प्रकाशन के लिए नहीं
केवल कार्यालयीन उपयोग हेतु

भारतीय कृषि अनुसंधान परिषद्
Indian Council of Agricultural Research

निदेशक का प्रतिवेदन एवं परीक्षणों की सारांश – तालिकाएं

DIRECTOR'S REPORT AND SUMMARY TABLES OF EXPERIMENTS

2019-2020

भा.कृ.अनु.प.–भारतीय सोयाबीन अनुसंधान संस्थान
ICAR-Indian Institute of Soybean Research
खण्डवा रोड , इन्दौर – 452001 (म.प्र.)
Khandwa Road, Indore – 452001 (M.P.)

प्रकाशन के लिए नहीं
केवल कार्यालयीन उपयोग हेतु

भारतीय कृषि अनुसंधान परिषद्
Indian Council of Agricultural Research

निदेशक का प्रतिवेदन एवं परीक्षणों की सारांश – तालिकाएं

DIRECTOR'S REPORT AND SUMMARY TABLES OF EXPERIMENTS

2019-2020

भा.कृ.अनु.प.–भारतीय सोयाबीन अनुसंधान संस्थान
ICAR-Indian Institute of Soybean Research
खण्डवा रोड , इन्दौर –452001 (म.प्र.)
Khandwa Road, Indore – 452001 (M.P.)

Coordination and Editing

Dr. V.S. Bhatia, Director
Dr. A.N. Sharma, I/c AICRP on Soybean

Director's Report

Dr. V.S. Bhatia, Director

Summary Report by Principal Investigators

Plant Breeding	- Dr. Sanjay Gupta, IISR, Indore
Agronomy	- Dr. S.D. Billore, Dr. R.K. Verma, IISR, Indore
Entomology	- Dr. A.N. Sharma, IISR, Indore
Pathology	- Dr. Shamarao Jahagirdar, UAS, Dharwad
Microbiology	- Dr. M.P. Sharma, IISR, Indore
FLD	- Dr. S.D. Billore, Dr. Raghvendra M., IISR, Indore
Food Processing	- Dr. L. Sophia Devi, CAU, Imphal

Data Compilation

Plant Breeding	- Dr. Sanjay Gupta, Dr. G.K Satpute, and Dr. Savita Kolhe (Online data submission), Shri R.M. Patel, Dr. Yogendra Mohan
Germplasm	- Dr. G.K. Satpute, Dr. Subhash Chandra, Dr. Rajesh Vangla, Shri R.M. Patel and Shri R.N. Shrivastava
Seed Production	- Dr. Mrinal Kuchlan, Dr. Poonam Kuchlan
Agronomy	- Dr. S.D. Billore and Dr. Nikhilesh Pandya
Entomology	- Dr. Lokesh Kumar Meena, Dr. A.N. Sharma and Shri R.N. Singh
Pathology	- Dr. Shamarao Jahagirdar and Shri. S.S. Vasuniya.
Microbiology	- Dr. M.P. Sharma
FLD	- Dr. S.D. Billore, Dr. B.U. Dupare and Dr. Nikhilesh Pandya

Secretarial Assistance and Reprography

Sh. Avinash Kalanke
Sh. S.N. Verma

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
12. Dry Land Agriculture Research Station, SKUAST-Kashmir, Old Airfield Complex, Rangreth Post Box No. 905, GPO Kashmir 190001, J & K

---

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

CONTENTS

SOYBEAN SCENARIO AND RESEARCH HIGHLIGHTS

1. Global Scenario

Soybean (*Glycine max* (L.) Merril) has a prominent place among modern agricultural commodities as the world's most important seed legume, which contributes about 25% to the global edible oil production, about two thirds of the world's protein concentrate for livestock feeding and is a valuable ingredient in formulated feeds for poultry and fish. It is also an important commodity for food manufacturers, pharma industry and many more industrial uses. It is therefore no surprise that global soybean demand is increasing rapidly. To this increasing demand, global production of soybean continue to increase till 2018-19 when a record area and production of 125 million ha and 358.85 million tons was obtained. However, during 2019-20 the area and production is expected to be 122.10 million ha and 341.76 million tons which indicates that a decline of 2.8% and 4.7% in soybean area and production as compared to 2018-19. The expected decline in global soybean production during 2019-20 compared to 2018-19 is mainly due to expected decline in area and production in the USA (14.6 and 23.7%, respectively) (Table 1). The global soybean productivity is also expected to marginally decline from 2850 kg/ha in 2018-19 to 2800 kg/ha in 2019-20. This year for the first time, Brazil will overtake the United States as the world's leading soybean producer. Soybean production in Brazil during 2019-20 is estimated at a record 126.0 million tons from a record area of 36.9 million hectares. Yield is estimated at 3.41 tons per hectare, up 5 percent from last year and up 6 percent from the 5-year average. Among the major soybean growing countries, India ranks fourth in terms of area under soybean and fifth in terms of production as per AMIS, FAO estimates (Table 1).

Table 1: World Area, Production & Productivity of Soybean

A = Area (m ha), P = Production (m t), Y = Yield (kg/ha)

Country	2017-18[A]			2018-19[B]			2019-20[B]		
	A	P	Y	A	P	Y	A	P	Y
USA	36.23	119.52	3299	35.45	120.52	3400	30.36	96.84	3190
Brazil	33.94	114.60	3377	35.90	117.00	3260	36.90	126.00	3410
Argentina	17.34	54.97	3171	16.60	55.30	3330	17.00	54.00	3180
China	7.34	13.15	1791	8.41	15.97	1900	9.30	18.10	1950
India	10.60	10.98	1036	11.30	10.93	960	11.25	9.30	830
World	123.55	352.64	2854	125.64	358.65	2850	122.10	341.76	2800

Source: A. FAO Database, B. USDA, March, 2020.

2. National Scenario

Soybean production in India during 2019-20 is estimated to be 13.63 million tons from an area of 11.34 million ha and a productivity of 1200 kg/ha. In 2018-19 the production was 13.27 million tons from an area of 10.96 million ha and productivity of 1227 kg/ha. As compared to 2018 therefore there is a marginal increase in area and production and a decline in productivity (Table 2). This decline is attributed to heavy rains during the season but more so during the crop maturity. The heavy rains during maturity have resulted in harvesting losses as farmers were unable to enter into the field and harvest the crop. In many areas the rains at maturity has led to seed deterioration putting pressure for availability of quality seeds for the next sowing season. Major insects

attacking the crop were stem fly, defoliators and girdle beetle and diseases were YMV, charcoal rot and pod blight. However, timely intervention from the institute and AICRPS Centres resulted in control of these insects and diseases and there was no major outbreak reported from anywhere during *kharif* 2019.

Madhya Pradesh (5.516 m ha), Maharashtra (4.01 m ha) and Rajasthan (1.06 m ha) were the major states for soybean and with Karnataka, Telengana, Gujarat, and Chhattisgarh with an area of 0.1 to 0.3 m ha showed good promise of expansion in the future.

Minimum support price of soybean was increased to Rs. 3710 per quintal for the marketing season 2019-20 from Rs 3399 per quintal for previous year. However, soybean prices ruled mostly above the minimum support prices during harvest season this year. Soybean traded in the range of Rs. 3900 to 4500 per quintal during October to March 2020 in all major markets.

Table 2: State wise Area, Production & Yield of Soybean in India during *Kharif* 2016-2018

A = Area (m ha), P = Production (m t), Y = Yield (kg/ha)

	2016 Kharif[1]			**2017 Kharif [1]**			**2018 Kharif [2]**		
State	**A**	**P**	**Y**	**A**	**P**	**Y**	**A**	**P**	**Y**
Madhya Pradesh	5.40	6.65	1231	5.01	5.32	1062	5.24	6.73	1285
Maharashtra	3.84	4.59	1194	3.84	3.89	1012	3.93	4.39	1117
Rajasthan	1.06	1.13	1072	0.89	1.07	1207	0.93	1.16	1244
Karnataka	0.32	0.24	745	0.28	0.42	1611	0.34	0.34	1000
Telangana	0.28	0.32	1162	0.15	0.25	1624	0.15	0.24	1586
Gujarat	0.12	0.09	717	0.15	0.12	791	0.14	0.17	1247
India	11.40	13.16	1154	10.47	10.98	1049	10.96	13.27	1228

Estimated soybean area and production during 2019: 11.34 m ha and 13.63 m tons as per 2nd estimates of DAC&FW.

Sources: 1. DAC&FW, GoI, 2. State-wise area, production and yield data from State Agricultural Department.

3. Research accomplishments for the year 2019-20

3.1 Breeding and Genetics

The data on yield and other characters of test entries in different breeding trials conducted in *Kharif* 2019 are presented in Table 1.1.1 to 1.6.25.

Initial Evaluation Trial (IVT)

Forty one entries were evaluated at 32 AICRP centres of six AICRP zones. The promising entries showing yield advantage over highest yielding check are presented in Table 3a. Three entries could out yield the best check variety VLS 89 in Northern Hill Zone. In Eastern Zone, Himso 1690 and SL 1213 were significantly superior to the best check JS 20-116. In Northern Plain, North Eastern, Central and Southern Zones none of the entries was significantly superior to the respective best checks SL 1074, MACS 1460 and NRC 86 and DSb 23.

Table 3a: Promising IVT entries across different zones

S. No.	Entry	Northern Hill Zone		Eastern Zone	
		Yield	Rank	Yield	Rank
1.	VLS 99	2568	I		
2.	SL 1213	2568	I	2123	II
3.	AMS 20-19	2527	II		
4.	Himso 1690			2228	I
5.	NRC 86 (c)				
6.	JS 20-116 (c)			1790	IX
7.	VLS 89 (c)	2313	V		

A new early maturity trial was constituted in Central Zone to identify genotypes which are at par in maturity and yield to the earliest maturing checks JS 95-60 and JS 20-34. Seven entries were statistically at par with the best yielding check JS 20-34 in yield and maturity (Table 3b).

Table 3b: Promising early maturing entries in IVT for central zone

S. No.	Entry	Maturity	Yield	Rank
1.	NRC 158	88.5	1716	VII
2.	NRC 152	90.4	1880	III
3.	NRC 157	92.1	1883	II
4.	NRC 165	91.8	1886	I
5.	NRC 164	91.9	1846	IV
6.	NRC 150	91.9	1796	V
7.	Pusa Sipani 408	89.7	1796	V
8.	JS 20-34 (c)	89.3	1784	VI
9.	JS 95-60 (c)	88.4	1590	VIII

High oil and lox 2 free entry NRC 149 out yielded the best checks in North Plain and Eastern Zones while it was comparable to best checks in North Eastern and Central Zones (Table 3c).

Table 3c: Promising high oil and lox 2 free entries in IVT across different zones

S. No.	Entry	Northern Plain Zone		North Eastern Hill Zone		Eastern Zone		Central Zone	
		Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank
1.	NRC 149	2716	I	3514	III	2037	III	2222	I
2.	NRC 86 (c)							2156	III
3.	JS 20-116 (c)					1790	IX		
4.	SL 1074 (c)	2346	II						
5.	MACS 1460 (c)			3571	II				

Advanced Varietal Trial – I

The results of mean performance of AVT-I entries over two years are presented in summary report of plant breeding trials. Table 4a shows performance of superior AVT-I entries in North Plain Zone. None of the entries could out yield the best check in Northern Hill Zone, North Eastern Zone and Eastern Zone. In Northern Plain Zone, JS 21-71 was significantly superior to the best check PS 1347.

Table 4a: Promising entries in AVT I of Northern Plain Zone.

S. No.	Entry	Yield	Rank
1.	JS 21-71	1946	I
2.	PS 1347 (c)	1783	II

EDV entries for YMV (NRCSL 2) and null KTI (MACSNRC 1667) were comparable to the respective parent varieties JS 335 and MACS 450 respectively in their respective Zones (Central and Southern Zone) (Table 4b).

Table 4b: Evaluation of EDVs of JS 335 (YMV resistance) and MACS 450 (Null KTI)

S. No.	Entry	Central Zone		Southern Zone	
		Yield	Rank	Yield	Rank
1.	NRCSL 2	1859	I		
2.	MACSNRC 1667			2236	II
3.	JS 335 (c)	1781	II		
4.	MACS 450 (c)			2299	I

NRC 138, an early maturing entry was evaluated in Central Zone and it was comparable to the best check JS 20-34 in yield and maturity (Table 4c).

Table 4c: Promising early maturing entry in AVT I of Central Zone

S No.	Entry	Yield	Rank	Maturity	Rank
1.	NRC 138	1785	II	95.1	II
2.	JS 20-34	1761	I	93.5	I

In South Zone, Karune was the vegetable type soybean entry and it surpassed the best check KDS 726 in green pod yield (Table 4d).

Table 4d: Promising vegetable type soybean entry in AVT I in Southern Zone

S, No.	Entry	Green Pod Yield	Rank
1.	Karune	10986	I
2.	KDS 726	9787	II

Advanced Varietal Trial-II

Table 5a shows promising entries for identification as variety with their yields (Average of IVT, AVTI and AVTII). In Northern Plain zone three entries PS 1611, PS 1613 and NRC 128 could out yield the best check variety PS 1347. In Eastern Zone, NRC 136 was the drought tolerant entry and was significantly superior to the best check. In addition to NRC 136, five other entries

could surpass the best check JS 97-52 in this zone. In Central Zone, AMS 100-39 was significantly superior to the best check NRC 86. In Southern Zone, five entries namely RSC 11-07, MACS 1493, AMS 100-39, KDS 992 and DSb 34 could out yield the best check JS 335.

Table 5a: Promising entries across different zones in AVT II

S. No	Entry	Northern Plain Zone		Eastern Zone		Central Zone		Southern Zone	
		Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank
1.	PS 1611	2132	III						
2.	PS 1613	2345	I						
3.	NRC 128	2269	II	1871	II				
4.	NRCSL 1			1706	V				
5.	RSC 11-07			1916	I				
6.	AMS 2014-1			1804	III				
7.	MACS 1493			1727	IV				
8.	NRC 136 (Drought tolerant)			1700	VI				
9.	AMS 100-39					2043	I		
10.	RSC 11-07							2507	IV
11.	MACS 1493							2607	III
12.	AMS 100-39							2498	V
13.	KDS 992							2661	I
14.	DSb 34							2661	II
15.	PS 1347 (C)	1888	IV						
16.	JS 97-52 (c)			1522	X				
17.	NRC 86 (c)					1846	II		
18.	JS 335 (c)							2265	11

In central Zone for which the early maturity trial are conducted, entry NRC 130 was comparable to early maturing check JS 20-34 in yield and maturity (Table 5b).

Table 5b: Promising early maturing entries in AVT II of Central Zone

S. No.	Entry	Yield	Rank
1.	NRC 130	1520	I
2.	JS 20-34 (c)	1514	II

NRC 147, a high oleic acid entry was comparable to the best check JS 335 (Table 5c) in Southern Zone.

Table 5c: Promising high oleic entries in AVT II of Southern Zone

S. No.	Entry	Yield	Rank
1.	NRC 147	2362	I
2.	JS 335 (c)	2276	II

Null lox 2 entry NRC 132 was comparable to the best check in Southern and Eastern Zones (Table 5d).

Table 5d: Promising null lox 2 entry in AVT II

S. No.	Entry	Southern Zone (Null Lox 2)		Eastern Zone (Null Lox 2)	
		Yield	Rank	Yield	Rank
1.	NRC 132	2277	IX	1652	VII
2.	JS 335 (c)	2265	II		
3.	JS 97-52 (c)			1522	X

3.2 Breeder seed production

The indent for soybean breeder seed for *Kharif* 2020, to be produced in 2019 was **16881.3**q. The indent comprised of 41 varieties. Major indent of 84.8% was given for nine (9) most important varieties namely JS 20-34 (18.1%), JS 335 (14.4%), JS 20-29 (10.9%), JS 20-69 (8.5%), JS 20-98 (7.8%), JS 93-05 (7.7%), JS 95-60 (7.3%), RVS 2001-4 (5.1%) and RVS 2002-4 (4.7%). The largest indent was given for JS 20-34 and JS 335 i.e. **3064.6 and 2435.0 q** respectively which is **32.5 %** of total indent. Against these indents a target of **17891.0** q was allotted to different AICRP Soybean and other NSP centres. The variety and centre wise production figures are shown in table **6**. A total of **11982.2** q breeder seed was produced during *kharif* 2019. There was a deficit of **4899.1**q.

The compensatory breeder seed production of **1800** q was planned during Rabi/Summer 2019-20 at JNKVV, Jabalpur; UAS, Dharwad; MPUAT, Udaipur; MPKV, Rahuri; VNMKV, Parbhani; UAS, Bengaluru and UAS, Shivamoga to compensate the deficit. The compensatory breeder seed production had been taken up for JS 20-34 (360q), JS 335 (150q), JS 20-29 (90q), JS 93-05 (260q), JS 95-60 (295q), JS 20-98 (217q), JS 20-69 (60q) and MAUS 71 (200q) (Table 7). There was major production failure at JNKVV centre during kharif 2019. This centre could produce 1439q against the target of 3830q. RVSKVV failed at the tune of 91% and 53% for production of JS 93-05 and JS 95-60.

Table 6: Breeder seed production *Kharif* 2019

Sl. No	Variety	Year	DAC Indent (q)	Centre	Allotment (q)	Production (q)	Surplus / Deficit over Indent (q)
1	JS 20-34	2015	3064.6	JNKVV, Jabalpur	1100	392	
				AU, Kota	800	597	
				MPUAT, Udaipur	300	110	
				RVSKVV, Gwalior	400	230	
				PDKV, Akola	100	61	
				VNMKV, Parbhani	200	8.5	
				IISR, Indore	0	16	
				Total	**2900**	**1414.5**	**-1650.1**
2	JS -335	1994	2435	RVSKVV, Gwalior	200	157	
				UAS, Dharwad	600	550	
				PDKV, Akola	300	300	
				MPKV, Rahuri	500	560	
				UAS, Bengaluru	300	500	
				UAS, Raichur	150	200	
				PJTSAU, Hyderabad	400	345	
				UAHS, Shivamogga	100	60	
				ARI, Pune	50	10	
				Total	**2600**	**2682**	**247**
3	JS 20-29	2014	1840.8	JNKVV, Jabalpur	200	70	
				RVSKVV, Gwalior	500	71	
				AU, Kota	300	106	
				MPUAT, Udaipur	300	125	
				Lokbharti, Sonasar	200	175	
				VNMKV, Parbhani	200	50	
				IGKV, Raipur	300	175.6	
				Total	**2000**	**772.6**	**-1068.2**
4	JS 93-05	2002	1303	RVSKVV, Gwalior	300	27	
				UAS, Dharwad	500	385	
				IGKV, Raipur	200	203.2	
				PDKV, Akola	200	200	
				MPKV, Rahuri	100	30	
				PJTSAU, Hyderabad	50	21	
				UAHS, Shimoga	100	25	
				AU, Kota	0	2	
				Total	**1450**	**893.2**	**-409.8**

5	JS 20-69	2016	1443.1	JNKVV, Jabalpur	1200	493	
				RVSKVV, Gwalior	300	100	
				VNMKV, Parbhani	50	43	
				IGKV, Raipur	50	100	
				IISR, Indore	0	30	
				Total	**1600**	**766**	**-677.1**
6	JS 95-60	2007	1244.7	RVSKVV, Gwalior	1000	471	
				AU, Kota	60	44	
				HIL	300	280	
				Total	**1360**	**795**	**-449.7**
7	JS 20-98	2018	1320.4	JNKVV, Jabalpur	1330	405	
				RVSKVV, Gwalior	0	9	
				Total	**1330**	**414**	**-906.4**
8	JS 97-52	2008	93	IGKV, Raipur	110	128.8	
				BAU, Ranchi	10	12	
				Total	**120**	**140.8**	**47.8**
9	DSb - 21	2014	297	UAS, Dharwad	325	320	23
10	DSb 23		28.9	UAS, Dharwad	35	35	6.1
11	RVS 2001-4	2014	864.1	RVSKVV, Gwalior	900	1018	
				JNKVV, Jabalpur		79	
				Total	**900**	**1097**	**232.9**
12	Raj Soya – 18	2017	375	RVSKVV, Gwalior	400	6	-369
13	RVS 2002-4	2017	800	RVSKVV, Gwalior	900	319	-481
14	RKS -113	2016	10	AU, Kota	15	30	20
15	RKS- 45	2013	5	AU, Kota	5	2.8	-2.2
16	RKS - 24	2011	5	AU, Kota	5	1.2	-3.8
17	MAUS - 158	2010	423	VNMKV, Parbhani	450	201	-222
18	MAUS - 71	2002	405	VNMKV, Parbhani	425	0	-405
19	MAUS - 162	2014	228	VNMKV, Parbhani	250	637	409
20	MAUS - 612	2018	183	VNMKV, Parbhani	200	254	71
21	NRC - 86	2015	110	IISR, Indore	125	60	-50
22	NRC - 37	2001	55	IISR, Indore	60	25	
				PDKV, Akola	20	50	
				Total	**80**	**75**	**20**
23	CG Soya 1	2018	95	IGKV, Raipur	110	196.4	101.4
24	Basara	2017	100	PJTSAU, Hyderabad	120	73	-27
25	MACS - 1188	2013	20	ARI, Pune	25	17	-3
26	MACS - 1281	2016	15	ARI, Pune	20	10	-5
27	PhuleKalyani	2006	32	MPKV, Rahuri	40	100	68
28	PhuleSangam	2018	25	MPKV, Rahuri	30	310	285
29	PS -1225	2009	14	GBPUAT, Pantnagar	18	72	58
30	PS -1347	2008	4	GBPUAT, Pantnagar	5	65	61
31	PS - 1368	2013	2	GBPUAT, Pantnagar	2	1.3	-0.7
32	Palam Soya	2005	15.6	CSKHPKV, Palampur	18	29.6	14
33	Hara Soya	2001	6.3	CSKHPKV, Palampur	8	8.5	2.2
34	Shiwalik	1990	2	CSKHPKV, Palampur	2	17.6	15.6
35	Pusa 12	2015	5	IARI, New Delhi	5	1.5	-3.5
36	VL Soya - 65	2010	4	VPKAS, Almora	4	6.5	2.5
37	VL Soya - 63	2008	2	VPKAS, Almora	2	2.8	0.8
38	VL 77	2016	4	VPKAS, Almora	4	0	-4
39	VLS - 89	2019	1	VPKAS, Almora	1	4.6	3.6
40	SL - 958	2015	0.4	PAU, Ludhiana	1	1	0.6
41	Birsa Soybean - 1	1983	0.5	BAU, Ranchi	1	2	1.5
42	Phule Kimaya			MPKV, Rahuri	0	35	35
43	PDKV Yellow Gold			PDKV, Akola	0	96	96
44	PS 1092	2000		GBPUAT, Pantnagar	0	0.5	0.5
45	Him Soya			CSKHPKV, Palampur	0	14.4	14.4
46	Palam Early Soya			CSKHPKV, Palampur	0	1.5	1.5
	Grand Total		**16881.3**		**17891**	**11982.2**	**-4899.1**

Table 7: The compensatory Breeder Seed production during Rabi/Summer 2019-2020

Sl. No.	Variety	Year	Deficit in K-2019 (q)	Centre	Production (q)
1	JS 20-34	2015	**-1650.1**	JNKVV, Jabalpur	210
				MPUAT, Udaipur	20
				RVSKVV, Gwalior	72
				PDKV, Akola	8
				UAS, Raichur	50
				Total	**360**
2	JS -335	1994	**247.0**	UAS, Dharwad	150
3	JS 20-29	2014	**-1068.2**	MPUAT, Udaipur	20
				VNMKV, Parbhani	40
				IGKV, Raipur	30
				Total	**90**
4	JS 93-05	2002	**-409.8**	UAS, Dharwad	225
				MPKV, Rahuri	35
				Total	**260**
5	JS 20-69	2016	**-677.1**	JNKVV, Jabalpur	30
				VNMKV, Parbhani	30
				Total	**60**
6	JS 95-60	2007	**-449.7**	UAS, Dharwad	180
				UAHS, Shivamogga	50
				UAS, Bengaluru	65
				Total	**295**
7	JS 20-98	2018	**-906.4**	JNKVV, Jabalpur	217
8	DSb - 21	2014	**23**	UAS, Dharwad	35
9	DSb 23		**6.1**	UAS, Dharwad	15
10	Raj Soya – 18	2017	**-369**	RVSKVV, Gwalior	12
11	RVS 2002-4	2017	**-481**	RVSKVV, Gwalior	36
12	MAUS - 71	2002	**-405**	VNMKV, Parbhani	200
13	JS 20-94	2019	**0**	JNKVV, Jabalpur	25
14	JS 20-116	2019	**0**	JNKVV, Jabalpur	45
	Grand Total		**-4899.1**		**1800**

3.3 Production technology

All the trials were conducted during *kharif* 2019 across all Centres of AICRP representing 6 zones of the country as per technical programme. The experiment-wise salient findings are given as under:

Evaluation of AVT II entries under different sowing dates

All the new entries (AMS 2014-1, NRC 136, MACS 1493, NRC 132, RSC 11-03, NRCSL 1, NRC 137) except NRC 147 gave more than 10% higher yield than check variety RKS 18 in North Eastern zone. The maximum yield was recorded with NRC 128 and RSC 11-07 in North eastern zone. New entry AMS 100-39 yielded higher (14.55%) than check variety NRC 86 in Central zone. New entry BAUS 102 yielded higher (27.57%) followed by MACSNRC 1667 (26.77%), MACS 1493 (17.88%), AMS 100-39 (16.33%), AMS 2014-1 (14.38%), SKF SP 11 (14.08%), NRC 147 (11.78%) and KDS 992 (11.35%) than check variety DSb 21 in Southern zone.

The wider row spacing (45 cm) marginally yielded higher in North plain, North eastern and Southern zone while in Central zone it was higher with narrow row planting (30 cm).

Sustainable soybean production through crop rotation and tillage systems

This the second cycle of crop rotation. The maximum SEY was recorded with soybean-soybean-soybean-maize rotation in north plain, soybean-maize-soybean-maize in north eastern, and Southern and soy-soy-maize-soy rotation in central zone. Conventional tillage gave higher SEY over minimum tillage in central and southern zone while the differences were negligible between tillage systems in North plain and north eastern zone.

System intensification for soybean productivity augmentation under Ridge Furrow planting

This was second year of the trial and invariably planting geometry of 45 x 10 cm or 45 x 5 behaved identically and was found superior over wider plant to plant spacing. The maximum yield was recorded with SL 958 in north plain, RSC 1046 in north eastern, JS 97-52 in north eastern hill, RVS 24 in Central and MACS 1188 in southern zone. The productivity potential of both the varieties was identical in central zone.

Evaluation of partial factor productivity for soybean

Soybean grown with full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow) yielded maximum as compared to other treatments. The balanced fertilizer, weed management and plant protection showed the maximum yield gap than rest of the factors.

Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on soybean

The trial was conducted under contract research and the application of Macarena enhanced the yield by 2.05 to 228.47% over weedy check. The combined application of Macarena + herbicide further increased the yield to the tune of 8.88 to 80.33% as compared to alone Macarena.

3.4 Frontline demonstrations (FLDs)

During the year, 24 centers have conducted a total of 980 FLDs on farmer's fields against the target of 900 FLDs in plot of 0.4 ha each.

Data accrued from successful 967 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 33.55 and 50.37% over farmers practice which was achieved by the additional expenditure of only Rs. 4134/ha. The estimated yield gap II was 417 kg/ha.

A summary of FLDs over 30 years (Table 8) consistently shows the benefits of improved technology.

Table 8: Soybean yield (kg/ha) and yield gap II in Front Line Demonstrations

Sl.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

3.5. Entomology

Total seven field/laboratory trials were conducted during *kharif* 2019 by the 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 (42.67 %) due to stem fly maggots was reported from Parbhani. 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 (33.33%). Pod damage due to *Cydia ptychora* to the extent of 47.28 % was observed at Dharwad center. High incidence of aphids (26.0/plant), leaf webber (12.0 larvae/m) and Bihar Hairy caterpillar (96.6 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. The larval mortality ranged from 11 to 50 %.

Soybean genotypes belonging to IVT, AVT-I, AVT-II of different zones were evaluated for insect resistance. Considering three years' data in AVT, 38 genotypes were found to be promising with respect to resistance against stem fly, defoliators, girdle beetle, pest complex and aphid. In IVT of *kharif* 2019, two kinds of IVT trials viz., IVT (Normal genotypes) and IVT (Early maturing genotypes) were conducted and twenty six entries from IVT (Normal genotypes) and ten from IVT (Early maturing genotypes) were found promising which will be evaluated further during coming season.

To confirm the type of resistance, 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, among 16 genotypes tested, only NRC 137 exhibited **strong antixenosis** reaction against *S. litura* larvae. Entries viz. NRC 128, DSb 34 and MACS 1493 exhibited good level of **antibiosis** with relatively lower AD, ECI and ECD as compared to other genotypes. All the Breeders should send their AVT-II entries to PI, Entomology for this trial.

Evaluation of germplasm is a regular process. This year also 50 germplasm lines were sent to the entomologists for screening against major insects at hot spots. As many as 6 lines exhibited insect resistance and good yield potential. These lines will also be tested further during next season.

In evaluation of promising genotypes against major insect-pests at Sehore, Indore, Kota, Dharwad and Imphal, 27 genotypes/lines were found promising at their respective centres.

In management of major insect-pests of soybean through microbial insecticides four microbial insecticides were tested at Amrawati, Parbhani, Imphal. *N.rileyi* @4ml/l was found best at Parbhani against tobacco caterpillar and semiloopers, *Beauveria bassiana* @ 4g/l at Amrawati against tobacco caterpillar, *Metarhizium anisopliae* @ 4g/l at Imphal against tobacco caterpillar and Bt Commercial @ 1g/l was found best treatment at Imphal against Bihar hairy caterpillar and leaf webber.

3.6 Plant Pathology

Six Pathology field trials were conducted during *kharif* 2019 at 15 co-ordinated centres spread over six 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. As reported by various centres, although a total of 19 diseases appeared across the country on soybean, only 11 of them were wide spread occurring in 3 or more zones and four were zone specific. The FLS at Almora, Palampur, Sehore, Jabalpur and Dharwad; YMV at Pantnagar, Ludhiana, Dholi and Delhi; RAB at Pantnagar, Jabalpur, Jorhat and Medziphema; CollR at Jorhat, Sehore and Jabalpur; rust and PB (Ct) at Dharwad and K. Digraj. Seed rot at Jorhat, BND at Delhi and IIB at Raipur 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 northern Plain zone while MLS appeared only at Central zone, BND

at Delhi and Seed rotting at Jorhat and IBB at Raipur in moderate to severe form. 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.

Soybean genotypes belonging to IVT, AVT-I, AVT-II of different zones were evaluated for disease resistance. Considering the disease severity, genotypes found to be promising with respect to resistance against FLS, MLS, PB (Ct), RAB, YMV, Rust, TLS, IBB, CollR, BLB, CR and BND were identified. **In IVT trial**; entries PS 1641, PS 1642, NRC 49 and Himso 1690 showed either HR/AR reaction over three locations and entries VLS 99, PS 1641, PS 1642, DSb 37, MACS 1639, KDS 1099, AMS 353, NRC 167 and Asb 50 showed either AR/HR reaction over two locations for PB (ct).

The entries DS 1318, JS 22-01, NRC 49, Himso 1690 and RVSM 2011-77 showed HR reaction at Delhi and Ludhiana centers for YMV. DSb 37 showed HR reaction to rust at all three locations (Dharwad, Medziphema and K. Digraj) in initial varietal screening trial. In IVT (early), none of entries showed resistant reaction for MLS at Sehore center while 13 entries showed resistant reaction at Indore center. The entries RVC 2011-73 and PUSA Sipani-1050 showed MR reaction to RAB. The reaction of entries remained specific to single disease across the locations except MLS in IVT (early) trial.

In AVT I trial, 19 entries screened with 15 different checks for disease susceptibility & yield at different hot spot locations. In NHZ, data wrt to screening of FLS, PB(Ct) was found reliable with more than 77.7 per cent infection in susceptible entries. None of entries showed either AR/HR reaction to FLS at Palampur & Almora centers. Only seven entries showed MR reaction to FLS at Palampur and entries DS 3110 showed AR reaction & Himso 1689 and JS 21-71 showed HR reaction to PB (Ct) at Palampur. In NPZ, entry DS 3110 and NRC 138 showed HR reaction for YMV at Delhi center and DS 3110 & JS 21-71 showed MR reaction at Ludhiana center. In eastern zone, none of entries showed AR/HR reaction to PB (Ct). However, ten entries showed MR reaction to PB(Ct). The entries DS 3110 and NRC 38 showed HR reaction across the zones (NHZ & NEHZ) against PB (Ct). In Central zone, seven entries showed AR reaction to CR at Jabalpur while Himso 1689 showed HR reaction to RAB. None of entries showed either AR/HR reaction to MLS, PB(Ct) & SMV across different locations. In Southern Zone, DSb 33 showed HR reaction at Dharwad while MR reaction at K. Digraj indicating highly resistant reaction to only Race 2 of *Phakopsora pachyrhizi* and MR reaction to Race 3 prevalent in Maharashtra state.

In AVT–II trial, twenty one entries were screened along with checks for disease susceptibility & yield at different hot spot locations. The entries NRCSL 1 and PS 1613, PS 1611 showed either AR/HR reaction over three locations (Pantnagar, Ludhiana and Delhi). All the entries showed susceptibility at Ludhiana center except NRCSL 1 and PS 1611. The entries DS 3108, MACS 1493, NRC 132 and PS 1613 showed HR reaction over two locations (Palampur and Pantnagar). None of entries showed either AR/HR reaction to FLS, RAB and YMV at Almora, Pantnagar and Dholi centers respectively. The entries DS 3108 & NRC 128 showed AR/HR reaction over different zones (NHZ,NPZ & Eastern zone). In CZ zone, the screening data was reliable wrt YMV, RAB, TLS and PB(Ct) across the locations. The entry NRCSL 1 was resistant for YMV and PB(Ct) across the locations. None of entries showed either AR/HR reaction to TLS

at Sehore and SMV & MLS at Indore centers. In SZ, DSb 34 showed HR reaction to rust at Dharwad and MR reaction at K. Digraj.

In the trial on performance of previous year resistant entries screened across six different zones, the entries JS 20-71, JS 20-89, DS 3050 and AMS 1002 maintained AR reaction at 6th year of their testing at Amravati center under sick plot conditions. The entries DSb 21, DSb 23 & DSb 28 maintained their HR reaction to rust at their 8th year of testing. The rust resistant donors EC 241778, EC 241780 & EC 242104 showed HR reaction at their 12th and 8th year of testing respectively at Dharwad center. At Pantnagar out of 32 previous entries, SL 1068, SL 1123 and DS 3108 maintained AR/HR status to YMV and RAB at second year of testing. At Jabalpur, the entries JS 20-34, JS 20-98, JS 20-36 and NRC 125 showed HR reaction to CR at their 6th year of testing.

Fifty germplasm lines were evaluated at Palampur, Jabalpur, Indore, Dharwad and Pantnagar centres for identification of sources of multiple disease resistance. At Palampur, five entries (CAT 1241, EC 107407, EC 241771, JS 20-51, JS 20-69 and EC 241696 and EC 291398 showed multiple disease resistance to PB(Ct) and BS. At Jabalpur, EC 107407, JS 20-53, EC 109540 showed resistance to YMV and RAB diseases. At Dharwad Center, DSb 21 and EC 242104 showed multiple resistance to rust and PSS diseases. None of entries showed multiple disease resistance at Indore center. At Pantnagar, the entries EC 109540 and JS 20-69 showed resistance to RAB & PB(ct).

In the integrated disease and pest management trial, seed treatment with Thiophanate methyl+Praclostrobin @ 2g per kg of seed followed by spraying with Chlorantraniliprole 0.2ml/L at 15 and 35 DAS was found effective in management of root rot complex and stem borers of soybean and resulted in enhanced the yield of the crop.

3.7. Microbiology

Isolation and functional characterization of selected rhizobia/rhizobacteria for developing inoculants to mitigate abiotic stress in soybean

This experiment was planned at various centers to recover fluorescent pseudomonads from the soybean rhizosphere soil and eventually to use them as potential PGPR for soybean. At Indore centre, two strains of *P. fluorescens* were found to have higher plant growth promoting (PGP) traits. They also were positive to ACC deaminase activity and showed growth at 30% PEG indicating this could be moisture tolerant strains. The strains will be characterized further through 16SrRNA gene sequences.

At Delhi centre, out of 16 pseudomonads, 04 moisture tolerant fluorescent pseudomonad isolates (tolerant upto 30% PEG) were found to be positive for IAA and siderophore production. At Ludhiana centre, 02 potential pseudomonads were selected based on multifarious PGP traits *viz.* IAA, P-solubilization, siderophore, ACC deaminase, salt tolerance and also positive for catalase and superoxide dismutase (SOD). Pseudomonads *viz.* LSE-2 & LSE-3 showed excellent growth on DF medium containing ACC as nitrogen source. Further, 2 pseudomonads LSE-2 & LSE-3 were identified as *P. oryzihabitans* and *P. fluorescence* by 16 S rRNA sequencing. At Pantnagar centre,

a total of 26 probable fluorescent *Pseudomonas* isolates were recovered from the soybean rhizosphere soil and roots and are being screened for moisture tolerance and PGP traits.

At Ludhiana, 08 rhizobacterial isolates were identified as fluorescent pseudomonads and screened for multifarious PGP traits (IAA, P-solubilization, siderophore, ACC deaminase and salt tolerance). On the basis of PGP traits, out of 8 pseudomonads, only 2 bacterial isolates were selected as potential PGPR (LSE-2 & LSE-3- identified as *P. oryzihabitans* and *P. fluorescence*) which possess ACC deaminase trait under abiotic stress conditions. Based on PEG screening (30% PEG), *P. oryzihabitans* was found to be tolerant than *P. fluorescence.*

At Pantnagar centre, a total of 08 isolates were recovered as fluorescent *Pseudomonas* and screened for moisture stress tolerance characteristics in a gradient of PEG-6000. Based on PEG screening, four isolates (pant-1, pant-3, pant-6 & pant-7) were found to show higher growth at 30% PEG and therefore were selected for further characterization**.**

Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean under pot conditions

This experiment was carried out in microcosms in unsterilized soil under moisture stress conditions (withholding water at R5 stage). Two potential soybean rhizobia (*B. daqingense* and *B. liaoningense*) recovered from soybean nodules by Indore centre were tested under moisture stress conditions. With these strains, a commercial/local soybean *Rhizobium* culture was also included in the trial. Across all the centres, inoculation of *B. daqingense* was found to be the superior strain in terms of having higher nodulation, biomass, nutrient uptake and physiological traits than the other combinations. Moreover, inoculation also improved plant fitness against stress. In conclusion, treatment of *B. daqingense* performed better under both the conditions than the all other strains which signify the role of inoculants in stress tolerance of soybean plants.

Field evaluation of AMF and *Paenibacillus polymyxa* microbial combination at farmer's field

Across all the centres, combined inoculation of *Paenibacillus polymyxa* (HKA 15) with AMF increased the nodule number, nodule dry mass as well as yield over farmer's practices. After conducting experiment for three years, it is concluded that co-inoculation of *Paenibacillus polymyxa* (HKA 15)+AM fungi at 75% RDF not only have comparable response with that of 100% RDF/farmers (20, 40,60 Kg NPK/ha) practice but also enhanced yield and cost:benefit ratio. Hence, it is recommended that application of both *Paenibacillus polymyxa* (HKA 15) +AM fungi together results in improving the crop stand, increasing the soybean yield and also saving fertilizer inputs by 25%.

Nodulation ability of AVT-II entries at respective centres

The performance of AVT II entries in terms of nodulation and compatibility with native homologous rhizobia was assessed in the field and observed that in the central zone, all the three entries (AMS 100-39, NRC 130 & NRC 130) performed equal or better in terms of producing higher nodules per plant, nodule dry weight and leghaemoglobin content in the fresh nodules than the checks (NRC 86 and JS 335).

In the north plain zone, across three centres (Delhi, Ludhiana and Pantnagar), three AVT-II lines, PS 1613, PS 1611, NRC 128 along with PS 1347 & SL 958 as checks were screened for nodulation in the breeder's field trial. Across all centres, entry PS 1613 was found to be most promising followed by PS 1611 and NRC 128.

At Dharwad centre, when compared to checks (JS 335 & DSb 21), out of 11 AVT II entries, only five entries viz., DSb 34, MACS 1493, RSC 11-07, BAUS 102 & AMS 2014-1 were found to have either equal or slightly higher nodulation parameters than the checks. However, out of five best, only two entries ie., DSb 34 & MACS 1493 were found to be most promising based on having significantly higher nodulation parameters and have compatibility with native homologous rhizobia and produced higher nodulation, nodule dry weight and leghaemoglobin content in nodules than the checks and with rest of test entries.

3.8 Soybean processing and value addition

CAU, Imphal center is working on this aspect with three objectives – i) to develop neutraceutical/functional food from fermented soybean-*Hawaizar*, ii) to see the effect of different soybean varieties on quality of soymilk production and iii) to formulate and develop soy okara (fresh) cookies by blending with different levels of black scented rice flour.

Fermentation of soybean with new starter cultures H and S was found to enhance phenolic contents and protein content. Among the varieties tested, NRC 132 and JS 335 showed least activity of lipoxygenase and thus identified as suitable for making various soya-based food products. Different combinations of wheat flour, okara and black rice flour were tested for making cookies. Incorporation of 10% okara in traditionally used mixture of wheat and black rice flours improved the nutritional quality of cookies in terms of protein and fiber content without compromising with the acceptable taste. These cookies can also be used for sponsored distribution among underprivileged segments of society through mid-day meals to fight malnutrition as they are high in nutrition in comparison to other traditional means and will also help in generating employment at local level in remote areas.

परीक्षणों की सारांश – तालिकाएँ

Summary Tables of Experiments

पादप प्रजनन
Plant Breeding

Principal Investigator	**Dr. Sanjay Gupta, 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
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
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	VLS 99	3309	2074	2321	2568.00	I
2	SL 1213	2049	2247	3407	2567.67	II
3	PS 1641	1827	2494	2000	2107.00	IX
4	NRC 154	1457	1753	1580	1596.67	XXXI
5	RVS 2011-32	1580	2025	1802	1802.33	XXII
6	MACS 1655	1877	1975	2247	2033.00	XVI
7	SKF 2036	1753	1827	2173	1917.67	XX
8	AUKS 200	1901	1284	1481	1555.33	XXXII
9	DS 1318	1704	2272	2173	2049.67	XIII
10	VLS 59 (C)	2296	1333	2247	1958.67	XIX
11	NRC 163	1580	2272	2099	1983.67	XVIII
12	JS 22-01	1556	1802	1975	1777.67	XXIV
13	RSC 11-20	1531	963	1778	1424.00	XXXVI
14	TS 46	2173	1877	2222	2090.67	XI
15	MAUS 717	1852	1877	2272	2000.33	XVII
16	PS 1642	1407	1556	2321	1761.33	XXV
17	AMS 20-19	1877	2272	3432	2527.00	III
18	KDS 1097	864	1012	1654	1176.67	XL
19	DSb 37	1383	1654	3086	2041.00	XV
20	VLS 89 (C)	2617	1605	2716	2312.67	V
21	ASb 51	840	1333	1012	1061.67	XLI
22	NRC 149	1037	2790	2568	2131.67	VIII
23	VLS 98	2123	1926	2642	2230.33	VI
24	DS 1326	1333	1556	2494	1794.33	XXIII
25	SL 1234	1531	2494	2148	2057.67	XII
26	RSC 11-22	716	1605	2247	1522.67	XXXIII
27	Himso 1690	1951	2198	2938	2362.33	IV
28	BAUS 103	1383	1160	2519	1687.33	XXVIII
29	JS 22-07	1654	1580	1704	1646.00	XXIX
30	PS 1556 (C)	1407	2519	2370	2098.67	X
31	TS 107	1827	2123	2173	2041.00	XV
32	MAUS 712	1605	1704	1802	1703.67	XXVII
33	NRC 168	1160	1531	1852	1514.33	XXXIV
34	MACS 1639	1901	1753	1556	1736.67	XXVI
35	DS 1320	1333	1457	1160	1316.67	XXXIX
36	KDS 1099	1136	1259	2099	1498.00	XXXV
37	AMS 353	1259	1827	2444	1843.33	XXI
38	DSb 36	543	790	1852	1061.67	XLI
39	AUKS 218	1136	1235	1753	1374.67	XXXVIII
40	VLS 63 (C)	2148	1975	2444	2189.00	VII
41	RVSM 2011-77	963	1580	1605	1382.67	XXXVII
42	SKF 6029	2049	2123	1975	2049.00	XIV
43	NRC 167	1235	1284	1605	1374.67	XXXVIII
44	ASb 50	1630	1407	1877	1638.00	XXX
45	RVS 2011-76	2123	1481	2519	2041.00	XV
	Mean	1613.69	1752.53	2140.98		
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	27/06/2019	26/06/2019	25/06/2019		
	CD	222.22	296.30	246.91		
	CV (5%)	8.50	10.20	7.29		
	Pooled CD				213.31	

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	VLS 99	51.33	50.33	61.67	54.44	XVIII
2	SL 1213	56.67	57.67	66.00	60.11	XXXIV
3	PS 1641	59.67	58.33	72.00	63.33	XXXVIII
4	NRC 154	49.00	45.67	59.33	51.33	I
5	RVS 2011-32	48.00	47.67	59.00	51.56	III
6	MACS 1655	53.33	54.67	65.00	57.67	XXVI
7	SKF 2036	48.33	49.67	63.00	53.67	XVI
8	AUKS 200	47.33	48.00	59.33	51.55	II
9	DS 1318	49.00	51.67	62.67	54.45	XIX
10	VLS 59 (C)	48.33	50.67	62.00	53.67	XVI
11	NRC 163	47.33	47.33	60.33	51.66	IV
12	JS 22-01	49.00	48.33	60.00	52.44	IX
13	RSC 11-20	58.33	57.67	69.33	61.78	XXXVII
14	TS 46	59.33	58.67	72.00	63.33	XXXVIII
15	MAUS 717	48.00	48.00	63.33	53.11	XIV
16	PS 1642	55.00	55.33	66.00	58.78	XXIX
17	AMS 20-19	59.33	55.67	67.33	60.78	XXXVI
18	KDS 1097	51.67	51.67	65.67	56.34	XXII
19	DSb 37	59.33	55.33	66.67	60.44	XXXV
20	VLS 89 (C)	52.33	51.67	65.67	56.56	XXIII
21	ASb 51	56.67	57.67	63.00	59.11	XXXI
22	NRC 149	52.67	51.67	63.33	55.89	XXI
23	VLS 98	54.67	54.67	65.00	58.11	XXVII
24	DS 1326	54.67	56.67	65.00	58.78	XXIX
25	SL 1234	56.67	55.33	66.33	59.44	XXXII
26	RSC 11-22	55.00	55.67	64.00	58.22	XXVIII
27	Himso 1690	53.33	52.33	60.00	55.22	XX
28	BAUS 103	58.00	56.00	67.33	60.44	XXXV
29	JS 22-07	51.67	49.33	64.67	55.22	XX
30	PS 1556 (C)	54.33	53.67	63.67	57.22	XXIV
31	TS 107	58.00	55.00	65.67	59.56	XXXIII
32	MAUS 712	49.00	49.67	62.00	53.56	XV
33	NRC 168	47.67	49.00	60.00	52.22	VIII
34	MACS 1639	48.67	49.00	60.33	52.67	XI
35	DS 1320	50.67	48.33	59.67	52.89	XIII
36	KDS 1099	49.33	46.33	61.00	52.22	VIII
37	AMS 353	56.67	48.67	66.67	57.34	XXV
38	DSb 36	48.67	49.33	60.67	52.89	XIII
39	AUKS 218	49.00	47.67	61.00	52.56	X
40	VLS 63 (C)	47.67	47.33	60.00	51.67	V
41	RVSM 2011-77	46.67	50.00	59.67	52.11	VII
42	SKF 6029	49.00	49.33	60.00	52.78	XII
43	NRC 167	48.00	50.67	63.00	53.89	XVII
44	ASb 50	57.00	53.67	66.00	58.89	XXX
45	RVS 2011-76	46.33	49.00	60.00	51.78	VI
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	27/06/2019	26/06/2019	25/06/2019		

Table 1.1.3

Trial : Initial Varietal Trial
Zone : Northern Hill Zone
Character : Days To Harvest Maturity

S.No	Varieties	Almora	Majhera	Palampur	Mean	Rank
1	VLS 99	112.00	117.00	125.00	118.00	XXVI
2	SL 1213	114.00	118.67	125.00	119.22	XXXII
3	PS 1641	115.00	120.67	125.67	120.45	XXXV
4	NRC 154	108.00	118.67	122.67	116.45	XIX
5	RVS 2011-32	105.33	111.33	122.67	113.11	V
6	MACS 1655	110.00	117.67	124.67	117.45	XXIII
7	SKF 2036	106.00	112.33	121.67	113.33	VII
8	AUKS 200	105.00	111.67	122.67	113.11	V
9	DS 1318	107.00	117.67	121.67	115.45	XIV
10	VLS 59 (C)	105.67	119.33	123.67	116.22	XVIII
11	NRC 163	105.33	115.33	122.67	114.44	XI
12	JS 22-01	104.00	108.33	122.67	111.67	I
13	RSC 11-20	108.00	124.33	125.33	119.22	XXXII
14	TS 46	111.00	119.33	124.67	118.33	XXVII
15	MAUS 717	106.00	113.67	123.33	114.33	X
16	PS 1642	107.33	116.00	124.67	116.00	XVI
17	AMS 20-19	112.00	119.00	125.00	118.67	XXIX
18	KDS 1097	106.00	126.67	125.00	119.22	XXXII
19	DSb 37	108.33	118.67	124.67	117.22	XXII
20	VLS 89 (C)	110.33	118.33	123.00	117.22	XXII
21	ASb 51	115.00	119.00	124.00	119.33	XXXIII
22	NRC 149	112.00	121.67	123.33	119.00	XXX
23	VLS 98	114.00	116.67	122.67	117.78	XXV
24	DS 1326	116.00	117.00	122.67	118.56	XXVIII
25	SL 1234	124.00	122.33	126.67	124.33	XXXVIII
26	RSC 11-22	108.00	117.67	122.67	116.11	XVII
27	Himso 1690	114.00	117.33	126.00	119.11	XXXI
28	BAUS 103	115.00	126.67	125.67	122.45	XXXVII
29	JS 22-07	106.33	115.33	122.67	114.78	XII
30	PS 1556 (C)	112.00	125.33	125.67	121.00	XXXVI
31	TS 107	109.00	111.33	124.67	115.00	XIII
32	MAUS 712	105.00	115.00	122.67	114.22	IX
33	NRC 168	104.67	120.00	124.67	116.45	XIX
34	MACS 1639	107.67	113.67	126.33	115.89	XV
35	DS 1320	107.00	111.33	121.67	113.33	VII
36	KDS 1099	108.00	110.67	120.33	113.00	IV
37	AMS 353	112.00	115.67	125.33	117.67	XXIV
38	DSb 36	103.67	116.00	122.67	114.11	VIII
39	AUKS 218	104.67	112.33	121.33	112.78	III
40	VLS 63 (C)	108.00	120.00	125.33	117.78	XXV
41	RVSM 2011-77	107.00	107.67	122.67	112.45	II
42	SKF 6029	108.33	118.33	124.67	117.11	XXI
43	NRC 167	108.00	121.00	121.67	116.89	XX
44	ASb 50	112.00	120.33	127.00	119.78	XXXIV
45	RVS 2011-76	107.33	110.67	121.67	113.22	VI
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	27/06/2019	26/06/2019	25/06/2019		

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	VLS 99	79.00	62.22	55.93	65.72	XL
2	SL 1213	77.67	70.33	58.80	68.93	XXXIX
3	PS 1641	92.33	82.22	60.47	78.34	XVIII
4	NRC 154	77.33	72.22	57.53	69.03	XXXVII
5	RVS 2011-32	81.67	73.77	71.53	75.66	XXIII
6	MACS 1655	91.67	94.22	74.20	86.70	XI
7	SKF 2036	79.33	66.66	72.27	72.75	XXIX
8	AUKS 200	76.00	81.22	64.07	73.76	XXVIII
9	DS 1318	76.33	63.44	47.80	62.52	XLII
10	VLS 59 (C)	73.67	50.22	52.67	58.85	XLIII
11	NRC 163	76.33	58.22	55.40	63.32	XLI
12	JS 22-01	87.67	73.00	62.07	74.25	XXVII
13	RSC 11-20	101.67	87.44	82.47	90.53	VI
14	TS 46	85.67	82.66	56.40	74.91	XXVI
15	MAUS 717	83.33	68.66	59.00	70.33	XXXIV
16	PS 1642	86.33	73.00	66.40	75.24	XXIV
17	AMS 20-19	96.33	83.11	75.20	84.88	XII
18	KDS 1097	116.67	109.22	75.87	100.59	III
19	DSb 37	120.00	101.44	96.87	106.10	I
20	VLS 89 (C)	117.33	83.33	70.73	90.46	VII
21	ASb 51	86.00	77.22	44.40	69.21	XXXVI
22	NRC 149	106.00	116.55	78.40	100.32	V
23	VLS 98	109.00	88.44	69.13	88.86	IX
24	DS 1326	90.33	61.44	61.13	70.97	XXXIII
25	SL 1234	96.67	86.11	57.87	80.22	XV
26	RSC 11-22	100.67	89.11	77.27	89.02	VIII
27	Himso 1690	80.33	85.11	65.87	77.10	XXI
28	BAUS 103	110.00	110.22	80.80	100.34	IV
29	JS 22-07	102.33	88.66	70.07	87.02	X
30	PS 1556 (C)	86.33	86.22	60.53	77.69	XIX
31	TS 107	79.00	84.77	65.20	76.32	XXII
32	MAUS 712	99.00	74.89	62.33	78.74	XVII
33	NRC 168	85.00	69.11	62.67	72.26	XXX
34	MACS 1639	93.33	89.66	58.93	80.64	XIV
35	DS 1320	78.00	82.33	55.33	71.89	XXXI
36	KDS 1099	87.00	95.33	66.27	82.87	XIII
37	AMS 353	86.00	84.88	65.40	78.76	XVI
38	DSb 36	108.33	118.89	80.53	102.58	II
39	AUKS 218	79.00	68.00	61.87	69.62	XXXV
40	VLS 63 (C)	82.00	66.66	58.13	68.93	XXXIX
41	RVSM 2011-77	97.33	74.55	60.00	77.29	XX
42	SKF 6029	85.33	82.44	57.67	75.15	XXV
43	NRC 167	84.33	67.55	55.07	68.98	XXXVIII
44	ASb 50	83.00	80.33	62.13	75.15	XXV
45	RVS 2011-76	83.67	70.33	61.40	71.80	XXXII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	27/06/2019	26/06/2019	25/06/2019		

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	VLS 99	17.35	17.48	16.13	16.99	II
2	SL 1213	11.44	11.61	13.23	12.09	XXVIII
3	PS 1641	10.88	12.22	12.17	11.76	XXXIII
4	NRC 154	15.03	18.35	16.80	16.73	III
5	RVS 2011-32	12.29	13.14	14.40	13.28	XV
6	MACS 1655	10.39	13.06	13.87	12.44	XXVI
7	SKF 2036	11.25	12.28	14.13	12.55	XXIV
8	AUKS 200	11.38	12.54	15.77	13.23	XVII
9	DS 1318	7.57	12.18	11.60	10.45	XXXIX
10	VLS 59 (C)	13.31	16.84	17.63	15.93	V
11	NRC 163	19.85	18.41	18.80	19.02	I
12	JS 22-01	11.72	12.28	14.70	12.90	XX
13	RSC 11-20	10.09	11.91	11.20	11.07	XXXV
14	TS 46	13.10	14.37	13.17	13.55	XIII
15	MAUS 717	10.46	12.23	13.47	12.05	XXIX
16	PS 1642	9.52	9.59	10.50	9.87	XLII
17	AMS 20-19	12.25	13.78	12.20	12.74	XXII
18	KDS 1097	12.42	14.85	14.50	13.92	X
19	DSb 37	10.09	11.71	10.83	10.88	XXXVI
20	VLS 89 (C)	14.73	15.59	14.83	15.05	VIII
21	ASb 51	12.17	12.90	12.93	12.67	XXIII
22	NRC 149	10.71	15.95	14.00	13.55	XIII
23	VLS 98	13.76	15.90	14.50	14.72	IX
24	DS 1326	10.74	9.76	11.87	10.79	XXXVII
25	SL 1234	12.20	12.69	12.63	12.51	XXV
26	RSC 11-22	9.15	11.00	10.40	10.18	XLI
27	Himso 1690	10.80	12.66	13.53	12.33	XXVII
28	BAUS 103	13.01	12.85	12.90	12.92	XIX
29	JS 22-07	13.40	16.09	17.10	15.53	VII
30	PS 1556 (C)	9.97	14.28	10.67	11.64	XXXIV
31	TS 107	11.98	13.45	13.57	13.00	XVIII
32	MAUS 712	10.58	12.06	13.07	11.90	XXXII
33	NRC 168	12.06	16.82	17.77	15.55	VI
34	MACS 1639	11.01	14.12	13.40	12.84	XXI
35	DS 1320	11.00	11.68	12.23	11.64	XXXIV
36	KDS 1099	9.66	10.26	10.63	10.18	XLI
37	AMS 353	11.03	12.49	12.27	11.93	XXXI
38	DSb 36	10.27	15.74	15.50	13.84	XI
39	AUKS 218	8.14	11.66	11.50	10.43	XL
40	VLS 63 (C)	12.50	18.35	18.67	16.51	IV
41	RVSM 2011-77	9.31	11.14	11.63	10.69	XXXVIII
42	SKF 6029	11.52	13.79	14.43	13.25	XVI
43	NRC 167	10.78	16.73	13.63	13.71	XII
44	ASb 50	12.78	14.67	13.07	13.51	XIV
45	RVS 2011-76	10.95	12.29	12.83	12.02	XXX
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	27/06/2019	26/06/2019	25/06/2019		

Table 1.1.6

Trial : Advanced Varietal Trial I
Zone : Northern Hill Zone
Character : Yield(Kg/ha)

S.No	Varieties	Almora	Palampur	Mean	Rank
1	NRC 142	1096	1011	1053.50	V
2	VLS 59(C)	2222	1690	1956.00	III
3	VLS 63(C)	1970	1944	1957.00	II
4	VLS 89(C)	2074	-	2074.00	I
5	PS 1092(C)	-	1219	1219.00	IV
	Mean	1840.50	1466.00		
	N.P.S.(Sqm)	6.75	12.96		
	DOS	03/07/2019	01/07/2019		
	CD	118.52	316.36		
	CV (5%)	5.54	17.33		
	Pooled CD			186.41	

Table 1.1.7

Trial : Advanced Varietal Trial I
Zone : Northern Hill Zone
Character : Days To Flower

S.No	Varieties	Almora	Palampur	Mean	Rank
1	NRC 142	50.25	58.00	54.13	IV
2	VLS 59(C)	47.50	58.00	52.75	III
3	VLS 63(C)	48.25	57.25	52.75	III
4	VLS 89(C)	49.25	-	49.25	I
5	PS 1092(C)	-	51.25	51.25	II
	N.P.S.(Sqm)	6.75	12.96		
	DOS	03/07/2019	01/07/2019		

Table 1.1.8

Trial : Advanced Varietal Trial I
Zone : Northern Hill Zone
Character : Days To Harvest Maturity

S.No	Varieties	Almora	Palampur	Mean	Rank
1	NRC 142	101.25	127.75	114.50	IV
2	VLS 59(C)	101.50	124.00	112.75	II
3	VLS 63(C)	100.50	127.25	113.88	III
4	VLS 89(C)	102.75	-	102.75	I
5	PS 1092(C)	-	130.25	130.25	V
	N.P.S.(Sqm)	6.75	12.96		
	DOS	03/07/2019	01/07/2019		

Table 1.1.9

Trial : Advanced Varietal Trial I
Zone : Northern Hill Zone
Character : Plant Height (cm)

S.No	Varieties	Almora	Palampur	Mean	Rank
1	NRC 142	79.00	54.05	66.53	II
2	VLS 59(C)	66.25	46.20	56.23	IV
3	VLS 63(C)	64.75	58.15	61.45	III
4	VLS 89(C)	88.00	-	88.00	I
5	PS 1092(C)	-	55.85	55.85	V
	N.P.S.(Sqm)	6.75	12.96		
	DOS	03/07/2019	01/07/2019		

Table 1.1.10

Trial : Advanced Varietal Trial I
Zone : Northern Hill Zone
Character : 100 Seed Weight (g)

S.No	Varieties	Almora	Palampur	Mean	Rank
1	NRC 142	9.98	12.85	11.42	V
2	VLS 59(C)	14.25	14.81	14.53	III
3	VLS 63(C)	14.37	16.33	15.35	II
4	VLS 89(C)	13.05	-	13.05	IV
5	PS 1092(C)	-	15.48	15.48	I
	N.P.S.(Sqm)	6.75	12.96		
	DOS	03/07/2019	01/07/2019		

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	VLS 99	0	0	444	148.00	XXXIV
2	SL 1213	1235	1136	1975	1448.67	V
3	PS 1641	0	469	2247	905.33	XII
4	NRC 154	0	370	914	428.00	XXII
5	RVS 2011-32	0	0	1358	452.67	XXI
6	MACS 1655	0	0	0	0.00	XXXV
7	SKF 2036	0	0	1235	411.67	XXIII
8	AUKS 200	0	840	691	510.33	XVIII
9	DS 1318	593	519	1580	897.33	XIII
10	PS 24 (C)	790	0	1111	633.67	XV
11	NRC 163	0	543	1111	551.33	XVII
12	JS 22-01	1037	2148	1481	1555.33	IV
13	RSC 11-20	0	0	1506	502.00	XIX
14	TS 46	0	0	1136	378.67	XXIV
15	MAUS 717	0	0	988	329.33	XXVI
16	PS 1642	0	346	2420	922.00	X
17	AMS 20-19	0	0	889	296.33	XXVIII
18	KDS 1097	0	0	667	222.33	XXXIII
19	DSb 37	0	0	815	271.67	XXX
20	SL 958 (C)	1086	790	1704	1193.33	VIII
21	ASb 51	0	0	691	230.33	XXXII
22	NRC 149	1778	3753	2617	2716.00	I
23	VLS 98	0	0	741	247.00	XXXI
24	DS 1326	1210	1235	1235	1226.67	VII
25	SL 1234	691	790	1284	921.67	XI
26	RSC 11-22	0	0	1679	559.67	XVI
27	Himso 1690	543	889	1457	963.00	IX
28	BAUS 103	0	0	864	288.00	XXIX
29	JS 22-07	691	1654	1802	1382.33	VI
30	SL 1074 (C)	1753	2593	2691	2345.67	II
31	TS 107	0	0	963	321.00	XXVII
32	MAUS 712	0	0	988	329.33	XXVI
33	NRC 168	0	0	963	321.00	XXVII
34	MACS 1639	0	0	0	0.00	XXXV
35	DS 1320	1506	1309	1901	1572.00	III
36	KDS 1099	0	0	963	321.00	XXVII
37	AMS 353	0	0	1111	370.33	XXV
38	DSb 36	0	0	0	0.00	XXXV
39	AUKS 218	519	1136	1111	922.00	X

40	Pusa 97-12 (C)	0	667	1284	650.33	XIV
41	RVSM 2011-77	0	0	963	321.00	XXVII
42	SKF 6029	0	0	963	321.00	XXVII
43	NRC 167	0	444	1037	493.67	XX
44	ASb 50	0	0	691	230.33	XXXII
45	RVS 2011-76	0	543	1111	551.33	XVII
	Mean	1033.24	1108.7	1271		
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	10-07-19	14-06-19	28-06-19		
	CD	49.38	123.46	271.6		
	CV (5%)	8.61	16.58	13.9		
	Pooled CD				144.00	

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	VLS 99	44.33	-	49.00	46.67	V
2	SL 1213	52.67	71.67	55.00	59.78	XLI
3	PS 1641	55.00	73.00	54.67	60.89	XLII
4	NRC 154	40.33	54.33	43.00	45.89	IV
5	RVS 2011-32	45.67	-	48.00	46.84	VI
6	MACS 1655	-	-	53.00	53.00	XXVI
7	SKF 2036	47.67	-	51.00	49.34	XVI
8	AUKS 200	41.67	53.33	47.00	47.33	IX
9	DS 1318	47.67	66.00	50.00	54.56	XXXIV
10	PS 24 (C)	45.67	-	51.00	48.34	XIII
11	NRC 163	42.67	54.67	48.00	48.45	XIV
12	JS 22-01	48.67	63.00	50.00	53.89	XXXI
13	RSC 11-20	55.00	-	59.00	57.00	XL
14	TS 46	53.00	-	54.00	53.50	XXX
15	MAUS 717	48.00	-	50.00	49.00	XV
16	PS 1642	49.67	64.33	54.00	56.00	XXXVI
17	AMS 20-19	49.67	-	52.33	51.00	XXII
18	KDS 1097	47.00	-	48.00	47.50	X
19	DSb 37	50.67	-	55.00	52.84	XXV
20	SL 958 (C)	50.33	65.00	53.67	56.33	XXXVIII
21	ASb 51	50.00	-	51.00	50.50	XXI
22	NRC 149	50.67	65.67	53.00	56.45	XXXIX
23	VLS 98	48.33	-	52.00	50.17	XX
24	DS 1326	49.33	65.00	51.67	55.33	XXXV
25	SL 1234	49.33	64.33	54.67	56.11	XXXVII
26	RSC 11-22	50.67	-	53.00	51.84	XXIII
27	Himso 1690	50.33	64.00	49.33	54.55	XXXIII
28	BAUS 103	52.00	-	54.33	53.17	XXVIII
29	JS 22-07	48.33	62.33	52.33	54.33	XXXII
30	SL 1074 (C)	53.00	73.00	57.00	61.00	XLIII
31	TS 107	48.00	-	51.00	49.50	XVII
32	MAUS 712	47.33	-	52.00	49.67	XVIII
33	NRC 168	45.00	-	49.00	47.00	VII
34	MACS 1639	-	-	48.00	48.00	XII
35	DS 1320	45.33	64.00	50.00	53.11	XXVII
36	KDS 1099	38.67	-	46.33	42.50	I
37	AMS 353	48.00	-	51.00	49.50	XVII
38	DSb 36	46.67	-	49.00	47.84	XI
39	AUKS 218	45.00	57.00	48.33	50.11	XIX
40	Pusa 97-12 (C)	46.00	64.00	48.33	52.78	XXIV
41	RVSM 2011-77	43.33	-	48.00	45.67	III
42	SKF 6029	41.33	-	48.00	44.67	II
43	NRC 167	47.33	61.67	51.00	53.33	XXIX
44	ASb 50	49.00	-	52.00	50.50	XXI
45	RVS 2011-76	42.00	53.00	46.33	47.11	VIII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	10/07/2019	14/06/2019	28/06/2019		

Table 1.2.3

Trial : Initial Varietal Trial
Zone : Northern Plain Zone
Character : Days To Harvest Maturity

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	VLS 99	-	-	113.00	113.00	IX
2	SL 1213	119.00	139.33	122.33	126.89	XXXIV
3	PS 1641	118.67	141.33	118.00	126.00	XXXIII
4	NRC 154	120.00	135.00	116.00	123.67	XXVIII
5	RVS 2011-32	112.67	-	116.67	114.67	XIV
6	MACS 1655	-	-	-	-	
7	SKF 2036	120.00	-	112.67	116.34	XVIII
8	AUKS 200	129.00	136.33	106.00	123.78	XXIX
9	DS 1318	114.33	140.33	112.00	122.22	XXVI
10	PS 24 (C)	115.33	-	113.33	114.33	XII
11	NRC 163	112.33	139.33	124.00	125.22	XXXII
12	JS 22-01	98.00	140.00	109.00	115.67	XVII
13	RSC 11-20	125.67	-	113.00	119.34	XXIV
14	TS 46	116.67	-	112.00	114.34	XIII
15	MAUS 717	120.00	-	115.00	117.50	XX
16	PS 1642	117.00	140.33	114.67	124.00	XXXI
17	AMS 20-19	114.33	-	115.33	114.83	XV
18	KDS 1097	126.33	-	108.00	117.17	XIX
19	DSb 37	110.33	-	112.00	111.17	VIII
20	SL 958 (C)	121.00	139.33	125.33	128.55	XXXVI
21	ASb 51	-	-	110.00	110.00	VII
22	NRC 149	123.67	140.67	122.67	129.00	XXXVII
23	VLS 98	117.67	-	113.33	115.50	XVI
24	DS 1326	117.67	139.00	115.00	123.89	XXX
25	SL 1234	123.33	141.00	127.00	130.44	XXXVIII
26	RSC 11-22	118.00	-	108.00	113.00	IX
27	Himso 1690	122.67	138.00	115.00	125.22	XXXII
28	BAUS 103	126.33	-	121.00	123.67	XXVIII
29	JS 22-07	104.00	138.33	113.00	118.44	XXII
30	SL 1074 (C)	118.33	141.67	123.00	127.67	XXXV
31	TS 107	-	-	107.00	107.00	III
32	MAUS 712	119.67	-	109.00	114.34	XIII
33	NRC 168	116.00	-	110.00	113.00	IX
34	MACS 1639	-	-	-	-	
35	DS 1320	107.33	137.33	109.00	117.89	XXI
36	KDS 1099	109.00	-	107.00	108.00	V
37	AMS 353	114.33	-	114.00	114.17	XI
38	DSb 36	-	-	-	-	
39	AUKS 218	97.00	134.67	108.00	113.22	X
40	Pusa 97-12 (C)	114.00	136.33	115.00	121.78	XXV
41	RVSM 2011-77	105.67	-	107.00	106.34	II
42	SKF 6029	110.67	-	107.00	108.84	VI
43	NRC 167	116.33	141.33	112.67	123.44	XXVII
44	ASb 50	110.00	-	105.67	107.84	IV
45	RVS 2011-76	108.33	136.67	112.33	119.11	XXIII
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	10/07/2019	14/06/2019	28/06/2019		

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	VLS 99	-	-	48.13	48.13	XXXII
2	SL 1213	52.44	58.60	60.93	57.32	XIV
3	PS 1641	47.44	49.87	56.80	51.37	XXIV
4	NRC 154	41.00	46.73	52.87	46.87	XXXV
5	RVS 2011-32	46.11	-	72.00	59.06	X
6	MACS 1655	-	-	-	-	
7	SKF 2036	41.11	-	56.20	48.66	XXX
8	AUKS 200	38.55	48.20	56.40	47.72	XXXIII
9	DS 1318	42.67	48.93	51.53	47.71	XXXIV
10	PS 24 (C)	51.11	-	54.73	52.92	XVIII
11	NRC 163	41.67	40.13	57.47	46.42	XXXVII
12	JS 22-01	49.22	54.87	56.13	53.41	XVII
13	RSC 11-20	50.44	-	77.33	63.89	V
14	TS 46	44.67	-	58.60	51.64	XXII
15	MAUS 717	45.33	-	58.07	51.70	XXI
16	PS 1642	46.59	35.07	58.67	46.78	XXXVI
17	AMS 20-19	43.89	-	55.07	49.48	XXVII
18	KDS 1097	45.00	-	81.53	63.27	VI
19	DSb 37	48.00	-	69.40	58.70	XII
20	SL 958 (C)	70.22	68.13	83.87	74.07	II
21	ASb 51	-	-	51.47	51.47	XXIII
22	NRC 149	72.44	86.73	81.13	80.10	I
23	VLS 98	42.67	-	65.53	54.10	XVI
24	DS 1326	54.55	59.33	58.07	57.32	XIV
25	SL 1234	60.33	65.40	62.07	62.60	VII
26	RSC 11-22	54.33	-	60.87	57.60	XIII
27	Himso 1690	48.33	60.87	61.07	56.76	XV
28	BAUS 103	47.53	-	70.47	59.00	XI
29	JS 22-07	62.89	74.47	64.73	67.36	IV
30	SL 1074 (C)	71.66	76.06	66.87	71.53	III
31	TS 107	-	-	60.33	60.33	VIII
32	MAUS 712	38.89	-	59.33	49.11	XXVIII
33	NRC 168	48.89	-	51.40	50.15	XXVI
34	MACS 1639	-	-	-	-	
35	DS 1320	53.33	60.07	64.87	59.42	IX
36	KDS 1099	37.56	-	58.80	48.18	XXXI
37	AMS 353	47.78	-	58.00	52.89	XIX
38	DSb 36	-	-	-	-	
39	AUKS 218	45.33	44.07	49.67	46.36	XXXVIII
40	Pusa 97-12 (C)	46.56	54.53	56.47	52.52	XX
41	RVSM 2011-77	40.55	-	51.87	46.21	XXXIX
42	SKF 6029	40.40	-	50.13	45.27	XLI
43	NRC 167	53.67	36.87	55.47	48.67	XXIX
44	ASb 50	40.22	-	51.73	45.98	XL
45	RVS 2011-76	49.00	46.80	56.27	50.69	XXV
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	10/07/2019	14/06/2019	28/06/2019		

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	VLS 99	-	-	7.00	7.00	XXIV
2	SL 1213	6.20	6.03	7.87	6.70	XXX
3	PS 1641	5.40	7.10	8.64	7.05	XXIII
4	NRC 154	5.93	8.90	10.92	8.58	X
5	RVS 2011-32	5.70	-	11.70	8.70	IX
6	MACS 1655	-	-	-	-	
7	SKF 2036	5.23	-	7.78	6.51	XXXII
8	AUKS 200	8.53	8.33	10.85	9.24	V
9	DS 1318	6.33	6.50	8.00	6.94	XXV
10	PS 24 (C)	8.33	-	8.15	8.24	XI
11	NRC 163	7.30	9.17	12.73	9.73	II
12	JS 22-01	7.50	8.73	10.56	8.93	VII
13	RSC 11-20	6.23	-	9.70	7.97	XV
14	TS 46	4.57	-	7.76	6.17	XXXV
15	MAUS 717	4.80	-	8.41	6.61	XXXI
16	PS 1642	4.23	5.37	6.82	5.47	XXXVII
17	AMS 20-19	5.17	-	7.75	6.46	XXXIV
18	KDS 1097	6.27	-	8.54	7.41	XX
19	DSb 37	3.50	-	6.52	5.01	XXXVIII
20	SL 958 (C)	7.90	7.07	9.69	8.22	XIII
21	ASb 51	-	-	8.23	8.23	XII
22	NRC 149	9.00	10.17	10.02	9.73	II
23	VLS 98	4.87	-	8.81	6.84	XXVII
24	DS 1326	6.80	6.13	6.48	6.47	XXXIII
25	SL 1234	6.93	5.93	8.85	7.24	XXII
26	RSC 11-22	5.23	-	8.28	6.76	XXVIII
27	Himso 1690	6.87	6.93	8.90	7.57	XVIII
28	BAUS 103	4.99	-	10.59	7.79	XVII
29	JS 22-07	6.83	10.10	14.74	10.56	I
30	SL 1074 (C)	6.33	5.93	7.94	6.73	XXIX
31	TS 107	-	-	8.95	8.95	VI
32	MAUS 712	5.80	-	8.90	7.35	XXI
33	NRC 168	6.37	-	12.33	9.35	IV
34	MACS 1639	-	-	-	-	
35	DS 1320	6.40	6.13	9.80	7.44	XIX
36	KDS 1099	3.40	-	8.86	6.13	XXXVI
37	AMS 353	4.17	-	9.22	6.70	XXX
38	DSb 36	-	-	-	-	
39	AUKS 218	4.93	7.13	10.25	7.44	XIX
40	Pusa 97-12 (C)	6.33	6.63	7.77	6.91	XXVI
41	RVSM 2011-77	5.07	-	10.89	7.98	XIV
42	SKF 6029	5.33	-	10.31	7.82	XVI
43	NRC 167	6.40	8.13	11.74	8.76	VIII
44	ASb 50	-	-	9.69	9.69	III
45	RVS 2011-76	6.03	8.07	13.62	9.24	V
	N.P.S.(Sqm)	4.05	4.05	4.05		
	DOS	10/07/2019	14/06/2019	28/06/2019		

Table 1.2.6

Trial : Advanced Varietal Trial I+II
Zone : Northern Plain Zone
Character : Yield(Kg/ha)

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	JS 21-71	1343	2481	2014	1946.00	III
2	DS 3110	1736	1255	1866	1619.00	V
3	PS 1613*	2407	1083	2602	2030.67	II
4	PS 1611*	1856	750	1657	1421.00	VI
5	NRC 128*	2315	1912	2500	2242.33	I
6	NRC 142	88	0	1412	500.00	X
7	PS 24(C)	1319	0	1366	895.00	IX
8	PS 1347(C)	1565	2116	1667	1782.67	IV
9	Pusa 97-12(C)	912	523	1514	983.00	VIII
10	SL 958(C)	1259	944	1398	1200.33	VII
	Mean	1480	1383	1799.6		
	N.P.S.(Sqm)	21.6	21.6	21.6		
	DOS	10-07-19	14-06-19	28-06-19		
	CD	134.26	180.56	185.19		
	CV (5%)	6.17	11.34	7.05		
	Pooled CD				136.16	

* AVT II Entries

Table 1.2.7

Trial : Advanced Varietal Trial I+II
Zone : Northern Plain Zone
Character : Days To Flower

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	JS 21-71	47.25	63.75	51.50	54.17	VI
2	DS 3110	45.00	63.75	49.50	52.75	IV
3	PS 1613*	47.00	64.00	55.50	55.50	VII
4	PS 1611*	45.00	61.50	49.75	52.08	III
5	NRC 128*	50.50	66.00	56.00	57.50	IX
6	NRC 142	44.25	-	49.50	46.88	I
7	PS 24(C)	45.50	-	52.50	49.00	II
8	PS 1347(C)	53.50	65.50	56.50	58.50	X
9	Pusa 97-12(C)	46.50	63.00	51.50	53.67	V
10	SL 958(C)	51.00	65.00	55.00	57.00	VIII
	N.P.S.(Sqm)		21.60	21.60		
	DOS		14/06/2019	28/06/2019		

* AVT II Entries

Table 1.2.8

Trial : Advanced Varietal Trial I+II
Zone : Northern Plain Zone
Character : Days To Harvest Maturity

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	JS 21-71	102.50	134.25	109.25	115.33	III
2	DS 3110	105.75	132.50	112.25	116.83	IV
3	PS 1613*	123.00	141.25	122.00	128.75	IX
4	PS 1611*	110.50	138.75	114.75	121.33	VI
5	NRC 128*	116.00	133.75	118.25	122.67	VII
6	NRC 142	104.25	-	106.50	105.38	I
7	PS 24(C)	112.00	-	115.25	113.63	II
8	PS 1347(C)	119.00	136.75	122.50	126.08	VIII
9	Pusa 97-12(C)	112.00	136.00	115.75	121.25	V
10	SL 958(C)	123.25	140.50	124.25	129.33	X
	N.P.S.(Sqm)		21.60	21.60		
	DOS		14/06/2019	28/06/2019		

* AVT II Entries

Table 1.2.9

Trial : Advanced Varietal Trial I+II
Zone : Northern Plain Zone
Character : Plant Height (cm)

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	JS 21-71	62.75	57.75	68.20	62.90	III
2	DS 3110	56.25	55.85	62.85	58.32	V
3	PS 1613*	55.16	57.80	67.25	60.07	IV
4	PS 1611*	53.59	56.70	60.05	56.78	VII
5	NRC 128*	64.59	72.40	68.75	68.58	II
6	NRC 142	48.25	-	67.70	57.98	VI
7	PS 24(C)	53.50	-	59.85	56.68	VIII
8	PS 1347(C)	43.50	58.90	48.30	50.23	X
9	Pusa 97-12(C)	49.42	57.50	56.45	54.46	IX
10	SL 958(C)	60.33	80.85	68.55	69.91	I
	N.P.S.(Sqm)		21.60	21.60		
	DOS		14/06/2019	28/06/2019		

* AVT II Entries

Table 1.2.10

Trial : Advanced Varietal Trial I+II
Zone : Northern Plain Zone
Character : 100 Seed Weight (gm)

S.No	Varieties	Delhi	Ludhiana	Pantnagar	Mean	Rank
1	JS 21-71	7.13	9.45	11.18	9.25	II
2	DS 3110	6.70	6.95	8.29	7.31	IX
3	PS 1613*	8.45	7.98	8.64	8.36	VII
4	PS 1611*	7.58	7.42	8.57	7.86	VIII
5	NRC 128*	8.85	8.75	11.26	9.62	I
6	NRC 142	6.25	-	12.23	9.24	III
7	PS 24(C)	7.82	-	9.87	8.85	IV
8	PS 1347(C)	6.72	8.90	9.50	8.37	VI
9	Pusa 97-12(C)	6.60	6.25	9.04	7.30	X
10	SL 958(C)	8.80	7.50	9.66	8.65	V
	N.P.S.(Sqm)		21.60	21.60		
	DOS		14/06/2019	28/06/2019		

* AVT II Entries

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	VLS 99	1926	1259	4194	3060.00	XI
2	SL 1213	2222	778	3639	2930.50	XV
3	PS 1641	2272	741	3944	3108.00	IX
4	NRC 154	2321	630	3500	2910.50	XVI
5	RVS 2011-32	2395	296	4056	3225.50	VI
6	MACS 1655	2741	630	3583	3162.00	VIII
7	SKF 2036	2988	593	2167	2577.50	XXI
8	AUKS 200	1753	444	2833	2293.00	XXXII
9	DS 1318	1580	593	1611	1595.50	XLIII
10	KDS 753 (C)	2148	926	3806	2977.00	XIV
11	NRC 163	2025	444	2250	2137.50	XXXVI
12	JS 22-01	1704	778	1389	1546.50	XLV
13	RSC 11-20	2222	556	4250	3236.00	V
14	TS 46	2395	519	3139	2767.00	XX
15	MAUS 717	2469	1037	2389	2429.00	XXVII
16	PS 1642	1654	444	3278	2466.00	XXV
17	AMS 20-19	2148	333	2806	2477.00	XXIV
18	KDS 1097	2370	815	5250	3810.00	I
19	DSb 37	3012	852	3167	3089.50	X
20	MACS 1460 (C)	2420	926	4722	3571.00	II
21	ASb 51	1556	519	3417	2486.50	XXIII
22	NRC 149	2222	333	4806	3514.00	III
23	VLS 98	2469	778	3917	3193.00	VII
24	DS 1326	2370	1370	2139	2254.50	XXXIV
25	SL 1234	2321	667	3361	2841.00	XIX
26	RSC 11-22	2444	2037	1306	1875.00	XXXVIII
27	Himso 1690	2025	741	2528	2276.50	XXXIII
28	BAUS 103	2494	519	1944	2219.00	XXXV
29	JS 22-07	1728	667	3167	2447.50	XXVI
30	JS 20-116 (C)	2469	1296	4056	3262.50	IV
31	TS 107	2667	444	944	1805.50	XL
32	MAUS 712	2741	889	2028	2384.50	XXIX
33	NRC 168	1926	815	2222	2074.00	XXXVII
34	MACS 1639	2198	556	2833	2515.50	XXII
35	DS 1320	2049	667	1500	1774.50	XLI
36	KDS 1099	1877	1333	2806	2341.50	XXX
37	AMS 353	2272	704	3528	2900.00	XVII
38	DSb 36	1679	778	4333	3006.00	XII
39	AUKS 218	1605	741	1500	1552.50	XLIV
40	RKS 113 (C)	2420	852	3583	3001.50	XIII
41	RVSM 2011-77	1432	778	1944	1688.00	XLII
42	SKF 6029	2123	1222	3667	2895.00	XVIII
43	NRC 167	1827	704	2778	2302.50	XXXI
44	ASb 50	1753	704	1972	1862.50	XXXIX
45	RVS 2011-76	2025	1037	2806	2415.50	XXVIII
	Mean	2165.71	772.11	3001.29		
	N.P.S.(Sqm)	4.05	2.70	3.60		
	DOS	07/07/2019	16/06/2019	23/07/2019		
	CD	395.06	444.44	1194.44		
	CV (5%)	11.34	35.46	24.34		
	Pooled CD				731.08	

Data of Jorhat centre not considered in calculation of zonal mean due to low mean yield and high CV

Table 1.3.2

Trial : Initial Varietal Trial
Zone : North Eastern Hill Zone
Character : Days To Flower

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	VLS 99	45.00	37.67	52.00	44.89	XXVII
2	SL 1213	47.00	28.33	38.33	37.89	II
3	PS 1641	47.00	41.33	56.00	48.11	XXXVI
4	NRC 154	41.00	40.00	39.33	40.11	XI
5	RVS 2011-32	43.00	40.67	38.00	40.56	XIII
6	MACS 1655	47.00	28.00	39.33	38.11	III
7	SKF 2036	47.00	28.67	39.00	38.22	IV
8	AUKS 200	46.00	34.33	36.33	38.89	V
9	DS 1318	43.00	40.67	36.00	39.89	X
10	KDS 753 (C)	44.00	36.00	61.00	47.00	XXXIII
11	NRC 163	44.00	37.00	37.00	39.33	VII
12	JS 22-01	48.00	28.33	61.33	45.89	XXXI
13	RSC 11-20	52.00	41.33	56.33	49.89	XXXIX
14	TS 46	50.00	36.00	59.33	48.44	XXXVII
15	MAUS 717	42.00	37.00	69.33	49.44	XXXVIII
16	PS 1642	52.00	36.33	38.00	42.11	XVII
17	AMS 20-19	48.00	37.00	50.33	45.11	XXIX
18	KDS 1097	48.00	40.33	38.00	42.11	XVII
19	DSb 37	49.33	31.00	37.33	39.22	VI
20	MACS 1460 (C)	44.00	34.00	41.00	39.67	VIII
21	ASb 51	49.00	41.33	40.00	43.44	XXV
22	NRC 149	49.00	41.00	38.00	42.67	XXI
23	VLS 98	47.00	44.33	52.33	47.89	XXXV
24	DS 1326	47.00	41.33	39.00	42.44	XIX
25	SL 1234	44.33	40.33	51.00	45.22	XXX
26	RSC 11-22	48.00	44.33	34.33	42.22	XVIII
27	Himso 1690	46.67	44.00	52.67	47.78	XXXIV
28	BAUS 103	49.67	46.67	59.00	51.78	XL
29	JS 22-07	46.00	40.67	37.33	41.33	XIV
30	JS 20-116 (C)	48.00	43.33	37.00	42.78	XXII
31	TS 107	47.00	44.67	37.33	43.00	XXIV
32	MAUS 712	46.00	42.67	39.00	42.56	XX
33	NRC 168	43.00	44.00	34.00	40.33	XII
34	MACS 1639	46.67	40.00	34.33	40.33	XII
35	DS 1320	43.00	43.33	51.67	46.00	XXXII
36	KDS 1099	46.00	28.67	44.33	39.67	VIII
37	AMS 353	50.00	40.33	34.67	41.67	XV
38	DSb 36	47.00	32.67	55.00	44.89	XXVII
39	AUKS 218	42.00	40.33	52.67	45.00	XXVIII
40	RKS 113 (C)	47.00	42.67	36.33	42.00	XVI
41	RVSM 2011-77	47.00	41.33	40.33	42.89	XXIII
42	SKF 6029	43.00	28.00	39.33	36.78	I
43	NRC 167	46.00	35.33	51.00	44.11	XXVI
44	ASb 50	49.67	28.00	42.00	39.89	X
45	RVS 2011-76	45.00	39.33	35.00	39.78	IX
	N.P.S.(Sqm)	4.05	2.70	3.60		
	DOS	07/07/2019	16/06/2019	23/07/2019		

Table 1.3.3

Trial : Initial Varietal Trial
Zone : North Eastern Hill Zone
Character : Days To Harvest Maturity

S.No	Varieties	Imphal	Jorhat	Umiam	Mean	Rank
1	VLS 99	103.67	76.67	83.00	87.78	XVI
2	SL 1213	106.67	70.00	79.00	85.22	V
3	PS 1641	106.00	81.67	83.00	90.22	XXX
4	NRC 154	103.33	92.00	78.33	91.22	XXXIII
5	RVS 2011-32	100.67	84.33	83.00	89.33	XXVI
6	MACS 1655	104.33	76.67	82.67	87.89	XVII
7	SKF 2036	101.00	67.00	83.00	83.67	II
8	AUKS 200	98.00	69.67	81.67	83.11	I
9	DS 1318	102.67	80.33	83.67	88.89	XXII
10	KDS 753 (C)	103.00	81.00	83.67	89.22	XXV
11	NRC 163	102.00	82.33	83.00	89.11	XXIV
12	JS 22-01	99.33	80.33	84.67	88.11	XVIII
13	RSC 11-20	102.00	80.33	82.67	88.33	XIX
14	TS 46	102.33	73.00	83.00	86.11	VII
15	MAUS 717	101.33	83.00	80.00	88.11	XVIII
16	PS 1642	103.00	68.33	80.67	84.00	III
17	AMS 20-19	100.33	86.33	80.33	89.00	XXIII
18	KDS 1097	100.33	79.00	79.67	86.33	VIII
19	DSb 37	102.33	79.00	80.33	87.22	XIII
20	MACS 1460 (C)	99.00	83.67	80.00	87.56	XV
21	ASb 51	102.67	73.00	81.67	85.78	VI
22	NRC 149	105.67	81.33	81.33	89.44	XXVII
23	VLS 98	104.67	87.00	79.67	90.45	XXXI
24	DS 1326	106.00	65.67	80.67	84.11	IV
25	SL 1234	108.33	84.00	81.00	91.11	XXXII
26	RSC 11-22	104.00	91.33	79.33	91.55	XXXV
27	Himso 1690	106.67	91.00	81.33	93.00	XXXVI
28	BAUS 103	105.33	87.33	81.67	91.44	XXXIV
29	JS 22-07	100.33	83.33	79.00	87.55	XIV
30	JS 20-116 (C)	99.00	87.67	80.33	89.00	XXIII
31	TS 107	103.33	91.33	78.67	91.11	XXXII
32	MAUS 712	101.67	88.00	79.00	89.56	XXVIII
33	NRC 168	103.33	84.33	81.33	89.66	XXIX
34	MACS 1639	101.67	83.00	80.33	88.33	XIX
35	DS 1320	101.33	80.00	79.67	87.00	XI
36	KDS 1099	102.00	78.67	80.33	87.00	XI
37	AMS 353	102.33	78.33	80.00	86.89	X
38	DSb 36	99.00	83.00	81.67	87.89	XVII
39	AUKS 218	95.33	85.00	81.00	87.11	XII
40	RKS 113 (C)	102.00	89.67	79.67	90.45	XXXI
41	RVSM 2011-77	98.67	86.33	80.00	88.33	XIX
42	SKF 6029	102.33	83.00	80.00	88.44	XX
43	NRC 167	100.67	79.67	79.67	86.67	IX
44	ASb 50	102.00	80.00	79.33	87.11	XII
45	RVS 2011-76	99.67	86.33	80.00	88.67	XXI
	N.P.S.(Sqm)	4.05	2.70	3.60		
	DOS	07/07/2019	16/06/2019	23/07/2019		

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	VLS 99	40.40	21.87	37.20	33.16	XXXIX
2	SL 1213	32.07	28.47	37.50	32.68	XL
3	PS 1641	48.07	24.07	40.30	37.48	XXV
4	NRC 154	30.73	29.27	34.37	31.46	XLI
5	RVS 2011-32	40.53	31.50	49.30	40.44	XI
6	MACS 1655	51.20	29.23	39.50	39.98	XIV
7	SKF 2036	40.07	27.07	41.90	36.35	XXXI
8	AUKS 200	38.67	30.47	43.90	37.68	XXIII
9	DS 1318	26.87	27.77	32.40	29.01	XLIV
10	KDS 753 (C)	44.00	28.57	44.47	39.01	XVIII
11	NRC 163	35.40	22.23	35.70	31.11	XLIII
12	JS 22-01	31.33	32.73	29.50	31.19	XLII
13	RSC 11-20	55.20	28.97	46.70	43.62	III
14	TS 46	44.87	28.70	40.80	38.12	XXI
15	MAUS 717	42.00	27.70	42.40	37.37	XXVI
16	PS 1642	37.07	29.60	36.40	34.36	XXXVII
17	AMS 20-19	41.60	25.37	49.10	38.69	XIX
18	KDS 1097	47.93	27.00	44.70	39.88	XV
19	DSb 37	47.93	24.23	47.10	39.75	XVI
20	MACS 1460 (C)	42.20	28.17	47.40	39.26	XVII
21	ASb 51	41.20	31.20	50.90	41.10	V
22	NRC 149	48.13	34.03	73.13	51.76	I
23	VLS 98	44.73	29.13	54.20	42.69	IV
24	DS 1326	38.53	26.77	38.00	34.43	XXXVI
25	SL 1234	39.67	28.47	42.70	36.95	XXVIII
26	RSC 11-22	44.93	31.10	46.30	40.78	IX
27	Himso 1690	35.87	29.73	43.90	36.50	XXX
28	BAUS 103	43.20	24.83	44.90	37.64	XXIV
29	JS 22-07	40.40	25.43	47.50	37.78	XXII
30	JS 20-116 (C)	46.73	26.97	49.00	40.90	VI
31	TS 107	49.40	28.47	38.20	38.69	XIX
32	MAUS 712	42.00	27.47	51.20	40.22	XII
33	NRC 168	38.40	29.40	34.00	33.93	XXXVIII
34	MACS 1639	44.87	27.67	34.70	35.75	XXXIV
35	DS 1320	41.53	31.20	38.30	37.01	XXVII
36	KDS 1099	48.87	27.13	46.30	40.77	X
37	AMS 353	43.67	32.07	32.70	36.15	XXXII
38	DSb 36	53.93	27.43	57.00	46.12	II
39	AUKS 218	35.07	26.77	45.10	35.65	XXXV
40	RKS 113 (C)	41.20	29.80	51.37	40.79	VIII
41	RVSM 2011-77	39.53	31.73	38.30	36.52	XXIX
42	SKF 6029	37.73	38.83	46.10	40.89	VII
43	NRC 167	39.67	27.10	53.50	40.09	XIII
44	ASb 50	45.00	31.20	31.60	35.93	XXXIII
45	RVS 2011-76	41.20	26.50	47.00	38.23	XX
	N.P.S.(Sqm)	4.05	2.70	3.60		
	DOS	07/07/2019	16/06/2019	23/07/2019		

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	VLS 99	20.39	10.21	11.45	14.02	V
2	SL 1213	14.97	8.88	12.56	12.14	XVIII
3	PS 1641	15.13	8.25	13.15	12.18	XVII
4	NRC 154	20.95	10.62	12.78	14.78	I
5	RVS 2011-32	19.16	9.55	12.22	13.64	VII
6	MACS 1655	16.60	8.59	13.13	12.77	XII
7	SKF 2036	16.97	7.23	9.12	11.11	XXXV
8	AUKS 200	17.79	8.17	9.53	11.83	XXIV
9	DS 1318	15.22	8.49	9.69	11.13	XXXIV
10	KDS 753 (C)	21.11	10.20	11.37	14.23	III
11	NRC 163	22.78	8.89	10.69	14.12	IV
12	JS 22-01	19.69	8.07	8.27	12.01	XX
13	RSC 11-20	14.82	9.67	11.03	11.84	XXIII
14	TS 46	15.52	8.48	10.49	11.50	XXVII
15	MAUS 717	16.79	8.55	11.50	12.28	XVI
16	PS 1642	10.91	7.53	10.47	9.64	XLIV
17	AMS 20-19	14.68	6.93	11.04	10.88	XXXIX
18	KDS 1097	17.62	10.20	11.04	12.95	X
19	DSb 37	17.06	8.77	9.94	11.92	XXI
20	MACS 1460 (C)	16.21	10.71	9.45	12.12	XIX
21	ASb 51	15.56	7.72	9.40	10.89	XXXVIII
22	NRC 149	16.11	8.21	12.81	12.38	XV
23	VLS 98	19.24	8.90	10.75	12.96	IX
24	DS 1326	13.48	9.01	11.80	11.43	XXXI
25	SL 1234	14.78	9.23	10.36	11.46	XXIX
26	RSC 11-22	12.71	7.13	9.37	9.74	XLIII
27	Himso 1690	15.46	8.06	10.47	11.33	XXXIII
28	BAUS 103	14.78	10.19	9.39	11.45	XXX
29	JS 22-07	22.15	11.28	10.38	14.60	II
30	JS 20-116 (C)	14.15	8.23	9.60	10.66	XL
31	TS 107	17.04	8.21	10.41	11.89	XXII
32	MAUS 712	16.70	8.28	10.37	11.78	XXV
33	NRC 168	20.17	9.07	12.08	13.77	VI
34	MACS 1639	17.77	7.58	9.89	11.75	XXVI
35	DS 1320	17.02	7.43	10.03	11.49	XXVIII
36	KDS 1099	11.25	7.74	9.91	9.63	XLV
37	AMS 353	14.77	7.07	9.82	10.55	XLI
38	DSb 36	20.48	6.98	10.15	12.54	XIII
39	AUKS 218	15.74	6.59	10.84	11.06	XXXVII
40	RKS 113 (C)	15.74	8.00	10.39	11.38	XXXII
41	RVSM 2011-77	14.37	7.37	9.85	10.53	XLII
42	SKF 6029	17.85	7.68	11.72	12.42	XIV
43	NRC 167	19.29	10.94	9.94	13.39	VIII
44	ASb 50	15.60	7.82	9.88	11.10	XXXVI
45	RVS 2011-76	17.35	8.88	12.11	12.78	XI
	N.P.S.(Sqm)	4.05	2.70	3.60		
	DOS	07/07/2019	16/06/2019	23/07/2019		

Table 1.3.6

Trial : Advanced Varietal Trial I+II
Zone : North Eastern Hill Zone
Character : Yield(Kg/ha)

S.No	Varieties	Imphal	Umiam	Mean	Rank
1	MACS 1620	2222	3600	2222.00	III
2	MAUS 732	2189	6100	2189.00	IV
3	PS 1613*	2096	3250	2096.00	V
4	DS 3108*	2189	2917	2189.00	IV
5	NRC 142	-	5383	-	
6	JS 335(C)	2278	-	2278.00	I
7	JS 97-52(C)	2074	4367	2074.00	VI
8	RKS 113(C)	1652	-	1652.00	VII
9	RKS 18(C)	2241	3400	2241.00	II
	Mean	2117.63	4145.29		
	N.P.S.(Sqm)	27.00	6.00		
	DOS	01/06/2019	08/07/2019		
	CD	329.63	2016.67		
	CV (5%)	12.01	56.91		
	Pooled CD			329.63	

* AVT II Entries

Data of Umiam centre not considered in zonal mean calculation due to high CV.

Table 1.3.7

Trial : Advanced Varietal Trial I+II
Zone : North Eastern Hill Zone
Character : Days To Flower

S.No	Varieties	Imphal	Umiam	Mean	Rank
1	MACS 1620	51.75	40.00	45.88	II
2	MAUS 732	54.50	42.67	48.59	V
3	PS 1613*	54.75	43.67	49.21	VI
4	DS 3108*	52.00	42.67	47.34	III
5	NRC 142	-	45.67	45.67	I
6	JS 335(C)	50.50	-	50.50	VIII
7	JS 97-52(C)	58.25	41.00	49.63	VII
8	RKS 113(C)	51.50	-	51.50	IX
9	RKS 18(C)	51.00	44.00	47.50	IV
	N.P.S.(Sqm)	27.00	6.00		
	DOS	01/06/2019	08/07/2019		

* AVT II Entries

Table 1.3.8

Trial : Advanced Varietal Trial I+II
Zone : North Eastern Hill Zone
Character : Days To Harvest Maturity

S.No	Varieties	Imphal	Umiam	Mean	Rank
1	MACS 1620	137.50	96.33	116.92	IV
2	MAUS 732	137.25	97.33	117.29	V
3	PS 1613*	138.00	103.67	120.84	VII
4	DS 3108*	133.50	97.33	115.42	II
5	NRC 142	-	101.00	101.00	I
6	JS 335(C)	130.75	-	130.75	VIII
7	JS 97-52(C)	136.50	100.33	118.42	VI
8	RKS 113(C)	131.00	-	131.00	IX
9	RKS 18(C)	133.00	98.33	115.67	III
	N.P.S.(Sqm)	27.00	6.00		
	DOS	01/06/2019	08/07/2019		

* AVT II Entries

Table 1.3.9

Trial : Advanced Varietal Trial I+II
Zone : North Eastern Hill Zone
Character : Plant Height (cm)

S.No	Varieties	Imphal	Umiam	Mean	Rank
1	MACS 1620	50.40	46.60	48.50	VII
2	MAUS 732	71.75	72.20	71.98	I
3	PS 1613*	47.00	36.90	41.95	IX
4	DS 3108*	40.40	51.17	45.79	VIII
5	NRC 142	-	60.50	60.50	V
6	JS 335(C)	63.15	-	63.15	II
7	JS 97-52(C)	66.95	56.40	61.68	III
8	RKS 113(C)	61.05	-	61.05	IV
9	RKS 18(C)	58.10	47.33	52.72	VI
	N.P.S.(Sqm)	27.00	6.00		
	DOS	01/06/2019	08/07/2019		

* AVT II Entries

Table 1.3.10

Trial : Advanced Varietal Trial I+II
Zone : North Eastern Hill Zone
Character : 100 Seed Weight (g)

S.No	Varieties	Imphal	Umiam	Mean	Rank
1	MACS 1620	24.12	14.48	19.30	I
2	MAUS 732	19.42	15.93	17.68	III
3	PS 1613*	18.63	11.87	15.25	VI
4	DS 3108*	17.85	13.14	15.50	V
5	NRC 142	-	13.20	13.20	IX
6	JS 335(C)	17.79	-	17.79	II
7	JS 97-52(C)	14.21	13.21	13.71	VIII
8	RKS 113(C)	16.98	-	16.98	IV
9	RKS 18(C)	18.21	10.89	14.55	VII
	N.P.S.(Sqm)	27.00	6.00		
	DOS	01/06/2019	08/07/2019		

* AVT II Entries

Table 1.4.1

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

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	VLS 99	963	1136	1358	2099	1389.00	XXXVI
2	SL 1213	1086	1506	2815	3086	2123.25	II
3	PS 1641	1037	1111	2543	2914	1901.25	VI
4	NRC 154	1210	938	1605	3062	1703.75	XIV
5	RVS 2011-32	1185	1012	1284	2395	1469.00	XXX
6	MACS 1655	1309	963	1062	2765	1524.75	XXVII
7	SKF 2036	1210	914	1753	2519	1599.00	XX
8	AUKS 200	1160	1210	1383	2395	1537.00	XXVI
9	DS 1318	1111	1802	1407	2889	1802.25	VIII
10	MACS 1460 (C)	790	1284	1309	3037	1605.00	XIX
11	NRC 163	765	1333	1926	2543	1641.75	XVII
12	JS 22-01	1086	1531	1407	2370	1598.50	XXI
13	RSC 11-20	741	1531	2568	2025	1716.25	XIII
14	TS 46	716	963	1185	2963	1456.75	XXXI
15	MAUS 717	1037	963	1605	2296	1475.25	XXIX
16	PS 1642	716	1605	1333	2815	1617.25	XVIII
17	AMS 20-19	1062	889	1235	2716	1475.50	XXVIII
18	KDS 1097	1136	914	1210	2494	1438.50	XXXII
19	DSb 37	1753	988	1185	2691	1654.25	XVI
20	JS 20-116 (C)	1235	1654	1481	2790	1790.00	IX
21	ASb 51	889	1012	1284	1827	1253.00	XLIII
22	NRC 149	988	1679	2519	2963	2037.25	III
23	VLS 98	1111	938	1432	2272	1438.25	XXXIII
24	DS 1326	963	1432	2000	2617	1753.00	XI
25	SL 1234	864	1901	1852	2790	1851.75	VII
26	RSC 11-22	988	1358	2864	2420	1907.50	V
27	Himso 1690	1556	1901	2099	3358	2228.50	I
28	BAUS 103	1457	1111	2099	3062	1932.25	IV
29	JS 22-07	790	1012	1086	2222	1277.50	XLI
30	KDS 753 (C)	1654	1012	1160	2494	1580.00	XXII
31	TS 107	1432	938	1778	2840	1747.00	XII
32	MAUS 712	1358	988	1926	2519	1697.75	XV
33	NRC 168	840	938	1185	2667	1407.50	XXXV
34	MACS 1639	1062	938	1086	2000	1271.50	XLII
35	DS 1320	988	1160	1185	1975	1327.00	XXXIX
36	KDS 1099	1630	889	1012	2173	1426.00	XXXIV
37	AMS 353	1654	1012	1457	2099	1555.50	XXV
38	DSb 36	1210	988	1457	1704	1339.75	XXXVII
39	AUKS 218	815	988	1062	2025	1222.50	XLV
40	RSC 10-46 (C)	1457	938	1679	2988	1765.50	X
41	RVSM 2011-77	1185	988	1185	1852	1302.50	XL
42	SKF 6029	1309	938	1630	2346	1555.75	XXIV
43	NRC 167	864	1012	1309	3062	1561.75	XXIII
44	ASb 50	963	1012	1136	1802	1228.25	XLIV
45	RVS 2011-76	914	988	1654	1778	1333.50	XXXVIII
	Mean	1116.64	1162.62	1573.11	2504.87		
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05		
	DOS	11/08/2019	20/07/2019	29/06/2019	24/06/2019		
	CD	222.22	222.22	296.30	641.98		
	CV (5%)	12.45	11.27	11.85	15.76		
	Pooled CD					320.78	

Table 1.4.2

Trial : Initial Varietal Trial
Zone : Eastern Zone
Character : Days To Flower

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	VLS 99	37.33	37.00	39.00	41.67	38.75	VI
2	SL 1213	35.33	40.67	42.33	42.33	40.17	XVII
3	PS 1641	34.67	42.00	44.00	45.33	41.50	XXVI
4	NRC 154	35.00	31.67	37.67	40.00	36.09	I
5	RVS 2011-32	36.67	37.67	38.00	38.00	37.59	IV
6	MACS 1655	37.00	42.33	42.33	42.00	40.92	XXII
7	SKF 2036	38.00	42.33	39.00	40.33	39.92	XIV
8	AUKS 200	37.33	34.00	38.00	39.33	37.17	III
9	DS 1318	38.00	38.33	40.00	40.33	39.17	VII
10	MACS 1460 (C)	36.67	40.00	41.00	41.00	39.67	XII
11	NRC 163	42.33	39.33	37.00	38.33	39.25	VIII
12	JS 22-01	36.00	43.00	41.00	38.33	39.58	XI
13	RSC 11-20	41.00	44.67	47.67	41.33	43.67	XXXIV
14	TS 46	34.00	41.67	46.67	46.33	42.17	XXVIII
15	MAUS 717	37.00	41.67	40.00	40.67	39.84	XIII
16	PS 1642	42.33	42.00	42.67	42.33	42.33	XXIX
17	AMS 20-19	36.33	42.00	42.67	43.67	41.17	XXIV
18	KDS 1097	38.67	33.00	43.67	42.67	39.50	X
19	DSb 37	37.00	44.67	47.00	47.33	44.00	XXXV
20	JS 20-116 (C)	41.33	39.33	40.67	41.33	40.67	XX
21	ASb 51	38.00	40.33	40.33	46.33	41.25	XXV
22	NRC 149	34.33	39.00	39.00	39.67	38.00	V
23	VLS 98	36.00	37.00	37.00	42.00	38.00	V
24	DS 1326	37.67	35.67	41.00	42.67	39.25	VIII
25	SL 1234	36.00	42.67	40.67	42.00	40.34	XIX
26	RSC 11-22	39.00	43.33	46.67	41.67	42.67	XXX
27	Himso 1690	36.67	39.67	45.67	41.00	40.75	XXI
28	BAUS 103	38.00	43.00	47.33	43.00	42.83	XXXII
29	JS 22-07	36.00	39.33	39.00	40.67	38.75	VI
30	KDS 753 (C)	41.33	36.33	47.00	46.33	42.75	XXXI
31	TS 107	37.00	37.33	47.67	46.00	42.00	XXVII
32	MAUS 712	38.67	29.67	37.33	39.67	36.34	II
33	NRC 168	39.00	31.67	36.00	38.67	36.34	II
34	MACS 1639	42.33	39.00	42.33	40.33	41.00	XXIII
35	DS 1320	37.00	40.33	41.67	41.33	40.08	XVI
36	KDS 1099	35.33	40.33	41.00	41.33	39.50	X
37	AMS 353	35.00	39.67	41.33	44.33	40.08	XVI
38	DSb 36	35.00	37.67	47.67	41.00	40.34	XIX
39	AUKS 218	36.00	38.33	43.00	40.33	39.42	IX
40	RSC 10-46 (C)	35.67	38.33	43.67	43.33	40.25	XVIII
41	RVSM 2011-77	42.33	33.33	41.67	41.00	39.58	XI
42	SKF 6029	35.00	38.33	41.33	40.33	38.75	VI
43	NRC 167	39.00	38.67	41.33	41.00	40.00	XV
44	ASb 50	39.33	42.33	45.33	45.33	43.08	XXXIII
45	RVS 2011-76	38.00	39.00	40.67	41.00	39.67	XII
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05		
	DOS	11/08/2019	20/07/2019	29/06/2019	24/06/2019		

Table 1.4.3

Trial : Initial Varietal Trial
Zone : Eastern Zone
Character : Days To Harvest Maturity

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	VLS 99	87.67	112.67	102.00	102.67	101.25	IV
2	SL 1213	89.00	110.67	108.00	113.33	105.25	XIX
3	PS 1641	90.67	110.00	108.00	112.67	105.34	XX
4	NRC 154	91.00	109.33	101.00	113.67	103.75	XIV
5	RVS 2011-32	89.67	115.33	105.00	102.67	103.17	X
6	MACS 1655	89.33	110.00	113.00	113.00	106.33	XXVI
7	SKF 2036	87.33	107.67	113.00	102.33	102.58	VIII
8	AUKS 200	87.33	108.67	117.00	100.67	103.42	XII
9	DS 1318	86.00	108.33	114.00	112.33	105.17	XVIII
10	MACS 1460 (C)	85.67	109.00	108.00	111.33	103.50	XIII
11	NRC 163	90.33	113.67	102.00	103.33	102.33	VII
12	JS 22-01	90.00	112.33	126.00	100.33	107.17	XXXII
13	RSC 11-20	90.67	110.00	108.00	102.67	102.84	IX
14	TS 46	88.33	111.33	108.00	113.33	105.25	XIX
15	MAUS 717	89.00	110.00	102.00	111.67	103.17	X
16	PS 1642	92.00	115.67	102.00	112.00	105.42	XXI
17	AMS 20-19	87.67	114.67	106.00	112.33	105.17	XVIII
18	KDS 1097	88.33	113.00	112.33	111.00	106.17	XXV
19	DSb 37	86.00	114.33	112.00	113.33	106.42	XXVII
20	JS 20-116 (C)	88.00	113.33	104.00	102.00	101.83	VI
21	ASb 51	90.33	115.67	106.33	114.33	106.67	XXX
22	NRC 149	94.33	116.33	107.00	114.33	108.00	XXXIV
23	VLS 98	90.00	110.33	111.00	116.00	106.83	XXXI
24	DS 1326	89.00	111.67	111.00	114.67	106.59	XXIX
25	SL 1234	89.67	117.33	111.00	100.67	104.67	XVI
26	RSC 11-22	90.00	113.00	112.00	111.67	106.67	XXX
27	Himso 1690	88.67	116.67	108.67	114.67	107.17	XXXII
28	BAUS 103	90.67	113.33	110.00	110.33	106.08	XXIV
29	JS 22-07	89.67	109.33	104.00	102.33	101.33	V
30	KDS 753 (C)	92.00	116.67	109.00	113.33	107.75	XXXIII
31	TS 107	90.67	112.67	110.67	112.00	106.50	XXVIII
32	MAUS 712	89.33	111.33	110.00	112.67	105.83	XXIII
33	NRC 168	90.33	110.67	106.00	106.33	103.33	XI
34	MACS 1639	88.67	117.33	101.67	113.00	105.17	XVIII
35	DS 1320	88.33	109.67	103.00	112.67	103.42	XII
36	KDS 1099	90.33	118.33	121.00	112.00	110.42	XXXV
37	AMS 353	87.33	118.00	102.67	114.33	105.58	XXII
38	DSb 36	89.00	108.33	104.00	103.67	101.25	IV
39	AUKS 218	85.33	110.67	86.00	104.00	96.50	I
40	RSC 10-46 (C)	95.33	111.67	106.00	114.33	106.83	XXXI
41	RVSM 2011-77	88.33	109.00	101.67	100.00	99.75	III
42	SKF 6029	88.67	119.00	102.33	102.67	103.17	X
43	NRC 167	88.67	116.67	102.33	108.00	103.92	XV
44	ASb 50	90.33	113.33	102.00	114.67	105.08	XVII
45	RVS 2011-76	89.00	112.00	97.00	100.33	99.58	II
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05		
	DOS	11/08/2019	20/07/2019	29/06/2019	24/06/2019		

Table 1.4.4

Trial : Initial Varietal Trial
Zone : Eastern Zone
Character : Plant Height (cm)

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	VLS 99	33.43	61.73	56.33	50.47	50.49	XXXIX
2	SL 1213	32.30	60.33	74.53	44.47	52.91	XXVIII
3	PS 1641	35.10	60.53	78.60	51.53	56.44	XVII
4	NRC 154	33.77	58.00	64.67	48.90	51.34	XXXV
5	RVS 2011-32	40.20	72.87	64.47	52.37	57.48	XV
6	MACS 1655	37.63	63.07	84.27	56.60	60.39	X
7	SKF 2036	29.90	58.20	62.73	47.53	49.59	XLII
8	AUKS 200	32.37	61.53	64.73	47.27	51.48	XXXIII
9	DS 1318	28.47	52.73	61.33	48.20	47.68	XLIII
10	MACS 1460 (C)	36.90	57.67	77.33	58.00	57.48	XV
11	NRC 163	30.60	59.07	65.67	48.53	50.97	XXXVII
12	JS 22-01	31.13	60.60	68.00	50.60	52.58	XXXI
13	RSC 11-20	38.20	65.93	78.87	55.80	59.70	XI
14	TS 46	31.87	57.00	73.67	52.20	53.69	XXIV
15	MAUS 717	32.17	68.40	51.13	49.47	50.29	XL
16	PS 1642	32.07	60.53	64.73	54.93	53.07	XXVII
17	AMS 20-19	28.53	55.67	77.47	57.13	54.70	XX
18	KDS 1097	36.93	55.13	93.00	65.67	62.68	VI
19	DSb 37	46.63	63.60	96.07	60.53	66.71	III
20	JS 20-116 (C)	40.87	73.47	78.20	63.60	64.04	V
21	ASb 51	29.63	65.20	53.40	51.93	50.04	XLI
22	NRC 149	43.60	82.80	99.67	73.33	74.85	I
23	VLS 98	34.07	66.00	70.00	48.60	54.67	XXI
24	DS 1326	29.07	58.20	72.40	44.40	51.02	XXXVI
25	SL 1234	30.73	74.60	81.60	48.27	58.80	XIII
26	RSC 11-22	39.47	74.93	77.27	52.07	60.94	VIII
27	Himso 1690	31.00	65.47	75.67	44.93	54.27	XXIII
28	BAUS 103	36.80	73.33	97.87	51.13	64.78	IV
29	JS 22-07	38.17	75.40	74.73	59.00	61.83	VII
30	KDS 753 (C)	39.13	63.07	73.13	66.47	60.45	IX
31	TS 107	33.27	62.47	70.47	51.07	54.32	XXII
32	MAUS 712	34.80	72.73	77.87	52.07	59.37	XII
33	NRC 168	28.93	65.53	73.47	52.67	55.15	XIX
34	MACS 1639	40.10	63.07	82.73	57.87	60.94	VIII
35	DS 1320	30.97	61.13	68.93	52.67	53.43	XXV
36	KDS 1099	46.00	55.87	71.80	56.07	57.44	XVI
37	AMS 353	31.70	58.07	69.67	51.33	52.69	XXIX
38	DSb 36	48.97	79.07	85.73	69.40	70.79	II
39	AUKS 218	35.13	56.93	65.27	50.27	51.90	XXXII
40	RSC 10-46 (C)	34.50	67.80	74.80	54.67	57.94	XIV
41	RVSM 2011-77	33.60	58.27	68.07	53.00	53.24	XXVI
42	SKF 6029	31.40	60.67	62.67	50.80	51.39	XXXIV
43	NRC 167	30.83	69.93	73.77	46.60	55.28	XVIII
44	ASb 50	31.70	62.47	62.87	45.93	50.74	XXXVIII
45	RVS 2011-76	32.37	74.33	60.40	43.47	52.64	XXX
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05		
	DOS	11/08/2019	20/07/2019	29/06/2019	24/06/2019		

Table 1.4.5

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

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	VLS 99	12.87	8.47	13.37	14.02	12.18	VII
2	SL 1213	9.71	8.47	14.15	11.48	10.95	XXII
3	PS 1641	11.57	6.78	12.90	11.06	10.58	XXVIII
4	NRC 154	15.96	10.00	15.03	14.38	13.84	II
5	RVS 2011-32	11.75	7.87	13.21	13.20	11.51	XV
6	MACS 1655	13.95	6.84	13.37	10.89	11.26	XVII
7	SKF 2036	11.65	8.32	13.50	10.47	10.99	XXI
8	AUKS 200	13.30	8.58	13.90	13.46	12.31	V
9	DS 1318	11.47	7.93	11.19	10.76	10.34	XXXI
10	MACS 1460 (C)	10.70	9.40	12.36	11.74	11.05	XX
11	NRC 163	13.45	9.37	16.68	18.13	14.41	I
12	JS 22-01	11.51	8.11	12.26	14.07	11.49	XVI
13	RSC 11-20	9.54	8.58	10.33	10.70	9.79	XXXVI
14	TS 46	9.73	9.15	13.40	11.39	10.92	XXIII
15	MAUS 717	11.19	11.01	12.46	11.64	11.58	XIV
16	PS 1642	8.25	5.51	8.75	10.93	8.36	XLII
17	AMS 20-19	10.70	8.87	11.09	8.93	9.90	XXXV
18	KDS 1097	13.44	6.22	12.33	11.59	10.90	XXIV
19	DSb 37	10.19	7.90	10.19	8.97	9.31	XXXVIII
20	JS 20-116 (C)	9.86	6.95	11.34	9.36	9.38	XXXVII
21	ASb 51	12.13	11.10	11.95	8.50	10.92	XXIII
22	NRC 149	13.52	10.95	12.66	10.83	11.99	X
23	VLS 98	14.14	7.90	16.46	14.64	13.29	IV
24	DS 1326	10.12	8.24	11.36	10.29	10.00	XXXIV
25	SL 1234	12.40	9.31	14.56	11.82	12.02	IX
26	RSC 11-22	9.67	6.56	10.40	9.19	8.96	XL
27	Himso 1690	11.96	6.94	12.68	10.98	10.64	XXVII
28	BAUS 103	12.47	8.00	11.55	10.84	10.72	XXVI
29	JS 22-07	13.11	7.08	11.85	12.76	11.20	XVIII
30	KDS 753 (C)	14.52	7.19	12.86	13.00	11.89	XI
31	TS 107	13.37	7.15	15.46	12.84	12.21	VI
32	MAUS 712	13.16	9.52	11.99	12.00	11.67	XII
33	NRC 168	16.20	7.91	12.75	17.54	13.60	III
34	MACS 1639	12.08	8.96	11.69	11.45	11.05	XX
35	DS 1320	10.70	7.65	12.34	11.18	10.47	XXX
36	KDS 1099	10.65	8.30	8.27	8.58	8.95	XLI
37	AMS 353	10.21	7.04	10.98	8.90	9.28	XXXIX
38	DSb 36	14.16	7.07	13.28	11.94	11.61	XIII
39	AUKS 218	8.79	5.75	9.31	9.06	8.23	XLIII
40	RSC 10-46 (C)	10.70	7.56	10.83	11.56	10.16	XXXIII
41	RVSM 2011-77	10.68	6.80	12.06	11.32	10.22	XXXII
42	SKF 6029	12.39	6.39	12.34	10.97	10.52	XXIX
43	NRC 167	13.08	7.24	13.73	14.26	12.08	VIII
44	ASb 50	12.81	6.80	12.04	11.83	10.87	XXV
45	RVS 2011-76	12.14	7.35	13.22	12.01	11.18	XIX
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05		
	DOS	11/08/2019	20/07/2019	29/06/2019	24/06/2019		

Table 1.4.6

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

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	PS 1637	1420	1300	3665	2128.33	III
2	MACS 1566	1443	1572	3750	2255.00	I
3	Himso 1689	1489	1094	2492	1691.67	X
4	RSC 11-17	1127	2156	3156	2146.33	II
5	MACS 1620	1535	1672	2461	1889.33	VII
6	DSb 33	1258	1256	3218	1910.67	VI
7	RSC 11-15	1173	2083	3117	2124.33	IV
8	NRC 148	1343	1506	2369	1739.33	IX
9	NRC 142	1204	1222	2130	1518.67	XIII
10	JS 335(C)	1119	1017	2423	1519.67	XII
11	JS 97-52(C)	1096	1256	3187	1846.33	VIII
12	RKS 18(C)	1219	1294	2330	1614.33	XI
13	RSC 10-46(C)	1150	1556	3603	2103.00	V
	Mean	1275.08	1460.31	2915.46		
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	17/08/2019	28/06/2019	01/07/2019		
	CD	216.05	177.78	416.67		
	CV (5%)	11.96	8.57	10.02		
	Pooled CD				236.99	

Table 1.4.7

Trial : Advanced Varietal Trial I
Zone : Eastern Zone
Character : Days To Flower

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	PS 1637	40.75	51.00	47.00	46.25	XII
2	MACS 1566	38.50	41.50	43.75	41.25	II
3	Himso 1689	38.50	44.25	44.25	42.33	VI
4	RSC 11-17	43.25	47.25	44.75	45.08	X
5	MACS 1620	41.25	42.00	43.50	42.25	V
6	DSb 33	40.75	41.25	42.25	41.42	III
7	RSC 11-15	42.50	47.75	46.25	45.50	XI
8	NRC 148	43.25	47.75	43.25	44.75	IX
9	NRC 142	42.25	41.00	44.25	42.50	VII
10	JS 335(C)	40.00	41.50	41.50	41.00	I
11	JS 97-52(C)	44.00	48.50	42.75	45.08	X
12	RKS 18(C)	41.00	41.25	43.50	41.92	IV
13	RSC 10-46(C)	44.75	41.00	45.00	43.58	VIII
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	17/08/2019	28/06/2019	01/07/2019		

Table 1.4.8

Trial : Advanced Varietal Trial I
Zone : Eastern Zone
Character : Days To Harvest Maturity

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	PS 1637	95.50	106.00	116.00	105.83	IX
2	MACS 1566	92.25	101.00	116.25	103.17	V
3	Himso 1689	87.25	104.00	114.25	101.83	III
4	RSC 11-17	100.50	103.50	115.50	106.50	XII
5	MACS 1620	91.50	106.50	114.50	104.17	VII
6	DSb 33	91.50	88.25	113.00	97.58	I
7	RSC 11-15	96.75	102.25	115.50	104.83	VIII
8	NRC 148	96.50	106.75	115.50	106.25	XI
9	NRC 142	94.00	88.00	115.50	99.17	II
10	JS 335(C)	92.25	103.00	113.25	102.83	IV
11	JS 97-52(C)	98.50	108.00	114.00	106.83	XIII
12	RKS 18(C)	92.50	101.50	116.50	103.50	VI
13	RSC 10-46(C)	99.25	101.00	117.75	106.00	X
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	17/08/2019	28/06/2019	01/07/2019		

Table 1.4.9

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

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	PS 1637	34.88	69.95	60.80	55.21	IX
2	MACS 1566	38.05	73.00	59.60	56.88	V
3	Himso 1689	32.75	54.95	46.95	44.88	XIII
4	RSC 11-17	28.85	85.00	55.35	56.40	VI
5	MACS 1620	39.10	73.85	51.25	54.73	X
6	DSb 33	35.92	74.25	55.85	55.34	VIII
7	RSC 11-15	37.85	73.45	61.60	57.63	IV
8	NRC 148	36.88	65.50	56.30	52.89	XI
9	NRC 142	35.60	92.50	55.05	61.05	I
10	JS 335(C)	34.18	64.35	50.50	49.68	XII
11	JS 97-52(C)	34.45	80.00	52.35	55.60	VII
12	RKS 18(C)	32.58	92.15	50.70	58.48	II
13	RSC 10-46(C)	33.40	75.35	65.25	58.00	III
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	17/08/2019	28/06/2019	01/07/2019		

Table 1.4.10

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

S.No	Varieties	Bhawanipatna	Raipur	Ranchi	Mean	Rank
1	PS 1637	10.04	11.32	12.13	11.16	IX
2	MACS 1566	12.06	11.64	13.63	12.44	III
3	Himso 1689	10.70	11.79	12.16	11.55	V
4	RSC 11-17	10.09	10.23	10.96	10.43	XI
5	MACS 1620	15.64	14.03	17.23	15.63	I
6	DSb 33	11.02	12.60	13.47	12.36	IV
7	RSC 11-15	8.95	10.16	11.55	10.22	XII
8	NRC 148	10.55	11.21	10.94	10.90	X
9	NRC 142	11.47	13.36	13.30	12.71	II
10	JS 335(C)	11.65	10.13	12.22	11.33	VI
11	JS 97-52(C)	8.87	10.54	10.83	10.08	XIII
12	RKS 18(C)	11.75	9.16	12.93	11.28	VII
13	RSC 10-46(C)	10.92	9.80	12.89	11.20	VIII
	N.P.S.(Sqm)	12.96	18.00	12.96		
	DOS	17/08/2019	28/06/2019	01/07/2019		

Table 1.4.11

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

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	RSC 11-07	1611	1134	1541	2347	1658.25	I
2	NRC 128	1565	1366	1515	2060	1626.50	II
3	AMS 2014-1	1398	889	1319	2583	1547.25	IV
4	NRC 136	1250	1088	830	2412	1395.00	VIII
5	MACS 1493	1681	1065	733	2449	1482.00	VI
6	RSC 11-03	1208	926	1233	1847	1303.50	XI
7	NRCSL 1	1495	1315	1452	2088	1587.50	III
8	NRC 132	1343	1028	963	2606	1485.00	V
9	NRC 137	1199	880	948	2120	1286.75	XII
10	NRC 147	1384	912	804	1509	1152.25	XIII
11	JS 335(C)	1176	972	974	2213	1333.75	X
12	RKS 18(C)	1227	1116	956	2241	1385.00	IX
13	JS 97-52(C)	1037	1181	1144	2565	1481.75	VII
	Mean	1351.85	1067.08	1108.62	2233.85		
	N.P.S.(Sqm)	21.60	21.60	27.00	21.60		
	DOS	25/08/2019	22/07/2019	27/06/2019	29/06/2019		
	CD	199.07	148.15	129.63	310.19		
	CV (5%)	10.14	9.74	8.17	9.61		
	Pooled CD					148	

Table 1.4.12

Trial : Advanced Varietal Trial II
Zone : Eastern Zone
Character : Days To Flower

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	RSC 11-07	37.75	42.75	41.00	44.50	41.50	V
2	NRC 128	39.75	43.50	42.50	45.25	42.75	VIII
3	AMS 2014-1	39.25	38.00	42.00	42.25	40.38	III
4	NRC 136	40.50	42.00	41.00	42.50	41.50	V
5	MACS 1493	39.25	47.50	44.50	45.50	44.19	XII
6	RSC 11-03	41.25	45.00	44.50	44.25	43.75	XI
7	NRCSL 1	38.25	39.25	41.00	42.50	40.25	II
8	NRC 132	41.25	43.50	44.50	42.75	43.00	X
9	NRC 137	38.25	40.25	41.00	44.25	40.94	IV
10	NRC 147	37.00	38.25	41.00	43.75	40.00	I
11	JS 335(C)	38.25	43.75	44.00	41.75	41.94	VII
12	RKS 18(C)	38.75	41.25	44.00	43.00	41.75	VI
13	JS 97-52(C)	42.00	39.25	45.50	44.50	42.81	IX
	N.P.S.(Sqm)	21.60	21.60	27.00	21.60		
	DOS	25/08/2019	22/07/2019	27/06/2019	29/06/2019		

Table 1.4.13

Trial : Advanced Varietal Trial II
Zone : Eastern Zone
Character : Days To Harvest Maturity

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	RSC 11-07	87.50	106.25	99.50	114.50	101.94	II
2	NRC 128	92.25	107.00	102.75	114.25	104.06	III
3	AMS 2014-1	95.50	112.00	103.00	116.00	106.63	IX
4	NRC 136	97.75	109.00	110.00	114.75	107.88	X
5	MACS 1493	94.75	105.75	108.25	114.25	105.75	VI
6	RSC 11-03	96.25	107.75	104.25	115.50	105.94	VII
7	NRCSL 1	91.75	107.25	110.00	113.00	105.50	V
8	NRC 132	91.25	114.25	106.50	112.25	106.06	VIII
9	NRC 137	100.75	117.25	107.00	114.50	109.88	XIII
10	NRC 147	89.25	106.25	95.00	115.25	101.44	I
11	JS 335(C)	91.75	109.25	105.00	110.75	104.19	IV
12	RKS 18(C)	91.75	112.50	112.00	116.50	108.19	XI
13	JS 97-52(C)	100.50	113.75	109.00	115.75	109.75	XII
	N.P.S.(Sqm)	21.60	21.60	27.00	21.60		
	DOS	25/08/2019	22/07/2019	27/06/2019	29/06/2019		

Table 1.4.14

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

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	RSC 11-07	39.77	71.15	67.60	60.15	59.67	X
2	NRC 128	38.83	68.20	80.35	66.90	63.57	VI
3	AMS 2014-1	32.88	78.75	74.75	74.20	65.15	IV
4	NRC 136	48.98	80.75	75.40	76.15	70.32	II
5	MACS 1493	42.60	75.65	69.65	64.35	63.06	VII
6	RSC 11-03	33.45	56.40	62.00	57.90	52.44	XIII
7	NRCSL 1	34.20	71.35	69.05	53.80	57.10	XI
8	NRC 132	36.90	74.20	78.15	62.15	62.85	VIII
9	NRC 137	42.95	89.50	81.45	71.55	71.36	I
10	NRC 147	47.75	75.10	88.00	65.20	69.01	III
11	JS 335(C)	33.55	75.20	62.10	54.55	56.35	XII
12	RKS 18(C)	34.70	58.10	98.20	52.45	60.86	IX
13	JS 97-52(C)	36.58	68.40	86.30	68.05	64.83	V
	N.P.S.(Sqm)	21.60	21.60	27.00	21.60		
	DOS	25/08/2019	22/07/2019	27/06/2019	29/06/2019		

Table 1.4.15

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

S.No	Varieties	Bhawanipatna	Dholi	Raipur	Ranchi	Mean	Rank
1	RSC 11-07	11.35	9.00	11.24	10.59	10.55	VI
2	NRC 128	12.76	10.91	13.79	15.06	13.13	I
3	AMS 2014-1	11.46	7.46	7.81	10.96	9.42	XIII
4	NRC 136	9.21	10.62	8.25	9.95	9.51	XI
5	MACS 1493	13.09	9.62	9.94	13.89	11.64	III
6	RSC 11-03	10.39	8.21	10.20	12.10	10.23	IX
7	NRCSL 1	12.65	10.74	11.87	13.91	12.29	II
8	NRC 132	9.68	7.31	10.05	12.08	9.78	X
9	NRC 137	9.77	7.99	9.12	10.89	9.44	XII
10	NRC 147	13.15	8.53	10.54	12.75	11.24	V
11	JS 335(C)	12.26	6.30	10.35	12.93	10.46	VII
12	RKS 18(C)	12.26	9.63	10.48	13.51	11.47	IV
13	JS 97-52(C)	9.18	11.89	9.82	10.67	10.39	VIII
	N.P.S.(Sqm)	21.60	21.60	27.00	21.60		
	DOS	25/08/2019	22/07/2019	27/06/2019	29/06/2019		

Table 1.5.1

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

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	VLS 99	1037	2494	2074	-	0	568	1580	1383	395	2222	469	1222	XLII
2	SL 1213	2247	2765	2074	247	1580	1086	2543	1185	1679	2222	1358	1874	XV
3	PS 1641	2395	2889	2173	1037	1605	1877	2543	1185	1136	2469	1679	1995	VIII
4	NRC 154	2346	2963	2272	1358	864	1309	2444	1728	938	2469	1210	1854	XVI
5	RVS 2011-32	1926	3136	2321	1556	1111	914	2617	1481	1432	2321	1506	1877	XIV
6	MACS 1655	2222	3630	2667	-	0	593	617	1037	889	2519	1457	1563	XXXII
7	SKF 2036	1901	3136	2420	790	1136	1210	2741	1556	1654	2173	1210	1914	XII
8	AUKS 200	1951	2593	1901	716	864	1210	1358	1506	642	2049	1185	1526	XXXIII
9	DS 1318	2074	2963	1630	568	790	716	2321	914	1235	1852	1481	1598	XXX
10	NRC 86 (c)	2222	3679	2667	864	1407	1605	3111	1580	1580	2148	1556	2156	III
11	NRC 163	1951	2395	1506	1704	1556	1160	2543	1778	1086	2519	1802	1830	XVIII
12	JS 22-01	1358	2370	1975	1111	1679	1383	2148	1901	938	1852	1531	1714	XXV
13	RSC 11-20	1951	2963	2025	1012	1778	1506	3086	1901	1136	3185	1383	2091	VI
14	TS 46	1556	2568	2321	74	0	914	3160	938	1358	2099	1160	1607	XXIX
15	MAUS 717	2025	2938	2173	691	691	1728	2790	1951	1333	2296	1630	1956	X
16	PS 1642	1457	2074	1654	1432	815	1951	2420	1852	1012	2049	1654	1694	XXVII
17	AMS 20-19	2272	2938	2494	568	1506	1457	3457	1630	2000	2123	1136	2101	IV
18	KDS 1097	1605	3136	2296	198	469	642	2222	1457	1605	2519	1358	1731	XXIII
19	DSb 37	1407	2716	2025	617	1383	1679	4049	1802	1778	2790	1333	2096	V
20	JS 20-34 (C)	1605	2247	1728	1037	1086	1432	1210	1309	642	1679	1333	1427	XXXIX
21	ASb 51	988	2593	2173	519	667	741	1136	889	593	2074	1037	1289	XLI
22	NRC 149	2765	2938	2296	1235	2049	1580	-	1802	2049	2741	1778	2222	I
23	VLS 98	1407	2815	2173	74	815	741	2173	864	469	2469	741	1467	XXXVI
24	DS 1326	1753	2938	2321	617	815	691	2691	1877	1136	2148	1407	1778	XX
25	SL 1234	1432	2074	1630	444	840	1333	1975	1704	1506	1654	938	1509	XXXIV
26	RSC 11-22	2000	2765	2148	1284	2000	1951	2000	1778	1605	1728	1259	1923	XI
27	Himso 1690	1877	2272	1728	49	148	716	1827	1407	617	2593	1235	1442	XXXVII
28	BAUS 103	2321	3951	3012	198	0	642	3383	1556	1407	2049	1333	1965	IX
29	JS 22-07	1531	2864	2148	1259	1333	1827	2815	1778	1531	2000	1235	1906	XIII
30	JS 20-98 (C)	1432	2395	1827	1235	1531	1333	2568	1901	1580	2296	1432	1830	XVIII
31	TS 107	1407	2741	2099	49	0	889	2790	1778	1086	3111	1358	1726	XXIV
32	MAUS 712	1877	2815	2099	519	963	716	3111	1506	1506	2617	1333	1854	XVI

33	NRC 168	1605	2272	1630	1531	1210	1062	1728	1630	395	2000	1136	1467	XXXVI
34	MACS 1639	1531	2815	2222	49	0	691	617	1531	840	2346	1432	1403	XL
35	DS 1320	1556	2741	2025	494	1160	642	2148	1951	1654	2444	1235	1756	XXII
36	KDS 1099	1802	2148	1704	568	593	1383	2296	1457	1160	2296	914	1575	XXXI
37	AMS 353	2568	3185	2444	568	1704	1728	3111	1407	1506	2741	1210	2160	II
38	DSb 36	1333	2617	1951	49	0	1012	691	1556	1506	2691	988	1435	XXXVIII
39	AUKS 218	1926	2148	1630	1383	1383	1778	1605	1778	938	2173	1679	1704	XXVI
40	RSC 10-46 (C)	2395	2741	2025	1605	1457	1802	2321	1778	1802	2864	1481	2067	VII
41	RVSM 2011-77	1185	1753	1580	1136	1333	1704	840	1605	1432	2074	1210	1472	XXXV
42	SKF 6029	2173	2420	1753	914	1457	1333	1012	1704	1753	2889	1259	1775	XXI
43	NRC 167	1926	2321	1728	1531	938	1481	2593	1531	1383	2716	1259	1788	XIX
44	ASb 50	1531	2988	2198	395	988	1111	1802	1580	1037	2198	1358	1679	XXVIII
45	RVS 2011-76	2272	2296	1778	1259	1704	1679	2074	1457	1037	2716	1383	1840	XVII
	Mean	1824.47	2715.53	2060.4	803.35	1194.95	1233.47	2206.76	1552.87	1244.36	2337.4	1312.47		
	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	02-07-19	05-07-19	28-06-19	09-07-19	01/07/2019	11-07-19	30-06-19	04-07-19	09-07-19	29-06-19	04-07-19		
	CD	320.99	493.83	370.37	345.68	148.15	271.6	296.3	444.44	271.6	296.3	246.91		
	CV (5%)	10.98	11.1	10.81	27.79	8.89	13.53	8.52	17.16	13.16	7.65	11.43		
	Pooled CD												270	

Data of Indore not included due to low mean yield and high CV.

