-	44.91	XXVII
3	CAUMS 2	49	40	41	42	43	47	45	44	43	42	41	-	43.36	XVIII
4	JS 22-11	46	43	47	45	44	48	48	46	58	41	40	41	45.58	XXXII
5	DLSb-2	47	45	46	42	45	53	50	45	54	43	41	-	46.45	XXXIV
6	RVSM 2012-11	47	38	39	34	41	45	36	40	41	35	36	-	39.27	I
7	RSC 11-39	48	42	45	42	45	46	48	46	58	41	40	39	45	XXVIII
8	AS-15	49	45	45	43	45	53	49	49	56	-	41	-	47.5	XXXVIII
9	PS 1664	49	49	51	46	42	53	49	52	54	-	44	40	48.09	XXXIX
10	MACS 1520 (C)	44	44	46	44	43	47	48	48	57	35	42	-	45.27	XXX
11	HIMSO 1691	49	41	41	42	42	50	43	32	42	41	36	-	41.73	XI
12	JS 22-14	47	39	40	42	40	47	38	36	42	36	36	-	40.27	VI
13	DS 3144	47	43	42	44	45	45	46	42	44	41	38	-	43.36	XVIII
14	DLSb-1	46	41	41	42	43	47	43	37	42	-	40	-	42.2	XV
15	NRC 128	47	43	41	42	44	48	47	46	47	42	40	40	43.92	XXII
16	VLS 101	48	39	40	42	42	45	41	38	40	-	39	-	41.4	IX
17	RSC 11-35	49	46	44	45	45	51	49	41	58	43	41	-	46.55	XXXV
18	PS 1661	46	46	45	45	45	51	47	41	54	43	43	42	45.67	XXXIII
19	Himso- 1692	49	47	47	45	42	52	47	42	44	-	38	-	45.3	XXXI
20	JS 20-116(C)	48	43	45	45	44	48	45	40	42	39	41	35	42.92	XVI
21	RVS 2012-10	44	40	40	36	43	48	39	37	40	41	33	39	40	V
22	PS 1670	45	42	41	46	40	49	46	47	45	45	42	40	44	XXIII
23	NRC 109	45	36	38	36	42	52	34	33	43	-	45	-	40.4	VII
24	MAUS 806	44	35	35	36	42	48	39	39	42	37	38	40	39.58	III
25	RVS 2011-10	45	41	41	36	41	49	36	42	42	37	35	34	39.92	IV
26	MAUS 768	47	41	41	38	42	49	39	44	42	35	36	37	40.92	VIII
27	ASb 36	46	42	42	43	43	51	46	40	48	-	42	-	44.3	XXV
28	ASb 9	48	46	45	44	42	48	47	46	43	-	43	-	45.2	XXIX
29	AUKS 207	47	37	39	42	40	50	39	-	42	-	42	-	42	XIV
30	NRC 86 (C)	44	41	41	42	43	49	42	43	40	39	38	39	41.75	XII
31	AUKS 206	46	43	44	42	41	45	40	-	40	37	39	-	41.7	X

32	MACS 1701	45	37	38	42	36	47	36	36	40	-	36	-	39.3	II
33	KDS 1096	47	42	41	44	40	48	46	48	43	44	42	-	44.09	XXIV
34	MACS 1691	44	41	40	46	43	52	49	47	43	42	43	-	44.55	XXVI
35	KDS 1144	44	43	43	42	44	45	45	43	44	43	37	-	43	XVII
36	BAUS 96-17	46	48	47	45	44	52	49	47	51	47	42	-	47.09	XXXVI
37	BAUS 31-17	47	48	48	43	45	52	49	49	51	45	42	-	47.18	XXXVII
38	TS 20-5	47	41	43	44	42	47	45	44	42	-	39	-	43.4	XIX
39	SL 1212	46	42	43	41	42	49	44	40	56	42	37	-	43.82	XXI
40	SL 1250	47	40	41	42	42	48	44	43	52	44	35	-	43.45	XX
41	DS 1312	48	41	40	42	40	48	42	38	44	40	37	-	41.82	XIII
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	10.7.20	7.7.20	9.7.20	1.7.20	8.7.20	9.7.20	10.7.20	4.7.20	5.7.20	12.7.20	20.7.20	7.7.20		

Table 1.5.3

Trial : Initial Varietal Trial
Zone : CENTRAL ZONE
Character : Days To Harvest Maturity

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	DSb-38	97	92	92	-	99	94	96	101	97	-	101	-	96.56	XVI
2	DS 3105	99	100	103	105	-	102	100	99	95	91	102	-	99.6	XXXII
3	CAUMS 2	99	88	89	-	-	96	93	86	88	86	101	-	91.78	III
4	JS 22-11	96	95	105	103	101	99	98	101	99	91	102	102	99.33	XXIX
5	DLSb-2	97	103	104	-	-	98	101	98	96	98	101	-	99.56	XXXI
6	RVSM 2012-11	98	93	94	97	-	98	94	90	100	89	97	-	95	XIII
7	RSC 11-39	97	97	101	101	101	97	95	93	100	94	100	97	97.75	XXIV
8	AS-15	99	99	100	-	-	98	96	90	102	-	102	-	98.25	XXVI
9	PS 1664	99	102	105	106	-	98	100	100	97	-	105	99	101.1	XXXV
10	MACS 1520 (C)	95	96	103	96	-	97	96	91	102	89	103	-	96.8	XVII
11	HIMSO 1691	98	92	93	-	-	99	96	99	91	83	97	-	94.22	IX
12	JS 22-14	98	87	88	95	-	99	90	91	92	84	96	-	92	IV
13	DS 3144	99	95	94	-	-	97	98	101	95	94	99	-	96.89	XIX
14	DLSb-1	97	93	94	-	-	96	93	90	100	-	101	-	95.5	XIV
15	NRC 128	99	101	102	101	-	99	97	100	100	91	101	100	99.18	XXVIII
16	VLS 101	99	94	95	-	-	94	92	90	94	-	100	-	94.75	XI
17	RSC 11-35	99	94	92	103	-	101	94	96	101	94	102	-	97.6	XXIII
18	PS 1661	96	97	99	104	-	104	98	98	102	93	103	103	99.73	XXXIII
19	Himso- 1692	98	99	102	-	-	99	97	103	95	-	99	-	99	XXVII
20	JS 20-116 (C)	99	91	96	96	-	98	92	89	93	83	102	99	94.36	X
21	RVS 2012-10	97	87	88	96	100	97	91	91	92	93	94	95	93.42	V
22	PS 1670	98	100	102	106	-	101	100	99	101	94	103	100	100.36	XXXIV
23	NRC 109	97	88	91	-	98	100	98	98	99	-	105	-	97.11	XXI
24	MAUS 806	87	88	82	95	89	99	88	84	91	81	99	99	90.17	I
25	RVS 2011-10	89	91	94	93	99	100	91	86	89	81	95	91	91.58	II
26	MAUS 768	97	92	89	95	-	101	94	97	89	84	97	96	93.73	VI
27	ASb 36	98	98	99	-	-	99	99	100	97	-	102	-	99	XXVII
28	ASb 9	99	93	97	-	-	99	98	102	100	-	104	-	99	XXVII
29	AUKS 207	98	91	88	97	98	100	90	-	89	-	103	-	94.89	XII
30	NRC 86 (C)	89	92	94	96	-	98	92	90	102	85	98	98	94	VIII
31	AUKS 206	96	89	90	99	95	97	92	-	95	87	99	-	93.9	VII
32	MACS 1701	95	93	94	-	-	98	92	102	90	-	96	-	95	XIII
33	KDS 1096	99	94	91	-	-	97	97	88	102	90	102	-	95.56	XV

34	MACS 1691	98	89	92	-	-	100	98	104	95	95	102	-	97	XX
35	KDS 1144	96	95	97	101	-	99	100	100	99	91	96	-	97.4	XXII
36	BAUS 96-17	97	101	104	-	-	102	100	101	89	99	102	-	99.44	XXX
37	BAUS 31-17	98	102	105	-	-	102	101	102	88	95	103	-	99.56	XXXI
38	TS 20-5	97	95	94	-	-	98	98	91	101	-	101	-	96.88	XVIII
39	SL 1212	98	98	101	-	-	100	97	101	98	90	97	-	97.78	XXV
40	SL 1250	99	95	97	-	91	101	99	102	100	90	96	-	97	XX
41	DS 1312	98	91	92	-	-	100	97	101	100	85	96	-	95.56	XV
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	10.07.20	07.07.20	09.07.20	01.07.20	08.07.20	09.07.20	10.07.20	04.07.20	05.07.20	12.07.20	20.07.20	07.07.20		

Table 1.5.4

Trial : Initial Varietal Trial
Zone : CENTRAL ZONE
Character : Plant Height (cm)

S.No	Varieties	Amr avati	Amreli	Anand	Indore	Jaba lpur	Kota	Lok Bharti	Mand saur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	DSb-38	52	67	82	36	53	50	87	59	45	-	56	-	58.7	XX
2	DS 3105	52	52	82	46	-	47	76	62	48	26	47	-	53.8	XXIX
3	CAUMS 2	60	59	68	53	-	58	75	69	51	35	55	-	58.3	XXII
4	JS 22-11	52	61	80	75	67	62	93	76	46	41	44	67	63.67	XII
5	DLSb-2	64	95	80	36	-	54	103	79	39	-	37	-	65.22	VII
6	RVSM 2012-11	71	54	72	55	-	63	78	76	56	27	46	-	59.8	XVI
7	RSC 11-39	46	71	75	77	79	60	85	72	55	33	40	50	61.92	XV
8	AS-15	55	94	105	55	-	69	98	82	58	-	53	-	74.33	II
9	PS 1664	48	76	111	69	-	63	102	87	47	-	50	67	72	III
10	MACS 1520 (C)	58	78	105	61	-	51	105	60	44	30	48	-	64	IX
11	HIMSO 1691	52	47	75	40	-	46	72	51	33	28	53	-	49.7	XXXV
12	JS 22-14	48	67	65	62	-	61	86	72	47	32	37	-	57.7	XXIV
13	DS 3144	80	49	65	44	-	52	80	74	50	38	47	-	57.9	XXIII
14	DLSb-1	68	58	103	40	-	40	95	79	49	-	44	-	64	IX
15	NRC 128	49	76	82	86	-	56	103	72	37	37	50	64	64.73	VIII
16	VLS 101	55	51	65	34	-	44	71	58	41	-	46	-	51.67	XXXII
17	RSC 11-35	75	100	106	88	-	64	104	82	51	48	49	-	76.7	I
18	PS 1661	83	74	85	69	-	73	89	73	66	31	53	46	67.45	IV
19	Himso- 1692	72	61	74	44	-	46	97	72	54	-	54	-	63.78	X
20	JS 20-116 (C)	41	81	76	75	-	57	99	86	66	41	38	64	65.82	VI
21	RVS 2012-10	42	40	44	47	58	46	71	59	50	28	32	38	46.25	XL
22	PS 1670	90	62	61	56	-	61	95	76	48	29	57	56	62.82	XIII
23	NRC 109	64	76	85	38	50	44	101	83	51	-	30	-	62.2	XIV
24	MAUS 806	54	53	57	59	63	55	89	70	45	32	38	57	56	XXV
25	RVS 2011-10	54	51	54	51	63	56	79	50	47	26	40	58	52.42	XXXI
26	MAUS 768	61	54	65	47	-	53	82	68	42	33	38	58	54.64	XXVII
27	ASb 36	53	42	65	35	-	49	81	48	25	-	41	-	48.78	XXXVII
28	ASb 9	76	45	67	53	-	51	89	61	37	-	48	-	58.56	XXI
29	AUKS 207	54	41	42	46	60	48	68	-	33	-	30	-	46.89	XXXIX
30	NRC 86 (C)	46	61	76	55	-	62	77	68	37	30	40	44	54.18	XXVIII
31	AUKS 206	70	30	88	46	66	48	39	-	39	28	28	-	48.2	XXXVIII
32	MACS 1701	53	54	60	41	-	45	73	63	44	-	43	-	52.89	XXX
33	KDS 1096	54	65	76	65	-	63	89	69	37	36	40	-	59.4	XVIII
34	MACS 1691	62	57	62	34	-	48	84	60	39	37	33	-	51.6	XXXIII

35	KDS 1144	57	52	104	50	-	59	82	78	43	31	39	-	59.5	XVII
36	BAUS 96-17	73	78	100	54	-	54	103	58	32	40	45	-	63.7	XI
37	BAUS 31-17	64	92	101	47	-	58	120	68	41	38	44	-	67.3	V
38	TS 20-5	83	52	60	52	-	54	99	59	34	-	40	-	59.22	XIX
39	SL 1212	61	46	62	44	-	52	78	64	34	31	42	-	51.4	XXXIV
40	SL 1250	75	47	74	47	65	53	80	64	35	29	43	-	55.64	XXVI
41	DS 1312	49	45	66	35	-	48	78	66	41	25	43	-	49.6	XXXVI
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	10-07-20	07-07-20	09-07-20	01-07-20	08-07-20	09-07-20	10-07-20	04-07-20	05-07-20	12-07-20	20-07-20	07-07-20		

Table 1.5.5

Trial : Initial Varietal Trial
Zone : CENTRAL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	DSb-38	-	9.62	10.27	-	7.87	9.03	9.83	7.28	9.2	-	8.94	-	9.01	XII
2	DS 3105	5.97	7.84	8.77	6.9	-	8.23	7.67	7.43	8.33	9.4	13.54	-	8.41	XVII
3	CAUMS 2	6.05	8.88	9.73	-	-	7.8	9.5	6.94	9.02	8.07	9.86	-	8.43	XVI
4	JS 22-11	6.47	6.74	7.03	7.4	8.83	10.4	6.67	7.01	9.37	8.3	10.62	9.5	8.2	XX
5	DLSb-2	6.25	7.07	7.65	-	-	8.23	8	7.36	6.98	-	9.07	-	7.58	XXXI
6	RVSM 2012-11	6.63	11.26	12.67	8	-	9.7	11	7.56	8.49	9.7	9.17	-	9.42	VI
7	RSC 11-39	7.72	8.23	8.38	7.53	8.23	9.67	7.33	6.54	7.84	8.27	10.75	7.83	8.19	XXI
8	AS-15	6.8	8.14	8.81	-	-	8.07	7.5	8.41	7.15	-	8.55	-	7.93	XXVIII
9	PS 1664	6.5	6.08	8.9	7.7	-	8.83	6.33	7.61	7.49	-	11.6	8.5	7.95	XXVII
10	MACS 1520(C)	7.3	8.28	8.39	6.67	-	8.9	6.33	6.7	7.85	9.5	10.77	-	8.07	XXIV
11	HIMSO 1691	6.72	10.87	11.46	-	-	7.83	11.83	7.99	8.01	10.5	9.47	-	9.41	VII
12	JS 22-14	8.13	10.4	12.2	7.53	-	8.77	8.67	8	9.03	10.27	13.93	-	9.69	IV
13	DS 3144	5.83	7.24	8.21	-	-	8	6.5	6.59	6.71	-	9.75	-	7.35	XXXIII
14	DLSb-1	-	10.22	10.97	-	-	7.87	8.67	6.57	9.91	-	10.31	-	9.22	X
15	NRC 128	8.63	8.26	9.05	9.6	-	10.17	7	8.42	8.68	8.8	14.59	10	9.38	VIII
16	VLS 101	4.75	10.25	10.18	-	-	8.33	9.5	6.67	7.53	-	12.02	-	8.65	XV
17	RSC 11-35	7.63	8.15	8.66	8.4	-	9.53	6.17	8.72	8.08	9.83	11.3	-	8.65	XV
18	PS 1661	7.05	6.24	7.71	8.03	-	8.77	7.67	6.73	6.5	8	10.05	8.5	7.75	XXX
19	Himso- 1692	7.13	9.57	9.77	-	-	7.87	8.17	6.87	8.71	-	16.05	-	9.27	IX
20	JS 20-116 (C)	6.63	7.77	8.41	7.37	-	9.23	8.5	6.53	6.68	9.73	10.69	10.5	8.37	XVIII
21	RVS 2012-10	8.38	8.54	9.72	9.17	9.7	9.1	8.33	8.66	9.03	8.1	11.41	7.83	9	XIII
22	PS 1670	8.8	7.61	8.16	9.73	-	10.2	7.5	8.54	8.51	9.03	11.81	9.67	9.05	XI
23	NRC 109	-	12.81	11.26	-	7.03	9.2	12.83	8.59	9.44	-	12.13	-	10.41	I
24	MAUS 806	9.17	10.41	11.97	9.13	10.1	10.2	10	10.37	8.57	11.97	10.36	11.5	10.31	II
25	RVS 2011-10	7.97	8.93	9.69	8.27	8.73	8.47	8.5	7.51	6.54	9.67	9.7	9.83	8.65	XV
26	MAUS 768	8.72	10.77	11.62	8.17	-	9.63	9.83	9.39	8.96	11	11.34	8.83	9.84	III
27	ASb 36	5.5	8.61	9.32	-	-	7.8	9.17	7.17	8.27	-	8.05	-	7.99	XXVI
28	ASb 9	-	8.32	9.04	-	-	7.87	9	7.03	8.64	-	12.05	-	8.85	XIV
29	AUKS 207	9.75	9.01	10.25	8.63	9.43	7.73	8.83	-	10.15	-	10.93	-	9.41	VII
30	NRC 86 (C)	7.63	8.31	8.43	6.1	-	8.1	8.17	6.65	8.34	11.1	9.97	7.17	8.18	XXII
31	AUKS 206	7.75	8.6	9.06	8.47	9.87	7.27	9.83	-	8.19	8.5	8.99	-	8.65	XV
32	MACS 1701	7.3	10.81	12.01	-	-	8.27	11.17	8.15	7.87	7.67	13.35	-	9.62	V
33	KDS 1096	-	8.19	8.52	-	-	7.63	6.67	7.28	8.33	-	12.25	-	8.41	XVII
34	MACS 1691	-	6.19	8.76	-	-	8.43	7.5	7.33	7.46	-	11.07	-	8.11	XXIII

35	KDS 1144	6.45	8.26	9.05	7	-	9.37	7.17	6.21	8.73	-	9.78	-	8	XXV
36	BAUS 96-17	5.38	8.12	8.55	-	-	7.77	8.83	-	8.54	-	9.33	-	8.07	XXIV
37	BAUS 31-17	5.45	7.73	8.54	-	-	7.57	6.5	6.53	7.44	-	8.7	-	7.31	XXXIV
38	TS 20-5	5.25	7.41	8.49	-	-	7.87	8.17	8.59	8.69	-	12.23	-	8.34	XIX
39	SL 1212	4.4	6.55	8.05	-	-	8.4	6	5.58	5.72	-	9.51	-	6.78	XXXV
40	SL 1250	5.83	8.31	9.3	-	7.37	8.27	6.17	6.66	7.37	7.67	10.87	-	7.78	XXIX
41	DS 1312	4.97	7.53	8.46	-	-	8.47	7.17	6.77	6.9	8.83	8.11	-	7.47	XXXII
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	10-07-20	07-07-20	09-07-20	01-07-20	08-07-20	09-07-20	10-07-20	04-07-20	05-07-20	12-07-20	20-07-20	07-07-20		

Table 1.5.6

Trial : Initial Varietal Trial : Early
Zone : CENTRAL ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Amravati	Amreli	Anand	Indore#	Jabalpur	Kota#	Lok Bharti	Mandsaur#	Morena	Parbhani	Sehore	Mean	Rank
1	NRC 174	395	840	296	-	173	-	988	-	914	1284	494	673	XXIV
2	NRC 186	1975	1827	1556	2099	1062	938	1654	988	1951	1778	2025	1729	VI
3	DS 3152	2272	2568	2148	-	247	691	2198	988	1827	1802	543	1701	VII
4	RVS 2011-4	2395	2444	2074	1778	296	1037	2593	1432	1531	1852	1975	1895	III
5	PS 1659	2272	1951	1580	1136	296	840	1309	691	1481	1877	988	1469	XIII
6	NRC 173	1926	2321	1877	-	222	815	1481	815	840	1160	1210	1380	XVI
7	RVSM 2012-4	1877	2519	2395	1407	370	1333	2099	790	1580	1951	1901	1837	IV
8	PS 1660	2469	2123	1654	1358	222	963	1778	1284	1802	1457	1605	1639	VIII
9	NRC 172	1654	2444	2123	765	321	765	1531	667	963	1753	914	1463	XIV
10	JS 20-34 (C)	1407	2222	2247	-	272	1160	2691	914	1235	1877	963	1614	IX
11	JS 22-12	1975	2420	1901	-	1407	1235	2444	1037	1556	2593	1605	1988	I
12	NRC 175	938	1210	1111	-	123	519	395	617	1012	1086	642	815	XXII
13	PS 1569	1259	1654	2025	-	74	519	840	617	1235	1901	765	1219	XVIII
14	JS 22-18	2148	2272	1778	-	1556	1185	2444	1037	1358	1556	1432	1818	V
15	NRC 177	1778	2000	1753	-	173	519	1753	1086	1235	2074	1580	1543	XI
16	JS 22-16	1975	2247	2272	-	741	1062	2543	815	1852	1580	2000	1901	II
17	NRC 178	1506	2025	1407	-	272	840	1531	790	963	2099	2025	1479	XII
18	NRC 183	914	1531	1383	-	198	420	1284	370	1136	1383	765	1074	XIX
19	NRC 182	741	1111	1210	-	198	519	1728	420	1062	1778	617	1056	XXI
20	JS 95-60(C)	1259	321	1160	-	0	469	1358	1012	1457	2444	568	1071	XX
21	NRC 181	2272	1679	1975	1309	321	1136	2173	938	1210	1679	1556	1608	X
22	NRC 179	1062	2000	1235	-	0	617	1778	370	1210	1506	988	1222	XVII
23	NRC 180	1778	2198	1185	-	0	617	2494	198	1210	1654	765	1411	XV
24	AUKS 203	272	222	222	-	173	420	99	-	1333	1383	667	546	XXVI
25	AUKS 199	321	247	173	593	173	-	99	198	1728	1160	840	593	XXV
26	MACS NRC 1711	691	123	1012	-	0	370	198	74	1481	1728	914	768	XXIII
	Mean	1520.42	1712.27	1528.92	1305.63	341.9	791.21	1595.5	756.17	1352.38	1707.5	1167.19	1336.0	
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	10-07-20	07-07-20	09-07-20	01-07-20	08-07-20	#####	10-07-20	04-07-20	05-07-20	12-07-20	20-07-20		
	CD	222.22	345.68	172.84	444.44	74.07	172.84	395.06	617.28	493.83	296.3	197.53		
	CV (5%)	8.92	12.07	7.28	77.54	12.6	14.48	15.42	55.01	22.21	10.69	9.76		

#Data from Indore, Kota and mandsaur rejected due to high CV/<1000kg/ha yield. Jabalpur (Hot spot) centre data was considered.

Table 1.5.7

Trial : Initial Varietal Trial : Early
Zone : CENTRAL ZONE
Character : Days To Flower

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Parbhani	Sehore	Mean	Rank
1	NRC 174	35	34	35	38	40	-	38	-	40	32	37	36.56	XIV
2	NRC 186	45	44	46	48	43	47	49	43	39	35	45	44	XXI
3	DS 3152	44	41	40	40	40	49	42	41	38	35	40	40.91	XX
4	RVS 2011-4	39	41	40	41	40	48	45	41	37	36	39	40.64	XIX
5	PS 1659	47	45	48	47	48	50	51	47	47	39	46	46.82	XXIII
6	NRC 173	35	37	38	35	33	39	38	41	34	32	37	36.27	XIII
7	RVSM 2012-4	35	34	33	38	36	38	39	35	34	32	37	35.55	XI
8	PS 1660	47	43	47	49	44	48	50	47	45	41	44	45.91	XXII
9	NRC 172	38	36	37	39	36	41	35	37	36	33	36	36.73	XVI
10	JS 20-34(C)	33	29	30	34	33	34	35	28	34	29	33	32	IV
11	JS 22-12	40	39	38	37	35	36	38	37	37	33	33	36.64	XV
12	NRC 175	35	27	31	26	34	32	31	29	33	28	32	30.73	I
13	PS 1569	32	35	37	38	34	37	38	43	39	25	36	35.82	XII
14	JS 22-18	35	34	37	40	33	40	40	37	38	32	37	36.64	XV
15	NRC 177	35	33	34	32	34	40	37	36	35	31	35	34.73	IX
16	JS 22-16	31	36	37	36	32	37	37	38	37	31	36	35.27	X
17	NRC 178	32	31	33	35	33	38	36	30	34	31	32	33.18	VI
18	NRC 183	32	33	33	34	35	38	36	32	34	26	33	33.27	VII
19	NRC 182	32	32	32	34	33	38	37	41	35	27	31	33.82	VIII
20	JS 95-60(C)	32	27	33	31	33	33	35	28	34	29	32	31.55	III
21	NRC 181	34	31	32	35	35	39	37	27	36	31	35	33.82	VIII
22	NRC 179	30	28	30	31	32	35	30	27	39	29	35	31.45	II
23	NRC 180	30	31	32	31	33	39	30	31	39	30	37	33	V
24	AUKS 203	41	40	42	43	38	41	41	-	39	37	41	40.3	XVIII
25	AUKS 199	40	40	42	44	39	-	44	41	35	37	41	40.3	XVIII
26	MACS NRC 1711	39	40	41	40	37	34	43	38	39	35	40	38.73	XVII
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	25-06-20	07-07-20	09-07-20	01-07-20	29-06-20	09-07-20	11-07-20	26-06-20	08-07-20	03-07-20	24-06-20		

Table 1.5.8

Trial : Initial Varietal Trial : Early
Zone : CENTRAL ZONE
Character : Days To Maturity

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Parbhani	Sehore	Mean	Rank
1	NRC 174	91	91	86	-	88	-	91	-	92	93	87	89.88	IX
2	NRC 186	93	93	90	102	91	92	93	104	98	96	101	95.73	XXIII
3	DS 3152	93	96	93	103	88	90	96	99	85	97	100	94.55	XXI
4	RVS 2011-4	91	93	91	104	94	92	96	98	88	98	104	95.36	XXII
5	PS 1659	95	98	101	102	97	93	97	99	92	100	108	98.36	XXV
6	NRC 173	90	88	89	-	95	98	91	85	86	93	100	91.5	XV
7	RVSM 2012-4	92	87	85	101	94	89	86	88	90	94	95	91	XIII
8	PS 1660	96	99	100	102	93	96	96	103	85	103	102	97.73	XXIV
9	NRC 172	91	87	88	103	94	94	89	102	87	94	99	93.45	XX
10	JS 20-34(C)	91	83	81	-	95	88	82	104	87	89	98	89.8	VIII
11	JS 22-12	90	87	89	-	89	88	87	85	88	93	100	89.6	VI
12	NRC 175	93	78	81	-	94	86	78	86	86	84	87	85.3	II
13	PS 1569	91	82	80	-	91	85	79	84	85	86	86	84.9	I
14	JS 22-18	89	84	84	-	88	89	88	98	85	93	98	89.6	VI
15	NRC 177	90	92	91	-	93	100	94	88	87	94	101	93	XVIII
16	JS 22-16	90	87	84	-	90	91	86	94	89	92	97	90	X
17	NRC 178	92	90	92	-	95	95	92	100	84	91	100	93.1	XIX
18	NRC 183	90	83	84	-	93	86	82	94	86	86	89	87.3	IV
19	NRC 182	90	81	82	-	90	85	82	84	86	86	88	85.4	III
20	JS 95-60(C)	90	84	84	100	-	91	78	88	85	88	88	87.6	V
21	NRC 181	91	83	85	103	90	89	88	94	91	93	98	91.36	XIV
22	NRC 179	87	89	87	101	-	90	86	92	86	90	89	89.7	VII
23	NRC 180	87	89	91	99	-	90	91	105	90	91	95	92.8	XVI
24	AUKS 203	91	96	93	-	96	92	91	-	86	98	93	92.89	XVII
25	AUKS 199	92	87	88	99	89	-	82	89	85	97	98	90.6	XI
26	MACS NRC 1711	89	85	87	96	-	91	94	90	84	96	96	90.8	XII
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	25-06-20	07-07-20	09-07-20	01-07-20	29-06-20	09-07-20	11-07-20	26-06-20	08-07-20	03-07-20	24-06-20		

Table 1.5.9

Trial : Initial Varietal Trial : Early
Zone : CENTRAL ZONE
Character : Plant Height (cm)

S. No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Parbhani	Sehore	Mean	Rank
1	NRC 174	29	28	37	-	31	-	33	-	29	38	33	32.25	XXV
2	NRC 186	80	65	51	70	67	63	74	74	42	66	68	65.45	II
3	DS 3152	72	56	57	-	57	48	77	73	48	54	45	58.7	IX
4	RVS 2011-4	55	63	57	55	59	51	75	76	43	63	60	59.73	VIII
5	PS 1659	60	67	53	55	68	57	88	81	43	59	55	62.36	VI
6	NRC 173	63	68	56	-	55	55	77	80	41	63	69	62.7	IV
7	RVSM 2012-4	61	48	49	44	56	41	72	64	41	57	68	54.64	XII
8	PS 1660	70	79	60	55	65	59	76	84	53	63	74	67.09	I
9	NRC 172	54	67	58	46	68	37	74	88	42	70	80	62.18	VII
10	JS 20-34(C)	43	33	45	-	37	38	54	58	35	39	44	42.6	XXI
11	JS 22-12	47	42	50	-	46	41	71	64	34	45	60	50	XIV
12	NRC 175	32	22	28	-	34	29	20	43	28	40	25	30.1	XXVI
13	PS 1569	35	31	34	-	51	38	41	66	33	50	34	41.3	XXII
14	JS 22-18	47	42	55	-	63	40	72	66	47	52	63	54.7	XI
15	NRC 177	41	49	46	-	41	42	71	46	32	43	55	46.6	XVII
16	JS 22-16	40	42	45	-	49	41	64	53	33	47	56	47	XVI
17	NRC 178	36	40	41	-	41	40	66	43	41	49	44	44.1	XIX
18	NRC 183	42	37	37	-	43	37	77	60	37	55	41	46.6	XVIII
19	NRC 182	50	35	50	-	48	36	75	59	38	52	54	49.7	XV
20	JS 95-60(C)	46	28	41	45	-	38	60	62	30	48	42	44	XX
21	NRC 181	42	58	63	61	68	52	92	92	49	78	57	64.73	III
22	NRC 179	57	59	61	35	-	43	83	82	36	59	46	56.1	X
23	NRC 180	60	74	66	31	-	54	92	98	40	71	42	62.8	V
24	AUKS 203	32	39	37	-	48	42	35	-	31	44	35	38.11	XXIV
25	AUKS 199	33	36	41	40	38	-	45	41	42	48	41	40.5	XXIII
26	MACS NRC 1711	62	37	46	25	-	42	89	62	37	75	53	52.8	XIII
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	25-06-20	07-07-20	09-07-20	01-07-20	29-06-20	09-07-20	11-07-20	26-06-20	08-07-20	03-07-20	24-06-20		

Table 1.5.10

Trial : Initial Varietal Trial : Early
Zone : CENTRAL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Parbhani	Sehore	Mean	Rank
1	NRC 174	16.33	15.25	13.82	-	11	-	14.67	-	8.81	17.85	16.5	14.28	II
2	NRC 186	8.13	6.47	9.92	8.03	8.33	8.93	5.33	6.74	6.5	10.43	9.83	8.06	XXV
3	DS 3152	8.38	9.06	10.9	-	8.17	8.3	8.33	7.65	9.16	12.85	7.67	9.05	XXIII
4	RVS 2011-4	12.5	10.11	11.59	11.63	9.27	9.8	8	11.41	11.27	15.63	10.5	11.06	X
5	PS 1659	8.75	6.18	9.4	7.2	8.43	8.37	5.83	6.79	7.39	9.93	7.67	7.81	XXVI
6	NRC 173	11.22	11.51	10.95	-	9.33	8.13	10.83	10.43	7.38	13.71	10.5	10.4	XVII
7	RVSM 2012-4	11.5	10.22	11.76	9.17	9.77	7.67	9.83	9.6	9.21	12.08	10.5	10.12	XIX
8	PS 1660	10.58	6.95	8.9	7.93	9	8.63	6	7.16	7.22	11.22	10.5	8.55	XXIV
9	NRC 172	13.58	15.07	12.58	12.1	11.9	11.27	13.33	13.35	9.45	17.01	12.33	12.91	IV
10	JS 20-34(C)	11.97	11.56	11.96	-	8.67	8.47	11.33	11.11	9.22	15.52	10.5	11.03	XI
11	JS 22-12	11.25	10.74	10.55	-	12.47	8.7	10.33	10.03	8.71	13.46	11.67	10.79	XII
12	NRC 175	10.83	10.14	11.42	-	9.63	8.13	7.67	10.35	9.26	12.95	10.5	10.09	XX
13	PS 1569	11.33	11.08	11.17	-	10.67	8.2	9.5	10.1	8.59	14.17	10.5	10.53	XVI
14	JS 22-18	11.5	11.89	11.68	-	12.5	9.2	11.17	12.42	7.48	15.33	13.67	11.68	VI
15	NRC 177	14.75	14.06	12.42	-	10.37	11.3	14.33	17.09	10.07	20.47	16.33	14.12	III
16	JS 22-16	9.08	10.38	11.87	-	10.73	7.53	10	9.35	7.77	12.73	10.5	9.99	XXII
17	NRC 178	15.22	13.99	13.67	-	11.87	11.17	13.83	14.9	11.92	20.59	17.67	14.48	I
18	NRC 183	10.25	11.37	12.76	-	7.97	8.47	9.83	13.38	9.96	11.25	12.33	10.76	XIII
19	NRC 182	10.22	9.08	10.41	-	8.83	8	9.67	11.62	8.01	12.95	11.67	10.05	XXI
20	JS 95-60(C)	12.25	12.64	12.94	-	-	6.7	13.33	11.21	9.95	15.86	7.67	11.39	VII
21	NRC 181	11.25	11.39	12.01	11.6	11.5	10.2	13	12.79	9.98	15.26	12.33	11.94	V
22	NRC 179	10.83	12.16	12.06	-	-	8.23	12.17	9.62	9.92	15.37	10.5	11.21	IX
23	NRC 180	12.08	12.7	11.91	-	-	7.63	12.67	9.66	8.69	15.54	11.17	11.34	VIII
24	AUKS 203	12.42	9.98	10.79	10.85	9.63	8.97	9	-	8.43	13.04	12.5	10.56	XV
25	AUKS 199	11.5	8.71	10.08	10.3	10.73	-	7.83	12.39	9.98	13.1	11.67	10.63	XIV
26	MACS NRC 1711	9.22	9.19	10.67	-	-	7.27	12	9.75	8.21	15.94	10.67	10.32	XVIII
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.05		
	DOS	25-06-20	07-07-20	09-07-20	01-07-20	29-06-20	09-07-20	11-07-20	26-06-20	08-07-20	03-07-20	24-06-20		

Table 1.5.11

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Hara Soya(C)	-	1259	1259	IV
2	NRC 188	1926	1407	1666.5	II
3	JS 95-60(C)	-	1778	1778	I
4	NRC 187	-	1481	1481	III
5	Karune(C)	-	469	469	V
	Mean	1926	1278.8		
	N.P.S.(Sqm)	4.05	4.05		
	DOS	02-07-20	19-07-20		
	CD	98.77	395.06		
	CV (5%)	15.17	16.57		

Table 1.5.12

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Green Pod Yield (Kg/ha) at Picking

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Hara Soya (C)	-	3745	3745	IV
2	NRC 188	6370	3868	5119	II
3	JS 95-60 (C)	-	5329	5329	I
4	NRC 187	-	4387	4387	III
5	Karune(C)	-	1408	1408	V
	N.P.S.(Sqm)	4.05	4.05		
	DOS	02-07-20	19-07-20		

Table 1.5.13

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Days To Flower

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Hara Soya(C)	-	33	33	IV
2	NRC 188	32	31	31.5	III
3	JS 95-60(C)	-	30	30	II
4	NRC 187	-	25	25	I
5	Karune(C)	-	33	33	IV
	N.P.S.(Sqm)	8.1	4.05		
	DOS	02-07-20	19-07-20		

Table 1.5.14

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Days To Picking at R6

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Hara Soya(C)	-	75	75	II
2	NRC 188	82	75	78.5	III
3	JS 95-60(C)	-	69	69	I
4	NRC 187	-	69	69	I
5	Karune(C)	-	75	75	II
	N.P.S.(Sqm)	8.1	4.05		
	DOS	2/7/2020	19/07/2020		

Table 1.5.15

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Days To Maturity

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Hara Soya(C)	-	93	93	III
2	NRC 188	119	91	105	IV
3	JS 95-60(C)	-	91	91	II
4	NRC 187	-	87	87	I
5	Karune(C)	-	93	93	III
	N.P.S.(Sqm)	8.1	4.05		
	DOS	02-07-20	19-07-20		

Table 1.5.16

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Plant Height (cm)

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Hara Soya(C)	-	39	39	II
2	NRC 188	53	44	48.5	I
3	JS 95-60(C)	-	23	23	IV
4	NRC 187	-	19	19	V
5	Karune(C)	-	28	28	III
	N.P.S.(Sqm)	8.1	4.05		
	DOS	2/7/2020	19/07/2020		

Table 1.5.17

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : 100 Green Seed Weight at picking

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Hara Soya(C)	-	28.01	28.01	V
2	NRC 188	43.89	49.06	46.48	II
3	JS 95-60(C)	-	28.7	28.7	IV
4	NRC 187	-	40.55	40.55	III
5	Karune(C)	-	54.27	54.27	I
	N.P.S.(Sqm)	8.1	4.05		
	DOS	02-07-20	19-07-20		

Table 1.5.18

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Indore	Mean	Rank
1	Hara Soya(C)	-	-	
2	NRC 188	20.17	20.17	I
3	JS 95-60(C)	-	-	
4	NRC 187	-	-	
5	Karune(C)	-	-	
	N.P.S.(Sqm)	8.1		
	DOS	02-07-20		

Table 1.5.19

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Moisture % at Picking Stage

S.No	Varieties	Parbhani	Mean	Rank
1	Hara Soya(C)	26.89	26.89	V
2	NRC 188	28.4	28.4	IV
3	JS 95-60(C)	30.87	30.87	I
4	NRC 187	29.27	29.27	II
5	Karune(C)	28.6	28.6	III
	N.P.S.(Sqm)	4.05		
	DOS	19-07-20		

Table 1.5.18

Trial : Advanced Varietal Trial I and II
Zone : CENTRAL ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Amravati	Amreli	Anand	Indore#	Jabalpur#	Lok Bharti	Morena	Nagpur#	Parbhani	Sehore#	Mean	Rank
1	NRC 149	2329	2315	1944	1422	0	2120	1926	69	1477	222	1730.143	XII
2	HIMSO 1689*	2301	2847	2625	116	315	2815	1968	37	1824	582	2099.286	IV
3	JS 21-72*	1713	3046	2583	1089	1713	3014	1583	356	1880	1000	2218.857	III
4	RVSM 2011-35**	2269	3162	2736	1351	1227	3028	2324	130	1884	1396	2375.714	I
5	NRCSL2**#	810	2699	1806	133	0	2454	1611	153	1681	244	1580.143	XIII
6	NRC 138**	1954	2907	2509	1138	1032	2338	1458	-	1727	1244	1989.286	VII
7	AMS 100-39***	2625	3051	2477	533	796	2875	1898	366	1931	724	2236.143	II
8	NRC 142**$	2106	2481	2241	960	1287	2833	1417	-	2028	1307	2056.143	V
9	NRC 86(C)	1727	2704	2292	280	625	2556	1583	185	2042	613	1932.714	IX
10	JS 20-34(C)	1236	2417	2222	551	718	2602	1319	-	1750	476	1752	XI
11	JS 20-98(C)	1940	3023	2282	1778	1134	2639	1273	356	1745	1178	2005.143	VI
12	RSC 10-46(C)	2028	2833	2116	1396	773	2417	1352	93	1810	489	1904.143	X
13	JS 335**(C)	1204	3014	2394	116	870	2917	1778	343	1722	236	1985.571	VIII
	Mean	1864.77	2807.62	2325.15	835.62	806.9	2662.15	1653.08	208.8	1807.77	747	1989.0	
	N.P.S.(Sqm)	21.6	21.6	21.6	22.5	21.6	21.6	21.6	21.6	21.6	22.5	21.6	
	DOS	44002	43999	44002	44011	44013	44021	44018	44025	44005	44005	44008.57	
	CD	268.52	310.19	328.7	204.44	120.37	245.37	347.22	106.48	162.04	102.22	254.63	
	CV (5%)	10.05	7.7	9.87	17.12	10.29	6.39	14.64	47.11	6.26	9.38	9.314286	

*Repeat AVT I entries.
**AVT II Entries, #NRCSL 2 is EDV and would be compared with JS 335 only. NRC 138 is early maturing entry and would be compared with JS 20-34 only. $NRC 142 null lipoxygenase and KTI entry.
***Repeat AVT II entry. Data from Indore, Nagpur, and Sehore centres were rejected due to <1000kg/ha yield. Data from Jabalpur centre was considered (Hot spot).

Table 1.5.19

Trial : Advanced Varietal Trial I and II
Zone : CENTRAL ZONE
Character : Days To Flower

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Lok Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	NRC 149	44	52	50	41	42	42	42	40	39	42	43.4	XI
2	HIMSO 1689*	48	45	43	45	42	43	40	34	43	38	42.1	VII
3	JS 21-72*	41	43	41	40	41	41	41	38	42	42	41	IV
4	RVSM 2011-35**	41	45	43	40	41	43	39	34	39	38	40.3	III
5	NRCSL2**#	46	43	50	40	42	42	39	40	41	41	42.4	IX
6	NRC 138**	37	35	37	32	34	46	40	-	33	31	36.11	II
7	AMS 100-39***	44	45	44	45	42	43	42	37	43	42	42.7	X
8	NRC 142**$	41	41	42	45	41	42	41	-	41	41	41.67	V
9	NRC 86(C)	48	43	42	43	42	44	42	37	40	39	42	VI
10	JS 20-34(C)	34	34	32	33	33	43	49	-	30	31	35.44	I
11	JS 20-98(C)	45	45	43	44	42	39	47	37	37	41	42	VI
12	RSC 10-46(C)	48	52	50	45	44	47	42	38	43	42	45.1	XII
13	JS 335**(C)	46	46	49	39	42	43	40	34	40	43	42.2	VIII
	N.P.S.(Sqm)	21.6	21.6	21.6	22.5	21.6	21.6	21.6	21.6	21.6	22.5		
	DOS	6/20/2020	#######	6/20/2020	######	7/1/2020	7/9/2020	7/6/2020	7/13/2020	6/23/2020	6/23/2020		

Table 1.5.20

Trial : Advanced Varietal Trial I and II
Zone : CENTRAL ZONE
Character : Days To Harvest Maturity

Sl. No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Lok Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	NRC 149	98	110	112	109	-	100	104	89	99	107	103.11	XIII
2	HIMSO 1689*	101	103	100	96	102	94	95	89	103	101	98.4	VII
3	JS 21-72*	94	101	103	96	103	94	95	89	102	101	97.8	VI
4	RVSM 2011-35**	93	102	101	101	105	95	94	87	99	100	97.7	V
5	NRCSL2**#	99	108	113	-	-	96	96	93	101	104	101.25	XI
6	NRC 138**	88	87	87	97	98	96	86	-	95	102	92.89	II
7	AMS 100-39***	95	97	96	96	99	87	97	81	103	98	94.9	III
8	NRC 142**$	92	90	89	97	103	100	87	-	101	99	95.33	IV
9	NRC 86(C)	100	108	106	102	105	93	95	90	101	101	100.1	IX
10	JS 20-34(C)	86	87	84	92	100	94	93	-	90	96	91.33	I
11	JS 20-98(C)	99	104	104	99	105	93	97	87	99	103	99	VIII
12	RSC 10-46(C)	101	112	111	106	105	97	100	86	104	107	102.9	XII
13	JS 335**(C)	100	104	107	-	105	95	95	91	100	105	100.22	X
	N.P.S.(Sqm)	21.6	21.6	21.6	22.5	21.6	21.6	21.6	21.6	21.6	22.5		
	DOS	6/20/2020	#######	6/20/2020	######	7/1/2020	7/9/2020	7/6/2020	7/13/2020	6/23/2020	6/23/2020		

Table 1.5.21

Trial : Advanced Varietal Trial I and II
Zone : CENTRAL ZONE
Character : Plant Height (cm)

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Lok Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	NRC 149	87	72	73	80	-	103	43	37	60	93	72	I
2	HIMSO 1689*	62	61	64	53	70	84	34	27	57	62	57.4	XI
3	JS 21-72*	69	73	73	73	72	83	43	36	46	73	64.1	V
4	RVSM 2011-35**	66	65	65	61	69	84	42	30	54	70	60.6	VI
5	NRCSL2**#	45	63	64	52	-	79	54	32	60	78	58.56	VIII
6	NRC 138**	49	63	63	56	60	85	30	-	51	57	57.11	XII
7	AMS 100-39***	66	71	70	65	58	97	45	38	57	79	64.6	IV
8	NRC 142**$	58	78	74	53	67	76	28	-	72	91	66.33	III
9	NRC 86(C)	53	62	64	49	70	90	37	28	66	66	58.5	IX
10	JS 20-34(C)	39	22	35	31	57	79	31	-	27	37	39.78	XIII
11	JS 20-98(C)	50	69	66	60	80	87	32	33	44	58	57.9	X
12	RSC 10-46(C)	74	83	78	76	79	98	52	35	74	69	71.8	II
13	JS 335**(C)	54	65	59	58	75	86	40	37	47	69	59	VII
	N.P.S.(Sqm)	21.6	21.6	21.6	22.5	21.6	21.6	21.6	21.6	21.6	22.5		
	DOS	6/20/2020	#######	6/20/2020	######	7/1/2020	7/9/2020	7/6/2020	7/13/2020	6/23/2020	6/23/2020		

Table 1.5.22

Trial : Advanced Varietal Trial I and II
Zone : CENTRAL ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Lok Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	NRC 149	10.79	8.64	8.06	9.77	-	8.5	9.45	9.45	13.09	7.88	9.51	VIII
2	HIMSO 1689*	9.88	8.97	8.1	6.58	8.43	9.25	9.64	10.1	11.64	8.5	9.11	XI
3	JS 21-72*	11.06	11.64	10.95	9.53	12.5	11.75	10.46	13.48	12.13	12.13	11.56	I
4	RVSM 2011-35**	10.94	11.05	10.83	10.43	9.88	11	9.6	10.5	14.25	12.25	11.07	III
5	NRCSL2**#	9.38	9.63	9.07	6.75	-	8.13	9.91	9.32	13.29	7.38	9.21	X
6	NRC 138**	11.41	9.15	8.99	8.45	10.18	6	8.97	-	10.03	10.63	9.31	IX
7	AMS 100-39***	12.24	11.98	11	9.5	11.68	10.75	9.45	11.05	12.82	10.5	11.1	II
8	NRC 142**$	11.54	10.58	10.03	8.47	11.5	7.13	8.26	-	13.05	12.25	10.31	V
9	NRC 86(C)	10.04	9.04	9.3	6.72	9.92	7.63	8.57	9.65	11.65	8.5	9.1	XII
10	JS 20-34(C)	11.75	13.58	12.18	9.35	8.7	9.75	8.83	-	14.96	10.25	11.04	IV
11	JS 20-98(C)	12.41	9.51	10.05	8.98	9.53	7.75	8.58	8.47	11.94	10.75	9.8	VI
12	RSC 10-46(C)	10.04	8.38	8.57	8.25	9.85	7.38	8.39	7.95	11.78	8.63	8.92	XIII
13	JS 335**(C)	10.04	9.71	10.56	7.45	9.8	9	8.94	10.18	11.8	7.75	9.52	VII
	N.P.S.(Sqm)	21.6	21.6	21.6	22.5	21.6	21.6	21.6	21.6	21.6	22.5		
	DOS	6/20/2020	#######	6/20/2020	######	7/1/2020	7/9/2020	7/6/2020	7/13/2020	6/23/2020	6/23/2020		

Table 1.5.23

Trial : Advanced Varietal Trial I and II
Zone : CENTRAL ZONE
Character : Oil Content (%)

Sr. No.	Name of Variety	Location							
		Jabalpur	Parbhani	Amravati	Lokbharati	Amrelli	Sehore	Morena	Mean
1	NRC 142**$	22.75	21.38	22.52	23.07	20.67	21.68	22.21	22.04
2	JS335(C)	20.65	19.44	20.5	20.95	18.21	19.83	21.72	20.19
3	RVSM 2011-35**	20.24	18.70	21.14	19.62	16.2	19.08	21.28	19.47
4	RSC 10-46 (C)	22.23	19.96	21.85	18.76	19.00	17.90	21.61	20.19
5	JS 20-98 (C)	21.15	18.68	21.53	20.85	17.57	20.07	21.84	20.24
6	JS 20-34 (C)	21.19	17.49	20.85	21.16	18.53	18.71	21.83	19.97
7	NRC 149	22.28	19.55	21.00	21.50	18.70	18.18	21.3	20.36
8	NRC 138 **	22.88	18.66	21.55	22.06	20.52	18.99	22.83	21.07
9	AMS100-39***	21.80	20.12	20.39	21.06	18.39	20.62	21.15	20.50
10	NRC86 (C)	22.16	20.15	21.19	20.77	18.45	18.88	21.51	20.44
11	HIMSO 1689*	21.37	19.803	21.68	21.04	19.75	19.55	-	20.53
12	JS-21-72*	21.54	19.973	21.40	21.40	17.50	18.11	-	19.99
13	NRC SL2**#	21.41	20.15	22.0	20.48	18.24	17.30	21.08	20.09

- Denote the seeds not received

Table 1.5.24

Trial : Advanced Varietal Trial I : Early
Zone : CENTRAL ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Amravati	Indore#	Kota	Lok Bharti	Mandsaur#	Parbhani	Mean	Rank
1	NRC 158	1582	1030	1134	1767	100	1350	1458.25	VI
2	NRC 152	1319	800	910	2739	315	1690	1664.5	I
3	NRC 157	1752	1052	949	1404	705	1566	1417.75	VII
4	NRC 165	1335	474	1065	2330	770	1721	1612.75	III
5	NRC 164	1420	733	1265	1150	260	2014	1462.25	V
6	NRC 150	1150	1422	1489	1829	585	1466	1483.5	IV
7	PUSA SIPANI 408	1026	44	610	1628	595	1505	1192.25	IX
8	JS 20-34(C)	1258	704	1011	2469	360	1806	1636	II
9	JS 95-60(C)	1127	37	903	1165	295	1782	1244.25	VIII
	Mean	1329.89	699.56	1037.33	1831.22	442.78	1655.56		
	N.P.S.(Sqm)	12.96	13.5	12.96	12.96	20	12.96		
	DOS	20-06-20	30-06-20	09-07-20	12-07-20	25-06-20	23-06-20		
	CD	200.62	251.85	208.33	254.63	125	223.77		
	CV (5%)	10.14	26.76	13.74	9.47	18.97	9.26		

#Data from Indore, Mandsaur were not considered due to <1000 kg/ha yield.

Table 1.5.25

Trial : Advanced Varietal Trial I : Early
Zone : CENTRAL ZONE
Character : Days To Flower

S. No	Varieties	Amravati	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Mean	Rank
1	NRC 158	39	37	36	35	39	32	36.33	VII
2	NRC 152	36	29	35	26	28	25	29.83	I
3	NRC 157	35	38	33	34	31	34	34.17	VI
4	NRC 165	36	34	33	33	26	31	32.17	III
5	NRC 164	39	40	37	35	36	39	37.67	VIII
6	NRC 150	38	35	36	33	28	31	33.5	V
7	PUSA SIPANI 408	38	34	34	33	27	30	32.67	IV
8	JS 20-34(C)	35	31	32	32	30	29	31.5	II
9	JS 95-60(C)	35	31	32	32	28	31	31.5	II
	N.P.S.(Sqm)	12.96	13.5	12.96	12.96	20	12.96		
	DOS	20-06-20	30-06-20	09-07-20	12-07-20	25-06-20	23-06-20		

Table 1.5.26

Trial : Advanced Varietal Trial I : Early
Zone : CENTRAL ZONE
Character : Days To Maturity

S. No	Varieties	Amravati	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Mean	Rank
1	NRC 158	95	95	87	83	96	91	91.17	VII
2	NRC 152	95	-	89	83	90	84	88.2	III
3	NRC 157	93	100	88	84	85	94	90.67	V
4	NRC 165	89	-	87	83	85	90	86.8	I
5	NRC 164	91	100	89	84	96	98	93	VIII
6	NRC 150	89	98	91	86	90	91	90.83	VI
7	PUSA SIPANI 408	93	-	88	84	86	90	88.2	III
8	JS 20-34(C)	85	90	90	83	92	89	88.17	II
9	JS 95-60(C)	88	89	91	83	91	91	88.83	IV
	N.P.S.(Sqm)	12.96	13.5	12.96	12.96	20	12.96		
	DOS	20-06-20	30-06-20	09-07-20	12-07-20	25-06-20	23-06-20		

Table 1.5.27

Trial : Advanced Varietal Trial I : Early
Zone : CENTRAL ZONE
Character : Plant Height (cm)

S. No	Varieties	Amravati	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Mean	Rank
1	NRC 158	59	56	58	75	53	46	57.83	III
2	NRC 152	60	36	57	71	65	49	56.33	IV
3	NRC 157	51	49	51	63	56	51	53.5	VI
4	NRC 165	61	37	53	48	32	39	45	VII
5	NRC 164	64	70	45	75	43	59	59.33	II
6	NRC 150	78	58	63	73	70	58	66.67	I
7	PUSA SIPANI 408	79	37	36	75	47	48	53.67	V
8	JS 20-34(C)	41	47	26	36	27	27	34	IX
9	JS 95-60(C)	54	24	34	38	35	39	37.33	VIII
	N.P.S.(Sqm)	12.96	13.5	12.96	12.96	20	12.96		
	DOS	20/06/20	30/06/20	9/7/20	12/7/20	25/06/20	23/06/20		

Table 1.5.28

Trial : Advanced Varietal Trial I : Early
Zone : CENTRAL ZONE
Character : 100 Seed Weight (g)

S. No	Varieties	Amravati	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Mean	Rank
1	NRC 158	10.13	9.3	9.38	11	8.23	12.96	10.17	VII
2	NRC 152	11.5	-	8.38	12	9	17	11.58	I
3	NRC 157	10.88	8.45	8.05	10.25	7.94	10.62	9.37	IX
4	NRC 165	8.56	7.95	8.98	10.5	9.44	11.25	9.45	VIII
5	NRC 164	12.88	10.18	8.6	10.88	10.46	13.14	11.02	III
6	NRC 150	10.44	10.65	9.9	10.25	10.16	14.11	10.92	IV
7	PUSA SIPANI 408	7.44	-	9.18	12.25	11.03	14.16	10.81	V
8	JS 20-34(C)	11.63	8.85	8.65	10.88	8.59	14.18	10.46	VI
9	JS 95-60(C)	13.06	7	8.75	12.75	9.65	15.1	11.05	II
	N.P.S.(Sqm)	12.96	13.5	12.96	12.96	20	12.96		
	DOS	20-06-20	30-06-20	09-07-20	12-07-20	25-06-20	23-06-20		

Table 1.6.1

Trial : Initial Varietal Trial
Zone : SOUTHERN ZONE
Character : Yield(Kg/ha)

S. No	Varieties	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb-38	3012	1481	1508	2049	3259	2261.8	I
2	DS 3105	1926	1630	820	2025	2568	1793.8	XVIII
3	CAUMS 2	2914	2519	847	1679	2296	2051	VIII
4	JS 22-11	2494	1556	1005	1407	2099	1712.2	XXI
5	DLSb-2	1728	1407	1587	1654	2247	1724.6	XX
6	RVSM 2012-11	2247	1185	1164	1333	2519	1689.6	XXV
7	RSC 11-39	1556	1407	926	1432	2370	1538.2	XXXIII
8	AS-15	2420	1556	873	1358	2272	1695.8	XXIII
9	PS 1664	1827	1185	1005	1185	1630	1366.4	XXXVII
10	DSb 21 (C)	2568	1259	1587	2000	3259	2134.6	IV
11	HIMSO 1691	1802	2000	873	1432	2346	1690.6	XXIV
12	JS 22-14	1951	2000	979	1753	2840	1904.6	XII
13	DS 3144	1728	2000	1058	1062	2272	1624	XXVIII
14	DLSb-1	2469	1333	1614	1679	3160	2051	VIII
15	NRC 128	2049	1704	1217	1753	2815	1907.6	XI
16	VLS 101	2395	1704	529	1037	2741	1681.2	XXVI
17	RSC 11-35	2642	1259	1217	1160	2840	1823.6	XVII
18	PS 1661	2272	1333	1190	1012	1926	1546.6	XXX
19	Himso- 1692	2272	1333	1270	1111	2568	1710.8	XXII
20	DSb 23 (C)	2815	1185	1693	1926	3383	2200.4	II
21	RVS 2012-10	1580	1407	1190	1432	2123	1546.4	XXXI
22	PS 1670	1802	1333	952	1679	1951	1543.4	XXXII
23	NRC 109	1185	1407	794	1778	1975	1427.8	XXXIV
24	MAUS 806	2938	1407	1138	1852	3210	2109	VI
25	RVS 2011-10	1481	2667	1296	1704	2469	1923.4	X
26	MAUS 768	2444	1704	1164	1284	2617	1842.6	XVI
27	ASb 36	-	1481	556	988	1309	1083.5	XL
28	ASb 9	-	-	661	1556	3358	1858.33	XIV
29	AUKS 207	-	1111	-	1062	1506	1226.33	XXXIX
30	MACS 1460 (C)	2593	2222	820	1877	3037	2109.8	V
31	AUKS 206	-	1778	-	494	1457	1243	XXXVIII
32	MACS 1701	2765	1852	1085	1901	2815	2083.6	VII
33	KDS 1096	2691	1704	1190	1975	3210	2154	III
34	MACS 1691	2741	1852	1190	1210	2247	1848	XV
35	KDS 1144	2148	1333	1085	2025	3506	2019.4	IX
36	BAUS 96-17	1975	1407	1085	1111	2198	1555.2	XXIX
37	BAUS 31-17	2593	1333	1032	1160	2222	1668	XXVII
38	TS 20-5	2469	1407	1058	1457	2568	1791.8	XIX
39	SL 1212	1259	2000	1111	1037	1630	1407.4	XXXV
40	SL 1250	1358	1778	1111	1160	1506	1382.6	XXXVI
41	DS 1312	1852	3037	1270	1185	1975	1863.8	XIII
	Mean	2188.14	1631.4	1096.15	1462.78	2446.32		
	N.P.S.(Sqm)	4.05	1.35	3.78	4.05	4.05		
	DOS	14/07/2020	#####	17/07/2020	#####	17/07/2020		
	CD	469.14	222.22	211.64	271.6	444.44		
	CV (5%)	14.44	7.58	12.94	11.51	11.4		

Table 1.6.2

Trial : Initial Varietal Trial
Zone : SOUTHERN ZONE
Character : Days To Flower

S. No	Varieties	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb-38	41	46	44	41	39	42.2	XXVIII
2	DS 3105	41	40	40	38	36	39	XIX
3	CAUMS 2	41	38	40	38	39	39.2	XX
4	JS 22-11	41	40	42	41	38	40.4	XXIII
5	DLSb-2	41	39	43	41	38	40.4	XXIII
6	RVSM 2012-11	38	37	35	35	36	36.2	VII
7	RSC 11-39	43	45	43	41	38	42	XXVII
8	AS-15	37	42	43	41	39	40.4	XXIII
9	PS 1664	45	47	42	44	41	43.8	XXXIII
10	DSb 21 (C)	41	40	43	42	40	41.2	XXV
11	HIMSO 1691	38	36	35	34	36	35.8	V
12	JS 22-14	38	34	36	36	34	35.6	IV
13	DS 3144	35	39	36	36	36	36.4	VIII
14	DLSb-1	41	40	41	41	39	40.4	XXIII
15	NRC 128	41	40	41	40	38	40	XXII
16	VLS 101	44	36	34	36	38	37.6	XIII
17	RSC 11-35	44	45	44	44	40	43.4	XXXII
18	PS 1661	41	47	42	42	40	42.4	XXIX
19	Himso- 1692	37	45	36	36	36	38	XIV
20	DSb 23 (C)	41	47	43	44	40	43	XXX
21	RVS 2012-10	37	36	35	34	32	34.8	III
22	PS 1670	41	35	36	42	37	38.2	XV
23	NRC 109	39	34	34	34	27	33.6	I
24	MAUS 806	41	34	40	41	37	38.6	XVI
25	RVS 2011-10	36	32	34	35	32	33.8	II
26	MAUS 768	38	40	40	41	37	39.2	XX
27	ASb 36	-	40	39	39	37	38.75	XVIII
28	ASb 9	-	-	43	45	42	43.33	XXXI
29	AUKS 207	-	40	-	40	38	39.33	XXI
30	MACS 1460 (C)	36	38	37	35	36	36.4	VIII
31	AUKS 206	-	36	-	42	38	38.67	XVII
32	MACS 1701	38	38	38	37	36	37.4	XII
33	KDS 1096	41	45	44	43	36	41.8	XXVI
34	MACS 1691	41	42	43	43	40	41.8	XXVI
35	KDS 1144	35	40	39	36	36	37.2	XI
36	BAUS 96-17	41	43	42	41	38	41	XXIV
37	BAUS 31-17	41	43	43	41	38	41.2	XXV
38	TS 20-5	41	44	44	41	39	41.8	XXVI
39	SL 1212	37	40	36	36	36	37	X
40	SL 1250	38	40	35	35	36	36.8	IX
41	DS 1312	35	38	36	35	36	36	VI
	N.P.S.(Sqm)	4.05	1.35	3.78		4.05		
	DOS	14/07/2020	11/7/2020	17/07/2020		17/07/2020		

Table 1.6.3

Trial : Initial Varietal Trial
Zone : SOUTHERN ZONE
Character : Days To Maturity

S.No	Varieties	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb-38	95	109	92	103	83	96.4	XXIX
2	DS 3105	93	80	90	98	84	89	II
3	CAUMS 2	95	93	90	98	83	91.8	XII
4	JS 22-11	97	90	93	102	84	93.2	XVIII
5	DLSb-2	97	106	95	98	90	97.2	XXXII
6	RVSM 2012-11	93	80	90	97	81	88.2	I
7	RSC 11-39	99	105	94	100	82	96	XXVII
8	AS-15	93	107	93	100	85	95.6	XXVI
9	PS 1664	102	106	92	104	85	97.8	XXXIII
10	DSb 21 (C)	97	102	92	104	85	96	XXVII
11	HIMSO 1691	90	103	89	96	84	92.4	XVI
12	JS 22-14	92	101	90	92	78	90.6	V
13	DS 3144	92	99	90	93	83	91.4	X
14	DLSb-1	95	107	92	97	85	95.2	XXIV
15	NRC 128	96	106	90	102	87	96.2	XXVIII
16	VLS 101	98	106	88	92	83	93.4	XIX
17	RSC 11-35	95	108	90	108	83	96.8	XXXI
18	PS 1661	92	108	90	99	85	94.8	XXII
19	Himso- 1692	97	110	89	92	87	95	XXIII
20	DSb 23 (C)	93	105	95	101	89	96.6	XXX
21	RVS 2012-10	92	103	88	91	80	90.8	VI
22	PS 1670	94	98	87	98	90	93.4	XIX
23	NRC 109	92	101	89	92	78	90.4	IV
24	MAUS 806	95	91	89	99	82	91.2	VIII
25	RVS 2011-10	92	99	87	95	80	90.6	V
26	MAUS 768	97	99	90	101	82	93.8	XX
27	ASb 36	-	99	90	96	84	92.25	XV
28	ASb 9	-	-	94	97	85	92	XIII
29	AUKS 207	-	91	-	97	82	90	III
30	MACS 1460 (C)	92	101	90	93	82	91.6	XI
31	AUKS 206	-	90	-	99	85	91.33	IX
32	MACS 1701	97	99	89	97	80	92.4	XVI
33	KDS 1096	97	107	94	103	82	96.6	XXX
34	MACS 1691	97	96	93	103	83	94.4	XXI
35	KDS 1144	92	102	89	97	81	92.2	XIV
36	BAUS 96-17	93	106	93	99	81	94.4	XXI
37	BAUS 31-17	95	106	93	99	84	95.4	XXV
38	TS 20-5	97	107	92	98	84	95.6	XXVI
39	SL 1212	97	101	89	93	84	92.8	XVII
40	SL 1250	91	102	88	93	84	91.6	XI
41	DS 1312	92	99	88	94	82	91	VII
	N.P.S.(Sqm)	4.05	1.35	3.78		4.05		
	DOS	14/07/2020	11/7/2020	17/07/2020		17/07/2020		

Table 1.6.4

Trial : Initial Varietal Trial
Zone : SOUTHERN ZONE
Character : Plant Height (cm)

S.No	Varieties	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb-38	51	50	60	43	70	54.8	III
2	DS 3105	37	35	21	36	46	35	XXXI
3	CAUMS 2	52	46	49	39	70	51.2	VIII
4	JS 22-11	55	49	36	43	71	50.8	X
5	DLSb-2	57	53	53	42	76	56.2	II
6	RVSM 2012-11	37	40	42	37	51	41.4	XXII
7	RSC 11-39	58	27	52	40	62	47.8	XIII
8	AS-15	58	49	57	38	63	53	V
9	PS 1664	52	33	41	28	62	43.2	XIX
10	DSb 21 (C)	59	45	47	46	72	53.8	IV
11	HIMSO 1691	32	31	42	34	46	37	XXVIII
12	JS 22-14	30	32	49	36	54	40.2	XXIII
13	DS 3144	27	30	29	28	45	31.8	XXXIII
14	DLSb-1	59	36	60	37	70	52.4	VI
15	NRC 128	41	35	42	46	54	43.6	XVIII
16	VLS 101	48	34	46	45	54	45.4	XVI
17	RSC 11-35	65	31	61	46	90	58.6	I
18	PS 1661	52	35	46	37	59	45.8	XV
19	Himso- 1692	40	30	47	36	46	39.8	XXIV
20	DSb 23 (C)	54	32	54	38	68	49.2	XII
21	RVS 2012-10	21	25	25	33	33	27.4	XXXVII
22	PS 1670	38	23	41	32	55	37.8	XXVII
23	NRC 109	35	36	42	28	55	39.2	XXVI
24	MAUS 806	59	36	53	35	69	50.4	XI
25	RVS 2011-10	25	28	40	28	58	35.8	XXIX
26	MAUS 768	35	30	33	28	51	35.4	XXX
27	ASb 36	-	28	25	29	36	29.5	XXXVI
28	ASb 9	-	-	40	44	69	51	IX
29	AUKS 207	-	23	-	28	39	30	XXXV
30	MACS 1460 (C)	38	33	42	33	70	43.2	XIX
31	AUKS 206	-	25	-	36	33	31.33	XXXIV
32	MACS 1701	46	33	35	34	64	42.4	XXI
33	KDS 1096	58	44	42	40	75	51.8	VII
34	MACS 1691	44	31	52	28	60	43	XX
35	KDS 1144	31	32	41	39	55	39.6	XXV
36	BAUS 96-17	53	40	37	29	62	44.2	XVII
37	BAUS 31-17	56	44	62	30	67	51.8	VII
38	TS 20-5	47	37	53	34	67	47.6	XIV
39	SL 1212	22	27	19	29	31	25.6	XXXVIII
40	SL 1250	31	30	37	30	42	34	XXXII
41	DS 1312	26	26	38	30	39	31.8	XXXIII
	N.P.S.(Sqm)	4.05	1.35	3.78		4.05		
	DOS	14/07/2020	11/7/2020	17/07/2020		17/07/2020		

Table 1.6.5

Trial : Initial Varietal Trial
Zone : SOUTHERN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb-38	13.17	10.87	12.77	12.39	12.53	12.35	XV
2	DS 3105	13.1	12	9.57	13.12	11.87	11.93	XVIII
3	CAUMS 2	13.27	12.43	9.9	11.41	10.73	11.55	XXII
4	JS 22-11	12.8	11.7	7.63	10.74	8.93	10.36	XXXIX
5	DLSb-2	13.73	9.2	12.6	11.22	10.83	11.52	XXIII
6	RVSM 2012-11	15.07	13.83	11.63	11.9	12.8	13.05	VII
7	RSC 11-39	14.1	10.97	8.8	10.66	10.33	10.97	XXXI
8	AS-15	12.73	12.07	9.3	10.49	11.13	11.14	XXX
9	PS 1664	14.1	10.03	8.47	10.68	8.93	10.44	XXXVIII
10	DSb 21 (C)	12.93	10.63	12.5	11.83	12.47	12.07	XVI
11	HIMSO 1691	18.9	13.43	13.14	11.31	15.93	14.54	I
12	JS 22-14	14.9	14.7	12.97	11.34	15.1	13.8	V
13	DS 3144	12.57	9.7	9.17	11.24	11.03	10.74	XXXIV
14	DLSb-1	14.47	12.57	12.84	10.61	13.3	12.76	IX
15	NRC 128	13.13	13.5	11.79	11.41	12.93	12.55	XII
16	VLS 101	16.57	14.93	10.5	10.46	12.8	13.05	VII
17	RSC 11-35	12.4	11.53	7.93	11.29	10.4	10.71	XXXV
18	PS 1661	14.13	10.27	8	11.46	9.53	10.68	XXXVI
19	Himso- 1692	20.53	13	13.94	10.41	13.83	14.34	II
20	DSb 23 (C)	16.73	11	12.9	10.25	12.63	12.7	X
21	RVS 2012-10	12	12.5	11.23	11.18	12.4	11.86	XIX
22	PS 1670	14.47	13.27	9.67	11.19	11.37	11.99	XVII
23	NRC 109	13.63	14.6	13.6	11.6	17.13	14.11	III
24	MAUS 806	15.13	15.33	12.2	11.47	15.03	13.83	IV
25	RVS 2011-10	12.27	11.93	10.4	11.43	12.33	11.67	XX
26	MAUS 768	16	13.83	10.23	11.16	13.27	12.9	VIII
27	ASb 36	-	12.3	10.5	10.68	11.3	11.2	XXVIII
28	ASb 9	-	-	10.47	12.27	14.57	12.44	XIV
29	AUKS 207	-	11.5	-	10.71	12.33	11.51	XXIV
30	MACS 1460 (C)	14.23	13.57	11.1	10.51	12.87	12.46	XIII
31	AUKS 206	-	10.37	-	10.09	12.33	10.93	XXXII
32	MACS 1701	14.7	14.2	10.2	10.69	13.4	12.64	XI
33	KDS 1096	12.5	13.2	9.27	11.24	11.63	11.57	XXI
34	MACS 1691	11.27	8.87	7.4	10.59	8.4	9.31	XL
35	KDS 1144	16.47	11.73	12.07	12.25	15	13.5	VI
36	BAUS 96-17	14.2	11.47	8.9	10.73	11.13	11.29	XXVI
37	BAUS 31-17	14.8	10.97	8.77	10.71	10.67	11.18	XXIX
38	TS 20-5	12.67	12.93	8.57	11.12	11.07	11.27	XXVII
39	SL 1212	12.53	9.73	9.27	11.47	9.5	10.5	XXXVII
40	SL 1250	14.13	11.03	10.34	10.54	10.8	11.37	XXV
41	DS 1312	12.53	10.63	9.43	10.49	10.97	10.81	XXXIII
	N.P.S.(Sqm)	4.05	1.35	3.78		4.05		
	DOS	14/07/2020	#####	17/07/2020		17/07/2020		

Table 1.6.6

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Hara Soya (C)	2716	2025	1926	2222.33	II
2	NRC 188	3358	1753	1654	2255.00	I
3	KDS 753 (C)	2444	2494	1679	2205.67	III
4	NRC 187	2568	1062	765	1465.00	IV
5	Karune (C)	-	2272	444	1358.00	V
	Mean	2771.50	1921.20	1293.60		
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	22/07/2020	14/07/2020	17/07/2020		
	CD	222.22	493.83	246.91		
	CV (5%)	5.50	13.77	10.35		

Table 1.6.7

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Green Pod Yield (Kg/ha) at Picking

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Hara Soya (C)	2708	4583	8831	5374.00	I
2	NRC 188	3349	4016	6329	4564.67	IV
3	KDS 726 (C)	2441	7464	4749	4884.67	III
4	NRC 187	2572	2030	1619	2073.67	V
5	Karune (C)	-	9312	1417	5364.50	II
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	22/07/2020	14/07/2020	17/07/2020		

Table 1.6.8

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Days To Flower

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Hara Soya (C)	29	33	32	31.33	III
2	NRC 188	26	29	32	29.00	II
3	KDS 726 (C)	32	45	40	39.00	V
4	NRC 187	32	30	24	28.67	I
5	Karune (C)	-	33	32	32.50	IV
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	22/07/2020	14/07/2020	17/07/2020		

Table 1.6.9

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Days To Picking at R6

S.No	Varieties	Adilabad	Pune	Mean	Rank
1	Hara Soya (C)	59	70	64.5	I
2	NRC 188	55	78	66.5	III
3	KDS 726 (C)	64	80	72	IV
4	NRC 187	68	63	65.5	II
5	Karune (C)	-	75	75	V
	N.P.S.(Sqm)	4.05	4.05		
	DOS	22/07/2020	17/07/2020		

Table 1.6.10

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Days To Maturity

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Hara Soya (C)	93	91	87	90.33	IV
2	NRC 188	82	88	87	85.67	I
3	KDS 726 (C)	97	102	111	103.33	V
4	NRC 187	99	89	73	87.00	II
5	Karune (C)	-	90	85	87.50	III
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	22/07/2020	14/07/2020	17/07/2020		

Table 1.6.11

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Plant Height (cm)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Hara Soya (C)	44	37	39	40	II
2	NRC 188	35	37	30	34	IV
3	KDS 726 (C)	43	64	56	54.33	I
4	NRC 187	35	14	23	24	V
5	Karune (C)	-	42	27	34.5	III
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	22/07/2020	14/07/2020	17/07/2020		

Table 1.6.12

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : 100 Green Seed Weight at picking

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Hara Soya (C)	19.7	46.33	40.63	35.55	IV
2	NRC 188	28.07	75	61.63	54.9	II
3	KDS 726 (C)	28.97	31.67	44.17	34.94	V
4	NRC 187	26.07	55.67	39.03	40.26	III
5	Karune (C)	-	91.33	65.77	78.55	I
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	22/07/2020	14/07/2020	17/07/2020		

Table 1.6.13

Trial : Initial Varietal Trial : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean
1	Hara Soya (C)	20	17	18.50	V
2	NRC 188	32	26	29.00	II
3	KDS 726 (C)	18	25	21.50	IV
4	NRC 187	27	20	23.50	III
5	Karune (C)	35	27	31.00	I
	N.P.S.(Sqm)	4.05	4.05		
	DOS	14/07/2020	17/07/2020		

Table 1.6.14

Trial : Advanced Varietal Trial II
Zone : SOUTHERN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	2070	2747	1620	1546	1819	3380	2197.00	I
2	AMS 100-39*	2070	2391	1653	1329	1722	2931	2016.00	III
3	NRC 142$	2344	2151	792	1301	1505	3032	2067	II
4	MACSNRC 1667	1356	1862	1079	1426	1463	2894	1680.00	VIII
5	NRCSL 1	1856	1351	1468	991	1389	2958	1668.83	IX
6	KS 103(C)	1200	2569	1185	1306	1477	2861	1766.33	VII
7	DSb 23(C)	1607	2956	1319	1597	1398	3014	1981.83	IV
8	DSb 21(C)	1304	2693	1356	1519	1477	2778	1854.50	VI
9	MACS 450(C)	1278	2058	1329	1097	1292	2806	1643.33	X
10	JS 335(C)	1896	2276	-	1319	1241	2773	1901.00	V
	Mean	1698.10	2305.40	1311.22	1343.10	1478.30	2942.70		
	N.P.S.(Sqm)	27.00	22.50	21.60	21.60	21.60	21.60		
	DOS	19/06/2020	14/07/2020	22/06/2020	07/07/2020	14/07/2020	08/07/2020		
	CD	274.07	253.33	115.74	199.07	245.37	263.89		
	CV (5%)	11.14	7.64	6.83	10.21	11.50	6.20		

*Repeat AVT-II entry. $NRC 142 is lipoxygenase free entry. $Data from Bidar Centre for NRC 142 was not included due to late sowing.

Table 1.6.15

Trial : Advanced Varietal Trial II
Zone : SOUTHERN ZONE
Character : Days To Flower

S. No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	38	42	42	39	41	41	40.50	IV
2	AMS 100-39*	40	42	42	39	42	41	41.00	VI
3	NRC 142$	44	42	45	35	42	39	41.17	VII
4	MACSNRC 1667	37	36	40	35	36	35	36.50	I
5	NRCSL 1	43	34	43	39	38	41	39.67	III
6	KS 103(C)	43	42	44	40	42	41	42.00	IX
7	DSb 23(C)	42	42	42	42	42	43	42.17	X
8	DSb 21(C)	38	42	43	41	44	43	41.83	VIII
9	MACS 450(C)	40	37	43	40	41	44	40.83	V
10	JS 335(C)	41	37	-	35	38	41	38.40	II
	N.P.S.(Sqm)	27.00	22.50	21.60	21.60	21.60	21.60		
	DOS	19/06/2020	14/07/2020	22/06/2020	07/07/2020	14/07/2020	08/07/2020		

Table 1.6.16

Trial : Advanced Varietal Trial II
Zone : SOUTHERN ZONE
Character : Days To Maturity

S. No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	100	101	99	89	103	88	96.67	II
2	AMS 100-39*	103	100	98	90	102	88	96.83	III
3	NRC 142$	110	100	109	91	100	86	99.33	VII
4	MACSNRC 1667	100	94	112	89	100	92	97.83	IV
5	NRCSL 1	108	92	109	90	103	91	98.83	V
6	KS 103(C)	107	101	115	91	109	96	103.17	X
7	DSb 23(C)	107	101	98	97	109	91	100.50	IX
8	DSb 21(C)	97	103	106	93	109	92	100.00	VIII
9	MACS 450(C)	103	94	107	90	109	91	99.00	VI
10	JS 335(C)	104	93	-	90	98	91	95.20	I
	N.P.S.(Sqm)	27.00	22.50	21.60	21.60	21.60	21.60		
	DOS	19/06/2020	14/07/2020	22/06/2020	07/07/2020	14/07/2020	08/07/2020		

Table 1.6.17

Trial : Advanced Varietal Trial II
Zone : SOUTHERN ZONE
Character : Plant Height (cm)

S. No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	56	47	69	55	39	81	57.83	VII
2	AMS 100-39*	64	56	73	71	42	83	64.83	IV
3	NRC 142$	83	57	61	91	40	85	69.5	II
4	MACSNRC 1667	44	54	86	82	38	86	65	III
5	NRCSL 1	50	18	67	49	32	77	48.83	X
6	KS 103(C)	82	60	92	83	49	89	75.83	I
7	DSb 23(C)	54	57	80	62	42	68	60.5	VI
8	DSb 21(C)	56	57	75	63	40	79	61.67	V
9	MACS 450(C)	47	42	63	69	43	73	56.17	VIII
10	JS 335(C)	64	45	-	48	34	68	51.8	IX
	N.P.S.(Sqm)	27	22.5	21.6	21.6	21.6	21.6		
	DOS	19/06/2020	14/07/2020	22/06/2020	7/7/2020	14/07/2020	8/7/2020		

Table 1.6.18

Trial : Advanced Varietal Trial II
Zone : SOUTHERN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	11.05	12.75	13.90	13.41	13.66	16.27	13.51	V
2	AMS 100-39*	12.00	15.97	15.00	13.68	12.09	16.17	14.15	II
3	NRC 142$	12.83	12.35	14.30	13.80	12.45	16.30	13.67	IV
4	MACSNRC 1667	11.10	14.85	16.25	14.57	12.39	16.50	14.28	I
5	NRCSL 1	11.72	14.82	13.45	10.07	11.07	16.32	12.91	IX
6	KS 103(C)	10.90	14.00	13.80	12.95	13.32	15.32	13.38	VI
7	DSb 23(C)	12.28	14.90	13.63	13.28	12.81	15.32	13.70	III
8	DSb 21(C)	11.95	12.25	12.72	12.53	13.22	14.85	12.92	VIII
9	MACS 450(C)	10.05	14.25	12.95	10.78	11.01	14.80	12.31	X
10	JS 335(C)	12.38	14.57	-	11.57	11.43	15.03	13.00	VII
	N.P.S.(Sqm)	27.00	22.50	21.60	21.60	21.60	21.60		
	DOS	19/06/2020	14/07/2020	22/06/2020	07/07/2020	14/07/2020	08/07/2020		

Table 1.6.19

Trial : Advanced Varietal Trial II
Zone : SOUTHERN ZONE
Character : Oil Content

Sr. No.	Name of Variety	Location				
		Dharwad	K Digraj	Pune	Adilabad	Mean
1	NRC 142	19.24	20.94	23.03	23.42	21.66
3	MACS NRC1667	18.32	21.29	21.9	22.40	20.98
5	DSB33	16.29	21.29	19.11	22.96	19.91
6	AMS100-39	16.79	20.4	19.98	20.20	19.34
9	NRCSL-1	15.76	20.97	21.92	23.35	20.50
13	Karune	-	-	21.10	-	21.10
8	KS103 (C)	16.03	21.70	22.52	20.89	20.29
10	DSB-23 (C)	16.9	20.18	21.86	22.13	20.26
11	Harasoya (C)	-	-	21.34	-	21.34
12	KDS726 (C)	-	-	19.76	-	19.76
2	JS335 (C)	20.39	20.47	22.26	22.3	21.36
7	MACS450 (C)	15.02	21.06	20.19	22.24	19.63
4	DSB21 (C)	16.30	21.91	20.70	22.03	20.24

- Denote the seeds not received

Table 1.6.20

Trial : Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Yield(Kg/ha)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	KARUNE	2806	2756	2209	2590.33	I
2	MACS 450(C)	1778	2273	2235	2095.33	V
3	HARASOYA(C)	1944	2070	2467	2160.33	IV
4	KDS 726(C)	1928	2476	3327	2577.00	II
5	DSb 21(C)	2539	1403	2639	2193.67	III
	Mean	2199.00	2195.60	2575.40		
	N.P.S.(Sqm)	18.00	15.75	15.12		
	DOS	22/06/2020	07/07/2020	09/07/2020		
	CD	294.44	311.11	489.42		
	CV (5%)	8.65	9.23	12.36		

Table 1.6.21

Trial : Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Green Pod Yield (Kg/ha) at Picking

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	KARUNE	7831	12117	11142	10363.33	I
2	MACS 450(C)	5350	10557	11067	8991.33	III
3	HARASOYA(C)	6191	7581	9066	7612.67	V
4	KDS 726(C)	7690	9984	13155	10276.33	II
5	DSb 21(C)	5292	9145	11086	8507.67	IV
	N.P.S.(Sqm)	18.00	15.75	15.12		
	DOS	22/06/2020	07/07/2020	09/07/2020		

Table 1.6.22

Trial : Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Days To Flower

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	KARUNE	27	36	37	33.33	I
2	MACS 450(C)	31	39	38	36.00	III
3	HARASOYA(C)	31	37	38	35.33	II
4	KDS 726(C)	36	46	40	40.67	V
5	DSb 21(C)	33	43	40	38.67	IV
	N.P.S.(Sqm)	18.00	15.75	15.12		
	DOS	22/06/2020	07/07/2020	09/07/2020		

Table 1.6.23

Trial : Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Days To Picking at R6

S.No	Varieties	Adilabad	Pune	Mean	Rank
1	KARUNE	58	78	68	III
2	MACS 450(C)	69	83	76	IV
3	HARASOYA(C)	70	90	80	V
4	KDS 726(C)	73	56	64.5	II
5	DSb 21(C)	68	57	62.5	I
	N.P.S.(Sqm)	18	15.12		
	DOS	22/06/2020	9/7/2020		

Table 1.6.24

Trial : Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Days To Maturity

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	KARUNE	83	91	87	87.00	I
2	MACS 450(C)	101	101	93	98.33	III
3	HARASOYA(C)	99	95	96	96.67	II
4	KDS 726(C)	104	105	95	101.33	V
5	DSb 21(C)	103	102	95	100.00	IV
	N.P.S.(Sqm)	18.00	15.75	15.12		
	DOS	22/06/2020	07/07/2020	09/07/2020		

Table 1.6.25

Trial: Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : Plant Height (cm)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	KARUNE	36	43	41	40	V
2	MACS 450(C)	45	60	44	49.67	III
3	HARASOYA(C)	46	40	51	45.67	IV
4	KDS 726(C)	61	75	64	66.67	I
5	DSb 21(C)	43	61	60	54.67	II
	N.P.S.(Sqm)	18	15.75	15.12		
	DOS	22/06/2020	7/7/2020	9/7/2020		

Table 1.6.26

Trial : Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : 100 Green Seed Weight at picking

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	KARUNE	68.47	96.73	68.00	77.73	I
2	MACS 450(C)	33.17	39.47	29.60	34.08	IV
3	HARASOYA(C)	38.08	54.03	49.68	47.26	II
4	KDS 726(C)	28.30	38.83	35.95	34.36	III
5	DSb 21(C)	27.48	31.70	25.43	28.20	V
	N.P.S.(Sqm)	18.00	15.75	15.12		
	DOS	22/06/2020	07/07/2020	09/07/2020		

Table 1.6.27

Trial : Advanced Varietal Trial II : Vegetable Soybean
Zone : SOUTHERN ZONE
Character : 100 Seed Weight (g)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean
1	KARUNE	34.65	29.07	31.86	I
2	MACS 450(C)	15.10	13.80	14.45	IV
3	HARASOYA(C)	22.62	22.63	22.63	II
4	KDS 726(C)	17.80	17.38	17.59	III
5	DSb 21(C)	12.70	14.13	13.42	V
	N.P.S.(Sqm)	15.75	15.12		
	DOS	07/07/2020	09/07/2020		

सस्य विज्ञान
Agronomy

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Adilabad (Telangna)	Dr. Sreedhar Chauhan

Table 2.1.1

SP-1/15. Evaluation of AVT II entries under different row spacing

Zone: Central **Design:** Split plot **Replications:** Three
Character: Seed yield (kg/ha)

Treatment	Sehore			Kota			Amrawati			Zonal mean		
	Row spacing (cm)											
Entry	**30**	**45**	**Mean**	**30**	**45**	**Mean**	**30**	**45**	**Mean**	**30**	**45**	**Mean**
RVSM 2011-35	2284	2634	2459	1027	908	967	1725	2029	1877	1679	1857	1768
NRCSL-2	638	761	700	1212	1355	1283	1398	1758	1578	1083	1291	1187
NRC-138	2202	1914	2058	2220	1895	2057	1381	1676	1529	1934	1828	1881
AMS 100-39	1214	1379	1296	1851	1880	1865	2242	2367	2305	1769	1875	1822
NRC 142	1543	1893	1718	1825	1587	1706	1207	1480	1343	1525	1653	1589
NRC 86 (c)	1060	1255	1157	1335	1448	1391	1386	1424	1405	1260	1376	1318
JS 20-34 (c)	844	741	792	903	876	890	1360	1381	1370	1036	999	1017
Mean	1398	1511		1482	1421		1528	1731		1469	1554	
Row spacing			NS			NS			128.32			-
Entries			130.28			144.15			167.99			-
Interaction			184.24			203.86			NS			-

Table 2.1.2

ASP-1/15. Evaluation of AVT II entries under different row spacing(Zonal mean)

Zone: Central **Design:** Split plot **Replications:** Three
Characters: Dry matter, CGR, RGR, Plant height, No. of pods/plant, 100-seed weight, Straw yield, Harvest Index, Grain production efficiency and RUE

Treatment	Dry matter (g/plant)			Mean CGR (g/m^2/day)		Mean RGR (g/g/day)		Bran-hes /plant	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	HI (%)	Grain prod-uction effici-ency (kg/ha/day)	RUE ($kgha^{-1}$ mm^{-1})
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing (cm)														
30	2.64	6.80	15.01	2.64	6.80	15.01	10.63	3.18	32.98	9.92	2492	37.74	14.77	1.56
45	2.69	7.10	16.08	2.69	7.10	16.08	11.68	3.47	35.73	10.10	2441	38.82	15.59	1.61
Entry														
RVSM 2011-35	2.63	7.40	15.63	2.63	7.40	15.63	12.59	3.48	38.98	11.25	2519	41.08	17.05	1.62
NRCSL-2	2.66	6.67	15.67	2.66	6.67	15.67	10.41	3.26	31.13	8.97	2670	42.61	11.83	1.32
NRC-138	2.60	6.98	15.24	2.60	6.98	15.24	11.35	3.38	38.80	10.13	2582	42.37	19.11	1.99
AMS 100-39	2.77	7.39	15.94	2.77	7.39	15.94	12.04	3.35	38.95	10.15	2791	38.99	18.47	1.99
NRC 142	2.73	6.43	16.22	2.73	6.43	16.22	9.42	3.48	34.87	10.86	2522	39.47	16.28	1.68
NRC 86 (c)	2.63	7.13	16.00	2.63	7.13	16.00	11.88	3.15	35.55	8.69	2508	35.87	12.86	1.42
JS 20-34 (c)	2.64	6.65	14.13	2.64	6.65	14.13	10.36	3.18	22.20	10.02	1671	37.56	10.66	1.09

Table 2.1.3.

ASP-1/15. Evaluation of AVT II entries under different row spacing

Zone: Southern **Design:** Split plot **Replications:** Three
Character: Seed yield (kg/ha)

Treatment	Dharwad			Pune			Adilabad			Zonal mean		
	Row spacing (cm)											
Entry	**30**	**45**	**Mean**	**30**	**45**	**Mean**	**30**	**45**	**Mean**	**30**	**45**	**Mean**
DSb 33	1024	1012	1018	2667	2920	2793	2083	2323	2203	1925	2085	2005
AMS 100-39	972	844	908	2491	2655	2573	2488	2848	2668	1984	2116	2050
NRC 142	1034	595	815	2798	3390	3094	1896	2096	1966	1909	2027	1958
KARUNE	636	463	549	3642	3351	3496	910	1079	994	1729	1631	1680
KS 103 (C)	930	801	865	1694	1950	1822	1484	1720	1602	1606	1742	1673
DSb 23 (C)	1039	951	995	3201	3822	3511	1917	2063	1990	1813	2035	1924
NRCSL 1	1270	820	1045	2444	2618	2531	1200	1331	1265	1733	1719	1726
MACSNRC 1667	1063	891	977	2429	3057	2743	2193	2474	2333	1803	2004	1903
Mean	996	797		2671	2970		1771	1992		1813	1920	
CD (P=0.05)												
Row spacing			175.0			29.37			NS			-
Entries			77.4			480.86			269.1			-
Interaction			109.5			NS			NS			-

`

Table 2.1.4.

ASP-1/15. Evaluation of AVT II entries under different row spacing (Zonal mean)

Zone: Southern **Design:** Split plot **Replications:** Three
Characters: Green pod yield (kg/ha)

Entry	Adilabad			Dharwad			Pune			Zonal mean		
	Row spacing (cm)											
	30	**45**	**Mean**	**30**	**45**	**Mean**	**30**	**45**	**Mean**	**30**	**45**	**Mean**
Karune	1770	2181	1975	5804	5308	5556	16349	16744	16547	7794	8078	8026
DSb 23 (C)	2988	3222	3105	1039	951	995	12729	12874	12801	5634	5682	5634
KS 103 (C)	2416	2762	2559	930	801	865	-	-	-	1673	1782	1712
Mean	2391	2722		2591	2068		14539	14773		5034	5181	

Table 2.1.5

ASP-1/15. Evaluation of AVT II entries under different row spacing(Zonal mean)

Zone: Southern **Design:** Split plot **Replications:** Three
Characters: Dry matter, CGR, RGR, Plant height, No. of pods/plant, 100-seed weight, Straw yield, Harvest Index, Grain production efficiency and RUE

Treatment	Dry matter (g/plant)			Mean CGR ($g/m^2/day$)		Mean RGR (g/g/day)		No. of branches /plant	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	HI (%)	Grain production efficiency (kg/ha/day)	RUE ($kgha^{-1} mm^{-1}$)
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing (cm)														
30	4.45	11.62	28.67	4.45	11.62	28.67	6.27	3.42	40.77	15.57	2942	25.63	18.53	2.34
45	5.08	13.64	29.75	5.08	13.64	29.75	4.62	4.55	44.32	15.65	2897	26.96	19.74	2.44
Entry														
DSb 33	4.96	11.81	30.52	4.96	11.81	30.52	5.06	4.12	44.91	13.39	3247	26.40	20.53	2.52
AMS 100-39	4.72	11.76	29.66	4.72	11.76	29.66	5.76	3.70	44.39	13.63	3261	26.50	20.77	2.55
NRC 142	4.45	11.18	27.46	4.45	11.18	27.46	5.45	3.91	45.03	14.34	2995	27.02	20.81	2.49
KARUNE	4.47	11.74	27.55	4.47	11.74	27.55	4.56	3.71	32.82	29.22	1920	30.22	18.08	2.18
KS 103 (C)	4.67	11.60	26.82	4.67	11.60	26.82	5.48	3.83	40.40	12.91	2846	21.35	13.78	1.67
DSb 23 (C)	4.97	12.50	30.06	4.97	12.50	30.06	5.54	4.51	47.13	13.15	3163	27.54	22.06	2.60
NRCSL 1	5.05	12.50	30.82	5.05	12.50	30.82	5.62	4.28	42.12	12.95	2649	25.07	16.59	2.07
MACSNRC 1667	4.83	12.77	30.69	4.83	12.77	30.69	6.10	3.90	43.97	15.35	3163	26.37	20.51	2.54

Table 2.2.1

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Northern plain **Design:** Strip plot **Replications:** Four
Character: Seed yield (kg/ha)

Crop rotation	Pantnagar			Ludhiana			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1727	1789	1758	1697	1689	1693	1712	1739	1726
Soy-Maize-Soy-Maize	4361	4389	4375	1687	1680	1683	3024	3035	3029
Soy-Soy-Maize-Soy	1773	1758	1766	1658	1661	1660	1716	1710	1713
Soy-Soy-Soy-Maize	1845	1863	1854	1652	1694	1673	1749	1779	1764
Mean	2426	2450		1674	1681		2050	2066	
CD (P=0.05)									
Tillage			531.1			NS			-
Crop Rotation			505.3			NS			-
Interaction			-			NS			-

Table 2.2.2

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Northern plain **Design:** Strip plot **Replications:** Four
Character: Rabi Seed yield (kg/ha)

Crop rotation	Pantnagar			Ludhiana			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	4225	4720	4472	5005	4875	4940	4615	4798	4706
Soy-Maize-Soy-Maize	4082	4439	4260	4993	4894	4943	4538	4667	4602
Soy-Soy-Maize-Soy	4111	4467	4289	4893	4940	4917	4502	4704	4603
Soy-Soy-Soy-Maize	4276	4742	4509	4809	4822	4815	4543	4782	4662
Mean	4173	4592		4925	4882		4549	4737	
CD (P=0.05)									
Tillage			766.8			NS			-
Crop Rotation			762.0			NS			-
Interaction			-			NS			-

Table 2.2.3

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Northern plain **Design:** Strip plot **Replications:** Four
Character: Soybean Equivalent yield (kg/ha)

Crop rotation	Pantnagar			Ludhiana			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1727	1789	1758	4180	3983	4081	2954	2886	2920
Soy-Maize-Soy-Maize	2079	2093	2086	4162	4026	4094	3121	3060	3090
Soy-Soy-Maize-Soy	1773	1758	1766	4086	4066	4076	2930	2912	2921
Soy-Soy-Soy-Maize	1845	1863	1854	4037	3989	4013	2941	2926	2934
Mean	1856	1876		4116	4016		2986	2946	
CD (P=0.05)									
Tillage			512.3			NS			-
Crop Rotation			420.0			NS			-
Interaction			-			NS			-

Table 2.2.4

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20)

Centre: Zonal mean **Character:** Yield and economical parameters
Design: Strip plot **Replications:** Four

Treatment	Seed yield (kg/ha)	Straw yield (kg/ha)	HI (%)	SEY (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
A. Tillage system								
Minimum	2050	4241	31.72	2986	45713	112363	66650	2.47
Conventional	2065	4277	31.60	2946	49283	112490	63207	2.28
B. Cropping system								
Soy-Soy-Soy-Soy	1723	4092	29.89	2072	47498	110958	63460	2.32
Soy-Maize-Soy-Maize	3027	4599	37.64	3115	47498	117168	69670	2.52
Soy-Soy-Maize-Soy	1710	4085	29.64	2921	47498	110276	62779	2.31
Soy-Soy-Soy-Maize	1765	4135	30.11	2941	47498	111304	63806	2.35

Table 2.2.5

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Northern Eastern **Design:** Strip plot **Replications:** Four
Character: Seed yield (kg/ha)

Crop rotation	Raipur			Ranchi			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1807	1964	1885	1793	1427	1610	1800	1696	1748
Soy-Maize-Soy-Maize	1941	2109	2025	3854	4032	3943	2898	3071	2984
Soy-Soy-Maize-So	1936	1968	1952	1815	1630	1723	1876	1799	1838
Soyb-Soy-Soy-Maize	1772	1799	1785	1530	1865	1697	1651	1832	1741
Mean	1864	1960		2248	2239		2056	2100	
CD (P=0.05)									
Tillage			207				122.80		-
Crop Rotation			162				127.98		-
Interaction			291				NS		-

Table 2.2.6

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Northern Eastern **Design:** Strip plot **Replications:** Four
Character: *Rabi*Seed yield (kg/ha)

Crop rotation	Raipur			Ranchi			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1058	1154	1106	2141	2002	2072	1600	1578	1589
Soy-Maize-Soy-Maize	1036	1098	1067	1910	2002	1956	1473	1550	1512
Soy-Soy-Maize-So	1024	1075	1050	2569	2315	2442	1797	1695	1746
Soyb-Soy-Soy-Maize	1194	1258	1226	1794	2153	1973	1494	1706	1600
Mean	1078	1146		2104	2118		1591	1632	
CD (P=0.05)									
Tillage			49.88			121.30			-
Crop Rotation			NS			388.06			-
Interaction			NS			NS			-

Table 2.2.7

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Northern Eastern **Design:** Strip plot **Replications:** Four
Character: Soybean Equivalent Yield (kg/ha)

Crop rotation	Raipur			Ranchi			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1394	1521	1457	2934	2580	2757	2164	2050	2107
Soy-Maize-Soy-Maize	1365	1447	1406	2991	3022	3006	2178	2234	2206
Soy-Soy-Maize-So	1349	1416	1383	3148	2897	3023	2249	2157	2203
Soy-Soy-Soy-Maize	1573	1658	1615	2779	3102	2940	2176	2380	2278
Mean	1420	1510		2963	2900		2192	2205	
CD (P=0.05)									
Tillage			110.58			207.78			-
Crop Rotation			NS			209.80			-
Interaction			NS			NS			-

Table 2.2.8

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20)

Zone: Northern Eastern **Design:** Strip plot **Replications:** Four
Centre: Zonal mean **Character:** Yield and economical parameters

Treatment	Seed yield (kg/ha)	Straw yield (kh/ha)	HI (%)	SEY (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
A. Tillage system								
Minimum	2056	3344	38.82	1582	34226	70046	35820	1.62
Conventional	2099	3381	38.87	1611	37451	71707	34256	1.49
B. Cropping rotation								
Soy-Soy-Soy-Soy	1747	2780	39.03	1533	35749	68387	32638	1.86
Soy-Maize-Soy-Maize	2984	5177	36.47	1643	36749	72323	35575	2.02
Soy-Soy-Maize-Soy	1837	2817	40.07	1553	35749	68680	32931	2.03
Soy-Soy-Soy-Maize	1741	2672	39.81	1656	35749	74114	38365	1.76

Table 2.2.9

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20)

Zone: Northern Eastern **Centre:** Raipur **Design:** Strip plot **Replications:** Four

Treatment	Bulk density (g/cm^3)	WHC (%)	Porosity (g/cm^2)	Initial values (Soil)				OC at harvest (%)
				Organic carbon (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	
A. Tillage system								
Minimum	1.33	46	56	0.58	224.4	13.98	367.2	0.49
Conventional	1.32	46	57	0.58	229.9	12.75	359.4	0.52
B. Cropping system								
Soy-Soy-Soy-Soy	1.32	44	57	0.58	228.6	13.94	367.6	0.48
Soy-Maize-Soy-Maize	1.31	46	56	0.58	220.3	11.12	351.5	0.47
Soy-Soy-Maize-Soy	1.31	44	57	0.58	229.4	14.44	362.8	0.49
Soy-Soy-Soy-Maize	1.31	44	56	0.58	227.7	14.04	362.1	0.50

Table 2.2.10

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2020-21)
Zone: Northern Eastern **Design:** Strip plot **Replications:** Four
Centre: Ranchi **Character:**Soil parameters and nutrient uptake

Treatment	Bulk density (g/cm^3)	WHC (%)	Porosity (g/cm^2)	Soil Initial values (kg/ha)				OC at harvest (%)	Nutrient uptake (kg/ha)		
				OC (%)	N	P	K		N	P	K
A. Tillage system											
Minimum	1.47	20.44	40.31	0.457	242.11	14.43	183.54	0.464	130.39	16.26	87.99
Conventional	1.54	20.00	40.00	0.454	241.05	14.33	181.37	0.459	128.71	16.25	86.75
SEm±	0.01	0.17	0.25	0.003	0.25	0.04	0.32	0.002	1.93	0.21	1.65
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B. Cropping system											
Soy-Soy-Soy-Soy	1.50	20.13	40.13	0.456	241.77	14.40	182.43	0.461	125.13	15.01	78.42
Soy-Maize-Soy-Maize	1.52	20.50	40.00	0.460	241.88	14.41	182.84	0.464	129.28	18.38	105.40
Soy-Soy-Maize-Soy	1.49	20.00	40.13	0.453	240.92	14.36	182.32	0.457	133.73	16.04	82.16
Soy-Soy-Soy-Maize	1.52	20.25	40.38	0.454	241.75	14.35	182.24	0.462	130.07	15.59	83.49
SEm±	0.02	0.28	0.33	0.002	0.30	0.02	0.32	0.002	2.88	0.28	2.04
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.89	6.53

Table 2.2.11

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Central **Design:** Strip plot **Replications:** Four
Character: Seed yield (kg/ha)

Crop rotation	Kota			Amrawati			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1140	984	1062	1861	2255	2058	1501	1620	1560
Soy-Maize-Soy-Maize	1123	1111	1117	1831	2022	1926	1477	1567	1522
Soy-Soy-Maize-So	1019	972	995	2085	2265	2175	1552	1619	1585
Soyb-Soy-Soy-Maize	1007	1065	1036	1880	2078	1979	1444	1572	1508
Mean	1072	1033		1914	2155		1493	1594	
CD (P=0.05)									
Tillage			NS			24.4			
Crop Rotation			NS			178.7			
Interaction			NS			NS			

Table 2.2.12

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Central **Design:** Strip plot **Replications:** Four
Character:*Rabi*Seed yield (kg/ha)

Crop rotation	Kota			Amrawati			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	2254	2423	2338	1983	1969	1976	2119	2196	2157
Soy-Maize-Soy-Maize	2384	2149	2266	1941	1924	1933	2163	2037	2100
Soy-Soy-Maize-So	2235	2134	2184	1922	1919	1921	2079	2027	2053
Soyb-Soy-Soy-Maize	2385	2394	2390	1917	1911	1914	2151	2153	2152
Mean	2314	2275		1941	1931		2128	2103	
CD (P=0.05)									
Tillage			NS			NS			
Crop Rotation			NS			NS			
Interaction			NS			NS			

Table 2.2.13

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Central **Design:** Strip plot **Replications:** Four
Character: SoybeanEquivalent Yield (kg/ha)

Crop rotation	Kota			Amrawati			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	3972	4028	4000	4123	4501	4312	4048	4265	4156
Soy-Maize-Soy-Maize	4117	3811	3964	4045	4217	4131	4081	4014	4048
Soy-Soy-Maize-So	3826	3653	3740	4278	4453	4366	4052	4053	4053
Soyb-Soy-Soy-Maize	4004	4073	4038	4066	4258	4162	4035	4166	4100
Mean	3980	3891		4128	4357		4054	4124	
CD (P=0.05)									
Tillage			NS			113.69			
Crop Rotation			NS			NS			
Interaction			NS			NS			

Table 2.2.14

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2018-19)

Zone: Central **Design:** Strip plot **Replications:** Four
Character: Yield and economical parameters

Treatment	Seed yield (kg/ha)	Straw yield (kh/ha)	HI (%)	SEY (Kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
A. Tillage system								
Minimum	1493	2030	41.96	4054	36342	109673	73331	2.39
Conventional	1594	2103	42.47	4124	39041	111964	72924	2.28
B. Cropping system								
Soy-Soy-Soy-Soy	1560	2170	41.44	4156	37714	112584	74871	2.38
Soy-Maize-Soy-Maize	1522	1976	42.92	4048	37589	109431	71843	2.30
Soy-Soy-Maize-Soy	1585	2083	42.49	4053	37824	109361	71537	2.32
Soy-Soy-Soy-Maize	1508	2038	42.01	4100	37638	111896	74258	2.36

Table 2.2.15

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20)

Zone: Central **Design:** Strip plot **Replications:** Four
Centre: Kota **Character:** Soil parameters and nutrient uptake

Treatment	Bulk density (g/cm^3)	WHC (%)	Porosity (g/cm^2)	Soil Initial values (kg/ha)				OC at harvest (%)	Nutrient uptake (kg/ha)		
				OC (%)	N	P	K		N	P	K
A. Tillage system											
Minimum	1.48	48.36	44.15	0.69	316.56	22.33	305.81	0.68	99.82	9.32	2.11
Conventional	1.48	48.04	43.97	0.69	313.81	22.18	301.50	0.68	93.60	8.69	2.01
SEm	0.003	0.17	0.18	0.00	3.20	0.34	3.57	0.003	4.05	0.39	0.03
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B. Cropping system											
Soy-Soy-Soy-Soy	1.48	48.34	44.10	0.69	316.63	22.32	302.50	0.68	98.15	9.20	2.04
Soy-Maize-Soy-Maize	1.48	48.39	44.24	0.69	316.75	22.46	304.88	0.68	104.33	9.77	2.14
Soy-Soy-Maize-Soy	1.48	47.98	43.88	0.68	313.00	22.05	303.75	0.68	89.45	8.30	1.98
Soy-Soy-Soy-Maize	1.47	48.11	44.03	0.69	314.38	22.20	303.50	0.68	94.90	8.76	2.08
SEm±	0.003	0.17	0.18	0.00	3.20	0.34	3.57	0.003	4.05	0.39	0.03
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2.2.16

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20) (After Harvesting of Soybean)
Zone: Central **Design:** Strip plot **Replications:** Four **Centre:** Amravati **Character:** soil parameters

Treatment	Bulk density (g/cm^3)	Porosity (g/cm^2)	Soil Initial values (kg/ha)				OC at harvest (%)	Nutrient uptake (kg/ha)		
			OC (%)	N	P	K		N	P	K
A. Tillage system										
Minimum	1.48	42.90	0.463	216.02	18.29	347.63	0.463	130.93	12.13	34.43
Conventional	1.49	42.90	0.460	196.72	17.28	342.35	0.460	146.65	13.50	37.91
SEm	0.004	0.002	0.0006	0.95	0.06	1.17	0.0006	0.51	0.05	0.08
CD (P=0.05)	NS	NS	0.003	4.28	0.25	5.27	0.003	2.31	0.24	0.35
B. Cropping system										
Soy-Soy-Soy-Soy	1.48	42.91	0.465	212.41	17.98	349.31	0.465	141.77	13.35	38.39
Soy-Maize-Soy-Maize	1.49	42.90	0.454	201.07	17.64	341.45	0.454	130.40	11.85	32.71
Soy-Soy-Maize-Soy	1.49	42.90	0.464	206.71	17.82	345.87	0.464	147.88	13.70	38.23
Soy-Soy-Soy-Maize	1.49	42.90	0.462	205.28	17.71	343.33	0.462	135.11	12.35	35.35
SEm	0.01	0.005	0.0001	1.26	0.07	1.36	0.0001	4.10	0.35	1.04
CD (P=0.05)	NS	NS	0.001	3.73	0.21	4.04	0.001	12.17	1.03	3.09
Interaction										
SE(m) +	0.01	0.007	0.001	1.78	0.10	1.92	0.001	5.79	0.49	1.47
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Balance sheet

Initial soil status (Amravati)

Treatment	Bulk density (g/cm3)	Porosity (%)	Initial values (Soil)			
			OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)
Composite sample	1.51	42.90	0.42	174.83	14.67	318.09

Table 2.2.17

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20) (After Harvesting of Gram)

Zone: Central **Design:** Strip plot **Replications:** Four **Centre:** Amravati **Character:** Soil parameters

Treatment	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Bulk Density (g/cm^3)
A. Tillage system					
Minimum	0.465	220	19.046	350	1.48
Conventional	0.458	200	17.773	345	1.49
SE(m) ±	0.001	0.70	0.116	0.98	0.004
CD (P=0.05)	0.005	3.15	0.523	4.42	NS
B. Cropping system					
Soy-Soy-Soy-Soy	0.465	218	18.799	353	1.48
Soy-Maize-Soy-Maize	0.456	204	18.374	343	1.49
Soy-Soy-Maize-Soy	0.463	211	18.400	348	1.49
Soy-Soy-Soy-Maize	0.461	208	18.064	346	1.49
SE(m) ±	0.001	0.84	0.169	1.26	0.01
CD (P=0.05)	0.003	2.51	0.502	3.76	NS
Interaction					
SE(m) ±	0.001	1.19	0.23	1.79	0.01
CD (P=0.05)	NS	NS	NS	NS	NS

Table 2.2.18

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20) (After Harvesting of Gram)

Zone: Central **Design:** Strip plot **Replications:** Four
Centre: Amravati **Character:** Nutrient uptake

Treatment	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
A. Tillage system			
Minimum tillage	74.40	10.45	20.26
Conventional tillage	76.03	11.13	20.72
SE(m) +	**0.72**	**0.17**	**0.12**
CD (P=0.05)	NS	NS	NS
B. Cropping system			
Soy-Soy-Soy-Soy	78.47	11.32	21.16
Soy-Maize-Soy-Maize	73.44	10.30	20.08
Soy-Soy-Maize-Soy	75.91	10.87	20.51
Soy-Soy-Soy-Maize	73.04	10.65	20.21
SE(m) +	1.94	0.38	0.51
CD (P=0.05)	NS	NS	NS
Interaction			
SE(m) +	2.75	0.43	0.72
CD (P=0.05)	NS	NS	NS

Table 2.2.19

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Southern **Design:** Split plot **Replications:** Three **Character:** Seed yield (kg/ha)

Crop rotation	Dharwad			Adilabad			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1929	1875	1902	1810	2656	2233	1870	2266	2068
Soy-Maize-Soy-Maize	2040	2095	2067	3218	3337	3278	2629	2716	2673
Soy-Soy-Maize-So	1752	1791	1771	2197	2387	2292	1975	2089	2032
Soyb-Soy-Soy-Maize	1831	1920	1875	2975	3142	3058	2403	2531	2467
Mean	1888	1920					2219	2400	
CD (P=0.05)									
Tillage			23			240.5			
Crop Rotation			30			456.6			
Interaction			69			NS			

Table 2.2.20

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Southern **Design:** Strip plot **Replications:** Four
Character: Rabi Seed yield (kg/ha)

Crop rotation	Dharwad			Adilabad			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1144	1086	1115	2398	3029	2713	1771	2058	1914
Soy-Maize-Soy-Maize	622	782	702	2320	2501	2410	1471	1642	1556
Soy-Soy-Maize-So	1124	1110	1117	2594	2913	2753	1859	2012	1935
Soyb-Soy-Soy-Maize	1148	1154	1151	2113	2234	2173	1631	1694	1662
Mean	1010	1033		2356	2669		1683	1851	
CD (P=0.05)									
Tillage			28.8			233.6			
Crop Rotation			63.4			339.6			
Interaction			112			NS			

Table 2.2.21

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems

Zone: Southern **Design:** Strip plot **Replications:** Four
Character: Soybean Equivalent Yield (kg/ha)

Crop rotation	Dharwad			Adilabad			Zonal mean		
	Tillage								
	Mini[m]	**Con[l]**	**Mean**	Mini[m]	Con[l]	**Mean**	Mini[m]	Con[l]	**Mean**
Soy-Soy-Soy-Soy	3229	3197	3212	4208	5685	4946	3719	4441	4079
Soy-Maize-Soy-Maize	6859	7168	7013	5538	5838	5688	6199	6503	6351
Soy-Soy-Maize-So	3119	3351	3235	4791	5300	5045	3955	4326	4140
Soyb-Soy-Soy-Maize	3189	3351	3266	5087	5376	5232	4138	4364	4249
Mean	4097	4267		4905	5549		4501	4908	
CD (P=0.05)									
Tillage			121			286.7			
Crop Rotation			282			583.1			
Interaction			136			505.0			

Table 2.2.22

Sustainable soybean production through diversification and tillage systems (2019-20)

Zone: Southern **Design:** Strip plot **Replications:** Four
Character: Yield and economical parameters

Treatments	Seed yield (kg/ha)	Straw yield (kh/ha)	HI (%)	SEY (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
A. Tillage system								
Minimum	2219	8804	30.32	4501	48188	124130	75961	1.51
Conventional	2400	8987	32.63	4908	46155	137371	91310	1.93
B. Cropping system								
Soy-Soy-Soy-Soy	2279	5112	29.92	4449	48154	138288	90135	1.78
Soy-Maize-Soy-Maize	2702	20159	29.46	6426	46973	141207	94234	1.92
Soy-Soy-Maize-Soy	2079	5096	31.18	4268	48154	132135	83981	1.69
Soy-Soy-Soy-Maize	2509	5042	35.19	4321	48153	133197	85231	1.71

Table 2.2.23

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20)

Zone: Southern **Design:** Strip plot **Replications:** Four
Centre: Adilabad **Character:** Soil properties

Treatment	Bulk density (g/cm^3)	WHC (%)	Porosity (g/cm^2)	Initial values of soil (kg/ha)				OC at harvest (%)	Nutrient uptake (kg/ha)		
				OC (%)	N	P	K		N	P	K
A. Tillage system											
Minimum	1.53	35.4	38.9	0.54	210.6	24.5	296.4	0.54	175.9	28.6	75.6
Conventional	1.55	36.2	38.0	0.55	219.6	26.3	274.0	0.62	160.5	29.4	65.9
SEm	0.01	0.74	0.63	0.01	2.99	0.25	14.7	0.01	1.85	1.30	2.80
CD (at 5%)	NS	NS	NS	NS	NS	1.08	NS	NS	9.2	NS	NS
B. Cropping system											
Soy-Soy-Soy-Soy	1.48	35.2	33.4	0.69	221.4	31.2	278.9	0.55	166.3	32.1	70.1
Soy-Maize-Soy-Maize	1.52	36.0	40.1	0.68	218.0	28.5	296.3	0.61	169.9	33.6	75.6
Soy-Soy-Maize-Soy	1.49	33.9	39.5	0.63	234.7	24.7	301.5	0.63	175.2	35.7	70.1
Soy-Soy-Soy-Maize	1.53	39.5	35.5	0.69	225.3	23.0	288.4	0.51	168.3	34.0	68.5
SEm	0.03	0.88	0.44	0.08	9.0	1.40	9.9	0.04	6.11	1.90	2.99
CD (at 5%)	0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Note: Balance sheet- not prepared

Table 2.3.1

ASP3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting

Zone: North Plain **Design:** Strip plot **Replications:** Three **Character:** Yield and economics

Plant geometry (cm)	Pantnagar			Ludhiana			Zonal mean		
	Variety								
	PS 1092	SL958	Mean	PS 1092	SL958	Mean	PS 1092	SL958	Mean
45x5	1416	1379	1397	1781	2295	2038	1599	1837	1718
45x10	1808	1708	1758	1656	2285	1971	1732	1997	1865
45x15	1077	1140	1108	1581	1968	1775	1329	1554	1442
45x20	913	1017	965	1452	1902	1677	1183	1460	1321
Mean	1304	1311		1618	2113		1461	1712	
CD (P=0.05)									
Variety			NS			210			238.4
Plant geometry			NS			95			240.6
Interaction			NS			NS			

Table 2.3.2

ASP3/15. System intensification for soybean productivity augmentation under Ridge Furrow planting

Zone: North Plain **Character:** Yield, yield attributes and economical parameters
Design: Strip plot **Replications:** Three

