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Annual Progress Report

2022-2023

All India Coordinated Research Project on Soybean

ICAR-Indian Institute of Soybean Research

(ISO 9001:2015 Certified Organization)

(Indian Council of Agricultural Research)

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I am honored to express my sincere thanks and gratitude to Dr. Himanshu Pathak, Secretary Department of Agricultural Research and Education (DARE), Government of India & Director General, Indian Council of Agricultural Research (ICAR), for his continuous support. His vision and leadership have played a pivotal role in fostering the growth of agricultural research in our country, My heartfelt thanks go to Dr. T R Sharma, Deputy Director General (Crop Science), for his insightful inputs, guidance and expertise in shaping the direction of our research and ensuring its relevance to the needs of the farming community. I would like to extend my sincere thanks and appreciation to Dr. Sanjeev Gupta, Assistant Director General (Oilseeds & Pulses), other Assistant Director Generals of ICAR for their constant support and encouragement. Their input and suggestions have immensely enriched our report and added credibility to our findings and their unwavering support has been crucial in helping achieve the research goals in AICRP on Soybean.

The overall weather conditions during crop season of 2022-23 across the soybean production zones were quite normal and favorable for crop growth and development. Rain distribution was normal in most of the zones. Performance of 54 IVT, 23 AVT I and 12 AVT II test entries was tested in co-ordinated trials at 31 locations across 6 agro climatic zones of the country. Breeder seed production during 2022-23 was 13113 q against the target of 14982 q. Row spacing of 45 cm recorded the higher yield in all of the AVT II entries. Microbial consortia of Rhizobium + MDSR14 + 12c (12c= Burkholderi aarboris-High P solubilizing); could reduce 25% of recommended fertilizer doses in Southern and Central Zone, while Bio Zn + Bio NPK was effective in reducing similar fertilizer doses in North Eastern Hill Zone. Nine microbes with multiple plant growth promoting traits such as IAA production, siderophore, ACC deaminase and higher survival in higher levels in a PEG osmoticum were isolated.

A total of 21 diseases were observed in six AICRP zones. Anthracnose pod blight and Yellow mosaic virus were the most severe diseases followed by Charcoal Rot, Pod Blight/Leaf/Stem blight, and Rhizoctonia aerial blight. Advanced breeding lines derived from different crosses showed resistance to RAB at Pantnagar. EC 280129 was found to be resistant to several diseases including FLS, Anth., BS, YMV, and CR. A total of 21 insect species infested the soybean in 2022. 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. AVT II entries NRC 165 and PS 1670 exhibited good antibiosis reaction. Seven germplasm lines viz., EC 389149, EC 457366, JSM 195, EC 113778, EC 232019, JS 20-41 and JS 20-53 exhibited insect resistance at hotspots. Results of multi-location testing of six microbial insecticide combinations against major insect-pest indicated their superior performance over control in reducing the insect-pest population.

I would like to acknowledge the contributions of all the scientist, researchers, and staff members specially principal investigators of different disciplines for their kind support and efforts in bringing this report well in time. Their dedication and hard work have been instrumental in conducting the research and compiling the data presented in this report. It is through their collective efforts that we have been able to present this Annual Progress Report (2023) of All India Coordinated Research Project on Soybean.

May 10, 2023 (Kunwar Harendra Singh)

ICAR-IISR Indore Director

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सारांश

मौसम :

खरीफ 2022 में सोयाबीन के लिए मौसमी स्थितियां अनुकूल थीं। जून और जुलाई में भारी बारिश ने भवानीपटना और जोरहाट में बुवाई को प्रभावित किया। अक्टूबर में भारी बारिश ने दक्षिणी क्षेत्र में पुणे और बेंगलुरु में कटाई को प्रभावित किया।

अनुवांशिकी एवं पादपप्रजनन :

समन्वित परीक्षण

पादप प्रजनन परीक्षण आवंटन और संचालन

स्वीकृत तकनीकी कार्यक्रम के अनुसार 16 राज्यों में फैले इकतीस केंद्र, किस्मों के विकास संबंधी गतिविधियों में शामिल थे। 31 केंद्रों को नौ परीक्षण आवंटित किए गए जिसके परिणामस्वरूप 16 राज्यों में कुल 84 परीक्षण हुए। ढोली और नागपुर केंद्रों ने क्रमशः दो और एक परीक्षण नहीं किया। जवाब दिए गए 82 परीक्षणों में से 63 स्वीकार किए गए। निगरानी टीम की रिपोर्ट के सुझाव के अनुसार 6 टियालों के डेटा पर विचार नहीं किया गया था। जबकि भवानीपटना और उगरखुर्द में बुवाई के समय भारी बारिश के कारण परीक्षण विफल हो गए थे, अन्य को या तो कम औसत उपज (<10 Q /हेक्टेयर) या उच्च सीवी (>25) के कारण खारिज कर दिया गया था।

तालिका 1: पादप प्रजनन परीक्षण आवंटन और संचालन

Trial	Zone	Allocation	Responded	Accepted	Trial Failed	Rejected Due To	
						High CV	Yield Below 10 Q
AVT 2	NHZ	3	3	3	0	-	-
AVT 1 + 2*	NPZ	3	2	2	0	-	-
AVT 1	EZ	4	3	3	0	-	-
AVT 2	NEHZ	3	3	2	0	-	1
AVT 1	CZ	12	12	8	3	-	1
AVT 1+2 (Early)	CZ	12	10	10	$2^{!}$	-	-
AVT II (Vegetable)	CZ	3	2	2	0	-	-
IVT	NHZ	3	3	3	3	-	-
	NPZ	3	3	2^{-}	0	-	1
	EZ	4	3	2	1	-	-
	NEHZ	3	3	1	1		1
	CZ	12	11	9	0	1	2
	SZ	7	6	6	1	-	-
IVT (Early)	CZ	12	11	9	0	-	2
	Total						

आरंभिक वैराइटी परीक्षण (आईवीटी)

NEHZ को छोड़कर सभी क्षेत्रों में तीन Checks सहित कुल 54 परीक्षण प्रविष्टियों का मूल्यांकन किया गया था.NEHZमेंपिछले वर्ष की 3 दोहराई गईप्रविष्टियों के कारण यह संख्या 57 थीं। NEHZ में बारह प्रविष्टियाँ, CZ में 3 प्रविष्टियाँ और CZ (प्रारंभिक) में एक प्रविष्टि ने सर्वोत्तम Check की तुलना में 10% या अधिक दाना/तेल उपज दर्ज की (तालिका २)।

तालिका २: विभिन्न जोंस के आरंभिक वैराइटी परीक्षण मेंउच्चसोयाबीनदाने का उत्पादन देने वाली प्रविष्टियों का दाना उत्पादन **(kg/ha)** और उनकी रैंक

S. No	**Entry**	**NEHZ**	**CZ**	**CZ (Early)**	
				Grain Yield	**Maturity**
1.	NRC 190	3630 (I)			
2.	AMS 2021-4	3185 (II)			
3.	Himso 1696	3185 (II)			
4.	KDS 1188	3136 (III)			
5.	AS 34	3136 (III)			
6.	RSC 1172	3086 (IV)			
7.	NRC 259	3062 (V)			
8.	NRC 260	3012 (VI)			
9.	AMS 2021-3	2988 (VII)			
10.	VLS 105	2963 (VIII)			
11.	MAUS 824	2938 (IX)			
12.	Pusa Sipani 433	2914 (X)			
13.	NRC 258		3303 (I)		
14.	MAUS 824		2747 (II)		
15.	NRC 259		2666 (III)		
16.	NRC 164			2559 (VII)	89.8 (IV)
17.	KDS 753 (C)	2617 (XVIII)			
18.	NRC 138 (C)			2071 (XV)	95.9 (XI)
19.	RVSM 2011-35		2425 (IX)		

उन्नत वैराइटी परीक्षण I (AVT I)

कोई भी प्रविष्टि NHZ में Check के मुकाबले दाना/तेल की उपज के 10% से अधिक रिकॉर्ड नहीं कर सकी। इस क्षेत्र में नल केटीआई प्रविष्टि एनआरसी 197 में Check की तुलना में 3% कम दाने की उपज दर्ज की गई। NPZ में, दाने की उपज में ईडीवी प्रविष्टि NRCSL 6, मूल वैरायटी SL 958 से 8% बेहतर थी। RSC 11-42 (EZ), JS 23-09 और JS 23-03 (CZ Early), NRC 188 (CZ Vegetable) अपनी-अपनी सर्वश्रेष्ठ checks में 10% या उससे अधिक बेहतर थे (तालिका 3)।

तालिका 3 : विभिन्न जोंस केउन्नत वैराइटी परीक्षण I मेंउच्चसोयाबीनदाने का उत्पादन देने वाली प्रविष्टियों का दाना उत्पादन (kg/ha) और उनकी रैंक

S. No	Entry	NPZ	EZ	CZ (Early)		CZ (Vegetable) Green Pod Yield (Kg/ha)
				Grain Yield	Maturity	
1.	NRCSL 6*	1144				
2.	JS 23-09			2332 (I)	90.5 (VIII)	
3.	JS 23-03			2279 (XII)	92.4 (XII)	
4.	RSC 11-42		2119 (II)			
5.	NRC 188					5991
6.	JS 20-34 (C)					5084
7.	Palam Early Soya I (C)					
8.	SL 958** (C)	1052				
9.	JS 20-116 (C)		1585 (VIII)			
10.	NRC 138 (C)			1797 (III)	92.2 (XI)	
11.	RSC 10-46		1696(V)			

उन्नत वैराइटी परीक्षण II (एवीटी II)

EZ में RSC 11-35 और CZ (Early) मेंJS 22-12, JS 22-16, JS 22-18 तथाNRC 165 संबंधित सर्वोत्तम check पर 10% से अधिक अनाज उपज दर्ज की (**तालिका3**)।

तालिका 4 : विभिन्न जोंस केउन्नत वैराइटी परीक्षण IIमेंउच्चसोयाबीनदाने का उत्पादन देने वाली प्रविष्टियों का दाना उत्पादन (kg/ha) और उनकी रैंक

S. No	Entry	EZ	CZ (Early)	
			Grain Yield	Maturity
1.	NRC 165		1965 (IV)	88.5 (V)
2.	JS 22-12		2238 (I)	90.2 (VII)
3.	JS 22-18		2156 (II)	91.2 (IX)
4.	JS 22-16		2107 (III)	91.8 (X)
5.	RSC 11-35	2302 (I)		
6.	NRC 138 (C)		1797 (VI)	92.17 (XI)
7.	RSC 10-46	1696(V)		

जनन द्रव्यों का मूल्यांकन

6 राज्यों में 6 एआईसीआरपी z zones में फैले 8 केंद्रों पर चेक किस्मों सहित 322 सोयाबीन जर्मप्लाज्म का एक सेट लगाया गया। ज़ोन की लोकप्रिय किस्मों को चेक के रूप में इस्तेमाल किया गया। अधिक उपज देने वाली,अपेक्षाकृत मोटे बीजों वाली तथाजल्दी पकने वाली किस्मों की पहचान की गई। Mahalanobis D^2 सांख्यिकी के आधार पर सोयाबीन जीनोटाइप को अल्मोड़ा, पालमपुर, पंतनगर,

मणिपुर, रायपुर, इंदौर, परभणी और पुणे केंद्रों में क्रमशः 12, 14,7,12,15,14,9 तथा 7 समूहों में बांटा गया। सोयाबीन आनुवंशिक आधार को विस्तृतकरने के लिए खरीफ 2023 में संकरण कार्यक्रम में इसके उपयोग के लिए ज़ोन की लोकप्रिय सोयाबीन किस्मों से diverse जर्मप्लाज्म की पहचान की गई।

प्रजनकबीज उत्पादनः

खरीफ 2023 के लिए सोयाबीन प्रजनक बीज का मांग 14982.25 क्विंटल था। इंडेंट में 72 किस्में शामिल थीं। JS 335, JS 20-98, JS 20-34 और JS 20-116 किस्मों के लिए उच्च इंडेंट दिया गया था जो क्रमशः 2649.05, 2096.0, 1341.7 और 1268.74 क्विंटल है | इस किस्मों का इंडेंट कुल इंडेंट का क्रमशः 17.68, 13.99, 8.95 और 8.47% है। कुल मिलाकर 49% इंडेंट में योगदान करते हैं। इन मांगपत्रों के विरुद्ध विभिन्न ए.आई.सी.आर.पी सोयाबीन और अन्य एन.एस.पी. केंद्रों को 15671.0 क्विंटल का लक्ष्य आवंटित किया गया था। खरीफ 2022 के दौरान कुल 13112.72 क्विंटल प्रजनक बीज का उत्पादन किया गया था। उत्पादन लक्ष्य से 2558.28 क्विंटल और डी.ए.सी. इंडेंट से 1869.63 क्विंटल की कमी थी। जेएस 20-69 के लिए खरीफ उत्पादन में सबसे अधिक घाटा 90% था। मध्य क्षेत्र के लिए विकसित किस्में जो अत्यधिक मांग वाली थीं, प्रतिकूल जलवायु परिस्थितियों के कारण असफल रहीं। जेएस 20-98, जेएस 20-94, जेएस 20-34 और जेएस 20-29 में विफलता की डिग्री क्रमशः 47.08%, 43.02%, 40.81% और 56.61% थी। मध्य क्षेत्र में आर.वी.एस.के.वी.वी., ग्वालियर, ए.यू, कोटा, जे.एन.के.वी.वी., जबलपुर और एम.पी.ए.यू.टी., उदयपुर और दक्षिणी क्षेत्र में यू.ए.एच.एस., शिवमोगा, यू.ए.एस., बेंगलुरु, यू.ए.एस., रायचूर में उत्पादन बड़ी विफलता थी। अन्य केन्द्रों का उत्पादन संतोषजनक रहा।

जे.एन.के.वी.वी., जबलपुर, यू.ए.एस., धारवाड़, वी.एन.एम.के.वी., परभणी, डॉ. पी.डी.के.वी., अकोला, एम.पी.के.वी., राहुरी, आई.जी.के.वी., रायपुर और यू.ए.एस., बेंगलुरु में रबी/ग्रीष्म 2022-23 के दौरान घाटे की भरपाई के लिए प्रतिपूरक प्रजनक बीज उत्पादन की योजना बनाई गई है । घाटा प्रतिपूरक उत्पादन 1449.0 क्विंटल होने का अनुमान है। रबी कार्यक्रम के बाद सोयाबीन प्रजनक बीज में अंतिम घाटा लगभग 420q होगा।

शस्य विज्ञान :

सभी AVT II प्रविष्टियों ने पंक्ति अंतराल 45 सेमी पर उच्चतम उत्पादन दिया। सोयाबीन -मक्का-मक्का अनुक्रम सोयाबीन समतुल्य के मामले में-सोयाबीनNPZ, NEZ, CZ और SZ में अधिकतम उत्पादन दिया। राइजोबियम +MDSR 14 + 12सी)12सी (उच्च पी उपलब्ध कराने वाला-बर्खोल्डेरिया आर्बोरिस = और BioZN + Bio NPK ने SZ, NEHZ और CZ में सलाह की गयी उर्वरक की मात्र को 25% को कम कर दिया। जैविक प्रबंधन के तरीकों से केवल NEHZ में उच्च सोयाबीन के दाने का उत्पादन दर्ज किया। थायोयूरिया के आवेदन का फोलियर स्प्रे @ 750 पीपीएम हे की /20-25 और 50-55 दिनों के बाद सोने की बुआई पर सोयाबीन उत्पादन पर लाभदायक प्रभाव दिखाया।

पादपरोग विज्ञान :

खरीफ 2022 में, भारत में छह क्षेत्रों से कुल 21 बीमारियां रिपोर्ट की गईं। इनमें, एंथ्राक्नोज़ पॉड ब्लाइट और येलो मोसेक वायरस सबसे गंभीर बीमारियां थीं जिसके बाद कॉल्डरोट , पॉड ब्लाइट / लीफ / स्टेम ब्लाइट और राइजोक्टोनिया एरियल ब्लाइट थी।YMV, पॉड ब्लाइट और फ्रॉग आई लीफ स्पॉट भारत के सभी सोयाबीन उत्पादक क्षेत्रों में गंभीर रूप से प्रकट हुए। एंथ्राक्नोज़ का अधिकतम प्रकोप इंदौर में और YMV और कार्बन रोट जबलपुर में दर्ज किया गया था। Dharwad में स्क्रीनिंग के दौरान कोई एंट्री जंग प्रतिरोधी प्रतिक्रियाओं का प्रदर्शन नहीं करती थी , और वहां उच्चतम रोग दबाव , 9 ग्रेड पर दर्ज किया गया था। Rust प्रतिरोधी स्रोत EC 241780 और EC 241778 टेस्टिंग के 14 वर्षों के बाद रोग प्रतिरोध टूट गया। जर्मप्लाज्म 280129 को FLS, Anth, BS, YMV और CR जैसी कई बीमारियों से प्रतिरोधी पाया गया। विभिन्न विधियों में जो विभिन्न रोगों को जीवाणु नियंत्रित करने के लिए परीक्षण किए गए , उनमें जोरहाट केंद्र पर बैकिलस थुरिंजेनेसिस टी)3) के बीज और पत्तियों पर लागू करना सर्वाधिक प्रभावी पाया गया था , जो एंथ्रैक्नोस और कॉलर रॉट के खिलाफ 15.33% तक रोग प्रभाव को नियंत्रित करने में मदद करता है। हालांकि, धारवाड़ केंद्र पर जैविक नियंत्रण विधि जंग के रोग के खिलाफ कम प्रभावी निकली। पंत नगर केन्द्र में अधिक तापमान और RAB की गंभीरता के बीच नकारात्मक सम्बन्ध पाया गया, जबकि बरसात के दिनों की संख्या रोग की गंभीरता के साथ–साथ सकारात्मक रूप से सहसंबद्ध थी। उन्नत ब्रीडिंग सामग्री का स्क्रीनिंग पंतनगर में AGS 25 x PS 1042, AGS 25 x PS 1592, CM 60 x PS 1692, Glycine soja x PS 1347, PK 515 x JS 97-52, PS 1592 x PS 1347, और TGX 1681-3f x PK 327 जैसे क्रॉस से प्राप्त सन्ततियां RAB के प्रति प्रतिरोध प्रदर्शित करते हैं . जोरहट केन्द्र पर सभी प्रजनन सामग्री कॉलर रॉट के प्रति संवेदनशील से अतिसंवेदनशील पाये गये।

कीटविज्ञान :

11 समन्वय केंद्रों द्वारा खरीफ-2022 के दौरान कुल सात फील्ड/प्रयोगशाला परीक्षण किए गए। सोयाबीन की फसल को प्रभावित करने वाली इक्कीस विभिन्न कीट प्रजातियों की सूचना मिली है। सभी केंद्रों पर तना मक्खी का प्रकोप देखा गया। अमरावती से स्टेम फ्लाई मैगॉट्स के कारण अधिकतम स्टेम टनलिंग (80%) की सूचना मिली थी। पिछले वर्षों की तुलना में इस मौसम में सफेद मक्खी का प्रकोप कम था। मध्य क्षेत्र में पर्णभक्षी और तना मक्खी प्रमुख कीट बने रहे लेकिन परभणी और इंदौर में गर्डल बीटल का प्रकोप आश्चर्यजनक रूप से नगण्य था। कोटा में गर्डल बीटल का प्रकोप सबसे अधिक (30.00%) था और इस कीट के लिए एक हॉट स्पॉट बना रहा। साइडिया पाइचोरा (फली भेदक) के कारण फली क्षति 37.42% तक धारवाड़ केंद्र में देखी गई। इंफाल से एफिड्स (35.00 एफिड्स/पौधा), लीफ वेबर (9.33 लार्वा/मी) और बिहार बालों वाली कैटरपिलर (83.33 लार्वा/एमआरएल) की घटनाओं की सूचना मिली थी। प्राकृतिक जैव-नियंत्रण एजेंटों में, एंटोमोपैथोजेनिक कवक जैसे ब्यूवेरिया बेसियाना और नोमुरिया रिलेई के कारण अगस्त - सितंबर के दौरान लेपिडोप्टेरान डिफोलिएटर्स में मस्कार्डिन रोग के गंभीर संक्रमण हुआ।

विभिन्न जोनों के आई.वी.टी., ए.वी.टी.–I, ए.वी.टी.–II से संबंधित सोयाबीन जीनोटाइप का कीट प्रतिरोध के लिए मूल्यांकन किया गया। ए.वी.टी. में तीन वर्षों के आंकड़ों को ध्यान में रखते हुए, स्टेम फ्लाई, डिफोलिएटर्स, गर्डल बीटल और पेस्ट काम्प्लेक्स के खिलाफ प्रतिरोध के संबंध में 13 जीनोटाइप कीट प्रतिरोध पाया गया। खरीफ 2022 के आई.वी.टी. में, दो प्रकार के आई.वी.टी. परीक्षण अर्थात, आई.वी.टी. (सामान्य जीनोटाइप) और आई.वी.टी. (जल्दी परिपक्व होने वाले जीनोटाइप) लगाये गए और आईवीटी (सामान्य जीनोटाइप) से तैंतीस प्रविष्टियां और आईवीटी (प्रारंभिक परिपक्व जीनोटाइप) से सात प्रविष्टियां आशाजनक पाई गईं, जिनका आगामी सत्र में ओर मूल्यांकन किया जाएगा।

प्रतिरोध के प्रकार की पुष्टि करने के लिए 13 ए.वी.टी.–द्वितीय प्रविष्टियों को नोवेल दृष्टिकोण जिसमें अप्प्रोक्सीमेट डाइजेस्तिबिलिटी, ई.सी.आई. और ई.सी.डी. सूचकांक शामिल थे, को इंदौर और पंतनगर में परीक्षण किया गया। परीक्षण किए गए 13 जीनोटाइप में से किसी भी प्रविष्टि में एस. लिटुरा लार्वा के खिलाफ मजबूत/अत्यधिक एंटीक्सेनोसिस प्रतिक्रिया प्रदर्शित नहीं हुई। एनआरसी 165 में सबसे कम ए.डी. पाई गई और पी.एस.1670 में सबसे कम ई.सी.आई. और ई.सी.डी. पाई गई। इन प्रविष्टियों में अच्छा एंटीबायोसिस रिएक्शन पाया गया।

जन्नद्रव्य का मूल्यांकन एक नियमित प्रक्रिया है। इस वर्ष भी हॉट स्पॉट पर प्रमुख कीड़ों की जांच के लिए कीट विज्ञानियों को 50 जर्मप्लाज्म लाइनें भेजी गईं। ईसी 389149, ईसी 457366, जेएसएम 195, ईसी 113778, ईसी 232019, जेएस 20-41 और जेएस 20-53 जैसी 7 लाइनों ने कीट प्रतिरोध प्रदर्शित किया। अगले सीजन के दौरान इन लाइनों का ओर परीक्षण भी किया जाएगा।

सोयाबीन के प्रमुख कीट–पीड़कों के माइक्रोबियल कन्सोर्सिया के माध्यम से प्रबंधन में पंतनगर, सीहोर, कोटा, धारवाड़, प्रभणी और इम्फाल में सोयाबीन के प्रमुख कीट–पीड़कों के खिलाफ छह माइक्रोबियल कीटनाशकों के संयोजन का परीक्षण किया गया। परिणामों से पता चला कि कीट–पीड़कों की आबादी को कम करने के लिए इनके संयोजनों को कंट्रोल से बेहतर पाया गया।

सुवा, एनेथम ग्रेवोलेंस के साथ इंटरक्रॉपिंग के माध्यम से सोयाबीन के डिफोलिएटर्स के प्रबंधन में कुल चार उपचार सुवा के साथ सोयाबीन की अलग–अलग पंक्तियों के संयोजन के साथ–साथ एवं एक उपचार मात्र सोयाबीन फसल के साथ धारवाड़, सीहोर, पंतनगर, प्रभानी और इंदौर में किए गए और इसके प्रयोग के परिणामों से संकेत मिला कि इंदौर को छोड़कर बाकि सब जगह उपचार– T4 (3 सोयाबीन: 2 सुवा: 3 सोयाबीन पंक्तियों का संयोजन) डिफोलिएटर्स की आबादी को कम करने में अन्य उपचारों से बेहतर पाया गया। इंदौर में सेमीलूपर (डायक्रिसिया ऑरिकैल्सिया) में T5 (6 सोयाबीन: 2 सुवा: 6 सोयाबीन पंक्तियों के संयोजन) और स्पोडोप्टेरा लिटुरा में T2 (3 सोयाबीन: 1 सुवा: 3 सोयाबीन पंक्तियों के संयोजन) सबसे अच्छा पाया गया।

सूक्ष्मजीवविज्ञान:

एमबी 10 (पी. फ्लोरेसेंस) और एमबी 16, स्यूडोमोनास फ्लोरेसेंस एलएसई-1, स्यूडोमोनास ऑरिजिहैबिटंस एलएसई-3 और छह राइजोबियल कल्चर जिसमें कई पौधों की वृद्धि होती है, जैसे कि आईएए उत्पादन, साइडरोफोर, एसीसी डेमिनेज और पीईजी में उच्च स्तर में उच्च उत्तरजीविता।

ऑस्मोटिकम को पृथक किया गया। माइक्रोबियल इनोकुलेंट्स के एकल या संयोजन के साथ एन और पी उर्वरकों की अनुशंसित और कम खुराक के साथ उपचार के नौ अलग-अलग संयोजनों में, उपचार में अनुशंसित एन एंड पी के 75% + अनुशंसित के + बी के 100% शामिल हैं। उच्चतम औसत उपज (किलोग्राम/हेक्टेयर), हालांकि प्रतिक्रिया गैर-महत्वपूर्ण थी (पी<0.05) अन्य उपचारों से भिन्न थी।नोड्यूलेशन मापदंडों पर pre-emergence शाकनाशियों के प्रभाव के मूल्यांकन पर प्रयोग में डिक्लोसुलम अनुप्रयोग का उपचार + N fixing या P solubilizing बैक्टीरिया (बी. डाकिंगेंस और बुर्कोलेरिया आर्बोरिस) य दोनों का समिश्रण नेउल्लेखनीय रूप से संवर्धित नोड्यूलेशन लक्षणों को दिखाया। Post-emergenc शाकनाशियों के लिए, इमाजेथापायर + प्रोपेक्विज़ाफॉप संयोजन के साथ उपचार ने उल्लेखनीय रूप से उच्च सहजीवी लक्षण दिखाए।एवीटी II प्रविष्टि एनआरसी 188, आरवीएसएम 2012-4, पीएस 1670, एनआरसीएसएल3, पीएस1670, एनआरसी195 और एनआरसीएसएल5 ने चेक की तुलना में उच्च या तुलनीय नोड्यूलेशन क्षमताओं को दिखाया।

खाद्य तकनीकी:

NRCSL 6, AS 24, JS 23-03, PS 1569 की दूध उपज अधिकतम थी और DLSB 1, RKS 113, NRC 190, NRC 189, JS 23-03 की टोफू उपज सबसे अधिक थी। अर्ध-प्रशिक्षित पैनलिस्टों द्वारा 9 बिंदु हेडोनिक स्केल पर पैनलिस्ट द्वारा संवेदी मूल्यांकन किया गया था। स्कोर 6 को स्वीकार्य संवेदी स्कोर के रूप में रखते हुए, CZ (AVT I) कीसभीप्रविष्टियाँ, JS 23-03 (CZ-AVT I + II प्रारंभिक), NRC 195 (NPZ-AVT I + II) और KDS 1096 और DLSb1 (NEHZ-AVT II) की सभी प्रविष्टियाँ) दूध और टोफू संवेदी के लिए स्वीकार्य थे।

अग्रिमपंक्ति प्रदर्शन:

1. सोयाबीन अग्रिम पंक्ति प्रदर्शन खरीफ 2022 के तहत विभिन्न घटक जैसे सोयाबीन की संपूर्ण उत्पादन तकनीक (Whole package), एकीकृत खरपतवार प्रबंधन (IWM), एकीकृत पोषक तत्व प्रबंधन (INM), एकीकृत कीट प्रबंधन (IPM), जैविक खेती (Organic farming) एवं अंतरवर्तीय फसल (Intercropping) के साथ सोयाबीन उत्पादन की उन्नत तकनीक को अपनाने पर कृषक् पद्धति की तुलना में सोयाबीन की उपज में 26.02 प्रतिशत एवं शुद्ध लाभ में 32.98 प्रतिशत की वृद्धि दर्ज की गई। इसी तरह, भिन्न–भिन्न घटकों जैसे सोयाबीन की संपूर्ण उत्पादन तकनीक (Whole package), एकीकृत खरपतवार प्रबंधन (IWM), एकीकृत पोषक तत्व प्रबंधन (INM), एकीकृत कीट प्रबंधन (IPM), जैविक खेती (Organic farming) एवं अंतरवर्तीय फसल (Intercropping) में 25.40, 32.99, 39.41, 31.85, 29.8, 23.60 प्रतिशत उपज में वृद्धि तथा 34.39, 52.24, 54.51, 46.78, 34.79, 20.40 प्रतिशत की वृद्धि उन्नत सोयाबीन उत्पादन तकनीक में कृषक पद्धति की तुलना में अधिक देखा गया।
2. विभिन्न घटकों के सम्मिलित परिणामस्वरूप पुणे में सोयाबीन की उन्नत उत्पादन तकनीक के अंतर्गत औसत सोयाबीन की उपज 2833 किग्रा/हेक्टेयर और कृषक फसल उत्पादन तकनीक में औसत 2383 किग्रा/हेक्टेयर अधिकतम उपज प्राप्त हुई, साथ ही देवघरबारिया में न्यूनतम उपज उन्नत तकनीक में 1284 किग्रा/हेक्टेयर और कृषक उत्पादन तकनीक में 944 किग्रा/हेक्टेयर उपज दर्ज की गई। वही, विभिन्न घटकों के अलग–अलग प्रदर्शन एवं उन्नत उत्पादन पद्धति के अंतर्गत पुणे में सोयाबीन की संपूर्ण उत्पादन विधि में 2977 किग्रा/हेक्टेयर, धारवाड़ में एकीकृत खरपतवार प्रबंधन में 2582 किग्रा/हेक्टेयर, एकीकृत पोषक तत्व प्रबंधन में 2644 किग्रा/हेक्टेयर एवं एकीकृत कीट

करदा में अंतरवर्तीय फसल प्रदर्शन घटक में 2554 किग्रा/हेक्टेयर सोयाबीन की अधिकतम उपज दर्ज की गई। जबकि, सोयाबीन उत्पादन की कृषक पद्धति में सभी छह घटकों में अधिकतम उपज पुणे में संपूर्ण उत्पादन घटक में 2511 किग्रा/हेक्टेयर और अंतरवर्तीय फसल प्रदर्शन घटक में 2021 किग्रा/हेक्टेयर उपज, अदिलाबाद में एकीकृत खरपतवार प्रबंधन में 2071 किग्रा/हेक्टेयर, एकीकृत पोषक तत्व प्रबंधन में 2069 किग्रा/हेक्टेयर, एकीकृत कीट प्रबंधन में 2034 किग्रा/हेक्टेयर उपज तथा इंदौर में जैविक सोयाबीन फसल उत्पादन तकनीक में 1405 किग्रा/हेक्टेयर न्यूनतम उपज दर्ज की गई।

3. सोयाबीन अग्रिम पंक्ति प्रदर्शन के 26 केंद्रों में उन्नत तकनीक एवं कृषक विधि में कुल उपज अंतर–। (YG-I) के आंकड़ो के अनुसार सीहोर में सबसे अधिक 810 किग्रा/हेक्टेयर और लुधियाना में सबसे कम 85 किग्रा/हेक्टेयर में देखा गया। हालांकि, समस्त 26 केन्द्रो का कुल औसत अनुमानित उपज अंतर 391 किग्रा/हेक्टेयर रहा। सोयाबीन अग्रिम पंक्ति प्रदर्शन में प्रदर्शित 6 घटकों में धारवाड़ केन्द्र में घटक एकीकृत पोषक तत्व प्रबंधन (INM) के तहत 854 किग्रा/हेक्टेयर अधिकतम उपज अंतर और लुधियाना में घटक सोयाबीन की संपूर्ण उत्पादन तकनीक (WP) के तहत् सबसे कम 85 किग्रा/हेक्टेयर न्यूनतम उपज अंतर–। दर्ज किया गया।
4. अखिल भारतीय समन्वित परियोजना के समस्त 6 जोन के उपज विश्लेषण में उन्नत तकनीक के अंतर्गत कृषक विधि की तुलना में उत्तर पूर्वी पहाड़ी क्षेत्र (NEHZ) में सबसे अधिक (42.1 प्रतिशत) उपज वृद्धि प्रतिशत दर्ज किया गया एवं उत्तरी मैदानी क्षेत्र (NPZ) में सबसे कम (13.9 प्रतिशत) उपज वृद्धि प्रतिशत देखा गया। वहीं, समस्त 6 जोन में प्रदर्शित विभिन्न घटकों के बीच सोयाबीन उत्पादन की उन्नत तकनीक के तहत पूर्वी क्षेत्र (EZ) में एकीकृत पोषक तत्व प्रबंधन (INM) के अंतर्गतअधिकतम 72.1 प्रतिशत उपज वृद्धि एवं उत्तरी मैदानी क्षेत्र (NPZ) में जैविक खेती घटक के अंतर्गत 12.1 प्रतिशत की नयूनतम वृद्धि दर्ज की गई।

5. समस्त 6 जोन के क्षेत्रवार (Zone wise) लाभ विश्लेषण पश्चात दक्षिणी क्षेत्र (SZ) में अधिकतम शुद्ध लाभ रू.79,695 प्रति हेक्टेयर सोयाबीन उत्पादन की उन्नत तकनीक में एवं रू. 64,685 प्रति हेक्टेयर सोयाबीन उत्पादन की कृषक पद्धति दोनों के तहत उच्चतम शुद्ध लाभ दर्ज किया गया। हालांकि, उन्नत तकनीक में न्यूनतम शुद्ध लाभ उत्तरी पहाड़ी क्षेत्र (NHZ) में रू. 39,116 प्रति हेक्टेयर और कृषक पद्धति में रू. 24,181 प्रति हेक्टेयर सबसे कम शुद्ध लाभ दर्ज किया गया था। समस्त क्षेत्र (Zone)में प्रदर्शित छह घटकों में से, दक्षिणी क्षेत्र (SZ) में सोयाबीन अंतवर्तीय फसल (सोयाबीन+गन्ना) घटक में सबसे अधिक शुद्ध लाभ रू. 2,93,659 प्रति हेक्टेयर उन्नत तकनीक में और कृषक पद्धति में रू. 2,53,412 प्रति हेक्टेयर दर्ज किया गया। जबकि, उत्तरी मैदानी क्षेत्र (NPZ) में सोयाबीन की जैविक खेती (Organic farming) घटक में सबसे कम शुद्ध लाभ रू. 30,509 प्रति हेक्टेयर में फसल उत्पादन की उन्नत विधि में तथा उत्तरी पहाड़ी क्षेत्र (NHZ) में फसल उत्पादन की कृषक पद्धतियों में रू. 18,921 प्रति हेक्टेयर दर्ज की गई।
6. अखिल भारतीय समन्वित परियोजना के समस्त 6 जोन के समग्र क्षेत्रवार औसत उच्चतम और नयूनतम उपज क्रमशः दक्षिणी क्षेत्र (SZ) में 2094 किग्रा/हेक्टेयर और उत्तरी पहाड़ी क्षेत्र (NHZ) में 1445 किग्रा/हेक्टेयर फसल उत्पादन की उन्नत तकनीक के तहत देखी गई। समस्त छह घटकों में से दक्षिणी क्षेत्र में एकीकृत पोषक तत्व प्रबंधन (INM) घटक के अंतर्गत2516 किग्रा/हेक्टेयर फसल उत्पादन की उन्नत तकनीक के तहत औसत उच्चतम उपज पाया गया और उत्तरी पहाड़ी क्षेत्र (NHZ) में 1300 किग्रा/हेक्टेयर में सोयाबीन की संपूर्ण उत्पादन तकनीक (Whole package) घटक में औसत न्यूनतम उपज देखी गई।
7. सोयाबीन अग्रिम पंक्ति प्रदर्शन के 26 केंद्रों के द्वारा किसान के खेतों में कुल मिलाकर लगभग 47 उन्नत सोयाबीन किस्मों का प्रदर्शन किया गया। जिसमें, सबसे ज्यादा प्रदर्शन केडीएस 753 और उसके बाद जेएस 20–34 किस्म पर किए गए। प्रदर्शन में प्रदर्शित विभिन्न घटकों के बीच, सोयाबीन की संपूर्ण उत्पादन तकनीक (Whole package) घटक में सबसे अधिक कुल 39 सोयाबीन की उन्नत किस्मों का प्रदर्शन के बाद घटते कम में एकीकृत खरपतवार प्रबंधन (IWM) में कुल 16, जैविक खेती (Organic farming) में कुल 11, एकीकृत पोषक तत्व प्रबंधन (INM) में कुल 10 सोयाबीन की अधिकतम उन्नत किस्में प्रदर्शन में लायी गई। वही एकीकृत कीट प्रबंधन (IPM) घटक में कुल 8 एवं

अंतरवर्तीय फसल (Intercropping) घटक में कुल 8 सोयाबीन की उन्नत प्रजातियों की न्यूनतम संख्या का प्रदर्शन किया गया।

8. विभिन्न 6 घटकों के तहत परीक्षण की गई सोयाबीन की उन्नत किस्मों के समग्र प्रदर्शन में सोयाबीन की किस्म MACS 1520 (दक्षिणी क्षेत्र तथा महाराष्ट्र) ने 3125 किग्रा/हेक्टेयर के बाद JS 20–116 (मध्य क्षेत्र तथा मध्यप्रदेश) (2908 किग्रा/हेक्टेयर) और MACS 1407 (दक्षिणी क्षेत्र तथा महाराष्ट्र) (2875 किग्रा/हेक्टेयर) में अधिकतम सोयाबीन की उपज उन्नत तकनीक के तहत दर्ज की गई एवं सबसे कम उपज पालम सोया (उत्तरी पहाड़ी क्षेत्र तथा हिमाचल प्रदेश) (1203 किग्रा/हेक्टेयर) के साथ दर्ज की गई। विभिन्न प्रदर्शित घटकों के बीच, सोयाबीन की संपूर्ण उत्पादन तकनीक (Whole package) घटक में सोयाबीन की उन्नत किस्म MACS 1520 और MACS 1460 में उच्चतम उपज 3125 किग्रा/हेक्टेयर (दक्षिणी क्षेत्र तथा महाराष्ट्र) और एकीकृत खरपतवार प्रबंधन (IWM) घटक के तहत पालम सोया (उत्तरी पहाड़ी क्षेत्र तथा हिमाचल प्रदेश) (1015 किग्रा/हेक्टेयर) में न्यूनतम उपज दर्ज की गई।
9. सोयाबीन अग्रिम पंक्ति प्रदर्शन के 26 केंद्रों में कुल मिलाकर 25 केंद्रों पर विभिन्न घटकों के तहत सोयाबीन की खेती की विस्तृत लागत निकाली गई है। जिसमें पाया गया कि सोयाबीन उत्पादन की उन्नत तकनीक के तहत सोयाबीन की खेती की लागत कृषकों की खेती की लागत की तुलना में 14.15 प्रतिशत अधिक थी। प्रदर्शन में प्रदर्शित 6 घटकों में से जैविक खेती (Organic farming) में सबसे अधिक सोयाबीन की उत्पादन लागत 28.71 प्रतिशत एवं घटक एकीकृत कीट प्रबंधन (IPM) में न्यूनतम 9.87 प्रतिशत देखी गई।
10. सभी छह घटकों के प्रदर्शन की समग्र उन्नत उत्पादन तकनीक में व्यय का क्रम इस प्रकार है – सर्वप्रथम बीज और बुवाई तत्पश्चात खाद, उर्वरक, भूमि की तैयारी, सिंचाई, निराई और अंतराशस्यन क्रियायें, कटाई, गहाई, अन्य लागत, कीटनाशक, खरपतवार नाशक, पक्षी से फसल की सुरक्षा, कवकनाशी और बीज उपचार।

Summary

Seasonal Conditions :

Seasonal conditions were favourable for soybean in kharif 2022. Heavy rains in June and July affected the sowing in Bhawanipatna and Jorhat. Heavy rains in October affected the harvesting in Pune and Bengaluru in Southern Zone.

Genetics and Plant Breeding :

Co-ordinated Breeding Trials

Plant Breeding Trial Allocation and Conduction

Thirty-one centers, spread over 16 states, were involved in the varietal developmental activities as per the approved technical program. Nine trials were allotted to 31 centres resulting in a total of 84 trials in 16 states. Dholi and Nagpur centres did not conduct two and one trials, respectively. Out of responded 82 trials 63 were accepted. Data of 6 tials was not considered as per the suggestion of monitoring team reports. While trials at Bhawanipatna and Ugarkhurd failed due to heavy rains at the time of sowing others were rejected either due to low mean yield (<10 Q/ha) or high CV (>25).

Table 1: Plant Breeding Trial Allocation and conduction

Trial	**Zone**	**Allocation**	**Responded**	**Accepted**	**Trial Failed**	**Rejected Due To**	
						High CV	**Yield Below 10 Q**
AVT 2	NHZ	3	3	3	0	-	-
AVT 1 + 2*	NPZ	3	2	2	0	-	-
AVT 1	EZ	4[$]	3	3	0	-	-
AVT 2	NEHZ	3	3	2	0	-	1[%]
AVT 1	CZ	12	12	8	3^	-	1[&]
AVT 1+2 (Early)	CZ	12	10	10	2[!]	-	-
AVT II (Vegetable)	CZ	3	2[+]	2	0	-	-
IVT	NHZ	3	3	3	3	-	-
	NPZ	3	3	2[-]	0	-	1
	EZ	4	3	2	1[/]	-	-
	NEHZ	3	3	1	1**	1”	1
	CZ	12	11	9	0	1[##]	2[@@]
	SZ	7	6^^	6	1	-	-
IVT (Early)	CZ	12	11***	9	0	-	2[%%]
	Total						

*Only PS 1670 AVT II entry planted at Delhi centre in AVT I + II trial. [#]Dholi Centre did not conduct trial. [%]Data of Umiam centre rejected due to low mean yield; ^ Trials vitiated at Morena, Nagpur and Mandsaur as per monitoring team report; [&]Data of Sehore centre was rejected due to Low mean grain yield; [!]Trials vitiated at Morena and Mandsaur as per monitoring team report; [+]Kota centre did not conduct the trial; [-]Data of Pantnagar centre not considered due to low mean yield; [/]Data of Bhawanipatna was not considered due to very late sowing (30/08) and failure of many entries; **Trial vitiated at Jorhat as per monitoring team report; ”Data of Umiam centre rejected due to low mean yield and high CV; data of Jabalpur and Morena rejected due to low mean yield; [##]data of Mandsaur centre was rejected due to high CV; ^^ Trials failed at Ugarkhurd due to heavy rains; ***Nagpur centre did not conduct the trial; [%%]Data of Jabalpur and Morena was rejected due to low mean yield.

Promising Entries in Plant Breeding Trials

On the basis of 2022-23 yield data, the entries that exhibited superiority over the best check in yield were identified. Food grade entries were given 5% yield advantage over the best check. EDVs were compared with their recurrent parent for yield and maturity. The mean yield (kg/ha) of the promising entries in IVT, AVT-II, AVT-II, as well as, best check have been given in Table 2 to 4.

Initial Varietal Trials (IVT)

A total of 54 test entries including three checks were evaluated in all the zones except for NEHZ where there were 57 entries due to 3 repeat entries of last year. Twelve entries in NEHZ, 3 entries in CZ and one entry in CZ (Early) recorded 10% or higher grain / oil yield as compared to the best check (Table 2).

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

S. No	Entry	NEHZ	CZ	CZ (Early)	
				Grain Yield	Maturity
1.	NRC 190	3630 (I)			
2.	AMS 2021-4	3185 (II)			
3.	Himso 1696	3185 (II)			
4.	KDS 1188	3136 (III)			
5.	AS 34	3136 (III)			
6.	RSC 1172	3086 (IV)			
7.	NRC 259	3062 (V)			
8.	NRC 260	3012 (VI)			
9.	AMS 2021-3	2988 (VII)			
10.	VLS 105	2963 (VIII)			
11.	MAUS 824	2938 (IX)			
12.	Pusa Sipani 433	2914 (X)			
13.	NRC 258		3303 (I)		
14.	MAUS 824		2747 (II)		
15.	NRC 259		2666 (III)		
16.	NRC 261			2559 (VII)	89.8 (IV)
17.	KDS 753 (C)	2617 (XVIII)			
18.	NRC 138 (C)			2071 (XV)	95.9 (XI)
19.	RVSM 2011-35		2425 (IX)		

Advanced Varietal Trials I (AVT I)

None of the entries could record more than 10% of grain / oil yield over the best check in NHZ. In this zone Null KTi entry NRC 197 recorded 3% less grain yield over the best check. In NPZ, EDV entry NRCSL 6 was 8% superior to the recurrent parent SL 958 in terms of grain yield. RSC 11-42 (EZ), JS 23-09 and JS 23-03 (CZ Early), NRC 188 (CZ Vegetable) were superior to their respective best checks by 10% or more (Table 3).

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

S. No	Entry	NPZ	EZ	CZ (Early)		CZ (Vegetable) Green Pod Yield (Kg/ha)
				Grain Yield	Maturity	
1.	NRCSL 6*	1144				
2.	JS 23-09			2332 (I)	90.5 (VIII)	
3.	JS 23-03			2279 (XII)	92.4 (XII)	
4.	RSC 11-42		2119 (II)			
5.	NRC 188					5991
6.	JS 20-34 (C)					5084
7.	Palam Early Soya I (C)					
8.	SL 958** (C)	1052				
9.	JS 20-116 (C)		1585 (VIII)			
10.	NRC 138 (C)			1797 (III)	92.2 (XI)	
11.	RSC 10-46		1696(V)			

***EDV of SL 958 ** Check for NRCSL 6**

Advanced Varietal Trials II (AVT II)

RSC 11-35 in EZ and JS 22-12, JS 22-16, JS 22-18, NRC 165 in CZ (early) could record more than 10% grain yield over the respective best check (Table 4).

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

S. No	Entry	EZ	CZ (Early)	
			Grain Yield	Maturity
1.	NRC 165		1965 (IV)	88.5 (V)
2.	JS 22-12		2238 (I)	90.2 (VII)
3.	JS 22-18		2156 (II)	91.2 (IX)
4.	JS 22-16		2107 (III)	91.8 (X)
5.	RSC 11-35	2302 (I)		
6.	NRC 138 (C)		1797 (VI)	92.17 (XI)
7.	RSC 10-46	1696(V)		

Genetic Resource Management:

During the year ICAR-IISR maintained 5946 soybean accessions including 74 accessions of 14 wild species. A total of 5914 accessions of *G max* (5108), *G soja* 749) and wild tertiary gene pool accessions (55) of 19 species were introduced through NBPGR. *G max* accessions include 749 non-transgenic soybean varieties of USA. Quarantine of 168 *G soja accessions* was completed and those with sufficient number of seed would be used for screening against diseases and insect pests in hot spots.

Multi-location Germplasm Evaluation and Identification of Diverse Parents for Hybridization

A set of 322 soybean germplasm along with check varieties were at 8 centres spread over 6 AICRP zones in 6 states. Popular varieties of the zone were used as check. High yielding, early maturing varieties with relatively bold seeds were identified. Based on the Mahalanobis D^2 statistics soybean genotypes were grouped in 12,14, 7, 12, 15, 14, 9, 7 clusters in Almora, Palampur, Pantnagar, Manipur, Raipur, Indore, Parbhani and Pune centres, respectively. High yielding and diverse germplasm with respect to popular soybean varieties of the zone was identified for its use in hybridization programme in kharif 2023 for widening of soybean genetic base.

Creation of genetic variability through Hybridization and Evaluation of Advanced Breeding Lines

A total of 388 new crosses were attempted in different AICRP centres and 1607 crosses were advanced / evaluated in different generations (F3 to F9). A total of 680 advanced breeding lines were evaluated in initial and advanced yield trials of different centres.

Breeder Seed Production:

The indent for soybean breeder seed for *Kharif*2023, to be produced in 2022was **14982.25**q. The indent comprised of 72 varieties. The higher indent was given for JS 335, JS 20-98, JS 20-34 and JS 20-116 i.e. **2649.05 q, 2096.0 q, 1341.7 q and 1268.74q** respectively which is 17.68, 13.99, 8.95 and 8.47% of total indent and altogether contribute to 49% of indent. Against these indents a target of **15671.0 q** was allotted to different AICRP Soybean and other NSP centres. A total of **13112.72q** breeder seed was produced during *kharif*2022. There was a deficit of **2558.28**q overproduction target and **1869.63 q** over DAC indent. The highest deficit in kharif production was 90% for JS 20-69. The varieties recommended for Central zone which were highly indented failed due to adverse climatic conditions. The degree of failure in JS 20-98, JS 20-94, JS 20-34 and JS 20-29 were 47.08%, 43.02%, 40.81% and 56.61% respectively. There was major production failure at RVSKVV, Gwalior, AU, Kota, JNKVV, Jabalpur and MPAUT, Udaipur in Central Zone and UAHS, Shivamoga, UAS, Bengaluru, UAS, Raichur in Southern Zone. Most of other centre’s production was satisfactory.

UAHS, Shivamoga, UAS, Bengaluru, UAS, Raichur in Southern Zone. Most of other centre's production was satisfactory.

Compensatory breeder seed production was planned to compensate the deficit during Rabi/Summer 2022-23 at JNKVV, Jabalpur, UAS, Dharwad, VNMKV, Parbhani, Dr. PDKV, Akola, MPKV, Rahuri, IGKV, Raipur and UAS, Bengaluru to compensate the deficit. The compensatory production is estimated to be **1449.0** q. The final deficit in soybean breeder seed after rabi programme will be around **420**q.

Agronomy:

All of the AVT II entries yielded higher at 45 cm of row spacing. Soybean-maize-soybean-maize rotation yielded maximum in terms of soybean equivalent in NPZ, NEZ, central zone and SZ Application of Rhizobium + MDSR14 + 12c (12c= Burkholderia arboris-High P solubilizing)and Bio Zn + Bio NPK could reduce the 25% of the recommended doses of the fertilizer in SZ & CZ and NEHZ, respectively. Organic management practices recorded higher grain yield only in NEHZ. The application of thiourea as foliar spray @ 750 ppm/ha at 20 -25 and 50 -55 days after sowing showed beneficial effect on soybean yield.

Plant Pathology :

In 2022, a total of 21 diseases were reported from six zones in India. Among these, Anthracnose pod blight and Yellow mosaic virus were the most severe diseases followed by Charcoal Rot, Pod Blight/Leaf/Stem blight, and Rhizoctonia aerial blight.YMV, Pod blight, and Frog eye leaf spot appeared in severe form in all soybean growing areas of India. Maximum incidence of anthracnose was recorded at Indore and that of YMV and Charcoal Rot at Jabalpur. No entries exhibited resistant reactions to rust, PSS, and Pod blight during screening at Dharwad, and the highest rust disease pressure, at 9 grade, was recorded there. Rust resistant sources EC 241780 and EC 241778 showed a breakdown in resistance after 14 years of testing.Germplasm accession EC 280129 was found to be resistant to several diseases including FLS, Anth, BS, YMV, and CR.Among the different methods tested to biologically control the diseases, seed and foliar application of Bacillus thuringiensis (T3) was found to be the most effective against anthracnose and collar rot, reducing disease severity by 15.33% compared to the control at Jorhat center. However, the biological control method was found to be less effective against rust disease severity (88.84%) at Dharwad center. The severity of major diseases in soybean was recorded for each variety in a trap nursery, highlighting the importance of predictive systems for effective disease management. At the

Pantnagar center, a strong negative correlation was found between maximum temperature and RAB severity, while the number of rainy days was positively correlated with disease severity. Similar correlations were observed at the Sehore center, where the number of rainy days was highly positively correlated and maximum temperature was negatively correlated with disease severity. Multiple regression analysis showed that each equation was effective in predicting RAB disease, with high R-squared values ranging from 0.85 to 0.90.Various AICRPS centers have recorded avoidable yield loss due to diseases such as CR, PB (Ct), RAB, Rust, and FLS. Full protection of fungicides can prevent 33.73% of yield loss in susceptible varieties and 47.24% of yield loss in resistant varieties due to RAB diseases at Pantnagar center. In other centers, the range of avoidable yield loss recorded was from 25.28% to 37.44% in susceptible varieties and 13.88% to 38.35% in resistant varieties.

The screening of advanced breeding material revealed that at Pantnagar the breeding material resulting from crosses such as AGS 25 x PS 1042, AGS 25 x PS 1592, CM 60 x PS 1692, Glycine soja x PS 1347, PK 515 x JS 97-52, PS 1592 x PS 1347, and TGX 1681-3f x PK 327 presented resistance towards RAB.

Entomology :

Total seven field/laboratory trials were conducted during *Kharif*-2022 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 tunneling (80%) due to stem fly maggots was reported from Amravati. White fly incidence was low during the season as compared to previous years. In Central zone incidence of defoliators and stem fly continued to be major pests but girdle beetle infestation was amazingly negligible at Parbhani and Indore. Girdle beetle infestation was highest at Kota (30.00%) and continued to be a hot spot for this pest. Pod damage due to *Cydia ptychora* to the extent of 37.42% was observed at Dharwad center. The incidence of aphids (35.00aphids/plant), leaf webber (9.33larvae/m) and Bihar Hairy caterpillar (83.33 larvae/mrl) 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.

Forty entries in IVT and 13 entries in AVT were promising with respect to resistance against stem fly, defoliators, girdle beetle and pest complex. AVT II entries NRC 165 and PS 1670 exhibited good antibiosis reaction. Seven germplasm lines viz., EC 389149, EC 457366, JSM 195, EC 113778, EC 232019, JS 20-41 and JS 20-53 exhibited insect resistance at hotspots. Results of multi-location testing of six microbial insecticide combinations against major insect-pest indicated their superior performance over control in reducing the insect-pest population. Results of multi-location intercropping of Suva with defoliators identified 3 treatments (different row numbers of soybean and suva) with lower larval population of important insects

Microbiology :

Plant growth promoting bacteria (PGPR) present in soil and promote plant growth by various directs and indirect action under abiotic stresses. Three AICRP microbiology centersdeveloped microbial inoculants namely, MB 10 (*P. fluorescens*) and MB 16, *Pseudomonas fluorescence*(LSE-1), *Pseudomonas oryzihabitans* (LSE-3), six rhizobial cultures named from Pant 1 to 6 were isolated. These cultures had shown for multiple plant growth promoting traits such as IAA production, siderophore, ACC deaminase and showed survival in higher levels in a PEG osmoticum.These PGPR and rhizobia are involved in the nutrient cycling in the ecosystem and play as a key player as a nutrient provider in plants. In MB2 trial, 09 different combinations of treatments with recommended and reduced doses of N and P fertilizers with the single or combinations of microbial inoculants were tested. Results showed that across all the centres, the 75% of recommended N & P and 100% of recommended K with B. *daqingense* + *Bacillus aryabhataii* showed the highest mean yield (Kg/ha), although the response was non-significantly ($p< 0.05$) different than other treatments. In MB 3 trial, recommended pre-and post-emergence herbicides in combination with PGPR was tested on nodulation of soybean. Overall, the use of diclosulam (pre-emergence) and inoculated with either N-fixing or P-solubilizing bacteria, i.e., *B. daqingense*&*Burkholeria arboris* or a combination of both has significantly enhanced nodulation traits. Whereas for post-emergence herbicides, the use of Imazethapyr + Propaquizafop combination with microbial strains showed significantly higher symbiotic traits.Soybean genotypes listed in AVT-II have been tested for nodulation with native homologous rhizobia for self-sustaining biological nitrogen fixation. Key soybean genotypes with higher or comparable nodulation abilities with checks at different centres were RVSM 2012-4,NRC 165, JS 22-16 and PS 1670.

Food Technology :

Cooking time was lesser for SL 1282, PS 1670, PS 1682, NRC 190, AS 24, JS 23-03, JS 23-09, NRC 181, NRC 130, KDS 1096, JS 20-116, DLSb1. Hull fragility was found highest in all the check varieties of NPZ (SL 1074, NRC 149 and SL 955) and CZ (AMS 100-39). Hydration ratio was highest for KDS 1096, NRCSL 6 and SL 955(C).

Milk yield of NRCSL 6, AS 24, JS 23-03, PS 1569 was maximum and tofu yield for DLSb1, RKS 113, NRC 190, NRC 189, JS 23-03 was the highest. Sensory evaluation was done by panelist on 9 point hedonic scale by semi-trained panelists. Keeping score 6 as acceptable sensory score, all entries of CZ-AVT I, JS 23-03 (CZ-AVT I +II Early), NRC 195 (NPZ-AVT I+II) and KDS 1096 and DLSb1 (NEHZ-AVT II) were acceptable for milk and tofu sensory.

Front Line Demonstration :

1. The overall adaptation of improved practices (IP) with different components such as whole package (WP), integrated weed management (IWM), integrated nutrient management (INM), integrated pest management (IPM), organic farming (OF) and intercropping (IC) in Kharif 2022 reported 26.02% increase in yield and 32.98% increase in net returns over local farmers practice (FP). Similarly, adaptation WP, IWM, INM, IPM, OF and IC reported to increase soybean yield by 25.40%, 32.99%, 39.41%, 31.85%, 29.88%, 23.60% and net returns by 34.39%, 52.24%, 54.51%, 46.78%, 34.79%, 20.40% respectively over local farmers practice (FP).
2. The overall adaptation of different components resulted in highest soybean yield under improved production technology (2833 kg/ha) and local farmer's practices (2383 kg/ha) at Pune. The lowest yield under improved technology (1284 kg/ha) and farmer's practices (944 kg/ha) was obtained at Devgrah Baria. Different components reported maximum yield at Pune (WP-2977 kg/ha), Dharwad (IWM-2582 kg/ha, INM-2644 kg/ha and IPM-2616 kg/ha), Indore (OF-1878 kg/ha) and Karda (IC-2554 kg/ha) under improved production technology. Whereas, maximum yield of all six components under farmer's practices was recorded at Pune (WP-2511 kg/ha and IC-2021 kg/ha), Adilabad (IWM-2071 kg/ha, INM-2069 kg/ha and IPM-2034 kg/ha) and Indore (OF-1405 kg/ha).
3. The overall yield gap I estimation across 26 centers revealed that, highest was observed in Sehore (810 kg/ha) and lowest was in Ludhiana (85 kg/ha). However, the overall average estimated yield gap I was 391 kg/ha across India. Among six components maximum yield gap-I was recorded under INM (854 kg/ha) at Dharwad and minimum yield gap-I was under WP (85 kg/ha) at Ludhiana.
4. The overall zone wise yield analysis indicated that, among six zones, highest % yield increase under improved practices was recorded in north eastern hill zone (42.1%). Lowest yield increase was observed in northern plain zone (13.9%) over farmer's practices. Among different components, highest % yield increase was observed in INM at eastern zone (72.1%) under improved practices. Lowest % yield increase was reported in OF at northern plain zone (12.1%) under improved technology as compared farmer's practices.
5. The zone wise overall profit analysis indicated that, highest net returns was recorded in southern zone under both improved (Rs 79,695/ha) and farmer's practices (Rs 64,685/ ha). However, lowest net profit was recorded in northern hill zone (Rs 39,116/ ha) under improved practices and farmer's practices (Rs 24,181/ha). Among six components, highest net return was recorded in IC (Soybean + Sugarcane) component at southern zone (Rs 2,93,659/ha) under improved practices and farmer's practices (Rs 2,53,412/ ha). Lowest net profit was observed in OF component at northern plain zone under improved practices (Rs 30,509/ha) and at northern hill zone under farmer's practices (Rs 18,921/ ha).
6. Overall zone wise average highest and lowest yield was observed in southern zone (2094 kg/ha) and northern hill zone (1445 kg/ha), respectively under improved practices. Among six component average highest yield was observed in INM at southern zone (2516 kg/ha) and average lowest yield in WP at northern hill zone (1300 kg/ha) under improved practices.

7. Overall around 47 improved soybean varieties were demonstrated in farmer's field. The maximum demonstrations were conducted on variety KDS 753 followed by JS 20-34. Among different components, maximum number of varieties were demonstrated in WP (39) followed by IWM (16), OF (11) and INM (10). The minimum number of varieties were demonstrated in IPM (8) and IC (8).
8. Overall performance of tested varieties under different components revealed that, MACS 1520 gave highest yield (Southern zone and Maharashtra) (3125 Kg/ha) followed by JS 20-116 (Central zone and Madhya Pradesh) (2908 Kg/ha) and MACS 1407 (Southern zone and Maharashtra) (2875 Kg/ha) under improved practices; and lowest yield was recorded with Palam soya (Northern hill zone and Himachal Pradesh) (1203 Kg/ha). Among different components, highest yield (3125 Kg/ha) was obtained in WP demonstrations done with MACS 1520 and MACS 1460 varieties (Southern zone and Maharashtra); and lowest in Palam soya (Northern hill zone and Himachal Pradesh) (1015 Kg/ha) under IWM demonstrations.
9. Overall 25 centres, detailed cost of soybean cultivation has been worked out under different components. Soybean cultivation cost under improved technology was 14.15% higher than farmers practice cultivation cost. Among 6 components, highest increase in soybean cultivation cost was observed with OF component demonstrations (28.71%) and minimum soybean cultivation cost increase was reported with IPM demonstrations (9.87%) component over farmer's practices.
10. The overall improved production technology of all six components demonstrations, the trend of expenditure was in line- seed and sowing, manure application, fertilizer application, land preparation, irrigation, hand weeding and inter-culture operations, harvesting, threshing, other cost, insecticide application, herbicide application, bird watching, fungicide application and seed treatment.

Monitoring Report

Monitoring of different AICRP-Soybean centres was undertaken by the teams constituted in the technical programme AICRP-Soybean 2022 by physically visiting the centres:

S. No	Team Members	Centres Monitored	Date of Monitoring
1.	Dr Rajesh Vangala, Scientist (Plant Breeding), ICAR-IISR Indore Dr Laxman Singh Rajput, Scientist (Plant Pathology)	Delhi, Ludhiana, Palampur, Srinagar	4th October to 12th October 2022
2.	Dr B S Gill, Soybean Breeder, PAU Ludhiana Dr Rajiv Ghawde, Jr Plant Pathologist, PDKV, Amravati	Almora, Majhera, Pantnagar	8th to 9th October 2022
3.	Dr Gyanesh Kumar Satpute, Principal Scientist (Plant Breeding), ICAR-IISR Indore Dr Rakesh Kumar, Scientist (Agronomy), ICAR-IISR Indore	Kota, Mandsaur, Morena	27th to 29thSep 2022
4.	Dr D S Meena, Associate Professor (Agronomy) Dr S P Mehtre, Soybean Breeder, VNMKV, Parbhani	Amravati, Nagpur, Raipur	19th to 21st Sep 2022
5.	Dr Anita Rani, Principal Scientist (Plant Breeding) Dr Lokesh Kumar Meena, Scientist (Entomology)	Adilabad, Parbhani, Bidar	30th Sep to 2nd Oct 2022
6.	Dr Milind Ratnaparkhe, Principal Scientist, ICAR-IISR Indore Dr Mrinal Kuchlan, Senior Scientist (Seed Technology) ICAR-IISR Indore	Bengaluru, Dharwad, Pune	22 to 25 Sep 2022
7.	Dr Sanjay Gupta, Principal Scientist (Plant Breeding) Dr M P Sharma, Principal Scientist (Microbiology)	Imphal, Medziphema, Jorhat, Umiam	18th to 23rd Sep 2022
8.	Dr Punam Kuchlan, Principal Scientist (Seed Technology) Dr Shivkumar M,, Senior Scientist (Plant Breeding)	Ranchi, Raipur	30th Sep to 4 Oct 2022
9.	Dr Gyanesh Kumar Satpute, Principal Scientist (Plant Breeding), ICAR-IISR Indore Dr Raghvendra N	Devgarh Baria, Sanosara, Amreli	15th to 18th Sep 2022

Centre wise salient observations

NHZ

Almora : The trails were conducted as per technical programme and well maintained. Plant stand was good and plant was at podding stage. Centre has attempted a good number of Crosses as per the regional need and genetic diversity.

Palampur: The overall performance of the centre was found to be very good.

Majhera : The trail was conducted as per technical programme. Crop stand was good and overall performance of centre is very good.

Srinagar : The overall performance of centre is very good.

NPZ

Pantnagar : The experiment seed production plot and FLD's were very well maintained and crop stand has come up very nicely. All the experiments critically and found trails excellent and outstanding.

Delhi : The overall performance of the centre is very good. Centre grew only PS 1670 entry of AVT II in AVT I + II trial.

Ludhiana : The overall performance of the centre was found to be very good.

EZ

Ranchi : All the trials were conducted as per technical programme and were managedwell. Overall performance of centre is very good.

Raipur : The trials are well laid out and are nicely maintained.
Overall performance of the centre was very good.

NEHZ

Umiam : Co-ordinated breeding trials were not conducted as per the technical programme. National Hybridization Programme material has been maintained properly.

Imphal : All the trials have been conducted as per technical programme and the overall performance of the centre is very good.

Jorhat : Initial Varietal Trial vitiated. Overall performance of the centre is poor and needs improvement.

CZ

Jabalpur: Overall performance of the centre is very good.

Sehore: Overall performance of the centre is very good.

Parbhani: Overall performance of the center was very good.

Amravati: Overall performance of the center was excellent.

Kota: Overall performance of the center was excellent.

Morena : Overall performance of the center was poor and needs improvement.

Anand : Overall performance of the center was very good.

Amreli : Overall performance of the centre found excellent.

Lokbharti : Overall performance of the center was very good.

(Sanosara)

Nagpur : Overall performance of the trails at this centre is good.

Mandsaur : Overall performance of the center was very good.

SZ

Pune : Overall performance of the center was excellent.

Bengaluru : The overall performance of the centre was very good.

Dharwad : Overall performance of the centre is Excellent.

Adilabad : Overall performance of the centre was good.

Bidar : The crop condition in all the disciplines was good. Overall performance of the centre was good.

1. Seasonal Conditions

Northern Hill Zone

Table 1.1 : Weather conditions during crop season in NHZ

Location	June 2022	July 2022	Aug. 2022	Sep. 2022	Oct. 2022	Nov. 2022
Max. Temp. (°C)						
Almora	33.1	30.4	31.3	29.3	25.9	21.0
Palampur	30.87	27.44	27.06	26.3033	25.02	21.39
Majhera	-	-	-	-	-	-
Min. Temp. (°C)						
Almora	17.8	21.0	19.9	18.2	11.1	4.4
Palampur	19.41	19.83	19.30	17.01	12.49	8.34
Majhera	-	-	-	-	-	-
Rainfall (mm) (Rainy Days)						
Almora	55.5 (7)	138.2 (13)	86.5 (10)	104.5 (9)	180.5 (6)	0.0 (0)
Palampur	130.6 (7)	597.4 (24)	853.8 (22)	254.2 (20)	38.6 (5)	17.2 (3)
Majhera	-	-	-	-	-	-
Max.R.H. (%)						
Almora	76.6	82.4	85.4	87.0	93.0	91.5
Palampur	57.36	91.96	89.83	87.43	76.67	69.95
Majhera	-	-	-	-	-	-
Min. R.H. (%)						
Almora	52.1	68.7	63.5	64.6	52.4	42.4
Palampur	47.17	83.93	83.50	80.86	59.35	49.9
Majhera	--	-	-	-	-	-
Sunshine (Hours/Day)						
Almora	7.52	5.27	6.42	4.88	6.85	6.87
Palampur	6.8	2.6	4.0	5.0	8.0	7.4
Majhera	-	-	-	-	-	-

Northern Plain Zone

Table 1.2 : Weather conditions during crop season in NPZ

Location	June 2022	July 2022	Aug. 2022	Sep. 2022	Oct. 2022	Nov. 2022
Max. Temp. (°C)						
Pantnagar	36.4	33.7	33.1	31.5	29.7	27.0
Delhi	-	-	-	-	-	-
Ludhiana	38.8	33.7	33.9	33.0	31.4	26.7
Min. Temp. (°C)						
Pantnagar	25.9	27.1	25.9	24.2	18.0	11.5
Delhi	-	-	-	-	-	-
Ludhiana	27.0	27.4	27.3	25.2	18.9	12.3
Rainfall (mm) (Rainy Days)						
Pantnagar	104.8(4)	232.8 (13)	152.1 (7)	373.9 (10)	294.3 (6)	NIL
Delhi	-	-	-	-	-	-
Ludhiana	70.0	323.8	59.2	190.1	5.4	NIL
Max.R.H. (%)						
Pantnagar	83	92	94	89	90	93
Delhi	-	-	-	-	-	-
Ludhiana	59	81	82	87	88	78
Min. R.H. (%)						
Pantnagar	32	60	64	65	43	40
Delhi	-	-	-	-	-	-
Ludhiana	36	66	64	61	43	45
Sunshine (Hours/Day)						
Pantnagar	6.9	6.9	6.3	5.7	7.3	6.3
Delhi	-	-	-	-	-	-
Ludhiana	8.0	4.8	7.4	6.8	7.7	7.0

Eastern Zone

Table 1.3 : Weather conditions during crop season in EZ

Location	June 2022	July 2022	Aug. 2022	Sep. 2022	Oct. 2022	Nov. 2022
Max. Temp. (°C)						
Ranchi	39.7	36.8	36.5	36.7	33.5	32.8
Raipur	38.65	31.86	31.175	31.325	31.1	29.95
Bhawanipatna	37.1	31.0	31.4	32.5	30.2	29.0
Min. Temp. (°C)						
Ranchi	23.5	21.8	21.5	22.4	15.4	4.0
Raipur	26.92	25.36	24.9	24.62	20.98	13.37
Bhawanipatna	26.3	24.4	23.6	23.7	20.6	14.9
Rainfall (mm) (Rainy Days)						
Ranchi	99.0 (6)	280.8 (16)	790.8 (19)	528.6 (17)	83.0 (4)	0.0 (0)
Raipur	16.1	71.24	106.75	42.75	11.84	0
Bhawanipatna	108.8 (8 days)	276.2(17 days)	635.6 (15 days)	117.4 (5 days)	111.8 (7 day)	NIL
Max.R.H. (%)						
Ranchi	86.6	85.8	85.6	85.9	85.4	86.2
Raipur	68	90.2	90.25	90.5	88.6	86.25
Bhawanipatna	64.0	85.1	82.5	78.6	81.7	73.3
Min. R.H. (%)						
Ranchi	69.5	69.6	69.9	69.9	69.8	69.4
Raipur	43.75	73.6	71.5	71	53.4	32.5
Bhawanipatna	56.2	81.5	81.0	77.0	76.5	63.3
Sunshine (Hours/Day)						
Ranchi	228.5	127.5	128.4	165.7	201.5	260.9
Raipur	5.375	2.76	4.4	4	7.26	7.325
Bhawanipatna	2.2	1.6	3.1	4.5	5.5	5.9

North Eastern Hill Zone

Table 1.4 : Weather conditions during crop season in NEHZ

Location	June 2022	July 2022	Aug. 2022	Sep. 2022	Oct. 2022	Nov. 2022
Max. Temp. (°C)						
Umiam	-	-	-	-	-	-
Imphal	28.70	30.97	30.02	30.52	28..88	27.16
Jorhat	31.2	33.4	33.8	32.4	30.4	28.9
Min. Temp. (°C)						
Umiam	-	-	-	-	-	-
Imphal	22.03	22.89	22.43	23.87	18.59	11.90
Jorhat	24.0	24.9	25.1	24.0	21.2	14.1
Rainfall (mm) (Rainy Days)						
Umiam	-	-	-	-	-	-
Imphal	286.20	148.40	94.80	98.60	146.30	5.40
Jorhat	321.8(19)	243.7(13)	166.5(12)	300.1(13)	235.8(11)	NIL
Max.R.H. (%)						
Umiam	-	-	-	-	-	-
Imphal	87.63	80.87	87.06	88.33	88.13	90.80
Jorhat	93	93	93	94	97	98
Min. R.H. (%)						
Umiam	-	-	-	-	-	-
Imphal	69.60	63.55	66.48	62.40	59.29	44.33
Jorhat	80	73	72	72	74	56
Sunshine (Hours/Day)						
Umiam	-	-	-	-	-	-
Imphal	2.9	4.7	4.9	5.8	6.8	9.2
Jorhat	59.5	173.3	193.3	132.1	253.2	259.0

Central Zone

Table 1.5 : Weather conditions during crop season in CZ

Location	June 2022	July 2022	Aug. 2022	Sep. 2022	Oct. 2022	Nov. 2022
Max. Temp. (°C)						
Jabalpur	37.74	31.46	30.32	30.65	30.45	-
Sehore	36.93	29.81	30.01	32.72	31.45	-
Parbhani	36.1	29.1	29.8	23.7	30.9	30.5
Amrawati	39.57	30.91	32.57	32.37	32.91	32.54
Kota	41.52	35.44	32.62	33.64	34.17	32.45
Morena	-	-	-	-	-	-
Anand	-	-	-	-	-	-
Amreli	28.2	31.7	31.8	33.2	34.3	33.5
Indore	36.97	28.00	27.89	29.54	30.00	28.39
Lokbharti	39.3	35.9	39.9	35.8	36.8	35.9
Nagpur	46.3	32.5	32.5	32.9	33.6	31.7
Mandsaur	36.78	29.89	28.57	30.55	31.11	-
Min. Temp. (°C)						
Jabalpur	26.04	24.78	24.05	23.60	18.62	-
Sehore	27.26	23.26	23.13	22.97	18.67	-
Parbhani	24.5	22.5	22.5	21.7	19.1	12.1
Amrawati	26.77	23.61	23.68	23.03	20.05	13.96
Kota	29.42	26.36	24.75	24.66	20.17	15.15
Morena	-	-	-	-	-	-
Anand	-	-	-	-	-	-
Amreli	26.5	25.2	24.8	23.9	21.7	17.1
Indore	26.29	23.50	23.06	22.61	18.43	11.63
Lokbharti	24.9	24.6	24.2	23.8	21.0	16.2
Nagpur	24.1	23.3	21.3	21.3	18.1	
Mandsaur	28.03	24.08	23.15	22.26	16.94	-
Rainfall (mm) (Rainy Days)						
Jabalpur	55(9)	78.52(20)	123.77(14)	51.07(13)	2.42(3)	-
Sehore	74.4(7)	768.5(24)	779.4(23)	184.6(12)	134.1(4)	-
Parbhani	159.7 (10)	449.2 (20)	72.3 (6)	215.4 (14)	155.9 (7)	NIL
Amrawati	122.60 (5)	363.4 (17)	219.40 (12)	297 (19)	79.40 (8)	NIL
Kota	89.50 (5)	451 (20)	480.60 (23)	100.1 (8)	28 (6)	NIL
Morena	-	-	-	-	-	-
Anand	-	-	-	-	-	-
Amreli	37.2 (2)	354.4 (18)	136.4 (11)	274.4 (9)	8.8 (1)	NIL
Indore	93.2(6)	437.60(15)	421.90(17)	194.10(9)	61.60(6)	NIL
Lokbharti	25.4(1)	152.0 (7)	114.3 (6)	88.9 (4)	25.4 (2)	NIL
Nagpur	68.6 (4)	715.8 (22)	350.8 (14)	299.2 (15)	108.6 (6)	NIL

Mandsaur	**24.50(3)**	**327.20(11)**	**290.70(7)**	**144.70(6)**	**70.00(3)**	**-**
Max.R.H. (%)						
Jabalpur	**65.26**	**90.58**	**89.8**	**90.35**	**86.1**	**-**
Sehore	**-**	**-**	**-**	**-**	**-**	**-**
Parbhani	**73**	**91**	**84**	**95**	**89**	**84**
Amrawati	**60.30**	**89.06**	**82.29**	**86.63**	**76.35**	**61.23**
Kota	**44.17**	**77.92**	**84.30**	**90.88**	**92**	**83.25**
Morena	**-**	**--**	**--**	**-**	**-**	**-**
Anand	**-**	**-**	**-**	**-**	**-**	**-**
Amreli	**83**	**89**	**89**	**88**	**76**	**68**
Indore	**86.28**	**91.57**	**90.32**	**89.38**	**82.57**	**85.00**
Lokbharti	**86**	**97**	**97**	**98**	**82**	**65**
Nagpur	**52**	**92**	**86**	**87**	**68**	**56**
Mandsaur	**70.70**	**93.00**	**94.96**	**94.10**	**91.22**	**-**
Min. R.H. (%)						
Jabalpur	**41.06**	**73.42**	**72.42**	**73.67**	**55**	**-**
Sehore	**-**	**-**	**-**	**-**	**-**	**-**
Parbhani	**40**	**74**	**61**	**69**	**49**	**27**
Amrawati	**49.43**	**79.03**	**73.03**	**79.40**	**64.58**	**46.93**
Kota	**32.25**	**72.90**	**81.97**	**87.70**	**92**	**79**
Morena	**-**	**-**	**-**	**-**	**-**	**-**
Anand	**-**	**-**	**-**	**-**	**-**	**-**
Amreli	**47**	**75**	**69**	**61**	**38**	**22**
Indore	**79.12**	**87.32**	**86.57**	**83.69**	**80.94**	**79.61**
Lokbharti	**38**	**65**	**57**	**46**	**27**	**24**
Nagpur	**29**	**58**	**60**	**63**	**46**	**40**
Mandsaur	**37.60**	**71.80**	**78.25**	**66.66**	**42.61**	**-**
Sunshine (Hours/Day)						
Jabalpur	**6.08**	**3.84**	**3.62**	**4.525**	**7.9**	**-**
Sehore	**-**	**-**	**-**	**-**	**-**	**-**
Parbhani	**6.0**	**2.3**	**5.1**	**5.5**	**7.1**	**8.4**
Amrawati	**-**	**-**	**-**	**-**	**-**	**-**
Kota	**-**	**-**	**-**	**-**	**-**	**-**
Morena	**-**	**-**	**-**	**-**	**-**	**-**
Anand						
Amreli	**4.6**	**2.1**	**3.1**	**5.7**	**8.3**	**9.2**
Indore	**-**	**-**	**-**	**-**	**-**	**-**
Lokbharti	**-**	**-**	**-**	**-**	**-**	**-**
Nagpur	**6.9**	**0.8**	**1.5**	**2.2**	**4.0**	**5.1**
Mandsaur	**9.7**	**6.64**	**7.07**	**7.79**	**8.46**	**-**

Southern Zone

Table 1.6 : Weather conditions during crop season in SZ

Location	June 2022	July 2022	Aug. 2022	Sep. 2022	Oct. 2022	Nov. 2022
Max. Temp. (°C)						
Pune	36.6	28.8	29.9	30.1	30.3	30.3
K. Digraj	29.325	28.42	28.20	28.1	29.5	29.15
Bengaluru	28.7	27.0	27.2	27.7	27.1	25.2
Dharwad	29.9	26.6	27.4	28.7	28.9	29.6
Adilabad	37.7	30.0	31.8	31.7	31.9	30.8
Bidar	-	-	-	-	-	-
Min. Temp. (°C)						
Pune	22.9	22.1	21.8	18.4	16.9	14.6
K. Digraj	24.17	24.76	17.42	21.87	21.24	20.1
Bengaluru	19.0	18.7	18.4	18.6	17.0	16.8
Dharwad	21.0	20.5	20.3	20.0	18.6	16.5
Adilabad	26.5	23.7	24.2	23.5	20.2	12.9
Bidar	-	-	-	-	-	-
Rainfall (mm) (Rainy Days)						
Pune	53(2)	153.4(10)	140.4(9)	183.0(10)	216.9(7)	NIL
K. Digraj	15.4(2)	152 (16)	98.8 (4)	86.4 (6)	196.4 (7)	NIL
Bengaluru	211.6(6)	87.4(3)	141.2(4)	145.8(5)	348.6(5)	20.0(6)
Dharwad	102.8 (7)	186.4 (14)	113.2 (14)	195.6 (11)	197.8 (9)	2.81 (1)
Adilabad	210.6(10)	828.4(22)	252.0(11)	173.4(7)	67.6(5)	NIL
Bidar	-	-	-	-	-	-
Max.R.H. (%)						
Pune	81.88	91.33	89.58	91.03	89.00	84.29
K. Digraj	87.3	89.74	90.75	90.22	86.02	67.22
Bengaluru	88.5	90.3	91.0	89.5	90.3	86.8
Dharwad	85.7	91.7	90.7	89.8	85.6	72.8
Adilabad	67.7	86.1	78.6	79.6	77.8	69.6
Bidar	-	-	-	-	-	-
Min. R.H. (%)						
Pune	53.35	74.60	67.16	89.90	52.14	36.70
K. Digraj	65.35	62.9	67.25	67.52	55.18	39.22
Bengaluru	58.0	62.3	61.0	58.8	61.5	60.5
Dharwad	76.5	82.5	82.4	74.2	67.8	45.6
Adilabad	550	84.3	76.0	75.9	67.7	48.5
Bidar	-	-	-	-	-	-
Sunshine (Hours/Day)						
Pune	-	-	-	-	-	-
K. Digraj	-	-	-	-	-	-
Bengaluru	-	-	-	-	-	-
Dharwad	-	-	-	-	-	-
Adilabad	-	-	-	-	-	-
Bidar	-	-	-	-	-	-

पदप प्रजनन
Plant Breeding

Principal Investigator	Dr. Sanjay Gupta, ICAR-IISR, Indore
Northern Hill Zone	
Palampur (Himachal Pradesh)	Dr. (Mrs.) VednaKumari
Almora (Uttarakhand)	Dr. Anuradha Bhartiya
Majhera (Uttarakhand)	Dr. Anjuli Agarwal
Srinagar (J&K)	Dr. Sher A Dar
Wadura, Sopore (J&K)	Dr. Ashraf Bhat
Northern Plain Zone	
Pantnagar (Uttarakhand)	Dr . M.K. Nautiyal
New Delhi	Dr. S.K. Lal
Ludhiana (Punjab)	Dr. B.S. Gill
Eastern Zone	
Ranchi (Jharkhand)	Dr. NutanVerma
Raipur (Chattisgarh)	Dr. Sunil Kumar Nag
Bhawanipatna (Orissa)	Dr. Susanta Kumar Mohanty
North Eastern Hill Zone	
Jorhat (Assam)	Dr.Zafar Ullah/ I A Sheikh
Imphal (Manipur)	Dr. Heisnam Nanita Devi
Umiam (Meghalaya)	Dr. Amit Kumar
Central Zone	
Indore (Madhya Pradesh)	Dr. Poonam Kuchlan
Sehore (Madhya Pradesh)	Dr. Moly Saxena
Nagpur (Maharashtra)	Dr. A.D. Bangiwar
Kota (Rajasthan)	Dr. B.L. Meena
Jabalpur (Madhya Pradesh)	Dr. Manoj Kumar Shrivastava
Amravati (Maharashtra)	Dr. G.D. Chandankar
Morena (Madhya Pradesh)	Dr. Jagendra Singh
Parbhani	Dr.S.P. Mehtre
Sanosara (Gujarat)	Dr. C.P. Singh
DevgadhBaria (Gujarat)	Dr G.J. Patel
Amreli(Gujarat)	DrViren Akbari / Mr.Umesh A. Chauhan
Mandsaur	Dr. Ramraj Sen
Southern Zone	
Dharwad (Karnataka)	Dr. Gopal Krishna Naidu
Bidar (Karnataka)	Dr. Sidramappa
Bangalore (Karnataka)	Dr. Onkarappa T.
K. Digraj (Maharashtra)	Dr. M.P. Deshmukh
Adilabad (Telangana)	Dr. M. Rajendra Reddy
Ugarkhurd (Karnataka)	Dr J Patwardhan

2. Genetics and Plant Breeding

Creation of Genetic Variability through Hybridization and Evaluation of Advanced Breeding Lines

A total of 388 new crosses were attempted in different AICRP centres and 1607 crosses were advanced / evaluated in different generations (F3 to F9). A total of 680 advanced breeding lines were evaluated in initial and advanced yield trials of different centres (Table 2.1 and Table 2.2).

Table 2.1: Number of crosses, their generation and number of selection practiced.

Centre	Objective (S)	Generations	Pedigree	No. Of Crosses/Lines	Selection	
					No. of plants	No. of bulks
1	2	3	4	5	6	7
AICRP on Soybean VNMKV, Parbhani	Early and extra early maturity, high seed yield, Non shattering, tolerance to pest disease and drought	Fresh Crosses	MAUS 71, MAUS 158, MAUS81, MAUS 162, MAUS 612, NRC 130, NRC 138, CAT 2797, EC 457464, RSC 10-52, TGX 854429, EC 546882, EC 274713, Nanking, MACS 450, JS 20-69	26	-	-
		F_1	NRC 136, KDS 992, MAUS 612, MAUS 162, MAUS 71, JS 95-60, KDS 726, BLSb-1, NRC 137, KDS 753, NRC 147, JS 20-116, MAUS 158, JS 20-69, DSb 34, JS 20-29	40 Evaluated and 34 advanced to F2	-	-
		F_2	MAUS 612, JS 20-116, DS 31-05, EC 572109, EC 546882, RVS 2010-1, MAUS 71, MAUS 162, MAUS 158, JS 95-60, EC 538828	35	115	30
		F_3	MAUS 71, MAUS 158, MAUS 162, MAUS 612, JS 20-34, DS 31-05, RSC 10-52, EC 389174, EC 538828, MACS 1520, RVS 2010-1, AMS-MB-5-18	34	829	37

		F_4	SKF-10-50, AMS 100-39, NRC 130, JS 20-34, EC 538828, MAUS 81, MAUS 162, JS 20-29, MAUS 612, MAUS 71, Shalimar, EC 113778, MAUS 158, JS 20-69	37	790	42
		F_5	MAUS 71, EC 538828, JS 20-29, EC 113778, Bragg, MAUS 158, EC 107407, NRC 37, MAUS 162, JS 20-69, MAUS 612, JS 20-34	35	611	39
		F_6	MAUS 158, AGS 25, MAUS 162, MAUS 71, EC 546882, SL 958, SL 979, MAUS 612, JS 20-89, MAUS 733, MAUS 614, JS 20-96, JS 93-05, MAUS 710, JS 20-98, KDS 344, JS 20-71, MAUS 711, NRC 99, JS 20-79, JS 97-52, RSC 10-29, NRC 107, VLS 63, NRC 121, JS 97-52, RSC 10-29, NRC 107, VLS 63, NRC 121	31	671	-
		F_7	MAUS 612, JS 20-96, NRC 107, JS 20-34, JS 20-89, AMS 1001, JS 20-69, EC 241780, MACS 1460, JS 20-71, MAUS 162, MAUS 158, RVS 2002-24, MAUS 717, PS 1518, JS 20-53, DS 31-01, KDS 889, AMS 1003, MAUS 706, JS 97-52	17	188	-
		DSR F_6	AGS 25, G 27, G 2911, EC 383165, Causlc, DSb 10, EC 572154, EC 572086, RVS 2001-18, EC 34087, JS 20-29, JS 20-34, RVS 2001-18, AK 887, EC 771186, JS 20-98, PS 10-29, JS 21-08, NRC 121, JS 93-05, PP6, JS 97-52,11-5B, Karune, EC 572086, JS 90-41, JS 21-08, JS 335, PI 1693-7, PI 416935, MACS 1188, EC 251396, MAUS 2, SL 688, NRC 37, SL 955, SL 958, RVS 2001-2, EC 52086, JS 90-41, 70-4, 70-5, 710-05, 23-2D, 450, 71-05, CAT 3293, PI 416937, CAT 3406, RKS 18, Bragg	51	288	-
		DSR F_7	EC 602288, NRC 2, JS 97-52, JS 90-41, JS 104-31, Bragg, G27, EC 390977, EC 538828, JS 21-08, Ankur, RVS 2009-9, PS 10-29, SL 688, TAMS 98-21, SL 958, JS	28	429	-

			71-05, 70-A, PS 1556, DSb 21, LEE, DS 3105, Swarna, Vasundara, NRC 37, SL 96, MAUS 81, EC 546882, MACS 452, MAUS 71, AGS 25, MAUS 612, DSb 23-02, Harasoya, RSC 10-46, PS 1556, DSb -1			
Punjab Agricultural University, Ludhiana	Breeding for high yield, early maturing, YMD resistant, photoperiod insensitive & food grade soybean varieties.	Fresh crosses	Parents involved: SL 1311, PS 1347, NRCSL 5, SL 955, NRC 195, JS 2171, AGS 351, NRC 142, AGS 456, NRC 130, NRC 138, NRC 105	21 crosses	-	-
		F_2 to F_5	Derived from hybridization between: PS 1347, NRC 149, SL 1315, SL 1330, SL 1311, JS 21-71, DS 9421, NRCS 5, G soja, NRC 94SL 958, AGS 456EC 538828, EC 107416, S 445, SL 979, AGS 191, Dsb 23, JS 335, Swarana Vasundra, NRC101	51 crosses	414	22
		F_6 to F_9	SL 958, SL 1074, SL 1120, SL 1116, SL 1184, SL 1191, SL 1104, SL 1204, IA 2067, G soja, SL 1123, JS 9752, Swarana Vasundra, NRC101	21 crosses	227	5
AICRP on Soybean, Regional Research Centre Dr. PDKV, Amravati	Breeding for High yield with Charcoal rot resistance, YMV resistance, Earliness, Kuntiz trypsin inhibitor free, drought tolerance, good germinability,	Fresh Cross	**Parentsinvolved**: AMS-MB 5-18, JS 21-71, TAMS-38, AMS 100-39, JS 97-52, NRC 127, MAUS 162, RVSM 2011-35	8	---	---
			Crosses on the basis of diversity analysis **Parentsinvolved**: NRC 130, NRC 138, CAT 2797, RSC 10-52, TGX 854429, EC 546882, EC 274713, Nanking, MACS 450, JS 20-69, EC 457464	8	---	---

	mechanical harvesting, long juvenility and multiple pest resistance.	F1	**Derived by hybridization between parents:** TAMS-38, AMS 100-39, NRC 127, Kalitur, UPSM 534, AMS 99-33, AMS-MB 5-18, JS 21-71.	8		
		F2	Derived by hybridization between :AMS-MB-5-18 x NRC 101, AMS-MB-5-18 x NRC 127, AMS-MB-5-19 x NRC 101, AMS-MB-5-19 x NRC 127, TAMS-38 x AMS-MB-5-18, AMS-MB-5-18 x JS 21-71, TAMS-38 x AMS 100-39, AMS-MB-5-18 x AMS 100-39, NRC 37 x NRC-7, AMS-MB-5-18 x NRC-7, AMS-99-33 x UPSM-534, AMS-MB-5-18 x MAUS 158, AMS 100-39 x MAUS 158, JS 335 x Kalitur.	14	148	--
		F3	Derived by hybridization between : TAMS-38 x AMS-MB-5-18, AMS-MB-5-18 x TAMS-38, AMS-99-33 x UPSM-534, NRC 37 x NRC-7, AMS 1001 x AGS 25.	5	63	--
		F5	Advanced generation lines derived from available crosses	31	19	7
		F6	Advanced generation lines derived from available crosses	21	10	7
MACS, Agharkar Research Institute, Pune	Earliness, High oil, High Yield, Null Trypsin, Null Lipoxygenase, Rust resistance, YMV resistance, Charcoal Rot Resistance and Vegetable and food grade type.	Fresh crosses	**Parents Involved:** MACS 1188, MACS 1460, MACS 1520, MAUS 612, KDS 726, KDS 753, EC 2579, EC 103334, AGS 143, NRC 105, AGS 406, SL 958, Lee, EC 242104, AMS-MB-5-18, MACS 1779, DSB 34, JS 95-60, MACS 1407, EC 141778, JS 97-52, EC 241780, AGS 460	25	-	-
		F_2 to F_5	Derived by hybridization between AMS-MB-5-18xAGS 25, AMS-MB-5-18xJS 95-60, AMS-MB-5-18xMACS 1520, AMS-MB-5-18xJS SH 93-37, DS 98-14xJS 95-60, DS 98-14xDSB 34,HARA SOYAxNRC 142,HARA	95	2799	

			SOYAxMACS 1520,HARA SOYAxMACS 1460, HARA SOYAxJS SH 93-37,HARA SOYAxNRCSL1,JS 93-05xDS 98-14,JS 97-52 x AGS 25,JS 97-52x NRCSL 1,JS 97-52 x NRC 142,JS SH 93-37 x NRC 142,JS SH 93-37 x YMVR1,JS SH 93-37 x MACS 330,Karune x NRC 147,Karune xJS SH 93-37, KarunexKDS 726,KARUNE x JS SH 93-37,KDS 726 x NRC 142,KDS 726 x YMVR1,MACS 1188 x AGS 25,MACS 1188 x NRCSL1,MACS 1188 x NRCSL1,MACS 1188 x MACS 1520,MACS 1188 x MACSNRC 1667,MACS 1188 x KARUNE, MACS 1188 x HARA SOYA,MACS 1188 x HIMSO 1689,MACS 1188 x DSb 34,MACS 1188 x HARDEE,MACS 1188 x TAMS 9821,MACS 1188 x YMVR 1,MACS 1188 x EC 103332,MACS 1188 x EC 251396,MACS 1188 x CAT 2126 B,MACS 1188 x VLS 63,MACS 1188 x TAMS 98-21,MACS 1188 x JS 93-05,MACS 1188 x KDS 753,MACS 1188 x EC 241780,MACS 1281 x RSC 10-46,MACS 1281 x TAMS 9821,MACS 1454 x JS 335,MACS 1460 x NRC 142,MACS 1460 x NRC 147,MACS 1460 x SWARNAVASUNDHARA,MACS 1460 x MACSNRC 1667,MACS 1460 x MACS 1520,MACS 1460 x DSb 34,MACS 1460 x DSb 21,MACS 1460 x EC 24180,MACS 1460XKARUNE,MACS 1460 x MACS 330,MACS 1460 x HARA SOYA,MACS 1460 x AMSMB 5-18,MACS 1460 x DSB 34,MACS 1460 x SL 958,MACS 1460 x HIMSO 1689,MACS 1460 x PS1613,MACS 1460 x TAMS 9821,MACS 1460 x AVKS 71,MACS 1460 x JS 95-60,MACS 1460 x JS SH 93-37,MACS 1460 x MACS 450,MACS 1460 x EC 103332,MACS 1460 x EC 251396,MACS 1460 x JS 335,MACS 1460 x Br 3,MACS 1460 x EC 241780, MACS 1460 x MACS 1188,MACS 1460 x DSb 21,MACS 1460 x VLS 63,MACS 1520 x NRC 142,MACS 1520 x			

			NRC 147, MACS 1520 x MACS 1460,MACS 450 x DSB 34,MACS 450 x AMS MB 5-18,MACS 450 x MACS 1460,MACS 450 x DSb 23, MACS 450 x DSb 21, NRC 132 x AGS 25,NRC 142 x MACSNRC 1667, SL 958 x NRC 142,SWARNA VASUNDHARA x NRC 132,SWARNAVASUNDHARAx NRC 142,SWARNAVASUNDHARAx NRC 147,TAMS 98-21 x VLS 75, VLS 75xMAUS 612,YMVR 1xJS 93-37,YMVR1 x HIMSO 1689,YMVR1 xNRCSL1			
		$F_6$to F_9	Advanced generation lines derived from 11-5-Bx (JS 335 X PI 416937), 70-4 x GC – 572154, 70-4 x 71 – 05, EC 34087 x 20-29, EC 383165 x JS 335, EC 546882 x MACS 450, EC 572086 x (SL 955 X JS 20-34, EC 572154 x RVS 2001-18, EC 572154 x (SL 958 x MACS 450), JS (SH)93-37 x SL 1074, JS 20-34 x RVS 2001-18, JS 20-98 x PS 1029, JS 20-98 x JS 20-34, JS 21-08 x NRC 121, JS 335 (JS 335 x PI 416937), JS 93-05 x TAMS 9821, JS 97-52 x PP6, JS 97-52 x EC 572086, JS 97-52 x NRC 121, JS 97-52 xKARUNE, KDS 344 x CAT 2126B, MACS 1188 x RSC 10-46, MACS 1188 x CAT 2126B, MACS 1188 x KDS 753, MACS 1188 x SL 1074, MACS 1188 x JS 95-60, MACS 1188 x KDS 726, MACS 1188 x VLS 63, MACS 1188 x MACS 1340, MACS 1281 x TAMS 9821, MACS 1281 x RSC 10-46, MACS 1407 x JS 95-60, MACS 1407 xJS 20-34, MACS 1407 x JS SH 93-37,MACS 1407 x DSb 21, MACS 1407 x KDS 726, MACS 1460 x NRC 122, MACS 1460 x RSC 10-46, MACS 1460 x TAMS 9821,MACS 1460 x DSb 21, MACS 1460 x KDS 753, MACS 450 x VLS 63, MAUS - 2 x SL 688, NRC 37 x JS 97-52, RVS 2001-18 x EC 572086,RVS 2001-18 x G 27, SL 958 x TAMS 9821, SL 958 x MAUS 612, SL 958 x MACS 58, SL 958 x JS 93-05, SL 958 x DSb 21	51		78

CAU, Imphal centre	Breeding for high yield, vegetable purpose, rust resistance	Fresh cross	MACS 1460, EC 456613, KDS 753, EC 241995, JS 20-116, EC 391346, EC 538807, Karune, Local bold (CAU SLC1/P)	9		
		F_3 to F_5	KDS 753, MACS 1460, NRC 127, JS 335, DSb 19, Cat 2086, CSB 10084, Cat 2018, SQL 37, EC 383165, Local bold (CAU SLC1/P)	16	16	-
		F_5 to F_9	DSb 19, MACS 1460, JS 97 52, RKS 18, RVS 2009-9, MAUS 71, AGS 25, DSB-23-02, SL 958, KPS 726, BNS-5, CAT 3406, MACS 450, PP 6, 2911- 40	87	87	-
ICAR-IISR, Indore M.P.	**(Dr. Shivakumar M. & Dr. Natraj V.)** Disease resistance, High yield, early maturity	F1	EC457254 x JS 95-60, Hardee x NRC128, JS20-98 x RSC 10-46, cat 2797 x IC250350, NRC128 x JS 95-60, JS20-98 x NRC 166A, JS97-52 x RSC10-46, JS20-98 x NRC 1JS38, NRC 136 x JS 95-60, NRC 166A x JS 22-18 F1, EC572136 x NRC 166A, JS20-34 x JS 95-60, EC457254 x EC572136, Hardee x e1-as, EC 993175 x JS 95-60, EC34372 x EC572109, EC34372 x JS95-60, EC572136 x EC457254, EC457254 x RSC10-46, EC572136 x DSb34, JS 20-98 x EC457254, JS20-98 x DSb34, EC 457254 x RSC 10-46, NRC 128 x NRC 181, NRC 128 x YMV2, NRC 128 x JS 20-12, NRC 128 x NRC 138, NRC 128 x RVSM 2010, EC 915983 x NRC 37, NRC 128 x EC 915983, WB 136 x NRC 37, NRC 181 x EC 457254, NRC 128 x EC457254, NRC 128 x RVSM 2012, EC 916032 x NRC 128, NRC 37 x EC 993175, EC 457254 x YMV2, NRC 181 x EC 993175, Code 16 x NRC 37, EC 915983 X NRC 128 F, 34372 x 128, NRC 128 x DSb34, NRC 128 x EC 93175.	43	323	-
		F3	AGS 155 x JS 95-60) x (AKSS 67 x NRC 155)] x [(IC 15089 x 14-36 b) x EC 34372 x 6A-34-25)] E			

			[(NRC 155 x NRC 128) x 7A-109 x EC 538828)] x [(IC15089 x 14-36A x AGS 155 x JS 20-34)] H [(IC 15089 x 14-36B) x (EC 34372 x 6A-34-25)] x [(AKSS 67 x NRC 155) x AGS 155 x JS 20-34 J-1 [(IC 15089 x 14-36A) x (EC 34372 x 6A-25-34)] x [(NRC 155 x EC 538828) x AGS 155 x JS 20-34)] C-1[(NRC 155 x NRC 128) x (7A-109 x EC 538828) x [(EC 34372 x 6A-34-25) x (AGS 155 x JS 95-60)]K-1[(NRC 155 x NRC 128) x (AGS 155 x JS 95-60)] x [(IC15089 x 14-36B) x EC 34372 x 6A-34-25]A-1[(NRC 155 x NRC 128) x (AGS 155 x JS 95-60)] x [(IC15089 x 14-36B) x EC 34372 x 6A-34-25]F-1[(EC 34372 x 6A-34-25) x (AGS 155 x JS 95-60)] x [(EC 538828 x NRC 128) x P501 x DS 3106)]G-2[(VP 1165 x JS 95-60) x (6A-33-1 x PB 220 YMV)] x [(IC 15089 x 14-36B) x (EC 34372 x 6A-34-25)]I-1, [(NRC 155 x NRC 128) x 7A-109 x EC 538828)] x [(IC15089 x 14-36A x AGS 155 x JS 20-34)]H-3, [(IC 15089 x 14-36B) x (EC 34372 x 6A-34-25)] x [(AKSS 67 x NRC 155) x AGS 155 x JS 20-34B-2, [(EC 34372 x 6A-34-25) x (AGS 155 x JS 95-60)] x [(EC 538828 x NRC 128) x P501 x DS 3106)]G-5, [(NRC 155 x NRC 128) x (7A-109 x EC 538828)] x [(IC 15089 x 14-36B) x EC 34372 x 6A-34-25]D-5			
	Disease resistance&High yield supplied to Adilabad.	F3	(JS 20-69 x NRC 128) x (DS 9712 x AMS 5-18),(JS 9752 x AMS 5-18) x (JS 20-69 x NRC 128),(P501 x DS 3106) x (CAT 2911 x NRC 128)	3	88	
	Disease resistance	F4	JS 20-69 x NRC 128 x JS 9712 x AMS 5-18,PS501 x DS3106 x 2911 x NRC128, JS97-52 x AMS MB 5-18 x JS 20-69 x NRC128, PS501 x DS3106 x 2911 x NRC128, PS501 x DS3106 x young x 2911, 2911 x NRC128 x UPS1165 x JS95-60, NRC 155 x NRC128 x 7A-109 x EC538828, PS501 x DS3106 x young x CAT3293, young	799		

			x cat3293 x NRC 155 x NRC128, GR47 x JS 97-52 x 11-5 B x 8-94-2, AMS MB 5-18 x Bragg, JS97-52 x AMS MB 5-18 xJS20-69 x NRC128 x PS501 x DS3106 x young x EC538828, JS 20-20 x 95-60, POP3, NRC 128 x JS 20-69, JS 20-69 x NRC 128, AMS MB-5-18 x NRC 128 F5, JS 97-52 x AMS MB 5-18, EC 4571254 x JS 95-60, JS 20-98 x JS 95-60			
	Disease resistance&High yield supplied to Adilabad.	F4	JS 9752 x AMS 5-18,NRC 128 x AMS 5-18,NRC 128 x JS 20-69, JS 20-69 x NRC 128, AMS 5-18 x JS 20-69, JS 97-52 x JS 20-69	6	110	
	Disease resistance	F5	NRC128 x AMS MB 5-18, NRC 128 x JS 95-60, JS97-52 x 8-94-4, PS501 x DS3106 x 2911 x NRC 128, JS2069 x NRC128 x JS9712 x AMS MB 5-18, JS 97-52 x AMS MB 5-18, AMS MB 5-18 x JS 20-69, JS 97-52 x AMS MB 5-18 x JS 20-69 x NRC 128, JS 2098 x NRC 128, NRC 128 x JS 20-69, JS 20-98 x JS 95-60.	35		
	Breeding Material Supplied to Kota	F5	A-252(F_5), A-315(F_5), A-221(F_5), A-120(F_5), A-6(F_5), A-188(F_5), A-127(F_5), A-122(F_5), A-24(F_5), A-260(F_5) NRC 128 × JS 20-34 (F_5), NRC 128×JS 20-34(F_5), NRC 128 × JS 95-60(F_5), NRC 128 × JS 95-60(F_5), NRC 128 × JS 95-60(F_5), NRC 128 × JS 95-60(F_5), NRC 128 × JS 95-60(F_5), 2911 × NRC 128(F_5), 2911 × NRC 128(F_5), 2911 × NRC 128(F_5), 2911 × NRC 128(F_5), 2911 × NRC 128(F_5), 2911×NRC 128(F_5), 2911×NRC 128(F_5), 2911×NRC 128(F_5)	25		
	Supplied to AICRPS Centre	F5	EC457254 × JS 65-60, NRC 128 × JS 20-34, NRC 128 × JS 95-60, 2911 × NRC 128	3		

	(Dr. Sanjay Gupta& Dr. Rajesh Vangala) High Yield based on the genetic diversity across AICRPS zones	Fresh crosses and their generation advancement in off season in glass house	MACS-1460 x AGS 25,MACS-1460 X TGX-8116-21 D, MACS-1460 X EC274713, MACS-1460 X EC 456613, MACS-1460 X EC 457475,NRC149 X AGS 25, NRC149 X NRC-256,NRC149 X RSC-10-46, NRC149 X DS3105,NRC149 X NRC-204, PS-1347 X AGS 25,NRC 138 X EC 546882, NRC 138 X AGS 25,NRC 138 X CAT2797, NRC 138 X NRC 131, NRC 138 X NANKING, NRC 138 X NRC130, DSB 34 x AGS143, DSB 34 X LEE,LEE X DSB34, AGS 25 X NRC 149,AGS 25 X KDS 753, AGS 25 X PS 1347, AGS 25 X RSC 1046, AGS 25 X MACS 1460,NRC 131 X NRC 225, NRC 131X NRC 136, RSC 10-46 X AGS 25, RSC 10-46 X NRC 128,RSC 10-46 X NRC 149 , RSC 10-46 X JS 20-34, VLS-89 X AGS 218, VLS-89 X NAN KING, SL 1074 X AGS 25, NRC 130 X CAT 2797, NRC 130 X EC-34372, NRC 130 X NRC-136, NRC-225 X NRC -131, KDS-753 X EC 103334, KDS-753 XEC-241995, CAT 2797 X NRC-130, JS 20-116 X EC-391346, JS 20-34 X NRC-158, JS 20-34 X RSC-10-46, JS 97-52 X JS 75-46, NRC-128 X RSC- 10-46, VLS-63 X EC-274713, EC-274713 X VLS-63,EC-546882 X NRC-138, EC-241995 X KDS 753, EC-538828 X NRC-158, NRC-158 X EC-538828, RSC- 10-52 X TGX-854-429,TGX-854-429 X RSC-10-52, JS 20-69 X MACS 450,JS 20-98 X NRC-256, NRC-256 X JS 20-98,NRC-256 X JS 20-116, NRC-256 X NRC-128, NRC-256 X RSC-10-46, NRC-256 X NRC-149,NRC-256 X DSB 21, NRC-189 X NRC 128, NRC-189 X DSB 21, NRC-189 X RSC-10-46,NRC-189 X JS 20-116, NRC-192 X RSC-10-46,NRC-192 X JS 20-116, NRC-192 X NRC-128, NRC-192 X DSB 21	70 crosses, 800 plants	-	-

	(Dr. Sanjay Gupta& Dr. Rajesh Vangala) High Yield based on the genetic diversity across AICRPS zones **(Bengaluru Centre)**	Fresh crosses and their generation advancement in off season Bengaluru centre	MACS 1460 x LJ 137,MACS 1460 X LJ 140, MACS 1460 X 138,MACS 1460 X U 119,MACS 1460 X VLS 63,MACS 1460 X NRC 130,MACS 1460 X LJ 124,MACS 1460 X RSC 10-46, VLS 59 X Palamsoya,VLS 59 X LJ 119, VLS 59 X LJ 124, VLS 59 X JS 20-34, VLS 59 X LJ 137,VLS 59 X LJ 140, SKUA -202 X VLS 59, SKUA -202 X NRC 138, SKUA -202 X JS 20-34, LJ-137 X VLS 59,LJ -137 X Dsb 34, NRC 138 X VLS 59, NRC 138 X Dsb 34, JS 20-34 X SKUA -202, JS 20-34 X VLS 59, Dsb 34 x LJ 140, Dsb 34 X LJ 137, Dsb 34 X NRC 138, Dsb 34 X LJ 124, Harasoya X Palamsoya, Harasoya X SKUA-202, Harasoya X VLS 59, Palamsoya X Harasoya, Palamsoya X VLS 59, Palamsoya X NRC 138, LJ 124 X VLS 59, LJ 124 X Dsb 34, LJ 140 X VLS 59, Skua 202 X Harasoya	37		
	Dr. Sanjay Gupta) Photoinsensitive, Long Juvenile High Yield	F2 to F3	RSC 10-46 X LJ 124 , RVSM 20 11-35 X LJ-124 , LJ 124 X NRC 128 ,NRC 130 X JS 20-34 , RSC 10-46 X LJ 140,JS 20-34 X LJ-140 , NRC 130 X LJ 124 , LJ 140 X NRC 128, LJ 124 X RSC 10-46 ,LJ 137 X NRC 138,RVSM 20 11-35 X JS 20-34 , LJ 140 X JS 20-34 , NRC 138 X LJ - 140 , LJ137 X NRC130, NRC138 X LJ137, LJ140 X NRC138, RSC 10-46 X LJ - 137 , LJ 137 X RSC10-46, LJ 124 X NRC138, LJ 124 X NRC 130, JS20-24 X NRC 138, RSC 10-46 X NRC 138,NRC 130 X LJ 137,NRC 130 X LJ- 140, JS 20-34 X LJ -137,JS 20-34 X LJ -119,JS 20-34 X NRC 130 , NRC 138X JS 20-34,RVSM 11-35 X NRC- 138 ,NRC 138 X LJ – 124, LJ-140 X NRC -130, LJ 137 X NRC 128 , AGS 25 X JS 9305, NRC 128 X LJ 124 , NRC 128 XLJ137 , JS 20-34 X LJ 124,NRC 128 X LJ 140 , LJ 140 X RS 10-46	38	1014	

	Dr. Sanjay Gupta) Photoinsensitive, Long Juvenile High Yield	Advanced Breeding Lines	JS 95-60 x AGS 25, JS 93-05 x AGS 25, JS 97-52 x EC 390977, SL 958 X AGS 25, SL 958 x JS 20-34, SL 958 x NRC 107, SL 958 x JS 95-60, SL 958 x EC 539928, SL 958 x EC 390977, JS 97-52 x AGS 25, (JS 97-52 x EC 390977) x (AGS 25 x EC 538828),			
	(Dr. Rajesh Vangala) Defoliator resistance, Earliness, Yield Photoinsensivity, stem fly, , abiotic, bold, vegetable, Earliness, PHS	F2 to F3	AGS 155 x AKSS 67, JS 97-52 x (JS20-34 X Line 202), F4P21 × Line 220, Harasoya x JS 9305, Harasoya x (F4P21 × Line 220), G5P22 x JS 335, JS 335 x F4P21, F3P18 x JS 335,JS 20-34 x G5P22, F4P21 × Line 202, F3P18 x Line 202, JS 9560 x Line 220,RKS 113 x SL 1104, JS 20-34 x Line 220, Basara x VLS 63, Basara x NRC 130, Basara x (F4P21 × Line 220),Basara x Karune, Basara x JS 20-98,Basara x RSC 10-46,RSC 10-46 x AGS 25,Harasoya x EC 915908,Hardee x EC 915965,AMS-MB-5-18 x EC 915908, JS 20-34 x EC 915965, Hardee x Karune, EC 457254 x RSC 10-46, Harasoya x Karune.	28	300	28
	(Dr. Gyanesh K. Satpute) Breeding for drought tolerant	F1	(38-11-265 x JS 95-60) x (JS71-05 x NRC 37) / (AMS MB 5-18 x JS 95-60) x (PI 159923 x JS71-05); (AMS MB 5-18 x JS 95-60) x (PI 159923 x JS 95-60) / (JS71-05 x NRC 37) x TGX 328-049; (AMS MB 5-18 x JS 95-60) x (PI159923 x JS95-60) / (AMS MB 5-18 x JS 95-60) x (PI 159923 x JS71-05); (AMS MB 5-18 x JS 95-60) x (PI 159923 x JS 95-60) / (PI 159923 x NRC 37) x (PI 159923 x JS 95-60); (JS71-05 x NRC 37) x TGX 328-049 / (PI 159923 x NRC 37) x (PI 159923 x JS 95-60); (AMS MB 5-18 x JS 95-60) x (PI 159923 x JS71-05) / (JS71-05 x NRC 37) x TGX 328-049; (PI 159923 x NRC 37) x (PI	**7/235 (Seeds)**		-

			159923 x JS 95-60)/ (AMS MB 5-18 x JS 95-60)x(PI 159923 x JS71-05)			
		F2	(AMS MB 5-18 x JS 95-60) x (PI 159923 x JS71-05) (38-11-265 x JS 95-60) x (JS71-05 x NRC 37) (JS71-05 x NRC 37) x TGX 328-049 (PI 159923 x NRC 37) x (PI 159923 x JS 95-60)	**4**	**-**	**4**
		F_3	NRC 136 x GKS 21-3; NRC 137 x GKS 21-3; NRC 137 x GKS 20-5; NRC 136 x GKS 20-4 – I; NRC 136 x GKS 20-4 – II; GKS 20-7 x NRC 137; NRC 137 x GKS 21-4; (AMS MB 5-18 x JS 95-60) x (PI 159923 x JS 95-60); (JS 71-05 x NRC 37) x (AMS MB 5-18 x JS 95-60); (JS 71-05 x NRC 37) x (PI 159923 x NRC 37); (JS 71-05 x NRC 37) x EC 60228; PI 159923 x JS 95-60; 38-11265 x TGX 822-10E; AMS MB 5-18 x JS 95-60; PI 159923 x JS 71-05; 38-11265 x JS 95-60; PI 159923 x NRC 37; JS 71-05 x NRC 37 – I; JS 71-05 x NRC 37 – II	**17**	**-**	**19**
		F_4	NRC 136 x GKS 21-3; NRC 137 x GKS 21-3; NRC 137 x GKS 20-5; NRC 136 x GKS 20-4 – I; NRC 136 x GKS 20-4 – II; GKS 20-7 x NRC 137; NRC 137 x GKS 21-4	**6**	**-**	**7**
		F_4	(PK 472xJS 335)x(EC 602288xEC 390977)/ (YoungxJS 335)x(JS 97-52xJS 90-41); (JS 335xYoung)x(EC 602288 x JS 90-41)/ (C-2797xJS 71-05)x(PK 472xJS 335); (YoungxJS 335)x(EC 602288xJS 90-41)/ (C-2797xJS 71-05)x(PK 472xJS 335); (PK 472xJS 335)x(EC 602288xEC 390977)/ (YoungxJS 335)x(EC 602288xJS 90-41); ((NRC 37 x JS 97-52) x EC 572154) x VP 1165; ((NRC 37 x JS 97-52) x EC 572154) x SL 958; ((NRC 37 x JS 97-52) x EC 572154) x DS 3106; ((NRC 37 x JS 97-52) x EC	**30/220**	**-**	**-**

			538828) x VP 1165; ((NRC 37 x JS 97-52) x EC 538828) X DS 3105; ((NRC 37 x JS 97-52) x EC 572086) X SL 958; ((EC 602288 -Cat 3293 x JS 90-41) x PI 416937) x SL 958; ((EC 602288-Cat-3293 x JS 90-41) x EC 572086) x DS 3105; ((JS 71-05 x JS 90-41) x EC 538828(x SL 979; ((EC 602288-Cat3293 x JS 71-05) x EC 538828) x SL 958; ((EC 602288-Cat3293 x JS 71-05) x EC 538828) x DS 3106; ((NRC 37 x JS 335) x EC 538828) x DS 3105; ((NRC 37 x JS 71-05) x EC 77147) x SL 958; ((NRC 37 x JS 71-05) x EC 538828) x DS 3106; ((NRC 37 x JS 71-05) x EC 538828) Xx SL 958; ((EC 602288-Cat 3293 x NRC 2) x EC 77147) x VP 1165; ((EC 602288-Cat 3293 x NRC 2) x EC 572154) X DS 3105; ((EC 602288-Cat 3293 x NRC 2) x EC 572086) x DS 3106; ((EC 602288-Cat 3293 x NRC 2) x JS 20-34) x SL 979; (JS 335 x (JS 335 x PI 416937)) x JS 335; ((PK 472 x JS 335) x (EC 602288 x EC 390977-PP6)) x JS 20-38; (RVS 2001-18 x 23, 104-32rt) x RVS 2001-18; (RVS 2001-18 x 22, 104-57rt) x RVS 2001-18; (RVS 2001-18 x Kh 16 F6 20-2 Drt) x RVS 2001-18; (107-70 x 104-57rt) x RVS 2001-18; (70-4 x kh16 F5 20-2 Drt) X RVS 2001-18; CAT 3293 X Young			
		F_5	(NRC 37 x JS 97-52) x EC 538828 , (NRC 37 x JS 97-52) x EC 572086, (EC 602288 -Cat 3293 x JS 90-41) x PI 416937, (EC 602288-Cat 3293 x EC 390977- PP6) x JS 20-34, (EC 602288-Cat-3293 x JS 90-41) x EC 572086, (JS 71-05 x JS 90-41) x EC 538828, (EC 602288-Cat3293 x JS 71-05) x EC 538828, (NRC 37 x JS 335) x EC 538828, (NRC 37 x JS 335) x EC 77147 , (NRC 37 x JS 71-05) x EC 77147, (NRC 37 x JS 71-05) x EC 538828, (NRC 2 x JS 71-05) x EC 771186, (EC 602288-Cat 3293 x NRC 2) x EC 572154, (EC 602288-Cat 3293 x NRC 2) x EC 572086, (EC 602288-Cat 3293 x NRC 2) x JS 20-34,	**22/84**	-	-

			(JS 335 x PI 416937) x EC 538828, (JS 71-05 x [(70-4 x JS 71-05)) x JS 71-05, (Young x JS 335) x (EC 602288 x JS 90-41), (JS 335 x Young) x (EC 602288 x JS 90-41) , (Young x JS 335) x (JS 97-52 x JS 90-41) , RVS 2001-18 x 22, 104-57rt, 107-70 x 104-57rt			
	shared with AICRPS Centres	F5	[(PK 472xJS 335)x(EC 602288xEC 390977)] / [(Young x JS 335) x (JS 97-52 x JS 90-41)], [(Young x JS 335) x (EC 602288 x JS 90-41)] / [(C-2797 x JS 71-05) x (PK 472 x JS 335)]			
	shared with AICRPS Centres	F6	[(PK 472 x JS 335) x (EC 602288 x EC 390977)] X JS 20-38, [(EC 602288 x JS 71-05) x EC 538828] X DS 3106, EC 6022883 X YOUNG, [(JS 71-05 x JS 90-41) x EC 538828] X SL979, [(NRC 37 x JS 71-05) x EC 538828] X DS 3106, [(NRC 37 x JS 97-52) x EC 572154] X DS3106, [RVS 2001-18x104-57rtXRVS 2001-18 (104-57rt derived from JS 97-52 xJS 90-41), [(NRC 37 x JS 97-52) x EC 572086] X SL 958, [RVS 2001-18 x 20-2Drt] X RVS 2001-18 (20-2Drt derived from JS 97-52 x PI 416937)	**9**		
		F_7	CAT 3293XJS 90-41 F5-1, Cat 3293 X DT 21 F5-14, Cat 3293 X NRC 2F5 -4, NRC 2 X DT 21 F5-2, Cat 2797 X JS 71-05 F5-17, PK 472 X JS 335 F5-2 , NRC 37 X JS 97-52 F5-2, NRC 2 X JS 71-05 F5-7, JS 335 X YOUNG F5-10, JS 335 X PI 416937 -10, PK 472 XJS 90-41 F5-1, JS 20-34 X JS 20-38 F5-11, JS 20-38 X DS 31-05 F5-7	**13/35**	**-**	**-**
	shared with AICRPS Centres	F7	(EC 602288 x JS 90-41) x EC 572086, 107-70 x 104-57rt i.e. [Adv Line of JS 97-52/NRC 37 x Adv Line of JS 97-52/JS 90-41]			
	Dr. Subhash Chandra (waterlogging tolerance)	**Multi-parent F_1 Cross**	(WL 4 X Y6) X (Y3 X WL4)/ (Y1 X Drt 3) X (Y3 X Drt 2), (Y2 X Drt 4/Doubt) x (Y1 X HT2)/ (Y3 X Drt 2) X (Y1 X HT2), (Y2 X Drt 4) x (Y1 X HT2)/ (WL 4 X Y6) X (Y3 X WL4), (Y3 X Drt 2) X (Y1 X HT2)/ (WL 4 X Y6)	**35/95 (seeds)**		

			X (Y3 X WL4), (Y1 X Drt 3) X (Y3 X Drt 2)/ (WL 4 X Y6) X (Y3 X WL4), (Y1 X Drt 3) X (Y3 X Drt 2)/ MACS 1460 X (Y5 X Ht 2), MACS 1460 X (Y5 X Ht 2)/ (Y3 X WL4) X (Y1 X Drt 3), (Y3 X Drt 2) X MACS 1460/ Y5 X (Y1 X Ht 2), MACS 1460 X (Y3 X Drt 2)/ (Y1 X WL3) X NRC 128, RSC 10-46 X (Y1 X WL3)/ (Y2 X Drt 4) x (Y1 X HT2), MACS 1460 X RSC 10-46/ JS 20-69 X VLS 63, GW 111 X GW 223/ (WL 4 X Y6) X (Y3 X WL4), NRC 181 X NRC 128/ JS 20-69 X RSC 10-46, GW 27 X GW 265/ JS 20-69 X VLS 63, GW 27 X GW 265/ NRC 181 X NRC 128, JS 20-69 X RSC 10-46/ GW 27 X GW 223, GW 111 X GW 265/ JS 20-69 X VLS 63, GW 111 X GW 265/ NRC 181 X NRC 128, CAT 3293 X NRC 128/ RVSM 2011-35 X RSC 10-46, GW 50 X GW 265/ GW 111 X GW 223, JS 20-69 X VLS 63/ CAT 3293 X NRC 128, JS 20-69 X VLS 63/ GW 50 X GW 223, RVSM 2011-35 X RSC 10-46/ MACS 1460 X RSC 10-46, RVSM 2011-35 X RSC 10-46/ GW 50 X GW 223, GW 50 X GW 223/ GW 111 X GW 223, GW 50 X GW 223/ GW 27 X GW 223, GW 50 X GW 223/ (WL 4 X Y6) X (Y3 X WL4), GW 111 X GW 223/ GW 50 X GW 223, GW 111 X GW 223/ GW 27 X GW 223, (Y3 X Drt 2) X (Y1 X HT2)/ (Y2 X Drt 4/Doubt) x (Y1 X HT2), (Y3 X Drt 2) X (Y1 X HT2)/ (Y3 X WL4) X (Y1 X Drt 3), H1-1 (G. soja X JS 20-34)/ H1-2 (G. soja X JS 20-34) yellow, H1-1 (G. soja X JS 20-34)/ H1-2 (G. soja X JS 20-34) black, H1-2 (G. soja X JS 20-34)/ H1-1 (G. soja X JS 20-34), (WL 4 X Y6) X (Y3 X WL4)/ (Y3 X WL4) X (Y1 X Drt 3)			
		Biparental F1S	NRC 256XNRC 192, PS 1569XYP34, PS 1569XNRC 256, PS 1569XJS 22-18, JS 20-98XVLS 63, NRC 149 X NRC 256, NRC 149XNRC 256, NRC 149XYP 34, NRC 192XYP 34, NRC 192XJS 22-18, NRC 138XTP 34, JS 20-69XNRC 256, JS 20-69XNRC 256, JS 20-69XRSC 10-	**15/59 (Seeds)**		

			46 , RVSM 2011-35XNRC 128			
		F_2	(WL 4 X HT2) X (Y2 X Drt 4), (Y3 X WL4) X (Y3 X Drt 2), (WL 4 X Y6) X (Y3 X WL4), (Y3 X Drt 2) X (Y1 X HT2), (Y3 X WL4) X (Y1 X Drt 3), (Y2 X Drt 4/Doubt) x (Y1 X HT2), (Y1 X Drt 3) X (Y3 X Drt 2), MACS 1460 X (AMSMB 5-18 X WL3), MACS 1460 X (Y5 X Ht 2), (Y3 X Drt 2) X MACS 1460, MACS 1460 X (Y3 X WL4), Y5 X (Y1 X Ht 2), Y5 X (Y3 X WL4), (Y1 X WL3) X NRC 128, MACS 1460 X (Y3 X Drt 2), RSC 10-46 X (Y1 X WL3), RVSM 2011-35 X RSC 10-46, MACS 1460 X RSC 10-46, JS 20-69 X RSC 10-46, NRC 181 X NRC 128, GW 27 X GW 223, GW 27 X GW 265, GW 50 X GW 223, GW 50 X GW 265, GW 111 X GW 223, CAT 3293 X NRC 128, GP 5 X JS 20-98, JS 20-69 X VLS 63, H1-1 (G. soja X JS 20-34), H1-2 (G. soja X JS 20-34)	**30/3657 (Seeds)**		
		F3	(JS 95-60 X JS 20-38) X JS 95-60, (JS 95-60 X JS 20-34) X Drt4, JS 20-98 X TGX 328-049, JS 20-98 X EC 455665, NRC 158 X CAT 1258, JS 20-69 X EC 455665, JS 20-34 X Hardee	7		
		F4	NRC 146 x JS 20-69, NRC 146 x AMS MB 5-18, NRC 128 x MACS 1520, Hardee x RSC 10-52, Hardee x JS 20-69'JS 20-98 x AMS MB 5-18	6		
AICRP on Soybean, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad	Earliness and high yield, High Yield with YMV & rust resistance, Photoperiod insensitivity, earliness and High Yield	Fresh crosses	DSb 27B x DSb 33, DSb 27B x DSb 23, DSb 27B x DSb 21, DSb 27B x KDS 726, SL 1028 x DSb 21, SL 1028 x DSb 23, SL 1028 x JS 335, SL 1028 x DSb 34, SL 1074 x DSb 34, SL 1074 x DSb 23, SL 955 x JS 335 MACS 330 x DSb 34, MACS 330 x JS 335, MACS 330 x KDS 726 JS 335 x DLSb 1, DSb 21 x EC 242104	16	-	-
		F_1	DSb 23 x DSb 27B, DSb 39 x DSb 27B, DLSb 1 x JS 95-	13	-	-

			60, EC 242104 x JS 95-60, EC 242104 x DSb 27B, DSb 34 x SL 1028, DSb 34 x SL 955, DSb 39 x SL 955, DSb 23 x SL 1028, DLSb 1 x SL 955, DSb 27B x KDS 726, DSb 27B x KDS 1194, DSb 34 x EC 242104			
		F_2	DSb 34 x EC 242104, DLSb 1 x EC 242104, DSb 39 x EC 242104, DSb 39 x DSb 34, DSb 23 x JS 20-116, JS 335 x JS 20-34,DSb 23 x DSb 27B, DSb 39 x SL 955, DSb 34 x SL 1028,DLSb 1 x JS 95-60, EC 242104 x DSb 27B, EC 242104 x JS 95-60, DLSb 1 x SL 955, DSb 23 x SL 1028, DSb 39 x DSb 27B	15	75	-
		F_3	DLSb 1 x JS 95-60, DLSb 2 x DSb 34, DSb 32 x EC 242104,DSb 32 x DLSb 1, DLSb 1 x DSb 32, DSb 32 x DLSb 2, DLSb 2 x DSb 32, DSb 23 x DLSb 2, DSb 23 x DLSb 1, DLSb 1x DSb 23, JS 335 x JS 20-34	11	215	-
		F_4	DSb 32 x EC 242104, DLSb 1 x DSb 32, DSb 32 x DLSb 2, DLSb 2 x DSb 32, DSb 23 x DLSb 2, DSb 23 x DLSb 1, DSb 32 x DLSb 1, DLSb 1 x JS 95-60, DLSb 2 x DSb 34, DLSb 1 x DSb 23	10	81	-
		F_5	DSb 23 x DLSb 1, DLSb 1 x DSb 23, DSb 32 x DLSb 1, DSb 32 x DLSb 4, DLSb 1 x DSb 32, DSb 23 x DLSb 4, DSb 32 x DSb 23, DSb 32 x DLSb 2, DSb 32 x EC 242104, DSb 23 x DLSb 2	10	40	24

		F_6	NRC 132 x DSb 23, DSb 23 x NRC 132, DSb 21 x EC 457254, DSb 23 x EC 457254, NRCSL 1 x DSb 23, (NRC 94 x *G.soja)* x DSb 32, DSb 31 x MACS 1460, JS 335 x NRCSL 1, DSb 23 x DLSb 1	09	06	45
		Stabilized lines	NRC 132 x DSb 23, DSb 23 x NRC 132, DSb 21 x EC 457254, DSb 23 x EC 457254, NRCSL 1 x DSb 23, (NRC 94 x *G.soja)* x DSb 32, DSb 31 x MACS 1460, 335 x NRCSL 1	08	-	48
JNKVV, Jabalpur (MP)	Development of early maturing varieties coupled with Yellow mosaic, Charcoal rot and Rhizoctonia aerial blight resistance	Fresh crosses (19)	**Parents involved:** JS 20-98, JS 23-09, JS 22-18, NRC 138, JS 21-08, CAT 489 A, KDS 1169, PS 1225, RVSM 2011-35,JS 23-03, PS 1092, JS 23-05, JS 21-72, NRC 202, JS 21-05, PS 1637, NRC 193, PS 1660, NRC 186, JS 22-11, JS 20-69, RSC 11-20, DS 3106, PS 1689, PS 1641	19	All	-
		F_1	JS 20-98,JS 95-60, JS 22-11, JS 22-12,JS 23-05, DS 31-05,JS 20-116, JSM 242,CAT 489 A,JS 97-52,JS 20-34,JS 23-03, JS 23-08, NRC 166, JS 21-08, PS 1611, JS 22-18, NRC 130, CAT 87, JSM 126PS 1659,NRC 128,PS 1225,DS 31-09, AMS 100-39, PS 1092.	23	170	-
		F_2	JS 95-6-, JS 22-11, JS 97-52, JS 22-12, JS 22-18, JS 20-98, JS 20-116, JS 21-08, NRC 166,PS 1611, JS 23-03, JS 20-34,JS 23-05,JSM 242, JSM 126,CAT 87, CAT 489 A, PS 1225,NRC 128,AMS 100-39,PS 1092, DS 3106,DS 3109,NRC 130	25	1207	-
		F_4	JS 20-98, DSB 32, NRC 148, JS 335, JS 20-24, JS 95-60, JS 22-05, JS 20-34	04	282	-
		F_5	JS 20-116, AMSMB 5-18, CAT 489A, PS 10-92, JS 21-08, SL 738, JS 95-60, JSM 283, NRC 148,JS 335, JS 20-	12	301	10

			94,JS 22-04, PB 1, JS 20-34JS 22-05, AMS 475,JS 93-05.			
		F_6	JS 20-98, JS 95-60, DS 3105, JS 20-69, MAUS 740, PB 1, JS 22-04, JS 93-05, AMSMB 5-18, AMS 475, JS 20-94, JS 20-69, JS 22-05	14	200	13
		F_7	JS 20-29, JS 20-24, PS 1092, JS 20-87, SL 955, JS 20-69, JS 20-116, JS 20-94, DS 3105, SL 738,JS 95-60, JS 21-05, JS 20-24,JSM 128, PS 1556, JS 335, G.soja, JS 20-29,	08	139	10
		F_8	JS 21-09, JS20-24,JS 20-38, PS 1092, JS 20-87, SL 955	05	40	03
		F_{11}	JS 20-71, JS 20-87, JS 20-22, JS 20-82, JS 95-60, JS 20-88, JS 20-34,	03	21	02
		F_{12}	JS 20-29, JS 95-60, JS 20-53, JS20-34,JS 20-88, JS 20-64,JS 335, NRC 86,	03	65	04
		F_{13}	JS 20-29, JS 93-05, JS 20-57, JSM 259, JS 20-88,	01	-	01
		F_{14}	JS 20-63, JS 95-60	01	-	01
ARS, Adilabad (PJTSAU), Telangana.	High Yield	Fresh Crosses	Basara x Lee, Basara x AGS 143, Basara x EC 103334, Basara x EC 2579	04	-	-
		F1	Basara x EC 34372, Basara x EC 457254, Basara x AKSS-67	3	-	-
		F2-F3	Basara x EC 34372, Basara x EC 457254, Basara x AKSS-67	3	-	-
		F3-F4	(JS 20-69 x NRC 128) x (DS 9712 x AMS-18),(JS 9752 x AMS 5-18) x (JS 20-69 x NRC128),P 501 x DS 3106) x (CAT 2911 x NRC 128), NHP-64,NHP-65,NHP-66,NHP-67,NHP-68,NHP-69,NHP-70,NHP-71,NHP-72,NHP-83,NHP-84,NHP-85, NHP-86,NHP-87,NHP-88	127	70	
		F4-F5	NHP- 6,NHP- 7,NHP- 8,NHP- 9,NHP- 10,NHP- 11,NHP-12,NHP- 13,NHP- 14,NHP- 15,NHP- 16, NHP- 17,NHP-	357	315	

			18,NHP- 19,NHP- 20,NHP- 21,NHP- 23,NHP- 24,NHP-25,NHP- 26 , NHP- 27,NHP- 28,NHP- 28,NHP-2 9,NHP-30,NHP-32,NHP- 33,NHP- 35,NHP- 37,NHP- 38,NHP-39, NHP-42,NHP- 45,NHP- 46,NHP-48,NHP-49,NHP-50,NHP- 52,NHP- 53,NHP- 54, ,NHP- 55, NHP-56,NHP-57,NHP- 61,NHP-62,NHP-63,NHP-66,NHP-65,NHP-67,NHP- 68, DSb 23 x MACS 450,basara x JS 20-34,Basara x JS 20-34,JS 97-52 x AMS 5-18,NRC128 x AMS 5-18,NRC128 x JS 20-69,JS 20-69x NRC 128,AMS 5-18x JS 20-69,JS 97-52x JS 20-59			
		F5-F6	MAUS 71 x JS 20-29,MAUS 158 x EC 538828,EC 113778 x MAUS 162,MAUS 162 x JS 20-69,JS 20-69 x EC 107407,JS 20-69 x MAUS 612,JS 20-34 x MAUS 158,RSC 11-07 x AMS100-39	32	24	
		F6-F7	71-05 x (70-4x71-05) x71-05,RVS2001-18 x EC 5572086,(NRC37 x 97-52) x NRC-121,(55-8-3 x 97-52) x 90-41,JS335 x AGS25,EC572154 x (SL958 x 450),EC38316 x CAVLC,SL958 x AGS25,F4-53 x (CAT3293 x 90-41),A3406 x RKS-18,RVS2001-2 x Code 13,97-52 x AGS25,AGS328 x RVS2001-18F1 ,LS20-38 x PS 1029,JS 97-52 x ECS70286 , 11-58 x (JS 335xYOUNG) , 11-5812 x (395 x P146937) ,JS 20-34 x RVS2001-18,JS 90-41 x NRC121F1 ,(NRC37 x JS335) x NRC 121 ,MAUS 2 x SL-688,(EC572086 x SL955) x JS20-34 ,EC34087 x 20-29 JS 20-98 x JS20-34,EC 383165 x JS335,70-4E x CS72154 ,JS21-08 x NRC121-1(25),JS97-52 x NRC121 -1,(70-4x71-05) x71-05 ,97-52 x11-5B	78	55	

ARS, Kasbe Digraj (Sangli) Maharashtra		Fresh Cross	P. Kimya (KDS 753) x GW 103 P. Kimya (KDS 753) x AGS 25 P. Kimya (KDS 753) x EC 390977 P. Sangam (KDS 726) x GW 171 P. Durva (KDS 992) x DSb 1	5		
		F1	KDS 753 x GW 153,KDS 992 x GW 103,KDS 344 x GW 87,KDS 992 x DSb 1,KDS 992 x GW 106,KDS 726 x DSb 1,KDS 726 x GW 171	7		
		F1-F2	JS 9305 x EC 242104	1		
		F2-F3	KDS 344 x NRC 147,NRC 158 x KDS 753,JS 93 05 x EC 242104,NRC 157 x EC 242104,KDS 344 x MACS 330,NRC 152 x KDS 753,KDS 869 x MACS 330,NRC 153 x KDS 753	8		
		F3-F4	KDS 753 x MACS 330,KDS 344 x MACS 330,KDS 344 X NRC147 KDS 753 X AGS 25,KDS 753 X Dt 21,KDS 980 x NRC 147,KDS 726 x EC 390977,KDS 344 X AGS 25,AMS 100-39 x Shalimar	9		
		F4-F5	KDS 753 x Dt 21,KDS 699 x JS 335,AMS 100-39 x Shalimar,KDS 693 x JS 335,KDS 869 x NRC 147,KDS 980 x NRC 147, KDS 344 x AGS 25,KDS 726 x NRC 147,KDS 753 x MACS 330,KDS 980 x AGS 25,KDS 344 x NRC 147,KDS 753 x NRC 147	12		
		F5-F6	KDS 753 x NRC 147 KDS 869 x NRC 147 KDS 726 x NRC 147			
HPKVV, PALAMPUR, HP		Fresh Cross by Scientist	**Crosses allocated for the Centre** **Parents involved:** VLS-63, MACS-124, VLS-89, P-318,	5	-	-

			VLS-89, NANKING, AGS-218,EC-274713			
		Fresh Cross by Student research work	**Other diverse crosses:** **Parents involved:** Palam Early Soya 1, JS 335, Himso-1685, Hara Soya, Him Soya, Shivalik, PS-1556, PS 16-89, KDS 1149, NRC 195, AS 40, Cat 411A, AMS MB 5-18, Himso 1689, PS 1572, KDS 992, EC 241778, DS 3163, EC 141117, RSC 10-52, PK 25	56 (Student's research)	-	-
		F_1	**Derived by hybridization between parents:** NRC 128, H 330, JS 20-94, NRC 136, Himso-1685, NRC SL-2, AMS MB 5-18, P2-2, CAT 411A, NRC SL-1, CAT 2086, JS 20-98, NRC 133, NRC 137, EC 109543, EC 242105, GP 448	16	-	-
		F1-F2	PS 1556 × Himso-1685,Palam Early Soya-I × Himso-1685, NRC 133 × EC 242105, PS 1556 × JS 20-98,Hardee × EC 390981,NRC 136 × EC 242105,JS 20-94 × EC 39177,JS 20-94 × EC 242105,JS 20-94 × EC 396059	9		
		F2-F3	PS 1613 × SL 11-23,NRC SL-I × GP 339, Him Soya × PS 1556,JS 20-71 × NRC 128, V 1120-6-9 × NRC 136,JS 20-94 × NRC 137 ,SL 1068 × PS 1613,Himso 1685 × NRC SL-I	8	180	
		F3-F4	NRC 136 × CAT 411A,GP 448 × Him Soya, NRC 137 × CAT 411A,CAT 411A × NRC 127,NRC 136 × AMS 1575,Him Soya × NRC SL-I,JS 20-87 × NRC 37,NHP crosses	7	357	
		F4-F5	Hardee × Himso-1685,AMS 1001 × JS 20-87,JS 20-87 × NRC 37,AGS 111 × JS 20-87,AGS 111 × Himso-1685, JS 335 × AGS 25	6	35	

		F5-F6	JS 20-98 × AK 887,Hara Soya × RSC 10-46 ,JS 20-87 × JS 20-94,EC 572154 × RVS 2001-18,(SL 958 × 11-5B) × JS 90-41 RSC 10-46 × Hara Soya, JS 20-94 × JS 20-98,MACS 1188 × EC 251396,JS 20-71 × JS 20-87,JS 21-08 × NRC 121,JS 20-94 × JS 20-87,P70-4 × EC 572154,CAT 72 × GP 339,JS 335 × AGS 25,JS 97-52 × 11-5B,JS 20-98 × PS 1024,RVS 2001-18 × EC 572154,RVS 2001-18 × EC 572086,JS 20-87 × NRC 37,JS 20-71 × RKS 113,EC 383165 × DSb 10,JS 20-71 × CAT 72,(SL 955 × JS 20-34) × EC572086	23	91	
		F6-F7	PS 1556 × RSC 10-46,JS 97-52 × AGS 25,EC 54682 × JS 97-52	3	6	
		F7-F8	Hardee × JS 335,Pb-1 × Him Soya, PK 472 × Hara Soya	3	7	
		F8-F9	PS 1466 × Him Soya	1	2	
		F9-F10	PK 472 × Hara Soya	1	3	
IARI-SKAF, Collaborative Outstation Research Centre, Mandsaur, MP	Breeding for high yield with YMV resistant, Earliness, mechanical harvesting and good germinability	Fresh cross	**Parents involve:** JS-20-34, JS-20-116, SKF-148 (69 days), JS-95-60, JS-20-98, JS-20-69	6	…..	…..
		F_1	**Cross on the basis of diversity analysis** **Parents involve:** JS-20-34, JS-20-116, SKF-148 (69days), JS-95-60, JS-20-98, JS-20-69			
		F_2-F_3	52 Hybrids/NHP material received by AICRPS and planted	52	350	---
		F_3-F_4	54 NHP Hybrids/NHP material received by AICRPS and planted	54	150	----
		F4-F5	Advanced of generation lines derived from crosses	54	100	80

AICRP on Soybean Sehore		Fresh Cross	RVS 20-12 X JS 95-60, JS 22-12 X RVS 2011-35, JS 22-12 X JS 20-34, NRC 190 X JS 95-60, NRC 160 X RVSM 2012-4, RSC 10-52 X JS 95-60, RSC 11-42 X JS 95-60, RSC 11-42 X AS 24, JS 20-94 X SL 688, AS 24 X JS 20-34,RVS 24 X JS 20-94, RVSM 2011 X JS 95-60, NRC 124 X JS 95-60, NRC 127 X RSC 10-46, SL 688 X JS 95-60, JS 20-29 X JS 23-09, JS 20-29 X JS 23-03, JS 20-116 X JS 93-05,JS 20-116 X JS 20-34, JS 97-52 X RSC 10-46.	20	447	-
		F1	JS 22-12 X RVSM 2012-4, RVS 2012-4 X JS 95-60, JS 22-12 X RVSM 2012-4, RVS 2013-20 X RVS 2013-15, JS 22-12 X KDS 1169, RVS 2013-20 X RVS 2013-7, RVS 18 X HIMSO 1689, RVSM 2012-4 X JS 22-18, JS 20-116 X JS 22-18, JS 20-116 X MACS 1520, RVS 2001-4 X JS 98-05, NRC 150 X MAUS 795, RVS 2011-10 X JS 21-72, NRC 150 X JS 22-18, NRC 150 X KDS 1169, RVS 2011-10 X MAUS 795, RVSM 2011-35 X JS 22-18, RVS 2013-20 X JS 95-60, JS 22-12 X MAUS 795,RVS 2011-10 X JS 22-18, RVS 2011-10 X HIMSO 1689, RVS 2013-20 X JS 22-12, RVSM 2011-35 X NRC 158, JS 20-69 X RVS 2013-15, RVS 24 X JS 93-05, NRC 94 X RVS 76, RVS 24 X RVS 2013-15, JS 20-94 X RVS 24, JS 20-116 X RVS 14-1, RVS 2001-4 X RVS 76, RVS 2011-10 X CODE 20 (E), NRC 94 X JS 335, RVS 2011-10 X RVS 76, JS 20-69 X RVS 2013-7, RVS 24 X JS 335, HIMSO 1689 X RVS 2001-4, RVS 76 X RVS 2001-4 , RVS 18 X HIMSO 1689, JS 20-116 X JS 22-18, RVS 76 X RVS 24, JS 95-60 X NRC 152, JS 20-69 X VLS 102	42		
		F1-F2	JS 20-09 X (PS 1475 x RVS 76), RVS2011X PS164, JS 2011-21 X JS 335, RVS 2013-28 X JS 21-72, JS 20-94 X RVS 2011-10, SL 688 X RVS 24, NRC 153 X JS 95-60, NRC 142 X JS 20-34, JS 20-29 X JS 20-22, RVS 18 X SL 958, RVS 24 X NRC 109	11		

		F2-F3	Himso 1689 X RVSM 35, JS 97-52 X RVS 24, NRC 130 X MACS 1575, JS 20-63 X JS 95-60, RVS 28 X RVS 76, NRC 131 X JS 20-34, JS 97-52 X RVS 76, RVS 11-10 X PS 1659, JS 20-98 X NRC 31, AMS-MB-5-1 X RVS 2001-4, RVS 2001-4 X MACS 1520, RVS 2011-4 X RSC 1046, MACS 15-75 X JS 2034, RVS 28 X SL 958, JS 20-34 X JS 95-60, RVSM 35 X NRC 72, RVS 11-32 X JS 335, MACS 1520 X JS 20-34, RVS 18 X PS 1664, JS 20-96 X JS 93-05, RVSM 35 X PS 1664	22		
		F3-F4	RVS 2001-4 X RVS 76, RVS 2011-2 X JS 95-60, AMS MB 5-1 X JS 20-34, Ec 572154 x Ec 572086, RVS 2001-4 X JS 93-05, CODE 2 X NRC 147, JS 20-96 X JS 93-05, RVS 28 X JS 93-05, CODE 2 X RVS 18, AMS MB 5-1 X JS 335, NRC 147 X JS 20-34, RVS 2001-4 X JS 20-94, RVS 2001-4 X RVS 24, MACS 1520 X JS 20-116, JS 20-116 X JS 20-98, RVS 2011-10 X JS 20-34, RVS 28 X JS 335, NRC 147 X RVS 18, AMS MB 5-1 X KDS 980, JS 97-52 X GP 178, RVS 2011-21 X MACS 1575, CODE 2 X JS 95-60, NRC 127 X JS 20-94, RSC 1052 X RVS 24	24		
		F4-F5	JS 97-52 X JS 93-05, JS 20-34 X JS 335, JS 20-98 X JS 20-34, AMS MB 5-1 X NRC 127, JS 20-53 X JS 20-34, Ec 383165 X Dsb 1, JS 335 X JS 93-05, JS 20-98 X RVS 76, JS 20-08 X JS 20-34, JS 20-89 X JS 335, RVS 2009-4 X JS 93-05, AMS MB 5-1 X RVS 76, RVS 76 X JS 20-34, RSC 10-70 X JS 20-116, AGS 25 X G 25, AMS MB 5-1 X NRC 127, JS 335 X AGS 25	17		
ARS, (AU), Ummedganj Kota RJ	Earliness, High Yield, Multiple Disease and Insect Resistance	F1+F2+F3+F4+F5+F6+F7	-	5+5+25 +34+41 +45+27	182	

Agriculture Research Centre, Lokbharti- Sanosara, Bhavnagar GJ	Breeding for High yield, Earliness, drought Tolerance and resistance against major insectpests	Fresh Cross	JS20-29,NRC86,JS20-34,JS95-60,MACS1520, NRC130,NRC138	12	-	-
		F1	**Derived by hybridization between parents-**RSC10-46/(JS20-88/JS20-34),JS20-98/RSC10-46,JS20-98/(JS20-88/JS20-34),JS20-98/ NRC86,(JS97-52/RVS2009-9)/ RSC10-46,NRC86/(JS97-52/RVS2009-9),NRC 86/ JS20-98			
		F1-F2	**Derived by hybridization between parents-**JS20-29xJS335,JS20-29xNRC 86	2	35	2
		F2-F3	**Derived by hybridization between parents-**JS-335xNRC86,JS-97-52xNRC 86	2	28	-
		F3-F4	**Derived by hybridization between parents-**NRC-37xJS93-05,Type-49xJS93-05,NRC-86xJS20-29, JS-20-29xNRC86,JS-20-29xType49,JS-20-29xJS93-05	6	257	-
		F4-F5	Advanced generation lines derived From available crosses	25	95	10
		F5-F6		20	15	8

Table 2.2 : Evaluation of advance breeding lines at different centres.