Data of Lok Bharti for NRC 149 not considered due to torn seed packet received and therefore less plant population

Table 1.5.2

Trial : Initial Varietal Trial
Zone : Central Zone
Character : Days To Flower

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	VLS 99	42.33	40.67	40.33	36.33	44.00	43.33	43.33	39.67	46.33	39.33	43.33	41.73	VIII
2	SL 1213	45.00	45.00	42.67	46.67	43.33	49.67	49.33	52.67	47.33	39.67	44.33	45.97	XXX
3	PS 1641	46.33	48.67	47.00	49.33	50.00	49.33	52.67	52.00	48.67	42.67	32.00	47.15	XXXVIII
4	NRC 154	45.67	40.67	41.67	36.67	36.00	42.33	42.67	39.00	43.67	30.33	37.00	39.61	II
5	RVS 2011-32	41.67	39.67	42.00	42.67	42.00	43.33	44.67	43.67	43.33	36.33	42.33	41.97	XIII
6	MACS 1655	43.33	45.00	46.00	46.33	45.67	48.67	50.67	47.33	46.67	41.67	46.33	46.15	XXXII
7	SKF 2036	42.33	41.67	41.00	46.67	44.33	44.33	48.33	45.00	43.67	38.67	44.33	43.67	XXII
8	AUKS 200	41.67	39.67	40.00	46.67	40.67	41.67	43.33	39.00	44.00	37.33	41.33	41.39	VII
9	DS 1318	42.33	40.00	42.67	46.33	41.67	44.67	46.67	48.00	43.00	36.67	42.33	43.12	XVIII
10	NRC 86 (C)	43.33	41.00	46.33	46.33	43.33	44.67	46.33	46.33	45.33	38.33	42.67	44.00	XXIV
11	NRC 163	41.33	35.00	36.00	43.00	41.33	42.33	43.33	41.00	44.00	35.67	40.67	40.33	III
12	JS 22-01	40.67	39.33	40.67	42.00	41.67	41.33	45.33	46.33	45.67	36.33	41.33	41.88	XI
13	RSC 11-20	46.67	47.00	47.33	38.33	49.33	48.33	52.67	53.33	49.00	44.33	50.00	47.85	XL
14	TS 46	45.00	46.00	43.33	46.67	48.67	47.33	51.00	49.00	49.33	41.33	41.33	46.27	XXXIII
15	MAUS 717	40.67	40.67	40.00	43.33	43.33	44.67	44.67	44.67	46.00	38.67	42.00	42.61	XV
16	PS 1642	45.67	46.00	47.00	45.67	47.33	46.67	47.67	48.33	47.67	43.67	45.67	46.49	XXXIV
17	AMS 20-19	43.33	41.00	42.33	46.33	44.33	46.33	49.00	47.67	45.67	40.33	48.33	44.97	XXVII
18	KDS 1097	43.67	40.67	39.67	42.67	43.33	47.33	46.33	44.67	45.33	41.67	47.67	43.91	XXIII
19	DSb 37	46.67	45.00	46.00	46.00	47.67	45.33	48.33	50.67	49.67	42.67	49.33	47.03	XXXVII
20	JS 20-34 (C)	34.67	32.00	35.00	39.00	30.33	36.67	38.00	39.00	44.00	29.67	32.33	35.52	I
21	ASb 51	42.67	43.00	44.00	46.67	45.33	46.33	49.33	47.00	46.50	39.33	48.33	45.32	XXIX
22	NRC 149	41.33	43.33	49.00	47.00	43.33	45.67	51.33	48.00	45.33	39.33	43.00	45.15	XXVIII
23	VLS 98	42.00	40.00	41.00	46.33	41.67	45.67	50.33	45.00	45.67	40.33	45.00	43.91	XXIII
24	DS 1326	42.67	41.00	40.33	48.67	44.67	45.33	50.00	48.00	45.67	40.33	44.33	44.64	XXVI
25	SL 1234	43.33	40.00	37.00	47.00	44.00	45.67	49.67	44.67	45.33	39.67	43.33	43.61	XXI
26	RSC 11-22	43.33	46.00	45.33	46.00	45.00	49.67	50.00	46.67	47.00	41.33	46.00	46.03	XXXI
27	Himso 1690	43.33	40.00	39.67	38.33	43.33	47.33	44.67	44.33	47.00	38.67	44.33	42.82	XVII
28	BAUS 103	44.33	46.00	43.67	46.67	48.00	48.33	53.67	47.00	48.33	45.00	49.67	47.33	XXXIX
29	JS 22-07	41.00	40.33	41.33	42.67	42.00	42.67	44.67	43.00	43.00	36.33	44.33	41.94	XII
30	JS 20-98	42.00	40.00	40.33	46.00	42.00	42.33	47.67	45.67	43.00	37.67	42.33	42.64	XVI

	(C)													
31	TS 107	46.33	45.67	46.67	51.33	47.33	44.67	51.67	48.00	50.00	44.00	36.33	46.55	XXXV
32	MAUS 712	42.00	42.00	41.00	46.67	43.33	43.00	49.33	42.67	43.67	37.33	43.33	43.12	XVIII
33	NRC 168	40.67	38.67	42.00	48.33	41.00	43.33	43.33	38.00	48.33	36.33	40.33	41.85	X
34	MACS 1639	41.33	41.67	42.67	49.33	43.00	42.67	48.00	41.00	44.00	38.67	43.00	43.21	XIX
35	DS 1320	42.00	39.00	37.33	42.67	42.33	43.33	46.67	43.33	44.00	37.33	41.00	41.73	VIII
36	KDS 1099	41.67	39.33	41.00	38.67	42.33	47.33	44.33	42.67	43.33	37.33	41.33	41.76	IX
37	AMS 353	42.00	40.33	40.67	46.33	44.67	46.00	46.00	46.67	43.00	39.67	44.00	43.58	XX
38	DSb 36	43.67	40.33	42.00	43.00	43.33	44.33	46.67	39.67	43.00	38.33	43.00	42.48	XIV
39	AUKS 218	41.67	39.00	36.33	42.33	41.33	40.67	44.67	42.00	44.00	31.33	40.33	40.33	III
40	RSC 10-46 (C)	44.67	46.33	47.67	46.67	46.33	48.33	49.67	48.67	50.33	43.33	41.33	46.67	XXXVI
41	RVSM 2011-77	41.67	38.67	39.67	42.67	41.33	42.67	45.33	39.33	44.00	37.33	40.67	41.21	V
42	SKF 6029	40.67	39.33	42.00	42.00	40.67	43.67	44.67	41.67	43.00	33.33	41.33	41.12	IV
43	NRC 167	41.33	40.67	42.00	46.67	43.67	45.33	45.67	47.33	43.00	36.33	42.33	43.12	XVIII
44	ASb 50	42.33	42.00	41.33	46.67	44.67	45.33	45.33	49.00	44.33	42.67	46.33	44.54	XXV
45	RVS 2011-76	41.00	38.67	36.67	42.67	42.33	40.67	44.33	41.67	44.33	37.33	44.00	41.24	VI
	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	02/07/2019	05/07/2019	28/06/2019	09/07/2019	01/07/2019	11/07/2019	30/06/2019	04/07/2019	09/07/2019	29/06/2019	04/07/2019		

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	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	VLS 99	104.33	105.00	106.67	108.33	-	94.33	114.00	97.00	104.33	100.33	109.67	104.40	XX
2	SL 1213	105.00	106.33	104.33	100.00	116.67	102.67	119.33	107.00	106.00	99.33	112.33	107.18	XXXVI
3	PS 1641	105.33	109.33	108.67	110.33	117.00	102.33	120.33	110.00	106.00	101.67	113.67	109.51	XLI
4	NRC 154	105.00	101.67	103.33	106.67	116.67	99.33	117.00	104.00	105.67	89.67	112.33	105.58	XXVI
5	RVS 2011-32	101.33	100.67	100.33	112.67	116.33	100.67	112.33	99.00	100.00	95.33	96.33	103.18	XIV
6	MACS 1655	104.67	107.33	108.00	99.33	-	101.67	107.67	87.00	106.67	101.33	108.33	103.20	XV
7	SKF 2036	105.00	102.67	104.00	111.33	112.00	99.67	116.67	97.00	106.67	100.33	105.33	105.52	XXV
8	AUKS 200	94.33	94.00	92.33	92.67	106.00	89.67	106.00	82.00	99.00	100.33	96.67	95.73	III
9	DS 1318	102.00	105.33	104.00	111.67	116.00	103.67	121.33	104.00	108.33	97.67	113.00	107.91	XXXVII
10	NRC 86 (C)	103.00	102.00	105.67	99.33	112.67	103.33	121.67	96.00	108.33	98.33	105.67	105.09	XXIII
11	NRC 163	102.67	93.33	88.00	99.33	111.33	99.33	105.67	94.00	103.00	95.33	106.00	99.82	VIII
12	JS 22-01	101.33	90.67	93.33	93.33	107.67	93.00	105.67	94.00	99.00	95.33	103.33	97.88	VI
13	RSC 11-20	104.00	106.67	105.33	110.00	116.67	103.00	111.67	96.00	107.00	103.67	112.67	106.97	XXXIV

14	TS 46	101.33	106.00	105.00	100.33	-	102.00	114.00	100.00	107.00	104.33	108.33	104.83	XXII
15	MAUS 717	102.33	103.00	102.67	107.67	116.00	102.00	123.00	96.00	107.00	99.33	107.67	106.06	XXIX
16	PS 1642	103.00	111.00	112.00	108.33	109.00	101.00	113.67	94.00	106.67	103.67	109.00	106.49	XXX
17	AMS 20-19	102.00	107.67	106.00	100.33	116.33	102.33	113.00	98.00	106.67	100.33	111.33	105.82	XXVIII
18	KDS 1097	102.00	101.00	100.67	100.67	111.67	103.33	111.00	96.00	106.67	103.33	109.67	104.18	XIX
19	DSb 37	104.33	110.00	110.33	99.67	115.33	100.33	112.67	101.00	104.33	103.33	111.33	106.60	XXXII
20	JS 20-34 (C)	85.33	85.00	84.00	100.33	106.67	88.33	97.33	92.00	98.00	89.67	92.67	92.67	I
21	ASb 51	102.00	108.00	110.67	100.33	116.33	102.00	114.00	96.00	106.50	100.67	107.33	105.80	XXVII
22	NRC 149	101.00	108.33	113.67	108.33	116.33	103.33	99.00	111.00	113.00	99.33	114.00	107.94	XXXVIII
23	VLS 98	101.00	105.33	107.00	111.33	109.33	103.67	116.67	96.00	108.67	101.33	112.33	106.61	XXXIII
24	DS 1326	101.67	107.00	107.33	110.67	116.33	104.33	117.33	111.00	113.00	100.67	111.67	109.18	XL
25	SL 1234	102.00	106.33	107.67	108.33	116.33	103.33	122.33	110.00	113.00	98.67	120.33	109.85	XLII
26	RSC 11-22	104.33	110.67	110.00	107.67	116.67	105.33	115.67	100.00	106.67	100.00	113.67	108.24	XXXIX
27	Himso 1690	103.00	104.67	106.00	98.67	108.33	103.33	113.33	106.00	102.33	98.33	112.33	105.12	XXIV
28	BAUS 103	103.67	112.33	111.33	109.33	-	105.33	119.33	108.00	113.00	108.33	119.67	111.03	XLIV
29	JS 22-07	100.33	98.33	95.00	98.67	110.67	97.33	108.00	96.00	102.33	96.33	102.33	100.48	X
30	JS 20-98 (C)	102.67	101.00	103.33	100.33	115.33	99.67	110.67	100.00	106.67	98.33	104.33	103.85	XVII

31	TS 107	103.00	101.33	98.67	100.33	-	98.67	113.00	94.00	101.00	105.00	105.00	102.00	XI
32	MAUS 712	103.67	104.00	105.33	108.33	113.33	100.00	120.33	106.00	109.00	98.67	110.00	107.15	XXXV
33	NRC 168	101.00	101.00	99.67	108.67	114.67	99.33	106.67	104.00	102.00	96.67	108.67	103.85	XVII
34	MACS 1639	103.00	105.33	106.33	99.33	-	100.00	113.33	98.00	106.67	99.33	109.33	104.07	XVIII
35	DS 1320	102.00	103.33	106.00	98.67	114.33	99.33	112.33	96.00	104.67	96.33	103.33	103.30	XVI
36	KDS 1099	101.33	102.33	104.67	93.33	110.33	98.67	113.33	94.00	104.67	99.67	105.00	102.48	XII
37	AMS 353	103.00	103.33	104.67	100.67	116.33	101.67	118.67	105.00	104.67	102.33	111.67	106.55	XXXI
38	DSb 36	102.00	92.00	93.67	100.33	-	90.00	105.00	96.00	98.67	97.67	103.33	97.87	V
39	AUKS 218	102.00	89.67	88.67	96.00	105.00	88.67	96.67	89.00	98.00	89.33	100.33	94.85	II
40	RSC 10-46 (C)	104.00	110.33	110.00	108.67	117.33	103.67	121.67	105.00	113.00	103.67	114.00	110.12	XLIII
41	RVSM 2011-77	102.67	92.00	92.33	100.00	107.00	90.67	107.33	86.00	99.67	98.67	101.33	97.97	VII
42	SKF 6029	101.00	90.00	89.67	100.33	111.00	93.33	113.00	100.00	106.67	94.33	103.33	100.24	IX
43	NRC 167	102.33	97.67	98.33	107.67	111.33	99.67	111.33	101.00	100.00	96.33	105.33	102.82	XIII
44	ASb 50	102.00	101.00	102.33	100.67	112.00	100.67	114.33	103.00	106.67	102.33	106.00	104.64	XXI
45	RVS 2011-76	102.00	90.00	91.33	100.33	109.00	91.33	106.67	88.00	99.00	96.67	97.67	97.45	IV
	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	02/07/2019	05/07/2019	28/06/2019	09/07/2019	01/07/2019	11/07/2019	30/06/2019	04/07/2019	09/07/2019	29/06/2019	04/07/2019		

Table 1.5.4

Trial : Initial Varietal Trial
Zone : Central Zone
Character : Plant Height (cm)

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	VLS 99	51.80	54.87	57.00	43.67	-	36.07	33.67	48.00	61.17	32.47	45.87	58.00	47.51	XLII
2	SL 1213	51.73	50.07	51.67	79.00	64.67	32.13	45.87	38.39	65.33	32.20	42.33	58.00	50.95	XXXV
3	PS 1641	59.53	69.27	66.40	74.67	71.67	36.33	43.87	32.22	58.33	42.93	56.87	64.33	56.37	XVI
4	NRC 154	52.33	50.47	51.80	73.00	55.33	37.87	43.40	35.67	60.33	32.80	43.47	63.33	49.98	XXXVIII
5	RVS 2011-32	63.73	71.40	72.67	69.33	62.33	41.27	42.13	64.33	66.33	33.53	54.60	64.33	58.83	XII
6	MACS 1655	71.00	68.47	67.87	66.33	-	45.73	53.03	60.33	70.83	37.00	62.27	77.33	61.84	X
7	SKF 2036	46.40	63.33	64.50	68.67	61.67	36.73	44.33	49.33	64.67	32.80	28.93	81.00	53.53	XXIV
8	AUKS 200	54.87	55.20	56.40	55.33	57.53	38.73	29.03	43.00	57.33	31.27	35.00	57.00	47.56	XLI
9	DS 1318	48.47	45.27	49.07	70.00	54.53	28.20	46.10	34.67	63.33	28.07	25.00	55.00	45.64	XLIII
10	NRC 86 (C)	57.73	62.00	64.07	84.33	67.53	39.07	47.07	52.33	62.67	32.53	38.00	67.67	56.25	XVII
11	NRC 163	52.40	46.00	48.80	71.00	67.33	31.07	33.20	36.78	74.83	29.80	42.73	72.67	50.55	XXXVII
12	JS 22-01	47.60	59.80	60.80	69.00	60.33	38.10	51.40	29.67	72.00	33.00	36.73	79.00	53.12	XXVII
13	RSC 11-20	80.27	78.87	82.07	94.00	95.00	43.27	65.87	34.33	57.33	43.30	66.60	91.33	69.35	IV
14	TS 46	67.80	64.93	66.30	80.33	-	39.20	59.23	29.67	72.83	34.47	45.80	70.67	57.38	XV
15	MAUS 717	49.07	54.13	58.33	84.33	78.67	34.00	40.93	38.33	56.17	31.73	34.60	71.67	52.66	XXIX
16	PS 1642	55.20	48.67	49.27	91.67	60.20	35.53	51.43	32.00	65.50	34.67	41.60	75.67	53.45	XXV
17	AMS 20-19	75.13	71.53	73.10	85.67	66.67	38.73	59.07	72.00	67.00	40.47	51.33	81.33	65.17	VI
18	KDS 1097	83.07	100.20	87.00	86.67	91.67	45.17	86.20	52.00	60.33	51.07	63.73	84.67	74.32	II
19	DSb 37	72.27	88.00	94.07	74.33	70.43	44.17	69.00	36.33	54.00	52.60	55.27	56.00	63.87	VIII

20	JS 20-34 (C)	41.33	26.87	35.20	46.67	39.83	27.87	21.97	61.33	47.00	26.47	22.80	57.67	37.92	XLIV
21	ASb 51	42.20	58.73	62.33	68.00	62.10	31.90	49.83	50.67	70.67	25.50	44.07	68.00	52.83	XXVIII
22	NRC 149	90.00	81.73	101.93	73.67	98.63	58.10	78.00	46.67	69.00	64.07	67.53	96.00	77.11	I
23	VLS 98	63.53	57.47	59.13	62.67	70.60	36.13	44.50	53.00	70.00	30.00	45.93	36.67	52.47	XXX
24	DS 1326	53.67	54.40	53.67	59.33	62.53	29.13	43.43	50.33	60.83	36.80	41.87	65.33	50.94	XXXVI
25	SL 1234	54.00	53.87	56.20	67.33	70.17	38.20	45.03	35.43	63.67	39.67	32.00	66.00	51.80	XXXIII
26	RSC 11-22	61.13	58.67	59.13	79.67	59.03	40.33	43.97	48.67	52.83	40.07	44.20	70.00	54.81	XXIII
27	Himso 1690	53.07	55.73	58.13	69.00	65.53	36.60	34.33	51.33	63.33	38.47	38.00	94.33	54.82	XXII
28	BAUS 103	76.27	69.93	72.60	68.00	-	44.03	71.40	32.33	66.33	46.60	61.13	54.33	60.27	XI
29	JS 22-07	54.13	62.07	64.00	77.67	65.77	48.27	60.93	58.67	57.33	34.67	37.67	71.67	57.74	XIII
30	JS 20-98 (C)	46.13	52.80	54.93	74.33	65.80	38.53	49.30	67.33	60.00	35.47	36.80	78.33	54.98	XXI
31	TS 107	70.13	70.27	73.07	68.33	-	38.53	48.83	56.33	67.67	39.87	37.67	64.33	57.73	XIV
32	MAUS 712	53.27	64.13	64.40	60.33	57.07	35.83	40.23	-	65.83	37.80	34.80	71.00	53.15	XXVI
33	NRC 168	53.80	51.40	54.30	72.67	57.07	35.40	45.30	-	59.83	32.87	46.13	66.00	52.25	XXXI
34	MACS 1639	62.20	61.53	63.73	64.00	-	37.33	41.67	-	61.83	39.47	52.93	74.33	55.90	XIX
35	DS 1320	57.33	48.00	52.13	57.33	59.97	31.80	36.37	-	65.00	35.00	29.40	69.33	49.24	XL
36	KDS 1099	73.33	69.87	70.33	76.00	69.87	46.17	64.80	-	60.67	50.53	64.00	67.67	64.84	VII
37	AMS 353	64.20	72.87	77.80	82.33	57.77	40.47	55.23	-	65.17	43.20	54.80	80.33	63.11	IX
38	DSb 36	82.73	90.47	92.53	75.33	-	49.53	73.17	-	53.50	44.07	66.07	85.00	71.24	III
39	AUKS 218	61.20	58.60	59.40	66.33	63.10	41.10	51.77	-	64.33	33.93	43.53	72.33	55.97	XVIII
40	RSC 10-46 (C)	75.07	64.80	63.93	82.67	81.27	44.27	52.77	-	61.17	46.80	53.60	93.33	65.43	V
41	RVSM 2011-77	49.00	51.20	50.40	77.33	64.40	37.87	41.50	-	67.67	38.27	42.73	82.67	54.82	XXII
42	SKF 6029	48.93	58.73	67.87	78.67	64.50	40.40	45.73	-	53.83	39.67	40.53	67.67	55.14	XX

43	NRC 167	60.07	44.53	52.70	68.00	66.40	37.53	46.70	-	60.33	30.53	42.93	54.00	51.25	XXXIV
44	ASb 50	61.87	57.33	56.93	57.00	64.87	41.47	28.27	-	63.83	33.07	62.33	46.67	52.15	XXXII
45	RVS 2011-76	56.00	45.27	47.27	73.33	62.07	36.23	30.13	-	60.33	26.47	55.33	56.33	49.89	XXXIX
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	3.00	4.05	4.05	4.05	4.05		
	DOS	02/07/2019	05/07/2019	28/06/2019	09/07/2019	01/07/2019	11/07/2019	30/06/2019	25/06/2019	04/07/2019	09/07/2019	29/06/2019	04/07/2019		

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	L' Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	VLS 99	11.63	15.20	14.99	-	-	9.17	15.33	9.53	12.00	16.95	11.50	12.92	VI
2	SL 1213	11.67	11.79	12.97	9.45	9.77	9.30	9.17	7.69	12.67	13.49	9.00	10.63	XXXI
3	PS 1641	10.13	12.03	11.90	10.78	12.27	12.43	10.17	10.17	13.23	13.27	12.83	11.75	XVI
4	NRC 154	16.22	15.80	13.97	13.90	13.10	13.20	13.33	11.90	13.13	17.35	15.67	14.32	III
5	RVS 2011-32	12.67	13.60	13.60	12.36	11.30	14.37	13.33	11.44	13.00	15.01	10.50	12.83	VII
6	MACS 1655	10.05	14.88	15.47	-	-	9.53	14.17	8.50	12.40	16.69	12.00	12.63	VIII
7	SKF 2036	9.83	12.26	11.73	9.08	10.13	8.23	12.33	9.06	11.53	13.56	10.50	10.75	XXIX
8	AUKS 200	12.63	13.84	14.43	11.07	9.90	13.17	13.17	9.56	12.40	14.83	12.50	12.50	X
9	DS 1318	10.97	11.11	10.60	8.37	8.23	10.03	10.67	9.56	12.13	12.41	11.00	10.46	XXXIV
10	NRC 86 (C)	9.97	10.68	10.93	9.66	8.53	10.23	10.83	8.74	11.00	11.63	10.50	10.25	XXXVI
11	NRC 163	16.30	15.88	15.63	15.22	12.97	15.83	15.50	12.53	16.37	17.77	13.50	15.23	I
12	JS 22-01	11.50	13.12	12.60	11.08	10.00	12.03	12.50	9.43	12.03	13.06	11.00	11.67	XVIII
13	RSC 11-20	11.75	11.15	10.77	9.33	10.40	10.17	12.00	9.72	12.45	12.98	12.00	11.16	XXIII
14	TS 46	10.58	11.75	10.93	8.35	-	7.87	12.00	8.74	12.00	13.37	13.50	10.91	XXVI
15	MAUS 717	11.75	11.90	11.73	9.60	9.63	10.27	12.17	10.81	12.40	13.95	10.00	11.29	XXI
16	PS 1642	9.22	7.47	9.70	7.48	7.53	8.73	8.33	7.75	11.40	10.34	9.17	8.83	XL
17	AMS 20-19	10.97	10.86	11.83	9.34	9.17	9.70	16.83	8.34	11.73	12.62	12.00	11.22	XXII
18	KDS 1097	12.22	12.48	12.53	8.65	8.27	9.23	13.33	10.88	13.13	14.82	13.00	11.69	XVII
19	DSb 37	9.75	9.61	10.20	8.45	8.97	9.40	9.33	6.88	12.57	11.74	10.83	9.79	XXXIX

20	JS 20-34 (C)	13.63	13.59	12.77	10.14	9.23	11.53	11.83	10.88	12.87	14.53	11.50	12.05	XIII
21	ASb 51	10.58	11.85	11.47	9.04	9.27	9.90	16.50	8.95	11.00	13.25	11.00	11.16	XXIII
22	NRC 149	12.98	12.41	11.07	11.15	12.27	12.57	11.23	10.38	12.50	16.05	12.83	12.31	XI
23	VLS 98	14.05	14.26	14.67	10.84	10.57	6.73	19.17	10.59	11.87	16.79	14.67	13.11	V
24	DS 1326	10.92	11.70	12.39	8.07	10.13	7.63	11.00	8.60	11.47	14.15	10.50	10.60	XXXII
25	SL 1234	8.92	11.64	11.90	8.93	8.70	8.57	9.50	8.47	11.40	13.17	12.50	10.34	XXXV
26	RSC 11-22	9.92	11.05	11.17	9.94	9.43	10.37	9.17	7.89	11.33	11.40	10.00	10.15	XXXVII
27	Himso 1690	10.02	10.69	10.87	8.74	8.90	7.87	11.00	9.41	10.63	15.04	12.50	10.52	XXXIII
28	BAUS 103	12.58	12.95	13.19	10.88	-	7.00	10.17	9.24	11.20	15.16	13.50	11.59	XIX
29	JS 22-07	12.58	15.42	15.47	11.14	12.07	14.40	21.17	12.79	17.10	15.89	10.50	14.41	II
30	JS 20-98 (C)	10.80	10.94	11.16	10.51	9.13	11.47	9.33	10.33	13.13	11.30	10.00	10.74	XXX
31	TS 107	8.75	12.36	12.61	8.84	-	10.43	18.50	8.32	11.00	14.84	11.00	11.67	XVIII
32	MAUS 712	11.30	12.13	11.83	8.10	9.37	7.80	11.50	9.82	12.40	13.27	12.00	10.87	XXVIII
33	NRC 168	15.67	16.01	15.77	14.94	11.93	13.53	12.17	10.72	13.93	16.76	13.50	14.08	IV
34	MACS 1639	11.17	14.18	14.68	7.86	-	8.57	17.83	9.69	12.47	14.33	10.00	12.08	XII
35	DS 1320	10.00	12.77	12.97	7.04	9.03	9.30	11.83	10.52	12.57	12.90	10.83	10.89	XXVII
36	KDS 1099	6.97	8.67	8.73	7.12	6.87	8.70	7.33	7.36	12.33	11.07	9.00	8.56	XLI
37	AMS 353	11.13	11.35	11.61	9.11	9.47	9.60	10.67	8.47	12.53	13.26	13.50	10.97	XXIV
38	DSb 36	11.88	14.63	15.24	9.70	-	9.53	19.50	7.65	13.97	14.55	12.50	12.92	VI
39	AUKS 218	8.80	9.55	10.24	9.35	7.13	9.03	12.67	8.43	12.13	10.44	10.50	9.84	XXXVII I
40	RSC 10-46 (C)	10.25	10.34	10.90	10.27	9.77	9.63	17.17	9.19	11.87	13.87	11.50	11.34	XX
41	RVSM 2011-77	10.50	11.28	11.87	10.80	8.63	11.03	9.67	9.71	14.40	11.70	10.50	10.92	XXV
42	SKF 6029	11.88	12.36	12.04	10.28	9.23	11.13	11.60	8.65	12.47	12.91	10.83	11.22	XXII

43	NRC 167	10.98	14.04	13.60	13.26	10.70	11.30	11.67	10.29	12.53	16.27	13.50	12.56	IX
44	ASb 50	12.88	12.52	12.88	10.21	8.93	11.20	11.50	9.00	12.97	14.77	12.50	11.76	XV
45	RVS 2011-76	12.97	13.34	13.23	11.90	10.10	11.30	12.17	9.50	12.20	13.42	11.83	12.00	XIV
	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	02/07/2019	05/07/2019	28/06/2019	09/07/2019	01/07/2019	11/07/2019	30/06/2019	04/07/2019	09/07/2019	29/06/2019	04/07/2019		

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	L'Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	PS 1656	2148	1778	1383	1259	1185	1877	2247	778	1728	938	2543	1704	1926.00	VII
2	NRC 153	840	1407	1185	444	-	1136	420	-	1432	370	2000	1111	1191.38	XXX
3	VLS 100	1457	1457	1086	49	-	840	1160	-	765	272	1506	568	1104.88	XXXI
4	NRC 155	1407	2099	1531	420	691	1086	1852	600	1407	494	1778	1407	1570.88	XXIV
5	RVS 2011-73	1753	3235	2395	1358	1086	1605	2519	844	642	790	3136	1778	2132.88	II
6	NRC 157	1852	2395	1877	469	420	1210	2395	-	1284	1284	2321	1728	1882.75	XI
7	AUKS 202	1951	2222	1630	1111	1160	1457	1136	556	1630	494	3185	1901	1889.00	VIII
8	NRC 169	1333	2741	2074	1160	1284	1753	3531	733	1827	1160	1951	1630	2105.00	III
9	DS 1314	1630	2543	1975	543	741	790	765	511	1506	642	1605	1778	1574.00	XXIII
10	JS 22-04	1926	2617	2123	963	1333	1951	296	2022	1852	593	2617	1704	1885.75	IX
11	NRC 151	1556	2272	1704	395	-	1383	1926	778	1531	617	1457	1481	1663.75	XVIII
12	MACS NRC 1710	914	1951	1531	272	-	1309	864	444	1383	99	1975	1802	1466.13	XXVI I
13	NRC 159	1506	1975	1531	99	-	1037	1654	467	741	247	2074	1852	1546.25	XXV
14	JS 20-34 (C)	1605	2272	1778	1333	1111	1284	1728	511	1259	494	2494	1852	1784.00	XV
15	NRC 158	1432	2370	1778	1062	642	1531	1309	800	1481	469	1901	1926	1716.00	XVII
16	DS 1312	1877	2914	2321	272	420	1062	2370	-	1259	1012	3531	1827	2145.13	I
17	NRC 162	889	2247	1728	1160	617	1185	1975	1511	889	1062	2494	1358	1595.63	XXI
18	JS 22-03	2148	2642	2025	1086	1309	1358	2617	844	1580	963	2593	1654	2077.13	IV
19	NRC 165	1654	2593	1975	691	691	1679	1654	978	1432	938	2296	1802	1885.63	X
20	PUSA-Sipani-1050	1432	2247	1802	148	469	1062	642	578	1309	420	1333	1753	1447.50	XXIX
21	NRC 152	1802	2716	2272	247	815	1160	1630	689	1457	370	1481	2519	1879.63	XII
22	AUKS 208	1654	2568	1975	914	420	1333	1037	711	1111	963	2296	1136	1638.75	XIX
23	NRC 161	1630	2346	1852	765	370	1654	1136	1156	1210	1481	1383	1802	1626.63	XX
24	PUSA-Sipani-408	1901	2716	2148	198	-	988	1753	711	1432	840	1210	2000	1768.50	XVI
25	NRC 156	1556	2123	1630	568	543	840	1704	933	1333	469	1580	1457	1527.88	XXVI
26	NRC 166	1778	2914	2296	1358	1309	1728	2444	1133	1432	1284	2099	1728	2052.38	VI
27	NRC 160	1136	2272	1605	963	765	1185	938	622	815	346	2272	1432	1456.88	XXVI II

28	JS 95-60 (C)	1630	1975	1407	123	-	1086	1383	689	1062	519	2247	1926	1589.50	XXII
29	NRC 164	1877	2444	1901	593	617	1704	1284	956	1086	667	2765	1704	1845.63	XIII
30	NRC 150	1728	2494	1778	790	1037	1679	1457	622	1062	1333	2123	2049	1796.25	XIV
31	KDS 980	1432	2840	2148	99	-	1704	2346	711	568	914	3679	1802	2064.88	V
	Mean	1594.65	2367.26	1820.77	674.58	827.61	1343.74	1618.45	810.67	1274.35	727.23	2191.13	1682.94		
	N.P.S.(Sq m)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.50	4.05	4.05	4.05	4.05		
	DOS	02/07/2019	05/07/2019	28/06/2019	09/07/2019	01/07/2019	11/07/2019	30/06/2019	25/06/2019	03/07/2019	09/07/2019	30/06/2019	04/07/2019		
	CD	271.60	395.06	320.99	296.30	197.53	296.30	172.84	44.44	444.44	296.30	345.68	271.60		
	CV (5%)	10.18	10.17	10.84	25.83	19.61	12.96	6.23	4.65	21.91	25.77	9.43	10.23		
	Pooled CD													266.69	

Data of Indore, Jabalpur, Mandsaur and Nagpur not included in zonal mean due to high CV and/or low mean yield.

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	L'Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	PS 1656	40.00	45.33	46.00	46.00	48.33	49.67	49.67	49.00	48.00	48.00	43.33	48.00	46.78	XXIX
2	NRC 153	35.00	34.67	34.00	31.67	32.67	36.67	38.67	27.67	34.00	39.00	31.33	34.33	34.14	VII
3	VLS 100	34.00	31.00	32.67	39.00	31.67	36.00	39.33	24.33	37.67	39.00	30.67	33.00	34.03	VI
4	NRC 155	35.00	36.33	35.33	38.33	33.33	36.00	39.33	28.00	34.00	38.00	32.33	35.33	35.11	X
5	RVS 2011-73	41.00	40.00	42.33	41.33	41.33	41.40	45.33	40.67	46.33	43.00	36.67	39.33	41.56	XXV
6	NRC 157	35.00	35.67	40.00	38.67	33.33	36.00	38.33	29.67	36.00	38.00	32.00	34.00	35.56	XII
7	AUKS 202	41.00	39.00	37.00	42.33	41.33	39.33	44.00	38.00	37.00	41.00	38.33	41.33	39.97	XXIII
8	NRC 169	35.33	38.33	40.00	38.67	40.67	39.67	42.33	30.67	37.00	38.00	34.67	39.00	37.86	XVIII
9	DS 1314	41.00	38.67	40.33	42.67	41.33	41.67	45.67	41.67	42.00	41.67	37.33	42.33	41.36	XXIV
10	JS 22-04	35.33	39.00	42.67	38.67	38.00	43.67	44.00	29.67	36.00	41.00	34.67	39.33	38.50	XX
11	NRC 151	35.00	38.67	38.00	39.00	34.33	37.33	39.00	28.33	35.00	41.00	30.67	34.00	35.86	XIV
12	MACS NRC 1710	34.00	29.67	32.67	32.33	30.33	36.00	28.67	21.33	30.00	39.00	25.00	30.33	30.78	I
13	NRC 159	33.33	30.33	37.00	31.67	30.33	38.00	31.00	23.00	35.00	41.00	29.33	32.33	32.69	III
14	JS 20-34	32.00	32.00	34.33	38.67	32.67	34.67	36.67	24.67	37.00	38.00	28.00	31.33	33.33	IV
15	NRC 158	33.00	35.67	34.67	41.00	34.00	40.33	40.33	29.00	37.00	40.67	29.33	35.33	35.86	XIV
16	DS 1312	40.00	40.00	42.00	42.00	41.67	39.33	46.00	46.67	45.67	42.33	37.33	40.33	41.94	XXVI
17	NRC 162	33.00	33.67	39.00	41.33	34.33	41.00	40.33	30.67	35.00	41.00	33.33	38.00	36.72	XVII
18	JS 22-03	43.00	40.00	44.67	46.00	42.33	42.67	45.33	42.67	46.67	46.33	41.33	45.00	43.83	XXVII
19	NRC 165	33.00	34.00	38.00	41.00	32.67	37.00	37.00	29.00	37.00	39.00	29.67	32.00	34.95	IX
20	PUSA-Sipani-1050	34.00	30.67	35.00	42.33	32.67	37.33	38.33	22.67	38.00	41.33	28.33	31.00	34.31	VIII
21	NRC 152	33.00	28.33	37.33	33.00	30.33	37.00	30.33	27.67	30.00	41.00	25.33	31.33	32.05	II
22	AUKS 208	34.67	37.00	39.00	42.00	41.33	40.00	43.67	37.33	37.00	43.00	38.67	39.33	39.42	XXII
23	NRC 161	34.33	36.33	40.67	39.00	34.00	38.33	39.33	30.00	34.00	38.00	33.33	35.33	36.05	XV
24	PUSA-Sipani-408	34.00	32.67	35.33	41.00	33.67	37.00	39.67	31.00	33.00	43.00	30.33	35.67	35.53	XI
25	NRC 156	35.00	28.00	30.67	32.00	31.33	37.00	29.33	22.33	28.00	36.67	28.67	30.33	30.78	I
26	NRC 166	40.00	37.67	42.00	42.33	39.33	41.00	43.33	31.67	37.00	38.00	36.33	39.00	38.97	XXI
27	NRC 160	35.00	33.67	35.33	40.67	32.67	41.33	43.00	28.67	36.00	43.00	31.67	33.33	36.20	XVI

28	JS 95-60	34.67	30.67	36.00	40.00	30.67	36.00	37.67	23.33	37.00	39.00	27.00	31.00	33.58	V
29	NRC 164	39.33	35.67	37.00	40.00	39.33	36.33	42.33	31.67	37.00	41.00	37.33	38.33	37.94	XIX
30	NRC 150	35.00	32.00	35.33	40.00	33.00	40.00	38.00	29.67	41.00	43.00	28.00	35.00	35.83	XIII
31	KDS 980	44.00	44.33	44.67	46.00	45.33	47.67	46.67	41.67	49.00	50.00	42.33	47.00	45.72	XXVIII
	N.P.S.(Sq m)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.50	4.05	4.05	4.05	4.05		
	DOS	02/07/2019	05/07/2019	28/06/2019	09/07/2019	01/07/2019	11/07/2019	30/06/2019	25/06/2019	03/07/2019	09/07/2019	30/06/2019	04/07/2019		

Table 1.5.8

Trial : Initial Varietal Trial : Early
Zone : Central Zone
Character : Days To Harvest Maturity

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	PS 1656	103.00	107.33	108.33	109.00	116.33	98.67	117.67	101.00	98.00	94.00	105.33	108.33	105.58	XXX
2	NRC 153	86.67	86.00	86.33	87.67	-	86.00	87.67	-	89.33	94.00	92.67	87.67	88.40	V
3	VLS 100	81.00	76.67	75.67	87.33	-	84.33	89.33	-	93.00	92.00	92.00	83.00	85.43	I
4	NRC 155	89.00	86.33	87.33	89.00	102.33	86.33	88.33	86.67	101.00	94.00	92.00	87.33	90.80	XII
5	RVS 2011-73	89.00	97.67	99.33	95.67	105.00	93.00	99.00	91.00	97.00	100.00	97.67	98.33	96.89	XXIV
6	NRC 157	89.67	91.00	94.67	92.67	102.00	84.67	91.67	-	93.67	92.67	92.33	88.33	92.12	XVII
7	AUKS 202	94.00	94.00	96.00	93.67	103.67	88.00	92.00	90.67	93.33	94.00	98.00	97.33	94.56	XXII
8	NRC 169	95.00	96.33	98.00	93.33	105.00	92.00	99.67	92.33	95.00	94.00	95.33	96.33	96.03	XXIII
9	DS 1314	95.00	96.00	98.67	104.00	106.33	96.00	107.67	90.00	102.00	96.00	95.33	104.33	99.28	XXVIII
10	JS 22-04	93.00	101.00	104.33	99.00	106.00	92.67	100.00	92.33	97.00	93.33	96.67	101.67	98.08	XXVI
11	NRC 151	87.67	89.67	91.67	86.67	-	85.00	89.67	87.00	91.67	93.33	92.00	89.00	89.40	IX
12	MACS NRC 1710	89.67	80.33	81.67	86.33	-	84.00	89.33	88.00	98.33	94.00	86.67	88.00	87.85	III
13	NRC 159	88.67	80.00	81.67	86.33	-	84.00	88.33	90.33	96.67	94.00	89.00	90.00	88.09	IV
14	JS 20-34	89.33	82.67	82.33	86.33	102.67	85.67	91.00	91.33	90.00	92.00	87.33	91.33	89.33	VIII
15	NRC 158	89.67	82.67	84.00	85.33	88.00	85.00	90.33	92.33	93.33	93.33	88.67	89.00	88.47	VII
16	DS 1312	93.33	102.67	101.67	98.00	90.67	92.00	117.67	-	94.67	94.00	96.67	99.33	98.24	XXVII
17	NRC 162	89.67	90.67	92.67	93.67	84.00	87.33	92.67	91.00	94.00	94.00	90.67	97.33	91.47	XIV
18	JS 22-03	87.67	100.33	103.00	98.00	106.33	97.00	100.67	92.67	94.00	94.00	102.33	88.00	97.00	XXV
19	NRC 165	89.67	92.67	94.33	88.00	104.33	84.33	90.67	92.33	91.00	93.33	90.33	90.00	91.75	XV
20	PUSA-Sipani-1050	93.67	91.33	92.00	92.67	107.00	86.00	99.00	91.67	90.00	94.00	88.33	100.33	93.83	XX
21	NRC 152	89.67	90.67	90.33	85.67	101.33	86.33	90.67	90.67	92.00	93.33	84.00	90.33	90.42	XI

22	AUKS 208	93.67	93.00	94.33	92.33	103.33	89.00	93.00	91.33	89.00	94.00	96.33	96.33	93.80	XIX
23	NRC 161	89.67	89.67	93.33	97.67	100.33	86.33	90.67	91.67	98.33	93.33	93.33	91.33	92.97	XVIII
24	PUSA-Sipani-408	89.67	86.00	87.00	88.33	-	84.00	91.67	92.00	93.00	93.33	89.33	92.33	89.70	X
25	NRC 156	81.00	77.00	78.33	87.00	82.33	84.67	87.33	86.00	95.33	92.33	89.33	86.33	85.58	II
26	NRC 166	94.00	94.67	96.00	96.33	103.00	87.00	96.67	92.00	90.33	94.00	95.67	92.33	94.33	XXI
27	NRC 160	89.67	85.67	88.00	93.67	102.33	86.00	90.67	91.67	88.33	94.00	90.67	91.33	91.00	XIII
28	JS 95-60	90.00	81.33	86.67	88.67	-	84.33	90.00	88.33	93.33	94.00	86.67	89.33	88.42	VI
29	NRC 164	89.67	84.00	88.00	92.67	91.00	85.67	91.00	93.67	103.00	94.00	98.67	91.00	91.86	XVI
30	NRC 150	89.67	91.33	93.00	88.67	103.00	88.33	91.67	91.67	88.00	94.00	88.67	94.33	91.86	XVI
31	KDS 980	93.00	100.33	103.33	101.67	-	102.00	105.67	92.67	101.00	92.00	102.33	102.33	99.67	XXIX
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.50	4.05	4.05	4.05	4.05		
	DOS	02/07/2019	05/07/2019	28/06/2019	09/07/2019	01/07/2019	11/07/2019	30/06/2019	25/06/2019	03/07/2019	09/07/2019	30/06/2019	04/07/2019		
	Pooled CD													2.95	

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	L'Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	PS 1656	62.80	81.13	81.73	70.33	73.17	35.53	46.50	49.00	65.00	39.13	57.73	76.33	61.53	IV
2	NRC 153	52.80	52.53	53.53	44.67	-	37.13	41.70	39.12	67.50	30.70	57.87	67.00	49.50	XX
3	VLS 100	40.60	41.67	41.47	49.67	-	33.00	29.13	32.52	48.67	34.10	30.27	57.67	39.89	XXVII
4	NRC 155	43.27	39.27	38.60	42.67	42.10	30.30	38.77	34.55	54.50	24.87	28.20	53.00	39.18	XXVIII
5	RVS 2011-73	56.80	66.07	66.73	72.33	70.10	38.87	53.07	64.22	66.50	30.78	57.87	71.67	59.58	VI
6	NRC 157	60.13	42.87	43.67	68.33	57.20	39.40	48.23	60.33	59.50	36.60	51.87	71.00	53.26	XVIII
7	AUKS 202	59.67	55.07	56.10	55.33	62.40	36.33	47.23	50.77	63.83	27.53	43.47	72.67	52.53	XIX
8	NRC 169	60.00	68.13	68.90	64.00	59.30	33.80	43.13	43.44	59.83	31.87	46.80	62.33	53.46	XVII
9	DS 1314	58.00	57.07	58.40	59.67	59.87	26.37	39.23	35.33	58.17	23.53	27.80	63.67	47.26	XXI
10	JS 22-04	56.33	60.13	60.33	62.33	73.30	38.27	46.33	53.89	61.17	31.53	52.80	56.67	54.42	XIV
11	NRC 151	54.80	49.60	51.60	53.00	-	34.57	40.33	36.78	59.33	28.93	31.20	50.67	44.62	XXIV
12	MACS NRC 1710	29.20	32.20	32.67	34.33	-	28.20	19.27	30.00	48.83	24.10	21.13	45.67	31.42	XXXI
13	NRC 159	49.53	45.80	47.13	52.33	-	30.00	41.53	34.62	49.67	26.93	43.40	69.33	44.57	XXV
14	JS 20-34	41.53	35.87	36.20	54.00	39.40	27.80	26.47	31.00	59.17	26.93	26.73	50.67	37.98	XXIX
15	NRC 158	57.93	71.47	68.40	59.67	65.47	35.87	47.40	38.44	64.33	32.33	40.67	78.33	55.03	XI
16	DS 1312	57.53	51.53	52.93	53.00	54.53	27.47	34.73	32.44	66.00	30.40	29.87	61.67	46.01	XXII
17	NRC 162	69.00	95.53	96.87	70.67	78.77	38.60	69.37	70.00	63.50	48.60	71.60	78.00	70.88	I
18	JS 22-03	56.33	69.87	70.93	59.67	66.20	33.13	40.70	53.78	63.00	29.13	46.67	72.33	55.15	X
19	NRC 165	44.00	44.33	44.73	42.67	52.00	31.17	36.07	35.78	60.92	28.07	42.07	77.00	44.90	XXIII
20	PUSA-Sipani-1050	53.33	69.13	68.93	48.67	78.77	35.67	57.13	61.33	63.33	31.60	39.07	73.33	56.69	VIII
21	NRC 152	65.20	86.47	87.47	48.00	77.47	32.47	62.97	50.89	63.17	29.13	30.20	73.00	58.87	VII
22	AUKS 208	55.33	71.93	73.53	61.33	59.43	37.20	41.63	46.44	65.67	33.53	47.40	65.00	54.87	XII

23	NRC 161	63.80	56.93	57.07	61.33	63.87	33.87	44.13	54.33	65.17	35.73	36.40	72.33	53.75	XVI
24	PUSA-Sipani-408	67.40	75.00	74.73	52.00	-	30.20	58.40	48.89	59.17	35.20	29.93	80.33	55.57	IX
25	NRC 156	54.33	40.33	41.00	54.00	45.53	28.53	24.50	36.64	54.67	29.87	35.87	60.67	42.16	XXVI
26	NRC 166	58.13	62.00	63.27	62.00	61.17	34.67	45.47	50.00	58.83	32.67	50.20	73.00	54.28	XV
27	NRC 160	76.80	84.87	84.23	71.00	88.83	42.20	53.03	50.00	67.17	43.40	48.80	87.00	66.44	II
28	JS 95-60	45.60	33.73	34.53	45.00	-	31.53	28.60	32.91	54.00	26.93	30.67	43.00	36.95	XXX
29	NRC 164	67.00	59.40	60.13	54.67	73.97	37.13	43.53	56.55	59.33	33.60	49.73	61.00	54.67	XIII
30	NRC 150	69.07	87.40	88.97	61.33	75.97	37.80	69.40	67.44	60.50	37.33	53.67	80.67	65.80	III
31	KDS 980	58.97	84.67	82.87	62.00	-	38.50	52.83	57.66	54.67	34.13	58.33	87.67	61.12	V
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.50	4.05	4.05	4.05	4.05		
	DOS	02/07/ 2019	05/07/ 2019	28/06/ 2019	09/07/ 2019	01/07/ 2019	11/07/ 2019	30/06/ 2019	25/06/ 2019	03/07/ 2019	09/07/ 2019	30/06/ 2019	04/07/ 2019		

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	L'Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	PS 1656	11.17	10.72	11.43	8.92	8.97	9.70	8.83	7.90	8.54	11.97	11.98	10.00	10.01	XXVII
2	NRC 153	11.75	12.41	13.08	9.83	-	10.20	10.67	-	10.10	10.60	13.15	10.50	11.23	XV
3	VLS 100	10.97	12.06	11.87	5.76	-	8.90	14.67	-	9.51	11.90	11.82	9.00	10.65	XXIII
4	NRC 155	10.42	13.50	14.13	8.45	10.93	10.03	16.17	7.51	9.30	13.10	13.33	10.50	11.45	XIII
5	RVS 2011-73	11.83	15.47	14.93	10.39	12.33	11.70	14.17	7.26	9.52	12.87	15.72	10.50	12.22	V
6	NRC 157	9.42	10.45	11.40	8.52	8.17	8.83	10.83	-	8.23	11.33	10.99	9.83	9.82	XXVIII
7	AUKS 202	10.75	13.29	12.92	10.87	10.43	9.47	12.33	6.67	9.48	12.47	14.12	10.83	11.14	XVI
8	NRC 169	12.50	14.90	13.85	11.99	11.13	11.10	14.00	6.80	11.55	14.43	16.21	12.83	12.61	II
9	DS 1314	11.58	12.00	11.63	8.63	10.23	8.80	10.00	2.74	11.20	11.00	13.59	9.83	10.10	XXVI
10	JS 22-04	12.13	14.41	14.66	9.98	10.90	10.63	13.00	4.50	9.20	11.93	15.75	10.83	11.49	XI
11	NRC 151	10.92	12.08	11.39	5.66	-	7.77	11.67	4.83	9.77	10.67	12.29	9.17	9.66	XXX
12	MACS NRC 1710	11.50	12.78	11.67	7.04	-	10.37	13.50	4.71	9.87	11.80	14.44	10.50	10.74	XXI
13	NRC 159	10.75	12.86	11.85	9.42	-	9.23	12.50	3.90	10.39	11.47	15.72	11.00	10.83	XX
14	JS 20-34	13.08	13.36	12.47	11.20	9.53	9.80	12.50	6.51	9.50	12.20	14.67	10.50	11.28	XIV
15	NRC 158	11.50	13.48	12.60	10.62	9.70	10.93	11.83	8.26	9.59	10.93	15.19	13.50	11.51	X
16	DS 1312	11.25	12.57	13.24	7.62	7.73	7.47	11.50	-	9.63	11.40	13.66	9.50	10.51	XXV
17	NRC 162	10.05	14.56	15.06	11.09	8.70	10.23	14.83	6.59	8.65	11.83	17.45	10.50	11.63	IX
18	JS 22-03	11.50	14.39	14.63	11.18	10.90	11.23	13.50	6.69	10.93	12.50	16.89	11.83	12.18	VI
19	NRC 165	8.75	11.70	11.44	7.53	8.23	8.13	10.67	7.55	9.44	12.40	11.10	10.00	9.75	XXIX
20	PUSA-Sipani-1050	10.08	14.46	13.51	6.82	9.93	9.63	12.17	5.91	8.85	12.87	15.42	10.50	10.85	XIX
21	NRC 152	12.25	15.49	15.18	8.41	11.10	12.30	15.17	5.93	9.35	11.70	17.99	13.50	12.36	III
22	AUKS 208	11.75	10.25	11.82	10.97	10.77	10.60	14.33	6.33	9.13	12.60	13.65	10.50	11.06	XVII
23	NRC 161	9.08	10.15	10.92	9.05	8.07	8.17	9.50	3.82	8.99	11.70	10.57	9.00	9.09	XXXI

24	PUSA-Sipani-408	10.50	13.36	12.51	7.33	-	8.20	15.67	3.90	9.78	11.40	14.43	12.83	10.90	XVIII
25	NRC 156	12.75	14.02	15.36	9.46	12.10	10.43	17.50	3.37	8.26	12.20	15.52	11.50	11.87	VIII
26	NRC 166	8.58	11.92	11.83	10.43	8.73	9.17	14.67	6.93	9.48	12.33	11.51	11.50	10.59	XXIV
27	NRC 160	11.08	15.94	14.70	12.40	10.30	12.37	19.33	11.26	9.78	11.60	18.26	12.50	13.29	I
28	JS 95-60	12.00	13.32	13.38	7.60	-	9.73	17.67	4.79	10.62	11.33	15.36	10.50	11.48	XII
29	NRC 164	11.00	11.33	12.65	9.38	8.07	10.13	15.33	7.91	9.55	11.77	11.98	9.50	10.72	XXII
30	NRC 150	12.00	13.60	14.62	11.28	12.37	10.83	11.33	9.80	10.12	10.87	13.82	12.17	11.90	VII
31	KDS 980	10.25	14.98	14.92	9.67	-	10.73	15.17	7.81	9.35	12.90	16.54	12.33	12.24	IV
	N.P.S.(Sqm)	4.05	4.05	4.05	4.05	4.05	4.05	4.05	4.50	4.05	4.05	4.05	4.05		
	DOS	02/07/ 2019	05/07/ 2019	28/06/ 2019	09/07/ 2019	01/07/ 2019	11/07/ 2019	30/06/ 2019	25/06/ 2019	03/07/ 2019	09/07/ 2019	30/06/ 2019	04/07/ 2019		

Table 1.5.11

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

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	RVSM 2011-35	2269	2971	1790	1502	1906	1852	3542	2731	1059	2577	1244	2194.10	I
2	Himso 1689	1975	2832	2029	418	1767	1829	3434	2330	1452	1875	889	2041.20	II
3	NRCSL 2	1852	2446	1852	684	872	1744	3418	2407	993	1968	1037	1858.90	VII
4	JS 21-72	1875	2461	1497	1164	2207	1644	3727	2137	1030	2276	1148	2000.20	IV
5	NRC 148	1890	2677	1667	844	980	1582	3480	1968	993	1713	970	1792.00	VIII
6	NRC 146	1250	2400	1620	596	1026	918	2600	1883	452	2045	-	1577.11	XIII
7	NRC 138	1451	1914	1435	738	1119	1620	2909	2261	1385	1968	-	1784.67	IX
8	MACSNRC 1575**	1088	1952	1273	44	139	1011	3912	1150	637	2623	-	1531.67	XIV
9	NRC 142	1528	2230	-	187	1528	1705	4136	1914	778	2631	1178	1958.67	V
10	NRC 86(C)	1613	2971	1968	596	1698	1289	3650	2238	1459	2191	963	2004.00	III
11	JS 20-34(C)	1466	2153	1597	667	1319	1073	3171	2060	941	2585	1244	1760.90	XI
12	JS 20-98(C)	1752	2276	1397	1111	1520	1443	2901	1806	1052	1867	1022	1703.60	XII
13	JS 335(C)	1860	2878	1613	809	1073	1505	2600	1937	926	2461	963	1781.60	X
14	JS 97-52(C)	1836	-	1520	1013	1065	-	3248	2052	-	1451	-	1862.00	VI
	Mean	1693.21	2473.92	1635.23	740.93	1301.36	1478.08	3337.71	2062.43	1012.08	2159.36	1065.80		
	N.P.S.(Sqm)	12.96	12.96	12.96	11.25	12.96	12.96	12.96	12.96	13.50	12.96	13.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07/ 2019	09/07/ 2019	06/07/ 2019	11/07 / 2019	30/06/ 2019	04/07/ 2019	13/07/ 2019	01/07/ 2019	02/07/ 2019		
	CD	293.21	324.07	223.77	151.11	208.33	316.36	555.56	462.96	214.81	200.62	88.89		
	CV (5%)	12.02	9.79	10.38	13.97	11.22	16.29	11.69	15.82	16.39	6.45	7.97		
	Pooled CD												249.37	

Table 1.5.12

Trial : Advanced Varietal Trial I
Zone : Central Zone
Character : Days To Flower

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	RVSM 2011-35	43.25	42.00	42.50	45.50	40.75	43.25	47.50	47.00	47.00	37.25	40.75	43.34	VII
2	Himso 1689	44.00	44.25	41.25	49.00	43.25	45.25	48.25	51.50	47.00	38.50	47.75	45.45	XIII
3	NRCSL 2	45.00	42.50	42.00	42.25	40.50	46.25	47.50	48.50	46.75	37.25	41.25	43.61	VIII
4	JS 21-72	41.50	42.00	43.75	40.50	40.25	46.00	47.50	47.75	47.00	36.50	42.25	43.18	VI
5	NRC 148	44.50	44.50	44.25	41.00	43.50	48.00	47.75	46.25	45.25	39.75	45.75	44.59	XI
6	NRC 146	42.25	38.75	38.50	41.00	35.25	42.25	41.50	38.00	43.50	33.75	-	39.48	IV
7	NRC 138	43.75	31.50	37.75	38.50	33.25	37.50	40.25	38.50	38.50	31.00	-	37.05	II
8	MACSNRC 1575**	43.50	32.00	36.25	41.50	33.25	39.25	36.75	36.00	42.00	32.00	-	37.25	III
9	NRC 142	45.00	41.25	-	46.50	39.50	45.25	42.50	48.25	47.00	42.75	41.50	43.95	X
10	NRC 86(C)	44.00	43.75	41.25	49.00	40.75	47.50	47.75	38.25	46.75	39.75	41.25	43.64	IX
11	JS 20-34(C)	35.75	32.50	31.75	39.00	31.75	36.00	47.25	50.50	38.00	29.50	33.00	36.82	I
12	JS 20-98(C)	42.00	42.75	40.25	42.00	40.25	44.75	47.25	51.00	47.00	37.50	40.00	43.16	V
13	JS 335(C)	45.50	43.75	45.25	46.00	41.25	47.50	47.50	48.25	46.75	39.50	44.75	45.09	XII
14	JS 97-52(C)	48.50	-	42.00	42.00	41.75	-	52.50	49.50	-	43.75	-	45.71	XIV
	N.P.S.(Sqm)	12.96	12.96	12.96	11.25	12.96	12.96	12.96	12.96	13.50	12.96	13.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07/ 2019	09/07/ 2019	06/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	13/07/ 2019	01/07/ 2019	02/07/ 2019		

Table 1.5.13

Trial : Advanced Varietal Trial I
Zone : Central Zone
Character : Days To Harvest Maturity

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L' Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	RVSM 2011-35	104.50	100.00	101.25	107.50	111.25	103.75	117.75	94.00	101.50	97.50	108.25	104.30	X
2	Himso 1689	103.50	100.50	102.00	103.00	107.25	97.25	118.50	92.00	100.75	99.50	106.25	102.77	IX
3	NRCSL 2	106.50	106.50	110.25	103.50	105.75	99.25	122.75	94.00	102.25	97.50	107.75	105.09	XII
4	JS 21-72	101.50	97.25	95.50	102.50	109.25	100.25	111.00	90.00	101.00	96.50	102.00	100.61	VI
5	NRC 148	105.00	109.00	104.50	110.00	108.00	102.25	118.25	92.50	102.75	101.25	110.75	105.84	XIV
6	NRC 146	96.00	95.00	96.50	93.50	107.75	97.00	104.25	86.00	97.00	95.25	-	96.83	IV
7	NRC 138	98.50	88.50	91.00	86.50	103.75	94.25	114.75	83.00	97.25	93.75	-	95.13	III
8	MACSNRC 1575**	102.00	90.00	91.75	88.50	104.00	90.25	95.50	80.00	95.00	90.75	-	92.78	I
9	NRC 142	103.00	93.50	-	100.50	105.50	93.25	100.50	87.00	101.50	100.00	98.25	98.30	V
10	NRC 86(C)	104.50	107.50	102.25	95.50	112.50	101.50	116.50	82.25	102.25	99.75	105.00	102.68	VIII
11	JS 20-34(C)	93.75	83.50	83.75	88.75	100.75	88.50	118.25	96.00	95.75	87.50	91.75	93.48	II
12	JS 20-98(C)	105.00	101.00	102.75	103.00	111.75	101.75	111.50	91.00	101.50	98.50	101.00	102.61	VII
13	JS 335(C)	105.00	102.50	107.00	110.50	109.25	103.25	116.50	94.00	102.50	100.00	101.00	104.68	XI
14	JS 97-52(C)	108.50	-	99.50	110.25	115.50	-	117.50	80.00	-	106.50	-	105.39	XIII
	N.P.S.(Sqm)	12.96	12.96	12.96	11.25	12.96	12.96	12.96	12.96	13.50	12.96	13.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07/ 2019	09/07/ 2019	06/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	13/07/ 2019	01/07/ 2019	02/07/ 2019		

Table 1.5.14

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

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L' Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	RVSM 2011-35	52.15	50.45	54.10	44.00	76.25	43.60	51.65	61.63	35.35	57.25	80.00	55.13	VI
2	Himso 1689	62.40	43.70	49.45	47.25	67.00	42.35	52.17	64.25	34.85	61.35	81.75	55.14	V
3	NRCSL 2	53.70	39.35	47.55	46.50	69.75	38.50	52.63	63.13	39.45	62.55	69.50	52.96	VIII
4	JS 21-72	52.05	45.65	51.60	64.00	74.25	43.47	61.58	64.38	39.00	51.30	80.50	57.07	IV
5	NRC 148	62.85	50.15	53.60	49.75	76.50	41.90	70.45	67.00	40.90	69.50	69.25	59.26	III
6	NRC 146	43.25	33.50	41.65	42.25	62.25	35.25	45.05	55.63	26.75	35.60	-	42.12	XI
7	NRC 138	42.70	31.95	40.85	41.75	59.75	35.65	50.75	58.50	34.10	42.70	-	43.87	X
8	MACSNRC 1575**	43.25	62.45	55.65	39.25	72.25	40.20	83.58	65.25	41.73	47.65	-	55.13	VI
9	NRC 142	62.10	63.20	-	45.75	83.25	47.05	75.60	63.63	40.90	57.70	75.00	61.42	II
10	NRC 86(C)	49.85	48.75	53.80	48.00	76.00	41.10	46.40	49.63	37.70	72.60	82.75	55.14	V
11	JS 20-34(C)	33.70	24.55	32.60	42.75	45.00	32.02	51.93	63.00	25.55	28.30	53.75	39.38	XII
12	JS 20-98(C)	50.05	44.80	50.50	45.75	81.25	40.00	63.97	65.63	36.20	52.35	71.50	54.73	VII
13	JS 335(C)	50.10	44.40	44.70	47.00	73.25	41.25	51.83	60.75	33.60	58.00	69.75	52.24	IX
14	JS 97-52(C)	53.45	-	55.80	50.25	80.75	-	62.80	65.38	-	72.40	-	62.98	I
	N.P.S.(Sqm)	12.96	12.96	12.96	11.25	12.96	12.96	12.96	12.96	13.50	12.96	13.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07 /2019	09/07/ 2019	06/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	13/07/ 2019	01/07/ 2019	02/07/ 2019		

Table 1.5.15

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

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L' Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	RVSM 2011-35	15.00	13.26	12.95	12.45	11.77	11.39	13.70	11.33	13.13	16.04	13.38	13.13	II
2	Himso 1689	11.88	11.51	12.80	8.93	8.68	9.47	13.50	8.63	11.05	14.29	11.38	11.10	X
3	NRCSL 2	13.00	12.16	12.12	9.39	7.90	9.50	11.63	9.69	12.10	13.94	10.00	11.04	XI
4	JS 21-72	13.88	14.92	13.12	11.45	12.63	10.25	15.63	11.44	12.68	14.61	11.00	12.87	III
5	NRC 148	12.47	12.03	11.92	10.43	9.90	9.88	11.25	10.08	12.00	13.41	11.00	11.31	IX
6	NRC 146	17.13	15.96	13.60	14.16	12.00	12.05	17.00	11.80	17.45	16.90	-	14.81	I
7	NRC 138	11.19	11.26	12.22	8.67	9.38	10.10	10.75	9.98	12.15	11.26	-	10.70	XII
8	MACSNRC 1575**	12.95	14.94	13.88	9.10	8.13	9.40	16.13	10.23	11.80	16.65	-	12.32	IV
9	NRC 142	13.31	11.70	-	9.72	11.32	11.35	15.38	8.28	11.97	14.71	9.88	11.76	VI
10	NRC 86(C)	10.69	11.15	11.21	8.70	9.82	9.72	12.13	9.69	12.40	12.02	9.75	10.66	XIII
11	JS 20-34(C)	13.41	14.43	12.63	10.55	10.60	10.98	13.00	9.81	13.60	13.05	11.63	12.15	V
12	JS 20-98(C)	12.29	11.07	12.47	10.51	10.43	10.85	11.38	10.03	12.88	13.05	10.63	11.42	VIII
13	JS 335(C)	12.97	11.96	13.03	9.85	10.63	9.00	11.75	8.73	13.22	13.98	10.88	11.45	VII
14	JS 97-52(C)	9.51	-	12.22	10.58	8.77	-	9.75	11.84	-	10.16	-	10.40	XIV
	N.P.S.(Sqm)	12.96	12.96	12.96	11.25	12.96	12.96	12.96	12.96	13.50	12.96	13.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07/ 2019	09/07/ 2019	06/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	13/07/ 2019	01/07/ 2019	02/07/ 2019		

Table 1.5.16

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : Green Pod Yield (Kg/ha) at Picking

S.No	Varieties	Parbhani	Mean	Rank
1	Karune	3614	3614.00	IV
2	Harasoya (C)	9742	9742.00	I
3	JS 95-60(C)	7870	7870.00	II
4	JS 20-34(C)	6404	6404.00	III
	N.P.S.(Sqm)	12.96		
	DOS	02/07/2019		
	CD	1444.14		
	CV (5%)	12.89		

Table 1.5.17

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : Yield(Kg/ha)

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Karune	15	1350	1350.00	IV
2	Harasoya(C)	74	2716	2716.00	I
3	JS 95-60(C)	52	2438	2438.00	II
4	JS 20-34(C)	859	2045	2045.00	III
	Mean	250.00	2137.25		
	N.P.S.(Sqm)	13.50	12.96		
	DOS	09/07/2019	02/07/2019		
	CD	66.67	308.64		
	CV (5%)	17.28	9.08		

Table 1.5.18

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : Days To Flower

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Karune	37.25	32.00	34.63	III
2	Harasoya(C)	38.00	35.50	36.75	IV
3	JS 95-60(C)	37.25	30.75	34.00	II
4	JS 20-34(C)	37.50	29.25	33.38	I
	N.P.S.(Sqm)	13.50	12.96		
	DOS	09/07/2019	02/07/2019		

Table 1.5.19

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : CENTRAL ZONE
Character : Days To Harvest Maturity

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Karune	99.50	94.75	97.13	III
2	Harasoya(C)	106.00	97.25	101.63	IV
3	JS 95-60(C)	89.25	92.00	90.63	II
4	JS 20-34(C)	89.25	87.25	88.25	I
	N.P.S.(Sqm)	13.50	12.96		
	DOS	09/07/2019	02/07/2019		

Table 1.5.20

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

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Karune	32.75	35.95	34.35	IV
2	Harasoya(C)	43.25	43.70	43.48	I
3	JS 95-60(C)	42.25	37.05	39.65	II
4	JS 20-34(C)	40.75	28.55	34.65	III
	N.P.S.(Sqm)	13.50	12.96		
	DOS	09/07/2019	02/07/2019		

Table 1.5.21

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : 100 Seed Weight (g)

S.No	Varieties	Indore	Parbhani	Mean	Rank
1	Karune	13.87	25.85	19.86	I
2	Harasoya(C)	10.14	16.36	13.25	II
3	JS 95-60(C)	9.99	15.09	12.54	III
4	JS 20-34(C)	11.04	12.49	11.77	IV
	N.P.S.(Sqm)	13.50	12.96		
	DOS	09/07/2019	02/07/2019		

Table 1.5.22

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : Germination (%)

S.No	Varieties	Amravati	Parbhani	Mean	Rank
1	Karune	4.75	43.25	24.00	IV
2	Harasoya(C)	75.91	82.00	78.96	III
3	JS 95-60(C)	82.70	81.50	82.10	I
4	JS 20-34(C)	77.45	83.25	80.35	II
	N.P.S.(Sqm)	25.92	12.96		
	DOS	08/06/2019	02/07/2019		

Table 1.5.23

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : Days To Picking at R6

S.No	Varieties	Parbhani	Mean	Rank
1	Karune	78.00	78.00	III
2	Harasoya(C)	81.50	81.50	IV
3	JS 95-60(C)	74.50	74.50	II
4	JS 20-34(C)	72.25	72.25	I
	N.P.S.(Sqm)	12.96		
	DOS	02/07/2019		

Table 1.5.24

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : 100 Green Seed Weight at picking

S.No	Varieties	Parbhani	Mean	Rank
1	Karune	72.75	72.75	I
2	Harasoya(C)	46.75	46.75	II
3	JS 95-60(C)	31.00	31.00	III
4	JS 20-34(C)	27.50	27.50	IV
	N.P.S.(Sqm)	12.96		
	DOS	02/07/2019		

Table 1.5.25

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Central Zone
Character : Moisture % at Picking Stage

S.No	Varieties	Parbhani	Mean	Rank
1	Karune	27.60	27.60	IV
2	Harasoya(C)	28.23	28.23	II
3	JS 95-60(C)	28.67	28.67	I
4	JS 20-34(C)	27.88	27.88	III
	N.P.S.(Sqm)	12.96		
	DOS	02/07/2019		

Table 1.5.26

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

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	AMS 100-39	2329	2444	1491	960	1856	1787	2630	1667	1622	2148	916	1997.11	I
2	NRC 130	1407	1981	1523	907	440	1292	1477	1199	773	2199	836	1365.67	VI
3	NRC 131	1565	1898	1389	1071	417	1394	1301	1477	884	1949	813	1363.78	VII
4	JS 335(C)	1931	2560	1556	818	690	1458	2606	1833	1227	2509	929	1818.89	III
5	JS 97-52(C)	1810	2208	1463	1338	1162	1597	2292	1500	1333	1241	871	1622.89	IV
6	NRC 86(C)	1940	2681	1745	898	1829	1389	3273	1343	1280	1912	893	1932.44	II
7	JS 20-34(C)	1245	1778	1662	773	782	1185	2440	1333	1369	2162	751	1550.67	V
	Mean	1746.71	2221.43	1547.00	966.43	1025.14	1443.14	2288.43	1478.86	1212.57	2017.14	858.43		
	N.P.S.(Sqm)	21.60	21.60	21.60	22.50	21.60	21.60	21.60	21.60	22.50	21.60	22.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07/ 2019	09/07/ 2019	01/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	14/07/ 2019	01/07/ 2019	03/07/ 2019		
	CD	268.52	361.11	180.56	244.44	111.11	240.74	259.26	388.89	271.11	185.19	93.33		
	CV (5%)	10.38	10.95	7.79	17.06	7.25	11.28	7.59	17.64	15.00	6.22	7.18		

Table 1.5.27

Trial : Advanced Varietal Trial II
Zone : Central Zone
Character : Days To Flower

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	AMS 100-39	43.50	43.75	42.00	46.00	44.00	46.00	45.75	48.25	46.00	41.75	45.50	44.77	VI
2	NRC 130	43.75	38.50	39.50	38.00	37.50	41.00	39.75	39.50	39.00	34.50	37.75	38.98	II
3	NRC 131	43.00	38.75	38.25	38.50	37.50	44.00	40.25	38.50	40.75	35.50	36.75	39.25	III
4	JS 335(C)	44.50	43.25	44.25	44.50	41.75	47.00	47.00	50.00	46.00	39.50	44.25	44.73	V
5	JS 97-52(C)	46.50	47.00	45.75	46.00	42.25	46.00	52.00	50.75	46.00	44.25	47.75	46.75	VII
6	NRC 86(C)	43.75	42.75	40.25	44.50	42.75	47.00	46.50	47.00	46.00	40.25	43.00	43.98	IV
7	JS 20-34(C)	35.50	32.75	34.75	38.75	33.75	35.75	47.25	39.00	40.75	27.75	31.00	36.09	I
	N.P.S.(Sqm)	21.60	21.60	21.60	22.50	21.60	21.60	21.60	21.60	22.50	21.60	22.50		
	DOS	03/07/ 2019	05/07/2 019	13/07/ 2019	09/07/ 2019	01/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	14/07/ 2019	01/07/ 2019	03/07/ 2019		

Table 1.5.28

Trial : Advanced Varietal Trial II
Zone : Central Zone
Character : Days To Harvest Maturity

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	AMS 100-39	100.00	93.50	96.50	93.75	117.75	100.00	105.00	90.00	101.50	101.75	105.25	100.45	IV
2	NRC 130	100.75	90.75	90.50	91.50	109.50	94.00	98.25	96.00	101.75	94.75	92.25	96.36	II
3	NRC 131	102.00	92.25	90.25	91.75	109.50	96.75	98.25	94.00	103.25	96.50	99.25	97.61	III
4	JS 335(C)	102.00	102.75	96.25	111.75	111.50	103.75	108.25	102.00	103.50	100.25	108.00	104.55	VI
5	JS 97-52(C)	106.25	105.75	99.25	111.00	117.25	105.00	117.75	104.00	104.75	105.75	108.75	107.77	VII
6	NRC 86(C)	100.25	106.75	92.00	95.00	117.25	101.00	122.25	101.00	104.75	99.25	103.75	103.93	V
7	JS 20-34(C)	89.75	84.00	86.00	88.50	101.50	87.75	116.50	97.00	101.75	86.50	91.75	93.73	I
	N.P.S.(Sqm)	21.60	21.60	21.60	22.50	21.60	21.60	21.60	21.60	22.50	21.60	22.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07/ 2019	09/07/ 2019	01/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	14/07/ 2019	01/07/ 2019	03/07/ 2019		

Table 1.5.29

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

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L'Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	AMS 100-39	50.80	54.55	60.15	57.00	79.50	45.10	68.93	65.25	50.00	52.00	86.25	60.87	II
2	NRC 130	36.10	37.15	48.75	46.75	58.00	35.60	40.85	51.38	40.90	41.30	83.00	47.25	VI
3	NRC 131	43.95	61.15	58.40	54.75	87.75	42.70	66.22	57.38	49.50	64.05	69.00	59.53	III
4	JS 335(C)	48.10	41.80	56.40	56.25	65.25	38.00	52.38	69.88	44.55	47.55	64.50	53.15	IV
5	JS 97-52(C)	58.70	50.70	61.55	56.75	76.25	39.63	67.78	68.88	50.65	67.05	78.75	61.52	I
6	NRC 86(C)	48.70	46.10	49.35	44.25	66.00	38.60	53.15	64.75	42.50	57.90	62.50	52.16	V
7	JS 20-34(C)	32.35	23.80	34.40	33.00	42.75	31.68	41.63	57.13	51.50	28.20	54.50	39.18	VII
	N.P.S.(Sqm)	21.60	21.60	21.60	22.50	21.60	21.60	21.60	21.60	22.50	21.60	22.50		
	DOS	03/07/ 2019	05/07/2 019	13/07/ 2019	09/07/ 2019	01/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	14/07/ 2019	01/07/ 2019	03/07/ 2019		

Table 1.5.30

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

S.No	Varieties	Amravati	Amreli	Anand	Indore	Jabalpur	Kota	L' Bharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	AMS 100-39	13.88	13.07	12.68	10.58	11.83	11.38	14.63	10.00	13.10	14.03	11.38	12.41	II
2	NRC 130	12.94	15.30	14.52	12.31	9.80	11.20	14.75	8.41	12.15	15.47	10.63	12.50	I
3	NRC 131	12.25	14.91	13.12	12.14	9.30	9.57	14.13	7.53	14.58	14.37	10.75	12.06	III
4	JS 335(C)	12.63	11.92	12.84	11.17	8.82	9.05	11.13	10.72	13.35	13.54	10.63	11.44	V
5	JS 97-52(C)	9.60	8.65	10.55	10.91	9.32	9.55	7.75	7.48	12.20	10.21	8.63	9.53	VII
6	NRC 86(C)	10.66	11.00	11.26	9.74	10.50	9.45	10.97	8.17	11.45	11.72	9.88	10.44	VI
7	JS 20-34(C)	13.97	13.95	13.61	9.61	10.68	10.70	12.22	10.13	12.10	12.01	12.00	11.91	IV
	N.P.S.(Sqm)	21.60	21.60	21.60	22.50	21.60	21.60	21.60	21.60	22.50	21.60	22.50		
	DOS	03/07/ 2019	05/07/ 2019	13/07/ 2019	09/07/ 2019	01/07/ 2019	11/07/ 2019	30/06/ 2019	04/07/ 2019	14/07/ 2019	01/07/ 2019	03/07/ 2019		

Table 1.6.1

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

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	VLS 99	2568	3307	1309	2989	1309	3802	2547.33	XI
2	SL 1213	2938	2566	1753	2011	1284	3506	2343.00	XXIII
3	PS 1641	2790	3651	2222	2778	1407	3951	2799.83	V
4	NRC 154	2889	1984	1605	2407	1210	3309	2234.00	XXXIII
5	RVS 2011-32	3210	2275	2049	2196	1457	2691	2313.00	XXVI
6	MACS 1655	2247	2751	2099	2751	2617	4148	2768.83	VI
7	SKF 2036	2420	2698	1827	2275	1284	3136	2273.33	XXVIII
8	AUKS 200	2741	3069	1309	2354	1210	3457	2356.67	XXI
9	DS 1318	2099	1984	1605	1746	1062	2938	1905.67	XLII
10	MACS 1460 (C)	2815	3201	1802	2725	2074	3407	2670.67	VIII
11	NRC 163	3012	2354	1679	2593	1432	3704	2462.33	XIV
12	JS 22-01	2395	2593	840	1508	1284	3210	1971.67	XLI
13	RSC 11-20	2716	2513	864	3016	1531	3605	2374.17	XIX
14	TS 46	2667	3307	1136	2540	1358	3457	2410.83	XVI
15	MAUS 717	1556	3016	1358	2989	1432	3259	2268.33	XXIX
16	PS 1642	2667	2751	1432	2513	1309	3753	2404.17	XVIII
17	AMS 20-19	1679	3280	1679	2698	1284	2988	2268.00	XXX
18	KDS 1097	2765	3386	1580	2302	1679	3407	2519.83	XIII
19	DSb 37	2617	3095	2148	3333	2889	3111	2865.50	III
20	DSb 23 (C)	2840	3545	1852	3413	2617	3284	2925.17	I
21	ASb 51	2938	2011	864	2593	1333	3012	2125.17	XXXVI
22	NRC 149	2963	2619	1679	2857	1309	3901	2554.67	X
23	VLS 98	3111	2460	1481	2196	1580	3901	2454.83	XV
24	DS 1326	3037	2249	1136	2037	1309	3556	2220.67	XXXIV
25	SL 1234	2148	2381	1383	1614	1284	3802	2102.00	XXXVII
26	RSC 11-22	2272	2646	1210	2249	1259	3802	2239.67	XXXII
27	Himso 1690	2444	2037	1630	2275	1951	3630	2327.83	XXV
28	BAUS 103	2173	2698	1679	2619	1235	3778	2363.67	XX
29	JS 22-07	2741	1878	864	2116	1333	3358	2048.33	XXXIX
30	DSb 21 (C)	2494	3280	1531	3307	2148	3383	2690.50	VII
31	TS 107	2099	3624	1753	2831	1580	3309	2532.67	XII
32	MAUS 712	2123	2063	1605	2619	1407	3309	2187.67	XXXV
33	NRC 168	3062	2196	1333	2249	1407	3457	2284.00	XXVII
34	MACS 1639	2765	3122	1531	2831	2543	4099	2815.17	IV
35	DS 1320	2370	1138	1383	1905	1185	3383	1894.00	XLIII
36	KDS 1099	2444	2566	1358	2884	1506	3333	2348.50	XXII
37	AMS 353	1827	3307	1901	2302	1704	3012	2342.17	XXIV
38	DSb 36	2469	3545	1111	2963	2617	2914	2603.17	IX
39	AUKS 218	1802	1720	889	1587	1827	2691	1752.67	XLV
40	KDS 753 (C)	3037	4180	1037	2884	2568	3630	2889.33	II
41	RVSM 2011-77	1556	2116	840	1587	1506	3185	1798.33	XLIV
42	SKF 6029	1210	3360	1457	2725	1926	2840	2253.00	XXXI
43	NRC 167	2938	1693	988	2143	1259	3333	2059.00	XXXVII I
44	ASb 50	2568	3016	1111	2619	1383	3753	2408.33	XVII
45	RVS 2011-76	1778	2249	1185	2407	1185	3111	1985.83	XL
	Mean	2488.89	2699.56	1446.38	2478.58	1601.62	3413.44		

	N.P.S.(Sqm)	4.05	3.78	4.05	3.78	4.05	4.05		
	DOS	29/06/ 2019	12/07/ 2019	23/07/ 2019	03/07/ 2019	13/07/ 2019	08/07/ 2019		
	CD	518.52	634.92	320.99	317.46	320.99	419.75		
	CV (5%)	12.58	14.34	14.03	7.93	12.43	7.65		
	Pooled CD							360.13	

Table 1.6.2

Trial : Initial Varietal Trial
Zone : Southern Zone
Character : Days To Flower

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	VLS 99	38.33	41.67	43.00	38.67	40.67	40.33	40.45	XXIV
2	SL 1213	37.67	40.67	42.00	38.67	38.33	37.00	39.06	XV
3	PS 1641	45.00	46.00	43.00	42.67	43.00	44.00	43.95	XXXVIII
4	NRC 154	38.67	33.67	41.00	34.00	34.67	33.00	35.84	I
5	RVS 2011-32	37.67	39.33	39.00	40.67	38.33	37.00	38.67	XI
6	MACS 1655	38.33	40.33	40.00	38.67	41.00	40.33	39.78	XX
7	SKF 2036	38.33	38.67	40.00	40.67	37.67	39.00	39.06	XV
8	AUKS 200	38.67	42.33	43.00	40.67	40.33	39.00	40.67	XXVII
9	DS 1318	38.00	42.00	41.00	38.33	37.33	37.00	38.94	XIV
10	MACS 1460 (C)	37.67	38.67	42.00	38.00	37.33	39.00	38.78	XII
11	NRC 163	38.00	36.67	41.00	37.33	36.33	37.00	37.72	VI
12	JS 22-01	38.33	36.67	37.00	36.00	34.33	35.00	36.22	II
13	RSC 11-20	44.67	43.67	41.00	41.00	43.33	44.00	42.95	XXXVI
14	TS 46	44.67	43.67	44.00	40.67	37.67	41.00	41.95	XXX
15	MAUS 717	38.00	39.33	38.00	37.67	36.33	36.67	37.67	V
16	PS 1642	40.00	45.33	46.00	42.33	42.33	41.00	42.83	XXXV
17	AMS 20-19	38.67	39.33	43.00	40.00	36.33	39.67	39.50	XVIII
18	KDS 1097	38.67	41.67	42.00	42.00	38.33	40.33	40.50	XXV
19	DSb 37	46.00	42.33	45.00	40.33	38.67	41.00	42.22	XXXII
20	DSb 23 (C)	39.00	44.33	46.00	42.33	43.33	41.00	42.67	XXXIII
21	ASb 51	39.33	44.67	45.00	38.00	36.67	41.00	40.78	XXVIII
22	NRC 149	38.67	39.00	42.00	39.33	35.67	33.00	37.95	VII
23	VLS 98	38.33	39.67	42.00	39.00	38.00	36.33	38.89	XIII
24	DS 1326	38.33	40.00	42.00	40.00	36.00	35.00	38.56	X
25	SL 1234	37.67	40.00	42.00	40.00	36.33	35.00	38.50	IX
26	RSC 11-22	38.33	41.33	43.00	41.00	38.33	40.33	40.39	XXIII
27	Himso 1690	38.67	36.33	41.00	35.33	36.33	35.00	37.11	IV
28	BAUS 103	39.00	42.67	42.00	42.00	39.33	41.00	41.00	XXIX
29	JS 22-07	38.67	40.00	38.00	37.67	36.33	35.67	37.72	VI
30	DSb 21 (C)	39.00	45.33	43.00	40.33	43.67	41.00	42.06	XXXI
31	TS 107	38.33	46.67	46.00	41.00	42.33	44.00	43.06	XXXVII
32	MAUS 712	38.00	42.33	43.00	38.67	37.33	39.00	39.72	XIX
33	NRC 168	38.33	39.00	41.00	38.33	36.33	33.00	37.67	V
34	MACS 1639	38.00	39.33	42.00	40.33	38.33	40.33	39.72	XIX
35	DS 1320	38.33	37.33	43.00	40.33	35.33	35.00	38.22	VIII
36	KDS 1099	39.00	42.33	43.00	40.00	36.00	35.00	39.22	XVI
37	AMS 353	39.00	42.33	44.00	40.00	36.67	37.00	39.83	XXI
38	DSb 36	38.67	42.67	43.00	38.00	41.33	41.00	40.78	XXVIII
39	AUKS 218	39.33	36.67	39.00	39.67	35.67	31.00	36.89	III
40	KDS 753 (C)	39.67	44.33	45.00	43.67	40.67	43.33	42.78	XXXIV
41	RVSM 2011-77	35.00	42.33	42.00	40.00	40.67	39.00	39.83	XXI
42	SKF 6029	40.67	39.33	43.00	40.00	38.33	38.33	39.94	XXII
43	NRC 167	42.67	38.67	42.00	39.00	35.33	38.33	39.33	XVII
44	ASb 50	39.33	41.00	44.00	40.00	38.33	41.00	40.61	XXVI
45	RVS 2011-76	38.33	41.33	43.00	41.00	40.67	39.67	40.67	XXVII
	N.P.S.(Sqm)	4.05	3.78	4.05	3.78	4.05	4.05		
	DOS	29/06/2019	12/07/2019	23/07/2019	03/07/2019	13/07/2019	08/07/2019		

Table 1.6.3

Trial : Initial Varietal Trial
Zone : Southern Zone
Character : Days To Harvest Maturity

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	VLS 99	101.00	103.33	99.00	88.67	105.33	104.67	100.33	XXIV
2	SL 1213	98.00	99.67	103.00	89.00	100.67	101.33	98.61	XI
3	PS 1641	110.33	105.33	101.00	90.33	99.00	104.00	101.67	XXXI
4	NRC 154	100.00	94.33	102.00	85.67	100.67	100.00	97.11	V
5	RVS 2011-32	98.33	99.00	103.00	91.00	100.67	100.00	98.67	XII
6	MACS 1655	99.67	102.33	105.00	89.67	102.00	100.00	99.78	XVII
7	SKF 2036	101.33	101.33	104.00	92.00	104.33	104.00	101.17	XXIX
8	AUKS 200	101.00	107.33	97.00	90.33	99.67	98.00	98.89	XIV
9	DS 1318	99.67	103.33	100.00	89.33	105.33	104.00	100.28	XXIII
10	MACS 1460 (C)	101.67	95.33	100.00	90.33	99.67	98.00	97.50	VI
11	NRC 163	101.67	96.33	100.00	87.67	101.67	100.00	97.89	VII
12	JS 22-01	101.33	97.67	99.00	89.33	92.67	91.00	95.17	II
13	RSC 11-20	109.33	99.33	104.00	91.00	100.00	98.67	100.39	XXV
14	TS 46	108.00	104.33	107.00	91.67	100.67	100.00	101.95	XXXIV
15	MAUS 717	98.67	99.33	105.00	88.33	105.00	103.67	100.00	XIX
16	PS 1642	104.00	104.33	109.00	91.67	99.00	98.00	101.00	XXVII
17	AMS 20-19	103.67	102.33	106.00	90.33	104.67	104.00	101.83	XXXIII
18	KDS 1097	102.67	101.33	107.00	91.67	100.00	98.00	100.11	XXI
19	DSb 37	111.33	99.33	109.00	89.67	102.33	100.67	102.06	XXXV
20	DSb 23 (C)	102.00	107.33	109.00	94.33	107.00	106.00	104.28	XXXVIII
21	ASb 51	101.67	99.33	104.00	92.67	104.67	103.67	101.00	XXVII
22	NRC 149	99.33	99.33	106.00	89.67	108.67	107.67	101.78	XXXII
23	VLS 98	100.00	104.33	102.00	89.67	104.67	103.33	100.67	XXVI
24	DS 1326	99.00	99.33	102.00	87.67	101.00	101.33	98.39	IX
25	SL 1234	101.00	102.33	105.00	90.00	106.67	106.00	101.83	XXXIII
26	RSC 11-22	103.33	99.33	99.00	91.33	100.00	98.00	98.50	X
27	Himso 1690	100.00	99.33	104.00	88.33	104.67	104.00	100.06	XX
28	BAUS 103	101.67	106.33	107.00	93.00	104.67	104.00	102.78	XXXVI
29	JS 22-07	104.33	105.00	97.00	90.00	99.33	98.00	98.94	XV
30	DSb 21 (C)	104.33	109.33	107.00	90.67	99.67	98.67	101.61	XXX
31	TS 107	102.67	107.33	95.00	93.00	101.00	100.00	99.83	XVIII
32	MAUS 712	99.33	99.33	99.00	90.00	100.67	100.00	98.06	VIII
33	NRC 168	101.67	99.33	98.00	90.00	98.33	100.00	97.89	VII
34	MACS 1639	100.67	99.67	102.00	92.00	104.67	102.67	100.28	XXIII
35	DS 1320	101.67	99.33	100.00	90.67	92.00	91.00	95.78	III
36	KDS 1099	104.67	104.33	108.00	90.33	98.00	96.00	100.22	XXII
37	AMS 353	101.67	105.33	102.00	91.33	103.00	100.67	100.67	XXVI
38	DSb 36	101.33	103.33	97.00	87.00	96.67	95.33	96.78	IV
39	AUKS 218	102.00	99.33	82.00	91.00	93.33	88.00	92.61	I
40	KDS 753 (C)	107.33	107.33	108.00	94.00	103.33	100.00	103.33	XXXVII
41	RVSM 2011-77	94.33	104.33	97.00	90.67	101.67	100.33	98.06	VIII
42	SKF 6029	102.67	99.33	103.00	88.33	105.00	104.00	100.39	XXV
43	NRC 167	110.67	98.33	96.00	87.67	100.33	100.00	98.83	XIII
44	ASb 50	100.33	100.00	104.00	90.67	100.33	100.00	99.22	XVI
45	RVS 2011-76	99.00	105.33	102.00	91.00	105.33	104.00	101.11	XXVIII
	N.P.S.(Sqm)	4.05	3.78	4.05	3.78	4.05	4.05		
	DOS	29/06/ 2019	12/07/ 2019	23/07/ 2019	03/07/ 2019	13/07/ 2019	08/07/ 2019		

Table 1.6.4

Trial : Initial Varietal Trial
Zone : Southern Zone
Character : Plant Height (cm)

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	VLS 99	51.60	48.40	25.07	48.00	27.00	74.00	45.68	XXVI
2	SL 1213	54.07	38.93	22.73	29.93	19.89	66.67	38.70	XLIII
3	PS 1641	52.93	52.20	24.07	47.20	28.33	82.33	47.84	XV
4	NRC 154	56.47	38.60	21.67	40.53	24.44	72.00	42.29	XXXV
5	RVS 2011-32	57.80	42.67	27.00	41.07	27.51	81.00	46.18	XXIII
6	MACS 1655	58.60	48.00	26.80	45.93	24.47	83.00	47.80	XVI
7	SKF 2036	53.47	38.27	26.07	33.13	24.16	73.67	41.46	XL
8	AUKS 200	56.27	56.13	21.93	47.27	23.78	77.33	47.12	XVIII
9	DS 1318	44.00	37.00	21.07	34.67	23.44	71.33	38.59	XLIV
10	MACS 1460 (C)	60.80	45.53	23.33	37.67	28.87	84.33	46.76	XXI
11	NRC 163	62.87	39.40	20.47	32.40	24.02	72.33	41.92	XXXIX
12	JS 22-01	50.40	45.27	22.40	33.07	30.73	75.33	42.87	XXXII
13	RSC 11-20	62.40	61.00	27.20	59.33	31.44	99.33	56.78	VI
14	TS 46	61.33	51.60	24.80	39.40	22.51	72.00	45.27	XXVII
15	MAUS 717	64.33	42.40	22.13	39.80	23.80	78.67	45.19	XXVIII
16	PS 1642	49.00	54.47	22.27	43.93	22.33	71.00	43.83	XXXI
17	AMS 20-19	54.53	49.40	26.73	50.53	28.96	75.00	47.53	XVII
18	KDS 1097	80.53	62.20	29.93	58.73	31.33	98.00	60.12	IV
19	DSb 37	73.93	67.13	34.93	55.47	31.64	100.00	60.52	II
20	DSb 23 (C)	54.80	54.93	31.60	61.40	29.49	75.00	51.20	XI
21	ASb 51	55.07	55.00	24.00	54.20	20.16	73.00	46.91	XIX
22	NRC 149	72.87	49.13	41.40	69.00	37.67	92.67	60.46	III
23	VLS 98	57.87	48.80	24.67	47.47	30.22	72.00	46.84	XX
24	DS 1326	50.40	46.60	22.93	31.40	30.89	72.33	42.43	XXXIV
25	SL 1234	46.67	44.20	20.07	29.27	23.73	67.33	38.55	XLV
26	RSC 11-22	53.80	55.07	26.80	43.47	25.67	74.67	46.58	XXII
27	Himso 1690	48.33	44.93	25.07	38.67	25.31	70.33	42.11	XXXVII
28	BAUS 103	65.80	55.07	26.33	51.47	41.36	75.00	52.51	X
29	JS 22-07	57.80	45.13	25.07	36.60	26.80	75.00	44.40	XXIX
30	DSb 21 (C)	62.00	59.33	26.60	57.93	30.02	79.67	52.59	IX
31	TS 107	60.67	51.80	25.60	45.80	35.24	80.33	49.91	XIII
32	MAUS 712	53.73	47.20	28.00	43.87	23.84	78.00	45.77	XXIV
33	NRC 168	49.93	43.47	26.60	37.53	22.18	72.00	41.95	XXXVIII
34	MACS 1639	58.53	59.13	29.80	52.13	29.09	87.33	52.67	VIII
35	DS 1320	54.00	41.33	20.60	37.53	23.91	75.67	42.17	XXXVI
36	KDS 1099	58.67	69.27	42.07	56.13	34.09	97.33	59.59	V
37	AMS 353	55.73	49.67	25.13	33.33	32.16	78.33	45.73	XXV
38	DSb 36	71.73	57.33	40.80	59.60	43.29	96.67	61.57	I
39	AUKS 218	60.87	38.47	21.47	35.27	24.73	66.67	41.25	XLII
40	KDS 753 (C)	65.40	65.80	26.87	53.53	24.29	91.33	54.54	VII
41	RVSM 2011-77	61.87	53.00	26.87	52.67	30.09	80.67	50.86	XII
42	SKF 6029	50.20	52.47	24.20	43.13	23.44	70.67	44.02	XXX
43	NRC 167	56.40	38.13	19.40	41.53	19.91	72.33	41.28	XLI
44	ASb 50	52.67	60.13	20.67	53.87	24.71	77.67	48.29	XIV
45	RVS 2011-76	39.60	48.33	22.27	44.73	32.36	67.33	42.44	XXXIII
	N.P.S.(Sqm)	4.05	3.78	4.05	3.78	4.05	4.05		
	DOS	29/06/2019	12/07/2019	23/07/2019	03/07/2019	13/07/2019	08/07/2019		

Table 1.6.5

Trial : Initial Varietal Trial
Zone : Southern Zone

Character : 100 Seed Weight (g)

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	VLS 99	15.80	18.33	16.33	15.53	11.91	18.77	16.11	IX
2	SL 1213	16.37	17.00	11.13	14.61	11.30	16.23	14.44	XXIII
3	PS 1641	14.73	15.83	13.63	13.33	11.21	14.53	13.88	XXXII
4	NRC 154	16.07	24.17	19.67	19.52	14.25	21.40	19.18	I
5	RVS 2011-32	16.17	20.17	15.40	16.42	13.68	17.70	16.59	VII
6	MACS 1655	11.40	17.00	16.53	15.21	10.91	17.53	14.76	XX
7	SKF 2036	14.07	18.17	14.37	14.55	10.78	15.40	14.56	XXII
8	AUKS 200	16.17	18.17	13.23	14.68	10.75	17.57	15.10	XIV
9	DS 1318	13.70	14.50	13.20	14.38	10.59	15.23	13.60	XXXIV
10	MACS 1460 (C)	16.00	15.00	13.13	13.92	10.77	14.93	13.96	XXXI
11	NRC 163	16.13	23.33	17.73	15.40	14.71	21.80	18.18	III
12	JS 22-01	14.93	21.17	14.27	14.82	13.52	17.07	15.96	X
13	RSC 11-20	14.37	14.83	13.23	14.06	11.37	14.30	13.69	XXXIII
14	TS 46	13.73	16.50	13.00	15.68	10.75	16.30	14.33	XXVII
15	MAUS 717	15.13	18.00	13.50	15.76	11.62	15.87	14.98	XVIII
16	PS 1642	12.50	13.67	10.30	12.49	10.81	12.83	12.10	XL
17	AMS 20-19	13.97	14.50	12.30	12.74	10.73	14.10	13.06	XXXVII
18	KDS 1097	15.20	18.17	14.13	15.21	11.61	16.23	15.09	XV
19	DSb 37	13.40	13.00	11.73	12.98	14.48	12.83	13.07	XXXVI
20	DSb 23 (C)	14.70	17.17	13.33	14.04	13.39	15.73	14.73	XXI
21	ASb 51	14.97	16.17	12.23	15.31	10.99	15.20	14.15	XXIX
22	NRC 149	15.83	18.17	14.37	14.54	11.25	15.90	15.01	XVII
23	VLS 98	15.10	23.83	16.27	16.38	13.09	19.67	17.39	V
24	DS 1326	16.90	17.00	14.50	14.49	10.63	16.37	14.98	XVIII
25	SL 1234	13.67	19.67	11.90	13.68	10.41	16.40	14.29	XXVIII
26	RSC 11-22	13.67	15.67	10.57	12.70	11.50	12.90	12.84	XXXIX
27	Himso 1690	16.10	18.33	12.47	16.00	11.36	15.50	14.96	XIX
28	BAUS 103	14.70	16.67	14.47	13.77	10.95	16.00	14.43	XXIV
29	JS 22-07	16.63	18.83	16.37	19.68	14.08	18.40	17.33	VI
30	DSb 21 (C)	15.03	15.17	12.27	13.57	11.67	13.87	13.60	XXXIV
31	TS 107	14.93	18.17	12.00	12.55	11.06	16.03	14.12	XXX
32	MAUS 712	15.67	18.17	12.93	15.35	13.86	15.97	15.33	XI
33	NRC 168	16.53	23.17	14.33	18.29	14.40	19.77	17.75	IV
34	MACS 1639	16.07	21.17	12.53	14.57	10.54	16.50	15.23	XII
35	DS 1320	16.03	17.17	12.87	13.56	10.92	15.80	14.39	XXVI
36	KDS 1099	13.00	13.00	10.73	10.51	11.11	12.37	11.79	XLI
37	AMS 353	14.70	15.17	13.30	12.62	10.56	13.97	13.39	XXXV
38	DSb 36	14.30	17.50	12.40	14.64	15.31	16.30	15.08	XVI
39	AUKS 218	12.13	13.17	8.80	11.43	10.63	11.33	11.25	XLII
40	KDS 753 (C)	17.17	21.83	18.27	18.49	14.91	19.27	18.32	II
41	RVSM 2011-77	12.77	15.00	10.63	13.83	11.90	13.87	13.00	XXXVIII
42	SKF 6029	15.67	16.33	14.37	14.36	10.44	15.33	14.42	XXV
43	NRC 167	14.83	19.83	12.77	18.50	13.02	19.20	16.36	VIII
44	ASb 50	15.37	16.50	14.13	16.10	12.40	16.17	15.11	XIII
45	RVS 2011-76	14.10	16.50	13.23	15.42	11.31	15.77	14.39	XXVI
	N.P.S.(Sqm)	4.05	3.78	4.05	3.78	4.05	4.05		
	DOS	29/06/2019	12/07/2019	23/07/2019	03/07/2019	13/07/2019	08/07/2019		

Table 1.6.6

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

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	2585	3248	1836	2701	1165	3796	2555.17	I

2	MACSNRC 1667**	3048	2269	1497	1528	1119	3426	2147.83	VI
3	NRC 142	3395	2338	-	1667	1111	3210	2344.20	IV
4	KS 103(C)	3225	3302	2083	1721	1003	3434	2461.33	III
5	DSb 23(C)	2569	3457	2068	2539	926	3295	2475.67	II
6	DSb 21(C)	2022	2824	1204	2176	980	2616	1970.33	VII
7	MACS 450(C)	3302	2855	1157	1782	795	3457	2224.67	V
	Mean	2878.00	2899.00	1640.83	2016.29	1014.14	3319.14		
	N.P.S.(Sqm)	12.96	12.96	12.96	12.96	12.96	12.96		
	DOS	29/06/ 2019	22/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	20/07/ 2019		
	CD	509.26	246.91	285.49	223.77	154.32	277.78		
	CV (5%)	12.00	5.65	13.82	7.44	10.21	5.64		
	Pooled CD							232.80	

**Repeat entry.

Table 1.6.7

Trial : Advanced Varietal Trial I
Zone : Southern Zone
Character : Days To Flower

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	37.00	43.75	40.00	40.00	40.25	38.25	39.88	III
2	MACSNRC 1667**	37.00	36.50	43.00	40.75	36.50	32.00	37.63	I
3	NRC 142	43.25	44.25	-	40.75	40.50	34.00	40.55	IV
4	KS 103(C)	45.25	44.50	43.00	41.50	42.25	37.25	42.29	V
5	DSb 23(C)	44.50	46.25	44.00	43.00	42.50	39.00	43.21	VII
6	DSb 21(C)	38.75	47.25	43.00	41.00	43.25	41.00	42.38	VI
7	MACS 450(C)	40.50	40.75	43.00	39.00	40.25	34.00	39.58	II
	N.P.S.(Sqm)		12.96	12.96	12.96	12.96	12.96		
	DOS		22/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	20/07/ 2019		

Table 1.6.8

Trial : Advanced Varietal Trial I
Zone : Southern Zone
Character : Days To Harvest Maturity

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	100.50	100.00	100.00	89.00	97.75	95.00	97.04	II
2	MACSNRC 1667**	98.00	95.00	96.00	88.25	96.75	92.00	94.33	I
3	NRC 142	103.50	107.75	-	89.50	99.25	92.00	98.40	III

4	KS 103(C)	110.75	101.50	98.00	90.75	108.50	101.00	101.75	VI
5	DSb 23(C)	108.75	104.25	102.00	94.25	106.00	101.00	102.71	VII
6	DSb 21(C)	101.25	109.75	96.00	91.50	108.50	99.00	101.00	V
7	MACS 450(C)	102.25	99.25	104.00	90.25	111.00	99.00	100.96	IV
	N.P.S.(Sqm)		12.96	12.96	12.96	12.96	12.96		
	DOS		22/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	20/07/ 2019		

Table 1.6.9

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

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	61.20	46.45	46.50	47.85	28.85	60.75	48.60	V
2	MACSNRC 1667**	64.40	46.10	33.25	60.15	29.20	57.75	48.48	VI
3	NRC 142	55.20	55.85	-	43.25	37.20	60.50	50.40	II
4	KS 103(C)	58.30	51.75	42.00	52.10	40.50	66.25	51.82	I
5	DSb 23(C)	51.65	48.30	49.50	60.40	26.45	65.25	50.26	III
6	DSb 21(C)	48.00	49.20	36.25	57.70	29.40	75.00	49.26	IV
7	MACS 450(C)	57.75	44.45	29.75	47.90	36.60	57.50	45.66	VII
	N.P.S.(Sqm)		12.96	12.96	12.96	12.96	12.96		
	DOS		22/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	20/07/ 2019		

Table 1.6.10

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

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	DSb 33	13.23	13.38	11.25	13.46	13.22	14.90	13.24	V
2	MACSNRC 1667**	16.54	14.38	13.32	16.11	14.30	16.42	15.18	I
3	NRC 142	14.83	13.63	-	15.06	11.24	14.22	13.80	IV
4	KS 103(C)	13.68	13.38	12.57	13.57	15.03	14.55	13.80	IV
5	DSb 23(C)	14.16	14.88	14.43	13.68	13.16	14.55	14.14	II
6	DSb 21(C)	12.18	12.38	13.70	13.30	11.19	13.65	12.73	VI

7	MACS 450(C)	16.98	14.63	13.28	14.44	10.37	14.97	14.11	III
	N.P.S.(Sqm)		12.96	12.96	12.96	12.96	12.96		
	DOS		22/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	20/07/ 2019		

Table 1.6.11

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Green Pod Yield (Kg/ha) at Picking

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Karune	7998	10997	13964	10986.33	I
2	Harasoya(C)	5917	6615	13090	8540.67	III
3	KDS 726(C)	7508	7993	13861	9787.33	II
	Mean	7141	8535	13638		
	N.P.S.(Sqm)	12.96	12.96	12.96		
	DOS	30/06/2019	22/07/2019	08/07/2019		
	CD	692.09	460.57	N/A		
	CV%	5.49	3.06	5.47		

Table 1.6.12

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Yield(Kg/ha)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Karune	2940	4136	2886	3320.67	I
2	Harasoya(C)	2191	3634	3449	3091.33	III
3	KDS 726(C)	2230	3742	3565	3179.00	II
	Mean	2453.67	3837.33	3300.00		
	N.P.S.(Sqm)	12.96	12.96	12.96		
	DOS	30/06/2019	22/07/2019	08/07/2019		
	CD	254.63	393.52	458.56		
	CV (5%)	6.01	5.88	7.87		

Table 1.6.13

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Days To Flower

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Karune	24.75	35.25	38.00	32.67	I
2	Harasoya(C)	31.00	37.50	47.00	38.50	II
3	KDS 726(C)	37.75	46.50	47.25	43.83	III
	N.P.S.(Sqm)	12.96	12.96	12.96		
	DOS	30/06/2019	22/07/2019	08/07/2019		

Table 1.6.14

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Days To Harvest Maturity

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Karune	85.25	95.25	109.00	96.50	I
2	Harasoya(C)	101.75	98.25	117.75	105.92	II
3	KDS 726(C)	104.50	105.00	114.00	107.83	III
	N.P.S.(Sqm)	12.96	12.96	12.96		
	DOS	30/06/2019	22/07/2019	08/07/2019		

Table 1.6.15

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Plant Height (cm)

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Karune	36.10	36.70	40.50	37.77	III
2	Harasoya(C)	47.25	35.35	60.75	47.78	II
3	KDS 726(C)	65.90	48.65	65.75	60.10	I
	N.P.S.(Sqm)	12.96	12.96	12.96		
	DOS	30/06/2019	22/07/2019	08/07/2019		

Table 1.6.16

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : 100 Seed Weight (g)

S.No	Varieties	Bangalore	Pune	Mean	Rank
1	Karune	35.75	31.52	33.64	I
2	Harasoya(C)	20.88	26.83	23.86	II
3	KDS 726(C)	18.25	19.55	18.90	III
	N.P.S.(Sqm)	12.96	12.96		
	DOS	22/07/2019	08/07/2019		

Table 1.6.17

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Germination (%)

S.No	Varieties	Adilabad	Pune	Mean	Rank
1	Karune	81.75	67.25	74.50	III
2	Harasoya(C)	88.25	89.75	89.00	II
3	KDS 726(C)	91.00	89.75	90.38	I
	N.P.S.(Sqm)	12.96	12.96		
	DOS	30/06/2019	08/07/2019		

Table 1.6.18

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Days To Picking at R6

S.No	Varieties	Adilabad	Pune	Mean	Rank
1	Karune	60.25	82.00	71.13	I
2	Harasoya(C)	71.25	97.00	84.13	II
3	KDS 726(C)	73.00	103.50	88.25	III
	N.P.S.(Sqm)	12.96	12.96		
	DOS	30/06/2019	08/07/2019		

Table 1.6.19

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : 100 Green Seed Weight at picking

S.No	Varieties	Adilabad	Bangalore	Pune	Mean	Rank
1	Karune	73.42	93.25	79.90	82.19	I
2	Harasoya(C)	36.17	36.75	52.73	41.88	II
3	KDS 726(C)	26.13	34.13	48.73	36.33	III
	N.P.S.(Sqm)	12.96	12.96	12.96		
	DOS	30/06/2019	22/07/2019	08/07/2019		

Table 1.6.20

Trial : Advanced Varietal Trial I : Vegetable Soybean
Zone : Southern Zone
Character : Moisture % at Picking Stage

S.No	Varieties	Adilabad	Pune	Mean	Rank
1	Karune	57.45	61.25	59.35	III
2	Harasoya(C)	60.42	70.25	65.34	I
3	KDS 726(C)	60.97	58.25	59.61	II
	N.P.S.(Sqm)	12.96	12.96		
	DOS	30/06/2019	08/07/2019		

Table 1.6.21

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	NRC 147	3231	2023	1176	2278	1356	2898	2160.33	IX
2	DSb 34	3241	3222	1259	2681	1884	3282	2594.83	II
3	MACS 1493	3250	2296	1528	2269	1750	3690	2463.83	IV
4	KDS 992	3324	3250	1616	2389	2000	3352	2655.17	I
5	RSC 11-07	3319	2440	1759	2079	1102	3204	2317.17	V
6	AMS 100-39	3069	3028	1542	2398	1727	3259	2503.83	III
7	NRCSL 1	2125	2023	1676	1083	1144	3292	1890.50	XV
8	BAUS 102	2426	2907	1495	2306	1083	3458	2279.17	VI
9	AMS 2014-1	2889	2407	1620	1019	1065	3296	2049.33	XIII
10	SKF-SP-11	2787	2792	1389	1634	1139	3222	2160.50	VIII
11	NRC 132	2495	2542	1394	1597	1116	3329	2078.83	XI
12	DSb 21(C)	2208	2866	944	2509	1338	2889	2125.67	X
13	RKS 18(C)	2083	2176	1463	1968	1097	3440	2037.83	XIV
14	JS 335(C)	2495	2606	1454	2153	1056	3403	2194.50	VII
15	JS 93-05(C)	2370	2565	1431	1949	1106	3028	2074.83	XII
	Mean	2754.13	2609.53	1449.73	2020.80	1330.87	3269.47		
	N.P.S.(Sqm)	21.60	21.60	21.60	21.60	21.60	21.60		
	DOS	23/06/ 2019	16/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	10/07/ 2019		
	CD	328.70	393.52	217.59	268.52	194.44	189.81		
	CV (5%)	8.30	10.51	10.41	9.29	10.25	4.07		

Table 1.6.22

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	NRC 147	40.25	38.00	46.00	40.00	38.50	41.00	40.63	IX
2	DSb 34	38.50	41.00	43.00	37.50	40.50	38.00	39.75	VII
3	MACS 1493	41.00	41.75	44.00	41.25	40.00	37.75	40.96	X
4	KDS 992	39.50	46.00	47.00	47.00	43.25	43.00	44.29	XV
5	RSC 11-07	42.25	39.25	45.00	38.50	38.25	38.00	40.21	VIII
6	AMS 100-39	41.00	45.50	44.00	41.00	40.50	42.50	42.42	XIII
7	NRCSL 1	42.00	36.00	42.00	37.00	38.25	38.00	38.88	III
8	BAUS 102	40.00	41.75	42.00	42.00	40.50	42.00	41.38	XI
9	AMS 2014-1	42.00	35.50	42.00	40.00	35.25	35.75	38.42	II
10	SKF-SP-11	41.75	37.00	42.00	39.25	38.25	37.75	39.33	VI
11	NRC 132	41.00	44.25	44.00	44.50	38.75	38.00	41.75	XII
12	DSb 21(C)	37.75	46.00	48.00	40.50	43.25	43.00	43.08	XIV
13	RKS 18(C)	41.75	35.25	43.00	39.00	38.50	38.00	39.25	V
14	JS 335(C)	41.00	36.25	42.00	39.00	38.50	38.00	39.13	IV
15	JS 93-05(C)	33.75	39.00	41.00	38.75	35.50	35.00	37.17	I
	N.P.S.(Sqm)	21.60	21.60	21.60	21.60	21.60	21.60		
	DOS	23/06/ 2019	16/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	10/07/ 2019		

Table 1.6.23

Trial : Advanced Varietal Trial II
Zone : Southern Zone
Character : Days To Harvest Maturity

S.No	Varieties	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
1	NRC 147	107.25	96.75	103.00	90.25	99.75	96.00	98.83	V
2	DSb 34	100.00	100.50	97.00	86.50	99.25	96.00	96.54	II
3	MACS 1493	106.25	99.50	99.00	89.00	101.75	98.00	98.92	VI
4	KDS 992	101.25	107.00	99.00	92.00	105.25	102.00	101.08	XIII
5	RSC 11-07	106.75	101.75	97.00	89.25	103.50	100.50	99.79	XI
6	AMS 100-39	105.50	104.75	100.00	91.75	98.75	96.00	99.46	VIII
7	NRCSL 1	104.75	101.25	97.00	88.25	104.75	102.00	99.67	X
8	BAUS 102	103.75	105.50	98.00	90.25	104.25	111.00	102.13	XV
9	AMS 2014-1	106.75	98.00	96.00	89.50	104.25	102.00	99.42	VII
10	SKF-SP-11	109.25	98.25	97.00	88.50	104.50	100.00	99.58	IX
11	NRC 132	102.50	104.25	100.00	87.50	105.50	102.00	100.29	XII
12	DSb 21(C)	98.50	110.00	102.00	91.25	108.50	101.25	101.92	XIV
13	RKS 18(C)	109.25	95.25	100.00	87.75	99.75	98.00	98.33	IV
14	JS 335(C)	102.25	95.25	99.00	87.25	100.00	98.00	96.96	III
15	JS 93-05(C)	92.25	100.25	96.00	85.50	96.00	96.25	94.38	I
	N.P.S.(Sqm)	21.60	21.60	21.60	21.60	21.60	21.60		
	DOS	23/06/ 2019	16/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	10/07/ 2019		

Table 1.6.24

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	NRC 147	82.45	53.50	35.75	57.35	37.00	72.00	56.34	I
2	DSb 34	54.30	43.70	31.25	48.35	29.75	68.75	46.02	VII
3	MACS 1493	75.15	40.35	29.25	44.95	30.50	57.25	46.24	VI
4	KDS 992	59.70	52.70	41.00	48.85	31.55	74.00	51.30	IV
5	RSC 11-07	62.85	50.85	30.75	43.95	22.55	62.00	45.49	IX
6	AMS 100-39	64.53	54.25	36.50	55.45	34.40	65.00	51.69	III
7	NRCSL 1	54.00	23.45	31.75	25.95	33.60	59.00	37.96	XV
8	BAUS 102	68.25	49.40	38.25	55.00	36.90	80.50	54.72	II
9	AMS 2014-1	64.10	33.15	38.00	37.30	33.95	65.50	45.33	X
10	SKF-SP-11	54.55	37.10	29.50	35.15	29.90	56.75	40.49	XIV
11	NRC 132	71.90	50.00	31.25	42.85	28.25	51.50	45.96	VIII
12	DSb 21(C)	54.95	54.40	28.25	56.25	32.35	69.75	49.33	V
13	RKS 18(C)	59.10	32.65	30.25	45.95	22.00	63.00	42.16	XII
14	JS 335(C)	53.35	35.80	30.50	50.65	25.45	59.50	42.54	XI
15	JS 93-05(C)	47.65	38.65	24.75	47.25	29.80	58.00	41.02	XIII
	N.P.S.(Sqm)	21.60	21.60	21.60	21.60	21.60	21.60		
	DOS	23/06/ 2019	16/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	10/07/ 2019		

Table 1.6.25

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	NRC 147	13.00	14.50	12.77	14.58	11.26	13.25	13.23	X
2	DSb 34	15.13	15.00	12.68	14.30	12.95	13.35	13.90	V
3	MACS 1493	15.50	15.38	13.40	15.15	11.35	12.50	13.88	VI
4	KDS 992	16.05	17.13	16.85	15.59	15.43	15.85	16.15	I
5	RSC 11-07	12.82	12.13	11.60	12.57	11.05	11.32	11.92	XV
6	AMS 100-39	15.92	15.38	14.85	15.53	11.24	13.67	14.43	II
7	NRCSL 1	14.77	13.63	13.47	13.84	10.70	14.52	13.49	VIII
8	BAUS 102	13.70	15.88	14.38	13.59	11.67	15.63	14.14	IV
9	AMS 2014-1	13.90	13.38	12.57	10.87	10.69	10.17	11.93	XIV
10	SKF-SP-11	15.68	16.88	13.85	13.13	11.54	13.90	14.16	III
11	NRC 132	15.18	12.63	12.72	12.45	12.26	10.90	12.69	XII
12	DSb 21(C)	11.00	13.38	11.43	13.45	12.94	11.85	12.34	XIII
13	RKS 18(C)	11.30	13.13	13.40	14.47	11.60	13.40	12.88	XI
14	JS 335(C)	11.85	16.88	13.68	14.44	11.27	14.55	13.78	VII
15	JS 93-05(C)	12.45	14.63	12.03	15.44	10.84	14.05	13.24	IX
	N.P.S.(Sqm)	21.60	21.60	21.60	21.60	21.60	21.60		
	DOS	23/06/ 2019	16/07/ 2019	23/07/ 2019	04/07/ 2019	12/07/ 2019	10/07/ 2019		

सस्य विज्ञान
Agronomy

Principal Investigator	**Dr. S.D. Billore, IISR, Indore**

Northern Plain Zone

Pantnagar (Uttarakhand)	Dr. Ajay K Shrivastava
Ludhiana (Punjab)	Dr. Harpreet Kaur
New Delhi	Dr. Anchal Das

Eastern Zone

Ranchi (Jharkhand)	Dr. Arvind Kumar Singh
Raipur (Chattisgarh)	Dr. Ram Mohan Savu
Bhawanipatna (Orissa)	Dr. G.C. Mishra

North Eastern Hill Zone

Imphal (Manipur)	Dr. (Mrs.) Toijam Sunanda Devi
Medziphema (Nagaland)	Dr. Engrala Ao

Central Zone

Sehore (Madhya Pradesh)	Dr. M.D. Vyas
Kota (Rajasthan)	Dr. D.S. Meena
Amravati (Maharashtra)	Dr. M.S. Dandghe
Devgadh baria (Gujarat)	Dr. G. J. Patel

Southern Zone

Dharwad (Karnataka)	Dr. G. Somangoudae
Pune (Maharashtra)	Dr. S.A. Jaybhay
Adilabad (Telangna)	Dr. Sreedhar Chauhan

Table 2.1.1.