Treatment	Branches/ Plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety										
PS 1092	3.35	63.15	8.56	1461	4547	27.06	30286	56148	25863	1.84
SL 958	3.40	65.45	8.55	1712	5685	25.50	30458	65897	35440	2.15
Plant geometry (cm)										
45x5	3.03	54.30	8.31	1718	5367	27.07	32882	66095	33213	2.01
45x10	3.28	62.25	8.49	1865	5758	27.77	30662	71630	40969	2.34
45x15	3.53	68.15	8.61	1442	4881	25.15	29331	55504	26173	1.88
45x20	3.66	72.45	8.82	1321	4459	25.13	28613	50863	22250	1.76

Table 2.3.3

AGRON.3/18.System intensification for soybean productivity augmentation under ridge furrow planting

Zone: North Plain **Centre:** Ludhiana **Character:** Plant dry matter, CGR and RGR and RUE
Design: Strip plot **Replications:** Three

Treatment	Plant dry weight (g)			CGR ($g\ m^{-2}\ d^{-1}$)		RGR ($g\ g^{-1}\ m^{-2}\ d^{-1}$)		RUE ($kgha^{-1}mm^{-1}$)
	30 DAS	45DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS	
Variety								
PS 1092	2.26	7.32	13.19	7.75	8.94	0.057	0.027	2.89
SL 958	2.41	7.56	13.02	7.89	8.37	0.053	0.025	3.52
Plant geometry (cm)								
45x5	2.43	6.51	12.21	7.46	9.59	0.047	0.028	3.48
45x10	2.48	7.51	12.99	7.67	8.37	0.053	0.024	3.64
45x15	2.33	7.57	13.51	7.56	8.72	0.055	0.026	2.96
45x20	2.10	8.17	13.72	8.59	7.93	0.533	0.024	2.74

Table 2.3.4

AGRON 3/18. System intensification for soybean productivity augmentation under ridge furrow planting

Zone: Eastern **Character:** Yield and economics
Design: Strip plot **Replications:** Three

Plant geometry	Raipur			Ranchi			Zonal mean		
	Variety								
	JS 95 60	RSC10 46	Mean	JS 95 60	RSC10 46	Mean	JS 95 60	RSC10 46	Mean
45x5	1544	1689	1617	1625	2246	1935	1584	1968	1776
45x10	1798	2010	1904	1597	2388	1993	1698	2199	1948
45x15	1426	1602	1514	1413	1976	1695	1419	1789	1604
45x20	1159	1347	1253	1153	1556	1354	1156	1451	1304
Mean	1482	1662		1447	2041		1464	1852	
CD (P=0.05)									
Variety			307.12			220.58			-
Plant geometry			-			183.02			-
Interaction			-			NS			-

Table 2.3.5

AGRON 3/18.System intensification for soybean productivity augmentation under ridge furrow planting

Zone: Eastern **Character:** Yield, yield attributes and economical parameters
Design: Strip plot **Replications:** Three

Treatment	Branches/ plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kh/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety										
JS 95 60	3.36	57.70	11.54	1464	2317	39.09	22776	56815	34039	2.09
RSC10 46	3.51	61.52	11.02	1852	2777	39.91	22713	71847	49134	2.71
Plant geometry (cm)										
45x5	3.39	58.94	11.14	1776	2685	39.84	24734	68910	44177	2.32
45x10	3.56	62.89	11.29	1948	2840	40.31	23082	75592	52510	2.86
45x15	3.47	59.12	11.11	1604	2500	39.26	22031	62245	40214	2.40
45x20	3.61	58.65	11.08	1304	2111	38.59	21131	50576	29445	2.00

Table 2.3.6

AGRON.4/18.System intensification for soybean productivity augmentation under ridge furrow planting

Centre: Ranchi **Character:** Plant dry matter, CGR, RGR and RUE
Design: Strip plot **Replications:** Three

Treatment	Plant dry weight (g)			CGR ($g/m^2/day$)		RGR (g/g/day)		RUE
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS	
Variety								
JS 95- 60	3.88	11.95	20.23	0.538	0.552	0.0327	0.0152	1.59
RSC 10-46	4.45	14.38	23.34	0.662	0.597	0.0340	0.0140	2.25
SEm±	0.04	0.09	0.45	0.005	0.027	0.0002	0.0005	0.04
CD (P=0.05)	0.22	0.57	2.74	0.028	NS	0.0011	NS	0.24
Plant geometry (cm)								
45x5	3.90	12.94	21.42	0.603	0.566	0.0347	0.0146	2.13
45x10	4.10	13.16	21.78	0.604	0.575	0.0338	0.0146	2.19
45x15	4.28	13.25	21.85	0.598	0.573	0.0327	0.0145	1.87
45x20	4.37	13.30	22.08	0.595	0.585	0.0322	0.0148	1.49
SEm±	0.08	0.14	0.26	0.012	0.021	0.0007	0.0005	0.07
CD (P=0.05)	0.24	0.44	0.80	NS	NS	NS	NS	0.20

Table 2.3.7

ASP3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting

Zone: North Eastern hill **Character:** Yield and economics
Design: Strip plot **Replications:** Three

Plant geometry (cm)	Imphal			Medziphema			Zonal mean		
	Variety								
	JS 93 05	JS 97 52	Mean	JS 93 05	JS 97 52	Mean	JS 93 05	JS 97 52	Mean
45x5	1304	1375	1340	626	1316	971	965	1346	1156
45x10	1415	1417	1416	594	934	764	1005	1176	1090
45x15	1523	1567	1545	389	864	626	956	1216	1086
45x20	1271	1319	1295	300	819	559	786	1069	927
Mean	1378	1419	-	477	983		928	1201	
CD (P=0.05)									
Variety			NS			NS			-
Plant geometry			-			171.68			-
Interaction			-			NS			-

Table 2.3.8

ASP3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting
Zone: North Eastern hill **Character:**Yield, yield attributes and economical parameters
Design: Strip plot **Replications:** Three

Treatment	Branches/ Plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety										
JS 93 05	4.39	42.10	13.01	928	2032	33.39	38922	55664	16742	0.36
JS 97 52	4.44	54.76	9.36	1201	2804	33.67	38922	72077	33155	0.84
Plant geometry (cm)										
45x5	4.26	46.71	11.31	1156	2456	34.90	42477	69321	26844	0.63
45x10	4.52	50.23	11.27	1090	2450	34.00	38902	65396	26494	0.64
45x15	4.55	51.82	11.05	1086	2456	33.83	37462	65137	27676	0.66
45x20	4.34	44.96	11.11	927	2310	31.39	36847	55627	18781	0.46

Table 2.3.9

AGRON.3/18.System intensification for soybean productivity augmentation under ridge furrow planting

Zone: North Eastern hill **Character:** Plant dry matter, CGR and RGR and RUE
Design: Strip plot **Replications:** Three

Treatment	Dry weight/plant (g)			CGR ($g/m^2/day$)		RGR (g/g/day)		RUE (kg/ha/mm)
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS	
Variety								
JS 93-05	1.16	3.81	8.43	2.393	4.612	0.077	0.054	1.55
JS97-52	1.18	4.75	10.90	3.968	6.367	0.088	0.053	2.00
Plant geometry (cm)								
45x5	1.17	4.06	8.38	5.323	8.913	0.083	0.049	2.06
45x10	1.07	4.11	9.34	3.138	5.614	0.087	0.056	1.85
45x15	1.12	4.43	10.62	2.387	4.100	0.087	0.057	1.71
45x20	1.33	4.54	10.34	1.869	3.337	0.073	0.056	1.48

Table 2.3.10

ASP3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting

Zone: Central **Character:** Yield and economics
Design: Strip plot **Replications:** Three

Plant geometry (cm)	Sehore			Amrawati			Kota			Deogarh Baria			Zonal mean		
				Variety											
	JS 2034	RVS 24	Mean	JS 2034	RVS 24	Mean	JS 2034	RVS 24	Mean	JS 2034	RVS 24	Mean	JS 2034	RVS 24	Mean
45x5	1728	808	1268	2652	2427	2540	1127	1528	1327	1527	1206	1367	1759	1492	1625
45x10	2065	741	1403	2469	2341	2405	1065	1427	1246	1786	1437	1612	1846	1487	1666
45x15	2132	718	1425	2291	2002	2147	995	1381	1188	1227	1167	1197	1661	1317	1489
45x20	1886	696	1291	1988	1538	1763	949	1258	1103	1002	880	941	1456	1093	1275
Mean	1953	741		2350	2077		1034	1399		1386	1173		1681	1347	
CD (P=0.05)															
Variety			52.63			NS			304			202			-
Plant geometry			124.30			263			-			-			-
Interaction			175.78			NS			-			-			-

Table 2.3.11

ASP3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting

Zone: Central **Character:** Yield, yield attributes and economical parameters
Design: Strip plot **Replications:** Three

Treatment	Branches/ Plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety										
JS 20 34	3.69	44.12	10.73	1681	2175	43.21	21970	61822	41398	2.46
RVS 24	3.73	41.98	10.74	1347	2074	38.93	21863	50163	28887	1.77
Plant geometry (cm)										
45x5	3.00	32.28	10.61	1625	2440	39.65	22646	60187	38545	2.16
45x10	3.65	41.88	10.71	1666	2312	41.20	21818	61720	41013	2.40
45x15	3.97	47.09	10.78	1489	1974	42.16	21295	55001	34835	2.17
45x20	4.23	50.96	10.84	1275	1772	41.28	20859	47059	27235	1.85

Table 2.3.12

AGRON.3/18.System intensification for soybean productivity augmentation under ridge furrow planting

Zone: Central **Character:** Plant dry matter, CGR and RGR and RUE
Design: Strip plot **Replications:** Three

Treatment	Dry weight/plant (g)			CGR ($g/m^2/day$)		RGR (g/g/day)		RUE (kg/ha/mm)
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS	
Variety								
JS 20 34	2.77	6.64	16.00	9.33	15.12	0.19	0.29	1.95
RVS 24	2.83	6.84	13.49	9.47	15.64	0.21	0.30	2.11
Plant geometry (cm)								
45x5	2.52	6.12	14.18	8.71	14.37	0.19	0.28	2.28
45x10	2.74	6.69	14.62	9.05	14.59	0.20	0.29	2.15
45x15	2.86	6.90	14.91	9.63	15.79	0.20	0.30	1.97
45x20	3.10	7.25	15.26	10.21	16.77	0.21	0.30	1.72

Table 2.3.13

ASP3/15. System intensification for soybean productivity augmentation under Ridge Furrow planting

Zone: Southern **Character:** Seed Yield (kg/ha)
Design: Strip plot **Replications:** Three

Plant geometry (cm)	Dharwad			Adilabad			Zonal mean		
	Variety								
	JS 93 05	MACS 1188	Mean	JS 93 05	MACS 1188	Mean	JS 93 05	MACS 1188	Mean
45x5	2820	3111	2966	2053	2695	2374	2437	2903	2670
45x10	2712	3097	2905	1993	2255	2123	2353	2676	2514
45x15	2663	3004	2834	1722	2032	1877	2193	2518	2356
45x20	2365	2768	2683	1615	1802	1708	1990	2285	2196
Mean	2640	2995		1845	2196		2243	2596	
CD (P=0.05)									
Variety			349			299			-
Plant geometry			218			353			-
Interaction			309			-			-

Table 2.3.14

ASP3/15. System intensification for soybean productivity augmentation under Ridge Furrow planting

Zone: Southern **Character:** Yield, yield attributes and economical parameters
Design: Strip plot **Replications:** Three

Treatment	Branches/ Plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety										
JS 93 05	4.40	43.35	13.65	2243	4209	15.51	36564	83323	46759	2.28
MACS 1188	4.94	54.65	14.11	2446	5114	15.86	36563	96520	59957	2.64
Plant geometry (cm)										
45x5	4.32	46.37	13.60	2670	3900	16.73	36970	99437	62467	2.69
45x10	4.50	48.12	13.82	2514	3742	16.10	36678	93487	56809	2.55
45x15	4.77	50.40	14.06	2356	3580	15.37	36454	87417	50964	2.40
45x20	5.10	51.12	14.04	2196	3503	14.49	36152	79345	43193	2.19

Table 2.3.15

AGRON. 3/18.System intensification for soybean productivity augmentation under ridge furrow planting

Zone: : Southern **Character:** Plant dry matter, CGR and RGR and RUE
Design: Strip plot **Replications:** Three

Treatment	Plant dry weight (g)			CGR (g/m^2/day)		RGR (g/g/day)		RUE (kg/ha-mm)
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS	
Variety								
JS 93 05	5.20	17.83	31.56	2.22	6.02	0.082	0.064	2.94
MACS 1188	5.97	22.69	40.01	2.12	6.83	0.091	0.066	3.38
Plant geometry (cm)								
45x5	5.54	19.97	35.88	3.62	12.12	0.087	0.069	3.47
45x10	5.65	19.99	35.36	2.06	6.13	0.087	0.066	3.28
45x15	5.82	20.48	35.96	1.63	4.04	0.086	0.063	3.09
45x20	5.90	20.60	35.93	1.39	3.41	0.084	0.063	2.80

Table 2.4.1

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: North Plain Zone **Variety:** SL-958 **Characters:** Economics
Centre: Pantnagar **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1968	-	-	32979	-	-	76344	32979	43365	2.32
FP – ST	1817	150	5827	32866	113	51.6	70517	32866	37651	2.15
FP – SI	1733	235	9120	32929	50	182.4	67225	32929	34296	2.04
FP – RDF	1386	582	22574	27539	5440	4.1	53770	27539	26231	1.95
FP – WM	625	1343	52112	26559	6420	8.1	24232	26559	-2327	0.91
FP – PA	1210	758	29396	30362	2617	11.2	46948	30362	16586	1.55
FP – R&F	1637	330	12815	31659	1320	9.7	63530	31659	31871	2.01

FP-Full package**, ST**-Seed treatment**, SI**- Seed inoculation**, WM**- Weed management**, PA**- Pesticide application, RF- Ridge & Furrow

Table 2.4.2

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Pantnagar **Zone:** North Plain **Variety:** SL-958
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	106.9	8.98	4258	6226	31.62
Full package – seed treatment	90.1	8.8	4196	6013	30.22
Full package – seed inoculation	91.0	8.5	4197	5929	29.16
Full package – RDF	68.3	8.47	3974	5360	25.46
Full package – weed management	39.3	8.01	2505	3130	20.09
Full package – insecticide application	62.9	8.38	3725	4935	25.01
Full package – Ridge furrow	75.7	8.85	4021	5658	29.54
SEm	13.46	0.260	322.5	398.5	2.182
CD (P=0.05)	NS	NS	993.5	1227.7	6.72

Table 2.4.3

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: PAU Ludhiana **Zone:** North Plain **Variety:** SL 958
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2026	-	-	33235	-	-	78606	33235	45371	2.37
FP – ST	1872	153	5954	32785	450	13.23	72642	32785	39857	2.22
FP – SI	1859	166	6457	33135	100	64.57	72139	33135	39004	2.18
FP – RDF	1780	246	9546	30063	3172	3.01	69050	30063	38987	2.30
FP – WM	1370	655	25425	31510	1725	14.74	53170	31510	21660	1.69
FP – PA	1904	122	4732	31250	1985	2.38	73864	31250	42614	2.36
FP – R&F	1957	68	2648	31840	1395	1.90	75947	31840	44107	2.39
SEm	54	56	2187		4.7	9.51	2097		2097	0.07
CD (P=0.05)	167	178	6887		15	29.95	6464		6464	0.21

FP-Full package**, ST**-Seed treatment**, SI**- Seed inoculation**, WM**- Weed management**, PA**- Pesticide application, R&F-Ridge & Furrow

Table 2.4.4

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Ludhiana **Zone:** North Plain **Variety:** SL 958
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	60.1	8.93	6986	9012	22.48
Full package – seed treatment	53.9	8.80	6785	8657	21.63
Full package – seed inoculation	50.5	8.53	6752	8611	21.78
Full package – RDF	48.9	8.50	5149	6929	25.68
Full package – weed management	41.6	8.73	5543	6914	20.07
Full package – insecticide application	52.5	8.90	6738	8642	22.10
Full package – Ridge furrow	54.8	8.57	6947	8904	22.24
SEm	2.35	0.15	460	462	1.32
CD (P=0.05)	7.3	NS	NS	1424	NS

Table 2.4.5

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: North Plain Zone **Variety:** SL-958 **Characters:** Economics
Design: RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1997			33107			77475	33107	44368	2.35
FP – ST	1845	152	5891	32826	282	32.42	71580	32826	38754	2.19
FP – SI	1796	201	7789	33032	75	123.49	69682	33032	36650	2.11
FP – RDF	1583	414	16060	28801	4306	3.56	61410	28801	32609	2.13
FP – WM	998	999	38769	29035	4073	11.42	38701	29035	9667	1.30
FP – PA	1557	440	17064	30806	2301	6.79	60406	30806	29600	1.96
FP – R&F	1797	199	7732	31750	1358	5.80	69739	31750	37989	2.20

Table 2.4.6

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: North Plain Zone **Variety:** SL-958 **Characters:** Yield attributes and yield of soybean
Design: RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	83.50	8.96	5622	7619	27.05
Full package – seed treatment	72.00	8.80	5491	7335	25.93
Full package – seed inoculation	70.75	8.52	5475	7270	25.47
Full package – RDF	58.60	8.49	4562	6145	25.57
Full package – weed management	40.45	8.37	4024	5022	20.08
Full package – insecticide application	57.70	8.64	5232	6789	23.56
Full package – Ridge furrow	65.25	8.71	5484	7281	25.89

Table 2.4.7

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Amravati **Zone:** Central **Variety:** RVS-24
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differential yield (kg/ha)	Value of differential yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differential cost	Cost of cultiva-tion (Rs/ha)	Gross Retu-rns (Rs/ha)	Net Retu-rns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2233	--	--	--	--	--	30767	81412	50646	2.65
FP – ST	1957	276	9533	100	625	15.25	30142	71203	41062	2.36
FP – SI	1788	445	15336	140	985	15.57	29782	64950	35168	2.18
FP – RDF	1363	870	30030	4385	6039	4.97	24728	49338	24610	2.00
FP – WM	1350	883	30455	6440	8138	3.74	22629	48972	26343	2.16
FP – PA	1719	514	17732	1344	2321	7.64	28446	62432	33986	2.19
FP – R&F	1778	455	15709	500	865	18.15	29902	64745	34844	2.17
SEm+	49.57	--	--	--	--	--	94.18	--	--	--
CD (P=0.05)	152.73	--	--	--	--	--	290.18	--	--	--

FP-Full package**, ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, RF- Ridge & Furrow

Table 2.4.8

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Amravati **Zone:** Central **Variety:** RVS-24
Characters: Yield attributes and Yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	42.00	11.69	2918	5151	43.36
Full package – seed treatment	39.67	11.18	2465	4422	44.25
Full package – seed inoculation	37.07	10.79	2165	3954	45.25
Full package – RDF	30.60	10.58	1553	2916	46.77
Full package – weed management	29.40	11.62	1593	2943	45.88
Full package – insecticide application	34.87	11.41	2083	3802	45.26
Full package – Ridge furrow	35.87	11.72	2277	4055	43.86
SEm+	1.49	0.65	70.69	--	--
CD (P=0.05)	4.59	NS	217.82	--	--

Table 2.4.9

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Kota **Zone:** Central **Variety:** RVS 24
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1612	-	-	25161	-	-	62533	25161	37372	1.49
FP – ST	1497	110	4268	388	24385	0.14	58071	24773	33298	1.34
FP – SI	1347	245	9506	273	24615	0.31	52264	24888	27376	1.10
FP – RDF	1106	481	18663	1786	21589	0.67	42900	23375	19525	0.84
FP – WM	893	709	27509	2102	20957	1.01	34661	23059	11602	0.50
FP – PA	1030	580	22504	1954	21253	0.82	39951	23207	16744	0.72
FP – R&F	1224	372	14434	2000	21161	0.53	47491	23161	24330	1.05
SEm±	39.24						1522.34		1522.34	0.06
CD (P=0.05)	120.94						4692.64		4692.64	0.19

ST-Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application

Table 2.4.10

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Kota **Zone:** Central **Variety:** RVS 24
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
1.Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	43.40	11.43	2522	4133	39.02
2.Full package – seed treatment	39.93	11.17	2339	3835	39.00
3.Full package – seed inoculation	39.27	11.03	2115	3462	38.91
4.Full package – RDF	34.67	10.77	1737	2843	38.91
5.Full package – weed management	28.67	10.67	1407	2300	38.85
6.Full package – insecticide application	31.40	10.87	1624	2653	38.86
7.Full package – Ridge furrow	35.60	10.90	1916	3140	38.99
SEm±	2.31	0.34	68.39	104.45	0.43
CD (P=0.05)	7.11	1.05	210.82	321.98	1.34

Table 2.4.11

AGRON-4/19: Evaluation of partial factor productivity for soybean

Centre: Sehore **Zone:** Central **Variety:** RVS 24
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2020			19214			76760	19214	57546	4.00
FP – ST	1751	269	10228	200	19014	1.86	66532	19014	47518	3.50
FP – SI	1818	202	7669	200	19014	2.48	69091	19014	50077	3.63
FP – RDF	1684	336	12787	2964	16250	1.27	63973	16250	47723	3.94
FP – WM	1504	516	19611	2000	17214	0.88	57149	17214	39935	3.32
FP – PA	1594	426	16199	1000	18214	1.12	60561	18214	42347	3.32
FP – R&F	1773	247	9386	0	19214	2.05	67374	19214	48160	3.51
SEm	32	-	-	-	-	-	-	-	-	-
CD (P=0.05)	99	-	-	-	-	-	-	-	-	-

FP-Full package**, ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F**- Ridge & Furrow

Table 2.4.12

AGRON-4/19: Evaluation of partial factor productivity for soybean

Centre: Sehore **Zone:** Central **Variety:** RVS 24
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
.Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridgefurrow)	40.67	11.00	2447	4467	45.23
.Full package – seed treatment	35.33	10.83	2806	4557	38.43
.Full package – seed inoculation	34.00	10.33	2806	4624	39.39
Full package – RDF	38.00	11.17	3008	4691	35.92
Full package – weed management	32.00	10.83	3277	4781	31.54
Full package – insecticide application	33.33	11.00	3187	4781	33.33
.Full package – Ridge furrow	36.00	11.00	2873	4646	38.16
SEm	1.49	0.28	104	100	0.99
CD (P=0.05)	4.59	NS	319	NS	3.04

Table 2.4.13

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Central Zone **Variety:** RVS 24 **Characters:** Economics
Design: RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1468			15421			48088	50816	50188	2.66
FP – ST	1303	180	6010	590	11464	16.25	44051	45933	42290	2.35
FP – SI	1240	241	8131	581	11617	16.59	42902	44774	40599	2.34
FP – RDF	1039	435	15373	2667	11379	13.82	37760	37993	33856	2.26
FP – WM	938	538	19397	3005	11980	13.36	33800	37469	29438	1.98
FP – PA	1087	394	14112	1477	10883	14.41	37407	42504	34642	2.11
FP– R&F	1195	282	9885	1023	10737	17.24	41442	43102	37905	2.21

FP-Full package**, ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application**, R&F-** Ridge & Furrow

Table 2.4.14

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Central Zone **Variety:** RVS 24 **Characters:** Yield attributes and yield of soybean
Design: RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridgefurrow)	42.02	11.37	2629	4584	42.54
Full package – seed treatment	38.31	11.06	2537	4271	40.56
Full package – seed inoculation	36.78	10.72	2362	4013	41.18
Full package – RDF	34.42	10.84	2099	3483	40.53
Full package – weed management	30.02	11.04	2092	3341	38.76
Full package – insecticide application	33.20	11.09	2298	3745	39.15
Full package – Ridge furrow	35.82	11.21	2355	3947	40.34

Table 2.4.15

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Raipur **Zone:** Eastern **Variety:** RSC 10 46
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1824	-	-	20285	-	-	70763.4	20285	50478.4	3.49
FP – ST	1565	259	10045.32	19715	570	17.62	60718.1	19715	41003.1	3.08
FP – SI	1534	290	11255.88	19995	290	38.81	59507.6	19995	39512.6	2.98
FP – RDF	762	1062	41217.24	16285	4000	10.30	29546.2	16285	13261.2	1.81
FP – WM	537	1287	49939.48	18385	1900	26.28	20824.0	18385	2439.0	1.13
FP – PA	580	1244	48251.68	17885	2400	20.10	22511.8	17885	4626.8	1.26
FP – R&F	1720	104	4046.84	19485	800	5.06	66716.6	19485	47231.6	3.42
SEm	20.08	-	-	-	-	-	-	-	-	-
CD (P=0.05)	63.47	-	-	-	-	-	-	-	-	-

FP- Full package,**ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F-** Ridge & Furrow

Table 2.4.16

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Raipur **Zone:** Eastern **Variety:** RSC 10 46
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	58.63	12.15	3255	5078	35.91
Full package – seed treatment	47.82	11.75	2732	4297	36.42
Full package – seed inoculation	47.14	11.54	2691	4225	36.30
Full package – RDF	38.36	11.08	1306	2067	36.84
Full package – weed management	30.24	10.16	915	1452	36.97
Full package – insecticide application	32.47	10.38	995	1575	36.84
Full package – Ridge furrow	52.24	12.15	3002	4722	36.42
SEm	0.81	0.24	38.97	63.62	-
CD (P=0.05)	2.54	0.75	121.45	190.47	-

Table 2.4.17

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Ranchi **Zone:** Eastern **Variety**: RSC 10-46
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiv ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2295	-		28500			89035	28500	60535	2.12
FP – ST	2200	95	3675	28200	300	12.25	85360	28200	57160	2.03
FP – SI	2185	110	4268	28443	57	74.88	84767	28443	56324	1.98
FP – RDF	1296	999	38768	21235	7265	5.34	50268	21235	29033	1.37
FP – WM	1313	982	38096	25785	2715	14.03	50939	25785	25154	0.98
FP – PA	1849	446	17309	26800	1700	10.18	71726	26800	44926	1.68
FP – R&F	2145	150	5809	26500	2000	2.90	83226	26500	56726	2.14
SEm±	129.80	-	-	-	-	-	5036.43	-	5036.43	0.18
CD (P=0.05)	400.00	-	-	-	-	-	15520.12	-	15520.12	0.56

FP-Full package, **ST**-Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F-** Ridge & Furrow

Table 2.4.18

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Ranchi **Zone:** Eastern **Variety:** RSC 10-46
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridgefurrow)	58.00	10.04	3173.89	5468.61	41.91
Full package – seed treatment	55.33	9.98	3077	5277	41.42
Full package – seed inoculation	52.33	9.83	3158	5342	40.84
Full package – RDF	29.00	9.61	2116	3411	38.06
Full package – weed management	30.00	9.90	2121	3434	38.24
Full package – insecticide application	50.67	9.90	3045	4894	37.79
.Full package – Ridge furrow	52.00	9.80	3093	5238	40.96
SEm±	2.28	0.29	103.14	166.40	1.69
CD (P=0.05)	7.03	NS	317.83	512.77	NS

Table 2.4.19

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Bhawanipatna **Zone:** Eastern **Variety:** RSC 10-46
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differential yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1577	-	-	44636	-		61175	44636	16539	1.37
FP – ST	1427	150	5820	44212	423	13.7	55355	44212	11142	1.25
FP – SI	1327	250	9700	44182	453	21.4	51475	44182	7292	1.17
FP – RDF	907	670	25996	35743	8893	2.9	35179	35743	-564	0.98
FP – WM	717	860	33368	35534	9102	3.7	27807	35534	-7727	0.78
FP – PA	1250	327	12675	42219	2417	5.2	48500	42219	6281	1.15
FP – R&F	1527	50	1940	40085	4551	0.4	59235	40085	19150	1.48
SEm	50	-	-	-	-	-	1957	-	1957	0.05
CD (P=0.05)	155	-	-	-	-	-	6031	-	6031	0.16

FP- Full package, **ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F-** Rif=dge& Furrow

Table 2.4.20

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Bhawanipatna **Zone:** Eastern **Variety:** RSC 10-46
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed Index (g)	Straw yield (kg/ha)	Biologi-cal yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	34	10.9	1823	3400	46.5
Full package – seed treatment	29	10.4	1717	3143	45.5
Full package – seed inoculation	29	10.4	1587	2913	45.6
Full package – RDF	22	9.8	1090	1997	45.5
Full package – weed management	20	9.2	887	1603	44.5
Full package – insecticide application	29	10.1	1547	2797	44.7
.Full package – Ridge furrow	31	10.7	1827	3353	45.6
SEm	**2**	0.3	98	126	1.7
CD (P=0.05)	**6**	1.0	301	389	NS

Table 2.4.21

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Eastern **Variety:** RSC 10 46 **Characters:** Economics
Design: RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2059			24393			79899	24393	55507	2.81
FP – ST	1882	177	6860	23958	435	14.94	73039	23958	49082	2.56
FP – SI	1859	200	7762	24219	174	56.85	72137	24219	47918	2.48
FP – RDF	1029	1031	39993	18760	5633	7.82	39907	18760	21147	1.59
FP – WM	925	1134	44018	22085	2308	20.16	35882	22085	13797	1.06
FP – PA	1214	845	32780	22343	2050	15.14	47119	22343	24776	1.47
FP – R&F	1932	127	4928	22993	1400	3.98	74971	22993	51979	2.78

FP- Full package, **ST**-Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F**-Ridge & Furrow

Table 2.4.22

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Eastern **Variety:** RSC 10 46 **Characters:** Yield attributes and yield
Design: RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridgefurrow)	58.32	11.10	3214	5274	38.91
Full package – seed treatment	51.58	10.87	2905	4787	38.92
Full package – seed inoculation	49.74	10.69	2925	4784	38.57
Full package – RDF	33.68	10.35	1711	2739	37.45
Full package – weed management	30.12	10.03	1518	2443	37.61
Full package – insecticide application	41.57	10.14	2020	3234	37.32
Full package – Ridge furrow	52.12	10.98	3048	4980	38.69

Table 2.4.23

AGRON-4/19: Evaluation of partial factor productivity for soybean

Centre: Imphal **Zone:** North Eastern Hill **Variety:** JS 97 52
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1277	-	-	48729	-	-	76625	48729	27896	0.57
FP – ST	1086	191	11450	48054	675	16.96	65175	48054	17121	0.36
FP – SI	1111	166	9950	48504	225	44.22	66675	48504	18171	0.37
FP – RDF	977	300	18025	40653	8076	2.23	58600	40653	17947	0.44
FP – WM	453	825	49475	41289	7440	6.65	27150	41289	-14139	-0.34
FP – PA	873	404	24250	46057	2672	9.08	52375	46057	6318	0.14
FP – R&F	1037	240	14415	45369	3360	4.29	62210	45369	16841	0.37
SEm	43.01	-	-	-	-	-	2581	-	2581	0.054
CD (P=0.05)	132.54	-	-	-	-	-	7952	-	7952	0.168

FP-Full package, **ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F**-Ridge & Furrow

Table 2.4.24

AGRON-4/19: Evaluation of partial factor productivity for soybean

Centre: Imphal **Zone:** North Eastern Hill **Variety:** JS 97 52
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed Index (g)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	86	8.2	4058	5335	24.2
Full package – seed treatment	79	8.1	3860	4946	22.3
Full package – seed inoculation	82	7.9	3662	4773	23.3
Full package – RDF	65	7.8	3271	4248	23.1
.Full package – weed management	34	7.0	1098	1550	29.3
Full package – insecticide application	60	7.6	3277	4150	21.2
Full package – Ridge furrow	71	7.6	3436	4473	23.3
SEm	2.79	0.245	230.4	247	1.65
CD (P=0.05)	8.61	NS	710.1	762	NS

Table 2.4.25

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Medziphema **Zone:** North Eastern Hill **Variety:** JS 97-52
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1061	-	-	33109	-	-	63653.40	33109	30544.40	0.92
FP – ST	1026	35	2080	31598	1511.00	1.38	61573.40	31598	29975.40	0.95
FP – SI	983	78	4693	32889	220.00	21.33	58960.00	32889	26071.00	0.79
FP – RDF	171	890	53380	25371	7738.00	6.90	10273.20	25371	-15097.80	-0.59
FP – WM	81	980	58780	28709	4400.00	13.36	4873.40	28709	-23835.60	-0.83
FP – PA	779	282	16907	31378	1731.00	9.77	46746.60	31378	15368.60	0.49
FP – R&F	1041	20	1173	30909	2200.00	0.53	62480.20	30909	31571.20	1.02
SEm	30.23	-	-	-	-	-	1813.85	-	1813.85	0.06
CD (P=0.05)	93.15	-	-	-	-	-	5589.01	-	5589.01	0.17

FP-Full package, **ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F**-Ridge &Furrow

Table 2.4.26

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Medziphema **Zone:** North Eastern Hill **Variety:** JS 97-52
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biologic al yield (kg/ha)	HI (%)
1.Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	47.89	10.33	1510.22	2571.11	41.47
2.Full package – seed treatment	35.89	10.27	1427.88	2454.11	41.76
3.Full package – seed inoculation	37.22	10.20	1354.45	2337.11	42.14
4.Full package – RDF	13.67	9.00	585.11	756.33	22.63
5.Full package – weed management	16.22	9.17	237.11	318.33	25.67
6.Full package – insecticide application	38.00	9.70	1123.11	1902.22	40.95
7.Full package – Ridge furrow	42.33	9.90	1546.78	2588.11	40.27
SEm	5.91	0.32	67.40	84.60	1.15
CD (P=0.05)	18.22	NS	207.67	260.68	3.53

Table 2.4.27

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Northern Eastern Hill Zone **Variety:** JS 97 52 **Characters:** Economics
Design: RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	1169			40919			70139	40919	29220	0.745
FP – ST	1056	113	6765	39826	1093	9.17	63374	39826	23548	0.655
FP – SI	1047	122	7322	40697	223	32.78	62818	40697	22121	0.58
FP – RDF	574	595	35703	33012	7907	4.57	34437	33012	1425	-0.075
FP – WM	267	902	54128	34999	5920	10.01	16012	34999	-18987	-0.585
FP – PA	826	343	20578	38718	2202	9.43	49561	38718	10843	0.315
FP – R&F	1039	130	7794	38139	2780	2.41	62345	38139	24206	0.695

FP=Full package, **ST-**Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **RF-** Ridge & Furrow

Table 2.4.28

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Northern Eastern Hill **Variety:** JS 97 52
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	66.95	9.27	2784	3953	32.84
Full package – seed treatment	57.45	9.19	2644	3700	32.03
Full package – seed inoculation	59.61	9.05	2508	3555	32.72
Full package – RDF	39.34	8.40	1928	2502	22.87
Full package – weed management	25.11	8.09	668	934	27.49
Full package – insecticide application	49.00	8.65	2200	3026	31.08
Full package – Ridge furrow	56.67	8.75	2491	3531	31.79

Table 2.4.29

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Dharwad **Zone:** Southern **Variety:** MACS1188
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2131		74585	18161	18161	1	74596	41700	32896	1.79
FP – ST	2110	21	735	18128	100	121	73837	41600	32237	1.77
FP – SI	1971	160	5600	17961	200	60	68979	41500	27479	1.66
FP – RDF	1910	220	7700	14200	3961	3	66900	37739	29161	1.77
FP – WM	1805	326	11410	11041	7120	1	63163	34580	28583	1.83
FP – PA	1852	279	9765	15181	2980	4	64819	38720	26099	1.67
FP – R&F	2012	119	4165	14361	3800	3	70419	37900	32519	1.86
SEm	71		18362	392	4820	40	2497		2497	0.06
CD (P=0.05)	220		NS	1209	NS	NS	7694		7694	0.20

FP- Full package, **ST**-Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F**- Ridge & Furrow

Table 2.4.30

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Dharwad **Zone:** Southern **Variety:** MACS 1188
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	78.67	13.86	3836	5968	0.32
Full package – seed treatment	78.00	13.67	3586	5696	0.37
Full package – seed inoculation	75.67	13.43	3153	5124	0.38
Full package – RDF	74.00	13.34	2867	4779	0.40
Full package – weed management	65.00	12.61	2166	3970	0.45
Full package – insecticide application	75.33	13.17	2593	4445	0.42
Full package – Ridge furrow	76.33	13.44	3420	5432	0.37
SEm	2.31	0.37	116	187	0.01
CD (P=0.05)	7.12	NS	356	575	0.02

Table 2.4.31

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Centre: Adilabad **Zone**: Southern **Variety:** MACS 1188
Characters: Yield and economics **Design:** RBD **Replications:** Three

Treatment	Seed yield (kg/ha)	Differential yield (kg/ha)	Value of differential yield (Rs/ha)	Cost of treatment (Rs/ha)	Differential cost (Rs/ha)	Ratio of differential value to differential cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2737	0	0	28140	28140	0	106183	49534	56649	2.14
FP – ST	2508	229	8885	27315	825	10.7	97297	44358	52939	2.19
FP – SI	2321	415	16115	27601	539	30.0	90068	43325	46743	2.14
FP – RDF	1646	1091	42331	19747	8393	7.4	63852	37807	26045	1.69
FP – WM	929	1808	70150	17173	10967	6.4	36032	28667	7366	1.26
FP – PA	2015	722	28001	21902	6238	4.5	78182	39683	38499	2.00
FP – R&F	1776	960	37261	24972	3168	11.8	68922	45499	23423	1.52
S. em±	206.4	206.4	8009.4	14.3	277.3	7.9	8009.4	3575.4	9037.0	0.28
CD (at 5%)	449.8	449.8	17452.5	31.2	604.2	17.3	17452.5	7790.9	19691.6	0.61

FP- Full package, **ST**-Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, **R&F**- Ridge &Furrow

Table 2.4.32

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Adilabad **Zone:** South **Variety:** MACS 1188
Characters: Yield attributes and yield **Design:** RBD **Replications:** Three

Treatment	Pods/ plant	Seed Index (g.)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
1.Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridgefurrow)	54.6	14.1	5449	8185	33.4
2.Full package – seed treatment	50.4	13.9	5440	7947	31.6
3.Full package – seed inoculation	47.3	14.3	5656	7911	29.1
4.Full package – RDF	36.5	13.5	4333	5979	27.5
5.Full package – weed management	28.0	13.2	2641	3570	27.1
6.Full package – insecticide application	38.1	13.6	4435	6450	31.2
7.Full package – Ridge furrow	41.2	13.7	4158	5934	29.9
SEm	3.3	0.7	485.2	589.7	3.1
CD (P=0.05)	7.2	NS	1057.3	1285.0	NS

Table 2.4.33

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Pune **Zone:** Southern Zone **Variety:** MACS 1188
Characters: Yield and economics of soybean

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2771	-	-	42057	-	-	96997	42057	54940	2.30
FP – ST	2665	106	3710	41807	250	14.84	93264	41807	51457	2.23
FP – SI	2651	120	4200	41957	100	42.00	92780	41957	50823	2.21
FP – RDF	2100	671	23485	35275	6782	3.46	73509	35275	38233	2.08
FP – WM	2277	494	17290	40307	1750	9.88	79696	40307	39389	1.98
FP – PA	2412	359	12565	39557	2500	5.03	84432	39557	44875	2.13
FP – R&F	2371	401	14035	39957	2100	6.68	82963	39957	43006	2.08
SEm	115.81	-	-	0.0003	-	-	4053.61	0.0003	4053.61	0.10
CD (P=0.05)	356.80	-	-	0.0001	-	-	12488	0.0001	12488	NS

Table 2.4.34

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Centre: Pune **Zone:** Southern **Variety:** MACS 1188
Characters: Yield attributes and yields of soybean

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)	64.53	13.73	2673	5444	50.94
Full package – seed treatment	57.80	13.57	2288	4956	53.81
Full package – seed inoculation	61.00	13.67	2316	4966	53.36
Full package – RDF	54.00	13.67	2371	4472	46.98
Full package – weed management	51.87	13.20	2202	4479	50.82
Full package – insecticide application	60.27	13.90	2386	4798	50.54
Full package – Ridge furrow	57.60	13.93	2448	4818	49.16
SEm	2.20	0.47	155.36	123.78	2.59
CD (P=0.05)	6.76	NS	NS	381.35	NS

Table 2.4.35

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Southern Zone **Variety:** MACS 1188 **Characters:** Yield and economics
Design: RBD **Replications:** Three

Treatment	Yield (kg/ha)	Differ-ential yield (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	Ratio of differe-ntial value to differe-ntial cost	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
FP (ST, SI,, RDF, WM, PA, R&F	2546			29453			92592	44430	48162	2.08
FP – ST	2428	119	4443	29083	392	48.85	88133	42588	45544	2.06
FP – SI	2314	232	8638	29173	280	44.00	83942	42261	41682	2.00
FP – RDF	1885	661	24505	23074	6379	4.62	68087	36940	31146	1.85
FP – WM	1670	876	32950	22840	6612	5.76	59630	34518	25113	1.69
FP – PA	2093	453	16777	25547	3906	4.51	75811	39320	36491	1.93
FP – R&F	2053	493	18487	26430	3023	7.16	74101	41119	32983	1.82

FP-Full package, ST-Seed treatment**, SI-** Seed inoculation**, WM-** Weed management**, PA-** Pesticide application, R&F-Ridge & Furrow

Table 2.4.36

AGRON-4/19: Evaluation of partial factor productivity for soybean (All Centres)

Zone: Southern Zone **Variety:** MACS 1188 **Characters:** Yield attributes and yield
Design: RBD **Replications:** Three

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
.Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridgefurrow)	65.93	13.90	3986	6532	28.22
Full package – seed treatment	62.07	13.71	3771	6200	28.59
Full package – seed inoculation	61.32	13.80	3708	6000	27.61
Full package – RDF	54.83	13.50	3190	5077	24.96
Full package – weed management	48.29	13.00	2336	4006	26.12
Full package – insecticide application	57.90	13.56	3138	5231	27.39
Full package – Ridge furrow	58.38	13.69	3342	5395	26.48

Table 2.5.1

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: North Plain **Variety:** PS 1347 and SL 958 **Character:** Growth and yield attributing
Design: RBD **Replications:** Three

Treatment	Ludhiana			Pantnagar			Zonal mean		
	Variety								
	PS 1347	**SL 958**	Mean	**PS 1347**	**SL 958**	Mean	**PS 1347**	**SL 958**	Mean
Thio Urea Spray (at 20-25 & 50-55 DAS)									
Cotrol	1390	1389	1389	1779	1601	1690	1585	1495	1540
Water spray	1414	1592	1503	1812	1655	1733	1613	1624	1618
Thiourea @ 250 ppm	1490	1674	1582	2005	1867	1936	1748	1771	1759
Thiourea @ 500 ppm	1546	1686	1616	2247	2028	2137	1897	1857	1877
Thiourea @ 750 ppm	1599	1769	1684	1961	1819	1890	1780	1794	1787
Mean	1488	1622		1961	1794		1725	1708	
	SEm	CD (P=0.05)		SEm	CD (P=0.05)				
Variety	45	132		0.537	NS				
Thiourea	72	NS		0.84	NS				
Interaction	102	NS		111.8	324.4				

Table 2.5.2

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: North Plain **Variety:** PS 1347 and SL 958 **Character:** Growth and yield attributing
Design: RBD **Replications:** Three

Treatment	Plant dry weight (g/plant)				CGR (g/m^2/day)			RGR (g/g/day)			Plant height (cm)	Bra-nches/ plant	Pods/ plant	Seed index (g)
	30 DAS	**45 DAS**	**60 DAS**	**75 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**				
Variety														
PS 1347	2.83	6.82	12.24	20.09	10.81	14.68	21.53	0.315	0.208	0.162	60.95	3.44	62.97	9.88
SL 958	2.69	7.17	11.61	21.83	12.12	12.02	28.03	0.408	0.166	0.389	77.02	3.33	58.06	8.77
Thiourea (Spray **at** 20-25 & 50-55 DAS)														
Water spray	2.83	6.77	11.26	19.70	10.66	12.14	23.25	0.293	0.175	0.181	65.48	3.11	52.67	9.29
Thiourea @ 250 ppm	2.73	7.16	11.01	19.95	11.99	10.42	24.50	0.348	0.149	0.188	69.65	3.12	54.25	9.18
Thiourea @ 250 ppm	2.68	7.14	11.98	21.22	12.07	13.13	25.83	0.360	0.182	0.187	71.59	3.59	64.78	9.36
Thiourea @ 500 ppm	2.80	7.16	12.78	21.74	11.79	15.19	24.60	0.347	0.209	0.162	71.85	3.62	65.29	9.50
Thiourea @ 750 ppm	2.74	6.74	12.59	22.18	10.83	15.85	26.25	0.335	0.221	0.186	66.27	3.48	65.57	9.30

Table 2.5.3

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: North Plain **Variety:** PS 1347 and SL 958 **Character:** Seed yield (kg/ha)

Design: FRBD **Replications:** Four

Treatment	Seed yield (kg/ha)			Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	Ludhiana	Pantnagar	Mean							
Variety										
PS 1347	1488	1961	1725	4404	6128	28.11	33627	66902	33821	2.01
SL 958	1622	1794	1708	4898	6606	26.17	33627	66271	33333	1.99
CD	132	145								
Thiourea (Spray **at** 20-25 & 50-55 DAS)										
Control	1389	1690	1540	4396	5936	26.07	32335	59744	28366	1.88
Water spray	1503	1733	1618	4454	6072	26.90	33602	62785	30172	1.90
Thiourea @ 250 ppm	1582	1936	1759	4666	6426	27.30	33834	68250	34587	2.02
Thiourea @ 500 ppm	1616	2137	1877	4883	6760	28.05	34066	72812	39030	2.15
Thiourea @ 750 ppm	1684	1890	1787	4854	6641	27.36	34298	69342	35731	2.05
CD	NS	229								

Table 2.5.4

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Eastern **Variety :** JS 95 60 and RSC 10 46 **Character:** Growth and yield attributing
Design: FRBD **Replications:** Four

Treatment	Raipur			Ranchi			Zonal mean		
	Variety								
	JS 95 60	RSC 1046	Mean	JS 95 60	RSC 1046	Mean	JS 95 60	RSC 1046	Mean
Thio Urea Spray (at 20-25 & 50-55 DAS)									
Cotrol	1205	1310	1258	1219	1846	1532	1212	1578	1395
Water spray	1317	1416	1367	1279	1859	1569	1298	1638	1468
Thiourea @ 250 ppm	1470	1485	1478	1438	2034	1736	1454	1760	1607
Thiourea @ 500 ppm	1624	1694	1659	1580	2228	1904	1602	1961	1782
Thiourea @ 750 ppm	1683	1775	1729	1573	2245	1909	1628	2010	1819
Mean	1460	1536		1418	2042		1439	1789	
	SEm	CD(P=0.05)							
Variety		5.88		34.05	98.79				
Thio Urea Spray		13.14		53.83	156.19				
Interaction	4.42	13.14		76.13	NS				

Table 2.5.5

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Eastern **Variety:** JS 95 60 and RSC 10 46 **Character:** Growth and yield attributing
Design: FRBD **Replications:** Four

Treatment	Plant dry weight (g/plant)				CGR (g/m^2/day)			RGR (g/g/day)			Plant height (cm)	Branches/ plant	Pods/ plant	Seed index (g)
	30 DAS	45 DAS	60 DAS	75 DAS	45-30 DAS	60-45 DAS	75-60 DAS	45-30 DAS	60-45 DAS	75-60 DAS				
Variety														
JS 95 60	1.68	6.78	16.81	25.47	0.341	0.736	0.511	0.041	0.013	0.006	60.22	3.55	45.42	10.88
RSC 10-46	1.79	7.53	20.52	29.26	0.383	0.866	0.583	0.043	0.016	0.007	70.42	4.14	58.97	10.77
Thiourea (Spray **at** 20-25 & 50-55 DAS)														
Water spray	1.65	6.38	16.99	24.61	0.316	0.707	0.509	0.041	0.014	0.007	42.85	3.34	46.86	10.27
Thiourea @ 250 ppm	1.69	6.56	17.92	25.44	0.325	0.758	0.501	0.041	0.014	0.007	62.65	3.46	49.36	10.44
Thiourea @ 250 ppm	1.73	7.19	19.74	26.95	0.365	0.336	0.481	0.042	0.015	0.006	65.35	4.05	53.97	10.94
Thiourea @ 500 ppm	1.77	7.69	20.20	29.11	0.395	0.834	0.594	0.042	0.015	0.006	67.52	4.28	54.94	11.12
Thiourea @ 750 ppm	1.82	7.96	20.97	30.71	0.410	0.868	0.649	0.042	0.015	0.006	69.73	4.37	57.34	11.33

Table 2.5.6

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Eastern **Variety:** JS 95 60 and RSC 10 46 **Character:** Seed yield (kg/ha)
Design: FRBD **Replications:** Four

Treatment	Seed yield (kg/ha)			Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	Raipur	Ranch	Mean							
Variety										
JS 95 60	1460	1418	1439	2409	3848	37.43	24815	55882	31067	1.83
RSC 10-46	1536	2042	1789	2737	4526	39.29	24815	69504	44689	2.33
CD (P=0.05)	5.88	99								
Thiourea (Spray **at**20-25 & 50-55 DAS)										
Control	1258	1532	1395	2286	3682	37.65	23905	54192	30287	1.80
Water spray	1367	1569	1468	2391	3859	37.91	24555	57009	32454	1.86
Thiourea @ 250 ppm	1478	1736	1607	2544	4151	38.53	24893	62402	37510	2.05
Thiourea @ 500 ppm	1659	1904	1781	2786	4568	38.88	25205	69200	43995	2.32
Thiourea @ 750 ppm	1729	1909	1819	2856	4675	38.85	25518	70663	45145	2.36
CD (P=0.05)	13.14	156								

Table 2.5.7

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Central **Variety:** NRC 86 and RVS 24 **Character:** Growth and yield attributing
Design: FRBD **Replications:** Four

Treatment	Sehore			Kota			Amravati			Zonal mean		
	Variety											
	NRC 86	RVS 24	Mean	NRC 86	RVS 24	Mean	NRC 86	RVS 24	Mean	NRC 86	RVS 24	Mean
Thio Urea Spray (at 20-25 & 50-55 DAS)												
Cotrol	1136	1630	1383	1162	1099	1131	2475	2063	2269	1591	1597	1594
Water spray	1185	1704	1444	1238	1153	1196	2611	2241	2426	1678	1699	1689
Thiourea @ 250 ppm	1210	1926	1568	1360	1253	1307	2620	2059	2340	1730	1746	1738
Thiourea @ 500 ppm	1259	1975	1617	1365	1233	1299	2816	2144	2480	1813	1784	1799
Thiourea @ 750 ppm	1309	2099	1704	1388	1343	1366	2515	2360	2437	1737	1934	1836
Mean	1220	1867		1303	1216		2608	2173		1710	1752	
	SEm	CD (P=0.05)		SEm±	CD (P=0.05)		SEm±	CD (P=0.05)				
Variety	8.60	52.34		27.37	65.60		33.26	96.51				
Thiourea	52.60	157.69		43.269	103.722		52.60	NS				
Interaction	74.38	NS		61.1913	NS		74.38	NS				

Table 2.5.8

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Central **Variety :** NRC 86 and RVS 24 **Character:** Growth and yield attributing
Design: FRBD **Replications:** Four

Treatment	Plant dry weight (g/plant)				CGR ($g/m^2/day$)			RGR (g/g/day)			Plant height (cm)	Branches/ plant	Pods/ plant	Seed index (g)
	30 DAS	45 DAS	60 DAS	75 DAS	45-30 DAS	60-45 DAS	75-60 DAS	45-30 DAS	60-45 DAS	75-60 DAS				
Variety														
NRC 86	2.70	7.06	12.50	18.44	16.04	13.14	15.48	7.90	0.042	0.024	42.49	26.76	46.77	10.62
RVS 24	2.61	7.23	12.65	19.16	15.92	13.38	17.16	5.56	0.043	0.026	42.39	24.99	36.39	10.57
Thiourea (Spray **at**20-25 & 50-55 DAS)														
Water spray	2.55	6.82	11.64	17.55	15.29	12.07	15.59	6.64	0.042	0.026	40.12	23.97	38.36	10.05
Thiourea @ 250 ppm	2.54	6.88	12.44	18.34	15.57	12.97	15.49	6.44	0.043	0.023	41.60	26.18	39.13	10.56
Thiourea @ 250 ppm	2.73	7.21	12.71	19.03	15.88	13.24	16.53	6.26	0.041	0.024	43.27	26.61	43.14	10.51
Thiourea @ 500 ppm	2.72	7.46	12.92	19.49	16.28	13.71	17.22	5.60	0.043	0.026	43.39	26.96	43.42	10.81
Thiourea @ 750 ppm	2.74	7.37	13.15	19.58	16.88	14.30	16.76	8.71	0.044	0.024	43.85	25.66	43.87	11.03

Table 2.5.9

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea
Zone: Central **Variety:** NRC 86 and RVS 24 **Character:** Seed yield (kg/ha)
Design: FRBD **Replications:** Four

Treatment	Seed yield (kg/ha)				Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	Sehore	Kota	Amra wati	Mean							
Variety											
NRC 86	1220	1303	2608	1710	2181	3891	49.66	28381	63950	35569	2.17
RVS 24	1867	1216	2173	1752	2376	4128	46.89	28106	65760	37654	2.39
CD (P=0.05)	52	66	97								
Thiourea(Spray **at**20-25 & 50-55 DAS)											
Control	1383	1131	2269	1594	2091	3685	48.91	27579	59681	32101	2.12
Water spray	1444	1196	2426	1689	2274	3963	47.64	28238	63229	34992	2.20
Thiourea @ 250 ppm	1568	1307	2340	1738	2278	4016	48.30	28300	65136	36837	2.30
Thiourea @ 500 ppm	1617	1299	2480	1799	2332	4130	48.62	28505	67371	38866	2.36
Thiourea @ 750 ppm	1704	1366	2437	1836	2419	4254	47.90	28595	68857	40261	2.42
CD (P=0.05)	158	1131	216								

Table 2.5.10

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Southern **Variety:** JS 93 05 and MACS 1188 **Character:** Growth and yield attributing
Design: FRBD **Replications:** Four

Treatment	Adilabad			Dharwad			Zonal mean		
	Variety								
	JS 93 05	**MACS 1188**	Mean	**JS 93 05**	**MACS 1188**	Mean	**JS 93 05**	**MACS 1188**	Mean
Thio Urea Spray (at 20-25 & 50-55 DAS)									
Cotrol	2177	2268	2222	1649	1855	1752	1913	2062	1987
Water spray	2220	2358	2289	1891	2400	2146	2056	2379	2218
Thiourea @ 250 ppm	2340	2521	2431	2091	2556	2323	2216	2539	2377
Thiourea @ 500 ppm	2510	2756	2633	2332	2672	2502	2421	2714	2568
Thiourea @ 750 ppm	2777	3021	2899	2347	2800	2574	2562	2911	2737
Mean	2405	2585		2062	2457		2234	2521	
	SEm	CD (P=0.05)		SEm	CD (P=0.05)				
Variety	53.4	156		50	149				
Thio Urea Spray	84.5	247		79	236				
Interaction	119.5	NS		112	NS				

Table 2.5.11

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Southern **Variety:** JS 93 05 and MACS 1188 **Character:** Growth and yield attributing
Design: FRBD **Replications:** Four

Treatment	Plant dry weight (g/plant)				CGR			RGR			Plant height (cm)	Branches/ plant	Pods/ plant	Seed index (g)
	30 DAS	**45 DAS**	**60 DAS**	**75 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**				
Variety														
JS 93 05	3.80	12.85	30.31	50.74	5.26	10.21	5.35	0.057	0.064	0.055	43.05	3.60	42.75	13.30
MACS 1188	5.98	19.46	34.55	56.84	6.45	10.33	3.38	0.061	0.063	0.057	59.15	5.00	52.55	14.45
Thiourea (at 20-25 & 50-55 DAS)														
Water spray	4.63	14.67	28.36	46.29	4.78	9.11	3.67	0.057	0.057	0.053	46.90	4.00	41.68	13.60
Thiourea @ 250 ppm	4.82	15.37	31.03	50.47	4.97	9.70	3.30	0.058	0.067	0.052	49.68	4.08	45.30	13.38
Thiourea @ 250 ppm	4.79	16.04	32.53	54.47	6.30	10.01	4.45	0.058	0.063	0.056	51.35	4.33	47.93	14.38
Thiourea @ 500 ppm	4.97	16.75	34.47	57.44	6.39	11.38	4.05	0.061	0.066	0.055	52.18	4.55	50.55	14.05
Thiourea @ 750 ppm	5.23	17.95	35.53	61.07	6.87	10.91	6.37	0.060	0.064	0.061	55.50	4.83	52.93	14.25

Table 2.5.12

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Zone: Southern **Variety:** JS 93 05 and MACS 1188 **Character:** Seed yield (kg/ha)
Design: FRBD **Replications:** Four

Treatment	Seed yield (kg/ha)			Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	Dharwad	Adilabad	Mean							
Variety										
JS 93 05	2062	2405	2062	3083	5145	40.00	36889	72164	35275	1.95
MACS 1188	2457	2586	2457	3733	5889	42.00	36889	85979	49090	2.32
CD (P=0.05)	149	-								
Thiourea (at 20-25 & 50-55 DAS)										
Control	1752	2,223	1988	3913	5900	35.88	39871	73775	33904	1.84
Water spray	2146	2,290	2218	4080	6298	36.45	41098	81963	40865	2.00
Thiourea @ 250 ppm	2323	2,432	2377	4327	6704	36.05	42182	87822	45639	2.11
Thiourea @ 500 ppm	2502	2,634	2568	4651	7218	35.68	43857	94869	51011	2.18
Thiourea @ 750 ppm	2574	2,900	2737	4824	7561	36.85	45532	101289	55756	2.24
CD (P=0.05)	NS	156								

Table 2.6.1

AGRON. 6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: North plain **Centre:** Pantnagar **Design:** RBD **Replications:** Three Variety: PS 1347
Character: Yield and economics

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ Plant (mg/plant)	Plant height (cm)	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	3.11	65.3	10.27	68	162.4	48.4	3.73	12.04	21.73	12.74	14.86	0.0647	0.0253
T1 + PSAP@ 6 g/l	2.77	75.4	11.12	59	143.0	49.1	3.76	12.32	23.21	13.14	16.69	0.066	0.0277
T1 + PSAP@ 9g/l	3.78	81.4	11.59	69	165.7	51.9	3.50	12.88	24.55	14.38	17.89	0.073	0.0293
T2.75% P&K +75% RPM without PSAP	4.78	61.1	10.32	75	188.8	47.3	3.63	11.93	21.33	12.72	14.41	0.066	0.0247
T2 + PSAP@ 6 g/l	3.33	78.1	10.47	69	177.3	49.7	3.66	12.09	24.04	12.93	18.33	0.066	0.313
T2 + PSAP@ 9g/l	4.22	78.6	10.88	73	181.7	51.0	3.49	12.09	24.26	13.19	18.66	0.0687	0.033
T3. 50% P&K +50% RPM without PSAP	2.89	57.0	9.83	78	195.0	42.3	3.60	11.80	21.89	12.57	15.47	0.0666	0.027
T3 + PSAP@ 6 g/l	3.66	78.5	9.93	74	185.0	41.8	3.40	11.85	23.30	12.96	17.56	0.707	0.0307
T3 + PSAP@ 9g/l	4.11	70.56	10.73	80	200.0	47.6	3.39	11.85	22.92	12.97	16.97	0.710	0.0300
T4. 100%N +00% P&K +50% RPM without PSAP	3.33	52.4	9.18	108	255.2	43.6	3.67	10.11	20.46	9.88	15.86	0.0537	0.0343
T4 + PSAP@ 6 g/l	3.99	62.7	9.79	88	204.3	44.4	3.35	10.74	20.71	11.32	15.29	0.0643	0.0303
T4 + PSAP@ 9g/l	3.78	60.0	9.95	92	212.4	45.4	3.74	11.78	21.28	12.32	14.57	0.0636	0.0247
SEm	0.784	5.52	0.456	57.0	15.32	2.90	0.416	1.25	1.49	2.03	2.927	0.104	0.0068
CD (P=0.05)	NS	16.19	NS	NS	44.93	NS	NS	NS	NS	NS	NS	NS	NS

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.2

AGRON.6/20.Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: North Plain **Centre:** Pantnagar **Design:** RBD **Replications:** Three
Variety: PS 1347 **Character:** Yield and economics

Treatment	Seed yield/ Plant (g)	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1.RDF with RPM without PSAP	11.0	1966	4068	6034	32.65	30962	76278	45316	2.46	6.38
T1 + PSAP@ 6 g/l	11.24	2011	4385	6397	31.42	48135	78031	29896	1.62	1.23
T1 + PSAP@ 9g/l	11.87	2144	4201	6346	33.67	54526	83204	28678	1.53	0.94
T2.75% P&K +75% RPM without PSAP	10.51	1782	3768	5550	32.14	29776	69139	39363	2.32	6.66
T2 + PSAP@ 6 g/l	10.93	1740	3631	5371	32.27	46252	67512	21260	1.46	0.95
T2 + PSAP@ 9g/l	10.52	1825	3849	5673	32.04	53340	70788	17448	1.33	0.59
T3.50% P&K +50% RPM without PSAP	10.37	1745	3918	5663	30.99	28591	67684	39093	2.37	8.27
T3 + PSAP@ 6 g/l	10.53	1819	3881	5770	32.14	45067	70558	25491	1.57	1.20
T3 + PSAP@ 9g/l	10.60	1621	3503	5125	31.60	52155	62913	10758	1.21	0.38
T4.100%N +00% P&K +50% RPM without PSAP	10.20	1176	3203	4379	26.89	23862	45640	21778	1.91	0.00
T4 + 10.23PSAP@ 6 g/l	10.07	1250	3389	4639	26.67	40338	48486	8148	1.20	0.49
T4 + PSAP@ 9g/l	10.23	1261	3360	4621	27.04	47426	48917	1491	1.03	0.06
SEm	0.451	156.86	256.12	343.6	2.00	-	-	-	0.138	-
CD (P=0.05)	NS	460.07	751.3	1007.7	5.88	-	-	-	0.406	-

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.3

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Eastern **Centre:** Raipur **Character:** Yield and economics **Design:** RBD **Replications:** Three
Variety: JS 97 52

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm)	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	4.00	62.09	11.82	7.94	1.43	50.28	1.25	6.81	40.62	0.345	2.221	0.0565	0.0404
T1 + PSAP@ 6 g/l	4.25	63.18	12.13	8.01	1.48	52.83	1.29	6.75	42.58	0.354	2.345	0.0567	0.0415
T1 + PSAP@ 9g/l	4.25	65.36	12.21	8.03	1.48	55.15	1.28	6.89	43.25	0.3671	2.408	0.0578	0.0417
T2.75% P&K +75% RPM without PSAP	3.55	55.84	11.75	7.88	1.45	48.39	1.19	5.45	34.27	0.274	1.907	0.0518	0.0375
T2 + PSAP@ 6 g/l	3.75	58.02	10.41	7.90	1.44	49.75	1.31	6.24	38.04	0.324	2.119	0.0529	0.0389
T2 + PSAP@ 9g/l	3.85	58.14	10.54	7.94	1.46	50.16	1.26	6.38	38.41	0.329	2.112	0.0542	0.0401
T3. 50% P&K +50% RPM without PSAP	3.35	48.10	9.38	7.66	1.18	47.36	1.19	4.88	29.85	0.241	1.645		0.0365
T3 + PSAP@ 6 g/l	3.35	50.46	9.63	7.72	1.21	48.15	1.20	5.01	31.05	0.247	1.728	0.0488	0.0369
T3 + PSAP@ 9g/l	3.45	53.27	10.34	7.75	1.39	47.21	1.24	5.08	31.58	0.245	1.745	0.0505	0.0372
T4. 100%N +00% P&K +50% RPM without PSAP	2.65	44.36	9.14	6.32	0.81	38.46	1.15	3.87	27.25	0.168	1.575	0.0465	0.0352
T4 + PSAP@ 6 g/l	2.85	45.11	9.92	6.68	0.96	40.23	1.18	4.23	28.63	0.198	1.610	0.0474	0.0355
T4 + PSAP@ 9g/l	3.00	47.25	9.61	6.83	1.02	40.85	1.18	4.85	29.11	0.228	1.619	0.0485	0.0361
SEm	-	2.09	-	-	-	-	-	-	-	-	-	-	-
CD (P=0.05)	NS	5.64	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.4

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Eastern **Centre:** Raipur **Character:** Yield and economics
Design: RBD **Replications:** Three **Variety**: JS 97 52

Treatment	Seed yield/ plant	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
T1. RDF with RPM without PSAP	33.87	1961	3463	5424.48	36.15	19810	76094.56	56285	3.84
T1 + PSAP@ 6 g/l	35.18	1968	3434	5403	36.43	33985	76370	42385	2.25
T1 + PSAP@ 9g/l	35.24	1984	3508	5491	36.12	41072	76960	35888	1.87
T2.75% P&K +75% RPM without PSAP	26.78	1634	2851	4485	36.43	18400	63403	45003	3.45
T2 + PSAP@ 6 g/l	29.58	1658	2941	4599	36.04	32575	64311	31736	1.97
T2 + PSAP@ 9g/l	31.45	1683	3010	4692	35.86	39662	65293	25631	1.65
T3. 50% P&K +50% RPM without PSAP	22.08	1573	2806	4379	35.91	17010	61017	44007	3.59
T3 + PSAP@ 6 g/l	24.11	1588	2803	4391	36.17	31185	61630	30444	1.98
T3 + PSAP@ 9g/l	24.32	1590	2783	4373	36.36	38272	61703	23432	1.61
T4. 100%N +00% P&K +50% RPM without PSAP	18.48	1094	1953	3047	35.91	15510	42455	26945	2.74
T4 + PSAP@ 6 g/l	18.64	1126	2021	3148	35.78	36772	43704	6932	1.19
T4 + PSAP@ 9g/l	19.25	1113	1987	3101	35.91	43860	43204	-656	0.99
SEm	5.2	52.4	78.4	-	-	-	-	-	-
CD (P=0.05)	NS	159.1	240.4	-	NS	-	-	-	-

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.5

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Eastern **Centre:** Ranchi **Character:** Plant dry matter **Design:** RBD
Replications: Three **Variety**: JS 97 52

Treatment	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
	30	45	60	30-45	45-60	30-45	45-60
T1. RDF with RPM without PSAP	2.57	8.17	13.00	0.373	0.322	0.033	0.013
T1 + PSAP@ 6 g/l	2.53	8.67	14.33	0.409	0.378	0.036	0.015
T1 + PSAP@ 9g/l	2.50	9.00	14.99	0.433	0.400	0.037	0.015
T2.75% P&K +75% RPM without PSAP	2.30	7.50	12.00	0.347	0.300	0.034	0.013
T2 + PSAP@ 6 g/l	2.32	7.83	13.00	0.368	0.344	0.035	0.015
T2 + PSAP@ 9g/l	2.27	8.00	13.83	0.382	0.389	0.036	0.016
T3. 50% P&K +50% RPM without PSAP	1.95	6.70	9.33	0.317	0.176	0.036	0.009
T3 + PSAP@ 6 g/l	1.93	6.76	9.67	0.322	0.194	0.036	0.010
T3 + PSAP@ 9g/l	1.97	7.00	9.93	0.336	0.196	0.037	0.010
T4.100%N +00% P&K +50% RPM without PSAP	1.63	5.17	8.17	0.236	0.200	0.033	0.013
T4 + PSAP@ 6 g/l	1.58	5.33	8.33	0.250	0.200	0.035	0.013
T4 + PSAP@ 9g/l	1.69	5.60	9.00	0.261	0.227	0.035	0.013
SEm	0.10	0.46	0.72	0.029	0.051	0.002	0.002
CD (P=0.05)	0.31	1.36	2.11	0.085	0.149	NS	NS

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.6

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Eastern **Centre:** Ranchi **Design:** RBD **Replications:** Three **Variety**: JS 97 52
Character: Yield attributes

Treatment	Branches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm)
T1. RDF with RPM without PSAP	4.50	53.00	9.43	36.80	0.23	78.67
T1 + PSAP@ 6 g/l	4.83	54.67	9.60	37.33	0.25	79.67
T1 + PSAP@ 9g/l	5.00	57.67	9.90	38.93	0.26	82.67
T2.75% P&K +75% RPM without PSAP	4.17	48.33	9.34	34.93	0.21	75.33
T2 + PSAP@ 6 g/l	4.30	49.33	9.37	35.73	0.22	76.00
T2 + PSAP@ 9g/l	4.67	50.00	9.43	36.27	0.23	79.00
T3. 50% P&K +50% RPM without PSAP	3.67	36.67	9.33	32.53	0.19	68.67
T3 + PSAP@ 6 g/l	3.80	38.00	9.36	33.07	0.20	70.00
T3 + PSAP@ 9g/l	3.87	39.00	9.37	33.87	0.21	70.00
T4.100%N +00% P&K +50% RPM without PSAP	2.93	31.00	9.23	26.40	0.17	65.33
T4 + PSAP@ 6 g/l	3.00	32.67	9.27	28.53	0.18	65.67
T4 + PSAP@ 9g/l	3.33	33.33	9.30	28.80	0.19	66.67
SEm±	0.50	3.02	0.30	2.11	0.01	1.55
CD (P=0.05)	1.48	8.87	NS	6.19	0.04	4.56

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.7

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Eastern **Centre:** Ranchi **Character:** Yield
Design: RBD **Replications:** Three **Variety**: JS 97 52

Treatment	Seed yield/ plant	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1. RDF with RPM without PSAP	5.45	1857	2675	4532	40.98	28500	72067	43567	1.53	2.53
T1 + PSAP@ 6 g/l	5.67	1933	2771	4704	41.08	43080	75013	31933	0.74	1.74
T1 + PSAP@ 9g/l	5.99	2044	2925	4969	41.11	50370	79288	28918	0.57	1.57
T2.75% P&K +75% RPM without PSAP	5.25	1789	2547	4336	41.26	26800	69409	42609	1.59	2.59
T2 + PSAP@ 6 g/l	5.58	1904	2707	4611	41.27	41380	73864	32484	0.79	1.79
T2 + PSAP@ 9g/l	5.83	1989	2800	4789	41.58	48670	77169	28499	0.59	1.59
T3. 50% P&K +50% RPM without PSAP	4.39	1497	2229	3725	40.19	25100	58065	32965	1.31	2.31
T3 + PSAP@ 6 g/l	4.58	1563	2302	3865	40.42	39680	60625	20945	0.53	1.53
T3 + PSAP@ 9g/l	4.97	1693	2435	4128	41.03	46970	65699	18729	0.40	1.40
T4. 100%N +00% P&K +50% RPM without PSAP	3.50	1195	2064	3258	36.63	22200	46353	24153	1.09	2.09
T4 + PSAP@ 6 g/l	3.57	1216	2086	3302	36.65	44070	47171	3101	0.07	1.07
T4 + PSAP@ 9g/l	3.69	1258	2133	3391	37.16	28500	48805	-2555	-0.05	0.95
SEm±	0.18	62.19	70.20	96.30	1.18	-	2412.98	2412.98	0.06	0.06
CD (P=0.05)	0.54	182.41	205.91	282.46	3.46	-	7077.46	7077.46	0.19	0.19

Table 2.6.8

AGRON. 6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean Zone:
Centre: Eastern **Character:** Yield and economics **Design:** RBD **Replications:** Three
Variety: JS 97 52

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ Plant (mg/plant)	Plant height (cm)	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	4.25	57.55	10.63	22.37	0.830	64.48	1.91	7.49	26.81	0.36	1.27	0.045	0.027
T1 + PSAP@ 6 g/l	4.54	58.93	10.87	22.67	0.865	66.25	1.91	7.71	28.46	0.38	1.36	0.046	0.028
T1 + PSAP@ 9g/l	4.63	61.52	11.06	23.48	0.870	68.91	1.89	7.95	29.12	0.40	1.40	0.047	0.028
T2.75% P&K +75% RPM without PSAP	3.86	52.09	10.55	21.41	0.830	61.86	1.75	6.48	23.14	0.31	1.10	0.043	0.025
T2 + PSAP@ 6 g/l	4.03	53.68	9.89	21.82	0.830	62.88	1.82	7.04	25.52	0.35	1.23	0.044	0.027
T2 + PSAP@ 9g/l	4.26	54.07	9.99	22.11	0.845	64.58	1.77	7.19	26.12	0.36	1.25	0.045	0.028
T3. 50% P&K +50% RPM without PSAP	3.51	42.39	9.36	20.10	0.685	58.02	1.57	5.79	19.59	0.28	0.91	0.036	0.023
T3 + PSAP@ 6 g/l	3.58	44.23	9.50	20.40	0.705	59.08	1.57	5.89	20.36	0.28	0.96	0.042	0.023
T3 + PSAP@ 9g/l	3.66	46.14	9.86	20.81	0.800	58.61	1.61	6.04	20.76	0.29	0.97	0.044	0.024
T4. 100%N +00% P&K +50% RPM without PSAP	2.79	37.68	9.19	16.36	0.490	51.90	1.39	4.52	17.71	0.20	0.89	0.040	0.024
T4 + PSAP@ 6 g/l	2.93	38.89	9.60	17.61	0.570	52.95	1.38	4.78	18.48	0.22	0.91	0.041	0.024
T4 + PSAP@ 9g/l	3.17	40.29	9.46	17.82	0.605	53.76	1.44	5.23	19.06	0.24	0.92	0.042	0.025

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.9

AGRON.6/20.Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Eastern **Character:** Yield and economics
Design: RBD **Replications:** Three **Variety**: JS 97 52

Treatment	Seed yield/ Plant (g)	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1. RDF with RMP without PSAP	19.66	1909	3069	4978	38.57	24155	74081	49926	2.69	2.53
T1 + PSAP@ 6 g/l	20.43	1951	3103	5053	38.76	38533	75692	37159	1.50	1.74
T1 + PSAP@ 9g/l	20.62	2014	3217	5230	38.62	45721	78124	32403	1.22	1.57
T2.75% P&K +75% RMP without PSAP	16.02	1711	2699	4410	38.85	22600	66406	43806	2.52	2.59
T2 + PSAP@ 6 g/l	17.58	1781	2824	4605	38.66	36978	69087	32110	1.38	1.79
T2 + PSAP@ 9g/l	18.64	1836	2905	4741	38.72	44166	71231	27065	1.12	1.59
T3. 50% P&K +50% RMP without PSAP	13.24	1535	2518	4052	38.05	21055	59541	38486	2.45	2.31
T3 + PSAP@ 6 g/l	14.35	1575	2552	4128	38.30	35433	61127	25695	1.26	1.53
T3 + PSAP@ 9g/l	14.65	1642	2609	4251	38.70	42621	63702	21081	1.01	1.40
T4.100%N +00% P&K +50% RMP without PSAP	10.99	1144	2008	3153	36.27	18855	44404	25549	1.92	2.09
T4 + 10.23PSAP@ 6 g/l	11.11	1171	2054	3225	36.22	40421	45438	5017	0.63	1.07
T4 + PSAP@ 9g/l	11.47	1186	2060	3246	36.54	36180	46005	-1605	0.47	0.95

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.10

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean Zone

Centre: Imphal **Zone** :North Eastern Hill **Character:** Yield and economics
Design: RBD **Replications:** Three **Variety**: JS 97 52

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm) at 60 DAS	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1=RDF with RPM without PSAP	5.5	64	8.8	47	0.49	66	1.61	6.93	16.7	7.81	14.32	0.097	0.059
T2=T1 + PSAP@ 6 g/l	5.5	78	8.7	46	0.50	65	1.73	6.39	16.9	6.83	15.35	0.088	0.065
T3=T1 + PSAP@ 9g/l	5.7	84	8.7	47	0.51	66	1.78	7.00	17.9	7.66	16.00	0.091	0.063
T4=75% P&K +75% RPM without PSAP	4.6	69	8.1	42	0.46	70	1.63	5.40	15.7	5.53	15.09	0.079	0.072
T5=T4 + PSAP@ 6 g/l	5.3	73	7.9	51	0.57	58	1.54	5.56	16.1	5.90	15.51	0.085	0.071
T6=T4 + PSAP@ 9g/l	5.2	75	8.3	47	0.51	65	1.71	5.67	16.2	5.81	15.45	0.080	0.070
T7= 50% P&K +50% RPM without PSAP	5.2	56	7.8	41	0.43	70	1.46	4.78	14.5	4.86	14.21	0.079	0.074
T8=T7 + PSAP@ 6 g/l	5.1	61	8.5	34	0.37	68	1.60	5.05	15.0	5.07	14.52	0.077	0.072
T9=T7 + PSAP@ 9g/l	4.9	67	8.0	48	0.43	66	1.42	5.24	15.4	5.60	14.91	0.087	0.072
T10=100%N +00% P&K +00% RPM without PSAP	4.4	53	8.1	44	0.49	55	1.55	4.70	14.7	4.61	14.66	0.074	0.076
T11=T10 + PSAP@ 6 g/l	5.4	55	8.2	45	0.50	60	1.69	5.01	15.2	4.88	14.89	0.073	0.074
T12=T10 + PSAP@ 9g/l	5.2	57	8.7	46	0.45	60	1.44	4.93	15.3	5.12	15.20	0.083	0.076
SEm	0.23	3.97	0.39	3.32	0.039	3.12	0.09	0.36	0.65	0.51	0.87	0.005	0.004
CD (P=0.05)	0.69	11.6	NS	NS	NS	9.15	NS	1.05	1.92	1.50	NS	NS	NS

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.11

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: North Eastern Hill **Centre:** Imphal **Character:** Yield and economics
Design: RBD **Replications:** Three **Variety**: JS 97 52

Treatment	Seed yield/ Plant (g)	Seed Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1=RDF with RPM without PSAP	9.0	1311	3739	5050	26.2	42294	78667	36373	1.86	-
T2=T1 + PSAP@ 6 g/l	9.7	1600	3342	4942	32.6	56553	96000	39447	1.70	0.22
T3=T1 + PSAP@ 9g/l	10.0	1678	2818	4496	37.3	63561	100667	37105	1.58	0.03
T4=75% P&K +75% RPM without PSAP	9.0	1086	3262	4348	25.0	39361	65180	25819	1.66	3.60
T5=T4 + PSAP@ 6 g/l	9.7	1289	3228	4517	28.6	53620	77333	23713	1.44	-1.12
T6=T4 + PSAP@ 9g/l	9.3	1394	3102	4496	31.3	60628	83667	23038	1.38	-0.73
T7= 50% P&K +50% RPM without PSAP	9.0	1003	3488	4491	22.3	36868	60167	23299	1.63	2.41
T8=T7 + PSAP@ 6 g/l	9.7	1147	3569	4716	24.4	51127	68833	17706	1.35	-2.11
T9=T7 + PSAP@ 9g/l	9.0	1292	3541	4833	27.0	58135	77500	19365	1.33	-1.07
T10= 100%N +00% P&K +00% RPM without PSAP	8.3	908	3518	4426	20.6	32322	54500	22178	1.69	1.42
T11=T10 + PSAP@ 6 g/l	9.7	1067	3419	4486	23.8	53589	64000	10411	1.19	-2.30
T12=T10 + PSAP@ 9g/l	9.3	1106	3439	4545	24.4	61003	66367	5364	1.09	-1.66
SEm	0.736	57.70	207.97	186.54	1.83	-	3462	3462	0.071	-
CD (P=0.05)	NS	169.22	NS	NS	5.36	-	10153	10153	0.208	-

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.12

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Centre:**, Amravati **Character:** Yield and economics
Design: RBD **Replication**: Three **Variety**: RVS 24

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm)	Plant dry matter (g/plant) at DAS				CGR ($g/m^2/day$)			RGR (g/g/day)		
							30	45	60	At Harv	45-30	60-45	75-60	45-30	60-45	75-60
T1. RDF with RPM without PSAP	2.13	46.93	10.31	42.00	83.96	65.60	3.64	5.29	9.58	17.37	4.94	12.89	23.37	0.030	0.047	0.048
T1 + PSAP@ 6 g/l	2.00	44.47	10.72	46.67	91.98	67.80	3.59	5.38	10.21	17.39	5.35	14.51	21.53	0.032	0.051	0.042
T1 + PSAP@ 9g/l	2.00	45.53	11.07	38.67	67.13	53.67	3.42	5.20	9.20	17.02	5.33	12.01	23.45	0.033	0.046	0.049
T2.75% P&K +75% RPM without PSAP	1.80	39.27	10.30	42.00	76.55	63.60	3.29	5.01	9.05	15.05	5.17	12.13	17.99	0.034	0.047	0.041
T2 + PSAP@ 6 g/l	1.60	44.80	9.89	37.67	80.21	59.93	3.26	4.90	8.94	15.09	4.91	12.14	18.44	0.032	0.049	0.042
T2 + PSAP@ 9g/l	1.93	32.67	10.05	43.00	94.82	50.00	3.36	4.56	7.27	12.18	3.62	8.13	14.71	0.025	0.037	0.040
T3. 50% P&K +50% RPM without PSAP	1.87	31.93	10.97	36.33	75.45	41.80	3.10	4.70	8.77	13.95	4.80	12.21	15.55	0.033	0.050	0.037
T3 + PSAP@ 6 g/l	1.60	31.60	10.57	44.00	98.22	50.73	3.00	4.78	8.33	14.05	5.35	10.63	17.18	0.037	0.044	0.042
T3 + PSAP@ 9g/l	1.73	29.87	9.84	40.00	97.70	38.40	3.19	4.63	8.42	16.59	4.32	11.37	24.52	0.030	0.048	0.054
T4. 100%N +00% P&K +50% RPM without PSAP	1.67	20.47	9.32	40.67	84.20	46.80	2.72	3.95	7.91	11.55	3.70	11.88	10.91	0.030	0.055	0.030
T4 + PSAP@ 6 g/l	1.47	28.47	9.62	37.67	66.49	46.20	3.04	4.37	7.81	11.01	3.97	10.34	9.61	0.029	0.046	0.027
T4 + PSAP@ 9g/l	1.67	25.67	9.77	38.00	89.00	44.07	3.08	4.42	8.32	11.31	4.03	11.67	8.98	0.029	0.051	0.025
SEm	0.12	2.31	0.38	3.85	14.03	2.83	0.12	0.26	0.37	0.68	0.95	1.13	2.10	--	--	--
CD (P=0.05)	0.35	6.79	NS	NS	NS	8.30	0.36	0.77	1.09	1.98	NS	NS	6.16	--	--	--

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.13

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Centre:** Amravati **Character:** Yield and economics
Design: RBD **Replication**: Three **Variety**: RVS 24

Treatment	Seed yield/ plant	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
T1. RDF with RPM without PSAP	4.92	2185	2768	4953	44.14	32061	79541	47480	2.48
T1 + PSAP@ 6 g/l	5.12	2276	2949	5226	43.55	47729	82954	35225	1.74
T1 + PSAP@ 9g/l	4.65	2065	2688	4753	43.42	54414	75268	20854	1.38
T2.75% P&K +75% RPM without PSAP	3.93	1745	2151	3897	44.78	29463	63442	33979	2.15
T2 + PSAP@ 6 g/l	4.16	1849	2299	4148	44.58	45155	67231	22076	1.49
T2 + PSAP@ 9g/l	3.65	1622	2002	3624	44.79	51811	58960	7149	1.14
T3. 50% P&K +50% RPM without PSAP	3.43	1525	1900	3425	44.52	27282	55452	28170	2.03
T3 + PSAP@ 6 g/l	3.41	1514	1816	3330	45.46	42756	54954	12197	1.29
T3 + PSAP@ 9g/l	3.20	1424	1734	3158	45.13	49673	51742	2069	1.04
T4. 100%N +00% P&K +50% RPM without PSAP	3.10	1378	1710	3089	44.55	23901	50110	26208	2.09
T4 + PSAP@ 6 g/l	3.34	1486	1814	3300	45.05	46689	53991	7303	1.16
T4 + PSAP@ 9g/l	3.41	1514	1850	3364	44.92	53829	55004	1175	1.02
SEm	0.22	99.94	121.32	218.66	--	189.89	--	--	--
CD (P=0.05)	0.66	293.10	355.77	641.24	--	--	--	--	--

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.14

AGRON. 6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Centre:** Kota **Character:** Yield and economics
Design: RBD **Replication**: Three **Variety**: RVS 24

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Heig-ht (cm)	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	4.13	40.67	8.80	45.3	76.92	53.20	2.00	6.89	13.59	10.85	14.87	0.0358	0.0197
T1 + PSAP@ 6 g/l	4.23	41.67	9.07	45.0	77.42	54.00	2.10	7.19	14.25	11.31	15.67	0.0359	0.0198
T1 + PSAP@ 9g/l	4.37	43.00	9.20	46.7	78.42	54.67	2.13	7.48	14.83	11.87	16.31	0.0363	0.0199
T2.75% P&K +75% RPM without PSAP	3.43	33.67	8.20	44.3	74.00	52.40	1.80	6.25	12.19	9.87	13.20	0.0360	0.0194
T2 + PSAP@ 6 g/l	3.47	34.00	8.40	43.7	75.08	52.93	1.97	6.87	13.47	10.89	14.66	0.0363	0.0195
T2 + PSAP@ 9g/l	3.60	35.33	8.60	44.3	76.67	53.93	2.01	7.12	14.06	11.33	15.41	0.0365	0.0197
T3. 50% P&K +50% RPM without PSAP	3.23	31.67	8.47	42.0	73.50	52.27	1.81	6.17	12.01	9.69	12.95	0.0356	0.0193
T3 + PSAP@ 6 g/l	3.30	32.33	8.60	41.7	73.83	53.07	1.94	6.67	13.09	10.50	14.25	0.0358	0.0195
T3 + PSAP@ 9g/l	3.40	33.33	8.47	43.7	76.42	53.93	2.00	6.91	14.04	10.90	15.82	0.0359	0.0205
T4. 100%N +00% P&K +50% RPM without PSAP	4.17	41.00	8.93	45.3	77.58	53.27	2.03	7.18	13.96	11.43	15.05	0.0367	0.0193
T4 + PSAP@ 6 g/l	4.27	42.00	9.20	44.0	78.33	54.27	2.10	7.55	14.93	12.09	16.40	0.0370	0.0198
T4 + PSAP@ 9g/l	4.40	43.33	9.27	46.3	79.42	54.93	2.13	7.70	15.33	12.37	16.95	0.0372	0.0200
SEm	0.22	2.17	0.32	0.92	1.00	0.19	0.12	0.30	0.42	0.52	0.72	0.0012	0.0009
CD (P=0.05)	0.64	6.37	0.94	2.71	2.94	0.55	NS	0.87	1.23	1.52	2.12	NS	NS

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.15

AGRON. 6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Centre:** Kota **Character:** Yield and economics
Design: RBD **Replication**: Three **Variety**: RVS 24

Treatment	Seed yield/ plant	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
T1.RDF with RPM without PSAP	5.22	1207	1898	3105	38.86	22736	46819	24082	1.06
T1 + PSAP@ 6 g/l	5.34	1247	1958	3204	38.90	30611	48371	17759	0.58
T1 + PSAP@ 9g/l	5.50	1300	2037	3337	38.95	34549	50440	15891	0.46
T2.75% P&K +75% RPM without PSAP	4.55	983	1565	2549	38.58	22111	38153	16042	0.73
T2 + PSAP@ 6 g/l	4.80	1067	1689	2756	38.69	29986	41387	11401	0.38
T2 + PSAP@ 9g/l	4.90	1100	1739	2839	38.73	33923	42680	8757	0.26
T3.50% P&K +50% RPM without PSAP	4.45	950	1516	2466	38.53	21485	36860	15375	0.72
T3 + PSAP@ 6 g/l	4.70	1033	1640	2673	38.65	29360	40093	10733	0.37
T3 + PSAP@ 9g/l	4.77	1050	1665	2715	38.64	33298	40740	7442	0.22
T4. 100%N +00% P&K +50% RPM without PSAP	5.20	1217	1913	3130	38.88	20234	47207	26972	1.33
T4 + PSAP@ 6 g/l	5.37	1267	1987	3254	38.92	32047	49147	17100	0.53
T4 + PSAP@ 9g/l	5.43	1275	2000	3275	38.93	35984	49470	13486	0.37
SEm	0.26	64.27	95.76	160.03	0.08		2493.63	2493.63	0.08
CD (P=0.05)	0.76	188.48	280.83	469.31	0.23		7312.92	7312.92	0.24

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.16

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Centre:** Sehore **Character:** Yield and economics
Design: RBD **Replication**: Three **Variety**: RVS 24

Treatment	Bran-ches/ plant	Pods/ plant	Seed inde x	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm)	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	4.66	28.00	9.17	34.67	102.33	66.55	2.33	8.10	13.83	17.10	16.99	0.083	0.036
T1 + PSAP@ 6 g/l	4.33	30.67	9.33	37.11	115.00	69.33	2.83	8.30	14.00	16.21	16.89	0.072	0.035
T1 + PSAP@ 9g/l	4.78	32.33	9.50	36.22	100.00	70.33	2.78	8.10	14.67	15.77	19.46	0.071	0.039
T2.75% P&K +75% RPM without PSAP	4.66	30.33	9.33	33.77	100.00	70.33	2.88	7.47	12.00	13.58	13.43	0.064	0.032
T2 + PSAP@ 6 g/l	5.11	29.33	9.50	36.00	111.67	70.22	2.77	7.37	11.83	13.61	13.23	0.065	0.032
T2 + PSAP@ 9g/l	4.00	29.33	9.67	36.33	115.00	74.00	2.66	7.87	12.00	15.42	12.25	0.072	0.028
T3. 50% P&K +50% RPM without PSAP	4.55	30.00	9.17	35.67	110.00	69.55	2.71	6.80	11.27	12.13	13.23	0.062	0.033
T3 + PSAP@ 6 g/l	5.22	31.33	9.33	36.55	113.33	73.78	2.94	7.03	11.43	12.12	13.04	0.06	0.032
T3 + PSAP@ 9g/l	4.89	29.33	9.50	33.22	101.00	70.44	2.55	7.43	11.47	14.46	11.95	0.071	0.029
T4. 100%N +00% P&K +50% RPM without PSAP	4.11	29.67	9.33	35.11	107.33	70.89	2.50	6.80	10.83	12.75	11.95	0.066	0.031
T4 + PSAP@ 6 g/l	4.78	28.00	9.33	34.55	106.67	71.44	2.81	7.30	11.17	13.30	11.46	0.064	0.028
T4 + PSAP@ 9g/l	4.33	30.67	9.50	36.33	106.67	75.67	2.93	7.47	12.17	13.43	13.93	0.062	0.032
SEm	0.27	1.82	0.18	0.92	4.05	2.08	0.12	0.28	0.50	0.93	1.87	0.004	0.004
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	0.83	1.47	2.73	NS	0.012	NS

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.17

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Centre:** Sehore **Character:** Yield and economics
Design: RBD **Replication**: Three **Variety**: RVS 24

Treatment	Seed yield/ plant	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1. RDF with RPM without PSAP	4.72	1749	2654	4403	39.76	19303	66461	47158	4.72	-
T1 + PSAP@ 6 g/l	4.78	1770	2654	4424	40.04	24553	67243	42690	4.78	0.149
T1 + PSAP@ 9g/l	4.83	1790	2695	4486	39.94	27178	68025	40847	4.83	0.199
T2.75% P&K +75% RPM without PSAP	4.44	1646	2613	4259	38.64	18352	62551	44199	4.44	-
T2 + PSAP@ 6 g/l	4.50	1667	2654	4321	38.59	23602	63333	39731	4.50	0.182
T2 + PSAP@ 9g/l	4.50	1667	2634	4300	38.75	26227	63333	37106	4.50	0.113
T3. 50% P&K +50% RPM without PSAP	4.22	1564	2531	4095	38.19	17404	59424	42020	4.22	-
T3 + PSAP@ 6 g/l	4.28	1584	2510	4095	38.78	22654	60206	37552	4.28	0.233
T3 + PSAP@ 9g/l	4.39	1626	2531	4156	39.11	25279	61770	36491	4.39	0.393
T4. 100%N +00% P&K +50% RPM without PSAP	4.17	1543	2490	4033	38.26	16004	58642	42638	4.17	-
T4 + PSAP@ 6 g/l	4.28	1584	2469	4053	39.13	23879	60206	36327	4.28	0.342
T4 + PSAP@ 9g/l	4.33	1605	2469	4074	39.41	26504	60988	34484	4.33	0.326
SEm	0.12	43	87	78	1.22	-	1648	1648	0.12	-
CD (P=0.05)	NS	127	NS	228	NS	-	4835	4835	0.34	-

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.18

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Character:** Yield and economics **Design:** RBD **Replications:** Three
Variety: RVS 24

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm) at 60 DAS	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1=RDF with RPM without PSAP	3.64	38.53	9.43	40.66	87.74	61.78	2.66	6.76	12.33	10.96	14.92	0.050	0.034
T2=T1 + PSAP@ 6 g/l	3.52	38.94	9.71	42.93	94.80	63.71	2.84	6.96	12.82	10.96	15.69	0.047	0.035
T3=T1 + PSAP@ 9g/l	3.72	40.29	9.92	40.53	81.85	59.56	2.78	6.93	12.90	10.99	15.93	0.047	0.035
T4=75% P&K +75% RPMwithout PSAP	3.30	34.42	9.28	40.02	83.52	62.11	2.66	6.24	11.08	9.54	12.92	0.045	0.033
T5=T4 + PSAP@ 6 g/l	3.39	36.04	9.26	39.12	88.99	61.03	2.67	6.38	11.41	9.80	13.34	0.044	0.034
T6=T4 + PSAP@ 9g/l	3.18	32.44	9.44	41.21	95.50	59.31	2.68	6.52	11.11	10.12	11.93	0.045	0.028
T7= 50% P&K +50% RPM without PSAP	3.22	31.20	9.54	38.00	86.32	54.54	2.54	5.89	10.68	8.87	12.80	0.044	0.034
T8=T7 + PSAP@ 6 g/l	3.37	31.75	9.50	40.75	95.13	59.19	2.63	6.16	10.95	9.32	12.64	0.044	0.032
T9=T7 + PSAP@ 9g/l	3.34	30.84	9.27	38.97	91.71	54.26	2.58	6.32	11.31	9.89	13.05	0.046	0.033
T10=100%N +00% P&K +00% RPM without PSAP	3.32	30.38	9.19	40.36	89.70	56.99	2.42	5.98	10.90	9.29	12.96	0.044	0.035
T11=T10 + PSAP@ 6 g/l	3.51	32.82	9.38	38.74	83.83	57.30	2.65	6.41	11.30	9.79	12.73	0.043	0.031
T12=T10 + PSAP@ 9g/l	3.47	33.22	9.51	40.21	91.70	58.22	2.71	6.53	11.94	9.94	14.18	0.043	0.034

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.19

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Central **Character:** Yield and economics **Design:** RBD **Replications:** Three
Variety: RVS 24

Treatment	Seed yield/ Plant (g)	Seed Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
T1=RDF with RPM without PSAP	4.95	1714	2440	4154	40.92	24700	64274	39573	2.75
T2=T1 + PSAP@ 6 g/l	5.08	1764	2520	4285	40.83	34298	66189	31891	2.37
T3=T1 + PSAP@ 9g/l	4.99	1718	2473	4192	40.77	38714	64578	25864	2.22
T4=75% P&K +75% RPM without PSAP	4.31	1458	2110	3568	40.67	23309	54715	31407	2.44
T5=T4 + PSAP@ 6 g/l	4.49	1528	2214	3742	40.62	32914	57317	24403	2.12
T6=T4 + PSAP@ 9g/l	4.35	1463	2125	3588	40.76	37320	54991	17671	1.97
T7= 50% P&K +50% RPM without PSAP	4.03	1346	1982	3329	40.41	22057	50579	28522	2.32
T8=T7 + PSAP@ 6 g/l	4.13	1377	1989	3366	40.96	31590	51751	20161	1.98
T9=T7 + PSAP@ 9g/l	4.12	1367	1977	3343	40.96	36083	51417	15334	1.88
T10= 100%N +00% P&K +00% RPM without PSAP	4.16	1379	2038	3417	40.56	20046	51986	31939	2.53
T11=T10 + PSAP@ 6 g/l	4.33	1446	2090	3536	41.03	34205	54448	20243	1.99
T12=T10 + PSAP@ 9g/l	4.39	1465	2106	3571	41.09	38772	55154	16382	1.91

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.20

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: South **Centre:** Adilabad **Character:** Yield and economics
Variety: MACS 1188 **Design:** RBD **Replications:** Three

Treatments	Bran-ches/ plant	Pods/ plant	Seed index (g.)	Nodule No./ plant	Nodule dry weight/ Plant (mg.)	Plant height (cm)	Plant dry matter (g/plant) at DAS			CGR ($g/m^2/day$)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	4.6	32.7	13.5	32.8	37.2	58.4	3.19	7.90	11.56	10.47	8.14	0.062	0.025
T1 + PSAP@ 6 g/l	5.1	37.2	13.1	34.7	40.0	61.9	3.06	6.99	12.45	8.74	12.14	0.056	0.039
T1 + PSAP@ 9g/l	6.0	44.9	14.7	36.3	39.7	65.9	2.58	8.39	14.76	12.91	14.16	0.079	0.038
T2.75% P&K +75% RPM without PSAP	3.9	28.1	12.9	32.3	35.2	47.9	2.87	9.43	15.03	14.56	12.45	0.079	0.031
T2 + PSAP@ 6 g/l	5.3	32.8	13.5	36.2	32.7	54.5	3.03	7.16	12.99	9.18	12.94	0.058	0.039
T2 + PSAP@ 9g/l	5.6	38.0	14.2	38.0	34.7	58.0	3.07	9.31	14.62	13.85	11.80	0.075	0.032
T3. 50% P&K +50% RPM without PSAP	3.4	22.2	13.3	32.6	34.4	38.9	3.48	9.51	14.99	13.39	12.17	0.067	0.030
T3 + PSAP@ 6 g/l	4.1	30.5	14.1	33.8	32.5	43.8	3.31	7.90	14.66	10.21	15.01	0.057	0.042
T3 + PSAP@ 9g/l	4.7	34.3	14.7	36.3	33.8	51.1	3.34	9.51	16.56	13.71	15.66	0.073	0.037
T4. 100%N +00% P&K +50% RPM without PSAP	2.9	20.6	12.7	26.1	24.3	31.1	3.61	10.34	15.69	14.96	11.89	0.070	0.028
T4 + PSAP@ 6 g/l	3.4	37.0	13.5	27.3	34.2	35.1	3.04	8.37	15.02	11.85	14.76	0.069	0.039
T4 + PSAP@ 9g/l	4.6	27.6	13.4	30.0	32.9	44.7	3.92	9.65	14.54	12.7	10.87	0.061	0.028
SEem±	0.5	2.4	0.7	2.3	2.7	3.6	0.39	0.79	0.81	1.91	2.60	0.009	0.007
CD (P=0.05)	1.5	7.3	NS	6.7	NS	10.7	NS	NS	2.39	NS	NS	NS	NS

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.21

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Southern **Centre:** Adilabad **Character:** Yield and economics
Variety: MACS 1188 **Design:** RBD **Replications:** Three

Treatment	Seed yield (g/plant)	Seed Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1. RDF with RPM without PSAP	13.8	1950	4483	6433	30.4	43489	75675	32186	1.74	0.14
T1 + PSAP@ 6 g/l	14.7	2319	4985	7304	31.8	47426	89993	42566	1.90	1.21
T1 + PSAP@ 9g/l	16.0	2986	6315	9301	32.2	49395	115852	66458	2.35	1.16
T2.75% P&K +75% RPM without PSAP	12.8	1765	4314	6079	29.1	42083	68463	26380	1.63	0.09
T2 + PSAP@ 6 g/l	13.9	1964	4498	6462	30.5	46020	76200	30179	1.66	1.26
T2 + PSAP@ 9g/l	14.8	2236	4529	6766	33.1	47989	86768	38779	1.82	1.26
T3. 50% P&K +50% RPM without PSAP	11.3	1467	3719	5186	28.4	40441	56917	16476	1.41	0.11
T3 + PSAP@ 6 g/l	12.6	1739	3914	5652	30.7	44379	67458	23080	1.53	1.38
T3 + PSAP@ 9g/l	13.7	1968	4357	6324	31.1	46347	76342	29995	1.66	1.35
T4. 100%N +00% P&K +50% RPM without PSAP	10.8	1111	2966	4078	27.5	39483	43114	3631	1.09	0.00
T4 + PSAP@ 6 g/l	12.2	1517	3856	5373	28.3	45389	58865	13475	1.30	0.80
T4 + PSAP@ 9g/l	13.2	1632	4093	5725	28.6	47350	63328	15978	1.34	0.51
S. em+	0.6	110.4	344.4	430.1	1.2	851.0	4287.0	4596.8	0.10	0.28
CD (P=0.05)	1.9	326.0	1016.8	1269.5	NS	2512.1	12656.2	13569.1	0.31	NS

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.22

AGRON.6/20 : Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean Zone

Centre: Dharwad **Zone**: Southern **Character:** Yield and economics

Variety: MACS 1188 **Design:** RBD **Replications:** Three

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm)	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/m^2/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	5.3	87.9	14.4	44.7	100	68.7	12.0	34.0	59.4	0.044	0.048	0.089	0.094
T1 + PSAP@ 6 g/l	5.7	89.3	14.9	50.7	105	70.5	13.2	38.5	62.8	0.051	0.051	0.094	0.095
T1 + PSAP@ 9g/l	6.3	90.7	15.2	52.0	107	72.4	13.3	44.3	66.4	0.062	0.063	0.099	0.095
T2.75% P&K +75% RPM without PSAP	4.9	84.5	14.0	35.3	93	68.6	11.6	31.5	57.8	0.040	0.044	0.087	0.088
T2 + PSAP@ 6 g/l	5.4	87.3	14.6	47.0	102	69.4	12.1	37.1	59.8	0.050	0.049	0.093	0.092
T2 + PSAP@ 9g/l	5.6	88.2	14.8	49.0	104	69.6	12.6	37.7	61.5	0.050	0.051	0.093	0.093
T3. 50% P&K +50% RPM without PSAP	4.6	83.2	13.4	36.0	88	67.3	10.2	31.1	56.1	0.042	0.050	0.088	0.093
T3 + PSAP@ 6 g/l	4.7	83.7	13.7	36.7	90	68.5	11.1	31.5	57.1	0.041	0.045	0.087	0.093
T3 + PSAP@ 9g/l	5.2	86.2	14.2	39.7	95	68.9	11.8	33.4	58.7	0.043	0.051	0.089	0.093
T4. 100%N +00% P&K +50% RPM without PSAP	4.4	73.3	11.7	31.3	81	58.5	9.9	28.5	53.1	0.037	0.049	0.084	0.092
T4 + PSAP@ 6 g/l	4.5	80.3	12.9	34.0	84	66.3	10.4	29.6	54.4	0.038	0.050	0.086	0.093
T4 + PSAP@ 9g/l	4.6	83.0	13.2	35.0	86	67.5	10.8	30.6	55.3	0.049	0.055	0.086	0.092
SEm	0.3	3.5	0.6	1.8	4	3.1	0.7	1.8	2.4	0.004	0.006	0.002	0.003
CD (P=0.05)	0.8	10.4	1.9	5.2	11	9.0	2.0	5.3	7.0	0.011	0.016	0.006	0.010

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.23

AGRON.6/20: Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Southern **Centre:** Dharwad **Character:** Yield and economics

Variety: MACS 1188 **Design:** RBD **Replications:** Three

Treatment	Seed yield/ plant	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1. RDF with RPM without PSAP	33.17	2500	2387	4887	0.52	38354	87500	50785	2.38	2.47
T1 + PSAP@ 6 g/l	33.77	2833	2456	5290	0.54	39229	99167	59302	2.49	1.48
T1 + PSAP@ 9g/l	34.05	3192	2496	5688	0.56	40542	111708	67905	1.86	2.40
T2.75% P&K +75% RPM without PSAP	31.97	2400	2240	4640	0.54	36715	84000	48785	2.39	1.81
T2 + PSAP@ 6 g/l	33.25	2600	2451	5051	0.51	37590	91000	52135	2.34	1.76
T2 + PSAP@ 9g/l	33.37	2767	2452	5218	0.53	38903	96833	54530	2.29	1.81
T3. 50% P&K +50% RPM without PSAP	30.71	2267	2232	4498	0.50	34554	79333	45618	2.35	1.96
T3 + PSAP@ 6 g/l	31.44	2300	2234	4534	0.51	35429	80500	43635	2.18	2.47
T3 + PSAP@ 9g/l	32.23	2467	2371	4838	0.51	36742	86333	47530	2.22	2.33
T4. 100%N +00% P&K +50% RPM without PSAP	26.67	1800	1972	3772	0.48	33821	63000	32285	2.05	2.61
T4 + PSAP@ 6 g/l	30.51	2233	2152	4385	0.51	34696	78167	40964	2.10	2.80
T4 + PSAP@ 9g/l	31.35	2263	2170	4433	0.51	36009	79217	40902	2.07	3.04
SEm	1.24	126	305	389	0.38		4399	4399	0.26	0.47
CD (P=0.05)	3.62	369	895	1141	1.13		12902	12902	0.77	1.38

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.24

AGRON. 6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Centre: Pune **Zone:** Southern **Character:** Yield and economics
Variety: MACS 1188 **Design:** RBD **Replications:** Three

Treatment	Branches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ Plant (mg)	Plant height (cm)	Plant dry matter (g/plant) at DAS			CGR ($g/m^2/day$)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1. RDF with RPM without PSAP	3.07	48.00	14.27	32.07	0.140	83.33	3.23	9.48	14.27	0.42	0.32	0.0313	0.0117
T1 + PSAP@ 6 g/l	3.20	51.93	14.53	28.00	0.110	81.60	3.07	9.37	15.15	0.42	0.39	0.0323	0.0140
T1 + PSAP@ 9g/l	2.80	49.33	14.40	28.93	0.170	81.93	3.23	8.95	13.28	0.38	0.29	0.0303	0.0110
T2.75% P&K +75% RPM without PSAP	2.60	46.33	14.80	30.47	0.160	79.60	2.93	9.70	14.51	0.45	0.32	0.0350	0.0117
T2 + PSAP@ 6 g/l	2.40	46.00	14.33	34.27	0.170	80.67	3.24	9.24	14.27	0.40	0.34	0.0307	0.0130
T2 + PSAP@ 9g/l	2.60	44.27	14.83	29.87	0.120	81.20	3.59	9.83	14.55	0.42	0.31	0.0293	0.0110
T3. 50% P&K +50% RPM without PSAP	2.73	43.20	14.43	27.67	0.140	80.47	3.17	9.99	15.17	0.45	0.35	0.0333	0.0120
T3 + PSAP@ 6 g/l	2.60	44.47	14.27	27.67	0.140	79.13	2.86	10.52	14.75	0.51	0.28	0.0380	0.0100
T3 + PSAP@ 9g/l	2.87	45.27	14.57	28.67	0.170	79.20	3.39	9.15	15.17	0.38	0.40	0.0290	0.0147
T4. 100%N +00% P&K +50% RPM without PSAP	2.60	43.20	14.73	33.93	0.140	75.27	3.47	10.58	14.03	0.47	0.23	0.0320	0.0080
T4 + PSAP@ 6 g/l	2.60	44.87	15.00	26.80	0.120	76.87	3.23	8.90	14.20	0.38	0.35	0.0293	0.0137
T4 + PSAP@ 9g/l	3.00	44.67	14.53	35.00	0.190	77.73	3.44	9.63	15.24	0.41	0.37	0.0300	0.0137
SEm	0.24	1.95	0.34	2.57	0.025	2.26	0.31	0.76	1.04	0.05	0.08	0.003	0.003
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.25

AGRON. 6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Centre: Pune **Zone:** Southern **Character:** Yield and economics
Variety: MACS 1188 **Design:** RBD **Replications:** Three

Treatment	Seed yield/ Plant (g)	Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1. RDF with RPM without PSAP	14.62	2495	2356	4851	51.48	37457	87318	49861	2.33	0.88
T1 + PSAP@ 6 g/l	17.29	2531	2405	4937	51.30	54632	88597	33965	1.62	0.35
T1 + PSAP@ 9g/l	11.73	2619	2507	5126	51.13	62507	91665	29158	1.47	0.36
T2.75% P&K +75% RPM without PSAP	12.02	2441	2604	5045	48.76	35215	85434	50219	2.43	0.89
T2 + PSAP@ 6 g/l	13.19	2424	2549	4973	48.91	60265	84846	24882	1.41	0.17
T2 + PSAP@ 9g/l	13.21	2476	2779	5255	47.14	52390	86662	34272	1.65	0.30
T3. 50% P&K +50% RPM without PSAP	13.77	2309	2554	4862	47.49	32972	80802	47830	2.45	0.30
T3 + PSAP@ 6 g/l	14.32	2305	2459	4763	48.44	58022	80664	22642	1.39	0.04
T3 + PSAP@ 9g/l	12.67	2385	2326	4711	50.87	50147	83464	33317	1.67	0.19
T4. 100%N +00% P&K +50% RPM without PSAP	13.85	2270	2856	5126	44.34	28487	79437	50950	2.79	
T4 + PSAP@ 6 g/l	13.25	2275	3010	5285	43.04	53537	79609	26073	1.49	0.01
T4 + PSAP@ 9g/l	14.31	2288	2727	5015	45.63	59837	80094	20257	1.34	0.02
SEm	1.04	80.60	125.60	174.95	1.17	0.0007	2821.09	2821.09	0.07	-
CD (P=0.05)	NS	236.36	368.34	NS	3.44	0.0021	NS	8282.75	0.21	-

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Table 2.6.26

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean Zone

Zone: Southern **Character:** Yield and economics **Variety**: MACS 1188**Design:** RBD
Replications: Three

Treatment	Bran-ches/ plant	Pods/ plant	Seed index	Nodule No./ plant	Nodule dry weight/ plant	Plant height (cm) at 60 DAS	Plant dry matter (g/plant) at DAS			CGR (g/m^2/day)		RGR (g/g/day)	
							30	45	60	45-30	60-45	45-30	60-45
T1=RDF with RPM without PSAP	4.32	56.20	14.06	36.52	45.78	70.14	6.14	17.13	28.41	3.64	2.84	0.061	0.044
T2=T1 + PSAP@ 6 g/l	4.67	59.48	14.18	37.80	48.37	71.33	6.44	18.29	30.13	3.07	4.19	0.061	0.049
T3=T1 + PSAP@ 9g/l	5.03	61.64	14.77	39.08	48.96	73.41	6.37	20.55	31.48	4.45	4.84	0.069	0.048
T4=75% P&K +75% RPM without PSAP	3.80	52.98	13.90	32.69	42.79	65.37	5.80	16.88	29.11	5.02	4.27	0.067	0.044
T5=T4 + PSAP@ 6 g/l	4.37	55.37	14.14	39.16	44.96	68.19	6.12	17.83	29.02	3.21	4.44	0.061	0.048
T6=T4 + PSAP@ 9g/l	4.60	56.82	14.61	38.96	46.27	69.60	6.42	18.95	30.22	4.77	4.05	0.066	0.045
T7= 50% P&K +50% RPM without PSAP	3.58	49.53	13.71	32.09	40.85	62.22	5.62	16.87	28.75	4.63	4.19	0.063	0.045
T8=T7 + PSAP@ 6 g/l	3.80	52.89	14.02	32.72	40.88	63.81	5.76	16.64	28.84	3.59	5.11	0.061	0.048
T9=T7 + PSAP@ 9g/l	4.26	55.26	14.49	34.89	42.99	66.40	6.18	17.35	30.14	4.71	5.37	0.064	0.048
T10=100%N +00% P&K +00% RPM without PSAP	3.30	45.70	13.04	30.44	35.15	54.96	5.66	16.47	27.61	5.16	4.06	0.062	0.043
T11=T10 + PSAP@ 6 g/l	3.50	54.06	13.80	29.37	39.44	59.42	5.56	15.62	27.87	4.09	5.05	0.061	0.049
T12=T10 + PSAP@ 9g/l	4.07	51.76	13.71	33.33	39.70	63.31	6.05	16.63	28.36	4.39	3.77	0.059	0.045

RDF-Recommended dose of fertilizer, **RPM-** Recommended plant protection measures

Table 2.6.27

AGRON.6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Zone: Southern **Character:** Yield and economics **Variety**: MACS 1188
Design: RBD **Replications:** Three

Treatment	Seed yield/ Plant (g)	Seed Yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	IBCR
T1=RDF with RPM, without PSAP	20.53	2315	3075	5390	27.47	39767	83498	44277	2.15	1.16
T2=T1 + PSAP@ 6 g/l	21.92	2561	3282	5844	27.88	47096	92586	45278	2.00	1.01
T3=T1 + PSAP@ 9g/l	20.59	2932	3773	6705	27.96	50815	106408	54507	1.89	1.31
T4=75% P&K +75% RP. without PSAP	18.93	2202	3053	5255	26.13	38004	79299	41795	2.15	0.93
T5=T4 + PSAP@ 6 g/l	20.11	2329	3166	5495	26.64	47958	84015	35732	1.80	1.06
T6=T4 + PSAP@ 9g/l	20.46	2493	3253	5746	26.92	46427	90088	42527	1.92	1.12
T7= 50% P&K +50% RPM without PSAP	18.59	2014	2835	4849	25.46	35989	72351	36641	2.07	0.79
T8=T7 + PSAP@ 6 g/l	19.45	2115	2869	4983	26.55	45943	76207	29786	1.70	1.30
T9=T7 + PSAP@ 9g/l	19.53	2273	3018	5291	27.49	44412	82046	36947	1.85	1.29
T10= 100%N +00% P&K +00% RPM without PSAP	17.11	1727	2598	4325	24.11	33930	61850	28955	1.98	0.87
T11=T10 + PSAP@ 6 g/l	18.65	2008	3006	5014	23.95	44541	72214	26837	1.63	1.20
T12=T10 + PSAP@ 9g/l	19.62	2061	2997	5058	24.91	47732	74213	25712	1.58	1.19

RDF-Recommended dose of fertilizer, **RPM**- Recommended plant protection measures

Frontline demonstrations

Table 2.7.1

Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452001, Madhya Pradesh
For the Year	2020-21

S. No.	Name of centre	Physical				Financial Allocation (Gross)
		Allocation		Achievement		
		Number of FLDs	Area in ha	Number of FLDs	Area in ha	
1	Almora	10	4.50	81	4.50	30000
2	Pantnagar	10	4.00	15	4.90	30000
3	Palampur	10	4.00	34	4.10	30000
4	Ludhiana	10	4.00	10	4.00	30000
5	Sehore	10	4.00	10	4.00	30000
6	Indore	40	16.00	40	16.00	120000
7	SOPA, Indore	270	108.00	270	108.00	810000
8	Solidribad, Bhopal	160	64.00	160	64.00	480000
9	Kota	30	12.00	30	12.00	90000
10	Amravati	20	8.00	20	8.00	60000
11	Parbhani	50	20.00	50	20.00	150000
12	Sangli	25	10.00	25	10.00	75000
13	KVK Karda	100	40.00	100	40.00	300000
14	DevgrahBaria	10	4.00	10	4.00	30000
15	Dharwad	10	4.00	10	4.00	30000
16	Ugar Sugar	50	20.00	23	9.200	150000
17	Adilabad	10	4.00	10	4.00	30000
18	Imphal	15	6.00	15	6.00	45000
19	Raipur	10	4.00	10	4.00	30000
20	Ranchi	10	4.00	20	4.00	30000
Total		**900**	**324.50**	**943**	**325.56**	**2700000**

Table 2.7.2

Details of category wise beneficiaries of frontline demonstrations (FLDs)

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452001, Madhya Pradesh
For the Year	2020-21

S. No.	Centre	Man					Women					Total
		SC	ST	OBC	Gen.	Total	SC	ST	OBC	Gen.	Total	
1	Almora	41	-	-	40	**81**	-	-	-	-	**0**	**81**
2	Pantnagar	1	-	2	11	**14**	-	-	-	1	**1**	**15**
3	Palampur	5	1	13	9	**28**	-	2	1	3	**6**	**34**
4	Ludhiana	-	-	-	10	**10**	-	-	-	-	**0**	**10**
5	Sehore	1	-	6	2	**9**	-	-	-	1	**1**	**10**
6	Indore	-	-	16	22	**38**	-	-	1	1	**2**	**40**
7	SOPA, Indore	9	9	149	78	**245**	2	2	11	10	**25**	**270**
8	Solidribad,	8	-	131	19	**158**	-	-	2	-	**2**	**160**
9	Kota	1	2	19	8	**30**	-	-	-	-	**0**	**30**
10	Amravati	2	4	11	1	**18**	-	-	1	1	**2**	**20**
11	Parbhani	5	-	15	20	**40**	-	2	4	4	**10**	**50**
12	Sangli	2	1	8	14	**25**	-	-	-	-	-	**25**
13	KVK Karda	13	10	70	3	**96**	-	2	2	-	**4**	**100**
14	DevgrahBaria	-	8	-	-	**8**	-	2	-	-	**2**	**10**
15	Dharwad	-	-	-	10	**10**	-	-	-	-	**0**	**10**
16	Ugar Sugar	-	-	-	22	**22**	-	-	-	1	1	**23**
17	Adilabad	2	2	3	1	**8**	-	2	-	-	**2**	**10**
18	Imphal	-	5	5	-	**10**	-	5	-	-	**5**	**15**
19	Raipur	-	-	7	-	**7**	-	-	1	2	**3**	**10**
20	Ranchi	-	20	-	-	**20**	-	-	-	-	**0**	**20**
Total		**90**	**62**	**455**	**270**	**877**	**2**	**17**	**23**	**24**	**66**	**943**
Percentage		**10.26**	**7.06**	**51.88**	**30.78**		**3.03**	**25.78**	**34.85**	**36.36**		
Total (men +women)		**92**	**79**	**478**	**294**	**943**						
Percentage		**9.75**	**8.38**	**50.69**	**31.18**							