Centre	Name of trials	No. of trials	No. Of strains tested	Name of best strain excelling the check	Yield (kg/ha)	Check	Superiority over the Check (%)	Specific Objectives
1	2	3	4	5	6	7	8	9
Punjab Agriculture University, Ludhiana	Final Yield Trial	1	6	SL 1436	3046	SL 958 (2551KG/HA)	19.4	High yield, YMD, Resistance
				SL 1437	3200		25.4	
				SL 1438	3546		39.0	
	Small Scale Trial	2	90	SL 1408	5508	SL 958 (3494 kg/ha)	57	High yield, YMD, Resistance, Early maturity
				SL 1415	5192		48	
				SL 1450	6258		79	
				SL 1457	5564		95	
				SL 1458	6211		78	
				SL 1461	6194		77	
				SL 1479	6042		79	
				SL 1481	5125		47	
				SL 1500	7900		126	
				SL 1505	5900		97	
				SL 1509	5364		53	
				SL 1519	6742		93	
				SL 1521	5158		48	
	Yield of check, SL 958 was low due to susceptibility to charcoal rot(R) that led to very high percent increase over check, most of entries in this trial are YMD resistant derivatives f JS 335 with resistance either from cultivated are wild sources.							

ICAR-IISR Indore (Dr. Shivakumar M. & Dr. Natraj V.)	PYT (Early)	1	32	A-302 EC 457254 x JS 20-34-7 EC 457254 x JS 20-34-14 EC 457254 x JS 20-34-15 EC 457254 x JS 20-34-1	2444	JS 20-34	15	Early maturity, high yield and anthracnose resistance
	PYT (Late)	3	96	A-83-1	2903	JS 20-69	35	High yield and anthracnose resistance
				A-221	2904		35	
				NRC 128 x JS 95-60-146	2918		36	
				NRC 128 x JS 95-60-149	2755		32	
				NRC 128 x JS 95-60-151	2888		35	
				NRC 128 x JS 95-60-152	2918		36	
				NRC 128 x JS 95-60-154	2962		37	
	• PYT- preliminary yield trial; Early- < 90 days maturity ; Late-> 100 days maturity							
				21(Spd)Sel 105-13	2712		2712	
				A(E) -30	1907		1907	
				49GH 130/1-3	2608		2608	
				B(E)-21	1211		1211	
				A(M/L)-II-16	1453		1453	
				B(E)-18	905		905	
Dr. PKDV Amravat	PYT	1	21	AMS 23-1	2863	AMS 100-39, AMS-MB 5-18, RVSM 2011-35, MAUS 158, JS	21.13	Breeding for high yield with Charcoal rot and YMV resistance, Earliness and multiple pest resistance
				AMS 23-10	2806		18.17	
				AMS 23-4	2776		17.47	

				AMS 23-9	2653	335, AMS 1001, JS 93-05	12.24	
				AMS 22-18	2629		11.24	
				TS 4	2612		10.5	
	MTV	1	11	AMS 22-14	2981	AMS 100-39, AMS-MB 5-18, RVSM 2011-35, MAUS 158, AMS 1001, JS 93-05, JS 335	22.90	
				AMS 22-16	2944		21.37	
				AMS 22-7	2704		11.45	
				AMS 22-1	2704		11.45	
				AMS 2019-1	2704		11.45	
	SMVT	1	26	AMNS 062809AMS 2019	12593 AMS 2022	- - - - -	--	
				AMNS 062809AMS 2019	12593 AMS 2022		--	
				AMNS 062809AMS 2019	12593 AMS 2022		--	
VNMKV, Parbhani (MS)	PVST	1	24 Entry + 6 (C)	MAUS 814	2867	MAUS 612 JS 355 JS 97-52	11.0 15.8 46.2	Early maturity, high seed yield, non shattering, tolerance to pest, disease and drought
				MAUS 824	3185	MAUS 612 JS355 JS 97-52	23.4 28.6 62.5	
	PVST	1	24 Entry + 6 (C)	MAUS 749	1992	JS 20-34 JS 95-60	29.2 10.9	Extra early maturity, high seed yield, non shattering, tolerance to pest, disease and drought
				MAUS 820	2259	JS 20-34 JS 95-60	46.6 25.8	
CAU Imphal	Station Trial	1	5	CAUMS 4	2480	JS 97-52	13.54	High Seed Yield

UAS Bangalore	SVT	1	15	KBSL-22-34 KBSL-22-34	2356	KBS - 23	12	High Seed Yield
JNKVV, Jabalpur (MP)	SVT		08 Entrry + 2 (C)	JS 25-08	1800	JS 20-98 (Medium check)	47.7	High yield, medium maturity (95 days), resistant to YMV, CR, RAB & BP
				JS 2504	1612.5	Yield – 1218.75 kg/h	32.3	High yield, medium maturity(90 days), lanceolate leaves, resistant to YMV, CR, RAB & BP
				JS 25-03	1568.75	JS 20-34 (Early check)	53.1	High yield, early(87 days), resistant to YMV, CR, RAB & BP
				JS 25-06	1418.75	Yield – 1025 kg/h	38.4	High yield, early(87 days), lanceolate leaves, resistant to YMV, CR, RAB & BP
AICRP on Soybean, MACS-Agharkar Research Institute, Pune Centre	PRT	1	36	MACS 1889	3310	**MACS 1520, JS 93-05,** MACS 1460 and MACS 1188	20.05	Breeding for High yield, High oil, Null Lipoxynase, Earliness, insect resistance and Vegetable and food grade type
				MACS 1874	3111		12.84	
				MACS 1862	3053		10.74	
				MACS 1897	3018		9.46	
				MACS 1882	2991		17.43	
				MACS 1872	2979		16.96	
				MACS 1884	2956		16.05	
	APT (N)	1	11	MACS 1847	3126	**KDS 753,**DSb 34 and MACS 1188	14.25	
				MACS 1831	3024		10.5	
	APT (Early)	1	10	MACS 1834	3210	**JS 93-05,** JS 95-60 and MACS 1460	15.92	
				MACS 1842	3167		14.36	
				MACS 1848	3116		12.54	
				MACS 1859	3020		9.05	
	LFT	1	10	MACS 1804	2708	**KDS 753,** DSb 34, JS 93-05 and MACS 1188	12.19	
				MACS 1810	2665		10.42	
AICRP on Soybean, CSK HPKV, Palampur	BARC soybean multiplication trial	5	8	TS-11	1884	Himso-1685, Himsoya	15.44	Breeding for • High yield • Early/mid maturity • Better quality oil • Disease resistance • Vegetable
				TS-6	1875		14.89	
				VLS 99	1873		14.77	
	Soybean station	1	8	P120-11-1-1 (Hardee × Hara	2611	Palam Early Soya-I	113.14	

	trial			Soya)				Types
				P132-1-1-2 (SL 679 × Pb-I)	2154		75.84	
				P101-20-2-5 (Pb-I × Him Soya)	1998		63.10	
				NRC 196	1967		60.57	
				JS 335	1773		44.73	
				NRC 197	1703		39.02	
	Soybean : Maize Intercropping trial	1	8	P120-11-1-1 (Hardee × Hara Soya)	2217	Palam Early Soya-I	83.53	
				P101-20-2-5 (Pb-I × Him Soya)	2009		66.31	
				NRC 196	1864		54.30	
				P132-1-1-2 (SL 679 × Pb-I)	1508		24.83	
				JS 335	1489		23.26	
	PRT	1	32	P6-1-1-2 (PS-1556 × RSC 10-46)	2883	Hara Soya, Him Soya, Shivalik	48.68	
				P26-9-1 (JS 335 × AG 25)	2841		46.52	
				P22-10-1-1 (Hardee × JS 335)	2834		46.16	
				P68-1-2 (AMS 50 × JS 20-87)	2834		46.16	
				P5-3-1 (CAT 72 × GP 339)	2626		35.43	
				Himso-1689 (NRC 2008 × G1-	2565		32.28	

				12)				
				P37-2-1 (JS 20-94 × JS 20-87)	2474		27.59	
				P27-6-1 (70-4 × 71-05)	2470		27.39	
				P37-1-2 (70-4 × EC 572154)	2449		26.30	
				P27-2-1 (70-4 × 71-05)	2423		24.96	
				P13-1-1 (JS 20-94 × JS 20-87)	2403		23.93	
University of Agricultural Sciences, Dharwad	PYT	01	26	2018-02 (DSb 23 x SL 958)-16	3547	DSb 23	37.23	Breeding for YMV & rust resistance, high yield and earliness
				2018-03 (DSb 23 x SL 958)-8	3496		35.23	
				2018-04 (DSb 23 x SL 958)-3	3474		34.39	
				2018-08 (NRC 94 x *G. soja*)-4	3260		26.10	
				2019-04 (DSb 21 x EC 457254)-22	3230		24.95	
				2018-10 (DSb 23 x SL 958) x DSb 23-10	3109		20.27	
	AYT	01	15	2015-04 (DSb 21 x DSb 32)	2805	DSb 23	14.19	
				2017-09 (DSb 23 x SL 979)	2512		2.26	
	SMLT	01	10	DLSb 5	2059	DSb 23	9.54	

				DLSb 3	2013		7.05	
				DSb 40	1943		3.34	
Agricultural Research Station (AU, Kota), Ummedganj Kota RJ	SVT I		24	AUKS 22-1	2593		64.22	Breeding for Earliness High Yielding and Disease resistance
				AUKS 22-10	2345		48.51	
				AUKS 22.20	2346		48.58	
				AUKS 22-9	2293		45.22	
				AUKS 22-2	2159		36.73	
				AUKS 22-18	2039		29.13	
				AUKS 22-7	1994		26.28	
	SVT I			AUKS 22-52	2346		48.58	
				AUKS 22-34	2322		47.06	
				AUKS 22.48	2315		46.61	
				AUKS 22-53	2179		38.00	
				AUKS 22-24	2080		31.73	
				AUKS 22-23	2025		28.25	
				AUKS 22-36	2006		27.04	
AICRP on Soybean, Agriculture Research Centre, Lokbharti-Sanosara, Bhavnagar	IYT	01	30	R&D-2022-12	2034.1	NRC 86, JS 20-34, JS 95-60, JS20-98, RSC 10-46, JS 20-116	20.98	Breeding for High yield, Earliness, drought tolerance and resistance against major insect pests
				R&D-2022-14	2037.2		21.16	
				R&D-2022-15	25.80		32.40	
				R&D-2022-16	1946.1		15.75	
				R&D-2022-24	2219.6		32.01	
	AYT	01	16	LOKSOY-2022-06	2988.9	NRC 86, JS20-34, JS 20-98, RSC 10-46	17.00	
				LOKSOY-2022-10	2878.4		12.60	
				LOKSOY-2022-12	2944.1		15.20	

Multi-location Germplasm Evaluation

A set of 322 soybean germplasm lines including checks was evaluated under RBD at multi-locations (8 centers) for second consecutive year. This trail was conducted with the purpose of identification of superior germplasm lines for yield and associated traits as well as identification of diverse germplasm lines for suggesting best cross combinations for respective zones. This activity is basically designed for broadening the genetic base to evolve the best soybean genotypes at particular zone. Details of trails are given below:

Accessions: 322 (Table 2.3)

Design: RBD; Replication: 2; Row length: 1.5 m

Centres:

- NHZ: Palampur and Almora
- NPZ: Pantnagar
- NEHZ: Manipur
- Eastern Zone: Raipur
- Central Zone: Indore and Parbhani.
- Southern Zone: Pune

Traits: Days to 50% flowering, Days to maturity, Plant height (cm), Number of pods, Number of nodes, 100 seed weight (g), Seed yield per plant (g)

Checks:

- NHZ: VLS 59, VLS 89, VLS 63, SL 1074, PS 1556, Palam Soya, Himso 1685, Harasoya
- NPZ: SL 1074, SL 955, PS 26, NRC 128
- NEHZ: MACS 1460, RKS 113, MACS 1407, KDS 753, JS 20-116, JS 97-52
- Eastern Zone: MACS 1460, RKS 113, MACS 1407, KDS 753, JS 20-116, NRC 128, RSC 10-52, AMS 2014-1, JS 97-52
- Central Zone: NRC 86, JS 20-116, JS 20-34, RSC 10-52, JS 20-69, NRC 130, NRC 138, RVSM 2011-35
- Southern Zone: Dsb 23, Dsb 34, KDS 753

Important descriptive statistics {(mean, range and CV (%)} of 322 germplasm lines over the 8 locations have been presented in Table 2.4. Top ten entries for yield per plant, early maturity and seed size are presented in Table 2.5.

Table 2.3: Details of soybean germplasm lines used in multi-location trails

S.No	Genotype	S.No	Genotype	S.No	Genotype	S.No	Genotype
1	IC 15089	82	JS335	163	IC 15759	244	TGX 239-6 D
2	CAT 47	83	EC 546882	164	BRAGG	245	MACS 13 (S)
3	NRC 12	84	EC 333901	165	EC 241715	246	AMSS 34
4	JS 20-34	85	JS 20-29	166	EC 39573	247	B 1667
5	KALITUR	86	EC 287754	167	TGX 824-35 E	248	EC 34060
6	AGS 153	87	EC 538807	168	TGX 328-049	249	EC 274701
7	EC 528623	88	TGX 849-309 F	169	PLSO 79	250	EC 100804
8	ICS 84/86-85B-41	89	TGX 825-3 D	170	TGX 802-265-D	251	EC 291453
9	JS 20-38	90	TGX 317-37 E	171	MACS 450	252	EC 76759
10	EC 390977	91	JSM 288	172	CAT 1258	253	EC 389173
11	NRC -7	92	JS(SH) 2001-64	173	RSC 10-52	254	EC 309529
12	EC 241756	93	JS 20-73	174	CAT 1341	255	EC 251416
13	TGX 854-42 D	94	PK 1284	175	EC 313974	256	TGX 863-26 F
14	TGX 854-429	95	PK 566	176	EC 291400	257	JS 98-02
15	TGX 825-17 E	96	PS 1029	177	EC 289099	258	T 49
16	PI 340900	97	K 53	178	EC 389391	259	WT 150
17	AMS-MB-5-18	98	MACS 708	179	TGX 849-47 F	260	NRC 1
18	AGS 142	99	PI 283327	180	HARDEE	261	AGS 193
19	BR 15	100	EC 456566	181	GC 12	262	DS 366
20	EC 291397	101	AGS 205	182	TAMS 38	263	EC 241761
21	NRC 2	102	EC 343310	183	EC 241712	264	EC 251388
22	EC 457464	103	MACS 1460	184	EC 581521	265	EC 287464
23	RVS 2001-18	104	CAT 1706	185	TGX 330-325 D	266	AGS 25
24	TGX 311-101 F	105	DS 97-12	186	PI 200465	267	EC 251456
25	JS 93-05	106	EC 389165	187	MAUS-61-2	268	TGX 996-5 F

26	B 160-3	107	TGX 825-1E	188	AGS 156	269	TGX 854-77 D
27	NRC 86	108	TGX 1016-19 F	189	ACC 1026	270	TGX 293-47 E
28	EC 457280	109	TGX 239-43 D	190	BR 10	271	V 55
29	TGX B 1435 E	110	TGX 854-4 F	191	EC 341822	272	EC 287457
30	TGX 780-5A	111	JS 79-82	192	EC 289091	273	EC 457305
31	PK 474	112	HIMSO 175	193	EC 251432	274	AGS 110
32	EC 457050	113	M 1052	194	EC 250591	275	B 471
33	BRG 1	114	PUSA 16	195	EC 251498	276	EC 39177
34	EC 547464	115	EC 341115	196	EC 291399	277	TGX 560-20D
35	EC 100778	116	EC 528622	197	EC 325113	278	VLS 75
36	EC 95815	117	EC 309537	198	EC 393231	279	EC 333870
37	EC 457052	118	TGX 984-18 E	199	EC 13054	280	EC 241310
38	EC 39376	119	TGX 311-59 E	200	TGX 86-24-6 E	281	EC 389154
39	EC 396067	120	JSM 302	201	SL 142	282	EC 389152
40	JS 20-76	121	JS 94-67	202	NRC 2007-1-3	283	EC 467282
41	JS 20-72	122	PS 1225	203	INDRA SOYA9	284	MACS 250
42	MAUS 47	123	LESOY 273	204	KHSB 2	285	SQL 5
43	RAUS -5	124	MACS 227	205	ADT-1	286	EC 251514
44	ALANKAR	125	PK 262	206	CO- soy-1	287	EC 390979
45	PALAM SOYA	126	MACS 58	207	EC 456613	288	EC 390981
46	IMP. PELICAN	127	CAT 1710	208	EC 457516	289	AKSS 143
47	PK 308	128	CAT 1149	209	B 252	290	N 298
48	ANKUR	129	CAT 2797	210	EC 274683	291	NRC 57
49	CO-SOYA-2	130	MACS 1520	211	EC 250577	292	EC 380522
50	GUJ. SOYBEEN-1	131	DS 321	212	EC 538802	293	EC 389179
51	SL-295	132	EC 274713	213	EC 389163	294	SQL 40
52	SHILAJEET	133	EC 309543	214	TGX 849-309 A	295	P 318
53	SHIVALIK	134	EC 589409	215	TGX 822-10 E	296	SQL 98
54	DURGA	135	EC 391181	216	TGX 302A-68 D	297	INDORE-2
55	PUSA 37	136	EC 542431	217	M 1085	298	NANKING

56	MAUS 71	137	TGX 298-7D	218	MAUS 142	299	JS 97-52
57	MAUS-1	138	TGX 803-99 E	219	LEE	300	JS 20-69
58	JS 75-46	139	CAT 660	220	EC 456620	301	PK 472
59	JS 20-98	140	TGX 312-012 E	221	AGS 128	302	NRC 37
60	DS 205	141	TGX 802-100 F	222	EC 287460	303	JS 71-05
61	TGX 860-11 D	142	TGX 573-209-23	223	EC 113770	304	NRC 128
62	TGX 855-44 G	143	IC 24532A	224	EC 103334	305	JS 20-116
63	JS 20-86	144	EC 357998	225	EC 18593	306	AMS 2014-1
64	NRC 2396	145	MACS 124	226	EC 15553	307	RSC 11-07
65	MACS 1034	146	EC 602288	227	TGX 854-60 A	308	SL 1074
66	MACS 1028	147	AGS 218	228	TGX 849-143 D	309	RKS 113
67	PUNJAB	148	EC 343312	229	JS 95-52	310	MACS 1407
68	EC 457475	149	EC 242003	230	GP 493	311	VLS 59
69	DSB 23	150	EC 550828	231	AGS 143	312	VLS 89
70	JS 90-41	151	EC 615187	232	AGS 105	313	VLS 63
71	Kaeri 651-6	152	EC 572160	233	EC 2579	314	RSC 10-52
72	EC 333859	153	TGX 702-4-8	234	EC 389167	315	PS 26
73	EC 274711	154	TGX 855-32 E	235	EC 389178	316	NRC 138
74	EC 93601	155	TGX 8116-21 D	236	TGX 802-150 D	317	NRC 130
75	EC 241995	156	TGX 86-24-1 D	237	TGX 539-2D-7	318	KDS 753
76	EC 391346	157	JS 20-37	238	TGX 885-44 E	319	DSB 34
77	EC 389148	158	JSM 245	239	TGX 814-148 F	320	Palam soya 1
78	EC 589400	159	KB 249	240	TGX 713-1 F	321	SL 955
79	ICAL 122	160	MAUS 41	241	TGX 573-219 D	322	RVSM 2011-35
80	PS 1024	161	IC 13051	242	TGX 297-16 F		
81	MACS 57	162	YOUNG	243	TGX 297		

Table 2.4: Mean, range and variance for yield attributing traits at different locations

Trait	*Almora*			*Palampur*			*Parbhani*			*Indore*		
	Mean	**Range**	**CV**	**Mean**	**Range**	**CV**	**Mean**	**Range**	**CV**	**Mean**	**Range**	**CV**
Days to 50% flowering	56.15	40.50-66.00	2.17	66.49	46.50-84.50	3.85	43.16	32.50-56.00	1.19	47.87	35.00-60.00	2.54
Days to maturity	113.44	95.00-125.00	1.21	126.99	120.50-132.50	1.35	102.41	91.50-117.00	0.44	107.32	97.00-119.50	1.13
Plant height (cm)	74.79	35.50-124.50	7.94	91.31	57.00-128.90	5.69	65.07	21.80-117.30	1.16	62.19	28.00-112.60	8.14
Number of pods	60.56	34.50-88.50	12.64	55.49	27.80-92.80	10.00	47.44	16.70-120.00	2.17	29.64	8.90-77.00	14.76
Number of nodes	14.37	9.50-19.50	19.28	15.86	11.00-21.90	9.39	17.62	7.60-34.50	1.99	12.32	6.70-22.45	10.73
100 seed weight (g)	11.27	6.65-17.84	16.29	13.40	7.50-20.26	5.10	12.63	7.53-21.31	2.45	6.71	3.17-13.03	9.73
Seed yield per plant (g)	13.06	3.21-26.59	24.47	9.50	5.40-16.35	6.41	8.05	4.30-19.07	5.13	2.84	0.17-9.73	23.35
Trait	***Manipur***			***Raipur***			***Pune***			***Pantnagar***		
	Mean	**Range**	**CV**	**Mean**	**Range**	**CV**	**Mean**	**Range**	**CV**	**Mean**	**Range**	**CV**
Days to 50% flowering	50.91	41.50-62.00	2.10	45.93	37.50-51.50	1.87	44.86	35.00-58.00	0.27	54.86	43.50-66.00	1.90
Days to maturity	113.26	103.50-124.50	1.07	96.39	83.50-110.50	0.63	107.34	88.00-138.00	0.03	118.38	113.00-123.50	1.08
Plant height (cm)	59.74	23.80-96.90	15.96	66.33	28.50-120.30	5.14	64.52	28.50-109.50	7.96	55.33	25.75-104.62	10.32
Number of pods	56.00	18.90-148.50	18.42	55.77	12.10-122.20	5.07	51.19	23.00-118.00	15.60	-	-	-
Number of nodes	14.36	8.40-23.50	11.67	-	-	-	-	-	-	15.97	9.50-23.50	12.38
100 seed weight (g)	10.21	5.29-16.5	8.02	8.34	0.50-16.00	7.89	12.77	6.79-21.05	12.77	-	-	-
Seed yield per plant (g)	10.23	2.06-31.11	18.94	14.70	4.80-37.40	10.13	11.41	5.40-18.10	11.41	19.74	3.70-44.50	16.94

Table 2.5: Prominent germplasm lines (top 10 entries) for high yielding traits across multilocations

	Almora	*Palampur*	*Pantnagar*	*Manipur*	*Indore*	*Parbhani*	*Raipur*	*Pune*
#Yield per plant	EC 389167, KHSB 2, MAUS 71, ANKUR, INDRA SOYA9, EC 39177, EC 396067, DS 97-12, EC 391346, MAUS 41	RSC 10-52, CO-SOY-1, EC 241712, NRC 2007-1-3, AGS 156, TGX 328-049, TGX 824-35 E, AGS 110, HARDEE, MAUS-1	K 53, JSM 302, CAT 660, DSB 23, JSM 288, CO-SOYA-2, LESOY 273, EC 309543, EC 542431, IC 15759	EC 287754, MACS 13 (S), TGX B 1435 E, MACS 450, EC 538807, JS 20-86, AMSS 34, EC 333901, NRC 2, JSM 245	RVS 2001-18, EC 390977, JS 20-38, EC 100778, ICS 84/86-85B-41, PS 1024, TGX 849-309 F, NRC -7, EC 546882, SQL 98	TGX 825-17 E, MACS 58, EC 291397, EC 333901, TGX 854-429, MACS 708, EC 241756, TGX 311-101 F, TGX 825-1E, EC 309537	TGX 8116-21 D, RSC 10-52, TGX 802-265-D, MACS 450, JS 20-37, EC 313974, CAT 1341, JS 75-46, TGX 849-47 F, KB 249	TGX 780-5A, BR 10, JS 20-34, CAT 1149, TGX 328-049, PALAM SOYA, HARDEE, TGX 854-77 D, WT 150, ICS 84/86-85B-41
#Seed size	JS 79-82, BR 15,NRC -7, EC 291397, SQL 5, EC 274713, NANKING, AGS 218, PK 262, WT 150	NANKING, EC 341822, NRC 12, NRC 2007-1-3, EC 550828, TGX 99605 F, INDORE-2, EC 289091, TGX 824-35 E, EC 457305	-	JS 79-82, PK 262, CO-SOYA-2, SL-295, EC 390979, NRC -7, TGX 885-44 E, NANKING, CAT 660	B 160-3, BR 10, RVS 2001-18, ACC 1026, NRC -7, DSB 23, JS 20-38, EC 390977, AGS 128, IMPROVED PLICAN	AGS 153, EC 547464, TGX 824-35 E, TGX 825-17 E, SL-295, TGX 311-101 F, CAT 2797, YOUNG, TGX 802-265-D, MACS 58	IMPROVED PLICAN, EC 457052, JS 75-46,IC 15089, AMS-MB 5-18, BR 15, TGX 311-101 F, ALANKAR, PUNJAB, TGX 825-17 E	MAUS 142, WT 150, AGS 128, EC 538807, EC 251514, NRC -7, EC 251416, NANKING, SQL 5, TGX 825-17 E
#Early maturity	JS 20-72, EC 538807, ICS 84/86-85B-41, EC 390977, JS 20-38, TGX B 1435 E, JS 20-29, TGX 780-5A, EC 389148, EC 528622	EC 274713, EC 343312, EC 309543, TGX 330-325 D, EC 251498, EC 389179, TGX 573-219 D, EC 389173, T 49, IC 15089	ICS 84/86-85B-41, JS 20-38, EC 241712, N 298, EC 457280, EC 457052, JS 20-76, EC 457475, EC 39573, GC 12	JS 20-38, EC 528622, ICS 84/86-85B-41, EC 333859, EC 391346, EC 389148, MAUS 41, EC 589400, MACS 1460, EC 341115	JS 20-98, MACS 1520, MACS 227, TGX 854-429, TGX 825-17 E, BR 15, MACS 124, JS(SH) 2001-64, MACS 708, PS 1225	SQL 40, EC 528623, SQL 5, NRC 12, JS 20-38, JS 20-72, PS 1024, BR 15, PI 340900, EC 457464	JS 20-38, EC 456566, EC 391346, EC 528622, EC 343312, KALITUR, EC 547464, EC 546882, EC 341115, EC 241715	EC 547464, JS 20-72, JS 20-38, EC 538807, EC 457464, EC 389148, EC 467282, EC 251514, JS 93-05, ICAL 122

Genetic diversity studies of germplasm accessions across multilocations

The quantitative assessment of genetic divergence was made by adopting D^2 statistic for yield and its component traits (Rao, 1952). For all the eight locations, genetic diversity studies were carried based on D^2 values such that the genotypes belonging to same cluster had smaller D^2 values when compared to the ones belonging to different clusters. It is assumed that maximum diversity will be manifested in cross combinations involving the parents belonging to most divergent clusters.

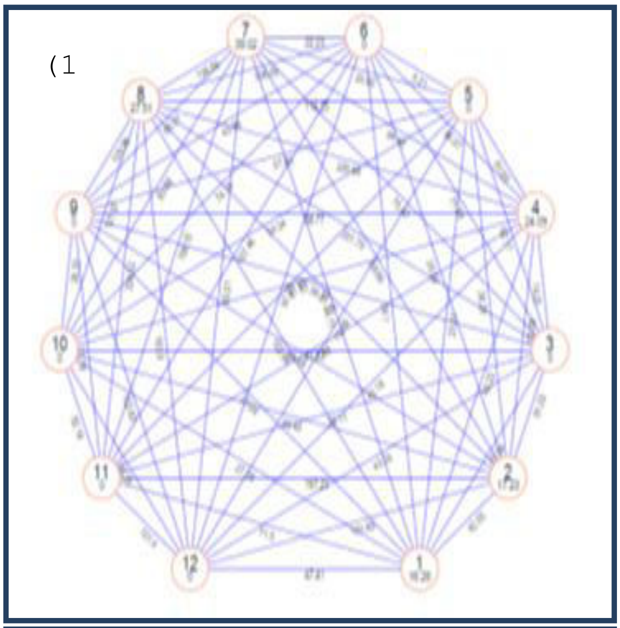
In the study 322 germplasm accessions were evaluated at 8 locations. For which genetic divergence studies were conducted and grouped germplasm accessions into different clusters based on D^2 values

Table 2.6: Genetic divergence clusters of 8 locations

S. No	Centre	Number of clusters based on D^2 values
1	Almora	12
2	Palampur	14
3	Pantnagar	7
4	Manipur	12
5	Raipur	15
6	Indore	14
7	Parbhani	9
8	Pune	7

Table 2.7: Contribution of traits for the diversity (In Percentage)

S.No	Trait	Almora	Palampur	Pantnagar	Manipur	Raipur	Indore	Parbhani	Pune
1	Days to 50% Flowering	44.67	12.36	44.78	31.24	4.02	30.12	3.52	19.31
2	Days to maturity	25.44	5.87	5.33	39.64	33.86	29.89	0.36	79.54
3	Plant Height	23.82	13.87	14.13	2.53	14.83	10.39	45.37	0.68
4	Number of nodes per plant	1.7	1.31	1.95	0.99	-	2.6	16.5	-
5	Number of pods per plant	0.49	9.98	-	8.82	35.94	10.64	30.61	0.17
6	100-seed weight	1.13	34.96	-	12.29	5.32	8.73	2.73	0.26
7	Seed yield per plant	2.75	21.65	33.81	4.49	6.03	7.63	0.91	0.04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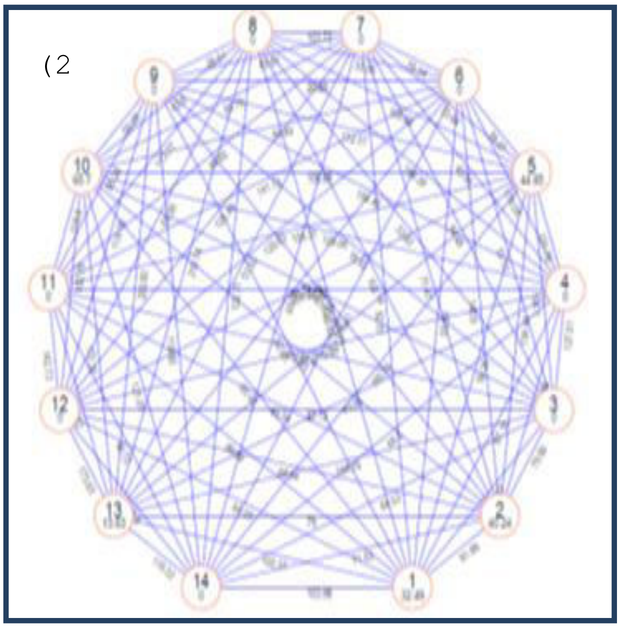
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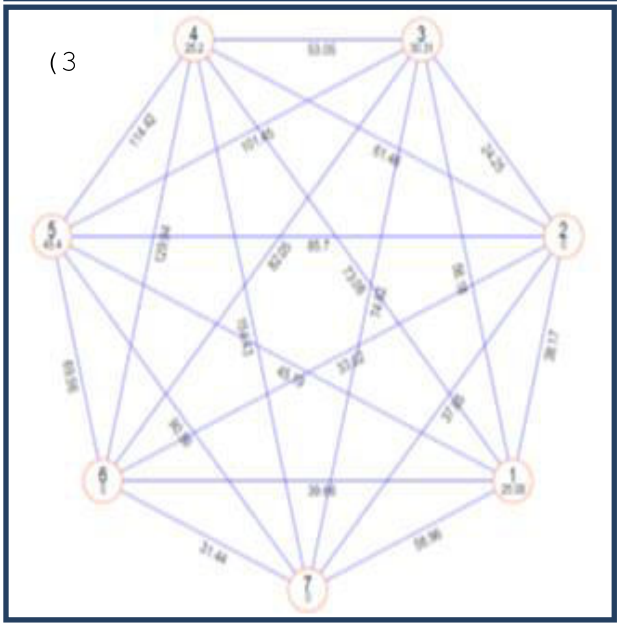
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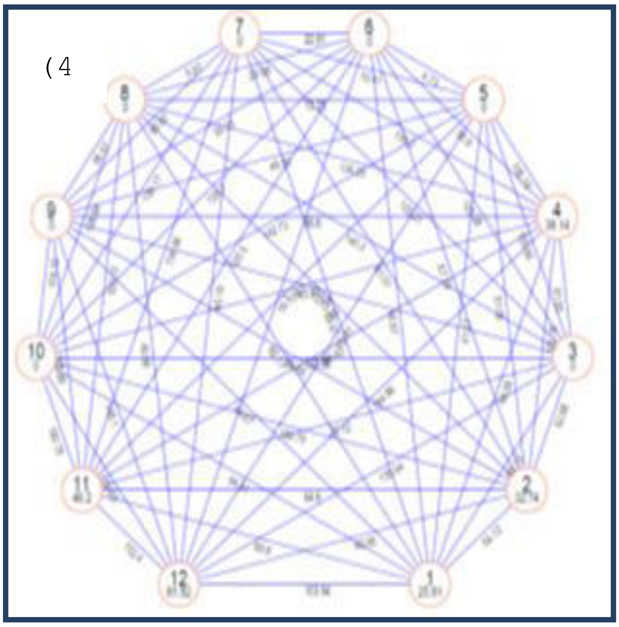
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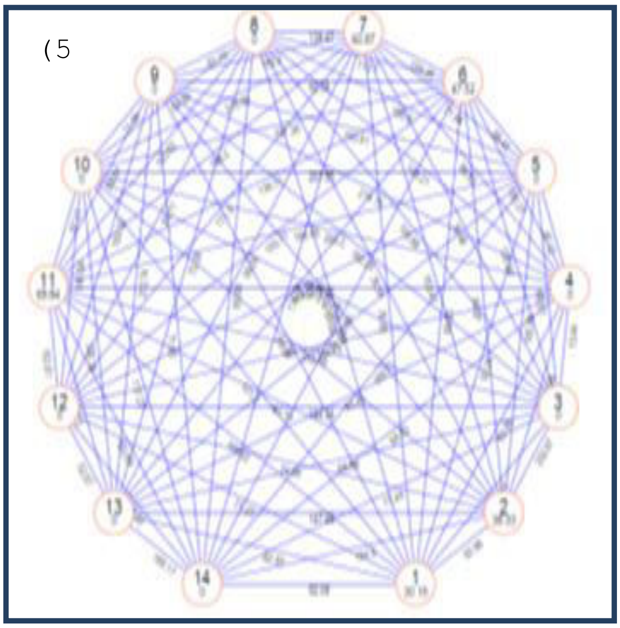
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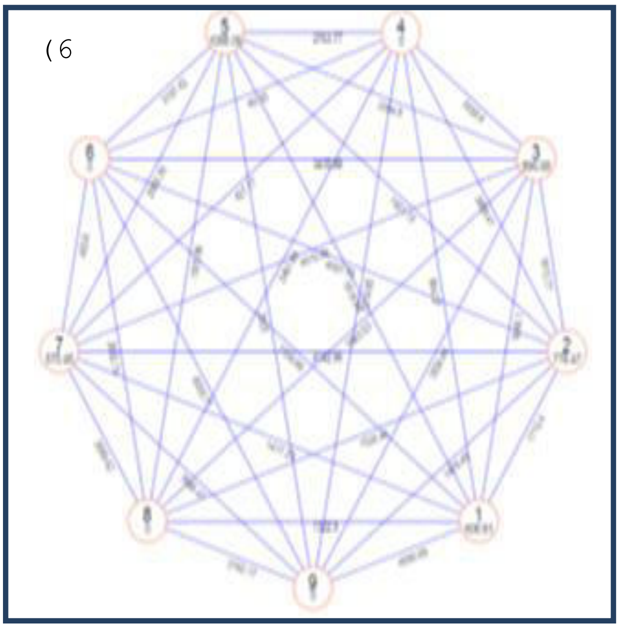
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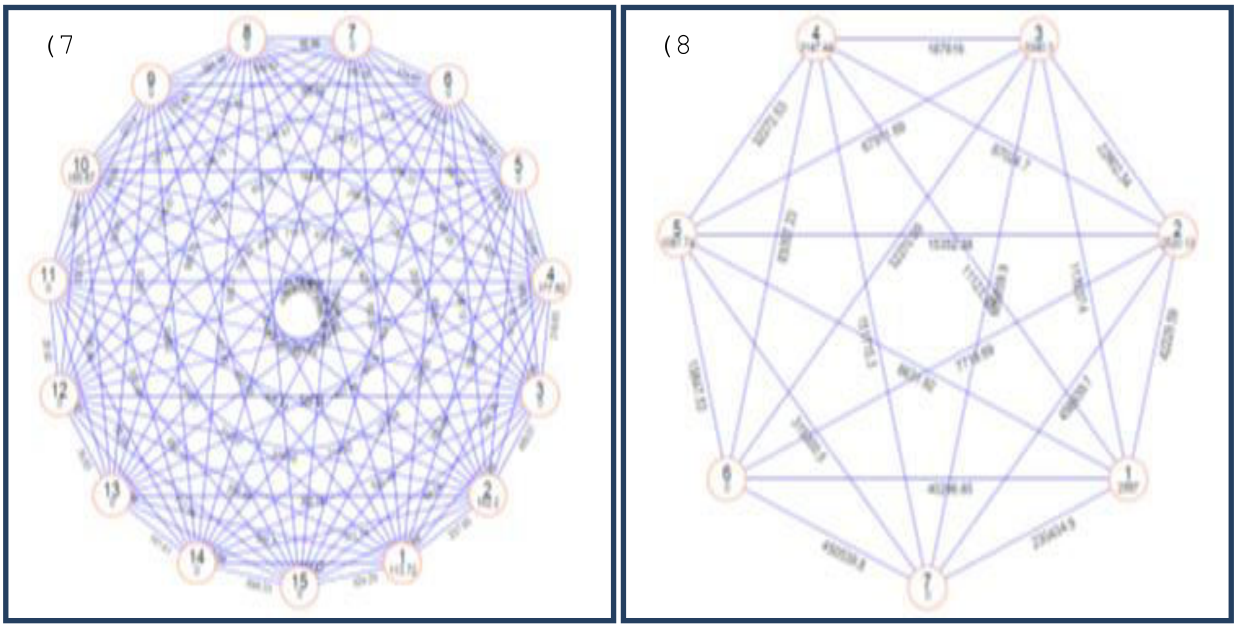

Figure 1: Clustering of germplasm accessions based on D^2 mahalanobis statistics (1) Almora (2) Palampur (3) Pantnagar (4) Imphal (5) Indore (6) Parbhani (7) Raipur (8) Pune

List of zone specific germplasm based on the genetic diversity, yield and yield component traits for targeted crosses

Zone	Location	Zonal checks	Germplasm	DF	DM	PH	NN	NP	TW	GYP
NHZ	Almora	VLS 89	**EC 389167**	58.00	112.00	115.50	18.00	75.50	13.00	**26.60**
		VLS 59	**EC 39177**	60.00	109.00	57.50	14.50	77.50	12.57	**20.68**
	Palampur	VLS 89	**EC 389167**	70.00	127.50	101.65	17.70	79.90	15.28	**12.95**
		VLS 59	**TGX 328-049**	71.00	130.50	98.70	18.85	62.10	12.95	**14.10**
NPZ	Pantnagar	PS 26	**AGS 205**	59.50	116.50	37.25	20.00	-	-	**41.50**
NEHZ	Manipur	JS 20-116	**EC 287754**	47.50	108.50	57.10	14.00	103.10	11.24	**31.11**
		KDS 753	**TGX B 1435 E**	47.00	108.50	46.40	13.00	101.40	11.36	**26.14**
Eastern	Raipur	MACS 1407	**EC 274713**	47.50	99.50	80.60	-	95.50	11.40	**25.95**
		RKS 113	**TGX 849-47 F**	46.50	88.50	54.80	-	25.20	9.10	**28.66**
Central	Indore	NRC 130	**EC 390977**	35.00	101.50	46.59	13.10	51.70	10.66	**9.67**
		NRC 138	**EC 100778**	41.00	102.50	63.20	12.50	28.75	7.23	**8.66**
	Parbhani	RVSM 11-35	**TGX 311-101 F**	38.00	97.50	85.90	29.20	88.00	16.60	**12.39**
		JS 20-116	**TGX 825-17 E**	45.50	103.50	55.60	20.00	57.20	16.97	**19.07**
Southern	Pune	MACS 1188	**TGX 780-5A**	49.00	99.00	47.00	-	55.00	12.00	**18.10**
		KDS 753	**WT 150**	49.00	116.00	45.00	-	52.00	18.25	**16.90**
		Dsb 34								

DF: Days to 50 % Flowering, DM: Days to maturity, PH: Plant Height, NN: Number of Nodes,

NP: Number of pods, TW: Test Weight, GYP: Grain Yield per Plant

Table 2.8 Breeder seed production *Kharif*2022 and Rabi/Summer 2022-23

SN	Variety	Year	DAC Indent (q)	Centre	Allotment (q)	Production (q)	Surplus/ Deficit
1	**JS 20-116**	2019	**1268.74**	JNKVV, Jabalpur	500	477.95	-22.05
				RVSKVV, Gwalior	500	295	-205.00
				IGKV, Raipur	100	108.3	8.30
				MPUAT, Udaipur	200	175	-25.00
				VNMKV, Parbhani	150	100	-50.00
				Sipani Farm	50	53.6	3.60
				Total	**1500**	**1209.85**	
2	**JS 20-94**	2019	**539.66**	JNKVV, Jabalpur	100	17.84	-82.16
				RVSKVV, Gwalior	150	0	-150.00
				Total	**250**	**17.84**	
3	**JS 20-98**	2018	**2096**	JNKVV, Jabalpur	800	177.04	-622.96
				RVSKVV, Gwalior	750	448	-302.00
				AU, Kota	500	333	-167.00
				MPUAT, Udaipur	250	191	-59.00
				IGKV, Raipur	100	42	-58.00
				HIL, New Delhi	40	0	-40.00
				Total	**2440**	**1191.04**	
4	**JS 20-69**	2016	**445.2**	JNKVV, Jabalpur	250	86.87	-163.13
				RVSKVV, Gwalior	200	6	-194.00
				HIL, New Delhi	80	0	-80.00
				Total	**530**	**92.87**	
5	**JS 20-34**	2015	**1341.7**	RVSKVV, Gwalior	300	260	-40.00
				JNKVV, Jabalpur	200	5.73	-194.27
				AU, Kota	500	438.75	-61.25
				MPUAT, Udaipur	250	10	-240.00
				VNMKV, Parbhani	50	40	-10.00
				HIL, New Delhi	30	0	-30.00
				Sipani Farm	50	55	5.00
				Lokbharti	25	0	-25.00
				Total	**1405**	**809.48**	
6	**JS 20-29**	2014	**430.2**	RVSKVV, Gwalior	250	11	-239.00
				AU, Kota	35	0.45	-34.55
				Lokbharti	150	180	30.00
				Total	**435**	**191.45**	
7	**JS 95-60**	2007	**299**	RVSKVV, Gwalior	250	172	-78.00
				AU, Kota	100	18.5	-81.50
				Total	**350**	**190.5**	
8	**JS 93-05**	2002	**321.1**	UAS, Dharwad	200	165	-35.00
				PDKV, Amravati	100	20	-80.00
				MPKV, Rahuri	50	25.8	-24.20
				RVSKVV, Gwalior		33	33.00
				Total	**350**	**243.8**	

9	**JS 335**	1994	**2649.05**	RVSKVV, Gwalior	50	8	-42.00
				UAS, Dharwad	600	520	-80.00
				PDKV, Amravati	60	60	0.00
				MPKV, Rahuri	300	346.5	46.50
				UAS, Bengaluru	600	364	-236.00
				UAS, Raichur	100	18	-82.00
				UAHS, Shimoga	400	70	-330.00
				PJTSAU, Adilabad	400	260	-140.00
				IGKV, Raipur		-	
				ARI, Pune	30	25.5	-4.50
				Total	**2540**	**1672**	
10	**RVS-2011-35**	2021	**16.3**	RVSKVV, Gwalior	**20**	469	449.00
11	**RVS 2001-4**	2014	**349.5**	RVSKVV, Gwalior	**375**	142	-233.00
12	**Raj Soya -18**	2017	**463.24**	RVSKVV, Gwalior	**475**	471	-4.00
13	**RVS-2001-18**	2017	6	RVSKVV, Gwalior	**6**	0	-6.00
14	**RVS 2002-4**	2017	**449.04**	RVSKVV, Gwalior	**460**	376	-84.00
				IISR, Indore	**0**	8	8.00
				Total	**460**	**384**	
15	**RVS 76**			RVSKVV, Gwalior	**0**	26	26.00
16	**NRC-86**	2015	**66**	IISR, Indore	**50**	22.5	-27.50
17	**NRCSL 1**	2021	**4**	IISR, Indore	**2**	0.5	-1.50
18	**NRC 136**	2021	**5**	IISR, Indore	**6**	3.5	-2.50
19	**NRC 130**	2021	**91.56**	IISR, Indore	**70**	82	12.00
				HIL, New Delhi	**50**	0	-50.00
				Total	**120**	**82**	
20	**NRC 127**	2018	**265**	IISR, Indore	**75**	39	-36.00
21	**NRC 128**	2021	**20**	IISR, Indore	**25**	20	-5.00
22	**NRC 138**	2021	**60**	IISR, Indore	**70**	130	60.00
23	**NRC 142**	2021	**25**	IISR, Indore	**250**	280	30.00
24	**NRC 147**	2021	**0.3**	IISR, Indore	**0.5**	0.2	-0.30
25	**MAUS-612**	2018	**605.1**	VNMKV, Parbhani	**625**	675	50.00
26	**MAUS - 162**	2014	**224.22**	VNMKV, Parbhani	**240**	300	60.00
27	**MAUS 158**	2010	**225**	VNMKV, Parbhani	**250**	250	0.00
28	**MAUS-71**	2002	**132**	VNMKV, Parbhani	**140**	150	10.00
29	**PhuleDurva (KDS 992)**	2021	**5**	MPKV, Rahuri	**5**	15	10.00
30	**PhuleKimaya (KDS 753)**	2020	**421.7**	MPKV, Rahuri	**440**	384.56	-55.44
31	**PhuleSangam (KDS 726)**	2019	**875.4**	MPKV, Rahuri	**900**	1100	200.00
32	**KDS 228 (PhuleKalyani)**	2006	**50**	MPKV, Rahuri	**50**	100	50.00
33	**MACS 1520**	2021	**92.6**	ARI, Pune	**50**	33.8	-16.20
34	**MACS 1407**	2021	**2.9**	ARI, Pune	**4**	25.8	21.80
35	**MACS 1460**	2020	**30.6**	ARI, Pune	**35**	85.8	50.80
36	**MACS 1281**	2016	**33**	ARI, Pune	**35**	34.5	-0.50
37	**MACS 1188**	2013	**60**	ARI, Pune	**65**	96.3	31.30
38	**PDKV Amba**	2021	**100**	PDKV, Amravati	**110**	800	690.00
39	**AMS MB 5-18 (Suwam Soya)**	2021	**78.86**	PDKV, Amravati	**85**	250	165.00
40	**PDKV Yell. Gold (AMS 1001)**	2019	**16.12**	PDKV, Amravati	**20**	250	230.00

41	**DSb 34**	2021	**280.3**	UAS, Dharwad	**300**	310	10.00
42	**Dsb.23 (DSB 23-2)**	2018	**33.15**	UAS, Dharwad	**40**	0	-40.00
43	**DSb - 21**	2014	**186.5**	UAS, Dharwad	**200**	170	-30.00
44	**Karune**	2021	**25**	UAS, Bengaluru	**30**	5	-25.00
45	**RSC 11-07**	2021	**27.6**	IGKV, Raipur	**30**	8	-22.00
46	**RSC 10-46**	2020	**54**	IGKV, Raipur	**60**	60	0.00
47	**RSC 10-52**	2020	**50.8**	IGKV, Raipur	**55**	55	0.00
48	**CG Soya 1**	2018	**43**	IGKV, Raipur	**50**	56.6	6.60
49	**AISB 50 (Adilabad Indore Soya Chikkudu-1)**	2021	**5**	PJTSAU, Adilabad	**7**	7	0.00
50	**Basara**	2012	**30**	PJTSAU, Adilabad	**35**	35	0.00
51	**Pant Soybean-26 (PS 1572)**	2020	**4**	GBPUAT, Pantnagar	**4**	15	11.00
52	**PS 1556**	2018	**2**	GBPUAT, Pantnagar	**2**	5	3.00
53	**Pant Soybean 23 (PS 1523)**	2017	**15**	GBPUAT, Pantnagar	**15**	12	-3.00
54	**Pant Soybean 24 (PS 1477)**	2017	**2**	GBPUAT, Pantnagar	**2**	10	8.00
55	**Pant Soybean 21 (PS 1480)**	2017	**15**	GBPUAT, Pantnagar	**15**	2	-13.00
56	**Pant Soybean - 19 (PS 1368)**	2013	**2**	GBPUAT, Pantnagar	**2**	6	4.00
57	**VL Bhatt 202**	2020	**2**	VPKAS, Almorah	**2**	4	2.00
58	**VL Soya 89**	2019	**14**	VPKAS, Almorah	**14**	22.75	8.75
59	**SL 958**	2015	**0.35**	PAU, Ludhiana	**1**	2	1.00
60	**Pusa Soybean 06**	2021	**10**	IARI, New Delhi	**0.5**	1	0.50
61	**Pusa-12**		**1.5**	IARI, New Delhi	**2**	2	0.00
62	**Pusa 9712**			IARI, New Delhi		1	1.00
63	**Him Soya**		**2**	CSKHPKV, Palampur	**2**	11.78	9.78
64	**Shivalik**			CSKHPKV, Palampur		9.85	9.85
65	**Palam soya**			CSKHPKV, Palampur		34.24	34.24
66	**Hara soya**			CSKHPKV, Palampur		11.06	11.06
67	**Him Palam Hara soya 1**			CSKHPKV, Palampur		0.3	0.30
68	**Birsa Soybean-3 (BAUS-40)**		**5**	BAU, Ranchi	**5**	6	1.00
69	**Kota Soybean-1**	2018	**5**	AU, Kota	**5**	**3.05**	-1.95
70	**KBS 23**	2020	**2**	Bengaluru	**2**	6.6	4.60
71	Jawahar Soya	2016	**5**				
72	JS 9712		**1.2**				
73	JS 20-114		**0.6**				
74	JS 20-38		**40.0**				
75	RLS 132		**0.34**				
76	**DSB 28 (DSB-2803)**		**0.36**	UAS, Dharwad	**1**	0	-1.00
77	**MACS NRC-1667**		**0.3**	ARI, Pune	**1**	1.2	0.20
	Grand Total		**14982.25**		**15671**	**13112.72**	**-2558.28**

Table: 2.9 Compensatory breeder seed production during Rabi 2022-23

S.N.	Variety	Year	Deficit over DAC Indent (q)	Centre	Rabi Prod. (Exp) (q)
1	**JS 20-116**	2019	**-58.89**	JNKVV, Jabalpur	360
				VNMKV, Parbhani	50
				Total	**410**
2	**JS 20-98**	2018	**-904.96**	JNKVV, Jabalpur	192
				IGKV, Raipur	70
				Total	**262**
3	**JS 20-69**	2016	**-352.33**	JNKVV, Jabalpur	**32**
4	**JS 20-34**	2015	**-532.22**	JNKVV, Jabalpur	**48**
5	**JS 93-05**	2002	**-77.3**	UAS, Dharwad	45
				PDKV, Amravati	80
				Total	**125**
6	**JS 335**	1994	**-977.05**	UAS, Dharwad	100
				UAS, Bengaluru	120
				UAHS, Shimoga	40
				PJTSAU, Adilabad	30
				Total	**290**
7	**MAUS-612**	2018		VNMKV, Parbhani	**75**
8	**Phule Kimaya (KDS 753)**	2020	**-55.44**	MPKV, Rahuri	**60**
9	**DSb 34**	2021		UAS, Dharwad	**45**
10	**Dsb.23 (DSB 23-2)**	2018	**-40**	UAS, Dharwad	**25**
11	**DSb - 21**	2014	**-30**	UAS, Dharwad	**45**
12	**RSC 11-07**	2021	**-22**	IGKV, Raipur	**30**
13	**DSB 28 (DSB-2803)**		**-1**	UAS, Dharwad	**2**
	Grand Total				**1449**

Co-ordinated Breeding Trials

Thirty-one centers, spread over 16 states, were involved in the varietal developmental activities as per the approved technical program. Zone wise salient findings of different trials are presented in **tables from 2.10 to 2.54**

Northern Hill Zone

Table . 2.10 Performance of Soybean Strains in IVT Normal, Zone : NHZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield (Kg/ha)					
			Almora	Palampur	Majhera	Mean	Rank	Almora	Palampur	Majhera	Mean	Oil Yield (kg/ha)	Rank
			1	2	3			1	2	3			
1	IVT22-1	VLS 104	2123	3012	2642	2592.33	II	22.61	19.04	20.92	20.86	540.67	III
2	IVT22-2	NRCSL 5	1852	2519	1407	1926.00	XXVIII	22.99	18.51	19.29	20.26	390.27	XXVII I
3	IVT22-3	JS 24-26	2346	2716	1481	2181.00	XIV	21.81	18.88	19.82	20.17	439.91	XV
4	IVT22-4	NRCSL 7	2198	2593	1259	2016.67	XXII	20.21	17.61	19.75	19.19	387.00	XXX
5	IVT22-5	VLS 63 (C)	2790	2642	1951	2461.00	VI	29.47	17.62	18.35	21.81	536.83	IV
6	IVT22-6	SKAUS 3	790	395	790	658.33	XLVII	19.91		20.24	20.08	132.16	LIII
7	IVT22-7	RVS 12-8	2099	1852	1926	1959.00	XXVI	20.49	19.02	19.66	19.72	386.38	XXXI
8	IVT22-8	KDS 1203	1877	2049	2198	2041.33	XX	22.06	18.80	19.36	20.07	409.76	XX
9	IVT22-9	NRC 253	1975	1852	1481	1769.33	XXXVI I	20.59	17.10	18.09	18.59	328.98	XLV
10	IVT22-10	MACS 1756	1531	2593	2099	2074.33	XVIII	20.48	16.11	19.73	18.77	389.42	XXIX
11	IVT22-11	Lok Soya-2	2074	2667	1679	2140.00	XV	20.47	16.79	19.67	18.98	406.10	XXIV
12	IVT22-12	AMS 2021-3	2247	1654	2025	1975.33	XXV	20.84	17.56	19.38	19.26	380.45	XXXI V
13	IVT22-13	Himso 1695	2444	2222	2938	2534.67	IV	22.26	17.61	20.40	20.09	509.22	V
14	IVT22-14	TS - 156	2049	2346	2025	2140.00	XV	21.15	19.31	19.77	20.08	429.64	XVI
15	IVT22-15	NRCSL 8	1704	2914	1580	2066.00	XIX	20.38	18.52	20.08	19.66	406.18	XXIII
16	IVT22-16	JS 24-34	1012	2420	1358	1596.67	XLI	21.14	18.42	19.28	19.61	313.16	XLVII
17	IVT22-17	VLS 89 (C)	3284	2988	2370	2880.67	I	20.53	17.93	20.75	19.74	568.55	I
18	IVT22-18	DS 1510	2222	2272	2247	2247.00	XII	17.66	18.10	20.27	18.68	419.66	XVIII
19	IVT22-19	KSS 213	1481	2222	1432	1711.67	XXXIX	20.72	19.00	19.07	19.60	335.43	XLIII
20	IVT22-20	MAUS 824	1852	2790	1457	2033.00	XXI	21.71	18.34	19.98	20.01	406.80	XXII
21	IVT22-21	NRC 254	1877	2049	1481	1802.33	XXXV	22.35	17.57	19.38	19.77	356.26	XLI
22	IVT22-22	AMS 2021-4	1852	1877	1704	1811.00	XXXIV	20.75	18.80	19.49	19.68	356.40	XL
23	IVT22-23	Himso 1696	2420	2790	1926	2378.67	IX	20.80	17.99	19.91	19.57	465.43	XI
24	IVT22-24	DS 1529	1852	2296	2469	2205.67	XIII	20.05	16.29	19.98	18.77	414.08	XIX
25	IVT22-25	KDS 1188	1704	1802	1432	1646.00	XL	20.38	18.95	18.72	19.35	318.50	XLVI
26	IVT22-26	MACS 1745	1778	1975	2272	2008.33	XXIII	20.25	19.18	18.91	19.45	390.55	XXVII

27	IVT22-27	NRC 255	1136	1679	1259	1358.00	XLII	21.37	17.73	19.10	19.40	263.45	XLVIII
28	IVT22-28	Asb 93	741	988	1210	979.67	XLV	21.68	19.99	19.37	20.35	199.33	LI
29	IVT22-29	VLS 105	1877	2272	1704	1951.00	XXVII	21.16	19.44	19.85	20.15	393.13	XXVI
30	IVT22-30	NRCSL 4	2148	2790	1951	2296.33	X	21.71	18.55	19.56	19.94	457.89	XIII
31	IVT22-31	NRC 257	1926	1679	1753	1786.00	XXXVI	20.44	18.23	19.58	19.42	346.78	XLII
32	IVT22-32	MAUS 814	1852	1926	2000	1926.00	XXVIII	19.84	18.51	19.67	19.34	372.49	XXXVI
33	IVT22-33	SL 1311	2296	2790	2173	2419.67	VII	22.62	18.75	18.60	19.99	483.69	VIII
34	IVT22-34	Asb 85	1753	1802	1704	1753.00	XXXVII	19.93	19.25	18.09	19.09	334.65	XLIV
35	IVT22-35	PS 1693	1877	2370	2000	2082.33	XVII	20.69	17.66	19.92	19.42	404.46	XXV
36	IVT22-36	NRC 256	1654	2247	1580	1827.00	XXXII	19.27	20.09	19.79	19.72	360.22	XXXIX
37	IVT22-37	RSC 1165	2198	1728	1531	1819.00	XXXIII	20.83	19.26	20.73	20.27	368.77	XXXVII
38	IVT22-38	BAUS 124	2765	1728	1531	2008.00	XXIV	20.88	17.23	19.11	19.07	382.99	XXXII
39	IVT22-39	DLSb 40	-	321	1309	815.00	XLVI		19.49	19.80	19.65	160.11	LII
40	IVT22-40	NRC 258	2074	3086	2025	2395.00	VIII	19.79	19.33	19.66	19.59	469.26	IX
41	IVT22-41	Pusa Sipani BS-9	1210	617	1358	1061.67	XLIV	21.24	19.11	19.85	20.07	213.04	L
42	IVT22-42	PS 1696	2099	3037	2049	2395.00	VIII	22.19	18.92	20.60	20.57	492.65	VII
43	IVT22-43	CAUMS 3	-	-	-	-							
44	IVT22-44	AUKS 212	1852	2420	2025	2099.00	XVI	20.83	19.50	20.07	20.13	422.60	XVII
45	IVT22-45	RVSM 12-21	1778	1728	2000	1835.33	XXXI	20.55	20.66	20.46	20.56	377.28	XXXV
46	IVT22-46	NRC 259	2099	2519	2222	2280.00	XI	21.16	17.36	20.64	19.72	449.62	XIV
47	IVT22-47	AS 34	1728	2469	1580	1925.67	XXIX	20.30	19.38	19.66	19.78	380.90	XXXIII
48	IVT22-48	VLS 99 (C)	2198	2889	2494	2527.00	V	21.82	20.70	21.97	21.50	543.22	II
49	IVT22-49	RSC 1172	1580	1654	2346	1860.00	XXX	20.25	19.27	19.08	19.53	363.32	XXXVIII
50	IVT22-50	AS 55	2494	2198	1506	2066.00	XIX	21.30	17.62	20.17	19.70	406.93	XXI
51	IVT22-51	TS-208	1111	1284	1457	1284.00	XLIII	20.18	19.98	20.19	20.12	258.30	XLIX
52	IVT22-52	NRC 260	2420	2765	2444	2543.00	III	20.78	19.11	20.10	20.00	508.52	VI
53	IVT22-53	NRC 196	2346	2543	2000	2296.33	X	21.40	19.32	20.47	20.40	468.37	X
54	IVT22-54	Pusa Sipani-SPS-433	2049	2593	2198	2280.00	XI	20.97	19.27	20.34	20.19	460.41	XII
		GM	1936.42	2181.68	1830.91			21.06	18.59	19.75			
		CD	444.44	469.14	271.60								
		CV	14.87	13.31	9.16								
		DOS	29/06/2022	25/06/2022	22/06/2022								

Table . 2.11 Performance of Soybean Strains in IVT Normal, Zone : NHZ

S.N.	Code	Strain	Days to Maturity			Days to Flower			Plant Height (Cm)			100 Seed Weight (Gm)		
			Almora	Palampur	Majhera	Almora	Palampur	Majhera	Almora	Palampur	Majhera	Almora	Palampur	Majhera
			1	2	3	1	2	3	1	2	3	1	2	3
1	IVT22-1	VLS 104	110	124	131	46	50	62	77	59	73	15.78	17.33	18.23
2	IVT22-2	NRCSL 5	108	120	125	45	49	55	75	74	64	13.98	16.31	19.20
3	IVT22-3	JS 24-26	104	113	117	47	50	62	84	76	58	11.34	12.74	14.43
4	IVT22-4	NRCSL 7	105	113	124	45	47	55	74	62	58	16.13	17.44	21.23
5	IVT22-5	VLS 63 (C)	108	126	129	47	48	62	69	57	52	16.21	15.70	21.07
6	IVT22-6	SKAUS 3	95	122	123	37	42	61	47	48	40	39.09	37.35	16.83
7	IVT22-7	RVS 12-8	103	120	118	47	47	62	62	54	53	15.13	14.88	15.37
8	IVT22-8	KDS 1203	115	125	123	48	49	62	105	131	78	13.38	13.35	15.37
9	IVT22-9	NRC 253	106	122	126	45	46	55	56	53	41	17.94	19.12	20.23
10	IVT22-10	MACS 1756	108	122	124	51	55	62	69	80	63	11.61	14.84	13.43
11	IVT22-11	Lok Soya-2	103	125	119	49	54	63	78	75	60	12.53	14.82	14.23
12	IVT22-12	AMS 2021-3	106	124	129	55	55	67	87	96	65	9.41	9.28	12.30
13	IVT22-13	Himso 1695	109	124	126	50	47	61	94	81	70	12.50	12.47	15.27
14	IVT22-14	TS - 156	104	115	116	52	52	61	98	140	84	10.18	13.69	13.23
15	IVT22-15	NRCSL 8	105	118	123	48	48	54	48	72	62	13.69	14.36	20.67
16	IVT22-16	JS 24-34	96	113	116	44	45	55	59	50	42	11.86	13.22	16.27
17	IVT22-17	VLS 89 (C)	109	124	126	49	51	63	99	94	76	16.12	16.86	18.37
18	IVT22-18	DS 1510	108	123	126	54	56	68	78	86	67	9.64	8.43	12.50
19	IVT22-19	KSS 213	106	125	126	49	53	52	57	63	45	15.47	17.83	17.27
20	IVT22-20	MAUS 824	107	126	126	49	51	61	73	70	52	16.98	16.20	17.40
21	IVT22-21	NRC 254	106	115	119	43	47	56	65	68	45	16.82	20.73	22.37
22	IVT22-22	AMS 2021-4	115	126	126	57	59	67	74	93	59	8.93	10.42	17.17
23	IVT22-23	Himso 1696	115	129	128	50	54	61	68	81	56	10.09	12.65	14.30
24	IVT22-24	DS 1529	115	131	127	53	57	71	72	101	85	11.30	11.26	14.43
25	IVT22-25	KDS 1188	108	126	123	49	49	62	97	88	68	14.21	15.65	16.37
26	IVT22-26	MACS 1745	115	131	131	53	58	70	81	83	76	10.19	10.10	12.37
27	IVT22-27	NRC 255	98	116	120	43	43	47	49	45	44	13.78	20.06	22.13
28	IVT22-28	Asb 93	100	118	117	46	52	55	55	53	41	11.88	12.86	13.77
29	IVT22-29	VLS 105	109	126	130	48	50	55	53	57	51	14.94	16.29	18.10
30	IVT22-30	NRCSL 4	110	128	125	49	51	60	79	75	69	13.46	14.13	15.80

31	IVT22-31	NRC 257	109	126	131	51	53	60	72	99	61	9.99	11.27	14.10
32	IVT22-32	MAUS 814	110	128	128	54	54	62	68	80	58	15.14	16.72	17.37
33	IVT22-33	SL 1311	110	126	123	50	52	61	68	70	48	12.68	14.41	16.30
34	IVT22-34	Asb 85	100	122	116	45	48	47	77	71	54	10.92	14.00	14.37
35	IVT22-35	PS 1693	114	129	128	53	55	66	81	123	66	10.71	13.11	14.10
36	IVT22-36	NRC 256	110	121	122	51	52	61	68	85	70	10.10	10.86	13.30
37	IVT22-37	RSC 1165	111	126	125	53	54	60	83	77	61	10.86	12.30	12.40
38	IVT22-38	BAUS 124	114	135	129	56	56	65	99	119	77	11.72	13.70	14.10
39	IVT22-39	DLSb 40	-	128	123	-	55	54	-	69	64	-	14.58	16.27
40	IVT22-40	NRC 258	106	120	118	52	55	61	87	88	67	9.50	11.72	12.30
41	IVT22-41	Pusa Sipani BS-9	106	126	116	50	53	64	51	58	48	13.45	14.37	13.20
42	IVT22-42	PS 1696	109	125	122	51	52	60	67	78	60	12.87	15.30	17.03
43	IVT22-43	CAUMS 3	-	-	-	-	-	-	-	-	-	-	-	-
44	IVT22-44	AUKS 212	115	128	128	54	59	61	87	86	73	9.10	9.53	12.67
45	IVT22-45	RVSM 12-21	109	122	119	49	48	51	62	48	55	13.30	14.02	15.13
46	IVT22-46	NRC 259	110	125	124	57	60	68	92	122	87	10.94	10.56	14.37
47	IVT22-47	AS 34	110	126	128	51	52	61	73	73	82	12.98	13.43	14.40
48	IVT22-48	VLS 99 (C)	108	124	124	51	49	53	78	66	75	16.43	17.87	17.00
49	IVT22-49	RSC 1172	115	132	127	54	60	72	95	111	76	9.21	11.03	13.20
50	IVT22-50	AS 55	106	111	128	49	48	54	77	74	60	16.28	17.15	21.33
51	IVT22-51	TS-208	102	108	119	51	49	53	85	125	78	10.51	11.03	14.07
52	IVT22-52	NRC 260	116	128	122	54	58	60	107	141	105	16.00	16.87	19.40
53	IVT22-53	NRC 196	108	115	118	48	51	59	64	78	66	11.92	12.03	14.77
54	IVT22-54	Pusa Sipani-SPS-433	107	117	119	51	50	58	57	77	62	12.10	13.43	14.77

Table . 2.12 Performance of Soybean Strains in AVT-I, Zone : NHZ

S.N.	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield (Kg/ha)					
		Almora	Palampur	Majhera	Mean	Rank	Almora	Palampur	Majhera	Mean	Oil Yield (kg/ha)	Rank
		1	2	3			1	2	3			
1	JS 23-03	1467	1594	1580	1547.00	VII	19.85	20.80	16.12	20.18	312.14	VI
2	NRC 197	1630	1806	2072	1836.00	II	20.37	20.16	20.95	19.67	361.19	II
3	MAUS 795	1363	1456	1898	1572.33	VI	21.2	20.22	16.96	19.77	310.81	VII
4	NRC 196	1630	628	2031	1429.67	VIII	21.16	20.04	20.06	19.94	285.03	VIII
5	Palam Early Soya 1(C)	1793	2056	1846	1898.33	I		19.66	19.71	19.07	361.99	I
6	VLS 89(C)	2030	1372	2083	1828.33	III	19.53	18.30	18.04	19.12	349.56	III
7	VLS 63(C)	1822	1289	2240	1783.67	IV		18.32	17.12	18.33	327.01	IV
8	VLS 99(C)	2148	917	2112	1725.67	V	19.78	18.22	18.25	18.65	321.88	V
	Mean	1735.38	1389.75	1982.75			20.32	18.65	19.47			
	CD	237.04	144.44	347.22								
	CV (5%)	7.59	6.01	10.02								
	DOS	30/06/2022	25/06/2022	25/06/2022								

Table . 2.13 Performance of Soybean Strains in AVT-I, Zone : NHZ

S.N.	Strain	Days to Maturity			Days to Flower			Plant Height (Cm)			100 Seed Weight (Gm)		
		Almora	Palampur	Majhera	Almora	Palampur	Majhera	Almora	Palampur	Majhera	Almora	Palampur	Majhera
		1	2	3	1	2	3	1	2	3	1	2	3
1	JS 23-03	95	108	112	46	45	47	56	57	55	11.48	13.40	17.83
2	NRC 197	106	118	112	47	53	58	93	47	84	13.01	15.77	18.40
3	MAUS 795	102	116	113	45	50	49	63	100	67	16.96	13.88	14.93
4	NRC 196	105	125	113	49	55	57	58	75	72	10.65	17.19	19.43
5	Palam Early Soya 1(C)	101	112	111	48	45	51	60	70	61	13.29	17.18	15.67
6	VLS 89(C)	107	122	120	48	55	58	80	46	98	15.05	17.90	21.10
7	VLS 63(C)	107	114	121	47	55	56	52	57	63	13.65	15.38	15.20
8	VLS 99(C)	109	117	122	48	65	58	63	44	77	14.37	13.96	14.97

Northern Plain Zone

Table . 2.14 Performance of Soybean Strains in IVT, Zone : NPZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield(Kg/ha)			
			Delhi	Ludhiana	Pantnagar	Mean	Rank	Ludhiana	Mean	Oil Yield (kg/ha)	Rank
			1	2	3			1			
1	IVT22-1	VLS 104	-	-	123	-		-			
2	IVT22-2	NRCSL 5	1210	2568	741	1889.00	III	22.37	22.37	422.57	III
3	IVT22-3	JS 24-26	1160	2074	1185	1617.00	IX	21.09	21.09	341.03	X
4	IVT22-4	NRCSL 7	840	1802	716	1321.00	XV	22.08	22.08	291.68	XIV
5	IVT22-5	NRC 149 (C)	1654	2988	2247	2321.00	I	22.73	22.73	527.56	I
6	IVT22-6	SKAUS 3	-	-	-	-		-			
7	IVT22-7	RVS 12-8	-	-	815	-		-			
8	IVT22-8	KDS 1203	-	-	-	-		-			
9	IVT22-9	NRC 253	-	-	420	-		-			
10	IVT22-10	MACS 1756	-	-	-	-		-			
11	IVT22-11	Lok Soya-2	-	-	716	-		-			
12	IVT22-12	AMS 2021-3	-	370	1457	370.00	XXI	-		0.00	XVII
13	IVT22-13	Himso 1695	-	-	840	-		-			
14	IVT22-14	TS - 156	-	-	469	-		-			
15	IVT22-15	NRCSL 8	889	2296	963	1592.50	X	22.54	22.54	358.95	VIII
16	IVT22-16	JS 24-34	-	-	469	-		-			
17	IVT22-17	SL 1074 (C)	2123	1185	2000	1654.00	VII	23.66	23.66	391.34	VI
18	IVT22-18	DS 1510	914	543	1457	728.50	XVI	21.74	21.74	158.38	XV
19	IVT22-19	KSS 213	-	-	-	-		-			
20	IVT22-20	MAUS 824	-	-	1012	-		-			
21	IVT22-21	NRC 254	-	-	519	-		-			
22	IVT22-22	AMS 2021-4	-	-	1654	-		-			
23	IVT22-23	Himso 1696	716	-	1136	716.00	XVII	-		0.00	XVIII
24	IVT22-24	DS 1529	1728	2395	1235	2061.50	II	22.13	22.13	456.21	II
25	IVT22-25	KDS 1188	-	-	-	-		-			
26	IVT22-26	MACS 1745	519	-	-	519.00	XIX	-		0.00	XIX
27	IVT22-27	NRC 255	-	-	420	-		-			
28	IVT22-28	Asb 93	-	-	296	-		-			
29	IVT22-29	VLS 105	-	-	99	-		-			
30	IVT22-30	NRCSL 4	1654	1136	914	1395.00	XIV	21.94	21.94	306.06	XIII
31	IVT22-31	NRC 257	-	-	840	-		-			
32	IVT22-32	MAUS 814	-	-	642	-		-			
33	IVT22-33	SL 1311	1704	1160	840	1432.00	XIII	21.43	21.43	306.88	XII
34	IVT22-34	Asb 85	-	-	444	-		-			
35	IVT22-35	PS 1693	1259	2000	1951	1629.50	VIII	21.74	21.74	354.25	IX

36	IVT22-36	NRC 256	-	-	988	-		-			
37	IVT22-37	RSC 1165	-	-	1333	-		-			
38	IVT22-38	BAUS 124	-	-	691	-		-			
39	IVT22-39	DLSb 40	-	-	-	-		-			
40	IVT22-40	NRC 258	-	494	2074	494.00	XX	-		0.00	XX
41	IVT22-41	Pusa Sipani BS-9	-	-	272	-		-			
42	IVT22-42	PS 1696	1185	1753	988	1469.00	XI	22.62	22.62	332.29	XI
43	IVT22-43	CAUMS 3	-	-	-	-		-			
44	IVT22-44	AUKS 212	-	543	1259	543.00	XVIII	21.97	21.97	119.30	XVI
45	IVT22-45	RVSM 12-21	-	-	1037	-		-			
46	IVT22-46	NRC 259	1481	2247	1704	1864.00	IV	21.54	21.54	401.51	IV
47	IVT22-47	AS 34	-	-	1383	-		-			
48	IVT22-48	PS 26 (C)	1457	-	617	1457.00	XII	-		0.00	XXI
49	IVT22-49	RSC 1172	-	-	617	-		-			
50	IVT22-50	AS 55	-	-	568	-		-			
51	IVT22-51	TS-208	-	-	346	-		-			
52	IVT22-52	NRC 260	1481	1901	1531	1691.00	VI	22.17	22.17	374.89	VII
53	IVT22-53	NRC 196	1778	1852	1605	1815.00	V	21.95	21.95	398.39	V
54	IVT22-54	Pusa Sipani-SPS-433	-	-	765	-		-			
		GM	1319.56	1628.17	*965.17*			22.11			
		CD	74.07	172.84	98.77						
		CV	9.55	19.42	7.49						
		DOS	08/07/2022	24/06/2022	05/07/2022						

- **Data of Pantnagar cancelled due to Mean < 1000Kg/ha in grain yield.**

Table . 2.15 Performance of Soybean Strains in IVT, Zone: NPZ

S.N.	Code	Strain	Days To Maturity		Days To Flowering		Plant Height (Cm)		100 Seed Weight (Gm)	
			Delhi	Ludhiana	Delhi	Ludhiana	Delhi	Ludhiana	Delhi	Ludhiana
			1	2	1	2	1	2	1	2
1	IVT22-1	VLS 104	-	-	-	-	-	-	-	-
2	IVT22-2	NRCSL 5	117	125	45	54	49	78	10.30	12.53
3	IVT22-3	JS 24-26	110	124	48	54	47	72	8.00	8.70
4	IVT22-4	NRCSL 7	117	126	45	52	47	75	11.17	12.47
5	IVT22-5	NRC 149 (C)	127	131	52	65	74	101	10.70	11.53
6	IVT22-6	SKAUS 3	-	-	-	-	-	-	-	-
7	IVT22-7	RVS 12-8	-	-	-	-	-	-	-	-
8	IVT22-8	KDS 1203	-	-	-	-	-	-	-	-
9	IVT22-9	NRC 253	-	-	-	-	-	-	-	-
10	IVT22-10	MACS 1756	-	-	-	-	-	-	-	-
11	IVT22-11	Lok Soya-2	-	-	-	-	-	-	-	-

12	IVT22-12	AMS 2021-3	-	126	-	65	-	46	-	5.77
13	IVT22-13	Himso 1695	-	-	-	-	-	-	-	-
14	IVT22-14	TS - 156	-	-	-	-	-	-	-	-
15	IVT22-15	NRCSL 8	119	126	45	52	60	77	10.20	11.37
16	IVT22-16	JS 24-34	-	-	-	-	-	-	-	-
17	IVT22-17	SL 1074 (C)	126	131	55	68	65	86	7.63	7.70
18	IVT22-18	DS 1510	119	128	53	62	59	67	4.47	5.90
19	IVT22-19	KSS 213	-	-	-	-	-	-	-	-
20	IVT22-20	MAUS 824	-	-	-	-	-	-	-	-
21	IVT22-21	NRC 254	-	-	-	-	-	-	-	-
22	IVT22-22	AMS 2021-4	-	-	-	-	-	-	-	-
23	IVT22-23	Himso 1696	125	-	51	-	43	-	5.77	-
24	IVT22-24	DS 1529	116	128	54	67	64	79	7.67	8.93
25	IVT22-25	KDS 1188	-	-	-	-	-	-	-	-
26	IVT22-26	MACS 1745	121	-	52	-	58	-	8.27	-
27	IVT22-27	NRC 255	-	-	-	-	-	-	-	-
28	IVT22-28	Asb 93	-	-	-	-	-	-	-	-
29	IVT22-29	VLS 105	-	-	-	-	-	-	-	-
30	IVT22-30	NRCSL 4	123	130	48	58	56	84	7.47	7.17
31	IVT22-31	NRC 257	-	-	-	-	-	-	-	-
32	IVT22-32	MAUS 814	-	-	-	-	-	-	-	-
33	IVT22-33	SL 1311	125	130	46	52	50	66	8.20	8.70
34	IVT22-34	Asb 85	-	-	-	-	-	-	-	-
35	IVT22-35	PS 1693	125	129	52	67	70	92	5.33	8.60
36	IVT22-36	NRC 256	-	-	-	-	-	-	-	-
37	IVT22-37	RSC 1165	-	-	-	-	-	-	-	-
38	IVT22-38	BAUS 124	-	-	-	-	-	-	-	-
39	IVT22-39	DLSb 40	-	-	-	-	-	-	-	-
40	IVT22-40	NRC 258	-	128	-	67	-	46	-	6.23
41	IVT22-41	Pusa Sipani BS-9	-	-	-	-	-	-	-	-
42	IVT22-42	PS 1696	120	128	50	59	48	64	8.40	9.63
43	IVT22-43	CAUMS 3	-	-	-	-	-	-	-	-
44	IVT22-44	AUKS 212	-	125	-	54	-	45	-	8.20
45	IVT22-45	RVSM 12-21	-	-	-	-	-	-	-	-
46	IVT22-46	NRC 259	120	128	56	69	72	85	8.37	9.53
47	IVT22-47	AS 34	-	-	-	-	-	-	-	-
48	IVT22-48	PS 26 (C)	125	-	52	-	52	-	-	-
49	IVT22-49	RSC 1172	-	-	-	-	-	-	-	-
50	IVT22-50	AS 55	-	-	-	-	-	-	-	-
51	IVT22-51	TS-208	-	-	-	-	-	-	-	-
52	IVT22-52	NRC 260	122	129	53	67	61	88	9.57	11.80
53	IVT22-53	NRC 196	112	125	45	53	55	65	7.60	8.43
54	IVT22-54	Pusa Sipani-SPS-433	-	-	-	-	-	-	-	-

Table . 2.16 Performance of Soybean Strains in Advanced Varietal Trial I+II, Zone : NPZ

S.N.	Strain	Seed Yield(Kg/ha)				Oil Content (%) & Yield Kg/ha				Days To Maturity	
		Ludhiana	Pantnagar	Mean	Rank	Ludhiana	Mean	Oil Yield (kg/ha)	Rank	Ludhiana	Pantnagar
		1	2			1				1	2
1	NRC 195	2668	502	1585.00	IV	22.43	22.43	355.52	IV	129	125
2	PS 1682	2407	1676	2041.50	III	21.30	21.30	434.84	III	126	122
3	SL 1282	1557	858	1207.50	VI	21.30	21.30	257.20	VI	130	118
4	PS 1670	3194	1658	2426.00	I	20.87	20.87	506.31	II	132	121
5	NRCSL 6 *	1036	1253	1144.50	VII	22.18	22.18	253.85	VII	129	117
6	SL 1074(C)	1076	1044	1060.00	VIII	23.38	23.38	247.83	VIII	129	123
7	SL 955(C)	1620	858	1239.00	V	23.29	23.29	288.56	V	132	121
8	NRC 149(C)	3183	1347	2265.00	II	22.90	22.90	518.69	I	128	125
9	SL 958(C)	1117	987	1052.00	IX	22.51	22.51	236.81	IX	131	123
10	GM	1984.22	1131.44			22.24					
11	CD	370.37	155.56								
12	CV	10.70	8.04								
13	DOS	23/06/2022	05/07/2022								

- Delhi centre could not conduct trail.

Table . 2.17 Performance of Soybean Strains in Advanced Varietal Trial I+II, Zone : NPZ

S.N.	Strain	Days To Flowering		Plant Height(Cm)		100 Seed Weight(gm)	
		Ludhiana	Pantnagar	Ludhiana	Pantnagar	Ludhiana	Pantnagar
		1	2	1	2	1	2
1	NRC 195	60	51	92	80	10.83	6.92
2	PS 1682	59	54	74	64	8.87	10.38
3	SL 1282	59	49	73	49	7.17	7.84
4	PS 1670	59	48	80	64	10.30	10.00
5	NRCSL 6	47	40	95	91	8.00	8.09
6	SL 1074(C)	59	54	81	61	7.97	7.47
7	SL 955(C)	59	52	76	54	7.37	7.15
8	NRC 149(C)	60	48	93	102	10.60	9.70
9	SL 958(C)	60	48	92	96	8.27	8.80

North Eastern Hill Zone

Table . 2.18 Performance of Soybean Strains in IVT, Zone : NEHZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Days To Maturity	Days To Flowering	Plant Height Cm	100 Seed Weight Gm	Oil Content % & Yield (Kg /ha)			
			Imphal	Jorhat	Umiam	Mean	Rank	Imphal	Imphal	Imphal	Imphal	Imphal	Mean	Oil Yield (kg/ha)	Rank
			1	2	3			1		1	1	1			
1	IVT22-1	VLS 104	1926	1444	593	1926.00	XXXVI	119	49	40	15.37	23.80	23.8	458.39	XXXVIII
2	IVT22-2	NRCSL 5	2420	1593	889	2420.00	XXIII	105	44	49	13.50	21.76	21.76	526.59	XXV
3	IVT22-3	JS 24-26	1926	741	593	1926.00	XXXVI	106	48	52	10.46	20.77	20.77	400.03	XLVIII
4	IVT22-4	NRCSL 7	1852	407	519	1852.00	XXXIX	105	43	46	15.97	20.83	20.83	385.77	LI
5	IVT22-5	JS 20-116 (C)	2222	593	617	2222.00	XXIX	106	49	60	8.84	19.49	19.49	433.07	XLIV
6	IVT22-6	SKAUS 3	1481	593	568	1481.00	XLVIII	102	35	36	32.06	21.92	21.92	324.64	LXI
7	IVT22-7	RVS 12-8	2247	741	494	2247.00	XXVIII	108	47	48	11.42	21.62	21.62	485.80	XXXIV
8	IVT22-8	KDS 1203	2642	1667	519	2642.00	XVII	110	49	78	11.27	21.92	21.92	579.13	XIV
9	IVT22-9	NRC 253	2691	2222	519	2691.00	XV	111	45	39	12.04	19.78	19.78	532.28	XXIII
10	IVT22-10	MACS 1756	2815	1037	593	2815.00	XIII	106	50	66	9.79	20.14	20.14	566.94	XVIII
11	IVT22-11	Lok Soya-2	2642	1148	444	2642.00	XVII	105	46	60	11.89	19.32	19.32	510.43	XXIX
12	IVT22-12	**AMS 2021-3 ***	2988	778	198	2988.00	VII	113	53	78	8.71	23.30	23.3	696.20	II
13	IVT22-13	Himso 1695	2420	1333	222	2420.00	XXIII	111	50	61	9.88	19.88	19.88	481.10	XXXV
14	IVT22-14	TS - 156	2543	1519	222	2543.00	XX	106	49	72	11.89	20.25	20.25	514.96	XXVIII
15	IVT22-15	NRCSL 8	1728	1185	765	1728.00	XLIII	108	44	50	16.54	20.67	20.67	357.18	LVI
16	IVT22-16	JS 24-34	1753	556	346	1753.00	XLII	100	42	37	12.03	20.86	20.86	365.68	LV
17	IVT22-17	KDS 753 (C)	2617	-	914	2617.00	XVIII	109	51	69	15.70	20.39	20.39	533.61	XXII
18	IVT22-18	DS 1510	2691	1852	296	2691.00	XV	110	54	66	8.81	20.98	20.98	564.57	XIX
19	IVT22-19	KSS 213	2494	593	395	2494.00	XXI	109	48	49	14.72	20.11	20.11	501.54	XXXII
20	IVT22-20	MAUS 824 *	2938	2296	370	2938.00	IX	110	46	51	16.54	21.07	21.07	619.04	VIII

21	IVT22-21	NRC 254	1901	778	370	1901.00	XXXVII	107	44	44	17.56	20.54	20.54	390.47	L
22	IVT22-22	**AMS 2021-4 ***	3185	852	272	3185.00	II	113	54	76	9.46	19.62	19.62	624.90	VI
23	IVT22-23	**Himso 1696 ***	3185	1148	272	3185.00	II	119	45	51	12.13	19.02	19.02	605.79	X
24	IVT22-24	DS 1529	2840	852	642	2840.00	XII	119	54	73	11.56	20.20	20.2	573.68	XVI
25	IVT22-25	**KDS 1188 ***	3136	2296	543	3136.00	III	108	46	65	14.61	19.21	19.21	602.43	XII
26	IVT22-26	MACS 1745	2864	667	963	2864.00	XI	111	54	71	10.33	20.21	20.21	578.81	XV
27	IVT22-27	NRC 255	1877	1222	765	1877.00	XXXVIII	100	40	37	17.65	19.76	19.76	370.90	LIII
28	IVT22-28	Asb 93	2617	704	469	2617.00	XVIII	103	46	44	12.88	19.72	19.72	516.07	XXVII
29	IVT22-29	**VLS 105 ***	2963	556	642	2963.00	VIII	113	48	51	17.33	20.96	20.96	621.04	VII
30	IVT22-30	NRCSL 4	2469	704	593	2469.00	XXII	110	48	56	11.53	20.05	20.05	495.03	XXXIII
31	IVT22-31	NRC 257	2790	3333	914	2790.00	XIV	114	51	70	11.06	20.41	20.41	569.44	XVII
32	IVT22-32	MAUS 814	2000	2000	617	2000.00	XXXIV	107	49	48	12.41	20.90	20.9	418.00	XLVII
33	IVT22-33	SL 1311	2667	1296	469	2667.00	XVI	109	48	44	13.48	20.70	20.7	552.07	XX
34	IVT22-34	Asb 85	1506	852	840	1506.00	XLVII	104	45	46	9.76	21.60	21.6	325.30	LX
35	IVT22-35	PS 1693	2420	1185	519	2420.00	XXIII	118	52	57	10.29	19.01	19.01	460.04	XXXVII
36	IVT22-36	NRC 256	2296	1667	840	2296.00	XXVI	109	49	59	9.70	20.38	20.38	467.92	XXXVI
37	IVT22-37	RSC 1165	2123	1333	296	2123.00	XXXI	107	49	49	8.34	20.26	20.26	430.12	XLV
38	IVT22-38	BAUS 124	1975	1444	716	1975.00	XXXV	115	51	60	11.99	19.80	19.8	391.05	XLIX
39	IVT22-39	DLSb 5	1679	-	469	1679.00	XLV	107	50	59	10.87	20.38	20.38	342.18	LVII
40	IVT22-40	NRC 258	2074	2148	519	2074.00	XXXIII	105	51	60	8.40	21.30	21.3	441.76	XLI
41	IVT22-41	Pusa Sipani BS-9	1827	1370	247	1827.00	XL	108	52	41	11.18	20.27	20.27	370.33	LIV
42	IVT22-42	PS 1696	2568	1185	247	2568.00	XIX	111	46	47	12.31	20.47	20.47	525.67	XXVI
43	IVT22-43	CAUMS 3	1704	-	148	1704.00	XLIV	118	51	38	12.99	19.92	19.92	339.44	LIX
44	IVT22-44	AUKS 212	2074	1222	247	2074.00	XXXIII	116	54	56	8.95	20.38	20.38	422.68	XLVI
45	IVT22-45	RVSM 12-21	2568	889	198	2568.00	XIX	110	48	52	12.71	20.70	20.7	531.58	XXIV

46	IVT22-46	**NRC 259 ***	3062	1111	370	3062.00	V	114	55	88	11.78	19.71	19.71	603.52	XI
47	IVT22-47	**AS 34 ***	3136	815	420	3136.00	III	106	46	54	11.06	20.49	20.49	642.57	III
48	IVT22-48	Macs 1407 (C)	2272	1222	395	2272.00	XXVII	108	51	74	9.47	20.06	20.06	455.76	XL
49	IVT22-49	**RSC 1172 ***	3086	1333	420	3086.00	IV	116	54	72	9.73	20.27	20.27	625.53	V
50	IVT22-50	AS 55	2148	1556	469	2148.00	XXX	107	45	47	17.10	20.27	20.27	435.40	XLIII
51	IVT22-51	TS-208	1654	3185	642	1654.00	XLVI	106	46	64	10.46	20.54	20.54	339.73	LVIII
52	IVT22-52	**NRC 260 ***	3012	1519	765	3012.00	VI	114	50	81	14.24	20.80	20.8	626.50	IV
53	IVT22-53	NRC 196	2370	1074	1086	2370.00	XXIV	107	46	45	11.83	21.40	21.4	507.18	XXX
54	IVT22-54	**Pusa Sipani-SPS-433 ***	2914	926	1333	2914.00	X	106	46	48	10.77	20.67	20.67	602.32	XIII
55	IVT22-55	NRC 189	2568	704	988	2568.00	XIX	109	51	56	9.19	21.03	21.03	540.05	XXI
56	IVT22-56	NRC 191	2691	1185	790	2691.00	XV	107	42	37	16.75	22.69	22.69	610.59	IX
57	IVT22-57	**NRC 190 ***	3630	2333	1012	3630.00	I	106	49	54	8.24	22.21	22.21	806.22	I
58	IVT22-58	Himso 1693	2099	1111	469	2099.00	XXXII	110	45	29	11.22	20.92	20.92	439.11	XLII
59	IVT22-59	KDS 1149	1802	1185	1086	1802.00	XLI	105	44	53	12.30	21.31	21.31	384.01	LII
60	IVT22-60	Himso 1694	2346	2556	716	2346.00	XXV	109	47	38	11.35	21.40	21.4	502.04	XXXI
61	IVT22-61	CAUMS 2	1901	963	247	1901.00	XXXVII	107	52	48	9.96	24.09	24.09	457.95	XXXIX
		GM	2410.41	1289.29	*559.03*							20.70			
		CD	469.14	814.81	518.52										
		CV	12.63	*42.98*	*89.50*										
		DOS	01/07/2022	08/08/2022	18/07/2022										

- **Data of Jorhat cancelled due to CV>25%.**
- **Data of Umiam cancelled due to Mean <1000 Kg/ha Grain Yield and Mean >25%.**

Table . 2.19 Performance of Soybean Strains in AVT -II, Zone III : NEHZ

S.N.	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield(Kg/ha)					Days To Maturity	
		Imphal	Jorhat	Umiam	Mean	Rank	Imphal	Jorhat	Mean	Oil Yield (kg/ha)	Rank	Imphal	Jorhat
		1	2	3			1	2				1	2
1	KDS 1096	1967	1139	726	1553.00	III	-	18.93	18.93	293.98	IV	108	110
2	DLSb 1	1317	1028	548	1172.50	V	21.61	21.28	21.45	251.44	V	110	120
3	MACS 1460(C)	1772	1657	607	1714.50	II	20.9	22.11	21.51	368.70	II	111	120
4	JS 20-116(C)	1600	1880	607	1740.00	I	22.86	21.74	22.30	388.02	I	106	120
5	RKS 113(C)	1717	1204	415	1460.50	IV	21.6	20.58	21.09	308.02	III	110	120
6	GM	1674.60	1381.60	580.60			21.74	20.93					
7	CD	333.33	157.41	192.59									
8	CV	10.59	5.95	17.24									
9	DOS	24/06/2022	02/07/2022	22/07/2022									

- Data of Umiam cancelled due to Mean<1000 Kg/ha grain yield.

Table . 2.20 Performance of Soybean Strains in AVT -II, Zone III : NEHZ

S.N.	Strain	Days To Flowering		Plant Height (Cm)		100 Seed Weight (Gm)	
		Imphal	Jorhat	Imphal	Jorhat	Imphal	Jorhat
		1	2	1	2	1	2
1	KDS 1096	52	51	69	97	9.36	0.11
2	DLSb 1	51	47	54	64	11.00	0.11
3	MACS 1460(C)	47	50	50	116	9.85	0.12
4	JS 20-116(C)	48	51	60	104	8.21	0.12
5	RKS 113(C)	52	47	49	85	9.71	0.12

Eastern Zone

Table .2.21 Performance of Soybean Strains in IVT Normal, Zone : EZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Days to Maturity			Days to Flower		
			Bhawani patna	Raipur	Ranchi	Mean	Rank	Bhawani patna	Raipur	Ranchi	Bhawani patna	Raipur	Ranchi
			1	2	3			1	2	3	1	2	3
1	IVT22-1	VLS 104	1827	1926	1136	1629.67	XXIX	90	96	115	38	46	46
2	IVT22-2	NRCSL 5	1210	2642	1358	1736.67	XXIII	85	98	111	37	41	40
3	IVT22-3	JS 24-26	1383	2420	1235	1679.33	XXVII	82	88	113	38	42	43
4	IVT22-4	NRCSL 7	1235	2420	963	1539.33	XXXIV	85	97	115	37	40	44
5	IVT22-5	JS 20-116(C)	-	2840	1333	2086.50	V	-	97	117	-	45	44

6	IVT22-6	SKAUS 3	1210	1136	593	979.67	XLIX	87	86	118	39	32	40
7	IVT22-7	RVS 12-8	1259	1926	1309	1498.00	XXXVI	81	89	115	37	39	43
8	IVT22-8	KDS 1203	2123	1210	1654	1662.33	XXVIII	93	111	117	38	43	45
9	IVT22-9	NRC 253	1580	1926	864	1456.67	XXXVIII	88	95	116	37	41	46
10	IVT22-10	MACS 1756	-	914	1580	1247.00	XLVII	-	98	114	-	46	44
11	IVT22-11	Lok Soya-2	1802	2617	1012	1810.33	XVIII	85	95	115	37	41	46
12	IVT22-12	AMS 2021-3	2099	1975	1333	1802.33	XX	88	94	116	39	47	46
13	IVT22-13	Himso 1695	1827	1778	1580	1728.33	XXIV	83	97	115	37	46	46
14	IVT22-14	TS - 156	1235	1457	1556	1416.00	XL	87	92	114	40	43	47
15	IVT22-15	NRCSL 8	-	2840	1185	2012.50	VII	-	96	117	-	41	47
16	IVT22-16	JS 24-34	1654	2296	543	1497.67	XXXVII	85	95	116	37	41	46
17	IVT22-17	RSC 10-46 (C)	1605	3457	1679	2247.00	II	91	97	116	39	47	43
18	IVT22-18	DS 1510	1210	2469	1654	1777.67	XXII	87	94	115	40	49	43
19	IVT22-19	KSS 213	-	2247	1012	1629.50	XXX	-	102	115	-	43	48
20	IVT22-20	MAUS 824	1728	2346	1580	1884.67	XIII	91	102	116	37	43	43
21	IVT22-21	NRC 254	988	2296	1037	1440.33	XXXIX	87	97	114	38	39	47
22	IVT22-22	AMS 2021-4	1704	2321	1556	1860.33	XV	87	102	116	40	49	47
23	IVT22-23	Himso 1696	1877	1975	1556	1802.67	XIX	90	105	117	37	49	43
24	IVT22-24	DS 1529	1185	2963	1580	1909.33	XI	88	102	116	39	49	47
25	IVT22-25	KDS 1188	1877	1012	1086	1325.00	XLIV	87	105	116	37	43	46
26	IVT22-26	MACS 1745	1951	617	1506	1358.00	XLII	89	99	116	43	45	45
27	IVT22-27	NRC 255	1160	2543	1012	1571.67	XXXIII	86	92	113	37	38	47
28	IVT22-28	Asb 93	1679	1556	790	1341.67	XLIII	83	88	114	35	35	42
29	IVT22-29	VLS 105	1728	1827	1185	1580.00	XXXII	89	97	116	37	43	45
30	IVT22-30	NRCSL 4	-	2321	1531	1926.00	X	-	104	116	-	43	44
31	IVT22-31	NRC 257	1457	1753	1358	1522.67	XXXV	89	100	117	40	45	46
32	IVT22-32	MAUS 814	1284	2691	1457	1810.67	XVII	88	104	114	39	45	47
33	IVT22-33	SL 1311	1333	2568	1432	1777.67	XXII	88	102	115	38	41	47
34	IVT22-34	Asb 85	1531	1358	963	1284.00	XLV	80	89	114	36	37	46
35	IVT22-35	PS 1693	1185	2691	1531	1802.33	XX	96	110	114	42	49	48
36	IVT22-36	NRC 256	1160	2247	1383	1596.67	XXXI	89	100	116	39	45	43
37	IVT22-37	RSC 1165	1531	1556	1136	1407.67	XLI	86	92	115	38	45	48
38	IVT22-38	BAUS 124	1679	2272	1951	1967.33	VIII	91	98	113	38	49	47
39	IVT22-39	DLSb 40	1210	-	469	839.50	LI	89	102	116	39	43	45
40	IVT22-40	NRC 258	2173	3111	1654	2312.67	I	84	96	116	37	43	46
41	IVT22-41	Pusa Sipani BS-9	1284	1333	568	1061.67	XLVIII	88	105	116	38	45	46
42	IVT22-42	PS 1696	1481	2444	1210	1711.67	XXVI	88	102	113	38	46	46

43	IVT22-43	CAUMS 3	-	-	864	864.00	L	-	-	115	-	-	46
44	IVT22-44	AUKS 212	1654	2420	1778	1950.67	IX	90	97	115	42	49	47
45	IVT22-45	RVSM 12-21	1605	1531	938	1358.00	XLII	83	94	115	38	41	45
46	IVT22-46	NRC 259	1556	2691	1432	1893.00	XII	89	97	117	41	49	46
47	IVT22-47	AS 34	1531	2247	1383	1720.33	XXV	87	103	119	36	43	46
48	IVT22-48	NRC 128 (C)	-	2494	1259	1876.50	XIV	-	-	117	-	49	47
49	IVT22-49	RSC 1172	-	2519	1728	2123.50	III	-	109	111	-	49	45
50	IVT22-50	AS 55	1802	2025	1753	1860.00	XVI	88	92	113	39	43	47
51	IVT22-51	TS-208	1333	1481	938	1250.67	XLVI	87	90	116	38	41	47
52	IVT22-52	NRC 260	1506	2025	1852	1794.33	XXI	94	102	114	40	42	46
53	IVT22-53	NRC 196	-	2765	1407	2086.00	VI	-	100	114	-	45	44
54	IVT22-54	Pusa Sipani-SPS-433	-	2938	1259	2098.50	IV	-	110	116	-	49	45
		GM	1532.52	2142.94	1290.76								
		CD	222.22	271.60	197.53								
		CV	11.41	8.18	9.77								
		DOS	24/08/2022	27/06/2022	23/06/2022								

Table . 2.22 Performance of Soybean Strains in IVT Normal, Zone : EZ

S.N.	Code	Strain	Plant Height			100 Seed Weight (Gm)		
			Bhawani patna	Raipur	Ranchi	Bhawanipatna	Raipur	Ranchi
			1	2	3	1	2	3
1	IVT22-1	VLS 104	29	55	53	13.95	11.44	15.62
2	IVT22-2	NRCSL 5	26	56	60	15.13	12.10	16.12
3	IVT22-3	JS 24-26	28	58	56	12.66	10.07	12.94
4	IVT22-4	NRCSL 7	29	56	55	16.12	14.31	15.68
5	IVT22-5	JS 20-116(C)	-	68	63	-	7.92	8.86
6	IVT22-6	SKAUS 3	30	50	52	25.54	22.65	29.60
7	IVT22-7	RVS 12-8	29	49	55	11.52	10.32	13.52
8	IVT22-8	KDS 1203	64	87	67	11.29	12.25	12.79
9	IVT22-9	NRC 253	26	45	44	14.58	12.31	18.23
10	IVT22-10	MACS 1756	-	65	58	-	11.00	12.72
11	IVT22-11	Lok Soya-2	29	61	56	13.14	10.09	12.27
12	IVT22-12	AMS 2021-3	36	68	68	9.39	7.25	9.49
13	IVT22-13	Himso 1695	34	65	59	9.71	8.23	10.05
14	IVT22-14	TS - 156	57	69	75	9.61	9.57	10.80
15	IVT22-15	NRCSL 8	-	58	52	-	12.86	15.59
16	IVT22-16	JS 24-34	29	46	46	12.76	12.04	11.91
17	IVT22-17	RSC 10-46 (C)	38	76	66	10.31	9.60	11.25
18	IVT22-18	DS 1510	29	68	64	8.18	6.53	9.08
19	IVT22-19	KSS 213	-	60	49	-	11.95	15.74

20	IVT22-20	MAUS 824	27	59	59	14.63	10.40	14.07
21	IVT22-21	NRC 254	29	53	50	17.11	13.62	16.16
22	IVT22-22	AMS 2021-4	34	65	66	9.17	7.96	10.56
23	IVT22-23	Himso 1696	27	54	54	10.70	9.74	10.70
24	IVT22-24	DS 1529	33	65	69	11.77	8.95	12.00
25	IVT22-25	KDS 1188	37	71	65	14.24	12.25	15.15
26	IVT22-26	MACS 1745	39	72	73	10.62	7.89	9.26
27	IVT22-27	NRC 255	25	43	50	15.60	12.76	13.96
28	IVT22-28	Asb 93	28	40	49	13.87	12.07	12.85
29	IVT22-29	VLS 105	31	44	50	14.33	12.12	15.58
30	IVT22-30	NRCSL 4	-	65	58	-	10.13	13.18
31	IVT22-31	NRC 257	35	69	67	11.20	8.57	12.73
32	IVT22-32	MAUS 814	31	67	54	14.23	10.56	12.57
33	IVT22-33	SL 1311	27	59	46	13.13	10.61	12.22
34	IVT22-34	Asb 85	37	57	51	11.47	9.30	10.73
35	IVT22-35	PS 1693	53	87	65	9.49	8.46	11.59
36	IVT22-36	NRC 256	38	64	69	11.10	8.03	12.27
37	IVT22-37	RSC 1165	29	58	60	9.94	7.58	10.30
38	IVT22-38	BAUS 124	35	69	81	12.05	9.19	12.62
39	IVT22-39	DLSb 40	32	-	62	14.74	-	10.20
40	IVT22-40	NRC 258	44	66	69	9.79	7.91	9.34
41	IVT22-41	Pusa Sipani BS-9	25	42	43	12.86	8.68	10.18
42	IVT22-42	PS 1696	32	53	56	13.10	9.46	12.75
43	IVT22-43	CAUMS 3	-	-	48	-	-	14.53
44	IVT22-44	AUKS 212	29	60	65	9.24	7.17	10.67
45	IVT22-45	RVSM 12-21	29	46	51	13.01	10.82	13.46
46	IVT22-46	NRC 259	61	83	69	9.66	8.31	11.06
47	IVT22-47	AS 34	30	58	51	11.79	9.27	10.40
48	IVT22-48	NRC 128 (C)	-	69	71	-	10.39	12.05
49	IVT22-49	RSC 1172	-	73	66	-	8.53	10.60
50	IVT22-50	AS 55	32	53	57	15.85	13.72	14.73
51	IVT22-51	TS-208	53	62	69	11.22	8.90	11.22
52	IVT22-52	NRC 260	64	61	89	13.43	9.35	15.35
53	IVT22-53	NRC 196	-	60	60	-	9.60	11.33
54	IVT22-54	Pusa Sipani-SPS-433	-	97	53	-	8.91	11.07

Table . 2.23 Performance of Soybean Strains in AVT-I + II, Zone : EZ

S.N.	Strain	Seed Yield(Kg/ha)					Days to Maturity			Days to Flower		
		Bhawanipatna	Raipur	Ranchi	Mean	Rank	Bhawanipatna	Raipur	Ranchi	Bhawanipatna	Raipur	Ranchi
		1	2	3			1	2	3	1	2	3
1	RVS 13-20	1973	1828	1028	1609.67	VII	84	97	118	35	44	44
2	CAUMS 2	1852	1650	1067	1523.00	IX	85	97	116	36	44	44
3	MAUS 791	1846	1961	1644	1817.00	IV	81	96	117	35	43	43
4	RSC 11-42 * I	2025	2917	1417	2119.67	II	86	96	117	39	44	45
5	AS 24	1829	1961	1717	1835.67	III	83	98	114	38	44	45
6	VLS 102	2025	972	472	1156.33	XIV	87	96	117	36	43	45
7	KDS 1149	1921	1189	972	1360.67	XI	84	105	114	36	47	45
8	DLSb 3	1829	1406	1094	1443.00	X	89	106	116	38	48	46
9	RSC 11-35 * II	2135	2683	2089	2302.33	I	86	105	118	40	47	45
10	NRC 128(C)	1823	2517	639	1659.67	VI	86	106	115	39	48	46
11	JS 20-116(C) I	1690	2094	972	1585.33	VIII	83	106	116	40	48	46
12	AMS 2014-1(C)	1557	1450	483	1163.33	XIII	85	106	118	37	47	47
13	MACS 1460(C)	1713	1100	1122	1311.67	XII	81	106	117	35	46	46
14	RSC 10-46(C) II	1649	2344	1094	1695.67	V	88	100	117	38	46	45
	GM	1847.64	1862.29	1129.29								
	CD	237.04	144.44	347.22								
	CV (5%)	7.59	6.01	10.02								
	DOS	30/06/2022	25/06/2022	25/06/2022								

*AVT II Entry

Table . 2.24 Performance of Soybean Strains in AVT-I + II, Zone : EZ

S.N.	Strain	Plant Height			100 Seed Weight		
		Bhawanipatna	Raipur	Ranchi	Bhawanipatna	Raipur	Ranchi
		1	2	3	1	2	3
1	RVS 13-20	37	47	52	11.67	12.36	12.90
2	CAUMS 2	43	52	50	11.35	11.26	10.11
3	MAUS 791	41	53	57	12.11	14.88	14.66
4	RSC 11-42	46	64	64	8.88	10.91	11.99
5	AS 24	41	63	61	9.19	10.64	9.84
6	VLS 102	41	41	36	12.57	11.84	14.95
7	KDS 1149	42	92	58	10.14	13.13	10.19
8	DLSb 3	63	52	67	10.79	9.09	12.22
9	RSC 11-35	53	80	76	10.11	13.44	11.53
10	NRC 128(C)	31	68	56	10.44	12.42	12.63
11	JS 20-116(C)	42	63	64	9.53	11.30	9.17
12	AMS 2014-1(C)	45	62	57	9.15	8.93	9.38
13	MACS 1460(C)	38	63	63	11.65	13.25	10.41
14	RSC 10-46(C)	39	73	75	10.99	12.60	11.83

Central Zone :

Table . 2.25 Performance of Soybean Strains in IVT Normal, Zone : CZ

S.N.	Code	Strain	Seed Yield(Kg/ha)													
			Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
			1	2	3	4	5	6	7	8	9	10	11	12		
1	IVT22-1	VLS 104	667	3432	2395	123	-	494	3802	1037	250	873	3111	519	1712.89	XLV
2	IVT22-2	NRCSL 5	2296	2765	2222	2222	1877	1901	1877	2173	861	2407	2914	2000	2289.33	XVII
3	IVT22-3	JS 24-26	1975	2938	2395	2667	2296	2617	2346	1951	1111	1667	3210	2025	2426.67	VIII
4	IVT22-4	NRCSL 7	1654	2395	1827	2222	1679	1679	2840	1704	278	2011	2988	1556	2130.22	XXVI
5	IVT22-5	JS 20-98 (C)	2099	2716	2370	2568	1160	1407	3235	2099	222	2011	2864	1457	2303.00	XV
6	IVT22-6	SKAUS 3	247	1654	1506	321	-	1457	1432	321	56	106	1728	519	996.67	LII
7	IVT22-7	RVS 12-8	1852	2790	2074	2296	642	1877	3654	1407	472	1825	3259	370	2221.89	XIX
8	IVT22-8	KDS 1203	2667	3086	2494	667	914	593	2173	1753	56	344	2815	2148	1887.44	XXXVIII
9	IVT22-9	NRC 253	1407	2444	2222	2963	617	864	1333	1259	111	1614	2494	1679	1891.11	XXXVII
10	IVT22-10	MACS 1756	247	3531	2815	123	-	568	2494	1407	83	-	2642	1407	1728.38	XLIV
11	IVT22-11	Lok Soya-2	1160	3160	2593	1531	420	420	3432	1605	361	1455	2173	988	1879.11	XXXIX

12	IVT22-12	AMS 2021-3	2765	2469	2123	1284	1111	1407	3531	1901	583	2804	2741	2667	2421.22	XI
13	IVT22-13	Himso 1695	2148	3506	2790	543	691	617	3358	2938	833	1772	2691	2272	2188.56	XXI
14	IVT22-14	TS - 156	1654	3432	2790	593	420	889	4099	1037	667	1190	2395	1728	2085.56	XXVIII
15	IVT22-15	NRCSL 8	1802	2716	2247	2914	1901	1358	2099	1605	528	1931	3284	2296	2294.11	XVI
16	IVT22-16	JS 24-34	1654	2272	1877	3062	864	1951	2593	1383	306	1746	2346	321	1980.22	XXXIII
17	IVT22-17	RSC 10-52(C)	2049	3136	2568	444	247	642	3160	2420	667	2275	3358	1802	2159.33	XXIII
18	IVT22-18	DS 1510	2765	2840	2370	1778	2049	2840	2716	1778	1472	2725	2198	2765	2555.22	IV
19	IVT22-19	KSS 213	2148	3235	2667	1531	444	963	4148	1778	472	1481	3358	1062	2288.11	XVIII
20	IVT22-20	MAUS 824 *	2642	3654	3358	1160	272	1086	3704	1852	833	3148	3556	2420	2747.56	II
21	IVT22-21	NRC 254	444	2617	2148	2864	296	889	2667	963	167	2090	2519	1556	1977.11	XXXIV
22	IVT22-22	AMS 2021-4	1802	2889	2395	938	444	1877	2741	1827	417	2672	2494	2148	2217.33	XX
23	IVT22-23	Himso 1696	1481	2469	2198	123	247	765	2864	1457	389	-	2173	1605	1709.75	XLVI
24	IVT22-24	DS 1529	1852	2198	2074	2049	864	2173	2494	2247	1611	3042	2395	2642	2324.33	XIV
25	IVT22-25	KDS 1188	543	2815	2321	346	-	543	2790	1630	83	-	2469	1778	1700.63	XLVII
26	IVT22-26	MACS 1745	617	3580	2395	49	-	741	2815	2296	139	-	2691	494	1672.75	XLVIII
27	IVT22-27	NRC 255	1160	2395	2173	2099	222	1259	2000	889	167	2566	2420	1802	1986.00	XXXII
28	IVT22-28	Asb 93	2025	2988	2469	790	642	840	2617	1481	250	503	2765	716	1745.89	XLII
29	IVT22-29	VLS 105	864	2963	1778	123	-	815	3556	1136	306	-	3383	444	1740.75	XLIII
30	IVT22-30	NRCSL 4	1556	2741	2222	963	543	889	2963	2395	1139	899	3457	840	1836.67	XL
31	IVT22-31	NRC 257	1728	2222	2123	2914	2049	2173	3235	1778	250	2169	2691	2543	2422.00	X
32	IVT22-32	MAUS 814	2395	3407	2568	2173	667	642	2395	1383	611	2434	3778	3012	2533.78	V
33	IVT22-33	SL 1311	2025	2444	2222	272	321	790	2790	2370	528	1058	2889	1926	1824.00	XLI
34	IVT22-34	Asb 85	1111	2494	2198	2420	198	914	2691	1531	444	1931	2642	1309	1967.78	XXXV
35	IVT22-35	PS 1693	1160	2222	1704	1284	-	1556	3457	1753	250	2249	2840	1753	2025.00	XXX
36	IVT22-36	NRC 256	2642	2074	1630	3086	1160	2272	2864	1037	889	2646	2321	2593	2458.67	VII
37	IVT22-37	RSC 1165	2025	2889	2321	420	444	963	3358	1827	389	1772	2963	1605	2035.11	XXIX
38	IVT22-38	BAUS 124	741	3901	3037	519	99	716	3407	1531	361	476	3506	988	1921.22	XXXVI
39	IVT22-39	DLSb 40	198	2543	1531	25	-	617	1407	741	333	-	2815	247	1172.88	LI
40	IVT22-40	NRC 258 *	2469	3556	2914	2642	1037	3333	5605	2321	1833	3624	2741	2840	3302.67	I
41	IVT22-41	PusaSipani BS-9	1062	2864	2296	593	-	617	3185	1259	83	291	2617	469	1554.89	XLIX
42	IVT22-42	PS 1696	2049	2321	1432	2469	988	1407	2691	2370	583	2302	3111	1531	2145.89	XXIV
43	IVT22-43	CAUMS 3	247	1111	173	1037	-	-	2420	444	-	-	1309	321	945.43	LIII
44	IVT22-44	AUKS 212	2790	2840	2247	1210	1111	938	3037	2148	1333	3175	2864	2667	2418.67	XII
45	IVT22-45	RVSM 12-21	1728	2716	2272	1951	494	1926	3210	1827	889	635	3111	2049	2177.56	XXII
46	IVT22-46	NRC 259 *	3086	2790	2198	1901	2593	2198	2494	1580	1000	3307	2988	3037	2666.56	III
47	IVT22-47	AS 34	1605	2840	2469	1457	691	691	3407	2148	889	847	2840	2667	2091.44	XXVII
48	IVT22-48	RVSM 2011-35 (C)	2049	2741	2247	1679	642	2074	3457	1778	361	3307	2543	1728	2425.00	IX
49	IVT22-49	RSC 1172	3086	3062	2346	889	469	765	3679	2173	278	2831	2667	3037	2484.67	VI
50	IVT22-50	AS 55	2049	3062	1531	2173	494	395	2469	1235	139	661	3877	1802	2002.11	XXXI

51	IVT22-51	TS-208	1185	2025	1728	296	123	617	3136	1086	222	1825	1432	1728	1552.44	L
52	IVT22-52	NRC 260	2716	3012	2444	765	272	1630	3778	2593	972	2751	3506	2395	2555.22	IV
53	IVT22-53	NRC 196	2222	2099	2099	2444	1111	2247	2543	2222	1667	2540	2741	2593	2392.00	XIII
54	IVT22-54	Pusa Sipani-SPS-433	2296	3111	2444	1136	173	642	3432	1333	694	1455	3111	1605	2136.89	XXV
		GM	1720.48	2780.96	2223.15	1427.98	818.14	1255.55	2957.04	1670.31	563.92	1903.04	2792.48	1712.43		
		CD	370.37	518.52	296.30	98.77	123.46	222.22	592.59	691.36	138.89	370.37	518.52	345.68		
		CV	13.48	11.71	8.07	4.21	12.00	11.41	12.48	25.80	14.32	13.44	11.21	12.68		
		DOS	08/07/2022	09/07/2022	22/07/2022	28/06/2022	02/07/2022	24/06/2022	26/06/2022	03/07/2022	25/06/2022	25/06/2022	22/06/2022	07/07/2022		

- **Data of Jabalpur and Morenacentre was rejected due to <1000Kg/ha mean yield.**
- **Data of Mandsaur was rejected due to CV >25%.**

Table . 2.26 Performance of Soybean Strains in IVT Normal, Zone V : CZ

S.N.	Code	Strain	Oil Content(%) & Oil Yield (Kg/ha)							
			Amravati	Amreli	Anand	Indore	Parbhani	Mean	Oil Yield (kg/ha)	Rank
			1	2	3	4	5			
1	IVT22-1	VLS 104	23.07	21.61	17.54	20.32	21.24	20.76	355.53	XLII
2	IVT22-2	NRCSL 5	19.92	22.12	16.83	20.25	20.68	19.96	456.95	XVIII
3	IVT22-3	JS 24-26	19.64	21.95	17.75	20.53	19.35	19.84	481.55	XIII
4	IVT22-4	NRCSL 7	20.97	22.28	16.86	19.17	20.6	19.98	425.53	XXVI
5	IVT22-5	JS 20-98 (C)	20.11	18.89	17.35	-	21.65	19.50	449.09	XXI
6	IVT22-6	SKAUS 3	21.51	20.77	17.83	19.36	20.88	20.07	200.03	LII
7	IVT22-7	RVS 12-8	20.22	21.52	19.42	19.32	20.25	20.15	447.62	XXIII
8	IVT22-8	KDS 1203	21.39	21.01	17.42	18.91	21.58	20.06	378.66	XXXVIII
9	IVT22-9	NRC 253	20.28	20.38	18	-	21.14	19.95	377.28	XLI
10	IVT22-10	MACS 1756	20.27	20.05	19.08	20.44	20.31	20.03	346.19	XLV
11	IVT22-11	Lok Soya-2	20.35	21.56	18.56	20.17	20.08	20.14	378.53	XXXIX
12	IVT22-12	AMS 2021-3	19.22	21.67	18.93	20.15	20.9	20.17	488.46	XI
13	IVT22-13	Himso 1695	20.83	22.18	19.24	20.91	20.22	20.68	452.51	XX
14	IVT22-14	TS - 156	20.42	21.72	18.63	19.25	19.47	19.90	414.98	XXX
15	IVT22-15	NRCSL 8	20.06	20.86	19.11	20.25	20.93	20.24	464.37	XV
16	IVT22-16	JS 24-34	20.35	22.61	19.1	19.24	21.57	20.57	407.41	XXXIII
17	IVT22-17	RSC 10-52(C)	19.99	20.92	15.66	19	21.21	19.36	417.96	XXVIII
18	IVT22-18	DS 1510	19.07	21.52	18.87	18.88	19.9	19.65	502.05	VII
19	IVT22-19	KSS 213	20	21.69	19.31	20.04	20.73	20.35	465.72	XIV
20	IVT22-20	MAUS 824	19.82	20.06	17.58	19.79	23.02	20.05	551.00	III
21	IVT22-21	NRC 254	22.02	20.82	17.95	19.26	18.51	19.71	389.73	XXXVI
22	IVT22-22	AMS 2021-4	19.6	21.19	17.22	18.89	19.9	19.36	429.28	XXV

23	IVT22-23	Himso 1696	20.45	20.48	17.35	19.31	21.11	19.74	337.50	XLVII
24	IVT22-24	DS 1529	21.14	20.67	18.64	18.09	20.81	19.87	461.84	XVII
25	IVT22-25	KDS 1188	19.71	20.41	17	-	19.97	19.27	327.75	LI
26	IVT22-26	MACS 1745	20.12	21.58	18.8	19.88	19.98	20.07	335.75	XLVIII
27	IVT22-27	NRC 255	20.13	21.13	19.09	19.73	21.46	20.31	403.32	XXXIV
28	IVT22-28	Asb 93	19.48	21.32	17	-	20.01	19.45	339.62	XLVI
29	IVT22-29	VLS 105	20.48	20.48	18.32	19.01	21.64	19.99	347.91	XLIV
30	IVT22-30	NRCSL 4	20.88	20.34	16.99	18.75	19.47	19.29	354.22	XLIII
31	IVT22-31	NRC 257	18.5	21.42	17.19	18.62	19.85	19.12	462.99	XVI
32	IVT22-32	MAUS 814	19.5	21.69	17.98	-	20.22	19.85	502.89	VI
33	IVT22-33	SL 1311	20.88	21.29	25.69	19.88	20.56	21.66	395.08	XXXV
34	IVT22-34	Asb 85	19.38	20.7	16.92	19.31	19.74	19.21	378.01	XL
35	IVT22-35	PS 1693	20.33	21.85	19.3	18.61	21.84	20.39	412.82	XXXII
36	IVT22-36	NRC 256	20.5	21.61	18.64	20.29	19.28	20.06	493.31	X
37	IVT22-37	RSC 1165	19.45	21.67	17.93	18.47	24.05	20.31	413.41	XXXI
38	IVT22-38	BAUS 124	20.71	20.78	17.17	-	21	19.92	382.61	XXXVII
39	IVT22-39	DLSb 40	20.51	21.64	0	18.89	21.33	16.47	193.22	LIII
40	IVT22-40	NRC 258	20.15	20.1	22.67	20.29	20.79	20.80	686.96	I
41	IVT22-41	PusaSipani BS-9	20.25	22.01	21.64	20.81	20.82	21.11	328.18	XLIX
42	IVT22-42	PS 1696	20.46	20.8	21.07	20.25	21.74	20.86	447.72	XXII
43	IVT22-43	CAUMS 3	19.79	21.55	0	18.4	21.53	16.25	153.67	LIV
44	IVT22-44	AUKS 212	21.35	21.91	19.4	21.09	22.5	21.25	513.97	V
45	IVT22-45	RVSM 12-21	20.27	22.35	19.99	19.69	22.49	20.96	456.37	XIX
46	IVT22-46	NRC 259	19.44	22.16	21.17	19.84	21.87	20.90	557.20	II
47	IVT22-47	AS 34	19.78	20.81	20.65	20.46	19.69	20.28	424.10	XXVII
48	IVT22-48	RVSM 2011-35 (C)	19.62	21.48	21.04	19.83	20.53	20.50	497.13	IX
49	IVT22-49	RSC 1172	19.02	21.13	18.95	20.23	21.1	20.09	499.07	VIII
50	IVT22-50	AS 55	20.77	22.07	20.01	20.51	20.49	20.77	415.84	XXIX
51	IVT22-51	TS-208	20.67	22.37	21.7	19.79	21.14	21.13	328.09	L
52	IVT22-52	NRC 260	19.81	22.1	19.1	19.57	21.18	20.35	520.04	IV
53	IVT22-53	NRC 196	18.89	23.11	19.63	19.91	20.31	20.37	487.25	XII
54	IVT22-54	Pusa Sipani-SPS-433	19.41	21.45	18.76	20.32	21.91	20.37	435.28	XXIV
		Mean	20.20	21.33	18.11	19.67	20.82			

Table . 2. 27 Performance of Soybean Strains in IVT Normal, Zone : CZ

S.N.	Code	Strain	Days to Maturity								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-1	VLS 104	102	101	105	113	101	108	94	101	100
2	IVT22-2	NRCSL 5	102	96	102	106	104	108	104	96	100
3	IVT22-3	JS 24-26	104	97	102	110	101	106	95	98	96
4	IVT22-4	NRCSL 7	98	92	96	103	104	104	95	95	98
5	IVT22-5	JS 20-98 (C)	105	100	99	111	99	106	101	100	98
6	IVT22-6	SKAUS 3	81	85	89	92	96	84	81	92	91
7	IVT22-7	RVS 12-8	103	89	92	104	99	95	82	99	96
8	IVT22-8	KDS 1203	100	104	94	116	96	112	100	101	105
9	IVT22-9	NRC 253	103	103	91	103	104	109	103	97	101
10	IVT22-10	MACS 1756	104	95	107	119	99	109	103	102	102
11	IVT22-11	Lok Soya-2	104	91	96	112	99	107	92	97	104
12	IVT22-12	AMS 2021-3	107	102	107	116	104	108	107	104	105
13	IVT22-13	Himso 1695	103	101	101	103	104	107	100	100	104
14	IVT22-14	TS - 156	90	97	108	102	96	95	84	100	97
15	IVT22-15	NRCSL 8	104	96	90	111	104	107	103	95	103
16	IVT22-16	JS 24-34	90	92	85	102	96	97	83	94	94
17	IVT22-17	RSC 10-52(C)	109	104	110	111	100	116	107	101	107
18	IVT22-18	DS 1510	110	101	108	115	104	108	108	106	103
19	IVT22-19	KSS 213	110	102	101	115	104	111	104	100	106
20	IVT22-20	MAUS 824	111	103	104	117	99	116	107	99	106
21	IVT22-21	NRC 254	100	92	92	102	96	103	83	94	96
22	IVT22-22	AMS 2021-4	96	101	108	117	104	107	104	104	103
23	IVT22-23	Himso 1696	104	106	105	116	103	119	93	101	106
24	IVT22-24	DS 1529	106	101	108	113	105	107	110	102	103
25	IVT22-25	KDS 1188	102	98	104	112	96	104	100	99	103
26	IVT22-26	MACS 1745	98	98	113	118	97	109	-	106	102
27	IVT22-27	NRC 255	94	93	89	102	96	96	116	93	93
28	IVT22-28	Asb 93	94	92	99	102	95	94	84	102	93
29	IVT22-29	VLS 105	95	100	94	113	99	108	115	100	100
30	IVT22-30	NRCSL 4	103	106	99	105	104	110	101	98	101
31	IVT22-31	NRC 257	108	99	104	110	104	107	103	102	100
32	IVT22-32	MAUS 814	108	100	104	112	99	111	104	100	103
33	IVT22-33	SL 1311	108	101	101	103	101	113	97	100	102
34	IVT22-34	Asb 85	95	86	91	103	97	93	84	98	93
35	IVT22-35	PS 1693	109	109	107	118	101	116	109	102	109
36	IVT22-36	NRC 256	108	100	101	111	99	104	102	103	103
37	IVT22-37	RSC 1165	108	97	104	103	100	109	93	102	103
38	IVT22-38	BAUS 124	109	104	110	118	100	118	-	103	104
39	IVT22-39	DLSb 40	90	96	103	102	102	100	-	102	102

40	IVT22-40	NRC 258	108	98	106	103	100	107	98	101	98
41	IVT22-41	PusaSipani BS-9	103	100	98	111	97	112	104	100	106
42	IVT22-42	PS 1696	109	102	101	113	97	109	104	99	105
43	IVT22-43	CAUMS 3	108	107	108	119	-	111	-	100	105
44	IVT22-44	AUKS 212	108	100	111	114	99	109	111	100	104
45	IVT22-45	RVSM 12-21	100	91	103	103	102	99	95	99	99
46	IVT22-46	NRC 259	108	100	111	113	97	115	112	104	104
47	IVT22-47	AS 34	103	101	99	111	102	109	99	98	103
48	IVT22-48	RVSM 2011-35 (C)	103	100	99	103	102	107	102	99	101
49	IVT22-49	RSC 1172	108	109	112	116	104	118	112	104	110
50	IVT22-50	AS 55	95	90	86	103	101	99	86	98	98
51	IVT22-51	TS-208	94	90	101	102	101	99	96	100	97
52	IVT22-52	NRC 260	108	104	106	118	105	116	112	100	105
53	IVT22-53	NRC 196	98	98	102	102	100	108	99	98	98
54	IVT22-54	Pusa Sipani-SPS-433	109	100	105	112	99	117	101	99	102

Table . 2.28 Performance of Soybean Strains in IVT Normal, Zone : CZ

S.N.	Code	Strain	Days to Flowering								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-1	VLS 104	41	42	46	45	50	44	42	42	41
2	IVT22-2	NRCSL 5	38	39	42	41	48	43	39	37	38
3	IVT22-3	JS 24-26	38	41	40	42	48	45	41	38	37
4	IVT22-4	NRCSL 7	36	36	40	37	50	43	37	36	36
5	IVT22-5	JS 20-98 (C)	40	40	41	42	46	44	40	39	39
6	IVT22-6	SKAUS 3	34	31	38	34	39	33	34	33	30
7	IVT22-7	RVS 12-8	38	40	40	43	46	41	41	39	37
8	IVT22-8	KDS 1203	41	39	41	42	46	42	42	41	39
9	IVT22-9	NRC 253	38	38	39	37	49	44	39	37	35
10	IVT22-10	MACS 1756	44	45	49	48	48	44	49	43	41
11	IVT22-11	Lok Soya-2	40	41	42	43	48	44	42	38	40
12	IVT22-12	AMS 2021-3	45	47	50	49	50	47	53	45	45
13	IVT22-13	Himso 1695	41	42	42	42	48	46	43	39	36
14	IVT22-14	TS - 156	43	41	44	49	48	43	45	41	43
15	IVT22-15	NRCSL 8	36	37	39	42	40	42	37	36	36
16	IVT22-16	JS 24-34	35	36	37	38	39	37	36	34	35
17	IVT22-17	RSC 10-52(C)	44	47	49	47	50	43	45	42	44
18	IVT22-18	DS 1510	46	47	49	49	50	55	46	46	44
19	IVT22-19	KSS 213	44	42	43	45	46	45	43	41	40
20	IVT22-20	MAUS 824	45	41	42	41	48	43	43	40	39