ASP-1/18. Evaluation of AVT II entries under different row spacing
Zone: Northern plain **Design:** Split plot **Replications:** Three
Character: Seed yield (kg/ha)

treatment	Pantnagar			Ludhiana			Zonal mean		
	Row spacing								
Entry	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**
PS 1613	1443	1749	**1596**	1420	1423	**1421**	1432	1586	**1509**
PS 1611	1376	1478	**1427**	899	914	**906**	1138	1196	**1167**
NRC 128	1325	1433	**1379**	868	874	**871**	1097	1154	**1125**
PS 1347	1526	1712	**1619**	1346	1377	**1361**	1436	1545	**1490**
Mean	**1418**	**1593**		**1133**	**1147**		**1276**	**1370**	
Spacing			NS			NS			-
Entries			118			206			-
Interaction			NS			NS			-

Table2.1.2.

ASP-1/18. Evaluation of AVT II entries under different row spacing (Zonal mean)
Zone: Northern plain **Design:** Split plot **Replications:** Three
Characters: Dry matter, CGR, RGR, Plant height, Branches and Pods/plant, Seed index, Straw yield, Harvest Index (HI), Grain production efficiency (GPE) and Rainfall use efficiency (RUE)

Treatment	Dry matter (g/plant)			CGR (g/m^2/day)		RGR (g/g/day)		Bran-ches /plant	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	HI (%)	GPE (kg/ha /day)	RUE (kg/ha/ mm)
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing														
30 cm	1.79	6.62	13.23	8.84	12.11	0.446	0.245	2.42	47.15	7.92	3702	26.38	9.64	1.35
45 cm	1.94	7.75	14.44	10.39	12.35	0.484	0.210	2.97	49.10	8.28	4014	26.20	10.37	1.44
Entry														
PS 1613	1.89	6.83	13.64	8.95	12.69	0.448	0.236	2.50	46.95	7.85	3983	27.51	11.01	1.52
PS 1611	1.85	7.62	14.23	10.22	12.25	0.503	0.211	2.78	50.00	7.81	3880	24.76	9.56	1.31
NRC 128	1.71	6.53	12.85	8.79	11.12	0.455	0.248	2.67	39.45	8.74	3669	24.23	8.49	1.18
PS 1347	2.02	7.77	14.62	10.52	12.86	0.458	0.216	2.87	56.00	8.03	3899	28.73	10.95	1.58

Table 2.1.3.

ASP-1/18. Evaluation of AVT II entries under different row spacing
Zone: North Eastern **Design:** Split plot **Replications:** Three
Character: Seed yield (kg/ha)

Treatment	Bhawanipatana			Ranchi			Raipur			Zonal mean		
	Row spacing											
Entry	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**
RSC11-07	1490	1257	**1373**	1996	2269	**2132**	1973	2121	**2047**	1820	1882	**1851**
NRC 128	1647	1403	**1525**	2180	2361	**2270**	1711	1937	**1824**	1846	1900	**1873**
AMS 2014-1	1567	1190	**1378**	1854	2292	**2073**	1619	1495	**1557**	1680	1659	**1669**
NRC 136	1300	1013	**1157**	2037	2245	**2141**	1573	1628	**1601**	1637	1629	**1633**
MACS 1493	1983	1607	**1795**	1935	2292	**2113**	1040	1081	**1060**	1653	1660	**1656**
NRC 132	1273	983	**1128**	2037	2384	**2211**	1251	1283	**1267**	1520	1550	**1535**
RSC 11-03	1030	980	**1005**	2139	2593	**2366**	1293	1357	**1325**	1487	1643	**1565**
NRCSL- 1	1963	1573	**1768**	1915	2083	**1999**	1569	1647	**1608**	1815	1768	**1792**
NRC 137	1110	1000	**1055**	1956	2060	**2008**	1578	1541	**1559**	1548	1534	**1541**
NRC 147	1320	1107	**1213**	1731	1991	**1861**	1127	1191	**1159**	1393	1430	**1411**
RKS 18 (c)	1310	1037	**1173**	1813	1968	**1890**	1017	1053	**1035**	1380	1353	**1366**
Mean	**1454**	**1195**		**1963**	**2231**		**1432**	**1485**		**1616**	**1637**	
CD (P=0.05)												
Spacing			NS			NS			NS			-
Entries			153			254			131.7			-
Interaction			294			NS			87.39			-

Table 2.1.4.

ASP-1/18. Evaluation of AVT II entries under different row spacing (Zonal mean)
Zone: North Eastern **Design:** Split plot **Replications:** Three
Characters: Dry matter, CGR, RGR, Plant height, Branches andPods/plant, Seed index, Straw yield, Harvest Index (HI), Grain production efficiency (GPE) and Rainfall use efficiency (RUE)

Treatment	Dry matter (g/plant)			CGR (g/m^2/day)		RGR (g/g/day)		Bran-ches /plant	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	HI (%)	GPE (kg/ha/ day)	RUE (kg/ha/ $mm_)$
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing														
30 cm	2.12	8.96	21.92	2.45	3.88	0.056	0.032	3.47	48.31	11.28	2624	39.14	16.39	2.63
45 cm	2.27	10.31	25.70	1.89	2.77	0.056	0.030	3.53	50.36	11.51	2429	41.03	16.17	2.54
Entry														
RSC11-07	2.25	10.28	26.58	2.51	3.62	0.056	0.031	3.71	54.33	11.60	2990	39.59	17.14	2.64
NRC 128	2.46	10.72	26.19	2.56	3.54	0.056	0.030	3.82	56.69	12.18	2905	40.21	18.25	2.87
AMS 2014-1	2.25	9.96	23.66	2.35	3.45	0.056	0.030	3.50	48.54	11.33	2676	39.53	16.37	2.60
NRC 136	2.04	9.72	23.98	1.86	3.17	0.055	0.033	3.43	50.30	11.04	2514	40.61	15.38	2.44
MACS 1493	2.20	9.91	22.72	2.56	3.57	0.050	0.029	3.63	48.34	12.02	2437	40.30	18.40	3.02
NRC 132	2.14	9.46	22.51	1.76	2.90	0.048	0.031	3.40	47.54	10.62	2293	40.87	15.93	2.43
RSC 11-03	2.22	9.85	22.99	1.81	2.81	0.052	0.031	3.35	49.71	11.37	2324	41.33	15.62	2.43
NRCSL- 1	2.42	10.46	24.87	2.52	3.70	0.055	0.031	3.76	55.12	11.74	2865	39.23	18.50	2.96
NRC 137	2.11	9.55	22.99	1.87	2.89	0.055	0.031	3.37	48.16	10.50	2650	38.87	13.99	2.26
NRC 147	2.12	9.11	22.53	2.16	3.19	0.051	0.031	3.32	46.10	11.46	2196	40.18	14.89	2.32
RKS18 (c)	2.13	9.05	21.31	2.16	3.06	0.048	0.029	3.34	41.70	11.54	2132	39.90	14.77	2.29

Table 2.1.5

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

Zone: North Eastern Hill **Design:** Split plot **Replications:** Three

Character: Seed yield (kg/ha)

Treatment	Imphal			Medziphema			Zonal mean		
	Row spacing								
Entry	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**
PS 1613	1640	1985	**1813**				1640	1985	**1813**
DS 3108	2213	2173	**2193**				2213	2173	**2193**
JS 335	1933	2008	**1971**				1933	2008	**1971**
KDS- 921				1835	557	**1196**	1835	557	**1196**
RSC 10-71				1424	615	**1020**	1424	615	**1020**
DSb -32				1182	522	**852**	1182	522	**852**
JS 97 52				1425	779	**1102**	1425	779	**1102**
Mean	**1928**	**2056**		**1467**	**618**		**1665**	**1234**	
CD (P=0.05)									
Row spacing			NS			106.20			-
Entries			159			NS			-
Interaction			NS			NS			-

Table 2.1.6.

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

Zone: North EasternHill **Design:** Split plot **Replications:** Three

Characters: Dry matter, CGR, RGR, Plant height, Branches andPods/plant, Seed index, Straw yield, Harvest Index (HI), Grain production efficiency (GPE) and Rainfall use efficiency (RUE)

Treatment	Dry matter (g/plant)			CGR (g/m^2/day)		RGR (g/g/day)		Bran-ches /plant	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	HI (%)	GPE (kg/ha/ day)	RUE (kg/ha/ mm)
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing														
30 cm	1.53	4.83	11.05	4.87	10.50	0.079	0.055	4.11	47.06	12.58	2917	37.35	13.47	7.38
45 cm	1.46	4.34	10.51	3.14	7.13	0.076	0.060	4.19	38.72	12.84	2555	34.53	10.04	3.95
Entry														
PS 1613	1.95	5.81	15.31	7.81	18.88	0.073	0.065	4.50	47.00	14.9	3837	32.08	12.95	2.40
DS 3108	2.28	6.26	14.38	8.02	16.32	0.068	0.056	4.72	55.00	13.7	3717	37.11	15.63	2.91
JS 335	2.16	6.02	14.33	7.76	16.91	0.069	0.058	4.10	39.00	15.3	3781	34.51	14.08	2.61
KDS- 921	0.85	3.71	7.07	0.191	0.224	0.094	0.047	3.78	41.78	11.02	2076	34.59	10.42	9.95
RSC 10-71	0.86	3.73	7.07	0.191	0.223	0.098	0.043	3.89	38.22	12.33	1637	38.04	8.89	8.49
DSb -32	0.86	2.62	6.39	0.118	0.251	0.074	0.061	3.95	29.39	9.63	1363	38.17	8.20	7.10
JS 97 52	0.86	2.51	6.98	0.110	0.298	0.074	0.069	3.81	44.72	10.30	1696	38.44	9.61	9.18

Table2.1.7.

ASP-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			Amrawati			Kota			Zonal mean		
	Row spacing											
Entry	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**
AMS-100-39	1190	1459	**1324**	1829	2265	**2047**	2037	1566	**1802**	1685	1763	**1724**
NRC 130	1176	985	**1081**	1491	1894	**1692**	1049	826	**938**	1239	1235	**1237**
NRC 131	1145	947	**1046**	1594	1656	**1625**	1204	833	**1019**	1314	1145	**1230**
NRC 86 (c)	1178	1369	**1274**	1659	1707	**1683**	1837	1281	**1559**	1558	1452	**1505**
JS 20-34 (c)	1560	1324	**1442**	1441	1656	**1549**	911	818	**864**	1304	1266	**1285**
Mean	**1250**	**1217**		**1603**	**1835**		**1408**	**1065**		**1420**	**1372**	
CD (P=0.05)												
Row spacing			NS			187			120			-
Entries			150			193			190			-
Interaction			NS			NS			NS			-

Table 2.1.8.

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, Branches andPods/plant, Seed index, Straw yield, Harvest Index (HI), Grain production efficiency (GPE) and Rainfall use efficiency(RUE)

Treatment	Dry matter (g/plant)			Mean CGR ($g/m^2/day$)		Mean RGR (g/g/day)		Bran-ches /plant	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	HI (%)	GPE (kg/ha/ day)	RUE (kg/ha/ $mm_)$
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing														
30 cm	2.51	4.39	8.74	5.75	13.25	0.030	0.032	2.86	28.40	11.45	2058	37.74	62.30	1.20
45 cm	2.63	4.84	9.40	6.85	14.01	0.032	0.031	3.18	32.90	11.74	2034	36.57	53.28	1.21
Entry														
AMS-100-39	2.85	4.88	10.24	6.05	16.04	0.031	0.040	3.64	40.40	12.25	2724	38.65	83.79	1.49
NRC 130	2.58	4.86	9.89	6.81	15.02	0.039	0.039	2.95	27.95	11.69	1753	41.12	43.41	1.09
NRC 131	2.57	4.74	8.97	6.47	12.64	0.037	0.033	2.88	27.13	11.61	1802	40.46	47.40	1.08
NRC 86 (c)	2.55	4.48	8.45	5.77	11.88	0.034	0.032	3.16	33.85	10.48	2441	38.39	70.61	1.27
JS 20-34 (c)	2.29	4.11	7.81	6.43	12.57	0.037	0.033	2.48	23.91	11.95	1509.667	46.24	44.57	1.07

Table 2.1.9.

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	Pune			Adilabad			Dharwad			Zonal mean		
	Row spacing											
Entry	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**	**30 cm**	**45 cm**	**Mean**
DSb 34	2828	3022	**2925**	2374	2497	**2435**	2189	2216	**2203**	2464	2578	**2521**
MACS 1493	3001	3081	**3041**	3122	3402	**3262**	1809	1896	**1853**	2644	2793	**2719**
KDS 992	2945	3096	**3021**	2763	3106	**2934**	1866	1645	**1756**	2525	2616	**2570**
RSC 1107	2170	3410	**2790**	2633	2912	**2773**	1839	1963	**1901**	2214	2762	**2488**
AMS 100-39	2861	3174	**3018**	3009	3338	**3174**	1703	2025	**1864**	2524	2846	**2685**
NRCSL 1	2808	2955	**2882**				1881	2038	**1959**	2345	2497	**2421**
BAUS 102	2800	2904	**2852**							2800	2904	**2852**
AMS 2014-1	3043	3274	**3159**	2351	3130	**2740**	1969	2070	**2020**	2454	2825	**2640**
SKF-SP-11	2600	2664	**2632**							2600	2664	**2632**
NRC 147	3186	3275	**3231**				2022	1836	**1929**	2604	2556	**2580**
MACSNRC 1667	2872	2979	**2926**							2872	2979	**2926**
NRC 132	2889	2935	**2912**				1784	1925	**1855**	2337	2430	**2384**
DSb 21 (C)	2237	2613	**2425**	2215	2523	**2369**	2104	2154	**2129**	2185	2430	**2308**
Mean	**2788**	**3030**		**2638**	**2987**		**1917**	**1967**		**2448**	**2661**	
CD (P=0.05)												
Row spacing			63.20			NS			NS			-
Entries			342.54			379.3			238.8			-
Interaction			NS			NS			338.3			-

Table 2.1.10.

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, Branches and Pods/plant, Seed index, Straw yield, Harvest Index (HI), Grain production efficiency (GPE) and Rainfall use efficiency (RUE)

Treatment	Dry matter (g/plant)			CGR (g/m^2/day)		RGR (g/g/day)		Bran-ches /plant	Pods/ plant	Seed index (g)	Straw yield (kg/ha)	Hi (%)	GPE (kg/ha/ day)	RUE (kg/ha/ $mm_)$
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing														
30 cm	3.38	9.98	15.94	6.06	7.99	0.050	0.024	3.16	41.51	13.23	3822	39.99	26.06	3.98
45 cm	3.86	12.06	18.23	5.03	5.49	0.052	0.021	4.40	46.00	13.44	3807	42.15	29.02	4.45
Entry														
DSb 34	3.32	10.63	16.47	5.30	6.13	0.058	0.023	3.95	39.64	13.33	3564	28.07	26.98	3.95
MACS 1493	3.98	11.19	17.95	5.98	8.52	0.047	0.024	4.00	48.11	13.44	4021	26.94	31.26	4.62
KDS 992	3.47	10.79	16.47	5.88	5.47	0.052	0.020	3.40	48.91	14.51	3782	27.13	27.78	4.37
RSC 1107	3.59	10.48	16.03	5.21	5.86	0.047	0.021	3.55	45.49	12.35	3754	26.37	26.41	4.08
AMS 100-39	3.79	11.13	17.03	5.91	6.87	0.048	0.021	3.86	43.74	14.07	3655	29.36	29.62	4.55
NRCSL 1	3.59	11.17	17.69	5.74	7.34	0.051	0.023	4.35	39.39	14.02	3893	25.71	26.13	4.13
BAUS 102	3.05	10.48	15.27	5.46	5.65	0.055	0.021	3.85	42.90	14.41	4400	37.61	24.10	3.84
AMS 2014-1	3.53	10.81	17.42	4.81	8.11	0.050	0.027	3.58	43.25	12.23	4053	26.73	28.84	4.49
SKF-SP-11	2.62	12.02	16.17	0.63	0.29	0.045	0.009	2.27	29.00	14.83	3880	40.48	26.32	3.97
NRC 147	3.38	11.37	16.42	3.37	4.07	0.048	0.015	3.54	40.25	12.72	3366	29.13	29.86	4.43
MACSNRC 1667	3.50	13.47	18.53	2.91	2.88	0.048	0.014	3.37	38.61	14.87	3675	43.69	30.07	4.43
NRC 132	3.45	10.63	16.27	0.48	0.28	0.037	0.011	2.91	34.99	11.10	2844	24.12	28.55	4.39
DSb 21 (C)	3.70	11.68	17.64	2.95	3.21	0.049	0.016	3.47	37.63	13.30	3166	25.05	25.38	3.80

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: *Kharif* Seed yield (kg/ha)

Crop rotation	Pantnagar			Ludhiana			Zonal mean		
	Tillage								
	Mini[m]	Con[I]	Mean	Mini[m]	Con[I]	Mean	Mini[m]	Con[I]	Mean
Soy-Soy-Soy-Soy	1944	1870	**1907**	1543	1567	**1555**	1744	1719	**1731**
Soy-Maize-Soy-Maize	4814	4185	**4499**	6650	5860	**6255**	5732	5023	**5377**
Soy-Soy-Maize-Soy	1962	1777	**1870**	1562	1635	**1598**	1762	1706	**1734**
Soy-Soy-Soy-Maize	4814	4740	**4777**	6586	7176	**6881**	5700	5958	**5829**
Mean	**3384**	**3143**		**4085**	**4060**		**3735**	**3602**	
CD (P=0.05)									
Tillage			NS			NS			-
Crop Rotation			192.2			550			-
Interaction			NS			631			-

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* (wheat) Seed yield (kg/ha)

Crop rotation	Pantnagar			Ludhiana			Zonal mean		
	Tillage								
	Mini[m]	Con[I]	Mean	Mini[m]	Con[I]	Mean	Mini[m]	Con[I]	Mean
Soy-Soy-Soy-Soy	4412	4315	**4364**	4298	4383	**4340**	4355	4349	**4352**
Soy-Maize-Soy-Maize	4703	4371	**4537**	4245	4265	**4255**	4474	4318	**4396**
Soy-Soy-Maize-Soy	4190	4634	**4412**	4272	4298	**4285**	4231	4466	**4349**
Soy-Soy-Soy-Maize	4592	4287	**4440**	4219	4272	**4245**	4406	4280	**4343**
Mean	**4474**	**4402**		**4258**	**4304**		**4366**	**4353**	
CD (P=0.05)									
Tillage			NS			NS			-
Crop Rotation			NS			NS			-
Interaction			NS			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								
	Mini[m]	Con[I]	Mean	Mini[m]	Con[I]	Mean	Mini[m]	Con[I]	Mean
Soy-Soy-Soy-Soy	1944	1870	**1907**	3674	3741	**3707**	2809	2806	**2807**
Soy-Maize-Soy-Maize	2407	2092	**2249**	5062	5046	**5054**	3735	3569	**3652**
Soy-Soy-Maize-Soy	1962	1777	**1870**	3680	3766	**3723**	2821	2772	**2797**
Soy-Soy-Soy-Maize	2407	2370	**2388**	5155	5275	**5215**	3781	3823	**3802**
Mean	**2180**	**2027**		**4392**	**4457**		**3286**	**3242**	
CD (P=0.05)									
Tillage			NS			NS			-
Crop Rotation			173.9			186			-
Interaction			NS			NS			-

Table 2.2.4.

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

Centre: Ludhiana**Character:** Yield and economical parameters

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 tillage	4085	9908	26.9	4393	55075	153697	98622	2.78
Conventional tillage	4060	10457	25.9	4457	58839	155952	97113	2.64
SEm	79	70	0.56	26		915	915	0.02
CD (P=0.05)	NS	NS	NS	NS		NS	NS	0.07
B. Cropping system								
Soy-Soy-Soy-Soy	1555	6332	19.86	3707	55869	129713	73844	2.32
Soy-Maize-Soy-Maize	6255	13937	31.68	5054	58044	176845	118801	3.05
Soy-Soy-Maize-Soy	1598	6348	20.16	3723	55869	130265	74395	2.33
Soy-Soy-Soy-Maize	6881	14114	33.91	5215	58044	182475	124430	3.15
SEm	114	164	0.71	46		1621	1620	0.03
CD (P=0.05)	550	1082	3.56	186		6502	6503	0.11

Table 2.2.5.

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20)
Centre: Pantnagar **Character:** Yield and economical parameters

Treatment	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
A. Tillage system							
Minimum tillage	1538	4726	24.56	28305	57051	28746	2.02
Conventional tillage	1743	4854	26.46	30945	64652	33707	2.09
SEm	67.3	144.6	0.014	-	-	-	0.09
CD (P=0.05)	NS		0.063	-	-	-	NS
B. Cropping system							
Soy-Soy-Soy-Soy	1596	4848	24.76	29625	59226	29601	2.00
Soy-Maize-Soy-Maize	1625	4652	25.76	29625	60298	30673	2.03
Soy-Soy-Maize-Soy	1575	4786	24.85	29625	58432	28807	1.97
Soy-Soy-Soy-Maize	1764	4875	26.56	29625	65450	35826	2.20
SEm	73.1	124.6	0.011	-	-	-	0.09
CD (P=0.05)	233.9	398.5	0.033	-	-	-	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: *Kharif* seed yield (kg/ha)

Crop rotation	Raipur			Ranchi			Zonal mean		
	Tillage								
	Mini[m]	Con[l]	Mean	Mini[m]	Con[l]	Mean	Mini[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	2354	1738	**2046**	2228	2167	**2197**	2291	1953	**2122**
Soy-Maize-Soy-Maize	6748	6236	**6492**	2395	2216	**2306**	4572	4226	**4399**
Soy-Soy-Maize-Soy	2142	1804	**1973**	2293	2267	**2280**	2218	2036	**2127**
Soy-Soy-Soy-Maize	6496	6112	**6304**	2354	2169	**2262**	4425	4141	**4283**
Mean	**4435**	**3973**		**2317**	**2205**		**3376**	**3089**	
CD (P=0.05)									
Tillage			NS				NS		-
Crop Rotation			406.9				206.75		-
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: *Rabi* seed yield (kg/ha)

Crop rotation	Raipur			Ranchi			Zonal mean		
	Tillage								
	Mini[m]	Con[l]	Mean	Mini[m]	Con[l]	Mean	Mini[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1104	1281	**1192**	2199	2222	**2211**	1652	1752	**1702**
Soy-Maize-Soy-Maize	1132	1198	**1165**	2222	2118	**2170**	1677	1658	**1668**
Soy-Soy-Maize-Soy	1074	1219	**1146**	2569	2442	**2506**	1822	1831	**1826**
Soy-Soy-Soy-Maize	1203	1264	**1233**	2407	2384	**2396**	1805	1824	**1815**
Mean	**1128**	**1240**		**2350**	**2292**		**1739**	**1766**	
CD (P=0.05)									
Tillage			54.67			NS			-
Crop Rotation			NS			246.83			-
Interaction			NS			194.35			-

Table 2.2.8.

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								
	Mini[m]	Con[l]	Mean	Mini[m]	Con[l]	Mean	Mini[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	2354	1738	**2046**	3369	3320	**3344**	2862	2529	**2695**
Soy-Maize-Soy-Maize	3374	3118	**3246**	3548	3315	**3432**	3461	3217	**3339**
Soy-Soy-Maize-Soy	2142	1804	**1973**	3626	3534	**3580**	2884	2669	**2777**
Soy-Soy-Soy-Maize	3248	3056	**3152**	3603	3406	**3505**	3426	3231	**3329**
Mean	**2779**	**2429**		**3537**	**3394**		**3158**	**2912**	
CD (P=0.05)									
Tillage			136.14			132.52			-
Crop Rotation			NS			211.24			-
Interaction			NS			NS			-

Table 2.2.9.

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2018-19)
Centre: Raipur **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 tillage	4435	8071	35.46	2779	41152	141729	100577	3.44
Conventional tillage	3973	7598	34.34	2429	45902	123879	77977	2.70
SEm	96.5	221	1.12	27.68	-	-	-	-
CD (P=0.05)	451.8	NS	NS	136.14	-	-	-	-
B. Cropping system								
Soy-Soy-Soy-Soy	2046	4549	31.02	2046	43847	104346	60499	2.38
Soy-Maize-Soy-Maize	6492	10208	38.87	3246	43847	165546	121699	3.78
Soy-Soy-Maize-Soy	1973	4368	31.11	1973	43847	100623	56776	2.29
Soy-Soy-Soy-Maize	6304	10121	38.38	3152	43847	160752	116905	3.67
SEm	136.1	190.5	0.84	-	-	-	-	-
CD (P=0.05)	406.9	580	2.75	-	-	-	-	-

Table 2.2.10.

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

Treatment	Bulk density	WHC	Porosity	Initial values (Soil)				OC at harvest (%)
				OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	
A. Tillage system								
Minimum tillage	1.33	45	56	0.58	222.4	13.96	364.4	0.49
Conventional tillage	1.31	46	57	0.58	229.9	12.71	358.3	0.52
B. Cropping system								
Soy-Soy-Soy-Soy	1.32	44	57	0.58	228.6	13.84	367.2	0.48
Soy-Maize-Soy-Maize	1.32	45	56	0.58	219.3	11.14	351.4	0.47
Soy-Soy-Maize-Soy	1.31	44	56	0.58	228.4	14.64	362.8	0.49
Soy-Soy-Soy-Maize	1.31	44	56	0.58	227.1	14.08	361.9	0.50

Table 2.2.11.

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2019-20)
Centre: Ranchi **Character:** Yield and economical parameters

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 tillage	2317	2870	44.65	3537	26300	85976	59676	2.27
Conventional tillage	2205	2765	44.49	3394	28000	81800	53800	1.92
SEm±	37.20	78.76	0.92	29.45	-	1380	1380	0.06
CD (P=0.05)	NS	NS	NS	NS	-	NS	NS	NS
B. Cropping system								
Soy-Soy-Soy-Soy	2197	2774	44.16	3344	27150	81521	54371	2.01
Soy-Maize-Soy-Maize	2306	2906	44.40	3432	27150	85536	58386	2.16
Soy-Soy-Maize-Soy	2280	2807	44.77	3580	27150	84591	57441	2.12
Soy-Soy-Soy-Maize	2262	2785	44.95	3505	27150	83904	56754	2.10
SEm±	64.63	120.71	1.25	66.03	-	2398	2398	0.09
CD (P=0.05)	NS	NS	NS	NS	-	NS	NS	NS

Table 2.2.12.

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2017-18)
Centre: Ranchi **Character:** Soil parameters and nutrient uptake

Treatment	Bulk density	WHC	Porosity	Initial values (Soil)				OC at harvest (%)	Nutrient uptake		
				OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N (kg/ha)	P (kg/ha)	K (kg/ha)
A. Tillage system											
Minimum tillage	1.51	20.38	40.13	0.457	241.74	14.38	183.14	0.462	175.34	20.81	107.39
Conventional tillage	1.59	20.19	39.94	0.453	240.51	14.31	181.17	0.457	168.23	20.36	106.07
SEm±	0.01	0.15	0.28	0.003	0.18	0.04	0.21	0.003	1.80	0.32	1.52
CD (P=0.05)	0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B. Cropping system											
Soy-Soy-Soy-Soy	1.54	20.25	39.88	0.455	241.02	14.35	182.27	0.459	167.52	20.10	102.55
Soy-Maize-Soy-Maize	1.57	20.63	40.00	0.459	241.50	14.37	182.64	0.463	175.34	20.85	110.53
Soy-Soy-Maize-Soy	1.52	19.88	39.75	0.451	240.09	14.34	182.00	0.456	174.14	20.98	106.02
Soy-Soy-Soy-Maize	1.55	20.38	40.50	0.456	241.88	14.32	181.71	0.461	170.13	20.40	107.84
SEm±	0.02	0.35	0.48	0.003	0.46	0.03	0.48	0.003	4.94	0.51	2.94
CD (P=0.05)	0.05	NS	NS	NS	NS	NS	NS	NS	NS	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: *Kharif* seed yield (kg/ha)

Crop rotation	Kota			Amrawati			Zonal mean		
	Tillage								
	Mini^{m}	Con^{l}	Mean	Mini^{m}	Con^{l}	Mean	Mini^{m}	Con^{l}	Mean
Soy-Soy-Soy-Soy	2292	2187	**2240**	1802	1985	**1894**	2047	2086	**2067**
Soy-Maize-Soy-Maize	3168	3119	**3143**	2352	2609	**2481**	2760	2864	**2812**
Soy-Soy-Maize-Soy	2216	2141	**2179**	1919	2120	**2019**	2068	2131	**2099**
Soy-Soy-Soy-Maize	3179	3118	**3148**	2209	2636	**2423**	2694	2877	**2786**
Mean	**2714**	**2641**		**2071**	**2338**		**2392**	**2489**	
CD (P=0.05)									
Tillage			NS			132.49			
Crop Rotation			162.53			126.74			
Interaction			NS			NS			

Table 2.2.14.

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

Zone: Central **Design:** Strip plot **Replications:** Four

Character: *Rabi s*eed yield (kg/ha)

Crop rotation	Kota			Amrawati			Zonal mean		
	Tillage								
	Mini^{m}	Con^{l}	Mean	Mini^{m}	Con^{l}	Mean	Mini^{m}	Con^{l}	Mean
Soy-Soy-Soy-Soy	1993	2168	**2080**	1687	1894	**1791**	1840	2031	**1936**
Soy-Maize-Soy-Maize	2168	1990	**2079**	1419	1719	**1569**	1794	1855	**1824**
Soy-Soy-Maize-Soy	2197	2326	**2261**	1535	1770	**1653**	1866	2048	**1957**
Soy-Soy-Soy-Maize	2455	2218	**2337**	1481	1722	**1602**	1968	1970	**1970**
Mean	**2203**	**2176**		**1531**	**1776**		**1867**	**1976**	
CD (P=0.05)									
Tillage			NS			166.62			
Crop Rotation			NS			110.63			
Interaction			NS			NS			

Table 2.2.15.

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

Zone: Central **Design:** Strip plot **Replications:** Four

Character: Soybean equivalent yield (kg/ha)

Crop rotation	Kota			Amrawati			Zonal mean		
	Tillage								
	Mini^{m}	Con^{l}	Mean	Mini^{m}	Con^{l}	Mean	Mini^{m}	Con^{l}	Mean
Soy-Soy-Soy-Soy	5001	5134	**5067**	3726	4146	**3936**	4364	4640	**4502**
Soy-Maize-Soy-Maize	4531	4264	**4397**	3970	4569	**4269**	4251	4417	**4333**
Soy-Soy-Maize-Soy	5202	5303	**5253**	3670	4140	**3905**	4436	4722	**4579**
Soy-Soy-Soy-Maize	4927	4575	**4751**	3899	4601	**4250**	4413	4588	**4501**
Mean	**4915**	**4819**		**3816**	**4364**		**4366**	**4592**	
CD (P=0.05)									
Tillage			NS			271.86			
Crop Rotation			304			185.83			
Interaction			NS			NS			

Table 2.2.16

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

Centre: Kota **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 tillage	2714	4430	38.06	4915	50773	167062	116289	2.29
Conventional tillage	2641	4302	38.13	4819	53773	163797	110025	2.05
SEm±	53.59	95.39	0.04	100.12		3403	3403	0.07
CD (P=0.05)	NS	NS	NS	NS		NS	NS	0.20
B. Cropping system								
Soy-Soy-Soy-Soy	2240	3586	38.45	5067	52273	172239	119967	2.30
Soy-Maize-Soy-Maize	3143	5195	37.70	4397	52273	149468	97195	1.86
Soy-Soy-Maize-Soy	2179	3478	38.52	5253	52273	178537	126265	2.42
Soy-Soy-Soy-Maize	3148	5204	37.70	4751	52273	161474	109201	2.09
SEm±	53.59	95.39	0.04	100.12		3403	3403	0.07
CD (P=0.05)	162.53	289.31	0.12	303.68		10322	10322	0.20

Table 2.2.17

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

Centre: Central **Centre:** Kota **Character:** Soil parameters

Treatment	Bulk density	WHC	Porosity	Initial values (Soil)				OC at harvest (%)	Nutrient uptake (kg/ha)		
				OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N	P	K
A. Tillage system											
Minimum till	1.48	48.24	43.87	0.678	318.75	22.84	300.50	0.673	147.81	19.96	104.07
Conventional till	1.47	47.67	44.14	0.679	317.19	22.50	301.56	0.676	130.06	19.04	97.73
SEm±	0.003	0.13	0.10	0.002	1.29	0.25	3.95	0.002	6.73	0.58	2.13
CD (P=0.05)	NS	0.39	NS	NS	NS	NS	NS	NS	NS	NS	6.46
B. Cropping system											
Soy-Soy-Soy-Soy	1.48	48.08	44.16	0.683	320.13	23.08	310.25	0.676	210.55	20.57	137.42
Soy-Maize-Soy-Maize	1.48	48.05	43.97	0.681	318.50	22.90	293.88	0.673	79.06	19.30	65.35
Soy-Soy-Maize-Soy	1.47	47.83	43.93	0.677	316.25	22.34	300.88	0.675	186.66	18.75	134.68
Soy-Soy-Soy-Maize	1.47	47.86	43.96	0.674	317.00	22.36	299.13	0.675	79.48	19.38	66.15
SEm±	0.003	0.13	0.10	0.002	1.29	0.25	3.95	0.002	6.73	0.58	2.13
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	20.40	NS	6.46

Table 2.2.18

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

Centre: Amravati **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 tillage	2070	4859	38.06	3816	31181	73535	42353	2.36
Conventional tillage	2338	5556	38.23	4364	34072	83143	49071	2.43
SE(m)+	29.44	79.74	--	60.41	65.50	1055.70	990.26	
CD (P=0.05)	132.49	358.82	--	271.86	294.73	4750.65	4456.16	
B. Cropping system								
Soy-Soy-Soy-Soy	1894	2012	48.47	3936	27861	63611	35750	2.28
Soy-Maize-Soy-Maize	2480	8426	27.58	4270	37351	92013	54662	2.46
Soy-Soy-Maize-Soy	2019	2089	49.15	3905	28113	67755	39643	2.41
Soy-Soy-Soy-Maize	2422	8304	27.39	4250	37182	89975	52793	2.42
SE(m)+	42.66	84.06	--	62.55	98.89	1467.98	1370.21	
CD (P=0.05)	126.74	249.71	--	185.83	293.77	4360.94	4070.49	
Interaction								
SE(m)+	60.34	118.88	--	88.47	139.85	2076.04	1937.77	
CD (P=0.05)	NS	NS	--	NS	415.45	NS	NS	

Market price (2018):1. Soybean Rs. 3200/q (seed), Rs. 150/q (straw), 2. Maize Rs. 1650/q (seed), Rs. 100/q (fodder), 3. Gram Rs. 3650/q (seed), Rs. 150/q (straw)

Table 2.2.19

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

Centre: Amravati **Character:** Soil parameters

Treatment	Bulk density	Porosity	Initial values (Soil)				OC at harvest (%)	Nutrient uptake (kg/ha)		
			OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N	P	K
A. Tillage system										
Minimum tillage	1.48	42.90	0.463	218	17.22	348	0.464	58.44	7.94	15.53
Conventional tillage	1.49	42.90	0.454	199	16.92	344	0.455	69.73	10.75	19.48
SEm	0.004	0.002	0.0004	0.58	0.066	1.04	0.001	1.56	0.36	0.48
CD (P=0.05)	NS	NS	0.002	2.61	NS	NS	0.003	7.03	1.63	2.17
B. Cropping system										
Soy-Soy-Soy-Soy	1.48	42.91	0.462	216	17.16	350	0.463	70.76	10.43	19.35
Soy-Maize-Soy-Maize	1.49	42.90	0.456	203	16.98	343	0.456	59.47	8.47	16.25
Soy-Soy-Maize-Soy	1.49	42.90	0.460	210	17.10	347	0.460	64.88	9.23	17.21
Soy-Soy-Soy-Maize	1.49	42.90	0.457	207	17.04	345	0.458	61.24	9.25	17.21
SEm	0.01	0.005	0.001	0.87	0.09	1.32	0.001	1.54	0.28	0.42
CD (P=0.05)	NS	NS	0.002	2.58	NS	3.91	0.003	4.57	0.84	1.25
Interaction										
SE(m) +	0.01	0.007	0.001	1.23	0.12	1.86	0.001	2.18	0.40	0.60
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Initial soil status

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

Table 2.2.20.

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

Zone: Southern **Design:** Split plot **Replications:** Three **Character:** *Kharif* seed 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	2270	2325	**2298**	1810	2656	**2233**	2040	2491	**2266**
Soy-Maize-Soy-Maize	7881	7933	**7907**	3218	3337	**3278**	5550	5635	**5593**
Soy-Soy-Maize-Soy	2244	2314	**2279**	2197	2387	**2292**	2221	2351	**2286**
Soy-Soy-Soy-Maize	7847	7836	**7842**	2975	3142	**3058**	5411	5489	**5450**
Mean	**5060**	**5102**		**2549**	**2880**		**3805**	**3991**	
CD (P=0.05)									
Tillage			NS			240.5			
Crop Rotation			94			456.6			
Interaction			135			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:** *Rabi* seed 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	1192	1244	**1218**	2398	3029	**2713**	1795	2137	**1966**
Soy-Maize-Soy-Maize	731	775	**753**	2320	2501	**2410**	1526	1638	**1582**
Soy-Soy-Maize-Soy	1113	1198	**1156**	2594	2913	**2753**	1854	2056	**1955**
Soy-Soy-Soy-Maize	751	764	**758**	2113	2234	**2173**	1432	1499	**1466**
Mean	**947**	**995**		**2356**	**2669**		**1652**	**1832**	
CD (P=0.05)									
Tillage			140			233.6			
Crop Rotation			83			339.6			
Interaction			160			NS			

Table 2.2.22.

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	1236	1376	**1406**	4208	5685	**4946**	2722	3531	**3176**
Soy-Maize-Soy-Maize	843	896	**869**	5538	5838	**5688**	3191	3367	**3279**
Soy-Soy-Maize-Soy	1284	1382	**1333**	4791	5300	**5045**	3038	3341	**3189**
Soy-Soy-Soy-Maize	867	882	**874**	5087	5376	**5232**	2977	3129	**3053**
Mean	**1070**	**1120**		**4905**	**5549**		**2988**	**3335**	
CD (P=0.05)									
Tillage			88			286.7			
Crop Rotation			67			583.1			
Interaction			128			505.0			

Table 2.2.23.

Sustainable soybean production through diversification and tillage systems (2018-19)

Centre: Adilabad **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 tillage	2549	4547	35.9	4905	58750	166311	107598	1.83
Conventional tillage	2880	4788	37.6	5549	61500	188133	126633	2.05
S.Em±	53.0	51	0.3	64.0	86.0	2161	2219	0.03
CD (0.05)	240.5	152	1.2	196.2	48.8	9723	9985	0.17
B. Cropping system								
Soy-Soy-Soy-Soy	2656	4861	31.5	5685	61500	192727	131227	2.13
Soy-Maize-Soy-Maize	3337	4742	40.9	5838	61500	197901	136401	2.21
Soy-Soy-Maize-Soy	2387	4526	33.6	5300	61500	179655	118155	1.92
Soy-Soy-Soy-Maize	3142	4463	40.7	5376	61500	182253	120753	1.96
SEm±	153.7	118	0.6	196.2	48.8	6654	6634	0.11
CD (0.05)	456.6	365	1.6	583.1	NS	19769	19711	0.33

Table 2.2.24.

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

Centre: Adilabad **Character:** Soil characters

Treatments	Bulk density	WHC	Porosity	Initial values (Soil)				OC at harvest (%)	Nutrient uptake (kg/ha)		
				OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N	P	K
A. Tillage system											
Minimum till	1.56	36.8	37.4	0.62	208.5	20.0	288.7	0.61	171.6	30.9	71.2
Conventional till	1.54	36.7	36.1	0.57	221.1	21.3	290.1	0.60	163.1	30.1	68.1
SEm±	0.02	0.72	0.53	0.03	3.10	0.23	15.3	0.02	1.87	1.30	2.83
CD (0.05%)	NS	NS	NS	NS	NS	1.08	NS	NS	8.7	NS	NS
B. Cropping system											
Soy-Soy-Soy-Soy	1.53	36.8	36.5	0.63	206.2	20.5	291.7	0.65	177.8	28.8	73.1
Soy-Maize-Soy-Maize	1.50	35.4	37.5	0.59	220.3	22.3	282.8	0.57	170.2	31.0	73.7
Soy-Soy-Maize-Soy	1.57	37.6	36.2	0.59	216.3	19.1	292.7	0.61	162.0	29.6	67.3
Soy-Soy-Soy-Maize	1.61	37.4	36.7	0.56	216.5	20.6	290.5	0.56	159.6	32.7	64.5
SEm±	0.02	0.71	0.45	0.04	7.4	1.40	11.1	0.03	5.99	1.65	3.72
CD (0.05)	0.07	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2.2.25.

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

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

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 tillage	5060	6111	0.39	2241	29919	89266	59347	0.912
Conventional tillage	5102	6018	0.40	2242	33169	90461	57292	0.905
SEm	24	29	0.003	29.32	-		519.33	0.01
CD (P=0.05)	109	88	0.009	87.96	-		1558.4	0.04
B. Cropping system								
Soy-Soy-Soy-Soy	2298	2166	0.17	1406	37304	77672	40368	1.1
Soy-Maize-Soy-Maize	7907	3954	0.24	869	25787	102798	77011	0.7
Soy-Soy-Maize-Soy	2279	2139	0.17	1333	37304	77039	39735	1.1
Soy-Soy-Soy-Maize	7842	3921	0.22	874	25785	101947	76162	0.7
SEm	46	65	0.005	22	-		410.66	0.006
CD (P=0.05)	135	194	0.014	67	-		1232.01	0.019

*Chickpea price = Rs. 45/kg, Soybean price = Rs. 39/kg

Table 2.3.1.

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

Zone: North Plain **Character:** Yield and economics

Plant geometry	Pantnagar			Ludhiana			Delhi			Zonal mean		
	Variety											
	PS 1092	SL958	Mean	PS 1092	SL958	Mean	PS 1092	SL958	Mean	PS 1092	SL958	Mean
45x5 cm	1618	1519	**1569**	1346	1651	**1498**	1361	1218	**1290**	1442	1463	**1452**
45x10 cm	1912	1985	**1949**	1266	1586	**1426**	1628	1504	**1566**	1602	1692	**1647**
45x20cm	1397	1348	**1373**	1178	1427	**1302**	1898	1420	**1659**	1491	1398	**1445**
45x30 cm	1103	1128	**1152**	1115	1392	**1254**	1524	1345	**1434**	1247	1288	**1280**
Mean	**1508**	**1495**		**1226**	**1514**		**1603**	**1372**		**1446**	**1460**	
CD (P=0.05)												
Variety			NS			101			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

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	4.73	59.37	9.18	1445	3343	22.09	30872	60953	30081	1.64
SL 958	4.77	56.63	9.09	1460	3390	22.97	31100	61331	30232	1.64
Plant geometry										
45 x 5 cm	3.80	47.60	8.59	1452	4437	17.37	32795	61212	28417	1.54
45 x 10 cm	4.58	55.93	9.18	1647	3744	21.26	31132	68614	37482	1.88
45 x 20 cm	5.22	61.73	9.21	1445	2983	23.13	30247	61050	30803	1.68
45 x 30 cm	5.41	66.40	9.55	1268	2301	28.39	29769	53693	23925	1.46

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

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	2.56	6.97	12.68	7.15	8.69	0.052	0.032	2.20
SL 958	2.71	7.53	13.87	8.36	9.71	0.054	0.033	2.12
Plant geometry								
45 x 5 cm	2.11	5.76	10.86	7.08	9.45	0.050	0.032	2.08
45 x 10 cm	2.60	7.42	13.47	8.16	9.36	0.054	0.032	2.39
45 x 20 cm	2.75	7.48	13.91	7.56	9.19	0.053	0.033	2.23
45 x 30 cm	3.04	8.36	14.81	8.22	8.80	0.054	0.032	1.95

Table 2.3.4.

AGRON 3/18.System intensification for soybean productivity augmentation under ridge furrow planting
Zone: North Eastern **Character:** Yield and economics

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 cm	1582	1719	**1651**	1820	2530	**2175**	1701	2124	**1913**
45x10 cm	1868	2016	**1942**	1752	2626	**2189**	1810	2321	**2066**
45x20cm	1408	1571	**1489**	1377	2441	**1909**	1392	2006	**1699**
45x30 cm	1217	1338	**1278**	1076	2296	**1686**	1146	1817	**1482**
Mean	**1519**	**1661**		**1506**	**2473**		**1513**	**2067**	
CD (P=0.05)									
Variety			303.28			148.58			-
Plant geometry			321.76			219.30			-
Interaction			NS			310.14			-

Table 2.3.5.

AGRON 3/18.System intensification for soybean productivity augmentation under ridge furrow planting
Zone: North Eastern **Centre:** Ranchi **Character:** Yield, yield attributes and economical parameters

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	2.95	56.81	11.71	1513	2314	39.79	21722	56039	34317	2.27
RSC10 46	3.14	62.99	11.73	2067	3172	38.94	21662	76609	54947	3.11
Plant geometry										
45 x 5 cm	3.01	58.85	11.47	1913	2879	39.77	23706	70884	47177	2.58
45 x 10 cm	3.16	65.39	11.69	2066	3098	40.20	22028	76539	54510	3.13
45 x 20 cm	2.91	57.04	11.40	1699	2662	38.93	20969	62959	41990	2.64
45 x 30 cm	2.98	56.82	11.42	1482	2326	38.76	20064	54913	34849	2.40

Table 2.3.6.

AGRON.3/18.System intensification for soybean productivity augmentation under ridge furrow planting
Zone: North Eastern **Centre:** Ranchi **Character:** Plant dry matter, CGR and RGR and RUE

Treatment	Plant dry weight (g)			CGR		RGR		RUE
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS	
Variety								
JS 95 60	4.28	13.15	20.14	0.591	0.466	0.0325	0.0123	1.81
RSC10 46	5.00	15.98	23.23	0.732	0.484	0.0336	0.0109	2.98
SEm±	0.08	0.22	0.18	0.020	0.027	0.0009	0.0007	0.03
CD (P=0.05)	0.46	1.34	1.09	0.120	NS	NS	NS	0.18
Plant geometry								
45 x 5 cm	4.36	13.66	20.79	0.621	0.475	0.0330	0.0122	2.62
45 x 10 cm	4.55	14.21	21.27	0.644	0.471	0.0329	0.0117	2.63
45 x 15 cm	4.82	15.09	22.23	0.685	0.476	0.0330	0.0113	2.30
45 x 20 cm	4.85	15.30	22.46	0.696	0.478	0.0332	0.0113	2.03
SEm±	0.08	0.33	0.38	0.021	0.034	0.0007	0.0008	0.09
CD (P=0.05)	0.24	1.02	1.18	0.065	NS	NS	NS	0.26

Table 2.3.7.

ASP3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting
Zone: North Eastern hill **Character:** Yield and economics

Plant geometry	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 cm	1161	1355	**1258**	794	1839	**1316**	977	1597	**1287**
45x10 cm	1309	2074	**1691**	604	1960	**1282**	956	2017	**1487**
45x20cm	1525	2031	**1778**	547	1613	**1080**	1036	1822	**1429**
45x30 cm	1394	1553	**1473**	314	945	**629**	854	1249	**1051**
Mean	**1347**	**1753**	**-**	**565**	**1589**		**956**	**1671**	
CD (P=0.05)									
Variety			258			NS			-
Plant geometry			NS			502.21			-
Interaction			NS			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

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	4.94	45.96	13.93	956	2119	32.62	36148	57361	21213	0.54
JS 97 52	5.30	91.55	9.75	1671	3197	35.14	36148	100270	64122	1.79
Plant geometry										
45 x 5 cm	4.49	63.09	11.77	1287	2692	33.25	39703	77232	37529	0.97
45 x 10 cm	4.94	69.32	12.03	1487	2840	34.62	36128	89201	53073	1.46
45 x 20 cm	5.67	74.09	11.70	1429	2750	34.13	34688	85749	51061	1.44
45 x 30 cm	5.36	68.53	11.86	1051	2349	33.52	34073	63079	29006	0.80

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

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	1.11	3.07	8.45	2.23	4.57	0.062	0.073	1.39
JS97-52	1.19	4.36	10.98	3.85	6.80	0.075	0.066	2.29
Plant geometry								
45 x 5 cm	1.14	3.19	9.08	5.00	10.11	0.060	0.077	1.81
45 x 10 cm	1.14	3.91	9.84	3.16	5.45	0.076	0.065	2.08
45 x 20 cm	1.13	3.90	9.85	2.27	3.95	0.073	0.066	2.00
45 x 30 cm	1.20	3.87	10.07	1.72	3.24	0.066	0.070	1.48

Table 2.3.10.

ASP3/18. System intensification for soybean productivity augmentation under Ridge Furrow planting
Zone: Central **Character:** Yield and economics

Plant geometry	Amrawati			Kota			Sehore			Deogarh Baria			Zonal mean		
	Variety														
	JS 20 34	RVS 24	Mean	JS 20 34	RVS 24	Mean	JS 20 34	RVS 24	Mean	JS 20 34	RVS 24	Mean	JS 20 34	RVS 24	Mean
45x5 cm	1844	1822	**1833**	895	1296	**1096**	1706	1235	**1470**	1398	1545	**1472**	1461	1475	**1468**
45x10 cm	2017	2052	**2035**	833	1196	**1015**	1504	1526	**1515**	1120	980	**1050**	1369	1439	**1404**
45x20cm	1551	1407	**1479**	764	1150	**957**	1302	1549	**1425**	1115	1318	**1217**	1183	1356	**1269**
45x30 cm	1444	1378	**1411**	718	1026	**872**	1212	1302	**1257**	1070	849	**960**	1111	1139	**1180**
Mean	**1714**	**1665**		**803**	**1167**		**1431**	**1403**		**1176**	**1173**		**1281**	**1352**	
CD (P=0.05)															
Variety			NS			304			NS			161			-
Plant geometry			265.22			NS			120.64			226			-
Interaction			NS			NS			170.64			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

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	3.03	34.60	10.62	1295	1749	42.34	21681	47190	26620	1.81
RVS 24	2.99	32.87	11.06	1338	1766	42.98	21715	48545	27963	1.87
Plant geometry										
45 x 5 cm	2.45	26.32	10.54	1414	1923	42.52	22558	51400	30006	1.88
45 x 10 cm	2.92	33.04	10.78	1499	1994	42.59	21920	54576	33856	2.13
45 x 20 cm	3.20	35.84	10.90	1239	1593	43.60	21255	45068	24942	1.79
45 x 30 cm	3.47	39.98	11.13	1114	1519	42.06	20907	40426	20515	1.57

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

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	2.51	5.72	11.85	7.70	12.16	0.190	0.303	1.36
RVS 24	2.56	5.91	12.15	7.92	12.48	0.206	0.300	1.47
Plant geometry								
45 x 5 cm	2.21	5.18	10.97	7.21	11.53	0.190	0.295	1.55
45 x 10 cm	2.44	5.75	11.65	7.48	11.49	0.196	0.297	1.64
45 x 20 cm	2.63	5.86	12.33	7.81	12.84	0.187	0.306	1.28
45 x 30 cm	2.87	6.46	13.05	8.74	13.39	0.213	0.303	1.20

Table 2.3.13.

ASP3/15. System intensification for soybean productivity augmentation under Ridge Furrow planting
Zone: Southern **Character:** Seed yield (kg/ha)

Plant geometry	Dharwad			Adilabad			Zonal mean		
	Variety								
	JS 93 05	MACS 1188	Mean	JS 93 05	MACS 1188	Mean	JS 93 05	MACS 1188	Mean
45x5 cm	1929	1945	**1937**	2667	3283	**2975**	2298	2614	**2456**
45x10 cm	1683	1679	**1681**	2402	3098	**2750**	2043	2389	**2216**
45x20cm	1364	1403	**1384**	2024	2739	**2382**	1694	2071	**1883**
45x30 cm	1224	1196	**1210**	1693	2413	**2053**	1459	1805	**1632**
Mean	**1550**	**1556**		**2196**	**2883**		**1873**	**2220**	
CD (P=0.05)									
Variety			33.00			819.8			-
Plant geometry			56.00			478.0			-
Interaction			167.15			NS			-

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

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	3.45	43.55	12.48	1873	3690	41.25	39585	81472	40830	2.06
MACS 1188	4.56	57.15	13.94	2220	4082	43.75	39585	106959	40000	2.70
Plant geometry										
45 x 5 cm	3.77	40.85	12.20	2456	4381	44.90	40830	110373	69543	2.70
45 x 10 cm	3.96	49.40	12.96	2216	4090	43.85	40000	102025	62025	2.55
45 x 20 cm	4.13	52.75	13.65	1883	3803	41.75	39170	88372	49202	2.26
45 x 30 cm	4.25	58.40	14.02	1632	3273	39.10	38340	76166	37826	1.99

Table 2.3.15.

AGRON. 3/18.System intensification for soybean productivity augmentation under ridge furrow planting
Centre: Adilabad **Character:** Plant dry matter, CGR and RGR and RUE

Treatment	Plant dry weight (g)			CGR		RGR		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	4.60	10.58	18.96	8.63	11.68	0.055	0.040	3.14
MACS 1188	5.81	15.22	25.42	14.0	14.75	0.065	0.034	4.12
SEm	0.10	0.76	0.92	0.74	1.00	0.002	0.001	0.13
CD (P=0.05)	0.68	4.9	6.07	4.90	NS	NS	NS	0.88
Plant geometry								
45 x 5 cm	4.02	10.69	18.02	19.74	21.73	0.064	0.035	4.25
45 x 10 cm	4.55	12.37	21.13	11.58	13.00	0.066	0.037	3.93
45 x 20 cm	5.40	13.02	23.36	7.52	10.21	0.057	0.041	3.40
45 x 30 cm	6.85	15.53	26.24	6.43	7.93	0.055	0.036	2.93
SEm±	0.37	0.87	0.55	1.29	1.93	0.007	0.005	0.16
CD (at 5%)	1.17	2.7	1.72	4.03	6.03	NS	NS	0.50

Table 2.4.1.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along withherbicides on Soybean
Centre: Sehore **Zone:** Central **Variety:** RVS 24
Characters: Weed count and their dry matter and weed control efficiency at 30 DAS

Treatment	Weed count at 30 DAS			Weed dry matter at 30 DAS			WCE at 30 DAS (%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafoppropargyl (8% EC) @ 1000 ml/ha + Macarena@ 625 ml/ha	2.66	1.00	3.67	2.40	0.98	3.38	87.80	93.20	90.02
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625 ml/ha	5.83	1.83	7.67	5.63	1.71	7.35	71.06	87.94	78.23
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625 ml/ha	6.50	3.50	10.00	6.27	3.40	9.67	68.07	76.00	71.49
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	3.16	1.16	4.33	2.73	0.96	3.70	86.18	93.15	89.10
Macarena @ 625 ml/ha	20.33	11.83	32.17	17.20	12.48	29.68	12.15	12.01	12.51
Two hand weeding at 20 and 40 DAS	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00
Weedy check	21.66	14.83	36.50	19.63	14.26	33.90	-	-	-
SEM	0.63	0.33	0.62	0.82	0.38	0.67	-	-	-
CD (0.05)	1.94	1.01	1.92	2.51	1.18	2.07	-	-	-

Table 2.4.2.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along withherbicides on Soybean
Centre: Sehore **Zone:** Central **Variety:** RVS 24
Characters: Weed count and their dry matter and weed control efficiency at 60 DAS

Treatment	Weed count at 60 DAS			Weed dry matter at 60 DAS			WCE at 60 DAS (%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafoppropargyl (8% EC) @ 1000 ml/ha + Macarena@ 625 ml/ha	5.00	1.33	6.33	5.93	2.53	8.47	82.56	92.66	87.56
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625 ml/ha	10.50	7.00	17.50	12.00	9.63	21.63	64.24	71.87	68.12
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625 ml/ha	14.00	12.33	26.33	15.33	14.93	30.27	54.50	56.34	55.47
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	8.33	3.33	11.67	8.73	5.87	14.60	74.01	82.97	78.50
Macarena @ 625 ml/ha	28.33	26.83	55.17	28.90	29.53	58.43	14.04	13.64	13.76
Two hand weeding at 20 and 40 DAS	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00
Weedy check	32.33	29.16	61.50	33.60	34.20	67.80	-	-	-
SEM	0.69	0.48	0.90	0.73	0.57	0.84	-	-	-
CD (0.05)	2.12	1.49	2.78	2.26	1.75	2.59	-	-	-

Table 2.4.3.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean
Centre: Sehore **Zone:** Central **Variety:** RVS 24
Characters: Plant dry weight, Pods/plant, Seed index, Seed & straw yield, HI, Economics

Treatment	Plant dry matter (g/plant)		Pods/ plant	Seed index	Yield (kg/ha)		HI (%)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	30 DAS	60 DAS			Seed	Straw				
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625ml/ha	3.05	7.83	30.33	10.33	1526	2783	35.41	21277	36725	2.73
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	2.66	7.37	29.33	10.17	1437	2750	34.33	21177	33413	2.58
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	2.94	6.61	27.67	10.00	1414	2738	34.04	22827	30910	2.35
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	2.77	7.61	29.33	10.33	1504	2851	35.05	21909	35240	2.61
Macarena @ 625 ml/ha	2.88	6.54	25.00	10.00	1145	2492	31.47	20027	23475	2.17
Two hand weeding at 20 and 40 DAS	3.05	8.44	34.67	10.33	1639	2559	39.07	29214	33053	2.13
Weedy check	2.88	6.44	23.33	9.83	1122	2469	31.25	19214	23435	2.22
SEM	0.13	0.25	1.43	0.14	48	139	1.61	-	1843	0.08
CD (0.05)	NS	0.78	4.41	NS	149	NS	NS	-	5677	0.26

Table 2.4.4.

AGRON-4/19: Evaluation of bio-efficacy of MACARENA (Bio-stimulant) along with herbicides on Soybean
Centre: Amravati **Zone:** Central **Variety:** RVS-24
Characters: Weed count and their dry matter and weed control efficiency at 30 DAS

Treatment	Weed count at 30 DAS			Weed dry matter at 30 DAS			WCE at 30 DAS(%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	17.67	15.33	33.00	26.75	21.11	47.85	58.73	30.44	49.71
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	24.00	15.67	39.67	45.14	23.62	68.76	30.36	22.15	27.74
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	12.33	19.67	32.00	30.97	22.42	53.38	52.22	26.12	43.90
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	19.00	18.67	37.67	32.00	22.48	54.49	50.62	25.90	42.74
Macarena @ 625 ml/ha	36.33	20.33	56.67	45.31	29.56	74.87	30.09	2.58	21.32
Two hand weeding at 20 and 40 DAS	11.33	13.00	24.33	13.96	17.31	31.27	78.46	42.94	67.13
Weedy check	40.00	21.00	61.00	64.81	30.34	95.15	0.00	0.00	0.00
SEm±	1.12	1.19	1.45	2.35	0.81	2.42	--	--	--
CD (P=0.05)	3.46	3.66	4.48	7.25	2.48	7.45	--	--	--

Table 2.4.5.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: Amravati **Zone:** Central **Variety:** RVS-24
Characters: Weed count and their dry matter and weed control efficiency at 60 DAS

Treatment	Weed count at 60 DAS			Weed dry matter at 60 DAS			WCE at 60 DAS(%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	29.67	14.33	44.00	33.13	16.11	49.24	54.13	66.40	59.02
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	40.00	16.00	56.00	43.63	40.95	84.58	39.59	14.58	29.61
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	17.33	16.00	33.33	27.19	27.28	54.47	62.36	43.10	54.68
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	29.00	20.00	49.00	41.57	34.70	76.27	42.45	27.61	36.53
Macarena @ 625 ml/ha	45.00	20.67	65.67	58.16	42.85	101.01	19.48	10.62	15.94
Two hand weeding at 20 and 40 DAS	11.67	12.33	24.00	13.76	13.36	27.12	80.95	72.13	77.43
Weedy check	51.00	21.00	72.00	72.23	47.94	120.17	0.00	0.00	0.00
SEm±	1.86	1.24	2.31	2.14	1.68	3.01	--	--	--
CD (P=0.05)	5.72	3.82	7.13	6.60	5.19	9.28	--	--	--

Table 2.4.6.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: Amravati **Zone:** Central **Variety:** RVS-24
Characters: Weed count and their dry matter and weed control efficiency at 30 DAS

Treatment	Plant dry matter (g/plant)		Pods/ plant	Seed index	Yield (kg/ha)		HI (%)	Cost of cultivation (Rs/ha)	GMR (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	30 DAS	60 DAS			Seed	Straw					
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	2.85	6.36	42.80	9.98	1825	2354	43.67	32456	61917	29462	1.91
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	2.44	5.89	35.00	10.66	1667	2056	44.78	31730	56415	24684	1.78
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	2.73	6.14	40.13	10.40	1758	2231	44.05	33104	59600	26496	1.80
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	2.58	6.06	36.13	10.84	1709	2162	44.12	33610	57916	24306	1.72
Macarena @ 625 ml/ha	2.01	5.31	33.60	9.92	1217	1547	44.06	29677	41271	11594	1.39
Two hand weeding at 20 and 40 DAS	2.99	6.85	48.13	10.92	2143	2772	43.60	34996	72737	37741	2.08
Weedy check	1.80	4.44	26.07	10.01	933	1060	46.81	28297	31456	3158	1.11
SE m±	0.15	0.38	1.85	0.50	87.17	109.64	--	165.62	--	--	--
CD (P=0.05)	0.46	1.16	5.69	NS	268.58	337.80	--	510.30	--	--	--

Table 2.4.7.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean
Centre: Kota **Zone:** Central **Variety:** RVS 24
Characters: Weed count and their dry matter and weed control efficiency at 30 DAS

Treatment	Weed count at 30 DAS			Weed dry matter at 30 DAS			WCE at 30 DAS (%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	31.67	16.00	47.67	10.13	5.76	15.89	50.52	47.83	49.65
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	32.67	17.33	50.00	10.45	6.24	16.69	48.96	43.48	47.18
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	23.33	15.67	39.00	7.47	5.64	13.11	63.54	48.91	58.80
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	17.67	13.67	31.33	5.65	4.92	10.57	72.40	55.43	66.90
Macarena @ 625 ml/ha	58.67	30.00	88.67	19.93	10.80	30.73	2.67	2.17	6.34
Two hand weeding at 20 and 40 DAS	4.33	3.33	7.67	1.39	1.20	2.59	98.16	97.37	97.86
Weedy check	64.00	30.67	94.67	20.48	11.04	31.52	0.00	0.00	0.00
SEM±	3.97	2.81	6.05	1.20	1.01	1.94			
CD (0.05)	12.24	8.66	18.66	3.71	3.12	6.09			

Table 2.4.8.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: Kota **Zone:** Central **Variety:** RVS 24
Characters: Weed count and their dry matter and weed control efficiency at 60 DAS

Treatment	Weed count at 60 DAS			Weed dry matter at 60 DAS			WCE at 60 DAS(%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	36.33	18.00	54.33	15.99	9.72	25.71	47.09	46.53	46.88
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	36.67	20.00	56.67	16.13	10.80	26.93	46.60	40.59	44.34
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	28.33	18.00	46.33	12.47	9.72	22.19	58.74	46.53	54.15
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	23.00	16.33	39.33	10.12	8.82	18.94	66.50	51.49	60.86
Macarena @ 625 ml/ha	67.33	29.00	96.33	29.63	17.17	46.80	1.94	5.54	3.29
Two hand weeding at 20 and 40 DAS	6.33	5.67	12.00	2.79	3.06	5.85	97.63	96.05	97.00
Weedy check	68.67	33.67	102.33	30.21	18.18	48.39	0.00	0.00	0.00
SEM±	2.21	3.35	4.48	0.97	1.59	2.12			
CD (0.05)	6.80	10.33	13.80	2.99	4.89	6.54			

Table 2.4.9.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: Kota **Zone:** Central **Variety:** RVS 24
Characters: Yield and economics

Treatment	Plant dry matter (g/plant)		Pods/ plant	Seed index	Yield (kg/ha)		HI (%)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	30 DAS	60 DAS			Seed	Straw				
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	2.08	11.99	31.93	11.57	1523	1853	38.15	21132	35384	1.67
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	2.17	11.68	31.20	11.55	1517	1849	38.09	21132	35136	1.66
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	2.27	12.38	32.07	11.60	1553	1888	38.16	22732	34897	1.54
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	2.55	13.21	32.73	12.03	1614	1958	38.21	22232	37635	1.69
Macarena @ 625 ml/ha	2.04	10.08	26.20	11.23	895	1110	38.01	19732	13473	0.68
Two hand weeding at 20 and 40 DAS	2.47	14.08	34.00	12.80	1732	2101	38.21	29081	35176	1.21
Weedy check	2.00	9.30	24.80	10.97	800	981	37.90	18857	10823	0.57
SEM±	0.22	0.65	0.53	0.08	42.79	100.24	0.98		1587.69	0.08
CD (P=0.05)	NS	2.01	1.62	0.26	131.92	309.00	NS		4894.09	0.23

Table 2.4.10.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: Raipur **Zone:** Eastern **Variety:** JS 97 52
Characters: Weed count and their dry matter and weed control efficiency at 30 DAS

Treatment	Weed count at 30 DAS			Weed dry matter at 30 DAS			WCE at 30 DAS (%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafoppropargyl (8% EC) @ 1000 ml/ha + Macarena@ 625 ml/ha	**1.87**	**3.54**	**3.94**	**1.80**	**2.75**	**3.21**	-	-	-
	3.00	12.00	15.00	2.74	7.06	9.80	77.15	48.54	61.88
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625 ml/ha	**2.55**	**4.53**	**5.15**	**2.87**	**3.02**	**4.11**	-	-	-
	6.00	20.00	26.00	7.72	8.64	16.36	35.61	37.03	36.37
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625 ml/ha	**2.12**	**5.15**	**5.52**	**2.07**	**4.27**	**4.69**	-	-	-
	4.00	26.00	30.00	3.80	17.74	21.54	68.34	29.30	16.23
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	**2.12**	**4.06**	**4.53**	**2.34**	**2.98**	**3.72**	-	-	-
	4.00	16.00	20.00	4.98	8.37	13.35	58.47	38.99	48.07
Macarena @ 625 ml/ha	**3.39**	**5.15**	**6.12**	**3.62**	**3.41**	**4.92**	-	-	-
	11.00	26.00	37.00	12.59	11.10	23.69	-5.00	19.10	7.86
Two hand weeding at 20 and 40 DAS	**1.87**	**2.74**	**3.24**	**1.05**	**1.37**	**1.58**	-	-	-
	3.00	7.00	10.00	0.61	1.39	2.00	94.91	89.87	92.22
Weedy check	**4.06**	**5.43**	**6.75**	**3.53**	**3.77**	**5.12**	-	-	-
	16.00	29.00	45.00	11.99	13.72	25.71	0.00	0.00	0.00

**Data in bold are transformed values*

Table 2.4.11.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: Raipur **Zone:** Eastern **Variety:** JS 97 52
Characters: Weed count and their dry matter and weed control efficiency at 60 DAS

Treatment	Weed count at 60 DAS			Weed dry matter at 60 DAS			WCE at 60 DAS (%)		
	Monocot	Dicot	Total	Monocot	Dicot	Total	Monocot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafoppropargyl (8% EC) @ 1000 ml/ha + Macarena@ 625 ml/ha	**3.54**	**4.95**	**6.04**	**2.45**	**4.21**	**4.82**	-	-	-
	12.00	24.00	36.00	5.50	17.22	22.72	74.48	53.43	61.18
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625 ml/ha	**3.81**	**5.87**	**6.96**	**3.68**	**4.38**	**5.68**	-	-	-
	14.00	34.00	48.00	13.02	18.70	31.72	39.58	49.43	45.81
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625 ml/ha	**3.67**	**6.36**	**7.31**	**3.61**	**4.54**	**5.76**	-	-	-
	13.00	40.00	53.00	12.54	20.12	32.66	41.81	45.59	44.20
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	**3.39**	**5.43**	**6.36**	**3.22**	**4.31**	**5.33**	-	-	-
	11.00	29.00	40.00	9.84	18.11	27.95	54.34	51.03	52.25
Macarena @ 625 ml/ha	**4.85**	**6.67**	**8.22**	**3.84**	**5.85**	**6.96**	-	-	-
	23.00	44.00	67.00	14.23	33.74	47.97	33.97	8.76	18.04
Two hand weeding at 20 and 40 DAS	**1.58**	**1.87**	**2.35**	**1.58**	**1.97**	**2.43**	-	-	-
	2.00	3.00	5.00	2.01	3.39	5.40	90.67	90.83	90.77
Weedy check	**4.74**	**7.11**	**8.51**	**4.70**	**6.12**	**7.68**	-	-	-
	22.00	50.00	72.00	21.55	36.98	58.53	0.00	0.00	0.00

***Data in bold are transformed values**

Table 2.4.12.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean
Centre: Raipur **Zone:** Eastern **Variety:** JS 97 52
Characters: Yield and economics

Treatment	Plant dry matter (g/plant)		Pods/ plant	Seed index	Yield (kg/ha)		HI (%)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	30 DAS	60 DAS			Seed	Straw				
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	2.38	12.75	53.80	12.15	1930	3870	33.28	16285	71410	4.39
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625ml/ha	1.41	8.21	49.53	11.23	1600	3560	31.01	15885	59200	3.73
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha	0.98	8.12	47.13	11.13	1470	3410	30.12	16785	54390	3.24
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	1.59	11.08	50.20	11.53	1830	3860	32.16	15285	67710	4.43
Macarena @ 625 ml/ha	0.60	7.64	46.00	10.20	1350	2920	31.62	17785	49950	2.81
Two hand weeding at 20 and 40 DAS	1.42	10.62	49.60	11.44	1650	3280	33.47	12685	61050	4.81
Weedy check	1.12	4.71	45.80	9.98	411	804	33.83	16785	15207	0.91
SEM	0.26	0.47	1.65	0.37	43	89	-	-	-	-
CD (0.05)	NS	1.42	4.91	1.08	124	262	-	-	-	-

Table 2.4.13.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: Adilabad **Zone:** Southern **Variety:** Basara
Characters: Weed count and their dry matter and weed control efficiency at 30 DAS

Treatment	Weed count at 30 DAS			Weed dry matter at 30 DAS (g/m^2)			WCE at 30 DAS (%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafoppropargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	122.9	61.6	184.6	13.5	20.3	33.8	63.5	67.2	65.8
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625 ml/ha	120.2	57.1	177.3	13.0	28.6	41.6	65.2	55.5	59.1
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625 ml/ha	132.4	55.1	187.5	9.8	25.6	35.4	73.3	60.2	65.0
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	114.8	53.7	168.4	13.7	21.7	35.4	63.8	65.6	64.9
Macarena @ 625 ml/ha	129.1	68.4	197.5	39.2	68.1	107.2	-	-	-
Two hand weeding at 20 and 40 DAS	15.2	11.3	26.5	4.4	8.7	13.2	87.9	85.9	86.7
Weedy check	128.0	66.0	194.0	38.6	65.6	104.2	0.0	0.0	0.0
SEm+	8.0	8.0	10.4	3.3	6.4	9.3	4.6	5.0	4.1
CD (P=0.05)	17.3	17.4	22.6	7.2	13.9	20.2	0.0	10.9	9.0

Table 2.4.14.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean

Centre: ARS, Adilabad Zone: Southern Variety: Basara
Characters: Weed count and their dry matter and weed control efficiency at 60 DAS

Treatment	Weed count at 60 DAS			Weed dry matter at 30 DAS (g/m^2)			WCE at 60 DAS (%)		
	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total	Mono-cot	Dicot	Total
Sodium Acifluorfan (16.5%) + Clodinafoppropargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	62.3	41.8	104.1	13.5	36.6	50.0	78.2	53.4	64.5
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625 ml/ha	81.9	56.1	138.0	13.0	51.0	64.1	79.1	35.4	55.1
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625 ml/ha	43.4	45.0	88.4	9.8	50.5	60.3	84.1	33.2	56.4
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	68.9	44.0	112.9	13.7	43.4	57.1	78.2	45.3	60.0
Macarena @ 625 ml/ha	184.9	97.1	281.9	64.4	84.8	149.1	-1.4	-6.0	-3.8
Two hand weeding at 20 and 40 DAS	34.3	24.8	59.1	4.4	15.8	20.2	92.8	78.3	85.0
Weedy check	185.4	93.7	279.0	63.3	80.5	143.8	0.0	0.0	0.0
SEm+	13.0	8.4	11.9	4.1	8.9	12.2	3.1	7.4	4.4
CD (P=0.05)	28.3	18.3	25.9	9.0	19.4	26.6	6.8	16.1	9.6

Table 2.4.15.

AGRON-4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on Soybean
Centre: Adilabad **Zone**: Southern **Variety:** Basara
Characters: Plant dry matter, yield attributes and economics

Treatments	Plant dry matter (g/plant)		Pods/ plant	Seed index (g)	Yield (kg/ha)		HI (%)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	30 DAS	60 DAS			Seed	Straw				
Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha	3.91	24.85	64.1	13.2	2535	4648	35.3	40500	53549	2.32
Imazethapyr 10% SL @ 1000 ml/ha + Macarena @ 625 ml/ha	3.65	20.35	44.8	12.8	2019	4415	31.4	40225	34694	1.86
Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625 ml/ha	4.98	17.70	36.5	13.0	1750	4148	29.6	39563	25370	1.64
Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha	4.03	23.89	62.2	13.4	2426	4703	34.0	41413	48602	2.18
Macarena @ 625 ml/ha	4.85	18.02	29.9	12.9	1556	3965	28.1	36500	21228	1.60
Two hand weeding at 20 and 40 DAS	4.55	26.92	71.4	13.6	2815	4942	36.2	48125	56312	2.18
Weedy check	3.97	15.72	26.2	13.0	1286	4064	23.9	35625	12098	1.36
SEm±	0.45	1.80	5.0	0.5	262.0	273.6	3.2	1736.4	10144.6	0.26
CD (P=0.05)	NS	3.9	10.8	NS	570.8	596.1	6.9	3783.5	22105.1	0.57

Table 2.5.1.

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: North Plain Zone **Variety:** SL-958
Characters: Yield and economics of soybean

Treatment	Yield (kg/ha)			Yield gap (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	IBCR
	Pantnagar	Ludhiana	Mean					
Full package*	1983	1616	1800	-	-	33444	-	-
Full package – seed treatment	1681	1563	1622	178	6630	33275	169	54.35
Full package – seed inoculation	1709	1544	1627	173	6439	33269	175	106.55
Full package – RDF	1394	1262	1328	471	17453	28616	4829	3.58
Full package – weed management	904	796	850	950	35215	30082	3363	12.82
Full package – insecticide application	1483	1328	1406	394	14597	30982	2463	5.94
Full package – Ridge furrow	1520	1458	1489	310	11481	32103	1342	8.63
SEm	23.16	37						
CD(P=0.05)	68.8	113						

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.2
AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: North Plain Zone **Variety:** SL-958
Characters: Yield attributes and yield of soybean

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Full package *	81.55	7.91	4526	6326	28.97	66822	33444	33378	2.01
Full package – seed treatment	62.60	7.82	4456	6078	27.28	60191	33275	26916	1.82
Full package – seed inoculation	57.85	8.08	4303	5931	28.19	60381	33269	27112	1.82
Full package – RDF	50.40	7.82	3674	5004	27.66	49367	28616	20752	1.74
Full package – weed management	31.15	8.15	2920	3772	24.47	31606	30082	1524	1.07
Full package – insecticide application	48.60	8.11	4027	5435	26.34	52223	30982	21242	1.69
Full package – Ridge furrow	53.20	8.40	4301	5793	26.50	55339	32103	23236	1.73

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.3

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: Central Zone **Variety:** RVS 24
Characters: Yield and economics of soybean

Treatment	Yield (kg/ha)					Yield gap (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	IBCR
	She-ore	Kota	Amra-vati	Devgarh baria	Mean					
Full package*	1605	1662	2163	1597	1757	-	-	24744	-	-
Full package – seed treatment	1425	1552	2005	1385	1592	149	5326	229	16304	5.17
Full package – seed inoculation	1414	1417	1861	1434	1532	246	8671	204	16485	5.48
Full package – RDF	1302	1181	1136	1240	1215	604	20741	3045	16430	2.42
Full package – weed management	1257	953	1423	1174	1202	599	21069	3521	17050	1.77
Full package – insecticide	1437	1082	1787	1330	1409	375	13311	1433	15546	3.17
Full package – Ridge furrow	1392	1290	1847	1287	1454	300	10669	833	15529	4.03
SEm	55	39.24	78.61	48.96						
CD (P=0.05)	169	120.95	242.20	145.46						

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.4

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: Central Zone **Variety:** RVS 24
Characters: Yield attributes and yield of soybean

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Full package*	51.82	11.39	2483	3784	41.63	55090	36238	39579	2.12
Full package – seed treatment	45.34	10.94	2347	3527	40.68	50095	34497	33754	1.91
Full package – seed inoculation	44.09	11.04	2176	3294	41.55	49156	33028	31939	1.88
Full package – RDF	34.92	10.67	1806	2690	41.48	42471	25537	23228	1.68
Full package – weed management	31.07	10.59	1771	2644	41.04	38891	28473	22365	1.60
Full package – insecticide	38.75	10.70	2004	3012	41.32	44875	31833	28276	1.78
Full package – Ridge furrow	39.52	10.89	2200	3258	40.09	46185	32210	29843	1.84

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.5

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: North eastern **Variety:** RSC 10 46
Characters: Yield and economics of soybean

Treatment	Yield (kg/ha)				Yield gap (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	IBCR
	Raipur	Ranchi	B'patna	Mean					
Full package*	1796	2519	1760	2025	-	-	25635	-	-
Full package – seed treatment	1639	2398	1620	1886	139	5062	20864	4771	262.85
Full package – seed inoculation	1566	2315	1563	1815	210	7649	20866	4769	73.29
Full package – RDF	794	1459	880	1044	980	35725	19190	6445	6.36
Full package – weed management	713	1513	627	951	1074	39021	18498	7137	9.80
Full package – insecticide	659	2022	1450	1377	648	23782	20112	5523	8.34
Full package – Ridge furrow	1745	2308	1670	1907	117	4294	20058	5577	1.35
SEm	15.59	94.05	35						
CD(P=0.05)	47.24	289.82	107						

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.6

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: North eastern **Variety:** RSC 10 46
Characters: Yield attributes and yield

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Full package*	55.07	11.00	2542	4567	44.50	72917	30323	42595	2.32
Full package – seed treatment	49.67	10.55	2485	4371	43.02	68084	30031	38054	2.18
Full package – seed inoculation	48.18	10.22	2244	4059	44.73	66185	30195	35990	2.08
Full package – RDF	36.75	9.92	1596	2641	39.92	38108	23713	14395	1.44
Full package – weed management	34.78	9.50	1425	2376	40.33	34813	26055	8758	1.09
Full package – insecticide	39.69	9.96	1727	3104	42.93	50051	28345	21706	1.48
Full package – Ridge furrow	49.02	10.74	2385	4292	44.61	69539	28091	41448	2.37

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.7

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: North eastern Hill **Variety** JS 97 52
Characters: Yield and economics of soybean

Treatment	Yield (kg/ha)			Yield gap (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	IBCR
	Imphal	Medzi-phema	Mean					
Full package*	1515	1353	1434	0	0	37805	0	0.00
Full package – seed treatment	1417	1345	1381	53	3169	36577	1228	3.26
Full package – seed inoculation	1496	1173	1335	99	5951	37470	335	25.73
Full package – RDF	1200	365	783	651	39072	29954	7852	5.02
Full package – weed management	668	176	422	1012	60714	32970	4836	12.85
Full package – insecticide	851	864	858	576	34572	35940	1866	18.43
Full package – Ridge furrow	1358	1344	1351	83	4979	35580	2225	2.22
SEm	60.12	85.05						
CD (P=0.05)	185.25	262.07						

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.8

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: North eastern Hill **Variety:** JS 97 52
Characters: Yield attributes and yield of soybean

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Full package*	58.45	10.60	2992	4426	34.22	86015	37805	48210	1.30
Full package – seed treatment	55.17	10.75	3015	4396	33.58	82859	36577	45274	1.23
Full package – seed inoculation	54.28	10.50	2910	4245	33.96	80072	37470	42455	1.13
Full package – RDF	37.11	10.34	2287	3069	28.07	46956	29954	11843	0.38
Full package – weed management	25.95	10.05	1146	1568	26.43	25314	32970	-10589	-0.31
Full package – insecticide	48.61	10.50	2129	2986	30.38	51456	35940	14363	0.41
Full package – Ridge furrow	56.23	10.40	2964	4315	33.61	81059	35580	44012	1.21

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.9

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

Treatment	Yield (kg/ha)				Yield gap (kg/ha)	Value of differe-ntial yield (Rs/ha)	Cost of treatment (Rs/ha)	Differ-ential cost (Rs/ha)	IBCR
	Adilabad	Dharwad	Pune	Mean					
Full package*	3039	2302	3670	3004	0	0	36249	18583	0.14
Full package – seed treatment	2673	2329	3474	2825	282	10052	35749	2206	14.80
Full package – seed inoculation	2782	2320	3439	2847	245	8591	35949	2067	31.87
Full package – RDF	1859	2056	2877	2264	987	34980	28100	7166	2.91
Full package – weed management	1096	2286	3376	2253	1119	40900	27770	7486	2.80
Full package – insecticide	1781	2299	3534	2538	698	25609	31611	4954	3.00
Full package – Ridge furrow	2627	2315	3574	2839	254	9227	33449	3621	2.07
SEm	260.9	**81**	89.83						
CD(P=0.05)	568.4	**246**	276.92						

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

Table 2.5.10

AGRON-5/19: Evaluation of partial factor productivity for soybean (All Centres)
Zone: Southern **Variety:** MACS 1188
Characters: Yield attributes and yield of soybean

Treatment	Pods/ plant	Seed index	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Gross Returns (Rs/ha)	Cost of cultiivi ation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Full package*	62.21	14.81	4202	7556	45.01	107108	43519	63589	2.43
Full package – seed treatment	57.22	14.59	3881	6954	44.96	100764	41790	59041	2.41
Full package – seed inoculation	55.17	14.64	4217	7328	42.86	101613	41434	60179	2.49
Full package – RDF	43.49	14.40	4303	6671	35.38	80681	36708	43973	2.33
Full package – weed management	44.61	14.64	3056	5292	39.79	79643	34574	45069	2.21
Full package – insecticide	49.82	14.58	3749	6406	40.69	90010	39291	50719	2.31
Full package – Ridge furrow	54.24	14.82	4152	7252	43.88	100957	41405	59552	2.16

**Full package -(Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)*

कीट विज्ञान

Entomology

Principal Investigator	**Dr. Amar N. Sharma, IISR, Indore**
Northern Hill Zone	
Palampur (Himachal Pradesh)	Dr. Surjeet Kumar
Northern Plain Zone	
New Delhi	Dr. Rajna S.
Pantnagar (Uttarakhand)	Dr. (Smt.) Neeta Gaur
Ludhiana (Punjab)	Dr. Ravinder Singh
North Eastern Hill Zone	
Imphal (Manipur)	Dr. (Smt.) Nilima Karam
Eastern Zone	
Raipur (Chhattisgarh)	Dr. B.P. Katlam
Central Zone	
Indore (Madhya Pradesh)	Dr. Lokesh Kumar Meena
Sehore (Madhya Pradesh)	Dr. (Smt.) Nanda Khandwe
Parbhani(Maharashtra)	Dr. R.S. Jadhav
Kota(Rajasthan)	Dr. H.R. Chaudhary
Amravati (Maharashtra)	Dr. S.S. Munje
Southern Zone	
Dharwad (Karnataka)	Dr. R. Channakeshava
Bidar (Karnataka)	Dr. M. Shobharani

Table 3.1: Ent. 1 a. Seasonal incidence of insect-pests and their bio-control agents

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 continued up to November (2.1 to 6.5/leaf)															
Stem fly	13.78 per cent stem tunneling															
PANTNAGAR (Var. Bragg)																
White fly / 3 leaf	--	--	--	--	0.7	1.47	2.03	**3.14**	3.13	2.30	1.43	1.10				
Girdle beetle % Infest.	No infestation															
Stem fly % Stem tunneling	--	--	--	--	9.33	11.86	14.15	23.8	**25.11**	23.92	20.89	22.23	--	--	--	--
Aphids / 3 leaf	--	--	--	--	0.3	0.5	0.82	3.03	3.15	**3.53**	1.50	1.03	--	--	--	--
Semilooper/m	--	--	--	--	0.56	0.67	0.89	0.5	0.7	**1.10**	0.5	0.6	--	--	--	--
Spodoptera litura Fb (l/mrl)	--	--	--	--	-	0.44	1.56	1.2	3.5	**6.10**	1.6	0.6	--	--	--	--
Spilosoma obliqua (W.) (l/mrl)	--	--	--	--	0.89	0.56	**1.78**	0.2	0.3	0.4	0.5	0.5	--	--	--	--
% Defoliation	9.40% at Flowering and 28.50% at peak incidence of larvae															
SEHORE (Var. JS 335)																
Blue beetle/m		1.0	2.6	1.5	0.9	0.3	0.0	0.0	0.0	0.0	0.0	--	--	--	--	--
G. gemma/m	--	--	--	0.5	1.5	2.9	5.9	4.2	2.9	0.5	0.2	--	--	--	--	--
C. acuta/m	--	--	--	--	1.0	3.3	6.5	4.8	2.6	1.0	0.6	--	--	--	--	--
Stem fly % Infest.	--	--	--	--	0.0	20.0	30.0	50.0	70.0	70.0	80.0	80.0	90.0	--	--	--
Stem fly % ST	--	--	--	--	0.0	1.3	2.55	5.24	8.45	20.87	24.6	15.8	7.32	--	--	--
Girdle beetle %	--	--	--	0.3	1.3	5.5	7.8	9.3	12.1	19.0	21.1	22.0	23.1	--	--	--
Minor insect pests	Gray weevil *(Myllocerus sp*.), Field crikets ,Jassid and white fly. Incidance of tobacco caterpillar, *Mocis undata* and *Helicoverpa* was observed at negligible level.															
PARBHANI (Var. MAUS 2)																
O. brevis % Infestation	--	--	--	--	--	--	3.33	6.67	6.67	6.67	13.33	18.33	**21.67**	**21.67**	**21.67**	--
Green semilooper larvae/mrl	--	--	--	--	--	--	1.33	1.00	7.33	6.33	**11.00**	7.33	2.33	1.33	--	--
Defoliation (%)	**7.71 %** at flowering and **20.53 %** at peak incidence of larvae															
M. sojae	**42.67 %**															
Minor insect pests	*H. armigera*, *Condica illecta, Spodoptera litura*, Jassids, White fly, Grey Weevil															
AMARAWATI (Var. JS 335)																
Girdle beetle %	--	--	--	--	1.1	3	1.5	1.1	1.33	1.33	1.17	--	--	--	--	--
Stem fly % Infest.	--	--	--	--	6.66	15	38	44	60	60	66	70	--	--	--	--
Minor insect pests	Semilooper, *S. litura*, White fly, Jassids															

SMW	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**
KOTA (Var. JS 335)																
Girdle beetle (%)	--	--	--	--	--	6.67	10.00	13.33	20.00	23.33	-	26.67	30.00	33.33	--	--
C. acuta / m	--	--	--	--	--	0.67	1.00	1.33	0.33	-	0.33	0.67	0.33	0.33	--	--
S. litura / m	--	--	--	--	--	0.33	-	0.67	0.67	0.33	0.33	0.67	0.67	0.33	--	--
H. armigera/m	-	-	--	--	--	0.67	0.67	0.33	0.67	-	0.33	--	--	--	--	--
White fly/plant	--	--	--	--	--	2.00	2.67	3.33	4.00	4.67	6.00	6.33	6.00	3.67	1.00	2.00
Jassids/plant	--	--	--	--	--	3.00	3.67	4.00	4.67	5.00	6.33	5.67	5.00	3.67	1.00	-
Defoliation (%)	5.0 at flowering and 27.5 at peak larval incidence															
Minor insects	Grass hoppers, Field cricket, Hairy caterpillars & Grey weevil															
DHARWAD (Var. JS 335)																
Spodoptera litura Fb (l/mrl)	--	--	--	0.57	1.76	3.20	4.25	3.90	2.35	1.90	1.65	--	--	--	--	--
Thysanoplusia orichalcea Fab (l/mrl)	--	--	--	0.20	0.35	0.80	1.25	1.15	0.80	0.70	-	--	--	--	--	--
Spilosoma obliqua (W.) (l/mrl)	--	--	--	-	2.10	2.95	3.40	4.10	4.75	3.95	3.20	1.90	--	--	--	--
O. brevis Infestation (%)	--	--	--	4.15	4.85	5.10	5.60	6.25	6.76	5.90	5.50	--	--	--	--	--
M. sojae Stem tunneling (%)	--	--	--	1.75	1.90	2.10	2.85	3.70	4.20	3.25	--	--	--	--	--	--
C. ptychora Pod damage (%)	--	--	--	--	--	--	--	34.90	37.85	41.25	44.79	46.15	47.28	--	--	--
% Defoliation	12.15% at Flowering and 30.50% at peak incidence of larvae															
Minor insect pests	*H. armigera, N. viridula, Myllocerous*,															

IMPHAL (Var. JS 335)																
S. obliqua/m	--	28.00	47.33	73.33	**96.67**	58.67	14.67	--	--	--	--	--	--	--	--	--
Leaf Weber /m	--	10.00	**12.00**	6.00	10.33	5.00	9.00	8.00	5.00	2.00	0.33	--	--	--	--	--
S. litura/m	--	--	2.00	4.33	6.33	4.00	**8.67**	5.67	2.67	4.67	2.00	--	--	--	--	--
Aphids / plant	--	--	6.00	8.10	18.50	**26.00**	21.20	12.40	7.50	--	--	--	--	--	--	--
Stem fly	5.43 %															
% Defoliation	25.18%															
Minor insect pests	Gram pod borer, whitefly, thrips, bean bug															

Table 3.2 : Ent. 1 b. Seasonal incidence of <u>Bio- control agents</u>

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.	40.6 % mortality due to *B. bassiana* during 10th September															
Bacterial infection	26.6% due to Bacterial infection during 10th September															
PARBHANI																
Lady bird beetle/m	--			0.00	0.00	0.33	**1.00**	**1.00**	**1.00**	0.67	**1.00**	0.67	0.33	0.67	0.33	--
Spider/m				0.33	1.00	1.33	2.33	2.00	2.33	4.33	2.33	1.33	**5.67**	5.00	2.33	
PANTNAGAR																
Coccinelid beetle/mrl	-	-	-	-	0.22	**1.33**	0.44	0.6	0.6	0.6	0.5	0.1				
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	**1**	**1**				
Bacterial infection	57.5 % mortality															
Virus infection	15 % parasitisation															
AMRAVATI																
Lady bird beetle	--	--				1	2	2	3		--	--	--	--	--	--
KOTA																
Coccinelid beetle/mrl						-	-	1.0	1.33	1.67	2.0	1.67	1.33			
Cotesia parasitization (%)						4.5	-	2.8	5.4	-	2.5	-	-			
Spiders/plant						-	-	0.5	0.8	0.9	1.0	1.2	0.7			
DHARWAD																
Coccinelid beetle/mrl	--	--	--	0.75	1.05	1.15	1.40	1.10	0.95	0.70		--	--	--	--	--
C. carnea /mrl	--	--	--	0.60	0.70	0.85	1.10	1.30	1.05	-		--	--	--	--	--
Spiders/plant	--	--	0.10	0.20	0.30	0.45	0.60	0.50	0.40	0.20		--	--	--	--	--
Apanteles sp. Parasitization (%)	--	--	--	--	5.75	6.90	7.75	8.01	6.50	5.50		--	--	--	--	--
N. rileyi Infection (%)	--	--	--	--	6.20	6.75	9.10	11.02	10.65	7.90			--	--	--	--
IMPHAL																
Spiders/plant		0.6	0.0	0.3	0.4	0.6	0.2	0.0	0.4					--	--	--
Coccinelids/plant		0.3	0.7	1.0	1.1	0.4	0.3	0.0	1.0	0.2	0.0	0.2		--	--	--
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		Semiloopers	*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)R**	**0.84 (1.35) R**	1.16 (1.19)MR	**R-HY**	**S-HY**	**R-HY**	**S-HY(T)**	9.65 (18.08LS	19.40 LS	4.00 (2.12)**HR**	1.00 (1.20)
2.	DSb 33	0.00 (0.50)**R**	1.50 (1.58)MR	1.66 (1.42) MR	**R-HY**	S-LY	R-LY	S-LY	15.40 (23.09)LS	12.04 LS	7.00 (2.72)MR	1.25 (1.21)
3.	DSb34	0.10 (0.82)LR	1.67 (1.63) MR	0.50 (0.96) **R**	S-LY	S-LY	**R-HY**	S-LY	4.68 (12.44)LS	12.59 LS	5.00 (2.34)**HR**	1.25 (1.31)
4.	HIMSO 1689	0.10 (0.82)LR	0.84 (1.35) **R**	3.00 (1.85) LR	S-LY	S-LY	R-LY	**R-HY**	18.85 (25.70)MS	27.44 MS	7.75 (2.86)MR	1.25 (1.31)
5.	JS 20-71	--	--	--	--	--	--	S-LY	--	28.16 MS	10.50 (3..31)LR	0.50 (1.00)
6.	JS 20-89	--	--	--	--	--	--	S-LY	--	8.12 LS	8.50 (2.99)LR	1.50 (1.40)
7.	JS 21-72	0.05 (0.66)MR	1.67 (1.63) MR	1.49 (1.41) MR	R-LY	R-LY	S-LY	**R-HY**	22.00 (27.91)MS	23.85 MS	8.75 (3.04)LR	2.00 (1.58)
8.	KDS 753	--	--	--	--	--	--	S-LY	--	11.24 LS	9.00 (3.08)LR	2.25 (1.65)
9.	KDS 869	--	--	--	--	--	--	S-LY	--	16.37 LS	5.50 (2.44)**R**	1.50 (1.40)
10.	KDS 980	--	--	--	--	--	--	S-LY	--	19.20 LS	9.00 (3.06)LR	2.00 (1.58)
11.	KDS 992	0.10 (0.82)LR	1.34 (1.52) MR	0.99 (1.19) MR	S-LY	S-LY	**R-HY**	**S-HY(T)**	12.60 (20.77) LS	28.35 LS	5.00 (2.34)**HR**	1.25 (1.31)
12.	MACS 1340	--	--	--	--	--	--	S-LY	--	10.52 LS	6.75 (2.68)MR	1.00 (1.20)
13.	MACS 1520	--	--	--	--	--	--	S-LY	--	12.75 LS	9.00 (3.07)MR	1.50 (1.41)
14.	MACS 1493	0.00 (0.50)**R**	1.17 (1.47) MR	0.33 (0.89) **HR**	R-LY	S-LY	**R-HY**	**S-HY(T)**	16.00 (23.55) LS	18.63 LS	3.50 (2.00)**HR**	2.00 (1.57)
15.	MACS 1566	0.10 (0.82)LR	1.84 (1.68) LR	0.49 (0.99) **R**	**R-HY**	S-LY	S-HY	**R-HY**	6.90 (15.21) LS	16.91 LS	10.00 (3.23)LR	1.00 (1.20)
16.	MACS 1620	0.00 (0.50)**R**	2.00 (1.73) LR	1.66 (1.47) MR	R-LY	R-LY	S-HY	S-LY	13.95 (21.91)LS	22.17 LS	9.25 (3.10)LR	1.25 (1.31)
17.	MACS NRC 1575	0.00 (0.50)**R**	2.17 (1.78) LR	0.33 (0.89) **HR**	S-LY	S-LY	R-HY	S-LY	11.55 (19.85) LS	24.35 LS	8.75 (3.03)LR	1.75 (1.49)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
18.	MACS NRC1667	0.00 (0.50)**R**	2.17 (1.78) LR	3.33 (1.95) LR	S-LY	S-LY	**S-HY**	S-LY	14.20 (22.08) LS	24.29 LS	5.75 (2.49)MR	1.25 (1.31)
19.	NRC130	0.00 (0.50)**R**	1.67 (1.63) MR	1.50 (1.40) MR	S-LY	S-LY	R-LY	**S-HY(T)**	13.00 (21.12)LS	27.20 MS	15.00 (3.93)HS	0.75 (1.11)
20.	NRC 131	0.00 (0.50)**R**	1.34 (1.52) MR	3.66 (2.04) S	S-LY	R-LY	S-LY	**R-HY**	14.60 (22.43)LS	20.31 LS	10.75 (3.35)S	1.50 (1.40)
21.	NRC 138	0.00 (0.50)**R**	2.00 (1.73) LR	2.39 (1.73) LR	S-LY	S-LY	S-LY	S-LY	16.10 (23.63) LS	12.15 LS	12.00 (3.52)HS	0.50 (0.96)
22.	NRC 142	0.10 (0.82)LR	1.33 (1.53) MR	0.83 (1.08)MR	**R-HY**	**R-HY**	**S-HY**	**S-HY(T)**	24.46 (29.61) MS	15.29 LS	16.75 (4.14)HS	2.00 (1.57)
23.	NRC 146	0.10 (0.82)LR	2.00 (1.73) LR	0.50 (0.96) **R**	R-LY	R-LY	S-LY	S-LY	5.25 (13.20) LS	19.84 LS	7.00 (2.73)MR	3.00 (1.87)
24.	NRC 148	0.00 (0.50)R	2.17 (1.78) LR	0.33 (0.89) HR	S-LY	R-LY	**R-HY**	**R-HY**	8.15 (16.57) LS	12.43 LS	6.00 (2.54)MR	1.50 (1.40)
25.	NRC SL-2	0.10 (0.82)LR	2.17 (1.78) LR	1.33 (1.34) MR	R-LY	S-LY	S-LY	S-LY	21.00 (27.25)MS	22.17 LS	9.75 (3.19)LR	1.75 (1.49)
26.	RVSM 2011-35	0.10 (0.82)LR	1.00 (1.41) **R**	2.00 (1.58) LR	S-LY	S-LY	S-LY	R-LY	11.38 (19.70)LS	26.37 MS	10.25 (3.27)LR	1.50 (1.40)
27.	JS 20-34 (C)	0.10 (0.82)LR	1.67 (1.63) MR	0.99 (1.19) MR	R-LY	S-LY	R-LY	S-LY	26.25 (30.80) MS	18.08 LS	4.50 (2.23)**HR**	0.50 (1.00)
28.	JS 20-98	0.20 (0.95)HS	--	--	S-LY	--	--	**S-HY(T)**	--	11.73 LS	5.00 (2.34)HR	0.75 (1.11)
29.	JS 97-52 (C)	0.00 (0.50)**R**	2.17 (1.78) LR	--	S-LY	R-HY	--	S-LY	--	20.02 LS	5.00 (2.34)**HR**	1.50 (1.40)
30.	JS 335 (C)	0.35 (1.09)HS	2.50 (1.87) S	--	R-LY	S-LY	--	S-LY	--	19.62 LS	7.25 (2.78)MR	1.50 (1.41)
31.	NRC 86 (C)	0.00 (0.50)**R**	1.84 (1.68) LR	0.83 (1.08)MR	R-LY	S-LY	R-LY	S-LY	8.45 (16.78) LS	15.35 LS	8.50 (3.00)LR	0.75 (1.11)
32.	AMS 2014-1	0.00 (0.50)**R**	--	1.16(1.13) MR	**R-HY**	--	**R-HY**	S-LY	13.00 (21.12)LS	16.06 LS	7.25 (2.78)MR	1.25 (1.31)
33.	AMS-MB-5-18	--	--	--	**--**	--	**--**	S-LY	--	16.08 LS	7.00 (2.73)MR	0.75 (1.06)
34.	BAUS 102	0.05 (0.66)MR	--	4.49 (2.19) LR	S-LY	--	R-LY	S-LY	10.35 (18.75)LS	20.21 LS	9.25 (3.12)LR	1.25 (1.21)
35.	DS 3105	--	--	--	--	--	--	S-LY	--	15.57 LS	9.00 (3.08)LR	1.75 (1.49)
36.	DS 3108	0.05 (0.66)MR	--	0.50 (0.96) R	**S-HY(T)**	--	**R-HY**	**S-HY(T)**	15.85 (23.45)LS	19.79 LS	4.50 (2.23)HR	1.75 (1.49)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
37.	DS 3110	0.10 (0.82)LR	--	1.49 (1.41) MR	S-LY	--	R-LY	S-HY(T)	9.15 (17.58)LS	24.54 LS	5.50 (2.44)R	1.50 (1.40)
38.	JS 21-71	0.10 (0.82)LR	--	1.33 (1.30) MR	S-LY	--	R-LY	S-HY(T)	12.00 (20.25) LS	20.69 LS	9.50 (3.15)LR	1.50 (1.36)
39.	Karune		--	--	--	--		S-LY		26.32 MS	5.00 (2.34)HR	1.50 (1.41)
40.	MAUS 732	0.10 (0.82)LR	--	2.66 (1.75)LR	S-LY	--	S-HY	S-LY	14.35 (22.24) LS	20.72 LS	8.50 (2.99)LR	1.00 (1.20)
41.	NRC 128	0.05 (0.66)MR	--	0.50 (0.96) R	S-LY	--	**R-HY**	S-LY	9.80 (18.23) LS	12.81 LS	5.00 (2.34)HR	1.75 (1.49)
42.	NRC 94	--	--	--	--	--	--	S-LY		11.84 LS	14.00 (3.80)HS	1.75 (1.49)
43.	NRC 117	--	--	--	--	--	--	S-LY		20.05 LS	4.00 (2.11)HR	1.00 (1.20)
44.	NRC 132	0.05 (0.66)MR	--	4.66 (2.24) HS	S-LY	--	**R-HY**	S-LY	24.00 (29.30) MS	16.39 LS	7.75 (2.85)MR	1.75 (1.49)
45.	NRC 136	0.00 (0.50)R	--	1.00 (1.14) MR	S-LY	--	R-LY	S-LY	11.45 (19.75)LS	23.04 LS	10.00 (3.23)LR	0.50 (0.96)
46.	NRC 137	0.00 (0.50)R	--	0.16 (0.81) HR	S-LY	--	S-LY	S-LY	13.60 (21.60) LS	34.09 MS	9.50 (3.15)LR	1.50 (1.40)
47.	NRC 147	0.83 (1.08)MR	--	0.83 (1.08) MR	S-LY	--	R-LY	S-HY(T)	17.50 (24.66) LS	20.53 LS	8.25 (2.95)LR	1.25 (1.31)
48.	NRCSL 1	0.83 (1.08)MR	--	0.83 (1.08) MR	S-LY	--	**R-HY**	R-LY	15.85 (23.45) LS	23.63 LS	9.25 (3.12)LR	1.00 (1.22)
49.	DSb 21	--	--	--	--	--	--	S-LY	14.35 (22.24) LS	23.88 LS	15.00 (3.93)HS	2.50 (1.72)
50.	DSb 23	--	--	--	--	--	--	S-LY	9.80 (18.23) LS	22.00 LS	10.75 (3.35)S	1.50 (1.40)
51.	DSb 28-3	--	--	--	--	--	--	R-LY	--	36.21 MS	8.50 (2.99)LR	1.00 (1.22)
52.	DSb 32	--	--	--	--	--	--	S-LY	--	12.50 LS	8.00 (2.91)LR	1.00 (1.20)
53.	Hara Soya (NC)	--	--	--	--	--	--	S-LY	--	23.65 LS	9.75 (3.18)LR	1.25 (1.29)
54.	JS 93-05	--	--	--	--	--	--	S-LY	--	16.95 LS	8.25 (2.95)LR	0.50 (1.00)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
55.	JS 95-60	--	--	--	--	--	--	S-LY	--	18.42 LS	10.50 (3.31)LR	1.25 (1.31)
56.	JS 20-96	--	--	--	--	--	--	R-LY	--	7.13 LS	10.75 (3.34)S	1.25 (1.31)
57.	KDS 726 (SZ)	--	--	--	--	--	--	S-LY	--	14.75 LS	10.25 (3.27)LR	1.00 (1.22)
58.	KS 103	--	--	--	--	--	--	S-LY	--	28.57 MS	13.75 (3.77)HS	2.00 (1.58)
59.	PS 24	--	--	--	--	--	--	S-LY	--	18.34 LS	7.25 (2.78)MR	1.00 (1.22)
60.	PS 1556	--	--	--	--	--	--	S-LY	--	12.87 LS	6.75 (2.69)MR	0.75 (1.06)
61.	PS 1572	--	--	--	--	--	--	S-LY	--	19.95 LS	8.00 (2.91)LR	1.00 (1.20)
62.	Pusa 97-12	--	--	--	--	--	--	S-LY	--	12.54 LS	9.00 (3.07)LR	2.00 (1.58)
63.	RKS 18	--	--	--	--	--	--	S-LY	--	15.40 LS	7.25 (2.77)MR	1.25 (1.31)
64.	RSC 10-46	--	--	--	--	--	--	S-LY	--	12.53 LS	5.00 (2.34)HR	1.50 (1.41)
65.	RSC 10-70	--	--	--	--	--	--	**R-HY**	--	10.91 LS	5.00 (2.34)HR	1.50 (1.41)
66.	RSC 10-52	--	--	--	--	--	--	S-LY	--	9.50 LS	5.25 (2.39)R	0.50 (0.96)
67.	RSC 10-71	--	--	--	--	--	--	S-LY	--	10.40 LS	8.25 (2.95)LR	1.25 (1.29)
68.	RVS 2007-6	--	--	--	--	--	--	S-LY	--	9.13 LS	11.50 (3.46)HS	1.25 (1.31)
69.	RVS 2009-9	--	--	--	--	--	--	S-LY	--	10.03 LS	7.25 (2.78)MR	0.50 (0.96)
70.	RVS 2010-1	--	--	--	--	--	--	S-LY	--	20.40 LS	9.00 (3.07)LR	1.00 (1.22)
71.	RVS 2001-18	--	--	--	--	--	--	**R-HY**	--	28.54 MS	7.00 (2.73)MR	1.25 (1.31)
72.	SL 958	--	--	--	--	--	--	R-LY	--	9.54 LS	3.75 (2.06)**HR**	1.25 (1.31)
73.	SL 1068	--	--	--	--	--	--	S-LY	--	11.18 LS	5.00 (2.34)**HR**	0.75 (1.11)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
74.	VLS 95	--	--	--	--	--	--	S-LY	--	12.84 LS	11.25 (3.42)S	1.50 (1.36)
75.	CSB 10112	--	--	--	--	--	--	S-LY	--	31.75 MS	9.25 (3.12)LR	1.75 (1.49)
76.	PS 1611	0.05 (0.66)MR		0.66 (1.01) R	R-LY	--	**R-HY**	**S-HY(T)**	16.40 (23.88) LS	19.93 LS	4.00 (2.11)HR	0.25 (0.85)
77.	PS 1613	0.15 (0.88)S		--	S-LY	--	--	**S-HY(T)**	--	26.73 MS	4.25 (2.17)HR	0.75 (1.06)
78.	PS 1637	0.00 (0.50)R		2.66 (1.74) LR	S-LY	--	**S-LY**	S-LY	18.90 (25.75)MS	27.04 MS	7.75 (2.87)MR	1.00 (1.22)
79.	RSC11-03	0.00 (0.50)R		0.66 (1.03) R	S-LY	--	**R-HY**	S-LY	23.95 (29.28) MS	22.76 LS	7.75 (2.84)MR	1.25 (1.31)
80.	RSC 11-07	0.10 (0.82)LR		3.33 (1.94) LR	S-LY	--	**R-HY**	S-LY	17.18 (24.46)	31.09 MS	7.25 (2.76)MR	0.75 (1.06)
81.	RSC 11-15	0.00 (0.50)R		2.16 (1.59) LR	**R-HY**	--	R-LY	S-LY	22.11 (27.94)	23.96 LS	9.50 (3.16)LR	0.75 (1.11)
82.	RSC 11-17	0.10 (0.82)LR		1.33 (1.34) MR	S-LY	--	**S-HY**	**S-HY(T)**	22.50 (28.27)	22.99 LS	13.25 (3.70)HS	1.75 (1.49)
83.	SKF-SP-11	0.00 (0.50)R		1.99 (1.40) MR	S-LY	--	R-LY	S-LY	25.00 (29.87)MS	32.41 MS	8.50 (2.99)LR	1.00 (1.22)
84.	MACS 450	--	--	--	--	--	--	S-LY	--	23.02 LS	8.50 (2.99)LR	1.50 (1.41)
85.	MACS1460 (C)	--	--	1.33 (1.34) MR	--	--	**S-HY**	S-LY	26.40 (30.85) MS	12.35 LS	8.25 (2.95)LR	0.50 (0.96)
86.	JS 20-116 (C)	--	--	0.99 (1.19) MR	--	--	R-LY	--	6.58 (15.91)LS	--	--	--
87.	VLS 63 (C)	--	--	3.83 (2.05) S	--	--	R-LY	S-LY	22.75 (28.47) MS	18.67 LS	13.00 (3.66)HS	1.50 (1.40)
88.	VLS 59 (C)	--	--	2.00 (1.58) LR	--	--	--	--	13.40 (21.44) LS	--	--	--
89.	PS 1347 (C)	--	--	3.66 (2.04) S	--	--	**S-HY**	S-LY	22.75 (28.44)MS	--	7.25 (2.75)MR	1.50 (1.41)
90.	JS 96-60 (C)	--	--	3.83 (2.07) S	--	--	S-LY	--	31.35 (33.81) MS	--	--	--
91.	SL 688(C)	--	--	2.16 (1.59) LR	--	--	**S-HY**	--	29.50 (32.88) MS	--	--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
92.	MAUS 61 (ZC)	--	--	--	--	--	--	S-LY	22.50 (28.27)	10.19 LS	6.00 (2.54)MR	1.00 (1.14)
93.	MAUS 158 (LC)	--	--	--	--	--	--	S-LY	--	19.16 LS	8.00 (2.91)LR	1.50 (1.41)
94.	MAUS 2 (LC)	--	--	--	--	--	--	S-LY	--	20.04 LS	11.00 (3.39)S	1.75 (1.49)
95.	MAUS-612 (LC)	--	--	--	--	--	--	S-LY	--	16.22 LS	5.75 (2.48)MR	1.00 (1.20)
SEm±		(0.06)	(0.07)	(0.29)	--	--	--	--	(1.27)	(1.02)	(0.15)	(0.18)
CD at 5%		(0.17)	(0.21)	(0.85)	--	--	--	--	(3.64)	(2.83)	(0.43)	(0.50)

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	Indore	Indore	Amravati	Prabhani	Kota	Sehore
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	AMS-2014-1	20.00 (0.46)HR	13.76 (21.76)HR	12.20 (20.43)MR	27.08 (31.36)LR	2.49 (9.08) MR	0.00 (0.71)MR	28.37 (32.17)HS	--	4.71 (12.36)MR
2.	AMS 100-39	20.00 (0.46)HR	33.63 (35.44) HS	8.65 (17.06)MR	41.04 (39.84)LR	2.91 (9.83) MR	0.00 (0.71)MR	26.94 (31.25)HS	13.34 (21.27)MR	7.45 (15.83) MR
3.	AMS-MB-5-18	--	35.32 (36.46)HS	--	--	--	--	2.04 (8.21)HR	--	--
4.	BAUS 102	35.00 (0.63)MR	8.84 (17.27)HR	12.88 (21.01) MR	--	--	0.00 (0.71)MR	24.38 (29.53)HS	--	1.23 (3.90) R
5.	DSb 21	--	26.00 (30.65)LR	--	--	--	--	15.89 (23.47)LR	--	--
6.	DSb23	--	36.62 (37.22)HS	--	--	--	--	13.97 (21.92)LR	--	--
7.	Harasoya (NC)	--	44.05 (41.57)HS	--	--	--	--	2.86 (9.73)HR	--	--
8.	DSb 32	--	5.56 (13.62)HR	--	--	--	--	4.47 (12.06)HR	--	--
9.	DSb 33	25.00 (0.52)HR	23.55 (29.02)MR	15.50 (23.17)LR			0.25 (0.85)LR	12.19 (20.42)LR	15.00 (22.76) MR	7.48 (15.85) LR
10.	DSb 34	45.00 (0.74)MR	22.00 (27.95)MR	13.09 (21.20)MR	39.81 (39.12)LR	5.69 (13.80)LR	0.25 (0.85)LR	10.50 (18.87)MR	11.67 (19.92) LR	1.73 (4.14) R
11.	DS 3105	--	33.01 (35.05)HS	--	--	--	--	8.81 (17.13)MR	--	--
12.	DS 3108	45.00 (0.74)MR	21.14 (27.36)R	14.25 (22.13)MR	--	--	0.25 (0.85)LR	5.25 (13.24)R	--	3.58 (9.88) MR
13.	DS 3110	65.00 (0.94)**S**	22.29 (28.16)MR	22.92 (28.56)LR	51.91 (46.09)S	1.65 (7.39) MR	0.25 (0.85)LR	18.19 (25.19)S	--	13.27 (21.31) LR
14.	HIMSO 1689	45.00 (0.74)MR	35.17 (36.35)HS	14.91 (22.61) LR	58.99 (50.18)HS	3.91 (11.40)MR	0.00 (0.71)MR	22.82 (28.53)HS	15.00 (22.76) MR	4.55 (8.77) MR
15.	JS 20-71	--	36.05 (36.89)	--	--	--	--	11.72 (20.00)LR	--	--
16.	JS 20-89	--	17.27 (24.54)HR	--	--	--	--	4.43 (12.13)HR	--	--
17.	JS 20-96	--	9.49 (17.92)HR	--	--	--	--	8.46 (16.89)MR	--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
18.	JS 93-05	--	33.22 (35.19)HS	--	--	--	--	8.15 (16.57)MR	--	--
19.	JS 95-60	--	36.55 (37.19)HS	--	--	--	--	1.00 (4.06)HR	--	--
20.	JS 21-71	45.00 (0.74)MR	25.17 (30.08)MR	15.35 (22.90) LR	41.70 (40.22)LR	4.25 (11.90) LR	0.25 (0.85)LR	17.78 (24.94)HS	--	9.34 (17.70) LR
21.	JS 21-72	25.00 (0.52)HR	17.04 (24.37)HR	25.36 (30.19) S	39.16 (38.74)LR	6.38 (14.63) LR	0.00 (0.71)MR	19.48 (26.16)HS	15.00 (22.76) MR	13.00 (21.11) LR
22.	KDS 753	--	26.44 (30.94)LR	--	--	--	--	7.07 (15.31)R	--	--
23.	KDS 869	--	18.81 (25.69)HR	--	--	--	--	14.12 (22.03)LR	--	--
24.	KDS 980	--	8.04 (16.45)HR	--	--	--	--	12.71 (20.87)LR	--	--
25.	KDS 992	55.00 (0.84)LR	19.81 (26.42)HR	14.92 (22.49)MR	33.63 (35.44)LR	7.69 (16.10) LR	0.50 (1.00)LR	6.51 (14.69)MR	11.67 (19.92) LR	9.02 (17.45) LR
26.	KS 103	--	28.78 (32.43)LR	--	--	--	--	18.16 (25.17)S	--	--
27.	Karune	--	13.40 (21.30)HR	--	--	--	--	25.14 (29.63)HS	--	--
28.	MACS 450	--	36.94 (37.42)HS	--	--	--	--	17.18 (24.48)S	--	--
29.	MACS 1520	--	23.07 (28.69)MR	--	--	--	--	9.84 (18.27)MR	--	--
30.	MACS 1566	45.00 (0.74)MR	44.42 (41.78)HS	19.79 (26.29) LR	32.81 (34.95)LR	3.64 (11.00)MR	0.25 (0.85)LR	11.28 (19.58)LR	16.67 (23.99) LR	8.76 (17.19) LR
31.	MACS 1620	65.00 (0.94)**S**	26.79 (31.16)LR	8.33 (16.76) R	38.84 (38.55)LR	6.32 (14.56) LR	0.25 (0.85)LR	9.66 (18.09)MR	16.67 (23.99) LR	3.27 (10.31)MR
32.	MACS 1493	35.00 (0.63)MR	11.21 (19.55)HR	5.29 (13.28) HR	25.38 (30.25)LR	4.40 (12.11) LR	0.00 (0.71)MR	10.37 (18.78)MR	13.34 (21.27) MR	1.44 (4.37) R
33.	MAUS 732	65.00 (0.94)**S**	31.59 (34.19)HS	36.87 (37.37) HS	31.70 (34.27)LR	4.10 (11.68)MR	0.00 (0.71)MR	15.64 (23.28)LR	--	3.51 (10.78) MR
34.	MACS 1575	45.00 (0.74)MR	34.31 (35.83)HS	29.11 (32.63)S	--	--	0.00 (0.71)MR	5.82 (13.91)R	18.34 (25.33) LR	9.76 (18.19)LR