Table 2.7.3

Results of Frontline Demonstrations (FLDs) on WHOLE PACKAGE in SOYBEAN conducted at various locations on farmers' fields

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR- Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh
For the Year	2020-21

S. No.	Implementing centre	No. of Trial	Area (ha)	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)	
				IP	FP	IP	FP	IP	FP	IP	FP
1	Almora	81	3.4	1460	1053	110169	83481	52503	52235	57665	31246
2	Pantnagar	15	4.9	1662	1353	63779	52494	30088	25575	33691	26919
3	Palampur	34	4.1	1353	1092	71704	57855	39810	35350	31894	22505
4	Ludhiana	10	4.0	1816	-	70441	-	33010	-	37431	-
5	Sehore	10	4.0	1304	666	49541	25316	19214	17067	30327	8249
6	Indore	40	16.0	1049	400	57316	14078	31788	24045	25528	-9967
7	SOPA, Indore	270	108.0	1011	796	42433	33382	16049	12917	26384	20466
8	Solidribad,	160	64.0	1092	812	46947	34921	25274	28658	21673	6263
9	Kota	30	12.0	1371	1128	53175	41830	25161	21916	28014	21831
10	Amravati	20	8.0	1735	1422	66451	54463	28708	26338	37743	28125
11	Parbhani	50	20.0	2077	1689	80568	65549	36244	35075	44324	30474
12	Sangli	25	10.0	2955	2547	100473	86605	42143	39025	58330	47580
13	KVK Karda	100	40.0	1301	1065	50463	41324	39281	36369	11182	4955
14	DevgrahBaria	10	4.0	1347	955	47135	33439	21155	16862	25980	16577
15	Dharwad	10	4.0	2976	2102	122000	86164	40216	33900	81784	52264
16	Ugar Sugar	23	9.20	2064	1769	66048	56608	49920	46049	16128	10559
17	Adilabad	10	4.0	1880	1648	72956	63935	45779	35842	27176	28093
18	Imphal	15	6.0	1558	1000	93460	59992	41572	26971	51888	33021
19	Raipur	10	4.0	1689	1186	65549	46005	18610	15020	47454	31180
20	Ranchi	20	4.0	1550	1188	60121	46091	28500	22665	31621	23426
Mean		**943**	**333.7**	**1663**	**1256**	**69536**	**51765**	**33251**	**29046**	**36311**	**22830**

*IP= Improved practice, **FP= Farmer's practice, *** Significant at 0.05 probability level, # data not included in mean

Table 2.7.4

Performance of SOYBEAN varieties under whole package in FLDs conducted at various locations on farmers' fields

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452001, Madhya Pradesh
For the Year	2020-21

S. No.	No. of trial	Variety	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		BC Ratio	
			IP	FP	IP	FP	IP	FP	IP	FP	IP	FP
1	348	JS 95-60	1038	820	44095	34830	21813	21204	22282	13626	2.14	1.88
2	100	MAUS 158	1301	1065	50463	41324	39281	36369	11182	4955	1.28	1.14
3	60	JS 20 69	1220	582	58073	23648	26465	27520	31609	3873	2.41	0.83
4	60	JS 93 05	1341	1116	49682	41115	28609	26360	21072	14755	2.00	1.83
5	33	Hara Soya	1339	1078	70958	57146	39810	35350	31148	21796	0.78	0.62
6	31	VLS 65	1313	883	119489	89141	57530	57560	61959	31580	1.08	0.55
7	28	MAUS 162	1982	1615	76907	62680	36244	35075	40663	27605	2.12	1.78
8	19	VLB 201	1317	885	119857	89358	57530	57560	62327	31798	1.08	0.55
9	26	JS 20 34	1240	1017	50523	41430	25549	24600	24975	16830	1.49	1.20
10	22	MAUS 158	2197	1784	85228	69200	36244	35075	48984	34125	2.35	1.97
11	20	AMS-MB-5-18	1735	1422	66451	54463	28708	26338	37743	28125	2.32	2.07
12	20	RKS113	1388	1153	53864	44717	25161	21916	28703	22801	1.14	1.04
13	19	Phulesangam	3014	2599	102465	88373	42143	39025	60322	49348	2.43	2.26
14	17	VLS 63	1698	1331	95068	74562	44058	43308	51010	31254	1.16	0.72
15	13	Him Soya	1384	1120	73339	59360	39810	35350	33529	24010	0.84	0.68
16	11	JS 97-52	1534	1159	59537	44969	28500	22665	31037	22304	1.09	0.98
17	12	VLS 47	1683	1313	94220	73500	44931	44181	49289	29319	1.10	0.67
18	10	NRC-37	1347	955	47135	33439	21155	16862	25980	16577	2.23	1.98
19	10	SL 958	1816	-	70441	-	33010	-	37431	-	2.13	-
20	10	Basara	1881	1648	72956	63935	45779	35842	27177	28093	1.60	1.79
21	10	CG Soya-1	1689	1186	65549	46005	18610	15020	47454	31180	3.62	3.1
22	9	BSS-2	1566	1220	60760	48660	28500	22665	32260	25995	1.13	1.15
23	7	DSb 21	2793	2055	114507	84273	40216	33900	74291	50373	2.85	2.49
24	7	PS 1225	1736	1407	66617	54597	31659	26651	34958	27946	2.10	2.05
25	6	DSb-19	1533	928	92000	55700	41572	26230	50428	29470	1.21	1.12
26	6	PhuleKimaya	2770	2383	94166	81005	42143	39025	52023	41980	2.24	2.08
27	6	JS 20 98	1529	692	71142	25283	25501	20610	45641	4673	2.84	1.28
28	5	RVS 24	1292	667	49111	25361	19214	17067	29897	8294	2.56	1.49
29	5	MACS 1460	1554	1034	93240	62016	41572	28358	51668	33658	1.24	1.19
30	4	DSb-32	1599	1065	95925	63900	41572	26350	54353	37550	1.31	1.42
31	4	JS 20 29	1250	600	68750	21000	31788	24290	36963	-3290	2.16	0.87
32	3	PS 1556	1333	1117	51173	43327	26317	22992	24856	20335	1.95	1.89
33	3	PS 1347	1883	1517	72282	58847	31659	26651	40623	32196	2.28	2.21
34	3	DSb 23	3158	2148	129492	88054	40216	33900	89276	54154	3.22	2.6
35	2	VLS 89	1745	1350	97720	75600	44058	43308	53662	32292	1.22	0.75
36	2	PS 1572	1950	1500	74841	58200	31659	26651	43182	31549	2.37	2.19
37	2	PS 1092	1275	1125	48935	43650	26317	22992	22618	20658	1.86	1.90
38	2	Palam Soya	1288	1035	68238	54855	39810	35350	28428	19505	0.72	0.56
39	2	RVS 18	1000	588	38000	22325	19214	17067	18786	5258	1.98	1.31
40	2	RVS 2001-04	1088	825	46763	35475	21121	23763	25641	11713	2.18	1.44

Table 2.7.5

Details of soybean cultivation cost under improved technology and farmers practice 2020-21

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452001, Madhya Pradesh
For the Year	2020-21

Centre		Land prep-aration	Seed & Sowing	ST & Ino'n	Fertili. & appli'n	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e &appli'n	Fungi'e &s appli'n	Harv-esting	Thres-hing	Any other	Total
Amravati	IP	5380	5220	240	4385	2060	-	5400	2664	-	4500	3800	-	**33649**
	FP	5380	5470	-	3275	2060	-	2000	1930	748	4500	2850	-	**28213**
Devgrah-baria,	IP	7200	6700	430	3441	2040	-	-	4672	-	1200	1300	-	**26983**
	FP	4800	1750	-	4816	-	-	1000	2500	-	1200	1300	-	**17366**
Dharwad	IP	8200	5704	460	7363	1881	1908	4816	3022	-	2862	4000	-	**40216**
	FP	8200	6200	-	4000	-	2000	5500	700	800	2500	4000	-	**33900**
Adilabad	IP	2173	7367	50	11434	4743	690	3983	4833	3184	3771	3383	515	**46124**
	FP	2173	5256	50	9178	2707	300	4613	3253	1219	3771	3383	500	**36400**
Kota	IP	4500	5800	233	2212	2102	-	-	2002	-	5112	3200	-	**25161**
	FP	4500	5000	-	-	2102	-	-	2002	-	5112	3200	-	**21916**
Pantnagar	IP	3960	5808	163	5440	3213	654	5000	2617	-	3270	1207	327	**31659**
	FP	3960	5058	113	3689	1420	654	4500	2617	-	3270	1207	327	**26815**
Imphal	IP	3200	9898	450	8076	-	-	6720	672	336	2688	4032	5500	**41572**
	FP	2400	8232	-	2786	-	-	5040	672	-	2688	4032	1500	**27350**
KVK, Karda, Maharashtra	IP	4500	10875	1012	5394	-	-	4000	3050	950	5000	4500		**39281**
	FP	4500	10875	-	4444	-	-	4000	3050	-	5000	4500		**36369**
Ludhiana	IP	3488	3750	75	3172	1500	-	-	1985				19040	**33010**
	FP	-	-	-	-	-	-	-	-	-	-	-	-	**-**
Palampur	IP	7000	10050	60	9650	3150	1100	-	-	-	3850	3300	1650	**39810**
	FP	7000	9000	-	5050	-	-	5500	-	-	3850	3300	1650	**35350**
Parbhani	IP	5700	7400	626	5684	2448	-	1200	2476	1358	5200	4152	-	**36244**
	FP	5700	8200	-	3375	2448	-	1200	4216	1358	5200	3378	-	**35075**
Raipur	IP	1800	4850	460	4000	1900	-	-	1600	-	2500	-	1500	**18610**
	FP	1800	4850	370	4000	-	-	-	-	-	2500	-	1500	**15020**
Ranchi	IP	4250	6690	356.25	7950	1185	-	2040	2210	-	1530	2295	-	**28506**
	FP	3400	5925	-	6455	-	-	3060	510	-	1275	2040	-	**22665**
Indore	IP	2825	7200	2487.5	7750	1987.5	-	-	2078	710	2500	1250	3000	**31788**
	FP	3000	7750	-	2875	1025	-	-	2000	625	2500	1250	3000	**24025**
Sangali (MPKV)	IP	2300	3150	250	2457	1000	-	1000	1200	-	2000	3000	500	**16857**
	FP	2300	1960	150	2100	1000	-	1000	1200	1200	2000	2200	500	**15610**
Mean	IP	**4432**	**6697**	**490**	**5894**	**2247**	**1088**	**3795**	**2506**	**1308**	**3285**	**3032**	**4004**	**32631**
Percentage		13.58	20.52	1.50	18.06	6.89	3.33	11.63	7.68	4.01	10.07	9.29	12.27	
Mean	FP	**4222**	**6109**	**171**	**4311**	**1823**	**985**	**3401**	**2054**	**992**	**3240**	**2818**	**1282**	**26862**
Percentage		15.72	22.74	0.64	16.05	6.79	3.67	12.66	7.65	3.69	12.06	10.49	4.77	
Overall increase in soybean cultivation cost over farmers practices														**21.47%**

Table 2.7.6

Productivity potentials and profitability of whole package technologies (2020-21)

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh
For the Year	2020-21

State	Centre	No of Demon (920)	Mean yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Additional net returns (Rs/ha)	B:C ratio	
			IP	FP		IP	FP	IP	FP		IP	FP
Uttarakhand	Almora	81	1460	1053	38.73	110169	83481	52503	52235	26688	2.10	1.60
Uttarakhand	Pantnagar	15	1662	1353	22.83	63779	52494	30088	25575	11284	2.12	2.05
HP	Palampur	34	1353	1092	23.94	71704	57855	39810	35350	13848	1.80	1.64
Punjab	Ludhiana	10	1816	-	-	70441	-	33010	-	-	2.13	-
MP	Sehore	10	1304	666	95.80	49541	25316	19214	17067	24225	2.58	1.48
MP	Indore	40	1049	400	162.55	57316	14078	31788	24045	43238	1.80	0.59
MP	SOPA	270	1010	792	27.53	42420	33264	17333	13950	9156	2.45	2.38
MP	Solidribad	160	1092	812	34.44	46947	34921	25274	28658	12027	1.86	1.22
Rajasthan	Kota	30	1371	1128	21.54	53175	41830	25161	21916	11345	2.11	1.91
Maharashtra	Amravati	20	1735	1422	22.01	66451	54463	28708	26338	11988	2.31	2.07
Maharashtra	Parbhani	50	2077	1689	22.91	80568	65549	36244	35075	15020	2.22	1.87
Maharashtra	Sangali	25	2955	2547	16.01	100473	86605	42143	39025	13869	2.38	2.22
Maharashtra	KVK Karda	100	1301	1065	22.16	50463	41324	39281	36369	9139	1.28	1.14
Gujrat	DevgrahBaria,	10	1347	955	41.05	47135	33439	21155	16862	13696	2.23	1.98
Karnataka	Dharwad	10	2976	2102	41.58	122000	86164	40216	33900	35836	3.03	2.54
Karnataka	Ugar Sugar	23	2064	1769	16.67	66048	56608	49920	46049	9227	1.32	1.22
Telangana	Adilabad	10	1880	1648	14.08	72956	63935	45779	35842	9021	1.59	1.78
Manipur	Imphal	15	1558	1000	55.79	93460	59992	41572	26971	33468	2.25	2.22
Chhattisgarh	Raipur	10	1689	1186	42.48	65549	46005	18610	15020	19544	3.52	3.06
Jharkhand	Ranchi	20	1550	1188	30.47	60121	46091	28500	22665	14030	2.11	2.03
Mean			**1663**	**1256**	**39.61**	**69536**	**51765**	**33251**	**29046**	**17718**	**2.16**	**1.84**

कीट विज्ञान
Entomology

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Dharwad (Karnataka)	Dr. R. Channakeshava
Bidar (Karnataka)	Dr. M. Shobharani

Table 3.1: Ent. 1 a. Seasonal incidence of soybean insect-pests

SMW	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
DELHI (Var. JS 335)																
YMV	YMV rating 9.00 on a scale of 1 – 9															
White fly	Infestation started right from its seedling stage and The highest number of whitefly count was observed in 37th standard meteorological week (SMW) with a value 23.7.															
Stem fly	mean stem tunneling 14.71 percent															
Spodoptera litura	The highest number of *Spodopetera* adults were obtained in 36th SMW (4.5) followed by 30th SMW (4.25).															
PANTNAGAR (Var. Bragg)																
White fly / 3 leaf	--	--	--	--	0.70	1.47	2.03	**2.14**	2.10	1.80	1.43	1.10	1.14			
Stem fly % Stem tunneling	--	--	--		8.33	11.86	14.15	21.88	27.11	22.85	24.57	23.65	23.57			
Aphids / 3 leaf	--	--	--		0.3	0.5	0.82	3.03	3.15	**3.83**	1.50	1.03	1.52			
Semilooper/m					0.6	0.4	0.89	0.5	0.7	**1.21**	0.5	0.6	0.5			
Spodoptera litura Fb (l/mrl)					-	0.42	1.36	1.2	3.5	**7.31**	1.6	0.6	0.5			
Spilosoma obliqua (W.) (l/mrl)					0.32	0.36	**1.78**	0.1	2.78	0.4	0.3	0.5	0.4			
% Defoliation	**10.07% leaf damage**															
SEHORE (Var. JS 335)																
Blue beetle/m		0.5	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0						
G. gemma/m			0.8	0.8	1.6	4.6	1.8	1.8	0.4	0.8						
C. acuta/m			1.0	1.2	2.6	6.8	3.3	2.8	0.6	0.6						
Stem fly % Infest.			15	15	20.0	20.0	33.0	40.0	50.0	70.0	80.0	80.0				
Stem fly % ST			23.8	20.5	20.0	25.27	29.50	31.27	29.65	27.27	30.25	15.25				
Girdle beetle %				5	17	11	25	20	21.5	26.50	15.0	9.5	0.8			
Minor insect pests	Gray weevil *(Myllocerus sp.*), Field crickets and white fly. Incidence of tobacco caterpiller *Mocis undata* and *Helicoverpa* was observed at negligible level.															
PARBHANI (Var. MAUS 2)																
O. brevis % Infestation		0.00	3.33	5.00	8.33	26.67	31.67	38.33	**40.00**	40.00	40.00	40.00	40.00	40.00		
Green semilooper larvae/mrl		0.00	0.33	0.33	0.33	0.67	2.00	9.67	11.33	13.33	15.33	6.00	1.67	0.00		
Defoliation (%)	**6.33 %** at flowering and **18.60 %** at peak larval incidence															
M. sojae	Stem tunneling at physiological maturity : **38.06 %-**															
Minor insect pests	*H. armigera, Condica illecta, Spodoptera litura,* Jassids, White fly, Grey Weevil															
AMARAWATI (Var. JS 335)																
Girdle beetle %	--	--			0.71	0.022	1.5	0	1.25	0.71	0	0	0	--	--	--
Stem fly % Infest.	--	--			20	20	30	44	60	60	66	70	0	--	--	--
Semilooper					0.2	0.2	0.2	0.2	0	0	0	0	0			
Spodoptera litura					0.4	0.4	0.4	0.4	0.2	0.2	0	0	0			

SMW	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
KOTA (Var. JS 335)																
Girdle beetle (%)	-	-			0.67	10.00	13.33	16.67	26.67	30.00	33.33	36.67	36.67			
C. acuta / m	-	-	-		0.33	0.67	1.00	1.33	1.00	0.67	0.33	0.33				
S. litura / m	-	-	-			0.33	0.00	0.67	0.33	0.33	0.67	0.33				
H. armigera/m						0.33	0.33	0.00	0.67	0.33	-	0.33				
White fly/plant	-	-		3.00	3.67	3.33	4.00	5.67	6.67	6.33	6.00	3.67	1.33			
Jassids/plant	-	-		1.33	2.00	2.67	2.33	4.33	5.00	3.67	2.67	1.67	1.00			
Defoliation (%)	4.0 at flowering and 23.5 at peak larval incidence at 34-35 (SMW)															
Minor insects	grass hoppers, field cricket, hairy caterpillars & grey weevil															
DHARWAD (Var. JS 335)																
Spodoptera litura Fb (l/mrl)	-	-				0.61	1.24	1.81	3.52	4.63	4.90	3.16	2.33	1.53	-	-	--
Thysanoplusia orichalcea Fab (l/mrl)	-	-				-	0.18	0.38	0.87	1.46	2.05	1.83	0.94	-	-	-	--
Spilosoma obliqua (W.) (l/mrl)	-	-				-	-	1.90	2.68	3.15	5.05	6.76	5.23	4.18	2.84	-	--
O. brevis Infestation (%)	-	-					4.32	4.77	5.38	5.89	6.31	6.57	5.63	4.88	3.35	-	--
M. sojae Stem tunneling (%)	-	-					1.69	2.07	2.67	3.19	3.94	2.07	-	-	-	-	--
C. ptychora Pod damage (%)	-	-										35.13	39.76	43.17	47.17	50.35	52.34
% Defoliation	15.27% at Flowering and 34.75% at peak incidence of larvae															
Minor insect pests	*H. armigera, N. viridula, Myllocerous,*															
IMPHAL (Var. JS 335)																
S. obliqua/m	0.00	0.00			78.67	**150.67**	74.00	20.00	37.67	6.67	0.00	1.33	0.00	0.00	--	-	--
Leaf Weber /m	0.00	2.67			4.67	6.00	**14.67**	9.33	6.33	8.00	5.33	2.33	2.67	3.67		-	--
S. litura/m	0.00	0.00			0.00	0.00	4.00	4.67	**5.67**	5.33	2.67	1.33	3.33	0.00		-	--
Aphids / plant	0.00	0.00			0.00	15.00	40.00	33.50	**71.00**	16.40	30.00	10.00	0.00	0.00		-	--
Stem fly	11.95%															
% Defoliation	At peak incidence 32.92%															
Minor insect pests	Gram pod borer, bean bug, thrips															

Table 3.2 : Ent. 1 b. Seasonal incidence of bio- control agents

SMW	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
SEHORE																
Apanteles cocoons/m	Negligible level															
B. bassiana infec.	35% mortality due to *B. bassiana* during 21 August 2020															
Bacterial infection	60% due to Bacterial infection during 5 September															
PARBHANI																
Lady bird beetle/m	--	0.00	0.00	0.00	0.33	0.33	0.67	1.33	**3.00**	2.00	2.33	2.67	1.67	0.33	--	--
Spider/m		0.00	0.00	0.00	0.00	0.67	2.33	2.33	3.33	3.33	2.33	**3.67**	1.00	0.00	--	--
PANTNAGAR																
Coccinelid beetle/mrl	-	-	-	-	0.22	**0.43**	0.44	0.67	1.63	0.60	0.50	0.30	**0.40**			
Spiders/plant	-	-	-	-	0.22	1.22	1	**2.1**	1.8	1.1	1	0.9				
Bugs/plant	-	-	-	-	0.22	0.44	0.56	0.3	0.5	0.7	**0.6**	**0.8**	**0.6**			
Bacterial infection	57.5 % mortality															
Virus infection	15 % parasitisation															
AMRAVATI																
Lady bird beetle	--	--				1	3	2	1		--	--	--	--	--	--
KOTA																
Coccinelid beetle/mrl						-	0.33	0.67	1.00	1.33	1.67	1.33	1.00	0.33	-	
Cotesia parasitization (%)						3.5	-	3.9	4.5	2.5	1.8	-	-	-	-	
Spiders/plant						-	0.3	0.5	0.6	0.9	1.0	0.7	0.5	-	-	
DHARWAD																
Coccinelid beetle/mrl	--	--	-	0.90	1.35	1.65	2.10	2.40	1.75	0.90		--	--	--	--	--
C. carnea /mrl	--	--	-	0.70	0.90	1.15	1.80	2.05	1.40	0.65		--	--	--	--	--
Spiders/plant	--	--	0.20	0.40	0.55	0.70	0.90	0.70	0.45	0.30		--	--	--	--	--
Apanteles sp. Parasitization (%)	--	--					6.15	7.25	8.20	8.90	7.50	6.00	--	--	--	--
N. rileyi Infection (%)	--	--					6.90	7.65	11.10	15.07	13.55	9.80	--	--	--	--
IMPHAL																
Spiders/plant	0.0	0.2	0.7	0.1	0.5	0.3	0.7	0.4	0.0	0.1				--	--	--
Coccinelids/plant	0.0	0.6	0.6	0.8	1.1	0.6	0.3	0.4	0.2	0.7	0.5	0.2	0.0	--	--	--
Larval mortality %	5 to 30%															

Table 3.3 : Ent. 2 a. Field screening of AVT entries (Central Zone) for resistance to major insect-pests (Defoliators)

S. No.	Entry	Defoliators (larvae / m)			Reaction to Insect-Pest complex				% Defoliation		Semilooper	*S. litura* (larvae/m)
		Amravati	Kota	Sehore	Amravati	Kota	Sehore	Prabhani	Sehore	Prabhani	Prabhani	Prabhani
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	AMS 100-39	0.00 (0.50)MR	1.00 (1.22)*-HR	0.99 (1.21) R	R-HY	S-HY	R-HY	**S-HY(T)**	6.25 (14.36) R	10.85 (19.19)*LS	5.25 (2.39)*HR	0.50 (1.00)*LR
2.	AMS 20-19	-	-	2.66 (1.77) LR	-	-	S-LY	-	17.00 (24.35) LR	-	-	-
3.	DSb 33	0.08 (0.78)S	1.67 (1.47) - MR	0.66 (1.03) HR	S-LY	R-LY	R-LY	S-LY	11.75 (19.60) MR	6.65 (14.93) LS	3.75 (2.06) HR	0.00 (0.70) MR
4.	HIMSO 1689	0.00 (0.50)MR	0.84 (1.15) – HR	4.33 (2.19) S	S-LY	R-LY	**	S-LY	23.00 (28.68) S	11.01 (19.35) LS	8.75 (3.04) S	0.50 (0.96) MR
5.	HIMSO 1690	0.00 (0.50)MR	-	4.16 (2.15) S	S-LY	-	S-LY	S-LY	17.00 (24.35)LR	8.40 (16.78) LS	11.25 (3.42) HS	2.25 (1.65) HS
6.	JS 21-71	-	-	1.00 (1.22 R	-	-	R-HY	S-LY	11.5 (19.82) MR	-	6.00 (2.54) MR	0.00 (0.70) MR
7.	JS 21-72	0.16 (0.90)HS	1.67 (1.47) - MR	0.99 (1.21) R	S-LY	R-HY	R-LY	**S-HY(T)**	9.5 (17.90) MR	13.10 (21.21) LS	5.75 (2.49) MR	0.50 (1.00) LR
8.	MACS NRC 1667	0.00 (0.50)MR	2.00 (1.58) - LR	0..66 (1.02) HR	-	S-LY	R-LY	S-LY	9.25 (17.71) MR	-	6.50 (2.64) MR	0.00 (0.70) MR
9.	NRC 138	0.00 (0.50)MR	1.67 (1.47) - MR	0.99 (1.22) R	S-LY	R-LY	S-LY	R-LY	6.15 (14.14) R	18.71 (25.59)MS	11.50 (3.46) HS	2.00 (1.57) HS
10.	NRC 142	0.08 (0.70)LR	1.17 (1.29) -R	3.66 (2.01) LR	R-HY	S-LY	R-LY	S-LY	8.00 (16.43) MR	13.77 (21.77) LS	6.75 (2.69) MR	0.00 (0.70) MR
11.	NRC 149	0.16 (0.90)HS	2.50 (1.73) - LR	0.99 (1.21) R	R-HY	S-LY	R-LY	S-LY	6.50 (14.55) R	18.43 (25.42) LS	5.50 (2.44) R	0.25 (0.85) MR
12.	NRC 150	0.6	-	1.66 (1.46) MR	S-LY	-	**	S-LY	7.75 (16.16) MR	25.36 (30.23) MS	7.50 (2.88) LR	0.25 (0.85) MR
13.	NRC 152	0.13	-	1.33 (1.86) LR	R-HY	-	S-HY	S-LY	16.50 (23.96)LR	11.32 (19.66) LS	6.75 (2.68) MR	0.25 (0.85) MR
14.	NRC 157	0.13	-	2.33 (1.47)MR	S-LY	-	**	S-LY	7.75 (16.15) MR	18.48 (25.43) LS	4.25 (2.17) HR	0.00 (0.70) MR
15.	NRC 158	0.00	-	1.49 (1.46) MR	S-LY	-	S-LY	S-LY	8.75 (17.19) MR	13.58 (21.60) LS	6.50 (2.63) MR	0.25 (0.85) MR
16.	NRC 164	0.26	-	1.83 (1.52) MR	S-HY(T)		S-LY	S-LY	16.50 (23.96)LR	17.03 (24.36) LS	4.75 (2.29) HR	0.25 (0.85) MR
17.	NRC 165	0.33	-	3.49 (1.99)LR	S-LY		S-LY	S-LY	21.25 (26.95) S	15.46 (23.15) LS	5.50 (2.47) MR	0.50 (1.00) LR

18.	NRCSL2	0.00 (0.50)MR	2.33 (1.68) - LR	1.99 (1.56) MR	S-LY	S-HY	R -LY	S-LY	8.75 (17.13) MR	6.85 (15.17) LS	5.25 (2.39) HR	0.00 (0.70) MR
19.	PUSA-Sipani-408	-	-	0.99 (1.21) R			**	S-LY	9.50 (18.44) MR	9.90 (18.33) LS	7.25 (2.78) LR	0.50 (1.00) LR
20.	RVSM 2011-35	0.00 (0.50)MR	1.17 (1.29) -R	5.33 (2.41) HS	S-LY	R - LY	R-HY	S-LY	7.75 (16.16) MR	10.76 (19.13) LS	5.00 (2.34) HR	0.25 (0.85) MR
21.	SL 1213	0.16 (0.90)HS	-	0.66 (1.03) HR	S-LY	-	**	S-LY	9.00 (17.71) MR	10.15 (18.57) LS	7.50 (2.82) LR	0.50 (0.96) MR
22.	VLS 99	0.00 (0.50)MR	-	Seed not germinated	S-LY		Seed not germinated	S-LY	Seed not germinated	9.14 (17.58) LS	7.75 (2.87) LR	0.25 (0.85) MR
23.	AMS-MB-5-18							S-LY		-	8.25 (2.95) LR	0.75 (1.06) LR
24.	AMS-MB-5-19	0.00 (0.50)**MR**	-	-	R-HY	-	-					
25.	BAUS 102	-	-	-	-	-	-	S-LY	-	-	11.25 (3.42) HS	2.00 (1.57) HS
26.	DS 3108	-	-	-		-	-	S-LY	-	-	6.00 (2.54) MR	0.25 (0.85) MR
27.	DSb 28-3	-	-	-	-	-	-	S-LY	-	-	7.75 (2.86) LR	0.00 (0.70) MR
28.	DSb 32	-	-	-	-	-	-	S-LY	-	-	6.00 (2.54) MR	0.00 (0.70) MR
29.	DSb 34	-	-	-	-	-	-	S-LY	-	-	4.75 (2.27) HR	0.50 (1.00) LR
30.	JS 20-89	-	-	-	-	-		R-LY	-	-	4.00 (2.11) HR	0.25 (0.85) MR
31.	JS 20-96	-	-	-	-	-		R-LY	-	-	4.00 (2.11) HR	0.00 (0.70) MR
32.	JS 97-52							R-LY			9.50 (2.15) HR	1.25 (1.31) LR
33.	KDS 869							S-LY			7.75 (2.87) LR	0.00 (0.70) MR
34.	KDS 980							S-LY			5.75 (2.49) MR	0.25 (0.85) MR

35.	KDS 992							S-LY			7.00 (2.73) LR	0.50 (1.00) LR
36.	MACS 1340							S-LY			7.50 (2.82) LR	0.50 (1.00) LR
37.	MACS 1493							S-LY			7.00 (2.73) LR	0.00 (0.70) MR
38.	NRC 117							R-LY			10.50 (3.31) HS	2.25 (1.65) HS
39.	NRC 128							S-LY			8.75 (3.33) HS	1.00 (1.14) LR
40.	NRC 130							S-LY			5.00 (2.34) HR	0.25 (0.85) MR
41.	NRC 136							S-LY			7.75 (2.87) LR	0.25 (0.85) MR
42.	NRC 146							S-LY			4.00 (2.11) HR	0.25 (0.85) MR
43.	NRC 147							S-LY			7.50 (2.82) LR	0.50 (1.00) LR
44.	NRC 148							S-LY			9.75 (2.19) HR	1.25 (1.21) LR
45.	PS 1611							S-LY			5.25 (2.39) HR	0.50 (1.00) LR
46.	PS 1613							S-LY			9.25 (2.12) HR	0.50 (0.96) MR
47.	PS 1637							R-LY			11.00 (2.19) HR	2.50 (1.73) HS
48.	RSC 10-52							S-LY			9.75 (3.20) HS	1.25 (1.31) LR
49.	RSC 10-70							S-LY			7.50 (2.82) LR	0.25 (0.85) MR
50.	RSC 11-03							S-LY			11.50 (3.44) HS	1.00 (1.22) LR
51.	RSC 11-07							S-LY			5.00 (2.34) HR	0.25 (0.85) MR

52.	RSC 11-15							S-LY			3.75 (2.06) HR	0.50 (1.00) LR
53.	RSC 11-17							S-LY			8.00 (2.91) LR	0.50 (0.96) MR
54.	RVS 2001-18							S-LY			4.75 (2.29) HR	0.25 (0.85) MR
55.	RVS 2007-6							R-LY			7.75 (2.87) LR	0.25 (0.85) MR
56.	RVS 2009-9							**R-HY**			3.75 (2.06) HR	0.00 (0.70) MR
57.	RVS 2010-1							S-LY			7.50 (2.82) LR	0.50 (0.96) MR
58.	SKF-SPS-11							S-LY			9.75 (3.20) HS	1.00 (1.22) LR
59.	SL 1068							R-LY			12.25 (3.56) HS	2.00 (1.57) HS
60.	CSB 10112							S-LY			8.25 (2.95) LR	1.00 (1.20) LR
61.	KDS 753							S-LY			4.00 (2.11) HR	0.00 (0.70) MR
62.	MACSNRC 1575							S-LY			3.50 (2.00) HR	0.00 (0.70) MR
63.	MAUS 61							S-LY			7.75 (2.87) LR	0.50 (1.00) LR
64.	NRC 94							S-LY			8.75 (3.04) S	1.00 (1.20) LR
65.	VLS 95							S-LY			4.00 (2.11) HR	0.25 (0.85) MR
66.	JS 93-05							S-LY			3.50 (2.00) HR	0.00 (0.70) MR
67.	MACS 1566							S-LY			4.25 (2.17) HR	0.50 (1.00) LR
68.	NRC 131							S-LY			7.00 (2.73) LR	0.00 (1.70) HS

69.	DS 3110							S-LY			3.75 (2.06) HR	0.25 (0.85) MR
70.	NRC 132							S-LY			9.25 (3.12) HS	0.00 (0.70) MR
71.	MAUS 2							S-LY			11.50 (3.46) HS	2.50 (1.73) HS
72.	MAUS 158							S-LY			4.50 (2.23) HR	0.00 (0.70) MR
73.	MAUS 612							S-LY			7.00 (2.73) LR	0.25 (0.85) MR
74.	Karune							R-LY		9.23 (17.68) LS	6.00 (2.54) MR	0.00 (0.70) MR
75.	AMS 2014-1							S-LY			10.75 (3.34) HS	1.75 (1.47) S
76.	MACS 1667 (C)			2.33 (1.68)LR			S-HY	S-LY	7.50 (15.89) MR			
77.	DSb 21 (ZC)							R-LY		12.13 (20.37) LS	7.00 (2.73) LR	0.25 (0.85) MR
78.	DSb 23 (ZC)							**S-HY(T)**		8.72 (17.15) LS	9.50 (3.16) HS	1.25 (1.31) LR
79.	Harasoya (ZC)							S-LY		13.56 (21.60) LS	8.75 (3.03) S	0.75 (1.11) LR
80.	JS 20-116 (C)			2.66 (1.78) LR			S-HY	**S-HY(T)**	8.50 (18.45) MR	14.97 (22.44) LS	5.00 (2.34) HR	0.00 (0.70) MR
81.	NRC 86 (C)	0.00 (0.50)MR	2.34 (1.68) - LR	2.66 (1.78) LR	S-HY	R-HY	R-LY	R-LY	7.75 (16.16) MR		8.75 (3.04) S	0.50 (0.96) MR
82.	JS 20-34 (C)	0.08 (0.78)S	1.84 (1.53) - MR	4.33 (2.19) S	S-LY	S-HY	S -LY	S-LY	24.50 (29.37)HS	10.56 (18.94) LS	3.25 (1.93) HR	0.00 (0.70) MR
83.	VLS 63 (C)			5.33 (2.41) H S			R-LY	S-LY	20.50 (26.92)S		7.50 (2.82) LR	0.00 (0.70) MR
84.	SL 958 (ZC)							S-LY			5.50 (2.44) R	0.25 (0.85) MR
85.	VLS 59 (C)			3.49 (1.99)LR			S-HY	-	23.00 (28.66)S			
86.	PS 1347 (C)			3.16 (1.89) LR			S-HY	R-LY	7.75 (16.14)MR		7.25 (2.78) LR	0.25 (0.85) MR

87.	PS 1556 (ZC)							S-LY			9.25 (3.12) HS	1.25 (1.31) LR
88.	PUSA 97-12 (ZC)							S-LY			12.50 (3.60) HS	2.00 (1.57) HS
89.	JS 95-60 (C)	0.13	2.17 (1.63) - LR	5.33 (2.41) HS	S-LY		S-LY	S-LY	25.20 (29.45)HS	13.34 (21.40) LS	5.00 (2.34) HR	0.00 (0.70) MR
90.	RSC 10-46 (C)	0.04 (0.64)MR		2.83 (1.81)LR	R-LY	S-LY	S-LY	R-LY	21.25 (26.95) S		9.75 (3.20) HS	1.50 (1.40) S
91.	MACS 450 (C)		2.61 (1.78) -S	1.99 (1.56) MR		S - LY	R-LY	S-LY	9.25 (17.71)MR		9.50 (2.16) HR	1.50 (1.40) S
92.	MACS 1460 (ZC)							S-LY			4.25 (2.17) HR	0.25 (0.85) MR
93.	KDS 726 (ZC)							S-LY		7.47 (15.83) LS	7.75 (2.86) LR	0.00 (0.70) MR
94.	KS 103 (ZC)							S-LY		9.94 (18.30) LS	7.75 (2.87) LR	0.50 (1.00) LR
95.	JS 20-98	0.00 (0.50)MR	2.17 (1.63) - LR		S-LY	S - LY		S-LY		7.29 (15.63) LS	9.25 (3.12) HS	1.00 (1.20) LR
96.	JS 335	0.00 (0.50)MR	2.84 (1.83) - HS		S-LY	S- LY		R-LY		11.40 (19.72) LS	7.25 (2.78) LR	0.50 (1.00) LR

Table 3.4 : Ent. 2 b. Field screening of AVT entries (Central Zone) for resistance to major insect-pests (STEM BORERS)

S. No.	Entry	% Stem tunnelling due to stem fly			Girdle beetle damage (%)			
		Amrawati	Parbhani	Sehore	Amravati	Prabhani	Kota	Sehore
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	AMS 100-39	15.00 (0.39)HR	28.44 (32.22)*HR	10.77 (19.03) R	0.25 (0.71)**R**	36.65 (37.19)*HS	11.67 (19.92)**MR	12.46 (20.32)LR
2.	AMS 20-19			44.50 (40.19) S				12.69 (20.86) LR
3.	DSb 33	62.50 (0.91)MR	25.85 (30.55) HR	25.06 (29.94) MR	0.00 (1.14)**MR**	26.64 (31.04)MR	15.00 (22.76) -LR	4.93 (12.64) HR
4.	HIMSO 1689	55.00 (0.84)MR	62.00 (51.93) HS	45.48 (42.39) S	0.25 (1.22)**LR**	29.68 (32.98) S	16.67 (24.10) MR	7.76 (16.03) MR
5.	HIMSO 1690	58.50 (0.87)MR	34.52 (35.97) MR	40.29 (39.14) LR	0.00 (0.71)**R**	8.93 (17.38) HR		15.30 (22.72)LR
6.	JS 21-71		26.70 (31.10) HR	8.17 (16.58) R		21.67 (27.71) LR		10.20 (18.37)MR
7.	JS 21-72	66.00 (0.95)LR	32.79 (34.92) MR	36.03 (36.62) LR	0.25 (1.58)**HS**	6.97 (15.26) HR	16.67 (24.10) -MR	15.63 (23.28) LR
8.	MACS NRC 1667	76.00 (1.06)LR	28.15 (32.03) HR	11.90 (19.16) R	0.25 (1.22)**LR**	17.69 (24.75)MR	20.00 (26.49) -LR	8.72 (17.15) MR
9.	NRC 138		36.44 (37.12) MR	26.22 (30.64) MR	0.25 (1.58)**HS**	22.39 (28.22) LR	18.34 (25.33) -LR	4.19 (12.62) HR
10.	NRC 142	63.00 (0.92)LR	26.61 (31.04) HR	25.16 (29.98) MR	0.00 (2.00)**HS**	30.87 (33.71) HS	16.67 (24.10) -MR	6.80 (14.85) R
11.	NRC 149	66.00 (0.95)LR	35.04 (36.29) MR	30.11 (33.27) LR	0.25 (0.71)**R**	13.56 (21.60) R	21.67 (27.72) -LR	5.64 (12.94) R
12.	NRC 150	73.30	51.97 (46.12) HS	45.48 (42.39) S	0.25	14.79 (22.56) R		8.90 (17 .35)MR
13.	NRC 152	59.00	37.85 (37.95) LR	26.22 (30.64) MR	0.25	24.15 (29.40) LR		15.49 (22.73) LR
14.	NRC 157	49.50	36.47 (37.14) MR	11.90 (19.96) R	0.00	11.66 (19.89) HR		7.25 (15.57)MR
15.	NRC 158	59.00	36.12 (36.93) MR	35.38 (36.37) LR	0.25	21.96 (27.81) LR		17.95 (24.74) S
16.	NRC 164	36.00	50.41 (45.23) HS	17.93 (24.70) MR	0.00	18.13 (25.19)MR		15.45 (23.13) LR

17.	NRC 165	32.00	38.12 (38.09) LR	27.47 (31.52) MR	0.25	21.94 (27.91) LR		7.90 (16.30)MR
18.	NRCSL2	65.00 (0.94)LR	37.18 (37.57) LR	9.01 (13.74) R	0.50 (1.73)**HS**	24.64 (29.76) LR	16.67 (23.99) - MR	5.44 (13.48) R
19.	PUSA-Sipani-408		43.84 (41.45) S	32.11 (34.07) LR		31.15 (33.91) HS		4.22 (12.17) H R
20.	RVSM 2011-35	58.00 (0.87)MR	38.72 (38.44) LR	25.16 (29.98)MR	0.00 (0.71)**R**	37.13 (37.42) HS	15.00 (22.76) -MR	8.71 (17.15) MR
21.	SL 1213	69.50 (0.99)LR	50.68 (45.38) HS	19.60 (26.12)MR	0.25 (1.22)**LR**	25.47 (20.20) HR		16.14 (23.67)LR
22.	VLS 99	74.50 (1.04)S	39.57 (38.95) LR	Seed not germinated	0.00 (1.22)**LR**	30.15 (33.17) S		Seed not germinated
23.	AMS-MB-5-18		44.58 (41.88) S			24.80 (29.85) LR		
24.	AMS-MB-5-19	15.00 (0.39)**HR**			0.25 (0.71)**R**			
25.	BAUS 102		44.39 (41.76) S			23.19 (28.76) LR		
26.	DS 3108		33.19 (35.17) MR			7.92 (16.33) HR		
27.	DSb 28-3		45.53 (42.42) S			16.62 (24.03)MR		
28.	DSb 32		32.45 (34.71) MR			13.08 (21.18) R		
29.	DSb 34		35.57 (36.60) MR			16.24 (23.75)MR		
30.	JS 20-89		48.27 (44.00) HS			15.76 (23.36)MR		
31.	JS 20-96		50.66 (45.37) HS			20.91 (27.20)MR		
32.	JS 97-52		33.39 (35.28) MR			25.44 (30.26) LR		
33.	KDS 869		29.47 (32.86) R			22.91 (28.58) LR		
34.	KDS 980		38.65 (38.43) LR			9.31 (17.75) HR		
35.	KDS 992		21.53 (27.57) HR			17.11 (24.43)MR		
36.	MACS 1340		49.08 (44.46) HS			25.34 (30.18) LR		

37.	MACS 1493		45.10 (42.16) S			24.15 (29.41) LR		
38.	NRC 117		49.57 (44.74) HS			28.97 (32.50) S		
39.	NRC 128		42.04 (40.36) LR			15.76 (23.36)MR		
40.	NRC 130		44.58 (41.88) S			23.38 (28.89) LR		
41.	NRC 136		26.58 (31.08) HR			31.27 (33.98) HS		
42.	NRC 146		61.65 (51.74) HS			16.72 (24.09)MR		
43.	NRC 147		26.86 (31.20) HR			24.61 (29.72) LR		
44.	NRC 148		33.21 (35.18) MR			25.26 (30.15) LR		
45.	PS 1611		57.19 (49.14) HS			24.31 (29.48) LR		
46.	PS 1613		25.12 (30.05) HR			23.46 (28.92) LR		
47.	PS 1637		31.94 (34.40) MR			40.03 (39.24) HS		
48.	RSC 10-52		29.96 (33.17) R			26.47 (30.95) LR		
49.	RSC 10-70		35.76 (36.71) MR			20.98 (27.25) LR		
50.	RSC 11-03		31.06 (33.86) MR			18.17 (25.17)MR		
51.	RSC 11-07		41.62 (40.16) LR			21.47 (27.59) LR		
52.	RSC 11-15		31.17 (33.89) MR			15.55 (23.21)MR		
53.	RSC 11-17		29.10 (32.63) R			20.76 (27.05)MR		
54.	RVS 2001-18		34.15 (35.75) MR			21.56 (27.63) LR		
55.	RVS 2007-6		19.37 (25.98) HR			23.60 (28.94) LR		
56.	RVS 2009-9		35.30 (36.44) MR			35.00 (36.10) HS		

57.	RVS 2010-1		32.72 (34.88) MR			18.20 (25.23)MR		
58.	SKF-SPS-11		28.97 (32.54) R			27.66 (21.65) R		
59.	SL 1068		33.70 (35.48) MR			20.76 (27.06)MR		
60.	CSB 10112		28.49 (32.24) HR			24.01 (29.32) LR		
61.	KDS 753		21.54 (27.57) HR			12.51 (20.69) HR		
62.	MACSNRC 1575		31.02 (33.83) MR			20.64 (26.92)MR		
63.	MAUS 61		30.94 (33.78) MR			19.17 (25.95)MR		
64.	NRC 94		32.07 (34.46) MR			14.73 (22.56) R		
65.	VLS 95		56.11 (48.56) HS			15.16 (22.86)MR		
66.	JS 93-05		38.06 (38.08) LR			10.71 (18.96) HR		
67.	MACS 1566		26.99 (21.27) HR			10.24 (18.64) HR		
68.	NRC 131		39.05 (38.65) LR			15.88 (23.21)MR		
69.	DS 3110		36.24 (36.98) MR			18.34 (25.34)MR		
70.	NRC 132		50.89 (45.50) HS			16.56 (24.00)MR		
71.	MAUS 2		34.85 (36.15) MR			25.20 (30.12) LR		
72.	MAUS 158		32.99 (34.93) MR			15.45 (23.13)MR		
73.	MAUS 612		39.68 (39.04) LR			18.90 (25.76)MR		
74.	Karune		34.71 (36.08) MR			22.18 (28.09) LR		
75.	AMS 2014-1		25.54 (30.35) HR			32.52 (34.72) HS		
76.	MACS 1667 (C)			32.35 (34.18)LR				10.91 (19.14)LR

77.	DSb 21 (ZC)		24.97 (29.96) HR			10.88 (19.25) HR		
78.	DSb 23 (ZC)		37.60 (37.81) LR			29.84 (33.10) S		
79.	Harasoya (ZC)		36.11 (36.92) MR			24.66 (29.77) LR		
80.	JS 20-116 (C)		30.36 (33.41) R	15.37 (22.92)MR		17.02 (24.34)MR		7.81 (16.18)MR
81.	NRC 86 (C)	67.50 (0.97)LR	34.08 (35.71) MR	25.13 (30.01)MR	0.25 (1.58)**HS**	22.57 (28.35) LR	16.67 (23.99) -MR	12.88 (21.00)LR
82.	JS 20-34 (C)	78.00 (1.09)S	49.59 (44.75) HS	22.35 (28.17) MR	0.00 (0.71)**R**	7.94 (16.20) HR	11.67 (19.92) -MR	8.26 (16.44) MR
83.	VLS 63 (C)		41.54 (40.12) LR	51.93 (46.09)HS		17.63 (24.81)MR		23.95 (29.28)HS
84.	SL 958 (ZC)		21.52 (27.63) HR	15.91 (22.58)MR		16.77 (24.14)MR		
85.	VLS 59 (C)			23.46 (28.33)MR				11.48 (19.79) L R
86.	PS 1347 (C)		52.16 (46.23) HS	19.18 (22.95)MR		15.79 (23.40)MR		11.00 (19.60)MR
87.	PS 1556 (ZC)		54.46 (47.55) HS			28.00 (31.94) S		
88.	PUSA 97-12 (ZC)		63.76 (53.00) HS			22.05 (27.95) LR		
89.	JS 95-60 (C)	80.00	50.14 (45.07) HS	59.22 (50.33)HS	0.25	18.86 (25.73)MR		19.69 (26.08) S
90.	RSC 10-46 (C)	45.00 (0.74)MR	36.30 (37.04) MR	15.91 (22.58)MR	0.00 (0.71)**R**	27.04 (31.32) LR	18.34 (25.33) -LR	15.32 (22.93)LR
91.	MACS 450 (C)		34.73 (36.09) MR	9.92 (18.25) R		20.87 (27.17)MR	20.00 (26.49) - LR	10.40 (18.80)LR
92.	MACS 1460 (ZC)		33.41 (35.30) MR			23.21 (28.79) LR		
93.	KDS 726 (ZC)		16.49 (23.93) HR			26.03 (30.66) LR		
94.	KS 103 (ZC)		33.56 (35.38) MR			33.48 (35.32) HS		
95.	JS 20-98	81.00 (1.12)S	62.37 (52.30) HS		0.00 (0.71)**R**	28.65 (32.33) S	15.00 (22.76) -MR	
96.	JS 335	79.00 (1.09)S	35.96 (36.82) MR		0.00 (1.22)**LR**	21.91 (27.85) LR	28.34 (32.15) -HS	

Table 3.5 : Ent. 2 c. Field screening of AVT entries (Northern Plain Zone) for resistance to major insect-pests

S.No.	Entry	Stem tunneling due to Stem fly (%)		Defoliators larvae (TC) / m	White fly 3 leaf/ Plant*	Aphid 3 leaf/ plant*	Bug/ mrl*	White fly		Reaction to Pest Complex	
		Pantnagar	Delhi	Pantnagar				Ludhiana	Delhi	Delhi	Pantnagar
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1.	AMS 100-39	59 (50.21)LR	35.26 (36.11)	3.5 (1.99)HS	4.5 (2.23)HR	2 (1.54)MR	10 (3.23)HS	5.66 (2.58)	5 (2.89	SLY	R-HY
2.	DS 9421	34 (35.64)HR	16.84 (24.22)	3.5 (1.99)HS	7 (2.73)HS	4.5 (2.23)HS	2 (1.58)R	12.00 (3.60)	1(1.86)	RLY	S-LY
3.	DSb 33	46 (42.69)HR		2.5 (1.72)LR	4 (2.06)HR	2 (1.41)MR	2.5 (1.72)MR	4.49 (2.34)			S-LY
4.	Himso 1689	45 (42.12)HR		2 (1.58)MR	5.5 (2.44)LR	3 (1.85)LR	2 (1.58)R	4.99 (2.44)			R-LY
5.	Himso 1690	41 (39.79)HR	16.06 (21.51)	2 (1.57)MR	3 (1.85)HR	1 (1.14)MR	1 (1.22)HR	No Germination	0 (1.76)	RLY	R-LY
6.	JS 21-72	37 (37.44)HR		2 (1.58)MR	6 (2.54)LR	0 (0.70)HR	0.5 (0.96)HR	**2.83 (1.96)**			S-HY(T)
7.	JS 21-71							6.99 (2.82)			
8.	Karune	51 (45.57)R		2.5 (1.72)LR	2 (1.58)HR	3.5 (1.96)S	0.5 (0.96)HR				R-LY
9.	NRC 138	70 (56.79)HS		2 (1.58)MR	4.5 (2.21)HR	1.5 (1.40)MR	1.5 (1.40)HR	**1.83 (1.68)**			S-LY
10.	NRC 149	17 (24.31)HR	28.94 (32.49)	1.5 (1.41)HR	6.5 (2.63)HS	2.5 (1.67)LR	3 (1.87)S	4.33 (2.30)	0 (1.79)	**RHY**	S-HY(T)
11.	NRC 150	37 (37.44)HR		3 (1.85)HS	5 (2.33)MR	1 (1.14)MR	3 (1.85)S				R-LY
12.	NRC 152	30 (33.16)HR		1.5 (1.40)HR	6.5 (2.63)HS	2 (1.41)MR	1.5 (1.40)HR				S-LY
13.	NRCSL-2	28 (31.91)HR		6 (2.54)HS	3 (1.85)HR	2 (1.41)MR	2 (1.58)R	**2.16 (1.77)**			S-LY
14.	RVSM 2011-35	58 (49.61)LR	22.48 (27.66)	3.5 (1.99)HS	8.5 (2.99)HS	2 (1.58)MR	3 (1.86)S	1.66 (1.63)	5 (2.34)	SLY	S-HY(T)
15.	SL 1213	86 (68.07)HS	15.82 (23.14)	2.5 (1.72)LR	6 (2.41)LR	2 (1.41)MR	2 (1.58)R	**1.16 (1.47)**	0 (1.57	SLY	S-LY
16.	VLS 99	33 (35.04)HR		1 (1.22)HR	4.5 (2.23)HR	0 (0.70)HR	2.5 (1.72)MR	4.66 (2.38)			R-LY
17.	DS 9712	51 (45.75)R	21.28 (27.01)	3 (1.85)HS	12 (3.52)HS	3 (1.85)LR	2.5 (1.72)MR		0 (1.78)	RLY	S-LY

18.	DSb 21 (C)	84 (66.58)HS		1 (1.22)HR	6 (2.54)LR	1 (1.14)MR	1.5 (1.40)HR				S-LY
19.	DSb 23 (C)	75 (60.11)HS		2 (1.57)MR	7 (2.73)HS	0.5 (0.96)HR	3.5 (1.99)HS	No Germination			S-LY
20.	JS 335 (C)	71 (57.46)HS		1 (1.22)HR	6 (2.54)LR	1 (1.22)MR	3 (1.87)S	1.83 (1.68)			S-LY
21.	JS 20-16 (C)	38 (38.05)HR		3.5 (1.99)HS	4 (2.12)HR	2 (1.54)MR	2 (1.57)R				S-LY
22.	JS 20-34 (C)	47 (43.27)HR	22.36 (28.13)	2.5 (1.72)LR	6 (2.54)LR	2 (1.41)MR	2 (1.58)R	3.49 (2.11)	7 (2.67)	SLY	S-LY
23.	JS 20-60 (C)	73 (58.70)HS		1.5 (1.40)HR	3 (1.62)HR	5 (2.24)HS	2 (1.58)R				S-LY
24.	JS 20-98 (C)	44 (41.55)HR		2.5 (1.72)LR	5 (2.24)MR	2.5 (1.72)LR	1 (1.22)HR	4.16 (2.27)			S-HY(T)
25.	JS 95-60 (C)	-		-	-	-	-				-
26.	JS 20-116 (C)	39 (38.64)HR		3 (1.87)HS	3 (1.78)HR	4.5 (2.23)HS	4 (2.10)HS	**2.83 (1.96)**			S-HY(T)
27.	KS 103 (C)	60 (50.78)S		1.5 (1.40)HR	8 (2.91)HS	1.5 (1.40)MR	2.5 (1.72)MR				S-LY
28.	MACS 450 (C)	38 (38.05)HR	24.03 (29.28)	1 (1.22)HR	4.5 (2.21)HR	1.5 (1.28)MR	2 (1.57)R	3.16 (2.04)	7 (2.72)	SLY	S-LY
29.	MACS 1460 (C)	61 (51.40)S		2 (1.58)MR	5 (2.33)MR	0.5 (0.96)HR	2.5 (1.72)MR	**1.16 (1.47)**			S-LY
30.	NRC 86 (C)	53 (46.72)MR		2.5 (1.72)LR	10.5 (3.31)HS	1.5 (1.40)MR	3 (1.85)S				S-LY
31.	PS 1347 (C)	64 (53.14)HS	23.79 (29.05)	3 (1.87)HS	5.5 (2.44)LR	2 (1.41)MR	4 (2.11)HS	4.50 (2.34)	0 (1.91)	RLY	S-LY
32.	PS 1556 (C)	77 (61.36)HS		1.5 (1.40)HR	8 (2.91)HS	3.5 (1.96)S	1.5 (1.40)HR				R-LY
33.	Pusa 97-12 (C)	57 (49.03)LR		3 (1.85)HS	4 (2.06)HR	0.5 (0.96)HR	3 (1.85)S	8.66 (3.11)			S-LY
34.	SL 958 (C)	51 (45.57)R	15.49 (21.13)	2 (1.58)MR	4 (2.12)HR	1.5 (1.40)MR	5 (2.33)HS	4.99 (2.44)	0 (1.79	SLY	S-LY
35.	SL 1074 (C)	92 (74.09)HS		2 (1.58)MR	6.5 (2.63)HS	2.5 (1.72)LR	4.5 (2.23)HS	**3.83 (2.19)**			S-LY
36.	VLS 63 (C)	-		-	-	-	-				-
37.	VLS 89 (C)	71 (57.43)HS		2.5 (1.72)MR	8 (2.91)HS	0 (0.70)HR	3 (1.87)S				R-LY

38.	DS 3108	69 (56.21)HS	22.04 (27.30)	5 (2.33)HS	6 (2.51)LR	4.5 (2.23)HS	3.5 (1.99)HS		3 (1.69)	RLY	S-HY(T)
39.	JS 20-87	66 (54.36)HS		2.5 (1.72)LR	6 (2.54)LR	3.5 (1.96)S	1.5 (1.40)HR				S-HY)T)
40.	KDS 992	54 (47.30)MR		1 (1.22)HR	3.5 (1.96)HR	1.5 (1.28)MR	1 (1.22)HR				S-LY
41.	MACS NRC 1667	77 (61.36)HS	32.65 (34.75)	2 (1.58)MR	8 (2.91)HS	0.5 (0.96)HR	1.5 (1.40)HR	2.49 (1.87)	7 (2.89)	RLY	S-LY
42.	MACS 1493	60 (50.79)S	26.80 (30.47)	1.5 (1.40)HR	3.5 (1.96)HR	1.5 (1.40)MR	2.5 (1.72)MR		7 (2.71)	RLY	R-HY
43.	NRC 131	50 (44.99)HR		1 (1.22)HR	5 (2.33)MR	1.5 (1.40)MR	2.5 (1.72)MR				R-LY
44.	NRC 146	69 (56.17)HS		0.5 (0.96)HR	5.5 (2.44)LR	3 (1.85)LR	2.5 (1.72)MR				S-LY
45.	RSC 11-07	67 (54.95)HS		2.5 (1.72)LR	6 (2.54)LR	3.5 (1.99)S	3.5 (1.99)HS				S-LY
46.	DS 1320		40.78(39.66)						0 (1.78)	RLY	
47.	DS 1326		31.80(34.30)						0(2.03)	SLY	
48.	**MACS 1620**		38.0(38.05)						5 (2.73)	RLY	
49.	SL 1234		12.71(17.20)						0 (1.82)	RLY	
50.	AMS 2014-1		27.53(30.44)						5 (2.44)	RLY	
51.	DS 3110		9.16(15.89)						1 (2.01)	**RHY**	
52.	**DSB 33**		23.00(28.14)						5 (2.78)	SLY	
53.	**JS 21-17**		18.77(25.01)						3 (2.43)	RLY	
54.	**MACS NRC 1490**		20.96(27.14)						7 (2.52)	SLY	
55.	PS 1611		22.46(28.21)						1 (2.10)	SLY	
56.	PS 1613		15.96 (23.22)						3 (2.19)	SLY	
57.	RSC 10-46		22.49 (27.75)					3.66 (2.16)	5 (2.61)	SLY	
58.	NRC 86		19.80 (25.85)					**2.49 (1.87)**	3 (1.81)	SLY	
59.	**AMS-2019**		31.68 (34.00)						7 (2.56)	SLY	
60.	DS 1318							4.16 (2.27)			
61.	NRC 142							2.99 (1.99)			

Table 3.6 : Ent. 2 d. Field screening of AVT entries (Southern Zone) for resistance to major insect-pests (DEFOLIATORS, STEM BORERS, POD BORER AND PEST COMPLEX)

Sl. No.	AVT-I Entries	Dharwad					Bidar		
		Defoliators (larvae/mrl) *	Leaf damage** (% Defoliation)	Girdle beetle damage**	Pod borer damage** (%)	Reaction to Insect pest complex	Leaf damage (% defoliation)**	Pod borer damage (%)**	Reaction to Insect pest complex
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	DS 9421	4.19 (2.17)LR	44.25 (41.68)MS	35.08 (36.30)S	12.89 (21.03)R	S-LY	Not sown due to non availability of seeds		
2	Himso 1689	4.27 (2.18)LR	47.75 (43.69)MS	33.87 (35.58)LR	9.62 (18.06)R	S-LY	31.67 (34.24)MR	24.33 (29.56)HS	S-LY
3	Himso 1690	4.31 (2.19)LR	43.75 (41.39)MS	34.57 (36.00)LR	10.48 (18.88)R	S-HY	28.56 (32.27)MR	10.66 (19.04)MR	S-LY
4	JS 21-72	2.87 (1.84)MR	23.20 (28.78)LS	28.72 (32.39)MR	6.17 (14.38)**R**	R-HY	36.06 (36.90)MR	9.49 (17.94)MR	S-LY
5	NRC 142	4.45 (2.22)LR	40.50 (39.51)MS	38.71 (38.46)HS	12.83 (20.98)R	S-HY	17.13 (24.45)MR	11.46 (19.77)MR	S-LY
6	NRC 149	4.35 (2.20)LR	42.35 (40.58)MS	35.69 (36.67)S	11.15 (19.50)R	S-LY	29.11 (32.65)MR	23.79 (29.15)HS	R-LY
7	SL 1213	3.16 (1.91)MR	32.25 (34.59)MS	28.87 (32.49)MR	9.28 (17.73)R	S-LY	41.20 (39.92)MR	15.08 (22.85)LR	S-LY
8	VLS 99	3.25 (1.94)MR	36.10 (36.91)MS	30.36 (33.42)LR	10.18 (18.60)R	S-LY	35.71 (36.70)MR	20.13 (26.58)S	S-LY
9	AMS 100-39	2.98 (1.87)MR	31.35 (34.04)MS	27.53 (31.63)MR	9.23 (17.68)R	R-HY	35.36 (36.49)MR	16.83 (24.21)LR	S-HY
10	DSb 33	4.12 (2.15)LR	41.20 (39.92)MS	31.78 (34.30)LR	8.77 (17.22)**R**	S-HY	37.22 (37.60)MR	12.02 (20.28)MR	S-HY
11	Karune	4.39 (2.21)LR	44.55 (41.85)MS	37.96 (38.02)S	13.58 (21.62)R	S-LY	42.75 (40.83)MR	18.25 (25.28)LR	R-HY
12	NRC 138	5.01 (2.35)S	52.15 (46.21)S	41.57 (40.13)HS	14.72 (22.55)R	S-LY	30.95 (33.79)MR	5.46 (13.51)HR	S-LY
13	NRC 142	4.39 (2.21)LR	42.70 (40.79)MS	37.65 (37.83)S	13.19 (21.29)R	S-HY	12.68 (20.86)R	9.65 (17.85)MR	S-LY
14	NRCSL 1	2.05 (1.60)**R**	18.75 (25.65)LS	26.14 (30.74)MR	8.45 (16.89)**R**	R-HY			

15	NRCSL 2	4.09 (2.14)LR	39.15 (38.72)MS	36.23 (36.99)S	12.67 (20.84)R	S-HY	35.04 (36.29)MR	6.14 (14.32)R	S-HY
16	RVSM 2011-35	2.78 (1.81)MR	24.40 (29.59)LS	30.17 (33.30)LR	6.89 (15.21)**R**	S-LY	38.57 (38.39)MR	11.58 (19.89)MR	S-HY
17	MACSNRC 1667	4.26 (2.18)LR	46.35 (42.89)MS	35.22 (36.39)S	13.66 (21.68)R	S-LY	22.82 (28.51)MR	8.35 (16.77)MR	S-LY
18	DSb 21 (C)	2.67 (1.78)MR	24.30 (29.52)LS	28.77 (32.42)MR	7.59 (15.99)**R**	S-HY	40.61 (39.57)MR	22.36 (28.18)HS	S-LY
19	DSb 23 (C)	2.72 (1.79)MR	28.65 (32.35)MS	29.38 (32.81)MR	9.33 (17.78)R	S-HY	27.50 (31.56)MR	14.19 (22.12)LR	S-LY
20	KS 103 (C)	2.88 (1.84)MR	30.20 (33.32)MS	32.61 (34.81)LR	13.54 (21.58)R	S-LY	30.39 (33.44)MR	22.78 (28.17)HS	S-LY
21	MACS 450 (C)	4.09 (2.14)LR	41.75 (40.24)MS	35.69 (36.67)S	11.27 (19.61)R	S-HY	38.79 (38.52)MR	5.62 (13.69)HR	R-HY
22	JS 335 (C)	3.01 (1.87)MR	35.75 (36.71)MS	30.87 (33.74)LR	9.84 (18.27)R	S-HY			-
23	AMS 20-19						42.63 (40.76)MR	4.88 (12.76)HR	S-LY
24	JS 21-71						42.51 (40.69)MR	5.26 (13.26)HR	R-HY
25	MACS 1620						37.94 (38.02)	10.62 (18.97)MR	R-HY
26	MAUS 732						24.39 (29.59)MR	16.27 (23.72)MR	S-LY

Table 3.7 : Ent. 2 e. Field screening of AVT entries for resistance to major insect-pests (Imphal)

Sl. No.	Entries	No. of Bihar Hairy Caterpillar/m	No. of leaf webber larvae/m	No. of tobacco caterpillar larvae/m	Percent defoliation at peak incidence /plant	No. of Aphids /plant	Stem tunnelling at physiological maturity (%)	Reaction to Insect pest complex
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	AMS 100-39	12.40 (3.54)* MR	4.10 (2.14)* LR	3.60 (2.02)* LR	19.33 LS	9.60 (3.08)*MR	7.07 (15.96)# LR	SLY
2.	DSb 33	61.00 (7.64) LR	3.10 (1.90) MR	2.10 (1.60) MR	24.07 LS	10.20 (3.27) MR	5.08 (13.62) MR	**SHY (T)**
3.	Himso 1689	31.50 (5.48) LR	4.60 (2.26) LR	1.70 (1.45) MR	24.44 LS	20.60 (4.59)LR	6.27 (15.02) MR	**SHY (T)**
4.	Himso 1690	11.80 (3.43) MR	3.30 (1.95) MR	**1.00 (1.20) R**	16.55 LS	12.80 (3.63) MR	4.24 (12.54) MR	**SHY (T)**
5.	JS 21-72	17.20 (4.10) MR	**5.60 (2.47) S**	3.10 (1.88) LR	26.28 MS	22.60 (4.80) LR	7.24 (16.15) LR	SLY
6.	NRC 138	3.60 (2.00) MR	3.10 (1.88) MR	**1.00 (1.22) R**	20.81 LS	9.80 (3.21) MR	4.67 (13.11) MR	**SHY (T)**
7.	NRC 142	8.40 (2.98) MR	3.50 (2.00) MR	1.70 (1.48) MR	20.52 LS	19.20 (4.44) LR	5.31 (13.91) MR	**SHY (T)**
8.	NRC 149	3.20 (1.91) MR	3.10 (1.90) MR	2.20 (1.61) MR	20.46 LS	13.80 (3.78) MR	4.76 (13.16) MR	**SHY (T)**
9.	NRC SL-2	14.00 (3.63) MR	4.60 (2.25) LR	2.50 (1.72) LR	25.27 MS	12.00 (3.53) MR	7.19 (15.99) LR	SLY
10.	RVSM 2011-35	36.40 (5.71) LR	4.05 (2.13) LR	3.20 (1.92) LR	26.94 MS	10.40 (3.29) MR	6.52 (15.15) LR	SLY
11.	SL 1213	12.20 (3.55) MR	2.70 (1.78) MR	2.20 (1.61) MR	18.32 LS	20.20 (4.54) LR	**2.91 (9.30) R**	**SHY (T)**
12.	VLS 99	14.80 (3.71) MR	3.70 (2.05) MR	2.00 (1.56) MR	17.52 LS	**8.00 (2.91) R**	7.68 (16.36) MR	**RHY**
13.	DSb 21 (C)	23.60 (4.80) LR	3.60 (2.02) MR	3.90 (2.10) LR	28.59 MS	9.40 (3.14) MR	7.20 (16.03) LR	SLY
14.	JS 20-34 (C)	27.20 (5.13) LR	3.70 (2.05) MR	2.90 (1.83) LR	28.56 MS	20.00 (4.50) LR	7.08 (15.96) MR	SLY
15.	JS 20-116 (C)	32.00 (5.60) LR	3.20 (1.92) MR	2.30 (1.67) MR	22.59 LS	20.20 (4.42) LR	5.57 (14.25) MR	SLY
16.	JS 335 (C)	51.60 (7.22) LR	3.90 (2.10) LR	3.20 (1.91) LR	27.23 MS	18.50 (4.36) LR	9.14 (18.07) LR	SLY

17.	JS 97-52 (C)	35.60 (6.00) LR	4.10 (2.14) LR	2.70 (1.77) LR	30.13 MS	17.20 (4.21) LR	11.04 (19.85) LR	SLY
18.	MACS 1460 (C)	6.80 (2.68) MR	2.70 (1.78) MR	1.70 (1.48) MR	19.17 LS	11.90 (3.52) MR	**5.43** **(14.08) R**	**SHY (T)**
19.	NRC 86 (C)	32.60 (5.70) LR	4.30 (2.19) LR	3.20 (1.92) LR	28.18 MS	18.20 (4.32) LR	5.32 (13.96) MR	SLY
20.	PS 1347 (C)	21.20 (4.62) LR	4.00 (2.11) LR	2.40 (1.69) LR	26.88 MS	18.20 (4.32) LR	8.53 (17.49) LR	SLY
21.	RKS 113 (C)	27.40 (5.27) LR	4.90 (2.32) LR	3.60 (2.02) LR	29.77 MS	17.20 (4.20) LR	8.18 (16.86) LR	SLY
SE ±		1.38	0.16	0.22	1.71	0.47	-	
CD at 5 %		2.89	0.33	0.46	3.56	0.98	NS	

Table 3.8 ENT 3a: Status of AVT-II entries for antixenosis and antibiosis against *S. litura* at Pantnagar

S. No	Genotypes	Antibiosis			Antixenosis	
		Approx. digestibility AD	Efficiency of Conversion Index ECI	Efficiency of Conversion of Digested food ECD	C value	Antixenosis response
1	AMS 100-39	60.05 (50.89)	45.86 (42.59)	70.90 (57.59)	1.16	Preferred host
2	DSb 33	45.16 (42.08)	40.28 (39.33)	73.84 (59.62)	1.30	Preferred host
3	NRC 138	56.02 (48.52)	36.49 (37.06)	55.30 (48.05)	0.86	Slight antixenosis
4	RVSM 2011-35	58.38 (49.85)	40.69 (39.50)	56.42 (48.71)	1.12	Preferred host
5	NRCSL 2	40.83 (39.64)	64.43 (53.67)	57.01 (49.09)	0.96	Slight antixenosis
6	JS 335	60.52 (51.11)	31.02 (33.61)	51.93 (46.11)	Check	Check
	SEM±	2.874	2.450	3.324	-	-
	CD at 5%	4.684	1.529	5.142	-	-

Table 3.9 ENT 3b: Status of AVT-II entries for antixenosis and antibiosis against *S. litura* at Indore

Sr. no.	Genotype	AD	ECI	ECD	'C' value	Response
1.	AMS 100-39	54.66 (47.67)	46.29 (42.87)	85.25 (67.41)	1.21	Preferred host
2.	Dsb 33	59.48 (50.47)	46.45 (42.96)	78.41 (62.31)	0.90	Slight antixenosis
3.	JS 21-71	61.27 (51.52)	53.61 (47.07)	87.81 (69.57)	0.91	Slight antixenosis
4.	Karune	61.69 (51.76)	44.13 (41.63)	73.78 (59.20)	1.11	Preferred host
5.	MACS NRC 1667	60.94 (51.32)	51.40 (45.80)	84.50 (66.82)	1.01	Preferred host
6.	NRC 138	64.40 (53.37)	55.74 (48.30)	87.25 (69.08)	0.97	Slight antixenosis
7.	NRC 142	72.45 (58.34)	60.01 (50.77)	83.25 (65.84)	1.01	Slight antixenosis
8.	NRC SL1	60.17 (50.87)	52.39 (46.37)	87.01 (68.87)	0.97	Slight antixenosis
9.	NRC SL2	57.09 (49.08)	38.18 (38.16)	70.02 (56.80)	0.97	Slight antixenosis
10.	RVSM 2011-35	56.60 (48.79)	50.91 (45.52)	89.87 (71.44)	1.06	Preferred host
11.	JS-335	69.90 (56.73)	53.98 (47.28)	76.38 (60.92)	1.00	Preferred host
	SEm±	(2.87)	(4.14)	(9.90)	-	-
	CD at 5%	(5.98)	(8.65)	(20.66)	-	-

Table 3.10: ENT 3c - Status of AVT-II entries for antixenosis and antibiosis against *S. litura* at Dharwad

Sl. No.	Genotypes	Antibiosis			Antixenosis	
		Approx. Digestibility (AD)*	Efficiency of Conversion Index (ECI)*	Efficiency of Conversion of Digested food (ECD)*	"C" Value	Antixenosis response
1	AMS 100-39	68.29 (55.71)	32.30 (34.62)	47.30 (43.43)	0.89	**Slight antixenosis**
2	DSb 33	71.08 (57.44)	46.25 (42.83)	65.07 (53.75)	1.26	Preferred host
3	Karune	71.14 (57.48)	44.43 (41.79)	62.45 (52.19)	1.11	Preferred host
4	NRC 138	69.04 (56.17)	50.07 (45.02)	72.52 (58.36)	1.29	Preferred host
5	NRC 142	65.90 (54.25)	39.54 (38.95)	60.00 (50.75)	1.13	Preferred host
6	NRCSL 1	67.07 (54.96)	33.69 (35.47)	50.23 (45.11)	0.87	**Slight antixenosis**
7	NRCSL 2	74.64 (59.74)	45.77 (42.56)	61.32 (51.52)	1.17	Preferred host
8	RVSM 2011-35	72.93 (58.62)	45.60 (42.46)	62.52 (52.23)	1.02	Preferred host
9	MACSNRC 1667	70.82 (57.28)	36.10 (36.91)	50.98 (45.54)	1.17	Preferred host
10	JS 335 (Check)	76.75 (61.15)	57.89 (49.52)	75.43 (60.26)	1.31	Preferred host
	S.Em±	1.67	1.54	2.77	-	-
	CD @ 1%	6.70	6.15	11.10	-	-

* Figures in the parenthesis are Transformed angular values

Table 3.11 : ENT.4 a. Field screening of IVT (Normal) entries for resistance to major insect-pests (Stem fly- % Stem tunneling)

S.N.	Entries	Pantnagar	Sehore	Parbhani	Delhi	Imphal
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	DSb-38	76 (60.70)HS	32.78 (34.91) HS	30.24 (33.35)*HR	23.68 27.53	7.49 (16.38)[#] LR
2.	DS 3105	26 (30.65)HR	25.48 (30.30) S	42.33 (40.57) LR	15.24 22.89	10.94 (19.77) LR
3.	CAUMS 2	44 (41.55)HR	17.50 (25.27) MR	40.99 (39.80) MR	18.21 24.47	6.31 (14.91) MR
4.	JS 22-11	38 (38.05)HR	12.48 (20.67) HR	40.90 (39.75) MR	18.81 25.25	4.72 (13.06) MR
5.	DLSb-2	62 (51.98)HS	16.92 (24.27) MR	32.77 (34.91) HR	18.51 23.65	5.09 (13.64) MR
6.	RVSM 2012-11	45 (42.13)HR	9.97 (18.38) HR	46.17 (42.80) S	25.09 28.52	7.23 (16.15) LR
7.	RSC 11-39	26 (30.64)HR	18.05 (25.12)MR	31.54 (34.14) HR	16.88 23.86	12.63 (21.21) LR
8.	AS-15	23 (28.61)HR	18.60 (25.53) MR	32.99 (35.04) HR	15.28 22.05	8.30 (17.05) LR
9.	PS 1664	44 (41.55)HR	21.12 (27.34) MR	25.15 (30.09) HR	19.74 26.28	Did not germinate
10.	MACS 1520	61 (51.38)HS	34.21 (35.77)HS	40.87 (39.73) MR	34.58 35.44	14.05 (22.42) LR
11.	HIMSO 1691	37 (37.46)HR	36.95 (37.42) HS	50.74 (45.41) HS	18.16 23.79	3.13 (9.56) MR
12.	JS 22-14	22 (27.96)HR	22.73 (28.46) LR	43.85 (41.46) LR	20.88 26.94	**0.00** **(4.05) R**
13.	DS 3144	51 (45.57)HS	23.75 (29.16) LR	63.16 (52.63) HS	23.51 28.80	8.69 (17.55) LR
14.	DLSb-1	59 (50.19)HS	8.72 (17.17) HR	31.94 (34.39) HR	23.29 26.05	5.26 (11.72) MR

15.	NRC 128	65 (53.74)HS	29.89 (33.12) HS	31.91 (34.38) HR	15.74 22.77	Did not germinate
16.	VLS 101	36 (36.86)HR	26.48 (31.39) S	49.74 (44.84) HS	18.95 24.74	4.67 (11.17) MR
17.	RSC 11-35	40 (39.21)HR	18.47 (25.10) MR	27.58 (31.67) HR	29.04 32.32	9.29 (18.21) LR
18.	PS 1661	28 (31.95)HR	15.70 (23.33) R	44.30 (41.71) LR	30.61 33.14	Did not germinate
19.	Himso- 1692	65 (53.74)HS	23.52 (28.99) LR	50.99 (45.55) HS	- -	**22.58** **(28.62) S**
20.	JS 20-116	63 (52.54)HS	17.66 (24.80) MR	38.86 (38.56) MR	27.20 31.03	12.99 (21.53) LR
21.	RVS 2012-10	36 (36.86)HR	25.52 (30.33) S	49.07 (44.46) HS	26.75 30.91	Did not germinate
22.	PS 1670	34 (35.66)HR	16.81 (24.18) MR	40.21 (39.34) MR	33.32 35.13	11.44 (20.21) LR
23.	NRC 109	19 (25.81)HR	26.04 (30.66) S	32.23 (34.58) HR	56.84 49.03	14.39 (22.41) LR
24.	MAUS 806	42 (40.39)HR	28.54 (32.27) HS	33.47 (35.33) HR	17.03 22.92	6.64 (15.48) MR
25.	RVS 2011-10	33 (35.06)HR	20.99 (27.25) MR	53.04 (46.73) HS	14.40 19.22	6.93 (15.76) MR
26.	MAUS 768	63 (52.54)HS	14.24 (22.11) R	39.65 (39.02) MR	30.01 33.10	16.88 (24.54) LR
27.	ASb 36	49 (44.43)HS	19.12 (25.91) MR	52.43 (46.38) HS	- -	Did not germinate
28.	ASb 9	96 (79.46)HS	20.78 (27.10) MR	32.72 (34.87) HR	32.12 34.18	Did not germinate
29.	AUKS 207	36 (36.87)HR	18.55 (25.50) MR	48.75 (44.28) HS	29.19 32.65	Did not germinate
30.	NRC 86	26 (30.64)HR	22.54 (28.31) LR	55.45 (48.13) HS	41.33 39.96	9.43 (18.36) LR
31.	AUKS 206	-	14.24 (22.11) R	----	24.88 29.66	Did not germinate

32.	MACS 1701	34 (35.67)HR	18.22 (25.25) MR	46.51 (42.99) S	- -	Did not germinate
33.	KDS 1096	100 (90.00)HS	32.37 (34.54) HS	28.58 (32.31)HR	- -	2.19 (8.41) MR
34.	MACS 1691	86 (68.35)HS	24.05 (29.24) S	37.72 (37.88) MR	20.66 26.54	**0.00** **(4.05) R**
35.	KDS 1144	48 (43.85)S	21.40 (27.05) LR	37.02 (37.46) R	22.42 28.11	12.21 (20.89) LR
36.	BAUS 96-17	55 (47.88)HS	22.35 (28.17) LR	45.11 (42.18) LR	27.58 30.91	Did not germinate
37.	BAUS 31-17	34 (35.63)HR	18.22 (25.25) MR	27.08 (31.34) HR	- -	5.88 (12.28) MR
38.	TS 20-5	79 (62.75)HS	14.22 (22.09) R	43.64 (41.33) LR	21.88 26.82	4.97 (11.45) MR
39.	SL 1212	67 (54.95)HS	11.30 (19.63) HR	53.32 (46.90) HS	23.47 28.55	13.32 (21.81) LR
40.	SL 1250	48 (43.85)S	14.50 (22.36) R	61.79 (51.82) HS	36.27 36.92	8.50 (17.44) LR
41.	DS 1312	54 (47.30)HS	27.18 (31.39) HS	53.60 (47.06) HS		1.66 (7.66) MR

Table 3.12: ENT. 4 b. Field screening of IVT (Normal) entries for resistance to major insect-pests (Girdle beetle - % Plant infestation)

S.N.	Entries	Sehore	Parbhani	Dharwad	Kota
(1)	(2)	(3)	(4)	(5)	(6)
1.	DSb-38	17.55 (24.60) LR	20.92 (27.19)*LR	9.57 (18.01)**R**	28.34 (32.15)**-S
2.	DS 3105	7.48 (15.98)MR	19.19 (25.93) LR	13.62 (21.65)MR	21.67 (27.72) - LR
3.	CAUMS 2	4.35 (11.89) HR	14.74 (22.57) MR	14.14 (22.08)MR	19.83 (26.36) - MR
4.	JS 22-11	11.94 (20.08)MR	16.45 (23.91) MR	12.25 (20.48)MR	21.50 (27.48) - LR
5.	DLSb-2	8.04 (16.32) MR	18.57 (25.50) LR	19.43 (26.14)LR	18.34 (25.33) - MR
6.	RVSM 2012-11	9.94 (18.32)MR	13.35 (21.42) MR	12.26 (20.49)MR	20.00 (26.49) - MR
7.	RSC 11-39	6.33 (13.89) R	15.27 (22.98) MR	13.93 (21.91)MR	13.34 (21.27) - R
8.	AS-15	13.01 (21.02) MR	20.61 (26.92) LR	13.04 (21.16)MR	18.50 (25.45) - MR
9.	PS 1664	17.82 (24.95)LR	7.04 (15.35) HR	11.77 (20.06)MR	20.00 (26.49) - MR
10.	MACS 1520	9.80 (18.11) MR	27.31 (33.15) HS	19.08 (25.89)LR	18.34 (25.33) - MR
11.	HIMSO 1691	21.59 (27.61)LR	15.71 (23.34) MR	21.95 (27.93)S	26.67 (31.09) - S
12.	JS 22-14	30.27 (33.11)HS	8.06 (16.46) HR	12.31 (20.53)MR	18.34 (25.33) - MR
13.	DS 3144	6.51 (14.71) R	4.75 (12.32) HR	17.94 (25.05)LR	21.67 (27.72) - LR
14.	DLSb-1	16.17 (23.63)LR	25.74 (30.47) S	19.40 (26.12)LR	18.34 (25.33) - MR
15.	NRC 128	17.10 (24.30)LR	16.07 (23.62) MR	20.64 (27.01)S	18.18 (25.21) - MR
16.	VLS 101	26.88 (31.73) S	28.12 (32.01) HS	23.98 (29.31)HS	21.67 (27.72) - LR

17.	RSC 11-35	3.08 (9.91) HR	23.66 (29.10) LR	10.65 (19.04)MR	13.33 (21.41) - R
18.	PS 1661	8.46 (16.57)R	21.74 (27.77) LR	16.76 (24.16)LR	15.00 (22.76) - MR
19.	Himso- 1692	11.30 (19.50) MR	41.58 (40.07) HS	24.09 (29.38)HS	20.00 (26.57) - LR
20.	JS 20-116	14.71 (22.49) LR	15.93 (23.51) MR	15.37 (23.07)LR	10.00 (18.19) - HR
21.	RVS 2012-10	19.64 (26.23)L	11.52 (19.75) R	9.07 (17.52)**R**	20.00 (26.49) - MR
22.	PS 1670	5.12 (12.66) HR	35.06 (36.29) HS	10.93 (19.30)MR	23.33 (28.88) - LR
23.	NRC 109	14.52 (22.39)LR	27.06 (31.33) S	16.75 (24.15)LR	24.83 (29.88) - LR
24.	MAUS 806	19.58 (26.24)LR	28.87 (32.42) HS	13.12 (21.23)MR	16.67 (24.10) - MR
25.	RVS 2011-10	4.67 (11.56) HR	17.61 (24.76) MR	21.67 (27.73)S	15.00 (22.76) - MR
26.	MAUS 768	15.67 (23.28)LR	11.96 (20.18) MR	18.80 (25.69)LR	18.34 (25.33) - MR
27.	ASb 36	13.43 (21.24) MR	17.68 (24.86) MR	13.99 (21.96)MR	21.67 (27.72) - LR
28.	ASb 9	7.71 (16.03)MR	22.84 (28.45) LR	12.75 (20.91)MR	18.34 (25.33) - MR
29.	AUKS 207	11.71 (19.94) MR	29.88 (33.11) HS	16.87 (24.24)LR	21.67 (27.72) - LR
30.	NRC 86	4.08 (10.91) HR	20.91 (27.20) LR	10.22 (18.64)MR	31.67 (34.24) - HS
31.	AUKS 206	6.67 (13.56) R	----	No germination	18.34 (25.33) - MR
32.	MACS 1701	19.43 (26.14)LR	19.51 (26.20) LR	36.24 (37.00)LR	20.00 (26.57) - LR
33.	KDS 1096	10.89 (19.20)MR	15.99 (23.52) MR	30.38 (33.43)MR	25.00 (29.99) - LR
34.	MACS 1691	23.64 (28.68) S	12.65 (20.82) MR	33.57 (35.39)LR	21.67 (27.72) - LR

35.	KDS 1144	10.68 (19.05) MR	10.29 (18.61) R	42.68 (40.77)S	18.34 (25.33) - MR
36.	BAUS 96-17	10.97 (19.01) MR	12.99 (21.06) R	43.81 (41.43)S	18.34 (25.33) - MR
37.	BAUS 31-17	16.59 (24.00) LR	22.06 (27.98) LR	37.75 (37.89)LR	21.67 (27.72) - LR
38.	TS 20-5	6.11 (14.19) R	19.92 (26.41) LR	34.37 (35.88)LR	20.00 (26.57) - LR
39.	SL 1212	27.41 (31.53) HS	8.80 (17.14) HR	67.98 (55.52)HS	26.50 (30.98) - S
40.	SL 1250	11.41 (19.69) MR	9.81 (18.20) HR	68.01 (55.53)HS	21.67 (27.72) - LR
41.	DS 1312	25.88 (30.54) S	8.02 (16.06) HR	47.78 (43.71)S	20.00 (26.57) - LR

Table 3.13: ENT. 4 c. Field screening of IVT (Normal) entries for resistance to major insect pests (Defoliators)

S.N.	Entries	Defoliators (Number of larvae / m)						Leaf damage (% defoliation)	No. of semilooper/ mrl	No. of *S. litura* larvae/mrl
		Sehore	Amrawati	Pantnagar	Kota	Dharwad	Imphal	Bidar	Parbhani	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	DSb-38	2.39 (1.73) LR		3 (1.87)MR	2.50 (1.72)*-LR	2.73 (1.80)**R**	1.10 (1.18)* MR	9.25 (17.69)R	7.67 (2.85)*LR	0.17 (0.80)*MR
2.	DS 3105	3.66 (2.03) S		4 (2.11)HS	2.00 (1.58) -MR	3.12 (1.90)MR	1.40 (1.26) MR	15.50 (23.05)MR	4.17 (2.15) HR	0.17 (0.80) MR
3.	CAUMS 2	1.33 (1.34) MR		3 (1.87)MR	1.34 (1.35) -MR	3.57 (2.02)LR	1.90 (1.51) MR	11.25 (18.83)R	9.67 (3.11) HS	1.33 (1.35) HS
4.	JS 22-11	0.22 (0.82) HR		4.5 (2.23)HS	1.34 (1.35) -MR	3.06 (1.89)MR	1.30 (1.23) MR	13.00 (20.10)MR	10.50 (3.31) HS	1.83 (1.51) HS
5.	DLSb-2	0.66 (1.03) R		1 (1.22)HR	2.50 (1.73) -LR	3.84 (2.08)LR	3.10 (1.65) LR	13.75 (20.62)MR	7.50 (2.82) LR	0.33 (0.89) MR
6.	RVSM 2012-11	2.16 (1.59) LR		5 (2.33)HS	2.00 (1.55) -MR	2.95 (1.86)MR	3.50 (1.91) LR	11.75 (19.87)R	5.17 (2.37) HR	0.00 (0.70) R
7.	RSC 11-39	0.83 (1.08) R		4.5 (2.23)HS	1.00 (1.22) -MR	3.18 (1.92)MR	3.50 (1.92) LR	9.25 (16.96)R	8.50 (2.99) S	0.33 (0.91) MR
8.	AS-15	3.66 (2.04) S		2 (1.58)HR	2.67 (1.78) -LR	3.26 (1.94)MR	3.00 (1.80) LR	7.00 (15.10)R	9.50 (3.16) HS	1.00 (1.21) LR
9.	PS 1664	1.33 (1.34) MR		6.5 (2.64)HS	2.00 (1.55) -MR	3.07 (1.89)MR	Did not germinate	7.50 (15.68)R	5.17 (2.37) HR	0.00 (0.70) R
10.	MACS 1520	2.66 (1.74) LR		2.5 (1.72)HR	1.84 (1.53) -MR	3.75 (2.06)LR	2.50 (1.71) LR	7.00 (14.99)R	4.17 (2.15) HR	0.17 (0.80) MR
11.	HIMSO 1691	1.22 (1.82) MR		4 (2.10)HS	2.00 (1.58) -MR	4.57 (2.25)S	1.80 (1.52) MR	7.50 (15.68)R	7.67 (2.85) LR	1.00 (1.22) LR
12.	JS 22-14	1.00 (1.14) MR		1.5 (1.40)HR	1.50 (1.41) -MR	3.96 (2.11)LR	2.00 (1.55) MR	7.00 (15.10)R	4.50 (2.23) HR	0.00 (0.70) R
13.	DS 3144	0.83 (1.08) R		8 (2.91)HS	1.84 (1.53) -MR	4.31 (2.19)S	2.30 (1.66) LR	7.00 (14.99)R	4.33 (2.19) HR	0.00 (0.70) R
14.	DLSb-1	6.83 (2.70) HS		3 (1.85)MR	3.00 (1.87) -LR	4.54 (2.24)S	1.40 (1.33) MR	11.75 (19.96)R	8.00 (2.91) LR	0.83 (1.15) LR
15.	NRC 128	1.33 (1.34) MR		2.5 (1.72)HR	1.33 (1.35) -MR	4.69 (2.28)S	Did not germinate	11.75 (19.96)R	4.00 (2.11) HR	0.00 (0.70) R

16.	VLS 101	4.49 (2.19) S		4.5 (2.23)HS	3.00 (1.87) -LR	5.07 (2.36)HS	2.20 (1.64) LR	7.50 (15.68)R	11.17 (3.41) HS	2.33 (1.68) HS
17.	RSC 11-35	0.50 (0.96) HR		3.5 (1.99)LR	0.84 (1.15) -MR	3.68 (2.04)LR	3.50 (1.94) LR	12.00 (20.17)MR	4.17 (2.15)HR	0.00 (0.70) R
18.	PS 1661	0.33 (0.87) HR		6 (2.54)HS	1.17 (1.29) -MR	3.74 (2.06)LR	Did not germinate	11.75 (19.96)R	6.67 (2.67) MR	0.00 (0.70) R
19.	Himso- 1692	3.33 (1.95) LR		3.5 (1.99)LR	3.00 (1.85) -LR	5.23 (2.39)HS	3.80 (1.98) LR	14.25 (21.90)MR	9.83 (3.21) HS	1.67 (1.46) HS
20.	JS 20-116	0.66 (1.01) R		1 (1.22)HR	0.67 (1.08) -R	4.78 (2.30)S	**0.50 (0.97) R**	12.25 (20.37)MR	4.67 (2.27) HR	0.00 (0.70) R
21.	RVS 2012-10	2.00 (1.58) LR		4 (2.10)HS	1.34 (1.35) -MR	3.05 (1.88)MR	Did not germinate	15.00 (22.44)MR	7.67 (2.85) LR	0.33 (0.89) MR
22.	PS 1670	0.66 (1.07) R		1.5 (1.40)HR	1.50 (1.41) -MR	2.97 (1.86)MR	3.40 (1.95) LR	12.25 (20.37)MR	8.50 (2.99) S	1.17 (1.28) S
23.	NRC 109	1.33 (1.30) MR		1.5 (1.40)HR	3.17 (1.90) -LR	3.63 (2.03)LR	4.10 (2.08) LR	16.50 (23.40)MR	8.67 (3.02) S	0.17 (0.80) MR
24.	MAUS 806	2.66 (1.68) LR		1 (1.22)HR	1.17 (1.29) -MR	3.19 (1.92)MR	**4.50 (2.15) S**	16.50 (23.40)MR	8.17 (2.94) LR	0.83 (1.15) LR
25.	RVS 2011-10	0.50 (0.99) H R		3 (1.85)MR	0.84 (1.15) -MR	5.39 (2.43)HS	3.40 (1.90) LR	16.75 (23.56)MR	4.17 (2.15) HR	0.00 (0.70) R
26.	MAUS 768	1.49 (1.41) MR		2.5 (1.72)HR	1.34 (1.35) -MR	4.67 (2.27)S	2.30 (1.48) MR	13.25 (21.20)MR	8.00 (2.91) LR	0.67 (1.08) LR
27.	ASb 36	5.66 (2.64) HS		3 (1.87)MR	1.84 (1.53) -MR	3.75 (2.06)LR	Did not germinate	12.50 (20.61)MR	6.33 (2.61) MR	0.00 (0.70) R
28.	ASb 9	1.66 (1.47) MR		2.5 (1.72)HR	3.50 (2.00) -LR	3.11 (1.90)MR	Did not germinate	16.25 (23.59)MR	7.17 (2.76) LR	0.50 (0.96) MR
29.	AUKS 207	2.66 (1.75) LR		0.5 (0.96)HR	2.67 (1.78) -LR	3.89 (2.10)LR	Did not germinate	16.13 (23.14)MR	5.00 (2.34) HR	0.00 (0.70) R
30.	NRC 86	0.50 (0.96) HR		5 (2.33)HS	3.17 (1.91) -LR	2.96 (1.86)MR	2.00 (1.41) MR	9.50 (17.45)R	9.00 (3.08) HS	1.33 (1.33) HS
31.	AUKS 206	1.99 (1.40) MR		-	2.50 (1.67) -LR	No germination	Did not germinate	15.00 (22.50)MR	----	----
32.	MACS 1701	3.33 (1.95) LR		3 (1.85)MR	1.84 (1.53) -MR	3.27 (1.94)MR	Did not germinate	18.38 (25.15)MR	7.33 (2.79) LR	0.00 (0.70) R
33.	KDS 1096	1.50 (1.40) MR		1.5 (1.40)HR	3.00 (1.84) -LR	2.61 (1.76)**R**	2.10 (1.44) MR	12.75 (20.71)MR	4.17 (2.15) HR	0.17 (0.80) MR
34.	MACS 1691	3.33 (1.94) LR		0.5 (0.96)HR	4.17 (2.16) -S	2.95 (1.86)MR	**0.50 (0.97) R**	13.00 (20.96)MR	8.50 (2.99) S	0.50 (0.99) LR
35.	KDS 1144	1.50 (1.40) MR		1.5 (1.40)HR	2.17 (1.63) -LR	3.87 (2.09)MR	1.00 (1.14) MR	10.00 (17.85)R	10.33 (3.29) HS	1.17 (1.28) S

36.	BAUS 96-17	1.66 (1.58) MR		5.5 (2.44)HS	2.50 (1.73) -LR	3.93 (2.10)LR	Did not germinate	11.50 (19.72)R	5.50 (2.44) HR	0.00 (0.70) R
37.	BAUS 31-17	1.66 (1.42) MR		2.5 (1.72)HR	2.84 (1.83) -LR	3.59 (2.02)LR	0.80 (1.08) MR	11.75 (19.96)R	10.83 (3.36) HS	1.67 (1.47) HS
38.	TS 20-5	0.99 (1.19) MR		1 (1.22)HR	3.50 (2.00) -LR	3.65 (2.04)LR	3.20 (1.88) LR	12.50 (19.74)R	8.00 (2.91) LR	0.50 (0.99) LR
39.	SL 1212	3.33 (1.95) LR		5 (2.33)HS	2.17 (1.63) -LR	5.64 (2.48)HS	2.60 (1.74) LR	13.00 (20.96)MR	6.50 (2.64) MR	0.00 (0.70) R
40.	SL 1250	1.50 (1.40) MR		6 (2.54)HS	2.34 (1.67) -LR	5.71 (2.49)HS	1.40 (1.37) MR	12.25 (20.37)MR	7.00 (2.73) MR	0.00 (0.700) R
41.	DS 1312	4.16 (2.13) S		5.5 (2.44)HS	1.33 (1.35) -MR	4.39 (2.21)S	2.70 (1.76) LR	13.00 (20.96)MR	10.00 (3.23) HS	1.33 (1.34) HS

Table 3.14: ENT. 4 d. Field screening of IVT (Normal) entries for resistance to major insect pests (Pod borer, Aphids, White fly, Leaf webber and YMV Rating)

S. No.	Entries	Pod Borer		No. of jassids/ plant	Aphid (3leaf/plant)		White fly		Leaf webber larvae/m	YMV Rating
		Dharwad	Bidar	Parbhani	Imphal	Pantnagar	Pantnagar	Parbhani	Imphal	Delhi
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	DSb-38	29.42 (32.83)MR	81.39 (65.30)HS	1.40 (1.37)*LR	3.20 (1.92)* MR	5.5 (2.42)MR	6 (2.54)MR	2.00 (1.57)*MR	3.20 (1.92)* LR	3
2.	DS 3105	37.49 (37.74)LR	55.97 (48.43)HS	1.10 (1.24) MR	3.40 (1.70) MR	6.5 (2.63)LR	4.5 (2.23)HR	2.70 (1.77) LR	2.20 (1.64) MR	0
3.	CAUMS 2	39.73 (39.06)LR	23.91 (29.28)R	1.20 (1.29) MR	3.20 (1.80) MR	4 (2.12)HR	6 (2.51)MR	2.00 (1.57) MR	2.50 (1.73) MR	7
4.	JS 22-11	31.66 (34.23)MR	36.32 (37.06)LR	1.60 (1.43) LR	5.40 (2.43) MR	6.5 (2.63)LR	9.5 (3.16)HS	2.30 (1.66) LR	**1.30 (1.33) R**	1
5.	DLSb-2	40.74 (39.65)LR	32.89 (34.99)LR	1.70 (1.46) LR	3.00 (1.63) MR	6.5 (2.64)LR	4.5 (2.23)HR	2.60 (1.75) LR	2.20 (1.64) MR	1
6.	RVSM 2012-11	30.32 (33.40)MR	60.25 (50.95)HS	1.70 (1.47) LR	2.30 (1.64) MR	6 (2.54)LR	9 (3.07)HS	1.80 (1.51) MR	2.20 (1.64) MR	3
7.	RSC 11-39	35.86 (36.77)LR	33.74 (35.49)LR	1.60 (1.44) LR	3.30 (1.88) MR	6 (2.51)LR	6.5 (2.60)MR	2.00 (1.57) MR	2.80 (1.81) LR	5
8.	AS-15	38.29 (38.21)LR	48.25 (44.00)HS	0.80 (1.14) MR	12.60 (3.13) LR	4.5 (2.23)R	8.5 (2.97)SH	2.80 (1.80) LR	2.30 (1.67) MR	3
9.	PS 1664	37.49 (37.74)LR	37.81 (37.95)LR	0.60 (1.04) R	Did not germinate	5 (2.34)MR	11 (3.33)SH	2.70 (1.78) LR	Did not germinate	1
10.	MACS 1520	41.57 (40.13)LR	48.94 (44.39)HS	2.10 (0.60) HR	4.20 (2.08) MR	5.5 (2.42)MR	6.5 (2.60)MR	2.30 (1.67) LR	3.20 (1.92) LR	0
11.	HIMSO 1691	43.96 (41.51)S	39.61 (39.00)LR	1.00 (1.22) MR	5.00 (2.22) MR	2.5 (1.52)HR	4.5 (2.23)HR	1.90 (1.54) MR	**1.00 (1.22) R**	9
12.	JS 22-14	40.83 (39.70)LR	40.00 (39.11)LR	2.20 (1.64) S	4.20 (2.14) MR	4 (2.12)HR	4.5 (2.15)HR	1.80 (1.51) MR	2.40 (1.70) MR	5
13.	DS 3144	46.55 (43.00)S	39.86 (39.15)LR	1.50 (1.41) LR	12.00 (3.12) LR	3 (1.62)HR	9 (3.07)HS	1.40 (1.37) MR	**3.90 (2.09) S**	0
14.	DLSb-1	47.91 (43.78)S	32.17 (34.55)MR	1.70 (1.47) LR	12.20 (2.95) LR	4.5 (2.15)R	7 (2.71)LR	1.60 (1.44) MR	2.50 (1.73) MR	0

15.	NRC 128	48.92 (44.36)S	26.38 (30.91)MR	1.60 (1.44) LR	Did not germinate	6.5 (2.64)LR	9 (3.07)HS	2.00 (1.57) MR	Did not germinate	0
16.	VLS 101	51.24 (45.69)HS	22.22 (28.10)R	0.80 (1.13) MR	4.30 (2.11) MR	6.5 (2.63)LR	10.5 (3.27)HS	1.40 (1.37) MR	2.70 (1.79) LR	7
17.	RSC 11-35	39.63 (39.00)LR	17.62 (24.82)HR	1.70 (1.47) LR	15.80 (3.49) LR	5.5 (2.42)MR	8 (2.89)HS	2.50 (1.73) LR	2.80 (1.81) LR	3
18.	PS 1661	43.48 (41.24)LR	29.73 (33.04)MR	1.20 (1.30) MR	Did not germinate	4 (2.12)HR	5 (2.24)HR	2.60 (1.75) LR	Did not germinate	0
19.	Himso- 1692	56.07 (48.47)HS	26.51 (30.99)MR	1.50 (1.41) LR	4.30 (2.08) MR	2.5 (1.52)HR	7.5 (2.82)S	1.90 (1.54) MR	3.10 (1.90) LR	9
20.	JS 20-116	43.26 (41.11)S	7.19 (15.56)HR	0.70 (1.09) R	12.00 (2.83) LR	5.5 (2.44)MR	6 (2.54)MR	1.90 (1.53) MR	**1.60** **(1.44) R**	--
21.	RVS 2012-10	34.67 (36.06)LR	49.25 (44.57)HS	1.70 (1.47) LR	Did not germinate	6.5 (2.63)LR	6 (2.54)MR	1.50 (1.43) MR	Did not germinate	1
22.	PS 1670	29.35 (32.79)MR	22.22 (28.13)R	0.90 (1.18) MR	10.90 (3.06) LR	8.5 (2.99)HS	9.5 (3.13)HS	2.10 (1.61) LR	2.30 (1.67) MR	7
23.	NRC 109	39.39 (38.86)LR	41.50 (40.10)S	1.80 (1.51) LR	12.00 (3.16) LR	4 (2.12)HR	5 (2.34)HR	2.00 (1.57) MR	2.70 (1.79) LR	0
24.	MAUS 806	35.35 (36.47)LR	47.14 (43.36)HS	0.60 (1.04) R	10.90 (3.02) LR	7 (2.73)HS	7 (2.73)LR	2.70 (1.78) LR	3.00 (1.87) LR	0
25.	RVS 2011-10	59.57 (50.50)HS	25.00 (29.89)MR	1.90 (1.54) LR	14.10 (3.30) LR	5.5 (2.44)MR	6 (2.51)MR	1.90 (1.54) MR	3.10 (1.90) LR	3
26.	MAUS 768	43.01 (40.97)S	37.69 (37.87)LR	0.70 (1.09) R	13.00 (2.93) LR	7.5 (2.82)HS	4.5 (2.15)HR	2.40 (1.70) LR	**4.00** **(2.12) S**	9
27.	ASb 36	36.53 (37.17)LR	21.01 (27.28)HR	1.30 (1.34) MR	Did not germinate	4 (2.12)HR	7 (2.55)LR	2.20 (1.63) LR	Did not germinate	9
28.	ASb 9	36.37 (37.08)LR	25.35 (30.23)MR	2.00 (1.57) LR	Did not germinate	8 (2.91)HS	11 (3.37)HS	1.40 (1.37) MR	Did not germinate	-
29.	AUKS 207	47.95 (43.81)S	14.36 (22.27)HR	1.00 (1.22) MR	Did not germinate	8 (2.91)HS	7.5 (2.79)S	1.60 (1.44) MR	Did not germinate	3
30.	NRC 86	33.48 (35.34)LR	35.25 (36.42)LR	1.50 (1.41) LR	7.60 (2.33) MR	6 (2.54)LR	5 (2.24)HR	2.60 (1.77) LR	3.30 (1.95) LR	0
31.	AUKS 206	No germination	0.00 0.00	----	Did not germinate	-	-	----	Did not germinate	1
32.	MACS 1701	36.24 (37.00)LR	28.85 (32.49)MR	1.40 (1.37) LR	Did not germinate	6.5 (2.64)LR	6 (2.54)HR	2.40 (1.69) LR	Did not germinate	7
33.	KDS 1096	30.38 (33.43)MR	26.11 (30.73)MR	1.60 (1.44) LR	8.80 (2.48) M	5.5 (2.42)MR	8 (2.91)HS	2.10 (1.60) LR	2.60 (1.76) MR	5

34.	MACS 1691	33.57 (35.39)LR	57.55 (49.34)HS	1.70 (1.48) LR	5.60 (2.06) MR R	5.5 (2.44)MR	7 (2.68)LR	2.70 (1.78) LR	1.80 (1.52) MR	5
35.	KDS 1144	42.68 (40.77)S	33.33 (35.26)LR	1.90 (1.54) LR	9.80 (2.60) LR	8 (2.91)HS	6.5 (2.63)MR	1.50 (1.41) MR	3.50 (2.00) LR	3
36.	BAUS 96-17	43.81 (41.43)S	19.92 (26.51)HR	1.10 (1.25) MR	Did not germinate	2.5 (1.52)HR	5.5 (2.33)HR	2.00 (1.57) MR	Did not germinate	7
37.	BAUS 31-17	37.75 (37.89)LR	29.01 (32.59)MR	1.90 (1.54) LR	8.80 (2.48) MR	4 (2.12)HR	6 (2.51)HR	2.10 (1.60) LR	3.10 (1.90) LR	9
38.	TS 20-5	34.37 (35.88)LR	26.04 (30.68)MR	1.60 (1.44) LR	10.60 (2.97) LR	7 (2.73)HS	7.5 (2.82)S	2.80 (1.81) LR	3.70 (2.05) LR	-
39.	SL 1212	67.98 (55.52)HS	26.02 (30.67)MR	1.80 (1.51) LR	8.60 (2.73) LR	6 (2.54)LR	6.5 (2.64)R	2.10 (1.59) MR	3.10 (1.90) LR	0
40.	SL 1250	68.01 (55.53)HS	29.65 (32.99)MR	0.70 (1.09) R	12.50 (3.09) LR	7 (2.71)HS	6.5 (2.64)R	1.50 (1.41) MR	2.50 (1.73) MR	0
41.	DS 1312	47.78 (43.71)S	39.00 (38.53)LR	1.50 (1.41) LR	6.40 (2.43) MR	6.5 (2.63)LR	7 (2.71)LR	2.10 (1.58) MR	3.20 (1.92) LR	0

ENT. 3.15: ENT. 4 e. Field screening of IVT (early) entries for resistance to major insect pests

Sr. No	Entries	Leaf Defoliators/ mrl *				Girdle beetle infestation (%) *					Stem fly (% stem tunneling)			
		Amrava	Kota	Sehore	Prabhani	Amravati	Kota	Sehore	Indore	Prabhani	Amravati	Sehore	Indore	Prabhani
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1	NRC 174	----	2.50 (1.73)*LR	3.16 (1.90) LR	2.17 (1.62)*HR	----	28.34 (32.15)LR	15.90 MR	----	18.76 (25.64)*LR	----	20.67 (26.85) MR	----	44.91 (42.07)* LR
2	NRC 186	0.30 (0.89) **LR**	0.84 (1.15) -R	1.00 (1.22) R	6.17 (2.58) LR	1.00 (1.22) **LR**	10.00 (18.43) - HR	11.75 R	5.37 (13.39)LR	17.12 (24.42) LR	73.9 (59.35) **LR**	25.40 (30.28) LR	42.91 (40.92) S	36.57 (37.19) MR
3	DS 3152	0.00 (0.71) MR	2.34 (1.68) - LR	1.33 (1.34) MR	7.50 (2.80) HS	1.00 (1.22) LR	21.67 (27.72) - LR	19.5 LR	5.28 (13.28) LR	9.95 (18.34) MR	61.9 (52.01) MR	21.87 (27.87) LR	63.96 (53.11) HS	49.39 (44.64) LR
4	RVS 2011-4	0.00 (0.71) MR	1.00 (1.22) - MR	0.99 (1.19) R	3.83 (2.08) HR	1.00 (1.22) LR	13.17 (21.13) -R	12.00 R	2.86 (9.73) LR	6.92 (15.23) R	65.6 (54.18) LR	27.80 (31.80) LR	58.66 (49.99) HS	35.73 (36.70) MR
5	PS 1659	0.00 (0.71) MR	1.83 (1.52) - LR	0.99 (1.19) R	8.33 (2.97) HS	0.50 (0.97) MR	21.67 (27.72) - LR	11.75 R	2.71 (9.47) LR	14.82 (22.63) LR	51.7 (45.98) MR	21.24 (27.39) MR	55.96 (48.42) HS	48.45 (44.09) LR
6	NRC 173	0.23 (0.85) LR	1.17 (1.28) - MR	3.99 (2.11) LR	5.67 (2.48) LR	2.00 (1.58) HS	18.33 (25.15) - MR	14.5 MR	7.13 (15.49)S	14.66 (22.50) LR	61.6 (51.78) HS	19.05 (25.84) MR	46.18 (42.81) HS	51.98 (46.13) LR
7	RVSM 2012-4	0.07 (0.75) MR	1.34 (1.35) - MR	4.16 (2.15) S	4.33 (2.19) HR	1.00 (1.22) LR	16.67 (23.99) - MR	21.75 LR	7.23 (15.59)S	8.37 (16.66) R	79.5 (63.08) LR	27.43 (31.51) LR	64.37 (53.35) HS	48.02 (43.85) LR
8	PS 1660	0.00 (0.71) MR	1.17 (1.29) - MR	0.66 (1.07) HR	3.17 (1.91) HR	0.00 (0.71) R	16.67 (23.99) – MR	22.50 LR	5.69 (13.80) LR	26.57 (21.00) MR	50 (45.00) MR	24.01 (29.19) LR	39.90 (39.17) S	46.24 (42.81) LR
9	NRC 172	0.17 (0.81) LR	1.50 (1.41) - MR	5.33 (2.41) HS	7.00 (2.73) S	1.00 (1.22) LR	20.00 (26.49) - MR	20.25 LR	3.55 (10.85) LR	11.94 (20.15) MR	51.9 (46.14) MR	20.29 (26.76) MR	57.31 (49.20) HS	41.58 (40.06) MR
10	JS 20-34	0.20 (0.83) LR	2.84 (1.83) -S	2.66 (1.78) LR	2.83 (1.82) HR	2.00 (1.58) HS	19.83 (26.36) - MR	20.25 LR	5.28 (13.28) LR	5.94 (14.11) HR	71.5 (57.75) LR	8.17 (16.51) HR	75.62 (60.41) HS	52.30 (46.31) LR
11	JS 22-12	0.00 (0.71) MR	1.50 (1.41) - MR	1.66 (1.46) MR	7.00 (2.73) S	0.00 (0.71) R	21.50 (27.48) - LR	18.50 MR	2.97 (9.92) LR	8.15 (16.58) R	68.3 (56.09) LR	23.47 (28.96) MR	59.79 (50.64) HS	46.14 (42.78) LR

12	NRC 175	----	2.50 (1.73) - LR	Seed not germinated	4.33 (2.19) HR		23.34 (28.83) - LR	Seed not germinated	---	15.97 (23.48) LR		Seed not germinated	---	57.45 (49.27) S
13	PS 1569	----	1.50 (1.40) - MR	1.83 (1.50) MR	4.17 (2.15) HR		20.00 (26.49) - MR	12.00 R	4.21 (11.84) LR	11.76 (20.00) MR		19.81 (26.41) MR	64.07 (53.17) HS	44.41 (41.77) LR
14	JS 22-18	0.30 (0.89) LR	1.84 (1.53) - LR	3.66 (2.02) LR	8.50 (1.99) HR	2.00 (1.58) HS	21.67 (27.72) - LR	21.75 LR	3.42 (10.65) LR	19.11 (25.91) LR	43.65 (41.32) MR	35.73 (36.68) HS	69.48 (56.46) HS	57.68 (49.52) HS
15	NRC 177	0.00 (0.71) MR	2.50 (1.73) - LR	1.66 (1.45) MR	3.67 (2.04) HR	0.50 (0.97) MR	23.33 (28.88) - LR	20.75 LR	4.71 (12.53) LR	14.20 (22.13) LR	47.2 (43.39) MR	27.45 (31.33) LR	37.17 (37.57)	51.56 (45.89) LR
16	JS 22-16	0.07 (0.75) MR	2.34 (1.68) - LR	0.33 (0.98) HR	7.00 (2.73) S	0.50 (0.97) MR	25.00 (29.99) - LR	16.75 MR	3.56 (10.88) LR	11.23 (19.56) MR	59.2 (50.36) MR	21.65 (27.71) MR	79.89 (63.35) HS	50.53 (45.29) LR
17	NRC 178	0.00 (0.71) MR	1.67 (1.47) - MR	0.83 (1.13) R	7.50 (2.82) HS	0.00 (0.71) R	29.84 (33.08) -S	12.10 R	4.85 (12.72) LR	12.93 (21.04) MR	64.3 (53.34) LR	28.69 (32.35) LR	72.05 (58.08) HS	34.01 (35.66) MR
18	NRC 183	----	2.00 (1.58) - LR	0.83 (1.13) R	4.50 (2.33) MR		21.67 (27.72) - LR	10.00 R	3.27 (10.41) LR	6.96 (15.26) R		29.77 (33.04) LR	68.05 (55.58) HS	45.62 (42.48) LR
19	NRC 182	0.03 (0.73) MR	1.50 (1.41) - MR	2.33 (1.48) LR	4.00 (2.11) HR	2.00 (1.58) HS	20.00 (26.49) - MR	16.5 MR	3.49 (10.77) LR	10.51 (18.89) MR	71.5 (57.80) LR	18.81 (25.69) MR	68.50 (55.86) HS	49.63 (44.78) LR
20	JS 95-60	0.07 (0.75) MR	2.50 (1.73) - LR	4.83 (2.29) S	6.50 (2.64) LR	0.00 (0.71) R	26.67 (31.05) - LR	26.5 S	4.99 (12.90) LR	8.25 (16.65) R	59.5 (50.48) MR	32.42 (34.65) S	83.24 (65.83) HS	52.55 (46.45) LR
21	NRC 181	0.00 (0.71) MR	1.17 (1.29) - MR	2.33 (1.44) LR	5.17 (1.37) HR	1.00 (1.22) LR	15.00 (22.76) - MR	11.50 R	7.26 (15.63)HS	13.07 (21.17) MR	63.1 (52.60) LR	12.17 (20.41) R	64.59 (53.48) HS	29.60 (32.95) HR
22	NRC 179	0.20 (0.83) LR	1.50 (1.40) - MR	4.83 (2.29) S	7.67 (2.85) HS	0.00 (0.71) R	20.00 (26.49) - MR	18.50 MR	---	8.53 (16.96) MR	66.9 (54.89) LR	21.51 (27.62) MR	----	42.21 (40.51) MR
23	NRC 180	0.37 (0.93)S	1.84 (1.53) - LR	3.49 (1.99) LR	4.00 (2.11) HR	1.00 (1.22)LR	31.67 (34.24) -S	15.00 MR	4.85 (12.72)LR	11.14 (19.48) MR	67.9 (55.65)LR	24.88 (29.43) LR	74.95 (59.96)HS	34.45 (35.92) MR
24	AUKS 203	----	----	----	----		----	----	---	----		----	---	-----

25	AUKS 199	----	----	----	----		----	----	---	----		----	---	-----
26	MACS NRC 1711	----	2.00 (1.58) - LR	1.66 (1.46) MR	9.83 (3.21) HS		24.83 (29.88) - LR	26.25 S	3.97 (11.49) LR	28.34 (32.16) HS		13.33 (21.40) R	43.30 (41.15) S	24.80 (29.86) HR

Table 3.16: ENT. 5a - Evaluation of germplasm lines at hot spots for resistance against major insect pests (Dharwad).