21	**IVT22-21**	**NRC 254**	**36**	**36**	**39**	**37**	**39**	**41**	**37**	**34**	**34**
22	**IVT22-22**	**AMS 2021-4**	**45**	**46**	**49**	**47**	**52**	**43**	**45**	**44**	**47**
23	**IVT22-23**	**Himso 1696**	**44**	**42**	**43**	**43**	**48**	**44**	**43**	**41**	**40**
24	**IVT22-24**	**DS 1529**	**46**	**45**	**47**	**47**	**50**	**49**	**47**	**42**	**46**
25	**IVT22-25**	**KDS 1188**	**43**	**40**	**43**	**42**	**50**	**41**	**42**	**40**	**40**
26	**IVT22-26**	**MACS 1745**	**47**	**48**	**50**	**49**	**46**	**49**	**53**	**47**	**48**
27	**IVT22-27**	**NRC 255**	**35**	**34**	**37**	**36**	**39**	**36**	**32**	**34**	**33**
28	**IVT22-28**	**Asb 93**	**39**	**40**	**41**	**45**	**44**	**43**	**43**	**42**	**39**
29	**IVT22-29**	**VLS 105**	**45**	**38**	**40**	**46**	**46**	**44**	**42**	**41**	**37**
30	**IVT22-30**	**NRCSL 4**	**37**	**40**	**42**	**41**	**45**	**44**	**41**	**38**	**37**
31	**IVT22-31**	**NRC 257**	**42**	**42**	**44**	**49**	**46**	**43**	**45**	**43**	**41**
32	**IVT22-32**	**MAUS 814**	**42**	**42**	**44**	**43**	**46**	**43**	**42**	**42**	**39**
33	**IVT22-33**	**SL 1311**	**39**	**41**	**43**	**43**	**48**	**44**	**42**	**40**	**38**
34	**IVT22-34**	**Asb 85**	**38**	**37**	**39**	**41**	**39**	**37**	**39**	**39**	**34**
35	**IVT22-35**	**PS 1693**	**45**	**43**	**45**	**49**	**48**	**48**	**47**	**43**	**44**
36	**IVT22-36**	**NRC 256**	**45**	**41**	**42**	**48**	**46**	**43**	**44**	**43**	**41**
37	**IVT22-37**	**RSC 1165**	**45**	**42**	**42**	**48**	**46**	**41**	**45**	**43**	**44**
38	**IVT22-38**	**BAUS 124**	**45**	**45**	**46**	**49**	**48**	**55**	**46**	**44**	**46**
39	**IVT22-39**	**DLSb 40**	**43**	**42**	**44**	**46**	**49**	**43**	**44**	**44**	**44**
40	**IVT22-40**	**NRC 258**	**43**	**45**	**48**	**46**	**50**	**44**	**46**	**41**	**41**
41	**IVT22-41**	**PusaSipani BS-9**	**42**	**43**	**43**	**46**	**46**	**42**	**42**	**41**	**42**
42	**IVT22-42**	**PS 1696**	**40**	**41**	**42**	**41**	**46**	**44**	**42**	**39**	**41**
43	**IVT22-43**	**CAUMS 3**	**42**	**43**	**45**	**41**	**-**	**44**	**43**	**40**	**41**
44	**IVT22-44**	**AUKS 212**	**44**	**49**	**48**	**46**	**46**	**49**	**50**	**41**	**46**
45	**IVT22-45**	**RVSM 12-21**	**44**	**39**	**41**	**43**	**50**	**43**	**41**	**40**	**39**
46	**IVT22-46**	**NRC 259**	**45**	**49**	**52**	**50**	**46**	**52**	**51**	**45**	**47**
47	**IVT22-47**	**AS 34**	**42**	**41**	**44**	**43**	**50**	**43**	**42**	**38**	**41**
48	**IVT22-48**	**RVSM 2011-35 (C)**	**42**	**40**	**42**	**43**	**48**	**46**	**42**	**39**	**41**
49	**IVT22-49**	**RSC 1172**	**45**	**52**	**51**	**50**	**50**	**50**	**52**	**46**	**47**
50	**IVT22-50**	**AS 55**	**39**	**39**	**37**	**39**	**48**	**42**	**36**	**38**	**35**
51	**IVT22-51**	**TS-208**	**42**	**40**	**42**	**43**	**50**	**39**	**42**	**40**	**38**
52	**IVT22-52**	**NRC 260**	**44**	**43**	**46**	**43**	**51**	**48**	**44**	**41**	**41**
53	**IVT22-53**	**NRC 196**	**43**	**41**	**43**	**42**	**50**	**44**	**42**	**38**	**40**
54	**IVT22-54**	**Pusa Sipani-SPS-433**	**43**	**41**	**44**	**43**	**46**	**41**	**43**	**39**	**41**

Table . 2.29 Performance of Soybean Strains in IVT Normal, Zone V : CZ

S.N.	Code	Strain	Plant Height (Cm)								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-1	VLS 104	45	55	59	53	48	49	37	49	32
2	IVT22-2	NRCSL 5	42	50	50	48	57	43	36	47	40
3	IVT22-3	JS 24-26	41	73	82	62	65	36	39	52	50
4	IVT22-4	NRCSL 7	34	57	59	51	63	41	42	54	38
5	IVT22-5	JS 20-98 (C)	41	48	52	64	57	51	34	51	37
6	IVT22-6	SKAUS 3	31	37	51	53	36	31	40	51	33
7	IVT22-7	RVS 12-8	43	46	47	65	48	39	42	51	48
8	IVT22-8	KDS 1203	55	108	93	82	68	89	95	99	67
9	IVT22-9	NRC 253	34	50	61	64	42	36	35	31	34
10	IVT22-10	MACS 1756	48	68	67	51	56	51	49	54	59
11	IVT22-11	Lok Soya-2	42	54	59	76	52	47	54	48	48
12	IVT22-12	AMS 2021-3	50	78	62	59	64	79	59	62	57
13	IVT22-13	Himso 1695	44	79	70	59	69	64	41	51	62
14	IVT22-14	TS - 156	47	89	85	73	76	66	46	89	62
15	IVT22-15	NRCSL 8	45	51	55	47	58	37	42	50	44
16	IVT22-16	JS 24-34	34	45	55	52	55	27	38	49	42
17	IVT22-17	RSC 10-52(C)	45	87	84	62	64	52	51	72	54
18	IVT22-18	DS 1510	49	74	74	62	65	44	50	59	61
19	IVT22-19	KSS 213	48	52	59	61	58	52	47	52	51
20	IVT22-20	MAUS 824	43	51	60	60	64	48	49	50	49
21	IVT22-21	NRC 254	29	50	65	43	54	39	42	46	38
22	IVT22-22	AMS 2021-4	50	85	79	69	74	58	49	57	51
23	IVT22-23	Himso 1696	35	63	77	41	63	59	36	41	72
24	IVT22-24	DS 1529	44	51	63	73	79	69	52	46	57
25	IVT22-25	KDS 1188	47	78	85	62	66	54	53	51	63
26	IVT22-26	MACS 1745	49	73	76	68	73	62	-	58	70
27	IVT22-27	NRC 255	42	41	49	35	45	33	42	31	43
28	IVT22-28	Asb 93	37	41	49	49	47	35	35	49	47
29	IVT22-29	VLS 105	38	48	50	33	42	45	48	39	36
30	IVT22-30	NRCSL 4	35	48	48	68	73	38	51	49	43
31	IVT22-31	NRC 257	47	68	73	70	79	55	68	60	45
32	IVT22-32	MAUS 814	44	64	68	82	57	57	45	59	37
33	IVT22-33	SL 1311	43	43	46	50	61	39	32	51	31
34	IVT22-34	Asb 85	38	45	49	64	52	39	43	49	62
35	IVT22-35	PS 1693	49	94	79	71	72	86	62	91	77
36	IVT22-36	NRC 256	50	73	59	72	83	60	50	57	62
37	IVT22-37	RSC 1165	48	56	59	61	70	41	48	50	47
38	IVT22-38	BAUS 124	44	80	50	66	78	85	58	58	75
39	IVT22-39	DLSb 40	42	77	62	50	61	50	-	61	36

40	IVT22-40	NRC 258	35	76	69	63	85	66	54	62	59
41	IVT22-41	PusaSipani BS-9	36	48	58	41	50	38	33	33	34
42	IVT22-42	PS 1696	37	60	64	47	64	44	45	49	43
43	IVT22-43	CAUMS 3	47	45	51	42	-	38	35	38	42
44	IVT22-44	AUKS 212	35	76	68	62	69	59	50	68	59
45	IVT22-45	RVSM 12-21	63	43	46	63	61	39	41	48	46
46	IVT22-46	NRC 259	36	100	86	64	77	76	59	79	72
47	IVT22-47	AS 34	36	52	65	62	65	40	48	47	48
48	IVT22-48	RVSM 2011-35 (C)	40	51	58	62	72	57	46	50	41
49	IVT22-49	RSC 1172	53	95	90	62	77	66	61	60	57
50	IVT22-50	AS 55	46	64	78	54	42	40	35	43	37
51	IVT22-51	TS-208	50	77	79	58	56	65	35	63	78
52	IVT22-52	NRC 260	57	115	95	64	109	91	71	100	65
53	IVT22-53	NRC 196	37	57	105	54	72	44	43	43	60
54	IVT22-54	Pusa Sipani-SPS-433	33	55	85	64	53	55	56	43	42

Table . 2.30 Performance of Soybean Strains in IVT Normal, Zone : CZ

S.N.	Code	Strain	100 seed Weight (Gm)								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-1	VLS 104	9.41	14.51	13.74	10.00	10.07	14.33	6.90	15.43	10.17
2	IVT22-2	NRCSL 5	15.90	14.86	13.83	14.72	13.90	17.00	13.17	16.61	13.25
3	IVT22-3	JS 24-26	13.19	11.90	11.24	13.19	11.30	13.50	9.77	12.89	10.30
4	IVT22-4	NRCSL 7	16.34	17.02	16.20	16.64	13.57	18.17	10.97	18.12	13.70
5	IVT22-5	JS 20-98 (C)	12.54	10.79	10.41	10.99	11.43	12.17	8.00	12.04	9.16
6	IVT22-6	SKAUS 3	22.53	30.32	28.32	13.60	11.07	20.67	19.10	30.55	21.40
7	IVT22-7	RVS 12-8	12.41	12.14	11.35	11.79	12.17	12.33	9.63	14.15	11.24
8	IVT22-8	KDS 1203	12.82	11.55	11.23	8.65	10.73	14.50	8.27	13.96	10.27
9	IVT22-9	NRC 253	17.40	17.27	15.91	15.51	11.63	14.50	11.90	18.30	12.12
10	IVT22-10	MACS 1756	9.47	11.75	10.72	9.08	10.57	15.17	-	12.53	7.20
11	IVT22-11	Lok Soya-2	11.35	12.81	11.84	9.09	9.23	14.00	7.40	13.63	10.21
12	IVT22-12	AMS 2021-3	10.51	7.56	9.22	8.03	10.00	8.83	8.10	9.52	10.84
13	IVT22-13	Himso 1695	12.01	9.80	9.46	6.98	8.97	9.33	8.30	12.22	10.10
14	IVT22-14	TS - 156	11.76	10.63	10.54	8.58	10.10	11.83	6.77	11.63	11.07
15	IVT22-15	NRCSL 8	15.52	15.21	14.13	16.35	9.70	16.83	12.97	16.21	13.72
16	IVT22-16	JS 24-34	12.57	13.39	12.95	15.12	10.87	13.17	9.90	12.57	11.29
17	IVT22-17	RSC 10-52(C)	13.58	11.49	11.27	8.10	10.70	14.17	9.37	13.16	11.11
18	IVT22-18	DS 1510	10.49	7.95	8.00	8.45	9.47	9.17	7.93	8.47	10.25

19	IVT22-19	KSS 213	14.27	15.99	14.96	10.63	10.63	17.33	10.63	14.62	12.00
20	IVT22-20	MAUS 824	16.55	15.66	14.82	12.57	11.63	17.17	12.37	15.89	13.98
21	IVT22-21	NRC 254	14.61	17.70	15.80	13.66	12.30	15.33	8.50	17.06	14.06
22	IVT22-22	AMS 2021-4	10.86	8.28	9.19	8.29	8.57	8.67	9.83	9.49	9.22
23	IVT22-23	Himso 1696	10.51	9.45	9.18	8.52	8.27	12.50	-	11.76	10.19
24	IVT22-24	DS 1529	12.71	10.88	10.20	11.61	9.63	10.17	10.63	11.45	11.25
25	IVT22-25	KDS 1188	14.54	13.37	12.81	10.20	8.17	15.17	-	15.13	13.21
26	IVT22-26	MACS 1745	9.83	9.55	9.88	8.54	10.23	13.00	-	10.11	8.26
27	IVT22-27	NRC 255	16.08	15.23	14.18	14.28	12.37	15.33	12.00	17.37	14.52
28	IVT22-28	Asb 93	13.77	13.68	12.66	9.57	10.00	13.17	9.37	13.81	11.15
29	IVT22-29	VLS 105	9.56	14.30	13.84	11.46	8.80	16.67	-	15.77	10.17
30	IVT22-30	NRCSL 4	10.90	13.76	12.78	8.13	7.83	15.33	6.97	13.12	11.12
31	IVT22-31	NRC 257	12.53	10.41	10.05	10.71	11.10	12.50	9.40	11.76	10.21
32	IVT22-32	MAUS 814	15.84	12.77	11.59	14.37	10.07	14.33	10.53	15.26	13.50
33	IVT22-33	SL 1311	14.93	13.79	13.10	10.41	10.37	14.00	5.90	12.50	11.17
34	IVT22-34	Asb 85	9.76	11.24	10.88	13.29	9.60	10.50	9.17	11.37	11.17
35	IVT22-35	PS 1693	11.33	8.72	9.37	9.16	10.30	10.67	8.43	12.02	9.19
36	IVT22-36	NRC 256	12.56	9.06	8.30	11.28	10.63	8.17	8.47	10.41	11.15
37	IVT22-37	RSC 1165	11.88	10.02	9.80	7.90	9.17	12.17	6.67	11.20	9.04
38	IVT22-38	BAUS 124	8.47	10.81	10.39	9.81	7.90	10.67	8.77	12.68	10.17
39	IVT22-39	DLSb 40	11.58	13.20	12.30	9.56	10.73	14.33	-	13.12	10.15
40	IVT22-40	NRC 258	11.35	10.11	9.63	9.46	10.20	12.00	6.87	9.64	10.11
41	IVT22-41	PusaSipani BS-9	11.61	12.25	11.85	8.92	8.53	13.83	7.07	12.07	10.25
42	IVT22-42	PS 1696	13.59	12.96	12.63	11.41	11.47	14.17	9.90	12.99	12.17
43	IVT22-43	CAUMS 3	14.86	14.13	13.34	13.69	-	13.67	10.40	15.08	13.17
44	IVT22-44	AUKS 212	10.03	8.40	8.76	8.26	7.17	9.83	7.97	11.02	10.08
45	IVT22-45	RVSM 12-21	12.78	12.16	11.18	12.37	11.17	12.83	9.60	13.16	12.10
46	IVT22-46	NRC 259	11.75	8.28	8.92	9.80	10.87	10.33	9.67	11.79	11.17
47	IVT22-47	AS 34	12.02	11.86	11.44	8.34	9.80	14.67	6.57	11.47	10.04
48	IVT22-48	RVSM 2011-35 (C)	13.71	13.63	13.27	14.17	10.83	15.00	10.63	13.49	12.14
49	IVT22-49	RSC 1172	11.36	8.47	8.95	8.22	9.20	11.00	8.57	9.46	11.20
50	IVT22-50	AS 55	15.57	15.22	14.15	13.71	9.10	14.50	10.90	17.47	14.68
51	IVT22-51	TS-208	9.70	10.18	9.98	7.74	7.17	10.33	5.80	10.42	10.10
52	IVT22-52	NRC 260	15.00	11.88	11.24	9.35	11.70	12.00	13.43	14.87	12.70
53	IVT22-53	NRC 196	12.54	9.16	9.85	9.47	10.30	11.83	7.67	12.01	10.15
54	IVT22-54	Pusa Sipani-SPS-433	12.10	12.15	11.82	8.61	9.07	13.33	7.17	12.07	8.99

Table . 2.31 Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Seed Yield (Kg/ha)												
			Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Parbhani	Sehore	Mean	Rank
			1	2	3	4	5	6	7	8	9	10	11		
1	IVT22-E-1	KDS 1271	1802	2691	2000	1728	420	741	1704	2346	83	2074	2000	1898.44	XVIII
2	IVT22-E-2	NRC 261	1728	2000	1556	2123	1037	988	2272	1432	333	3679	2395	2019.22	XVI
3	IVT22-E-3	RVS 15-1	2667	2963	2321	2568	1185	1506	4025	2074	722	3506	2716	2705.11	II
4	IVT22-E-4	MAUS 820	2272	3506	2395	1086	568	1062	3654	2173	167	3728	1432	2367.56	X
5	IVT22-E-5	DS 1550	2593	3333	1975	2222	1531	2321	3877	1802	1472	2889	1901	2545.89	VII
6	IVT22-E-6	NRC 164 *	2642	3630	1852	3457	-	1111	2568	2148	83	2963	2667	2559.78	VI
7	IVT22-E-7	AMS 2022-1	2790	3753	2667	1185	1852	1457	3136	1901	306	3728	2667	2587.11	V
8	IVT22-E-8	JS 24-33	2222	2938	1802	3679	1679	1901	2222	1704	194	2889	1802	2351.00	XII
9	IVT22-E-9	NRC 138 (C)	1975	2617	2049	2444	914	1951	1531	1309	333	3086	1679	2071.22	XV
10	IVT22-E-10	KDS 1275	2889	3407	2395	198	321	420	4741	1481	361	2790	1062	2153.67	XIII
11	IVT22-E-11	MAUS 749	2222	3679	2543	494	617	593	4593	1284	750	3259	2519	2354.00	XI
12	IVT22-E-12	DS 1547	2790	2691	2074	2198	1556	2593	4173	2444	972	3235	2593	2754.56	I
13	IVT22-E-13	MACS 1779	2346	3457	2593	420	296	938	4963	1827	56	3235	1531	2367.78	IX
14	IVT22-E-14	JS 24-25	1358	2222	1556	2148	1432	593	1778	1457	83	2568	741	1602.33	XXII
15	IVT22-E-15	RSC 11-75	2790	2395	2049	1704	716	1333	4099	2815	278	3531	3012	2636.44	IV
16	IVT22-E-16	AS 26	1901	2296	1630	2494	321	691	2444	1704	222	2938	1531	1958.78	XVII
17	IVT22-E-17	NRC 141	2025	2691	1728	1556	543	519	2444	667	83	2741	2025	1821.78	XX
18	IVT22-E-18	NRC 152 (C)	1062	2469	1753	494	-	617	1852	1457	139	2198	642	1393.78	XXIV
19	IVT22-E-19	AUKS 234	2765	3407	2519	1605	469	2025	3778	1704	528	2889	3259	2661.22	III
20	IVT22-E-20	NRC 263	1185	3210	2173	2519	-	617	1852	1975	750	2617	889	1893.00	XIX

21	IVT22-E-21	AS 47	1679	3037	2370	1753	272	741	2469	1432	139	3383	2049	2101.44	XIV
22	IVT22-E-22	JS 20-34 (C)	1185	2420	2247	1852	617	593	2272	1728	111	2123	1704	1791.56	XXI
23	IVT22-E-23	DLSb 40	914	2543	2173	99	-	667	2272	1728	28	3383	123	1544.67	XXIII
24	IVT22-E-24	AUKS 238	2642	2889	2247	1481	-	1877	4049	1926	1222	2593	3037	2526.78	VIII
		GM	2101.83	2926.83	2111.13	1729.46	*860.32*	1160.63	3032.00	1771.58	*392.29*	3001.04	1915.67		
		CD	370.37	493.83	271.60	98.77	172.84	197.53	567.90	271.60	83.33	469.14	320.99		
		CV	10.73	10.43	7.53	3.26	15.40	10.36	11.44	9.04	11.03	9.69	9.87		
		DOS	09/07/2022	09/07/2022	22/07/2022	28/06/2022	02/07/2022	24/06/2022	25/06/2022	03/07/2022	26/06/2022	23/06/2022	07/07/2022		

- **Data of Jabalpur and Morenacentre was rejected due to <1000Kg/ha grain yield.**
- **Nagpur centre could not conduct trail.**
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Table . 2.32 Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Oil Content %& Yield (Kg/ha)								
			Amravati	Amreli	Anand	Indore	Parbhani	Mean	Mean seed yield (kg/ha)	Oil Yield (kg/ha)	Rank
			1	2	3	4	8				
1	IVT22-E-1	KDS 1271	18.56	22.00	20.14	19.10	18.72	19.70	1898.44	374.08	XX
2	IVT22-E-2	NRC 261	20.01	22.38	19.60	17.86	19.78	19.93	2019.22	402.35	XVII
3	IVT22-E-3	RVS 15-1	20.21	23.00	21.95	20.10	20.30	21.11	2705.11	571.09	II
4	IVT22-E-4	MAUS 820	21.43	20.48	22.52	18.97	21.90	21.06	2367.56	498.54	X
5	IVT22-E-5	DS 1550	20.10	21.95	21.54	18.46	20.17	20.44	2545.89	520.49	VII
6	IVT22-E-6	NRC 164	19.95	22.61	18.86	20.02	20.41	20.37	2559.78	521.43	VI
7	IVT22-E-7	AMS 2022-1	19.18	21.37	19.63	19.43	21.47	20.21	2587.11	522.97	V
8	IVT22-E-8	JS 24-33	18.85	22.05	22.95	19.85	22.02	21.14	2351	497.10	XI
9	IVT22-E-9	NRC 138 (C)	18.92	20.45	20.63	19.53	20.67	20.04	2071.22	415.07	XVI
10	IVT22-E-10	KDS 1275	18.51	22.30	20.10	20.51	20.15	20.31	2153.67	437.43	XIV
11	IVT22-E-11	MAUS 749	21.76	21.46	20.21	20.28	23.11	21.36	2354	502.87	IX
12	IVT22-E-12	DS 1547	19.66	20.96	21.03	20.51	22.16	20.86	2754.56	574.72	I
13	IVT22-E-13	MACS 1779	19.46	22.54	18.92	19.65	20.10	20.13	2367.78	476.70	XII
14	IVT22-E-14	JS 24-25	21.71	21.78	20.66	20.24	20.81	21.04	1602.33	337.12	XXII
15	IVT22-E-15	RSC 11-75	19.61	21.76	21.30	19.92	20.90	20.70	2636.44	545.72	IV
16	IVT22-E-16	AS 26	21.29	20.43	22.39	20.13	21.73	21.19	1958.78	415.15	XV
17	IVT22-E-17	NRC 141	19.46	21.04	20.33	19.84	21.38	20.41	1821.78	371.83	XXI
18	IVT22-E-18	NRC 152 (C)	19.16	22.51	21.67	21.31	20.71	21.07	1393.78	293.70	XXIV
19	IVT22-E-19	AUKS 234	20.18	21.39	21.12	20.18	20.92	20.76	2661.22	552.43	III

20	IVT22-E-20	NRC 263	22.62	22.43	19.52	20.32	19.59	20.90	1893	395.60	XVIII
21	IVT22-E-21	AS 47	20.22	23.03	22.13	21.12	22.90	21.88	2101.44	459.78	XIII
22	IVT22-E-22	JS 20-34 (C)	20.93	23.17	21.65	20.62	20.96	21.47	1791.56	384.61	XIX
23	IVT22-E-23	DLSb 40	21.89	22.20	18.99	19.67	20.68	20.69	1544.67	319.56	XXIII
24	IVT22-E-24	AUKS 238	19.67	22.57	17.88	20.52	20.40	20.21	2526.78	510.62	VIII
	Mean		20.14	21.91	20.66	19.92	20.91				

Table . 2.33 Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Days To Maturity								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-E-1	KDS 1271	94.33	88.67	85.00	91.00	91.67	89.67	89.00	87.67	92.67
2	IVT22-E-2	NRC 261	96.00	92.33	90.67	105.00	102.67	105.33	91.00	97.33	99.67
3	IVT22-E-3	RVS 15-1	94.33	91.00	105.67	103.00	96.67	98.00	95.67	101.33	100.67
4	IVT22-E-4	MAUS 820	96.00	101.67	102.67	114.00	90.67	105.33	101.67	94.67	99.00
5	IVT22-E-5	DS 1550	96.33	98.33	105.33	112.00	104.33	102.67	103.00	99.67	99.33
6	IVT22-E-6	NRC 164 *	88.00	83.33	87.33	98.00	92.67	84.33	92.33	86.67	95.33
7	IVT22-E-7	AMS 2022-1	91.00	92.33	95.67	102.00	97.67	99.33	97.00	102.33	100.67
8	IVT22-E-8	JS 24-33	87.00	87.33	96.67	95.00	95.67	88.33	88.00	88.67	88.00
9	IVT22-E-9	NRC 138 (C)	96.00	91.33	95.67	102.33	100.67	100.33	91.67	90.33	95.00
10	IVT22-E-10	KDS 1275	97.00	98.00	100.00	109.33	103.67	110.33	98.33	98.33	103.33
11	IVT22-E-11	MAUS 749	96.00	97.67	101.33	101.00	102.67	105.00	98.67	95.67	102.00
12	IVT22-E-12	DS 1547	96.00	94.00	104.67	108.00	101.67	101.67	99.00	101.33	99.33
13	IVT22-E-13	MACS 1779	94.00	90.67	102.33	112.00	93.33	98.33	98.00	100.33	98.33
14	IVT22-E-14	JS 24-25	80.00	85.67	88.33	95.00	107.33	80.33	87.00	89.67	97.00
15	IVT22-E-15	RSC 11-75	98.00	100.00	100.67	112.67	105.67	105.33	105.33	102.33	106.33
16	IVT22-E-16	AS 26	82.00	86.67	85.00	96.67	101.67	88.00	90.67	88.33	91.67
17	IVT22-E-17	NRC 141	83.00	78.33	87.67	95.00	92.33	83.33	89.33	87.33	92.00
18	IVT22-E-18	NRC 152 (C)	89.00	85.67	90.67	95.00	102.67	87.33	89.67	86.33	91.00
19	IVT22-E-19	AUKS 234	101.00	99.67	108.33	112.33	103.33	105.33	102.33	102.33	105.33
20	IVT22-E-20	NRC 263	81.00	83.00	85.00	95.00	93.33	79.33	87.67	87.67	89.00
21	IVT22-E-21	AS 47	86.00	84.67	89.67	95.00	99.67	89.67	89.33	89.67	95.33
22	IVT22-E-22	JS 20-34 (C)	86.00	84.67	85.67	98.00	93.67	91.00	88.33	89.00	87.00
23	IVT22-E-23	DLSb 40	94.33	93.00	100.67	112.33	95.67	98.00	99.00	103.00	99.00
24	IVT22-E-24	AUKS 238	101.00	101.33	108.33	114.33	104.33	105.00	100.00	106.00	104.33

Table . 2.34 Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Days To Flowering								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-E-1	KDS 1271	27	29	33	31	36	33	37	30	32
2	IVT22-E-2	NRC 261	37	37	36	41	40	39	45	38	39
3	IVT22-E-3	RVS 15-1	39	40	42	46	42	43	44	43	44
4	IVT22-E-4	MAUS 820	31	35	40	38	38	40	36	33	36
5	IVT22-E-5	DS 1550	35	38	40	41	42	42	43	40	38
6	IVT22-E-6	NRC 164	36	33	36	41	35	37	44	28	37
7	IVT22-E-7	AMS 2022-1	41	40	39	47	42	42	45	42	44
8	IVT22-E-8	JS 24-33	31	34	37	39	38	37	41	30	35
9	IVT22-E-9	NRC 138 (C)	31	31	35	35	36	34	35	32	35
10	IVT22-E-10	KDS 1275	37	38	41	41	42	41	44	39	39
11	IVT22-E-11	MAUS 749	37	40	43	45	39	42	43	36	44
12	IVT22-E-12	DS 1547	42	42	44	44	40	43	40	41	44
13	IVT22-E-13	MACS 1779	37	38	40	45	42	41	45	41	34
14	IVT22-E-14	JS 24-25	31	30	34	38	35	33	34	31	39
15	IVT22-E-15	RSC 11-75	44	42	44	46	42	43	40	44	45
16	IVT22-E-16	AS 26	34	31	34	38	34	34	35	30	34
17	IVT22-E-17	NRC 141	37	34	37	45	42	42	44	29	40
18	IVT22-E-18	NRC 152 (C)	27	30	35	31	36	36	44	28	32
19	IVT22-E-19	AUKS 234	45	45	47	45	42	43	47	43	46
20	IVT22-E-20	NRC 263	33	29	33	35	35	32	34	30	32
21	IVT22-E-21	AS 47	34	32	35	38	36	37	38	31	36
22	IVT22-E-22	JS 20-34 (C)	31	29	34	36	36	33	35	30	31
23	IVT22-E-23	DLSb 40	41	40	44	46	42	42	45	42	42
24	IVT22-E-24	AUKS 238	45	46	48	40	48	50	44	46	47

Table . 2.35 Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Plant Height (Cm)								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-E-1	KDS 1271	36	35	40	51	44	49	56	44	41
2	IVT22-E-2	NRC 261	55	76	66	63	52	76	68	82	53
3	IVT22-E-3	RVS 15-1	56	70	66	60	78	55	80	72	51
4	IVT22-E-4	MAUS 820	40	59	52	60	54	44	68	50	48
5	IVT22-E-5	DS 1550	55	61	56	59	70	52	74	48	45
6	IVT22-E-6	NRC 164	47	55	61	72	64	38	78	68	51
7	IVT22-E-7	AMS 2022-1	53	66	52	72	65	47	68	48	53
8	IVT22-E-8	JS 24-33	46	40	46	59	58	29	56	42	37
9	IVT22-E-9	NRC 138 (C)	39	39	35	44	49	33	50	42	38
10	IVT22-E-10	KDS 1275	51	92	63	56	68	92	64	73	75
11	IVT22-E-11	MAUS 749	53	84	58	73	71	56	74	63	72
12	IVT22-E-12	DS 1547	58	48	43	54	55	38	65	45	55
13	IVT22-E-13	MACS 1779	44	58	58	49	65	46	67	47	47
14	IVT22-E-14	JS 24-25	37	30	38	34	33	32	45	42	36
15	IVT22-E-15	RSC 11-75	52	65	59	73	80	56	78	72	64
16	IVT22-E-16	AS 26	39	55	49	53	67	41	60	57	39
17	IVT22-E-17	NRC 141	46	71	65	64	74	44	63	62	44
18	IVT22-E-18	NRC 152 (C)	36	61	55	40	64	44	56	49	39
19	IVT22-E-19	AUKS 234	49	71	67	65	77	54	66	59	52
20	IVT22-E-20	NRC 263	31	29	36	55	40	40	39	41	33
21	IVT22-E-21	AS 47	45	56	56	45	64	44	56	58	43
22	IVT22-E-22	JS 20-34 (C)	30	25	35	32	45	26	41	32	33
23	IVT22-E-23	DLSb 40	39	76	75	52	65	46	64	79	48
24	IVT22-E-24	AUKS 238	55	74	63	63	69	62	64	70	63

Table . 2.36 Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	100 Seed Weight (Gm)								
			Amravati	Amreli	Anand	Indore	Kota	Lok Bharti	Mandsaur	Parbhani	Sehore
			1	2	3	4	5	6	7	8	9
1	IVT22-E-1	KDS 1271	15.27	14.03	13.20	13.61	10.57	13.50	15.13	12.03	13.15
2	IVT22-E-2	NRC 261	15.27	13.09	12.64	13.11	11.53	15.17	13.43	15.25	12.15
3	IVT22-E-3	RVS 15-1	15.33	12.11	11.69	13.73	12.47	14.17	12.00	14.76	8.57
4	IVT22-E-4	MAUS 820	17.07	15.65	14.57	14.37	11.10	18.50	16.63	18.90	12.28
5	IVT22-E-5	DS 1550	12.63	10.90	10.82	10.51	10.50	13.17	9.93	11.43	14.09
6	IVT22-E-6	NRC 164	11.53	10.08	9.41	11.47	9.50	9.83	10.12	10.57	9.09
7	IVT22-E-7	AMS 2022-1	13.97	12.13	11.34	10.35	10.20	12.00	11.77	13.39	9.13
8	IVT22-E-8	JS 24-33	11.53	11.15	10.86	12.66	11.50	10.83	10.73	11.12	10.93
9	IVT22-E-9	NRC 138 (C)	11.07	10.97	10.39	11.07	10.47	12.50	8.17	11.64	10.17
10	IVT22-E-10	KDS 1275	13.20	10.95	10.49	9.60	10.33	14.50	11.83	12.95	8.10
11	IVT22-E-11	MAUS 749	11.13	9.20	9.97	7.40	8.50	11.00	8.93	10.92	10.95
12	IVT22-E-12	DS 1547	11.47	9.36	9.00	8.86	9.37	10.83	9.42	10.97	10.85
13	IVT22-E-13	MACS 1779	14.30	13.44	12.70	10.28	11.10	15.00	12.70	15.39	10.24
14	IVT22-E-14	JS 24-25	14.37	17.37	16.51	15.11	7.63	13.67	14.77	15.65	9.20
15	IVT22-E-15	RSC 11-75	11.10	7.64	8.40	9.38	10.13	11.83	9.91	11.22	11.95
16	IVT22-E-16	AS 26	12.37	11.73	11.35	13.02	11.03	12.33	14.14	14.37	11.16
17	IVT22-E-17	NRC 141	13.20	10.58	10.23	8.84	8.53	11.83	10.77	12.95	12.25
18	IVT22-E-18	NRC 152 (C)	14.03	13.02	12.45	11.84	10.00	12.83	14.33	14.94	10.07
19	IVT22-E-19	AUKS 234	9.70	7.72	8.55	9.16	9.27	10.67	7.96	9.78	12.01
20	IVT22-E-20	NRC 263	13.10	14.44	13.47	13.94	9.23	12.33	13.93	13.03	10.31
21	IVT22-E-21	AS 47	12.87	13.42	12.91	13.69	10.37	12.33	12.19	15.50	10.07
22	IVT22-E-22	JS 20-34 (C)	12.70	11.96	10.98	13.43	9.93	12.17	12.70	12.80	11.29
23	IVT22-E-23	DLSb 40	11.27	12.66	11.62	9.78	8.33	14.17	7.77	13.16	11.24
24	IVT22-E-24	AUKS 238	9.60	6.93	7.65	8.39	9.17	9.67	9.04	10.18	10.34

Table . 2.37 Performance of Soybean Strains in AVT – I ,Zone : CZ

S.N.	Strain	Seed Yield(Kg/ha)										
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Parbhani	Sehore	Mean	Rank
		1	2	3	4	5	6	7	8	9		
1	NRC 189	3171	3067	2581	850	1049	2894	3906	2737	463	2531.88	IV
2	NRC 190	3553	3032	2558	1400	1296	1481	3850	2662	2160	2479.00	V
3	NRC 192	3183	3391	3015	1289	944	1836	3956	2818	198	2554.00	II
4	AS 24	4144	3380	2749	928	957	1512	3844	2882	352	2549.50	III
5	RSC 11-42	3796	2789	2483	1378	1080	1944	3367	2917	1123	2469.25	VI
6	RVSM 2011-35(C)	3067	3142	2656	1300	605	2762	3606	2569	667	2463.38	VII
7	AMS 100-39(C)	3189	3275	2813	911	1840	2454	3433	2679	586	2574.25	I
8	RSC 10-52(C)	3171	2610	2523	783	741	1690	3011	2257	327	2098.25	VIII
	GM	3409.25	3085.75	2672.25	1104.88	1064.00	2071.63	3621.63	2690.13	734.50		
	CD	688.66	393.52	260.42	83.33	148.15	270.06	577.78	428.24	135.80		
	CV	11.54	7.23	5.58	4.32	7.79	7.40	9.09	9.06	10.72		
	DOS	07/07/2022	09/07/2022	05/07/2022	28/06/2022	02/07/2022	24/06/2022	24/06/2022	28/06/2022	08/07/2022		

- **Data of Sehore cancelled due to Mean <1000Kg/h in grain yield.**
- **Morena, Nagpur &Mandsaur Data not inserted/Vitiate**

Table . 2.38 Performance of Soybean Strains in AVT – I , Zone : CZ

S.N.	Strain	Oil Content % and Oil Yield (kg/ha)									
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Parbhani	Mean	Oil Yield (kg/ha)	Rank
		1	2	3	4	5	6	7			
1	NRC 189	16.12	22.21	19.42	19.21	22.05	19.52	20.71	20.08	508.43	IV
2	NRC 190	20.95	21.58	18.97	18.71	23.59	18.46	20.34	20.36	504.82	VI
3	NRC 192	16.96	20.58	18.21	18.21	20.54	18.28	21.17	19.33	493.62	VII
4	AS 24	20.06	19.88	19.69	18.45	22.77	19.67	21.74	20.46	521.69	II
5	RSC 11-42	19.71	21.45	19.26	18.35	22.75	19.46	22.08	20.48	505.58	V
6	RVSM 2011-35(C)	18.04	21.59	20.70	20.40	22.68	19.20	21.79	20.86	513.95	III
7	AMS 100-39(C)	17.12	20.16	19.51	18.61	22.98	18.43	25.61	20.48	527.17	I
8	RSC 10-52(C)	18.25	22.07	18.09	18.76	20.84	18.75	21.22	19.82	415.95	VIII
	Mean	18.40	21.19	19.23	18.84	22.28	18.97	21.83			

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Table . 2.39 Performance of Soybean Strains in AVT – I , Zone : CZ

S.N.	Strain	Days To Maturity							
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Parbhani
		1	2	3	4	5	6	7	8
1	NRC 189	112	97	100	116	101	104	106	99
2	NRC 190	111	100	104	114	101	102	103	101
3	NRC 192	109	102	97	118	104	99	109	98
4	AS 24	103	97	105	112	99	99	104	102
5	RSC 11-42	107	96	103	112	104	104	108	100
6	RVSM 2011-35(C)	107	102	103	104	99	101	105	98
7	AMS 100-39(C)	96	89	106	102	93	97	97	103
8	RSC 10-52(C)	110	102	109	115	102	102	113	101

Table . 2.40 Performance of Soybean Strains in AVT – I , Zone : CZ

S.N.	Strain	Days To Flowering							
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Parbhani
		1	2	3	4	5	6	7	8
1	NRC 189	37	40	42	45	45	46	46	40
2	NRC 190	41	41	41	45	44	44	46	41
3	NRC 192	43	38	39	42	45	43	45	39
4	AS 24	42	40	44	45	46	45	47	42
5	RSC 11-42	43	42	45	45	46	46	45	40
6	RVSM 2011-35(C)	41	37	40	41	44	45	46	39
7	AMS 100-39(C)	38	42	46	43	45	44	45	44
8	RSC 10-52(C)	44	44	49	45	46	46	47	42

Table . 2.41 Performance of Soybean Strains in AVT – I , Zone : CZ

S.N.	Strain	Plant Height (Cm)							
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Parbhani
		1	2	3	4	5	6	7	8
1	NRC 189	51	51	59	65	51	58	53	56
2	NRC 190	40	59	68	60	52	56	48	51
3	NRC 192	41	70	61	82	61	76	68	54
4	AS 24	42	69	80	73	41	49	57	48
5	RSC 11-42	41	67	71	59	49	61	59	52
6	RVSM 2011-35(C)	37	51	56	59	51	45	49	38
7	AMS 100-39(C)	40	68	67	65	53	46	51	63
8	RSC 10-52(C)	48	82	91	71	50	48	74	63

Table . 2.42 Performance of Soybean Strains in AVT – I , Zone : CZ

S.N.	Strain	100 Seed Weight (Gm)							
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Parbhani
		1	2	3	4	5	6	7	8
1	NRC 189	13.32	9.33	9.59	8.49	8.18	10.83	11.83	11.06
2	NRC 190	10.76	9.15	9.98	8.48	8.55	10.77	8.00	9.97
3	NRC 192	11.91	11.63	11.83	8.81	9.31	11.20	10.67	11.89
4	AS 24	11.07	10.37	10.85	7.85	9.00	10.40	11.67	10.29
5	RSC 11-42	11.38	9.25	10.09	8.70	8.93	10.67	8.00	10.74
6	RVSM 2011-35(C)	14.93	13.72	13.31	11.50	8.41	13.53	12.83	14.44
7	AMS 100-39(C)	15.13	13.40	13.76	9.89	10.70	11.17	12.83	13.66
8	RSC 10-52(C)	12.80	11.09	11.12	12.07	9.90	10.37	13.00	13.59

Table . 2.43 Performance of Soybean Strains in (AVT I+II) Early, Zone : CZ

S.N.	Strain	Seed Yield(Kg/ha)											
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Nagpur	Parbhani	Sehore	Mean	Rank
		1	2	3	4	5	6	7	8	9	10		
1	JS 23-03 * I	1568	2691	2569	3189	1790	2523	2378	1474	3148	1469	2279.90	II
2	JS 23-09 * I	1881	3235	2928	2667	1747	2469	2361	1960	2899	1179	2332.60	I
3	KDS 1169	1973	2813	2569	739	722	687	2033	648	2488	1160	1583.20	XI
4	PS 1569	2726	2917	2436	606	630	563	1956	262	2431	1123	1565.00	XII
5	JS 22-12 * II	1927	3015	2569	2544	1648	2492	2728	1389	2645	1426	2238.30	III
6	JS 22-18 * II	1852	2946	2697	2539	1809	1289	3361	1451	1858	1759	2156.10	IV
7	JS 22-16 * II	2332	3027	2714	1939	1759	1466	2772	1373	2500	1185	2106.70	V
8	RVSM 2012-4	2477	2905	2604	1294	525	2106	2611	-	2569	1667	2084.22	VI
9	NRC 181	1933	-	1944	1556	691	965	3339	-	2309	1253	1748.75	IX
10	NRC 165 * II	2205	2679	2465	1444	1432	1242	1867	2230	2807	1284	1965.50	VII
11	NRC 130(C)	1626	2760	2569	1233	537	1227	1261	849	2668	-	1636.67	X
12	NRC 138(C) I & II	2083	2494	2020	1072	1531	2801	1639	1242	2002	1086	1797.00	VIII
13	JS 95-60(C)	1823	2442	2176	461	414	1181	1311	-	2656	1284	1527.56	XIV
14	JS 20-34(C)	1904	2610	2205	1222	537	1559	989	1250	1910	1204	1539.00	XIII
	GM	2022.14	2810.31	2461.79	1607.50	1126.57	1612.14	2186.14	1284.36	2492.14	1313.77		
	CD	271.99	376.16	300.93	55.56	154.32	200.62	388.89	308.64	486.11	86.42		
	CV	8.00	8.58	7.22	2.11	8.12	7.30	10.63	17.99	11.63	4.27		
	DOS	06/07/2022	09/07/2022	05/07/2022	28/06/2022	01/07/2022	24/06/2022	25/06/2022	26/06/2022	29/06/2022	09/07/2022		

Table . 2.44 Performance of Soybean Strains in (AVT I+II) Early, Zone : CZ

S.N.	Strain	Oil Content % & Yield (Kg/ha)										
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Parbhani	Sehore	Mean	Oil Yield (kg/ha)	Rank
		1	2	3	4	5	6	7	8			
1	JS 23-03	19.87	20.87	17.87	18.01	24.50	19.73	21.23	19.65	20.22	460.91	II
2	JS 23-09	19.62	21.00	17.37	18.33	22.46	19.94	20.41	20.28	19.93	464.80	I
3	KDS 1169	18.22	20.79	17.78	17.81	23.32	17.95	20.39	19.77	19.50	308.78	XIII
4	PS 1569	19.38	21.69	17.28	20.31	24.19	18.98	20.63	20.75	20.40	319.28	XI
5	JS 22-12	19.32	21.07	17.21	18.04	24.08	18.93	21.60	20.62	20.11	450.09	III
6	JS 22-18	20.26	22.88	17.78	17.68	25.51	19.34	20.54	21.75	20.72	446.69	IV
7	JS 22-16	20.81	21.32	18.67	18.30	24.08	18.18	20.78	20.76	20.36	428.98	V
8	RVSM 2012-4	18.95	20.29	18.59	18.92	25.27	18.85	22.27	20.57	20.46	426.51	VI
9	NRC 181	19.73	-	18.71	19.11	24.43	20.18	21.43	19.73	20.47	358.04	IX
10	NRC 165	17.49	20.70	18.75	17.66	21.87	17.36	19.15	19.80	19.10	375.36	VII
11	NRC 130(C)	19.37	20.42	16.32	20.16	23.08	-	20.43	-	19.96	326.73	X
12	NRC 138(C)	18.46	20.56	17.7	19.67	23.97	19.13	20.42	19.71	19.95	358.55	VIII
13	JS 95-60(C)	20.55	21.64	18.66	18.26	21.60	19.14	21.69	20.11	20.21	308.66	XIV
14	JS 20-34(C)	20.58	22.62	19.39	18.56	23.15	19.59	21.45	20.09	20.68	318.25	XII
	Mean	19.47	21.22	18.01	18.63	23.68	19.02	20.89	20.28			

Table . 2.45 Performance of Soybean Strains in (AVT I+II) Early, Zone : CZ

S.N.	Strain	Days To Maturity									
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
		1	2	3	4	5	6	7	8	9	10
1	JS 23-03 * I	86.33	88.67	92.00	97.67	90.67	95.67	94.33	95.33	92.67	90.67
2	JS 23-09 * I	83.00	85.33	89.67	97.00	86.00	93.67	93.67	89.67	95.67	91.67
3	KDS 1169	84.00	86.00	88.67	91.00	88.00	92.67	79.00	83.67	88.67	87.67
4	PS 1569	95.00	80.33	87.33	91.33	86.67	93.33	85.33	87.33	95.67	84.33
5	JS 22-12 * II	85.00	83.67	90.33	97.67	87.33	96.33	83.00	96.33	93.67	88.67
6	JS 22-18 * II	89.00	86.67	89.00	97.67	86.67	94.67	95.00	88.00	94.33	91.33
7	JS 22-16 * II	96.33	87.67	90.33	97.00	85.67	94.33	96.67	88.00	94.67	87.67
8	RVSM 2012-4	96.33	85.67	86.33	98.67	90.67	94.33	97.00	-	95.33	88.67
9	NRC 181	93.33	-	86.67	97.67	85.67	94.33	101.00	-	95.67	90.67
10	NRC 165 * II	86.33	83.33	85.33	97.33	86.00	91.67	80.00	87.33	96.33	91.67
11	NRC 130(C)	84.33	79.67	84.67	93.00	86.67	90.67	79.33	84.33	94.33	-
12	NRC 138(C) I & II	97.00	89.00	87.00	99.00	86.67	90.67	100.67	88.00	91.33	92.33
13	JS 95-60(C)	83.00	83.67	86.33	94.67	84.00	92.67	85.67	-	90.33	87.67
14	JS 20-34(C)	81.33	78.67	84.67	93.00	85.33	92.33	86.33	88.00	88.67	87.33

Table . 2.46 Performance of Soybean Strains in (AVT I+II) Early, Zone : CZ

S.N.	Strain	Days To Flowering									
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
		1	2	3	4	5	6	7	8	9	10
1	JS 23-03	53	32	40	34	35	39	38	38	34	36
2	JS 23-09	53	34	41	37	35	39	38	33	36	36
3	KDS 1169	50	28	37	33	28	36	33	32	31	33
4	PS 1569	58	32	33	37	35	39	39	35	36	39
5	JS 22-12	53	34	40	36	36	39	39	38	35	34
6	JS 22-18	56	33	37	36	37	37	39	38	35	33
7	JS 22-16	58	33	40	35	33	38	38	36	35	35
8	RVSM 2012-4	58	34	33	37	38	40	40	-	36	32
9	NRC 181	55	-	38	35	36	39	36	-	35	34
10	NRC 165	53	30	35	35	34	37	36	32	36	34
11	NRC 130(C)	53	32	35	32	34	35	35	33	35	-
12	NRC 138(C)	53	30	40	31	31	36	35	32	33	35
13	JS 95-60(C)	49	29	40	31	28	35	35	-	30	32
14	JS 20-34(C)	49	28	33	31	30	34	34	32	29	33

Table . 2.47 Performance of Soybean Strains in (AVT I+II) Early, Zone : CZ

S.N.	Strain	Plant Height (Cm)									
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
		1	2	3	4	5	6	7	8	9	10
1	JS 23-03	32	38	48	49	37	57	34	36	38	36
2	JS 23-09	34	38	39	50	38	54	35	34	29	33
3	KDS 1169	27	41	46	60	44	48	32	39	39	38
4	PS 1569	29	49	35	44	50	35	38	27	48	33
5	JS 22-12	30	43	48	45	56	49	35	140	38	35
6	JS 22-18	34	42	40	42	58	41	36	35	34	38
7	JS 22-16	27	38	48	44	52	40	28	33	38	31
8	RVSM 2012-4	30	42	46	37	56	48	34	-	38	42
9	NRC 181	30	-	30	59	58	43	82	-	58	43
10	NRC 165	30	36	38	42	42	60	26	34	51	41
11	NRC 130(C)	29	42	43	43	39	39	31	37	36	-
12	NRC 138(C)	33	40	44	35	39	58	32	32	42	36
13	JS 95-60(C)	28	25	47	45	43	35	32	-	38	38
14	JS 20-34(C)	26	32	27	23	37	32	23	32	29	31

Table . 2.48 Performance of Soybean Strains in (AVT I+II) Early, Zone : CZ

S.N.	Strain	100 Seed Weight (Gm)									
		Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Nagpur	Parbhani	Sehore
		1	2	3	4	5	6	7	8	9	10
1	JS 23-03	12.70	13.56	12.48	14.20	10.66	11.87	12.50	10.27	14.03	12.04
2	JS 23-09	11.18	11.81	11.87	11.17	10.33	10.40	11.67	9.10	12.08	9.22
3	KDS 1169	13.69	12.78	12.15	10.76	9.40	10.73	12.50	10.60	13.35	10.24
4	PS 1569	12.15	11.50	11.59	8.67	9.90	9.93	12.83	8.80	12.46	9.25
5	JS 22-12	10.61	11.35	11.04	12.85	11.23	10.63	12.83	9.37	11.88	10.31
6	JS 22-18	13.41	14.30	13.17	12.95	10.93	11.17	13.83	9.70	13.34	10.10
7	JS 22-16	11.72	11.55	11.08	11.74	10.29	10.10	12.67	8.33	11.62	9.14
8	RVSM 2012-4	12.37	11.10	11.54	10.68	8.53	9.97	11.50	-	12.63	9.09
9	NRC 181	14.53	-	10.62	12.63	13.72	11.53	13.50	-	13.37	11.00
10	NRC 165	8.91	11.64	11.13	10.87	9.78	9.83	10.00	7.63	10.82	10.08
11	NRC 130(C)	15.24	12.37	11.63	13.95	10.58	10.97	14.67	12.03	15.61	-
12	NRC 138(C)	10.50	10.90	11.25	10.30	10.29	9.13	11.00	8.83	13.28	8.08
13	JS 95-60(C)	13.40	11.82	12.53	11.30	10.53	10.18	13.17	-	13.53	11.20
14	JS 20-34(C)	12.61	13.05	11.61	12.91	9.21	9.73	12.00	9.03	12.12	11.24

Table . 2. 49 Performance of Soybean Strains in (AVT II) Vegetable, Zone : CZ

S. N.	Strain	Seed Yield(Kg/ha)	Green Pod Yield (Kg/ha) at Picking					Oil Content %& Oil Yield (Kg/ha)								
		Indore	Kota	Parbhani	Mean	Rank	Indore	Kota	Parbhani	Mean	Rank	Indore	Parbhani	Mean	Oil Yield (kg/ha)	Rank
1	NRC 188 *	1150	1929	2183	2056.00	II	3852	4105	10015	5990.67	I	20.44	20.95	20.69	451.69	III
2	Hara Soya(C)	1067	1119	2943	2031.00	III	3505	2443	8111	4686.33	III	18.89	21.54	20.21	594.89	II
3	Karune(C)	83	1034	1574	1304.00	V	267	2058	6639	2988.00	V	-	21.05	21.05	331.39	V
4	JS 95-60(C)	444	1188	3142	2165.00	I	720	2392	9092	4068.00	IV	19.42	21.41	20.41	641.33	I
5	JS 20-34(C)	1189	1497	1726	1611.50	IV	4236	3480	7537	5084.33	II	18.34	20.60	19.47	335.98	IV
	GM	786.60	1353.40	2313.60								19.27	21.11			
	CD	72.22	339.51	522.49												
	CV	5.01	13.22	12.00												
	DOS	28/06/2022	24/06/2022	27/06/2022												

- Data of Indore cancelled due to Mean <1000Kg/h in grain yield.

Table .2.50 Performanceof Soybean Strains in (AVT II) Vegetable , Zone : CZ

S.N .	Strain	Days to Maturity			Days to Flower			Days To Picking at R6			Plant Height (Cm)			100 Seed Weight(Gm)		
		Indore	Kota	Parbhani	Indore	Kota	Parbhani	Indore	Kota	Parbhani	Indore	Kota	Parbhani	Indore	Kota	Parbhani
1	NRC 188	111	101	96	37	38	34	76	73	79	36	44	32	16	18	22
2	Hara Soya(C)	122	103	98	42	46	38	80	79	76	61	46	61	9	10	17
3	Karune(C)	110	96	94	36	39	34	74	73	78	42	44	40	21	16	24
4	JS 95-60(C)	95	91	90	31	36	31	68	69	74	38	33	42	9	12	13
5	JS 20-34(C)	96	91	88	30	34	29	67	68	72	33	34	38	12	11	12

Table . 2.51 Performance of Soybean Strains in IVT Normal, Zone : SZ

S.N.	Code	Strain	Seed Yield(Kg/ha)							
			Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Mean	Rank
			1	2	3	4	5	6		
1	IVT22-1	VLS 104	2074	1556	2593	2937	1457	3654	2378.50	XIX
2	IVT22-2	NRCSL 5	2469	1333	2494	2593	1358	2914	2193.50	XXXVII
3	IVT22-3	JS 24-26	3235	1444	2420	2434	2543	2444	2420.00	XVI
4	IVT22-4	NRCSL 7	2988	1444	1901	2989	1407	2494	2203.83	XXXV
5	IVT22-5	DSb 21 (C)	1778	1639	2963	1958	1506	4395	2373.17	XX
6	IVT22-6	SKAUS 3	1852	972	1309	1640	1259	1679	1451.83	LII
7	IVT22-7	RVS 12-8	3457	1222	2691	1984	2519	3605	2579.67	X
8	IVT22-8	KDS 1203	2395	1528	3136	1693	1407	3901	2343.33	XXIII
9	IVT22-9	NRC 253	2716	1417	1827	2143	1654	2815	2095.33	XL
10	IVT22-10	MACS 1756	2790	1111	3284	2513	1605	3926	2538.17	XII
11	IVT22-11	Lok Soya-2	3333	1139	2667	529	1358	3531	2092.83	XLI
12	IVT22-12	AMS 2021-3	3185	944	2222	1640	1704	3506	2200.17	XXXVI
13	IVT22-13	Himso 1695	2815	1167	3136	2063	1309	3160	2275.00	XXVII
14	IVT22-14	TS - 156	3383	1361	3284	3042	1235	3185	2581.67	IX
15	IVT22-15	NRCSL 8	2741	1472	1852	2619	1852	3185	2286.83	XXVI
16	IVT22-16	JS 24-34	2198	944	1432	2063	1457	2741	1805.83	XLIX
17	IVT22-17	KDS 753 (C)	3136	1361	3284	2302	1185	4469	2622.83	V
18	IVT22-18	DS 1510	3111	1306	2519	2037	1877	3210	2343.33	XXIII
19	IVT22-19	KSS 213	3210	1222	2321	2381	1259	3802	2365.83	XXII
20	IVT22-20	MAUS 824	3531	1222	2864	1905	1654	3111	2381.17	XVIII
21	IVT22-21	NRC 254	3160	1111	2173	2302	1284	3086	2186.00	XXXVIII
22	IVT22-22	AMS 2021-4	3358	1306	2099	1349	1877	3556	2257.50	XXX
23	IVT22-23	Himso 1696	3432	1361	2296	1667	1111	3605	2245.33	XXXII
24	IVT22-24	DS 1529	3284	1194	2148	1905	2000	3062	2265.50	XXVIII

25	IVT22-25	KDS 1188	3432	1611	2716	2540	1309	4272	2646.67	IV
26	IVT22-26	MACS 1745	3654	1333	3556	2354	1259	4074	2705.00	II
27	IVT22-27	NRC 255	2593	1500	1802	2116	1259	2963	2038.83	XLVI
28	IVT22-28	Asb 93	3654	1083	1975	2619	1383	2617	2221.83	XXXIV
29	IVT22-29	VLS 105	3160	1167	2296	2169	1383	3802	2329.50	XXIV
30	IVT22-30	NRCSL 4	3062	1167	2074	1323	1309	3358	2048.83	XLV
31	IVT22-31	NRC 257	3111	1139	2667	2884	2469	3407	2612.83	VII
32	IVT22-32	MAUS 814	3383	1167	2716	2566	2272	3630	2622.33	VI
33	IVT22-33	SL 1311	3407	972	2025	1720	1309	3111	2090.67	XLII
34	IVT22-34	Asb 85	3481	972	2815	2169	2444	3383	2544.00	XI
35	IVT22-35	PS 1693	3309	1278	1728	1349	2247	3432	2223.83	XXXIII
36	IVT22-36	NRC 256	1926	1500	2222	3175	2667	3358	2474.67	XIV
37	IVT22-37	RSC 1165	3457	861	1926	1799	1185	3210	2073.00	XLIII
38	IVT22-38	BAUS 124	3309	806	2346	1587	1309	3605	2160.33	XXXIX
39	IVT22-39	DLSb 40	2296	722	1358	2804	963	2568	1785.17	L
40	IVT22-40	NRC 258	3111	1444	3259	2646	2963	3704	2854.50	I
41	IVT22-41	Pusa Sipani BS-9	2469	694	1284	-	963	2519	1585.80	LI
42	IVT22-42	PS 1696	3160	1083	1605	1058	2123	3160	2031.50	XLVII
43	IVT22-43	CAUMS 3	1975	-	864	-	667	1926	1358.00	LIII
44	IVT22-44	AUKS 212	3457	972	2222	1587	1852	3457	2257.83	XXIX
45	IVT22-45	RVSM 12-21	3012	1194	2321	2090	2074	3531	2370.33	XXI
46	IVT22-46	NRC 259	3506	1361	2074	-	2543	3432	2583.20	VIII
47	IVT22-47	AS 34	3580	1306	2346	1270	1877	3556	2322.50	XXV
48	IVT22-48	DSb 34 (C)	3432	1722	2988	2910	1383	3630	2677.50	III
49	IVT22-49	RSC 1172	3086	1139	2370	1931	2346	3531	2400.50	XVII
50	IVT22-50	AS 55	3086	1417	2173	476	1704	2691	1924.50	XLVIII
51	IVT22-51	TS-208	3136	1028	1802	2116	1753	2494	2054.83	XLIV
52	IVT22-52	NRC 260	3062	1694	2321	1693	2494	3407	2445.17	XV
53	IVT22-53	NRC 196	3012	1583	2148	2751	2593	2914	2500.17	XIII
54	IVT22-54	Pusa Sipani-SPS-433	3580	1472	2617	1376	1333	3111	2248.17	XXXI
		GM	3028.31	1248.36	2324.65	2073.84	1690.96	3275.72		
		CD	469.14	277.78	444.44	343.92	296.30	518.52		
		CV	9.35	13.42	11.55	10.78	10.78	9.56		
		DOS	22/06/2022	27/07/2022	28/06/2022	22/06/2022	11/07/2022	30/06/2022		

Table . 2.52 Performance of Soybean Strains in IVT Normal, Zone : SZ

S.N.	Code	Strain	Oil Content (%) & Yield Kg/ha							
			Adilabad	Bangalore	Dharwad	K. Digraj	Pune	Mean	Oil Yield (kg/ha)	Rank
			1	2	3	3	5			
1	IVT22-1	VLS 104	23.8	19.3	17.65	21.5	21.02	20.65	491.26	XVI
2	IVT22-2	NRCSL 5	22.02	19.55	17.44	22.44	22.56	20.80	456.29	XXX
3	IVT22-3	JS 24-26	21.78	19.76	18	21.08	20.54	20.23	489.61	XVII
4	IVT22-4	NRCSL 7	22.09	20.72	18.7	21.21	21.42	20.83	459.01	XXIX
5	IVT22-5	DSb 21 (C)	21.79	19.08	17.45	20.63	21.05	20.00	474.63	XXII
6	IVT22-6	SKAUS 3	22.91	18	17.77	20.28	20.91	19.97	289.99	LIII
7	IVT22-7	RVS 12-8	21.71	19.07	19.97	20.99	21.81	20.71	534.25	III
8	IVT22-8	KDS 1203	22.9	18.81	18.17	20.69	20.42	20.20	473.31	XXIV
9	IVT22-9	NRC 253	22.02	20.78	18.41	21.7	20.61	20.70	433.82	XXXIX
10	IVT22-10	MACS 1756	19.93	19.19	17.42	22.45	19.44	19.69	499.66	XIV
11	IVT22-11	Lok Soya-2	22.17	17.65	19.77	22.04	21.02	20.53	429.66	XLI
12	IVT22-12	AMS 2021-3	21.06	17.17	17.62	20.38	20.08	19.26	423.80	XLIII
13	IVT22-13	Himso 1695	20.07	21.95	19.45	20.54	21.48	20.70	470.88	XXVI
14	IVT22-14	TS - 156	20.38	18.3	19.65	20.65	21.34	20.06	517.99	VII
15	IVT22-15	NRCSL 8	19.39	18.42	19.59	21.58	23.55	20.51	468.94	XXVII
16	IVT22-16	JS 24-34	21.15	18.71	19.71	20.62	22.19	20.48	369.76	L
17	IVT22-17	KDS 753 (C)	20.55	19.47	19.41	21.9	20.17	20.30	532.43	IV
18	IVT22-18	DS 1510	18.5	17.77	18.75	20.74	20.93	19.34	453.15	XXXV
19	IVT22-19	KSS 213	19.8	18.32	19.05	21.71	20.67	19.91	471.04	XXV
20	IVT22-20	MAUS 824	20.84	18.76	19.04	21.65	21.28	20.31	483.71	XVIII
21	IVT22-21	NRC 254	20.72	17.55	20.31	19.83	21.08	19.90	434.97	XXXVIII
22	IVT22-22	AMS 2021-4	20.66	22.39	20.22	21.34	20.51	21.02	474.62	XXIII
23	IVT22-23	Himso 1696	20.1	18.83	20.05	20.81	21.21	20.20	453.56	XXXII
24	IVT22-24	DS 1529	20.61	17.82	20.14	20.45	22.32	20.27	459.17	XXVIII
25	IVT22-25	KDS 1188	20.37	18.52	20.12	20.16	19.81	19.80	523.93	VI
26	IVT22-26	MACS 1745	19.1	19.04	20	20.24	22.49	20.17	545.71	II
27	IVT22-27	NRC 255	21.07	18.26	21.09	19.89	21.48	20.36	415.07	XLVI
28	IVT22-28	Asb 93	19.17	18.45	20.19	21.02	20.76	19.92	442.54	XXXVII
29	IVT22-29	VLS 105	22.12	18.43	21.09	23.12	22.78	21.51	501.03	XIII
30	IVT22-30	NRCSL 4	18.64	20.24	20.64	20.79	20.56	20.17	413.33	XLVII
31	IVT22-31	NRC 257	18.34	17.68	20.42	20.53	21.58	19.71	514.99	IX
32	IVT22-32	MAUS 814	20.67	18.65	19.4	20.78	20.73	20.05	525.67	V
33	IVT22-33	SL 1311	20.56	18.5	19.27	21.2	21.44	20.19	422.19	XLIV
34	IVT22-34	Asb 85	19.35	19.47	20.26	20.98	19.84	19.98	508.29	XI
35	IVT22-35	PS 1693	20.59	19.04	19.79	21.12	21.72	20.45	454.82	XXXI
36	IVT22-36	NRC 256	20.1	18.4	19.94	20.01	20.91	19.87	491.77	XV

37	IVT22-37	RSC 1165	21.04	19.25	19.37	21.54	21.37	20.51	425.26	XLII
38	IVT22-38	BAUS 124	21.18	18.66	19.24	21.36	19.52	19.99	431.89	XL
39	IVT22-39	DLSb 40	21.09	19.55	20.48	21.27	19.74	20.43	364.64	LI
40	IVT22-40	NRC 258	21.4	18.13	19.66	19.7	20.96	19.97	570.04	I
41	IVT22-41	Pusa Sipani BS-9	19.27	18.85	20	20.81	20.97	19.98	316.84	LII
42	IVT22-42	PS 1696	20.18	18.8	19.23	21.62	22.42	20.45	415.44	XLV
43	IVT22-43	CAUMS 3	21.73		19.93	22.23	19.46	20.84	282.97	LIV
44	IVT22-44	AUKS 212	18.2	18.94	18.78	20.5	21.72	19.63	443.17	XXXVI
45	IVT22-45	RVSM 12-21	19.47	21.26	20.3	19.93	20.69	20.33	481.89	XIX
46	IVT22-46	NRC 259	18.96	18.05		21.01	21.75	19.94	515.15	VIII
47	IVT22-47	AS 34	20.35	16.83	19.98	20.45	19.99	19.52	453.35	XXXIV
48	IVT22-48	DSb 34 (C)	17.48	17.11	19.89	20.75	20.25	19.10	511.30	X
49	IVT22-49	RSC 1172	21.09	18.64	18.99	20.6	20.02	19.87	476.93	XXI
50	IVT22-50	AS 55	20.57	17.01	18.33	20.26	21.87	19.61	377.36	XLIX
51	IVT22-51	TS-208	20.07	18.3	20.04	21.25	19.61	19.85	407.97	XLVIII
52	IVT22-52	NRC 260	19.02	17.12	19.75	22.26	19.59	19.55	477.98	XX
53	IVT22-53	NRC 196	21.4	17.4	19.69	21.2	21.83	20.30	507.63	XII
54	IVT22-54	Pusa Sipani-SPS-433	21.18	18.32	20.26	21.51	19.58	20.17	453.46	XXXIII
		GM	20.57	18.76	19.43	21.02	20.98			

Table . 2.53 Performance of Soybean Strains in IVT Normal, Zone : SZ

S.N.	Code	Strain	Days To Maturity						Days To Flowering					
			Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune
			1	2	3	4	5	6	1	2	3	4	5	6
1	IVT22-1	VLS 104	111	95	92	91	105	106	42	37	43	41	39	42
2	IVT22-2	NRCSL 5	108	88	92	88	97	95	41	33	36	38	34	37
3	IVT22-3	JS 24-26	109	89	92	86	99	97	41	35	35	36	34	38
4	IVT22-4	NRCSL 7	110	86	90	87	95	92	41	36	34	37	34	37
5	IVT22-5	DSb 21 (C)	108	101	108	89	109	107	43	43	47	39	41	45
6	IVT22-6	SKAUS 3	94	90	91	89	93	90	35	36	29	39	35	35
7	IVT22-7	RVS 12-8	110	92	94	89	99	97	44	38	41	39	37	41
8	IVT22-8	KDS 1203	116	93	107	92	105	104	44	33	38	42	39	39
9	IVT22-9	NRC 253	110	90	98	92	102	100	41	35	36	42	35	37
10	IVT22-10	MACS 1756	114	101	94	89	106	105	46	40	45	39	42	45
11	IVT22-11	Lok Soya-2	110	89	94	92	101	98	44	32	38	42	36	39
12	IVT22-12	AMS 2021-3	115	94	101	94	103	101	47	40	45	44	41	44
13	IVT22-13	Himso 1695	111	90	101	89	102	101	43	35	38	39	37	39
14	IVT22-14	TS - 156	102	91	93	93	100	97	43	44	43	43	38	45
15	IVT22-15	NRCSL 8	109	89	92	87	99	97	40	36	36	37	31	37
16	IVT22-16	JS 24-34	99	98	80	87	97	94	39	33	35	37	32	37
17	IVT22-17	KDS 753 (C)	116	101	103	97	109	108	46	46	47	47	44	46
18	IVT22-18	DS 1510	117	94	98	96	105	104	47	44	46	46	42	45

19	IVT22-19	KSS 213	115	91	101	92	109	106	47	37	41	42	41	41
20	IVT22-20	MAUS 824	111	91	100	88	107	105	43	35	38	38	35	38
21	IVT22-21	NRC 254	108	86	121	85	98	97	40	34	36	35	32	37
22	IVT22-22	AMS 2021-4	116	94	103	93	112	110	46	39	46	43	42	47
23	IVT22-23	Himso 1696	109	96	101	88	107	106	43	33	38	38	36	38
24	IVT22-24	DS 1529	113	94	103	93	103	100	46	38	45	43	41	45
25	IVT22-25	KDS 1188	111	93	90	92	103	100	41	36	41	42	37	40
26	IVT22-26	MACS 1745	114	98	103	99	103	101	46	44	48	49	42	45
27	IVT22-27	NRC 255	102	86	92	84	95	92	40	32	44	34	31	37
28	IVT22-28	Asb 93	101	91	93	92	98	95	39	38	43	42	39	41
29	IVT22-29	VLS 105	101	94	101	92	106	105	38	36	43	42	38	41
30	IVT22-30	NRCSL 4	112	91	103	86	107	105	42	35	37	37	36	38
31	IVT22-31	NRC 257	110	97	101	93	103	100	44	41	45	43	40	44
32	IVT22-32	MAUS 814	110	90	99	90	103	101	44	35	41	40	37	39
33	IVT22-33	SL 1311	111	90	97	89	106	105	43	37	38	39	37	38
34	IVT22-34	Asb 85	96	91	93	91	98	95	39	38	38	41	36	38
35	IVT22-35	PS 1693	116	98	112	93	111	110	44	43	45	43	39	47
36	IVT22-36	NRC 256	115	98	101	94	102	100	45	44	43	44	39	41
37	IVT22-37	RSC 1165	111	97	104	94	107	105	44	43	44	44	42	45
38	IVT22-38	BAUS 124	115	90	107	94	107	105	46	37	45	44	38	45
39	IVT22-39	DLSb 40	108	100	99	86	103	100	43	39	45	36	39	45
40	IVT22-40	NRC 258	115	88	97	92	98	95	44	36	41	42	39	41
41	IVT22-41	Pusa Sipani BS-9	114	90	99	92	103	100	45	38	41	42	36	40
42	IVT22-42	PS 1696	114	88	99	89	102	100	42	33	38	39	36	41
43	IVT22-43	CAUMS 3	115	-	106	92	102	100	44	-	38	42	43	39
44	IVT22-44	AUKS 212	111	98	101	97	104	103	46	38	47	47	42	45
45	IVT22-45	RVSM 12-21	101	91	99	92	99	97	40	37	43	42	38	41
46	IVT22-46	NRC 259	115	94	101	-	103	101	46	44	47	-	41	45
47	IVT22-47	AS 34	113	91	101	89	102	100	43	36	38	39	36	39
48	IVT22-48	DSb 34 (C)	103	97	100	93	103	100	43	42	45	43	38	45
49	IVT22-49	RSC 1172	115	99	112	99	111	110	45	44	47	49	44	45
50	IVT22-50	AS 55	115	92	94	88	104	98	43	34	37	38	35	38
51	IVT22-51	TS-208	102	94	100	92	100	97	42	43	45	42	36	40
52	IVT22-52	NRC 260	116	94	105	92	107	106	43	36	38	42	38	41
53	IVT22-53	NRC 196	112	90	96	90	99	97	41	34	38	40	36	39
54	IVT22-54	Pusa Sipani-SPS-433	114	90	98	88	103	100	43	33	41	38	35	37

Table . 2.54 Performance of Soybean Strains in IVT Normal, Zone : SZ

S.N.	Code	Strain	Plant Height (Cm)						100 Seed Weight(Gm)					
			Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune	Adilabad	Bangalore	Bidar	Dharwad	K. Digraj	Pune
			1	2	3	4	5	6	1	2	3	4	5	6
1	IVT22-1	VLS 104	51	40	30	34	28	55	16.07	12.84	11.00	18.85	11.39	18.41
2	IVT22-2	NRCSL 5	37	26	40	35	29	42	16.17	14.72	15.17	17.70	14.07	17.63
3	IVT22-3	JS 24-26	45	25	29	31	26	38	13.70	13.20	13.33	14.99	12.43	14.79
4	IVT22-4	NRCSL 7	41	26	29	38	31	42	17.80	17.59	17.57	19.75	16.44	19.95
5	IVT22-5	DSb 21 (C)	44	45	32	37	32	66	13.67	12.69	11.23	14.76	9.62	14.38
6	IVT22-6	SKAUS 3	39	29	26	29	26	39	28.43	30.74	31.10	38.82	11.34	34.22
7	IVT22-7	RVS 12-8	48	38	32	35	34	51	16.50	10.75	9.97	14.37	11.63	14.74
8	IVT22-8	KDS 1203	126	35	66	49	54	72	13.37	13.13	11.17	16.62	10.00	14.03
9	IVT22-9	NRC 253	38	25	24	25	31	34	17.13	16.42	16.17	18.53	16.45	19.70
10	IVT22-10	MACS 1756	52	38	48	49	34	61	13.50	10.17	11.23	11.95	9.40	14.56
11	IVT22-11	Lok Soya-2	48	30	33	28	25	54	14.17	12.28	12.33	15.68	11.64	14.71
12	IVT22-12	AMS 2021-3	48	36	48	44	38	55	12.07	8.69	8.30	13.26	8.34	10.63
13	IVT22-13	Himso 1695	61	31	49	40	26	60	12.27	10.60	11.37	13.78	8.70	13.71
14	IVT22-14	TS - 156	78	37	61	63	50	63	12.03	8.88	10.62	12.12	8.98	13.40
15	IVT22-15	NRCSL 8	53	34	29	37	30	48	17.63	15.19	11.37	19.29	14.74	19.45
16	IVT22-16	JS 24-34	40	22	22	31	20	29	16.80	12.79	14.50	15.06	13.87	15.77
17	IVT22-17	KDS 753 (C)	51	46	54	49	32	66	17.03	14.74	15.58	15.28	12.20	17.83
18	IVT22-18	DS 1510	57	32	40	35	37	55	12.40	8.88	8.78	11.61	8.43	10.77
19	IVT22-19	KSS 213	39	25	31	34	30	48	16.27	15.76	14.90	19.71	10.35	18.32
20	IVT22-20	MAUS 824	58	30	38	29	31	47	15.93	14.12	13.97	17.49	12.10	17.63
21	IVT22-21	NRC 254	49	29	26	29	24	38	18.00	17.17	17.48	21.68	16.87	20.63
22	IVT22-22	AMS 2021-4	45	33	39	35	48	58	12.30	8.90	8.95	13.45	8.11	11.58
23	IVT22-23	Himso 1696	56	33	26	29	28	40	15.40	11.43	10.00	15.67	10.59	14.10
24	IVT22-24	DS 1529	52	30	35	40	44	58	12.50	11.90	10.07	14.58	9.39	13.59
25	IVT22-25	KDS 1188	121	36	53	44	31	57	17.53	13.82	14.13	16.18	10.70	17.53
26	IVT22-26	MACS 1745	62	46	52	52	40	77	12.00	10.00	10.07	15.57	8.83	12.33
27	IVT22-27	NRC 255	50	30	27	28	27	40	16.10	16.52	18.47	19.57	14.89	21.28
28	IVT22-28	Asb 93	40	31	28	33	26	37	16.67	14.28	14.32	16.44	9.16	15.86
29	IVT22-29	VLS 105	35	31	25	37	30	54	12.93	14.48	13.33	20.35	11.50	18.45
30	IVT22-30	NRCSL 4	54	31	31	30	27	53	15.13	12.46	11.03	16.29	9.94	14.59
31	IVT22-31	NRC 257	58	47	39	48	44	71	12.03	8.91	9.83	13.45	9.05	12.47

32	IVT22-32	MAUS 814	67	26	29	33	29	43	14.50	15.24	12.97	18.09	12.59	17.37
33	IVT22-33	SL 1311	44	25	28	33	27	41	13.97	13.03	11.17	17.27	11.38	15.37
34	IVT22-34	Asb 85	63	37	43	34	28	59	14.07	11.09	13.40	12.40	12.97	14.17
35	IVT22-35	PS 1693	106	52	42	43	51	55	14.47	10.70	8.48	13.85	14.46	13.39
36	IVT22-36	NRC 256	47	48	47	46	38	69	13.00	8.62	9.55	12.03	7.24	11.91
37	IVT22-37	RSC 1165	58	32	34	31	29	56	13.33	8.38	9.03	12.33	7.88	13.18
38	IVT22-38	BAUS 124	59	32	47	45	28	61	12.10	11.83	11.07	15.79	8.42	13.90
39	IVT22-39	DLSb 40	41	31	39	45	35	67	12.83	11.57	12.28	14.65	11.79	15.48
40	IVT22-40	NRC 258	40	41	49	34	36	64	16.07	10.50	11.83	13.95	10.07	11.75
41	IVT22-41	Pusa Sipani BS-9	61	17	25	25	23	30	14.10	12.92	13.27	14.63	10.32	14.25
42	IVT22-42	PS 1696	64	28	28	32	31	46	13.27	14.22	12.55	15.47	11.19	14.95
43	IVT22-43	CAUMS 3	33	-	21	30	27	30	12.07	-	15.43	17.03	8.30	16.09
44	IVT22-44	AUKS 212	57	43	47	33	27	63	12.40	8.80	8.90	14.06	8.62	11.63
45	IVT22-45	RVSM 12-21	53	39	26	42	29	48	14.20	11.05	12.82	15.44	11.90	14.88
46	IVT22-46	NRC 259	106	44	41	48	59	76	12.33	10.94	10.32	14.15	8.67	12.98
47	IVT22-47	AS 34	49	25	27	37	29	43	14.23	11.59	11.53	15.14	9.75	13.84
48	IVT22-48	DSb 34 (C)	42	36	38	41	36	53	13.10	11.69	11.70	14.06	10.90	14.40
49	IVT22-49	RSC 1172	55	40	38	40	46	61	12.03	9.65	8.65	13.66	8.95	11.66
50	IVT22-50	AS 55	40	31	24	26	37	54	18.13	17.05	17.82	21.64	13.31	21.26
51	IVT22-51	TS-208	83	40	31	51	47	58	12.60	9.45	11.12	12.25	8.93	11.99
52	IVT22-52	NRC 260	122	46	44	45	52	73	15.43	14.02	13.45	18.02	11.73	16.60
53	IVT22-53	NRC 196	44	34	24	33	36	41	13.60	12.91	11.18	14.12	12.13	14.10
54	IVT22-54	Pusa Sipani-SPS-433	51	29	30	28	29	46	14.37	12.83	12.42	14.40	10.32	14.35

सस्य विज्ञान
Agronomy

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3.Agronomy

Experiments on six major agronomic aspects were conducted during *kharif,* 2022 at 15 coordinating centres across the six zones.

1. AGRON 1/22. Evaluation of AVT II entries under different row spacing.
2. AGRON 2/15. Sustainable soybean production through crop diversification and tillage systems.
3. AGRON. 3/18/21. Evaluation of novel bio formulation for yield enhancement in soybean.
4. GRON-4/22: Organic farming for soybean-based cropping systems.
5. AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea.
6. AGRON- 6/2022 Effect of phytotron's Biostumilant on soybean (*Glycine max*).

By and large, all the trials were conducted during *kharif* 2022 at all the Centre representing 6 zones of the country as per technical programme. The experiment-wise salient findings (Table 3.1.1 to 3.6.7) are given as under.

1. AGRON 1/22. Evaluation of AVT II entries under different row spacing

The new entry with two row-spacing (30 and 45 cm) were tested in split plot design with three replications to study the response of soybean new entry to different row spacing (Table 3.1.1-3.1.8).

1.1. Eastern Zone (Ranchi, Raipur and Bhawanipatna)

1.1.1. New Entry

The new entry RSC 11-35 produce significantly higher yield than check varieties MACS 1460, JS 20-116 and found at par with check variety RSC 10-46 at Ranchi centre. At Raipur and Bhawanipatna centre, new entry RSC 11-35 produce significantly higher yield than all the check varieties. On zonal mean basis, the highest seed yield was registered with new entry RSC 11-35 (22.2 q/ha) followed by checks RSC 10-46 (19.5 q/ha) and MACS 1460 (18.4 q/ha) (Table 3.1.1). On zonal mean basis, a similar trend was also observed in all the growth and yield attribute parameters under study (Table 3.1.2).

1.1.2. Row spacing

The seed yield of soybean was significantly influenced by different row spacing at both the centres (Table 3.1.1). At Ranchi centre, significantly the higher seed yield was recorded with wider row spacing (45 cm) than narrow row spacing (30 cm). Similarly, at Raipur centre the higher seed yield was recorded with wider row spacing (45 cm) than narrow row spacing (30 cm). However, at Bhawanipatna higher seed yield was recorded with narrow row spacing (30 cm) than wider row spacing (40 cm). On zonal mean basis, the higher seed yield was recorded under wider planting (5.3%) as compared to narrow planting (Table 3.1.1). A similar trend was also noted in all the growth and yield attribute parameters (Table 3.1.2).

1.1.3. Interaction effect

The interaction between entries and row spacing was found non-significant at all the centre.

1.2. North plain Zone (Pantnagar and Ludhiana)

1.2.1. New Entry

The new entry PS – 1670 produced significantly higher yield than check varieties SL 955 and PS – 1347 at Pantnagar centre. At Ludhiana centre, seed yield of entry PS – 1670 was found at par with check varieties PS – 1347 and SL – 955.On zonal mean basis, the new entry PS – 1670 produced more than 10% higher seed yield than checks PS 1347 then SL – 955 (Table 3.1.3). On zonal mean basis, more or less a similar trend was also observed in all the growth and yield attribute parameters under study (Table 3.1.4).

1.2.2. Row spacing

Row spacing significantly influenced seed yield at Pantnagar. However, non-significant effect of row spacing on soybean yield was observed at Ludhiana centre (Table 3.1.3). At Pantnagar centre, the higher seed yield was recorded with wider row spacing (45 cm) than narrow row spacing (30 cm). Likewise, at Ludhiana centre numerically higher seed was registered with wider row spacing than narrow row spacing. On zonal mean basis, the higher yield (13.6%) was recorded under wider planting as compared to narrow planting (Table 3.1.3).

On zonal mean basis, maximum values of all the growth and yield attributes were associated with wider planting (Table 3.1.4).

1.2.3. Interaction effect

The interaction between entries and row spacing was found non-significant at both the centre (Table 3.1.2).

1.3. North Eastern Hill Zone (Imphal and Medziphema)

1.3.1. New Entry

The new entry KDS-1096 produce significantly higher seed yield than check varieties MACS-1460 and RKS-113 and fund at par with the check JS-20 116 at Imphal centre. Whereas new entry DLSb-1 produced lower seed yield than check varieties MACS-1460 and JS-20 116. However, at Medziphema centre, the new entries KDS-1096 and DLSb-1 produced lower seed yield then all checks under study (Table 3.1.5). On zonal mean basis, the new entry DLSb-1, yielded lower than all the check varieties namely; MACS-1460, JS-20 116 and RKS-113. Similarly, the new entry KDS-1096 yielded higher than check MACS-1460 (8.8%) and RKS-113 (18.2%).

1.3.2. Row spacing

Non-significant effect of row spacing on soybean yield was observed at both the centre (Table 3.1.5). At Imphal centre, numerically the higher seed yield was recorded with narrow row spacing (30 cm) than wider row spacing (45 cm). Whereas, at Medziphema centre numerically higher seed was registered with wider row spacing than narrow row spacing. On zonal mean basis, the higher seed yield was recorded under wider row spacing (1.71%) as compared to narrow row spacing. A similar trend was also noted in all the growth and yield attribute parameters (Table 3.1.6).

1.3.3. Interaction effect

The interaction between entries and row spacing was found non-significant at both the centre (Table 3.1.5).

1.4. Central Zone (Kota, Sehore and Amravati)

1.4.1. New Entry

All the new entries (except PS 1569) NRC 165, JS 22-12, JS 22-16, JS 22-18, RVSM 2012-4, NRC181 (early), yielded higher than the check variety NRC 138 at Sehore centre. On the contrary, at Kota, check variety NRC 138 produced higher seed yield than all the new entries under study. Similarly, at Amravati centre, new entries NRC 165, JS 22-12, JS 22-16, JS 22-18, RVSM 2012-4, NRC181 (early) yielded significantly lower than check variety NRC 138 (Table 3.1.7). However, at Amravati centre, the new entry PS 1569 produced significantly higher yield then check NRC 138. Moreover, on zonal mean basis all the new entries PS 1569, NRC 165, JS 22-12, JS 22-16, JS 22-18, RVSM 2012-4 and NRC181 yielded lower than the check NRC 138.

1.4.2. Row spacing

The seed yield of soybean slightly influenced by different row spacing at all the centre (Table 3.1.7). At Sehore centre, numerically the higher seed yield was recorded with wider row spacing (45 cm) than narrow row spacing (30 cm). Similarly, at Amravati centre significantly higher seed was recorded with wider row spacing (45 cm) then narrow row spacing (30 cm). Whereas, at Kota centre slightly higher seed was registered with narrow row (30 cm) spacing then wider row spacing (45 cm). On zonal mean basis, numerically the higher seed yield was recorded under wider planting (5.29%) as compared to narrow planting.

1.4.3. Interaction effect

The interaction between entries and row spacing was found non-significant at all the centre (Table 3.1.7).

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

Two tillage systems (minimum and conventional) and four crop rotations were tested in strip plot design with four replications to study the response of soybean to tillage systems and crop rotations (Table 3.2.1-3.2.22).

2.1. North plain zone (Pantnagar and Ludhiana)

2.1.1. *Crop rotation*

Soybean yield was not influenced by the crop rotation at Pantnagar and Ludhiana. Similarly, *rabi* yield remained unaffected due to different crop rotation at both the centres (Table 3.2.1 to 3.2.4). Soybean-Soybean-Maize-Soybean rotation yielded maximum SEY (3847 kg/ha) followed by soybean-soybean- soybean-soybean as evidenced from the zonal mean data (Table 3.2.3). The maximum net return and B:C ratio was observed under the Soybean-Soybean-Maize-Soybeanrotation (Table 3.2.4).

2.1.2. *Tillage system*

Soybean, *rabi* and soybean equivalent yield differed non-significantly between two tillage systems at Ludhiana and Pantnagar (Table 3.2.1to 3.2.3). Zonal mean basis, the numerically higher yield of *kharif* season crop was registered under conventional tillage system as compared to minimum tillage system (Table 3.2.1). Similarly, the slightly higher yield of *rabi* season crops were found under minimum tillage as compared to conventional tillage system (Table 3.2.2). However, the higher soybean equivalent yield was observed under conventional tillage system on zonal average basis (Table 3.2.3). The higher gross returns and net returns was observed under conventional tillage system as compared to minimum tillage systems. (Table 3.2.4).

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. Northern Eastern zone (Raipur and Ranchi)

2.2.1. Crop rotation

On zonal mean basis, the highest soybean equivalent yield was registered under Soybean-Soybean-Maize-Soybeansystem as compared to remaining system (Table 3.2.5). However, Soybean-Soybean-Soybean-Maize crop rotation produced maximum *rabi* yield on zonal mean basis (Table 3.2.6). Among crop rotations, the higher net returns and B:C ratio were registered with Soybean-Soybean-Maize-Soybean(Table 3.2.8)

2.2.2. Tillage system

The higher soybean equivalent yield was registered with conventional tillage (Table 3.2.7). At Raipur centre, significantly the higher *kharif* crop yield and soybean equivalent yield were found under conventional tillage as compared to minimum tillage practice. Similarly, *rabi* yield was also higher under conventional tillage practices as compared to minimum tillage. Among the tillage systems, the maximum cost of cultivation, gross returns, net returns were found under conventional tillage system (Table 3.2.8). The economical parameters and initial values of soil OC, N, P, and K and nutrient uptake are mentioned in Table 3.2.8 to3.2.10.

2.2.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be non-significant for soybean, *rabi* and soybean equivalent yield (Table 3.2.5, Table 3.2.6, Table 3.2.7).

2.3. Central zone (Kota and Amravati)

2.3.1. Crop rotation

The higher *kharif* crop yield was registered under Soybean-Soybean-Maize-Soybeansystem at both the centres (Table 3.2.11). The higher *rabi* yield was recorded with soybean-soybean-soybean-soybean system on zonal mean basis (Table 3.2.12). However, the maximum SEY was observed in Soybean-Soybean-Maize-Soybean followed by soybean-soybean- maize-soybean crop rotation on zonal mean basis (Table 3.2.13).

The maximum net returns and B:C ratio was with Soybean-Soybean-Maize-Soybeancrop rotation (Table 3.2.14). The initial values of soil parameters and nutrient uptake at of Kota and Amravati are given in Table 3.2.15, 3.2.16 and 3.2.17.

2.3.2. Tillage system

Minimum tillage produced higher yield (*kharif*, *rabi* and SEY) than conventional tillage at both Kota and Amravati (Table 3.2.11 to 3.2.13). On zonal mean basis, minimum tillage gave higher yield to the tune of 7.5%, 4.1% and 5.6% of kharif crop yield, *rabi* yield and SEY over conventional tillage, respectively (Table 3.2.11 to 3.2.13).

As economic point of view, the highest net returns and B:C ratio was registered under minimum tillage as compared to conventional tillage (Table 3.2.14). The initial values of soil parameters and nutrient uptake at of Kota and Amravati are given in Table 3.2.15, 3.2.16 and 3.2.17.

2.3.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be non-significant at both the centre (Table 3.2.11 to 3.2.13).

2.4 Southern zone (Dharwad and Adilabad)

2.4.1. Crop rotation

The *kharif* crop yield, rabi crop yield and SEY were highest with Soybean-Soybean-Maize-Soybean at Dharwad centre (Table 3.2.18 to 3.2.20). At Adilabad centre, the maximum *kharif* crop yield and rabi yield was registered with Soybean-Soybean-Maize-Soybeancrop rotation (Table 3.2.18 to 3.2.20). Similarly, on zonal mean basis, the higher yield of *kharif* crop yield, rabi crop yield and SEY were found with Soybean-Soybean-Maize-Soybeanrotation as evidenced from zonal mean (Table 3.2.18 to 3.2.20). The economics of different treatments and soil analysis and nutrient uptake data are given in table 3.2.21 and 3.2.22.

2.4.2. Tillage system

Conventional tillage yielded higher than minimum tillage as evidenced from zonal mean. On zonal mean basis, conventional tillage gave higher *kharif* crop yield (7.8%), *rabi* yield (23.3%) and SEY (24.4%) over minimum tillage (Table 3.2.18 to 3.2.20). Among the tillage systems, the maximum cost of cultivation, gross returns, net returns were found under conventional tillage system. The economics, soil analysis and nutrient uptake data are given in table 3.2.21 and 3.2.22.

2.4.3. Interaction effect

Interaction between tillage systems and crop rotations was found to be non-significant at both the centre (Table 3.2.18 to 3.2.20).

3. AGRON. 3/18/21. Evaluation of novel bio formulation for yield enhancement in soybean

Novel bio-formulations (seven treatments) such as Bio Zn, Bio NPK and Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing) were tested with 100% and 75% RDF under field conditions with three replications to evaluate the effect of novel bio formulations on productivity of soybean (Table 3.3.1 to 3.3.25).

3.1 Southern zone (Dharwad, Adilabad and Pune):

3.1.1 Dharwad

The yield data of soybean for Dharwad centre is presented in the table 3.3.1. The use of novel bio formulations significantly influenced the yield of soybean. At Dharwad centre, the maximum soybean yield was registered with application of 100% RDF followed by 75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High solubilizing) and 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 20.9% with the application of 100% RDF, 15% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c, and 13.2% with the application of 75 % RDF + Bio Zn + Bio NPK as compared to control (Table 3.3.1). Available nutrients in soil and their uptake depicted in Table 3.3.8 & 3.3.9.

3.1.2 Adilabad

The yield data of soybean for Adilabad centre is presented in the table 3.3.1. The use of novel bio formulations significantly influenced the yield of soybean. At Adilabad centre, the maximum soybean yield was registered with the application of 75 % RDF + Rhizobium + MDSR14 + 12c followed by 100% RDF and then 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 51.7% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c, 50% with the application of 100% RDF, and 43.2% with the application of 75 % RDF + Bio Zn + Bio NPK as compared to control (Table 3.3.1).

3.1.3 Pune

The yield data of soybean for Pune centre is presented in the table 3.3.1. The use of novel bio formulations significantly influenced the yield of soybean. At Pune centre, the maximum soybean yield was registered with the application of 75 % RDF + Rhizobium + MDSR14 + 12c followed by 75 % RDF + Bio Zn + Bio NPK and then 100% RDF only. The yield of soybean increased by 25.3% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c, 22.4% with the application of 75 % RDF + Bio Zn + Bio NPK, and 20.6% with the application of 100% RDF over the control treatment (Table 3.3.1).

3.1.4 Zonal mean

Overall, on the basis of zonal mean the highest seed yield of soybean was registered with the application 75 % RDF + Rhizobium + MDSR14 + 12c followed by 100% RDF only and 75 % RDF + Bio Zn + Bio NPK. The increase was 28.3% under 75 % RDF + Rhizobium + MDSR14 + 12c, 28.2% under 100% RDF application and 24.3% under 75 % RDF + Bio Zn + Bio NPK treatment as compared to control (Table 3.3.1). Growth, development and yield attributes follow the same trend as that of yield (Table 3.3.6 &3.3.7). From the economics point of view, maximum net returns and B:C ratio were associated with the application of 75 % RDF + Rhizobium + MDSR14 + 12c. Whereas, the maximum cost of cultivation was associated with the application of 100% RDF only (Table 3.3.6).

3.2 Eastern Zone (Ranchi and Raipur):

3.2.1 Ranchi

The yield data of soybean for Ranchi centre is presented in the table 3.3.4. The use of novel bio formulations significantly influenced the yield of soybean. At Ranchi centre, the maximum soybean yield was registered with the application of 100% RDF followed by 75 % RDF + Rhizobium + MDSR14 + 12c and then with the 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 123.7% with the application of 100% RDF, 98.6% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 87.8% with the application of 75 % RDF + Bio Zn + Bio NPK as compared to control treatment.

3.2.2 Raipur

The yield data of soybean for Raipur centre is presented in the table 3.3.4. The use of novel bio formulations significantly influenced the yield of soybean. At Raipur centre, the maximum soybean yield was registered with the application of 75 % RDF + Bio Zn + Bio NPK followed by 75 % RDF + Rhizobium + MDSR14 + 12c and 100% RDF. The yield of soybean increased by 88.5% with the application of 75 % RDF + Bio Zn + Bio NPK, 73.5% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 64.3% with application of 100% RDF over the control treatment (Table 3.3.4).

3.2.3 Zonal mean

Overall, on the zonal mean basis maximum soybean yield was registered with the 100% RDF application followed by 75 % RDF + Bio Zn + Bio NPK and 75 % RDF + Rhizobium + MDSR14 + 12c. The yield of soybean increased by 93.3% with the application of 100% RDF, 88.1% with the application of 75 % RDF + Bio Zn + Bio NPK and 85.6% on application of 75 % RDF + Rhizobium + MDSR14 + 12c over the control treatment (Table 3.3.4).

Growth, development and yield attributes follows the same trend as was observed in yield (Table 3.3.10, 3.3.11). From the economics point of view, maximum gross returns, net returns were associated with the application of 100% RDF only. Whereas, maximum B:C ratio was associated with the application of 75 % RDF + Bio Zn + Bio NPK followed by 75 % RDF + Rhizobium + MDSR14 + 12c and then with 100% RDF. Whereas, the maximum cost of cultivation was associated with the application of 100% RDF only (3.3.10).

3.2 Central zone (Sehore, Kota, Amravati and Devgadh baria):

3.1.2 Sehore

The yield data of soybean for Sehore centre was presented in the table 3.3.2. The use of novel bio formulations significantly influenced the yield of soybean. At Sehore centre, the maximum soybean yield was registered with application of 100% RDF followed by 75% RDF + Bio Zn + Bio NPK and 75 % RDF + Rhizobium + MDSR14 + 12c. The yield of soybean increased by 17.3% with the application of 100% RDF, 15.8% with the application of 75 % RDF + Bio Zn + Bio NPK and 12.6% with application of 75 % RDF + Rhizobium + MDSR14 + 12c as compared to control (Table 3.3.2).

3.3.2 Kota

The yield data of soybean for Kota centre was presented in the table 3.3.2. The use of novel bio formulations significantly influenced the yield of soybean. At Kota centre, the maximum soybean yield was registered with the application of 100% RDF followed by 75 % RDF + Rhizobium + MDSR14 + 12c and then 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 25.2% with the application of 100% RDF, 20.8% with the application of 75 % RDF + Rhizobium

+ MDSR14 + 12c and 15.6% with the application of 75 % RDF + Bio Zn + Bio NPK as compared to control (Table 3.3.2).

3.3.3 Amravati

The yield data of soybean for Amravati centre was presented in the table 3.3.2. The use of novel bio formulations significantly influenced the yield of soybean. At Amravati centre, the maximum soybean yield was registered with the application of 75 % RDF + Rhizobium + MDSR14 + 12c followed by 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 65.7% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 64.6% with the application of 75 % RDF + Bio Zn + Bio NPK over the control treatment (Table 3.3.2).

3.3.4 Devgadh baria

The yield data of soybean for **Devgadh baria** centre was presented in the table 3.3.2. The use of novel bio formulations significantly influenced the yield of soybean. At Devgadh baria centre, the maximum soybean yield was registered with the application of 75 % RDF + Rhizobium + MDSR14 + 12c followed by 100% RDF only. The yield of soybean increased by 29.7% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 16.8% with the application of 100% RDF only over the control treatment (Table 3.3.2).

3.3.4 Zonal mean

Overall, zonal mean basis the highest seed yield of soybean was registered with the application 75 % RDF + Rhizobium + MDSR14 + 12c followed by 75 % RDF + Bio Zn + Bio NPK treatment. The increase was 30.4% under 75 % RDF + Rhizobium + MDSR14 + 12c and 26.5% under 75 % RDF + Bio Zn + Bio NPK treatment as compared to control (Table 3.3.2). However, supplementation of the 25% RDF with the Rhizobium + MDSR14 + 12c increase 4.2% seed yield as compared to 100% RDF only. Growth, development and yield attributes follows the same trend as was observed in yield (Table 3.3.14 to 3.3.18).

Economics point of view, maximum gross returns, net returns and B:C ratio were associated with the application of 75 % RDF + Rhizobium + MDSR14 + 12c treatment. Whereas, the maximum cost of cultivation was associated with the application of 100% RDF only (3.3.14).

3.2 North Plain Zone (Delhi, Pantnagar and Ludhiana):

3.1.3 Delhi

The yield data of soybean for Delhi centre was presented in the table 3.3.3. The use of novel bio formulations significantly influenced the yield of soybean. At Delhi centre, the maximum soybean yield was registered with application of 75 % RDF + Bio Zn + Bio NPK followed by 100% RDF only. The yield of soybean increased by 108.5% with the application of 75 % RDF + Bio Zn + Bio NPK and 96.2% with the application of 100% RDF only as compared to control (Table 3.3.3).

3.4.2 Pantnagar

The yield data of soybean for Pantnagar centre was presented in the table 3.3.3. The use of novel bio formulations significantly influenced the yield of soybean. At Pantnagar centre, the maximum soybean yield was registered with the application of 100% RDF followed by 75 % RDF + Bio Zn + Bio NPK and 75 % RDF + Rhizobium + MDSR14 + 12c. The yield of soybean increased by 53.1% with the application of 100% RDF, 44.2% with the application of 75 % RDF + Bio Zn + Bio NPK and 33.4% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c over the control treatment.

3.4.3 Ludhiana

The yield data of soybean for Ludhiana centre was presented in the table 3.3.3. The use of novel bio formulations significantly influenced the yield of soybean. At Ludhiana centre, the maximum soybean yield was registered with the application of 100% RDF and then 75 % RDF + Rhizobium + MDSR14 + 12c. The yield of soybean increased by, 40.7% with application of 100% RDF and 39.3% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c over the control treatment (Table 3.3.3).

3.4.4 Zonal mean

Overall, zonal mean basis the maximum soybean yield was registered with the application of 100% RDF followed by 75 % RDF + Bio Zn + Bio NPK and then 75 % RDF + Rhizobium + MDSR14 + 12c. The yield of soybean increased by 61.9% with the application of 100% RDF, 56.7% with the application of 75 % RDF + Bio Zn + Bio NPK, and 49.3% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c over the control treatment (Table 3.3.3).

Growth, development and yield attributes follows the same trend as was observed in yield (Table 3.3.19 &3.3.20).

Economics point of view, maximum gross returns, net returns and B:C ratio were associated with the application of 100% RDF followed by 75 % RDF + Bio Zn + Bio NPK treatment and then with 75 % RDF + Rhizobium + MDSR14 + 12c. Whereas, the maximum cost of cultivation was associated with the application of 100% RDF only (3.3.20).

3.2 North Eastern Zone (Imphal and Medziphema):

3.1.4 Imphal

The yield data of soybean for Imphal centre is presented in the table 3.3.5. The use of novel bio formulations significantly influenced the yield of soybean. At Imphal centre, the maximum soybean yield was registered with application of 75 % RDF + Bio NPK followed by 100% RDF and 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 28.8% with the application of 75 % RDF + Bio NPK, 19.4% with the application of 100% RDF only as compared to control (Table 3.3.5).

3.5.2 Medziphema

The yield data of soybean for Medziphema centre was presented in the table 3.3.5. At Medziphema centre, the maximum soybean yield was registered with the application of 75 % RDF + Bio Zn followed by 75 % RDF + Bio Zn + Bio NPK and then 100% RDF (Table 3.3.5).

3.5.3 Zonal mean

Overall, zonal mean basis the highest seed yield of soybean was registered with the application 75 % RDF + Bio Zn + Bio NPK followed by 100% RDF only and 75 % RDF + Rhizobium + MDSR14 + 12c. The increase was 31.9% under 75 % RDF + Bio Zn + Bio NPK, 31.8% under 100% RDF application and 25.7% under 75 % RDF + Rhizobium + MDSR14 + 12c treatment as compared to control (Table 3.3.5). Growth, development and yield attributes follows the same trend as was observed in yield (Table 3.3.24 & 3.3.25)

Economics point of view, maximum B:C ratio was associated with 75 % RDF + Bio Zn + Bio NPK treatment. Whereas, the maximum cost of cultivation was associated with the application of 100% RDF only (Table 3.3.24).

4. GRON-4/22: Organic farming for soybean-based cropping systems

4.1. Eastern Zone (Ranchi and Raipur)

The experiment was started during *kharif,* 2022. Soybean yield didn't vary significantly among the cropping systems. Among the management practices, the highest soybean yield was registered with inorganic crop management practices at both Ranchi and Raipur centers. At Ranchi and Raipur, the seed yield was increased by 12.8% and 54.38%, respectively under inorganic management practices as compared to organic management. Similarly, net return and B:C ratio were comparatively higher in inorganic crop management practices than the organic management practice at both the centers. However, organic management reported higher cost of cultivation as compared to inorganic crop management practices. The available nutrients in soil and their uptake is depicted in Table 3.4.1 and 3.4.2.

4.2. Central Zone (Kota, Amravati and Devgadh baria)

The yield data of soybean for central zone was presented in the table 3.4.4. Soybean yield didn't vary significantly among the cropping systems. Overall, zonal mean basis the highest soybean yield was registered with inorganic crop management practices. The seed yield was 21.6% higher under inorganic management practices as compared to organic management.

4.3. Southern Zone (Pune, Adilabad and Dharwad)

The yield data of soybean for southern zone was presented in the table 3.4.5. Among the cropping systems the seed yield of soybean was did not influenced. Overall, zonal mean basis the highest soybean yield was registered with inorganic crop management practices. The seed yield was 10.2% higher under inorganic management practices as compared to organic management.

Similarly, net return and B:C ratio were comparatively higher in inorganic crop management practices than the organic management practice. However, organic management reported higher cost of cultivation as compared to inorganic crop management practices.

The soil physical properties, available nutrients in soil and their uptake is depicted in Table 3.4.7 and 3.4.8.

4.4. North Plain Zone (Ludhiana and Pantnagar)

The yield data of soybean for north plain zone was presented in the table 3.4.9. Overall, zonal mean basis the highest soybean yield was registered with inorganic crop management practices. The seed yield was 16.9% higher under inorganic management practices as compared to organic management. Similarly, net return and B:C ratio were comparatively higher in inorganic crop management practices than the organic management practice. However, organic management reported higher cost of cultivation as compared to inorganic crop management practices. (Table 3.4.10).

4.5. North Eastern Hill Zone (Imphal and Medziphema)

The yield data of soybean for north eastern hill zone was presented in the table 3.4.11. At Imphal and Medziphema centre, highest seed yield was reported under organic management practices. Similarly, on zonal mean basis, highest grain yield was registered with organic management practices. The seed yield of soybean increased by 10.2% in organic management practices as compared to inorganic management practices (Table 3.4.11). On zonal mean basis net returns and B:C ratio was comparatively greater in inorganic management practices than the organic management practices. However, organic management practices reported higher cost of cultivation as compared to inorganic management practices on taking zonal mean into consideration (Table 3.4.12). The soil physical properties, available nutrients in soil and their uptake is depicted in Table 3.4.13 and 3.4.14.

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

The experiment was initiated during 2020 and completed in 2022. Five treatments of thiourea application such as control, water spray, thiourea @ 250ppm, thiourea @ 500ppm, thiourea @ 750ppm (Applied at 20-25 days after sowing (DAS) and 50-55 DAS) were tested under factorial RBD with three replications to evaluate the effect of foliar spray of thiourea on growth and yield of soybean varieties under different zones (Table 3.5.1. to 3.5.8.5).

5.1. North plain zone (Pantnagar Ludhiana and Delhi)

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affect the growth and yields of soybean at all the centre (Table 3.5.1 & 3.5.2).

5.1.1. Variety

Among the two varieties, significantly the highest seed yield was recorded with PS 1347 at Pantnagar and Ludhiana centre. While, variety SL 958 produce significantly higher seed yield than PS 1347 at Delhi centre.

5.1.2. Thiourea

The application of thiourea with increasing dose increase the seed yield of soybean at Pantnagar, Delhi and Ludhiana centre the highest yield was recorded with the application of thiourea @ 750 ppm/ha. On zonal mean basis, the highest seed yield was registered with the application of thiourea @ 750 ppm/ha followed by 500 ppm/ha. On zonal mean basis, the seed yield was increased by 23.3% with the application of thiourea @ 750 ppm/ha as compared to control. The similar trend was also observed for growth and economical parameters (Table 3.5.2).

5.2. Eastern zone (Raipur and Ranchi)

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affect the growth and yields of soybean at all the centre (Table 3.5.3 to 3.5.4).

5.2.1. Variety

Among the two varieties, significantly the highest seed yield was recorded with the RSC 10-46 as compared to JS 95-60 at both the centre. The variety RSC 10-46 yielded 21.8% higher than JS 95-60 as evidenced from zonal mean. The similar trend was also observed for growth and economics parameters (Table 3.5.3 and 3.5.4).

5.2.2. Thiourea

The foliar application of thiourea with increasing dose increase the seed yield at both the centre and the highest yield was recorded with the application of thiourea @ 750 ppm/ha followed by application of thiourea @ 500 ppm/ha. Overall, the similar trend was also observed among all the remaining growth and economical parameters. On zonal mean basis, the seed yield was increased by 23.9% with the application of thiourea @ 750 ppm/ha and followed by 18.7% with the application of thiourea @ 500 ppm/ha as compared to control treatment (Table 3.5.4).

5.3 Central zone (Sehore, Kota, Amravati and Devgadh baria)

5.3.1. Variety

Among the varieties, significantly the highest seed yield was recorded with the JS 20-69 as compared to JS 20-29 at Sehore. At Amravati centre, the highest seed yield was recorded with the RVS 24 than NRC 86 variety. Highest seed yield was reported with NRC 37 at Devgadh baria. Similar trend was also observed among other growth, yield attributes and economical parameters (Table 3.5.5 and 3.5.6).

5.3.2. Thiourea

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affect the growth and yields of soybean at central zone (Sehore, Kota, Amravati and Devgadh baria) (Table 3.5.5 and 3.5.6). Among the foliar spray application treatments, the highest seed yield at Sehore, Kota, Amravati and Devgadh baria centers, was registered with the application of thiourea @ 750 ppm/ha followed by 500 ppm/ha. On zonal mean basis, the highest seed yield was registered with the application of thiourea @ 750 ppm/ha followed by application of thiourea @ 500 ppm/ha. The yield was increased by 21.9% with the application of thiourea @ 750 ppm/ha and 19.3% with the application of thiourea @ 500 ppm/ha over control, as evidenced by zonal mean data. The similar trend was also observed for the yield attributes and economical parameters (Table 3.5.6).

5.4. Southern zone (Dharwad and Adilabad)

5.4.1. Variety

Among the varieties, the highest seed yield was recorded with the MACS 1188 as compared to JS 93-05 at both the centre. On zonal mean basis, variety MACS 1188 produced 15.1% higher yield as compared to JS 93-05 (Table 3.5.8).

5.4.2. Thiourea

Foliar application of thiourea in soybean at 20-25 and 50-55 days after sowing significantly affect the growth and yields of soybean at both the centers (Table 3.5.7 to 3.5.8). Among the foliar spray application treatments, the yield of soybean was increased with the increased dose of the thiourea foliar spray and the highest yield of soybean was registered with the application of thiourea @ 750 ppm/ha followed by application of thiourea @ 500 ppm/ha. The similar trend was also observed for the yield attributes and economical parameters (Table 3.5.7 and 3.3.8). The yield was increased by 30.2% under the application of thiourea @ 750 ppm/ha and 22.1% under the application of thiourea @ 500 ppm/ha over control, as evidenced by zonal mean.

5.4.2.1Pooled analysis results of thiourea application on soybean

The three year (2020-2022) pooled analysis of soybean yield and economics data of northern plain zone, eastern zone, central zone and southern zone revealed that, foliar application of thiourea @ 750ppm reported highest grain yield, gross returns and B:C ratio as compared to control (Table 3.5.8.1 to 3.5.8.4) Similarly, foliar application of thiourea @ 500ppm found next best treatments across zone. However, the similar trend was also observed with zonal mean (Table 3.5.8.5).

5.4.2.2Conclusion

Pooled average data of 3 years (2020-2022) revealed that foliar application of thiourea @ 750ppm across 4 zones (NPZ, EZ, CZ and SZ) reported significantly highest seed yield (25%), gross returns, net returns and B:C (2.40) ratio compared to control.

6. AGRON- 6/2022 Effect of phytotron's Biostumilant on soybean (*Glycine max*)

Four treatments each with varying concentrations including untreated control of respective bio stimulants *viz*., Phytotron's Biostumilant VININ (Gibberellin Augmenter), Phytotron's Biostumilant TULIP (Cytokinin supplement), Phytotron's Biostumilant WINSTOP (Auxin supplement) were tested under RBD to test the effect of Phytotron's Biostumilant on soybean (*Glycine max*) (Table 3.6.1. to 3.6.5).

6.1. Central zone (Kota, Amravati, Sehore)

On the zonal mean basis, the higher seed yield of soybean was recorded with the application of 2.0 ml / lit. + GA (10 ppm)- first spray at 3-4 nodal growth stage after germination followed by 4.0 ml / lit. - Second Spray at 8-9 nodal growth stage after germination of VININ-Biostimulant-Antioxidant (Gibberellin Augmenter) as compared to other treatments. Similarly, application of 2.0 ml / lit. - First Spray along with post-emergence herbicide application after germination and crop establishment followed by Second Spray @ 2.0 ml / Lit at 10 % flowering and third Spray @ 2.5 ml / lit. after Pod setting (nearly 15 days after second spray) of TULIP-Cytokinin supplement registered highest seed yield of soybean as compared to remaining treatments. Maximum yield of soybean was registered with the application of 2.0 ml / lit. - first spray at pre-flowering stage approximately 30 DAG. (Days after germination) followed by 3.0 ml / lit. - Second Spray after Seed Setting stage (50 DAG) of WINSTOP- Auxin supplement as compared to other treatments. Among the three bio stimulants, application WINSTOP- Auxin supplement reported highest yield of soybean.

6.2. Southern zone (Dharwad, Pune)

Overall, on zonal mean basis, the highest seed yield of soybean was registered with the application of 2.5 ml / lit. + GA (10 ppm)- first spray at 3-4 nodal growth stage after germination followed by 5.0 ml / lit. - Second Spray at 8-9 nodal growth stage after germination of VININ - Biostimulant-Antioxidant (Gibberellin Augmenter) as compared to other treatments. Similarly, application of 2.5 ml / lit. - First Spray along with post-emergence herbicide application after germination and crop establishment followed by Second Spray @ 2.5 ml / Lit at 10 % flowering and third spray @ 3.0 ml / lit. after Pod setting (nearly 15 days after second spray) of TULIP-Cytokinin supplement registered highest yield of soybean on comparing with other treatments. Maximum yield of soybean was registered with the application of 2.5 ml / lit. - first spray at pre-flowering stage approximately 30 DAG. (Days after germination) followed by 3.5 ml / lit. - Second Spray after Seed Setting stage (50 DAG) of WINSTOP- Auxin supplement on comparing with other treatments. Application of WINSTOP- Auxin supplement reported highest yield of soybean as compared to VININ and TULIP biostimulants.

6.3. North Plain (Pantnagar)

The application of VININ - Biostimulant-Antioxidant (Gibberellin Augmenter) on soybean did not influence the seed yield. The higher seed yield was obtained on application of **2.**5 ml / lit. - First Spray along with post-emergence herbicide application after germination and crop establishment followed by Second Spray @ 2.5 ml / Lit at 10 % flowering and third spray @ 3.0 ml / lit., after Pod setting (nearly 15 days after second spray) of TULIP - Cytokinin supplement. Similarly, highest yield of soybean was registered on application of 2.5 ml / lit. - first spray at pre-flowering stage approximately 30 DAG followed by 3.5 ml / lit. - Second Spray after Seed Setting stage (50 DAG) of WINSTOP - Auxin supplement. Among the three biostimulants, maximum soybean yield was registered with the application of WINSTOP - Auxin supplement.

Table 3.1.1

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

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

Treatment	Ranchi			Raipur			Bhawanipatna			Zonal mean		
	Row spacing											
Entry	**30 cm**	**45 cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**
RSC 11-35	2204	2904	2554	2165	2356	2261	1893	1818	1856	2087	2359	2224
MACS 1460 (c)	1996	2463	2230	1746	1824	1785	1596	1424	1510	1779	1904	1842
JS 20-116 (c)	1556	2230	1893	1625	1694	1660	1532	1374	1453	1571	1766	1669
RSC 10-46 (c)	2748	2230	2489	1915	2027	1971	1465	1302	1384	2043	1853	1948
Mean	2126	2456		1863	1975		1622	1480		1870	1970	
Row spacing			294			290			NS			
Entries			285			123			116			
Interaction			NS			NS			NS			

Table 3.1.2

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

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

Characters: Dry matter, CGR, RGR, Plant height, No. of pods/plant, 100-seed weight, Straw yield, Harvest Index, Grain production efficiency and RUE

Treatment	Growth and yield attributes			Dry matter (g/plant)			Mean CGR (g/m^2/day)		Mean RGR (g/g/day)		Straw yield (kg/ha)	Harvest index (%)
	No. of branches /plant	No. of pods/ plant	100-seed weight (g)	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS		
Row spacing												
30 cm	3.36	42.42	10.56	1.78	6.91	19.52	3.43	8.42	0.06	0.04	2798.44	40.78
45 cm	3.98	54.83	11.06	2.22	10.02	26.88	3.03	6.84	0.06	0.04	2986.44	40.73
Entry												
RSC 11-35	3.82	54.69	10.90	2.03	9.61	25.53	3.20	7.64	0.06	0.04	3329.31	40.78
MACS 1460 (c)	3.32	48.59	10.55	1.73	8.62	20.34	0.41	0.86	0.04	0.03	3219.76	38.46
JS 20-116 (c)	3.61	42.40	11.16	2.01	8.95	22.81	3.66	8.28	0.06	0.04	2598.07	40.27
RSC 10-46 (c)	3.91	52.92	10.65	1.84	10.38	26.52	0.53	1.20	0.05	0.03	3605.33	38.11

Table 3.1.3

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

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

Treatment	Pantnagar			Ludhiana			Zonal mean		
	Row spacing								
Entry	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**
PS - 1670	1316	2247	1781	2537	2836	2687	1927	2542	2234
PS – 1347 (c)	1259	1448	1354	2612	2619	2616	1936	2034	1985
SL – 955 (c)	1213	1341	1277	2528	2535	2532	1871	1938	1905
Mean	1263	1679		2559	2663		1911	2171	
Row spacing			264			NS			
Entries			398			NS			
Interaction			NS			NS			

Table 3.1.4

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

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

Characters: Dry matter, CGR, RGR, Plant height, No. of pods/plant, 100-seed weight, Straw yield, Harvest Index, Grain production efficiency and RUE

Treatment	Growth and yield attributes			Dry matter (g/plant)			Mean CGR ($g/m^2/day$)		Mean RGR (g/g/day)		Straw yield (kg/ha)	Harvest index (%)	Grain production efficiency (kg/ha/day)	RUE (kg/ha/mm)
	No. of branches /plant	No. of pods/ plant	100-seed weight (g)	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS				
Row spacing														
30 cm	3.95	72.61	10.00	3.16	8.68	17.79	10.03	19.28	0.050	0.034	5434	26.30	13.36	2.55
45 cm	4.36	93.65	10.54	2.91	8.50	19.01	9.94	19.93	0.053	0.038	5234	29.40	15.26	2.81
Entry														
PS - 1670	4.56	91.48	10.50	3.04	8.97	19.58	10.73	21.08	0.053	0.037	5843	27.98	15.66	2.88
PS - 1347	4.30	80.56	10.73	3.20	8.64	18.82	9.79	21.00	0.050	0.037	4628	29.55	14.14	2.63
SL - 955	3.60	77.29	9.59	2.86	8.16	16.79	9.44	16.73	0.051	0.036	5531	26.02	13.15	2.57

Table 3.1.5

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

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

Treatment	Imphal			Medziphema			Zonal mean		
	Row spacing								
Entry	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**
KDS-1096	2092	1953	2022	1266.7	1344.0	1305.3	1679	1649	1664
DLSb-1	1722	1214	1468	1178.7	1072.0	1125.3	1450	1143	1297
MACS-1460 (c)	1619	1864	1742	1153.8	1478.7	1316.2	1386	1671	1529
JS-20 116 (c)	1817	2064	1940	1640.0	1556.2	1598.1	1729	1810	1769
RKS-113 (c)	1386	1492	1439	1327	1426	1377	1357	1459	1408
Mean	1727	1717		1313	1375		1520	1546	
Row spacing			NS			NS			-
Entries			110			236			-
Interaction			NS			NS			-

Table 3.1.6

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

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

Characters: Dry matter, CGR, RGR, Plant height, No. of pods/plant, 100-seed weight, Straw yield, Harvest Index, Grain production efficiency and RUE

Treatment	Growth and yield attributes			Dry matter (g/plant)			Mean CGR ($g/m^2/day$)		Mean RGR (g/g/day)		Straw yield (kg/ha)	Harvest index (%)	Grain production efficiency (kg/ha/day)	RUE (kg/ha/mm)
	No. of branches /plant	No. of pods/ plant	100 seed weight (g)	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS				
Row spacing														
30cm	4.42	59.94	11.43	1.87	6.12	10.07	10.37	9.96	0.077	0.034	2713	35.93	13.60	3.05
45cm	4.59	62.83	11.48	1.87	6.33	10.66	8.67	9.03	0.079	0.036	2536	37.69	13.84	3.09
Entry														
KDS-1096	4.42	63.21	10.83	1.90	6.25	10.34	9.49	9.45	0.078	0.034	2682	38.03	14.97	3.39
DLSb-1	4.59	59.25	12.27	1.75	5.90	9.75	9.10	8.50	0.079	0.033	2557	33.74	11.54	2.60
MACS-1460	4.41	61.82	11.60	1.83	6.07	10.39	9.28	9.88	0.078	0.038	2395	39.00	13.53	3.07
JS-20 116	4.85	66.81	11.55	1.94	6.74	11.45	10.70	10.61	0.082	0.035	2831	38.50	16.06	3.53
RKS-113	4.23	57.09	11.05	1.93	6.09	9.93	9.00	8.99	0.074	0.034	2657	34.78	12.51	2.76

Table 3.1.7

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			Kota			Amravati			Zonal mean		
	Row spacing											
Entry	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**
PS 1569	1255	1461	1358	971	932	951	2423	2779	2601	1550	1724	1637
NRC 165	2037	2099	2068	1250	1343	1297	1761	2227	1994	1683	1890	1786
JS 22-12	1708	2119	1914	2315	2022	2168	1727	1806	1766	1917	1982	1949
JS 22-16	1831	2078	1955	1482	1491	1486	1387	1762	1575	1567	1777	1672
JS 22-18	2016	2263	2140	1898	1559	1729	1779	2130	1954	1898	1984	1941
RVSM 2012-4	2366	2222	2294	1852	1566	1709	1918	1981	1950	2045	1923	1984
NRC181	2037	2119	2078	1142	1096	1119	1472	1745	1609	1550	1653	1602
NRC 138 (c)	1543	1461	1502	2516	2315	2415	1948	2301	2124	2002	2026	2014
Mean	1849	1978		1678	1540		1802	2091		1776	1870	
Row spacing			25			102			133			-
Entries			140			203			112			-
Interaction			NS			NS			NS			-

Table 3.1.8

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, No. of pods/plant, 100-seed weight, Straw yield, Harvest Index, Grain production efficiency and RUE

Treatment	Growth and yield attributes			Dry matter (g/plant)			Mean CGR ($g/m^2/day$)		Mean RGR (g/g/day)		Straw yield (kg/ha)	Harvest index (%)	Grain production efficiency (kg/ha/day)	RUE (kg/ha/ mm)
	No. of branches /plant	No. of pods/ plant	100 seed weight (g)	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS				
Row spacing														
30cm	2.79	32.47	10.30	2.53	12.40	23.01	28.28	29.21	0.092	0.030	2153	45.28	17.93	1.44
45cm	3.51	36.27	10.94	2.92	12.23	24.39	26.55	33.62	0.081	0.033	2274	44.90	18.92	1.53
Entry														
PS 1569	3.20	33.46	10.13	3.02	13.14	24.82	29.18	32.84	0.080	0.032	2128	42.62	16.20	1.42
NRC 165	2.43	32.38	10.87	2.69	12.29	23.32	27.59	30.65	0.087	0.032	2075	45.95	18.94	1.48
JS 22-12	3.05	36.42	10.26	2.75	12.22	23.56	26.86	30.86	0.087	0.032	2385	45.47	20.53	1.61
JS 22-16	3.26	29.23	10.31	2.48	10.98	22.79	24.25	32.88	0.088	0.035	2063	44.74	16.47	1.30
JS 22-18	3.59	40.10	10.83	2.82	12.78	23.57	28.52	29.48	0.087	0.030	2311	45.69	20.10	1.59
RVSM 2012-4	3.44	35.20	10.63	2.67	12.42	23.98	27.99	31.96	0.089	0.031	2300	46.31	19.48	1.55
NRC181	3.58	26.04	11.67	2.36	10.83	20.92	23.54	28.38	0.090	0.033	1817	46.18	16.17	1.16
NRC 138 (C)	2.73	42.13	10.25	3.01	13.84	26.41	30.74	34.22	0.084	0.031	2626	43.75	19.52	1.68

Table 3.2.1

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

Zone: Northern plain; **Design:** Strip plot; **Replications:** Four; **Character:** Seed yield (kg/ha); **Min**[m] = Minimum, **Con**[l] = Conventional

Crop rotation	Ludhiana			Pantnagar			Zonal mean		
	Tillage system								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1726	1709	1718	1420	1587	1504	1573	1648	1611
Soy-Soy-Maize-Soy	1701	1644	1672	1332	1414	1378	1517	1529	1525
Soy-Maize-Soy-Maize	7625	7528	7577	3595	3987	3791	5610	5758	5684
Soy-Soy-Soy-Maize	1705	1702	1704	1470	1336	1403	1588	1519	1554
Mean	3189	3145		1954	2081		2572	2613	
CD (P=0.05)									
Tillage			NS			NS			-
Crop Rotation			238			442			-
Interaction			NS			NS			-

Table 3.2.2

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems (2021-22)

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

Crop rotation	Ludhiana			Pantnagar			Zonal mean		
	Tillage system								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	4659	4732	4696	4297	3973	4134	4478	4353	4415
Soy-Soy-Maize-Soy	4651	4716	4683	3986	4131	4059	4319	4424	4371
Soy-Maize-Soy-Maize	4522	4538	4530	4467	4294	4380	4495	4416	4455
Soy-Soy-Soy-Maize	4643	4692	4667	4739	4626	4682	4691	4659	4675
Mean	4619	4669		4372	4256		4496	4463	
CD (P=0.05)									
Tillage			NS			NS			-
Crop Rotation			NS			382			-
Interaction			NS			NS			-

Table 3.2.3

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	Ludhiana			Pantnagar			Zonal mean		
	Tillage								
	Min^m	Con^l	Mean	Min^m	Con^l	Mean	Min^m	Con^l	Mean
Soy-Soy-Soy-Soy	4103	4123	4113	1420	1587	1504	2762	2855	2809
Soy-Maize-Soy-Maize	4073	4050	4061	1332	1414	1373	2703	2732	2717
Soy-Soy-Maize-Soy	5917	5879	5898	1702	1888	1795	3810	3884	3847
Soy-Soy-Soy-Maize	4074	4095	4085	1470	1336	1403	2772	2716	2744
Mean	4542	4536		1481	1556		3012	3046	
CD (P=0.05)									
Tillage			NS			NS			-
Crop Rotation			162			251			-
Interaction			NS			201			-

Table 3.2.4

AGRON.2/15: Sustainable soybean production through diversification and tillage systems

Zone: Northern plain **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
Tillage system								
Minimum tillage	3076	5958	31.55	3169	45508	128313	81883	2.81
Conventional tillage	3212	5924	32.58	3267	49919	132552	83554	2.65
Crop rotations								
Soy-Soy-Soy-Soy	1747	5200	25.79	2945	47673	119408	72655	2.5
Soy-Maize-Soy-Maize	3076	6169	31.76	3053	47673	124160	75565	2.6
Soy-Soy-Maize-Soy	4641	6183	38.86	3802	47835	153139	104383	3.2
Soy-Soy-Soy-Maize	3113	6211	31.95	3074	47673	125022	78271	2.6

Table 3.2.5

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

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

Crop rotation	Ranchi			Raipur			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1979	2031	2005	1811	1982	1897	1895	2007	1951
Soy-Soy-Maize-Soy	1990	2146	2068	1927	2143	2035	1959	2145	2052
Soy-Maize-Soy-Maize	2031	2042	2036	5682	6247	5965	3857	4145	4001
Soy-Soy-Soy-Maize	3208	3250	3229	1688	1769	1729	2448	2510	2479
Mean	2302	2367		2777	3035		2540	2701	
CD (P=0.05)									
Tillage			170			199			
Crop Rotation			248			162			
Interaction			NS			296			

Table 3.2.6

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems (2021-22)

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

Crop rotation	Ranchi			Raipur			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	2176	2338	2257	1172	1208	1190	1674	1773	1724
Soy-Soy-Maize-Soy	2303	2373	2338	1118	1153	1136	1711	1763	1737
Soy-Maize-Soy-Maize	2251	2269	2260	1049	1097	1073	1650	1683	1667
Soy-Soy-Soy-Maize	2350	2506	2428	1295	1346	1321	1823	1926	1875
Mean	2270	2371		1159	1201		1715	1786	
CD (P=0.05)									
Tillage			90			59			-
Crop Rotation			218			NS			-
Interaction			NS			NS			-

Table 3.2.7

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

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

Crop rotation	Ranchi			Raipur			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	2999	3127	3063	1811	1982	1897	2405	2555	2480
Soy-Maize-Soy-Maize	3069	3258	3163	1927	2143	2035	2498	2701	2599
Soy-Soy-Maize-Soy	3086	3105	3095	5682	6247	5965	4384	4676	4530
Soy-Soy-Soy-Maize	2565	2657	2611	1688	1769	1729	2127	2213	2170
Mean	2930	3037		2777	3035		2854	3036	
CD (P=0.05)									
Tillage			95			199			-
Crop Rotation			191			162			-
Interaction			NS			296			-

Table 3.2.8

AGRON.2/15: Sustainable soybean production through diversification and tillage systems

Zone: Northern Eastern **Design:** Strip plot; **Replications:** Four; **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
Tillage system								
Minimum	2540	4453	37.30	1700	41175	115433	74258	2.80
Conventional	2701	4744	37.16	1758	45837	122375	76538	2.67
Crop rotation								
Soy-Soy-Soy-Soy	1951	3219	38.00	1791	43344	111687	68343	2.58
Soy-Maize-Soy-Maize	2052	3379	38.09	1785	43344	114340	70997	2.64
Soy-Soy-Maize-Soy	4001	7054	38.41	1729	44594	127611	84268	2.94
Soy-Soy-Soy-Maize	2479	4742	34.42	1611	43344	121977	77384	2.74

Table 3.2.9

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2021-22)

Zone: Northern Eastern **Centre:** Raipur **Character:** Soil parameters

Treatment	Bulk density	WHC	Porosity	Initial values (Soil)				Organic carbon at harvest (%)
				Organic carbon (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	
A. Tillage system								
Minimum tillage	1.33	48	58	0.58	228.4	13.89	365.2	0.49
Conventional tillage	1.32	47	57	0.58	229.1	12.55	357.4	0.52
B. Cropping system								
Soy-Soy-Soy-Soy	1.33	45	58	0.58	232.7	14.16	365.8	0.48
Soy-Maize-Soy-Maize	1.32	46	57	0.58	222.4	11.47	354.5	0.48
Soy-Soy-Maize-Soy	1.31	45	58	0.58	231.2	13.98	364.1	0.49
Soy-Soy-Soy-Maize	1.32	44	56	0.58	229.4	14.21	364.2	0.50

Table 3.2.10

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2021-22)

Zone: Northern Eastern **Centre:** Ranchi **Character:** Soil parameters and nutrient uptake

Treatment	Bulk density	WHC	Porosity	Initial values (Soil)				Organic carbon at harvest (%)	Nutrient uptake		
				Organic carbon (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N (kg/ha)	P (kg/ha)	K (kg/ha)
A. Tillage system											
Minimum tillage	1.43	24.26	43.21	0.472	245.34	14.48	187.16	0.476	143.71	17.77	96.69
Conventional tillage	1.47	23.62	42.39	0.465	241.65	14.41	184.75	0.470	151.28	18.88	105.25
SEm(±)	0.01	0.26	0.36	0.002	0.57	0.02	0.34	0.002	1.67	0.29	3.52
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B. Cropping system											
Soy-Soy-Soy-Soy	1.44	24.15	42.93	0.469	247.30	14.43	186.20	0.474	157.25	18.90	98.79
Soy-Maize-Soy-Maize	1.44	24.60	43.61	0.472	243.38	14.45	186.88	0.477	163.54	19.75	102.37
Soy-Soy-Maize-Soy	1.42	24.00	43.91	0.466	239.80	14.46	184.52	0.471	157.87	18.98	102.46
Soy-Soy-Soy-Maize	1.50	23.01	40.75	0.466	243.50	14.44	186.21	0.471	111.33	15.67	100.26
SEm(±)	0.02	0.34	0.44	0.004	2.63	0.03	1.23	0.004	3.96	0.49	3.20
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	12.67	1.55	NS

Table 3.2.11.

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

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

Crop rotation	Kota			Amravati			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1197	1246	1222	2028	1765	1897	1613	1506	1560
Soy-Soy-Maize-Soy	1397	1284	1341	2030	1767	1899	1714	1526	1620
Soy-Maize-Soy-Maize	2735	2704	2719	2369	2121	2245	2552	2413	2482
Soy-Soy-Soy-Maize	1320	1294	1307	1922	1769	1846	1621	1532	1577
Mean	1662	1632		2087	1856		1875	1744	
CD (P=0.05)									
Tillage			**NS**			**80**			
Crop Rotation			164			**80**			
Interaction			**NS**			**NS**			

Table 3.2.12.

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems (2021-22)

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

Crop rotation	Kota			Amravati			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	2325	2181	2253	2048	1872	1960	2187	2027	2107
Soy-Soy-Maize-Soy	2323	2312	2318	1950	1833	1892	2137	2073	2105
Soy-Maize-Soy-Maize	2230	2118	2174	1722	1659	1691	1976	1889	1933
Soy-Soy-Soy-Maize	2208	2284	2246	1976	1841	1909	2092	2063	2078
Mean	2271	2224		1924	1801		2098	2013	
CD (P=0.05)									
Tillage			**NS**			**110**			
Crop Rotation			**NS**			**98**			
Interaction			**NS**			**NS**			

Table 3.2.13.