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
35.	MACS 1667	45.00 (0.74)MR	27.23 (31.44)LR	11.17 (19.50)MR	66.51 (54.64)HS	4.11 (11.70) MR	0.25 (0.85)LR	17.34 (24.56)S	18.34 (25.33) LR	11.01 (19.27) LR
36.	NRC 117	--	45.21 (42.24)HS	--	--	--	--	6.59 (14.87)MR	--	--
37.	NRC 94	--	32.12 (34.52)HS	--	--	--	--	11.12 (19.46)LR	--	--
38.	NRC 128	55.00 (0.84)LR	29.80 (33.08)S	6.21 (14.02)R	27.79 (31.81)LR	4.77 (12.62) LR	0.00 (0.71)MR	9.55 (18.00)MR	--	1.78 (4.81) R
39.	NRC 130	45.00 (0.74)MR	9.15 (17.60)HR	22.61 (28.35) LR	27.65 (31.72)LR	7.53 (15.92) LR	0.00 (0.71)MR	7.23 (15.53)MR	20.00 (26.49) LR	5.01 (12.54) MR
40.	NRC 131	45.00 (0.74)MR	24.48 (29.63)MR	21.20 (27.23)LR	47.12 (43.35)LR	3.61 (10.95) MR	0.00 (0.71)MR	10.30 (18.71)MR	13.34 (21.27) MR	4.88 (12.75)MR
41.	NRC 132	45.00 (0.74) MR	49.47 (44.69)HS	11.02 (19.37) MR	45.24 (42.27)LR	3.35 (10.55) MR	0.00 (0.71)MR	7.13 (14.90)MR	--	5.16 12.23)MR
42.	NRC 136	45.00 (0.74)MR	20.32 (26.79)HR	15.96 (23.52) LR	31.48 (34.13)LR	4.53 (12.28) LR	0.00 (0.71)MR	11.01 (19.36)LR	--	6.82 (14.88) MR
43.	NRC 137	55.00 (0.84)LR	31.89 (34.35)HS	8.33 (16.76)R	35.69 (36.68)LR	5.22 (13.20) LR	0.50 (1.00)LR	20.36 (26.81)HS	--	1.19 (4.43) R
44.	NRC 138	25.00 (0.52)HR	50.49 (45.27)HS	9.78 (18.21)MR	54.23 (47.43)S	0.79 (5.09)R	0.25 (0.85)LR	12.86 (21.00)LR	16.67 (23.99) LR	4.55 (12.37) MR
45.	NRC 142	65.00 (0.94)**S**	34.50 (35.96)HS	23.55 (28.77)LR	--	--	0.25 (0.85)LR	15.61 (22.28)LR	11.67 (19.92) LR	6.38 (13.69) M R
46.	NRC 146	45.00 (0.74)MR	6.86 (15.17)HR	5.40 (12.38)HR	27.98 (31.94)LR	1.60 (7.26) MR	0.00 (0.71)MR	1.19 (4.43)HR	16.67 (23.99) LR	5.24 (13.00) MR
47.	NRC 147	65.00 (0.94)**S**	19.68 (26.33)HR	5.66 (12.53)HR	31.30 (34.02)LR	5.25 (13.25) LR	0.00 (0.71)MR	16.53 (23.98)MR	--	2.31 (7.69) R
48.	NRC 148	40.00 (0.68)MR	20.67 (27.04)R	14.44 (22.30)MR	52.94 (46.68)S	6.67 (14.97) LR	0.50 (1.00)LR	5.58 (13.62)HR	15.00 (22.76) LR	9.13 (17.45) LR
49.	NRCSL 1	55.00 (0.84)LR	22.61 (28.38)MR	11.64 (19.94)MR	29.07 (32.63)LR	3.57 (10.90) MR	0.00 (0.71)MR	6.52 (14.77)MR	--	2.94 (11.08) R

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
50.	NRCSL 2	45.00 (0.74)MR	17.40 (24.61)HR	23.66 (29.08)LR	37.95 (38.03) LR	2.97 (9.93) MR	0.00 (0.71)MR	7.55 (15.67)MR	16.67 (23.99)LR	3.70 (11.05)MR
51.	Pusa 97-12	--	55.67 (48.25)HS	--	--	--	--	6.89 (14.92)MR	--	--
52.	RKS 18	--	16.54 (23.97)HR	--	--	--	--	12.18 (20.39)LR	--	--
53.	RSC 10-46	--	8.63 (17.08)HR	--	--	--	--	11.47 (19.79)LR	--	--
54.	RSC 10-70	--	7.80 (16.20)HR	--	--	--	--	5.04 (12.93)R	--	--
55.	SL 958	--	37.68 (37.85)HS	--	--	--	--	21.30 (27.47)HS	--	--
56.	CSB 10112	--	28.71 (32.39)LR	--	--	--	--	16.53 (23.96)LR	--	--
57.	SL 1068	--	52.15 (46.22)HS	--	--	--	--	8.57 (16.95)MR	--	--
58.	PS 1611	35.00 (0.63)MR	34.36 (35.87)HS	13.55 (20.37)MR	29.87 (33.13) LR	5.56 (13.63) LR	0.00 (0.71)MR	8.87 (17.14)MR	--	3.56 (10.85)MR
59.	DSb 28-3	--	14.71 (22.55)HS	--	--	--	--	8.16 (16.59)MR	--	--
60.	PS 24	--	51.07 (45.60)HS	--	--	--	--	11.92 (19.81)LR	--	--
61.	PS 1556	--	37.32 (37.65)HS	--	--	--	--	6.21 (14.42)MR	--	--
62.	PS 1572	--	50.46 (45.25)HS	--	--	--	--	6.85 (15.15)MR	--	--
63.	PS 1613	55.00 (0.84)LR	28.33 (32.13)LR	--	45.87 (42.63) LR	6.18 (14.39) LR	0.00 (0.71)MR	12.88 (20.99)LR	--	--
64.	PS 1637	50.00 (0.79)LR	18.72 (25.61)HR	24.35 (29.46)LR	41.53 (40.12) LR	7.39 (15.77) LR	0.00 (0.71)MR	8.30 (16.72)MR	--	6.10 (14.21) LR
65.	RSC 10-52	--	14.83 (22.64)HR	--	--	--	--	6.90 (15.21)MR	--	--
66.	RSC 10-71	--	33.21 (35.18)HS	--	--	--	--	12.80 (20.95)LR	--	--
67.	RVS 2007-6	--	9.59 (18.02)HR	--	--	--	--	12.13 (20.37)LR	--	--
68.	RVS 2009-9	--	8.02 (16.42)HR	--	--	--	--	8.55 (17.00)MR	--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
69.	RVS 2010-1	--	7.85 (16.26)HR	--	--	--	--	5.28 (13.27)R	--	--
70.	RVS 2001-18	--	13.43 (21.49)HR	--	--	--	--	15.10 (22.85)LR	--	--
71.	RSC11-03	35.00 (0.63)MR	17.57 (24.78)HR	9.25 (17.68)MR	--	--	0.50 (1.00)LR	14.73 (22.56)LR	--	6.83 (14.94)MR
72.	RSC 11-07	55.00 (0.84)LR	9.57 (17.99)HR	6.17 (14.37) R	--	--	0.25 (0.85)LR	11.75 (19.90)LR	--	1.19 (4.43) R
73.	RSC 11-15	35.00 (0.63)MR	7.15 (15.51)HR	8.94 (17.14) MR	19.68 (26.34) LR	6.76 (15.07) LR	0.00 (0.71)MR	8.35 (16.79)MR	--	6.91 (15.18) LR
74.	RSC 11-17	45.00 (0.74)MR	11.54 (19.79)HR	12.92 (21.05) MR	33.52 (35.38) LR	2.09 (8.32) MR	0.00 (0.71)MR	8.44 (16.78)MR	--	2.14 (7.78) R
75.	RVSM 2011-35	65.00 (0.94)**S**	30.80 (33.70)HS	17.70 (23.85) LR	22.43 (28.27) LR	2.65 (9.37) MR	0.25 (0.85)LR	11.68 (19.97)LR	11.67 (19.92)MR	3.56 (10.85)MR
76.	SKF-SP-11	45.00 (0.74)MR	18.88 (25.74)HR	22.92 (28.56) LR	--	--	0.00 (0.71)MR	11.41 (19.73)LR	--	13.73 (21.82)S
77.	KDS 726 (SZ)	--	10.87 (19.24)HR		--	--	--	16.20 (23.73)LR	--	--
78.	MACS1460 (C)	--	20.12 (26.64)HR	19.63 (26.28) LR	--	--	--	9.37 (17.53)MR	--	4.78 (12.59)MR
79.	JS 20-116 (C)	--	--	9.63 (17.74) MR	--	--	--		--	6.74 (14.94) LR
80.	NRC 86 (C)	55.00 (0.84)LR	33.62 (35.43)HS	14.30 (22.14) MR	44.68 (41.95) LR	5.36 (13.39) LR	0.00 (0.71)MR	12.20 (20.43)LR	18.34 (25.33) LR	9.57 (17.97) LR
81.	JS 20-34 (C)	65.00 (0.94)**S**	30.63 (33.58)HS	17.58 (24.72) LR	29.04 (32.61) LR	2.48 (9.07)MR	0.00 (0.71)MR	5.24 (12.56)R	11.67 (19.92) MR	3.82 (11.12)MR
82.	JS 20-98	50.00 (0.79)LR	51.23 (45.70)HS	--	40.36 (39.44) LR	7.26 (15.63) LR	0.00 (0.71)MR	7.74 (16.13)MR	--	--
83.	VLS 63 (C)	--	24.91 (29.92)MR	12.95 (21.07) MR	--	--	--	14.24 (22.15)LR	--	9.68 (16.76) LR
84.	VLS 59 (C)	--		12.56 (20.74) MR	--	--	--		--	6.13 (14.28) LR
85.	VLS 95	--	39.51 (38.94)HS		--	--	--	10.99 (19.35)LR	--	
86.	PS 1347 (C)	--	48.86 (44.33)HS	12.61 (20.70)MR	--	--	--	11.16 (19.50)LR	--	5.19 (13.13)MR

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
87.	JS 96-60 (C)	--	--	27.14 (31.38) S	--	--	--	--	--	14.75 (23.73) S
88.	SL 688(C)	--	--	20.14 (26.65) LR	--	--	--	--	--	18.00 (25.04) S
89.	JS 97-52 (C)	55.00 (0.84)LR	24.59 (29.72)MR	--	47.95 (43.83)S	6.83 (15.15) LR	0.50 (1.00)LR	11.29 (19.50)LR	18.34 (25.33) LR	--
90.	JS 335 (C)	45.00 (0.74)MR	36.27 (37.00)HS	--	26.59 (31.04) LR	5.95 (14.12) LR	0.50 (1.00)LR	13.06 (20.90)LR	23.34 (28.83) S	--
91.	MAUS 158 (LC)	--	21.47 (27.59)R	--	--	--	--	9.62 (18.03)MR	--	--
92.	MAUS 2 (LC)	--	41.57 (40.14)HS	--	--	--	--	16.82 (24.17)LR	--	--
93.	MAUS-612 (LC)	--	27.37 (31.15)LR	--	--	--	--	7.90 (16.26)MR	--	--
94.	**SEm±**	(0.05)	(0.87)	(2.45)	(8.89)	(3.23)	(0.07)	(1.86)	(1.91)	(3.28)
95.	**CD at 5%**	(0.16)	(2.42)	(7.02)	(17.72)	(6.44)	(0.21)	(5.16)	(5.60)	(9.37)

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

S.No.	Entry	Stem tunnelling due to Stem fly (%)		Defoliators larvae / m	White fly 3 leaf/ Plant*	Aphid 3 leaf/ plant*	Bug/ mrl*	% Defoliation	White fly	YMV (1-9 Scale)	Reaction to Pest Complex	
		Pantnagar	Delhi	Pantnagar					Ludhiana	Delhi		Pantnagar
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	**AMS-100-39**	33.60 (37.03)R	--	9.50 (3.16)HR	8.70 (3.03)HS	9.30 (3.12)HS	1.00 (1.22)HR	12.50 (20.70)HR	--	0	--	S-LY
2.	**AMS-2014-1**	15.00 (21.52)HR	--	7.30 (2.79)HR	9.90 (3.22)HS	12.10 (3.54)HS	0.50 (0.96)HR	9.30 (17.75)HR	--	--	--	S-LY
3.	**BAUS-102**	43.60 (43.16)HS	--	8.90 (3.06)HR	11.90 (3.52)HS	13.80 (3.78)HS	0.00 (0.71)HR	12.50 (20.70)HR	--	--	--	R-LY
4.	**DS 1347**	--	--	--	--	--	--	--	--	0	--	--
5.	**DS-3108**	24.00 (28.58)HR	--	9.20 (3.11)HR	8.80 (3.04)HS	10.00 (3.23)HS	1.00 (1.14)HR	12.30 (20.51)HR	--	--	--	R-HY
6.	**DS-3110**	27.00 (32.25)HR	--	15.20 (3.95)HS	9.10 (3.09)HS	14.10 (3.81)HS	1.00 (1.22)HR	20.00 (26.53)HS	2.08(1.75)	1	--	R-LY
7.	**DSb-33**	26.20 (29.72)HR	--	9.50 (3.16)HR	7.10 (2.75)HR	7.60 (2.84)HR	1.00 (1.20)HR	15.00 (22.77)MR	3.33(2.07)	--	--	S-LY
8.	**DSb-34**	21.00 (27.76)HR	14.50 (22.14)	8.60 (3.01)HR	7.70 (2.86)MR	7.80 (2.88)MR	2.50 (1.72)HS	11.00 (19.35)HR	2.83(1.95)	BB	--	S-LY
9.	**DSb-**21	--	--	--	--	--	--	--	--	--	--	--
10.	**DSb-32**	--	16.09 (23.53)	--	--	--	--	--	--	1	--	--
11.	**Himso-1689**	20.20 (25.14)HR	--	14.80 (3.91)HS	7.70 (2.86)MR	9.00 (3.08)HS	1.50 (1.40)MR	19.00 (25.81)S	--	--	--	R-LY
12.	**JS-21-71**	56.00 (49.78)HS	--	18.10 (4.31)HS	8.40 (2.98)HS	7.20 (2.77)HR	5.00 (2.33)HS	25.00 (29.99)HS	1.83(1.67)	--	--	S-LY
13.	**JS-21-17**	--	6.26 (14.38)	--	--	--	--	--	--	1	--	--
14.	**JS-21-72**	45.60 (43.16)HS	--	12.80 (3.63)HS	7.60 (2.84)HR	5.70 (2.48)HR	0.50 (1.00)HR	17.50 (24.72)LR	--	--	--	R-LY
15.	**KDS 992**	97.00 (80.94)HS	--	10.00 (3.23)HR	6.10 (2.56)HR	4.50 (2.23)HR	0.00 (0.71)HR	13.50 (21.52)R	--	5	--	S-LY
16.	**MACS-1493**	21.80 (30.52)HR	17.97 (24.96)	8.20 (2.94)HR	9.20 (3.11)HS	9.00 (3.08)HS	0.50 (0.96)HR	11.50 (19.81)HR	3.08(2.01	7	--	S-LY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
17.	**MACS 1566**	25.00 (28.21)HR	8.90 (17.31)	8.50 (2.99)HR	8.70 (3.03)HS	10.00 (3.23)HS	1.50 (1.40)LR	11.80 (20.08)HR	3.33(2.07)	5	--	S-LY
18.	**MACS 1620**	34.20 (36.62)MR	10.75(18. 66)	7.50 (2.82)HR	10.50 (3.31)HS	6.50 (2.64)HR	2.50 (1.72)HS	10.30 (18.71)HR	3.91(2.20)	9	--	S-LY
19.	**MAUS 732**	35.00 (36.21)MR	--	6.80 (2.70)HR	9.10 (3.09)HS	5.80 (2.50)HR	1.50 (1.40)LR	9.30 (17.75)HR	3.58(2.14)	--	--	R-LY
20.	**MACSNRC 1575**	53.00 (47.29)HS	7.82 (15.85)	7.40 (2.80)HR	9.60 (3.17)HS	15.30 (3.97)HS	2.00 (1.58)HS	10.00 (18.43)HR	--	7	--	R-LY
21.	**MACSNRC 1667**	27.00 (30.45)HR	10.17 (18.17)	6.40 (2.62)HR	6.70 (2.68)HR	7.50 (2.82)HR	1.00 (1.20)MR	9.00 (17.43)HR	--	3	--	S-LY
22.	**NRC 130**	40.20 (39.28)S	--	8.30 (2.96)HR	2.10 (1.61)HR	8.10 (2.92)LR	1.00 (1.22)MR	11.50 (19.81)HR	--	--	--	S-LY
23.	**NRC 131**	52.00 (45.11)HS	--	7.20 (2.77)HR	6.70 (2.68)HR	1.90 (1.54)HR	0.50 (0.96)MR	10.50 (18.90)HR	--	--	--	S-LY
24.	**NRC 132**	50.00 (45.34)HS	--	15.40 (3.98)HS	9.50 (3.16)HS	13.35 (3.72)HS	1.50 (1.40)LR	21.30 (27.48)HS	--	--	--	S-HY (T)
25.	**NRC 136**	39.00 (39.23)LR	--	18.70 (4.38)HS	8.10 (2.93)S	7.80 (2.88)MR	1.50 (1.40)LR	26.30 (30.84)HS	--	--	--	S-LY
26.	**NRC 137**	37.00 (38.40)LR	--	15.80 (4.03)HS	6.40 (2.62)HR	7.20 (2.77)HR	3.50 (1.99)HS	21.50 (27.61)HS	--	--	--	S-LY
27.	**NRC 138**	35.80 (35.90)MR	--	12.80 (3.64)HS	6.80 (2.70)HR	8.40 (2.98)HS	1.50 (1.40)LR	18.30 (25.32)LR		--	--	S-LY
28.	**NRC 142**	--	--	--	--	--	--	--	1.75(1.65)	--	--	--
29.	**NRC 146**	28.00 (32.70)HR	--	8.00 (2.91)HR	3.10 (1.89)HR	3.00 (1.87)HR	2.50 (1.72)HS	11.50 (19.81)HR	--	--	--	S-LY
30.	**NRC 147**	20.00 (26.20)HR	--	12.40 (3.59)HS	7.30 (2.79)HR	9.00 (3.08)HS	2.00 (1.58)HS	17.30 (24.57)LR	--	--	--	S-LY
31.	**NRC 148**	21.00 (28.03)HR	--	9.90 (3.22)HR	8.40 (2.98)HS	10.60 (3.33)HS	2.50 (1.72)HS	14.00 (21.96)MR	--	--	--	R-LY
32.	**NRCSL 1**	40.00 (39.52)S	--	12.60 (3.61)HS	8.30 (2.96)HS	16.20 (4.08)HS	1.00 (1.22)MR	17.50 (24.72)LR	3.00(1.92)	--	--	R-LY
33.	**NRCSL** 2	--	--	--	--	--	--	--	2.25(1.79)	--	--	--
34.	**PS 1611**	32.00 (35.17)HR	--	16.10 (4.07)HS	8.90 (3.06)HS	5.80 (2.50)HR	1.00 (1.14)MR	23.00 (28.65)HS	4.33(2.30)	5	--	R-LY
35.	**PS 1613**	33.60 (34.93)R	--	17.40 (4.23)HS	9.90 (3.22)HS	11.20 (3.42)HS	1.50 (1.40)LR	25.50 (30.32)HS	**1.75(1.62)**		--	S-LY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
36.	**PS 1637**	42.00 (40.91)HS	--	18.50 (4.32)HS	6.60 (2.66)HR	7.60 (2.84)HR	1.00 (1.22)MR	26.00 (30.65)HS	--		--	S-HY (T)
37.	**RSC 11-03**	37.60 (37.04)LR	--	16.60 (4.13)HS	7.70 (2.86)MR	11.30 (3.43)HS	0.00 (0.71)HR	22.50 (28.31)HS	--	3	--	S-LY
38.	**RSC 11-07**	21.00 (27.69)HR	--	15.60 (4.01)HS	6.70 (2.68)HR	7.30 (2.79)HR	0.50 (0.96)HR	21.50 (27.61)HS	--	--	--	R-LY
39.	**RSC 11-15**	24.40 (29.59)HR	--	10.50 (3.31)HR	8.20 (2.94)HS	4.50 (2.23)HR	1.50 (1.40)LR	15.00 (22.77)MR	--	--	--	S-LY
40.	**RSC 11-17**	34.80 (36.14)MR	--	8.10 (2.93)HR	6.40 (2.62)R	9.40 (3.14)HS	0.00 (0.71)HR	18.80 (25.69)S	--	--	--	S-LY
41.	**RVSM 2011-35**	34.30 (35.84)MR	--	8.60 (3.01)HR	8.80 (3.04)HS	7.30 (2.79)HR	0.00 (0.71)HR	12.00 (20.26)HR	--	--	--	S-HY (T)
42.	**SKF-SP-11**	24.40 (29.58)HR	--	9.60 (3.17)HR	9.30 (3.13)HS	6.10 (2.56)HR	1.00 (1.22)MR	13.00 (21.12)HR	3.58(2.12)	--	--	S-LY
43.	**RANS 102**	--	--	--	--	--	--	--	3.42(2.07)	--	--	--
44.	**SL 58**	--	7.12 (15.14)	--	--	--	--	--	--	7	--	--
45.	**SL 688**	--	11.89 (20.10)	--	--	--	--	--	--	1	--	--
46.	**DSb-21 (C)**	55.60 (48.21)HS	--	6.80 (2.70)HR	3.00 (1.87)HR	6.90 (2.72)HR	0.50 (0.96)HR	9.50 (17.94)HR	--	--	--	S-LY
47.	**DSb-23 (C)**	56.50 (48.73)HS	--	8.00 (2.91)HR	3.00 (1.86)HR	6.60 (2.66)HR	1.00 (1.20)MR	11.00 (19.35)HR	--	--	--	S-LY
48.	**JS 335 (C)**	32.70 (34.87)HR	--	8.30 (2.96)HR	8.50 (2.99)HS	8.90 (3.06)HS	1.00 (1.22)MR	11.50 (19.78)HR	4.50(2.34)	--	--	R-LY
49.	**JS 20-34 (C)**	45.30 (42.30)HR	--	10.40 (3.30)HR	6.80 (2.70)HR	8.50 (2.99)HS	1.00 (1.20)MR	14.50 (22.37)MR	5.00(2.41)	--	--	S-LY
50.	**JS 93-05 (C)**	35.30 (36.44)MR	--	10.80 (3.36)HR	6.20 (2.58)HR	3.40 (1.96)HR	1.00 (1.22)MR	14.80 (22.60)MR	2.66(1.91)	--	--	S-HY (T)
51.	**KS 103 (C)**	45.10 (42.18)HS	66.37 (54.75)	7.70 (2.86)HR	5.60 (2.46)HR	7.10 (2.75)HR	2.00 (1.58)HS	10.50 (18.90)HR	--	--	--	S-LY
52.	**MACS 450 (C)**	32.00 (34.44)HR	0 (2.02)	15.80 (4.03)HS	8.80 (3.04)HS	4.00 (2.12)HR	2.50 (1.73)HS	22.00 (27.94)HS	--	--	--	S-LY
53.	**NRC 86 (C)**	65.60 (54.09)HS	70.9 (57.37)	13.10 (3.68)HS	8.20 (2.94)HS	11.10 (3.40)HS	2.00 (1.57)HS	17.00 (24.26)LR	--	--	--	S-LY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
54.	**PS 24 (C)**	60.00 (50.77)HS	--	10.90 (3.37)HR	9.00 (3.08)HS	6.30 (2.60)HR	1.00 (1.22)MR	15.00 (22.78)MR	9.33(3.21)	--	--	S-LY
55.	**PS 1347 (C)**	30.20 (33.32)HR	--	11.10 (3.40)HR	6.90 (2.71)HR	6.70 (2.68)HR	1.50 (1.41)LR	15.50 (23.18)MR	2.91(1.95)	--	--	S-LY
56.	**Pusa 97-12 (C)**	17.20 (24.48)HR	8.91 (17.19)	12.50 (3.60)HS	10.60 (3.33)HS	4.80 (2.30)HR	0.50 (0.99)HR	17.00 (24.34)LR	4.08(2.21)	0		S-LY
57.	**RKS 18 (C)**	40.30 (39.40)S	--	16.80 (4.15)HS	7.70 (2.86)MR	10.70 (3.34)HS	2.50 (1.72)HS	24.00 (29.31)HS	--	--	--	S-LY
58.	**RKS 113 (C)**	41.00 (39.81)HS	--	11.20 (3.42)HR	8.20 (2.94)HS	3.40 (1.97)HR	4.00 (2.11)HS	15.30 (23.02)MR	--	--	--	R-LY
59.	**RSC 10-46 (C)**	30.00 (33.20)HR	--	9.60 (3.17)HR	8.10 (2.93)S	6.30 (2.60)HR	2.00 (1.58)HS	13.00 (21.13)HR	--	--	--	S-HY (T)
60.	**SL 958 (C)**	38.40 (38.28)LR	--	14.50 (3.87)HS	8.80 (3.04)HS	5.80 (2.50)HR	1.00 (1.22)MR	19.30 (26.05)HS	2.50(1.86)	--	--	S-LY
61.	**JS 20-71 (R-Hy)**	38.00 (38.05)LR	--	12.30 (3.57)HS	8.20 (2.94)HS	7.60 (2.84)HR	1.00 (1.22)MR	17.00 (24.34)LR	--	--	--	R-LY
62.	**JS 20-89 (R-Hy)**	51.30 (45.74)HS	--	16.90 (4.17)HS	8.30 (2.96)HS	4.50 (2.23)HR	2.00 (1.57)HS	21.80 (27.82)HS	--	--	--	S-HY (T)
63.	**JS 20-98 (R-Hy)**	15.70 (23.34)HR	--	12.10 (3.54)HS	9.10 (3.09)HS	2.50 (1.72)HR	0.50 (0.99)HR	15.80 (23.42)MR	**2.42(1.81)**	--	--	S-HY (T)
64.	**JS 97-52 (R-Hy)**	25.90 (30.58)HR	--	12.00 (3.53)S	7.10 (2.75)HR	2.50 (1.73)HR	1.00 (1.22)MR	16.80 (24.19)LR	4.08(2.17)	--	--	S-LY
65.	**KDS 726 (R-Hy)**	27.40 (31.55)HR	--	16.20 (4.08)HS	11.50 (3.46)HS	10.70 (3.34)HS	2.00 (1.57)HS	22.50 (28.30)HS	--	--	--	S-LY
66.	**NRC 128 (R-Hy)**	44.60 (41.89)HS	--	11.90 (3.52)LR	8.20 (2.94)HS	9.50 (3.16)HS	0.50 (0.99)HR	16.50 (23.96)LR	3.08(1.99)	--	--	S-HY (T)
67.	**SL 955 (R-Hy)**	60.70 (51.18)HS	--	15.10 (3.94)HS	12.00 (3.53)HS	12.90 (3.66)HS	1.50 (1.40)LR	20.80 (27.12)HS	--	--	--	S-HY (T)
68.	**JS 20-69 (S-Hy)**	40.30 (39.40)S	--	11.40 (3.44)MR	8.40 (2.98)HS	11.30 (3.43)HS	0.50 (0.99)HR	16.00 (23.57)MR	--	--	--	R-LY
69.	**JS 20-87 (S-Hy)**	22.10 (28.02)HR	--	12.10 (3.54)HS	4.30 (2.18)HR	6.40 (2.62)HR	0.50 (0.99)HR	16.00 (23.53)MR	--	--	--	S-LY
SEm±		**(0.98)**	**--**	**(0.11)**	**(0.66)**	**(0.76)**	**(0.14)**	**(0.80)**	**--**	--	--	--
CD at 5 %		**(2.79)**	**(2.12)**	**(0.33)**	**(0.18)**	**(0.21)**	**(0.41)**	**(2.27)**	**(0.59)**	--	--	--

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)	Stem fly (% stem tunneling)**	Pod borer damage** (%)	Girdle beetle damage** (%)	Reaction to Insect pest complex	Defoliators (larvae/m)*	Leaf damage (% defoliation)**	Pod borer damage (%)**	Reaction to Insect pest complex
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	DS 3110	4.20 (2.17)S	44.25 (41.68)MS	10.47 (18.87)	36.08 (36.90)HS	12.70 (20.87)S	S-LY	2.17 (1.63)HR	18.50 (25.47)R	6.13 (14.31)MR	S-LY
2	DSb 33	2.77 (1.81)**R**	18.75 (25.65)**LS**	8.92 (17.37)	22.87 (28.56)**R**	6.51 (14.78)MR	R-HY	2.92 (1.84)HS	31.00 (33.54)MR	2.44 (8.19)HR	S-LY
3	Himso 1689	3.51 (2.00) LR	37.75 (37.89)MS	8.30 (16.74)	32.46 (34.72)S	8.48 (16.92)MR	R-HY	2.58 (1.76)LR	22.50 (28.32)MR	5.17 (13.09)R	S-HY
4	JS 21-71	2.75 (1.80)MR	36.75 (37.30)MS	7.32 (15.69)	31.41 (34.07)LR	7.05 (15.39)MR	S-HY	3.00 (1.87)HS	26.00 (30.66)MR	9.06 (17.48)HS	S-LY
5	JS 21-72	2.90 (1.84)MR	30.50 (33.51)MS	8.06 (16.49)	28.71 (32.39)LR	7.52 (15.91)MR	S-HY	3.00 (1.87)HS	27.50 (31.63)MR	5.76 (13.74)MR	S-LY
6	Karune	4.10 (2.14)S	51.70 (45.96)S	12.81 (20.96)	25.68 (30.44)MR	7.15 (15.50)MR	S-LY	-	-	-	-
7	MACS 1566	3.60 (2.02)LR	27.75 (31.78)MS	13.84 (21.83)	24.99 (29.98)MR	8.14 (16.57)MR	S-HY	2.25 (1.66)HR	18.50 (25.47)R	14.18 (21.91)HS	S-HY
8	MACS 1620	3.25 (1.94)LR	26.25 (30.81)MS	14.73 (22.56)	24.38 (29.58)MR	10.18 (18.60)LR	S-HY	1.42 (1.38)HR	14.00 (21.97)R	6.40 (14.63)MR	R-HY
9	MACSNRC 1575	4.25 (2.18)S	51.50 (45.84)S	10.73 (19.11)	33.37 (35.27)S	9.02 (17.47)LR	S-HY	1.58 (1.44)HR	15.00 (22.50)R	5.46 (13.51)MR	S-LY
10	MACSNRC 1667	4.39 (2.21)S	50.25 (45.13)S	15.66 (23.30)	39.71 (39.05)HS	9.37 (17.82)LR	R-HY	1.58 (1.44)HR	14.00 (21.97)R	7.41 (15.67)LR	S-LY
11	MAUS 732	3.75 (2.06)S	37.50 (37.75)MS	10.76 (19.14)	24.43 (29.61)MR	7.52 (15.91)MR	R-HY	1.42 (1.38)HR	15.00 (22.79)R	10.21 (18.50)HS	S-HY
12	NRC 138	5.10 (2.37)HS	52.00 (46.13)S	10.85 (19.22)	28.11 (32.01)LR	13.61 (21.64)HS	S-LY	1.42 (1.38)HR	14.00 (21.97)R	5.18 (13.04)R	S-LY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
13	NRC 142	4.50 (2.24)HS	44.50 (41.83)MS	11.45 (19.77)	31.70 (34.25)LR	12.70 (20.87)S	S-LY	-	-	-	S-LY
14	NRC 146	5.10 (2.37)HS	47.65 (43.64)MS	10.36 (18.77)	27.98 (31.92)MR	9.10 (17.55)MR	S-LY	1.33 (1.35)HR	14.00 (21.77)R	6.13 (14.32)MR	S-LY
15	NRC 148	3.75 (2.06)S	32.15 (34.53)MS	9.54 (17.98)	25.38 (30.24)MR	14.28 (22.19)S	R-HY	2.58 (1.76)LR	23.50 (29.00)MR	7.38 (15.76)LR	S-LY
16	NRCSL 2	5.40 (2.43)HS	52.65 (46.50)S	15.11 (22.87)	32.39 (34.68)S	10.95 (19.32)LR	S-LY	2.58 (1.76)LR	23.50 (29.00)MR	4.60 (12.24)HR	R-HY
17	PS 1637	3.50 (2.00)MR	28.75 (32.41)MS	16.51 (23.96)	25.01 (29.99)MR	6.91 (15.23)MR	S-HY	1.83 (1.53)HR	15.00 (22.69)R	4.43 (12.01)HR	R-LY
18	RSC 11-15	3.77 (2.07)S	29.60 (32.95)MS	17.92 (25.03)	33.64 (35.44)S	7.00 (15.34)LR	R-HY	2.00 (1.58)HR	24.00 (29.26)MR	7.94 (16.36)S	S-LY
19	RSC 11-17	3.85 (2.09)S	31.85 (34.34)MS	16.04 (23.60)	35.71 (36.68)S	15.28 (23.00)HS	R-LY	1.58 (1.44)HR	23.50 (29.00)MR	5.91 (13.89)MR	S-LY
20	RVSM 2011-35	4.70 (2.28)HS	47.15 (43.35)MS	16.32 (23.82)	33.70 (35.47)S	17.55 (24.76)HS	S-LY	2.42 (1.71)R	28.50 (32.27)MR	5.89 (14.05)MR	S-LY
21	AMS 100-39	3.10 (1.90)MR	32.15 (34.53)MS	12.30 (20.52)	28.68 (32.37)LR	5.52 (13.58)**R**	R-HY	2.83 (1.83)HS	30.00 (33.21)MR	9.58 (18.02)HS	S-LY
22	AMS 2014-1	3.20 (1.92)MR	40.00 (39.22)MS	10.34 (18.75)	25.62 (30.40)MR	5.98 (14.15)MR	R-LY	2.58 (1.76)LR	24.50 (29.67)MR	6.79 (15.09)LR	S-LY
23	BAUS 102	4.00 (2.12)S	34.50 (35.96)MS	14.30 (22.21)	24.44 (29.62)MR	6.27 (14.50)MR	S-LY	3.75 (2.06)HS	33.00 (35.04)MR	5.48 (13.51)MR	S-HY
24	DS 3108	5.30 (2.41)HS	62.00 (51.92)S	20.51 (26.92)	35.59 (36.61)HS	11.48 (19.80)S	S-LY	3.17 (1.910)HS	33.00 (35.05)MR	3.75 (11.17)HR	S-LY
25	DSb 34	2.85 (1.83)**R**	20.50 (26.91)**LS**	9.74 (18.18)	26.40 (30.91)MR	8.50 (16.94)MR	R-HY	3.17 (1.91)HS	33.50 (35.37)MR	3.16 (9.94)HR	S-LY
26	KDS 992	3.75 (2.06)MR	42.50 (40.67)MS	17.13 (24.44)	23.61 (29.06)**R**	9.60 (18.04)LR	S-LY	3.17 (1.91)HS	26.50 (30.98)MR	7.11 (15.40)LR	S-LY
27	MACS 1493	3.58 (2.02)LR	44.00 (41.54)MS	13.04 (21.16)	27.69 (31.74)MR	10.41 (18.82)LR	S-HY	2.25 (1.66)HR	25.00 (29.93)MR	2.28 (8.61)HR	R-LY
28	NRC 128	3.50 (2.00)LR	28.00 (31.94)MS	14.71 (22.54)	31.20 (33.94)LR	14.65 (22.50)S	R-LY	2.58 (1.76)LR	32.50 (34.76)MR	5.95 (13.97)MR	S-LY
29	NRC 130	3.25 (1.94)LR	29.75 (33.04)MS	11.73 (20.02)	34.73 (36.09)S	7.99 (16.41)MR	S-LY	3.17 (1.91)HS	32.25 (34.60)MR	3.92 (11.29)HR	S-LY
30	NRC 131	4.52 (2.24)HS	57.25 (49.15)S	14.75 (22.58)	32.38 (34.67)S	16.56 (24.00)HS	S-LY	2.33 (1.68)HR	19.00 (26.06)R	5.14 (13.07)R	S-LY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
31	NRC 132	3.45 (1.99)LR	32.00 (34.44)MS	19.51 (26.20)	34.20 (35.78)S	5.31 (13.29)**R**	S-LY	3.33 (1.96)HS	30.00 (33.21)MR	8.68 (17.11)HS	S-LY
32	NRC 136	3.40 (1.97)LR	38.00 (38.04)MS	13.73 (21.74)	37.27 (37.61)HS	7.31 (15.68)MR	S-HY	3.33 (1.96)HS	36.75 (37.32)MR	5.54 (13.59)MR	S-LY
33	NRC 137	4.50 (2.24)HS	46.50 (42.98)MS	14.46 (22.34)	36.48 (37.14)HS	11.48 (19.80)S	S-HY	3.17 (1.91)HS	25.50 (30.33)MR	4.89 (12.78)HR	S-LY
34	NRC 147	3.00 (1.87)MR	24.15 (29.42)**LS**	10.35 (18.76)	29.48 (32.87)LR	7.47 (15.86)MR	S-HY	3.17 (1.91)HS	26.00 (30.66)MR	12.68 (20.86)HS	R-LY
35	NRCSL 1	3.50 (2.00)LR	35.45 (36.53)MS	18.01 (25.10)	34.52 (35.97)S	7.58 (15.97)MR	S-LY	2.00 (1.58)HR	20.00 (26.57)R	9.13 (17.40)HS	S-LY
36	PS 1611	4.15 (2.16)S	42.00 (40.38)MS	10.34 (18.75)	25.10 (30.05)MR	7.76 (16.17)MR	R-HY	2.17 (1.63)HR	23.00 (28.66)MR	9.69 (18.12)HS	R-HY
37	PS 1613	3.75 (2.06)S	26.50 (30.97)MS	9.20 (17.65)	27.64 (31.71)MR	5.59 (13.67)**R**	S-LY	2.17 (1.63)HR	23.50 (29.00)MR	10.02 (18.23)HS	R-HY
38	RSC 11-03	3.30 (1.95)MR	31.45 (34.10)MS	12.93 (21.07)	24.07 (29.37)MR	5.26 (13.25)**HR**	S-HY	2.58 (1.76)LR	25.00 (29.96)MR	4.20 (11.81)HR	S-LY
39	RSC 11-07	3.65 (2.04)S	35.00 (36.26)MS	12.06 (20.31)	23.27 (28.83)MR	6.37 (14.61)MR	S-HY	2.42 (1.71)R	26.00 (30.66)MR	3.23 (9.65)HR	S-HY
40	SKF-SP-11	5.95 (2.54)HS	44.35 (41.74)MS	19.71 (26.35)	44.35 (41.74)HS	6.10 (14.29)MR	S-LY	2.75 (1.80)HS	24.50 (29.67)MR	7.59 (15.91)LR	R-HY
41	DSb 21	-	-	-	-	-	-	2.17 (1.63)HR	23.50 (29.00)MR	21.34 (27.23)HS	S-LY
42	DSb 23 (C)	2.60 (1.76)**R**	24.25 (29.49)**LS**	9.62 (18.06)	25.74 (30.47)MR	7.41 (15.79)LR	S-HY	3.00 (1.87)HS	26.00 (30.66)MR	5.14 (13.07)R	S-LY
43	KS 103 (C)	3.25 (1.94)MR	28.85 (32.47)MS	13.22 (21.31)	21.38 (27.53)**R**	9.28 (17.73)LR	S-LY	3.75 (2.06)HS	30.00 (33.21)MR	5.39 (13.39)R	S-HY
44	DSb 21 (C)	3.14 (1.91)MR	32.15 (34.53)MS	11.30 (19.63)	26.61 (31.04)MR	6.54 (14.81)MR	R-HY	2.75 (1.80)HS	24.50 (29.67)MR	7.59 (15.91)LR	S-LY
45	MACS 450 (C)	3.75 (2.06)LR	42.75 (40.81)MS	12.62 (20.80)	27.69 (31.74)MR	8.27 (16.71)MR	S-HY	3.00 (1.87)HS	22.00 (27.97)MR	4.36 (12.04)HR	S-LY
46	RKS 18 (C)	3.25 (1.94)MR	37.75 (37.89)MS	9.25 (17.70)	28.82 (32.46)LR	7.73 (16.14)MR	S-HY	3.58 (2.02)HS	32.00 (34.45)MR	5.92 (14.05)MR	R-HY
47	JS 335 (C)	2.80 (1.82)**R**	25.65 (30.42)MS	12.62 (20.80)	32.33 (34.64)S	5.58 (13.66)**R**	S-HY	3.17 (1.91)HS	29.00 (32.83)MR	11.68 (19.83)HS	S-LY
48	DSb 34 (C)	-	-	-	-	-	-	3.75 (2.06)	35.50 (36.52)MR	3.19 (10.11)HR	S-LY
49	JS 93-05 (C)	3.64 (2.03)LR	32.70 (34.86)MS	13.55 (21.59)	28.38 (32.18)MR	8.41 (16.85)LR	S-LY	**Germination failed**			
	S.Em±	0.15	1.33	1.23	1.46	0.95	--	0.03	0.54	0.39	--
	CD @ 5%	0.46	3.77	3.77	4.33	2.89	--	0.09	1.53	1.12	--
	CD @ 1%	0.61	5.09	4.86	5.56	3.76	--	0.12	2.04	1.49	--
	Mean	3.19	35.66	26.00	27.52	8.83	--	2.53	24.49	6.58	--

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	4.20 (1.85)*MR	3.10 (1.90)* MR	3.50 (1.99)*MR	17.36 LS	5.40 (2.43)*R	3.86 (11.88)#R	SLY
2.	AMS 2014-1	2.60 (1.55)MR	2.90 (1.84) MR	4.10 (2.14) LR	21.99 LS	10.40 (3.30) MR	2.25 (8.49) MR	SHY (T)
3.	BAUS 102	0.00 (0.71)R	2.60 (1.76) R	3.10 (1.90) MR	16.86 LS	8.20 (2.94) MR	2.23 (8.47) MR	SHY (T)
4.	DS 3108	11.90 (2.82)MR	4.20 (2.15) LR	3.50 (2.00) MR	26.26 MS	18.80 (4.35) LR	4.45 (12.84) MR	SHY (T)
5.	DS 3110	14.00 (3.02)MR	4.30 (2.19) LR	4.40 (2.21) LR	24.76 LS	24.00 (4.95) LR	8.67 (17.54) MR	SLY
6.	DSb 33	27.20 (5.24)LR	3.70 (2.04) MR	4.50 (2.24) LR	26.99 MS	9.00 (3.08) MR	4.23 (12.05) MR	RLY
7.	DSb 34	18.80 (4.13)MR	4.70 (2.28)LR	2.50 (1.71) R	27.42 MS	19.20 (4.44) LR	7.88 (16.83) LR	SLY
8.	Himso 1689	27.60 (5.29)LR	5.60 (2.46) S	4.10 (2.12) LR	26.71 MS	13.80 (3.78) MR	4.15 (12.17) MR	SLY
9.	JS 21-71	19.20 (4.42)LR	4.00 (2.12) MR	4.20 (2.14) LR	20.93 LS	10.00 (3.24) MR	2.28 (8.53) MR	SLY
10.	JS 21-72	14.50 (3.87)MR	4.40 (2.20) LR	4.40 (2.21) LR	24.32 LS	9.80 (3.20) MR	5.39 (14.04) LR	SLY
11.	KDS 992	0.00 (0.71)R	3.50 (2.00) MR	3.50 (1.99) MR	26.02 MS	25.80 (5.12) S	2.71 (9.07) MR	SLY
12.	MACS 1493	0.00 (0.71)R	3.50 (2.00) MR	3.90 (2.07) MR	26.38 MS	26.60 (5.13) S	2.35 (8.62) MR	SLY
13.	MACS 1566	22.80 (4.82)LR	3.30 (1.95) MR	3.80 (2.05) MR	27.39 MS	8.20 (2.93) MR	0.00 (4.05) R	SLY
14.	MACS 1620	6.80 (2.56)MR	1.80 (1.52) R	2.50 (1.69) R	16.61 LS	17.80 (4.21) LR	4.49 (12.82) MR	SHY (T)
15.	MACSNRC 1575	14.80 (3.88)MR	3.90 (2.10) MR	4.50 (2.23) LR	26.53 MS	23.60 (4.87) LR	4.97 (13.35) LR	SLY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
16.	MAUS 732	4.50 (1.89)MR	2.30 (1.67) R	2.30 (1.66) R	21.19 LS	18.80 (4.35) LR	5.88 (14.63) LR	SHY (T)
17.	NRC 128	44.00 (6.49)LR	4.70 (2.27) LR	3.90 (2.10) MR	29.20 MS	16.80 (4.16) LR	4.92 (13.45) LR	SLY
18.	NRC 130	19.50 (4.41)LR	3.60 (2.02) MR	4.50 (2.20) LR	25.32 MS	13.00 (3.67) MR	6.89 (15.74) LR	SLY
19.	NRC 131	63.60 (6.88)LR	4.50 (2.24) LR	5.60 (2.46) LR	27.42 MS	11.00 (3.16) MR	6.83 (15.66) LR	SLY
20.	NRC 132	10.50 (2.67)MR	5.70 (2.49) S	3.70 (2.05) MR	28.06 MS	15.60 (3.97) LR	3.99 (10.49) MR	SLY
21.	NRC 136	33.20 (4.87)LR	4.20 (2.17) LR	4.70 (2.20) LR	26.63 MS	13.60 (3.75) MR	1.81 (7.88) MR	SLY
22.	NRC 137	50.00 (5.37)LR	4.80 (2.30) LR	3.30 (1.92) MR	26.78 MS	17.40 (4.20) LR	6.53 (15.37) LR	SLY
23.	NRC 138	12.60 (3.56)MR	3.70 (2.05) MR	3.80 (2.03) MR	28.30 MS	7.40 (2.78) MR	9.39 (18.33) LR	SLY
24.	NRC 146	47.00 (6.78)LR	4.70 (2.28) LR	3.60 (2.02) MR	24.43 LS	15.80 (4.03) LR	8.99 (17.94) LR	SLY
25.	NRC 147	14.50 (1.85)MR	5.60 (2.46) S	4.30 (2.19) MR	27.06 MS	9.60 (3.08) MR	1.73 (7.77) MR	SLY
26.	NRC 148	46.00 (1.55)MR	4.20 (2.16) LR	3.50 (1.98) MR	28.50 MS	10.20 (3.25) MR	5.46 (13.90) LR	SLY
27.	NRCSL 1	48.40 (3.65)MR	4.50 (2.24) LR	3.90 (2.05) MR	26.39 MS	19.20 (4.34) MR	7.99 (16.92) LR	SLY
28.	NRCSL – 2	60.00 (6.52)LR	3.80 (2.06) MR	3.30 (1.90) MR	28.61 MS	7.40 (2.79) LR	6.52 (15.30) LR	SLY
29.	PS 1611	19.80 (6.94)LR	3.10 (1.90) MR	5.10 (2.34) LR	27.54 MS	15.60 (3.93) LR	3.96 (11.78) MR	SLY
30.	PS 1613	23.00 (7.28)LR	4.20 (2.17) LR	5.90 (2.53) S	26.89 MS	15.80 (4.00) LR	5.63 (14.11) LR	SLY
31.	PS 1637	24.00 (4.24)LR	5.60 (2.47) S	4.90 (2.31) LR	28.87 MS	13.00 (3.67) MR	6.80 (15.68) LR	SLY
32.	RSC 11-03	8.80 (4.46)LR	4.80 (2.30) LR	3.50 (1.99) MR	27.79 MS	24.40 (4.91) LR	5.60 (14.25) LR	SHY (T)
33.	RSC 11-07	10.00 (4.93)LR	5.30 (2.41) LR	3.90 (2.09) MR	31.10 MS	12.40 (3.39) MR	4.20 (12.38) MR	SLY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
34.	RSC 11-15	2.80 (2.80)MR	3.20 (1.92) MR	2.30 (1.66) R	20.93 LS	12.80 (3.60) MR	4.79 (13.21) LR	SHY (T)
35.	RSC 11-17	0.00 (2.62)MR	2.40 (1.70) R	1.90 (1.53) R	20.81 LS	9.80 (3.11) MR	4.35 (12.65) MR	SHY (T)
36.	RVSM 2011-35	30.60 (1.59)MR	4.00 (2.12) MR	3.30 (1.94) MR	29.82 MS	13.20 (3.66) MR	5.64 (14.26) LR	SLY
37.	SKF-SP-11	0.00 (0.71)R	2.80 (1.82) R	3.20 (1.92) MR	20.62 MS	13.20 (3.70) MR	3.24 (11.13) MR	SHY (T)
38.	DSb 21 (C)	21.80 (5.56)LR	3.80 (2.06) MR	5.30 (2.37) LR	26.63 MS	12.00 (3.54) MR	4.50 (12.84) MR	SLY
39.	JS 20-34 (C)	26.80 (0.71)R	4.80 (2.30) LR	5.10 (2.35) LR	25.09 MS	27.40 (5.27) S	1.30 (7.10) MR	SLY
40.	JS 335 (C)	28.80 (4.68)LR	5.50 (2.45) S	6.10 (2.56) S	26.63 MS	21.00 (4.63) LR	5.14 (13.72) LR	SLY
41.	JS 93-05 (C)	22.20 (5.15)LR	4.60 (2.26) LR	4.70 (2.26) LR	26.40 MS	18.20 (4.32) LR	4.80 (13.31) LR	SLY
42.	JS 97-52 (C)	62.00 (5.35)LR	4.60 (2.26) LR	5.20 (2.38) LR	24.80 LS	19.80 (4.50) LR	6.20 (14.99) LR	SLY
43.	NRC 86 (C)	47.00 (4.67)LR	4.20 (2.17) LR	5.20 (2.35) LR	25.85 MS	21.20 (4.62) LR	3.74 (11.81) MR	SLY
44.	PS 1347 (C)	22.20 (7.82)LR	5.70 (2.49) S	4.90 (2.28) LR	25.75 MS	15.20 (3.89) LR	7.30 (16.21) LR	SLY
45.	RKS 18 (C)	46.60 (6.71)LR	4.60 (2.26) LR	5.30 (2.35) LR	25.26 MS	19.60 (4.48) LR	6.20 (15.00) LR	SLY
46.	RKS 113 (C)	28.20 (4.71)LR	5.20 (2.24) LR	5.30 (2.40) LR	26.63 MS	13.00 (3.62) MR	5.20 (13.80) LR	SLY
SEm ±		(2.17)	(0.15)	(0.21)	(1.47)	(0.59)	(3.46)	
CD at 5 %		(4.37)	(0.30)	(0.42)	(2.97)	(1.20)	(6.96)	

Table 3.8 ENT 3a: Status of AVT-II entries for antibiosis and antixenosis 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	response
1	AMS 100-39	70.04(57.04)	49.4(44.66)	71.96(58.86)	1.17	Preferred host
2	AMS 2014-1	66.02(54.35)	42.85(40.88)	65.11(53.88)	1.27	Preferred host
3	BAUS 102	69.03(56.18)	36.34(36.98)	52.56(46.53)	1.16	Preferred host
4	DS 3108	67.33(55.16)	35.38(36.43)	53.02(46.82)	0.85	Slight antixenosis
5	DSb 34	61.51(51.69)	43.60(41.31)	71.50(57.96)	0.97	Slight antixenosis
6	KDS 992	65.57(54.07)	43.90(41.49)	66.95(54.92)	0.87	Slight antixenosis
7	MACS 1493	72.33(58.42)	30.85(33.69)	43.27(41.07)	1.29	Preferred host
8	NRC 128	69.38(56.56)	28.52(32.25)	41.82(40.23)	1.22	Preferred host
9	NRC 130	70.71(57.61)	34.07(35.69)	49.38(44.65)	0.95	Slight antixenosis
10	NRC 131	62.53(52.25)	36.00(36.86)	57.63(49.39)	0.99	Slight antixenosis
11	NRC 132	70.29(56.99)	37.81(37.93)	53.97(47.28)	1.18	Preferred host
12	NRC 136	71.61(57.81)	35.83(36.72)	50.01(45.01)	1.2	Preferred host
13	NRC 137	65.38(53.98)	36.64(37.23)	56.33(48.66)	1.16	Preferred host
14	NRC 147	63.19(52.65)	40.90(39.72)	64.79(53.71)	1.22	Preferred host
15	NRC SL 1	71.91(58.03)	37.02(37.45)	56.74(48.89)	1.27	Preferred host
16	PS 1611	57.27(49.17)	38.97(38.61)	67.98(55.55)	1.16	Preferred host
17	PS 1613	59.18(50.29)	33.55(35.38)	56.86(48.95)	1.30	Preferred host
18	RSC 11-03	70.72(57.25)	40.68(39.61)	57.65(49.44)	**0.72**	Moderate antixenosis
19	RSC 11-07	60.34(50.96)	40.04(39.19)	66.54(54.95)	1.08	Preferred host
20	SKF-SP-11	64.53(53.45)	30.70(33.63)	47.66(43.65)	0.95	Slight antixenosis
21	JS 335	67.67(55.35)	28.89(32.50)	42.71(40.80)	Check	Check
	SEM±	1.919	1.668	3.222	--	--
	CD at 5%	5.484	4.769	9.211	--	--

Table 3.9 ENT 3b: Status of AVT-II entries for antibiosis and antixenosis against *S. litura* at Indore

Sr. No.	Genotype	Antibiosis			Antixenosis	
		Approx. digestibility (AD)	Efficiency of Conversion Index (ECI)	Efficiency of Conversion of Digested food (ECD)	C value	Response
1.	Dsb-34	69.36 (56.39)	40.51(39.53)	58.19(49.72)	0.87	Slight antixenosis
2.	PS-1611	67.50 (55.25)	31.44(34.10)	46.55(43.02)	0.65	Moderate antixenosis
3.	PS-1613	70.80 (57.29)	30.69(33.64)	43.60(41.33)	0.61	Moderate antixenosis
4.	AMS-2014-1	73.25(58.86)	40.40(39.47)	54.98(47.86)	0.75	Moderate antixenosis
5.	AMS-100-39	77.74(61.85)	27.49(31.62)	35.14(36.35)	1.15	Preferred host
6.	KDS-992	76.72(61.15)	20.74(27.09)	27.23(31.45)	1.47	Preferred host
7.	MACS-1493	74.90(59.93)	18.30(25.33)	24.25(29.50)	1.05	Preferred host
8.	NRC-147	80.28(63.64)	46.88(43.21)	58.29(49.77)	0.55	Moderate antixenosis
9.	NRC-128	75.70(60.46)	55.55(48.19)	72.88(58.62)	0.78	Slight antixenosis
10.	NRC-136	77.92(61.98)	64.04(53.15)	81.99(64.89)	0.55	Moderate antixenosis
11.	NRC-131	79.96(63.41)	34.42(35.92)	44.13(41.63)	0.97	Slight antixenosis
12.	NRC-132	80.17(63.55)	67.50(55.24)	83.82(66.28)	0.60	Moderate antixenosis
13.	NRC-137	68.91(56.11)	65.09(53.78)	94.54(76.49)	**0.49**	**Strong antixenosis**
14.	NRC-SL-1	77.93(61.98)	72.35(58.28)	92.81(74.44)	0.57	Moderate antixenosis
15.	NRC-130	72.84(58.59)	52.09(46.20)	71.70(57.86)	0.87	Moderate antixenosis
16.	JS-335	73.41(58.96)	51.50(45.86)	70.97(57.40)	1.00	Preferred host
	SEm±	**(2.26)**	**(4.72)**	**(6.66)**	-	-
	CD at 5%	**(4.62)**	**(9.65)**	**(13.60)**	-	-

Table 3.10: ENT 3c - Status of AVT-II entries for antibiosis and antixenosis 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	Response
1	AMS 100-39	70.23(56.91)	51.40(45.78)	73.19(58.79)	1.15	Preferred host
2	AMS 2014-1	68.49(55.83)	48.70(44.24)	71.12(57.47)	1.26	Preferred host
3	BAUS 102	67.96(55.50)	49.33(44.60)	65.54(54.03)	1.11	Preferred host
4	DS 3108	69.04(56.17)	34.81(36.14)	57.41(49.24)	0.90	Slight antixenosis
5	DSb 34	64.86(53.62)	31.82(34.33)	47.22(43.39)	0.67	Moderate antixenosis
6	KDS 992	69.31(56.33)	35.40(36.50)	49.31(44.59)	0.70	Moderate antixenosis
7	MACS 1493	73.56(59.03)	40.90(39.74)	61.03(51.35)	1.27	Preferred host
8	NRC 128	70.23(56.91)	43.64(41.33)	59.40(50.40)	1.02	Preferred host
9	NRC 130	65.68(54.12)	36.10(36.91)	51.98(46.12)	0.92	Slight antixenosis
10	NRC 131	68.29(55.71)	36.43(37.11)	56.79(48.88)	0.95	Slight antixenosis
11	NRC 132	67.45(55.19)	31.66(34.23)	53.27(46.86)	0.72	Moderate antixenosis
12	NRC 136	71.14(57.48)	43.32(41.14)	61.35(51.54)	1.10	Preferred host
13	NRC 137	69.12(56.22)	48.54(44.15)	63.47(52.79)	1.20	Preferred host
14	NRC 147	65.56(54.04)	41.34(40.00)	67.76(55.38)	1.22	Preferred host
15	NRCSL 1	73.48(58.98)	46.60(43.03)	59.02(50.18)	1.28	Preferred host
16	PS 1611	65.01(53.71)	48.85(44.32)	69.14(56.23)	1.15	Preferred host
17	PS 1613	65.90(54.25)	46.45(42.95)	71.61(57.78)	1.26	Preferred host
18	RSC 11-03	71.21(57.53)	40.21(39.34)	56.46(48.69)	0.98	Slight antixenosis
19	RSC 11-07	67.14(55.00)	38.75(38.48)	57.72(49.42)	0.93	Slight antixenosis
20	SKF-SP-11	67.58(55.27)	52.20(46.24)	75.24(60.13)	1.24	Preferred host
21	JS 335 (C)	72.86(58.58)	40.68(39.61)	57.64(49.37)	-	-
	S.Em±	1.89	1.68	2.96	-	-
	CD @ 5%	5.71	5.06	8.89	-	-

* Figures in the parenthesis are Transformed angular values

Table 3.11 : ENT.4 a. Field screening of IVT entries for resistance to major insect-pests (Stem fly- % Stem tunneling)

S.N.	Entry	Dharwad	Pantnagar	Sehore	Parbhani	Amrawati	Imphal	Indore
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	VLS 99	11.65 (19.95)	59.70 (50.59)HS	26.71 (31.09) S	40.59 (39.56)HS	55 (47.88)**S**	7.45 (16.33)#LR	48.96 (44.40)S
2.	SL 1213	19.45 (26.16)	50.30 (45.17)HS	32.85 (34.94)HS	35.96 (36.84)LR	45 (42.12)**LR**	5.06 (13.57) MR	82.00 (64.90)HS
3.	PS 1641	12.56 (20.75)	32.90 (34.99)HR	27.04 (31.30)LR	36.75 (37.31)S	25 (29.89)MR	3.10 (9.53) MR	61.71 (51.77)HS
4.	NRC 154	10.56 (18.96)	37.60 (37.81)HR	17.16 (24.45)MR	26.49 (30.96)R	35 (36.22)MR	5.78 (14.50) MR	23.89 (29.26)LR
5.	RVS 2011-32	14.98 (22.76)	38.20 (38.16)HR	13.86 (21.84)MR	22.98 (28.62)HR	65 (53.78)HS	7.41 (16.29) LR	27.50 (31.62)LR
6.	MACS 1655	13.64 (21.67)	55.80 (48.33)HS	10.07 (18.44)MR	31.89 (34.36)LR	45 (42.12)LR	8.91 (17.69) LR	65.34 (53.93)LR
7.	PUSA-Sipani-2036	12.65 (20.83)	35.40 (36.50)HR	28.31 (32.12)LR	11.29 (19.62)HR	45 (42.12)LR	8.92 (17.30) LR	33.17 (35.16)LR
8.	AUKS 200	17.97 (25.07)	36.40 (37.10)HR	14.50 (22.22)MR	35.04 (36.27)LR	40 (39.23)LR	5.06 (13.57) MR	67.12 (55.01)HS
9.	DS 1318	14.35 (22.25)	54.60 (47.64)HS	38.17 (38.08)HS	43.23 (41.10)HS	25 (29.89)MR	4.79 (13.19) MR	64.85 (53.64)LR
10.	PS 24 ©	14.54 (22.41)	44.10 (41.61)MR	--	--	--	--	--
11.	NRC 163	9.89 (18.32)	42.00 (40.39)MR	11.79 (14.56) R	38.43 (38.20)HS	30 (33.21)MR	6.50 (15.33) LR	38.39 (38.28)LR
12.	JS 22-01	21.78 (27.81)	28.40 (32.19)HR	7.19 (15.36)R	40.09 (39.27)HS	40 (39.23)LR	9.23 (17.96) LR	80.42 (63.73)HS
13.	RSC 11-20	23.47 (28.97)	47.80 (43.73)HS	15.88 (21.94)MR	8.77 (17.18)HR	45 (42.12)LR	3.10 (9.53) MR	29.19 (32.70)LR
14.	TS 46	19.26 (26.02)	40.20 (39.34)HR	16.91 (23.40)MR	29.61 (32.89)MR	35 (36.22)MR	3.10 (9.53) MR	38.73 (38.48)LR
15.	MAUS 717	16.89 (24.26)	86.10 (68.11)HS	10.99 (19.20)MR	27.43 (31.57)MR	25 (29.89)MR	9.47 (18.17) LR	38.15 (38.14)LR
16.	PS 1642	15.26 (22.99)	56.00 (48.44)HS	13.54 (21.58)MR	32.22 (34.58)LR	45 (42.12)LR	10.62 (19.03) LR	41.58 (40.15) S

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
17.	**AMS 20-19**	13.38 (21.45)	55.60 (48.21)HS	13.59 (21.66)MR	40.81 (39.69)HS	10 (18.43)HR	7.81 (16.68) LR	44.95 (42.10) S
18.	**KDS 1097**	16.45 (23.92)	37.50 (37.76)HR	17.85 (24.95)MR	21.43 (27.57)HR	45 (42.12)LR	9.60 (18.28) LR	27.77 (31.80)LR
19.	**DSb 37**	13.99 (21.96)	45.30 (42.30)LR	14.86 (22.68)MR	21.46 (27.45)HR	45 (42.12)LR	12.10 (20.79) LR	38.69 (38.46)LR
20.	**SL 958 ©**	--	30.20 (33.33)HR	--	--	--	--	--
21.	**ASb 51**	12.53 (20.72)	48.70 (44.25)HS	27.03 (31.28) S	52.90 (46.65)HS	25 (29.89)MR	6.49 (15.33) LR	45.32 (42.31) S
22.	**NRC 149**	14.87 (22.67)	21.40 (27.55)HR	22.99 (28.68)LR	33.15 (35.15)LR	25 (29.89)MR	7.52 (16.40) LR	62.25 (52.09)HS
23.	**VLS 98**	10.65 (19.04)	25.70 (30.46)HR	19.51 (26.04)LR	48.07 (43.88)HS	40 (39.11)LR	3.21 (9.66) MR	49.97 (44.98)HS
24.	**DS 1326**	22.67 (28.42)	54.60 (47.63)HS	18.33 (25.31)LR	39.06 (38.67)HS	30 (32.90)MR	3.10 (9.53) MR	28.45 (32.23)LR
25.	**SL 1234**	17.65 (24.83)	56.40 (48.67)HS	19.79 (26.40)LR	44.10 (41.59)HS	50 (45.00)LR	**0.00** **(4.05) R**	62.89 (52.47)HS
26.	**RSC 11-22**	14.33 (22.23)	31.00 (33.83)HR	29.61 (32.95) S	10.80 (19.13)HR	35 (36.22)MR	7.12 (16.00) LR	27.69 (31.75)LR
27.	**Himso 1690**	14.59 (22.45)	34.90 (36.20)HR	15.35 (22.85)MR	46.73 (43.12)HS	40 (39.11)LR	6.80 (15.67) LR	37.28 (37.63)LR
28.	**BAUS 103**	19.17 (25.96)	28.70 (32.38)HR	24.73 (29.79)LR	23.43 (28.94)HR	30 (32.90)MR	8.98 (17.75) LR	26.39 (30.91)LR
29.	**JS 22-07**	20.25 (26.73)	51.80 (46.03)HS	23.96 (29.25)LR	45.99 (42.69)HS	25 (29.89)MR	10.33 (18.88) LR	38.94 (38.61)LR
30.	**SL 1074 ©**	--	51.30 (45.74)HS	--	--	--	--	--
31.	**TS 107**	16.46 (23.93)	37.60 (37.81)HR	17.49 (24.70)LR	47.15 (43.36)HS	30 (32.90)MR	5.19 (13.75) MR	56.05 (48.47)HS
32.	**MAUS 712**	17.07 (24.39)	34.20 (35.78)HR	22.25 (28.13)LR	14.73 (22.53)HR	30 (33.21)MR	7.98 (16.92) LR	53.31 (46.90)HS
33.	**NRC 168**	15.58 (23.24)	34.50 (35.96)HR	13.10 (21.20)MR	13.43 (21.48)HR	50 (45.00)LR	8.58 (17.39) LR	50.72 (45.41)HS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
34.	**MACS 1639**	16.56 (24.00)	85.40 (67.58)HS	17.06 (23.55)MR	46.44 (42.95)HS	45 (42.12)LR	9.01 (17.96) LR	52.15 (46.23)HS
35.	**DS 1320**	19.34 (26.08)	45.00 (42.12)LR	14.50 (22.13)MR	48.51 (44.14)HS	45 (42.12)LR	10.12 (18.71) LR	57.98 (49.59)HS
36.	**KDS 1099**	12.77 (20.93)	32.50 (34.75)HR	5.85 (13.97)R	25.78 (30.50)R	35 (35.78)MR	9.83 (18.47) LR	78.40 (62.31) HS
37.	**AMS 353**	13.14 (21.24)	36.70 (37.28)HR	19.48 (26.05)LR	43.68 (41.36)HS	0 (0.00)HR	9.18 (17.92) LR	51.70 (45.97) HS
38.	**DSb 36**	14.46 (22.34)	95.60 (77.90)HS	25.20 (30.11)LR	3.80 (11.22)HR	35 (36.22)MR	5.00 (13.56)MR	37.94 (38.02) LR
39.	**AUKS 218**	13.08 (21.19)	40.60 (39.58)HR	18.41 (25.14)LR	37.59 (37.80)S	30 (32.90)MR	**0.00** **(4.05) R**	62.89 (52.47) HS
40.	**Pusa 97-12 (C)**	--	45.90 (42.64)LR	--	--	--	--	--
41.	**RVSM 2011-77**	14.14 (22.08)	27.90 (31.87)HR	8.99 (17.05)MR	42.94 (40.93)HS	50 (45.00)LR	8.93 (17.71) LR	44.70 (41.96) S
42.	**PUSA-Sipani-6029**	21.14 (27.36)	35.20 (36.38)HR	14.00 (21.96)MR	33.38 (35.28)MR	40 (39.23)LR	**0.00** **(4.05) R**	25.30 (30.20) LR
43.	**NRC 167**	17.09 (24.41)	33.20 (35.18)HR	18.33 (25.31)LR	20.90 (27.17)HR	40 (39.23)LR	10.19 (19.01) LR	33.05 (35.09) LR
44.	**Asb 50**	13.95 (21.92)	36.20 (36.98)HR	27.80 (31.80)S	35.55 (36.58)LR	35 (36.22)MR	9.35 (18.07) LR	44.36 (41.76) S
45.	**RVS 2011-76**	16.07 (23.62)	45.80 (42.59)LR	17.35 (24.59)MR	27.07 (31.34)R	50 (45.00)LR	3.10 (9.53) MR	48.00 (43.85) S
46.	**DSb** 23 (c)	12.67 (20.84)	--	--	--	--	--	--
47.	**DSb** 21 (c)	18.98 (25.82)	--	--	--	--	--	--
48.	KDS 753 (C)	12.37 (20.58)	--	--	--	--	--	--
49.	NRC 86 (C)	--	--	10.99 (19.14)MR	47.78 (43.72)HS	45 (42.12)LR	--	40.40 (39.47) LR
50.	JS 20-116 (C)	--	--	7.96 (15.31)R		40 (39.23)LR	--	61.30 (51.53) HS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
51.	JS 20-**34** (C**)**	--	--	--	30.52 (33.52)MR	--	--	--
52.	JS 20-98 (C)	--	--	21.11 (27.13)LR	53.93 (47.24)HS	35 (36.22)MR	--	67.10 (55.00) HS
53.	RSC 10-46 (C)	--	--	16.36 (22.11)MR	4.70 (12.29)HR	35 (36.22)MR	--	39.51 (38.94) LR
54.	**MACS 1460**	--	--	--	--	--	9.28 (18.18) LR	--
55.	JS 20-116	--	--	--	--	--	7.01 (15.88) LR	--
56.	**KDS 753**	--	--	--	--	--	7.36 (16.27) LR	--
57.	**RKS 113**	--	--	--	--	--	3.10 (9.53) MR	--
58.	MAUS 158 (LC)	--	--	--	23.90 (29.24)HR	--	--	--
59.	MAUS 2 (LC)	--	--	--	42.09 (40.43)HS	--	--	---
60.	MAUS 612 (LC)	--	--	--	34.85 (36.16)LR	--	--	--
61.	**SEm+**	(1.29)		(3.40)	**(1.00)**	(3.61)	(4.16)	**(6.97)**
62.	**CD at 5 %**	(3.88)		(9.73)	**(2.79)**	(10.24)	(8.39)	**(14.04)**

Table 3.12: ENT. 4 b. Field screening of IVT entries for resistance to major insect-pests (Girdle beetle - % Plant infestation)

Code	Entry	Sehore	Parbhani	Dharwad	Amrawati	Kota	Indore
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	**VLS 99**	12.50 (20.42) LR	17.89 (25.00)HS	10.22 (18.64)MR	0.00 (0.71)MR	11.67 (19.92) R	10.79 (19.18)LR
2.	**SL 1213**	12.67 (20.83)LR	11.97 (20.23)LR	12.27 (20.50)LR	0.50 (1.00)LR	21.67 (27.72) LR	7.56 (15.95) LR
3.	**PS 1641**	15.19 (22.62)LR	14.94 (22.72)HS	8.79 (17.24)MR	0.25 (0.85)LR	23.34 (28.83) LR	8.29 (16.73) LR
4.	**NRC 154**	6.80 (14.85)MR	11.40 (19.69)LR	10.90 (19.27)LR	0.00 (0.71)MR	15.00 (22.76) MR	3.39 (10.60) MR
5.	**RVS 2011-32**	4.73 (12.54) R	1.11 (6.05)HR	8.08 (16.51)MR	0.50 (1.00)LR	21.67 (27.72) LR	5.95 (14.12) MR
6.	**MACS 1655**	10.00 (18.17)MR	13.42 (21.45)S	10.91 (19.28)LR	0.00 (0.71)MR	20.00 (26.49) LR	13.94 (21.92) LR
7.	**PUSA-Sipani-2036**	15.61 (23.22) LR	7.88 (16.25)MR	7.58 (15.97)MR	0.50 (1.00)LR	20.00 (26.57) LR	4.32 (12.00) MR
8.	**AUKS 200**	8.72 (17.15)MR	16.57 (24.02)HS	11.69 (19.99)LR	0.00 (0.71)MR	13.34 (21.27) MR	5.55 (13.62) MR
9.	**DS 1318**	8.27 (16.70)MR	8.40 (16.84)MR	13.42 (21.48)LR	0.50 (1.00)LR	20.00 (26.49) LR	3.44 (10.68) MR
10.	**PS 24 ©**	--	--	7.73 (16.14)MR	--	--	--
11.	**NRC 163**	5.04 (12.94) R	2.31 (8.51)HR	7.60 (16.00)MR	0.00 (0.71)MR	23.34 (28.83) LR	4.59 (12.36) MR
12.	**JS 22-01**	4.79 (12.62) R	15.41 (23.10)HS	10.86 (19.23)MR	0.00 (0.71)MR	20.00 (26.49) LR	3.91 (11.40) MR
13.	**RSC 11-20**	15.49 (22.73)LR	29.31 (32.76)HS	10.59 (18.98)MR	0.25 (0.85)LR	16.67 (23.99) MR	21.45 (27.59) HS
14.	**TS 46**	17.95 (24.74) S	9.90 (18.33)LR	12.05 (20.30)LR	0.50 (1.00)LR	20.00 (26.49) LR	11.64 (19.94) LR
15.	**MAUS 717**	3.48 (10.48) R	9.71 (18.12)LR	11.29 (19.63)LR	0.50 (1.00)LR	21.67 (27.72) LR	9.63 (18.07) LR
16.	**PS 1642**	15.45 (23.13) LR	11.82 (20.11)LR	7.63 (16.03)MR	0.00 (0.71)MR	15.00 (22.76) MR	7.34 (15.71) MR
17.	**AMS 20-19**	3.84 (11.03) R	11.37 (19.67)LR	8.30 (16.74)MR	0.00 (0.71)MR	23.34 (28.83) LR	8.16 (16.60) LR

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
18.	**KDS 1097**	24.50 (29.37)HS	9.77 (18.11)LR	13.41 (21.47)S	0.50 (1.00)**LR**	20.00 (26.49) LR	7.78 (16.20) LR
19.	**DSb 37**	24.24 (29.44)HS	14.84 (22.61)HS	7.74 (16.15)MR	1.00 (1.22)**HS**	20.00 (26.57) LR	14.05 (22.01) LR
20.	**SL 958 ©**	--	--	--	--	--	--
21.	**ASb 51**	16.14 (23.67)LR	15.18 (22.92)HS	14.72 (22.55)HS	0.00 (0.71)**MR**	19.84 (26.38) LR	4.10 (11.68) MR
22.	**NRC 149**	12.45 (20.40)LR	15.08 (22.79)HS	12.58 (20.77)LR	0.25 (0.85)**LR**	18.33 (25.15) MR	7.62 (16.02) LR
23.	**VLS 98**	7.90 (16.30)MR	10.32 (18.73)HR	8.31 (16.75)MR	0.50 (1.00)**LR**	18.34 (25.33) LR	15.36 (23.07) LR
24.	**DS 1326**	10.91 (19.14)LR	13.30 (21.37)LR	12.77 (20.93)LR	0.25 (0.85)**LR**	23.33 (28.88) LR	2.49 (9.08) MR
25.	**SL 1234**	7.25 (15.57)MR	4.50 (12.24)HR	12.32 (20.54)LR	0.25 (0.85)**LR**	18.34 (25.33) LR	4.31 (11.98) MR
26.	**RSC 11-22**	12.88 (21.00)LR	11.79 (20.06)LR	7.45 (15.83)MR	0.25 (0.85)**LR**	11.67 (19.92) R	4.66 (12.47) MR
27.	**Himso 1690**	23.95 (29.28)HS	10.04 (18.45)LR	8.64 (17.09)MR	0.00 (0.71)**MR**	21.67 (27.72) LR	6.71 (15.01) MR
28.	**BAUS 103**	19.69 (26.08) S	12.16 (20.33)LR	11.40 (19.73)MR	0.00 (0.71)**MR**	15.00 (22.76) MR	11.02 (19.39) LR
29.	**JS 22-07**	8.26 (16.44)MR	4.96 (12.80)HR	12.52 (20.71)LR	0.00 (0.71)**MR**	21.67 (27.72) LR	13.43 (21.49) LR
30.	**SL 1074 ©**	-----	---	----	-----	----	---
31.	**TS 107**	4.62 (12.17) R	3.94 (11.45)HR	10.72 (19.10)MR	0.00 (0.71)**MR**	18.34 (25.33) LR	12.98 (21.12) LR
32.	**MAUS 712**	7.81 (16.18)MR	10.94 (19.27)LR	7.31 (15.68)**R**	0.00 (0.71)**MR**	23.34 (28.83) LR	7.39 (15.77) MR
33.	**NRC 168**	15.32 (22.93)LR	6.55 (14.82)R	9.26 (17.71)MR	0.50 (1.00)**LR**	20.00 (26.49) LR	13.88 (21.87) LR
34.	**MACS 1639**	5.45 (13.30)MR	11.03 (19.39)LR	6.87 (15.19)**R**	0.00 (0.71)**MR**	21.67 (27.72) LR	10.44 (18.85) LR
35.	**DS 1320**	7.18 (15.52)MR	9.55 (17.97)MR	8.14 (16.57)MR	0.25 (0.85)**LR**	18.34 (25.33) LR	4.44 (12.16) MR

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
36.	**KDS 1099**	3.13 (10.13) HR	15.87 (23.87)HS	13.37 (21.44)S	0.00 (0.71)**MR**	11.67 (19.92) R	3.81 (11.26) MR
37.	**AMS 353**	5.29 (13.11)MR	7.52 (15.90)MR	9.71 (18.15)MR	0.00 (0.71)**MR**	20.00 (26.49) LR	6.58 (14.86) MR
38.	**DSb 36**	9.92 (18.25)MR	12.38 (20.58)LR	7.55 (15.94)MR	0.25 (0.85)**LR**	20.00 (26.57) LR	8.74 (17.20) MR
39.	**AUKS 218**	10.40 (18.80)LR	5.49 (13.38)HR	12.33 (20.55)LR	0.25 (0.85)**LR**	20.00 (26.49) LR	3.94 (11.44) MR
40.	**Pusa 97-12 (C)**	--	--	--	--	--	--
41.	**RVSM 2011-77**	12.72 (20.88)LR	8.61 (17.06)MR	9.84 (18.27)MR	0.25 (0.85)**LR**	23.34 (28.83) LR	5.04 (12.97) MR
42.	**PUSA-Sipani-6029**	5.44 (13.48)MR	5.61 (13.66)HR	15.16 (22.91)HS	0.00 (0.71)**MR**	15.00 (22.76) MR	9.06 (17.52) LR
43.	**NRC 167**	3.34 (10.51)HR	5.24 (13.22)HR	11.62 (19.92)LR	0.50 (1.00)**LR**	21.67 (27.72) LR	8.18 (16.62)MR
44.	**Asb 50**	7.60 (15.98)MR	9.24 (17.65)MR	15.78 (23.40)HS	0.00 (0.71)**MR**	20.00 (26.49) LR	21.43 (27.58) HS
45.	**RVS 2011-76**	11.01 (19.06)LR	9.99 (18.39)LR	8.86 (17.31)MR	0.50 (1.00)**LR**	11.67 (19.92) R	10.52 (18.92) LR
46.	**DSb** 23 (c)	--	--	8.02 (16.44)MR	--	--	--
47.	**DSb** 21 (c)	--	--	8.87 (17.32)MR	--	--	--
48.	KDS 753 (C)	--	--	7.98 (16.40)MR	--	--	--
49.	NRC 86 (C)	7.76 (16.03)MR	5.69 (13.79)HR	--	0.00 (0.71)MR	18.34 (25.33) LR	6.40 (14.65) MR
50.	JS 20-116 (C)	8.71 (17.15)MR	--	--	0.00 (0.71)MR	--	2.03 (8.19) MR
51.	JS 20-98 (C)	11.48 (19.79)LR	8.31 (16.71)MR	--	0.25 (0.85)LR	20.00 (26.49) LR	2.95 (9.89) MR
52.	RSC 10-46 (C)	3.51 (10.78) HR	9.13 (17.58)MR	--	0.25 (0.85)LR	--	12.55 (20.74) LR

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
53.	JS 20 34 (C)	--	1.39 (6.76)HR	--	--	18.34 (25.33) LR	--
54.	RKS 113 (C)	--		--	--	21.67 (27.72) LR	--
55.	MAUS 158 (LC)	--	5.74 (13.86)HR	--	--	--	--
56.	MAUS 2 (LC)	--	6.87 (15.19)MR	--	--	--	--
57.	MAUS 612 (LC)	--	5.19 (13.15)HR	--	--	--	--
58.	**SEm+**	(2.10)	(1.00)	(1.04)	(0.08)	(1.85)	(4.17)
59.	**CD at 5 %**	(6.01)	(2.78)	(3.15)	(0.22)	(5.28)	(8.39)

Table 3.13: ENT. 4 c. Field screening of IVT entries for resistance to major insect pests (Defoliators)

Code	Entry		Defoliators (Number of larvae / m)						Semilooper/ mrl	*S. litura* larvae/mrl
		Sehore	Amrawati	Pantnagar	Kota	Dharwad	Bidar	Imphal	Parbhani	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	VLS 99	0.49 (0.99)R	0.05 (0.74)MR	5.10 (2.36)HR	0.84 (1.35) HR	3.70 (2.05)LR	2.50 (1.73)HR	28.20 (4.97)*LR	5.67 (2.48)HR	1.33 (1.35)
2.	SL 1213	1.99 (1.57) LR	0.05 (0.74)MR	8.20 (2.95)HR	2.00 (1.73) MR	4.16 (2.16)S	2.50 (1.73)HR	32.80 (5.35) LR	667 (2.67)MR	1.17 (1.27)
3.	PS 1641	1.16 (1.63)LR	0.00 (0.71)MR	8.50 (3.00)HR	2.34 (1.82) LR	3.71 (2.05)LR	2.50 (1.73)HR	4.10 (2.13) MR	9.50 (3.15)LR	2.50 (1.73)
4.	NRC 154	2.16 (1.41) MR	0.05 (0.74)MR	9.10 (3.09)HR	1.00 (1.41) HR	2.73 (1.80)**R**	7.00 (2.74)HS	11.00 (3.39) MR	10.17 (3.26)LR	1.50 (1.41)
5.	RVS 2011-32	0.33 (0.98)HR	0.05 (0.74)MR	7.10 (2.75)HR	2.17 (1.78) LR	3.81 (2.08)LR	5.50 (2.43)HS	15.60 (4.00) LR	8.67 (3.01)LR	0.83 (1.15)
6.	MACS 1655	1.83 (1.50)MR	0.00 (0.71)MR	8.20 (2.94)HR	2.17 (1.77) LR	3.59 (2.02)MR	2.00 (1.55)HR	5.20 (2.28) MR	7.17 (2.76)MR	1.00 (1.19)
7.	PUSA-Sipani-2036	1.49 (1.46)MR	0.00 (0.71)MR	7.70 (2.86)HR	2.17 (1.78) HR	4.11 (2.15)S	6.00 (2.55)HS	25.60 (5.10) LR	7.83 (2.88)MR	1.83 (1.52)
8.	AUKS 200	2.33 (1.68)LR	0.00 (0.71)MR	6.30 (2.60)HR	1.00 (1.41) HR	4.48 (2.23)S	3.50 (2.00)HR	12.20 (3.56) MR	3.83 (2.07)HR	2.17 (1.61)
9.	DS 1318	2.66 (1.78)LR	0.05 (0.74)MR	9.90 (3.22)S	2.00 (1.73) MR	4.73 (2.29)S	5.00 (2.34)LR	6.80 (2.23) MR	8.83 (3.05)LR	1.83 (1.52)
10.	PS 24 ©	--	--	10.00 (3.24)HS	--	3.62 (2.03)MR	--	--	--	--
11.	NRC 163	0.99 (1.19)MR	0.00 (0.71)MR	13.20 (3.70)HS	2.00 (1.73) MR	3.48 (1.99)MR	5.00 (2.34)LR	**1.40 (1.26) R**	12.33 (3.58)HS	1.67 (1.46)
12.	JS 22-01	1.33 (1.34)MR	0.10 (0.77)LR	9.75 (3.20)S	2.17 (1.77) LR	3.32 (1.95)MR	5.50 (2.43)HS	23.00 (4.85) LR	7.17 (2.76)MR	1.17 (1.28)
13.	RSC 11-20	1.66 (1.46)MR	0.05 (0.74)MR	9.30 (3.13)LR	2.17 (1.78) LR	3.13 (1.91)MR	5.00 (2.30)HS	15.20 (3.79) LR	4.67 (2.26)HR	1.50 (1.41)
14.	TS 46	1.83 (1.50)MR	0.10 (0.77)LR	10.80 (3.36)HS	2.50 (1.87) LR	5.18 (2.38)HS	5.00 (2.35)LR	60.40 (7.79) S	7.67 (2.84)MR	1.00 (1.22)
15.	MAUS 717	3.16 (1.90)LR	0.10 (0.77)LR	9.90 (3.22)S	2.84 (1.96) LR	3.45 (1.99)MR	4.00 (2.11)MR	14.20 (3.81) LR	7.50 (2.82)MR	1.17 (1.27)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
16.	PS 1642	1.66 (1.45)MR	0.15 (0.80)LR	10.60 (3.33)HS	1.00 (1.41) HR	3.72 (2.05)LR	3.00 (1.87)HR	25.20 (5.07) LR	10.50 (3.30)S	2.17 (1.59)
17.	AMS 20-19	1.33 (1.34)MR	0.00 (0.71)MR	11.45 (3.45)HS	2.34 (1.82) LR	3.51 (2.00)MR	3.00 (1.87)HR	44.20 (6.58) S	10.33 (3.29)S	0.67 (1.02)
18.	KDS 1097	0.66 (1.07)HR	0.00 (0.71)MR	11.60 (3.47)HS	2.50 (1.87) LR	3.62 (2.03)MR	3.50 (2.00)HR	----	12.50 (3.60)HS	2.00 (1.56)
19.	DSb 37	3.33 (1.95)LR	0.05 (0.74)MR	10.70 (3.34)HS	2.17 (1.78) LR	3.01 (1.87)MR	3.50 (2.00)HR	8.20 (2.93) MR	12.17 (3.55)HS	2.17 (1.63)
20.	SL 958 (C)	--	--	6.60 (2.66)HR	--	--	--	6.20 (2.59) MR	--	--
21.	ASb 51	3.99 (2.11)LR	0.10 (0.77)LR	8.20 (2.94)HR	2.50 (1.87) LR	3.60 (2.02)MR	3.50 (1.96)HR	4.20 (2.13) MR	9.17 (3.10)LR	1.67 (1.46)
22.	NRC 149	2.66 (1.78)LR	0.35 (0.92)HS	5.90 (2.52)HR	2.50 (1.87) LR	4.14 (2.15)S	3.50 (1.96)HR	11.60 (2.79) MR	8.67 (3.02)LR	1.67 (1.47)
23.	VLS 98	4.83 (2.29)S	0.15 (0.80)LR	6.50 (2.64)HR	2.50 (1.87) LR	4.03 (2.13)S	5.00 (2.30)LR	6.60 (2.66) MR	18.33 (4.33)HS	1.83 (1.50)
24.	DS 1326	2.83 (1.82)LR	0.10 (0.77)LR	6.80 (2.70)HR	2.34 (1.82) LR	5.31 (2.41)HS	3.50 (2.00)HR	20.40 (4.42) LR	8.00 (2.91)MR	1.17 (1.28)
25.	SL 1234	2.66 (1.77)LR	0.05 (0.74)MR	9.60 (3.17)MR	2.34 (1.82) LR	4.30 (2.19)S	3.50 (1.96)HR	17.80 (4.00) LR	8.17 (2.94)MR	1.67 (1.46)
26.	RSC 11-22	3.66 (2.03)LR	0.05 (0.74)MR	10.20 (3.27)HS	1.00 (1.41) HR	3.51 (2.00)MR	4.00 (2.11)MR	11.20 (3.18) MR	14.17 (3.82)HS	1.83 (1.50)
27.	Himso 1690	4.33 (2.19)S	0.05 (0.74)MR	12.60 (3.61)HS	2.67 (1.91) LR	3.69 (2.05)MR	3.00 (1.85)HR	10.20 (3.26) MR	9.50 (3.14)LR	0.67 (1.06)
28.	BAUS 103	4.16 (2.15)S	0.25 (0.87)S	12.00 (3.53)HS	0.84 (1.35) HR	4.83 (2.31)HS	6.00 (2.54)HS	14.80 (3.90) LR	4.33 (2.19)HR	2.17 (1.61)
29.	JS 22-07	5.33 (2.41)HS	0.10 (0.77)LR	14.20 (3.83)HS	2.17 (1.78) LR	3.88 (2.09)LR	5.00 (2.30)LR	13.40 (3.73) MR	7.83 (2.88)MR	1.33 (1.34)
30.	SL 1074 ©	--	--	10.20 (3.27)HS	--	--	--	--	--	--
31.	TS 107	0.66 (1.03)R	0.00 (0.71)MR	9.60 (3.17)MR	2.34 (1.82) LR	5.30 (2.41)HS	4.50 (2.21)LR	38.00 (5.92) LR	10.33 (3.28)LR	1.17 (1.28)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)
32.	MAUS 712	1.66 (1.46)MR	0.20 (0.83)LR	12.40 (3.59)HS	2.34 (1.82) LR	3.45 (1.99)MR	6.00 (2.52)HS	12.20 (3.56) MR	5.50 (2.44)HR	1.67 (1.45)
33.	NRC 168	0.99 (1.21)MR	0.20 (0.84)LR	10.70 (3.34)HS	2.67 (1.91) LR	2.92 (1.85)MR	5.50 (2.43)HS	8.20 (2.93) MR	8.33 (2.97)MR	1.67 (1.43)
34.	MACS 1639	1.33 (1.86)LR	0.05 (0.74)MR	9.80 (3.20)S	2.34 (1.82) LR	3.90 (2.10)LR	5.50 (2.39)HS	12.20 (3.56) MR	10.33 (3.29)S	1.67 (1.45)
35.	DS 1320	2.33 (1.47)MR	0.00 (0.71)MR	11.80 (3.50)HS	1.00 (1.41) HR	4.15 (2.16)S	4.00 (2.11)MR	15.40 (3.96) LR	6.17 (2.57)R	1.33 (1.35)
36.	KDS 1099	0.83 (1.13)R	0.00 (0.71)MR	9.80 (3.20)LR	2.17 (1.77) LR	3.58 (2.02)MR	5.50 (2.43)HS	7.20 (2.75) MR	7.00 (2.72)MR	2.17 (1.62)
37.	AMS 353	0.99 (1.19)R	0.00 (0.71)MR	9.10 (3.09)HR	2.33 (1.82) LR	3.89 (2.10)LR	6.00 (2.54)HS	21.00 (4.60) LR	8.00 (2.91)MR	0.83 (1.15)
38.	DSb 36	1.33 (1.34) MR	0.00 (0.71)MR	10.40 (3.30)HS	2.84 (1.96) LR	3.23 (1.93)MR	5.50 (2.45)HS	14.40 (3.48) MR	11.67 (3.48)HS	1.00 (1.21)
39.	AUKS 218	2.33 (1.68)LR	0.20 (0.84)LR	10.30 (3.28)HS	2.17 (1.78) LR	3.43 (1.98)MR	5.50 (2.45)HS	12.00 (3.48) MR	5.83 (2.51)R	2.33 (1.65)
40.	Pusa 97-12 (C)	--	--	13.50 (3.74)HS	--	--	--	--	--	--
41.	RVSM 2011-77	1.83 (1.52)MR	0.00 (0.71)MR	8.90 (3.06)HR	1.17 (1.47) R	4.30 (2.19)S	4.00 (2.12)MR	7.40 (2.72) MR	8.17 (2.94)MR	2.17 (1.62)
42.	PUSA-Sipani-6029	3.49 (1.99)LR	0.20 (0.84)LR	11.00 (3.38)HS	2.84 (1.96) LR	5.27 (2.40)HS	4.50 (2.23)LR	18.80 (4.35) LR	12.17 (3.55)HS	2.00 (1.56)
43.	NRC 167	1.99 (1.56)MR	0.05 (0.74)MR	10.80 (3.36)HS	2.67 (1.91) LR	5.57 (2.46)HS	4.50 (2.23)LR	20.70 (4.60) LR	4.83 (2.30)HR	1.67 (1.46)
44.	Asb 50	2.83 (1.81)LR	0.05 (0.74)MR	8.40 (2.98)HR	0.84 (1.35) HR	4.01 (2.12)S	4.00 (2.11)MR	13.60 (3.59) MR	9.67 (3.18)LR	0.83 (1.09)
45.	RVS 2011-76	1.83 (1.52)MR	0.20 (0.83)LR	9.60 (3.17)MR	2.50 (1.87) LR	3.80 (2.07)LR	4.00 (2.11)MR	10.80 (3.33) MR	8.33 (2.97)LR	0.83 (1.15)
46.	DSb 23(C)	--	--	--	--	3.28 (1.94)MR	4.00 (2.11)MR	--	--	--
47.	DSb 21(C)	--	--	--	--	2.51 (1.73)**R**	5.50 (2.43)HS	--	--	--
48.	KDS 753 (C)	--	--	--	--	3.58 (2.02)MR	5.00 (2.35)LR	16.80 (4.16) LR	--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)
49.	NRC 86 (C)	2.66 (1.78)LR	0.10 (0.77)LR	--	2.34 (1.82) LR	--	--	--	9.33 (3.12)LR	1.50 (1.40)
50.	JS 20-116 (C)	3.44 (1.99)LR	0.00 (0.71)MR	--	--	--	--	16.80 (4.14) LR	--	--
51.	JS 20-98 (C)	3.00 (1.87)LR	0.30 (0.89)S	--	2.50 (1.87) LR	--	--	--	5.00 (2.34)HR	0.83 (1.13)
52.	RSC 10-46 (C)	0.83 (1.15)R	0.00 (0.71)MR	--	--	--	--	--	6.83 (2.70)MR	1.33 (1.34)
53.	JS 20 34 (C)	--	--	--	2.84 (1.96) LR	--	--		4.00 (2.11)HR	1.00 (1.21)
54.	RKS 113 (C)	--	--	--	2.67 (1.91) LR	--	--	12.80 (3.61) MR	--	--
55.	MACS 1460 (C)	--	--	--	--	--	7.00 (2.73)HS	8.80 (3.05) MR	--	--
56.	MAUS 158 (LC)	--	--	--	--	--		--	9.67 (3.18)LR	1.83 (1.52)
57.	MAUS 2 (LC)	--	--	--	--	--	---	--	7.33 (2.79)MR	1.67 (1.47)
58.	MAUS 612 (LC)	--	--	--	--	--	----	--	5.17 (2.37)HR	0.83 (1.15)
	SEm+	(0.16)	(0.04)		(0.08)	(0.21)	(0.20)	(1.22)	(0.11)	(0.18)
	CD at 5 %	(0.50)	(0.12)		(0.24)	(0.64)	(0.56)	(2.46)	(0.33)	(0.50)

Table 3.14: ENT. 4 d. Field screening of IVT entries for resistance to major insect pests (Pod borer, Aphids, White fly, Leaf webber and YMV Rating)

S. No.	Entry	Pod Borer			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)
1.	VLS 99	32.25 (34.59)MR	5.60 (13.17)MR	0.17 (0.80)	33.80 (5.79)*LR	3.10 (1.89)HR	0.30 (0.89)HR	1.40 (1.37)LR	4.70 (2.28)*LR	9
2.	SL 1213	36.32 (37.05)LR	5.73 (13.75)MR	1.00 (1.21)	22.00 (4.72) LR	2.20 (1.62)HR	3.00 (1.87)S	1.10 (1.26)LR	3.50 (2.00) MR	0
3.	PS 1641	34.53 (35.97)LR	5.82 (13.48)MR	1.17 (1.24)	21.00 (4.64) LR	5.90 (2.52)HS	2.10 (1.61)HR	1.40 (1.37)LR	2.10 (1.60)MR	7
4.	NRC 154	30.53 (33.53)MR	7.28 (15.42)S	0.33 (0.89)	24.20 (4.97) LR	13.10 (3.68)HS	2.70 (1.78)MR	0.60 (1.04)R	3.80 (2.07) LR	3
5.	RVS 2011-32	37.57 (37.79)LR	7.62 (16.02)HS	0.33 (0.89)	31.60 (5.66) LR	4.70 (2.27)HS	4.50 (2.23)HS	1.00 (1.22)MR	4.20 (2.14) LR	5
6.	MACS 1655	38.15 (38.13)LR	5.03 (12.93)MR	0.50 (0.96)	30.40 (5.56) LR	1.70 (1.47)HR	3.30 (1.94)HS	1.10 (1.25)LR	2.90 (1.84) MR	BB
7.	PUSA-Sipani-2036	39.69 (39.03)S	10.70 (18.61)HS	0.67 (1.08)	35.40 (5.99) LR	2.10 (1.61)HR	1.70 (1.48)HR	1.60 (1.44)S	3.50 (1.99) MR	5
8.	AUKS 200	37.12 (37.52)LR	6.53 (14.80)LR	0.33 (0.89)	20.80 (4.60) LR	8.10 (2.93)HS	0.90 (1.18)HR	1.30 (1.34)LR	4.40 (2.21) LR	3
9.	DS 1318	36.32 (37.05)LR	5.44 (13.41)MR	0.67 (1.02)	30.10 (5.52) LR	2.90 (1.83)HR	2.20 (1.64)HR	0.80 (1.14)MR	2.30 (1.61)MR	3
10.	PS 24 ©	---	---	---	--	3.50 (1.99)HR	4.80 (2.30)HS	---	----	1
11.	NRC 163	29.79 (33.07)MR	7.00 (15.34)LR	0.33 (0.89)	10.60 (3.24) MR	9.70 (3.19)HS	5.10 (2.36)HS	0.80 (1.14)MR	2.60 (1.76) MR	9
12.	JS 22-01	39.66 (39.02)S	8.31 (16.75)HS	0.33 (0.91)	33.50 (5.80) LR	11.70 (3.49)HS	4.90 (2.32)HS	1.70 (1.48)HS	4.90 (2.32) LR	3
13.	RSC 11-20	45.38 (42.33)HS	11.10 (19.22)HS	0.67 (1.06)	24.00 (4.95) LR	1.00 (1.22)HR	1.50 (1.41)HR	0.80 (1.14)MR	3.00 (1.87) MR	3
14.	TS 46	40.74 (39.65)HS	4.61 (12.23)R	0.17 (0.80)	15.00 (3.79) MR	3.90 (2.09)HR	4.20 (2.16)HS	0.90 (1.18)MR	3.70 (2.05) LR	5
15.	MAUS 717	33.75 (35.50)MR	4.59 (12.35)R	0.00 (0.70)	20.60 (4.47) LR	1.40 (1.37)HR	2.00 (1.57)HR	0.90 (1.18)MR	3.10 (1.89) MR	9

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
16.	PS 1642	36.07 (36.90)LR	3.86 (11.25)HR	1.17 (1.27)	12.20 (3.49) MR	8.70 (3.03)HS	4.80 (2.30)HS	1.30 (1.34)LR	3.60 (2.02) MR	7
17.	AMS 20-19	38.43 (38.29)LR	4.39 (11.62)HR	0.50 (0.99)	16.00 (3.93) MR	3.40 (1.96)HR	5.10 (2.36)HS	0.80 (1.14)MR	5.30 (2.41) LR	5
18.	KDS 1097	44.31 (41.72)HS	8.68 (17.12)HS	0.83 (1.09)	13.80 (3.70) MR	2.70 (1.78)HR	1.90 (1.54)HR	1.30 (1.34)LR	5.80 (2.48) LR	9
19.	DSb 37	34.90 (36.20)MR	4.02 (11.51)HR	0.83 (1.15)	23.80 (4.62) LR	1.80 (1.51)HR	2.60 (1.75)MR	1.50 (1.41)S	4.00 (2.12) LR	9
20.	SL 958 ©	--	--	0.83 (1.15)	--	2.40 (1.70)HR	3.90 (2.09)HS	--	--	1
21.	ASb 51	39.83 (39.12)S	4.60 (12.39)R	0.50 (0.99)	17.40 (4.07) MR	1.70 (1.48)HR	3.90 (2.09)HS	1.30 (1.34)LR	4.00 (2.12) LR	3
22.	NRC 149	42.18 (40.48)HS	3.87 (10.43)HR	0.17 (0.80)	34.60 (5.84) LR	7.00 (2.73)HS	3.20 (1.92)HS	1.40 (1.37)LR	2.20 (1.64) MR	0
23.	VLS 98	38.22 (38.17)LR	5.14 (12.92)MR	1.33 (1.35)	19.40 (4.44) LR	6.30 (2.60)HS	1.50 (1.40)HR	0.70 (1.09)MR	3.50 (2.00) MR	7
24.	DS 1326	44.18 (41.64)HS	6.18 (14.16)LR	0.50 (0.96)	17.40 (4.16) MR	4.95 (2.33)HS	1.40 (1.37)HR	0.50 (0.99)HR	3.90 (2.09) LR	0
25.	SL 1234	41.40 (40.03)HS	4.60 (12.00)R	0.67 (1.08)	12.80 (3.58) MR	1.50 (1.40)HR	1.60 (1.44)HR	1.10 (1.25)LR	3.10 (1.90) MR	0
26.	RSC 11-22	39.84 (39.12)S	5.17 (12.94)MR	1.17 (1.27)	21.60 (4.70) LR	3.20 (1.92)HR	1.20 (1.30)HR	0.90 (1.18)MR	3.20 (1.92) MR	7
27.	Himso 1690	35.36 (36.47)MR	4.18 (11.76)HR	0.83 (1.15)	21.40 (4.66) LR	3.80 (2.07)HR	5.10 (2.36)HS	0.90 (1.17)MR	3.20 (1.92) MR	1
28.	BAUS 103	42.20 (40.50)HS	4.13 (11.63)HR	0.33 (0.89)	17.80 (4.27) MR	3.20 (1.92)HR	0.90 (1.18)HR	1.40 (1.37)LR	4.50 (2.21) LR	9
29.	JS 22-07	33.78 (35.52)MR	5.99 (14.16)LR	0.17 (0.80)	17.20 (4.20) MR	4.50 (2.23)S	3.90 (2.09)HS	0.50 (0.99)HR	3.70 (2.05) LR	7
30.	SL 1074 ©	--	--	--	--	3.30 (1.94)HR	4.40 (2.20)HS	--	--	0

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
31.	TS 107	40.29 (39.39)S	4.15 (11.71)HR	0.50 (0.99)	17.40 (4.16) MR	4.80 (2.30)HS	2.10 (1.61)HR	0.80 (1.14)MR	4.10 (2.14) LR	3
32.	MAUS 712	35.07 (36.30)MR	9.48 (17.93)HS	0.83 (1.13)	10.70 (3.32) MR	1.30 (1.33)HR	3.00 (1.87)S	0.90 (1.18)MR	3.80 (2.07) LR	5
33.	NRC 168	29.21 (32.70)MR	6.67 (14.95)LR	0.83 (1.15)	15.00 (3.94) MR	0.60 (1.04)HR	3.00 (1.86)S	0.60 (1.04)R	3.90 (2.10) LR	3
34.	MACS 1639	32.40 (34.68)MR	7.97 (16.39)HS	1.17 (1.28)	13.80 (3.70) MR	2.20 (1.64)HR	3.50 (1.99)HS	0.90 (1.18)MR	4.20 (2.17) LR	BB
35.	DS 1320	37.51 (37.75)LR	6.40 (14.64)LR	1.00 (1.19)	12.80 (3.58) MR	2.80 (1.81)HR	2.80 (1.81)LR	1.10 (1.26)LR	4.00 (2.12) LR	7
36.	KDS 1099	38.64 (38.42)LR	6.10 (14.15)LR	0.83 (1.15)	23.80 (4.93) LR	3.90 (2.09)HR	1.00 (1.22)HR	0.50 (0.99)HR	4.10 (2.13) LR	9
37.	AMS 353	37.83 (37.94)LR	6.46 (14.71)LR	0.00 (0.70)	16.20 (3.95) MR	2.20 (1.64)HR	1.40 (1.37)HR	1.50 (1.41)HS	3.70 (2.04) LR	9
38.	DSb 36	29.20 (32.70)MR	6.15 (14.36)LR	0.50 (0.96)	16.00 (3.93) MR	2.30 (1.67)HR	2.60 (1.75)MR	1.10 (1.26)LR	3.10 (1.89) MR	BB
39.	AUKS 218	37.81 (37.93)LR	7.30 (15.66)S	0.83 (1.13)	**3.80 (2.05) R**	2.20 (1.64)HR	2.20 (1.64)HR	1.40 (1.37)LR	2.90 (1.84) MR	5
40.	Pusa 97-12 (C)	--	--	--	--	9.60 (3.17)HS	3.50 (1.99)HS	--	--	3
41.	RVSM 2011-77	41.61 (40.15)HS	4.59 (12.37)R	1.67 (1.46)	18.40 (4.26) LR	12.30 (3.57)HS	1.50 (1.40)HR	0.80 (1.14)MR	3.90 (2.10) LR	5
42.	PUSA-Sipani-6029	35.98 (36.84)MR	4.92 (12.81)MR	1.00 (1.21)	**3.40 (1.94) R**	6.40 (2.62)HS	0.60 (1.04)HR	1.10 (1.26)LR	0.22	9
43.	NRC 167	40.60 (39.57)S	4.07 (11.61)HR	1.00 (1.22)	18.20 (4.28) LR	1.00 (1.22)HR	2.10 (1.61)HR	0.90 (1.18)MR	0.45	5
44.	Asb 50	38.78 (38.50)LR	4.26 (11.84)HR	1.00 (1.21)	26.50 (5.20) LR	3.20 (1.92)HR	3.60 (2.02)HS	0.60 (1.04)R	4.10 (2.14) LR	3
45.	RVS 2011-76	34.25 (35.81)MR	4.25 (11.77)HR	0.50 (0.99)	30.0 (5.52) LR	4.40 (2.21)LR	2.40 (1.69)HR	1.00 (1.22)MR	3.80 (2.07) LR	5
46.	JS 20 116 (C)	--	--	--	24.00 (4.64) LR	--	--	--	3.20 (1.91) MR	--
47.	RKS 113 (C)	--	--	--	28.00 (5.33) LR	--	--	--	5.40 (2.42) LR	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
48.	MACS 1460	37.40 (37.69)LR	5.16 (13.12)MR	--	19.30 (4.35) MR	--	--	--	2.60 (1.75) MR	--
49.	RSC 10-46 (NC)	--	--	1.00 (1.14)	--	--	--	0.70 (1.09)MR	--	--
50.	KDS 753(C)	36.84 (37.35)LR	6.75 (15.06)LR	--	20.50 (4.57) LR	--	--	--	2.60 (1.73) MR	--
51.	DSb 23 (C)	33.09 (35.10)MR	7.13 (15.37)S	--	--	--	--	--	--	--
52.	DSb 21 (C)	32.31 (34.63)MR	5.01 (12.75)MR	--	--	--	--	--	--	--
53.	NRC 86 (C)	--	--	1.33 (1.33)	1.33 (1.33)	--	--	1.30 (1.34)LR	--	--
54.	JS 20-98 (C)	--	--	1.17 (1.24)	--	--	--	1.20 (1.30)LR	--	--
55.	JS 20-34 (C)	--	--	0.83 (1.15)	--	--	--	0.50 (0.99)HR	--	--
56.	MAUS 158 (LC)	--	--	0.83 (1.15)	--	--	--	1.10 (1.26)LR	--	--
57.	MAUS 2 (LC)	--	--	1.17 (1.27)	--	--	--	1.40 (1.37)LR	--	--
58.	MAUS 612 (LC)	--	--	0.17 (0.80)	--	--	--	0.80 (1.13)MR	--	--
59.	**SE +**	(1.92)	(0.38)	(0.17)	(0.96)	(0.89)	(0.78)	(0.05)	(0.22)	--
60.	**CD at 5 %**	(5.69)	(1.09)	(0.47)	(1.94)	(0.25)	(0.22)	(0.16)	(0.45)	--

ENT. 3.15: ENT. 4 e. Field screening of IVT (<u>early</u>) entries for resistance to major insect pests

Sr. No	Genotype	Leaf Defoliators/ mrl *				Girdle beetle infestation (%) *				Stem fly (% stem tunneling)				*H. armigera* /mrl
		A'vati	Kota	Sehore	P'bhani	A'vati	Kota	Indore	P'bhani	A'vati	Sehore	Indore	P'bhani	P'bhani
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1	PS 1656	0.20 (0.83)LR	2.84 1.96) S	1.66 (1.47)MR	9.00 (3.08)LR	0.05 (0.74)MR	21.67 (27.72) LR	12.86 (21.01) LR	5.86 (13.98)LR	55 (47.88)LR	0.00 (0.00)HR	30.89 (33.76)LR	16.42 (23.89)HR	0.67 (1.08)
2	NRC 153	0.15 (0.81)LR	2.17 (1.78) LR	1.99 (1.56)LR	9.83 (3.21)LR	0.25 (0.85)LR	18.34 (25.33) LR	12.13 (20.38) LR	3.57 (10.83)MR	45 (42.12)LR	19.29 (25.98)R	45.97 (42.69)S	23.37 (28.88)MR	0.67 (1.06)
3	VLS 100	0.05 (0.74)**MR**	2.67 (1.91) S	1.33 (1.35)MR	4.00 (2.11)HR	0.00 (0.71)**MR**	16.67 (23.99)MR	4.93 (12.82)MR	4.61 (12.39)MR	55 (47.88)LR	0.00 (0.00)HR	66.49 (54.63)HS	50.89 (45.50)HS	0.50 (0.99)
4	NRC 155	0.15 (0.81)**LR**	0.84 (1.35) HR	0.83 (1.14) R	4.83 (2.30)HR	0.25 (0.85)**LR**	13.34 (21.27)MR	7.45 (15.83) LR	4.69 (12.46)MR	45 (42.12)LR	0.00 (0.00)HR	52.73 (46.56)HS	45.22 (42.24)HS	0.50 (0.96)
5	RVS 2011-73	0.00 (0.71)**MR**	1.83 (1.68) MR	1.83 (1.52)LR	5.50 (2.44)HR	0.00 (0.71)**MR**	18.33 (25.15) LR	11.56 (19.87) LR	4.91 (12.78)MR	55 (47.88)LR	24.96 (29.96)S	27.44 (31.59)LR	27.02 (31.30)LR	0.67 (1.08)
6	NRC 157	0.00 (0.71)**MR**	1.17 (1.47) MR	1.33 (1.34)MR	8.83 (3.05)LR	0.00 (0.71)**MR**	11.67 (19.92)MR	9.97 (18.40) LR	2.80 (9.61)R	45 (42.12)LR	13.75 (21.73)R	64.50 (53.43)HS	14.23 (22.16)HR	0.83 (1.09)
7	AUKS 202	0.15 (0.81)**LR**	2.84 (1.96) S	2.33 (1.62)LR	6.00 (2.54)R	0.25 (0.85)**LR**	16.67 (23.99)MR	4.37 (12.07)MR	8.78 (17.22)S	55 (47.88)LR	21.14 (27.34)S	42.20 (40.51) S	16.09 (23.61)HR	0.50 (0.99)
8	NRC 169	0.20 (0.84)**LR**	2.33 (1.82) LR	3.99 (2.11) HS	12.50 (3.60)HS	0.00 (0.71)**MR**	15.00 (22.76)MR	10.27 (18.69) LR	6.63 (14.92)LR	45 (42.12)LR	17.38 (24.60)R	55.43 (48.11)HS	23.92 (29.27)MR	0.83 (1.13)
9	DS 1314	0.15 (0.81)**LR**	2.00 (1.41) R	0.83 (1.15)R	4.83 (2.30)HR	0.00 (0.71)**MR**	15.00 (22.76)MR	7.07 (15.42) LR	4.40 (12.01)MR	45 (42.12)LR	8.89 (15.30) R	(42.06) S	41.95 (40.36)HS	0.17 (0.80)
10	JS 22-04	0.15 (0.81)**LR**	2.00 (1.41) R	2.49 (1.73)LR	7.67 (2.83)MR	0.50 (1.00)**S**	11.67 (19.92)MR	6.69 (14.99)MR	5.43 (13.47)LR	45 (42.12)LR	24.02 (29.33)HS	26.87 (31.22)LR	31.94 (34.41)HS	0.50 (0.99)
11	NRC 151	0.15 (0.81)**LR**	2.00 (1.41) R	0.83 (1.15)R	8.83 (3.05)LR	0.25 (0.85)**LR**	13.34 (21.27)MR	6.78 (15.09)MR	5.72 (13.81)LR	45 (42.12)LR	12.98 (20.98)R	1.01 (45.58)HS	24.23 (29.46)MR	1.33 (1.34)
12	MACS-NRC 1710	0.05 (0.74)**MR**	2.50 (1.87) LR	0.83 (1.15) R	10.00 (3.23)LR	0.25 (0.85)**LR**	23.34 (28.83) LR	4.04 (11.59)MR	4.22 (11.85)MR	45 (42.12)LR	17.33 (24.59)LR	72.90 (58.63)HS	29.18 (32.69)LR	0.67 (1.06)
13	NRC 159	0.15 (0.80)**LR**	0.84 (1.35) HR	1.33 (1.34)MR	6.50 (2.64)MR	0.00 (0.71)**MR**	15.00 (22.76)MR	6.30 (14.53)MR	3.42 (10.61)MR	45 (42.12)LR	0.00 (0.00)HR	46.55 (43.02) S	27.36 (31.49)LR	0.83 (1.15)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
14	JS 20-34	0.05 (0.74)**MR**	2.50 (1.87) LR	3.33 (3.03) HS	7.17 (2.76)MR	0.00 (0.71)**MR**	23.34 (28.83) LR	13.60 (21.64) LR	3.51 (10.78)MR	35 (36.22)MR	11.56 (19.86)R	65.80 (54.21)HS	48.68 (44.23)HS	0.33 (0.89)
15	NRC 158	0.15 (0.81)**LR**	2.84 (1.96) S	2.66 (1 .78) S	8.50 (2.99)LR	0.00 (0.71)**MR**	18.34 (25.33) LR	10.78 (19.17) LR	11.05 (19.39)HS	65 (53.78)S	10.36 (18.66)R	52.03 (46.16) HS	44.12 (41.61)HS	0.50 (0.99)
16	DS 1312	0.05 (0.74)**MR**	2.50 (1.87) LR	0.66 (1.07)HR	8.50 (2.99)LR	0.00 (0.71)**MR**	20.00 (26.49) LR	0.47 (3.93) MR	5.78 (13.86)LR	35 (36.22)MR	14.31 (22.21)LR	36.42 (37.12)LR	44.05 (41.57)HS	1.33 (1.34)
17	NRC 162	0.05 (0.74)**MR**	1.17 (1.47) MR	0.83 (1.15)R	8.83 (3.05)LR	0.75 (1.11)**HS**	11.67 (19.92)MR	5.77 (13.89)MR	6.74 (15.02)LR	40 (39.11)MR	10.24 (18.59)R	61.30 (51.53)HS	5.19 (13.04)HR	0.83 (1.15)
18	JS 22-03	0.00 (0.71)**MR**	2.34 (1.82) LR	2.66 (1.78)LR	9.67 (3.18)LR	0.00 (0.71)**MR**	18.34 (25.33)MR	19.07 (25.89) LR	11.41 (19.69)HS	40 (39.11)MR	27.57 (31.63)HS	76.43 (60.96)HS	37.50 (37.75)HS	0.50 (0.99)
19	NRC 165	0.15 (0.81)**LR**	1.17 (1.47) MR	2.33 (1.68)LR	7.33 (2.79)MR	0.00 (0.71)**MR**	13.34 (21.27)MR	12.77 (20.93) LR	7.13 (15.44)LR	35 (36.22)MR	23.11 (28.56)HS	42.87 (40.90) S	17.76 (24.91)HR	0.83 (1.13)
20	PusaSipani-1050	0.00 (0.71)**MR**	2.67 (1.91) S	0.66 (1.07)HR	5.67 (2.48)R	0.00 (0.71)**MR**	21.67 (27.72) LR	13.22 (21.32) LR	7.67 (16.07)LR	40 (39.11)MR	13.14 (21.01)LR	59.61 (50.54)HS	11.17 (19.47)HR	0.67 (1.06)
21	NRC 152	0.15 (0.81)**LR**	2.34 (1.82) LR	2.16 (1.83) S	3.50 (1.98)HR	0.25 (0.85)**LR**	20.00 (26.49) LR	14.74 (22.58) LR	7.32 (15.52)LR	40 (39.11)MR	10.83 (19.19)R	59.13 (50.26)HS	32.35 (34.65)HS	0.00 (0.70)
22	AUKS 208	0.00 (0.71)**MR**	0.84 (1.35) R	1.66 (1.46)MR	8.67 (3.02)LR	0.00 (0.71)**MR**	11.67 (19.92)MR	8.82 (17.28) LR	9.75 (18.18)HS	45 (42.12)LR	16.25 (23.74)LR	70.98 (57.40)HS	34.70 (36.06)HS	0.83 (1.13)
23	NRC 161	0.05 (0.74)**MR**	1.17 (1.47) MR	2.66 (1.77)LR	8.33 (2.96)LR	0.00 (0.71)**MR**	15.00 (22.76)MR	3.41 (10.63)MR	3.08 (9.99)R	35 (35.78)MR	11.24 (19.41)R	61.27 (51.51)HS	8.16 (16.59)HR	0.00 (0.70)
24	Pusa-Sipani-408	0.05 (0.74)**MR**	2.67 (1.91) S	1.16 (1.29)MR	5.67 (2.48)R	0.25 (0.85)**LR**	21.67 (27.60) LR	6.27 (14.50)MR	3.48 (10.74)MR	50 (45.00)LR	8.53 (16.69)R	46.46 (42.97) S	10.60 (19.00)HR	0.67 (1.06)
25	NRC 156	0.20 (0.83)**LR**	0.84 (1.35) R	1.66 (1.47)MR	13.00 (3.67)HS	0.00 (0.71)**MR**	13.34 (21.27)MR	3.47 (10.74)MR	5.44 (13.46)LR	55 (47.88)LR	21.36 (27.50)S	37.55 (37.79)LR	29.53 (32.90)S	0.17 (0.80)
26	NRC 166	0.05 (0.74)**MR**	2.50 (1.87) LR	2.90 (1.86)S	16.00 (4.06)HS	0.00 (0.71)**MR**	20.00 (26.57) LR	5.78 (13.91)MR	5.66 (13.75)LR	45 (42.12)LR	12.50 (20.60)R	26.83 (31.20)LR	10.23 (18.65)HR	1.17 (1.27)
27	NRC 160	0.15 (0.81)**LR**	1.00 (1.41) R	2.33 (1.63)LR	10.33 (3.28)S	0.00 (0.71)**MR**	11.67 (19.92)MR	5.14 (13.10)MR	1.63 (7.16)HR	35 (36.22)MR	15.61 (23.25)LR	31.18 (33.94)LR	8.55 (16.98)HR	1.00 (1.21)
28C	JS 95-60	0.00 (0.71)**MR**	2.84 (1.96) S	2.66 (1.78)S	4.00 (2.12)HR	0.50 (1.00)**S**	18.33 (25.15) LR	4.98 (12.89)MR	0.43 (2.64)HR	50 (45.00)LR	15.93 (23.47)LR	53.82 (47.19)HS	66.41 (54.58)HS	0.17 (0.80)
29	NRC 164	0.15 (0.81)**LR**	2.17 (1.78) LR	0.83 (1.15)R	10.17 (3.26)S	0.50 (1.00)**S**	18.34 (25.33) LR	4.84 (12.70)MR	4.81 (12.64)MR	25 (29.89)R	32.95 (34.99)HS	49.45 (44.68)HS	20.75 (27.08)MR	0.67 (1.08)
30	NRC 150	0.00 (0.71)**MR**	2.34 (1.82) LR	2.33 (1.68)LR	9.50 (3.15)LR	0.00 (0.71)**MR**	16.67 (23.99)MR	6.78 (15.09)MR	9.71 (18.15)HS	45 (42.12)LR	14.55 (22.38)LR	46.06 (42.74) S	13.83 (21.82)HR	0.33 (0.89)
31	KDS 980	0.10 (0.77)**LR**	2.17 (1.78) LR	2.50 (1.73)LR	8.83 (3.04)LR	0.00 (0.71)**MR**	18.34 (25.33) LR	12.18 (20.43) LR	3.70 (11.06)MR	55 (47.88)LR	27.75 (31.74)HS	67.94 (55.51)HS	20.02 (26.57)R	0.33 (0.89)
	SE (m) ±	**0.03**	**0.08**	**(0.10)**	**0.12**	**0.07**	**2.08**	**(6.99)**	**1.02**	**3.40**	**(1.69)**	**(6.42)**	**1.09**	**0.15**
	CD at 5%	**0.10**	**0.22**	**(0.30)**	**0.35**	**0.21**	**6.02**	**(14.27)**	**2.83**	**9.85**	**(4.92)**	**(13.10)**	**3.02**	**0.41/NS**

Table 3.16: ENT. 5a - Evaluation of germplasm lines at hot spots for resistance against major insect pests at Dharwad.