Sl. No.	Germplasm accession	Defoliators (larvae/mrl)*	Leaf damage (% defoliation)**	Pod borer damage** (%)	Yield (Kg/ha)
1	JSM 232	3.89 (2.10)LR	34.50 (35.96)MS	39.98 (39.20)S	784
2	G-03508	4.32 (2.20)LR	52.25 (46.27)S	33.05 (35.08)MR	1035
3	JSM 195	4.05 (2.13)LR	47.25 (43.41)MS	31.26 (33.98)MR	1284
4	JSM 285	4.67 (2.27)S	56.89 (48.94)S	45.76 (42.55)HS	718
5	MACS 303	3.19 (1.92)MR	30.75 (33.66)MS	41.30 (39.97)S	1056
6	JS 20-86	2.67 (1.78)**R**	25.05 (30.02)LS	29.88 (33.12)MR	1118
7	TGX 849-81	5.17 (2.38)S	58.75 (50.02)S	42.42 (40.62)S	895
8	WT-88	5.63 (2.48)HS	61.20 (51.45)S	41.85 (40.29)S	757
9	UPSL-77	4.88 (2.32)S	58.65 (49.96)S	36.05 (36.88)LR	1107
10	RKS 54	4.07 (2.14)LR	47.15 (43.35)MS	32.13 (34.52)MR	1251
11	TGX 293-41E	5.12 (2.37)S	56.60 (48.77)S	46.52 (42.99)HS	689
12	EC 391181	5.09 (2.36)S	53.25 (46.84)S	47.11 (43.33)HS	670
13	JSM 245	4.53 (2.24)LR	49.75 (44.84)MS	36.39 (37.09)LR	1007
14	SL 525	3.76 (2.06)MR	29.30 (32.76)MS	37.47 (37.73)LR	1204

15	F4P20	4.57 (2.25)S	48.55 (44.15)MS	42.02 (40.39)S	938
16	KDS 256	3.76 (2.06)LR	28.70 (32.38)MS	32.81 (34.93)MR	1357
17	GP 434	4.90 (2.32)S	53.15 (46.79)S	45.16 (42.21)HS	707
18	EC 39573	5.23 (2.39)HS	58.45 (49.84)S	41.04 (39.82)S	729
19	SL 738	2.89 (1.84)**R**	30.20 (33.32)MS	33.63 (35.43)MR	1215
20	EC 172576	4.59 (2.26)S	47.60 (43.61)MS	40.82 (39.69)S	840
21	EC 457198	4.97 (2.34)S	47.35 (43.46)MS	37.56 (37.78)LR	1145
22	UGM 75	5.28 (2.40)HS	57.65 (49.38)S	47.91 (43.78)HS	612
23	EC 39503	5.38 (2.42)HS	56.40 (48.66)S	46.95 (43.23)HS	629
24	UGM 77	4.19 (2.17)LR	44.40 (41.77)MS	38.13 (38.12)LR	1095
25	MACS 7102	3.76 (2.06)MR	38.50 (38.34)MS	33.91 (35.60)MR	1285
26	EC 14117	4.08 (2.14)LR	47.70 (43.66)MS	38.57 (38.38)LR	875
27	EC 381884	4.10 (2.14)LR	49.55 (44.72)MS	36.09 (36.91)LR	962
28	VLS 11	3.89 (2.10)MR	34.50 (35.96)MS	38.93 (38.59)LR	1029
29	Harder	3.57 (2.02)MR	32.30 (34.62)MS	32.51 (34.75)MR	1173
30	JSM 242	4.28 (2.19)LR	56.25 (48.57)S	41.04 (39.82)S	818

31	EC 241780	3.12 (1.90)MR	29.35 (32.79)MS	37.02 (37.46)LR	1007
32	EC 457074	3.70 (2.05)MR	33.40 (35.29)MS	31.81 (34.31)MR	1221
33	EC 241302	3.03 (1.88)MR	28.40 (32.19)MS	34.94 (36.22)MR	1187
34	SL(E) 1	4.06 (2.14)LR	42.55 (40.70)MS	32.13 (34.52)MR	1134
35	JSM 227	3.95 (2.11)LR	48.75 (44.27)MS	34.24 (35.80)MR	1067
36	EC 377883 B	3.45 (1.99)MR	47.85 (43.75)MS	35.37 (36.48)LR	1101
37	PK 122	3.58 (2.02)MR	45.90 (42.63)MS	34.56 (35.99)MR	1048
38	EC 457214	4.57 (2.25)S	57.35 (49.21)S	43.93 (41.50)S	762
39	EC 350664	4.45 (2.22)S	52.35 (46.33)S	44.54 (41.85)S	755
40	MACS 171	2.87 (1.84)**R**	23.75 (29.15)LS	33.57 (35.39)MR	1409
41	JSM 222	4.39 (2.21)LR	51.50 (45.84)S	39.34 (38.83)LR	1040
42	PK 431337	4.15 (2.16)LR	47.75 (43.69)MS	44.71 (41.95)S	1080
43	SL 2951	3.89 (2.10)MR	37.95 (38.01)MS	31.33 (34.02)MR	1118
44	PK 25	5.58 (2.47)HS	57.80 (49.47)S	47.57 (43.59)HS	623
45	Z-22 (20-14C)	5.02 (2.35)S	56.15 (48.51)S	43.09 (41.01)S	763
46	Z-17 (23-10B)	5.17 (2.38)HS	52.35 (46.33)S	46.93 (43.22)HS	730

47	Z-23 (23-16C)	5.23 (2.39)HS	54.40 (47.51)S	40.51 (39.51)S	786
48	Z-9 (20-40B)	4.98 (2.34)S	48.75 (44.27)MS	37.04 (37.47)LR	848
49	Z-19 (14-11B)	5.01 (2.35)S	52.45 (46.39)S	43.51 (41.25)S	794
50	PI 204336	4.73 (2.29)S	44.65 (41.91)MS	37.98 (38.03)LR	815

Table 3.17: ENT. 5b. Screening of germplasm line at hot spots for resistance against major insect-pests (Central region)

S. No.	ACC. No.	Indore		Kota		Sehore			
						Semiloopers		Stem fly	Girdle beetle
		Stem fly (% stem tunneling)	Girdle beetle (% Infestation)	Defoliators (Larvae/mrl)	Girdle Beetle (% Infestation)	Larvae/ mrl+	Defoliation (%)	(% Stem tunneling)	(%Plant Infestation)
1.	JSM 232	36.09 (36.92)S	1.39 (6.77)LR	1.17 (1.29)*-MR	11.67 (19.53)**-**R**	2.66	14.8	21.50	10.00
2.	G-03508	64.49 (53.42) HS	0.00 (0.00)MR	No germination		5.33	23.5	27.80	8.00
3.	JSM 195	68.33 (55.75) HS	0.00 (0.00)MR	1.00 (1.22) - MR	10.00 (18.19) - **HR**	2.66	8.50	21.25	9.60
4.	JSM 285	36.68 (37.27) S	0.00 (0.00)MR	1.50 (1.38) - MR	25.00 (29.99) - LR	3.33	16.0	17.36	0.00
5.	MACS 303	51.92 (46.10) HS	2.33 (8.77) LR	2.17 (1.63) -LR	18.34 (25.33) - MR	Seed not germinated			
6.	JS 20-86	34.98 (36.26) S	9.27 (17.72)HS	1.50 (1.40) - MR	21.67 (27.72) - LR	4.33	29.5	28.75	11.10
7.	TGX 849-81	40.53 (39.54) HS	2.00 (8.13) LR	1.17 (1.29) - MR	13.34 (21.72) - MR	3.33	26.5	24.45	0.00
8.	WT-88	47.19 (43.39) HS	0.00 (0.00)MR	1.50 (1.41) - MR	28.33 (32.07) - LR	5.00	28.5	16.95	8.25
9.	UPSL-77	46.66 (43.08) HS	0.00 (0.00)MR	2.50 (1.73) -LR	24.83 (29.88) - LR	5.33	22.0	15.10	7.20
10.	RKS 54	50.12 (45.07) HS	2.58 (9.23) LR	1.50 (1.41) - MR	25.00 (29.68) - LR	2.00	14.0	25.95	12.25
11.	TGX 293-41E	31.23 (33.98)LR	5.99 (14.17) S	2.50 (1.73) -LR	26.67 (30.91) - LR	3.33	20.0	12.70	10.00
12.	EC 391181	45.15 (42.22) HS	2.32 (8.76) LR	1.50 (1.40) - MR	25.00 (29.99) - LR	4.66	23.5	18.33	8.00
13.	JSM 245	28.31 (32.15)LR	4.58 (12.36) S	1.84 (1.53) - MR	28.34 (32.15) - LR	5.00	25.5	17.40	12.90

14.	SL 525	26.97 (31.29)LR	1.64 (7.36) LR	1.00 (1.22) - MR	11.67 (19.92) - **R**	3.66	15.0	20.75	7.20
15.	F4P20	46.87 (43.20) HS	3.81 (11.26) LR	3.17 (1.91) -S	30.00 (33.18) - LR	3.66	13.0	18.00	13.45
16.	KDS 256	28.92 (32.53)LR	0.00 (0.00)MR	2.17 (1.63) -LR	26.67 (30.91) - LR	4.33	19.0	18.10	7.40
17.	GP 434	44.46 (41.82) HS	0.00 (0.00)MR	2.00 (1.58) -LR	28.33 (32.07) - LR	2.33	15.5	40.25	0.00
18.	EC 39573	37.91 (38.00) HS	0.00 (0.00)MR	1.50 (1.41) - MR	21.67 (27.60) - LR	1.66	10.5	21.00	6.18
19.	SL 738	58.80 (50.07) HS	1.43 (6.87) LR	2.50 (1.73) -LR	20.00 (26.57) - MR	1.33	10.0	23.07	6.55
20.	EC 172576	37.12 (37.54) S	0.00 (0.00)MR	1.50 (1.41) - MR	25.00 (29.68) - LR	1.33	11.5	11.50	7.90
21.	EC 457198	37.24 (37.61) S	0.00 (0.00)MR	2.50 (1.73) -LR	26.67 (31.05) - LR	1.33	16.0	19.25	6.75
22.	UGM 75	49.78 (44.87) HS	0.00 (0.00)MR	1.50 (1.40) - MR	25.00 (29.89) - LR	5.33	22.5	15.50	8.40
23.	EC 39503	66.12 (54.40) HS	0.00 (0.00)MR	1.84 (1.53) - MR	26.67 (31.05) - LR	Seed not germinated			
24.	UGM 77	62.66 (52.33) HS	0.00 (0.00)MR	2.50 (1.73) -LR	21.67 (27.72) - LR	3.66	19.0	19.50	0.00
25.	MACS 7102	53.67 (47.10) HS	0.00 (0.00)MR	2.34 (1.68) -LR	28.34 (32.15) - LR	3.33	17.0	18.65	11.5
26.	EC 14117	44.03 (41.57) HS	1.62 (7.30) LR	1.67 (1.47) - MR	18.34 (25.33) - MR	2.00	11.5	15.21	0.00
27.	EC 381884	43.64 (41.35) HS	0.00 (0.00)MR	0.84 (1.15) -R	11.67 (16.70) - R	4.00	27.5	9.60	12.85
28.	VLS 11	44.00 (41.55) HS	1.09 (5.98) LR	1.50 (1.41) - MR	15.00 (22.76) - MR	3.00	**13.0**	26.10	15.67
29.	Harder	64.08 (53.18) HS	19.32 (26.07) HS	2.50 (1.73) -LR	21.67 (27.72) - LR	5.33	26.5	25.00	**23.50**
30.	JSM 242	30.55 (33.55)LR	2.09 (8.30) LR	1.67 (1.47) - MR	23.34 (28.83) - LR	3.00	16.0	27.96	12.65

31.	EC 241780	37.44 (37.72) S	1.25 (6.42) LR	2.34 (1.68) -LR	28.34 (32.15) - LR	2.33	15.0	26.40	15.00
32.	EC 457074	43.41 (41.21) HS	0.00 (0.00)MR	0.84 (1.15) -**R**	10.00 (18.43) - **R**	4.33	19.5	18.85	15.00
33.	EC 241302	51.10 (45.63) HS	0.00 (0.00)MR	1.50 (1.41) - MR	21.84 (27.84) - LR	3.33	16.5	20.00	18.85
34.	SL(E) 1	40.07 (39.27) HS	5.10 (13.05) S	1.00 (1.22) - MR	10.00 (18.43) - **R**	4.00	18.6	19.45	10.22
35.	JSM 227	48.92 (44.38) HS	0.00 (0.00)MR	2.50 (1.73) -LR	25.00 (29.99) - LR	3.66	13.0	15.45	8.00
36.	EC 377883 B	38.30 (38.23) HS	2.02 (8.17) LR	2.34 (1.68) -LR	23.34 (28.83) - LR	4.33	27.0	17.60	11.80
37.	PK 122	53.41 (46.95) HS	0.00 (0.00)MR	2.17 (1.63) -LR	23.34 (28.83) - LR	4.66	26.0	25.18	11.50
38.	EC 457214	53.18 (46.82) HS	0.81 (5.15) LR	2.50 (1.73) -LR	20.00 (26.57) - MR	3.66	11.5	7.25	15.00
39.	EC 350664	56.62 (48.80) HS	5.36 (13.39) S	1.84 (1.53) - MR	25.00 (29.99) - LR	3.00	**11.5**	32.86	6.50
40.	MACS 171	29.13 (32.66) LR	1.52 (7.07) LR	2.50 (1.73) -LR	19.83 (26.36) - MR	4.00	16.0	21.65	9.20
41.	JSM 222	54.37 (47.50) HS	0.00 (0.00)MR	1.50 (1.38) - MR	20.00 (26.49) - MR	2.00	10.0	15.00	0.00
42.	PK 431337	57.20 (49.14) HS	1.14 (6.12) LR	2.00 (1.58) -LR	23.34 (28.83) - LR	2.66	11.50	25.50	5.85
43.	SL 2951	31.84 (34.35)LR	5.56 (13.63)S	2.00 (1.58) -LR	21.67 (27.72) - LR	6.33	26.5	26.45	12.50
44.	PK 25	37.13 (37.54) S	0.00 (0.00)MR	1.84 (1.50) - MR	23.33 (28.88) - LR	5.00	23..5	34.18	11.50
45.	Z-22 (20-14C)	42.37 (40.61) HS	1.25 (6.42) LR	2.34 (1.67) -LR	30.00 (33.18) - LR	3.33	17.50	24.80	25.50
46.	Z-17 (23-10B)	32.70 (34.88) S	2.28 (8.68) LR	2.50 (1.72) -LR	18.33 (25.15) - MR	6.00	26.0	15.00	15.0
47.	Z-23 (23-16C)	51.76 (46.01) HS	1.28 (6.50) LR	2.67 (1.78) -LR	26.67 (31.09) - LR	4.66	18.6	27.45	12.50

48.	Z-9 (20-40B)	50.31 (45.17) HS	0.00 (0.00)MR	2.17 (1.63) -LR	21.67 (27.72) - LR	3.00	12.5	34.35	10.00
49.	Z-19 (14-11B)	44.31 (41.73) HS	0.00 (0.00)MR	2.50 (1.73) -LR	13.33 (21.41) - MR	3.33	16.5	16.95	11.50
50.	PI 204336	60.41 (51.01) HS	0.00 (0.00)MR	2.17 (1.63) -LR	20.00 (26.49) - MR	5.00	22.5	17.27	8.00

Table 3.18: ENT. 5c. Evaluation of germplasm lines at hot spots for resistance against major insect-pests (Imphal).

Sl. No.	Entries		No. of webber larvae /m	No. of other defoliating larvae*/mrl(*(tobacco caterpillar, hairy caterpillars etc.)	Percent defoliation at peak incidence/plant	No. of aphids/plant	Yield per line (kg)
1	Code 1	JSM 232	3.80	1.50	25.56 MS	8.00	0.120
2	Code 2	G-03508	**Did not germinate**				
3	Code 3	JSM 195	3.20	1.75	26.25 MS	11.33	0.120
4	Code 4	JSM 285	2.20	1.50	25.00 MS	9.33	0.100
5	Code 5	MACS 303	2.80	2.00	20.00 LS	8.67	0.128
6	Code 6	JS 20-86	2.80	2.00	24.29 LS	10.00	0.100
7	Code 7	TGX 849-81	4.20	1.25	25.00 MS	5.67	0.105
8	Code 8	WT-88	2.20	2.00	20.00 LS	8.67	0.050
9	Code 9	UPSL-77	**1.00**	**0.50**	**15.00 LS**	7.33	**0.180**
10	Code 10	RKS 54	**Missing from the postal packe**				
11	Code 11	TGX 293-41E	3.20	2.25	23.33 LS	12.33	0.100
12	Code 12	EC 391181	2.00	2.00	21.67 LS	10.67	0.150
13	Code 13	JSM 245	2.40	1.75	22.17 LS	6.33	0.070
14	Code 14	SL 525	2.60	2.50	28.18 MS	9.33	0.080
15	Code 15	F4P20	2.60	2.75	23.33 LS	13.00	0.090

16	Code 16	KDS 256	**Did not germinate**				
17	Code 17	GP 434	3.40	2.50	26.84 MS	6.00	0.105
18	Code 18	EC 39573	**Did not germinate**				
19	Code 19	SL 738	3.20	2.25	22.00 LS	6.33	0.055
20	Code 20	EC 172576	2.20	1.75	20.91 LS	10.33	0.045
21	Code 21	EC 457198	3.80	1.25	23.33 LS	10.33	0.125
22	Code 22	UGM 75	3.80	3.50	25.00 MS	11.33	0.160
23	Code 23	EC 39503	**Did not germinate**				
24	Code 24	UGM 77	3.60	2.00	20.00 LS	8.00	0.125
25	Code 25	MACS 7102	**Did not germinate**				
26	Code 26	EC 14117	4.40	2.75	24.12 LS	12.00	0.086
27	Code 27	EC 381884	3.80	2.50	18.00 LS	10.67	0.195
28	Code 28	VLS 11	4.00	1.50	15.00 LS	8.67	0.085
29	Code 29	Harder	2.60	1.75	16.67 LS	5.33	0.145
30	Code 30	JSM 242	3.20	1.75	25.00 MS	10.33	0.100
31	Code 31	EC 241780	3.40	2.00	16.67 LS	6.67	0.225
32	Code 32	EC 457074	3.20	2.50	16.67 LS	10.67	0.125
33	Code 33	EC 241302	3.40	2.25	17.37 LS	9.00	0.105
34	Code 34	SL(E) 1	2.80	2.25	18.33 LS	9.00	0.185

35	Code 35	JSM 227	4.00	2.50	20.00 LS	6.00	0.105
36	Code 36	EC 377883 B	2.80	2.50	18.42 LS	6.00	0.125
37	Code 37	PK 122	3.20	1.75	17.78 LS	8.67	0.105
38	Code 38	EC 457214	2.80	2.00	15.33 LS	10.67	0.125
39	Code 39	EC 350664	3.60	2.25	26.00 MS	12.00	0.055
40	Code 40	MACS 171	2.40	1.75	23.33 LS	10.00	0.185
41	Code 41	JSM 222	3.60	2.25	23.33 LS	9.67	0.100
42	Code 42	PK 431337	1.20	0.75	18.00 LS	8.67	0.160
43	Code 43	SL 2951	1.40	0.75	18.00 LS	4.67	0.160
44	Code 44	PK 25	1.20	1.00	17.27 LS	5.33	0.200
45	Code 45	Z-22 (20-14C)	2.60	2.50	27.14 MS	11.33	0.070
46	Code 46	Z-17 (23-10B)	**Missing from the postal packet**				
47	Code 47	Z-23 (23-16C)	4.00	2.50	26.00 MS	11.67	0.135
48	Code 48	Z-9 (20-40B)	3.00	2.75	20.00 LS	11.00	0.125
49	Code 49	Z-19 (14-11B)	3.40	1.75	24.55 LS	12.33	0.085
50	Code 50	PI 204336	4.80	3.00	21.43 LS	8.67	0.100

LS: Least Susceptible, MS: Moderately susceptible

Table 3.19: ENT. 5d. Incidence of whitefly, *Bemisia tabaci* in soybean germplasm lines (PAU, Ludhiana)

S. No.	Entry	#**Mean whitefly adults /trifoliate leaf	Yield (kg/ha)
1	**JSM 232**	**1.66 (1.63)**	**555.5**
2	G 03508	No Germination	No Germination
3*	JSM 95	-	-
4	JSM 285	2.99 (1.99)	388.8
5	**MACS 303**	**1.49 (1.58)**	**1111.1**
6	**JS 20-86**	3.66 (2.16)	**2222.3**
7	**TG x 849-81**	**0.83 (1.35)**	-
8*	WT 88	-	-
9	UPSL 77	3.99 (2.23)	1388.9
10	RKS 54	4.66 (2.37)	444.4
11	**TG x 293-41E**	**1.66 (1.63)**	**1666.7**
12*	EC 391181	4.83 (2.41)	-
13*	JSM 245	-	-
14	SL 525	3.99 (2.23)	1388.8
15	F4 PLO	7.33 (2.88)	555.5
16*	KDS 256	7.49 (2.89)	-
17	GPU 34	10.83 (3.44)	194.5
18*	EC 39573	9.49 (3.23)	-
19	**SL 738**	**1.66 (1.63)**	**1666.7**
20	EC 172576	2.83 (1.95)	222.2
21	FC 457198	1.99 (1.73)	666.7
22	UGM 75	2.99 (1.99)	555.5
23	EC 39503	No Germination	No Germination
24	UGM 77	2.66 (1.91)	277.8
25*	MACS 7102	3.99 (2.23)	-
26*	EC 14117	3.50 (2.12)	-
27	**EC 381884**	4.49 (2.34)	**2777.8**
28	VLS 11	5.50 (2.55)	833.3

29*	Harder	3.66 (2.16)	-
30*	JSM 242	1.83 (1.68	-
31	EC 241780	No Germination	No Germination
32	EC 457074	1.99 (1.73)	222.2
33	EC 241302	2.66 (1.91)	388.9
34	SL (E) 1	1.83 (1.67)	111.1
35	JSM 227	4.33 (2.30)	444.4
36	EC 377883	4.99 (2.44)	222.3
37	PK 122	4.66 (2.37)	833.3
38*	EC 457214	2.16 (1.78)	-
39*	EC350664	2.33 (1.82)	-
40	**MACS 171**	**1.49 (1.55)**	**555.5**
41	**JSM 222**	**1.66 (1.63)**	**277.8**
42	PK 431337	4.83 (2.41)	444.4
43	SL 2951	4.83 (2.41)	333.3
44*	PK 25	2.99 (1.99)	-
45	**Z- 22 (20-146)**	**1.16 (1.47)**	**555.6**
46*	Z- 17(23-10 B)	-	-
47*	Z- 23 (23-16 C)	4.33 (2.30)	-
48	Z- 9 (20-40 B)	5.16 (2.48)	222.2
49*	Z-19 (14-11 B)	4.16 (2.27)	-
50	PI 204336	3.50 (2.12)	305.6
CD at 5%		**(0.34)**	**264**

Table 3.20: ENT. 6a. Integrated management of root rot complex and stem borers of soybean (Dharwad)

Tr.	Treatment details	Formul a-tions	Dosage (g/ml/ kg seed)	% field stand*	% Root rot incidence*	% Stem tunneling*	% Girdling*	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed wt (g)	Seed yield (kg/ha)
T_1	Seed treatment (ST) with Carboxin + Thiram	75% WP	3	93.82 (75.57)	7.50 (15.82)	18.01 (25.10)	28.01 (31.94)	46.02	5.60	64.50	13.35	1550.66
T_2	ST with Trifloxystrobin + Penflufen	240 FS	1	98.76 (83.56)	2.15 (8.75)	15.47 (23.15)	25.86 (30.55)	48.80	5.88	66.70	13.65	1625.46
T_3	ST with Thiophanate methyl + Pyroclostrobin	500 FS	2	96.29 (78.86)	3.75 (11.09)	15.01 (22.79)	23.78 (29.17)	48.40	5.85	66.50	13.80	1610.08
T_4	ST with *Trichoderma harzianum*	-	10	90.11 (71.65)	10.50 (18.32)	20.16 (26.67)	32.69 (34.86)	46.75	5.15	62.10	12.90	1510.33
T_5	ST with Thiamethoxam	600 FS	2	88.88 (70.49)	12.50 (20.64)	8.37 (16.81)	13.52 (21.56)	45.75	5.25	64.30	13.10	1540.66
T_6	T1 + T5	-	3+2	94.25 (76.09)	6.75 (14.95)	10.48 (18.88)	17.02 (24.36)	46.84	5.91	64.90	14.10	1650.25
T_7	T2 + T5	-	1+2	99.99 (89.39)	1.10 (6.64)	5.75 (13.87)	6.97 (15.30)	48.98	5.99	66.95	14.20	1710.25
T_8	T3 + T5	-	2+2	97.65 (80.56)	3.25 (10.32)	6.27 (14.50)	7.89 (16.31)	48.75	5.92	67.05	14.85	1690.32
T_9	T4 + T5	-	10+2	92.45 (73.68)	8.50 (16.54)	12.07 (20.32)	12.17 (20.41)	46.25	5.75	58.45	13.64	1580.32
T_{10}	ST with biopolymer chitosan based *Trichoderma* formulation (IIOR)	SC	4	92.50 (74.17)	8.55 (16.85)	13.25 (21.34)	21.13 (27.36)	46.80	5.50	62.45	13.10	1550.21
T_{11}	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR)	SC	10	93.50 (75.45)	7.50 (15.85)	11.18 (19.53)	19.67 (26.32)	46.90	5.52	62.58	13.25	1560.25
T_{12}	ST with biopolymer chitosan based Trichoderma formulation (IIOR) + Thiamethoxam		2+10	94.00 (76.10)	6.00 (14.20)	9.15 (17.60)	14.07 (22.02)	47.25	5.60	64.25	13.30	1585.25
T_{13}	Untreated control	-	-	81.25 (64.48)	22.22 (28.11)	25.47 (30.30)	39.16 (38.72)	42.35	5.15	53.20	12.10	1325.25
	S.Em±	-	-	1.78	0.95	0.81	0.91	0.56	0.32	0.65	0.18	56.28
	CD @ 5%	-	-	3.98	2.88	2.44	2.75	1.65	1.21	1.85	0.56	192.36

Table 3.21: ENT 7a: Effect of microbial consortia on population of tobacco leaf eating caterpillar/mrl in soybean

		Imphal									Amravati						
Treatments		1st spray			2nd spray			3rdspray			1st spray				2nd spray		
		PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	Treatments	PT	3DAT	7DAT	PT	3DAT	7DAT
T1	*Beauveriabassiana* (2 kg/ha) + *Metarhiziumanisopliae*(2 kg/ha)	1.22 (1.31)	0.89 (1.17)	0.78 (1.12)	0.67 (1.07)	0.67 (1.07)	0.44 (1.12)	0.56 (1.02)	0.33 (0.91)	0.22 (0.84)	*Beauveria bassiana* @ 4g/l	1.58 (1.25)	1.25 (1.11)	1.08 (1.04)	1.92 (1.37)	1.34 (1.14)	1.92 (1.38)
T2	*Nomuraearileyi*(2 kg/ha) + Bt(1 kg/ha)	1.00 (1.21)	0.78 (1.12)	0.56 (1.02)	0.67 (1.07)	0.60 (1.07)	0.22 (1.02)	0.11 (0.78)	0.00 (0.71)	0.00 (0.71)	*Metarhizium anisopliae* @ 4g/l	1.42 (1.14)	1.50 (1.22)	1.50 (1.20)	2.00 (1.40)	2.33 (1.53)	2.00 (1.40)
T3*	*Nomuraearileyi*(2 kg/ha) + *Metarhiziumanisopliae*(2 kg/ha)	0.89 (1.13)	0.89 (1.15)	0.70 (1.07)	1.00 (1.22)	0.78 (1.12)	0.67 (1.07)	0.56 (1.02)	0.50 (1.00)	0.28 (0.87)	*Nomuraea rileyi* @ 4g/l	2.08 (1.44)	1.25 (1.10)	0.92 (0.95)	2.25 (1.49)	1.25 (1.10)	1.17 (1.07)
T4	*Beauveriabassiana* (2 kg/ha) + *Nomuraearileyi*(2 kg/ha)	1.00 (1.22)	1.11 (1.27)	0.67 (1.06)	0.78 (1.12)	0.67 (1.07)	0.56 1.06 ()	0.44 (0.97)	0.44 (0.97)	0.33 (0.90)	Bt Commercial @ 1g/l	2.08 (1.43)	1.42 (1.19)	1.33 (1.15)	2.08 (1.44)	1.57 (1.24)	2.00 (1.39)
T5	*Beauveriabassiana* (2 kg/ha) + Bt(1 kg/ha)	1.00 (1.22)	0.56 (1.02)	0.33 (0.91)	0.44 (0.97)	0.30 (0.97)	0.22 (0.91)	0.28 (0.87)	0.22 (0.84)	0.11 (0.78)	Untreated check	1.50 (1.22)	2.33 (1.53)	2.67 (1.63)	2.83 (1.68)	2.92 (1.70)	3.25 (1.80)
T6	*Metarhiziumanisopliae*(2 kg/ha) + Bt(1 kg/ha)	0.89 (1.18)	0.48 (0.97)	0.44 (0.97)	0.56 (1.02)	0.22 (0.84)	0.22 (0.97)	0.39 (0.93)	0.28 (0.87)	0.17 (0.80)	-	-	-	-	-	-	-
T7	Untreated control	1.56 (1.43)	1.78 (1.50)	2.33 (1.68)	1.22 (1.31)	1.44 (1.39)	1.67 (1.68)	1.00 (1.22)	0.89 (1.18)	0.33 (0.90)	-	-	-	-	-		
	CD at 5%	NS	0.27	0.26	NS	0.28	0.26	0.22	0.11	0.21	CD at 5%-	-	0.19	0.23	-	0.28	0.30

Table 3.22: ENT 7b: Effect of microbial consortia on population of defoliators in soybean at Imphal.

Treatments		Bihar hairy caterpillar/m									Bean leaf webber/m								
		1st spray			2nd spray			3rdspray			1st spray			2nd spray			3rdspray		
		PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT
T1	*Beauveriabassiana* (2 kg/ha) + *Metarhiziumanisopliae*(2 kg/ha)	58.33 (7.64)	37.33 (6.04)	13.56 (3.59)	19.33 (4.42)	15.44 (3.93)	3.33 (1.79)	0.00 (0.71)	0.00	0.00	3.89 (2.09)	3.56 (1.99)	2.89 (1.81)	3.00 (2.09)	2.78 (1.77)	2.67 (1.75)	1.67 (1.44)	0.89 (1.17)	0.67 (1.05)
T2	*Nomuraearileyi*(2 kg/ha) + Bt(1 kg/ha)	58.89 (7.69)	40.67 (6.42)	2.22 (1.36)	4.67 (2.02)	4.00 (1.91)	2.00 (1.44)	0.00 (0.71)	0.00	0.00	4.22 (2.16)	3.44 (1.97)	1.56 (1.37)	2.11 (2.16)	1.89 (1.46)	1.56 (1.37)	0.67 (1.08)	0.67 (1.08)	0.56 (0.99)
T3	*Nomuraearileyi*(2 kg/ha) + *Metarhiziumanisopliae*(2 kg/ha)	47.78 (6.89)	40.00 (6.36)	11.56 (3.44)	6.22 (2.30)	8.89 (3.03)	2.22 (1.54)	0.00 (0.71)	0.00	0.00	4.00 (2.12)	3.11 (1.89)	2.00 (1.57)	2.22 (2.12)	2.00 (1.56)	1.78 (1.50)	1.33 (1.35)	0.67 (1.08)	0.89 (1.17)
T4	*Beauveriabassiana* (2 kg/ha) + *Nomuraearileyi*(2 kg/ha)	48.89 (6.98)	44.44 (6.70)	14.44 (3.81)	10.67 (2.89)	7.78 (2.88)	4.00 (2.12)	0.00 (0.71)	0.00	0.00	3.89 (2.09)	3.22 (1.91)	2.22 (1.64)	2.78 (2.09)	2.67 (1.76)	2.22 (1.64)	1.44 (1.39)	0.78 (1.13)	0.44 (0.95)
T5	*Beauveriabassiana* (2 kg/ha) + Bt(1 kg/ha)	41.11 (6.43)	45.33 (6.75)	3.56 (1.84)	9.11 (2.98)	6.67 (2.62)	0.44 (0.92)	0.00 (0.71)	0.00	0.00	4.11 (2.15)	3.22 (1.92)	1.33 (1.31)	1.67 (2.15)	1.44 (1.32)	1.33 ()1.31	0.56 (1.02)	0.33 (0.91)	0.33 (0.90)
T6	*Metarhiziumanisopliae*(2 kg/ha) + Bt(1 kg/ha)	44.44 (6.61)	43.11 (6.60)	9.11 (2.74)	12.89 (3.20)	8.67 (3.02)	6.00 (2.54)	0.00 (0.71)	0.00	0.00	3.89 (2.09)	3.56 (2.01)	1.89 (1.54)	2.33 (2.09)	2.11 (1.60)	1.89 (1.54)	1.00 (1.22)	0.56 (1.02)	0.78 (1.12)
T7	Untreated control	75.56 (8.70)	45.56 (6.78)	43.78 (6.65)	44.44 (6.69)	25.11 (4.96)	13.11 (3.57)	0.44 (0.92)	0.00	0.00	5.00 (2.33)	5.22 (2.39)	5.56 (2.45)	4.89 (2.33)	5.22 (2.39)	4.89 (2.31)	2.56 (1.69)	2.33 (1.68)	0.89 (1.18)
CD @ 5%		NS	NS	2.02	2.62	1.49	1.34	NS	-	-	NS	0.26	0.53	NS	0.44	0.58	0.48	0.15	NS

Figures in parentheses are square root (x + 0.5) values

Table 3.23: ENT 7c: Effect of microbial consortia on defoliators population on soybean at Prabhani.

T.N.	Treatment details	Semiloopers						Tobacco caterpillar						Yield kg/ha
		1st Spray			2nd Spray			1st Spray			2nd Spray			
		DBT	3 DAT	7 DAT	DBT	3 DAT	7 DAT	DBT	3 DAT	7 DAT	DBT	3 DAT	7 DAT	
1	*B.bassiana* + *M.anisopliae*	6.67 (2.66)	6.11 (2.56)	3.44 (1.97)	2.67 (1.77)	1.56 (1.43)	0.89 (1.17)	1.22 (1.38)	1.11 (1.26)	0.44 (0.96)	0.33 (0.91)	0.11 (0.77)	0.00 (0.70)	1280.89
2	*N.rileyi* + Bt.	7.89 (2.89)	6.33 (2.61)	3.89 (2.09)	2.89 (1.83)	1.78 (1.50)	1.11 (1.26)	1.44 (1.43)	1.33 (1.35)	0.56 (1.02)	0.44 (0.96)	0.33 (0.91)	0.11 (0.77)	1205.62
3	*N.rileyi* + *M.anisopliae*	7.44 (2.81)	6.44 (2.63)	3.67 (2.03)	2.78 (1.80)	1.67 (1.46)	1.00 (1.21)	1.56 (1.35)	1.22 (1.31)	0.33 (0.91)	0.22 (0.84)	0.00 (0.70)	0.00 (0.70)	1275.13
4	*B.bassiana* + *N.rileyi*	7.67 (2.85)	5.22 (2.39)	2.33 (1.68)	1.67 (1.47)	0.56 (1.02)	0.11 (0.77)	1.33 (1.39)	1.00 (1.21)	0.22 (0.84)	0.11 (0.77)	0.00 (0.70)	0.00 (0.70)	1370.56
5	*B.bassiana* + Bt.	7.33 (2.79)	6.67 (2.67)	4.22 (2.16)	3.00 (1.86)	1.89 (1.54)	1.22 (1.30)	1.44 (1.46)	1.22 (1.31)	0.67 (1.08)	0.56 (1.02)	0.33 (0.91)	0.22 (0.84)	1137.75
6	*M.anisopliae* + Bt.	7.11 (2.75)	6.78 (2.69)	4.00 (2.12)	3.11 (1.89)	2.00 (1.57)	1.33 (1.35)	1.67 (1.35)	1.44 (1.39)	0.78 (1.12)	0.67 (1.08)	0.44 (0.96)	0.33 (0.91)	1110.19
7	Control	7.22 (2.77)	10.11 (3.25)	7.22 (2.77)	5.67 (2.48)	3.89 (2.09)	1.89 (1.54)	1.33 (0.06)	1.56 (1.43)	1.11 (1.26)	1.00 (1.22)	0.78 (1.12)	0.67 (1.08)	965.81
	S.E. ±	0.11	0.06	0.09	0.05	0.06	0.06	0.07	0.06	0.05	0.05	0.04	0.04	63.18
	C.D. at 5%	N.S.	0.19	0.28	0.17	0.20	0.20	N.S.	N.S.	0.14	0.15	0.11	0.12	194.40

Table 3.24: ENT 7d: Effect of microbial consortia on defoliators population on soybean at Dharwad

Tr.	Treatment details	Tobacco caterpillar - *Spodoptera litura* (No. of larvae/mrl)								
		1st spray			2nd spray			3rd spray		
		1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT
T_1	*Beauveria bassiana* (2kg/ha) +*Metarhizium anisopliae* (2kg/ha)	5.04 (2.35)	4.20 (2.17)	2.15 (1.63)	4.89 (2.32)	3.25 (1.94)	1.49 (1.41)	4.23 (2.17)	2.89 (1.84)	1.02 (1.23)
T_2	*Nomuraea rileyi* (2kg/ha) and *Bacillus thuringiensis* (Bt) (1 kg/ha)	5.10 (2.37)	3.92 (2.10)	1.37 (1.37)	4.78 (2.30)	2.77 (1.81)	0.92 (1.19)	4.30 (2.19)	2.23 (1.65)	0.54 (1.02)
T_3	*Nomuraea rileyi* (2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	5.08 (2.36)	4.01 (2.12)	1.89 (1.55)	4.84 (2.31)	3.01 (1.87)	1.22 (1.31)	4.28 (2.19)	2.54 (1.74)	0.79 (1.14)
T_4	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi* (2kg/ha)	5.12 (2.37)	3.89 (2.10)	1.25 (1.32)	4.91 (2.33)	2.59 (1.76)	0.79 (1.14)	4.19 (2.17)	2.05 (1.60)	0.23 (0.85)
T_5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	5.07 (2.36)	4.11 (2.15)	2.07 (1.60)	4.82 (2.31)	3.51 (2.00)	1.77 (1.51)	4.22 (2.17)	3.01 (1.87)	1.57 (1.44)
T_6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	5.11 (2.37)	4.35 (2.20)	2.60 (1.76)	4.85 (2.31)	3.79 (2.07)	2.05 (1.60)	4.25 (2.18)	3.23 (1.93)	1.89 (1.55)
T_7	Untreated control	5.06 (2.36)	6.78 (2.70)	9.57 (3.17)	4.93 (2.33)	5.76 (2.50)	7.78 (2.88)	4.32 (2.20)	5.89 (2.53)	8.04 (2.92)
	S.Em±	0.37	0.29	0.24	0.35	0.28	0.21	0.30	0.24	0.19
	CD @ 5%	NS	0.88	0.74	NS	0.85	0.65	NS	0.73	0.58

* Figures in the parenthesis are transformed √ x+ 0.5 values DBT: Days before treatment; DAT: Days after treatment

Table 3.25: ENT 7e: Effect of microbial consortia on defoliators population on soybean at Dharwad

Tr.	Treatment details	Semilooper - *Thysanoplusia orichalcea* (No. of larvae/mrl)								
		1st spray			2nd spray			3rd spray		
		1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT
T_1	*Beauveria bassiana* (2kg/ha) +*Metarhizium anisopliae* (2kg/ha)	3.02 (1.88)	2.12 (1.62)	1.10 (1.26)	2.57 (1.75)	1.70 (1.48)	1.05 (1.24)	2.39 (1.70)	1.38 (1.37)	0.75 (1.12)
T_2	*Nomuraea rileyi* (2kg/ha) and *Bacillus thuringiensis* (Bt) (1 kg/ha)	2.92 (1.85)	1.77 (1.51)	0.85 (1.16)	2.66 (1.78)	1.35 (1.36)	0.89 (1.18)	2.40 (1.70)	1.12 (1.27)	0.59 (1.04)
T_3	*Nomuraea rileyi* (2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	2.86 (1.83)	1.89 (1.55)	0.97 (1.21)	2.55 (1.75)	1.49 (1.41)	0.75 (1.12)	2.41 (1.71)	1.25 (1.32)	0.72 (1.10)
T_4	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi* (2kg/ha)	2.88 (1.84)	1.69 (1.48)	0.70 (1.10)	2.72 (1.79)	1.27 (1.33)	0.56 (1.03)	2.37 (1.69)	1.05 (1.24)	0.34 (0.92)
T_5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	2.95 (1.86)	2.19 (1.64)	1.25 (1.32)	2.59 (1.76)	1.85 (1.53)	1.23 (1.32)	2.42 (1.71)	1.65 (1.47)	1.12 (1.27)
T_6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	3.01 (1.87)	2.35 (1.69)	1.32 (1.35)	2.60 (1.76)	1.97 (1.57)	1.39 (1.37)	2.45 (1.72)	1.82 (1.52)	1.25 (1.32)
T_7	Untreated control	3.03 (1.88)	4.35 (2.20)	5.16 (2.38)	2.56 (1.75)	3.57 (2.02)	4.79 (2.30)	2.35 (1.69)	3.57 (2.02)	4.32 (2.20)
	S.Em±	0.30	0.27	0.22	0.29	0.24	0.19	0.27	0.22	0.17
	CD @ 5%	NS	0.82	0.68	NS	0.73	0.59	NS	0.69	0.51

* Figures in the parenthesis are transformed $\sqrt{x+0.5}$ values DBT: Days before treatment; DAT: Days after treatment

Table 3.26: ENT 7f: Effect of microbial consortia on defoliators population on soybean at Dharwad

Tr.	Treatment details	Bihar hairy caterpillar- *Spilosoma obliqua* (No. of larvae/mrl)									Leaf damage (% defoliation)*	Seed Yield (kg/ha)
		1st spray			2nd spray			3rd spray				
		1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT		
T_1	*Beauveria bassiana* (2kg/ha) +*Metarhizium anisopliae* (2kg/ha)	4.13 (2.15)	3.62 (2.03)	1.57 (1.44)	3.91 (2.10)	2.78 (1.81)	1.05 (1.24)	2.15 (1.63)	1.83 (1.53)	0.95 (1.20)	22.27 (28.15)	2370
T_2	*Nomuraea rileyi* (2kg/ha) and *Bacillus thuringiensis* (Bt) (1 kg/ha)	4.10 (2.14)	3.49 (2.00)	1.17 (1.29)	3.85 (2.09)	2.29 (1.67)	0.74 (1.11)	2.11 (1.62)	1.59 (1.45)	0.39 (0.94)	15.13 (22.88)	2589
T_3	*Nomuraea rileyi* (2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	4.15 (2.16)	3.56 (2.01)	1.38 (1.37)	3.88 (2.09)	2.45 (1.72)	0.93 (1.20)	2.08 (1.61)	1.67 (1.47)	0.61 (1.05)	19.45 (26.16)	2493
T_4	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi* (2kg/ha)	4.12 (2.15)	3.36 (1.96)	1.09 (1.26)	3.94 (2.11)	2.18 (1.64)	0.56 (1.03)	2.09 (1.61)	1.34 (1.36)	0.22 (0.85)	10.86 (19.23)	2715
T_5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	4.17 (2.16)	3.87 (2.09)	1.85 (1.53)	3.90 (2.10)	2.92 (1.85)	1.27 (1.33)	2.05 (1.60)	1.89 (1.55)	1.07 (1.25)	24.97 (29.97)	2074
T_6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	4.11 (2.15)	3.92 (2.10)	1.92 (1.56)	3.89 (2.10)	2.89 (1.84)	1.35 (1.36)	2.12 (1.62)	1.91 (1.55)	1.13 (1.28)	25.14 (30.08)	2057
T_7	Untreated control	4.16 (2.16)	5.78 (2.51)	7.89 (2.90)	3.97 (2.11)	4.97 (2.34)	6.57 (2.66)	2.23 (1.65)	3.91 (2.10)	5.11 (2.37)	**40.17 (39.32)**	**1261**
	S.Em±	0.32	0.28	0.23	0.27	0.22	0.19	0.25	0.17	0.15	0.92	33.3
	CD @ 5%	NS	0.85	0.71	NS	0.67	0.59	NS	0.53	0.46	2.77	101.5

* Figures in the parenthesis are transformed √ x+ 0.5 values DBT: Days before treatment; DAT: Days after treatment

Table 3.27: ENT 7g: Effect of microbial consortia on defoliators population on soybean at Kota

S.No.	Treatments	Infestation of defoliators/m row length				Seed yield (kg/ha)
		1st spray (40 DAG)		2nd spray (55 DAG)		
		3 DAT	7 DAT	3 DAT	7 DAT	
1	*Beauveria bassiana* (2 kg/ha) + *Metarhizium anisopliae* (2 kg/ha)	2.33 (1.68)	1.44 (1.39)	1.67 (1.46)	1.44 (1.39)	1519
2	*Nomuraea rileyi* (2 kg/ha) + *Bacillus thuringiensis* (Bt) (1 kg/ha)	2.00 (1.58)	1.33 (1.35)	1.44 (1.39)	1.33 (1.35)	1603
3	*Nomuraea rileyi* (2 kg/ha) + *Metarhizium anisopliae* (2 kg/ha)	2.67 (1.77)	2.00 (1.57)	2.56 (1.75)	2.11 (1.61)	1429
4	*Beauveria bassiana* (2 kg/ha) + *Nomuraea rileyi* (2 kg/ha)	2.33 (1.68)	1.56 (1.43)	2.22 (1.64)	2.00 (1.58)	1503
5	*Beauveria bassiana* (2 kg/ha) + *Bacillus thuringiensis* (Bt) (1 kg/ha)	1.89 (1.55)	1.22 (1.31)	1.33 (1.35)	1.22 (1.31)	1709
6	*Metarhizium anisopliae* (2 kg/ha) + *Bacillus thuringiensis* (Bt) (1 kg/ha)	1.78 (1.51)	1.11 (1.27)	1.11 (1.27)	1.00 (1.22)	1751
7	Untreated control	3.33 (1.96)	3.34 (1.95)	3.56 (2.04)	3.78 (2.07)	1302
	SEm±	0.07	0.08	0.10	0.06	69.20
	CD (P=0.05)	0.23	0.24	0.29	0.19	213.20

Table 3.28: ENT 7h : Effect of microbial consortia on defoliators population on soybean at Sehore

S. No.	Treatment	Population of grey semilooper , *Gesonia gemma* / mrl (Ist Spray)/ mrl				Population of grey semiloopers / mrl (IInd Spray)				Yield (Kg/ha)
		Before treatment	3 DAT	7 DAT	Mean	Before treatment	3 DAT	7 DAT	Mean	
1.	*Beauveria bassiana (2kg/ha) +Metarhizium anisopliae* (2kg/ha)	5.00 (2.34)	2.55 (1.73)	1.66 (1.39)	2.10 (1.56)	4.77 (2.21)	3.33 (1.96)	2.43 (1.71)	2.90 (1.83)	1290.70
2.	*Nomuraea rileyi* (2kg/ha) and *Bacillu thuringiensis* (Bt) (1 kg/ha)	5.11 (2.36)	2.00 (1.59)	1.00 (1.22)	1.50 (1.43)	3.77 (1.97)	1.67 (1.46)	0.99 (1.22)	1.33 (1.34)	1516.65
3.	*Nomuraea rileyi* (2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	4.00 (2.09)	2.33 (1.63)	1.33 (1.32)	1.83 (1.32)	3.89 (2.07)	1.89 (1.56)	0.78 (1.11)	1.35 (.1.33)	1502. 70
4.	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi* (2kg/ha.)	3.77 (2.05)	2.99 (1.90)	2..66 (1.80)	2.82 (1.85)	4.00 (2.15)	2.33 (1.68)	1.66 (1.26)	1.99 (1.47)	1276.38
5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis (*Bt) (1 kg/ha)	3.33 (1.96)	2.44 (1.64)	1.41 (1.38)	1.90 (1.24)	3.33 (1.96)	1.99 (1.47)	0.99 (1.22)	1.49 (1.34)	1455.54
6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	4.55 (2.22)	2.89 (1.83)	2.33 (1.68)	2.61 (1.75)	3.78 (2.04)	2.44 (1.70)	1.33 (1.36)	1.88 (1.53)	1133.00
7	Untreated check	4.22 (2.15)	6.22 (2.59)	5.00 (2.33)	5.61 (2.46)	4.78 (2.29)	6.00 (2.54)	3.69 (2.04)	4.84 (2.29)	1044.43
	SEm+	(0.15)	(0.24)	(0.25)		(0.23)	(0.13)	(0.18)	(0.18)	69.44
	CD at 5 %	NS	(0.72)	(0.76)		NS	(0.41)	(0.56)	(0.56)	208.33

Figures in parenthesis are V x+0.5 transformed values DAT = Days after Treatment

Table 3.29: ENT 7i : Effect of microbial consortia on defoliators population on soybean at Sehore

S. No.	Treatment	Population of grey semilooper, *Chrysodexis acuta* / mrl (Ist Spray) / mrl				Population of grey semiloopers / mrl (IInd Spray)			Mean
		Before treatment	3 DAT	7 DAT	Mean	Before treatment	3 DAT	7 DAT	
1.	*Beauveria bassiana (2kg/ha) +Metarhizium anisopliae* (2kg/ha)	3.88 (2.08)	2.33 (1.68)	1.89 (1.56)	2.11 (1.62)	4.11 (2.14)	3.00 (1.87)	2.88 (1. 83)	2.94 (1.85)
2.	*Nomuraea rileyi* (2kg/ha) and *Bacillu thuringiensis* (Bt)(1 kg/ha)	4.22 (2.23)	1.89 (1.56)	1.67 (1.46)	1.77 (1.51)	5.88 (2.49)	2.33 (1.68)	0.92 (1.19)	1.62 (1.43)
3.	*Nomuraea rileyi* (2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	5.11 (2.40)	2.44 (1.70)	1.66 (1.26)	2.05 (1.48)	5.55 (2.43)	3.33 (1.96)	0.99 (1.11)	2.16 (1.43)
4.	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi* (2kg/ha.)	4.77 (2.26)	3.33 (1.96)	2.99 (1.86	3.16 (1.91)	4.77 (2,28)	2.88 (1. 83)	1.99 (1.47)	2.43 (1.65)
5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis (*Bt) (1 kg/ha)	4.33 (2.12)	2.33 (1.68)	1.55 (1.42)	1.94 (1.55)	5.33 (2.40)	2.55 (1.73)	1.66 (1. 45)	2.10 (1.59)
6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	4.55 (2.19)	3.33 (1.96)	2.44 (1.70)	2.88 (1.83)	4.99 (2.33)	3.66 (2.68	1.89 (1.51)	2.77 (2.09)
7.	Untreated check	4.99 (2.32)	4.58 (2.24)	6.00 (2.54)	5.29 (2.39)	5.77 (2.49)	6.00 (2.54)	4.84 (2.29)	5.42 (2.41)
	SEm+	(0.19)	(0.14)	(0.23		(0.08)	(0.13)	(0.18)	---
	CD at 5 %	(NS)	(0.42)	(0.61)	---	NS	(0.41)	(0.56)	---

Table 3.30: ENT 7j : Effect of microbial consortia on defoliators population on soybean at Pantnagar

Incidence of tobacco caterpillar in different treatments

Treatments	Spray I			Spray II			Spray III			% Defoliation	Yield (Kg/ha)
	Population mean/m row			Population mean /m row			Population mean/m row				
	1 DBT	3 DAT	7DAT	1 DBT	3DAT	7DAT	1 DBT	3DBT	7DBT		
T1: Beauveria bassiana (2kg/ha)+ Metarhizium anisopliae (2kg/ha)	0.00	0.00	0.00	1.93 (1.54)	1.33 (1.35)	1.13 (1.28)	1.33 (1.34)	1.23 (1.32)	0.93 (1.20)	18	1897
T2: Nomuraea rileyi (2kg/ha) and Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	1.07 (1.24)	0.69 (1.09)	0.70 (1.09)	1.13 (1.24)	0.75 (1.12)	0.68 (1.08)	20	1870.5
T3: Nomuraea rileyi (2kg/ha)+ Metarhizium anisopliae (2kg/ha)	0.00	0.00	0.00	1.40 (1.36)	0.67 (1.07)	0.66 (1.08)	1.33 (0.90)	0.73 (1.11)	0.65 (1.07)	15	1995
T4: Beauveria bassiana (2kg/ha)+ Nomuraea rileyi (2kg/ha)	0.00	0.00	0.00	1.53 (1.42)	1.25 (1.32)	1.22 (1.31)	1.20 (1.21)	1.16 (1.29)	1.14 (1.28)	20	1875.5
T5: Beauveria bassiana (2kg/ha)+ Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	1.13 (1.27)	1.18 (1.30)	1.16 (1.29)	1.27 (1.30)	1.11 (1.27)	1.07 (1.25)	18.5	1945
T6: Metarhizium anisopliae (2kg/ha) + Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	0.87 (1.15)	1.22 (1.31)	1.20 (1.30)	1.60 (1.44)	1.13 (1.28)	1.09 (1.26)	22	1849
T7: Control	0.00	0.00	0.00	1.00 (1.22)	1.63 (1.46)	2.93 (1.76)	1.53 (1.40)	1.70 (1.48)	2.98 (1.87)	25	1764.5
SEM±	-	-	-	0.13	0.06	0.05	0.20	0.05	0.04		
CD 5%	-	-	-	0.34	0.19	0.16	0.59	0.15	0.11		

Table 3.31: ENT 7 k : Effect of microbial consortia on defoliators population on soybean at Pantnagar

Incidence of Bihar hairy caterpillar in different treatments

Treatments	Spray I			Spray II			Spray III		
	Population mean/m row			Population mean /m row			Population mean/m row		
	1 DBT	3 DAT	7DAT	1 DBT	3DAT	7DAT	1 DBT	3DBT	7DBT
T1: Beauveria bassiana (2kg/ha)+ Metarhizium anisopliae (2kg/ha)	0.00	0.00	0.00	0.40 (0.94)	0.40 (0.95)	0.20 (0.84)	0.30 (0.89)	0.27 (0.88)	0.26 (0.87)
T2: Nomuraea rileyi (2kg/ha) and Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	0.27 (0.87)	0.20 (0.84)	0.13 (0.79)	0.35 (0.92)	0.18 (0.82)	0.16 (0.81)
T3: Nomuraea rileyi (2kg/ha)+ Metarhizium anisopliae (2kg/ha)	0.00	0.00	0.00	1.00 (1.22)	0.07 (0.75)	0.00 (0.70)	0.29 (0.89)	0.13 (0.79)	0.13 (0.79)
T4: Beauveria bassiana (2kg/ha)+ Nomuraea rileyi (2kg/ha)	0.00	0.00	0.00	0.55 (1.03)	0.41 (0.95)	0.21 (0.84)	0.27 (0.86)	0.28 (0.88)	0.27 (0.89)
T5: Beauveria bassiana (2kg/ha)+ Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	0.53 (1.01)	0.44 (0.97)	0.23 (0.85)	0.33 (0.89)	0.30 (0.89)	0.29 (0.89)
T6: Metarhizium anisopliae (2kg/ha) + Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	0.69 (1.09)	0.43 (0.96)	0.20 (0.84)	0.30 (0.75)	0.29 (0.89)	0.28 (0.88)
T7: Control	0.00	0.00	0.00	0.40 (0.94)	0.49 (0.99)	0.95 (1.20)	0.40 (0.94)	0.55 (1.02)	1.11 (1.27)
SEM±	-	-	-	0.21	0.06	0.25	0.23	0.23	0.02
CD 5%	-	-	-	0.70	0.18	0.13	0.76	0.08	0.06

Table 3.32: ENT 7 l : Effect of microbial consortia on defoliators population on soybean at Pantnagar

Incidence of Green semilooper in different treatments

Treatments	Spray I			Spray II			Spray III		
	Population mean/m row			Population mean /m row			Population mean/m row		
	1 DBT	3 DAT	7DAT	1 DBT	3DAT	7DAT	1 DBT	3DBT	7DBT
T1: Beauveria bassiana (2kg/ha)+ Metarhizium anisopliae (2kg/ha)	0.00	0.00	0.00	0.53 (1.00)	0.40 (0.95)	0.13 (0.79)	0.57 (1.03)	0.30 (0.89)	0.29 (0.89)
T2: Nomuraea rileyi (2kg/ha) and Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	0.60 (1.04)	0.07 (0.75)	0.07 (0.75)	0.33 (0.91)	0.20 (0.84)	0.20 (0.83)
T3: Nomuraea rileyi (2kg/ha)+ Metarhizium anisopliae (2kg/ha)	0.00	0.00	0.00	0.93 (1.18)	0.00 (0.71)	0.00 (0.71)	0.47 (0.98)	0.13 (0.79)	0.13 (0.78)
T4: Beauveria bassiana (2kg/ha)+ Nomuraea rileyi (2kg/ha)	0.00	0.00	0.00	0.47 (0.97)	0.40 (0.95)	0.13 (0.79)	0.37 (0.93)	0.30 (0.89)	0.29 (0.89)
T5: Beauveria bassiana (2kg/ha)+ Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	0.53 (1.00)	0.45 (0.97)	0.14 (0.80)	0.57 (1.03)	0.35 (0.92)	0.29 (0.89)
T6: Metarhizium anisopliae (2kg/ha) + Bacillus thuringiensis (1kg/ha)	0.00	0.00	0.00	0.53 (1.01)	0.40 (0.95)	0.13 (0.79)	0.38 (0.94)	0.32 (0.91)	0.30 (0.89)
T7: Control	0.00	0.00	0.00	0.33 (0.91)	0.55 (1.02)	0.90 (1.18)	0.39 (0.94)	0.60 (1.05)	1.10 (0.98)
SEM±	-	-	-	0.23	0.07	0.02	0.16	0.03	0.03
CD 5%	-	-	-	0.76	0.22	0.07	0.52	0.09	0.10

पादप रोग विज्ञान
Plant Pathology

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Abbreviations used for soybean diseases

S. No.	Disease	Abbreviation	Pathogen
1.	Charcoal rot	CR	*Macrophomina phaseolina (Rhizoctonia bataticola*)
2.	Collar rot	Coll. R	*Sclerotium rolfsii*
3.A.	Rhizoctonia Root Rot	RRR	*Rhizoctonia solani*
3.B.	Rhizoctonia Aerial Blight	RAB	*Rhizoctonia solani*
4.	Bacterial Pustule	BP	*Xanthomanas campestris* pv. *glycines*
5.	Bacterial Blight	BLB	*Pseudomonas savastanoi* pv. *glycinea*
6.	Fusarium Rot / Wilt	FR /FW	*Fusarium* species
7.	Soybean Mosaic Virus	SMV	*Soja virus I*
8.	Soybean Yellow Mosaic Virus	YMV	*Mungbean yellow mosaic virus*
9.	Bud Proliferation/ No Podding	BPro./NPod.	*Phytoplasma*
9.	Myrothecium Leaf Spot	MLS	*Myrothecium roridum*
10.	Frogeye Leaf Spot	FLS	*Cercospora sojina*
11.A.	Cercospora Leaf Spot/Blight	CLS	*Cercospora kikuchii*
11.B.	Purple Seed Stain	PSS	*Cercospora kikuchii*
12.	Rust	Rust	*Phakopsora pachyrhizi*
13.	Alternaria Leaf Spot	ALS	*Alternaria* species
14.	Brown Spot	BS	*Septoria glycine*
15.	Target Leaf Spot	TLS	*Corynespora cassicola*
16.	Phoma Leaf Blight	PhB	*Phoma medicaginis*
17.	Cotyledon Spot	CS	A number of fungi HRe involved
18.	Indian Bud Blight	IBB	A strain of *Groundnut bud necrosis virus*
29.	Powdery Mildew	PM	*Microsphaera diffusa*
20.	Anthracnose	Anth.	*Colletotrichum truncatum*
21.	Pod And Stem Blight	P&SB	*Diaporthe phaseolorum vHR. sojae*
22.	Wilt Complex	WC	-
23.	Pod Diseases/ Blight	PB PB(Ct) PB(Mr) PB(Mp) PB(Ph) PB(Fus) PB(Cer)	 a.*Colletotrichum truncatum* b. *Myrothecium roridum* c. *Macrophomina phaseolina* d. *Phomopsis* species e. *FusHRium* species f. *Cercospora* species
24	Choanephora Leaf Blight	ChLB	*Choanephora infundibulifera*
25	Red Crown Rot	RCR	*Colonectria* species
26	Helminthosporium Leaf Spot	HLS	*Helminthosporium* species
27	Sudden Death Syndrome	SDS	*FusHRium* species
28	Seed Rot	SR	*Pythium* spp. *Phytophthora* spp.

Table 4.1: PP1 Survey for soybean diseases (diseases scenario at different centers)

S. No.	Location / Disease	Northern Hill Zone		Northern Plain Zone			North Eastern Hill Zone		Central Zone					Southern Zone		No. of Centres (14)
		Palampur	Almora	Ludhiana	Pantnagar	Delhi	Jorhat	Medziphema	Sehore	Kota	Indore	Jabalpur	Amravati	K- Digraj	Dharwad	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	01
1	CR											+	+			2
2	Coll. R						+	+	+			+				4
3	RAB				+		+	+		+	+	+				6
4	Rust							+						+	+	3
5	BS	+										+				2
6	TLS								+						+	2
7	CLS/PSS						+			+		+			+	4
8	FLS	+	+						+			+			+	5
9	ALS									+		+	+		+	4
10	PB(Ct)	+	+		+		+	+	+	+	+	+	+	+	+	12
11	BP	+	+		+					+	+	+	+		+	8
12	BLB				+		+									2
13	YMV	+		+	+	+	+				+	+	+		+	9
14	SMV			+	+		+				+	+				5
15	FR /FW				+		+									2
16	BND					+										1
17	SR						+		+		+					3
18	CMV						+				+					2
Centre-wise no. of diseases reported		5	3	2	7	2	10	4	5	5	7	11	5	2	8	76

Table 4.2: PP2 Trap nursery trial for disease monitoring (Infection Index)

S. No.	Varieties	Northern Hill Zone							Northern Plain Zone							
		Almora DOS: 18/06/2020			Palampur DOS: 22.06.2020				Pantnagar DOS : 01/07/2020						Delhi**	
		FLS	PB (ct)	BP	FLS	BS	PB (ct)	BP	BP	BLB	BB	PB(Ct)	RAB	YMV	YMV	BND
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	JS 9752	55.55	33.33	11.11	55.55	33.33	11.11	11.11	0.78	14.63	0	6.04	24.68	9.42	-	-
2	JS 9560	33.33	77.77	77.77	33.33	24.66	11.11	11.11	-	-	-	-	-	-	-	-
3	JS 72-280	33.33	55.55	44.44	33.33	33.33	20.66	8.88	0.88	12.88	0	10.77	64.06	63.17	23.93	0.00
4	RKS 18	-			-	-	-	-	0.38	23.88	0	13.44	57.00	50.58	52.27	0.76
5	PK 262	11.11	66.66	44.44	77.77	55.55	11.11	0.00	0.00	20.32	0	8.88	64.00	46.88	97.05	0.73
6	PK 472	55.55	44.44	11.11	33.33	24.66	11.11	0.00	1.13	25.05	0	19.15	46.50	24.17	76.92	0.00
7	MACS 58	11.11	11.11	11.11	33.33	33.33	11.11	11.11	0.00	16.25	0	14.67	57.33	26.75	-	-
8	JS 93-05	33.33	33.33	0.00	33.33	55.55	55.55	0.0	0.63	21.33	0	6.88	47.00	49.91	-	-
9	Punjab 1	55.55	22.22	11.11	55.55	11.11	11.11	11.11	0.88	24.98	0	22.08	63.57	14.25	100.00	0.00
10	Bragg	55.55	33.33	11.11	55.55	33.33	77.77	0.0	0.00	24.94	0	14.04	69.75	16.38	92.30	0.00
11	Monetta	33.33	55.55	55.55	16.66	33.33	33.33	11.11	0.25	30.20	0	17.88	41.25	28.65	100.00	0.00
12	KHSB 2	33.33	11.11	0.00	33.33	33.33	11.11	11.11	0.00	34.30	0	26.25	66.10	15.98	-	
13	NRC 7	33.33	11.11	11.11	20.66	33.33	44.44	0.00	0.00	15.13	0	19.77	50.13	16.25	1.35	0.00
14	VLS 58	33.33	11.11	11.11	11.11	33.33	33.33	0.0	1.13	16.50	0	14.88	60.50	13.13	87.5	0.00
15	JS 335	33.33	11.11	11.11	55.55	55.55	77.77	0.00	0.00	32.25	0	13.79	60.13	42.50	100.00	0.00
16	Shivalik	77.77	33.33	11.11	77.77	33.33	33.33	0.00	1.25	28.25	0	11.03	44.98	20.16	90.56	0.00

** CI: Coefficient of infection *Disease grades - Reaction not reported

Table 4.2: contd...

S. No.	Varieties	North Eastern Hill Zone						
		Jorhat DOS: 04/6/2020				Medziphema DOS: 22/07/2020		
		Coll-R	RAB	PB (Ct)	SMV	Rust	RAB	PB (Ct)
1	2	3	4	5	6	7	8	9
1	JS 9752	-	-	-	-	13.33	3.70	7.78
2	JS 9560	-	-	-	-	-	-	-
3	JS 72-280	2.9	2.9	8.02	2.09	0.00	1.85	6.29
4	RKS 18	-	-	-	-	4.28	11.48	16.66
5	PK 262	0.55	3.45	7.59	3.76	3.33	0.00	4.03
6	PK 472	1.88	2.56	11.3	20.1	0.37	0.74	6.66
7	MACS 58	3.3	9.75	21.85	1.73	2.22	0.74	2.96
8	JS 93-05	0.62	2.34	5.0	6.79	8.51	11.11	30.37
9	Punjab 1	0.74	2.28	4.26	4.32	4.44	5.18	6.66
10	Bragg	1.9	2.54	28.51	3.95	4.81	7.03	7.77
11	Monetta	0.62	1.85	11.85	15.8	2.59	5.55	6.29
12	KHSB 2	0.67	2.99	9.8	5.2	1.85	1.85	15.92
13	NRC 7	0.68	5.18	10.55	10.98	9.99	10.36	4.81
14	VLS 58	0.80	2.22	9.07	1.29	0.74	3.70	4.07
15	JS 335	0.74	2.71	8.45	16.1	12.59	3.33	7.03
16	Shivalik	0.49	2.4	7.28	51.27	0.00	7.78	6.29

- Reaction not reported

Table 4.2: contd...

S. No	Varieties	Central Zone														Southern Zone		
		Sehore* DOS: 24/06/2020		Jabalpur DOS : 22/06/2020					Indore DOS : 27/06/2020		Amravati DOS: 26/06/2020					Dharwad DOS: 15/07/2019		
		MLS	TLS	YMV	RAB	CR	BP	PB (Ct)	PB (Ct)	RAB	YMV	CR	PB (Ct)	BP	ALS	Rust	PSS PDI	PB (ct)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	JS 9752	0	1.0	9.5	23.2	16.2	0.0	0.0	53.62	32.22	0.00	0.00	0.00	2.33	0.00	-	-	-
2	JS 9560	0	5.05	17.2	14.3	90.6	0.0	15.2	97.63	89.88	0.00	0.00	0.00	0.00	0.00	-	-	-
3	JS 72-280	0	-	16.8	27.5	43.5	0.0	8.3	72.56	35.33	0.00	0.00	0.00	0.00	0.00	80.65	34.56	33.74
4	RKS 18	0	-	45.2	19.3	62.8	2.9	15.2	94.52	72.65	-	-	-	-	-	77.36	30.45	56.64
5	PK 262	0	4.5	34.5	22.3	65.4	6.8	19.5	58.33	35.33	0.00	0.00	0.00	0.00	0.00	-	-	-
6	PK 472	0	3.5	21.0	19.5	86.8	0.0	8.5	57.21	32.33	3.66	0.00	2.44	0.00	3.66	-	-	-
7	MACS 58	0	-	18.2	17.5	81.7	0.0	17.2	97.57	89.88	-	-	-	-	-	74.48	52.25	47.54
8	JS 93-05	0	5.55	31.7	9.0	48.5	0.0	31.7	97.57	72.65	-	-	-	-	-	85.59	22.22	52.25
9	Punjab 1	0	3.6	14.3	25.8	47.2	9.2	0.0	97.57	32.33	0.00	0.00	0.00	0.00	0.00	80.65	55.85	51.85
10	Bragg	0	-	7.8	18.1	83.5	0.0	21.6	74.62	94.88	0.00	5.33	0.00	4.33	0.00	78.59	55.55	33.74
11	Monetta	0	-	19.4	14.8	79.0	0.0	9.1	95.49	72.65	0.00	0.00	0.00	0.00	0.00	80.65	33.74	53.08
12	KHSB 2	0	-	8.6	22.0	28.5	4.6	7.7	90.45	72.65	90.00	0.00	0.00	8.43	90.00	76.54	52.25	48.55
13	NRC 7	0	4	7.1	16.5	19.0	0.0	1.8	95.19	72.65	0.00	0.00	0.00	0.00	0.00	75.71	51.44	49.38
14	VLS 58	0	-	12.4	26.8	54.6	0.0	0.0	97.57	94.88	-	-	-	-	-	-	-	-
15	JS 335	0	7.85	24.7	28.1	22.7	6.4	5.3	72.76	72.65	9.33	0.00	0.00	0.00	9.33	97.93	79..01	90.94
16	Shivalik	0	-	9.3	29.2	23.4	0.0	6.7	55.44	35.33	100.00	2.33	0.00	0.00	100.00	72.83	49.38	48.97

***Disease grades** - Reaction not reported

Table 4.3: PP3 (a). Reaction of CIVT (N) entries for various diseases.

S. No.	Varieties	FLS		BP			PB (ct)							RAB						YMV				BS	BLB	
		Almora	Palampur	Pantnagar	Kota	Amravati	K.Digraj	Kota	Palampur	Jorhat	Indore	Dharwad	Almora	Medziphema	Kota	Indore	Pantnaagar	Jorhat	Jabalapur	Delhi	Jabalpur	Pantnagar	Ludhiana	Palampur	Pantnagar	Sehore
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	DSb-38	MR	HR	~~MR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~HR~~	HS	MR	HR	~~MR~~	~~MS~~	-	HS	~~HR~~	MS	-	HR	~~MR~~	-	~~MR~~	MR	HR
2	DS 3105	MS	S	~~MR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~HR~~	HS	MR	HR	~~MR~~	~~HR~~	S	S	~~MR~~	MS	HR	HR	~~R~~	HR	~~HR~~	MR	HR
3	CAUMS 2	MS	MR	~~HR~~	~~HR~~	~~HR~~	~~MS~~	~~HR~~	MR	~~HR~~	HS	MS	HR	~~HR~~	~~HR~~	-	MS	~~HR~~	S	HS	HR	~~R~~	MR	~~MS~~	MR	HR
4	JS 22-11	MS	HS	~~MS~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MR	~~HR~~	MR	MS	HR	~~HR~~	~~HR~~	MR	HS	~~HR~~	MR	MR	HR	~~HR~~	MR	~~MR~~	MR	HR
5	DLSb-2	MR	HR	~~MR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~MS~~	HS	MR	HR	~~HR~~	~~HR~~	-	HS	~~HR~~	S	HS	MR	~~MR~~	HR	~~MR~~	MS	HR
6	RVSM 2012-11	MS	S	~~MR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~HR~~	MR	MS	HR	~~HR~~	~~HR~~	-	S	~~MR~~	S	HR	HR	~~R~~	HR	~~MR~~	MS	HR
7	RSC 11-39	MR	MS	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	MS	~~MS~~	MR	MS	HR	~~HR~~	~~HR~~	MR	HR	~~HR~~	MR	HS	HR	~~R~~	MR	~~MR~~	HR	S
8	PS 1664	MS	MS	~~HR~~	~~MR~~	~~HR~~	~~MR~~	~~HR~~	MR	-	HR	MS	HR	~~HR~~	~~HR~~	MR	HS	-	MS	HS	MS	~~MR~~	MR	~~MR~~	MS	HR
9	HIMSO 1691	MR	HR	~~MR~~	~~HR~~	~~MR~~	~~MR~~	~~HR~~	MS	~~HR~~	HS	MS	HR	~~HR~~	~~HR~~	MS	S	~~HR~~	MS	S	HR	~~R~~	MR	~~MR~~	MR	HS
10	JS 22-14	MR	MR	~~MR~~	~~HR~~	~~HR~~	~~MS~~	~~HR~~	MR	~~MR~~	S	MR	MS	~~HR~~	~~HR~~	-	S	~~MS~~	MS	HS	HR	~~R~~	MR	~~MR~~	MS	HR
11	DS 3144	S	S	~~MR~~	~~HR~~	-	~~MS~~	~~HR~~	MR	~~MR~~	HS	MR	MR	~~HR~~	~~HR~~	-	S	~~MR~~	MR	HR	MR	~~MR~~	HR	~~MR~~	S	HR
12	DLSb-1	MR	HR	~~MR~~	~~MR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~MR~~	HS	MR	HR	~~HR~~	~~HR~~	-	HS	~~HR~~	MS	HR	HR	~~R~~	HR	~~MR~~	MS	HR
13	NRC 128	MR	HS	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MR	~~MR~~	MS	MS	HR	~~HR~~	~~HR~~	MR	MS	~~HR~~	MR	HR	HR	~~R~~	HR	~~MR~~	MR	HR
14	VLS 101	MR	HR	~~MR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~MS~~	HS	MS	HR	~~HR~~	~~MR~~	-	S	~~MR~~	MR	HS	R	~~HR~~	MS	~~HR~~	MS	HR
15	RSC 11-35	MS	S	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	S	~~MS~~	MS	MS	HR	~~HR~~	~~HR~~	MR	S	~~MR~~	MR	HS	HR	~~R~~	MS	~~MR~~	MR	HR
16	PS 1661	MS	HR	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	HR	~~MR~~	MR	MS	HR	~~HR~~	~~HR~~	HR	MS	~~HR~~	HR	HR	HR	~~R~~	HR	~~MR~~	MR	HR
17	Himso- 1692	MS	S	~~MR~~	~~HR~~	~~MR~~	~~MR~~	~~HR~~	MS	~~MR~~	HS	MR	HR	~~HR~~	~~HR~~	-	MS	~~MR~~	MS	HS	R	~~HR~~	S	~~MR~~	MS	HR
18	RVS 2012-10	MR	MS	~~MR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~	S	~~MS~~	MS	MR	MR	~~HR~~	~~HR~~	MR	MS	~~HR~~	MR	MR	HR	~~HR~~	HR	~~MR~~	MR	HR
19	PS 1670	MS	HS	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	MR	~~MS~~	MR	MR	HR	~~HR~~	~~HR~~	MR	MR	~~MR~~	MS	HR	HR	~~HR~~	HR	~~MR~~	MR	HR
20	NRC 109	MR	S	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	S	~~MR~~	HS	MS	MR	~~HR~~	~~HR~~	HS*	MS	~~HR~~	MS	HS	R	~~HR~~	S	~~MR~~	MR	HS
21	MAUS 806	MR	MS	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~MS~~	MS	MS	HR	~~HR~~	~~HR~~	MS	MR	~~MR~~	MR	HR	MR	~~HR~~	HR	~~MS~~	MR	HS
22	RVS 2011-10	MS	S	~~HR~~	~~HR~~	-	~~MS~~	~~HR~~	MR	~~MR~~	MR	MS	HR	~~HR~~	~~HR~~	MR	MS	~~HR~~	MR	MR	R	~~HR~~	S	~~MR~~	MR	HR
23	ASb 36	NG	MS	~~HR~~	~~MR~~	-	~~MR~~	~~HR~~	MR	-	HS	MS	NG	-	~~HR~~	-	MS	-	MS	HS	MS	~~HR~~	MR	~~MR~~	MR	HR
24	ASb 9	NG	MS	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	MR	-	HS	MS	NG	-	~~HR~~	-	MS	-	MR	-	MR	~~HR~~	HR	~~MR~~	HR	HS

25	MACS 1701	MS	MS	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~MR~~	S	MS	HR	~~HR~~	~~HR~~	MR	MR	~~HR~~	MS	HS	MS	~~HR~~	S	~~MR~~	MR	HR
26	KDS 1096	MR	MS	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~MS~~	S	MS	HR	~~HR~~	~~HR~~	MR	HR	~~HR~~	MS	-	MS	~~HR~~	S	~~MR~~	HR	HR
27	MACS 1691	MS	S	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	MS	~~MS~~	HS	MR	HR	~~HR~~	~~HR~~	-	S	~~MR~~	MS	-	HR	~~HR~~	S	~~MR~~	HR	HR
28	KDS 1144	MR	MS	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS	~~MR~~	MR	MR	HR	~~MR~~	~~HR~~	MR	S	~~HR~~	MS	HS	MS	~~MS~~	-	~~HR~~	MR	HR
29	BAUS 96-17	MR	MS	~~MR~~	~~HR~~	-	~~MR~~	~~HR~~	MS	~~MS~~	S	MR	MR	-	~~HR~~	MR	MS	~~MR~~	MS	HS	S	~~MS~~	HR	~~MR~~	MS	HR
30	BAUS 31-17	HR	S	~~MR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~	MS		S	MR	HR	-	~~HR~~	MR	MS	-	MS	HS	MS	~~MS~~	HR	~~MR~~	MS	HR
31	TS 20-5	HR	S	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	MS	~~MR~~	HS	MR	HR	~~HR~~	~~HR~~	-	MR	~~HR~~	S	-	R	~~HR~~	HR	~~HR~~	HR	MS
32	SL 1212	HR	MS	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	MS	-	S	MR	HR	~~HR~~	~~HR~~	MR	HS	-	MS	HR	HR	~~R~~	HR	~~MR~~	MR	HR
33	SL 1250	HR	S	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	MS	-	S	MS	HR	~~HR~~	~~HR~~	HS	S	-	MR	HR	R	~~R~~	HR	~~MR~~	MS	HR
34	DS 1312	MS	S	~~HR~~	~~HR~~	-	~~MR~~	~~HR~~	S	-	HS	MR	MR	~~HR~~	~~HR~~	-	MS	-	S	HR	MS	~~HR~~	HR	~~MS~~	HR	HR
1	Shivalik (c)	S	HS						MR													HR		MS		
2	Bragg (c)			MR										HR			HS	R							MS	
3	VLS 63 (c)		MR						HR															MR		
4	SL 688 (c)			MR													S					HR			MS	
5	PS 1556(c)		MS						HR															MR		
6	RKS 18 (c)													MR												
7	JS 97-52 (c)					MR								MR												
8	JS 93-05 (c)					HR	MS					S		HR				R								
9	JS 335 (c)		S	MR		MR	MS		S		S	MS		MR			HS	R				MR	HS	MR	S	
10	JS 95-60 (c)					HR																				
11	NRC 86 (c)				HR						MS															
12	Punjab 1 (c)			HR		-								~~HR~~			S								MS	MS
13	DSb 21 (c)											S														
14	MACS 450											MR					MS								-	
15	DSb 23											MR														
16	VLS 2	S											MS													

Strike out should not be consider - Reaction not reported

Table 4.3: contd..

S. No	Varieties	TLS	BND	Rust			SMV	Coll.R.	CR		ALS	CLS	PSS
		Sehore	Delhi	Dharwad	Medziphema	K.Digraj	Jorhat	Jorhat	Amravati	Jabalpur	Kota	Kota	Dharwad
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	DSb-38	HR	-	MR	~~HR~~	MR	HS	MS	HR	HS	~~HR~~	~~HR~~	MR
2	DS 3105	HR	~~HR~~	MS	~~HR~~	HS	MS	MS	HR	S	~~HR~~	~~HR~~	MR
3	CAUMS 2	MS	~~HR~~	MS	~~HR~~	HS	MS	HS	MS	HS	~~HR~~	~~MR~~	MR
4	JS 22-11	HR	~~HR~~	MS	~~HR~~	HS	HS	HS	MR	HR	~~MR~~	~~HR~~	MR
5	DLSb-2	HS	~~HR~~	MR	~~HR~~	S	MS	MS	HR	HS	~~HR~~	~~HR~~	MR
6	RVSM 2012-11	HR	~~HR~~	MS	~~HR~~	HS	MS	MR	HR	MR	~~HR~~	~~HR~~	MR
7	RSC 11-39	HR	~~HR~~	S	~~HR~~	HS	HR	MR	HR	S	~~HR~~	~~HR~~	MR
8	PS 1664	HR	~~HR~~	MS	~~HR~~	HS			HR	HS	~~HR~~	~~HR~~	MS
9	HIMSO 1691	HR	~~HR~~	MS	~~HR~~	HS	MR	HR	HR	HS	~~HR~~	~~HR~~	MS
10	JS 22-14	MS	~~HR~~	MS	~~HR~~	HS	MR	HR	HR	MR	~~HR~~	~~HR~~	MR
11	DS 3144	HR	~~HR~~	S	~~HR~~	HS	MR	HR	-	HS	~~HR~~	~~HR~~	MR
12	DLSb-1	HR	~~HR~~	MR	~~HR~~	MS	MS	HR	HR	HS	~~HR~~	~~HR~~	MR
13	NRC 128	HR	~~HR~~	MS	~~MR~~	MR	HS	HR	HS	HS	~~HR~~	~~HR~~	MS
14	VLS 101	HR	~~HR~~	MS	~~HR~~	HS	MS	HR	HR	HS	~~HR~~	~~HR~~	MS
15	RSC 11-35	HR	~~HR~~	S	~~HR~~	HS	MR	MR	HR	MS	~~HR~~	~~HR~~	MR
16	PS 1661	HR	~~HR~~	S	~~HR~~	HS	MS	HR	HR	MR	~~HR~~	~~HR~~	MR
17	Himso- 1692	HR	~~HR~~	S	~~MR~~	HS	HS	MR	HR	HS	~~HR~~	~~HR~~	MS
18	RVS 2012-10	HR	~~HR~~	MS	~~HR~~	MR	MS	HR	HR	HR	~~HR~~	~~HR~~	MR
19	PS 1670	HR	~~HR~~	S	~~HR~~	S	MR	HR	-	MR	~~HR~~	~~HR~~	MR
20	NRC 109	HR	~~HR~~	MS	~~HR~~	S	HS	R	HR	HS	~~MR~~	~~HR~~	MR
21	MAUS 806	HR	~~HR~~	MR	~~HR~~	HS	HS	HR	HR	MR	~~HR~~	~~HR~~	MS
22	RVS 2011-10	MR	~~HR~~	MS	~~HR~~	HS	MR	R	-	HR	~~HR~~	~~HR~~	MS
23	ASb 36	HR	~~HR~~	MS	-	S			-	HS	~~HR~~	~~HR~~	MR
24	ASb 9	MR	-	MS	-	MR			-	MS	~~HR~~	~~HR~~	
25	MACS 1701	HR	~~HR~~	MS	~~HR~~	HS	HS	HR	MR	HS	~~HR~~	~~MR~~	MS

26	KDS 1096	HR	-	MS	~~MS~~	MR	MS	HR	MS	HS	~~HR~~	~~HR~~	MS
27	MACS 1691	HR	-	MS	~~HR~~	HS	HR	HR	-	HS	~~HR~~	~~HR~~	MR
28	KDS 1144	HR	~~HR~~	MS	~~MS~~	MR	HR	MR	**HS**	MS	~~HR~~	~~HR~~	MS
29	BAUS 96-17	MS	~~HR~~	MS	-	HS	HR	MR	-	HS	~~HR~~	~~HR~~	MR
30	BAUS 31-17	HR	~~HR~~	MS	-	HS			HR	HS	~~HR~~	~~HR~~	MR
31	TS 20-5	HR	-	MS	~~HR~~	HS	HR	HR	-	HS	~~HR~~	~~HR~~	MR
32	SL 1212	HR	~~HR~~	MS	~~HR~~	HS	--	-	-	MR	~~HR~~	~~HR~~	MR
33	SL 1250	HR	~~HR~~	MS	~~MR~~	HS	-	-	-	HS	~~HR~~	~~HR~~	MS
34	DS 1312	HR	~~HR~~	MS	~~HR~~	HS	-	-	-	HS	~~HR~~	~~HR~~	MR
1	RKS 18 (c)				HR								
2	JS 97-52 (c)				HR				HR				
3	JS 93-05 (c)	S		S	MR	HS		R	HR				MS
4	JS 335 (c)	S		HS	MR	HS		HR	HR				S
5	JS 72-44 (c)	MS											
6	JS 95-60 (c)								HS	HS			
7	Punjab 1 (c)	MR			HR				HR				
8	NRC 86 (c)	HR											
9	DSb 21(c)			MR									HR
10	NRC 37 (c)	MR											
11	Shivalik	MR											
12	MACS 450			MS									HR
13	KDS 753			MR									

Strike out should not be consider - Reaction not reported

Table 4.3: PP3 (a). Reaction of CIVT (Early) entries for various diseases

S. No	Varieties	TLS	PB(Ct)		RAB			CR		YMV		ALS		CLS	BP	
		Sehore	Kota	Indore	Kota	Indore	Jabalpur	Amravati	Jabalpur	Indore	Jabalpur	Amravati	Kota	Kota	Kota	Amravati
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	NRC 174	NG	~~HR~~	NG	~~HR~~	NG	R	~~NG~~	MS	NG	R	~~NG~~	~~HR~~	~~HR~~	~~HR~~	~~NG~~
2	NRC 186	HR	~~HR~~	MR	~~HR~~	MR	MR	~~HR~~	HR	HR	HR	~~MR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
3	DS 3152	HR	~~HR~~	S*	~~HR~~	-*	MR	~~HR~~	MS	-*	HR	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
4	RVS 2011-4	HR	~~HR~~	MS	~~HR~~	S	MS	~~HR~~	HS	HR	HR	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~
5	PS 1659	MR	~~HR~~	MR	~~HR~~	HR	MS	~~HR~~	HS	MS	HS	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
6	NRC 173	HR	~~HR~~	S	~~HR~~	MS	MS	~~HR~~	MS	R	S	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
7	RVSM 2012-4	HR	~~HR~~	MR	~~MR~~	MR	MS	~~HR~~	MR	R	R	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
8	PS 1660	-	~~HR~~	MS	~~HR~~	HR	S	-	HS	HR	HR	-	~~HR~~	~~HR~~	~~HR~~	-
9	NRC 172	S	~~HR~~	MS	~~HR~~	HR	MS	~~HR~~	HR	HR	S	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
10	JS 22-12	HR	~~HR~~	MR	~~HR~~	MR	MR	-	HR	HR	HR	-	~~HR~~	~~HR~~	~~HR~~	-
11	NRC 175	HR	~~HR~~	NG	~~HR~~	NG	HR	-	S	NG	MS	-	~~HR~~	~~HR~~	~~HR~~	-
12	PS 1569	HR	~~HR~~	NG	~~HR~~	NG	MS	-	HS	NG	MS	-	~~HR~~	~~HR~~	~~HR~~	-
13	JS 22-18	MS	~~HR~~	MR	~~HR~~	R	S	~~HR~~	HR	HR	HR	~~HR~~	~~MR~~	~~MR~~	~~HR~~	~~HR~~
14	NRC 177	HR	~~HR~~	MR	~~HR~~	MR	MR	-	HS	R	S	-	~~HR~~	~~HR~~	~~HR~~	-
15	JS 22-16	-	~~HR~~	MR	~~HR~~	MR	MR	~~HR~~	MR	R	R	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
16	NRC 178	HR	~~HR~~	MR	~~HR~~	MR	MS	~~HR~~	MS	MR	MR	~~MR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
17	NRC 183	HR	~~HR~~	S	~~HR~~	MS	MS	~~HR~~	HS	MS	HR	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
18	NRC 182	HR	~~HR~~	HS	~~HR~~	-	MR	~~HR~~	S	-	R	~~MR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
19	NRC 181	HR	~~HR~~	S	~~HR~~	S	MS	~~HR~~	HS	R	MR	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
20	NRC 179	-	~~HR~~	MR	~~HR~~	MR	MS	~~HS~~	HS	S	R	~~HR~~	~~HR~~	~~HR~~	~~HR~~	~~HR~~
21	MACS NRC 1711	HR	~~HR~~	MR	~~HR~~	MR	-	-	MR	S	S	-	~~MR~~	~~MR~~	~~HR~~	-
1	JS 95-60 (c)	-	~~HR~~	HS	HR	S	MS	MR	HS	HS	R	HR	HR	HR	HR	HR
2	JS 20-34 (c)	S	~~HR~~	MS	MR	MR	MS	HR	MR	MR	HS	HR	HR	HR	HR	MR

Strike out should not be consider - Reaction not reported

Table 4.4: PP3 (b). Reaction of AVT-I entries for various diseases

S. No.	Varieties	Northern Hill Zone				Northern Plain Zone*					
		Palampur			Almora	Pantnagar			Ludhiana	Delhi	
		FLS	PB (ct)	BS	FLS	BP	BLB	RAB	YMV	YMV	BND
1	2	3	4	5	6	7	8	9	10	11	12
1	AMS 20-19	-	-	-	-	-	-	-	-	-	-
2	MAUS 732	-	-	-	-	-	-	-	-	-	-
3	Himso 1690	HS	HR	~~MR~~	-	~~HR~~	~~MR~~	MS	-	HR	~~HR~~
4	JS 21-72	MR	MR	~~MR~~	MR	~~MR~~	~~MS~~	MS	MR	HS	~~HR~~
5	NRC 142	S	MR	~~MR~~	-	-	-	-	HR	MS	~~HR~~
6	NRC 149	MR	HR	~~MR~~	MS	-	-	-	HR	HR	~~HR~~
7	SL 1213	S	MR	~~MR~~	MR	~~HR~~	~~MR~~	MR	HR	HR	~~HR~~
8	VLS 99	HR	MR	~~MR~~	HR	~~MR~~	~~MS~~	MS	HR	-	-
9	MACS 16-20	-	-	-	MR	-	-	-	-	-	-
10	NRC 150	-	-	-	-	-	-	-	-	HS	~~HR~~
11	NRC 152	-	-	-	-	-	-	-	-	HS	~~HR~~
12	NRC 157	-	-	-	-	-	-	-	-	-	-
13	NRC 158	-	-	-	-	-	-	-	R	-	-
14	NRC 164	-	-	-	-	-	-	-	-	-	-
15	NRC 165	-	-	-	-	-	-	-	-	-	-
16	Pusa Sipani 408	-	-	-	-	-	-	-	-	-	-
1	JS 335 ©	MS	S	MS	-	-	-	-	-		
2	PS 1092 ©	-	-	-	-	-	-	-	-		
3	Shivalik ©	HS	MS	MS	-	-	-	-	-		
4	VLS 89 ©	S	HR	HR	-	-	-	-	-		
5	VLS 63 ©	MR	HR	MR	-	-	-	-	-		
6	RKS18	-	-	-	-	-	-	-	-		
7	VLS2 ©				S						
8	MACS 450 ©					MR	MS	HS			
9	JS 335								HS	HS	HR

- Reaction not reported, Strike out should not be consider

Table 4.4: PP3 (b). Reaction of AVT-I entries for various diseases

S. No.	Varieties	North Eastern Hill Zone			
		Medziphema			
		Anthracnose	Rust	RAB	PB(Ct)
1	2	3	4	5	4
1	AMS 20-19	~~HR~~	~~HR~~	~~HR~~	~~HR~~
2	MAUS 732	-	-	-	-
3	Himso 1690	-	-	-	-
4	JS 21-72	~~MR~~	~~HR~~	~~HR~~	~~MR~~
5	NRC 142	-	-	-	-
6	NRC 149	~~MR~~	~~HR~~	~~MR~~	~~MR~~
7	SL 1213	~~MR~~	~~MR~~	~~MR~~	~~HR~~
8	VLS 99	~~HR~~	~~HR~~	~~HR~~	~~HR~~
9	MACS 16-20	~~MR~~	~~HR~~	~~HR~~	~~MR~~
10	NRC 150	-	-	-	-
11	NRC 152	-	-	-	-
12	NRC 157	-	-	-	-
13	NRC 158	-	-	-	-
14	NRC 164	-	-	-	-
15	NRC 165	-	-	-	-
16	Pusa Sipani 408	-	-	-	-
1	Bragg ©	HR	HR	HR	HR
2	JS 97-52 ©	HR	HR	HR	HR
3	JS 335 ©	MR	MR	MR	MR
4	JS 93-05 ©	HR	HR	MR	MR

- Reaction not reported, Strike out should not be consider

Table 4.4: Contd… PP 3(b). Reaction of AVT-I entries for various diseases

S. No.	Varieties	Central Zone											Southern Zone*		
		Jabalpur			Sehore		Indore				Amravati		Dharwad		
		CR	YMV	RAB	TLS	BB	PB (Ct)	RAB	YMV	SMV	CR	ALS	Rust	PSS	PB (ct)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	AMS 20-19	HS	MS	MS	MS	MS	HR	R	R	S	HR	~~HR~~	MS	MR	MS
2	MAUS 732	-	-	-	-	-	HS	MR	HS	HS	-	-	MS	HR	MR
3	Himso 1690	HS	R	MS	MR	HR	-	-	-	-	HS	~~HR~~	MS	MR	MS
4	JS 21-72	HR	HR	MR	MR	HR	HR	R	MR	S	HR	~~HR~~	MS	HR	MS
5	NRC 142	HR	HR	MR	-	-	-	-	-	-	HR	~~HR~~	-	-	-
6	NRC 149	S	HR	MR	HR	HR	NG	NG	NG	NG	HR	~~HR~~	MS	MS	MS
7	SL 1213	S	HR	MS	-	-	HS	-	-	-	HS	~~HR~~	MS	HR	MS
8	VLS 99	HS	MS	MS	-	-	HR	R	R	MS	-	-	MS	MR	MS
9	MACS 16-20	-	-	-	-	-	MS	R	HS	HS	HR	~~HR~~	MS	HR	MS
10	NRC 150	HR	HR	MR	HR	-	HS	HS	-	-	HR	~~HR~~	-	-	-
11	NRC 152	HS	R	MR	HR	-	S	S	MS	S	S	~~HR~~	-	-	-
12	NRC 157	MS	MR	S	HR	-	MR	MS	HS	S	HS	~~HR~~	-	-	-
13	NRC 158	MR	HR	MS	HR	-	MR	R	HS	HS	HS	~~MR~~	-	-	-
14	NRC 164	HS	HR	MS	MR	-	MR	MR	S	HS	HR	~~HR~~	-	-	-
15	NRC 165	MS	R	MR	HR	-	MR	R	S	S	HR	~~HR~~	-	-	-
16	Pusa Sipani 408	HS	MR	MR	HR	-	MS	-	HS	S	HR	~~HR~~	-	-	-
1	NRC 37 ©	MS	MS	MS		HS					-	-			
2	JS 97-52 ©	MR	MR	MS			MR	MR	MR	MR	HR	HR			
3	JS 72-44 ©					HS					-	-			
4	JS 335 ©	MS	MS	MS	HS	HS	S	MS	HS	S	HR	HR	HS	S	S
5	JS 95-60 ©	HS	MR	MR	HR		HS	HS	HS	S	HS	HR			
6	JS 93-05 ©	HS	S	MS		MS					HR	HR			
7	Punjab 1 ©	MS	R	S		MS					HR	HR			
8	DSb 21 ©	HS	R	MS									MR	MR	MR
9	Shivalik ©					MS					--	-			
10	DSb 23	--	-	-		-					-	-	HR	MR	MR
11	MACS 58	MS	MS	MS		--					-	-			

- Reaction not reported, Strike out should not be consider

Table 4.5: PP3 (c). Reaction of AVT-II entries for various diseases

S. No.	Varieties	Northern Hill Zone					Northern Plain Zone*							
		Palampur			Almora		Pantnagar					Delhi		Ludhiana
		FLS	PB (ct)	BS	FLS	PB (ct)	BP	BLB	RAB	PB	YMV	YMV	BND	YMV
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	AMS 100-39	MR	MR	~~MR~~	HR	HR	~~MR~~	~~MS~~	MR	~~HR~~	~~HR~~	HS	~~HR~~	MR
2	DSb 33	MS	MR	~~MR~~	HR	MR	~~HR~~	~~MR~~	MR	~~HR~~	~~HR~~	HS	~~HR~~	-
3	JS 21-71	-	-	~~-~~	-	-	~~-~~	~~-~~	-	~~-~~	~~-~~			MR
4	Karune	-	-	~~-~~	NG	NG	~~-~~	~~-~~	-	~~-~~	~~-~~	HS	~~HR~~	-
5	MACSNRC 1667	-	-	~~-~~	MR	MS	~~HR~~	~~S~~	MR	~~MR~~	~~MR~~	HS	~~HR~~	MR
6	NRC 138	MS	MS	~~MR~~	MS	MS	~~HR~~	~~MR~~	MS	~~HR~~	~~HR~~	R	~~HR~~	-
7	NRC 142	S	MR	~~MR~~	-	-	~~-~~	~~-~~	-	~~-~~	~~-~~			R
8	NRCSL 1	-	-	~~-~~	MS	S	~~MR~~	~~MS~~	S	~~HR~~	~~MR~~	HR	~~HR~~	-
9	NRCSL 2	S	MR	~~MR~~	MS	MS	~~-~~	~~-~~	-	~~-~~	~~-~~	-	~~-~~	R
10	RVSM 2011-35	S	MR	~~MR~~	MS	MS	~~MR~~	~~MR~~	MR	~~HR~~	~~HR~~	HS	~~HR~~	S
1	JS 335 (C)	MS	S	MS			MR					HS	~~HR~~	HS
2	Shivalik (C)	HS	MS	MS		S								
3	VLS 59 (C)	HR	MR	MR										
4	MACS 450©						MR	MS	HS	HR	MR			
5	VLS 2 ©				S	S								
6	Bragg ©					S								

- Reaction not reported, Strike out should not be consider

Table 4.5: Contd… PP3 (c). Reaction of AVT-II entries for various diseases

S. No.	Varieties	North Eastern Hill Zone						
		Medziphema			Jorhat			
		Rust	RAB	PB (ct)	Coll. R	RAB	PB (Ct)	SMV
1	2	3	4	5	6	7	8	9
1	AMS 100-39	~~HR~~	~~HR~~	~~MR~~	~~MR~~	~~MS~~	~~MR~~	~~MR~~
2	DSb 33	~~HR~~	~~HR~~	~~HR~~	~~MS~~	~~MR~~	~~MS~~	~~MS~~
3	JS 21-71	~~MR~~	~~MR~~	~~MR~~				
4	Karune	-	-	-				
5	MACSNRC 1667	~~HR~~	~~HR~~	~~MR~~	~~MS~~	~~MS~~	~~MS~~	~~MR~~
6	NRC 138	~~HR~~	~~HR~~	~~MR~~				
7	NRC 142	-	-	-				
8	NRCSL 1	-	-	-	~~MS~~	~~MS~~	~~MS~~	~~MR~~
9	NRCSL 2	~~HR~~	~~MR~~	~~HR~~				
10	RVSM 2011-35	~~MR~~	~~HR~~	~~HR~~				
1	Bragg ©	~~HR~~	~~MR~~	~~HR~~	~~HR~~	~~HR~~	~~MR~~	~~HR~~
2	JS 97-52 ©							
3	JS 335 ©	MR	MR	HR	HR	HR	HR	HR
4	RKS 18	MR	MR	MR				
5	JS 93-05 ©	HR	HR	MR				
6	Punjab 1	HR	HR	MR				
7	SL 525	-	-	-				

- Reaction not reported, Strike out should not be consider

Table 4.5: PP3 (c). Reaction of AVT-II entries for various diseases

S. No	Varieties	Central Zone									Southern Zone*			
		Jabalpur			Sehore	Amravati			Indore		Dharwad			K. Digraj
		CR	YMV	RAB	TLS	CR	ALS	BP	PB (Ct)	RAB	Rust	PSS	PB (ct)	Rust
1	2	3	4	5	6	8	9	10	11	12	13	14	15	16
1	AMS 100-39	MR	MS	MR	HR	HR	~~HR~~	~~HR~~	MS	MS	S	MR	MS	~~MR~~
2	DSb 33	HS	MR	MS	HR	HR	~~MR~~	~~HR~~	MS	HS	MR	MR	MR	~~MR~~
3	JS 21-71	HR	HR	MR	MS				MR	MR	MS	MS	MS	
4	Karune								NG	NG	MS	MS	MR	
5	MACSNRC 1667	HS	MR	MS	-				S	HS	S	MS	MS	~~MR~~
6	NRC 138	MR	HR	HR	HR	HR	~~HR~~	~~HR~~	MR	MR	MS	MS	MS	
7	NRC 142	HR	HR	MR	MR	HR	~~HR~~	~~HR~~	MR	MR	MS	MS	MS	
8	NRCSL 1								S	HS				~~MR~~
9	NRCSL 2	MS	HR	MS	MS	HR	~~HR~~	~~HR~~	S	HS	MS	MR	MR	
10	RVSM 2011-35	HR	HR	MR	HR	HR	~~HR~~	~~MR~~	MR	MR	S	MR	MS	
1	NRC 37 ©	MS	MS	MS	MR	-	-			-	-	-	-	-
2	JS 97-52 ©	MR	MR	MS	-			MR			-	-	-	-
3	JS 335 ©	MS	MS	MS	HS	HR	MS	HR	S	S	HS	S	S	MS
4	JS 95-60 ©	HS	MR	MR	-						-	-	-	-
5	JS 93-05 ©	HS	S	MS		HS	HR	HR			-	-	-	MS
6	JS 20-29	S	HR	MS		-	-				-	-	-	-
7	Punjab 1 ©	MS	MR	S		HR	HR	HR			-		-	-

- Reaction not reported, Strike out should not be consider

Table 4.6: PP4 Performance of the previous year's resistant entries

S. No.	Northern Plain Zone						Northern Hill Zone								Central Zone					
	Pantnagar (01/07/2019)				Ludhiana		Almora (26/06/2019)				Palampur (23-6-2019)				Amravati (16/07/2019)					
	Var.	Year of Test	RAB	YMV	Var.	YMV	Var.	FLS	Var.	FLS	VHR.	Year of Test	FLS	PB (Ct)	Var.	Year of Test	CR	Var.	Year of Test	CR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	SL-1068	3rd	MR	HR	SL958	HR	KSO 245	HR	VLS 47	HR	ASb 50	1st	HR	MR	AMS-2014-1	2nd	HR	Dsb-33	1st	HR
2	SL-1123	3rd	HR	HR	PS1347	HR	JS 20-34	HR	JS 40	MR	ASb 51	1st	HR	MR	AMS100-39	2nd	HR	KDS-992	1st	HR
3	DS-3108	3rd	S	HR	SL1028	HR	VLS 76	HR	MACS 1058	MR	AUKS 218	1st	HR	MS	AMS-1003	6th	HR	JS-21-71	1st	HR
4	PS-1613	3rd	HS	MS	SL1074	HR	KDS 344	MR	DSB-11	HR	DSb 37	1st	HR	MR	*BAUS-102	2nd	-	MACS-1493	2nd	HR
5	SL-688	3rd	MS	HR	PS1611	HR	NRC 88	HR	MAVS 282	HR	TS 46	1st	MR	MR	DS-3108	3rd	HR	MACS-1620	2nd	HR
6	SL-1028	16th	MR	HR	DS3106	HR	VS 2004-9	HR	JS 20-14	MR	EC 241778	1st	HR	HR	*Dsb-34	3rd	-	MAUS-732	2nd	MR
7	SL-1074	4rd	MS	HR	SL688	HR	VS 2005-40	MR	JS (SH) 2002-14	HR	Cat 195 c (BR4)	1st	HR	S	DS-3110	2nd	HR	MACSNRC-1575	2nd	HR
8	MACS-1460	3rd	S	HR	PUSA97-12	HR	VS 2006-17	HR	NRC 79	HR	Cat 411A	1st	HR	MR	NRC-138	2nd	HR	PS-1637	2nd	HR
9	DS-3101	5th	MS	MS	PS1613	HR	AMS-1	HR	DSB 20	MR	SKF 6029	1st	HR	MR	NRC-146	2nd	HR	PS-1611	2nd	MR
10	MACS-1407	6th	MR	HR	SL1213	HR	RHS-52	HR	AMS-MB-5-18	HR	NRC 154	1st	HR	MS	NRC-148	2nd	HR	PS-1613	2nd	HR
11	DS-2705	6th	MR	HR	SL1074	HR	JS (SH) 2003	HR	AMS-MB-5-19	HR	EC 1619	1st	MR	HR	NRC-142	2nd	HR	RSC-11-03	2nd	HR
12	PS-		MR	HR	SL955	HR	NRC 82	HR	KDS	MR	MAC	1st	HR	MS	NRCSL	2nd	HR	RSC-	2nd	HR

	1540								378		S 1566				-2			1107		
13	PS-1611		S	MR	SL1212	HR	JS 20-19	MR	VLS 86	HR	AMS MB 5-18	1st	HR	HR	NRC-128	2nd	HR	RSC-11-15	2nd	HR
	NRC-137		MS	HR	SL525	HR	TS-9	HR	VLS 87	HR	DSb 32	1st	MR	MS	NRC-130	2nd	MR	RSC-1137	2nd	HR
14	SL-1213		MR	HR	SL744	HR	NRC 84	HR	HIMSO 1685	HR	TS 53	1st	MR	MR	NRC-131	2nd	HR	RSC-10-71	3rd	HR
15	VLS-63		MR	MR	SL1233	HR	KHS 86	HR	MACS 1407	MR	RSC 10-52	2nd	HR	MR	NRC-132	2nd	HR	RVSM-2011-35	2nd	MR
16	SL-1234		MR	HR	SL1200	HR	KS 5343	MR	MAUS 706	HR	SL 1123	2nd	HR	HR	NRC-136	2nd	HR	*SKF SP-11	2nd	-
17	VLS-89		MS	HR	SL979	HR	VLS 74	HR	NRC 99	HR	CAT 407	2nd	MR	MR	NRC-137	2nd	HR	DS-3109	2nd	HR
18					SL1234	HR	VLS 73	HR	VLS 89	HR	CAT 473B	2nd	HR	MR	NRC-147	2nd	HR	JS-2090	2nd	HR
19					SL1250	HR	KDS 753	HR	JS (SH) 2002-11	MR	KDS 992	2nd	HR	HR	JS-20-96	3rd	HR	JS-2105	2nd	HR
20					JS 335	HS	KDS 869	HR	KDS 8	HR	SQL 89	2nd	MR	HR	JS-2105	2nd	HR			
21							MACS 1442	HR	BAUS 96	MR	Himso 1685	2nd	HR	HR	JS-2106	2nd	HR			
22							VLS 92	HR	KS 113	HR	JS 20-116	2nd	HR	HR	JS-2109	2nd	HR			
23							NRC 125	MR	KDS 1073	MR	PS 1572	2nd	MR	HR	*SL-710	2nd	-			
24							TS 53	MR	AMS 100-39	HR	ASb 50	4th	HR	HR	SL-738	2nd	HR			
25							SL 1123	MR	AMS 2014-1	HR	ASb 51	4th	HR	MR	JS-21-72	2nd	HR			
26							NRC 129	HR	BAUS 102	MR	AUKS 218	4th	HR	HR	PS-1634	2nd	HR			
27							RVS	HR							NRC-	2nd	HR			

							2011-2								86				
28							SalimHR	HR							*TS-59	2nd	-		
29							DSB-21	HR											
30							JS 75-46	HR											
31							KDS 980	HR											
32							KDS 1045	HR											
33							JS 20-94	HR											
34							KS 3	HR											
35							TS 7	HR											
36							NSO 81	MR											
37							NRC 85	HR											
38							NRC 42	HR											

Contd.,

S. No	Central Zone							Southern Zone				
	Jabalpur DOS: 27/06/2019				Sehore DOS :03/07/2019			Dharwad DOS:15/07/2019				
	VHR.	Year of Test	CR	RAB	VHR.	Year of test	MLS	VHR.	Year of Test	Rust	PSS	PB (ct)
1	2	3	4	5	6	7	8	9	10	11	12	13
1	JS 20-34	8th	HR	MS	AMS 475	3rd	HR	DSb 23	9th	HR	MR	HR
2	JS 20-36	7th	MS	S	AMS MB 5-18	3rd	HR	DSb 28	9th	MR	MS	MS
3	JS 20-98	7th	MR	HR	AMS 5-19	3rd	MS	DSb 34	4th	MS	HR	MS
4	PS 1469	6th	S	MR	AMS 77	3rd	MS	DSb 21 (C)	11th	HR	MS	MS
5	AMS MB 5 - 18	5th	MS	MR	JS20 -82	3rd	HR	KDS 753	7th	HR	MR	MS
6	NRC 125	5th	S	HR	JS20 -90	3rd	MR	EC 391336	7th	HR	MR	MS
7	RSC 10-52	5th	MS	MS	JS20 -96	5th	MS	EC 379152	8th	MR	MR	MR
8	JS 20-19	5th	HR	MR	JS20 -103	3rd	MS	EC 242104	9th	HR	HR	MR
9	JS 20-20	5th	HR	MR	JS20 -108	3rd	MS	EC 3551	10th	HR	MR	HR
10	JS 20-96	4th	HR	HR	JS21 -09	3rd	MS	EC 241780	13th	HR	HR	HR
11	AMS MB 5 -19	4th	MS	MS	SL 96	3rd	MS	EC 241778	13th	MR	HR	HR
12	AUKS - 174	4th	HS	MS	SL 955	3rd	MS	JS 21-08	8th	MR	HR	HR
13	AMS 2014 -1	3rd	S	MS	SL 958	3rd	MS	DSb 32	7th	MR	MR	MR
14	JS 21-17	4th	HR	HR	RVS 2002-4	5th	HR	DSb 31	7th	MR	MR	MS
15	AMS 100- 39	3rd	MR	MS	RVS 2001-4	6th	MR	DS 3106	4th	MS	MR	MS
16	RSC 11-03	3rd	MS	MS				EC 251409	2nd	MR	MS	MS
17	PS 1613	3rd	HR	MR				DLSb-1	1st	MS	MR	MR
18	AMS 243	3rd	S	MS				RSC 10-52	4th	MR	MR	MS

19	AMS – 77	3rd	S	MR				DLSb -2	1st	MR	MS	MS
20	AMS 264	3rd	HR	MR				SL 1074	4th	MS	MS	HR
21	DS 3106	3rd	MS	MS				DSb 30-2	3rd	HR	MS	MS
22	DS 3109	3rd	S	MR								
23	JS 21-71	3rd	HR	HR								
24	JS 21-72	3rd	HR	MR								
25	KDS 1009	3rd	MS	MR								
26	KDS 1073	3rd	MS	MS								
27	MAUS 158	3rd	MS	MS								
28	NRC SL 2	3rd	HS	MS								
29	SL 1191	3rd	HR	HR								
30	VLS 94	3rd	S	MR								
31	PS 1611	3rd	HR	HR								
32	PS 1613	3rd	HR	MR								
33	RSC 11-07	2nd	S	MS								
34	MACS 1566	2nd	MS	MR								
35	NRC 146	2nd	MR	MS								
36	AMS 2014-1	2nd	MS	MR								
37	NRC 128	2nd	MS	MR								
38	BAUS 102	2nd	S	MS								
39	SKF –SP-11	2nd	MS	S								
40	NRC 166	2nd	MR	MS								
41	JS 22-01	2nd	HR	HR								
42	KDS 1097	2nd	MS	MR								
43	NRC 154	2nd	HR	MR								
44	RSC 11-22	2nd	MS	MS								
45	DS 1318	2nd	HR	HR								

Table 4.7: PP5. Evaluation of germplasm lines for identification of multiple disease resistant sources

S.N	Palampur (24/06/2019)				Jabalpur (27/06/2019)				Indore					Dharwad (15-7-2019)				Pantnagar (1-7-2019)			
	Genotype	FLS	PB (ct)	BS	Genotype	YMV	CR	RAB	Genotype	PB (Ct)	SMV	YMV	RAB	Genotype	Rust	PSS	PB	Genotype	RAB	YMV	BLB
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	JSM 232	MS	MS	MR	JSM 232	MS	S	MS	JSM 232	HS	-	R	-	JSM 232	MS	MS	MR	JSM 232	MS	HR	MS
2	G 3508 (Mix)	S	MS	MR	G – 03508	NG			GO 3508	S	MS	MR	MR	G-03508	NG			G 03508	-	-	-
3	JSM 195	MR	MS	HR	JSM 195	MS	MR	MS	JSM 195	HS	-	-	-	JSM 195	MS	MS	MS	JSM 195	MR	MR	MR
4	JSM 285	S	MS	MR	JSM 285	MS	MS	MR	JSM 285	HS	S	MR	-	JSM 285	MS	MS	MS	JSM 285	MR	HR	HR
5	MACS 303	HS	HR	HR	MACS 303	MR	HS	S	MACS 30 B	S	MS	R	R	MACS 303	MS	MS	MS	MACS 303	MR	MR	MR
6	JS 20-86	HS	S	HR	JS 20-86	HR	MS	MS	JS 20-86	MR	HS	R	R	JS 20-86	MS	MS	MR	JS 20-86	MS	HR	HR
7	TGX 849-81(late)	MR	HR	MR	TG X 849-81	S	MS	MS	TGX 879-81	MR	MR	S	R	TGX 849-81	MS	MS	MR	TGA-849-81	S	MR	MS
8	WT- 88	S	MS	MR	WT – 88	MR	MS	S	WT 88	S	MS	R	R	WT-88	S	MR		WT-88	S	HR	MS
9	UPSL 77 (late)	MR	HR	MR	UPSL- 77	HR	MS	MS	UPSC 77	HS	S	-	-	UPSL-77	MS	MS	MS	UPSSL-77	S	HR	MS
10	RKS 54	S	MS	MR	RKS 54	HR	HR	MR	R1 255-4	MR	HS	MR	R	RKS 54	MS	MS	MS	RKS-54	HR	HR	HR
11	TGX 293-41E	HR	HR	MR	TGX 293-41E	S	MR	MR	TGX 293-41E	MR	MR	HS	R	TGX 293-41E	MS	MS	MS	TGX-293-41E	MR	HR	MR
12	EC 391181	HR	HR	MR	EC 391181	S	MS	MR	EC 391181	MS	MS	HS	R	EC 391181	MS	MS	MS	EC-391181	MR	HR	MR
13	JSM 245	HR	MS	MR	JSM 245	S	S	MS	JSM 245	S	MS	S	R	JSM 245	MS	MS	S	JSM 245	MR	HR	MS
14	SL 525	MR	MS	MR	SL 525	HR	HR	HR	SL 525	R	S	R	R	SL 525	MS	MS	MS	SL 525	MS	MR	MR
15	F4 P20	MS	MS	MS	F4P20	MS	MS	MR	F4 P20	MR	MS	R	R	F4P20	S	MS	MS	F4 P20	MS	HR	MR
16	KDS 256	MS	MS	MR	KDS 256	MR	MR	MS	LDS 256	R	S	R	R	KDS 256	MS	MS	MR	KPS 256	MR	HR	MR
17	GP 434 (late)	MR	MR	MR	GP 434	MS	MR	MR	GP 434	HS	-	-	-	GP 434	MS	MS	MS	GP 434	MS	MR	MS
18	EC 39573	HR	MR	MR	EC 39573	R	MR	MS	EC 39573	HS	-	-	-	EC 39573	MS	MS	MS	EC 39573	MS	HR	MS
19	SL 738	HR	MS	MR	SL 738	HR	MS	MS	SL 738	HS	-	-	-	SL 738	MS	S	MS	SL-738	S	HR	S
20	EC	HR	MR	MR	EC	S	MS	MR	EC	HS	-	-	-	EC	MS	MS	S	EC-	MS	HR	MS