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			Amravati			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	4025	3899	3962	4740	4244	4492	4383	4072	4227
Soy-Maize-Soy-Maize	4223	4096	4159	4612	4194	4404	4418	4145	4282
Soy-Soybean-Maize-Soy	5447	5280	5363	4649	4318	4483	5048	4799	4923
Soy-Soy-Soy-Maize	4005	4071	4038	4538	4206	4372	4272	4139	4205
Mean	4425	4337		4635	4240		4530	4289	
CD (P=0.05)									
Tillage			**NS**			**201**			
Crop Rotation			214			**NS**			
Interaction			**NS**			**NS**			

Table 3.2.14

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2021-22)

Zone: Central **Design:** Strip plot **Replications:** Four **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
Tillage system								
Minimum	2204	3748	40.66	3256	41445	133874	92429	3.23
Conventional	2039	3625	40.12	3096	44427	127371	82944	2.87
Crop rotations								
Soy-Soy-Soy-Soy	1559	2009	43.20	2929	41797	117316	75520	2.81
Soy-Maize-Soy-Maize	1620	2147	42.71	3029	41798	121306	79508	2.90
Soy-Soy-Maize-Soy	3731	8519	32.75	3804	46404	166066	119663	3.58
Soy-Soy-Soy-Maize	1576	2071	42.91	2942	41746	117801	76055	2.82

Table 3.2.15

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2021-22)

Zone: Central **Design:** Strip plot **Replications:** Four **Centre: ARS, Kota**

Character: Soil physical and chemical parameters; nutrient uptake

Character: Treatment	Bulk density	WHC	Porosity	Initial values (Soil)				Organic carbon at harvest (%)	Nutrient uptake		
				Organic carbon (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N (kg/ha)	P (kg/ha)	K (kg/ha)
A. Tillage system											
Minimum tillage	1.49	49.71	44.63	0.65	312.3	22.2	303.8	0.70	153.57	15.9	91.9
Conventional tillage	1.48	49.48	44.52	0.64	309.4	21.9	300.0	0.69	147.59	15.2	86.8
SEm	0.005	0.11	0.16	0.00	1.89	0.22	2.50	0.005	5.01	0.54	3.4
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B. Cropping system											
Soy-Soy-Soy-Soy	1.49	49.64	44.65	0.65	311.8	22.2	303.4	0.70	111.38	11.5	65.6
Soy-Maize-Soy-Maize	1.49	49.73	44.70	0.65	315.3	22.3	305.9	0.70	124.19	12.8	74.6
Soy-Soy-Maize-Soy	1.47	49.42	44.39	0.64	307.0	21.9	298.0	0.69	248.19	25.6	146.6
Soy-Soy-Soy-Maize	1.48	49.59	44.57	0.65	309.5	21.9	300.4	0.69	118.56	12.2	70.6
SEm	0.005	0.11	0.16	0.00	1.89	0.22	2.50	0.005	5.01	0.54	3.34
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	15.19	1.65	10.2

Table 3.2.16

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2021-22)

Centre: RRC, Amravati Character: Soil physical and chemical parameters; nutrient uptake

Treatment	Bulk density	Porosity	Initial values (Soil)				Organic carbon at harvest (%)	Nutrient uptake		
			Organic carbon (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N (kg/ha)	P (kg/ha)	K (kg/ha)
A. Tillage system										
Minimum tillage	1.48	42.90	0.475	221.1	18.4	329.6	0.48	139.9	17.0	55.4
Conventional tillage	1.49	42.90	0.469	201.8	17.4	324.4	0.47	124.5	15.3	51.1
SEm	**0.005**	**0.002**	**0.001**	**0.95**	**0.06**	**1.17**	**0.001**	**1.40**	**0.21**	**0.49**
CD (P=0.05)	**NS**	**NS**	**0.005**	**4.28**	**0.25**	**5.27**	**0.005**	**6.30**	**0.95**	**2.19**
B. Cropping system										
Soy-Soy-Soy-Soy	1.48	42.91	0.475	217.5	18.1	331.3	0.48	127.7	11.8	31.8
Soy-Maize-Soy-Maize	1.49	42.90	0.466	206.2	17.8	323.5	0.47	147.6	29.8	117.2
Soy-Soy-Maize-Soy	1.49	42.90	0.474	211.8	17.9	327.9	0.47	129.2	11.9	32.5
Soy-Soy-Soy-Maize	1.49	42.90	0.473	210.4	17.8	325.3	0.47	124.4	11.3	31.6
SEm	**0.01**	**0.005**	**0.001**	**1.26**	**0.07**	**1.36**	**0.001**	**1.77**	**0.27**	**0.51**
CD (P=0.05)	**NS**	**NS**	**0.004**	**3.73**	**0.21**	**4.04**	**0.004**	**5.26**	**0.80**	**1.51**
Interaction										
SE(m) +	**0.01**	**0.007**	**0.002**	**1.78**	**0.10**	**1.92**	**0.002**	**2.50**	**0.38**	**0.72**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Balance sheet

Table: Initial soil status

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

Table 3.2.17

AGRON.2/15: Sustainable soybean production through diversification and tillage systems (2021-22) (After Harvesting of Gram)

Centre: CZ. RRC, Amravati (MS) Character: Soil Parameter

Treatment	Organic carbon	Available Nitrogen	Available Phosphorus	Available Potassium	Bulk Density
A. Tillage system					
Minimum tillage	0.490	227	21.09	344	1.48
Conventional tillage	0.484	211	18.81	338	1.49
SE(m) ±	0.000	0.72	0.116	0.98	0.004
CD (P=0.05)	0.002	3.24	0.523	4.42	NS
B. Cropping system					
Soy-Soy-Soy-Soy	0.496	227	20.38	347	1.48
Soy-Maize-Soy-Maize	0.485	217	19.87	340	1.49
Soy-Soy-Maize-Soy	0.478	213	19.61	337	1.49
Soy-Soy-Soy-Maize	0.488	220	19.94	342	1.49
SE(m) ±	0.002	0.84	0.17	1.26	0.01
CD (P=0.05)	0.005	2.50	0.50	3.76	NS
Interaction					
SE(m) ±	0.002	1.19	0.23	1.79	0.01
CD (P=0.05)	NS	NS	NS	NS	NS

Table 3.2.18

ASP-2/ 15. Sustainable soybean production through crop diversification and tillage systems (2021-22)

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

Crop rotation	Dharwad			Adilabad			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	2415	2384	2400	2035	2508	2271	2225	2446	2336
Soy-Soy-Maize-Soy	2402	2400	2401	2002	2352	2177	2202	2376	2289
Soy-Maize-Soy-Maize	4260	4175	4217	2729	3112	2920	3495	3644	3569
Soy-Soy-Soy-Maize	2431	2416	2424	1986	2506	2246	2209	2461	2335
Mean	2877	2844		2188	2619		2533	2732	
CD (P=0.05)									
Tillage			NS			363			
Crop Rotation			88			210			
Interaction			NS			NS			

Table 3.2.19

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems (2021-22)

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

Crop rotation	Dharwad			Adilabad			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	1163	1312	1238	1586	2198	1892	1375	1755	1565
Soy-Soy-Maize-Soy	874	872	873	1846	1986	1916	1360	1429	1395
Soy-Maize-Soy-Maize	1230	1319	1274	1670	2242	1956	1450	1781	1615
Soy-Soy-Soy-Maize	820	834	827	1472	2389	1930	1146	1612	1379
Mean	1022	1084		1643	2204		1333	1644	
CD (P=0.05)									
Tillage			56			320			
Crop Rotation			45			NS			
Interaction			NS			NS			

Table 3.2.20

ASP-2/15. Sustainable soybean production through crop diversification and tillage systems (2021-22)

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

Crop rotation	Dharwad			Adilabad			Zonal mean		
	Tillage								
	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean	Min[m]	Con[l]	Mean
Soy-Soy-Soy-Soy	859	968	913	4043	5453	4748	2451	3211	2831
Soy-Maize-Soy-Maize	364	363	363	5233	5825	5529	2799	3094	2946
Soy-Soy-Maize-Soy	907	940	940	4334	5700	5017	2621	3320	2979
Soy-Soy-Soy-Maize	342	347	344	4258	5658	4958	2300	3003	2651
Mean	617	662		4467	5659		2542	3161	
CD (P=0.05)									
Tillage			25			212			
Crop Rotation			22			362			
Interaction			NS			NS			

Table 3.2.21

Sustainable soybean production through diversification and tillage systems (2021-22)

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

Treatments	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
Tillage system								
Minimum tillage	2533	4435	30.20	2542	65294	136719	71425	2.09
Conventional tillage	2732	4645	31.05	3161	71577	161844	90267	2.26
Crop rotations								
Soy-Soy-Soy-Soy	2336	4080	36.93	2831	67987	154529	86542	2.27
Soy-Maize-Soy-Maize	2289	3375	17.34	2946	68945	145669	75219	2.07
Soy-Soy-Maize-Soy	3569	4555	35.65	2979	70450	161788	92843	2.35
Soy-Soy-Soy-Maize	2335	6152	32.71	2651	66360	135138	68778	2.04

Table 3.2.22

2/15: Sustainable soybean production through diversification and tillage systems (2021-22)

Center: ARS, Adilabad **Character: Initial soil parameters (before soybean crop *Kharif*, 2020)**

Treatments	Bulk density (mg M^3)	WHC (%)	Porosity (%)	Initial values (Soil)				Organic carbon at harvest (%)	Nutrient uptake		
				Organic carbon (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)		N (kg/ha)	P (kg/ha)	K (kg/ha)
A. Tillage systems											
Minimum tillage	1.56	36.8	37.4	0.62	208.5	20.0	288.7	0.61	171.6	30.9	71.2
Conventional tillage	1.54	36.7	36.1	0.57	221.1	21.3	290.1	0.60	163.1	30.1	68.1
S. em±	0.02	0.72	0.53	0.03	3.10	0.23	15.3	0.02	1.87	1.30	2.83
CD (P=0.05)	NS	NS	NS	NS	NS	1.08	NS	NS	8.7	NS	NS
B. Cropping systems											
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
S. em±	0.02	0.71	0.45	0.04	7.4	1.40	11.1	0.03	5.99	1.65	3.72
CD (P=0.05)	0.07	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 3.3.1

ASP3/18/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Southern Zone **Character:** Seed Yield

Treatment	Seed yield (kg/ha)			
	Dharwad	Adilabad	Pune	Mean
Control	2347	1618	2383	2116
RDF only	2838	2427	2873	2713
75 % RDF	2499	1824	2766	2363
75 % RDF + Bio Zn	2599	1951	2811	2454
75 % RDF + Bio NPK	2642	2159	2851	2551
75 % RDF + Bio Zn + Bio NPK	2656	2317	2916	2630
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High solubilizing)	2699	2455	2987	2714
SEm±	60	145	95	
CD (P=0.05)	186	451	292	

Table 3.3.2

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Central Zone **Character:** Yield

Treatment	Seed yield (kg/ha)				
	Sehore	Kota	Amravati	Devgadhbaria	Mean
Control	1960	1011	1293	1386	1413
RDF only	2299	1266	1884	1619	1767
75 % RDF	2160	1138	1437	1444	1545
75 % RDF + Bio Zn	2176	1154	1898	1500	1682
75 % RDF + Bio NPK	2191	1157	2015	1521	1721
75 % RDF + Bio Zn + Bio NPK	2269	1169	2128	1583	1787
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	2207	1221	2142	1797	1842
SEm±	37	39	71	61	
CD (P=0.05)	114	120	219	181	

Table 3.3.3

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: North Plain Zone **Character:** Yield

Treatment	**Seed yield(kg/ha)**			
	Delhi	**Pantnagar**	**Ludhiana**	**Mean**
Control	1017	1258	1102	1126
RDF only	1995	1926	1551	1824
75 % RDF	1563	1555	1305	1474
75 % RDF + Bio Zn	1779	1592	1327	1566
75 % RDF + Bio NPK	1851	1697	1374	1641
75 % RDF + Bio Zn + Bio NPK	2120	1814	1358	1764
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	1830	1678	1535	1681
SEm±	87	106	72	
CD (P=0.05)	268	3250	222	

Table 3.3.4

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Eastern Zone **Character:** Yield

Treatment	**Seed yield(kg/ha)**		
	Ranchi	**Raipur**	**Mean**
Control	1074	1123	1099
RDF only	2403	1845	2124
75 % RDF	1725	1687	1706
75 % RDF + Bio Zn	1730	1729	1729
75 % RDF + Bio NPK	1924	1812	1868
75 % RDF + Bio Zn + Bio NPK	2017	2117	2067
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	2133	1948	2040
SEm±	12 (This should be CD)	56	
CD (P=0.05)	384 (This should be SE	169	

Table 3.3.5

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Northeastern Zone **Character:** Yield

Treatment	Seed yield(kg/ha)		
	Imphal	Medziphema	Mean
Control	1644	1388	1516
RDF only	1963	2033	1998
75 % RDF	1860	2024	1942
75 % RDF + Bio Zn	1869	2080	1975
75 % RDF + Bio NPK	2117	1597	1857
75 % RDF + Bio Zn + Bio NPK	1944	2053	1999
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	1892	1917	1905
SEm$\pm$	60	74	
CD (P=0.05)	185	228	

Table 3.3.6

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Southern **Character:** Yield, yield attributes and economical parameters

Treatment	Branches/ plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Control	4.42	38.30	12.95	2116	3890	6006	35.23	39289	99594	60305	2.53
RDF only	5.17	56.60	13.96	2713	4205	6895	39.35	47488	127051	79563	2.68
75 % RDF	4.31	46.90	13.26	2363	4098	6461	36.57	42043	110767	68724	2.63
75 % RDF + Bio Zn	4.97	49.33	13.27	2454	3960	6413	38.27	43633	115042	71409	2.64
75 % RDF + Bio NPK	4.74	50.23	13.16	2551	4098	6613	38.58	42813	119366	76552	2.79
75 % RDF + Bio Zn + Bio NPK	5.27	52.43	13.33	2630	4059	6680	39.37	44876	122819	77943	2.74
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	5.17	57.63	13.95	2714	4221	6925	39.19	43466	126589	83122	2.91

Table 3.3.7

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Southern (**Zonal mean**) **Variety:** **Character:** Plant dry weight (g), CGR, RGR, Nodule parameters at R2, Nodule parameters at R5

Treatment	Plant dry weight (g)			RGR		Nodule parameters at R2	Nodule parameters at R5
	30 DAS	45 DAS	60 DAS	45-30 DAS	60-45 DAS	Numbers	Numbers
Control	4.65	14.02	29.32	0.053	0.035	35.73	43.80
RDF only	5.59	19.41	38.80	0.061	0.036	42.57	50.90
75 % RDF	4.87	15.03	30.63	0.055	0.035	38.43	47.23
75 % RDF + Bio Zn	4.70	15.67	32.23	0.059	0.037	42.17	49.00
75 % RDF + Bio NPK	5.05	16.15	33.26	0.057	0.037	41.00	53.40
75 % RDF + Bio Zn + Bio NPK	5.29	18.51	36.32	0.063	0.034	43.80	54.83
75 % RDF + Rhizobium+MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	5.12	19.10	37.51	0.067	0.033	46.20	56.30

Table 3.3.8

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Southern **Centre:** Dharwad **Variety:** DSb 2 **Character: Soil: Initial -Composite soil sample**

N (231 kg/ha), P (21.5 kg/ha), K (298 kg/ha), Zn (0.68 mg/kg) and Fe (8.31 mg/kg)

Treatment	Soil at harvest				
	Available N (Kg/ha)	Available P (Kg/ha)	Available K (Kg/ha)	Available Zn (mg/kg)	Available Fe (mg/kg)
Control	273	21.13	373	0.96	9.98
RDF only	183	13.46	294	0.29	8.50
75 % RDF	265	19.80	355	0.91	9.97
% RDF + Bio Zn	248	18.43	324	0.68	9.46
% RDF + Bio NPK	218	17.76	317	0.65	9.33
75 % RDF + Bio Zn + Bio NPK	214	16.30	300	0.49	9.05
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	193	15.54	299	0.54	8.84
SEm	10	0.71	13	0.03	0.38
CD (P=0.05)	32	2.19	41	0.08	1.18

Table 3.3.9

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Southern **Centre :**Dharwad **Variety:** DSb 21**Character: Crop uptake at harvest N, P, K, Zn and Fe**

Treatment	N uptake (Kg/ha)	P uptake (Kg/ha)	K uptake (Kg/ha)
Control	83.50	11.80	70.56
RDF only	105.6	18.22	95.67
75 % RDF	83.20	13.40	73.08
75 % RDF + Bio Zn	85.10	12.54	75.61
75 % RDF + Bio NPK	96.20	13.65	80.92
75 % RDF + Bio Zn + Bio NPK	104.7	18.11	91.47
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	105.0	18.14	91.99
SEm	2.77	0.93	2.47
CD (P=0.05)	8.52	2.85	7.60

Table 3.3.10

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Eastern Zone**, Character:** Yield, yield attributes and economical parameters

Treatment	Branches/ plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Control	3.42	38.79	11.29	1099	2075	3174	34.63	21313	47237	25924	2.22
RDF only	4.68	58.04	14.51	2124	3339	5463	38.88	28203	91327	63124	3.24
75 % RDF	3.74	49.60	13.83	1706	2918	4624	36.89	26480	73364	46884	2.77
75 % RDF + Bio Zn	3.76	50.07	13.98	1729	2886	4616	37.46	26780	74367	47587	2.78
75 % RDF + Bio NPK	4.27	54.15	14.38	1868	3135	5003	37.34	26830	80332	53502	2.99
75 % RDF + Bio Zn + Bio NPK	4.54	59.92	15.18	2067	3412	5479	37.73	27130	88880	61750	3.28
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	4.60	59.04	14.48	2040	3372	5412	37.69	27040	87735	60695	3.24

Table 3.3.11

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Eastern Zone, **Variety:Character:** Plant dry weight (g), CGR, RGR, Nodule parameters at R2, Nodule parameters at R5

Treatment	Plant dry weight (g)			RGR		Nodule parameters at R2			Nodule parameters at R5		
	30 DAS	45 DAS	60 DAS	45-30 DAS	60-45 DAS	Numbers	Fresh weight (g)	Dry weight (g)	Numbers	Fresh weight (g)	Dry weight (g)
Control	1.28	7.21	10.69	0.040	0.007	21.95	1.50	0.096	25.85	1.01	0.129
RDF only	1.83	9.15	14.04	0.040	0.010	33.47	2.42	0.161	37.07	1.49	0.203
75 % RDF	1.34	7.89	11.69	0.041	0.009	29.75	2.28	0.150	30.27	1.30	0.168
75 % RDF + Bio Zn	1.35	7.86	12.09	0.043	0.010	33.04	2.50	0.164	33.27	1.44	0.178
75 % RDF + Bio NPK	1.69	8.46	12.94	0.041	0.009	36.80	2.88	0.186	35.55	1.47	0.188
75 % RDF + Bio Zn + Bio NPK	1.90	10.5	16.23	0.041	0.009	39.72	2.97	0.196	42.02	1.72	0.227
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	1.83	9.62	15.38	0.041	0.009	40.20	3.13	0.203	42.39	1.91	0.236

Table 3.3.12

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Eastern Centre: Ranchi Variety: JS 97-52, Character: Soil data: Initial and at Harvest N, P, K, and Zn

Treatment	Soil nutrient status after crop harvest			
	Av. N(kg/ha)	Av. P(kg/ha)	Av. K(kg/ha)	Av. Zn(mg/kg)
Control	234.93	13.78	178.00	0.636
RDF only	266.75	16.55	182.33	0.660
75 % RDF	240.10	14.21	183.07	0.650
75 % RDF + Bio Zn	241.15	14.56	184.19	0.663
75 % RDF + Bio NPK	254.10	15.60	187.84	0.653
75 % RDF + Bio Zn + Bio NPK	258.95	16.06	188.33	0.661
75 % RDF + Rhizobium + MDSR14 + 12c	260.03	16.46	193.37	0.650
SEm(±)	4.13	0.50	5.75	0.023
CD (P=0.05)	13	1.53	18	NS
Initial	**241**	**15.16**	**188**	**0.620**

Table 3.3.13

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean
Zone: EasternCentre: Ranchi Variety: JS 97-52 Character: Uptake of N, P, K, and Zn after crop harvest

Treatment	Total nutrient uptake		
	N(kg/ha)	P(kg/ha)	K(kg/ha)
Control	71.74	8.87	48.29
RDF only	150.57	18.10	94.18
75 % RDF	104.03	13.84	71.47
75 % RDF + Bio Zn	105.38	13.70	71.99
75 % RDF + Bio NPK	132.40	15.83	78.47
75 % RDF + Bio Zn + Bio NPK	134.56	15.92	80.36
75 % RDF + Rhizobium + MDSR14 + 12c	142.73	16.67	85.49
SEm(±)	10	0.71	3.84
CD (P=0.05)	31	2.19	12

Table 3.3.14

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean
Zone: Central **Character:** Yield, yield attributes and economical parameters

Treatment	Branches/ plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	B:C ratio
Control	2.29	23.56	10.86	1412.50	1577.00	2989.50	46.61	44927.33	1.39
RDF only	3.19	37.51	12.02	1767.00	1910.25	3677.50	47.75	50171.00	1.59
75 % RDF	2.73	29.71	11.64	1544.75	1657.75	3202.75	47.61	46254.00	1.48
75 % RDF + Bio Zn	2.91	32.10	11.71	1682.00	1793.50	3475.50	47.89	47899.00	1.63
75 % RDF + Bio NPK	2.96	33.12	12.05	1721.00	1857.00	3578.25	47.67	48355.33	1.67
75 % RDF + Bio Zn + Bio NPK	3.31	36.03	12.13	1787.25	1919.50	3706.75	47.82	48743.33	1.74
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	3.35	38.36	11.71	1789.65	1921.63	3710.65	47.83	48586.22	1.86

Table 3.3.15

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Central Zone, **Character:** Plant dry weight (g), CGR, RGR, Nodule parameters at R2, Nodule parameters at R5

Treatment	Plant dry weight (g)			CGR		RGR		Nodule parameters at R2			Nodule parameters at R5		
	30 DAS	45 DAS	60 DAS	45-30 DAS	60-45 DAS	45-30 DAS	60-45 DAS	Numbers	Fresh weight (g)	Dry weight (g)	Numbers	Fresh weight (g)	Dry weight (g)
Control	2.33	5.79	11.00	8.99	13.98	0.050	0.040	28.33	1.48	0.26	22.00	1.33	0.20
RDF only	2.96	7.01	12.85	10.51	15.41	0.045	0.037	35.22	1.98	0.35	26.44	1.78	0.27
75 % RDF	2.52	6.60	12.19	10.65	14.89	0.050	0.037	33.44	1.81	0.30	25.78	1.66	0.24
75 % RDF + Bio Zn	2.73	6.75	12.42	10.47	15.07	0.045	0.037	34.67	1.93	0.33	26.33	1.70	0.25
75 % RDF + Bio NPK	2.84	6.91	12.54	10.60	14.96	0.045	0.036	41.00	2.58	0.48	28.11	1.80	0.27
75 % RDF + Bio Zn + Bio NPK	2.97	7.06	12.86	10.65	15.39	0.045	0.036	44.33	2.76	0.53	29.00	1.88	0.29
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	2.98	7.26	13.24	11.21	15.89	0.049	0.034	46.33	2.95	0.57	30.22	2.00	0.30

Table 3.3.16

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Central, Centre: ARS,Kota, Variety: JS 95-60, Character: Soil; data: Initial N, P, K, Zn, and Fe; and at Harvest: N, P, K, Zn and Fe

Treatment	Initial					At harvest				
	N(kg/ha)	P(kg/ha)	K(kg/ha)	Zn(mg/ha)	Fe(mg/ha)	N(kg/ha)	P(kg/ha)	K(kg/ha)	Zn(mg/ha)	Fe(mg/ha)
Control	250.2	23.5	348.8	0.550	3.8	253.3	22.9	356.3	0.655	4.04
RDF only	250.8	23.8	350.3	0.570	3.9	257.9	25.5	360.5	0.685	4.27
75 % RDF	250.4	23.6	348.6	0.553	3.8	256.1	25.1	359.3	0.667	4.17
75 % RDF + Bio Zn	250.3	23.6	349.0	0.553	3.8	256.3	25.3	359.3	0.670	4.19
75 % RDF + Bio NPK	250.4	23.7	349.5	0.558	3.8	256.5	25.2	359.6	0.675	4.20
75 % RDF + Bio Zn + Bio NPK	250.4	23.7	349.7	0.564	3.9	257.2	25.3	359.8	0.677	4.21
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	250.5	23.8	350.1	0.568	3.9	257.5	25.4	360.2	0.680	4.26
SEm	0.21	0.09	0.97	0.005	0.04	0.69	0.53	0.52	0.005	0.038
CD (P=0.05)	NS	NS	NS	NS	NS	2.12	1.62	1.61	0.017	0.12

Table 3.3.17

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Central **Centre: ARS,Kota** **Variety: JS 95-60**

Character: Crop content: N, P, K, Zn, and Fe; and at Harvest: N, P, K, Zn and Fe

Treatment	Nutrient content in seed at harvest					Nutrient content in straw at harvest				
	N (%)	P (%)	K (%)	Zn (PPM)	Fe (PPM)	N (%)	P (%)	K (%)	Zn (PPM)	Fe (PPM)
Control	6.00	0.220	1.24	21.33	42.11	2.14	0.183	2.17	13.27	77.93
RDF only	6.48	0.237	1.35	22.09	42.68	2.31	0.243	2.32	14.04	78.59
75 % RDF	6.47	0.230	1.31	21.83	42.60	2.25	0.227	2.28	13.72	78.35
75 % RDF + Bio Zn	6.52	0.231	1.32	21.84	42.57	2.25	0.230	2.29	13.75	78.39
75 % RDF + Bio NPK	6.46	0.232	1.33	21.85	42.58	2.26	0.233	2.29	13.84	78.41
75 % RDF + Bio Zn + Bio NPK	6.46	0.233	1.33	21.89	42.64	2.27	0.237	2.30	13.89	78.47
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	6.47	0.233	1.34	21.99	42.65	2.30	0.240	2.31	13.97	78.57
SEm	0.08	0.002	0.01	0.10	0.11	0.02	0.009	0.02	0.13	0.12
CD (P=0.05)	0.24	0.007	0.04	0.31	0.34	0.06	0.027	0.07	0.40	0.36

Table 3.3.18

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: Central   Centre: ARS, Kota   Variety: JS 95-60   Character: Crop uptake: Harvest: N, P, K, Zn and Fe

Treatment	Uptake at harvest				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (g/ha)	Fe (g/ha)
Control	60.67	5.08	46.33	42.21	163.82
RDF only	82.08	7.56	60.53	54.24	201.15
75 % RDF	73.61	6.50	54.01	48.34	182.75
75 % RDF + Bio Zn	75.31	6.65	54.97	49.04	184.99
75 % RDF + Bio NPK	74.75	6.73	55.23	49.33	185.49
75 % RDF + Bio Zn + Bio NPK	75.49	6.88	55.75	49.95	187.37
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	79.10	7.20	58.30	52.20	194.72
SEm±	2.97	0.24	1.84	1.47	5.31
CD (P=0.05)	9.16	0.74	5.68	4.52	16

Table 3.3.19

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean

Zone: North plain Zone,   **Variety: Character:** Plant dry weight (g), CGR, RGR, Nodule parameters at R2, Nodule parameters at R5

Treatment	Plant dry weight (g)			CGR		RGR	
	30 DAS	45 DAS	60 DAS	45-30 DAS	60-45 DAS	45-30 DAS	60-45 DAS
Control	2.64	6.77	12.59	8.85	11.70	0.050	0.031
RDF only	3.30	9.65	18.34	13.29	17.78	0.056	0.033
75 % RDF	2.96	8.12	15.47	11.06	14.68	0.054	0.034
75 % RDF + Bio Zn	3.02	8.01	16.62	10.97	16.60	0.053	0.038
75 % RDF + Bio NPK	3.22	8.94	19.12	12.10	19.54	0.054	0.039
75 % RDF + Bio Zn + Bio NPK	3.44	9.43	18.45	12.78	17.62	0.057	0.034
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	3.13	9.00	18.26	11.88	18.53	0.055	0.037

Table 3.3.20

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: North Plain Zone**Character:** Yield, yield attributes and economical parameter

Treatment	Branches/ plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Control	3.26	49.12	9.03	1126	3333	4459	25.25	31252	53593	22551	1.71
RDF only	4.21	73.42	10.06	1824	4409	6233	29.26	36456	86774	50318	2.38
75 % RDF	3.73	65.20	9.56	1474	3745	5219	28.24	35190	70650	35460	2.01
75 % RDF + Bio Zn	3.89	61.63	9.55	1566	3873	5440	28.79	35475	74968	39494	2.11
75 % RDF + Bio NPK	4.11	71.38	9.64	1641	4027	5662	28.98	35525	78280	42756	2.20
75 % RDF + Bio Zn + Bio NPK	4.05	74.55	9.96	1764	4118	5882	29.99	35726	84506	48780	2.37
75 % RDF + Rhizobium + MDSR14 + 12c (12c=	3.89	71.43	9.74	1681	4369	6050	27.79	35531	80237	44705	2.26

Table 3.3.21

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: North Plain Zone **Centre: Delhi** **Variety: SL 958**

Treatment	N, P, K uptake in grain at harvest			Total N uptake (G +S)	Total P uptake (G +S)	Total K uptake (G +S)
	N	P	K			
Control	50.7	2.8	11.9	117.71	6.73	52.60
RDF only	114.9	7.0	26.7	227.65	15.88	100.83
75 % RDF	87.7	4.9	19.2	188.61	11.50	80.32
75 % RDF + Bio Zn	100.6	5.4	22.1	202.37	11.66	85.26
75 % RDF + Bio NPK	105.2	5.6	23.7	213.52	13.13	92.71
75 % RDF + Bio Zn + Bio NPK	120.7	7.1	27.6	234.78	15.52	101.58
75 % RDF + Rhizobium + MDSR14 + 12c	105.3	6.1	23.6	211.38	14.97	92.02
SEm	5.0	0.57	1.4	7.86	1.35	2.95
CD (P=0.05)	15.3	2	4.5	24	4.17	9

Character: Crop uptake: Initial N, P, K, (kg/ha) Zn, and Fe; and at Harvest: N, P, K, Zn and Fe

Table 3.3.22

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: North Plain Zone **Centre:** G B P U A & T, Pantnagar **Variety:** PS-1347

Character: Soil; data: Initial N, P, K, Zn, and Fe; and at Harvest: N, P, K, Zn and Fe

Treatment	**Initial (kg/ha)**			**Final N P K After Harvest (kg/ha)**		
	N	**P**	**K**	**N**	**P**	**K**
Control	230	18.2	215.1	192	18.1	210.1
RDF only	236	18.4	224.0	230	18.2	217.4
75 % RDF	228	18.3	216.4	212	18.0	215.3
75 % RDF + Bio Zn	240	18.4	213.8	217	18.2	208.7
75 % RDF + Bio NPK	228	18.4	217.8	204	18.1	215.8
75 % RDF + Bio Zn + Bio NPK	242	18.1	216.8	214	17.8	214.5
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	230	18.3	218.6	210	17.9	216.8
SEm	3	0.084	2	1.68	0.057	0.049
CD (P=0.05)	9	0.259	6.77	5	0.176	0.153

Table 3.3.23

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: North Plain Zone **Centre:** G B P U A & T, Pantnagar **Variety:** PS-1347

Character: Crop uptake: Initial N, P, K, Zn, and Fe; and at Harvest: N, P, K, Zn and Fe

Treatment	N Uptake		Total N Uptake	P Uptake		Total P Uptake	K Uptake		Total K Uptake
	Grain	Straw		Grain	Straw		Grain	Straw	
Control	78.03	50.03	128.10	7.10	10.33	17.40	19.50	25.50	45.00
RDF only	124.20	68.03	192.23	12.56	15.36	27.90	31.73	34.50	66.26
75 % RDF	98.90	59.90	158.76	9.90	12.93	22.80	24.93	29.76	54.66
75 % RDF + Bio Zn	101.93	64.20	166.13	10.10	13.90	24.00	25.10	31.60	56.66
75 % RDF + Bio NPK	107.23	65.90	173.13	10.36	14.40	24.76	26.70	32.33	59.00
75 % RDF + Bio Zn + Bio NPK	116.10	66.00	182.01	10.83	14.43	25.26	29.20	34.00	63.23
75 % RDF + Rhizobium + MDSR14 + 12c	107.23	66.73	173.93	10.90	14.36	25.33	27.10	33.33	60.40
SEm	7	4	10	0.704	1	2	2	2	3.38
CD (P=0.05)	21	12	31	2	4	5	6	6	10

Table 3.3.24

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean;

Zone: North Eastern Zone **Character:** yield attributes

Treatment	Branches/ plant	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Control	3.45	43.3	10.7	1516	2890	4405	34.4	32294	114314	82020	3.54
RDF only	3.44	52.8	10.7	1998	3588	5587	35.8	42797	149671	106874	3.50
75 % RDF	3.45	55.1	10.8	1942	3654	5596	34.7	40815	145257	104442	3.56
75 % RDF + Bio Zn	4.05	54.0	10.8	1975	3480	5455	36.2	40815	147550	106736	3.62
75 % RDF + Bio NPK	3.75	61.3	10.3	1857	3364	5221	35.6	40815	140586	99772	3.44
75 % RDF + Bio Zn + Bio NPK	4.13	62.6	10.	1999	3455	5453	36.7	40815	149609	108794	3.67
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	4.15	55.8	10.6	1905	3202	5106	37.3	40815	142765	101951	3.50

Table 3.3.25

ASP3/18. Evaluation of novel bio formulation for yield enhancement in soybean

Zone: North eastern Zone, **Variety:** **Character:** Plant dry weight (g), CGR, RGR, Nodule parameters at R2, Nodule parameters at R5

Treatment	Plant dry weight (g)			CGR		RGR		Nodule parameters at R2			Nodule parameters at R5		
	30 DAS	45 DAS	60 DAS	45-30 DAS	60-45 DAS	45-30 DAS	60-45 DAS	Numbers	Fresh weight (g)	Dry weight (g)	Numbers	Fresh weight (g)	Dry weight (g)
Control	1.44	4.48	7.52	5.68	5.76	0.080	0.035	26.77	0.460	0.265	16.42	0.355	0.120
RDF only	1.59	5.30	8.65	7.12	6.37	0.084	0.032	38.27	0.745	0.400	18.17	0.545	0.210
75 % RDF	1.71	5.11	8.22	6.35	5.80	0.073	0.031	31.10	0.485	0.285	16.99	0.350	0.220
75 % RDF + Bio Zn	1.42	5.42	8.23	8.03	5.14	0.095	0.027	35.67	0.685	0.360	18.34	0.480	0.215
75 % RDF + Bio NPK	1.64	5.29	8.32	6.68	5.28	0.074	0.027	48.02	0.990	0.510	26.85	0.540	0.320
75 % RDF + Bio Zn + Bio NPK	1.53	4.94	8.68	6.35	7.37	0.075	0.040	51.65	0.795	0.370	18.74	0.320	0.155
75 % RDF + Rhizobium + MDSR14 + 12c (12c= *Burkholderia arboris*-High P solubilizing)	1.26	5.10	8.52	7.33	6.93	0.101	0.038	39.50	0.640	0.320	20.42	0.515	0.185

Table 3.4.1

AGRON-4/22: Organic farming for soybean-based cropping systems

Zone: Eastern Variety: RSC 10-46 Centre: Ranchi

Characters: Yield, HI, SEY and economics of soybean; Initial NPK, Balance sheet of NPK, total Uptake of NPK, organic carbon and physical properties.: Characters: Total Uptake of NPK

Treatments	Seed yield (kg/ha)	Straw yield (kg/ha)	HI (%)	COC (Rs./ha)	Net return (Rs./ha)	B:C ratio
Cropping System						
Soybean- Wheat	1998	2892	40.83	38650	58132	1.515
Soybean-Maize	1983	2866	41.01	38650	57455	1.496
SEm(±)	23.6	99.5	1.1	-	1087.9	0.025
CD	92.6	390.4	4.4	-	4271.0	0.097
Organic management practices						
Organic farming	1871	2704	40.91	45300	52285	1.033
Inorganic farming	2109	3052	40.93	32000	63302	1.978
SEm(±)	52.25	73.09	1.06	-	2442.41	0.061
CD	170.40	238.36	3.44	-	7965.12	0.200

Treatments	Total Nutrient uptake (kg/ha)		
	N	P	K
Cropping System			
Soybean- Wheat	156.48	18.75	106.12
Soybean-Maize	152.29	18.79	104.69
SEm(±)	1.23	0.11	0.85
CD	4.84	0.42	3.34
Organic management practices			
Organic farming	147.41	17.52	99.14
Inorganic farming	161.35	20.03	111.67
SEm(±)	2.73	0.34	1.54
CD	8.91	1.11	5.03

Characters: Initial NPK, organic carbon and physical properties of experimental soil.

Treatments	Initial values (Soil)						
	N (kg/ha)	P (kg/ha)	K (kg/ha)	O C (%)	Bulk density	Porosity	WHC
Cropping System							
Soybean- Wheat	243.04	14.42	184.57	0.460	1.50	40.70	22.52
Soybean-Maize	243.10	14.39	184.04	0.465	1.48	40.60	21.92
SEm(±)	0.74	0.04	0.28	0.001	0.02	0.13	0.15
CD	NS	NS	NS	NS	NS	NS	NS
Organic management practices							
Organic farming	243.34	14.41	184.15	0.466	1.48	40.50	22.26
Inorganic farming	242.80	14.41	184.46	0.459	1.51	40.80	22.18
SEm(±)	0.81	0.04	0.25	0.003	0.03	0.30	0.33
CD	NS	NS	NS	NS	NS	NS	NS

Table 3.4.2

AGRON-4/22: Organic farming for soybean-based cropping systems
Zone: Eastern Variety: RSC 10-46 Centre: Raipur
Characters: Seed & straw yield, soybean equivalent yield, harvest index and economics

Cropping systems (CS)	Seed yield (kg/ha)	Straw yield (kg/ha)	Soybean equivalent yield (kg/ha)	Biological yield (kg/ha)	Harvest Index (kg/ha)	Cost of cultivation (Rs.)	Gross returns (Rs.)	Net returns (Rs.)	B:C ratio
Soybean- Wheat	1599	3071	1599	4669	34.19	28385	68736	40351	2.46
Soybean-Maize	1619	3161	1619	4779	33.88	28385	69596	41211	2.49
Organic management practices									
Organic farming	1265	2458	1265	3722	33.97	30005	54374	24369	1.81
Inorganic farming	1953	3774	1953	5726	34.10	26765	83958	57193	3.14
SEm	46.2	69.4	46.2	83.7	-	-	-	-	-
CD	140	208	140	246	-	-	-	-	-

Table 3.4.3

AGRON-4/22: Organic farming for soybean-based cropping systems

Zone: Eastern Variety: RSC 10-46 Characters: Seed & straw yield

Cropping Systems	Seed Yield(kg/ha)			Straw Yield(kg/ha)		
	Ranchi	**Raipur**	**Mean**	**Ranchi**	**Raipur**	**Mean**
Soybean-Wheat	1997.48	1599	1798.24	2891.78	3071	2981.39
Soybean- Maize	1982.93	1619	1800.965	2865.64	3161	3013.32
SEm(±)	23.6			99.5		
CD	92.6			390		
Organic Management Practices						
Organic farming	1870.57	1265	1567.785	2704.54	2458	2581.27
Inorganic farming	2109.84	1953	2031.42	3052.88	3774	3413.44
SEm(±)	52	46.2		73	69.4	
CD	170	140		238	208	

Table 3.4.4

AGRON-4/22: Organic farming for soybean-based cropping systems

Zone: Central Characters: Yield

Cropping Systems	Seed Yield(kg/ha)				Straw Yield(kg/ha)			
	Kota	**Amrawati**	**Devgadh Baria**	**Mean**	**Kota**	**Amrawati**	**Devgadh Baria**	**Mean**
Soybean-Wheat	1155	1890	1393	1479	1769	2235	1558	1854
Soybean-Chickpea	1192	1898	1351	1480	1829	2210	1243	1761
Mean	1174	1894	1372	1480	1799	2223	1401	1808
SEm(±)		26				51		
CD		NS				NS		
Organic Management Practices								
Organic farming	1207	1712	1090	1336	1854	1982	1200	1679
Inorganic farming	1140	2076	1655	1624	1745	2462	1593	1933
Mean	1173	1894	1373	1480	1800	2222	1397	1806
SEm(±)	19	8.53	48		31	15	62	
CD	59	28	188		96	48	242	

Table 3.4.5

AGRON-4/22: Organic farming for soybean-based cropping systems: Zone: Southern Characters: Yield

	Seed Yield(kg/ha)				Straw Yield(kg/ha)			
	Pune	**Adilabad**	**Dharwad**	**Mean**	**Pune**	**Adilabad**	**Dharwad**	**Mean**
Cropping Systems								
Soybean-Wheat	3029	2245	2675	2650	2782	4485	4413	3893
Soybean-Chickpea	2899	2587	2724	2737	2961	4582	4497	4013
Mean	2964	2416	2700	2693	2872	4534	4455	3953
SEm(±)	39.17		48.9		48.69		118.73	
CD	NS		NS		NS		NS	
Organic Management Practices								
Organic farming	3072	1559	2722	2451	2783	3813	4628	3741
Inorganic farming	2856	2487	2676	2673	2960	4785	4282	4009
Mean	2964	2023	2699	2562	2872	4299	4455	3875
SEm(±)	50	0.03	57		63	164	112	
CD	195	NS	NS		NS	510	NS	

Table 3.4.6

AGRON-4/22: Organic farming for soybean-based cropping systems: Zone: Southern Characters: Yield

	Cost of cultivation			Net returns			B:C ratio		
	Pune	**Adilabad**	**Mean**	**Pune**	**Adilabad**	**Mean**	**Pune**	**Adilabad**	**Mean**
Cropping Systems									
Soybean-Wheat	41275	54350	47813	88976	36903	62940	3.16	1.78	2.47
Soybean-Chickpea	41275	54151	47713	83394	64341	73868	3.02	2.06	2.54
Mean	41275	54251	47763	86185	50622	68404	3.09	1.92	2.51
Organic Management Practices									
Organic farming	42425	60840	51633	89679	4845	47262	3.11	1.10	2.11
Inorganic farming	40125	53683	46904	82691	38350	60521	3.06	2.00	2.53
Mean	41275	57262	49268	86185	21598	53891	3.09	1.55	2.32

Table 3.4.7

AGRON-4/22: Organic farming for soybean-based cropping systems
Zone: Southern Zone Variety: MACS 1188 Centre Pune
Characters: Yield, HI, SEY and economics of soybean; Initial NPK, Balance sheet of NPK, total Uptake of NPK, organic carbon and physical properties.

Cropping systems (CS)	Initial NPK (kg/ha)			Total Uptake (seed and straw) of N, P and K(kg/ha)		
	Nitrogen (N)	Phosphorous (P)	Potassium (K)	Nitrogen (N)	Phosphorous (P)	Potassium (K)
Soybean-Wheat	170.85	70.18	509.51	277.07	17.58	104.53
Soybean- Chickpea	179.34	67.66	498.1	282.08	18	102.86
SEm	1.49	1.61	5.54	2.91	0.44	1.65
CD	5.86	NS	NS	NS	NS	NS
Organic management practices						
Organic farming	176.74	69.53	502.88	287.58	18.27	107.61
Inorganic farming	173.45	68.31	504.73	271.57	17.31	99.78
SEm	1.71	0.88	0.93	1.6	0.46	0.46
CD	NS	NS	NS	6.27	NS	1.8

Cropping systems (CS)	Organic carbon and physical properties			
	Organic carbon (%)	Bulk density	Porosity	WHC (Water Holding Capacity)
Soybean-Wheat	0.82	0.89	59.15	43.57
Soybean-Chickpea	0.79	0.88	60.76	43.96
SEm	0.02	0.04	2.36	0.97
CD	NS	NS	NS	NS
Organic management practices				
Organic farming	0.75	0.87	61.27	43.45
Inorganic farming	0.84	0.9	58.64	44.08
SEm	0.02	0.02	0.53	0.51
CD	0.09	NS	2.08	NS

Table 3.4.8

AGRON-4/22: Organic farming for soybean-based cropping systems (*Kharif*, 2022)

Zone: Southern **Centre:** Adilabad (Telangana) **Variety:** MACS-1188

Characters: Yield, HI, SEY and economics of soybean; Initial NPK, Balance sheet of NPK, total Uptake of NPK, organic carbon and physical properties.

Cropping systems (CS)	Initial			At harvest			Total uptake (Seed & straw) of N, P and K (kg/ha)		
	Initial Nitrogen (N) (kg/ha)	Initial Phosphorous (P) (kg/ha)	Initial Potassium (K) (kg/ha)	Nitrogen (N) (kg/ha)	Phosphorous (P) (kg/ha)	Potassium (K) (kg/ha)	Nitrogen (N) (kg/ha)	Phosphorous (P) (kg/ha)	Potassium (K) (kg/ha)
Soybean-Wheat	238.3	55.2	400.9	245.4	73	490.1	136.5	13.6	78
Soybean-Chickpea	251.9	53.9	378.1	241.1	73.2	463.9	144	13.1	85.2
Organic management practices									
Organic farming	245.3	46.7	433.5	235	76.3	479	135.3	12.6	81
Inorganic farming	218.8	59.1	371.3	225.9	73.8	456.6	139.2	13.4	76
Mean	238.5	53.7	395.9	236.9	74.1	472.4	138.8	13.2	80.1
SEm±	11.7	4.2	26.5	12.2	4.11	16	3.1	0.5	3.2
CD (at 5%)	NS	NS	NS	NS	NS	NS	NS	NS	NS

Cropping systems (CS)	Soil data: Balance sheet (kg/ha)		
	Nitrogen (N) (kg/ha)	Phosphorous (P) (kg/ha)	Potassium (K) (kg/ha)
Soybean-Wheat	7.1	17.9	89.2
Soybean-Chickpea	-10.7	19.3	85.9
Organic management practices			
Organic farming	-10.2	29.6	45.5
Inorganic farming	7.1	14.8	85.3
Mean	-1.7	20.4	76.5
SEm±	7.2	6.9	17.7
CD (at 5%)	NS	NS	NS

Table 3.4.9

AGRON-4/22: Organic farming for soybean-based cropping systems

Zone: North Plain Characters: Yield

Cropping Systems	Seed Yield			Straw yield			Harvest Index		
	Ludhiana	**Pantnagar**	**Mean**	**Ludhiana**	**Pantnagar**	**Mean**	**Ludhiana**	**Pantnagar**	**Mean**
Soybean-Wheat	1539	1480	1510	3801	3581	3691	28.82	29.24	29.03
Soybean-Chickpea	1476	1422	1449	4098	3473	3786	26.48	29.05	27.68
Mean	1508	1451	1479	3950	3527	3738	27.63	29.15	28.35
SEm(±)	48	46.4		141	127				
CD	NS	NS		NS	NS				
Organic Management Practices									
Organic farming	1384	1226	1305	3517	3263	3390	28.24	27.31	27.80
Inorganic farming	1376	1675	1525	3411	3823	3617	28.74	30.47	29.66
Mean	1380	1451	1415	3464	3543	3504	28.49	29.05	28.77
SEm(±)	35	106		109	203				
CD	113	347		356	NS				

Table 3.4.10

AGRON-4/22: Organic farming for soybean-based cropping systems

Zone: North Plain Characters: Yield

Cropping Systems	Cost of cultivation			Net return			B:C ratio		
	Ludhiana	**Pantnagar**	**Mean**	**Ludhiana**	**Pantnagar**	**Mean**	**Ludhiana**	**Pantnagar**	**Mean**
Soybean-Wheat	37101	35738	36420	45623	18296	31960	2.23	0.64	1.44
Soybean-Chickpea	37101	36264	36683	42244	36918	39581	2.14	1.27	1.71
Mean	37101	36001	36551	43934	27607	35770	2.19	0.96	1.57
Organic Management Practices									
Organic farming	32721	35738	34230	26796	15673	21235	1.82	0.54	1.18
Inorganic farming	32721	36264	34493	26442	34557	30500	1.81	1.19	1.50
Mean	32721	36001	34361	26619	25115	25867	1.82	0.87	1.34

Table 3.4.11

AGRON-4/22: Organic farming for soybean-based cropping systems
Zone: North Eastern Hill Characters: Yield

Cropping Systems	Seed Yield			Straw yield			Harvest Index		
	Imphal	**Medziphema**	**Mean**	**Imphal**	**Medziphema**	**Mean**	**Imphal**	**Medziphema**	**Mean**
Soybean-Mustard	1138	1841	1489	1746	3067	2407	39.46	37.51	38.22
Soybean-Maize	1148	1873	1511	1698	3119	2409	40.34	37.52	38.55
Mean	1143	1857	1500	1722	3093	2408	39.90	37.52	38.38
SEm(±)	19	23		62	55		0.674	0.63	
CD	NS	NS		NS	NS		NDS	NS	
Organic Management Practices									
Organic farming	1171	1974	1572	1717	3195	2456	40.55	38.19	39.03
Inorganic farming	1115	1740	1427	1727	2991	2359	39.23	36.78	37.69
Mean	1143	1857	1500	1722	3093	2408	39.90	37.52	38.38
SEm(±)	23.75	83		70	78		0.950	0.58	
CD	NS	NS		NS	NS		NS	NS	

Table 3.4.12

AGRON-4/22: Organic farming for soybean-based cropping systems
Zone: North Eastern Hill Characters: Yield

Cropping Systems	Cost of cultivation			Net returns			B:C ratio		
	Imphal	**Medziphema**	**Mean**	**Imphal**	**Medziphema**	**Mean**	**Imphal**	**Medziphema**	**Mean**
Soybean-Mustard	43400	44572	43986	47656	84269	65963	1.10	1.90	1.50
Soybean-Maize	43400	44572	43986	48408	86551	67480	1.13	1.96	1.55
Mean	43400	44572	43986	48032	85410	66721	1.12	1.93	1.52
Organic Management Practices									
Organic farming	46856	49314	48085	46800	88865	67833	1.00	1.80	1.40
Inorganic farming	39944	44572	42258	49264	81955	65610	1.23	2.06	1.65
Mean	43400	46943	45172	48032	85410	66721	1.12	1.93	1.52

Table 3.4.13

AGRON-4/22: Organic farming for soybean-based cropping systems

Zone: North Eastern Hill Characters: Yield, Centre: Imphal

Cropping systems (CS)	**Organic carbon and physical properties**			**WHC (water holding capacity)**
	Organic carbon (%)	**Bulk density(g/cm^3)**	**Porosity (%)**	
Soybean-Mustard	0.64	1.13	30.5	34.5
Soybean-Maize	0.64	1.15	29.5	34.8
SEm	0.0074	0.0042	0.3344	0.557
CD	NS	0.0164	NS	NS
Organic management practices				
Organic farming	0.65	1.14	29.4	33.8
Inorganic farming	0.63	1.14	30.6	35.4
SEm	0.0161	0.0045	0.451	0.57
CD	NS	NS	NS	NS

Table 3.4.14

AGRON-4/22: Organic farming for soybean-based cropping systems

Zone: North Eastern Hill Characters: Yield, Centre: Medziphema

Cropping systems (CS)	**Initial**			**Total Uptake (seed and straw) of N, P and K (kg/ha)**		
	Nitrogen (N), (kg/ha)	**Phosphorous (P) (kg/ha)**	**Potassium (K) (kg/ha)**	**nitrogen (N)**	**Phosphorous (P)**	**Potassium (K)**
Soybean-Mustard	204.43	12.94	157.05	137.58	17.47	91.61
Soybean-Maize	202.5	12.63	158.91	141.47	17.4	95.29
Organic management practices						
Organic farming	201.83	12.74	155.88	145.89	18.06	95.96
Inorganic farming	205.1	12.84	160.08	133.17	16.82	90.94
Mean	203.47	12.79	157.98	139.53	17.44	93.45
SEm	1.12	0.18	7.2	5.24	0.58	1.8
CD	NS	NS	NS	NS	NS	NS

AGRON-4/22: Organic farming for soybean-based cropping systems: Zone: North Eastern Hill

Cropping systems (CS)	Organic carbon and physical properties			WHC (water holding capacity)
	Organic carbon (%)	Bulk density	porosity	
Soybean-Mustard	1.4	1.35	46.88	43.61
Soybean-Maize	1.34	1.34	47.41	43.7
Organic management practices				
Organic farming	1.37	1.34	47.48	43.82
Inorganic farming	1.37	1.34	46.82	43.49
Mean	1.37	1.34	47.15	43.66
SEm	**0.02**	**0.007**	**0.45**	**0.44**
CD	**NS**	**NS**	**NS**	**NS**

AGRON-4/22: Organic farming for soybean-based cropping systems: Zone: North Eastern Hill

Cropping systems (CS)	Balance sheet (kg/ha)		
	Nitrogen (N)	Phosphorous (P)	Potassium (K)
Soybean-Mustard	79.35	43.57	77.94
Soybean-Maize	73.53	43.33	76.12
Organic management practices			
Organic farming	60.94	30.88	64.92
Inorganic farming	91.93	56.01	89.14
Mean	76.44	43.45	77.03

Table 3.5.1

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone: North Plain**, Variety:** PS 1347 and SL 958**Character:** Growth and yield attributing

Treatment	**Plant dry weight (g/plant)**				**CGR**			**Plant height (cm)**	**Branches/ plant**	**Pods/ plant**	**Seed index (g)**
	30 DAS	**45 DAS**	**60 DAS**	**75 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**				
Variety											
PS 1347	3.70	8.56	15.24	24.14	8.95	13.56	16.03	63.14	4.35	77.08	10.67
SL 958	4.23	9.91	17.94	27.04	10.59	15.83	16.21	84.24	4.11	79.12	9.59
Thiourea (Spray at 20-25 & 50-55 DAS)											
Control	3.17	6.88	14.17	22.93	7.65	16.95	19.56	72.13	3.20	60.58	9.86
Water spray	3.25	7.16	14.38	23.46	8.03	17.05	20.16	74.58	3.27	63.26	9.96
Thiourea @ 250 ppm	3.39	7.90	15.47	24.77	9.26	17.99	20.45	76.44	3.49	67.25	10.31
Thiourea @ 500 ppm	3.76	8.55	16.36	26.06	9.81	18.44	21.49	79.26	3.52	72.58	10.58
Thiourea @ 750 ppm	3.90	8.63	16.98	27.23	9.72	19.37	22.72	82.63	3.85	76.77	10.64

Table 3.5.2

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone: North Plain**, Variety:** PS 1347 and SL 958; **Character:** Seed yield (kg/ha)

Treatment	Delhi	Pantnagar	Ludhiana	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety										
PS 1347	1824	1704	2603	2044	3997	5761	38423	89316	50893	2.32
SL 958	2039	1651	1568	1753	4232	6077	38423	93869	55446	2.44
Sem$\pm$	38.41	67.3	28							
CD	114.15	NS	83							
Thiourea (Spray at 20-25 & 50-55 DAS)										
Control	1698	1435	1957	1697	4738	4466	53281	70313	28090	1.32
Water spray	1738	1463	2021	1741	5026	4495	54944	72391	28655	1.32
Thiourea @ 250 ppm	1891	1750	2127	1923	5361	4950	56641	81141	35833	1.43
Thiourea @ 500 ppm	2152	1824	2142	2039	5490	5144	56912	86843	41390	1.53
Thiourea @ 750 ppm	2181	1917	2180	2093	5620	5288	57497	89183	43269	1.55
Sem$\pm$	61	106	45							
CD (at 5%)	180	309	131							

Table 3.5.3

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone: Eastern, Variety's 95-60 and RSC 10-46,
Character: Growth and yield attributing

Treatment	**Plant dry weight (g/plant)**				**CGR**			**RGR**			**Plant height (cm)**	**Branches/ plant**	**Pods/ plant**	**Seed index (g)**
	30 DAS	**45 DAS**	**60 DAS**	**75 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**				
Variety														
JS 95 60	1.78	6.85	17.35	28.65	0.35	0.74	0.53	0.040	0.013	0.006	60.61	3.52	45.98	10.91
RSC 10-46	1.91	7.79	22.80	30.98	0.40	0.87	0.60	0.042	0.015	0.007	70.59	4.07	60.77	10.90
Thiourea (Spray at 20-25 & 50-55 DAS)														
Control	1.71	21.62	16.14	25.06	0.33	0.71	0.52	0.041	0.014	0.007	61.99	3.35	48.89	10.44
Water spray	1.79	7.00	18.12	26.31	0.34	0.76	0.53	0.041	0.014	0.007	62.82	3.63	50.89	10.67
Thiourea @ 250 ppm	1.85	7.55	20.19	27.96	0.38	0.84	0.50	0.041	0.014	0.006	64.52	4.08	56.55	11.20
Thiourea @ 500 ppm	1.87	8.20	21.66	30.51	0.42	0.85	0.59	0.042	0.014	0.006	68.59	4.27	58.38	11.28
Thiourea @ 750 ppm	1.93	8.35	22.22	32.37	0.42	0.88	0.66	0.041	0.015	0.006	70.74	4.41	59.30	11.51

Table 3.5.4

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone: Eastern; **Variety:** JS 95-60 and RSC 10-46**;**

Character: Seed yield (kg/ha)

Treatment	**Raipur**	**Ranchi**	**Seed yield (kg/ha)**	**Straw yield (kg/ha)**	**Biological yield (kg/ha)**	**HI (%)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Variety										
JS 95 60	1535	1551	1543	2379	3922	39.34	28398	66352	37955	2.34
RSC 10-46	1696	2064	1880	3010	4890	38.45	28398	80843	52445	2.85
Sem±	1.64	47								
CD (at 5%)	4.88	137								
Thiourea (**S**pray at 20-25 & 50-55 DAS)										
Control	1421	1629	1525	2433	3958	38.53	27418	65570	38152	2.39
Water spray	1506	1695	1600	2557	4157	38.49	28155	68812	40657	2.44
Thiourea @ 250 ppm	1632	1832	1732	2721	4453	38.90	28493	74486	45993	2.61
Thiourea @ 500 ppm	1716	1904	1810	2842	4651	39.92	28805	77827	49022	2.70
Thiourea @ 750 ppm	1805	1976	1890	2920	4810	39.29	29093	81292	52175	2.79
Sem±	2.60	75.								
CD (at 5%)	7.72	217								

Table 3.5.5

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone: Central **Character:** Growth and yield attributing

Treatment	**Plant dry weight (g/plant)**				**CGR**			**RGR**			**Plant height (cm)**	**Branches/ plant**	**Pods/ plant**	**Seed index (g)**
	30 DAS	**45 DAS**	**60 DAS**	**75 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**	**45-30 DAS**	**60-45 DAS**	**75-60 DAS**				
Variety														
NRC 86	2.15	6.73	10.44	22.18	13.66	11.06	35.11	0.084	0.031	0.057	53.35	3.86	36.75	10.64
RVS 24	2.28	7.01	10.67	23.16	14.11	10.88	37.32	0.084	0.028	0.061	53.26	4.01	39.99	11.18
Thiourea (Spray at 20-25 & 50-55 DAS)														
Control	2.09	6.31	10.19	20.06	11.70	10.23	27.82	0.068	0.024	0.044	50.42	3.53	31.29	10.28
Water spray	2.21	6.49	10.52	20.92	11.89	10.65	29.33	0.066	0.024	0.045	50.75	3.56	33.74	10.56
Thiourea @ 250 ppm	2.30	6.54	10.81	21.48	11.71	11.30	30.03	0.064	0.026	0.045	51.83	3.70	36.65	10.84
Thiourea @ 500 ppm	2.37	6.75	11.36	22.13	12.10	12.29	30.30	0.063	0.027	0.043	52.84	3.78	37.60	11.12
Thiourea @ 750 ppm	2.39	6.83	11.51	22.16	12.27	12.45	29.87	0.063	0.027	0.043	52.46	3.91	37.98	11.13

Table 3.5.6

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone**:** Central**, Character:** Seed yield (kg/ha)

Treatment	Sehore	Kota	Amravati	Devgadh baria	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety												
JS 20 29	1960	-	2101	1641	1900	2096	4189	47.97	29780	83189	53409	2.71
JS 20 69	2267	1362	2220	1552	2013	2205	4613	47.84	29856	87415	57559	2.89
Sem±	4.93	-	41									
CD (at 5%)	30.01	-	119									
Thiourea (Spray at 20-25 & 50-55 DAS)												
Control	1877	1290	2050	1269	1621	1924	3793	45.79	27671	71288	43617	2.25
Water spray	1988	1363	2073	1406	1707	2026	3935	45.78	28284	75131	46848	2.34
Thiourea @ 250 ppm	2072	1353	2140	1635	1800	2110	4018	45.97	28493	79345	50852	2.47
Thiourea @ 500 ppm	2247	1391	2300	1802	1935	2245	4249	46.17	28739	85298	56559	2.67
Thiourea @ 750 ppm	2384	1415	2240	1868	1976	2284	4309	46.25	28955	87049	58094	2.73
Sem±	50	35	65	166								
CD (at 5%)	150	NS	NS	10.1								

Table 3.5.7

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone: Southern **Character:** Growth and yield attributing

Treatment	Plant dry weight (g/plant)				RGR			Plant height (cm)	Branches/ plant	Pods/ plant	Seed index (g)
	30 DAS	45 DAS	60 DAS	75 DAS	45-30 DAS	60-45 DAS	75-60 DAS				
Variety											
JS 93 05	4.94	21.93	34.28	51.76	0.085	0.031	0.031	56.36	4.79	48.26	13.05
MACS 1188	6.52	28.60	41.51	55.35	0.085	0.027	0.024	68.56	5.35	53.81	14.31
Thiourea (Spray at 20-25 & 50-55 DAS)											
Control	5.18	22.44	32.67	46.45	0.085	0.025	0.028	56.11	4.30	42.09	12.80
Water spray	5.54	24.33	37.04	50.84	0.082	0.031	0.027	61.79	4.59	44.99	13.00
Thiourea @ 250 ppm	5.68	25.82	38.80	54.64	0.087	0.029	0.027	61.98	5.13	48.79	13.14
Thiourea @ 500 ppm	6.01	26.69	39.10	56.85	0.085	0.029	0.029	64.48	5.49	56.97	14.19
Thiourea @ 750 ppm	6.24	27.18	41.85	59.86	0.085	0.031	0.027	68.94	5.84	62.31	14.72

Table 3.5.8

AGRON. 5/20: Drought alleviation in soybean through foliar application of Thiourea; Zone: Southern **Character:** Seed yield (kg/ha)

Treatment	Adilabad	Dharwad	Seed yield (kg/ha)(mean)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Variety										
JS 93 05	2503	2163	2333	4429	6836	34.13	45795	116186	70391	2.54
MACS 1188	2694	2677	2686	4509	7244	37.08	45868	132860	86992	2.90
Sem±	65.4	52								
CD (at 5%)	191	154								
Thiourea (Spray at 20-25 & 50-55 DAS)										
Control	2202	2181	2192	4287	6548	33.48	43810	109960	66150	2.51
Water spray	2372	2284	2328	4355	6756	34.46	44675	116595	71921	2.61
Thiourea @ 250 ppm	2589	2404	2497	4415	6989	35.73	45175	123206	77531	2.73
Thiourea @ 500 ppm	2789	2565	2677	4604	7345	36.45	46878	132687	85809	2.83
Thiourea @ 750 ppm	3044	2664	2854	4653	7559	37.76	48620	140167	91547	2.88
Sem±	104	82								
CD (at 5%)	302	244								

Table 3.5.8.1

Drought alleviation in soybean through foliar application of Thiourea under northern plain zone (NPZ) 2020-2022.

Treatment	Seed Yield (kg/ha)				Economics			
	Pantnagar	Ludhiana	Delhi	Mean of north plain zone	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1511^{C}	1528^{A}	1738^{C}	1570^{B}	39930^{A}	65314^{B}	29390^{C}	1.59^{A}
Water spray	1545^{BC}	1609^{A}	1777^{C}	1626^{B}	41209^{A}	67706^{B}	30563^{BC}	1.60^{A}
Thiourea @ 250 ppm	1797^{AB}	1697^{A}	1927^{B}	1788^{AB}	41907^{A}	74889^{AB}	36816^{AB}	1.74^{A}
Thiourea @ 500 ppm	1920^{A}	1772^{A}	2194^{A}	1927^{A}	42131^{A}	80931^{A}	42714^{A}	1.89^{A}
Thiourea @ 750 ppm	1902^{A}	1778^{A}	**2227^{A}**	**1920^{A}**	42459^{A}	80989^{A}	42621^{A}	1.87^{A}
LSD	**259.54**	**663.81**	**146.96**	**222.02**	**22638**	**12945**	**7293**	**0.53**

Table 3.5.8.2

Drought alleviation in soybean through foliar application of Thiourea under eastern zone (EZ) 2020-2022.

Treatment	Seed Yield (kg/ha)			Economics			
	Raipur	Ranchi	Mean of eastern zone	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1362^{D}	1613^{C}	1488^{C}	31617^{A}	56930^{A}	34416^{B}	2.05^{A}
Water spray	1447^{CD}	1661^{C}	1554^{C}	32604^{A}	59484^{A}	36260^{B}	2.09^{A}
Thiourea @ 250 ppm	1564^{BC}	1786^{B}	1675^{B}	33672^{A}	64373^{A}	40471^{AB}	2.25^{A}
Thiourea @ 500 ppm	1679^{AB}	1898^{A}	1788^{A}	34493^{A}	68901^{A}	44731^{A}	2.41^{A}
Thiourea @ 750 ppm	1766^{A}	1930^{A}	1848^{A}	35460^{A}	71335^{A}	46230^{A}	2.48^{A}
LSD at 5%	**120.76**	**102.94**	**108.73**	**22331**	**16070**	**8195**	**0.53**

Table 3.5.8.3

Drought alleviation in soybean through foliar application of Thiourea under central zone (CZ) 2020-2022.

Treatment	Seed Yield (kg/ha)					Economics			
	Sehore	Kota	Amravati	Devgadh baria (2021 & 2022)	Mean of central zone	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1667^{A}	1279^{A}	2204^{A}	1310^{C}	1639^{C}	27559^{D}	65424^{A}	37864^{A}	2.21^{B}
Water spray	1773^{A}	1336^{A}	2279^{A}	1446^{C}	1729^{BC}	28194^{C}	69073^{A}	40879^{A}	2.29^{B}
Thiourea @ 250 ppm	1905^{A}	1376^{A}	2331^{A}	1676^{B}	1827^{AB}	28372^{BC}	73067^{A}	44695^{A}	2.44^{AB}
Thiourea @ 500 ppm	2016^{A}	1400^{A}	2499^{A}	1843^{A}	1936^{A}	28609^{AB}	77492^{A}	48883^{A}	2.59^{A}
Thiourea @ 750 ppm	2116^{A}	1440^{A}	2407^{A}	1908^{A}	1962^{A}	28738^{A}	78608^{A}	49870^{A}	2.63^{A}
LSD	**566.87**	**204.37**	**319.62**	**146.52**	**182.09**	**245.86**	**13857**	**13684**	**0.26**

Table 3.5.8.4

Drought alleviation in soybean through foliar application of Thiourea under southern zone (SZ) 2020-2022.

Treatment	Seed Yield (kg/ha)			Economics			
	Adilabad	Dharwad	Mean of southern zone	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	2099^{C}	2038^{D}	2069^{D}	41471^{C}	93571^{A}	52098^{A}	2.28^{A}
Water spray	2218^{BC}	2238^{CD}	2228^{CD}	42555^{BC}	100234^{A}	57679^{A}	2.38^{A}
Thiourea @ 250 ppm	2399^{ABC}	2377^{BC}	2388^{BC}	43423^{BC}	106703^{A}	63113^{A}	2.50^{A}
Thiourea @ 500 ppm	2579^{AB}	2544^{AB}	2562^{AB}	45082^{AB}	114609^{A}	69451^{A}	2.58^{A}
Thiourea @ 750 ppm	2774^{A}	2634^{A}	2704^{A}	46864^{A}	120560^{A}	73695^{A}	2.62^{A}
LSD at 5%	**448.45**	**221.18**	**221.77**	**3182**	**33481**	**30512**	**0.63**

Table 3.5.8.5

Drought alleviation in soybean through foliar application of Thiourea under across 4 zones 2020-2022.

Treatment	Seed Yield (kg/ha)	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1691^{C}	35144^{A}	70310^{B}	38442^{B}	2.03^{C}
Water spray	1784^{C}	36141^{A}	74124^{AB}	41345^{AB}	2.09^{BC}
Thiourea @ 250 ppm	1920^{B}	36844^{A}	79758^{AB}	46274^{AB}	2.23^{AB}
Thiourea @ 500 ppm	2053^{A}	37579^{A}	85483^{AB}	51445^{AB}	2.37^{A}
Thiourea @ 750 ppm	2108^{A}	38380^{A}	87873^{A}	53104^{A}	2.40^{A}
LSD at 5%	**117.54**	**7211**	**17342**	**13197**	**0.19**

Table 3.6.1

AGRON- 6/21. - AGRON- 6/2022 Effect of phytotron's Biostumilant on soybean (Glycine max)

Zone: Central: Character: Yield and economics

Table 3.6.1 A Effect of VININ - Biostimulant-Antioxidant (Gibberellin Augmenter) on growth, yield and yield attributes of soybean

Treatment	Branches per plant (no's)	Number of Pods per plant	100-Pod weight	100- Seed weight	seed yield (kg/ha)	Straw yield (kg/ha)	Harvest Index	Nodule numbers	Nodule dry weight	Herbicidal injury, (phytotoxicity) (0-10 scale)
1.5 ml / lit. + GA (10ppm)- first spray followed by 3.0 ml / lit. - Second Spray	3.33	33.15	44.15	11.56	1888	2195	45.21	33.12	43.38	0.00
2.0 ml / lit. + GA (10ppm)- first spray followed by 4.0 ml / lit. - Second Spray	3.53	35.33	46.60	11.58	2030	2339	45.43	36.61	51.28	0.00
2.5 ml / lit. + GA (10ppm)- first spray followed by 5.0 ml / lit. - Second Spray	3.51	34.28	45.55	11.85	1900	2167	45.65	33.69	43.53	0.00
Control	3.20	32.89	44.28	11.66	1915	2202	45.46	35.72	50.64	0.00

Table 3.6.1B.

Effect of TULIP - Cytokinin supplement on growth, yield and yield attributes of soybean

Treatment	Branches per plant (no's)	Number of Pods per plant	100-Pod weight	100- Seed weight	seed yield (kg/ha)	Straw yield (kg/ha)	Harvest Index	Nodule numbers	Nodule dry weight	Herbicidal injury, (phytotoxicity) (0-10 scale)
1.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 1.5 ml / Lit and Third Spray @ 2.0 ml / lit., at 15 days interval	3.30	31.40	44.05	11.24	1967	2407	44.23	35.32	44.04	0.00
2.0 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.0 ml / Lit and Third Spray @ 2.5 ml / lit., at 15 days interval.	3.54	34.17	46.78	11.31	2062	2568	43.87	38.73	52.42	0.00
2.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.5 ml / Lit and Third Spray @ 3.0 ml / lit., at 15 days interval	3.41	31.94	45.73	11.84	2016	2484	44.15	37.72	48.92	0.00
Control	3.20	31.85	44.9	11.25	1989	2405	44.45	37.12	51.7	0.00

Table 3.6.1 C.

Effect of WINSTOP - Auxin supplement on growth, yield and yield attributes of soybean

Treatment	Branches per plant (no's)	Number of Pods per plant	100-Pod weight	100-Seed weight	seed yield (kg/ha)	Straw yield (kg/ha)	Harvest Index	Nodule numbers	Nodule dry weight	Herbicidal injury, (phytotoxicity) (0-10 scale)
1.5 ml / lit. - first spray followed by 2.5 ml / lit. - Second Spray.	3.28	33.92	45.65	11.36	1902	2146	46.05	33.96	45.14	0.00
2.0 ml / lit. - first spray followed by 3.0 ml / lit. - Second Spray.	3.49	37.28	46.65	11.33	2083	2371	45.96	37.21	52.36	0.00
2.5 ml / lit. - first spray followed by 3.5 ml / lit. - Second Spray.	3.45	36.03	46.89	11.85	2073	2377	45.72	35.92	47.59	0.00
Control	3.28	35.36	45.24	11.10	2020	2305	45.76	36.21	51.81	0.00

Table 3.6.2

AGRON- 6/21. - AGRON- 6/2022 Effect of phytotron's Biostumilant on soybean (Glycine max)

Zone: Central **Character:** Yield

Table 3.6.2 A Effect of VININ - Biostimulant-Antioxidant (Gibberellin Augmenter) on yield of soybean

Treatment (Gibberellin)	Seed yield (kg/ha)			
	Kota	Amravati	Sehore	Mean
1.5 ml / lit. + GA (10ppm)- first spray followed by 3.0 ml / lit. - Second Spray	1115	1994	2556	1888
2.0 ml / lit. + GA (10ppm)- first spray followed by 4.0 ml / lit. - Second Spray	1170	2254	2667	2030
2.5 ml / lit. + GA (10ppm)- first spray followed by 5.0 ml / lit. - Second Spray	1200	1821	2679	1900
Untreated control	1082	2144	2519	1915
Sem±	38	64	197	
CD (at 5%)	NS	198	NS	

Table 3.6.2 B.

Effect of TULIP - Cytokinin supplement on yield of soybean

Treatment (Cytokinin)	Seed yield (kg/ha)			
	Kota	**Amravati**	**Sehore**	**Mean**
1.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 1.5 ml / Lit and Third Spray @ 2.0 ml / lit., at 15 days interval.	1188	2244	2469	1967
First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.0 ml / Lit and Third Spray @ 2.5 ml / lit., at 15 days interval	1198	2495	2494	2062
2.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.5 ml / Lit and Third Spray @ 3.0 ml / lit., at 15 days interval.	1245	2285	2519	2016
Untreated control	1130	2392	2444	1989
Sem±	49	58	49	
CD (at 5%)	NS	179	NS	

Table 3.6.2 C.

Effect of WINSTOP - Auxin supplement on yield of soybean

Treatment (Auxin)	Seed yield (kg/ha)			
	Kota	**Amravati**	**Sehore**	**Mean**
1.5 ml / lit. - first spray followed by 2.5 ml / lit. - Second Spray.	1165	2028	2512	1902
2.0 ml / lit. - first spray followed by 3.0 ml / lit. - Second Spray.	1170	2500	2580	2083
2.5 ml / lit. - first spray followed by 3.5 ml / lit. - Second Spray	1208	2419	2593	2073
Untreated control	1100	2460	2500	2020
Sem±	38.2	116	62	
CD (at 5%)	NS	356	NS	

Table 3.6.3

AGRON- 6/21. - AGRON- 6/2022 Effect of phytotron's Biostumilant on soybean (Glycine max)
Zone: SouthernCharacter: Yield and economics

A. VININ - Biostimulant-Antioxidant (Gibberellin Augmenter)

Treatment	Branches/plant	Pods/ plant	100 Pod weight (g)	100 Seed weight	Seed Yield (kg/ha)	Straw Yield (kg/ha)	HI (%)	R_2 Stage			R_5 Stage		
								Nodule no.	Nodule fresh weight (g)	Nodule dry weight (mg)	Nodule no.	Nodule fresh weight (g)	Nodule dry weight (mg)
1.5 ml / lit. + GA (10ppm)- first spray followed by 3.0 ml / lit. - Second Spray.	4.78	42.76	49.70	14.08	2984	4100	43.46	26.87	1.07	37.63	18.90	1.72	94.70
2.0 ml / lit. + GA (10ppm)- first spray followed by 4.0 ml / lit. - Second Spray	4.80	47.69	52.09	14.31	3055	4234	43.33	31.71	1.70	41.41	20.55	2.18	99.70
2.5 ml / lit. + GA (10ppm)- first spray followed by 5.0 ml / lit. - Second Spray	4.84	50.26	53.80	14.18	3162	4191	44.21	30.27	1.73	42.19	21.90	2.32	102.60
Control	4.66	40.64	47.95	13.75	2881	4242	41.64	25.56	1.07	34.19	18.60	1.64	94.30

B. TULIP - Cytokinin supplement; four treatments

Treatment	Branches/plant	Pods/ plant	100 Pod weight (g)	100 Seed weight	Seed Yield (kg/ha)	Straw Yield (kg/ha)	HI (%)	R_2 Stage			R_5 Stage		
								Nodule no.	Nodule fresh weight (g)	Nodule dry weight (mg)	Nodule no.	Nodule fresh weight (g)	Nodule dry weight (mg)
1.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 1.5 ml / Lit and Third Spray @ 2.0 ml / lit., at 15 days interval.	4.32	44.91	53.74	13.76	2841	4168	42.4	30.67	1.44	38.45	20.05	1.88	101.00
2.0 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.0 ml / Lit and Third Spray @ 2.5 ml / lit., at 15 days interval	4.43	50.17	56.85	13.83	3061	4288	44.1	30.76	1.58	42.89	21.50	2.21	106.90
2.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.5 ml / Lit and Third Spray @ 3.0 ml / lit., at 15 days interval	4.54	53.56	58.70	14.06	3099	4203	45.0	29.88	1.68	43.74	22.35	2.39	108.60
Control	4.27	42.45	48.86	13.80	2735	4190	42.15	25.62	1.31	35.18	18.80	1.75	98.00

C. WINSTOP – Biostimulant (Auxin supplement)

Treatment	Branches /plant	Pods/ plant	100 Pod weight (g)	100 Seed weight(g)	Seed Yield (kg/ha)	Straw Yield (kg/ha)	HI (%)	R_2 Stage			R_5 Stage		
								Nodule no.	Nodule fresh weight (g)	Nodule dry weight (mg)	Nodule no.	Nodule fresh weight (g)	Nodule dry weight (mg)
1.5 ml / lit. - first spray followed by 2.5 ml / lit. - Second Spray	3.94	45.93	49.96	30.40	3108	3923	42.1	33.07	1.39	36.52	19.30	2.04	101.00
2.0 ml / lit. - first spray followed by 3.0 ml / lit. - Second Spray	4.23	49.57	53.86	13.74	3219	3892	43.4	31.94	1.40	38.81	20.90	2.24	106.80
2.5 ml / lit. - first spray followed by 3.5 ml / lit. - Second Spray	4.21	52.76	56.31	13.35	3407	3819	45.2	32.40	1.52	41.13	21.90	2.38	108.80
Control	3.64	39.93	44.90	13.55	3053	4049	40.8	30.46	1.32	30.40	18.60	1.81	99.60

Table 3.6.4

AGRON- 6/21. - AGRON- 6/2022 Effect of phytotron's Biostumilant on soybean (Glycine max)

Zone: Southern **Character:** Yield

Table 3.6.4 (A) Effect of VININ - Biostimulant-Antioxidant (Gibberellin Augmenter) on yield of soybean

Treatment (Gibberellin)	Seed yield (kg/ha)		
	Dharwad	Pune	Mean
1.5 ml / lit. + GA (10ppm)- first spray followed by 3.0 ml / lit. - Second Spray.	2656	3312	2984
2.0 ml / lit. + GA (10ppm)- first spray followed by 4.0 ml / lit. - Second Spray	2787	3322	3055
2.5 ml / lit. + GA (10ppm)- first spray followed by 5.0 ml / lit. - Second Spray	2894	3430	3162
Untreated control	2644	3117	2881
Sem±	74	67.6	
CD (at 5%)	229	208	

Table 3.6.4 B. Effect of TULIP - Cytokinin supplement on yield of soybean

Treatment (Cytokinin)	Seed yield (kg/ha)		
	Dharwad	Pune	Mean
1.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 1.5 ml / Lit and Third Spray @ 2.0 ml / lit., at 15 days interval.	2425	3257	2841
First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.0 ml / Lit and Third Spray @ 2.5 ml / lit., at 15 days interval	2546	3575	3061
2.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.5 ml / Lit and Third Spray @ 3.0 ml / lit., at 15 days interval.	2667	3530	3099
Untreated control	2238	3231	2735
Sem±	75	69.1	
CD (at 5%)	236	213	

Table 3.6.4 C.

Effect of WINSTOP - Auxin supplement on yield of soybean

Treatment (Auxin)	Seed yield (kg/ha)		
	Dharwad	Pune	Mean
1.5 ml / lit. - first spray followed by 2.5 ml / lit. - Second Spray.	3041	3175	3108
2.0 ml / lit. - first spray followed by 3.0 ml / lit. - Second Spray.	3112	3325	3219
2.5 ml / lit. - first spray followed by 3.5 ml / lit. - Second Spray	3274	3539	3407
Untreated control	3007	3099	3053
Sem±	67	74.6	
CD (at 5%)	207	230	

Table 3.6.5

AGRON- AGRON- 6/2022 Effect of phytotron's Biostumilant on soybean (Glycine max)

Zone: North Plain **Centre:** G B P U A & T, Pantnagar

A. VININ - Biostimulant-Antioxidant (Gibberellin Augmenter)

Treatment	Branches per plant (no's)	Number of Pods per plant	100-Pod weight	100-Seed weight	seed yield (kg/ha)	Straw yield (kg/ha)	Harvest Index	nodule numbers and nodule dry weight R-5 Stage		Herbicidal injury, (phytotoxicity) (0-10 scale)
								No.	Wt. mg/plant	
1.5 ml / lit. + GA (10ppm)- first spray followed by 3.0 ml / lit. - Second Spray	6.14	100.40	36.40	10.17	1533	3650	29.49	55.20	233.05	0
2.0 ml / lit. + GA (10ppm)- first spray followed by 4.0 ml / lit. - Second Spray	6.43	97.00	33.20	10.17	1466	3479	29.63	59.20	243.89	0
2.5 ml / lit. + GA (10ppm)- first spray followed by 5.0 ml / lit. - Second Spray	6.43	91.60	33.20	10.10	1400	3428	29.05	57.60	235.08	0
Control	6.14	103.80	37.80	10.27	1644	3761	30.32	65.40	259.65	-
SEm	0.461	6	2	0.842	110	200	0.805	3	16	-
C.D	NS	NS	NS	NS	NS	NS	NS	NS	NS	-

(B) TULIP - Cytokinin supplement

Treatment	Branches per plant (no's)	Number of Pods per plant	100-Pod weight	100- Seed weight	seed yield (kg/ha)	Straw yield (kg/ha)	Harvest Index	nodule numbers and nodule dry weight R-5 Stage		Herbicidal injury, (phytotoxicity) (0-10 scale)
								No.	Wt. mg/plant	
1.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 1.5 ml / Lit and Third Spray @ 2.0 ml / lit., at 15 days interval	5.39	97.16	33.60	10.26	1688	3938	30.282	61.00	261.48	0
2.0 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.0 ml / Lit and Third Spray @ 2.5 ml / lit., at 15 days interval	6.00	103.52	34.60	10.32	1711	3946	30.32	63.80	269.34	0
2.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.5 ml / Lit and Third Spray @ 3.0 ml / lit., at 15 days interval	6.20	107.18	39.20	10.25	1822	4012	31.18	72.60	294.00	0
Control	5.86	113.50	33.20	10.28	1666	3990	29.58	57.20	254.44	-
SEm	0.387	9	2	0.824	118	265	0.993	5	23	-
C.D	NS	NS	NS	NS	NS	NS	NS	NS	NS	-

(C) WINSTOP - Auxin supplement

Treatment	Branches per plant (no's)	Number of Pods per plant	100-Pod weight	100- Seed weight	seed yield (kg/ha)	Straw yield (kg/ha)	Harvest Index	nodule numbers and nodule dry weight R-5 Stage		Herbicidal injury, (phytotoxicity) (0-10 scale)
								No.	Wt. mg/plant	
1.5 ml / lit. - first spray followed by 2.5 ml / lit. - Second Spray.	6.134	95.60	33.60	10.29	1711	4044	29.82	60.34	270.84	0
2.0 ml / lit. - first spray followed by 3.0 ml / lit. - Second Spray.	6.200	101.08	34.20	10.57	1800	4133	30.38	66.04	283.19	0
2.5 ml / lit. - first spray followed by 3.5 ml / lit. - Second Spray.	5.26	107.86	38.80	10.61	1922	4255	31.18	67.00	302.10	0
Control	6.13	90	31	10	1622	3933	29	65	247	-
SEm	0.482	7	3	0.770	140	278	1.19	5	24	-
C.D	NS	NS	NS	NS	NS	NS	NS	NS	NS	-

पादप रोग विज्ञान
Plant Pathology

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4. Plant Pathology

PP 1: Survey for soybean diseases

The disease scenarios at various locations have been analyzed through a combination of survey, surveillance and past records of soybean pathology trials (detailed in Tables 4.1 to 4.10). In the NHZ, only FLS was reported as moderate to severe at Almora, while at Palampur, FLS was moderate to severe, but Anth, BP and YMV were in mild to moderate form.In the NPZ, RAB was severe at Pantnagar, with BLB and YMV in moderate to severe form (Fig 1-3). Moreover, sudden death syndrome was severe at all locations in the Pilibhit district of UP, followed by RAB, Pod blight, SMV, and Bacterial blight.YMV and SMV were moderately to severely prevalent at Ludhiana. In the NEHZ, mild to moderate disease pressure was observed for YMV, Anth, CLS/PSS and RAB at Jorhat, while Medziphema reported moderate to severe levels of PB (Ct), rust and RAB. In CZ, TLS was severe at Sehore, but CLS/PSS and MLS were mild.In Amravati, CR and Charcoal Rot were moderate to severe, whereas other diseases like ALS, YMV, BP and Anth were in very mild form. At Jabalpur, YMV and CR were moderately to severely prevalent, while RAB, CollR, PB(Ct) and BP were in mild to moderate form. At Indore, Anth, RAB and SMV appeared in severe form, while YMV and BP were in moderate to severe form. In SZ, rust was severe at Dharwad and Kasbe Digraj, whereas Anth was moderate and TLS was moderate at Dharwad. Thus it is evident that the disease was prevalent in all the zones in moderate to severe form.

PP 2: Trap nursery trial

The study looked at the appearance of major diseases across 10 centres in different zones, using nine susceptible varieties (Table 4.2). Results showed that Bragg had the highest severity of CR (72.50%) at Jabalpur, while Monetta had the highest severity of YMV (51.79%) at the same centre. Monetta also had the highest severity of both RAB (29.26%) and Anth (27.78%) at Jabalpur. NRC 7 had the highest severity of anthracnose (78.78%) and RAB (69.29%) at the Indore centre. PK 472 had the highest severity of FLS (99.99%) at Sehore centre, followed by Punjab 1 (97.77%) and JS 335 (96.66%). Rust had a uniformly high severity across all varieties at Dharwad centre, but JS 95-60 had the highest severity of pod blight (48.25%) at the same centre, followed by JS 335 (45.55%). Shivalik and JS 9560 had the highest FLS (77.77%) and Anth (72.22%) severity respectively at the Palampur centre of NHZ. Punjab 1 had the highest RAB severity (58.18%) at the Pantnagar centre, while PK 472 had the highest YMV severity (35.20%). Disease incidence was generally low at the Pantnagar centre of NPZ. Only three varieties (JS 65-60, Shivalik and PK-262) had CR at Amravati centre. Anthracnose incidence was low in only three varieties (JS-335, JS-9305 and Monetta) at the same centre. JS 95-60 had the highest severity of RAB (25.22%) and Anth (22.00%) at the Amravati centre, while Monetta had the highest Anth severity (22.14%) at Jorhat centre CZ. NRC 7 had the highest RAB incidence (17.78%), while Monetta had the highest Anth incidence (11.43%) at Medziphema centre.

PP 3: Incidence of various diseases in IVT (N)

Fifty-four entries were screened at 15 locations across different zones to evaluate their resistance against major diseases (Table 4.3). Reliable evaluation results were obtained for various entries against CR, Anth, YMV, RAB, and TLS at CZ. Entries IVT (N) 2, IVT (N) 3, IVT (N) 4, IVT (N) 15, IVT (N) 16, IVT (N) 18, IVT (N) 31, IVT (N) 35, IVT (N) 36, IVT (N) 42, and IVT (N) 46 were found to have higher resistant reaction against CR at two locations. Similarly, various entries showed HR or MR reaction against Anth, YMV, and RAB at different locations across the zones. At EZ, only one entry IVT35 showed MR reaction against PB (Ct).In the CZ region's Amravati center, most of the varieties displayed high resistance (HR) reactions against ALS disease, while several entries (IVT (N) 2, IVT (N) 3, IVT (N) 4, IVT (N) 5, IVT (N) 6, IVT (N) 12, IVT (N) 15, IVT (N) 16, IVT (N) 18, IVT (N) 23, IVT (N) 24, IVT (N) 30, IVT (N) 31, IVT (N) 33, IVT (N) 35, IVT (N) 36, IVT (N) 37, IVT (N) 39, IVT (N) 40, IVT (N) 42, IVT (N) 43, IVT (N) 44, IVT (N) 45, IVT (N) 46, IVT (N) 48, IVT (N) 52,IVT (N) 53)exhibited HR reactions against YMV disease at Jabalpur center. Most of the entries showed an absolute resistant (AR) reaction against Brown spot at Sehore center.Additionally, at the Sehore center, most entries showed absolute resistance (AR) reactions against Brown spot disease, and several entries (IVT (N) 3, IVT (N) 16, IVT (N) 18, IVT (N) 31, IVT (N) 36, IVT (N) 40, IVT (N) 42, IVT (N) 44, IVT (N) 46, IVT (N) 53)displayed HR reactions against RAB disease at Jabalpur center. Some cultivars showed medium resistant (MR) reactions against RAB disease at Indore center (IVT (N) 20, IVT (N) 21, IVT (N) 31, IVT (N) 36). At the Amravati center, all varieties, except four (IVT (N) 16, IVT (N) 18, IVT (N) 25, IVT (N) 41), exhibited HR reactions against BP disease. Only one entry (IVT (N) 14) displayed HR reaction against SMV disease in the CZ's Indore center. In the SZ region, only two entries (IVT (N) 15 and IVT (N) 48) showed MR reactions against rust disease and IVT (N) 15, IVT (N) 30, IVT (N) 53 and IVT (N) 54 showed moderately resistant against Pod blight, while all cultivars showed MR reactions against purple seed stain disease in Dharwad centre of SZ. In the NPZ region, some entries (IVT (N) 2 and IVT (N) 5)displayed HR reactions against RAB, and entry IVT (N) 5 and IVT (N) 25 showed HR reaction against SMV at Pantnagar centre. Only a few entries (IVT (N) 3, IVT (N) 5 and IVT (N) 35) exhibited resistance against YMV disease at Ludhiana center, whereas only two entries (IVT (N) 1 and IVT (N) 2) showed HR reactions against FLS disease, and several entries (IVT (N) 1, IVT (N) 18, IVT (N) 22, IVT (N) 35, IVT (N) 49 andIVT (N) 52) displayed R reactions against Anth disease in the NHZ region. In the NEHZ region, several entries (IVT (N) 1, IVT (N) 2, IVT (N) 3, IVT (N) 4, IVT (N) 17, IVT (N) 22, IVT (N) 25, IVT (N) 36, IVT (N) 42, IVT (N) 46, IVT (N) 49, IVT (N) 50 and IVT (N) 54) showed HR reactions against YMV, and only one entry (IVT (N) 12) exhibited an HR reaction against RAB and Anth disease, respectively. Only one entry (IVT35) showed MR reaction against PB (Ct) disease in the EZ region.

PP 3 (a): Incidence of various diseases in IVT (Early)

A total of twenty-four entries, including check samples, were assessed for major diseases at fourteen locations across different zones (Table 4.4). The evaluation of these entries was deemed reliable for diseases such as RAB, Anth, CR, MLS, and YMV at CZ. Specifically, at the Jabalpur centre of CZ, entries IVT (E) 3, IVT (E) 13, IVT (E) 14, IVT (E) 15, and IVT (E) 23 exhibited HR reactions against RAB, while at the Kota centre, entries IVT (E) 2, IVT (E) 5, IVT (E) 7, IVT (E) 8, IVT (E) 11, IVT (E) 15, IVT (E) 18, and IVT (E) 24 showed HR reactions. Similarly, entries IVT (E) 3, IVT (E) 5, IVT (E) 7, IVT (E) 9, IVT (E) 12, IVT (E) 14, IVT (E) 16, IVT (E) 19, IVT (E) 21, and IVT (E) 24 exhibited HR reactions against Anth at Jabalpur centre, while only two entries, namely IVT (E) 12 and IVT (E) 15 from Jabalpur, showed resistance against Anth at the Indore centre of CZ. All the entries were found to show HR reaction against CR except for IVT (E) 23, which exhibited MR against CR at Amravati centre of CZ. Moreover, entries IVT (E) 6, IVT (E) 8, IVT (E) 9, IVT (E) 11, IVT (E) 14, IVT (E) 16, IVT (E) 17, IVT (E) 18, IVT (E) 20, IVT (E) 21, IVT (E) 22, IVT (E) 23 and IVT (E) 24 demonstrated HR reactions against MLS at Sehore centre of CZ, while entries IVT (E) 3, IVT (E) 8, IVT (E) 14, IVT (E) 19, and IVT (E) 24 exhibited HR reactions against YMV at all four locations of CZ.

PP 3.1: Incidence of various diseases in AVT I and AVT II (N)

A total of 11 entries, including checks, underwent screening for major diseases in 14 different locations across zones, as detailed in Table 4.3. Among these entries, NRC 192, NRC 190, NRC 189, AS 24, RSC 11-42, JS 95-60, JS 335 (c), and AMS-100-39 showed a high resistance (HR) reaction against CR and ALS in CZ. Meanwhile, NRC 192, NRC 190, NRC 189, AS 24, RSC 11-42, JS 23-03, and JS 23-09 were classified with moderate resistance (MR) against Anth at CZ, while NRC 192, NRC 190, AS 24, RSC 11-42, JS95-60, and AMS-100-39 exhibited HR response to YMV in the same region. At Sehore centre, entries NRC 190, NRC 189, RSC 11-42, JS 23-03, JS 23-09, KDS 1169, and JS335 (c) showed HR against Brown spot. In CZ, only KDS 1169 showed resistance against RAB, but NRC 192, NRC 189, RSC 11-42, JS 95-60, JS335 (c), and AMS-100-39 demonstrated HR reaction against BP at Amravati centre. In Indore centre of CZ, entries NRC 190, AS 24, RSC 11-42, JS 23-09 demonstrated MR reaction against SMV. In NPZ, entries PS-1682, SL-1282, and NRC SL 6 exhibited resistance reaction to RAB. Similarly, SL-1282, SHIVALIK, PS1670, and SL955 showed resistance to SMV, while SL-1282, NRC SL 6, SL -1074, and SL955 exhibited HR response against YMV at Ludhiana centre. At NHZ, VLS 59, JS 23-03, and MAUS 795 showed resistance against FLS, but only VLS 99 demonstrated resistance reaction to Anth at Palampur centre.

PP 3.1 (b): Incidence of various diseases in AVT I (E) and AVT II (E)

At 5 different locations in CZ, 24 entries (including checks and checks for major diseases) were screened. Table 4.4 shows the results of this screening. Four of the entries (JS 22-12, JS 22-18, JS 23-03 and KDS 1169) exhibited HR reaction against both RAB and Anth, while four other entries (NRC 190, NRC 189, JS 22-16 and JS 23-09) only exhibited HR reaction against Anth, all at the Jabalpur center of CZ. Additionally, five entries (JS 22-12, JS 22-18, NRC 181, JS 23-03 and JS 23-09) showed HR reaction against CR at both centers of CZ. At the Sehore center of CZ, eleven entries (PS 1569, NRC-165, JS 22-16, JS 22-18, RVSM 2012-4, JS 23-03, KDS 1169, JS95-60, NRC 130, NRC 138 and JS-2034 (c)) exhibited AR reaction against

MLS. Finally, seven entries (JS 22-12, JS 22-18, NRC 181, JS 23-03, JS 23-09, JS20-29 (c) and DSB21 (c)) exhibited HR reaction against YMV, both at the Jabalpur and Amravati centers of CZ.

PP3.1 (c): AVT-II Evaluation of breeding materials for resistant donor(s) for NEHZ

In Table 4.4, six entries were examined at the 02 location of NEHZ, which included checks. Among the entries, DLsb 1 demonstrated resistance against Anth, CR, and RAB at both locations of NEHZ. On the other hand, entries KDS 1096, Check JS 20-116, JS 335 (C), and MACS 1460 (C) only displayed resistance against RAB at the Medziphema center of NEHZ.

PP 4: Performance of previous year resistant entries

The study evaluated disease-resistant entries and variants from previous years to determine their resistance status in different locations. The findings revealed that several entries maintained their resistance reactions after multiple years of testing, while others showed a breakdown in resistance. For example, JS 20-98 demonstrated resistance against CR, YMV, and RAB after nine years of testing in Jabalpur under hot spot conditions. However, EC 241780 and EC 241778 showed a breakdown in resistance after 14 years of testing in Dharwad and exhibited MR reactions against rust, PSS, and anthracnose. Similarly, germplasm lines KDS 753 and DSb 30-2 lost their resistance in prolonged testing at Dharwad and became susceptible to rust disease. On the other hand, RVS 2002-4 maintained its HR reaction against MLS in the 6th year of testing at Sehore under hot spot conditions. At Ludhiana and Pantnagar, all entries-maintained R to MS reactions against major diseases after two years of testing. The results provide insights into the long-term resistance status of various disease-resistant varieties across multiple locations.

PP.5. Evaluation of germplasm lines for identification of multiple disease resistant sources

The study evaluated fifty germplasm lines across multiple centers to identify sources of multiple disease resistance(Table 4.6). The EC 280129 line stood out for its resistance against

FLS, Anth, BS, YMV, and CR at Palampur, Jabalpur, Indore andPantnagarcenters. Additionally, certain entries such as EC 390981 A, EC 389198, EC 389174, EC 350664, EC 343312, EC 333880, EC 325098, EC 308312, EC 309512, EC 309537, EC 289099, EC 20149showed multiple disease resistance to PB (Ct), BS, and FLS at Palampur, while EC 251682, EC 325098, EC 333875, and EC 457366 showed resistance to YMV, CR, and RAB at Jabalpur. At Pantnagar, the EC 343312 and EC 280129 entries exhibited strong multiple resistance to RAB, Anth, and BLB while also displaying resistance to YMV. The findings highlight potential sources of disease resistance in germplasm lines that may be useful in breeding programs.

PP 6/ENT 8 - Biological management of major diseases of soybean center

Biological management was carried out in several regions including Indore, Dharwad, Amravati, Jabalpur, Pantnagar, Palampur, Jorhat, and Sehore to effectively manage major soybean diseases (Table 4.7). The results showed that various types of microbial treatments were effective in reducing disease severity and improving yield. For instance, Seed and foliar application of Bacillus sp. EF 53 was found to be the most effective in reducing anthracnose disease severity in Indore. Similarly, seed and foliar application of *Panibacillusm acrens* were effective in managing Rust and pod blight in Dharwad and enhanced the yield, as well as reducing the incidence of RAB disease in Jabalpur. Furthermore, seed and foliar application of *Trichoderma viridae* was effective in managing charcoal rot in Jabalpur and collar rot in Jorhat, while seed and foliar application of Bacillus sp. EF 111 was effective for Anthracnose management in Palampur. Overall, these experiments demonstrated the potential of biological management as an effective strategy for managing soybean diseases in various regions (Table 4.7.1- 4.7.8).

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PP 7: Development of forewarning systems against major diseases of soybean.

The study evaluated the disease severity in different varieties of trap nursery and considered the importance of early warning systems for effective disease control in soybean (Table 4.8). Results showed that maximum temperature had a highly negative correlation with RAB severity at Pantnagar center, while the number of rainy days had a highly positive correlation with disease severity. Tmin, Tmax, RH, and Rainfall had a significant negative correlation, while No. of rainy days had a highly significant positive correlation with PDI across all varieties. For the highly susceptible Panjab 1 variety, the correlation coefficients of PDI with weather parameters T_{max}, T_{min}, RH, RF and No. of rainy days were -0.75, -0.88, -0.08, -0.54 and 0.24 respectively, whereas in case of the other varieties the correlation coefficient of PDI with T_{max} ranged from -0.87 to -0.93 and with T_{min}, RH, RF and No. of rainy days were - 0.69 to -0.75, -0.08 to -0.65, -0.16 to -0.58 and 0.11 – 0.22, respectively varied, with Tmax having the most negative correlation. At Sehore center, the number of rainy days was highly positively correlated with disease severity and negatively correlated with the maximum temperature. The study also conducted a multiple regression analysis to determine the contribution of independent weather parameters, such as maximum temperature (X_1), minimum temperature (X_2), relative humidity (X_3), rainfall (X_4), No. of rainy days (X_5), on disease incidence. The regression equations obtained for different varieties revealed that weather factors accounted for more than 85 to 90 % of the total variation in disease incidence, regardless of the variety. Regression analysis and conclusion was drawn based on the data analysis. The regression equation obtained for Punjab 1 was $Y = 108.265 + 0.182x_1 - 5.975x_2 - 0.663x_3 + 0.539x_4 + 0.044x_5$ with R^2 value of 0.85 (Table 4.8.1- 4.8.4) whereas, for PK 262, it was $Y = 146.164 + 0.536x_1 - 3.456x_2 - 0.952x_3 + 0.169x_4 + 0.053x_5$ ($R^2 = 0.86$). So, it was concluded that the irrespective of the varieties, the weather factors *viz.,* T_{max}, T_{min}, RH, RF and No. of rainy days account for more than 85 % of the total variation in disease incidence. At Palampur center, the number of maximum temperature was positively correlated with disease severity and negatively correlated with the minimum temperature, Relative humidity and rainfall. The regression equation obtained for Punjab 1 Y= $= -465.982 + 19.595x_1 - 26.577x_2 + 4.192x_3 + 1.577x_4 - 0.004x_5$ account for more than 98 % of the total variation in charcoal rot disease incidence and same for Rhizoctonia aerial blight JS 335 and Bragg Y= $y= -315.737 + 10.395x_1 - 13.606x_2 + 2.825x_3 + 0.958x_4 + 0.011x_5$, $Y=-332.418 + 12.056x_1 - 14.962x_2 + 2.693x_3 + 1.092x_4 – 0.00x_5$ respectively.

PP 8: Estimation of avoidable losses soybean diseases (II year)

At various AICRPS center avoidable yield loss due to various diseases such as CR, PB (Ct), RAB, Rust, FLS were recorded (Table 4.9.1- 4.9.11). The table shows that yield loss can be caused by various diseases such as CR, PB (Ct), RAB, Rust, and FLS at different AICRPS centers (Table 4.9.1- 4.9.11). The disease pressure was highest at the Jabalpur center, where the variety JS 2029 suffered a yield loss of 28.20%. However, resistance variety showed a lower yield loss of 13.88%. At Amravati center, chemical application of fungicide could not prevent all yield loss but managed to avoid 37.44% and 38.85% yield loss in susceptible and resistance variety, respectively. Full protection of fungicides was able to prevent 25.28% and 26.43% of yield loss due to FLS and anthracnose diseases at Palampur center, respectively. At Medziphema center, full protection of fungicides could prevent 28.24% and 32.07% of yield loss in susceptible and resistant variety, respectively due to RAB and anthracnose diseases. Indore center experienced low disease pressure, and the use of fungicides at Pantnagar center prevented 33.73% and 52.82% of yield loss in susceptible and resistant variety, respectively due to RAB diseases.

PP-9. Evaluation of breeding material of F6 generation hot spot for disease(s) for resistant donor(s)

To ensure the effectiveness of resistance variety, a thorough screening process was conducted on breeding material of F6 generation at Pantnagar centers. The results, as shown in Table 4.10.1, indicate that the breeding materials derived from AGS 25 x PS 1042, AGS 25 x PS 1592, CM 60 x PS 1692, Glycine soja x PS 1347, PK 515 x JS 97-52, PS 1592 x PS 1347, TGX 1681-3f x PK 327 exhibited high resistance against RAB at Pantnagar

Table 4.1: PP1 Survey for soybean diseases (diseases scenario at different centers)

S. No.	Location / Disease	Northern Hill Zone		Northern Plain Zone				North Eastern Hill Zone		Central Zone					Eastern Zone	Southern Zone		No. of Centres (15)
		Palampur	Almora	Ludhiana	Pantnagar	Pilibhit (UP)	Delhi	Jorhat	Medziphema	Sehore	Kota	Indore	Jabalpur	Amravati	Raipur	K- Digraj	Dharwad	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	18
1	CR			+									+	+				3
2	Coll. R								+				+	+				3
3	RAB				+	+		+	+		+	+	+	+				8
4	Rust								+							+	+	3
5	BS									+								1
6	TLS									+							+	2
7	CLS/PSS							+					+					2
8	FLS	+	+										+				+	4
9	ALS													+			+	2
10	Anth	+			+	+		+	+			+	+	+	+	+	+	11
11	BP	+			+							+	+	+				5
12	BLB				+	+												2
13	YMV	+		+	+		+	+			+	+	+	+		+		10
14	SMV			+	+	+						+	+					5
15	FR /FW				+													1
16	BND																	0
17	SR																	0
18	CMV																	0
19	MLS									+								1
20	IBB														+			1
21	SDS					+												
Centre-wise no. of diseases reported		4	1	3	7	5	1	4	4	3	0	5	9	7	2	3	5	

Fig. 1: GIS-based survey of bacterial blight of soybean at Pantnagar during *Kharif* 2019-21

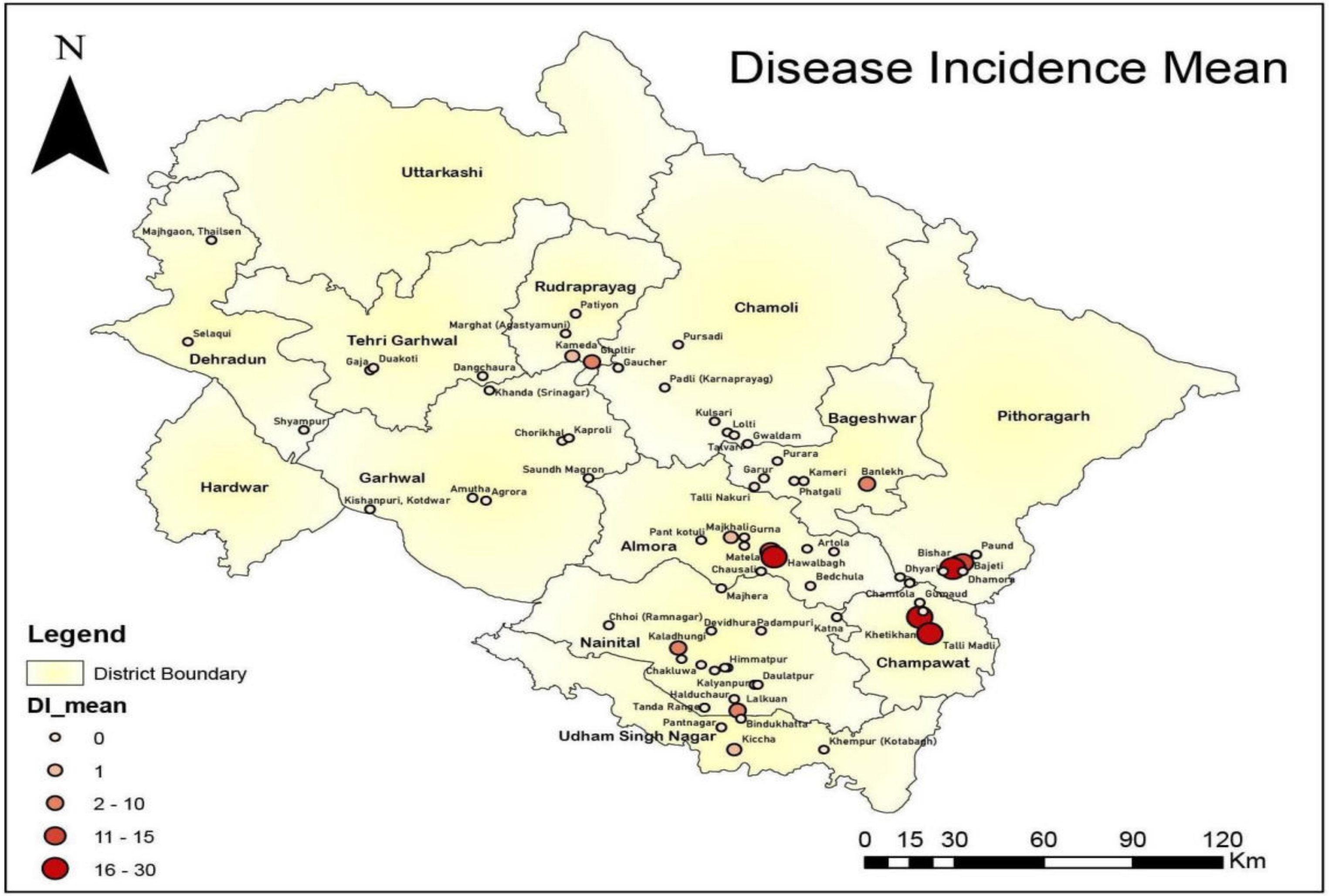


Fig 2: GIS-based survey of bacterial blight of soybean in Pantnagar during *Kharif* 2019-21

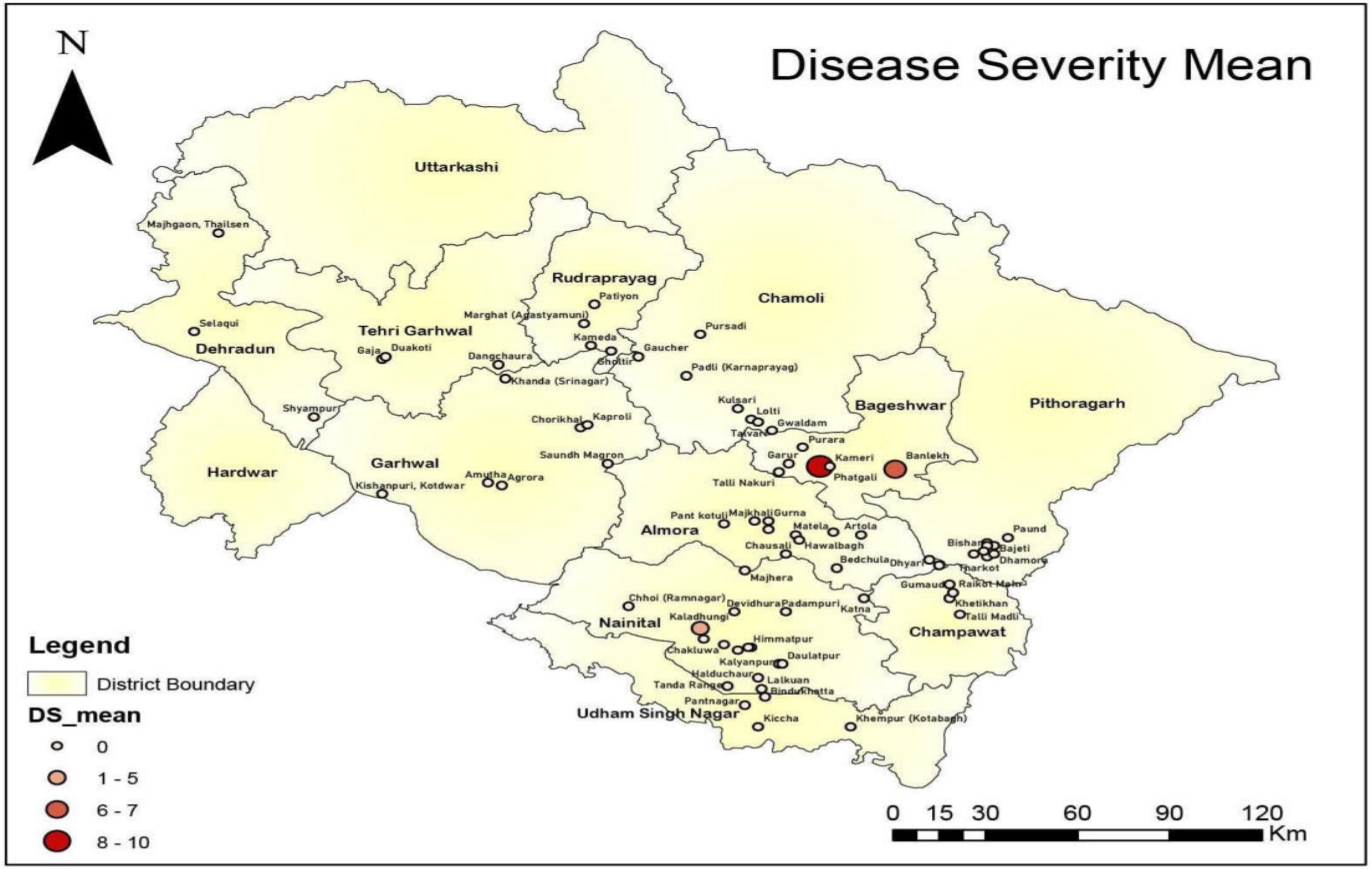
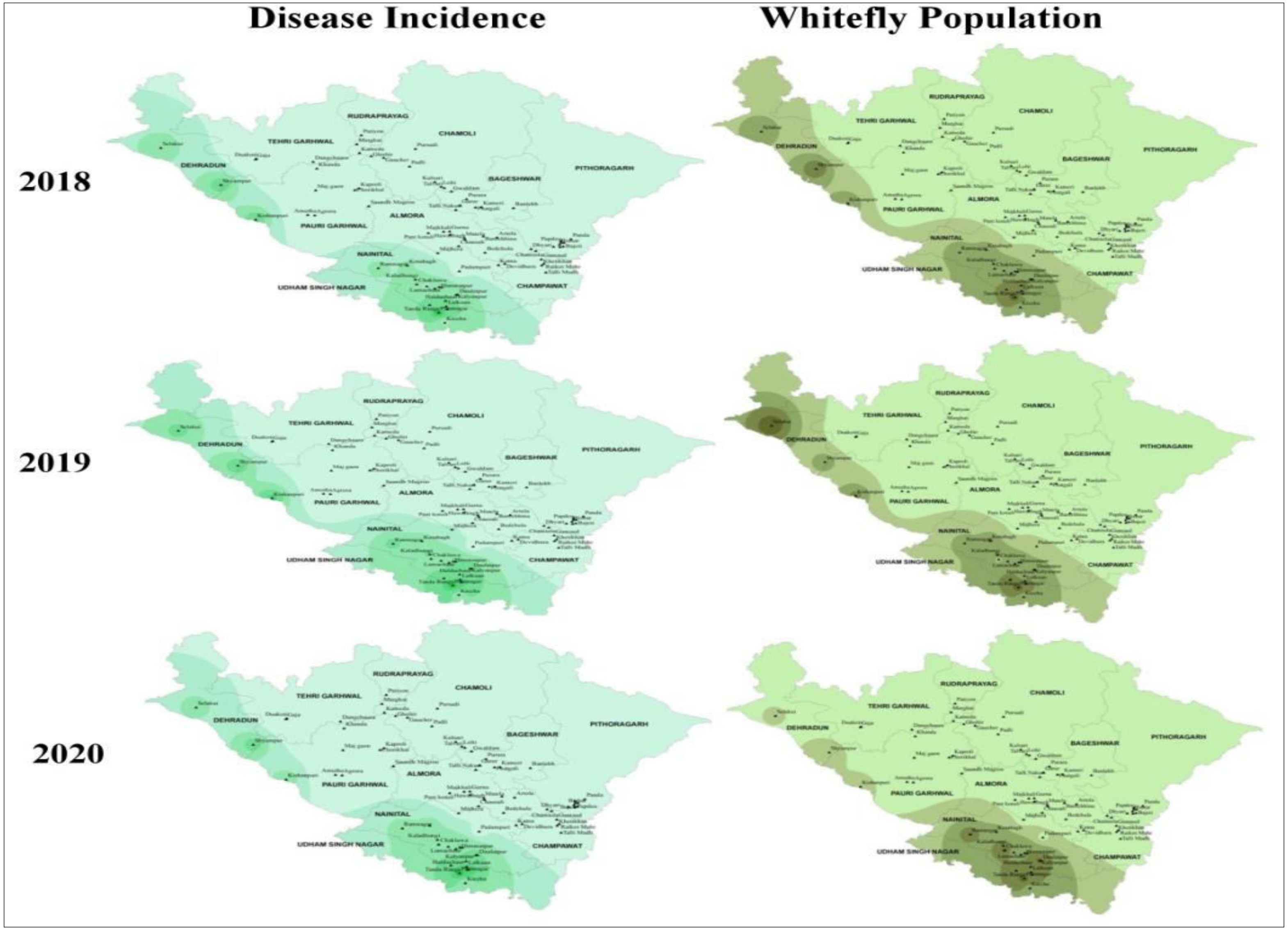


Fig 3: GIS-based survey of YMV of soybean in Pantnagar during *Kharif* 2019-21



PP1: Occurrence of soybean diseases in major soybean areas in Himachal Pradesh

District/village	GPS location		**Variety grown**	**Percent disease index**			
	Latitude	Longitude		Frogeye leaf spot (*Cercosporasojina*)	Pod blight (*Colletotrichumtruncatum*)	YMV	Bacterial pustule (*Xanthomonascampestris*pv. *glycines*)
Kangra							
Paprola	32°05' 28"N	76°63'41" E	Hara Soya	55.55	11.11	0.0	0.0
			Him Soya	77.77	33.33	0.0	0.0
			Palam Soya	33.33	33.33	0.0	11.11
Matour	32°06' 00" N	76° 16' 12" E	Hara Soya	33.33	33.33	0.0	0.0
			Him Soya	33.33	11.11	11.11	0.0
Bagli	32°10' 45" N	76° 22' 41" E	Him Soya	33.33	33.33	0.00	
Jhehol	32°10' 53" N	76° 22' 27" E	Him Soya	77.77	55.55	0.00	0.0
Nagri	32°08' 21" N	76° 26' 56" E	Hara Soya	55.55	33.33	0.0	
Kangra	32°06' 03" N	76° 16' 11" E	Hara Soya	33.33	11.11	33.33	0.0
			Shivalik	77.77	33.33	00	0.0
Palampur	32°05' 53" N	76° 32' 07" E	Hara Soya	33.33	33.33	0.0	11.11
			Bragg	55.55	55.55	0.0	0.0
			Shivalik	77.77	11.11	0.0	0.0
			Him Soya	77.77	33.33	0.0	0.0
Mandi							
Siyanji	31°32' 40" N	76° 57' 00" E	Him Soya	55.55	11.11	0.0	0.0
Sunder Nagar	31°32' 19" N	76° 55' 67" E	Hara Soya	33.33	33.33	0.0	0.0
Harabag	31°29' 22" N	76° 53' 31" E	Hara Soya	33.33	11.11	0.0	0.0

Table 4.2.1:PP-2 Weekly Per cent incidence of charcoal rot (%) in trap nursery during Kharif 2022 at Jabalpur centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.00	0.00
36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	6.50	0.00	0.00	0.00
37	Sept 10-16	0.00	3.00	0.00	6.50	0.00	0.00	15.00	0.00	13.50	8.00
38	Sept 17-23	8.50	12.50	8.00	23.00	3.00	4.00	45.50	13.00	33.00	28.50
39	Sept 24-30	17.50	28.50	13.00	41.50	14.00	14.00	56.50	25.50	70.50	63.50
40	Oct 1-7	20.50	35.00	16.50	61.00	17.00	16.00	-	33.00	-	72.50

Table 4.2.2:PP-2 Weekly Per cent disease index (PDI) of Yellow mosaic disease in trap nursery during Kharif 2022 at Jabalpur centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.31	0.00	0.99	2.41	1.17	0.43	1.91	0.00	2.59	0.00
32	Aug 6-12	1.85	1.36	5.49	7.04	7.35	9.63	9.14	2.47	10.25	2.96
33	Aug 13-19	12.22	7.47	17.10	22.22	22.41	19.57	24.50	7.16	23.15	8.02
34	Aug 20-26	21.42	22.04	25.80	37.90	33.64	31.66	29.94	13.70	45.37	15.99
35	Aug 27 –Sept 2	24.13	32.96	29.44	48.27	40.86	36.91	30.55	15.74	55.92	18.02
36	Sept 3-9	25.43	41.66	31.54	51.29	42.96	39.01	30.74	16.79	56.66	18.33
37	Sept 10-16	26.23	44.13	31.85	51.54	43.89	39.94	-	17.10	56.79	18.64
38	Sept 17-23	26.48	44.57	32.34	51.79	44.01	40.24	-	17.22	-	18.70

Table 4.2.3:PP-2 Weekly Per cent disease index (PDI) of RAB in trap nursery during Kharif 2022 at Jabalpur centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.31	0.00	0.00	0.49	0.80	0.00	0.25
35	Aug 27 –Sept 2	0.99	0.19	0.80	1.98	0.74	0.12	2.53	1.98	0.93	2.22
36	Sept 3-9	3.27	2.59	5.56	5.31	2.78	1.42	5.99	4.88	4.32	4.81
37	Sept 10-16	11.54	9.32	9.75	15.62	9.94	5.62	12.84	15.99	7.59	7.96
38	Sept 17-23	19.13	15.80	19.75	27.22	19.32	14.57	14.01	29.13	10.99	16.91
39	Sept 24-30	22.34	16.30	21.97	29.26	20.25	15.25	-	31.36	-	18.39

Table 4.2.4:PP-2 Weekly Per cent disease index (PDI) of Anthracnose/Pb in trap nursery during Kharif 2022 at Jabalpur centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	1.11	0.00	0.00	0.89	0.00	3.33	0.00
34	Aug 20-26	0.00	0.00	0.89	4.00	0.00	0.00	8.00	0.00	15.11	0.00
35	Aug 27 –Sept 2	0.00	0.00	4.00	8.44	0.00	0.00	29.11	0.00	22.44	0.00
36	Sept 3-9	1.11	0.00	6.89	13.11	0.00	0.00	40.67	3.56	40.00	2.44
37	Sept 10-16	3.78	0.00	11.11	18.89	0.00	3.78	51.33	7.11	44.22	5.11
38	Sept 17-23	6.44	3.33	12.44	24.89	1.78	6.44	54.00	8.67	46.22	6.67

39	Sept 24-30	8.44	4.67	13.11	27.11	4.89	8.44	-	9.33	-	6.89
40	Oct 1-7	9.56	4.67	13.78	27.78	5.56	8.67	-	9.78	-	7.11

Table 4.2.5. Weather parameters during cropping season of Kharif, 2022 at Jabalpur centre

Standard Weeks	Months & dates	Temperature		Sun shine Hrs.	Rain fall (mm)	Relative humidity %		Wind velocity	Vapour pressure		Evaporation (mm)	No. of rainy days
		Max.	Min.			Mor.	Eve.		Mor.	Eve.		
22	May 28-3 June	39.9	24.1	7.1	13.6	55.1	27.1	6.4	16.4	14.5	8.0	2
23	June 4-10	42.8	29.1	9.2	0.0	38.4	17.4	5.8	13.0	10.6	9.4	0
24	June 11-17	38.3	27.7	5.5	20.8	63.6	44.3	7.1	18.9	18.4	7.2	1
25	June 18-24	33.3	23.7	5.1	172.2	84.3	56.6	4.8	21.2	21.2	4.4	4
26	June 25-July 1	34.4	25.6	3.5	68.4	84.9	59.9	4.2	22.8	22.4	4.7	2
27	July 2-8	31.3	25.0	2.8	164.2	90.1	77.3	3.1	23.4	24.1	3.8	6
28	July 9-15	33.2	24.7	7.5	57.6	89.6	66.9	5.3	23.1	23.7	4.2	3
29	July 16-22	30.5	24.6	2.9	53.8	92.4	77.9	5.4	23.2	23.8	2.7	4
30	July 23-29	30.5	24.4	1.9	101.0	92.9	78.3	3.5	23.0	23.7	2.9	5
31	July 30- Aug 5	31.8	25.2	4.1	16.0	87.9	66.7	3.5	23.1	22.5	3.5	2
32	Aug 6-12	31.6	25.0	4.4	53.8	88.3	72.4	5.5	23.0	23.6	3.0	4
33	Aug 13-19	29.4	24.0	3.5	135.7	89.0	75.0	6.1	22.2	21.9	2.8	4
34	Aug 20-26	29.0	23.1	2.7	208.1	91.9	74.4	6.0	21.4	21.2	2.9	3
35	Aug 27–Sept 2	31.3	24.1	3.9	97.5	90.0	67.9	3.4	22.8	22.9	3.2	3
36	Sept 3-9	31.9	24.3	4.7	47.0	87.4	71.6	3.0	22.8	23.1	3.1	2
37	Sept 10-16	30.5	24.2	4.3	118.0	90.6	79.4	5.4	22.6	22.9	3.5	4
38	Sept 17-23	29.8	23.6	3.2	39.3	92.4	79.0	3.7	22.1	23.1	2.5	7
39	**Sept 24-30**	30.4	22.3	5.9	0.0	91.0	64.7	3.4	20.7	21.1	2.8	0
40	Oct 1-7	31.5	22.6	6.2	27.4	87.7	67.4	2.3	20.6	21.3	3.1	1
41	Oct 8-14	30.9	22.4	7.0	62.3	89.9	64.1	3.4	20.4	20.1	3.7	2

42	Oct 15-21	29.4	16.0	9.2	0.0	83.9	48.6	2.4	14.2	14.9	3.4	0
43	Oct 22-28	30.0	13.5	9.2	0.0	82.9	39.9	1.8	13.3	12.5	2.7	0
Total rainfall					1456.7	Total rainy days						59

Table 4.2.6: PP2 Weekly Per cent disease index (PDI) of anthracnose (%) in trap nursery during Kharif 2022 at Indore centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.00
36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	6.50	0.00	0.00
37	Sept 10-16	0.00	3.00	0.00	6.50	0.00	0.00	15.00	0.00	13.50
38	Sept 17-23	20.21	10.26	10.30	18.7	12.73	14.72	18.73	12.94	11.24
39	Sept 24-30	28.44	32.29	11.50	18.49	44.76	12.44	27.40	26.00	35.66
40	Oct 1-7	27.94	22.32	1.73	34.11	35.15	12.83	43.87	21.60	33.17
41	Oct 8-16	46.54	39.17	17.71	60.94	78.78	14.73	63.95	39.17	48.61

Table 4.2.7: PP2 Weekly Per cent disease index (PDI) of RAB (%) in trap nursery during Kharif 2022 at Indore centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.00
36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	6.50	0.00	0.00
37	Sept 10-16	0.00	3.00	0.00	6.50	0.00	0.00	15.00	0.00	13.50
38	Sept 17-23	50.33	41.00	27.32	35.22	49.22	37.21	47.28	28.66	39.61
39	Sept 24-30	43.17	48.60	29.23	38.50	56.93	14.45	58.50	33.50	49.55
40	Oct 1-7	48.94	50.02	27.11	45.59	64.73	23.34	55.66	37.55	45.15
41	Oct 8-16	42.06	58.01	32.67	56.83	69.29	17.19	54.84	34.89	56.64

Table 4.2.8: PP2 Weekly Per cent incidence of charcoal rot (%) in trap nursery during Kharif 2022 at Amravati centre

SMW	Month and date	JS 9560	JS-335	Shivalik	JS-9305	Punjab 1	PK 472	PK-262	Monetta	NRC-7
27	July 02-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	Sept 10-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	Sept 17-23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	**Sept 24-30**	0.00	**3.60**	**4.70**	0.00	0.00	0.00	**3.88**	0.00	0.00

Table 4.2.9: PP2 Weekly Per cent disease index (PDI) of Yellow mosaic disease in trap nursery during Kharif 2022 at Amravati centre

SMW	Month and date	JS 9560	JS-335	Shivalik	JS-9305	Punjab 1	PK 472	PK-262	Monetta	NRC-7
27	July 2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	**4.50**	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	2.44	0.00	**2.10**	0.00	**5.20**	0.00	0.00	0.00

36	Sept 3-9	0.00	4.30	0.00	**2.11**	0.00	0.00	0.00	0.00	0.00
37	Sept 10-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4.2.10: PP2 Weekly Per cent disease index (PDI) of Bacterial pustules in trap nursery during Kharif 2022 at Amravati centre

SMW	Month and date	JS 9560	JS-335	Shivalik	JS-9305	Punjab 1	PK 472	PK-262	Monetta	NRC-7
27	July 2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.00**	0.00
34	Aug 20-26	0.00	**1.20**	0.00	0.00	0.00	0.00	0.00	**1.80**	0.00
35	Aug 27 –Sept 2	0.00	**3.24**	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	Sept 10-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	Sept 17-23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4.2.11: PP2 Weekly Per cent disease index (PDI) of Anthracnose/Pb in trap nursery during Kharif 2022 at Amravati centre

SMW	Month and date	JS 9560	JS-335	Shivalik	JS-9305	Punjab 1	PK 472	PK-262	Monetta	NRC-7
27	July 2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	Sept 10-16	0.00	0.00	0.00	**3.22**	0.00	0.00	0.00	**4.40**	0.00
38	Sept 17-23	0.00	**3.80**	0.00	**4.00**	0.00	0.00	0.00	**6.30**	0.00
39	Sept 24-30	0.00	**5.66**	0.00	**5.33**	0.00	0.00	0.00	**7.50**	0.00

Table 4.2.12: PP2 Weekly Per cent disease index (PDI) of ALS in trap nursery during Kharif 2022 at Amravati centre

SMW	Month and date	JS 9560	JS-335	Shivalik	JS-9305	Punjab 1	PK 472	PK-262	Monetta	NRC-7
27	July 2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	Sept 10-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2.55**	0.00
38	Sept 17-23	0.00	**1.30**	0.00	0.00	0.00	0.00	0.00	**4.50**	0.00
39	Sept 24-30	0.00	**2.20**	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4.2.12. Weather parameters during cropping season of Kharif, 2022 at Amravati centre

MW	Weekly Date	Temperature (^0C)		Relative Humidity (%)		Rainfall	No. of Rainy Days
		Tmin.	Tmax.	RHI	RHII	(mm)	
18	30-4-2022 to 6-5-2022	27.4	44.9	30.9	25.0	0.0	0
19	7-5-2022 to 13-5-2022	28.3	44.4	30.7	19.4	0	0
20	14-5-2022 to 20-5-2022	29.4	45.3	33.6	20.9	0	0
21	21-05-2022 to 27-5-2022	27.6	42.7	45.0	34.6	8.6	1
22	28-5-2022 to 3-6-2022	30.2	43.5	41.4	30.6	1.8	1
23	4-6-2022 to 10-6-2022	29.7	44.9	37.7	25.3	0.4	0
24	11-6-2022 to 17-6-2022	26.3	39.5	68.3	52.9	21	1
25	18-6-2022 to 24-6-2022	24.3	35.8	73.4	70.1	99.6	3
26	25-6-2022 to 1-7-2022	25.4	35.0	74.6	63.0	6.6	1
27	2-7-2022 to 8-7-2022	24.3	32.0	90.7	78.9	75	4
28	9-7-2022 to 15-7-2022	22.9	29.7	93.1	84.6	102	6
29	16-7-2022 to 22-7-2022	23.8	29.9	89.0	77.9	140.6	3
30	23-7-2022 to 29-7-2022	23.2	30.6	87.1	78.4	39.8	3
31	30-7-2022 to 5-8-2022	24.7	34.7	78.0	67.3	0.2	0
32	6-8-2022 to 12-8-2022	23.5	31.3	88.1	84.4	169.2	6
33	13-8-2022 to 19-8-2022	23.2	30.9	84.1	75.4	37.2	4
34	20-8-2022 to 26-8-2022	23.4	33.1	79.7	68.9	1.4	0
35	27-8-2022 to 2-9-2022	23.7	33.9	82.4	67.6	34.2	4
36	3-9-2022 to 9-9-2022	23.7	33.2	86.6	84.3	70.6	6
37	10-9-2022 to 16-9-2022	23.1	31.4	89.9	86.7	157.6	6
38	17-9-2022 to 23-9-2022	22.7	31.4	88.6	78.3	38.4	4
39	24-9-2022 to 30-9-2022	22.6	32.9	81.6	71.7	7.6	1
40	1-10-2022 to 7-10-2022	22.7	34.0	77.0	66.4	32.8	2
41	8-10-2022 to 14-10-2022	22.8	31.6	86.3	78.3	44.2	6
42	15-10-2022 to 21-10-2022	21.0	32.6	74.4	71.3	2.4	0
43	22-10-2022 to 28-10-2022	15.6	33.4	69.3	48.4	0	0
44	29-10-2022 to 4-11-2022	15.2	33.1	70.7	49.7	0	0
	Total (up to 4/11/2022)	**24.1**	**35.4**	**71.6**	**61.5**	**1091.2**	**62**

Table 4.2.13: PP2 Weekly Per cent incidence of Myrothecium leaf spot (%) in trap nursery during Kharif 2022at Sehore centre

SMW	Month &date	JS 9560	JS 335	Shivalik*	JS 93-05	Punjab 1	PK 472	PK 262	Monetta	NRC7
27	July 2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	Sept 3-9	0.00	0.67	0.00	0.22	0.72	0.61	33.39	12.11	7.61
37	Sept 10-16	0.00	17.77	0.00	27.78	17.16	52.83	35	12.67	42.22
38	Sept 17-23	0.00	72.33	0.00	32	49.16	74.44	74.44	33.89	55.55
39	Sept 24-30	0.00	88.88	0.00	72.77	95.55	99.99	99.99	77.77	0.00
40	Oct 1-6	0.00	96.66	0.00	77.77	97.77	99.99	0.00	0.00	14.17

Table 4.2.14: Weather parameters during cropping season of Kharif, 2022 atSehore centre

Standard Week no.	Week	Temperature °C		Rainfall (mm)	No of rainy days
		Max	Min		
23	4-10 **June**	42.72	29.02	0	0
24	11-17	38.52	29.27	16.2	1
25	18-24	34.77	24.05	45.8	3
26	25-1	31.71	26.71	12.4	3
27	2-8 **July**	32.20	23.78	95.1	6
28	9-15	30.21	23.14	381.6	7
29	16-22	29.24	22.48	156.5	5
30	23-29	27.60	23.65	135.3	6
31	30-5 **Aug**	31.82	24.00	63.5	4
32	6-12	31.70	23.98	114.4	7
33	13-19	27.48	22.78	193.2	5
34	20-26	28.45	22.30	399.3	5
35	27-2	30.64	22.61	9.0	2
36	3-9 **Sep**	33.10	24.02	9.4	2
37	10-16	32.14	24.27	109.2	4
38	17-23	32.85	21.87	51.7	4
39	24-30	32.81	21.75	14.3	2
40	1-7 **Oct**	32.20	21.05	90.7	2
41	8-14	31.50	20.84	43.4	2
42	15-21 Oct.	30.71	18.64	0	0
43	22-28 Oct.	31.42	14.17	0	0
				1941.0	**70**

Table 4.2.15: PP2 Weekly Per cent disease index of frogeye leaf spot in trap nursery during Kharif 2022 at Palampurcentre

SMW	Month and date	JS 95-60	JS 335	Shivalik	JS 93-05	Punjab 1	PK 472	PK 262	Monetta	NRC 7
27	July 2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	5.55	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	1.00	0.5	11.11	0.55	5.55	0.00	0.00	4.81	0.00
35	Aug 27 –Sept 2	5.55	4.81	16.66	5.55	13.33	0.00	1.11	11.11	0.00
36	Sept 3-9	16.66	24.44	32.59	11.11	24.44	5.55	4.44	26.66	3.33
37	Sept 10-16	24.44	30.00	42.22	16.66	33.33	11.11	5.55	36.66	8.88
38	Sept 17-23	26.66	38.66	68.89	24.44	55.55	24.44	5.55	48.88	10.33
39	Sept 24-30	33.33	55.55	77.77	26.66	66.66	33.33	11.11	55.55	11.11
40	Oct 1-7	33.33	55.55	77.77	33.33	66.66	33.33	11.11	55.55	11.11

Table 4.2.16: PP2 Weekly Per cent disease index (PDI) of anthracnose/pod blight of soybean in trap nursery during Kharif 2022 at Palampur centre

SMW	Month and date	JS 95-60	JS 335	Shivalik	JS 93-05	Punjab 1	PK 472	PK 262	Monetta	NRC 7
27	July 2-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	July 9-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	July 16-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	1.55	0.50	0.50	3.33	1.66	0.00	0.00	0.00	3.33
34	Aug 20-26	5.55	5.55	3.33	6.33	3.33	0.00	0.50	0.00	5.55
35	Aug 27 –Sept 2	11.11	11.11	11.11	8.66	5.55	0.00	3.66	5.55	8.66
36	Sept 3-9	18.66	24.44	16.66	11.11	6.66	5.55	6.66	6.66	11.66
37	Sept 10-16	26.66	34.21	26.64	24.66	8.66	8.33	8.66	8.66	16.66
38	Sept 17-23	33.33	55.55	28.88	26.33	16.66	9.66	8.66	11.11	24.66
39	Sept 24-30	55.55	64.33	30.00	55.55	26.64	11.11	9.33	11.11	28.88
40	Oct 1-7	72.22	66.66	33.33	66.66	33.33	33.33	11.11	33.33	55.55

Table 4.2.17: Weather parameters during cropping season of Kharif, 2022 at Palampur centre

MSW	Date	Temperature		Rainfall (mm)	No. of rainy days	Relative Humidity (%)		Wind speed (kmph)	Evaporation (mm)	Sunshine (hours)
		Max (°C)	Min (°C)			Max	Min			
22	28th May- 3rd June 2022	30.81	19.57	25.40	1	45.29	36.71	6.6.0	6.80	7.93
23	4th June- 10th June 2022	34.15	21.84	0.00	0	36.00	25.00	6.66	9.62	9.29
24	11th June- 17th June 2022	29.64	19.48	2.37	3	87.00	49.14	7.16	7.60	8.36
25	18th June- 24th June 2022	29.26	16.00	4.00	3	69.00	59.85	5.50	3.71	3.79
26	25th June- 1st July 2022	28.40	20.00	17.26	4	82.71	71.57	5.11	4.87	3.57
27	2nd July- 8th July 2022	28.37	19.64	15.60	5	93.00	71.14	4.82	2.34	3.43
28	9th July- 15th July 2022	28.84	19.80	22.49	6	88.43	89.14	4.91	2.51	3.50
29	16th July- 22nd July 2022	28.17	20.40	3.14	4	91.42	82.71	4.40	2.87	2.30
30	23rd July- 29th July 2022	26.09	19.70	32.29	7	94.71	87.57	4.51	2.20	1.64
31	30th July- 5th August 2022	26.85	19.03	31.29	5	93.29	86.71	3.90	2.03	3.64
32	6th August- 12th August 2022	27.58	19.81	23.00	6	90.14	80.17	4.57	2.24	2.93
33	13th August- 19th August 2022	27.27	19.43	34.77	5	86.57	86.86	4.49	3.91	3.29
34	20th August- 26th August 2022	26.09	18.64	33.94	6	89.71	83.86	4.50	2.19	4.43
35	27th August- 2nd September 2022	27.64	19.34	7.40	5	87.00	85.00	3.69	2.49	6.00
36	3rd September- 9th September 2022	26.67	17.79	10.51	4	91.00	82.71	4.16	2.60	5.14
37	10th September- 16th September 2022	26.70	17.43	10.63	4	88.71	81.57	4.16	2.90	4.21
38	17th September- 23rd September 2022	26.29	17.10	1.74	5	88.71	76.86	4.11	2.90	5.29
39	24th September- 30thSeptember 2022	25.07	15.33	11.86	2	86.43	79.86	4.19	2.93	4.93
40	1st October- 7th October 2022	27.00	15.31	8.80	1	82.57	71.71	4.50	3.58	8.21
41	8th October- 14th October 2022	24.21	13.43	1.80	2	83.00	68.57	4.44	2.84	5.21
42	15th October- 21st October 2022	24.74	11.81	5.20	1	76.86	55.14	5.99	3.41	8.50
43	22nd October- 28th October 2022	24.93	10.36	12.00	1	64.14	44.26	5.71	3.00	9.53
44	29th October- 4th November 2022	23.70	11.0	0.00	0	71.86	51.14	5.21	3.41	8.78

Table 4.2.18:PP2 Weekly Per cent Disease Index (PDI)Rust in trap nursery during Kharif 2022 at Dharwadcentre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	7.77	5.55	3.56	4.12	3.33	3.55	5.55	6.51	5.55	3.80
34	Aug 20-26	11.11	11.11	11.11	11.11	11.11	9.21	11.11	9.65	11.11	10.16
35	Aug 27 –Sept 2	33.65	26.58	28.48	24.56	27.82	25.65	33.33	33.54	33.33	20.12
36	Sept 3-9	44.56	40.12	38.25	31.25	30.56	32.58	34.65	36.65	33.33	26.56
37	Sept 10-16	55.55	50.23	44.65	38.25	34.56	37.56	44.44	40.21	55.55	42.21
38	Sept 17-23	52.21	48.65	50.21	48.23	40.56	42.32	44.44	45.32	66.66	53.65
39	Sept 24-30	66.66	50.25	52.17	65.66	58.45	55.55	56.66	58.65	77.77	60.25
40	1 - 7 Oct	77.77	70.32	77.77	77.77	63.18	70.25	66.89	67.69	77.77	77.77
41	8 - 14 Oct	92.35	88.95	86.66	82.21	86.63	87.77	89.99	87.87	92.21	86.60

Table 4.2.19: PP2 Weekly Per cent Disease Index(PDI)Pod blight in trap nursery during Kharif 2022 at Dharwad centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
30	July 23-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	July 30- Aug 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Aug 6-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Aug 13-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Aug 20-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	Sept 3-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	Sept 10-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	Sept 17-23	2.55	1.65	3.45	1.68	2.55	1.21	7.55	6.56	11.11	2.12
39	Sept 24-30	5.35	4.36	8.25	4.55	6.62	7.55	11.25	18.76	17.25	16.23
40	1 - 7 Oct	17.77	18.11	20.31	12.36	22.11	19.25	33.33	27.88	25.67	28.65
41	8 - 14 Oct	45.55	44.22	37.52	28.72	38.21	35.55	48.25	44.32	47.77	40.21

Table 4.2.20: Weather parameters during cropping season of Kharif, 2022 at Dharwad

Standard Weeks	Months & dates	Temperature		Rain fall (mm)	Relative humidity %		No. of rainy days
		Max.	Min.		Max.	Min	
30	July 23-29	27.8	20.4	29.6	91.7	74.0	1
31	July 30- Aug 5	29.7	20.9	12.2	85.3	77.4	3
32	Aug 6-12	25.3	20.2	53.8	92.1	86.3	6
33	Aug 13-19	26.8	19.9	9.2	92.9	86.0	2
34	Aug 20-26	27.7	20.2	3.2	90.9	78.3	0
35	Aug 27–Sept 2	29.6	20.4	127.2	91.1	74.0	5
36	Sept 3-9	29.3	21.0	48.8	90.1	77.4	3
37	Sept 10-16	26.6	20.5	48.2	95.0	89.1	5
38	Sept 17-23	28.3	19.0	0.0	88.1	67.4	0
39	Sept 24-30	30.0	19.3	6.2	85.1	66.1	1
40	Oct 1-7	29.0	19.6	69.4	91.3	76.0	3
41	Oct 8-14	28.1	20.5	72.2	93.4	81.9	2
Total rainfall				**480.0**	Total rainy days		31

Table 4.2.21:Disease index of RAB 2022 (Standard meteorological week 29-43)at Pantnagar center

RAB PDI (%) at Week after sowing												
SMW*	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**
JS-95-60	0	0	0	1.4	4	6.45	12	21	28.5	32	37.15	40.58
JS 335	0	0	0	3	6.5	11	21.5	34.25	41.5	46.12	51.25	54.62
Shivalik	0	0	0	2.25	5.75	11.75	18.5	24.5	27.5	31.75	34.01	36.15
JS 93-05	0	0	0	2.75	7.5	12.75	20.5	26.33	29.6	33	36	38.9
Punjab 1	0	0	3.57	9.54	15.45	21.33	29.5	38	45.5	51.5	55	58.18
PK 472	0	0	1.15	5.5	9.5	14.25	20	28	33	37	40	42.78
PK 262	0	0	0	1.12	4.35	8.5	15.5	21	25.75	28.5	31.5	32
Monetta	0	0	1.5	3.4	6.5	11.5	19	26.59	32.75	36.85	39	40.68
NRC 7	0	0	0	1.65	4.25	8.35	16.33	23.45	28.25	32	34	35.2

Table 4.2.22: Weather parameters during cropping season of Kharif, 2022 at Pantnagar

Month	Date	Metro week No. (2022)	Temperature (^{O}C)		Relative Humidity (%)		Rainfall (mm)	No. of rainy days	Sun Shine Hrs.	Wind velocity (km/hr)	Evap. (mm)
			Max	Min.	0712 am	1412 pm					
Aug.	06-12	32	32.8	26.3	81	66	16.8	2	6.1	1.6	4.2
Aug.	13-19	33	34.1	26.3	84	67	3.0	1	8.6	2.9	5.0
Aug.	20-26	34	33.9	25.9	88	64	57.8	2	8.5	2.8	5.2
Aug.-Sept	27-02	35	33.4	25.4	94	67	74.5	2	5.6	2.4	5.4
Sep	03-09	36	33.0	25.1	88	65	2.8	1	7.1	1.4	3.9
Sep	10-16	37	31.5	24.5	88	70	39.1	4	6.6	5.3	4.1
Sep	17-23	38	30.5	25.0	89	76	197.4	2	3.1	1.6	3.1
Sep-Oct	24-30	39	31.1	22.3	87	67	134.6	3	5.9	4.7	3.8
Oct	01-07	40	32.4	23.0	88	62	60.6	1	7.8	2.8	3.9
Oct	08-14	41	26.3	19.5	90	69	233.7	5	3.9	3.8	4.5
Oct	15-21	42	30.7	18.0	85	50	0.0	0.0	8.2	0.9	3.3
Oct	22-28	43	30.4	14.3	88	43	0.0	0.0	9.5	0.4	3.8
						Total	**820.30**	**23**			

Table 4.2.23: Trap nursery trial for disease monitoring (infection index)

S. NO.	Varieties	Northern Hill Zone						Northern Plain Zone						
		Almora	Palampur DOS: 23/06/2022					Pantnagar DOS: 05/07/2022						
		FLS	FLS	PB (ct)	BS	BP	PM	BP	BLB	BB	PB	RAB	SYMV	SMV
1	JS 95-60	1	33.33	72.22	55.55	0.0	-	0.68	5.26	0.00	7.54	40.58	27.65	0.00
2	JS 335	2	55.55	66.66	33.33	0.0	-	0.00	7.75	0.00	4.98	54.62	32.58	0.00
3	Shivalik	4	77.77	33.33	33.00	0.0	-	0.00	3.78	5.40	0.00	36.15	12.40	0.00
4	JS 93-05	3	55.55	66.66	33.33	11.11	33.33	0.92	6.42	0.00	0.00	38.90	17.58	0.00
5	Punjab 1	5	66.66	33.33	33.33	0.0	-	0.00	4.33	0.00	0.00	58.18	22.75	0.00
6	PK 472	2	33.33	33.33	33.33	0.0	-	0.00	5.26	0.00	5.18	42.78	35.20	0.00
7	Bragg	3	-	-	-	-	-	-	-	-	-	-	-	-
8	Monetta	4	55.55	33.33	33.33	0.0	-	0.00	5.00	0.00	0.00	40.68	9.25	0.00
9	NRC 7	4	33.33	55.55	55.55	11.11	-	0.00	0.54	3.25	0.00	35.20	18.27	17.00
10	PK 262	2	11.11	11.11	33.33	0.0	-	0.78	2.16	0.00	6.39	32.00	11.50	0.00

Table 4.2: contd...