Sl. No.	Accession No.	Defoliators (larvae/mrl)*	Leaf damage (% defoliation)**	Pod borer damage** (%)	Yield (Kg/ha)
(1)	(2)	(3)	(4)	(5)	(6)
1	EC 590225	3.19 (1.92)MR	33.45 (35.32)MS	39.45 (38.89)LR	1167
2	EC 30967 A	3.89 (2.10)S	35.49 (36.55)MS	32.52 (34.75)MR	1044
3	WT 88	2.58 (1.75)**R**	22.70 (28.44)**LS**	30.73 (33.65)MR	1333
4	EC 390981 B	4.01 (2.12)HS	52.15 (46.21)S	30.23 (33.34)MR	833
5	TGX 849 D-13-4	4.12 (2.15)S	54.75 (47.71)S	43.77 (41.40)HS	722
6	EC 393237	3.76 (2.06)LR	36.50 (37.15)MS	34.35 (35.87)MR	767
7	TGX 1488-9-1D	4.09 (2.14)S	39.45 (38.89)MS	41.89 (40.32)S	806
8	EC 291397	3.59 (2.02)LR	40.25 (39.36)MS	37.32 (37.64)LR	944
9	EC 393228	3.03 (1.88)MR	30.55 (33.54)MS	32.52 (34.75)MR	1156
10	EC 333872	2.78 (1.81)MR	21.35 (27.51)LS	31.60 (34.19)MR	1300
11	EC 242072	2.39 (1.70)**R**	23.45 (28.95)**LS**	30.99 (33.81)MR	1383
12	SL (E) 1	4.07 (2.14)S	62.40 (52.16)S	41.58 (40.14)S	719
13	SQL 37	3.69 (2.05)LR	34.50 (35.96)MS	35.86 (36.77)LR	1056
14	KB 17	2.81 (1.82)MR	24.60 (29.72)**LS**	36.94 (37.41)LR	1483
15	EC 242111	4.28 (2.19)S	42.30 (40.55)MS	36.49 (37.15)LR	987
16	EC 309537	3.27 (1.94)MR	27.50 (31.62)MS	32.27 (34.60)MR	1506
17	EC 350664	3.66 (2.04)LR	28.40 (32.19)MS	34.63 (36.03)MR	1556
18	JSM 227	5.01 (2.35)HS	55.30 (48.02)S	40.51 (39.51)S	778
19	JS 20-69	2.32 (1.68)**R**	26.50 (30.97)MS	33.10 (35.11)MR	1622
20	EC 390981A	4.23 (2.17)S	32.64 (34.83)MS	40.29 (39.39)S	889
21	JS 20-98	3.15 (1.91)MR	27.80 (31.81)MS	33.03 (35.07)MR	1694
22	EC 114572	3.55 (2.01)LR	42.70 (40.79)MS	35.38 (36.48)LR	1361
23	JS 20-50	3.21 (1.93)MR	27.50 (31.62)MS	34.42 (35.91)MR	1278
24	NRC 86	2.86 (1.83)MR	24.50 (29.66)**LS**	37.60 (37.81)LR	1544
25	EC 457214	4.37 (2.21)S	37.40 (37.69)MS	43.38 (41.18)HS	834
26	EC 289099	4.06 (2.14)S	42.60 (40.73)MS	38.04 (38.07)LR	789

(1)	(2)	(3)	(4)	(5)	(6)
27	EC 391332	2.24 (1.66)**R**	24.40 (29.59)**LS**	35.56 (36.59)MR	1411
28	IC 596520	3.04 (1.88)MR	39.60 (38.98)MS	38.40 (38.28)LR	1178
29	EC 333929	5.43 (2.44)HS	55.80 (48.31)S	41.98 (40.37)S	722
30	EC 103336	5.56 (2.46)HS	51.50 (45.84)S	40.51 (39.51)S	767
31	VP 1206-9	4.15 (2.16)S	37.30 (37.63)MS	36.49 (37.15)LR	1056
32	PI 204336	3.00 (1.87)MR	34.70 (36.08)MS	31.27 (33.99)MR	1112
33	AGS 164	4.39 (2.21)S	58.50 (49.87)S	45.41 (42.35)HS	984
34	JS 20-29	3.45 (1.99)MR	24.70 (29.79)**LS**	31.60 (34.19)MR	1183
35	G 10525	3.70 (2.05)LR	28.40 (32.19)MS	33.71 (35.48)MR	1056
36	G 4P15	3.64 (2.03)LR	29.60 (32.95)MS	34.84 (36.16)MR	1150
37	G 47	3.44 (1.98)MR	29.90 (33.14)MS	34.03 (35.67)MR	1097
38	G 03465	4.32 (2.20)S	52.50 (46.41)S	43.40 (41.19)HS	1011
39	KDS 726	2.98 (1.87)MR	27.40 (31.55)MS	34.01 (35.66)MR	1504
40	MAUS 7107	2.35 (1.69)**R**	27.80 (31.81)MS	33.04 (35.07)MR	1558
41	DSb 21	2.45 (1.72)**R**	23.20 (28.78)**LS**	32.81 (34.93)MR	1783
42	Himso 1685	5.02 (2.35)HS	55.60 (48.20)S	45.18 (42.22)HS	1129
43	JS 20-116	3.98 (2.12)LR	38.50 (38.34)MS	36.80 (37.33)LR	1167
44	JS 20-41	2.45 (1.72)MR	29.60 (32.95)MS	38.04 (38.07)LR	1672
45	JS 20-89	3.15 (1.91)MR	27.75 (31.78)MS	35.56 (36.59)MR	1318
46	NRC 94	4.01 (2.12)S	53.60 (47.05)S	38.40 (38.28)LR	1106
47	PS 1476	3.35 (1.96)LR	35.80 (36.74)MS	39.98 (39.20)S	1207
48	RKS 113	2.69 (1.79)MR	24.30 (29.52)**LS**	32.51 (34.75)MR	1556
49	MACS 693	3.28 (1.94)MR	28.30 (32.13)MS	34.98 (36.24)MR	1522
50	EC 241778	3.16 (1.91)MR	34.50 (35.96)MS	30.45 (33.48)MR	1544
51	JS 335 (C)	3.14 (1.91)MR	26.50 (30.97)MS	37.14 (37.53)LR	1613
	S.Em±	0.18	1.30	1.67	53.25
	CD @ 5%	0.55	3.65	5.12	158.89

HR = Highly resistant, R = Resistant, MR= Moderately resistant, LR = Low Resistant, S = Susceptible, MS = Moderately susceptible, LS = Least susceptible, HS = Highly susceptible * Figures in the parenthesis are transformed $\sqrt{x+0.5}$ values, ** Transformed angular values

Table 3.17: ENT. 5b. Screening of germplasm line at hot spots for resistance against major insect-pests (*Kharif*-2019) (Central region)

S. No.	Accession No.	Indore			Sehore			
		Stem fly (% stem tunneling)	Girdle beetle (% damage)	Girdle beetle (% Infestation)	Semiloopers		Stem fly (% Stem tunneling)	Girdle beetle (% Infestation)
					Larvae/ mrl+	Defoliation (%)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	EC590225	28.27	7.41	22.22	1.33	20.20LS	12.5	5.00
2.	EC30967A	48.08	2.86	8.57	2.66	26.04 MS	50.00	0.00
3.	WT88	-	-	-	1.33	18.69LS	0.00	0.00
4.	EC390981B	40.69	0.00	4.65	0.66	3.5LS	16.66	4.00
5.	TGX849D-13-4	45.92	1.47	10.29	1.33	27.50 MS	11.37	0.00
6.	EC393237	-	-	-	1.00	26.00MS	13.33	0.00
7.	TGX1488-9-1D	-	-	-	0.33	2.4LS	0.00	0.00
8.	EC291397	-	-	-	1.33	13.50 LS	12.22	5.00
9.	EC393228	-	-	-	0.00	0.00	0.00	0.00
10.	EC333872	47.43	6.00	8.00	0.33	1.50LS	22.10	4.00
11.	EC242072	47.34	11.11	11.11	0.66	26.00 MS	16.00	5.85
12.	SL(E)1	44.91	7.69	23.08	1.66	27.50MS	18.33	24.4
13.	SQL37	25.00	1.96	7.84	1.66	20.50LS	33.33	10.66
14.	KB17	49.53	3.53	12.94	1.66	20.00LS	8.33	0.00
15.	EC242111	48.97	0.00	11.11	0.33	0.00	0.00	5.00
16.	EC309537	-	-	-	1.00	23.0LS	22.50	15.00
17.	EC350664	40.63	7.50	10.00	1.66	28.0MS	0.00	4.00
18.	JSM227	46.05	3.03	3.03	0.00	0.00	0.00	0.00
19.	JS20-69	65.97	5.00	15.00	1.00	19.50LS	14.28	33.3
20.	EC390981A	44.84	2.94	17.65	1.33	30.70MS	16.66	11.11
21.	JS20-98	73.98	0.00	4.17	0.33	0.00	20.00	12.5
22.	EC114572	69.27	0.00	4.55	1.33	15.50LS	23.33	10.00
23.	JS20-50	37.56	4.23	11.27	1.66	20.40 LS	13.33	16.66
24.	NRC86	43.60	0.00	3.45	033	13..5LS	10.00	10.4
25.	EC457214	66.46	0.00	7.41	1.66	26.10MS	18.46	6.25

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
26.	EC289099	-	-	-	2.00	28.50 MS	16.66	15.38
27.	EC391332	35.57	9.09	12.12	1.33	20.00LS	10.00	6.66
28.	IC596520	31.93	2.17	2.17	1.33	24.50LS	21.66	6.00
29.	EC333929	34.52	3.23	6.45	0.00	00.0	0.00	5.50
30.	EC103336	-	23.74	4.00	0.00	0.00	15.23	3.00
31.	VP1206-9	-	44.71	10.34	1.33	26.5MS	16.66	5.00
32.	PI204336	-	42.42	3.49	0.00	0.00	0.00	0.00
33.	AGS164	-	29.25	5.88	1.33	17.5LS	15.15	14.28
34.	JS20-29	-	48.57	7.14	2.66	17.0LS	22.2	20.00
35.	G10525	-	51.04	4.35	0.00	0.00	0.00	0.00
36.	G_4P_{15}	-	-	-	2.33	7.50LS	25.71	11.11
37.	G47	-	35.96	2.44	1.33	12.5LS	17.14	5.00
38.	GO3465	-	69.70	0.00	1.66	19.5LS	20.00	15.00
39.	KDS726	-	41.67	25.00	0.00	0.00	7.14	13.38
40.	MAUS7107	-	46.22	8.33	1.66	8.5LS	15.38	20.00
41.	DSB21	-	49.18	7.55	0.00	0.00	13.33	5.00
42.	HIMSO1685	-	54.55	15.00	2.66	13.50LS	20.00	13.33
43.	JS20-116	-	8.05	6.67	1.00	19.50LS	16.66	12.50
44.	JS20-41	-	8.33	0.00	1.66	12.00LS	15.08	5.00
45.	JS20-89	-	26.26	6.15	1.66	9.00LS	12.50	15.75
46.	NRC94	-	59.63	2.86	1.33	16.00LS	0.00	16.66
47.	PS1476	-	-	-	0.00	0.00	15.38	0.00
48.	RKS113	-	-	-	1.33	0.00	11.00	5.00
49.	MACS693	-	62.50	7.04	1.33	20.50LS	0.00	7.15
50.	EC241778	-	39.15	0.00	0.00	19.59LS	0.00	20.00
51.	JS 335 (C)	-	--	--	3.33	27.50 MS	35.33	22.50

**Poor germination in S. No. 3,6,7,8,9,16,26,36,47&48 at Indore

Table 3.18: ENT. 5c. Evaluation of germplasm lines at hot spots for resistance against major insect-pestsat Imphal.

Code No.	Entries	No. of BHC larvae/m	No. of other defoliating larvae*/m(*leaf roller and tobacco caterpillar)	Percent defoliation at peak incidence/plant	No. of aphids/plant	Yield / row (kg)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Code 1	EC-590225	18.00	8.00	28.18 (MS)	30.80	0.300
Code 2	EC-30967A	11.33	9.00	27.14 (MS)	20.00	0.275
Code 3	WT-88	18.67	6.00	31.82 (MS)	10.00	0.100
Code 4	EC-390981B	20.67	8.00	30.00 (MS)	12.00	0.200
Code 5	TGX 849D-13-4	8.00	10.00	27.50 (MS)	16.00	0.250
Code 6	EC-393237	18.00	8.00	30.00 (MS)	14.00	0.115
Code 7	TGX 1488-9-ID	9.33	**4.00**	20.00 (LS)	9.00	0.275
Code 8	EC-291397	17.33	5.00	30.00 (MS)	10.80	0.170
Code 9	EC-333228	12.00	10.00	32.86 (MS)	24.00	0.180
Code 10	EC-333872	**4.00**	**4.00**	16.17 (LS)	4.80	**0.290**
Code 11	EC-242072	27.33	8.00	29.35 (MS)	22.00	0.120
Code 12	SL (E)-1	21.67	7.00	28.33 (MS)	24.00	0.200
Code 13	SQL-37	35.00	6.00	30.63 (MS)	13.00	0.115
Code 14	KB-17	44.00	10.00	30.00 (MS)	**0.00**	0.200
Code 15	EC-242111	28.67	10.00	22.00 (LS)	**0.00**	0.125
Code 16	EC-309537	6.67	10.00	20.91(LS)	16.00	0.175
Code 17	EC-350664	10.67	10.00	27.14 (MS)	12.40	0.250
Code 18	JSM-227	27.33	8.00	30.95 (MS)	12.00	0.100
Code 19	JS-20-69	4.00	12.00	22.31 (LS)	20.00	0.280
Code 20	EC-390981A	14.67	6.00	26.84 (MS)	6.40	0.225
Code 21	JS 20-98	4.67	6.00	18.00 (LS)	4.00	0.250
Code 22	EC-114572	**4.00**	**4.00**	15.00 (LS)	6.80	0.275
Code 23	JS 20-50	21.67	10.00	25.00 (MS)	9.00	0.280
Code 24	NRC-86	**2.67**	**2.00**	18.00 (LS)	**0.00**	**0.295**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Code 25	EC-457214	10.67	11.00	26.47 (MS)	6.80	0.175
Code 26	EC-289099	22.00	8.00	25.00 (MS)	20.00	0.200
Code 27	EC-391332	16.00	10.00	25.20 (MS)	20.00	**0.300**
Code 28	IC-596520	15.00	9.00	25.48 (MS)	15.60	0.220
Code 29	EC-333929	16.67	6.00	26.52 (MS)	10.00	0.275
Code 30	EC-103336	12.67	**4.00**	22.73 (LS)	9.20	0.100
Code 31	VP 1206-9	13.67	**4.00**	22.38 (LS)	30.00	0.200
Code 32	PI-204336	7.33	5.00	12.86 (LS)	4.00	0.280
Code 33	AGS-5164	25.67	9.00	28.18 (MS)	15.60	0.115
Code 34	JS 20-29	9.67	8.00	16.67 (LS)	20.00	0.225
Code 35	G-10525	9.00	13.00	23.33 (LS)	40.00	0.250
Code 36	G-4015	28.67	9.00	30.95 (MS)	13.20	0.160
Code 37	G-47	73.33	8.00	31.54 (MS)	10.00	0.120
Code 38	G-03465	16.00	14.00	26.84 (MS)	15.20	0.250
Code 39	KDS-726	7.33	**4.00**	19.47 (LS)	12.00	0.280
Code 40	MAUS-7107	5.67	10.00	24.74 (LS)	4.80	0.200
Code 41	DSB-21	43.33	6.00	30.00 (MS)	24.00	0.240
Code 42	HIMSO-1685	6.00	**4.00**	18.89 (LS)	4.00	0.250
Code 43	JS 20-116	66.67	10.00	32.86 (MS)	6.40	0.225
Code 44	JS 20-41	26.67	12.00	26.84 (MS)	26.80	0.100
Code 45	JS 20-89	12.67	8.00	21.43 (LS)	20.00	0.250
Code 46	NRC-94	25.67	10.00	29.00 (MS)	20.00	0.125
Code 47	PS-1476	8.33	**3.00**	21.43 (LS)	3.20	0.225
Code 48	RKS-113	30.00	5.00	27.14 (MS)	36.00	0.100
Code 49	MACS-693	15.00	4.00	23.33 (LS)	15.60	**0.300**
Code 50	EC-241778	60.00	10.00	30.77 (MS)	11.20	0.220
JS 335 (mean of 10 lines)		83.33	12.00	32.50 (MS)	17.60	0.250

LS: Least Susceptible, MS: Moderately susceptible

Table 3.19: ENT. 5d. Incidence of whitefly, *Bemisia tabaci* in soybean germplasm lines at PAU, Ludhiana

S. No.	Entry	Whitefly adults /trifoliate leaf			Yield (kg/ha)
		Sept. 2019	Oct. 2019	Mean	
1	EC 590225	4.00	5.00	4.50	-
2	EC 30967A	2.00	3.00	2.50	29.63
3	WT 88	5.00	4.00	4.50	51.85
4	EC 390981 B	1.50	2.00	1.75	-
5	TG x 849D-13-4	3.00	4.00	3.50	-
6	**EC 393237**	**0.50**	**1.00**	**0.60**	**103.70**
7	TG x 1488-911	3.00	6.00	4.50	66.67
8	EC 291397*	-	-	-	-
9	EC 393228*	-	-	-	-
10	EC 333872	2.00	3.00	2.50	-
11	**EC 242072**	**1.00**	**0.50**	**0.75**	**51.85**
12	**SLCE 11**	**0.80**	**0.60**	**0.70**	**103.70**
13	**CQL 37**	**1.00**	**1.80**	**0.90**	**44.44**
14	KB 17	6.50	5.00	5.75	51.85
15	EC 242111	2.00	1.00	1.50	-
16	EC 309537	1.00	2.00	1.50	37.04
17	EC 350664*	-	-	-	-
18	JSM 27*	-	-	-	-
19	**JS 20-69**	**1.00**	**0.60**	**0.80**	**718.52**
20	EC 390981 A	9.00	7.00	8.00	29.63
21	JS 20-98	1.50	2.00	1.75	155.56
22	EC 114572	1.50	3.00	2.25	-
23	JS 20-50	3.00	4.00	3.50	88.89
24	NBC 86*	-	-	-	-
25	EC 457214*	-	-	-	-
26	EC 289099	1.00	1.00	1.00	-
27	**EC 391332**	**1.50**	**0.50**	**1.00**	**29.63**
28	IC 596520	1.00	2.00	1.50	51.85
29	EC 333929	1.00	1.00	1.00	-
30	EC 103336	2.00	1.00	1.50	66.67
31	VP 12069	3.50	2.50	3.00	-
32	PI 204336*	-	-	-	-
33	AGS-164	2.50	1.50	2.00	37.04
34	**JS 20-29**	**0.50**	**1.00**	**0.75**	**422.22**
35	G 10525	2.50	2.00	2.25	88.89
36	GuP-15	2.00	1.00	1.50	-
37	G 47	1.00	2.00	1.50	29.63
38	G 03465	5.50	6.00	5.75	81.48
39	KDS 726*	-	-	-	-
40	MAUS 7107*	1.00	2.00	1.50	-
41	DSB 21*	-	-	-	-
42	HIMSO 1685	2.50	3.00	2.75	37.04
43	JS 20- 116	4.00	2.00	3.00	96.30
44	JS 20- 41	2.00	1.00	1.50	66.67
45	JS 20- 89	5.00	4.00	4.50	88.89
46	NRC 94	8.50	6.50	7.50	170.37
47	PS 1476	8.00	7.00	7.50	29.63
48	RKS 113*	-	-	-	-
49	MACS 693	3.50	4.00	3.75	-
50	EC 241778	1.50	1.00	1.25	-

* Entries got killed due to various diseases like Bud Necrosis Virus, SMV etc

Table 3.19: ENT. 6a. Evaluation of promising soybean genotypes for insect resistance, maturity and yield at Indore

Tr. No.	Genotypes	DTF	Stem fly	Girdle beetle		Yield (kg/ha)	
			% stem tunneling	% Infestation	% damage	UP	P
1	Cat. No. 47	27	47.40 (43.51)	7.59 (16.00)	4.42 (12.14)	1136	1359
2	Cat. No. 146	28	54.42 (47.54)	1.41 (6.82)	1.41 (6.82)	997	1483
3	VP 1165	38	37.81 (37.95)	11.26 (19.60)	6.00 (14.18)	1326	1608
4	$G_5 P_{22}$	37	50.62 (45.36)	5.96 (14.13)	3.15 (10.23)	1885	**2206**
5	Cat. No. 2503	40	47.00 (43.28)	4.73 (12.56)	1.58 (7.23)	1935	**2206**
6	$F_3 P_{18}$	46	70.00 (56.79)	6.64 (14.93)	2.70 (9.45)	**2130**	**2198**
7	$F_4 P_{21}$	46	71.57 (57.78)	8.17 (16.61)	3.10 (10.15)	2073	2168
8	JS 20-34	26	37.93 (38.01)	3.01 (10.00)	2.00 (8.12)	1859	2199
9	JS 97-52	46	50.30 (45.17)	9.97 (18.41)	4.39 (12.09)	2112	2257
10	JS 335	40	33.48 (35.35)	14.13 (22.08)	8.10 (16.54)	2196	2546
SEm ±			**(2.90)**	**(3.89)**	**(3.31)**	**154.05**	**116.51**
CD at 1%			**(8.34)**	**(11.18)**	**(9.53)**	**443.41**	**335.38**
CD at 5%			**(6.08)**	**(8.16)**	**(6.95)**	**323.64**	**244.79**

Table 3.20: ENT 6b: Evaluation of promising genotypes for resistance against major insect-pests at Kota

S. No.	Genotypes	Defoliators (Mrl)*	Girdle Beetle (% Infestation) **	Yield Kg/ha
1	AMS 108	2.50 (1.87) LR	18.34 (25.33) LR	63.89
2	AMS MB 5-18	1.17 (1.47) R	13.34 (21.27) MR	1594.44
3	AMSS 34	0.84 (1.35) HR	13.34 (21.27) MR	1047.22
4	DSb 32	2.50 (1.87) LR	15.00 (22.76) MR	930.55
5	DSb 34	1.84 (1.68) MR	15.00 (22.76) MR	505.56
6	EC 113778	2.00 (1.73) LR	16.67 (23.99) LR	438.89
7	EC 232019	2.34 (1.82) LR	23.34 (28.83) LR	413.89
8	EC 547464	0.84 (1.35) HR	11.67 (19.92) MR	1808.33
9	Harder	2.34 (1.82) LR	16.67 (23.99) LR	811.11
10	JS 20-41	2.00 (1.73) LR	13.33 (21.41) MR	811.11
11	JS 20-48	1.17 (1.47) R	13.34 (21.27) MR	1533.33
12	JS 20-50	1.84 (1.68) MR	15.00 (22.76) MR	1294.44
13	JS 20-51	1.00 (1.41) R	15.00 (22.76) MR	1155.55
14	JS 20-53	1.17 (1.47) R	13.34 (21.27) MR	2427.78
15	JS 20-55	0.84 (1.35) HR	13.34 (21.27) MR	1205.55
16	JS 20-59	2.17 (1.78) LR	16.67 (24.10) LR	1613.89
17	JS 20-61	2.50 (1.87) LR	15.00 (22.76) MR	2283.33
18	JS 20-86	2.34 (1.82) LR	20.00 (26.57) LR	1591.67
19	JS 21-71	2.17 (1.78) LR	15.00 (22.76) MR	766.67
20	KDS 1009	2.50 (1.87) LR	16.67 (24.10) LR	955.55
21	MACS 1493	2.50 (1.87) LR	21.67 (27.72) LR	463.89
22	MAUS 142	1.17 (1.47) R	11.67 (19.92) MR	800.00
23	NRC 127	2.17 (1.78) LR	16.67 (23.99) LR	2566.66
24	NRC 146	2.50 (1.87) LR	21.67 (27.72) LR	369.44
25	PS 1423	2.17 (1.77) LR	20.00 (26.49) LR	172.22
26	RSC 11-17	2.50 (1.87) LR	20.00 (26.49) LR	363.89
27	RVS 2011-10	2.50 (1.87) LR	18.34 (25.33) LR	383.33
28	SQL 31	2.67 (1.91) LR	18.34 (25.33) LR	794.44
29	SQL 32	2.00 (1.73) LR	18.34 (25.33) LR	527.78
30	SQL 37	2.17 (1.77) LR	16.67 (23.99) LR	263.89
	Sem±	(0.08)	(1.92)	86.71
	CD at 1%	(0.30)	(7.48)	337.96
	CD at 5%	(0.22)	(5.55)	250.76

* Square root transformed values ** Angular transformed values

Table 3.21: ENT 6c: Evaluation of promising genotypes for resistance to major pest of soybean at Sehore.

S. No.	Variety	Semiloopers Larvae/ mrl+	Stem fly % Stem tunneling ++	Girdle beetle % Infestation++	Defoliation (%)
1	AMS-108	2.66(1.78) S	24.66(29.65) S	11.10(19.42) LR	18.85(25.70) LS
2	AMSS 34	3.33(2.03) HS	13.15(20.80) MR	9.60(17.97) LR	9.50(17.73) LS
3	AMSMB 5-18	0.83(1.15) R	11.26(19.54) MR	8.25(16.62) MR	13.75(21.71) LS
4	AMS2014-1	1.33(1.34) MR	8.76(16.91) MR	10.20(18.56) LR	8.75(17.15) LS
5	DSb 32	1.16(1.29) MR	9.63(17.93)MR	7.90(15.92) MR	7.40(15.65) LS
6	DSb 34	0.66(1.07) HR	8.71(17.14)R	10.25(18.68) LR	5.00(12.90)LS
7	DSb 28-03	0.83(1.15) R	20.41(26.79)LR	9.50(17.93) LR	8.90(17.34) LS
8	EC347464	2.66(1.78) LR	11.59(19.52)MR	9.20(17.66) LR	14.00(21.93) LS
9	EC113778	2.33(1.68)LR	13.24(21.30)MR	14.4(21.99)LR	13.50(21.51) LS
10	EC 232019	0.66(1.07) HR	10.20(18.58)MR	10.15(18.57)LR	4.39(12.44) LS
11	Harder	2.16(1.83)S	12.07(20.27)MR	8.00(16.37)MR	16.75(24.05) LS
12	JS20-41	1.66(1.47) MR	12.12(20.21)MR	10.00(18.41)LR	7.65(16.02) LS
13	JS 20-48	1.33(1.35)MR	12.45(20.43)MR	12.90(20.98)LR	6.90(15.21) LS
14	JS 20-50	0.83(1.14) R	12.20(19.96)MR	5.75(13.56) R	8.05(16.42) LS
15	JS 20-51	1.83(1.52)LR	10.83 (19.09)MR	13.45(21.40)LR	11.00(19.35) LS
16	JS 20-53	2.66(1.78) S	32.16(34.19) HS	7.40(15.75)MR	7.85(16.20) LS
17	JS 20-55	2.33(1.62)LR	7.51(15.69)R	5.70(13.44) R	8.55(16.92) LS
18	JS 20-59	3.99(2.11) HS	12.80(20.92)MR	5.05(11.65) R	22.60(28.05)MS
19	JS 20-61	1.33(1.34)MR	12.16(20.02)MR	7.90(15.92)MR	12.25(20.25) LS
20	JS 20-86	2.49(1.73)LR	12.05(20.02)MR	5.85(13.88) R	15.50(23.17) LS
21	JS20-71	2.90(1.86)S	21.43(27.53) LR	6.75(15.06)LR	8.05(16.47) LS
22	KDS1009	2.33(1.63)LR	12.96(20.92)MR	8.40(16.69)LR	25.00(29.30)MS
23	MACS 1493	0.83(1.15) R	7.35(15.62) R	3.70(10.97) HR	10.40(18.79) LS
24	MAUS142	1.49(1.41) MR	18.97(25.80) LR	8.75(17.00) MR	17.50(24.66) LS
25	NRC 127	0.83(1.15) R	13.21(21.21) MR	3.00(9.69) HR	8.00(16.35) LS
26	NRC 146	1.66(1.46)MR	14.88(22.67)LR	11.5(20.32) MR	11.25(19.58) LS
27	PS 1423	2.66(1.77)LR	20.22(26.67)LR	2.33(1.63) HR	12.00(20.25) LS
28	RSC11-17	1.99(1.56)LR	20.81(27.02)LR	9.20(17.12) MR	24.00(27.25)MS
29	RSC11-07	1.33(1.34)MR	13.35(21.31) MR	8.40(16.69)LR	19.15(23.58) LS
30	RSC10-70	1.49(1.41)MR	8.75(17.84)R	2.33(1.63)HR	12.75(20.90) LS

S. No.	Variety	Semiloopers Larvae/ mrl+	Stem fly % Stem tunneling ++	Girdle beetle % Infestation++	Defoliation (%)
31	RVS2007-6	0.83(1.15) R	7.55(15.82) R	3.00(9.69) R	10.80(19.13) LS
32	RVS2011-10	0.83(1.14) R	12.83(20.93) MR	1.49(1.41) HR	6.40(15.88) LS
33	SQL 31	1.66(1.47) MR	16.07(23.56)LR	12.65(21.08)LR	8.95(17.39) LS
34	SQL 32	2.33(1.68) LR	14.39(22.26)LR	12.00(20.04) LR	24.95(29.28)MS
35	SQL 37	2.50(1.73) LR	13.80(21.81)MR	23.50(28.88) S	17.50(22.66) LS
36	SL1072	2.33(1.63) LR	11.70(19.96)MR	11.85(17.75) LR	13.60(21.60) LS
	SE m ±	**(0.10)**	**(2.38)**	**(2.55)**	**(1.84)**
	CD at 5 %	**(0.30)**	**(7.08)**	**(7.33)**	**(5.32)**

(+) Transformed to Vx+0.5, (++) Angular values

Table 3.22: ENT 6d: Evaluation of promising genotypes for resistance against major insect pests at Dharwad

Sl. No.	Promising genotypes	Defoliators (larvae/mrl)*	Leaf damage (% defoliation)**	Pod borer damage** (%)	Yield (kg/ha)
From Germplasm 2018					
1	AMS 108	3.04(1.88)MR	31.21(33.95)MS	33.75(35.50)LR	1305
2	AMSS 34	3.82(2.08)LR	35.24(36.40)MS	36.82(37.34)LR	1280
3	EC 347464	2.28(1.67)**R**	24.75(29.82)**LS**	31.03(33.84)MR	1263
4	EC 113778	2.85(1.83)MR	27.66(31.72)MS	27.03(31.31)MR	1464
5	EC 232019	3.07(1.89)MR	31.37(34.05)MS	28.07(31.98)MR	1391
6	Harder	3.94(2.11)LR	42.32(40.57)MS	38.65(38.42)S	1321
7	JS 20-41	2.35(1.69)**R**	23.15(28.75)**LS**	25.19(30.11)**R**	1594
8	JS 20-48	3.86(2.09)LR	32.97(35.03)MS	27.62(31.69)MR	1340
9	JS 20-50	3.57(2.02)LR	30.64(33.60)MS	29.82(33.08)MR	1301
10	JS 20-51	3.96(2.11)LR	44.12(41.61)MS	27.90(31.87)MR	1327
11	JS 20-53	2.82(1.82)MR	28.57(32.30)MS	30.29(33.38)MR	1475
12	JS 20-55	4.66(2.27)S	54.26(47.42)S	33.16(35.14)LR	1402
13	JS 20-59	5.47(2.44)HS	65.17(53.81)S	35.88(36.78)LR	1298
14	JS 20-61	3.82(2.08)LR	37.23(37.59)MS	31.24(33.97)MR	1296
15	JS 20-86	2.77(1.81)MR	33.18(35.16)MS	34.25(35.81)LR	1354
16	MAUS 142	2.69(1.79)MR	24.13(29.41)LS	28.57 (32.30)MR	1443
17	PS 1423	3.45(1.99)LR	31.07(33.86)MS	38.93(38.59)S	1308
18	SQL 31	4.17(2.16)S	45.09(42.17)MS	34.81(36.14)LR	1172
19	SQL 32	3.97(2.11)LR	35.38(36.48)MS	32.40(34.68)LR	1282
20	SQL 37	3.02(1.88)MR	38.25(38.19)MS	31.59(34.18)MR	1338
From IVT-2018					
21	RSC 11-17	2.94(1.85)MR	29.36(32.80)MS	27.33(31.51)MR	1258
22	KDS 1009	4.48(2.23)S	45.47(42.38)MS	32.68(34.85)LR	1072
23	JS 21-71	2.37(1.69)**R**	24.18(29.44)MS	27.72(31.76)MR	1408
24	NRC 146	4.65(2.27)S	37.25(37.60)MS	37.68(37.85)S	1229
25	RVS 2011-10	3.64(2.03)LR	40.17(39.32)MS	37.90(37.98)S	1082
From AVT-2018					
26	AMS 2014-1	2.85(1.83)MR	32.36(34.66)MS	32.34(34.64)LR	1423
27	DSb 34	2.39(1.70)**R**	24.58(29.71)MS	29.86(33.11)MR	1523
28	RSC 10-70	3.17(1.92)MR	46.37(42.90)MS	32.70(34.86)LR	1296
29	SL 1072	5.22(2.39)HS	52.15(46.21)S	34.28(35.82)LR	1095
30	MACS 1493	3.35(1.96)MR	35.26(36.41)MS	31.81(34.32)MR	1261
31	PS 1572	4.64(2.27)S	45.07(42.15)MS	30.79(33.69)MR	1150

32	AMS-MB-5-18	3.09(1.89)MR	37.89(37.98)MS	25.57(30.36)**R**	1379
33	DSb 32	2.26(1.66)**R**	22.15(28.06)LS	29.71(33.02)MR	1491
34	NRC 127	3.24(1.93)MR	38.47(38.32)MS	32.90(34.99)LR	1325
35	DSb 28-03	2.97(1.86)MR	27.19(31.42)MS	33.01(35.05)LR	1392
36	RVS 2007-06	3.92(2.10)LR	32.37(34.66)MS	30.14(33.28)MR	1238
37	JS 335 (C)	3.23(1.93)MR	28.65(32.35)MS	28.33(32.15)MR	1387
	S.Em±	0.21	1.28	1.48	51.21
	CD @ 5%	0.62	3.81	4.51	152.49
	CD @ 1%	0.86	5.07	5.89	203.17
	Mean	3.19	34.97	31.72	1289

HR = Highly resistant, R = Resistant, MR= Moderately resistant, LR = Low Resistant,

S = Susceptible, MS = Moderately susceptible, LS = Least susceptible, HS = Highly susceptible

* Figures in the parenthesis are transformed $\sqrt{x+0.5}$ values, ** Transformed angular values

Table 3.23: ENT 6e: Evaluation of promising genotypes for resistance against major insect-pests at Imphal.

Sl. No.	Entries	No. of BHC larvae/m	other defoliating larvae*/m(*leaf roller and tobacco caterpillar)	Percent defoliation at peak incidence/plant	No. of aphids/plant
1	AMS 2014-1	12.00 (3.43)*MR	19.00(4.34)*LR	27.67LS	18.00(4.24)*MR
2	AMS MB 5-18	18.00(4.24) MR	8.00(2.83) MR	25.67MS	21.80(4.59) LR
3	AMSS 34	24.00(4.91) LR	8.50(2.99) MR	24.00LS	12.00(3.49) MR
4	DSb 28-03	14.50(3.86) MR	14.00(3.77) LR	22.83LS	**7.60(2.85) MR**
5	DSb 32	19.50(4.47) MR	8.00(2.89) MR	26.50MS	31.30(5.43) LR
6	DSb 34	**10.00(3.18) R**	9.00(3.08) MR	19.16LS	33.60(5.47) LR
7	EC 232019	37.00(6.11) S	18.50(4.35) LR	26.24MS	13.00(3.61) MR
8	Harder	12.00(3.54) MR	7.00(2.73) MR	19.46LS	33.00(5.38) LR
9	JS 20-41	52.00(7.21) S	8.00(2.83) MR	26.93MS	12.40(3.57) MR
10	JS 20-48	22.00(4.74) LR	9.00(3.04)MR	26.21MS	30.80(5.29) LR
11	JS 20-50	31.00(5.61) S	11.00(3.39) LR	21.06LS	41.80(6.14) LR
12	JS 20-51	37.00(6.03) S	16.50(3.94) LR	26.68MS	26.00(5.11) LR
13	JS 20-53	**11.00(3.31) R**	21.00(4.53) S	27.58MS	48.00(6.64) LR
14	JS 20-55	28.00(5.33) LR	**5.50(2.43) MR**	27.09MS	37.70(5.70) LR
15	JS 20-59	26.00(5.14) LR	9.00(3.08)MR	26.85MS	30.70(5.40) LR
16	JS 20-61	**11.00(3.39) R**	13.00(3.61) LR	17.96LS	13.10(3.67) MR
17	JS 20-86	33.00(5.73) S	7.50(2.76) MR	25.50MS	27.40(5.08) LR
18	JS 21-71	14.00(3.72) MR	15.00(3.92) LR	24.14LS	19.20(4.37) MR
19	KDS 1009	17.00(4.17) MR	9.00(3.08)MR	26.13MS	32.00(5.63) LR
20	MACS 1493	16.00(4.03) MR	12.00(3.49) LR	19.91LS	17.00(4.14) MR
21	MAUS 142	**8.00(2.83) R**	**3.50(1.96) MR**	19.17LS	11.00(3.39) MR
22	NRC 127	**9.00(3.08) R**	7.00(2.63) MR	19.38LS	**7.00(2.73) MR**
23	NRC 146	43.00(6.54) S	17.00(4.17) S	28.71MS	26.60(4.97) LR
24	PS 1572	**7.00(2.73) R**	7.00(2.56) MR	20.17LS	**6.60(2.65) MR**
25	RSC 11-17	**9.00 (3.36) R**	**4.00(2.12) MR**	**16.25LS**	10.20(3.26) MR
26	RVS 2007-6	28.00(5.33) LR	10.00(3.23) LR	27.09MS	10.40(3.30) MR
27	RVS 2011-10	32.00(5.68) S	9.00(3.08) MR	21.79LS	21.20(4.50) LR
28	SQL 31	20.00(4.52) LR	8.00(2.92) MR	22.33LS	**8.50(2.97) MR**
29	SQL 32	18.00(4.24) MR	10.00(3.23) LR	21.15LS	22.80(4.82) LR
30	SQL 37	16.00(3.99) MR	**6.50(2.64) MR**	18.62LS	22.00(4.72) LR
SE +		0.52	0.65	1.74	1.11
CD at 5 %		1.07	1.33	3.55	2.27

*****Figures in parentheses are square root (x + 0.5) transformed values; Percent defoliation is an original value; LS: Least Susceptible; MS: Moderately susceptible

Table 3.24: ENT 7a: Effect of microbial agents on population of tobacco caterpillar/mrl in soybean

Treatments	Amravati							lahpmI									
	1st spray			2nd spray			Yield (kg/ha)	1st spray			2nd spray			3rd spray			Yield (kg/ha)
	DBT	3 DAT	7 DAT	DBT	3 DAT	7 DAT		PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	
T1*Beauveria bassiana* @ 4g/l	1.75 (1.32)	1.50 (1.22)	1.08 (1.04)	1.59 (1.25)	1.08 (1.04)	1.00 (0.99)	864.19	1.13 (1.26)	0.58 (1.02)	0.54 (1.02)	2.63 (1.75)	1.71 (1.47)	1.54 (1.40)	0.96 (1.19)	0.88 (1.14)	0.25 (0.85)	1648.15
T2 *Metarhizium anisopliae* @ 4g/l	2.00 (1.41)	1.92 (1.38)	1.75 (1.29)	2.08 (1.43)	1.84 (1.34)	1.67 (1.26)	725.30	0.96 (1.20)	0.71 (1.09)	0.50 (0.98)	2.46 (1.71)	1.46 (1.39)	1.00 (1.22)	0.96 (1.19)	0.88 (1.13)	0.25 (0.85)	**1725.31**
T3* *Nomuraea rileyi* @ 4g/l	-	-	-	-	-	-	-	0.96 (1.20)	1.17 (1.28)	0.67 (1.08)	3.00 (1.86)	1.58 (1.43)	1.58 (1.43)	1.08 (1.26)	0.92 (1.19)	0.25 (0.84)	1567.90
T4 Bt Commercial @ 1g/l	1.50 (1.22)	1.42 (1.19)	1.33 (1.15)	1.58 (1.25)	1.42 (1.18)	1.25 (1.10)	805.55	1.08 (1.26)	0.79 (1.13)	0.83 (1.15)	2.54 (1.73)	1.58 (1.41)	1.21 (1.28)	1.08 (1.23)	0.96 (1.19)	0.13 (0.78)	1700.62
T5 Untreated check	1.33 (1.15)	2.08 (1.44)	2.25 (1.50)	2.25 (1.49)	2.17 (1.46)	2.25 (1.49)	540.12	1.08 (1.26)	1.42 (1.37)	1.79 (1.49)	3.54 (2.01)	4.29 (2.17)	4.63 (2.25)	1.96 (1.56)	1.17 (1.28)	0.25 (0.85)	1200.62
SE (m) ±	0.09	0.04	0.08	0.09	0.07	0.07	51.40	-	-	-	-	-	-	-	-	-	100.50
CD at 5%	0.29	0.13	0.25	0.27	0.22	0.21	158.39	NS	NS	0.23	NS	0.28	0.36	NS	0.24	NS	218.96
CV%	15.53	6.79	14.28	13.24	12.12	12.22	12.82	-	-	-	-	-	-	-	-	-	
F test	NS	Sign	Sign	NS	Sign	Sign	Sign.	-	-	-	-	-	-	-	-	-	

Figures in parentheses are square root values, *Due to non availability of *Nomuraea rileyi* formulation data could not be obtained

Table 3.25: ENT 7b: Effect of microbial agents on population of other defoliators in soybean at <u>Imphal</u>.

Treatments	Bihar hairy caterpillar/m									Bean leaf webber/m								
	1st spray			2nd spray			3rd spray			1st spray			2nd spray			3rd spray		
	PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT
T1 *Beauveria bassiana* @ 4g/l	66.67 (7.20)	40.33 (5.47)	8.75 (2.43)	7.08 (2.60)	5.08 (2.30)	2.08 (1.57)	5.08 (2.28)	4.75 (2.28)	1.00 (1.06)	3.13 (1.88)	2.63 (1.76)	1.58 (1.44)	2.33 (1.67)	1.96 (1.56)	1.17 (1.28)	1.75 (1.49)	1.54 (1.40)	1.00 (1.19)
T2 *Metarhizium anisopliae* @ 4g/l	48.75 (5.99)	15.00 (2.47)	1.67 (1.20)	5.08 (2.29)	5.00 (2.34)	1.92 (1.48)	2.83 (1.79)	3.71 (1.97)	0.50 (0.93)	4.42 (2.20)	3.92 (2.09)	0.88 (1.09)	2.58 (1.75)	1.88 (1.53)	1.13 (1.22)	1.58 (1.44)	1.17 (1.23)	1.04 (1.19)
T3 *Nomuraea rileyi* @ 4g/l	44.25 (5.80)	16.75 (3.72)	4.00 (1.80)	5.67 (2.47)	4.38 (2.16)	2.75 (1.68)	5.17 (2.37)	4.75 (2.23)	3.50 (1.84)	3.29 (1.92)	2.42 (1.70)	1.46 (1.38)	2.46 (1.71)	2.21 (1.63)	1.46 (1.38)	1.08 (1.22)	1.21 (1.25)	1.17 (1.28)
T4 Bt Commercial @ 1g/l	87.42 (8.49)	6.92 (2.17)	3.75 (1.75)	5.00 (2.14)	8.42 (2.86)	2.50 (1.60)	7.75 (2.82)	5.00 (2.34)	0.67 (1.02)	5.17 (2.34)	3.42 (1.95)	1.00 (1.18)	2.21 (1.62)	1.38 (1.36)	0.88 (1.10)	2.08 (1.59)	1.63 (1.39)	1.13 (1.23)
T5 Untreated check	26.25 (4.53)	21.83 (2.51)	21.58 (4.15)	27.04 (4.78)	27.75 (5.23)	10.50 (3.23)	11.33 (3.29)	8.25 (2.92)	1.25 (1.12)	4.33 (2.17)	4.83 (2.27)	4.17 (2.15)	4.08 (2.13)	4.88 (2.30)	4.29 (2.15)	4.42 (2.20)	5.25 (2.38)	4.21 (2.12)
CD @ 5%	NS	NS	1.77	1.78	1.10	1.08	0.98	0.58	NS	NS	0.35	0.43	0.33	0.26	0.43	0.33	0.39	0.39

Figures in parentheses are square root (x + 0.5) values

Table 3.26: ENT 7c: Effect of microbial agents on defoliators population on soybean at Prabhani.

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	
T1 *Beauveria bassiana* @ 4g/l	6.92 (2.72)	5.75 (2.49)	3.58 (2.02)	2.92 (1.84)	2.08 (1.60)	0.75 (1.11)	0.67 (1.07)	0.58 (1.03)	0.25 (0.86)	0.17 (0.80)	0.08 (0.75)	0.00 (0.70)	1141
T2 *Metarhizium anisopliae* @ 4g/l	8.08 (2.92)	6.25 (2.59)	4.00 (2.11)	3.25 (1.93)	2.33 (1.68)	1.00 (1.22)	0.83 (1.15)	0.75 (1.11)	0.42 (0.95)	0.33 (0.91)	0.25 (0.86)	0.08 (0.75)	1032
T3 *Nomuraea rileyi* @ 4g/l	7.42 (2.80)	5.33 (2.41)	3.17 (1.91)	2.58 (1.75)	1.83 (1.52)	0.58 (1.03)	0.75 (1.11)	0.42 (0.95)	0.17 (0.80)	0.08 (0.75)	0.00 (0.70)	0.00 (0.70)	1281
T4 Bt Commercial @ 1g/l	6.83 (2.70)	5.83 (2.51)	3.75 (2.05)	3.08 (1.79)	2.17 (1.63)	0.83 (1.15)	0.58 (1.03)	0.50 (0.99)	0.33 (0.90)	0.17 (0.80)	0.17 (0.80)	0.00 (0.70)	1110
T5 Untreated check	7.33 (2.79)	8.08 (2.92)	10.67 (3.34)	9.92 (3.22)	6.67 (2.67)	2.92 (1.84)	0.83 (1.15)	0.92 (1.18)	1.50 (1.41)	1.67 (1.47)	1.25 (1.32)	0.42 (0.95)	869
S. Em.±	0.05	0.02	0.05	0.03	0.04	0.04	0.05	0.04	0.05	0.05	0.05	0.03	77
C.D. at 5%	NS	0.07	0.15	0.10	0.11	0.11	NS	0.12	0.16	0.14	0.14	0.09	237

Figures in parentheses are $\sqrt{x + 0.5}$ transformed values, DBT = Day before treatment, DAT = Days after treatment, NS = Non significant.

पादप रोग विज्ञान
Plant Pathology

Principal Investigator	**Dr. Shamarao Jahagirdar, UAS, Dharwad**
Northern Hill Zone	
Palampur (Himachal Pradesh)	Dr. Amar Singh
Almora (Uttarakhand)	Dr. K.K. Mishra
Northern Plain Zone	
Pantnagar (Uttarakhand)	Dr. K.P. Singh
Ludhiana (Punjab)	Dr. (Mrs.) Asmita Sirari
New Delhi	Dr. Anirban Roy
Dholi (Bihar)	Dr. Ashim Kumar Mishra
North Eastern Hill Zone	
Medziphema (Nagaland)	Dr. Pezangulie Chakruno
Jorhat (Assam)	Dr. Munmi Borah
Eastern Zone	
Raipur (Chhattisgarh)	Dr. R K Dantre
Central Zone	
Indore (Madhya Pradesh)	Dr. Sanjeev Kumar Dr. Laxman Singh Rajput
Sehore (Madhya Pradesh)	Dr. Moly Saxena
Jabalpur (Madhya Pradesh)	Dr. P.K. Amrate
Amravati (Maharashtra)	Dr. D.L. Wasule
Southern Zone	
Dharwad (Karnataka)	Dr. Shalini N Huilgol
Ugar Khurd (Karnataka)	Mr.Jagadish S. Patwardhan Mr. R.D. Patil

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.	Cotyledonary Spot	CS	A number of fungi are 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 var. sojae*
22.	Wilt Complex	WC	-
23.	Pod Diseases/ Blight	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. *Fusarium* 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	*Fusarium* 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			Eastern zone		North Eastern Hill Zone		Central Zone				Southern Zone		No. of Centres (15)
		Palampur	Almora	Ludhiana	Pantnagar	Delhi	Dholi	Raipur	Jorhat	Medziphema	Sehore	Indore	Jabalpur	Amravati	K- Digraj	Dharwad	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	CR												+	+			2
2	Coll. R								+		$		+				3
3	RAB				+				$	+			+				4
4	Rust									+					+	+	3
5	BS	+											+				2
6	TLS										+					+	2
7	CLS/PSS								+				+			+	3
8	FLS	+	+								+		+			+	5
9	MLS										+	+					2
10	ALS								$				+	+		+	4
11	PB(Ct)	+	+		+			+	+	+		+	+	+	+	+	11
12	BP	+	+		+					+			+	+		+	7
13	BLB				+				+								2
14	YMV	+		+	+	+	+		+				+	+		+	9
15	SMV			+	+							+	+				4
16	FR /FW				+				+	+							3
17	BND					+			$								2
18	SR								$								1
19								+									1
Centre-wise no. of diseases reported		5	3	2	7	2	1	2	10	5	4	3	11	5	2	8	70

Table 4.2: PP2 Trap nursery trial for disease monitoring (Infection Index)

S. No.	Varieties	Northern Hill Zone							Northern Plain Zone							
		Almora DOS: 18/06/2019			Palampur DOS: 24.06.2019				Pantnagar DOS : 01/07/2019						Delhi*	
		FLS	PB (ct)	BP	FLS	BS	PB (ct)	BP	BP	BLB	PB(Ct)	RAB	SMV	YMV	YMV	BND
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	JS 72-44	44.4	11.1	11.1	33.33	33.33	11.11	11.11	0.5	19.83	11.64	48.82	0	9.87	-	-
2	JS 75-46	33.3	11.1	11.1	33.33	33.33	11.11	11.11	-	-	-	-	-	-	-	-
3	JS 71-05	44.4	11.1	11.1	55.55	55.55	11.11	0.00	0	23.32	11.32	75.56	0	73.0	-	-
4	JS 72-280	No seed	--	--	33.33	24.66	11.11	0.00	0	21.31	11.32	71.64	0	53.05	52.27	0.76
5	PK 262	55.5	11.1	11.1	11.11	24.66	11.11	11.11	0	16.66	11.11	62.52	0	55.05	96.43	0.89
6	PK 472	66.8	11.1	11.1	33.33	33.33	44.44	33.33	0	22.54	22.16	49.74	0	27.24	92.11	1.32
7	MACS 58	55.5	11.1	22.2	11.11	11.11	11.11	33.33	0.5	19.59	11.62	21.11	0	25.88	-	-
8	JS 93-05	44.4	11.1	33.3	33.33	33.33	55.55	0.0	0	9.87	9.87	31.13	0	53.09	Dead	Dead
9	Punjab 1	55.5	11.1	22.2	16.66	33.33	33.33	11.11	0.5	21.16	25.5	42.55	0	12.12	97.87	0.53
10	Bragg	77.7	22.2	22.2	24.66	33.33	11.11	11.11	0	21.32	11.11	40.01	0	15.04	100.00	0.00
11	Monetta	44.4	11.1	11.1	20.66	33.33	44.44	0.00	0	19.53	15.5	37.24	0	27.26	100.00	0.00
12	KHSB 2	33.4	11.1	22.2	11.11	33.33	33.33	0.0	0	32.27	29.72	69.15	0	27.27	-	
13	NRC 7	33.3	11.1	11.1	55.55	33.33	77.77	0.00	0	21.35	29.72	35.84	0	11.33	22.06	1.47
14	VLS 58	22.2	11.1	22.2	77.77	33.33	11.11	0.00	0	24.11	11.1	32.58	0	9.52	100.00	0.00
15	JS 335	33.3	33.3	11.1	33.33	33.33	11.11	11.11	0	22.11	15.83	33.36	0	46.35	100.00	0.00
16	Shivalik	66.8	33.3	22.2	33.33	33.33	11.11	11.11	0	9.87	15.24	35.59	0	16.99	100.00	0.00

*** CI: Coefficient of infection**

Table 4.2: contd...

S. No.	Varieties	North Eastern Hill Zone						
		Jorhat DOS: 04/6/2019				Medziphema DOS: 27/06/2019		
		Coll-R	RAB	PB (Ct)	CR	Rust	RAB	PB (Ct)
1	2	3	4	5	6	7	8	9
1	JS 72-44	8.20	10.02	19.25	25.31	21.70	0.00	12.13
2	JS 75-46	9.20	27.13	39.25	23.35	27.30	0.00	18.90
3	JS 71-05	19.20	17.96	42.12	39.20	9.80	0.00	21.78
4	JS 72-280	6.37	18.27	39.73	42.27	11.24	10.87	35.12
5	PK 262	11.83	12.20	31.21	49.75	12.56	0.00	20.67
6	PK 472	18.71	15.07	29.28	47.20	36.76	0.00	25.80
7	MACS 58	7.76	13.78	41.29	51.20	18.97	0.00	32.12
8	JS 93-05	9.49	16.69	29.76	49.76	24.66	19.23	27.67
9	Punjab 1	-	-	-	-	13.61	0.00	39.12
10	Bragg	7.99	3.30	30.21	45.72	20.15	47.28	0.00
11	Monetta	20.71	9.76	29.69	42.70	16.98	17.82	20.54
12	KHSB 2	6.76	2.85	31.76	35.90	7.90	32.87	0.00
13	NRC 7	7.25	19.27	37.72	53.20	13.88	68.29	23.45
14	VLS 58	5.96	18.76	45.71	52.27	23.72	0.00	9.83
15	JS 335	16.76	17.20	41.27	59.43	29.18	0.00	18.64
16	Shivalik	18.27	1.20	37.76	51.27	14.90	o.oo	25.19

Table 4.2: contd...

S. No	Varieties	Central Zone										Southern Zone		
		Sehore* DOS: 03/07/2019		Jabalpur DOS : 27/06/2019			Amravati DOS: 12/07/2019					Dharwad DOS: 15/07/2019		
		MLS	TLS	YMV	RAB	CR	YMV	CR	PB (Ct)	BP	ALS	Rust	PSS PDI	PB (ct)
1	2	3	4	5	6	7	10	11	12	13	14	15	16	17
1	JS 72-44	7.5	0.5	6.2	7.5	0.0	0.00	0.00	0.00	0.00	5.78	83.70	6.58	20.49
2	JS 75-46	6.7	3.75	10.3	10.6	13.8	0.00	0.00	0.00	0.00	5.05	89.63	4.94	19.25
3	JS 71-05	6.8	0	13.2	29.6	4.2	0.00	0.00	0.00	3.65	0.00	92.59	4.53	17.76
4	JS 72-280	-	-	17.0	19.0	4.0	0.00	0.00	0.00	0.00	0.00	88.15	5.76	23.68
5	PK 262	8	0	6.2	22.4	0.0	0.00	0.00	0.00	0.00	0.00	89.63	6.17	20.73
6	PK 472	6	2.9	7.2	14.2	0.0	0.00	0.00	0.00	0.00	0.00	91.11	4.94	24.44
7	MACS 58	7.2	0	22.2	9.4	0.0	0.00	0.00	0.00	0.00	0.00	97.04	9.05	28.88
8	JS 93-05	5.5	4.05	31.5	11.2	5.6	0.00	0.00	0.00	0.00	0.00	86.67	9.46	21.87
9	Punjab 1	7.7	0	3.0	28.5	0.0	0.00	0.00	0.00	0.00	0.00	89.63	8.23	29.25
10	Bragg	5.8	0	6.2	22.8	23.7	0.00	0.00	13.83	7.03	7.16	86.67	4.53	23.69
11	Monetta	7.4	3.05	28.0	17.5	20.3	0.00	0.00	20.05	12.34	0.00	92.59	17.28	56.64
12	KHSB 2	7.9	0	14.5	20.3	4.7	0.00	0.00	0.00	0.00	8.43	88.15	4.94	41.21
13	NRC 7	7.8	4	9.0	18.4	7.4	0.00	0.00	0.00	0.00	0.00	85.19	9.46	23.29
14	VLS 58	6.1	4.65	13.0	18.9	54.6	0.00	0.00	0.00	0.00	0.00	89.63	4.94	23.85
15	JS 335	7.8	4.0	29.7	21.5	5.6	0.00	0.00	11.89	0.00	0.00	91.11	9.47	27.38
16	Shivalik	2.55	5.9	8.2	19.0	23.5	0.00	0.00	24.50	6.82	7.58	95.56	7.41	25.91

***Disease grades**

Table 4.3: PP3 (a). Reaction of CIVT entries for various diseases.

S. No.	Varieties	FLS		BP		MLS		PB (ct)							RAB				YMV					BS	IBB	BLB
		Almora	Palampur	Pantnagar^{nc}	Amravati	SEHORE	INDORE	Pantnagar	Medziphem a	Palampur	Jorhat	Indore	Dharwad	Raipur	Medziphem a	Pantnagar	Jorhat	Jabalapur	Delhi	Jabalpur	Pantnagar	Ludhiana	Jorhat	Palampur	Raipur	Pantnagar
1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	VLS 99	MR	AR	AR	AR	HS	R	MR	HR	AR	HR	HS	MR	S	AR	MR	HR	MS	HS	HR	MR	HS	AR	MR	HR	MR
2	SL 1213	MS	MS	HR	AR	S	MR	HR	MS	AR	R	MS	MR	MS	S	HR	AR	HR	HR	HR	AR	S	AR	MR	HR	MR
3	PS 1641	MS	MS	AR	AR	HS	MS	HR	AR	AR	MS	MS	MR	MR	MR	MR	AR	HR	HS	HR	MR	HS	AR	MR	HR	MR
4	NRC 154	MS	AR	AR	AR	HS	MR	MR	AR	MR	MS	MR	MR	S	AR	MS	HR	MR	HS	HR	MR	HS	AR	HR	HR	MR
5	RVS 2011-32	MS	S	AR	AR	HS	MS	S	HR	MS	HR	MS	MR	MS	AR	S	AR	MR	HS	HR	HR	HS	AR	MR	HR	MR
6	MACS 1655	MS	HS		AR	HS	R	-	AR	AR	R	HS	MS	S	MR	-	AR	MS	Dead	HR	-	-	AR	MR	MR	MR
7	PUSA-Sipani-2036	MS	MS	AR	HR	HS	S	HR	MR	MS	R	S	MR	MR	MR	HS	AR	MR	HS	R	MR	HS	AR	MR	HR	HR
8	AUKS 200	MS	MS	AR	AR	HS	MS	HS	MR	MR	HR	S	MR	MR	S	S	AR	MS	S	R	AR	MR	AR	MS	HR	MR
9	DS 1318	S	S	AR	AR	HS	MS	HR	S	HR	MS	MS	MR	MR	MR	S	AR	MR	HR	HR	HR	R	AR	MR	HR	HR
10	NRC 163	S	HR	AR	AR	HS	HS	MS	S	MS	R	MS	MR	MR	MR	HS	AR	MR	HS	MR	MR	HS	AR	MR	HR	S
11	JS 22-01	S	MR	AR	HR	HS	MS	S	MS	MS	R	S	MS	MS	AR	MS	AR	MR	HR	HR	AR	R	AR	HR	HR	MR
12	RSC 11-20	S	MS	AR	AR	HS	MS	MR	MR	MR	R	MS	MS	MR	MS	S	AR	MR	HS	HR	HR	HS	AR	HR	HR	MR
13	TS 46	MS	AR	AR	AR	HS	S	MR	AR	HR	R	HS	MR	MR	MR	HS	AR	MS	HS	HR	MR	HS	AR	MR	HR	MR
14	MAUS 717	MS	HS	AR	AR	HS	S	MR	MR	MR	R	MS	MS	MR	AR	HS	HR	MR	HS	MS	MR	HS	AR	MR	HR	MR
15	PS 1642	MS	S	AR	AR	S	MR	AR	AR	AR	HR	MR	MS	MR	AR	MS	MR	MS	HS	R	AR	HS	AR	MR	HR	HR
16	AMS 20-19	S	HR	AR	AR	S	S	HR	HR	MR	HR	S	MR	MS	AR	HS	AR	HR	HS	HR	MS	HS	AR	HR	HR	HR
17	KDS 1097	MS	S	AR	AR	MS	R	MR	AR	MR	HR	HS	MR	MS	AR	HS	AR	MS	HS	R	MS	HS	AR	MR	HR	HR
18	DSb 37	MS	HR	AR	AR	MR	S	MR	AR	AR	HR	S	MR	S	AR	HS	AR	MS	HS	R	MS	-	AR	MR	HR	HR
19	ASb 51	MS	HR	AR	HR	MS	R	MR	AR	AR	HR	S	MS	MR	HR	HS	AR	MS	HS	HR	MS	-	AR	MR	HR	HR
20	NRC 149	MS	MS	AR	AR	MS	MR	AR	HR	HR	HR	MR	MR	MR	AR	AR	AR	AR	HR	HR	AR	HR	HR	MR	HR	MR
21	VLS 98	MS	S	AR	AR	MS	S	HR	AR	MR	HR	HS	MR	MR	AR	S	AR	MR	HS	MR	MR	HS	HR	MS	HS	MR
22	DS 1326	MS	HS	AR	AR	S	MR	MR	AR	HR	HR	MS	MS	MS	HR	MS	AR	MS	HR	HR	AR	HR	AR	MR	HR	MR
23	SL 1234	MS	S	AR	AR	S	MR	HR	MS	MR	HR	S	MR	S	HR	MR	AR	MR	HR	MR	HR	HR	HR	HR	HR	MR
24	RSC 11-22	MS	MS	AR	AR	MS	S	MS	AR	MR	HR	MS	MR	MR	AR	S	HR	MS	HS	HR	HR	HS	AR	MR	HR	HR
25	Himso 1690	MS	S	AR	AR	S	R	HR	AR	AR	HR	HS	MR	MR	AR	MR	AR	S	HR	MR	HR	HR	AR	MR	HR	MR

1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
26	BAUS 103	MS	MS	AR	AR	HS	MS	MR	AR	HR	HR	S	MS	MR	AR	HS	AR	S	HS	MR	MR	HS	AR	HR	HR	MR
27	JS 22-07	MS	MR	AR	AR	HS	MR	MS	MR	MR	HR	S	MR	S	AR	MS	AR	MS	HS	MR	HR	HS	AR	MS	HR	MR
28	TS 107	MS	MS	AR	HR	MS	R	MS	MS	AR	HR	HS	MS	MR	S	S	AR	MS	HS	R	MS	HS	AR	MR	HR	HR
29	MAUS 712	S	S	AR	AR	HS	MR	HR	AR	MR	HR	S	MR	MR	HR	HR	HR	S	HS	HR	MS	HS	AR	MR	HR	MR
30	NRC 168	MS	S	AR	AR	HS	S	MR	AR	MS	AR	MS	MR	MS	AR	MR	AR	S	HS	HR	MS	HS	AR	MR	HR	S
31	MACS 1639	MS	S	AR	HR	MS	MR	-	AR	AR	HR	HS	MS	MS	AR	-	AR	MS	Dead	HR	-	-	AR	HR	HR	-
32	DS 1320	MS	S	AR	AR	HS	MR	HR	S	HR	HR	S	MR	MR	AR	S	AR	S	HS	HR	AR	HR	AR	MR	HR	MS
33	KDS 1099	MS	MS	AR	AR	MS	HS	MR	AR	AR	HR	S	MR	MS	MS	HS	HR	MS	HS	MR	MS	HS	AR	MR	HR	MS
34	AMS 353	MS	MR	AR	HR	S	HS	MR	AR	AR	AR	S	MS	MR	MR	HS	AR	MS	HS	MS	MS	HS	AR	MR	HR	AR
35	DSb 36	MS	MS	AR	HR	S	MR	-	AR	MS	AR	HS	MR	MS	MR	-	AR	MR	Dead	HR	-	-	AR	HR	MS	-
36	AUKS 218	MS	AR	AR	AR	S	MR	S	AR	AR	AR	MS	MR	MS	AR	S	AR	MR	HS	HR	HR	HS	AR	S	HR	MR
37	RVSM 2011-77	MS	S	MS	AR	S	HS	MR	AR	MR	AR	S	MR	MR	AR	HS	AR	MR	HR	HR	HR	HS	AR	MS	HR	AR
38	PUSA-Sipani-6029	MS	HR	AR	AR	HS	MS	MS	MR	MR	AR	S	MR	MS	AR	HS	AR	MS	HS	MR	MS		AR	MD	HR	AR
39	NRC 167	MS	AR	MS	AR	S	MR	MS	AR	AR	AR	MR	MS	MS	AR	S	AR	MS	HS	MS	MS		AR	MR	HR	MS
40	ASb 50	MS	HR	AR	AR	S	MR	MR	AR	AR	AR	S	MR	MR	AR	HS	HR	MS	HS	HR	MS		AR	MR	MR	MR
41	RVS 2011-76	MS	S	AR		S	MR	S	HR	MR	AR	S	MR	MR	HR	HS	AR	MS	HS	HR	HR		AR	MS	HR	HR
1	**Shivalik (c)**	S		AR		S		MR		MS						HS					HR			MS		HR
2	**Bragg (c)**			AR				MR	HR		HR				MR	MR	R				HR		AR			MR
3	**VLS 63 (c)**																		HR							
4	**SL 688 (c)**			AR				MR								MR					HR					HR
5	**PS 1556(c)**																		HR							
6	**RKS 18 (c)**								MR						MR											
7	**JS 97-52 (c)**				MR				HR						MR											
8	**JS 93-05 (c)**			AR	AR	MS			HR		HR		S	S	MS		R						AR			

1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
9	**JS 335 (c)**			AR	MR	S		MR	S	S	HR		MS	S	MS	S	R				MR	HS	HR	MR	MS	MR
10	**JS 95-60 (c)**				HR																					
11	**JS 72-44 (c)**					HS																				
12	**Punjab 1 (c)**			AR	AR	MS		MR	HR						AR	S					HR					MR
13	**DSb 21 (c)**												S													
14	**NRC 37 (c)**					S																				
15	**MACS 450**			AR									MR			MS					HR					HR
16	**DSb 23**												MR													

Table 4.3: contd...

S. No	Varieties	TLS	BND	Rust			SMV	ALS	Coll.R.	CR		PSS
		Sehore	Delhi	Dharwad	Medziphema	K.Digraj	Indore	Amravati	Jorhat	Amravati	Jabalpur	Dharwad
1	2	3	4	5	6	7	8	9	10	11	12	13
1	VLS 99	AR	HR	MS	HR	MS	R	AR	HR	HR	MS	HR
2	SL 1213	AR	HR	S	AR	MS	R	AR	AR	AR	AR	HR
3	PS 1641	AR	HR	HS	AR	MS	R	AR	AR	AR	AR	HR
4	NRC 154	AR	HR	MS	AR	S	MS	AR	AR	MS	AR	HR
5	RVS 2011-32	AR	HR	MS	HR	MS	MR	AR	HR	AR	MR	MR
6	MACS 1655	AR	Dead	MS	AR	MR	R	AR	R	AR	S	HR
7	PUSA-Sipani-2036	AR	HR	S	AR	MR	MS	AR	R	AR	MR	HR
8	AUKS 200	AR	HR	MS	MR	S	R	AR	HR	AR	MS	MR
9	DS 1318	AR	HR	MS	AR	MS	R	AR	AR	AR	AR	MR
10	NRC 163	AR	HR	MR	MR	S	R	AR	HR	AR	MR	HR
11	JS 22-01	AR	HR	MS	AR	S	R	AR	AR	AR	AR	HR
12	RSC 11-20	AR	HR	MS	MR	S	S	HR	AR	AR	MR	HR
13	TS 46	MS	HR	MS	AR	MS	R	AR	AR	AR	MS	HR
14	MAUS 717	AR	HR	MS	AR	MS	MR	AR	AR	AR	MR	MR
15	PS 1642	AR	HR	MS	HR	MR	R	AR	R	AR	HS	HR
16	AMS 20-19	AR	HR	MS	HR	S	R	HR	AR	AR	AR	HR
17	KDS 1097	AR	HR	HS	HR	MS	R	AR	AR	AR	AR	HR
18	DSb 37	AR	HR	HR	HR	HR	R	HR	AR	AR	MR	HR
19	ASb 51	AR	HR	MS	HR	S	R	AR	AR	AR	MR	HR
20	NRC 149	AR	HR	S	AR	MR	R	AR	AR	AR	MR	HR
21	VLS 98	AR	HR	MS	MS	MS	R	HR	AR	AR	HS	HR
22	DS 1326	AR	HR	MR	AR	S	R	AR	AR	AR	MR	HR

1	2	3	4	5	6	7	8	9	10	11	12	13
23	SL 1234	AR	HR	S	HR	S	R	AR	R	AR	HS	MR
24	RSC 11-22	AR	HR	S	MR	MS	MR	AR	R	AR	AR	HR
25	Himso 1690	AR	HR	S	HR	MS	R	AR	R	HR	HS	MR
26	BAUS 103	AR	HR	S	AR	S	R	AR	AR	AR	MR	HR
27	JS 22-07	AR	HR	S	HR	MS	R	HR	AR	AR	MR	HR
28	TS 107	MS	HR	S	AR	MS	R	HR	AR	AR	HS	HR
29	MAUS 712	AR	HR	MS	HR	HS	S	AR	AR	AR	MR	HR
30	NRC 168	AR	HR	S	MR	HS	MS	HR	AR	AR	MR	HR
31	MACS 1639	AR	Dead	MR	MS	MS	R	AR	AR	AR	HS	HR
32	DS 1320	AR	HR	HS	AR	S	R	AR	AR	AR	MS	MR
33	KDS 1099	AR	HR	S	AR	MS	R	AR	R	AR	S	HR
34	AMS 353	AR	HR	S	AR	S	R	AR	R	AR	AR	HR
35	DSb 36	AR	Dead	HR	S	MR	R	AR	R	AR	HS	HR
36	AUKS 218	AR	HR	S	HR	MS	R	AR	AR	AR	HS	HR
37	RVSM 2011-77	AR	HR	HS	MR	MS	R	AR	AR	AR	S	MR
38	PUSA-Sipani-6029	AR	HR	S	MR	S	R	AR	AR	AR	AR	HR
39	NRC 167	AR	HR	S	MR	MR	MR	AR	AR	AR	S	HR
40	ASb 50	MS	HR	HS	MR	MS	R	AR	AR	AR	MR	HR
41	RVS 2011-76	AR	HR	MS	HR	MS	R	AR	AR	AR	MR	MR
1	Bragg (c)				HR				MR			
2	VLS 58 (c)											
3	VLS 59 (c)		HR									
4	VLS 63 (c)		HR									
5	PS 1556 (c)		HR									
6	SL 688 (c)											
7	RKS 18 (c)				MR							
8	JS 97-52 (c)				HR			HR		AR		
9	JS 93-05 (c)	S		S	HR	HS		HR	R	AR		MS
10	JS 335 (c)	S		HS	MR	HS		MR	HR	AR		HR
11	JS 72-44 (c)	MS										
12	JS 75-46 (c)											
13	JS 95-60 (c)							AR		AR		

14	Punjab 1 (c)	MR			HR			AR		AR		
15	NRC 77 (c)											
16	NRC 86 (c)											
17	DSb 21(c)			HR								HR
18	NRC 37 (c)	MR										
19	Shivalik	MR										
20	MACS 450			MS								HR
21	KDS 753			MR								

Table 4.3: PP3 (a). Reaction of CIVT(Early) entries for various diseases

S. No	Varieties	MLS		TLS	PB(Ct)	SMV	RAB	CR	YMV	ALS	BP
		Sehore	Indore	Sehore	Indore	Indore	Jabalpur	Jabalpur	Jabalpur	Amravati	Amravati
1	2	3	4	5	6	7	8	9	10	11	12
1	PS 1656	S	S	AR	MS	MR	MS	MR	HR	AR	AR
2	NRC 153	S	R	AR	MR	R	S	S	R	AR	AR
3	VLS 100	HS	R	AR	MS	R	MS	S	MR	AR	MS
4	NRC 155	MS	R	MR	MR	R	MS	MR	HR	AR	AR
5	RVS 2011-73	HS	S	AR	S	MR	MR	MR	HR	AR	AR
6	NRC 157	S	S	MR	HS	R	MS	S	HR	AR	AR
7	AUKS 202	S	S	AR	S	R	MS	MR	HR	AR	AR
8	NRC 169	S	MR	MS	MS	R	S	MR	HR	AR	AR
9	DS 1314	S	MR	AR	MS	R	MS	MS	R	AR	AR
10	JS 22-04	S	MR	AR	S	S	S	AR	HR	AR	AR
11	NRC 151	S	MR	MS	MS	R	S	HS	HR	AR	AR
12	MACS NRC 1710	S	R	MS	MS	R	MS	HS	R	AR	HR
13	NRC 159	S	R	MS	S	R	MS	HS	HR	AR	HR
14	NRC 158	MS	HS	AR	HS	MS	MS	S	HR	AR	HR
15	DS 1312	HS	MS	AR	HS	R	MS	MS	R	HR	HR
16	NRC 162	MS	R	AR	MS	R	MS	HS	MR	HR	AR
17	JS 22-03	S	S	MS	MS	R	S	AR	HR	AR	HR
18	NRC 165	MS	S	AR	S	R	MS	S	HR	AR	HR
19	PUSA-Sipani-1050	S	R	AR	HS	R	MR	MS	HR	AR	HR
20	NRC 152	S	R	AR	S	R	S	MR	HR	AR	AR
21	AUKS 208	MS	S	AR	MS	R	S	MS	HR	AR	AR
22	NRC 161	MS	S	MS	S	R	MS	MS	R	AR	AR
23	PUSA-Sipani-408	S	S	AR	HS	R	MS	MR	HR	AR	HR
24	NRC 156	MS	R	MS	MS	R	MS	AR	HR	AR	HR
25	NRC 166	S	R	AR	MS	R	MS	AR	R	HR	AR

26	NRC 160	HS	R	AR	MS	R	MS	MR	HR	HR	AR
27	NRC 164	HS	MS	AR	HS	R	MR	AR	HR	AR	HR
28	NRC 150	HS	R	AR	HS	R	MR	AR	HR	AR	AR
29	KDS 980	MS	R	AR	MS	R	MS	MS	HR	AR	HR
1	JS 97-52 (c)										AR
2	JS 93-05 (c)	MS		S						AR	AR
3	JS 335 (c)	HS		S						HR	
4	JS 72-44 (c)	HS		MS							HR
5	JS 75-46 (c)										
6	JS 95-60 (c)	HS	R	AR	HS	R	MS	HS	MR	AR	HR
7	JS 20-29 (c)										
8	JS 20-34 (c)	S	R	MR	S	R	S	S	HR	AR	AR
9	Punjab 1 (c)	MR		MR						HR	AR
10	NRC 77 (c)										
11	NRC 86 (c)										
12	DSb 21(c)										
13	SL525(c)										
14	MAUS 47(c)			MR							
15	NRC 37 (c)	S		MR							

Table 4.4: PP3 (b). Reaction of AVT-I entries for various diseases

S. No.	Varieties	Northern Hill Zone				Northern Plain Zone*							Eastern zone		
		Palampur			Almora	Pantnagar				Ludhiana	Delhi		Dholi	Raipur	
		FLS	PB (ct)	BS	FLS	BLB	PB (ct)	RAB	YMV	YMV	YMV	BND	YMV	IBB	PB (ct)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	DS 3110	HS	AR	MS	S	MR	MR	MS	HR	MR	HR	HR	-	HR	MS
2	DSb 33	MS	MR	MS	S	HR	S	HS	HR	S	HS	HR	MR	MR	MS
3	Himso 1689	MS	HR	MS	S	MR	MS	S	MS	HS	HS	HR	-	HR	MR
4	JS 21-71	MR	HR	MS	S	MR	MR	MS	HR	MR	HS	HR	-	HR	S
5	JS 21-72	MR	MR	MS	S	MR	MS	MS	HR	-	MS	HR	-	HR	MR
6	Karune	AR	MR	MR	-	-	-	-		-	Dead	Dead	-	-	-
7	MACS 1566				MS	HR	MR	HS	MS	HS	HS	MR	HR	HR	MR
8	MACS 1620	HS	MR	MR	MS	HR	MR	S	HR	HS	Dead	Dead	MR	HR	MR
9	MACSNRC 1575	MR	MS	MR	MS					HS	Dead	Dead	MR	MR	S
10	MACSNRC1667	MR	MS	MS	MS	HR	MR	HS	MR	HS	HS	MR	MR	HR	S
11	MAUS 732	MS	MR	HR	MS	HR	MR	S	MR	HS	HS	HR	-	HR	MR
12	NRC 138	MR	MR	MR	MS	AR	S	S	HR	-	HR	HR	-	HR	MR
13	NRC 146	HR	MS	HR	MS	AR	MR	HS	MR	-	HS	HR	-	HR	MS
14	NRC 148	MS	MR	MR	MS	HR	MR	S	MR	-	HS	HR	-	HR	MR
15	NRCSL 2	S	MR	MR	MS	MR	MR	S	AR	-	HS	HR	-	HR	MR
16	PS 1637	MS	MR	MR	MS	HR	MR	MS	HR	-	HS	HR	-	HR	MS
17	RSC 11-15	MR	MR	HR	MS	AR	MR	HS	HR	-	HS	HR	-	HR	MR
18	RSC 11-17	MS	MR	MR	MS	HR	MR	S	MR	-	HS	HR	-	HR	MR
19	RVSM 2011-35	MR	MR	MR	MS	HR	HR	MS	AR	-	S	HR	-	MR	MS
1	JS 335 ©	MS	S	MS	-	-	-	-	-	-			S		
2	PS 1092 ©	AR	MS	MR	-	-	-	-	-	-			-		
3	Shivalik ©	HS	MS	MS	HS	-	-	-	-	-			-		
4	VLS 59 ©	HR	MR	MR	-	-	-	-	-	-			-		
5	VLS 63 ©	MR	HR	MR	-	-	-	-	-	-					
6	RKS18	-	-	-	-	-	-	-	-	-			HS		
7	SL 1234	-	-	-	-	-	-	-	-	HR			-		
8	DSb 21									-					
9	NRC 7													HR	MR

-: Reaction for check entries: not reported * Data not reported from Delhi Center

**At Ludhiana center the entries NRCSL 2,JS 93-05 & DSb 21-plants killed due to some reason other than diseases

Table 4.4: PP3 (b). Reaction of AVT-I entries for various diseases

S. No.	Varieties	North Eastern Hill Zone						
		Medziphema		Jorhat				
		PB (ct)	PB(Ct)	Coll. R	RAB	PB (Ct)	YMV	BLB
1	2	3	4	5	6	7	8	9
1	DS 3110	AR	HR	AR	AR	HR	AR	MR
2	DSb 33	HR	HR	AR	AR	MR	AR	HS
3	Himso 1689	AR	HR	HR	HR	MR	AR	HS
4	JS 21-71	HR	HR	HS	MR	HR	AR	HS
5	JS 21-72	AR	MR	S	AR	HR	AR	MR
6	Karune	Germination failed at all centers						
7	MACS 1566	HR	S	AR	AR	HR	AR	HS
8	MACS 1620	HR	MS	AR	HR	HR	AR	MR
9	MACSNRC 1575	HR	HR	-	-	-	-	-
10	MACSNRC1667	AR	HS	-	-	-	-	-
11	MAUS 732	AR	HR	MR	HR	AR	AR	HS
12	NRC 138	MS	HR	-	-	-	-	-
13	NRC 146	HR	HR	MS	AR	S	AR	HS
14	NRC 148	HR	AR	MS	HR	S	AR	HS
15	NRCSL 2	HR	HR	MR	AR	HR	AR	HS
16	PS 1637	AR	AR	MR	AR	HR	AR	HS
17	RSC 11-15	AR	AR	MS	HR	S	AR	HS
18	RSC 11-17	HR	AR	MR	HR	HR	AR	MR
19	RVSM 2011-35	AR	HR	MR	AR	HR	AR	MR
1	Bragg ©	HR	HR	-	-	-	-	-
2	JS 97-52 ©	HR	HR	-	-	-	-	-
3	JS 335 ©	MR	MS		-	-	-	-
4	JS 93-05 ©	-	-	MR	AR	HR	AR	MR
5	PS 1042 ©	-	-	-	-	-	--	-
6	VLS 59	-	-	AR	AR	HR	AR	HS
7	VLS 63	-	-	S	AR	HR	AR	S
8	SL 688	-	-	-	-	-	-	-
9	SL 525	-	-		-	-	-	-
10	RKS 18		-	-	-	-	-	-
11	Punjab 1	-	-	-	-	-	-	-
12	PS 1092	-	-	S	AR	HR	AR	MR

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			K.Digraj	
		CR	YMV	RAB	MLS	PB (Ct)	SMV	MLS	ALS	BP	Rust	PSS	PB (ct)	Rust	PB (Ct)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	DS 3110	S	R	MR	MS	HS	MS	MR	HR	HR	MS	MR	MS	-	-
2	DSb 33	MS	R	S	MS	MR	R	MR	AR	HR	HR	MR	MR	MR	MS
3	Himso 1689	AR	MR	HR	MS	MS	MR	MR	AR	AR	MS	MR	MS	-	-
4	JS 21-71	AR	HR	MR	S	MR	R	MS	AR	AR	MS	MR	MS	-	-
5	JS 21-72	AR	HR	MR	S				AR	AR	MS	HR	MS	-	-
6	Karune	-	-	-	-	MS	S	HS	-	-	MS	HR	MS	-	-
7	MACS 1566	AR	MS	MS	MS	MR	MS	R	HR	AR	S	HR	MS	-	-
8	MACS 1620	AR	R	S	MS	HS	R	R	AR	AR	MS	HR	MS	-	-
9	MACSNRC 1575	S	HR	MS	MS	S	R	MS	AR	HR	MS	HR	MS	-	-
10	MACSNRC1667	HS	MR	MR	MS	S	MS	MR	AR	HR	MS	MR	MS	MS	MS
11	MAUS 732	MS	MS	MS	MS	MR	R	MR	HR	AR	MS	HR	MR	-	-
12	NRC 138	MS	R	S	S	R	R	MR	HR	HR	MS	MS	MS	-	-
13	NRC 146	AR	R	MS	MS	MR	MS	MR	HR	HR	MS	MS	MS	MS	MS
14	NRC 148	MR	HR	MS	MS	R	R	MR	HR	AR	MS	HR	MR	-	-
15	NRCSL 2	MR	HR	MS	MS	MS	MR	S	AR	AR	MS	HR	MS	-	-
16	PS 1637	S	HR	MR	MS	R	MR	S	AR	HR	MS	HR	MS	-	-
17	RSC 11-15	MS	HR	MS	MS	R	R	MR	AR	HR	MS	HR	MS	-	-
18	RSC 11-17	AR	HR	MS	MR	R	MR	MR	AR	AR	MS	MR	MS	-	-
19	RVSM 2011-35	MR	HR	MS	HS				AR	AR	MS	HR	MR	-	-
1	Bragg ©	-	-	-	-				-	-	S	HS	MS	-	-
2	NRC 37 ©	MS	MS	MS	HS				-	-	-	-	-	--	-
4	JS 97-52 ©	MR	MR	MS		MS	MR	MR	HR	AR					-
5	JS 72-44 ©				HS				-	-	-	-	-	-	-
6	JS 335 ©	MS	MS	MS	HS	MS	MS	MS	HR	AR		HR	MS	HS	-
7	JS 95-60 ©	HS	MR	MR					AR	AR	HS	MR		-	S
8	JS 93-05 ©	HS	S	MS	MS				AR	AR	S	HR	S	-	-
9	Punjab 1 ©	MS	R	S	MS				AR	HR		MS	MS	-	-
10	DSb 21 ©	HS	R	MS							HR	HR	S	HR	MS
11	Shivalik ©				MS				--	-	HS	--	MS	-	-

12	VLS 63 ©	--	-	-	-				-	-		--	--	-	-
13	VLS59©	--	-	-	-				-	-	S	--	--	-	-
14	VLS58©	--	-	-	-				-	-		MS	MS	-	-
15	RKS 18©	--	-	-	-				-	-	S	MR	--	-	-
16	NRC 86	--	-	-	-	S	MR	S	-	-			--	-	-
17	SL 958	--	-	-	-				-	-	S	MS	--	-	-
18	JS 20-98					MR	R	MS							
19	JS 20-34	--	-	-	-	MS	R	HS	-	-			--	-	-
20	DSb 23	--	-	-	-				-	-	HR	HR	MR	HR	MS
21	MACS 58	MS	MS	MS	--				-	-	-	-	-	-	-

*****Trials at Ugarkhurd vitiated due to flood -:Not tested ** Karune not germinated

Table 4.5: PP3 (c). Reaction of AVT-II entries for various diseases

S. No.	Varieties	Northern Hill Zone				Northern Plain Zone*							Eastern zone		
		Palampur			Almora	Pantnagar				Delhi		Ludhiana	Dholi	Raipur	
		FLS	PB (ct)	BS	FLS	BLB	PB	RAB	YMV	YMV	BND	YMV	YMV	IBB	PB(Ct)
1	2	3	4	5	6	10	11	12	13	14	15	16	17	18	19
1	AMS 100-39	MR	MR	MR	MR	HR	MS	MS	HR	HS	HR	-	MS	HR	MS
2	AMS 2014-1	MS	MR	MR	MS	HR	MR	MS	MR	HS	HR	-	HR	HR	MR
3	BAUS 102	MS	S	MR	MS	MR	MR	S	MR	HS	HR	HS	-	HR	MR
4	DS 3108	MS	HR	MR	S	HR	HR	MS	AR	S	R	MR	S	HR	S
5	DSb 34	MS	MR	MR	MS	HR	MR	HS	HR	HS	HR	MS	-	HR	MR
6	KDS 992	MR	MR	MR	HR	-				Dead	Dead	-	-	MS	S
7	MACS 1493	MR	HR	MR	MR	HR	HR	HS	HR	HR	S	HS	S	HR	S
8	NRC 128	MS	AR	MR	MS	MR	HR	MR	AR	HR	HR	S	MS	HR	MR
9	NRC 130	MR	MS	MR	MS	S	MR	S	MR	HS	HR	-	MS	HR	S
10	NRC 131	MR	MS	MR	MS	S	MR	MS	MR	HS	HR	-	MR	HR	MS
11	NRC 132	MS	HR	MR	S	HR	HR	S	AR	HR	HR	-	S	HR	MR
12	NRC 136	MR	AR	MR	S	MR	HR	MS	HR	HS	HR	-	MS	HR	MR
13	NRC 137	MR	HR	MR	S	MR	MR	S	HR	HR	HR	-	MS	HR	MR
14	NRC 142	-	-	-		-	-			-	-	-	MR		
15	NRC 147	AR	MR	HR	S	MR	S	HS	MR	S	HR		-	HR	MS
16	NRCSL 1	MS	MR	MR	MS	HR	HR	S	AR	HR	HR	HR	S	HR	MS
17	PS1611	MR	MR	MR	MS	MR	HR	MS	AR	HR	HR	HR	HR	HR	MR
18	PS 1613	HR	HR	MR	MS	HR	HR	MS	HR	S	HR	MR	S	HR	MS
19	RSC 11-03	S	MR	MR	MS	HR	MR	S	HR	S	HR	-	MS	HR	MR
20	RSC 11-07	S	MR	MR	S	MS	HR	MS	AR	S	HR	-	S	HR	MR
21	SKF-SPS-11	MS	HR	MR	-	MR	MR	HS	MR	S	HR	HS	-	HR	MS
1	JS 335 (C)	MS	S	MS		MR	MR	S	MR			HS		HR	MS
2	Shivalik (C)	HS	MS	MS	S	MR	MR	HS	HR				-		
3	VLS 59 (C)	HR	MR	MR											
4	SL 688 ©					HR	MR	MR	HR						

5	RKS 18 ©														
6	Bragg ©				S	MR	MR	MR	HR						
7	JS 72-44 (C)	--	-	-	-	-	-	-	-			HS	-		
8	JS 75-46 (C)	--	-	-	-	-	-	-	-			HS	-		
9	Pb -1 (C)					MR	MR	S	HR			--			
10	JS 93-05(C)	--	-	-	-	-	-	-	-			--	S		
11	JS 97-52 (C)	--	-	-	-	-	-	-	-			--	-		
12	JS 20-34	--	-	-	-	-	-	-	-			--	-		
13	SL 958					MR	MR	MR	AR			HS			
14	PS 1092	--	-	-	-	-	-	-	-			--	-		
15	MACS 450	--	-	-	-	MS	MR	HS	HR						
16	NRC 37	--	-	-	-	-	-	-	-			--	-	HR	MS

-:No Seed - - :Not reported * Data not reported from Delhi Center

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)	YMV	CR
1	2	3	4	5	6	7	8	9	10
1	AMS 100-39	AR	HR	HR	MR	MS	MR	HR	S
2	AMS 2014-1	HR	HR	AR	MR	MR	HR	HR	HS
3	BAUS 102	HR	HR	HR	MS	AR	MR	R	S
4	DS 3108	HR	AR	AR	MS	AR	HR	HR	AR
5	DSb 34	HR	AR	AR	MR	MR	S	HR	AR
6	KDS 992	HR	HR	S	-	-	-	-	-
7	MACS 1493	MS	AR	HR	-	-	-	-	-
8	NRC 128	HR	AR	AR	MR	HS	HR	R	R
9	NRC 130	HR	HR	MS	-	-	-	-	-
10	NRC 131	AR	AR	AR	-	-	-	-	-
11	NRC 132	MR	MS	MR	MS	S	HR	HR	R
12	NRC 136	HR	AR	MS	MR	MS	MS	HR	MR
13	NRC 137	HR	AR	AR	MR	AR	S	HR	MR
14	NRC 142	-	-	-	-	-	-	-	-
15	NRC 147	MR	MS	MS	-	-	-	-	-
16	NRCSL 1	HR	HR	MS	MR	MR	MR	HR	AR
17	PS1611	HR	AR	HR	-	-	-	-	-
18	PS 1613	HR	AR	MR	-	-	-	-	-
19	RSC 11-03	MR	AR	AR	-	-	-	-	-
20	RSC 11-07	AR	HR	AR	HS	AR	AR	HR	MR
21	SKF-SPS-11	MR	MS	MS	-	-	-	-	-
1	Bragg ©	HR	MR	HR	MS	MS	MS	MS	S
2	JS 97-52 ©								
3	JS 335 ©	HR	MS	S	MS	MS	MS	MS	MR
4	RKS 18	MR	MR	MR					
5	JS 93-05 ©	HR	MS	HR	MS	MR	MS	MS	S
6	Punjab 1	HR	HR	MR					
7	SL 525	-	-	-					

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	YMV	CR	ALS	BP	PB (Ct)	SMV	MLS	Rust	PSS	PB (ct)	Rust
1	2	3	4	5	6	7	8	9	10	S	MS	MR	11	12	13	14
1	AMS 100-39	AR	HR	MR	S	AR	AR	AR	AR	MS	S	HS	MS	MR	MS	S
2	AMS 2014-1	AR	MS	MR	MR	AR	AR	AR	AR	-	-	-	MS	MR	MS	S
3	BAUS 102	AR	MS	MR	MR	AR	AR	HR	AR	-	-	-	MS	MR	MS	HS
4	DS 3108	MS	HR	MS	MS	AR	AR	AR	AR	HS	S	HS	MS	MR	MS	-
5	DSb 34	MR	MR	MS	S	AR	AR	AR	AR	HS	MS	S	HR	HR	MR	MR
6	KDS 992	MS	MR	MS	MS	AR	AR	AR	AR	HS	MR	S	MS	HR	MS	MR
7	MACS 1493	MR	HR	MS	MS	AR	AR	AR	AR	MR	MR	S	S	HR	MS	MS
8	NRC 128	AR	HR	MS	MS	AR	AR	HR	HR	S	R	S	MS	HR	MS	-
9	NRC 130	MR	HR	MS	MR	AR	AR	AR	HR	MS	R	HS	MS	HR	MS	-
10	NRC 131	MR	R	MS	MR	AR	AR	AR	AR	MS	MR	HS	MS	MR	MS	-
11	NRC 132	HS	HR	MS	S	AR	AR	AR	AR	MS	R	S	MS	HR	MR	S
12	NRC 136	S	MR	MS	S	AR	AR	AR	AR	HS	MS	MS	MS	MS	MS	-
13	NRC 137	MS	HR	MS	S	AR	AR	AR	AR	-	-	-	MS	MS	MS	-
14	NRC 142	MS	HR	MR	-	-	-	-	-	S	R	HS	MS	HR	MS	-
15	NRC 147	MR	HR	MS	MR	AR	AR	AR	HR	HS	MR	HS	MS	HR	MR	S
16	NRCSL 1	MR	HR	MS	MS	AR	AR	AR	HR	R	MR	MR	MS	HR	MS	HS
17	PS1611	AR	HR	MR	S	AR	AR	AR	HR	MS	R	S	MS	HR	MS	-
18	PS 1613	AR	MR	MR	MR	AR	AR	AR	HR	-	-	-	MS	HR	MS	-
19	RSC 11-03	MR	MR	MS	MS	AR	AR	HR	AR	-	-	-	MS	MR	MS	-
20	RSC 11-07	MS	MS	MS	MS	AR	AR	HR	HR	-	-	-	MS	HR	MR	MS
21	SKF-SPS-11	AR	MR	MS	MS	AR	AR	AR	AR	-	-	-	S	MR	MR	S
1	Bragg ©	-	-	-	-	-	-	-			-		-	-	-	-
2	NRC 37 ©	MS	MS	MS	HS	-	-	-			-		-	-	-	-
3	NRC 86 ©	-	-	-	-	-	-	-		S	MR	S	-	-	-	-
4	JS 97-52 ©	MR	MR	MS	-	AR	AR	AR	AR	MS	MR	MR	-	-	-	-
5	JS 72-44 ©	-	-	-	HS	-	-	-			-		-	-	-	-

6	JS 335 ©	MS	MS	MS	HS	AR	AR	HR	AR	MS	MS	MS	-	-	-	-
7	JS 95-60 ©	HS	MR	MR	-	AR	AR	AR	AR				-	-	-	-
8	JS 93-05 ©	HS	S	MS	S	AR	AR	AR	AR				-	-	-	HS
9	JS 75-46 ©	-	-	-	-	-	-	-			-		-	-	-	-
10	JS 20-34	-	-	-	HS	-	-	-		MS	MR	HS	-	-	-	-
11	JS 20-29	-	-	-	MS	-	-	-			-		-	-	-	-
12	JS 20-69	-	-	-	S	-	-	-			-		-	-	-	-
13	JS 20-98		-	-	MS	-	-	-		MR	MR	MS	-	-	--	-
14	Punjab 1 ©	MS	MR	S	MS	AR	AR	HR	HR				-		-	-
15	DSb 21 ©	HS	MR	MS	-	-	-	-			-		-	-	-	-
16	Shivalik ©				MS											
17	DSb 21	-	-	-	-	-	-	-			-		-	-	-	HR
18	MACS 58	MS	MS	MS	-	-	-	-			-		-	-	-	-

Note : * Trials at Ugarkhurd vitiated due to heavy rains received during the season. -:Not reported

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	Var.	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	2nd	HR	HR	SL958	HR	KSO 245	HR	NRC 99	HR	AMS MB 5-18	1st	HR	HR	JS 20-71	**6th**	**AR**	AMS 2014-1	**1st**	**AR**
2	SL-1123	2nd	HR	AR	PS1347	HR	JS 20-34	HR	VLS 89	MR	DSb 32	1st	MR	MR	JS 20-89	**6th**	**AR**	MACS-1493	**1st**	**AR**
3	DS-3108	2nd	HR	AR	SL1028	HR	VLS 76	MR	KDS 753	HR	EC 309537	1st	AR	HR	DS 3050	**6th**	**AR**	NRC-132	**1st**	**AR**
4	PS-1613	2nd	MR	HR	SL1074	HR	KDS 344	HR	KDS 869	HR	PS 1092	1st	AR	MS	AMS 1002	**6th**	**AR**	NRC-134	**1st**	**AR**
5	SL-688	2nd	MR	HR	PS1611	HR	NRC 88	HR	VLS 2	MR	TS 53	1st	MR	MR	AMS 1003	**5th**	**AR**	NRC-136	**1st**	**AR**
6	PS-1572	3rd	MS	AR	DS3106	HR	VS 2004-9	HR	MACS 1442	HR	RSC 10-52	1st	HR	AR	JS 20-87	**4th**	**AR**	NRC-147	**1st**	**AR**
7	SL-1028	15th	MR	HR	SL688	HR	VS 2005-40	HR	VLS 92	MR	SL 1123	1st	HR	AR	JS 20-53	**4th**	**AR**	RSC-11-07	**1st**	**AR**
8	SL-1074	3rd	MR	HR	PUSA97-12	HR	VS 2006-17	HR	NRC 125	HR	CAT 407	2nd	MR	AR	MAUS 706	**4th**	**AR**	SRF-SPS-11	**1st**	**AR**
9	VLS-89	4th	MR	MR	PS1613	HR	VLS 47	HR	TS 53	MS	CAT 473B	2nd	HR	AR	AMS-MB 5-18	**3rd**	**AR**	TS-59	**1st**	**AR**
10	PS-1589	3rd	MS	HR	SL1213	HR	JS-40	HR	SL 1123	S	KDS 992	2nd	AR	AR	JS 20-98	**3rd**	**AR**	RSC-11-03	**1st**	**AR**
11	MACS-1460	2nd	MR	HR	SL1074	HR	VLS 2	HR	NRC 129	MS	SQL 89	2st	MR	HR	RSC 10-46	**3rd**	**AR**	NRC-146	**1st**	**AR**

12	JS-2098	3rd	MS	HR	SL955	HR	MACS 1058	HR	RVS 2011-2	MS	Himso 1685	3nd	AR	HR	PS 1556	**4th**	**AR**	MAUS-732	**1st**	**AR**
13	DS-3101	4th	MR	HR	SL1212	HR	DSB-11	HR	Salimar	MS	JS 20-116	3nd	AR	MR	RVS 2008-24	**3rd**	**AR**	PS-1634	**1st**	**AR**
	PS1546		MS	HR	SL525	HR	MAUS-282	HR	DSb 21	MR	NRC 126	3nd	HR	AR	NRCSL-2	**1st**	**AR**	RVS 2007-06	**1st**	**AR**
14	SL-979	2nd	MS	AR	SL744	HR	JS-20-14	MR	JS 75-46	MS	PS 1572	3nd	HR	HR	PS-1637	**1st**	**AR**	MACS 1520	**1st**	**AR**
15	SL-482	3rd	MS	HR	SL1233	HR	JS (SH)2002-14	MR	JS 20-116	MS	JS 335		MR	S	NRC-138	**1st**	**AR**	NRC-125	**1st**	**AR**
16	SL-958	3rd	MS	HR	SL1200	HR	NRC 79	MR	KDS 980	HR	Shivalik		S	MR	JS 20-19	**2nd**	**AR**	JS-20-18	**1st**	**AR**
17	PS1518	3rd	MS	HR	SL979	HR	AMS 1	MR	KDS 1045	HR					JS 20-20	**2nd**	**AR**	JS-21-06	**2nd**	**AR**
18	MACS-1407	5th	MR	AR	SL1234	HR	RHS-52	MR	JS 20-94	MR					JS 20-29	**2nd**	**AR**	JS 21-13	**2nd**	**AR**
19	DS-2705	5th	MR	HR	SL1250	HR	JS (SH) 2003	MR	KS 3	MS					JS 20-34	**2nd**	**AR**	SL-96	**2nd**	**AR**
20	DS-2708	5th	MS	AR	JS 335	HS	NRC 82	MR	TS 7	MS					JS 20-69	2nd	AR	SL 710	2nd	AR
21	PS-1042	6th	MS	HR			VLS 2	MR	NSO 81	MS					JS 20-79	2nd	AR	AMS 100-39	1st	AR
22	PS-1505	4th	MS	HR			JS 20-19	HR	NRC 85	MS					JS 20-90	2nd	AR	MACSNRC-1575	1st	AR
23	NRC-127	2nd	S	AR			JS-9	HR	NRC 42	MS					DS-3106	2nd	AR	MACSNRC -1667	1st	AR
24	PS-1552	2nd	MS	HR			NRC 84	HR	JS (SH) 2002-11	MS					NRC-86	1st	AR	BAUS-100	1st	AR
25	PS-PS-140	4th	MR	HR			KHS 86	HR	VLS 2	MS					NRC-148	1st	AR	JS-335©	-	MS

26	SL-1104	6th	MS	HR			KS 5343	HR	KDS 8	MR					JS 20-94	2nd	AR	JS-9305©	-	MR
27	DS-3106	2nd	S	AR			VLS 74	MR	BAUS 96	MR					JS 20-96	2nd	AR	Punjab-1©	-	MR
28	NRC-128	8th	MS	HR			VLS 73	MR	KDS 1073	MS					JS 20-108	2nd	AR	TAMS-38©	-	HS
29	PS-1611	6th	MR	HR			DSB 20	HR	AMS 100-39	MS					JS 20-116	2nd	AR			
30	NRC-134	2nd	MS	HR			AMS-MB-5-18	MR	AMS 2014-1	MS					JS 21-05	2nd	AR			
31	NRC-137	3rd	MR	HR			AMS-MB-5-19	HR	BAUS 102	MS					NRC-128	1st	AR			
32							VLS 2	MR	DS 3106	MS					SL-738	2nd	AR			
33							KDS 378	HR	DSb 32	MS					DS-3108	1st	AR			
34							VLS 86	HR	KDS 921	MS					KDS-921	2nd	AR			
35							VLS 87	HR	MACS 1520	MS					RSC 10-71	2nd	AR			
36							Himso 1685	HR	MACS 1575	MS					PS-1613	1st	AR			
37							MACS 1407	HR	VLS 2	S					DS-3109	1st	AR			
38							MACS 706	HR							MACS -1620	1st	AR			

Contd.,

S. No	Central Zone							Southern Zone					Eastern zone			
	Jabalpur DOS: 27/06/2019				Sehore DOS :03/07/2019			Dharwad DOS:15/07/2019					Raipur			
	Var.	Year of Test	CR	RAB	Var.	Year of test	MLS	Var.	Year of Test	Rust	PSS	PB (ct)	Var.	IBB	Var.	IBB
1	JS 20-34	7th	AR	MS	AMS 38-24	2nd	S	DSb 23	8th	HR	HR	MR	JS 2003 -2	HR	RSC 10-70	HR
2	JS 20-69	7th	MR	MS	AMS 243	2nd	HS	DSb 28-3	8th	HR	HR	MR	NRC 7	HR	RSC 10-71	HR
3	JS 20-98	6th	HR	HR	AMS 475	2nd	S	DSb 30-2	6th	MR	HR	MR	HIMSO1679	HR	RSC 10-52	HR
4	JS 20-36	6th	AR	MR	AMS MB 5-18	2nd	MS	DSb 21 (C)	10th	HR	HR	MS	JS 20-19	HR	IVT 41	HR
5	NRC 86	6th	MR	MR	AMS 5-19	2nd	MS	KDS 753	6th	MR	MR	MS	NRC 82	HR	BRAGG	HR
6	PS 1469	5th	AR	MR	AMS 77	2nd	MS	EC 391336	6th	HR	HR	MR	MACS 1254	HR	JS 335	HR
7	MAUS 706	5th	S	MR	JS 99-89	2nd	MS	EC 379152	7th	HR	MR	MS	SL 795	HR	JS 97-52	HR
8	MACS - 1520	4th	MR	MS	JS 20-18	2nd	HS	EC 242104	8th	HR	HR	MR	AMS 323	HR	NRC 37	HR
9	AMS MB 5 - 18	4th	HR	MR	JS 20- 19	2nd	MS	EC 3551	9th	MR	HR	MS	KDS 354	S	DSb 34	HR
10	NRC 125	4th	HR	HR	JS 20-20	2nd	HS	EC 241780	12th	HR	HR	MS	KS 3	HR	MAUS 725	HR
11	RSC 10-52	4th	MR	MS	JS20 -34	2nd	MS	EC 241778	12th	HR	HR	MS	JS 20-39	HR	SL 1068	HR
12	AMS MB 5 -19	3rd	AR	MR	JS20 -69	5th	MS	JS 21-08	7th	MS	MR	MR	PS 1477	HR	MAUS 731	HR
13	AUKS - 174	3rd	AR	MS	JS20 -79	2nd	MS	DSb 32	6th	HR	HR	MR	KDS 344	HR	AMS 2014 -1	HR
14	AMS 2014 -1	3rd	HR	MS	JS20 -82	2nd	MS	DSb 31	6th	MR	HR	MR	DS 2706	HR	DS 3108	HR
15	JS 21-17	3rd	AR	MR	JS20 -84	2nd	MS	DS 3106	3rd	MS	MR	MR	JS 20-34	HR	AMS 100-39	HR
16	NRC – 133	3rd	S	MR	JS20 -86	2nd	MR	NRC 125	3rd	MS	HR	MS	SL 900	HR	PS 1613	HR

17	AMS 100- 39	3rd	AR	MR	JS20 -89	2nd	MR	NRC 126	3rd	MS	HR	MR	RKS 115	HR	RSC 11-07	HR
18	RSC 11-03	3rd	MR	MS	JS20 -90	2nd	MR	RSC 10-52	3rd	MS	MR	MS	MAUS 612	HR	SKF SPS 11	HR
19	PS 1613	3rd	MS	MR	JS20 -94	2nd	MS	SL 1028	3rd	MS	MR	MS	JS 20-69	HR	NRC130	HR
20	RVS 2011-1	3rd	S	MR	JS20 -96	4th	MS	SL 1074	3rd	MS	HR	MS	NRC 93	HR	NRC 37	HR
21	AMS 243	2nd	MR	MS	JS20 -103	2nd	MS	NRC 128	3rd	MS	HR	MS	RKS 113	HR	JS 335	HR
22	AMS – 77	2nd	AR	MR	JS20 -108	2nd	MS	DSb 34	3rd	HR	HR	MR	RSC 10-46	HR		
23	AMS 264	2nd	AR	MR	JS21 – 03	2nd	MR	BAUS 102	3rd	MS	HR	MS	RSC 10-29	HR		
24	DS 3106	2nd	AR	HR	JS21 – 05	2nd	MS	JS 335 (C)		HS	S	S	RSC 10-30	HR		
25	DS 3109	2nd	HR	MR	JS21 -06	2nd	MS						CG 1	HR		
26	JS 21-71	2nd	AR	HR	JS21 -09	2nd	MS						IVT 2	HR		
27	JS 21-72	2nd	AR	HR	JS21 -13	2nd	MS						IVT 6	HR		
28	KDS 1009	2nd	AR	MR	SL 96	2nd	MS						IVT11	HR		
29	KDS 1073	2nd	MR	MR	SL 710	2nd	MS						IVT13	HR		
30	MAUS 158	2nd	AR	HR	SL 738	2nd	MS						IVT 24	HR		
31	NRC SL 2	2nd	MR	MR	SL 955	2nd	MS						IVT 26	HR		
32	SL 1191	2nd	AR	MR	SL 958	2nd	MS						IVT 39	HR		
33	VLS 94	2nd	HR	MR	RVS 2002-4	4th	MR						IVT 40	HR		
					RVS 2001-4	5th	MR						TAMS39	HR		
													NRC 125	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	CR	YMV	RAB	Genotype	PB (Ct)	BP	SMV	Genotype	Rust	PSS	PB	Geno type	RAB	YMV	PB
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Ankur (NG)	-	-	-	EC 109540	HR	MS	MS	P501	MR	S	S	ANKUR	S	HR	MS	ANKUR	MR	HR	MR
2	Bhatt (NG)	-	-	-	JS 20-51	HR	MR	S	JS 2075	S	S	S	BHATT	S	HR	MR	BHATT	MR	HR	HR
3	PI 210178 (NG)	-	-	-	NRC 67	HR	MR	MS	EC109540	S	S	S	PI 20178	MS	HR	MS	PI-210178		AR	MR
4	EC 358002 (NG)	--	-	-	JS 20-37	HR	MS	MS	CAT 1241AM204	HS	R	R	EC 358002	MR	HR	MS	EL-358002	MR		AR
5	EC 241807	S	MR	MR	EC 107407	HR	MS	MS	CAT195 BR4	S	S	S	EC 241807	MR	HR	MR	EC-241807	MS	HR	MR
6	CAT 1241 A(M204)	MS	AR	HR	CAT 1241A	HR	MR	MR	PI 210178	NG*	NG	NG	CAT 1241A/M204	MS	HR	MR	CAT-1241A M-204	MR	MS	MR
7	EC 107407	MR	HR	MR	EC 251358	HR	AR	MR	JS 2069	MR	R	R	EC 107407	MR	MR	MS	EC-107407	MS	MR	HR
8	EC 251368	AR	MS	HR	JS 21-08	R	MR	MS	NRC 71	NG	NG	NG	EC 251358	MR	HR	MR	EC-251358			
9	EC 241771	HR	AR	MR	EC 241309	HR	AR	MS	EC29398	HS	S	S	EC 241771	MR	HR	MR	EC-241771	MR	MR	HR
10	EC 7048	S	MR	MR	DB 1588	HR	AR	MS	EC 245986	S	R	R	EC 7048	MS	HR	MS	EC-7048	S	MR	HR
11	EC 1619	HR	AR	HR	PS 1347	HR	MR	MS	NRC 67	MS	S	S	EC 1619	MS	HR	MS	EC-1619	HS	HR	AR
12	JS 20-37	S	AR	MR	P501	R	MS	MS	EC 39177	NG	NG	NG	JS 20-37	MS	MR	MR	JS-20-37	S	HR	HR

13	EC 245986 (mix.)	MS	AR	MR	JS 20-79	HR	AR	MR	GP 448	NG	NG	NG	EC 245986	MR	HR	MS	EC-245886	MS	MR	MR
14	DSb 21	MR	HR	HR	EC 245986	MR	MS	S	EC 358002	NG	NG	NG	DSb 21	HR	HR	MS	DSB-21			
15	NRC 71	MS	MR	MR	EC 7048	HR	MR	MS	EC 250591	NG	MR	MR	NRC 71	MS	MR	MS	NRC-71			
16	EC 114573 (late)	AR	AR	MR	EC 250591	HR	MS	S	JS 20-31	MR	S	S	EC 11457	MS	MR	MS	EC-114573	S	MS	AR
17	EC 250591	S	AR	MR	**JS 20-31**	HR	AR	HR	DSB21	HS	S	S	EC 250591	MR	HR	MR	EC-250591	S	MR	HR
18	DB 1588 (late)	MR	AR	MR	AGS 95	R	MS	MS	EC24187	HS	MR	MR	DB 1588	MS	MR	MR	DB-4588	MS	MR	HR
19	CAT 195 (BR4)	AR	AR	HR	M 204	R	S	MS	EC242104	MS	S	S	CAT 195/ BR 4	MS	HR	MR	CAT-195CR4	MS	MR	HR
20	EC 242104 (late)	MS	AR	MR	EC 291398	R	S	MS	JS 2037	S	MR	MS	EC 242104	HR	HR	MS	EC-242104	HS	MR	MR
21	P 501	MS	HR	MR	EC 242104	MR	MR	MS	EC251358	HS	MR	MR	P 501	MS	HR	MR	PS-501	MS	MR	MR
22	VP 1164	HR	AR	HR	EC 457286	R	HS	MS	AG595	S	R	R	VP 1164	MS	HR	MR	VP-1164	S	MR	AR
23	EC 291448 (NG)	-	-	-	EC 39177	HR	HS	MR	DB1588	H	R	R	EC 109540	MR	MR	MR	EC-291448	MS	HR	AR
24	JS 20-53	MS	HR	MR	TGx – 849D-13-4	HR	AR	HR	JS2065	S	R	R	JS 20-69	MS	MR	MS	JS-20-69	HR	HR	MR
25	JS 20-75	MR	HR	MR	EC 241778	HR	MR	MS	JS2042	S	R	R	JS 20-75	MS	MR	MS	JS-20-75	HS	HR	MR
26	JS 20-51	MS	AR	HR	Cat – 195 (BR 4)	HR	MR	MS	JS2079	S	S	R	JS 20-51	MS	MR	MS	JS-20-51	S	AR	AR

27	VP 1162	MS	MR	MR	BHATT	MR	HS	MR	EC241778	HS	R	R	VP 1162	MS	MR	MS	VP-1162	HS	HR	MR
28	EC 109540	MS	HR	MS	**JS 20-42**	HR	AR	HR	JS21-08	S	MS	R	EC 109540	MR	HR	MR	EC-109540	MS	HR	AR
29	JS 20-69	MS	HR	MR	VP 1162	HR	MS	MR	EC241696	S	R	R	JS 20-53	MS	HR	MR	JS-20 53	MR	HR	HR
30	NRC 84	MS	HR	MR	VP 1164	MS	AR	MR	JS2051	MS	R	MS	NRC 84	MS	HR	MS	NRC-84	HS	HR	MR
31	EC 457286	MS	AR	MR	**JS 20-69**	HR	AR	MR	VP1162	NG	NG	NG	EC 457286	MR	HR	MS	EC-457286	MS	AR	MR
32	NRC 67 (NG)	-	-	-	EC 241807	HR	MS	MR	VP1164	S	R	R	NRC 67	MS	HR	S	NRC-67	HS	MR	MR
33	JS 20-42	MS	HR	MR	PI 210178	HR	S	MS	JS2053	S	R	S	JS 20-42	MS	MR	S	JS-20-42		MR	
34	EC 241696	MS	AR	HR	ANKUR	MR	HS	MS	JS2034	S	R	R	EC 241696	MR	MR	S	PS-1347	MS	AR	MR
35	JS 20-79	MS	AR	MR	EC 114573	MR	HS	MR	EC241771	S	R	S	JS 20-79	MS	HR	MR	JS-20-79	MR	MR	HR
36	JS 20-65	MS	AR	MR	NRC 84	HR	MR	MS	EC241777	HS	R	R	JS 20-65	MS	HR	MS	JS-20-65	S	HR	AR
37	EC 241777	MS	HR	MR	JS 20-65	HR	MR	S	ANKUR	NG	NG	NG	EC 241777	MS	MR	MS	EC-241777	HS	HR	MS
38	EC 241309 (NG)	-	-	-	Dsb 21	R	HS	MS	M204	HS	R	R	EC 241309	MR	MR	MS	EC-241309	MS	MR	MS
39	JS 21-08	HR	MR	MR	EC 291448	HR	MR	S	BHATT	HS	R	R	JS 21-08	MS	HR	MS	JS-21-08	MS	HR	A
40	TGX-849D-13-4 (very late)	S	AR	MR	JS 20-34	R	AR	MR	EC7048	MS	MR	R	TGX 8490-13-4	MS	HR	MS	TGX-849-D	MR	HR	MR
41	EC 241778 (late)	AR	AR	HR	GP 448	R	MS	S	PL5057	HS	MS	MS	EC 241778	HR	MR	MS	EC-241778			
42	EC 39177	S	HR	HR	PLS 057	R	MS	S	EC107407	HS	R	R	EC 39177	MR	MR	MS	EC-39177	S	MR	AR

43	PLSO 57	MR	HR	MR	EC 241696	MR	MR	MS	EC457386	HS	SR	R	PLSO 57	MS	HR	MS	PL-5057	MS	MR	MR
44	PS 1347 (NG)	-	-	-	EC 241771	R	MR	MS	EC291448	S	R	R	PS 1347	MS	HR	MS	EC-241696	S	MR	MR
45	GP 448	MS	AR	MR	EC 1619	MS	MR	MS	EC114573	HS	R	R	GP 448	MS	HR	S	GP-448	MR	MS	MR
46	JS 20-31	MS	AR	MR	NRC 71	R	MR	MS	TGX-849D-13-4	S	R	R	JS 20-31	MS	HR	MS	JS-20-31		HR	MR
47	M 204 (NG)	-	-	-	JS 20-53	R	AR	MR	EC241309	HS	R	R	M 204	MS	HR	MS	M-204	MS	HR	HR
48	AGS 95 (NG)	-	-	-	EC 358002	R	MR	MS	PS1347	HS	R	R	AGS 95	MS	MR	MS	AG-595	MS	MR	HR
49	EC 291398	MS	HR	HR	EC 241777	R	MR	MS	NRC84	MS	S	R	EC 291398	MR	MR	MS	EC-291398	MR	MR	AR
50	JS 20-34	AR	MS	MR	JS 20-75	R	AR	HR					JS 20-34	MS	HR	MS	JS-20-34	MS	HR	S
51	JS 335 (Check)	MS	S	MR	JS 20-29 (c)	HR	MS	MS												
	Shivalik (Check)	HS	MS	MS	JS 95-60(c)	MR	HS	MR												
52					JS 93-05(c)	MS	HS	MS												
53					JS 335(c)	MS	MR	MS												

-: Not germinated

Table 4.8a : PP 6/ENT 8 - Integrated management of root rot complex and stem borers of soybean Center: Dharwad

Tr.	Treatment details	Formula -tion	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 weight (g)	Seed yield (kg/ha)
T_1	Seed treatment (ST) with Carboxin + Thiram	75% WP	3	92.33 (73.89)	8.50 (16.94)	17.45 (24.68)	27.42 (31.56)	45.12	5.57	64.15	14.00	1815.25
T_2	ST with Trifloxystrobin + Penflufen	240 FS	1	96.55 (79.26)	4.65 (12.44)	15.30 (23.02)	26.15 (30.74)	48.20	5.66	66.05	14.30	2212.52
T_3	ST with Thiophanate methyl + Pyroclostrobin	500 FS	2	95.59 (77.84)	4.20 (11.82)	14.16 (22.10)	24.54 (29.68)	48.40	5.92	66.25	14.60	2352.65
T_4	ST with *Trichoderma harzianum*	-	10	89.50 (71.06)	12.25 (20.47)	19.22 (25.99)	30.53 (33.53)	44.25	5.10	62.10	13.19	1765.20
T_5	ST with Thiamethoxam	600 FS	2	92.21 (73.76)	8.16 (16.59)	9.45 (17.90)	14.62 (22.47)	45.21	5.25	64.30	13.10	1925.40
T_6	T1 + T5	-	3+2	94.25 (76.09)	6.65 (14.93)	10.12 (18.54)	16.57 (24.01)	46.54	5.58	64.25	14.30	1970.50
T_7	T2 + T5	-	1+2	98.53 (83.00)	2.35 (8.81)	6.02 (14.20)	8.57 (17.02)	48.65	5.96	66.75	14.80	2520.70
T_8	T3 + T5	-	2+2	98.76 (83.51)	2.15 (8.42)	5.41 (13.44)	7.64 (16.04)	48.75	5.97	67.57	14.85	2650.20
T_9	T4 + T5	-	10+2	92.41 (73.97)	8.24 (16.67)	11.57 (19.88)	13.89 (21.87)	46.25	5.35	58.45	13.80	2245.10
T_{10}	Untreated control	-	-	82.10 (64.94)	21.50 (27.61)	23.54 (29.01)	40.28 (39.38)	42.35	5.03	53.20	12.10	1510.34
	S.Em±	-	-	0.83	1.20	0.74	0.88	0.45	0.21	0.86	0.16	88.65
	CD @ 5%	-	-	2.50	3.61	2.27	2.68	1.35	0.85	2.45	0.48	195.12

* Figures in the parenthesis are transformed angular values Variety : JS 335 Date of sowing : 15-07-2019

Table 4.8b: Integrated management of root rot complex and stem borers of soybean Center: Pantnagar

Sl. No.	Treatment	% field stand	% root rot incidence	Plant Height (cm)	No. of branches per plant	No. of pods per plant	100 seed weight	Seed yield (q/ha)
1.	T1-ST with carboxin + thiram	91.1	3.34	58.6	6.18	52.7	8.69	11.27
2.	T2- ST with Trifloxystrobin + penflufen	93.9	2.41	65.2	6.27	57.2	8.75	11.42
3.	T3- ST with Thiophanate Methyl + pyraclostrobin	92.3	2.77	62.1	6.22	54.6	8.72	11.33
4.	T4- ST with Trichoderma harzianum	84.9	3.63	56.7	6.16	49.4	8.55	11.16
5.	T5- ST with Thiomethoxam	85.2	7.15	55.8	6.15	48.4	8.52	11.11
6.	T1 + T5	93.1	2.94	59.5	6.21	54.3	8.68	11. 38
7.	T2 + T5	96.2	1.84	66.3	6.33	59.5	8.81	11.59
8.	T3 + T5	94.4	2.36	63.4	6.24	56.7	8.71	11.41
9.	T4 + T5	88.6	3.28	57.6	6.18	51.3	8.57	11.23
10.	Control	78.4	21.6	49	5.98	45.4	8.49	10.74

Table 4.8c Integrated Management of the root rot complex and stem borers of Soybean (2019) Center: Amaravati

SN	Treatment	No Branches /plants	Plant Height	No of Pods	Yield per Plots	100 seed wt.	Yield Kg /Ha.
T_1	T1- Seed treatment (ST) with Carboxin + Thiram 75 % WP (3gm/Kg of seed)	2.43 (1.55)*	47.20	33.2 (5.76)*	1.82 (1.34)	10.51 (3.24)	1691.35
T_2	T2- ST with Trifloxystrobin + Penflufen 240 FS (1gm/ Kg of seed)	2.43 (1.55)	48.36	35.32 (5.94)	2.15 (1.46)	10.85 (3.29)	1996.91
T_3	T3- ST with Thiophanate methyl + Pyroclostrobin 500 FS (2gm/ Kg of seed)	2.46 (1.57)	48.28	34.99 (5.91)	2.01 (1.41)	10.89 (3.30)	1864.19
T_4	T4- ST with *Trichoderma harzianum* (10gm/ Kg of seed)	2.43 (1.55)	49.43	35.84 (5.99)	2.09 (1.44)	10.79 (3.28)	1938.27
T_5	T5-ST with Thiomethoxam 600 FS (2ml/ Kg of seed)	2.46 (1.57)	47.55	35.81 (5.98)	2.11 (1.45)	10.01 (3.16)	1953.70
T_6	T6- Seed treatment (ST) with Carboxin + Thiram(T1)+ ST with Thiomethoxam(T5) i.e.(T1+T5) 3gm+2gm/ kg of seed	2.46 (1.57)	52.36	41.73 (6.45)	2.25 (1.50)	12.5 (3.53)	2089.50
T_7	T7- ST with Trifloxystrobin + Penflufen + ST with Thiomethoxam (1gm+2ml)	2.4 (1.54)	49.86	40.55 (6.37)	2.17 (1.47)	11.54 (3.39)	2012.34
T_8	T8- ST with Thiophanate methyl + Pyroclostrobin + ST with Thiomethoxam (2+2/ Kg of seed)	2.5 (1.58)	52.14	40.29 (6.35)	2.2 (1.48)	11.94 (3.45)	2037.03
T_9	T9- ST with *Trichoderma harzianum* +ST with Thiomethoxam (10+2/ Kg seed)	2.43 (1.55)	47.29	41.3 (6.43)	2.23 (1.49)	11.74 (3.42)	2061.72
T_{10}	T10- Untreated Control	2.4 (1.54)	36.18	26.84 (5.71)	1.52 (1.22)	8.43 (2.86)	1407.40
	SE(m)	NS	2.32	1.68	0.04	0.12	94.08
	CD (P=0.05)	-	6.89	4.98	0.11	0.36	279.29
	CV(%)	-	8.36	7.89	4.62	6.32	8.55

Table 4.8d: Integrated management of the root rot complex and stem borers of soybean Center: Palampur

Treatment	% field stand	% root rot incidence	% Girdling	Plant height (cm)	No. of pods/Pt	100g seed wt.(g)	Seed yield (q/ha)
T1= SST with Carboxin +thiram (3g/kg)	73.3	0.83	4.3	46.0	37.1	12.80	12.360
T2= ST with Trifloxystrobin (1g/kg)	67.6	5.67	3.7	46.4	35.7	12.87	11.686
T3= ST with Thiophanate methyl (2gkg)	75.7	2.33	4.3	47.9	33.5	12.70	12.303
T4= ST with *Trichoderma harzianum* (10g/kg)	70.4	5.00	3.7	45.6	36.0	12.87	10.676
T5= ST with Thiomethoxam (2g/kg)	63.9	13.33	3.7	47.1	35.3	12.45	9.070
T6= T1 +T5	72.3	0.83	2.3	46.5	37.8	12.40	12.280
T7= T2 +T5	71.5	4.33	4.3	46.4	36.2	12.43	11.310
T8= T3 +T5	72.5	2.67	3.7	47.5	36.7	12.80	11.860
T9=T4 +T5	72.5	5.67	3.0	43.7	38.9	12.83	10.590
T10= Untreated control	62.8	14.00	16.7		30.2	11.80	8.143
CD (P= 0.05)	5.829	2.567	2.713	2.156	NS	NS	1.288

ST = Seed treatment
Two spray with chlorantroniprole @ 0.2ml/L at 15 and 35 DAS in treatment no. T1 to T9
Two sprays with Propiconazole @ 1ml/L at 35 and 45 DAS in treatment no. T1 to T9

Table 4.8e: Efficacy of various treatments in management of root rot complex, stem fly and girdle beetle and its impact on yield
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)	Seed yield(kg /ha
T_1	Seed treatment (ST) with Carboxin + Thiram 75 % WP @ 3g/kg seed	5.0	74.7	7.5	13.3	5.8	73.5	2.1	23.5	10.80	1418.7
T_2	ST with Trifloxystrobin + Penflufen 240 FS @ 1ml/kg seed	5.9	73.3	8.4	13.7	6.0	73.0	2.2	22.8	10.73	1397.3
T_3	ST with Thiophanate methyl + Pyroclostrobin 500 FS @ 2ml/kg seed	4.7	75.8	7.1	13.6	5.4	74.8	2.2	24.6	10.83	1459.7
T_4	ST with *Trichoderma harzianum* @ 10g/kg seed	5.3	72.2	8.5	14.8	5.5	74.3	2.1	23.1	10.67	1406.0
T_5	ST with Thiomethoxam 600 FS FS @ 2ml/kg seed	6.6	69.8	9.0	9.5	3.2	75.2	2.3	23.0	10.60	1351.7
T_6	T1 + T5	3.4	78.6	7.5	8.2	3.3	77.2	2.5	26.4	11.00	1530.0
T_7	T2 + T5	3.9	76.8	8.0	8.8	3.2	76.3	2.4	25.2	10.77	1508.3
T_8	T3 +T5	2.3	81.4	6.9	8.7	3.3	78.7	2.5	27.5	11.17	1580.0
T_9	T4+ T5	4.2	76.4	7.7	9.2	3.7	76.9	2.3	26.2	10.93	1510.7
T_{10}	Untreated control	10.8	61.1	12.3	23.8	10.3	70.3	1.8	20.1	9.30	970.0
	CD (5 %)	**0.86**	**1.54**	**1.88**	**2.92**	**2.78**	**4.01**	**NS**	**3.66**	**0.46**	**81.7**

सूक्ष्मजीव विज्ञान

Microbiology

Principal Investigator	**Dr. M.P. Sharma, IISR, Indore**
Northern Plain Zone	
Pantnagar (Uttarakhand)	Dr. Naveneet Pareek Dr. K.P. Raverkar
New Delhi	Dr. (Smt.) K. Annapurna
Ludhiana (Punjab)	Dr. (Smt.) Poonam Sharma
Central Zone	
Indore (Madhya Pradesh)	Dr. Mahaveer P. Sharma
Sehore (Madhya Pradesh)	Dr. R. C. Jain
Southern Zone	
Dharwad (Karnataka)	Dr. P. Jones Nirmalnath

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: FAME profile of bacterial isolates:

S.No.	Seq no.	Sim Index	Isolates
1.	**MB1**	**0.506**	**Pseudomonas-fluorescens-biotype A**
2.	**MB2**	**0.705**	**Pseudomonas-mucidolens**
3.	MB4	0.403	Pseudomonas-putida-biotype A
4.	MB6	0.650	Flavobacterium-johnsoniae
5.	MB8	0.756	Pseudomonas-mucidolens
6.	MB9	0.479	Pseudomonas-putida-biotype A
7.	**MB10**	**0.806**	**Pseudomonas-fluorescens-biotype A**
8.	MB11	0.519	Pseudomonas-putida-biotype A
9.	**MB14**	**0.678**	**Pseudomonas-putida-biotype A**

Table.MB1/16B: Qualitative analysis of potential rhizobacteria isolate for PGP traits

PGP traits		MB1	MB2	MB10	MB14
IAA at 3th day	(+) Tryptophan	++	+	+++	+++
P-solubilization at 7th day	PSI (cm)	1	1.5	3	2
Siderophore at 7 day	Diameter of clear halo zone (cm)	0.5	-	-	1.5
ACC plate at 5 day assay	DF + ACC	-	+	++	++
	DF + $(NH_4)_2SO_4$	++	+	++	++
	DF	+	+	+	+

Table-MB1/16C: Evaluation of isolates at different levels of PEG 6000 under *Invitro* (growth observed in KB broth at 48 hours at 28°C at Indore Centre

Selected potential isolates	PEG				
	0%	10%	20%	30%	Mean one way
MB1	1.103a	0.63a	0.323a	0.156 a	0.555a
MB2	1.033a	0.63a	0.28 a	0.153 a	0.58 a
MB10	1.12 a	0.62a	0.363b	0.116a	0.535a
MB14	1.016 a	0.23b	0.83a	0.183a	0.401a
LSD (P=0.05)	0.106	0.144	0.39	0.069	
Mean	0.55a	0.525a	0.55a	0.58a	
2-WAY ANOVA LSD (0.05) PEG		0.47			
LSD (0.05) Isolates		0.47			
Interaction effects Isolate × PEG		ns			

Delhi Centre

Table MB1/16D: Growth* in terms optical density (OD $_{600}$nm) of fluorescent pseudomonads grown in media amended with PEG at different rates

Treatment	Isolates	72 hrs			
		0% PEG	10% PEG	20% PEG	30% PEG
MB I T5	1	1.96	1.69	1.43	0.96
	2	2.21	1.49	1.25	0.92
	3	2.18	1.96	1.69	0.76
	4	2.21	1.96	1.55	0.93
MB I T6	1	2.18	2.12	1.96	**1.63**
	2	2.19	2.01	1.87	0.94
	3	2.16	2.09	1.88	**1.23**
	4	2.18	1.99	2.19	0.57
MB I T7	1	2.39	1.87	1.65	0.83
	2	2.15	1.81	1.97	0.36
	3	2.12	1.72	1.70	0.32
	4	2.08	2.06	1.53	0.34
MB I T8	1	2.14	2.04	2.06	**1.66**
	2	2.24	2.16	1.97	**1.11**
	3	2.04	1.89	1.59	0.62
	4	2.07	1.95	1.64	0.58

Observations are of 72hrs incubation and mean of 3 replicates

Ludhiana Centre

Table MB1/16E: Screening of selected potential rhizobacterial isolates for multifarious PGP traits at Ludhiana Centre

Multifarious PGP traits		*Bradyrhizobium* sp.	*P. oryzihabitans*	*P. fluorescence*
IAA(µg ml^{-1}) at 6^{th} day	(-) Tryptophan	13.32	15.71	48.77
	(+) Tryptophan	46.38	14.62	47.33
P-solubilization at 12^{th} day	PSI	1.30	1.75	1.80
	($mg100ml^{-1}$)	11.46	9.87	11.55
Siderophore	Diameter of clear halo zone (cm)	1.05	2.00	1.65
ACC ($OD_{600\ nm}$)	Bacterial growth	++	+++	+++
	DF + ACC	0.5372	0. 9733	0.8453
	DF + $(NH_4)_2SO_4$	0.9453	1.4316	1.2138
	DF	0.2750	0.3444	0.3283

Table-MB1/16F: Intensity of growth in selected potential *Bradyrhizobium* sp. and rhizobacterial isolates of soybean at Ludhiana Centre

Stress treatment	**Selected potential isolates**		
PEG6000 (%)	***Bradyrhizobium* sp.**	***P. oryzihabitans***	***P. fluorescence***
0	0.828	1.54	0.716
5	0.487	1.20	0.535
7.5	0.466	0.986	0.495
10	0.417	0.816	0.473
15	0.415	0.654	0.470
20	0.321	0.414	0.328
25	0.286	0.268	0.195
30	0.178	0.102	0.090
NaCl %			
0	0.140	1.743	1.077
2.5	0.203	0.947	0.936
5	0.242	0.841	0.733
7.5	0.238	0.720	0.419
10	0.178	0.194	0.395
Temperature (Degrees Celsius)			
28±2	0.396	1.327	1.142
35±2	0.275	0.926	0.856
40±2	0.150	0.394	0.737

Table-MB1/16G: Multifunctional PGP traits of selected bacterial isolates under normal vs stressed conditions

Treatments	Indole acetic acid production (µg/ml)		Phosphate solublization (mg/100 ml)		ACC-deaminase production (O.D.=600nm)		Biofilm formation at 24 h(O.D.=540nm)		Zinc-solublization Index	
	28°C	45°C	28°C	45°C	28°C	45°C	28°C	45°C	28°C	45°C
***Bradyrhizobium* sp.**	9.19[a]	9.11[a]	6.31[a]	7.63[a]	1.11[a]	1.01[b]	0.2775[b]	0.6487[a]	1.11	1.01
Pseudomonas fluorescence	11.85[a]	11.41[b]	10.06[b]	11.03[b]	1.51[b]	1.16[b]	0.2878[a]	0.9087[b]	1.51	1.16
Pseudomonas oryzihabitans	10.98[a]	10.92[a]	8.03[a]	8.99[a]	1.58[b]	1.23[a]	0.3005[c]	0.8874[a]	1.58	1.23

Table-MB1/16H: Proline content of selected isolates under normal vs stressed conditions

Treatments	Proline content (µg/ml)		
	Absolute control	NaCl (5%)	PEG (6000) (5%)
***Bradyrhizobium* sp.**	2.622[a]	8.486[b]	8.356[b]
Pseudomonas fluorescence	3.326[a]	8.874[b]	7.723[c]
Pseudomonas oryzihabitans	3.181[a]	7.977[b]	7.521[b]

Pantnagar centre

Table-MB1/16J: Characterization of fluorescent *Pseudomonas* at varying concentration of PEG-6000 for developing inoculants to mitigate abiotic stress in soybean (Pantnagar)

Isolates	PEG Concentration (%)				Remarks (Visible growth, VG)
	Absorbance at 640 nm				
	0	15	25	35	
Control (Blank)	0.0006	0.0014	0.003	0.006	No growth
Pant-1	0.358	0.149	0.169	0.179	Very good growth
Pant-2	1.186	0.844	0.427	0.047	
Pant-3	1.697	1.409	0.765	0.198	Good growth
Pant-4	1.434	0.905	0.219	0.013	Poor growth
Pant-5	1.668	0.947	0.264	0.017	
Pant-6	2.126	1.550	1.004	0.496	Very good growth
Pant-7	2.042	1.257	0.513	0.197	Good growth
Pant-8	1.413	1.312	0.466	0.110	

MB2a/18: 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 2019

Inoculation	Nodules (no./plant) (at 50% flowering stage)			Nodule dry mass (at 50% flowering stage) (mg/plant)			Root dry mass (at harvest stage) (g/plant)			shoots dry mass (at harvest stage) (g/plant)		
	ST	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**	**ST**	**UNST**	**Mean**
Un-inoculated control	5.33f	23.66d	14.5d	7.53d	10.06d	8.8c	3.58d	3.57d	3.57d	10.48e	9.28e	9.88c
Commercial *B. japonicum*	5.66f	36.66c	21.16c	6.13d	11.53d	8.83c	4.44cd	4.54cd	4.49bc	12.44cde	10.18e	11.31c
B. daqingense	14.33e	60.00a	37.16a	13d	40.6a	26.8a	5.71ab	6.12a	5.91a	14.85bc	18.78a	16.81a
B. liaoningense	11.00ef	49.00b	30.00b	11.53d	23.66c	17.6b	4.07cd	5.19abc	4.63bc	10.64de	16.66ab	13.65b
B. japonicum	8.00ef	49.66b	28.83b	11.36d	33.63ab	22.5ab	3.69d	4.69bcd	4.19cd	14.03bcd	15.15bc	14.59ab
AMF	7.00ef	34.00c	20.5c	9.26d	25.73bc	17.5b	5.14abc	4.96bc	5.05b	12.87cde	15.28bc	14.08b
Mean	8.55b	42.16a		9.80b	24.20a		4.44a	4.84a		12.55b	14.22a	
One way ANOVA LSD (P=0.05)	**7.62**			**9.00**			**1.03**			**3.21**		
Two way ANOVA LSD (P=0.05)												
Stress	**3.26**			**3.805**			**0.423**			**1.313**		
Inoculation	**5.65**			**6.590**			**0.732**			**2.274**		
Interaction effect												
Stress× Inoculation	*******			******			**ns**			******		

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA and treatment means followedby same letter did not differ significatly.