	172576				172576				172576					172576				172516			
21	EC 457198	MS	S	MS	EC 457198	S	MR	MR	EC 457198	HS	MS	MR	MR	EC 457198	MS	MS	MS	EC-457198	S	MR	S
22	UGM 75	MS	MR	MR	UGM 75	MS	S	MR	UGM 75	HS	-	-	-	UGM 75	MS	MR	MS	OGN-7	MS	HR	MS
23	EC 39503	MS	MR	MR	EC 39503	MS	MR	MS	EC 39503	MR	MR	R	R	EC 39503	MS	MR	MR	EC-39503	-	-	-
24	UGM 77	HR	HR	MR	UGM 77	R	MS	MR	UGM 77	HS	-	-	-	UGM 77	MR	MR	MS	UGM-77	S	HR	MS
25	MACS 7102 (Mix.)	MS	MR	MR	MACS 7102	S	MS	MR	MACS 7102	HS	-	-	-	MACS 7102	MR	MR	MR	MACS-7102	MS	HR	MS
26	EC 14117	HR	HR	MR	EC 14117	MR	HR	HR	EC 14117	HS	-	-	-	EC 14117	MS	MR	MR	EC-14117	MR	MR	MS
27	EC 381884	MS	HR	HR	EC 381884	HR	HS	MS	EC 381884	HS	-	-	-	EC 381884	MR	MS	MR	EC-381884	MR	HR	MR
28	VLS 11	MR	MR	MR	VLS – 11	R	HS	MS	VLS 11	R	R	R	R	VLS 11	MR	MR	MR	VLS-11	MR	HR	MR
29	Harder	HR	HR	MR	Harder	MS	MS	HR	Harder	R	MS	MR	R	Harder	MS	MS	MS	Harder	MS	MR	MR
30	JSM 242	HR	MS	MR	JSM 242	HS	MR	MR	JSM 242	MS	S	MR	R	JSM 242	MS	MS	MR	JSM-242	S	HR	MS
31	EC 241780	HR	HR	MR	EC 241780	MR	S	MR	EC 241780	HS	MS	-	-	EC 241780	MR	MR	MR	EC-241780	MS	HR	HR
32	EC 457074	S	MR	MR	EC 457074	MS	HS	MR	EC 457014	HS	-	S	-	EC 457074	MS	MS	MR	EC-457074	S	MR	HR
33	EC 241302	S	MR	MR	EC 241302	R	MR	MS	EC 241302	HS	-	-	-	EC 241302	MS	MS	MR	EC-241302	MS	MR	MS
34	SL (E) 1	HS	HR	MR	SL (E) 1	MR	MS	MS	SL (E) 1	MR	S	MS	MR	SL(E) 1	MS	MS	MR	SL-E(1)	MR	MR	MR
35	JSM 227	HR	MR	HR	JSM 227	HS	MS	MR	JSM 227	HS	-	MS	-	JSM 227	MS	MS	MR	JSM -227	MR	MR	MR
36	EC 37788B (13)	MR	MR	HR	EC 377883B	MR	MS	HR	EC 3778838	HS	-	-	MS	EC 377883 B	MS	MS	MS	EC 37788373	MR	HR	MR
37	EC 241780	HR	HR	MR	PK 122	HR	HR	HR	PK 122	S	S	R	MR	PK 122	MS	MS	MR	PK-122	MS	HR	MR
38	EC 457214	HR	MR	MR	EC 457214	S	MS	MR	EC 457214	HS	-	S	-	EC 457214	MS	MS	MR	EC-457214	S	MR	MR
39	EC 350664	MR	MR	MR	EC 350664	MS	MR	MR	EC 350664	HS	-	-	-	EC 350664	MS	S	MR	EC-350664	MR	MR	MS
40	MACS 171	MR	MR	MR	MACS 171	S	MR	MS	MACS 171	S	S	R	MS	MACS 171	S	MS	MR	MACS-171	MS	MR	MR
41	JSM 222	HR	MS	MR	JS 222	MS	HR	MS	JSM 222	HS	S	MS	MR	JSM 222	MS	MS	MR	JSM 222	MS	MR	MS
42	PK 431337	MR	MS	MR	PK 431337	R	HR	MS	PK 431337	MS	HS	R	MR	PK 431337	MR	MS	MR	PK-431337	MS	HR	HR
43	SL 2951	MR	MR	MS	SL 2951	MS	HR	MR	SL 2951	MS	S	R	MR	SL 2951	MS	MS	MR	SL-2959	MS	MR	MR
44	PK 25	MR	HR	MR	PK 25	MS	S	MS	PK 25	HS	-	-	-	PK 25	S	MS	MR	PK-25	MR	MR	MR

45	Z-22 (20-146)	MS	HR	HR	Z 22 (20-14C)	MR	HS	MR	Z 23 (20-14C)	R	MS	R	R	Z-22 (20-14C)	MS	MS	MR	Z-22(20-MC)	S	HR	HR
46	Z-17 23-10B	MS	HR	MR	Z 17 (23-10B)	MR	MS	MS	Z 17(23-108)	MR	MR	R	R	Z-17 (23-10B)	MS	MS	MR	Z-17 (23-10B)	MR	MR	MR
47	Z- 23 23-16C	MS	HR	MR	Z 23 (23-16 C)	R	MR	MR	Z 23(23-16C)	R	MS	R	R	Z-23 (23-16C)	MS	MS	MR	Z-23(23-16-C)	MS	HR	MR
48	Z-9 20-40B	MS	MR	HR	Z 9 (20-40 B)	HR	HR	MR	Z 9 (20-40B)	MR	S	R	R	Z-9 (20-40B)	MS	S	MR	Z-9-20-40B	MS	MR	MS
49	Z -19 14-11B	S	MR	HR	Z 19 (14 – 11 B)	MR	S	MS	Z 19(14-11B)	MS	S	R	MR	Z-19 (14-11B)	MS	MS	MR	Z-19(14-11B)	MR	MR	MR
50	PI-204336	MR	MR	MR	PI 204336	MR	MS	S	PI-204336	HS	-	-	-	PI 204336	MS	MS	MR	P1204336	S	HR	MR

-: Not germinated

Table 4.8a : PP 6/ENT 8 - Integrated management of root rot complex and stem borers of soybean Dharwad Center

Tr.	Treatment details	Formula-tions	Dosage (g/ml/ kg seed)	% field stand*	% Root rot incidence*	% Stem tunneling*	% Girdling*	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed wt (g)	Seed yield (kg/ha)
T_1	Seed treatment (ST) with Carboxin + Thiram	75% WP	3	93.82 (75.57)	7.50 (15.82)	18.01 (25.10)	28.01 (31.94)	46.02	5.60	64.50	13.35	1550.66
T_2	ST with Trifloxystrobin + Penflufen	240 FS	1	98.76 (83.56)	2.15 (8.75)	15.47 (23.15)	25.86 (30.55)	48.80	5.88	66.70	13.65	1625.46
T_3	ST with Thiophanate methyl + Pyroclostrobin	500 FS	2	96.29 (78.86)	3.75 (11.09)	15.01 (22.79)	23.78 (29.17)	48.40	5.85	66.50	13.80	1610.08
T_4	ST with *Trichoderma harzianum*	-	10	90.11 (71.65)	10.50 (18.32)	20.16 (26.67)	32.69 (34.86)	46.75	5.15	62.10	12.90	1510.33
T_5	ST with Thiamethoxam	600 FS	2	88.88 (70.49)	12.50 (20.64)	8.37 (16.81)	13.52 (21.56)	45.75	5.25	64.30	13.10	1540.66
T_6	T1 + T5	-	3+2	94.25 (76.09)	6.75 (14.95)	10.48 (18.88)	17.02 (24.36)	46.84	5.91	64.90	14.10	1650.25
T_7	T2 + T5	-	1+2	99.99 (89.39)	1.10 (6.64)	6.27 (14.50)	7.89 (16.31)	48.98	5.99	66.95	14.20	1710.25
T_8	T3 + T5	-	2+2	97.65 (80.56)	3.25 (10.32)	5.75 (13.87)	6.97 (15.30)	48.75	5.92	67.05	14.85	1690.32
T_9	T4 + T5	-	10+2	92.45 (73.68)	8.50 (16.54)	12.07 (20.32)	12.17 (20.41)	46.25	5.75	58.45	13.64	1580.32
T_{10}	ST with biopolymer chitosan based *Trichoderma* formulation (IIOR)	SC	4	92.50 (74.17)	8.55 (16.85)	11.18 (19.53)	19.67 (26.32)	46.80	5.50	62.45	13.10	1550.21
T_{11}	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR)	SC	10	93.50 (75.45)	7.50 (15.85)	13.25 (21.34)	21.13 (27.36)	46.90	5.52	62.58	13.25	1560.25
T_{12}	ST with biopolymer chitosan based Trichoderma formulation (IIOR) + Thiamethoxam		2+10	94.00 (76.10)	6.00 (14.20)	9.15 (17.60)	14.07 (22.02)	47.25	5.60	64.25	13.30	1585.25
T_{13}	Untreated control	-	-	81.25 (64.48)	22.22 (28.11)	25.47 (30.30)	39.16 (38.72)	42.35	5.15	53.20	12.10	1325.25
	S.Em±	-	-	1.78	0.95	0.81	0.91	0.56	0.32	0.65	0.18	56.28
	CD @ 5%	-	-	3.98	2.88	2.44	2.75	1.65	1.21	1.85	0.56	192.36

* Figures in the parenthesis are transformed angular values Variety : JS 335 Date of sowing : 13-07-2020

Table 4.8b: Integrated management of root rot complex and stem borers of soybean Center: Pantnagar

S.No	Treatment	%Field Stand	% Root rot incidence	Anthracnose PDI (%)	%Stem tunneling	Plant height (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (grams)	Seed Yield kg/ 4.5 m^2 plot
1	ST with Carboxin+ Thiram (T1)	92.15	5.17	6.42	53	56.2	6.2	54.7	7.81	0.47
2	ST with Trifloxistrobin+ Penflufen (T2)	88.22	2.22	2.67	58	62.7	6.2	51.3	7.75	0.58
3	ST with Thiphanate methyl+ Pyroclostrobin (T3)	93.25	4.28	3.16	64	67.0	6.2	55.0	7.90	0.47
4	ST with *Trichoderma harzianum* (T4)	88.33	7.25	2.90	70	59.2	7.2	55.3	7.45	0.60
5	ST with Thiomethoxam (T5)	91.33	7.40	4.17	44	55.9	6.6	52.3	7.70	0.75
6	T1+ T5	93.67	4.50	6.55	72	55.9	7.3	58.0	7.50	0.48
7	T2+ T5	86.33	6.08	3.46	23	57.8	6.8	53.3	7.55	0.70
8	T3+ T5	87.33	2.55	3.83	64	62.6	6.6	53.7	7.52	0.65
9	T4+T5	84.67	3.61	3.80	57	67.0	7.0	55.7	7.85	0.58
10	ST with biopolymer chitosan based *Trichoderma* formulation (IIOR)	93.08	5.08	4.83	66	63.6	6.7	54.3	7.90	0.57
11	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR)	90.11	4.92	6.00	45	54.7	6.4	52.7	7.50	0.52
12	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR) + Thiomethoxam	84.85	3.93	2.27	59	57.9	7.2	56.7	7.35	0.62
13	Untreated Control	76.17	18.00	17.46	75	47.2	5.2	42.7	7.10	0.58

Table 4.8c Integrated Management of the root rot complex and stem borers of Soybean 2020 Center: Amaravati

Sr. No	Treatment	Germin-ation%	Root root %	% stem fly infestation 30 DAS	% stem fly infestation at Maturity	% Tunneling at 30 DAS	% Tunneling at Maturity	No of Branches	Height of the plants	No of pods	Yield per plot	Yield kg per Ha.
T1	Seed treatment (ST) with Carboxin + Thiram	85.31	11.7 (20.00)	4.96 (2.73)	63.22	3.44 (2.35)	4.53 (2.63)	3.67 (2.41)*	46.07	40.33	1.01 (1.50)	1514.89
T2	ST with Trifloxystrobin + Penflufen	77.88	13.2 (21.32)	5.14 (2.77)	63.55	3.22 (2.79)	4.54 (2.63)	4.00 (2.50)	47.57	40.33	0.96 (1.48)	1427.19
T3	ST with Thiophanate methyl + Pyroclostrobin	69.80	11.4 (19.74)	4.40 (2.60)	59.36	3.45 (2.36)	4.43 (2.60)	3.67 (2.41)	43.33	40	0.98 (1.49)	1281.06
T4	ST with *Trichoderma harzianum*	82.50	11.7 (20.03)	4.85 (2.70)	62.99	3.75 (2.36)	4.43 (2.60)	3.33 (2.33)	44.07	42.00	0.95 (1.48)	1338.82
T5	ST with Thiamethoxam	77.52	15.2 (22.96)	3.82 (2.45)	58.25	3.46 (2.36)	5.69 (2.89)	4.00 (2.50)	48.00	40.67	0.98 (1.51)	1277.09
T6	T1 + T5	82.50	8.1 (16.52)	3.04 (2.24)	44.88	3.78 (2.44)	4.94 (2.72)	4.33 (2.58)	48.81	41.00	1.01 (1.51)	1673.06
T7	T2 + T5	88.20	6.7 (14.96)	1.89 (1.87)	39.28	1.94 (1.86)	2.81 (2.18)	4.33 (2.58)	50.29	42.33	1.02 (1.51)	1648.07
T8	T3 + T5	89.66	4.3 (11.94)	0.78 (1.38)	38.21	0.73 (1.36)	1.55 (1.75)	4.67 (2.66)	51.47	45.67	1.25 (1.62)	1767.03
T9	T4 + T5	74.20	10.8 (19.23)	4.18 (2.54)	55.96	3.74 (2.43)	4.37 (2.59)	4.00 (2.50)	48.53	43.67	0.98 (1.49)	1422.20
T10	ST with biopolymer chitosan based *Trichoderma* formulation (IIOR)	88.90	8.4 (16.81)	5.07 (2.75)	58.92	2.59 (2.11)	4.4 (2.60)	4.33 (2.58)	47.73	42.00	1.04 (1.52)	1647.36
T11	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR)	88.82	6.9 (15.25)	2.74 (2.16)	48.34	3.40 (2.34)	4.39 (2.60)	4.67 (2.66)	48.87	43.33	1.01 (1.51)	1684.31
T12	ST with biopolymer chitosan based Trichoderma formulation (IIOR) + Thiamethoxam	92.44	6.5 (14.79)	2.18 (1.98)	42.82	2.71 (2.15)	4.66 (2.66)	3.67 (2.41)	47.47	42.33	1.01 (1.51)	1683.83
T13	Untreated control	68.55	19.5 (26.19)	6.88 (3.12)	70.25	3.88 (2.47)	5.95 (2.94)	3.33 (2.33)	42.81	39.33	0.88 (1.44)	1263.43
	SE(m)	2.73	1.42	0.23	2.46	0.16	0.16	NS	NS	NS	NS	NS
	CD(P=0.05)	7.96	4.17	0.69	7.18	0.47	0.48	-	-	-	-	-
	CV(%)	8.78	13.48	17.40	7.86	12.79	11.15	-	-	-	-	-

Table 4.8d: Integrated management of the root rot complex and stem borers of soybean Center: Palampur

Treatment	% field stand	% root rot incidence	Anthracnose	% Girdling	Plant height (cm)	No. of pods/Pt	100g seed wt.(g)	Seed yield (q/ha)
T1= ST with Carboxin +thiram (3g/kg)	72.20	5.92	5.18	3.00	46.40	29.60	11.86	9.24
T2= ST with Trifloxystrobin +Penflufen (1ml/kg)	67.27	8.14	4.44	3.67	46.00	28.67	12.20	8.55
T3= ST with Thiophanate methyl +Pyraclostrobin)(2g/kg)	69.58	8.88	5.18	3.67	46.80	27.73	11.87	7.87
T4= ST with *Trichoderma harzianum* (10g/kg)	63.39	8.88	5.92	3.67	45.33	27.27	12.46	7.63
T5= ST with Thiomethoxam (2g/kg)	66.67	14.81	5.18	1.67	48.00	28.87	11.83	8.04
T6= T1 +T5	74.28	3.70	4.44	2.33	46.93	31.47	11.97	9.38
T7= T2 +T5	71.64	8.14	5.18	1.67	46.47	33.93	11.77	8.40
T8= T3 +T5	72.36	5.18	4.44	1.67	48.00	41.67	11.80	10.38
T9=T4 +T5	64.85	5.92	4.44	2.33	45.87	28.13	11.31	7.50
T10= ST with biopolymer chitosan based Trichoderma formulation (IIOR)@ 4ml/kg	65.45	6.66	17.77	6.67	47.20	27.00	11.76	6.50
T11= ST with biopolymer cellulose based Trichoderma formulation (IIOR),@ 10ml/kg	63.18	6.66	23.77	6.67	47.20	26.87	11.63	6.24
T12=ST with biopolymer cellulose based Trichoderma formulation (IIOR) +Thiomethoxam(@10 + 2g/kg)	68.61	6.66	25.18	7.33	46.73	29.40	11.50	6.38
T13= Untreated control	57.33	14.81	24.44	9.00	45.07	24.60	12.51	6.14
CD (P= 0.05)	5.184	4.735	7.27	2.156	NS	6.529	NS	1.059

Table 4.8e: Efficacy of various treatments in management of root rot complex, stem fly and girdle beetle and its impact on yield during kharif-2020 Center: Jabalpur

Treatments	Details	Root rot (%)	Field Stand (%)	CR mortality (%)	Stem tunneling (%)	Girdling (%)	Plant ht (cm),	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Pod blight (%)	Seed yield (kg/ha
T_1	Seed treatment (ST) with Carboxin + Thiram 75 % WP @ 3g/kg seed	3.2	73.1	10.2	23.0	3.3	65.3	2.2	21.2	11.27	3.3	1260.0
T_2	ST with Trifloxystrobin + Penflufen 240 FS @ 1ml/kg seed	2.9	75.7	9.2	22.7	4.0	67.2	2.5	21.5	11.13	3.5	1278.3
T_3	ST with Thiophanate methyl + Pyroclostrobin 500 FS @ 2ml/kg seed	3.1	73.0	9.0	22.0	3.7	66.3	2.4	22.3	11.17	3.0	1255.0
T_4	ST with *Trichoderma harzianum* @ 10g/kg seed	6.2	69.1	14.1	20.3	4.3	66.7	2.2	20.2	10.87	4.9	1161.7
T_5	ST with Thiomethoxam 600 FS FS @ 2ml/kg seed	7.8	67.1	19.2	11.7	2.7	67.3	2.3	20.8	10.83	5.6	1140.0
T_6	T1 + T5	2.0	76.5	9.7	10.7	2.3	68.9	2.5	24.6	11.30	2.5	1323.3
T_7	T2 + T5	1.9	78.7	8.9	11.3	3.0	70.0	2.7	25.8	11.43	2.4	1333.3
T_8	T3 +T5	1.7	79.8	8.6	12.0	2.7	70.9	2.7	26.8	11.60	2.0	1351.7
T_9	T4+ T5	4.9	75.6	10.5	13.7	3.3	69.7	2.6	23.4	11.23	4.3	1281.7
T_{10}	ST *Trichoderma harzianum (*chitosan based - (IIOR*)*	4.5	72.1	9.8	19.3	4.3	68.7	2.2	20.8	11.07	4.5	1213.3
T_{11}	ST *Trichoderma harzianum* (Cellulose based - (IIOR)	4.8	70.9	11.1	20.3	4.7	67.9	2.1	20.5	11.00	5.1	1200.0
T_{12}	ST *Trichoderma harzianum* (chitosan based - (IIOR*)* + Thiomethoxam	3.6	74.8	8.5	12.7	3.0	71.0	2.8	25.1	11.37	3.8	1295.0
T_{13}	Untreated	10.9	63.4	24.1	35.7	12.5	63.3	2.2	18.1	10.07	9.0	771.6
	CD (5 %)	**0.92**	**1.86**	**4.26**	**6.28**	**4.36**	**3.11**	**N/A**	**1.85**	**0.46**	**0.72**	**57.71**

Table 4.8f: Efficacy of various treatments in management of root rot complex, stem fly and girdle beetle and its impact on yield during kharif-2020 Center: Jorhat

Treatments	Chemicals	% Root rot incidence	anthracnose Severity (PDI) %	100 seed weight	No of Pod	Yield per plot (Kg)	Plant height (cm)	% Field stand
T_1	Seed treatment (ST) with Carboxin + Thiram	0.66	5.217	11.23	53.20	0.15	33.53	94.25
T_2	ST with Trifloxystrobin + Penflufen	0.63	3.7	11.50	51.07	0.23	77.58	97.1
T_3	ST with Thiophanate methyl + Pyroclostrobin	0.76	6.0	12.43	56.80	0.21	31.83	92.82
T_4	ST with *Trichoderma harzianum*	0.6	4.89	11.00	52.47	0.28	37.12	93.43
T_5	ST with Thiomethoxam	0.66	4.52	13.27	52.00	0.22	40.25	97.71
T_6	T1 +T5	0.7	6.0	11.13	53.93	0.24	36.81	95.71
T_7	T2 + T5	0.73	5.55	12.87	52.80	0.18	39.51	97.12
T_8	T3 +T5	0.6	4.89	12.53	51.67	0.24	40.02	94.2
T_9	T4+ T5	0.5	6.0	12.63	52.67	0.26	39.27	95.71
T10	ST with biopolymer chitosan based *Trichoderma* formulation (IIOR)	0.6	6.03	13.00	49.80	0.22	39.63	97.13
T_{11}	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR)	0.73	4.11	11.67	53.33	0.13	40.26	96.85
T12	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR) +Thiomethoxam	0.36	1.9	13.13	54.67	0.23	39.35	94.20
T13	Untreated control	1.16	18.5	12.13	51.60	0.25	40.73	85.42

Table4.9a (PP7): Development of forewarning systems against major diseases of soybean). Pearson correlation coefficient between corresponding week weather parameter and % increase of charcoal rot incidence at AICRP on Jabalpur (2017, 2018, 2019 and 2020)

	JS95-60	JS97-52	Average
Maximum Temp	0.400	0.796*	.510
Minimum Temp	-.654	-.315	-.191
Sun shine hours	0.701	0.684*	.486
Rainfall (mm)	-.255	-.540	-.305
Morning RH	.139	-.570	-.136
Evening RH	-.462	-.475	-.227
Rainy days	-.159	-.564	-.225

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9b: Pearson correlation coefficient between one week prior weather parameter and % increase of charcoal rot incidence at AICRP on Jabalpur (2017, 2018, 2019 and 2020)

	JS95-60	JS97-52	Average
Maximum Temp	-.208	.428	-.021
Minimum Temp	-.799*	-.463	-.425
Sun shine hours	.268	.693*	.381
Rainfall (mm)	.266	-.228	.124
Morning RH	.703	.042	.486
Evening RH	.035	-.579	-.219
Rainy days	.389	-.319	.145

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9c: Pearson correlation coefficient between two week prior weather parameter and % increase of charcoal rot incidence at AICRP on Jabalpur (2017, 2018, 2019 and 2020)

	JS9560	JS9752	Average
Maximum Temp	-.740*	-.319	-.654
Minimum Temp	-.684	-.648	-.603
Sun shine hours	-.401	.000	-.331
Rainfall (mm)	.742*	.237	.612
Morning RH	.864**	.645	.867**
Evening RH	.679	.096	.517
Rainy days	.810*	.281	.668*

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.d: Pearson correlation coefficient between corresponding week weather parameter and % increase of YMV at AICRP on Jabalpur (2017, 2018, 2019 and 2020)

	JS 335
Maximum Temp	-.799**
Minimum Temp	.474
Sun shine hours	-.853**
Rainfall (mm)	.680*
Morning RH	.460
Evening RH	.773**
Rainy days	.605*

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.e: Pearson correlation coefficient between corresponding week weather parameter and % increase of Rust and PB at AICRP on Dharwad (2000 to 2020 for rust 2011-2020 for PB)

	Rust	PB
Rainfall (mm)	0.97**	0.81**
RH minimum	-0.59	-0.00
RH Max	-0.89	-0.40
Minimum Temp	-0.86	-0.92
Maximum Temp	0.80**	0.21*
Rainy days	0.62	0.62

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.f: Pearson correlation coefficient between one week prior weather parameter and % increase of Rust and PB at AICRP on Dharwad (2000 to 2020 for rust 2011-2020 for PB)

	Rust	PB
Rainfall (mm)	0.97**	0.81**
RH minimum	-0.59	-0.00
RH Max	-0.89	-0.40
Minimum Temp	-0.86	-0.92
Maximum Temp	0.80**	0.21*
Rainy days	0.62	0.62

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.g: Pearson correlation coefficient between one week prior weather parameter and % increase of Rust and PB at AICRP on Dharwad (2000 to 2020 for rust 2011-2020 for PB)

	Rust	PB
Rainfall (mm)	0.72	0.22
RH minimum	-0.82	-0.72
RH Max	-0.91	-0.82
Minimum Temp	-0.90	-0.95
Maximum Temp	0.89**	0.77*
Rainy days	-0.16	-0.39

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.h: Pearson correlation coefficient between corresponding week weather parameter and % increase of RAB and YMV at AICRP on Pantnagar (2000 to 2020)

	RAB	YMV
Maximum Temp	-0.78**	-0.74**
Minimum Temp	-0.94	-0.85**
Rainfall (mm)	-0.82**	-0.66**
RH	-0.87**	-0.77**
Rainy days	-0.98**	-0.92**

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.i: Pearson correlation coefficient between one week prior weather parameter and % increase of RAB and YMV at AICRP on Pantnagar (2000 to 2020)

	RAB	**YMV**
Maximum Temp	-0.73**	-0.75**
Minimum Temp	-0.95	-0.92**
Rainfall (mm)	-0.90**	-0.81**
RH	-0.86**	-0.79**
Rainy days	-0.97**	-0.94**

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.j: Pearson correlation coefficient between two week prior weather parameter and % increase of RAB and YMV at AICRP on Pantnagar (2000 to 2020)

	RAB	**YMV**
Maximum Temp	-0.78**	-0.74**
Minimum Temp	-0.94	-0.85**
Rainfall (mm)	-0.82**	-0.66**
RH	-0.87**	-0.77**
Rainy days	-0.98**	-0.92**

**Correlation is significant at the 0.01 level and *Correlation is significant at the 0.05 level

Table 4.9.k: Correlation coefficient (r) values between severity of MLS and CR with various weather parameters at Sehore center

		CR	MLS
Year	**Weather parameter**	**Correlation coefficient**	**Correlation coefficient**
2011	Rain fall		-0.592
	Max. Temp.		0.147300124
	Min Temp.		-0.502
	Humidity		-0.744
2012	Rain fall		-0.802*
	Max. Temp.		0.547
	Min Temp.		0.218
	Humidity		0.404
2013	Rain fall	-0.51	-0.82*
	Max. Temp.	0.544*	0.766
	Min Temp.	-0.065	-0.268
	Humidity	0.504*	0.409
2015	Rain fall	-0.627	-
	Max. Temp.	0.791*	-
	Min Temp.	-0.64	-
	Humidity	0.738*	-
2016	Rain fall	-0.702	-0.874*
	Max. Temp.	0.795*	0.808*
	Min Temp.	-0.404	0.017
	Humidity	-	-
2017	Rain fall	0.414	0.21
	Max. Temp.	0.363	0.699
	Min Temp.	-0.245	-0.6
	Humidity	-	
2019	Rain fall	-	-0.579
	Max. Temp.	-	0.416
	Min Temp.	-	-0.296
	Humidity	-	0.402

Table 4.10 a: Estimation of avoidable yield loss due to CR, RAB and Frog eye leaf spot disease in soybean during 2020
Center: Jabalpur

Treatment	CR		RAB			FLS			Yield (Kg/ha)	Avoidable Yield loss (%)
	Incidence (%)	AUDPC	Incidence (%)	PDI	AUDPC	Incidence (%)	PDI	AUDPC		
JS 95-60										
1	90.3	1762.0	10.3	4.1	95.5	7.4	1.9	32.3	0.0	-
2	86.7	1557.5	9.5	3.8	76.8	6.2	1.6	30.3	0.0	-
3	85.0	1503.0	7.0	3.5	73.0	4.8	1.1	22.0	0.0	-
4	88.7	1640.0	5.1	2.6	59.8	3.4	1.2	21.3	0.0	-
5	87.3	1724.5	9.1	5.1	126.8	6.8	2.1	41.0	0.0	-
6	89.0	1747.5	16.5	6.6	148.5	10.8	3.9	77.5	0.0	-
JS 20-98										
1	0.0	0.0	8.3	3.5	54.5	5.3	1.3	13.0	1400.0	4.29
2	0.0	0.0	6.7	2.7	20.3	3.7	0.7	5.3	1441.7	7.05
3	0.0	0.0	5.1	1.9	21.5	4.4	0.8	5.8	1470.0	8.84
4	0.0	0.0	4.2	1.1	20.3	2.8	0.6	4.3	1476.7	9.26
5	0.0	0.0	9.1	3.8	55.5	6.5	1.5	11.5	1383.3	3.13
6	0.0	0.0	12.9	5.0	69.0	8.9	2.4	25.3	1340.0	-
CD (p=0.05)	**5.22**	**-**	**1.89**	**0.86**	**-**	**2.12**	**0.78**	**-**	**26.73**	**-**

Incidence and PDI= 75 DAS, AUDPC= 30, 45, 60 and 75 DAS

Table 4.10 b: Estimation of avoidable yield loss due to CR, disease in soybean during 2020 Center: Amravati

Treatments	JS-335 PDI (CR) DAS (PDI %)				AMS 1000-2 PDI (CR) DAS (PDI%)				Yield Kg / ha	JS 335 Avoidable Yield Loss %	Yield Kg / ha	AMS 1000-2 Avoidable Yield Loss %
	30	**45**	**60**	**75**	**30**	**45**	**60**	**75**				
T1:ST with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0.74 *(1.36)	6.58 (3.07)	10.90 (3.80)	15.63 (4.45)	1.41 (1.69)	5.80 (2.91)	9.75 (3.62)	14.82	1534.00	17.91	1407.41	8.55
T2: ST with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0.00 (0.50)	7.41 (3.22)	11.05 (3.82)	12.18 (3.99)	0.00 (0.50)	5.18 (2.78)	9.27 (3.54)	14.29 (4.35)	1556.00	19.05	1417.00	12.30
T3: ST with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0.00 (0.50)	5.40 (2.82)	9.19 (3.53)	13.81 (4.22)	0.00 (0.50)	5.14 (2.77)	9.00 (3.50)	**13.47 (4.28)**	1614.20	21.99	1685.19	30.88
T4: ST with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	0.00 (0.50)	7.07 (3.16)	10.48 (3.74)	**10.73 (3.78)**	0.00 (0.50)	5.60 (2.87)	9.57 (3.59)	14.50 (4.17)	1657.41	24.02	1734.58	22.46
T5: ST with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Water spray	1.17 (1.58)	7.48 (3.23)	12.67 (4.06)	17.51 (4.68)	1.77 (1.83)	7.88 (3.31)	11.65 (3.91)	17.14 (4.31)	1364.20	10.16	1383.00	5.73
T6: No ST NO Spray i.e Control	2.96 (2.22)	9.36 (3.56)	13.63 (4.19)	18.89 (4.85)	2.37 (2.04)	9.05 (3.51)	12.57 (4.04)	17.22 (4.65)	1259.26	-	1290.13	-
F -Test	NS	NS	NS	NS	SIG	SIG	SIG	SIG	NS		SIG.	
SE(m)+-	-	-	-	-	0.14	0.13	0.17	0.19	-		69.03	-
CD	-	-	-	-	0.41	0.37	0.51	0.56	-		203.72	-

Table 4.10 c: Estimation of avoidable yield loss due to TLS, disease in soybean during 2020 Center: Sehore

Varieties/ Treatment	Per cent TLS leaf spot incidence				AUPDC	Yield kg/ha*	Avoidable losses (%)*
	30 DAS*	45 DAS*	60 DAS*	75 DAS*			
V1T1	0	10.3 (18.72)**	62.22 (52.06)	75.55 (60.40)	2221.44	551.11	41.01
V1T2	0	9.55 (17.95)	9.55 (19.95 0	9.55 (19.95)	429.96	622.22	48.24
V1T3	0	8.89 (17.36)	8.89 (17.36)	9.78 ((18.24)	413.29	640.00	49.68
V1T4	0	9.44 (17.85)	9.44 (17.85)	9.44 (17.85)	424.96	647.78	50.23
V1T5	0	43.33 (41.15)	75.33 (60.20)	91.66 (73.15)	3154.68	584.33	44.85
V1T6	0	47.33 (43.45)	99.9 (89.73)	99.99 (89.73)	3709.63	322.22	
V2T1	0	0.93 (5.53)	6.8 (15.12)	6.8 (15.12)	217.95	1175.00	43.62
V2T2	0	0.86 (5.32)	0.86 (5.32)	0.86 (5.32)	38.7	1433.34	51.35
V2T3	0	0.8 (5.13)	0.88 (5.58)	0.88 (5.58)	38.4	1441.67	52.50
V2T4	0	0.85 (5.29)	0.85 (5.29)	0.85 (5.29)	38.25	1372.22	49.77
V2T5	0	3.9 (11.39)	8.25 (16.64)	8.25 (16.64)	306	1050.56	37.04
V2T6	0	4.26 (11.97)	9 (17.46)	9 (17.46)	333.9	673.33	
		CD5%	CD5%	CD5%		CD 5%	
Variety (V)	-	1.948	7.039	13.689		103.263	
Treatment (T)	-	1.892	4.975	23.462		157.165	
V X T	-	2.676	7.036	33.181		222.264	

*mean of three replications of three replications

**Data in parenthesis are Arsine transformed data V1= JS9560, V2= JS 2098 (T1 to T6 as per the technical programme)

Table 4.10 d: Estimation of avoidable yield loss due to Rust, disease in soybean during 2020 Center: Dharwad DOS : 13.07.2020

Treatment : Main Treatment T1: Susceptible variety (JS 335) Main Treatment T2: Resistance/Moderate resistance variety (DSb 23)

Rust

Sub treat.		30DAS		45 DAS		60 DAS		75 DAS		Yield (q/ha.)		AUDPC		Avoidable losses (%)*	
	Main Treat.	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23
T1		0.00	0.00	15.21 (23.02)	3.44 (10.61)	33.33 (35.24)	3.33 (10.12)	40.74 (39.55)	10.01 (18.37)	1446.66	1776.41	1033.65	176.62	14.75	6.77
T2		0.00	0.00	14.36 (22.67)	2.83 (9.63)	18.52 (24.72)	2.22 (8.08)	18.59 (24.79)	5.92 (13.99)	1586.46	1807.86	632.62	120.15	28.63	8.39
T3		0.00	0.00	14.25 (22.37)	2.65 (8.82)	18.52 (24.72)	1.11 (6.04)	18.52 (24.72)	4.81 (12.65)	1634.08	1921.00	630.45	92.47	24.52	13.79
T4		0.00	0.00	12.25 (20.88)	1.65 (7.25)	18.52 (24.72)	1.11 (6.04)	18.52 (24.72)	3.70 (12.65)	1637.33	1971.00	600.45	69.15	24.67	15.97
T5		0.00	0.00	16.34 (24.03)	6.58 (14.65)	48.14 (43.86)	8.89 (17.02)	77.77 (61.84)	10.70 (8.75)	1381.66	1648.32	1550.48	312.30	10.74	-0.48
T6		0.00	0.00	20.21 (26.69)	7.40 (15.75)	55.50 (48.16)	11.11 (19.46)	85.18 (71.03	11.11 (19.46)	1233.33	1656.18	1774.50	360.97	0.00	0.00
Mean				**15.73 (23.27)**	**4.06 (11.12)**	**32.10 (33.57)**	**4.63 (11.13)**	**43.14 (41.11)**	**7.65 (16.58)**	**1486.59**	**1755.10**				
				SEm±	CD @ 5%	SEm±	CD @ 5%	SEm±	CD @ 5%	SEm±	CD @ 5%				
MT				0.45	1.33	1.27	3.75	1.70	5.00	16.08	47.18				
ST				0.78	2.31	2.21	6.50	2.95	8.66	27.86	81.75				
MT x ST				1.11	3.27	3.13	9.19	4.17	12.24	39.40	115.57				
CV				11.24		24.29		25.06		4.21					

Table 4.10 d.1: Estimation of avoidable yield loss due to PB(Ct), disease in soybean during 2020 Center: Dharwad DOS : 13.07.2020
Pod blight

Sub treat.		30DAS		45 DAS		60 DAS		75 DAS		Yield (q/ha.)		AUDPC	
	Main Treat.	**JS 335**	**DSb 23**	**JS 335**	**DSb 23**	**JS 335**	**DSb 23**	**JS 335**	**DSb 23**	**JS 335**	**DSb 23**	**JS 335**	**DSb 23**
T1		0.00	0.00	0.00	0.00	29.53 (35.85)	13.64 (21.63)	30.86 (33.73)	14.81 (22.63)	1446.66	1776.41	674.40	315.30
T2		0.00	0.00	0.00	0.00	33.98 (35.63)	9.99 (18.40)	32.10 (34.49)	12.34 (20.56)	1586.46	1807.86	750.45	242.40
T3		0.00	0.00	0.00	0.00	25.24 (30.14)	9.62 (18.04)	27.16 (31.40)	11.11 (19.46)	1634.08	1921.00	582.30	227.63
T4		0.00	0.00	0.00	0.00	21.60 (27.66)	9.52 (17.65)	20.99 (27.25)	11.11 (19.46)	1637.33	1971.00	481.43	226.13
T5		0.00	0.00	0.00	0.00	50.43 (45.22)	15.55 (23.20)	50.61 (45.33)	17.28 (24.55)	1381.66	1648.32	1136.03	362.85
T6		0.00	0.00	0.00	0.00	55.58 (48.20)	17.32 (24.50)	56.78 (48.88)	18.52 (25.48)	1233.33	1656.18	1259.55	398.70
Mean						**38.53 (38.10)**	**12.56 (20.57)**	**36.41 (36.84)**	**14.20 (36.84)**	**1486.59**	**1755.10**		
						SEm±	CD @ 5%			SEm±	CD @ 5%		
MT						0.51	1.49	0.78	1.32	16.08	47.18		
ST						0.88	2.59	0.94	2.38	27.86	81.75		
MT x ST						1.25	3.67	1.36	3.42	39.40	115.57		
CV						7.39		5.65		4.21			

Table 4.11 e: Estimation of avoidable yield loss due to disease in soybean during 2020 Center: Medziphema DOS : 22.10.2020

Treatments	Per cent Disease Index												Yield (Kg/ha)	Avoidable yield loss (%)
	Rust				RAB				PB (Ct)					
	30DAS	45DAS	60DAS	75DAS	30DAS	45DAS	60DAS	75DAS	30DAS	45DAS	60DAS	75DAS		
	JS 335												JS 335	JS 335
Sub T1	0.00	0.00	8.84	15.07	0.00	0.00	2.07	14.67	0.00	0.00	0.00	19.96	1865.00	8.20
Sub T2	0.00	0.00	7.37	11.11	0.00	0.00	0.00	15.44	0.00	0.00	0.00	10.03	2061.00	16.93
Sub T3	0.00	0.00	3.70	7.92	0.00	0.00	0.00	11.44	0.00	0.00	0.00	6.31	2185.33	21.66
Sub T4	0.00	0.00	2.81	3.59	0.00	0.00	0.00	9.10	0.00	0.00	0.00	5.16	2383.33	28.17
Sub T5	0.00	0.00	10.30	18.18	0.00	0.00	2.51	20.33	0.00	0.00	0.00	20.85	1820.00	5.93
Sub T6	0.00	0.00	19.44	26.92	0.00	0.00	14.67	23.67	0.00	0.00	0.00	25.88	1712.00	0.00
CD at 5%			0.40	0.39			0.42	0.51				0.30	152.84	
Sem±			0.13	0.13			0.14	0.17				0.10	49.60	
	JS 97-52												JS 97-52	JS 97-52
Sub T1	0.00	0.00	4.51	12.00	0.00	0.00	0.00	18.67	0.00	0.00	0.00	11.10	2178.67	10.34
Sub T2	0.00	0.00	1.78	8.00	0.00	0.00	0.00	16.75	0.00	0.00	0.00	7.89	2327.33	16.07
Sub T3	0.00	0.00	1.78	6.67	0.00	0.00	0.00	13.98	0.00	0.00	0.00	4.76	2533.67	22.90
Sub T4	0.00	0.00	1.78	4.00	0.00	0.00	0.00	7.51	0.00	0.00	0.00	4.76	2720.00	28.19
Sub T5	0.00	0.00	12.37	19.33	0.00	0.00	0.00	26.08	0.00	0.00	0.00	14.70	2063.33	5.33
Sub T6	0.00	0.00	13.44	26.00	0.00	0.00	4.07	31.70	0.00	0.00	0.00	18.85	1953.33	0.00
CD at 5%			0.59	0.82			0.32	0.47				0.43	214.27	
Sem±			0.19	0.27			0.11	0.15				0.41	69.54	

Table 4.10 f: Estimation of avoidable yield loss due to disease in soybean during 2020 Center: Palampur

Variety/Treatment	PDI of Frogeye leaf spot					PDI of Pod blight			Yield (q/ha)	Avoidable yield loss (%)
	9th Aug	24th Aug	9th Sept	24th Sept	AUDPC	9th Sept.	24th Sept.	AUDPC		
Variety 1: VLS59										
Sub T 1= Seed treatment + one spray	5.55	11.48	29.25 (32.71)	50.74 (45.40)	1033.18	5.55 (13.58)	27.40 (31.53)	247.15	16.12	10.45
Sub T 2= Seed treatment + two sprays	4.81	9.99	25.55 (30.25)	31.11 (33.86)	802.58	2.96 (9.57)	20.00 (26.53)	172.18	17.21	16.13
Sub T 3= Seed treatment + three sprays	3.70	11.85	14.44 (22.32)	19.26 (26.01)	566.53	1.85 (7.73)	14.81 (22.58)	124.75	18.67	22.70
Sub T 4= Seed treatment + four sprays	3.70	10.37	11.48 (19.79)	18.51 (25.47)	494.31	1.11 (6.05)	6.66 (14.81)	58.28	20.18	28.47
Sub T 5= Seed treatment + water spray	4.07	19.63	44.81 (42.00)	50.36 (45.19)	1374.81	8.88 (17.25)	31.11 (33.88)	316.58	14.93	4.05
Sub T 6= No seed treatment and no spray	5.18	23.33	47.03 (43.28)	51.11 (45.62)	1477.63	11.11 (19.36)	31.85 (34.32)	322.15	14.43	-
Variety-2 (JS 335)										
Sub T 1= Seed treatment + one spray	8.88	11.11	33.33 (35.24)	54.81 (47.74)	1144.25	29.62 (32.94)	48.14 (43.92)	661.05	10.97	35.02
Sub T 2= Seed treatment + two sprays	8.14	10.37	16.29 (23.78)	38.88 (38.56)	752.53	11.48 (19.71)	25.92 (30.56)	413.80	13.03	45.28
Sub T 3= Seed treatment + three sprays	9.63	14.44	15.92 (23.44)	19.26 (26.01)	672.04	5.18 (13.09)	17.77 (24.91)	244.38	13.56	47.40
Sub T 4= Seed treatment + four sprays	8.14	10.00	10.74 (19.12)	18.51 (25.47)	510.98	3.33 (10.41)	11.48 (19.71)	219.40	15.55	54.13
Sub T 5= Seed treatment + water spray	9.26	28.88	53.33 (46.89)	64.81 (53.61)	1788.37	41.48 (40.07)	64.81 (53.62)	877.05	7.24	1.57
Sub T 6= No seed treatment and no spray	9.62	30.37	54.07 (47.32)	65.55 (54.06)	1830.39	43.33 (41.13)	65.55 (54.06)	897.15	7.13	-
CD	A=2.57 B=N/A	A=1.246 B=2.761	A=N/A B= 2.384	A=0.755 B=1.96	A=16.152 B=106.394	A=1.79 B=1.99	A=0.582 B=2.749	A=44.203 B=40.936	A= 4.559 B= 1.25	-

Table 4.10 g: Estimation of avoidable yield loss due to disease in soybean during 2020 Center: Indore

S.No	Treatment	PB (Ct) PDI (%)				Yield (q/ha)	AYL	AUDPC
		30 DAS	45 DAS	60 DAS	75 DAS		(%)	
1	M1T1	55.25	65.25	80.52	85.25	0.89	26.17	2458.75
2	M1T2	50.25	45.25	78.65	82.67	0.95	34.31	2326.10
3	M1T3	45.25	42.25	65.52	79.52	1.04	47.10	2183.48
4	M1T4	45.25	42.25	60.25	70.23	1.08	52.91	2020.90
5	M1T5	55.25	65.25	80.52	87.33	0.75	6.89	2495.15
6	M1T6	60.25	75.57	90.33	90.33	0.71	0.00	2635.15
7	M2T1	3.70	5.23	7.28	9.23	18.11	31.21	226.28
8	M2T2	2.81	4.38	5.23	7.23	19.20	39.11	175.70
9	M2T3	3.70	3.12	5.23	5.23	19.27	39.61	156.28
10	M2T4	4.54	3.18	3.18	3.18	19.65	42.36	135.10
11	M2T5	8.22	9.23	10.57	12.22	14.52	5.17	357.70
12	M2T6	10.23	12.25	15.57	17.57	13.80	0.00	486.50
		0.48	0.38	0.41	0.43			
		1.43	1.13	1.22	1.28			

M1= Susceptible variety (JS-9560)
M2= Resistant variety (JS-20-98)

Table 4.10 h: Estimation of avoidable yield loss due to RAB disease in soybean during 2020 Center: Pantnagar

S.No	Treatment	Incidence (%) RAB				PDI (%) RAB				AUDPC			Yield kg/ 4.5 m^2 plot	AYL (%)
		30 DAS	45 DAS	60 DAS	75 DAS	30 DAS	45 DAS	60 DAS	75 DAS	45 DAS	60 DAS	75 DAS		
1	M1T1	5.00	8.50	14.50	20.50	3.50	10.25	18.75	28.00	103.13	217.50	350.63	0.52	3.23
2	M1T2	3.00	5.75	11.50	14.75	5.67	13.00	14.15	16.75	140.00	203.63	231.75	0.58	14.29
3	M1T3	4.50	7.50	10.33	13.50	6.50	11.33	12.50	14.50	133.75	178.75	202.50	0.63	21.05
4	M1T4	6.50	7.00	9.25	11.50	4.83	7.23	10.50	13.33	90.50	133.00	178.73	0.57	12.20
5	M1T5	8.00	11.00	23.50	27.75	4.06	14.83	16.50	24.00	141.68	235.00	303.75	0.52	3.23
6	M1T6	12.00	24.50	39.50	60.00	12.00	26.84	42.25	72.50	291.33	518.20	860.63	0.50	-
7	M2T1	3.00	8.75	13.50	19.25	3.00	7.58	15.33	19.50	79.38	171.85	261.23	1.17	44.29
8	M2T2	0.00	6.50	9.25	12.25	3.17	8.18	11.50	15.54	85.10	147.60	202.80	1.30	50.00
9	M2T3	0.00	5.00	7.50	11.33	1.17	4.43	10.35	13.00	42.00	110.88	175.13	0.92	29.09
10	M2T4	2.50	3.00	5.75	9.50	0.67	3.33	8.50	10.33	30.00	88.75	141.23	1.20	45.83
11	M2T5	4.00	9.50	15.00	23.35	2.33	6.83	16.15	20.50	68.75	172.38	274.88	0.68	4.88
12	M2T6	10.00	12.50	17.50	25.00	9.17	15.22	21.50	26.50	182.90	275.40	360.00	0.65	-

M1= Susceptible variety (JS-335)
M2= Resistant variety (JS-20-98)

सूक्ष्मजीव विज्ञान
Microbiology

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MB 1/16: Isolation and functional characterization of selected rhizobia/rhizobacteria for developing inoculants to mitigate abiotic stress in soybean

Indore Centre

Table MB1/16A: Identification of bacterial isolates based on FAME profile

S. No.	Isolate	Sim Index	Isolates
1	MB17		NO MATCH
2	MB6	0.650066	*Flavobacterium-johnsoniae*
3	MB8	0.755749	*Pseudomonas-mucidolens*
4	MB4	0.40292	*Pseudomonas-putida-biotype* A
5	MB11	0.362577	*Pseudomonas-putida-biotype* A
6	MB14	0.678242	*Pseudomonas-putida-biotype* A
7	MB7	0.170921	*Pseudomonas-putida-biotype* A
8	**MB1**	**0.518262**	***Pseudomonas-putida-biotype A***
9	**MB2**	**0.705276**	***Pseudomonas-mucidolens***
10	MB5	0.261297	*Pseudomonas-putida-biotype* A
11	MB7	0.199062	*Pseudomonas-putida-biotype* A
12	MB9	0.479329	*Pseudomonas-putida-biotype* A
13	**MB10**	**0.806043**	***Pseudomonas-fluorescens-biotype* A**
14	MB11	0.519728	*Pseudomonas-putida-biotype* A
15	MB13	0.24714	*Lysinibacillus-sphaericus-GC subgroup F*
16	MB15	0.167847	*Photorhabdus-luminescens-luminescens*
17	**MB16**		**NO MATCH**

Table MB1/16B: Identification of moisture tolerant PGPR strains (tolerant at 25 and 30% PEG)

S. no.	Isolate	25% PEG	30% PEG
1	MB1 (*Pseudomonas putida)*	0.46b	0.25c
2	MB2 *(Pseudomonas mucidolens)*	**0.92 a**	**0.81a**
3	MB10 (*Pseudomonas fluorescens)*	**0.98 a**	**0.65b**
4	MB16 (No- match)	0.45b	0.25c
LSD (P=0.05)		**0.146**	**0.154**

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

Table MB1/16C: Qualitative and quantitative screening of potential moisture tolerant PGPR strains for Proline, ACC deaminase and Siderophore production under *invitro* conditions (Indore Centre)

Inoculation	Proline (µg/ml)			ACC (mMα ketobutyrate µg/protein/ h)			Siderophore (µg/ml)		
	ST	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**
MB1	1.41c	5.11bc	4.64b	0.26f	0.60c	0.431d	20.66d	25.5bcd	23.09a
MB2	4.63c	5.74b	5.18b	0.34e	0.64bc	0.493c	23.55cd	30.79b	27.17a
MB10	**4.94bc**	**8.08a**	**6.51a**	**0.44d**	**0.69 b**	**0.568 b**	**27.19bcd**	**47.46a**	**37.32a**
MB16	**4.98bc**	**8.10a**	**6.54a**	**0.46d**	**0.77a**	**0.616**	**27.44bc**	**52.80a**	**40.12a**
Mean	4.68b	6.76a		0.37b	0.67a		24.71b	39.14a	
One way ANOVA LSD (P=0.05)	0.994			0.063			6.046		
Two way ANOVA LSD (P=0.05)									
Stress									
Inoculation	0.497			0.0315					
Int. effect	0.703			0.044			3.023		
Stress× inoculation	**			ns			4.275 ***		

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

Table MB1/16D: Quantitative screening of potential rhizobacteria isolate for IAA, PSB and EPS under *invitro* conditions (Indore Centre)

Inoc	IAA (µg/ml)			PSB (KH_2PO_4µg/ml)			EPS (mg glucose/L)		
	ST	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**
MB1	3.66 h	33.14d	18.40d	76.49 f	127.30 d	101.89c	168.44b	199.46ab	183.95b
MB2	14.34g	57.12 c	35.73c	93.92ef	157.25 d	125.58b	179.46ab	223.54ab	201.50ab
MB10	**21.01f**	**73.46 b**	**47.23b**	**96.79ef**	**179.56 b**	**138.17b**	**248.23ab**	**255.38ab**	**251.80a**
MB16	**25.28e**	**89.34a**	**57.31a**	**104.48e**	**302.23 a**	**203.35a**	**254.76ab**	**269.53a**	**262.14a**
Mean	16.07 b	63.27 a		92.92b	191.58a		212.72a	236.97a	
One way ANOVA LSD (P=0.05)	2.224			21.693			83.960		
Two way ANOVA LSD (P=0.05) Stress Inoculation Int. effect Stress× inoculation	1.112 1.572 ***			10.846 15.339 ***			41.980 59.368 ns		

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

Ludhiana Centre

Table MB1/16E: Table 1. Growth index (OD~600nm) of potential *Bradyrhizobium* and *Pseudomonas* sp. as single and consortium inoculants for concerted stress tolerance at varying temperatures up to 6 days (Ludhiana Centre)

Treatments	**28ºC**	**37ºC**	**45ºC**
Bradyrhizobium sp. (LSBR-3)	0.810a	0.511b	0.210c
Pseudomonas fluorescence LSE-1	0.940a	0.632b	0.323c
Pseudomonas oryzihabitans LSE-3	1.020a	0.864b	0.587c
Bradyrhizobium + *Pseudomonas fluorescence*	1.062a	0.952b	0.688c
Bradyrhizobium + *Pseudomonas oryzihabitans*	1.696a	0.995b	0.858c

Pantnagar centre

Table-MB1/16F: Characterization of fluorescent *Pseudomonas* at varying concentration of PEG-6000 for developing inoculants to mitigate abiotic stress in soybean (Pantnagar Centre)

Isolates	PEG Concentration (%)			
	Absorbance at 640 nm			
	0	**15**	**25**	**35**
Control (Blank)	0.0006	0.0014	0.003	0.006
Pant-1	**0.358**	**0.149**	**0.169**	**0.179**
Pant-2	**1.186**	**0.844**	**0.427**	**0.047**
Pant-3	1.697	1.409	0.765	0.198
Pant-4	1.434	0.905	0.219	0.013
Pant-5	1.668	0.947	0.264	0.017
Pant-6	**2.126**	**1.550**	**1.004**	**0.496**
Pant-7	2.042	1.257	0.513	0.197
Pant-8	**1.413**	**1.312**	**0.466**	**0.110**

MB2a/18A: Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean under pot conditions (Ludhiana, Delhi, Pantnagar, Indore, Sehore and Dharwad)

Indore Centre

MB2a/18A: Evaluation of promising soybean rhizobia for conferring drought tolerance based on nodulation and growth parameters on soybean (Variety JS 95-60) grown under pot conditions during Kharif 2020 (Indore Centre)

Inoculation	Nodules (no./plant) (at 50% flowering stage)			Nodule dry mass (at 50% flowering stage) (g/plant)			Root dry mass (at harvest stage) (mg/plant)			Shoot dry mass (at harvest stage) (g/plant)		
	ST	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**
Un-inoculated control	2.66d	8.0b	5.33b	0.03b	0.04b	0.03b	2.83d	3.46c	3.14c	2.39c	4.24ab	3.31b
Commercial *B. japonicum*	5.0c	7.0bc	6.0b	0.04b	0.06b	0.05b	3.23cd	4.33b	3.78b	2.68bc	3.53bc	3.11b
B. daqingense	8.0b	12.33a	10.16a	0.07b	0.24a	0.15a	4.31b	5.67a	4.99a	4.32ab	5.35a	4.83a
B. liaoningense	8.0b	8.0b	9.54a	0.05b	0.18a	0.12a	4.43b	4.75b	4.59a	3.72bc	3.50bc	3.61b
Mean	5.91b	9.58a		0.05b	0.13a		3.70b	4.55a		3.28b	4.15a	
One way ANOVA LSD (P=0.05)	**2.262**			**0.056**			**0.582**			**1.479**		
Two way ANOVA LSD (P=0.05) Stress Inoculation Int. effect Stress×inoculation	**1.131** **1.599** **ns**			**0.028** **0.039** ****			**0.412** **0.291** **ns**			**0.739** **1.046** **ns**		

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

Table MB2a/18B: Evaluation of promising soybean rhizobia for conferring drought tolerance based on RWC and N & P content in soybean plants and seeds (Variety JS 95-60) grown under pot conditions during Kharif 2020 (Indore Centre)

Inoculation	Relative water content (%)			Leghaemoglobin content (mg/g nodules)			N-content in shoots (%)			P-content in shoots (%)		
	ST	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**
Un-inoculated control	34.88e	42.46de	38.67b	7.57c	7.78c	7.67c	0.63c	0.68bc	0.65b	0.04b	003c	0.03c
Commercial *B. japonicum*	38.76e	53.31cde	46.03b	8.03bc	9.29ab	8.66b	0.63c	0.67bc	0.65b	0.043b	0.04b	0.04b
B. daqingense	59.16bcd	70.14abc	64.65a	9.91a	9.98a	9.94a	0.81a	0.84a	0.82a	0.06a	0.063a	0.06a
B. liaoningense	73.24ab	79.63a	76.43a	9.3ab	10.06a	9.68a	0.86a	0.76ab	0.81a	0.063a	0.07a	0.06a
Mean	51.51b	61.39a		8.70a	9.28a		0.73a	0.74a		0.05a	0.05a	
One way ANOVA LSD (P=0.05)	**18.200**			**1.239**			**0.099**			**0.009**		
Two way ANOVA LSD (P=0.05)												
Stress	**9.100**			**0.619**			**0.049**			**0.004**		
Inoculation	**12.869**			**0.876**			**0.070**			**0.007**		
Interaction effect Stress×inoculation	**ns**			**ns**			**ns**			**ns**		

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

MB2a/18C: Evaluation of promising soybean rhizobia for conferring drought tolerance based on P uptake, chlorophyll and proline content in soybean plants (Variety JS 95-60) grown under pot conditions during Kharif 2020 (Indore Centre)

Inoculation	Shoot N uptake (g/plant)			Shoot P uptake (g/plant)			Chlorophyll Content (mg g^{-1} of fresh leaf)			Proline content (µmol.g^{-1})		
	ST	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**
Un-inoculated control	0.15b	0.03b	0.09b	0.01c	0.01bc	0.01c	0.2e	0.22de	0.21d	2.66f	2.15f	2.41d
Commercial *B. japonicum*	0.16b	0.02b	0.09b	0.01c	0.01c	0.01c	0.25d	0.24de	0.24c	4.13e	3.99e	4.06c
B. daqingense	0.35a	0.04b	0.19a	0.02b	0.01c	0.03a	0.30c	0.32bc	0.31b	6.73b	5.23d	5.98b
B. liaoningense	0.32a	0.03b	0.17ab	0.02b	0.01c	0.02b	0.47a	0.36b	0.42a	7.3a	5.86c	6.58a
Mean	0.24a	0.03		0.01a	0.02a		0.31a	0.28b	5.20a	4.30b		
One way ANOVA LSD (P=0.05)	**0.126**			**0.009**			**0.044**			**0.561**		
Two way ANOVA LSD (P=0.05) Stress	0.063			0.004			0.022			0.396		
Inoculation	0.089			0.007			0.031			0.280		
Interaction effect Stress×inoculation	ns			ns			**			**		

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

Sehore centre

Table-MB2a/18D Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean based on nodulation, LegH and N content in drought stressed and unstressed/irrigated soybean plants (Variety RVS 24) grown under pot conditions during Kharif 2020

Inoculation	Nodules (no./plant) (at 50% flowering stage)			Nodule dry mass (at 50% flowering stage) (g/plant)			Leghaemoglobin content (mg/g of nodules)			N-content in shoots (%)		
	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean
Un-inoculated control	48.9	42.3	45.6	66.0	58.1	62.1	3.6	3.5	3.6	0.9	0.9	0.9
Commercial *B. japonicum*	53.0	59.5	56.25	85.8	81.8	83.8	3.7	3.7	3.7	1.00	0.9	0.9
B. daqingense	51.1	47.3	74.75	97.8	82.9	90.4	3.8	3.7	3.8	1.00	1.00	1.00
B. liaoningense	61.1	47.2	54.15	105.3	103.3	104.3	3.9	3.9	3.9	1.00	1.00	1.00
Mean	53.7	51.6	52.65	88.7	81.5	85.1	3.8	3.7	3.7	1.00	0.9	1.00
Two way ANOVA LSD (P=0.05) Stress Inoculation Interaction effect Stress×inoculation	SE(m) 1.47 2.08 2.94	C.D.(5%) 4.22 5.97 8.44		SE(m) 1.45 2.05 2.90	C.D.(5%) 4.16 5.89 8.32		SE(m) 0.01 0.01 0.02	C.D(5%) 0.03 0.04 0.06		SE(m) 0.0 0.00 0.00	C.D.(5%) 0.01 0.01 0.01	

Table-MB2a/18E Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean based on physiological and growth parameters in drought stressed and unstressed soybean plants (Variety RVS 24) grown under pot conditions during Kharif 2020

	Chlorophyll Content (mg g^{-1} of fresh leaf)			Relative water content (%)			Dry wt. of shoot $plant^{-1}$ (g)			Dry wt. of root $plant^{-1}$ (g)			P-content in shoots (%)		
	ST	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**
Un-inoculated control	3.8	4.2	4	18.92	17.52	18.22	5.6	4.8	5.2	1.7	1.4	1.55	0.12	0.12	0.12
Commercial *B. japonicum*	4.2	4.2	4.2	20.63	20.23	20.43	6.3	5.9	6.1	2.3	1.3	1.80	0.13	0.13	0.13
B. daqingense	4.3	4.3	4.3	24.12	22.22	23.17	7.2	6.6	6.9	2.5	2.3	3.65	0.14	0.14	0.14
B. liaoningense	4.5	4.4	4.4	26.53	25.73	26.13	7.9	7.6	7.7	2.9	2.7	4.25	0.2	0.19	0.29
Mean	4.2	4.3	4.2	22.55	21.42	21.98	6.7	6.2	6.5	2.35	1.92	2.1	0.14	0.29	0.21
Two way ANOVA LSD (P=0.05)	SE(m)	C.D(5%)		SE(m)	C.D.(5%)		SE(m)	C.D.(5%)		SE(m)	C.D.(5%)		SE(m)	C.D.(5%)	
Stress	0.06	0.17		0.14	0.41		0.09	0.27		0.04	0.12		0.00	0.012	
Inoculation	0.09	0.25		0.19	0.55		0.13	0.38		0.06	0.18		0.00	0.012	
Interaction effect Stress×inoculation	0.12	0.35		0.27	0.81		0.19	0.53		0.08	0.24		0.00	0.013	

Table- MB2a/18F Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean (variety RVS 24) under pot conditions during Kharif 2020

(Sehore Centre)

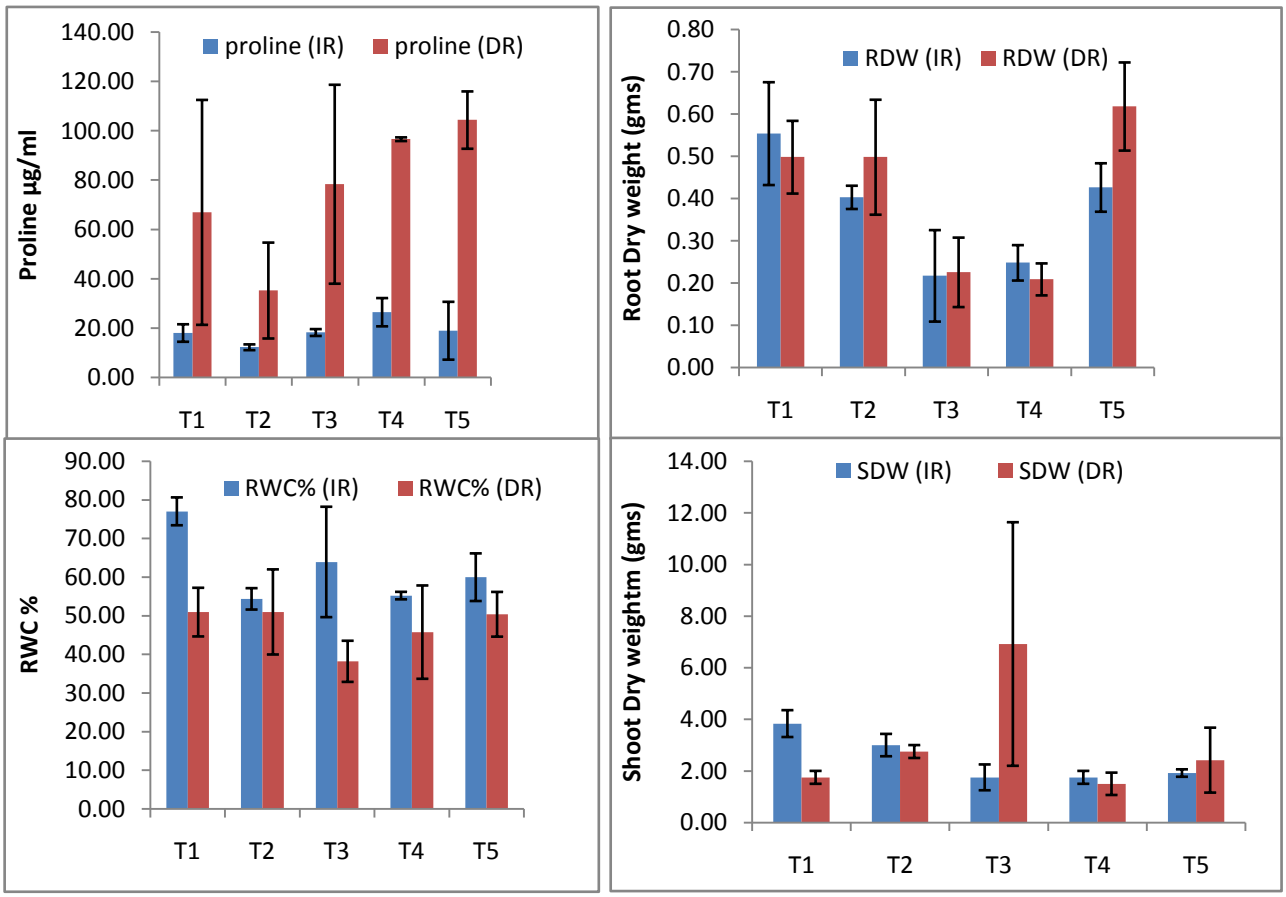
	Grain yield per plant (gram)		
	ST	**UNST**	**Mean**
Un-inoculated control	8.9	7.9	8.4
Commercial (*B. japonicum)*	10.7	9.9	10.3
B. daqingense	**12.7**	**11.8**	**12.3**
B. liaoningense	**14.4**	**13.6**	**14.0**
Mean	11.7	10.8	11.2
Two way ANOVA LSD (P=0.05) Stress Inoculation Interaction effect Stress×inoculation		SE(m) 0.16 0.23 0.33	C.D(5%) 0.47 0.66 0.93

Delhi Centre

Table-MB2a/18G: Evaluation of promising soybean rhizobia for conferring drought tolerance based on Leghaemoglobin content and nitrogen content in irrigated and drought stressed soybean plants (Variety DS 12-13) grown under pot conditions during Kharif 2020

Potential rhizobial strain	**Irrigated**		**Drought**	
	Leghaemoglobin in nodules (mg/g)	**Nitrogen content % (IR)**	**Leghaemoglobin in nodules (mg/g)**	**Nitrogen content %**
Uninoculated control	4.34	4.97	1.84	3.81
Local Rhizobial strain, KAS-1	2.36	5.09	2.25	3.53
B. daqingense	4.22	4.40	6.03	5.23
B.liaoningense	3.66	4.88	7.28	4.16
Pseudomonas sp local strain (selected from previous year study)	1.34	5.42	1.34	2.93
CD	N/S	0.422	2.784	0.262
SE(m)	1.407	0.113	0.872	0.07

Figure-MB2a/18H: Evaluation of promising soybean rhizobia for conferring drought tolerance based on proline content, RWC and dry weight of root and shoots in irrigated and drought stressed soybean plants (Variety DS 12-13) grown under pot conditions during Kharif 2020 (Delhi Centre)



Ludhiana Centre

Table-MB2a/18H: Evaluation of promising PGPR for conferring drought tolerance in soybean based on physiological and growth parameters in drought stressed and unstressed soybean plants (Variety SL 958) grown under pot conditions during Kharif 2020

Treatments	Dry wt. of shoot plant^{-1} (g)		Dry wt. of root plant^{-1} (g)		Chlorophyll Content (mgg^{-1} of fresh leaf)		Number of nodules/ plant		Dry Weight of nodules/ plant (mg)		Leghaemoglobin content (mg/g of nodules)		Catalase Activity (U/min/g fresh weight of root)		Grain yield (g/plant)
	BD	**AD**	**BD**	**AD**	**BD**	**AD**	**BD**	**AD**	**BD**	**AD**	**BD**	**AD**	**BD**	**AD**	
Un-inoculated control	4..85	4.15	0.28	0.21	1.32	0.65	10	7	10.92	6.22	2.28	1.98	3.48	7.15	1.32
Bradyrhizobium sp. (LSBR-3)	5.7 9	5.22	0.40	0..35	1.45	0.68	12	9	11.19	7.09	3.46	2.98	4.22	8.39	1.51
B. daqingense	**5.83**	**5.09**	**0.55**	**0.42**	**1.85**	**0.70**	**11**	**10**	**13.20**	**8.95**	**3.12**	**2.5 7**	**4.59**	**7.73**	**2.7 8**
B. liaoningense	**4.92**	**3.98**	**0.56**	**0.39**	**1.77**	**0.80**	**11**	**9**	**12.65**	**8.15**	**3.10**	**2.43**	**4.74**	**7.48**	**2.28**
CD @5%	A=0.40 B=0.42 AB=0.78		A=0.12 B=0.17 AB=0.23		A=0.20 B=0.02 AB=0.06		A=NS B=NS AB=NS		A=2.20 B=3.62 AB=5.71		A=0.21 B=0.29 AB=0.35		A=NS B=0.10 AB=0.22		0.62

BD = Before Drought; AD = After Drought

Pantnagar Centre

Table-MB2a/18I: Evaluation of promising PGPR for conferring drought tolerance in soybean based on chlorophyll content and proline in soybean leaves in drought stressed and unstressed soybean plants (Variety PS 1347) grown under pot conditions during Kharif 2020 (Pantnagar Centre)

Moisture level/ Cultures	Chlorophyll 'a' content in leaves (mg g^{-1})			Chlorophyll 'b' content in leaves (mg g^{-1})			Total Chlorophyll content (a+b) in leaves (mg g^{-1})			Proline content in leaves (µg g^{-1})		
	No stress	**Stress**	**Average**	**No stress**	**Stress**	**Average**	**No stress**	**Stress**	**Average**	**No stress**	**Stress**	**Average**
Uninoculated Control	8.08	12.70	10.39	6.58	7.35	**6.97**	14.66	20.04	**17.36**	0.029	0.165	0.097
Local rhizobial strain (pant 2)	10.85	13.12	11.99	6.90	7.69	**7.29**	17.75	20.82	**19.28**	0.034	0.146	0.091
B. daqingense	11.49	14.68	13.08	7.85	8.14	**8.00**	19.34	22.82	**21.08**	0.032	0.156	0.094
B. liaoningense	13.91	15.25	14.58	8.90	10.33	**9.61**	22.81	25.58	**24.19**	0.038	0.115	0.076
Average	**11.08**	**13.94**		**7.56**	**8.38**		**18.64**	**22.31**		**0.033**	**0.146**	
C.D. (≤ 0.05)	**Moisture stress (MS)**	**Cultures (C)**	**MS X C**	**Moisture stress (MS)**	**Cultures (C)**	**MS X C**	**Moisture stress (MS)**	**Cultures (C)**	**MS X C**	**Moisture stress (MS)**	**Cultures (C)**	**MS X C**
	NS	1.03	1.46	0.91	1.29	NS	NS	1.63	NS	NS	0.012	0.017

Table-MB2a/18J: Evaluation of promising PGPR for conferring drought tolerance in soybean based on nodulation and RWC in drought stressed and unstressed soybean plants (Variety PS 1347) grown under pot conditions during Kharif 2020 (Pantnagar Centre)

Moisture level/ Cultures	Nodule Number/plant			Nodule dry weight g/plant			Relative Water content in leaves (%)		
	No stress	Stress	Average	No stress	Stress	Average	No stress	Stress	Average
Uninoculated Control	88.2	87.2	87.7	0.85	0.82	0.83	45.64	31.76	38.70
Local rhizobial strain (pant 2)	101.7	103.2	102.4	0.98	0.95	0.96	56.00	38.11	47.06
B. daqingense	119.8	125.0	122.4	1.21	1.15	1.18	51.06	33.47	42.26
B. liaoningense	115.2	118.0	116.6	1.05	1.03	1.04	52.17	38.32	45.24
Average	**106.2**	**108.3**		**1.02**	**0.99**		**51.22**	**35.41**	
C.D. (≤ 0.05)	**Moisture stress (MS)** 7.2	**Cultures (C)** 10.1	**MS X C** NS	**Moisture stress (MS)** 0.095	**Cultures (C)** 0.134	**MS X C** NS	**Moisture stress (MS)** NS	**Cultures (C)** 5.00	**MS X C** NS

Table-MB2a/18K: Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean based on growth and nutrient uptake in drought stressed and unstressed soybean plants (Variety PS 1347) grown under pot conditions during Kharif 2020 (Pant Nagar Centre)

Moisture level/ Cultures	**Shoot dry mass ((g plant^{-1})**			**Root dry mass (mg plant^{-1})**			**Nitrogen uptake in shoot (mg plant^{-1})**			**Phosphorus uptake in shoot (mg plant^{-1})**		
	No stress	**Stress**	**Average**	**No stress**	**Stress**	**Average**	**No stress**	**Stress**	**Average**	**No stress**	**Stress**	**Average**
Uninoculated Control	8.24	6.53	7.38	7.96	7.48	7.72	36.89	25.06	30.97	22.73	18.97	20.85
Local rhizobial strain (pant 2)	9.84	7.99	8.92	10.06	8.93	9.50	51.70	35.70	43.70	36.23	28.52	32.38
B. daqingense	11.00	9.99	10.50	11.03	10.11	10.57	62.12	40.79	51.46	34.28	27.81	31.04
B. liaoningense	7.89	7.43	7.65	9.94	8.96	9.44	37.47	37.59	37.53	32.24	29.19	30.72
Average	**9.24**	**7.99**		**9.75**	**8.87**		**47.04**	**34.79**		**31.37**	**26.12**	
C.D. (≤ 0.05)	**Moisture stress (MS)** NS	**Cultures (C)** 0.66	**MS X C** NS	**Moisture stress (MS)** NS	**Cultures (C)** 0.49	**MS X C** NS	**Moisture stress (MS)** NS	**Cultures (C)** 4.19	**MS X C** 5.92	**Moisture stress (MS)** NS	**Cultures (C)** 2.99	**MS X C** NS

Table-MB2a/18L: Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean based on growth and nutrient uptake in drought stressed and unstressed soybean plants (Variety PS 1347) grown under pot conditions during Kharif 2020 (Pantnagar Centre)

Moisture level/ Cultures	**Nitrogen up take in grains (mg plant^{-1})**			**P uptake in grains (mg plant^{-1})**			**Grain yield (g plant^{-1})**		
	No stress	**Stress**	**Average**	**No stress**	**Stress**	**Average**	**No stress**	**Stress**	**Average**
Uninoculated Control	409.5	276.4	343.0	58.49	39.49	48.99	9.94	7.72	8.83
Local rhizobial strain (pant 2)	586.7	377.8	482.2	83.81	54.00	68.89	12.01	8.96	10.48
B. daqingense	459.5	336.6	398.1	65.65	48.09	56.87	10.46	8.07	9.26
B. liaoningense	660.1	474.5	567.3	94.30	67.79	81.04	12.70	9.90	11.30
Average	**529.0**	**366.3**		**75.56**	**42.33**		**11.28**	**8.66**	
C.D. (≤ 0.05)	**Moisture stress (MS)** NS	**Cultures (C)** 51.2	**MS X C** NS	**Moisture stress (MS)** NS	**Cultures (C)** 7.31	**MS X C** NS	**Moisture stress (MS)** NS	**Cultures (C)** 0.86	**MS X C** 1.22

Dharwad Centre

MB 2a/18M: Relative chlorophyll content in leaves, leghaemoglobin in nodules, proline & RWC in leaves and nodule numbers of soybean as influenced by selected rhizobia strains at different moisture levels under pot conditions during Kharif 2020 (Dharwad centre)

Treatments (M1) Rhizobial inoculation	**Chlorophyll content (SPAD)**			**Leghaemoglobin in nodules (mg/g fresh nodules)**			**Proline content in leaves (µmol g-1 FW)**			**Relative water content (%)**			**Nodules/plant**		
	FC	**SS**	**Mean of A**	**FC**	**SS**	**Mean of A**	**FC**	**SS**	**Mean of A**	**FC**	**SS**	**Mean of A**	**FC**	**SS**	**Mean of A**
T1: Un-inoculated control	25.24	22.94	24.09	0.42	0.29	0.35	5.71	6.93	**6.32**	48.62	33.47	41.05	25.24	22.94	24.09
T2: Local rhizobial strain	29.90	25.40	27.65	0.61	0.50	0.60	5.22	6.44	**5.56**	57.06	43.15	50.11	29.90	25.41	27.65
T3: *B. daqingense*	**33.84**	**29.80**	**31.82**	**0.65**	**0.61**	**0.63**	**4.71**	**5.61**	**5.16**	**65.63**	**49.54**	**57.58**	**33.840**	**29.81**	**31.82**
T4: *B. liaoningense*	**30.97**	**29.70**	**30.33**	**0.62**	**0.60**	**0.56**	**4.96**	**5.91**	**5.70**	**61.82**	**44.46**	**53.14**	**30.97**	**29.70**	**30.34**
Mean of B	29.99	26.96		0.58	0.50		5.15	6.22		58.28	42.66		29.99	26.96	
	S.Em. ±		C.D.@ 1%	S.Em. ±		C.D.@ 1%	S.Em. ±		C.D.@ 1%	S.Em. ±		C.D.@ 1%	S.Em. ±		C.D.@ 1%
C.D. of A	0.718		2.17	0.025		0.07	0.34		1.04	0.78		2.35	0.72		2.17
C.D. of B	0.508		1.53	0.017		0.05	0.24		0.74	0.55		1.66	0.51		1.53
C.D. of A×B(Inoculation +Stress level	1.016		3.17	0.035		0.10	0.49		1.39	1.10		3.20	1.01		3.03

FC, field capacity/well watered; SS, stressed

MB 3/14A: Field evaluation of AMF and *Paenibacillus polymyxa* microbial combination on soybean (JS 95-60) during Kharif 2020 at Indore Centre

Indore Centre

Treatment	Nodules (no./plant) (at 50% flowering stage)	Nodule dry mass (at 50% flowering stage) (g/plant)	shoots dry mass (at harvest stage) (kg/ha)	N-content in shoots (%)	P-content in shoots (%)	Leghaemoglobin (mg per gm nodule)	Chlorophyll Content (mg g^{-1} of fresh leaf)
Paenibacillus polymyxa (HKA 15)+AMF	153.6a	0.306a	254.15a	5.48a	1.252a	6.48a	0.342a
Farmers practice (12, 32, 16 Kg NPK/ha)	127.6a	0.218a	199.66b	4.78b	1.054a	5.974a	0.222b
LSD (P=0.05)	**26.674**	**0.097**	**46.48**	**0.691**	**0.616**	**1.371**	**0.065**

Sehore Centre

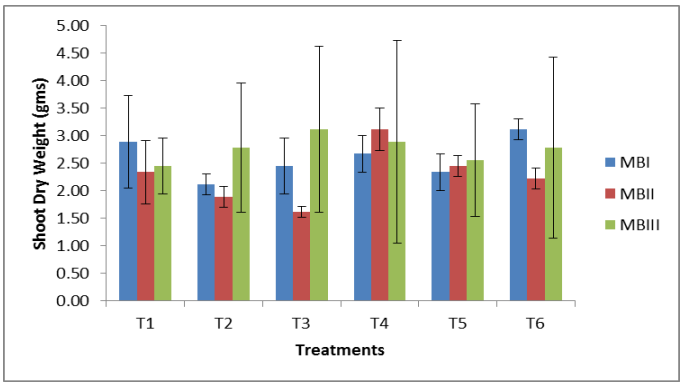
Table- MB 3/14B: Field evaluation of AMF and *Paenibacillus polymyxa* in a field trial at Sehore centre (Variety RVS 2001-4) during Kharif 2020

Treatments	NN per plant	NDW dry wt.(mg)	Grain yield Kg/ha	B:C Ratio
T1 *Paenibacillus polymixa+75% RDF*	36.25 (97)	50.00 (92)	1400 (87.10)	1.98:1
T2 Farmer practice	19.21	40.21	1050	1.25:1
Result (p=0.05)	Significant	Significant	Significant	
T1 v/s T2				

*t value: 2.26 & fcal values are mentioned in parenthesis.

Delhi Centre

Table/Fig-MB 3/14C: Field evaluation of combination of AMF and *P. polymyxa* and other microbial strains on nodulation and shoot dry weight (figure) in Delhi centre



Treatments	Nodulation at 50% flowering stage		
	DS 9712	**DS 12-5**	**HIMS01563**
AMF+ *Paenibacillus polymyxa* HKA 15	**21.89 ±4.44**	**16.89 ±1.07**	**19.44 ±4.91**
B 36	11.33 ±3.28	17.78 ±7.53	19.78 ±5.06
WI-9	**16.22 ±7.62**	**21.44 ±12.53**	**20.78 ±15.55**
KAS-1	14.00 ±4.33	16.78 ±8.51	22.11 ±6.30
RDF	9.67 ±1.76	12.44 ±4.43	18.78 ±1.95
Un-inoculated Control	16.00 ±5.90	19.22 ±3.34	17.33 ±1.86
CD	6.59	N/A	N/A
SE(m)	2.08	3.36	4.50

Ludhiana Centre

Table-MB3/14D: Field evaluation of AMF and *P. polymyxa* microbial combination on symbiotic traits, total N & P content and yield in soybean at farmer's field in Ludhiana Centre (variety SL-958)

Treatments	Number of nodules/plant	Dry weight of nodules/ plant (mg)	Total N content of shoot (%)	Total P content of shoot (%)	Grain yield (kg/ha)
Farmer's practice	32	79.5	1.32	0.118	1735
***Paenibacillus polymyxa* (HKA 15) + AMF consortium**	48	98.5	1.48	0.132	1880

Table-MB 3/14E Economics of microbial consortium of *Paenibacillus polymyxa* (HKA 15) + AMF application as biofertilizer in soybean at farmer's field at Ludhiana Centre.

Treatments	Grain yield (kg/ha)	*Gross returns (Rs/ha)	**Net returns (Rs/ha)	B :C ratio	Additional income over control (Rs/ha)
Farmer's practice	1735	67318	32995	0.96	-
***Paenibacillus polymyxa* (HKA 15) + AMF consortium**	1880	72944	38371	1.1	5376

*Market price of soybean = Rs. 3880/- quintal

** Cost of microbial consortium @ Rs. 100 per packet (for one hectare)

Cost of cultivation of farmer's practice = Rs. 34,323

Cost of cultivation of microbial treatments = Rs. 34,573

Pantnagar centre

Table-MB3/14F: Impact of AM fungi and *Paenibacillus polymyxa* microbial combination on nodulation, nutrient content and yield of soybean at Farmer's field (Variety PS 1225) at Pantnagar Centre

Treatments	No. of Nodules/ plant	Nodule dry weight (g/pl)	N content in stover at harvest (%)	N content in grain (%)	Total N uptake (kg/ha)	P content in Stover at harvest (%)	P content in grain (%)	Total P uptake (kg/ha)	Grain yield (kg/ha)	B:C Ratio
Paenibacillus polymyxa (HKA 15) + AMF consortia	124	0.32	0.63	6.16	127.45	0.35	0.614	21.35	1700	1:2.08
Farmer's Practice	79	0.23	0.58	4.42	84.44	0.29	0.575	16.41	1350	1:1.96

MB 4/13: Nodulation ability of AVT-II entries of respective centers

Indore Centre

Table MB4/13A: Evaluation of five AVT-II entries for nodulation parameters during Kharif 2020 at IISR, Indore (Indore Centre)

Variety	Nodule number	Nodule dry weight (mg/g nodules)	Leghaemoglobin content (mg/g nodules)	Chlorophyll Content (mg g-1 of fresh leaf)
RVSM 2011-35	58d	0.43b	1.97c	2.18b
NRCSL 2	188a	0.6a	7.22a	2.59a
NRC 138	57.66d	0.26d	1.97c	1.67c
AMS 100-39	150b	0.38bc	5.08b	1.08d
NRC 142	92.33c	0.34c	5.23b	1.6c
NRC 86	176.33a	0.37bc	7.03a	0.53e
LSD (P=0.05)	**13.457**	**0.072**	**0.322**	**0.359**

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

Sehore Centre

Table MB 4/13B: Evaluation of five AVT-II entries for nodulation parameters during Kharif 2020 (Sehore Centre)

Treatment	Nodule number per plant	Nodule dry weight(mg/plant)	Leghaemoglobin content (mg/g)
RVSM 2011-35	36.37	69.23	3.74
NRCSL 2	26.97	53.57	3.37
NRC 138	27.49	54.66	3.3
AM 100-39	28.59	57.47	3.36
NRC 142	30.13	57.34	3.25
NRC 86	34.42	63.61	3.28
CD at 5 %	0.46	0.65	0.02

Table MB 4/13C: Evaluation of five AVT-II entries for nodulation parameters during kharif 2020 at Indore and Sehore Centre (mean of all entries)

Treatment	Nodule number per plant.	Nodule dry weight(mg/plant)	Leghaemoglobin content (mg/g)
RVS 2011-35	47.185	34.83	2.855
NRC SL 2	**107.485**	**27.085**	**5.295**
NRC 138	42.575	27.46	2.635
AM 100-39	89.295	28.925	4.22
NRC 142	61.23	28.84	4.24
NRC 86 (Check)	105.375	31.99	5.155

Dharwad Centre

Table MB 4/13D: Nodulation ability of AVT-II entries for nodulation parameters at Dharwad Centre during Kharif 2020

Treatments	Nodule no/plant	Nodule dry weight(g)	Leghaemoglobin	Dehydrogenase (µg TPF formed g^{-1} soil d^{-1})
DSB-33	**59.00**	**0.49**	**2.10**	31.92
ASM 100-39	46.00	0.39	1.77	24.61
NRC 142	39.00	0.35	1.36	18.20
MACS NRC-1667	43.00	0.39	1.88	22.69
KS-103	31.00	0.28	1.68	26.15
NRCSL2	**54.00**	**0.37**	**2.05**	17.94
Karune (vegetable type)	49.00	0.32	1.59	20.00
DSb-21 (check)	62.00	0.59	2.19	31.02
KS-103 (check)	31.00	0.28	1.68	26.15
S.Em. ±	**0.90**	**0.011**	**0.039**	**1.191**
C.D.@ 1%	**3.81**	**0.045**	**0.164**	**5.014**

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अग्रिम पंक्ति प्रदर्शन
Frontline Demonstrations

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Northern Hill Zone	
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Almora (Uttarakhand)	Dr. Anuradha Bhartiya
Northern Plain Zone	
Ludhiana (Punjab)	Ms. Harpreet Kaur /Dr. Guriqbal Singh
Pantnagar (Uttarakhand)	Dr. Ajay Kumar Srivastava
North Eastern Hill Zone	
Imphal (Manipur)	Dr. (Mrs.) Toijam Sunanda Devi
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Eastern Zone	
Raipur (Chattisgarh)	Dr. Ram Mohan Savu
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Central Zone	
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Parbhani (Maharashtra)	Dr. S.P. Mehtre
Amravati (Maharashtra)	Dr. M.S. Dandge
SOPA, Indore (Madhya Pradesh)	Shri. Jitendra Singh
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Karda (Maharashtra)	Dr. Ravindra Kale
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Adilabad (Andhra Pradesh)	Dr. C. Sreedhar
Dharwad (Karnataka)	Dr. Somanagoude
Ugarkhurd (Karnataka)	Mr. Jagadish S. Patwardhan
Sangli (Maharastra)	Dr. Dilip Kathmale

Frontline demonstrations

Table 6.1

Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh 452001
For the Year	2020-21

S. No.	Name of centre	Physical				Financial Allocation (Gross)
		Allocation		Achievement		
		Number of FLDs	Area in ha	Number of FLDs	Area in ha	
1	Almora	10	4.50	81	4.50	30000
2	Pantnagar	10	4.00	15	4.90	30000
3	Palampur	10	4.00	34	4.10	30000
4	Ludhiana	10	4.00	10	4.00	30000
5	Sehore	10	4.00	10	4.00	30000
6	Indore	40	16.00	40	16.00	120000
7	SOPA, Indore	270	108.00	270	108.00	810000
8	Solidribad, Bhopal	160	64.00	160	64.00	480000
9	Kota	30	12.00	30	12.00	90000
10	Amravati	20	8.00	20	8.00	60000
11	Parbhani	50	20.00	50	20.00	150000
12	Sangli	25	10.00	25	10.00	75000
13	KVK Karda	100	40.00	100	40.00	300000
14	DevgrahBaria	10	4.00	10	4.00	30000
15	Dharwad	10	4.00	10	4.00	30000
16	Ugar Sugar	50	20.00	23	9.200	150000
17	Adilabad	10	4.00	10	4.00	30000
18	Imphal	15	6.00	15	6.00	45000
19	Raipur	10	4.00	10	4.00	30000
20	Ranchi	10	4.00	20	4.00	30000
Total		**900**	**324.50**	**943**	**325.56**	**2700000**

Table 6.2

Details of category wise beneficiaries of frontline demonstrations (FLDs)

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh
For the Year	2020-21

S. No.	Centre	Man					Women					Total
		SC	ST	OBC	Gen.	Total	SC	ST	OBC	Gen.	Total	
1	Almora	41	-	-	40	**81**	-	-	-	-	**0**	**81**
2	Pantnagar	1	-	2	11	**14**	-	-	-	1	**1**	**15**
3	Palampur	5	1	13	9	**28**	-	2	1	3	**6**	**34**
4	Ludhiana	-	-	-	10	**10**	-	-	-	-	**0**	**10**
5	Sehore	1	-	6	2	**9**	-	-	-	1	**1**	**10**
6	Indore	-	-	16	22	**38**	-	-	1	1	**2**	**40**
7	SOPA, Indore	9	9	149	78	**245**	2	2	11	10	**25**	**270**
8	Solidribad,	8	-	131	19	**158**	-	-	2	-	**2**	**160**
9	Kota	1	2	19	8	**30**	-	-	-	-	**0**	**30**
10	Amravati	2	4	11	1	**18**	-	-	1	1	**2**	**20**
11	Parbhani	5	-	15	20	**40**	-	2	4	4	**10**	**50**
12	Sangli	2	1	8	14	**25**	-	-	-	-	-	**25**
13	KVK Karda	13	10	70	3	**96**	-	2	2	-	**4**	**100**
14	DevgrahBaria	-	8	-	-	**8**	-	2	-	-	**2**	**10**
15	Dharwad	-	-	-	10	**10**	-	-	-	-	**0**	**10**
16	Ugar Sugar	-	-	-	22	**22**	-	-	-	1	1	**23**
17	Adilabad	2	2	3	1	**8**	-	2	-	-	**2**	**10**
18	Imphal	-	5	5	-	**10**	-	5	-	-	**5**	**15**
19	Raipur	-	-	7	-	**7**	-	-	1	2	**3**	**10**
20	Ranchi	-	20	-	-	**20**	-	-	-	-	**0**	**20**
Total		**90**	**62**	**455**	**270**	**877**	**2**	**17**	**23**	**24**	**66**	**943**
Percentage		**10.26**	**7.06**	**51.88**	**30.78**		**3.03**	**25.78**	**34.85**	**36.36**		
Total (men +women)		**92**	**79**	**478**	**294**	**943**						
Percentage		**9.75**	**8.38**	**50.69**	**31.18**							

Table 6.3

Results of Frontline Demonstrations (FLDs) on WHOLE PACKAGE in SOYBEAN conducted at various locations on farmers' fields

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR- Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh
For the Year	2020-21

S. No.	Implementing centre	No. of Trial	Area (ha)	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)	
				IP	FP	IP	FP	IP	FP	IP	FP
1	Almora	81	3.4	1460	1053	110169	83481	52503	52235	57665	31246
2	Pantnagar	15	4.9	1662	1353	63779	52494	30088	25575	33691	26919
3	Palampur	34	4.1	1353	1092	71704	57855	39810	35350	31894	22505
4	Ludhiana	10	4.0	1816	-	70441	-	33010	-	37431	-
5	Sehore	10	4.0	1304	666	49541	25316	19214	17067	30327	8249
6	Indore	40	16.0	1049	400	57316	14078	31788	24045	25528	-9967
7	SOPA, Indore	270	108.0	1011	796	42433	33382	16049	12917	26384	20466
8	Solidribad,	160	64.0	1092	812	46947	34921	25274	28658	21673	6263
9	Kota	30	12.0	1371	1128	53175	41830	25161	21916	28014	21831
10	Amravati	20	8.0	1735	1422	66451	54463	28708	26338	37743	28125
11	Parbhani	50	20.0	2077	1689	80568	65549	36244	35075	44324	30474
12	Sangli	25	10.0	2955	2547	100473	86605	42143	39025	58330	47580
13	KVK Karda	100	40.0	1301	1065	50463	41324	39281	36369	11182	4955
14	DevgrahBaria	10	4.0	1347	955	47135	33439	21155	16862	25980	16577
15	Dharwad	10	4.0	2976	2102	122000	86164	40216	33900	81784	52264
16	Ugar Sugar	23	9.20	2064	1769	66048	56608	49920	46049	16128	10559
17	Adilabad	10	4.0	1880	1648	72956	63935	45779	35842	27176	28093
18	Imphal	15	6.0	1558	1000	93460	59992	41572	26971	51888	33021
19	Raipur	10	4.0	1689	1186	65549	46005	18610	15020	47454	31180
20	Ranchi	20	4.0	1550	1188	60121	46091	28500	22665	31621	23426
Mean		**943**	**333.7**	**1663**	**1256**	**69536**	**51765**	**33251**	**29046**	**36311**	**22830**

*IP= Improved practice, **FP= Farmer's practice, *** Significant at 0.05 probability level, # data not included in mean

Table 6.4

Performance of SOYBEAN varieties under whole package in FLDs conducted at various locations on farmers' fields

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh 452001
For the Year	2020-21

S.No.	No. of trial	Variety	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		BC Ratio	
			IP	FP	IP	FP	IP	FP	IP	FP	IP	FP
1	348	JS 95-60	1038	820	44095	34830	21813	21204	22282	13626	2.14	1.88
2	122	MAUS 158	1749	1424	67845	55262	37763	35722	30083	19540	1.81	1.55
3	60	JS 20 69	1220	582	58073	23648	26465	27520	31609	-3873	2.41	0.83
4	37	JS 93 05	979	789	41498	33368	17954	16515	23544	16853	2.33	2.13
5	33	Hara Soya	1339	1078	70958	57146	39810	35350	31148	21796	0.78	0.62
6	31	VLS 65	1313	883	119489	89141	57530	57560	61959	31580	1.08	0.55
7	28	MAUS 162	1982	1615	76907	62680	36244	35075	40663	27605	2.12	1.78
8	19	VLB 201	1317	885	119857	89358	57530	57560	62327	31798	1.08	0.55
9	26	JS 20 34	1240	1017	50523	41430	25549	24600	24975	16830	1.49	1.2
10	20	AMS-MB-5-18	1735	1422	66451	54463	28708	26338	37743	28125	2.32	2.07
11	20	RKS113	1388	1153	53864	44717	25161	21916	28703	22801	1.14	1.04
12	19	Phulesangam	3014	2599	102465	88373	42143	39025	60322	49348	2.43	2.26
13	17	VLS 63	1698	1331	95068	74562	44058	43308	51010	31254	1.16	0.72
14	13	Him Soya	1384	1120	73339	59360	39810	35350	33529	24010	0.84	0.68
15	11	JS 97-52	1534	1159	59537	44969	28500	22665	31037	22304	1.09	0.98
16	12	VLS 47	1683	1313	94220	73500	44931	44181	49289	29319	1.1	0.67
17	10	NRC-37	1347	955	47135	33439	21155	16862	25980	16577	2.23	1.98
18	10	SL 958	1816	-	70441	-	33010	-	37431	-	2.13	-
19	10	Basara	1881	1648	72956	63935	45779	35842	27177	28093	1.6	1.79
20	10	CG Soya-1	1689	1186	65549	46005	18610	15020	47454	31180	3.62	3.1
21	9	BSS-2	1566	1220	60760	48660	28500	22665	32260	25995	1.13	1.15
22	7	DSb 21	2793	2055	114507	84273	40216	33900	74291	50373	2.85	2.49
23	7	PS 1225	1736	1407	66617	54597	31659	26651	34958	27946	2.1	2.05
24	6	DSb-19	1533	928	92000	55700	41572	26230	50428	29470	1.21	1.12
25	6	PhuleKimaya	2770	2383	94166	81005	42143	39025	52023	41980	2.24	2.08
26	6	JS 20 98	1529	692	71142	25283	25501	20610	45641	4673	2.84	1.28
27	5	RVS 24	1292	667	49111	25361	19214	17067	29897	8294	2.56	1.49
28	5	MACS 1460	1554	1034	93240	62016	41572	28358	51668	33658	1.24	1.19
29	4	DSb-32	1599	1065	95925	63900	41572	26350	54353	37550	1.31	1.42
30	4	JS 20 29	1250	600	68750	21000	31788	24290	36963	-3290	2.16	0.87
31	3	PS 1556	1333	1117	51173	43327	26317	22992	24856	20335	1.95	1.89
32	3	PS 1347	1883	1517	72282	58847	31659	26651	40623	32196	2.28	2.21
33	3	DSb 23	3158	2148	129492	88054	40216	33900	89276	54154	3.22	2.6
34	2	VLS 89	1745	1350	97720	75600	44058	43308	53662	32292	1.22	0.75
35	2	PS 1572	1950	1500	74841	58200	31659	26651	43182	31549	2.37	2.19
36	2	PS 1092	1275	1125	48935	43650	26317	22992	22618	20658	1.86	1.9
37	2	Palam Soya	1288	1035	68238	54855	39810	35350	28428	19505	0.72	0.56
38	2	RVS 18	1000	588	38000	22325	19214	17067	18786	5258	1.98	1.31
39	2	RVS 2001-04	1088	825	46763	35475	21121	23763	25641	11713	2.18	1.44

Table 6.5

Details of soybean cultivation cost under improved technology and farmers practice 2020-21

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh 452001
For the Year	2020-21

Centre		Land prep-aration	Seed & Sowing	ST & Ino'n	Fertili. & appli'n	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e &s appli'n	Harv-esting	Thres-hing	Any other	Total
Amravati	IP	5380	5220	240	4385	2060	-	5400	2664	-	4500	3800	-	**33649**
	FP	5380	5470	-	3275	2060	-	2000	1930	748	4500	2850	-	**28213**
Devgrah-baria, Gujrat	IP	7200	6700	430	3441	2040	-	-	4672	-	1200	1300	-	**26983**
	FP	4800	1750	-	4816	-	-	1000	2500	-	1200	1300	-	**17366**
Dharwad	IP	8200	5704	460	7363	1881	1908	4816	3022	-	2862	4000	-	**40216**
	FP	8200	6200	-	4000	-	2000	5500	700	800	2500	4000	-	**33900**
Adilabad	IP	2173	7367	50	11434	4743	690	3983	4833	3184	3771	3383	515	**46124**
	FP	2173	5256	50	9178	2707	300	4613	3253	1219	3771	3383	500	**36400**
Kota	IP	4500	5800	233	2212	2102	-	-	2002	-	5112	3200	-	**25161**
	FP	4500	5000	-	-	2102	-	-	2002	-	5112	3200	-	**21916**
Pantnagar	IP	3960	5808	163	5440	3213	654	5000	2617	-	3270	1207	327	**31659**
	FP	3960	5058	113	3689	1420	654	4500	2617	-	3270	1207	327	**26815**
Imphal	IP	3200	9898	450	8076	-	-	6720	672	336	2688	4032	5500	**41572**
	FP	2400	8232	-	2786	-	-	5040	672	-	2688	4032	1500	**27350**
KVK, Karda, Maharashtra	IP	4500	10875	1012	5394	-	-	4000	3050	950	5000	4500		**39281**
	FP	4500	10875	-	4444	-	-	4000	3050	-	5000	4500		**36369**
Ludhiana	IP	3488	3750	75	3172	1500	-	-	1985				19040	**33010**
	FP	-	-	-	-	-	-	-	-	-	-	-	-	**-**
Palampur	IP	7000	10050	60	9650	3150	1100	-	-	-	3850	3300	1650	**39810**
	FP	7000	9000	-	5050	-	-	5500	-	-	3850	3300	1650	**35350**
Parbhani	IP	5700	7400	626	5684	2448	-	1200	2476	1358	5200	4152	-	**36244**
	FP	5700	8200	-	3375	2448	-	1200	4216	1358	5200	3378	-	**35075**
Raipur	IP	1800	4850	460	4000	1900	-	-	1600	-	2500	-	1500	**18610**
	FP	1800	4850	370	4000	-	-	-	-	-	2500	-	1500	**15020**
Ranchi	IP	4250	6690	356.25	7950	1185	-	2040	2210	-	1530	2295	-	**28506**
	FP	3400	5925	-	6455	-	-	3060	510	-	1275	2040	-	**22665**
Indore	IP	2825	7200	2487.5	7750	1987.5	-	-	2078	710	2500	1250	3000	**31788**
	FP	3000	7750	-	2875	1025	-	-	2000	625	2500	1250	3000	**24025**
Sangali (MPKV)	IP	2300	3150	250	2457	1000	-	1000	1200	-	2000	3000	500	**16857**
	FP	2300	1960	150	2100	1000	-	1000	1200	1200	2000	2200	500	**15610**
Mean	IP	**4432**	**6697**	**490**	**5894**	**2247**	**1088**	**3795**	**2506**	**1308**	**3285**	**3032**	**4004**	**32631**
Percentage		13.58	20.52	1.50	18.06	6.89	3.33	11.63	7.68	4.01	10.07	9.29	12.27	
Mean	FP	**4222**	**6109**	**171**	**4311**	**1823**	**985**	**3401**	**2054**	**992**	**3240**	**2818**	**1282**	**26862**
Percentage		15.72	22.74	0.64	16.05	6.79	3.67	12.66	7.65	3.69	12.06	10.49	4.77	
Overall increase in soybean cultivation cost over farmers practices														**21.47%**

Table 6.6

Productivity potentials and profitability of whole package technologies (2020-21)

Name and Postal address of the ICAR Crop Improvement Project with Pin code	**ICAR-Indian Institute of Soybean Research**, Khandwa Road, Indore-452 001, Madhya Pradesh 452001
For the Year	2020-21

State	Centre	No of Demon (920)	Mean yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Additional net returns (Rs/ha)	B:C ratio	
			IP	FP		IP	FP	IP	FP		IP	FP
Uttarakhand	Almora	81	1460	1053	38.73	110169	83481	52503	52235	26688	2.10	1.60
Uttarakhand	Pantnagar	15	1662	1353	22.83	63779	52494	30088	25575	11284	2.12	2.05
HP	Palampur	34	1353	1092	23.94	71704	57855	39810	35350	13848	1.80	1.64
Punjab	Ludhiana	10	1816	-	-	70441	-	33010	-	-	2.13	-
MP	Sehore	10	1304	666	95.80	49541	25316	19214	17067	24225	2.58	1.48
MP	Indore	40	1049	400	162.55	57316	14078	31788	24045	43238	1.80	0.59
MP	SOPA	270	1011	796	27.02	42433	33382	16049	12917	9051	2.64	2.58
MP	Solidribad	160	1092	812	34.44	46947	34921	25274	28658	12027	1.86	1.22
Rajasthan	Kota	30	1371	1128	21.54	53175	41830	25161	21916	11345	2.11	1.91
Maharashtra	Amravati	20	1735	1422	22.01	66451	54463	28708	26338	11988	2.31	2.07
Maharashtra	Parbhani	50	2077	1689	22.91	80568	65549	36244	35075	15020	2.22	1.87
Maharashtra	Sangali	25	2955	2547	16.01	100473	86605	42143	39025	13869	2.38	2.22
Maharashtra	KVK Karda	100	1301	1065	22.16	50463	41324	39281	36369	9139	1.28	1.14
Gujrat	DevgrahBaria,	10	1347	955	41.05	47135	33439	21155	16862	13696	2.23	1.98
Karnataka	Dharwad	10	2976	2102	41.58	122000	86164	40216	33900	35836	3.03	2.54
Karnataka	Ugar Sugar	23	2064	1769	16.67	66048	56608	49920	46049	9227	1.32	1.22
Telangana	Adilabad	10	1880	1648	14.08	72956	63935	45779	35842	9021	1.59	1.78
Manipur	Imphal	15	1558	1000	55.79	93460	59992	41572	26971	33468	2.25	2.22
Chhattisgarh	Raipur	10	1689	1186	42.48	65549	46005	18610	15020	19544	3.52	3.06
Jharkhand	Ranchi	20	1550	1188	30.47	60121	46091	28500	22665	14030	2.11	2.03
Mean			**1663**	**1256**	**39.58**	**69536**	**51765**	**33251**	**29046**	**17724**	**2.17**	**1.85**

सारांश प्रतिवेदन
Summary Reports

SUMMARY REPORT OF BREEDING TRIALS KHARIF 2020

1. Northern Hill Zone

1.1 Initial Varietal Trial

Proposed Testing Centres: Almora, Palampur, Majhera
Data received from: All Centres

The yield data of 38 test entries and three checks is presented in Table 1.1.1. **Data of Almora centre was rejected due to <1000 Kg/ha grain yield**. Mean grain yield of the zone varied from 247 kg/ha (AUKS 206) to 1938 kg/ha (VLS 63) with an average of 1250 kg/ha and none of the entries was superior to the best check. The maturity duration of the trial ranged from 90 to 124 days with a mean of 115 days.

1.2 Advanced Varietal Trial-I

Proposed Testing Centres: Almora, Palampur, Majhera
Data received from: All Centres

VLS 99 and SL 1213 were tested in the trial along with three checks (Table1.1.14). The yield and maturity duration varied from 1450 (Check PS 1556) to 2107 Kg / ha (VLS 99) and 112 (Check VLS 63) to 116 days (check PS 1556), respectively. The test entry VLS 99 was the highest yielding (2107 Kg/ha) followed by the check variety VLS 63 (1928 Kg/ha). VLS 99 with 9.3% yield advantage over the best check had the maturity duration of 113 days which was equivalent to the best check.

1.3 Initial Varietal Trial (Vegetable)

Proposed Testing Centres: Palampur, Almora
Data received from: Palampur

The trial could not be taken up at Almora due to late availability of seed. Table 1.1.7 and 1.4.6 of this compilation show the green pod yield (kg/ha) at picking and yield (kg/ha) of two test entries viz. NRC 187 and NRC 188 and three checks. Check Hara Soya was the highest yielding entry **with** green pod yield (2020 kg/ha) at picking and yield (1086kg/ha).

2. Northern Plain Zone

2.1 Initial Varietal Trial

Proposed Testing Centres: Pantnagar, Delhi, Ludhiana.
Data received from: All the Centres

The yield data of 38 test entries and three checks has been presented in Table 1.2.1. Grain yield ranged from 0 to 2313 kg/ha with a mean of 942 kg/ha. PS 1670 was the highest yielding entry with maturity duration of 116 days. It recorded an increased yield of 9.3% over the best check SL 955.

2.2 Advanced Varietal Trial-I

Proposed Testing Centres: Pantnagar, Delhi, Ludhiana,
Data received from: All the Centres

The grain yield and maturity of two test entries and four checks is presented in Table 1.2.6 and 1.2.8. NRC 149 was the YMV resistant high oil entry and DS 9421 an EDV of Pusa 9712 for null KTi. NRC 149 (2325 Kg/ha) registered an increase of 13% over the best check PS

1347 (2051 Kg/ha) but matured 4 days later. DS 9421 being EDV of Pusa 9712 was directly entered in AVT-I. It yielded 6% and 42% lesser than the recurrent parent (Pusa 9712) and the best check (PS 1347), respectively. Its maturity duration (117 days) was 2 days less than its recurrent parent and 6 days less than the best check PS 1347.

3. North Eastern Hill Zone

3.1 Initial Varietal Trial

Proposed Testing Centres: Jorhat, Imphal, Umiam
Data received from: All the Centres

The yield data of 38 test entries and 3 checks has been presented in Table 1.3.1. Seed was received very late in all the centres and sowing was delayed. Mean grain yield in this trial was less than 10Q / ha. Three entries KDS 1096 (1177 Kg/ha), DSb 38 (1226 Kg/ha) and DLSb 1(897 Kg/ha) were superior to the best check JS 20-116 (798 Kg/ha).

3.2 Advanced Varietal Trial-I

Proposed Testing Centres: Jorhat, Imphal, Umiam
Data received from: All the Centres

Data of Jorhat centre was rejected due to low mean yield. Null lipoxygenase 2 and null KTi entry NRC 142 was tested with three checks and its yield (1619 Kg/ha) was 14% less than the best check (JS 20-116, 1885 Kg/ha).

4. Eastern Zone

4.1 Initial Varietal Trial

Proposed Testing Centres: Bhawanipatna, Raipur, Ranchi, Dholi
Data received from: Bhawanipatna, Raipur, Ranchi

The yield data of 38 test entries and 3 checks has been presented in Table 1.4.1 of this compilation. Trials could not be conducted at Dholi centre due to heavy rains. The mean grain yield of the trial varied from 815 Kg/ha to 2354 Kg/ha with an average of 1522 Kg/ha and the mean maturity duration had a range and mean of 92 to 106 days and 102 days, respectively. The maximum yield recorded in KDS 1096 was 10% higher than the best check (JS 20-116).

4.2 Advanced Varietal Trial-I

Proposed Testing Centres: Bhawanipatna, Raipur, Ranchi, Dholi
Data received from: Bhawanipatna, Raipur, Ranchi

Table 1.4.14 and 1.4.16 compilation show yield and maturity data of three test entries and three checks. None of the test entries was significantly superior to the best check RSC 10-46 (2219 Kg/ha). The maturity duration of the trial ranged from 100 days (check JS 20-116) to 105 days (SL 1213 and check RSC 10-46).

4.3 Initial Varietal Trial (Vegetable)

Proposed Testing Centres: Raipur, Ranchi, Dholi
Data received from: Raipur,

Trials could not be conducted at Dholi due to heavy rains and at Ranchi due to very poor germination. Two test entries NRC 187 and NRC 188 were tested with checks Hara Soya, Karune and MACS 1460. MACS 1460 was the highest green pod yielding check (2127

Kg/ha) followed by NRC 188 (1670 Kg/ha) (Table 1.4.7). In grain yield also MACS 1460 was the highest yielder (1481 Kg/ha) followed by NRC 188 (1358 Kg/ha) however NRC 188 (89 days) was the second earliest maturing after Karune (87 days) (Table 1.4.9). Green pod picking duration of NRC 187 (69 days) was earliest as compared to MACS 1460 (70 days) and NRC 188 (73 days).

Central Zone

4.4 Initial Varietal Trial

Proposed Testing Centres: Amravati, Amreli, Anand, Indore, Jabalpur, Kota, Lok Bharti, Mandsaur, Morena, Nagpur, Parbhani, Sehore
Data received from: All the Centres

Data of Amravati, Jabalpur, Mandsaur, Nagpur and Sehore was rejected due to low mean yield and high CV. Data of Indore centre was rejected due to high CV and that of Kota and Parbhani centres was rejected due to low mean yield. Data of Jabalpur was accepted inspite of very low yield since it is the hotspot for charcoal rot. Grain yield varied from 253 to 2321 Kg/ha with an average of 1309 Kg/ha (Table 1.5.1). RVS 2011-10 was the highest yielding entry and yielded 28% higher than the best check JS 20-116 (1815 Kg/ha). Days to maturity varied from 90-101 days with RVS 2011-10 maturing in 91 days and the best check maturing in 94 days.

4.5 Initial Varietal Trial (Early)

Proposed Testing Centres: Amravati, Anand, Amreli, Indore, Jabalpur, Kota, Lok Bharti, Mandsaur, Morena, Parbhani, Sehore
Data received from: All the centres

Data from Indore was rejected due to high CV and that of Mandsaur due to high CV and low yield. Data of Kota was rejected due to low yield. Mean grain yield varied from 599 to 2123 Kg/ha with an average of 1512 Kg/ha (Table 1.5.6). Among two checks JS 20-34 had the higher yield and matured in 90 days. Five entries JS 22-16 (90 days), RVSM 2012-4 (91 days), JS 22-18 (90) and NRC 181(91 days) matured up to 3 days more than JS 20-34. Among these entries except for NRC 181 all entries were superior to JS 20-34. NRC 181, a null KTi entry, was only 14 Kg less than JS 20-34 in grain yield.

4.6 Initial Varietal Trial (Vegetable)

Proposed Testing Centres: Indore, Kota, Parbhani
Data received from: I

Trial failed at Kota centre due to late availability of seed and sowing. Two test entries NRC 187 and NRC 188 were evaluated at two centres with three checks (Hara Soya, JS 95-60 and Karune). Among the checks Hara Soya and Karune are vegetable types for NHZ and SZ and JS 95-60 is a grain type early maturing bold seeded variety. Suitable vegetable type variety for CZ is not available. None of the checks/entries except for NRC 188 survived at Indore and its mean green pod yield in the zone (5119 Kg/ha) was 4% less than the best check JS 95-60 (5329 Kg/ha). In grain yield also it ranked second after JS 95-60 with 6% lesser yield. Days to picking of NRC 188 was 9 days more than the best check JS 95-60. NRC 188 (46 g) surpassed the best check (29 g) for 100 green seed weight which is a highly desirable feature of vegetable type soybean.

4.7 Advanced Varietal Trial-I

Proposed Testing Centres: Amravati, Anand, Amreli, Indore, Jabalpur, Kota, Lok Bharti, Morena, Parbhani, Sehore
Data received from: All the Centres except Kota

Trial failed at Kota centre. Data from Indore, Nagpur and Sehore was rejected due to low mean yield. There was one fresh (NRC 149) and two repeat entries (Himso 1689 and JS 21-72) in this trial (Table 1.5.18). NRC 149 was high oil and YMV resistant entry and its yield performance of 2018 Kg/ha was 6% less than that of its best check NRC 86 (2151 Kg/ha). Yield performance of AVT I repeat entry Himso 1689 was 11% higher than its best check NRC 86.

4.8 Advanced Varietal Trial-I (Early)

Proposed Testing Centres: Amravati, Anand, **Indore,** Jabalpur, **Kota**, Morena, Nagpur, **Parbhani,** Sehore, Amreli, **Lok Bharti, Mandsaur**
Data received from: Amravati, Indore, Kota, Parbhani, Lok Bharti, Mandsaur

Data from Indore was rejected due to high CV and low yield and that of Mandsaur due to low yield. Mean grain yield varied from 1192 to 1665 Kg/ha with an average of 1464 Kg/ha (Table 1.5.24). Among two checks JS 20-34 had the higher yield and matured in 88 days. Six entries NRC 158 (91 days), NRC 152 (88 days), NRC 157 (91 days), NRC 165 (87 days), NRC 150 (91 days), PUSA SIPANI 408 (88 days) matured up to 3 days more than JS 20-34. Among these entries NRC 152 was superior to JS 20-34.

4.9 Advanced Varietal Trial-II

Proposed Testing Centres Amravati, Anand, Amreli, Indore, Jabalpur, Kota, Lok Bharti, Morena, Parbhani, Sehore
Data received from: All the Centres except Kota

Five entries (RVSM 2011-35, NRCSL 2, NRC 138, AMS 100-39 and NRC 142) were evaluated in AVT-II. Among these entries NRCSL 2 was an EDV for YMV and its yield (1580 Kg/ha) was 20% less than its recurrent parent JS 335 (Table 1.5.18).
NRC 138 was an early maturing entry and matured (93 days) 3 days later than the early check JS 20-34 (Table 1.5.20). Its yield performance (1989 Kg/ha) was 14% higher than JS 20-34 (Table 1.5.18). Based on 3 years of data, NRC 138 registered at par with the early maturing check JS 20-34 (Table 1). RVSM 2011-35 recorded an increase of 18% over the best check JS 335 in AVT II. Based on three year data this entry recorded 18% increase in yield over the best check NRC 86 (Table 2). AMS 100-39, a repeat AVT II entry, registered an increase of 13% in 2020 trial over the best check JS 335. Based on the four year data this entry recorded 12% increase over the best check NRC 86 (Table 3). NRC 142 was the null KTi and null lox 2 entry and was directly entered in AVT I in 2019. In AVT II of 2020 it recorded 4% higher yield over the best check JS 335. Based on two year data it was the top ranking entry with yield advantage of 1% over the best check NRC 86 (Table 4).

Table 1: Mean Performance of Early Maturing AVT II Entry NRC 138 in Central Zone

S.No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		IVT-2018	AVT I-2019	AVT II-2020			
1.	NRC 138	1594	1785	1989	1789	I	93
2.	JS 20-34(C)	1635	1761	1752	1716	II	90

Table 2: Mean Performance of AVT II Entries Central Zone

S.No.	Entry	Yield (Kg/ha)			Mean	Rank
		IVT-2018	AVT I-2019	AVT II-2020		
1.	RVSM 2011-35	2034	2194	2376	2201	I
2.	NRC 138	1594	1785	1989	1789	V
3.	NRCSL 2	1849	1859	1580	1763	VI
4.	JS 20-34(C)	1635	1761	1752	1716	VII
5.	NRC 86 (C)	1648	2004	1933	1862	II
6.	JS 20-98 (C)	1701	1703	2005	1803	IV
7.	JS 335 (C)	1817	1781	1986	1861	III

Table 3: Mean Performance of Repeat AVT II Entry AMS 100-39 in Central Zone

S. No.	Entry	Yield (Kg/ha)				Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019	AVT II-2020			
1.	AMS 100-39	2164	1968	1997	2236	2091	I	97
2.	JS 335(C)	1622	1583	1819	1986	1753	III	100
3.	NRC 86(C)	2023	1584	1932	1933	1868	II	100
4.	JS 20-34(C)	1305	1686	1551	1752	1574	IV	90

Table 4: Mean Performance null lox 2 and null KTi entry NRC 142 in Central Zone

S.No.	Entry	Yield (Kg/ha)		Mean	Rank	Maturity
		AVT I-2019	AVT II-2020			
1.	NRC 142	1959	2056	2008	I	97
2.	JS 335(C)	1782	1986	1884	III	103
3.	NRC 86(C)	2004	1933	1969	II	102
4.	JS 20-34(C)	1761	1752	1757	IV	92

5. Southern Zone

5.1 Initial Varietal Trial

Proposed Testing Centres: Adilabad, Bidar, Bengaluru, Dharwad, K.Digraj, Pune,
Data received from: Bidar, Bengaluru, Dharwad, K.Digraj, Pune,
Seed was not received at Adilabad centre. The yield data of 38 test entries and three checks has been presented in Table 1.6.1. Mean yield ranged from 1083 kg/ha to 2262 kg/ha with the average yield of 1751 kg/ha. DSb 38 recorded with an yield performance of 2262 Kg/ha, recorded an increase of 3% over the best check DSb 23. Maturity duration in the trial ranged from 88 to 98 days with an average of 93 days.