S. NO.	Varieties	Central Zone									North Eastern Hill Zone	
		Amravati DOS: 07/07/2022					Jorhat				Medziphema DOS: 30/10/2022	
		YMV	CR	PB (Ct)	BP	ALS	Coll. R	RAB	Anth (PB)	Mosaic diseases	RAB	Anth./PB (Ct)
1	JS 95-60	0.00	0.00	0.00	0.00	0.00	5.00	25.22	22.00	11.42	16.25	8.25
2	JS 335	3.48	0.00	7.54	3.44	3.50	13.57	17.14	17.14	10.00	10.42	7.46
3	Shivalik	0.00	10.45	0.00	0.00	0.00	0.00	22.14	13.57	0.00	8.19	5.71
4	JS 93-05	0.00	0.00	8.43	0.00	0.00	16.00	24.11	9.00	9.00	7.49	8.49
5	Punjab 1	0.00	0.00	2.80	0.00	0.00	17.00	22.22	11.66	13.00	13.75	7.30
6	PK 472	6.83	0.00	0.00	0.00	0.00	0.00	17.14	9.00	14.00	11.52	3.06
7	Bragg	-	-	-	-	-	0.00	10.71	9.00	18.00	-	-
8	Monetta	0.00	0.00	12.02	2.80	7.05	0.00	20.55	19.28	22.14	12.08	11.43
9	NRC 7	0.00	0.00	0.00	0.00	0.00	17.00	24.22	16.00	0.00	17.78	4.68
10	PK 262	0.00	6.28	0.00	0.00	0.00	0.00	14.00	17.14	0.00	9.30	3.09

Table 4.3: PP3 Reaction of IVT, AVT I and AVT II entries for various diseases of Central zone

Entry	CR								Anthracnose								ALS			
	Amravati				Jabalpur				Jabalpur				Indore				Amravati			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (Normal)																				
VLS 104	9	9	9	HS	9	9	9	HS	3	3	3	MR	3	3	3	MR	0	0	0	HR
NRCSL 5	0	0	0	HR	0	0	0	AR	1	1	1	HR	1	3	3	MR	0	0	0	HR
JS 24-26	0	0	0	HR	0	0	0	AR	3	1	3	MR	3	1	3	MR	0	0	0	HR
NRCSL 7	0	0	0	HR	0	0	0	AR	1	1	1	HR	1	3	3	MR	0	0	0	HR
JS 20-116 (C)	0	0	0	HR	5	3	5	MS	3	3	3	MR	3	5	5	MS	0	0	0	HR
SKAUS 3	5	5	5	MS	9	9	9	HS	3	3	3	MR	9	5	9	HS	0	0	0	HR
RVS 12-8	0	0	0	HR	7	5	7	S	3	3	3	MR	3	3	3	MR	0	0	0	HR
KDS 1203	0	0	0	HR	5	9	9	HS	5	7	7	S	5	3	5	MS	0	0	0	HR
NRC 253	0	0	0	HR	3	7	7	S	3	3	3	MR	3	5	5	MS	0	0	0	HR
MACS 1756	0	0	0	HR	9	9	9	HS	5	7	7	S	3	3	3	MR	0	0	0	HR
Lok Soya-2	0	0	0	HR	3	3	3	MR	7	7	7	S	3	3	3	MR	0	0	0	HR
AMS 2021-3	0	0	0	HR	3	3	3	MR	0	1	1	HR	3	3	3	MR	0	0	0	HR
Himso 1695	**7**	**7**	**7**	**S**	9	5	9	HS	3	3	3	MR	5	3	5	MS	0	0	0	HR
TS - 156	0	0	0	HR	9	9	9	HS	1	3	3	MR	5	3	5	MS	3	3	3	MR
NRCSL 8	0	0	0	HR	0	0	0	AR	0	1	1	HR	1	3	3	MR	0	0	0	HR
JS 24-34	0	0	0	HR	0	0	0	AR	0	1	1	HR	3	3	3	MR	3	3	3	MR
KDS 753 (C)	0	0	0	HR	0	3	3	MR	3	1	3	MR	3	3	3	MR	0	0	0	HR
DS 1510	0	0	0	HR	0	0	0	AR	1	0	1	HR	3	3	3	MR	0	0	0	HR
KSS 213	3	3	3	MR	5	9	9	HS	1	3	3	MR	1	3	3	MR	0	0	0	HR
MAUS 824	0	0	0	HR	5	3	5	MS	3	1	3	MR	0	3	3	MR	0	0	0	HR

NRC 254	0	0	0	HR	5	0	5	MS	3	1	3	MR	3	3	3	MR	0	0	0	HR
AMS 2021-4	0	0	0	HR	9	9	9	HS	3	1	3	MR	1	5	5	MS	0	0	0	HR
Himso 1696	0	0	0	HR	7	9	9	HS	3	3	3	MR	3	5	5	MS		0	0	HR
DS 1529	0	0	0	HR	3	0	3	MR	3	1	3	MR	1	3	3	MR	0	0	0	HR
KDS 1188	0	0	0	HR	5	9	9	HS	5	5	5	MS	3	3	3	MR	0	0	0	HR
MACS 1745	0	0	0	HR	7	9	9	HS	3	7	7	S	3	3	3	MR	0	0	0	HR
NRC 255	0	0	0	HR	3	9	9	HS	1	3	3	MR	5	3	5	MS	3	3	3	MR
Asb 93	0	0	0	HR	5	9	9	HS	3	3	3	MR	5	1	5	MS	0	0	0	HR
VLS 105	**9**	**9**	**9**	**HS**	7	7	7	S	3	3	3	MR	5	3	5	MS	0	0	0	HR
NRCSL 4	0	0	0	HR	5	7	7	S	3	3	3	MR	3	3	3	MR	0	0	0	HR
NRC 257	0	0	0	HR	0	0	0	AR	1	1	1	HR	3	3	3	MR	0	0	0	HR
MAUS 814	0	0	0	HR	5	0	5	MS	1	1	1	HR	5	3	5	MS	0	0	0	HR
SL 1311	0	0	0	HR	9	9	9	HS	3	3	3	MR	3	5	5	MS	0	0	0	HR
Asb 85	0	0	0	HR	7	7	7	S	3	3	3	MR	3	5	5	MS	0	0	0	HR
PS 1693	0	0	0	HR	0	0	0	AR	1	1	1	HR	3	3	3	MR	0	0	0	HR
NRC 256	0	0	0	HR	0	0	0	AR	1	1	1	HR	3	3	3	MR	3	3	3	MR
RSC 1165	0	0	0	HR	7	7	7	S	3	3	3	MR	3	3	3	MR	0	0	0	HR
BAUS 124	0	0	0	HR	7	9	9	HS	3	3	3	MR	3	3	3	MR	0	0	0	HR
DLSb 5	0	0	0	HR	5	9	9	HS	7	5	7	S	1	3	3	MR	0	0	0	HR
NRC 258	0	0	0	HR	0	3	3	MR	0	0	0	AR	3	1	3	MR	0	0	0	HR
PusaSipani BS-9	0	0	0	HR	5	5	5	MS	3	3	3	MR	3	1	3	MR	0	0	0	HR
PS 1696	0	0	0	HR	0	0	0	AR	1	1	1	HR	1	3	3	MR	0	0	0	HR
CAUMS 3	**5**	**5**	**5**	**MS**	7	5	7	S	3	3	3	MR	1	3	3	MR	0	0	0	HR
AUKS 212	0	0	0	HR	3	0	3	MR	3	1	3	MR	3	1	3	MR	0	0	0	HR
RVSM 12-21	0	0	0	HR	7	9	9	HS	3	3	3	MR	3	3	3	MR	0	0	0	HR
NRC 259	0	0	0	HR	0	0	0	AR	1	1	1	HR	3	3	3	MR	0	0	0	HR
AS 34	0	0	0	HR	0	7	7	S	3	3	3	MR	5	3	5	MS	0	0	0	HR

Macs 1407 (C)	0	0	0	HR	5	3	5	MS	3	1	3	MR	3	1	3	MR	0	0	0	HR
RSC 1172	0	0	0	HR	7	9	9	HS	3	3	3	MR	3	3	3	MR	3	3	3	MR
AS 55	0	0	0	HR	3	3	3	MR	3	3	3	MR	5	5	5	MS	0	0	0	HR
TS-208	0	0	0	HR	9	9	9	HS	3	3	3	MR	5	3	5	MS	0	0	0	HR
NRC 260	0	0	0	HR	5	9	9	HS	3	5	5	MS	5	3	5	MS	0	0	0	HR
NRC 196	**7**	**7**	**7**	**S**	3	0	3	MR	3	1	3	MR	3	3	3	MR	0	0	0	HR
Pusa Sipani-SPS-433	0	0	0	HR	3	0	3	MR	3	3	3	MR	3	3	3	MR	0	0	0	HR
AVT I (Normal)																				
NRC 192	0	0	0	HR	0	0	0	AR	3	3	3	MR	1	5	5	MS	0	0	0	HR
NRC 190	0	0	0	HR	0	0	0	AR	1	1	1	HR	3	3	3	MR	0	0	0	HR
NRC 189	0	0	0	HR	0	0	0	AR	1	1	1	HR	3	3	3	MR	0	0	0	HR
AS 24	0	0	0	HR	0	3	3	MR	3	3	3	MR	5	3	5	MS	0	0	0	HR
RSC 11-42	0	0	0	HR	0	0	0	AR	5	1	5	MS	3	5	5	MS	0	0	0	HR
JS 23-03					0	0	0	AR	1	1	1	HR	3	5	5	MS				
JS 23-09					0	0	0	AR	1	0	1	HR	3	5	5	MS				
KDS 1169					0	3	3	MR	1	3	3	MR	9	9	9	HS				
JS 95-60	0	0	0	HR	7	7	7	S	5	9	9	HS					0	0	0	HR
JS335 (c)	0	0	0	HR	5	5	5	MS	5	3	5	MS	7	5	7	S	0	0	0	HR
AMS-100-39	0	0	0	HR													0	0	0	HR

Table 4.3.1: PP3. Reaction of IVT, AVT I and AVT II entries for various diseases of Central zone

Entry	YMV												Brown spot			
	Jabalpur				Amravati				Indore				Sehore			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (N)																
VLS 104	76.00	45.00	76.00	HS	0	0	0	HR	5	0	5	MS	0	0	0	AR
NRCSL 5	2.00	0.00	2.00	HR	0	0	0	HR	1	0	1	R	0	0	0	AR
JS 24-26	0.00	0.00	0.00	HR	0	0	0	HR	1	0	1	R	3	3	3	MR
NRCSL 7	2.50	0.00	2.50	HR	**7**	**7**	**7**	**S**	0	0	0	HR	3	3	3	MS
JS 20-116 (C)	1.50	3.00	3.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
SKAUS 3	0.50	3.00	3.00	HR	0	0	0	HR	3	0	3	MR	3	3	3	MS
RVS 12-8	5.00	2.50	5.00	R	0	0	0	HR	0	0	0	HR	0	0	0	AR
KDS 1203	14.00	2.00	14.00	MR	0	0	0	HR	1	0	1	R	0	0	0	AR
NRC 253	43.50	45.00	43.00	S	0	0	0	HR	0	1	1	R	0	0	0	AR
MACS 1756	15.00	5.50	15.00	MR	0	0	0	HR	0	3	3	MR	0	0	0	AR
Lok Soya-2	80.00	76.00	80.00	HS	0	0	0	HR	1	3	3	MR	0	0	0	AR
AMS 2021-3	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
Himso 1695	45.00	15.00	45.00	S	0	0	0	HR	1	3	3	MR	0	0	0	AR
TS - 156	49.50	42.00	49.50	S	0	0	0	HR	1	0	1	R	0	0	0	AR
NRCSL 8	0.00	2.50	2.50	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
JS 24-34	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	4	4	4	MS
KDS 753 (C)	52.50	20.00	52.50	S	0	0	0	HR	3	1	3	MR	0	0	0	AR

DS 1510	0.00	0.00	1.88	HR	0	0	0	HR	1	0	1	R	0	0	0	AR
KSS 213	5.00	18.00	18.00	MR	0	0	0	HR	1	0	1	R	0	0	0	AR
MAUS 824	10.00	52.50	52.50	S	0	0	0	HR	0	1	1	R	0	0	0	AR
NRC 254	5.50	0.00	5.50	R	0	0	0	HR	0	0	0	HR	0	0	0	AR
AMS 2021-4	4.50	2.50	4.50	R	0	0	0	HR	0	0	0	HR	0	0	0	AR
Himso 1696	3.00	0.00	3.00	HR	3	3	3	HR	1	0	1	R	0	0	0	AR
DS 1529	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
KDS 1188	15.00	16.00	16.00	MR	0	0	0	HR	3	1	3	MR	0	0	0	AR
MACS 1745	42.00	45.00	45.00	S	0	0	0	HR	5	1	5	MS	0	0	0	AR
NRC 255	43.50	18.00	43.50	S	0	0	0	HR	3	0	3	MR	0	0	0	AR
Asb 93	18.00	5.00	18.00	MR	0	0	0	HR	5	0	5	MS	0	0	0	AR
VLS 105	20.00	18.00	20.00	MS	0	0	0	HR	0	0	0	HR	0	0	0	AR
NRCSL 4	2.00	0.00	2.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
NRC 257	1.50	0.00	1.50	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
MAUS 814	49.50	17.00	49.50	S	0	0	0	HR	0	1	1	R	0	0	0	AR
SL 1311	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
Asb 85	15.00	2.00	15.00	MR	0	0	0	HR	3	1	3	MR	4	3	4	MS
PS 1693	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
NRC 256	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
RSC 1165	2.00	3.00	3.00	HR	0	0	0	HR	1	0	1	R	0	0	0	AR
BAUS 124	16.00	43.50	43.50	S	0	0	0	HR	3	1	3	MR	0	0	0	AR
DLSb 5	0.00	2.50	2.50	HR	0	0	0	HR	1	0	1	R	0	0	0	AR
NRC 258	0.00	0.00	0.00	HR	0	0	0	HR	1	0	1	R	0	0	0	AR
PusaSipani BS-9	18.00	15.00	18.00	MR	0	0	0	HR	1	3	3	MR	0	0	0	AR
PS 1696	0.00	0.00	0.00	HR	0	0	0	HR	0	1	1	R	0	0	0	AR
CAUMS 3	3.00	3.50	3.50	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
AUKS 212	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
RVSM 12-21	0.00	2.00	2.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
NRC 259	0.00	0.00	0.00	HR	0	0	0	HR	1	0	1	R	0	0	0	AR

AS 34	17.00	45.00	45.00	S	0	0	0	HR	3	1	3	MR	0	0	0	AR
Macs 1407 (C)	0.00	3.00	3.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
RSC 1172	20.00	23.00	23.00	MS	0	0	0	HR	1	0	1	R	0	0	0	AR
AS 55	40.50	15.00	40.50	S	0	0	0	HR	1	5	5	MS	0	0	0	AR
TS-208	18.00	25.00	25.00	MS	0	0	0	HR	1	0	1	R	0	0	0	AR
NRC 260	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
NRC 196	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	AR
Pusa Sipani-SPS-433	49.50	84.00	84.00	HS	0	0	0	HR	3	5	5	MS	0	0	0	AR
AVT I (Normal)																
NRC 192	7.5	21	21	MS	0	0	0	HR	1	0	1	R			0.12	HR
NRC 190	0	0	0	HR	0	0	0	HR	0	0	0	HR			0.0	AR
NRC 189	0	0	0	HR	0	5	5	MS	0	0	0	HR			0.0	AR
AS 24	22	46.5	46.5	S	0	0	0	HR	1	3	3	MR			0.71	HR
RSC 11-42	3	2	3	HR	0	0	0	HR	0	0	0	HR			4.49	S
JS 23-03	1.5	0	1.5	HR					0	0	0	HR				
JS 23-09	0	2.5	2.5	HR					0	0	0	HR				
KDS 1169	5.5	9.5	9.5	MR					0	0	0	HR				
JS95-60	20	7.5	20	MS	0	0	0	HR							0.0	AR
JS335 (c)	17	22	22	MS	5	5	5	MS	0	0	0	HR				
AMS-100-39					0	0	0	HR							0.37	HR

Table 4.3.2: PP3. Reaction of IVT, AVT I and AVT II entries for various diseases of Central zone

Entry	RAB								BP								SMV			
	Indore				Jabalpur				Amravati				Indore				Indore			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (Normal)																				
VLS 104	5	9	9	HS	5	3	5	MS	0	0	0	HR	0	0	0	HR	5	1	5	MS
NRCSL 5	3	5	5	MS	3	0	3	MR	0	0	0	HR	0	0	0	HR	5	0	5	MS
JS 24-26	3	5	5	MS	1	1	1	HR	0	0	0	HR	0	0	0	HR	5	0	5	MS
NRCSL 7	3	5	5	MS	3	3	3	MR	0	0	0	HR	0	0	0	HR	7	0	7	MR
JS 20-116 (C)	5	7	7	S	3	1	3	MR	0	0	0	HR	0	0	0	HR	5	1	5	MS
SKAUS 3	5	5	5	MS	5	3	5	MS	0	0	0	HR	0	0	0	HR	9	0	9	HS
RVS 12-8	7	3	7	S	5	3	5	MS	0	0	0	HR	0	0	0	HR	3	5	5	MS
KDS 1203	5	9	9	HS	3	5	5	MS	0	0	0	HR	0	0	0	HR	5	9	9	HS
NRC 253	5	9	9	HS	3	3	3	MR	0	0	0	HR	0	0	0	HR	1	5	5	MS
MACS 1756	7	7	7	S	5	3	5	MS	0	0	0	HR	0	0	0	HR	5	0	5	MS
Lok Soya-2	5	5	5	MS	3	5	5	MS	0	0	0	HR	0	0	0	HR	5	0	5	MS
AMS 2021-3	5	5	5	MS	3	3	3	MR	0	0	0	HR	0	1	1	R	1	3	3	MR
Himso 1695	7	9	9	HS	5	3	5	MS	0	0	0	HR	0	0	0	HR	1	5	5	MS
TS - 156	5	3	5	MS	3	5	5	MS	0	0	0	HR	0	0	0	HR	1	0	1	HR
NRCSL 8	3	9	9	S	0	0	0	AR	0	0	0	HR	0	0	0	HR	7	5	7	S
JS 24-34	1	9	9	HS	0	1	1	HR	3	3	3	MR	0	0	0	HR	5	5	5	MS
KDS 753 (C)	5	7	7	S	5	5	5	MS	0	0	0	HR	1	0	1	R	9	7	9	HS
DS 1510	3	9	9	HS	1	0	1	HR	3	3	3	MR	0	0	0	HR	3	0	3	MR
KSS 213	1	5	5	MS	3	5	5	MS	0	0	0	HR	0	0	0	HR	7	0	7	S
MAUS 824	1	3	3	MR	3	1	3	MR	0	0	0	HR	0	0	0	HR	9	5	9	HS
NRC 254	3	3	3	MR	3	0	3	MR	0	0	0	HR	0	0	0	HR	3	0	3	MR

AMS 2021-4	3	5	5	MS	5	3	5	MS	0	0	0	HR	0	0	0	HR	5	7	7	S
Himso 1696	5	7	7	S	3	5	5	MS	0	0	0	HR	0	0	0	HR	3	0	3	MR
DS 1529	3	9	9	HS	3	3	3	MR	0	0	0	HR	0	0	0	HR	1	3	3	MR
KDS 1188	5	3	5	MS	5	3	5	MS	3	3	3	MR	0	0	0	HR	9	0	9	HS
MACS 1745	9	7	9	HS	5	5	5	MS	0	0	0	HR	0	0	0	HR	9	5	9	HS
NRC 255	5	3	5	MS	3	5	5	MS	0	0	0	HR	5	0	5	MS	7	0	7	S
Asb 93	7	3	7	S	3	5	5	MS	0	0	0	HR	0	0	0	HR	3	0	3	MR
VLS 105	5	3	5	MS	5	3	5	MS	0	0	0	HR	0	0	0	HR	1	0	1	R
NRCSL 4	7	5	7	S	5	3	5	MS	0	0	0	HR	0	0	0	HR	9	0	9	HS
NRC 257	3	1	3	MR	1	0	1	HR	0	0	0	HR	0	0	0	HR	7	5	7	S
MAUS 814	5	5	5	MS	3	3	3	MR	0	0	0	HR	0	3	3	MR	5	0	5	MS
SL 1311	9	9	9	HS	5	3	5	MS	0	0	0	HR	0	0	0	HR	3	1	3	MR
Asb 85	7	7	7	S	5	3	5	MS	0	0	0	HR	1	0	1	R	5	3	5	MS
PS 1693	5	7	7	S	3	0	3	MR	0	0	0	HR	0	0	0	HR	1	0	1	R
NRC 256	3	3	3	MR	1	0	1	HR	0	0	0	HR	0	0	0	HR	3	1	3	MR
RSC 1165	9	3	9	HS	3	3	3	MR	0	0	0	HR	0	0	0	HR	5	3	5	MS
BAUS 124	5	9	9	HS	5	5	5	MS	0	0	0	HR	0	0	0	HR	5	7	7	S
DLSb 5	9	5	9	HS	3	5	5	MS	0	0	0	HR	0	0	0	HR	1	0	1	R
NRC 258	7	7	7	S	1	0	1	HR	0	0	0	HR	0	0	0	HR	1	0	1	R
PusaSipani BS-9	3	7	7	S	5	7	7	S	3	3	3	MR	0	0	0	HR	3	0	3	MR
PS 1696	7	5	7	S	1	0	1	HR	0	0	0	HR	1	0	1	R	0	1	1	R
CAUMS 3	5	3	5	MS	3	3	3	MR	0	0	0	HR	1	0	1	R	1	0	1	R
AUKS 212	7	3	7	S	0	1	1	HR	0	0	0	HR	0	0	0	HR	3	0	3	MR
RVSM 12-21	7	5	7	S	3	5	5	MS	0	0	0	HR	0	0	0	HR	3	1	3	MR
NRC 259	5	5	5	MS	1	0	1	HR	0	0	0	HR	0	0	0	HR	5	7	7	S
AS 34	3	9	9	HS	5	7	7	S	0	0	0	HR	0	0	0	HR	5	3	5	MS
Macs 1407 (C)	5	5	5	MS	3	3	3	MR	0	0	0	HR	0	0	0	HR	5	3	5	MS
RSC 1172	5	5	5	MS	5	5	5	MS	0	0	0	HR	0	0	0	HR	3	0	3	MR
AS 55	7	5	7	S	5	3	5	MS	0	0	0	HR	0	0	0	HR	5	7	7	S

TS-208	7	9	9	HS	5	5	5	MS	0	0	0	HR	0	0	0	HR	1	0	1	R
NRC 260	5	5	5	MS	5	5	5	MS	0	0	0	HR	0	0	0	HR	0	1	1	R
NRC 196	3	5	5	MS	1	0	1	HR	0	0	0	HR	0	0	0	HR	7	9	9	HS
Pusa Sipani-SPS-433	3	5	5	MS	5	5	5	MS	0	0	0	HR	0	0	0	HR	5	0	5	MS
AVT I (Normal)																				
NRC 192	3	7	7	S	3	3	3	MR	0	0	0	HR					5	0	5	MS
NRC 190	5	3	5	MS	1	3	3	MR	5	5	5	MS					3	3	3	MR
NRC 189	5	3	5	MS	3	3	3	MR	0	0	0	HR					9	5	9	HS
AS 24	5	7	7	S	5	3	5	MS	0	3	3	MR					3	0	3	MR
RSC 11-42	3	7	7	S	3	3	3	MR	0	0	0	HR					3	1	3	MR
JS 23-03	3	7	7	S	1	0	1	HR									5	7	7	S
JS 23-09	5	9	9	HS	0	1	3	MR									3	1	3	MR
KDS 1169	1	1	1	R	0	1	1	HR									3	9	9	HS
JS 95-60					5	3	5	MS	0	0	0	HR								
JS335 (c)	5	3	5	MS	5	5	5	MS	0	0	0	HR					7	5	7	S
AMS-100-39									0	0	0	HR								

Table 4.3.3: PP3. Reaction of IVT, AVT I and AVT II entries for various diseases of SZ

CODE	RUST										Pod blight										Purple seed stain					
	Dharwad				Kasbe-digraj				Ugarkhurd		Kasbe-digraj				Dharwad				Ugarkhurd		Dharwad				Ugarkhurd	
	R 1	R 2	Max Score	DR	R 1	R 2	Max Score	DR	Max Score	DR	R 1	R 2	Max Score	DR	R 1	R 2	Max Score	DR	Max Score	DR	R 1	R 2	Max Score	DR	Max Score	DR
VLS 104	7	7	7	S	9	9	9	HS	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRCSL 5	5	5	5	MS	9	9	9	HS	5	MS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
JS 24-26	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR

NRCSL 7	5	5	5	MS	7	7	7	S	5	MS	9	7	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
JS 20-116 (C)	9	9	9	HS	5	5	5	MS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
SKAUS 3	7	7	7	S	9	9	9	HS	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
RVS 12-8	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
KDS 1203	9	9	9	HS	5	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 253	7	7	7	S	9	9	9	HS	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
MACS 1756	5	5	5	MS	9	9	9	HS	5	MS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
Lok Soya-2	9	9	9	HS	5	5	5	MS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
AMS 2021-3	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
Himso 1695	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
TS - 156	5	5	5	MS	7	7	7	S	5	MS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRCSL 8	3	3	3	MR	9	9	9	HS	3	MR	9	9	9	HS	3	3	3	MR	3	MR	3	3	3	MR	3	MR
JS 24-34	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
KDS 753 (C)	7	7	7	S	5	5	5	MS	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
DS 1510	7	7	7	S	5	5	5	MS	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
KSS 213	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
MAUS 824	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 254	7	7	7	S	9	9	9	HS	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
AMS 2021-4	9	9	9	HS	5	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR

Himso 1696	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
DS 1529	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
KDS 1188	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
MACS 1745	7	7	7	S	5	5	5	MS	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 255	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
Asb 93	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
VLS 105	9	9	9	HS	5	5	5	MS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRCSL 4	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	3	3	3	MR	3	MR	3	3	3	MR	3	MR
NRC 257	5	5	5	MS	7	7	7	S	5	MS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
MAUS 814	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
SL 1311	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
Asb 85	9	9	9	HS	7	9	9	HS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
PS 1693	9	9	9	HS	5	5	5	MS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 256	5	5	5	MS	7	7	7	S	5	MS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
RSC 1165	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
BAUS 124	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
DLSb 5	5	5	5	MS	7	7	7	S	5	MS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 258	5	5	5	MS	7	7	7	S	5	MS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
PusaSipani BS-9	9	9	9	HS	5	5	5	MS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR

PS 1696	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
CAUMS 3	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
AUKS 212	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
RVSM 12-21	9	9	9	HS	5	5	5	MS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 259	9	9	9	HS	5	5	5	MS	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
AS 34	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
Macs 1407 (C)	3	3	3	MR	5	7	7	S	3	MR	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
RSC 1172	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
AS 55	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
TS-208	9	9	9	HS	7	7	7	S	9	HS	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 260	7	7	7	S	5	7	7	S	7	S	9	9	9	HS	5	5	5	MS	5	MS	3	3	3	MR	3	MR
NRC 196	7	7	7	S	7	7	7	S	7	S	9	9	9	HS	5	5	5	MR	5	MR	3	3	3	MR	3	MR
Pusa Sipani-SPS-	7	7	7	S	7	7	7	S	7	MS	9	7	9	HS	5	5	5	MR	5	MR	3	3	3	MR	3	MR

Table 4.3.4: PP3. Reaction of IVT, AVT I and AVT II entries for various diseases of NPZ

Entry	RAB				SMV				YMV									
	Pantnagar				Ludhiana				Pantnagar				Ludhiana				Delhi	
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	Coefficient of Infection	DR
VLS 104	1	1	1	R	3	3	3	R	2	2	2	MR	7	7	7	HS	22.76	MS
NRCSL 5	0	0	0	HR	5	5	5	MR	1	0	1	R	5	5	5	MS	100.00	HS
JS 24-26	1	1	1	R	7	7	7	S	2	1	2	MR	3	3	3	R	40.48	S
NRCSL 7	1	1	1	R	5	5	5	MR	1	1	1	R	5	5	5	MS	100.00	HS
JS 20-116 (C)	0	0	0	HR	3	3	3	R	0	0	0	HR	3	3	3	R	100.00	HS
SKAUS 3	1	1	1	R	5	5	5	MR	3	1	3	MS	7	7	7	HS	39.13	S
RVS 12-8	1	1	1	R	5	5	5	MR	1	1	1	R	7	7	7	S	50.94	S
KDS 1203	5	3	5	MS	1	1	1	HR	1	1	1	R	3	3	3	MS	Dead	HS
NRC 253	1	1	1	R	3	3	3	R	3	3	3	MS	7	7	7	HS	100.00	HS
MACS 1756	5	7	7	S	-	-	-	-	1	0	1	R	-	-	-	-	66.67	S
Lok Soya-2	1	1	1	R	3	3	3	R	3	3	3	MS	7	7	7	HS	24.44	MS
AMS 2021-3	1	1	1	R	3	3	3	R	1	1	1	R	5	5	5	S	96.97	HS
Himso 1695	1	1	1	R	5	5	5	MR	2	1	2	MR	7	7	7	HS	Dead	HS
TS - 156	1	3	3	MR	3	3	3	R	1	1	1	R	7	7	7	HS	74.66	HS
NRCSL 8	9	7	9	HS	5	5	5	MR	1	1	1	R	5	5	5	MS	100.00	HS
JS 24-34	1	1	1	R	3	3	3	R	2	2	2	MR	5	5	5	S	Dead	HS
KDS 753 (C)	1	1	1	R	-	-	-	-	1	1	1	R	-	-	-	-	71.79	HS
DS 1510	1	3	3	MR	5	5	5	MR	1	1	1	R	5	5	5	S	29.89	MS
KSS 213	1	1	1	R	3	3	3	R	1	1	1	R	7	7	7	HS	100.00	HS
MAUS 824	1	1	1	R	3	3	3	R	2	2	2	MR	7	7	7	HS	Dead	HS
NRC 254	9	7	9	HS	3	3	3	R	1	1	1	R	7	7	7	HS	98.32	HS

AMS 2021-4	9	9	9	HS	3	3	3	R	1	1	1	R	7	7	7	HS	Dead	HS
Himso 1696	7	7	7	S	-	-	-	-	1	1	1	R	-	-	-	-	23.26	MS
DS 1529	5	3	5	MS	5	5	5	MR	2	2	2	MR	4	4	4	MS	10.00	MR
KDS 1188	5	5	5	MS	-	-	-	-	0	0	0	HR	-	-	-	-	100.00	HS
MACS 1745	3	1	3	MR	-	-	-	-	4	3	4	S	-	-	-	-	100.00	HS
NRC 255	1	1	1	R	3	3	3	R	3	3	3	MS	7	7	7	HS	11.33	MR
Asb 93	1	1	1	R	3	3	3	R	3	3	3	MS	7	7	7	HS	8.40	R
VLS 105	5	3	5	MS	-	-	-	-	2	2	2	MR	-	-	-	-	100.00	HS
NRCSL 4	5	5	5	MS	5	5	5	MR	1	1	1	R	5	5	5	MS	100.00	HS
NRC 257	9	9	9	HS	3	3	3	R	2	2	2	MR	7	7	7	HS	100.00	HS
MAUS 814	9	7	9	HS	5	5	5	MR	2	2	2	MR	7	7	7	HS	11.00	MR
SL 1311	1	1	1	R	-	-	-	-	2	2	2	MR	-	-	-	-	100.00	HS
Asb 85	5	3	5	MS	5	5	5	MR	1	1	1	R	5	5	5	HS	100.00	HS
PS 1693	1	0	1	R	3	3	3	R	1	0	1	R	3	3	3	R	3.47	HR
NRC 256	1	1	1	R	7	7	7	S	2	2	2	MR	7	7	7	S	100.00	HS
RSC 1165	1	1	1	R	7	7	7	S	2	2	2	MR	7	7	7	HS	5.73	R
BAUS 124	1	1	1	R	3	3	3	R	2	2	2	MR	7	7	7	HS	100.00	HS
DLSb 5	1	1	1	R	NG	NG	NG	NG	0	1	1	R	NG	NG	NG	NG	100.00	HS
NRC 258	7	5	7	S	7	7	7	S	1	1	1	R	7	7	7	HS	100.00	HS
PusaSipani BS-9	9	9	9	HS	3	3	3	R	3	3	3	MS	7	7	7	HS	Dead	HS
PS 1696	7	5	7	S	3	3	3	R	1	1	1	R	3	3	3	MR	100.00	HS
CAUMS 3	1	1	1	R	7	7	7	S	1	1	1	R	7	7	7	HS	100.00	HS
AUKS 212	9	7	9	HS	5	5	5	MR	2	2	2	MR	7	7	7	HS	4.30	R
RVSM 12-21	1	1	1	R	5	5	5	MR	1	1	1	R	5	5	5	S	100.00	HS
NRC 259	9	9	9	HS	5	5	5	MR	3	3	3	MS	5	5	5	MS	100.00	HS
AS 34	7	7	7	S	7	7	7	S	3	3	3	MS	7	7	7	HS	Dead	HS
Macs 1407 (C)	3	1	3	MR	3	3	3	R	1	0	1	R	4	4	4	MS	5.10	R

RSC 1172	9	9	9	HS	5	5	5	MR	2	2	2	MR	7	7	7	HS	100.00	HS
AS 55	7	5	7	S	5	5	5	MR	2	2	2	MR	5	5	5	S	4.05	R
TS-208	1	1	1	R	3	3	3	R	2	1	2	MR	7	7	7	S	100.00	HS
NRC 260	7	5	7	S	3	3	3	R	2	2	2	MR	3	3	3	MS	100.00	HS
NRC 196	7	7	7	S	5	5	5	MR	2	2	2	MR	3	3	3	MS	100.00	HS
Pusa Sipani-SPS-433	9	7	9	HS	3	3	3	R	2	1	1	R	7	7	7	HS	100.00	HS
AVT I (Normal)																		
NRCSL3					3	1	3	MR	0	0	0	HR	1	1	1	R		
PS-1682	0	1	1	R	0	3	3	MR	0	0	0	HR	1	3	3	MR		
NRC 195	3	1	3	MR	3	3	3	MR	0	1	1	R	0	0	0	HR		
SL-1282	1	0	1	R	1	3	3	MR	0	0	0	HR	0	0	0	HR		
NRC SL 6	1	1	1	R	3	1	3	MR	0	0	0	HR	1	3	3	MR		
NRC149	5	3	5	MS					0	0	0	HR						
SL -1074	3	3	3	MR	1	3	3	MR	0	0	0	HR	0	0	0	HR	2.92	HR
JS335	7	3	7	S			-	-	0	1	1	R	7	9	9	HS		
SHIVALIK	5	3	5	MS														
SL958					1	1	1	R					1	0	1	R		
AVT II (Normal)																		
PS1670					0	1	1	R					3	1	3	MR	3.36	HR
SL955					1	0	1	R					0	0	0	HR	3.32	HR

Table 4.3.5: PP3. Reaction of IVT, AVT I and AVT II entries for various diseases of NHZ

CODE	Frogeye leaf spot (*Cercosporasojina*)								Anthracnose			
	Palampur				Almora				Palampur			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (N)												
VLS 104	0	0	0	HR	1	1	1	R	1	1	1	R
NRCSL 5	0	0	0	HR	1	3	3	MR	7	7	7	S
JS 24-26	5	1	5	MS	3	5	5	MS	3	5	5	MS
NRCSL 7	0	1	1	R	5	5	5	MS	9	7	9	HS
JS 20-116 (C)	3	3	3	MR	1	3	3	MR	3	3	3	MR
SKAUS 3	0	3	3	MR	3	5	5	MS	9	5	9	HS
RVS 12-8	3	1	3	MR	5	5	5	MS	3	3	3	MR
KDS 1203	3	5	5	MS	1	7	7	S	5	5	5	MS
NRC 253	3	5	5	MS	3	7	7	S	5	5	5	MS
MACS 1756	0	1	1	R	5	7	7	S	7	5	7	S
Lok Soya-2	3	5	5	MS	5	5	5	MS	5	5	5	MS
AMS 2021-3	5	5	5	MS	5	5	5	MS	1	3	3	MR
Himso 1695	1	0	1	R	5	5	5	MS	0	3	3	MR
TS - 156	7	7	7	S	5	7	7	S	1	3	3	MR
NRCSL 8	1	1	1	R	3	5	5	MS	7	7	7	S
JS 24-34	3	1	3	MR	3	5	5	MS	9	9	9	HS
KDS 753 (C)	3	5	5	MS	3	5	5	MS	1	3	3	MR
DS 1510	1	3	3	MR	3	5	5	MS	1	1	1	R
KSS 213	5	5	5	MS	3	5	5	MS	5	3	5	MS
MAUS 824	3	3	3	MR	3	7	7	S	5	5	5	MS

NRC 254	5	7	7	S	3	7	7	S	7	7	7	S
AMS 2021-4	5	5	5	MS	7	7	7	S	1	1	1	R
Himso 1696	7	7	7	S	7	7	7	S	3	3	3	MR
DS 1529	7	7	7	S	5	7	7	S	1	3	3	MR
KDS 1188	1	3	3	MR	3	5	5	MS	9	7	9	HS
MACS 1745	3	3	3	MR	3	5	5	MS	1	7	7	S
NRC 255	1	1	1	R	1	5	5	MS	9	3	9	HS
Asb 93	3	0	3	MR	3	3	3	MR	5	3	5	MS
VLS 105	0	1	1	R	1	1	1	R	3	5	5	MS
NRCSL 4	3	5	5	MS	5	5	5	MS	7	3	7	S
NRC 257	3	1	3	MR	3	5	5	MS	5	3	5	MS
MAUS 814	1	5	5	MS	1	3	3	MR	1	3	3	MR
SL 1311	1	3	3	MR	5	3	5	MS	0	5	5	MS
Asb 85	1	3	3	MR	3	5	5	MS	7	9	9	HS
PS 1693	7	9	9	HS	3	5	5	MS	1	1	1	R
NRC 256	5	7	7	S	7	7	7	S	5	5	5	MS
RSC 1165	1	1	1	R	3	5	5	MS	3	3	3	MR
BAUS 124	3	3	3	MR	3	5	5	MS	3	5	5	MS
DLSb 5	5	3	5	MS	5	5	5	MS	5	5	5	MS
NRC 258	1	1	1	R	3	3	3	MR	3	5	5	MS
PusaSipani BS-9	3	5	5	MS	3	5	5	MS	3	5	5	MS
PS 1696	3	3	3	MR	1	5	5	MS	1	3	3	MR
CAUMS 3	NG				5	3	5	MS				
AUKS 212	5	5	5	MS	5	5	5	MS	1	3	3	MR
RVSM 12-21	5	5	5	MS	5	5	5	MS	7	7	7	S
NRC 259	5	5	5	MS	3	3	3	MR	3	1	3	MR
AS 34	5	3	5	MS	3	3	3	MR	7	5	7	S

MACS 1407 (C)	0	1	1	R	1	5	5	MS	3	1	3	MR
RSC 1172	5	5	5	MS	3	5	5	MS	1	1	1	R
AS 55	3	3	3	MR	5	7	7	S	5	5	5	MS
TS-208	3	5	5	MS	5	5	5	MS	7	7	7	S
NRC 260	5	5	5	MS	3	5	5	MS	0	1	1	R
NRC 196	5	3	5	MS	1	3	3	MR	3	3	3	MR
Pusa Sipani-SPS-433	3	3	3	MR	3	5	5	MS	3	5	5	MS
AVT I (Normal) and AVT II (Normal)												
VLS 99	5	5	5	MS					1	1	1	R
VLS 59	1	1	1	R								
VLS 89	7	5	7	S					3	3	3	MR
VLS 63	3	3	3	MR					1	3	3	MR
SHIVALIK	7	9	9	HS					3	5	5	MS
JS 23-03	1	1	1	R	3	3	3	MR	7	3	7	S
NRC 197	7	5	7	S	3	3	3	MR	3	1	3	MR
MAUS 795	1	1	1	R	3	3	3	MR	3	5	5	MS
NRC 196	3	1	3	MR	1	3	3	MR	1	3	3	MR
Palam Early Soya 1	3	3	3	MR					3	3	3	MR
JS 335	5	5	5	MS					7	7	7	S

Table 4.3.6: PP3. Reaction of IVT, AVT I and AVT II entries for various diseases of NEHZ

Entry	RAB								Anthracnose								YMV			
	Jorhat				Medziphema				Jorhat				Medziphema				Jorhat			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (N)																				
VLS 104	1	1	1	R	3	1	3	MR	3	1	3	MR	1	1	1	**R**	0	0	0	HR
NRCSL 5	3	1	3	MR	1	1	1	R	1	3	3	MR	0	1	1	R	0	0	0	HR
JS 24-26	1	3	3	MR	3	3	3	MR	1	0	1	R	1	0	1	R	0	0	0	HR
NRCSL 7	1	1	3	MR	1	0	1	R	1	1	1	R	1	1	1	R	0	0	0	HR
JS 20-116 (C)	1	1	1	R	0	1	1	R	1	3	3	MR	1	0	1	R	1	3	3	MR
SKAUS 3	3	3	1	R	3	5	5	MS	1	1	1	R	3	1	3	MR	5	5	5	MS
RVS 12-8	3	3	3	MR	3	3	3	MR	0	1	1	R	1	1	1	R	1	1	1	R
KDS 1203	3	1	3	MR	0	3	3	MR	1	3	3	MR	1	0	1	R	1	1	1	R
NRC 253	5	3	5	MS	3	0	3	MR	7	5	7	S	0	1	1	R	0	1	1	R
MACS 1756	1	1	1	R	1	0	1	R	0	1	1	R	1	1	1	R	0	1	1	R
Lok Soya-2	0	1	1	R	0	3	3	MR	1	1	1	R	3	0	3	MR	1	0	1	R
AMS 2021-3	0	0	0	HR	3	1	3	MR	1	1	1	R	1	0	1	R	1	0	1	R
Himso 1695	1	3	3	MR	1	3	3	MR	3	5	5	MS	0	1	1	R	1	1	1	R
TS - 156	1	1	1	R	0	3	3	MR	1	1	1	R	0	1	1	R	1	3	3	MR
NRCSL 8	3	5	5	MS	1	1	1	R	1	1	1	R	1	0	1	R	1	1	1	R
JS 24-34	1	3	3	MR	0	1	1	R	5	3	5	MS	1	1	1	R	0	1	1	R
KDS 753 (C)	1	0	1	R	3	0	3	MR	1	1	1	R	1	0	1	R	0	0	0	HR
DS 1510	3	3	3	MR	1	3	3	MR	1	0	1	R	0	1	1	R	7	5	7	S
KSS 213	1	1	1	R	1	0	1	R	3	1	3	MR	0	1	1	R	3	5	5	MS
MAUS 824	1	1	1	R	0	1	1	R	1	1	1	R	1	0	1	R	0	1	1	R
NRC 254	1	1	1	R	3	0	3	MR	0	1	1	R	1	0	1	R	1	1	1	R
AMS 2021-4	1	1	1	R	1	1	1	R	5	3	5	MS	0	1	1	R	0	0	0	HR

Himso 1696	0	1	1	R	3	0	3	MR	3	3	3	MR	0	1	1	R	0	1	1	R
DS 1529	1	1	1	R	0	1	1	R	3	3	3	MR	1	0	1	R	1	1	1	R
KDS 1188	1	1	1	R	3	3	3	MR	0	0	0	HR	1	1	1	R	1	3	3	MR
MACS 1745	1	0	1	R	0	1	1	R	1	1	1	R	1	0	1	R	1	0	1	R
NRC 255	3	5	5	MS	3	0	3	MR	0	1	1	R	0	1	1	R	0	1	1	R
Asb 93	1	3	3	MR	0	3	3	MR	1	3	3	MR	0	1	1	R	0	3	3	MR
VLS 105	1	1	1	R	3	3	3	MR	0	1	1	R	1	0	1	R	1	3	3	MR
NRCSL 4	3	3	3	MR	1	1	1	R	3	1	3	MR	1	1	1	R	5	5	5	MS
NRC 257	1	1	1	R	3	0	3	MR	0	1	1	R	3	5	5	MS	5	3	5	MS
MAUS 814	1	1	1	R	0	3	3	MR	0	1	1	R	1	0	1	R	1	1	1	R
SL 1311	1	1	1	R	1	1	1	R	0	1	1	R	0	1	1	R	0	1	1	R
Asb 85	5	3	5	MS	0	3	3	MR	3	5	5	MS	0	1	1	R	3	0	3	MR
PS 1693	3	3	3	MR	0	1	1	R	3	1	3	MR	1	0	1	R	1	0	1	R
NRC 256	1	1	1	R	1	0	1	R	1	1	1	R	1	1	1	R	0	0	0	HR
RSC 1165	0	1	1	R	1	1	1	R	3	5	5	MS	1	0	1	R	1	0	1	R
BAUS 124	1	3	3	MR	3	0	3	MR	1	1	1	R	0	1	1	R	1	1	1	R
DLSb 5	1	3	3	MR	1	1	1	R	5	5	5	MS	0	1	1	R	0	1	1	R
NRC 258	3	3	3	MR	0	3	3	MR	7	5	7	S	1	0	1	R	0	3	3	MR
PusaSipani BS-9	1	1	1	R	3	3	3	MR	1	3	3	MR	1	3	3	MR	0	1	1	R
PS 1696	3	5	5	MS	1	0	1	R	7	5	7	S	1	0	1	R	0	0	0	HR
CAUMS 3	3	3	3	MR	0	1	1	R	1	0	1	R	0	1	1	R	3	1	3	MR
AUKS 212	1	1	1	R	0	3	3	MR	1	0	1	R	0	1	1	R	3	3	3	MR
RVSM 12-21	1	3	3	MR	1	3	3	MR	1	3	3	MR	1	0	1	R	1	1	1	R
NRC 259	5	5	5	MS	0	3	3	MR	3	3	3	MR	1	1	1	R	0	0	0	HR
AS 34	1	3	3	MR	3	0	3	MR	0	1	1	R	0	3	3	MR	3	5	5	MS
Macs 1407 (C)	1	0	1	R	3	1	3	MR	1	1	1	R	1	0	1	R	1	1	1	R
RSC 1172	3	1	3	MR	0	3	3	MR	3	3	3	MR	0	1	1	R	0	0	0	HR
AS 55	7	5	7	S	3	3	3	MR	3	1	3	MR	0	1	1	R	0	0	0	HR
TS-208	1	1	1	R	1	3	3	MR	1	1	1	R	1	0	1	R	0	1	1	R

NRC 260	1	1	1	R	3	1	3	MR	1	3	3	MR	1	1	1	R	1	1	1	R
NRC 196	0	1	1	R	0	3	3	MR	1	3	3	MR	1	0	1	R	5	5	5	MS
Pusa Sipani-SPS-433	1	0	1	R	1	1	1	R	3	1	3	MR	0	1	1	R	0	0	0	HR
NRC 189	1	1	1	R	3	3	3	MR	1	0	1	R	0	1	1	R	0	0	0	HR
NRC 191	3	5	5	MS	0	1	1	R	1	1	1	R	1	0	1	R	1	0	1	R
NRC 190	1	1	1	R	1	3	3	MR	3	3	3	MR	1	1	1	R	1	0	1	R
Himso 1693	1	3	3	MR	3	1	3	MR	5	3	5	MS	1	0	1	R	5	7	7	S
KDS 1149	1	1	1	R	1	0	1	R	0	1	1	R	1	0	1	R	1	3	3	MR
Himso 1694	1	3	3	MR	0	3	3	MR	5	3	5	MS	0	1	1	R	1	1	1	R
RVSM 16-20	1	1	1	R	1	1	1	R	3	1	3	MR	1	1	1	R	1	1	1	R
MACS 1460					1	0	1	R					1	1	1	R				
RKS18					1	1	1	R					1	0	1	R				
JS 97-52					0	1	1	R					0	1	1	R				
JS 9305					0	1	1	R					0	1	1	R				
JS 335					1	0	1	R					1	0	1	R				

Table 4.3.7: PP3. Reaction of IVT, AVT I and AVT II entries for various diseases of EZ

Entry	IBB				PB (Ct)			
	Raipur							
	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT								
VLS 104	7	5	7	S	3	5	5	MS
NRCSL 5	5	5	5	MS	5	3	5	MS
JS 24-26	7	5	7	S	5	5	5	MS
NRCSL 7	5	9	9	HS	5	3	5	MS
JS 20-116 (C)	3	5	5	MS	3	5	5	MS

SKAUS 3	5	7	7	S	7	9	9	HS
RVS 12-8	5	9	9	HS	5	5	5	MS
KDS 1203	9	5	9	HS	5	5	5	MS
NRC 253	7	7	7	S	3	5	5	MS
MACS 1756	7	5	7	S	5	5	5	MS
Lok Soya-2	5	5	5	MS	3	5	5	MS
AMS 2021-3	7	5	7	S	3	5	5	MS
Himso 1695	5	5	5	MS	3	5	5	MS
TS - 156	5	5	5	MS	3	5	5	MS
NRCSL 8	5	5	5	MS	5	5	5	MS
JS 24-34	9	5	9	HS	5	5	5	MS
KDS 753 (C)	5	5	5	MS	3	3	3	MR
DS 1510	5	5	5	MS	5	3	5	MS
KSS 213	7	7	7	S	5	3	5	MS
MAUS 824	5	7	7	S	5	3	5	MS
NRC 254	5	7	7	S	5	5	5	MS
AMS 2021-4	7	7	7	S	5	3	5	MS
Himso 1696	7	7	7	S	5	5	5	MS
DS 1529	5	5	5	MS	3	5	5	MS
KDS 1188	7	7	7	S	7	5	7	S
MACS 1745	9	5	9	HS	5	3	5	MS
NRC 255	5	5	5	MS	5	5	5	MS
Asb 93	7	7	7	S	5	5	5	MS
VLS 105	7	7	7	S	5	5	5	MS
NRCSL 4	7	7	7	S	5	5	5	MS
NRC 257	5	5	5	MS	5	5	5	MS

MAUS 814	7	5	7	S	5	5	5	MS
SL 1311	7	5	7	S	5	5	5	MS
Asb 85	7	5	7	S	5	5	5	MS
PS 1693	7	7	7	S	3	3	3	MR
NRC 256	5	5	5	MS	5	5	5	MS
RSC 1165	5	5	5	MS	5	5	5	MS
BAUS 124	7	5	7	S	7	5	7	S
DLSb 5	0	7	7	S	5	5	5	MS
NRC 258	5	5	5	MS	3	5	5	MS
PusaSipani BS-9	0	5	5	MS	5	5	5	MS
PS 1696	5	7	7	S	5	3	5	MS
CAUMS 3	0	7	7	S	5	5	5	MS
AUKS 212	5	7	7	S	5	3	5	MS
RVSM 12-21	5	5	5	MS	5	5	5	MS
NRC 259	5	5	5	MS	5	5	5	MS
AS 34	5	7	7	S	5	5	5	MS
Macs 1407 (C)	5	5	5	MS	3	5	5	MS
RSC 1172	5	7	7	S	3	5	5	MS
AS 55	5	7	7	S	3	5	5	MS
TS-208	5	5	5	MS	5	5	5	MS
NRC 260	5	5	5	MS	7	5	7	S
NRC 196	5	5	5	MS	5	5	5	MS
Pusa Sipani-SPS-433	7	5	7	S	3	5	5	MS
AVT I								
MAUS 795	5	5	5	MS	5	3	5	MS
KDS 1169	9	7	9	HS	5	5	5	MS

JS 23-09	7	5	7	S	5	5	5	MS
JS 23-03	5	5	5	MS	5	5	5	MS
NRC 197	7	5	7	S	5	5	5	MS
NRC 196	5	5	5		5	5	5	MS
MAUS 791	5	5	5	MS	5	5	5	MS
AS 24	5	5	5	MS	5	5	5	MS
VLS 102	7	5	7	S	5	5	5	MS
RSC 11-44	5	3	5	MS	5	5	5	MS
NRC 190	5	5	5	MS	5	5	5	MS
SL 1282	5	5	5	MS	5	3	5	MS
NRC 192	5	5	5	MS	5	5	5	MS
KDS 1149	5	5	5	MS	5	3	5	MS
NRC 195	5	5	5	MS	5	5	5	MS
PS 1682	5	5	5	MS	5	5	5	MS
RVS 13-20	5	5	5	MS	5	5	5	MS
CAUMS-2	5	5	5	MS	5	3	5	MS
NRC 189	3	5	5	MS	5	5	5	MS
AVT II								
RSC 1135	5	5	5	MS	3	5	5	MS
JS 22-16	5	5	5	MS	5	3	5	MS
DSLB-1	7	5	7	S	3	5	5	MS
JS 22-12	0	0	0	HR	5	3	5	MS
RVSM 2012-4	5	7	7	S	3	5	5	MS
KDS 1096	7	7	7	S	5	5	5	MS
PS 1569	3	3	3	MR	5	5	5	MS
PS 1670	3	3	3	MR	5	5	5	MS

NRC 165	5	5	5	MS	5	5	5	MS
JS 22-18	9	9	9	HS	5	5	5	MS
RSC 11-07	5	5	5	MS	3	5	5	MS
JS 20-116	5	5	5	MS	5	5	5	MS
MACS 1460	5	5	5	MS	3	5	5	MS
NRC 128	5	5	5	MS	5	5	5	MS
RSC 10-46	5	5	5	MS	5	5	5	MS
AMS 2014-1	5	5	5	MS	5	5	5	MS
JS 97-52	5	5	5	MS	5	5	5	MS

Table 4.4.1: PP3 (a). Reaction of CIVT (E), AVT I (E) and AVT II (E) entries for various diseases of Central zone

Entry	RAB												Anthracnose							
	Jabalpur				Indore				Kota				Indore				Jabalpur			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (Early)																				
KDS 1271	3	5	5	MS	7	5	7	S	7	5	7	S	7	5	7	S	5	7	7	S
NRC 261	3	3	3	MR	3	3	3	MR	0	0	0	HR	3	9	9	HS	1	3	3	MR
RVS 15-1	1	1	1	HR	3	7	7	S	3	1	3	MR	3	3	3	MR	0	1	1	HR
MAUS 820	3	3	3	MR	3	3	3	MR	0	3	3	MR	3	1	3	MR	1	3	3	MR
DS 1550	3	3	3	MR	5	3	5	MS	0	0	0	HR	1	3	3	MR	1	1	1	HR
NRC 164	3	1	3	MR	7	3	7	S	5	7	7	S	3	1	3	MR	7	7	7	S
AMS 2022-1	3	1	3	MR	5	5	5	MS	0	0	0	HR	3	5	5	MS	1	1	1	HR
JS 24-33	3	0	3	MR	7	7	7	S	0	0	0	HR	3	5	5	MS	5	3	5	MS
NRC 138 (C)	3	3	3	MR	5	5	5	MS	0	1	1	R	3	3	3	MR	1	1	1	HR
KDS 1275	5	3	5	MS	9	9	9	HS	5	3	5	MS	5	5	5	MS	3	5	5	MS
MAUS 749	3	3	3	MR	5	5	5	MS	0	0	0	HR	3	5	5	MS	1	3	3	MR

DS 1547	1	3	3	MR	5	3	5	MS	3	0	3	MR	1	1	1	R	1	1	1	HR
MACS 1779	1	0	1	HR	7	7	7	S	0	7	7	S	3	5	5	MS	3	3	3	MR
JS 24-25	1	0	1	HR	3	5	5	MS	0	5	5	MS	5	7	7	S	1	1	1	HR
RSC 11-75	0	1	1	HR	3	3	3	MR	0	0	0	HR	1	1	1	R	1	3	3	MR
AS 26	3	0	3	MR	3	7	7	S	3	3	3	MR	3	5	5	MS	1	1	1	HR
NRC 141	1	5	5	MS	5	9	9	HS	7	5	7	S	5	3	5	MS	1	3	3	MR
NRC 152 (C)	3	1	3	MR	1	3	3	MR	0	0	0	HR	9	3	9	HS	3	1	3	MR
AUKS 234	3	3	3	MR	1	1	1	R	5	0	5	MS	1	3	3	MR	1	1	1	HR
NRC 263	3	0	3	MR	1	5	5	MS	5		5	MS	9	7	9	HS	7	5	7	S
AS 47	3	1	3	MR	3	5	5	MS	5	5	5	MS	7	5	7	S	1	1	1	HR
JS 20-34 (C)	3	3	3	MR	7	5	7	S	3	3	3	MR	3	3	3	MR	3	3	3	MR
DLSb 40	1	0	1	HR	NG	NG			7	-	7	S	NG	NG			5	3	5	MS
AUKS 238	1	3	3	MR	3	1	3	MR	0	0	0	HR	3	5	5	MS	1	1	1	HR
AVT I (Early) and AVT II (Early)																				
PS 1569	3	3	3	MR													3	3	3	MR
NRC-165	5	3	5	MS													1	3	3	MR
JS 22-12	1	1	1	HR													1	1	1	HR
JS 22-16	3	1	3	MR													1	0	1	HR
JS 22-18	1	0	1	HR													0	1	1	HR
RVSM 2012-4	3	5	5	MS													3	1	3	MR
NRC 181	3	NG	3	MR													3	NG	3	MR
JS93-05 (c)	3	3	3	MR													9	9	9	HS
JS20-29 (c)	5	5	5	MS													3	1	3	MR
DSB21 (c)	5	3	5	MS													5	5	5	MS

Table 4.4.2: PP3 (a). Reaction of CIVT (E), AVT I (E) and AVT II (E) entries for various diseases of Central zone

Entry	CR								MLS			
	Jabalpur				Amravati				Sehore			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (Early)												
KDS 1271	7	5	7	S	0	0	0	HR	0	1	1	R
NRC 261	3	5	5	MS	0	0	0	HR	7	5	7	S
RVS 15-1	0	0	0	AR	0	0	0	HR	7	7	7	S
MAUS 820	3	3	3	MR	0	0	0	HR	5	7	7	S
DS 1550	3	7	7	S	0	0	0	HR	7	7	7	S
NRC 164	9	5	9	HS	0	0	0	HR	0	0	0	HR
AMS 2022-1	7	5	7	S	0	0	0	HR	0	3	3	MR
JS 24-33	0	0	0	AR	0	0	0	HR	0	0	0	HR
NRC 138 (C)	5	3	5	MS	0	0	0	HR	0	0	0	HR
KDS 1275	9	9	9	HS	0	0	0	HR	0	1	1	R
MAUS 749	5	7	7	S	0	0	0	HR	0	0	0	HR
DS 1547	3	3	3	MR	0	0	0	HR	3	1	3	MR
MACS 1779	3	0	3	MR	0	0	0	HR	1	1	1	R
JS 24-25	0	0	0	AR	0	0	0	HR	0	0	0	HR
RSC 11-75	0	0	0	AR	0	0	0	HR	1	1	1	R
AS 26	0	0	0	AR	0	0	0	HR	0	0	0	HR
NRC 141	0	5	5	MS	0	0	0	HR	0	0	0	HR
NRC 152 (C)	0	3	3	MR	0	0	0	HR	0	0	0	HR
AUKS 234	5	9	9	HS	0	0	0	HR	1	0	1	R
NRC 263	5	0	5	MS	0	0	0	HR	0	0	0	HR
AS 47	0	0	0	AR	0	0	0	HR	0	0	0	HR
JS 20-34 (C)	3	0	3	MR	0	0	0	HR	0	0	0	HR

DLSb 40	3	0	3	MR	3	3	3	MR	0	0	0	HR
AUKS 238	5	7	7	S	0	0	0	HR	0	0	0	HR
AVT I (Early) and AVT II (Early)												
PS 1569	0	3	3	MR	0	0	0	HR	0	**0**	0	AR
NRC-165	3	0	3	MR					0	**0**	0	AR
JS 22-12	0	0	0	AR	0	0	0	HR	0	**3**	3	MR
JS 22-16	3	0	3	MR	0	0	0	HR	0	0	0	AR
JS 22-18	0	0	0	AR	0	0	0	HR	0	0	0	AR
RVSM 2012-4	0	3	3	MR	0	0	0	HR	0	0	0	AR
NRC 181	0	NG	0	AR	0	0	0	HR				
JS 23-03	0	0	0	AR	0	0	0	HR	0	0	0	AR
JS 23-09	0	0	0	AR	0	0	0	HR	3	3	3	MR
KDS 1169	0	3	3	MR	0	3	3	MR			0	AR
JS95-60	7	7	7	S	0	0	0	HR			0	AR
JS335 (c)	5	5	5	MS	0	0	0	HR	9	7	9	HS
NRC 130,					0	0	0	HR	0	0	0	AR
NRC 138					0	0	0	HR	0	0	0	AR
NRC-165					0	0	0	HR				
JS-2034 (c)											0	AR

Table 4.4.3: PP3 (a). Reaction of CIVT (E), AVT I (E) and AVT II (E) entries for various diseases of Central zone

CODE	YMV															
	Jabalpur				Indore				Amravati				Kota			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (E)																
KDS 1271	2.50	3.00	3.00	HR	0	0	0	HR	0	0	0	HR	3	2	3	MS
NRC 261	25.00	15.00	25.00	MS	0	1	1	R	0	0	0	HR	5	5	5	HS
RVS 15-1	2.00	0.50	2.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	HR
MAUS 820	45.00	18.00	45.00	S	0	0	0	HR	0	0	0	HR	4	4	4	S
DS 1550	2.50	2.50	2.50	HR	3	0	3	MR	0	0	0	HR	0	0	0	HR
NRC 164	2.00	1.50	2.00	HR	0	0	0	HR	0	0	0	HR	1	0	1	R
AMS 2022-1	45.00	19.00	45.00	S	0	0	0	HR	0	0	0	HR	0	0	0	HR
JS 24-33	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	HR
NRC 138 (C)	7.50	4.00	7.50	R	0	0	0	HR	3	3	3	MR	0	0	0	HR
KDS 1275	42.00	21.00	42.00	S	0	0	0	HR	0	0	0	HR	5	5	5	HS
MAUS 749	86.00	57.00	86.00	HS	0	0	0	HR	0	0	0	HR	5	4	5	HS
DS 1547	0.00	1.50	1.50	HR	1	0	1	R	0	0	0	HR	0	0	0	HR
MACS 1779	2.50	2.00	2.50	HR	3	0	3	MR	0	0	0	HR	0	0	0	HR
JS 24-25	0.00	1.50	1.50	HR	0	0	0	HR	0	0	0	HR	-	0	0	HR
RSC 11-75	18.00	15.00	18.00	MR	1	0	1	R	0	0	0	HR	0	0	0	HR
AS 26	16.00	20.00	20.00	MS	0	0	0	HR	0	0	0	HR	5	5	5	HS
NRC 141	22.00	25.00	25.00	MS	1	0	1	R	0	0	0	HR	4	5	5	HS
NRC 152 (C)	6.50	20.00	20.00	MS	0	0	0	HR	0	0	0	HR	5	5	5	HS
AUKS 234	2.50	3.00	3.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	HR
NRC 263	1.50	2.00	2.00	HR	0	0	0	HR	0	0	0	HR	1	-	1	R
AS 47	25.00	42.00	42.00	S	3	0	3	MR	0	0	0	HR	5	4	5	HS
JS 20-34 (C)	22.00	40.50	40.50	S	0	3	3	MR	3	3	3	MR	5	0	5	HS

DLSb 40	5.50	3.50	5.50	R	0	0	0	HR	0	0	0	HR	4	-	4	S
AUKS 238	0.00	0.00	0.00	HR	0	0	0	HR	0	0	0	HR	0	0	0	HR
AVT I (Early) and AVT II (Early)																
RSC 11-42	3	2	3	HR												
PS 1569	20	8	20	MS					0	0	0	HR				
NRC-165	6	3.5	6	R												
JS 22-12	0	1.5	1.5	HR					0	0	0	HR				
JS 22-16	2	5	5	R					0	0	0	HR				
JS 22-18	0	2	2	HR					0	0	0	HR				
RVSM 2012-4	6	4.5	6	R					0	0	0	HR				
NRC 181	3.5	NG	3.5	HR					0	0	0	HR				
JS 23-03	1.5	0	1.5	HR					0	0	0	HR				
JS 23-09	0	2.5	2.5	HR					0	0	0	HR				
KDS 1169	5.5	9.5	9.5	MR					0	0	0	HR				
JS 95-60	20	7.5	20	MS					0	0	0	HR				
JS335 (c)	17	22	22	MS					5	5	5	MS				
NRC 130,									0	0	0	HR				
NRC 138									0	0	0	HR				
NRC-165									0	0	0	HR				
JS-2034 (c)																

Table 4.4.4. PP3(c) AVT-II Evaluation of breeding materials for resistant donor(s) for NEHZ

CODE	Anth								CR				RAB			
	Jorhat				Medziphema				Jorhat				Medziphema			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
KDS 1096	3	0	3	**MR**	1	0	1	R	3	0	3	**MR**	1	1	1	R
Check JS 20-116	3	3	3	**MR**	1	1	1	R	3	5	5	**MS**	1	0	1	R
DLsb 1	1	0	1	**R**	0	1	1	R	0	1	1	**R**	1	0	1	R
Check RKS 113	0	3	3	**MR**					5	5	5	**MS**				
JS 335 (C)					1	1	1	R					0	1	1	R
MACS 1460 (C)					1	0	1	R					1	1	1	R

Table 4.5: PP4 Performance of the previous year's resistant entries

S.No.	Northern Plain Zone									Northern Hill Zone				Central Zone		
	Pantnagar						Ludhiana			Palampur				Amravati		
	Var.	Year of Test	BLB	RAB	PB	YMV	Var.	YMV	SMV	VHR.	Year of Test	FLS	Anth (Ct)	Var.	Year of Test	CR
1	**2**	**3**	**4**	**5**	**6**	**7**		**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	SL-1068	2nd	HR	R	HR	R	**DSB38**	R	R	KDS 1169	Ist year	HR	MS	MAUS-819	1st	AR
2	SL-1123	2nd	R	MR	HR	R	**JS22-14**	MS	R	KDS 1201	Ist year	HR	S	KDS-1201	1st	AR
3	DS-3108	2nd	HR	HR	HR	R	**NRC28**	MR	MR	PS 1660	1st year	R	HR	KDS-1173	1st	AR
4	PS-1613	2nd	MS	HR	HR	MR	**NRC109**	R	R	PS 1675	1st year	MR	MR	KDS-1169	1st	MR
5	SL-688	2nd	MR	HR	HR	R	**JS20-98**	MS	MR	EC 350664	1st year	HR	HR	RVS-13-7	1st	AR
6	SL-1028	2nd	HR	MR	HR	MR	**PUSA 97-**	R	HR	MAUS 795	1st year	HR	MR	JS-2034	3rd	AR
7	SL-1074	2nd	R	MR	MR	R	**NRC149**	R	R	EC 251895	1st year	MS	HR	JS-2303	2nd	AR
8	MACS-1460	2nd	HR	R	MR	MR	**VLS99**	MR	R	EC 280129	1st year	HR	HR	PS-1660	2nd	AR
9	DS-3101	2nd	HR	R	HR	R	**SL1213**	R	R	EC 308312	1st year	R	HR	NRC-186	2nd	AR
10	MACS-1407	2nd	MR	R	HR	R				EC 291401	1st year	HR	HR	KBS-21-1	1st	AR
11	DS-2705	2nd	R	R	MR	R				KDS 1194	1st year	HR	S	AMS-115	2nd	HR
12	PS-1540	2nd	R	MR	HR	R				EC 357998	1st year	R	MS	AMS-1901	2nd	MR
13	PS-1611	2nd	MS	R	HR	R				EC 393153	1st year	HR	HR	RVS-1315	2nd	HR
14	NRC-137	2nd	HR	MR	HR	R				EC 390981A	1st year	MR	HR	JS-2309	2nd	HR
15	SL-1213	2nd	HR	MR	HR	MR				VLS 99	2nd year	HR	MR	MAUS-818	2nd	HR
16	VLS-63	2nd	R	HR	HR	R				PK 25	2nd year	HR	HR	DLSb-4	2nd	MR
17	SL-1234	2nd	HR	R	HR	R				EC 141117	2ndyear	HR	MS	Dsb-39	2nd	AR
18	VLS-89	2nd	R	HR	HR	MR				UGM 77	2nd year	HR	HR	RVSM-2011-35	2nd	AR
19	NRC-128	2nd	R	R	HR	HR				EC 391181	2nd year	R	HR	AS-40	1st	AR
20	SL-979	2nd	R	R	HR	R				DSb 33	2ndyear	MR	MR	JS-2308	1st	AR
										Harder	2nd year	HR	HR	JS-23-05	2nd	AR

21										ASb 50	3^{rd} Year	HR	R	DS-1312	1^{st}	MR
22										ASb 51	3^{rd} year	R	R	DS-3168	1^{st}	AR
23										AUKS 218	3^{rd} year	HR	MR	DS-3124	1^{st}	AR
24										EC 241778	3^{rd} year	HR	HR	SL1230	2^{nd}	MR
25										Cat 411A	3^{rd} year	HR	R			
26										SKF 6029	3^{rd} Year	HR	HR	HIMSO-1694	1^{st}	AR
27										MACS 1566	3^{rd} year	HR	MR	HIMSO-1693	1^{st}	AR
28										RSC 10-52	4^{th} year	R	R			
29										Himso 1685	6^{th} year	HR	R			
30										JS 20-116	6^{th} year	HR	R			
31										PS 1572	6^{th} year	MR	MR			
32										JS 335 (Check)		MS	S			
33										Shivalik (Check)		HS	MS			

Contd.,

S. No	Central Zone										Southern Zone				
	Jabalpur							Sehore			Dharwad				
	Var.	Year of Test	CR	RAB	YMV Var.	YMV Year of test	YMV	Var.	Year of test	MLS	Var.	Year of Test	Rust	PSS	Anth
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	JS 20-34	10th	HR	MS	JS 20-69	10th	R	AMS 475	4th year	HR	DSb 23	10th	MR	MR	MR
2.	JS 20-98	9th	HR	HR	JS 20-98	9th	R	RVS 2002-4	6th year	HR	DSb 34	5th	MR	MR	MR
3.	JS 20-19	7th	MR	MR	JS 20-20	9th	R	RVS 2001-4	7th year	MR	DSb 21	12th	MS	MR	MR
4.	JS 20-20	7th	AR	MR	JS 21-05	7th	HR	KDS 1169	1st year	HR	KDS 753	8th	S	MR	MR
5.	JS 20-96	6th	MR	MR	JS 21-17	6th	HR	PS 1675	1st year	MS	EC 242104	10th	MR	MR	MR
6.	JS 21-17	6th	MR	MR	PS 1611	5th	HR	NRC 186	1st year	HR	EC 241780	14th	MR	MR	MR
7.	JS 21-05	5th	AR	HR	PS 1613	5th	MS	NRC 202	1st year	MS	EC 241778	14th	MR	MR	MR
8.	AMS 264	5th	MR	MS	NRC 129	5th	HR	NRC 165	1st year	HR	DSb 32	8th	MS	MR	MR
9.	JS 21-72	5th	AR	HR	DS 3106	5th	HR	AS 40	1st year	HR	EC 251409	3rd	MR	MR	MR
10.	MACS 1566	4th	MR	MR	DS 3109	5th	HR	BAUS (M) 3	1st year	MS	DLSb-1	2nd	MS	MR	MR
11.	NRC 166	4th	HR	MR	JS 21-72	5th	R	NRC 195	1st	HR	DLSb -2	2nd	MS	MR	MR

									year						
12.	JS 22-01	4th	AR	MR	PS 1637	4th	MR				DSb 40	1st	MS	MR	MR
13.	NRC 154	4th	MS	MR	JS 21-75	4th	R				KDS 726	4th	MS	MR	MR
14.	RSC 11-22	4th	MS	MR	NRC 166	4th	MR				DSb 30-2	8th	S	MR	MR
15.	DS 1318	4th	MR	MR	JS 22-03	4th	HR								
16.	JS 22-12	3rd	AR	MR	NRC SL 1	4th	HR								
17.	JS 22-14	3rd	S	MS	RVS 2011-76	4th	HR								
18.	JS 22-16	3rd	MR	MR	RSC 11-20	4th	MR								
19.	JS 22-18	3rd	AR	HR	PS 1641	4th	MR								
20.	KDS 1073	3rd	AR	HR	SL 955	4th	HR								
21.	NRC 186	3rd	AR	MR	JS 22-12	3rd	HR								
22.	PS 1661	3rd	AR	MS	JS 22-16	3rd	R								
23.	RVS 2011-10	3rd	AR	MR	JS 22-18	3rd	HR								
24.	JS 23-09	2nd	AR	MR	NRC 186	3rd	R								
25.	JS 23-03	2nd	AR	HR	PS 1670	3rd	HR								
26.	NRC 197	2nd	HS	MR	RVSM 2012-04	3rd	MS								
27.	NRC 196	2nd	AR	MR	RVSM 2012-11	3rd	HR								
28.	RVSM 2012-4	2nd	MS	HR	NRC 197	2nd	MR								
29.	NRC 181	2nd	MR	MR	NRC 196	2nd	HR								
30.	RVS 13-7	2nd	AR	MR	NRC 201	2nd	R								
31.	NRC 201	2nd	MS	MR	NRC 202	2nd	HR								
32.	PS 1689	2nd	HS	MR	PS 1689	2nd	HR								
33.	NRC 189	2nd	MR	HR	PS 1682	2nd	R								
34.	RSC 11-48	2nd	AR	MR	SL 1282	2nd	R								
35.	NRC 192	2nd	AR	HR	RVSM 2012-11	2nd	HR								
36.	NRC 190	2nd	AR	HR	RSC 11-42	2nd	MR								
37.					RVS 2011-76	2nd	HR								
38.					NRC 189	2nd	HR								

Table 4.6.1: PP5. Evaluation of germplasm lines for identification of multiple disease resistant sources

S.N		Palampur			Jabalpur			Indore		Pantnagar			
	Genotype	FLS	PB (ct)	BS	YMV	CR	RAB	Anth	CR	RAB	Anth	BLB	YMV
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	**EC 251682**	MR	R	MS	R	MR	HR	MR	S	R	HR	MR	R
2	**EC 251827**	MR	R	MR	MR	AR	MS	MS	HS	NG	NG	NG	NG
3	**EC 251865**	MS	HR	MS	HR	S	MR	MR	S	HR	HR	MR	MR
4	**EC 251861**	MR	MR	MR	HR	S	MR	MS	S	HR	HR	MS	HR
5	**EC 251541**	S	MR	MR	MR	MS	MS	MR	MS	HR	HR	MR	MR
6	**EC 251876**	MR	MS	MR	MR	S	MS	MS	S	HR	HR	MR	R
7	**EC 254755**	MS	MR	MR	MR	HS	MS	R	MR	HR	HR	R	R
8	**EC 280129**	MR	R	MR	MR	MR	MS	NG	NG	HR	HR	HR	R
9	**EC 280148**	NG	NG	NG	Not Germinated			MR	MS	NG	NG	NG	NG
10	**EC 20149**	MR	MR	MR	MS	MR	MR	MR	HS	HR	HR	MR	MR
11	**EC 281462**	MS	MR	MR	MS	R	MR	R	MR	HS	HR	R	NR
12	**EC 287466**	MR	MS	MR	HR	MR	MS	MR	S	HR	HS	R	R
13	**EC 287469**	MS	MR	MS	S	MR	MR	MR	MS	HR	HR	R	R
14	**EC 289099**	MR	MR	MR	MS	MR	HR	MR	MS	HR	HR	MR	R
15	**EC 291401**	R	MR	MS	MR	MR	MS	MR	HS	HR	HR	MR	MR
16	**EC 308312**	HR	R	MR	MS	MR	MR	MR	S	HR	HR	MR	HR
17	**EC 309512**	MR	MR	MR	S	MR	MR	MR	MS	HS	HR	HR	R
18	**EC 309537**	MR	MR	MR	MS	MR	MR	MR	MS	HR	HR	R	R
19	**EC 309538**	MS	S	MS	S	MR	MR	MR	MS	R	HR	R	R
20	**EC 313915**	NG	NG	NG	MS	R	MR	R	MR	HS	HR	R	HR
21	**EC 313976**	NG	NG	NG	Not Germinated			MR	HS	MS	HR	R	MS
22	**EC 333888**	MS	R	MR	MR	MR	MS	MR	S	HR	HR	R	R

23	**EC 325098**	MR	R	MR	R	MR	MR	MR	HS	MS	HR	R	R
24	**EC 325103**	MS	MS	MS	S	MR	MS	MR	MS	HR	HR	MR	MR
25	**EC 333875**	MS	MR	MS	MR	AR	HR	MR	S	HS	HR	MR	R
26	**EC 333879**	MS	MR	MR	S	MS	HR	MR	S	HR	HR	MR	R
27	**EC 333880**	MR	R	MR	R	HS	MR	MS	S	HR	HR	MR	MR
28	**EC 333876**	MS	MS	MS	R	MR	MS	R	MS	MS	HR	HR	R
29	**EC 333892**	MR	R	MS	S	MS	HR	MR	S	HR	HR	MR	MR
30	**EC 333929**	R	MS	MR	HR	MS	HR	MR	MS	HR	HR	NG	HR
31	**EC 340506B**	R	MR	MS	MS	MS	MR	MR	MS	HR	HR	R	MS
32	**EC 343312**	MR	R	MR	R	S	MR	MR	MS	HR	HR	HR	R
33	**EC 350664**	MR	MR	MR	MS	MS	MR	MR	MR	HR	HR	HR	MR
34	**EC 357998**	NG	NG	NG	Not Germinated					NG	NG	NG	NG
35	**EC 383165**	R	MR	MS	S	MS	HR	MR	S	HR	HR	R	R
36	**EC 389149**	MS	HS	MR	MS	AR	HR	MR	MS	HR	HR	MR	MR
37	**EC 389148**	NG	NG	NG	Not Germinated					NG	NG	NG	NG
38	**EC 389153**	NG	NG	NG	S	MS	MR	NG	NG	NG	NG	NG	NG
39	**EC 389154**	MR	MR	MS	HS	S	MS	MR	HS	HR	HR	R	R
40	**EC 389160**	R	HS	MS	MS	AR	HR	MR	MS	MS	HR	MR	HR
41	**EC 389170**	S	MS	MR	S	S	MR	MR	MS	R	HR	HR	R
42	**EC 389170**	NG	NG	NG	MS	MS	MR	NG	NG	NG	NG	NG	NG
43	**EC 389174**	R	HR	MR	MS	HS	MR	MR	MR	NG	NG	NG	NG
44	**EC 389198**	MR	R	MR	MS	S	MR	MS	MS	NG	NG	NG	NG
45	**EC 390981 A**	R	R	MR	MR	S	MS	R	R	R	HR	HR	MR
46	**EC 393228**	NG	NG	NG	Not Germinated			R	R	NG	NG	NG	NG
47	**EC 396059**	NG	NG	NG	Not Germinated			MR	MR	NG	NG	NG	NG
48	**EC 457216**	MS	MR	MR	HS	HS	MS	MR	MR	MS	HR	MR	MR
49	**EC 457366**	MS	MS	MR	MR	AR	MR	R	R	NG	NG	NG	NG
50	**EC 458350**	MS	MR	MR	S	MS	S	R	R	NG	NG	NG	NG

Table 4.6.2: PP 5: Screening of germplasm lines for multiple disease resistance at Dharwad

SlNo.	Genotypes	Rust(0 to 9 scale)	Rust reaction	PSS(0-9)	Reaction to PSS	Pod blight(0-9)	Reaction to PB
1	EC 251827	7	S	3	MR	5	MS
2	EC 383165	7	S	3	MR	5	MS
3	EC 389149	5	MS	3	MR	3	MR
4	EC 457366	7	S	3	MR	5	MS
5	EC 458350	9	HS	3	MR	5	MS
6	EC 251541	5	MS	3	MR	3	MR
7	EC 357998	7	S	3	MR	5	MS
8	EC 389170	7	S	3	MR	5	MS
9	EC 291401	5	MS	3	MR	3	MR
10	EC 389174	7	S	3	MR	5	MS
11	JSM 195	9	HS	3	MR	3	MR
12	JSM 232	9	HS	3	MR	5	MS
13	SL 525	9	HS	3	MR	5	MS
14	SL (E) 1	7	S	3	MR	5	MS
15	MACS 171	9	HS	3	MR	5	MS
16	AMS 108	9	HS	3	MR	5	MS
17	AMSS 34	7	S	3	MR	5	MS
18	EC 113778	9	HS	3	MR	5	MS
19	EC 232019	7	S	3	MR	5	MS
20	Harder	7	S	3	MR	5	MS
21	JS 20-41	7	S	3	MR	5	MS
22	JS 20-48	9	HS	3	MR	5	MS
23	JS 20-50	9	HS	3	MR	5	MS
24	JS 20-51	7	S	3	MR	5	MS
25	JS 20-53	7	S	3	MR	5	MS
26	JS 20-55	9	HS	3	MR	5	MS
27	JS 20-59	7	S	3	MR	5	MS
28	JS 20-61	9	HS	3	MR	3	MR
29	JS 20-86	7	S	3	MR	5	MS
30	MAUS 142	9	HS	3	MR	5	MS
31	PS 1423	7	S	3	MR	5	MS

Table 4.7.1: PP6 Biological management of major diseases of soybean Centre Sehore

Treatment	chemicals	Field stand (%)	Disease severity (%)	Plant ht(cm)	No. of branches / plant	No. of pods / plant	100 seed weight (g)	Seed yield (q/ha)
T1	Seed and foliar application of *Panibacillusmacrens*	81.69	**0**	43.20	2.81	43.36	10.93	1270.38
T2	Seed and foliar application of B*acillus thuringiensis*	81.41	**0**	43.86	2.86	43.55	11.73	1279.64
T3	Seed and foliar application of B*acillus EF 53*	80.91	**0**	41.77	2.87	43.93	11.60	1268.53
T4	Seed and foliar application of B*acillus EF 111*	80.78	**0**	43.06	2.71	42.59	11.67	1270.38
T5	Seed and foliar application of *Tricodermaviride*	80.28	**0**	45.32	2.54	42.36	11.47	1216.67
T6	Seed and foliar application of *Psuedomonasflurescence*	79.50	**0**	42.96	2.50	43.37	11.33	1224.08
T7	Untreated control	79.41	**0**	40.34	2.54	40.97	11.27	1233.34
	SE(m)	NS	**NS**	NS	NS	NS	NS	NS

NOTE: This year no disease appeared in the trial even in the control.

Table 4.7.2: PP6 Per cent disease severity of POD BLIGHT/ANTHRACNOSE under biologicalmanagement of major diseases of soybean, Centre: INDORE

Treatment		Anthracnose PDI %				no. of pod/ plant	test weight	pod weight	plant height	yield
		30 DAS	45 DAS	60DAS	AUDPC					
T1	Seed and foliar application of *Panibacillusmacrens*	9.00	23.33	73.33	1035.0	35.60	13.67	9.93	32.63	1453.91
T2	Seed and foliar application of *Bacillus thuringiensis*	11.67	31.67	81.67	1262.5	28.27	13.67	8.93	32.60	1547.74
T3	Seed and foliar application of *Bacillus sp.* EF 53	6.33	21.67	56.67	845.0	28.40	12.00	7.20	31.73	1605.76
T4	Seed and foliar application of *Bacillus sp.* EF 111	10.00	40.00	68.33	1262.5	33.60	1 2.00	10.07	31.97	1756.79
T5	Seed and foliar application of *Trichodermaviridae*	10.00	25.00	76.67	1100.0	30.20	13.33	8.73	33.67	2090.95
T6	Seed and foliar application of *Pseudomonas fluorescence*	20.00	36.67	68.33	1362.5	32.27	13.00	9.07	37.40	1816.46
T7	Untreated control	23.33	41.67	85.00	1612.5	28.80	12.00	8.53	33.57	1738.27
	CD value				151.20	2.93	1.65	1.81	2.20	269.01

Table 4.7.3: PP6 Biological management of major diseases of soybean. Centre: Dharawad

Treatment		Per cent field stand	Per cent root rot complex	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed wt (g)	Rust (PDI)		Pod blight (PDI)		Yield (q/ha.)
								60 DAS	75 DAS	60 DAS	75 DAS	
T1	Seed and foliar application of *Panibacillusmacrens*	89.00	8.00 (16.37)	40.24	5.94	64.25	14.62	54.44 (46.89)	88.47 (70.15)	18.35 (25.36)	33.66 (35.46)	13.60
T2	Seed and foliar application of *Bacillus thuringiensis*	87.40	15.40 (23.02)	39.58	5.60	64.35	14.55	53.66 (47.03)	88.70 (70.35)	26.58 (31.03)	34.66 (36.46)	14.65
T3	Seed and foliar application of *Bacillus sp.* EF 53	91.50	3.80 (11.20)	40.25	5.85	60.21	13.64	53.33 (46.89)	90.25 (71.35)	33.66 (35.46)	33.66 (35.46)	13.65
T4	Seed and foliar application of *Bacillus sp.* EF 111	90.20	5.80 (13.88)	41.25	5.60	62.55	13.20	53.33 (46.89)	91.35 (73.35)	11.11 (19.47)	34.66 (36.46)	13.50
T5	Seed and foliar application of *Trichodermaviridae*	95.60	1.90 (7.89)	42.60	6.12	66.21	13.28	52.56 (46.03)	88.47 (70.15)	14.54 (22.41)	34.56 (36.00)	14.65
T6	Seed and foliar application of *Pseudomonas fluorescence*	93.70	2.50 (9.07)	41.80	5.94	64.55	13.28	53.56 (47.03)	86.47 (68.32)	18.35 (25.36)	39.29 (38.81)	13.75
T7	Untreated control	84.21	12.35 (20.14)	38.25	5.25	53.70	12.60	55.63 (48.03)	94.88 (76.25)	38.78 (38.51)	36.78 (37.51)	**12.56**
	S.Em±	**1.98**	**0.38**	0.36	0.31	0.45	0.17	**NS**	**NS**	**NS**	**NS**	**NS**
	CD (0.05)	**5.50**	**1.16**	1.02	1.10	1.43	0.55					

***Arc sine transformed values**

Table 4.7.4: Effect of various biological agents on severity of soybean diseases during 2022 Centre: Jabalpur

Treatments		Field Stand (%)	Charcoal rot		RAB		Anthracose/pod blight		Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Seed yield (kg/ha
			Incidence (90 days)	AUDPC	PDI (90 days)	AUDPC	PDI (90 days)	AUDPC					
T1	Seed and foliar application of *Panibacillusmacrens*	75.13	9.33	105.00	17.86	258.02	14.52	231.11	54.27	2.70	28.07	11.07	1495.4
T2	Seed and foliar application of *Bacillus thuringiensis*	74.62	11.00	127.50	20.45	299.69	14.96	245.55	52.77	2.53	27.10	10.87	1319.4
T3	Seed and foliar application of *Bacillus sp.* EF 53	74.10	12.00	140.00	20.74	301.85	15.41	266.66	51.93	2.47	26.50	11.03	1333.3
T4	Seed and foliar application of *Bacillus sp.* EF 111	73.08	13.33	155.00	20.29	300.92	15.26	274.44	52.47	2.53	26.17	10.90	1305.6
T5	Seed and foliar application of *Trichodermaviridae*	78.72	9.00	92.50	17.90	267.59	12.44	222.22	54.20	2.77	28.30	11.13	1537.0
T6	Seed and foliar application of *Pseudomonas fluorescence*	76.41	10.67	125.00	18.07	269.44	13.63	240.00	55.27	2.70	28.00	11.10	1472.2
T7	Untreated control	71.28	15.00	177.50	22.26	340.74	17.19	296.66	49.83	2.43	25.47	10.70	1268.5
	CD (P=0.05)	NS	3.658	NS	2.149	32.597	1.679	37.925	2.771	**NS**	1.643	0.236	105.916
	SE(m)	1.486	1.174	21.189	0.690	10.463	0.539	12.173	0.890	0.083	0.527	0.076	33.997

Dose of Seed treatment = 5 g/ml/kg seed, Dose of foliar application treatment = 10 g/ml/litre water

*AUDPC was calculated based on the diseases severity/incidence at 45, 60, 75 and 90 days after sowing

Table 4.7.5: Per cent disease severity of POD BLIGHT/ANTHRACNOSE under biologicalmanagement of major diseases of soybean, Centre: Jorhat

Treatment		% Field Stand	% Disease severity			AUDPC	Plant ht (cm),	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Seed yield (q/ha)
			45 DAS	60 DAS	75 DAS						
T1	Seed and foliar application of *Panibacillusmacrens*	50	15.5	30.21	39.52	1162.05	58	6	58	12.52	0.49
T2	Seed and foliar application of B*acillus thuringiensis*	50	20.8	30.1	34.52	1247.4	64	7	73	15.27	0.60
T3	Seed and foliar application of B*acillus EF 53*	50	10.8	13.2	15.33	564.975	63	7	79	14.33	0.56
T4	Seed and foliar application of B*acillus EF 111*	50	14.2	20.6	24.52	795.9	60	6	67	14.50	0.56
T5	Seed and foliar application of *Tricodermaviride*	50	12.7	20.5	25.23	799.725	57.5	6	54	13.51	0.52
T6	Seed and foliar application of *Psuedomonasflurescence*	50	15.5	23.4	27	966	60	6	57	14.33	0.54
T7	Untreated control	50	35.4	41.2	48.32	1736.4	55.5	6	52	11.11	0.42

Table 4.7.6:Per cent disease severity of COLLAR ROT under biologicalmanagement of major diseases of soybean, Centre: Jorhat

Treatment		% Field Stand	% Disease severity			AUDPC	Plant ht (cm),	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Seed yield (q/ha)
			45 DAS	60 DAS	75 DAS						
T1	Seed and foliar application of *Panibacillu smacrens*	50	16.7	32.4	22.22	1105.65	58	6	58	12.52	0.49
T2	Seed and foliar application of B*acillus thuringiensis*	50	13.1	21.7	25.52	848.4	63	7	79	14.33	0.56
T3	Seed and foliar application of B*acillus EF 53*	50	11.6	15.9	23.33	722.475	64	7	73	15.27	0.60
T4	Seed and foliar application of B*acillus EF 111*	50	15.3	22.9	25.74	976.05	60	6	67	14.50	0.56
T5	Seed and foliar application of *Tricodermaviride*	50	23.4	32.5	14.44	1194.3	57.5	6	54	13.51	0.52
T6	Seed and foliar application of *Psuedomona sflurescence*	50	16.7	22.8	18.33	909.975	60	6	57	14.33	0.54
T7	Untreated control	50	37.9	42.8	38.00	1645.5	55.5	6	52	11.11	0.42

Table 4.7.7:Biological management of major diseases of soybean. Centre: Pantnagar

Treatment		Dosage (g/ml/kg seed)	%Field Stand	Disease severity at 45 DAS	Disease severity at 60 DAS	Disease severity at 75 DAS	AUDPC	Plant height (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (grams)	Seed Yield (q/ ha)
T1	Seed and foliar application of *Panibacillu smacrens*	5	91.82	9.25	29.58	51.08	604.95	54.6	6.4	55.0	7.7	20.88
T2	Seed and foliar application of *Bacillus thuringiensis*	5	89.22	8.24	26.50	49.35	568.875	61.7	6.2	52.0	7.7	23.33
T3	Seed and foliar application of *Bacillus* sp. EF 53	5	92.03	6.59	22.48	47.49	524.775	56.9	6.5	54.7	7.7	20.66
T4	Seed and foliar application of *Bacillus* sp. EF 77	5	87.67	5.52	20.50	42.23	470.475	57.8	6.6	56.0	7.7	19.11
T5	Seed and foliar application of *Trichoderma viridae*	5	94.00	2.16	13.16	29.50	319.95	69.7	7.4	57.0	7.7	23.78
T6	Seed and foliar application of *Pseudomonas fluorescence*	5	93.67	3.85	15.24	35.82	382.95	65.9	7.0	53.0	7.7	23.11
T7	Untreated control	-	79.83	12.75	39.45	61.45	756.75	50.5	5.5	44.3	7.7	20.22

Table 4.7.8: Biological management of major diseases of soybean Centre: Palampur

Treatment		Frogeye leaf spot (*Cercosporasojina*)						Pod blight/Anthracnose (*Colletotrichumtruncatum*)			Pl. Height (cm)	No. of branches/pl	Pods/ Pl	100 seed wt(g)	Yield q/h
			PDI (%)				AUDPC	PDI(%)		AUDPC					
		Field stand (%)	15th Aug.	31st Aug.	15th Sept.	30th Sept		15th Sept	30th Sept.						
T1	Seed and foliar application of *Panibacillusmacrens*	93.3	5.18	10.74	25.91	32.22	830.20	9.18	22.32	236.25	82.60	2.73	42.60	13.17	13.25
T2	Seed and foliar application of *Bacillus thuringiensis*	93.4	5.18	11.11	22.21	36.29	810.75	9.99	22.54	244.00	82.80	2.80	39.20	13.22	12.86
T3	Seed and foliar application of *Bacillus* sp. EF 53	95.5	4.81	10.74	24.43	34.44	821.83	10.29	22.54	246.22	80.13	2.67	36.60	13.05	14.36
T4	Seed and foliar application of *Bacillus* sp. EF 77	94.3	5.18	11.48	22.88	34.43	812.48	6.29	18.73	187.63	84.73	2.67	41.33	13.24	14.97
T5	Seed and foliar application of *Trichodermaviridae*	94.9	4.81	10.00	25.18	36.65	838.55	8.25	20.72	217.30	80.40	2.53	37.27	13.11	12.46
T6	Seed and foliar application of *Pseudomonas fluorescence*	93.4	5.92	11.11	23.69	34.44	824.60	8.03	20.99	217.7	80.53	2.73	39.40	13.18	12.88
T7	Untreated control	88.9	8.88	21.46	37.38	45.88	1293.38	11.00	31.21	316.55	78.60	2.60	39.60	12.97	11.84
	CD	3.710				6.753	121.649		2.184	69.307	NS	NS	NS	NS	1.705

Seed treatment @ 5g/ kg seed

Two foliar sprays @ 10g/L were appliedafter 40 DAS and 55 DAS

Table 4.8.1: PP7 Correlation coefficient (r) values between intensity of corynospora leaf spot and various weather parameters at Sehore center

Year	Weather parameter	Correlation coefficient	Test of significance	Regression equation
2022	Rain fall	-0.443	-1.106	Var2=(-1.429)x168,702+var1+140.851
	Max. Temp.	0.720	2.32	Var2= (0.037)x 29.60+var1+1.737
	Min. Temp	-0.212	-0.486	Var2=(-0.005)x22.98+var1+1.062

Table 4.8.2: PP7 Correlation co-efficients of Rhizoctonia aerial blight disease index in relation to weather variables during disease period in 2022at Pantnagar center

Cultivars	**Environmental variable**				
	Min temp	**Max temp**	**RH (%)**	**Rainfall**	**No. of rainy days**
JS-95-60	-0.69	-0.93	-0.65	-0.16	0.11
JS 335	-0.72	-0.90	-0.14	-0.58	0.18
Shivalik	-0.72	-0.87	-0.15	-0.56	0.22
JS 93-05	-0.75	-0.88	-0.13	-0.52	0.22
Punjab 1	-0.75	-0.88	-0.08	-0.54	0.21
PK 472	-0.74	-0.89	-0.10	-0.55	0.19
PK 262	-0.70	-0.87	-0.17	-0.58	0.20
Monetta	-0.74	-0.88	-0.12	-0.54	0.22
NRC 7	-0.70	-0.87	-0.16	-0.58	0.22

Table 4.8.3: PP7 Multiple regression analysis for prediction of Rhizoctonia aerial blight on different cultivars of soybean during 2022

Cultivars	Prediction equation	R^2
JS-95-60	$y = 191.368 + 0.302x_1 - 2.927x_2 - 0.896x_3 + 0.384x_4 + 0.610x_5$	0.900
JS 335	$y = 225.862 + 1.168x_1 - 5.571x_2 - 1.391x_3 + 0.056x_4 + 0.960x_5$	0.881
Shivalik	$y = 122.685 + 1.302x_1 - 4.899x_2 - 0.900x_3 + 0.642x_4 + 0.043x_5$	**0.876**
JS 93-05	$y = 114.547 + 1.748x_1 - 5.546x_2 - 0.907x_3 + 0.811x_4 + 0.041x_5$	**0.868**
Punjab 1	$y = 108.265 + 0.182x_1 - 5.975x_2 - 0.663x_3 + 0.539x_4 + 0.044x_5$	**0.859**
PK 472	$y = 132.166 + 0.719x_1 - 4.917x_2 - 0.653x_3 + 0.509x_4 + 0.037x_5$	**0.866**
PK 262	$y = 146.164 + 0.536x_1 - 3.456x_2 - 0.952x_3 + 0.169x_4 + 0.053x_5$	**0.864**
Monetta	$y = 172.604 + 0.283x_1 - 3.921x_2 - 0.940x_3 + 0.082x_4 + 0.064x_5$	**0.867**
NRC 7	$y = 157.252 + 0.674x_1 - 3.742x_2 - 1.014x_3 + 0.118x_4 + 0.066x_5$	**0.871**

Table 4.8.4: PP7: Correlation co-efficients of charcoal rot (%) disease index in relation to weather variables during disease period in 2022at Jabalpur center

Cultivars		Environmental variable			
	Min temp	Max temp	RH (%) morning	RH (%) Evening	Rainfall
JS 335	0.123	-0.838	-0.151	-0.527	-0.697
PK 472	0.146	-0.825	-0.183	-0.514	-0.679
Shivalik	0.110	-0.814	-0.134	-0.473	-0.699
Monetta	0.160	-0.787	-0.207	-0.454	-0.660
NRC 7	0.202	-0.848	-0.254	-0.628	-0.545
PK 262	0.171	-0.854	-0.218	-0.602	-0.668
JS 95-60	0.302	-0.364	-0.512	-0.001	-0.561
Punjab 1	0.42	-0.826	-0.180	-0.516	-0.685
JS 93-05	0.192	-0.761	-0.375	-0.337	-0.680
Bragg	0.125	-0.822	-0.149	-0.503	-0.690

Table 4.8.5:PP7:Multiple regression analysis for prediction of charcoal rot (%) on different cultivars of soybean during 2022

Cultivars	Prediction equation	R^2
JS 335	$y= -264.116 + 11.361x_1 - 10124x_2 + 2.583x_3 + 0.953x_4 - 0.006x_5$	**0.90**
PK 472	$y= -658.122 + 24.263x_1 - 30.223x_2 + 5.450x_3 + 1.975x_4 - 0.024x_5$	**0.89**
Shivalik	$y= -225.219 + 9.260x_1 - 12.962x_2 + 2.105x_3 + 0.859x_4 - 0.005x_5$	**0.88**
Monetta	$y= -1339.509 + 46.901x_1 - 54.811x_2 + 10.067x_3 + 4.082x_4 - 0.078x_5$	**0.90**
NRC 7	$y= -237.670 + 10.804x_1 - 14.184x_2 + 2.116x_3 + 0.726x_4 + 0.171x_5$	**0.91**
PK 262	$y= -208.464 + 9.487x_1 - 12.992x_2 + 1.989x_3 - 0.662x_4 + 0.007x_5$	**0.92**
JS 95-60	$y= -761.434 + 21.904x_1 - 33.422x_2 + 7.819x_3 + 2.871x_4 - 0.163x_5$	**0.91**
Punjab 1	$y= -465.982 + 19.595x_1 - 26.577x_2 + 4.192x_3 + 1.577x_4 - 0.004x_5$	**0.98**
JS 93-05	$y= -1976.481 + 66.410x_1 - 78.102x_2 + 15.529x_3 + 5.513x_4 - 0.084x_5$	**0.92**
Bragg	$y= -1399.148 + 49.860x_1 - 62.581x_2 + 11.862x_3 + 4.068x_4 - 0.029x_5$	**0.90**

Table 4.8.6: PP7:Correlation co-efficients of RABdisease index in relation to weather variables during disease period in 2022at Jabalpur center

Cultivars		Environmental variable			
	Min temp	Max temp	RH (%) morning	RH (%) evening	Rainfall
JS 335	0.110	-0.798	-0.121	-0.428	-0.719
PK 472	0.061	-0.801	-0.053	-0.422	-0.720
Shivalik	0.120	-0.	-0.132	-0.431	-0.693
Monetta	0.108	-0.791	-0.108	-0.434	-0.734
NRC 7	0.101	-0.815	-0.107	-0.470	-0.721
PK 262	0.126	-0.842	-0.147	-0.504	-0.695
JS 95-60	0.299	-0.215	-0.520	-0.128	-0.535
Punjab 1	0.119	-0.800	-0.119	-0.462	-0.734
JS 93-05	0.303	-0.358	-0.505	-0.020	-0.522
Bragg	0.170	-0.773	-0.184	-0.458	-0.730

Table 4.8.7: PP7: Multiple regression analysis for prediction of RAB on different cultivars of soybean during 2022at Jabalpur center

Cultivars	Prediction equation	R^2
JS 335	$y= -315.737 + 10.395x_1- 13.606x_2+2.825x_3 + 0.958x_4+ 0.011x_5$	0.99
PK 472	$y= -533.721 + 17.111x_1- 19.922x_2+4.184x_3 + 1.485x_4+0.014x_5$	0.93
Shivalik	$y= -392.523 + 14.079x_1- 18.274x_2+3.350x_3 + 1.342x_4+ 0.007x_5$	**0.98**
Monetta	$y= -503.747 + 17.822x_1- 23.399x_2+4.420x_3+ 1.581x_4- 0.018x_5$	**0.90**
NRC 7	$y= -330.969 + 12.127x_1- 16.357x_2+3.037x_3 + 1.082x_4- 0.012x_5$	**0.89**
PK 262	$y= -251.352 + 9.566x_1- 12.689x_2+2.309x_3+0.737x_4- 0.0x_5$	**0.92**
JS 95-60	$y= -65.499–5.889x_1+3.550x_2+0.608x_3-0.139x_4- 0.105x_5$	**0.91**
Punjab 1	$y= -535.737 + 19.032x_1- 24.863x_2+ 4.733x_3–1.703x_4–0.017x_5$	**0.89**
JS 93-05	$y= 0.309–2.976x_1+1.408x_2+0.819x_3–0.106x_4–0.061x_5$	**0.84**
Bragg	$y= -332.418 + 12.056x_1- 14.962x_2+2.693x_3 + 1.092x_4–0.00x_5$	**0.99**

Table 4.8.8: PP7: Correlation co-efficient of frogeye leaf spot disease index in relation to weather variables during disease period in 2022at Palampur centre

Cultivars	Environmental variable					
	Min temp	Max temp	RH (%) morning	RH (%) evening	Rainfall	No. of rainy days
JS 95-60	-0.553	-0.954	-0.454	-0.736	-0.729	
JS 335	-0.574	-0.977	-0.513	-0.766	-0.670	
Shivalik	-0.596	-0.961	-0.516	-0.761	-0.693	
JS 93-05	-0.473	-0.950	-0.575	-0.824	-0.719	
Punjab 1	-0.578	-0.961	-0.632	-0.779	-0.703	
PK 472	-0.580	-0.953	-0.598	-0.807	-0.581	
PK 262	-0.555	-0.979	-0.573	-0.742	-0.616	
Monetta	-0.574	-0.955	-0.459	-0.753	-0.737	
NRC 7	-0.562	-0.926	-0.450	-0.759	-0.666	

Table 4.8.9: PP7 Multiple regression analysis for prediction of frogeye leaf spot on different cultivars of soybean during 2022at Palampur centre

Cultivars	Prediction equation	R^2
JS 95-60	$y = 68.383 + 1.652x_1 - 8.057x_2 + 0.441x_3 – 0.160x_4 – 0.321x_5$	0.976
JS 335	$y = 231.430 + 0.827x_1 - 12.076x_2 + 0.045x_3 + 0.168x_4 – 0.354x_5$	0.984
Shivalik	$y = 780.537 – 11.691x_1 - 6.450x_2 – 2.385x_3 – 1.145x_4 - 0.911x_5$	**0.982**
JS 93-05	$y = 231.125 – 0.698x_1 - 4.209x_2 – 0.685x_3 – 0.511x_4 - 0.308x_5$	**0.987**
Punjab 1	$y = 721.919 – 10.711x_1 - 4.747x_2 – 2.389x_3 – 1.220x_4 – 0.835x_5$	**0.991**
PK 472	$y = 498.951 – 7.673x_1 – 0.876x_2 – 1.887x_3 – 1.193x_4 – 0.261x_5$	**0.973**
PK 262	$y = 29.161 + 0.852x_1 – 2.889x_2 - 0.018x_3 + 0.074x_4 – 0.033x_5$	**0.973**
Monetta	$y = 328.089 – 3.087x_1 – 8.856x_2 – 0.251x_3 – 3.358x_4 – 0.668x_5$	**0.983**
NRC 7	$y = 79.264 – 0.802x_1 – 1.803x_2 – 0.034x_3 – 0.034x_4 – 0.199x_5$	**0.904**

Table 4.8.10: PP7 Correlation co-efficients of anthracnose/pod blight disease index in relation to weather variables during disease period in 2022at Palampur centre

Cultivars	Environmental variable					
	Min temp	Max temp	RH (%) morning	RH (%) evening	Rainfall	No. of rainy days
JS 95-60	-0.458	-0.964	-0.720	-0.834	-0.964	
JS 335	-0.559	-0.960	-0.601	-0.815	-0.960	
Shivalik	-0.474	-0.931	-0.565	-0.764	-0.913	
JS 93-05	-0.481	-0.955	-0.745	-0.808	-0.955	
Punjab 1	-0.474	-0.949	-0.742	-0.830	-0.949	
PK 472	-0.186	-0.843	-0.714	-0.881	-0.843	
PK 262	-0.427	-0.903	-0.547	-0.755	-0.903	
Monetta	-0.127	-0.819	-0.747	-0.868	-0.922	
NRC 7	-0.309	-0.904	-0.766	-0.876	-0.974	

Table 4.8.11: PP7 Multiple regression analysis for prediction of anthracnose/pod blight on different cultivars of soybean during 2022at Palampur centre

Cultivars	Prediction equation	R^2
JS 95-60	$y= 297.439 + 4.905x_1-1.341x_3- 0.507x4– 13.731x_5$	0.99
JS 335	$y= 416.669–0.842x_1- 0.424x_3–1.285x_4– 12.596x_5$	0.945
Shivalik	$y= 66.491 + 3.728x_1- 0.216x_3– 0.188x_4-8.636x_5$	**0.861**
JS 93-05	$y= 393.600 + 1.512x_1- 2.039x_3–0.403x_4-11.187x_5$	**0.981**
Punjab 1	$y= 218.172 + 0.110x_1- 1.018x_3–0.420x_4– 4.835x_5$	**0.97**
PK 472	$y= -7.186 + 6.669x_1–0.159x_3–0.480x_4– 6.194x_5$	**0.956**
PK 262	$y= -11.354 + 2.181x_1+0.194x_3+ 0.020x4– 3.394x_5$	**0.870**
Monetta	$y= -28.366 + 7.630x_1–0.290x_3–0.340x_4– 6.390x_5$	**0.971**
NRC 7	$y= 167.723 + 6.005x_1–1.107x_3–0.737x_4– 8.631x_5$	**0.981**

Table 4.9.1:PP8 : Estimation of avoidable yield loss due to CR, RAB and Frog eye leaf spot disease in soybean during 2022 Center: Jabalpur

Variety	Treatment	CR		RAB			FLS			Yield (Kg/ha)	Avoidable Yield loss (%)	Yield gain or loss (%)
		Incidence (%)	AUDPC	Incidence (%)	PDI	AUDPC	Incidence (%)	PDI	AUDPC			
JS 20-29												
T1	Seed treatmentwith Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/haat 30 DAS)	17.33	130.00	30.33	12.90	135.64	11.33	3.83	28.70	1150.0	14.50	(-) 11.54
T2	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/haat 30 and 45 DAS)	16.33	122.50	22.33	8.64	100.00	9.67	2.53	18.98	1208.3	18.62	(-) 7.05
T3	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/haat 30, 45 and 60 DAS)	15.67	117.50	12.33	3.64	43.98	7.00	1.23	9.26	1316.7	25.32	(+) 1.28
T4	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/haat 30, 45, 60 and 75 DAS)	14.67	110.00	11.33	3.33	33.33	6.33	1.36	10.18	1369.4	28.20	(+) 5.34
T5	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + water spray	18.00	135.00	41.33	17.22	187.49	16.00	5.19	38.89	1105.6	11.06	(-) 14.96
T6	No spray No seed treatment	27.33	205.00	55.33	20.18	231.94	24.67	9.38	70.37	983.3	-	(-) 24.36
JS 20-98												
T1	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30 DAS)	0.67	5.00	7.67	3.27	24.54	4.67	0.56	4.17	1861.1	9.25	(-) 6.94
T2	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @	0.00	0.00	6.00	2.72	20.37	3.00	0.37	2.78	1877.8	10.06	(-) 6.11

	625 ml/ha at 30 and 45 DAS)										
T3	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30, 45 and 60 DAS)	0.33	2.50	4.00	1.30	9.72	2.33	0.19	1.39	1900.0	11.11	(-) 5.00
T4	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30, 45, 60 and 75 DAS)	0.00	0.00	3.67	1.11	8.33	2.00	0.06	0.46	1961.1	13.88	(-) 1.94
T5	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + water spray	0.67	5.00	9.67	5.00	37.50	5.00	0.93	6.94	1822.2	7.32	(-) 8.89
T6	No spray No seed treatment	1.33	10.00	12.00	6.91	51.85	6.67	1.42	10.65	1688.9	-	(-) 15.56
	CD (p=0.05)	2.619	19.64	2.763	1.305	12.672	2.660	0.542	4.066	88.262	-	-
	SE(m)	0.887	6.65	0.936	0.442	4.293	0.901	0.184	1.377	29.901	-	-

Incidence and PDI= 75 DAS, AUDPC was calculated from PDI values of RAB and FLS at 30, 45, 60 and 75 DAS

Table 4.9.2:PP8: Estimation of avoidable yield loss due to CR, disease in soybean during 2022   Center: Amravati

Sr. NO	Treatments		V1 (JS-335) Kg/ha.	Avoidable Yield Loss (V1) %	V2 (AMS 1002)Kh/ha.	Avoidable Yield Loss(V2)
1	T1	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	1030.12	24.06	1165.22	27.00
2	T2	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	1120.33	30.18	1120.40	24.08
3	T3	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	1190.29	34.28	1210.33	29.72
4	T4	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	1250.30	37.44	1325.66	35.85
5	T5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	951.46	17.78	995.20	14.54
6	T6	No Seed treatment NO Spray i.e Control	782.22	-	850.50	-
	F -Test		SIG.		SIG.	
	SE(m)+-		50.22		55.44	
	CD		152.66		167.33	

Table 4.9.3:PP8: Estimation of avoidable yield loss due to Rust, disease in soybean during 2022   Center: Dharwad

Sub treat.	Main Treat.	30DAS		45 DAS		60 DAS		75 DAS		Yield (q/ha.)		AUDPC		Avoidable yield and loss (%)	
		JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23
T1	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0.00	0.00	14.76 (22.58)	2.76 (9.56)	33.33 (35.24)	4.44 (12.16)	40.74 (39.55)	11.11 (19.46)	1325.66	1666.41	1033.65	176.62	22.05	12.62
T2	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0.00	0.00	13.82 (21.81)	2.83 (9.68)	20.66 (27.02)	4.44 (12.16)	27.66 (31.72)	6.76 (15.06)	1422.46	1717.86	632.62	120.15	27.36	15.23
T3	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0.00	0.00	13.76 (21.77)	2.11 (8.35)	20.66 (27.02)	3.33 (10.55)	16.76 (24.16)	4.76 (12.60)	1534.08	1811.00	630.45	92.47	32.64	19.59
T4	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75	0.00	0.00	10.11 (18.53)	2.81 (9.65)	20.66 (27.02)	3.33 (10.55)	16.76 (24.16)	2.88 (9.77)	1537.33	1971.00	600.45	69.15	32.78	26.12

	DAS														
T5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	0.00	0.00	18.11 (25.18)	7.66 (16.06)	50.11 (45.04)	8.89 (17.02)	77.77 (61.84)	17.88 (25.00)	1281.66	1548.32	1550.48	312.30	19.38	5.95
T6	No Seed treatment NO Spray i.e Control	0.00	0.00	19.26 (26.02)	11.11 (16.06)	55.55 (48.17)	11.11 (19.46)	88.88 (70.49)	18.88 (24.74)	1033.33	1456.18	1774.50	360.97		
Mean				**15.73 (23.27)**	**4.06 (11.12)**	**32.10 (33.57)**	**4.63 (11.13)**	**43.14 (41.11)**	**7.65 (16.58)**	**1355.73**	**1695.33**				
				SEm±	CD @ 5%	SEm±	CD @ 5%	SEm±	CD @ 5%	SEm±	CD @ 5%				
MT				0.45	1.33	1.27	3.75	1.70	5.00	16.08	47.18				
ST				0.78	2.31	2.21	6.50	2.95	8.66	27.86	81.75				
MT x ST				1.11	3.27	3.13	9.19	4.17	12.24	39.40	115.57				
CV				11.24		24.29		25.06		4.21					

Table 4.9.4:PP8. Estimation of avoidable yield loss due to PB(Ct), disease in soybean during 2022 Center: Dharwad

Sub treat.	Main Treat.	30DAS		45 DAS		60 DAS		75 DAS		Yield (q/ha.)		AUDPC		Avoidable yield and loss (%)	
		JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23	JS 335	DSb 23
T1	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0.00	0.00	0.00	0.00	11.33 (19.66)	8.33 (16.77)	28.88 (32.49)	11.11 (19.46)	1325.66	1666.41	594.30	298.28	22.05	12.62
T2	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0.00	0.00	0.00	0.00	16.76 (24.16)	8.88 (17.33)	18.35 (25.35)	8.88 (17.33)	1422.46	1717.86	410.93	199.80	27.36	15.23
T3	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0.00	0.00	0.00	0.00	13.33 (21.41)	7.66 (16.06)	14.55 (22.41)	7.66 (16.06)	1534.08	1811.00	342.30	135.68	32.64	19.59
T4	Seed treatment with Thiophanate Methyl(450g/I)+Pyracl	0.00	0.00	0.00	0.00	11.11 (19.46)	4.28 (11.93)	11.11 (19.46)	5.55 (13.62)	1537.33	1971.00	249.98	106.65	32.78	26.12

	ostrobin 50g/l @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS														
T5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	0.00	0.00	0.00	0.00	23.66 (29.09)	10.11 (18.53)	36.66 (37.25)	14.23 (22.15)	1281.66	1548.32	764.10	376.58	19.38	5.95
T6	No Seed treatment NO Spray i.e Control	0.00	0.00	0.00	0.00	18.83 (25.18)	17.66 (28.84)	40.21 (39.34)	18.88 (25.75)	1033.33	1456.18	876.38	419.85		
Mean						**23.94 (29.29)**	**9.49 (17.58)**	**24.96 (29.39)**	**10.52 (18.65)**	**1355.73**	**1695.33**				
						SEm±	CD @ 5%			SEm±	CD @ 5%				
MT						0.51	1.49	0.78	1.32	15.07	43.18				
ST						0.88	2.59	0.94	2.38	24.86	78.63				
MT x ST						1.25	3.67	1.36	3.42	26.40	85.57				
CV						7.39		5.65		8.95					

Table 4.9.5:PP8: Estimation of avoidable yield loss due to disease in soybean during 2022   Center: Palampur

	Variety/Treatment	PDI of Frogeye leaf spot					PDI of Pod blight			Yield (q/ha)	Avoidable yield loss (%)
		16th Aug	1st Sept	16th Sept	30th Sept	AUDPC	16th Sept.	30th Sept.	AUDPC		
Variety 1: VLS 59											
T 1	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30 DAT	5.18	10.89	21.03	34.80 (36.09	778.60	8.14	22.95 (28.57)	233.23	17.23	25.28
T 2	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30 and 45 DAS	4.44	5.18	18.14	27.95 931.81)	592.75	6.66	18.88 (25.69)	191.55	20.59	10.71
T 3	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30, 45 and 60 DAS	03.33	5.18	7.03	19.25 (25.96)	352.50	4.07	12.96 (21.01)	127.70	22.22	3.64
T 4	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30, 45, 60 and 75 DAS	4.44	5.18	5.92	12.21 ((20.24)	291.40	3.70	7.03 (15.30)	80.48	23.06	-
T 5	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + water spray	4.81	12.22	24.43	38.88 (38.55)	877.40	9.99	23.69 (29.09)	252.65	16.27	29.44
T 6	No seed treatment and no spray	4.44	15.18	31.84	42.21 (40.48)	1055.10	12.22	29.62 (32.95)	313.78	13.88	38.89
Variety-2 (JS 335)											
T 1	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30 DAT	5.92	15.17	29.62	47.02 (43.26)	1068.91	21.00	45.69 (42.49)	500.18	14.39	26.43
T 2	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30 and 45 DAS	5.55	8.14	21.47	37.02 (37.45)	763.45	14.81	27.03 (31.29)	313.75	16.75	14.37

T 3	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30, 45 and 60 DAS	6.29	7.40	10.37	23.69 (29.08)	491.38	10.37	18.14 (25.18)	213.80	17.63	9.87
T 4	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + one sprayTebuconazole @ 625ml/ha at 30, 45, 60 and 75 DAS	6.66	6.66	8.51	16.29 (23.72)	399.66	6.29	10.74 (19.08)	127.70	19.56	-
T 5	Seed treatment with Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed + water spray	7.40	25.17	39.61	55.17 (50.74)	1441.05	28.28	57.01 (49.01)	639.73	12.81	34.51
T 6	No seed treatment and no spray	8.14	31.10	47.76	59.98	1693.78	33.69	60.35 (50.98)	705.28	11.00	43.76
	CD (P=0.05)				A=1.469 B=2.544 A x B= 3.598	A=61.091 B=105.813 AxB= 149.642		A=1.356 B=2.348 AxB= 3.320	A=20.998 **B=**36.37 A xB= 51.435	A= 0.747 B= 1.294	-

Figures in parentheses are angular transformation value, A = main factor (variety), B = Sub-factor (Fungicide treatments)

Seed treatment: Thiophanate methyl + Pyraclostrobin @ 2ml/kg of seed

Foliar spray: Tebuconazole @ 625ml/ha

Table 4.9.6:PP8: Estimation of avoidable yield loss due to diseases RAB, ANT, rust, YMV in soybean during 2022   Center: Medziphema

Varieties/Treatments		Disease incidence (%)								Yield (Kg/ha)	Avoidable yield loss (%)
		RAB				ANTH/PB(Ct.)					
		30DAS	45DAS	60DAS	75DAS	30DAS	45DAS	60DAS	75DAS		
V1: JS 335											
T 1	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0	12.33	15.67	28.67	3.00	9.67	17.00	30.07	1314.00	16.79
T 2	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0	9.00	11.33	21.00	1.67	7.33	11.33	17.33	1378.00	20.66
T 3	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0	8.67	9.67	14.67	2.33	7.33	9.67	11.00	1425.00	23.27
T 4	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	0	6.33	8.67	13.00	1.33	6.33	8.67	10.67	1523.67	28.24
T 5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	0	19.00	32.33	44.33	3.67	10.33	30.33	34.67	1206.67	9.39
T 6	No Seed treatment NO Spray i.e Control	0	23.00	42.33	59.00	6.67	13.00	42.67	59.00	1093.33	
V2: JS 97-52											
T 1	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0	10.33	13.00	20.33	1.00	8.33	15.33	18.67	1815.00	13.66
T 2	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0	7.33	9.67	16.33	1.00	6.00	9.67	13.67	1924.67	18.58

T 3	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0	6.67	8.67	12.33	1.00	5.67	8.00	9.00	2213.00	29.19
T 4	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	0	6.33	8.33	11.33	1.33	5.33	8.33	8.67	2306.67	32.07
T 5	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Water spray	0	11.00	19.67	35.33	1.00	8.67	21.67	27.33	1686.67	7.09
T 6	No Seed treatment NO Spray i.e Control	0	14.67	27.67	46.00	2.33	10.00	22.67	34.33	1567.00	
		CD 5%	CD 5%	CD 5%	CD 5%	CD 5%	CD 5%	CD 5%	CD 5%		
	Variety (V)	0	6.92	15.34	13.91	3.68	10.56	21.76	19.46		
	Treatment (T)	0	5.87	7.84	9.07	3.29	5.62	9.58	12.52		
	VXT	0	8.31	11.08	12.82	4.66	7.95	13.54	17.70		

Table 4.9.7:PP8: Estimation of avoidable yield loss due to diseases RAB, ANT, rust, YMV in soybean during 2022 Center: Medziphema

Varieties/Treatments		Per cent Disease Index								Yield (Kg/ha)	Avoidable yield loss (%)
		RAB				ANTH/PB(Ct.)					
		30DAS	45DAS	60DAS	75DAS	30DAS	45DAS	60DAS	75DAS		
V1: JS 335											
T 1	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0	8.51	13.33	17.03	1.11	8.88	16.29	25.92	1314.00	16.79
T 2	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0	6.66	8.14	10.37	1.11	6.66	10.36	16.66	1378.00	20.66
T 3	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Three	0	6.29	6.66	9.70	1.11	6.29	9.25	13.22	1425.00	23.27

	Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS										
T 4	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	0	5.92	7.03	7.40	0.00	4.81	8.14	11.10	1523.67	28.24
T 5	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Water spray	0	13.33	18.88	18.51	1.48	9.25	12.59	17.03	1206.67	9.39
T 6	No Seed treatment NO Spray i.e Control	0	18.15	22.22	24.07	1.85	12.21	23.33	27.03	1093.33	
V2: JS 97-52											
T 1	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0	5.33	8.51	13.70	1.11	6.29	12.21	16.66	1815.00	13.66
T 2	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0	4.44	6.96	8.15	1.11	3.70	8.88	10.36	1924.67	18.58
T 3	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0	5.92	6.29	9.63	1.11	3.33	8.51	9.25	2213.00	29.19
T 4	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	0	4.70	5.18	6.66	0.74	2.96	7.40	8.51	2306.67	32.07
T 5	Seed treatment with Thiophanate Methyl(450g/I)+Pyraclostrobin 50g/I @ 2 ml / Kg of seed + Water spray	0	5.55	15.18	16.29	1.11	5.92	11.48	12.59	1686.67	7.09
T 6	No Seed treatment NO Spray i.e Control	0	7.03	17.40	18.88	1.11	8.51	17.03	21.11	1567.00	
		CD 5%	CD 5%	CD 5%	CD 5%	CD 5%	CD 5%	CD 5%	CD 5%		
	Variety (V)	0	7.04	2.39	1.76	3.69	2.07	2.43	3.80		
	Treatment (T)	0	4.27	4.54	4.73	1.39	4.27	5.91	4.91		
	VXT	0	6.04	6.42	6.69	1.96	6.04	8.36	6.94		

Table 4.9.8:PP8: Estimation of avoidable yield loss due to disease in soybean during 2022   Center: Indore

S.No	Treatment	Incidence (%) of CR				PDI (%) of Anth				Yield	AYL (%)
		30 DAS	45 DAS	60 DAS	75 DAS	30 DAS	45 DAS	60 DAS	75 DAS		
V1: JS 95-60											
T1	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	0.00	0.00	0.00	16.25	0.00	0.00	0.00	20.45	2187.49	18.42
T2	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0.00	0.00	0.00	12.12	0.00	0.00	0.00	18.00	2228.92	19.93
T3	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0.00	0.00	0.00	12.12	0.00	0.00	0.00	16.66	2488.62	28.29
T4	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	0.00	0.00	0.00	12.12	0.00	0.00	0.00	12.24	2663.38	32.99
T5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	0.00	0.00	0.00	18.66	0.00	0.00	0.00	28.27	1864.62	4.29
T6	No Seed treatment NO Spray i.e Control	0.00	0.00	0.00	22.12	0.00	0.00	0.00	32.12	1784.62	0.00
V2: JS 20-98											
T1	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + One	0.00	0.00	0.00	6.25	0.00	0.00	0.00	20.86	2525.54	20.94

	Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS										
T2	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	0.00	0.00	0.00	4.24	0.00	0.00	0.00	18.66	2758.97	27.63
T3	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	0.00	0.00	0.00	3.65	0.00	0.00	0.00	16.00	3068.31	34.92
T4	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	0.00	0.00	0.00	3.24	0.00	0.00	0.00	12.25	3154.46	36.70
T5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	0.00	0.00	0.00	8.25	0.00	0.00	0.00	22.12	2354.05	15.18
T6	No Seed treatment NO Spray i.e Control	0.00	0.00	0.00	10.00	0.00	0.00	0.00	27.12	1996.72	0.00
	CD @ 5%										
Variety (V)	NS	NS	NS	NS	NS	NS	NS	NS	1.20	37.47	
Treatment (T)	NS	NS	NS	NS	NS	NS	NS	NS	1.05	54.96	
VXT	NS	NS	NS	NS	NS	NS	NS	NS	1.48	60.72	

Table 4.9.9:PP8: Estimation of avoidable yield loss due to RAB disease in soybean during 2022 Center: Pantnagar

	Treatment	Incidence (%)				PDI (%)				AUDPC			Yield kg/ 4.5 m^2 plot	AYL (%)
		30 DAS	45 DAS	60 DAS	75 DAS	30 DAS	45 DAS	60 DAS	75 DAS	45 DAS	60 DAS	75 DAS		
JS 335														
T1	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	3.6	6.35	10.5	18.25	2.38	8.52	16.40	24.75	38.15	87.22	144.02	0.64	14.06
T2	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at	2.4	3.68	7.5	15.10	4.15	11.62	13.25	16.35	55.195	87.045	103.6	0.68	19.12
T3	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	3.85	5.52	8.5	13.42	5.27	10.40	12.54	14.20	54.845	80.29	93.59	0.83	33.73
T4	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	3.29	4.95	7.25	11.52	3.80	5.80	8.32	13.25	33.6	49.42	75.495	0.67	17.91
T5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	6.50	9.20	15.5	21.75	2.18	17.34	25.55	47.80	68.32	150.11	256.72	0.62	11.29
T6	No Seed treatment NO Spray i.e Control	10.25	20.18	26.5	43.5	9.50	19.45	30.26	56.20	101.32	173.98	302.61	0.55	-
JS 20-98														
T1	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + One Foliar spray Tebuconazole @ 625 ml/ha.at 30 DAS	2.71	6.70	11.5	19.25	1.75	6.20	13.45	18.35	27.825	68.775	111.3	1.25	46.4

T2	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Two Foliar sprays Tebuconazole @ 625 ml/ha.at 30 & 45 DAS	1.45	4.50	7.25	13.25	2.40	6.35	11.20	15.70	30.625	61.425	94.15	1.42	52.82
T3	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Three Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 & 60 DAS	2.26	3.00	5.5	10.5	0.58	3.42	8.56	13.50	14.00	41.93	77.21	0.98	32.63
T4	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Four Foliar sprays of Tebuconazole @ 625 ml/ha.at 30 , 45 , 60 & 75 DAS	1.25	2.50	4.75	7.5	1.72	2.65	7.50	10.35	15.29	35.52	62.47	1.27	47.24
T5	Seed treatment with Thiophanate Methyl(450g/l)+Pyraclostrobin 50g/l @ 2 ml / Kg of seed + Water spray	2.80	6.80	12.34	20.15	1.65	5.40	14.45	22.10	24.675	69.47	127.92	0.69	2.89
T6	No Seed treatment NO Spray i.e Control	7.54	11.25	17.5	22.75	6.52	10.42	15.70	27.40	59.29	91.42	150.85	0.67	-

Table 4.9.10:PP8: Estimation of avoidable yield loss due to Collar rot and Anth disease in soybean during 2022 Center: Jorhat

Treatment		Coll. Rot.(DAS) PDI of 10 randomly selected plant				
		PDI				
		30 DAS	45 DAS	60DAS	75DAS	AUDPC
	V1: JS 9305					
T1	Seed treatment + one spray (at 30 DAS)	25.743	21.28	16.30	11.99	1039.80
T2	Seed treatment + two sprays (at 30 and 45 DAS)	23.147	17.86	12.42	9.25	870.75
T3	Seed treatment + three sprays (at 30, 45 and 60 DAS)	20.030	16.06	11.46	7.92	772.68
T4	Seed treatment + four sprays (at 30, 45, 60 and 75 DAS)	16.837	13.17	10.66	7.26	664.33
T5	Seed treatment + water spray	27.543	23.64	14.16	12.10	1070.95
T6	No spray No seed treatment	31.307	26.21	15.74	12.78	1194.73
	V2: JS 335					
T1	Seed treatment + one spray (at 30 DAS)	10.673	7.44	5.48	2.97	376.20
T2	Seed treatment + two sprays (at 30 and 45 DAS)	8.613	5.32	3.77	2.14	281.53
T3	Seed treatment + three sprays (at 30, 45 and 60 DAS)	5.510	3.91	2.41	1.08	185.63
T4	Seed treatment + four sprays (at 30, 45, 60 and 75 DAS)	3.410	2.40	1.56	0.59	114.92
T5	Seed treatment + water spray	12.737	10.27	6.54	3.65	470.68
T6	No spray No seed treatment	14.08	12.25	8.81	6.36	574.70
	Cd= 31.28375					

Table 4.9.11:PP8: Estimation of avoidable yield loss due to Collar rot and Anth disease in soybean during 2022   Center: Jorhat

Treatment		ANTHRACNOSE (DAS) PDI of 10 randomly selected plant				
		PDI				
		30 DAS	**45 DAS**	**60DAS**	**75DAS**	**AUDPC**
V1: JS 9305						
T1	Seed treatment + one spray (at 30 DAS)	0	2.25	21.31	23.11	526.75
T2	Seed treatment + two sprays (at 30 and 45 DAS)	0	1.55	16.17	21.31	425.75
T3	Seed treatment + three sprays (at 30, 45 and 60 DAS)	0	0.85	9.12	12.42	242.80
T4	Seed treatment + four sprays (at 30, 45, 60 and 75 DAS)	0	0.69	6.44	6.22	153.56
T5	Seed treatment + water spray	0	3.49	23.40	29.80	626.93
T6	No spray No seed treatment	0	4.49	24.57	33.85	689.93
V2: JS 335						
T1	Seed treatment + one spray (at 30 DAS)	0	1.59	5.21	5.22	141.23
T2	Seed treatment + two sprays (at 30 and 45 DAS)	0	0.92	4.47	4.10	111.73
T3	Seed treatment + three sprays (at 30, 45 and 60 DAS)	0	0.40	2.51	3.25	68.08
T4	Seed treatment + four sprays (at 30, 45, 60 and 75 DAS)	0	0.00	1.16	0.66	22.35
T5	Seed treatment + water spray	0	2.02	6.99	12.07	225.78
T6	No spray No seed treatment	0	3.59	9.25	16.77	318.48
	CD= 70.59939					

Table 4.9.12:PP8: Estimation of avoidable yield loss due to TLS disease in soybean during 2022   Center: Sehore

Varieties/Treatment		Per cent Brown leaf spot incidence				Yield kg/ha*	Avoidable losses (%)*
		30 DAS*	45 DAS*	60 DAS*	75 DAS*		
V1: JS 95-60							
T1	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30 DAS)	0	23.33 (4.87)	27.89 (5.32)	61.36 (7.86)	1261.11	16.74
T2	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30 and 45 DAS)	0	10.78 (3.34)	10.96 (3.38)	16.41 (4.10)	1577.78	33.45
T3	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30, 45 and 60 DAS)	0	10.89 (3.36)	10.63 (3.33)	11.00 (3.38)	1622.22	35.27
T4	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30, 45, 60 and 75 DAS)	0	10.22 (3.26)	9.33 (3.13)	9.51 (3.16)	1616.66	35.05
T5	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + water spray	0	31.11 (5.61)	66.66 (8.19)	73.00 (8.57)	1255.56	16.37
T6	No spray No seed treatment	0	36.66 (6.08)	64.15 (8.03)	87.15 (9.36)	1050.00	-
V2: JS 20-98							
T1	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30	0	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1850.00	16.82

	DAS)						
T2	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30 and 45 DAS)	0	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1850.00	16.82
T3	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30, 45 and 60 DAS)	0	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1866.66	17.56
T4	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + one foliar spray Tebuconazole 25.9EC @ 625 ml/ha at 30, 45, 60 and 75 DAS)	0	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1881.11	18.19
T5	Seed treatment with Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed + water spray	0	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1577.77	2.46
T6	No spray No seed treatment	0	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1538.89	-
	CD 5%						
	Variety (V)	-	0.30			237.86	
	Treatment (T)	-	0.17			269.15	
	V X T	-	0.42			380.64	

*mean of three replications

**Data in parenthesis are transformed data V1= JS9560, V2= JS 2098 (T1 to T6 as per the technical programme)

Table 4.10.1: PP 9 Evaluation of breeding material of F6 generation hot spot for disease(s) for resistant donor(s) at Pantnagar centre

S.No	Variety	Disease Rating (0-9) scale	CATEGORY
		RAB	
1	AGS 25 x JS 335	5	MS
2	AGS 25 x PS 1042	1	R
3	AGS 25 x PS 1592	1	R
4	CM 60 x PS 1692	1	R
5	Glycine soja x PS 1347	1	R
6	DT 21 x PS 1347	3	MR
7	JS 335 x UPSM 534	3	MR
8	JS 97-52 x PS 1576	3	MR
9	NRC 90 x PS 1556	3	MR
10	PK 515 x UPSM 534	3	MR
11	PK 515 x JS 97-52	1	R
12	PS 1556 x EC 389148	3	MR
13	PS 1584 x SL 979	3	MR
14	PS 1592 x PS 1347	1	R
15	TGX 1681-3F x PS 1347	3	MR
16	KT x Himso 1563	5	MS
17	KT x PK 327	3	MR
18	Bhatt x Himso 1563	7	S
19	TGX 1681-3f x PK 327	1	R
20	TGX 1681-3f x EC 252778	5	MS
21	TGX 1681-3f x VLS 59	3	MR

Table 4.10.2: PP 9 Evaluation of breeding material of F6 generation hot spot for disease(s) for resistant donor(s) at AAU, Jorhat centre

Sl. NO.	Line	Gen.	Coller rot	
			DI	CATEGORY
1	JS 97-52 X AMS 5-18	F4	54.81	S
2	JS 97-52 X AMS 5-18	F4	42.87	MS
3	AMS 5-18 X JS 20-69	F4	41.56	MS
4	JS 20-69 X NRC 128	F4	39.02	MS
5	NRC 128 X JS 20-69	F4	38.77	MS
6	NRC 128 X AMS 5-18	F4	49.03	MS
7	NRC 128 X AMS 5-18	F4	41.83	MS
8	(JS 97-52 X AMS 5-18) x (JS 20-69 X NRC 128)	F3	60.61	S
9	(JS 97-52 X AMS 5-18) x (JS 20-69 X NRC 128)	F3	55.26	MS
10	(JS 97-52 X AMS 5-18) x (JS 20-69 X NRC 128)	F3	54.81	MS
11	(JS 97-52 X AMS 5-18) x (JS 20-69 X NRC 128)	F3	60.87	S
12	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	55.42	MS
13	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	58.76	S
14	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	39.29	MS
15	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	58.64	S
16	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	40.48	MS
17	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	48.28	MS
18	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	36.17	MS
19	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	47.44	MS
20	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	40.28	MS
21	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	46.11	MS
22	(JS 20-69 X NRC 128) x (DS 9712 X AMS 5-18)	F3	50.38	MS

कीट विज्ञान
Entomology

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5. ENTOMOLOGY

Seven entomological field trials were conducted during *kharif* 2022 at **11** coordinated centres viz. Sehore, Parbhani, Kota, Amravati and Indore (Central Zone), Dharwad and Bidar (Southern Zone),Pantnagar, Ludhiana and Delhi (Northern Plain Zone) and Imphal (North Eastern Hill Zone). Trial wise salient findings are presented below:

Ent. 1. Seasonal incidence of insect-pests and their bio-control agents

A. Incidence of insect-pests: The information on incidence of major insect-pests at different coordinating centres is compiled. Total 21 insect spp. infested soybean crop in different zones during *kharif* 2022 at 11 different coordinating centres (Details in table 5.1):

Zone	Insects
North Plain Zone (Pantnagar, Delhi)	*Bemisia tabaci, Obereopsis brevis, S. obliqua, S. litura,* semilooper, ***Melanagromyza sojae*, Aphids**.
North Eastern Hill Zone (Imphal)	*Helicoverpa armigera,* ***Spilarctia obliqua****, A. modicella,* **Aphids**, *M. sojae, Bemisia tabaci, S. litura, C. acuta, Obereopsis brevis,* Bean bug, Thrips.
Central Zone (Sehore, Kota, Parbhani, Amravati)	*Cneorane* spp, *Melanagromyza sojae, Gesonia gemma, Chrysodeixis acuta, Spodoptera litura, Obereopsis brevis, Helicoverpa armigera, Diachrysia orichalcea, Spilarctia obliqua, Hedylepta indicata*, *Bemisia tabaci, Myllo*cerus spp., Grass hopper, Field Crickets.
Southern Zone (Dharwad)	*Melanagromyza sojae*, *Obereopsis brevis*, *S. litura,*, *D. orichalcea*, *Spilarctia obliqua*, *N. viridula*, *Cydia ptychora*, Thrips, Aphids, Jassids, *Bemisia tabaci*, *Myllocerus* spp., *A. modicella, H. indicata*, *Helicoverpa armigera.*

The extent of infestation/damage by major insect-pests at different coordinating centres is given below:

Location	Major insects (infestation / damage)
Pantnagar	Stem fly –13.8% stem tunneling; Aphids – 1.7/ 3 leaves; Defoliation- 17.6% leaf damage at peak incidence.
Sehore	*Gessonia gemma*- 4.8larvae /mrl; *Chrysodeixis acuta*- 6.6 larva /mrl ;Stem fly- 75% infestation with maximum stem tunneling-37.2 %; Girdle beetle - 25.5% infestation; Defoliation- 9.5% at vegetative stage, 16.0% at flowering and 29.0% at peak population.
Parbhani	Girdle beetle – negligible infestation; Stem fly – 34.1% stem tunnelling;Semiloopers – 7.6 larvae/MRL
Kota	Girdle beetle – 30.0% infestation; Semiloopers – 2.3larvae/m; Defoliation –5.0% at flowering and 21.5% at peak larval incidence
Dharwad	*C. ptychora* – 37.4% pod damage
Imphal	*S. obliqua* – 83.3larvae/m; Leaf Webber – 9.3larvae/mrl; *S. litura* – 5.6larvae/m; Defoliation –31.8% ; Aphids – 35.0aphids/plant
Amravati	Stem fly with 60 % infestation.

B. Incidence of Bio-control agents (BCAs): Periodic incidence of natural bio-control agents were recorded in soybean ecosystem. The important ones were; entomopathogenic fungi – *Beauveria bassiana, Nomurea rileyi,* Parasitoids – *Bracon* sp., *Apanteles* sp.,*Cotesia flavipus*; Predators – Spiders, Coccinelids, *Cantheconidia furcellata*. The extent of larval mortality due to bio-control agents (BCAs) is given hereunder (Details in table 5.2):

Location	BCAs	Period	Extent
Sehore	*B. bassiana*	August last week	30-45 % mortality due to *B. bassiana.*
Kota	*Cotesia* Coccinelid beetle Spiders	35th SMW	4.50% parasitisation 1.67 beetle/mrl 1.00 spider/plant
Dharwad	*N. rileyi,* *Apanteles*	September 38th SMW 37thSMW	Upto 22 per cent % larval mortality 6 to 8% parasitisation
Imphal	*N. Rileyi, Metarhizium anisopliae* and *B. bassiana*	--	5 to 10 % larval mortality
Pantnagar	Bacterial infection Virus infection Fungi		47.8% larval mortality 16.1% larval mortality 9.5% larval mortality
Parbhani	*Coccinella* Spiders	36th SMW	2.00/m 3.67/m

Ent. 2. Field screening of AVT-I&II entries for resistance against major insect-pests

AVT-I and -II entries of different zones, along with those found resistant in previous years were screened for insect resistance / tolerance. Further, they were categorized into different resistance categories against individual insect spp. by employing **AICRPS method** and against location specific insect-pest complex by **Maximin - Minimax method.** Information on reaction of different entries against major insect-pests during last three years (2020, 2021 and 2022) was compiled and promising genotypes were identified by using following criteria:

1. Resistance against one or more insect spp. at 3 or more locations in any of the 3 years.
2. Location specific insect-pest complex by **Maximin - Minimax method** (R-HY/S-HY(T) at 3 or more locations in any of the 3 years.