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 2019

Inoculation	Relative water content (%)			N-content in seed (%)			N-content in shoots (%)			P-content in seed (%)			P-content in shoots (%)		
	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean
Un-inoculated control	48.54c	76.1a	62.32a	5.08c	4.85c	4.97b	0.53b	0.54b	0.53b	0.45d	0.62abcd	0.54b	0.02e	0.02e	0.021c
Commercial *B. japonicum*	50.46bc	65.5abc	57.98a	5.22c	4.94c	5.08b	0.61ab	0.52b	0.56b	0.48cd	0.68abc	0.58b	0.04cde	0.04cde	0.04bc
B. daqingense	53.8bc	71.3ab	62.59a	6.76ab	7.14a	6.95a	0.73a	0.73a	0.73a	0.62abcd	0.69ab	0.66ab	0.05cd	0.16a	0.10a
B. liaoningense	62.4abc	76.5a	69.45a	5.78bc	7.46a	6.62a	0.63ab	0.68ab	0.65ab	0.65abc	0.5bcd	0.57b	0.03de	0.08b	0.05b
B. japonicum	71.64ab	64.7abc	68.19a	5.55c	5.55c	5.55b	0.58ab	0.6ab	0.59b	0.51bcd	0.6abcd	0.56b	0.04cde	0.06bc	0.05b
AMF	66.5abc	66.5abc	66.55a	5.69bc	5.46c	5.57b	0.60ab	0.64ab	0.62ab	0.69ab	0.82a	0.75a	0.06bc	0.17a	0.12a
Mean	58.91b	70.11a		5.68a	5.90a		0.61a	0.62a		0.57b	0.65a		0.04b	0.09a	
One way ANOVA LSD (P=0.05)	**18.721**			**1.075**			**0.162**			**0.177**			**0.026**		
Two way ANOVA LSD (P=0.05)															
Stress	**7.642**			**0.438**			**0.066**			**0.072**			**0.010**		
Inoculation	**13.238**			**0.760**			**0.115**			**0.125**			**0.018**		
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 and treatment means followedby same letter did not differ significatly.

MB2a/18C: Evaluation of promising soybean rhizobia for conferring drought tolerance based on N& P uptake in soybean (Variety JS 95-60) grown under pot conditions during Kharif 2019

Inoculation	N-content in roots (%)			Seed N uptake (g/plant)			Shoot N uptake (g/plant)			Root N uptake (g/plant)		
	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean
Un-inoculated control	0.54de	0.63cde	0.59cd	0.32f	0.87de	0.59e	0.55e	0.5e	0.52d	0.19d	0.22cd	0.20d
Commercial *B. japonicum*	0.54de	0.53e	0.53d	0.39f	1.06cd	0.73de	0.76cde	0.53e	0.65cd	0.24cd	0.24cd	0.24cd
B. daqingense	0.90a	0.80ab	0.85a	1.28c	2.6a	1.94a	1.09abc	1.38a	1.23a	0.51a	0.49a	0.50a
B. liaoningense	0.69bcd	0.71bc	0.70b	0.85de	1.7b	1.27b	0.68de	1.14ab	0.91b	0.27bcd	0.37b	0.32b
B. japonicum	0.64cde	0.66bcde	0.65bc	0.55ef	1.3c	0.92cd	0.80cde	0.91bcd	0.85bc	0.23cd	0.31bc	0.27bcd
AMF	0.56cde	0.59cde	0.57cd	0.78de	1.34c	1.06bc	0.79cde	0.98bcd	0.88b	0.29bcd	0.29bcd	0.29bc
Mean	0.65a	0.65a		0.6b	1.48a		078b	090a		0.29a	0.32a	
One way ANOVA LSD (P=0.05)	**0.141**			**0.341**			**0.295**			**0.090**		
Two way ANOVA LSD (P=0.05) Stress	**0.057**			**0.241**			**0.120**			**0.036**		
Inoculation	**0.100**			**0.139**			**0.209**			**0.063**		
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 and treatment means followedby same letter did not differ significatly.

MB2a/18D: 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 2019

Inoculation	Seed P 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	0.02e	0.11cd	0.07d	0.02e	0.02e	0.02c	0.57f	1.69e	1.135d	11.30a	3.36de	7.33a
Commercial *B. japonicum*	0.03e	0.15c	0.09cd	0.05cde	0.04de	0.04c	1.75e	1.79e	1.77c	8.33b	3.60de	5.9b
B. daqingense	0.11cd	0.25a	0.18a	0.08cd	0.29a	0.19a	2.67a	2.45ab	2.56a	4.47d	3.05de	3.76cd
B. liaoningense	0.09d	0.11cd	0.10c	0.03e	0.14b	0.08b	2.5ab	1.95cde	2.26b	4.43d	2.57e	3.50d
B. japonicum	0.05e	0.14c	0.09c	0.06cde	0.09c	0.07b	2.22bcd	2.03cde	2.12b	6.6c	2.52e	4.56c
AMF	0.09d	0.2b	0.14b	0.086cd	0.27a	0.17a	2.30bc	1.94de	2.12b	6.06c	3.24de	4.65c
Mean	0.06b	0.16a		0.05b	0.14a		2.01a	1.97a		6.86a	3.06b	
One way ANOVA LSD (P=0.05)	**0.037**			**0.044**			**0.329**			**1.386**		
Two way ANOVA LSD (P=0.05)												
Stress	0.015			0.017			0.134			0.565		
Inoculation	0.026			0.031			0.232			0.980		
Interaction effect Stress×inoculation	**			***			***			***		

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA and treatment means followedby same letter did not differ significatly.

Sehore centre

Table-MB2a/18E 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 JS-95-60) grown under pot conditions during Kharif 2019

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	31.3	30.3	30.9	80.4	84.4	82.4	3.6	3.5	3.6	0.9	0.9	0.9
Commercial *B. japonicum*	35.0	33.3	34.2	90.8	97.7	94.3	3.7	3.7	3.7	1	0.9	0.9
B. daqingense	39.5	37.3	38.4	105.9	97.8	101.8	3.8	3.7	3.8	1	1	1
B. liaoningense	43.0	40.8	41.9	122.9	112.30	117.6	3.9	3.9	3.9	1	1	1
Mean	37.3	35.4	36.3	100.0	98.1	99.0	3.8	3.7	3.7	1	0.9	0.9
Two way ANOVA LSD (P=0.05)												
Stress	(m)	C.D.(5%)		SE(m)	C.D.(5%)		SE(m)	C.D(5%)		SE(m)	C.D.(5%)	
Inoculation	0.17	0.71		2.50	7.18		0.01	0.03		0.0	0.01	
Interaction effect	0.25	0.71		3.54	10.16		0.01	0.04		0.00	0.01	
Stress×inoculation	0.36	1.00		5.00	14.36		0.02	0.05		0.00	0.01	

*Data are average of 3 replications;

Table-MB2a/18F 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 JS-95-60) grown under pot conditions during Kharif 2019

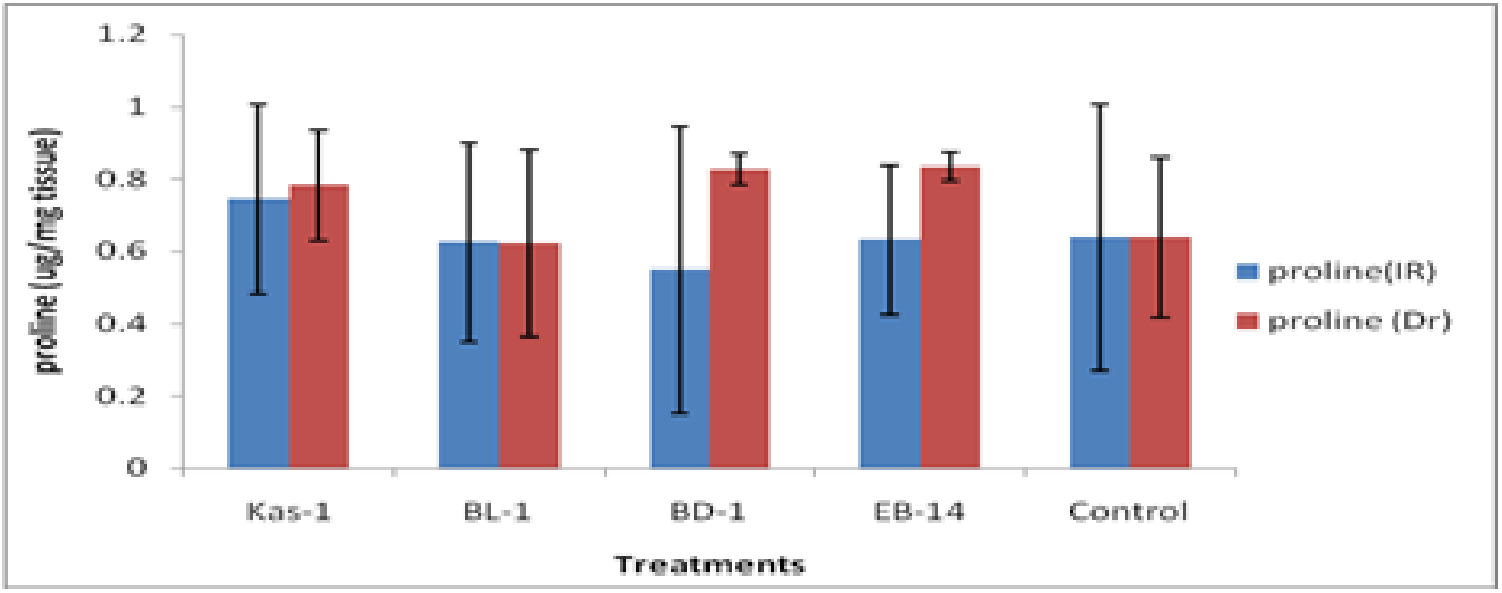
Inoculation	Chlorophyll Content (mg g^{-1} of fresh leaf)			Relative water content (%)			Dry wt. of shoot $plant^{-1}$ (g)			Dry wt. of root $plant^{-1}$ (g)			P-content in shoots (%)		
	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean	ST	UNST	Mean
Un-inoculated control	3.8	4.2	4	18.9	17.5	18.2	5.6	4.8	5.2	1.6	1.3	1.5	0.1	0.1	0.1
Commercial *B. japonicum*	4.3	4.2	4.2	20.6	20.2	20.4	6.3	5.9	6.1	2.2	1.2	2.0	0.1	0.1	0.1
B. daqingense	4.3	4.3	4.3	24.1	22.2	23.2	7.2	6.7	6.9	2.4	2.2	2.3	0.1	0.1	0.1
B. liaoningense	4.5	4.4	4.4	25.5	24.7	25.1	8	7.6	7.8	2.8	2.6	2.7	0.2	0.1	0.2
Mean	4.2	4.3	4.2	23.4	21.1	21.7	6.8	6.2	6.5	2.2	2.0	2.1	0.1	0.1	0.1
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		0.13	0.37		0.09	0.25		0.04	0.11		0.00	0.01	
Inoculation	0.09	0.25		0.18	0.52		0.12	0.36		0.05	0.15		0.00	0.01	
Interaction effect Stress×inoculation	0.12	0.35		0.26	0.74		0.18	0.50		0.07	0.21		0.00	0.01	

*Data are average of 3 replications;

Delhi Centre

Table &Figure-MB2a/18G: Evaluation of promising soybean rhizobia for conferring drought tolerance based on chlorophyll content, relative water content and proline content in irrigated and drought stressed soybean plants (Variety DS 12-13) grown under pot conditions during Kharif 2019

Potential rhizobial strain	Irrigated		Drought	
	Chlorophyll µg/mg fresh tissue (Irrigated)	RWC % Irrigated	Chl Chlorophyll µg/mg fresh tissue	RWC % Drought
KAS-1	285.35	47.73	353.96	54.02
BL-1	415.41	52.66	524.66	44.74
BD-1	363.25	40.66	434.47	45.79
EB-14	362.99	43.74	553.89	34.31
Control	459.47	39.97	614.51	32.24



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 2019

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	4.99	4.25	0.26	0.21	1.27	0.64	8	6	10.84	5.32	2.10	1.92	3.39	7.04	1.28
Bradyrhizobium sp. (LSBR-3)	5.67	5.02	0.43	0.40	1.49	0.61	9	8	11.22	6.02	3.16	2.86	4.02	8.25	1.45
B. daqingense	5.82	5.00	0.58	0.42	1.83	0.73	9	9	12.83	7.82	3.21	2.77	4.49	7.97	2.61
B. liaoningense	4.87	3.93	0.57	0.30	1.67	0.81	10	10	12.24	7.73	3.09	2.21	4.63	7.34	2.20
CD @5%	**A=0.44 B=0.48 AB=0.81**		**A=0.10 B=0.19 AB=0.20**		**A=0.22 B=0.04 AB=0.05**		**A=NS B=NS AB=NS**		**A=2.18 B=3.54 AB=5.22**		**A=0.19 B=0.26 AB=0.31**		**A=NS B=0.12 AB=0.23**		**0.587**

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 2019

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	7.27	11.51	9.39	5.99	6.67	**6.33**	13.26	18.18	**15.72**	28.58	103.77	66.17
Local rhizobial strain (pant 2)	9.77	11.90	10.83	6.28	6.98	**6.63**	16.05	18.88	**17.46**	34.83	140.42	87.63
B. daqingense	10.34	13.30	11.82	7.15	7.39	**7.27**	17.49	20.69	**19.09**	30.13	132.54	81.33
B. liaoningense	12.53	13.82	13.18	8.10	9.37	**8.74**	20.63	23.19	**21.91**	35.72	149.65	92.69
Average	**9.99**	**12.63**		**6.88**	**7.24**		**16.86**	**20.24**		**28.58**	**131.59**	
C.D. (≤ 0.05)	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**
	NS	10.1	14.3	0.83	1.17	1.69	1.04	1.48	2.09	7.14	10.1	14.9

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 2019

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	25	10	18	0.127	0.100	0.113	47.88	35.74	41.81
Local rhizobial strain (pant 2)	28	14	21	0.145	0.123	0.134	58.53	43.17	48.35
B. daqingense	32	20	26	0.183	0.138	0.161	53.57	37.75	45.66
B. liaoningense	31	22	27	0.170	0.168	0.169	54.64	43.38	49.01
Average	**29**	**17**		**0.156**	**0.13**		**53.66**	**45.55**	
C.D. (≤ 0.05)	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**
	1.68	2.37	3.36	.014	0.020	0.028	4.38	6.19	15.1

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 2019

Moisture level/ Cultures	Shoot dry mass ((g 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**
Uninoculated Control	3.47	2.35	2.91	10.08	9.23	12.15	10.91	8.66	9.78
Local rhizobial strain (pant 2)	3.64	2.96	3.30	20.27	13.67	16.97	15.91	11.89	13.90
B. daqingense	3.90	4.04	3.96	20.47	16.62	18.54	15.78	10.60	13.19
B. liaoningense	3.31	2.90	3.10	21.47	15.28	18.37	15.31	12.90	14.11
Average	**3.58**	**3.06**		**19.32**	**13.70**		**14.48**	**11.01**	
C.D. (≤ 0.05)	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**	**Moisture stress (MS)**	**Cultures (C)**	**MS × C**
	0.20	0.28	10.2	1.14	1.61	2.29	1.01	1.44	13.6

Dharwad Centre

MB 2a/18L: 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 (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		
	Stress level (M2)			Stress level (M2)			Stress level (M2)			Stress level (M2)			Stress level (M2)		
	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	33.2	32.22	32.70	0.44	0.26	0.35	5.45	6.00	5.72	48.44	34.83	41.63	24.90	21.88	23.39
T2: Local rhizobial strain	34.90	33.3	34.10	0.59	0.49	0.58	4.96	5.65	5.30	56.88	42.97	49.92	29.15	24.40	26.77
T3: *B. daqingense*	38.48	35.8	37.11	0.64	0.59	0.61	4.45	5.35	4.90	65.45	49.35	57.40	32.80	29.25	31.02
T4: *B. liaoningense*	36.58	34.65	35.61	0.60	0.57	0.54	4.70	5.55	5.1	61.64	43.71	52.67	30.00	27.50	28.75
Mean of B	35.77	33.98		0.57	0.48		4.89	5.63		58.10	42.71		29.21	25.75	
			S.Em. ±	C.D.@ 1%	C.D.@ 1%	S.Em. ±		S.Em. ±	C.D.@ 1%		S.Em. ±	C.D.@ 1%		S.Em. ±	C.D.@ 1%
C.D. of A			1.00	0.32	0.06	0.019		0.02	0.08		0.620	1.899		0.351	1.076
C.D. of B			0.71	0.23	0.04	0.014		0.02	0.06		0.439	1.343		0.248	0.761
C.D. of A×B(Inoculation +Stress level			1.1	0.4	0.08	0.028		0.04	0.12		0.877	2.345		0.497	1.03

FC, field capacity/well watered; SS, stressed

MB 3/14: Field evaluation of AMF and *Paenibacillus polymyxa* microbial combination at farmer's field

Indore Centre

Table MB 3/14A: Field evaluation of AMF and *Paenibacillus polymyxa* in a field trial at Indore centre (Variety JS 95-60)

Treatment	Nodules (no./plant) (at 50% flowering stage)	Nodule dry mass (at 50% flowering stage) (g/plant)	N-content in shoots (%)	N-content in Seed (%)	P-content in shoots (%)	P-content in seed (%)	N uptake (kg $ha^{-1)}$	P uptake (kg $ha^{-1)}$	Grain yield (kg/ha)	Cost benefit ration
Paenibacillus polymyxa (HKA 15)+AMF consortia	177.2a	1.10a	0.61a	6.77a	0.097a	0.586a	120.28a	11.23a	1608a	2.93
Farmers practice (12, 32, 16 Kg NPK/ha)	121.6b	0.73b	0.53b	5.51b	0.072a	0.466a	68.15b	7.00b	1070b	1.95
LSD (P=0.05)	**32.952**	**0.224**	**0.068**	**0.778**	**0.071**	**0.130**	**15.66**	**2.706**	**142.764**	

*Data are average of 6 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA

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 2019

Treatments	NN per plant	NDW dry wt.(mg)	Grain yield Kg/ha	B:C Ratio
T1 *Paenibacillus polymixa+75% RDF*	35.25(96)	48.00 (90)	17.50 (86.10)	1.90:1
T2 Farmer practice	17.20	36.28	10.61	1.2:1
Result (p=0.05)	Significant	Significant	Significant	
T1 v/s T2				

*t value : 2.26 & fcal values are mentioned in parenthesis.

Delhi Centre

Table-MB 3/14C: Field evaluation of AMF and *P. polymyxa* microbial combination in Delhi centre (Variety DS12- 13)

Treatment	**Nodules (no./plant) (at 50% flowering stage)**	**Nodule dry mass (at 50% flowering stage) (g/plant)**	**N-content in shoots (%)**	**Grain yield (kg/ha)**
Paenibacillus polymyxa (HKA 15)+AMF consortia	29.65a	105.66a	2.17a	1051.66a
Farmers practice (20, 40, 60 Kg NPK/ha)	25.25a	93.44a	2.12a	995.00a
LSD (P=0.05)	2.41	42.32	0.85	138.03

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	20	55.8	1.11	0.116	1035
***Paenibacillus polymyxa* (HKA 15) + AMF consortium**	28	67.5	1.13	0.123	1180

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	1035	38398	4075	1.11	-
***Paenibacillus polymyxa* (HKA 15) + AMF consortium**	1180	43778	9205	1.20	4500

*Market price of soybean = Rs. 3710/- 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 1347) 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	103	0.266	1.81	5.43	72.87	0.289	0.635	11.63	1750	1:2.14
Farmer's Practice	65	0.164	1.32	4.42	52.00	0.263	0.518	10.25	1625	1:1.97

MB 4/13: Nodulation ability of AVT-II entries of respective centers

Table MB 4/13A: Nodulation ability with the native homologous rhizobia of AVT II soybean entries evaluated at different centres during Kharif 2019

Zones	AVT II entries	Nodule number/plant	Nodule dry weight (mg/plant)	LgH (mg/g) fresh nodules)
Central Zone				
Sehore	AMS 100-39	23.55	47.33	3.52
	NRC 130	22.77	48.19	3.52
	NRC 131	31.21	45.61	3.53
	JS 335	25.21	54.02	3.56
	NRC 86	32.10	45.61	3.33
	JS 97-52	26.10	49.66	3.76
	JS 20-34	27.88	56.89	3.71
Indore	AMS 100-39	64.50^{ab}	317.60^{b}	13.95^{b}
	NRC 130	60.00^{ab}	278.25^{b}	11.06^{c}
	NRC 131	53.33^{bc}	367.25^{a}	15.61^{a}
	JS 335	36.87^{c}	153.29^{c}	6.12^{e}
	NRC 86	75.00a^{bc}	296.47^{b}	7.48^{d}
North plain zone				
Ludhiana	PS 1613	58	49.9	0.85
	PS 1611	23	ND	ND
	NRC 128	60	65.5	1.38
	PS 1347	40	76.5	1.78
	SL 958	30	76.8	1.69
	NRC 142	27	ND	ND
	JS 21-71	43	88.4	1.85
	DS 3110	76	39.4	0.68
	PS 24	20	ND	ND
	PUSA 97-12	85	77.5	1.65
Pantnagar	PS 1613	62	0.547	0.68
	PS 1611	68	0.745	0.74
	NRC 128	66	0.512	0.64
	PS1347 (Check)	60	0.414	0.46
	SL 958 (Check)	54	0.473	0.59
South Zone	NRC 147	36.00	0.44	1.88
	DSB 34	54.50	0.64	2.30
	MACS 1493	52.00	0.63	2.05
	KDS 992	40.50	0.45	1.38
	RSC 11-07	46.50	0.57	1.52
	AMS 100-399	38.00	0.45	1.39
	NRCSL 1	33.50	0.41	1.34
	BAUS 102	46.50	0.56	1.50
	AMS 2014-1	43.00	0.52	2.00
	SKF-SP-11	30.00	0.37	1.30
	NRC-132	43.00	0.52	1.42
	DSB-21 C	49.50	0.58	2.05
	JS 335 C	41.00	0.48	1.44

*AVT II entries in NEHZ and EZ could not be evaluated for nodulation parameters due to non availability of microbiologists/discipline at those centres

MB 4/13: Nodulation ability of AVT-II entries of respective centers

Indore centre

Table-MB 4/13B: Evaluation of AVT-II entries for nodulation parameters at IISR, Indore

Variety	Nodule No.	Nodule Biomass (mg/plant)	Leghaemoglobin (mg/g)
AMS 100-39	64.50^{ab}	317.60^{b}	13.95^{b}
NRC 130	60.00^{ab}	278.25^{b}	11.06^{c}
NRC 131	53.33^{bc}	367.25^{a}	15.61^{a}
JS 335	36.87^{c}	153.29^{c}	6.12^{e}
NRC 86	75.00a^{bc}	296.47^{b}	7.48^{d}
LSD (p=0.05)	19.70	46.48	1.16

*Data are average of 3 replications; LSD, least significance difference at 5% level of significance by Duncans multiple range test of ANOVA & means followed by same letter did not differ significatly

Sehore centre

Table-MB 4/13C: Evaluation of AVT-II entries for nodulation parameters at RAK college of Agriculture Sehore (MP) during Kharif 2019

Variety	Nodule No.	Nodule Biomass (mg/plant)	Leghaemoglobin (mg/g of nodules)
AMS 100-39	**23.55**	**47.33**	**3.52**
NRC 130	**22.77**	**48.19**	**3.52**
NRC 131	**31.21**	**45.61**	**3.53**
JS 335	25.21	54.02	3.56
NRC 86	32.10	45.61	3.33
JS 97-52	26.10	49.66	3.76
JS 20-34	27.88	56.89	3.71
CD (p=0.05)	7.30	15.61	0.03
±SEM	2.37	5.06	0.01

Delhi Centre

Table-MB 4/13D: Evaluation of AVT-II entries for nodulation parameters at Delhi Centre
MB 4/13: Screening AVT-II lines of North Plain Zone along with checks for nodulation ability

AVT-II Line	SDW/plant (g)	RDW/plant (g)
PS1613	17.55	1.41
PS1611	12.49	1.07
NRC128	19.62	1.77
PS1347	10.31	0.82
SL958	11.37	1.17
CD	5.65	0.50
SE(m)	1.80	0.16
SE(d)	2.56	0.23
CV	23.41	25.71

Ludhiana Centre

Table-MB 4/13E: Screening of AVT-II entries of nodulation ability with native homologous rhizobia under field conditions Ludhiana Centre

AVT–II entries (varieties)	Number of nodules/plant	Dry Weight of nodules/plant (mg)	Leghaemoglobin content (mg/g of nodules)
PS 1613	58	49.9	0.85
PS 1611	23	ND	ND
NRC 128	60	65.5	1.38
PS 1347	40	76.5	1.78
SL 958	30	76.8	1.69
NRC 142	27	ND	ND
JS 21-71	43	88.4	1.85
DS 3110	76	39.4	0.68
PS 24	20	ND	ND
PUSA 97-12	85	77.5	1.65

Pantnagar Centre

Table-MB 4/13F: Screening of AVT-II entries of nodulation ability with native homologous rhizobia under field conditions (Pantnagar Centre)

AVT-II	Nodule Number (plant^{-1})	Nodule dry wt. (g plant^{-1})	Leghaemoglobin (mg g^{-1} of fresh wt. nodules)
PS 1613	62	0.547	0.68
PS 1611	68	0.745	0.74
NRC 128	66	0.512	0.64
PS1347 (Check)	60	0.414	0.46
SL 958 (Check)	54	0.473	0.59

Dharwad Centre

Table-MB 4/13G: Screening of AVT-II entries (South zone) of nodulation ability with native homologous rhizobia under field conditions (Dharwad Centre)

AVT II Entry	Dehydrogenase (µg TPF formed g^{-1} soil d^{-1})	Nodule no/plant	Nodule dry weight(g/plant)	Leghaemoglobin (mg/g of nodules)
NRC 147	30.98	36.00	0.44	1.88
DSB 34	45.56	54.50	0.64	2.30
MACS 1493	35.08	52.00	0.63	2.05
KDS 992	36.88	40.50	0.45	1.38
RSC 11-07	36.24	46.50	0.57	1.52
AMS 100-399	33.12	38.00	0.45	1.39
NRCSL 1	36.49	33.50	0.41	1.34
BAUS 102	32.65	46.50	0.56	1.50
AMS 2014-1	30.72	43.00	0.52	2.00
SKF-SP-11	36.14	30.00	0.37	1.30
NRC-132	33.96	43.00	0.52	1.42
DSB-21 C	45.18	49.50	0.58	2.05
JS 335 C	39.31	41.00	0.48	1.44
S. Em±	**0.660**	**0.991**	**0.09**	**0.08**
C. D. (1%)	**2.75**	**4.130**	**0.358**	**0.341**

अग्रिम पंक्ति प्रदर्शन
Frontline Demonstrations

Principal Investigator	**Dr. S.D. Billore, IISR, Indore**
Northern Hill Zone	
Palampur (Himachal Pradesh)	Dr. (Mrs.) Vedna Kumari
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
Medziphema (Nagaland)	Dr. Engrala Ao
Eastern Zone	
Raipur (Chattisgarh)	Dr. Ram Mohan Savu
Ranchi (Jharkhand)	Dr. A.K. Singh
Dholi (Bihar)	Dr. Anil Pandey
Central Zone	
Indore (Madhya Pradesh)	Dr. Rakesh Kumar Verma Dr. S.D. Billore
Sehore (Madhya Pradesh)	Dr. M.D. Vyas
Kota (Rajasthan)	Dr. D.S. Meena
Parbhani (Maharashtra)	Dr. S.P. Mehtre
Amravati (Maharashtra)	Dr. M.S. Dandge
SOPA, Indore (Madhya Pradesh)	Shri. Jitendra Singh
Srijan (Rajasthan)	Shri Anjani Kumar
Bharuch(Gujarat)	Dr. M.M. Patel
Karda (Maharashtra)	Dr. Ravindra Kale
Devgadh Baria (Gujarat)	Dr. G.J. Patel
SOLIDARIDAD	Dr. Suresh Motwani Shri Hasan
Southern Zone	
Adilabad (Andhra Pradesh)	Dr. C. Sreedhar
Dharwad (Karnataka)	Dr. Somanagoude
Ugarkhurd (Karnataka)	Mr. Jagadish S. Patwardhan
Sangli (Maharastra)	Dr. Dilip Kathmale

Soybean Frontline Demonstration

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	2019-20

S. No.	Name of implementing centre	Physical				Financial
		Allocation		Achievement		Allocation (Gross)
		Number of FLDs	Area in ha	Number of FLDs	Area in ha	
1	Almora	10	4.00	102	2.50	30000
2	Palampur	10	4.00	36	4.16	30000
3	Ludhiana	10	4.00	10	4.00	30000
4	Pantnagar	10	4.00	13	5.20	30000
5	Sehore	10	4.00	10	4.00	30000
6	Indore	50	20.00	50	20.00	150000
7	Kota	30	12.00	30	12.00	90000
8	Parbhani	50	20.00	50	20.00	150000
9	Amravati	20	8.00	20	8.00	60000
10	Sangli	25	10.00	25	10.00	75000
11	Adilabad	10	4.00	10	4.00	30000
12	Dharwad	10	4.00	10	4.00	30000
13	Raipur	10	4.00	10	4.00	30000
14	Ranchi	10	4.00	20	4.00	30000
15	Imphal	15	6.00	15	6.00	45000
16	Medziphema	10	4.00	10	4.00	30000
17	Dholi (RAU)	15	6.00	0	0	0
18	KVK, Karda	75	30.00	75	30.00	225000
19	Bharuch, Gujrat	15	6.00	14	6.00	45000
20	Devgarhbaria	10	4.00	10	4.00	30000
21	Ugarkhurd	50	20.00	0	0	0
22	SOPA, Indore	250	100.00	250	100.00	750000
23	Soliddaridad, Bhopal	100	40.00	100	40.00	300000
24	Srijan, Rajasthan	95	38.00	110	43.20	3300000
	Total	**900**	**360**	**980**	**341.06**	**2700000**

Data not included in summation

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-National SoybeanResearch Institute**, Khandwa Road, Indore-452 001, Madhya Pradesh
For the Year	2019-20

S. no.	Centre	Man					Women					Total
		SC	ST	OBC	Gen.	Total	SC	ST	OBC	Gen.	Total	
1	Almora	25			41	**66**	12			24	**36**	**102**
2	Palampur	5	1	7	14	**27**	1	1	1	6	**9**	36
3	Ludhiana				10	**10**						10
4	Pantnagar			1	11	**12**				1	**1**	13
5	Sehore	1		3	3	**7**				3	**3**	10
6	Indore	4	3	30	12	**49**			1		**1**	50
7	Kota	2	5	22		**29**	1				**1**	30
8	Parbhani	1	11	11	17	**40**	1		2	7	**10**	50
9	Amravati	4	8	5		**17**		1	2		**3**	20
10	Pune											
11	Sangli		2	5	18	**25**						25
12	Adilabad	1		1	7	**10**				1	**1**	10
13	Dharwad	1			9	**10**						10
14	Raipur#			8	2	**10**						10
15	Ranchi		1	19		**20**						20
16	Imphal		12	3		**15**						15
17	Medziphema		6			**6**		4			**4**	10
18	KVK, Karda	10	10	25	30	**75**						75
19	Bharuch, Gujrat		3		4	**7**		6		1	**7**	14
20	Devgarhbaria			7		**7**			3		**3**	10
21	SOPA, Indore	10	5	119	91	**225**	1	1	11	12	**25**	250
22	Soliddaridad, Bhopal	15	10	55	20	**100**						100
23	Srijan, Rajasthan						38	32	39	1	**110**	110
	Total	79	77	321	289	**766**	54	45	59	56	**214**	**980**
	Percentage	**10.31**	**10.05**	**41.90**	**37.72**		**25.23**	**21.03**	**27.57**	**26.68**		
	Total (men +women)	**133**	**122**	**380**	**345**	**980**						
	Percentage	**13.57**	**12.45**	**38.78**	**35.20**							

Data not included in summation

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- National SoybeanResearch Institute**, Khandwa Road, Indore-452 001, Madhya Pradesh
For the Year	2019-20

S. No.	Implementing centre	No. of trial (980)	Area (ha) (341.06)	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	102	2.50	1859	1377	88559	67622	46142	45892	42417	21730
2	Palampur	36	4.16	1250	1002	66250	53088	39403	34972	26847	18116
3	Ludhiana	10	4.00	1559		57852		34398		23454	
4	Pantnagar	13	5.20	1677	1342	62214	49800	29877	26259	32337	23541
5	Sehore	10	4.00	1231	737	46786	22122	19214	17067	27572	5055
6	Indore	50	18.00	1546	1142	58735	43392	21900	21000	36835	22392
7	Kota	30	12.00	1304	1148	48372	42597	30273	27028	18099	15569
8	Parbhani	50	20.00	1957	1576	72605	58479	32903	31779	39702	26700
9	Amravati	20	8.00	2008	1449	68081	48968	32544	26996	35537	21972
10	Sangli	25	10.00	2672	2228	90838	39025	42143	39025	48695	36710
11	Adilabad	10	4.00	2785	2352	103320	87255	39503	33943	63816	53313
12	Dharwad	10	4.00	3259	2108	123842	80085	42488	34900	81354	45185
13	Raipur	10	4.00	1725	1231	63836	45551	18095	14825	45741	30726
14	Ranchi	20	8.00	1588	1224	58904	45403	28080	22490	30824	22913
15	Imphal	15	6.00	1496	883	89785	52975	36710	22154	53075	30821
16	Medziphema	10	4.00	1599	1074	95927	64427	30406	22547	65521	41880
17	KVK, Karda	75	30.00	1830	1570	68710	58886	38105	36274	30605	22612
18	Bharuch, Gujrat	14	6.00	1647	1360	56832	46907	18631	17112	38201	29795
19	Devgarhbaria	10	4.00	1431	939	42885	27588	21155	15335	21730	12253
20	SOPA, Indore	250	100.00	1007	793	37271	29337	17333	13950	20077	15499
21	Soliddaridad, Bhopal	100	40.00	737	659	29500	26349	20568	21568	8932	4781
22	Srijan, Rajasthan	110	43.20	2072	1550	58022	43387	21564	19440	36458	23947
	Mean			**1738**	**1321**	**67688**	**49202**	**30065**	**25931**	**37629**	**25024**

*IT= Improved technology, **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- National Soybean Research Institute**, Khandwa Road, Indore-452 001, Madhya Pradesh
For the Year	2019-20

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	407	JS 95 60	1340	1091	46215	38110	20490	19194	25760	18943	2.01	1.78
2	96	MAUS 158	1945	1608	72568	59958	35504	34027	37064	25932	2.06	1.77
3	80	VL Bhat 201	1256	833	89194	67503	47142	47892	42052	19611	0.89	0.41
4	45	JS 93-05	1650	1282	52749	40984	25906	23771	26843	17213	1.75	1.45
5	30	RKS 113	1304	1148	48372	42597	30273	27028	18099	15569	1.60	1.58
6	27	JS 97 52	1620	1037	85061	52854	32633	22257	52428	30598	1.58	1.37
7	25	JS 20 29	1425	1045	54158	39718	21900	21000	32258	18718	2.47	1.89
8	24	Hara soy	1235	993	65455	52647	39403	34972	26052	17675	1.66	1.51
9	21	JS 20 34	1307	926.5	50467	35909	21254.5	21398.5	29212	14510	2.38	1.71
10	17	JS 20 69	1195	983	46154	38062	22743	23099	23412	14964	2.06	1.70
11	17	KDS 344	2481	2065	84365	39025	42143	39025	42222	31175	2.00	1.8
12	15	MAUS 612	1843	1492	68375	55353	32903	31779	35472	23574	2.07	1.74
13	14	MAUS 162	2019	1626	74905	60325	32903	31779	42002	28546	2.27	1.89
14	13	VLS 47	1925	1480	78909	60680	45642	44892	33267	15788	0.73	0.35
15	10	CGS 1	1725	1231	63836	45551	18095	14825	45741	307267	3.53	3.07
16	10	Basara	2785	2352	103320	87255	39503	33943	63816	53313	2.62	2.57
17	10	SL958	1559	-	57852	-	34398	-	23454	-	1.68	-
18	10	MACS-1188	1647	1360	56832	46907	18631	17112	38201	29795	2.05	1.74
19	10	NRC 37	1431	939	42885	27588	21155	15335	21730	12253	2.03	1.8
20	9	RKS 18	1474	932	88438	55862	33172	21103	55266	34760	1.73	1.62
21	9	DSb 19	1511	916	90647	54933	36710	22872	53937	32061	1.47	1.40
22	9	Him soy	1290	1024	68370	54266	39403	34972	28967	19294	1.73	1.55
23	8	KDS 726	3076	2573	104593	39025	42143	39025	62450	48472	2.48	2.24
24	6	VL Soya 65	1213	840	86088	68040	47142	47892	38946	20148	0.83	0.42
25	6	JS 335	3217	2533	90067	70933	21842	17783	68225	53150	3.14	3.1
26	5	DSb 21	2905	2065	110390	78470	42488	34900	67902	43570	2.6	2.25
27	5	DSb 23	3613	2150	137294	81700	42488	34900	94806	46800	3.23	2.34
28	5	PS 24	1770	1400	65667	51940	30945	27239	34722	24701	2.12	1.91
29	5	RVS 18	1237	737	47021	28021	19214	17067	27807	10954	2.45	1.64
30	4	RVS 24	1281	766	48688	29089	19214	17067	29474	12022	2.53	1.70
31	3	PS1347	1683	1367	62452	50703	30945	27239	31507	23464	2.02	1.86
32	3	JS 20 98	1425	1025	54150	38950	20557	19034	33593	19917	2.60	1.99
33	3	PS 1092	1467	1150	54413	42665	26317	22992	28096	19673	2.07	1.86
34	2	PS1225	1750	1450	64925	53795	30945	27239	33980	26556	2.1	1.97
35	1	VLS 59	2040	1570	83640	64370	45642	44892	37998	19478	0.83	0.43
36	1	VLS 89	2590	1880	106190	77080	45642	44892	60548	32188	1.33	0.72
37	1	VLS 63	2130	1660	87330	68060	45642	44892	41688	23168	0.91	0.52

Table 6.5

Details of soybean cultivation cost under improved technology and farmers practice 2019-20

Centre		Land preparation	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
Palampur	IT	7000	9966	45	9622	3122					3752	3216	1608	39403
	FP	7000	9000		5036			5360			3752	3216	1608	34972
Ludhiana	IT	3413	4500	75	3640	1500			2250			18720	300	34398
Indore	IT	4200	4150	100	3200	2000			1000		4000	2200		21900
	FP	3600	4500		2164	2054			1500		4000	2200		21000
Kota	IT	4500	5800	233	2212	2102			2002		5112	3200		30273
	FP	4500	5000			2102			2002		5112	3200		27028
Parbhani	IT	5500	7200	626	5328	2398		1100	2626		4700	3425		32903
	FP	5500	8000		3047	2398		1100	4276		4700	2758		31779
Adilabad	IT	2305	7378	50	5195	4482	1295	5440	3305	1211	4083	4198	565	39503
	FP	2305	5882		4537	2389	30	6915	2676	324	3958	4098	560	33743
Sangli	IT	2300	3150	250	2457	1000		1000	1200		2000	3000		16857
	FP	2300	1960	150	2100	1000		1000	1200	1200	2000	2200		15610
Dharwad	IT	7700	5704	460	7363	1881	2544	5134	3022		3180	5000		42488
	FP	7700	6200		4000		2000	5500	700	800	2500	5000		34900
Amravati	IT	4760	5220	240	4385	2060		5400	2664		4000	3800		32529
	FP	4760	5470		3275	2060		2000	1930	728	4000	2850		27993
Ranchi	IT	4250	6690	360	7775	1185		2040	1700		1530	2040		28076
	FP	3400	5925		6535			3060	510		1275	1785		22490
Imphal	IT	3200	7625	300	7965			4500	450	450	2688	4032	1500	36710
	FP	2400	6475		2675			3375	225		1800	2700	1000	20650
Medziphema	IT	2500	5500	1291	7518		220	4400	440		1760	3300		33109
	FP	2500	5760					3520			2640	2200		20060
Bharuch	IT	5250	5725	309	2540	1600			800			3750	150	19974
	FP	5250	6000		1490	1600			600			3750		18090
Devgarhbaria	IT	7200	6350	420	3191	2080			670		800	1200		21811
	FP	4800	1400		4616			1200	540		1200	1200		15056
Raipur	IT	1800	4925	460	4000	1900			1600					
	FP	1800	4925		4000						2500	1500		18685
Mean	**IT**	**4392**	**5992**	**348**	**5093**	**2101**	**1353**	**3627**	**1695**	**831**	**3134**	**4363**	**825**	**30710**
Percentage		14.30	19.51	1.13	16.58	6.84	4.41	11.81	5.52	2.70	10.20	14.21	2.69	
Mean	**FP**	**4130**	**5464**	**150**	**3623**	**1943**	**1015**	**3303**	**1469**	**763**	**3034**	**2761**	**1056**	**25111**
Percentage		16.45	21.76	0.60	14.43	7.74	4.04	13.15	5.85	3.04	12.08	11.00	4.21	

Table 6.6

Productivity potentials and profitability of whole package technologies (2019-20)

State	Centre	No of Demon (980)	Mean yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Additi-onal net returns (Rs/ha)	B:C ratio	
			IT	FP		IT	FP	IT	FP		IT	FP
Uttarakhand	Almora	102	1859	1377	37.09	88559	67622	46142	45892	20937	1.92	1.48
HP	Palampur	36	1250	1002	24.95	66250	53088	39403	34972	8731	1.68	1.52
Punjab	Ludhiana	10	1559			57852		34398			1.68	
Uttarakhand	Pantnagar	13	1677	1342	24.96	62214	49800	29877	26259	12414	2.08	1.90
MP	Sehore	10	1231	737	67.03	46786	22122	19214	17067	16617	2.44	1.30
MP	Indore	50	1546	1142	36.71	58735	43392	21900	21000	15344	2.68	2.07
Rajasthan	Kota	30	1304	1148	14.00	48372	42597	30273	27028	5775	1.60	1.58
Maharashtra	Parbhani	50	1957	1576	23.96	72605	58479	32903	31779	13001	2.20	1.83
Maharashtra	Amravati	20	2008	1449	27.67	68081	48968	32544	26996	13565	2.09	1.81
Maharashtra	Sangli	25	2672	2228	17.62	90838	39025	42143	39025	14165	2.16	1.94
Telengana	Adilabad	10	2785	2352	18.50	103320	87255	39503	33943	10504	2.62	2.57
Karnataka	Dharwad	10	3259	2108	54.55	123842	80085	42488	34900	56620	2.92	2.30
Chhattisgar	Raipur	10	1725	1231	40.14	63836	45551	18095	14825	18285	3.53	3.07
Jharkhand	Ranchi	20	1588	1224	30.0	58904	45403	28080	22490	13501	1.10	1.02
Manipur	Imphal	15	1496	883	71.03	89785	52975	36710	22154	22254	1.45	1.39
Meghalaya	Medziphema	10	1599	1074	49.70	95927	64427	30406	22547	22644	2.18	1.89
Maharashtra	KVK, Karda	75	1830	1570	16.60	68710	58886	38105	36274	7993	1.80	1.62
Gujrat	Bharuch	14	1647	1360	21.04	56832	46907	18631	17112	8406	2.05	1.74
Gujrat	Devgarhbaria	10	1431	939	34.36	42885	27588	21155	15335	9823	2.03	1.80
MP	SOPA, Indore	250	1007	793	26.99	37271	29337	17333	13950	7934	2.15	2.10
MP	Solidaridad, Bhopal	100	737	659	11.83	29500	26349	20568	21568	3151	1.48	1.26
Rajasthan	Srijan, Rajasthan	110	2072	1550	34.79	58022	43387	21564	19440	14635	1.73	1.28
	Mean		**1738**	**1321**	**33.55**	**67688**	**49202**	**30065**	**25931**	**15062**	**2.07**	**1.78**

सारांश प्रतिवेदन
Summary Reports

SUMMARY REPORT OF PLANT BREEDING EXPERIMENTS

1. Northern Hill Zone

1.1 Initial Varietal Trial

Proposed Testing Centres: Almora, Palampur, Majhera, Srinagar, Sopore
Data received from: Almora, Palampur, Majhera

The yield data of 41 test entries and four checks is presented in Table 1.1.1 of this compilation. None of the entries could mature in Srinagar and Sopore centres. Grain yield varied from 1062 kg/ha (ASb 51) to 2568 kg/ha (VLS 99) with an average of 1836 kg/ha. VLS 99, SL 1213 (2568 Kg/ha) and AMS 20-19 (2527 Kg/ha) were significantly superior to the best check VLS 89 (2313 Kg/ha).

1.2 Advanced Varietal Trial-I

Proposed Testing Centres: Almora, Palampur
Data received from: Almora, Palampur,

The yield of single AVT-I entry NRC 142 and four checks is given in Table 1.1.6 of this compilation. Grain yield of NRC 142 (1054 Kg/ha) was less than all of the checks.

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 41 test entries along with four checks has been presented in Table 1.2.1 of this compilation. Grain yield ranged from 148 kg/ha (VLS 99) to 2716 kg/ha (NRC 149) with a mean of 706 kg/ha. NRC 149 (2716 Kg/ha), a high oil and lox 2 free entry was significantly superior to the best check SL 1074 (2346 Kg/ha).

2.2 Advanced Varietal Trial-I

Proposed Testing Centres: Pantnagar, Delhi, Ludhiana,
Data received from: All the Centres

The grain yield and maturity of three test entries and four checks is presented in Table 1.2.6 and 1.2.8 of this compilation. JS 21-71 was significantly superior (1946 Kg/ha) to the best check PS 1347 (1783 Kg/ha).

2.3 Advanced Varietal Trial-II

Proposed Testing Centres: Pantnagar, Delhi, Ludhiana
Data received from: All the Centres

The grain yield and maturity of three test entries and four checks is presented in Table 1.2.6 and 1.2.8 of this compilation. Entries PS 1613 and NRC 128 were significantly superior to the best check PS 1347 (1783 Kg/ha). Based on the three year data, all of the 3 test entries could out yield the best check PS 1347 (1888 Kg/ha) (Table 1). The mean maturity duration ranged from 118 to 126 days.

Table 1: Mean Performance of AVT-II Entries of Northern Plain Zone

S.No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019			
1	NRC 128	3371	1193	2242	2269	II	118
2	PS 1611	2675	2299	1421	2131	III	119
3	PS 1613	2362	2641	2031	2345	I	125
4	PS 1347 (C)	1918	1964	1783	1888	IV	124
5	Pusa 97-12 (C)	1819	1530	983	1444	VI	121
6	SL 958 (C)	1983	1788	1200	1657	V	126

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 41 test entries along with four checks has been presented in Table 1.3.1 of this compilation. Data of Jorhat centre was rejected due to high CV and low mean yield. The mean yield varied from 1547 Kg/ha (JS 22-01) to 3810 Kg/ha (KDS 1097) with the trial average of 2584 Kg/ha. No entry was significantly superior to the best check MACS 1460 (3571 Kg/ha). High oil and lox 2 free NRC 149 was comparable (3514 Kg/ha) to the best check.

4. Advanced Varietal Trial-I

4.1 **Proposed Testing Centres:** Jorhat, Imphal, Umiam

Data received from: Imphal &Umiam

The yield and maturity of 3 test entries along with 4 checks is presented in Table 1.3.6 and 1.3.8, respectively of this compilation. Data from Umiam was rejected due to high CV. None of the test entries was significantly superior the best check JS 335 (2278 Kg/ha).

4.2 Advanced Varietal Trial-II

Proposed Testing Centres: Jorhat, Imphal, Umiam

Data received from: Imphal &Umiam

Based on the mean performance of three years, none of the two test entries could out yield the best check JS 335 (Table 2).

Table 2: Mean Performance of AVT-II Entries of North Eastern Hill Zone

S.No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II 2019			
1	PS 1613	1531	1967	2096	1865	I	108
2	DS 3108	1506	1850	2189	1848	II	105
3	JS 335(c)	1297	1867	2278	1814	III	108
4	JS 97-52(c)	1247	1144	2074	1488	V	102
5	RKS 18(c)	1235	1867	2241	1781	IV	104

5. Eastern Zone

5.1 Initial Varietal Trial

Proposed Testing Centres: Bhawanipatna, Raipur, Ranchi, Dholi

Data received from: All the Centres

The yield data of 41 test entries along with four checks has been presented in Table 1.4.1 of this compilation. Mean maximum yield of 2229 kg/ha was recorded in Himso 1690 whereas the mean minimum yield (1223 Kg/ha) was recorded by AUKS 218. The trial average was 1589 Kg/ha. Himso 1690 (2229 Kg/ha), SL 1213 (2123 Kg/ha) and high oil & lox 2 free entry NRC 149 were significantly superior to the best check JS 20-116 (1790 Kg/ha).

5.2 Advanced Varietal Trial-I

Proposed Testing Centres: Raipur, Ranchi, Dholi

Data received from: All the Centres

Table 1.4.6 and 1.4.8 of this compilation show yield and maturity data of nine test entries and four checks. None of the test entries was significantly superior to the best check RSC 10-46 (2103 Kg/ha). The maturity ranged from 98 days (DSb33) to 107 days (JS 97-52, RSC 11-17).

5.3 Advanced Varietal Trial-II

Proposed Testing Centres: Bhawanipatna, Raipur, Ranchi, Dholi

Data received from: All the Centres

Average grain yield and maturity data of 9 test entries over three years has been shown in Table 3. Based on three years average data, except for three entries (NRC 137, NRC 132 and RSC 11-03) all of the other entries were significantly superior to the best check JS 97-52 (1522 Kg/ha). Lox 2 free entry NRC 132 was comparable (1652 Kg/ha) to the best check JS 97-52.

Table 3: Mean Performance of AVT-II Entries of Eastern Zone

S.No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019			
1	NRC 128	1982	2004	1627	1871	II	106
2	NRCSL 1	1938	1593	1588	1706	V	107
3	NRC 137	1766	1655	1287	1569	IX	108
4	RSC 11-07	2130	1959	1658	1916	I	102
5	AMS 2014-1	1883	1981	1547	1804	III	107
6	NRC 132	1802	1668	1485	1652	VII	105
7	RSC 11-03	1784	1810	1304	1633	VIII	107
8	MACS 1493	1765	1934	1482	1727	IV	105
9	NRC 136	1741	1964	1395	1700	VI	107
11	JS 335(C)	1580	1494	1334	1469	XII	105
12	RKS 18(C)	1506	1642	1385	1511	XI	107
13	JS 97-52(C)	1376	1709	1482	1522	X	110

6. Central Zone

6.1 Initial Varietal Trial

Proposed Testing Centres: Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti

Data received from: All the Centres

The data from Indore centre was rejected due to high coefficient of variation and low mean yield. The yield data of 41 test entries along with four checks has been presented in Table 1.5.1. The mean value for yield varied from 1222 kg/ha (VLS 99) to 2222 kg/ha (NRC 149) with the trial mean of 1752 Kg/ha. No entry was significantly superior to the best check NRC 86 (2156 Kg/ha). High oil and lox 2 free entry NRC 149 (2222 Kg/ha) was comparable to the best check.

2.1 Initial Varietal Trial (Early)

Proposed Testing Centres: Amravati, Anand, Indore, Jabalpur, Kota, Mandsaur, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti

Data from Indore, Jabalpur, Mandsaur and Nagpur centre was rejected due to high CV and/or low mean yield. The yield and maturity data of seven entries along with four checks have been presented in Table 1.5.6 and 1.5.8 of this compilation. Maturity duration varied from 85.4 days to 105.6 days. JS 20-34 was the best yielding check (1784 Kg/ha) with maturity duration of 89.3 days. Seven entries VLS 100, NRC 156, MACSNRC 1710, NRC 159, NRC 153, Pusa Sipni 408 and NRC 158 were earlier to the best check JS 20-34 but were significantly inferior in yield. Six entries (NRC 158, 152, 157, 165, 164, 150 and PUSA-Sipani-408) were statistically at par with JS 20-34 in maturity and yield.

2.2 Advanced Varietal Trial-I

Proposed Testing Centres: Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti

Data received from: All the Centres

Data from Indore centre was rejected due to low mean yield. The yield and maturity data of 9 entries along with 5 checks have been presented in Table 1.5.11 and 1.5.13 of this compilation. NRCSL 2 an EDV of JS 335 for YMV resistance was comparable (1859 Kg/ha) to JS 335 (1782 Kg/ha).

2.3 Advanced Varietal Trial-I (Vegetable)

Proposed Testing Centres: Indore, Kota and Parbhani

Data received from: Parbhani

Trial failed at Indore and Kota centres. Green pod yield, grain yield, maturity duration, 100 seed weight, picking duration of the test entry Karune and 3 checks has been presented in Table 1.5.16, 1.5.17 and 1.5.19, 1.5.21 and 1.5.23 of this compilation. Karune was significantly inferior to all of the checks in green pod yield but significantly superior to all of the checks in 100 seed weight.

Advanced Varietal Trial-II

Proposed Testing Centres Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti

Data received from: All the Centres

Based on the two year performance the test entry AMS 100-39 was significantly superior (2043 Kg/ha) NRC 86 (1846 Kg/ha) (Table 4). Early maturing entries NRC 130 and NRC 131 were comparable to the best check JS 95-60 (Table 5).

Table 4: Mean Performance of AVT II Entries of Central Zone

S.No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019			
1.	AMS 100-39	2164	1968	1997	2043	I	97.3
2.	JS 335(C)	1622	1583	1819	1675	III	99.8
3.	JS 97-52(C)	1352	1433	1623	1469	V	103.7
4.	NRC 86(C)	2023	1584	1932	1847	II	99.3
5.	JS 20-34(C)	1305	1686	1551	1514	IV	88.67

Table 5: Mean Performance of Early Maturing AVT II Entries of Central Zone

S. No.	Entry	IVT 2017	AVT I 2018	AVT II 2019	Mean	Rank	Maturity (days)
1.	NRC 130	1712	1481	1366	1520	I	91.6
2.	NRC 131	1555	1446	1364	1455	III	93.2
3.	JS 20-34 (C)	1305	1686	1551	1514	II	88.7

3. Southern Zone

3.1 Initial Varietal Trial

Proposed Testing Centres: Adilabad, Bidar, Bengaluru, Dharwad, K.Digraj, Pune,

Data received from: All the Centres

The yield data of 41 test entries along with four checks has been presented in Table 1.6.1. Mean yield ranged from 1753 kg/ha (AUKS 218) to 2925 kg/ha (DSb 23) with the average yield of 2355 kg/ha. None of the entries was significantly superior to the best check DSb 23.

3.2 Advanced Varietal Trial-I

Proposed Testing Centres: Adilabad, Bidar, Bengaluru, Dharwad, K.Digraj, Pune,

Data received from: All the Centres

The yield data of 3 test entries along with four checks has been presented in Table 1.6.6. MACSNRC 1667 was the repeat EDV (MACS 450 for null KTI) entry. Like 2018, its yield was less (comparable (2148 Kg/ha) to MACS 450 (2225 Kg/ha).

Advanced Varietal Trial-I (Vegetable)

Proposed Testing Centres: Adilabad, Bengaluru, Pune

Data received from: All the Centres

The yield data of Karune along with 2 checks has been presented in Table 1.6.11. Mean green pod yield of Karune (10986 Kg/ha) was significantly superior to the best check KDS 726 (9787 Kg/ha).

Advanced Varietal Trial-II

Proposed Testing Centres: Adilabad, Bidar, Bengaluru, Dharwad, K.Digraj, Pune,

Data received from: All the Centres

The yield data of 10 test entries along with 4 checks has been presented in Table 1.6.21. Based on the mean performance during three years 5 test entries KDS 992, DSb 34, MACS 1493, RSC 11-07 and AMS 100-39 were superior to the best check JS 335 (Table 5). High oil and null lox 2 entry NRC 132 was comparable to JS 335 in yield. This was a repeat entry and its yield was less than MACS 450 in 2018 also. Mid oleic acid entry NRC 147 ranked first and was comparable to the best check JS 335 (Table 6)

Table 5: Mean Performance of AVT II Entries of Southern Zone

S. No.	Entry	Yield (Kg/ha)			Mean	Rank	Maturity
		IVT-2017	AVT I-2018	AVT II-2019			
1.	NRCSL 1	2472	2503	1891	2288	VIII	98
2.	RSC 11-07	2649	2556	2317	2507	III	97
3.	AMS 2014-1	2549	2365	2049	2321	VII	98
4.	NRC 132	2479	2273	2079	2277	IX	99
5.	MACS 1493	2703	2655	2464	2607	II	96
6.	AMS 100-39	2580	2409	2504	2497	IV	98
7.	KDS 992	2617	2710	2655	2661	I	101
8.	DSb 34	2546	2841	2595	2661	I	94
9.	BAUS 102	2467	2460	2279	2402	V	101
10.	SKF-SP-11	2456	2431	2161	2349	VI	98
11.	DSb 21(c)	2270	2346	2126	2247	XI	99
12.	RKS 18 (c)	2291	2260	2038	2196	XII	96
13.	JS 335 (c)	2241	2358	2195	2264	X	96
14.	JS 93-05 (c)	1956	2250	2075	2093	XIII	92

Table 6: Mean Performance of high oleic acid entry in AVT-II of Southern Zone

S.No.	Entry	Yield (Kg/ha)		Mean	Maturity
		AVT I-2018	AVT II- 2019		
1.	NRC 147	2563	2160	2362	96
2.	DSb 21(c)	2346	2126	2236	99
3.	RKS 18(C)	2260	2038	2149	97
4.	JS 335(C)	2358	2195	2276	95
5.	JS 93-05(C)	2250	2075	2162	93

Compiled and Summarized by:

Dr. Sanjay Gupta
Principal Scientist and PI (Plant Breeding)
ICAR-Indian Institute of Soybean Research, Indore

SUMMARY REPORT OF AGRONOMIC EXPERIMENTS

By and large, all the trials were conducted during *kharif* 2019 at all the Centre representing 6 zones of the country as per technical programme. The experiment-wise salient findings (Table 2.1.1 to 2.5.10) are given as under.

1. AGRON1 /19.Evaluation of AVT II entries under different row spacing

The new entries with two row spacing were tested in split plot with three replications to study the response of soybean new entries to different sowing dates (Table 2.1.1-2.1.10).

1.1. Northern plain zone (Pantnagar and Ludhiana)

1.1.1. Entries

Soybean new entries differed significantly at both the centre (Table 2.1.1). None of the new entry found superior than check variety PS 1347 at Pantnagar. New entry PS 1613 yielded marginally higher (4.41%) than check PS 1347 at Ludhiana. On zonal mean basis, all the three new entries yielded lower than check variety PS 1347.

Similar trend was also recorded in most of the growth and development and 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 due to row spacing at both the Centre. However, the wider row spacing (45 cm) yielded numerically higher than narrow planting (30 cm) at both the centre. On the zonal mean basis, the wider row spacing yielded more (7.37%) 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 between entries and row spacingwas found to be non-significant at both the centre(Table 2.1.1).

1.2. Northern eastern (Ranchi, Raipur and Bhawanipatna)

1.2.1. Entries

New entries MACS1493, NRCSL-1, NRC 128, RSC 11-07 and AMS 2014-1gave significantly higher yield then check at Bhawanipatna. Similarly, entries RSC 11-03, NRC 128 and NRC 132 yielded significantly higher then check at Ranchi. Furthermore, all entries produced significantly higher yield than check except NRC 147 and MACS 1493 at Raipur centre. The entries, RSC 11-07, NRC 128, NRCSL-1 and NRC 136 yielded higher than other entries. On the basis of zonal mean, all the new entries produced higher yield to the tune of 3.29 to 37.12% than check variety RKS 18(Table 2.1.3).All the new entries except NRC 147 gave more than 10% higher yield than check variety. The maximum yield was recorded with NRC 128 and RSC 11 07.

Similar trend was also recorded in most of the growth and development and yield attributes, straw yield, grain production index and rainfall use efficiency (Table 2.1.4).

1.2.2. Row spacing

Planting of soybean in different row spacing did not alter the soybean yield at all the three centre as well as in zonal mean. However, numerically higher yield was recorded with wider row spacing (45 cm). (Table 2.1.3).

A similar trend was also observed in all the studied parameters (Table 2.1.4).

1.2.3. Interaction effect

The interaction between entries and row spacingwas found to be significant at Bhawanipatna and Raipur centre(Table 2.1.3).The interaction of MACS 1493 X 30 cm and RSC 11 07 x 30 cm at Bhawanipatna and Raipur, respectively.

1.3. North eastern hill zone (Imphal and Medziphema)

1.3.1. Entries

The new entries were compared with JS 335 at Imphal and JS 97 52 at Medziphema. New entry DS 3108 produced higher yield (11.26%) than check variety JS 335 at Imphal. New entry KDS 921 yielded higher (8.52%) than check variety JS 97 52 at Medziphema and differed non-significantly (Table 2.1.5). On the zonal mean basis, the valid conclusion could not not be made because both centre planted different set of new entries.

On zonal mean basis, more or less a similar trend was also observed in all the parameters under study(Table 2.1.6).

1.3.2. Row spacing

Row spacing failed to alter the soybean yield at Imphal centre. The narrow planting (30 cm) produced higher yield (137.38%) than wider row spacing at Medziphema (Table 2.1.5).On zonal mean basis, the highest yield (34.92%) was recorded under narrow row spacing as compared to wider spacing.

On zonal mean basis, maximum values of all the growth and yield attributes were associated with narrow row spacing (Table 2.1.6).

1.3.3. Interaction effect

The interaction between entries and row spacingwas found non-significant at both the centre(Table 2.1.5).

1.4. Cenral zone (Sehore, Kota and Amravati)

1.4.1. Entries

None of the new entry yielded higher than both check varieties at Sehore. New entry AMS 100-39 produced maximum yield at Amravati and Kota. On the basis of zonal mean, the new entry i.e. AMS 100-39 yielded higher (14.55 and 34.16%) than check variety NRC 86 and JS 20 34, respectively (Table 2.1.7).

On zonal mean basis, more or less a similar trend was also observed in all the parameters under study(Table 2.1.8).

1.4.2. Row spacing

The effect of row spacing on soybean yield was negligible at Sehore. The narrow (32.21%) and wider (14.47%) planting of soybean yielded significantly higher at Kota and Amravati,

respectively (Table 2.1.7).On zonal mean basis, the higher yield (3.50%) was recorded under narrow planting as compared to wider planting.

On zonal mean basis, maximum values of all the growth and yield attributes were associated with narrow planting (Table 2.1.8).

1.4.3. Interaction effect

The interaction between entries and row spacing was found non-significant at all the three centres (Table 2.1.7).

1.5. Southern zone (Pune, Adilabad and Dharwad)

1.5.1. Entries

All the new entries yielded higher than check variety DSb 21 at Pune. Among the new entries, NRC 147 produced maximum yield followed by AMS 2014-1, MACS 1493, KDS 992 and AMS 100-39. At Adilabad centre, MACS 1493AMS produced maximum yield followed by 100-39 and then KDS 992 and RSC 1107.None of the new entries were found better than check variety DSb 21 at Dharwad. On the basis of zonal mean, the New entry BAUS 102 yielded higher (27.57%) followed by MACSNRC 1667 (26.77%), MACS 1493 (17.88%), AMS 100 39 (16.33%), AMS 2014-1 (14.38%), SKF SP 11 (14.08%), NRC 147 (11.78%) and KDS 992 (11.35%) than check variety DSb 21 (Table 2.1.9).

On zonal mean basis, more or less a similar trend was also observed in all the parameters under study (Table 2.1.10).

1.5.2. Row spacing

The effect of row spacing on soybean yield was negligible at Adilabad and Dharwad. Planting of soybean in wider row spacing yielded (8.68%) than narrow planting at Pune (Table 2.1.9).On zonal mean basis, the higher yield (8.70%) was recorded under wider planting planting as compared to narrow planting.

On zonal mean basis, maximum values of all the growth and yield attributes were associated with wider planting planting (Table 2.1.10).

1.5.3. Interaction effect

The interaction between entries and row spacing was found significant at Dharwad(Table 2.1.9).The interaction of DSB 34 x 45 cm produced maximum yield at Dharwad.

2. AGRON 2/15. Sustainable soybean production through crop rotation and tillage systems

Two tillage systems (minimum and conventional) and four crop rotationswere tested in strip plot design with four replications to study the response of soybean to tillage systems and crop rotations (Table 2.2.1-2.2.25).

2.1. North plain zone (Pantnagar and Ludhiana)

2.1.1. *Crop rotations*

Soybean yield significantly influenced by the crop rotation at Pantnagar and Ludhiana however, *rabi* and soybean equivalent yield remained unaffected due to different crop rotation at both

the centre (Table 2.2.1, 2.2.2 and 2.2.3).Soybean-soybean-soybean-maize rotation yielded maximum SEY followed by soybean-maize-soybean-maize as evidenced 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 systems*

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 net returns and B:C ratio was 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 rotations

The highest soybean and soybean equivalent yield was associated with Soybean-Maize-Soybean-Maize and closely followed Soybean-soybean-soybean- maize (Table 2.2.6.). Soybean-soybean-maize-soybean produced maximum *rabi* yield and closely followed by soybean-soybean-soybean- maize.

The economical parameters and initial values of soil OC, N. P, and K and nutrient uptake were given in (Table 2.2.9 to 2.2.12).

2.2.2. Tillage systems

Soybean and *rabi* yield remained unaffected due to tillage systems at both the centre (Table 2.2.6 and 2.2.7). The highest soybean equivalent yield (8.45%) was with minimum tillage (Table 2.2.8.).

The economical parameters and initial values of soil OC, N. P, and K and nutrient uptake were given in (Table 2.2.9 to 2.2.12).

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 cause appreciable improvement in soybean and *rabi* yield at Kota centre (Table 2.2.13 to 2.2.14).On zonal mean basis, soybean-maize- soybean-maize yielded maximum and closely followed by soybean-soybean-soybean-maize. The marginally higher rabi yield was recorded with soybean-soybean-soybean-maize. The maximum and minimum SEY was observed in Soy-Soy-Maize-Soy and Soybean-Maize-Soybean-Maize crop rotation (Table 2.2.15).

The maximum net returns and B:C ratio was with continuous soybean (Table 2.2.15.).The initial values of soil parameters and nutrient uptake at of Kota and Amravati are given in Table 2.2.16 and 2.2.17.

2.3.2. Tillage systems

Conventional tillage produced higher yield (soybean, *rabi* and SEY) than minimum tillage (Table 2.2.13 to 2.2.15).On zonal mean basis, conventional tillage gave higher yield to the tune of 4.06, 5.84 and 5.18% of soybean, *rabi* and SEY over minimum tillage, respectively (Table 2.2.13 to 2.2.15).

Conventional tillage was found to be economical than minimum tillage at Amravati and just reverse was true with Kota (Table 2.2.17 and 2.2.18.).The initial values of soil parameters and nutrient uptake at of Kota and Amravati are given in Table 2.2.19 and 2.2.20.

.

2.3.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be non-significant at both the centres (Table 2.2.12 to 2.2.13).

2.2. Southern zone (Dharwad and Adilabad)

2.4.1. Crop rotation

Kharif crop yield was highest with soybean-maize-soybean-maize at both centre (Table 2.2.20). The maximum *rabi* crop yield was with soybean-soybean soybean- Soybean (Table 2.2.21). Soybean-maiz**e**-Soybean-maiz**e** rotation produced maximum SEY as evidenced from zonal mean (Table 2.2.22).

The economics of different treatments and soil analysis and nutrient uptake data are given in table 2.2.23and 2.2.25.

2.4.2. Tillage systems

Conventional tillage yielded higher than minimum tillage at both the centre. On zonal mean basis, conventional tillage gave higher soybean (4.89%), *rabi* yield (10.90%) and SEY (11.61%) over minimum tillage.

The economics, soil analysis and nutrient uptake data are given in table 2.2.23 and 2.2.25.

2.4.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be significant at Dharwad.

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 replication 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 (*Delhi, Pantnagar and Ludhiana):

3.1.1. Planting geometry:

The different planting geometry did not influence soybean yield at Pantnagar (Table 2.3.1). Planting of soybean at 45 x 5 cm and 45 x 20 cm spacing produced maximum yield and closely followed by 45 x 10 cm at Ludhiana and Delhi. Zonal mean data revealed that the maximum yield was recorded with 45 x 10 cm.

Growth and development and yield attributes and 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 PS 10 92 yielded higher (6.03%) than SL 958 at Delhi and SL 958 produced higher (11.36%) yield as compared to PS 10 92 at Ludhiana (Table 2.3.1). On zonal mean basis, both the varieties behaved identically with reference to yield.

Growth and development and yield attributes and economics follows 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 centres.

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 closely followed by 45 x 5 cm and both the treatments showed superiority over reaming treatments (Table 2.3.4).

Plant growth and development and yield attributes and economics was 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 (36.62%) as compared to JS 95 60 (Table 2.3.4). Variety RSC 10 46 was found to be superior in respect of 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 Raipur. The interaction of 45 x 10 X RSC 10 46 produced maximum yield at Ranchi.

3.3. North eastern hill (Imphal and Medziphema)*:*

3.3.1. Planting geometry:

Planting geometry did not show any appreciable effect on soybean yield at Imphal (Table 2.3.7). The increase in plant to plant space within row had negative impact on soybean yield and highest yield being with 45 x 5 cm. at Medziphema. On the basis of zonal mean, the highest yield was associated with 45 x 10 cm and closely followed by 45 x 20 cm.

Growth and development and yield attributes and economical parameters follows the 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 (74.79%) as compared to JS 93 05(Table 2.3.7).Growth and development and yield attributes and economical parameters follows 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.

3.4. Central (Sehore, Kota , Devgarbaria and Amravati):

3.4.1. Planting geometry:

Soybean yield remained unaffected due planting geometry at Sehore (Table 2.3.10). The maximum yield was recorded with 45 x 10 cm at Amravati, while at Kota and Devgarbaria, the highest yield was noted with 45 x 5 cm and closely followed by 45 x 10 cm. 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 and yield attributes and economical parameters follows the similar pattern as observed in yield (Table 2.3.11 and 2.3.12).

3.4.2. Variety:

Soybean variety RVS 24 yielded higher at all the centre and produced higher yield to the tune of 5.54% than JS 20 34 (Table 2.3.10),.

Growth and development and yield attributes and economical parameters follows the similar pattern as observed in yield (Table 2.3.11 and 2.3.12).

3.4.3. Interaction effect:

Interaction of variety and planting geometry was found to be significant at Sehore and interaction of JS 20 34 x 45 x 5 cm produced maximum yield as compared to other combinations.

3.5. Southern (Adilabad and Dharwad)*:*

3.5.1. 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 (Table 2.3.13).

Growth and development and yield attributes and economical parameters follows the similar pattern as observed in yield (Table 2.3.14 and 2.3.15).

3.5.2. Variety:

. Variety MACS 1188 yielded higher (7.85%) than JS 93 05 (Table 2.4.13) as evidenced from the zonal mean.

Growth and development and yield attributes and economical parameters follows the similar pattern as observed in yield (Table 2.3.14 and 2.3.15).

3.5.3. 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. 4/19: Evaluation of bio-efficacy of Macarena (Bio-stimulant) along with herbicides on soybean

Four herbicides with Macarena and Macarena alone, two hand weeding along with weedy check were assessed with three replications to evaluate the bio-efficacy of Macarena along with herbicides on soybean crop (Table 2.4.1 to 2.4.15).

4.1. Central (Sehore, Kota and Amravati):

The highest weed control efficiency was with two hand weeding at Sehore. All the herbicides were found effective to control the weeds in soybean crop at 30 as well as at 60 days after sowing (Table 2.4.1 and 2.4.2). The maximum monocot, dicot as well as total weed control efficiency was noted with Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha and Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha at both the stages. The application of Macarena enhanced the yield by 2.05% over weedy check. The combined application of Macarena + herbicide further increased the yield to the tune of 23.49 to 33.28% as compared to alone Macarena. The maximum yield was recorded with two hand weeding and remained at par Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha and Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha. However, all the herbicides behaved statistically at par with regards to yield. Yield attributes and economics follows the similar trend as observed in yield (Table 2.4.3).

The highest weed control efficiency was with two hand weeding at Amravati. All the herbicides showed less than 50% weed control efficiency at 30 DAS (Table 2.4.4). All the herbicides were found to be more effective on monocot weeds than dicot weeds. The lowest weed control efficiency was recorded with Imazethapyr 10% SL @ 1000 ml/ha + MACARENA @ 625ml/ha. At 60 DAS, only two herbicides showed more than 50% weed control efficiency i.e. Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha and Fluazifop-p-butyl 13.4 EC @ 2000 ml/ha + Macarena @ 625ml/ha (Table 2.4.5). The application of Macarena enhanced the yield by 45.94% over weedy check. The combined application of Macarena + herbicide further increased the yield to the tune of 32.90 to 52.17% as compared to alone Macarena. The maximum yield was recorded with two hand weeding. Among the herbicides, the highest yield was noted with Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha and remained at par with rest of the herbicide treatments. to yield. Yield attributes and economics follows the similar trend as it was observed in yield (Table 2.4.6).

The highest weed control efficiency was with two hand weeding at Kota. The maximum weed control efficiency was recorded with Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha at both the stages of observations (Table 2.4.7 and 2.4.8). All the herbicides were found to be more effective on monocot weeds than dicot weeds. The application of Macarena enhanced the yield by 11.88% over weedy check. The combined application of Macarena + herbicide further increased the yield to the tune of 69.49 to 80.33% as compared to alone Macarena. The maximum yield was associated with two hand weeding and remained at par with Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha (Table 2.4.9). Yield attributes and economics follows the similar trend as was observed in yield (Table 2.4.9).

4.2. North eastern (Raipur):

The highest weed control efficiency was with two hand weeding at Raipur. The maximum weed control efficiency was recorded with Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena@ 625 ml/haat both the stages of observations (Table 2.4.10 and 2.4.11). All the herbicides were found to be more effective on monocot weeds than dicot weeds. The application of Macarena enhanced the yield by 228.47% over weedy check. The combined application of Macarena + herbicide further increased the yield to the tune of 8.88 to 42.96% as compared to alone Macarena. The maximum yield was recorded with Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena@ 625 ml/ha and remained at par with Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha (Table 2.4.12). Yield attributes and economics follows the similar trend as was observed in yield (Table 2.4.12).

4.3. Southern (Adilabad):

The highest weed control efficiency was with two hand weeding at Adilabad. The maximum monocot, dicot as well as total weed control efficiency was noted with Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha and Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha at both the stages (Table 2.4. 13 and 2.4.14). The application of Macarena enhanced the yield by 20.99% over weedy check. The combined application of Macarena + herbicide further increased the yield to the tune of 12.47 to 62.91% as compared to alone Macarena. The maximum yield was recorded with two hand weeding and remained at par with Sodium Acifluorfan (16.5%) + Clodinafop propargyl (8% EC) @ 1000 ml/ha + Macarena @ 625 ml/ha and Propaquizafop 2.5% EC + Imazethapyr 3.7% ME @ 2000 ml/ha + Macarena @ 625 ml/ha (Table 2.4.15).Yield attributes and economics follows the similar trend as was observed in yield (Table 2.4.15).

5. 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 (Table 2.5.1. to 2.5.10).

5.1. North plain zone (Pantnagar and Ludhiana)

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 2.5.1). The omission of weed management from full package showed highest yield gap followed by the omission of recommended dose of fertilizers, insecticides and ridge furrow system. The minimum yield gap was with the omission of seed inoculation and seed treatment. 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 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 2.5.2).

5.2. Central zone (Sehore, Kota, Devgarhbaria and Amravati)

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 2.5.3). The omission of recommended dose of fertilizers weed management from full package showed highest yield gap followed by the omission of weed management, 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 2.5.4).

5.3. North eastern zone (Raipur, Ranchi and Bhawanipatna)

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 2.5.5). 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 similar trend was also observed in economical parameters. The minimum yield gap was with omission of ridge and furrow system. The maximum cost incurred due to weed management followed by RDF, ridge and furrow planting and insecticide application. The lowest cost was observed in seed treatment and inoculation. The highest IBCR was recorded under omission of seed treatment followed by seed inoculation. The yield attributes, biological and straw yield depicted in Table 2.5.6).

5.4. North eastern hill zone (Imphal and Medziphema)

Cultivation of soybean was with full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge and furrow) yielded maximum as compared to other treatments (Table 2.5.7). The omission of weed management from full package showed highest yield gap followed by the omission of recommended dose of fertilizers and insecticides. The similar trend was also observed in economical parameters. The minimum yield gap was with omission of seed treatment. The maximum cost incurred due to RDF followed by weed management, ridge and furrow 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 insecticide application. The yield attributes, biological and straw yield depicted in Table 2.5.8).

5.5. Southern zone (Pune, Dharwad and Adilabad)

Soybean grown was with full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge and furrow) yielded maximum as compared to other treatments (Table 2.5.9). The omission of weed management from full package showed highest yield gap followed by the omission of recommended dose of fertilizers, insecticides and seed treatment. The lowest yield gap was associated with seed inoculation. 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 2.5.10.

Summarized by:
Dr. S.D. Billore
PI and Principal Scientist (Agronomy)
ICAR-Indian Institute of Soybean Research, Indore

SUMMARY REPORT OF ENTOMOLOGY EXPERIMENTS

Seven entomological field trials were conducted during *kharif* 2019 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 in **Table 3.1**. Total **21** insect spp. infested soybean crop in different zones during *kharif* 2019 at different coordinating centres:

Zone	Insects
North Plain Zone (Delhi, Pantnagar)	*Bemisia tabaci, Obereopsis brevis, S. obliqua, S. litura, D. orichalcea, 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 –100 % plant infestation and 25.11% stem tunnelling; Aphids – 3.53/ 3 leaves; Defoliation 9.40 % at flowering.
Sehore	*Gessonia gemma* -5.9larvae /mrl ; *Chrysodeixis .acuta*-6.5 larvae /mrl ;Stem fly 90% infestation With maximum tunneling 24.6 per cent . Girdle beetle -23.1 % infestation. Defoliation -1.5 % at vegetative stage, 9% at flowering and 22% at peak population
Parbhani	Girdle beetle – 21.67 % infestation; Stem fly – 42.67 % stem tunnelling; Semilooper – 11.00 larvae/MRL
Amravati	No major insect except Stem fly with 70 % infestation.
Kota	Girdle beetle – 33.33 % infestation ; Semiloopers – 1.33 larvae/m; Defoliation – 5.0 at flowering and 27.5 at peak larval incidence
Dharwad	*C. ptychora* – 47.28 % pod damage; *H. indicata* – 20.15 % infestation;
Imphal	*S. obliqua* – 96.67 larvae / m; Leaf Weber – 12.0 larvae /m; *S. litura* – 8.67 larvae/m; Defoliation – 25.18 % Aphids – 26.0 /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* **(Table 3.2**). The extent of larval mortality due to bio-control agents (BCAs) is given hereunder:

Location	BCAs	Period	Extent
Sehore	*B. bassian* bacterial infection	10th september	40.6% larval mortality 20.6%
Kota	*Cotesia*	35th SMW	5.4 % parasitisation
Dharwad	*N. rileyi,* *Apanteles*	September 34th SMW	11.02% larval mortality 8.01% parasitisation
Imphal	*N. Rileyi* and *B. bassiana*	--	5 to 30 % larval mortality
Pantnagar	Bacterial infection Virus infection	-- --	57.5 % mortality 15 % parasitoidation
Parbhani	*Coccinella* Spiders	34th SMW 39th SMW	1.00 /m 5.67 /m

Ent. 2. Screening for resistance against major insect-pests (AVT entries)

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 (Tables 3.3 to 3.7).** Information on reaction of different entries against major insect-pests during last three years (2017, 2018 and 2019) was compiled and promising genotypes were identified by using following criteria:

1. Resistance against one insect spp. at 3 or more locations in any of the 3 years,
2. Multiple resistance at any location in any of the 3 years, or
3. Resistance against one insect spp. in 2 or more years at any location.

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, DSb 34, RVS 2010-1, MACS 1493, NRC 146, NRC 147, RSC11-07.
Girdle beetle	AMS-MB5-18, BAUS 102, DSb 32, NRC 132, NRC 137.
Defoliators	DSb 32, DSb 33, DSb 34, AMS-MB5-18, AMS 100-39, NRC 147, KDS 992, MACS 1566, MACS-NRC1575, MACS 1667, MACS 1493, MACS 1620, NRC 128, NRC 131, NRC 146, NRC 148, JS 20-34, DS 3108, RSC11-15, SKF-SP-11, JS-335.
PC	DSb 32, JS 20-94, JS 20-116, MACS 1493, MACS 1520, MACS 1620, MACS 1566, NRC 127, NRC 142, NRC 148, RVS 2007-6, JS 20-98, JS-335, JS-93-05, AMS-MB5-18, DSb 34, NRC 128, RSC11-03, RSC11-07, RSC11-15, RSC11-17, SL-688, AMS 100-39, HIMSO 1689, AMS 2014-1, DS 3108, MAUS732, PS 1611, PS 1637.
Aphid	RSC10-46

ENT 3: Status of AVT-II entries for antixenosis and antibiosis against *S. litura*

At Indore, among 16 genotypes tested, only one entry, NRC-137 exhibited **strong antixenosis** against *S. litura*. However, at Dharwad and Pantnagar it was not exhibited. The genotypic differences in antixenosis reaction across locations need to be studied in detail.

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	1.17	Preferred host	1.15	Preferred host	1.15	Preferred host
2	AMS 2014-1	1.27	Preferred host	1.26	Preferred host	0.75	Moderate antixenosis
3	BAUS 102	1.16	Preferred host	1.11	Preferred host	-	-
4	DS 3108	0.85	Slight antixenosis	0.90	Slight antixenosis	-	-
5	DSb 34	0.97	Slight antixenosis	0.67	Moderate antixenosis	0.87	Slight antixenosis
6	KDS 992	0.87	Slight antixenosis	0.70	Moderate antixenosis	1.47	Preferred host
7	MACS 1493	1.29	Preferred host	1.27	Preferred host	1.05	Preferred host
8	NRC 128	1.22	Preferred host	1.02	Preferred host	0.78	Slight antixenosis
9	NRC 130	0.95	Slight antixenosis	0.92	Slight antixenosis	0.87	Moderate antixenosis
10	NRC 131	0.99	Slight antixenosis	0.95	Slight antixenosis	0.97	Slight antixenosis
11	NRC 132	1.18	Preferred host	0.72	Moderate antixenosis	0.60	Moderate antixenosis
12	NRC 136	1.2	Preferred host	1.10	Preferred host	0.55	Moderate antixenosis
13	NRC 137	1.16	Preferred host	1.20	Preferred host	0.49	Strong antixenosis
14	NRC 147	1.22	Preferred host	1.22	Preferred host	0.55	Moderate antixenosis
15	NRCSL 1	1.27	Preferred host	1.28	Preferred host	0.57	Moderate antixenosis
16	PS 1611	1.16	Preferred host	1.15	Preferred host	0.65	Moderate antixenosis
17	PS 1613	1.30	Preferred host	1.26	Preferred host	0.61	Moderate antixenosis
18	RSC 11-03	0.72	Moderate antixenosis	0.98	Slight antixenosis	-	-
19	RSC 11-07	1.08	Preferred host	0.93	Slight antixenosis	-	-
20	SKF-SP-11	0.95	Slight antixenosis	1.24	Preferred host	-	-
21	JS 335 (C)	Check	Check	-	-	-	-
		-	-	-	-	-	-
		-	-	-	-	-	-

Antibiosis reaction of AVT-II entries

The lower values of ECI and ECD for NRC 128, DSb 34 and MACS 1493 indicate good antibiosis reaction against *S. litura* larvae. It was interesting to note that NRC 137, which showed strong antixenosis reaction at Indore was having high AD value. It implies that given a choice, the larvae do not prefer SL 1104, but under no-choice condition they consume lot of foliage. However, relatively low ECI and ECD indicate adverse effect on larval growth and development.

S. No.	Genotypes	Pantnagar			Dharwad			Indore		
		AD	ECI	ECD	AD	ECI	ECD	AD	ECI	ECD
1	AMS 100-39	70.04 (57.04)	49.41 (44.66)	71.96 (58.86)	70.23 (56.91)	51.40 (45.78)	73.19 (58.79)	77.74 (61.85)	27.49 (31.62)	35.14 (36.35)
2	AMS 2014-1	66.02 (54.35)	42.85 (40.88)	65.11 (53.88)	68.49 (55.83)	48.70 (44.24)	71.12 (57.47)	73.25 (58.86)	40.40 (39.47)	54.98 (47.86)
3	BAUS 102	69.03 (56.18)	36.34 (36.98)	52.56 (46.53)	67.96 (55.50)	49.33 (44.60)	65.54 (54.03)	-	-	-
4	DS 3108	67.33 (55.16)	35.38 (36.43)	53.02 (46.82)	69.04 (56.17)	34.81 (36.14)	57.41 (49.24)	-	-	-
5	DSb 34	61.51 (51.69)	43.60 (41.31)	71.50 (57.96)	64.86 (53.62)	31.82 (34.33)	47.22 (43.39)	69.36 (56.39)	40.51 (39.53)	58.19 (49.72)
6	KDS 992	65.57 (54.07)	43.90 (41.49)	66.95 (54.92)	69.31 (56.33)	35.40 (36.50)	49.31 (44.59)	76.72 (61.15)	20.74 (27.09)	27.23 (31.45)
7	MACS 1493	72.33 (58.42)	30.85 (33.69)	43.27 (41.07)	73.56 (59.03)	40.90 (39.74)	61.03 (51.35)	74.90 (59.93)	18.30 (25.33)	24.25 (29.50)
8	NRC 128	69.38 (56.56)	28.52 (32.25)	41.82 (40.23)	70.23 (56.91)	43.64 (41.33)	59.40 (50.40)	75.70 (60.46)	55.55 (48.19)	72.88 (58.62)
9	NRC 130	70.71 (57.61)	34.07 (35.69)	49.38 (44.65)	65.68 (54.12)	36.10 (36.91)	51.98 (46.12)	72.84 (58.59)	52.09 (46.20)	71.70 (57.86)
10	NRC 131	62.53 (52.25)	36.00 (36.86)	57.63 (49.39)	68.29 (55.71)	36.43 (37.11)	56.79 (48.88)	79.96 (63.41)	34.42 (35.92)	44.13 (41.63)
11	NRC 132	70.29 (56.99)	37.81 (37.93)	53.97 (47.28)	67.45 (55.19)	31.66 (34.23)	53.27 (46.86)	80.17 (63.55)	67.50 (55.24)	83.82 (66.28)
12	NRC 136	71.61 (57.81)	35.83 (36.72)	50.01 (45.01)	71.14 (57.48)	43.32 (41.14)	61.35 (51.54)	77.92 (61.98)	64.04 (53.15)	81.99 (64.89)
13	NRC 137	65.38 (53.98)	36.64 (37.23)	56.33 (48.66)	69.12 (56.22)	48.54 (44.15)	63.47 (52.79)	68.91 (56.11)	65.09 (53.78)	94.54 (76.49)
14	NRC 147	63.19 (52.65)	40.90 (39.72)	64.79 (53.71)	65.56 (54.04)	41.34 (40.00)	67.76 (55.38)	80.28 (63.64)	46.88 (43.21)	58.29 (49.77)
15	NRCSL 1	71.91 (58.03)	37.02 (37.45)	56.74 (48.89)	73.48 (58.98)	46.60 (43.03)	59.02 (50.18)	77.93 (61.98)	72.35 (58.28)	92.81 (74.44)
16	PS 1611	57.27 (49.17)	38.97 (38.61)	67.98 (55.55)	65.01 (53.71)	48.85 (44.32)	69.14 (56.23)	67.50 (55.25)	31.44 (34.10)	46.55 (43.02)
17	PS 1613	59.18 (50.29)	33.55 (35.38)	56.86 (48.95)	65.90 (54.25)	46.45 (42.95)	71.61 (57.78)	70.80 (57.29)	30.69 (33.64)	43.60 (41.33)
18	RSC 11-03	70.72 (57.25)	40.68 (39.61)	57.65 (49.44)	71.21 (57.53)	40.21 (39.34)	56.46 (48.69)	-	-	-
19	RSC 11-07	60.34 (50.96)	40.04 (39.19)	66.54 (54.95)	67.14 (55.00)	38.75 (38.48)	57.72 (49.42)	-	-	-
20	SKF-SP-11	64.53 (53.45)	30.70 (33.63)	47.66 (43.65)	67.58 (55.27)	52.20 (46.24)	75.24 (60.13)	-	-	-
21	JS 335 (C)	67.67 (55.35)	28.89 (32.50)	42.71 (40.80)	72.86 (58.58)	40.68 (39.61)	57.64 (49.37)	73.41 (58.96)	51.50 (45.86)	70.97 (57.40)
	S.Em±	1.919	1.668	3.222	1.89	1.68	2.96	(2.26)	(4.72)	(6.66)
	CD @ 5%	5.484	4.769	9.211	5.71	5.06	8.89	(4.62)	(9.65)	(13.60)

Ent. 4. Screening of IVT entries for resistance to major insect-pests

Forty five coded entries were screened against major insect-pests in **(IVT Normal)** at different coordinating centres (**Tables 3.11 to 3.14**). 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	NRC 154, RVS 2011-32, PUSA-Sipani-2036, JS 22-01, KDS 1097, RSC 11-22, BAUS 103, MAUS 712, NRC 168, KDS 1099, AMS 353, AUKS 218, PUSA-Sipani-6029, NRC 167
Defoliators	VLS 99, SL 1213, PS 1641, NRC 154, RVS 2011-32, MACS 1655, PUSA-Sipani-2036, AUKS 200, PS 1642, KDS 1097, ASb 51, NRC 149, DS 1326, BAUS 103, DS 1320, AMS 353, RVSM 2011-77, Asb 50
Girdle beetle	RVS 2011-32, NRC 163, TS 107, KDS 1099, NRC 167
Aphids	AUKS 218
White fly	DS 1326, KDS 1099, AMS 353
Multiple Insects	PUSA-Sipani-2036, RVS 2011-32, KDS 1099, BAUS 103, KDS 1097, NRC 154, AMS 353, AUKS 218, DS 1326

Thirty one coded entries were screened against major insect-pests in **(IVT Early)** at different coordinating centres (**Tables 3.15**). 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 Early)
Stem fly	PS 1656, NRC 157, NRC 162, NRC 161, Pusa-Sipani-408, NRC 166
Defoliators	NRC 155, DS 1314, NRC 151, PusaSipani-1050

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, Ludhiana, Dharwad and Imphal (**Table 3.16 to 3.19)**. On the basis of insect reaction and yield potential following promising lines were identified for further evaluation during next season: WT 88, EC 242072, JS 20-69, EC 391332, MAUS 7107 and DSb 21.

ENT 6. Evaluation of promising genotypes for resistance against major insect-pests

Promising genotypes were evaluated for insect reaction against major insect-pests at their respective centres (Sehore, Indore, Kota, Dharwad and Imphal) (**Table 3.20 to 3.24)**. On the basis of insect reaction and yield potential following promising lines were identified for further evaluation: AMS MB 5-18, AMSS 34, EC 547464, JS 20-41, JS 20-48, JS 20-50, JS 20-51, JS 20-53, JS 20-55, JS 20-59, JS 20-61, JS 20-86, JS 21-71, MAUS 142, DSb 32, DSb 34, DSb 28-03, EC 232019, EC 347464, MACS 1493, NRC 127, PS 1423, RSC10-70, RVS2007-6, RVS2011-10, PS 1572 and RSC 11-17.

ENT 7. Management of major defoliators using microbial agents

In order to identify suitable microbial insecticides for management of major insect-pests of soybean four microbial insecticides were tested at Amrawati, Prabhani, Imphal (**Table 3.25 to 3.27)**.

N.rileyi @4ml/l was found best at Prabhani against tobacco caterpillar and semiloopers, *Beauveria bassiana* @ 4g/l at Amrawati against tobacco caterpillar, *Metarhizium anisopliae* @ 4g/l at Imphal against tobacco caterpillar and Bt Commercial @ 1g/l was found best treatment at Imphal against Bihar hairy caterpillar and leaf webber.

Compiled and Summarized by:

Dr. Lokesh Kumar Meena, Scientist and
Dr. A. N. Sharma, Principal Scientist and PI (Entomology)
ICAR-Indian Institute of Soybean Research, Indore

SUMMARY REPORT OF PLANT PATHOLOGY EXPERIMENTS

Six Pathology field trials were conducted during *kharif* 2019 at 15co-ordinated centres spread over six 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 4.8).

As reported by various centres, although a total of 19 diseases appeared across the country on soybean,only 11 of them were wide spread occurring in 3 or more zones and four were zone specific. The FLS at Almora, Palampur, Sehore, Jabalpur and Dharwad; YMV at Pantnagar, Ludhiana, Dholi and Delhi; RAB at Pantnagar, Jabalpur,Jorhat and Medziphema; CollR at Jorhat,Sehore and Jabalpur; rust and PB (Ct) at Dharwad and K. Digraj. Seed rot at Jorhat, BND at Delhi and IIB at Raipur 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 northern Plain zone while MLS appeared only at Central zone,BND at Delhi and Seed rotting at Jorhat and IBB at Raipur in moderate to severe form. 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 BP & PB (Ct) were in mild form. Whereas at Palampur, FLS,BS,BP and PB(Ct) were in moderate to severe 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 Eastern zone at Dholi, YMV was in moderate to severe form and at Raipur PB(Ct) was moderate to severe form and IBB was in mild to moderate form. In NEZ, At Raipur, PB (Ct) and IBB were mild to moderate form. In NEHZ, At Jorhat, disease pressure CR 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, MLS & TLS appeared in severe form. At Amravati, PB (Ct) & Charcoal Rot (CR) was found 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. In SZ, rust was severe at Dharwad and K.Digraj. 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 10 centres across the zones (Table 4.2) on 16 susceptible varieties. In NHZ, at Almora, the situation was different from previous year where in FLS appeared in moderate to severe form while PB (Ct) and BP appeared in mild to moderate form. At Palampur, 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 SMV , 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) & CR were in moderate to severe form and CollR & RAB were in mild to moderate form. At Medziphema, RAB, PB (Ct) and Rust were in moderate to severe form. In CZ, at Sehore, MLS and TLS appeared in moderate to severe form. At Jabalpur, this year, CR,YMV and RAB appeared in moderate to severe form. At Amravati, CR were in moderate

form and other diseases such as YMV, PB(Ct) and ALS 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

Fourty 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, BLB, TLS and CR 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. BP, BS, BND, PSS/CLS, BND at Delhi,SMV at Indore and CR at Amravati,YMV at Jabalpur,Pantnagar and Jorhat 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 Absolute Resistant (AR) and 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 PS 1641,PS 1642,NRC 49 and Himso 1690 showed either HR/AR reaction over three locations and entries VLS 99, PS 1641,PS 1642,DSb 37,MACS 1639,KDS 1099,AMS 353,NRC 167 and Asb 50 showed either AR/HR reaction over two locations for PB (ct). The entries DS 1318,JS 22-01,NRC 49,Himso 1690 and RVSM 2011-77 showed HR reaction at Delhi and Ludhiana centers for YMV. DSb 37 showed HR reaction to rust at all three locations (Dharwad,Medziphema and K.Digraj) in initial varietal screening trial. In IVT (early), none of entries showed resistant reaction for MLS at Sehore center while 13 entries showed resistant reaction at Indore center. The entries RVC 2011-73 and PUSA Sipani-1050 showed MR reaction to RAB. The reaction of entries remained specific to single disease across the locations except MLS in IVT (early) trial. Appearance of FLS was moderate at Almora and severe at Palampur.All the entries showed either MS/S reaction against FLS at Alomra,while entries NRC 154,TS 46,AKUS 218 and NRC 167 showed AR reaction to FLS at Palampur center.

Appearance of PB(Ct) was moderate to severe at Pantnagar,Medziphema, Palampur,,Indore,Raipur and Dharwad. At Pantnagar, the entries PS 1642,NRC 149 showed AR reaction, while 21 entries showed AR reaction at Medziphema.At Indore,none of entries showed either AR/HR reaction while three entries showed MR reaction. None of entries showed either AR or HR reaction at Dharma & Raipur centers. RAB appeared in severe form at Medziphema, Pantnagar and Jabalpur centers Twenty three entries showed AR reaction at at Medziphema. At Pantnagar,NRC 19 showed AR reaction while SL 1213 showed HR reaction against RAB.At Jabalpur NRC 149 showed AR reaction while SL 1213,PS 1641 showed HR reaction.The data of Pantnagar and Jorhat for PB (Ct), ,Jorhat for RAB, Jabalpur,Pantnagar and Jorhat for YMV,BS for Palampur,IBB for Raipur, BND for Delhi, SMV for Indore,ALS for Amravati, CR at Amravati were not considered reliable due to less than 77.7 infection index. At Pantnagar for BLB, AMS 353 showed AR reaction.At Sehore, majority of the entries showed AR reaction for TLS. Rust was severe at Medziphema,Dharwad and K.Digraj. DSb 37 showed HR reaction at all the three locations.

PP 3(b): Incidence of various diseases in AVT-I

A total of nineteen 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 15 centres (Table 4.4) along with checks. Susceptible check varieties or test entries contracted severe disease (I. I. equal or more than 77.7).For FLS at Palampur and Almora, RAB and PB(Ct) at Pantnagar, YMV at Ludhiana,Delhi & Dholi, PB (Ct) at Raipur and Medziphema, BLB at Jorhat, CR at Jabalapur, MLS at Sehore and Indore, YMV at Jabalpur,rust & PB (Ct) at Dharwad and K.Digraj are reliable. Therefore, resistant status of entries against these diseases at above locations was considered as reliable. The entries observed AR and highly resistant (HR) at such centre (s) and did not express susceptible reaction to

same disease at other centre (s) of the same zone were considered as real resistant. Resistant status of BS at Palampur, BND at Delhi, IBB at Raipur,PB(Ct) at Medziphema,CollR,YMV and RAB,ALS and BP at Amravati and PSS at Dharwad were considered as not reliable.

In NHZ, data wrt to screening of FLS,PB(Ct) was found reliable with more than 77.7 per cent infection in susceptible entries. None of entries showed either AR/HR reaction to FLS at Palampur & Almora centers. Only seven entries showed MR reaction to FLS at Palampur and entries DS 3110 showed AR reaction & Himso 1689 and JS 21-71 showed HR reaction to PB (Ct) at Palampur. In NPZ, entry DS 3110 and NRC 138 showed HR reaction for YMV at Delhi center and DS 3110 & JS 21-71 showed MR reaction at Ludhiana center. In eastern zone, none of entries showed AR/HR reaction to PB (Ct).However, ten entries showed MR reaction to PB(Ct). The entries DS 3110 and NRC 38 showed HR reaction across the zones(NHZ & NEHZ) against PB (Ct). In Central zone, seven entries showed AR reaction to CR at Jabalpur while Himso 1689 showed HR reaction to RAB. None of entries showed either AR/HR reaction to MLS,PB(Ct) & SMV across different locations. In Southern Zone, DSb 33 showed HR reaction at Dharwad while MR reaction at K.Digraj indicating highly resistant reaction to only Race 2 of *Phakopsora pachyrhizi* and MR reaction to Race 3 prevalent in Maharashtra state.

PP 3(c): Incidence of various diseases in AVT-II

Twenty one entries at 13 locations across the country were evaluated for their reaction to diseases along with checks as per procedure described in Table 4.5. Susceptible check variety (s) or test entry (s) with severe disease rating (1.1 equal or morethan 77.7) for FLS at Palampur and Almora, PB(Ct) at Pantnagar,Palampur Indore and Raipur ,BLB, PB RAB and YMV at Pantnagar,YMV at Dholi, Ludhiana Delhi and Jabalpur, CR at Jabalpur, Sehore and Amravati,TLS at Sehore,rust at Dharwad and K.Digraj, Therefore the resistant of entries against those disease at above locations were considered on reliable. The data with respect to BS at Palampur, IBB at Raipur,YMV,CR,ALS and BP at Amravati, and PB(Ct) at Dharwad were not reliable because infection index was below 77.7. The entries NRCSL 1 and PS 1613, PS 1611 showed either AR/HR reaction over three locations (Pantnagar,Ludhiana and Delhi).All the entries showed susceptibility at Ludhiana center except NRCSL 1 and PS 1611.The entries DS 3108,MACS 1493,NRC 132 and PS 1613 showed HR reaction over two locations (Palampur and Pantnagar).None of entries showed either AR/HR reaction to FLS,RAB and YMV at Almora,Pantnagar and Dholi centers respectively. The entries DS 3108 & NRC 128 showed AR/HR reaction over different zones(NHZ,NPZ & Eastern zone). In CZ zone, the screening data was reliable wrt YMV,RAB,TLS and PB(Ct) across the locations.The entry NRCSL 1 was resistant for YMV and PB(Ct) across the locations.None of entries showed either AR/HR reaction to TLS at Sehore and SMV & MLS at Indore centers.In SZ, DSb 34 showed HR reaction to rust at Dharwad and MR reaction at K.Digraj.

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 six different zones,the entries JS 20-71,JS 20-89,DS 3050 and AMS 1002 maintained AR reaction at 6^{th} year of their testing at Amravati center under sick plot conditions.The entries DSb 21,DSb 23 & DSb 28 maintained their HR reaction to rust at their 8^{th} year of testing.The rust resistant donors EC 241778,EC 241780 & EC 242104 showed HR reaction at their 12^{th} and 8th year of testing respectively at Dharwad center. At Pantnagar out of 32 previous entries, SL 1068,SL 1123 and DS 3108 maintained AR/HR status to YMV and RAB at second year of testing. At Jabalpur , the entries JS 20-34,JS 20-98,JS 20-36 and NRC 125 showed HR reaction to CR at their 6^{th} 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. At Palampur, five entries (CAT 1241,EC 107407,EC 241771,JS 20-51,JS 20-69 and EC 241696 and EC 291398 showed multiple

disease resistance to PB(Ct) and BS. At Jabalpur, EC 107407,JS 20-53,EC 109540 showed resistance to YMV and RAB diseases.At Dharwad Center, DSb 21 and EC 242104 showed multiple resistance to rust and PSS diseases. None of entries showed multiple disease resistance at Indore center. At Pantnagar, the entries EC 109540 and JS 20-69 showed resistance to RAB & PB(ct)(Table 4.7).

PP 6/ENT 8 - Integrated management of root rot complex and stem borers of soybean

In first year of experimentation conducted at Dharwad,Pantnagar,Palampur,Amravati centers revealed that seed treatment with Thiophanate methyl+Praclostrobin @ 2g per kg of seed followed by spraying with chlorantroniprole 0.2ml/L at 15 and 35 DAS was found effective in management of root rot complex and stem borers of soybean and enhanced the yield(Table 4.8).

Compiled and Summarized by

Dr. Shamarao Jahagirdar
Principal Scientist and PI (Plant Pathology)
University of Agricultural Sciences, Dharwad, Karnataka

SUMMARY REPORT OF MICROBIOLOGY TRIALS

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

This experiment was initiated at various centers to explore fluorescent pseudomonads from the soybean rhizosphere soil finally to use as potential plant growth promoting rhizobacteria in soybean. The colonies exhibiting fluorescence under UV light in Kings B media were selected for isolation and further investigations. **Table: MB 1/16A to MB1/16J** lists the results on isolations and evaluation PGP and moisture stress tolerant parameters carried out at different centres. A total of 36 isolates including last year were recovered from soybean rhizosphere from which 9 from Indore, 16 from Delhi center; 03 from Ludhiana and 8 from Pantnagar center have been purified and evaluated under invitro for drought stress tolerance characteristics.

At Indore centre, a total of 9 putative rhizobacteria were obtained from the soybean rhizosphere soil. Out of these, 04 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 four 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, out of four strains, two strain i.e., *P. fluorescens* & *P. putida* were found to have higher IAA production, P-solubilization and siderophore production zones and also showed positive to ACC deaminase activity assay. Moreover, all the four pseudomonads were found to show growth across the gradient of PEG up to 30%. However, overall, two strains i.e., MB-10&14 were showed comparatively higher growth at 30% PEG indicating moisture tolerant strains and will be characterized further through 16SrRNA gene sequences **(Tables MB1/16A to MB1/16C).**

At Delhi centre, out of eighty nine bacterial isolates were isolated from two soybean rhizosphere at two stages of the crop growth and showing fluorescence on Kings B medium. All of them were screened for P-solubilization, siderophore production, antagonistic activity and IAA production. These were also screened for growth under broth culture on PEG 6000 (polyethylene glycol) under different concentrations (0%, 10%, 20% and 30%). Growth and PGP activities were evaluated for the 89 isolates after 3 days of incubation. However, OD_{600} values were scored at every 24hrs for 3 days (**Table MB-1/16D**). Isolates from Genotype 1 and crop growth stage two; 20 isolates were found positive for P-solubilization and siderophore production and only three isolates showed antagonistic ability. Eight isolates showed an IAA production of > 12 µg IAA/ml. Twenty two isolates from Genotype 2 were siderophore producers, however only seven produced >10 µg/ml IAA. In contrast isolates from crop stage 1, showed low siderophore production and IAA production was found to be ranging between 2-4 µg/ml. Out of 16 isolates possessing PGP traits were evaluated in a gradient of PEG for moisture stress tolerance trait, 04 were found to be best and will be characterized and evaluated further.

At Ludhiana, Eight rhizobacterial isolates were identified as pseudomonads on the basis of colonies exhibited fluorescence under UV light on King's medium. All the pseudomonads screened for multifarious PGP traits *viz.* IAA, P-solubilization, siderophore, ACC deaminase and salt tolerance. All the pseudomonads were positive for catalase and superoxide dismutase (SOD). On the basis of PGP traits, out of 8 pseudomonads, only 2 bacterial isolates were selected as potential PGPR under abiotic stress conditions (Table.1). Pseudomonads *viz.* LSE-2 & LSE-3 showed excellent growth on DF medium containing ACC as nitrogen source. Further, 2 pseudomonads LSE-2 & LSE-3 were identified as *P. oryzihabitans* (MF 278905.1) and *P. fluorescence* (MH 888077.1) along with *Bradyrhizobium* sp. (MH 644039.1) by 16 Sr RNA sequencing. PEG (6000) was used for the study abiotic stress in these isolates **(Tables MB1/16E and F).** All the isolates were tested with PEG (6000) at varying concentrations from 0 to 30%, reduced growth with increasing concentrations of PEG (Table. 2). *P. oryzihabitans* revealed less decreased in growth in terms of optical density (5%= 1.201

and 7.5%= 0.986) as compared to *P. fluorescence* (5%= 0.535 and 7.5%= 0.495). Similar trend was seen with different concentrations of NaCl (@0, 2.5, 5, 7.5 and 10%) except *Bradyrhizobium* sp. LSBR-3. However, maximum optical density was recorded with P. *oryzihabitans* as compared to P. *fluorescence.* Further, all the isolates were screened at different temperatures (28°C, 35°C and 40°C). Highest optical density was observed with P. *fluorescence* at 28±2°C and sharply decreased at 40±2°C temperature **(Table MB1/16F).** While screening at elevated temperature (45°C) it was observed that all the bacterial isolates maintained functional traits *viz.* IAA, P-solubilization ACC-deaminase production and zinc solubilization. Significant enhancement in biofilm production was noticed at 45°C over 28°c temperature. Similarly, significant enhancement in proline content was recorded with Nacl (5%) and PEG (5%) over absolute control treatment in all the bacterial isolates. However, comparatively both the pseudomonads i.e., *P. oryzihabitans* and *P. fluorescence* showed higher PGP and physiological traits and tolerance to high temperature than the *Bradyrhizobium* sp. Nevertheless rhizobial strain found to be tolerant at highest PEG concentration and maintained significantly higher parameters when compared to control **(Table MB-1/16G & MB-1/16H).**

At Pantnagar centre, last year of the total 26 probable fluorescent *Pseudomonas* isolated from the rhizosphere soil of various soybean varieties grown under field conditions and raised under glass house conditions, 08 isolates were recovered as fluorescent *Pseudomonas* and screened for moisture stress tolerance characteristics under invitro at varying concentration of PEG-6000. Based on assay out of eight, four isolates (pant-1, pant-3, pant-6 & pant-7) were found to show higher growth at 30% PEG therefore was selected for further characterization **(Table MB-1/16J).**

MB2a/18: Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean under pot conditions

Centres: Indore, Sehore, Delhi, Ludhiana, Pantnagar and Dharwad

This trial was conducted 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.

At Indore centre, nodulation parameters -nodule number, nodule biomass and leghaemoglobin content in nodules enhanced significantly in the treatment of *B. daqingense* and *B. liaoningense* in stressed as well unstressed pots over the control. However,the response of *B. japonicum* although was significantly lower than *B. daquingense* but at par with *B. liaoningense*. Comparatively the AMF response on nodulation was lower than two rhizobial inoculants but was higher than commercial rhizobia and was significantly higher over the control. The dry biomass of shoot and root and relative water content was also found to enhance significantly in *B. daqingense* when compared with control and commercial local rhizobial culture and found to be superior for all the parameters than the other two rhizobia and AMF. Similarly, the RWC, dry weights of root, shoots and P content in shots was enhanced significantly even under stress conditions over the control and local commercial inoculum. The N & P content and uptake in seeds and shoots were also enhanced significantly in *B. daqingens* inoculated plants over the control and commercial strain. In general, the N response trend was found in *B. daqingens>B. liaoningens>AMF>B.japonicum* manner whereas for P nutrition was - AMF>*B.daqingens>B.liaoningense>B.japonicum*. The inoculation also improved physiological parameters (chlorophyll and proline) in stressed plants with higher response obtained through *B. daqingens* followed by AMF and either of other Bradyrhizobial strains (*B. japonicum and liaoningense*) indicating that *B daqingens* and AMF can be suitable consortia for improved growth, nodulation, nutrition and physiological status of soybean **(Tables MB2a18A to D).**

At Sehore centre, irrespective of stress, out of there rhizobia and one commercial strain, significantly higher nodules, biomass, leghaemoglobin in nodules and N content in shoots was observed in plants inoculated with *B. daqingens* followed by *B. liaoningense* over the other inoculations and control. Regardless of type of microbial inoculation, the inoculation has offset the impact of drought stress and produced similar or slightly lower than normal unstressed plants due to improved physiological traits. Similarly the inoculation of *B.daqingens* and *B. liaoningense* followed by *B. japonicum* was found to be superior for chlorophyll content but for RWC, shoot and root biomass the response was significant when compared to control and commercial local strain indicating that B. *daqingens* could be potential strain and can be demonstrated for large utilization in soybean **(Table- MB-2a/18G to H).**

At Delhi centre, the drought stress amelioration property of soybean rhizobia under unsterilized soil conditions was examined. The plants were grown with five treatments under two stress levels viz, no moisture stress and stress at R5 stage for 10 days (by stopping irrigation) or until plants started showing wilting symptoms whichever was earlier. The parameters studied were proline and chlorophyll content in leaves, relative water content (RWC), shoot and root dry weights. It was observed that inoculation enhanced the tolerance of the plants to low moisture by producing more proline. Inoculated plants of *Bradyrhizobium yuaningense* KAS-1; *B. daqingense* BD-2 and *Enetrobacter sp*. EB-14 showed increased proline production in drought stressed plants compared to their irrigated counterparts **(Table 2a/18G).**

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 treatments *Bradyrhizobium* sp. & *Bradyrhizobium daqingense* 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* treatment varied from 1.13 to 2.03 folds 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 was statistically at par to *B. liaoningense* and *B. daqingense*. Overall, inoculation of both the strains improved plant nodulation, vigour and N and P nutrient uptake under both the conditions although comparatively inoculation of *B. daqingens* and pant-local rhizobia performed better and improved grain yield than the rest of strains **(Tables MB2a/18I to MB2a/18K).**

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 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 **(Tables MB2a/18L).**

<u>In conclusion, inoculation of *B. daqingense* performed better under both the conditions than the all other strains which signify the role of rhizobial inoculants in stress tolerance of soybean plants.</u>

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 latest released 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. Different 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, analysed and recorded.