5.2 Initial Varietal Trial (Vegetable)

Proposed Testing Centres: Adilabad, Bengaluru, Pune
Data received from: All Centers

Table 1.6.7 and 1.6.6 show green pod yield (kg/ha) at picking and yield (kg/ha) of two test entries viz. NRC 187 and NRC 188 and three checks. Check Hara Soya was the highest yielding entry with green pod yield (5374 kg/ha) at picking (Table 1.6.7). However, NRC 188 had higher yield (2255 kg/ha) as compared to the check Hara Soya (2222 kg/ha).

5.3 Advanced Varietal Trial-II

Proposed Testing Centres: Adilabad, Bidar, Bengaluru, Dharwad, K.Digraj, Pune,
Data received from: All the centres

DSb 33, AMS 100-39, NRC 142, MACSNRC 1667 and NRCSL 1 were evaluated in this trial. DSb 33 was the top ranking entry and its yield was 2197 kg/ha, 11% higher than the best check DSb 23. Its mean yield over 3 years (2553 Kg/ha) was 5% higher than the best check DSb 23 (Table 4). Maturity of DSb 33 was 4 days less than the best check DSb 23.

Table 4: Mean Performance of DSb 33 in Southern Zone

S. No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		IVT-2018	AVT I-2019	AVT II-2020			
NRCSL	DSb 33	2906	2555	2197	2553	I	96
1	KS 103(C)	2514	2461	1766	2247	III	101
2	DSb 23(C)	2830	2475	1982	2429	II	101
	DSb 21(C)	2767	1970	1855	2197	IV	98

1 and AMS 100-39 were the repeat AVT II entries. Mean performance of NRCSL 1 was 2.8% less than the check RKS 18 and 10% less than the qualifying entry AMS 100-39. AMS 100-39 yielded 8.2% higher than the check RKS 18(Table 4).

Table 5: Mean Performance of repeat entry AMS 100-39 and NRCSL 1in Southern Zone

S. No.	Entry	Yield (Kg/ha)				Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019	AVT II-2020			
1.	NRCSL 1	2472	2503	1891	1669	2134	V	98
2.	AMS 100-39	2580	2409	2504	2016	2377	I	98
3.	DSb 21(C)	2270	2346	2126	1855	2149	IV	100
4.	RKS 18 (c)	2291	2260	2038	-	2196	II	96
5.	JS 335 (c)	2241	2358	2194	1901	2174	III	96
6.	JS 93-05 (c)	1955	2250	2075	-	2093	VI	92

Null lox 2 and Kti entry NRC 142 yielded 4% higher than the best check DSb 23 in AVT II. It ranked second in the overall performance with almost equivalent yield to that of best check DSb 23 (Table 6). Maturity duration of NRC 142 (99 days) was 2 days earlier than and that of the check DSb 23 (101 days).

Table 6: Mean Performance of NRC 142 in Southern Zone

S.No.	Entry	Yield (Kg/ha)		Mean	Rank	Maturity
		AVT I-2019	AVT II-2020			
NEDV	1. NRC 142	2344	2067	2206	II	99
2.	KS 103(C)	2461	1766	2114	III	103
3.	DSb 23(C)	2475	1982	2228	I	102
MA	4. DSb 21(C)	1970	1855	1912	IV	101

CSNRC 1667 for null KTi was at par with its recurrent parent in yield performance in AVT II but recorded 11% less yield than the best check JS 335 (Table 7). In overall performance in two trials of AVT 1 and one trial of AVT II its performance was (29 Kg, 1.4%) less than its recurrent parent and 4% less than the best check JS 335. Maturity duration of MACSNRC 1667 was 1 day later than JS 335 (95 days).

Table 7: Mean Performance of EDV for null KTi MACSNRC 1667 in Southern Zone

S.No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		AVTI-2018	AVT I-2019	AVT II-2020			
1.	MACSNRC 1667	2325	2148	1680	2051	IV	96
2.	MACS 450	2374	2224	1643	2080	II	99
3.	DSb 21(C)	2346	1970	1855	2057	III	99
4.	JS 335(C)	2358	-	1901	2129	I	95

Advanced Varietal Trial-II (Vegetable)

Proposed Testing Centres: Adilabad, Bidar, Bengaluru, Dharwad, K.Digraj, Pune,
Data received from: All the centres

Vegetable soybean entry Karune yielded 87 Kg/ha more green pods than the best check variety KDS 726 in AVT II. In overall performance the mean yield of Karune was 8% higher than the best check KDS 726 (Table 8).

Table 8: Mean Performance of vegetable entry Karune in Southern Zone

S.No.	Entry	Green Pod Yield (Kg/ha)			Mean	Rank	Mean Days to Picking
		AVTI-2018	AVT I-2019	AVT II-2020			
1.	Karune	10571	10986	10363	10640	I	70
2.	Harasoya (c)	9230	8540	7613	8461	III	80
3.	KDS 726 (c)	9472	9787	10276	9845	II	78

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SUMMARY REPORT OF AGRONOMIC EXPERIMENTS 2020-21

By and large, all the trials were conducted during *kharif* 2020 at all the Centre representing 6 zones of the country as per technical programme. The experiment-wise salient findings (Table 2.1.1 to 2.6.26) are given as under.

1. AGRON 1/20. Evaluation of AVT II entries under different row spacing

The new entries with two row spacing (30 and 45 cm) were tested in split plot design with three replications to study the response of soybean new entries to different row spacing (Table 2.1.1-2.1.4).

1.1. Central zone (Sehore, Kota, Amravati))

1.1.1. New Entry

Soybean new entries differed significantly at all the three Centre (Table 2.1.1). They were found superior than check varieties NRC 86 and JS 20-34 at Sehore except NRCSL-2. NRCSL-2 had significantly lower seed yield than check NRC 86 but was at par with check JS 20-34. NRC-138, AMS 100-39 and NRC 142 produce was significantly higher yield than check varieties at Kota. Whereas, NRCSL-2 and RVSM 2011-35 entries yielded lower than NRC 86 and marginally higher than check JS 20-34. RVSM 2011-35, NRCSL-2 and AMS 100-39 produce was significantly higher yield than both the checks, whereas, NRC-138 was found statistical identical to check NRC 86 at Amravati Centre. On zonal mean basis, all the new entries yielded higher than check varieties except NRCSL-2, which yielded lower than check NRC 86 and marginally higher than check JS 20-34.

Similar trend was also recorded in most of the growth and development, yield attributes, straw yield, grain production index and rainfall use efficiency (Table 2.1.2).

1.1.2. Row spacing

The soybean yield remained unaffected in different row spacing at all the three Centre except Amravati. At Amravati, significantly higher seed yield was recorded at wider row spacing (45 cm). In generally, the wider row spacing (45 cm) yields were numerically higher than narrow planting (30 cm) at all the centre except Kota. On the zonal mean basis, the wider row spacing yielded more (5.78%) than narrow planting (Table 2.1.1).

A similar trend was also noted in all the parameters (Table 2.1.2).

1.1.3. Interaction effect

The interaction effect between entries and row spacing was found significant at Sehore and kota, whereas, non-significant interaction effect was registered at Amravati (Table 2.1.1). The highest yield was recorded in RVSM 2011 35 x 45 cm at Sehore and NRC 138 x 30 cm at Kota.

1.2. Southern zone (Pune, Adilabad and Dharwad)

1.2.1. New Entry

The new entries DSb 33, NRCSL 1 and MACSNRC 1667 had significantly higher yield than check variety KS 103 at Dharwad. Similarly, the lowest yield was recorded with Karune followed by NRC 142. The check variety DSb 23 was found statistically on par with all the new entries. All the entries had significantly higher yield than check KS 103 at Pune, however, check DSb 23 yielded higher than all the entries. At Adilabad, entries namely; DSb 33, AMS 100-39, NRC 142 and

MACSNRC 1667 yielded higher than both the checks. The highest yield was registered with AMS 100-39 followed by MACSNRC 1667 and DSb 33. However, NRCSL 1 and KARUNE yielded lower than both the checks.

On the basis of zonal mean, AMS 100-39 (22.5%) yielded highest followed by DSb 33 (19.8%), NRC 142 (17.0%), MACSNRC 1667 (13.7%), NRCSL 1 (3.16%) and KARUNE (0.41%) as compared to check KS 103. Similarly, AMS 100-39 (6.54%) yielded higher followed by DSb 33 (4.20%) and NRC 142 (1.76%) than check variety DSb 23 (Table 2.1.3).

On zonal mean basis, more or less a similar trend were also observed in all the parameters under study (Table 2.1.4).

1.2.2. Row spacing

The significant effect of row spacing on soybean yield was observed at different centres (Table 2.1.3). At Dharwad centre, the maximum yield was recorded under row spacing of 30 cm. Whereas, the reverse trend was observed at Adilabad and Pune. Soybean planting at wider row spacing (45 cm) yielded higher at Pune (11.2%) and Adilabad (12.5%) than narrow planting (30 cm), respectively (Table 2.1.3). On zonal mean basis, the higher yield (5.90%) were recorded under wider planting as compared to narrow planting.

On zonal mean basis, maximum values of all the growth and yield attributes were associated with wider planting (Table 2.1.5).

1.2.3. Interaction effect

The interaction between entries and row spacing was found significant at Dharwad only (Table 2.1.3). The interaction of NRCSL 1 x 30 cm produced maximum yield at Dharwad.

1.2.4. Green pod yield

Green pod yield of Karune was significantly higher at Dharwad and Pune centre and it was lowest at Adilabd due to low plant population of Karune. The plant population of Karune was only 65% as compared to check varieties. Green pod yield of new entry Karune was compared with check variety DSb 23 and KS 103 (Table 2.1.4). Pod yield of Karune was the maximum and yielded higher to tune of 42.46 and 368.8% than DSb 23 and KS 103, respectively.

Karune, as well as, both checks yielded higher under wider spacing (45 cm) than narrow spacing (30 cm). It yielded higher (3.64%) under 45 cm row spacing than 30 cm spacing.

2. AGRON 2/15. Sustainable soybean production through crop diversification and tillage systems

Two tillage systems (minimum and conventional) and four crop rotations were tested in strip plot design with four replications to study the response of soybean to tillage systems and crop rotations (Table 2.2.1-2.2.23).

2.1. North plain zone (Pantnagar and Ludhiana)

2.1.1. *Crop rotation*

Soybean yield was significantly influenced by the crop rotation at Pantnagar. However, soybean, *rabi* and soybean equivalent yield (SEY) remained unaffected due to different crop rotation at Ludhiana (Table 2.2.1, 2.2.2 and 2.2.3). Soybean-maize-soybean-maize rotation yielded maximum

SEY (3090 kg/ha) followed by soybean-soybean-soybean-maize as evident from the zonal mean data. These two treatments also showed higher net returns and B:C ratio (Table 2.2.4).

2.1.2. *Tillage system*

Soybean, *rabi* and soybean equivalent yield differed non-significantly between two tillage systems at Ludhiana and pantnagar (Table 2.2.1, 2.2.2 and 2.2.3.). The numerically higher yield of soybean and *rabi* were registered under conventional tillage as compared to minimum tillage system. However, the higher soybean equivalent yield was observed under minimum system (1.36%) on zonal average basis. The net returns and B:C ratio were marginally higher with minimum tillage (Table 2.2.4).

2.1.3. *Interaction effect*

Interaction between tillage systems and crop rotations for soybean, *rabi* yield and SEY were found to be non-significant at both the centre.

2.2. Eastern zone (Raipur and Ranchi)

2.2.1. Crop rotation

On zonal mean basis, the highest soybean yield was associated with soybean-maize-soybean-maize system (Table 2.2.5.). Soybean-soybean-maize-soybean produced maximum *rabi* yield and closely followed by soybean-soybean-soybean- maize system (Table 2.2.6). Similarly, the highest soybean equivalent yield was registered under soybean-soybean-soybean- maize as compared to remaining system (Table 2.2.7).

Among crop rotations, the higher net returns was with soybean-soybean-soybean-maize while the higher B:C ratio was in the soybean-soybean-maize-soybean (Table 2.2.8)

2.2.2. Tillage system

Soybean and soybean equivalent yield remained unaffected due to tillage systems at both the centre (Table 2.2.5 and 2.2.7). The *rabi* yield was significantly higher under conventional as compared to minimum tillage at Ranchi. The numerically highest soybean equivalent yield was with conventional tillage (Table 2.2.7).

Among the tillage systems, the maximum net returns and B:C ratio was found under minimum tillage system (Table 2.2.8). The economical parameters and initial values of soil OC, N. P, and K and nutrient uptake are given in (Table 2.2.8 to 2.2.10).

2.2.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be non-significant for soybean, *rabi* and soybean equivalent yield.

2.3. Central zone (Kota and Amravati)

2.3.1. Crop rotation

Crop rotation failed to show appreciable improvement in soybean and *rabi* yield at Kota (Table 2.2.11 to 2.2.12). However, at Amravati significantly higher soybean yield was registered under the soybean-soybean-maize-soybean system. On zonal mean basis, soybean-soybean-maize-soybean yielded maximum and was closely followed by soybean-soybean-soybean-soybean. Marginally higher *rabi* yield was recorded with soybean-soybean-soybean-soybean and closely

followed by soybean-soybean-soybean-maize. The maximum and minimum SEY was observed in soybean-soybean-soybean-soybean and followed by soybean-soybean-soybean-maize crop rotation (Table 2.2.13).

The maximum net returns and B:C ratio was with continuous soybean (Table 2.2.14). The initial values of soil parameters and nutrient uptake at of Kota and Amravati are given in Table 2.2.15 and 2.2.16.

2.3.2. Tillage system

Minimum tillage produced higher yield (soybean, *rabi* and SEY) than conventional tillage at Kota (Table 2.2.11 to 2.2.13). Conventional tillage produced higher yield (soybean and SEY) than minimum tillage at Amravati. On zonal mean basis, conventional tillage gave higher yield to the tune of 6.76, and 1.72% from soybean and SEY over minimum tillage, respectively (Table 2.2.11 to 2.2.13). On zonal mean basis, minimum tillage gave higher yield to the tune of 1.18% of *rabi* over conventional tillage (Table 2.2.12).

As economic point of view, the highest net returns and B:C ratio was registered under minimum tillage as compared to conventional tillage. Among the crop rotations, soybean-soybean-soybean-soybean registered highest net returns and B:C ratio followed by soybean-soybean-soybean-maize (Table 2.2.14). The initial values of soil parameters and nutrient uptake at of Kota and Amravati are given in Table 2.2.15 and 2.2.18.

2.3.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be non-significant at both the centre (Table 2.2.12 to 2.2.13).

2.4. Southern zone (Dharwad and Adilabad)

2.4.1. Crop rotation

Kharif crop yield was highest with soybean-maize-soybean-maize at both centre (Table 2.2.19). The maximum *rabi* crop yield was found with soybean-soybean-soybean-maize at Dharwad (Table 2.2.20). However, the maximum *rabi* crop yield at Adilabad was recorded with soybean-soybean-maize-soybean rotation. Soybean-maiz**e**-Soybean-maiz**e** rotation produced maximum SEY as evidenced from zonal mean (Table 2.2.21).

The economics of different treatments and soil analysis and nutrient uptake data are given in Table 2.2.22 and 2.2.23.

2.4.2. Tillage system

Conventional tillage yielded higher than minimum tillage at both the centre. On zonal mean basis, conventional tillage gave higher soybean (8.15%), *rabi* yield (9.98%) and SEY (9.04%) over minimum tillage (Table 2.2.21).

The economics, soil analysis and nutrient uptake data are given in Table 2.2.22 and 2.2.23.

2.4.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be significant at Dharwad. While at Adilabad, interaction of soybean-maize-soybean-maize under conventional tillage produced maximum SEY (Table 2.2.21).

3. AGRON. 3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting

Two variety and four planting geometry were assessed in split plot design with three replications to optimize the planting geometry for achieving higher yield of soybean varieties (Table 2.3.1 to 2.3.15).

3.1. *North plain zone (*Pantnagar and Ludhiana):

3.1.1. Planting geometry

The different planting geometry did not influence soybean yield at Pantnagar (Table 2.3.1). However, planting of soybean at 45 x 10 cm spacing produced maximum yield and followed by 45 x 5 cm at Pantnagar. Significantly higher yield of soybean was recorded at 45 x 5 cm spacing followed by 45 x 10 at Ludhiana. Zonal mean data revealed that the maximum yield was recorded with 45 x 10 cm followed by 45 x 5 cm spacing.

Branches per plant, pods per plant, seed index and plant dry weight were increased with the wider spacing and the higher values of these parameters were observed at 45 x 20 cm spacing. However, economics follows the same trend as was observed in yield (Table 2.3.2 and 2.3.3).

3.1.2. Variety

Difference between varieties was found to be non-significant at Pantnagar. However, variety SL 958 yielded higher (30.5%) than PS 1092 at Ludhiana (Table 2.3.1). On zonal mean basis, the variety SL 958 was produced 17.2% higher yield as compared to PS 1092.

Growth and development, yield attributes and economics follow the same trend as was observed in yield (Table 2.3.2 and 2.3.3).

3.1.3. Interaction effect

The interaction between variety and planting geometry was found to be non-significant at both the centre.

3.2. North eastern (Raipur and Ranchi)*:*

3.2.1. Planting geometry

The maximum yield was recorded with 45 x 10 cm plant geometry and followed by 45 x 5 cm plant geometry at both the centre (Table 2.3.4). A similar trend was observed in the zonal mean data. Plant growth and development, yield attributes and economics were in line as observed in yield (Table 2.3.5 and 2.3.6).

3.2.2. Variety

Variety RSC 10 46 produced higher yield (26.5%) as compared to JS 95 60 (Table 2.3.4). Variety RSC 10 46 was found to be superior with respect to growth and development, yield attributes and economical parameters (Table 2.3.5 and 2.3.6).

3.2.3. Interaction effect

The interaction between variety and planting geometry was found to be non-significant at both the centre.

3.3. North eastern hill (Imphal and Medziphema)*:*

3.3.1. Planting geometry

Planting geometry 45 x 15 cm yielded higher as compared to remaining spacing followed by 45 x 10 m and 45 x 5 cm spacing at Imphal (Table 2.3.7). The increase in plant to plant space within row had negative impact on soybean yield and highest yield was reported with 45 x 5 cm at Medziphema. On the basis of zonal mean, the highest yield was associated with 45 x 5 cm and followed by 45 x 10 cm.

Growth and development, yield attributes and economical parameters follow the more or less similar pattern as observed in yield (Table 2.3.8 and 2.3.9).

3.3.2. Variety

On the basis of zonal mean, variety JS 97 52 yielded higher (29.4%) as compared to JS 93 05 (Table 2.3.7). Growth and development, yield attributes and economical parameters follow the similar pattern as observed in yield (Table 2.3.8 and 2.3.9).

3.3.3. Interaction effect

The interaction between variety and planting geometry was found to be non-significant at both the centres.

3.3. Central (Sehore, Kota , Devgarbaria and Amravati):

3.3.1. Planting geometry

The soybean yield was significantly affected by planting geometry at Sehore (Table 2.3.10). The highest yield was recorded at 45 x 15 cm spacing and closely followed by 45 x 10 cm spacing at Sehore. The increase in plant-to-plant space within row had negative impact on soybean yield and highest yield being with 45 x 5 cm followed by 45 x 10 cm spacing at Kota, Devgarbaria and Amravati centres. On zonal mean basis, the planting of soybean either 45 x 10 cm or 45 x 5 cm produced identical yield and gave significantly higher yield than rest of the treatments.

Growth and development, yield attributes and economical parameters follow the similar pattern as observed in yield (Table 2.3.11 and 2.3.12).

3.3.2. Variety

Soybean variety JS 20-34 yielded higher than RVS 24 at all the centre except Kota. On zonal mean basis, variety JS 20-34 produced to the tune of 24.8% higher yield as compared to RVS 24 (Table 2.3.10).

Growth and development and yield attributes and economical parameters follow the similar pattern as observed in yield (Table 2.3.11 and 2.3.12).

3.3.3. Interaction effect

Interaction of variety and planting geometry was found to be significant at Sehore and interaction of JS 20 34 x 45 x 15 cm produced maximum yield as compared to other combinations (Table 2.3.10). The interaction effect was found to be non-significant at other centres.

3.4. Southern (Adilabad and Dharwad)

3.4.1. Planting geometry

As the plant to plant spacing increased the soybean yield decreased at both the centre and maximum yield was recorded with 45 x 5 cm spacing followed by 45x10 cm (Table 2.3.13).

Growth and development, yield attributes and economical parameters follow similar pattern as observed in yield (Table 2.3.14 and 2.3.15).

3.4.2. Variety

Variety MACS 1188 yielded higher (9.05%) than JS 93 05 (Table 2.4.13) as evidenced from the zonal mean. Growth and development, yield attributes and economical parameters follow the similar pattern as observed in yield (Table 2.3.14 and 2.3.15).

3.4.3. Interaction effect

Interaction of variety and planting geometry was found to be significant at Dharwad and interaction of 45 x 5 cm X MACS 1188 produced maximum yield.

4. AGRON 5/19.Evaluation of partial factor productivity for soybean

Seven treatments of nutrient under RBD to evaluate the yield gap of soybean due to omission of nutrients were undertaken (Table 2.4.1. to 2.4.36).

4.1 North plain zone (Pantnagar and Ludhiana)

The data of partial factor productivity for Pantnagar and Ludhiana are presented in (Table 2.4.1. to 2.4.4). Soybean was grown with full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge and furrow) yielded maximum as compared to other treatments (Table 2.4.5). The omission of weed management from full package showed highest yield gap followed by the omission of insecticides and recommended dose of fertilizers (RDF). The minimum yield gap was with the omission of seed treatment, ridge furrow and seed inoculation. The maximum cost incurred due to RDF followed by weed management and insecticide application. The lowest cost was observed in seed treatment and inoculation. The highest B:C ratio was recorded with full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge and furrow) followed by omission of Ridge furrow system, seed treatment, RDF and seed inoculation. The similar trend was also observed in economical parameters. The yield attributes, biological and straw yield depicted in (Table 2.4.6).

4.2 Central zone (Sehore, Kota, Devgarhbaria and Amravati)

The individual centre data are given in Table 2.4.7 to 2.4.12. Soybean was grown with full package (Seed treatments, seed inoculation, RDF, weed management, insecticide, Ridge and furrow) yielded maximum as compared to other treatments (Table 2.4.13). The omission of weed management from full package showed highest yield gap followed by the omission of recommended dose of fertilizers, insecticides, ridge furrow system and seed inoculation. The lowest yield gap was recorded with the omission of seed treatment. The maximum cost incurred due to weed management followed by RDF and insecticide application. The lowest cost was observed in seed inoculation and treatment. The highest IBCR was recorded under omission of seed inoculation followed by seed treatment. The similar trend was also observed in economical parameters. The yield attributes, biological and straw yield depicted in (Table 2.4.14).

4.3 Eastern zone (Raipur, Ranchi and Bhawanipatna)

Data of individual centre are presented in Table 2.4.15 to 2.4.20. Soybean was grown with full package (seed treatment, seed inoculation, RDF, weed management, insecticide, ridge and furrow) yielded maximum as compared to other treatments (Table 2.4.21). The omission of weed management from full package showed highest yield gap followed by the omission of recommended dose of fertilizers, insecticides and seed inoculation. The lowest net return and B:C ratio was registered under omission of weed management from full package followed by the omission of recommended dose of fertilizers and insecticides. The minimum yield gap was with omission of ridge and furrow system. The maximum cost incurred due to RDF followed by weed management, insecticide application and ridge and furrow planting. The lowest cost was observed in inoculation and seed treatment. The highest IBCR was recorded under omission of seed treatment followed by seed inoculation. The yield attributes, biological and straw yield depicted in Table 2.4.22.

4.4 North eastern hill zone (Imphal and Medziphema)

Individual centre data are depicted in Table 2.4.23 to 2.4.26. Cultivation of soybean with full package (seed treatments, seed inoculation, RDF, weed management, insecticide, ridge and furrow) yielded maximum as compared to other treatments (Table 2.4.27). Omission of weed management from full package showed highest yield gap followed by the omission of recommended dose of fertilizers and insecticides. The maximum reduction in the cost of cultivation was associated with omission of recommended dose of fertilizers followed by weed management, ridge and furrow and insecticide application. The lowest cost was observed in seed inoculation and treatment. The yield attributes, biological and straw yield depicted in Table 2.4.28.

4.5 Southern zone (Pune, Dharwad and Adilabad)

The individual centre data are embodied in Table 2.4.29 to 2.4.34. Soybean was grown with full package (seed treatments, seed inoculation, RDF, weed management, insecticide, ridge and furrow) yielded maximum as compared to other treatments (Table 2.4.35). The omission of weed management from full package showed highest yield gap followed by the omission of recommended dose of fertilizers, ridge and furrow planting and pesticide application. The lowest yield gap was associated with seed treatment followed by seed inoculation. The maximum cost was incurred due to weed management followed by RDF and insecticide application. The lowest cost was observed in seed treatment followed by seed inoculation. The highest IBCR was recorded under omission of seed treatment followed by seed inoculation. A similar trend was also observed in economical parameters. The yield attributes, biological and straw yield depicted in was Table 2.4.36.

5. AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea

Five treatments of thiourea application including control were tested under factorial RBD to evaluate the effect of foliar spray of thiourea on growth and yield of soybean varieties under different zones (Table 2.5.1. to 2.5.10).

5.1. North plain zone (Pantnagar and Ludhiana)

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affected the growth and yields of soybean at both the centre (Table 2.5.1 to 2.5.3).

5.1.1. Variety

Among the two varieties, significantly higher seed yield was recorded with SL 958 at Ludhiana and with PS 1347 at Pantnagar. A similar trend was also observed for growth and economics parameters (Table 2.5.3).

5.1.2. Thiourea

The application of thiourea with increasing dose increased the seed yield at Ludhiana and the highest yield was recorded with the application of thiourea @ 750 ppm/ha. However, at Pantnagar, the highest seed yield was recorded with the application of thiourea @ 500 ppm/ha. On zonal mean basis, the highest seed yield was registered with the application of thiourea @ 500 ppm/ha followed by 750 ppm/ha. Similar trend was also observed for growth and economical parameters (Table 2.5.3).

5.1.3. Interaction effect

Interaction of variety and foliar application of thiourea was found to be significant at Pantnagar and interaction of PS 1347 x thiourea @ 500 ppm/ha produced maximum yield as compared to other combinations.

5.2. North Eastern zone **(Raipur and Ranchi)**

5.2.1. Variety

Among the two varieties, significantly higher seed yield was recorded with the RSC 10-46 as compared to JS 95-60 at both the centre. The variety RSC 10-46 yielded 24.3% higher than JS 95-60 as evidenced from zonal mean. A similar trend was also observed for growth and economics parameters (Table 2.5.5 and 2.5.6).

5.2.2. Thiourea

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affected the growth and yields of soybean at both the centres (Table 2.5.4 to 2.5.6). Furthermore, the foliar application of thiourea with increasing dose increased the seed yield at both the centre and the highest yield was recorded with the application of thiourea @ 750 ppm/ha followed by application of thiourea @ 500 ppm/ha. Overall, a similar trend was also observed among all the remaining growth and economical parameters. The seed yield was increased by 30.4% with the application of thiourea @ 750 ppm/ha and followed by 27.6% with the application of thiourea @ 500 ppm/ha as compared to control treatment.

5.2.3. Interaction

Interaction of variety and foliar application of thiourea was found to be significant at Raipur and interaction of RSC 10-46 and the application of thiourea @ 750 ppm/ha produced maximum yield as compared to other combinations.

5.3. Central zone **(Sehore, Kota and Amravati)**

5.3.1. Variety

Among the varieties, significantly higher seed yield was recorded with the RVS 24 as compared to NRC 86 at Sehore and Amravati centre. The yield was 53.0% and 20.0% higher with variety RVS 24 as compared to NRC 86 at both the centre, respectively. Whereas, at Kota centre higher yield was recorded with variety NRC 86. On zonal mean basis, the highest yield was recorded with variety RVS 24 and a similar trend was also observed among other growth, yield attributes and economical parameters (Table 2.5.8 and 2.5.9).

5.3.2. Thiourea

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affected the growth and yields of soybean at central zone (Sehore, Kota and Amravati) (Table 2.5.7 to

2.5.7). Among the foliar spray application treatments, the highest seed yield at Kota and Amravati centre was registered with the application of thiourea @ 500 ppm/ha and closely followed by the application of thiourea @ 750 ppm/ha. However, at Sehore, the highest yield was registered with the application of thiourea @ 750 ppm/ha. On zonal mean basis, the highest seed yield was registered with the application of thiourea @ 750 ppm/ha followed by application of thiourea @ 500 ppm/ha. A similar trend was also observed for the yield attributes and economical parameters (Table 2.5.9). The yield was increased by 14.3% with the application of thiourea @ 750 ppm/ha and 12.9% with the application of thiourea @ 500 ppm/ha over control, as evidenced by zonal mean data.

5.3.3. Interaction

Interaction between variety and thiourea was found to be non-significant at the three centres.

5.4. Southern zone (Dharwad and Adilabad)

5.4.1. Variety

Among the varieties, the highest seed yield was recorded with the MACS 1188 (19.2%) as compared to JS 93-05 at both the centre. On zonal mean basis, variety MACS 1188 produced 19.2% higher yield as compared to JS 93-05 (Table 2.5.10).

5.4.2. Thiourea

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affected the growth and yields of soybean at both the centres (Table 2.5.10 to 2.5.12). Among the foliar spray application treatments, the yield of soybean increased with the increased dose of the thiourea foliar spray and the highest yield of soybean was registered with the application of thiourea @ 750 ppm/ha followed by application of thiourea @ 500 ppm/ha. Similar trend was also observed for the yield attributes and economical parameters (Table 2.5.12).The yield increased by 37.6% under the application of thiourea @ 750 ppm/ha and 29.2% under the application of thiourea @ 500 ppm/ha over control, as evidenced by zonal mean.

5.4.3. Interaction

Interaction effect of variety and thiourea was found to be non-significant at both the centres.

AGRON. 6/20. Bio-efficacy evaluation of potassium salt of active phosphorus (PSAP) on soybean

Twelve treatment combinations of potassium salt of active phosphorus (PSAP) were tested under RBD to evaluate the Bio-efficacy of potassium salt of active phosphorus (PSAP) on soybean (Table 2.6.1. to 2.5.27).

6.1. North plain zone

6.1.1 Pantnagar

Application of potassium salt of active phosphorus (PSAP) on soybean significantly influenced the growth and yield of soybean (Table 2.6.2). Significantly higher yield of soybean were registered with the application of RDF with RPM without PSAP (T1) + PSAP @ 9g/l followed by T1 + PSAP @ 6 g/l, T1, 75% P&K +75% RPM without PSAP (T2) + PSAP @ 9g/l, T2 and T2 + PSAP @ 6 g/l. However, the lowest seed yield was recorded with application of 100%N +00% P&K +50% RPM without PSAP (T4) followed by T4 + PSAP @ 6 g/l and T4 + PSAP@ 9g/l. The highest cost of cultivation was registered with the treatment T1 + PSAP @ 9g/l, followed by T2 + PSAP@ 9g/l and T3 + PSAP @ 9g/l. Whereas, lowest cost of cultivation was observed with the treatment 100%N

+00% P&K +50% RPM without PSAP (T4) followed by 50% P&K +50% RPM without PSAP (T3) and 75% P&K +75% RPM without PSAP (T2). On the economics point of view, the maximum net returns and B:C ratio was registered with the treatment RDF with RPM without PSAP (T1) followed by 75% P&K +75% RPM without PSAP (T2) and 50% P&K +50% RPM without PSAP (T3). Whereas, lowest net returns and B:C ratio was found under the application of T4 + PSAP @ 9g/l, followed by T4 + PSAP @ 6 g/l and T3 + PSAP@ 9g/l. The growth, development and yield attributes data given in Table 2.6.1.

6.2. Eastern zone

6.2.1. Raipur

Application of potassium salt of active phosphorus (PSAP) on soybean significantly influenced the growth and yield of soybean (Table 2.6.4). The highest yield was registered with the application of T1 + PSAP @ 9g/l followed by T1 + PSAP @ 6 g/l. However, the lowest seed yield was recorded with application of 100%N +00% P&K +50% RPM without PSAP (T4) followed by T4 + PSAP @ 9g/l and T4 + PSAP@ 6 g/l. The highest cost of cultivation was registered with the treatment T4 + PSAP @ 9g/l followed by T1 + PSAP @ 9g/l and T2 + PSAP@ 9g/l. Whereas, lowest cost of cultivation was observed with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) followed by 50% P&K +50% RPM without PSAP (T3) and 75% P&K +75% RPM without PSAP (T2). The maximum net returns and B:C ratio was registered with the treatment 75% P&K +75% RPM without PSAP (T2) followed by 50% P&K +50% RPM without PSAP (T3) and T1 + PSAP @ 6 g/l. Whereas, lowest net returns and B:C ratio was found under the application of T4 + PSAP@ 9g/l followed by T4 + PSAP @ 6 g/l and T3 + PSAP@ 9g/l. The growth, development and yield attributes data given in Table 2.6.3.

6.2.2. Ranchi

Application of potassium salt of active phosphorus (PSAP) on soybean significantly influenced the growth and yield of soybean (Table 2.6.7). Among the different treatments, the highest yield was noted with T1 + PSAP @ 9g/l and closely followed by T2 + PSAP @ 9g/l, T1 + PSAP @ 6 g/l and T2 + PSAP@ 6 g/l. The highest cost of cultivation was registered with the treatment T1 + PSAP @ 9g/l. The lowest cost of cultivation was observed with the treatment T4- 100%N +00% P&K +50% RPM without PSAP. The maximum net returns were found with T1- RDF with RPM without PSAP while the highest B:C Ratio was with T2-75% P&K +75% RPM without PSAP. The growth, development and yield attribute data given in Table 2.6.5 and 2.6.6.

On the basis of zonal mean, the maximum yield was recorded with T1 + PSAP @ 9g/l and closely followed by T1-RDF with RMP without PSAP and T2 + PSAP @ 9g/l (Table 2.6.9). The highest net returns and B:C ratio was with T1- RDF with RMP without PSAP. The growth, development and yield attributes data given in Table 2.6.8.

6.3. North Eastern Hill

6.3.1 Imphal

Application of potassium salt of active phosphorus (PSAP) on soybean significantly influenced the growth and yield of soybean (Table 2.6.10 and 2.6.11). The highest yield of soybean was registered with the application of T1 + PSAP @ 9g/l (T3) followed by T1 + PSAP @ 6 g/l (T2). However, the lowest seed yield was recorded with application of 100%N +00% P&K +50% RPM without PSAP (T4) followed by T4 + PSAP @ 9g/l and T4 + PSAP @ 6 g/l. The highest cost of cultivation was registered with the treatment T1 + PSAP @ 9g/l followed by T4 + PSAP @ 9g/l and T3 + PSAP @ 9g/l. Whereas, lowest cost of cultivation was observed with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) followed by 50% P&K +50% RPM without PSAP. The economic analysis revealed that the maximum net returns and B:C ratio was registered with the

treatment T1 + PSAP @ 6 g/l. Whereas, lowest net returns and B:C ratio was found under the application of T4 + PSAP @ 9g/l.

6.4. Central zone

6.4.1 Amravati

Application of potassium salt of active phosphorus (PSAP) on soybean significantly influenced the growth and yield of soybean (Table 2.6.12 and 2.6.13). Significantly higher yield of soybean was registered with the application of RDF with RPM without PSAP (T1) + PSAP @ 6g/l followed by RDF with RPM without PSAP (T1). However, the lowest seed yield was recorded with application of 100%N +00% P&K +50% RPM without PSAP (T4) followed by T3 + PSAP @ 9g/l. The highest cost of cultivation was registered with the treatment T1 + PSAP@ 9g/l followed by T4 + PSAP @ 9g/l. Whereas, lowest cost of cultivation was observed with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) followed by 50% P&K +50% RPM without PSAP (T3). From the economics point of view, the maximum net returns and B:C ratio was registered with the treatment RDF with RPM without PSAP. Whereas, lowest net returns and B:C ratio was found under the application of T4 + PSAP @ 9g/l followed by T3 + PSAP @ 9g/l. Among the potassium salt of active phosphorus (PSAP) treatment the maximum net returns and B:C ratio was registered under the treatment T1 + PSAP @ 6 g/l.

6.4.2. Kota

Application of potassium salt of active phosphorus (PSAP) on soybean significantly influenced the growth and yield of soybean (Table 2.6.14 and 2.6.15). Significantly higher yield of soybean was registered with the application of T1 + PSAP@ 9g/l which was closely followed by T4 + PSAP @ 9g/l. Similarly, the highest cost of cultivation was also registered under the same treatment. However, the lowest seed yield was recorded with application of 50% P&K +50% RPM without PSAP (T3) followed by 75% P&K +75% RPM without PSAP (T2). The economics showed that the lowest cost of cultivation was observed with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) followed by 50% P&K +50% RPM without PSAP (T3). The maximum net returns and B:C ratio was registered with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) followed by RDF with RPM without PSAP (T1). Whereas, lowest net returns and B:C ratio was found under the application of T3 + PSAP @ 9g/l followed by T2 + PSAP @ 9g/l. Among the potassium salt of active phosphorus (PSAP) treatment the maximum net returns and B:C ratio was registered under the treatment T1 + PSAP @ 6 g/l.

6.4.2. Sehore

The yield of soybean (Cv. RVS 24) didn't vary significantly among the different treatment of potassium salt of active phosphorus (Table 2.6.16 and 2.6.17). Numerically, the highest yield of soybean was registered with the application of T1 + PSAP @ 9g/l and closely followed by T1 + PSAP @ 6 g/l and RDF with RPM without PSAP. However, the lowest seed yield was recorded with application of 100%N +00% P&K +50% RPM without PSAP (T4) and closely followed by 50% P&K +50% RPM without PSAP (T3). Economics revealed that the highest cost of cultivation was registered under the treatment T1 + PSAP @ 9g/l followed by T2 + PSAP@ 9g/l and T4 + PSAP @ 9g/l. Similarly, the lowest cost of cultivation was observed with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) followed by 50% P&K +50% RPM without PSAP (T3). The maximum net returns were registered with the treatment RDF with RPM without PSAP (T1) followed by 75% P&K +75% RPM without PSAP (T2). The maximum B:C ratio was registered with the application of T1 + PSAP @ 9g/l and T1 + PSAP@ 6g/l. Whereas, lowest net returns were found under the application of T4 + PSAP @ 9g/l followed by T4 + PSAP@ 6 g/l. Similarly, the highest IBCR was observed with application of T3 + PSAP @ 9g/l followed by T4 + PSAP @ 6 g/l and T4 + PSAP @ 9g/l.

On the basis of zonal mean, the maximum yield was noticed with T2=T1 + PSAP@ 6 g/l and closely followed by T3=T1 + PSAP@ 9g/l and T1=RDF with RPM without PSAP (Table 2.6.19). The maximum net returns and B:C ratio was associated with T1=RDF with RPM without PSAP. The growth, development and yield attributes data are given in Table 2.6.18.

6.5. Southern zone

6.5.1. Adilabad

Application of potassium salt of active phosphorus (PSAP) on soybean (Cv. MACS 1188) significantly influenced the growth and yield of soybean at Adilabad centre (Table 2.6.20 and 2.6.21). Significantly higher yield was registered with the application of T1 + PSAP @ 9g/l followed by T1 + PSAP @ 6 g/l and T2 + PSAP @ 9g/l. The lowest yield was recorded with treatment 100%N +00% P&K +50% RPM without PSAP (T4) and followed by 50% P&K +50% RPM without PSAP (T3). Economics point of view, the highest cost of cultivation was registered under the T1 + PSAP @ 9g/l treatment. The lowest cost of cultivation was observed with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) followed by 50% P&K +50% RPM without PSAP (T3). The maximum net returns, B:C ratio and IBCR was registered with the treatment T1 + PSAP @ 9g/l. Whereas, lowest net returns and B:C ratio was found under the application of 100%N +00% P&K +50% RPM without PSAP.

6.5.2. Dharwad

Application of potassium salt of active phosphorus (PSAP) on soybean (Cv. MACS 1188) significantly influenced the yield of soybean at Dharwad centre (Table 2.6.22 and 2.6.23). The highest yield, cost of cultivation and net returns were registered under the treatment T1 + PSAP @ 9g/l and followed by T1 + PSAP@ 6g/l. However, lowest yield, cost of cultivation and net returns were registered under the treatment 100%N +00% P&K +50% RPM without PSAP (T4). The maximum B:C ratio was registered with the treatment T1 + PSAP @ 6 g/l and minimum with T1 + PSAP@ 9g/l.

6.5.3. Pune

Application of potassium salt of active phosphorus (PSAP) on soybean (Cv. MACS 1188) significantly influenced the growth and yield of soybean at Pune centre (Table 2.6.24 and 2.6.25). Significantly the highest yield of soybean was registered with the application of T1 + PSAP @ 9g/l followed by T1 + PSAP @ 6 g/l. The lowest yield was recorded with treatment 100%N +00% P&K +50% RPM without PSAP (T4) and closely followed by T4 + PSAP @ 6 g/l and T4 + PSAP @ 9 g/l. Economics point of view, the highest cost of cultivation was registered under the T1 + PSAP@ 9g/l and followed by T2 + PSAP @ 6 g/l treatment. The lowest cost of cultivation was found with the treatment 100%N +00% P&K +50% RPM without PSAP (T4). The maximum net returns and B:C ratio was registered with the treatment 100%N +00% P&K +50% RPM without PSAP (T4) and closely followed by 75% P&K +75% RPM without PSAP (T2) Whereas, lowest net returns and B:C ratio was found under the application of T4 + PSAP@ 9g/l followed by T3 + PSAP@ 6 g/l.

On the basis of zonal mean, the highest yield was recorded with **T3**=T1 + PSAP@ 9g/l and closely followed by **T2**=T1 + PSAP@ 6 g/l and **T6**=T4 + PSAP @ 9g/l (Table 2.6.27). The highest net returns and B:C ratio was recorded with **T3**=T1 + PSAP @ 9g/l and **T12**=T10 + PSAP @ 9g/l. The growth, development and yield attributes data was presented in table 2.6.26.

Compiled and Summarized by
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Frontline demonstrations

During the year, out of 23 centers, only 20 centres have conducted a total of 943 FLDs on farmer's fields against the target of 900 FLDs in plot of 0.4 ha each. The physical and financial targets and achievements are presented in Table 2.7.1. The centers namely Medziphema, Bharuch and Dholi did not conduct the FLDs due to COVID 19 restriction at respective centers during cropping season. Of the 943 FLDs, 93 and 7 % were represented by man and farm women, respectively. However, the representation of categories wise beneficiaries was 9.75 % by SC, 8.38% by ST, 50.69% by OBC and 31.18% by general (Table 2.7.2).

Data accrued from successful 943 FLDs on full package (all the recommended inputs and cultural practices and improved soybean varieties) revealed that the adoption of research emanated improved soybean production technology led to an increase in yield and net returns to the tune of 32.3% and 59.05%, respectively over farmers practice. This was achieved by the additional expenditure of only ₹4205ha^{-1} (Table 2.7.3). The difference in gross returns due to improved technology and farmer's practice was 34.33%. Soybean yield as high as [2976-2955 kgha^{-1} (IP)] and [2102-2547 kg ha^{-1} (FP)] could be obtained in some farmer's field under the improved production technology and farmer's practice at Dharwad and Sangli, respectively. The lowest yield under improved technology was recorded at SOPA, Indore (1011 kg ha^{-1}). Whereas, lowest yield in farmer's practice was reported at ICAR-IISR, Indore (400 kg ha^{-1}). The estimated yield gap II was 406 kgha^{-1}.

In all 943 frontline demonstrations, a total of 39 improved varieties have been demonstrated in farmer's fields (Table 2.7.4). The maximum demonstrations were conducted on variety JS 95 60 followed by MAUS 158 and JS 20-69. Among the varieties, DSb 23 gave highest yield (3158 kg/ha) followed by Phule Sangam (3014 kgha^{-1}), DSb 21 (2793 kgha^{-1}) and Phule Kimaya (2770 kgha^{-1}) under improved practices. However, lowest yield was recorded with JS 93-05 (979 kg ha^{-1}).

The details of cost of soybean cultivation of 15 centers have been worked out. The details of cost of cultivation under improved technology and farmers practice (Table 2.7.5) indicated that the soybean cultivation cost under improved technology was higher to the tune of 21.47% as compared to farmers practice cultivation cost. Under the improved production technology, the trend of expenditure was in line- Seed and sowing, followed by fertilizer application, land preparation, intercultural operations/hand weeding, harvesting, threshing, insecticide application, herbicide, fungicide application and others. However, in case of farmers practice the trend was seed and sowing, land preparation, fertilizer, intercultural operations, harvesting, threshing, insecticide and herbicide application and others.

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REPORT OF ENTOMOLOGY EXPERIMENTS CONDUCTED
***KHARIF* – 2020**

Seven entomological field trials were conducted during *kharif* 2020 at **11** Coordinated centres viz. Delhi, Pantnagar, Ludhiana (Northern Plain Zone), Sehore, Parbhani, Kota, Amrawati, Indore (Central Zone), Dharwad and Bidar (Southern Zone) and Imphal (North Eastern Hill Zone). Trial wise salient findings are presented below:

Ent. 1. Seasonal incidence of insect-pests and their bio-control agents

A. Incidence of insect-pests: The information on incidence of major insect-pests at different coordinating centres is compiled. Total **21** insect spp. infested soybean crop in different zones during *kharif* 2020 at different coordinating centres:

Zone	Insects
North Plain Zone (Delhi, Pantnagar)	*Bemisia tabaci, Obereopsis brevis, S. obliqua, S. litura,* semilooper, ***Melanagromyza sojae,*** **Aphids**.
North Eastern Hill Zone (Imphal)	*Helicoverpa armigera,* ***Spilarctia obliqua****, A. modicella,* **Aphids**, *M. sojae, Bemisia tabaci, S. litura, C. acuta, Obereopsis brevis,* Bean bug, Thrips
Central Zone (Sehore, Kota, Parbhani, Amravati)	*Cneorane* spp, ***Melanagromyza sojae****,* ***Gesonia gemma****, Chrysodeixis acuta, Spodoptera litura,* ***Obereopsis brevis****, Helicoverpa armigera, Diachrysia orichalcea, Spilarctia obliqua, Hedylepta indicata, Bemisia tabaci, Myllo*cerus spp., Grass hopper, Field Crickets
Southern Zone (Dharwad)	*Melanagromyza sojae*, *Obereopsis brevis, S. litura, D. orichalcea, Spilarctia obliqua, N. viridula,* ***Cydia ptychora***, Thrips, Aphids, Jassids, *Bemisia tabaci*, *Myllocerus* spp., *A. modicella,* ***H. indicata****, Helicoverpa armigera,*

The extent of infestation/damage by major insect-pests at different coordinating centres is given below:

Location	Major insects (infestation / damage)
Delhi	No major insect observed
Pantnagar	Stem fly –27.11% stem tunnelling; Aphids – 3.83/ 3 leaves; Defoliation 10.07 leaf damage.
Sehore	*Gessonia gemma* -4.6 larvae /mrl ; *Chrysodeixis acuta*- 6.8larvae /mrl ;Stem fly 80% infestation, With maximum tunneling 31.27 per cent, Girdle beetle -26.50 % infestation
Parbhani	Girdle beetle – 40.00 % infestation; Stem fly – 38.06 % stem tunnelling; *Chrysodeixis acuta* – 6.8 larvae/MRL
Amravati	Stem fly with 70 % infestation.
Kota	Girdle beetle – 36.67 % infestation ; Semiloopers – 1.33 larvae/m; Defoliation – 4.0 at flowering and 23.5 at peak larval incidence
Dharwad	*C. ptychora* – 52.384% pod damage
Imphal	*S. obliqua* – 150.67 larvae / m; Leaf Webber – 14.67 larvae /m; *S. litura* – 5.67 larvae/m; Defoliation – 32.92 % Aphids – 71.0 /plant

B. Incidence of Bio-control agents (BCAs): Periodic incidence of natural bio-control agents were recorded in soybean ecosystem. The important ones were; entomopathogenic fungi – *Beauveria bassiana Nomurea rileyi,* Parasitoids – *Bracon* sp., *Apanteles* sp., *Cotesia flavipus*; Predators – Spiders, Coccinelids, *Cantheconidia furcellata*. The extent of larval mortality due to bio-control agents (BCAs) is given hereunder:

Location	BCAs	Period	Extent
Sehore	*B. bassiana*	21 August 2020	35% mortality due to *B.*

	Bacterial infection	5 September	*bassiana.* 60% due to Bacterial infection.
Kota	*Cotesia*	35th SMW	4.5 % parasitisation
Dharwad	*N. rileyi*, *Apanteles*	September 34th SMW	15.07% larval mortality 8.90% parasitisation
Imphal	*N. Rileyi* and *B. bassiana*	--	5 to 30 % larval mortality
Pantnagar	Bacterial infection Virus infection	-- --	57.5 % larval mortality 15 % larval mortality
Parbhani	*Coccinella* Spiders	34th SMW 39th SMW	3.00 /m 3.67 /m

Ent. 2. Field screening of AVT-I&II entries for resistance against major insect-pests

AVT-I and -II entries of different zones, along with those found resistant in previous years were screened for insect resistance/tolerance. Further, they were categorized into different resistance categories against individual insect spp. by employing **AICRPS method** and against location specific insect-pest complex by **Maximin - Minimax method.** Information on reaction of different entries against major insect-pests during last three years (2018, 2019 and 2020) were compiled and promising genotypes were identified by using following criteria:

1. Resistance against one or more insect spp. at 3 or more locations.
2. Location specific insect-pest complex by **Maximin - Minimax method** (R-HY/S-HY(T) at 3 or more locations.

Based on above criteria, lines identified as potential donors for insect resistance / tolerance against specific insect pests are mentioned below:

Insect(s)	**Genotype(s)**
Stem fly	AMS 100-39, AMS 2014-1, MACS 1493, NRC 146, NRC 147, RSC11-07, DSb 34.
Girdle beetle	NRC 149, AMS-MB5-18, BAUS 102, DSb 32, NRC 132, NRC 137.
Defoliators	AMS 100-39, NRC 149, MACS 1493, DS 3108, DSb 34, NRC 148, DSb 33, KDS 992, SKF-SP-11, JS-20-34, CSB 10084, MACS-NRC1575, NRC 147.
PC	AMS 100-39, MACS 1566, NRC 148, AMS 2014-1, MAUS732, PS 1611, RSC11-03, RSC11-07, RSC11-15, RSC11-17, NRC 142, MACS 1620, JS-335, HIMSO 1689, DS 3108, AMS-MB5-18, DSb 32, MACS 1493, NRC 128, NRC 131, NRC 136.

ENT 3: Status of AVT-II entries for antixenosis and antibiosis against *S. litura*

Antixenosis studies were carried out in 11 AVT-II entries at Indore, Pantnagar and Dharwad. Among 11 genotypes tested, none of the entry was exhibited **strong /extreme antixenosis** against *S. litura.*

Antixenosis reaction of AVT-II entries:

S. No.	Genotypes	Pantnagar		Dharwad		Indore	
		C value	Response	C value	Response	C value	Response
1	AMS 100-39	1.16	Preferred host	0.89	Slight antixenosis	1.21	Preferred host
2	Dsb 33	1.30	Preferred host	1.26	Preferred host	0.90	Slight antixenosis
3	JS 21-71	-	-	-	-	0.91	Slight antixenosis

4	Karune	-	-	1.11	Preferred host	1.11	Preferred host
5	MACS NRC 1667	-	-	1.17	Preferred host	1.01	Preferred host
6	NRC 138	0.86	Slight antixenosis	1.29	Preferred host	0.97	Slight antixenosis
7	NRC 142	-	-	1.13	Preferred host	1.01	Slight antixenosis
8	NRC SL1	-	-	0.87	Slight antixenosis	0.97	Slight antixenosis
9	NRC SL2	0.96	Slight antixenosis	1.17	Preferred host	0.97	Slight antixenosis
10	RVSM 2011-35	1.12	Preferred host	1.02	Preferred host	1.06	Preferred host
11	JS-335	Check	Check	1.31	Preferred host	1.00	Preferred host

Antibiosis reaction of AVT-II entries

The lowest AD and ECD was found in NRC SL2 and the lowest ECI was found in AMS 100-39. These entries were found to have good antibiosis reaction:

S. No.	Genotypes	Pantnagar			Dharwad			Indore		
		AD	ECI	ECD	AD	ECI	ECD	AD	ECI	ECD
1	AMS 100-39	60.05 (50.89)	45.86 (42.59)	70.90 (57.59)	68.29 (55.71)	32.30 (34.62)	47.30 (43.43)	54.66 (47.67)	46.29 (42.87)	85.25 (67.41)
2	Dsb 33	45.16 (42.08)	40.28 (39.33)	73.84 (59.62)	71.08 (57.44)	46.25 (42.83)	65.07 (53.75)	59.48 (50.47)	46.45 (42.96)	78.41 (62.31)
3	JS 21-71	-	-	-	-	-	-	61.27 (51.52)	53.61 (47.07)	87.81 (69.57)
4	Karune	-	-	-	71.14 (57.48)	44.43 (41.79)	62.45 (52.19)	61.69 (51.76)	44.13 (41.63)	73.78 (59.20)
5	MACS NRC 1667	-	-	-	70.82 (57.28)	36.10 (36.91)	50.98 (45.54)	60.94 (51.32)	51.40 (45.80)	84.50 (66.82)
6	NRC 138	56.02 (48.52)	36.49 (37.06)	55.30 (48.05)	69.04 (56.17)	50.07 (45.02)	72.52 (58.36)	64.40 (53.37)	55.74 (48.30)	87.25 (69.08)
7	NRC 142	-	-	-	65.90 (54.25)	39.54 (38.95)	60.00 (50.75)	72.45 (58.34)	60.01 (50.77)	83.25 (65.84)
8	NRC SL1	-	-	-	67.07 (54.96)	33.69 (35.47)	50.23 (45.11)	60.17 (50.87)	52.39 (46.37)	87.01 (68.87)
9	NRC SL2	40.83 (39.64)	64.43 (53.67)	57.01 (49.09)	74.64 (59.74)	45.77 (42.56)	61.32 (51.52)	57.09 (49.08)	38.18 (38.16)	70.02 (56.80)
10	RVSM 2011-35	58.38 (49.85)	40.69 (39.50)	56.42 (48.71)	72.93 (58.62)	45.60 (42.46)	62.52 (52.23)	56.60 (48.79)	50.91 (45.52)	89.87 (71.44)
11	JS-335	60.52 (51.11)	31.02 (33.61)	51.93 (46.11)	76.75 (61.15)	57.89 (49.52)	75.43 (60.26)	69.90 (56.73)	53.98 (47.28)	76.38 (60.92)
	S.Em±	2.874	2.450	3.324	1.67	1.54	2.77	(2.87)	(4.14)	(9.90)
	CD @ 5%	4.684	1.529	5.142	6.70	6.15	11.10	(5.98)	(8.65)	(20.66)

Ent. 4. Field screening of IVT entries for resistance to major insect-pests

Forty one coded entries were screened against major insect-pests in **(IVT Normal)** at different coordinating centres. Promising entries showing desirable reaction against one major insect-pest at more than one location and/or against more than one insect spp. at one or more locations are listed below, which will be tested further in next season:

Insect	Promising entries (IVT Normal)
Stem fly	JS 22-11, RVSM 2012-11, RSC 11-39, AS-15, PS 1664, JS 22-14, DLSb-1, RSC 11-35, PS 1661, NRC 109, MAUS 806, BAUS 31-17.
Defoliators	DSb-38, DLSb-2, RVSM 2012-11, RSC 11-39, AS-15, MACS 1520, JS 22-14, DS 3144, NRC 128, RSC 11-35, PS 1661, JS 20-116, PS 1670, RVS 2011-10, AUKS 207, NRC 86, KDS 1096, MACS 1691, KDS 1144, BAUS 96-17, BAUS 31-17, TS 20-5.
Girdle beetle	RSC 11-39, DS 3144, RSC 11-35, RVS 2012-10.

Twenty six coded entries were screened against major insect-pests in **(IVT Early)** at different coordinating centres. Promising entries showing desirable reaction against one major insect-pest at more than one location and/or against more than one insect spp. at one or more locations are listed below, which will be tested further in next season:

Insect	Promising entries
Stem fly	NRC 181, MACS NRC 1711
Girdle beetle	NRC 186, RVS 2011-4, JS 22-12, NRC 178, NRC 183, JS 95-60
Defoliators	NRC 186, RVS 2011-4, PS 1660

ENT 5. Evaluation of germplasm lines at hot spots for resistance against major insect-pests

Fifty germplasm lines were evaluated for their insect reaction at respective hot spots (Sehore, Indore, Kota, Ludhiana, Dharwad and Imphal. On the basis of insect reaction and yield potential these following promising lines were identified for further evaluation during next season:

Insect	Promising entries
Girdle beetle	JSM 195, JSM 232, SL 525, EC 457074, SL(E) 1.
Defoliators	JS 20-86, SL 738, MACS 171, EC 457074.

ENT 6: Integrated management of root rot complex and stem borers of soybean

The results of this experiment indicated that, the treatment T_7 *i.e.* seed treatment with Trifloxystrobin + Penflufen 240 FS @ 1 ml/kg of seeds + Thiamethoxam 600 FS @ 2 ml/kg of seeds and followed by spraying of Chlorantraniliprole @ 0.2 ml/l at 15 & 35 DAS and Propiconazole @ 1 ml/l at 35 and 45 DAS was found to be significantly superior and on par, respectively, as compared to treatment T_8. The treatment T_7 had recorded lower incidence of per cent root rot (1.10), per cent stem tunneling (5.75) and per cent girdling (6.97) as compared to other treatments. Further, it recorded higher % field stand (99.99), plant height (48.98 cm), number of branches per plant (5.99), number of pods per plant (66.95), 100 seed weight (14.20) and seed yield (1710.25 kg/ha). The next best treatment was T_8 *i.e.* seed treatment with Thiophanate methyl + Pyroclostrobin 500 FS @ 2 ml/kg of seeds + Thiamethoxam 600 FS @ 2 ml/kg of seeds.

Thus, seed treatment with Trifloxystrobin + Penflufen 240 FS @ 1 ml/kg of seeds + Thiamethoxam 600 FS @ 2 ml/kg of seeds and followed by spraying of Chlorantraniliprole @ 0.2 ml/l at 15 & 35 DAS and Propiconazole @ 1 ml/l at 35 & 45 DAS was found to be effective and economical for the management of root rot complex and seed borers of soybean.

ENT 7. Management of major insect-pests of soybean through microbial consortia

In order to identify suitable microbial insecticides for management of major insect-pests of soybean six microbial insecticidal mixtures were tested at Dharwad, Sehore, Kota, Pantnagar Prabhani and Imphal. The treatment ***Beauveria bassiana*** **(2 kg/ha) +** ***Nomuraea rileyi*** **(2 kg/ha)** at **Dharwad** recorded least number of *S. litura* (0.23 larvae/plant), Semilooper (0.34 larvae/plant), Bihar hairy caterpillar (0.22 larvae/mrl) and leaf damage (10.86%) and found significantly superior over all other

treatments. The treatment *Nomuraea rileyi* (2 kg/ha) + *Bacillus thuringiensis* (1 kg/ha) was next best treatment and recorded lowest *S. litura* (0.54 larvae/plant), Semilooper (0.59 larvae/plant) Bihar hairy caterpillar (0.39 larvae/mrl) and leaf damage (15.13%). Seed yield differed significantly among the treatments and it ranged from 1261 to 2715 kg/ha. The treatment, *Beauveria bassiana* (2 kg/ha) + *Nomuraea rileyi* (2 kg/ha) recorded higher seed yield of 2715 kg/ha and found significantly superior over other treatments.

In case of microbial consortia at **Kota** the combination the T6 (*Metarhizium anisopliae* 2 kg/ha + *Bacillus thuringiensis* (Bt) 1 kg/ha) was found better over other treatments giving higher yield and minimum incidence of defoliators.

The T3 (*Nomuraea rileyi* (2kg/ha) + *Metarhizium anisopliae* (2kg/ha)) has shown good results at **Pantnagar**.

T2 (*Nomuraea rileyi* (2kg/ha) and *Bacillu thuringiensis* (Bt) (1 kg/ha) was most effective treatment followed by T3 and T5 at **Sehore**.

At Imphal, *B. bassiana* + *Bt* commercial treatment harboured only 0.44 larvae/mrl of BHC which was at par with *N. rileyi* + *Bt* treatment recording 2 larvae/mrl. Population of tobacco caterpillar after 7 days of 1st treatment was lowest with *M. anisopliae*+ *Bt* observed with 0.44 larvae/mrl but it was at par with all other microbial treatments except untreated control wherein 2.33 larvae/mrl were observed. *B. bassiana* + *Bt* with 0.33 no. of larvae/mrl observed was the best and resulted in 11.5 times reduction of population of leaf webber as observed before first treatment. This treatment significantly different and was superior to other microbial combinations in reduction of leaf webber.

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REPORT OF PLANT PATHOLOGY EXPERIMENTS
KHARIF - 2020

Eight Pathology field trials were conducted during *kharif* 2020 at 14 co-ordinated centres spread over five zones to generate the information on prevalence of diseases, their severity, sources of resistance to either a single disease or multiple diseases, screening of germplasm lines for identification of sources of multiple disease resistance, integrated management strategies against root rot complex and stem borers. Trial wise salient findings are presented below: (Table 4.1 to 4.10). As reported by various centres, although a total of 02 diseases appeared across the country on soybean, only 04 of them were wide spread occurring in 3 or more zones and one were zone specific as BND at Delhi centre. The PB (Ct) appeared at all the centre across the country except Delhi and Ludhiana centre, whereas FLS appeared at Almora, Palampur Sehore, Jabalpur and Dharwad; YMV appeared at at Pantnagar, Ludhiana, Delhi, Jabalpur, Indore, Palampur, Jorhat and Amravati, RAB at Pantnagar, Jabalpur, Indore, Kota, Jorhat, Medziphema, Coll. R appeared at Jorhat, Medziphema, Sehore and Jabalpur; rust and PB (Ct) at Dharwad, K. Digraj and Medziphema, Seed rot at Jorhat, Sehore and Indore, BND at Delhi appeared in moderate to severe form, severity of other diseases was mild to moderate at most of the locations. Two disease *viz*., PB (Ct) and YMV were found in all the five zones which are the key diseases across the locations. FLS appeared in four zones except North Eastern Hill Zone; SMV, RAB CLS and FLS appeared in three zone. The other hemibiotrphic diseases at different locations appeared in mild to moderate form. In general, the disease pressure differed at different locations across the zones mainly due to favourable & congenial weather that prevailed across the different locations during the cropping period. The severity of foliar fungal diseases was more during this year when compared to previous year.

The major results of the trials are presented here as under:

PP 1: Survey for soybean diseases

Disease scenario across the locations has been reported by synthesis and analysis of the available information from survey and surveillance and also based on severity of diseases recorded in other trials of soybean pathology (Table 4.1 to 4.5). In NHZ, at Almora, FLS was moderate to severe and PB (Ct) were in mild form. Whereas at Palampur, FLS was moderate to severe whereas BS, BP and PB (Ct), YMV were in mild to moderate form. In NPZ, at Pantnagar, RAB, BLB, YMV and PB (Ct) were moderate to severe where in SMV and BP were recorded with mild form. At Ludhiana, YMV was severe and SMV was mild form, while at Delhi, YMV were severe and BND was mild to moderate. In NEHZ, At Jorhat, disease pressure SMV and PB (Ct) were noticed in moderate to severe form while CollR and RAB were in mild to moderate form. At Medziphema, PB (Ct), rust, RAB were in moderate to severe form. In CZ, at Sehore, TLS appeared in severe form. At Amravati, PB (Ct) & Charcoal Rot (CR) was found in moderate to severe from. Disease pressure of *Alternaria* leaf spot (ALS), BP and Yellow Mosaic Virus (YMV) were found in mild to moderate form. At Jabalpur, YMV and CR were moderate to severe, RAB, CollR, PB(Ct) and BP were in mild to moderate form. At Indore PB (Ct), RAB & SMV appeared in severe form, YMV, BP was found moderate to severe from. In SZ, rust was severe at Dharwad and K.Digraj. The PB (Ct) was moderate at Dharwad and K.Digraj and PSS appeared in moderate form at Dharwad.

PP 2: Trap nursery trial

Appearance of various major diseases was monitored at 11 centres across the zones on 16 susceptible varieties (Table 4.2). In NHZ, at Almora, the situation was different from previous year where in PB (Ct) appeared in moderate to severe form while FLS and BP appeared in mild to moderate form.AtPalampur, FLS, PB (Ct), BP and BS appeared in moderate to severe form. In NPZ, at Pantnagar, PB (Ct) RAB and YMV in were severe form and YMV, BP and BLB were in mild form. At Delhi, YMV was in severe form and BND was in mild form. In NEHZ, at Jorhat, the disease situation was almost little different from the last year where in PB(Ct), RAB, Coll.R & SMV were in

moderate to severe form and At Medziphema, RAB, PB (Ct) and Rust were in moderate to severe form. In CZ, at Sehore, TLS appeared in moderate to severe form. At Jabalpur, this year, CR, YMV and RAB appeared in moderate to severe form. At Amravati, CR was in moderate form and other diseases such as YMV, PB (Ct) and ALS appeared in mild form. At Indore PB (Ct) & RAB appeared in severe form, SMV and YMV appeared in mild form. In SZ, rust appeared in severe form at Dharwad and Kasbe Digraj and PB (Ct) was in moderate at Ugarkhurd and K. Digraj and PSS appeared in moderate form at Dharwad center

PP 3(a): Incidence of various diseases in IVT

Forty one entries along with checks were screened at 12 locations across the zones against major diseases (Table 4.3). Evaluation of entries were considered reliable only for FLS, PB (Ct), RAB, YMV, Rust, Coll.R, SMV, PSS, BLB and CR appeared in moderate to severe form in susceptible checks or in any test entry at one or more centres. For FLS at Palampur and Almora, PB (Ct) at Indore, Palampur, Dharwad, RAB at Pantnagar, Jabalpur, Indore, YMV at Ludhiana, Delhi, Jabalpur, BLB at Sehore, Pantnagar, CR at Jabalpur, Amrabvati, SMV at Indore, Rust at Dharwad, K.digraj, SMVat Jorhat, Coll. R at Jorhat, PSS at Dharwad, TLS sehore was selected due to diseases appear in moderate to severe form in susceptible checks or in any test entry at one or more centres. Disease pressure of rest of the diseases at different centre was low to moderate in susceptible check as well as in test entries. Therefore, the resistant status of the entries to diseases of latter group was not reliable and needs further confirmation. The data of those centres where susceptible check/test entries showed susceptible or highly susceptible reaction were considered for classifying varieties into different resistance categories. The entries observed Highly Resistant (HR) at such centre (s) and did not express susceptible reaction to same disease at other centres where infection in susceptible check (s) and in entries was even less than 77.7 were also considered as resistant. In IVT trial, entries DSb-38, DLSb-2, Himso 1691, JS 22-14, DLSb-1, and VLS 101 shower MR to HR reaction toward FLS in Almora and Palmpur. In IVT trial, PS 1664, PS 1661 showed at HR reaction toward PB (Ct) at least one center out of three centre and showed at MR reaction toward PB (Ct) at least one center out of three centre. Only one entry PS 1661 showed HR reaction toward RAB in at least two locations out of three. Only one entry RSC 11-39 showed MR to HR reaction toward RAB in three locations. Total nine entries DS 3105, RVSM 2012-11, DS 3144, DLSb-1, NRC 128, PS 1661, PS 1670, SL 1212 and SL 1250 showed HR reaction toward YMV in all three selected locations. Three entries KDS 1096, MACS 1691, DS 1213 showed HR reaction towards BLB at two location. Most of entries showed HR reaction toward TLS at Sehore centre. None of entries show either HR or MR towards Rust. Total 14 entries Himso 1691, JS 22-14, DS 3144, DLSb1, NRC 128, VLS 101, PS 161, RVS 2012-10, PS 1670, MACS 1701, KDS 1096, MACS 1691, TS 20-5 showed HR reaction towards Coll. R at Jorhat centre. Total four entries RSC 11-39, KDS 1144, BAUS 96-17, TS 20-5 showed HR reaction toward SMV at Jorhat. Only one entry RVS 2012-10 showed HR reaction to CR at across the zone. None of entries showed HR reaction to PSS at Dharwad centre. The data of BP for Pantnagar, Amravati and Kota, PB (Ct) for K.Digraj, Kota, Jorhat, Almora, RAB for Kota and Jorhat, YMV for Pantnagar, BS for Palampur, BND for Delhi, Rust for Medziphema, ALS and CLS for Kota was not considered reliable due to less than 77.7 infection index and low disease pressure.

PP 3(a.1): Incidence of various diseases in IVT (Early)

Total twenty six entries along with checks were screened at five locations across the central zones against major diseases (Table 4.3.1). Evaluation of entries were considered reliable only for PB (Ct), RAB, CR, YMV, appeared in moderate to severe form in susceptible checks or in any test entry at one or more centres. Disease pressure of rest of the diseases i.e., TLS at Sehore, PB (Ct) at Kota, RAB at Kota, CR at Amravati, ALS at Amaravti and Kota, CLS at Kota, BP for at Amaravti and Kota, YMV at Jabalpur was low to moderate in susceptible check as well as in test entries. Therefore, the resistant status of the entries to diseases of latter group was not reliable and needs further confirmation. The data of those centres where susceptible check/test entries showed susceptible or highly susceptible reaction considered for classifying varieties in to different resistance categories.

The entries observed Highly Resistant (HR) at such centre (s) and did not express susceptible reaction to same disease at other centres where infection in susceptible check (s) and in entries was even less than 77.7 were also considered as resistant. In IVT trial, none of entries show HR reaction toward PB (Ct) in Indore, ten entries NRC 186, PS 1659, RVSM 2012-4, JS 22-12, JS 22-18, NRC 177, JS 22-16, NRC 178, NRC 179, MACSNRC 1711 showed MR reaction at Indore centre. Three entries NRC 186, NRC 172 and JS 20-18 showed HR reaction to CR at Jabalpur. None of entries show HR reaction toward RAB in both the location, NRC 186, JS 22-12, NRC 177, JS 22-16 showed MR reaction toward RAB in both the location. Three entries NRC 186, NRC 172, JS 22-18 showed HR reaction toward CR at Jabalpur. Total six entries NRC 186, RVS 2011-4, PS 1660, NRC 172, JS 22-12, and JS 22-18 showed HR reaction toward YMV at Indore centre.

PP 3(b): Incidence of various diseases in AVT-I

A total of sixteen entries which were promoted to AVT-1 from IVT in the previous year of testing from all the zones, have been evaluated against major diseases at 11 centres (Table 4.4) along with checks. Susceptible check varieties or test entries contracted severe disease (I. I. equal or more than 77.7). Evaluation of entries were considered reliable only for FLS, PB (Ct), RAB, YMV, Rust, PSS and CR appeared in moderate to severe form in susceptible checks or in any test entry at one or more centres. For FLS at Palampur and Almora, PB(Ct) at Indore, Palampur, Dharwad, RAB at Pantnagar, Jabalpur, Indore, YMV at Ludhiana, Delhi, Jabalpur, Indore CR at Jabalpur, Amrabvati, SMV at Indore, Rust at Dharwad, PSS at Dharwad TLS sehore was selected due to diseases appear in moderate to severe form in susceptible checks or in any test entry at one or more centres. Disease pressure of rest of the diseases was low to moderate in susceptible check as well as in test entries. Therefore, the resistant status of the entries to diseases of latter group was not reliable and needs further confirmation. Data of BS at Palmpur, BP at Pantnagar, Sehore, BLB at Pantnagar, BND at Delhi, PB (Ct) at Medziphema, Rust at Medhziphema, RAB at Medziphema, ALS at Amravati, was not reliable.

In NHZ, FLS and PB (Ct) was selected for evaluation of entries, only one entry VLS 99 showed HR reaction towards FLS at Palampur and Almora centre. Only two entries Himso 1690, NRC 149 showed HR reaction towards PB (Ct) at Palampur centre. In NPZ, none of entries show HR reaction towards RAB, only one entry SL 1213 showed MR reaction towards RAB. Two entries NRC 149 and SL 1213 showed HR reaction towards YMV at Delhi and Ludhiana centre. Data of NEHZ was not reliable. In CZ, three entries JS 21-72, NRC 142, NRC 150 showed HR reaction towards CR at Jabalpur Centre and Amravati. Seven entries showed HR reaction towards TLS at Sehore centre. None of entries showed HR reaction toward YMV at Jabalpur and Indore centre. Only one entry JS 21-72 showed MR to HR reaction toward YMV across the zone. None of entries showed HR reaction towards RAB in CZ, whereas two entries JS 21-72 and NRC 165 showed MR to HR reaction toward RAB in CZ. Three entries AMS 20-19, VLS 99 and JS 21-72 showed HR reaction towards PB (Ct) at Indore centre. All entries show S reaction toward SMV at Indore centre. In SZ, at Dharwad centre all the entries showed MS reaction towards rust, whereas only one entry MAUS 732 showed MR reaction towards PB (Ct), four entries MAUS 732, JS 21-72, SL 1213, MACS 16-20 showed HR reaction to PSS.

PP 3(b): Incidence of various diseases in AVT-II

A total of ten entries which were promoted to AVT-II from AVT I in the previous year of testing from all the zones, have been evaluated against major diseases at 13 centres (Table 4.5) along with checks. Susceptible check varieties or test entries contracted severe disease (I. I. equal or more than 77.7). Evaluation of entries were considered reliable only for FLS, PB (Ct), RAB, YMV, Rust, PSS and CR appeared in moderate to severe form in susceptible checks or in any test entry at one or more centres. For FLS at Palampur and Almora, PB(Ct) at Indore, Palampur, Almora, Dharwad, RAB at Pantnagar, Jabalpur, Indore, YMV at Ludhiana, Delhi, Jabalpur, CR at Jabalpur, Amravati, Rust at Dharwad, PSS at Dharwad, TLS at Sehore was selected due to diseases

appear in moderate to severe form in susceptible checks or in any test entry at one or more centres. Disease pressure of rest of the diseases was low to moderate in susceptible check as well as in test entries. Therefore, the resistant status of the entries to diseases of latter group was not reliable and needs further confirmation. So, Data of BS at Palmpur, BP at Pantnagar, Sehore, Amravati, BLB at Pantnagar, BND at Delhi, PB (Ct) at Medziphema, Jorhat, Rust at Medhziphema, RAB at Medziphema, Jorhat Coll. R at Joorhat, SMV at Jorhat, ALS at Amravati, was not reliable.

In NHZ, FLS and PB (Ct) was selected for evaluation of entries, none of entries showed HR toward FLS and PB (Ct). One entry, AMS 100-39 showed MR to HR reaction to FLS and PB (Ct) at Palampur and Almora centre. One entry DSb -33 showed MR to HR reaction to PB (Ct) at Palampur and Almora centre. In NPZ, none of entries show HR reaction towards RAB, four entries AMS 100-39, DSb -33, MACSNRC 1667, RVSM 2011-35 showed MR reaction towards RAB. None of entries showed HR toward YMV across the zone, whereas NRC 142, NRCSL 2 showed R reaction toward YMV at Ludhiana centre, NRCSL1 showed R reaction toward YMV at Delhi centre. Data of NEHZ was not reliable. In CZ, NRC 142 and RVSM 2011-35 showed HR reaction toward CR at across the zone. Three entries JS 21-71, NRC 142 and RVSM 2011-35 showed MR reaction toward RAB. Five entries JS 21-71, NRC 138, NRC 142, NRCSL 2 and RVSM 2011-35 showed HR reaction toward YMV at Jabalpur. Four entries AMS 100-39, DSb 33, NRC 138, and RVSM 2011-35 showed HR reaction toward TLS at Sehore. None of entries showed HR reaction toward PB(Ct) at Indore centre, four entries JS 21-71, NRC 138, NRC 142 and RVSM 2011-35 showed MR reaction toward PB(Ct) at Indore. In SZ, None of entries showed HR reaction toward Rust, PB(Ct) and PSS. DSb-33 showed MR reaction toward Rust, PB(Ct) and PSS.

PP 4: Performance of previous year resistant entries

Disease specific resistant entries/varieties of past years were further evaluated to select those which are showing durable resistance status at various identified locations (Table 4.6). In the trial on performance of previous year resistant entries screened across five different zones, the entry AMS-1003 maintained HR reaction at 6^{th} year of their testing at Amravati center under sick plot conditions. The entry JS 20-34 maintained HR reaction at 8^{th} year of their testing at Jabalpur center under hot spot conditions. The entries DSb 21, and DSb 23, DSb 28 maintained their HR reaction to rust at their 9^{th} year of testing at Dharwad center. The rust resistant donors EC 241778, EC 241780 and EC 242104 showed HR reaction at their 13^{th} and 9^{th} year of testing, respectively, at Dharwad center. At Pantnagar SL-1068, SL 1123 and DS 3108 maintained HR status to YMV at third year of testing. Entry SL 1123 maintained HR status to RAB at third year of testing. At Palampur ASb-50 maintained HR status to both FLS and PB (Ct) at fourth year of testing. (Table 4.6)

PP.5. Evaluation of germplasm lines for identification of multiple disease resistant sources

Fifty germplasm lines were evaluated at Palampur, Jabalpur, Indore, Dharwad and Pantnagar centres for identification of sources of multiple disease resistance (Table 4.7). At Palampur, six entries TGX 293-41E, EC 391181, UGM 77, EC 14117, Harder and EC 241780 showed multiple disease resistance to PB (Ct) and FLS, whereas three germplasm lines MACS 303, EC 381884 and Z-22 (20-146) showed multiple disease resistance to PB (Ct) and BP. At Jabalpur, SL 525, PK 122, showed multiple resistances to YMV, CR and RAB diseases. At Indore, VLS 11 showed multiple resistances to YMV, PB (Ct), SMV and RAB diseases, where as LDS 256 and SL 525 showed multiple resistance to YMV, PB (Ct) and RAB diseases. At Dharwad Center, none of germplasm lines showed multiple resistances. At Pantnagar, the entry RKS-54 showed multiple resistances to RAB, YMV and BLB, whereas JSM 285, JS 20-86, PK-431337 and Z-22(20-MC) showed multiple resistances to YMV and BLB.

PP 6/ENT 8 - Integrated management of root rot complex and stem borers of soybean

Integrated management trails were conducted at Dharwad, Amravati, Jabalpur, Pantnagar, Palampur and Jorhat for effective management of root rot complex and stem borers (Table 4.8). In second year of experimentation conducted at Dharwad, seed treatment with Trifloxystrobin + Penflufen @ 1g/kg of seed along with Thiamethoxam @ 2 ml/kg of seed was found effective in management of root rot complex and stem borers of soybean and enhanced the yield. At Pantnagar seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed along with Thiamethoxam @ 2 ml/kg of seed was found effective in management of root rot complex, where as seed treatment with Trifloxystrobin + Penflufen @ 1g/kg of seed along with Thiamethoxam @ 2 ml/kg of seed was found effective in management of stem borers of soybean. At Amravati seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed along with Thiamethoxam @ 2 ml/kg of seed was found effective in management of root rot complex and stem borers of soybean. At Palampur centre except application of seed treatment with Thiomethoxam@ 2 ml/kg of seed all treatments found effective in management of root rot complex and stem borers of soybean. Similar situation was observed at Jabalpur and Jorhat station (Table 4.8).

PP 7: Development of forewarning systems against major diseases of soybean.

Considering the importance of forewarning systems in timely management of important diseases in soybean, the disease severity of RAB, YMV, CR, MLS, PB(Ct) and Rust was recorded over 10 to 20 years at various AICRPS centre. The diseases severity data were correlated with prevailing weather parameters viz., maximum temperature, minimum temperature, relative humidity, amount of rainfall and number of rainy days (Table 4.9). At Jabalpur centre charcoal rot was recorded in two varieties JS 9560 and JS 9752 at weakly interval and correlated with weather parameter of corresponding week. Only maximum temperature and sunshine hours got significantly positively correlated between corresponding week weather parameter to disease severity. One weak prior only sunshine hour got significantly positively correlated to weather parameter from disease severity, whereas none of weather parameters get significantly positively correlated to charcoal rot severity two weak prior. If soybean faces maximum temperature around 29.7 to 31.7 ◦C for 2 week and 2.9 to 4.5 h sunshine hours in a week at 45 DAS than CR symptoms will appear in soybean crop. At Jabalpur centre YMV was recorded JS 335 at weakly interval and correlated with weather parameter. Maximum temperature, rainfall and evening RH positively significantly correlated with YMV data. At Dharwad centre rust and pod blight diseases were recorded in JS 335 variety at weakly interval and correlated with weather parameter of corresponding week. Only rainfall and maximum temperature got significantly positively correlated between corresponding week weather parameter to diseases severity of rust and pod blight. One weak prior also rainfall and maximum temperature got significantly positively correlated to weather parameter from disease severity of rust and pod blight, whereas only maximum temperature was positively significantly correlated to rust and pod blight severity two weak prior. If soybean faces maximum temperature around 27 to 28 ◦C for 2 week and more than 20 mm RF for 2 days in a weak with at 45 DAS that lead to appearance of rust will appear. If soybean faces maximum temperature around 27 to 28 ◦C for 2 week and more than 17 mm RF for 2 days in a weak with at 45 DAS that lead to appearance of pod blight in soybean crop. At Pantnagar centre RAB and YMV were recorded in two varieties (KHSb-2 for RAB and PK-262 for YMV) at weakly interval and correlated with weather parameter of corresponding week. None of weather data correlated with diseases severity in corresponding week, one week prior and two week prior. At sehore centre MLS and CR data was correlated with weather parameter. MLS was negatively correlated with rain fall during the years 2012, 2013 and 2016, whereas Maximun temperature was positively correlated but was significant in the year 2016 only. CR was positively correlated with maximum temperature during 2016 only. If soybean faces maximum temperature more than 32◦C for 2 week at 45 DAS that lead to appearance of CR in soybean crop.

PP 8: Estimation of avoidable losses soybean diseases (I year)

At various AICRPS centre yield loss due to various diseases such as CR, PB(Ct), RAB, TLS, Rust, FLS were recorded (Table 4.10). In first year of experimentation conducted at Jabalpur centre showed 85.0 % incidence of charcoal rot reduce 100% yield loss, whereas seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed with followed by foliar application of tebuconazole @ 0.125 % could not able to reduce disease severity in susceptible variety (Table 4.8). While resistance variety JS 2098 was given 13.40 q/ha of yield without application of any fungicide. In resistance variety, seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed could able to avoid 3.13 % yield loss, along with maximum foliar application of tebuconazole @ 0.125 % able to reduce only 9.26 % of yield loss. At Amravati centre yield is not significant so experiment could not able to conclude. The severity of charcoal rot disease in Amravati is too low. At Sehore centre, seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed could able to avoid 44.85 % yield loss, whereas seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg along with maximum foliar application of tebuconazole @ 0.125 % able to avoid 50.23 % of yield loss caused by TLS. At Dharwad centre, Seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed could able to avoid 10.74 % yield loss, whereas seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg along with maximum foliar application of tebuconazole @ 0.125 % able to avoid 28.63 % of yield loss caused by Rust and PB(Ct). At Medziphem centre, Seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed could able to avoid 5.93 % yield loss, whereas seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg along with maximum foliar application of tebuconazole @ 0.125 % able to avoid 28.17 % of yield loss caused by RAB, Rust and PB(Ct). At Palmpur centre, Seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed could able to avoid 4.05 % yield loss, whereas seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg along with maximum foliar application of tebuconazole @ 0.125 % able to avoid 28.47 % of yield loss caused by FLS and PB (Ct). At Indore centre, Seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed could able to avoid 6.89 % yield loss, whereas seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg along with maximum foliar application of tebuconazole @ 0.125 % able to avoid 52.91 % of yield loss caused by PB (Ct). At Pantnagar centre, Seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed could able to avoid 3.23 % yield loss, whereas seed treatment with Thiphanate methyl+ Pyroclostrobin @ 2ml/kg along with maximum foliar application of tebuconazole @ 0.125 % able to avoid 21.05 % of yield loss caused by RAB.

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AICRP-Soybean Microbiology Trials
Kharif 2020

MB 1/16: Isolation and functional characterization of selected rhizobia/rhizobacteria for developing inoculants to mitigate abiotic stress in soybean

(Centre: Indore, Delhi, Ludhiana & Pantnagar)

The experiment was initiated at various centers to explore fluorescent pseudomonads and rhizobia from the soybean rhizosphere soil and root nodules to use as potential microbial inoculants in soybean. The colonies exhibiting fluorescence under UV light in Kings B media were selected for isolation and further investigations. The rhizobia were isolated on YEMA medium with congored and white/creamy colonies were selected based on generation time.

Table: MB 1/16A to MB1/16F lists the results on isolations and evaluation PGP and moisture stress tolerant parameters carried out at different centres. Across the centers, a total of 37 isolates were evaluated/recovered from soybean rhizosphere from which 17 from Indore, 9 from Delhi center; 3 from Ludhiana and 8 from Pantnagar center have been evaluated invitro for drought stress tolerance characteristics.

At Indore centre, a total of 17 putative rhizobacteria (including o4 from last year) were obtained from the soybean rhizosphere soil. Out of these, 12 isolates were identified to be as pseudomonads based on the basis of fatty acid methyl ester analysis (FAME) having a unique profile of fatty acids and high similarity index. The colonies exhibited fluorescence under UV light on King's medium. All 12 isolates were found to mainly belong to *Pseudomonas* genera (Table-MB-16/1A) and were evaluated for moisture stress tolerance traits at varying PEG concentration (0 to 40% PEG 6000 gradient in KB broth).

During first stage, 4 isolates (MB1, 2, 10 & MB16) were found to be moisture tolerant (tolerant upto 25%). In which MB2 growth showed significant higher (0.814 OD) in 30%PEG as compared to other strains. On biochemical evaluation all these p*seudomonads* were found to be potential based on PGP and stress tolerance traits. Among the four PEG tolerant potential isolates tested, MB 10 and 16 were found to superior in terms of producing higher amount of EPS, siderophore, proline, ACC deaminase than the other two. MB 10 was *P. fluorescens* whereas MB 16 may be novel and is being targeted for identification through 16SrRNA gene sequencing (**Tables MB1/16A to MB1/16D).**

At Delhi centre, the isolations on Kings B specific medium was carried out for fluorescent pseudomonads. A slight modification was done to the medium. King's medium B (KMB) agar was supplemented with chloramphenicol (13 µg/ml), ampicillin (40 µg/ml), and cycloheximide (100 µg/ml). Soybean rhizospheric soil samples were serial diluted and plated on this medium. Five fluorescing colonies and 4 non fluorescing colonies were picked and purified. All the nine isolates were screened for antibiotic gene PCR. Out of 9 isolates 5 isolates were positive for 2,4-DAPG and Phenazine. No isolate was found positive for Pyrrolnitrin. The 16 S rDNA sequence analysis identified these five isolates to be *Pseudomonas fluorescens*, *Acinetobacter baumannii* (02 isolates), *Cupriavidus gilardii* and *Chryseobacterium* sp. These will be screened for other PGP traits.

At Ludhiana, three potential PGPRs and single and in consortia (5 combinations) were assessed for concerted stress tolerance for salinity, drought and temperature as per spectrophotometrically assay. All bacterial isolates were able to grow on LB broth with each of 5% NaCl and PEG 6000 incubated at 28º, 37º and 45ºC temperatures. With the increase in temperature, the growth in all dual and single treatments decreased significantly. All bacterial isolates were able to grow on LB broth with each of 5% NaCl and PEG 6000 incubated at 28º, 37º and 45 ºC. Maximum growth was recorded with dual inoculant LSBR3+LSE-3 (OD 1.696 at 28ºC, 0.995 at 37ºC and 0.858

at 45ºC). Dual treatments of *Bradyrhizobium* sp. and rhizobacteria exhibited higher growth on concerted stress tolerance over single inoculants **(Table MB1/16E).**

At Pantnagar centre, 26 putative fluorescent *Pseudomonas* were screened for their capability to resist the stress conditions under laboratory conditions using PEG-6000. Out of all, 08 isolates were evaluated at varying concentration (0, 15, 25 and 35%) of PEG-6000. Out of these isolates of fluorescent Pseudomonads Pf-Pant-6 (S) could grow in the medium followed by Pf-Pant-3 (R) and Pf-Pant-7 (R) containing highest concentration of PEG-6000 i.e. 35%. Further screening of these isolates for the production of ACC deaminase activity, antioxidant potential and phytohormones are in progress, but could not be completed because laboratory remained closed for long period and non availability of students due to Covid-19 pandemic situation **(Table MB1/16F).**

MB2a/18: Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean under pot conditions

Centre: (Indore, Sehore, Delhi, Ludhiana, Pantnagar and Dharwad)

This trial was continuing from the past 3 years and was carried out at the centres in unsterilized soil in pots. 02 potential root nodulating soybean rhizobia (*B. daqingense* and *B.liaoningense*) recovered from soybean varieties which are currently in seed chain by the Indore centre were tested under moisture stress conditions. With these strains, a commercial/local soybean *Rhizobium* culture was also included in the trial. The treatments comprising of no. of rhizobial strains+ one uninoculated control with and without stress conditions (2 factors) replicated 6 times in a factorial (2 factors) completely randomized design. The stress treatment (stopping irrigation) was imposed at R5 stage for 10 days or until plants started showing wilting symptoms whichever is earlier. Root nodulation, growth, nutrient and physiological parameters were observed, analysed and recorded.

Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean under pot conditions soybean (JS 95-60) using as an indicator crop was conducted during Kharif 2020.

At Indore centre, the inoculation of *B. daqingense* followed by the *B. liaoningense* has significantly increased the nodulation parameter (nodule number, nodule biomass) and the root and shoots biomass over the other combinations. However, the chlorophyll and relative water content, proline recorded at 50% flowering stage was little higher than the *B. daqingense inoculation* but statistically non significant. The nutrient content and uptake i.e., N & P content and uptake found in the shoots were significantly higher than commercial strain and control plants **(Tables MB2a18A to C).**

At Sehore centre, irrespective of stress, out of there rhizobia significantly higher nodules, biomass, leghaemoglobin in nodules and N content in shoots were observed in plants inoculated with *B. liaoningense* followed by *B. daqingense* over the other inoculations and control. Regardless of type of microbial inoculation, the inoculation had offset the impact of drought stress and produced similar or slightly lower than normal unstressed plants due to improved physiological traits. When compared to commercial rhizobia, the inoculation of *B. liaoningense* and *B. daqingense* was found to be superior (the response was non-significantly different) for chlorophyll content, RWC and shoot and root biomass. It has demonstrated that over a period of three years both the strains were found to be potential and can be demonstrated in field for large utilization in soybean **(Table- MB-2a/18D to F).**

At Delhi centre, it was observed that inoculation improved the ability of plants to withstand moisture stress per se over uninoculated control plants. Among the four isolates, plants inoculated with *Bradyrhizobium yuanmingense* KAS-1(T2) and *Psuedomonas* sp. (T5) gave higher resilience. However, T3-*B. daqingense* showed higher leghaemoglobin content in nodules and high shoot weights under stress conditions compared to other strains used. *B. yuanmingense* KAS-1 inoculated plants showed lower proline content in shots under stress indicating its role in stress alleviation.

However, moisture stress impact did not impact much the shoot dry weights of plants inoculated with *B. yuanmingense* KAS1, *B.liaoningense, and Pseudomonas sp.* The nitrogen content in the leaves under irrigated conditions showed higher leaf %N in inoculated plants with *B. yuanmingense* KAS-1 and *Pseudomonas* strain. Over all, *B. yuanmingense* and *B. daqingense* and *Pseudomonas sp* were found to be superior among all the tested strains (**Table- MB-2a/18G and Figure MB-2a/18H**).

At Ludhiana centre, data recorded at R5 stage for growth, symbiotic traits before and after moisture stress revealed significantly enhancement in all the inoculated treatments over un-inoculated control. Among all the inoculations, the response of *Bradyrhizobium* sp. & *Bradyrhizobium daqingense* was higher and differed significantly for dry weight of shoot and nodule dry weight in before and after drought stress treatments as compared to *B. liaoningense.* However, the difference was non-significant for shoot dry weight, chlorophyll content, nodule number leghaemoglobin content and catalase activity. Improvement in yield due to inoculation with different *Bradyrhizobium daqingense* was highest when compared to all inoculations and 2.10 folds higher over un-inoculated control **(Table MB2a/18H).**

At Pantnagar, both the strains *B.daqingense and B. liaoningense* performed better in terms of having higher chlorophyll, proline content, RWC and all other parameters over the control. However local strain (pant-2) also did well as compared to control but when compared to other two strains the response for all the parameters except grain yield was lower than to *B. liaoningense* and *B. daqingense.* Overall, inoculation of both the strains improved plant nodulation, physiological plant fitness parameters and N and P nutrient uptake under both the conditions although comparatively inoculation of *B. daqingens* and pant-local rhizobia has improved grain yield than the rest of strains. Nevertheless, the *B. liaoningense* has performed equally well when compared to control **(Tables MB2a/18I to MB2a/18L).**

At Dharwad centre, both the strains *B.daqingense and B. liaoningense* performed better in terms of having higher chlorophyll, proline content, RWC, leghaemoglobin and all other parameters over the control and Dharwad local strain. However, comparatively the response of *B. daqingense* followed by *B. liaoningense* for all the parameters was higher over the control and local strain and found to be the best. The novel strain *B.daqingens* is slow growing and can be promoted for large scale utilization after field evaluation **(Tables MB2a/18M).**

Over a period of 3 years experimentation, it is concluded that across all the centres (06), inoculation of *B. daqingense* performed better under both stress and normal conditions which signify its role in stress tolerance of soybean plants. For large scale utilization, it is recommended to evaluate the strain in the field in different zones/at multilocations.

MB 3/14: Field evaluation of AMF and *Paenibacillus polymyxa* microbial combination at farmer's field

Centres: Indore, Sehore, Delhi, Ludhiana* and *Pantnagar

This trial was conducted with most popular soybean variety of the concern centre and response of *Paenibacillus polymyxa* (HKA 15)+AMF consortia (*Rhizophagus intraradices+Funneliformi geosporus+Funneliformis mosseae+Septoglomus constrictum*) with reduced dose of NPK fertilizers (75% RDF) was compared with 100% NPK fertilizers as farmers practice. Various parameters viz., Nodule number, nodule dry weight (at 50 % flowering stage), N and P content in shoots and grains at harvest, total N and P -uptake (Kg/ha), grain yield and B:C ratio was observed/analyzed and recorded.

At Indore centre, inoculation of *Paenibacillus polymyxa* (HKA 15) and AMF with 75% RDF significantly increased nodule number, nodule dry weight and nutrients (N, P content in shoots and seeds) when compared to the farmers practice (100% NPK). The co-inoculation of *Paenibacillus*

polymyxa (HKA 15)+AMF has significantly enhanced the leghaemoglobin in root nodules, chlorophyll content, dry weights and N and P-uptake in shoots over the farmers practice. However, due to severe infestations of anthracnose and drought stress plants showed only chaffy pods and hence grain yield could not be recorded **(Table MB3/14A).**

At Sehore, co-inoculation of *Paenibacillus polymyxa* (HKA 15) + AMF at 75% RDF has significantly enhanced all the nodulation (nodule numbers and nodule dry mass), grain yield and cost: benefit ratio over the farmers practice. The microbial inoculation with 25% lower NPK fertilizers has enhanced grain yield by 30% higher yield over the farmers practice (**Table MB3/14B)**.

Similarly, at Delhi Centre, the combined inoculation of *Paenibacillus polymyxa* (HKA 15) and AMF was evaluated along with other strains with 3 varieties of soybean. The magnitude of response of microbial combinations for nodulation and shoot dry weight over farmer's practices was varied with the 3 varieties tested. Among all the varieties, variety DS 9712 responded significantly in terms of nodulation and shoot dry weight when applied with *Paenibacillus polymyxa* (HKA 15) +AMF than the other microbial strains. In addition, KAS-1 strain was found to be best with HIMSO 01563 and WI-9 with DS 12-5 for sustaining the higher nodulation and dry matter **(Table MB3/14C)**

At Ludhiana, application of microbial combination of *Paenibacillus polymyxa* (HKA 15) +AMF has improved nodulation, N & P content over farmer's practice treatment. Enhancement in yield due to microbial combination was 8.3% over the farmer's practice. Additional income of Rs. 5376 was recorded with application of microbial consortium over farmer's practice treatment. Benefit cost ratio with microbial consortium was 1.1 whereas, with farmer's practice was 0.96 **(Table MB3/14D to E).**

At Pantnagar centre, the application of *Paenibacillus polymyxa* (HKA 15)+AMF has enhanced nodules per plant, nodule dry weight/plant, N & P content and uptake in seeds and shoots respectively over the farmer's practice. The application of this microbial combination has enhanced the yield by 25.95% over the farmer's practice. The benefit cost ratio with *Paenibacillus polymyxa* (HKA 15)+AMF was 2.08 whereas, with farmer's practice was 1.96 **(Table MB3/14F).**

After experimentation of 3 years at five centres, it is concluded that co-inoculation of *Paenibacillus polymyxa* (HKA 15)+AM fungi at 75% RDF not only have comparable response with 100% RDF/farmers (20, 40,60 Kg NPK/ha) practice but also enhanced yield and cost: benefit ratio which becomes soybean production more economic. Hence, it is recommended that application of both *Paenibacillus polymyxa* (HKA 15) +AM fungi together has improves the crop stand, increases the soybean yield and also saves fertilizer inputs by 25%. Therefore it can be recommended for improved and economic production of soybean across all the zones.

MB 4/13: Nodulation ability of AVT-II entries at respective centres

Centres: Indore, Sehore & Dharwad

The performance of AVT II entries in terms of nodulation and compatibility with native homologous rhizobia was assessed in the field and data are presented in **Table MB4/14A to MB 4/14D).** In the central zone, across two centres (Sehore and Indore) all the five entries (RVSM 2011-35, NRCSL 2, NRC 138, AMD 100-39 and NRC 142) along with check NRC 86 was examined for nodulation, leghaemoglobin in the fresh nodules and chlorophyll content in shoots at 50% flowering stage.

At Indore centre, for nodulation parameters (nodule number, nodule dry weight and leghaemoglobin content), out of all entries only one entry i.e., NRCSL2 found to be super nodulating and showed significantly higher nodulation and chlorophyll content over the check and other entries tested. However, when compared to check the entries RVSM 2011-35 and AMS 100-39 showed higher nodule dry weight but these entries showed significantly lower leghaemoglobin content than

the check. Although except the most promising entry NRCSL 2, based on chlorophyll content entries showed higher chlorophyll content than the check may did not have good nodulation.

Overall NRCSL 2 found to be best entry followed by RVSM 2011-35 and AMS 100-39 as promising entries in terms of maintaining relatively higher nodulation, leghaemoglobin and chlorophyll content **(Table MB4/13A &13C).** Similarly at Sehore, when compared to check out of all 05 entries, based on nodulation and leghaemoglobin content the most promising entries were found to be RVSM 2011-35 and NRCSL 2. The other two entries viz., NRCSL 2 and AM 100-39 found to have relatively higher nodulation with compatible native homologous rhizobia and hence could be promising **(Tables MB4/13B to 13C).**

At Dharwad centre, when compared to check (DSB 21), out of 07 AVTII entries, only two entries i.e., DSB 33 followed by NRCSL 2 had comparable (non significantly different) response over the check (DSB 21) but had relatively higher nodulation parameters than the rest of 5 entries. Hence two entries viz., DSB 33 and NRCSL 2 were found to be compatible with native homologous rhizobia and produced higher nodulation and could promising in sustaining higher yields **(Table MB4/13D).**

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Soybean processing and value addition

Introduction

Soybean is one of the few plants that provide a high quality protein with minimum saturated fat. Soybeans help people feel better and live longer with enhanced quality of life. Soybeans contain all the three macronutrients required for good nutrition, as well as fibre, minerals and vitamins. Soybean processing is useful to promote the rural women for their economic upliftment. The beans can be processed in a variety of ways. Different value added soybean products- soymilk, tofu, soy flour, soya nuggets, soya besan, soynuts, soya masala nuts, soy papads etc. offer improved nutrition, result in foods that have improved functional properties, and when consumed on a regular basis can be part of a program that will not only improve general health but prevent some chronic diseases including heart disease.

Objective/Technical Programme

1. Optimization of manufacturing processes for selected soy health foods
   a. whole soybean items : soy nuts, fermented soybean and soy yoghurt
   b. RTE soy based multigrain sweet/ savory items: cookies, laddoo, chakli and namakpare
   c. Ready to cook soy based snacks : upma and noodles
2. Proximate analysis of optimized soy health foods
3. Optimization of packaging conditions of soy health foods and shelf life analysis

Programme 1: Optimization of manufacturing processes for selected soy health foods

A. Method of preparation of soy fortified products:

I. Method of preparation of roasted soybean

1. Whole soybean seeds are cleaned, sorted and dehulled in dehuller
2. 150 grams of dehulled seed were blanched for 5 minutes in boiling water and soaked thereafter in cold water for two hours
3. After soaking, the excess water from the seeds are drained out and dried the seeds in oven at 60W till attaining moisture content of 50 %.
4. After drying, seeds were rubbed with spice mix and roasted inside the microwave in different time-temperature combinations: T_1- 900W for 10 minutes, T_2-200W for 25 minutes

II. Method of preparation of fermented soybean

The seeds of JS-335 soybean variety were procured from Andro Research Farm, CAU, Imphal and local small variety were purchased from local farmers of Manipur. The seeds were cleaned manually, dried in sun and stored in plastic containers for further use. It is difficult to maintain consistent quality control when making traditional fermented soybean-*hawaijar*. So a scientific method for production of quality fermented soybean-*hawaijar* is established by inoculating with starter culture of *Bacillus subtilis* strain H and S. The whole beans were first washed and then soaked in distilled water that was three times their weights at room temperature overnight. After decanting the water, the soaked soybeans were cooked in a pressure cooker by allowing 5 whistle and keep in sim for 45 minutes in low flame. After cooling, the steamed beans were inoculated with starter culture of *Bacillus subtilis* strain H and S @ 2% and then fermented/incubated at 40-42^{0}C for 20-22 hrs

III. Preparation of eggless soy cookies

Composite flour is prepared by substituting the wheat flour with soy flour in the ratio of 0:100 (control), T_1- 10:90, T_2- 20:80, T_3-30:70 and T_4- 40:60 of roasted soy flour: wheat flour.

Method of preparation

1. Combine hydrogenated vegetable fat and sugar to form creamy mixture
2. Sieve together flour and baking powder.
3. Mix the creamed mixture with the dry mixture of flour
4. Make the dough and divide the dough into small piece of peda size.
5. Bake at 180^0C for 20-25 min. Turn cookies out from the tray and cool completely and pack it in moisture proof packaging

IV. Method of preparation of soy laddoo

1. Sieve wheat flour and soy flour and keep in a utensil
2. Add ghee in a pan and allow it to melt. Now add sieved wheat and soy flour in different ratio in melted ghee and stir constantly
3. Roast the flour on medium flame until it turns light brown in colour and emits a good smell. Turn off the gas, let the flour cool off
4. When the flour becomes less hot then add the remaining ghee to it along with powdered sugar, roasted dry fruits and cardamom.
5. Take little amount of mixture in your hand and roll giving it a round shape.

V. Method of preparation of soy chakli

For preparing soy chakli, mix and sieve rice flour and soy flour. Add all spices (carom, cumin, red chilli, and asafoetida), salt and oil and mix well. Add little water to knead soft dough and put inside chakli mould. Prepare round shaped chakli by pressing the machine from the top revolving it in circular motion. Put them in the pan and fry on a low or medium flame.

VI. Method of preparation of soy namakpare

For preparing soy namakpare, mix and sieve refined wheat flour and soy flour in different ratios. Add all spices, salt, oil and mix well. Add little water to knead soft dough and put aside to rest for 5 minutes at room temperature. Prepare round shaped dough balls and flatten using rolling pin. Cut in square shape using knife and put them in the baking tray. Bake namakpare at 180W for 20 minutes or till golden brown in color. Control sample was fried in medium flame till golden brown. Samples were cooled at room temperature and packed and sealed in polyethylene packs for further analysis and storage studies.

VII. Method of preparation of soy upma mix

Mix soy okara and semolina in different ratio and roast till it gets brown with constant stirring. Keep roasted mix aside in plate. Now roast groundnut till brown and keep aside. Heat oil in pan and add mustard seeds, when seeds splutter, add dried green chillies, carrot and peas and fry for 1 min. Now add roasted okara-semolina mix, add salt and groundnuts till mixture attains moisture content of 5-7 percent. Pack in aluminium laminated packs for further analysis and storage studies.

VIII. Method of preparation of soy fortified noodles

Soy fortified noodles were prepared by replacing wheat flour at the level of 5,10,15 and 20% of soy flour. The ingredients were mixed thoroughly to a desired crumbly consistency similar to that of moist breads. The dough was kept for resting for about 40 minutes. The sheeting of dough was made by a process of folding and passing through the rollers of noodle making machine. The sheeted dough was extruded through a suitable diameter of the machine and cut to have the desired size of extrudates. The extruded noodle was steamed for 10 min at 102–105 °C. Noodles were dried at 50 °C for 5 h in an air oven. The dried noodle samples were packed in LDPE /polyethylene bags.

Results of optimization:

I. Sensory analysis of roasted soy nuts

The sensory evaluation of roasted soy nuts was done by using nine-point hedonic scale using numerical ranging from 1 to 9 where 1 represented "disliked extremely" and 9 represented "liked extremely". The various attributes for which the sample was calculated were colour, flavour, texture, taste, appearance and overall acceptability (Table 4). Fried soy nuts sample was taken as control to compare effect of frying on organoleptic quality.

Table 4: Average score for sensory evaluation of roasted soy nuts

Samples	Colour	Flavour	Taste	Texture	Appearance	Overall acceptability
Control	8.25	8.80	9.00	9.00	8.50	8.75
T1	7.50	8.05	8.15	8.25	7.55	8.00
T2	8.00	8.25	7.75	8.00	7.25	7.75

Where,
T_1- 900W for 10 minutes, T_2- 200W for 25 minutes

The average score for overall acceptability of the control, T_1 and T_2 was calculated as 8.75, 8.00 and 7.75, respectively. Sensory evaluation in terms of overall acceptability (OAA) was found to be highest in control (due to better texture and flavour of fried soy nuts oven roasted soy nuts) followed by treatment T_1. OAA was comparable for microwave roasted soy nuts and baked soy nuts but the time taken in roasting was less in microwave method, thus treatment T_1 was optimized for roasted soy nut preparation.

II. Sensory analysis of eggless soy cookies

The sensory evaluation of soy cookies was done by using nine-point hedonic scale using numerical ranging from 1 to 9 where 1 represented "disliked extremely" and 9 represented "liked extremely". The various attributes for which the sample was calculated were colour, flavour, texture, taste, appearance and overall acceptability. Mean score for different characteristics of all type of packed cookies are summarized in the table 5.

Table 5: Average score for sensory evaluation of eggless soy cookies

Samples	Colour	Flavour	Taste	Texture	Appearance	Overall acceptability
Control	9.00	8.80	9.00	9.00	8.50	8.80
T_1	9.00	9.00	8.70	8.50	8.60	8.80
T_2	9.00	8.50	8.50	8.50	8.50	8.60
T_3	8.50	8.30	8.10	7.70	8.00	8.10
T_4	8.00	8.00	7.70	7.40	7.70	7.80

Where,
T_1- 10% wheat flour replacement, T_2-20% wheat flour replacement, T_3- 30% wheat flour replacement, T_4- 40% wheat flour replacement

Scores obtained for overall acceptability reveals that all the treatment including the control treatment are acceptable. The average score for overall acceptability of the control, T_1, T_2, T_3 and T_4 was calculated as 8.8, 8.8, 8.6, 8.1 and 7.8 respectively. Sensory evaluation in terms of overall acceptability was found to be highest in control and T_1 due to better texture. Addition of roasted soy flour improved taste of cookies but texture score of samples reveal negative impact of soy flour on lightness of cookies. But the cookies had acceptable overall qualities up to 40% replacement of wheat flour with roasted soy flour, therefore T_4 was optimized for cookie preparation.

III. Sensory analysis of soy laddoo

Various treatments (T_1- 25% whole wheat flour replacement, T_2-50% whole wheat flour replacement) were analysed organoleptically as compared to control (100% whole wheat flour) was done using nine-point hedonic scale using numerical ranging from 1 to 9 where 1 represented "disliked extremely" and 9 represented "liked extremely".

Table 6: Average score for sensory evaluation of soy laddoo

Samples	Colour	Flavour	Taste	Mouth feel	Appearance	Overall acceptability
Control	8.00	8.20	8.00	8.20	8.50	8.20
T_1	8.80	8.70	8.50	8.30	8.60	8.60
T_2	9.00	8.50	8.70	7.90	8.50	8.50

Where,

Control- 100% whole wheat flour, T_1- 25% whole wheat flour replacement, T_2-50% whole wheat flour replacement

The various attributes for which the sample was calculated were colour, flavour, taste, mouth feel, appearance and overall acceptability. Mean score for different characteristics of all type of packed laddoo are summarized in the Table 6.

Scores obtained for overall acceptability reveals that all the treatment including the control treatment are acceptable. The average score for overall acceptability of the control, T_1 and T_2 was calculated as 8.2, 8.6 and 8.5 respectively. Addition of soy flour improved taste and overall acceptability of laddoo. As laddoo had acceptable overall qualities up to 50% replacement of whole wheat flour with soy flour, therefore T_2 was optimized for laddoo preparation.

IV. Sensory analysis of soy chakli

The sensory evaluation of soy chakli as compared to control (fried) was done by using nine-point hedonic scale using numerical ranging from 1 to 9 where 1 represented "disliked extremely" and 9 represented "liked extremely". The various attributes for which the sample was calculated were colour, flavour, texture, taste, appearance and overall acceptability. Mean score for different characteristics of all type of packed chaklies are summarized in the table 7.

Table 7: Average score for sensory evaluation of soy chakli

Samples	Colour	Flavour	Taste	Texture	Appearance	Overall acceptability
Control	8.8	8.4	8.4	8.8	8.5	8.6
T_1	8.5	8.6	8.1	8.5	8.6	8.5
T_2	7.8	7.9	7.8	7.0	8.0	7.7
T_3	6.5	7.3	7.1	5.7	7.4	6.8

Where,

control- fried chakli, T_1-10% rice flour replacement with roasted soy flour, T_2-20% rice flour replacement with roasted soy flour, T_3-30% rice flour replacement with roasted soy flour

Scores obtained for overall acceptability reveals that all the treatment including the control treatment are acceptable. The average score for overall acceptability of the control, T_1, T_2 and T_3 was calculated as 8.6, 8.5, 7.7 and 6.8 respectively. Sensory evaluation in terms of overall acceptability was found to be high in control due to better texture. Frying of control sample provided better texture to chakli samples but texture of all treatments were in acceptable range for baked soy fortified chakli samples. Addition of roasted soy flour in higher percentage resulted in negative impact on crunchiness

of chakli. All the chakli samples had acceptable overall qualities up to 30% replacement of rice flour with roasted soy flour but texture was affected significantly in this treatment. As our objective is incorporation of soybean to highest level without much change in desirability of product therefore T_2 was optimized for chakli preparation.

V. Sensory analysis of soy namakpare

The sensory evaluation of soy namakpare as compared to control was done by using nine-point hedonic scale ranging from 1 to 9 where 1 represented "disliked extremely" and 9 represented "liked extremely". The various attributes for which the sample was calculated were colour, flavour, texture, taste, appearance and overall acceptability. Mean score for different characteristics of all type of packed namakpare are summarized in the table 8.

Table 8: Average score for sensory evaluation of soy namakpare

Samples	Colour	Flavour	Taste	Texture	Appearance	Overall acceptability
Control	8.0	8.5	8.3	8.6	8.2	8.3
T_1	8.2	8.6	8.1	8.3	8.2	8.3
T_2	8.2	8.7	8.0	8.1	8.1	8.2
T_3	8.0	8.3	7.8	7.8	8.1	8.0

Where,
control- 100% wheat flour, T_1-10% wheat flour replacement with roasted soy flour, T_2-20% wheat flour replacement with roasted soy flour, T_3-30% wheat flour replacement with roasted soy flour

The average score for overall acceptability of the control, T_1, T_2 and T_3 was calculated as 8.3, 8.3, 8.2 and 8, respectively. Sensory evaluation in terms of overall acceptability was found to be high in control and T_1 due to better texture. The addition of roasted soy flour in higher percentage did not affect overall acceptability of soy namakpare significantly. But all the namakpare samples had acceptable overall qualities up to 30% replacement of wheat flour with roasted soy flour. As our objective is incorporation of soybean to highest level under acceptable organoleptic range therefore T_3 was optimized for namakpare preparation.

VI. Sensory analysis of soy upma mix

The sensory evaluation of soy upma as compared to control was done by using nine-point hedonic scale ranging from 1 to 9 where 1 represented "disliked extremely" and 9 represented "liked extremely". The various attributes for which the sample was calculated were colour, flavour, taste, mouth feel, appearance and overall acceptability. Mean score for different characteristics of all type of packed upma mix are summarized in the table 9.

Scores obtained for overall acceptability revealed that all the treatment including the control treatment are acceptable. The average score for overall acceptability of the control, T_1, T_2 and T_3 was calculated as 8.3, 8.2 and 8.1, respectively. Sensory evaluation in terms of overall acceptability was found to be high in control and T_1 due to better mouth feel.

Table 9: Average score for sensory evaluation of soy upma mix

Samples	Colour	Flavour	Taste	Mouth feel	Appearance	Overall acceptability
Control	8.0	8.7	8.5	8.5	8.0	8.3
T_1	8.1	8.4	8.3	8.2	8.1	8.2
T_2	8.0	8.5	8.0	7.9	8.0	8.1

Where,
control- 100% semolina, T_1-25% semolina replacement with okara, T_2-50% semolina replacement with okara

The addition of okra in higher percent age did not significantly affect overall acceptability of soy upma mix. All the samples had acceptable overall qualities up to 50% replacement of semolina with okara. As our objective is incorporation of soybean to highest level under acceptable organoleptic range therefore T_2 was optimized for upma mix preparation.

Sensory analysis of fermented soybean-*Hawaijar*

The sensory evaluation of fermented soybean-*Hawaijar* was done by using nine-point hedonic scale using numerical ranging from 1 to 9 where 1 represented "disliked extremely" and 9 represented "liked extremely". The various attributes for which the sample was calculated were colour, flavour, taste, appearance and overall acceptability as shown in Table 10.

Table 10: Average score for sensory evaluation of fermented soybean -*Hawaijar* after 3 month storage period under refrigerated condition

Samples	Colour	Flavour	Taste	Appearance	Overall acceptability
T_1	7.60	8.00	8.20	7.80	7.80
T_2	6.80	6.60	6.60	6.80	6.60
T_3	6.04	5.09	5.90	5.24	5.56
T_4	7.60	7.00	7.40	6.80	7.20
S.Ed(+)	0.48	0.66	0.29	0.49	0.29
CD(0.05)	1.02	1.40	0.62	1.04	0.61

Where,

T_1= Local small variety fermented with starter culture (H)
T_2= Local small variety fermented with starter culture (S)
T_3= JS-335 variety fermented with starter culture (H)
T_4= JS-335 variety fermented with starter culture (S)

The average score for overall acceptability of the T_1, T_2, T_3 and T_4 was calculated as 7.80, 6.60, 5.56 and 7.20 respectively. Sensory evaluation in terms of overall acceptability was found to be highest in treatment T_1 (Local small variety fermented with starter culture H) with 7.80 followed by treatment T_4 (JS-335 variety fermented with starter culture S) with 7.20.

Cooked soybean ready for fermentation

Vacuum packing of fermented soybean

Cooked soybean kept in incubator for fermentation

Programme 2: Proximate analysis of optimized soy health foods

Nutritional analysis

The moisture, protein, fat and ash were estimated using standard AOAC methods.

Results:

Proximate composition of soy fortified products

The proximate composition of soy fortified products with comparision to their respective control samples is given in table 11. Results also revealed that the entire soybean fortified optimized products provided more protein than control sample. Roasted soy nut had 1.5 times more protein than fried soy nuts used as control. This may be due to relatively less percentage of fat in roasted sample. The fat content was 3.7 times less in roasted soy nuts than control whereas ash content remained unchanged.