Based on above criteria, lines identified as potential donors for insect resistance / tolerance against specific insect pests are mentioned below (Details in table 5.3 to 5.8):

Insect(s)	Genotype(s)
Stem fly	AMS 100-39.
Girdle beetle	NRC 149.
Defoliators	NRC 149,DLSb 1, NRC 152
PC	KDS 1096, RVS 2011-10, RSC 10-46, AMS 100-39, DSb 33, JS-21-72, NRC 142, NRC 149, NRCSL2, RVSM 2011-35, JS-20-116.

ENT 3: Status of AVT-II entries for antixenosis and antibiosis against *S. litura*

Antixenosis studies have been done on 13 AVT-II entries at Indore and Pantnagar. Among 13genotypes tested, none of the entry exhibited **strong/extreme antixenosis** against *S. litura* (Details in table 5.10)

<u>Antixenosis</u> reaction of AVT-II entries:

S.No.	Genotypes	Pantnagar		Indore	
		C value	Response	C value	Response
1	JS 2218	0.81	Slight antixenotic	0.83	Slight antixenosis
2	JS 2212	0.65	Moderate antixenotic	1.00	Preferred host
3	JS 2216	1.01	Preferred host	1.16	Preferred host
4	RSC 11-35	-	-	0.86	Slight antixenosis
5	PS 1569	0.62	Moderate Antixenotic	1.13	Preferred host
6	NRC 188	-	-	0.95	Slight antixenosis
7	NRC 165	-	-	0.68	Moderate antixenosis
8	RVSM 2012-4	-	-	0.81	Slight antixenosis
9	DLSB 1	0.78	Slight antixenotic	0.81	Slight antixenosis
10	KDS 1096	1.32	Preferred host	0.88	Slight antixenosis
11	JS 9560	-	-	1.00	Preferred host
12	PS 1670	1.12	Preferred host	-	-
13	JS335	Check	Check	-	-

<u>Antibiosis</u> reaction of AVT-II entries

The lowest AD was found in NRC 165 and the lowest ECI and ECD were found in PS 1670. These entries were found good antibiosis reaction (Details in table 5.9)

Sr. no.	Genotype	AD (Approximate Digestibility)		ECI (Efficiency of Conversion of Ingested food)		ECD (Efficiency of Conversion of Digested food)	
		Pantnagar	Indore	Pantnagar	Indore	Pantnagar	Indore
1.	JS 2218	88.74 (0.87)	67.38 (55.17)	16.81 (0.01)	52.92 (46.67)	18.42 (0.45)	79.22 (62.88)
2.	JS 2212	90.19 (0.04)	63.08 (52.58)	27.78 (0.69)	54.09 (47.34)	29.23 (0.50)	87.41 (69.22)
3.	JS 2216	87.32 (0.81)	58.68 (50.00)	20.36 (0.14)	57.94 (49.57)	21.45 (0.17)	98.74 (83.56)
4.	RSC 11-35	-	68.82 (56.06)	-	66.99 (54.93)	-	97.32 (80.57)
5.	PS 1569	91.89 (0.14)	68.87 (56.08)	24.67 (0.16)	55.35 (48.07)	26.39 (0.26)	83.67 (66.17)
6.	NRC 188	-	69.74 (56.63)	-	51.53 (45.87)	-	75.69 (60.46)

7	NRC 165	-	58.53 (49.91)	-	55.54 (48.18)	-	94.85 (76.88)
8	RVSM 2012-4	-	78.48 (62.36)	-	56.92 (48.98)	-	72.87 (58.61)
9	DLSB 1	87.12 (0.86)	62.50 (52.24)	16.67 (0.10)	55.31 (48.05)	18.12 (0.13)	88.80 (70.45)
10	KDS 1096	92.76 (1.68)	61.21 (51.48)	32.17 (0.75)	53.64 (47.09)	35.63 (0.55)	87.81 (69.56)
11	JS 9560	-	69.53 (56.50)	-	57.19 (49.13)	-	82.02 (64.91)
12	PS 1670	89.38 (1.07)	-	14.46 (0.33)		15.58 (0.21)	
13	JS335	86.86 (1.80)	-	22.46 (0.03)		25.36 (0.44)	

Ent. 4. Field screening of IVT entries for resistance to major insect-pests

Sixty two coded entries were screened against major insect-pests in **IVT (Normal)** at different coordinating centres. Promising entries showing desirable reaction against one major insect-pest at more than one location and/or against more than one insect spp. at one or more locations are listed below, which will be tested further in next season (Details in table 5.11 & 5.14):

Insect	Promising entries(IVT Normal)
Stem fly	NRCSL 5, NRCSL 7, NRC 253, TS – 156, MAUS 824, NRC 255, NRC 257, PS 1693, RSC 1165, BAUS 124, NRC 258, Pusa Sipani BS-9, NRC 259, NRC 260, Pusa Sipani-SPS-433.
Girdle beetle	MAUS 824, DS 1529, NRC 258.
Defoliators	NRCSL 7, SKAUS 3, NRC 253, MACS 1756, Lok Soya-2, MAUS 824, NRC 254, Himso 1696, DS 1529, KDS 1188, Asb 93, VLS 105, NRCSL 4, NRC 257, SL 1311, PS 1693, NRC 256, DLSb 40, NRC 258, AUKS 212, AS 34, RVSM 2011-35, TS-208, NRC 260, NRC 196, Pusa Sipani-SPS-433.
whitefly	RSC 1165.

Twenty four coded entries were screened against major insect-pests in **IVT (Early)** at different coordinating centres of Central Region (Kota, Sehore, Prabhani, Indore and Amravati) and thirty four entries (Pantnagar, Bidar, Dharwad and Ludhiana) at rest of the centres. Promising entries showing desirable reaction against one major insect-pest at more than one location and/or against more than one insect spp. at one or more locations are listed below, which will be tested further in next season (Details in table 5.15):

Insect	Promising entries
Stem fly	NRC 152, AS 47
Girdle beetle	DS 1550, DS 1547, AUKS 238
Defoliators	DLSb 40, DS 1547, JS 20-34

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 their respective hot spots (Sehore, Indore, Kota, Ludhiana, Dharwad and Imphal). On the basis of insect reaction these following promising lines were identified for further evaluation during next season (Details in table 5.16 & 5.18):

Insect	Promising entries
Girdle beetle	EC 389149, EC 457366, JSM 195, EC 113778, EC 232019, JS 20-41, JS 20-53.
Defoliators	EC 113778, EC 232019.

ENT 6. Management of major insect-pests of soybean through microbial consortia

In order to identify suitable microbial insecticides for management of major insect-pests of soybean six microbial insecticidal mixtures were tested at Dharwad, Kota, Pantnagar, Prabhani and Imphal.

At Dharwad

The incidence of defoliators in all the treatments before taking the spray was non-significant. Seven days after third spray (7 DAS) the significant difference on the incidence of *Spodoptera litura,* Semilooper and Bihar hairy caterpillar was observed among the treatments. The treatment T3: *Nomuraea rileyi* (2 kg/ha)+*Metarhizium anisopliae* (2 kg/ha)was recorded least number of *S. litura* (0.22 larvae/plant), Semilooper (0.00 larvae/plant), Bihar hairy caterpillar (0.89 larvae/mrl) and leaf damage (15.60%) and found significantly superior over all other treatments. The treatment T2: *Nomuraea rileyi* (2 kg/ha) + *Bacillus thuringiensis* (1 kg/ha) was next best treatment by recording lowest *S. litura* (0.31 larvae/plant), Semilooper (0.18 larvae/plant) Bihar hairy caterpillar (1.03 larvae/mrl) and leaf damage (17.25%). Seed yield was differed significantly among the treatments and it was ranged from 859 to 1785 kg/ha. The treatment, *Nomuraea rileyi* (2 kg/ha)+*Metarhizium anisopliae* (2 kg/ha) recorded higher seed yield of 1785 kg/ha and found significantly superior over other treatments (Details in table 5.22 & 5.24):

At Pantnagar

The infestation of major insect pests like lepidopterous defoliators was observed on treatments. The treatment 3 (*Nomuraea rileyi* (2kg/ha) + *Metarhizium anisopliae* (2kg/ha)) has shown good results based on percent defoliation and yield (Details in table 5.26 to 5.28):

At Prabhani

a. Semilooper:

At 7 DAT, microbial agent treatment T4. *B.bassiana* + *N. rileyi* found significantly superior over rest of the treatments by recording lowest of 1.56 larvae/mrl. Next best microbial agent treatments were T1. *B. bassiana* + *M. anisopliae*(2.33 larvae/mrl), T3. *N. rileyi* + *M.anisopliae* (2.56 larvae/mrl) and T2. *N. rileyi* + *Bt* (2.67 larvae/mrl) which were found at par with each other. It was followed by microbial agent treatments T5. *B.bassiana* + *Bt* (3.22 larvae /mrl) and T6. *M.anisopliae* + *Bt* (3.33 larvae/mrl) which were found at par with each other. Highest semiloopers larvae were observed in control (7.11 larvae/mrl).

At the time of 2nd spray, before spraying there was significant differences were observed among the microbial agent treatments and control. This was due to the pathogenicity of microbial agents sprayed at the time of 1st spraying; where microbial agent treatment T4. i.e. *B.bassiana* + *N. rileyi* recorded significantly lowest of 1.22 larvae/mrl. It was followed by microbial agent treatments T1. *B. bassiana* + *M.*

anisopliae(1.89 larvae/mrl), T3. *N. rileyi* + *M.anisopliae* (2.00 larvae/mrl) and T2. *N. rileyi* + *Bt* (2.11 larvae/mrl). Highest of 6.67 larvae/mrl were recorded in control.

At 3 DAT, microbial agent treatment T4. *B.bassiana* + *N. rileyi* recorded significantly lowest of 0.67 larvae/mrl, however it was found at par with microbial agent treatment T1. *B. bassiana* + *M. anisopliae*(1.11 larvae/mrl). The next best microbial agent treatments were T3. *N. rileyi* + *M.anisopliae* (1.22 larvae/mrl), T2. *N. rileyi* + *Bt* (1.33 larvae/mrl) and T5. *B.bassiana* + *Bt* (1.89 larvae /mrl) which were found at par with each other. Highest of 5.11 larvae/mrl were recorded in control.

At 7 DAT, microbial agent treatment T4. *B.bassiana* + *N. rileyi* recorded significantly lowest of 0.11 larvae/mrl and found superior over rest of the microbial agents in reducing the population of semiloopers. Next best at par microbial agent treatments were T1. *B. bassiana* + *M. anisopliae*(0.78 larvae/mrl), T3. *N. rileyi* + *M.anisopliae* (0.89 larvae/mrl), T2. *N. rileyi* + *Bt* (1.00 larvae/mrl). It was followed by microbial agent treatments T5. *B.bassiana* + *Bt* (1.33 larvae /mrl) and T6. *M.anisopliae* + *Bt* (1.44 larvae/mrl) which were found at par with each other. Highest of 3.11 semilooper larvae/mrl were observed in control (Details in table 5.21).

b) *Spodoptera litura*:

During *Kharif*2022-23, the overall incidence of *S. litura* was very low. At 3 DAT, microbial agent treatment T4. *B.bassiana* + *N. rileyi* recorded significantly lowest of 0.67 larvae/mrl. However, it was found at par with microbial agent treatments T1. *B. bassiana* + *M. anisopliae* (0.78 larvae/mrl), T3. *N. rileyi* + *M.anisopliae* (0.89 larvae /mrl) and T2. *N. rileyi* + *Bt* (1.00 larvae/mrl). It was followed by microbial agent treatments T5. *B.bassiana* + *Bt* (1.11 larvae/mrl) and T6. *M.anisopliae* + *Bt* (1.22 larvae/mrl) which were found at par with each other. Highest of 1.33 larvae/mrl were recorded in control.

At 7 DAT, lowest of 0.33 larvae/mrl were recorded in biopesticide treatment T4. *B.bassiana* + *N. rileyi*. However, it was found at par with microbial agent treatments T3. *N. rileyi* + *M.anisopliae* (0.44 larvae/mrl) and T1. *B. bassiana* + *M. anisopliae*(0.56 larvae/mrl). It was followed by microbial agent treatments T2. *N. rileyi* + *Bt* (0.67 larvae/mrl), T5. *B.bassiana* + *Bt* (0.78 larvae /mrl) and T6. *M.anisopliae* + *Bt* (0.89 larvae/mrl) which were found at par with each other. Highest *Spodoptera* larvae were recorded in control (1.33 larvae/mrl).

At the time of 2nd spray, before spray there were significant differences among the microbial agent treatments and control. This was due to the pathogenicity of microbial agents sprayed at the time of 1st spraying; wherein lowest *Spodoptera* infestation (0.11 larvae/mrl) was recorded in microbial agent treatment T4. *B.bassiana* + *N. rileyi*. However, it was found at par with microbial agent treatment T3. *N. rileyi* + *M.anisopliae* (0.33 larvae/mrl). It was followed by microbial agent treatments T1. *B. bassiana* + *M. anisopliae*(0.44 larvae/mrl), T2. *N. rileyi* + *Bt* (0.56 larvae/mrl) T5. *B.bassiana* + *Bt* (0.67 larvae /mrl) and T6. *M.anisopliae* + *Bt* (0.78 larvae/mrl) which were found at par with each other. Highest *Spodoptera* larvae were recorded in control (1.22 larvae/mrl).

At 3 DAT, no *Spodoptera* larvae were observed in microbial agent treatment T4. *B.bassiana* + *N. rileyi*. However, it was found at par with microbial agents treatments T3. *N. rileyi* + *M.anisopliae* (0.11 larvae/mrl)and T1. *B. bassiana* + *M. anisopliae* (0.22 larvae/mrl). It was followed by microbial agent treatments T2. *N. rileyi* + *Bt* (0.33 larvae/mrl), T5. *B.bassiana* + *Bt* (0.44 larvae /mrl) and T6. *M.anisopliae* + *Bt* (0.56 larvae/mrl). Highest *Spodoptera* larvae were recorded in control (1.00 larvae/mrl).

At 7 DAT, there was higher reduction in larval population and no *Spodoptera* larvae were observed in microbial agent treatments T3. *N.rileyi* + *M.anisopliae* and T4. *B.bassiana* + *N. rileyi*. However, these treatments were found at par with microbial agent treatments T1. *B. bassiana* + *M. anisopliae*(0.11 larvae /mrl) and T2. *N. rileyi* + *Bt*(0.22 larvae /mrl). It was followed by microbial agent treatments T5. *B.bassiana* + *Bt* (0.33

larvae /mrl) and T6. *M.anisopliae* + *Bt* (0.44 larvae/mrl) which were found at par with each other. Highest of 0.89 larvae/mrl were recorded in untreated control (Details in table 5.21).

c. Yield

All the microbial agent treatments recorded significantly higher yield than control. The microbial agent treatment T4. *B.bassiana* + *N. rileyi* recorded highest of 1779 kg/ha yield. However, it was found at par with microbial agent treatments T1. *B. bassiana* + *M. anisopliae* (1678kg/ha), T3. *N. rileyi* + *M.anisopliae* (1653kg/ha) and T2. *N. rileyi* + *Bt* (1635 kg/ha). It was followed by microbial agent treatments T5. *B.bassiana* + *Bt* and T6. *M.anisopliae* + *Bt* which recorded 1432 and 1407kg/ha seed yield, respectively. Lowest seed yield of 1256kg/ha was recorded in control (Details in table 5.21).

<u>At Kota</u>

In case of microbial consortia, the combination the treatment-6 (*Metarhizium anisopliae* 2 kg/ha+*Bacillus thuringiensis* (Bt) 1 kg/ha) found better over other treatments giving higher yield and minimum incidence of defoliators (Details in table 5.25).

<u>At Imphal</u>

Bihar hairy caterpillar (BHC)

High population of BHC prior to insecticidal application in all plots varied from 15.56 – 26.67 larvae/mrl. After 3 days of spray treatment, population of BHC was observed to reduce ranging from 7.56 – 17.78 larvae/mrl but there were no significant differences among treatment including untreated control. After 7 days of application, *M. anisopliae*+ *Bt*that resulted in 87.5% reduction with 3.33 larvae/mrl recorded with*B. bassiana* + *M. anisopliae* resulted in 77.8% reduction of BHC with only 4.44 larvae/mrl and all treatments except control treatment are statistically similar in effectiveness. At the start of 2nd treatment, there was decrease in the number of BHC with population varying from 2.00 – 6.44 larvae/mrl with lowest population observed in *B. bassiana* + *Bt* commercial treatment. There was a higher reduction in larval population on the 7th day after 2ndtreatment in all treated plots as pathogenicity starts to manifest leading to high mortality of larva within 3-5 days after treatment. *B. bassiana* + *Bt* commercial treatment, *N. rileyi* + *Bt* treatment and *M. anisopliae* + *Bt* commercial treatment harbouring only 0.22 larvae/mrl. No profound effect could be seen at start of 3rd treatment as BHC incidence was observed to reduce as the crop ages with even untreated control observed with 0.67 larvae/mrl (Details in table 5.20):

Bean leaf webber

Population of bean leaf webber ranging from 3.11 – 4.89 larvae/mrl was observed in the experimental plots before application of microbial combinations. Difference among treatments could be observed from 7thday after first treatment in all the plots with treatment *B. bassiana* + *M. anisopliae* recorded lowest population of leaf webber (1.89 larvae/mrl) followed by *N. rileyi* + *Bt*(2.00 larvae/mrl). Similar trend continued on 2nd application with pretreatment showing non-significant among treatments and reducing bean leaf webber population at 3rd and 7th days after treatment. At 3days after 3rd application, a clear scenario could be observed in which treatment combination of *N.rileyi* + *Bt* with no. of larvae observed as 0.56 was the best and resulted in 81.9% reduction of population of leaf webber as observed before first treatment (Details in table 5.20):

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Tobacco caterpillar:

Population of tobacco caterpillar at the beginning of pest initiation ranged from0.11 – 0.33 larvae/mrl. Difference among treatments could be observed from7thday after first treatment in all the plots. Population of tobacco caterpillar after 7 days of 1st treatment was lowest with *N. rileyi* + *M. anisopliae* observed with 0.78 larvae/mrlat par with *M. anisopliae* + *Bt* (0.89 larvar/mrl) with untreated control that was observed with 1.67 larvae/mrl. After the 3rdtreatment, negligible count of tobacco caterpillar could be observed in all microbial treatment combinations with *N. rileyi* + *Bt* and *B. bassiana* + *Bt* recording 0.11 larvae/mrl. This coincided with the decline of the pest naturally in the ecosystem as could be observed from untreated control (0.22larvae/m) during the period (Details in table 5.19).

Yield of soybean

The yield of soybean increased significantly due to microbial treatments than untreated control. The treatments produced 3395.07 kg/ha to 3738.69kg/ha compared to 2816.47 kg/ha in untreated control treatment. *B. bassiana* + *Bt* treated plots gave the highest yield of 3765.44 kg/ha followed by *N. rileyi* + *Bt* yielding 3738.69 kg/ha. Thus, from the experiment with microbial consortia, it can be observed that fungus in combination with bacterial formulations is effective in managing major lepidopteran defoliators of soybean (Details in table 5.19).

At Amravati

In the following experiment the four microbial biopesticides viz., *Beauveria bassiana, Metarhizium anisopliae, Nomuraea rileyi* and Bt Commercial were tested against major defoliators of soybean. The crop was raised with standard agronomic practices under field conditions. Two round of sprays were given using knapsack sprayer; first at pest initiation stage and another one at 20 days interval after the first treatment. The pre-treatment (DBT) observations and post treatment (DAT) observations recorded on 3 and 7 days. The yield data against major lepidopteran defoliators of soybean was also recorded (5.19).

ENT 7. Management of major defoliators of soybean through intercropping with suva, *Anethumgra graveolens*

For management of defoliators of soybean through intercropping with suva, *Anethum gra veolens* five treatments of different rows combinations of soybean and sows were tested at Dharwad, Pantnagar, Prabhani and Indore.

At Dharwad

The treatments T4: Soybean + Suva (3 Soybean: 2 suva: 3 Soybean rows combination) was found be significantly superior by recording lower *Spodoptera litura* (1.78 larvae/mrl), *Thysanoplusia orichalcea* (1.65 larvae/mrl), *Spilarctia obliqua* (3.14 larvae/mrl) larval population and recorded less leaf damage (18.75%) followed by T2: Soybean + Suva (3 Soybean: 1 suva: 3 Soybean rows combination) intercropping system. The next best treatment was T5: Soybean + Suva (6:2:6). The treatments T3 (6:1:6) and T1 (Sole soybean) was found on par with each other and larval population was higher in these treatments.

This indicates that, Soybean + Suva intercropping system has got added advantage in controlling defoliator population by attracting more number of lepidopteran adults to lay their eggs and thus controls the defoliation (Details in table 5.29 & 5.30).

<u>At Pantnagar</u>

The treatment 4 (3 soybean:2 suva: 3 soybean rows combination) has shown the best result among all the treatments (Details in table 5.29).

<u>At Prabhani</u>

a. Semilooper:

During *kharif*2022-23, the overall incidence of semilooper was more. It was observed that, among different treatments T4: Soybean + Suva (3 Soybean: 2 Suva: 3 Soybean rows combination) was found be significantly superior over rest of the treatments by recording lower (2.83 larvae/mrl) semiloopers larval population. The next best treatments were T2: Soybean + Suva (3 Soybean: 1 Suva: 3 Soybean rows combination) (4.42 larvae/mrl), T5: Soybean + Suva (6 Soybean: 2 Suva: 6 Soybean rows combination) (4.58 larvae/mrl) and T3: (6 Soybean: 1 Suva: 6 Soybean rows combination) (5.17 larvae/mrl) which were found at par with each other. Highest of 8.75 semilooper larvae/mrl were recorded in treatment T1: Sole soybean (12 rows) (Details in table 5.29).

b) *Spodoptera litura*:

During *Khari f*2022-23, the overall incidence of *S. litura* was very low. It was observed that, among different treatments T4: Soybean + Suva (3 Soybean: 2 Suva: 3 Soybean rows combination) recorded lowest of 0.17 larvae/mrl. However, it was found at par with treatments T2: Soybean + Suva (3 Soybean: 1 Suva: 3 Soybean rows combination) (0.33 larvae/mrl) and T5: Soybean + Suva (6 Soybean: 2 Suva: 6 Soybean rows combination) (0.42 larvae/mrl). These were followed by treatment T3: (6 Soybean: 1 Suva: 6 Soybean rows combination) (0.50 larvae/mrl). Highest of 0.83 larvae/mrl was recorded in treatment T1: Sole soybean (12 rows).

Thus, the results indicate that, among different treatments intercropping treatment T4: Soybean + Suva with 3 Soybean: 2 Suva: 3 Soybean rows combination was found superior for the management of defoliators. Hence, it is concluded that Soybean + Suva intercropping system will be useful in controlling defoliator's population (Details in table 5.29).

<u>At Indore</u>

Treatment 5 (T5) (6 Soybean: 2 suva: 6 Soybean rows combination) was found be significantly superior by recording lowest population of semiloopers (3.08 larvae/mrl). In case of *Spodoptera litura* treatment T2 (3 Soybean: 1 Suva: 3 Soybean rows combination) recorded lowest population (0.33 larvae/mrl) (Details in table 5.29).

Table 5.1: Ent. 1 a. Seasonal incidence of soybean insect-pests

SMW	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
PANTNAGAR (Var. Bragg)																
White fly / 3 leaf				2.31	2.48	2.79	3.19	2.13	0.91	2.01	1.76	1.51	1.24	1.06	0.64	0.41
Stem fly % stem tunneling				0	0	0	1.12	2.71	5.58	7.48	8.74	6.58	9.32	10.11	12.42	13.86
Aphids / 3 leaf				0	0	0	0.12	0.39	0.75	1.1	1.78	1.49	0.89	0.58	0.29	0.16
Semilooper/m				0	0	0	0	0	0.49	1.41	0	0.76	0.89	0.97	1.12	0.7
Spodoptera litura Fb (l/mrl)				0	0	0	0	0	0	1.78	2.14	2.76	3.38	4.76	1.92	0.71
Spilosoma obliqua (W.) (l/mrl)				0	0	0	0	1.78	2.13	0.39	0	0	0	0	0	0
SEHORE (Var. JS 335)																
Blue beetle	-	-	0.5	0.8	0.5	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-	-
G. gemma	-	-	-	-	0.4	0.8	1.6	1.8	4.8	1.8	0.4	0.6	-	-	-	-
C .acuta	-	-	-	-	0.8	1.0	2.4	3.3	6.6	2.8	0.8	0.6	-	-	-	-
Helicoverpa	-	-	-	0.2	0.3	0.3	0.5	0.9	1.3	0.4	-	-	-	-	-	-
Tobacco	-	-	-	-	-	0.2	0.30	0.7	1.8	1.2	0.9	0.8	-	-	-	-
Stem fly % infest.	-	-	-	8	15	15	20.0	25.0	33.0	38.0	45.0	70.0	70.0	75.0	-	
Stem fly (%) ST	-	-	-	3	18.8	20.5	20.0	25.27	28.50	32.27	29.65	26.50	30.25	15.25	-	-
Girdle beetle%	-	-	-	5.0	15.0	18.0	25.0	20.5	21.5	25.50	15.0	10.5	0.80	-	-	-
Minor insect pests	Grey weevil *(Myllocerus sp.)*, Field crickets and white fly. Incidence of tobacco caterpillar *Mocis undata* and *Helicoverpa* was observed at negligible level.															
PARBHANI (Var. MAUS 2)																
S. litura larvae/mrl		0.00	0.00	0.00	0.00	0.00	1.33	1.33	1.33	**1.67**	1.33	0.33				
Green semilooper larvae/mrl		0.00	0.00	0.00	0.00	0.00	3.67	4.33	6.00	**7.67**	7.33	1.67				
White fly/plant		0.00	0.00	0.20	0.50	0.90	0.60	**1.40**	1.00	0.90	0.50	0.80				
Jassids/plant		0.00	0.00	0.00	0.00	0.00	0.40	**1.60**	0.50	0.60	1.30	0.30				
Aphids/plant		0.00	0.00	0.00	0.20	0.80	**2.60**	0.70	0.60	0.50	0.30	0.10				
Stem fly % Stem tunneling	**34.17** %															
AMARAWATI (Var. JS 335)																
Girdle beetle %		0	0.6	0.2	0.4	0	0	0	0	0	0	0	0			
Stem fly % Infest.		0	5	10	20	10	30	40	50	60	0	0	0			
Semilooper		0	0	0	0	0.2	0.33	0.4	0.26	0	0	0	0			
Spodoptera litura		0	0	0	0	0.33	0.4	0.5	0.6	0.13	0	0	0			

SMW	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
KOTA (Var. JS 335)																
Girdle beetle (%)	-	-	3.33	6.67	6.67	10.00	13.33	16.67	23.33	26.67	30.00	30.00	30.00	30.00	30.00	
Semi loopers/m	-	-	0.33	0.67	1.00	1.00	1.33	1.67	2.00	2.33	0.67	0.33	0.33	0.00	0.00	
S. litura / m	-	-	0.00	0.00	0.33	0.33	0.67	1.00	1.33	1.67	0.67	0.00	0.00	0.00	0.00	
H. armigera/m	-	-	0.33	0.00	0.67	1.00	1.00	1.33	1.33	1.00	0.67	0.33	0.00	0.00	0.00	
White fly/plant	0.67	1.00	1.67	2.33	2.67	3.00	4.33	5.00	5.33	6.00	4.33	4.00	2.33	0.67	0.00	
Jassids/plant	0.67	1.67	2.33	3.33	4.00	4.33	5.33	6.00	8.00	8.33	6.67	5.00	3.33	1.00	0.00	
Defoliation (%)	5.0 at flowering and 21.5 at peak larval incidence at 35 (SMW)															
Minor insects	*grass hoppers, field cricket, hairy caterpillars & grey weevil*															
DHARWAD (Var. JS 335)																
Spodoptera litura Fb (l/mrl)			-	1.25	**2.39**	3.12	4.03	5.29	6.15	5.87	3.56	2.87	1.17	0.59	-	-
Thysanoplusia orichalcea Fab (l/mrl)			-	-	0.41	1.23	1.38	2.01	2.89	3.15	2.55	1.78	1.01	0.56	-	-
Spilosoma obliqua (W.) (l/mrl)			-	-	1.03	3.15	4.87	5.94	6.71	7.15	5.89	4.37	3.28	2.18	-	-
Omiodes indicata Infestation (%)			-	-	7.28	8.16	9.38	9.69	11.32	12.43	14.25	11.19	9.16	5.34	-	-
O. brevis Infestation (%)			-		-	3.16	4.63	6.18	8.64	10.15	9.55	6.83	5.39	-	-	-
M. sojae Stem tunneling (%)			-	1.45	7.42	10.39	17.37	28.67	23.48	20.15	14.22	5.31	-	-	-	-
C. ptychora Pod damage (%)			-		-	-	-	-	-	18.75	22.74	28.17	30.69	32.25	35.38	37.42
Helicoverpa armigera (l/mrl)			-		-	-	1.39	2.08	3.14	2.89	2.25	1.87	0.54	-	-	-
Myllocerus beetles/plant.			-		-	-	0.59	0.72	1.23	1.50	2.34	1.45	0.80	-	-	-
Green stinkbugs *Nezara viridula* (number/ plant)			-		-	-	-	0.85	1.69	2.31	2.49	1.83	0.93	0.79	-	-
% Defoliation	21.35 % at Flowering and 34.79 % at peak incidence of larvae (34-36 SMW)															
IMPHAL (Var. JS 335)																
S. obliqua/m	0	16.67	26.67	**83.33**	36.67	44.33	36.67	25.00	16.00	0.00	0.00	0.00	0.00	**0**	0	0
Leaf Weber /m	0	4.33	5.67	7.67	**9.33**	6.00	4.00	2.00	1.67	0.67	0.67	0.00	0.00	0	0	0
S. litura/m	0	0.00	0.00	0.00	2.67	3.00	3.33	**5.67**	4.00	3.00	3.00	0.67	0.00	0	0	**0**
Aphids / plant	0	0.00	0.00	0.00	4.00	**35.00**	30.00	11.50	10.00	10.00	0.00	0.00	0.00	0	**0**	0

Seedling mortality at 7-10 DAG	7.00% due to stem fly attack at seedling stage	
Stem tunneling at physiological maturity	12.74%	
% Defoliation	At peak incidence - 30.78%	At flowering - 27.80%
Minor insect pests	Gram pod borer, bean bug, soybean thrips	

Table 5.2 : Ent. 1 b. Seasonal incidence of bio- control agents

SMW	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
SEHORE																
Spiders and coccinellids	Negligible															
B. bassiana infec.	30-45 % mortality during August last week															
PARBHANI																
Lady bird beetle/m		0.00	0.00	0.00	0.33	0.33	1.33	1.33	1.33	**2.00**	1.67	1.33				
Spider/m		0.00	0.00	0.00	1.00	0.33	1.67	1.33	3.33	**3.67**	3.33	1.67				
PANTNAGAR																
Coccinelid beetle/mrl				0	0	0.12	0.36	0.48	0.61	0.87	1.01	1.26	0.79	0.56	0.57	0.32
Bugs/plant				0	0	0	0.19	0.38	0.69	1.21	1.58	1.66	1.89	2.19	0.76	1.1
Bacterial infection	47.8%															
Virus infection	16.1%															
Fungal infection	9.5%															
AMRAVATI																
Lady bird beetle		0	0	2	1	2	2	0	0	0	0	0	0			
KOTA																
Coccinelid beetle/mrl	-	-	0.33	0.67	0.67	1.00	1.00	1.33	1.67	1.33	0.67	0.33	0.33	0.00	0.00	
Cotesia parasitization (%)	-	-	0.75	0.00	2.5	2.5	3.00	4.00	4.50	3.00	2.70	1.25	0.40	0.00	0.00	
Spiders/plant	-	-	-	-	0.3	0.5	0.6	0.8	1.00	1.00	0.7	0.4	0.2	0.00	0.00	
DHARWAD																
Coccinelid beetle/mrl							0.81	1.47	2.10	2.93	3.37	2.10	1.62	-	-	-
C. carnea /mrl							0.75	1.05	1.67	2.05	2.50	1.95	1.42	-	-	-
Spiders/plant							0.25	0.40	0.75	1.05	0.70	0.60	0.35	-	-	-
Apanteles sp. Parasitization (%)	-	-	0.75	0.00	2.5	2.5	3.00	4.00	4.50	3.00	2.70	1.25	0.40	0.00	0.00	-

N. rileyi Infection (%)							3.39	6.08	7.15	8.49	7.85	6.23	-	-	-	-
IMPHAL																
Spiders/plant	0	0	0.3	0.3	0.5	0.8	0.4	0.2	0.2	0.3	0.2	0.2	0	0	0	0
Coccinelids/plant	0	0	0.3	0.5	0.2	0.2	0.2	0.2	0.1	0	0.1	0.2	0	0	0	0
Larval mortality %	5 to 10%															

Table 5.3: Ent. 2a. 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		Semilooper	*S. litura* (larvae/m)
		Kota	Kota	Prabhani	Prabhani	Prabhani
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	AS 24	2.84 (1.83)-MR	SLY	**Did not germinate**	Did not germinate	Did not germinate
2.	KDS 1096	2.84 (1.83) - MR	SLY	S-LY	**4.50 (2.23) R**	0.25 (0.85) MR
3.	NRC 189	3.17 (1.91) - LR	**RHY**	S-LY	7.00 (2.73) S	0.75 (1.11) LR
4.	NRC 190	2.67 (1.78) -MR	SLY	**R-HY**	9.00 (3.08) HS	1.25 (1.31) S
5.	NRC 192	3.17 (1.91) –LR	**RHY**	**S-HY (T)**	**4.25 (2.17) HR**	0.25 (0.85) MR
6.	RSC 11-42	2.50 (1.73) - MR	**SHY**	S-LY	8.25 (2.95) HS	0.75 (1.11) LR
7.	CAUMS 2	-	-	S-LY	**3.25 (1.93)* HR**	0.00 (0.70)* MR
8.	DLSb 1	-	-	S-LY	6.00 (2.54) LR	0.75 (1.11) LR
9.	DLSb 3	**-**	**-**	**S-HY (T)**	6.00 (2.54) LR	0.50 (0.96) MR
10.	JS 22-12	-	-	S-LY	7.75 (2.87) HS	1.00 (1.22) LR
11.	JS 22-16	-	-	S-LY	**4.25 (2.17) HR**	0.25 (0.85) MR
12.	JS 22-18			R-LY	8.75 (3.04) HS	1.25 (1.31) S
13.	JS 23-03	-	-	S-LY	6.50 (2.64) LR	0.75 (1.11) LR
14.	JS 23-09	-	-	S-LY	**3.25(1.93) HR**	0.25(0.85) MR

15.	KDS 1149	-	-	**R-HY**	7.00 (2.73) S	1.00 (1.22) LR
16.	KDS 1169	**-**	**-**	R-LY	9.00 (3.08) HS	1.00 (1.22) LR
17.	MAUS 791	-	-	**R-HY**	5.25 (2.39) MR	0.25 (0.85) MR
18.	MAUS 795	-	-	S-LY	4.75 (2.29) MR	0.50 (1.00) LR
19.	NRC 165			S-LY	6.25 (2.59) LR	0.75 (1.11) LR
20.	NRC 181	-	-	S-LY	**3.75 (2.06) HR**	0.00 (0.70) MR
21.	NRC 188	-	-	S-LY	6.00 (2.54) LR	0.75 (1.11) LR
22.	NRC 195	-	-	**S-HY (T)**	4.75 (2.29) MR	0.25 (0.85) MR
23.	NRC 196	-	-	S-LY	8.25 (2.95) HS	1.00 (1.22) LR
24.	NRC 197			**R-HY**	**4.25 (2.17) HR**	0.00 (0.70) MR
25.	PS 1569	-	-	S-LY	6.50 (2.64) LR	0.75 (1.11) LR
26.	PS 1682	-	-	**S-HY (T)**	**2.75 (1.80) HR**	0.00 (0.70) MR
27.	RVS 13-20	-	-	**R-HY**	5.25 (2.39) MR	0.25 (0.85) MR
28.	RVSM 2012-4	-	-	S-LY	7.00 (2.73) S	0.75 (1.11) LR
29.	SL 1282	-	-	S-LY	5.25 (2.39) MR	0.25 (0.85) MR
30.	VLS 102	-	-	S-LY	9.00 (3.08) HS	1.50 (1.41) HS
31.	AMS-MB-5-18	-	-	S-LY	**3.25 (1.93) HR**	0.00 (0.70) MR
32.	DS 3108	-	-	S-LY	**3.00 (1.86) HR**	0.00 (0.70) MR
33.	DS 3110	-	-	S-LY	5.00(2.34) MR	0.50(1.00) LR
34.	DSb 21	-	-	S-LY	6.00	0.50

					(2.54) LR	(1.00) LR
35.	DSb 23	-	-	S-LY	4.75 (2.29) MR	0.50 (1.00) LR
36.	DSb 33	-	-	S-LY	**3.25 (1.93) HR**	0.00 (0.70) MR
37.	DSb 34	-	-	S-LY	6.00 (2.54) LR	0.75 (1.11) LR
38.	Himso 1690	-	-	S-LY	**3.75 (2.06) HR**	0.25 (0.85) MR
39.	JS 20-89	-	-	S-LY	8.50 (2.99) HS	0.75 (1.11) LR
40.	JS 20-96	-	-	S-LY	6.00 (2.54) LR	0.75 (1.11) LR
41.	JS 21-71	-	-	S-LY	8.25 (2.95) HS	1.00 (1.22) LR
42.	JS 21-72	-	-	S-LY	7.00 (2.73) S	1.00 (1.22) LR
43.	JS 93-05			S-LY	**4.00 (2.11) HR**	0.00 (0.70) MR
44.	KDS 869	-	-	S-LY	7.75 (2.87) HS	1.00 (1.22) LR
45.	KDS 980	-	-	**S-HY (T)**	8.25 (2.95) HS	0.50 (1.00) LR
46.	KDS 992	-	-	S-LY	7.25 (2.78) HS	0.50 (1.00) LR
47.	MACS 1520	-	-	S-LY	7.75 (2.87) HS	0.75 (1.11) LR
48.	MAUS 61			**S-HY (T)**	6.25 (2.59) LR	0.25 (0.85) MR
49.	NRC 131	-	-	S-LY	4.75 (2.28) MR	0.25 (0.85) MR
50.	NRC 147	-	-	S-LY	8.25 (2.95) HS	0.75 (1.11) LR
51.	NRC 148	-	-	S-LY	**4.00 (2.11) HR**	0.25 (0.85) MR
52.	NRC 152	-		S-LY	6.00 (2.54) LR	0.25 (0.85) MR
53.	NRC 157	-	-	S-LY	8.00	1.00

					(2.91) HS	(1.22) LR
54.	NRC 164	-	-	S-LY	**3.25 (1.93) HR**	0.25 (0.85) MR
55.	NRCSL 2	-	-	S-LY	8.25 (2.95) HS	0.75 (1.11) LR
56.	PS 1613	-	-	S-LY	7.00 (2.73) S	1.00 (1.22) LR
57.	PS 1637			S-LY	**4.00 (2.12) HR**	0.25 (0.85) MR
58.	RSC 10-70	-	-	S-LY	6.00 (2.54) LR	0.75 (1.11) LR
59.	RSC 11-17	-	-	S-LY	**3.25 (1.93) HR**	0.25 (0.85) MR
60.	RVS 2010-1	-	-	S-LY	6.25 (2.59) LR	0.75 (1.11) LR
61.	RVS 2011-10			S-LY	**3.25 (1.93) HR**	0.00 (0.70) MR
62.	SKF-SPS-11	-	-	S-LY	5.00 (2.34) MR	0.50 (1.00) LR
63.	VLS 95	-	-	S-LY	**3.75 (2.06) HR**	0.00 (0.70) MR
64.	AMS 100-39 (C)	2.67 (1.78) -MR	SHY	**R-HY**	7.75 (2.87) HS	0.75 (1.11) LR
65.	RSC 10-52 (C)	3.00 (1.87) –LR	SLY	S-LY	5.25 (2.39) MR	0.25 (0.85) MR
66.	RVSM 2011-35 (C)	2.00 (1.58) –R	RHY	S-LY	7.00 (2.73) S	0.50 (1.00) LR
67.	JS 335 (LC)	4.00 (2.12) –S	SLY	-	-	-
68.	RKS 18 (LC)	2.17 (1.63) -MR	SLY	-	-	-
69.	RKS-24 (LC)	3.34 (1.96) - LR	SLY	-	-	-
70.	RKS-113 (LC)	3.50 (2.00) - LR	SLY	-	-	-
71.	AMS 2014-1 (ZC)	-	-	S-LY	6.50 (2.64) LR	0.25 (0.85) MR
72.	Hara Soya (ZC)	-	-	**S-HY (T)**	8.00 (2.91) HS	1.00 (1.22) LR
73.	JS 20-116 (ZC)			**S-HY (T)**	5.50 (2.44) MR	0.25 (0.85) MR

74.	JS 20-34 (ZC)	-	-	S-LY	**2.75 (1.80) HR**	0.00 (0.70) MR
75.	JS 95-60 (ZC)	-	-	S-LY	**3.50 (2.00) HR**	0.00 (0.70) MR
76.	Karune (ZC)	-	-	R-LY	6.00 (2.54) LR	0.75 (1.11) LR
77.	MACS 1460 (ZC)			**S-HY (T)**	**4.25 (2.17) HR**	0.75 (1.11) LR
78.	NRC 128 (ZC)	-	-	S-LY	7.25 (2.77) S	0.75 (1.11) LR
79.	NRC 130 (ZC)	-	-	S-LY	**4.50 (2.23) R**	0.25 (0.85) MR
80.	NRC 149 (ZC)	-	-	S-LY	6.75 (2.69) LR	0.75 (1.11) LR
81.	RSC 10-46 (ZC)			S-LY	6.00 (2.54) LR	0.25 (0.85) MR
82.	SL 958 (ZC)	-	-	S-LY	**3.75 (2.06) HR**	0.00 (0.70) MR
83.	MAUS 2 (LC)	-	-	S-LY	7.50 (2.82) HS	1.00 (1.22) LR
84.	MAUS 158 (LC)	-	-	S-LY	**4.50 (2.23) R**	0.25 (0.85) MR
SE $\pm$		0.07	-	-	0.08	0.10
CD at 5 %		0.21	-	-	0.23	0.29

*** Values in the parenthesis are square root transformation; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible, R-LY: Resistant low yielder, S-HY: Susceptible high yielder, R-HY: Resistant high yielder, S-LY: Susceptible low yielder.**

Table 5.4: Ent. 2 b. Field screening of AVT entries (Central Zone) for resistance to major insect-pests (STEM BORERS)

S. No.	Entry	Girdle beetle damage (%)	% Stem tunnelling due to stem fly	
		Kota	Prabhani	Amravati
(1)	(2)	(3)	(4)	(5)
1.	AS 24	9.17 (17.61)**MR	**Did not germinate**	32.50 (0.61)
2.	KDS 1096	12.50 (20.69)LR	**24.92 (29.93) R**	
3.	NRC 189	11.67 (19.92)LR	43.79 (41.42) HS	31.50 (0.60)
4.	NRC 190	**7.50 (15.87) R**	49.95 (44.96) HS	36.50 (0.65)
5.	NRC 192	9.17 (17.61) MR	**16.36 (23.85) HR**	16.50 (0.42)
6.	RSC 11-42	9.17 (17.61) MR	32.19 (34.54) LR	20.50 (0.47)
7.	CAUMS 2	-	34.38 (35.89)* LR	24.00 (0.51)
8.	DLSb 1	-	36.87 (37.37) S	28.50 (0.56)
9.	DLSb 3	-	30.18 (33.31) MR	19.50 (0.46)
10.	JS 22-12	-	39.43 (38.89) HS	-
11.	JS 22-16	-	58.02 (49.62) HS	-
12.	JS 22-18	-	36.79 (37.33) S	-
13.	JS 23-03	-	38.41 (38.29) HS	-
14.	JS 23-09	-	42.76 (40.83) HS	-
15.	KDS 1149	-	51.57 (45.89) HS	
16.	KDS 1169	-	30.81 (33.70) LR	29.00 (0.57)
17.	MAUS 791	-	33.42 (35.30) LR	36.50 (0.65)
18.	MAUS 795	-	27.33 (31.51) MR	
19.	NRC 165	-	37.90 (37.99) HS	
20.	NRC 181	-	30.30 (33.39) MR	
21.	NRC 188	-	25.97 (30.60) MR	
22.	NRC 195	-	44.13 (41.62) HS	35.00 (0.63)
23.	NRC 196	-	53.85 (47.20) HS	
24.	NRC 197	-	**25.04 (30.02) R**	
25.	PS 1569	-	65.66 (54.18) HS	
26.	PS 1682	-	68.09 (55.63) HS	42.00 (0.70)
27.	RVS 13-20	-	30.89 (33.75) LR	13.50 (0.37)
28.	RVSM 2012-4	-	52.87 (46.64) HS	-
29.	SL 1282	-	37.27 (37.62) S	-
30.	VLS 102	-	51.42 (45.80) HS	-

31.	AMS-MB-5-18	-	49.43 (44.66) HS	-
32.	DS 3108	-	32.40 (34.68) LR	-
33.	DS 3110	-	31.90 (34.36) LR	-
34.	DSb 21	-	**18.31 (25.30) HR**	-
35.	DSb 23	-	**18.88 (25.74) HR**	-
36.	DSb 33	-	**23.01 (28.65) HR**	-
37.	DSb 34	-	34.08 (35.70) LR	-
38.	Himso 1690	-	54.05 (47.31) HS	-
39.	JS 20-89	-	35.81 (36.74) LR	-
40.	JS 20-96	-	**22.79 (28.50) HR**	
41.	JS 21-71	-	30.38 (33.44) MR	-
42.	JS 21-72	-	**24.07 (29.37) HR**	-
43.	JS 93-05	-	**19.21 (25.99) HR**	-
44.	KDS 869	-	**13.11 (20.92) HR**	-
45.	KDS 980	-	**20.20 (26.69) HR**	-
46.	KDS 992	-	**16.02 (23.58) HR**	-
47.	KDS-1096	-	-	25.00 (0.52)
48.	NRC 86	-	-	21.50 (0.48)
49.	MACS 1520	-	28.66 (32.36) MR	-
50.	MAUS 61	-	**25.45 (30.29) R**	-
51.	NRC 131	-	**16.82 (24.20) HR**	-
52.	NRC 147	-	**14.34 (22.21) HR**	-
53.	NRC 148	-	28.89 (32.49) MR	-
54.	NRC 152	-	**19.61 (26.24) HR**	-
55.	NRC 157	-	**16.79 (24.17) HR**	-
56.	NRC 164	-	**15.22 (22.92) HR**	-
57.	NRCSL 2	-	**25.06 (30.03) R**	-
58.	PS 1613	-	33.47 (35.34) LR	-
59.	PS 1637	-	39.09 (38.66) HS	-
60.	RSC 10-70	-	**24.58 (29.72) R**	-
61.	RSC 11-17	-	**20.81 (27.13) HR**	-
62.	RVS 2010-1	-	**10.75 (19.08) HR**	-
63.	RVS 2011-10	-	38.52 (38.35) HS	-
64.	SKF-SPS-11	-	**21.97 (27.94) HR**	-

65.	VLS 95	-	27.29 (31.48) MR	-
66.	AMS 100-39 (C)	-	39.06 (38.67) HS	-
67.	RSC 10-52 (C)	11.67(19.92) – LR	**8.52 (16.94) HR**	-
68.	RVSM 2011-35 (C)	9.17(17.61) – MR	**21.16 (27.37) HR**	-
69.	JS 335 (LC)	18.34(25.33) – HS	-	15.50 (0.40)
70.	RKS 18 (LC)	14.17(22.04) –LR	-	-
71.	RKS-24 (LC)	14.17(22.10) – LR	-	-
72.	RKS-113 (LC)	13.34(21.38) – LR	-	-
73.	AMS 2014-1 (ZC)	-	**23.57 (29.03) HR**	-
74.	Hara Soya (ZC)	-	34.98 (36.24) LR	-
75.	JS 20-116 (ZC)	-	**22.80 (28.51) HR**	-
76.	JS 20-34 (ZC)	-	34.17 (35.76) LR	-
77.	JS 95-60 (ZC)	-	39.62 (38.99) HS	-
78.	Karune (ZC)	-	45.17 (42.22) HS	-
79.	MACS 1460 (ZC)	-	**19.64 (26.29) HR**	-
80.	NRC 128 (ZC)	-	34.57 (36.00) LR	-
81.	NRC 130 (ZC)	-	26.04 (30.67) MR	-
82.	NRC 149 (ZC)	-	**25.38 (30.24) R**	-
83.	RSC 10-46 (ZC)	-	**19.86 (26.46) HR**	-
84.	SL 958 (ZC)	-	**14.79 (22.60) HR**	-
85.	MAUS 2 (LC)	-	40.83 (39.71) HS	-
86.	MAUS 158 (LC)	-	**20.64 (27.01) HR**	-
SE $\pm$		1.18	1.15	0.045
CD at 5 %		3.64	3.19	0.13

*** Values in the parenthesis are angular/arc sine transformation; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible, R-LY: Resistant low yielder, S-HY: Susceptible high yielder, R-HY: Resistant high yielder, S-LY: Susceptible low yielder**

Table 5.5 : Ent. 2c. Field screening of AVT (early) entries for resistance to major insect-pests

S. No.	Name of Entry	Stem fly infestation (%) tunneling basis #	Defoliators (Larvae/mrl)	Girdle Beetle (% Infestation)	Insect reaction to insect-pests
		Amrawati	Kota		
1.	JS 22-12	37.00 (0.65)	2.50 (1.73)*-LR	13.34 (21.38)**-LR	RHY
2.	JS 22-16	25.00 (0.52)	2.00 (1.57) - MR	10.00 (18.43) – MR	RHY
3.	JS 22-18	50.00 (0.79)	2.84 (1.83) – LR	12.83 (20.99) – LR	SLY
4.	JS 23-03	-	2.33 (1.68) - MR	10.00 (18.38) – MR	RHY
5.	JS 23-09	46.00 (0.75)	2.34 (1.68) -MR	10.00 (18.38) – MR	RHY
6.	KDS 1169	21.50 (0.47)	2.67 (1.78) –LR	12.50 (20.69) – LR	SLY
7.	NRC 165	28.50 (0.56)	2.34 (1.68) -MR	10.84 (19.21) – MR	SLY
8.	PS-1569	32.00 (0.60)	2.67 (1.78) –LR	14.17 (22.10) –LR	SLY
9.	RVSM 2012-4	17.00 (0.42)	1.67 (1.47) – MR	10.84 (19.21) – MR	SHY
10.	MAUS-795	22.00 (0.49)	-	-	-
11.	JS 95-60	23.00 (0.50)	-	-	-
12.	JS 20-34 (C)		3.00 (1.87) – LR	15.00 (22.76) –LR	SLY
13.	JS 95-60 (C)		3.84 (2.08) –S	16.67 (24.10) –S	SLY
14.	NRC 130 (C)		2.33 (1.68) –MR	12.83 (20.99) – LR	SLY
15.	NRC 138 (C)		1.67 (1.47) -MR	13.00 (21.13) – LR	RHY
	SEm±	0.05	0.08	0.84	
	CD at 1%		0.34	3.63	
	CD at 5 %	0.16	0.24	2.59	
	CV%	13.01			

***Values in the parenthesis are square root transformation in case defoliators and angular/arc sine transformation in case of stem fly and girdle beetle; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible, R-LY: Resistant low yielder, S-HY: Susceptible high yielder, R-HY: Resistant high yielder, S-LY: Susceptible low yielder**

Table 5.6: Ent. 2d. Field screening of AVT entries (Northern Plain Zone) for resistance to major insect pests

S. No.	Variety	Lepidopterous defoliators/mrl*			Stem fly % Tunnelling**	White fly 3 leaf/ Plant*	Aphid 3 leaf/ plant* Ludhiana	Bug/ mrl*	White fly	Reaction to Pest Complex
		BHC*	TC*	GSL*						
		Pantnagar			Pantnagar	Pantnagar			Ludhiana	Pantnagar
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	NRCSL-3	-	-	-	-	-	-	-	**1.80(1.65)**	-
2.	NRCSL-6	-	-	-	-	-	-	-	2.66 (1.90)	-
3.	NRCSL-195	-	-	-	-	-	-	-	2.33(1.80)	-
4.	AMS 24	2.00 (1.70) LR	2.00 (1.70)HS	1.00 (1.30)HS	31.15 (33.81)S	10.50 (3.61)HR	0.00 (0.70)HR	0.00 (0.70)HR	-	S-Ly
5.	CAUMS 2	1.00 (1.30)**R**	2.00 (1.70)HS	0.00 (0.70)S	**19.19 (25.87)HR**	11.50 (3.78)HR	1.00 (1.30)HR	0.00 (0.70)HR	-	S-Ly
6.	DLSb 1	0.00 (0.70)**HR**	1.00 (1.30)HS	1.00 (1.30)HS	24.71 (29.69)MR	7.50 (3.08)HR	0.00 (0.70)HR	1.00 (1.30)HS	-	S-Ly
7.	DLSb 3	1.00 (1.30)**R**	2.00 (1.70)HS	0.00 (0.70)S	**6.21 (14.36)HR**	8.50 (3.27)HR	3.00 (2.02)HR	0.00 (0.70)HR	-	**R-Hy**
8.	JS 22-12	0.00 (0.70)**HR**	1.00 (1.30)HS	0.00 (0.70)HS	47.95 (43.80)HS	13.50 (4.08)HR	0.00 (0.70)HR	3.00 (2.02)HS	-	R-Hy
9.	JS 22-16	0.00 (0.70)**HR**	0.00 (0.70)**HR**	1.00 (1.30)HS	27.85 (31.74)LR	10.00 (3.53)HR	0.00 (0.70)HR	0.00 (0.70)HR		S-Hy(T)
10.	JS 22-18	**0.00 (0.70)HR**	1.00 (1.30)HS	1.00 (1.30)HS	31.37 (33.95)S	8.50 (3.27)HR	2.00 (1.70)HR	0.00 (0.70)HR	-	R-Hy
11.	JS 23-03	**0.00 (0.70)HR**	0.00 (0.70)HR	0.00 (0.70)S	30.86 (33.63)LR	13.50 (4.08)HR	0.00 (0.70)HR	2.00 (1.70)HS	-	S-Hy(T)
12.	JS 23-09	1.50 (1.51) MR	1.00 (1.30) HS	0.00 (0.70) S	27.08 (31.24) LR	10.00 (3.53) HR	4.00 (2.30) HR	0.00 (0.70) HR	-	S-Hy(T)
13.	KDS 1096	**0.00 (0.70) HR**	**0.00 (0.70) HR**	0.00 (0.70) S	68.68 (56.52) HS	10.00 (3.53) HR	0.00 (0.70) HR	0.00 (0.70) HR	-	-
14.	KDS 1149	45.00 (7.38) HS	0.00 (0.70) HR	1.00 (1.30) HS	42.86 (40.83) HS	14.00 (4.15) HR	23.00 (5.30) HS	1.00 (1.30) HS	-	R-Ly
15.	KDS 1169	2.00 (1.70) LR	0.00 (0.70) HR	0.00 (0.70) S	31.43 (33.99) S	12.00 (3.86) HR	0.00 (0.70) HR	0.00 (0.70) HR	-	S-Ly
16.	MAUS 791	0.00	0.00	1.00	67.21	10.00	0.00	1.00	-	S-Ly

		(0.70) HR	(0.70) HR	(1.30) HS	(55.53) HS	(3.53) HR	(0.70) HR	(1.30) HS		
17.	MAUS 795	2.50 (1.87) LR	1.00 (1.30) HS	0.00 (0.70) S	**16.44** **(23.81)** **HR**	13.00 (4.01) HR	0.00 (0.70) HR	2.00 (1.70) HS	-	R-Ly
18.	NRC 189	0.00 (0.70) HR	1.00 (1.30) HS	2.00 (1.70) HS	**19.33** **(25.97)** **HR**	16.50 (4.50) HR	45.00 (7.38) HS	2.00 (1.70) HS		R-Hy
19.	NRC 190	1.50 (1.51) MR	0.00 (0.70) HR	0.00 (0.70) S	35.40 (36.41) HS	11.50 (3.78) HR	5.00 (2.55) HR	1.00 (1.30) HS	-	R-Hy
20.	NRC192	0.00 (0.70) HR	1.00 (1.30) HS	0.00 (0.70) S	7.25 (15.54) HR	13.00 (4.01) HR	0.00 (0.70) HR	1.00 (1.30) HS	-	R-Hy
21.	NRC 195	0.00 (0.70) HR	2.00 (1.70) HS	0.00 (0.70) S	23.45 (28.85) MR	13.50 (4.08) HR	2.00 (1.70) HR	0.00 (0.70) HR	-	R-Hy
22.	NRC 196	0.00 (0.70) HR	0.00 (0.70) HR	1.00 (1.30) HS	19.49 (26.09) HR	18.00 (4.70) HR	0.00 (0.70) HR	2.00 (1.70) HS	-	R-Hy
23.	NRC 197	2.00 (1.70) LR	0.00 (0.70) HR	0.00 (0.70) S	89.23 (89.42) HS	15.50 (4.37) HR	3.00 (2.02) HR	0.00 (0.70) HR	-	R-Ly
24.	PS 1569	0.00 (0.70) HR	0.00 (0.70) HR	0.00 (0.70) S	25.33 (30.10) MR	11.00 (3.70) HR	0.00 (0.70) HR	0.00 (0.70) HR	-	R-Ly
25.	PS 1670	0.00 (0.70) HR	1.00 (1.30) HS	0.00 (0.70) S	19.57 (26.14) HR	19.00 (4.82) HR	0.00 (0.70) HR	1.00 (1.30) HS	**0.67(1.28)**	S-Hy(T)
26.	PS 1682	3.00 (2.02) S	1.00 (1.30) HS	1.00 (1.30) HS	7.41 (15.72) HR	19.50 (4.88) HR	9.00 (3.36) R	0.00 (0.70) HR	1.50(1.60)	S-Hy(T)
27.	RSC 11-35	0.00 (0.70) HR	1.00 (1.30) HS	0.00 (0.70) S	5.71 (13.75) HR	18.50 (4.76) HR	1.00 (1.30) HR	0.00 (0.70) HR	-	S-Hy(T)
28.	RSC 11-42	0.00 (0.70) HR	3.00 (2.02) HS	0.00 (0.70) S	20.00 (26.45) HR	13.50 (4.08) HR	2.00 (1.70) HR	1.00 (1.30) HS	-	R-Ly
29.	RVS 1320	1.00 (1.30) R	3.00 (2.02) HS	0.00 (0.70) S	29.81 (32.98) LR	12.00 (3.86) HR	0.00 (0.70) HR	2.00 (1.70) HS	-	R-Ly
30.	SL 1282	0.00	1.00	1.00	21.71	11.50	22.00	3.00	**2.00(1.72)**	R-Hy

		(0.70) HR	(1.30) HS	(1.30) HS	(27.66) R	(3.78) HR	(5.18) HS	(2.02) HS		
31.	VLS 102	0.00 (0.70) HR	1.00 (1.30) HS	1.00 (1.30) HS	24.81 (29.76) MR	11.50 (3.78) HR	0.00 (0.70) HR	1.00 (1.30) HS	-	R-Ly
32.	AMS 100-39	1.50 (1.51) MR	0.00 (0.70) HR	1.00 (1.30) HS	23.85 (29.12) MR	23.50 (5.35) HR	4.50 (2.42) HR	1.00 (1.30) HS	-	R-Hy
33.	JS 20-34	2.00 (1.70) LR	1.00 (1.30) HS	0.00 (0.70) S	48.78 (44.28) HS	12.50 (3.93) HR	0.00 (0.70) HR	1.00 (1.30) HS	-	S-Ly
34.	JS 95-60	0.00 (0.70) HR	1.00 (1.30) HS	0.00 (0.70) S	38.61 (38.33) HS	22.50 (5.24) HR	7.50 (3.08) HR	1.00 (1.30) HS	-	R-Ly
35.	Karune	0.00 (0.70) HR	0.00 (0.70) HR	1.00 (1.30) HS	4.21 (11.78) HR	16.50 (4.50) HR	0.00 (0.70) HR	0.00 (0.70) HR	-	S-Ly
36.	MACS 1460	0.50 (1.04) HR	0.00 (0.70) HR	1.00 (1.30) HS	17.56 (24.66) HR	12.00 (3.86) HR	0.00 (0.70) HR	2.00 (1.70) HS		S-Ly
37.	NRC 128	1.00 (1.30) R	0.00 (0.70) HR	1.00 (1.30) HS	25.00 (29.88) MR	0.00 (0.70) HR	1.00 (1.30) HR	0.00 (0.70) HR	-	S-Ly
38.	NRC 130	0.00 (0.70) HR	2.00 (1.70) HS	1.00 (1.30) HS	28.21 (31.97) LR	0.00 (0.70) HR	3.00 (2.02) HR	2.00 (1.70) HS	-	S-Ly
39.	NRC 149	3.00 (2.02) S	1.00 (1.30) HS	1.00 (1.30) HS	13.97 (21.85) HR	16.00 (4.43) HR	18.00 (4.70) HS	0.00 (0.70) HR	-	R-Hy
40.	RSC 10-52	0.00 (0.70) HR	8.00 (3.17) HS	0.00 (0.70) S	28.83 (32.36) LR	16.00 (4.43) HR	12.00 (3.86) LR	2.00 (1.70) HS	-	S-ly
41.	RVSM 2011-35	0.00 (0.70) HR	1.00 (1.30) HS	1.00 (1.30) HS	6.25 (14.40) HR	19.00 (4.82) HR	0.00 (0.70) HR	1.00 (1.30) HS	-	R-Ly
42.	SL 955(C)	2.00 (1.70) LR	1.00 (1.30) HS	0.00 (0.70) S	33.61 (35.33) HS	18.00 (4.70) HR	9.00 (3.36) R	1.00 (1.30)	2.33(1.82)	S-Hy(T)
43.	SL 958(C)	0.00 (0.70) HR	2.00 (1.70) HS	0.00 (0.70) S	31.24 (33.87) S	12.10 (3.87) HR	0.00 (0.70) HR	0.00 (0.70) HR	4.66(2.40)	S-Ly
44.	SL 1074(C)	0.00	0.00	0.00	37.60	11.00	6.00	1.00	2.00(1.72)	S-Ly

		(0.70) HR	(0.70) HR	(0.70) S	(37.73) HS	(3.70) HR	(2.77) HR	(1.30) HS		
45.	VLS 63	4.00 (2.30) HS	0.00 (0.70) HR	1.00 (1.30) HS	46.74 (43.09) HS	15.00 (4.30) HR	0.00 (0.70) HR	1.00 (1.30) HS	-	S-Ly
46.	VLS 89	2.50 (1.87) LR	2.00 (1.70) HS	0.00 (0.70) S	16.36 (23.75) HR	16.00 (4.43) HR	3.50 (2.16) HR	0.00 (0.70) HR	-	S-Ly
47.	VLS 99	1.00 (1.30) R	0.00 (0.70) HR	3.00 (2.02) HS	37.21 (37.49) HS	16.00 (4.43) HR	0.00 (0.70) HR	4.00 (2.30) HS	-	S-Ly
48.	JS 21-72	2.00 (1.70) LR	0.00 (0.70) HR	0.00 (0.70) S	26.04 (30.57) MR	10.50 (3.61) HR	2.00 (1.70) HR	2.00 (1.70) HS	-	S-Ly
49.	JS 335	0.00 (0.70) HR	0.00 (0.70) HR	1.00 (1.30) HS	11.00 (19.28) HR	17.00 (4.57) HR	3.00 (2.02) HR	2.00 (1.70) HS	-	S-Ly
50.	JS 20-98	0.00 (0.70)HR	1.00 (1.30)HS	1.00 (1.30)HS	8.16 (16.51)HR	15.00 (4.30)HR	1.00 (1.30)HR	0.00 (0.70)HR		R-Hy
51.	JS 97-52	2.00 (1.70)LR	1.00 (1.30)HS	0.00 (0.70)S	11.94 (20.12)HR	20.50 (5.01)HR	0.00 (0.70)HR	2.00 (1.70)HS	-	R-Hy
52.	JS 20-87	0.00 (0.70)HR	0.00 (0.70)HR	2.00 (1.70)HS	24.44 (29.51)MR	15.00 (4.30)HR	4.00 (2.30)HR	1.00 (1.30)HS	-	S-Ly
53.	Himso 1689	3.00 (2.02)S	1.00 (1.30)HS	0.00 (0.70)S	11.93 (20.11)HR	25.50 (5.57)HR	2.00 (1.70)HR	2.00 (1.70)HS	-	R-Ly
54.	RV S 2011-10	1.00 (1.30)R	0.00 (0.70)HR	2.00 (1.70)HS	10.68 (18.98)HR	13.00 (4.01)HR	1.00 (1.30)HR	1.00 (1.30)HS	-	R-Ly
55.	MACS 1493	0.00 (0.70)HR	1.00 (1.30)HS	0.00 (0.70)S	12.40 (20.52)HR	14.50 (4.23)HR	0.00 (0.70)HR	0.00 (0.70)HR	-	S-Ly
CD 5%		0.30	0.17	0.13	4.44	0.25	0.43	0.16	0.29	-
CV		10.38	5.87	4.94	7.46	3.30	11.53	5.46	-	-
SEM±		0.106	0.06	0.04	1.56	0.088	0.151	0.057	-	-

***Values in the parenthesis are square root transformation in case defoliators and sucking insects and angular/arc sine transformation in case of stem fly; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible, R-LY: Resistant low yielder, S-HY: Susceptible high yielder, R-HY: Resistant high yielder, S-LY: Susceptible low yielder**

Table 5.7: Ent. 2e. Field screening of AVT entries for resistance to major insect-pests (Imphal)

Sl. No.	Entries	No. of Bihar Hairy Caterpillar/mrl	No. of leaf webber larvae/mrl	No. of tobacco caterpillar larvae/mrl	Percent defoliation at peak incidence /plant	No. of Aphids /plant	Stem tunnelling at physiological maturity (%)	Reaction to insect-pests
1.	**KDS 1096**	8.40 (2.98)* MR	1.00 (1.22)* MR	1.10 (1.26)* MR	22.98 LS	8.00 (2.92)* MR	5.80 (14.53)# MR	SHY (T)
2.	**DLSb 1**	7.60 (2.84) MR	1.00 (1.22) MR	1.00 (1.22) MR	22.67 LS	7.00 (2.73) MR	5.78 (14.51) MR	SHY (T)
3.	**JS 20-116 (C)**	20.00 (4.48) LR	1.50 (1.41) LR	2.10 (1.61) LR	24.71 LS	19.00 (4.41) S	6.69 (15.52) LR	SHY (T)
4.	**MACS 1460 (C)**	11.20 (3.42) MR	1.30 (1.34) MR	1.20 (1.29) MR	23.36 LS	10.50 (3.31) MR	4.99 (13.55) MR	SHY (T)
5.	**RKS 113 (C)**	30.00 (5.45) S	2.20 (1.64) S	2.10 (1.61) MR	25.62 MS	11.00 (3.39) MR	5.83 (14.57) LR	SLY
SE ±		0.55	0.09	0.10	1.29	0.23	-	
CD at 5 %		1.54	0.24	0.27	3.59	0.65	NS	

***Values in the parenthesis are square root transformation in case defoliators and angular/arc sine transformation in case of stem fly; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible, R-LY: Resistant low yielder, S-HY: Susceptible high yielder, R-HY: Resistant high yielder, S-LY: Susceptible low yielder**

Table 5.8: Ent. 2f. Field screening of AVT entries for resistance to major insect-pests (Dharwad)

Sl. No.	AVT-I Entries	Defoliators (larvae/mrl)*	Leaf damage** (% Defoliation)	Stem fly (% stem tunneling)**	Pod borer damage** (%)	Girdle beetle damage** (%)	Reaction to Insect pest complex
1	AS 24	4.85 (2.31)S	54.25 (47.42)S	28.47 (32.23)S	36.08 (36.90)S	15.70 (23.33)LR	S-LY
2	CAUMS-2	5.32 (2.41)HS	68.75 (55.99)S	27.95 (31.90)S	37.87 (37.96)S	12.51 (20.71)MR	S-LY
3	DLSb 3	**2.78 (1.81)R**	23.45 (28.95)LS	14.50 (22.37)MR	27.78 (31.79)LR	**8.48 (16.92)R**	**R-HY**
4	JS 23-03	3.27 (1.94)LR	37.75 (37.89)MS	18.32 (25.33)LR	31.41 (34.07)LR	**7.05 (15.39)R**	**S-HY**

5	JS 23-09	3.43 (1.98)LR	40.50 (39.51)MS	18.06 (25.14)LR	28.71 (32.39)LR	**7.52 (15.91)R**	S-HY
6	KDS 1149	2.69 (1.79)MR	23.70 (29.12)LS	22.82 (28.52)LR	25.68 (30.44)MR	14.15 (22.09)LR	S-HY
7	KDS 1169	2.74 (1.80)MR	24.75 (29.82)LS	23.45 (28.95)LR	24.99 (29.98)MR	15.14 (22.89)LR	S-HY
8	MAUS 791	3.58 (2.02)LR	36.25 (37.00)MS	27.73 (31.76)S	24.38 (29.58)MR	10.18 (18.60)MR	S-LY
9	MAUS 795	3.79 (2.07)LR	47.50 (43.55)MS	28.14 (32.02)S	33.37 (35.27)LR	12.02 (20.28)MR	S-LY
10	NRC 189	4.13 (2.15)S	50.25 (45.13)S	30.26 (33.36)HS	30.71 (33.64)LR	16.37 (23.86)S	S-HY
11	NRC 190	4.05 (2.13)LR	51.50 (45.84)S	32.27 (34.60)HS	28.87 (32.49)LR	17.52 (24.73)HS	S-LY
12	NRC 192	4.27 (2.18)S	52.00 (46.13)S	30.85 (33.73)HS	28.11 (32.01)LR	16.61 (24.04)S	S-LY
13	NRC 195	4.35 (2.20)S	54.50 (47.56)S	28.45 (32.22)S	31.70 (34.25)LR	15.70 (23.33)S	S-HY
14	NRC 196	3.98 (2.12)LR	47.65 (43.64)MS	30.36 (33.42)S	27.98 (31.92)LR	18.10 (25.17)HS	S-HY
15	NRC 197	3.88 (2.09)LR	42.15 (40.47)MS	27.48 (31.60)S	26.68 (31.09)MR	14.28 (22.19)LR	S-HY
16	PS 1682	4.57 (2.25)S	52.65 (46.50)S	25.11 (30.06)LR	32.39 (34.68)LR	15.95 (23.53)LR	S-LY
17	RSC 11-42	3.65 (2.04)LR	38.75 (38.48)MS	26.51 (30.98)LR	25.01 (29.99)MR	16.91 (24.27)S	S-LY
18	RVS 13-20	2.83 (1.82)MR	39.60 (38.98)MS	27.92 (31.88)LR	33.64 (35.44)LR	17.00 (24.34)HS	S-HY
19	SL 1282	4.17 (2.16)S	51.85 (46.04)S	31.15 (33.91)S	35.71 (36.68)S	15.28 (23.00)LR	S-LY
20	VLS 102	3.86 (2.09)LR	47.15 (43.35)MS	32.58 (34.79)S	33.70 (35.47)LR	17.55 (24.76)HS	S-LY
21	DLSb 1	**2.45 (1.72)R**	25.15 (30.09)LS	16.30 (23.80)MR	28.68 (32.37)LR	12.52 (20.71)MR	R-HY
22	JS 22-12	3.50 (2.00)LR	37.50 (37.75)MS	27.84 (31.83)LR	28.62 (32.33)LR	**7.98 (16.40)R**	S-HY
23	JS 22-16	3.89 (2.10)LR	44.50 (41.83)MS	26.30 (30.84)LR	29.45 (32.85)LR	**8.27 (16.71)R**	S-HY

24	JS 22-18	4.02 (2.13)S	57.00 (49.00)S	27.15 (31.39)LR	35.59 (36.61)S	11.48 (19.80)MR	S-LY
25	KDS 1096	2.92 (1.85)MR	27.50 (31.62)MS	19.74 (26.37)MR	26.40 (30.91)MR	8.50 (16.94)R	R-HY
26	NRC 165	3.75 (2.06)LR	42.50 (40.67)MS	28.13 (32.02)LR	23.61 (29.06)MR	13.60 (21.63)LR	S-HY
27	NRC 188	4.02 (2.13)S	47.00 (43.26)MS	27.75 (31.78)LR	27.69 (31.74)LR	14.41 (22.30)LR	S-HY
28	PS 1569	3.86 (2.09)LR	45.00 (42.11)MS	24.71 (29.80)MR	31.20 (33.94)S	14.65 (22.50)LR	S-LY
29	PS 1670	4.25 (2.18)S	54.75 (47.71)S	25.56 (30.36)LR	34.73 (36.09)S	15.99 (23.56)S	S-LY
30	RSC 11-35	3.52 (2.00)LR	37.25 (37.60)MS	24.75 (29.82)MR	32.38 (34.67)LR	16.56 (24.00)S	S-LY
31	RVSM 2012-4	3.45 (1.99)LR	38.00 (38.04)MS	19.51 (26.20)MR	34.20 (35.78)S	13.29 (21.37)LR	S-HY
32	DSb 34 (C)	**2.55** **(1.75)R**	27.50 (31.62)MS	**13.73** **(21.74)R**	23.45 (28.95)MR	7.31 **(15.68)R**	R-HY
33	KS 103 (C)	3.25 (1.94)MR	36.50 (37.15)MS	22.24 (28.13)MR	29.95 (33.17)LR	10.28 (18.69)MR	S-HY
34	DSb 21 (C)	2.78 (1.81)MR	24.15 (29.42)LS	25.17 (30.10)LR	26.61 (31.04)LR	**8.54** **(16.98)R**	R-HY
35	MACS 450 (C)	3.75 (2.06)LR	42.00 (40.38)MS	22.62 (28.39)MR	27.69 (31.74)LR	12.27 (20.50)MR	S-LY
36	RKS 18 (C)	3.25 (1.94)MR	35.45 (36.53)MS	19.85 (26.45)MR	28.82 (32.46)LR	13.73 (21.74)LR	S-LY
37	JS 335 (C)	3.11 (1.90)MR	32.10 (34.50)MS	20.62 (27.00)MR	32.33 (34.64)LR	14.28 (22.19)LR	S-HY
38	JS 93-05 (C)	3.59 (2.02)LR	31.45 (34.10)MS	25.67 (30.43)LR	28.38 (32.18)LR	16.41 (23.89)S	S-LY
	S.Em±	0.15	1.33	1.23	1.46	0.95	-
	CD @ 5%	0.46	3.77	3.77	4.33	2.89	-
	CD @ 1%	0.61	5.09	4.86	5.56	3.76	-

***Values in the parenthesis are square root transformation in case defoliators and angular/arc sine transformation in case of stem fly, pod borer and girdle beetle; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible, R-LY: Resistant low yielder, S-HY: Susceptible high yielder, R-HY: Resistant high yielder, S-LY: Susceptible low yielder**

Table 5.9: ENT 3a: Status of AVT-II entries for antibiosis against *S. litura*

Sr. no.	Genotype	AD (Approximate Digestibility)		ECI (Efficiency of Conversion of Ingested food)		ECD (Efficiency of Conversion of Digested food)	
		Pantnagar	Indore	Pantnagar	Indore	Pantnagar	Indore
1.	JS 2218	88.74 (0.87)	67.38 (55.17)	16.81 (0.01)	52.92 (46.67)	18.42 (0.45)	79.22 (62.88)
2.	JS 2212	90.19 (0.04)	63.08 (52.58)	27.78 (0.69)	54.09 (47.34)	29.23 (0.50)	87.41 (69.22)
3.	JS 2216	87.32 (0.81)	58.68 (50.00)	20.36 (0.14)	57.94 (49.57)	21.45 (0.17)	98.74 (83.56)
4.	RSC 11-35	-	68.82 (56.06)	-	66.99 (54.93)	-	97.32 (80.57)
5.	PS 1569	91.89 (0.14)	68.87 (56.08)	24.67 (0.16)	55.35 (48.07)	26.39 (0.26)	83.67 (66.17)
6.	NRC 188		69.74 (56.63)	-	51.53 (45.87)	-	75.69 (60.46)
7	NRC 165	-	58.53 (49.91)	-	55.54 (48.18)	-	94.85 (76.88)
8	RVSM 2012-4	-	78.48 (62.36)	-	56.92 (48.98)	-	72.87 (58.61)
9	DLSB 1	87.12 (0.86)	62.50 (52.24)	16.67 (0.10)	55.31 (48.05)	18.12 (0.13)	88.80 (70.45)
10	KDS 1096	92.76 (1.68)	61.21 (51.48)	32.17 (0.75)	53.64 (47.09)	35.63 (0.55)	87.81 (69.56)
11	JS 9560		69.53 (56.50)	-	57.19 (49.13)	-	82.02 (64.91)
12	PS 1670	89.38 (1.07)	-	14.46 (0.33)	-	15.58 (0.21)	-
13	JS 335 (C)	86.86 (1.80)	-	22.46 (0.03)	-	25.36 (0.44)	-
	SEM±	1.12		0.41		0.40	
	CD at 5%	3.45		1.27		1.22	

*** Figures in the parenthesis are Transformed angular values**

Table 5.10: ENT 3b - Status of AVT-II entries for antixenosis against *S. litura*

Sr. No.	Genotypes	"C" Value		Antixenosis response	
		Pantnagar	Indore	Pantnagar	Indore
1	JS 2218	0.81	0.83	Slight antixenotic	Slight antixenosis
2	JS 2212	0.65	1.00	Moderate antixenotic	Preferred host
3	JS 2216	1.01	1.16	Preferred host	Preferred host
4	RSC 11-35	-	0.86	-	Slight antixenosis
5	PS 1569	0.62	1.13	Moderate Antixenotic	Preferred host
6	NRC 188	-	0.95	-	Slight antixenosis
7	NRC 165	-	0.68	-	Moderate antixenosis
8	RVSM 2012-4	-	0.81	-	Slight antixenosis
9	DLSB 1	0.78	0.81	Slight antixenotic	Slight antixenosis
10	KDS 1096	1.32	0.88	Preferred host	Slight antixenosis
11	JS 9560	-	1.00	-	Preferred host
12	PS 1670	1.12	-	Preferred host	-
13	JS 335 (C)	Check	-	Check	-

Table 5.11: ENT.4 a. Field screening of IVT (Normal) entries for resistance to major insect-pests (Stem fly- % Stem tunneling)

Sr. No.	Entries	Pantnagar	Sehore	Parbhani	Amravati	Imphal	Dharwad
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	VLS 104	39.25 (38.70)HS	5.94 (14.05) HR	37.82 (37.94)* HS	31.5 (34.14)LR	4.57 (13.00)[#] MR	11.82 (20.10)MR
2	NRCSL 5	11.00 (19.28)R	22.35 (28.18) S	**18.53 (25.48) HR**	47 (43.26)HS	6.60 (15.46) LR	19.62 (26.28)LR
3	JS 24-26	29.17 (32.58)LR	22.50 (28.28) S	37.96 (38.01) HS	32.5 (34.74)LR	3.78 (11.67) MR	12.73 (20.90)MR
4	NRCSL 7	12.62 (20.71)MR	12.95 (21.07) MR	**15.42 (22.77) HR**	15.5 (23.18)MR	2.90 (10.51) MR	9.73 (18.17)R
5	JS 20-98	-	13.89 (21.84) MR	36.48 (37.14) S	13.5 (21.47)MR	-	-
6	SKAUS 3	26.43 (30.82)LR	27.14 (31.38) S	**15.83 (23.38) HR**	48.5 (44.14)HS	4.14 (12.44) MR	13.81 (21.81)MR

7	RVS 12-8	21.31 (27.38)LR	14.92 (22.49) MR	34.70 (36.08) LR	22 (27.95)MR	8.12 (17.04) LR	12.82 (20.98)MR
8	KDS 1203	78.30 (64.04)HS	18.99 (25.78) LR	**5.85 (14.00) HR**	27.5 (31.42)LR	5.34 (13.83) MR	18.14 (25.20)LR
9	NRC 253	7.37 (15.67)HR	13.38 (21.40) R	70.16 (56.89) HS	25 (29.89)LR	9.26 (18.10) LR	14.52 (22.39)MR
10	MACS 1756	90.19 (87.56)HS	12.56 (20.74) MR	27.98 (31.93) MR	11 (19.35)R	9.25 (18.07) LR	14.71 (22.55)MR
11	Lok Soya-2	16.20 (23.63)MR	9.23 (17.66) MR	36.68 (37.26) S	25 (29.89)LR	**1.79 (7.85) R**	10.06 (18.49)MR
12	AMS 2021-3	18.85 (25.62)MR	18.91 (25.76) LR	41.18 (39.91) HS	25 (30.00)LR	4.38 (12.69) MR	21.95 (27.93)S
13	Himso 1695	11.34 (19.58)R	20.14 (26.65) LR	30.39 (33.45) MR	35 (36.22)S	3.45 (9.92) MR	23.64 (29.08)S
14	TS - 156	15.44 (23.03)MR	17.58 (24.72) LR	**15.53 (23.20) HR**	37 (37.38)S	**2.00 (8.15) R**	19.43 (26.15)LR
15	NRCSL 8	42.66 (40.71)HS	30.54 (33.51) HS	33.10 (35.11) LR	16 (23.57)MR	5.88 (14.61) MR	17.06 (24.39)LR
16	JS 24-34	35.63 (36.55)HS	14.44 (22.30) MR	**25.07 (30.00) R**	21.5 (27.61)MR	8.10 (17.04) LR	15.43 (23.12)LR
17	RSC 10-52	-	24.35 (29.46) LR	**15.92 (23.51) HR**	14.5 (22.14)MR	-	-
18	DS 1510	33.19 (35.07)S	17.70 (23.85) LR	52.45 (46.39) HS	18 (25.07)MR	7.28 (16.19) LR	16.62 (24.05)LR
19	KSS 213	40.13 (39.22)HS	13.55 (20.37) MR	**22.89 (28.57) HR**	21.5 (27.61)MR	7.87 (16.72) LR	14.16 (22.10)MR
20	MAUS 824	29.80 (32.97)LR	5.28 (13.28) HR	**12.90 (21.04) HR**	15 (22.50)MR	4.20 (12.51) MR	12.84 (20.99)MR
21	NRC 254	15.81 (23.32)MR	5.40 (12.38) HR	74.78 (59.84) HS	35.5 (36.43)S	4.46 (12.82) MR	12.70 (20.87)MR
22	AMS 2021-4	18.49 (25.36)MR	12.92 (21.05) MR	35.53 (36.58) LR	20.5 (26.92)MR	8.47 (17.43) LR	15.04 (22.81)LR
23	Himso 1696	54.97 (47.92)HS	14.30 (22.14) MR	48.62 (44.20) HS	31 (33.83)LR	5.97 (14.73) MR	10.82 (19.20)MR

24	DS 1529	29.66 (32.88)LR	5.40 (12.38) HR	44.76 (41.98) HS	15 (22.50)MR	8.97 (17.88) LR	22.84 (28.54)S
25	KDS 1188	80.73 (66.64)HS	6.17 (14.37) R	**13.36 (21.42) HR**	17.5 (24.71)MR	10.05 (18.88) LR	17.82 (24.96)LR
26	MACS 1745	49.37 (44.63)HS	11.64 (19.94) MR	35.94 (36.83) S		7.73 (16.67) LR	14.50 (22.38)MR
27	NRC 255	10.81 (19.10)R	5.94 (14.05) HR	28.56 (32.28) MR	23 (28.61)LR	3.70 (10.19) MR	14.76 (22.59)MR
28	Asb 93	43.87 (41.42)HS	19.63 (26.28) LR	43.83 (41.44) HS	46 (42.70)HS	5.76 (14.48) MR	19.34 (26.08)LR
29	VLS 105	50.98 (45.57)HS	8.94 (17.14) MR	53.65 (47.08) HS	11.5 (19.78)R	8.30 (17.24) LR	20.42 (26.86)S
30	NRCSL 4	13.48 (21.44)MR	25.36 (30.19) S	31.49 (34.13) LR	31 (33.83)LR	5.36 (13.99) MR	19.15 (25.94)LR
31	NRC 257	1.46 (6.90)HR	8.33 (16.76) R	**9.42 (17.80) HR**	22 (27.95)MR	6.33 (15.02) LR	16.63 (24.06)LR
32	MAUS 814	7.69 (16.02)HR	9.63 (17.74) MR	31.09 (33.88) LR	32.5 (34.74)LR	5.63 (14.24) MR	17.24 (24.53)LR
33	SL 1311	12.56 (20.66)MR	9.01(17.41) R	47.08 (43.31) HS	34 (35.63)LR	11.92 (20.59) LR	15.75 (23.38)LR
34	Asb 85	37.69 (37.78)HS	14.91 (22.61) LR	33.84 (35.56) LR	23.5 (28.94)LR	5.93 (14.59) MR	16.73 (24.14)LR
35	PS 1693	4.18 (11.73)HR	9.25 (17.68) MR	**19.25 (26.01) HR**	22.5 (28.28)MR	6.08 (14.53) MR	19.51 (26.21)LR
36	NRC 256	12.43 (20.55)MR	8.33 (16.76) R	37.37 (37.67) S	15 (22.50)MR	9.33 (18.22) LR	12.94 (21.08)MR
37	RSC 1165	6.48 (14.67)HR	8.33 (16.66) R	**25.53 (30.34) R**	19 (25.65)MR	10.51 (19.31) LR	13.31 (21.39)MR
38	BAUS 124	26.95 (31.16)LR	29.11 (32.63) S	**23.68 (29.11) HR**	12.5 (20.61)R	3.92 (12.13) MR	14.63 (22.48)MR
39	DLSb 40	64.84 (53.98)HS	14.25 (22.13) MR	**16.07 (23.61) HR**		7.10 (15.99) LR	13.25 (21.34)MR
40	NRC 258	8.03 (16.38)HR	6.21 (14.02) R	**21.74 (27.77) HR**	9.5 (17.80)HR	6.24 (15.01) LR	12.54 (20.74)MR
41	Pusa Sipani BS-9	17.02 (24.26)MR	15.96 (23.52) LR	**23.65 (29.07) HR**	11 (19.35)R	9.44 (18.32) LR	14.31 (22.22)MR

42	PS 1696	50.00 (45.00)HS	15.53 (23.17) LR	45.62 (42.47) HS	29 (32.58)LR	7.46 (15.85) LR	21.31 (27.48)S
43	CAUMS 3	-	8.59 (17.06) MR	30.95 (33.78) LR		5.76 (14.36) MR	17.26 (24.54)LR
44	AUKS 212	19.27 (25.93)MR	11.02 (19.37) MR	31.12 (33.90) LR	28.5 (32.07)LR	7.36 (15.80) LR	14.12 (22.07)MR
45	RVSM 12-21	11.16 (19.42)R	9.78 (18.21) MR	45.88 (42.63) HS	24 (29.26)LR	9.02 (17.91) LR	16.24 (23.76)LR
46	NRC 259	10.11 (18.45)R	36.87 (37.37) HS	**15.14 (22.89) HR**	18 (24.97)MR	2.52 (8.83) MR	18.31 (25.33)LR
47	AS 34	18.70 (25.51)MR	9.78 (18.21) MR	36.79 (37.32) S	25 (29.89)LR	11.51 (20.28) LR	22.85 (28.55)S
48	RVSM 2011-35	-	11.17 (19.50) MR	30.31 (33.39) MR	12.5 (20.61)R	-	-
49	RSC 1172	36.56 (37.11)HS	19.79 (26.29) LR	32.48 (34.73) LR	23.5 (28.94)LR	6.11 (14.81) MR	22.44 (28.27)S
50	AS 55	9.52 (17.88)R	23.66 (29.08) LR	49.85 (44.90) HS	34 (35.63)LR	9.43 (18.23) LR	26.73 (31.12)HS
51	TS-208	14.55 (22.32)MR	21.20 (27.23) LR	25.90 (30.58) MR	20.5 (26.84)MR	5.38 (14.01) MR	18.02 (25.11)LR
52	NRC 260	10.42 (18.74)R	22.61 (28.35) LR	**23.43 (28.93) HR**	9.5 (17.95)HR	9.40 (18.33) LR	24.53 (29.68)HS
53	NRC 196	17.05 (24.28)MR	23.55 (28.77) LR	55.11 (47.93) HS	23.5 (28.94)LR	3.70 (10.19) MR	19.73 (26.36)LR
54	Pusa Sipani-SPS-433	10.29 (18.62)R	5.66 (12.53) HR	**12.34 (20.52) HR**	13 (21.01)R	**1.82 (7.89) R**	17.93 (25.04)LR
55	NRC 189	-	-	-		6.69 (15.36) LR	-
56	NRC 191	-	-	-		7.50 (16.41) LR	-
57	NRC 190	-	-	-		6.17 (14.68) LR	-
58	Himso 1693	-	-	-	-	5.42 (13.91) MR	-
59	KDS 1149	-	-	-	-	4.51 (12.94) MR	-

60	Himso 1694	-	-	-	-	7.11 (16.01) LR	-
61	RVSM 16-20					5.85 (14.50) MR	
62	NRC 149	13.07 (21.09)MR	-	-	-	-	-
63	SL 1074	19.40 (26.02)MR	-	-	-	-	-
64	PS 26	32.09 (34.39)	-	-	-	-	-
65	JS 20-116	-	-	-	-	3.20 (11.06) MR	-
66	KDS 753	-	-	-	-	10.32 (19.10) LR	14.53 (22.40)MR
67	MACS 1407	-	-	-	-	7.28 (16.19) LR	
68	DSb 21	-	-	-	-	-	15.15 (22.90)MR
69	DSb 34	-	-	-	-	-	13.55 (21.59)MR
70	MAUS 2 (LC)	-	-	-	-	-	-
71	MAUS 158 (LC)		-	**20.96 (27.24) HR**	-	-	-
SE ±		2.37	2.29	1.15	2.59	3.31	1.29
CD at 5 %			7.00	3.19	7.37	6.62	3.88
CD at 1 %		6.73	-	4.34	-	-	5.11
CV %		11.24	-	4.86	12.90	-	16.80

***Values in the parenthesis are angular/arc sine transformation; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible**

Table 5.12: ENT. 4 b. Field screening of IVT (Normal) entries for resistance to major insect-pests (Girdle beetle - % Plant infestation)

Sr. No.	Entries	Sehore	Dharwad	Kota
(1)	(2)	(3)	(4)	(5)
1	VLS 104	1.19(4.43) R	10.78(19.16)MR	21.67(27.72)**- LR
2	NRCSL 5	11.01 (19.27) LR	12.83(20.98)MR	10.00 (18.43) - R
3	JS 24-26	7.48 (15.85) LR	9.35(17.80)MR	9.17 (17.47) - HR
4	NRCSL 7	4.55 (8.77) MR	11.46(19.78)MR	10.00 (18.43) - R
5	JS 20-98	5.01(12.54) MR	-	10.00 (18.43) –HR
6	SKAUS 3	13.73 (21.82) S	11.47(19.79)MR	21.67 (27.72) -LR
7	RVS 12-8	6.38 (13.69) MR	8.14(16.58)R	11.67 (19.72) - MR
8	KDS 1203	5.24 (13.00) MR	12.25(20.48)MR	23.34 (28.83) -S
9	NRC 253	1.44 (4.37) R	13.98(21.95)LR	14.50 (22.33) -MR
10	MACS 1756	6.10 (14.21) MR	8.29(16.73)R	21.67 (27.72) -LR
11	Lok Soya-2	6.83 (14.94) MR	8.16(16.60)R	14.50 (22.33) - MR
12	AMS 2021-3	9.76 (18.19) LR	11.42(19.75)MR	20.00 (26.49) - LR
13	Himso 1695	6.91 (15.18) LR	11.15(19.50)MR	17.67 (24.85) -LR
14	TS - 156	3.56 (10.85) MR	12.61(20.80)MR	20.00 (26.49) - LR
15	NRCSL 8	6.82(14.88) MR	11.85(20.13)MR	9.17 (17.61) -HR
16	JS 24-34	4.78 (12.59) MR	8.19(16.63)R	12.00 (20.27) -MR
17	RSC 10-52	6.74 (14.94) LR	-	14.17 (22.10) - MR
18	DS 1510	9.68 (16.76) LR	13.97(21.94)LR	12.50 (20.69) - MR
19	KSS 213	3.70 (11.05) MR	8.30(16.74)R	16.67 (23.99) - MR
20	MAUS 824	00.00 (0.00) HR	8.58(17.03)R	18.34 (25.33) -LR
21	NRC 254	1.73 (4.14) R	15.28(23.00)LR	20.00 (26.49) - LR
22	AMS 2021-4	4.55 (12.37) MR	13.14(21.25)LR	15.00 (22.76) - MR
23	Himso 1696	9.13 (17.45) LR	8.87(17.32)R	21.67 (27.72) - LR
24	DS 1529	2.31 (7.69) R	13.33(21.41)MR	10.84 (19.21) - R
25	KDS 1188	3.56 (10.85) MR	12.88(21.03)MR	25.00 (29.99) -S
26	MACS 1745	5.06 (12.76) MR	8.01(16.44)R	21.67 (27.72) - LR
27	NRC 255	00.00 (0.00) HR	9.20(17.65)MR	20.00 (26.49) - LR
28	Asb 93	6.13 (14.28) LR	11.96(20.23)MR	20.83 (27.72) - LR
29	VLS 105	5.19 (13.13) MR	13.08(21.20)LR	20.00 (26.49) - LR
30	NRCSL 4	14.75 (23.73) S	9.43(17.88)MR	25.00 (29.99) -S
31	NRC 257	00.00 (0.00) HR	11.28(19.62)MR	18.34 (25.33) -LR
32	MAUS 814	3.82 (11.12) MR	7.87(16.29)R	20.00 (26.49) -LR
33	SL 1311	2.94 (11.08) R	9.82(18.26)MR	20.00 (26.49) -LR
34	Asb 85	2.49 (8.87) MR	10.43(18.83)MR	20.00 (26.49) -LR

35	PS 1693	3.44 (10.63) MR	12.70(20.87)MR	11.67 (19.92) -MR
36	NRC 256	1.19 (4.43) R	13.93(21.91)LR	11.67 (19.92) -MR
37	RSC 1165	2.14 (7.78) R	10.27(18.69)MR	15.84 (23.44) - MR
38	BAUS 124	4.98 (12.68) MR	8.11(16.54)R	25.00 (29.99) -S
39	DLSb 40	1.66 (7.27) R	12.89(21.04)MR	25.83 (30.52) -HS
40	NRC 258	5.02 (12.88) MR	8.54(16.99)R	8.33 (16.33) -HR
41	Pusa Sipani BS-9	9.57 (17.97) LR	10.40(18.81)MR	15.00 (22.76) -MR
42	PS 1696	5.88 (13.69) LR	15.72(23.35)LR	14.17 (22.04) -MR
43	CAUMS 3	00.00 (0.00) HR	12.18(20.42)MR	15.84 (23.44) - MR
44	AUKS 212	5.82 (13.61) MR	16.34(23.84)S	12.50 (20.61) -MR
45	RVSM 12-21	3.44 (10.63) MR	9.42(17.87)MR	18.34 (25.33) - LR
46	NRC 259	10.60 (18.85) S	16.32(23.82)S	20.00 (26.49) -LR
47	AS 34	3.27 (10.31) MR	16.09(23.64)S	20.00 (26.49) -LR
48	RVSM 2011-35	3.51 (10.78) MR	-	13.34 (21.38) - MR
49	RSC 1172	18.00 (25.04) S	13.56(21.60)LR	25.83 (30.52) -HS
50	AS 55	3.58 (9.88) MR	28.40(32.19)HS	15.00 (22.76) -MR
51	TS-208	13.00 (21.11) LR	20.12(26.64)S	16.67 (23.99) -MR
52	NRC 260	9.34 (17.70) LR	18.93(25.78)S	21.67 (27.72) - LR
53	NRC 196	9.02 (17.45) LR	25.12(30.07)HS	11.67 (19.92) -MR
54	Pusa Sipani-SPS-433	0.00 (0.00) HR	15.79(23.41)	23.33 (28.88) -S
55	KDS 753	-	8.86(17.31)R	-
56	DSb 21	-	8.64(17.09)R	-
57	DSb 34	-	10.21(18.63)MR	-
	SEm±	**3.21**	1.04	1.55
	CD at 5 %	**9.58**	4.19	4.39

***Values in the parenthesis are angular/arc sine transformation; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptibl**

Table 5.13: ENT.4 c. Field screening of IVT (Normal) entries for resistance to major insect pests (Defoliators)

Code No.	Entries	Defoliators (Number of larvae / m)					Leaf damage (% defoliation)	No. of semilooper/ Mrl	No. of *S. litura* larvae/mrl
		Sehore	Pantnagar	Kota	Dharwad	Imphal	Bidar	Parbhani	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	VLS 104	1.33 (1.30) MR	0.00 (0.70)HR	2.50(2.80)*- HS	3.93 (2.11)LR	4.80 (2.30)* LR	18.20 (25.25)MR	5.50 (2.44)* MR	0.50 (0.99)* MR
2	NRCSL 5	2.66 (1.74) LR	0.00 (0.70)HR	1.50 (1.41) – MR	4.39 (2.21)S	4.80 (2.30) LR	20.16 (26.68)LR	7.17 (2.76) LR	1.17 (1.28) LR
3	JS 24-26	3.66 (2.04) S	0.00 (0.70)HR	1.84(1.53) – MR	3.94 (2.11)LR	2.00 (1.49) MR	14.76 (22.59)MR	9.50 (3.16) HS	1.00 (1.21) LR
4	NRCSL 7	1.99 (1.40) MR	0.00 (0.70)HR	1.84 (1.53) –MR	2.96 (1.86)R	4.80 (2.28) LR	28.82 (32.47)LR	6.50 (2.64) LR	1.00 (1.21) LR
5	JS 20-98	1.16 (1.19) MR	-	1.67 ((1.47) –MR	-	-	-	7.50 (2.82) LR	1.17 (1.27) LR
6	SKAUS 3	3.83 (2.04) S	0.00 (0.70)HR	2.34 (1.68) –LR	3.82 (2.08)LR	4.00 (2.07) LR	20.92 (27.21)LR	**3.50 (1.99) HR**	0.50 (0.99) MR
7	RVS 12-8	1.00 (1.14) MR	0.00 (0.70)HR	1.84 (1.53) – MR	4.34 (2.20)S	4.00 (2.09) LR	16.93 (24.30)MR	8.50 (2.99) HS	0.83 (1.15) LR
8	KDS 1203	3.33 (1.95) LR	1.00 (1.30)HR	2.17 (1.63) –MR	4.71 (2.28)S	4.00 (2.11) LR	24.01 (29.34)LR	5.83 (2.51) MR	1.00 (1.21) LR
9	NRC 253	0.66 (1.02) R	0.00 (0.70)HR	2.67 (1.78) – LR	4.96 (2.34)HS	2.80 (1.72) MR	25.53 (30.35)LR	8.83 (3.05) HS	1.00 (1.22) LR
10	MACS 1756	0.50 (0.96) R	0.00 (0.70)HR	3.50 (2.00) –S	3.85 (2.09)LR	4.40 (2.18) LR	18.25 (25.29)MR	7.17 (2.76) LR	0.67 (1.08) MR
11	Lok Soya-2	1.99 (1.40) MR	0.00 (0.70)HR	1.84 (1.53) –MR	3.71 (2.05)LR	2.00 (1.58) MR	21.20 (27.42)LR	**3.67 (2.03) HR**	1.00 (1.19) LR
12	AMS 2021-3	1.33 (1.34) MR	0.00 (0.70)HR	1.84 (1.53) –MR	3.55 (2.01)LR	3.00 (1.80) MR	17.26 (24.55)MR	9.50 (3.16) HS	0.67 (1.02) MR
13	Himso 1695	2.16 (1.59) LR	0.00 (0.70)HR	2.17 (1.63) – MR	3.36 (1.97)MR	3.20 (1.88) MR	28.46 (32.24)LR	8.17 (2.94) HS	0.50 (0.99) MR
14	TS - 156	3.83 (2.04) S	0.00 (0.70)HR	2.50 (1.73) – LR	5.41 (2.43)HS	1.60 (1.45) MR	20.48 (26.91)LR	10.83 (3.36) HS	1.33 (1.34) LR
15	NRCSL 8	3.66 (2.04) S	0.00 (0.70)HR	1.84 (1.53) – MR	3.68 (2.05)LR	1.60 (1.42) MR	16.93 (24.30)MR	9.50 (3.16) HS	0.67 (1.06) MR

16	JS 24-34	1.16 (1.19) MR	2.50 (1.87)HR	1.84 (1.53) – MR	3.95 (2.11)LR	3.40 (1.92) MR	30.14 (33.30)LR	6.50 (2.64) LR	1.17 (1.28) LR
17	RSC 10-52	3.83 (2.04) S	-	2.00 (1.58) –MR	-	-	-	**4.17 (2.15) HR**	0.33 (0.91) MR
18	DS 1510	3.66 (2.03) S	0.00 (0.70)HR	1.83 (1.52) –MR	3.85 (2.09)LR	3.60 (2.02) LR	24.25 (29.50)LR	10.17 (3.26) HS	1.00 (1.21) LR
19	KSS 213	1.99 (1.40) MR	0.00 (0.70)HR	2.34 (1.68) –LR	3.24 (1.93)MR	3.50 (1.94) LR	12.00 (20.27)MR	6.17 (2.58) MR	0.83 (1.15) LR
20	MAUS 824	0.33 (0.89) HR	0.00 (0.70)HR	1.84 (1.53) – MR	3.51 (2.00)MR	4.20 (2.14) LR	28.98 (32.57)LR	7.50 (2.82) LR	0.83 (1.15) LR
21	NRC 254	0.50 (0.96) R	4.00 (2.30)HR	2.17 (1.63) – MR	3.83 (2.08)LR	2.60 (1.68) MR	21.06 (27.32)LR	**4.50 (2.23) HR**	0.33 (0.89) MR
22	AMS 2021-4	1.33 (1.34) MR	0.00 (0.70)HR	2.33 (1.68) – LR	4.37 (2.21)S	4.30 (2.18) LR	19.90 (26.50)MR	6.67 (2.67) LR	0.33 (0.91) MR
23	Himso 1696	1.99 (1.40) MR	0.00 (0.70)HR	2.67 (1.78) –LR	4.26 (2.18)S	3.00 (1.83) MR	19.65 (26.31)MR	**5.17 (2.37) HR**	0.33 (0.91) MR
24	DS 1529	0.33 (0.89) HR	0.00 (0.70)HR	1.33 (1.35) – R	5.54 (2.46)HS	4.70 (2.28) LR	19.64 (26.31)MR	7.83 (2.88) S	1.00 (1.21) LR
25	KDS 1188	0.66 (1.03) R	3.50 (2.16)HR	3.34 (1.96) -S	4.53 (2.24)S	3.20 (1.90) MR	29.47 (32.88)LR	7.17 (2.76) LR	0.67 (1.06) MR
26	MACS 1745	3.66 (2.04) S	22.00 (5.18)HS	3.17 (1.91) -S	3.74 (2.06)LR	4.30 (2.18) LR	27.00 (31.31)LR	6.50 (2.64) LR	1.17 (1.27) LR
27	NRC 255	0.16 (0.83) HR	30.00 (6.04)HS	2.50 (1.73) – LR	3.92 (2.10)LR	1.80 (1.52) MR	13.63 (21.66)MR	5.83 (2.51) MR	0.17 (0.80) MR
28	Asb 93	1.49 (1.41) MR	0.00 (0.70)HR	2.50 (1.73) – LR	5.06 (2.36)HS	3.60 (2.02) LR	18.59 (25.54)MR	**4.67 (2.27) HR**	0.67 (1.08) MR
29	VLS 105	0.50 (0.96) R	4.50 (2.42)HR	2.84 (1.83) – LR	4.11 (2.15)S	3.50 (1.94) LR	22.50 (28.31)LR	**3.17 (1.91) HR**	0.17 (0.80) MR
30	NRCSL 4	3.66 (2.03) S	0.00 (0.70)HR	2.34 (1.68) –LR	2.74 (1.80)R	3.20 (1.90) MR	17.12 (24.44)MR	6.67 (2.67) LR	1.33 (1.33) LR
31	NRC 257	0.33 (0.89) HR	0.00 (0.70)HR	1.84 (1.53) – MR	5.53 (2.46)HS	3.30 (1.90) MR	10.76 (19.15)MR	6.17 (2.58) MR	0.67 (1.08) MR
32	MAUS 814	0.66 (1.07) R	35.00 (6.51)HS	2.00 (1.58) – MR	3.68 (2.05)LR	3.20 (1.90) MR	27.10 (31.37)LR	6.67 (2.67) LR	0.33 (0.91) MR
33	SL 1311	0.83(1.08) R	0.00 (0.70)HR	2.50 (1.72) –LR	3.15 (1.91)MR	3.70 (2.01) LR	18.91 (25.78)MR	6.33 (2.61) MR	0.33 (0.91) MR
34	Asb 85	3.66 (2.04) S	2.50 (1.87)HR	2.67 (1.77) – LR	4.13 (2.15)S	3.80 (2.03) LR	19.93 (26.52)MR	10.00 (3.23) HS	1.33 (1.34) LR

35	PS 1693	1.33 (1.30) MR	0.00 (0.70)HR	1.33 (1.35) – R	4.38 (2.21)S	1.80 (1.52) MR	27.02 (31.32)LR	6.83 (2.70) LR	0.33 (0.91) MR
36	NRC 256	0.50 (0.96) R	0.00 (0.70)HR	1.17 (1.29) – HR	3.81 (2.08)LR	3.60 (1.96) LR	13.00 (21.14)MR	**5.17 (2.34) HR**	0.67 (1.06) MR
37	RSC 1165	0.99 (1.19) MR	0.00 (0.70)HR	2.17 (1.63) – MR	4.12 (2.15)S	3.50 (1.96) LR	21.12LR (27.36)LR	6.50 (2.64) LR	1.00 (1.21) LR
38	BAUS 124	3.83 (2.06) S	1.50 (1.51)HR	3.34 (1.96) –S	3.46 (1.99)MR	3.70 (2.01) LR	18.31 (25.33)MR	5.50 (2.44) MR	0.50 (0.99) MR
39	DLSb 40	1.33(1.34) MR	0.00 0.70)HR	2.84 (1.83) –LR	2.66 (1.78)R	4.00 (2.12) LR	13.26 (21.35)MR	**3.50 (1.98) HR**	0.33 (0.89) MR
40	NRC 258	0.99 (1.19) MR	0.00 (0.70)HR	1.17 (1.28) – HR	3.81 (2.08)LR	3.70 (2.01) LR	20.65 (27.03)LR	6.50 (2.64) LR	1.17 (1.24) LR
41	Pusa Sipani BS-9	2.16 (1.59) LR	0.00 (0.70)HR	2.17 (1.63) – MR	4.53 (2.24)S	2.80 (1.72) MR	17.65 (24.84)MR	6.00 (2.54) MR	0.83 (1.15) LR
42	PS 1696	3.00 (1.85) LR	0.00 (0.70)HR	1.84 (1.53) - LR	5.50 (2.45)HS	4.10 (2.12) LR	23.72 (29.15)LR	6.67 (2.67) LR	0.83 (1.13) LR
43	CAUMS 3	0.83 (1.08) R		3.17 (1.91) –S	5.80 (2.51)HS	4.40 (2.21) LR	17.31 (24.58)MR	6.67 (2.67) LR	0.83 (1.13) LR
44	AUKS 212	1.66 (1.47) MR	0.00 (0.70)HR	1.17 (1.29) -HR	4.24 (2.18)S	3.50 (1.96) LR	22.23 (28.13)LR	5.83 (2.51) MR	0.83 (1.15) LR
45	RVSM 12-21	1.50 (1.40) MR	3.00 (2.02)HR	1.50 (1.41) - MR	4.03 (2.13)LR	3.10 (1.78) MR	20.95 (27.24)LR	7.83 (2.88) S	0.83 (1.15) LR
46	NRC 259	4.66 (2.24) HS	0.00 (0.70)HR	2.17 (1.63) - MR	3.71 (2.05)LR	3.10 (1.78) MR	16.45 (23.93)MR	7.17 (2.76) LR	0.83 (1.13) LR
47	AS 34	0.49 (0.99) R	0.00 (0.70)HR	3.34 (1.96) –S	2.92 (1.85)MR	2.90 (1.74) MR	17.40 (24.66)MR	**5.17 (2.37) HR**	0.50 (0.99) MR
48	RVSM 2011-35	0.83(1.08) R		2.17 (1.63) –MR	2.10 (1.61)R	-	-	6.50 (2.64) LR	0.33 (0.89) MR
49	RSC 1172	3.66 (2.04) S	65.00 (8.86)HS	3.30 (2.00) –S	3.28 (1.95)MR	3.00 (1.83) MR	19.32 (26.07)MR	6.00 (2.54) MR	0.67 (1.06) MR
50	AS 55	3.83 (2.05) S	14.00 (4.15)HS	2.00 (1.58) – MR	-	3.00 (1.87) MR	20.38 (26.84)LR	7.83 (2.88) S	0.83 (1.13) LR
51	TS-208	2.66 (1.78) LR	4.50 (2.42)HR	1.34 (1.35) – R	4.46 (2.23)S	3.10 (1.78) MR	15.96 (23.55)MR	5.50 (2.44) MR	0.33 (0.91) MR
52	NRC 260	4.33(2.18) HS	0.00 (0.70)HR	1.67 (1.47) – MR	4.12 (2.15)S	4.20 (2.14) LR	19.74 (26.38)MR	**4.50 (2.23) HR**	0.67 (1.06) MR

53	NRC 196	4.66 (2.24) HS	0.00 (0.70)HR	1.17 (1.28) –HR	4.98 (2.34)HS	2.60 (1.68) LR	24.46 (29.64)LR	6.50 (2.64) LR	0.50 (0.99) MR
54	Pusa Sipani-SPS-433	0.50 (0.96) R	0.00 (0.70)HR	3.84 (2.08) –HS	3.42 (1.98)MR	2.00 (1.53) MR	24.97 (29.98)LR	5.50 (2.44) MR	0.67 (1.06) MR
55	NRC 189	**-**	-	-	-	4.20 (2.14) LR	-	-	-
56	NRC 191	**-**	-	-	-	3.00 (1.83) MR	-	-	-
57	NRC 190	**-**	-	-	-	3.00 (1.76) MR	-	-	-
58	Himso 1693	-	-	-	-	4.60 (2.25) LR	-	-	-
59	KDS 1149	-	-	-	-	4.20 (2.14) LR	-	-	-
60	Himso 1694	-	-	-	-	3.80 (2.05) LR	-	-	-
61	RVSM 16-20	-	-	-	-	4.20 (2.14) LR	-	-	-
62	NRC 149	**-**	0.00 (0.70)HR	-	-	-	-	-	-
63	SL 1074	**-**	0.00 (0.70)HR	-	-	-	-	-	-
64	PS 26	**-**	0.00 (0.70)HR	-	-	-	-	-	-
65	JS 20-116	-	-	-		3.20(1.88) MR	-	-	-
66	KDS 753	-	-	-	3.74(2.06)LR	2.50(1.73) MR	17.53(24.75)MR	-	-
67	MACS 1407	-	-	-	-	2.60(1.75) MR	-	-	-
68	DSb 21	-	-	-	4.04 (2.13)S	-	21.90 (27.90)LR	-	-
69	DSb 34	-	-	-	4.23(2.18)S	-	11.48(19.80)MR	-	-
70	MAUS 2 (LC)	-	-	-	-	-	-	7.50(2.82) LR	1.00(1.21) LR
71	MAUS 158 (LC)	-	-	-	-	-	-	5.50(2.44) MR	0.17(0.80) MR
SE ±		**0.28**	0.18	0.09	0.21	0.25	4.20(2.14) LR	0.07	0.11
CD at 5 %		**0.84**		0.26	0.64	0.50	8.61	0.21	0.32
CD at 1 %			0.53	0.35	0.85	-	11.47	0.26	0.41
CV %			15.08		4.06	-	26.53	4.22	15.31

***Values in the parenthesis are square root transformation; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible**

Table 5.14: ENT.4 d. Field screening of IVT (Normal) entries for resistance to major insect pests (Pod borer, Aphids, White fly, Leaf Webber and YMV Rating)

Code No.	Entries	Pod Borer		Aphid (3leaf/plant)		White fly/leaf			No. of jassids/ plant	Bug/ mrl*
		Dharwad	Bidar	Imphal	Pantnagar	Pantnagar	Parbhani	Ludhiana	Parbhani	Pantnagar
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**
1	VLS 104	31.90 (34.38)MR	6.56 (14.82)LR	5.20 (2.39)*MR	0.00 (0.70)MR	5.50 (2.66)HR	1.30 (1.34)*LR	-	1.00 (1.22)*	1.50 (1.51)HS
2	NRCSL 5	35.97 (36.84)LR	3.72 (11.12)MR	7.60 (2.85) LR	1.50 (1.51)HS	16.50 (4.50)HR	1.40 (1.37) LR	**1.00(1.42)**	0.70 (1.09)	1.00 (1.30)HS
3	JS 24-26	34.18 (35.77)LR	8.46 (16.86)S	7.50 (2.80) LR	0.50 (1.04)HS	15.00 (4.30)HR	1.30 (1.33) LR	**1.66(1.60)**	0.80 (1.13)	0.70 (1.15)HS
4	NRCSL 7	30.18 (33.31)MR	1.67 (7.42)MR	8.40 (2.98) LR	0.50 (1.04)HS	5.50 (2.66)HR	1.50 (1.41) LR	1.50(1.58)	0.80 (1.13)	0.50 (1.04)HS
5	JS 20-98	-	-	-	-	-	1.50 (1.41) LR	**-**	0.90 (1.18)	-
6	SKAUS 3	37.80 (37.93)LR	6.07 (14.26)LR	7.20 (2.74) LR	0.60 (1.10)HS	7.00 (2.98)HR	1.30 (1.34) LR	3.16(2.02)	0.80 (1.13)	0.00 (0.70)R
7	RVS 12-8	39.34 (38.83)LR	6.60 (14.89)LR	8.40 (2.86) LR	0.00 (0.70)MR	8.00 (3.17)HR	1.40 (1.37) LR	-	0.90 (1.18)	0.00 (0.70)R
8	KDS 1203	36.77 (37.32)LR	2.26 (8.48)MR	6.50 (2.64) LR	0.50 (1.04)HS	4.50 (2.42)HR	1.40 (1.37) LR	-	1.00 (1.22)	2.00 (1.70)HS
9	NRC 253	35.97 (36.84)LR	5.00 (12.92)LR	5.20 (2.37) MR	3.00 (2.02)HS	7.50 (3.08)HR	1.50 (1.41) LR	3.00(2.00)	0.70 (1.09)	1.00 (1.30)HS
10	MACS 1756	37.05 (37.48)LR	3.64 (10.95)MR	7.60 (2.80) LR	2.00 (1.70)HS	5.00 (2.55)HR	1.30 (1.34) LR	No germination	1.00 (1.22)	0.00 (0.70)R
11	Lok Soya-2	29.44 (32.85)MR	2.27 (8.63)MR	**2.80 (1.76) R**	1.00 (1.30)HS	11.50 (3.78)HR	1.20 (1.30)MR	2.66(1.92)	0.80 (1.13)	0.00 (0.70)R
12	AMS 2021-3	39.31 (38.81)LR	2.90 (9.29)MR	5.40 (2.43) MR	1.50 (1.51)HS	7.50 (3.08)HR	1.30 (1.34) LR	4.00(2.22)	0.70 (1.09)	1.40 (1.47)HS
13	Himso 1695	45.03 (42.13)HS	2.66 (9.38)MR	5.80 (2.51) MR	0.00 (0.70)MR	13.00 (4.01)HR	1.30 (1.33) LR	3.16(2.03)	0.80 (1.13)	1.70 (1.59)HS
14	TS - 156	40.39 (39.45)S	5.00 (12.92)LR	4.20 (2.16) MR	1.00 (1.30)HS	10.00 (3.53)HR	1.10 (1.25)MR	-	0.90 (1.18)	0.00 (0.70)R
15	NRCSL 8	33.40 (35.29)LR	3.15 (9.92)MR	7.60 (2.82) LR	0.00 (0.70)MR	11.50 (3.78)HR	1.40 (1.37) LR	**1.00(1.42)**	1.00 (1.22)	3.00 (2.02)HS

16	JS 24-34	35.72 (36.69)LR	3.31 (10.45)MR	7.60 (2.85) LR	2.10 (1.73)HS	7.00 (2.98)HR	1.30 (1.34) LR	-	1.00 (1.22)	1.50 (1.51)HS
17	RSC 10-52	-	-	-	-	-	1.50 (1.41) LR	**-**	1.00 (1.22)	-
18	DS 1510	43.96 (41.52)HS	1.73 (7.56)MR	6.00 (2.50) MR	0.00 (0.70)MR	9.50 (3.45)HR	1.40 (1.37) LR	1.16(1.45)	0.70 (1.09)	1.00 (1.30)HS
19	KSS 213	34.55 (35.99)LR	4.23 (11.77)LR	7.40 (2.81) LR	1.30 (1.43)HS	15.50 (4.37)HR	1.20 (1.30)MR	-	1.00 (1.22)	0.00 (0.70)R
20	MAUS 824	32.74 (34.89)LR	5.74 (13.38)LR	7.80 (2.88) LR	0.70 (1.15)HS	9.50 (3.45)HR	1.10 (1.26)MR	3.67(2.15)	0.90 (1.17)	0.00 (0.70)R
21	NRC 254	39.48 (38.91)LR	8.38 (16.60)S	7.80 (2.88) LR	0.00 (0.70)MR	10.00 (3.53)HR	1.40 (1.37) LR	2.50(1.88)	1.10 (1.26)	1.50 (1.51)HS
22	AMS 2021-4	41.83 (40.28)S	3.94 (11.36)LR	6.20 (2.58) LR	0.00 (0.70)MR	10.50 (3.61)HR	1.50 (1.41) LR	2.33(1.82)	0.90 (1.18)	2.00 (1.70)HS
23	Himso 1696	37.87 (37.97)LR	8.56 (16.24)LR	5.80 (2.45) MR	1.50 (1.51)HS	12.50 (3.93)HR	1.40 (1.37) LR	-	0.90 (1.18)	1.00 (1.30)HS
24	DS 1529	43.83 (41.44)HS	4.71 (11.67)LR	5.00 (2.34) MR	0.00 (0.70)MR	11.00 (3.70)HR	1.20 (1.30)MR	**2.16(1.78)**	0.80 (1.14)	0.00 (0.70)R
25	KDS 1188	41.05 (39.83)S	6.99 (15.29)LR	8.00 (2.91) LR	0.00 (0.70)MR	8.00 (3.17)HR	1.10 (1.26)MR	-	0.90 (1.17)	0.00 (0.70)R
26	MACS 1745	39.49 (38.92)LR	2.19 (8.49)MR	5.80 (2.51) MR	0.50 (1.04)HS	7.00 (2.98)HR	1.30 (1.34) LR	-	0.90 (1.18)	2.50 (1.87)HS
27	NRC 255	35.01 (36.27)LR	5.12 (13.02)LR	6.80 (2.70) LR	1.20 (1.39)HS	7.50 (3.08)HR	1.10 (1.26)MR	-	0.90 (1.17)	1.50 (1.51)HS
28	Asb 93	41.85 (40.30)S	5.25 (13.25)LR	4.80 (2.30) MR	0.40 (0.99)HS	7.00 (2.98)HR	1.50 (1.41) LR	-	0.90 (1.17)	0.00 (0.70)R
29	VLS 105	33.43 (35.31)LR	4.83 (12.69)LR	6.20 (2.58) LR	0.00 (0.70)MR	5.00 (2.55)HR	1.00 (1.22)MR	-	1.00 (1.22)	0.00 (0.70)R
30	NRCSL 4	31.96 (34.41)MR	6.45 (14.65)LR	5.20 (2.38) MR	0.00 (0.70)MR	8.50 (3.27)HR	1.30 (1.34) LR	2.67(1.90)	0.90 (1.18)	0.60 (1.10)HS
31	NRC 257	39.94 (39.18)LR	2.97 (9.92)MR	4.20 (2.16) MR	1.50 (1.51)HS	16.00 (4.43)HR	1.00 (1.22)MR	-	0.90 (1.18)	0.00 (0.70)HS
32	MAUS 814	34.72 (36.09)LR	3.36 (10.39)MR	8.60 (3.00) LR	0.50 (1.04)HS	13.50 (4.08)HR	1.20 (1.30)MR	-	1.00 (1.22)	1.30 (1.43)HS
33	SL 1311	28.86 (32.48)MR	4.32 (11.96)LR	6.60 (2.66) LR	3.00 (2.02)HS	10.00 (3.53)HR	1.10 (1.26)MR	1.50(1.58)	0.90 (1.18)	0.70 (1.15)HS
34	Asb 85	32.05 (34.47)MR	1.43 (6.86)MR	6.80 (2.70) LR	2.00 (1.70)HS	12.00 (3.86)HR	1.30 (1.34) LR	-	0.90 (1.18)	0.00 (0.70)R

35	PS 1693	37.16 (37.55)LR	1.52 (7.08)MR	3.40 (1.96) MR	1.50 (1.51)HS	15.50 (4.37)HR	1.00 (1.22)MR	1.83(1.66)	0.90 (1.18)	0.00 (0.70)R
36	NRC 256	38.29 (38.22)LR	2.70 (9.46)MR	6.20 (2.59) LR	1.00 (1.30)HS	18.50 (4.76)HR	1.20 (1.30)MR	-	0.60 (1.04)	0.60 (1.10)HS
37	RSC 1165	37.48 (37.74)LR	3.81 (11.26)LR	4.40 (2.21) MR	1.50 (1.51)HS	19.00 (4.82)HR	**0.80 (1.13) HR**	-	0.90 (1.18)	0.00 (0.70)R
38	BAUS 124	28.85 (32.48)MR	2.03 (8.18)MR	7.60 (2.83) LR	0.00 (0.70)MR	21.00 (5.07)HR	1.20 (1.30)MR	-	0.90 (1.18)	2.00 (1.70)HS
39	DLSb 40	32.46 (34.72)MR	2.81 (9.64)MR	5.30 (2.39) MR	0.00 (0.70)MR	8.00 (3.17)HR	1.20 (1.30)MR	No germination	1.00 (1.22)	0.00 (0.70)R
40	NRC 258	36.49 (37.15)LR	5.10 (12.90)LR	4.60 (2.25) MR	1.00 (1.30)HS	12.00 (3.86)HR	0.90 (1.18)MR	-	1.10 (1.26)	1.70 (1.59)HS
41	Pusa Sipani BS-9	41.26 (39.95)S	2.02 (8.17)MR	7.40 (2.78) LR	0.00 (0.70)MR	9.00 (3.36)HR	1.10 (1.26)MR	-	0.70 (1.09)	1.00 (1.30)HS
42	PS 1696	35.63 (36.64)LR	7.87 (16.30)MR	7.20 (2.76) LR	0.60 (1.10)HS	11.50 (3.78)HR	1.40 (1.37) LR	**2.50(1.72)**	1.00 (1.22)	1.30 (1.43)HS
43	CAUMS 3	40.25 (39.36)S	2.70 (9.38)MR	4.80 (2.30) MR			1.00 (1.22)MR	-	0.80 (1.14)	
44	AUKS 212	38.43 (38.30)LR	4.87 (11.99)LR	6.10 (2.57) LR	1.00 (1.30)HS	14.50 (4.23)HR	0.90 (1.18)MR	3.66(2.12)	0.50 (0.98)	2.10 (1.73)HS
45	RVSM 12-21	33.90 (35.60)MR	3.77 (11.19)LR	5.60 (2.47) MR	0.00 (0.70)MR	10.00 (3.53)HR	1.20 (1.30)MR	-	1.10 (1.26)	0.50 (1.04)HS
46	NRC 259	36.91 (37.39)LR	2.97 (9.85)MR	4.20 (2.16) MR	0.50 (1.04)HS	14.50 (4.23)HR	1.20 (1.30)MR	**1.67(1.62)**	0.90 (1.18)	1.70 (1.59)HS
47	AS 34	37.99 (38.03)LR	1.89 (7.87)MR	6.20 (2.58) LR	0.50 (1.04)HS	12.50 (3.93)HR	1.60 (1.44) LR	-	0.90 (1.18)	0.00 (0.70)R
48	RVSM 2011-35	-	-	-	-	-	1.00 (1.22)MR	-	1.00 (1.22)	-
49	RSC 1172	40.25 (39.36)S	4.39 (12.08)LR	7.20 (2.77) LR	2.00 (1.70)HS	10.50 (3.61)HR	1.20 (1.30)MR	-	1.20 (1.30)	2.10 (1.73)HS
50	AS 55	45.97 (42.67)HS	4.19 (11.81)LR	7.20 (2.77) LR	1.00 (1.30)HS	10.50 (3.61)HR	1.30 (1.34) LR	-	0.80 (1.14)	1.90 (1.66)HS
51	TS-208	41.33 (39.99)S	1.79 (7.68)MR	3.60 (2.02) MR	0.00 (0.70)MR	9.50 (3.45)HR	1.10 (1.26)MR	-	1.20 (1.30)	0.50 (1.04)HS
52	NRC 260	34.77 (36.12)LR	2.89 (9.55)MR	6.40 (2.59) LR	0.00 (0.70)MR	8.50 (3.27)HR	1.20 (1.30)MR	**2.50(1.72)**	1.10 (1.26)	0.00 (0.70)R
53	NRC 196	38.78 (38.50)LR	6.21 (14.17)MR	4.00 (2.09) MR	2.50 (1.87)HR	17.00 (4.57)HR	1.20 (1.30)MR	**1.25(1.49)**	1.10 (1.26)	0.00 (0.70)R

54	Pusa Sipani-SPS-433	35.14 (36.34)LR	2.63 (9.33)MR	4.40 (2.21) MR	2.00 (1.70)HR	17.50 (4.63)HR	1.30 (1.34) LR	-	0.90 (1.18)	1.10 (1.34)HS
55	NRC 189	-	-	5.40 (2.43) LR	-	-	-	-	-	-
56	NRC 191	-	-	6.20 (2.59) LR	-	-	-	-	-	-
57	NRC 190	-	-	5.20 (2.39) MR	-	-	-	-	-	-
58	Himso 1693	-	-	7.60 (2.84) LR	-	-	-	-	-	-
59	KDS 1149	-	-	6.00 (2.55) MR	-	-	-	-	-	-
60	Himso 1694	-	-	7.40 (2.79) LR	-	-	-	-	-	-
61	RVSM 16-20	-	-	5.40 (2.43) MR	-	-	-	-	-	-
62	NRC 149	-	-	-	0.00 (0.70)MR	12.00 (3.86)HR	-	**1.33(1.55)**	-	1.00 (1.30)HS
63	SL 1074	-	-	-	1.20 (1.39)HS	20.00 (4.95)HR	-	**2.16(1.78)**	-	1.00 (1.30)HS
64	PS 26	-	-	-	0.00 (0.70)MR	16.00 (4.43)HR		2.17(1.73)	-	0.00 (0.70)R
65	JS 20-116	-	-	7.00(2.74) LR	-	-	-	-	-	-
66	KDS 753	38.08(38.09)LR	5.41(13.45)LR	6.80(2.69) LR	-	-	-	-	-	-
67	MACS 1407	-	-	3.80(2.06) MR	-	-	-	-	-	-
68	DSb 21	37.22(37.58)LR	1.71(7.45)MR	-	-	-	-	-	-	-
69	DSb 34	30.38(33.43)MR	3.65(10.79)MR	-	-	-	-	-	-	-
70	MAUS 2 (LC)	-	-	-	-	-	1.20(1.30)	-	1.60(1.44) LR	-
71	MAUS 158 (LC)	-	-	-	-	-	1.10(1.26)	-	0.90(1.18) MR	-
SE ±		1.92	1.80	0.29	0.098	0.063	0.05		0.05	0.135
CD at 5%		5.69	5.10	0.57	0.28	0.17	NS	(0.55)	0.14	

***Values in the parenthesis are square root transformation and angular/arc sine transformation in case of pod borer; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible**

ENT. 5.15: ENT. 4 e. Field screening of IVT (early) entries for resistance to major insect pests (Central Region)

Code No	Entries	Leaf Defoliators/ mrl *					Girdle beetle infestation (%) *				Stem fly (% stem tunneling)			
		Amravati	Kota	Sehore	Prabhani		Amravati	Kota	Sehore	Indore				
					Semilooper	*S. litura*					Prabhani	Amravati	Sehore	Indore
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1	KDS 1271	0.00 (0.71)**MR**	2.17 (1.63)*LR	1.33 (1.34)MR	**3.17 (1.90)* HR**	0.67 (1.08)*MR	0.50 (0.97)**LR**	17.00 (24.72)MR	15.90 (23.49) MR	7.48 (15.87S	20.70 (26.80)LR	51.5 (45.88)**LR**	18.81 (25.69)MR	20.56 (26.96)S
2	NRC 261	0.10 (0.77)**MR**	2.67(1.78) - LR	0.99 (1.19) R	**3.67 (2.02) HR**	**0.17 (0.80) R**	0.00 (0.71)**MR**	21.67 (27.72) LR	11.55 (19.86) R	4.32 (12)LR	**4.36 (11.91)HR**	36 (36.80)**MR**	20.67 (26.85)MR	10.71 (19.1)MR
3	RVS 15-1	0.00 (0.71)**MR**	3.84(2.08) - HS	1.00 (1.22) R	6.33 (2.61) LR	1.00 (1.22) LR	0.50 (0.97)**MR**	28.34 (32.15) HS	19.5 (26.19)LR	10.3 (18.71)HS	**7.39 (15.77)HR**	27 (31.12)**MR**	21.87 (27.87) LR	15.76 (23.39)MR
4	MAUS 820	0.07 (0.75)**MR**	2.34(1.68) - LR	1.83 (1.50)MR	7.83 (2.88) S	1.00 (1.21) LR	1.50 (1.40)**S**	17.50 (24.68)MR	16.5 (23.96) MR	2.96 (9.9) LR	**9.51 (17.95) R**	52.5 (46.44)**LR**	20.29 (26.76)MR	40.99 (39.8) S
5	DS 1550	0.00 (0.71)**MR**	1.17 (1.29) - HR	3.16 (1.90) LR	5.67 (2.47) MR	0.83 (1.15) MR	0.00 (0.71)**MR**	10.00 (18.43)HR	11.75 (20.04) R	1.64 (7.35)MR	43.60 (41.32)HS	15 (22.50)**HR**	21.24 (27.39)MR	54.20 (47.41) HS
6	NRC 262	0.17 (0.82)**LR**	2.50(1.73) - LR	2.33 (1.48)LR	5.50 (2.44) MR	1.33 (1.33) LR	0.00 (0.71)**MR**	19.83 (26.36) LR	14.5 (22.37) MR	2.43 (8.96) LR	15.65 (23.20)MR	42 (40.39)**LR**	27.80 (31.80) LR	15.97 (23.55)MR
7	AMS 2022-1	0.00 (0.71)**MR**	2.00 (1.58)MR	3.66 (2.02) LR	9.50 (3.16) HS	1.17 (1.27) LR	1.50 (1.40)**S**	20.00 (26.49) LR	21.80 (27.82) LR	1.00 (5.73)MR	13.16 (21.09)MR	69.5 (56.75)**HS**	27.43 (31.51) LR	25.01 (30) LR
8	JS 24-33	0.30 (0.88)**LR**	2.17 (1.63) LR	4.16 (2.15) S	6.00 (2.54) LR	0.50 (0.99) MR	0.00 (0.71)**MR**	16.67 (23.99)MR	22.50 (28.31) LR	1.00 (5.73)MR	**6.32 (14.04)HR**	75.5 (60.47)**HS**	24.88 (29.43) LR	24.95 (29.96) LR
9	NRC 138 (C)	0.03 (0.73)**MR**	1.84 (1.53)MR	1.66 (1.46)MR	5.83 (2.51) LR	1.17 (1.28) LR	0.00 (0.71)**MR**	14.17 (22.10)MR	12.25 (20.48) R	1.00 (5.73)MR	49.82 (44.89) HS	85 (67.50)**HS**	19.05 (25.84)MR	21.43 (27.57) LR
10	KDS 1275	0.10 (0.77)**MR**	2.00 (1.58)MR	1.66 (1.45)MR	7.67 (2.85) S	0.67 (1.08) MR	1.00 (1.22)**LR**	19.83 (26.36) LR	20.25 (26.73) LR	3.69 (11.08)LR	16.60 (23.96)MR	11.5 (19.78)**HR**	21.65 (27.71)MR	28.61 (32.33) LR
11	MAUS 749	0.00 (0.71)**MR**	2.17 (1.63) LR	4.83 (2.29) S	9.33 (3.13) HS	1.00 (1.22) LR	0.00 (0.71)**MR**	21.67 (27.72) LR	18.50 (25.46) MR	2.85 (9.71) LR	28.41 (32.20) S	42.5 (40.68)**LR**	23.47 (28.96)MR	24.00 (29.33) LR
12	DS 1547	0.27 (0.87) **LR**	0.84(1.15) - HR	0.83 (1.13) R	7.67 (2.85) S	0.83 (1.13) MR	2.00 (1.58) **HS**	10.00 (18.19)HR	12.10 (20.35) R	1.00 (5.73)MR	42.32 (40.57) HS	60 (50.89) **S**	19.81 (26.41)MR	59.88 (50.69) HS
13	MACS 1779	0.23 (0.85)**LR**	2.67(1.78) - LR	3.99 (2.11) LR	**3.67 (2.03) HR**	0.33 (0.91) MR	0.00 (0.71)**MR**	23.33 (28.88) LR	21.75 (24.79) LR	1.00 (5.73)MR	15.98 (23.55)MR	26.5 (30.93)**MR**	35.73 (36.68) HS	15.39 (23.09)MR
14	JS 24-25	0.00	2.17(1.63)	0.66	5.33	0.83	1.00	10.84	20.75 (27.09)	1.00	21.47	10	27.45	62.58

		(0.71)**MR**	–LR	(1.07)HR	(2.41) MR	(1.15) MR	(1.22)**LR**	(19.21) R	LR	(5.73)MR	(27.55) LR	(18.43)**HR**	(31.33) LR	(52.28) HS
15	RSC 11-75	0.23 (0.85)**LR**	2.00(1.58) - MR	2.66 (1.78) LR	7.50 (2.82) LR	1.50 (1.41) LR	0.00 (0.71)**MR**	24.17 (29.44) LR	20.25 (26.73) LR	7.49 (15.88) S	30.50 (33.51) HS	15 (22.50)**HR**	28.69 (32.35) LR	19.05 (25.88)MR
16	AS 26	0.00 (0.71)**MR**	2.17(1.63) - LR	1.66 (1.46)MR	**3.17** **(1.91) HR**	0.50 (0.99) MR	1.50 (1.40)**S**	21.67 (27.72) LR	16.75 (24.15) MR	4.03 (11.58)LR	**8.30** **(16.69)HR**	38.5 (38.25)**LR**	29.77 (33.04) LR	25.42 (30.28) LR
17	NRC 141	0.00 (0.71)**MR**	2.34 (1.68) LR	4.83 (2.29) S	10.00 (3.24) HS	1.67 (1.46) LR	0.00 (0.71)**MR**	20.83 (27.12) LR	12.15(20.39) R	3.97 (11.49)LR	**11.47** **(19.76) R**	21 (27.18)**MR**	24.0 (29.19) LR	23.61 (29.07) LR
18	NRC 152 (C)	0.53 (1.01)**S**	1.84 (1.53)MR	0.33 (0.98)HR	6.50 (2.64) LR	0.83 (1.15) MR	1.50 (1.40)**S**	18.17 (25.20)MR	10.13(18.55) R	1.00 (5.73)MR	**6.96** **(15.29)HR**	27.5 (31.42)**MR**	8.17 (16.51)HR	38.64 (38.43) LR
19	AUKS 234	0.00 (0.71)**MR**	1.17 (1.29) HR	2.33 (1.44) LR	10.33 (3.29) HS	1.33 (1.34) LR	0.00 (0.71)**MR**	13.34 (21.27)MR	11.75 (20.04) R	1.65 (7.39)MR	25.36 (30.22) LR	9 (17.43)**HR**	18.81 (25.69)MR	26.48 (30.97) LR
20	NRC 263	0.20 (0.83)**LR**	3.50 (2.00) HS	3.49 (1.99) LR	**4.50** **(2.23) HR**	0.83 (1.13) MR	1.50 (1.40)**S**	28.33 (32.07) HS	26.50 (30.37) S	1.00 (5.73)MR	13.20 (21.29)MR	51.5 (45.86)**LR**	32.42 (34.65) S	49.61 (44.77) HS
21	AS 47	0.00 (0.71)**MR**	2.17 (1.63) LR	5.33 (2.41) HS	7.00 (2.73) LR	1.00 (1.21) LR	0.00 (0.71)**MR**	22.50 (28.28) LR	15.00 (22.78) MR	1.00 (5.73)MR	**9.99** **(18.42) R**	47.5 (43.55)**LR**	12.17 (20.41) R	35.49 (36.56) LR
22	JS 20-34 (C)	0.37 (0.92)**LR**	1.34 (1.35)R	0.83 (1.13) R	**4.17** **(2.15) HR**	0.83 (1.15) MR	2.50 (1.73)**HS**	16.67 (24.10)MR	18.50 (25.46) MR	1.00 (5.73)MR	22.32 (28.18) LR	28.5 (32.12)**MR**	21.51 (27.62)MR	25.01 (30) LR
23	DLSb 40	0.00 (0.71)**MR**	1.84 (1.53)MR	0.99 (1.19) R	**4.33** **(2.19) HR**	0.50 (0.99) MR	0.00 (0.71)**MR**	18.17 (25.20)MR	26.20 (30.78) S	1.00 (5.73)MR	15.41 (23.05)MR	24 (29.33)**MR**	25.40 (30.28) LR	0
24	AUKS 238	0.37 (0.92)**LR**	0.84 (1.15)HR	1.66 (1.46)MR	7.17 (2.76) LR	1.33 (1.35) LR	1.50 (1.40)**S**	9.17 (17.61)HR	11.70 (19.99) R	2.15 (8.43)MR	23.20 (28.71) LR	43.5 (41.26)**LR**	13.33 (21.40) R	30.89 (33.76) LR
25	MAUS 2	-	-	-	8.00 (2.91) HS	1.17 (1.28) LR	-	-	-	-	28.89 (32.48) HS	-	-	-
26	MAUS 18	-	-	-	**4.83** **(2.30) R**	0.33 (0.91) MR	-	-	-	-	15.83 (23.42)MR	-	-	-
SEm±		-	0.08	**0.20**	0.08	0.11	-	1.68	**2.10**	**2.96**	1.85	2.97	**2.36**	**6.66**
CD at 1%		-	0.30		0.31	0.43	-	6.67		**7.96**	7.29			**17.95**
CD at 5%		-	0.22	**0.61**	0.26	0.32	-	4.92	**5.90**	**5.96**	5.40	8.63	**6.92**	**13.43**
CV %		-	-	-	4.91	13.72	-	-	-	-	10.41	13.48	-	-

***Values in the parenthesis are square root transformation in case defoliators and angular/arc sine transformation in case of stem fly and girdle beetle; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible**

Table 5.16: ENT. 5a - Evaluation of germplasm lines at hot spots for resistance against major insect pests (Dharwad)

Sl. No.	IISR Germplasm	Defoliators (larvae/mrl)*	Percent defoliation at peak incidence **	Pod borer damage** (%)	Yield (Kg/ha)
1	EC 251827	3.43(1.98)LR	33.60(35.41)MS	39.69(39.03)S	979
2	EC 383165	4.13(2.15)S	35.64(36.64)MS	32.76(34.90)MR	1057
3	EC 389149	2.82(1.82)R	22.85(28.54)LS	30.97(33.80)MR	1346
4	EC 457366	4.25(2.18)S	52.30(46.30)S	30.47(33.49)MR	946
5	EC 458350	4.36(2.20)S	54.90(47.79)S	44.01(41.54)HS	735
6	EC 251541	4.00(2.12)S	36.65(37.24)MS	34.59(36.01)LR	818
7	EC 357998	4.33(2.20)S	39.60(38.98)MS	42.13(40.45)HS	780
8	EC 389170	3.83(2.08)LR	40.40(39.45)MS	37.56(37.78)LR	957
9	EC 291401	3.27(1.94)MR	30.70(33.63)MS	32.76(34.90)MR	1168
10	EC 389174	3.02(1.88)MR	31.50(34.13)MS	31.84(34.34)MR	1313
11	JSM 195	2.63(1.77)R	23.60(29.05)LS	31.23(33.96)MR	1397
12	JSM 232	4.31(2.19)S	62.55(52.25)S	41.82(40.27)S	732
13	SL 525	3.93(2.10)LR	34.65(36.05)MS	36.10(36.91)LR	1068
14	SL (E) 1	3.05(1.88)MR	24.75(29.82)LS	37.18(37.55)LR	1096
15	MACS 171	4.52 (2.24)S	42.45 (40.64)MS	36.73 (37.29)LR	1000
16	AMS 108	3.51 (2.00)MR	27.65 (31.71)MS	32.51 (34.75)MR	1318
17	AMSS 34	2.56 (1.75)R	23.65 (30.07)LS	23.34 (28.88)R	1609
18	EC 113778	5.25 (2.40)HS	55.45 (48.11)S	40.75 (39.65)S	695
19	EC 232019	3.90 (2.10)LR	28.55 (32.28)MS	34.87 (36.18)MR	1168
20	Harder	4.47 (2.23)S	32.79 (34.92)MS	40.53 (39.52)S	901
21	JS 20-41	3.39 (1.97)MR	27.95 (31.90)MS	33.27 (35.21)MR	1207
22	JS 20-48	3.79 (2.07)LR	42.85 (40.87)MS	35.62 (36.63)LR	1174
23	JS 20-50	3.45 (1.99)MR	27.65 (31.71)MS	34.66 (36.05)LR	1090
24	JS 20-51	3.10 (1.90)MR	24.65 (29.76)LS	37.84 (37.94)LR	1257
25	JS 20-53	4.61 (2.26)S	37.55 (37.78)MS	43.62 (41.32)HS	847
26	JS 20-55	4.30 (2.19)S	42.75 (40.81)MS	38.28 (38.20)LR	802
27	JS 20-59	2.48 (1.73)R	24.55 (29.69)LS	35.80 (36.73)LR	1424
28	JS 20-61	3.28 (1.94)MR	39.75 (39.07)MS	38.64 (38.42)LR	1190
29	JS 20-86	5.67 (2.48)HS	55.95 (48.40)S	42.22 (40.51)HS	735
30	MAUS 142	5.80 (2.51)HS	51.65 (45.93)S	40.75 (39.65)S	779
31	PS 1423	4.39 (2.21)S	37.45 (37.72)MS	36.73 (37.29)LR	1068
32	SQL 31	3.24 (1.93)MR	34.85 (36.17)MS	31.51 (34.13)MR	1125
33	SQL 32	4.63 (2.26)S	58.65 (49.96)S	45.65 (42.48)HS	997
34	SQL 37	3.69 (2.05)LR	24.85 (29.89)MS	31.84 (34.34)MR	1196
35	EC 287466	3.94 (2.11)LR	28.55 (32.28)MS	33.95 (35.62)MR	1068
36	EC 287469	3.88	29.75	35.08	1163

		(2.09)LR	(33.04)MS	(36.30)LR	
37	EC 350664	3.68 (2.04)LR	30.05 (33.23)MS	34.27 (35.81)LR	1110
38	EC 309537	4.56 (2.25)S	52.65 (46.50)S	43.64 (41.33)HS	1024
39	JS 75-30	3.22 (1.93)MR	27.55 (31.65)MS	34.25 (35.80)LR	1217
40	VLS 75	2.59 (1.76)R	27.95 (31.90)MS	33.28 (35.22)MR	1471
41	CAT 1477	4.69 (2.28)S	53.35 (46.90)S	43.05 (35.08)MR	796
42	CAT 1483	5.26 (2.40)HS	55.75 (48.28)S	45.42 (42.35)HS	642
43	DSb 1	2.92 (1.85)MR	28.65 (32.35)MS	31.04 (33.84)MR	1379
44	EC 333879	3.01 (1.87)MR	29.75 (33.04)MS	38.28 (38.20)LR	1285
45	G 141	3.39 (1.97)MR	27.90 (31.87)MS	35.80 (36.73)LR	1131
46	G 620	4.25 (2.18)S	53.75 (47.13)S	38.64 (38.42)S	1018
47	DE 201	3.59 (2.02)LR	35.95 (36.83)MS	40.22 (39.34)S	1120
48	DS 98-02	2.93 (1.85)MR	24.45 (29.62)LS	32.75 (34.89)MR	1268
49	DS 24110	3.52 (2.00)LR	28.45 (32.22)MS	35.22 (36.39)MR	1235
50	AGS 747	3.40 (1.97)MR	34.65 (36.05)MS	30.69 (33.62)MR	1057
51	JS 335 (C)	3.38 (1.97)MR	28.65 (32.35)MS	37.38 (37.67)LR	1326
S.Em±		0.18	1.30	1.67	53.25
CD @ 5%		0.55	3.65	5.12	158.89
CD @ 1%		0.71	5.16	6.76	212.79

***Values in the parenthesis are square root transformation in case defoliators and angular/arc sine transformation in case of pod borer and percent defoliation; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible**

Table 5.17: ENT. 5b. Screening of germplasm line at hot spots for resistance against major insect-pests (Central region) & Ludhiana

		Indore			Kota		Ludhiana
S. No.	**ACC. No.**	**Stem fly (% stem tunneling)**	**Girdle beetle (% Infestation)**	**Defoliators (Larvae/mrl)**	**Defoliators (Larvae/mrl)**	**Girdle Beetle (% Infestation)**	**#**Mean whitefly adults /trifoliate leaf**
1.	EC 251827	22.68 (28.43) LR	7.25 (15.62) LR	2.50 (1.73) MR	2.00 (1.58)*MR	16.67 (24.10) MR	2.50
2.	EC 383165	34.46 (35.94) LR	13.50 (21.55) LR	9.00 (3.08) LR	2.17 (1.63) LR	18.34 (25.33) MR	1.00
3.	EC 389149	30.03 (33.22) LR	No germination	4.00 (2.12) LR	1.50 (1.41) MR	11.67 (19.92) HR	-
4.	EC 457366	40.82 (39.71) LR	No germination	2.00 (1.58) MR	1.50 (1.41) MR	12.83 (20.99) R	2.00
5.	EC 458350	37.89 (37.99) LR	17.66 (24.85) LR	8.00 (2.91) LR	1.67 (1.47) MR	15.00 (22.79) MR	-
6.	EC 251541	35.23 (36.4) LR	12.90 (21.04) LR	6.50 (2.64) LR	2.34 (1.67) LR	20.00 (26.57) MR	-
7.	EC 357998	25.02 (30.01) LR	No germination	2.50 (1.73) MR	3.00 (1.86) LR	25.00 (29.99) LR	No germination
8.	EC 389170	27.61 (31.69) LR	No germination	4.00 (2.12) LR	2.67 (1.78) LR	21.67 (27.72) LR	-
9.	EC 291401	32.05 (34.48) LR	No germination	7.00 (2.73) LR	1.67 (1.47) MR	20.00 (26.57) MR	-
10.	EC 389174	No germination	No germination	No germination	2.34 (1.67) LR	23.33 (28.88) LR	No germination
11.	JSM 195	42.07 (40.43) LR	No germination	7.00 (2.73) LR	1.33 (1.35) MR	11.67 (19.92) HR	-
12.	JSM 232	17.24 (24.53) MR	8.56 (17.01) LR	8.00 (2.91) LR	1.84 (1.53) MR	25.00 (29.99) LR	-
13.	SL 525	31.72 (34.27) LR	No germination	9.00 (3.08) LR	2.34 (1.68) LR	23.34 (28.83) LR	3.67
14.	SL(E) 1	40.28 (39.39) LR	14.33 (22.24) LR	7.00 (2.73) LR	2.17 (1.63) MR	18.50 (25.45) MR	2.00
15.	MACS 171	23.02 (28.67) LR	7.66 (16.07) LR	6.00 (2.54) LR	2.50 (1.72) LR	26.67 (30.91) LR	-
16.	AMS 108	No germination	No germination	No germination	No germination	No germination	No germination
17.	AMSS 34	32.49 (34.75) LR	3.94 (11.45) MR	4.50 (2.23) LR	2.17 (1.63) LR	21.67 (27.72) LR	-
18.	EC 113778	30.64 (33.61) LR	No germination	2.00 (1.58) MR	1.17 (1.29) R	10.00 (18.43) HR	0.50
19.	EC 232019	21.37 (27.53) LR	No germination	3.00 (1.87) MR	0.84 (1.15) HR	9.17 (17.61) HR	1.00
20.	Harder	55.41 (48.1) HS	No germination	5.00 (2.34) LR	2.00 (1.58) MR	25.00 (29.99) LR	**1.00**
21.	JS 20-41	36.76 (37.32) LR	No germination	2.50 (1.73) MR	1.67 (1.47) MR	13.00 (21.08) R	2.00
22.	JS 20-48	18.73 (25.64) MR	11.00 (19.36) LR	8.50 (3) LR	2.34 (1.68) LR	26.67 (31.05) LR	1.00
23.	JS 20-50	42.86 (40.89) S	6.55 (14.83) MR	9.00 (3.08) LR	2.34 (1.68) LR	23.33 (28.88) LR	1.50
24.	JS 20-51	51.15 (45.66) HS	No germination	5.00 (2.34) LR	2.00 (1.58) MR	20.83 (27.12) LR	1.50
25.	JS 20-53	57.63 (49.39) HS	13.50 (21.55) LR	8.00 (2.91) LR	1.50 (1.40) MR	12.67 (20.84) R	-
26.	JS 20-55	63.62 (52.9) HS	No germination	2.00 (1.58) MR	2.34 (1.68) LR	25.00 (29.99) LR	-
27.	JS 20-59	25.72 (30.47) LR	No germination	2.50 (1.73) MR	No germination	No germination	2.00

28.	JS 20-61	78.62 (62.46) HS	No germination	1.00 (1.22) MR	No germination	No germination	1.00
29.	JS 20-86	21.31 (27.49) LR	No germination	2.00 (1.58) MR	2.00 (1.58) MR	20.00 (26.57) MR	-
30.	MAUS 142	No germination	No germination	No germination	No germination	No germination	No germination
31.	PS 1423	43.31 (41.15) S	No germination	8.50 (3) LR	2.17 (1.63) LR	21.67 (27.72) LR	1.50
32.	SQL 31	29.14 (32.67) LR	No germination	4.00 (2.12) LR	2.00 (1.58) MR	21.84 (27.84) LR	-
33.	SQL 32	29.47 (32.87) LR	No germination	3.00 (1.87) MR	2.34 (1.68) LR	24.50 (29.65) LR	-
34.	SQL 37	71.87 (57.96) HS	No germination	2.00 (1.58) MR	2.50 (1.73) LR	25.17 (30.10) LR	**1.50**
35.	EC 287466	45.72 (42.54) S	8.14 (16.58) LR	2.50 (1.73) MR	2.00 (1.58) MR	25.00 (29.99) LR	-
36.	EC 287469	34.29 (35.84) LR	No germination	1.00 (1.22) MR	2.67 (1.63) LR	23.00 (28.66) LR	-
37.	EC 350664	65.8 (54.21) HS	No germination	6.00 (2.54) LR	2.17 (1.63) LR	20.83 (27.12) LR	-
38.	EC 309537	No germination	No germination	No germination	No germination	No germination	No germination
39.	JS 75-30	43.5 (41.26) S	9.39 (17.84) LR	5.50 (2.44) LR	1.84 (1.53) MR	15.00 (22.79) MR	-
40.	VLS 75	59.34 (50.38) HS	No germination	4.00 (2.12) LR	2.34 (1.68) LR	23.33 (28.88) LR	-
41.	CAT 1477	56.33 (48.63) HS	No germination	2.00 (1.58) MR	3.50 (2.00) S	30.00 (33.18) HS	-
42.	CAT 1483	41.83 (40.29) LR	11.00 (19.36) LR	4.50 (2.23) LR	2.00 (1.58) MR	18.34 (25.33) MR	**-**
43.	Dsb 1	46.04 (42.73) S	No germination	5.00 (2.34) LR	2.34 (1.68) LR	18.67 (25.57) MR	-
44.	EC 333879	24.91 (29.94) LR	6.00 (14.17) MR	4.5 0 (2.23) LR	3.50 (2.00) S	29.17 (32.58) S	-
45.	G 141	22.73 (28.47) LR	4.91 (12.8) MR	5.50 (2.44) LR	2.17 (1.63) MR	23.34 (28.83) LR	-
46.	G 620	33.04 (35.08) LR	No germination	6.50 (2.64) LR	No germination	-	0.50
47.	DE 201	49.31 (44.6) S	8.08 (16.51) LR	4.00 (2.12) LR	3.00 (1.87) LR	25.00 (29.89) LR	-
48.	DS 98-02	32.19 (34.56) LR	6.00 (14.17) MR	2.00 (1.58) MR	2.50 (1.73) LR	20.00 (26.49) MR	2.00
49.	DS 24110	21.51 (27.63) LR	3.94 (11.45) MR	5.00 (2.34) LR	3.50 (2.00) S	17.34 (24.60) MR	1.00
50.	AGS 747	22.83 (28.54) LR	3.50 (10.78) MR	4.00 (2.12) LR	2.33 (1.68) LR	30.84 (33.68) HS	-
CD at 5%		**(7.28)**	**(9.37)**	**(0.53)**	**(0.10)**	**(2.39)**	
SEm±		**(14.64)**	**(19.24)**	**(1.09)**	**(0.29)**	**(6.81)**	

***Values in the parenthesis are square root transformation in case defoliators and whitefly and angular/arc sine transformation in case of stem fly and girdle beetle; Abbreviations used: HR: Highly resistant, R: Resistant, MR: Moderately resistant, LR: Low resistant, S: Susceptible, HS: Highly susceptible, R-LY: Resistant low yielder, S-HY: Susceptible high yielder, R-HY: Resistant high yielder, S-LY: Susceptible low yielder**

Table 5.18: ENT. 5c. Evaluation of germplasm lines at hot spots for resistance against major insect-pests (Imphal).