At Indore centre, inoculation of *Paenibacillus polymyxa* (HKA 15) and AMF with 75% RDF has 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 P-uptake in shoots, grain yield and cost benefit ratio over the farmers practice **(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 **(Table MB3/14B)**.

Similarly, at Delhi Centre, the combined inoculation of *Paenibacillus polymyxa* (HKA 15) and AMF has increased the nodule number, nodule dry mass, shoot N and as well as yield over farmer's practices. However the values were statistically at par **(Table MB3/14C).**

At Ludhiana, application of *Paenibacillus polymyxa* (HKA 15)+AMF improved nodulation, N & P content over Farmer's practice treatment. Enhancement in yield due to microbial combination was 14% over Farmer's practice. Additional income of Rs. 4500 was recorded with application of microbial consortium over Farmer's practice treatment. Benefit cost ratio with microbial consortium was 1.20 whereas, with Farmer's practice treatment it was 1.11 (Table MB-3/14D & MB-3/14E).

At Pantnagar too, the higher responses on nodulation, nutrient uptake, grain yield and cost economic due to combined application of *Paenibacillus polymyxa* (HKA 15)+AMF over the farmers practice was also obtained at farmers field. Benefit cost ratio with microbial consortium was 2.14 whereas, with Farmer's practice treatment it was 1.97 **(Table MB3/14F).**

After following five years 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%.

MB 4/13: Nodulation ability of AVT-II entries at respective centres

Centres: Indore, Sehore, Delhi, Ludhiana, Pantnagar & 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 4/14G).** In the central zone, across two centres (Sehore and Indore) all the three entries (AMS 100-39, NRC 130 & NRC 130) performed better in terms of producing higher nodules per plant, nodule dry weight and leghaemoglobin content in the fresh nodules than the checks (NRC 86 and JS 335). At Indore among all the varieties, significantly higher nodule biomass, leghaemoglobin in nodules was observed in all the three AVTII entries over the check. However, higher number of nodules was observed in check (NRC 86) than the test entries but statistically non significant. Concerning the nodule biomass, NRC 131 registered the highest nodule biomass (367.25 mg/plant), followed by AMS 100-39 (317.60 mg/plant). The lowest nodule biomass was recorded in JS 335 (153.29 mg/plant). In the case of leghaemoglobin content, NRC 131 (15.61 mg/g of nodules) dominated over the other entries examined. Lowest leghaemoglobin content was observed in JS 335 (6.12 mg/g of nodules) and NRC 86 (7.48 mg/g of nodules). Regarding the leghaemoglobin content varieties were ranked as NRC 131> AMS 100-39>NRC 130>JS 335>NRC 86. Similarly at Sehore, all three entries performed equal or better (although non significant) for nodulation parameters than the checks indicating that test entries are having higher compatibity with native homologous rhizobia **(Tables MB4/13B & MB14/3C).**

In the north plain zone, across three centres (Delhi, Ludhiana and Pantnagar), three AVT-II lines, PS 1613, PS1611, NRC 128 along with PS 1347 & SL 958 as checks were screened for nodulation in the breeder's field trial. At Delhi centre, only shoot dry weights were observed which was found to be maximum in NRC128 (19.62g/plant) followed by PS1613 (17.55g/plant). The root dry weights were also found to be highest in NRC128 (1.77g/plant) and PS1613 (1.41g/plant) **(Table-MB4/14D).**

At Ludhiana centre, among the three entries, PS 1613 followed by NRC 128 performed better in terms of nodules per plant but did not perform in terms of nodule dry mass and leghaemoglobin in nodules when compared to checks (PS 1347 & SL 958). The entre PS 1611 and NRC 147 were not found promising **(Table-MB4/14E).** On the other hand, at Pantnagar centre, all the three AVTII entries performed better for having higher nodules, biomass and leghaemoglobin than the check **(Table-MB4/14F).**

At Dharwad centre, when compared to checks (JS 335 & DSB 21C), out of 11 AVTII entries, only five entries viz., DSB 34, MACS 1493, RSC 11-07, BAUS 102 & AMS 2014-1 were found to have either equal or slightly higher nodulation parameters than the checks. However, out of all only two entries ie., DBS 34 & MACS 1493 were found best based on having significantly higher nodulation parameters and have compatibity with native homologous rhizobia and produced higher nodulation, nodule dry weight and leghaemoglobin content in nodules than the checks and with rest of test entries (Table MB4/13G). **(Table0-MB4/13G).**

Compiled and Summarized by

Dr. M.P. Sharma
Principal Scientist and PI (Microbiology)
ICAR-Indian Institute of Soybean Research
Indore-452001, Madhya Pradesh

SUMMARY REPORT OF SOYBEAN FRONTLINE DEMONSTRATIONS

During the year, 24 centers have conducted a total of 980 FLDs on farmer's fields against the target of 900 FLDs in plot of 0.4 ha each (Table 6.1). The physical and financial targets and achievements were presented in Table 6.1. The centres namely Ugarkhurd and Dapoli did not conduct the FLDs due to drought and unavailability of good quality seed. Of the 980 FLDs, 78.16 and 21.84% were represented by man and farm women. While the representation of categories wise beneficiaries was 13.57% by SC, 12.45% by ST, 38.78% by OBC and 35.20% by general (Table 6.2).

Data accrued from successful 967 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 33.55 and 50.37% over farmers practice which was achieved by the additional expenditure of only Rs. 4134/ha (Table 6.3). The difference in gross returns due to improved technology and farmer's practice was 37.57%. Soybean yield as high as 3259 and 2352 kg/ha could be obtained in some farmer's field under the improved production technology and farmer's practice at Dharwad and Adilabad. The lowest yield under improved technology and Farmer's practice was recorded at Srijan, Rajasthan (775 and 659 kg/ha). The estimated yield gap II was 417 kg/ha.

In all 967 frontline demonstrations, a total of 37 improved varieties have been demonstrated in farmer's fields (Table 6.4). The maximum demonstrations was conducted on variety JS 95 60 followed by MAUS 158 and VL Bhatt 201. Among the varieties, soybean variety DSb 23 gave highest yield (3613 kg/ha) followed by JS 335 (3217 kg/ha), KDS 726 (3076 kg/ha) and DSb 21 (2905 kg/ha). The lowest yield was recorded with JS 20 69 (1195 kg/ha). None of the variety yielded below 1 t/ha.

The details of cost of soybean cultivation of 15 centres have been worked out. The details of cost of cultivation under improved technology and farmers practice (Table 6.5) indicated that the soybean cultivation cost under improved technology was higher to the tune of 22.30% 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, threshing, harvesting, interculture operations/ hand weeding, herbicide application, insecticide application and others. However, in case of farmers practice the trend was seed and sowing, land preparation, fertilizer, interculture operations, harvesting, threshing, herbicide and insecticide application and others.

Compiled and Summarized by

Dr. S. D. Billore
Principal Scientist and PI (Agronomy)
ICAR- Indian Institute of Soybean Research, Indore

REPORT OF RERSEARCH ON SOYBEAN PROCESSING AND VALUE ADDITION

Introduction

Fermentation is the most effective and cheapest mode of processing. Indeed, the first benefit of soybean fermentation is the reduction of its beany flavour and chalkiness. Fermentation can reduce anti-nutritional factors and objectionable flavour. This can be achieved by using microbial cultures in the form of mono and multi cultures. Southeast Asian countries were known to consume different types of fermented soybean. In India, people of North Eastern states traditionally prepare and consume fermented soybean. The main objection to soybean products by some consumers are the associated intrinsic flavour which has been described as beany/grassy or astringent and phenomenon of flatulence. Various processing activity reduces or removes this harmful elements (Fig.1). In the present study, fermentation is applied to improve bioactive components responsible for health benefits and reduction of anti-nutritional factors.

Objective/Technical Programme

1. To develop nutraceutical/functional food from fermented soybean
2. Effect of different soybean varieties on quality of soymilk production
3. Formulation and development of soy okara (fresh) cookies by blending with different levels of black scented rice flour

Programme 1: To develop nutraceutical/ functional food from fermented soybean-*hawaijar*

Natural antioxidants in plants are related to three major groups: carotenoids, vitamins and phenolics. Soybean and soybean products containing phenolic compounds have been shown to possess antioxidant ability. Various researchers have observed that the intake of antioxidants containing soy food was associated with a reduced cardiovascular risk resulting from lower blood pressure. Furthermore, several reports have found that many fermented soybean exhibit high contents of anti-oxidative agents than unfermented soybeans. The objectives of this study are (1) to determine these antioxidant effects by measuring total phenolic content (TPC) and (2) to determine the nutritional values of dried fermented soybean products.

Fermentation not only reduces the toxins but also it is an excellent processing method for improving nutritional and functional properties of soybean due to the increased content of small bioactive compounds. Generally, the occurrence of ACE inhibitory effect in soybean fermented foods tended to be attributed to bioactive peptides produced by the hydrolysis of soybean protein during fermentation.

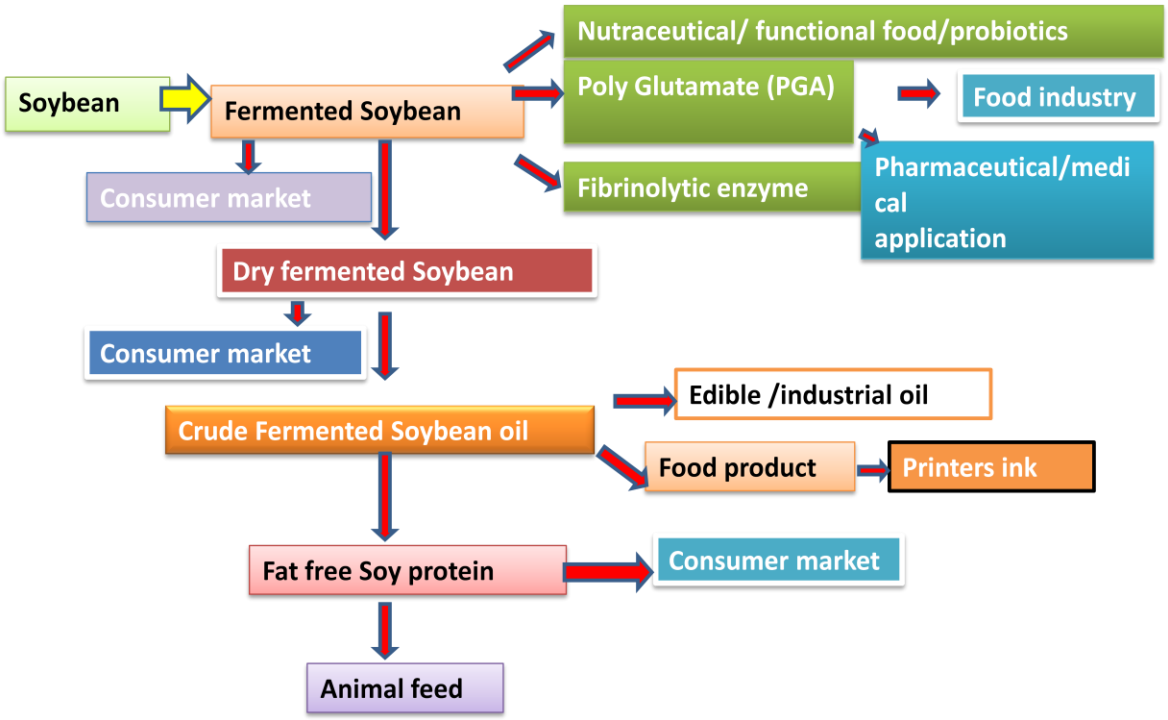


Fig 1: Value chain of fermented soybean

Fermentation of 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 minites 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 as shown in the Fig. 1.

Determination of the total phenolic content

The total phenolic content (TPC) of the samples was determined based on the modified method described by Singleton and Rossi. An aliquot of extract (0.2ml) was added to 0.5 ml Folin-Ciocalteau phenol reagent and 0.8ml of distilled water. After mixing and allowed to react for 3 minutes, 0.8ml of 8% Na_2CO_3 was added. The mixer was incubated at room temperature for 30 minutes. The absorbance was then measured at 750nm using a spectrophotometer. Total phenolic content were expressed as mg gallic acid equivalents (GAE)/ 100g of extract.

Proximate analysis

The recommended methods of the Association of Official Analytical chemists (AOAC, 2000) were used for the determination of protein content.

Diagram1: Flow Chart for fermented soybean- *Hawaijar* preparation using starter culture

Raw soybean

Soak 100g soybean seeds overnight

Cooking standardised in pressure cooker. After 5 whistle keep in sim for 45min

Wash the cooked seeds two times with boiled water and drain it

Transfer 20g each cooked seeds to stainless steel tray with lid

Inoculate activated starter @20g/kg of different strain to boiled soybean and mix it thoroughly

Incubate the inoculated seeds at 40-42^0 C for 20-22 hrs

Quality fermented soybean-*hawaijar* is ready to serve

Results

As shown in table 1, the total phenolic content (TPC) of extract of the raw soybean and fermented soybean- *hawaijar* by inoculation with different starter culture strain S and H ranged between 230.50 and 461.10 mg gallic acid equivalent/100g extract. It was found that total phenolic content of fermented soybean with both the starter culture are significantly higher than raw soybean extract (T_5). The total phenolic content of fermented soybean with starter culture H and S ranged between 391.21 and 461.10 mg gallic acid equivalent/100g extract. The highest total phenolic content was found in treatment T_3 with 461.10 mg GAE/100g extract while lowest was observed in raw soybean (T_5) with 230.50 mg GAE/100g extract.

Fermentation process enhanced the total phenolic content and the JS 335 fermented soybean showed the highest total phenolic content (461.10 mg GAE/100g). In conclusion, the fermentation process could enhance total phenolic contents of soybean and this is in agreement with the findings reported by other investigators who suggested that the release of aglycones from the bean substrate during fermentation increase their phenolic content.

Table 1: Proximate analysis of the dried soybean and soybean products

Treatments	Total phenolic content (mg GAE/100g extract)	Total protein (%)
T_1	391.21	37.69
T_2	419.81	36.27
T_3	461.10	46.58
T_4	460.83	42.20
T_5	230.50	23.34
SEd(±)	5.43	1.68
$CD_{0.05}$	12.09	3.74

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

The most significant change in fermented soybean-*hawaijar* is noticed by increase in protein content during fermentation. Protein was found in high levels in dried 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.

Programme 2: Effect of different soybean varieties on quality of soymilk production

Soymilk is the liquid extract obtained after cooking, grinding and filtering soybean. It is not a "whole soyfood" as the majority of the fibre fraction (okara) is removed during processing. The soymik extract obtained after filtration has a consistency that is very similar to cow's milk and is frequently used as an alternative to dairy products. The benefits of

soybeans for human consumption have been demonstrated, but many consumers avoid its dietary use mainly due to the presence of off-odour and off-flavour generated by the action of the enzyme lipoxygenase. Before beans are crushed or ground, lipoxygenase (LOX) and polyunsaturated fatty acids (PUFA) are separated within the cell, but following soaking and homogenization in the process of making soymik, they are mixed and begin to react to form the oxidation products and volatile compounds.

The aim of this study are to know which varieties (4 types of soybean viz., JS-335, NRC 132, RKS 18 and local variety) are best suited for our purposes and their nutrient composition of soymilk. Soymilk was processed as shown in diagram 2. The dry soybeans (100 g) are initially rinsed and soaked in 500 ml distilled water for 16 h at room temperature. Then was added 400 ml distilled water at room temperature, with a bean-to-water ratio of 1:9 (w/v). Soybeans were ground for three times at high speed (Fig. 2).

Preparation of Extract

Soybean grains were soaked in distilled water overnight and homogenized in 10 ml ice-cooled distilled water using a pestle and mortar. The homogenate was allowed to stand for 10 min at 4^0C and centrifuged at 15000 g for 30 min at 4^0C. The resultant supernatant was used for all the estimations.

LOX Assay and Protein Estimation

For LOX activity, the substrate was prepared by adding 35 μl of linoleic acid to 5 μl of double distilled water containing 50 μl Tween-20. The linoleic acid was dissolved by adding 0.2 M NaOH to the above solution. Once the whole linoleic acid was dissolved, the pH was brought to 6.5 by adding 0.2 M HCl and the final volume made to 100 ml using 0.1 M phosphate buffer (pH 6.5). The substrate solution was then kept at low temperature (4–6^0C) in a refrigerator. LOX activity was determined spectro-photometrically by adding 50 μl of soybean extract to 2.95 ml of substrate solution. The increase in absorbance at 234 nm was measured for 10 min at room temperature. The activity was expressed as OD/min/mg protein.

The protein and fat content of the soymilk samples were determined using the methods of the Association of Official Analytical Chemists (1990).

Fig 2: Soymilk extraction

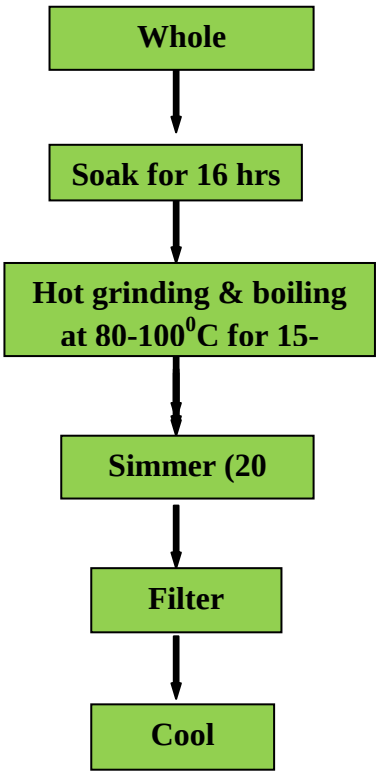


Diagram 2: Flowchart for Soymilk production

Results

From the table 2, the protein composition values ranges from 3.03% to 4.10% with treatment T_1 having the highest value of 4.10% and treatment T_4 (local variety) the least value of 3.03%. There is significant difference between the analyzed samples. Besides the higher the protein in the soybean, the higher the protein in the soymilk, higher protein varieties are therefore preferred for soymilk production. Also the lower protein value may have resulted in smaller droplets size particles and the white colour of soymilk is a substitute to cow milk and provides protein for the body when consumed.

The fat composition ranged from 0.98 to 2.00%. The highest value is found in RKS 18 (treatment T_3) with 2.00% while the least value is found in local variety (treatment T_4) with 0.98%. There is no significant difference between the analyzed samples. The variation in the values could be attributed to the fact that heat help extraction of oil and hence the amount of heat applied could affect the fat composition.

Table 2 information shows lipoxygenase (LOX) activity in homogenates prepared from soaked soybean grains of four soybean variety. A large variation was observed among the varieties. The activity was very high in RKS 18 and Local variety and very low in NRC 132 and JS 335. In general, the LOX activities ranged from 4.87 to5.15 ΔOD/min/mg protein $x10^{-3}$. Our results indicated that NRC-132 and JS-335 are the two most promising varieties for making various soy-products from the viewpoints of improvement in both flavour and human health safety.

Table 2: Effect of different processing methods on chemical composition of soymilk by using different types of soybean

Treatments	Protein (%)	Fat (%)	LOX activity (ΔOD/min/mg of protein x10^{-3})
T1	4.10	1.94	4.90
T2	3.70	1.40	4.87
T3	3.70	2.00	5.09
T4	3.03	0.98	5.15
SEd(±)	0.00	0.04	0.08
$CD_{0.05}$	0.01	0.10	0.18

Design: CRD
Replication (R): 3
Treatment (T): 4

Where,
T1= JS 335
T2 = NRC 132
T3= RKS 18
T4 = Local variety

Programme 3: Formulation and development of soy okara (fresh) cookies by blending with different levels of black scented rice flour

Soymilk and tofu production yields large quantities of agro waste (okara). Okara is high in fibre and protein making it a potential nutritious food ingredient. Unless okara is frozen or dried, its fatty composition, high moisture content and nutritive components give rise to a rancid scent making its disposal unpleasant. In general, it is considered as a waste product or used as animal feed. An important characteristics of okara flour is that it does not contain gluten. A possible use for okara is in baked goods as it has a large amount of fiber and protein.

Cookies are widely consumed and generally, they are rich in carbohydrates, fats and calories, but low in fibre, vitamins and minerals. Currently, fortification of cookies has evolved to improve its nutritional and functional quality. This may be achieved through incorporation of protein-rich ingredients from soybean and wheat flour as a fortification of cookies. Substitution of purple rice flour for wheat flour will not only increase the dietary fiber and bioactive contents, but it is also a cheaper raw material. Black scented rice/ purple rice (*Oryza sativa* L.) contains much higher levels of antioxidants, vitamins and minerals such as iron and zinc compared to wheat. Recently, products with high protein and fiber contents are more commonly chosen by consumers to reduce the risk of diabetes and obesity. Considering the potential health benefits of black rice and soy okara and the increasing consumption of healthy food, the objective of this study was to prepare nutritious cookies and to see the effect of different combination of fresh okara on the nutritional and sensory quality of the developed cookies.

The seed of JS-335 soybean variety were procured from Andro Research Farm, Central Agricultural University (CAU), Imphal. The seeds were cleaned manually, dried in sun and stored in plastic containers for further use. Wheat flour was procured from the local

market. The flours were screened through a 0.25 mm sieve and stored at 4^0C in a refrigerator to prevent spoilage particularly rancidity until usage.

Preparation of Composite Flour

Composite flour is prepared by substituting the wheat flour with okara and black rice flour in the ratio of 25:10:65, 30:10:60, 35:10:55, 40:10:50 and 0:0:100 (control) of okara: black rice flour: wheat flour (Table 3). The method adopted in the preparation of okara fortified cookies is shown in Figure 3.

Table 3: Treatments of composite flour

Treatments		Okara (wet) (%)	Black rice flour (%)	Wheat Flour (%)
T_1	JS-335	25	10	65
T_2		30	10	60
T_3		35	10	55
T_4		40	10	50
T_5	Control	-	-	100

Chemical analysis

The proximate composition (i.e., moisture, fat, protein and crude fibre) of okara fortified cookies samples/products were determined according to the standard analytical methods (AOAC 2000).

Determination of moisture

Moisture content was determined by drying a sample in an oven at 70^0C for 12 hr, the weight loss incurred was calculated as:
Moisture (%) =weight loss on drying/weight of the sample x 100

Determination of fat

Fat content was determined using the Soxhlet extraction method. In this method, fat was determined by extracting the dried materials (food samples) with a light petroleum fraction in a continuous extraction apparatus. The solvent was distilled off and the extract was dried and weighed.

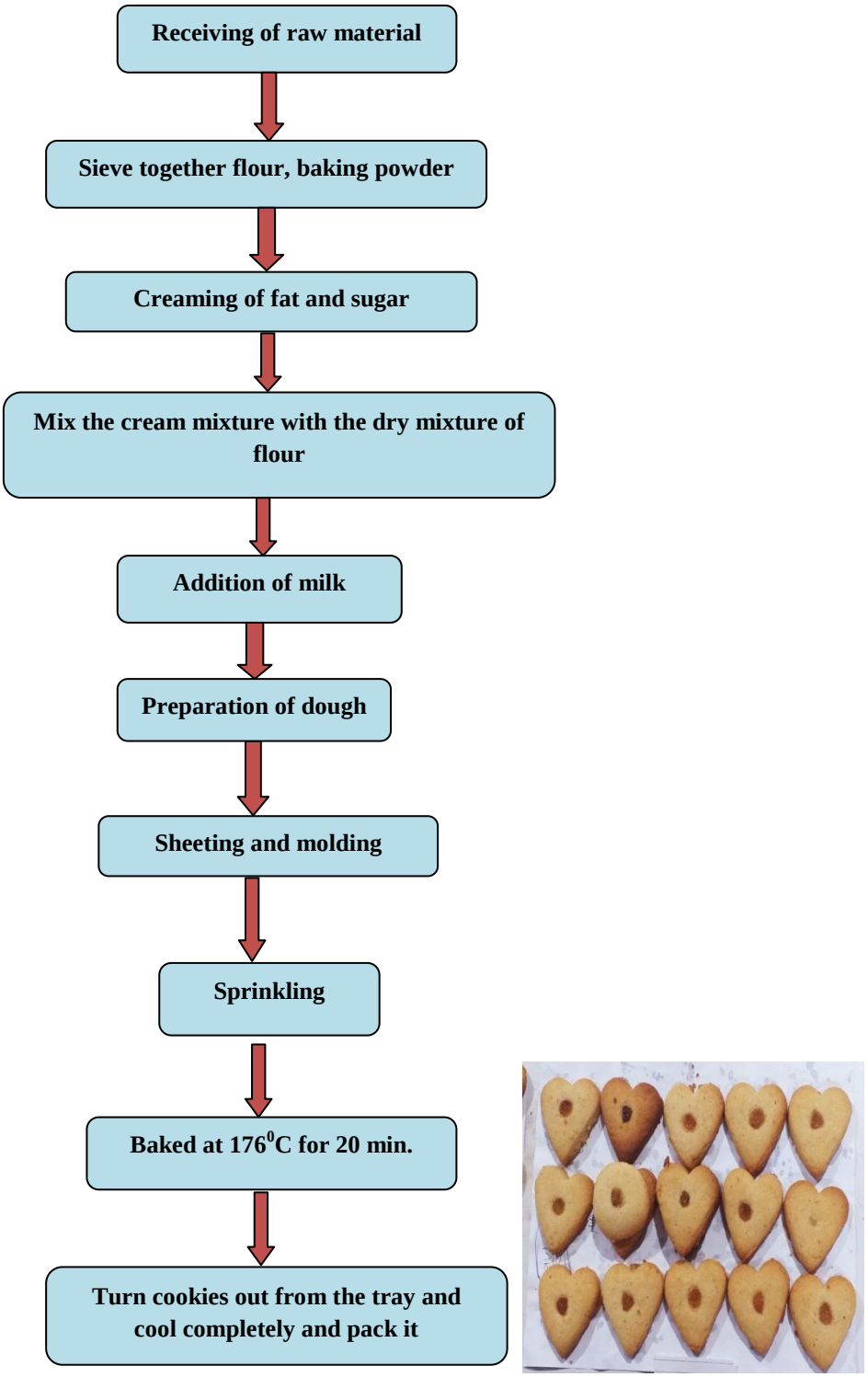


Figure 3: Flowchart for the preparation of okara (fresh) fortified cookies

Determination of protein

Protein content of the samples was determined using the Kjeldahl method. The method consists of three basic steps: 1. Digestion of the sample in sulphuric acid with a catalyst, which results in conversion of nitrogen to ammonia; 2. Distillation of the ammonia

into a trapping solution; and 3. Quantification of the ammonia by titration with a standard solution. According to this method, percentage of crude protein content of the samples = % nitrogen x 6.25

Determination of crude fibre

The moisture and fat free sample was boiled with 0.255N H_2SO_4 and 0.313N NaOH, consecutively, for 30 min under a reflux condenser and each time the sample was washed well with boiling water to remove acid and alkali residues. The sample was then transferred into a crucible, dried overnight at 100^0C and weighed (W_1) in an analytical balance. The crucible was heated in a muffle furnace at 600^0C for 20 min, cooled and weighed again (W_2). The difference in the weights (W_1-W_2) represents the weight of crude fibre.

$$\text{Crude fiber (g/100g of Sample)} = \left\{ \frac{W_1 - W_2}{\text{Weight of the Sample}} \right\} \text{X } 100$$

Sensory evaluation

The sensory evaluation of the products was done on the basis of 9-point hedonic scale scorecard. Each attribute was scored based on its intensity scaled on a 9-point hedonic scale (1= disliked extremely, 2=disliked very much, 3=disliked moderately, 4=disliked slightly, 5= neither liked or disliked, 6= liked slightly, 7= liked moderately, 8= liked very much, 9= liked extremely) for colour, taste, texture, flavour and overall acceptability.

Statistical analysis

Data on nutritional and sensory evaluation of biscuits were analysed statistically by Completely Randomized Design (CRD).

Results

The results for moisture, protein and fat are given in table 4. The moisture content was not significantly affected by the partial replacement of wheat flour with okara (fresh) powder and black rice flour. The results revealed that the moisture content decreased from 5.70 to 3.97 % with the increase in okara (fresh) portion.

As expected, the protein content increased with the level of substitution of okara (fresh) portion. The results of protein contents were shown in table 4, which revealed that there were high significant differences between the samples. Results showed that the protein content gradually increased from 8.75 % to 13.45 % with increased addition of okara (fresh) portion. In general, treatment T_4 gave the highest protein content (13.45%) followed by treatment T_3 (10.82%) as compared with the control sample T_5 (3.26%). Appraisal of data in table 4 revealed that the replacement of wheat flour with okara (fresh) portion and black rice flour

caused an increase in fat content from 16.21% to 19.45%. There were high significant difference in the fat content of okara fortified cookies.

The fibre content of the cookies increased from 0.48% to 2.82% with the increase in okara (fresh) portion. The highest fibre content (2.82%) was found in treatment T_4 and lowest (0.12%) was recorded for control (T_5) cookies. The increase in fibre content could be due to the increase in soy okara (fresh) portion during preparation of cookies.

Table 4: Proximate composition of cookies prepared from different levels of okara (fresh), black rice and wheat flour.

Treatments	Parameters			
	Moisture (%)	Protein (%)	Fat (%)	Crude Fibre (%)
T_1	5.41	8.75	16.21	0.48
T_2	5.02	9.10	16.54	1.02
T_3	4.50	10.82	18.91	2.20
T_4	3.97	13.45	19.45	2.82
T_5	5.70	3.26	12.43	0.12
S.Ed (±)	0.80	0.69	0.57	0.12
C.D	1.79	1.54	1.26	0.26

where,

T_1= Okara (fresh): Black rice flour: Wheat flour (25:10:65)

T_2= Okara (fresh): Black rice flour: Wheat flour (30:10:60)

T_3= Okara (fresh): Black rice flour: Wheat flour (35:10:55)

T_4= Okara (fresh): Black rice flour: Wheat flour (40:10:50)

T_5= Control (0:0:100)

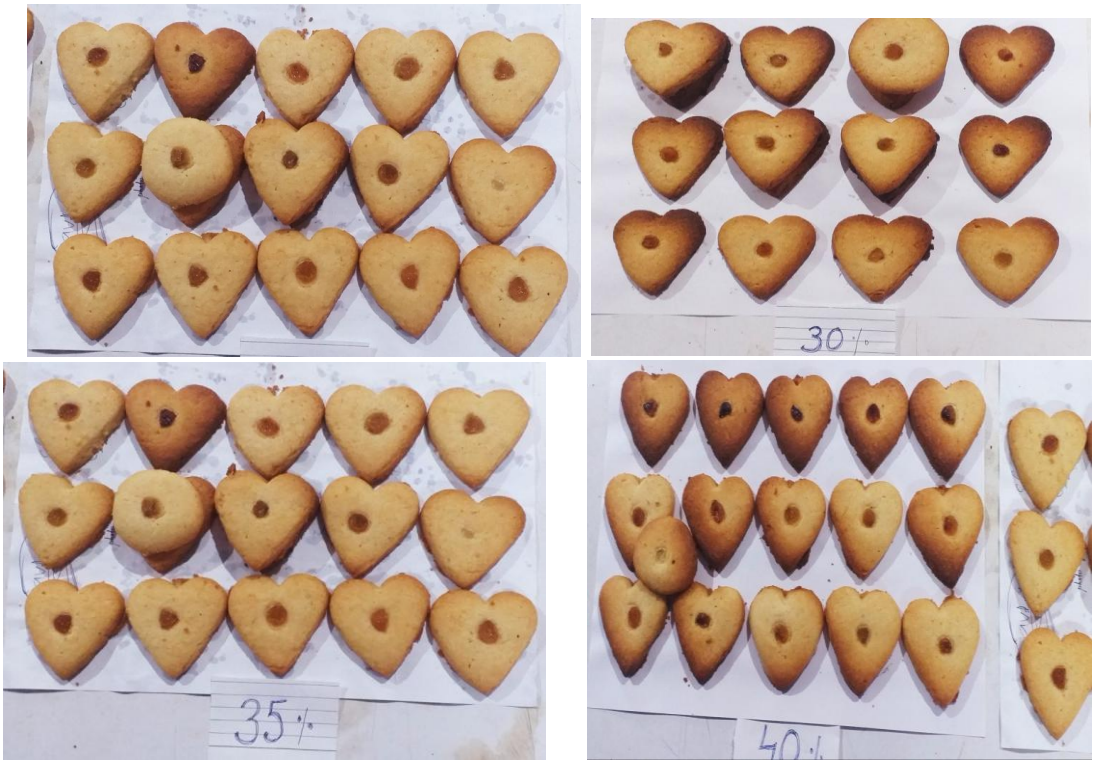


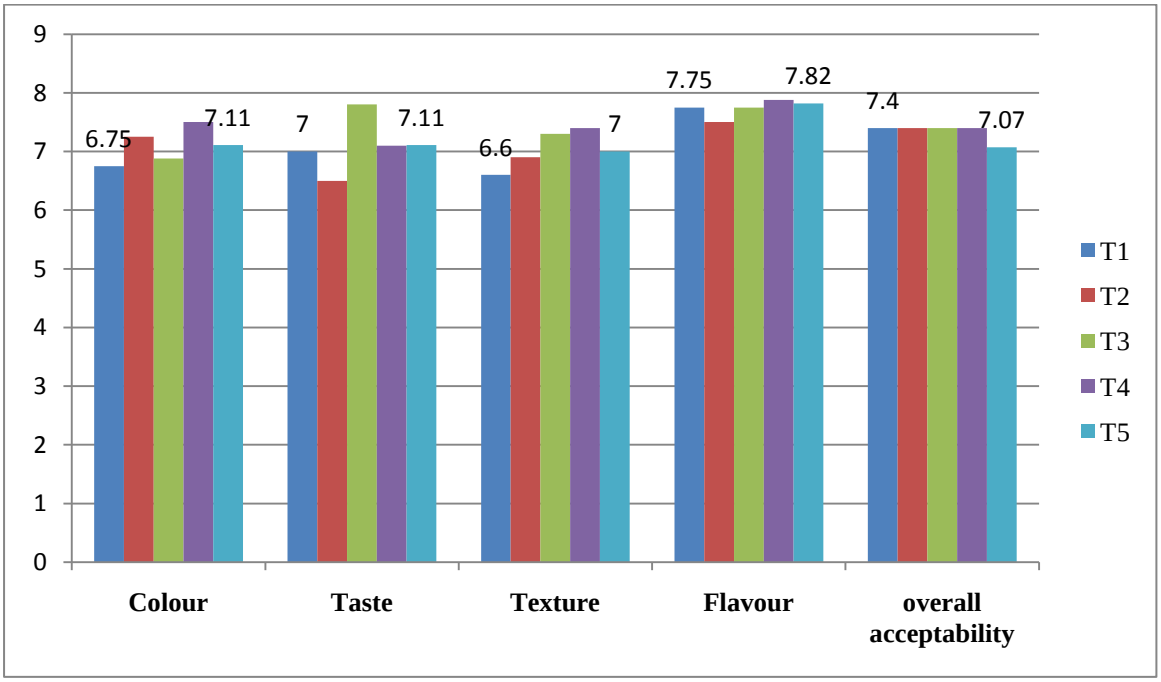
Plate 1: Cookies prepared with different levels of okara (fresh), black rice and wheat flour

Sensory evaluation

According to the total sensory scores, the samples exhibited great acceptable sensory characteristics among consumer panel members as shown in table 5 and fig. 4. The overall acceptability scores for treatment T_1, T_2, T_3 and T_4 remains the same. So fortification of cookies can be done by replacing wheat flour with okara (fresh) upto 25-40%.

Table 5: Average score for sensory evaluation of cookies from different levels of okara powder, black scented rice and wheat flour

Treatments	Parameters				
	Colour	Taste	Texture	Flavour	Overall acceptability
T1	6.75	7.00	6.60	7.75	7.40
T2	7.25	6.50	6.90	7.50	7.40
T3	6.88	7.80	7.30	7.75	7.40
T4	7.50	7.10	7.40	7.88	7.40
T5	7.11	7.11	7.00	7.82	7.07
S.Ed(±)	0.29	0.51	0.34	2.35	0.43
CD	0.65	1.14	0.77	5.24	0.97



where,

T_1= Okara (fresh): Black rice flour: Wheat flour (25:10:65)
T_2= Okara (fresh): Black rice flour: Wheat flour (30:10:60)
T_3= Okara (fresh): Black rice flour: Wheat flour (35:10:55)
T_4= Okara (fresh): Black rice flour: Wheat flour (40:10:50)
T_5= Control (0:0:100)

Fig 4: Diagrammatic representation of sensory analysis of different cookies formulations

Cost Benefit Ratio

From table 4, 5 and 6 it is very clear that we can finalize recipe for cookies which are high in nutrition and having good acceptability (scores for treatment T_1, T_2, T_3 and T_4 remains the same) with slight reduction in cost benefit ratio (1:1.87 to 1:1.95) in comparison to traditional wheat flour cookies (1:2.14) which is having low nutritional and low overall acceptability. The slight reduction in benefit to manufacturer can be covered by higher demand due to unique nutritional quality of the finished product. This cookies can also be used for sponsored distribution among underprivileged segments of society (especially kids as mid day meal) to fight malnutrition as they are high in nutrition in comparison to other traditional means and will also help in generating employment at local level in remote areas.

Table 6: Cost benefit ratio of cookies from different levels of okara (fresh), black scented rice and wheat flour

Treatments	Total cost (including all ingredients used, electricity, labour charges)	Total weight of cookies (g)	Total value of cookies (@Rs 200/Kg)	Total benefit	Cost benefit ratio
	1	2	3	4 (3-1)	5(4/1)
T_1	18.98	14x 20=280	56	37.02	1:1.95
T_2	19.16	14x 20=280	56	36.84	1:1.92
T_3	19.33	14x 20=280	56	36.67	1:1.90
T_4	19.51	14x 20=280	56	36.49	1:1.87
T_5	17.86	14x 20=280	56	38.14	1:2.14

*Average weight of one cookie=14g

**Total no. of cookies produce=20

where,

T_1= Okara (fresh): Black rice flour: Wheat flour (25:10:65)

T_2= Okara (fresh): Black rice flour: Wheat flour (30:10:60)

T_3= Okara (fresh): Black rice flour: Wheat flour (35:10:55)

T_4= Okara (fresh): Black rice flour: Wheat flour (40:10:50)

T_5= Control (0:0:100)

Plate 3: Cookies packed in PE pouches for storage

CONCLUSION

The ethanol extracts of dried fermented soybeans exhibited higher total phenolic content than non-fermented soybeans. The highest total phenolic content (461.10 mg GAE/100g) was found in JS-335 fermented-soybean by using *Bacillus subtilis* as starter culture. These results show the potential of dried fermented-soybean products for developing a healthy food supplement. The lipoxygenase activity (LOX) were very low in NRC-132 and JS-335 soybean variety with LOX activity ranging from 4.87 to 5.15 Δ OD/min/mg protein $x10^{-3}$. Our results indicated that NRC132 and JS-335 are the two most promising varieties with for making various soy-products from the viewpoints of improvement in both flavour and human health safety. Among different treatments for cookies preparation, treatment T_4 gave the highest protein content (13.45%) and crude fibre of 2.82%. Thus soy okara (fresh) can be used to increase the value of the agro waste. Finally the nutritional value of the cookies increases without affecting the sensory attributes. This cookies can also be used for sponsored distribution among underprivileged segments of society (especially kids as mid day meal) to fight malnutrition as they are high in nutrition in comparison to other traditional means and will also help in generating employment at local level in remote areas.

परिशिष्ट
Appendices

Appendix - I

RECOMMENDATIONS OF 49TH ANNUAL GROUP MEETING (March 16-18, 2019) AND ACTION TAKEN REPORT

S. No.	Recommendations	Action Taken
1.	It was recommended that promotion criteria for entries would be 10% yield superiority over the best checks. These criteria would be applied from 2019 in all the trials.	This criteria is being applied from the present workshop.
2.	As per the "Guidelines for testing crop varieties under AICRPs" entries with quality traits should be at par with the best performing check". [However, during discussion, a yield advantage of 5% over the best check was recommended for initial entries.]	This criteria is continuing from 2018 and entries with special traits are being given the yield advantage of 5% over the best check.
3.	In the newly constituted early maturity trial, JS 20-34 and JS 95-60 would be the checks and promotion criteria would be at par yield, per day productivity and up to 90 days of maturity. Entries with extra early maturity (< 85 days) marginally less yield as per the criteria.	This criteria is being applied from the present workshop.
4.	Thrust areas for all the centres should be decided	Thrust areas of all the centres have been decided and communicated.
5.	All the centres are to strictly take up the breeding programme in these areas. Crosses for the centres would be decided by the ICAR-IISR Indore and breeders are to develop sufficient number of F1s so as to have a population of at least 4000 F_2. Their presentations in AICRP should be restricted to these thrust areas. F1s should reach UAS Bangalore by 10 December. Hot spots Ludhiana, Dharwad, Jabalpur, Amravati, Palampur and Almora would be utilized for screening of F2s and F3s.	1. Hybridization programme has been suggested as per the assigned to 24 centres as per the finalized thrust areas. Only 11 centres sent F1s to off-season nursery at Bangalore. 2. Number of F1s, required to generate large F2 population, are less in most of the centres. 3. Presentation template is under development for centres. 4. Breeders used the hot spots for screening of of F2s and F3s. 5. Except for Adilabad, Dharwad and Imphal off season generation advancement facility is not being utilized by other centres for rapid generation advancement.
6.	Jorhat and Umiam centres would screen lines for water logging tolerance	Screening failed at Jorhat centre due to heavy rains. At Umiam 40 accessions including germplasm, breeding lines and soybean varieties were screened for water logging tolerance at vegetative stage.

7.	NRC 132, a null LOX 2 entry in AVTII, would be evaluated for reduced beany flavor along with other entries and checks. PI Food Technology and Dr Neha Pandey from ICAR-IISR would take up the experiment.	As Ms. Neha Pandey proceeded on study leave, Dr Sophia, from CAU, Imphal took up the activity. Total seven (7) soybean entries including NRC 132, were evaluated at Imphal center for total LOX (Δ OD /min/mg protein $x10^{-3}$) in soya milk which was very low in JS 335(4.87), NRC 132(4.90) and DSb 21(4.89) and these entries had very less beany flavour.
8.	All the AVT I entries and checks of Eastern and Central Zone would be tested for oil content. Samples must reach ICAR-IISR by 1st December.	As per the recommendation, all the entries were tested for oil content.
9.	Entries for estimation of oil (AVT II) by 1st December and for sucrose content (AVT I) samples must reach ICAR-IISR Indore as soon as drying of seeds.	Entries were received in time from most of the centres.
10.	Seed of IVT entries and checks must reach ICAR-IISR Indore by 5 April.	Seed was received in time from all centres.
11.	Soybean genotype SL 1104 can be used as source for antixenosis resistance. This genotype should be used for incorporating antixenosis resistance against defoliators in breeding programmes.	RSC 10-52 with antixenosis and antibiosis and also with resistance to charcoal rot was identified for release in the last year's workshop. This genotype was used for incorporation of insect and disease resistance in crossing programme.
12.	Bt 127 SC formulated by an ICAR Institute (IIOR, Hyderabad) from indigenous strain and would be very cost effective. Promotion of such bio-control products developed by public R&D set up should be encouraged.	The formulation is not commercially available for farmers. However, other commercially available Bt formulations are already recommended for management of lepidopteran defoliators.
13.	Seed treatment with pesticides (pre-mix Pyroclostrobin & Thiophanate Methyl) + (pre-mix Thiram and Carboxin) + Thiamethoxam) along with polymer coating can be done much before the actual sowing to suitably adjust within the narrow planting window.	The technology is included in PoP and is being widely circulated through advisories and extension activities by IISR.
14.	AMS MB 5-18, SL 958, DS 3050, JS 20-71 and MACS 1336 identified as resistant sources for Charcoal rot and DSb 32, DSb 23 for rust can be used as resistant sources in breeding programme.	The identified resistant sources have been included in the breeding programmes of designated centers. **Jabalpur** center has made 4 crosses for charcoal rot resistance using AMS MB 5-18. **Dharwad** center is invariably using DSb 23 and DSb 32 for incorporating rust resistance into early maturing and high yielding varieties.

Multi-location Germplasm Evaluation

Table 1: Evaluation of Germplasm at Multi-location- INDORE (Adjusted means)

S. No.	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	Number of primary branches per plant	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Grain yield per plant (g)	Row Yield (g)	Row Yield (g) Unadjusted
Check 1	**NRC 86 (C)**	39.00	106.43	62.54	2.34	10.17	9.43	28.11	2.23	12.24	7.79	298.41	298.41
Check 2	**JS 20-29 (C)**	42.00	108.00	59.11	3.09	10.23	11.77	30.91	2.00	13.75	9.08	249.70	245.67
Check 3	**JS 20-69 (C)**	42.00	110.43	64.90	3.25	10.74	9.79	28.10	2.50	11.93	8.85	348.97	348.97
Check 4	**JS 20-34 (C)**	30.00	102.00	46.77	1.46	8.51	6.29	21.03	2.69	12.29	5.02	138.26	138.26
Check 5	**JS 20-98 (C)**	38.00	111.00	61.63	3.31	9.89	10.03	27.83	2.49	12.77	6.82	322.19	322.19
1	VP 1199	44.00	108.17	73.93	2.18	11.20	9.88	19.70	2.32	5.97	0.34	37.01	22.90
2	K 53	43.00	106.17	50.33	2.18	9.20	6.48	17.10	2.32	8.17	0.86	79.01	64.90
3	EC 389153	57.00	110.17	90.93	3.78	15.20	13.68	36.70	2.92	6.97	5.34	161.31	147.20
4	UPSL 152	58.00	119.17	84.33	3.18	13.00	12.88	30.70	3.12	5.64	2.24	66.11	52.00
5	EC 389154 C	48.00	108.17	67.33	2.78	11.60	14.08	29.90	2.12	6.78	1.16	64.81	50.70
6	UPSL 72	50.00	107.17	79.43	3.38	9.50	8.93	16.70	2.12	6.33	0.41	28.21	14.10
7	UPSM 9	51.00	109.17	80.60	3.05	12.66	9.01	20.70	2.12	5.04	0.26	19.91	5.80
8	UPSM 20	50.00	117.17	84.33	3.18	13.00	12.88	30.70	3.12	6.54	1.88	29.71	15.60
9	EC 389179 B	47.00	110.17	62.43	3.63	11.50	12.93	28.95	2.12	7.09	1.06	52.81	38.70
10	UPSL 652	49.00	106.17	71.93	2.63	13.75	15.68	24.95	2.12	6.27	0.34	29.71	15.60
11	UPSM 77	55.00	120.17	84.33	3.18	13.00	12.88	30.70	3.12	9.04	3.72	93.61	79.50
12	EC 391181	48.00	104.17	83.53	1.38	14.80	13.48	31.70	2.32	9.63	3.84	238.41	224.30
13	VGM 70	52.00	107.17	83.93	4.38	12.00	10.35	27.36	2.12	6.08	1.46	53.91	39.80
14	UPSM 57	51.00	111.17	95.26	3.71	14.66	18.68	26.36	2.45	8.22	2.83	54.21	40.10
15	VLS 75	40.00	106.17	66.13	1.18	10.40	9.88	28.70	2.12	11.04	3.00	141.71	127.60
16	EC 391316	42.00	108.17	57.13	2.18	9.80	9.88	23.70	2.92	6.52	1.30	93.51	79.40
17	RVS 2006-21	41.00	109.17	51.33	2.18	10.20	10.48	24.90	2.12	12.84	3.22	141.61	127.50
18	JS 97-52	49.00	107.17	63.43	3.38	11.75	14.18	41.70	2.12	10.04	7.02	378.71	364.60
19	EC 391346	43.00	108.17	74.13	3.18	12.20	13.08	31.90	2.12	8.99	1.82	72.11	58.00
20	NRC 2007 A	45.00	110.17	84.93	2.98	16.00	14.28	33.70	2.32	9.84	4.70	129.51	115.40

21	NRC 80-1	46.00	112.17	75.73	1.98	13.00	14.08	35.10	2.12	8.64	2.68	151.41	137.30
22	JS 20-01	44.00	107.17	76.18	2.38	11.25	11.43	21.95	2.62	12.04	3.00	179.31	165.20
23	EC 396065	47.00	108.17	77.93	2.78	11.20	11.08	23.70	2.12	7.86	3.36	72.51	58.40
24	EC 251682	45.00	106.17	84.33	3.18	13.00	12.88	30.70	3.12	7.50	1.72	68.31	54.20
25	TGX 840-4-E	51.00	112.17	71.93	1.88	11.00	6.18	11.70	2.12	4.64	1.51	25.41	11.30
26	EC 251541	52.00	112.77	91.03	1.93	11.63	12.10	30.48	2.02	7.78	1.99	38.21	11.20
27	EC 393224	50.00	111.77	82.23	4.73	14.43	12.70	36.68	2.22	9.88	6.09	184.61	157.60
28	EC 340506 B	46.00	107.77	83.48	1.98	11.18	7.80	27.93	2.02	8.94	2.51	71.11	44.10
29	EC 393231	47.00	108.77	83.43	1.93	11.63	9.90	24.08	2.02	8.18	1.75	108.31	81.30
30	EC 251516	48.00	109.77	59.03	2.73	10.83	8.90	22.88	2.22	7.87	1.71	37.21	10.20
31	G 2258	49.00	107.77	82.43	2.93	12.83	8.70	21.68	2.62	10.08	4.33	101.71	74.70
32	DS 91-3	52.00	109.77	95.98	3.98	15.93	13.80	40.43	2.27	8.28	4.91	63.61	36.60
33	DCB 137	40.00	108.77	71.43	1.53	12.03	11.70	33.68	2.22	11.48	8.19	161.51	134.50
34	EC 457214	44.00	107.77	77.43	2.53	12.03	12.30	39.68	2.22	10.98	10.79	254.51	227.50
35	DE 201	39.00	105.77	79.83	2.53	11.23	9.70	22.28	2.02	6.94	1.69	65.01	38.00
36	EC 381884	51.00	110.77	78.23	3.33	11.23	9.90	20.68	2.02	5.57	1.77	56.01	29.00
37	EC 457366	42.00	107.77	66.63	3.33	10.43	10.50	34.68	2.62	9.47	5.43	139.61	112.60
38	AGS 12	46.00	111.77	77.63	2.33	10.83	10.30	38.48	2.62	9.72	5.45	148.31	121.30
39	F4P20	49.00	112.77	74.23	3.13	13.43	12.50	41.48	2.22	9.92	9.97	238.61	211.60
40	SL 794	52.00	110.77	106.98	3.98	14.68	12.55	32.93	2.02	6.98	1.49	65.41	38.40
41	EC 103336	46.00	109.77	79.43	1.93	12.23	9.70	32.28	2.02	7.81	2.49	84.71	57.70
42	NRC 86	39.00	106.77	73.63	1.93	11.03	10.30	30.08	2.42	9.77	8.11	226.31	199.30
43	EC 106998	48.00	109.77	79.03	2.93	13.23	12.10	36.68	2.02	6.56	4.77	94.01	67.00
44	SL 752	46.00	105.77	99.03	2.93	15.23	16.50	40.68	2.02	7.00	3.21	98.71	71.70
45	EC 109540	48.00	106.77	84.43	1.93	13.03	9.90	30.68	2.02	8.95	4.01	70.01	43.00
46	UGM 75	56.00	110.77	78.43	2.13	12.23	8.50	23.88	2.02	7.78	2.03	73.11	46.10
47	EC 113778	47.00	109.77	77.43	2.73	12.63	12.70	34.48	2.22	6.24	1.45	42.61	15.60
48	MACS 303	49.00	112.77	71.63	1.53	12.03	10.50	31.28	2.22	9.16	6.69	282.01	255.00
49	NRC 2006 M	45.00	106.77	85.83	2.53	12.23	13.50	45.68	2.02	11.48	7.53	206.41	179.40
50	EC 16213	40.00	110.77	71.63	1.93	10.83	8.70	25.08	2.02	7.38	1.75	75.91	48.90
51	EC 23001 A	53.00	110.77	102.44	2.16	13.32	13.93	30.00	2.18	8.76	7.28	81.73	53.00
52	EC 15961	54.00	109.77	81.86	1.99	11.74	9.01	23.75	2.18	7.04	2.26	49.03	20.30

53	EC 173325	38.00	108.77	65.51	2.29	9.39	9.86	26.00	2.98	7.41	2.70	85.63	56.90
54	PSL 6	55.00	109.77	81.51	2.69	12.59	12.26	29.00	2.18	7.06	3.04	89.83	61.10
55	TS 20-52	50.00	105.77	72.51	2.29	10.99	12.46	36.00	2.38	11.41	8.32	478.63	449.90
56	SL 525	48.00	104.77	69.11	1.49	10.49	9.26	41.25	2.18	9.53	10.11	370.43	341.70
57	EC 242004 F	53.00	112.77	71.36	1.74	10.74	7.76	20.00	2.18	11.32	3.46	61.23	32.50
58	EC 242072	44.00	106.77	64.31	1.89	11.39	8.86	21.80	2.18	7.81	2.92	76.33	47.60
59	PS 1475	37.00	109.77	51.31	1.69	9.59	7.66	22.00	2.58	8.51	3.02	70.43	41.70
60	NRC 37	42.00	106.77	75.51	1.29	11.79	10.86	35.40	2.18	11.04	8.20	154.73	126.00
61	EC 242111	50.00	110.77	66.36	1.24	10.99	7.76	19.25	2.18	8.01	3.41	55.33	26.60
62	MACS 171	51.00	106.77	80.11	1.29	14.19	11.26	22.00	2.38	10.51	5.62	190.83	162.10
63	SL 29-51	51.00	105.77	70.31	3.89	11.79	13.66	42.00	2.18	11.51	6.06	210.03	181.30
64	AGS 164	46.00	106.77	63.51	0.89	10.19	7.26	18.40	2.18	11.41	2.86	63.83	35.10
65	EC 251501	45.00	108.77	67.11	1.16	10.99	10.59	25.00	2.18	8.02	5.11	59.23	30.50
66	MACS 1259	45.00	107.77	70.91	1.49	10.99	9.26	23.00	2.38	6.62	6.98	135.93	107.20
67	AGS 174	46.00	104.77	51.91	2.09	11.39	8.06	24.00	2.38	8.81	3.20	60.03	31.30
68	EC 251876	43.00	109.77	59.51	1.49	11.19	12.06	31.00	2.38	7.61	2.96	90.23	61.50
69	SL 432	55.00	108.77	76.61	3.74	13.74	10.51	28.75	2.18	10.75	3.28	63.93	35.20
70	LEE 75	50.00	107.77	76.86	2.74	10.24	10.26	23.75	2.18	8.41	3.51	75.83	47.10
71	EC 389099	47.00	109.77	74.71	2.09	11.99	10.86	29.00	2.38	8.14	3.86	101.43	72.70
72	JS 20-69	41.00	106.77	65.51	3.29	10.59	10.26	35.00	2.18	12.51	5.34	191.23	162.50
73	JSM 195	44.00	107.77	76.11	2.09	11.19	10.66	31.20	2.18	10.37	6.74	180.73	152.00
74	EC 291397	46.00	108.77	70.71	2.09	11.39	11.46	29.40	2.18	8.68	5.42	88.93	60.20
75	PS 1336	44.00	109.77	70.61	2.49	12.49	11.51	31.25	2.18	8.11	3.12	61.53	32.80
76	EC 291403	51.00	109.17	73.53	3.13	9.69	4.46	25.18	1.90	5.86	4.03	-	9.20
77	EC 291451	47.00	110.17	76.03	2.53	13.39	12.66	38.68	2.50	7.73	4.68	37.91	65.50
78	EC 24091	46.00	110.17	70.78	3.38	10.94	9.96	27.68	2.90	9.09	1.54	30.81	58.40
79	EC 291453	53.00	109.17	84.63	3.53	14.19	12.26	44.68	2.10	6.65	4.54	66.61	94.20
80	EC 309537	44.00	111.17	70.03	2.63	13.69	11.46	37.68	1.90	6.55	1.62	8.21	35.80
81	EC 30967 A	45.00	110.17	69.43	3.33	10.59	13.26	38.68	1.90	6.36	1.72	46.61	74.20
82	RSC 14	43.00	108.17	71.43	6.33	11.79	11.06	27.08	1.90	7.46	2.38	15.11	42.70
83	EC 325103	42.00	109.17	79.43	1.93	9.59	8.26	29.68	1.90	8.37	5.10	85.31	112.90
84	PKS 7	56.00	106.17	92.28	3.13	11.69	8.21	27.68	1.90	6.16	0.96	258.91	286.50

85	JSM 285	44.00	108.17	68.03	2.93	11.59	12.26	39.68	2.50	11.96	5.78	3.91	31.50
86	EC 33872 B	49.00	110.17	61.63	2.33	11.39	9.86	22.68	1.90	11.16	0.78	53.41	81.00
87	G 91	53.00	111.17	90.36	4.80	13.52	17.13	43.34	1.90	8.46	1.88	-	9.20
88	SQL 1	41.00	109.17	67.28	2.88	10.94	8.21	28.93	2.40	8.06	4.23	-	18.50
89	JSM 232	43.00	106.17	77.03	2.53	11.99	11.06	40.68	2.50	10.06	4.58	163.31	190.90
90	JSM 222	40.00	107.17	77.43	4.13	11.19	10.66	39.68	2.10	12.36	3.44	138.31	165.90
91	JSM 245	45.00	104.17	84.83	2.73	11.79	10.86	39.88	2.90	8.94	7.22	152.51	180.10
92	EC 39513	50.00	106.17	68.53	1.88	11.69	8.96	26.43	2.15	8.36	2.16	13.61	41.20
93	EC 39743	54.00	110.17	103.03	2.88	13.94	9.21	25.18	1.90	7.96	2.98	-	17.10
94	TGX 1835-10 F	56.00	114.17	68.03	3.80	10.85	4.79	11.68	1.90	3.16	0.08	-	3.80
95	EPS 1 B	45.00	109.17	67.53	1.38	9.69	7.71	26.93	1.90	7.82	1.38	-	26.80
96	EC 116342	44.00	110.17	71.36	1.80	11.52	6.79	17.34	2.23	7.07	2.71	-	20.60
97	MACS 1045	53.00	109.17	73.03	4.13	11.85	8.13	27.01	1.90	8.84	1.71	-	25.10
98	G 47	45.00	110.17	71.43	1.93	11.59	9.86	22.68	2.30	7.31	3.46	19.41	47.00
99	JSM 242	43.00	107.17	85.43	4.13	11.99	11.86	42.68	2.90	10.46	5.62	171.21	198.80
100	SL (E) 1	44.00	108.17	76.63	1.93	11.79	9.06	26.68	1.90	11.36	6.86	168.21	195.80
101	PK 701	56.00	107.77	73.92	2.80	10.97	9.33	20.17	1.98	8.42	5.46	38.23	27.50
102	PK 1038	53.00	108.77	105.67	3.05	13.47	15.58	46.42	1.98	8.62	12.84	36.63	25.90
103	RKS 54	51.00	110.77	74.87	2.65	9.47	9.58	40.92	1.98	12.62	11.86	481.43	470.70
104	EC 33940	47.00	105.77	53.42	2.05	9.72	7.33	22.67	1.98	10.42	4.49	49.23	38.50
105	RKS 45	55.00	109.77	94.00	3.72	13.13	8.91	20.58	1.98	8.72	5.08	26.23	15.50
106	MAUS 128	47.00	107.77	73.67	3.38	10.80	9.91	27.25	1.98	9.54	2.34	27.33	16.60
107	G 2225	55.00	118.77	50.47	3.85	9.87	14.18	38.92	1.98	10.36	8.42	146.73	136.00
108	JS 20-29	42.00	111.77	62.87	2.25	9.87	7.78	22.12	1.98	13.72	9.74	308.43	297.70
109	TNAU 20023	52.00	109.77	74.67	3.38	10.80	4.91	20.58	1.98	5.27	1.41	29.73	19.00
110	G4P15	43.00	114.77	60.92	1.80	9.72	8.58	25.67	2.98	8.84	3.79	128.03	117.30
111	GP 465	47.00	109.77	65.47	1.85	10.67	8.78	28.92	2.58	10.82	6.72	129.43	118.70
112	TGX 849-D-13-4	52.00	117.77	86.07	3.45	12.47	12.98	32.92	1.98	8.29	3.86	143.23	132.50
113	JSM 227	46.00	107.77	66.07	1.85	10.87	9.98	31.92	1.98	10.32	7.86	222.23	211.50
114	JS 20-98	48.00	109.77	55.92	2.80	9.72	8.83	22.92	2.48	12.92	6.12	210.23	199.50
115	TGX 849-812	51.00	105.77	86.47	2.65	13.47	13.78	41.92	1.98	10.17	9.14	302.23	291.50

116	KB 17	47.00	107.77	56.67	1.80	9.47	5.58	15.17	1.98	6.48	3.49	41.03	30.30
117	KDS 256	51.00	109.77	70.67	4.05	11.27	14.58	42.52	2.18	11.52	6.58	292.53	281.80
118	LEE 54	49.00	106.77	75.87	3.45	10.67	10.18	33.92	1.98	7.69	2.18	68.63	57.90
119	JS 96-31	46.00	103.77	77.67	2.45	10.87	10.58	31.32	2.78	8.45	4.22	89.13	78.40
120	TNAU 20024	48.00	106.77	70.34	3.38	8.80	6.91	18.92	1.98	6.20	4.98	329.43	318.70
121	SQL 37	50.00	107.77	70.67	3.55	10.47	11.83	30.67	2.98	9.23	3.80	116.53	105.80
122	WT 88	51.00	108.77	61.87	3.25	9.87	10.58	32.32	2.58	14.47	7.58	212.03	201.30
123	TNAU 20022	49.00	109.77	90.67	4.05	12.47	9.58	18.92	1.98	7.15	2.54	28.03	17.30
124	EC 528640	48.00	110.77	70.92	2.30	11.72	10.83	33.92	1.98	8.22	6.12	75.03	64.30
125	EC 538830	48.00	108.77	70.47	2.25	11.47	11.38	35.32	1.98	8.54	2.70	63.53	52.80
126	PK 258	45.00	109.17	93.79	3.49	12.15	11.02	26.96	1.86	6.96	6.78	33.29	77.40
127	EC 468597	44.00	111.17	73.19	2.49	10.75	7.42	26.96	1.86	8.35	6.14	-	36.10
128	EC 572160	53.00	110.17	63.99	3.59	11.40	8.77	30.51	1.86	9.56	3.52	49.39	93.50
129	SL 682	45.00	108.17	86.24	4.34	13.40	10.77	40.51	1.86	8.75	10.69	4.19	48.30
130	PI 204336	43.00	107.17	67.19	1.69	10.95	6.82	22.76	2.06	12.05	7.24	-	33.50
131	UGM 70	44.00	107.17	80.99	2.76	10.15	7.69	18.42	1.86	5.85	1.77	-	5.80
132	PS 93108	39.00	108.17	88.49	2.34	11.90	8.02	19.26	1.86	9.45	5.52	-	20.20
133	LEE 96	42.00	109.17	76.32	3.76	10.81	10.02	33.42	2.19	8.27	7.97	25.19	69.30
134	TGX 1488-9-1 D	42.00	111.17	54.39	1.89	8.95	6.22	19.16	2.26	8.82	4.18	-	42.50
135	LEE 53	30.00	106.17	66.59	2.69	10.75	7.02	19.76	1.86	8.56	5.52	14.79	58.90
136	TGX 702-4-8	38.00	110.17	51.59	1.89	9.15	5.02	15.76	1.86	8.86	3.18	-	30.70
137	GP 566	51.00	108.17	97.32	3.76	14.48	8.69	16.76	1.86	6.15	2.71	-	6.80
138	JS 98-11	46.00	108.17	77.24	3.34	10.65	11.27	20.76	1.86	7.10	5.42	8.99	53.10
139	PS 1421	45.00	110.17	71.99	3.49	13.15	11.22	36.56	2.06	9.81	2.40	-	18.70
140	VLS 11	45.00	109.17	72.99	1.89	11.95	9.62	25.76	1.86	10.45	17.70	141.29	185.40
141	PS 1467	46.00	111.17	63.79	1.89	10.95	8.82	29.76	1.86	12.75	9.24	132.69	176.80
142	EC 350664	43.00	110.17	52.39	2.89	10.55	10.02	21.96	2.46	11.85	6.00	123.29	167.40
143	EC 377883 B	55.00	110.17	70.59	3.09	9.75	7.62	22.76	2.86	12.15	7.86	200.59	244.70
144	JS 20-34	50.00	106.17	41.79	2.89	8.15	4.82	19.36	2.86	11.42	5.80	69.49	113.60
145	GC 84051-32-1	47.00	111.17	70.49	2.09	11.40	9.52	27.26	2.11	8.39	2.87	19.89	64.00
146	PK 431337	47.00	109.17	74.99	3.49	12.95	16.02	32.76	1.86	8.86	7.46	132.69	176.80

147	EC 390977	51.00	108.17	58.99	2.29	10.95	12.22	27.76	2.26	8.75	7.90	119.39	163.50
148	JS 20-86	49.00	114.17	75.59	2.29	10.15	6.42	23.36	1.86	11.84	6.92	-12.31	31.80
149	JS 20-50	46.00	109.17	55.74	3.09	9.15	9.27	25.51	2.61	11.49	9.37	132.49	176.60
150	MACS 7102	48.00	107.17	56.79	3.29	11.35	8.62	35.16	2.86	12.85	10.94	148.69	192.80
151	11-5 E (Z-2)	51.00	108.17	76.83	2.53	9.79	5.50	20.28	1.94	10.67	2.47	118.25	127.10
152	20-40 B (Z-9)	49.00	114.17	82.83	3.13	11.79	11.90	32.68	1.94	10.64	7.19	271.95	280.80
153	20-41 B (Z-15)	42.00	110.17	71.83	2.33	9.99	9.30	25.28	1.94	10.86	7.31	223.55	232.40
154	23-10 B (Z-17)	46.00	109.17	65.23	2.13	9.79	10.10	32.68	1.94	9.87	8.07	245.65	254.50
155	23-11 A (Z-18)	38.00	111.17	70.43	2.33	10.79	11.50	37.48	1.94	9.47	9.41	270.55	279.40
156	14-11 B (Z-19)	46.00	109.17	72.43	2.53	10.19	10.70	39.68	1.94	10.96	7.45	246.15	255.00
157	20-14 C (Z-22)	48.00	107.17	67.03	2.93	10.39	6.50	32.48	1.94	12.46	6.17	319.45	328.30
158	23-16 C (Z-24)	46.00	111.17	71.23	2.73	9.59	10.10	24.28	1.94	9.19	2.67	84.45	93.30
159	23-16 C (Z-23)	42.00	113.17	69.43	2.73	10.39	9.30	40.28	1.94	10.16	6.63	320.95	329.80

Table 2: Descriptive Statistics for Multi-location Germplasm Evaluation at Indore

	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	Number of primary branches per plant	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Grain yield per plant (g)	Row Yield (g)
Minimum	30.00	104.00	40.80	0.80	8.00	4.00	9.00	2.00	3.50	0.40	3.80
Maximum	58.00	120.00	108.00	6.20	16.00	17.00	47.50	3.00	14.35	17.06	470.70
Mean	47.14	109.23	74.12	2.71	11.50	10.19	28.96	2.19	8.89	4.61	104.90
Coeff of Variation	9.92	2.46	15.40	30.12	12.57	23.79	25.75	14.16	22.75	59.28	90.99

Table 3: Evaluation of Germplasm at Multi-location- IMPHAL (Adjusted means)

S.No	Genotype	Days to 50 % Flowering	Days to maturity	Plant Height (cm)	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	100 Seed weight (g)	Grain yield per plant (g)	Row Yield (g)	Row Yield (g) Unadjusted
Check 1	**RVS 2010-1 (C)**	46.80	111.00	56.76	13.40	19.88	54.44	13.07	13.87	264.00	264.00
Check 2	**RSC 10-46 (C)**	47.40	117.60	60.32	13.24	26.44	79.28	13.88	15.48	310.20	310.20
Check 3	**RKS 113 (C)**	46.40	111.20	56.39	13.04	24.52	64.56	13.29	14.43	259.00	259.00
Check 4	**MACS 1460 (C)**	46.20	112.80	53.76	14.64	26.80	80.56	14.11	14.91	197.00	197.00
Check 5	**KDS 753 (C)**	47.60	112.20	51.88	13.28	22.80	52.16	16.47	11.97	191.00	191.00
1	VP1199	51.88	111.76	65.74	18.08	69.25	98.24	13.23	13.05	216.24	215.00
2	K-53	65.88	113.76	74.14	12.48	17.85	46.24	14.42	9.39	191.24	190.00
3	EC-389153	68.88	121.76	93.74	21.08	43.45	117.04	8.31	5.33	166.24	165.00
4	UPSL 152	55.88	123.76	117.14	17.08	38.65	90.04	9.43	6.63	126.24	125.00
5	EC 389154C	62.88	111.76	82.54	15.88	31.05	97.64	14.42	10.55	136.24	135.00
6	UPSL 72	65.88	120.76	108.74	19.48	42.85	90.04	11.11	13.41	171.24	170.00
7	UPSM 9	65.88	118.76	57.14	13.68	11.45	48.84	15.31	15.32	241.24	240.00
8	UPSM 20	56.88	117.76	103.54	21.48	43.25	84.54	10.29	5.49	176.24	175.00
9	EC 389179B	52.88	111.76	73.54	15.08	21.85	53.84	16.61	14.33	271.24	270.00
10	UPSL 652	52.88	113.76	54.14	14.28	25.45	73.04	19.12	16.73	176.24	175.00
11	UPSM 77	61.88	122.76	99.54	17.68	42.45	105.44	13.08	13.69	231.24	230.00
12	EC 391181	49.88	110.76	79.94	18.68	20.45	44.84	14.49	5.51	141.24	140.00
13	VGM 70	58.88	111.76	105.14	13.08	25.05	72.04	11.57	11.95	226.24	225.00
14	UPSM 57	68.88	115.76	93.34	18.08	30.25	81.64	11.26	10.87	121.24	120.00
15	VLS 75	51.88	110.76	70.74	18.28	34.05	67.64	13.81	14.20	211.24	210.00
16	EC 391316	51.88	109.76	68.94	18.08	30.05	65.24	15.68	8.66	106.24	105.00
17	RVS 2006-21	52.88	112.76	70.74	15.88	34.25	72.84	20.55	10.70	271.24	270.00
18	JS 97-52	65.88	112.76	69.74	15.28	35.65	102.64	10.19	14.48	231.24	230.00
19	EC 391346	54.88	110.76	69.54	13.08	32.85	77.84	17.93	10.99	201.24	200.00
20	NRC 2007A	48.88	114.76	86.14	21.48	29.85	71.44	13.70	14.59	297.24	296.00

21	NRC 80-1	49.88	113.76	67.54	15.68	23.25	55.84	13.91	12.36	301.24	300.00
22	JS 20-01	49.88	111.76	58.34	13.88	22.65	54.64	18.01	14.46	201.24	200.00
23	EC 396065	53.88	110.76	65.54	17.88	30.05	63.44	14.81	7.85	121.24	120.00
24	EC 251682	50.88	110.76	96.94	18.28	30.85	75.84	17.75	12.16	151.24	150.00
25	TGX 840-4-E	1.88	0.76	2.94	0.88	-0.55	2.04	0.31	-0.72	-	-
26	EC 251541	67.88	110.76	108.14	17.68	32.85	90.64	10.62	12.10	216.24	215.00
27	EC 393224	61.88	112.76	63.14	14.68	36.05	83.64	12.92	16.06	271.24	270.00
28	EC 340506B	50.88	111.76	62.74	17.68	28.45	52.24	17.59	12.91	206.24	205.00
29	EC 393231	54.88	110.76	57.54	13.88	27.25	73.04	14.73	13.77	246.24	245.00
30	EC 251516	43.88	112.76	50.54	14.88	25.65	47.84	18.69	8.74	161.24	160.00
31	G 2258	49.88	108.96	75.42	17.84	18.69	50.28	13.49	8.83	120.04	165.00
32	DS 91-3	52.88	108.96	97.02	20.64	37.89	76.68	10.19	4.48	85.04	130.00
33	DCB 137	44.88	109.96	56.02	16.44	20.49	57.08	12.94	10.23	200.04	245.00
34	EC 457214	48.88	108.96	64.22	17.44	28.09	75.08	11.88	12.98	225.04	270.00
35	DE 201	47.88	109.96	41.02	10.84	11.69	34.88	11.88	6.38	95.04	140.00
36	EC 381884	62.88	116.96	112.32	17.64	36.49	61.28	7.92	12.69	165.04	210.00
37	EC 457336	49.88	109.96	45.12	13.24	22.24	42.48	11.54	2.25	-9.96	35.00
38	AGS 12	47.88	109.96	44.02	11.24	18.49	42.48	14.34	16.12	255.04	300.00
39	F4P20	44.88	114.96	46.42	14.04	23.49	45.08	8.95	9.09	245.04	290.00
40	SL 794	48.88	109.96	85.82	17.64	29.09	63.68	9.59	7.18	170.04	215.00
41	EC 103336	50.88	108.96	63.02	15.44	37.74	74.58	11.16	8.89	125.04	170.00
42	NRC 86	49.88	109.96	65.02	14.64	36.69	84.68	11.38	14.74	185.04	230.00
43	EC 106998	51.88	109.96	47.22	11.84	15.49	38.88	11.88	7.65	130.04	175.00
44	SL 752	51.88	108.96	57.02	15.44	22.89	86.28	11.69	13.58	195.04	240.00
45	EC 109540	50.88	108.96	72.42	14.24	27.49	68.48	13.99	12.60	155.04	200.00
46	UGM 75	60.88	114.96	55.02	17.04	26.89	127.48	14.08	22.23	390.04	435.00
47	EC 113778	50.88	106.96	66.02	14.64	29.09	75.68	13.35	12.80	215.04	260.00
48	MACS 303	48.88	111.96	53.42	16.64	37.49	72.48	13.56	13.23	235.04	280.00

49	NRC 2006M	54.88	112.96	84.82	19.04	30.49	83.68	9.37	12.21	137.04	182.00
50	EC16213	41.88	107.96	61.02	15.24	21.09	48.08	13.24	2.26	50.04	95.00
51	EC 23001	60.88	111.96	104.42	15.84	44.29	99.48	11.54	8.18	190.04	235.00
52	EC 15961	53.88	110.96	114.02	17.84	43.09	103.88	13.84	12.44	60.04	105.00
53	EC 173325	43.88	110.96	23.62	13.24	18.89	45.58	17.39	10.57	45.04	90.00
54	PSL 6	51.88	109.96	64.62	15.84	25.29	40.08	13.23	5.56	165.04	210.00
55	JS 20-52	52.88	111.96	56.42	15.64	27.89	82.68	10.38	10.51	180.04	225.00
56	SL 525	45.88	111.96	72.42	15.64	26.09	80.08	8.16	13.30	265.04	310.00
57	EC 242004	60.88	115.96	70.02	17.44	42.29	114.48	11.08	18.69	435.04	480.00
58	EC242072	56.88	109.96	87.22	18.24	34.09	241.28	12.29	7.71	85.04	130.00
59	PS 1475	57.88	121.96	76.82	14.84	23.09	78.08	14.17	6.74	45.04	90.00
60	NRC 37	-	-	-	-	-	-	-	-	-	-
61	EC 242111	49.88	108.16	75.47	15.76	24.81	114.72	13.73	23.82	449.24	530.00
62	MACS 171	54.88	127.16	33.87	8.56	19.41	134.72	14.98	6.54	-0.76	80.00
63	SL 2951	52.88	114.16	53.67	9.76	18.81	63.52	12.92	9.81	34.24	115.00
64	AGS 164	49.88	109.16	67.67	13.16	23.01	62.32	13.92	16.80	194.24	275.00
65	EC 251501	59.88	110.16	70.07	11.36	17.61	53.92	8.98	6.13	34.24	115.00
66	MACS 1259	47.88	111.16	62.47	13.96	28.81	72.92	16.95	32.64	239.24	320.00
67	AGS 174	50.88	111.16	65.07	14.16	44.01	63.32	17.18	17.49	129.24	210.00
68	EC 251876	49.88	108.16	60.27	11.16	24.01	42.72	18.57	11.18	39.24	120.00
69	SL 432	53.88	109.16	58.27	14.96	36.01	81.92	11.40	9.03	29.24	110.00
70	LEE 75	46.88	116.16	80.47	7.96	27.81	64.12	13.89	7.08	94.24	175.00
71	EC 389099	47.88	109.16	72.47	11.56	40.01	78.52	15.20	12.10	99.24	180.00
72	JS 20-69	44.88	116.16	56.27	9.16	23.01	65.32	12.12	13.27	124.24	205.00
73	JSM 195	44.88	112.16	56.47	9.56	25.21	55.52	13.18	13.04	144.24	225.00
74	EC 291397	46.88	110.16	73.07	13.36	36.21	102.52	16.69	18.54	274.24	355.00
75	PS 1336	47.88	119.16	62.27	11.76	20.81	39.32	18.58	10.61	144.24	225.00
76	EC 294003	-	-	-	-	-	-	-	-	-	-

77	EC 291451	55.88	110.16	74.47	11.36	26.41	74.32	13.75	9.43	59.24	140.00
78	EC 24091	55.88	110.16	97.07	14.36	14.01	41.92	13.75	6.43	9.24	90.00
79	EC 291453	41.88	113.16	86.87	16.16	34.01	76.32	11.26	14.01	154.24	235.00
80	EC 309537	50.88	112.16	75.67	12.16	24.81	72.92	16.71	10.72	29.24	110.00
81	EC 30967A	46.88	109.16	73.47	15.96	41.21	88.72	14.23	8.36	89.24	170.00
82	RSC 14	51.88	114.16	73.07	12.16	26.31	81.92	15.13	11.38	69.24	150.00
83	EC 325103	40.88	110.16	71.27	15.16	48.21	79.92	14.57	13.91	34.24	115.00
84	PKS 7	51.88	110.16	82.47	15.36	35.01	73.12	14.16	14.13	104.24	185.00
85	JSM 285	51.88	115.16	89.87	11.56	23.41	68.92	16.59	6.80	-10.76	70.00
86	EC 33872B	41.88	111.16	87.07	14.36	32.41	66.12	13.62	11.97	59.24	140.00
87	G91	56.88	111.16	93.47	10.16	21.01	56.92	10.60	5.12	-25.76	55.00
88	SQL 1	45.88	110.16	65.67	11.96	27.81	66.72	12.92	13.38	104.24	185.00
89	JSM 232	46.88	122.16	78.47	9.76	16.81	63.32	10.27	3.51	-40.76	40.00
90	JSM 222	44.88	108.16	69.87	12.76	25.61	72.32	13.30	11.26	124.24	205.00
91	JSM 245	49.88	118.36	80.34	13.08	20.57	64.04	12.95	11.13	150.24	120.00
92	EC 39513	50.88	113.36	57.14	16.48	27.77	73.24	12.83	18.97	295.24	265.00
93	EC 39743	52.88	115.36	54.14	15.48	30.57	120.04	11.60	17.88	315.24	285.00
94	TG X1835-10F	53.88	125.36	54.94	15.88	17.77	97.24	15.72	7.10	210.24	180.00
95	EPS 1B	46.88	112.36	55.74	13.88	39.97	80.44	15.47	21.45	260.24	230.00
96	EC 116343	50.88	114.36	61.34	14.88	22.77	59.04	13.47	12.51	305.24	275.00
97	MACS 1045	61.88	118.36	69.14	14.88	31.37	81.84	15.60	12.89	290.24	260.00
98	G47	49.88	114.36	75.74	16.08	22.37	77.64	15.22	18.83	320.24	290.00
99	JS 20-34	37.88	110.36	28.34	8.88	13.17	33.99	14.20	6.50	90.24	60.00
100	SL (E)1	46.88	120.36	75.94	14.48	49.77	181.04	13.85	28.88	495.24	465.00
101	PK 701	59.88	114.36	86.54	17.88	49.37	123.64	13.25	14.86	255.24	225.00
102	PK 1038	44.88	112.36	87.14	18.88	48.37	110.24	10.98	15.81	245.24	215.00
103	RKS 54	50.88	118.36	69.54	78.08	31.17	105.44	11.64	32.77	255.24	225.00
104	EC 33940	47.88	111.36	68.34	16.28	30.57	65.24	14.12	12.23	150.24	120.00

105	RKS-45	55.88	115.36	106.74	15.68	23.77	85.24	7.38	9.13	236.24	206.00
106	MAUS-128	60.88	122.36	105.54	17.48	42.37	105.24	12.78	17.96	330.24	300.00
107	G2225	65.88	124.36	90.34	17.88	43.97	96.04	9.27	13.51	305.24	275.00
108	JS 20-29	47.88	113.36	49.94	13.28	31.17	83.84	14.93	11.95	225.24	195.00
109	TNAU 20023	60.88	113.36	77.34	16.08	30.57	71.84	14.25	13.49	265.24	235.00
110	G4P15	55.88	115.36	44.34	10.68	13.17	70.84	13.14	7.91	160.24	130.00
111	GP 465	56.88	115.36	72.54	11.08	21.37	45.64	7.54	11.15	245.24	215.00
112	TGX 849-D-13-4	65.88	124.36	88.14	19.08	54.57	132.24	7.68	6.11	200.24	170.00
113	JSM 227	47.88	114.36	56.74	14.28	15.17	36.84	16.50	11.62	295.24	265.00
114	JS 20-98	45.88	112.36	68.74	16.68	26.77	93.44	12.85	13.61	290.24	260.00
115	TG X 849-813	48.88	113.36	63.74	16.88	39.37	112.44	13.43	20.81	370.24	340.00
116	KB-17	51.88	111.36	58.74	16.68	30.17	69.44	13.19	10.09	240.24	210.00
117	KDS 256	49.88	114.36	53.74	12.48	34.57	109.44	7.76	17.87	265.24	235.00
118	LEE-54	49.88	112.36	69.94	15.48	36.97	101.64	14.34	11.92	180.24	150.00
119	JS 96-31	42.88	113.36	51.74	13.08	23.17	38.24	14.47	7.94	195.24	165.00
120	TNAU 20024	54.88	113.36	95.74	18.68	47.37	102.44	11.28	14.90	275.24	245.00
121	SQL 37	42.48	109.76	69.02	17.44	31.49	96.52	15.36	25.24	414.24	320.00
122	WT 88	40.48	111.76	53.02	13.44	27.69	78.12	14.75	19.51	354.24	260.00
123	TNAU 20022	-	-	-	-	-	-	-	-	-	-
124	EC 528640	49.48	110.76	66.82	14.44	38.49	83.92	19.62	19.06	343.24	249.00
125	EC 538830	49.48	108.76	69.42	18.24	38.69	96.72	15.32	19.88	369.24	275.00
126	PK 258	52.48	109.76	96.62	14.24	33.09	78.32	12.33	12.73	274.24	180.00
127	EC 468597	50.48	109.76	56.62	15.04	27.89	55.12	15.68	10.42	209.24	115.00
128	EC 572160	48.48	109.76	70.82	16.64	31.29	65.92	18.53	13.85	179.24	85.00
129	SL 682	58.48	112.76	59.22	14.24	26.09	84.12	14.36	13.93	224.24	130.00
130	PI 204336	46.48	109.76	47.42	16.24	35.49	111.52	17.20	24.30	394.24	300.00
131	UGM 70	57.48	109.76	85.62	13.84	46.09	109.72	14.81	17.64	309.24	215.00
132	PS 931Q8	57.48	114.76	95.62	14.24	43.69	110.12	14.10	18.54	229.24	135.00

133	LEE 96	45.48	110.76	62.22	15.64	34.49	87.32	18.82	21.68	509.24	415.00
134	TG X 1488-9-1D	60.48	115.76	55.02	15.24	29.29	82.52	16.98	21.16	319.24	225.00
135	LEE 53	50.48	109.76	67.62	18.04	34.69	77.52	17.47	14.77	264.24	170.00
136	TG X 702-4-8	58.48	120.76	94.82	17.84	57.49	121.92	13.04	47.58	314.24	220.00
137	GP566	-	-	-	-	-	-	-	-	-	-
138	JS 98-11	50.48	109.76	258.02	12.44	37.89	76.32	18.15	22.05	289.24	195.00
139	PS1421	-	-	-	-	-	-	-	-	-	-
140	VLS 11	51.48	108.76	65.42	14.44	32.69	73.12	13.43	14.97	234.24	140.00
141	PS 1467	43.48	108.76	58.22	15.84	18.49	53.32	14.60	15.37	314.24	220.00
142	EC 350664	46.48	109.76	54.22	14.24	31.49	90.32	15.94	19.72	304.24	210.00
143	EC 377883B	47.48	109.76	63.62	16.44	26.09	103.32	17.83	17.11	324.24	230.00
144	JS 20-34 (Filler)	-	-	-	-	-	-	-	-	-	-
145	GC 84051-32-1	49.48	108.76	56.82	15.44	41.49	78.52	15.12	16.63	259.24	165.00
146	PK 431337	61.48	109.76	53.42	14.24	22.89	54.72	16.84	16.13	224.24	130.00
147	EC 390977	58.48	108.76	23.22	12.64	11.89	27.52	16.51	9.62	184.24	90.00
148	JS 20-86	46.48	109.76	62.42	14.44	26.09	65.92	14.62	17.32	274.24	180.00
149	JS 20-50	47.48	111.76	47.22	13.84	23.89	87.52	15.64	25.63	424.24	330.00
150	MACS-7102	45.48	109.76	58.82	14.84	34.49	95.52	17.64	18.74	364.24	270.00
151	11-5E(Z-2)	45.48	108.76	43.22	12.64	20.09	58.52	12.76	13.81	244.24	150.00
152	20-40B(Z-9)	45.48	112.76	74.22	16.84	35.29	112.32	12.84	19.86	344.24	250.00
153	20-14B (Z-15)	49.48	111.76	57.82	13.44	30.09	72.52	15.05	14.92	254.24	160.00
154	23-10B(Z-17)	46.48	109.76	58.62	13.84	25.69	80.72	15.58	27.49	294.24	200.00
155	23-11A(Z-18)	43.48	109.76	42.42	12.44	27.09	59.12	12.03	14.59	344.24	250.00
156	14-11B(Z-19)	44.48	112.76	61.42	18.84	38.89	107.32	14.47	18.18	309.24	215.00
157	20-14C(Z-22)	48.48	109.76	73.02	15.04	37.89	115.72	12.98	22.86	454.24	360.00
158	23-16C(Z-24)	57.48	110.76	92.22	15.64	17.89	43.52	13.11	11.72	264.24	170.00
159	23-16 C(Z-23)	48.48	108.76	61.22	15.24	27.69	86.1	14.02	18.30	294.24	200.00
160	DS 3106	165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4: Descriptive Statistics for Multi-location Germplasm Evaluation at IMPHAL

	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	100 Seed weight (g)	Grain yield per plant (g)	Row Yield (g)
Minimum	38.00	108.00	21.80	8.80	8.80	22.60	8.00	4.12	35.00
Maximum	67.00	128.00	261.00	78.00	69.80	246.20	20.24	43.55	530.00
Mean	51.99	112.74	71.16	15.42	30.10	78.34	13.71	13.50	205.55
Coeff of Variation	11.67	3.22	33.17	36.27	32.06	34.94	17.82	40.78	40.40

Table 5: Evaluation of Germplasm at Multi-location- Pantnagar (Adjusted means)

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	Number of primary branches per plant	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Grain yield per plant (g)	Row Yield (g)	Row Yield (g) Unadjusted
Check 1	SL 958 (c)	55.75	122.75	74.00	5.25	46.67	2.23	10.76	8.48	217.50	217.5
Check 2	SL 955 (c)	59.75	122.50	54.67	6.25	57.83	2.10	9.94	11.19	195.25	195.25
Check 3	SL 979 (c)	57.5	121.50	53.00	4.50	63.25	2.10	10.53	9.76	121.75	121.75
Check 4	PS 24 (c)	53.75	114.50	42.54	5.75	54.25	2.00	10.15	9.86	94.75	94.75
Check 5	PS 1347 (c)	56.25	119.25	42.08	5.00	56.00	2.18	10.73	11.75	145.75	145.75
1	VP 1199	52.6	119.30	84.13	0.95	16.53	1.90	6.24	3.10	82.20	55.00
2	K 53	52.6	120.30	63.46	3.95	39.53	2.10	7.42	5.33	112.20	85.00
3	EC 389153	66.6	125.30	81.46	1.95	78.53	2.20	4.36	6.86	207.20	180.00
4	UPSL 152	66.6	126.30	84.13	3.95	89.53	2.00	7.88	10.91	162.20	135.00
5	EC 389154C	56.6	119.30	79.79	3.95	63.87	2.20	10.30	3.51	127.20	100.00
6	UPSL 72	64.6	120.30	83.13	2.95	42.20	2.00	9.56	3.24	127.20	100.00
7	UPSM 9	66.6	124.30	156.79	1.95	41.53	2.10	5.12	2.70	112.20	85.00
8	UPSM 20	63.6	124.30	124.46	4.95	46.20	2.20	6.58	4.66	107.20	80.00
9	EC 389179B	56.6	120.30	75.13	2.95	38.53	2.00	6.22	5.38	147.20	120.00
10	UPSL 652	65.6	119.30	71.13	1.95	52.53	2.20	5.18	2.77	117.20	90.00
11	UPSM 77	65.6	121.30	82.13	4.95	57.53	2.20	9.80	5.78	137.20	110.00
12	EC 391181	49.6	115.30	92.46	1.95	24.53	2.20	8.54	4.66	92.20	65.00
13	VGM 70	53.6	115.30	104.13	3.95	58.53	2.00	8.68	5.50	202.20	175.00
14	UPSM 57	64.6	118.30	121.46	2.95	40.53	2.00	7.12	6.43	142.20	115.00
15	VLS 75	53.6	116.30	66.46	2.95	36.87	2.00	8.28	4.08	102.20	75.00
16	EC 391316	56.6	117.30	66.46	2.95	70.53	2.10	9.28	13.41	192.20	165.00
17	RVS 2006-21	49.6	114.30	51.79	0.95	11.87	2.20	9.70	1.84	77.20	50.00

18	JS 97-52	55.6	114.30	65.79	1.95	46.20	2.10	9.70	9.91	437.20	410.00
19	EC 391346	56.6	117.30	77.79	5.95	52.20	2.20	8.62	7.63	242.20	215.00
20	NRC 2007A	55.6	120.30	82.13	1.95	44.53	2.10	6.38	6.09	162.20	135.00
21	NRC 80-1	53.6	115.30	67.13	0.95	42.87	2.10	7.96	5.35	152.20	125.00
22	JS 20-01	51.6	117.30	59.13	1.95	36.20	1.90	11.64	6.48	252.20	225.00
23	EC 396065	55.6	116.30	85.46	3.95	48.20	2.00	7.14	8.33	157.20	130.00
24	EC 251682	55.6	116.30	80.79	1.95	34.53	2.00	7.52	4.40	117.20	90.00
25	TGX 840-4-E	62.6	121.30	55.46	3.95	45.53	2.00	5.78	4.31	92.20	65.00
26	EC 251541	56.6	118.30	92.79	1.95	39.53	1.80	4.18	1.27	72.20	45.00
27	EC 393224	54.6	117.30	67.46	1.95	63.87	2.20	8.08	17.66	207.20	180.00
28	EC 3405000	54.6	113.30	60.46	4.95	46.87	2.00	7.08	5.55	127.20	100.00
29	EC 393231	56.6	113.30	52.46	1.95	51.87	2.10	6.64	4.11	107.20	80.00
30	EC 251516	48.6	115.30	45.46	2.95	35.20	1.70	7.16	5.38	67.20	40.00
31	G 2258	56.6	112.30	59.13	2.95	49.87	2.10	6.34	9.11	112.20	85.00
32	DS 91-3	55.6	111.30	73.46	0.95	41.87	2.10	6.32	4.66	92.20	65.00
33	DCB 137	53.6	112.30	62.46	1.95	30.53	2.00	7.96	5.02	177.20	150.00
34	EC 457214	54.6	112.30	43.46	1.95	18.20	2.00	6.78	7.16	72.20	45.00
35	DE 201	53.6	117.30	88.13	1.95	52.20	2.00	8.86	7.07	227.20	200.00
36	EC 381884	64.6	120.30	118.13	4.95	50.20	2.00	5.52	5.80	162.20	135.00
37	EC 457336	52.6	121.30	78.13	2.95	41.87	1.80	9.08	8.90	147.20	120.00
38	AGS 12	51.6	122.30	63.46	2.95	39.87	2.20	9.40	6.33	127.20	100.00
39	F4P20	55.6	120.30	58.79	3.95	51.53	2.00	7.70	23.00	377.20	350.00
40	SL 794	55.6	115.30	98.46	1.95	51.53	2.00	8.92	4.33	97.20	70.00
41	EC 103336	59.6	114.30	77.79	2.95	32.53	2.00	9.18	7.79	157.20	130.00
42	NRC 86	55.6	116.30	64.46	1.95	42.87	2.10	8.74	9.26	267.20	240.00
43	EC 106998	55.6	116.30	78.13	1.95	40.20	2.20	6.60	6.15	202.20	175.00
44	SL 752	54.6	113.30	82.13	3.95	50.53	1.80	6.64	6.09	162.20	135.00

45	EC 109540	55.6	114.30	73.46	3.95	27.20	2.10	7.86	6.14	137.20	110.00
46	UPSM 75	57.2	118.10	52.19	3.15	39.60	1.98	6.29	6.61	-41.80	20.00
47	EC 113778	58.2	112.10	67.19	7.15	67.27	2.08	7.15	7.22	18.20	80.00
48	MACS 303	57.2	116.10	49.53	3.15	80.60	2.18	7.23	18.70	13.20	75.00
49	NRC 2006 M	57.2	111.10	48.03	4.15	81.93	1.78	6.57	12.45	-36.80	25.00
50	EC 16213	54.2	120.10	43.53	5.15	33.27	2.18	9.03	4.95	13.20	75.00
51	EC 23001 A	57.2	110.10	100.19	4.15	55.27	1.98	7.39	5.66	18.20	80.00
52	EC 15961	57.2	109.10	82.86	5.15	65.93	1.98	6.57	6.61	-21.80	40.00
53	EC 173325	56.2	115.10	46.86	4.15	49.93	2.08	9.33	6.61	18.20	80.00
54	PSL 6	57.2	112.10	83.19	6.15	63.93	1.98	7.01	6.20	-11.80	50.00
55	TS 20-52	61.2	112.10	54.53	4.15	78.93	1.98	4.77	8.28	38.20	100.00
56	SL 525	59.2	124.10	65.53	5.15	104.60	2.08	8.01	16.25	313.20	375.00
57	EC 242004 F	65.2	118.10	95.19	6.15	51.27	1.98	7.09	5.21	38.20	100.00
58	EC 242072	62.2	117.10	73.19	6.15	58.60	2.18	6.77	6.95	8.20	70.00
59	PS 9475	61.2	120.10	41.53	5.15	49.60	2.08	7.83	6.61	18.20	80.00
60	NRC 37	62.2	-	-	-	-	-	-	-	-	0.00
61	EC 242111	59.2	113.10	67.19	7.15	43.60	2.18	7.85	5.45	-6.80	55.00
62	MACS 171	63.2	117.10	52.19	6.15	51.27	2.38	7.97	6.37	-16.80	45.00
63	SL 29-51	60.2	122.10	144.53	7.15	63.27	2.18	8.47	14.95	178.20	240.00
64	AGS 164	63.2	117.10	60.53	4.15	41.27	1.98	6.89	5.83	38.20	100.00
65	EC 251501	59.2	113.10	59.86	4.15	50.27	1.98	5.59	5.33	8.20	70.00
66	MACS 1255	56.2	113.10	69.53	6.15	60.27	2.38	8.19	6.02	23.20	85.00
67	AGS 174	58.2	112.10	57.86	5.15	57.60	2.08	7.55	8.52	58.20	120.00
68	EC 251876	58.2	110.10	58.86	6.15	58.93	1.98	7.07	9.95	88.20	150.00
69	SL 432	59.2	109.10	51.53	5.15	60.93	2.08	6.37	6.45	3.20	65.00
70	LEE 75	56.2	111.10	76.86	4.15	68.93	2.08	7.53	6.31	78.20	140.00
71	EC 389099	56.2	115.10	73.53	6.15	74.93	1.98	7.09	9.95	68.20	130.00

72	JS 20-69	56.2	112.10	62.86	4.15	63.93	2.18	10.63	13.70	158.20	220.00
73	JSM 195	47.2	112.10	55.86	6.15	65.93	1.98	10.41	9.95	158.20	220.00
74	EC 291397	62.2	113.10	57.19	6.15	73.60	2.08	8.51	11.95	58.20	120.00
75	PS 1336	55.2	113.10	62.53	5.15	58.27	2.18	9.03	5.61	23.20	85.00
76	EC 291403	63.2	120.10	55.19	6.15	50.27	1.98	7.21	6.82	-6.80	55.00
77	EC 291451	59.2	112.10	66.53	6.15	64.60	1.98	7.15	7.25	33.20	95.00
78	EC 24091	56.2	118.10	64.19	7.15	41.27	2.08	7.03	9.95	38.20	100.00
79	EC 291453	64.2	118.10	95.86	5.15	55.93	2.08	6.15	8.00	83.20	145.00
80	EC 309537	61.2	112.10	59.53	6.15	64.27	2.18	7.19	10.28	93.20	155.00
81	EC 30967A	58.2	112.10	66.86	5.15	66.93	2.18	7.25	13.95	148.20	210.00
82	RSC 14	58.2	113.10	37.53	5.15	49.93	2.18	9.01	9.39	23.20	85.00
83	EC 325103	56.2	110.10	50.53	5.15	72.60	1.98	10.09	6.52	63.20	125.00
84	PKS 7	64.2	118.10	61.19	5.15	46.60	2.08	6.59	11.95	-1.80	60.00
85	JSM 285	53.2	100.10	51.19	4.15	64.60	2.18	9.67	11.82	33.20	95.00
86	EC 338728	58.2	113.10	51.19	5.15	63.93	1.98	7.79	6.37	28.20	90.00
87	G 91	57.2	109.10	70.19	6.15	69.93	1.98	7.49	4.35	48.20	110.00
88	SQL 1	57.2	110.10	61.19	4.15	65.60	2.18	7.21	7.80	-6.80	55.00
89	JSM 232	56.2	109.10	50.53	9.15	114.93	2.18	7.57	8.28	-36.80	25.00
90	JSM 222	57.2	109.10	65.86	6.15	81.27	2.08	5.95	8.16	53.20	115.00
91	TSM 245	56.2	112.90	65.99	3.55	71.33	2.22	9.34	5.72	3.00	55.00
92	EC 39513	57.2	114.90	65.66	3.55	68.00	2.32	10.12	4.99	93.00	145.00
93	EC 39743	62.2	118.90	115.66	4.55	47.00	1.82	9.22	7.46	123.00	175.00
94	TGX 1835-10F	57.2	114.90	58.99	3.55	38.00	1.82	10.84	7.39	-12.00	40.00
95	EPS 1B	53.2	120.90	64.99	4.55	54.00	2.02	10.10	4.13	23.00	75.00
96	EC 116343	56.2	114.90	64.66	4.55	42.67	1.62	9.26	6.61	48.00	100.00
97	MACS 1045	55.2	111.90	42.99	5.55	42.67	2.02	12.48	9.06	-27.00	25.00
98	G 47	55.2	110.90	58.99	4.55	51.00	2.22	10.48	8.58	3.00	55.00

99	TGM 242	54.2	117.90	76.99	3.55	59.33	2.12	10.44	6.04	33.00	85.00
100	SL(E) 1	57.2	120.90	69.33	3.55	51.67	2.12	12.00	11.28	43.00	95.00
101	PK 701	57.2	110.90	86.66	4.55	48.00	2.12	9.64	9.06	-27.00	25.00
102	PK 1038	60.2	110.90	106.99	5.55	76.00	2.02	9.00	8.22	-7.00	45.00
103	RKS 54	57.2	111.90	69.99	3.55	66.00	2.02	9.74	12.25	363.00	415.00
104	EC 33940	57.2	111.90	60.99	5.55	65.67	2.02	10.70	10.10	23.00	75.00
105	RKS 45	56.2	110.90	99.66	5.55	69.67	2.02	9.38	12.39	158.00	210.00
106	AMAUS 128	64.2	121.90	100.99	3.55	75.33	2.02	13.38	11.97	-7.00	45.00
107	G2225	64.2	122.90	85.66	5.55	89.33	2.02	9.94	9.65	73.00	125.00
108	JS 20-29	52.2	119.90	51.33	2.55	30.00	2.02	11.84	10.72	-32.00	20.00
109	TNAU 20023	54.2	111.90	78.66	5.55	80.33	2.12	8.46	6.11	18.00	70.00
110	G4P15	54.2	111.90	35.66	2.55	45.00	2.02	8.78	9.47	-17.00	35.00
111	GP 465	55.2	114.90	44.66	4.55	61.00	2.02	11.24	8.00	28.00	80.00
112	TGX 849-D-13-4	55.2	119.90	50.33	5.55	88.00	2.02	8.64	16.51	248.00	300.00
113	TSM 227	55.2	112.90	45.66	3.55	39.00	2.02	10.06	5.53	73.00	125.00
114	JS 20-98	55.2	116.90	39.33	4.55	53.50	2.02	12.06	19.06	3.00	55.00
115	TGX 849-813	55.2	110.90	59.99	5.55	73.00	2.12	9.82	8.22	53.00	105.00
116	KB 17	55	116.70	91.69	6.35	68.20	2.20	9.80	5.67	236.60	150.00
117	KDS 256	56	117.70	86.03	7.35	66.20	2.00	9.16	8.76	286.60	200.00
118	LEE 54	54	112.70	91.36	7.35	82.20	2.10	9.62	7.76	256.60	170.00
119	JS 96-31	50	112.70	72.36	6.35	67.20	2.10	9.06	6.33	106.60	20.00
120	TNAU 20024	55	113.70	112.36	9.35	70.87	2.20	9.00	5.80	221.60	135.00
121	SQL 37	54	120.70	71.69	9.35	79.20	2.10	8.06	13.24	181.60	95.00
122	WT 88	55	-	-	-	-	-	-	-	-	0.00
123	TNAU 20022	54	112.70	105.69	9.35	45.53	2.00	8.98	3.95	146.60	60.00
124	EC 528640	52	112.70	86.36	8.35	86.87	2.10	8.44	9.04	161.60	75.00
125	EC 538830	55	112.70	90.03	7.35	83.20	2.10	6.72	6.92	231.60	145.00

126	PK 258	55	113.70	130.36	9.35	82.20	2.10	6.62	10.92	131.60	45.00
127	EC 468597	52	112.70	79.36	9.35	78.20	2.00	8.82	5.29	176.60	90.00
128	EC 572160	54	113.70	89.69	7.35	66.20	2.20	9.48	6.78	271.60	185.00
129	SL 682	56	112.70	98.69	9.35	90.87	2.20	9.14	6.23	191.60	105.00
130	PI 204336	56	113.70	57.03	6.35	68.87	2.00	8.38	13.95	186.60	100.00
131	UGM 70	56	112.70	124.69	6.35	63.53	2.10	8.56	8.10	356.60	270.00
132	PS 93108	64	112.70	78.69	6.35	81.87	2.00	6.38	12.17	111.60	25.00
133	LEE 96	62	113.70	68.69	8.35	78.53	2.20	6.16	8.00	136.60	50.00
134	TGX 1488-9-1D	54	112.70	49.03	6.35	71.87	2.00	10.56	6.81	136.60	50.00
135	LEE 53	56	113.70	67.03	5.35	55.53	2.20	10.06	11.33	121.60	35.00
136	TGX 702-4-8	55	118.70	68.03	7.35	66.20	2.20	9.04	3.76	131.60	45.00
137	GP 566	55	119.70	98.69	6.35	58.20	2.00	8.86	3.83	111.60	25.00
138	JS 98-11	57	111.70	92.69	9.35	76.53	2.20	8.56	10.67	141.60	55.00
139	PS 1421	59	-	-	-	-	-	-	-	-	0.00
140	VLS 11	55	107.70	86.69	8.35	69.20	2.10	8.02	7.28	246.60	160.00
141	PS 1467	-	-	-	-	-	-	-	-	-	0.00
142	EC 350664	55	111.70	53.36	8.35	84.20	2.20	7.98	8.55	246.60	160.00
143	EC 377883 B	51	111.70	62.03	8.35	74.87	2.00	7.42	13.95	186.60	100.00
144	JS 20-34	-	-	-	-	-	-	-	-	-	0.00
145	GE 84051-32-1	52	111.70	82.03	8.35	79.87	2.20	5.48	4.87	211.60	125.00
146	PK 431337	52	111.70	115.36	14.35	80.87	2.20	10.56	15.92	151.60	65.00
147	EC 390977	48	112.70	60.69	7.35	56.53	2.10	8.64	6.33	106.60	20.00
148	JS 20-86	55	-	-	-	-	-	-	-	-	0.00
149	JS 20-50	56	118.70	80.36	9.35	82.20	2.10	10.16	24.67	261.60	175.00
150	MACS 7102	55	113.70	66.69	9.35	70.87	2.20	10.62	13.67	156.60	70.00
151	11-5E (Z-2)	52	113.70	100.69	10.35	90.20	2.10	10.34	18.24	216.60	130.00
152	20-40B (Z-9)	52	113.70	73.69	7.35	100.20	2.00	11.18	18.24	216.60	130.00

153	20-14B (Z-15)	54	113.70	81.69	8.35	93.20	2.30	11.80	19.31	361.60	275.00
154	23-10B (Z-17)	51	114.70	69.03	8.35	81.20	2.00	9.32	24.67	236.60	150.00
155	23-11A (Z-18)	55	112.70	72.69	8.35	75.53	2.10	10.06	23.00	296.60	210.00
156	14-11B (Z-19)	51	112.70	66.36	5.35	85.87	2.10	9.92	10.60	261.60	175.00
157	20-14C (Z-22)	55	113.70	72.69	7.35	64.20	2.00	11.72	9.67	236.60	150.00
158	23-16C (Z-24)	49	111.70	118.36	10.35	88.87	2.10	9.96	8.33	216.60	130.00
159	23-16C (Z-23)	51	112.70	70.03	8.35	64.87	2.20	9.16	10.57	206.60	120.00
160	Z-9	51	111.70	99.03	12.35	88.53	2.20	9.98	5.07	221.60	135.00
161	Z-9	51	112.70	102.36	9.35	63.87	2.00	11.82	9.67	236.60	150.00

Table 6: Descriptive Statistics for Multi-location Germplasm Evaluation at PANTNAGAR

	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	Number of primary branches per plant	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Grain yield per plant (g)	Row Yield (g)
Minimum	46.00	102.00	36.33	3.00	25.67	1.60	4.26	1.61	20.00
Maximum	67.00	126.00	156.33	12.00	109.00	2.40	13.34	25.00	415.00
Mean	56.52	115.07	73.65	5.26	60.25	2.07	8.44	8.64	114.13
Coeff of Variation	6.81	3.65	27.46	26.62	24.47	5.73	21.15	50.93	63.64

Table 7: Evaluation of Germplasm at Multi-location- PALAMPUR (Adjusted means)

S.No	Genotype	Days to 50 per cent flowering	Days to maturity	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Grain yield per plot (g)	Grain yield per plot (g) Unadjusted
Check 1	Shivalik	66.60	126.80	24.00	2.04	15.24	101.00	101.00
Check 2	Him Soya	67.40	126.40	34.40	2.02	15.28	108.00	108.00
Check 3	Hara Soya	68.00	128.20	34.00	1.92	17.86	109.80	109.80
Check 4	Palam Early Soya-1	65.00	127.80	26.40	2.02	16.30	108.20	108.20
1	VP 1199	69.50	124.55	5.20	2.28	12.35	-40.00	12.00
2	K 53	-	-	-	-	-	-	0.00
3	EC 389153	-	-	-	-	-	-	0.00
4	UPSL 152	82.50	141.55	7.20	2.38	8.65	-24.00	28.00
5	EC 389154	69.50	135.55	25.20	1.88	13.95	76.00	128.00
6	UPSL 72	80.50	134.55	45.20	2.08	9.75	342.00	394.00
7	UPSM 9	83.50	134.55	38.20	1.98	10.35	245.00	297.00
8	UPSM 20	83.50	134.55	53.20	1.88	12.15	212.00	264.00
9	EC 389179B	69.50	127.55	18.20	1.98	12.55	90.00	142.00
10	UPSL 652	80.50	135.55	33.20	2.38	10.15	197.00	249.00
11	UPSM 77	83.50	141.55	40.20	2.38	12.05	215.00	267.00
12	EC 391181	68.50	134.55	18.20	2.28	11.85	101.00	153.00
13	VGM 70	80.50	137.55	14.20	2.08	14.35	85.00	137.00
14	UPSM 57	81.50	141.55	16.20	1.98	10.45	49.00	101.00
15	MLT 75	69.50	127.55	13.20	1.88	14.05	45.00	97.00
16	EC 391316	69.50	124.55	17.20	2.48	13.85	84.00	136.00
17	RVS 2006-21	69.50	124.55	7.20	1.98	13.75	-22.00	30.00
18	JS-97-52	83.50	127.55	5.20	2.28	10.55	40.00	92.00
19	EC 391346	78.50	127.55	4.20	1.88	10.15	-1.00	51.00
20	NRC 2007A	78.50	133.55	16.20	2.28	12.05	76.00	128.00
21	NRC 80-1	80.50	133.55	12.20	1.88	13.95	41.00	93.00

22	JS 20-01	-	-	-	-	-	-	0.00
23	EC 396065	80.50	127.55	19.20	1.98	10.35	63.00	115.00
24	EC 251682	80.50	129.55	14.20	1.88	12.45	-42.00	10.00
25	TGX540-4-E	83.50	141.55	5.20	2.28	14.35	-18.00	34.00
26	EC 251541	82.50	135.55	3.20	1.98	10.05	1.00	53.00
27	EC 393224	83.50	127.55	11.20	1.98	13.85	61.00	113.00
28	EC 340506B	81.50	127.55	8.20	2.38	14.35	-5.00	47.00
29	EC 393231	81.50	127.55	12.20	2.28	14.45	20.00	72.00
30	EC 251516	68.50	124.55	19.20	1.98	16.05	1.00	53.00
31	G 2258	81.50	127.55	19.20	2.88	10.45	91.00	143.00
32	DS 91-3	81.50	141.55	14.20	1.98	11.85	42.00	94.00
33	DCB 137	73.25	131.80	32.70	2.45	12.12	105.75	104.00
34	EC 457214	67.25	129.80	22.70	2.35	11.62	163.75	162.00
35	DE 201	73.25	127.80	36.70	2.25	11.72	105.75	104.00
36	EC 381884	84.25	135.80	42.70	1.95	9.72	196.75	195.00
37	EC 457336	73.25	124.80	32.70	1.95	17.52	38.75	37.00
38	AGS 12	-	-	-	-	-	-	0.00
39	F 4P20	72.25	127.80	30.70	2.25	12.12	184.75	183.00
40	SL 794	87.25	141.80	21.70	2.05	10.02	28.75	27.00
41	EC 103336	73.25	127.80	19.70	1.95	14.12	109.75	108.00
42	NRC 86	73.25	124.80	30.70	1.85	10.02	11.75	10.00
43	EC 106998	73.25	124.80	22.70	2.35	9.42	97.75	96.00
44	SL 752	84.25	141.80	17.70	2.25	12.12	123.75	122.00
45	EC 109540	87.25	127.80	32.70	1.85	12.22	158.75	157.00
46	UGM 75	84.25	135.80	17.70	2.25	11.62	33.75	32.00
47	EC 113778	87.25	127.80	21.70	2.25	13.42	138.75	137.00
48	MACS 303	73.25	127.80	32.70	2.45	10.12	147.75	146.00
49	NRC 2006M	73.25	131.80	42.70	1.95	13.42	183.75	182.00

50	EC 16213	72.25	124.80	36.70	2.55	13.92	34.75	33.00
51	EC 23001A	87.25	129.80	29.70	2.05	13.62	52.75	51.00
52	EC 15961	87.25	141.80	20.70	2.25	10.02	96.75	95.00
53	EC 173325	73.25	127.80	22.70	2.25	13.42	94.75	93.00
54	PSL 6	85.25	140.80	35.70	2.45	11.62	53.75	52.00
55	JS 20-52	73.25	127.80	30.70	2.05	11.72	191.75	190.00
56	SL 525	73.25	131.80	19.70	2.05	11.52	176.75	175.00
57	EC 242004F	85.25	131.80	54.70	2.25	13.62	392.75	391.00
58	EC 242072	72.25	127.80	23.70	2.25	13.52	91.75	90.00
59	PS 1475	73.25	131.80	27.70	2.15	15.72	160.75	159.00
60	NRC 37	73.25	131.80	47.70	2.25	13.42	403.75	402.00
61	EC 242111	74.25	124.80	50.70	1.95	13.62	295.75	294.00
62	MACS 171	77.25	131.80	20.70	1.95	13.92	72.75	71.00
63	SL 29-51	87.25	131.80	17.70	2.35	13.92	37.75	36.00
64	AGS 164	84.25	131.80	22.70	2.05	9.42	94.75	93.00
65	EC 251501	70.25	123.05	21.70	2.13	14.22	96.75	63.00
66	MACS 1259	-	-	-	-	-	-	0.00
67	AGS 174	84.25	123.05	25.70	1.93	16.02	85.75	52.00
68	EC 251876	70.25	126.05	24.70	1.93	13.72	204.75	171.00
69	SL 482	70.25	134.05	23.70	2.13	12.32	154.75	121.00
70	LEE 75	78.25	132.05	27.70	1.93	13.72	63.75	30.00
71	EC 389099	70.25	126.05	31.70	1.93	14.22	233.75	200.00
72	JS 20-69	70.25	126.05	27.70	1.93	11.92	221.75	188.00
73	JSM 195	64.25	126.05	31.70	1.93	16.22	190.75	157.00
74	EC 291397	64.25	123.05	28.70	1.93	16.32	142.75	109.00
75	PS 1336	64.25	123.05	21.70	1.93	17.72	68.75	35.00
76	EC 291403	78.25	130.05	23.70	1.83	12.52	126.75	93.00
77	EC 291451	71.25	123.05	33.70	2.33	15.72	195.75	162.00

78	EC 24091	71.25	123.05	23.70	2.23	14.22	79.75	46.00
79	EC 291453	81.25	128.05	37.70	1.93	12.32	310.75	277.00
80	EC 309537	74.25	126.05	26.70	1.93	15.92	159.75	126.00
81	EC 30967A	69.25	126.05	34.70	1.93	16.32	237.75	204.00
82	RSC 14	70.25	130.05	23.70	2.23	16.42	161.75	128.00
83	EC 325103	70.25	126.05	31.70	1.93	17.72	178.75	145.00
84	PKS 7	82.25	140.05	24.70	1.83	13.92	136.75	103.00
85	JSM 285	82.25	130.05	20.70	1.83	14.42	77.75	44.00
86	EC 33872B	83.25	131.05	48.70	1.73	16.32	340.75	307.00
87	G 91	81.25	140.05	25.70	1.93	12.22	133.75	100.00
88	SOL 1	64.25	126.05	24.70	1.73	16.02	177.75	144.00
89	JSM 232	70.25	130.05	20.70	1.83	13.92	127.75	94.00
90	JSM 222	78.25	126.05	25.70	1.93	11.82	68.75	35.00
91	JSM 245	70.25	130.05	25.70	2.23	11.72	154.75	121.00
92	EC 39513	81.25	133.05	39.70	1.83	16.22	169.75	136.00
93	EC 39743	85.25	140.05	26.70	1.73	15.72	156.75	123.00
94	TGX 1835-10F	69.25	130.05	28.70	1.83	14.02	103.75	70.00
95	EPS 1B	69.25	126.05	31.70	2.33	17.92	263.75	230.00
96	EC 116343	69.25	126.05	33.70	2.33	15.82	166.75	133.00
97	MACS 1045	82.25	135.30	25.45	1.85	12.90	139.75	110.00
98	G 47	73.25	127.30	32.45	1.85	13.40	194.75	165.00
99	JSM 242	72.25	127.30	20.45	1.95	11.20	102.75	73.00
100	SL (E) 1	73.25	135.30	22.45	1.85	13.10	160.75	131.00
101	PK 701	86.25	141.30	21.45	2.35	8.90	124.75	95.00
102	PK 1038	86.25	141.30	32.45	2.05	9.60	269.75	240.00
103	PKS 54	81.25	131.30	43.45	1.85	9.20	265.75	236.00
104	EC 33940	73.25	127.30	31.45	2.25	12.90	168.75	139.00
105	RKS 45	84.25	142.30	47.45	1.95	10.90	208.75	179.00

106	MAUS 128	85.25	142.30	42.45	2.05	13.40	189.75	160.00
107	G 2225	88.25	142.30	28.45	1.95	11.50	226.75	197.00
108	JS 20-29	73.25	127.30	38.45	2.25	15.10	238.75	209.00
109	TNAU 20023	86.25	131.30	52.45	2.45	11.20	301.75	272.00
110	G 4 P15	71.25	124.30	47.45	2.25	15.30	175.75	146.00
111	GP 465	72.25	131.30	28.45	2.45	13.10	184.75	155.00
112	TGX849-D-13-4	91.25	145.30	54.45	1.85	9.10	348.75	319.00
113	JSM 227	73.25	131.30	57.45	1.95	12.90	400.75	371.00
114	JS 20-98	72.25	124.30	48.45	2.25	15.10	248.75	219.00
115	TGX 849-813	73.25	127.30	36.45	1.95	13.40	334.75	305.00
116	KB 17	73.25	127.30	38.45	2.45	13.50	236.75	207.00
117	KDS 256	73.25	127.30	42.45	2.45	13.50	276.75	247.00
118	LEE 54	72.25	127.30	30.45	1.95	13.60	205.75	176.00
119	JS 96-31	72.25	127.30	30.45	2.25	14.90	121.75	92.00
120	TNAU 2002A	84.25	140.30	42.45	2.25	10.90	207.75	178.00
121	SRL 37	70.25	124.30	48.45	1.95	13.50	211.75	182.00
122	WT 88	70.25	124.30	38.45	1.85	15.60	200.75	171.00
123	TNAU 20022	75.25	127.30	57.45	2.05	10.90	369.75	340.00
124	EC 528640	70.25	127.30	52.45	1.95	13.10	284.75	255.00
125	EC 538830	70.25	127.30	50.45	2.25	13.40	236.75	207.00
126	PK 258	86.25	140.30	41.45	2.35	13.50	192.75	163.00
127	EC 468597	-	-	-	-	-	-	0.00
128	EC 572160	73.25	124.30	34.45	2.45	13.10	137.75	108.00
129	SL 682	82.75	140.30	43.95	2.10	12.72	193.75	207.00
130	PI 204336	67.75	123.30	33.95	1.90	14.62	89.75	103.00
131	UGM 70	82.75	140.30	30.95	1.90	13.22	214.75	228.00
132	PS 93108	82.75	140.30	58.95	2.10	15.22	314.75	328.00
133	LEE 96	69.75	127.30	47.95	1.70	16.82	214.75	228.00

134	TGX 1488-9-1D	69.75	127.30	60.95	1.90	17.42	368.75	382.00
135	LEE 53	69.75	127.30	53.95	1.90	17.12	227.75	241.00
136	TGX 702-4-8	68.75	127.30	48.95	1.90	14.82	279.75	293.00
137	GP 566	68.75	130.30	56.95	1.90	12.92	225.75	239.00
138	JS 98-11	82.75	132.30	44.95	2.20	12.82	285.75	299.00
139	PS 1421	69.75	134.30	26.95	1.80	15.12	71.75	85.00
140	VLS 11	67.75	123.30	46.95	2.30	11.22	309.75	323.00
141	PS 1467	65.75	127.30	63.95	2.10	15.32	431.75	445.00
142	EC 350664	65.75	123.30	57.95	1.80	15.42	311.75	325.00
143	EC 377883B	67.75	127.30	42.95	2.20	16.62	205.75	219.00
144	JS 20-34	58.75	123.30	26.95	1.80	15.22	87.75	101.00
145	GC 84051-32-1	66.75	126.30	15.95	2.20	15.32	151.75	165.00
146	PK 431337	66.75	123.30	25.95	1.90	11.42	213.75	227.00
147	EC 390977	58.75	127.30	28.95	1.90	14.62	97.75	111.00
148	JS 20-86	61.75	123.30	33.95	2.10	13.12	107.75	121.00
149	JS 20-50	65.75	127.30	40.95	2.20	15.32	231.75	245.00
150	MACS 7102	65.75	123.30	23.95	2.20	14.72	67.75	81.00
151	11-5E (Z-2)	66.75	127.30	26.95	2.10	15.12	115.75	129.00
152	20-40B (Z-9)	67.75	127.30	38.95	1.70	14.82	197.75	211.00
153	20-14B (Z-15)	65.75	127.30	34.95	2.20	12.92	105.75	119.00
154	23-10B (Z-17)	65.75	128.30	33.95	1.90	13.12	249.75	263.00
155	23-11A (Z-18)	66.75	127.30	40.95	1.90	14.72	234.75	248.00
156	14-11B (Z-19)	66.75	127.30	28.95	1.80	15.22	171.75	185.00
157	20-14C (Z-22)	69.75	127.30	21.95	2.30	13.12	186.75	200.00
158	23-16C (Z-24)	68.75	127.30	27.95	1.80	11.22	138.75	152.00
159	23-16C (Z-23)	69.75	128.30	43.95	1.70	12.92	206.75	220.00
160	Himso-1685 (Local Check)	69.75	128.30	33.95	2.50	23.32	233.75	247.00

Table 8: Descriptive Statistics for Multi-location Germplasm Evaluation at PALAMPUR

	Days to 50 per cent flowering	Days to maturity	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Grain yield per plot (g)
Minimum	61	124	11	1.8	8.9	10
Maximum	89	145	66	2.8	22.8	445
Mean	75.05	130.25	30.96	2.08	13.34	159.25
Coeff of Variation	9.09	4.26	41.44	10	15.12	58.07

Table 9: Evaluation of Germplasm at Multi-location- PUNE (Adjusted means)

S.No.	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	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 (g)	Grain yield per plant (g)	Grain yield per plant (g) (not adjusted)
C1	MACS 1460	39.00	97.60	71.16	2.64	8.88	14.08	46.76	14.36	12.64	12.64
C2	KDS 753	43.60	98.40	78.36	3.72	10.64	18.44	40.96	18.02	15.00	15.00
C3	Dsb 23	42.20	99.60	83.20	4.12	10.00	18.96	40.08	14.64	11.15	11.15
C4	Dsb 21	41.40	96.80	76.72	3.20	9.52	18.16	41.52	12.54	13.77	13.77
C5	MACS 1188	45.60	98.40	76.72	3.28	10.08	17.92	43.72	15.58	14.03	14.03
1	VP 1199	38.16	92.16	70.47	3.11	12.10	25.23	54.33	11.21	13.57	11.66
2	K 53	42.16	100.16	49.47	3.91	9.90	19.63	41.33	17.71	16.45	14.54
3	EC 389153	52.16	102.16	91.27	5.51	15.30	44.23	109.93	14.81	13.99	12.08
4	UPSL 152	52.16	102.16	94.67	4.91	12.90	27.43	52.33	9.51	9.13	7.22
5	EC 389154 C	44.16	102.16	66.47	3.11	11.50	20.83	51.53	12.81	11.39	9.48
6	UPSL 72	47.16	100.16	102.67	4.91	12.70	34.03	76.33	9.71	14.49	12.58
7	UPSM 9	54.16	102.16	114.27	3.71	11.70	25.43	56.53	9.01	10.07	8.16
8	UPSM 20	52.16	100.16	115.27	4.31	10.70	31.03	67.13	9.81	14.15	12.24
9	EC 389179B	42.16	102.16	69.67	3.71	12.10	19.43	58.93	12.81	13.15	11.24
10	UPSL 652	47.16	102.16	103.67	2.91	14.10	28.23	61.33	9.41	10.29	8.38
11	UPSM 77	52.16	100.16	83.27	4.31	11.90	25.83	72.13	10.41	13.09	11.18