Protein content in baked soy fortified namakpare (30% wheat flour replacement with soy flour) showed 7 fold increase in protein content as compared to control with 100% wheat flour. As the soy fortified product was baked and control was fried, there was 3 times decrease in fat content of baked soy namakpare as compared to fried control sample. Ash content in optimized sample was also 2.5 times higher than control may be due to higher ash content in soy flour.

Protein content in baked soy chakli (20% wheat flour replacement with soy flour) showed 1.4 fold increase in protein content as compared to control with 10% rice flour replacement with gram flour. As the soy fortified product was baked and control was fried, there was 1.6 times decrease in fat content of baked soy chakli as compared to fried control sample. Ash content in optimized sample was also 2.3 times higher than control may be due to higher ash content in soy flour.

Protein content in soy fortified laddoos (50% wheat flour replacement with soy flour) showed 4.3 fold increase in protein content as compared to control with 100% wheat flour. As soy flour contains more fat than wheat flour, the fat content of soy laddoo sample was slightly higher than control.

Protein content in baked soy cookies (30% wheat flour replacement with soy flour) was 2.1 times higher as compared to control with 100% wheat flour. Fat required to bake soy cookies was less than control. Ash content in optimized sample was also 1.8 times higher than control may be due to higher ash content in soy flour.

Protein content and fat content in soy okara upma mix were comparable to control sample may be due to less protein in okara than soy flour.

Table 11: Proximate composition of different soy fortified foods

Treatments	Parameters								
	Protein (%)			Fat (%)			Ash (%)		
	Control	Optimized	Change in protein (times)	Control	Optimized	Change in fat (times)	Control	Optimized	increase in ash (times)
Roasted Soy nuts	30.30	47.80	1.5	46.72	12.53	3.7	6.06	6.20	1.02
Soy namakpare	3.00	21.26	7.0	49.22	16.30	3.0	2.10	5.39	2.5
Soy chakli	11.10	15.65	1.4	26.43	15.98	1.6	1.67	3.89	2.3
Soy laddu	6.60	28.50	4.3	15.40	18.28	1.2	-	-	-
Soy cookies	6.20	13.40	2.1	35.90	26.72	1.3	2.1	3.84	1.8
Soy upma	10.20	12.60	1.2	12.10	14.17	0.85	-	-	-

All the readings are average of triplicate

As the soybean are soaked and cooked prior to fermentation, *hawaijar* or fermented soybean had high moisture content as shown in table 12. The mean moisture content of fermented soybean increased with fermentation and it was highest in treatment T_4(16.04%) followed by treatment T_3(16.01%).

The most significant change in fermented soybean-*hawaijar* is noticed by increase in protein content during fermentation (Table 2). Protein was found in high levels in fermented soybean products which is significantly higher than that of raw soybean (control). Also, the dried fermented-soybean prepared with *B. subtilis* strain H are significantly higher than that fermented with *B. subtilis* strain S in case of JS-335 soybean variety. The protein content varied between 23.34% in raw soybean (control) to 46.58% in fermented soybean prepared with *B subtilis* strain H. The increasing in protein content may be due to the ability of the microorganisms to digest proteins and change to small size peptide as well as functional properties such as anti-cancer and various clinical compounds.

The mean wise increased in fat content were highly significant in case of treatment T_3(15.08%) followed by treatment T_4(14.64%). The product with lowest mean fat content (10.67%) was observed in treatment T_5. The amount of fat or oil content increased suddenly during fermentation and continued to increase during the storage period. This result suggested that fermentation probably enhances oil extraction.

Table 12: Proximate analysis of the dried soybean and fermented soybean-*Hawaijar*

Treatments	Moisture (%)	Total protein (%)	Total fat (%)
T_1	13.11	37.69	13.05
T_2	13.25	36.27	13.40
T_3	16.01	46.58	15.08
T_4	16.04	42.20	14.64
T_5	10.40	23.34	10.67
SEd(±)	0.15	1.68	0.28
$CD_{0.05}$	0.34	3.74	0.62

Where,
T_1= Local small variety fermented with starter culture (H)
T_2= Local small variety fermented with starter culture (S)
T_3= JS-335 variety fermented with starter culture (H)
T_4= JS-335 variety fermented with starter culture (S)
T_5= Raw soybean

From the table 13, it is revealed that soy fortified noodles with 20% soy flour recorded maximum moisture of 6.50% and minimum moisture of 5.90% in control sample. Our results also revealed that all the four treatments of soy protein enriched noodles provided more protein than control sample. The protein content of soy fortified noodles were two times that of control sample.

Addition of soy flour markedly increased fat content than control sample. Soy flour blended noodles recorded maximum fat of 8.37% in treatment T_4 (20%) and minimum fat 4.58% in control sample

Table 13: Proximate composition of soy fortified noodles prepared from different levels of soy flour and refined wheat flour.

Treatments	Parameters		
	Moisture (%)	Protein (%)	Fat (%)
T_1	6.10	14.29	6.87
T_2	6.24	16.69	7.90
T_3	6.29	17.02	8.24
T_4	6.50	17.20	8.37
T_5	5.90	8.29	4.58
S.Ed (±)	0.06	0.02	0.02
C.D	0.14	0.05	0.04

where, T_1(5% soy flour),T_2(10% soy flour), T_3(15% soy flour), T_4(20% soy flour) and T_5 (Control)

Programme 3: Optimization of packaging conditions of soy health foods and shelf life analysis /Shelf life evaluation on basis of sensory analysis

Shelf life evaluation of all the product samples was done on the basis of sensory analysis. Fresh samples of optimized product were compared with samples stores in airtight packaging at ambient temperature. The results of 3 month storage studies are given in table 14. Results revealed that all samples were acceptable after 3 months of storage which suggests non perishable nature of products.

Packaging and storage study of different soy fortified products

The final accepted soy noodles, soy nuts, soy namakpare and soy chakli were packed in LDPE /polyethylene bags and the sample was sealed using heat sealing machine and kept in the ambient temperatures for storage studies. Then, sensory characteristics were measured after three month of storage period.

The final acceptable soy cookies and laddoos were packed in PP rectangular packaging material after wrapping of each piece with cling wrap and kept in the ambient temperatures for storage studies. Then, sensory characteristics were measured after three month of storage period.

The final acceptable soy upma mix were packed in aluminium laminates LDPE bags and the sample was sealed using heat sealing machine and kept in the ambient temperatures for storage studies. Then, sensory characteristics were measured after three month of storage period.

Sensory analysis of soy fortified noodles after three months storage

The sensory attributes like appearance, colour, taste, texture and overall acceptability were evaluated by semi trained judges using 9-point Hedonic scale. The panellist gives score 9-1 to the product, ranging from ‘like extremely’ to ‘disliked extremely’ to find out the most suitable composition of noodles.

The analysis suggests that soy fortified noodles was very much by panel of semi trained judges. Mean score for different characteristics of all type of packed noodles are summarized in the table 15. Scores obtained for overall acceptability reveals that all the treatment including the control treatment are acceptable.

An overall acceptability is one of most important sensorial factor to be evaluated at last stage of evaluation process for final verdict. According to sensorial evaluation control (T_5) secured highest score (7.62) followed by T_2 (7.61) and hence treatment T_2 (10% soy flour) founds more appropriate for incorporation in noodles. Sensory evaluation in terms of overall acceptability (OAA) was found to be highest in control T_5 (due to better texture) followed by treatment T_2 thus treatment T_2 was optimized for soy fortified noodles preparation.

The prepared noodles can be packed in LDPE as packaging material and can be stored at ambient temperature for about 3 month.

Table 14: Average score for sensory evaluation of different optimized soy fortified foods after 3 month storage period under ambient condition

Optimized product name	Parameters											
	Colour		Flavour		Taste		Texture		Appearance		Overall acceptability	
	0 month	3 month	0 month	3 month	0 month	3 month	0 month	3 month	0 month	3 month	0 month	3 month
Roasted soy nuts	7.85	7.50							8.25	8.00		
Soy cookies			7.50	7.00	8.35	7.85	8.15	7.75			8.00	7.50
Soy chakli	7.80	7.50	7.90	7.75	7.80	7.70	7.00	7.00	8.00	7.85	7.70	7.50
Soy laddoo	9.00	9.00	8.50	8.55	8.70	8.50	7.90	7.50	8.50	8.00	8.50	8.00
Soy upma mix	8.00	8.00	8.50	8.00	8.00	7.25	7.50	7.50	8.00	8.00	8.10	8.00
Soy namakpare	8.00	8.00	8.30	8.25	7.80	7.50	7.80	7.50	8.10	8.00	8.00	7.85
Soy cookies	8.00	7.50	8.00	7.50	7.70	7.50	7.40	6.50	7.70	7.50	7.80	7.00

average of score given by 10 panelists

Table 15: Average score for sensory evaluation of soy fortified noodles after 3 month storage period under ambient condition

Treatments	Parameters				
	Appearance	Colour	Taste	Texture	Overall acceptability
T1	6.70	6.59	6.69	7.09	6.79
T2	7.70	7.90	7.67	7.61	7.64
T3	6.10	5.70	6.31	5.70	6.25
T4	5.01	5.10	5.95	5.95	6.21
T5	7.60	8.00	7.80	7.62	7.89
S.Ed(+)	0.11	0.07	0.07	0.07	0.06
CD	0.25	0.16	0.15	0.15	0.13

where, T_1(5% soy flour),T_2(10% soy flour), T_3(15% soy flour), T_4(20% soy flour) and T_5 (Control)

Soy fortified noodles prepared from different combination of soy flour and refined wheat flour

Roasted soy nuts packed in cup type plastic container for storage studies

Cookies packed in plastic container for storage studies

Soy laddoo packed in plastic container for storage studies

परिशिष्ट
Appendices

Appendix-I

Recommendations of 50th Annual Group Meeting and Action Taken Report

S. No.	Recommendations	Action Taken
1.	Recent research advances made by the ICAR-IISR, Indore must be highlighted on institutional web site.	Complied
2.	Speed breeding must be an activity and Bangalore centre may be assigned this activity.	Complied
3.	Role of computational biology and its application in soybean improvement should be explored.	Computational biology studies have been initiated and are being used for the analysis of soybean genome and in the soybean improvement program
4.	Pre-breeding activity must be one of the important components in breeding programme and ICAR-IISR, Indore needs to initiate the same. *G max* X *G tomentella b*reeding lines developed by Dr R J Singh in University of Illinois should be introduced in India.	• ICAR-IISR has initiated the pre-breeding programme involving *G soja.* Early maturing *soja* lines of 70-80 days maturity have been crossed with adapted cultivars for widening of genetic base and imparting earliness from wild gene pool. • Dr R J Singh has not responded to the requests.
5.	AVT-2 entries should be compared with similar/respective maturity checks in Agronomical trials.	Compiled
6.	Soybean genotype NRC-132 can be used as source for antixenosis resistance and NRC 128, DSb 34, KDS 992 and MACS 1493 can be used for antibiosis resistance.	NRC 128 and NRC 132 have been utilized for hybridization in 2020
7.	Soybean genotypes JS 20-71, JS 20-89, DS 3050 and AMS 1002 can be used as source of resistance for Charcoal rot resistance. Genotypes DSb 21,DSb 23, EC 241778, EC 241780 & EC 242104 & DSb 28 can be used for rust resistance breeding.	DSb 21, DSb 23 and EC 242104 have been utilized in breeding programme for rust resistance

Identification of mega-environments for grain yield

Ten soybean genotypes viz., SL1213, DS1318, JS22-01, NRC149, DS1326, SL1234, HIMSO1690, JS22-07, DS1320 and AUKS218 were evaluated across nineteen different AICRP centers (Almora, Palampur, Delhi, Ludiana, Pantnagar, Bhawanipatna, Raipur, Ranchi, Amravati, Jabalpur, Parbhani, Morena, LokBharti, Adilabad, Bengaluru, Kasbedigraj, Pune, Imphal and Umiam) for the two consecutive years (2019 and 2020). Data on days to flowering, days to maturity, plant height, 100seed weight and plot yield were recorded. Plot yield was converted into kg/ha for further analysis. Mean values of each trait across different locations and years were presented in Table 1-18. Significant G×E interaction (at $p<0.05$) was detected for grain yield through Pooled ANOVA (Table 19). Further, discriminative and representative environments and mega-environments for grain yield were identified through GGE biplot analysis. Discriminating ability of an environment is proportional to the length of respective environmental vector. In the present study, vector length of Ludhiana (LDH) is highest among all followed by Delhi (DLH) (Figure 1). Therefore, these two locations are more discriminative and informative. The arrow of AEA (Average- Environment Axis) represents the average environment. Environment vector with least deviation from AEA is considered to be most representative of other test locations. In the current study, Amravati (AMT) location has least deviation from the AEA, followed by Raipur (RPR). Therefore, Amravati location is considered as most representative location. Centre of the concentric circles in fig 2 represents the ideal environment for breeding for wider adaptable genotypes. Environment vector which is closest to this point is assumed to be near ideal environment. In the present study Raipur (RPR) is nearer to the ideal environment for selecting for wider adaptable genotypes.

To differentiate test locations into mega environments, and for homogenization of environments, which-won-where feature of GGE biplot has been employed (Fig 3). Genotypes at each vertex of triangle are the best at corresponding environments. Perpendicular lines drawn from the biplot origin are the equality lines that differentiate test locations into different mega environments. Testing at one or two representative locations within a mega environment can draw similar conclusions as that of testing at every location within a mega environment. This reduces the cost and resources for evaluation. In the current study, nineteen locations were categorized into three mega environments. One with locations Ludhiana (LDH), Delhi (DLH), Morena (MRN), Adilabad (ADB), Pantnagar (PNT), Parbhani (PRB), Pune (PUN), Amravati (AMT), Raipur(RPR), Bhawanipatna(BPN), Umiam (UMM) and Palampur (PLM), with NRC149 as best performing genotype and the second mega environment comprising of locations Bengaluru (BNG), Almora (ALM), Ranchi (RNC), Imphal (IMP) and Kasbedigraj (KDR) with HIMSO 1690 as best performing genotype. The third mega environment consists of locations Jabalpur(JBL) and Lokbharti (LKB) with DS1320 as best performing genotype. However, consistency of this mega-environment pattern has to be validated across years as done in case of wheat

Table 1: Year-wise mean values for days to flowering, days to maturity and plant height in NEZ.: ALM-Almora, PLM-Palampur

Genotype	Days to Flowering				Days to Maturity				Plant Height (cm)			
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	ALM	ALM	PLM	PLM	ALM	ALM	PLM	PLM	ALM	ALM	PLM	PLM
SL 1213	56.67	58.67	66.00	68.33	114.00	123.00	125.00	125.00	77.67	58.00	58.80	75.67
DS 1318	49.00	59.67	62.67	65.67	107.00	117.67	121.67	125.00	76.33	57.67	47.80	74.60
JS 22-01	49.00	61.67	60.00	63.33	104.00	107.00	122.67	124.67	87.67	59.33	62.07	83.80
NRC 149	52.67	61.67	63.33	64.33	112.00	118.00	123.33	125.33	106.00	90.00	78.40	89.13
DS 1326	54.67	63.67	65.00	63.67	116.00	120.33	122.67	125.00	90.33	44.33	61.13	86.60
SL 1234	56.67	65.00	66.33	68.33	124.00	125.67	126.67	124.33	96.67	50.00	57.87	84.40
Himso 1690	53.33	64.33	60.00	63.33	114.00	122.33	126.00	124.67	80.33	58.33	65.87	77.47
JS 22-07	51.67	61.67	64.67	67.67	106.33	118.33	122.67	124.33	102.33	64.00	70.07	85.07
DS 1320	50.67	63.67	59.67	61.33	107.00	120.33	121.67	125.00	78.00	64.33	55.33	90.13
AUKS 218	49.00	61.67	61.00	66.33	104.67	106.00	121.33	125.33	79.00	61.33	61.87	82.00

Table 2: Year-wise mean values for 100 seed weight and grain yield in NEZ. ALM: Almora, PLM: Palampur

Genotype	100 seed weight (g)				Grain Yield (Kg/ha)			
	2019	2020	2019	2020	2019	2020	2019	2020
	ALM	ALM	PLM	PLM	ALM	ALM	PLM	PLM
SL 1213	11.44	8.98	13.23	17.53	2057.61	1440.33	3399.17	1827.16
DS 1318	7.57	7.22	11.60	15.17	1703.70	1028.80	2172.83	1440.33
JS 22-01	11.72	9.54	14.70	17.17	1547.32	979.42	1975.30	1703.70
NRC 149	10.71	9.70	14.00	17.07	1037.03	1078.19	2559.66	2115.22
DS 1326	10.74	8.89	11.87	16.40	1333.33	1193.41	2493.82	1917.69
SL 1234	12.20	9.76	12.63	15.83	1539.09	798.35	2139.91	1596.70
Himso 1690	10.80	10.26	13.53	17.83	1950.61	1341.56	2946.50	2016.46
JS 22-07	13.40	10.26	17.10	17.40	1662.55	1300.41	1711.93	1662.55
DS 1320	11.00	9.48	12.23	16.47	1333.33	1209.87	1160.49	1432.10
AUKS 218	8.14	7.79	11.50	16.83	1144.03	1539.09	1744.85	1481.48

Table 3: Year-wise mean values for days to flowering and days to maturity in NPZ: DLH- Delhi, LDH-Ludhiana, PNT-Pantnagar

Genotype	Days to Flowering						Days to Maturity					
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	DLH	DLH	LDH	LDH	PNT	PNT	DLH	DLH	LDH	LDH	PNT	PNT
SL 1213	52.67	54.33	71.67	61.00	55.00	55.67	119.00	122.33	139.33	116.67	122.33	121.00
DS 1318	47.67	47.67	66.00	55.00	50.00	52.67	114.33	112.67	140.33	117.33	112.00	122.00
JS 22-01	48.67	47.00	63.00	54.00	50.00	48.33	98.00	103.33	140.00	113.33	109.00	124.00
NRC 149	50.67	50.67	65.67	56.00	53.00	53.67	123.67	123.67	140.67	121.00	122.67	123.67
DS 1326	49.33	50.33	65.00	52.00	51.67	53.67	117.67	114.00	139.00	116.00	115.00	120.67
SL 1234	49.33	51.00	64.33	54.00	54.67	54.33	123.33	123.00	141.00	118.00	127.00	121.00
Himso 1690	50.33	50.00	64.00	54.33	49.33	55.67	122.67	121.67	138.00	114.00	115.00	119.00
JS 22-07	48.33	48.67	62.33	51.67	52.33	52.00	104.00	103.33	138.33	112.00	113.00	121.00
DS 1320	45.33	48.00	64.00	56.00	50.00	48.67	107.33	108.33	137.33	111.67	109.00	120.00
AUKS 218	45.00	47.67	57.00	48.00	48.33	49.00	97.00	98.67	134.67	110.00	108.00	120.00

Table 4: Year-wise mean values for Plant Height and 100 seed weight in NPZ: DLH- Delhi, LDH-Ludhiana, PNT-Pantnagar

Genotype	Plant Height (cm)						100 Seed Weight (cm)					
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	DLH	DLH	LDH	LDH	PNT	PNT	DLH	DLH	LDH	LDH	PNT	PNT
SL 1213	52.44	57.00	58.60	76.33	60.93	77.73	6.20	8.41	6.03	8.73	7.87	8.27
DS 1318	42.67	54.33	48.93	66.33	51.53	77.83	6.33	8.63	6.50	7.53	8.00	8.30
JS 22-01	49.22	52.67	54.87	46.00	56.13	99.33	7.50	7.75	8.73	9.07	10.56	10.92
NRC 149	72.44	70.33	86.73	73.00	81.13	135.07	9.00	11.07	10.17	10.57	10.02	11.73
DS 1326	54.55	40.33	59.33	53.00	58.07	79.00	6.80	7.73	6.13	7.73	6.48	6.83
SL 1234	60.33	62.00	65.40	47.33	62.07	86.13	6.93	8.70	5.93	8.53	8.85	6.41
Himso 1690	48.33	43.33	60.87	78.00	61.07	89.60	6.87	7.07	6.93	6.57	8.90	6.94
JS 22-07	62.89	51.00	74.47	50.00	64.73	92.87	6.83	8.56	10.10	10.20	14.74	12.36
DS 1320	53.33	42.67	60.07	40.33	64.87	78.67	6.40	8.21	6.13	9.00	9.80	9.34
AUKS 218	45.33	33.00	44.07	34.00	49.67	75.80	4.93	5.77	7.13	6.07	10.25	9.41

Table 5: Year-wise mean values for grain yield in NPZ: DLH- Delhi, LDH-Ludhiana, PNT-Pantnagar

Genotype	Grain Yield (Kg/ha)					
	2019	2020	2019	2020	2019	2020
	DLH	DLH	LDH	LDH	PNT	PNT
SL 1213	1242.80	1950.61	1144.03	1448.56	1967.07	1753.08
DS 1318	584.36	2065.84	526.75	1555.55	1588.47	2164.60
JS 22-01	1037.03	1053.50	2156.37	888.89	1481.48	740.74
NRC 149	1786.00	2271.60	3761.31	2032.92	2617.28	2131.68
DS 1326	1218.10	2469.13	1226.33	1242.80	1234.57	1423.86
SL 1234	691.36	1563.78	790.12	1572.01	1292.18	1489.71
Himso 1690	551.44	888.89	880.66	740.74	1465.02	1259.26
JS 22-07	683.13	1102.88	1654.32	839.50	1802.46	1111.11
DS 1320	1506.17	1893.00	1308.64	1423.86	1901.23	1514.40
AUKS 218	510.29	222.22	1127.57	271.60	1111.11	1473.25

Table 6: Year-wise mean values for days to flowering and days to maturity in EZ: BPN-Bhawanipatna, RPR-Raipur and RNC-Ranchi

Genotype	Days to Flowering						Days to Maturity					
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	BPN	BPN	RPR	RPR	RNC	RNC	BPN	BPN	RPR	RPR	RNC	RNC
SL 1213	35.33	40.67	42.33	42.00	42.33	44.33	89.00	98.67	108.00	106.00	113.33	106.67
DS 1318	38.00	38.33	40.00	39.33	40.33	40.33	86.00	99.00	114.00	111.00	112.33	104.67
JS 22-01	36.00	36.00	41.00	39.67	38.33	39.33	90.00	90.00	126.00	112.00	100.33	98.67
NRC 149	34.33	36.67	39.00	38.33	39.67	41.33	94.33	101.00	107.00	105.00	114.33	105.33
DS 1326	37.67	38.00	41.00	38.00	42.67	42.00	89.00	99.00	111.00	108.00	114.67	104.00
SL 1234	36.00	38.67	40.67	41.00	42.00	41.33	89.67	101.33	111.00	109.00	100.67	116.33
Himso 1690	36.67	38.33	45.67	44.00	41.00	42.00	88.67	99.67	108.67	106.00	114.67	117.00
JS 22-07	36.00	36.67	39.00	38.00	40.67	39.33	89.67	88.67	104.00	101.00	102.33	98.33
DS 1320	37.00	38.67	41.67	41.00	41.33	40.00	88.33	97.33	103.00	102.00	112.67	98.67
AUKS 218	36.00	36.67	43.00	41.67	40.33	39.33	85.33	86.00	86.00	102.00	104.00	106.33

Table 7: Year-wise mean values for Plant Height and 100 seed weight in EZ: BPN-Bhawanipatna, RPR-Raipur and RNC-Ranchi

Genotype	Plant Height (cm)						100 Seed Weight (g)					
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	BPN	BPN	RPR	RPR	RNC	RNC	BPN	BPN	RPR	RPR	RNC	RNC
SL 1213	32.30	32.70	74.53	68.18	44.47	52.03	9.71	13.36	14.15	8.10	11.48	10.64
DS 1318	28.47	33.87	61.33	55.95	48.20	50.60	11.47	13.48	11.19	8.16	10.76	11.11
JS 22-01	31.13	37.60	68.00	64.29	50.60	54.13	11.51	14.03	12.26	9.99	14.07	12.96
NRC 149	43.60	52.97	99.67	91.71	73.33	58.80	13.52	15.98	12.66	9.52	10.83	11.82
DS 1326	29.07	35.40	72.40	70.45	44.40	50.53	10.12	12.97	11.36	6.61	10.29	9.39
SL 1234	30.73	36.57	81.60	80.46	48.27	54.20	12.40	13.97	14.56	9.46	11.82	11.22
Himso 1690	31.00	40.10	75.67	72.85	44.93	51.27	11.96	13.58	12.68	8.79	10.98	10.25
JS 22-07	38.17	41.07	74.73	71.83	59.00	69.73	13.11	16.09	11.85	8.50	12.76	13.45
DS 1320	30.97	38.27	68.93	66.91	52.67	50.40	10.70	13.75	12.34	8.21	11.18	9.46
AUKS 218	35.13	39.70	65.27	65.38	50.27	62.27	8.79	10.93	9.31	8.18	9.06	8.87

Table 8: Year-wise mean values for grain yield in EZ: BPN-Bhawanipatna, RPR-Raipur and RNC-Ranchi

Genotype	Grain Yield (Kg/ha)					
	2019	2020	2019	2020	2019	2020
	BPN	BPN	RPR	RPR	RNC	RNC
SL 1213	1086.42	2477.36	2823.04	1711.93	3078.18	2411.52
DS 1318	1102.88	2222.22	1415.63	1358.02	2880.65	2526.74
JS 22-01	1078.19	1786.00	1407.40	1588.47	2362.13	1670.78
NRC 149	987.65	2748.96	2510.28	1983.53	2971.19	1662.55
DS 1326	954.73	2584.36	2008.23	1646.09	2609.05	1802.46
SL 1234	872.43	1283.95	1851.85	1415.63	2798.35	2551.43
Himso 1690	1555.55	2683.12	2098.76	1275.72	3358.02	1168.72
JS 22-07	798.35	1201.64	1094.65	1053.50	2222.22	2403.29
DS 1320	995.88	1588.47	1176.95	1135.80	1975.30	1563.78
AUKS 218	814.81	1201.64	1061.73	1209.87	2032.92	1884.77

Table 9: Year wise mean values for days to flowering in CZ: AMT-Amravati, JBL-Jabalpur, PRB-Parbhani, MRN-Morena and LKB-LokBharti

Genotype	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	AMT	AMT	JBL	JBL	PRB	PRB	MRN	MRN	LKB	LKB
SL 1213	45.00	47.00	43.33	46.00	39.67	42.33	52.67	37.67	49.33	49.33
DS 1318	42.33	46.00	41.67	45.67	36.67	38.67	48.00	39.33	46.67	46.67
JS 22-01	40.67	46.67	41.67	41.00	36.33	36.67	46.33	39.00	45.33	47.33
NRC 149	41.33	45.00	43.33	45.67	39.33	38.33	48.00	35.67	51.33	50.33
DS 1326	42.67	47.00	44.67	46.00	40.33	42.33	48.00	40.00	50.00	49.67
SL 1234	43.33	48.33	44.00	43.33	39.67	39.33	44.67	38.33	49.67	49.33
Himso 1690	43.33	48.67	43.33	44.00	38.67	38.67	44.33	39.33	44.67	46.33
JS 22-07	41.00	45.33	42.00	44.33	36.33	36.67	43.00	40.00	44.67	47.67
DS 1320	42.00	43.00	42.33	42.33	37.33	36.67	43.33	41.33	46.67	49.67
AUKS 218	41.67	40.00	41.33	44.00	31.33	31.33	42.00	38.00	44.67	46.67

Table 10: Year wise mean values for days to maturity in CZ: AMT-Amravati, JBL-Jabalpur, PRB-Parbhani, MRN-Morena and LKB-LokBharti

Genotype	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	AMT	AMT	JBL	JBL	PRB	PRB	MRN	MRN	LKB	LKB
SL 1213	105.00	99.33	116.67	101.67	99.33	103.33	107.00	94.00	119.33	109.33
DS 1318	102.00	98.33	116.00	104.33	97.67	99.67	104.00	93.67	121.33	104.33
JS 22-01	101.33	99.67	107.67	100.00	95.33	97.33	94.00	91.67	105.67	96.33
NRC 149	101.00	98.33	116.33	105.00	99.33	99.33	111.00	90.67	99.00	108.33
DS 1326	101.67	98.67	116.33	107.00	100.67	103.33	111.00	94.67	117.33	109.33
SL 1234	102.00	100.33	116.33	104.33	98.67	100.33	110.00	87.67	122.33	108.33
Himso 1690	103.00	100.00	108.33	107.33	98.33	100.67	106.00	88.00	113.33	108.33
JS 22-07	100.33	97.67	110.67	102.33	96.33	97.33	96.00	92.33	108.00	94.67
DS 1320	102.00	97.33	114.33	107.00	96.33	97.67	96.00	87.00	112.33	107.33
AUKS 218	102.00	96.33	105.00	99.67	89.33	92.67	89.00	87.67	96.67	93.33

Table 11: Year wise mean values for plant height in CZ: AMT-Amravati, JBL-Jabalpur, PRB-Parbhani, MRN-Morena and LKB-LokBharti

Genotype	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	AMT	AMT	JBL	JBL	PAR	PAR	MRN	MRN	LKB	LKB
SL 1213	51.73	41.03	0.64	49.60	42.33	53.27	65.33	33.00	45.87	85.10
DS 1318	48.47	45.17	0.32	44.00	25.00	55.53	63.33	28.00	46.10	78.13
JS 22-01	47.60	52.00	0.68	43.73	36.73	62.93	72.00	30.33	51.40	68.10
NRC 149	90.00	89.87	0.83	85.20	67.53	68.40	69.00	47.00	78.00	94.83
DS 1326	53.67	51.03	0.33	61.97	41.87	43.47	60.83	32.00	43.43	82.33
SL 1234	54.00	62.30	0.34	65.93	32.00	48.53	63.67	39.33	45.03	84.77
Himso 1690	53.07	55.83	0.06	61.73	38.00	54.80	63.33	40.67	34.33	54.47
JS 22-07	54.13	65.23	0.54	46.70	37.67	68.00	57.33	29.00	60.93	84.23
DS 1320	57.33	57.83	0.47	51.97	29.40	69.13	65.00	53.33	36.37	75.63
AUKS 218	61.20	51.57	0.56	52.60	43.53	66.00	64.33	34.67	51.77	84.27

Table 12: Year wise mean values for 100-seed weight in CZ: AMT-Amravati, JBL-Jabalpur, PRB-Parbhani, MRN-Morena and LKB-LokBharti

	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	AMT	AMT	JBL	JBL	PAR	PAR	MRN	MRN	LKB	LKB
SL 1213	11.67	9.88	9.77	8.30	13.49	11.52	7.69	9.59	9.17	9.00
DS 1318	10.97	7.97	8.23	7.47	12.41	11.09	9.56	7.83	10.67	8.67
JS 22-01	11.50	11.00	10.00	12.53	13.06	11.93	9.43	8.81	12.50	9.67
NRC 149	12.98	11.80	12.27	9.90	16.05	14.20	10.38	8.68	11.23	8.33
DS 1326	10.92	9.75	10.13	8.73	14.15	12.23	8.60	9.51	11.00	7.67
SL 1234	8.92	8.80	8.70	9.53	13.17	11.83	8.47	6.11	9.50	8.00
Himso 1690	10.02	9.72	8.90	8.47	15.04	13.31	9.41	8.50	11.00	9.83
JS 22-07	12.58	13.50	12.07	11.87	15.89	15.34	12.79	10.73	21.17	13.33
DS 1320	10.00	8.80	9.03	8.47	12.90	12.86	10.52	8.91	11.83	9.50
AUKS 218	8.80	8.47	7.13	9.17	10.44	11.54	8.43	9.15	12.67	7.67

Table 13: Year wise mean values for grain yield in CZ: AMT-Amravati, JBL-Jabalpur, PRB-Parbhani, MRN-Morena and LKB-LokBharti

	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	AMT	AMT	JBL	JBL	PRB	PRB	MRN	MRN	LKB	LKB
SL 1213	2255.14	1802.46	1588.47	246.91	2230.45	2074.07	1185.18	814.81	2534.97	2518.51
DS 1318	2074.07	1777.77	790.12	288.07	1851.85	2395.06	905.35	962.96	2320.98	1967.07
JS 22-01	1349.79	1539.09	1687.24	1316.87	1860.08	2584.36	1893.00	493.83	2148.14	2436.21
NRC 149	2773.66	2279.83	2057.61	65.84	2732.50	1670.78	1794.23	1744.85	1028.80	1489.71
DS 1326	1753.08	1399.17	823.04	246.91	2148.14	2864.19	1876.54	757.20	2691.35	1901.23
SL 1234	1440.33	1061.73	847.73	551.44	1646.09	1720.16	1695.47	1094.65	1967.07	1695.47
Himso 1690	1876.54	1621.40	148.15	213.99	2592.59	2172.83	1407.40	378.60	1818.93	1218.10
JS 22-07	1522.63	1777.77	1341.56	938.27	2008.23	2279.83	1769.54	329.22	2806.58	2000.00
DS 1320	1555.55	1283.95	1160.49	386.83	2444.44	2386.83	1942.38	510.29	2156.37	2049.38
AUKS 218	1917.69	1604.93	1382.71	502.06	2181.06	1572.01	1769.54	362.14	1596.70	1580.24

Table 14: Year wise mean values for days to flowering and days to maturity in SZ: ADB-Adilabad, BNG-Bengaluru, KDR-KasbeDigraj, PUN-Pune

Genotype	Days to Flowering								Days to Maturity							
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	ADB	ADB	BNG	BNG	KDR	KDR	PUN	PUN	ADB	ADB	BNG	BNG	KDR	KDR	PUN	PUN
SL 1213	37.67	38.67	40.67	41.67	38.33	38.00	37.00	38.00	98.00	102.33	99.67	99.33	100.67	98.67	101.33	91.00
DS 1318	38.00	37.00	42.00	41.00	37.33	36.33	37.00	38.00	99.67	93.00	103.33	99.67	105.33	95.33	104.00	88.00
JS 22-01	38.33	40.00	36.67	38.00	34.33	34.33	35.00	38.00	101.33	103.00	97.67	93.00	92.67	94.67	91.00	88.00
NRC 149	38.67	41.33	39.00	38.33	35.67	31.67	33.00	38.00	99.33	104.67	99.33	94.00	108.67	94.33	107.67	88.00
DS 1326	38.33	41.00	40.00	38.67	36.00	38.67	35.00	38.00	99.00	105.00	99.33	101.33	101.00	102.67	101.33	88.00
SL 1234	37.67	39.33	40.00	36.00	36.33	38.33	35.00	36.00	101.00	102.00	102.33	98.00	106.67	100.67	106.00	93.00
Himso 1690	38.67	41.00	36.33	35.00	36.33	34.33	35.00	38.00	100.00	105.00	99.33	101.00	104.67	94.67	104.00	93.00
JS 22-07	38.67	37.33	40.00	37.00	36.33	35.67	35.67	36.67	104.33	96.00	105.00	96.00	99.33	97.33	98.00	87.67
DS 1320	38.33	38.33	37.33	39.00	35.33	35.67	35.00	36.67	101.67	99.33	99.33	95.33	92.00	96.67	91.00	88.33
AUKS 218	39.33	41.00	36.67	37.00	35.67	34.67	31.00	37.33	102.00	104.00	99.33	97.00	93.33	97.67	88.00	90.00

Table 15: Year wise mean values for plant height and 100-seed weight in SZ: ADB-Adilabad, BNG-Bengaluru, KDR-KasbeDigraj, PUN-Pune

Genotype	Plant Height (cm)								100seed weight (g)							
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	ADB	ADB	BNG	BNG	KDR	KDR	PUN	PUN	ADB	ADB	BNG	BNG	KDR	KDR	PUN	PUN
SL 1213	54.07	53.10	38.93	35.00	19.89	30.33	66.67	52.67	16.37	13.17	17.00	15.27	11.30	12.29	16.23	14.10
DS 1318	44.00	46.40	37.00	57.93	23.44	30.47	71.33	38.67	13.70	13.03	14.50	17.43	10.59	10.89	15.23	12.23
JS 22-01	50.40	51.63	45.27	40.13	30.73	32.67	75.33	49.00	14.93	12.93	21.17	20.00	13.52	11.87	17.07	15.27
NRC 149	72.87	73.90	49.13	53.83	37.67	35.60	92.67	89.00	15.83	16.27	18.17	17.00	11.25	11.49	15.90	11.43
DS 1326	50.40	56.90	46.60	32.80	30.89	33.47	72.33	64.00	16.90	16.47	17.00	17.43	10.63	10.63	16.37	12.73
SL 1234	46.67	48.87	44.20	43.43	23.73	35.60	67.33	60.33	13.67	11.90	19.67	16.07	10.41	10.38	16.40	11.47
Himso 1690	48.33	39.70	44.93	39.00	25.31	32.93	70.33	59.67	16.10	15.60	18.33	15.77	11.36	11.27	15.50	12.90
JS 22-07	57.80	63.97	45.13	58.53	26.80	34.40	75.00	68.00	16.63	16.17	18.83	16.97	14.08	12.31	18.40	16.70
DS 1320	54.00	50.27	41.33	42.53	23.91	29.93	75.67	58.00	16.03	15.63	17.17	17.30	10.92	10.50	15.80	12.93
AUKS 218	60.87	55.83	38.47	40.40	24.73	32.67	66.67	55.67	12.13	11.00	13.17	11.83	10.63	10.46	11.33	10.13

Table 16: Year wise mean values for grain yield in SZ: ADB-Adilabad, BNG-Bengaluru, KDR-KasbeDigraj, PUN-Pune

Genotype	Grain Yield (g)							
	2019	2020	2019	2020	2019	2020	2019	2020
	ADB	ADB	BNG	BNG	KDR	KDR	PUN	PUN
SL 1213	2930.03	2576.13	2557.32	1744.85	1275.72	1407.40	3506.16	3119.33
DS 1318	2098.76	2460.90	1975.31	2049.38	1061.73	1316.87	2938.26	2082.30
JS 22-01	2403.29	1736.62	2601.41	534.98	1275.72	1012.34	3201.64	3176.95
NRC 149	2954.73	3185.18	2619.05	1489.71	1308.64	1168.72	3892.99	2222.22
DS 1326	3037.03	3341.56	2239.86	1069.96	1308.64	1119.34	3563.78	3539.09
SL 1234	2148.14	1802.46	2372.13	1489.71	1283.95	1160.49	3794.23	2625.51
Himso 1690	2444.44	2699.58	2045.85	1654.32	1950.61	1415.63	3637.85	2979.42
JS 22-07	2732.50	2633.74	1869.49	2378.60	1325.10	1374.48	3349.79	3497.93
DS 1320	2370.36	2551.43	1137.57	1835.39	1185.18	971.19	3390.94	2995.88
AUKS 218	1810.70	1670.78	1728.39	2049.38	1818.93	1465.02	2683.12	2962.96

Table 17: Year wise mean values for days to flowering, days to maturity and plant height in NEH: IMP-Imphal and UMM-Umiam

Genotype	Days to Flowering				Days to Maturity				Plant Height (cm)			
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
	IMP	IMP	UMM	UMM	IMP	IMP	UMM	UMM	IMP	IMP	UMM	UMM
SL 1213	47.00	48.33	38.33	40.00	106.67	115.67	79.00	94.00	32.07	67.67	37.50	25.80
DS 1318	43.00	46.67	36.00	41.00	102.67	117.67	83.67	92.00	26.87	51.67	32.40	32.73
JS 22-01	48.00	48.33	61.33	43.00	99.33	110.33	84.67	94.00	31.33	64.00	29.50	34.00
NRC 149	49.00	50.67	38.00	40.00	105.67	121.33	81.33	93.67	48.13	122.80	73.13	36.87
DS 1326	47.00	51.67	39.00	40.33	106.00	118.33	80.67	93.67	38.53	60.33	38.00	29.47
SL 1234	44.33	49.00	51.00	40.00	108.33	124.00	81.00	92.00	39.67	69.67	42.70	28.40
Himso 1690	46.67	51.00	52.67	40.33	106.67	124.67	81.33	93.00	35.87	67.60	43.90	26.07
JS 22-07	46.00	48.00	37.33	39.33	100.33	109.00	79.00	93.67	40.40	67.67	47.50	34.00
DS 1320	43.00	47.33	51.67	44.33	101.33	110.33	79.67	93.33	41.53	60.13	38.30	29.93
AUKS 218	42.00	45.67	52.67	39.67	95.33	106.00	81.00	90.67	35.07	78.60	45.10	28.73

Table 18: Year wise mean values 100-seed weight and grain yield in NEH: IMP-Imphal and UMM-Umiam

Genotype	100seed weight (g)				Grain Yield (Kg/ha)			
	2019	2020	2019	2020	2019	2020	2019	2020
	IMP	IMP	UMM	UMM	IMP	IMP	UMM	UMM
SL 1213	14.97	9.29	12.56	8.64	2230.45	3004.11	3648.05	1588.47
DS 1318	15.22	9.29	9.69	7.63	1580.24	2139.91	1601.81	2658.43
JS 22-01	19.69	12.39	8.27	8.11	1695.47	2485.59	1379.59	1687.24
NRC 149	16.11	11.77	12.81	8.58	2230.45	2370.36	4796.16	1465.02
DS 1326	13.48	8.79	11.80	8.98	2378.60	1843.62	2138.83	1818.93
SL 1234	14.78	11.12	10.36	7.96	2312.75	2864.19	3351.76	2255.14
Himso 1690	15.46	11.63	10.47	8.54	2024.69	3695.46	2527.71	2041.15
JS 22-07	22.15	14.10	10.38	9.86	1720.16	1728.39	3157.32	1909.46
DS 1320	17.02	10.15	10.03	8.57	2041.15	2493.82	1509.22	1761.31
AUKS 218	15.74	11.11	10.84	9.83	1604.93	2897.11	1490.70	2790.12

Table 19: Year-wise pooled ANOVA for grain yield

Source		2019				2020			
	DF	TSS	MSS	F Cal	Pr(>F)	TSS	MSS	F Cal	Pr(>F)
ENV	18	$2.02e^{+08}$	11214760	118.612	0.000	$1.97\ e^{+08}$	10942597	66.8	0.000
REP(ENV)	38	$3.59\ e^{+06}$	94550	0.998	$4.77e^{-01}$	$6.23\ e^{+06}$	163820	2.42	$1.63\ e^{-05}$
GEN	9	$3.79\ e^{+07}$	4208011	44.423	$2.17\ e^{-52}$	$8.92\ e^{+06}$	990703	14.61	$4.82\ e^{-20}$
G×E	162	$1.10\ e^{+08}$	677273	7.150	**$1.69\ e^{-52}$**	$9.91\ e^{+07}$	611563	9.02	**$1.72\ e^{-64}$**
Error	342	$3.24\ e^{+07}$	94725			$2.32\ e^{+07}$	67799		
CV	16.2					15.3			

Figure 1: Analysis of discriminativeness and representativeness of environments

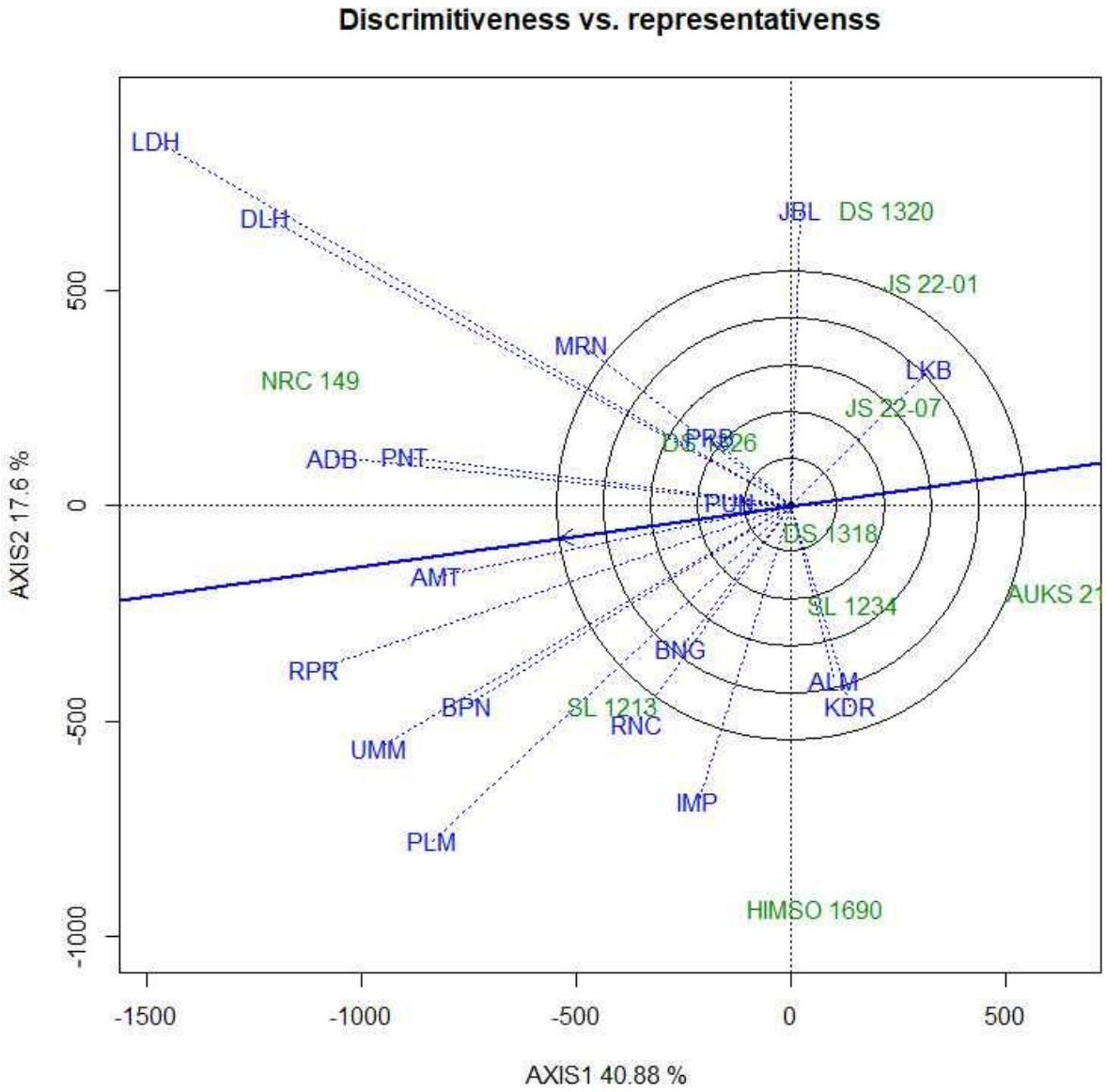


Figure 2: Ranking of environments based on ideal environment

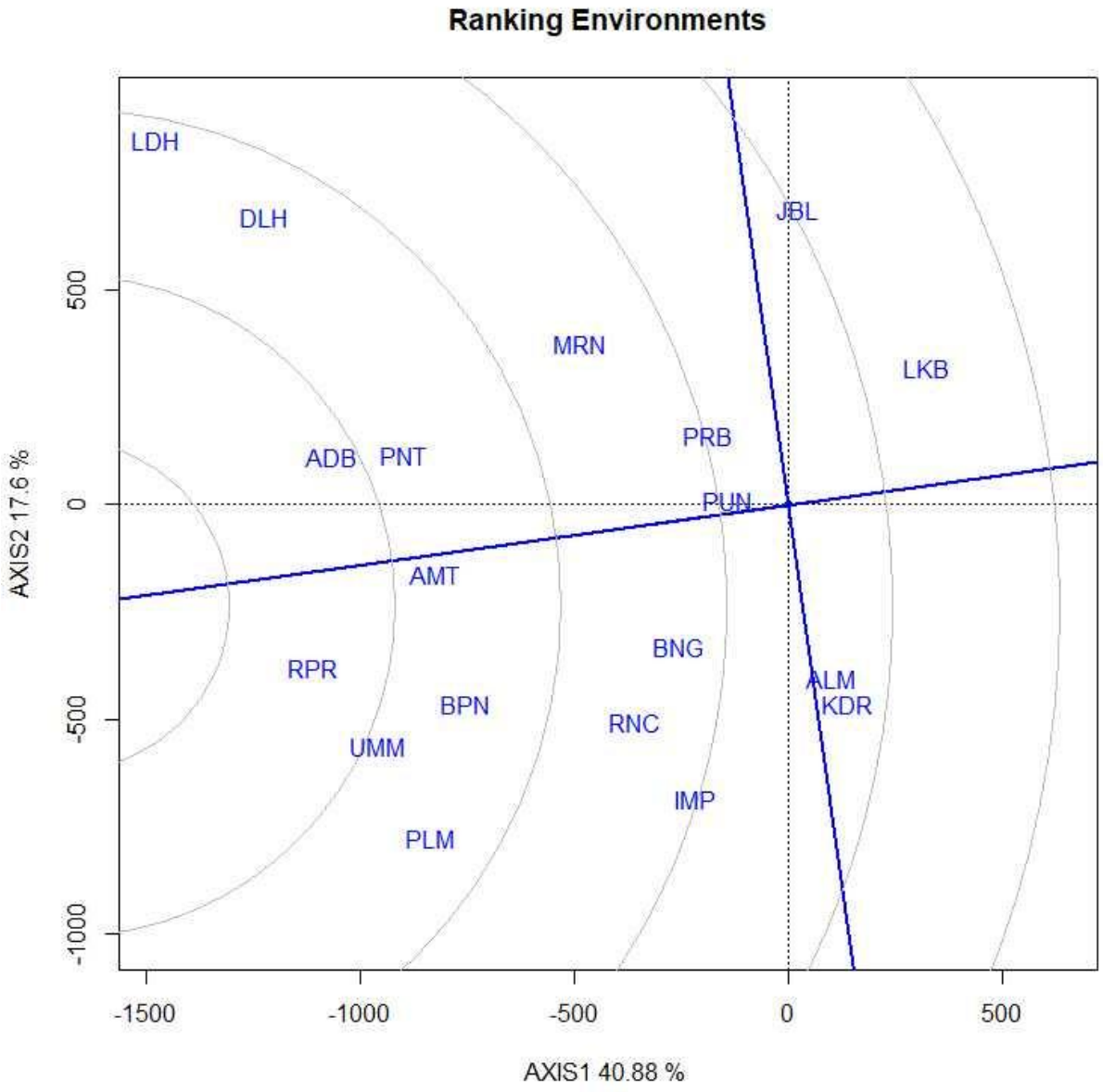
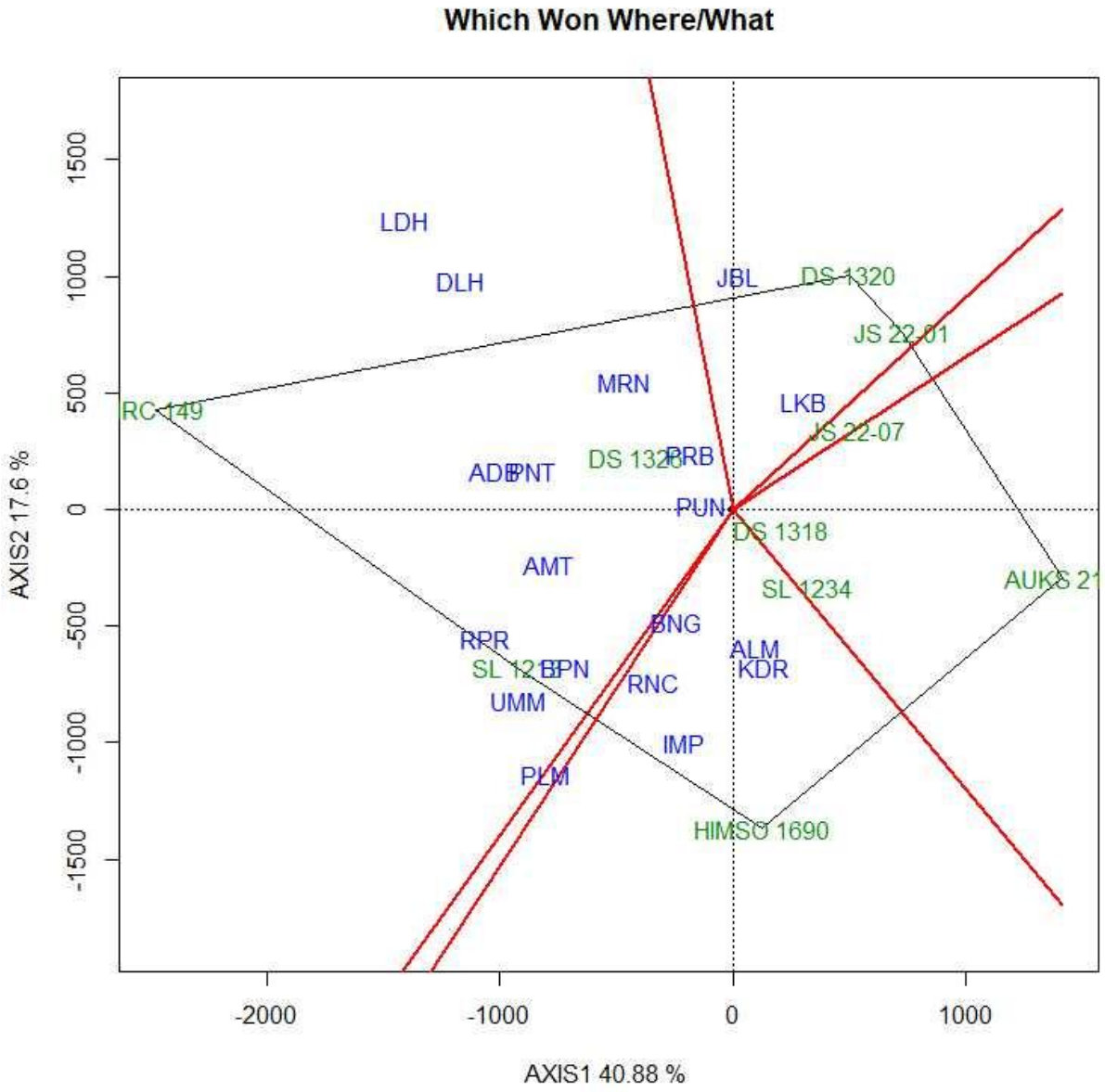


Figure 3: Which-won-where analysis of test locations



Compiled by:

Dr V Natraj

Appendix-III

Multi-Location Germplasm Evaluation

With the purpose of identification of superior germplasm lines for yield and associated traits and their subsequent integration in breeding programmes across AICRP on Soybean centres to broaden the genetic base of coming soybean varieties, a multi-location evaluation trial of 125 germplasm lines was conducted across 8 locations representing all the zones of AICRP *viz.* Palampur (NHZ), Pantnagar (NPZ), Imphal (North Eastern Hill Zone), Raipur (EZ), Indore, Jabalpur and Parbhani (CZ) and Pune (SZ) for 9 morphological traits (Days to flower (DF), Days to maturity (DM), Plant Height (PH in cm), Branches / plant, Pods / plant, 100 seed weight (100 SW in g), Plot yield (gm) and seed yield / plant (gm) as per the programme given below.

DESIGN : Augmented Design
PLOT SIZE : Single row, 3m long
REPLICATION : Nil
LOCATIONS (8) : Palampur, Pantnagar, Imphal, Jabalpur, Raipur, Almora, Parbhani and Pune
ENTRIES :125
Zonal Checks **:** Zonal Checks after every 5 rows of the accessions. Same checks are to be repeated in all blocks.

NHZ (Palampur and Almora)	: VLS 59, VLS 63, PS 1556, Himso 1685, Hara Soya
NPZ (Pantnagar)	: SL 958, SL 955, SL 979, PS 24, PS 1347
EZ (Raipur)	: MACS 1460, RKS 113, KDS 753, RSC 10-46, CG Soya 1
NEHZ (Imphal)	: MACS 1460, RKS 113, KDS 753, RSC 10-46, RVS 2010-1
CZ (Jabalpur , Parbhani)	: NRC 86, JS 20-34, JS 20-29, JS 20-69, JS 20-98.
Southern Zone (Pune)	: MACS 1460, KDS 753, DSb 23, DSb 21, MACS 1188

Mean performance and descriptive statistics of 125 germplasm lines over 8 locations along with the performance of checks is given in Tables 20-32.

Table 20: Multilocation Germplasm Evaluation

MLT Germplasm 2020 PUNE Adjusted means											
S.No	**Genotype**	**Days to 50 per cent flowering**	**Days to maturity**	**Plant Height**	**Number of primary branches per plant**	**Number of nodes per plant**	**Number of pod clusters per plant**	**Number of pods per plant**	**100 Seed weight**	**Grain yield per plant**	**Row yield**
Check 1	MACS 1460	36.20	86.00	64.80	3.01	10.24	14.84	53.96	12.48	14.64	570.80
Check 2	KDS 753	43.00	94.40	66.60	3.32	10.44	17.12	52.60	15.00	15.66	510.80
Check 3	Dsb 23	43.60	94.40	65.88	3.72	10.48	18.44	52.88	11.78	13.09	295.60
Check 4	Dsb 21	42.20	92.60	68.16	3.28	11.56	18.56	48.04	12.26	12.74	259.20
Check 5	MACS 1188	47.00	93.60	80.32	3.32	11.92	20.36	57.68	12.52	14.90	428.00
1	AGS 163 B	40.60	85.40	59.63	4.40	11.93	26.90	80.87	6.05	11.94	216.48
2	AMSS 0 34	49.60	93.40	48.03	4.60	11.93	28.70	73.27	6.85	12.06	0.00
3	AGS 0 56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EC 0 251506	42.60	93.40	109.23	5.20	15.53	43.10	82.67	7.95	15.48	410.48
5	EC0251531	42.60	89.40	82.03	1.60	12.13	13.90	56.67	10.85	8.74	0.00
6	EC 457285	33.60	90.40	47.03	1.20	7.93	7.90	31.67	13.35	4.24	92.48
7	EC 251383	43.60	93.40	92.03	4.00	14.33	23.50	72.67	10.45	15.08	374.48
8	AMS 059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	AGS032	40.60	85.40	78.43	2.80	12.73	22.50	63.47	6.35	6.32	148.48
10	AGS02	46.60	93.40	80.83	2.20	12.13	27.30	98.07	6.15	13.94	0.00
11	AMS0195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	BR07	48.60	101.40	47.03	1.80	8.43	14.10	55.87	12.75	2.70	0.00
13	AMS0250501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	AMS0107	38.60	85.40	38.83	3.40	9.53	12.90	34.27	12.55	6.94	0.00
15	EC309512	38.60	91.40	39.83	2.00	8.33	10.30	26.27	15.75	7.40	66.48
16	ICS084/860850B041	36.60	85.40	87.83	1.80	13.73	23.30	58.47	11.05	13.58	0.00
17	EC0251682	43.60	91.40	90.63	4.00	14.13	26.30	73.67	12.75	17.66	258.48
18	AMS 26A	38.60	85.40	44.03	3.40	9.93	12.90	43.07	12.15	12.16	0.00
19	AMS 480701	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	AMS056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	AMS0MB051018	38.60	93.40	63.83	1.20	11.93	14.10	64.87	12.55	13.98	388.48
22	AMS02430703	42.60	91.40	52.83	2.10	9.68	11.30	36.67	8.05	4.81	0.00
23	EC0251516	41.60	85.40	46.63	3.40	9.93	18.50	58.47	14.35	14.94	220.48
24	AMS0250502	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	AGS 99	38.60	85.40	75.23	5.80	12.33	31.90	78.67	8.75	13.12	366.48

26	AMS 110	39.00	86.20	27.15	4.23	7.33	14.82	39.47	10.75	17.90	135.28
27	AMS 38024	34.00	86.20	42.35	3.13	9.13	20.22	52.07	19.15	20.02	193.28
28	EC 383165	39.00	94.20	43.35	3.53	10.13	23.02	55.87	13.25	22.62	171.28
29	EC 333872	42.00	90.20	80.95	2.73	12.73	23.02	55.47	14.85	13.30	761.28
30	EC 251470	43.00	86.20	85.95	2.33	12.53	18.62	56.67	10.85	12.82	241.28
31	EC 457185	43.00	94.20	100.15	1.93	12.13	15.42	48.47	12.75	11.82	459.28
32	EC 393222	55.00	102.20	93.75	4.93	16.33	41.42	81.87	6.55	15.94	150.28
33	AMS 60020304	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	AMS 115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	AGS 164	43.00	94.20	78.35	2.73	12.33	18.22	67.67	11.65	14.40	767.28
36	RICUM	43.00	94.20	74.75	1.33	11.73	16.02	45.07	12.15	10.82	421.28
37	AGS 371	43.00	94.20	73.55	2.53	10.93	17.82	49.67	7.65	10.08	271.28
38	AMS 19B	39.00	92.20	72.55	4.13	11.93	17.22	51.47	12.25	14.26	605.28
39	BDS 190	43.00	90.20	75.35	3.73	12.33	27.42	56.07	11.05	19.98	101.28
40	EC 457214	39.00	94.20	49.95	2.53	11.13	19.02	58.07	12.05	15.08	407.28
41	EC 456527	47.00	96.20	103.15	3.53	14.13	34.22	61.07	8.85	15.84	425.28
42	UPSL 422	47.00	96.20	101.75	2.73	9.73	26.82	66.07	8.95	9.78	239.28
43	EC 389392	44.00	96.20	79.95	2.13	9.93	16.62	36.07	11.35	6.84	229.28
44	EC 251827	43.00	91.20	86.75	2.23	11.13	19.42	46.27	12.35	9.02	321.28
45	EC 313915	43.00	86.20	69.95	4.33	9.93	17.42	47.87	11.35	12.66	391.28
46	EC 309538	37.00	86.20	58.75	3.53	9.33	15.22	37.07	12.45	8.96	485.28
47	EC 333897	30.00	80.20	35.95	3.13	6.93	12.02	33.27	14.55	7.54	165.28
48	NRC 43	49.00	94.20	125.15	3.53	16.93	30.42	81.07	7.95	10.96	539.28
49	EC 39177	44.00	94.20	73.35	2.33	11.93	16.82	50.67	11.15	11.74	221.28
50	EC 391162	44.00	90.20	77.15	5.40	12.93	33.62	90.87	9.05	19.33	403.28
51	EC 456599	55.60	94.00	90.47	5.89	14.77	40.82	109.91	5.71	13.44	470.08
52	NRC 23020	39.60	86.00	67.07	4.49	12.37	22.02	61.11	13.51	18.78	226.08
53	UPSM 780	49.60	96.00	75.67	4.69	11.17	22.42	59.91	8.01	10.10	250.08
54	EC 393222	57.60	102.00	87.67	5.49	12.97	29.82	79.11	9.11	14.92	109.08
55	ICAL0122	41.60	94.00	55.27	4.04	11.77	16.22	60.11	13.41	11.74	24.08
56	JS 75030	49.60	86.00	62.67	3.29	10.57	17.62	63.91	10.11	17.80	330.08
57	SEHORE01	41.60	94.00	63.87	3.09	10.57	15.22	57.11	9.61	18.20	304.08
58	NRC 8001	43.60	92.00	68.47	3.04	12.57	15.82	54.71	10.61	13.08	154.08
59	RVS0200604	43.60	92.00	60.07	2.89	8.97	14.02	48.91	13.81	14.12	304.08
60	GP0496	39.60	94.00	86.67	2.89	12.57	17.62	52.31	12.21	12.58	386.08
61	UPSL 326	49.60	94.00	102.27	5.29	15.17	39.22	98.51	6.41	15.78	176.08
62	EC 389170	41.60	94.00	53.07	5.49	9.57	25.42	71.91	6.11	13.40	42.08

63	RKS 30	41.60	94.00	92.67	2.89	14.37	23.82	59.71	9.81	11.56	256.08
64	UPSL 340	52.60	98.00	84.47	5.09	12.57	32.22	64.71	7.21	11.76	176.08
65	EC 171194	41.60	92.00	54.27	2.89	10.77	16.82	60.71	15.21	16.10	278.08
66	EC 37939	44.60	94.00	72.07	3.89	12.37	21.82	70.11	11.31	13.32	282.08
67	EC 172578	43.60	96.00	63.67	5.69	10.77	19.82	60.51	14.81	19.60	292.08
68	UPSL 601	47.60	96.00	87.87	4.49	15.77	33.42	90.91	7.41	13.92	282.08
69	EC 389156	49.60	96.00	92.47	8.69	11.37	41.42	103.31	5.81	10.20	96.08
70	NRC 57	37.60	92.00	58.07	2.69	11.37	16.82	54.51	14.81	12.44	382.08
71	TNAU 20023	49.60	94.00	86.47	4.69	12.17	27.42	58.11	7.81	10.14	96.08
72	EC 281462	43.60	94.00	74.07	2.29	11.57	15.02	59.51	12.01	13.40	364.08
73	EC 280149	41.60	94.00	63.27	1.49	10.97	15.62	64.71	11.51	14.30	142.08
74	PK 1120	34.60	86.00	40.07	3.69	8.77	19.22	44.11	13.01	11.74	136.08
75	EC 391012	39.60	96.00	78.07	7.09	14.77	29.62	71.31	15.01	15.14	318.08
76	SAL 12	35.20	90.60	33.47	3.45	8.09	16.86	37.51	14.59	7.20	547.28
77	NRC 79	49.20	90.60	103.87	4.65	15.89	39.46	81.11	9.09	9.60	343.28
78	UPSL 470	49.20	92.60	81.47	4.65	10.49	31.66	73.71	6.59	13.66	81.28
79	TNAU 20049	49.20	92.60	73.67	3.25	11.29	19.66	40.91	9.79	5.36	109.28
80	JS 20048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	JS 20041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	AGS 116	41.20	94.60	88.47	3.45	14.09	28.46	83.11	11.29	16.86	521.28
83	JS 20038	34.20	82.60	34.27	3.25	8.69	14.46	36.91	12.59	8.00	343.28
84	EC 37183	57.20	92.60	88.67	4.85	12.09	24.46	49.51	10.09	5.12	133.28
85	PS 1336	39.20	92.60	74.07	2.45	12.89	19.66	59.71	15.39	14.22	431.28
86	TNAU 5055	47.20	94.60	88.27	2.85	13.09	23.26	40.91	13.29	5.84	609.28
87	UPSM 719	55.20	94.60	89.67	5.45	11.29	33.26	60.11	7.79	13.24	147.28
88	NRC 59	49.20	94.60	98.67	3.25	14.49	18.86	48.11	7.19	6.56	153.28
89	UPSL 472	49.20	94.60	87.67	6.05	10.69	31.46	67.91	8.39	6.72	313.28
90	EC 456549	47.20	94.60	73.47	2.45	10.09	15.46	32.31	8.49	3.84	145.28
91	PK 1038	47.20	94.60	88.47	4.85	15.09	32.26	77.51	8.69	9.86	177.28
92	PK 726	43.20	94.60	90.07	3.45	12.49	24.46	65.31	8.79	6.26	189.28
93	SL 443	47.20	94.60	78.47	4.65	12.29	31.66	88.31	9.29	12.72	223.28
94	NRC 42	47.20	94.60	82.47	2.65	10.49	16.26	33.11	9.69	3.70	125.28
95	NRC 2006 M	39.20	94.60	74.07	2.05	13.49	17.66	45.11	15.69	7.98	463.28
96	NRC 37	39.20	94.60	63.47	2.85	12.49	19.46	60.11	12.89	10.54	359.28
97	JS 89024	49.20	94.60	75.87	3.65	11.49	29.06	69.11	8.99	10.68	231.28
98	AGS 129	43.20	92.60	56.87	4.18	11.69	15.86	33.31	13.19	8.84	104.28
99	NRC 41	39.20	94.60	49.87	4.25	11.29	19.86	51.51	15.69	15.96	553.28

100	EC 241780	49.20	94.60	101.27	4.85	16.09	33.26	78.51	12.19	21.78	477.28
101	PSL 788	48.60	93.80	103.27	6.53	14.09	40.98	80.83	7.91	19.30	412.88
102	UPSL 162	54.60	103.80	82.87	6.13	11.09	33.58	66.23	15.11	9.10	311.88
103	RKS 52	46.60	93.80	68.27	3.13	10.69	22.18	70.43	11.31	17.68	238.88
104	IMP 1	46.60	93.80	93.47	5.33	14.29	31.98	72.63	11.41	18.26	350.88
105	JS 20041	36.60	85.80	64.47	4.93	10.29	20.78	56.83	10.51	14.04	480.88
106	NRC 34	46.60	93.80	111.47	5.53	16.69	35.58	76.03	9.21	11.96	304.88
107	UPSL 72	46.60	94.80	95.07	5.13	11.89	28.18	63.63	8.81	9.16	350.88
108	UPSL 479	46.60	93.80	63.07	5.13	12.29	27.38	74.03	8.31	10.40	398.88
109	NRC 20070103	46.60	93.80	96.67	3.73	10.49	18.98	49.83	9.51	11.50	326.88
110	TNAU 20037	46.60	93.80	88.07	3.73	9.29	17.18	52.83	9.61	6.32	348.88
111	TUNIA	44.60	90.80	100.07	4.73	14.29	19.78	32.03	10.71	6.88	272.88
112	UPSM 57	48.60	93.80	92.27	5.53	13.09	42.38	90.03	9.01	19.68	630.88
113	RKS 21	38.60	90.80	61.07	2.28	10.69	11.58	25.43	11.61	3.91	290.88
114	TNAU 20051	48.60	93.80	105.07	4.73	15.29	27.78	67.03	9.51	10.48	272.88
115	UPSM 783	48.60	93.80	102.87	4.93	11.49	28.38	59.63	8.31	9.02	324.88
116	EC 127503	56.60	93.80	99.27	6.13	14.69	32.18	85.63	7.11	8.32	466.88
117	UPSL 786	48.60	99.80	93.87	4.53	11.69	28.98	47.23	8.51	11.38	352.88
118	RVS 2006022	38.60	85.80	50.07	2.73	9.49	10.98	38.83	13.11	7.42	326.88
119	GP 525	42.60	93.80	87.87	3.73	13.09	19.78	39.43	11.01	9.90	412.88
120	UPSL 415	48.60	101.80	99.07	3.93	12.09	16.58	71.83	8.11	6.50	221.88
121	UPSM 695	46.60	93.80	86.67	4.13	11.09	22.18	60.43	8.71	9.36	420.88
122	JS 790420	42.60	91.80	51.87	4.93	9.09	20.98	42.63	15.21	8.62	240.88
123	UPSM 662	46.60	93.80	80.87	5.13	12.29	31.18	64.43	9.31	15.26	658.88
124	JS 95052	40.60	93.80	63.07	2.53	8.29	13.18	39.43	12.11	8.38	270.88
125	EC 481571	40.60	83.80	78.67	4.73	12.09	21.98	50.83	8.01	12.10	462.88

Table 21: Descriptive statistics for germplasm evaluation at Pune

Character	Minimum	Maximum	Range	Mean	Coeff of Variation
Days to 50 per cent flowering	30.00	57.60	27.60	44.08	11.99
Days to maturity	80.2	103.8	23.6	92.54	4.45
Plant Height	27.15	125.15	98.00	75.27	26.16
Number of primary branches per plant	1.20	8.69	7.49	3.80	35.47
Number of nodes per plant	6.93	16.93	10.00	11.81	17.55
Number of pod clusters per plant	7.9	43.1	35.2	22.9	35.42
Number of pods per plant	25.43	109.91	84.48	59.62	28.77
100 Seed weight	5.71	19.15	13.44	10.77	25.53
Grain yield per plant	2.70	22.62	19.92	11.97	35.59
Row yield	24.08	767.28	743.20	311.05	49.56

Table 22: MLT Germplasm 2020 Parbhani Adjusted means

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height	Number of primary branches per plant	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	100 Seed weight	Grain yield per plant	Row yield
Check 1	JS 20029	38.80	99.80	35.36	2.80	15.64	13.32	48.32	12.40	7.75	332.40
Check 2	JS 20034	29.60	89.00	24.48	2.48	13.36	10.12	31.44	14.17	7.18	233.20
Check 3	JS 20069	38.00	99.20	34.96	2.84	14.88	11.12	30.16	10.70	5.20	272.20
Check 4	JS 20098	37.80	99.00	51.60	2.64	14.64	12.56	30.80	10.82	5.47	256.20
Check 5	NRC 86	39.00	99.60	59.60	3.60	20.48	17.64	61.60	11.05	9.52	371.80
1	AGS 163 B	32.04	93.72	61.36	1.79	18.00	16.07	42.18	6.50	3.88	269.36
2	AMSS 0 34	38.04	98.72	71.16	0.79	15.80	13.67	56.38	7.06	5.38	190.36
3	AGS 0 56	32.04	92.72	45.36	0.59	9.40	7.07	28.38	10.94	5.73	65.36
4	EC 0 251506	44.04	104.72	105.16	3.79	19.00	16.67	56.58	7.82	6.38	329.36
5	EC0251531	44.04	104.72	48.16	2.79	20.60	18.07	80.18	11.84	8.88	449.36
6	EC 457285	32.04	92.72	25.76	2.19	9.20	6.87	27.58	8.82	4.29	229.36
7	EC 251383	44.04	103.72	52.16	2.79	13.00	10.87	31.98	9.42	4.88	179.36
8	AMS 059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	AGS032	34.04	93.72	64.16	2.19	18.00	15.87	43.58	6.80	3.71	254.36
10	AGS02	40.04	99.72	24.16	0.79	20.00	17.87	89.38	5.64	2.91	94.36
11	AMS0195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	BR07	33.04	93.72	19.76	2.19	8.60	6.07	14.98	8.00	1.88	14.36
13	AMS0250501	34.04	93.72	12.16	1.39	0.40	0.13	16.98	10.04	2.97	14.36
14	AMS0107	36.04	94.72	32.16	1.19	8.00	6.07	22.98	11.02	3.88	204.36
15	EC309512	36.04	96.72	27.16	1.19	8.00	5.67	24.78	10.54	3.36	117.36
16	ICS084/860850B041	33.04	93.72	59.16	1.59	14.80	11.67	35.78	9.18	4.02	149.36
17	EC0251682	41.04	100.72	45.76	1.59	14.80	11.87	55.38	9.88	3.66	189.36
18	AMS 26A	33.04	94.72	32.16	1.19	9.00	6.47	19.38	8.86	3.05	161.36
19	AMS 480701	33.04	93.72	30.16	2.99	10.80	7.87	30.98	10.66	5.24	39.36
20	AMS056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	AMS0MB051018	38.04	98.72	45.16	1.59	9.60	6.87	28.18	9.70	4.33	209.36
22	AMS02430703	35.04	97.72	39.36	1.39	14.00	11.07	60.38	10.18	6.88	169.36
23	EC0251516	35.04	94.72	34.56	1.39	12.00	9.87	31.38	10.42	4.05	119.36
24	AMS0250502	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	AGS 99	43.04	101.72	43.96	1.79	15.80	13.47	70.38	5.68	3.25	39.36
26	AMS 110	34.64	94.92	32.24	3.67	19.44	14.79	39.26	11.58	7.64	196.36

27	AMS 38024	35.64	94.92	34.44	2.47	13.84	12.39	28.26	9.44	7.33	148.36
28	EC 383165	35.64	94.92	50.24	2.67	20.84	17.39	71.26	10.54	10.53	449.36
29	EC 333872	37.64	98.92	48.04	1.47	14.84	13.19	48.26	10.82	6.90	434.36
30	EC 251470	32.64	94.92	59.64	0.47	9.64	9.39	31.26	10.30	5.40	344.36
31	EC 457185	41.64	102.92	60.24	2.47	12.84	10.99	59.46	11.66	10.40	524.36
32	EC 393222	29.64	88.92	54.64	2.67	9.84	8.99	20.86	10.76	4.93	112.36
33	AMS 60020304	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	AMS 115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	AGS 164	43.64	102.92	42.24	1.07	12.84	11.99	23.26	11.10	6.12	244.36
36	RICUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	AGS 371	41.64	101.92	42.24	2.67	13.84	11.99	32.46	6.12	3.72	200.36
38	AMS 19B	38.64	98.92	44.24	2.47	15.04	12.79	52.26	10.96	8.16	370.36
39	BDS 190	35.64	95.92	13.84	2.47	9.04	7.79	20.06	9.96	4.73	96.36
40	EC 457214	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	EC 456527	47.64	106.92	89.44	2.07	19.84	17.79	65.06	8.40	7.38	400.36
42	UPSL 422	49.64	108.92	92.44	2.67	23.64	17.99	69.26	8.58	7.50	420.36
43	EC 389392	42.64	102.92	89.24	2.07	19.44	16.79	44.26	11.60	8.19	449.36
44	EC 251827	42.64	102.92	43.24	1.47	16.44	14.39	45.86	9.80	6.50	404.36
45	EC 313915	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	EC 309538	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	EC 333897	30.64	91.92	22.24	2.27	22.24	19.19	69.26	11.86	10.40	234.36
48	NRC 43	41.64	101.92	77.04	1.47	10.44	7.99	39.26	8.88	5.90	374.36
49	EC 39177	41.64	101.92	48.24	1.87	12.84	11.79	38.26	10.52	7.32	404.36
50	EC 391162	38.64	100.92	47.84	2.47	14.44	12.59	40.86	9.36	7.40	352.36
51	EC 456599	48.04	104.12	111.60	8.11	33.80	27.11	88.02	6.73	7.34	454.36
52	NRC 23020	38.04	99.12	74.60	2.51	13.60	10.91	30.62	14.69	7.34	314.36
53	UPSM 780	49.04	109.12	60.80	0.91	15.80	12.31	51.22	7.47	5.34	229.36
54	EC 393222	57.04	117.12	93.20	1.31	17.00	13.31	31.22	8.95	5.42	339.36
55	ICAL0122	38.04	95.12	50.20	3.91	17.60	13.91	50.22	12.39	10.34	214.36
56	JS 75030	48.04	109.12	61.80	2.11	20.80	16.51	68.22	9.15	8.76	194.36
57	SEHORE01	38.04	98.12	30.40	4.51	18.80	17.11	51.22	9.17	8.34	178.36
58	NRC 8001	39.04	100.12	46.00	3.71	25.00	21.91	84.82	11.07	9.34	412.36
59	RVS0200604	32.04	94.12	45.80	3.31	17.00	13.71	47.02	10.93	7.37	294.36
60	GP0496	34.04	95.12	72.80	3.31	17.20	12.91	37.22	10.51	7.89	419.36
61	UPSL 326	46.04	105.12	86.40	1.11	27.80	23.91	74.02	7.39	6.34	394.36
62	EC 389170	43.04	104.12	57.80	0.51	8.40	4.71	95.22	7.05	6.09	379.36
63	RKS 30	42.04	103.12	89.40	1.51	10.00	6.91	29.02	10.45	5.23	264.36

64	UPSL 340	48.04	109.12	87.00	0.71	10.80	6.91	31.02	6.59	3.52	209.36
65	EC 171194	39.04	100.12	41.80	0.71	9.20	6.91	29.02	14.39	7.54	322.36
66	EC 37939	42.04	102.12	60.60	1.51	13.80	12.11	51.22	10.19	7.34	349.36
67	EC 172578	43.04	103.12	30.80	2.31	12.60	10.91	32.22	16.77	8.39	469.36
68	UPSL 601	50.04	110.12	97.20	1.51	11.00	7.51	28.62	7.95	5.38	276.36
69	EC 389156	54.04	114.12	86.80	2.11	20.20	17.71	40.82	6.95	4.54	219.36
70	NRC 57	36.04	97.12	47.80	2.11	16.40	12.51	38.22	13.57	8.34	514.36
71	TNAU 20023	44.04	104.12	122.00	3.31	22.40	18.91	35.22	9.49	6.36	269.36
72	EC 281462	44.04	104.12	80.40	0.91	11.80	8.31	46.42	12.29	8.55	494.36
73	EC 280149	39.04	99.12	45.80	2.91	26.60	21.31	71.02	11.33	9.54	356.36
74	PK 1120	39.04	99.12	48.80	1.51	10.00	8.91	19.42	10.49	4.84	250.36
75	EC 391012	42.04	103.12	62.80	1.31	16.60	14.11	49.22	11.99	6.54	344.36
76	SAL 12	36.44	96.12	42.44	1.67	12.52	10.79	39.74	10.01	6.84	293.56
77	NRC 79	36.44	96.12	86.44	2.87	24.52	18.59	59.54	7.67	7.14	354.56
78	UPSL 470	37.44	98.12	84.44	3.67	26.12	19.79	98.34	7.33	7.51	280.56
79	TNAU 20049	36.44	96.12	88.44	2.47	24.32	19.79	51.94	8.49	6.72	364.56
80	JS 20048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	JS 20041	37.44	98.12	42.04	1.87	10.12	7.99	26.74	8.37	4.35	165.56
82	AGS 116	45.44	105.12	94.44	2.67	19.52	15.99	37.94	10.93	6.83	286.56
83	JS 20038	34.44	94.12	48.64	2.67	14.32	11.79	29.94	10.87	5.84	237.56
84	EC 37183	48.44	105.12	76.44	5.87	21.12	17.59	49.94	10.09	7.33	308.56
85	PS 1336	36.44	99.12	54.44	3.07	15.32	12.99	34.54	12.81	6.24	254.56
86	TNAU 5055	45.44	105.12	82.44	1.47	26.92	20.79	82.34	8.13	8.53	402.56
87	UPSM 719	51.44	111.12	87.64	0.47	12.52	10.79	29.94	7.61	4.33	220.56
88	NRC 59	49.44	109.12	90.24	6.07	31.52	25.99	67.94	7.75	6.82	370.56
89	UPSL 472	51.44	110.12	85.24	3.67	18.92	17.39	97.94	7.79	12.00	560.56
90	EC 456549	50.44	109.12	92.44	3.07	19.92	16.79	43.94	8.61	6.54	292.56
91	PK 1038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	PK 726	45.44	105.12	75.44	0.67	13.52	11.79	45.94	9.75	7.44	263.56
93	SL 443	48.44	107.12	79.64	0.67	17.32	16.19	30.94	9.53	5.53	208.56
94	NRC 42	45.44	106.12	88.24	2.47	22.72	18.59	57.14	9.33	7.44	313.56
95	NRC 2006 M	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	NRC 37	45.44	105.12	50.44	1.47	14.52	13.39	51.94	11.59	9.43	382.56
97	JS 89024	45.44	106.12	81.44	2.47	19.32	17.59	61.94	7.95	8.77	422.56
98	AGS 129	36.44	97.12	55.04	2.87	17.92	16.99	58.94	10.67	6.43	317.56
99	NRC 41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	EC 241780	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

101	PSL 788	49.84	109.12	74.96	3.15	9.84	7.43	38.18	8.92	6.57	270.36
102	UPSL 162	30.84	92.12	89.36	2.75	11.64	8.23	40.18	10.02	7.56	221.36
103	RKS 52	44.84	105.12	60.36	3.15	11.84	7.23	32.98	8.42	5.58	161.36
104	IMP 1	44.84	106.12	72.76	1.75	20.64	17.23	60.18	9.54	7.56	311.36
105	JS 20041	35.84	97.12	54.36	2.15	18.04	15.83	50.18	13.18	7.06	259.36
106	NRC 34	36.84	95.12	51.16	1.35	11.24	9.83	37.78	8.64	6.28	225.36
107	UPSL 72	44.84	106.12	89.36	5.95	20.84	18.03	34.78	7.76	4.57	163.36
108	UPSL 479	44.84	106.12	118.16	0.35	8.84	6.03	34.18	8.74	5.27	191.36
109	NRC 20070103	43.84	105.12	97.16	1.55	20.04	16.23	28.18	8.98	4.39	146.36
110	TNAU 20037	43.84	105.12	91.76	3.95	29.44	20.43	70.18	8.30	7.27	254.36
111	TUNIA	44.84	106.12	65.76	2.35	14.04	11.63	32.58	9.28	5.56	160.36
112	UPSM 57	49.84	110.12	90.56	2.55	17.64	12.23	44.18	9.18	7.84	387.36
113	RKS 21	38.84	100.12	45.96	1.55	16.64	12.63	43.18	11.56	8.17	389.36
114	TNAU 20051	47.84	107.12	80.96	3.95	28.84	21.03	36.58	9.08	5.56	182.36
115	UPSM 783	38.84	100.12	89.36	3.15	18.84	16.23	70.98	6.44	5.56	248.36
116	EC 127503	49.84	117.12	92.36	1.95	15.44	13.03	78.18	8.28	7.18	343.36
117	UPSL 786	49.84	110.12	99.76	1.15	16.44	13.83	35.78	9.06	5.86	160.36
118	RVS 2006022	37.84	98.12	32.76	0.35	8.84	6.23	25.18	12.82	5.47	162.36
119	GP 525	38.84	100.12	101.16	0.75	11.64	10.23	34.38	10.46	6.26	199.36
120	UPSL 415	49.84	110.12	105.56	1.55	16.44	11.83	42.78	7.94	5.08	162.36
121	UPSM 695	49.84	108.12	90.56	2.15	18.84	15.03	47.78	6.74	5.26	201.36
122	JS 790420	43.84	105.12	56.76	2.75	15.24	11.83	45.78	11.50	8.13	411.36
123	UPSM 662	49.84	112.12	18.96	0.55	8.04	7.03	25.98	7.24	5.31	14.36
124	JS 95052	41.84	103.12	36.56	3.35	9.64	8.63	36.38	9.88	6.88	306.36
125	EC 481571	43.84	104.12	66.36	2.15	18.44	15.03	58.18	7.45	6.11	290.36

Table 23: Descriptive statistics for germplasm evaluation at Parbhani

	Minimum	Maximum	Range	Mean	Coeff of Variation
Days to 50 per cent flowering	29.60	57.04	27.44	41.12	14.64
Days to maturity	88.92	117.12	28.2	101.49	5.83
Plant Height	12.16	122.00	109.84	62.33	40.55
Number of primary branches per plant	0.35	8.11	7.76	2.25	55.65
Number of nodes per plant	0.40	33.80	33.40	16.03	35.47
Number of pod clusters per plant	0.13	27.11	26.98	13.14	36.69
Number of pods per plant	14.98	98.34	83.36	45.76	41.03
100 Seed weight	5.64	16.77	11.13	9.68	20.77
Grain yield per plant	1.88	12.00	10.12	6.42	29.20
Row yield	14.36	560.56	546.20	273.08	42.78

Table 24: MLT Germplasm 2020- IMPHAL Adjusted means

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	100 Seed weight	Grain yield per plant	Row yield
Check 1	RKS 113	43.00	107.80	52.60	11.28	23.96	89.40	11.36	16.70	166.55
Check 2	RSC 10-46	44.20	107.20	51.28	10.60	54.04	59.28	12.43	8.32	132.24
Check 3	RVS 2010-1	42.60	106.40	41.40	11.00	25.96	90.48	9.20	14.00	139.15
Check 4	KDS 753	43.40	106.00	50.36	12.76	22.36	74.52	13.98	18.67	251.41
Check 5	MACS 1460	39.80	105.80	43.16	10.68	15.84	64.96	9.44	10.56	100.64
1	AGS 163 B	39.20	97.44	51.32	12.62	45.55	96.73	6.46	14.75	138.15
2	AMSS – 34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	AGS – 56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EC – 251506	49.20	108.44	69.92	11.02	33.75	68.13	7.83	10.32	193.33
5	EC-251531	42.20	107.44	48.12	12.22	21.95	65.53	9.86	8.23	46.26
6	EC 457285	37.20	107.44	37.72	8.62	17.35	40.33	9.38	6.70	38.03
7	EC 251383	44.20	108.44	68.12	13.22	30.35	76.93	9.85	11.46	147.02
8	AMS -59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	AGS-32	39.20	105.44	44.92	12.02	81.75	89.73	5.49	8.07	155.16
10	AGS-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	AMS-195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	BR-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	AMS-25-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	AMS-107	39.20	106.44	24.12	10.02	23.45	57.13	9.22	10.22	0.00
15	EC309512	39.20	105.44	38.72	11.82	28.75	59.53	15.31	24.50	235.49
16	ICS-84/86-85-B-41	44.20	106.44	54.52	14.22	27.75	62.33	9.42	9.25	13.25
17	EC-251682	45.20	105.44	59.52	14.22	37.95	123.73	9.40	12.12	119.26
18	AMS 26A	40.20	103.44	26.12	9.52	16.95	34.63	7.54	5.28	0.00
19	AMS 48-7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	AMS-56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	AMS-MB-51-18	43.20	107.44	24.12	10.62	25.25	63.73	7.48	8.89	0.00
22	AMS-243-7-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	EC-251516	41.20	107.44	35.52	9.42	28.95	76.53	9.75	13.89	147.16
24	AMS-25-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	AGS 99	41.20	106.44	50.12	13.02	47.15	20.93	5.41	12.02	122.08
26	AMS 110	43.60	105.84	30.52	11.02	29.51	84.49	11.86	10.76	74.45
27	AMS 38-24	45.60	102.84	23.52	7.02	21.51	50.49	6.15	9.92	73.46

28	EC 383165	43.60	104.84	34.02	12.52	36.01	112.49	9.76	14.44	88.14
29	EC 333872	41.60	105.84	56.72	12.02	45.91	115.89	11.91	18.56	247.73
30	EC 251470	43.60	106.84	51.72	11.22	34.91	86.89	10.89	13.55	183.11
31	EC 457185	48.60	106.84	57.92	11.42	44.51	146.69	13.31	20.90	249.59
32	EC 393222	55.60	109.84	53.52	12.62	44.91	135.29	10.10	19.42	352.50
33	AMS 60-2-3-4	43.60	105.84	33.02	9.52	35.51	111.49	12.17	24.47	107.29
34	AMS 115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	AGS 164	48.60	102.84	30.72	10.62	15.71	33.69	6.82	6.61	72.86
36	RICUM	43.60	107.84	43.32	13.22	22.51	37.89	7.72	6.65	75.58
37	AGS 371	44.60	104.84	36.92	8.22	22.51	58.29	6.41	8.99	105.60
38	AMS 19B	46.60	105.84	33.52	11.62	24.91	51.89	8.62	8.69	103.34
39	BDS 190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	EC 457214	42.60	107.84	30.12	11.02	20.31	53.09	7.65	7.99	94.69
41	EC 456527	51.60	103.84	65.12	13.22	18.71	45.89	9.81	8.26	101.45
42	UPSL 422	54.60	110.84	92.92	11.22	27.91	72.09	9.43	10.23	123.09
43	EC 389392	56.60	107.84	65.92	12.82	32.71	73.49	10.92	10.03	167.10
44	EC 251827	43.60	110.84	50.32	11.22	19.31	49.09	10.79	7.74	80.54
45	EC 313915	44.60	104.84	47.32	9.62	21.91	43.29	10.50	8.59	106.41
46	EC 309538	49.60	107.84	47.32	13.82	28.91	63.29	11.09	11.49	110.22
47	EC 333897	33.60	104.84	29.72	7.22	21.91	47.29	12.68	8.36	86.10
48	NRC 43	42.60	105.84	71.72	12.22	32.31	82.49	10.40	13.52	160.17
49	EC 39177	48.60	104.84	44.52	11.62	18.91	46.29	8.20	8.26	79.27
50	EC 391162	46.60	106.84	65.52	9.82	39.01	91.99	9.49	24.56	145.90
51	EC 456599	49.60	110.84	45.20	11.58	0.00	58.97	9.85	8.12	113.73
52	NRC 23-20	48.60	103.84	62.40	12.78	0.00	44.37	14.16	9.86	105.03
53	UPSM 780	49.60	103.84	75.80	22.98	0.00	37.17	7.89	9.31	121.33
54	EC 393222	57.60	106.84	91.00	16.98	0.00	229.77	11.12	39.15	367.30
55	ICAL-122	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	JS 75-30	49.60	107.84	54.80	11.38	0.00	48.17	10.77	10.76	293.75
57	SEHORE-1	43.60	104.84	53.20	13.18	0.00	49.77	7.49	7.05	87.38
58	NRC 80-1	42.60	106.84	54.40	13.18	0.00	103.97	10.67	18.01	229.99
59	RVS-2006-4	40.60	109.84	38.80	10.78	0.00	44.57	14.38	9.84	230.28
60	GP-496	40.60	110.84	65.20	10.78	0.00	78.57	10.55	18.35	281.42
61	UPSL 326	53.60	109.84	74.20	12.38	0.00	69.77	8.57	10.01	213.20
62	EC 389170	48.60	106.84	51.80	9.38	0.00	59.37	7.49	8.24	152.60
63	RKS 30	53.60	110.84	60.00	12.78	0.00	47.77	9.49	10.74	185.47
64	UPSL 340	55.60	112.84	84.80	13.18	0.00	74.57	7.74	9.35	134.81

65	EC 171194	48.60	109.84	53.80	8.78	0.00	63.37	18.43	22.46	329.65
66	EC 37939	43.60	104.84	55.20	12.38	0.00	122.97	10.12	14.18	194.83
67	EC 172578	43.60	109.84	44.40	10.78	0.00	54.77	11.74	11.40	131.19
68	UPSL 601	53.60	107.84	91.40	10.58	0.00	99.97	8.43	12.35	176.41
69	EC 389156	55.60	108.84	81.00	13.18	10.99	131.57	6.90	16.58	306.75
70	NRC 57	38.60	106.84	50.40	11.58	0.00	70.37	12.21	18.73	202.27
71	TNAU 20023	56.60	109.84	73.60	12.98	0.00	88.77	8.33	13.23	203.47
72	EC 281462	48.60	104.84	59.40	12.78	0.00	70.57	12.86	16.90	342.03
73	EC 280149	47.60	107.84	33.80	12.98	0.00	78.97	9.12	13.75	101.07
74	PK 1120	38.60	109.84	42.20	10.78	0.00	59.77	12.29	12.26	213.60
75	EC 391012	49.60	110.84	53.60	12.38	0.00	68.17	16.18	13.56	237.68
76	SAL 12	38.00	101.04	44.00	8.94	15.75	26.45	10.49	4.99	119.61
77	NRC 79	54.00	103.04	66.60	15.14	29.15	87.45	7.59	9.37	157.99
78	UPSL 470	52.00	107.04	83.80	10.54	15.35	7.85	7.46	1.34	87.97
79	TNAU 20049	47.00	107.04	72.40	11.74	31.95	72.65	8.26	8.22	202.33
80	JS 20-48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	JS 20-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	AGS 116	48.00	101.04	66.60	11.34	37.75	112.05	9.88	16.04	286.07
83	JS 20-38	35.00	109.04	41.40	9.34	17.95	23.25	8.72	5.52	112.50
84	EC 37183	53.00	113.04	51.10	14.04	32.05	69.65	8.47	11.27	71.34
85	PS 1336	47.00	110.04	64.20	18.34	48.35	154.25	16.47	21.50	406.80
86	TNAU 5-55	47.00	106.04	82.40	14.74	40.75	110.25	8.72	9.99	136.54
87	UPSM 719	55.00	107.04	105.60	13.34	92.75	74.65	13.81	7.44	191.79
88	NRC 59	54.00	101.04	70.60	10.94	12.35	11.45	7.87	-0.41	71.13
89	UPSL 472	53.00	103.04	91.60	11.14	15.55	28.85	5.88	0.73	121.86
90	EC 456549	52.00	103.04	90.20	11.34	25.95	59.85	6.74	4.02	99.05
91	PK 1038	50.00	105.04	62.00	10.14	22.35	32.25	9.64	3.37	135.80
92	PK 726	47.00	106.04	89.60	12.34	39.15	92.85	6.83	22.34	145.03
93	SL 443	52.00	104.04	73.00	16.34	54.35	178.15	8.94	18.15	227.76
94	NRC 42	52.00	105.04	70.40	14.34	33.55	90.65	8.50	9.20	149.31
95	NRC 2006 M	44.00	107.04	51.80	10.34	34.15	105.25	12.94	21.11	255.50
96	NRC 37	42.00	103.04	61.40	14.34	54.75	127.25	8.20	15.78	230.43
97	JS 89-24	53.00	106.04	73.20	13.94	42.15	122.05	8.20	15.78	230.43
98	AGS 129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	NRC 41	39.00	101.04	47.40	10.14	30.35	58.25	11.51	11.54	171.77
100	EC 241780	52.00	107.04	73.40	13.54	25.35	56.05	11.37	10.07	382.19
101	PSL 788	51.60	112.84	74.56	14.82	42.79	136.77	6.67	17.05	66.69

102	UPSL 162	51.60	113.84	91.96	16.02	55.19	163.97	9.09	15.36	139.36
103	RKS 52	47.60	112.84	52.96	13.42	29.79	81.37	10.54	14.65	128.78
104	IMP 1	50.60	115.84	67.96	13.42	34.59	110.77	11.34	20.16	143.52
105	JS 20-41	36.60	103.84	45.96	94.62	25.39	64.57	12.02	15.82	160.60
106	NRC 34	50.60	109.84	37.36	10.42	13.59	17.97	6.40	4.97	16.51
107	UPSL 72	52.60	112.84	54.76	9.22	12.99	26.37	7.87	5.66	33.84
108	UPSL 479	50.60	109.84	49.56	10.22	15.79	22.97	10.32	4.50	24.52
109	NRC 2007-1-3	50.60	113.84	38.96	11.62	14.99	27.97	7.43	5.50	5.43
110	TNAU 20037	51.60	114.84	33.36	10.42	21.99	20.77	5.85	4.80	0.00
111	TUNIA	46.60	108.84	33.16	12.02	13.79	20.57	6.37	4.49	0.00
112	UPSM 57	49.60	112.84	53.56	11.82	15.59	29.37	8.27	5.72	41.27
113	RKS 21	42.60	103.84	27.76	11.82	13.79	28.97	7.73	6.02	15.15
114	TNAU 20051	46.60	108.84	51.56	11.42	17.99	39.97	8.15	6.14	55.66
115	UPSM 783	52.60	114.84	49.96	9.22	18.19	33.77	7.19	6.21	53.76
116	EC 127503	55.60	115.84	52.36	11.22	27.59	73.17	7.22	8.88	52.21
117	UPSL 786	47.60	105.84	61.36	14.82	18.99	33.37	8.35	6.72	46.66
118	RVS 2006-22	45.60	104.84	27.96	11.62	21.99	42.57	9.33	7.76	36.53
119	GP 525	48.60	109.84	40.16	11.02	20.99	42.97	8.49	8.56	68.91
120	UPSL 415	49.60	108.84	74.96	12.22	22.99	50.37	9.58	8.57	133.35
121	UPSM 695	49.60	108.84	65.96	10.42	23.19	45.57	8.79	6.34	81.90
122	JS 79-420	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
123	UPSM 662	49.60	109.84	69.16	7.82	25.19	67.97	8.61	11.31	168.61
124	JS 95-52	43.60	109.84	34.36	9.82	18.59	34.57	12.32	6.26	81.36
125	EC 481571	43.60	107.84	50.36	15.02	36.59	80.37	9.81	8.71	86.25

Table 25: Descriptive statistics for germplasm evaluation at IMPHAL

Character	**Minimum**	**Maximum**	**Range**	**Mean**	**Coeff of Variation**
Days to 50 per cent flowering	33.6	57.6	24	46.89	11.4
Days to maturity	97.44	115.84	18.4	107.38	3.14
Plant Height	23.52	105.6	82.08	55.27	32.55
Number of nodes per plant	7.02	94.62	87.6	12.64	64.3
Number of pod clusters per plant	10.99	92.75	81.76	29.16	48.23
Number of pods per plant	7.85	229.77	221.92	70.2	53.61
100 Seed weight	5.41	18.43	13.02	9.61	25.43
Grain yield per plant	0.73	39.15	38.41	11.52	50.72
Row yield	5.43	406.8	401.37	146.94	58.58

Table 26: MLT Germplasm 2020- Almora Adjusted means

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height	Plant Dry weight	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	100 Seed weight	Grain yield per plant	Row yield
Check 1	VLS 59	49.00	102.60	47.40	22.48	5.20	15.20	49.00	11.63	9.87	243.62
Check 2	VLS 63	50.00	107.40	48.40	26.29	6.40	23.00	61.80	12.33	14.31	280.72
Check 3	PS 1556	52.20	113.20	60.60	21.09	6.00	20.80	56.00	10.19	8.35	218.65
Check 4	Himso 1685	50.60	109.00	61.00	21.90	4.80	16.60	42.60	15.54	11.02	229.76
Check 5	Hara Soya	46.80	105.00	57.40	28.52	6.00	23.40	59.60	13.32	12.61	201.02
1	AGS 163 B	50.72	98.44	43.76	6.52	14.28	42.40	89.80	8.73	2.48	0.00
2	AMSS - 34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	AGS - 56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EC - 251506	67.72	116.44	100.76	9.69	5.28	34.40	91.80	8.24	2.02	220.72
5	EC-251531	56.72	115.44	59.76	22.08	9.28	23.40	53.80	11.67	2.90	207.36
6	EC 457285	53.72	114.44	76.76	30.68	15.28	35.40	70.80	11.48	14.74	312.89
7	EC 251383	61.72	114.44	135.76	23.20	4.28	47.40	129.80	8.81	10.84	236.18
8	AMS -59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	AGS-32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	AGS-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	AMS-195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	BR-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	AMS-25-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	AMS-107	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	EC309512	56.72	108.44	39.76	16.70	7.28	31.40	80.80	12.48	4.43	0.00
16	ICS-84/86-85-B-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	EC-251682	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	AMS 26A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	AMS 48-7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	AMS-56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	AMS-MB-51-18	56.72	108.44	54.76	23.05	6.28	27.40	51.80	9.35	7.84	110.19
22	AMS-243-7-3	61.72	108.44	44.76	19.02	5.28	25.40	42.80	10.96	7.13	0.00
23	EC-251516	55.72	101.44	46.76	15.21	6.28	26.40	61.80	11.90	7.18	140.19
24	AMS-25-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

25	AGS 99	59.72	108.44	70.76	9.45	8.28	60.40	116.80	7.55	2.01	90.68
26	AMS 110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	AMS 38-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	EC 383165	54.32	111.44	37.56	31.41	5.08	31.20	76.00	10.84	14.77	283.56
29	EC 333872	58.32	108.44	45.56	32.41	6.08	32.20	51.00	10.55	15.89	174.94
30	EC 251470	58.32	111.44	61.56	38.98	8.08	42.20	82.00	9.99	17.01	170.28
31	EC 457185	59.32	114.44	70.56	29.11	5.08	25.20	78.00	11.06	10.42	100.53
32	EC 393222	62.32	125.44	72.56	10.10	8.08	48.20	87.00	6.63	4.97	4.18
33	AMS 60-2-3-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	AMS 115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	AGS 164	59.32	111.44	60.56	30.32	9.08	22.20	66.00	9.98	12.11	125.58
36	RICUM	59.32	108.44	76.56	60.61	7.08	34.20	88.00	10.79	24.53	223.85
37	AGS 371	54.32	108.44	64.56	31.90	5.08	30.20	97.00	6.82	14.82	377.72
38	AMS 19B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	BDS 190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	EC 457214	54.32	111.44	52.56	30.67	8.08	28.20	50.00	10.06	12.09	159.52
41	EC 456527	62.32	116.44	101.56	18.14	3.08	23.20	46.00	9.11	6.70	103.35
42	UPSL 422	65.32	116.44	141.56	20.95	6.08	33.20	52.00	8.44	4.41	96.48
43	EC 389392	54.32	125.44	109.56	19.27	7.08	58.20	141.00	9.54	9.16	50.74
44	EC 251827	54.32	108.44	78.56	36.38	5.08	29.20	58.00	10.75	15.11	183.58
45	EC 313915	54.32	102.44	56.56	29.19	6.08	44.20	102.00	8.40	16.76	169.54
46	EC 309538	52.32	108.44	50.56	30.87	4.08	25.20	55.00	11.75	11.83	161.76
47	EC 333897	39.32	79.44	27.56	14.20	8.08	10.20	13.00	10.81	7.68	0.00
48	NRC 43	59.32	114.44	123.56	21.61	8.08	54.20	119.00	10.34	11.37	172.36
49	EC 39177	59.32	111.44	65.56	19.84	4.08	27.20	59.00	10.26	9.38	56.40
50	EC 391162	54.32	111.44	100.56	27.70	4.08	29.20	62.00	11.24	9.54	242.89
51	EC 456599	62.32	125.64	108.76	7.43	6.48	35.80	75.40	5.79	2.17	186.39
52	NRC 23-20	47.32	101.64	67.76	13.18	5.48	23.80	57.40	8.37	6.45	250.21
53	UPSM 780	62.32	116.64	129.76	24.26	6.48	27.80	60.40	10.16	6.20	299.46
54	EC 393222	65.32	125.64	105.76	13.30	8.48	48.80	115.40	6.07	8.69	165.95
55	ICAL-122	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	JS 75-30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
57	SEHORE-1	54.32	104.64	85.76	33.51	7.48	29.80	110.40	8.03	11.82	64.34
58	NRC 80-1	59.32	102.64	36.76	4.41	5.48	10.80	17.40	0.00	2.25	45.62
59	RVS-2006-4	54.32	107.64	29.76	3.65	3.48	7.80	16.40	0.00	1.01	35.90
60	GP-496	53.32	108.64	81.76	27.13	6.48	33.80	75.40	10.28	9.58	119.62
61	UPSL 326	62.32	116.64	92.76	30.47	8.48	53.80	120.40	7.44	7.77	164.18

62	EC 389170	59.32	111.64	57.76	18.42	6.48	41.80	97.40	4.57	6.76	160.14
63	RKS 30	59.32	111.64	66.76	19.01	6.48	23.80	58.40	8.87	7.33	179.87
64	UPSL 340	66.32	121.64	80.76	8.48	5.48	27.80	60.40	5.16	2.71	92.01
65	EC 171194	54.32	108.64	56.76	18.46	3.48	18.80	46.40	13.97	5.98	107.81
66	EC 37939	59.32	108.64	70.76	18.90	5.48	26.80	74.40	10.53	7.84	273.39
67	EC 172578	54.32	114.64	55.76	16.03	7.48	33.80	77.40	12.94	11.52	257.42
68	UPSL 601	65.32	121.64	113.76	19.19	8.48	29.80	66.40	8.07	10.44	395.18
69	EC 389156	65.32	119.64	103.76	7.65	6.48	30.80	69.40	5.37	3.33	143.87
70	NRC 57	53.32	102.64	57.76	18.34	3.48	17.80	55.40	9.90	8.22	179.54
71	TNAU 20023	59.32	108.64	83.76	20.88	6.48	35.80	80.40	11.85	8.45	265.22
72	EC 281462	59.32	111.64	73.76	14.87	3.48	19.80	56.40	8.61	6.39	274.04
73	EC 280149	59.32	111.64	59.76	40.39	6.48	36.80	123.40	8.79	18.09	208.15
74	PK 1120	51.32	108.64	57.76	32.96	4.48	28.80	68.40	11.62	12.60	277.66
75	EC 391012	47.32	104.64	76.76	15.10	3.48	21.80	59.40	11.82	4.66	125.86
76	SAL 12	48.52	109.64	53.96	13.25	5.88	20.80	63.60	10.37	15.85	187.70
77	NRC 79	60.52	118.64	90.96	12.84	5.88	25.80	61.60	9.03	6.74	145.37
78	UPSL 470	66.52	121.64	84.96	42.92	7.88	26.80	63.60	8.02	7.48	46.59
79	TNAU 20049	60.52	113.64	104.96	25.82	7.88	32.80	78.60	10.27	16.53	298.74
80	JS 20-48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	JS 20-41	55.52	109.64	56.96	33.28	5.88	23.80	61.60	10.19	11.66	274.11
82	AGS 116	60.52	113.64	96.96	33.28	4.88	17.80	59.60	9.99	12.74	264.37
83	JS 20-38	44.52	95.64	34.96	18.00	4.88	13.80	45.60	11.01	9.02	162.20
84	EC 37183	69.52	121.64	62.96	8.50	5.88	21.80	49.60	0.47	3.52	34.69
85	PS 1336	52.52	113.64	84.96	40.09	7.88	35.80	91.60	14.20	15.94	281.96
86	TNAU 5-55	60.52	113.64	105.96	29.58	7.88	41.80	94.60	9.93	12.09	253.42
87	UPSM 719	63.52	118.64	88.96	14.15	4.88	18.80	51.60	6.20	3.80	146.55
88	NRC 59	63.52	113.64	79.96	6.11	4.88	18.80	41.60	4.41	2.19	129.70
89	UPSL 472	69.52	123.64	75.96	9.83	7.88	34.80	67.60	5.03	6.14	190.56
90	EC 456549	66.52	118.64	79.96	14.46	5.88	17.80	54.60	8.34	7.93	181.94
91	PK 1038	60.52	113.64	100.96	17.16	7.88	37.80	88.60	8.04	5.86	192.72
92	PK 726	60.52	113.64	114.96	19.77	6.88	35.80	96.60	8.24	8.61	217.96
93	SL 443	60.52	113.64	100.96	25.37	7.88	39.80	104.60	7.67	6.96	243.03
94	NRC 42	60.52	113.64	103.96	14.13	8.88	31.80	68.60	8.34	5.17	191.66
95	NRC 2006 M	55.52	113.64	64.96	13.68	5.88	20.80	73.60	9.89	6.35	237.20
96	NRC 37	55.52	110.64	71.96	20.63	6.88	29.80	58.60	9.91	10.27	165.96
97	JS 89-24	60.52	113.64	89.96	31.34	8.88	49.80	113.60	7.77	12.87	291.74
98	AGS 129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

99	NRC 41	55.52	108.64	58.96	22.34	5.88	17.80	48.60	12.26	9.80	198.55
100	EC 241780	63.52	106.64	72.96	15.61	6.88	20.80	56.60	10.55	5.67	151.16
101	PSL 788	62.12	116.84	85.96	28.27	9.28	45.80	100.20	6.34	9.90	209.68
102	UPSL 162	72.12	125.84	105.96	11.40	7.28	35.80	80.20	3.55	2.92	190.85
103	RKS 52	54.12	116.84	89.96	22.04	5.28	27.80	74.20	5.84	10.05	282.22
104	IMP 1	59.12	111.84	71.96	59.17	10.28	62.80	177.20	7.59	26.03	122.18
105	JS 20-41	54.12	101.84	94.96	17.51	7.28	21.80	51.20	7.36	7.93	207.86
106	NRC 34	59.12	111.84	49.96	18.50	7.28	28.80	79.20	6.03	6.24	308.80
107	UPSL 72	62.12	114.84	100.96	12.10	7.28	27.80	64.20	4.68	4.75	199.34
108	UPSL 479	65.12	116.84	109.96	19.16	5.28	26.80	63.20	6.56	9.83	305.58
109	NRC 2007-1-3	59.12	111.84	108.96	27.66	8.28	43.80	96.20	5.24	9.31	258.01
110	TNAU 20037	59.12	111.84	119.96	14.98	6.28	25.80	61.20	5.88	5.98	272.02
111	TUNIA	59.12	111.84	100.96	22.62	8.28	43.80	96.20	7.08	8.01	198.11
112	UPSM 57	62.12	116.84	83.96	25.11	6.28	25.80	78.20	6.87	9.65	212.02
113	RKS 21	54.12	113.84	96.96	32.74	5.28	27.80	94.20	7.93	12.78	288.42
114	TNAU 20051	59.12	116.84	71.96	29.82	8.28	50.80	118.20	6.19	9.14	162.49
115	UPSM 783	70.12	116.84	102.96	21.84	7.28	34.80	70.20	5.93	8.50	212.59
116	EC 127503	67.12	119.84	87.96	18.02	7.28	41.80	123.20	4.57	7.82	185.54
117	UPSL 786	65.12	116.84	92.96	32.24	9.28	45.80	139.20	16.52	10.68	226.13
118	RVS 2006-22	52.12	104.84	43.96	22.96	8.28	28.80	75.20	8.69	9.86	223.65
119	GP 525	59.12	107.84	67.96	19.18	6.28	24.80	55.20	14.09	7.39	251.26
120	UPSL 415	65.12	116.84	93.96	30.15	7.28	36.80	77.20	7.10	9.00	232.09
121	UPSM 695	65.12	116.84	107.96	23.51	6.28	43.80	102.20	6.37	9.75	184.34
122	JS 79-420	54.12	107.84	64.96	19.21	5.28	31.80	69.20	8.92	7.39	190.26
123	UPSM 662	62.12	116.84	78.96	23.51	7.28	37.80	84.20	7.65	10.64	208.01
124	JS 95-52	54.12	104.84	59.96	26.28	8.28	32.80	71.20	9.22	10.65	220.04
125	EC 481571	45.12	91.84	60.96	17.55	4.28	21.80	58.20	9.92	6.29	176.96

Table 27: Descriptive statistics for germplasm evaluation at ALMORA

Character	**Minimum**	**Maximum**	**Range**	**Mean**	**Coeff of Variation**
Days to 50 per cent flowering	39.32	72.12	32.80	58.23	10.21
Days to maturity	79.44	125.84	46.4	111.88	6.36
Plant Height	27.56	141.56	114.00	77.50	31.69
Pod dry weight	3.65	60.61	56.96	22.22	44.97
Number of nodes per plant	3.08	15.28	12.20	6.64	28.99
Number of pod clusters per plant	7.8	62.8	55	31.03	35.32
Number of pods per plant	13.00	177.20	164.20	74.64	36.18
100 Seed weight	0.47	16.52	16.06	8.99	29.94
Grain yield per plant	1.01	26.03	25.02	9.05	49.16
Row yield	4.18	395.18	390.99	194.43	38.57

Table 28: MLT Germplasm 2020- PANTNAGAR Adjusted means

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height	Number of nodes per plant	Number of pods per plant	100 Seed weight	Grain yield per plant	Row yield	Reaction to diseases (1-9 scale)		
										YMV	CR	RAB
Check 1	SL 958	54.00	120.00	96.40	22.00	71.00	8.79	2.10	163.00	1	1	3
Check 2	SL 955	60.00	123.00	45.72	17.00	42.00	7.75	2.10	75.00	1	1	7
Check 3	PS 1572	58.00	120.00	38.93	14.00	23.00	7.26	2.10	83.00	1	1	3
Check 4	PS 24	50.00	120.00	55.86	12.00	57.00	9.10	1.90	178.00	1	1	3
Check 5	PS 1347	54.00	120.00	49.10	14.00	47.00	9.62	2.10	162.00	1	1	3
1	AGS 163 B	40.00	107.00	51.80	15.60	42.80	4.12	2.20	30.00	1	1	3
2	AMSS - 34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
3	AGS - 56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
4	EC - 251506	64.00	122.00	140.80	28.20	75.00	7.41	2.20	260.00	1	1	3
5	EC-251531	61.00	122.00	93.60	21.60	77.00	7.92	2.10	90.00	1	1	3
6	EC 457285	47.00	122.00	75.80	15.80	56.00	9.02	2.10	130.00	1	1	3
7	EC 251383	55.00	114.00	113.80	21.00	94.00	7.88	2.10	230.00	5	1	5
8	AMS -59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
9	AGS-32	42.00	107.00	80.60	18.60	23.80	4.57	2.10	70.00	1	1	9
10	AGS-2	63.00	115.00	94.00	22.00	125.00	5.60	2.10	25.00	1	1	5
11	AMS-195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
12	BR-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
13	AMS-25-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
14	AMS-107	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
15	EC309512	52.00	118.00	68.60	17.60	66.60	8.70	2.00	90.00	5	1	5
16	ICS-84/86-85-B-41	35.00	113.00	123.20	23.00	50.60	8.39	1.90	60.00	1	1	7
17	EC-251682	57.00	115.00	86.00	24.20	89.00	7.51	2.10	230.00	1	1	7
18	AMS 26A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
19	AMS 48-7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
20	AMS-56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
21	AMS-MB-51-18	55.00	110.00	80.20	22.20	88.80	7.55	2.00	300.00	1	1	9
22	AMS-243-7-3	56.00	110.00	61.80	18.20	68.60	8.24	2.00	25.00	1	1	5
23	EC-251516	47.00	117.00	61.60	16.40	29.80	10.59	1.80	50.00	1	1	9
24	AMS-25-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
25	AGS 99	60.00	110.00	87.00	23.80	117.80	5.30	2.10	290.00	7	1	7
26	AMS 110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