Code No.	Entries	No. of BHC larvae/mrl	No. of other defoliating larvae*/mrl (*tobacco caterpillar, leaf roller etc.)	Percent defoliation at peak incidence/plant	No. of aphids/plant	Yield per line (kg)
1	EC 251827	7.60	1.20	18.00 LS	6.00	0.410
2	EC 383165	Did not germinate				
3	EC 389149	7.20	1.80	20.00 LS	14.00	0.320
4	EC 457366	9.60	1.20	21.58 LS	7.33	0.205
5	EC 458350	5.00	0.80	20.00 LS	0.00	0.365
6	EC 251541	0.00	0.80	21.11 LS	6.67	0.270
7	EC 357998	6.20	2.00	23.33 LS	10.67	0.265
8	EC 389170	Did not germinate				
9	EC 291401	9.20	2.40	24.00 LS	16.67	0.195
10	EC 389174	7.60	1.40	22.00 LS	8.33	0.160
11	JSM 195	6.00	0.80	16.67 LS	10.00	0.350
12	JSM 232	5.20	2.00	25.71 MS	7.33	0.165
13	SL 525	6.40	1.60	23.33 LS	7.33	0.300
14	SL(E)1	2.40	0.60	18.89 LS	3.33	0.370
15	MACS 171	8.40	2.00	21.67 LS	11.33	0.155
16	AMS 108	Did not germinate				
17	AMSS 34	3.60	0.80	23.33 LS	13.33	0.340
18	EC 113778	4.60	1.40	25.00 MS	10.67	0.250
19	EC 232019	6.80	0.60	23.33 LS	23.33	0.200
20	Harder	2.40	1.80	20.00 LS	33.33	0.200
21	JS 20-41	10.80	1.40	25.38 MS	7.33	0.175
22	JS 20-48	Did not germinate				
23	JS 20-50	2.00	1.00	24.00 LS	6.67	0.210
24	JS 20-51	Did not germinate				
25	JS 20-53	7.20	2.00	24.55 LS	10.00	0.155
26	JS 20-55	10.40	2.20	24.29 LS	10.67	0.145
27	JS 20-59	Did not germinate				
28	JS 20-61	Did not germinate				

29	JS 20-86	Did not germinate				
30	MAUS 142	6.80	1.40	22.31 LS	33.33	0.165
31	PS 1423	13.00	2.00	25.38 MS	10.00	0.155
32	SQL 31	Did not germinate				
33	SQL 32	11.60	2.60	21.20 LS	7.33	0.135
34	SQL 37	Did not germinate				
35	EC 287466	8.80	1.20	20.77 LS	14.00	0.295
36	EC 287469	2.00	1.20	20.00 LS	10.67	0.375
37	EC 350664	1.00	1.00	18.89 LS	6.67	0.325
38	EC 309537	6.80	2.00	19.60 LS	13.33	0.270
39	JS 75-30	12.00	2.40	25.56 MS	6.67	0.160
40	VLS 75	5.60	0.60	17.50 LS	10.67	0.240
41	CAT 1477	7.20	1.40	22.31 LS	20.67	0.135
42	CAT 1483	5.20	1.00	17.50 LS	7.33	0.245
43	Dsb 1	10.00	3.00	26.67 MS	6.67	0.190
44	EC 333879	2.40	1.60	20.91 LS	6.67	0.235
45	G 141	9.60	1.00	21.43 LS	16.67	0.315
46	G 620	Did not germinate				
47	DE 201	4.80	1.60	22.50 LS	16.67	0.235
48	DS 98-02	0.00	1.60	25.00 MS	7.33	0.235
49	DS 24110	5.20	1.80	22.50 LS	10.67	0.260
50	AGS 747	6.00	1.60	20.53 LS	18.00	0.320
51	JS 335(Mean of 10 lines)	9.60	1.40	25.38 MS	20.67	0.325

***Abbreviations used: LS: Least susceptible, MS: Moderately susceptible**

Table 5.19: ENT 6a: Effect of microbial consortia on population of tobacco leaf eating caterpillar/mrl in soybean

Treatments		Imphal										Amravati						
		1st spray			2nd spray			3rd spray					1st spray			2nd spray		
		PT	3DAT	7DAT	PT	3DAT	7DAT	PT	3DAT	7DAT	Yield (Kg/ha)	Treatments	PT	3DAT	7DAT	PT	3DAT	7DAT
T1	***Beauveri abassiana* (2 kg/ha)+*Metarhizium anisopliae* (2 kg/ha)**	0.00	0.22 (0.84)	1.00 (1.22)	0.78 (1.13)	0.67 (1.07)	0.56 (1.02)	0.33 (0.91)	0.33 (0.91)	0.11 (0.78)	3403.30	*Beauveria bassiana* @ 4g/l	2.08 (1.44)	1.83 (1.35)	1.50 (1.21)	3.00 (1.73)	2.75 (1.66)	2.67 (1.63)
T2	***Nomuraea rileyi*(2 kg/ha) + *Bt*(1 kg/ha)**	0.00	0.11 (0.78)	1.22 (1.31)	0.67 (1.07)	0.56 (1.02)	0.44 (0.97)	0.33 (0.91)	0.22 (0.84)	0.11 (0.78)	3738.69	*Metarhizium anisopliae* @ 4g/l	1.84 (1.35)	2.08 (1.44)	2.08 (1.43)	3.58 (1.89)	3.33 (1.82)	2.83 (1.68)
T3	***Nomuraea rileyi*(2 kg/ha) + *Metarhizium anisopliae*(2 kg/ha)**	0.00	0.33 (0.91)	0.78 (1.13)	0.67 (1.07)	0.67 (1.07)	0.67 (1.08)	0.44 (0.97)	0.11 (0.78)	0.11 (0.78)	3526.75	*Nomuraea rileyi* @ 4g/l	2.25 (1.48)	1.17 (1.07)	0.84 (0.88)	3.25 (1.79)	2.25 (1.49)	1.92 (1.38)
T4	***Beauveria bassiana* (2 kg/ha) + *Nomuraea rileyi*(2 kg/ha)**	0.00	0.22 (0.84)	1.00 (1.22)	1.00 (1.22)	0.78 (1.12)	0.67 (1.07)	0.56 (1.02)	0.22 (0.84)	0.00 (0.71)	3405.36	Bt Commercial @ 1g/l	2.33 (1.53)	1.50 (1.21)	1.08 (1.03)	2.75 (1.66)	2.75 (1.65)	2.42 (1.54)
T5	***Beauveriabassiana* (2 kg/ha) + *Bt*(1 kg/ha)**	0.00	0.33 (0.91)	1.22 (1.31)	1.00 (1.22)	0.56 (1.02)	0.44 (0.97)	0.44 (0.97)	0.33 (0.91)	0.00 (0.71)	3765.44	Untreated check	1.50 (1.21)	2.09 (1.44)	3.67 (1.91)	3.34 (1.82)	3.59 (1.89)	3.75 (1.93)
T6	***Metarhizium anisopliae*(2 kg/ha) + *Bt*(1 kg/ha)**	0.00	0.22 (0.84)	0.89 (1.18)	0.89 (1.18)	0.67 (1.07)	0.56 (1.02)	0.44 (0.97)	0.22 (0.84)	0.11 (0.78)	3395.07	-	-	-	-	-	-	-
T7	**Untreated control**	0.00	0.22 (0.84)	1.67 (1.47)	1.78 (1.51)	1.44 (1.39)	1.56 (1.43)	0.89 (1.17)	0.89 (1.16)	0.22 (0.84)	2816.47	-	-	-	-	-	-	-
CD @ 5%		-	NS	0.20	0.19	0.19	0.21	0.12	NS	NS	193.12	SE (m) ±	-	0.08	0.09	-	0.07	0.08
CD at 1%		-	-	-	-	-	-	-	-	-	420.78	CD at 5%	-	0.25	0.29	-	0.21	0.25

***Values in the parenthesis are square root transformation; Abbreviations used: PT: Pre treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.20: ENT 6b: Effect of microbial consortia on population of defoliators at Imphal

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	***Beauveriabassiana*** **(2 kg/ha)+*Metarhiziumanisopliae*(2 kg/ha)**	20.00 (4.53)	8.00 (2.85)	4.44 (3.59)	2.22 (1.61)	1.11 (1.26)	0.44 (0.96)	0.22 (0.83)	0.00	0.00	3.56 (2.01)	2.44 (1.71)	1.89 (1.54)	1.56 (1.43)	1.33 (1.35)	1.00 (1.22)	0.89 (1.18)	0.67 (1.08)	0.67 (1.08)
T2	***Nomuraearileyi*(2 kg/ha) + *Bt*(1 kg/ha)**	26.67 (5.21)	7.56 (2.75)	5.33 (1.36)	2.22 (1.61)	1.11 (1.26)	0.22 (0.83)	0.22 (0.83)	0.00	0.00	3.11 (1.90)	2.67 (1.77)	2.00 (1.58)	1.33 (1.34)	1.22 (1.31)	1.11 (1.26)	0.78 (1.13)	0.56 (1.02)	0.56 (1.02)
T3	***Nomuraearileyi*(2 kg/ha) + *Metarhiziumanisopliae*(2 kg/ha)**	15.56 (4.00)	8.56 (2.98)	4.67 (3.44)	3.11 (1.89)	0.67 (1.08)	0.44 (0.96)	0.00 (0.71)	0.00	0.00	3.89 (2.09)	3.22 (1.93)	2.33 (1.67)	1.78 (1.50)	1.56 (1.43)	1.11 (1.27)	0.89 (1.18)	0.67 (1.08)	0.67 (1.08)
T4	***Beauveriabassiana*** **(2 kg/ha) + *Nomuraearileyi*(2 kg/ha)**	16.67 (4.13)	10.00 (3.05)	4.67 (3.81)	2.89 (1.83)	1.56 (1.37)	0.89 (1.12)	0.44 (0.92)	0.00	0.00	3.89 (2.08)	3.56 (2.01)	2.67 (1.77)	1.78 (1.50)	1.44 (1.39)	1.33 (1.35)	1.22 (1.31)	1.00 (1.22)	0.78 (1.13)
T5	***Beauveriabassiana*** **(2 kg/ha) + *Bt*(1 kg/ha)**	18.89 (4.21)	10.22 (3.19)	4.56 (1.84)	2.00 (1.56)	1.33 (1.35)	0.22 (0.83)	0.22 (0.83)	0.00	0.00	4.22 (2.17)	3.11 (1.89)	2.56 (1.74)	2.00 (1.58)	1.33 (1.35)	1.00 (1.22)	0.89 (1.18)	0.78 (1.12)	0.67 (1.07)
T6	***Metarhiziumanisopliae*(2 kg/ha) + *Bt*(1 kg/ha)**	26.67 (5.12)	10.00 (3.12)	3.33 (2.74)	2.22 (1.63)	0.89 (1.17)	0.22 (0.83)	0.22 (0.83)	0.00	0.00	3.78 (2.07)	2.89 (1.83)	2.22 (1.64)	1.67 (1.47)	1.56 (1.43)	1.22 (1.31)	1.11 (1.27)	1.00 (1.22)	0.89 (1.18)
T7	**Untreated control**	26.67 (5.10)	17.78 (4.26)	18.67 (6.65)	6.44 (2.62)	3.11 (1.89)	2.00 (1.57)	0.67 (1.08)	0.00	0.00	4.89 (2.32)	4.22 (2.17)	4.78 (2.29)	3.11 (1.89)	3.00 (1.86)	2.78 (1.79)	2.33 (1.68)	1.67 (1.47)	1.00 (1.22)
CD @ 5%		NS	NS	2.02	0.39	0.45	0.30	NS	-	-	NS	NS	0.32	NS	0.18	0.24	0.15	0.13	NS

***Values in the parenthesis are square root transformation; Abbreviations used: PT: Pre treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.21: ENT 6c: Effect of microbial consortia on defoliators population on soybean at Prabhani

T.N.	Treatment details	Semiloopers						Tobacco caterpillar						Yield kg/ha
		1st Spray			2nd Spray			1st Spray			2nd Spray			
		DBT	3 DAT	7 DAT	DBT	3 DAT	7 DAT	DBT	3 DAT	7 DAT	DBT	3 DAT	7 DAT	
1	*B.bassiana* + *M.anisopliae*	4.33 (2.19)	3.78 (2.06)	2.33 (1.68)	1.89 (1.54)	1.11 (1.26)	0.78 (1.12)	1.11 (1.26)	0.78 (1.12)	0.56 (1.02)	0.44 (0.96)	0.22 (0.84)	0.11 (0.77)	1678.24
2	*N.rileyi* + Bt.	4.44 (2.21)	4.00 (2.11)	2.67 (1.77)	2.11 (1.61)	1.33 (1.35)	1.00 (1.21)	1.22 (1.31)	1.00 (1.22)	0.67 (1.08)	0.56 (1.02)	0.33 (0.91)	0.22 (0.84)	1634.64
3	*N.rileyi* + *M.anisopliae*	4.67 (2.27)	3.89 (2.08)	2.56 (1.74)	2.00 (1.57)	1.22 (1.31)	0.89 (1.17)	1.00 (1.21)	0.89 (1.17)	0.44 (0.96)	0.33 (0.91)	0.11 (0.77)	0.00 (0.70)	1652.74
4	*B.bassiana* + *N.rileyi*	4.89 (2.31)	3.67 (2.03)	1.56 (1.42)	1.22 (1.31)	0.67 (1.07)	0.11 (0.77)	1.33 (1.35)	0.67 (1.07)	0.33 (0.91)	0.11 (0.77)	0.00 (0.70)	0.00 (0.70)	1778.61
5	*B.bassiana* + Bt.	4.56 (2.24)	4.33 (2.19)	3.22 (1.92)	2.67 (1.78)	1.89 (1.54)	1.33 (1.35)	1.22 (1.31)	1.11 (1.26)	0.78 (1.12)	0.67 (1.07)	0.44 (0.96)	0.33 (0.91)	1432.26
6	*M.anisopliae* + Bt.	4.78(2.28)	4.44(2.22)	3.33(1.95)	2.56(1.74)	2.00(1.57)	1.44(1.39)	1.33(1.35)	1.22(1.31)	0.89(1.17)	0.78(1.12)	0.56(1.02)	0.44(0.96)	1406.76
7	Control	4.67(2.27)	5.11(2.36)	7.11(2.75)	6.67(2.67)	5.11(2.36)	3.11(1.89)	1.11(1.26)	1.33(1.35)	1.33(1.35)	1.22(1.31)	1.00(1.22)	0.89(1.17)	1256.21
S.E. ±		0.09	0.09	0.05	0.05	0.08	0.06	0.06	0.05	0.05	0.06	0.04	0.05	104.50
C.D. at 5%		NS	NS	0.16	0.16	0.24	0.18	NS	0.16	0.15	0.18	0.14	0.15	321.53

***Values in the parenthesis are square root transformation; Abbreviations used: PT: Pre treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.22: ENT 6d: Effect of microbial consortia on defoliators population on soybean at Dharwad

Tr. No.	Treatment details	Tobacco caterpillar - *Spodoptera litura* (No. of larvae/mrl)								
		1st spray			2nd spray			3rd spray		
		1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT
T_1	*Beauveria bassiana* (2kg/ha) +*Metarhizium anisopliae* (2kg/ha)	4.02 (2.13)	3.98 (2.12)	3.02 (1.88)	3.05 (1.88)	2.55 (1.75)	1.92 (1.56)	1.90 (1.55)	0.92 (1.19)	0.45 (0.97)
T_2	*Nomuraea rileyi*(2kg/ha)and *Bacillus thuringiensis* (Bt)(1 kg/ha)	4.08 (2.14)	3.97 (2.11)	2.91 (1.85)	2.95 (1.86)	2.45 (1.72)	1.71 (1.49)	1.70 (1.48)	0.76 (1.12)	0.31 (0.90)
T_3	*Nomuraea rileyi*(2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	4.03 (2.13)	3.95 (2.11)	2.69 (1.79)	2.70 (1.79)	2.28 (1.67)	1.52 (1.42)	1.55 (1.43)	0.71 (1.10)	0.22 (0.85)
T_4	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi*(2kg/ha)	4.10 (2.14)	4.59 (2.26)	3.54 (2.01)	3.55 (2.01)	2.78 (1.81)	2.13 (1.62)	2.10 (1.61)	1.53 (1.42)	1.24 (1.32)
T_5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	4.05 (2.13)	4.03 (2.13)	3.27 (1.94)	3.30 (1.95)	2.95 (1.86)	2.03 (1.59)	2.00 (1.58)	1.42 (1.39)	1.02 (1.23)
T_6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	4.09 (2.14)	4.05 (2.13)	3.41 (1.98)	3.40 (1.97)	3.12 (1.90)	2.58 (1.75)	2.60 (1.76)	1.74 (1.50)	1.39 (1.37)
T_7	Untreated control	4.04 (2.13)	4.68 (2.28)	5.39 (2.43)	5.40 (2.43)	6.12 (2.57)	6.85 (2.71)	6.50 (2.65)	6.28 (2.60)	5.74 (2.50)
	S.Em±	0.40	0.35	0.30	0.31	0.25	0.21	0.20	0.15	0.12
	CD @ 5%	NS	1.05	0.90	NS	0.75	0.64	NS	0.45	0.36

***Values in the parenthesis are square root transformation; Abbreviations used: 1DBT: One day before treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.23: ENT 6e: Effect of microbial consortiaon defoliators population on soybean at Dharwad

Tr. No.	Treatment details	Semilooper - *Thysanoplusia orichalcea* (No. of larvae/mrl)								
		1st spray			2nd spray			3rd spray		
		1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT
T_1	*Beauveria bassiana* (2kg/ha) +*Metarhizium anisopliae* (2kg/ha)	2.85 (1.83)	2.78 (1.81)	1.93 (1.56)	1.95 (1.57)	1.51 (1.42)	0.95 (1.20)	0.95 (1.20)	0.69 (1.09)	0.29 (0.89)
T_2	*Nomuraea rileyi*(2kg/ha)and *Bacillus thuringiensis* (Bt)(1 kg/ha)	2.92 (1.85)	2.68 (1.78)	1.78 (1.51)	1.80 (1.52)	1.35 (1.36)	0.89 (1.18)	0.90 (1.18)	0.53 (1.01)	0.18 (0.82)
T_3	*Nomuraea rileyi*(2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	2.96 (1.86)	2.39 (1.70)	1.56 (1.44)	1.57 (1.44)	1.23 (1.32)	0.69 (1.10)	0.70 (1.10)	0.42 (0.96)	0.00 (0.71)
T_4	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi*(2kg/ha)	2.87 (1.84)	2.95 (1.86)	2.21 (1.65)	2.21 (1.65)	1.73 (1.49)	1.35 (1.36)	1.35 (1.36)	1.02 (1.23)	0.45 (0.97)
T_5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (Bt)(1 kg/ha)	2.88 (1.84)	2.83 (1.82)	2.08 (1.61)	2.10 (1.61)	1.69 (1.48)	1.12 (1.26)	1.10 (1.26)	0.76 (1.12)	0.36 (0.93)
T_6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt)(1 kg/ha)	2.93 (1.85)	3.01 (1.87)	2.38 (1.70)	2.39 (1.70)	1.95 (1.57)	1.45 (1.40)	1.45 (1.40)	1.10 (1.26)	0.58 (1.04)
T_7	Untreated control	2.95 (1.86)	3.12 (1.90)	4.06 (2.14)	4.08 (2.14)	4.79 (2.30)	5.21 (2.40)	5.25 (2.40)	4.72 (2.28)	3.76 (2.06)
	S.Em±	0.30	0.28	0.22	0.22	0.20	0.16	0.16	0.13	0.08
	CD @ 5%	NS	0.85	0.65	NS	0.60	0.48	NS	0.40	0.24

***Values in the parenthesis are square root transformation; Abbreviations used: 1DBT: One day before treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.24: ENT 6f: Effect of microbial consortiaon defoliators population on soybean at Dharwad

Tr. No.	Treatment details	Bihar hairy caterpillar- *Spilosoma obliqua* (No. of larvae/mrl)									Leaf damage (% defoliation)*	Seed Yield (kg/ha)
		1st spray			2nd spray			3rd spray				
		1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT	1 DBT	3 DAT	7 DAT		
T_1	*Beauveria bassiana* (2kg/ha) +*Metarhizium anisopliae* (2kg/ha)	15.52 (4.00)	14.18 (3.83)	10.05 (3.25)	10.10 (3.26)	8.52 (3.00)	5.85 (2.52)	5.80 (2.51)	3.54 (2.01)	1.52 (1.42)	18.35 (25.35)	1624
T_2	*Nomuraea rileyi*(2kg/ha)and *Bacillus thuringiensis* (Bt)(1 kg/ha)	15.69 (4.02)	13.39 (3.73)	9.39 (3.14)	9.45 (3.15)	7.08 (2.75)	5.01 (2.35)	5.00 (2.35)	2.97 (1.86)	1.03 (1.24)	17.25 (24.53)	1706
T_3	*Nomuraea rileyi*(2kg/ha)+ *Metarhizium anisopliae* (2kg/ha)	15.75 (4.03)	12.37 (3.59)	8.25 (2.96)	8.50 (3.00)	6.18 (2.58)	4.34 (2.20)	4.25 (2.18)	2.39 (1.70)	0.89 (1.18)	15.60 (23.25)	1785
T_4	*Beauveria bassiana* (2kg/ha)+ *Nomuraea rileyi*(2kg/ha)	15.87 (4.05)	15.03 (3.94)	11.15 (3.41)	11.25 (3.43)	10.32 (3.29)	7.22 (2.78)	7.10 (2.76)	4.69 (2.28)	2.02 (1.59)	22.15 (28.06)	1508
T_5	*Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (Bt)(1 kg/ha)	15.63 (4.02)	14.69 (3.90)	10.69 (3.35)	10.75 (3.35)	9.02 (3.09)	6.38 (2.62)	6.25 (2.60)	4.03 (2.13)	1.85 (1.53)	20.15 (26.66)	1575
T_6	*Metarhizium anisopliae* (2kg/ha)+ *Bacillus thuringiensis* (Bt) (1 kg/ha)	15.91 (4.05)	15.24 (3.97)	12.08 (3.55)	12.00 (3.54)	11.06 (3.40)	8.05 (2.92)	8.00 (2.92)	5.03 (2.35)	2.78 (1.81)	27.35 (31.52)	1481
T_7	Untreated control	15.77 (4.03)	16.02 (4.06)	17.39 (4.23)	17.45 (4.24)	18.02 (4.30)	18.65 (4.38)	17.69 (4.26)	15.34 (3.98)	12.17 (3.56)	53.25 (46.84)	859
	S.Em±	0.55	0.40	0.33	0.32	0.28	0.20	0.20	0.18	0.15	0.79	24.5
	CD @ 5%	NS	1.20	0.98	NS	0.85	0.60	NS	0.55	0.45	2.40	73.6

***Values in the parenthesis are square root transformation; Abbreviations used: 1DBT: One day before treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.25: ENT 6g: Effect of microbial consortia on defoliators population on soybean at Kota

S.No.	Treatments	Infestation of defoliators/m row length				Seed yield (kg/ha)
		1st spray (40 DAG)		2nd spray (55 DAG)		
		3 DAT	7 DAT	3 DAT	7 DAT	
1	*Beauveria bassiana* (2 kg/ha) + *Metarhiziumanisopliae* (2 kg/ha)	1.89 (1.55)*	1.44 (1.39)	1.78 (1.50)	1.44 (1.39)	1031
2	*Nomuraearileyi* (2 kg/ha) + *Bacillus thuringiensis* (Bt) (1 kg/ha)	1.67 (1.47)	1.22 (1.31)	1.44 (1.39)	1.22 (1.31)	1123
3	*Nomuraearileyi* (2 kg/ha) + *Metarhiziumanisopliae* (2 kg/ha)	2.11 (1.61)	1.89 (1.55)	2.11 (1.61)	2.00 (1.58)	994
4	*Beauveria bassiana* (2 kg/ha) +*Nomuraearileyi* (2 kg/ha)	1.89 (1.55)	1.56 (1.43)	1.89 (1.55)	1.67 (1.47)	1025
5	*Beauveria bassiana* (2 kg/ha) + *Bacillus thuringiensis* (Bt) (1 kg/ha)	1.56 (1.43)	1.11 (1.27)	1.22 (1.31)	1.11 (1.26)	1173
6	*Metarhiziumanisopliae* (2 kg/ha) + *Bacillus thuringiensis* (Bt) (1 kg/ha)	1.11 (1.27)	0.78 (1.13)	1.00 (1.22)	0.78 (1.13)	1241
7	Untreated control	2.45 (1.71)	2.89 (1.84)	2.78 (1.75)	3.00 (1.87)	907
	SEm±	0.04	0.04	0.06	0.06	31.36
	CD (P=0.05)	0.13	0.14	0.19	0.20	96.61

***Values in the parenthesis are square root transformation; Abbreviations used: 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.26: ENT 6h: Effect of microbial consortiaon defoliators population on soybean at Pantnagar (tobacco caterpillar)

Treatments	Spray I (Population mean/m row)			Spray II(Population mean/m row)			Spray III(Population mean/m row)			% Defoliation	Yield (Kg/ha)
	1 DBT	3 DAT	7DAT	1 DBT	3DAT	7DAT	1 DBT	3DBT	7DBT		
T1: *Beauveria bassiana* (2kg/ha)+*Metarhiziumanisopliae*(2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1.84 (1.53)	1.53 (1.42)	0.87 (1.17)	1.64 (1.46)	1.43 (1.38)	0.67 (1.08)	12.70	2476
T2: *Nomuraearileyi* (2kg/ha) and *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1.47 (1.40)	0.74 (1.11)	0.53 (1.01)	1.47 (1.40)	0.63 (1.06)	0.51 (1.01)	13.17	2572
T3: *Nomuraearileyi* (2kg/ha)+ *Metarhiziumanisopliae* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1.21 (1.30)	0.33 (0.91)	0.27 (0.87)	1.56 (1.43)	0.57 (1.03)	0.47 (0.98)	10.16	2651
T4: *Beauveria bassiana* (2kg/ha)+ *Nomuraearileyi* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1.17 (1.29)	0.81 (1.14)	0.64 (1.06)	1.49 (1.41)	1.12 (1.27)	0.79 (1.13)	14.51	2498
T5: *Beauveria bassiana* (2kg/ha)+	0.00	0.00	0.00	1.12	0.67	0.53	1.55	1.07	0.91	15.86	2404

Bacillus thuringiensis (1kg/ha)	(0.70)	(0.70)	(0.70)	(1.27)	(1.08)	(1.01)	(1.43)	(1.25)	(1.18)		
T6: *Metarhiziumanisopliae* (2kg/ha) + *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1.14 (1.28)	0.79 (1.13)	0.66 (1.07)	1.66 (1.47)	1.13 (1.27)	0.87 (1.17)	16.47	2389
T7: Control	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	1.39 (1.37)	1.48 (1.40)	1.54 (1.42)	1.69 (1.48)	1.79 (1.51)	1.97 (1.57)	18.86	2239
SEM±	-	-	-	0.007	0.003	0.004	0.002	0.004	0.005		
CD 5%	-	-	-	0.021	0.011	0.013	0.009	0.014	0.015		

***Values in the parenthesis are square root transformation; Abbreviations used: 1DBT: One day before treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.27: ENT 6i: Effect of microbial consortiaon defoliators population on soybean at Pantnagar (Bihar hairy caterpillar)

Treatments	Spray I(Population mean/m row)			Spray II(Population mean/m row)			Spray III(Population mean/m row)		
	1 DBT	3 DAT	7DAT	1 DBT	3DAT	7DAT	1 DBT	3DBT	7DBT
T1: *Beauveria bassiana* (2kg/ha)+ *Metarhiziumanisopliae* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.30 (0.89)	0.21 (0.84)	0.11 (0.78)	0.17 (0.81)	0.11 (0.78)	0.00 (0.70)
T2: *Nomuraearileyi* (2kg/ha) and *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.19 (0.83)	0.12 (0.78)	0.07 (0.75)	0.24 (0.86)	0.16 (0.81)	0.00 (0.70)
T3: *Nomuraearileyi* (2kg/ha)+ *Metarhiziumanisopliae* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.39 (0.94)	0.06 (0.74)	0.00 (0.70)	0.13 (0.79)	0.03 (0.72)	0.00 (0.70)
T4: *Beauveria bassiana* (2kg/ha)+ *Nomuraearileyi* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.41 (0.95)	0.26 (0.87)	0.11 (0.78)	0.20 (0.83)	0.13 (0.79)	0.00 (0.70)
T5*:* *Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.36 (0.92)	0.24 (0.86)	0.16 (0.81)	0.16 (0.81)	0.09 (0.76)	0.10 (0.77)
T6: *Metarhiziumanisopliae* (2kg/ha) + *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.44 (0.97)	0.33 (0.91)	0.09 (0.76)	0.14 (0.80)	0.17 (0.81)	0.13 (0.79)
T7: Control	0.00 (0.70)	0.00 (0.70)	0.00 (0.00)	0.52 (1.01)	0.61 (1.05)	0.67 (1.08)	0.27 (0.87)	0.35 (0.92)	0.41 (0.95)
CD 5%	-	-	-	0.009	0.007	0.006	0.004	0.003	0.002

***Values in the parenthesis are square root transformation; Abbreviations used: 1DBT: One day before treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.28: ENT 6 j: Effect of microbial consortiaon defoliators population on soybean at Pantnagar
Incidence of Green semilooper in different treatments

Treatments	Spray I			Spray II			Spray III		
	Population mean/m row			Population mean /m row			Population mean/m row		
	1 DBT	**3 DAT**	**7DAT**	**1 DBT**	**3DAT**	**7DAT**	**1 DBT**	**3DBT**	**7DBT**
T1: *Beauveria bassiana* (2kg/ha)+ *Metarhiziumanisopliae* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.39 (0.94)	0.27 (0.87)	0.11 (0.78)	0.33 (0.91)	0.21 (0.84)	0.17 (0.81)
T2: *Nomuraearileyi* (2kg/ha) and *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.46 (0.98)	0.17 (0.81)	0.06 (0.74)	0.22 (0.84)	0.13 (0.79)	0.11 (0.78)
T3: *Nomuraearileyi* (2kg/ha)+ *Metarhiziumanisopliae* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.59 (1.04)	0.07 (0.75)	0.05 (0.74)	0.31 (0.90)	0.16 (0.81)	0.12 (0.78)
T4: *Beauveria bassiana* (2kg/ha)+ *Nomuraearileyi* (2kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.27 (0.87)	0.18 (0.82)	0.09 (0.76)	0.21 (0.84)	0.14 (0.80)	0.14 (0.80)
T5: *Beauveria bassiana* (2kg/ha)+ *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.36 (0.92)	0.26 (0.87)	0.17 (0.81)	0.39 (0.94)	0.19 (0.83)	0.13 (0.79)
T6: *Metarhiziumanisopliae* (2kg/ha) + *Bacillus thuringiensis* (1kg/ha)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.32 (0.90)	0.20 (0.83)	0.02 (0.72)	0.36 (0.92)	0.22 (0.84)	0.24 (0.86)
T7: Control	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.23 (0.85)	0.39 (0.94)	0.57 (1.03)	0.46 (0.98)	0.54 (1.02)	0.72 (1.10)
SEM±	-	-	-	0.002	0.001	0.001	0.002	0.001	0.003
CD 5%	-	-	-	0.006	0.004	0.001	0.007	0.005	0.009

***Values in the parenthesis are square root transformation; Abbreviations used: 1DBT: One day before treatment, 3DAT: 3 Days after treatment, Resistant, 7DAT: 7 Days after treatment**

Table 5.29: ENT 7a: Management of major defoliators of soybean through intercropping with suva, *Anethum graveolens*

Treatments and Treatment Details		Indore		Dharwad			Prabhani		Pantnagar		
		Semiloopers	*S.litura*	Semiloopers	*S.litura*	*Spilarctia obliqua*	Semiloopers	*S.litura*	Semiloopers	*S.litura*	*S. obliqua*
T1	Soybean (12 R)	15.34 (3.98)	1.33(1.35)	3.15(1.91)	6.23(2.59)	8.25(2.96)	8.75(3.04)*	0.83(1.15)*	1.13(1.27)	2.31(1.67)	0.0(0.70)
T2	Soybean + Suva (3:1)	12.67(3.63)	0.33(0.91)	2.24(1.66)	2.78(1.81)	4.02(2.13)	4.42(2.21)	0.33(0.90)	0.97(1.21)	1.74(1.49)	0.0(0.70)
T3	Soybean + Suva (6:1)	12.58(3.62)	1.25(1.32)	2.95(1.86)	4.49(2.23)	5.13(2.37)	5.17(2.37)	0.50(0.99)	1.04(1.24)	2.01(1.58)	0.0(0.70)
T4	Soybean + Suva (3:2)	12.50(3.61)	0.92(1.19)	1.65(1.47)	1.78(1.51)	3.14(1.91)	2.83(1.82)	0.170.80)	0.86(1.16)	1.63(1.45)	0.0(0.70)
T5	Soybean + Suva (6:2)	12.08(3.55)	0.67 (1.08)	2.39(1.70)	3.21(1.93)	4.68(2.28)	4.58(2.25)	0.42(0.95)	0.72(1.10)	1.69(1.48)	0.0(0.70)
S.E. ±				0.25	0.35	0.32	0.06	0.06	0.70	0.78	-
C.D. at 5%				0.75	1.06	0.96	0.18	0.18	2.17	2.42	-

***Values in the parenthesis are square root transformation**

Table 5.30: ENT 7b – Number of eggs laid on suva and soybean and percent larvae found (species-wise), Dharwad

Tr. No.	Treatment details	No. of eggs laid by						Percent larvae					
		Spodoptera litura		*Thysanoplusia orichalcea*		*Spilarctia oblique*		*Spodoptera litura*		*Thysanoplusia orichalcea*		*Spilarctia obliqua*	
		Soybean	Suva	Soybean	Suva	Soybean	Suva	Soybean	Suva	Soybean	Suva	Soybean	Suva
T_1	Sole soybean (12 rows)	270	-	12	-	500	-	70%	-	25%	-	45%	-
T_2	Soybean + Suva (3 soybean: 1 suva: 3 soybean rows combination)	100	170	08	15	100	250	20%	40%	8%	15%	10%	20%
T_3	Soybean + Suva (6 soybean: 1 suva: 6 soybean rows combination)	80	180	7	12	80	230	25%	30%	8%	10%	10%	15%
T_4	Soybean + Suva (3 soybean: 2 suva: 3 soybean rows combination)	80	375	05	20	100	500	10%	60%	5%	20%	15%	40%
T_5	Soybean + Suva (6 soybean: 2 suva: 6 soybean rows combination)	70	240	05	15	70	250	20%	35%	10%	20%	15%	25%

सूक्ष्मजीव विज्ञान
Microbiology

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6. MICROBIOLOGY

MB 1/16: Isolation and functional characterization of selected rhizobia/rhizobacteria for developing inoculants to mitigate abiotic stress in soybean.

The objective of this trial is to isolate and identify rhizobacteria for mitigating abiotic stress in soybean.This experiment was initiated at various centres to explore fluorescent pseudomonads and rhizobia from the soybean rhizosphere soil and root nodules, eventually to use as potential microbial inoculants for application in soybean. The colonies exhibiting fluorescence under UV light in Kings B media were selected for isolation and further investigations. The rhizobia were isolated on YEMA medium with congo-red and white/creamy colonies selected based on generation time.

At Indore centre, four potential *Pseudomona*s strains (identified through FAME) were selected based on 30% PEG (6000) and these strains were characterized previously for PGP and ACC deaminase and other physiological trait activities. Overall, two strains viz., MB 10 (*P. fluorescens*) and MB 16 were found to be superior in terms of producing higher amounts of EPS, siderophore, proline, ACC deaminase than the other two. These strains are being examined for presence of ACC deaminase (acdS) gene. The protocols have been standardized for ACC deaminase (acdS) target gene using specific acdS primers. Based on PCR amplified product using acdS primers produced single band with approximate 200-250 bp length on 1.5% agarose gel stained with Goodview dye under UV light confirmed the presence of target gene in the product.The presence of acdS in the strain suggests the capacity of strain to produce ACC deaminase apart from having PGP traits and symbiotic abilities and can be released as moisture stress tolerant strain for application in soybean. These strains are being characterized for molecular identification through 16SrRNA gene sequencing (**Table 6.1**).

At Ludhiana centre, two rhizobacteria, namely *Pseudomonas fluorescence* (LSE-1) and *Pseudomonas oryzihabitans*(LSE-3), have been identified with abiotic stress tolerance and multiple PGP traits (**Table 6.2**).

At Pantnagar centre,30 probable rhizobacteria have been isolated from the root nodules of soybean and screened for their capability to resist stress conditions under laboratory conditions using PEG-6000. Six isolates named Pant Soybean *Rhizobium* (PSR) from 1 to 6 numbers were evaluated at varying concentrations (0, 15, 25 and 35%) of PEG-6000. Out of these four isolates, Pf Pant-1 & Pf Pant-3 and Pf Pant-6 & Pf Pant-7 could grow at 15 and 25 concentrations, respectively. The Pf Pant-2 and Pf Pant-4 grew at the highest concentration of PEG-6000, i.e. 35%. Further screening of these isolates for the PGP traits was done under in-vitro condition. Strain Pant 1 and Pant 3 showed higher & Pant 2, Pant 6 and Pant 7 showed moderate P-solubilization activity. High Zinc solubilization activity was found in strains Pant 1, Pant 3 & Pant 7 and moderate activity in Pant 2. High IAA production was observed only in two strains i.e. Pant 2 and Pant 6, whereas moderate activity was observed in Pant 1, Pant 3, Pant 4 and Pant 7 strains. High HCN production was found in Pant 1, Pant 3 and Pant 7, and only one strain, Pant 6, showed moderate HCN production activity (**Table 6.3**).

MB 2/21: Response of N-fixing rhizobiaandP solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on latest release variety of soybean of a zone

(Ludhiana, Delhi, Pantnagar, Indore, Sehore, and Dharwad)

Field experimentation was conducted with different doses of chemical fertilizers and with microbial inoculants. As previously, we have been testing only half doses of nitrogen (75%) and the microbial inoculum into consideration. However, reducing the doses of nitrogen (75%) and phosphorus (75%) fertilizers combined with the microbial inoculants was suggested during the AICRP-2022. Therefore, nine different combinations of treatments with recommended and reduced doses of N and P fertilizers with the single or combinations of microbial inoculants were tested. Key microbial inoculants were nitrogen fixer (*Bradyrhizobium daqingense*) and phosphorus solubilizing bacteria (*Bacillus aryabhataii*). These two bacteria are known to plant growth-promoting traits as well. The experiment at different centres was laid out in an RBD design with three replications.

Plant biomass, leaf chlorophyll content, and nodulation characteristics such as nodule number nodule fresh and dry biomass were recorded at the R5 stage. Soybean yield was taken at physiological maturity.

At the Indore centre, the shoot fresh and dry weight of microbial inoculated plants at 75% N, P & 100% K+*B. daqingense* + *B. aryabhattai* (T8) was comparable with RDF. The fresh root and dry weights were also higher in plots applied with T8 followed by 75% N & 100% PK+*B. daqingense* (T5)when compared to control/RDF (T1) and non-inoculated plants grown at reduced doses of fertilizers (T2, T3, T4). However, the differences were found to be non-significant ($p< 0.05$). The symbiotic parameters, such as nodule dry weight and number were also influenced in plants treated with T8 and T5 treatment and the response was comparable with RDF plants. Overall microbial treatments have promoted the nodulation over the non-inoculated plants. However, the magnitude of response was varying. The maximum response was observed in plants treated with consortia of *B. daqingense* + *B. aryabhattai.* Similarly, leghaemoglobin and chlorophyll contents were significantly higher in T8 and T5 treatments over the non-inoculated plants. Nevertheless, the response was comparable with RDF plants (T1). The yield and BC ratio showed that microbial inoculated plants grown at reduced doses of N & P fertilizers i.e., T8, T5, T7 had produced significantly higher yield than their non-inoculated plants. But the productivity response was comparable with plants grown at 100% RDF (T1). We conclude that 25% reduced doses of nitrogen and phosphatic fertilisers with microbial consortia (N-fixing-*Bradyrhizobium daqingense*and P-solubilizing strain *B. aryabhattai.*and *B. daqingense*alone (T5) gave significantly higher yield over their non-inoculated counterparts. Therefore, we can save 25% on N and P chemical fertilizers (**Table/Figure6.4 to 6.6).**

At Sehore centre**,** the experiment was conducted with the RVS-24 soybean variety. Nodule numbers except for 75% of recommended N and 100% of recommended P and K (T2) showed the lowest nodule numbers. Nodule dry weight and leaf chlorophyll content were significantly higher in 75% of recommended N & P and 100% of recommended K with *B. daqingense* + *Bacillus aryabhataii* (T8). Similarly, T8 and T9 showed higher leghaemoglobin content in their nodules. The grain yield and benefit: cost ratio was the highest, with 75% of recommended N & P and 100% of recommended K+ *B. daqingense*+*Bacillus aryabhataii* (T8) (**Table 6.7**).

At Delhicentre,**soybean** variety DS 9712 was used for the given study in RBD with 4 replications. In terms of symbiotic parameters, treatment with 75% N & 100% P K+local rhizobia strain (T6), 75% N&P & 100% K+*B. daqingense and Bacillus aryabhattai (T8),* and

75% N&P & 100%K+*B. aryabhataii*+local rhizobia strain (T9) had significantly higher nodule numbers and nodule dry weight. Leghaemoglobin content was higher in 75% N&P & 100%K+*B. aryabhataii*+local rhizobia strain (T9), and the least was recorded with only RDF (T1) and 75% N & 100% P&K (T2). Similarly, the chlorophyll content was higher in T9, T8, T7, and T4 than in the other treatments. Least leaf chlorophyll content was measured in uninoculated treatments, namely T1, T2, and T3. Similarly, the yield was found to be higher in all the microbial treatments when compared to their non-inoculated counterparts. However plants inoculated with microbial consortia (*B.daqingense and Bacillus aryabhattai)* at 25% N& P fertilizers showed highest yield over the other treatments including RDF treatment (**Table 6.8**).

At Ludhiana centre,soybean genotype SL 958 was used in the present study. Symbiotic characteristics recorded at the R5 stage showed that 75% of recommended N and 100% of recommended P and K+ *Bradyrhizobium daqingense* (T5) had higher nodule numbers, followed by 75% of recommended N & P and 100% of recommended K+*B. daqingense* + *Bacillus aryabhataii* (T8). Similarly, higher nodule dry weight was recorded with T8 and T9 treatments. Nodules and leghaemoglobin content was recorded lowest with non-inoculated T1 and T2 treatments compared to other treatments. Similarly, the grain yield was recorded highest with microbial inoculations T8, T9, and T5 and the yield was comparable with T1 (RDF) (**Table 6.9**).

At Pantnagar centre,the soybean genotype PS-1347 was used in the study. The symbiotic parameters, such as nodule number, were significantly higher in T5, T8, T4, and T9. However, dry nodule weight and leghaemoglobin content were non-significant ($p < 0.05$). Similarly, plant dry biomass and total leaf chlorophyll content were non-significant ($p < 0.05$). The yield was higher in T9, control (RDF), T8, T7 and T6. It showed that a reduced dose of N & P recommended fertilizers with microbial inoculants could save 25% of N &P fertilizerswithout compromising the productivity of soybean (**Table 6.10 to 6.11**).

At Dharwad centre, the nodule parameters *viz.,* nodule number, nodule dry weight and leghaemoglobin content were the highest in the soybean plants that received 75% of recommended N & P and 100% of recommended K+ *B. daqingense* + *Bacillus aryabhataii* (48.39, 3.42 and 0.78 respectively), followed with 75% of recommended N & P and 100% of recommended K+*Bacillus aryabhataii* RDF+ commercial/local rhizobial strain available in the zone/market (46.85, 3.10 and 0.70 respectively) and 75% of recommended N and 100% of recommended P and K+*Bradyrhizobium daqingense*, which is significantly superior to the plants received only chemical fertilizers at the rate of 100% recommended dose of NPK.

In general, the dual application of N-fixing bacteria and P- solubilising bacteria, along with 75% of recommended N & P and 100% of recommended K, enhanced the relative chlorophyll content as well as seed yield compared the plots received 100% RDF alone.

The soil enzyme activities *viz.*, dehydrogenase, phosphatase and urease are influenced in the soybean rhizosphere with the application of 75% of recommended N & P and 100% of recommended K+ *B. daqingense* + *Bacillus aryabhataii* (**23.59**µg TPF formed g^{-1} soil d^{-1}; 28.91µg pnp released g^{-1} soil h^{-1} and 35.36 µg $NH4^{+}$ N g^{-1}soil day^{-1} respectively)**,** which is significantly higher to the treatments received only inorganic chemical fertilizers viz., 100% recommended dose of NPK fertilizers (**16.10** µg TPF formed g^{-1} soil d^{-1}; 20.90µg pnp released g^{-1} soil h^{-1} and 24.71 µg $NH4^{+}$ N g^{-1}soil day^{-1} respectively) (**Table 6.12 to 6.13)** .

Overall, after one year of experimentation, it is concluded that across all the centres, T8 (75% of recommended N & P and 100% of recommended K with B. *daqingense*+*Bacillus* *aryabhataii*) showed the highest mean yield (Kg/ha), although the response was non-significantly ($p < 0.05$) different than other treatments.

MB 3/21a: Assessing the impact of pre and post-emergence herbicides with PGPR on soybean nodulation in unsterilized microcosms (Indore, Sehore, Ludhiana, Pantnagar and Dharwad)

The effect of herbicides application (pre and post-emergence) and microbial inoculation on soybean nodulation and other parameter such as nodulation, leghaemoglobin, chlorophyll, shoot dry weight and plant height were assessed on soybean.

At Indore centre,the nodulation parameter (nodule number, nodule dry weight and leghaemoglobin content) was influenced due to herbicide and microbial applications. However, the magnitude of the response varied due to the type of inoculation and herbicides. The pots were applied with Diclosulam (pre-emergence) and inoculated with either N-fixing or P-solubilizing bacteria, i.e., *B. daqingense*&*Burkholeria arboris*) or a combination of both has significantly enhanced the dry nodule weight compared to uninoculated plants. On the other hand, pots applied with Pendimethalin (pre-emergence) and inoculated with either *B. daqingense* or *Burkholeria arboris* did not significantly influence the dry nodule weight over the control. However, the plants inoculated with consortia (*B. daqingense* and *B. arboris*) showed significantly higher nodule dry weight when compared to uninoculated plants. Based on two-way ANOVA results, irrespective of the type of microbial inoculation, higher dry weight was observed in plants treated with Diclosulam than the Pendimethalin.

In the case of post-emergence herbicides, the plants inoculated with N-fixing bacterium (*B. daqingense*) alone or with combined with P-solubilizing bacteria (*B. arboris*) showed higher nodule dry weight when compared to single inoculation of *B. arboris*. With this microbial inoculation, the pots treated with Imazethapyre + Propaquizafop combination showed significantly higher nodule dry weight than the single application of herbicides (Imazethapyre or Propaquizafop). The nodule number also showed a similar response as observed in the case of dry nodule weight. However, overall *B.daqingense* inoculation with pre or post-emergence herbicide has enhanced the nodules more than the other inoculations. Leghaemoglobin content was found to be highly significant with herbicide application or microbial inoculation, or a combination of these two. Microbial consortia application showed significantly higher leghaemoglobin content, and in the case of herbicide the combination of Imazethapyre + Propaquizafop and Diclosulam alone showed higher leghaemoglobin content.

The chlorophyll content and plant height in plants grown in pots applied with Diclosulam pre-emergence herbicide has increased, although non-significantly higher in plants treated with either N-fixing bacteria or consortia over the uninoculated plants. The inoculation of B. *arboris* did not promote the chlorophyll content and plant height. Irrespective of the type of inoculation, plants grown in pots applied with Diclosulam showed significantly higher content and plant height than those grown in Pendimethalin. Similarly, the effect of inoculation with post-emergence herbicide for both parameters was also non-significant. However, regardless of microbial inoculation, plants treated with either Imazethapyre alone or a combination with Propaquizafop have increased chlorophyll and plant height more than the Propaquizafop application (**Table6.14 to 6.18**).

At Sehore centre,data revealed that the treatment combination of strain *B.daqingense* and Diclosulam pre emergence herbicide responded significantly on increasing the nodule no, nodule dry weight, leghaemoglobin content, shoot height and chlorophyll content when compared to other combinations (**Table6.19 to 6.21**).

At Ludhiana centre, **s**creening of pre and post-emergence herbicides and beneficial PGPR *viz*., *B. daqingense, Paenibacillus polymyxa* (HKA-15) and *Bradyrhizobium sp.* LSBR-3local strain revealed significant variation among the bacterial species for key symbiotic traits in soybean. Two-hand weeding with the application of *B. daqingense* resulted in the highest symbiotic traits (nodulation, nodule dry weight and leghaemoglobin content) among all the treatments, followed by the application of *Paenibacillus polymyxa* and *Bradyrhizobium sp.* LSBR-3. A combination of Pendimethalin+ hand weeding resulted in better symbiotic traits than the combined application of Propaquizafop 10EC + Imazethapyr with all bacterial strains (**Table6.22**).

At Pantnagar centre, **t**he effect of herbicide or strain or its interaction was significant. The Burkholderia arboris treatment showed the highest nodule numbers, nodule dry weight and leghaemoglobin content, followed by *Pseudomonas* sp. and *Bradyrhizobium daqingense.* The influence of herbicides used here showed that Pendimethalin 30 EC followed by Diclosulam 84 WDG had higher nodule numbers, nodule dry weight and leghaemoglobin content. Similarly, for plant height, the pendimethalin 30 EC treated pots had higher plant heights than Diclosulam 84 WDG. Microbial inoculants*Burkholderia arboris* inoculated plots had higher plant heights than the *Pseudomonas* used. A similar trend was also found for the nitrogen content in grain and grain yield. Similarly, significantly lowest weed populations were observed in pendimethalin 30 EC followed by Diclosulam 84 WDG (**Table6.23 to 6.26**).

At Dharwad centre,in general, plants treated with *B. daqingense* were superior in enhancing the plant over uninoculated control (51.80 and 41.80, respectively) recorded at 65 DAS. Among the different herbicides, the highest plant height was recorded with Diclosulam 84 % WDG (PE), followed by Imazethapyr 10% SL alone (50.00 and 48.92, respectively). However, the lowest plant height was recorded with Pendimethalin at 30% EC (PE) (44.17). The results pertain to the interactive effect; the plants received *B. daqingense* plus Diclosulam 84 % WDG (PE) recorded the highest plant height (56.33), while the lowest plant height was recorded with Propaquizafop 2.5% alone (40.67).In general, plants treated with *B. daqingense* were found to be more nodulated compared to the control soybean plant (31.13 and 19.27, respectively). Among the different herbicides, the highest nodule number was recorded with Imazethapyr 10% SL, followed by Propaquizafop 2.5% + Imazethapyr 3.75% (32.00 and 28.50 respectively). However, the lowest nodule number was recorded with Pendimethalin 30% EC (PE) (18.50).The results pertain to the interactive effect. The plants that received *B. daqingense* plus Imazethapyr 10% SL recorded the highest nodule number, while the lowest was recorded with Pendimethalin 30% EC (PE) alone (37.33 and 13.67 respectively).The Leghaemoglobin content was the highest with *B. daqingense* compared to the control soybean plant (0.58 and 0.35, respectively). Among the different herbicides, Imazethapyr's highest leghaemoglobin content was recorded at 10% SL, followed by Diclosulam 84 % WDG (PE) alone (0.56 and 0.50, respectively). However, the lowest was recorded with Pendimethalin at 30% EC (PE) (0.41). The results pertain to the interactive effect; the plants that received *B. daqingense* plus Imazethapyr 10% SL recorded the highest leghaemoglobin, while the lowest was recorded with Pendimethalin 30% EC (PE) alone (0.68 and 0.30respectively).

The relative chlorophyll content was the highest with *B. daqingense* compared to the control soybean plant (43.73 and 31.13, respectively). Among the different herbicides, the highest relative chlorophyll content was recorded with Imazethapyr 10% SL, followed by Propaquizafop 2.5% + Imazethapyr 3.75% (41.83 and 39.67 respectively). However, the lowest was recorded with Pendimethalin at 30% EC (PE) (35.58). The results pertain to the interactive effect; the plants that received SB-120 (Local strain) plus Imazethapyr 10% SL recorded the highest relative chlorophyll content (47.00).

The lowest weed population was recorded in the treatment received *B. daqingense* plus Imazethapyr 3.75% (1.34 per M^2) (**Table 6.27 to 6.28).**

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

At Indore centre,early type entries showed that significantly highest fresh and dry nodule weight was recorded in RVSM 2012-4. However, the leghaemoglobin content in PS-1569, NRC165, and JS 22-12 were comparable with one of early check variety JS 95-60. Similarly, the chlorophyll content was significantly higher in PS-1569, NRC-165, JS 22-12, JS 22-16, and JS 22-18 than in all the early variety check varieties used for the checks. Overall, RVSM 2012-4 and NRC 165 were found to be superior among all the tested entries.

In case of vegetable type entries, **t**he soybean genotype NRC 188 was at par with all the checks used in the study(**Table 6.29**).

At Sehore centre,nodule numbers for AVT II entries showed that except PS1569, others tested soybean genotypes were higher nodule numbers than the checks. The dry nodule weight of soybean genotypes (NRC 165, JS 22-12, JS 22-16, and RVSM2012-4) was higher than the check (JS95-60). Whereas PS1569 showed lower dry weight. Similarly, leghaemoglobin content was higher in all the tested soybean genotypes than the checks. Overall, RVSM 2012-4 followed by NRC 165 and JS 22-16showed higher performance of symbiotic activities (**Table 6.30**).

At Delhi centre,the nodule number and dry nodule weight of soybean genotype PS 1670 were at par with the checks (SL955 and SL958). Leghaemoglobin content in the nodules was significantly higher in the test entry than both checks(**Table6.31**).

At Ludhiana centre,the test entryPS1670 performed better than all the checks used and found to be promising entry based on symbiotic traits(**Table6.32**).

At Pantnagar centre also, test entry PS 1670 showed higher nodules than the checks. The leghaemoglobin content was at par with the checks (**Table 6.33**).

Tables and Figures

Table 6.1: PEG tolerant bacterial isolates (Indore Centre)

S. No.	**Strain**	**Isolates**	**OD 600^{nm} in KB Broth 30% PEG**
1	P1 (MB1)	*Pseudomonas-putida-biotype A*	0.247 c
2	P2 (MB2)	***Pseudomonas-mucidolens***	0.814 a
3	P3 (MB10)	***Pseudomonas-fluorescens-biotype A***	0.654 b
4	P4 (MB16)	No- match	0.254 c
LSD (P=0.05)			**0.154**

*Data are average of 5 replications; LSD, least significance difference at 1% level of significance by Duncan's multiple range test of ANOVA

Table 6.2 : Potential moisture stress tolerant PGP strains (Ludhiana Centre)

Trait	*Pseudomonas fluorescence*		*Pseudomonas oryzihabitans*	
	28°C	**45°C**	**28°C**	**45°C**
IAA ((µg/ml)	11.85 [a]	11.41 [b]	10.98 [a]	10.92[a]
P- solublization (mg/100 ml)	10.06[b]	11.03[b]	8.03[a]	8.99[a]
Zn-solubilization index	1.51	1.16	1.58	1.23
ACC-deaminase production (OD)	1.51 [b]	1.16 [b]	1.58 [b]	1.23 [a]
Biofilm formation (OD)	0.2878 [a]	0.9087[b]	0.3005[c]	0.8874[a]
Overall growth in NA broth	0.940a	0.323c	1.020a	0.587c
Proline (µg/ml) PEG 6000 (5%)	7.723[c]	-	7.521[b]	-
Proline (µg/ml) (NaCl 5%)	8.874[b]	-	7.977[b]	-

Table 6.3: Plant growth promoting traits of selected isolates from soybean rhizosphere (Pantnagar Centre)

Culture	P Solubilization	Zinc Solubilization	IAA production	HCN Production
Pant 1	+++	+++	+	+++
Pant 2	-	+	+++	-
Pant 3	+++	+++	+	+++
Pant 4	-	-	+	-
Pant 6	+	-	+++	+
Pant 7	+	+++	+	+++

Table 6.4: Field response of N-fixing rhizobiaandP-solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on soybean growth parameters (cultivar NRC 130) (Indore centre)

Treatments	**Shoot fresh weight (gm/plant)**	**Shoot dry weight (gm/plant)**	**Root fresh weight (gm/plant)**	**Root dry weight (gm/plant)**
T1	34.33 a	9.74 a	3.60 ab	1.9 abc
T2	25.77 a	8.21 a	1.87 c	0.99 c
T3	30.22 a	8.25 a	2.85 bc	1.58 abc
T4	28.11 a	8.41 a	2.66 bc	1.80 abc
T5	33.55 a	9.69 a	3.93 a	2.41 ab
T6	32.22 a	8.52 a	2.17 c	0.99 c
T7	28.00 a	7.66 a	2.09 c	0.98 c
T8	36.55 a	9.88 a	4.12 a	2.65 a
T9	25.89 a	7.61 a	2.86 bc	1.31 bc
LSD (p=0.05)	**11.94**	**2.59**	**0.97**	**1.00**

Table 6.5 : Field response of N-fixing rhizobiaandP-solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on soybean nodulation and chlorophyll parameters (cultivar NRC 130) (Indore centre)

Treatments	**Nodule dry weight (gm/plant)**	**Nodule number per plant**	**Leghaemoglobin (mg/g nodule wt)**	**Chlorophyll content in leaves (A+B) (mg/gm of fresh weight)**
T1	0.233 a	49.7 ab	9.22 a	3.74 ab
T2	0.157 c	38.52 abcd	5.82 c	2.80 bc
T3	0.163bc	32.04 cd	5.76 c	2.87 bc
T4	0.163bc	39.48 abcd	5.78 c	2.69 bc
T5	0.227 ab	46.44 abc	8.64 ab	3.26 abc
T6	0.140 c	25.96 d	6.26 c	2.88 bc
T7	0.183abc	34.78 bcd	7.05 bc	2.83 bc
T8	0.243 a	51.37 a	9.78 a	4.09 a
T9	0.190abc	31.15 d	6.60 c	2.59 c
LSD (*p*=0.05)	**0.061**	**13.73**	**1.886**	**0.950**

Where, T1= RDF; T2=75% N & 100% P K; T3=75% P & 100% N K; T4=75% N P & 100% K; T5=75% N & 100% P K+*B. daqingense;*

T6=75% N & 100% P K+local rhizobia strain; T7=75% P & 100% N K+*B. aryabhattai;* T8=75% N P & 100% K+*B. daqingense. aryabhattai;*T9=75% N P & 100%K+*B. aryabhattai*+local rhizobia strain;

* Data are average of 3 replications represented as mean ± standard deviation followed by an alphabet. The same letter did not differ significantly by DMRT post hoc significance test at a significance level of 5 %.

Figure 6.6 : Field response of N-fixing rhizobiaandP solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on soybean yield and benefit-cost ratio (NRC 130) at Indore centre

* Yield bars are average of 3 replications. Treatment means followed by the same letter did not differ significantly by DMRT of ANOVA (*p*=0.05)

Where, T1= RDF; T2=75% N & 100% P K; T3=75% P & 100% N K; T4=75% N P & 100% K; T5=75% N & 100% P K+*B. daqingense;* T6=75% N & 100% P K+local rhizobia strain; T7=75% P & 100% N K+*B. aryabhattai;* T8=75% N P & 100% K+*B. daqingense. aryabhattai;* T9=75% N P & 100%K+*B. aryabhattai*+local rhizobia strain

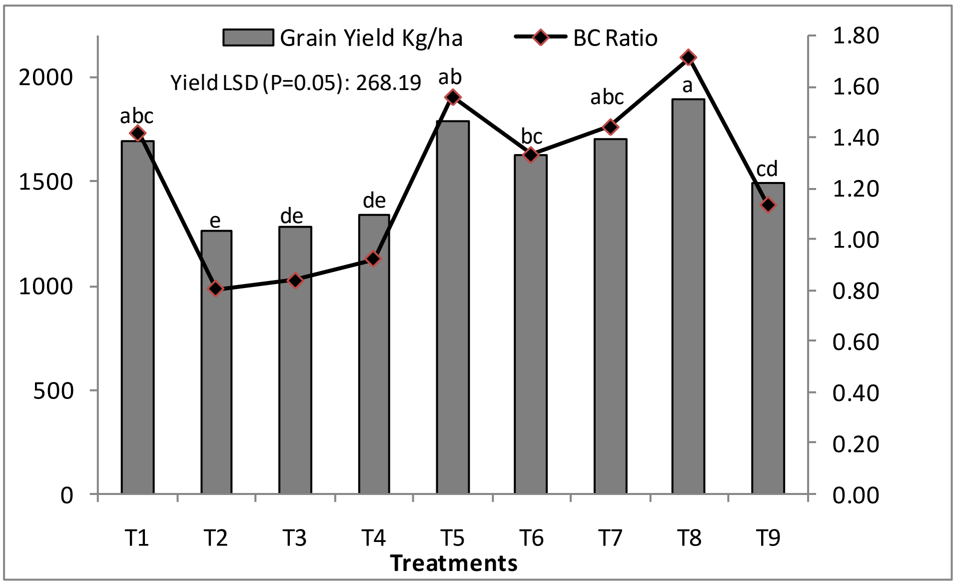

Table 6.7 : Performance of N-fixing rhizobiaandP solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on chlorophyll content (mg g^{-1}) and grain yield (kg ha^{-1}) of soybean at Sehore centre

Treatment	Nodule number/plant	Nodule dry weight mg/plant)	LegHb (mg / g nodule wt)	Chlorophyll content (%)	Grain yield (kg/ha)	B:C Ratio
T1=RDF100%	35.4	87.38	3.11	36.62	1708.85	2.68:1
T2=75%RDF-N, 100%RDF-P&K	30.08	83.06	2.17	33.05	1730.3	2.70:1
T3=75%RDF-P&100%RDF-N&K	35.12667	89.68	2.18	33.14	1723.3	2.72:1
T4=75%RDF-N&P&100%RDF-K	36.56667	87.5	2.24	36.52	1730.28	2.80:1
T5=75%RDF-N,100%RDF-P&K+*Brady rhizobium daqingense*	38.87333	88.28	2.17	35.62	1722.25	2.86:1
T6=75%RDF-N&100%P&K+local rhizobium strain	36.16667	93.58	2.24	37.05	1714.17	2.82:1
T7=75%RDF P&100%RDF N&K+ *Bacillus aryabhattai*	41.45	97.84	2.34	37.63	1720.2	2.83:1
T8=75%RDF N&P,100%RDF K+B. daqingense+ Bacillus aryabhattai	46.1	103.97	3.38	38	1825.47	3.38:1
T9=75%RDF N&P,100%RDF K+ *Bacillus aryabhatii*+RDF+local strain.	40.38333	100.95	3.34	36.88	1627.69	2.90:1
±SEM	4.151308	0.55	0.01	0.15	7.2789	-
CD (5%)	12.44562	1.65	0.05	0.46	21.8221	-

Table 6.8 : Field response of N-fixing rhizobiaandP solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on soybean yield (DS 9712 at <u>Delhi centre</u>

Treatment No. & description	No. of Nodules /plant	Nodule dry wt (mg/plant)	Total Chlorophyll content (g/ mg FW)	LegHb content (mg/g nodule wt)	Yield /ha (kg)
T1=RDF	7.75	33.1	0.669	0.19	186.367
T2=75% N & 100% P K	8.25	37.1	0.769	0.211	201.367
T3=75% P & 100% N K	16.25	76.175	0.883	0.277	204.493
T4=75% N P & 100% K	13.25	62.95	1.483	0.211	260.182
T5=75% N & 100% P K+*B. daqingense*	14.5	82.2	1.253	0.239	207.495
T6=75% N & 100% P K+local rhizobia strain	26.75	135.4	1.076	0.248	205.637
T7=75% P & 100% N K+*B. aryabhattai*	13.25	66.2	1.586	0.259	241.912
T8=75% N P & 100% K+*B. daqingense*+*B. aryabhattai*	23.25	111.175	1.494	0.277	229.666
T9=75% N P & 100%K+*B. aryabhattai*+local rhizobia strain	23.75	127.7	1.719	0.286	230.176
C.D.	8.183	36.258	0.618	0.006	N/A
SE(m)	2.672	11.839	0.202	0.002	23.917
SE(d)	3.779	16.743	0.285	0.003	33.824
C.V.	26.878	23.607	27.514	1.285	18.767

Table 6.9 : Effectof N-fixing rhizobiaandP-solubilizingbacteriawith RDF and reduction of fertilization on symbiotic traits and yield in soybean atLudhiana centre

Treatments	Number of nodules/plant	Dry weight of nodules/ plant (mg)	LegHb content (mg/g of nodule wt)	Grain yield (kg/ha)
T1=RDF (100% recommended dose of NPK fertilizers	52.3	147.6	7.4 8	1807
T2=75% of recommended N and 100% of recommended P and K	48.6	146.0	7.31	1768
T3=75% of recommended P and 100% of recommended N and K	48.1	148.1	7.35	1751
T4=75% of recommended N&P and 100% of recommended K	49.0	148.7	7.4 0	1775
T5= 75% of recommended N and 100% of recommended P and K+ *Bradyrhizobium daqingense*	54.7	158.5	7.88	1792
T6=75% of recommended N and 100% of recommended P and K +Commercial/local rhizobial strain	50.5	155.8	7.7 9	1786
T7=75% of recommended P and 100% of recommended N and K+ *Bacillus aryabhattai*	49.0	149.8	7.6 6	1768
T8=75% of recommended N & P and 100% of recommended K+ *B. daqingense*+*Bacillus aryabhattai*	53.0	161.2	7.89	1834
T9=75% of recommended N & P and 100% of recommended K+ *Bacillus aryabhattai* RDF+ Commercial/local rhizobial strain	51.0	162.3	7.85	1829
CD@5%	**1.65**	**4.87**	**0.55**	**42**

Table 6.10: Performance of N-fixing rhizobiaandP solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on nodulation and plant dry matter in soybean at Pantnagar centre

Treatment	Nodule Number (No./plant)	Nodule dry weight (g/plant)	LegHb content in nodules(mg/g nodule wt)	Plant dry weight (g/plant)
T1=RDF	55.3	0.16	0.47	35.02
T2=75% of N and 100% P and K	61.7	0.19	0.48	31.25
T3=75% of P and 100% N and K	53.0	0.18	0.47	29.36
T4=75% N&P and 100% K	80.1	0.18	0.48	31.54
T5= 75% N and 100% P and K+*Brh. daq*	84.0	0.22	0.51	32.82
T6=75% N and 100% P and K +Pant 2	71.0	0.29	0.54	33.85
T7=75% P and 100% N and K+ *B. ary*	60.7	0.25	0.52	31.25
T8=75% N & P and 100% K+ *Brh. daq*+*B. ary*	80.3	0.28	0.53	34.26
T9=75% N & P and 100%K+*B. ary*+ Pant 2	77.0	0.26	0.55	35.21
C.D. at 5%	19.7	N/S	N/S	NS
CV	16.3	8.5	4.17	8.28

Table 6.11 : Performance of N-fixing rhizobiaandP solubilizingbacteriawith RDF/farmers practice and with reduction of fertilization on chlorophyll content (mg g^{-1}) and grain yield (kg ha^{-1}) of soybean at Pantnagar centre

Treatment	Chlorophyll a	Chlorophyll b	Chlorophyll a+b	Grain yield (Kg/ha)
T1= RDF	2.1	1.06	2.73	1479.7
T2=75% of N and 100% P and K	1.82	0.88	2.28	1192.3
T3=75% of P and 100% N and K	1.83	0.84	2.25	1150.3
T4=75% N&P and 100% K	1.82	0.87	2.27	1186.3
T5= 75% N and 100% P and K+*Brh daq*	1.88	0.90	2.35	1141.0
T6=75% N and 100% P and K +Pant 2	1.91	0.98	2.47	1454.3
T7=75% P and 100% N and K+ *B. ary*	1.92	0.95	2.47	1435.0
T8=75% N & P and 100% K+ *Brh. daq*+*B. ary*	1.96	1.02	2.55	1476.0
T9=75% N & P and 100% K+*B. ary*+ Pant 2	**2.02**	1.07	2.67	1521.0
C.D. at 5%	**N/S**	**N/S**	**N/S**	264.9
CV	**7.6**	**12.8**	**8.0**	**11.3**

Table 6.12 : Nodulation, relative chlorophyll content and yield parameters as influenced by the interactive effect of N fixing rhizobia and P-solubilizing bacteria at different levels of NPK in soybeanat Dharwad centre

Treatments	Nodule number	Nodule dry weight (g plant^{-1})	LegHb content (mg/g nodule wt.)	Relative chlorophyll content	Yield (kg/ha)
T1	40.48	2.35	0.31	37.99	2233.11
T2	36.78	2.26	0.29	38.42	2219.98
T3	37.43	2.41	0.32	34.86	2311.89
T4	34.54	2.12	0.25	34.60	1993.34
T5	43.92	2.96	0.69	43.65	2422.44
T6	43.64	2.69	0.50	41.60	2324.01
T7	42.55	2.56	0.48	40.72	2286.64
T8	48.39	3.42	0.78	46.13	2540.00
T9	46.85	3.10	0.70	44.95	2455.31
S.Em±	**0.20**	**0.01**	**0.02**	**0.85**	**30.22**
C D at 5%	**0.61**	**0.03**	**0.07**	**2.55**	**90.59**

Table 6.13 : Dehydrogenase enzyme, phosphatase and urease activity as influenced by the interactive effect of N fixing rhizobia and P-solubilizing bacteria at different levels of NPK in soybean (Dharwad centre)

Treatments	Dehydrogenase (µg TPF formed g^{-1} soil d^{-1})	Phosphatase (µg pnp released g^{-1} soil h^{-1})	Urease (µg NH4 + N g^{-1} soil day^{-1})
T1	16.10	20.90	24.71
T2	15.39	18.98	24.10
T3	13.76	19.25	23.45
T4	12.88	16.25	20.39
T5	20.01	26.19	30.70
T6	18.93	24.45	30.15
T7	18.36	23.11	30.58
T8	23.59	28.91	35.36
T9	21.09	26.16	33.67
S.Em±	**0.45**	**0.72**	**1.00**
C D at 5%	**1.35**	**2.17**	**2.98**

Table 6.14 to 6.18: Assessing the impact of pre and post-emergence herbicides with PGPR on soybean nodulation, leghaemoglobin in nodules, chlorophyll content and shoot height in unsterilized microcosmsat <u>Indore centre</u>

Table 6.14. Nodule dry weight (g/plant)-Indore centre

Inoculation	**Nodule dry weight (g/plant)**					Mean
	Pre-emergence		Post-emergence			
	Diclosulam	Pendimethalin	Propaquizafop	Imazethapyr	Pro+ima	
B. daqingense	0.27ab	0.14ef	0.19de	0.26ab	0.31a	0.23b
B arboris	0.27ab	0.18def	0.13f	0.19de	0.17def	0.19c
Consortia	0.26abc	0.27ab	0.27ab	0.22bcd	0.31a	0.26a
control	0.14ef	0.19de	0.25abc	0.26abc	0.27ab	0.21b
LSD (p=0.05)	0.049					
Mean	0.23b	0.19c	0.21bc	0.23b	0.26a	
Herbicide	***					
Inoc	***					
Herb×Inoc	***					

Table 6.15. Nodule number/plant-Indore centre

Inoculation	**Nodule number/Plant**					Mean
	Pre-emergence		Post-emergence			
	Diclosulam	Pendimethalin	Propaquizafop	Imazethapyr	Pro+ima	
B. daqingense	53.33efg	70.33bcd	72bc	82.66b	99a	75.46a
B arboris	42.66fgh	28.66hi	33.66hi	29hi	40.66gh	34.93b
Consortia	55efg	42.66fgh	52.33efg	52.66efg	67.33cde	54b
control	57def	22.66i	28hi	21i	35.33hi	32.8c
LSD (p=0.05)	13.85					
Mean	52b	41.08c	46.5bc	46.33bc	60.58a	
herbicide	***					
Inoc	***					
Herb×Inoc	***					

Table 6.16. Leghaemoglobin in root nodules -Indore centre

Inoculation	**Leghaemoglobin (µg/g nodule wt)**					Mean
	Pre-emergence		Post-emergence			
	Diclosulam	Pendimethalin	Propaquizafop	Imazethapyr	Pro+ima	
B.daqingense	20.45cd	6.14k	12.76gh	10.99ghij	23.19bc	14.70b
B arboris	11.21ghi	9.78hij	12.76gh	17.86de	8.01ijk	11.92c
Consortia	25.78b	7.56jk	8.4ijk	16.48ef	32.19a	18.08a
control	13.63fg	8.30ijk	13.63fg	14.39	11.40ghi	12.27c
LSD (p=0.05)	3.05					
Mean	17.77a	7.94d	11.89c	14.95b	18.7a	
Herbicide	***					
Inoc	***					
Herb×Inoc	***					

Table 6.17. Chlorophyll content in fresh leaves -Indore centre

Inoculation	Chlorophyll (mg/g)					Mean
	Pre-emergence		Post-emergence			
	Diclosulam	Pendimethalin	Propaquizafop	Imazethapyr	Pro+ima	
B. daqingense	2.12bcd	1.04fg	1.97bcde	1.95bcde	2.40abc	1.89a
B arboris	1.04fg	1.27def	2.01bcde	2.49abc	2.49abc	1.86a
Consortia	3.06a	0.69fg	1.96bcde	1.95bcde	2.1bcd	1.94a
control	2.24abc	2.78ab	1.14efg	1.55cdef	2.43abc	1.76a
LSD	0.795					
Mean	2.11b	1.11c	1.77b	1.98ab	2.35a	
Herbicide	***					
Inoc	ns					
Herb×Inoc	**					

Table 6.18. Shoot height (cm)-Indore centre

Inoculation	**Plant height (cm)**					Mean
	Pre-emergence		Post-emergence			
	Diclosulam	Pendimethalin	Propaquizafop	Imazethapyr	Pro+im	
B.daqingense	52abcd	42.83d	62ab	56.83abcd	445cd	55.86a
B arboris	43cd	44.5cd	48.5abcd	56.33abcd	60.33abc	50.53a
Consortia	50.5abcd	48.16bcd	57.5abcd	65.66a	52abcd	54.76a
control	51.66abcd	47.5bcd	50.83abcd	43.83cd	65.66a	49.9a
LSD	14.41					
Mean	49.29bc	43.25c	54.70ab	55.66ab	60.91a	
Herbicide	***					
Inoc	ns					
Herb×Inoc	ns					

Table 6.19: Assessing the impact of pre and post-emergence herbicides with PGPR on nodule number and nodule dry weight in soybean under unsterilized microcosms (Sehore centre).
Where H1=Diclosulam, H2-Pendimethalin; H3=Propaquizafop; H4=Imazethapyre; H5=Propaquizafop+Imazethapyre
S1 =*B.daqingence* , S2= *Paenibacillus polymyxa* S3 = local strain, S4 = Uninoculated ;
(Initial N =195 kg / ha; P_2O_5 =12.10 kg/ha; K_2O =482 kg / ha; S= 9.6 ppm; Soil Ph= 7.8; EC= 0.93 dSm; Dos 06 /07/2022; DOH 12/10/2022)

Treatment	**Number of nodules/plant**						**Nodule dry weight mg/ plant**					
	H_1	**H_2**	**H_3**	**H_4**	**H5**	**Mean of Strains**	**H_1**	**H_2**	**H_3**	**H_4**	**H5**	**Mean of Strains**
S1 (*B.daq*)	29.71	22.69	26.58	26.67	29.21	**26.97**	85.61	81.90	78.85	79.92	80.16	**81.29**
S2 (*Paenibacillus*)	25.93	27.31	30.53	31.21	31.01	**29.10**	81.47	81.84	81.56	82.27	81.68	**81.76**
S3 (local rhizobia)	27.30	28.23	25.71	30.09	19.81	**26.23**	83.81	84.70	85.13	85.51	85.48	**54.93**
S4(Uninoculated)	17.29	16.10	17.05	18.87	14.78	**16.82**	71.34	71.62	72.02	72.99	73.09	**72.21**
Mean of Herbicides	**25.06**	**23.58**	**24.97**	**26.71**	**23.70**		**80.56**	**80.01**	**79.39**	**80.17**	**80.10**	
	S.Em. ±			C.D. (p = 0.01)			S.Em. ±			C.D. (p = 0.01)		
C.D. of Herbicide (H)	**0.49**			**1.41**			**0.20**			**0.56**		
C.D. of Microbes (S)	**0.44**			**1.27**			**0.18**			**0.51**		
C.D. of H×S	**0.98**			**2.83**			**0.39**			**1.13**		

Table 6.20: Assessing the impact of pre and post-emergence herbicides with PGPR on leghaemoglobin content in nodules and shoot height in soybean under unsterilized microcosms (Sehore centre).

Where H1=Diclosulam, H2-Pendimethalin; H3=Propaquizafop; H4=Imazethapyre; H5=Propaquizafop+Imazethapyre

S1 =*B.daqingense*, S2= *Paenibacillus polymyxa* S3 = local strain, S4 = Uninoculated

Treatment	Leghaemoglobin (mg/g nodule wt)						Shoot height (cm/plant)					
	H_1	H_2	H_3	H_4	H5	Mean of Strains	H_1	H_2	H_3	H_4	H5	Mean of Strains
S1 (*B.daq*)	2.93	2.84	2.99	3.15	2.81	**2.95**	46.87	47.11	47.41	46.45	48.35	**47.24**
S2 (*Paenibacillus*)	2.94	2.89	2.88	2.88	3.22	**2.96**	49.01	48.98	49.57	46.62	48.46	**48.73**
S3 (local rhizobia)	2.89	2.91	2.91	2.58	2.51	**2.76**	48.54	48.13	48.24	48.25	48.14	**48.24**
S4(Uninoculated)	2.19	2.53	2.18	2.49	2.17	**2.31**	48.72	48.57	45.02	46.11	44.48	**46.58**
Mean of Herbicides	**2.74**	**2.79**	**2.74**	**2.78**	**2.68**		**48.26**	**48.20**	**47.56**	**47.10**	**47.36**	

	S.Em. ±	**C.D. (p = 0.01)**	S.Em. ±	C.D. (p = 0.01)
C.D. of Herbicide (H)	**0.14**	**NS**	**0.48**	**NS**
C.D. of Microbes (S)	**0.13**	**0.37**	**043**	**1.23**
C.D. of H×S	**0.29**	**NS**	**0.96**	**NS**

Table 6.21: Assessing the impact of pre and post-emergence herbicides with PGPR on chlorophyll content in leaves of soybean plants grown in unsterilized microcosms (Sehore centre).
Where H1=Diclosulam, H2-Pendimethalin; H3=Propaquizafop; H4=Imazethapyre; H5=Propaquizafop+Imazethapyre
S1 =*B.daqingence* , S2= *Paenibacillus polymyxa* S3 = local strain, S4 = Uninoculated

Treatment	**Chlorophyll content %**					
	H_1	**H_2**	**H_3**	**H_4**	**H5**	**Mean of microbial strains**
S1 (*B.daq*)	27.61	25.43	27.26	26.73	27.50	**26.91**
S2 (*Paenibacillus*)	29.97	31.57	33.65	30.31	31.35	**31.37**
S3 (local rhizobia)	33.64	32.94	34.01	35.37	35.44	**34.28**
S4(Uninoculated)	24.49	21.95	20.00	17.99	18.58	**20.60**
Mean of Herbicides	**28.93**	**27.98**	**28.73**	**27.60**	**28.23**	
	S.Em. $\pm$			C.D. (p = 0.01)		
C.D. of Herbicide (H)	27.61			25.43		
C.D. of Microbes (S)	29.97			31.57		
C.D. of H×S	33.64			32.94		

Table 6.22: Assessing the impact of pre and post-emergence herbicides with PGPR on soybean nodulation, leghaemoglobin in nodules, chlorophyll content and shoot height in unsterilized microcosms (Ludhiana centre)

Treatments	Pendimethalin + Hand weeding			Imazethapyr			Propaquizafop 2.5% + Imazethapyr			Two hand weeding			Weedy check		
	No. of nodule /plant	Dry wt. of nodules/ plant (mg)	Leghaemoglobin content (mg/g of nodules)	No. of nodules/plant	Dry wt. of nodules/ plant (mg)	Leghaemoglobin content (mg/g of nodules)	No. of nodules/plant	Dry wt. of nodules/ plant (mg)	Leghaemoglobin content (mg/g of nodules)	Number of nodules/ plant	Dry wt. of nodules/ plant (mg)	Leghaemoglobin content (mg/g of nodules)	No. of nodules/plant	Dry wt. of nodules/ plant (mg)	Leghaemoglobin content (mg/g of nodules)
Bradyrhizobium daqingense	54	174.6	8.10	50.7	168.8	7.68	52.5	170.1	7.90	56	175.2	8.22	50	165.2	7.11
Paenibacillus polymyxa	48	173.0	7.74	44	160.7	7.38	46.5	164.3	6.95	50	172.8	7.91	43	158.7	6.48
Bradyrhizobium sp. LSBR-3 (Local)	53	173.8	7.93	50	164.2	7.41	51	167.7	7.76	54	173.6	8.16	49	163.3	7.00
Control	45	168.0	5.98	42	158.8	6.02	43	162.1	6.10	47	171.0	6.32	41	155.5	5.79
CD @5%	**2.00**	**1.66**	**1.51**	**1.5**	**2.37**	**NS**	**4.3**	**2.34**	**0.26**	**1.63**	**3.49**	**1.40**	**2.16**	**3.69**	**2.08**

Table 6.23: **Assessing the impact of pre and post-emergence herbicides with PGPR on soybean nodulation under unsterilized microcosms (Pantnagar centre)**

<table>
<tr><th rowspan="2">Strains and herbicides</th><th colspan="5">No. of nodules/Plant</th><th colspan="5">Nodule dry weight (mg/Plant)</th></tr>
<tr><th>Control (Unino.)</th><th>B. daqingense</th><th>B. arboris</th><th>Pseudomonas sp.</th><th>Mean</th><th>Control (Unino.)</th><th>B. daqingense</th><th>B. arboris</th><th>Pseudomonas sp</th><th>Mean</th></tr>
<tr><td>Control (Weedy chk)</td><td>1.57</td><td>3.37</td><td>3.80</td><td>3.69</td><td>3.11</td><td>0.43</td><td>0.66</td><td>2.18</td><td>0.95</td><td>1.06</td></tr>
<tr><td>Diclosulam 84 WDG</td><td>1.45</td><td>4.63</td><td>6.41</td><td>5.12</td><td>4.40</td><td>1.23</td><td>3.18</td><td>4.60</td><td>3.61</td><td>3.16</td></tr>
<tr><td>Pendimethalin 30 EC</td><td>1.72</td><td>5.69</td><td>7.09</td><td>6.48</td><td>5.25</td><td>1.60</td><td>3.49</td><td>5.02</td><td>3.79</td><td>3.48</td></tr>
<tr><td>Propaquizafop 10 EC</td><td>1.02</td><td>4.08</td><td>5.08</td><td>4.79</td><td>3.74</td><td>1.16</td><td>2.52</td><td>4.16</td><td>2.93</td><td>2.69</td></tr>
<tr><td>Imazethapyr 10 SL</td><td>1.15</td><td>3.02</td><td>3.99</td><td>3.33</td><td>2.87</td><td>0.74</td><td>1.18</td><td>2.72</td><td>2.13</td><td>1.69</td></tr>
<tr><td>Propaquizafop 10 EC + Imazethapyr 10 SL</td><td>1.49</td><td>4.36</td><td>6.29</td><td>5.11</td><td>4.31</td><td>1.47</td><td>3.17</td><td>4.19</td><td>3.25</td><td>3.02</td></tr>
<tr><td>Mean</td><td>1.40</td><td>4.19</td><td>5.44</td><td>4.75</td><td></td><td>1.44</td><td>2.37</td><td>3.81</td><td>2.78</td><td></td></tr>
</table>

Factors	C.D.	SE(d)	SE(m)	C.D.	SE(d)	SE(m)
Factor(H)	0.307	0.152	0.108	0.097	0.048	0.034
Factor(S)	0.251	0.124	0.088	0.079	0.039	0.028
Factor(H × S)	0.614	0.304	0.215	0.194	0.096	0.068
	C.V. = 9.44			CV= 4.52		

Table 6.24: Assessing the impact of pre and post-emergence herbicides with PGPR on Leghaemoglobin content in nodules and plant height of soybean under unsterilized microcosms (Pantnagar centre)

Strains and herbicides	Leghaemoglobin content (mg/ g fresh nodule weight)					Plant (cm)				
	Control (Unino.)	*B. daqingense*	*B. arboris*	*Pseudomonas* sp.	Mean	Control (Unino.)	*B. daqingense*	*B. arboris*	*Pseudomonas* sp	Mean
Control (Weedy chk)	3.12	3.59	5.12	3.99	3.95	59.2	59.8	74.4	61.9	63.8
Diclosulam 84 WDG	3.65	3.99	6.25	5.65	4.89	81.9	84.7	91.1	87.7	86.4
Pendimethalin 30 EC	3.85	4.32	6.72	5.65	5.14	91.2	92.2	97.1	92.9	93.4
Propaquizafop 10 EC	2.91	3.72	5.02	4.72	4.09	81.2	83.1	85.2	82.4	83.0
Imazethapyr 10 SL	2.59	2.72	3.25	2.92	3.90	79.3	81.2	83.5	82.1	81.5
Propaquizafop 10 EC + Imazethapyr 10 SL	3.60	3.71	6.12	5.25	4.67	77.4	71.2	76.5	73.4	74.6
Mean	3.25	3.64	5.38	4.66		78.4	78.7	84.6	80.1	

Factors	**C.D.**	**SE(d)**	**SE(m)**	**C.D.**	**SE(d)**	**SE(m)**
Factor(H)	0.132	0.065	0.046	0.630	0.305	0.213
Factor(S)	0.107	0.053	0.038	0.514	0.241	0.147
Factor(H × S)	0.263	0.130	0.092	1.245	0.702	0.414
	C.V.= 3.77			C.V.= 2.72		

Table 6.25 : Assessing the impact of pre and post-emergence herbicides with PGPR on N content and uptake in soybean grains under unsterilized microcosms (Pantnagar centre)

Strains and herbicides	Nitrogen content in grains (%)					N uptake in grains (mg/plant)				
	Control (Unino.)	*B. daqingense*	*B. arboris*	*Pseudomonas* sp.	Mean	Control (Unino.)	*B. daqingense*	*B. arboris*	*Pseudomonas* sp	Mean
Control (Weedy chk)	4.84	4.92	5.15	5.07	4.99	335.73	515.01	653.72	608.41	528.22
Diclosulam 84 WDG	5.23	5.37	5.55	5.47	5.41	441.27	643.69	794.47	737.74	654.29
Pendimethalin 30 EC	5.34	5.62	5.84	5.67	5.62	455.40	685.12	844.89	771.10	689.13
Propaquizafop 10 EC	4.96	5.23	5.37	5.24	5.19	397.50	551.72	689.43	641.40	570.01
Imazethapyr 10 SL	5.00	5.21	5.33	5.29	5.21	417.94	570.20	702.93	665.65	589.18
Propaquizafop 10 EC + Imazethapyr 10 SL	5.16	5.25	5.53	5.46	5.35	424.91	606.68	770.33	697.38	624.83
Mean	5.09	5.27	5.46	5.37		412.13	595.41	742.63	686.95	

Factors	C.D.	SE(d)	SE(m)	C.D.	SE(d)	SE(m)
Factor(H)	0.046	0.023	0.016	3.284	1.628	1.151
Factor(S)	0.038	0.019	0.013	2.681	1.329	0.940
Factor(H × S)	0.092	0.046	0.032	6.567	3.256	2.302
	C.V.= 1.06			C.V.= 0.66		

Table 6.26: Assessing the impact of pre and post-emergence herbicides with PGPR on soybean grain yield under unsterilized microcosms <u>(Pantnagar centre)</u>

Strains and herbicides	Grain yield (g per plant)				
	Control (Unino.)	***B. daqingense***	***B. arboris***	***Pseudomonas* sp.**	**Mean**
Control (Weedy chk)	6.94	10.46	12.70	12.01	10.53
Diclosulam 84 WDG	8.52	11.98	14.32	13.48	12.05
Pendimethalin 30 EC	8.43	12.20	14.45	13.60	12.19
Propaquizafop 10 EC	8.01	10.56	12.91	12.24	10.93
Imazethapyr 10 SL	8.03	10.75	12.99	12.38	11.03
Propaquizafop 10 EC + Imazethapyr 10 SL	8.35	11.56	13.92	12.78	11.62
Mean	8.08	11.28	13.58	12.78	

Factors	**C.D.**	**SE(d)**	**SE(m)**
Factor(H)	0.132	0.065	0.046
Factor(S)	0.107	0.053	0.038
Factor(H × S)	0.263	0.131	0.092
	C.V. = 1.40		

Table 6.27 : Assessing the impact of pre and post-emergence herbicides with PGPR on nodule number and leghaemoglobin content in nodules in soybean under unsterilized microcosms (Dharwad centre).
Where H1=Diclosulam,H2-Pendimethalin; H3=Propaquizafop; H4=Imazethapyre; H5=Propaquizafop+Imazethapyre

Treatment	Number of nodules/plant						Leghaemoglobin content (mg/g nodule wt)					
	H_1	**H_2**	**H_3**	**H_4**	**H5**	**Mean of M**	**H_1**	**H_2**	**H_3**	**H_4**	**H5**	**Mean of M**
M_1 (*B.daq*)	32.00	20.67	32.00	37.33	33.67	**31.13**	0.62	0.48	0.52	0.68	0.58	**0.58**
M_2 (*Paenibacillus*)	26.33	19.33	27.67	31.67	28.33	**26.67**	0.43	0.37	0.45	0.52	0.44	**0.44**
M_3(local rhizobia)	30.33	20.33	31.67	35.00	31.00	**29.67**	0.60	0.51	0.54	0.61	0.53	**0.56**
M_4 (Uninoculated)	19.33	13.67	18.33	24.00	21.00	**19.27**	0.34	0.30	0.34	0.42	0.35	**0.35**
Mean of H	**27.00**	**18.50**	**27.42**	**32.00**	**28.50**		**0.50**	**0.41**	**0.46**	**0.56**	**0.48**	
	S.Em. $\pm$			C.D. (p = 0.01)			S.Em. $\pm$			C.D. (p = 0.01)		
C.D. of M (Microbial inoculants	**0.40**			**1.14**			**0.008**			**0.022**		
C.D. of H (Herbicides)	**0.45**			**1.28**			**0.008**			**0.024**		
C.D. of M×H	**0.89**			**2.56**			**0.017**			**0.048**		

Table 6.28 : Assessing the impact of pre and post-emergence herbicides with PGPR on plant height and relative chlorophyll content in soybean under unsterilized microcosms (Dharwad centre).
Where H1=Diclosulam,H2-Pendimethalin; H3=Propaquizafop; H4=Imazethapyre; H5=Propaquizafop+Imazethapyre

Treatment	Plant Height (cm)						Relative chlorophyll content					
	60 DAS						60 DAS					
	H_1	**H_2**	**H_3**	**H_4**	**H5**	**Mean of M**	**H_1**	**H_2**	**H_3**	**H_4**	**H5**	**Mean of M**
M_1 (*B.daq*)	56.33	47.00	51.00	56.00	48.67	51.80	46.67	41.00	41.67	46.00	43.33	**43.73**
M_2 (*Paenibacillus*)	48.00	41.67	43.67	48.00	45.33	45.33	38.67	31.67	39.67	42.00	38.33	**38.07**
M_3(local rhizobia)	53.00	46.33	49.33	49.67	49.67	49.60	43.33	38.00	42.67	47.00	46.67	**43.53**
M_4 (Uninoculated)	42.67	41.67	40.67	42.00	42.00	41.80	29.33	31.67	32.00	32.33	30.33	**31.13**
Mean of H	50.00	44.17	46.17	48.92	46.42		**39.50**	**35.58**	**39.00**	**41.83**	**39.67**	
	S.Em. $\pm$			C.D. (p = 0.01)			S.Em. $\pm$			C.D. (p = 0.01)		
C.D. of M (Microbial inoculants	0.56			1.61			0.55			1.58		
C.D. of H (Herbicides)	0.63			1.81			0.62			1.76		
C.D. of M×H	1.26			3.61			1.23			3.53		

Table 6.29:Nodulation ability of AVT-II entries (early and vegetable type) at Indore centre

Early type

Genotype/variety	Nodule fresh weight (gm/plant)	Nodule dry weight (gm/plant)	Leghaemoglobin (mg/g nodule wt)	Chlorophyll (mg/g fresh leaves)
PS-1569	0.48 cdef	0.28 bc	5.48 a	3.78abc
NRC-165	0.49 cdef	0.40abc	4.9 abc	4.19a
JS22-12	0.44 cdef	0.37abc	5.09 ab	3.59abcd
JS 22-16	0.63 cdef	0.49 ab	3.92 cd	3.77abc
JS 22-18	0.70 dcdef	0.48 ab	3.96 bcd	3.51abcde
RVSM 2012-4	**1.16 ab**	**0.63 a**	3.78 d	2.82ef
NRC130	**1.21 a**	**0.63 a**	4.35 bcd	2.72f
NRC138	0.57 cdef	0.33 bc	3.81 d	2.80ef
JS 20-34	0.78 abcde	0.41 abc	3.99 bcd	2.98def
JS 95-60	0.59 cdef	0.22 bc	4.86 abcd	3.39bcdef
LSD (0.05)	**0.423**	**0.234**	**0.968**	**0.645**

Vegetable type

Vegetable Genotype/varity	Nodule fresh weight(gm/plant)	Nodule dry weight(gm/plant)	Leghaemoglobin (mg/g nodule)	Chlorophyll (mg/gm)
NRC188	0.96 abc	0.49 ab	4.03 bcd	3.18 cdef
Hara Soya	0.27 f	0.20 bc	4.13 bcd	3.15 cdef
Karune	0.28 ef	0.23 bc	4.36 bcd	3.99 ab
JS 95-60	0.40 cdef	0.28 bc	4.29bcd	3.58 abcd
JS2034	0.81 abcd	0.45 abc	3.93 cd	3.02 def
LSD (0.05)	**0.423**	**0.234**	**0.968**	**0.645**

Table 6.30 : Nodulation ability of AVT-II entries of respective centres (Sehore centre)

Genotype/variety	Nodule number/Plant	Nodule dry weight (mg/plant)	Leghaemoglobin (mg/g nodule wt.)
PS-1569	28.26	84.47	2.19
NRC-165	39.88	97.19	2.28
JS22-12	34.75	90.94	2.34
JS 22-16	36.77	97.96	2.28
JS 22-18	39.28	89.54	2.30
RVSM 2012-4	41.99	100.90	2.36
NRC138 (Chk)	40.88	89.55	2.32
JS 20-34 (Chk)	32.55	90.59	2.3
JS 95-60(Chk)	34.45	86.30	2.27
CD (5%)	**2.40**	**4.35**	**0.024**

Table 6.31 : Nodulation ability of AVT-II entries of respective centres (Delhi centre)

Sl. No.	Soybean genotypes	No. of Nodules/plant	Nodule dry wt. (mg/plant)	LegHb content (mg/g nodule wt.)
1	PS 1670	19.34	105.00	0.284
3	SL955 (Check)	19.14	113.40	0.256
4	SL958-EDV (Check)	18.53	97.88	0.231
	C.D.	N/A	N/A	0.139
	SE(m)	9.175	45.033	0.042
	SE(d)	12.976	63.686	0.059
	C.V.	91.863	88.558	16.721

Table 6.32 : Nodulation ability of AVT-II entries of respective centres (Ludhiana centre)

AVT–II entries (varieties)	Number of nodules/plant	Nodule dry wt. (mg/plant)	Leghaemoglobin content (mg/g of nodules)
PS1670	**44**	**74.6**	**4.08**
PS1682	38	67.1	3.70
SL1282	35	65.0	3.38
NRCSL3	45	76.6	4.11
NRCSL5	41	69.7	3.83
NRCSL6	32	61.0	3.13
NRC195	42	71.2	3.97
SL958	30	52.4	3.11
SL955	36	64.5	3.66
SL1074	34	62.8	3.22
CD@5%	**1.30**	**2.74**	**1.39**

Table 6.33 : Nodulation ability of AVT-II entries of respective centres (Pantnagar centre)

AVT-II Entries	Nodule Number /plant)	Nodule dry wt. (g/plant)	Plant dry wt. (g/plant)	LegHb (mg/g nodule wt)
PS 1670	**68.40**	**0.209**	**16.2**	**0.428**
SL-955	72.42	0.215	23.4	0.295
SL-958	65.72	0.213	16.8	0.479
PS-1347	60.46	0.192	34.0	0.321

7. Multi-Location Analysis Of Food Grade Characteristics Of AVT Entriesgrown In Three Different Zones:

1. Northern Plain Zone Advanced Varietal Trial I & II (NPZ-AVT I+II):

Physical analysis:

Physical analysis of soybean seed include parameters like 100 seed weight, seed size (dimensions), seed colour and lustre, hilum colour. Ideally, varieties suitable for soy milk and tofu should have larger size (higher 100 seed weight and dimensions), creamish white colour, clear or light coloured hilum. The aim of the experiment was to evaluate the suitability of AVT I &II entries for desired physical traits for soy milk and tofu manufacturing industry. Comparative analysis of AVT I and II entries grown in three agro climatic zones viz. Northern Plain Zone (Ludhiana and Pantnagar), Central Zone (Amravati, Anand, Amreli, Indore, Jabalpur, Kota, Parbhani, Sehore and Lokbharti) and North Eastern Hill zone (Imphal and Jorhat) were studied for given parameters and results are depicted in Table 7.1 to 7.42.

In Northern Plain Zone (NPZ), PS 1670 and NRC 149(C) gave the highest 100 seed weightfollowed by NRC SL 6. 100 seed weight and seed dimension data suggested that in NPZ entries viz. NRC149 (C), PS 1670, SL 958 (C) and NRC SL 6 has largest seed size. Entries PS 1670, NRC SL 6 and NRC 149(C) had pale yellow to yellow seed colour which makes them suitable for soymilk processing [Table 7.1].

Food grade characteristics:

Soy milk and tofu yield as well as sensory parameters are essential for screening of soybean entries for milk analogue preparation. Lesser cooking time and higher hydration ratio indicates better cooking quality. Cooking time among all AVT Entries was lesser for SL 1282, PS 1670 and PS 1682. Hydration ratio was found highest in AVT entries NRC SL 6 and SL 955(C). Hull fragility was found highest in all the check entries (SL 1074, NRC 149 and SL 955) of NPZ AVT entries. Milk yield of NPZ, AVT entries NRC SL 6 (9.37), PS 1682(9.32) and PS 1670(9.20) were found maximum and tofu yield for SL 1282(234.52), NRC SL 6 (224.43) and PS 1682(218.97) were found highest among the AVT entries (Table 7.2)

Sensory evaluation was done by panellist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, entry NRC 195was acceptable for milk and tofu sensory.Our results identified NRC 195 to be a desirable entry from NPZ for soymilk and tofu preparation (Table 7.3)

Table 7.1: Physical Analysis and Cooking Time of AVT II Entries of NPZ

S. N	Entry	100 Seed weight (g)			Seed dimension (mm)			Seed colour		Hilum colour		Seed Lustre		Cooking time (min)		
		LDH	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**	**LDH**	**PNT**	**LDH**	**PNT**	**LDH**	**PNT**	LDH	PNT	Mean
1.	NRC 195	10.5	7.4	8.9	5.23	5.30	5.27	Yellow (2.5Y 8/6)	Yellow (10YR 7/6)	Black (2.5Y 2.5/1)	Pale brown (2.5Y 8/3)	Shiny	Dull	86.6	101.3	94.0
2.	PS 1682	6.78	8.52	7.65	5.46	5.30	5.38	Pale olive (5Y 6/4)	Pale brown (2.5Y 7/4)	Very dark grey (5Y 3/1)	Black (2.5Y 2.5/1)	Intermediate	Intermediate	84.0	67.0	75.0
3.	SL 1282	9.15	8.46	8.81	5.23	5.56	5.40	Olive yellow (5Y 6/6)	Pale brown (2.5Y 8/4)	Dark greyish brown (2.5Y 4/2)	Light olive brown (2.5Y 5/3)	Intermediate	Shiny	55.3	78.3	66.8
4.	NRC SL 6	7.07	13.16	10.12	4.83	6.16	5.50	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Black (5Y 2.5/1)	Very dark grey (5y 3/1)	Shiny	Shiny	87.0	66.6	76.8
5.	PS 1670	10.33	10.87	10.60	5.53	5.70	5.62	Yellow (5Y 8/6)	Very pale brown (10YR 8/4)	Light yellowish brown (2.5Y 6/4)	Dark brown (10YR 3/3)	Intermediate	Shiny	59.6	74.6	67.1
6.	SL 1074 (C)	8.14	7.45	7.80	5.16	5.56	5.36	Very pale brown (10YR 8/3)	Yellow (10YR 7/8)	Dark brown (7.5YR 3/2)	Olive grey (5Y 4/2)	Shiny	Shiny	96.3	75.6	86.0
7.	SL 955(C)	9.03	7.42	8.23	5.33	5.33	5.33	Pale brown (2.5Y 8/4)	Yellow (2.5Y 7/6)	Dark yellowish brown (10YR 4/6)	Brown (10YR 4/3)	Shiny	Intermediate	89.3	119.3	104.3
8.	NRC 149(C)	-	11.34	11.34	-	5.93	5.93	-	Pale yellow (5Y 7/4)	-	Yellowish brown (10YR 5/4)	-	Shiny	-	115.6	115.6
9.	SL 958(C)	8.59	10.60	9.60	5.16	5.86	5.51	Yellow (2.5Y 8/8)	Olive yellow (2.5Y 6/8)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Shiny	Shiny	91.3	96.6	94.0
10.	S.Ed (±)	0.16	0.20		0.32	0.30								0.78	0.6	
11.	CD	0.35	0.43		0.69	0.65								1.68	1.4	

Table 7.2: Hydration Ratio, Hull Fragility, Milk Yield, TSS-Milk and Tofu Yield of AVTII Entries of NPZ

S. N	Entry	Hydration ratio			Hull fragility (no.)			Milk yield (lit/kg)			TSS-Milk (^{0} Brix)			Tofu yield (g/kg)		
		LDH	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**
1.	NRC 195	2.17	2.12	2.15	5.33	10.3	7.83	8.80	9.33	9.0	4.13	4.56	4.35	187.0	177.4	182.2
2.	PS 1682	2.17	2.21	2.19	5.67	19.0	12.3	9.13	9.50	9.3	3.93	6.06	5.00	261.4	176.5	218.9
3.	SL 1282	2.19	2.20	2.20	16.0	15.3	15.6	9.07	9.13	9.1	3.46	5.73	4.60	268.8	200.2	234.5
4.	NRC SL 6	2.48	2.14	2.31	8.00	15.33	11.6	9.73	9.00	9.3	4.46	6.90	5.68	268.7	180.1	224.4
5.	PS 1670	2.09	2.10	2.10	4.33	31.00	17.6	8.73	9.66	9.2	4.93	5.26	5.10	205.8	218.8	181.4
6.	SL 1074 (C)	2.15	2.15	2.15	39.3	45.3	42.3	9.67	8.60	9.1	4.66	6.20	5.43	212.1	150.8	181.4
7.	SL 955(C)	2.25	2.33	2.29	4.33	39.6	22.0	8.93	9.06	9.0	5.56	6.03	5.80	205.4	216.7	211.0
8.	NRC 149(C)	-	2.14	2.14	-	37.3	37.3	-	9.13	9.1	-	6.80	6.80	-	199.8	199.8
9.	SL 958(C)	2.13	2.21	2.17	6.33	37.0	21.6	9.00	9.26	9.1	5.36	6.56	5.96	216.2	134.0	175.1
10.	S.Ed (±)	0.09	0.07		1.13	1.85		0.32	0.33		0.25	0.71		9.24	5.57	
11.	CD	0.19	0.16		2.43	3.91		0.69	0.70		0.53	1.51		19.8	11.8	

Table 7.3: Sensory analysis of soymilk from AVT I&II entries of NPZ

Sl.no.	Varieties	Colour			Texture			Beaniness			Overall acceptability		
		LDH	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**	**LDH**	**PNT**	**Mean**
1	NRC 195	6.8	6.5	6.6	6.0	5.5	5.8	5.8	6.0	5.9	6.8	5.5	6.1
2	PS 1682	6.0	2.8	4.4	6.0	2.3	4.1	6.3	3.0	4.6	6.3	2.8	4.5
3	SL 1282	7.0	3.0	5.0	7.5	2.3	4.9	6.5	3.0	4.8	7.3	2.8	5.0
4	NRC SL 6	6.0	1.5	3.8	6.5	2.3	4.4	5.7	2.8	4.2	6.5	2.3	4.4
5	PS 1670	6.3	2.5	4.4	6.5	2.8	4.6	6.0	2.5	4.3	6.8	2.5	4.6
6	SL 1074	7.3	2.8	5.0	8.0	3.0	5.5	6.0	2.8	4.4	6.5	3.0	4.8
7	SL 955	7.3	3.0	5.1	7.0	3.0	5.0	6.5	3.0	4.8	6.3	2.8	4.5
8	NRC 149	7.0	3.5	5.3	6.0	3.5	4.8	6.0	3.0	4.5	6.0	3.0	4.5
9	SL 958	7.3	3.5	5.4	6.5	3.0	4.8	5.8	2.8	4.3	7.0	3.0	5.0

2. Central Zone (CZ) Advanced Varietal Trial (AVT I):

The hundred seed weight of soybean genotypes ranged from 8.66- 11.70 g. In CZ-AVT I trials, RVSM 2011-35 and AS 24 had the largest and smallest seed weight respectively (Table 7.4). Maximum hydration ratio of 2.32 was observed in entry NRC 190 (Table 10) while AMS 100-39 entry exhibited maximum hull fragility of 29.66 in AVT I trial (Table 7.11). All entries of AVT I had pale yellow to yellow seed colour which makes them suitable for soymilk processing [Table 7.6]. Entries AS 24 had pinkish grey hilum colour so is considered suitable for soymilk and tofu processing. It was interpreted that cooking time among all AVT Entries was lesser for NRC 190, AS 24 (Table 9). Maximum soymilk was obtained from AS 24 followed by AMS 100-39 (C), NRC 189and yield of soymilk ranged from 8.95-9.30lit/kg (Table 7.12).Tofu prepared showed statistically significant difference in the yield of fresh tofu.Maximum yield of fresh tofu was obtained from AMS 100-39, NRC 190, NRC 189 (Table 14). Sensory evaluation was done by panellist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, all entries from CZ were acceptable for milk sensory (Tables 7.19 - 7.22).

Table 7. 4: 100-Seed Weight of AVT I & II Soybean Entries of Central Zone

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	12.72	7.32	9.00	8.06	6.08	9.39	11.15	8.08	9.04	8.98
2	NRC 190	10.26	10.09	8.96	7.54	7.05	8.79	9.55	9.11	8.28	8.85
3	NRC 192	12.04	9.41	11.23	8.13	7.43	9.90	11.30	12.62	10.57	10.29
4	AS 24	11.49	7.69	9.66	7.09	7.58	8.96	10.43	5.78	9.30	8.66
5	RSC 11-42	11.10	7.67	8.96	7.95	8.00	9.55	11.09	7.88	7.89	8.90
6	RVSM 2011-35(C)	15.35	9.42	13.56	9.24	6.62	11.74	14.48	11.94	12.94	11.70
7	AMS 100-39(C)	13.90	10.32	12.55	8.89	9.45	11.30	13.51	10.16	12.86	11.44
8	RSC 10-52(C)	13.29	10.19	10.15	9.25	8.74	8.46	14.52	10.01	10.70	10.59
	S.Ed (±)	0.17	0.17	0.22	0.19	0.23	0.23	0.22	0.33	0.18	
	CD	0.37	0.36	0.48	0.42	0.49	0.49	0.48	0.70	0.39	

Table 7.5: Seed Dimension of AVT I & II Soybean Entries of Central Zone

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	6.06	5.16	5.50	4.93	5.07	5.20	5.70	5.46	5.26	5.37
2	NRC 190	5.63	6.00	5.40	4.86	5.06	5.37	6.00	5.53	4.93	5.42
3	NRC 192	5.83	5.46	6.13	5.63	5.39	5.50	6.00	6.00	5.60	5.73
4	AS 24	5.63	5.43	5.93	5.33	5.26	5.28	6.00	4.86	4.90	5.40
5	RSC 11-42	5.83	5.03	5.76	5.73	5.67	5.37	6.06	5.10	5.10	5.52
6	RVSM 2011-35(C)	6.00	5.20	6.13	5.80	5.10	5.25	6.40	5.63	6.16	5.74
7	AMS 100-39(C)	5.83	5.46	6.36	5.30	5.74	5.58	6.03	5.66	6.26	5.80
8	RSC 10-52(C)	6.16	6.03	5.70	5.40	5.36	5.26	6.13	5.70	5.53	5.70
	S.Ed (±)	0.19	0.27	0.17	0.15	0.21	0.17	0.24	0.22	0.18	
	CD	0.42	0.57	0.37	3.50	0.45	0.36	0.52	0.48	0.39	

Table7. 6: **Seed Colour (Munsell chart of color) of AVT I & II Soybean Entries of Central Zone**

S. No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti
1	NRC 189	Yellow (2.5Y 7/6)	Yellow (5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale yellow (5Y 8/3)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/2)	Pale brown (2.5Y 8/4)	Yellow (10YR 8/8)
2	NRC 190	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/3)	Pale brown (2.5Y 8/3)	Pale brown (2.5Y 8/3)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/3)
3	NRC 192	Yellow (2.5Y 7/6)	Pale yellow (5Y 8/2)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Olive yellow (2.5Y 6/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 7/6)
4	AS 24	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale yellow (5Y 7/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Olive yellow (2.5Y 6/6)	Yellow (2.5Y 8/6)
5	RSC 11-42	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 7/4)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/4)	Olive yellow (2.5Y 6/6)	Olive yellow (2.5Y 6/6)
6	RVSM 2011-35 (C)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/3)	Light olive brown (2.5Y 5/4)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 7/4)
7	AMS 100-39(C)	Yellow (2.5Y 7/6)	Pale yellow (5Y 8/3)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Olive yellow (2.5Y 6/6)	Yellow (2.5Y 8/8)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 7/6)
8	RSC 10-52(C)	Pale brown (2.5Y 8/4)	Pale yellow (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/3)	Yellow (2.5Y 7/6)	Olive yellow (5Y 6/8)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)

Table 7. 7: Hilum Colour of AVT I & II Soybean Entries of Central Zone

S. No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti
1	NRC 189	Very dark greyish brown (10YR 3/2)	Very dark brown ((10YR 2/2)	Very dark grey (7.5YR 3/1)	Black (7.5YR 2.5/1)	Very dark greyish brown (2.5Y 3/2)	Very drak grey (10YR 3/1)	Black (2.5Y 2.5/1)	Dark yellowish brown (10YR 3/6)	Very dark grey (10YR 3/1)
2	NRC 190	Black (10YR 2/1)	Black (10YR 2/2)	Black (7.5YR 2.5/1)	Black (7.5YR 2.5/1)	Black (2.5Y 2.5/1)	Black (10YR 2/1)	Black (5Y 2.5/1)	Very dark grey (5Y 3/1)	Black (5Y 2.5/1)
3*	NRC 192	Dark grey (10YR 4/1)	Very dark grey (10YR 3/1)	Very dark grey (7.5YR 3/1)	Brown (7.5YR 4/3)	Black (10YR 2/1)	Very dark brown (2.5Y 3/2)	Very dark grey (2.5Y 3/1)	Black (2.5Y 2.5/1)	Black (5Y 2.5/1)
4	AS 24	Pinkish grey (5YR 7/2)	Brown (10YR 4/3)	Grey (7.5YR 6/1)	Brown (7.5YR 4/2)	Very dark grey (5Y 3/1)	Dark olive grey (5Y 3/2)	Dark yellowish brown (10YR 3/4)	Strong brown (7.5YR 5/6)	Dark brown (7.5Y 3/3)

5	RSC 11-42	Dark grey (5YR 4/1)	Brown (10YR 5/3)	Black (7.5YR 2.5/1)	Dark grey (7.5YR 4/1)	Black (10YR 2/1)	Black (10YR 2/1)	Very dark grey (5Y 3/1)	Black (2.5Y 2.5/1)	Black (10YR 2/1)
6	RVSM 2011-35(C)	Very dark grey (10YR 3/1)	Black (10YR 2/1)	Black (7.5YR 2.5/1)	Black (7.5YR 2.5/1)	Very dark greyish brown (10YR 3/2)	Very dark grey (2.5Y 3/1)	Black (10YR 2/1)	Black (5Y 2.5/2)	Black (7.5YR 2.5/1)
7	AMS 100-39 (C)	Brown (10YR 4/3)	Pale brown (10YR 6/3)	Brown (7.5YR 5/3)	Pinkish grey (7.5YR 7/2)	Dark greyish brown (2.5Y 4/2)	Olive (5Y 4/4)	Black (2.5Y 2.5/1)	Olive brown (2.5Y 4/3)	Yellowish brown (10YR 5/4)
8	RSC 10-52 (C)	Dark greyish brown (10YR 4/2)	Very pale brown (10YR 8/4)	Pinkish white (7.5YR 8/2)	Black (7.5YR 2.5/1)	Olive brown (2.5Y 4/4)	Olive brown (2.5Y 4/4)	Dark olive brown (2.5Y 3/3)	Very dark grey (2.5Y 3/1)	Light yellowish brown (10YR 6/4)

Table 7. 8: Seed Lustre of Soybean Entries of AVT I & AVT II in Central Zone

S. No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti
1	NRC 189	Shiny	Intermediate	Intermediate	Shiny	Dull	Shiny	Shiny	Shiny	Shiny
2	NRC 190	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	Shiny	Intermediate	Shiny
3	NRC 192	Intermediate	Intermediate	Intermediate	Shiny	Shiny	Intermediate	Shiny	Shiny	Dull
4	AS 24	Shiny	Shiny	Shiny	Intermediate	Shiny	Dull	Shiny	Dull	Shiny
5	RSC 11-42	Shiny	Shiny	Intermediate	Shiny	Shiny	Intermediate	Shiny	Shiny	Shiny
6	RVSM 2011-35	Intermediate	Intermediate	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	Shiny
7	AMS 100-39	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny
8	RSC 10-52	Shiny	Shiny	Shiny	Dull	Dull	Shiny	Shiny	Shiny	Shiny

Table 7. 9: Cooking Time (min) of Soybean Entries of AVT I & AVT II in Central Zone

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	NRC 189	91.66	99.33	94.33	96.00	93.66	75.66	97.66	90.66	72.00	90.11	IV
2	NRC 190	86.66	97.33	87.66	70.66	83.00	69.00	95.33	77.33	59.33	80.70	I
3	NRC 192	101.00	107.00	85.00	85.66	70.66	71.66	92.66	98.66	106.33	90.96	VI
4	AS 24	95.00	103.00	80.33	98.00	89.33	74.00	75.66	98.00	87.33	88.96	III
5	RSC 11-42	74.33	79.66	96.66	91.00	103.00	78.66	104.33	91.00	102.33	91.22	VII

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
6	RVSM 2011-35 (C)	92.00	87.00	80.66	81.00	63.00	76.33	94.33	71.00	85.66	81.22	II
7	AMS 100-39(C)	83.66	107.00	83.00	105.33	92.66	75.66	103.00	97.66	104.33	94.70	VIII
8	RSC 10-52 (C)	106.00	80.33	91.33	87.66	101.00	74.33	89.33	103.00	83.33	90.70	V
	S.Ed (+)	1.65	1.26	0.57	0.86	1.15	5.47	0.80	1.76	2.53		
	CD	3.54	2.69	1.22	1.85	2.46	11.74	1.71	3.78	5.43		

Table 7.10: Hydration Ratio of AVT I & AVT II soybean Entries of Central Zone

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	NRC 189	2.06	2.19	2.20	2.32	2.16	2.21	2.12	2.19	2.18	2.18	IV
2	NRC 190	2.17	2.21	2.24	2.39	2.18	2.15	2.17	2.17	2.41	2.32	I
3	NRC 192	2.11	2.18	2.20	2.54	2.11	2.18	2.21	1.99	2.28	2.20	III
4	AS 24	2.14	2.21	2.07	2.49	2.16	2.04	2.14	2.79	2.26	2.26	II
5	RSC 11-42	2.16	2.19	2.23	2.34	2.18	2.36	2.26	2.43	2.19	2.26	II
6	RVSM 2011-35 (C)	2.24	2.04	2.16	2.15	2.17	2.27	2.13	2.23	2.18	2.17	V
7	AMS 100-39(C)	2.50	2.34	2.24	2.34	2.20	2.02	2.12	1.76	2.11	2.18	IV
8	RSC 10-52(C)	2.10	2.21	2.16	2.28	2.08	2.19	2.16	2.29	2.17	2.18	IV
	S.Ed (+)	0.18	0.09	0.06	0.11	0.46	0.12	0.05	0.15	0.10		
	CD	0.38	0.19	0.12	0.24	0.10	0.26	0.09	0.32	0.21		

Table 7.11: Hull Fragility of AVT I & AVT II soybean Entries of Central Zone

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	NRC 189	8.33	5.33	14.33	27.66	13.33	8.33	24.00	25.66	10.00	15.22	V
2	NRC 190	7.66	15.33	12.00	18.66	14.00	10.33	10.00	4.33	20.00	12.48	VII
3	NRC 192	8.33	24.67	10.66	17.66	10.00	14.66	17.00	8.66	9.33	13.44	VI
4	AS 24	20.66	20.33	27.33	44.00	14.66	8.66	16.00	15.66	12.33	19.96	III
5	RSC 11-42	4.33	6.33	21.00	18.00	6.33	7.66	13.00	2.66	12.00	10.15	VIII
6	RVSM 2011-35 (C)	17.00	28.00	9.66	6.33	23.66	15.66	40.00	17.33	40.00	21.96	II
7	AMS 100-39(C)	23.00	26.67	21.00	18.00	40.33	27.66	31.00	48.66	30.66	29.66	I
8	RSC 10-52(C)	17.00	13.67	19.00	21.33	5.33	4.66	28.33	10.00	18.66	15.33	IV
	S.Ed (+)	0.70	1.32	1.44	1.96	1.33	1.16	2.00	1.75	1.59		
	CD	1.50	2.83	3.09	4.21	2.84	2.49	4.29	3.76	3.40		

Table 7.22: Milk Yield of AVT I & AVT II soybean Entries of Central Zone

S. No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	NRC 189	9.26	8.93	9.06	9.53	9.73	9.10	9.26	9.53	8.60	9.22	III
2	NRC 190	8.93	9.33	9.53	9.20	8.73	9.26	9.20	9.60	8.66	9.16	V
3	NRC 192	9.40	9.26	8.73	8.40	9.00	9.10	9.66	9.46	8.66	9.07	VII
4	AS 24	9.33	8.80	9.06	9.73	9.80	9.20	9.46	9.20	9.13	9.30	I
5	RSC 11-42	9.20	9.53	9.20	9.40	9.73	9.13	8.53	9.53	8.26	9.17	IV
6	RVSM 2011-35(C)	8.86	8.86	9.46	9.13	9.40	8.93	8.53	9.26	9.73	9.13	VI
7	AMS 100-39(C)	9.06	9.53	9.13	9.26	9.73	9.53	9.13	8.66	9.20	9.25	II
8	RSC 10-52(C)	8.93	9.46	9.13	9.33	8.80	9.06	8.80	8.00	9.06	8.95	VIII
	S.Ed (±)	0.27	0.21	0.24	0.28	0.27	0.40	0.33	0.24	0.27		
	CD	0.58	0.44	0.51	0.59	0.58	0.86	0.71	0.52	0.58		

Table 7.33: TSS-Milk of AVT I & AVT II soybean Entries of Central Zone

S. No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	NRC 189	4.90	5.03	5.33	5.53	4.66	7.93	3.46	4.00	6.43	5.25	V
2	NRC 190	5.53	4.86	4.93	5.63	5.50	7.43	5.43	4.00	5.50	5.42	II
3	NRC 192	5.03	5.50	5.30	6.03	5.20	8.23	4.23	4.03	5.10	5.41	III
4	AS 24	5.30	5.76	5.20	3.50	4.13	7.13	3.86	4.16	5.56	4.96	VIII
5	RSC 11-42	5.10	3.96	4.96	3.56	4.36	7.06	6.83	4.30	6.06	5.13	VI
6	RVSM 2011-35 (C)	6.03	5.90	3.96	4.13	4.60	7.23	5.30	4.53	3.83	5.06	VII
7	AMS 100-39 (C)	5.40	5.43	4.16	6.13	4.33	8.06	4.96	4.76	4.50	5.30	IV
8	RSC 10-52(C)	5.63	4.96	5.60	6.06	5.80	7.63	6.33	5.50	3.80	5.70	I
	S.Ed (±)	0.46	0.33	0.27	0.31	0.52	0.48	0.60	0.43	0.56		
	CD	0.99	0.71	0.58	0.67	1.12	1.03	1.28	0.91	1.21		

Table7. 44: Tofu Yield of AVT I & AVT II soybean Entries of Central Zone

S. No .	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	NRC 189	250.83	290.93	217.10	219.73	201.06	263.83	275.10	191.43	244.80	239.42	III
2	NRC 190	262.16	271.60	226.10	169.93	227.40	270.10	268.53	214.30	272.86	242.55	II
3	NRC 192	217.40	243.13	247.40	192.76	196.60	247.73	255.13	201.40	274.93	230.72	VII
4	AS 24	216.83	240.36	209.53	182.80	178.53	239.70	234.46	185.10	251.20	215.39	VIII
5	RSC 11-42	235.20	225.86	257.33	235.86	175.00	278.73	249.60	201.10	283.16	237.98	IV
6	RVSM 2011-35(C)	221.66	282.43	242.53	267.53	146.40	283.56	261.06	134.76	239.16	231.01	VI
7	AMS 100-39(C)	261.30	267.66	248.30	209.90	218.60	270.63	275.30	263.30	285.13	255.57	I
8	RSC 10-52(C)	251.20	262.50	246.76	168.03	233.36	235.76	236.23	239.40	261.10	237.15	V
	S.Ed (±)	9.68	10.37	8.64	7.50	15.05	16.85	16.20	7.50	17.53		
	CD	20.77	22.24	18.54	16.09	32.29	36.14	34.74	16.08	37.60		

Table 7.15:Soy-milk Colour Sensory analysis of soymilk from AVT I entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	6.0	7.3	5.3	7.3	6.7	5.6	7.3	6.3	6.8	6.5
2	NRC 190	6.3	7.0	6.0	7.3	6.7	5.3	7.0	6.7	6.3	6.5
3	NRC 192	6.3	7.7	5.0	6.7	7.3	5.7	7.0	7.0	7.7	6.7
4	AS 24	7.0	5.7	6.7	7.7	6.0	5.3	6.0	7.0	7.7	6.6
5	RSC 11-42	6.0	6.3	6.3	6.3	7.7	4.0	6.0	6.7	6.7	6.2
6	RVSM 2011-35 (C)	6.3	5.7	6.0	5.7	6.0	5.3	7.0	6.0	6.3	6.0
7	AMS 100-39(C)	6.0	6.0	6.7	6.3	5.7	6.3	6.3	6.7	6.3	6.3
8	RSC 10-52(C)	7.0	7.3	5.7	7.3	6.0	7.3	6.7	6.0	6.7	6.7

Table 7.16:Soy-milk Consistency Sensory analysis of soymilk from AVT I entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	6.0	7.3	5.3	7.3	6.7	5.6	7.3	6.3	6.8	6.5
2	NRC 190	6.3	7.0	6.0	7.3	6.7	5.3	7.0	6.7	6.3	6.5
3	NRC 192	6.3	7.7	5.0	6.7	7.3	5.7	7.0	7.0	7.7	6.7
4	AS 24	7.0	5.7	6.7	7.7	6.0	5.3	6.0	7.0	7.7	6.6
5	RSC 11-42	6.0	6.3	6.3	6.3	7.7	4.0	6.0	6.7	6.7	6.2
6	RVSM 2011-35 (C)	6.3	5.7	6.0	5.7	6.0	5.3	7.0	6.0	6.3	6.0
7	AMS 100-39(C)	6.0	6.0	6.7	6.3	5.7	6.3	6.3	6.7	6.3	6.3
8	RSC 10-52(C)	7.0	7.3	5.7	7.3	6.0	7.3	6.7	6.0	6.7	6.7

Table 7.17: Sensory analysis of Beaniness of Soy-milk AVT I entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	6.0	7.3	5.3	7.3	6.7	5.6	7.3	6.3	6.8	6.5
2	NRC 190	6.3	7.0	6.0	7.3	6.7	5.3	7.0	6.7	6.3	6.5
3	NRC 192	6.3	7.7	5.0	6.7	7.3	5.7	7.0	7.0	7.7	6.7
4	AS 24	7.0	5.7	6.7	7.7	6.0	5.3	6.0	7.0	7.7	6.6
5	RSC 11-42	6.0	6.3	6.3	6.3	7.7	4.0	6.0	6.7	6.7	6.2
6	RVSM 2011-35 (C)	6.3	5.7	6.0	5.7	6.0	5.3	7.0	6.0	6.3	6.0
7	AMS 100-39(C)	6.0	6.0	6.7	6.3	5.7	6.3	6.3	6.7	6.3	6.3
8	RSC 10-52(C)	7.0	7.3	5.7	7.3	6.0	7.3	6.7	6.0	6.7	6.7

Table 7.18: Sensory analysis of Overall Acceptability of Soy-milk AVT I entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	6.0	6.7	6.0	7.0	7.7	6.0	6.7	4.7	6.3	6.3
2	NRC 190	6.0	6.3	6.0	8.0	6.0	6.0	6.7	5.3	6.0	6.3
3	NRC 192	6.0	7.7	6.0	7.3	6.0	4.0	7.0	5.7	7.0	6.3
4	AS 24	6.3	5.7	6.3	8.0	6.0	7.0	7.0	6.0	7.3	6.6
5	RSC 11-42	6.0	6.3	6.0	7.3	8.0	7.0	6.7	6.3	6.3	6.7
6	RVSM 2011-35 (C)	6.3	6.7	6.0	6.0	5.3	7.0	7.0	6.0	6.7	6.3
7	AMS 100-39(C)	6.0	6.7	6.7	7.0	6.0	6.3	8.0	5.3	6.3	6.5
8	RSC 10-52(C)	7.0	6.3	6.0	7.3	5.3	4.7	6.7	6.0	7.0	6.3

Table 7.19: Sensory analysis of Tofu Colour of AVT I Entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	7.0	6.7	7.0	7.0	6.7	7.0	7.0	6.7	6.7	6.9
2	NRC 190	6.7	6.7	6.3	8.0	6.3	6.7	6.7	6.3	6.7	6.7
3	NRC 192	6.7	5.7	6.3	7.7	6.0	6.0	6.0	6.7	7.0	6.5
4	AS 24	6.3	6.3	7.3	6.7	5.7	6.0	6.7	7.0	7.3	6.6
5	RSC 11-42	6.3	7.0	7.0	7.3	6.3	5.0	7.3	6.3	6.7	6.6
6	RVSM 2011-35 (C)	7.0	7.3	6.3	7.7	7.7	5.7	7.7	6.0	5.7	6.8
7	AMS 100-39(C)	7.7	6.7	7.3	6.0	7.7	6.3	6.0	7.0	6.7	6.8
8	RSC 10-52(C)	6.0	6.3	6.7	6.7	6.3	6.3	7.0	6.3	7.0	6.5

Table 7.20: Sensory analysis of Tofu Testure of AVT I Entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	7.3	6.3	7.0	8.3	6.0	6.7	7.7	5.7	7.3	6.9
2	NRC 190	7.0	6.3	6.3	8.3	5.7	5.7	6.3	5.7	7.7	6.6
3	NRC 192	6.3	6.7	6.0	7.0	4.7	5.3	7.0	5.7	6.7	6.2
4	AS 24	6.0	6.3	7.0	8	5.7	5.7	7.0	6.7	6.7	6.6
5	RSC 11-42	7.0	7.0	6.3	7.7	6.0	6.0	6.3	5.7	6.3	6.5
6	RVSM 2011-35 (C)	6.7	7.0	6.0	7.3	4.7	5.7	8.0	5.7	5.7	6.3
7	AMS 100-39(C)	7.0	7.0	7.0	6.7	5.7	6.7	6.0	6.0	6.3	6.5
8	RSC 10-52(C)	5.7	6.7	5.3	6.0	5.7	6.3	6.7	4.7	7.0	6.0

Table 7.21: Sensory analysis of Tofu Beaniness of AVT I Entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	6.0	7.3	5.3	7.3	6.7	5.6	7.3	6.3	6.8	6.5
2	NRC 190	6.3	7.0	6.0	7.3	6.7	5.3	7.0	6.7	6.3	6.5
3	NRC 192	6.3	7.7	5.0	6.7	7.3	5.7	7.0	7.0	7.7	6.7
4	AS 24	7.0	5.7	6.7	7.7	6.0	5.3	6.0	7.0	7.7	6.6
5	RSC 11-42	6.0	6.3	6.3	6.3	7.7	4.0	6.0	6.7	6.7	6.2
6	RVSM 2011-35 (C)	6.3	5.7	6.0	5.7	6.0	5.3	7.0	6.0	6.3	6.0
7	AMS 100-39(C)	6.0	6.0	6.7	6.3	5.7	6.3	6.3	6.7	6.3	6.3
8	RSC 10-52(C)	7.0	7.3	5.7	7.3	6.0	7.3	6.7	6.0	6.7	6.7

Table 7.22: Sensory analysis of Tofu Overall Accesptability of AVT I Entries of CZ

S. No	Entry	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	NRC 189	6.0	6.7	6.0	7.0	7.7	6.0	6.7	4.7	6.3	6.3
2	NRC 190	6.0	6.3	6.0	8.0	6.0	6.0	6.7	5.3	6.0	6.3
3	NRC 192	6.0	7.7	6.0	7.3	6.0	4.0	7.0	5.7	7.0	6.3
4	AS 24	6.3	5.7	6.3	8.0	6.0	7.0	7.0	6.0	7.3	6.6
5	RSC 11-42	6.0	6.3	6.0	7.3	8.0	7.0	6.7	6.3	6.3	6.7
6	RVSM 2011-35 (C)	6.3	6.7	6.0	6.0	5.3	7.0	7.0	6.0	6.7	6.3
7	AMS 100-39(C)	6.0	6.7	6.7	7.0	6.0	6.3	8.0	5.3	6.3	6.5
8	RSC 10-52(C)	7.0	6.3	6.0	7.3	5.3	4.7	6.7	6.0	7.0	6.3

3. Central Zone (CZ) Advanced Varietal Trial AVT I &II-Early):

In CZ-AVT I+II (Early) trials, 100 seed weight and seed dimension data suggested that **JS 23-03** (highestamong all entries of the three different zones i.e. 12.32g and JS 23-03, NRC 181 have high seed dimension. (Table 7.23 and 7.24). All entries of AVT (I + II) Early had pale yellow to yellow seed colour which makes them suitable for soymilk processing [Table 7. 25]. From the results of AVT I & II (Early) it was interpreted that cooking time among was lesser for JS 23-03, JS 23-09, NRC 181, NRC 130, hydration ratio did not vary significantly among entries (Table 7.28 & 7.29). Maximum soymilk was obtained from JS 23-03, PS 1569 and KDS 1169 (Table 7.31). Tofu prepared from entries showed statistically significant difference in the yield of fresh tofu (Table 7.33).Maximum yield of fresh tofu was obtained from JS 23-03, PS 1569, JS23-09, JS 22-12 (Table 7.33).