12	EC 391181	42.16	98.16	80.27	3.31	11.30	22.43	51.53	12.21	28.37	26.46
13	VGM 70	47.16	100.16	121.87	4.91	12.90	36.43	75.53	10.31	14.79	12.88
14	UPSM 57	51.16	102.16	128.67	4.31	15.50	35.03	70.53	11.21	16.39	14.48
15	VLS 75	42.16	94.16	74.07	3.71	11.10	23.63	70.13	11.91	17.43	15.52
16	EC 391316	47.16	92.16	72.87	3.51	11.50	25.43	71.93	14.01	17.45	15.54
17	RVS 206-21	42.16	96.16	69.47	3.51	10.50	20.63	57.13	12.81	19.29	17.38
18	JS 97-52	47.16	96.16	91.87	3.71	11.30	24.43	67.53	10.41	14.11	12.20
19	EC 391346	45.16	92.16	75.87	4.11	10.10	23.23	56.13	13.61	13.29	11.38
20	NRC 2007-A	40.16	98.16	88.67	3.91	14.90	27.63	66.73	12.51	21.45	19.54
21	NRC 80-1	40.16	98.16	72.67	4.31	13.10	28.03	94.13	15.61	21.45	19.54
22	JS 20-01	42.16	98.16	75.07	3.91	10.10	23.83	57.53	12.11	18.95	17.04
23	EC 396065	45.16	92.16	80.47	4.11	11.70	26.43	67.73	12.61	15.45	13.54
24	EC 251682	44.16	98.16	88.27	4.11	10.90	23.23	56.13	14.11	12.41	10.50
25	TG X 840-4-E	45.16	98.16	87.47	4.51	10.30	27.03	58.53	10.91	13.37	11.46
26	EC 251541	51.16	98.16	132.67	3.31	10.90	27.63	66.53	9.91	12.45	10.54
27	EC 393224	45.16	98.16	88.47	4.51	11.70	27.83	67.33	11.31	23.07	21.16
28	EC 340506B	44.16	98.16	82.07	3.31	12.30	22.63	62.13	13.41	13.63	11.72
29	EC 393231	47.16	92.16	80.87	4.11	11.90	19.43	46.33	11.71	8.65	6.74
30	EC 251516	42.16	94.16	58.87	4.11	10.30	21.03	50.73	15.21	16.33	14.42
31	GZ 258	44.16	94.16	78.67	4.31	12.10	23.43	52.33	12.61	12.69	10.78
32	DS 91-3	47.16	98.16	110.27	4.71	12.30	32.43	78.53	10.51	16.83	14.92
33	Dcb 137	39.76	94.16	67.43	1.23	10.14	12.75	45.37	14.73	11.49	10.84
34	EC 457214	39.76	96.16	61.63	1.63	10.74	15.15	52.57	14.13	13.63	12.98
35	DE 201	39.76	94.16	82.03	2.43	9.14	13.15	26.57	14.33	13.63	12.98
36	EC 381884	48.76	98.16	96.23	4.23	8.54	28.35	63.77	9.53	10.31	9.66
37	EC 457336	35.76	92.16	55.23	2.03	6.94	9.55	26.57	18.33	7.19	6.54
38	AGS 12	41.76	94.16	63.23	2.83	7.94	12.35	33.57	16.93	10.69	10.04
39	F 4 P 20	41.76	100.16	76.63	4.03	10.34	20.75	52.97	12.43	11.77	11.12
40	SL 794	46.76	100.16	111.03	3.43	11.54	25.95	64.97	11.33	12.59	11.94
41	EC 103336	44.76	92.16	69.23	2.43	9.14	14.15	33.77	14.13	7.39	6.74
42	NRC 86	41.76	96.16	63.83	2.03	8.54	13.15	31.77	14.63	9.03	8.38

43	EC 106998	46.76	96.16	87.03	3.83	10.94	22.35	59.57	16.73	12.83	12.18
44	SL 752	46.76	96.16	118.03	2.83	10.54	20.75	53.57	10.93	10.71	10.06
45	EC 109540	43.76	98.16	71.43	3.63	11.54	23.35	66.17	13.23	15.15	14.50
46	UGM 75	46.76	98.16	87.03	3.63	9.34	19.95	50.97	14.63	15.35	14.70
47	AC 113778	46.76	92.16	86.43	3.43	12.54	18.95	55.37	13.63	20.63	19.98
48	MACS 303	39.76	98.16	69.23	2.83	10.74	18.75	59.17	11.93	14.43	13.78
49	NRC 2006M	39.76	98.16	66.43	2.43	9.94	18.95	58.97	13.03	14.19	13.54
50	EC 16213	39.76	92.16	55.83	2.43	7.54	9.75	25.77	14.83	6.09	5.44
51	EC 23001A	39.76	100.16	116.83	4.43	11.74	31.35	63.97	14.43	13.33	12.68
52	EC 15961	48.76	100.16	92.43	4.03	8.54	28.35	74.77	12.93	16.03	15.38
53	EC 173325	33.76	94.16	57.43	1.83	7.34	10.95	35.77	18.43	14.11	13.46
54	PSL 6	46.76	98.16	119.03	5.03	14.74	35.15	85.37	11.63	20.79	20.14
55	TS 20-52	41.76	98.16	85.23	3.23	10.14	18.55	54.77	12.33	10.53	9.88
56	SL 525	41.76	98.16	79.63	4.03	8.74	17.55	54.97	11.53	12.51	11.86
57	EC 242004 F	46.76	98.16	130.43	3.23	10.94	26.95	61.17	13.13	15.01	14.36
58	EC 202072	43.76	98.16	98.43	3.43	8.94	17.15	33.97	15.63	9.11	8.46
59	PS 1475	35.76	94.16	60.03	2.78	7.74	14.75	30.77	18.43	12.49	11.84
60	NRC 37	39.76	102.16	69.63	2.43	11.34	20.75	66.17	14.23	19.11	18.46
61	EC 242111	43.76	92.16	85.43	3.43	9.34	17.35	34.97	14.83	8.47	7.82
62	MACS 171	46.76	100.16	104.43	1.43	10.34	10.95	21.57	17.53	7.09	6.44
63	SL 2951	43.76	94.16	104.03	3.03	12.34	19.35	42.37	13.43	13.33	12.68
64	AGS 164	41.76	94.16	84.23	2.83	10.34	18.35	52.97	13.33	16.99	16.34
65	EC 251501	46.76	97.36	69.27	3.63	11.74	22.67	51.33	13.41	13.44	11.54
66	MACS 1259	41.76	99.36	70.47	1.83	11.34	18.07	52.13	15.31	16.24	14.34
67	AGS 174	46.76	97.36	76.07	2.03	10.34	17.47	40.53	13.01	11.80	9.90
68	EC 251876	46.76	99.36	67.07	2.03	11.34	17.47	58.13	15.81	15.76	13.86
69	SL 432	46.76	99.36	106.87	3.83	13.54	30.07	68.73	10.81	13.58	11.68
70	LEE 75	44.76	95.36	91.67	4.63	10.34	24.87	58.33	13.11	15.66	13.76
71	EC 389099	46.76	97.36	74.47	4.23	10.94	23.87	83.13	13.41	21.18	19.28
72	JS 2069	41.76	99.36	65.67	3.43	9.34	19.07	44.33	13.61	13.92	12.02
73	JSM 195	39.76	99.36	63.47	5.03	10.34	25.07	65.13	15.31	21.24	19.34

74	EC 291397	37.76	97.36	66.27	3.63	12.34	23.67	69.33	14.81	20.38	18.48
75	PS 1336	39.76	99.36	76.47	2.23	11.94	15.07	47.73	17.31	16.00	14.10
76	EC 291403	46.76	99.36	53.07	5.83	8.34	18.47	51.33	15.01	14.80	12.90
77	EC 291451	43.76	95.36	66.47	2.63	10.34	20.67	50.33	13.41	15.12	13.22
78	EC 24091	43.76	95.36	74.27	2.83	11.74	19.87	49.93	12.81	11.50	9.60
79	EC 291453	44.76	101.36	94.47	5.03	13.74	31.47	77.13	9.11	16.68	14.78
80	EC 309537	41.76	101.36	81.07	3.63	12.14	21.07	62.33	12.61	14.66	12.76
81	EC 30967A	46.76	101.36	79.67	4.03	11.74	21.67	63.13	15.51	15.82	13.92
82	RSC 14	46.76	101.36	66.87	2.83	11.34	22.07	68.93	14.61	21.10	19.20
83	EC 325103	41.76	101.36	78.07	3.03	9.94	17.27	44.73	15.71	13.58	11.68
84	PKS 7	48.76	101.36	85.87	3.23	8.94	23.67	58.93	10.71	12.42	10.52
85	TSM 285	41.76	97.36	77.47	2.83	10.74	18.07	48.73	14.11	15.96	14.06
86	EC 33872B	43.76	99.36	67.27	3.03	12.94	17.87	59.33	14.01	15.32	13.42
87	G 91	48.76	99.36	114.47	4.83	13.14	34.27	84.33	11.81	18.32	16.42
88	SQL 1	37.76	97.36	75.27	1.83	10.74	16.07	49.93	15.61	17.04	15.14
89	TSM 232	41.76	105.36	75.67	3.43	11.34	20.27	59.33	14.41	15.26	13.36
90	JSM 222	41.76	99.36	74.07	2.83	10.34	18.87	55.33	14.51	14.82	12.92
91	JSM 245	39.76	99.36	72.07	2.63	9.34	15.67	56.93	14.31	18.82	16.92
92	EC 39513	46.76	99.36	74.27	2.43	11.54	15.47	54.13	15.21	16.00	14.10
93	EC 39743	51.76	99.36	131.27	2.63	10.74	16.47	40.13	14.21	10.62	8.72
94	TG X 1835-10F	46.76	99.36	96.87	5.83	11.74	24.27	47.33	18.41	13.80	11.90
95	EPS1B	39.76	95.36	78.67	3.03	10.54	18.67	57.13	15.31	17.84	15.94
96	EC 116343	46.76	103.36	83.67	3.43	10.74	20.87	52.73	17.91	17.28	15.38
97	MACS 1045	44.76	101.76	82.63	2.79	8.74	16.19	24.41	19.39	6.59	7.74
98	G- 47	44.76	97.76	76.63	2.79	10.34	18.19	58.41	14.09	15.85	17.00
99	JSM 242	35.76	97.76	67.83	2.79	8.94	12.39	38.61	14.59	11.37	12.52
100	SL (E) 1	44.76	103.76	81.83	2.99	8.14	14.19	29.21	18.39	10.09	11.24
101	PK 701	46.76	99.76	134.43	4.39	13.34	31.59	74.41	11.39	15.65	16.80
102	PK 1038	46.76	99.76	122.23	2.99	10.94	21.39	48.01	11.29	8.01	9.16
103	RKS 54	41.76	99.76	81.63	3.39	11.94	18.79	58.01	11.09	13.15	14.30
104	EC 33940	41.76	95.76	79.23	3.19	10.94	18.79	56.41	14.29	9.89	11.04

105	RKS 45	49.76	99.76	121.23	3.79	11.74	22.79	39.61	12.19	6.75	7.90
106	MAUS 128	44.76	105.76	113.03	3.19	12.94	14.19	55.81	17.49	11.55	12.70
107	G 2225	48.76	105.76	133.43	2.79	16.34	29.99	72.81	11.89	11.73	12.88
108	JS 20-29	39.76	97.76	70.43	2.59	9.14	14.59	28.41	16.89	11.25	12.40
109	TNAU 20023	46.76	97.76	136.43	4.39	11.54	33.59	66.81	10.39	10.57	11.72
110	GyP15	37.76	97.76	81.43	2.79	9.34	12.79	18.81	14.49	7.45	8.60
111	GP465	39.76	97.76	76.83	2.59	10.94	16.99	53.01	13.79	11.55	12.70
112	TGX849-813	53.76	105.76	96.63	2.99	12.34	26.19	53.61	9.29	16.45	17.60
113	KB 17	39.76	103.76	74.63	3.39	10.34	15.99	50.41	12.79	12.25	13.40
114	JS 20-98	31.76	97.76	68.83	2.19	9.74	13.19	31.41	15.39	10.29	11.44
115	TG X 849 -813	46.76	103.76	96.03	3.79	11.74	25.19	64.81	12.99	13.01	14.16
116	KB 17	42.76	97.76	72.83	2.79	10.14	16.99	43.21	12.89	11.33	12.48
117	KDS 256	39.76	105.76	93.23	1.99	9.14	12.19	22.01	11.69	4.15	5.30
118	LEE 54	44.76	97.76	78.83	4.19	11.34	22.19	63.41	15.19	17.79	18.94
119	JS 96-31	39.76	99.76	81.03	2.99	8.94	14.99	31.81	16.09	10.63	11.78
120	TNAU 20024	46.76	99.76	120.03	3.19	11.54	22.59	60.21	10.49	11.65	12.80
121	SQL 37	39.76	99.76	78.23	2.79	9.74	14.59	25.01	15.09	9.87	11.02
122	WT 88	39.76	99.76	76.83	2.79	8.74	11.39	22.01	17.19	8.45	9.60
123	TNAU 20024	46.76	99.76	126.43	4.79	13.54	30.99	80.81	11.49	15.35	16.50
124	SQL 37	46.76	97.76	72.63	3.79	11.14	21.39	55.01	14.29	11.51	12.66
125	EC 538830	42.76	97.76	74.63	3.19	11.34	18.99	44.81	13.19	11.39	12.54
126	PK 258	46.76	97.76	114.23	3.79	10.94	26.39	50.01	11.49	9.91	11.06
127	EC 468597	42.76	97.76	72.03	3.59	10.94	21.19	50.21	11.89	13.33	14.48
128	EC 572160	44.76	103.76	74.23	3.59	11.94	23.59	65.81	13.79	15.65	16.80
129	SL 682	46.56	99.56	113.79	4.03	10.86	25.15	52.57	11.47	6.88	10.20
130	PI 204336	39.56	99.56	54.99	3.03	8.86	14.55	38.97	12.87	6.38	9.70
131	UGM 70	46.56	102.56	107.39	5.03	11.66	39.15	83.57	12.27	13.78	17.10
132	PS 93108	49.56	104.56	130.39	3.43	12.06	21.35	52.97	12.17	7.64	10.96
133	LEE 96	44.56	102.56	70.19	3.43	11.26	21.15	63.77	14.27	13.76	17.08
134	TG X 1488 - 9 1 D	44.56	110.56	66.19	3.43	10.46	19.75	51.57	13.67	9.62	12.94
135	LEE 53	41.56	98.56	82.59	2.43	11.46	17.55	40.37	14.27	15.98	19.30

136	TG X 702-48	44.56	100.56	67.99	3.23	11.66	20.75	50.97	14.97	11.56	14.88
137	GP - 566	48.56	96.56	94.59	5.43	12.66	33.15	69.97	14.57	11.10	14.42
138	TS 98-11	46.56	98.56	118.39	4.23	12.46	34.55	74.57	12.27	14.24	17.56
139	PS - 1421	46.56	104.56	69.79	3.83	10.66	17.95	49.97	16.97	12.64	15.96
140	LS 11	44.56	100.56	72.99	3.63	11.46	22.95	63.77	10.17	8.86	12.18
141	PS 1467	39.56	100.56	62.59	2.03	11.46	19.55	62.77	14.07	12.44	15.76
142	EC 350604	37.56	104.56	53.19	2.83	8.46	14.35	31.17	14.17	5.82	9.14
143	EC 377883B	39.56	104.56	87.99	2.43	10.06	16.15	33.37	16.77	9.72	13.04
144	JS 20-34	29.56	94.56	44.99	1.23	7.26	8.35	15.57	14.77	2.12	5.44
145	GC 840551 - 32 - 1	44.56	96.56	70.79	3.83	13.66	24.95	68.37	15.37	15.86	19.18
146	PK 431337	44.56	96.56	108.19	5.83	14.46	30.55	70.57	10.77	12.26	15.58
147	EC 390977	39.56	96.56	98.59	3.23	10.06	14.95	32.57	13.07	3.06	6.38
148	TS 20-86	39.56	98.56	78.19	4.23	11.06	21.95	55.57	13.57	10.48	13.80
149	JS 20-50	39.56	104.56	74.79	3.43	9.26	16.35	35.97	15.47	7.64	10.96
150	MACS 7102	39.56	96.56	75.19	2.83	9.26	14.75	31.17	14.97	6.44	9.76
151	11-5E(Z-2)	42.56	94.56	135.39	2.43	9.86	16.95	35.37	10.37	2.82	6.14
152	20-4013(Z-9)	39.56	100.56	102.39	2.63	13.06	22.55	51.57	12.77	9.48	12.80
153	20-4013(Z-15)	39.56	100.56	76.79	3.43	10.86	20.35	59.57	12.87	11.66	14.98
154	23-10B(Z-17)	37.56	98.56	68.59	3.03	10.26	19.15	62.57	12.37	12.02	15.34
155	23-11A(Z-18)	37.56	98.56	71.99	4.03	9.66	21.95	63.57	11.07	9.10	12.42
156	14-11B (Z-19)	39.56	102.56	79.19	3.83	9.86	24.15	80.97	12.17	20.08	23.40
157	20-14C(Z-22)	42.56	102.56	87.19	4.43	11.06	25.35	63.97	13.47	15.08	18.40
158	23-16C(Z-24)	41.56	94.56	101.39	3.83	8.86	18.15	45.37	10.77	3.46	6.78
159	23-16C(Z-23)	44.56	94.56	71.39	3.83	9.66	18.75	47.37	11.77	8.20	11.52

Table 10: Descriptive Statistics for Multi-location Germplasm Evaluation at PUNE

Parameters	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	Number of primary branches per plant	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Grain yield per plant (g)	Row Yield (g)
Minimum	31.00	94.00	45.00	1.20	7.40	8.20	17.00		8.80	5.30	202.74
Maximum	55.00	110.00	137.40	6.00	16.20	41.80	103.00		19.30	26.46	2381.40
Mean	43.61	98.74	85.12	3.43	10.94	21.46	54.27		13.46	13.03	768.47
Coeff of Variation	9.38	3.20	24.13	25.76	14.16	27.76	27.47		15.77	28.12	40.99

Table 11: Evaluation of Germplasm at Multi-location- PARBHANI (Adjusted means)

Sr. no.	Name of Entry	Days to Flower	Days to maturity	Plant ht (Cm)	No of nods/ plant	No of pod cluster/ plant	No of pods /plant	100 Seed wt. (g)	seed yield/ plant (g)	Seed yield /row (g)	Seed yield/row (g) (non adjusted)
C1	NRC 86	38.80	97.80	60.08	13.40	9.08	36.68	12.31	9.87	510.79	510.79
C2	JS 20-34	29.20	88.00	37.64	9.32	7.04	37.16	11.29	8.59	371.14	371.14
C3	JS 20 – 29	38.20	97.60	62.72	12.20	8.12	39.04	16.07	11.86	682.78	682.77
C4	JS 20 – 69	36.00	96.40	63.56	12.48	8.08	32.76	13.04	9.87	591.96	591.96
C5	JS 20 – 98	38.40	98.40	53.36	14.00	10.00	28.84	13.36	9.57	432.11	432.11
1	VP 1199	38.12	97.24	74.43	16.64	14.70	61.62	10.03	8.37	488.12	487.20
2	K 53	39.12	98.24	41.63	16.04	13.70	50.82	15.43	11.75	541.42	540.50
3	EC 389153	49.12	107.24	76.83	19.64	17.70	55.02	7.41	6.79	373.70	372.78
4	UPSL 152	50.12	108.24	90.03	23.24	19.70	38.82	8.33	6.45	255.12	254.20
5	EC 389154 C	43.12	102.24	55.43	22.44	19.50	42.42	10.57	8.65	294.92	294.00
6	UPSL 72	46.12	105.24	86.03	22.64	16.90	57.02	8.51	7.10	316.02	315.10
7	UPSM 9	46.12	105.24	84.83	13.44	12.30	92.22	9.33	7.60	272.87	271.95
8	UPSM 20	43.12	104.24	62.23	17.64	15.90	79.22	11.25	10.10	572.22	571.30
9	EC 389179B	39.12	100.24	76.43	12.64	10.70	38.42	11.97	9.15	419.22	418.30
10	UPSL 652	44.12	105.24	62.43	15.64	13.30	62.02	8.47	7.10	302.32	301.40
11	UPSM 77	46.12	107.24	71.03	13.64	11.30	43.82	10.63	8.90	424.77	423.85
12	EC 391181	41.12	102.24	69.63	17.24	13.90	31.22	11.53	7.50	406.92	406.00

13	VGM 70	46.12	107.24	87.83	15.04	13.10	35.02	10.71	7.95	455.22	454.30
14	UPSM 57	46.12	107.24	103.43	22.24	19.90	97.02	11.19	10.04	558.95	558.03
15	VLS 75	38.12	98.24	59.03	13.64	12.30	50.02	12.97	11.07	531.10	530.18
16	EC 391316	40.12	101.24	71.03	15.64	13.70	43.42	11.11	9.05	449.72	448.80
17	RVS 206-21	38.12	98.24	60.23	14.64	11.30	42.62	15.63	12.75	675.92	675.00
18	JS 97-52	41.12	101.24	71.43	14.24	11.70	53.22	11.45	9.75	494.92	494.00
19	EC 391346	39.12	100.24	65.43	13.64	10.30	36.42	12.23	10.87	415.10	414.18
20	NRC 2007-A	38.12	99.24	99.63	17.64	14.90	36.42	11.71	9.55	354.32	353.40
21	NRC 80-1	37.12	97.24	57.83	14.64	11.90	46.42	13.29	10.82	455.43	454.51
22	JS 20-01	36.12	97.24	67.03	14.64	11.50	35.42	14.27	11.15	611.32	610.40
23	EC 396065	39.12	100.24	66.23	13.64	11.50	41.02	11.71	9.54	391.10	390.18
24	EC 251682	39.12	100.24	72.43	16.44	13.90	37.22	12.25	9.25	378.92	378.00
25	TG X 840-4-E	45.12	106.24	69.63	18.64	15.90	42.42	10.43	8.37	333.84	332.92
26	EC 251541	47.12	108.24	108.83	19.64	18.10	103.02	10.29	9.25	342.92	342.00
27	EC 393224	41.12	101.24	79.43	14.44	12.30	47.62	10.33	9.35	546.92	546.00
28	EC 340506B	41.12	101.24	74.23	14.64	11.30	30.22	11.33	6.75	390.92	390.00
29	EC 393231	41.12	101.24	70.03	15.64	12.10	41.62	11.03	9.65	564.92	564.00
30	EC 251516	38.12	99.24	56.23	13.24	10.70	31.22	14.77	9.90	406.22	405.30
31	GZ 258	40.12	101.24	71.83	13.44	11.10	21.02	10.83	5.81	290.04	289.12
32	DS 91-3	46.12	106.24	93.43	19.04	13.90	50.22	9.81	6.47	237.28	236.36
33	Dcb 137	38.32	97.64	62.47	14.52	10.82	41.26	11.99	8.76	500.93	486.78
34	EC 457214	35.32	95.64	56.27	14.52	12.82	35.26	12.27	8.92	510.05	495.90
35	DE 201	36.32	98.64	73.87	13.92	11.22	30.26	12.63	7.87	312.50	298.35
36	EC 381884	36.32	96.64	104.47	14.72	11.42	50.46	7.81	6.12	350.45	336.30
37	EC 457336	36.32	96.64	54.07	12.52	8.82	50.66	15.53	12.62	485.35	471.20
38	AGS 12	37.32	98.64	50.87	11.72	8.22	37.06	16.31	11.42	585.35	571.20
39	F 4 P 20	39.32	97.64	61.47	13.72	10.62	46.66	10.65	8.60	500.19	486.04
40	SL 794	44.32	104.64	95.27	13.72	9.62	39.26	9.29	7.62	302.75	288.60
41	EC 103336	38.32	98.64	57.87	14.72	11.82	46.06	12.38	11.16	407.99	393.84
42	NRC 86	39.32	99.64	60.67	13.52	8.62	36.26	11.97	9.22	509.15	495.00
43	EC 106998	39.32	99.64	80.87	14.72	12.22	42.46	11.15	9.42	336.15	322.00

44	SL 752	40.32	98.64	76.27	12.52	9.22	60.06	10.65	9.06	464.99	450.84
45	EC 109540	39.32	97.64	53.07	14.72	9.22	44.46	11.97	8.67	419.75	405.60
46	UGM 75	45.32	105.64	61.67	12.52	9.02	32.46	16.59	11.55	490.01	475.86
47	AC 113778	39.32	97.64	54.07	16.72	11.22	48.66	11.51	10.04	397.13	382.98
48	MACS 303	40.32	98.64	61.47	11.72	7.22	24.86	11.65	6.86	379.35	365.20
49	NRC 2006M	37.32	98.64	59.07	14.72	10.22	60.86	12.63	10.52	426.15	412.00
50	EC 16213	36.32	95.64	47.07	13.72	9.22	32.66	12.61	9.74	271.19	257.04
51	EC 23001A	37.32	97.64	102.47	11.72	9.02	39.86	12.37	10.22	324.15	310.00
52	EC 15961										
53	EC 173325	35.32	96.64	47.47	10.52	7.02	19.66	16.21	8.43	334.34	320.19
54	PSL 6	45.32	106.64	112.87	13.72	11.02	50.06	9.97	8.45	442.11	427.96
55	TS 20-52	41.32	100.64	69.87	14.32	11.22	40.06	11.63	8.62	274.55	260.40
56	SL 525	41.32	103.64	61.87	13.72	8.22	52.26	11.39	10.02	602.15	588.00
57	EC 242004 F	45.32	107.64	102.87	13.92	10.22	54.46	10.99	7.87	442.55	428.40
58	EC 202072	41.32	100.64	66.07	13.52	9.22	50.86	11.15	9.36	251.79	237.64
59	PS 1475	35.32	95.64	68.47	12.72	8.22	45.66	16.03	13.42	806.15	792.00
60	NRC 37	36.32	96.64	72.07	14.52	11.02	39.46	11.89	8.42	506.15	492.00
61	EC 242111	40.32	98.64	68.67	12.32	9.82	54.26	11.31	8.87	290.95	276.80
62	MACS 171	40.32	101.64	95.67	12.12	9.62	26.46	15.75	8.92	431.75	417.60
63	SL 2951	40.32	101.64	84.47	14.72	9.82	52.66	11.65	10.07	526.35	512.20
64	AGS 164	43.32	102.64	65.47	12.72	10.02	58.06	12.79	11.10	536.39	522.24
65	EC 251501	40.32	100.64	60.87	11.72	8.82	27.66	10.39	6.60	269.35	255.20
66	MACS 1259	39.52	99.84	50.19	14.68	9.98	41.50	14.10	11.12	505.81	504.00
67	AGS 174	39.52	98.84	69.19	14.68	10.58	45.90	10.88	8.08	311.89	310.08
68	EC 251876	40.52	99.84	61.39	12.88	9.58	45.30	12.56	9.11	323.46	321.65
69	SL 432	46.52	104.84	90.99	13.88	9.78	37.90	9.48	7.48	417.61	415.80
70	LEE 75	40.52	99.84	61.59	15.08	11.98	45.90	12.40	11.42	668.81	667.00
71	EC 389099	39.52	98.84	61.99	12.48	8.98	37.70	11.60	9.22	401.71	399.90
72	JS 2069	37.52	97.84	64.19	12.68	7.58	33.30	12.62	8.82	429.01	427.20
73	JSM 195	34.52	94.84	49.39	12.88	7.98	43.10	13.72	11.32	571.81	570.00
74	EC 291397	34.52	94.84	49.79	14.48	9.38	41.50	12.92	10.10	531.17	529.36

75	PS 1336	34.52	93.84	69.99	13.68	10.98	42.50	16.20	12.67	639.31	637.50
76	EC 291403	40.52	99.84	45.99	9.28	6.78	35.10	14.08	10.42	411.31	409.50
77	EC 291451	39.52	98.84	62.39	12.08	8.98	36.10	11.80	9.82	397.81	396.00
78	EC 24091	39.52	98.84	65.19	14.48	9.58	29.50	11.06	7.42	339.31	337.50
79	EC 291453	38.52	97.84	78.39	14.48	10.98	36.90	7.64	6.07	370.81	369.00
80	EC 309537										
81	EC 30967A	40.52	98.84	74.19	11.68	7.78	42.70	13.26	10.79	425.81	424.00
82	RSC 14	40.52	98.84	65.99	13.88	9.18	35.90	12.04	10.38	420.21	418.40
83	EC 325103	38.52	97.84	88.99	12.28	7.98	32.90	14.72	8.12	370.81	369.00
84	PKS 7	46.52	104.84	70.19	13.88	7.58	54.10	8.70	7.08	273.89	272.08
85	TSM 285	36.52	95.84	62.39	13.88	9.18	32.10	15.34	11.42	484.81	483.00
86	EC 33872B	39.52	98.84	62.79	13.68	7.58	26.30	11.90	7.19	438.01	436.20
87	G 91	44.52	102.84	97.39	15.88	10.58	45.30	9.12	7.33	379.72	377.91
88	SQL 1	36.52	94.84	64.19	11.68	8.38	31.50	15.16	11.81	453.63	451.82
89	TSM 232	37.52	94.84	68.99	11.08	8.78	29.50	14.00	8.12	469.21	467.40
90	JSM 222	36.52	95.84	60.99	12.48	9.38	55.10	11.24	10.54	447.85	446.04
91	JSM 245	35.52	96.84	61.79	11.08	7.98	65.90	13.16	11.40	483.97	482.16
92	EC 39513	42.52	101.84	62.39	13.08	9.98	28.90	12.98	8.66	499.99	498.18
93	EC 39743	48.52	106.84	73.19	14.88	11.78	52.10	11.30	9.64	555.85	554.04
94	TG X 1835-10F	48.52	106.84	61.39	11.68	8.58	34.50	16.80	12.02	582.61	580.80
95	EPS1B	34.52	94.84	53.99	10.88	8.18	24.90	12.46	7.42	421.81	420.00
96	EC 116343	39.52	101.84	61.79	11.68	8.18	28.90	15.14	9.42	334.31	332.50
97	MACS 1045	45.52	104.84	62.19	13.28	10.38	40.10	14.62	11.42	461.81	460.00
98	G- 47	39.92	96.44	62.63	14.36	11.42	44.46	13.02	11.42	646.71	666.40
99	JSM 242	34.92	98.44	54.63	11.56	9.22	34.46	15.02	10.42	514.41	534.10
100	SL (E) 1	42.92	102.44	59.83	11.56	8.82	32.86	14.02	9.72	592.31	612.00
101	PK 701	45.92	105.44	79.83	16.76	12.62	57.86	10.28	7.91	475.32	495.01
102	PK 1038	46.92	105.44	73.43	20.76	16.62	61.86	8.96	5.87	310.51	330.20
103	RKS 54	40.92	99.44	54.23	14.36	11.62	54.06	10.70	7.75	474.11	493.80
104	EC 33940	40.92	99.44	55.83	12.76	9.22	23.26	12.40	6.62	193.31	213.00
105	RKS 45	45.92	104.44	68.23	13.56	11.62	44.46	9.98	8.03	448.36	468.05

106	MAUS 128	43.92	104.44	80.23	12.36	10.02	58.46	15.38	11.95	676.39	696.08
107	G 2225	47.92	107.44	70.63	14.36	10.22	50.46	9.90	6.89	422.51	442.20
108	JS 20-29	39.92	97.44	63.43	12.56	8.42	38.06	16.76	11.72	529.31	549.00
109	TNAU 20023	43.92	105.44	71.23	15.56	13.22	71.66	9.30	6.97	337.91	357.60
110	GyP15	35.92	95.44	46.03	14.96	12.82	31.66	15.20	11.52	700.31	720.00
111	GP465	36.92	96.44	55.83	18.56	16.42	49.46	12.40	10.37	566.21	585.90
112	TGX849-813	47.92	106.44	93.63	27.36	19.42	95.06	6.94	5.05	312.11	331.80
113	KB 17	37.92	96.44	63.43	20.76	16.42	47.86	12.38	10.25	624.11	643.80
114	JS 20-98	37.92	98.44	54.23	13.96	10.42	28.46	12.88	8.62	508.11	527.80
115	TG X 849 -813	42.92	102.44	78.03	18.36	13.82	29.06	11.34	8.32	481.91	501.60
116	KB 17	40.92	100.44	69.43	16.36	12.42	26.26	12.80	8.72	495.51	515.20
117	KDS 256	40.92	100.44	63.83	12.96	9.82	29.06	10.54	7.52	404.31	424.00
118	LEE 54	39.92	99.44	70.03	14.16	11.62	30.06	13.80	9.42	534.71	554.40
119	JS 96-31	35.92	94.44	60.83	13.96	12.42	28.06	15.38	8.67	428.66	448.35
120	TNAU 20024	44.92	103.44	73.63	21.76	18.22	49.86	9.06	6.94	410.67	430.36
121	SQL 37	36.92	97.44	49.63	12.76	9.42	20.86	15.42	7.17	332.21	351.90
122	WT 88	37.92	98.44	51.83	14.36	11.22	25.26	16.42	11.32	641.11	660.80
123	TNAU 20024	45.92	104.44	99.43	23.96	19.22	50.86	10.08	8.16	412.31	432.00
124	SQL 37	39.92	99.44	66.23	20.76	18.22	39.06	11.16	8.70	365.87	385.56
125	EC 538830	40.92	100.44	69.03	16.36	13.42	27.06	9.58	5.97	264.11	283.80
126	PK 258	46.92	106.44	70.03	18.76	15.82	40.86	10.06	7.97	309.86	329.55
127	EC 468597	40.92	100.44	65.43	11.56	9.22	23.86	12.14	7.12	352.71	372.40
128	EC 572160	39.92	99.44	65.03	17.56	13.02	27.86	13.28	8.62	426.21	445.90
129	SL 682	46.12	104.84	85.47	24.80	19.46	68.58	9.08	8.04	480.40	477.60
130	PI 204336	37.12	97.84	48.87	15.00	12.46	44.98	12.50	10.64	594.16	591.36
131	UGM 70	47.12	108.84	71.47	20.00	16.46	42.38	11.86	9.98	468.10	465.30
132	PS 93108	49.12	108.84	72.67	23.60	19.26	36.78	9.18	7.73	370.00	367.20
133	LEE 96	41.12	99.84	64.87	17.20	13.46	56.58	12.12	10.28	461.80	459.00
134	TG X 1488 - 9 1 D	41.12	100.84	62.67	15.40	12.06	45.58	12.70	10.62	582.50	579.70
135	LEE 53	41.12	99.84	57.67	10.60	6.66	45.78	12.22	10.83	518.80	516.00
136	TG X 702-48	41.12	100.84	56.87	19.60	13.86	50.58	12.68	10.13	394.75	391.95

137	GP - 566	47.12	108.84	81.27	15.40	11.06	54.98	11.16	9.63	489.85	487.05
138	TS 98-11	46.12	104.84	103.47	13.80	10.46	45.78	12.28	10.15	546.58	543.78
139	PS - 1421	42.12	101.84	55.07	18.60	12.06	51.18	15.14	13.27	556.78	553.98
140	LS 11	41.12	98.84	64.67	15.40	10.46	47.18	8.00	7.03	266.90	264.10
141	PS 1467	37.12	95.84	55.47	15.80	12.06	43.58	14.68	12.07	542.35	539.55
142	EC 350604	37.12	98.84	41.87	14.40	11.06	50.78	9.06	7.63	357.65	354.85
143	EC 377883B	37.12	95.84	57.87	12.20	9.06	41.78	17.80	15.05	901.00	898.20
144	JS 20-34	29.12	88.84	37.47	9.60	6.86	36.78	11.80	9.83	314.80	312.00
145	GC 840551 - 32 - 1	41.12	99.84	48.67	13.40	9.06	49.58	12.54	10.89	435.20	432.40
146	PK 431337	40.12	99.84	75.67	11.80	8.06	45.78	9.74	8.03	296.95	294.15
147	EC 390977	35.12	94.84	59.27	14.80	12.06	35.38	11.58	9.03	378.70	375.90
148	TS 20-86	40.12	98.84	54.27	18.80	13.46	37.58	14.98	11.08	519.80	517.00
149	JS 20-50	38.12	95.84	58.07	14.00	9.26	44.78	14.30	11.93	713.80	711.00
150	MACS 7102	38.12	95.84	49.87	11.60	8.46	42.58	14.52	12.42	669.16	666.36
151	11-5E(Z-2)	41.12	100.84	68.67	11.00	7.46	44.78	10.84	8.73	366.10	363.30
152	20-4013(Z-9)	36.12	93.84	62.87	14.20	10.46	43.98	12.58	10.19	386.98	384.18
153	20-4013(Z-15)	40.12	100.84	57.07	12.80	8.46	45.18	12.74	10.58	632.80	630.00
154	23-10B(Z-17)	35.12	94.84	63.87	12.20	7.46	36.98	11.30	8.33	497.80	495.00
155	23-11A(Z-18)	38.12	96.84	47.47	13.60	10.86	44.98	10.74	8.62	515.20	512.40
156	14-11B (Z-19)	38.12	96.84	58.47	12.40	8.46	46.98	11.84	9.23	551.80	549.00
157	20-14C(Z-22)	41.12	100.84	60.27	13.20	9.06	33.58	13.72	9.88	581.00	578.20
158	23-16C(Z-24)	40.12	97.84	64.27	13.60	9.86	38.98	11.24	9.08	497.80	495.00
159	23-16C(Z-23)	41.12	97.84	51.27	14.80	11.06	46.98	12.80	10.62	635.20	632.40

Table 12: Descriptive Statistics for Multi-location Germplasm Evaluation at PARBHANI

Parameters	Days to 50 per cent flowering	Days to maturity	Plant Height (cm) (cm)	Number of nodes per plant	Number of pod clusters per plant	Number of pods per plant	100 Seed weight (g) (g)	Grain yield per plant (g)	Row Yield (g)
Minimum	29.00	89.00	37.80	9.20	6.80	19.60	6.96	5.53	213.00
Maximum	50.00	109.00	112.60	27.40	19.80	102.80	17.82	14.97	898.20
Mean	40.59	100.29	67.50	14.81	11.32	43.51	12.11	9.29	450.75
Coeff of Variation	9.45	3.79	21.57	21.34	26.38	31.51	18.07	19.10	26.80

Table 1: Evaluation of Germplasm at Multi-location- RAIPUR (Mean) (Not adjusted)

S.No.	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	Number of primary branches per plant	Number of pods per plant	Number of seeds per pod	100 Seed weight (g)	Row Yield (g)
1	VP 1199	40	97	81.2	4	46.2	2.3	9.64	101
2	K 53	40	95	66.8	3.6	35.2	2.5	13.98	212
3	EC 389153	57	112	94.2	4.8	70.4	2.4	7.99	113
4	UPSL 152	56	110	69	4.8	46.4	2.2	6.8	44
5	EC 389154 C	48	103	74.2	3.8	38.8	2.3	11.76	115
6	UPSL 72	56	110	112.2	4.4	49	2.3	9.66	75
7	UPSM 9	57	110	100.8	3.8	45	2.5	7.9	155
8	UPSM 20	57	110	102.4	4.4	49.8	2.3	9.17	113
9	EC 389179B	46	103	68.4	3.4	39.2	2.2	11.13	192
10	UPSL 652	57	110	102	3.6	38	2.4	7.97	121
11	UPSM 77	56	115	97.2	5	59.4	2.4	10.51	147
12	EC 391181	43	99	88.4	3.6	42	2.3	9.65	112
13	VGM 70	57	115	94.2	4.8	39.2	2.3	8.62	41
14	UPSM 57	57	115	99	4.6	51.2	2.5	8.16	119
15	VLS 75	45	105	78.2	3.8	37	2.3	12.13	104
16	EC 391316	45	105	73	2.6	35	2.3	11.61	130
17	RVS 206-21	47	105	73.4	3.6	36.6	2.3	15.76	167

18	JS 97-52	46	105	68.4	3.8	36.2	2.3	9.16	92
19	EC 391346	46	105	70	3.6	40	2.3	12.65	121
20	NRC 2007-A	40	95	97.6	4.4	50.2	2.2	10.62	154
21	NRC 80-1	42	99	74	3.8	45	2.3	11.25	124
22	JS 20-01	40	97	76	1.4	36.2	2.4	10.2	91
23	EC 396065	45	103	84.6	3.6	50	2.3	10.15	107
24	EC 251682	46	103	81.2	3.4	43.8	2.3	12.62	66
25	TG X 840-4-E	57	115	102.6	3.8	48.6	2.4	7.17	112
26	EC 251541	60	121	98.4	3.6	34.8	2.4	9.62	101
27	EC 393224	47	103	80.6	3.2	29.8	2.5	10.15	96
28	EC 340506B	47	103	82	3.8	59	2.5	13.62	127
29	EC 393231	47	103	72.8	4.8	39.6	2.3	7.61	105
30	EC 251516	43	101	62.4	4.6	38.4	2.5	13.96	104
31	GZ 258	43	101	79	3.8	55	2.3	11.65	57
32	DS 91-3	45	101	86	4	40.7	2.4	10.66	95
33	Dcb 137	45	101	75	4	45.8	2.5	12.13	147
34	EC 457214	45	101	74.2	3.4	63	2.3	11.54	84
35	DE 201	43	100	73	3.6	39.2	2.3	12.58	93
36	EC 381884	47	105	85.8	3.4	21.6	2.3	7.92	56
37	EC 457336	48	103	70.4	4	62.8	2.5	13.46	315
38	AGS 12	42	99	64.6	3.2	39.4	2.4	9.62	273
39	F 4 P 20	47	104	76.2	3.8	39.4	2.3	10.17	65
40	SL 794	57	115	89.8	3.4	22.2	2.3	8.65	142
41	EC 103336	47	104	70.6	3.4	42	2.3	12.15	191
42	NRC 86	42	99	71.2	3.6	33.8	2.2	13.16	171
43	EC 106998	47	104	91.2	3.2	31.8	2.3	9.15	54
44	SL 752	47	104	100.4	4.4	55	2.3	11.15	127
45	EC 109540	47	104	78.8	4.6	68.2	2.3	11.24	251
46	UGM 75	57	115	110.6	3.6	45	2.4	8.16	107
47	AC 113778	57	114	89.4	4	33.8	2.4	12.15	163
48	MACS 303	45	102	82.2	5	58.8	2.4	12.16	163

49	NRC 2006M	45	102	80.2	2.8	33.2	2.4	12.17	181
50	EC 16213	45	102	73	3.4	38.6	2.4	11.15	85
51	EC 23001A	45	102	78.2	4.6	49	2.4	11	90
52	EC 15961	39	97	67.6	4.6	50.6	2.4	8.13	46
53	EC 173325	49	105	68.8	3	25.4	2.3	10.16	32
54	PSL 6	48	103	66.8	2.8	34.3	2.3	9.65	43
55	TS 20-52	46	103	16.6	3.3	33.6	2.4	8.64	197
56	SL 525	46	103	60.4	2	39.5	2.4	10.15	170
57	EC 242004 F	57	115	89	2.6	40.3	2.5	9.15	214
58	EC 202072	48	105	83.6	3	59.3	2.4	10.18	81
59	PS 1475	42	103	60.6	3.7	41	2.4	13.12	294
60	NRC 37	45	102	71.3	3.3	44	2.3	12.65	82
61	EC 242111	46	103	83	4.6	51.3	2.3	12.2	157
62	MACS 171	45	102	111.6	4	42.6	2.5	12.11	147
63	SL 2951	47	103	81	2.6	33.6	2.3	10.16	43
64	AGS 164	46	103	70.3	3.3	24	2.4	7.16	64
65	EC 251501	47	103	76.6	4.3	58.3	2.3	12.15	93
66	MACS 1259	45	100	87.3	4.3	26.6	2.5	12.17	175
67	AGS 174	47	104	73.3	2.3	25.6	2.4	12.19	99
68	EC 251876	46	102	81.3	5.3	41.3	2.3	12.19	184
69	SL 432	54	111	96	3	56.6	2.4	8.64	47
70	LEE 75	45	101	112	3.6	51	2.5	12.7	107
71	EC 389099	48	104	84.3	3.3	36.3	2.4	9.11	73
72	JS 2069	40	97	69.3	4.6	29.6	2.4	12.15	198
73	JSM 195	40	97	63.6	4.3	64.6	2.5	13.62	92
74	EC 291397	43	100	69.6	3.3	25.6	2.4	11.23	102
75	PS 1336	46	103	88.6	3.6	32.3	2.4	14.12	172
76	EC 291403	44	101	67	3	56.3	2.3	12.15	220
77	EC 291451	48	104	77.3	4.6	32.6	2.3	11.6	97
78	EC 24091	44	101	70	5.3	41.3	2.5	13.16	140
79	EC 291453	56	115	98	3.3	52	2.4	7.64	210

80	EC 309537	48	104	76.6	3.6	16.6	2.3	12.1	98
81	EC 30967A	48	104	83.6	4	48.6	2.3	10.25	111
82	RSC 14	43	100	63.3	3.6	37.3	2.4	14.15	142
83	EC 325103	40	97	64	5	51.3	2.3	14.15	92
84	PKS 7	54	111	114.6	3.3	20.3	2.3	8.13	70
85	TSM 285	40	97	74	3.3	26.6	2.4	11.61	181
86	EC 33872B	54	111	78	3.3	43.2	2.3	11.12	191
87	G 91	56	115	74.6	4	20.7	2.3	9.11	77
88	SQL 1	54	92	66	3.6	49	2.4	11.15	177
89	TSM 232	40	98	71.3	3.6	40.5	2.4	11.13	86
90	JSM 222	40	98	72.3	3.6	42.3	2.3	12.15	226
91	JSM 245	40	97	87.6	5.6	50	2.3	11.65	142
92	EC 39513	40	97	93.3	3.6	54.3	2.3	12.15	194
93	EC 39743	54	110	113.3	3	42.3	2.4	10.16	158
94	TG X 1835-10F	54	110	87.6	3.6	52.3	2.2	13.11	222
95	EPS1B	40	97	71.3	3.6	42.3	2.2	8.16	77
96	EC 116343	40	97	71	4.7	32.6	2.4	12.97	157
97	MACS 1045	40	97	75	4	49.6	2.3	15.12	203
98	G- 47	42	99	69.3	3	48	2.3	13.1	100
99	JSM 242	38	95	69	4.3	69.6	2.2	13.97	164
100	SL (E) 1	42	99	58.3	3.3	38.3	2.3	9.62	166
101	PK 701	54	111	69.3	3.6	32	2.4	9.14	57
102	PK 1038	56	115	76.6	3.3	24	2.4	7.61	68
103	RKS 54	56	115	81.3	4	73	2.6	6.15	167
104	EC 33940	54	111	67.6	5	21.6	2.3	11.65	132
105	RKS 45	54	111	120.6	2.6	23.6	2.3	9.64	82
106	MAUS 128	54	112	73.6	2.6	27	2.5	7.68	95
107	G 2225	56	115	70.2	3.6	29	2.2	7.62	165
108	JS 20-29	36	94	64.2	3.6	33.4	2.3	15.15	147
109	TNAU 20023	44	101	68.4	4.2	51.4	2.3	8.13	152
110	GyP15	38	95	70.4	4	33.6	2.6	7.65	176

111	GP465	48	105	66.4	4	23.2	2.3	7.61	96
112	TGX849-813	54	111	97.6	3.4	56.4	2.2	7.97	83
113	KB 17	52	111	97.6	3.4	36	2.4	6.96	104
114	JS 20-98	40	97	70.8	3.6	31	2.4	13.15	221
115	TG X 849 -813	40	97	78.2	3.6	31.6	2.3	9.61	94
116	KB 17	48	105	61.6	4.2	42	2.3	10.13	65
117	KDS 256	44	101	79.3	3	21.6	2.3	10.15	145
118	LEE 54	43	100	78.8	4.8	43.4	2.4	7.64	75
119	JS 96-31	40	97	86.6	3.6	38.6	2.3	10.15	48
120	TNAU 20024	54	112	79	3.8	25.8	2.3	8.14	41
121	SQL 37	40	97	72.6	3.6	34	2.3	11.66	218
122	WT 88	40	97	68.6	4.4	47.8	2.5	11.12	353
123	TNAU 20024	40	97	72.2	4.2	31.8	2.5	10.16	50
124	SQL 37	52	110	75.4	3.6	40	2.2	12.47	113
125	EC 538830	54	112	73.4	4.2	30.4	2.3	12.16	104
126	PK 258	54	112	87.6	3	14	2.2	8.12	46
127	EC 468597								
128	EC 572160	44	101	82.4	3.8	48.4	2.3	10.61	149
129	SL 682	54	112	59.8	2.8	29	2.3	6.12	55
130	PI 204336	40	97	103.6	3.2	17.6	2.2	13.17	196
131	UGM 70	54	112	84.2	3.2	26.4	2.2	10.15	44
132	PS 93108	55	111	83.2	4.2	56.8	2.4	10.15	158
133	LEE 96	40	97	69.8	3.8	44.6	2.4	12.69	222
134	TG X 1488 - 9 1 D	54	112	82.4	4.6	50.2	2.3	13.14	179
135	LEE 53	48	105	71.6	4.4	48.6	2.3	13.12	179
136	TG X 702-48	54	112	101.4	3.2	15.4	2.3	12.65	75
137	GP - 566								
138	TS 98-11	56	116	72.6	3	33.8	2.5	7.92	96
139	PS - 1421	54	112	91	3.4	37	2.3	13.17	92
140	LS 11	54	112	71	3.4	56.4	2.2	10.14	70
141	PS 1467	54	112	65.8	4	47.2	2.4	12.65	203

142	EC 350604	54	112	80.6	3.8	33.6	2.3	13.05	156
143	EC 377883B	48	105	43.3	3	17.3	2.3	13.15	75
144	JS 20-34	40	97	88.3	4	41.6	2.3	11.65	49
145	GC 840551 - 32 - 1	48	105	79	4.3	82	2.4	7.65	150
146	PK 431337	54	112	72.8	3.6	56	2.4	8.66	100
147	EC 390977	54	112	57.4	3.6	52	2.6	9.13	110
148	TS 20-86	54	112	85.3	4	40	2.5	7.62	329
149	JS 20-50	40	98	60.6	3.3	51	2.6	13.97	131
150	MACS 7102	40	98	96.6	3.3	46	2.3	12.17	222
151	11-5E(Z-2)	40	97	89.6	3.6	49	2.4	11.12	115
152	20-4013(Z-9)	54	112	78	4.6	52	2.4	13.14	157
153	20-4013(Z-15)	40	97	64.3	4	51.6	2.5	11.24	130
154	23-10B(Z-17)	40	97	66	5	79.6	2.4	9.62	145
155	23-11A(Z-18)	40	97	76.6	4	39.3	2.3	7.62	209
156	14-11B (Z-19)	40	97	79.3	3.3	15.3	2.2	6.8	125
157	20-14C(Z-22)	40	97	87	3.3	38.6	2.2	9.61	46
158	23-16C(Z-24)	40	97	68.3	4.3	42.6	2.4	7.65	94
159	23-16C(Z-23)	40	97	92.3	5.3	50	2.5	11.55	170

Table 2: Descriptive Statistics for Multi-location Germplasm Evaluation at RAIPUR

Parameters	Days to 50 per cent flowering	Days to maturity	Plant Height (cm) (cm)	Number of primary branches per plant	Number of pods per plant	Number of seeds per pod	100 Seed weight (g) (g)	Row Yield (g) (g)
Minimum	36.00	92.00	16.60	1.40	14.00	2.20	6.12	32.00
Maximum	60.00	121.00	120.60	5.60	82.00	2.60	15.76	353.00
Mean	47.21	104.20	79.08	3.76	41.39	2.35	10.67	129.38
Coeff of Variation	12.90	6.11	18.00	17.95	31.01	3.98	20.08	47.29

Table 3: Evaluation of Germplasm at Multi-location- JABALPUR (means) (Not adjusted)

S.No.	Genotype	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	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 (g)	Row Yield (g)	YMV	BP	CR	RAB
C1	JS 20-34	30.00	100.00	35.67	0.00	10.60	4.60	24.60	9.00	72.00	MR	AR	AR	MR
C2	JS 335	41.00	103.00	69.00	2.70	14.00	9.00	55.30	9.10	140.00	MS	HR	MR	MS
C3	JS 20-98	40.00	103.00	64. 7	0.70	13.30	6.00	33.00	10.00	143.00	HR	AR	AR	MR
C4	JS 95-60	29.00									MR	HR	HS	MS
C5	NRC86	30.00	101.00	81.60	2.60	17.70	25.30	123.00	11.30	102.00	MR	AR	MR	MR
1	VP 1199	42.00									R	HR	HS	MS
2	K 53	48.00	104.00		2.30	14.00	2.30	23.00			R	AR	MR	MS
3	EC 389153	56.00	105.00	88.70	4.30	16.30	7.30	74.30	5.40	118.00	R	MS	AR	MR
4	UPSL 152	57.00	113.00	88.70	2.70	16.30	5.00	65.00	9.20	148.00	HR	MR	AR	HR
5	EC 389154 C	49.00									R	MR	S	MS
6	UPSL 72	60.00									HR	R	MS	S
7	UPSM 9	63.00									HR	AR	MS	S
8	UPSM 20	48.00									HR	AR	S	MS
9	EC 389179B	50.00	98.00		2.30	12.00	3.00	32.60			MS	HR	S	MR
10	UPSL 652	51.00									MS	AR	S	MS
11	UPSM 77	60.00	118.00	88.30	3.00	15.30	3.60	20.60	5.90	68.00	MS	AR	MR	MR
12	EC 391181	49.00	101.00	83.00	2.00	14.60	4.60	49.70	6.40	49.00	S	MR	AR	MS
13	VGM 70	51.00			3.60	15.00					MR	MS	MR	MS
14	UPSM 57	49.00									MS	AR	HS	MR
15	VLS 75	48.00	110.00	58.00	2.60	13.00	5.60	49.30	10.80	68.00	S	AR	MR	MR
16	EC 391316	48.00	99.00	65. 3	0.30	15.00	3.30	32.30	4.40	32.00	MS	AR	MR	MS
17	RVS 206-21	40.00									R	HR	MR	S
18	JS 97-52	49.00	103.00	57.30	2.60	12.30	4.60	45.00	7.80	113.00	R	AR	MR	MR
19	EC 391346	49.00	101.00	72.40	1.30	14.60	3.30	42.00	5.70	43.00	MS	MR	AR	MR

20	NRC 2007-A	49.00	110.00	81. 7	1.70	17.60	13.00	73.00	10.00	37.00	S	AR	MR	MR
21	NRC 80-1	49.00	100.00	80.70	1.70	16.00	7.00	59.30	8.00	67.00	MS	AR	MR	MS
22	JS 20-01	49.00		77.00	1.30	13.60					MR	AR	MS	MS
23	EC 396065	49.00		74.70	1.00	14.00	6.00				R	MR	MS	MS
24	EC 251682	48.00			2.00	12.60	1.30				MR	HR	MR	S
25	TG X 840-4-E	60.00									HR	MR	MS	S
26	EC 251541	51.00									MR	MR	MR	MS
27	EC 393224	52.00									MS	MR	S	MS
28	EC 340506B	46.00									HR	MR	MS	S
29	EC 393231	48.00									R	MS	MS	MS
30	EC 251516	47.00									HR	HR	HS	MS
31	GZ 258	47.00									HR	MR	HS	MS
32	DS 91-3	49.00									MR	HR	MS	S
33	Dcb 137	41.00	104.00	66.30	3.00	13.30	10.00	60.40	6.50	158.00	HR	MR	AR	HR
34	EC 457214	48.00			2.00	14.60	12.00				R	AR	MS	MS
35	DE 201	40.00	101.00	82. 0	2.30	13.00	3.70	37.00	6.30	26.00	HR	AR	HS	MR
36	EC 381884	70.00									HR	AR	HS	MR
37	EC 457336	42.00			3.00	12.30					HR	AR	HS	MR
38	AGS 12	47.00	104.00	75. 7	3.30	14.00	5.60	37.60	7.90	172.00	MR	AR	AR	HR
39	F 4 P 20	47.00	104.00	82. 3	1.70	13.00	6.30	41.00	7.00	63.00	MR	MR	MR	HR
40	SL 794	48.00			2.30	14.00					HR	MS	S	MS
41	EC 103336	41.00			2.00	15.60					HR	MR	MS	S
42	NRC 86	47.00	102.00	70.60	2.60	13.70	6.00	46.30	9.40	11.10	MR	AR	MR	MS
43	EC 106998	48.00			3.30	14.30					HR	MS	MS	MS
44	SL 752	49.00	104.00	100.30	3.00	13.70	3.70	43.70	6.90	62.00	MR	MR	AR	MR
45	EC 109540	49.00	99.00	66.30	1.00	13.70					MR	MR	AR	S
46	UGM 75	50.00	112.00	87.70	5.00	15.30	5.00	41.00	8.00	49.00	R	MR	AR	MR
47	AC 113778	49.00	101.00	77.30	2.00	11.70	0.30	19.00	5.10	18.00	R	MR	MR	MS
48	MACS 303	47.00	98.00	76.70	2.00	14.70	10.00	54.70	5.00	105.00	MS	AR	AR	HR
49	NRC 2006M	49.00	113.00	71.60	3.70	11.70	5.30	58.00	12.80	203.00	MR	AR	AR	MR
50	EC 16213	50.00	91.00	51.30	0.30	10.70	4.70	24.00	9.10	22.00	MR	MS	AR	MS

51	EC 23001A	49.00									MR	MR	MS	MS
52	EC 15961	47.00	101.00	110.30	1.70	9.00					R	MR	MR	S
53	EC 173325	36.00									R	MR	MR	S
54	PSL 6	47.00	101.00	88.60	1.70	11.70					MS	MS	S	MR
55	TS 20-52	47.00	103.00	61.00	0.70	13.30					MR	AR	S	MS
56	SL 525	46.00			1.30	13.30					MS	MR	S	MR
57	EC 242004 F	47.00									AR	MR	HS	MR
58	EC 202072	46.00									AR	MS	HS	MS
59	PS 1475	41.00	104.00	58.30	1.30	10.70	3.70	25.70	8.50	86.00	MR	AR	AR	MR
60	NRC 37	48.00	112.00	57.00	2.70	15.30	4.00	33.00	9.00	77.00	MS	AR	MR	MS
61	EC 242111	49.00	102.00	60.70	0.00	13.30	1.30	19.30	6.50	59.00	HR	AR	AR	MS
62	MACS 171	49.00	-		1.00	15.30					R	AR	HS	MR
63	SL 2951	48.00	-		0.00	12.00					MS	AR	HS	MS
64	AGS 164	41.00	102.00	53.60	0.70	12.70					R	AR	S	MS
65	EC 251501	47.00									HR	AR	S	S
66	MACS 1259	45.00			1.30	12.30					HR	AR	S	MS
67	AGS 174	48.00									MR	AR	HS	MS
68	EC 251876	48.00			0.70	13.30					HR	S	S	MS
69	SL 432	49.00									HR	MR	HS	MR
70	LEE 75	49.00									MR	MR	HS	MS
71	EC 389099	49.00	99.00	52.70	1.00	11.60					HR	S	AR	MS
72	JS 2069	47.00	102.00	57.30	1.30	11.30	3.70	29.70	11.40	47.00	HR	HR	MR	MS
73	JSM 195	37.00	99.00	51.30	0.70	11.60					R	HR	MS	MR
74	EC 291397	38.00	102.00	48.70	0.00	12.00					HR	MR	MR	MS
75	PS 1336	38.00	98.00	58. 7	1.00	15.60					HR	HR	MS	MR
76	EC 291403	47.00	103.00	63. 7	3.00	13.00	4.00	31.00	6.00	35.00	HR	HR	MR	MR
77	EC 291451	46.00	102.00	78.70	1.33	14.70	4.00	35.70	7.40	28.00	HR	MS	MS	MR
78	EC 24091	46.00			2.60	14.30					HR	MR	S	MR
79	EC 291453	55.00	103.00	94.00	3.30	14.00	1.30	22.30	5.20	39.00	MR	S	AR	MR
80	EC 309537	47.00									HR	MS	MR	S
81	EC 30967A	47.00	102.00	72.00	3.00	14.00	4.60	32.30	7.40	15.00	HR	MR	MR	MR

82	RSC 14	49.00	104.00	76.00	3.60	15.70					MR	HR	MS	MS
83	EC 325103	47.00	93.00	80. 7	0.30	13.30	8.00	48.70	7.00	37.00	HR	MR	AR	MR
84	PKS 7	51.00									HR	S	HS	MR
85	TSM 285	38.00	97.00	84.30	0.30	16.00	8.30	49.30	10.00	176.00	R	AR	AR	HR
86	EC 33872B	39.00	101.00	74. 7	3.00	14.60					HR	MR	MS	S
87	G 91	48.00									MS	MR	HS	MS
88	SQL 1	39.00	104.00	73.70	2.70	11.00	2.00	36.70	6.00	40.00	R	MR	AR	MS
89	TSM 232	39.00	104.00	79.70	5.30	15.70	13.30	72.30	9.70	177.00	HR	MR	AR	HR
90	JSM 222	45.00	104.00	79.70	3.30	21.00	13.00	84.70	5.80	66.00	MR	AR	AR	MR
91	JSM 245	44.00	110.00	95.70	3.00	13.70	8.70	64.70	7.40	125.00	MR	AR	AR	MS
92	EC 39513	50.00									S	MR	HS	MR
93	EC 39743	67.00									AR	AR	HS	MS
94	TG X 1835-10F	66.00									R	AR	S	MS
95	EPS1B	36.00									R	MS	HS	MS
96	EC 116343	45.00									R	MR	HS	S
97	MACS 1045	48.00									HR	MR	HS	MS
98	G- 47	49.00									MS	MS	HS	MR
99	JSM 242	32.00	99.00	57.00	0.00	9.30	7.30	45.30	10.80	60.00	MR	AR	AR	MR
100	SL (E) 1	50.00	110.00	87.70	3.00	15.00	9.60	64.70	11.30	106.00	MS	AR	AR	MS
101	PK 701	49.00	102.00	96.70	1.70	13.30	6.00	50.70	8.60	84.00	HR	MS	AR	MS
102	PK 1038	55.00	102.00	115.70	4.30	15.60	13.30	95.00	7.10	62.00	MS	MS	AR	MR
103	RKS 54	48.00	103.00	77.30	3.70	11.70	16.30	82.70	5.52	140.00	MS	MR	AR	HR
104	EC 33940	49.00	101.00	65.67	2.00	12.30	1.70	17.00	5.98	32.00	AR	MR	AR	MS
105	RKS 45	53.00									R	MR	HS	MR
106	MAUS 128	63.00									MR	AR	HS	MS
107	G 2225	65.00	117.00	95. 7	3.00	18.00	12.70	97.70	7.50	264.00	R	AR	AR	HR
108	JS 20-29	40.00	109.00	76. 0	1.70	11.70	1.30	19.70	9.00	88.00	HR	MR	MS	MS
109	TNAU 20023	46.00									MR	S	HS	MR
110	GyP15	40.00	105.00	69. 0	2.30	14.00	3.30	35.30	8.70	55.00	HR	HR	AR	MR
111	GP465	41.00			1.30	16.00					HR	AR	HS	MR

112	TGX849-813	60.00	118.00	95.30	3.00	19.30	11.70	99.00	6.30	148.00	HR	AR	AR	MR
113	KB 17	48.00	103.00	68.30	2.30	15.00	10.30	68.30	10.10	185.00	MR	AR	AR	MR
114	JS 20-98	38.00	103.00	82.00	2.00	16.00	7.30	45.00	11.10	174.00	R	AR	AR	MR
115	TG X 849 -813	47.00	104.00	82.30	2.30	15.00	5.00	53.30	9.50	195.00	R	MS	AR	MR
116	KB 17	46.00	104.00	94.00	2.30	14.67	4.00	44.00	9.60	48.00	R	AR	MR	MR
117	KDS 256	46.00	104.00	83.70	1.70	13.30	3.60	33.00	7.50	214.00	HR	HR	AR	MR
118	LEE 54	48.00	99.00	68.30	2.00	16.00	10.00	47.70	7.00	39.00	R	MR	MR	MR
119	JS 96-31	39.00	101.00	77.30	1.30	10.00	6.60	34.00	9.10	61.00	R	HR	MR	MR
120	TNAU 20024	48.00	109.00	146.00	4.00	19.70	8.30	90.70	9.00	124.00	R	MR	MR	MR
121	SQL 37	40.00	112.00	78.30	2.30	14.30	3.70	46.30	8.10	159.00	MR	AR	AR	MS
122	WT 88	46.00	112.00	54.00	3.60	12.70	8.30	60.60	8.70	126.00	MR	AR	AR	MS
123	TNAU 20024	51.00	102.00	108.30	3.00	14.70	3.30	47.70	6.00	72.00	S	MR	MR	MR
124	SQL 37	47.00	102.00	77. 0	1.60	14.00	6.60	53.30	9.00	84.00	HR	MS	MR	MS
125	EC 538830	45.00	101.00	84.30	2.30	13.70	4.00	44.30	7.00	68.00	MR	AR	MR	MR
126	PK 258	46.00	102.00	102.60	3.70	17.30	7.60	78.00	6.80	85.00	MS	MR	AR	MR
127	EC 468597	46.00	103.00	80.30	1.30	14.00	5.00	40.00	6.00	64.00	R	MS	MR	MR
128	EC 572160	46.00	100.00	79.70	1.70	15.70					MR	MS	S	MR
129	SL 682	47.00	109.00	116.70	2.30	12.60	6.30	62.70	8.20	32.00	MS	HR	MS	MR
130	PI 204336	47.00	103.00	67. 3	2.60	15.00	7.00	53.30	8.50	192.00	MS	AR	AR	MR
131	UGM 70	63.00	101.00	83.00	2.60	14.60					S	AR	AR	MR
132	PS 93108	61.00									S	MR	HS	MR
133	LEE 96	46.00									S	AR	HS	MR
134	TG X 1488 - 9 1 D	46.00	103.00	68. 7	2.30	12.67	6.00	49.00	7.50	60.00	MS	AR	MR	MR
135	LEE 53	48.00									S	AR	HS	MR
136	TG X 702-48	66.00									MS	MR	HS	MR
137	GP - 566	51.00			2.00	11.70					S	AR	MR	S
138	TS 98-11	52.00		67.30	3.60	13.30					S	MR	S	MS
139	PS - 1421	50.00			0.30	14.00					HR	AR	HS	MR
140	LS 11	48.00	102.00	73.00	2.70	13.30	3.60	41.00	7.00	89.00	HR	AR	AR	MR
141	PS 1467	49.00	112.00	69.00	2.70	17.30	9.70	59.00	10.20	167.00	MR	AR	AR	HR
142	EC 350604	49.00	104.00	63.30	3.00	12.00	3.70	32.00	11.00	234.00	HR	AR	AR	HR

143	EC 377883B	47.00	112.00	77.00	2.00	15.00	4.00	37.00	14.20	95.00	HR	AR	AR	MS
144	JS 20-34	32.00	101.00	42.00	0.60	8.30	5.00	29.00	10.50	85.00	MR	AR	AR	MR
145	GC 840551 - 32 - 1	46.00	102.00	58.30	1.00	14.00					HR	AR	S	MS
146	PK 431337	35.00			2.00	15.30					HR	AR	MS	S
147	EC 390977	34.00									MR	HR	S	MS
148	TS 20-86	63.00									R	HR	S	S
149	JS 20-50	46.00		69.70	3.30	11.00					R	AR	MS	MS
150	MACS 7102	46.00	101.00	70.00	2.60	12.30	2.60	40.30	10.40	45.00	MR	AR	MS	MR
151	11-5E(Z-2)	47.00									R	MR	HS	MS
152	20-4013(Z-9)	37.00	109.00	65. 3	3.00	10.60	1.70	27.00	8.00	25.00	HR	AR	MR	S
153	20-4013(Z-15)	46.00	102.00	59. 3	1.00	11.00					HR	AR	MS	S
154	23-10B(Z-17)	37.00	112.00	66. 7	2.00	14.70	6.00	49.30	9.30	57.00	HR	AR	AR	S
155	23-11A(Z-18)	47.00	101.00	57.00	3.00	11.00	4.30	29.00	7.00	25.00	R	MR	MR	MS
156	14-11B (Z-19)	38.00	102.00	56.30	1.00	11.30	0.30	13.00	6.30	26.00	HR	MR	MR	MR
157	20-14C(Z-22)	47.00	102.00	59.30	2.00	12.00	1.00	17.70	7.20	15.00	HR	AR	MS	MR
158	23-16C(Z-24)	37.00	103.00	77.70	1.70	15.30	3.30	29.70	6.80	30.00	MR	HR	MR	S
159	23-16C(Z-23)	47.00	104.00	62.60	2.30	12.70	5.70	38.00	5.80	22.00	R	AR	MR	MS

Table 12: Descriptive Statistics for Multi-location Germplasm Evaluation at JABALPUR

Parameters	Days to 50 per cent flowering	Days to maturity	Plant Height (cm)	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 (g)	Grain yield per plant (g)	Row Yield (g)
Minimum	32.00	91.00	42.30	0.30	8.30	0.30	13.00	4.40	0.11	11.10
Maximum	65.00	118.00	146.00	5.30	21.00	16.30	99.00	14.20	4.59	264.00
Mean	46.47	104.51	77.69	2.36	13.94	5.85	46.84	8.00	1.50	86.51
Coeff of Variation	12.50	4.96	23.31	44.35	16.50	57.99	42.32	24.50	67.31	69.76

Appendix – III

Summary of National Hybridization Programme Kharif 2019

(A) Crosses assigned and conducted with number of successful F1s for NHP 2019-20

Centre	Cross	Trait	Crosses Made (Number of seeds)	No of F1s (True F1s)
NHZ				
Almora	• NRC 152 (Sending seed) x Black soybean variety (FLS resistant)	Food usage bhat soybean	-	-
Palampur	• Palam Early Soya 1 x Shalimaar soybean	Early maturity with FLS resistance	Him Soya x JS-339	6 (0)
			Hardee x EC-390981A	3 (0)
			NRCSL-1 x JP-339 (6)	6 (1)
			NRC-127 x Hardee (	6 (0)
NPZ				
Pantnagar	• JS 21-71 x SL 688 • SL 688 x JS 20-34	YMV + RAB + Early	JS 21-71 x SL 688	To be planted in Kharif 2020.
			JS 21-71 x JS 20-34	
			JS 20-34 x SL 688	
	• NRC 152 x NRC 127	Both are KTI free so all progenies would be KTI free, NRC 152 is lox 2 free also.	NRC 152 x NRC 127	
Ludhiana	• SL 979 x Photoinsensitive advanced lines with you • SL 958 x Pusa 9712	YMV + RAB + Early	-	-
Delhi	• Photoinsensitive lines x Pusa 97-12	YMV + Earliness	-	-
NEHZ				
Imphal	• NRC 127 x MACS 1460 • KDS 753 x MACS 1460	Early + Food usage	KDS 753 X MACS 1460	18 (3)
			NRC 127 X MACS 1460	3 (0)
Jorhat	• JS 97-52 x JS 335	Water logging + Drought + High yield	-	-
EZ				
Raipur	• RSC 10-46 x NRC 139	**Marker assisted Backcross breeding for YMV resistance in RSC 10-46**	-	-
Ranchi	• Karune x NRC 105 • MACS 1460 x RSC 10-46	Vegetable soybean Earliness	-	-
Dholi	• MACS 1460 x DS 3105	YMV + Earliness	-	-

CZ				
Sehore	• JS 20-34 x SL 958	YMV, CR, Early; **Please take up backcross breeding for increasing height of JS 20-34**	JS 20-34 X NRC 131	(0)
			RSC10-5 2 X AMS - MB 5-18	(0)
			MACS 15-20 X JS 97-52	(0)
			RVS 28 X RSC 10- 52	(0)
			AMS-MB 5-18 X JS 93-05	(0)
			RVS 2011-76 X RVS -76	(0)
			RVS 2011-10 X JS 95-60	(0)
			JS 20-96 X JS 93-05	(2)
			JS 20-94 X JS 20-96	(2)
			NRC 142 X JS 20-34	(2)
			AMS - MB 5-18 X RSC 10-46	(0)
			NRC 130 X RVS 18	(2)
			RVS 2011-10 X JS 335	(0)
Jabalpur	• JS 20-34 x DS 3106	YMV, CR, Early; **Please take up backcross breeding for increasing height of JS 20-34**	-	-
Amravati	• AMS-MB-5-18 x JS 21-71	YMV + CR + Early	AMS-MB-5-18 x JS 21-71	50 (0)
Parbhani	• JS 20-34 x DS 3105	YMV, CR, Early; **Please take up backcross breeding for increasing height of JS 20-34**	DS 3105 x JS 20-34	18 (0)
			JS 20-34 x DS 3105	20 (0)
			RVS 2010-1 x MAUS 162	20 (1)
			RVS 2010-1 x MACS 1520	15 (0)
			MAUS 71 x RSC 10-52	12 (1)
			MAUS 162 x EC 389174	20 (0)
			MAUS 162 x RVS 2010-1	15 (2)
			MAUS 162 x RSC 10-52	12 (0)
Morena	• Himso 1689 x JS 21-71	Earliness + YMV + CR	-	-
Kota	• RSC 10-52 x JS 20-34	Insect resistance + Earliness	-	-
Amreli	• JS 20-34 x NRC 130 • JS 20-34 x NRC 131	Earliness + charcoal rot resitance	JS 20-34 x NRC 130 (30) NRC 131 x JS 20-34 (30)	(0)
SZ				
Pune	• MACSNRC 1667 x NRC 152		MACSNRC 1667 X NRC 142	75 (10)
			NRC 127 X MACSNRC 1667	21 (6)
Dharwad	• GP evaluation for insect resistance • DSb 23 x advanced YMV + rust	Pod borer resistance High yield, YMV and Rust	1) DSb 23 x YMRB 1	35 (6)
			2) DSb 32 x YMRB 1	34 (2)
			3) DSb 32 x DSb 23	50 (3)
			4) DSb 23 x DSb 32	40 (3)
Bangalore	• (High TSS lines available with you) x Karune	Vegetable soybean	-	-
K Digraj	• KDS 753 x AGS 25 • KDS 753 x NRCSL 2	Long juvenility + Rust	-	-

Adilabad	• GP screening for pre-harvest sprouting • DSb 23 x MACS 1460	Earliness + Rust	DSb-23 x MACS1460	12 (0)
Bidar	• DSb21 x MACS 1460	Earliness + Rust + High yield	-	-
Lokbharti	• JS 20-34 x NRC 130 • NRC 86 x JS 20-34	Earliness + charcoal rot resitance	1) JS 20-34 x NRC 130	30 (1)
			2) JRC 97-52 x JS 335	22 (0)

(B) Off-season Generation Advancement

Imphal

(i) F4

PP_6 X 2911 -40
K-18 (70 - 4 X 71 - 05) X 71 - 05
K-18 (23 - 20 X 450) X EC 572086
JS 97 - 52 X 104 - 31
JS 97 - 52 X PS 2005

(ii) F6

JS 97 - 52 X AGS 25 P_3
JS 97 - 52 X Tams 98-21 P_2
Cat 3406 X MACS 450 P_5
KPS 726 X BNS - 5 P_4
Cat 3406 X macs 450 P_5

Dharwad

(i) F2s

NRC 132 x DSb 23	100
NRC 132 x EC 457254	100
DSb 23_ x EC 457254	100
DSb 21 x EC 457254	200
F_3	
DSb 23 x SL 979	200
DSb 31 x DT 21	200
DSb 31 x SL 958	200
JS 335 x MACS 1460	200

(ii) F4s

DSb 23 x SL 958	200
DSb 23 x SL 979	100

(iii) F5s

MACS1460 x EC 242104	200
DSb 21 x DT 21	200
DSb 31 x DT 21	200
DSb 23 x DSb 27	200

DSb 23 x EC 242104	200
SL 979 x DSb 21	200

Adilabad

(i) F_4

RVS 2001-18 x ECS 72154	5
EC 34087 x 2029	5
AGS 25 x 2911	5
JS 9041x NRC 121F1	5
JS 2034 x EC 771186	5

(F6)

PS 1029 x G 29	5
JS 9752 x L 688	5
JS 9752 x Lee	5
JS 9752 x SL 688	5
JS 9752 x Bragg	5

OIL CONTENT (%, dry weight basis) OF AVT-I ENTRIES OF AICRPS TRIAL 2019 in Central and Eastern Zone as determined by Near infrared reflectance spectroscopy
(Values given for each entry is the mean of two replicates)

CENTRAL ZONE

S.N.	Entry	Amravati	Jabalpur	Amreli	Lokbharti	Parbhani	Nagpur	Morena
1	NRC138	19.25	19.15	19.95	19.90	17.90	18.95	19.95
2	JS335	18.90	18.50	18.5	19.65	17.80	18.50	19.92
3	JS20-34	18.34	18.52	18.55	18.95	17.80	18.90	19.11
4	NRC142	20.90	19.95	20.70	21.10	20.10	20.20	20.95
5	Himso1689	17.85	17.85	17.15	18.95	18.70	18.05	20.40
6	NRC146	18.55	18.15	19.05	20.06	18.21	19.5	19.85
7	NRC148	20.90	20.95	21.00	21.05	17.50	20.55	21.10
8	MACSNRC1575	19.55	18.15	18.55	19.15	18.13	20.45	21.10
9	JS21-72	18.25	17.85	18.10	18.45	18.40	18.10	18.80
10	NRC86	18.25	18.15	19.00	17.65	19.42	18.25	19.75
11	NRCSL2	19.25	19.25	19.50	19.75	18.90	19.25	20.10
12	RVSM-2011-35	18.45	18.10	18.75	19.35	18.91	18.00	19.90
13	JS97-52	18.15	18.40	18.00	18.90	17.60	18.95	19.75
14	JS20-98	18.70	19.25	18.90	18.95	18.34	18.39	20.45

Note: AVT I entries not received from Sehore and Indore

EASTERN ZONE

S.	Entry	Ranchi	Bhawanipatna
1	PS1637	18.55	19.95
2	MACS1566	17.95	18.50
3	Himso1689	18.45	18.50
4	RSC11-17	19.55	20.15
5	MACS1620	17.85	19.55
6	DSb33	17.35	20.95
7	RSC11-15	18.25	20.35
8	NRC148	20.87	20.93
9	NRC142	20.01	21.25
10	JS335	18.15	19.25
11	JS97-52	18.55	18.50
12	RKS18	17.55	20.90
13	RSC10-46	18.25	19.50

*** AVT I entries not received from Dholi and Raiput**

OIL CONTENT (%) OF AVT-II ENTRIES OF AICRPS TRIAL 2019 AS DETERMINED BY NEAR INFRARED REFLECTANCE SPECTROSCOPY

(Values given for each entry is the mean of two replicates)

CENTRAL ZONE

Entry	AMRAWATI	JABALPUR	SEHORE	AMRELI	MORENA	LOKBHARTI	INDORE	PARBHANI	NAGPUR
AMS100-39	19.90	17.93	18.50	19.16	19.19	-	19.80	19.37	18.71
JS97-52	18.86	17.51	18.20	19.05	19.34	18.70	18.70	18.92	17.40
NRC86	17.76	18.45	19.52	18.81	19.06	20.21	19.30	18.82	18.60
NRC130	16.82	16.56	16.65	17.48	18.72	20.21	18.85	18.96	15.89
NRC131	17.58	16.42	16.47	17.59	18.66	20.3	17.90	18.86	18.35
JS20-34	18.17	17.50	18.50	18.79	18.70	21.00	18.82	18.50	18.20
JS335	19.36	18.35	17.87	17.85	19.13	20.90	18.65	19.31	18.27

SOUTHERN ZONE

Entry	PUNE	BANGALORE	K DIGRAJ	ADILABAD	DHARWAD
DSb34	19.50	18.33	17.62	18.82	18.95
JS335	19.70	18.17	17.54	18.40	18.98
AMS2014-1	20.68	19.20	18.63	20.24	18.64
SKF -SP-11	19.96	18.49	17.89	19.59	17.94
RKS18	20.33	18.80	17.93	19.00	19.39
NRC132	20.75	17.40	17.04	-	16.80
AMS100-39	20.20	18.58	16.65	19.03	18.69
KDS992	20.70	19.39	18.18	20.70	17.37
BAUS102	20.60	18.52	16.13	18.65	18.05
MACS1493	20.32	19.84	16.45	19.95	17.92
DSB21	20.10	17.11	17.31	18.71	18.20
NRCSL1	21.30	17.06	17.77	17.88	18.06
NRC147	20.35	19.20	17.85	19.25	18.40
RSC11-07	20.45	18.08	18.70	19.82	18.16
JS93-05	20.60	18.58	16.52	-	18.85

NORTH PLAIN ZONE

Entry	PANTNAGAR	LUDHIANA
JS97-12	17.07	16.56
PS1347	17.26	18.12
SL958	16.96	17.31
PS1613	16.00	18.77
PS1611	18.66	19.07
PS24	18.88	20.30
NRC128	19.80	20.10

EASTRN ZONE

Entry	RAIPUR	BHAWANIPATNA	DHOLI	RANCHI
RSC11-07	20.18	16.68	20.06	18.61
NRC128	19.70	18.50	19.6	17.72
JS335	18.75	16.40	16.69	17.15
NRC137	16.22	15.24	19.23	16.57
AMS2014-1	19.75	17.37	16.85	20.26
NRCSL1	19.58	17.35	19.63	19.43
RSC 11-03	17.49	17.70	17.67	18.36
NRC147	18.20	16.31	18.36	18.21
JS97-52	19.26	16.89	18.9	18.06
MACS1493	18.14	18.52	18.70	17.35
NRC132	18.40	17.30	21.20	20.17
RKS18	18.69	16.82	20.00	17.75
NRC136	17.38	16.40	17.80	18.26

NORTH EAST HILL ZONE

Entry	IMPHAL
RKS113	20.74
DS3108	21.30
RKS18	20.80
PS1613	19.49
JS335	20.70
JS97-52	19.54

SUCROSE content (%, on dry weight basis) of the immature seeds picked at R6 stage of entries (AVT-I) in AICRPS VEGETABLE SOYBEAN trial

Entry	Location		
	BANGLORE	PUNE	ADILABAD
Karune	5.04	4.84	4.72
Harit soya	5.17	5.30	6.00
KDS726	5.04	4.50	3.80

Values given are the mean of two replicates only. Samples received from Parbhani location were of harvest maturity stage (not of R6 stage)

Oil estimation done by :

Dr. Vineet Kumar,
Principal Scientist (Biochemistry)
ICAR-IISR Indore

Compilation of Monitoring Reports (*kharif* 2019)

Team 1	**: Dr Sanjay Gupta, and Dr. MP Sharma**
Centres:	**: Delhi, Ludhiana, Palampur and Srinagar***

* **The Team could not visit Srinagar center due to prevailing law and order situation.**

Weather conditions at different centres during the season (date of monitoring):			
Parameters	**Delhi** (17.9.2019)	**Ludhiana** (19.9.2019)	**Palampur (**21.9.2019 **)**
Onset of monsoon	7th July	June end	2.7.2019
Date of sowing	--	July 6 onwards	18.6.2019
Rainfall distribution	--	Erratic	Below normal
Rainfall (mm)	585.5	739.6	1808
# Rainy days	--	20	104

Conduct of Trials: (Allotted / Conducted)			
Discipline	**Delhi**	**Ludhiana**	**Palampur**
Plant Breeding	3 / 3	2 / 2	2 / 2
Agronomy	3 / 1*	4 / 4	--
Entomology	3 / 3	2 / 2	2 / 2
Pathology	4 / 4	4 / 4	6 / 6
Microbiology	2 / 2	3 / 3	--

* **Two trials could not be conducted due to shortage of labourers**

Germplasm:			
	Delhi	**Ludhiana**	**Palampur**
Total collection	1150	730	250
# Acquired - From	50 from IISR, Indore	200 from USDA	159 lines from IISR, Indore
For Traits	--	YMV resistance	--
How used	--	YMV screening and PEQ	Being evaluated for different traits

Crosses made: (Parents / Pollinations)			
	Delhi	**Ludhiana**	**Palampur**
# Crosses	16 / ???	21/50 each	23 / 616
Traits	High yield and disease resistance	YMV resistance, yield, Null KTI, Photo- insensitivity	Not mentioned

Generation Advancement:			
	Delhi	**Ludhiana**	**Palampur**
Generations advanced	Not mentioned	F2 to F6; 214 crosses; 761 progenies	F1 to F6; 107 crosses
Advanced generations received	52 F3 and 37 F4 from IISR, Indore	36 from IISR, Indore and 5 from Dharwad	--

Delhi: Most of the crosses are poor performer. YMV has severely affected crosses. Modification in NHP cross distribution is required to be taken up. One of the parent in the cross must be YMV resistant for NPZ.

Seed Production Programme: (Variety / Target / Expected in q)		
Delhi	**Ludhiana**	**Palampur**
Breeder Seed:		

Pusa 9712 / 5 / 5	SL 958 / 1 / 8	Hara Soya / 8.0 / 15.0 Palam Soya/ 18.0 /30.0 Him Soya /00 /12.0 Shivalik / 00 / 15.0
Nucleus Seed: Stage I + Stage II (Variety / Target / Expected in kg)		
--	SL 688 / 30 / 30 SL 525 / 30 / 30 SL 744 / 30 / 30 SL 958 / 60 / 60	Hara Soya / -- / 250 Palam Soya/ -- /250 Him Soya /-- /200 Shivalik / --/ 250

Front Line Demonstrations: (Allotted / Conducted / Visited by Team)		
Delhi	**Ludhiana**	**Palampur**
NA	10 / 10 / 5	10 / 31 / 4

Budget Utilization: AUC submitted		
Delhi	**Ludhiana**	**Palampur**
NA	Yes	Yes

Comments of Monitoring Team:		
Delhi	**Ludhiana**	**Palampur**
Good	Very Good	Very Good

Team 2	**: Dr. SR Ramgiry and Anirban Roy**
Centres	**: Pantnagar, Almora and Majhera**

Weather conditions at different centres during the season (date of monitoring):			
Parameters	**Pantnagar** (13-14.10.2019**)**	**Majhera** (14.10.2019)	**Almora** (14-16.10.2019)
Onset of monsoon	3.7.2019	24.6.2019	--
Date of sowing	28.6.2019	26.6.2019	--
Rainfall distribution	Normal	Normal	--
Rainfall (mm)	1161.8	--	--
# Rainy days	38	38	--

Conduct of Trials: (Allotted / Conducted)				
Discipline	**Pantnagar**	**Majhera**	**Almora**	**Remarks**
Plant Breeding	3 / 3	1 / 1	3 / 3	All the trials have been conducted nicely and as per the Technical Programme
Agronomy	4 / 4	Nil	--	
Entomology	5 / 5	Nil	--	
Pathology	6 / 6	Nil	4/4	
Microbiology	4 / 4	Nil	--	

Germplasm:			
	Pantnagar	**Majhera**	**Almora**
Total collection	2621	NA	1100
# Received - From	160 germplasm, 137 RILs and 51 breeding lines from IISR, Indore. 10 breeding lines from Pune.	NA	Nil
For Traits	Earliness, BP, RAB and YMV resistant and high yield etc.	--	--
How used	5 lines used for high yield, resistant to biotic\ abiotic stress, plant	--	--

	ideotype, free from lodging shattering etc.		

Crosses made: (Parents / Pollinations)			
	Pantnagar	**Majhera**	**Almora**
# Crosses	38 /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 F7; 184 crosses; 2237 IPP's	NA	F1 to F6; 238 crosses; 423 populations
Advanced generations received	61 from Indore and 10 from Pune	NA	86 from Indore

Seed Production Programme: (Variety / Target / Expected in q)			
	Pantnagar	**Majhera**	**Almora**
Breeder Seed:			
	PS 1347/ 4 / 70 PS 19 / 2 /125 PS 1225/ 18 / 114	NA	VLS 65 / 4.0 / 5.5 VLS 63 / 2.0 / 3.0 VLS 89 / 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 1556, PS 1572, Bhatt and PS 1241	NA	VLS 65 / 0.80 / 0.80 VLS 63 / 0.50 / 0.50

Front Line Demonstrations: (Allotted / Conducted / Visited by Team)				
	Pantnagar	**Majhera**	**Almora**	**Remarks**
	10/13 / 5	NA	10 / 10 / 5	--

Budget Utilization: AUC submitted			
	Pantnagar	**Majhera**	**Almora**
	Yes	Yes	NA

Overall comment of Monitoring Team			
	Pantnagar	**Majhera**	**Almora**
	Excellent	Excellent	Good

Team 3	**Dr SP Mehtre, Dr. Laxman Singh Rajput**
Centres:	**Kota, Jabalpur, Sehore and Morena**

Weather conditions at different centres during the season (date of monitoring):				
Parameters	**Jabalpur** (17.09.2019)	**Sehore** (18.09.2019)	**Morena** (19.09.2019)	**Kota** (20.09.2019)
Onset of monsoon	11.06.2019	28.06.2019	17.06.2019	25.06.2019
Date of sowing	27.06.2019	02.07.2019	03.07.2019 and 04.07.2019	02.07.2018 – 15.07.2019
Rainfall distribution	improper / erratic	Erratic	Dry spell and then evenly	continuous

			distributed	
Rainfall (mm)	1533.5 mm	2026 mm	526.8mm	1322.4mm
# Rainy days	51	50	28	32

Conduct of Trials:				
Discipline	**Jabalpur**	**Sehore**	**Morena**	**Kota**
Plant breeding	4 / 4	4 / 4	4 / 4	5 / 5
Agronomy	--	5 / 5	--	5 / 5
Entomology	--	7 / 6	--	6 / 6
Plant Pathology	6 / 6	7 / 6	--	2 / 2
Microbiology	--	3 / 3	--	--

At Kota center, AVT-I (Vegetable) vitiated because of very poor plant population. Similarly, in screening of germplasm line for insect resistance, only 12 lines out of 50 lines germinated,

Germplasm:

	Jabalpur	**Sehore**	**Morena**	**Kota**
Total Collection	625	400	21	308
Received from	159 lines from IISR, Indore	250 lines from RVSKVV Gwalior	-	50 from Jabalpur and 50 from Pantnagar
For traits	Yield and diseases reaction	Pest and disease resistant	-	-
How used	Germplasm accession maintained and multiplied for use in breeding programme.	--	-	-

Information on Crosses Made :(Parents/pollinations)

	Jabalpur	**Sehore**	**Morena**	**Kota**
#Crosses	17/700 each	23/ 1035 each	**NIL**	06/360
Traits	Earliness, four seededness, high yield, pest and disease resistance and none shattering	Earliness, high yield, pest and disease tolerance, drought and non-shattering.	**Crossing programme not implemented**	Earliness, high yield, pest and disease tolerance and non-shattering

Information on Generation Advancement:

	Jabalpur	**Sehore**	**Morena**	**Kota**
Generation Advanced	F_4-$F_{6,}$ -10 crosses from PunS; F_3 -52 crosses from Indore 1399 IPP's & 54 Bulk	F_2-F_8; 90 crosses of different generation and 22 cross combinations (15-20 lines each) under NHP	F_3 – 52 crosses from Indore; F_3 and F_5 – 31 crosses from Sehore.	F_3-F_8 - 115 crosses of different generation

Seed Production Programme: (Variety/ Target / Expected (q)

	Jabalpur	**Sehore**	**Morena**	**Kota**
Breeder seed:	JS 20-69/1200/1295 JS 20-29/200/182 JS 20-34/1100/1152 JS 90-98/1330/1310	RVS 2001-4/75/72 JS 95-60/150/100 JS 93-05/30/25 RVS 24/30/45 JS 20-34/6/5	JS 335/108/95	JS 20-34/800/1050 JS 20-29/300/320 JS 93-05 /100/320 JS 95-60 /60/90 RVS 45/5/10

		JS 335/60/10 JS 20-29 /120/50 RVS 18/0.8/12 JS 20-69/15/6 JS 20-98/30/15		RVS 24/5/10 RVS 113/15/35
Nucleus seed	JS 20-98, JS 20-94, JS 20-116, JS 20-69, JS 95-60, JS93-05, JS 335, JS 20-29, JS 97-52, JS 20-34	RVS 2001-4, JS 95-60, JS 93-05, JS 355, JS 20-116, JS 20-34, JS 20-29, JS 20-98, RVS 18, RVS 24, RVS 76, JS 20-69	**Not sown**	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
Excellent	Very Good	Good	Good

Team 4	**: Dr Kamendra Singh, and Dr Arvind Kumar**
Centres:	**: Amravati, Nagpur, Raipur and Ranchi**

Weather conditions at different centres during the season: (Date of Monitoring)				
Parameters	**Nagpur** 16/09/2019	**Amrawati (16-18.09.2019)**	**Raipur 19/09/2019**	**Ranchi** 21.09.2019
Onset of monsoon on	26th Meteorological week	23/6/2019	10.6.2019	23.06.2019
Sowing commenced on	09/07/2019	Ist Week of July	25.6.2019	24.06.2019
Rainfall Distribution	Erratic distribution.	Dry spell	Normal	Erratic
Rainfall (mm)	1079.4	742.3	858.7	780
Rainy days (no.)	38	40	35	49

Conduct of Trials:					**Remarks**
Discipline	**Nagpur**	**Amrawati**	**Raipur**	**Ranchi**	Amrawati: In Ent.4, treatment of *N. rileyi* could not be applied. Raipur: MB 3-14 was not conducted.
Plant Breeding	4 /4	5 / 5	3 / 3	3 / 3	
Agronomy	--	5 / 5	5 / 5	4 /4	
Entomology	--	5 / 5	3 / 3	--	
Pathology	--	6 / 6	4 / 4	--	

Microbiology	--	--	4 / 3	--	

Germplasm:				
	Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Total collection	Nil	849	375	549
# Received - From	--	--	59 Advance breeding lines and 169 germplasm lines from IISR, Indore	Nil
For Traits	--	--	--	--
How used	--	--	Not mentioned	--

Crosses made: (Parents / Pollinations)				
	Nagpur	**Amrawati**	**Raipur**	**Ranchi**
# Crosses	--	16 /800	16 / 60 to 70 pollinations per cross combination	04 / 200 each
Traits	--	Early, YMV resistant, RR & RAB Resistant, Drought, Mechanical Harvesting.	High yield and Multiple disease resistance	Yield improvement, wider adaptability, earliness, Vegetable soybean

Generation Advancement:				
	Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Generations advanced	F_3; 53 crosses	F1 to F7: 125 crosses and 767 progenies	F1 to F7 : 662 crosses; 263 Bulks and 760 SPS	F3 to F6; 09 crosses
Advanced generations received	Yield and resistance to diseases and insect pest.	52 F_3 crosses from Indore and 7 F_3 crosses from Pune	36 from IISR, Indore	52 F_3 and 36 F_4 from IISR under NHP

Seed Production Programme: (Variety / Target / Expected in q)			
Nagpur	**Amrawati**	**Raipur**	**Ranchi**
Breeder Seed:			
NA	JS 335/300/500 JS 93-05/200/300 JS 20-34/100/80 NRC 37 / 20 / 80	CG Soya-1 /140/100 JS 20-29/300/56 JS 93-05/200/120 JS 97-52/110/130 JS 20-69/50/60	JS 97-52/10/10 BS -1 / 1.0 / 1.0
Nucleus Seed: Stage I + Stage II			
NA	JS 335, JS 93-05, AMS 1001,	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	20/20/5	10 /10 / 5	10 /20 / 5

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 1 Contractual TA	1 Scientist Nil

Overall specific comments of the monitoring team about the performance of the centre:

Nagpur	Amrawati	Raipur	Ranchi
Good	Very Good	Good	**Very Good**

Team 5	: **Dr. Manoj Srivastava, and Dr R. Channakeshava**
Centres:	**:Parbhani. Amreli, Anand and Bhavnagar**

Weather conditions at different centres during the season:				
Parameters	**Lok Bharti (23.9.2019)**	**Amrreli (23.09.2019)**	**Devgadh Baria (22.9.2019)**	**Parbhani 25&26.9.2019**
Onset of monsoon	13.6.2019	13.6.2019	15.6.2019	04.06.2019
Date of sowing	30.6.2019	4.7.2019	28.6.2019	19.6.2019-17.7.2019
Rainfall distribution	Normal	Proper	Improper / Erratic	Erratic with uneven distribution (1^{st} dry spell 14 July to 25 July – 12 days) (2^{nd} dry spell 9^{th} August to 30^{th} Aug. – 22 days)
Rainfall (mm)	600	795	1099	666
# Rainy days	26	34	34	38

Conduct of Trials:				
Discipline	**Lok Bharti**	**Amreli**	**Devgadh Baria**	**Parbhani**
Plant Breeding	4 / 4	4 / 4	4 / 4	5 / 5
Agronomy	--	--	2 / 2	--
Entomology	--	--	--	5 / 5
Pathology	--	--	--	--
Microbiology	--	--	--	--

Germplasm:				
	Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
Total collection	--	570	121	650
# Received - From	--	A.R.S., J.A.U., Amreli	TRTC, Devgadh Baria(Self)	159 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	--	--	NA	2 accessions used in breeding

				programme

Crosses made: (Parents / Pollinations)				
	Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
# Crosses	9 / 90	8 / 395	14 crosses attempted but no seed setting	12 / 1900
Traits	Earliness, high yield, pest and disease resistance and non-shattering	High seed yield, resistance to charcoal rot and early maturity	NA	High seed yield, early to medium maturity, pest, disease and drought tolerance, non shattering

Generation Advancement:				
	Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
Generations advanced:	F2 to F4 – 254 SPPs and 52 Bulks	F_1 to F_4 – 263 SPPs	37 F_1, 14 F_2 and 1 F_3 from IISR, Indore	F1 to F7; 321 crosses for Non Shattering, high seed yielding, tolerant to pests, diseases and drought, suitable for mechanical harvesting.
Advanced generations received	53 F_3 received from IISR, Indore under NHP	52 F_3 received from IISR, Indore under NHP	--	312 F_6 and 590 F_5 Magic Population from IISR, Indore

Seed Production Programme: (Variety / Target / Expected in q)			
Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
Breeder Seed:			
JS 20-29 / 200 / 220	NA	NA	MAUS 71 / 405 / 650 MAUS 158 / 423 / 450 MAUS 162 / 228 / 900 MAUS 612/183/540 JS 20-34 / 200 / 60 JS 20-29 / 200 / 150 JS 20-69 / 50 / 100
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, KDS 344, JS 20-29, JS 335, JS 93-05

Front Line Demonstrations: Allotted / Conducted / Visited by Team			
Lok Bharti	**Amrreli**	**Devgadh Baria**	**Parbhani**
NA	NA	10 / 10 / 3	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
Good	Good	Good	Excellent

Team 6	**: Dr. GK Satpute and Dr. PK Amrate**
Centres:	**: Sangli, Ugar Khurd and Adilabad**

Weather conditions at different centres during the season:			
Parameters	**Sangli (25.09.2019)**	**Ugar Khurd (24.09.2019)**	**Adilabad (27.09.2019)**
Onset of monsoon	08.06.2019 (20.6mm)	09.06.2019	29.06.2019
Date of sowing	22.7.2019-20.8.2019	32.07.2019	28.06.2019
Rainfall distribution	Well distribution except during 30.7.19 to 5.8.19 (6 days- 201.mm) heavy rainfall & flood	Even	Even
Rainfall (mm)	547.08	503.75	719.1
# Rainy days	36	47	41

Conduct of Trials:			
Discipline	**Sangli**	**Ugarkhurd**	**Adilabad**
Plant Breeding	3 / 4 (Including 01 IVT repeat trial of kharif 2018)	--	6 / 6
Agronomy	--	--	5 / 5
Entomology	--	--	--
Pathology	3 / 3	All the 4 trials vitiated due to flood situation at V3-V4 stage.	--
Microbiology	--	--	--

Germplasm:			
	Sangli	**Ugarkhurd**	**Adilabad**
Total collection	--	--	300
# Received - From	--	--	1from Dharwad and 1 from Pune
For Traits	--	--	--
How used	--	--	--

Crosses made: (Parents / Pollinations)			
	Sangli	**Ugarkhurd**	**Adilabad**
# Crosses	2 / 100 each	--	1 / 100
Traits	Long juvenility with rust resistance and Long juvenility & YMV resistance in the background of rust resistance	--	Earliness and rust resistance

Generation Advancement:			
	Sangli	**Ugarkhurd**	**Adilabad**
Generations advanced:	F_1 to F_7 – 22 crosses	NA	F3 to F6; 100 crosses; 400 populations
Advanced Generations received:	52 F_3 and 36 F_4 from IISR, Indore		52 F_3 from IISR, Indore

Seed Production Programme: (Variety / Target / Expected in q)		
Sangli	**Ugarkhurd**	**Adilabad**
Breeder Seed:		
JS 93-05 / 100 / 100 JS 335 / 500 / 500 DS 228 / 40 / 40 KDS 726 / 30 / 30	--	JS 335/400/250 JS 93-05/50/50 Basara/120/125 **FS / CS under Seed Hub:** JS 335 / 550 / 900 Basara/ 650 / 700 JS 93-05/100/150
Nucleus Seed: Stage I + Stage II		
KDS 753, KDS 726, KDS 753, DS 228, KDS 344, JS 93-05	--	Basara-I and Basara-II

Front Line Demonstrations: Allotted / Conducted / Visited by Team		
Sangli	**Ugarkhurd**	**Adilabad**
25 / 25 / 5	50/00 (reasons informed to IISR)	10 / 10 / 05

Budget Utilization: AUC submitted		
Sangli	Ugarkhurd	**Adilabad**
??	??	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**
Good	--	Good

Team 7	**: Dr. Mrinal Kuchlan and Dr. Shiva Kumar**
Centres:	**: Pune, Dharwad and Bangalore**

Weather conditions at different centres during the season:			
Parameters	**Pune (20.09.2019)**	**Bangalore (16.09.2019)**	**Dharwad (17-18.09.2019)**
Onset of monsoon	22.06.2019	June	June last week
Date of sowing	30.06.2019	22.07.2019	27.06.2019

Rainfall distribution	Uneven	Uneven	Abormal
Rainfall (mm)	311.1	438.6	929
# Rainy days	21	26	53

Conduct of Trials:			
Discipline	**Pune**	**Bangalore**	**Dharwad**
Plant Breeding	5 / 5	4 / 4	3 / 3
Agronomy	2 / 2	--	4 / 4
Entomology	--	--	8 / 8
Pathology	--	--	6 / 6
Microbiology	--	--	2 / 2

Germplasm:			
	Pune	**Bangalore**	**Dharwad**
Total collection	607	110	510
# Received - From	159 IISR	110 from IISR, Indore	--
For Traits	Earliness Yield	Bold seed, High yield and powdery mildew	Rust resistance, High yield, Earliness, Better seed longevity, Four seeded pods, Vegetable types.
How used	Evaluation in progress	Being evaluated	Being used in breeding programme for desirable traits

Crosses made: (Parents / Pollinations)			
	Pune	**Bangalore**	**Dharwad**
# Crosses	**20 / 750**	**5 / 493**	7 /1510
Traits	Earliness, High oil, High Yield, Null Trypsin, Null Lipoxygenase, Rust resistance, YMV resistance, Vegetable type	--	High yield, Rust & YMV resistance Earliness

Generation Advancement:			
	Pune	**Bangalore**	**Dharwad**
Generations advanced:	F1-F6; 193 crosses; 1900 IPPs	F3-F6, 60 crosses, 250 populations	F_2 to F_7; 49 crosses; 4296 IPPs
Advanced generations received	52 segregating and 590 Magic populations from IISR, Indore; 3 F_{10} and 3 F_{11} from Jabalpur		

Seed Production Programme: (Variety / Target / Expected in q)		
Pune	**Bangalore**	**Dharwad**
<u>Breeder Seed</u>:		
JS 335 / 50 / 60 MACS 1188 / 25 / 80 MACS 1281 / 20 / 20	JS 335 / 300 / 200	JS 335 /600/675 JS 93-05 /550/775 DSb 21 /325 /400 DSb 23/28/25
<u>Nucleus Seed</u>: Stage I + Stage II		
JS 335, MACS 1188, MACS 1281,		DSb 21, DSb 23, JS 335, DSb 31,

MACS 1460		DSb 32

Front Line Demonstrations: Allotted / Conducted / Visited by Team		
Pune	**Bangalore**	**Dharwad**
NA	NA	10 / 10 / 7

Budget Utilization: AUC submitted		
Pune	**Bangalore**	**Dharwad**
Yes	Yes	Yes

Manpower : (Scientist and Technical)

	Pune	**Bangalore**	**Dharwad**
Sanctioned	1 Scientists 1 TA	1 Scientists 1 TA	4 Scientists 3 TAs
In position	1 Scientists 1 TA	1 Scientists 1 TA	4 Scientists 3 TAs

Overall specific comments of the monitoring team about the performance of the centre:

Pune	**Bangalore**	**Dharwad**
Excellent	Very Good	**Excellent**

Team 8	**: Dr. A.N. Sharma and Dr. S.D. Billore**
Centres:	**: Jorhat, Imphal, Medziphema and Umiam (Barapani)**

Weather conditions at different centres during the season:				
Parameters	**Imphal (20-22.9.2019)**	**Umiam (18.9.2019)**	**Jorhat (18.9.2019)**	**Medziphema (16.9.2019)**
Onset of monsoon	3.6.2019	--	June 2019	8.6.2019
Date of sowing	8.9.2019	8-22.07.2019	4.6.2019	20.6.2019
Rainfall distribution	Normal	--	--	Normal
Rainfall (mm)	452.2	--	917.5	714.1
# Rainy days	56	--	47	46

Conduct of Trials:					**Remarks**
Discipline	**Imphal**	**Umiam**	**Jorhat**	**Medziphema**	**Imphal**: All trials were conducted as per Technical programme and maintained nicely. **Umiam**: AVT-II failed even after re-sowing twice. Data should not be used in compiled report. In water logging trial, water logging conditions could not be maintained and the plant population was also very poor. **Jorhat**: All the Trials were badly affected due to heavy and continuous rains and subsequent water logging. The check varieties were not true to type.
Plant Breeding	3 / 3	4 / 4	6 / 6	--	
Agronomy	3 / 3	--	--	3 / 3	
Entomology	6 / 6	--	--	--	
Pathology	--	--	5 / 5	3 / 3	
Microbiology	--	--	--	--	
Food Tech	3 / 3	--	--	--	

					Medziphema: Due to land constraint, plot size in Agronomy trials was reduced. In Trap Nursary trial of Plant Pathology, many genotypes were not true to type.

Germplasm:				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
Total collection	511	Nil	Nil	NA
# Received - From	500 from Indore, 1 from Bangaluru, and 11 local collections.	Nil	--	NA
For Traits	Yield and Vegetable type	Nil	--	NA
How used	7 lines being used in Crossing programme	Nil	--	NA

Crosses made: (Parents / Pollinations)				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
# Crosses	5/ 220	Nil	Nil	NA
Traits	Vegetable type	Nil	--	NA
Generation Advancement:				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
Generations advanced:	F1 to F5; 7 crosses; 27 Populations; 52 under NHP and 38 from other centers	Nil	52 lines received from centers being evaluated.	NA

Seed Production Programme: (Variety / Target / Expected in q)				
	Imphal	**Umiam**	**Jorhat**	**Medziphema**
Breeder Seed:				
	NA	NA	NA	NA
Nucleus Seed: Stage I + Stage II				
	NA	NA	NA	NA

Front Line Demonstrations: Allotted / Conducted / Visited by Team			
Imphal	**Umiam**	**Jorhat**	**Medziphema**
15 / 15 /3	NA	NA	10 / 10 / 1

Budget Utilization: AUC submitted			
Imphal	**Umiam**	**Jorhat**	**Medziphema**
Yes	Yes	Yes	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

Besides AICRPS work, Imphal, Jorhat and Medziphema centers are also doing extension work using TSP funds. Utilization of funds was appreciable at Imphal and Jorhat centers, but was not up to the mark at Medziphema center.

Pedigree of Entries included in Coordinated Breeding Trials

Entry	Pedigree
AMS 353	Bragg x TAMS 41
AMS 20-19	Mutant of Bragg
ASb 50	NRC 2 x P.Soya
ASb 51	RKS 15 x EC 481309
BAUS-103	JS-335 x MACS-58
DS 1314	P9712 X DS 3047
DS 1318	P12 X DS 2711
DS 1326	P12 X SL 688
DS1312	SL 688 X DS 3047
DS1320	P9712 X DS 2961
Himso-1690	Hara Soya x Pb 1
JS 22-01	SL 738X JS 95-60
JS 22-03	JS 20-29 X JSM 275
JS 22-04	JS 20-29 X JS 20-22
JS 22-07	SL 738 X JS 95-60
KDS 1097	JS 95 60 x MACS 1259
KDS 1099	JS 97 52 x EC 390977
KDS 980	JS 93 05 x EC 241780
MAUS 712	MAUS 71 x PK 1029
MAUS 717	Himso 1563 x EC 394837
NRC 166	JS 95-60 x AGS 25
NRC 149	NRC94 x SL958
NRC 150	JS 97-52 x NRC109
NRC 151	JS335 x PI205085*
NRC 152	NRC101 x NRC109
NRC 153	AVKS84 x NRC109
NRC 154	JS 335 × EC 538828
NRC 155	MACS 330 × NRC 86
NRC 156	MACS 330 ×NRC 86
NRC 157	JS 95-60 x AGS 25
NRC 158	Type 49 × EC 538828
NRC 159	EC 572109 × JS 95-60
NRC 160	EC 538828 x EC 390977
NRC 161	JS 95-60 x AGS 25
NRC 162	EC 538828 x EC 390977
NRC 163	JS 97-52 x EC 538828
NRC 164	JS 95-60 x AGS 25
NRC 165	JS 95-60 x AGS 25
NRC 167	JS 97-52 x Cat 2306
NRC 168	JS 97-52 x EC 538828
NRC 169	JS 97-52 x EC 538828
PS 1641	JS 93-52 x PK 472
PS 1642	JS 97-52 x PS 1225
PS 1656	JS 97-52 x JS 90-5-12
RSC 11-20	MAUS 504 x MACS 1336
RSC 11-20	MAUS 504 x MACS 1336
RSC 11-22	JS 97-52 x JS 93-05
RSC 11-22	JS 97-52 x JS 93-05
RVS 2011-32	JS 335 X PK 1042
RVS 2011-73	JS 95-60 X JSM 110
RVS 2011-76	JS 20-29 X JSM 275
RVSM 2011-77	JS 20-30 x JS 93-05
SL 1213	SL 958 x SL 955
SL 1234	SL 783 x SL 871

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. V.S. Bhatia	Director	09303224211 (M) 0731-2760987 (R) dsrdirector@gmail.com
2.	Dr. A.N. Sharma	Principal Scientist and PI-Entomology	09425958694 (M) 0731-2471807 (R) amarnathsharma2@gmail.com
3.	Dr. S.D. Billore	Principal Scientist and PI-Agronomy	09977763727 (M) 0731-2700059 (R) billsd@rediffmail.com
4.	Dr. Sanjay Gupta	Principal Scientist and PI-Plant Breeding	07415105890 (M) sanitaishu@gmail.com
5.	Dr. M.P. Sharma	Principal Scientist and PI-Microbiology	09926012261 (M) 0731-6562647 (R) mahaveer620@gmail.com
6.	Dr. G.K. Satpute	Senior Scientist (Genetics & Plant Breeding)	09425079866 gksatpute@yahoo.co.in
7.	Dr. Mrinal.K.Kuchlan	Scientist SS (Seed Technology)	09009562694 (M) mrinal.kk@gmail.com
8.	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 post s**	**Gross salary as on January, 2019**	**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 (37400-67000)+10000	1	157827.00	Dr. Dhirendra Singh	Vegetable Science / Soybean Breeder	August 2018	9897865329 dheer_singh72@yahoo.co.in	Dr. Kamendra Singh Professor, G&PB and Project Incharge 05944-234441(O), 233246 (R), 9997706784 (M), singh.kamendra@rediffmail.com Dr. P. S. Shukla Professor, G&PB/ Jt. Director, BSPC 9412141008 (M), 05944-234441(O) ps.shukla@rediffmail.com Dr. M. K. Karnwal, SRO 9639778002 Karan.mk30@gmail.com
Agronomist (S-2) (12000-18300)	JRO (15600-39100) + 7000	1	81122.00	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	157827.00	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)	Senior research office (37400-67000) + 9000	1	118544.00	Dr. Neeta Gaur **(**Appointed**)**	Entomology	17.5.2006	9457407231 (O) 05944-233737 (R) Neetagaur_ento@rediffmail.com	-

Jr. Plant Pathologist (S-1) (8000-13500)	Senior research office (37400-67000) + 9000	1	118544.00	Dr. S. K. Mishra	Plant Pathology	June, 2013		Dr. K. P. Singh, Professor 9412142537 (M), kpsingh.gbpuat@gmail.com
Technical Staff (T-4)		4						
	(9300-		77200.00	Shri R. B. Sachan		Aug. 2018	9897428345	
	(9300-		84285.00	Dr. H. R. Jaiswal		July 2017	9897165967	
	(9300-		62481.00	Dr. M.K.Gupta		Dec.1992	9412120628	
	(9300-		84285.00	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. Asstt.	1	67281	Mr. Trilochal Singh		10.4.2001	--		
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**	➢ Dr.S.S.Nichal is working as Associate professor /Soybean Breeder, Regional Research Centre, Amravati. Mo. 09588414144 e-mail ID- nichal_satish@rediffmail.com ➢ G.D.Chandankar is additionally working as seed production officer, Regional Research Centre, Amravati. Mo. 08275553087 e-mail-gchandankar@rediffmail.com ➢ Dr. S.S. Munje , Jr.Entomologist,looking additionally the Entomological Research Trials Mo.No.09423682629 , E –mail ID-shyammunje@yahoo.com
Scientists									
Jr. Plant Breeder (15600-39100) GP 6000	(1) Jr. Plant Breeder (29070-39100) G.P.-6000	01	83559/-	Dr. S.S. Nichal **(I/c AICRPS)**	Plant Breeding	07.07. 12	Nil	Mo. 09588414144 e-mail ID- nichal_satish@rediffmail.com	
Jr. Agronomist (15600-39100) GP 6000	(1) Jr.Agronomist (30230-39100) G.P.-6000	01	80816/-	**Dr. M.S. Dandge**	Agronomy	10.07. 12	Nil	Mo. 09657725820 e-mail- msdandge@rediffmail.com	
Jr. Plant Pathologist (15600-39100) GP 6000	(3) Jr. Plant Pathologist (29180-39100) G.P.-6000	01	76896/-	**Dr. R.S. Ghawde**	Plant Pathology	08.08. 18	Nil	Mo. 09420841421 e-mail-rajiv_ghawde @rediffamil.com	
Technical Staff									
Technical Asst. (9300-34800) GP -4200	1) Agril.Asstt (10840-20,000)	01	31187/-	U.S.Tarale	-	10.06.15	Nil	- -	
Technical Asst. (9300-34800) GP -4200	2) Agril.Asstt (9910-20,000)	01	28556/-	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 Jan, 2019**	**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) (37,400-67,000+9,000	1	Principal Scientist (Plant Breeding) (Rs.37400-67000+ AGP 10000)	Rs.1,92,258	Dr. G. T. Basavaraja (Center I/c)	Breeding	08.06.1998	-	0836-2446556. Extn.2214280(O) 09141388524 (M) Fax: 0836-2748377 basavarajagt@uasd.in	Dr. Shamarao Jahagirdar PI Plant Pathology 09740641068 (M) shamaraoj@gmail.com

Scientist (Agronomy) (15,600-39,000+6,000 AGP)	1	Jr. Agronomist (Rs.15600-39100+ AGP 6000)	Rs.65,807	Dr. Somanagoude	Agronomy	20.09.2017	-	09741058053 (M) sangu_agr@yahoo.com	Dr. P Jones Nirmalnath, Microbiologist
Scientist (Entomology) (15,600-39,000+6,000 AGP)	1	Jr. Entomologist (Rs.15600-39100+ AGP 6000)	Rs.65,807	Dr. R. Channakeshava	Entomology	02.03.2017	-	09900934831 (M) channakeshavar@gmail.com	
Scientist (Plant Pathology) (15,600-39,000+6,000 AGP)	1	Jr. Pathologist (Rs.15600-39100+ AGP 8000)	Rs.88,784	Dr. Shalini Huilgol	Pathology	23.06.2017	-	09740264000 (M) sagarshalini@uasd.in	
Technical Staff (4 Post)									
Technical Assistant (T4) (Rs.9300-34800+ AGP 4200)	1	Technical Assistant (Rs.9300-34800+ AGP 4200)	Rs. 37,415	Mrs. Sheela Duddagi	Plant Breeding	01-07-2015	-	0836-2446556. Extn.2214280(O) 07204392351 (M) Fax: 0836-2748377 sheelavd.sheela@gmail.com	-
Technical Assistant (T4) (Rs.9300-34800+ AGP 4200)	1	Technical Assistant (Rs.9300-34800+ AGP 4200)	Rs. 42,103	Mr. C.J. Kumar	-	-		-	-
Fieldman (T1) (5200-20200) (GP=2000)	1	Lab. Asst. (Rs.16000-29600)	Rs.46,785	Mr. T.M. Nadaf	-	23-7-2016	-	0836-2446556. Extn.2214280(O) 9900335264 (M)	-
Fieldman (T1) (5200-20200) (GP=2000)	1	Field Asst. (Rs.16000-29600)	Rs. 40,950	Mr. B.S. Shyagoti	-	01-04-2013	Working arrangement in U.A.S. Dairy, Dharwad	-	-

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 Jan 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. 37400-67000and AGP of Rs. 8000/ 9000	Professor (Plant Breeding) Rs. 37400-67000+ AGP Rs. 10000	1	189579.00	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	31000=00	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) gauravtaggar@pau.edu Dr (Mrs) Sunita Sharma (Biochem) 09876130110 (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	-		

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 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									
Jr. Plant Breeder (15600-39100 + 6000 GP)	Jr. Plant Breeder (20590 + 6000 GP)	1	93550	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	101678	Dr. T. Sunanda Devi	Agronomy	30th August 2011	-	+919856117141 sunandabckv@gmail.com	-
Jr. Entomologist (15600-39100 + 6000 GP)	Jr. Entomologist (22990 + 6000 GP)	1	101678	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	107520	Dr. L. Sophia Devi	Food Technology	30th August 2011	-	09856939623, 08837223476 rush2sophia@gmail.com	-
Technical Staff									
Fieldman (T1) (5200 - 20200)	Fieldman (T1) (6820 + 1900 GP)	4	34877	H. Sarat Singh	-	19th December 2012	-	+917085411341	-
Fieldman (T1) (5200 - 20200)	Fieldman (T1) (6820 + 1900 GP)		34877	N. Daya Singh	-	20th December 2012	-	+919774941381 ningthoujamdayaSingh@gmail.com	-
Fieldman (T1)	Fieldman		32118	K. Lalit Singh	-	3rd January 2014	-	+919436683166	-

(5200 - 20200)	(T1) (6560 + 1900 GP)								
Fieldman (T1) (5200 - 20200)	Fieldman (T1) (6560 + 1900 GP)		32118	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. Reecha T. Das	Plant Breeding	13/1/2020	-	das.reecha@gmail.com 09611931984	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 +2000	Field Asstt.III 14000-49000+8700	1	27966	MrDiganta.Hazarika		11/12/2017	-	9365543837	Nil
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 5200-20200)	1	Rs. 26905/-	Mr. Talososang Amri		24-07-2012		08731821798 (M)	
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

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	-		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
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) [37,400-67,000 + 9,000 AGP]	1	Senior Scientist		Dr. M..K.Shrivastava (Center I/c)	Plant Breeding	From 10-08-2017	Filled	M. 09827256494 07987299126 shrivastava.manoj03@gmail.com	
Scientist (Plant Pathology) [15,600-39,100 + 6,000 AGP]	1	Scientist 15600-39100+ AGP 6000		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	9300-34800+ AGP 4200	51000 (7th Pay)	Mr. Gyanendra Singh-	Technical Assistant	20-03-2019	Filled	8839498002 singh.gyan14@gmail.com	

Technical Assistant (T4) (Rs.9300-34800+ AGP 4200)	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 Research Assistant (9,300-34,800)	Senior Research Assistant (9300-34800+ AGP 4400)	1	Rs. 50,009/-	Shri D.T. Pawar	Plant Breeding	21.06.2010	1	09422176738(M) rameshpwr267@gmail.com	NA
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 + 6000 (Stage-I)	1	₹ 66,716.00	Dr. M. Rajendar Reddy	Plant Breeding	24.07.2017	-	08732-226863 (O) 09704134304 (M) rajendar0536@gmail.com	
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

Appendix-*VII*

STATEMENT SHOWING REVISED ESTIMATE OF BUDGET FOR AICRP ON SOYBEAN CENTRES FOR THE FY 2019-20

(Rs. in Lakhs)

S. No.	Name of the centre	Pay	TA.	R. cont.	Adm Exp	Total
(A) Other than NEH						
1	CoA, (RVSKVV) SEHORE	170.00	2.60	12.00	--	184.60
2	UAS, DHARWAD	71.00	2.00	11.00	--	84.00
3	ARI, (MACS) PUNE	67.00	0.80	5.50	--	73.30
4	GBPUA&T, PANTNAGAR	85.00	3.00	12.00	--	100.00
5	UAS, BANGALORE	30.00	0.60	2.50	--	33.10
6	MAU, PARBHANI	36.94	1.70	5.50	--	44.14
7	ARS, KOTA	85.00	1.70	8.00	--	94.70
8	PAU, LUDHIANA	45.50	1.50	5.50	--	52.50
9	ANGRAU,ARS, ADILABAD	30.50	1.00	5.50	--	37.00
10	CSKHPKV, PALAMPUR	50.56	1.30	6.00	--	57.86
11	BAU, RANCHI	14.00	1.10	5.00	--	20.10
12	JNKVV, JABALPUR	41.00	1.20	6.00	--	48.20
13	IGKV, RAIPUR	30.00	1.50	6.00	--	37.50
14	PDKV, AMRAVATI	27.50	2.00	8.50	--	38.00
15	VPKAS, ALMORA	--	--	--	--	--
16	IARI, NEW DELHI	--	--	--	--	--
17	ICAR RE NEH, BARAPANI	--	1.00	1.00	--	2.00
18	ZARS (RVSKV), MORENA	20.00	1.00	3.00	--	24.00
	Need Based requirement		--	13.00	--	13.00
	Reserve	4.00	--	--	--	4.00
	Total (A)	**808.00**	**24.00**	**116.00**	**--**	**948.00**
(B) NEH						
19	SASRD, MEDZIPHAMA	23.60	1.30	7.00	--	31.90
20	AAU, JORHAT	17.40	0.90	4.00	--	22.30
21	CAU, IMPHAL	42.75	3.15	14.00	--	59.90
	Adm. Exp.	--	--	--	9.65	9.65
	Total (B)	**83.75**	**5.35**	**25.00**	**9.65**	**123.75**
(C) Tribal Sub Plan		--	--	9.77	20.23	30.00
	Grand Total (A+B+C)	**891.75**	**29.35**	**150.77**	**29.88**	**1101.75**