27	AMS 38-24	47.00	116.00	70.00	17.00	50.00	11.78	1.80	35.00	1	1	9
28	EC 383165	47.00	110.00	67.00	21.00	84.00	7.11	1.80	160.00	1	1	7
29	EC 333872	56.00	109.00	89.00	21.00	84.40	6.17	2.10	65.00	1	1	7
30	EC 251470	55.00	108.00	100.00	23.00	77.00	5.18	2.00	110.00	1	1	5
31	EC 457185	51.00	110.00	107.40	21.00	68.40	7.43	2.00	120.00	1	7	5
32	EC 393222	47.00	110.00	122.80	35.00	58.00	9.96	2.10	450.00	1	1	5
33	AMS 60-2-3-4	44.00	116.00	85.50	21.00	22.50	2.53	2.20	20.00	1	1	7
34	AMS 115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
35	AGS 164	55.00	110.00	87.80	22.00	73.20	6.54	2.20	215.00	1	1	7
36	RICUM	56.00	110.00	100.60	22.00	52.40	7.12	2.10	235.00	1	1	7
37	AGS 371	47.00	110.00	86.80	23.00	62.00	2.57	2.20	165.00	1	1	9
38	AMS 19B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
39	BDS 190	57.00	116.00	73.75	21.00	73.00	6.94	2.20	50.00	1	1	9
40	EC 457214	51.00	115.00	75.80	21.00	73.00	3.75	2.00	125.00	1	1	7
41	EC 456527	62.00	128.00	149.60	17.00	75.20	8.15	2.10	185.00	1	1	7
42	UPSL 422	57.00	125.00	132.20	21.00	71.20	7.43	2.20	200.00	1	1	7
43	EC 389392	45.00	124.00	104.40	19.00	52.20	9.96	2.00	110.00	1	1	5
44	EC 251827	56.00	114.00	98.20	20.00	72.40	7.24	2.20	220.00	1	1	7
45	EC 313915	57.00	114.00	65.00	18.00	74.00	7.63	2.00	150.00	1	7	7
46	EC 309538	51.00	114.00	41.80	16.20	51.20	7.72	2.20	55.00	1	1	7
47	EC 333897	31.00	100.00	37.20	8.80	16.00	0.00	0.00	0.00	1	1	9
48	NRC 43	52.00	108.00	128.40	22.80	70.40	7.73	2.00	100.00	7	5	5
49	EC 39177	60.00	115.00	88.60	19.20	62.00	7.10	2.00	65.00	1	1	7
50	EC 391162	56.00	115.00	85.00	19.20	62.80	7.66	2.00	95.00	7	1	7
51	EC 456599	60.00	116.00	129.00	20.40	82.80	4.69	2.00	145.00	1	1	3
52	NRC 23-20	50.00	118.00	92.00	18.00	25.00	9.80	1.70	50.00	1	1	7
53	UPSM 780	63.00	123.00	142.00	18.80	46.20	7.68	2.20	75.00	7	1	3
54	EC 393222	60.00	124.00	106.60	20.80	70.60	7.84	2.20	135.00	1	1	3
55	ICAL-122	62.00	124.00	73.00	19.00	80.00	7.74	1.80	110.00	1	1	3
56	JS 75-30	57.00	116.00	108.20	19.80	57.20	8.14	2.20	200.00	5	1	5
57	SEHORE-1	52.00	108.00	108.20	19.60	62.25	7.49	2.10	65.00	1	1	7
58	NRC 80-1	52.00	110.00	98.20	17.80	76.40	8.08	1.70	105.00	1	1	5
59	RVS-2006-4	47.00	120.00	64.75	17.00	44.60	10.51	1.60	115.00	1	1	7
60	GP-496	47.00	126.00	80.00	17.80	65.60	8.83	2.10	180.00	1	9	3
61	UPSL 326	62.00	125.00	142.20	22.40	61.00	7.70	2.00	200.00	1	1	3
62	EC 389170	59.00	124.00	83.00	18.40	63.40	5.05	2.10	45.00	1	1	7
63	RKS 30	63.00	124.00	88.20	18.60	57.40	6.42	1.90	80.00	7	1	7

64	UPSL 340	57.00	116.00	89.20	18.80	76.00	6.56	2.30	185.00	5	1	5
65	EC 171194	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
66	EC 37939	56.00	112.00	83.20	19.60	73.20	8.20	2.20	190.00	1	1	7
67	EC 172578	56.00	118.00	81.40	19.20	79.00	10.83	2.30	170.00	1	1	5
68	UPSL 601	66.00	114.00	128.20	20.40	59.00	6.92	1.90	190.00	9	1	3
69	EC 389156	61.00	110.00	131.60	21.60	51.00	5.05	2.00	153.00	7	1	5
70	NRC 57	47.00	110.00	100.40	18.40	49.40	8.62	1.80	50.00	9	1	7
71	TNAU 20023	52.00	110.00	110.00	19.20	55.20	6.02	1.80	70.00	5	7	7
72	EC 281462	57.00	114.00	115.40	18.60	61.00	7.74	2.10	95.00	5	1	5
73	EC 280149	55.00	108.00	78.80	19.80	54.00	6.88	2.10	50.00	5	1	5
74	PK 1120	56.00	116.00	72.80	17.80	54.80	8.64	2.10	255.00	1	1	1
75	EC 391012	45.00	110.00	107.20	20.80	52.00	9.18	1.80	85.00	1	1	5
76	SAL 12	50.00	118.00	86.40	18.00	56.60	7.36	2.10	115.00	1	1	3
77	NRC 79	53.00	110.00	180.40	22.20	61.00	6.13	2.10	80.00	5	1	3
78	UPSL 470	57.00	122.00	141.40	18.80	58.80	7.32	2.20	230.00	1	1	3
79	TNAU 20049	55.00	107.00	131.60	20.20	62.00	7.05	2.00	100.00	5	1	7
80	JS 20-48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
81	JS 20-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
82	AGS 116	60.00	107.00	143.00	20.60	18.40	8.31	2.10	55.00	5	1	9
83	JS 20-38	45.00	117.00	44.40	16.00	42.80	8.34	2.00	45.00	1	1	9
84	EC 37183	49.00	110.00	97.60	18.80	25.40	7.57	1.80	30.00	1	1	9
85	PS 1336	47.00	115.00	87.20	18.40	35.80	10.58	1.70	65.00	1	1	9
86	TNAU 5-55	55.00	123.00	115.60	18.60	24.00	7.74	1.80	40.00	1	1	7
87	UPSM 719	58.00	122.00	115.60	18.40	32.40	6.38	2.00	45.00	1	1	9
88	NRC 59	64.00	122.00	108.00	17.60	48.00	7.30	2.10	95.00	1	1	3
89	UPSL 472	64.00	127.00	117.20	22.60	42.00	4.98	2.00	45.00	1	1	7
90	EC 456549	66.00	125.00	126.00	25.00	62.50	7.80	2.00	210.00	1	1	3
91	PK 1038	57.00	111.00	135.20	22.20	77.20	7.55	1.90	85.00	1	1	7
92	PK 726	58.00	111.00	86.60	17.20	30.00	7.44	2.20	75.00	1	1	7
93	SL 443	55.00	108.00	111.60	18.00	50.60	8.09	1.80	70.00	1	7	5
94	NRC 42	53.00	108.00	102.80	19.60	45.60	6.88	2.00	30.00	1	5	9
95	NRC 2006 M	54.00	110.00	81.00	17.00	37.20	8.50	1.80	40.00	7	1	9
96	NRC 37	52.00	108.00	90.20	17.60	42.00	7.50	2.10	35.00	7	1	9
97	JS 89-24	56.00	108.00	87.80	19.80	67.80	6.79	2.20	75.00	1	5	7
98	AGS 129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
99	NRC 41	51.00	117.00	77.80	17.80	65.20	9.66	1.90	145.00	7	1	9
100	EC 241780	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

101	PSL 788	66.00	124.00	111.40	25.00	66.00	7.33	2.20	120.00	7	1	9
102	UPSL 162	68.00	125.00	116.80	22.40	55.60	6.23	2.20	125.00	7	1	9
103	RKS 52	55.00	123.00	83.60	17.20	52.40	8.82	1.80	40.00	7	1	9
104	IMP 1	56.00	118.00	111.60	23.40	91.60	8.94	2.10	170.00	7	1	9
105	JS 20-41	46.00	119.00	92.40	19.60	26.40	10.81	2.00	40.00	7	1	9
106	NRC 34	56.00	124.00	127.60	20.40	44.00	8.00	2.20	80.00	5	1	5
107	UPSL 72	66.00	122.00	140.40	18.40	61.20	6.44	1.70	190.00	1	1	3
108	UPSL 479	61.00	119.00	106.20	22.40	55.20	6.50	2.20	190.00	7	1	5
109	NRC 2007-1-3	53.00	114.00	136.80	25.00	49.80	7.38	2.00	60.00	7	1	5
110	TNAU 20037	56.00	117.00	140.75	21.40	56.40	6.98	1.80	65.00	7	1	5
111	TUNIA	61.00	124.00	120.80	22.60	54.60	6.59	2.00	45.00	5	1	5
112	UPSM 57	67.00	124.00	155.80	24.40	50.80	7.93	2.20	200.00	5	1	3
113	RKS 21	51.00	112.00	80.20	18.40	59.00	7.69	2.20	110.00	5	1	3
114	TNAU 20051	56.00	110.00	82.60	19.00	64.80	6.54	1.80	60.00	7	1	3
115	UPSM 783	59.00	117.00	87.80	19.00	58.60	5.72	2.20	110.00	5	1	3
116	EC 127503	60.00	118.00	87.00	20.20	73.00	4.48	2.20	190.00	7	1	3
117	UPSL 786	67.00	125.00	96.00	24.40	68.20	6.68	2.00	125.00	9	1	3
118	RVS 2006-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
119	GP 525	55.00	126.00	121.60	21.60	61.00	7.60	2.00	140.00	7	1	3
120	UPSL 415	61.00	126.00	139.80	22.40	58.20	7.71	2.20	130.00	1	1	3
121	UPSM 695	58.00	125.00	135.40	23.80	61.00	6.55	2.00	200.00	1	1	3
122	JS 79-420	57.00	115.00	115.00	14.80	26.80	7.96	1.80	35.00	1	1	7
123	UPSM 662	60.00	124.00	164.80	23.80	49.40	7.86	1.80	170.00	5	1	3
124	JS 95-52	55.00	116.00	92.80	18.40	69.20	7.05	2.00	360.00	1	1	3
125	EC 481571	45.00	118.00	81.00	18.00	29.00	5.22	1.80	50.00	5	1	9

Table 29: Descriptive statistics for germplasm evaluation at PANTNAGAR

Character	Minimum	Maximum	Range	Mean	Coeff of Variation
Days to 50 per cent flowering	31	68	37	54.96	12.19
Days to maturity	100	128	28	116.26	5.32
Plant Height	37.2	180.4	143.2	99.19	28.74
Number of nodes per plant	8.8	35	26.2	19.9	16.16
Number of pods per plant	16	125	109	58.32	32.87
100 Seed weight	2.53	11.78	9.25	7.43	21.75
Grain yield per plant	1.6	2.3	0.7	2.02	7.73
Row yield	20	450	430	120.95	64.33

Table 30 MLT 2020 Germplasm- Jabalpur Adjusted means

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	100 Seed weight	Grain yield per plant	Row yield	Disease Reactions		
											YMV	CR	RAB
Check 1	NRC 86	42.00	104.00	53.60	10.60	5.70	40.60	9.40	9.30	70.00	MR	MS	MS
Check 2	JS 20-34	34.00	91.00	45.00	10.00	3.50	30.10	8.90	5.40	56.00	MR	AR	MS
Check 3	JS 20-29	42.00	99.00	53.30	10.30	5.40	29.20	10.50	7.20	40.00	HR	S	MS
Check 4	JS 20-69	41.00	104.00	53.60	11.60	4.90	30.90	10.60	7.60	60.00	HR	MR	MR
Check 5	JS 20-98	43.00	104.00	69.00	12.30	5.10	35.70	9.90	7.90	80.00	HR	AR	MR
1	AGS 163 B	40.00	96.00	60.60	12.30	11.30	50.00	11.7	11.00	100.00	MS	MR	MS
2	AMSS - 34	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	S
3	AGS - 56	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
4	EC - 251506	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
5	EC-251531	53.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MS
6	EC 457285	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
7	EC 251383	44.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
8	AMS -59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
9	AGS-32	39.00	94.00	58.00	11.66	13.20	55.60	3.7	5.30	50.00	MS	S	MS
10	AGS-2	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	S	S	MS
11	AMS-195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
12	BR-7	43.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
13	AMS-25-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
14	AMS-107	38.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	S
15	EC309512	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
16	ICS-84/86-85-B-41	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
17	EC-251682	52.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MR
18	AMS 26A	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
19	AMS 48-7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
20	AMS-56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
21	AMS-MB-51-18	45.00	93.00	49.00	13.00	9.30	21.60	6.00	3.40	40.00	MS	MS	MS
22	AMS-243-7-3	45.00	94.00	63.30	11.00	8.60	28.30	5.10	3.80	30.00	MS	MS	MR
23	EC-251516	41.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
24	AMS-25-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

25	AGS 99	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MR
26	AMS 110	34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	S
27	AMS 38-24	35.00	100.00	58.60	10.30	9.50	72.30	9.40	12.30	35.00	MR	MR	MS
28	EC 383165	61.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	S	MS
29	EC 333872	43.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
30	EC 251470	43.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
31	EC 457185	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MS	HS	MR
32	EC 393222	58.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
33	AMS 60-2-3-4	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
34	AMS 115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
35	AGS 164	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	S
36	RICUM	43.00	96	44.50	9.30	6.60	18.30	5.50	3.80	25.00	HR	HS	MR
37	AGS 371	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MS	HS	S
38	AMS 19B	41.00	97.00	50.70	11.00	7.30	27.60	5.20	4.80	30.00	MS	S	MR
39	BDS 190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
40	EC 457214	42.00	95.00	56.30	11.30	7.30	20.60	4.90	2.30	28.00	MS	S	MR
41	EC 456527	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
42	UPSL 422	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	S
43	EC 389392	41.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
44	EC 251827	44.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MS
45	EC 313915	44.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
46	EC 309538	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MS	HS	MR
47	EC 333897	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
48	NRC 43	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	S
49	EC 39177	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
50	EC 391162	43.00	106.00	58.30	9.30	4.30	10.60	5.00	1.20	46.00	MR	S	MR
51	EC 456599	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
52	NRC 23-20	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
53	UPSM 780	58.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
54	EC 393222	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
55	ICAL-122	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
56	JS 75-30	43.00	102	69.00	12.60	8.30	67.00	6.50	10.30	42.00	R	HS	MR
57	SEHORE-1	42.00	104.00	74.60	14.30	8.60	55.40	6.20	8.30	50.00	HR	S	MR
58	NRC 80-1	43.00	104.00	68.00	12.30	7.20	73.30	5.30	10.70	38.00	MS	S	MR
59	RVS-2006-4	35.00	103.00	61.60	11.00	8.30	42.00	7.40	7.20	30.00	MR	MR	S
60	GP-496	57.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
61	UPSL 326	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MR

62	EC 389170	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	S
63	RKS 30	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	S
64	UPSL 340	42.00	104	55.90	11.00	6.20	34.60	7.50	5.70	70.00	R	MS	MR
65	EC 171194	43.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
66	EC 37939	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	S
67	EC 172578	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
68	UPSL 601	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	S	S
69	EC 389156	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	S	S
70	NRC 57	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	MS	S
71	TNAU 20023	44.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
72	EC 281462	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
73	EC 280149	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
74	PK 1120	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MR
75	EC 391012	41.00	95.00	65.60	15.30	9.20	38.60	7.50	7.80	50.00	HR	MR	MS
76	SAL 12	43.00	109.00	44.60	9.00	6.20	27.30	6.00	4.20	60.00	HR	MS	MS
77	NRC 79	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
78	UPSL 470	55.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MS
79	TNAU 20049	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MR
80	JS 20-48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
81	JS 20-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
82	AGS 116	52.00	111	68.30	12.00	5.30	40.30	6.60	6.40	68.00	HR	HS	MS
83	JS 20-38	34.00	97.00	47.20	9.30	6.30	30.30	6.80	5.00	50.00	MR	AR	MS
84	EC 37183	57.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MS
85	PS 1336	41.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
86	TNAU 5-55	43.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MR
87	UPSM 719	58.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
88	NRC 59	55.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
89	UPSL 472	57.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
90	EC 456549	55.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
91	PK 1038	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
92	PK 726	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
93	SL 443	49.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
94	NRC 42	49.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
95	NRC 2006 M	41.00	95.00	55.10	10.00	8.20	35.00	6.20	5.30	48.00	MS	MS	MR
96	NRC 37	43.00	93.00	52.80	12.60	7.60	24.00	5.00	3.40	26.00	MR	MR	MS
97	JS 89-24	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
98	AGS 129	42.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MR

99	NRC 41	41.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	S
100	EC 241780	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	S
101	PSL 788	55.00	108	47.80	10.60	6.00	16.00	5.90	3.00	80.00	HR	S	MR
102	UPSL 162	57.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MS
103	RKS 52	45.00	107	59.80	9.00	6.00	14.60	7.50	6.50	65.00	MR	S	MS
104	IMP 1	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MR
105	JS 20-41	40.00	103	46.50	10.00	4.60	15.60	7.00	4.80	60.00	HR	MS	MR
106	NRC 34	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
107	UPSL 72	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
108	UPSL 479	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
109	NRC 2007-1-3	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
110	TNAU 20037	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
111	TUNIA	53.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
112	UPSM 57	54.00	106	63.00	13.00	5.80	49.00	5.90	7.70	49.00	MR	MS	MR
113	RKS 21	41.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MS	HS	MS
114	TNAU 20051	52.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	S
115	UPSM 783	53.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	R	HS	MR
116	EC 127503	59.00	102.00	66.60	11.60	5.30	14.30	5.40	3.30	70.00	MS	AR	MR
117	UPSL 786	54.00	108	64.60	12.00	3.90	11.30	6.90	2.60	100.00	S	AR	HR
118	RVS 2006-22	36.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MR
119	GP 525	44.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
120	UPSL 415	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MR
121	UPSM 695	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	HR	HS	MS
122	JS 79-420	41.00	103.00	81.60	12.00	7.60	12.30	4.00	1.90	100.00	HR	MR	MS
123	UPSM 662	55.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MR	HS	MS
124	JS 95-52	43.00	103.00	78.30	11.30	8.60	14.30	6.50	5.30	110.00	R	MR	MR
125	EC 481571	40.00	95.00	66.30	13.00	6.60	12.60	5.70	2.60	100.00	HR	AR	HR

Table 31: Descriptive statistics for germplasm evaluation at JABALPUR

Character	Minimum	Maximum	Range	Mean	Coeff of Variation
Days to 50 per cent flowering	34	61	27	46.23	14.59
Days to maturity	91	111	20	100.74	5.39
Plant Height	44.5	81.6	37.1	59.15	16.36
Number of nodes per plant	9	15.3	6.3	11.35	13.08
Number of pod clusters per plant	3.5	13.2	9.7	6.99	30
Number of pods per plant	10.6	73.3	62.7	32.33	54.51
100 Seed weight	3.7	11.7	8	6.81	28.63
Grain yield per plant	1.2	12.3	11.1	5.8	48.46
Row yield	25	110	85	57.53	41.81

Table 32: MLT Germplasm 2020- Palampur Adjusted means

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height	Number of primary branches per plant	Number of seeds per pod	Number of pods per plant	100 Seed weight	Row yield
Check 1	VLS-63	60.00	114.00	50.20	3.80	2.20	39.00	10.70	65.00
Check 2	Hara Soya	57.00	114.00	61.40	3.00	2.50	26.00	13.10	45.00
Check 3	Himso-1685	71.00	119.00	62.60	3.10	2.80	31.00	16.90	65.00
Check 4	VLS-59	61.00	114.00	29.40	2.70	2.70	24.00	12.40	90.00
Check 5	PS-1556	61.00	114.00	40.70	2.90	2.00	26.00	10.40	83.00
1	AGS 163 B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	AMSS - 34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	AGS - 56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EC - 251506	69.00	114.00	85.60	5.20	2.10	35.00	14.00	187.00
5	EC-251531	64.00	114.00	38.80	3.20	2.20	37.00	16.20	50.00
6	EC 457285	61.00	114.00	25.20	3.60	2.00	16.00	10.40	20.00
7	EC 251383	60.00	114.00	70.80	4.20	2.10	32.00	12.60	70.00
8	AMS -59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	AGS-32	60.00	114.00	34.20	2.80	2.00	20.00	10.20	27.00
10	AGS-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	AMS-195	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	BR-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	AMS-25-5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	AMS-107	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	EC309512	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	ICS-84/86-85-B-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	EC-251682	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	AMS 26A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	AMS 48-7-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	AMS-56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	AMS-MB-51-18	61.00	114.00	26.20	2.80	2.00	14.00	11.10	20.00
22	AMS-243-7-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	EC-251516	60.00	114.00	22.50	3.30	2.20	17.00	12.40	28.00
24	AMS-25-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	AGS 99	69.00	118.00	25.00	2.40	2.00	18.00	11.90	34.00

26	AMS 110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	AMS 38-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	EC 383165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	EC 333872	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	EC 251470	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	EC 457185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	EC 393222	74.00	118.00	47.40	3.00	2.10	19.00	12.30	35.00
33	AMS 60-2-3-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	AMS 115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	AGS 164	61.00	114.00	24.20	2.20	2.20	12.00	10.80	37.00
36	RICUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	AGS 371	60.00	114.00	36.80	3.10	2.20	13.00	11.40	30.00
38	AMS 19B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	BDS 190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	EC 457214	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	EC 456527	71.00	118.00	54.60	3.60	2.00	21.00	12.40	72.00
42	UPSL 422	74.00	118.00	52.80	3.40	2.10	26.00	11.90	55.00
43	EC 389392	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	EC 251827	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	EC 313915	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	EC 309538	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	EC 333897	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	NRC 43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	EC 39177	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	EC 391162	60.00	114.00	47.60	3.60	1.90	13.00	11.20	40.00
51	EC 456599	74.00	118.00	76.40	3.60	2.00	30.00	12.00	55.00
52	NRC 23-20	60.00	114.00	39.40	2.20	2.20	19.00	12.60	39.00
53	UPSM 780	74.00	118.00	57.60	2.60	2.00	17.00	12.10	85.00
54	EC 393222	74.00	118.00	56.60	3.60	2.10	26.00	9.80	40.00
55	ICAL-122	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	JS 75-30	60.00	114.00	67.40	3.20	2.10	24.00	11.40	35.00
57	SEHORE-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	NRC 80-1	61.00	114.00	48.60	3.40	2.20	41.00	12.30	68.00
59	RVS-2006-4	61.00	114.00	28.80	2.80	2.00	24.00	15.20	38.00
60	GP-496	60.00	114.00	44.60	2.80	2.20	28.00	14.40	65.00
61	UPSL 326	74.00	118.00	50.20	2.60	2.10	31.00	10.70	75.00
62	EC 389170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

63	RKS 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	UPSL 340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	EC 171194	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	EC 37939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67	EC 172578	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	UPSL 601	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	EC 389156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	NRC 57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71	TNAU 20023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	EC 281462	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	EC 280149	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
74	PK 1120	59.00	114.00	47.40	2.80	2.10	17.00	11.80	30.00
75	EC 391012	60.00	114.00	54.20	2.30	2.00	12.00	12.40	25.00
76	SAL 12	61.00	114.00	49.70	2.70	2.40	18.00	15.30	30.00
77	NRC 79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	UPSL 470	74.00	118.00	56.20	2.20	2.00	32.00	8.70	76.00
79	TNAU 20049	74.00	118.00	69.40	2.60	2.20	36.00	12.70	94.00
80	JS 20-48	74.00	118.00	60.60	2.60	2.10	32.00	13.80	80.00
81	JS 20-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	AGS 116	72.00	116.00	53.40	2.60	2.10	29.00	12.60	35.00
83	JS 20-38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	EC 37183	74.00	118.00	39.70	2.20	2.00	26.00	11.30	25.00
85	PS 1336	60.00	114.00	43.40	1.80	2.00	23.00	19.30	70.00
86	TNAU 5-55	71.00	116.00	73.20	2.60	2.10	39.00	12.70	115.00
87	UPSM 719	74.00	118.00	73.80	2.20	2.00	36.00	10.90	105.00
88	NRC 59	74.00	118.00	53.10	2.40	2.20	37.00	12.30	145.00
89	UPSL 472	74.00	118.00	50.20	2.60	2.20	31.00	8.90	100.00
90	EC 456549	61.00	114.00	57.80	3.00	3.10	33.00	9.70	75.00
91	PK 1038	74.00	118.00	51.60	2.60	2.10	24.00	10.60	45.00
92	PK 726	74.00	116.00	52.20	3.60	2.10	36.00	9.40	95.00
93	SL 443	74.00	118.00	58.40	2.60	2.00	50.00	12.00	105.00
94	NRC 42	61.00	114.00	68.80	3.00	2.10	42.00	11.40	100.00
95	NRC 2006 M	61.00	114.00	34.40	1.80	2.00	22.00	10.30	50.00
96	NRC 37	60.00	114.00	27.80	2.00	2.00	15.00	11.10	35.00
97	JS 89-24	74.00	118.00	35.60	2.40	2.10	12.00	12.30	30.00
98	AGS 129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	NRC 41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

100	EC 241780	74.00	118.00	42.40	2.80	2.20	26.00	11.80	45.00
101	PSL 788	74.00	118.00	83.80	4.60	2.40	50.00	12.30	115.00
102	UPSL 162	74.00	118.00	65.20	4.20	2.10	36.00	9.70	90.00
103	RKS 52	61.00	114.00	35.40	2.40	2.00	30.00	10.90	85.00
104	IMP 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	JS 20-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
106	NRC 34	74.00	114.00	51.20	2.60	2.10	26.00	10.70	55.00
107	UPSL 72	74.00	118.00	42.60	3.60	2.00	20.00	13.90	95.00
108	UPSL 479	74.00	118.00	59.20	3.00	2.20	30.00	10.60	115.00
109	NRC 2007-1-3	61.00	114.00	68.60	3.40	2.40	69.00	10.70	185.00
110	TNAU 20037	74.00	114.00	62.00	2.60	2.40	61.00	12.90	75.00
111	TUNIA	61.00	114.00	57.20	3.80	2.30	51.00	13.10	48.00
112	UPSM 57	79.00	116.00	89.20	3.80	2.10	66.00	12.80	95.00
113	RKS 21	61.00	114.00	41.80	2.60	2.10	30.00	12.10	55.00
114	TNAU 20051	71.00	116.00	56.20	2.40	2.10	27.00	9.70	50.00
115	UPSM 783	74.00	116.00	65.20	3.40	2.20	43.00	11.20	45.00
116	EC 127503	74.00	118.00	68.60	2.80	2.30	54.00	11.00	105.00
117	UPSL 786	74.00	118.00	72.40	2.40	2.00	42.00	8.70	165.00
118	RVS 2006-22	61.00	114.00	44.40	2.60	2.20	33.00	13.10	115.00
119	GP 525	61.00	114.00	59.60	4.60	2.30	37.00	13.40	100.00
120	UPSL 415	74.00	118.00	59.60	3.40	2.30	35.00	10.30	125.00
121	UPSM 695	74.00	118.00	57.20	2.20	2.00	38.00	12.70	135.00
122	JS 79-420	61.00	114.00	35.20	3.60	2.00	23.00	11.40	32.00
123	UPSM 662	74.00	118.00	61.60	3.80	2.20	46.00	9.80	170.00
124	JS 95-52	61.00	114.00	52.60	3.40	2.10	32.00	15.10	68.00
125	EC 481571	61.00	114.00	35.20	1.60	2.00	20.00	12.40	45.00

Table 33: Descriptive Statistics for Germpalsm Evaluation at Palampur

Character	Minimum	Maximum	Range	Mean	Coeff of Variation
Days to 50 per cent flowering	57	79	22	67.3	9.88
Days to maturity	114	119	5	115.77	1.67
Plant Height	22.5	89.2	66.7	51.82	29.59
Number of primary branches per plant	1.6	5.2	3.6	2.97	23.21
Number of pods per plant	12	69	57	30.22	41.1
100 Seed weight	8.7	19.3	10.6	11.95	15.63
Number of seeds per pod	1.9	3.1	1.2	2.15	9.1
Row yield	20	187	167	71.66	55.66

Table 13: Evaluation of Germplasm at Multi-location-RAIPUR (Adjusted means)

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height	Number of primary branches per plant	Number of pods per plant	100 Seed weight	Row yield
1	AGS-163-B	35.00	86.00	77.60	3.00	75.00	8.17	183.00
2	AGS-56	44.00	90.00	70.60	5.00	60.00	9.16	56.00
3	AMSS-34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	EC-251506	53.00	102.00	100.00	3.80	42.00	9.22	231.00
5	EC-25153	53.00	103.00	76.80	2.40	76.00	9.28	166.00
6	EC-251383	35.00	92.00	63.20	3.00	61.00	10.09	218.00
7	EC-457285	49.00	99.00	97.20	4.00	83.00	12.12	379.00
8	EC-251383	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	AMS-59	35.00	86.00	77.80	2.60	60.00	9.16	308.00
10	AGS-32	56.00	104.00	55.00	4.00	56.00	9.28	36.00
11	AGS-02	42.00	95.00	56.50	5.00	65.00	10.54	24.00
12	AMS-195	35.00	95.00	59.50	3.00	42.00	9.14	22.00
13	BR-07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	AMS-25	35.00	90.00	25.00	3.50	26.00	9.96	34.00
15	AMS-107	51.00	100.00	53.20	3.80	56.00	10.61	201.00
16	EC-309512	35.00	85.00	66.80	2.40	61.00	12.16	118.00
17	ICS-84	44.00	100.00	71.60	4.20	75.00	11.24	350.00
18	EC-1682	56.00	85.00	35.60	2.80	30.00	13.06	46.00
19	AMS-48	35.00	90.00	30.00	3.00	28.00	9.15	30.00
20	AMS-26A	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	AMS-56	44.00	102.00	73.00	4.00	95.00	9.32	664.00
22	AMS-MB-51-18	35.00	95.00	37.00	4.00	81.00	10.15	23.00
23	AMS-243-7-3	35.00	85.00	44.20	3.80	64.00	12.52	277.00
24	AMS-25-5-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	AGS-99	56.00	98.00	45.40	5.00	78.00	10.27	286.00
26	AMS-110	47.00	94.00	62.00	4.00	49.00	9.15	13.00
27	AMS-38-24	35.00	98.00	60.60	3.80	68.00	12.22	111.00
28	EC-383165	35.00	85.00	42.60	4.80	96.00	9.32	67.00
29	EC-333872	51.00	99.00	57.20	3.40	73.00	8.18	280.00
30	EC-151470	51.00	100.00	61.80	3.00	71.00	10.15	206.00
31	EC-457185	49.00	99.00	72.20	3.60	76.00	9.15	370.00

32	EC-393222	56.00	102.00	80.20	5.40	127.00	9.54	110.00
33	AMS-60-2-3-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	AMS-115	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	AGS-164	56.00	102.00	84.80	2.20	66.00	9.61	365.00
36	RICUM	51.00	99.00	60.80	4.40	76.00	8.19	189.00
37	AGS-371	50.00	102.00	54.40	4.00	56.00	7.61	238.00
38	AMS-195	53.00	102.00	71.40	3.20	100.00	10.46	422.00
39	BDS-190	56.00	103.00	42.20	2.50	28.00	9.12	39.00
40	EC-457285	49.00	98.00	56.60	4.60	105.00	11.17	118.00
41	EC-456522	56.00	102.00	132.20	3.80	49.00	8.17	66.00
42	UPSL-422	56.00	103.00	97.80	3.60	63.00	9.51	199.00
43	EC-389392	58.00	103.00	101.00	4.80	85.00	9.22	305.00
44	EC-251827	51.00	98.00	65.80	3.80	53.00	10.16	117.00
45	EC-313915	38.00	85.00	63.20	3.60	53.00	10.21	250.00
46	EC-309538	44.00	98.00	50.40	4.80	54.00	12.21	111.00
47	EC-333879	35.00	90.00	61.00	3.00	47.00	9.61	30.00
48	NRC-43	51.00	85.00	90.80	5.20	91.00	9.51	347.00
49	EC-39-177	49.00	100.00	46.70	5.20	45.00	9.56	48.00
50	EC-39162	49.00	102.00	54.80	4.00	70.00	12.42	216.00
51	EC-45699	56.00	103.00	97.20	4.00	73.00	8.78	204.00
52	NRC-2320	35.00	96.00	60.20	3.20	36.00	14.16	36.00
53	UPSM-780	56.00	104.00	100.60	3.80	86.00	8.11	248.00
54	EC-393222	58.00	104.00	85.20	4.40	116.00	9.62	110.00
55	ICAL-122	58.00	104.00	69.00	4.00	56.00	9.10	27.00
56	JS-75-30	51.00	98.00	106.00	4.40	95.00	12.15	314.00
57	SEHORE-1	35.00	96.00	67.20	3.80	68.00	11.12	199.00
58	NRC-80-1	49.00	98.00	81.60	3.20	73.00	12.61	214.00
59	RVS-2006-4	35.00	95.00	61.20	2.40	37.00	11.12	164.00
60	GP-496	39.00	95.00	98.40	3.40	47.00	12.15	67.00
61	UPSL-326	58.00	105.00	126.80	3.80	24.00	9.54	165.00
62	EC-389170	56.00	105.00	64.00	3.40	33.00	8.61	80.00
63	RKS-30	53.00	100.00	109.40	3.60	26.00	9.54	62.00
64	UPSL-340	35.00	95.00	101.60	3.80	76.00	6.80	296.00
65	EC-171194	43.00	95.00	53.00	3.00	49.00	11.24	53.00
66	EC-37939	49.00	98.00	75.60	3.00	55.00	8.15	198.00
67	EC-172578	53.00	98.00	46.50	4.00	76.00	12.17	57.00
68	UPSL-601	58.00	100.00	130.40	4.40	50.00	9.69	114.00

69	EC-389156	58.00	102.00	95.80	3.60	79.00	9.34	145.00
70	NRC-57	35.00	95.00	55.20	2.80	55.00	13.16	152.00
71	TNAU-20023	53.00	104.00	113.40	3.20	38.00	12.16	210.00
72	EC-281462	56.00	104.00	72.20	4.20	79.00	10.32	136.00
73	EC-280149	53.00	103.00	54.40	3.60	65.00	10.16	90.00
74	PK-1220	35.00	103.00	51.00	4.20	49.00	14.12	120.00
75	EC-391012	38.00	90.00	78.20	3.00	50.00	12.16	314.00
76	SQL-12	42.00	102.00	63.20	3.00	49.00	11.27	118.00
77	NRC-79	46.00	103.00	120.20	3.40	31.00	9.19	65.00
78	UPSL-470	62.00	107.00	125.60	2.80	44.00	10.54	150.00
79	TNAU-20049	42.00	102.00	100.00	3.60	69.00	8.19	230.00
80	JS-20-48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	JS-20-42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	AGS-116	62.00	107.00	109.80	5.00	106.00	9.16	139.00
83	JS-20-38	42.00	102.00	42.60	3.40	29.00	11.22	50.00
84	EC-37183	40.00	99.00	69.00	3.00	44.00	8.13	85.00
85	PS-1336	48.00	100.00	79.60	4.60	81.00	5.02	240.00
86	TNAU-5-55	49.00	101.00	111.00	3.20	33.00	8.76	106.00
87	UPSM-719	54.00	106.00	124.00	3.00	36.00	8.54	192.00
88	NRC-59	62.00	108.00	131.40	3.60	34.00	8.61	58.00
89	UPSL-742	62.00	108.00	79.80	3.00	42.00	8.16	105.00
90	EC-456549	64.00	108.00	132.20	3.20	41.00	9.72	152.00
91	PK-1038	49.00	102.00	123.00	3.20	47.00	8.54	112.00
92	PK-726	49.00	102.00	108.40	3.40	45.00	10.22	165.00
93	SL-443	49.00	102.00	123.80	3.60	34.00	7.62	119.00
94	NRC-42	46.00	100.00	125.40	3.40	40.00	8.32	156.00
95	NRC-2006M	44.00	100.00	81.00	3.40	78.00	9.28	372.00
96	NRC-37	44.00	102.00	66.00	4.00	84.00	8.31	138.00
97	JS-89-24	49.00	106.00	97.20	3.00	51.00	8.42	309.00
98	AGS-129	53.00	106.00	72.00	4.00	56.00	10.17	20.00
99	NRC-141	39.00	95.00	54.60	2.60	62.00	10.22	250.00
100	EC-241780	49.00	106.00	78.40	2.80	57.00	12.15	230.00
101	UPSL-788	64.00	107.00	140.60	3.20	39.00	10.21	119.00
102	UPSL-162	64.00	107.00	84.80	3.00	26.00	9.32	110.00
103	RKS-52	39.00	96.00	77.00	3.40	64.00	11.22	155.00
104	IMP-1	49.00	100.00	68.60	3.00	41.00	10.36	115.00
105	JS-20-41	39.00	96.00	58.40	3.20	51.00	10.24	77.00

106	NRC-34	50.00	102.00	109.40	3.40	32.00	10.41	80.00
107	UPSL-72	62.00	107.00	94.20	3.00	31.00	9.28	104.00
108	UPSL-479	51.00	102.00	96.00	3.00	45.00	10.25	85.00
109	NRC-2007-1-3	46.00	100.00	126.00	3.40	57.00	10.51	205.00
110	TNAU-20037	44.00	100.00	92.60	3.20	52.00	8.77	120.00
111	TUNIA	51.00	100.00	104.80	3.00	32.00	9.32	57.00
112	UPSM-57	60.00	108.00	111.00	5.00	63.00	7.27	77.00
113	RKS-21	44.00	98.00	65.60	2.60	32.00	14.15	91.00
114	TNAU-2005	48.00	102.00	124.40	3.40	31.00	9.68	123.00
115	UPSM-783	58.00	108.00	131.00	3.00	29.00	8.17	201.00
116	EC-127503	62.00	108.00	107.20	3.80	38.00	8.14	255.00
117	UPSL-786	62.00	108.00	89.60	3.40	53.00	10.77	160.00
118	RVS-2006-22	44.00	100.00	69.00	3.00	56.00	9.43	22.00
119	GP-525	51.00	102.00	73.60	3.00	20.00	10.16	130.00
120	UPSL-415	62.00	108.00	81.40	2.80	30.00	9.36	25.00
121	USPL-695	62.00	108.00	86.80	3.40	69.00	8.42	230.00
122	JS-79-420	51.00	100.00	66.00	3.40	57.00	10.16	27.00
123	UPSM-662	62.00	108.00	107.20	3.40	33.00	8.43	120.00
124	JS-95-52	64.00	108.00	68.60	3.20	41.00	11.47	46.00
125	EC-451571	39.00	86.00	59.00	3.20	59.00	10.15	33.00

Table 14: Descriptive Statistics for Multi-location Germplasm Evaluation at RAIPUR

Character	Minimum	Maximum	Range	Mean	Coeff of Variation
Days to 50 per cent flowering	35	64	29	48.86	18.01
Days to maturity	85	108	23	99.69	6.1
Plant Height	25	140.6	115.6	80.62	33.3
Number of primary branches per plant	2.2	5.4	3.2	3.56	19.34
Number of pods per plant	20	127	107	56.72	38.04
100 Seed weight	5.02	14.16	9.14	9.92	15.88
Row yield	13	664	651	154.93	70.29

Top five entries for yield per plant, early maturity and seed size are as following.

Trait	Palampur	Almorah	Pantnagar	Imphal	Jabalpur	Parbhani	Raipur	Pune
[#]**Yield per plant**	EC 251506, NRC 2007-1-3, UPSM 662, UPSL 786, NRC 59	IMP 1, RICUM, EC 280149, EC 251470, EC 313915	**EC 393222**, JS 95-52, AMS-MB-51-18, AGS 99, EC 251506	**EC 393222**, EC 391162, **EC30951**2, AMS 60-2-3-4, EC 171194	AMS 38-24, AGS 163 B, NRC 80-1, JS 75-30, SEHORE-1	UPSL 472, EC 383165, EC **457185**, EC 333897, ICAL0122	AMS 56, AMS 195, EC 457285, NRC-2006M, EC-**457185**,	AMS 38-24, **EC309512**, NRC 2006 M, NRC 41, PS 1336
[#]**Seed size**	**PS 1336**, JS 95-52, EC-251531, SAL 12, **RVS-2006-4**	UPSL 786, **PS 1336**, GP 525,EC **171194**, EC **172578**	**AMS 38-24**, EC 172578, **JS 20-41**, EC 251516, **PS 1336**	**EC 171194**, **PS 1336**, EC **391012**, EC309512, **RVS-2006-4**	AGS 163 B, **AMS 38-24**, UPSL 340, **EC 391012**, RKS 52	**EC 172578**, **NRC 23-20**, **EC 171194**, **JS 20-41**, **NRC 57**	**NRC 23-20**, RKS 21, PK 1220, **NRC 57**, EC 1682,	EC 383165, EC 241780, **AMS 38-24**, BDS 190, UPSM 57
[#]**Early maturity**	EC 251506, EC 251531, **EC 457285**, EC 251383, **AGS-32**	**EC 333897**, **EC 481571**, **JS 20-38**, **AGS 163 B**, EC 251516	**EC 333897**, **AGS 163 B**, **AGS-32**, TNAU 20-49, **AGS 116**	**AGS 163** B, SAL 12, **AGS 116**, NRC 59, NRC 41	AMS-MB-51-18, NRC 37, **AGS 32**, AMS-243-7-3, EC 457214	EC 393222, **EC 333897**, UPSL 162, AGS 56, **EC 457285**	EC 309512, EC 1682, AMS 243-7-3, EC 383165, EC 313915	**EC 333897**, **JS 20-38**,**EC 481571**,**AGS 163 B**, **AGS-32**

[#]Genotypes performing better at more than one location for the trait depicted in bold.

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Appendix-IV

Evaluation of Soybean genotypes for water logging tolerance traits in Umiam center and Jorhat center under AICRPS

Around 30 soybean genotypes including elite soybean germplasm lines and breeding lines were evaluated for water logging tolerance at ICAR Research Complex for NEH Region, Umiam, Meghalaya and AAU, Jorhat centers under AICRPS. The water logging conditions were provided in Vegetative 2-Vegetative 3 (V_2-V_3) stages of plant for 10 days up to 10-12 cm above the soil surface in stressed plot while counter control plot was maintained with normal irrigated conditions and agro-morphological traits were recorded from both plots. Foliar damage score (FDS) was recorded in water logged plot on 1(tolerant) - 9(susceptible) scale based on foliage chlorosis and necrosis. Plant survival rate (PSR) was calculated based on number of survived plants in each genotype in stress plot. Stem elongation rate (SER) was calculated based on plant height enhancement in stress plot during water logging conditions. A dependent variable - per cent reduction from water logging treatment to the control treatment was calculated according to the formula: yield= (control – water logging)/control * 100 for yield per plant. Genotypes performing better than best check for water logging traits showed in Table 1 and Table 2. On the basis of water logging tolerance index (WLTI) calculated on % yield reduction in water logging plot, genotypes *viz*., JS 20-69, PK 1284, JS 71-05, EC 391346, EC 287754, EC 456620, NRC 37 and TGX317-37E performed better than best check at Umiam center. Similarly, genotypes *viz*., EC 287469, NRC 37, JS 20-69, EC 93601, JS 20-34, JSM 288, JS 20-76, EC 456620, EC 389148, EC 391346 showed better performance than best check for yield in stress conditions at Jorhat center. Some genotypes i.e. JS 20-69, EC 391346, EC 456620, and NRC 37 found to be water logging tolerant in both locations.

Table 1: Details of prominent soybean entries performing better for water logging tolerance traits at AICRP center, Umiam

Genotype	Stem elongation rate (SER)	Genotype	Plant survival rate (PSR)	Genotype	Foliar damage score (FDS)	Genotype	Per cent yield reduction (%)
TGX 317-37 E	83.25	JSM 302	100	EC93601	1	JS 20-69	2.32
EC 287754	76.79	EC456620	95.24	JS71-05	1	PK1284	1.23
Sel 1-34	71.89	NRC-37	92.59	JS20-69	1	JS71-05	3.23
CAT 1149	66.18	JS20-69	91.67	NRC-37	1	EC391346	3.70
NRC-37	57.29	JS71-05	90	JS 20-38	2	EC287754	24.50
JS 20-38	56.98	PK1284	81.82	EC287754	2	EC456620	27.87
EC291400	55.08	JS20-34	81.82	JS20-73	2	NRC-37	31.87
JS 20-69	54.96	EC287754	75	PK1284	2	TGX317-37E	35.88
		JS20-76	72.22	EC456620	2		
		TGX317-37E	70	EC391346	2		
JS97-52 (Check)	37.90	JS97-52 (Check)	67.51	JS97-52 (Check)	2	JS97-52 (Check)	50.56
JS95-60 (Check)	25.44	JS95-60 (Check)	54.16	JS95-60 (Check)	4.67	JS95-60 (Check)	76.47
PK472 (Check)	47.98	PK472 (Check)	33.80	PK472 (Check)	4.33	PK472 (Check)	90.97

Table 2: Details of prominent soybean entries performing better for water logging tolerance traits under AICRP center, Jorhat

Genotype	Stem elongation rate (SER)	Genotype	Plant survival rate (PSR)	Genotype	Foliar damage score (FDS)	Genotype	Per cent yield reduction (%)
Sel 3-60	33.33	EC 287754	100	TGX 317-37E	1	EC 287469	0.50
Sel 3-73	29.13	EC 391181	100	JSM 288	1	NRC 37	0.81
TGX 317-37E	26.22	Sel 1-34	100	EC 456556	1	JS 20-69	0.81
Sel 1-34	22.32	Sel 3-60	100	EC 391181	1	EC 93601	1.98
JS 20-34	22.22	JS 20-98	100	Sel 3-38	1	JS 20-34	2.94
NRC 37	21.38	PK 1284	100	Sel 3-73	1	JSM 288	4.08
		JSM 302	100	Hardee	1	JS 20-76	4.76
		EC 241413	100	EC 241712	1	EC 456620	6.04
		JS 20-34	100	PK 1284	1	EC 389148	6.79
		JS 20-69	100	EC 456620	1	EC 391346	7.04
		NRC 37	100	JS 20-76	1		
JS 97-52 (Check)	19.57	JS 97-52 (Check)	97	JS 97-52 (Check)	1.67	JS 97-52 (Check)	7.44
JS 95-60 (Check)	6.22	JS 95-60 (Check)	94.47	JS 95-60 (Check)	2.67	JS 95-60 (Check)	17.33
PK 472 (Check)	18.89	PK 472 (Check)	91.43	PK 472 (Check)	1.00	PK 472 (Check)	28.10

Appendix-V

National Hybridization Programme

Information on off season nursery of Bangalore centre for the year 2020-21

Sl. No.	Name of the centre	No. of crosses (F_1 s)	Crosses
1	Banglore	2	KARUNE X VS 94 KARUNE X KBS 23
2	Almora	2	VLS 89 X NRC 142 VLS 59 X NRC 142
3	Amravathi	1	AMS-MB-5-18 X JS 21-71
4	Palampur	4	EC-242105 X NRC 137 PS-1556 X JS 20-98 NRC-133 X EC-242105 NRC-133 X Himso-1685
5	Parbhani	5	RVS 2010-1 X MAUS-612 RVS 2010-1 X MAUS-71 MAUS612 X JS 20-116 EC572109 X MAUS 158 EC572109 X MAUS 71
6	Impal	4	KARUNE X CAU Local BOLD CAU Local Bold X KARUNE CAU Local Bold X MACS 1460 MACS 1460 X CAU Local Bold
7	Adilabad	1	BASARA X AMS 100-39 BASARA X NRCSL-1
8	Pune	11	KARUNE X NRC 147 MACS 1460 X NRC 142 MACS 1460 X NRC 147 MACS 1460 X SWARNA VASUNDHARA NRC 132 X AGS 25 MACS 1520 X NARC 142 MACS 1188 X AGS 25 MACS 1188 X NRC 147 JS 97-52 X NRC 142 HARASOYA X MACS 1520
9	Delhi	3	HIMSO 1690 X SL 1074 HIMSO 1690 X JS 2201 ABL. 45 X HIMSO 1690
10	Pantnagar	5	NRC 127 X AGS 25 DT21 X AGS 25 JS 20-116 X NRC 128 PK 515 X JS 335 DSb21 X PS 26
11	Ludhiana	1	SL 1074 X DS 13-18
12	Ranchi	7	NRC 105 X BSS 2 KARUNE X BSS 2 NRC 105 X PS 1556 NRC 105 X JS 9752 KARUNE X JS 97-52 KARUNE X MACS 1460 NRC 105 X MACS 1460

13	Amreli	2	VLS 94 X EC 34101 JS 335 X G. SOY.2
	Total	**48**	

Segregating populations from different centres

Sl. No.	Name of the centre	Generation	Cross
1	Dharwad	F_2	DSb 32 x EC-242104 DSb32 X DLSb1 DLSb-1 X DSb-32 DSb32 X DLSb2 DLSb2 X DSb32 DSb23 X DSLb2
		F_3	DSb23 X DLSb1 DLSB1 X DSb23 DSb32 X DLSb1 Dsb 23 x DLSb-4 DLSb-32 X DSb-32 DSb23 X DLSb4 DSb 32 X DSb23
		F_4	DSb 31 X MACS 1460 DSb 23 X EC 457254 DSb 21 X EC 457254
2	Impal	F_5	PP6 X 2911-40
		F_7	KPS 726 X BNS 5
3	Adilabad	F_4	JS 20-34 X RVS2001-18 (55-8-3 X 9752) X 90-41
		F_5	RVS2001-18 X G27 97-52 X KARUN JS 97-52 X NRC 121
		F_6	PS1556 X RSC 10-46 JS 9752 X 104-31 PP6 X 2911(33) IVT6 X SWARNA SUNDRA HAMSA X RSC 10-46

Compiled By
Dr Shivakumar M

Appendix-VI

Compilation of online Monitoring Reports (Kharif 2020)
Compilation of Monitoring Reports (*kharif* 2020)

Team 1	**: Dr Manoj Srivastava and Dr Laxman Singh Rajput**
Centres:	**: Delhi, Ludhiana, Palampur**

Weather conditions at different centres during the season (date of monitoring):			
Parameters	**Delhi**	**Ludhiana**	**Palampur**
Date of monitoring	09.10.2020	07.10.2020	09.10.2020
Onset of monsoon	11th July	4.07.2020	24.06.2020
Date of sowing	12.07.2020 onwards	9.06.2020 onwards	22.06.2020 onwards
Rainfall distribution	High deficit in September	Erratic	Erratic
Rainfall (mm)	945.7	387.2	1500.6
# Rainy days	-	21	73

Conduct of Trials: (Allotted / Conducted)			
Discipline	**Delhi**	**Ludhiana**	**Palampur**
Plant Breeding	3 / 3	3 / 3	5/5
Pathology	3 / 2	4 / 4	7/7
Entomology	3 / 3	3 / 3	2 / 1

Germplasm:			
	Delhi	**Ludhiana**	**Palampur**
Total collection	1100	675	300
# Acquired - From	-	40 from IISR, Indore 300 from CSK HOKV Palampur	125 from IISR, Indore
For Traits	--	Photoperiod insensitivity	Higher yield, earliness, and resistance to biotic stress, vegetable type
How used	--	One accession was used in hybridization	15 accession used in hybridization program

Crosses made: (Parents / Pollinations)			
	Delhi	**Ludhiana**	**Palampur**
# Crosses	30 / 1150	14/1500	15 / 482
Traits	High yield and adapted trait, MYMIV, CPMMV, Bud blight, RAB, Rust resistance and earliness, vegetable soybean	Resistance YMV and SMV, yield and early maturity	Higher yield, earliness, and resistance to biotic stress, vegetable type

Generation Advancement:			
	Delhi	**Ludhiana**	**Palampur**
Generations advanced	F2 to F6; 97 crosses; 353 progenies	F2 to F7; 124 crosses; 909 progenies	F1 to F7; 108 crosses 929 progenies

Advanced generations received	46 from IISR, Indore	155 from IISR, Indore and 69 from Dharwad	nil

Seed Production Programme: (Variety / Target / Expected in q)		
Delhi	**Ludhiana**	**Palampur**
Breeder Seed:		
Nil	SL 958 / 1 / 25	Hara Soya / 2 q / 18 q Palam Soya/ -- /25 q Him Soya /2 q /16q Shivalik / --/ 20 q
Nucleus Seed: Stage I + Stage II (Variety / Target / Expected in kg)		
Pusa 06/ 10 q Pusa 05/ 1 q Pusa 12/ 1 q Pusa 14/ 0.5 q Pusa 9712/ 0.5 q Pusa 9814/ 0.5 q Pusa 40/0.5 q Pusa 37/0.5 q Pusa 24/0.5 q Pusa 22/0.5 q Pusa 20/0.5 q Pusa 16/0.5 q	SL 958 / 60 / SL 979/30/ SL 955/30/ SL 688 / 30 / SL 744 / 30 / SL 925 / 30 /	Hara Soya / 300 kg Palam Soya/ 400 kg Him Soya /400 kg Shivalik / 350 kg

Front Line Demonstrations: (Allotted / Conducted /)		
Delhi	**Ludhiana**	**Palampur**
NA	10 / 10 /	10 / 28 /

Budget Utilization: AUC submitted		
Delhi	**Ludhiana**	**Palampur**
NA	Yes	Yes

Comments of Monitoring Team:		
Delhi	**Ludhiana**	**Palampur**
Very Good	Excellent	Very Good

Team 2	**: Dr Sunil Kumar Nag and Dr Amar Singh**
Centres	**: Pantnagar, Almora and Majhera**

Weather conditions at different centres during the season (date of monitoring):			
Parameters	**Pantnagar**	**Majhera**	**Almora** -
Date of monitoring	03.10.2020	08.10.2020	
Onset of monsoon	3.7.2020	23.06.2020	--
Date of sowing	01.07.2020 onward	09.07.2020 onward	--
Rainfall distribution	Normal	Less than Normal	--
Rainfall (mm)	1239.1	--	--
# Rainy days	58	35	--

Conduct of Trials: (Allotted / Conducted)				
Discipline	**Pantnagar**	**Majhera**	**Almora**	**Remarks**
Plant Breeding	4 / 4	02/02	5/4	
Agronomy	5 / 5	Nil	--	

Entomology	5 / 5	Nil	--	
Pathology	8 / 8	Nil	4/4	
Microbiology	3 / 3	Nil	--	

Germplasm:			
	Pantnagar	**Majhera**	**Almora**
Total collection	2851	NA	1100
# Received - From	125 from IISR, Indore.	NA	125 from IISR, Indore
For Traits	Earliness, disease resistance and high yield etc.	--	--
How used	2 accessions used for high yield, resistant to biotic/ abiotic stress, and early maturity	--	--

Crosses made: (Parents / Pollinations)			
	Pantnagar	**Majhera**	**Almora**
# Crosses	35 /150 to 200 each	NA	24 / 80 per cross
Traits	High yield, earliness, photo insensitivity and diseases resistant (YMV, BP, RAB, BLB, PB)	--	High yield, FLS & pod blight resistance, Improved plant type of black soybean

Generation Advancement:			
	Pantnagar	**Majhera**	**Almora**
Generations advanced	F1 to F8; 188 crosses; 1764 progenies and 45 bulks	NA	F1 to F6; 160 crosses; 280 populations
Advanced generations received	61 from Indore and 10 from Pune	NA	94 from Indore

Seed Production Programme: (Variety / Target / Expected in q)			
	Pantnagar	**Majhera**	**Almora**
Breeder Seed:			
	PS 19 / 4 / PS 1225/ 14/ PS 21 / 5 / PS 23 / 5/ PS 24 / 10 /	NA	VLS 89 / 8.0 / 9.5 VLS 65 / 5.0 / 4.5
Nucleus Seed: Stage I + Stage II			
	PS 1225, PS 1092 PS 1042, PS 1347,PS 1029,PS 19, PS 20,PS 21,PS 22, PS 23, PS 24, PS 25, PS 26	NA	VLS 89 / 0.50 q / 0.75 q VLS 65 / 0.80 q / 1.0 q

Front Line Demonstrations: (Allotted / Conducted / Visited by Team)				
	Pantnagar	**Majhera**	**Almora**	**Remarks**
	10/15 / -	NA	10 / 10 /	--

Budget Utilization: AUC submitted			
	Pantnagar	**Majhera**	**Almora**
	Yes	Yes	-

Overall comment of Monitoring Team			
	Pantnagar	**Majhera**	**Almora**
	Excellent	Excellent	Good

Team 3	**Dr SP Mehtre, Dr Lokesh Kumar Meena**
Centres:	**Kota, Jabalpur, Sehore and Morena**

Weather conditions at different centres during the season (date of monitoring):				
Parameters	**Jabalpur**	**Sehore**	**Morena**	**Kota**
Date of monitoring	07.10.2020	08.10.2020	9.10.2020	**6.10.2020**
Onset of monsoon	22.6.2020	17.06.2020	24.06.2020	25.06.2020
Date of sowing	22.6.2020 onwards	21.06.2020 onwards	05.07.2020 onwards	02.07.2020 - 25.07.2020
Rainfall distribution	erratic	Erratic	Normal	continuous
Rainfall (mm)	1111.2 mm	1620 mm	439 mm	641.7 mm
# Rainy days	43	61	27	--

Conduct of Trials:				
Discipline	**Jabalpur**	**Sehore**	**Morena**	**Kota**
Plant breeding	4 / 4	4 / 3	3 / 3	5 / 5
Agronomy	--	5 / 5	--	6 / 6
Entomology	--	6 / 6	--	6 / 6
Plant Pathology	7/ 7	5/ 5	--	2 / 2
Microbiology	--	3 / 3	--	--

Germplasm:

	Jabalpur	**Sehore**	**Morena**	**Kota**
Total Collection	436	350	33	308
Received from	125 from IISR, Indore	One *Glycine soja* accession from Pant nagar	-	
For traits	Yield and diseases reaction	Pest and disease resistant	-	-
How used	-	--	-	-

Information on Crosses Made :(Parents/pollinations)

	Jabalpur	**Sehore**	**Morena**	**Kota**
#Crosses	25/645	35/ 1035	**8/143**	2/450
Traits	High yields, earliness, four seededness, resistances against YMV, CR and RAB	-	Earliness, high yield and drought resistance	Earliness, high yield, pest and disease tolerance, drought and non-shattering

Information on Generation Advancement:

	Jabalpur	Sehore	Morena	Kota
Generation Advanced	F_2-$F_{11,}$ -164 crosses including 61 crosses from Indore and 41 Bulk, 1820 populations	F_2-F_8; 94 crosses	F_3 – F_5; 69 crosses	F_4-F_8 - 145 crosses
Traits	High yield, Earliness, four seededness, excessive moisture tolerance, Resistant to Charcoal rot, YMV and RAB	For yield, earliness and disease resistance traits	Six drought tolerance bulk under evaluation	Earliness, high yield, multiple disease and insect resistance

Seed Production Programme: (Variety/ Target / Expected (q)

	Jabalpur	Sehore	Morena	Kota
Breeder seed:	JS 20-69/400/866 JS 20-116/170/375 JS 20-34/500/1100 JS 20-98/1050/1873 JS 20-94/300/180	RVS 2001-4/100/80 JS 95-60/80/50 JS 93-05/25/20 RVS 24/70/60 JS 20-34/50/45 JS 335/20/10 JS 20-29 /50/50 RVS 18/120/110 JS 20-69/50/50 JS 20-98/25/25	RVS 24/105/115 JS 335/15/ (Failed)	JS 20-34/800/600 JS 20-29/200/40 JS 95-60 /150/50 JS 20-98/100/45 RKS 18/5/0.45 RAUS 5/5/0
Nucleus seed	JS 20-98, JS 20-94, JS 20-116, JS 20-69, JS 95-60, JS 93-05, JS 335, JS 20-29, JS 97-52, JS 20-34	RVS 2001-4, JS 95-60, RVS 24, RVS 18 JS 20-29, JS 93-05 JS 20-69, JS 20-98 JS 335, JS 20-34 JS 20-116, RVS 76	-	RKS 18, RKS 24, RKS 45, RKS 113

Front Line Demonstrations: Allotted/conducted/visited by team

Jabalpur	Sehore	Morena	Kota
NA	10/10/6	NA	30/30/5

Budget utilization: AUC Submitted

Jabalpur	Sehore	Morena	Kota
Submitted	Submitted	Submitted	Submitted

Manpower : (Technical/Non technical)

Manpower	Jabalpur	Sehore	Morena	Kota
Sanctioned	2-Scientists 2-TA	5-Scientists 4-TA	1- Scientist 1 - TA	3-Scientists 2-TA
In position	2-Scientists 1- TA	5-Scientists 4-TA	1- Scientist **0 - TA**	3-Scientists 2-TA

Overall specific comments of the monitoring team about the performance of the centre:

Jabalpur	Sehore	Morena	Kota
Very good	Excellent	Very good	Very good

Team 4	**: Dr MD Vyas and Dr Raghavendra**
Centres:	**: Amravati, Nagpur, Raipur and Ranchi**

Weather conditions at different centres during the season: (Date of Monitoring)				
Parameters	**Nagpur**	**Amrawati**	**Raipur**	**Ranchi**
Date of monitoring	21.09.2020	6.10.2020	18.09.2020	18.09.2020
Onset of monsoon on	1.06.2020	10/6/2020	10.6.2020	17.06.2020
Sowing commenced on	30/06/2020	1st Fortnight of June	24.6.2020	21.06.2020
Rainfall Distribution	Continues	Normal	Normal	Erratic
Rainfall (mm)	1384.8	1055.4	965.7	1122.9
Rainy days (no.)	53	56	39	40

Conduct of Trials:					**Remarks**
Discipline	**Nagpur**	**Amrawati**	**Raipur**	**Ranchi**	
Plant Breeding	3 /3	6 / 6	4 / 4	4 / 4	
Agronomy	--	6 / 6	5 / 5	5 /5	
Entomology	--	5 / 5	-	--	
Pathology	--	9 / 9	-	--	
Microbiology	--	--	2 / 2	--	

Germplasm:				
	Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Total collection	Nil	904	300	549
# Received - From	--	--	125 germplasm lines from IISR, Indore	Nil
For Traits	--	--	--	--
How used	--	--	Not mentioned	--

Crosses made: (Parents / Pollinations)				
	Nagpur	**Amrawati**	**Raipur**	**Ranchi**
# Crosses	--	12 /800	48 / 40 to 50 pollinations per cross combination	04 / 200 each
Traits	--	Charcoal rot resistance, Earliness, Drought tolerance, YMV resistant, Mechanical Harvesting.	High yielding, good germinations, pod blight & bud blight High yielding, pod blight, RAB & bud blight	Yield improvement, wider adaptability, earliness, Vegetable soybean

Generation Advancement:				
	Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Generations advanced	Nil	F1 to F7: 134 crosses and 968 progenies	F1 to F7 : 496 crosses; 143 Bulks and 620 SPS	F4 to F7; 09 crosses
Advanced generations received	Nil	Nil	-	40 F_4 and 30 F_5 from IISR under NHP
Traits	-	-	High yielding And multiple resistance (RAB, IBB, Pod blight)	-

Seed Production Programme: (Variety / Target / Expected in q)			
Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Breeder Seed:			
NA	JS 335/200/240 JS 93-05/125/135 JS 20-34/150/150 AMS-1001/20/180	CG Soya-1 /70/80 JS 20-98/200/150 JS 93-05/50/60 JS 97-52/70/80 JS 20-69/50/65	JS 97-52/15/15 BS -1 / 3.75 / 4.0 BS-2/2.5/3.0
Nucleus Seed: Stage I + Stage II			
NA	JS 335, JS 93-05, AMS 1001, AMS-MB-5-18, AMS-100-39	JS 97-52, JS 93-05, CG SOYA-1 , JS 20-29 JS 20-69	BS 1, BSS-2, JS 97-52

Front Line Demonstrations: Allotted / Conducted / Visited by Team			
Nagpur	**Amrawati**	**Raipur**	**Ranchi**
NA	20/20/17	10 /10 / 5	10 /20 /

Budget Utilization: AUC submitted			
Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Yes	Yes	Yes	Yes

Manpower : (Technical/Non technical)

Manpower	**Nagpur**	**Amrawati**	**Raipur**	**Ranchi**
Sanctioned	Need based testing centre	3 Scientists 2 TAs	2 Scientists 2 TA	2 Scientists 2 Technical
In position		2 Scientists 2 TAs	2 Scientists 2 Contractual TA	1 Scientist 1 Technical

Overall specific comments of the monitoring team about the performance of the centre:

Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Good	Very Good	Excellent	**Very Good**

Team 5	: **Dr. VK Tiwari and Dr Rakesh Verma**
Centres:	**: Lokbharti , Parbhani. Amreli, Anand**

Weather conditions at different centres during the season:				
Parameters	**Lokbharti**	**Amrreli**	**Devgadh Baria**	**Parbhani**
Date of monitoring	3.11. 2020	**28.09.2020**	**8.11.2020**	25 & 26/09/2020
Onset of monsoon	22.06.2020	05.06.2020	11.06.2020	4.06.2020
Date of sowing	9.07.2020 onwards	08.06.2020 onwards	19.06.2020 onwards	29/06/2020 to 17/07/2020
Rainfall distribution	Normal	Normal	Normal	Erratic with uneven distribution
Rainfall (mm)	686	964	956	877
# Rainy days	21	45	35	47

Conduct of Trials:				
Discipline	**Lok Bharti**	**Amreli**	**Devgadh Baria**	**Parbhani**
Plant Breeding	4 / 4	3 / 3	3 / 3	7 / 7
Agronomy	--	--	3 / 3	--
Entomology	--	--	--	5 / 5
Pathology	--	--	--	--
Microbiology	--	--	--	--

Germplasm:				
	Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
Total collection	--	570	165	650
# Received - From	--	-	TRTC, Devgadh Baria(Self)	125 from IISR Indore
For Traits	--	Earliness, bold seed size, high yield and charcoal rot resistance	High yield and earliness, resistance to YMV, CR and RAB	High yield, earliness, non shattering, biotic and abiotic stress resistance.
How used	--	Hybridization	-	3 accessions used in breeding programme

Crosses made: (Parents / Pollinations)				
	Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
# Crosses	33 / 204	8 / 697	-	35 / 1900
Traits	Earliness, high yield, pest and disease resistance and non-shattering	Earliness, high yield, bold seed size and disease resistance	-	High seed yield, early to medium maturity, pest, disease and drought tolerance, non shattering

Generation Advancement:				
	Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
Generations advanced:	F3 to F5 – 58 crosses, 306 SPPs	F_3 to F_5 – 81 crosses, 476 SPPs		F1 to F7; 248 crosses for Non Shattering, high

	Traits: High yield and major biotic and abiotic stresses.			seed yielding, tolerant to pests, diseases and drought, suitable for mechanical harvesting.
Advanced generations received	-	-	--	83 F_6 and 48 F_6 Magic population from IISR, Indore

Seed Production Programme: (Variety / Target / Expected in q)			
Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
Breeder Seed:			
JS 20-29 / 260 / 80-100	NA	NA	MAUS 71 / 430 / 650 MAUS 158 / 445 / 550 MAUS 162 / 293 / 350 MAUS 612/175/250 JS 20-34 / 100 / 00 JS 20-29 / 250/ 250 JS 20-69 / 100 / 200
Nucleus Seed: Stage I + Stage II			
JS 20-29	NA	NA	MAUS 1,MAUS 2, MAUS 32, MAUS 61, MAUS 61-2, MAUS 71, MAUS 81, MAUS 158, MAUS 162, MAUS 612, JS 20-29, JS 20-34, JS 20-69, KDS 344, JS 93-05

Front Line Demonstrations: Allotted / Conducted / Visited by Team			
Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
NA	NA	10 / 10 / -	50 / 50 / 10

Budget Utilization: AUC submitted			
Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
NA	NA	NA	Yes

Manpower : (Technical/Non technical)

Manpower	**Lok Bharti**	**Amrreli**	**Devgadh Baria**	**Parbhani**
Sanctioned	Voluntary Center	Voluntary Center	Need based testing centre	Scientists – 2 Technicals - 2
In position	--	--		Scientists – 2 SRA - 2

Overall specific comments of the monitoring team about the performance of the centre:

Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
Very Good	Very Good	Very Good	Excellent

Team 6	**: Dr M. Shivakumar and Dr Laxman Singh Rajput**
Centres:	**: Sangli, Ugar Khurd and Adilabad**

Weather conditions at different centres during the season:			
Parameters	**Sangli**	**Ugar Khurd**	**Adilabad**
Date of monitoring	**7.10.2020**	**14.09.2020**	**14.09.2020**

Onset of monsoon	26.06.2020 (20.6mm)	01.06.2020	-
Date of sowing	15/07/2020 onwards	8/8/2020	-
Rainfall distribution	heavy rainfall in the month of August, September & octomber	Even	Even
Rainfall (mm)	875.5	420.50	921.2
# Rainy days	56	30	49

Conduct of Trials:			
Discipline	**Sangli**	**Ugarkhurd**	**Adilabad**
Plant Breeding	2/ 3 (Including 01 IVT repeat trial of kharif 2019)	-	6 / 6
Agronomy	--	-	5 / 5
Entomology	--	1/-	--
Pathology	3 / 3	3/2	--
Microbiology	--	--	--

Germplasm:			
	Sangli	**Ugarkhurd**	**Adilabad**
Total collection	125	--	300
# Received - From	30 from IISR, Indore	--	11 from IISR, Indore
For Traits	Drought tolerance, earliness, Rust resistance, Low leno-lenic acid, High oil	--	Drought tolerance
How used	--	--	Crosses will be attempted in Rabi 2020

Crosses made: (Parents / Pollinations)			
	Sangli	**Ugarkhurd**	**Adilabad**
# Crosses	6 /??	--	2 / 80 each
Traits	Double null (null KTI and null lipoxygenase-2) and rust resistance Double null (null lipoxygenase-2and null lipoxygenase-3) and rust resistance Yield, Wider adability and rust resistance, Long juvenility , early maturity and	--	Earliness and 100 seed weight, higher yield

Generation Advancement:			
	Sangli	**Ugarkhurd**	**Adilabad**
Generations advanced:	F_1 to F_7 – 57 crosses	NA	F4 to F7; 68 crosses; 400 populations
Advanced Generations received:			-
traits	High oleic , rust resistance and high yield, Earliness ,		Medium duration and yield

	photo insensitivity Long juvenility, rust &YMV, wider adaptability free from Trypsin inhibitor		

Seed Production Programme: (Variety / Target / Expected in q)		
Sangli	**Ugarkhurd**	**Adilabad**
Breeder Seed:		
JS 93-05 / 156 / 156 JS 335 / 1230 / 1230 DS 228 / 303/ 303 KDS 726 / 393 / 393 KDS 753/180/180	--	JS 335/200/250 JS 93-05/25/50 Basara/50/60 **FS / CS under Seed Hub:** JS 335 / 550 / 900 Basara/ 650 / 700 JS 93-05/100/150
Nucleus Seed: Stage I + Stage II		
JS 335, JS 93 05, Phule Kalyani (DS 228) Phule Kimaya (KDS 753), Phule Sangam (KDS 726), KDS 344, KDS 992	--	Basara-I and Basara-II

Front Line Demonstrations: Allotted / Conducted / Visited by Team		
Sangli	**Ugarkhurd**	**Adilabad**
25 / 25 / -	50/23	10 / 10 / -

Budget Utilization: AUC submitted		
Sangli	**Ugarkhurd**	**Adilabad**
Yes	??	Yes

Manpower : (Technical/Non technical)

	Sangli	**Ugarkhurd**	**Adilabad**
Sanctioned	Voluntary center	Voluntary center	2 Scientists, 2 TAs
In position	--	--	2 Scientists, 2 TAs

Overall specific comments of the monitoring team about the performance of the centre:

Sangli	**Ugarkhurd**	**Adilabad**
Very Good	Good	Very Good

Team 7	**: Dr. Sanjay Gupta and Dr M.P Sharma**
Centres:	**: Pune, Dharwad and Bangalore**

Weather conditions at different centres during the season:			
Parameters	**Pune**		**Dharwad**
Date of monitoring			
Onset of monsoon	01.06.2020		21.06.2020
Date of sowing	26.06.2020 onwards		23.06.2020 onwards
Rainfall distribution	Uneven		Abormal
Rainfall (mm)	547.4		810.5
# Rainy days	35		60

Conduct of Trials:			
Discipline	**Pune**		**Dharwad**
Plant Breeding	6/ 6		2 / 2
Agronomy	3 / 3		6/ 6
Entomology	--		7/ 7
Pathology	--		7 / 7
Microbiology	--		2 / 2

Germplasm:			
	Pune		**Dharwad**
Total collection	607		481
# Received - From	125 IISR		Nil
For Traits	Earliness Yield		-
How used	Evaluation in progress		

Crosses made: (Parents / Pollinations)			
	Pune		**Dharwad**
# Crosses	**30 / 1025**		8/2270
Traits	Earliness, High Yield, Null Trypsin, Null Lipoxygenase, Rust resistance, YMV resistance, Vegetable type, Long Juvenility and Charcoal rot resistance.	--	Resistant to rust, YMV, earliness and high yield Better seed longevity

Generation Advancement:			
	Pune		**Dharwad**
Generations advanced:	F1-F6; 180 crosses; 1721 progenies		F_1 to F_7; 67crosses; 467 IPPs and 30 SPD
Advanced generations received	Nil		Nil

Seed Production Programme: (Variety / Target / Expected in q)		
Pune		**Dharwad**
<u>Breeder Seed</u>:		
JS 335 / 12/ 12 MACS 1188 / 60 / 175 MACS 1281 / 7 / 15		JS 335 /900/900 JS 93-05 /250/250 DSb 21 /425 /425 DSb 23/15/15
<u>Nucleus Seed</u>: Stage I + Stage II		
JS 335, MACS 1188, MACS 1281, MACS 1460, MACS 1407, MACS 1520		DSb 21, DSb 23, JS 335

Front Line Demonstrations: Allotted / Conducted / Visited by Team		
Pune		**Dharwad**
NA		10 / 10 / -

Budget Utilization: AUC submitted		
Pune		**Dharwad**
Yes		Yes

Manpower : (Scientist and Technical)

	Pune		**Dharwad**
Sanctioned	1 Scientists 1 TA		4 Scientists 1 TAs
In position	1 Scientists 1 TA		4 Scientists 1 TAs

Overall specific comments of the monitoring team about the performance of the centre:

Pune		**Dharwad**
Very Good		**Very Good**

Due to poor internet connectivity, Field monitoring of trials at Bangalore couldn't be done

Team 8	**: Dr Kamendra Singh and Dr K.P. Singh**
Centres:	**: Jorhat, Imphal, Medziphema and Umiam (Barapani)**

Weather conditions at different centres during the season:				
Parameters	**Imphal**	**Umiam**	**Jorhat**	**Medziphema**
Date of monitoring	07/10/2020	**14.10.2020**	05/10/2020	**06/10/2020**
Onset of monsoon	27/05/2020	--	5.5.2020	1.6.2020
Date of sowing	12/06/2020	**25/07/2020-07/08/2020**	19-06-2020 to 11-09-2020	17.07.2020
Rainfall distribution	Normal	--	Normal	Normal
Rainfall (mm)	1037.8	--	1815	280
# Rainy days	100	--	104	21

Conduct of Trials:					**Remarks**
Discipline	**Imphal**	**Umiam**	**Jorhat**	**Medziphema**	
Plant Breeding	4 / 4	3 / 3	3 / 3	--	
Agronomy	3 / 3	--	--	3 / 3	
Entomology	5 / 5	--	--	--	
Pathology	--	--	5 / 5	4 / 4	
Microbiology	--	--	--	--	
Food Techchnology	3 / 3	--	--	--	

Germplasm:				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
Total collection	635	Nil	Nil	NA
# Received - From	199	Nil	--	NA
For Traits	Yield and Vegetable type	Nil	--	NA
How used	2 accessions used in crossing program	Nil	--	NA

Crosses made: (Parents / Pollinations)				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
# Crosses	4/ 100 each	Nil	4/50	NA

			each	
Traits	Vegetable type and yield	Nil	Water logging tolerance	NA
Generation Advancement:				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
Generations advanced:	F1 to F6; 25 crosses; 113 Populations including 51 families from IISR Indore	52 crosses 156 populations	-	NA
Traits	Yield	Yield and disease resistance	-	

Seed Production Programme: (Variety / Target / Expected in q)				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
Breeder Seed:				
	NA	**Umiam Soybean 1 /25/15-20 RCS 1-10/10/6-8**	NA	NA
Nucleus Seed: Stage I + Stage II				
	NA	**Umiam Soybean 1**	NA	NA

Front Line Demonstrations: Allotted / Conducted / Visited by Team			
Imphal	**Umiam**	**Jorhat**	**Medziphema**
15 / 15 /-	NA	NA	10 / -

Budget Utilization: AUC submitted			
Imphal	**Umiam**	**Jorhat**	**Medziphema**
Yes	Yes	Provisional UC submitted	Yes

Manpower : (Technical/Non technical)

	Imphal	**Umiam**	**Jorhat**	**Medziphema**
Sanctioned	4 Scientists, 4 TA	NA	2 Scientists, 2 TA	2 Scientists, 2 TA
In position	4 Scientists, 4 TA	--	2 Scientists, 2 TA	2 Scientists, 2 TA

Overall specific comments of the monitoring team about the performance of the centre:

Imphal	**Umiam**	**Jorhat**	**Medziphema**
Excellent	Good	Good	Good

Note. All the monitoring teams were evaluated the centers and monitored the each trial virtually through online mode.

Compiled by:
Dr Shivakumar M

Appendix-VII

Pedigree of Entries Included in Coordinated Breeding Trials

S. No	Entry	Pedigree
1.	NRC 170	JS 97-52 x NRC 37
2.	NRC 171	JS 97-52 x JS 335
3.	NRC 172	JS 335 x EC 538828
4.	NRC 173	Type 49 x EC 538828
5.	NRC 174	EC 538828 x JS 97-52
6.	NRC 175	MACS330 x NRC 86
7.	NRC 177	NRC 7 x EC 538828
8.	NRC 178	NRC 7 x EC 538828 (88-90 days)
9.	NRC 179	SL525 x NRC101
10.	NRC 180	Samrat x PI542044 x PI596540
11.	NRC 181	JS97-52 x NRC102
12.	NRC 182	PI205085 x NRC109
13.	NRC 183	PI205085 x J97-52 x PI5420244 x PI596540
14.	NRC 184	JS 335 x JS 97-52
15.	NRC 185	JS 97-52 x JS 88-66
16.	NRC 186	JS 97-52 x JS 88-66
17.	NRC 187	NRC 105 x NRC 101
18.	NRC 188	Karune x NRC 101
19.	ASb 9	Lsb 3 x NRC 51
20.	Asb 36	JS 93 -05 x Lsb 1
21.	VLS 101	VLS 75 x VLS 69
22.	AMS-0542	JS 93-05 X IC 519842
23.	AMS-2017-1	Mutant of JS 9305
24.	AS 15	(BR 13 x GJS 3) F_2- 2013-5-1-3-2
25.	AS 40	(G.Soy 1 x AMRS 472) F_2- 2015-8-2-4-4
26.	AS 26	(GJS 3 x JS 75-10) F_2- 2015-2-1-1-2
27.	AS 30	(GJS 3 x AMRS 530) F_2- 2015-4-2-3-1
28.	DS 3144	DS 2207 X JS 335
29.	DS 3105	Pusa 9712 X JS 335
30.	DS 3152	DS 2208 X JS 2034
31.	DSb 38	DSb 18 x EC 241780
32.	DLSb 1	SL 979 x DSb 21
33.	DLSb 2	DSb 21 x SL 958
34.	CAUMS 2	Selection from NRC 2012 M-120-B-2
35.	DS 94-21	Null Kti EDV of Pusa 9712
36.	JS 22-11	JS 97-52 X JS (IS) 90-5-12-1
37.	JS 22-14	JS 20-53 X JS 20-34
38.	JS 22-12	JS 20-53 X JS 20-34
39.	JS 22-16	JS 20-88 X JS 20-34
40.	JS 22-18	JS 20-53 X JS 20-34
41.	KDS 1144	DS 228 x Type 49
42.	KDS 1096	KDS 378 x DSb 21
43.	AUKS-206	JS 20-29 x JS 20-22
44.	AUKS-207	JS 20-29 x JS 20-22
45.	PS 1664	JS 97-52 x PS 1225
46.	PS 1661	JS 97-52 x JS 335
47.	PS 1670	PS 1584 x JS 20-69

48.	MACS 1691	MACS 450 X NRC 67
49.	MACS 1701	RKS 24 X MACS 450
50.	MACSNRC 1711	PI 542044 X JS 93-05
51.	RVS 2011-10	JS 335 X PS 1042
52.	RVS 2012-10	JS 20-29 X PS 1475

Compiled by:
Dr Gyanesh K Stapute

Appendix-VIII

STATEMENT SHOWING CONTACT PERSONS AT COORDINATING UNIT, IISR, INDORE AND STAFF POSITION OF AICRP ON SOYBEAN

A. Coordinating Unit

ICAR-Indian Institute of Soybean Research, Indore-452 001

S.No.	Name	Designation	Contact No.& E-mail
1.	Dr. Nita Khandekar	Director	09303224211 (M) 0731-2760987 (R) dsrdirector@gmail.com
2.	Dr. S.D. Billore	Principal Scientist and PI-Agronomy	09977763727 (M) 0731-2700059 (R) billsd@rediffmail.com
3.	Dr. Sanjay Gupta	Principal Scientist and PI-Plant Breeding	07415105890 (M) sanitaishu@gmail.com
4.	Dr. M.P. Sharma	Principal Scientist and PI-Microbiology	09926012261 (M) 0731-6562647 (R) mahaveer620@gmail.com
5.	Dr Laxman Singh Rajput	Scientist and PI-Plant Pathology	07974300933 (M) laxman0742@gmail.com
6.	Dr Lokesh Kumar Meena	Scientist and PI-Entomology	09753318347 lokesharsnagpur@gmail.com
7.	Dr. G.K. Satpute	Senior Scientist (Genetics & Plant Breeding)	09425079866 gksatpute@yahoo.co.in
8.	Dr Rakesh kumar Verma	Scientist Agronomy	09098318607 sherawat90rakesh@gmail.com
9.	Dr Shivakumar M	Scientist Plant Breeding	07415746998 shivaiari9683@gmail.com
10.	Dr. Mrinal. K. Kuchlan	Senior Scientist (Seed Technology)	09009562694 (M) mrinal.kk@gmail.com
11.	Shri. Ravindra Kumar	Finance & Account Officer	0731-2437946 raviazad1971@gmail.com

B. STAFF POSITION AICRP ON SOYBEAN

1. GBPUA&T, PANTNAGAR-263 145 (UTTARAKHAND) -MAIN CENTRE								
1	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on December 2020**	**Name (appointed / adjusted) AICRP soybean**	**Discipline/ subject**	**Date of joining the present post / project**	**Contact no. (Residence, office & Mobile, FAX & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and Email**
Scientist								
Plant Breeder (S-2) (12000-18300)	Professor, G&PB/ Jt. Director, BSPC (37400-67000)+10000	1	-	Dr. P. S. Shukla	Plant Breeding	Nov 2020	9412141008 (M), 05944-234441(O) ps.shukla@rediffmail.com	Dr. Kamendra Singh Professor, G&PB and Project Incharge 05944-234441(O), 233246 (R), 9997706784 (M), singh.kamendra@rediffmail.com Dr. M. K. Karnwal, SRO 9639778002 Karan.mk30@gmail.com
Agronomist (S-2) (12000-18300)	Professor (37400-67000)+10000	1	204205.00	Dr. D. K. Shukla	Agronomy	August 2018	9410755714 Shukladk1974@rediffmail.com	Dr. Ajay Kumar Srivastava, Assistant Professor, Agronomy 9412925737 drajaysrivastava@gmail.com
Microbiologist (S-2) (12000-18300)	Professor (37400-67000)+10000	1	173052.00	Dr. Naveneet Pareek	Soil Science /Microbiology	August 2018	941132050 pareeknav@gmail.com	Dr. K.P. Raverkar, Professor, Soil Science 9412364837 (M), kraverkar@gmail.com
Jr. Entomologist (S-1) (8000-13500)	Sr. Research Officer (37400-67000)+9000	1	129994.00	Dr. Neeta Gaur **(**Appointed**)**	Entomology	17.5.2006	9457407231 (O) 05944-233737 (R) Neetagaur_ento@rediffmail.com	-

Jr. Plant Pathologist* (S-1) (8000-13500)	Professor (37400-67000)+10000	1	-	Dr K.P. Singh	Plant Pathology	-	-	-
Technical Staff (T-4)		4						
Level 8	Technical Assistant (9300-34800)+4800		87411.00	Shri R. B. Sachan		Aug. 2018	9897428345	
Level 9	Jr. Scientist (9300-34800)+5400		97368.00	Dr. H. R. Jaiswal		July 2017	9897165967	
Level 7	STA (9300-34800)+4600		71128.00	Dr. M.K.Gupta		Dec.1992	9412120628	
Level 9	PA II (9300-34800)+5400		97368.00	Dr. Dalchand		June 2011	9410238211	

2. INDIAN AGRICULTURAL RESEARCH INSTITUTE, NEW DELHI – 110 012 (ICAR INSTITUTE BASED CENTER) –MAIN CENTRE

1	2	3	4	5	6	7	8	9	10
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on July, 2017**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
-	Principal Scientist 37000-67000			Dr. S. K. Lal (Center I/c)	Genetics & Plant Breeding	NA		9968063221 sklal@iari.res.in sklal68@gmail.com	Dr. A. Talukdar akshayassam@hotmail.com 09810879176 (M)
-	Head of the Division 37000-67000			Dr. K. Annapurna	Microbiology	NA		09868422180 (M) annapurna96@yahoo.co.in	
	Principal Scientist			Dr. Anirban Roy	Plant Pathology	NA		011-25848418 (O) 9560083999 anirbanroy75@yahoo.com	

-	Senior Scientist			Dr. Anchal Dass	Agronomy	NA		011-25841488 (O); 08527759564 (M) anchal_iari@rediffmail.com	
	Scientist Pay Scale : Level 11		91377 /-	Rajna S	Entomology	29.07.2019	NA	9968738158(mob) 7762851595(mob) rajnasalim@gmail.com	NIL

3. RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, RAK COLLEGE OF AGRICULTURE, SEHORE-446 001 (M.P.) -MAIN CENTRE									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col. 5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
Senior Scientist (Breeding) [37,400-67,000 + 9,000 AGP]	Principal Scientist	1	189355	Dr. S.R. Ramgiry (Center I/c)	Breeding	3.1.2006	--	08982305368 sr.ramgiry57@gmail.com	
Senior Scientist (Pathology) [37,400-67,000 + 9,000 AGP]	Principal Scientist	1	187244	Dr. M. Saxena	Pathology	4.9.2015	--	09425079059 molysaxena@yahoo.com	
Senior Scientist (Agronomy) [37,400-67,000 + 9,000 AGP]	Principal Scientist	1	191814	Dr. M.D. Vyas	Agronomy	22.7.2009	--	09425080108 vyasmd@rediffmail.com	
Senior Scientist (Entomology) [37,400-67,000 + 9,000 AGP]	Principal Scientist	1	188086	Dr. N. Khandwe	Entomology	5.8.2006	--	09826685106 nandakhandwe@rediffmail.com	
Senior Scientist (Microbiology) [37,400-67,000 + 9,000 AGP]	Senior Scientist	1	182657	Dr. R.C. Jain	Microbiology	21.8.2012	--	09826449874 rcj2011@gmail.com	
Technical Staff	**5**								
Tech. Asstt.	Tech. Asstt.	1	73000	Mr. P.K. Sharma		25.9.2014	--		
Tech. Asstt.	Tech.	1	67281	Mr. Trilochal		10.4.2001	--		

	Asstt.			Singh				
Tech. Asstt.	Tech. Asstt.	1	45268	Mr. M.P. Naiyak		10.4.2001	9893712579	
F.E.O.	F.E.O.	1	39243	Mr. Laxman Malviya		6.5.2012	--	
F.E.O.	F.E.O.	1	38533	Mr. P.S. Maravi		8.9.2008	--	

4. **AGRICULTURE UNIVERSITY, KOTA, BORKHERA FARM, BARAN ROAD KOTA-324001 Rajasthan**

1	2	3	4	5	6	7	8	9	10
Approved post by the council with pay scale	**No. of posts**	**Existing post with pay scale and grade pay**	**Gross salary as on Jan, 2019 (Rs.)**	**Name**	**Discipline/ subject**	**Date of joining the present project and Post**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
Senior Scientist (Agronomy) [37,400-67,000 + 9,000 AGP]	**1**	Assistant Professor [15600-39100 + 7,000 AGP]	92,536/-	Dr. D. S. Meena (I/c AICRPS)	Agronomy	22.08.2005	-	09414893694 (M) dsmeena1967@gmail.com maenads 1967@yahoo.co.in	-
Senior Scientist (Entomology) [37,400-67,000 + 9,000 AGP]	**1**	Professor [37,400-67,000 + 10,000 AGP]	1,86,526/	Dr. H. R. Chaudhary	Entomology	16.05.2011	-	0744-2844369 (Telfax) 0744-2326673 (R) 09460677775 (M) arskota@hotmail.com	
Scientist/Assistant Professor (Plant Breeding) [15600-39100 + 6,000 AGP]	**1**	Assistant Professor [15600-39100 + 6,000 AGP]	76,978/-	Dr. Bharat Lal Meena	Plant Breeding	10.08.2017	-		-
Technical Staff									
Tech. Asstt. .(T4) (9300-34800) 4200	**1**	Tech. Asstt. .(T4) (9300-34800) 4800	54,511/-	Smt. Chaman Kumari Jadon	Agronomy	30.06.2007	-	09829260404 (M)	-
Tech. Asstt./ (A.A.O.) (9300-34800) 4200	**1**	Tech. Asstt. (A.A.O.) (9300-34800) 5400	85,053	Shri A. K. Sharma	-	18.01.2010	-	09414331137 (M)	-

Tech. Asstt. .(T4)	**1**	-	-	-	-	**-**	01..03.2017	**-**	-

5. AICRP ON SOYBEAN DR.PDKV, REGIONAL RESEARCH CENTRE, MORSHI ROAD, AMRAVATI-444 603 (MAHARASHTRA) – MAIN CENTRE									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross Salary as on January 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientists									
Jr. Plant Breeder (15600-39100) GP 6000	Sr. Plant Breeder (37400-67000) G.P.-9000	01	132172	Dr. Satish Nichal (Center I/c)	Plant Breeding	01.11.18	Nil	Mo. 9423473550, 09588414144 e-mail: nichal_satish@rediffmail.com	Dr. Satish Nichal, Sr. Plant Breeder, additionally working as Seed Production Officer, Regional Research Centre, Amravati. Mo. 9423473550, 09588414144 e-mail: nichal_satish@rediffmail.com Dr. S.S. Munje, Jr. Entomologist, looking additionally the Entomological Research Trials. Mo.No.09423682629 , E –mail: shyammunje@yahoo.com
Jr. Agronomist (15600-39100) GP 6000	Jr. Agronomist (15600-39100) G.P.-7000	01	93514	Shri. M.S. Dandge	Agronomy	10.07. 12	Nil	Mo. 09657725820 e-mail: msdandge@rediffmail.com	
Jr. Plant Pathologist (15600-39100) GP 6000	Jr. Plant Pathologist (15600-39100) G.P.-6000	01	84021	Shri. R.S. Ghawde	Plant Pathology	08.08. 18	Nil	Mo. 09420841421 e-mail: rajiv_ghawde @rediffamil.com	
Technical Staff									
Technical Assistant (9300-34800) GP -4200	Agriculture Assistant (5200-20200) G.P.-2400	01	36247	Mr. U. S. Tarale	-	10.06.15	Nil	- -	
Technical Assistant (9300-34800) GP -4200	Agriculture Assistant (5200-20200) G.P.-2400	01	33174	Mr. U. N. Shinde	-	01.07.18	Nil		

6. AGHARKAR RESEARCH INSTITUTE, G.G. AGARKAR ROAD, PUNE- 411 004 (M.S.)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**No. of posts**	**Existing post with pay scale and grade pay**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5,**
Scientist									
Scientist (Plant Breeding) (15600-39100 + 6000 AGP)	1	Scientist D & Soybean Breeder (15600 - 39100) + GP=7600	1,02,321	Dr. Philips Varghese (Center I/c)	Plant Breeding	27.06.2017/ 03/09/1997	-	020-25325061 (O), 020-25651542 (Fax), 09423014578 (M) philipsv@gmail.com philipsv@aripune.org	Dr. S.A. Jaybhai, Agronomist 09284509057 / 7588559910
Technical Staff									
Fieldman (T1) (5200-20200) (GP=2000)	1	Technical Assistant B (9300 -34800) Basic 13475 + GP=4200	45,618	Mr. B.N. Waghmare	-	01.07.2014/ 25.04.1997	-	02112-282164 (O) 09762502294 (M) balasahebpulje@gmail.com	

7. UNIVERSITY OF AGRICULTURAL SCIENCES, MAIN AGRICULTURAL RESEARCH STATION, KRISHI NAGAR DHARWAD-580 005 (KARNATAKA)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**No. of posts**	**Existing post with pay scale and grade pay**	**Gross salary as on 01. 10.2020**	**Name**	**Discipline/subject**	**Date of joining the present post and project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col., with phone (Office, Residence, Mobile) Fax and e-mail**
Scientist (4 Post)									
Senior Scientist (Plant Breeding)	1	Principal Scientist (Plant Breeding) (Rs.37400-	Rs.2,05,600	Dr. G. T. Basavaraja (Center I/c)	Breeding	08.06.1998	-	0836-2446556. Extn.2214280(O) 09141388524 (M) Fax: 0836-2748377	Dr. Shamarao Jahagirdar PI Plant Pathology 09740641068 (M)

(37,400-67,000+ 10,000 AGP)		67000+ AGP 10000)						basavarajagt@uasd.in	shamaraoj@gmail.com
Scientist (Agronomy) (15,600-39,100+6,000 AGP)	1	Jr. Agronomist (Rs.15600-39100+ AGP 6000)	Rs.1,10,400	Dr. Somanagoude	Agronomy	01.07.2019	-	09741058053 (M) sangu_agr@yahoo.com	Dr. P Jones Nirmalnath, Microbiologist
Scientist (Entomology) (15,600-39,100+6,000 AGP)	1	Jr. Entomologist (Rs.15600-39100+ AGP 6000)	Rs.63,000	Dr. R. Channakeshava	Entomology	02.03.2017	-	09900934831 (M) channakeshavar@gmail.com	
Scientist (Plant Pathology) (15,600-39,100+6,000 AGP)	1	Jr. Pathologist (Rs.15600-39100+ AGP 6000)	Rs.1,07,200	Dr. Shalini Huilgol	Pathology	23.06.2017	-	09740264000 (M) sagarshalini@uasd.in	
Technical Staff (4 Post)									
Technical Assistant (T4) (Rs.9300-34800+ 4,200 AGP)	1	Technical Assistant (Rs.9300-34800+ AGP 4200)	Rs.15,670	Dr. (Smt.) Harshiya Banu	Plant Breeding	09-.03.2020	-	09513129166 (M) harshiyagpb@gmail.com	-
Fieldman (T1) (5200-20200) (GP=2000)	2	Field Asst. (Rs.16000-29600)	Rs. 40,950	Mr. B.S. Shyagoti	-	01-04-2013	One post is vacant since 01-06-2019	-	Vacant due to retirement of Mr. T.M. Nadaf w.e.f. 31-05-2019

8. UNIVERSITY OF AGRICULTURAL SCIENCES, GKVK, BENGALURU-560 065 (KARNATAKA)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**No. of Posts**	**Existing post with pay scale and grade pay**	**Gross salary as on April 2019**	**Name**	**Discipline/ Subject**	**Date of joining the present Project/t pos**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, Fax) & Email ID**	**Name of the scientists with designation and discipline working on soybean other than mentioned in col.4 with phone(Office, residence, mobile) Fax and E-mail**
Scientists									
Plant Breeder (Sr. Scientist / Assoc. Prof.) Rs. 37400-67000+ AGP Rs. 8000- 9000	Principal Scientist/ Professor (Plant Breeding) Rs. 37400-67000+ AGP Rs. 10000	1	2,22,976=00	Dr. Onkarappa,T.	**Genetics & Plant Breeding**	02-11-2018	-	Mob: 9590739123 **Email ID: onkarappa.t@gmail.com**	nil
Technical staff									
Tech. Asstt. (T4) 9300-38400+ GP 4200	Tech. Asstt. (T4) 9300-38400+ GP 4200	1	43400=00	Dr. Sowmya, H.H	**Genetics & Plant Breeding**	20-7-2018		8792456063 Sowmyahh.cta@gmail.com	

9. CSKHPKIV, PALAMPUR, DISTRICT KANGRA (H.P.)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on January, 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientists									

Assistant Soybean Breeder (15600-39100 + 6000 AGP)	Principal Scientist 37400-67000 + 10000 AGP	One	171257.00	Dr. Vedna Kumari	Plant Breeding & Genetics	8.1.2014	---	drvedna@gmail.com (M) 94181-12681 (O) 01894-230391	Dr. Janardan Singh Principal Scientist (Agronomy) singhjdr@rediffmail.com (M) 94189-27836 (O)1894-230392
Assistant Pathologist (15600-39100 + 6000 AGP)	Senior Scientist 37400-67000 + 9000 AGP	One	141745.00	Dr. Amar Singh	Plant Pathology	27.01.2011	---	singhamar008@gmail.com (M) 94181-49782 (O) 01894-230391	Dr. Surjeet Kumar Principal Scientist (Entomology) skumarhpau@gmail.com (M) 94181-53087 (O) 01894-230385
Technical Staff									
Technical Assistant-I (10300-34800 + 5000 AGP)	Farm Manager 10300-34800 + 5000 AGP	Two	66951.00	Shri Dharam Singh	-	25.03.2017	---	(M) 98054-06680 (O) 01894-230391	---
Technical Assistant-I (10300-34800 + 5000 AGP)	Farm Manager 15600-39100 + 6600 AGP		78240.00	Shri Mehar Chand	-	14.09.2017	---	(M) - (O) 01894-230391	--

10. VIVEKANANDA PARATIYA KRISHI ANUSANDHAN SANSTHAN, ALMORA-263601 UTTARAKHAND (ICAR INSTITUTE BASED CENTER)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
-	Scientist (15,600-39,100 + 6,000)	-	-	Dr. Anuradha Bhartiya (Center I/c)	Plant Breeding	21.04.2009	-	05962-241005, Extn.219 (O) 05962-241250, 231539 (Fax) 09410560611(M) anuradhagpb@gmail.com	
-	Sr. Scientist (15,600-39,100 + 8,000)	-	-	Dr. K.K. Mishra	Plant Pathology	01.02.2011	-	9411195453 (M) 05962-231539 (Fax) mishrakkpatho@gmail.com	

-	Sr. Scientist (15,600-39,100 + 8,000)	-	-	Dr. Sher Singh	Agronomy	23.03.2012	-	05962-241005 Extn.306 (O) 05962-241250, 231539 (Fax) 09456158263 (M) shersingh76@gmail.com	

11. PUNJAB AGRICULTURAL UNIVERSITY LUDHIANA – 141004 (PUNJAB)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
Asstt. Plant Breeder (15,600-39,100) + GP 6,000	Sr. Breeder (37,400-67,000) + GP 10,000	1	1,44,440	Dr. B.S. Gill (Center I/c)	Plant Breeding	Joined as Asstt. Plant Breeder on 22.1.1997, promoted to Sr. Breeder on 23.1.2012	-	09872163567 (M) gbalwinder@hotmail.com	Dr. (Mrs) Jagmeet Kaur (Sr. Physiologist) 09888034979 (M) jagskaur@gmail.com Dr. (Mrs) Poonam Sharma (Microbiologist) 09915004976 (M) poonam1963in@yahoo.co.in Dr. Guriqbal Singh (Agronomist) 0161-2251362 (R) singhguriqbal@rediffmail.com Dr (Mrs) Asmita Sirari Asstt. Plant Pathologist 0161-2401960-413(O) asmitasirari@gmail.com Dr Ravinder Singh Sr. Entomologist 097800-29107 (M) ravindergurvara@pau.edu Dr GK Taggar, Asstt. Entomologist 098144-22183 (M)
Asstt. Agronomist (15,600-39,100) + GP 6000	Asstt. Agronomist (15,600-39,100) + GP 6000	1	84,700	Ms. Harpreet Kaur	Agronomy	28.01.2010	-	08146080300 (M) hkmand@rediffmail.com	
Technical Staff									
Tech. Asstt. (10,300-34,800) + GP 3800	Beldar (4900-10,680) + GP 1900	1	39,919	Shri. Sita Ram	-	01.03.2013	-		
Field man (10,300-34,800) + GP 3200	Field man (10,300-34,800) + GP 3750	1	52,213	Shri Balwant Singh	-	01.11.2014	-		

									gauravtaggar@pau.edu Dr (Mrs) Sunita Sharma (Biochem) 09876130110 (M)

12. CENTRAL AGRICULTURAL UNIVERSITY, IROISEMBA IMPHAL-795004 (MANIPUR)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on March, 2020**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
Jr. Plant Breeder (15600-39100 + 6000 GP)	Jr. Plant Breeder (20590 + 6000 GP)	1	1,02,177	Dr. H. Nanita Devi (Center I/c)	Plant Breeding	30th August 2011	-	+918974057246 heisnamnanita@rediffmail.com	-
Jr. Agronomist (15600-39100 + 6000 GP)	Jr. Agronomist (22990 + 6000 GP)	1	1,11,087	Dr. T. Sunanda Devi	Agronomy	30th August 2011	-	+919856117141 sunandabckv@gmail.com	-
Jr. Entomologist (15600-39100 + 6000 GP)	Jr. Entomologist (22990 + 6000 GP)	1	1,11,087	Dr. Nilima Karam	Entomology	30th August 2011	-	+918974715757 nilikaram@gmail.com	-
Jr. Food Scientist (15600-39100 + 6000 GP)	Jr. Food Scientist (24600 + 6000 GP)	1	1,17,432	Dr. L. Sophia Devi	Food Technology	30th August 2011	-	09856939623, 08837223476 rush2sophia@gmail.com	-
Technical Staff									
Fieldman (T1) (5200 - 20200)	Fieldman (T1)	4	40,491	H. Sarat Singh	-	19th December 2012	-	+917085411341	-

	(6820 + 1900 GP)								
Fieldman (T1) (5200 - 20200)	Fieldman (T1) (6820 + 1900 GP)		40,491	N. Daya Singh	-	20th December 2012	-	+919774941381 ningthoujamdayaSingh@gmail.com	-
Fieldman (T1) (5200 - 20200)	Fieldman (T1) (6560 + 1900 GP)		38,358	K. Lalit Singh	-	3rd January 2014	-	+919436683166	-
Fieldman (T1) (5200 - 20200)	Fieldman (T1) (6560 + 1900 GP)		38,358	H. Subhaschandra Singh	-	12th March 2014	-	+918787596910	-

13. ASSAM AGRICULTURAL UNIVERSITY, JORHAT -785013 (ASSAM)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on January, 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) &Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist (2 posts)									
Plant Breeder (15600-39100 +6000 to 8000)	Jr. Scientist 15600-39100 +GP6000	1	87308	Dr. Jaffarulla	Plant Breeding	-	-	zafar.ullah300@gmail.com	Nil
Plant Pathologist (15600-39100 +6000 to 8000)	Jr. Scientist 15600-39100 +GP6000	1	61326	Dr. Munmi. Borah	Plant Pathology	01/04/2018	-	912764720 munmi.borah@aau.ac.in	Nil
Technical Staff (2 posts)									
Technical Asstt.(T1) 5200-20200	Field Asstt.III 14000-	1	27966	MrDiganta.Hazarika		11/12/2017	-	9365543837	Nil

+2000	49000+8700								
Technical Asstt.(T1) 5200-20200 +2000	Field Asstt.III 14000-49000+8700	1	27966	Mr. Bimal Deori		12/12/2017	-	9613665059	Nil

14. ICAR RESEARCH COMPLEX FOR NEH REGION, UMIAM – 793 103, MEGHALAYA (ICAR INSTITUTE BASED CENTER)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
-	-	-	-	Dr. Amit Kumar (Center I/c)	Plant Breeding	-	-	amit4118@gmail.com 8974630789	-
-	-	-	-	Dr. P. Baiswar	Plant Pathologist	-	-	pbaiswar@yahoo.com 9436107733	-

15. SCHOOL OF AGRICULTURAL SCIENCES AND RURAL DEVELOPMENT, NAGALAND UNIVERSITY, MEDZIPHEMA – 797 106 (NAGALAND)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist - 2									
Jr. Scientist (Plant Pathology)	Jr. Scientist (15600-39100)	1		Dr. Pezangulie Chakruno	Plant Pathology	26.06.2018		09402682097 (M) sksunilphd@gmail.com	Dr. Amarendra Kumar Singh (Center I/c) 09436075153 (M) 08974055853 (O) aksingh_1967@yahoo.com
Jr. Scientist (Agronomy)	Jr. Scientist (15600-39100)	1	Rs. 83326/-	Dr. Engrala Ao	Agronomy	20-03-2013		09436824141 (M) engraao@yahoo.in	
Technical Staff (T-4) – 2									
Technical Assistant	Techncal Assisant	1	Rs. 26905/-	Mr. Talososang Amri		24-07-2012		08731821798 (M)	

	5200-20200)								
Technical Assistant	Technical Assistant 5200-20200)	1	Rs. 26905/-	Mr. Imliakum Ao		25-07-2012		09612304897 (M)	

16. BIRSA AGRICULTURAL UNIVERSITY, KANKE, RANCHI-6									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of post**	**Gross salary as on Jan 2019**	**Name**	**Discipline / subject**	**Date of joining the present post/project**	**If post is vacant, date from which it is lying vacant**	**Contact No.**	**Name of scientist with designation & discipline working on soybean other than mentioned in col. 5 with phone**
Scientists									
Jr. Scientist	Jr. Scientist-cum-Asstt. Prof. (15,600-39,100) GP-7000/-	1	-	Vacant	Plant Breeding	-	-	-	Dr. (Mrs.) Nutan Verma 09279324334 (M) nvbau2006@yahoo.co.in
Jr. Scientist	Jr. Scientist-cum-Asstt. Prof. (15,600-39,100) GP-6000/-	1	79667/-	Dr. Arvind Kumar Singh (Center I/c)	Agronomy	24.07.2004	-	09431315705 (M) aksbau@gmail.com	
Technical Staff									
Technical Asstt.	Field overseer (9300-34800) GP-2400/-	1	51548/-	Sri S.K Jamahir		01.08.2007	-	09798534619 (M)	
STA	Vacant	-		-		-	1		

17. INDIRA GANDHI AGRICULTURAL UNIVERSITY, RAIPUR-492 012 (C.G.)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**No. of posts**	**Existing post with pay scale and grade pay**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present project and Post**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist (2Post)									

Scientist (Plant breeding) [15,600-39,100 + 6,000 AGP]	01	Scientist 15600-39000 +AGP 7000	71,394/=	Dr. Sunil Kumar Nag (Center I/c)	Plant Breeding	2.11.2010	-	Phone- 0771-2442352 (O), Mobile- 9926159853, 9691021610 E-Mail- nagsk_igkv@yahoo.com	Dr. S. B Gupta Microbiologist Mobile- 78030-13547 Phone (O)- 0771-2442581 E-mail- sbgupta_igau2002@yahoo.co.in Dr R K Dantre (Plant Pathologist Mobile- 94242-14723 Phone (O)- 0771-2444204 ravikantdantre@yahoo.com Dr. B.P. Katlam Entomologist Mobile: 06260854580 Email: katlambp1974@gmail.com
Scientist (Agronomy) [15,600-39,100 + 6,000 AGP]	01	Principal Scientist 37400-67000+ AGP 10000 (Promoted in the scheme)		Dr. Rama Mohan Savu	Agronomy	10.10.2018	-		
Technical Staff (2Post)									
Field Assistant (T1) (5,200-20,200) GP 2000	02						Vacant (Since inception of project)		

18. JNKVV, KRISHINAGAR, ADHARTAL, JABALPUR-482 004 (M.P.)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**No. of posts**	**Existing post with pay scale and grade pay**	**Gross salary as on Jan 2019**	**Name**	**Discipline / subject**	**Date of joining the present project and Post**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist (2 Post)									
Senior Scientist (Plant Breeding)	1	Senior Scientist	145836 =00	Dr. M..K.Shrivastava	Plant Breeding	From	Filled	M. 09827256494 07987299126 shrivastava.manoj03@gmail.co	

[37,400-67,000 + 9,000 AGP]				(Center I/c)		10-08-2017		m	
Scientist (Plant Pathology) [15,600-39,100 + 6,000 AGP]	1	Scientist 15600-39100+ AGP 6000	70188=00	Dr. P. K Amrate	Plant Pathology	19-05-2017	Filled	08224821863 pawanamrate@gmail.com	
Technical Staff (2 Post)									
Technical Assistant (T4) (Rs.9300-34800+ AGP 4200)	1	Tech.Officer 9300-34800+ AGP 4200	51000 (7th Pay)	Mr. Gyanendra Singh-	Plant Pathology	20-03-2019	Filled	8839498002 singh.gyan14@gmail.com	
Technical Assistant (T1) (Rs.5200-20200+ GP 2000)	1	Vacant	-	-	-	-	-	-	

19. MARATHWADA AGRICULTURAL UNIVERSITY, PARBHANI-431 402 (MS.)

1	2	3	4	5	6	7	8	9	10
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.4, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
Soybean Breeder (37,400-67,000)	Soybean Breeder & Officer Incharge (37400-67000 + AGP 9000)	1	Rs.1,06,137/-	Dr. S.P. Mehtre (Center I/c)	Agril. Genetics & Plant Breeding	12/09/2014	--	09421462282, 07588156210 shivaji_pmehtre@rediffmail.com Fax.- (02452)220121	NA
Jr.Entomologist (15,600-39,100)	Jr.Entomologist (15600-39100+ AGP 6000)	1	Rs.59,596/-	Dr. R.S. Jadhav	Agril. Entomology	01.03.2018	--		
Technical Staff (T-4)									
Senior	Senior	1	Rs. 50,009/-	Shri D.T.	Plant	21.06.2010	1	09422176738(M)	NA

Research Assistant (9,300-34,800)	Research Assistant (9300-34800+ AGP 4400)			Pawar	Breeding			rameshpwr267@gmail.com	
Senior Research Assistant (9,300-34,800)	Senior Research Assistant (9300-34800+ AGP 4400)	1	-	Smt.A.A. Joshi	Food Science	14/07/2015	21/10/2014	09637240406 joshianuprita.2009@gmail.com	NA

20. PJTSAU - AGRICULTURAL RESEARCH STATION, ADILABAD, TELANGANA STATE									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col. 5, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientists									
Scientist (Agronomy) ₹ 15,600 – 39100 + 6000 AGP	Senior Scientist (Agronomy) ₹ 15,600 - 39100 + 8000 AGP Pay: ₹ 31890 + 8000 (Stage-III)	1	₹ 97,514.00	Dr. Sreedhar Chauhan (Center I/c)	Agronomy	23.07.2013	-	08732-226863 (O) 094411 67821 (M) chauhan.sreedhar@gmail.com	-
Scientist (Plant Breeding) ₹ 15,600 – 39100 + 6000 AGP	Scientist (Plant Breeding) ₹ 15,600 - 39100 + 6000 AGP Pay: Rs. 21300 +	1	₹ 66,716.00	Dr. M. Rajendar Reddy	Plant Breeding	24.07.2017	-	08732-226863 (O) 09704134304 (M) rajendar0536@gmail.com	

	6000 (Stage-I)								
Technical Staff									
AEO ₹ 17890-53950/-	AEO 17890-53950/25140 + 300/- (TI) Pay: ₹ 25,140.00	1	₹ 34,618.00	Sri Sk. Eesa	Intermediate	21.09.2016	-	08732-226863 (O) 99499 40584 (M)	-
AEO ₹ 17890-53950/-	AEO ₹ 15,000.00	1	₹ 20,117.00	Sri R. Naveen	Diploma in Agriculture	06.04.2017	**	08732-226863 (O) 078938 96654 (M) ramellynaveen@gmail.com	

21. RVSKV ZONAL AGRICULTURAL RESEARCH STATION MORENA – 476001 (M.P.)									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Approved post by the council with pay scale	**Existing post with pay scale and grade pay**	**No. of posts**	**Gross salary as on Jan 2019**	**Name**	**Discipline/ subject**	**Date of joining the present post / project**	**If the post is vacant, date from which it is lying vacant**	**Contact no. (Residence, Office & Mobile, FAX) & Email ID**	**Name of the scientists with designation & discipline working on soybean other than mentioned in col.4, with phone (Office, Residence, Mobile) Fax and E-mail**
Scientist									
-	Prin. Scientist	-	-	Dr. V.K. Tiwari (Center I/c)	Plant Breeding			9425407723 07532234426 vkt786@rediffmail.com	
Technical									
Tech. Asstt. (T-1) 5200-20200+1900	Vacant								

Statement of the Scientists working for AICRP on Soybean at need based testing Centre

1. GBPUA&T, Regional Research Station, Majhera, P.O. Garampani Dist- Nainital, Uttarakhand – 263135			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1	Dr. Anjuli Agrawal	Officer Incharge (Biochemistry)	(O) 05942-245538 (M) +917500241431 E-mail : oicmajhera@gmail.com

3. Rajendra Agricultural University, Tirhut College of Agriculture, Dholi-843 121, (Muzaffarpur) , Bihar			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Dr. Anil Pandey	Univ. Prof.(Plant Breeding & Genetics) -cum-Chief Scientist & Team Leader (Oilseeds)	E-mail- aniltcadholi@gmail.com Mobile No. 09934019564 Fax: 06274-240266/24025
2.	Dr. Vikram Bharati	Jr. Agronomist (S.F.)	E-mail- vbharatiagro@gmail.com Mobile No.09471645321
3.	Dr. Ashim Kumar Mishra	Jr. Pathologist (Spices)	E-mail- ashim_sigatoka@yahoo.com Mobile No. 09973218436

4. OUA&T, Reginal Research and Technology Transfer Station , Bhawanipatna, Arkabahalipada Farm, Bhawanipatna – 766001, Kalahandi, Odisha			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No.**
1	Dr. Gouranga Charan Mishra	Sr. Scientist Agronomy	(O) 06670-230274 (M) 09337749182 E-mail : gcmishra8@gmail.com
2	Dr. Susanta Kumar Mohanty	Junior Breeder (Plant Breeding and Genetics)	(O) 06670-230274 (M) 09437124090 E-mail : susantamohanty.2008@rediffmail.com

5. PDKV, Department of Agricultural Botany, College of Agriculture, Nagpur-440001			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No.**
1.	Dr. A.D. Bangiwar		

6. R & D Unit, The Ugar Sugar Woks Ltd., Ugar-khurd, Karnataka-591316			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Mr.Jagadish S.Patwardhan	Deputy Manager R & D.	08339-272230 (Ext-214) **(O)**, 9900559159 **(M)** Fax-08339-272232 jagadish.kulkarni@ugarsugar.com jagdishpatwardhan@yahoo.com helpdesk@ugarsugar.com
2.	Mr. R.D.Patil	Agronomist	7259186041 **(M)** helpdesk@ugarsugar.com
3.	Mr.B.B.Patil	Circle Superintendent	7259020396 **(M)** helpdesk@ugarsugar.com

7. MPKV, Agricultural Research Station, Mahatma Phule Krishi Vidyapeeth, K. Digraj-416305 Distt. Sangli (M.S.)			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Dr. D.K. Kathamale	Officer Incharge	0233-2437288 (O), 0233-2437275 (Fax), 0233-2326661 (R), 09405267061 (M) kathmaledk@rediffmail.com kathmaledk@gmail.com
2.	Dr. M.P. Deshmukh	Associate Prof. (Plant Breeding)	0233-2437288 (O), 0233-2437275 (Fax), 0233-2332886 (R), 09423185603 (M) 09422210476 (M) drmpdeshmukh@gmail.com
3.	Dr. S.B. Mahajan	Assistant Prof. (Plant Pathology)	sachinbm512@gmail.com

8. UAS, Raichur, ARS, Bidar-585401 Karnataka			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Dr. Sidramappa	Assistant professor (Plant Breeding)	09900875348 (M) E-mail- siddugpb@yahoo.co.in
2.	Dr.Shobharani M	Agril. Entomology	09740330194, E-mail: srani_ent@yahoo.co.in

9. TRIBAL RESEARCH CUM TRAINING CENTRE, ANAND AGRICULTURAL UNIVERSITY, DEVGADH BARIA – 389 380, DIST : DAHOD (GUJARAT)			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Dr. G. J. Patel	Asso. Res. Scientist (Agron)	9825930039 girish_agri2005@yahoo.co.in
2.	Prof. D. B. Parmar	Assi. Res. Scientist (Plant Breeding)	9725017818 dhirajsinh@aau.in

10. Agricultural Research Station Junagarh Agricultural University Keria Road 365601 Amreli- Gujarat.			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Dr. Viren Akbari	Assistant Research Scientist, Plant Breeding	09558458537 virenakabari@jau.in

11. Wheat Research Center Lokbharti, village - Sanosara, Taluqa - Sihor, Dist- Bhavnagar, Gujarat - 364230			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Dr. C. P. Singh	Plant Breeding	09727765645 singh.cp70@gmail.com

12. Dry Land Agriculture Research Station, SKUAST-Kashmir, Old Airfield Complex, Rangreth Post Box No. 905, GPO Kashmir 190001, J & K			
1	**2**	**3**	**4**
Sr. No.	**Name of the scientist**	**Designation with discipline**	**Telephone No. (Office, Residence, Mobile, Fax, E-mail)**
1.	Dr. M.N. Khan	Professor, Genetics and Plant Breeding	0959013998 mnk900@gmail.com

Compiled by
Dr Gyanesh K Satpute