Sensory evaluation was done by panellist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, all entries from CZ were acceptable for milk sensory.The maximum overall acceptability score of soymilk were exhibited by entry JS 23-03 (Table 7.34 - 7.40).

Table 7.23: 100 Seed Weight of AVT I & II Early Entries of Central Zone

S. No	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	10.70	10.70	14.18	14.03	10.29	12.33	14.55	12.25	11.81	12.32	I
2	JS 23-09	10.49	10.49	11.29	11.99	10.30	9.76	12.00	9.71	10.77	10.76	VI
3	KDS 1169	11.07	11.07	12.11	10.53	9.09	9.45	13.32	11.52	11.94	11.12	V
4	PS 1569	10.27	10.27	11.06	8.37	9.30	9.57	12.09	9.71	10.81	10.16	IX
5	JS 22-12	9.14	9.14	11.08	12.18	8.54	10.54	11.73	9.40	11.32	10.34	VII
6	JS 22-18	11.05	11.05	12.70	13.73	8.67	11.73	12.87	11.00	12.93	11.75	III
7	JS 22-16	8.38	8.38	10.77	9.13	9.03	9.92	12.05	8.90	11.44	9.78	XIII
8	RVSM 2012-4	8.57	8.57	11.24	9.92	6.78	9.91	12.49	9.59	11.56	9.85	XII
9	NRC 181	10.11	10.11	-	10.83	9.29	12.97	13.91	10.67	13.16	11.38	IV
10	NRC 165	9.32	9.32	10.83	10.35	7.02	9.52	10.83	8.81	9.20	9.47	XIV
11	NRC 130(C)	11.08	11.08	12.50	11.96	7.73	11.85	15.34	-	13.75	11.91	II
12	NRC 138(C)	10.38	10.38	10.39	8.56	8.51	10.17	12.57	8.49	10.23	9.96	XI
13	JS95-60 (C)	6.99	6.99	13.65	9.17	8.23	8.67	13.32	10.37	13.04	10.05	X
14	JS 20-34 (C)	9.81	9.81	12.36	11.50	7.94	8.11	11.89	10.07	10.84	10.26	VIII
	S.Ed (±)	0.28	0.28	0.14	0.17	0.22	0.21	0.21	0.17	0.26		
	CD	0.59	0.59	0.29	0.35	0.46	0.44	0.43	0.34	0.53		

Table 7.24: Seed Dimension (mm) of AVT I & II Early Entries of Central Zone

S. No	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	6.23	5.90	6.23	6.30	5.76	6.18	6.26	6.13	5.76	6.08	II
2	JS 23-09	5.93	5.60	5.70	5.90	5.57	5.58	5.80	5.43	5.40	5.66	X
3	KDS 1169	6.23	6.26	5.83	6.00	5.09	5.82	5.86	6.00	5.53	5.85	VI
4	PS 1569	6.16	5.80	5.93	5.60	5.77	5.15	6.10	5.70	6.03	5.80	VII
5	JS 22-12	5.70	5.36	5.73	6.00	5.65	5.59	5.80	4.93	5.66	5.60	XI
6	JS 22-18	5.96	6.06	5.90	6.30	5.41	6.09	6.00	6.03	6.03	5.98	III
7	JS 22-16	6.23	5.16	5.86	5.73	5.68	5.72	5.83	5.70	5.86	5.75	VIII
8	RVSM 2012-4	5.96	5.43	5.93	5.53	5.44	5.63	6.00	5.60	6.00	5.72	IX
9	NRC 181	6.33	5.93	-	5.86	5.44	6.55	6.53	5.83	6.26	6.09	I
10	NRC 165	5.36	5.43	5.80	5.70	5.15	5.27	6.03	5.60	4.76	5.46	XIII
11	NRC 130(C)	5.86	6.06	6.43	5.80	5.60	5.67	6.73	-	6.53	6.09	I
12	NRC 138(C)	5.76	5.56	5.46	5.73	5.45	5.55	5.93	5.36	5.26	5.56	XII

13	JS95-60 (C)	6.50	5.06	6.36	5.73	5.51	5.63	6.23	6.43	6.10	5.95	IV
14	JS 20-34 (C)	6.00	6.00	6.26	6.00	5.30	5.19	6.06	6.03	5.86	5.86	V
	S.Ed (+)	0.22	0.18	0.13	0.18	0.18	0.19	0.23	0.22	0.27		
	CD	0.46	0.37	0.26	0.38	0.36	0.39	0.47	0.46	0.55		

Table 7.25: Seed Colour of AVT I & II Early Entries of Central Zone

S. No	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti
1	JS 23-03	Yellow (2.5Y 7/6)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (10YR 7/6)	Yellow 10YR 8/6	Pale yellow (5Y 7/4)	Light yellowish brown (2.5Y 6/4)	Pale yellow (5Y 8/4)
2	JS 23-09	Yellow (2.5Y 7/6)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 7/4)	Yellow 10YR 7/6	Pale brown (2.5Y 7/4)	Light yellowish brown (2.5Y 6/4)	Pale brown (2.5Y 8/4)
3	KDS 1169	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Light yellowish brown (2.5Y 6/4)	Yellow 10YR 7/6	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
4	PS 1569	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 7/6)
5	JS 22-12	Light yellowish brown (2.5Y 6/4)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Pale Yellow (2.5Y 8/4)	Pale brown (2.5Y 7/3)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 7/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)
6	JS 22-18	Yellow (2.5Y 7/6)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 7/6)	Light yellowish brown (2.5Y 6/4)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 7/4)	Light olive brown (2.5Y 5/6)	Light yellowish brown (2.5Y 6/4)
7	JS 22-16	Pale brown (2.5Y 8/3)	Yellow (2.5Y 7/8)	Pale brown (2.5Y 8/4)	Pale Brown (2.5Y 8/4)	Yellow (10YR 8/6)	Very pale brown (10YR 7/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/3)	Pale brown (2.5Y 7/4)
8	RVSM 2012-4	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale Brown (2.5Y 8/4)	Yellow (10YR 7/6)	Pale brown (2.5Y 8/3)	Pale brown (2.5Y 8/3)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/8)
9	NRC 181	Pale brown (2.5Y 8/3)	Yellow (2.5Y 8/8)	-	Pale Brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
10	NRC 165	Pale brown (2.5Y 8/3)	Yellow (2.5Y 8/4)	Yellow (2.5Y 8/6)	Pale Brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Brownish yellow (10YR 6/6)	Pale brown (2.5Y 8/3)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
11	NRC 130(C)	Yellow (2.5Y 7/6)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Pale Brown (2.5Y 8/3)	Pale brown (2.5Y 8/4)	Yellow (10YR 7/6)	Yellow (2.5Y 8/6)	-	Yellow (2.5Y 8/8)
12	NRC 138(C)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale Brown (2.5Y 8/4)	Pale yellow (5Y 8/3)	Yellow (2.5Y 8/6)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 7/6)
13	JS95-60 (C)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 7/3)	Yellow (2.5Y 8/8)	Pale brown (2.5Y 7/4)	Pale brown (2.5Y 8/4)	Yellow (5Y 8/6)
14	JS 20-34 (C)	Yellow (2.5Y 7/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale Brown (2.5Y 8/4)	Light olive brown (2.5Y 5/6)	Pale brown (2.5Y 7/4)	Yellow (2.5Y 7/6)	Pale brown (2.5Y 8/4)	Light olive brown (2.5Y 5/6)

Table 7.26: Hilum Colour of AVT I & II Early Entries of Central Zone

S.No	Varietie	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti
1	JS 23-03	Very dark grey (10YR 3/1)	Dark grey (5YR 4/1)	Black (10YR 2/1)	Very dark grey (10YR 3/1)	Black (2.5Y 2/1)	Dark greyish brown (10YR 3/2)	Black (5Y 2.5/1)	Very dark grey (5Y 3/1)	Dark Olive grey (5Y 3/2)
2	JS 23-09	Brown (10YR 4/3)	Black (7.5Y 2.5/2)	Black (10YR 2/1)	Black (10YR 2/1)	Very dark greyish brown (2.5Y 3/2)	Black (10YR 2/1)	Very dark grey (5Y 3/1)	Black (5Y 2.5/1)	Black (2.5Y 2.5/1)
3	KDS 1169	White (10YR 8/1)	Pink (7.5YR 3/1)	Very pale brown (10YR 8/3)	Very pale brown (10YR 8/3)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 7/4)	Dark yellowish brown (10YR 4/4)	Light yellowish brown (2.5Y 6/4)	Strong brown (7.5YR 5/6)
4	PS 1569	Light grey (10YR 7/1)	Very dark grey (7.5YR 3/1)	Brown (10YR 5/3)	Yellowish brown (10YR 5/6)	Dark brown (10YR 3/3)	Very dark grey (2.5Y 3/1)	Very dark brown (10YR 2/2)	Dark grey (5Y 4/1)	Light olive brown (2.5Y 5/3)
5	JS 22-12	Dark greyish brown (10YR 4/2)	Dark brown (7.5YR 3/2)	Black (10YR 2/1)	Black (10YR 2/1)	Black (7.5Y 2.5/1)	Dark brown (7.5YR 3/3)	Black (5Y 2.5/1)	Very dark grey (5Y 3/1)	Black (2.5Y 2.5/1
6	JS 22-18	Dark grey (10YR 4/1)	Dark grey (7.5YR 4/1)	Grey (10YR 5/1)	Black (10YR 2/1)	Black (10YR 2/1)	Very dark greyish brown (2.5Y 3/2)	Black (2.5Y 2.5/1)	Black (2.5Y 2/1)	Black (2.5Y 2.5/1)
7	JS 22-16	Black (10YR 2/1)	Brown (7.5YR 4/3)	Dark grey (10YR 4/1)	Brown (10YR 4/3)	Black (10YR 2/9)	Dark brown (10YR 3/3)	Very dark grey (10YR 3/1)	Dark brown (10TR 3/3)	Dark brown (7.5Y 3/3)
8	RVSM 2012-4	Dark grey (10YR 4/1)	Black (7.5Y 2.5/1)	Brown (10YR 4/3)	Very dark greyish brown (10YR 3/2)	Very dark grey (2.5Y 3/1)	Dark brown (7.5YR 3/2)	Very dark brown (10YR 2/2)	Black (5Y 2.5/1)	Black (2.5Y 2.5/1)
9	NRC 181	Very dark grey (10YR 3/1)	Dark brown (7.5YR 3/3)	-	Brown (10YR 5/3)	Dark olive brown (2.5Y 3/3)	Dark brown (10YR 3/3)	Very dark greyish brown (10YR 3/2)	Dark olive brown (2.5Y 3/3)	Dark brown (10YR 3/3)
10	NRC 165	Very pale brown (10YR 8/2)	Pink (7.5YR 8/3)	Very pale brown (10YR 8/3)	Very pale brown (10YR 8/3)	Strong brown (7.5YR 4/6)	Yellowish brown (10YR 5/8)	Yellowish brown (10YR 5/4)	Very pale brown (10YR 8/4)	Pink (7.5YR 7/4)
11	NRC 130(C)	White (10YR 8/1)	Very dark grey (5YR 3/1)	White (10YR 8/1)	White (10YR 8/1)	Yellow (10YR 8/6)	Yellow (2.5Y 7/6)	Brown (2.5Y 8/6)	-	Yellow (10YR 8/6)
12	NRC 138(C)	Very pale brown (10YR 7/3)	Brown (7.5YR 4/3)	Very pale brown (10YR 8/3)	Very pale brown (10YR 8/3)	Yellowish brown (10YR 5/4)	Yellowish brown (10YR 5/8)	Black (10YR 2/1)	Light yellowish brown (2.5Y 6/4)	Yellowish brown (10YR 5/6)
13	JS95-60 (C)	White (10YR 8/1)	Brown (7.5YR 4/3)	Very pale brown (10YR 8/3)	Very pale brown (10TR 8/4)	Brown (10YR 4/3)	Yellowish brown (10YR 5/4)	Light olive brown (2.5Y 5/4)	Light yellowish brown (2.5Y 6/4)	Pale olive (5Y 6/4)
14	JS 20-34 (C)	Black (10YR 2/1)	Dark grey (7.5YR 4/1)	Very pale brown (10YR 8/3)	Dark grey (10YR 4/1)	Very dark grey (2.5Y 3/1)	Black (10 YR 2/1)	Dark brown (7.5YR 3/2)	Very dark grey (5Y 3/1)	Black (7.5YR 2.5/1)

Table 7.27: Seed lustre of Advanced Varietal Trial I&II (AVT I+II) Early for CZ

S. No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti
1	JS 23-03	Shiny	Shiny	Shiny	Intermediate	Shiny	Intermediate	Shiny	Shiny	Shiny
2	JS 23-09	Shiny	Shiny	Shiny	Shiny	Intermediate	Dull	Shiny	Dull	Shiny
3	KDS 1169	Shiny	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	Shiny	Shiny
4	PS 1569	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny
5	JS 22-12	Dull	Shiny	Intermediate	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny
6	JS 22-18	Shiny	Shiny	Shiny	Intermediate	Shiny	Shiny	Shiny	Shiny	Intermediate
7	JS 22-16	Shiny	Shiny	Intermediate	Shiny	Dull	Shiny	Dull	Intermediate	Shiny
8	RVSM 2012-4	Shiny	Intermediate	Intermediate	Intermediate	Intermediate	Shiny	Dull	Shiny	Shiny
9	NRC 181	Shiny	Shiny	-	Shiny	Shiny	Shiny	Intermediate	Shiny	Shiny
10	NRC 165	Shiny	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	Shiny	Shiny
11	NRC 130(C)	Shiny	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	-	Shiny
12	NRC 138(C)	Shiny	Shiny	Intermediate	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny
13	JS95-60(C)	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Intermediate
14	JS 20-34(C)	Shiny	Shiny	Shiny	Intermediate	Shiny	Dull	Shiny	Shiny	Shiny

Table 28: Cooking Time (min) of Advanced Varietal Trial I&II (AVT I+II) Early for CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	90.66	91.00	61.66	76.00	86.66	67.66	88.66	76.66	90.66	81.07	I
2	JS 23-09	92.33	82.66	103.66	74.33	89.66	91.66	65.33	94.00	77.66	85.70	II
3	KDS 1169	105.33	96.66	88.33	101.00	142.33	94.33	96.66	152.00	102.33	108.77	XIV
4	PS 1569	103.66	107.00	91.00	88.33	123.00	73.66	107.00	87.00	174.66	106.15	XIII
5	JS 22-12	116.66	90.33	104.33	95.66	94.66	88.33	109.33	83.33	115.66	99.81	XI
6	JS 22-18	98.00	86.00	95.33	93.66	79.33	80.33	95.33	106.00	117.33	94.59	IX
7	JS 22-16	101.66	104.33	121.33	100.66	99.66	76.00	102.33	85.66	131.33	102.55	XII
8	RVSM 2012-4	87.00	96.33	101.66	85.00	96.66	89.00	100.66	111.66	92.66	95.63	X
9	NRC 181	100.33	75.00	-	90.33	79.66	86.33	88.66	85.66	80.00	85.75	III
10	NRC 165	80.33	96.66	97.33	75.33	85.66	84.00	92.66	133.33	96.00	93.48	VIII
11	NRC 130(C)	96.66	95.33	71.33	93.33	93.00	86.66	92.33	-	72.66	87.66	IV
12	NRC 138(C)	91.66	85.33	101.00	70.66	78.66	91.33	71.00	108.33	117.33	90.59	VI
13	JS95-60(C)	104.33	94.33	61.00	100.33	85.66	81.66	91.66	84.00	95.33	88.70	V
14	JS 20-34(C)	108.33	101.00	81.66	100.00	74.33	94.66	88.66	96.66	71.33	90.74	VII
	S.Ed (±)	0.88	1.07	1.25	0.75	1.36	1.85	1.27	0.82	1.17		
	CD	1.81	2.21	2.59	1.54	2.80	3.81	2.61	1.69	2.40		

Table 7.29: Hydration Ratio of AVT I & II Entries of Central Zone

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	2.31	2.28	2.24	2.23	2.29	2.24	2.16	2.21	2.16	2.24	VI
2	JS 23-09	2.23	2.22	2.24	2.14	2.34	2.14	2.29	2.21	2.29	2.23	VII
3	KDS 1169	2.24	2.18	1.86	2.35	2.20	2.18	2.24	2.12	2.24	2.18	XI
4	PS 1569	2.21	2.18	2.26	2.05	2.32	2.26	2.17	2.25	2.17	2.21	IX
5	JS 22-12	2.20	2.19	2.20	2.22	2.32	2.55	2.31	2.25	2.31	2.28	II
6	JS 22-18	2.19	2.34	2.22	2.22	2.35	2.21	2.16	2.25	2.16	2.23	VII
7	JS 22-16	2.30	2.22	2.25	2.34	2.30	2.30	2.18	2.24	2.18	2.26	IV
8	RVSM 2012-4	2.23	2.23	2.32	2.40	2.31	2.24	2.23	2.24	2.23	2.27	III
9	NRC 181	2.30	2.17	-	2.39	2.28	2.04	2.14	2.30	2.14	2.22	VIII
10	NRC 165	2.26	2.17	2.10	2.21	2.17	2.26	2.22	2.15	2.22	2.20	X
11	NRC 130(C)	2.39	2.21	2.55	2.32	2.31	2.24	2.24	-	2.24	2.31	I
12	NRC 138(C)	2.05	2.28	2.67	2.31	2.20	2.13	2.18	2.21	2.18	2.25	V
13	JS95-60(C)	2.21	2.22	1.72	2.19	2.26	2.20	2.19	2.20	2.19	2.15	XII
14	JS 20-34(C)	2.23	2.24	2.22	2.28	2.33	2.22	2.28	2.23	2.28	2.26	IV
	S.Ed (±)	0.05	0.15	0.17	0.12	0.09	0.17	0.08	0.13	0.08		
	CD	0.11	0.31	0.35	0.24	0.19	0.36	0.16	0.27	0.16		

Table 7.30: Hull Fragility of Advanced Varietal Trial I&II (AVT I+II) Early for CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	24.66	40.66	19.33	14.00	11.33	18.33	11.66	14.66	10.00	18.29	V
2	JS 23-09	26.33	43.00	7.66	9.00	7.66	7.33	6.00	9.33	30.33	16.29	VI
3	KDS 1169	13.66	24.33	8.33	13.66	7.66	3.33	21.00	17.66	22.66	14.70	VII
4	PS 1569	16.33	21.33	17.66	15.33	42.33	11.66	9.33	17.66	39.00	21.18	II
5	JS 22-12	10.66	18.00	8.66	18.00	5.33	8.33	4.33	12.33	25.33	12.33	XII
6	JS 22-18	15.33	14.66	20.66	28.66	11.33	8.00	10.66	12.00	10.00	14.59	VIII
7	JS 22-16	4.66	8.33	17.33	7.00	10.33	3.00	2.66	7.33	3.66	7.14	XIV
8	RVSM 2012-4	7.33	15.33	6.66	7.33	27.33	7.00	4.00	12.00	12.66	11.07	XIII
9	NRC 181	30.00	49.00	-	4.33	15.66	8.66	17.00	16.33	16.00	19.62	IV
10	NRC 165	19.66	13.00	24.66	8.33	13.66	4.33	14.00	16.66	11.33	13.96	IX
11	NRC 130(C)	26.00	37.33	25.33	50.66	21.66	17.66	13.00	-	7.00	24.83	I
12	NRC 138(C)	19.66	22.33	9.66	8.66	11.33	10.66	39.66	16.33	44.66	20.33	III
13	JS95-60(C)	21.33	16.00	8.66	9.66	12.66	5.33	17.00	13.66	15.33	13.29	X
14	JS 20-34(C)	18.66	13.33	9.33	20.00	11.33	6.66	8.00	11.33	14.66	12.59	XI
	S.Ed (±)	1.69	1.21	1.02	1.83	1.45	0.82	1.43	1.46	2.01		
	CD	3.48	2.49	2.11	3.75	2.98	1.68	2.93	3.00	4.12		

Table 7.31: Milk yield (lit./kg) Advanced Varietal Trial I&II (AVT I+II) Early for CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	9.00	9.66	9.30	9.33	8.80	9.47	9.60	9.53	9.13	9.31	II
2	JS 23-09	9.06	8.70	9.46	9.40	8.73	9.23	8.60	9.13	9.33	9.07	VIII
3	KDS 1169	8.80	9.00	9.13	9.26	9.20	9.23	9.46	9.33	9.46	9.21	V
4	PS 1569	9.53	9.73	8.93	9.66	9.06	9.20	9.06	9.40	9.33	9.32	I
5	JS 22-12	8.93	8.93	9.26	8.66	9.13	9.33	8.70	8.80	9.06	8.98	XI
6	JS 22-18	9.20	8.66	8.06	9.13	9.13	8.86	8.86	9.40	8.46	8.86	XIII
7	JS 22-16	9.06	9.26	8.60	9.33	9.46	9.43	9.06	8.13	9.20	9.06	IX
8	RVSM 2012-4	9.23	8.66	9.16	9.00	9.33	9.33	9.26	9.13	8.86	9.11	VII
9	NRC 181	8.86	9.66	-	9.06	9.33	9.13	9.16	9.26	9.46	9.24	IV
10	NRC 165	9.06	8.80	8.73	8.26	8.60	9.20	9.06	8.80	9.06	8.84	XIV
11	NRC 130(C)	9.40	9.20	8.86	9.46	9.46	9.56	9.06	-	9.33	9.29	III
12	NRC 138(C)	9.33	9.13	9.66	8.33	9.53	8.80	9.33	9.00	9.46	9.17	VI
13	JS95-60(C)	9.26	9.00	8.66	9.60	8.73	9.53	8.00	8.13	9.46	8.93	XII
14	JS 20-34(C)	8.53	8.13	9.26	9.20	9.26	8.96	9.40	9.00	9.46	9.02	X
	S.Ed (±)	0.35	0.24	0.29	0.33	0.36	0.37	0.30	0.47	0.38		
	CD	0.73	0.48	0.60	0.69	0.74	0.76	0.62	0.96	0.77		

Table 32: TSS of milk (^{0} Brix) Advanced Varietal Trial I&II (AVT I+II) Early for CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	5.60	4.50	4.53	4.33	4.36	4.56	5.76	3.66	4.23	4.61	XII
2	JS 23-09	5.73	4.83	4.13	4.30	4.66	5.60	5.93	4.40	4.80	4.93	VII
3	KDS 1169	5.26	4.73	4.53	4.10	3.03	4.50	6.36	3.80	5.80	4.68	X
4	PS 1569	4.46	3.83	4.90	3.60	4.03	4.70	6.06	4.63	5.93	4.68	X
5	JS 22-12	5.43	5.10	4.63	5.03	3.90	3.50	6.36	4.46	5.23	4.85	VIII
6	JS 22-18	4.20	4.70	6.03	4.80	4.46	6.50	5.86	5.70	4.10	5.15	IV
7	JS 22-16	4.93	5.33	5.03	3.93	4.00	6.03	5.83	6.06	4.16	5.03	VI
8	RVSM 2012-4	5.20	5.20	4.93	5.06	5.40	3.96	5.36	5.30	6.20	5.18	III
9	NRC 181	3.86	4.10	-	4.70	5.46	5.26	4.16	4.63	4.90	4.63	XI
10	NRC 165	5.63	5.40	5.63	5.73	4.10	5.73	6.40	5.10	7.23	5.66	I
11	NRC 130(C)	5.16	5.10	5.10	3.90	4.93	3.33	6.53	-	4.60	4.83	IX
12	NRC 138(C)	5.30	5.06	4.00	5.20	5.10	6.73	5.63	4.23	4.33	5.06	V
13	JS95-60(C)	5.83	5.36	5.16	4.30	5.03	5.03	7.30	5.00	5.20	5.36	II
14	JS 20-34(C)	6.66	5.63	4.50	4.36	5.33	5.30	6.50	5.20	4.76	5.36	II
	S.Ed (±)	0.34	0.41	0.27	0.42	0.49	0.56	0.42	0.53	0.60		
	CD	0.70	0.84	0.55	0.86	1.01	1.15	0.87	1.09	1.24		

Table 33: Tofu yield (g/kg) of Advanced Varietal Trial I&II (AVT I+II) Early for CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean	Rank
1	JS 23-03	242.20	248.83	246.76	235.43	194.46	316.60	256.63	293.23	259.06	254.80	II
2	JS 23-09	242.90	211.33	252.66	210.03	208.10	265.80	269.53	257.23	276.00	243.73	III
3	KDS 1169	245.73	209.26	220.73	207.00	150.00	294.56	269.20	205.10	254.23	228.42	XIV
4	PS 1569	248.56	237.03	239.86	225.96	255.30	222.80	240.63	280.76	240.13	243.44	IV
5	JS 22-12	225.10	210.83	245.03	208.03	285.06	255.60	229.23	280.13	251.60	243.40	V
6	JS 22-18	206.03	220.03	251.93	217.83	250.90	249.66	255.10	197.33	259.50	234.26	XII
7	JS 22-16	214.43	196.96	210.60	199.40	223.83	260.13	225.20	295.20	235.06	228.98	XIII
8	RVSM 2012-4	285.83	209.23	225.40	238.96	211.80	273.03	244.53	230.83	222.46	238.01	X
9	NRC 181	243.73	268.86	-	234.90	218.50	213.20	226.73	270.10	240.73	239.59	IX
10	NRC 165	228.70	262.00	239.63	245.23	242.53	201.73	268.76	236.63	234.93	240.02	VIII
11	NRC 130(C)	249.16	212.33	237.00	247.70	242.00	328.63	266.63	-	268.10	256.44	I
12	NRC 138(C)	265.20	241.26	213.96	213.06	216.06	249.56	221.26	310.90	230.76	240.22	VII
13	JS95-60(C)	245.03	244.33	254.20	254.86	212.00	248.23	250.90	245.50	226.30	242.37	VI
14	JS 20-34(C)	228.43	230.60	257.70	240.96	215.26	295.63	255.80	191.76	220.86	237.44	XI
	S.Ed (±)	9.07	9.12	6.98	9.24	13.29	16.28	10.60	16.19	18.04		
	CD	18.64	18.75	14.40	18.99	27.33	33.46	21.79	33.41	37.07		

Table 7.34: Sensory analysis of soymilk Colour from AVT I&II (Early) entries of CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	JS 23-03	7.3	6.3	4.7	7.3	6.7	7.0	6.3	5.3	7.0	6.4
2	JS 23-09	5.7	6.0	5.0	6.3	7.3	6.0	5.7	6.0	6.0	6.0
3	KDS 1169	6.7	6.3	5.7	6.7	7.3	7.0	6.3	5.7	7.3	6.6
4	PS 1569	6.0	6.7	5.3	7.7	6.3	7.3	7.3	6.0	8.0	6.7
5	JS 22-12	6.3	7.0	6.0	5.3	7.3	6.7	7.7	6.0	7.3	6.6
6	JS 22-18	6.0	5.3	6.3	6.0	6.3	6.0	6.7	6.0	6.0	6.1
7	JS 22-16	6.7	6.3	6.0	7.3	6.3	6.3	6.7	4.7	6.7	6.3
8	RVSM 2012-4	6.3	6.7	6.3	7.3	6.0	6.3	6.7	6.0	7.0	6.5
9	NRC 181	5.7	7.3	-	7.3	5.7	6.0	6.7	5.7	6.7	5.7
10	NRC 165	6.7	7.0	6.7	7.7	6.3	6.7	6.7	6.0	7.0	6.8
11	NRC 130(C)	5.0	5.7	6.3	7.3	6.7	7.0	6.7	-	6.3	5.7
12	NRC 138(C)	6.3	6.7	6.0	8.7	6.3	7.0	6.0	6.0	7.0	6.7
13	JS95-60(C)	6.7	7.3	6.3	7.7	6.3	7.0	7.0	6.3	7.7	6.9
14	JS 20-34(C)	6.3	5.7	6.7	8.3	6.3	7.0	7.3	6.0	7.7	6.8

Table 7. 35: Sensory analysis of soymilk Consistency from AVT I&II (Early) entries of CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	JS 23-03	7.0	6.7	5.0	7.7	8.7	7.3	6.7	6.0	7.7	7.0
2	JS 23-09	6.3	5.7	5.0	7.0	7.3	6.0	6.0	5.7	5.7	6.1
3	KDS 1169	4.7	6.7	5.7	7.7	7.3	3.0	7.0	6.0	7.3	6.2
4	PS 1569	4.7	6.3	4.7	6.7	7.0	3.3	5.7	6.3	6.0	5.6
5	JS 22-12	6.0	6.3	6.0	6.0	6.0	6.7	7.7	6.7	7.3	6.5
6	JS 22-18	5.7	7.3	6.0	7.3	7.0	5.3	6.7	5.7	6.0	6.3
7	JS 22-16	5.3	6.7	6.0	7.3	6.3	4.7	6.0	6.3	7.7	6.3
8	RVSM 2012-4	6.3	6.3	6.3	7.3	6.3	6.3	6.3	5.7	6.7	6.4
9	NRC 181	6.3	5.7	-	6.7	5.3	6.3	7.0	6.3	6.0	5.5
10	NRC 165	6.3	7.3	6.7	6.7	5.7	7.7	6.7	5.7	6.7	6.6
11	NRC 130(C)	6.3	6.7	6.3	6.7	4.7	6.7	7.3	-	5.3	5.6
12	NRC 138(C)	6.0	7.3	6.0	7.3	4.7	6.0	6.0	5.3	7.0	6.2
13	JS95-60(C)	6.7	6.3	6.0	7.3	5.3	7.0	6.3	5.7	7.7	6.5
14	JS 20-34(C)	7.0	6.7	6.0	7.7	6.3	7.3	6.7	6.7	6.7	6.8

Table 7.36: Sensory analysis of soymilk Beaniness from AVT I&II (Early) entries of CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	JS 23-03	6.7	6.7	5.7	5.7	7.3	7.7	6.0	6.3	7.3	6.6
2	JS 23-09	5.3	5.7	5.7	6.7	6.3	6.7	5.7	6.0	5.7	6.0
3	KDS 1169	5.0	6.0	5.3	7.3	6.0	4.3	6.0	6.0	7.3	5.9
4	PS 1569	5.0	6.7	6.0	6.7	6.7	4.7	6.7	6.3	6.0	6.1
5	JS 22-12	5.5	6.3	6.3	6.3	6.3	6.0	7.0	6.3	6.7	6.3
6	JS 22-18	5.6	6.0	6.0	6.7	6.0	5.7	5.7	6.3	6.0	6.0
7	JS 22-16	5.7	6.7	5.3	7.0	6.7	5.7	6.0	6.0	7.0	6.2
8	RVSM 2012-4	5.0	6.0	5.0	6.7	5.3	6.7	6.0	6.3	6.3	5.9
9	NRC 181	6.0	6.7	-	6.7	5.3	6.3	6.3	6.3	5.7	5.5
10	NRC 165	6.0	6.0	6.0	7.0	5.3	6.7	5.3	6.3	7.3	6.2
11	NRC 130(C)	7.0	6.0	5.7	8.0	5.0	6.7	5.7	-	5.0	5.5
12	NRC 138(C)	5.9	6.7	6.0	7.0	6.3	6.0	5.3	6.3	6.7	6.2
13	JS95-60(C)	6.0	7.0	6.3	7.7	4.0	6.3	5.7	6.0	7.7	6.3
14	JS 20-34(C)	6.0	5.7	6.0	7.7	5.7	7.3	6.7	6.3	6.7	6.5

Table 7.37: Sensory analysis of Tofu Colour of AVT I&II (Early) entries of CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	JS 23-03	6.3	5.3	5.0	8.7	6.7	5.7	6.7	5.3	6.0	6.2
2	JS 23-09	6.3	6.3	6.3	6.7	6.0	6.3	6.7	6.0	6.7	6.4
3	KDS 1169	7.0	6.7	5.7	8.0	6.7	6.7	6.3	6.3	6.3	6.6
4	PS 1569	7.0	5.7	7.3	7.3	7.7	6.3	7.0	7.0	7.7	7.0
5	JS 22-12	6.7	5.7	7.7	6.7	5.0	6.0	6.3	6.3	8.3	6.5

6	JS 22-18	6.7	6.3	7.3	7.7	6.3	6.3	7.3	6.7	7.7	6.9
7	JS 22-16	7.3	7.0	7.0	7.0	7.7	6.3	7.3	6.7	7.3	7.1
8	RVSM 2012-4	6.0	7.0	6.7	8.3	7.0	6.3	7.0	6.7	6.7	6.9
9	NRC 181	6.3	6.3	-	8.3	6.0	6.0	6.0	5.7	6.7	5.7
10	NRC 165	6.3	6.7	6.3	7.3	6.0	5.3	6.0	5.7	6.7	6.3
11	NRC 130(C)	6.3	6.0	6.3	7.3	7.3	5.7	7.0	-	6.3	5.8
12	NRC 138(C)	7.0	8.3	6.7	6.7	6.7	6.0	7.0	6.0	7.3	6.9
13	JS95-60(C)	7.0	6.3	6.7	7.7	5.3	6.0	7.0	6.7	6.3	6.6
14	JS 20-34(C)	7.7	6.0	7.0	7.7	6.0	6.0	6.3	5.3	7.0	6.6

Table 38: Sensory analysis of Tofu Texture of AVT I&II (Early) entries of CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	JS 23-03	6.0	5.7	4.7	8.0	5.7	5.3	6.7	4.7	5.3	5.8
2	JS 23-09	5.7	6.7	6.0	7.3	6.0	6.0	7.0	5.7	6.3	6.3
3	KDS 1169	5.7	6.0	5.3	8.7	5.0	6.0	7.3	5.7	6.0	6.2
4	PS 1569	7.0	5.3	6.3	7.0	6.0	5.7	6.0	6.0	7.0	6.3
5	JS 22-12	6.3	5.3	6.7	6.7	4.7	5.0	6.0	6.0	7.0	6.0
6	JS 22-18	6.3	6.3	6.3	6.7	6.7	5.3	7.7	6.7	6.7	6.5
7	JS 22-16	6.7	6.7	6.7	6.7	7.0	6.0	7.0	6.7	6.3	6.6
8	RVSM 2012-4	5.0	7.3	6.7	7.0	7.3	6.0	6.7	6.7	6.3	6.6
9	NRC 181	5.3	6.0	-	7.7	7.0	6.7	7.0	6.3	6.3	5.8
10	NRC 165	7.0	6.0	8.0	7.0	6.0	7.0	6.3	7.0	8.0	6.9
11	NRC 130(C)	6.3	7.0	7.3	7.3	7.0	6.3	7.3	-	7.0	6.2
12	NRC 138(C)	6.3	7.7	7.0	7.3	6.7	6.3	6.7	6.7	7.0	6.9
13	JS95-60(C)	5.3	7.0	7.3	6.7	6.3	6.3	5.7	6.7	7.3	6.5
14	JS 20-34(C)	6.3	6.0	7.0	7.7	6.3	6.3	6.0	6.3	7.3	6.6

Table 7.39: Sensory analysis of Tofu Beaniness of AVT I&II (Early) entries of CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	JS 23-03	5.7	5.0	6.3	5.7	5.7	3.7	5.3	6.3	6.3	5.6
2	JS 23-09	6.7	6.3	6.7	5.3	5.3	4.0	6.7	6.7	6.3	6.0
3	KDS 1169	6.3	6.3	5.7	6.3	5.7	3.3	6.7	6.0	6.3	5.8
4	PS 1569	6.0	5.3	6.7	6.3	5.7	3.7	5.3	6.7	6.3	5.8
5	JS 22-12	6.7	6.0	5.7	5.7	5.3	3.0	5.3	6.3	5.7	5.5
6	JS 22-18	6.3	6.3	6.0	7.0	5.3	3.7	6.7	6.3	5.3	5.9
7	JS 22-16	6.0	5.0	6.3	6.0	5.0	3.7	6.7	6.3	5.7	5.6
8	RVSM 2012-4	6.3	5.7	5.3	7.0	4.0	3.0	5.7	6.0	5.7	5.4
9	NRC 181	6.3	6.0	-	7.0	5.0	3.3	5.7	6.0	5.3	5.0
10	NRC 165	7.0	6.3	6.0	6.7	5.3	4.0	5.7	5.7	6.0	5.9
11	NRC 130(C)	7.0	6.0	6.0	6.7	6.0	3.7	6.0	-	5.3	5.2
12	NRC 138(C)	6.0	6.7	6.0	6.0	5.3	3.7	6.0	5.7	6.0	5.7
13	JS95-60(C)	6.7	5.3	5.7	6.7	4.3	4.0	5.7	6.0	6.0	5.6
14	JS 20-34(C)	6.3	4.7	5.3	6.7	5.0	4.0	5.7	5.7	5.3	5.4

Table 7.40: Sensory analysis of Tofu Overall Acceptability of AVT I&II (Early) entries of CZ

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Parbhani	Sehore	Lokbharti	Mean
1	JS 23-03	5.7	5.0	6.3	5.7	5.7	3.7	5.3	6.3	6.3	5.6
2	JS 23-09	6.7	6.3	6.7	5.3	5.3	4.0	6.7	6.7	6.3	6.0
3	KDS 1169	6.3	6.3	5.7	6.3	5.7	3.3	6.7	6.0	6.3	5.8
4	PS 1569	6.0	5.3	6.7	6.3	5.7	3.7	5.3	6.7	6.3	5.8
5	JS 22-12	6.7	6.0	5.7	5.7	5.3	3.0	5.3	6.3	5.7	5.5
6	JS 22-18	6.3	6.3	6.0	7.0	5.3	3.7	6.7	6.3	5.3	5.9
7	JS 22-16	6.0	5.0	6.3	6.0	5.0	3.7	6.7	6.3	5.7	5.6
8	RVSM 2012-4	6.3	5.7	5.3	7.0	4.0	3.0	5.7	6.0	5.7	5.4
9	NRC 181	6.3	6.0	-	7.0	5.0	3.3	5.7	6.0	5.3	5.0
10	NRC 165	7.0	6.3	6.0	6.7	5.3	4.0	5.7	5.7	6.0	5.9
11	NRC 130(C)	7.0	6.0	6.0	6.7	6.0	3.7	6.0	-	5.3	5.2
12	NRC 138(C)	6.0	6.7	6.0	6.0	5.3	3.7	6.0	5.7	6.0	5.7
13	JS95-60(C)	6.7	5.3	5.7	6.7	4.3	4.0	5.7	6.0	6.0	5.6
14	JS 20-34(C)	6.3	4.7	5.3	6.7	5.0	4.0	5.7	5.7	5.3	5.4

Results of North Eastern Hill Zone (NEHZ-AVT II):

1. **Physical analysis:**

In NEHZ-AVT II trial, 100 seed weight and seed dimension data suggested that KDS 1096 and DLSb 1 has largest seed size [Table 7.41] which was higher than control. Dimension of KDS 1096 and DL Sb 1 were largest among all entries (Table 7. 41. However, entries DLSb 1 and JS 20-116 had black hilum colour which makes them unsuitable to use in milk analogue processing [Table 7.41].Control variety, MACS 1460 used for NEHZ had light brown hilum colour which is most suitable for milk analogue processing [Table 7.41].

2. **Food grade characteristics**

From theresultsit was that cooking time was lesser for KDS 1096, JS 20-11(C), DL Sb1(Table 7.39). Hydration ratio was highest for KDS 1096 among all entries (Table 7.42). Milk yield of KDS 1096 (8.88 lit/kg) and DL Sb 1(8.50 lit/kg) was found maximum and tofu yield for RKS 113(C), JS 20-116(C) and DL Sb 1were found highest (Table 7.42)

Sensory evaluation was done by panellist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, all entries from NEHZ (KDS 1096 and DL Sb1) were acceptable for milk sensory (Table 7.41) and entry KDS 1096 was acceptable for sensory tofu.Our results identified KDS 1096 to be a desirable entry from NEHZ for soymilk and tofu preparation (Table 7.43, 7.44).

Table 7.42: Cooking Time, Hydration Ratio, Hull Fragility, Milk Yield, Milk TSS, Tofu Yield of AVT II Entries of NEHZ

SN	Entry	Cooking time (min)			Hydration ratio			Hull fragility (no.)			Milk yield (lit/kg)			Milk TSS (^{0}Brix)			Tofu yield (g/kg)		
		Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean
1	KDS 1096	59.00	90.00	74.50	2.25	6.74	4.50	7.33	10.33	8.83	8.63	9.13	8.88	6.13	4.53	5.33	196.17	234.83	215.50
2	DL Sb 1	68.67	82.00	75.34	2.18	6.54	4.36	8.33	8.00	8.17	8.87	8.13	8.50	5.30	4.90	5.10	198.30	281.47	239.89
3	MACS 1460(C)	65.00	88.33	76.67	2.22	6.65	4.44	9.33	4.33	6.83	8.80	8.87	8.84	6.33	4.60	5.47	239.07	220.20	229.64
4	JS 20-116 (C)	66.67	83.00	74.84	2.20	6.59	4.40	12.33	7.33	9.83	8.27	8.67	8.47	5.37	4.87	5.12	202.07	292.27	247.17
5	RKS 113 (C)	57.00	97.00	77.00	2.19	6.57	4.38	8.33	13.00	10.67	9.20	8.73	8.97	6.03	4.50	5.27	233.40	265.87	249.64
6	S.Ed (±)	10.37	7.53		0.16	0.16		1.30	0.95		0.96	0.29		0.58	0.57		17.39	14.49	
7	CD	23.92	17.36		0.36	0.36		3.01	2.19		2.22	0.66		1.33	1.32		40.09	33.41	

Table 7. 43: Sensory Analysis of Soymilk for AVT II Entries of NEHZ

Sl.no.	Varieties	Colour			Consistency			Beaniness			Overall acceptability		
		Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean
1	KDS 1096	6.50	7.25	6.9	7.00	7.25	7.1	7.5	5.5	6.5	8.25	5.50	6.90
2	DL Sb 1	6.25	6.00	6.1	6.25	5.75	6.0	6.5	5.3	5.9	7.00	6.00	6.50
3	MACS 1460 (C)	6.50	6.50	6.5	6.25	6.00	6.1	7.0	6.3	6.6	6.75	6.25	6.50
4	JS 20-116 (C)	6.50	6.50	6.5	7.50	6.75	7.1	7.5	5.8	6.6	6.75	5.00	5.90
5	RKS 113 (C)	6.25	7.25	6.8	6.25	7.00	6.6	7.0	6.0	6.5	7.50	5.75	6.60

Table 7.44: Sensory Analysis of Tofu for AVT II Entries of NEHZ

Sl.no.	Varieties	Colour			Consistency			Beaniness			Overall acceptability		
		Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean	Imphal	Jorhat	Mean
1	KDS 1096	6.5	5.7	6.1	6.8	7.0	6.9	6.5	4.3	5.4	6.5	3.5	5.0
2	DL Sb 1	6.5	4.0	5.3	6.8	4.0	5.4	6.0	3.5	4.8	6.0	3.0	4.5
3	MACS 1460 (C)	6.3	4.3	5.3	6.3	4.0	5.1	6.3	2.3	4.3	5.8	3.0	4.4
4	JS 20-116 (C)	6.3	4.3	5.3	6.3	4.5	5.4	6.3	4.3	5.3	5.5	3.3	4.4
5	RKS 113 (C)	6.8	3.5	5.2	5.3	3.3	4.3	6.0	4.3	5.2	5.5	3.3	4.4

Summary and conclusion

From multi-location analysis of food grade characteristics tables from three different zones viz., Northern Plain Zone (NPZ), Central Zone (CZ) and North Eastern Hill Zone (NEHZ), it was interpreted that cooking time among all AVT entries was lesser forSL 1282, PS 1670 and PS 1682 (NPZ-AVT I+II), NRC 190, AS 24 (CZ-AVT I), JS 23-03, JS 23-09, NRC 181, NRC 130 (CZ-AVT I+II: Early), KDS 1096, JS 20-11(C), DL Sb1 for NEHZ-AVT II trial. Hull fragility was found highest in all the check entries (SL 1074, NRC 149 and SL 955) of NPZ AVT I+II entries and AMS 100-39 (CZ-AVT I). Hydration ratio was highest for KDS 1096 among all entries (NEHZ-AVT II), NRC SL 6 and SL 955(C) for NPZ-AVT I+II entries.

Milk yield ofNRC SL 6 (NPZ-AVT I+II), AS 24 (CZ-AVT I) andJS 23-03, PS 1569(CZ-AVT I+II Early) was maximum and tofu yield for DL Sb1, RKS 113 (NEHZ), NRC 190, NRC 189(CZ-AVT I), JS 23-03 (CZ-AVT I+II Early) was highest.Sensory evaluation was done by panelist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, all entries of CZ-AVT I, JS 23-03 (CZ-AVT I +II Early),NRC 195 (NPZ-AVT I+II) and KDS 1096 and DL Sb1 (NEHZ-AVT II)were acceptable for milk and tofu sensory.Therefore, we may conclude from all the compiled results that there is significant difference in terms of food grade characteristics among AVT entries of three zones i.e., Northern Plain Zone (NPZ), Central Zone (CZ) and North Eastern Hill Zone (NEHZ)

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अग्रिम पंक्ति प्रदर्शन
Frontline Demonstration

Principal Investigator	:	Dr. Raghavendra Nargund,ICAR-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
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 (Chhattisgarh)	:	Dr. Ram Mohan Savu
Ranchi (Jharkhand)	:	Dr. A.K. Singh
Begusarai (Bihar)	:	Dr. Rampal

- **Central Zone**

Indore (Madhya Pradesh)	:	Dr Nita Khandekar
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
Bharuch(Gujarat)	:	Dr. Lalit Patil
Karda (Maharashtra)	:	Dr. Ravindra L. Kale
Devgadh Baria (Gujarat)	:	Dr. Chirag Patel
Sipani farm, Mandsaur	:	Dr. Ramraj Sen

- **Southern Zone**

Adilabad (Telangana State)	:	Dr. Chauhan Sreedhar
Dharwad (Karnataka)	:	Dr. G. Somanagouda
GKVK/UAS, Bangalore	:	Dr. T. Onkarappa
ICAR-KLE, KVK Belagavi	:	Mrs. Sridevi B. Angadi/ Mr. G.B. Vishwanath
Ugarkhurd (Karnataka)	:	Mr. Jagadish S. Patwardhan
Sangli (Maharastra)	:	Dr. Dilip Kathmale
KVK, Kanerimath Kolhapur	:	Dr. Ravindra Singh
Pune (ARI)	:	Mr. S. A. Jaybhay
ICAR-KVK, Myrada, Erode district, T.N..	:	Dr. Saravana Kumar

8. Frontline Demonstration

Progress of the research project: Frontline Demonstrations on Soybean *Kharif* 2022

1. Distribution of frontline demonstrations

Under the scheme "Frontline demonstrations and other related activities of Oilseeds" funded under the NFSM-Oilseed by DAC&FW, Ministry of Agriculture and Farmers' Welfare, Govt. of India, 26 cooperating centres of AICRPS/ ICAR institutes/ Ag. Universities/NGOs/FPOs conducted 1608 frontline demonstrations (FLDs) against the allocation of 1800 FLDs in plot of 0.40 ha each (Table 8.1 &8.1a) under rainfed condition with 6 components in 52 districts across 14 states during 2022-23. Madhya Pradesh had maximum FLDs (520) followed by Maharashtra (360), Karnataka (338), Chhatisgarh (100) and Uttarakhand (85). Out of 26 FLDs conducting centres, 6 were in Maharashtra, 4 in Karnataka, 3 in Madhya Pradesh, 2 each in Gujarat and Uttarakhand; and one each in rest of the 9 states. Maximum districts (10) were covered in Madhya Pradesh followed by 8 in Punjab, 7 in Maharashtra, 6 in Karnataka, 4 in Rajasthan, 3 each in Uttarakhand and Himachal Pradesh, 2 each in Gujrat, Chhattisgarh and Manipur, one each in Telangana state, Nagaland, Jharkhand and Bihar (Table 8.1c). The sowing time spread for soybean crop from June 9 to 18 July in Madhya Pradesh, June 11 to July 25 in Maharashtra, June 22-23 in Rajasthan, July 2 to 26 July in Gujarat, June 10 to 13 June in Karnataka, second fortnight of June in Uttarakhand, June 06 to July 2 in Punjab, and remaining states June 5to 15 July for soybean sowing.

1.1 Overall performance of soybean FLDs conducted during *kharif* 2022

The physical and financial targets and achievements were presented in (Table 8.1b). The center namely ICAR-KVK, Myrada, Erode district did not conduct the FLDs due to non-availability of seeds. Of the 1608 FLDs conducted during *kharif* 2022, 91.49% and 8.51% were represented by man and farm women, respectively. However, the representation of categories wise beneficiaries was 5.14% by SC, 27.84% by ST, 23.53% by OBC and 43.44% by general (Table 8.2).

Data accrued from successful 1608 FLDs on all the components (whole package, integrated weed management, integrated nutrient management, integrated pest management, organic farming and intercropping) across 26 centers with all the recommended inputs and cultural practices and improved soybean varieties revealed that, the adoption of research derived improved soybean production technology led to an increase in yield and net returns to the tune of 26.02% and 32.98%, respectively over farmers practice. Which was succeeded by the additional expenditure of only ₹ 5557ha^{-1} (Table 8.3). The difference in gross returns due to improved technology and farmer's practice was 24.30%.

Soybean yield as high as [2833-2664 kg ha^{-1} (IP)] and [2383-2118 kgha^{-1} (FP)] could be obtained in some farmer's field under the improved production technology and farmer's practice at Pune and Sipani farm Mandsaur, respectively. The lowest yield under improved technology (1284 kg ha^{-1})) and farmer's practice (944 kg ha^{-1}) was recorded at DevgrahBaria. The zone wise yield analysis indicated that, among six zones, highest % yield increase under improved practices was recorded in north eastern hill zone (42.1%) followed by (fb) eastern zone (40.2%), central zone (28.7%), northern hill zone (27.5%), southern zone (19.4%) andlowest in northern plain zone (13.9%) over farmer's practices. Further, zone wise average highest and lowest yield was observed in southern zone (2094 kg ha^{-1}) and northern hill zone (1445 kg ha^{-1}), respectively under improved practices (Figure 8.1). The zone wise profit analysis indicated that, highest net returns was recorded in southern zone under both improved (Rs 79695ha^{-1}) and farmer's practices (Rs 64685ha^{-1}).Similarly, lowest net profit was recorded in northern hill zone under improved practices (Rs 39116ha^{-1}) and under farmer's practices (Rs 24181ha^{-1}). However, highest % net profit increase was observed under northern hill zone (61.8%), fb eastern zone (56.3%), central zone (40.5%), north eastern hill zone (37.4%), southern zone (23.2%) and lowest % net profit increase was observed in northern plain zone (5.4%) over farmer's practices (Figure 2). The yield gap I estimation (Table 8.3) across 26 centers revealed that, highest was observed at Sehore (810 kgha^{-1}) and lowest was atLudhiana (85 kg ha^{-1}). However, the average estimated yield gap I was 391 kg ha^{-1} across 26 centers in India. A total of 47 improved varieties were demonstrated in farmer's fields (Table 8.4, 8.4.1 &8.4.2). The maximum demonstrations were conducted on variety KDS 753 followed by JS 20-34. Among the varieties, MACS 1520 (Southern zone & Maharashtra) gave highest yield (3125 kg ha^{-1}) followed by JS 20-116 (Central zone and Madhya Pradesh) (2908 kg ha^{-1}), MACS 1407 (Southern zone & Maharashtra) (2875 kg ha^{-1}) under improved practices. However, lowest yield was recorded with Palam soya (Northern Hill Zone and Himachal Pradesh) (1203 kg ha^{-1}). The details of cost of soybean cultivation of 25 centers have worked out. The cost of cultivation under improved technology and farmers practice (Table 8.5) indicated that, the soybean cultivation cost under improved technology was higher to the tune of 14.15% as compared to farmers practice. Under the improved production technology, the trend of expenditure was in line- seed and sowing, manure application, fertilizer application, land preparation, irrigation, hand weeding and inter-culture operations, harvesting, threshing, other cost, insecticide application, herbicide application, bird watching, fungicide application and seed treatment. However, in case of farmer's practices the trend was seed and sowing, hand weeding and inter-culture operations, irrigation, fertilizer application, land preparation, harvesting, manure application, threshing, other cost, insecticide application, herbicide application, bird watching, fungicide application and seed treatment.

2.Types of demonstrations

The 1608 FLDs on soybean were conducted with 6 components (Table 8.3a-8.3f) includes whole package (WP), integrated weed management (IWM), integrated nutrient management (INM), integrated pest management (IPM), organic farming (OF) and intercropping (IC). Maximum (918) FLDs were conducted on WP component followed by OF (325), IC (184), IWM (95), IPM (46) and INM (40). Variety-wise analysis was also done to see the performance of demonstrated improved varieties. There were total of 47 improved soybean varieties demonstrated under different FLDs components (Table 8.4, 8.4a-8.4f). Maximum (39) varieties were demonstrated in WP followed by IWM (16), OF (11), INM (10), IC (08) and IPM (08). The results included the mean seed yield (kg ha^{-1}) for both the improved practices (IP) and farmers' practices (FP), besides yield superiority of improved technology (%), yield gap (kg ha^{-1}), cost of cultivation (CoC), gross return (GR) and net return (NR) in Rs ha^{-1} from the IP and benefit: cost (B:C) ratio for both the IP and FP.

2.1. Whole package (WP) FLDs of soybean

2.1.1 Soybean yield and economics under WP demonstrations

In *kharif* 2022, 24 centers have conducted 918 FLDs under whole package component. The adoption of research emanated improved soybean production technology in whole package component led to an increase in yield and net returns to the tune of 25.40 and 34.39 %, respectively over farmers practice. Which was achieved by the additional expenditure of only □ 5322 ha^{-1} (Table 8.3a). The difference in gross returns due to improved technology and farmer's practice was 25.60%. The highest soybean seed yield could be obtained in some farmer's field under the improved production technology at Pune (2977 kg ha^{-1}) and KVK Karda (2670 kg ha^{-1}). Whereas, under farmer's practices, highest seed yield obtained at Pune (2511 kg ha^{-1}) and Sipani farm Mandsaur (2118 kg ha^{-1}). The lowest yield under improved technology (1284 kg ha^{-1}) and farmer's practice (944 kg ha^{-1}) was recorded at DevgrahBaria. The zone wise yield analysis indicated that, among six zones, highest % yield increase under improved practices was recorded in eastern zone (53.3%) followed by (fb) north eastern hill zone (43.2%) and central zone (27.5%). Lowest yield increase % was observed in northern plain zone (14.5%) followed by southern zone (18.9%) and northern hill zone (25.0%) over farmer's practices. Further, zone wise average highest and lowest yield was observed in southern zone (2108 kg ha^{-1}) and northern hill zone (1300 kg ha^{-1}), respectively under improved practices (Figure 1a). The zone wise profit analysis indicated that, highest net returns was recorded in north eastern hill zone under both improved (Rs 84197 ha^{-1}) and farmer's practices (Rs 59368 ha^{-1}), same as lowest net profit was recorded in northern hill zone (Rs 30985 ha^{-1}) under improved practices and eastern zone (Rs 18921 ha^{-1}) under farmer's practices. However, highest % net profit increase was under eastern zone (83.6%), followed by northern hill zone (63.8%) and north eastern hill zone (41.8%). Lowest % net profit increase was observed in northern plain zone (5.0%), followed by southern zone (25.2%) and central zone (40.7%) over farmer practices (Figure 8.2a). The yield gap I estimation (Table 8.3a) across 24 centers revealed that, highest was observed in Sehore (810 kg ha^{-1}) and lowest was in Ludhiana (85 kg ha^{-1}). However, the average estimated yield gap I was 389 kg ha^{-1} across 24 centers under whole package demonstrations. The details of soybean cost of cultivation have worked out in all 23 centers. The cost of cultivation under improved technology and farmers practice (Table 8.5a) indicated that, the soybean cultivation cost under improved technology was higher to the tune of 15.26% as compared to farmers practice. Under the improved production technology, the trend of expenditure was in line- seed and sowing, followed by fertilizer application, land preparation, harvesting, hand weeding and inter-culture operation, threshing, manure application, other cost, insecticide, herbicide application, bird watching, fungicide application, irrigation and seed treatment. However, in case of farmer's practices the trend was seed and sowing, followed by, land preparation, hand weeding and inter-culture operation, harvesting, fertilizer, manure application, threshing, other cost, insecticide, herbicide application, bird watching, fungicide application, irrigation and seed treatment.

2.1.2 Soybean varietal performance under WP demonstrations

In 918 frontline demonstrations under whole package component, a total of 39 improved soybean varieties were demonstrated in farmer’s field (Table 8.4a, 8.4.1a and 8.4.2a). The maximum demonstrations were conducted on cultivar KDS 753 followed by JS 20-34. Among the cultivars, MACS 1520 and MACS 1407 (Southern zone and Maharashtra) gave highest yield (3125 kg ha^{-1}) followed by JS 20-116 (Central zone Madhya Pradesh) (2908 kg ha^{-1}), MACS 1188 (Southern zone and Maharashtra) (2850 kg ha^{-1}) under improved practices. However, lowest yield was recorded with Palam soya (Northern Hill zone and Himachal Pradesh) (1195 kg ha^{-1}).

2.2. Integrated Weed Management (IWM) FLDs of soybean

2.2.1 Soybean yield and economics under IWM demonstrations

In IWM component, around 07 centers were conducted 95 FLDs during *kharif* 2022. The adoption of research derived improved soybean production technology in integrated weed management component led to an increase in yield and net returns to the tune of 32.99 and 52.24%, respectively over farmers practice. Which was achieved by the additional expenditure of only □ 4669 ha^{-1} (Table 8.3b). The difference in gross returns due to improved technology over farmer’s practice was 33.45%. Soybean yield, high as 2582-2360 kg ha^{-1} (IP-Dharwad and Adilabad) and 2071-1790 kg ha^{-1} (FP-Adilabad and Dharwad) could be obtained in farmer’s field under the improved production technology and farmer’s practice. The lowest yield under improved technology was observed at Palampur (1375 kg ha^{-1}) and farmer's practice was recorded at Raipur (977 kg ha^{-1}). The zone wise yield analysis showed that, among five zones, % yield increase under improved practices was recorded highest in eastern zone (61.8%) followed by (fb) southern zone (28.0%) and northern hill zone (25.0%). Lowest yield increase % was shown in northern plain zone (24.7%) fb central zone (21.9%) over farmer's practices. Furthermore, zone wise average highest and lowest yield was observed in southern zone (2471 kg ha^{-1} and 1930 kg ha^{-1}) under improved practices. Whereas, in farmer practices maximum yield in northern hill zone (1375 kg ha^{-1}) and minimum yield in eastern zone (1014 kg ha^{-1}) was observed (Figure 8.1b). The zone wise profit analysis indicated that, highest net returns was recorded in central zone under both improved (Rs 83648 ha^{-1}) and farmer's practices (Rs 54760 ha^{-1}). Similarly, lowest net profit was recorded in northern hill zone under IP (Rs 35852 ha^{-1}) and eastern zone under FP (Rs 21385 ha^{-1}). However, highest % net profit increase was observed under eastern zone (89.9%), fb northern hill zone (57.0%), central zone (52.8%) and southern zone (42.8%). Lowest net profit increase % was observed in northern plain zone (28.8%) over farmer practices (Figure 8.2b). However, the yield gap I estimation (Table 8.3b) across 07 centers was found highest in Dharwad (793 kg ha^{-1}) and lowest was in Palampur (275 kg ha^{-1}). The average estimated yield gap I was 476 kg ha^{-1} under IWM component across 7 centers. The details of cost of soybean cultivation of 07 centers have worked out. The cost of cultivation under improved technology and farmers practice (Table 8.5b) showed that, the soybean cultivation cost under improved technology (IWM) was higher to the tune of 14.40% as compared to farmer's practices. Under the improved production technology, the trend of expenditure was in line-seed and sowing, fertilizer application, land preparation, harvesting, hand weeding and inter-culture operations, threshing, irrigation, manure application, herbicide application, insecticide application, bird watching, other cost, fungicide application and seed treatment. Conversely, in case of farmer's practices the trend was seed and sowing, land preparation, hand weeding and inter-culture operations, fertilizer application, harvesting, threshing, irrigation, manure application, insecticide application, herbicide application, bird watching, other cost, fungicide application and seed treatment.

2.2.2 Soybean varietal performance under IWM demonstrations

Under integrated weed management component, a total of 16 improved varieties were demonstrated in farmer's field (Table 8.4b, 8.4.1b and 8.4.2b). The maximum demonstrations were conducted on variety CG soya-1 followed by PS 1347. Among the varieties, DSb 21 gave highest yield (Southern zone and Karnataka) (2601 kg ha^{-1}) followed by DSb 34 (Southern zone and Karnataka) (2560 kg ha^{-1}) and JS 93-05 (Southern zone and Telangana) (2423 kg ha^{-1}) under improved practices. However, lowest yield was recorded with Palam soya (Northern hill zone and Himachal Pradesh) (1015 kg ha^{-1}).

2.3 Integrated Nutrient Management (INM) FLDs of soybean

2.3.1 Soybean yield and economics under INM demonstrations

Under INM component 40 FLDs conducted by 03 centers during *kharif* 2022. The adoption of research resultant improved soybean production technology in integrated nutrient management component led to an increase in yield and net returns over farmers practice to the tune of 39.41 and 54.51 %, respectively. Which was achieved by the additional expenditure of □ 6642 ha^{-1} (Table 3c). The gross returns increase percentage was observed 38.12 % in improved technology over farmer's practice. Soybean yield, high as 2644-2387 kg ha^{-1} (IP-Dharwad and Adilabad), 2069-1790 kg ha^{-1} (FP-Adilabad and Dharwad), and the lowest yield under improved practices (IP) and farmer's practice (FP) was recorded at Raipur (IP-1829 and FP-1063 kg ha^{-1}). The zone wise yield analysis showed that, among two zones, % yield increase under improved practices was recorded highest in eastern zone (72.1%) and lowest was in southern zone (30.4%) over farmer's practices. Further, zone wise average highest (2516 kg ha^{-1}) and lowest yield (1929 kg ha^{-1}) was observed in southern zone under improved practices. Whereas, eastern zone was recorded highest (1829 kg ha^{-1}) and lowest yield (1063 kg ha^{-1}) under farmer's practices (Figure 1c). The zone wise profit analysis indicated that, highest (Rs 75554 ha^{-1}) and lowest (Rs 52505 ha^{-1}) net returns was recorded in southern zone under improved practices. Similarly, under farmer's practices, the eastern zone recorded maximum (Rs 52505 ha^{-1}) and minimum net profit (Rs 27397 ha^{-1}). However, highest net profit increase % was recorded under eastern zone (95.2%) and lowest in southern zone (43.9%) (Figure 2c). The yield gap I estimation (Table 8.3c) across 03 centers, recorded maximum YG-I in Dharwad (854 kg ha^{-1}) and minimum in Adilabad (319 kg ha^{-1}). However, the average estimated yield gap I was 647 kg ha^{-1} across 3 centers. The details of cost of soybean cultivation of 03 centers have worked out. The cost of cultivation under improved technology and farmers practice (Table 8.5c) showed that, the soybean cultivation cost under improved technology was higher to the tune of 18.30% as compared to farmers practice. Under the improved production technology, the trend of expenditure was in line- seed and sowing, fertilizer application, threshing, land preparation, harvesting, insecticide application, fungicide application, hand weeding and inter-culture operations, herbicide application, irrigation, manure application, bird watching, other cost and seed treatment, in case of farmer's practices the trend was seed and sowing, fertilizer application, land preparation, threshing, harvesting, hand weeding and inter-culture operations, herbicide application, irrigation, insecticide application, fungicide application, bird watching, other cost, manure application and seed treatment.

2.3.2 Soybean varietal performance under INM demonstrations

Total of 10 improved soybean varieties were demonstrated in farmer’s fields under integrated nutrient management component (Table 8.4c, 8.4.1c and 8.4.2c). The maximum demonstrations were conducted on variety DSb 34 followed by DSb 21 and CG Soya-1. Among the varieties, DSb 21 gave highest yield (2661 kg ha^{-1}) followed by DSb 34 (Southern zone and Karnataka) (2627 kg ha^{-1}) and KDS 726 (Southern zone and Telangana) (2560 kg ha^{-1}) under improved practices. However, lowest yield was recorded with CG Soya-1 (Eastern zone and Chhattisgarh) (1829 kg ha^{-1}).

2.4 Integrated Pest Management (IPM) FLDs of soybean

2.4.1 Soybean yield and economics under IPM demonstrations

The 04 centers were conducted 46 FLDs on IPM component during *kharif* 2022. The adoption of research shown improved soybean production technology in IPM component increased soybean yield and net returns to the tune of 31.85% and 46.78 %, respectively over farmer's practice. Further, was achieved with the additional expenditure of only □ 4098 ha^{1} (Table 8.3d). Around, 30.37% increased gross return was recorded in improved technology over farmer’s practice. However, highest soybean yield was recorded in Dharwad (2616 kg ha^{-1}) followed by Adilabad (2322 kg ha^{-1}) and lowest in Raipur (1554 kg ha^{-1}) under improved practices. Similarly, Adilabad recorded maximum yield (2034 kg ha^{-1}) and Raipur recorded minimum yield ((957 kg ha^{-1}) under farmer’s practice. The zone wise yield analysis showed that, among two zones, % yield increase under improved practices over farmer’s practices was recorded highest in eastern zone (35.8%) and lowest in southern zone (29.1%). Further, highest (2469 kg ha^{-1}) and lowest yield (1912 kg ha^{-1}) was recorded in southern zone under improved practices. Whereas, under farmer practices eastern zone was recorded maximum (1765 kg ha^{-1}) and minimum (1299 kg ha^{-1}) soybean yield (Figure 8.1d). The zone wise profit analysis, indicated that, highest (Rs 73232 ha^{-1}) and lowest (Rs 65623 ha^{-1}) net returns was recorded in southern zone under improved practices. Whereas, under farmer’s practices, eastern zone was recorded maximum (Rs 50913 ha^{-1}) and minimum net profit (Rs 43688 ha^{-1}). However, highest net profit increase % under improved practices was recorded at eastern zone (50.2%) and lowest (43.8%) was in southern zone over farmer practices (Figure 8.2d). Yield gap I estimation (Table 8.3d) across 04 centers, recorded maximum YG-I at Dharwad (825 kg ha^{-1}) and minimum at Adilabad (289 kg ha^{-1}). However, the average estimated yield gap I was 511 kg ha^{-1} across four centers. The details of cost of soybean cultivation of 04 centers were worked out. The cost of cultivation (Table 8.5d) showed that, soybean cultivation cost increased under improved technology to the tune of 9.87% over farmers practice. Under the improved technology, the trend of expenditure was in line- seed and sowing, fertilizer application, threshing, land preparation, harvesting, insecticide application, hand weeding and inter-culture operations, herbicide application, irrigation, fungicide application, bird watching, manure application, other cost and seed treatment and in case of farmer's practices the trend was seed and sowing, hand weeding and inter-culture operations, threshing, fertilizer application, land preparation, harvesting, irrigation, herbicide application, insecticide application, bird watching, manure application, fungicide application, other cost and seed treatment.

2.4.2 Soybean varietal performance under IPM demonstrations

Under component IPM total 08 improved varieties were demonstrated (Table 8.4d, 8.4.1d and 8.4.2d). The maximum demonstrations were conducted on variety CG Soya-1 followed by NRC 128 and DSb 34. Among the varieties, DSb 21 (Southern zone and Karnataka) gave highest yield (2618 kg ha^{-1}) followed by DSb 34 (Southern zone and Karnataka) (2615 kg ha^{-1}) and KDS 726 (Southern zone and Telangana) (2389 kg ha^{-1}) under improved practices. However, lowest yield was recorded with CG Soya-1 (Eastern zone and Chhattisgarh) (1554 kg ha^{-1}).

2.5 Organic farming (OF) FLDs of soybean

2.5.1 Soybean yield and economics under OF demonstrations

During *kharif* 2022, 06 centers have conducted 325 FLDs on organic farming component. The adoption organic farming practices under improved technology increased the soybean yield and net returns to the tune of 29.88% and 34.79%, respectively, over farmer's practices and was achieved with the additional expenditure of only □ 9187 ha^{-1} (Table 8.3e). The increased percentage of gross returns in improved technology over farmer’s practice was 30.35%. The highest soybean yield was recorded at Indore (1878 kg ha^{-1}) and Almora (1578 kg ha^{-1}) under improved practices. Whereas, under farmer's practices highest yield was recorded at Indore (1405 kg ha-1) and Pantnagar (1240 kg ha^{-1}). The lowest yield under improved technology (1204 kg ha^{-1}) and farmer’s practice (854 kg ha^{-1}) was recorded at Imphal. The zone wise yield analysis showed that, among four zones yield increase % under improved practices over farmer’s practices was recorded highest in north eastern hill zone (40.4%) fb central zone (33.6%), northern hill zone (28.2%) and lowest in northern plain zone (12.1%). The highest yield was recorded with central zone (IP-1878 kg ha^{-1} and FP-1405 kg ha^{-1}) and lowest yield in north eastern hill zone (IP-1372 kg ha^{-1} and FP-977 kg ha^{-1}) under both improved and farmer's practices (Figure 1e). The zone wise profit analysis indicated that, highest net profit was recorded in central zone (IP-Rs 69900 ha^{-1} and FP- Rs 54940 ha^{-1}) and lowest was in northern plain zone (Rs 30509 ha^{-1}) under improved practices and northern hill zone (Rs 24996 ha^{-1}) under farmer’s practices. However, highest net profit % increased under improved practices was recorded in northern hill zone (62.8%) fb north eastern hill zone (27.7%) over farmer practices. The lowest net profit % increase was recorded in northern plain zone (19.5%) fb central zone (27.2%) under improved practices compared to farmer's practices (Figure 8.2e). The yield gap I estimation (Table 8.3e) across 06 centers revealed that, maximum YG-I was observed in Medziphema (440 kg ha^{-1}) and minimum in Pantnagar (150 kg ha^{-1}). However, the average estimated YG-I was 343 kg ha^{-1} across six centers. The details of cost of soybean cultivation of 05 centers have worked out. The cost of cultivation (Table 8.5e) showed that, the soybean cultivation cost increased under improved technology to the tune of 28.71% over farmers practice. Under the improved technology, the trend of expenditure was in line- manure application, fertilizer application, seed and sowing, hand weeding and inter-culture operations, insecticide application, land preparation, threshing, harvesting, other cost, bird watching and seed treatment and in case of farmer's practices the trend was fertilizer application, seed and sowing, hand weeding and inter-culture operations, manure application, land preparation, harvesting, threshing, bird watching, other cost and insecticide application.

2.5.2 Soybean varietal performance under OF demonstrations

In organic farming component total of 11 improved varieties were demonstrated (Table 8.4e, 8.4.1e and 8.4.2e). The maximum demonstrations were conducted on variety JS 20-69 followed by JS 20-34 and VLS 89. Among the varieties, JS 20-34 (Central zone and Madhya Pradesh) gave highest yield (1903 kg ha^{-1}) followed by JS 20-69 (Central zone and Madhya Pradesh) (1860 kg ha^{-1}) and VLS 89 (Northern hill zone and Uttarakhand) (1763 kg ha^{-1}) and lowest yield was recorded with DSb 32 (North eastern hill zone and Manipur) (1204 kg ha^{-1}) under improved practices.

2.6 Intercropping (IC) FLDs of soybean

2.6.1 Soybean yield and economics under IC demonstrations

The six centers have conducted 184 FLDs on intercropping component during *kharif* 2022. The adoption of IC component has improved soybean yield and net returns to the tune of 23.60% and 20.40% over farmer's practices with the additional expenditure of only Rs 8812 ha^{-1} under different intercropping systems (soybean + pigeonpea, soybean + sugarcane and soybean + BT cotton) (Table 8.3f). The 17.9% more gross return was recorded in improved technology over farmer’s practice. The maximum soybean yield under different intercropping systems were recorded under improved technology at Karda (2554 kg ha^{-1}), Pune (2438 kg ha^{-1}) and Kolhapur (2214 kg ha^{-1}). Whereas, in farmer practices Pune (2021 kg ha^{-1}), Karda (1909 kg ha^{-1}) and Kolhapur (1847 kg ha^{-1}) reported highest soybean yield. However, Amravati center recorded the minimum soybean yield under improved (1731 kg ha^{-1}) and farmer's practices (1349 kg ha^{-1}). The highest soybean equivalent yield (SEY) was recorded under improved practices and farmer's practices at Kolhapur (11905 kg ha^{-1} and 11064 kg ha^{-1}) and Pune (9702 kg ha^{-1} and7814 kg ha^{-1}) under soybean + sugarcane, intercropping, respectively. Similarly, SEY under soybean + pigeonpea intercropping found highest at Parbhani (IP-

3888 kg ha^{-1} and FP- 3147 kg ha^{-1}) and lowest in Karda (IP-776 kg ha^{-1} and FP- 478 kg ha^{-1}) respectively under improved technology and farmer's practices. However, the SEY increased under improved technology over farmer practices was 24.5%. The zone wise yield analysis showed that, among two zones highest soybean yield increase was recorded in central zone (29.0%) and lowest in southern zone (18.7%) under improved practices as compared to farmer practices. Further, highest soybean yield recorded in southern zone (IP-2326 kg ha^{-1} and FP-1934 kg ha^{-1}) and lowest seed yield was recorded in central zone (IP-2132 kg ha^{-1} and FP-1652 kg ha^{-1}) under improved (IP) and farmer's practices (FP), respectively (Figure 1f). The zone wise profit analysis indicated that, highest net return was recorded in southern zone under soybean + sugarcane intercropping system (IP-Rs 293659 ha^{-1} and FP- Rs 253412 ha^{-1}) and soybean + BT cotton intercropping system (IP-Rs 95105 ha^{-1} and FP- Rs 75886 ha^{-1}). The lowest net return was recorded in central zone under soybean + pigeonpea intercropping system (IP- Rs 77610 ha^{-1} and FP- Rs 59164 ha^{-1}). The highest % increased net profit (31.2%) was recorded under central zone with soybean+pigeonpea intercropping system and lowest net profit % increase (15.9%) was recorded in southern zone under soybean + sugarcane intercropping system (Figure 8.2f). The yield gap I and SEY yield gap I estimation (Table 8.3f) across 06 centers showed, maximum YG-I was observed in Karda (646 kg ha^{-1}) and minimum in Belagavi (237 kg ha^{-1}). Similarly, SEY yield gap I highest observed in Pune (1888 kg ha^{-1}) and lowest in Belagavi (239 kg ha^{-1}). However, the average estimated YG-I was 410 kg ha^{-1} and SEY YG-I 731 kg ha^{-1} across six centers. The details of cost of soybean cultivation of 05 centers have worked out. The cost of cultivation (Table 8.5f) observed that, the soybean intercropping cultivation cost increased under improved technology to the tune of 10.12% over farmer's practices. Under the improved technology, the trend of expenditure was in line- manure application, seed and sowing, irrigation, hand weeding and inter-culture operations, land preparation, fertilizer application, harvesting, threshing, insecticide application, herbicide application, other cost, bird watching, fungicide application and seed treatment and in the case of farmer's practices the trend was seed and sowing, irrigation, hand weeding and inter-culture operations, manure application, land preparation, fertilizer application, harvesting, threshing, insecticide application, herbicide application, bird watching, other cost, seed treatment and fungicide application.

2.6.2 Soybean varietal performance under IC demonstrations

Total 08 improved soybean varieties were demonstrated at 06 centers in intercropping system (Table 8.4f, 8.4.1f and 8.4.2f). The maximum demonstrations were conducted on variety KDS 753 followed by MAUS 612 and AMS 100-39. Among the varieties, MACS 1407 gave highest yield (2625 kg ha^{-1}) fb MACS 1460 (2438 kg ha^{-1}), MAUS 612 (2327 kg ha^{-1}) (Southern zone and Maharashtra) and lowest yield was recorded with AMS 100-39 (Central zone and Maharashtra) (1874 kg ha^{-1}) under improved practices. However, highest SEY observed in MACS 1460 (29963 kg ha^{-1}), MACS 1407 (9767 kg ha^{-1}) and MACS 1188 (9377 kg ha^{-1}) (Southern zone and Maharashtra). Lowest SEY was recorded with MAUS 612 (Central zone and Maharashtra) (2282 kg ha^{-1}) under improved technology.

3. Training of field level extension workers and farmers under FLDs programme

Three farmer's training (Belagavi, Dharwad and Raipur) and three extension officers/input dealer's trainings (Adilabad, Bharuch and Imphal) were successfully conducted by six centers across 5 states (Chhattisgarh, Gujarat, Karnataka, Manipur and Telangana State) in India.

S. No.	Organizing FLDs centers	Type of training	Zone	State of participants	Place of training	Dates	No. of participants
1	Raipur	Farmers training	EZ	Chhattisgarh	KVK, Kawardha	25.08.2022	63
2	KVK Bharuch	Ext. officers/Input dealers training	CZ	Gujrat	KVK, Chaswad	11.11.2022	17
3	UAS Dharwad	Farmers training	SZ	Karnataka	KVK, UAS, Dharwad	24.11.2022	30
4	ICAR-KLE-KVK, Belagavi	Farmers training	SZ	Karnataka	ICAR-KLE-KVK, Belagavi	09.03.2023	78
5	CAU, Imphal	Ext. officers/Input dealers training	NEHZ	Manipur	CAU, Imphal	21.10.2022	20
6	PJTSAU, Adilabad	Ext. officers/Input dealers training	SZ	Telangana State	Adilabad	03.09.2022	25

Table 8.1Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop 2022-23

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	2022-23

S. No.	Name of implementing centre	State	Zone	Physical Allocation															
				No. of FLDs								Area in ha							
				WP	IWM	INM	IPM	IC	FGV	Org. far.	Total	WP	IWM	INM	IPM	IC	FGV	Org. far.	Total
1	Palampur (CSKHPKV)	HP	NHZ	3	2	0	0	0	0	5	**10**	1.2	0.8	0	0	0	0	2	**4**
2	Almora (VPKAS)	UK	NHZ	3	2	0	0	0	0	5	**10**	1.2	0.8	0	0	0	0	2	**4**
3	Pantnagar (GBPUA&T)	UK	NPZ	45	25	0	0	0	0	5	**75**	18	10	0	0	0	0	2	**30**
4	Ludhiana (PAU)	PB	NPZ	50	0	0	0	0	0	0	**50**	20	0	0	0	0	0	0	**20**
5	Indore (IISR/AICRPS)	MP	CZ	400	0	0	0	0	100	0	**500**	160	0	0	0	0	40	0	**200**
6	Sehore (RVSKVV)	MP	CZ	5	5	0	0	0	0	0	**10**	2	2	0	0	0	0	0	**4**
7	Kota (MPUA&T)	RJ	CZ	30	0	0	0	0	0	0	**30**	12	0	0	0	0	0	0	**12**
8	Parbhani (MAU)	MH	CZ	25	0	0	0	25	0	0	**50**	10	0	0	0	10	0	0	**20**
9	Amravati (PDKV)	MH	CZ	10	0	0	0	10	0	0	**20**	4	0	0	0	4	0	0	**8**

10	Kasbe digraj, Sangli (MPKV)	MH	SZ	15	0	0	0	10	0	0	**25**	6	0	0	0	4	0	0	**10**
11	Pune (ARI)	MH	SZ	8	0	0	0	7	0	0	**15**	3.2	0	0	0	2.8	0	0	**6**
12	Dharwad (UAS)	KA	SZ	25	20	20	0	15	0	0	**80**	10	8	8	0	6	0	0	**32**
13	Adilabad (PJTSAU)	TS	SZ	20	10	10	10	0	0	0	**50**	8	4	4	4	0	0	0	**20**
14	Medziphema	NL	NEHZ	3	2	0	0	0	0	5	**10**	1.2	0.8	0	0	0	0	2	**4**
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	25	0	0	0	25	0	0	**50**	10	0	0	0	10	0	0	**20**
16	Raipur (IGKVV)	CG	EZ	50	30	10	10	0	0	0	**100**	20	12	4	4	0	0	0	**40**
17	Ranchi (BAU)	JH	EZ	5	5	0	0	0	0	0	**10**	2	2	0	0	0	0	0	**4**
18	Imphal (CAU)	MN	NEHZ	5	0	0	0	0	0	5	**10**	2	0	0	0	0	0	2	**4**
19	KVK, Bharuch	GJ	CZ	10	5	0	0	0	0	0	**15**	4	2	0	0	0	0	0	**6**
20	KVK Karda	MH	CZ	50	0	0	0	50	0	0	**100**	20	0	0	0	20	0	0	**40**
21	KVK, Begusarai	BR	EZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
22	DevgrahBaria (TRTC)	GJ	CZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
23	KVK, Belagavi	KA	SZ	140	0	0	0	60	0	0	**200**	56	0	0	0	24	0	0	**80**
24	Bengaluru (UAS)	KA	SZ	100	50	0	0	0	0	0	**150**	40	20	0	0	0	0	0	**60**
25	KVK, Kanerimath, Kolhapur	MH	SZ	100	0	0	0	50	0	0	**150**	40	0	0	0	20	0	0	**60**
26	*ICAR-KVK, Myrada, Erode district.	TN	SZ	25	0	0	0	25	0	0	**50**	10	0	0	0	10	0	0	**20**
27	Sipani farm, Mandsaur	MP	CZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
Total				**1182**	**156**	**40**	**20**	**277**	**100**	**25**	**1800**	**473**	**62.4**	**16**	**8**	**111**	**40**	**10**	**720**

*FLD not conducted

Table 8.1a Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop 2022-23

S. No.	Name of implementing centre	State	Zone	Physical															
				Achievement															
				No. of FLDs								Area in ha							
				WP	IWM	INM	IPM	IC	FGV	Org. far.	Total	WP	IWM	INM	IPM	IC	FGV	Org. far.	Total
1	Palampur (CSKHPKV)	HP	NHZ	6	2	0	0	0	0	2	**10**	2.4	0.8	0	0	0	0	0.8	**4**
2	Almora (VPKAS)	UK	NHZ	0	0	0	0	0	0	10	**10**	0	0	0	0	0	0	4	**4**
3	Pantnagar (GBPUA&T)	UK	NPZ	45	25	0	0	0	0	5	**75**	18	10	0	0	0	0	2	**30**
4	Ludhiana (PAU)	PB	NPZ	50	0	0	0	0	0	0	**50**	20	0	0	0	0	0	0	**20**
5	Indore (IISR/AICRPS)	MP	CZ	200	0	0	0	0	0	300	**500**	80	0	0	0	0	0	120	**200**
6	Sehore (RVSKVV)	MP	CZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
7	Kota (MPUA&T)	RJ	CZ	30	0	0	0	0	0	0	**30**	12	0	0	0	0	0	0	**12**
8	Parbhani (MAU)	MH	CZ	40	0	0	0	10	0	0	**50**	16	0	0	0	4	0	0	**20**
9	Amravati (PDKV)	MH	CZ	10	0	0	0	10	0	0	**20**	4	0	0	0	4	0	0	**8**
10	Kasbe digraj, Sangli (MPKV)	MH	SZ	25	0	0	0	0	0	0	**25**	10	0	0	0	0	0	0	**10**

11	Pune (ARI)	MH	SZ	11	0	0	0	4	0	0	**15**	4.4	0	0	0	1.6	0	0	**6**
12	Dharwad (UAS)	KA	SZ	24	20	20	16	0	0	0	**80**	9.6	8	8	6.4	0	0	0	**32**
13	Adilabad (PJTSAU)	TS	SZ	20	10	10	10	0	0	0	**50**	8	4	4	4	0	0	0	**20**
14	Medziphema	NL	NEHZ	7	0	0	0	0	0	3	**10**	2.8	0	0	0	0	0	1.2	**4**
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	33	0	0	0	0	0	0	**33**	13.2	0	0	0	0	0	0	**13.2**
16	Raipur (IGKVV)	CG	EZ	50	30	10	10	0	0	0	**100**	20	12	4	4	0	0	0	**40**
17	Ranchi (BAU)	JH	EZ	5	5	0	0	0	0	0	**10**	2	2	0	0	0	0	0	**4**
18	Imphal (CAU)	MN	NEHZ	5	0	0	0	0	0	5	**10**	2	0	0	0	0	0	2	**4**
19	KVK, Bharuch	GJ	CZ	12	3	0	0	0	0	0	**15**	4.8	1.2	0	0	0	0	0	**6**
20	KVK Karda	MH	CZ	50	0	0	0	50	0	0	**100**	20	0	0	0	20	0	0	**40**
21	KVK, Begusarai	BR	EZ	0	0	0	10	0	0	0	**10**	0	0	0	4	0	0	0	**4**
22	DevgrahBaria (TRTC)	GJ	CZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
23	KVK, Belagavi	KA	SZ	140	0	0	0	60	0	0	**200**	56	0	0	0	24	0	0	**80**
24	Bengaluru (UAS)	KA	SZ	25	0	0	0	0	0	0	**25**	10	0	0	0	0	0	0	**10**
25	KVK, Kanerimath, Kolhapur	MH	SZ	100	0	0	0	50	0	0	**150**	40	0	0	0	20	0	0	**60**
26	*ICAR-KVK, Myrada, Erode district.	TN	SZ	0	0	0	0	0	0	0	**0**	0	0	0	0	0	0	0	**0**
27	Sipani farm, Mandsaur	MP	CZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
Total				**918**	**95**	**40**	**46**	**184**	**0**	**325**	**1608**	**367**	**38**	**16**	**18.4**	**73.6**	**0**	**130**	**643**

*FLD not conducted

Table 8.1b Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop 2022-23

S. No.	Name of implementing centre	State	Zone	Trainings conducted				Financial Allocation (Gross)		
				Extension officer		Farmer				
				Allotted	Conducted	Allotted	Conducted	Training	FLD	Total
1	Palampur (CSKHPKV)	HP	NHZ	-	-	-	-	-	30000	30000
2	Almora (VPKAS)	UK	NHZ	-	-	-	-	-	30000	30000
3	Pantnagar (GBPUA&T)	UK	NPZ	-	-	-	-	-	225000	225000
4	Ludhiana (PAU)	PB	NPZ	-	-	1	0	24000	150000	174000
5	Indore (IISR/AICRPS)	MP	CZ	-	-	-	-	-	1500000	1500000
6	Sehore (RVSKVV)	MP	CZ	-	-	-	-	-	30000	30000
7	Kota (MPUA&T)	RJ	CZ	-	-	1	0	24000	90000	114000
8	Parbhani (MAU)	MH	CZ	-	-	-	-	-	150000	150000
9	Amravati (PDKV)	MH	CZ	-	-	-	-	-	60000	60000
10	Kasbe digraj, Sangli (MPKV)	MH	SZ	-	-	-	-	-	75000	75000
11	Pune (ARI)	MH	SZ	-	-	-	-	-	45000	45000
12	Dharwad (UAS)	KA	SZ	-	-	1	1	24000	240000	264000

13	Adilabad (PJTSAU)	TS	SZ	1	1	-	-	36000	150000	186000
14	Medziphema	NL	NEHZ	1	0	-	-	36000	30000	66000
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	-	-	-	-	-	150000	150000
16	Raipur (IGKVV)	CG	EZ	-	-	1	1	24000	300000	324000
17	Ranchi (BAU)	JH	EZ	-	-	-	-	-	30000	30000
18	Imphal (CAU)	MN	NEHZ	1	1	-	-	36000	30000	66000
19	KVK, Bharuch	GJ	CZ	1	1	-	-	36000	45000	81000
20	KVK Karda	MH	CZ	-	-	-	-	-	300000	300000
21	KVK, Begusarai	BR	EZ	-	-	-	-	-	30000	30000
22	DevgrahBaria (TRTC)	GJ	CZ	-	-	-	-	-	30000	30000
23	KVK, Belagavi	KA	SZ	-	-	1	1	24000	600000	624000
24	Bengaluru (UAS)	KA	SZ	-	-	-	-	-	450000	450000
25	KVK, Kanerimath, Kolhapur	MH	SZ	-	-	-	-	-	450000	450000
26	*ICAR-KVK, Myrada, Erode district.	TN	SZ	1	0	-	-	36000	150000	186000
27	Sipani farm, Mandsaur	MP	CZ	-	-	-	-	-	30000	30000
Total				**5**	**3**	**5**	**2**	**300000**	**5400000**	**5700000**

*FLD not conducted

Table 8.1cState WiseFrontline Demonstrations (FLDs) on Soybean conducted during *kharif* 2022-23

S. No.	State	Name of implementing centre	Total FLDs conducted	Zone	District covered	Period of sowing 2022
1	Maharashtra	Parbhani (MAU)	50	CZ	Parbhani	20.06.2022 to 10.07.2022
2	Maharashtra	Amravati (PDKV)	20	CZ	Amravati	22.06.2022 to 07.07.2022
3	Maharashtra	Kasbe Digraj, Sangli (MPKV)	25	SZ	Sangli	11.06.2022 to 25.06.2022
4	Maharashtra	Pune (ARI)	15	SZ	Pune, Satara	16.06.2022 to 24.07.2022
5	Maharashtra	KVK Karda	100	CZ	Washim	15.06.2022 to 25.07.2022
6	Maharashtra	KVK, Kanerimath, Kolhapur	150	SZ	Kolhapur	15.06.2022 to 30.06.2022
7	Madhya Pradesh	Indore (IISR/AICRPS)	500	CZ	Dhar, Jhabua, Bhopal, Dewas, Sehore, Ujjain, Agarmalwa, Shajapur, Bundi (RJ), Kota (RJ), Baran (RJ)	09.06.2022 to 18.07.2022
8	Madhya Pradesh	Sehore (RVSKVV)	10	CZ	Sehore	15.06.2022 to 05.07.2022
9	Madhya Pradesh	Sipani farm, Mandsaur	10	CZ	Mandsaur, Pratapgarh (RJ)	17.06.2022 to 05.07.2022
10	Karnataka	Dharwad (UAS)	80	SZ	Dharwad, Belagavi, Haveri	27.05.2022 to 23.06.2022
11	Karnataka	Ugar Khurd (Ugar Sugar Works Ltd.)	33	SZ	Ugarkhurd	15.06.2022 to 30.06.2022

12	Karnataka	KVK, Belagavi	200	SZ	Belagavi	15.06.2022 to 30.06.2022
13	Karnataka	Bengaluru (UAS)	25	SZ	Bengaluru	10.06.2022 to 30.06.2022
14	Gujrat	KVK, Bharuch	15	CZ	Bharuch	17.07.2022 to 26.07.2022
15	Gujrat	DevgrahBaria (TRTC)	10	CZ	Dahod	02.07.2022 to 15.07.2022
16	Uttarakhand	Almora (VPKAS)	10	NHZ	Almora	2nd fortnight of June
17	Uttarakhand	Pantnagar (GBPUA&T)	75	NPZ	Nainital, Pilibhit	2nd fortnight of June
18	Himachal Pradesh	Palampur (CSKHPKV)	10	NHZ	Kangra, Bilaspur, Mandi	25.05.2022 to 30.06.2022
19	Punjab	Ludhiana (PAU)	50	NPZ	Hoshiarpur, Ropar, Patiala, Ludhiana, Sangrur, Roopnagar, Bathinda, Mansa	06.06.2022 to 02.07.2022
20	Rajasthan	Kota (MPUA&T)	30	CZ	Kota	22 & 23.06.2022
21	Telangana State	Adilabad (PJTSAU)	50	SZ	Adilabad	05.06.2022 to 30.06.2022
22	Nagaland	Medziphema	10	NEHZ	Dimapur	15.06.2022 to 15.07.2022
23	Chhattisgarh	Raipur (IGKVV)	100	EZ	Kawardha, Kanker	15.06.2022 to 30.06.2022
24	Jharkhand	Ranchi (BAU)	10	EZ	Ranchi	15.06.2022 to 30.06.2022
25	Manipur	Imphal (CAU)	10	NEHZ	Churachandpur, Kangpokpi	25.05.2022 to 30.06.2022
26	Bihar	KVK, Begusarai	10	EZ	Begusarai	16.06.2022 to 25.06.2022

Table 8.2Details of category wise beneficiaries of frontline demonstrations (FLDs) 2022-23

S. No.	Name of implementing centre	State	Zone	Man					Women					Total
				SC	ST	OBC	Gen.	Total	SC	ST	OBC	Gen.	Total	
1	*Palampur (CSKHPKV)	HP	NHZ	11	1	11	26	**49**	3	-	5	1	**9**	**58**
2	*Almora (VPKAS)	UK	NHZ	4	-	-	4	**8**	19	-	-	6	**25**	**33**
3	Pantnagar (GBPUA&T)	UK	NPZ	-	-	-	64	**64**	-	-	-	11	**11**	**75**
4	*Ludhiana (PAU)	PB	NPZ	5	-	3	45	**53**	-	-	-	-	**0**	**53**
5	Indore (IISR/AICRPS)	MP	CZ	5	314	166	15	**500**	-	-	-	-	**0**	**500**
6	Sehore (RVSKVV)	MP	CZ	-	-	10	-	**10**	-	-	-	-	**0**	**10**
7	Kota (MPUA&T)	RJ	CZ	2	9	16	3	**30**	-	-	-	-	**0**	**30**
8	Parbhani (MAU)	MH	CZ	1	1	17	17	**36**	2	-	1	11	**14**	**50**
9	Amravati (PDKV)	MH	CZ	3	1	11	4	**19**	-	-	1	-	**1**	**20**
10	Kasbe digraj, Sangli (MPKV)	MH	SZ	2	2	3	15	**22**	-	-	-	3	**3**	**25**
11	Pune (ARI)	MH	SZ	2	1	2	3	**8**	2	1	2	2	**7**	**15**
12	Dharwad (UAS)	KA	SZ	8	2	5	54	**69**	1	-	-	10	**11**	**80**
13	Adilabad (PJTSAU)	TS	SZ	3	24	5	5	**37**	-	10	2	1	**13**	**50**
14	Medziphema	NL	NEHZ	-	4	-	1	**5**	-	3	-	2	**5**	**10**

15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	-	3	-	28	**31**	-	-	-	2	**2**	**33**
16	Raipur (IGKVV)	CG	EZ	-	51	39	7	**97**	-	2	1	-	**3**	**100**
17	*Ranchi (BAU)	JH	EZ	-	-	5	-	**5**	-	-	15	-	**15**	**20**
18	Imphal (CAU)	MN	NEHZ	-	7	-	-	**7**	-	3	-	-	**3**	**10**
19	KVK, Bharuch	GJ	CZ	-	4	1	1	**6**	-	8	-	1	**9**	**15**
20	KVK Karda	MH	CZ	8	2	39	51	**100**	-	-	-	-	**0**	**100**
21	KVK, Begusarai	BR	EZ	-	-	-	10	**10**	-	-	-	-	**0**	**10**
22	DevgrahBaria (TRTC)	GJ	CZ	-	-	7	-	**7**	-	-	3	-	**3**	**10**
23	KVK, Belagavi	KA	SZ	2	9	14	170	**195**	-	-	1	4	**5**	**200**
24	Bengaluru (UAS)	KA	SZ	3	6	4	7	**20**	1	3	1	-	**5**	**25**
25	KVK, Kanerimath, Kolhapur	MH	SZ	-	-	-	150	**150**	-	-	-	-	**0**	**150**
26	ICAR-KVK, Myrada, Erode district.	TN	SZ	-	-	-	-	**0**	-	-	-	-	**0**	**-**
27	Sipani farm, Mandsaur	MP	CZ	-	-	9	1	**10**	-	-	-	-	**0**	**10**
Total				**59**	**441**	**367**	**681**	**1548**	**28**	**30**	**32**	**54**	**144**	**1692**
Percentage				**3.81**	**28.49**	**23.71**	**43.99**	**91.49**	**19.44**	**20.83**	**22.22**	**37.50**	**8.51**	**100**
Total (Men+Women)				**87**	**471**	**399**	**735**	**1692**						
Percentage (Men + Women)				**5.14**	**27.84**	**23.58**	**43.44**							

* The land holdings are small. Therefore, the trials are split and hence, the number of trials are increased

Table 8.3 Results of Frontline Demonstrations (FLDs) on SOYBEAN under different components of FLDs conducted at various locations in farmers' field 2022-23.

S. No.	Name of implementing centre	State	Zone	No. of Trial	Area (ha)	Grain yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)		Net benefit ratio (N:C)		Benefit cost ratio (G:C)		Yield gap (kg/ha)
						IT	FP		IT	FP	IT	FP	IT	FP	IT	FP	IT	FP	
1	Palampur (CSKHPKV)	HP	NHZ	10	4.0	1313	1048	25.3	85325	68106	53523	48671	31802	19435	0.59	0.40	1.59	1.40	265
2	Almora (VPKAS)	UK	NHZ	10	4.0	1578	1219	29.4	104667	85727	58238	56800	46430	28927	0.80	0.51	1.80	1.51	358
3	Pantnagar (GBPUA&T)	UK	NPZ	75	30.0	1693	1375	23.2	72613	58853	35596	29726	37016	29127	1.04	0.98	2.04	1.98	319
4	Ludhiana (PAU)	PB	NPZ	50	20.0	1610	1525	5.6	83500	83206	34432	30656	49068	52550	1.43	1.71	2.43	2.71	85
5	Indore (IISR/AICRPS)	MP	CZ	500	200.0	1924	1534	25.4	104178	82862	32470	23904	71709	58958	2.21	2.47	3.21	3.47	390
6	Sehore (RVSKVV)	MP	CZ	10	4.0	2363	1553	52.2	113400	74520	30405	26100	82995	48420	2.73	1.86	3.73	2.86	810
7	Kota (MPUA&T)	RJ	CZ	30	12.0	1344	1132	18.7	57791	48686	36523	31922	21268	16764	0.58	0.53	1.58	1.53	212
8	Parbhani (MAU)	MH	CZ	50	20.0	2346	1975	18.8	116138	97616	49502	48307	66636	49309	1.35	1.02	2.35	2.02	370
9	Amravati (PDKV)	MH	CZ	20	8.0	1725	1362	26.7	113015	96027	44541	41023	68474	55004	1.54	1.34	2.54	2.34	363
10	Kasbe Digraj, Sangli (MPKV)	MH	SZ	25	10.0	1597	1323	20.7	55892	46302	49090	42040	6802	4262	0.14	0.10	1.14	1.10	274
11	Pune (ARI)	MH	SZ	15	6.0	2833	2383	18.9	238200	195953	85646	80571	152554	115383	1.78	1.43	2.78	2.43	450
12	Dharwad (UAS)	KA	SZ	80	32.0	2595	1791	44.9	129768	89537	44545	37560	85223	51977	1.91	1.38	2.91	2.38	805
13	Adilabad (PJTSAU)	TS	SZ	50	20.0	2372	2066	14.8	120873	105297	58176	53794	62697	51503	1.08	0.96	2.08	1.96	305
14	Medziphema	NL	NEHZ	10	4.0	1646	1163	41.6	115229	81375	43386	28410	71843	52965	1.66	1.86	2.66	2.86	484
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	33	13.2	2067	1894	9.1	103333	94712	61164	55272	42169	39440	0.69	0.71	1.69	1.71	172
16	Raipur (IGKVV)	CG	EZ	100	40.0	1677	998	68.0	72090	42906	24323	18295	47767	24611	1.96	1.35	2.96	2.35	679
17	Ranchi (BAU)	JH	EZ	10	4.0	1522	1050	44.9	65425	45150	32493	26180	32932	18970	1.01	0.72	2.01	1.72	472
18	Imphal (CAU)	MN	NEHZ	10	4.0	1430	1002	42.7	114400	80160	45650	30807	68750	49353	1.51	1.60	2.51	2.60	428
19	KVK, Bharuch	GJ	CZ	15	6.0	1747	1450	20.4	92736	74001	24690	25966	68045	48035	2.76	1.85	3.76	2.85	296
20	KVK Karda	MH	CZ	100	40.0	2612	1920	36.0	129009	91874	71408	55408	57600	36466	0.81	0.66	1.81	1.66	692
21	KVK, Begusarai	BR	EZ	10	4.0	1976	1642	20.3	135028	111656	46736	47115	88292	64541	1.89	1.37	2.89	2.37	334
22	DevgrahBaria (TRTC)	GJ	CZ	10	4.0	1284	944	36.1	64215	47185	25875	21006	38340	26179	1.48	1.25	2.48	2.25	341
23	KVK, Belagavi	KA	SZ	200	80.0	1765	1526	15.7	116797	100682	40236	37994	76561	62688	1.90	1.65	2.90	2.65	240
24	Bengaluru (UAS)	KA	SZ	25	10.0	1318	1162	13.4	79106	69749	34986	29204	44120	40545	1.26	1.39	2.26	2.39	156
25	KVK, Kanerimath, Kolhapur	MH	SZ	150	60.0	2205	1890	16.7	248405	226136	80971	74455	167434	151681	2.07	2.04	3.07	3.04	315
26	Sipani farm, Mandsaur	MP	CZ	10	4.0	2664	2118	25.8	114552	91074	40307	39249	74245	51825	1.84	1.32	2.84	2.32	546
Total				**1608**	**643**	**1892**	**1502**	**27.5**	**109449**	**88052**	**45573**	**40017**	**63876**	**48035**	**1.46**	**1.25**	**2.46**	**2.25**	**391**

Table 8.3a Results of Frontline Demonstrations (FLDs) on whole package used in SOYBEAN at various locations in farmer's field 2022-23.

S. No.	Name of implementing centre	State	Zone	No. of Trial	Area (ha)	Grain yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)		Net B:C ratio (N:C)		B:C ratio (G:C)		Addi. returns (Rs/ha)	Yield gap (kg/ha)
						IT	FP		IT	FP	IT	FP	IT	FP	IT	FP	IT	FP		
1	Sipani farm, Mandsaur	MP	CZ	10	4.0	2664	2118	25.8	114552	91074	40307	39249	74245	51825	1.84	1.32	2.84	2.32	23478	546
2	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	33	13.2	2067	1894	9.1	103333	94712	61164	55272	42169	39440	0.69	0.71	1.69	1.71	8621	172
3	Dharwad (UAS)	KA	SZ	24	9.6	2551	1792	42.4	127569	89604	44545	37560	83024	52044	1.86	1.39	2.86	2.39	37965	759
4	DevgrahBaria (TRTC)	GJ	CZ	10	4.0	1284	944	36.1	64215	47185	25875	21006	38340	26179	1.48	1.25	2.48	2.25	17030	341
5	Pune (ARI)	MH	SZ	11	4.4	2977	2511	18.6	133977	113011	42602	40364	91375	72647	2.14	1.80	3.14	2.80	20966	466
6	Amravati (PDKV)	MH	CZ	10	4.0	1713	1388	23.4	76742	62182	34223	30809	42519	31373	1.24	1.02	2.24	2.02	14560	325
7	KVK Karda	MH	CZ	50	20.0	2670	1931	38.2	114804	81113	68164	52355	46640	28758	0.68	0.55	1.68	1.55	33691	739
8	Kota (MPUA&T)	RJ	CZ	30	12.0	1344	1132	18.7	57791	48686	36523	31922	21268	16764	0.58	0.53	1.58	1.53	9105	212
9	Bengaluru (UAS)	KA	SZ	25	10.0	1318	1162	13.4	79106	69749	34986	29204	44120	40545	1.26	1.39	2.26	2.39	9358	156
10	Sehore (RVSKVV)	MP	CZ	10	4.0	2363	1553	52.2	113400	74520	30405	26100	82995	48420	2.73	1.86	3.73	2.86	38880	810
11	Medziphema	NL	NEHZ	7	2.8	1710	1200	42.5	119686	84000	39829	28410	79857	55590	2.00	1.96	3.00	2.96	35686	510
12	Ranchi (BAU)	JH	EZ	5	2.0	1530	1049	45.9	65790	45086	32115	26180	33675	18906	1.05	0.72	2.05	1.72	20705	482
13	KVK, Bharuch	GJ	CZ	12	4.8	1675	1396	20.0	88098	71180	23953	24826	64145	46354	2.68	1.87	3.68	2.87	16918	279
14	KVK, Kanerimath, Kolhapur	MH	SZ	100	40.0	2201	1912	15.1	116660	101319	42379	40225	74281	61094	1.75	1.52	2.75	2.52	15341	289
15	Pantnagar (GBPUA&T)	UK	NPZ	45	18.0	1669	1352	23.4	71762	58146	36264	30140	35498	28006	0.98	0.93	1.98	1.93	13617	317
16	Imphal (CAU)	MN	NEHZ	5	2.0	1656	1150	44.0	132480	92000	43944	28854	88536	63146	2.01	2.19	3.01	3.19	40480	506
17	Raipur (IGKVV)	CG	EZ	50	20.0	1614	1005	60.6	69420	43230	22585	18295	46835	24935	2.07	1.36	3.07	2.36	26190	609
18	Ludhiana (PAU)	PB	NPZ	50	20.0	1610	1525	5.6	83500	83206	34432	30656	49068	52550	1.43	1.71	2.43	2.71	294	85
19	Palampur (CSKHPKV)	HP	NHZ	6	2.4	1300	1040	25.0	84508	67592	53523	48671	30985	18921	0.58	0.39	1.58	1.39	16915	260
20	Adilabad (PJTSAU)	TS	SZ	20	8.0	2417	2092	15.6	123126	106554	62408	57288	60717	49265	0.97	0.86	1.97	1.86	16572	325
21	Indore (IISR/AICRPS)	MP	CZ	200	80.0	1994	1727	15.4	105547	91205	31125	26219	74421	64986	2.39	2.48	3.39	3.48	14342	266
22	KVK, Belagavi	KA	SZ	140	56.0	1736	1496	16.1	96826	83431	28212	26399	68613	57032	2.43	2.16	3.43	3.16	13395	240
23	Kasbe Digraj, Sangli (MPKV)	MH	SZ	25	10.0	1597	1323	20.7	55892	46302	49090	42040	6802	4262	0.14	0.10	1.14	1.10	9590	274
24	Parbhani (MAU)	MH	CZ	40	16.0	2407	2046	17.7	103496	87962	49140	48030	54356	39932	1.11	0.83	2.11	1.83	15534	361
Total/Average				**918**	**367**	**1919**	**1531**	**26.9**	**95928**	**76377**	**40325**	**35003**	**55604**	**41374**	**1.50**	**1.29**	**2.50**	**2.29**	**19551**	**389**

Table 8.3b Results of Frontline Demonstrations (FLDs) on Integrated Weed management (IWM)used in SOYBEAN at various locations in farmer's field 2022-23.

S. No.	Name of implementing centre	State	Zone	No. of Trial	Area (ha)	Grain yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)		Net B:C ratio (N:C)		B:C ratio (G:C)		Addi. returns (Rs/ha)	Yield gap (kg/ha)
						IT	FP		IT	FP	IT	FP	IT	FP	IT	FP	IT	FP		
1	Dharwad (UAS)	KA	SZ	20	8.0	2582	1790	44.3	129115	89475	44545	37560	84570	51915	1.90	1.38	2.90	2.38	39640	793
2	Ranchi (BAU)	JH	EZ	5	2.0	1513	1052	43.9	65059	45215	32870	26180	32189	19035	0.98	0.73	1.98	1.73	19845	462
3	KVK, Bharuch	GJ	CZ	3	1.2	2033	1668	21.9	111287	85287	27639	30526	83648	54760	3.03	1.79	4.03	2.79	26001	365
4	Pantnagar (GBPUA&T)	UK	NPZ	25	10.0	1798	1442	24.7	77314	62006	36264	30140	41050	31866	1.13	1.06	2.13	2.06	15308	356
5	Raipur (IGKVV)	CG	EZ	30	12.0	1770	977	81.1	76109	42031	27085	18295	49024	23736	1.81	1.30	2.81	2.30	34078	793
6	Palampur (CSKHPKV)	HP	NHZ	2	0.8	1375	1100	25.0	89375	71500	53523	48671	35852	22829	0.67	0.47	1.67	1.47	17875	275
7	Adilabad (PJTSAU)	TS	SZ	10	4.0	2360	2071	13.9	119929	105203	53484	51352	66445	53850	1.24	1.05	2.24	2.05	14726	289
Total/Average				**95**	**38**	**1919**	**1443**	**36.4**	**95455**	**71531**	**39344**	**34675**	**56111**	**36856**	**1.54**	**1.11**	**2.54**	**2.11**	**23925**	**476**

Table 8.3c Results of Frontline Demonstrations (FLDs) on Integrated Nutrient Management (INM)used in SOYBEAN at various locations in farmer's field 2022-23

S. No.	Name of implementing centre	State	Zone	No. of Trial	Area (ha)	Grain yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)		Net B:C ratio (N:C)		B:C ratio (G:C)		Addi. returns (Rs/ha)	Yield gap (kg/ha)
						IT	FP		IT	FP	IT	FP	IT	FP	IT	FP	IT	FP		
1	Dharwad (UAS)	KA	SZ	20	8.0	2644	1790	47.7	132218	89503	44545	37560	87673	51943	1.97	1.38	2.97	2.38	42715	854
2	Raipur (IGKVV)	CG	EZ	10	4.0	1829	1063	72.1	78656	45692	25185	18295	53471	27397	2.12	1.50	3.12	2.50	32964	767
3	Adilabad (PJTSAU)	TS	SZ	10	4.0	2387	2069	15.4	122808	106388	59372	53320	63436	53068	1.07	1.00	2.07	2.00	16420	319
Total/Average				**40**	**16**	**2287**	**1640**	**45.1**	**111227**	**80527**	**43034**	**36392**	**68193**	**44136**	**1.72**	**1.29**	**2.72**	**2.29**	**30700**	**647**

Table 8.3d Results of Frontline Demonstrations (FLDs) on Integrated Pest management (IPM)used in SOYBEAN at various locations in farmer's field 2022-23

S. No.	Name of implementing centre	State	Zone	No. of Trial	Area (ha)	Grain yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)		Net B:C ratio (N:C)		B:C ratio (G:C)		Addi. returns (Rs/ha)	Yield gap (kg/ha)
						IT	FP		IT	FP	IT	FP	IT	FP	IT	FP	IT	FP		
1	Dharwad (UAS)	KA	SZ	16	6.4	2616	1791	46.1	130819	89556	44545	37560	86274	51996	1.94	1.38	2.94	2.38	41263	825
2	Raipur (IGKVV)	CG	EZ	10	4.0	1554	957	62.4	66813	41130	23860	18295	42953	22835	1.80	1.25	2.80	2.25	25684	597
3	Adilabad (PJTSAU)	TS	SZ	10	4.0	2322	2034	14.2	117630	103046	57439	53216	60191	49829	1.05	0.94	2.05	1.94	14584	289
4	KVK, Begusarai	BR	EZ	10	4.0	1976	1642	20.3	135028	111656	46736	47115	88292	64541	1.89	1.37	2.89	2.37	23372	334
Total/Average				**46**	**18**	**2117**	**1606**	**35.8**	**112572**	**86347**	**43145**	**39047**	**69428**	**47300**	**1.67**	**1.23**	**2.67**	**2.23**	**26226**	**511**

Table 8.3e Results of Frontline Demonstrations (FLDs) on Organic Farming (Org. Far.)used in SOYBEAN at various locations in farmer's field 2022-23

S. No.	Name of implementing centre	State	Zone	No. of Trial	Area (ha)	Grain yield (kg/ha)		Increase in yield (%)	Gross Returns (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns (Rs/ha)		Net B:C ratio (N:C)		B:C ratio (G:C)		Addi. returns (Rs/ha)	Yield gap (kg/ha)
						IT	FP		IT	FP	IT	FP	IT	FP	IT	FP	IT	FP		
1	Medziphema	NL	NEHZ	3	1.2	1540	1100	40.0	107800	77000	49314	28410	58486	48590	1.19	1.71	2.19	2.71	30800	440
2	Pantnagar (GBPUA&T)	UK	NPZ	5	2.0	1390	1240	12.1	56760	49450	26251	23926	30509	25524	1.16	1.07	2.16	2.07	7310	150
3	Imphal (CAU)	MN	NEHZ	5	2.0	1204	854	41.0	96320	68320	47356	32760	48964	35560	1.03	1.09	2.03	2.09	28000	350
4	Almora (VPKAS)	UK	NHZ	10	4.0	1578	1219	29.4	104667	85727	58238	56800	46430	28927	0.80	0.51	1.80	1.51	18940	358
5	Palampur (CSKHPKV)	HP	NHZ	2	0.8	1361	1073	26.9	88493	69736	53523	48671	34970	21065	0.65	0.43	1.65	1.43	18757	289
6	Indore (IISR/AICRPS)	MP	CZ	300	120.0	1878	1405	33.6	103266	77300	33366	22360	69900	54940	2.09	2.46	3.09	3.46	25966	472
Total/Average				**325**	**130**	**1492**	**1149**	**30.5**	**92884**	**71255**	**44675**	**35488**	**48210**	**35768**	**1.15**	**1.21**	**2.15**	**2.21**	**21629**	**343**

Table 8.3f Results of Frontline Demonstrations (FLDs) on Intercropping (IC)used in SOYBEAN at various locations in farmer's field.

S. N.	Name of implementing centre	State	Zone	No. of Trial	Intercropping	Area (ha)	Yield kg/ha						SEY % increase over FP	#Gross return (Rs/ha)		#Cost of cultivation (Rs/ha)		#Net returns Rs/ha		#Net B:C ratio (N:C)		#B:C ratio (G:C)		Addi. returns (Rs/ha)	Soybean Yield gap (kg/ha)	SEY gap (kg/ha)
							IT			FP																
							soybean	Intercrop	SEY	soybean	Intercrop	SEY		IP	FP	IP	FP	IP	FP	IP	FP	IP	FP			
1	*Pune (ARI)	MH	SZ	4	Soybean+ sugarcane	1.6	2438	149000	9702	2021	120000	7814	24.1	522013	422896	203439	190340	233577	173967	1.15	0.92	2.57	2.22	99117	417	1888
2	Amravati (PDKV)	MH	CZ	10	Soybean+ Pigeon pea	4.0	1731	813	2978	1349	796	2570	15.9	131151	112949	49700	46130	81452	66819	1.64	1.45	2.64	2.45	18203	382	408
3	KVK Karda	MH	CZ	50	Soybean+ Pigeon pea	20.0	2554	506	776	1909	312	478	62.3	109831	82070	74652	58460	35178	23609	0.47	0.40	1.47	1.40	27761	646	298
4	KVK, Kanerimath, Kolhapur	MH	SZ	50	Soybean+ sugarcane	20.0	2214	136622	11905	1847	129951	11064	7.6	511895	475771	158154	142915	353741	332856	2.24	2.33	3.24	3.33	36124	367	840
5	KVK, Belagavi	KA	SZ	60	Soybean + Bt Cotton	24.0	1833	763	1844	1596	648	1605	14.9	163397	140936	68292	65050	95105	75886	1.39	1.17	2.39	2.17	22461	237	239
6	Parbhani (MAU)	MH	CZ	10	Soybean+ Pigeon pea	4.0	2111	1158	3888	1699	961	3174	22.5	167150	136481	50950	49417	116200	87064	2.28	1.76	3.28	2.76	30670	411	713
Total/Average				**184**		**74**	**2147**	**48144**	**5182**	**1737**	**42111**	**4451**	**24.5**	**267573**	**228517**	**100864**	**92052**	**152542**	**126700**	**1.53**	**1.34**	**2.60**	**2.39**	**39056**	**410**	**731**

*** Gross and Net return, B:C Ratio, additional returns for sugarcane are estimated as sugarcane is 18months old crop not yet harvested as received from respective center.**
 # Gross return, Cost of cultivation, Net return, Net B;C & B:C are soybean +respective intercrop.

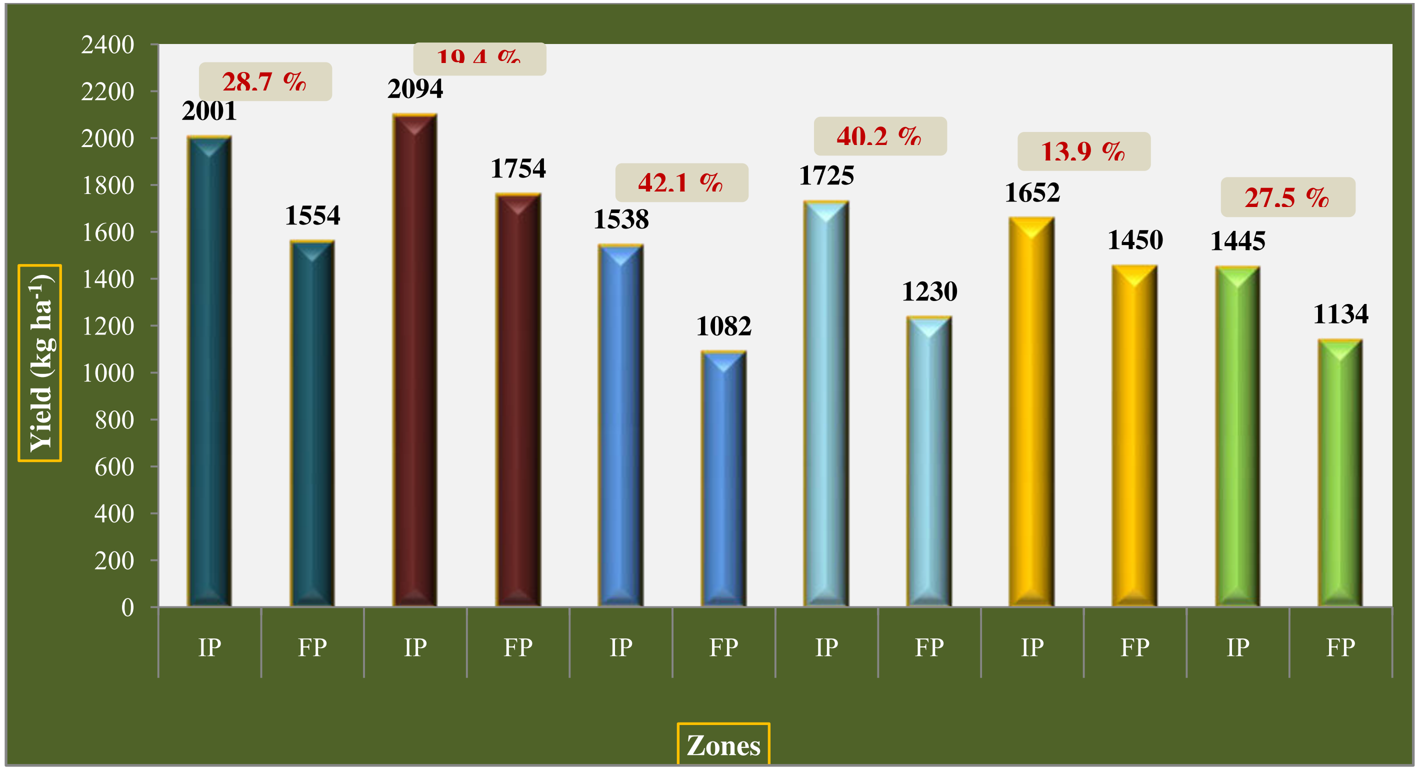


Figure 8.1 Zone wise soybean yield analysis under different components of FLD (Mean of all components, Whole package, integrated weed management, integrated nutrient management, integrated pest management, organic farming and intercropping). IP-Improved practices and FP-Farmers practices.

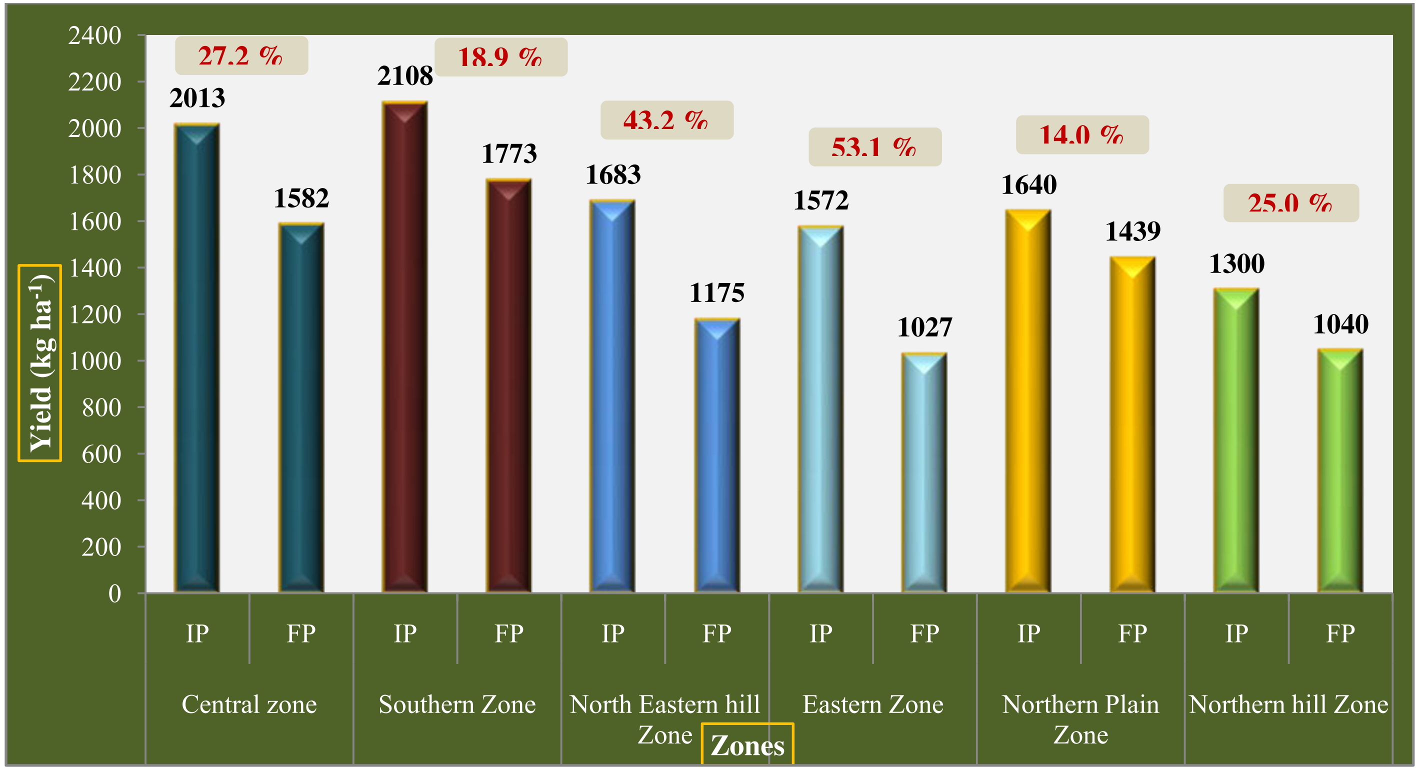


Figure 8.1a Zone wise soybean yield analysis under whole package component. IP-Improved practices and FP-Farmers practices.

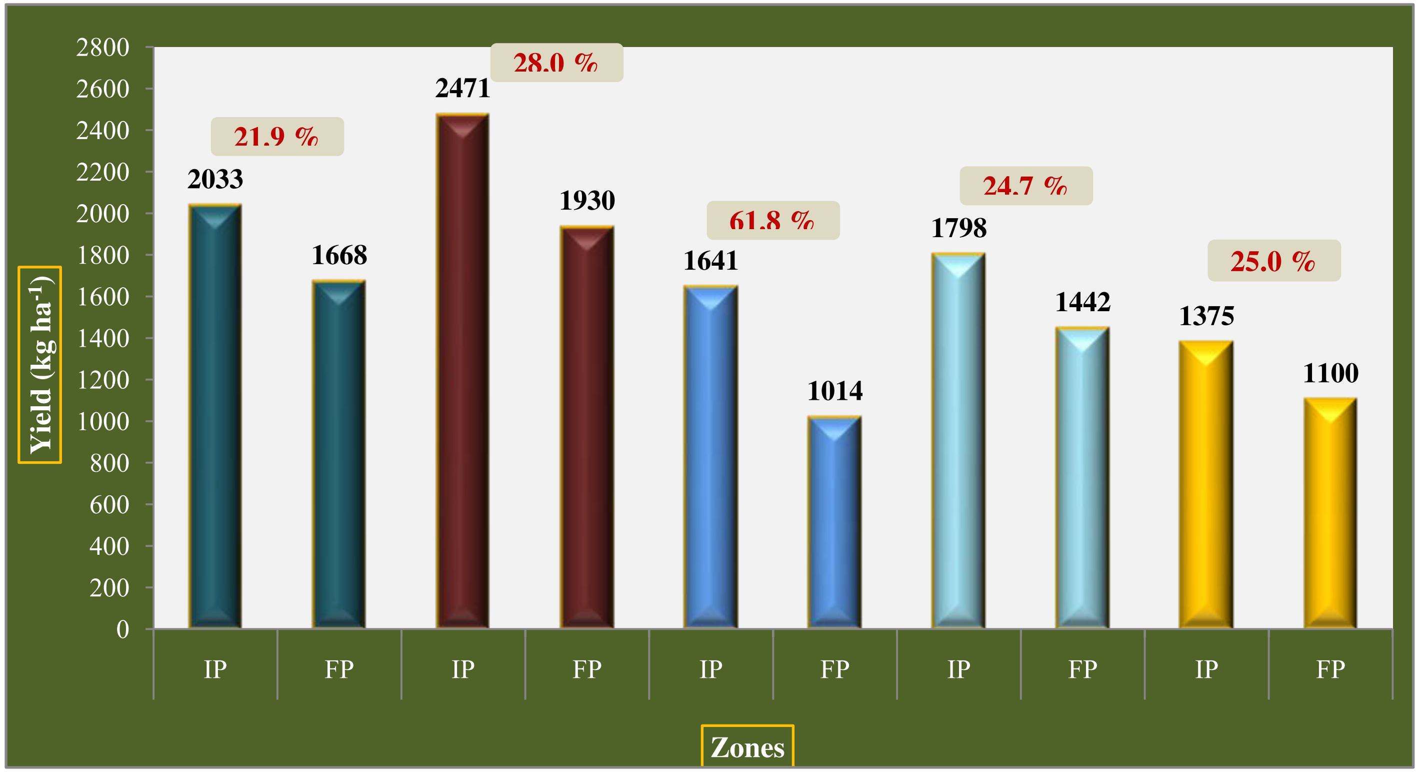


Figure 8.1b Zone wise soybean yield analysis under integrated weed management component. IP-Improved practices and FP-Farmers practices.

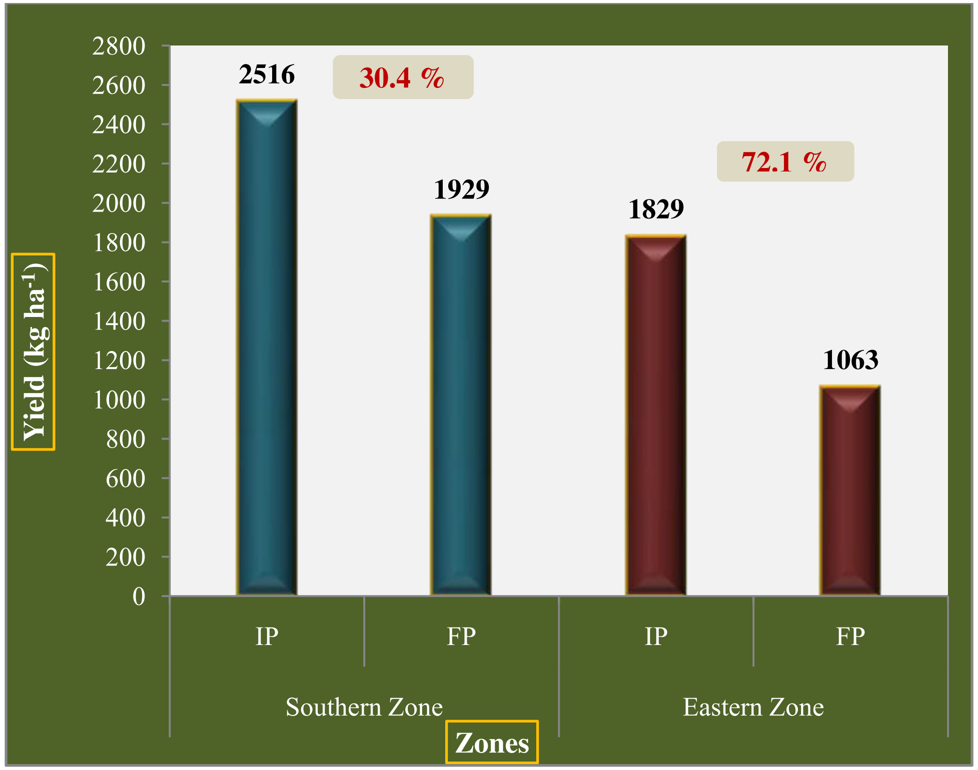


Figure 8.1c Zone wise soybean yield analysis under integrated nutrient management component. IP-Improved practices and FP-Farmers practices.

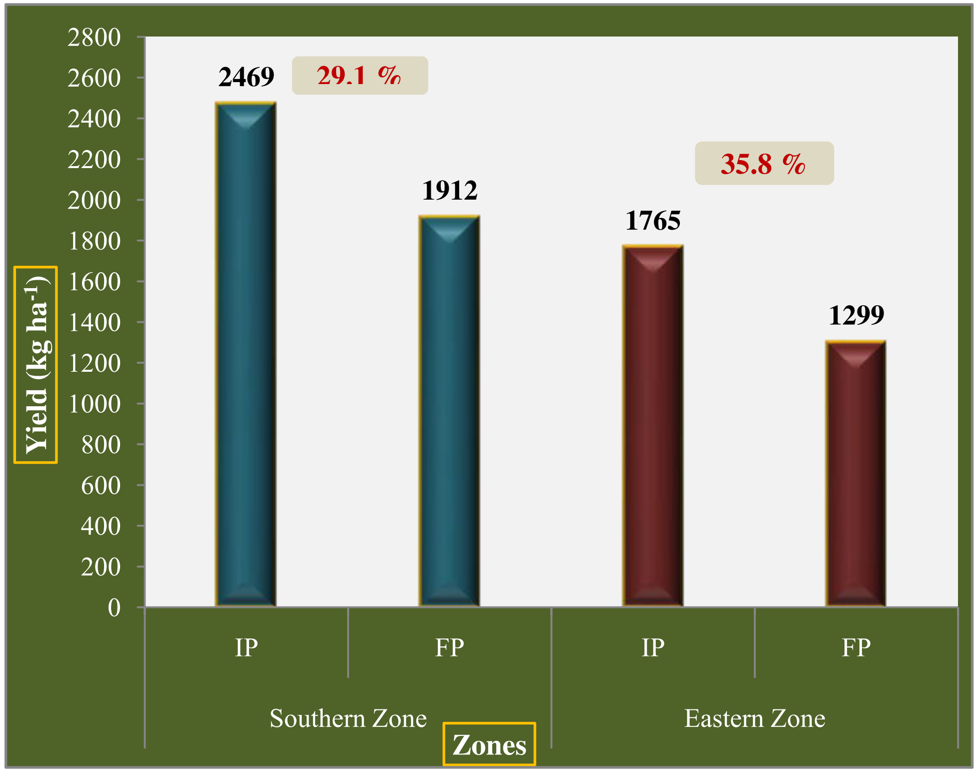


Figure 8.1d Zone wise soybean yield analysis under integrated pest management component. IP-Improved practices and FP-Farmers practices.

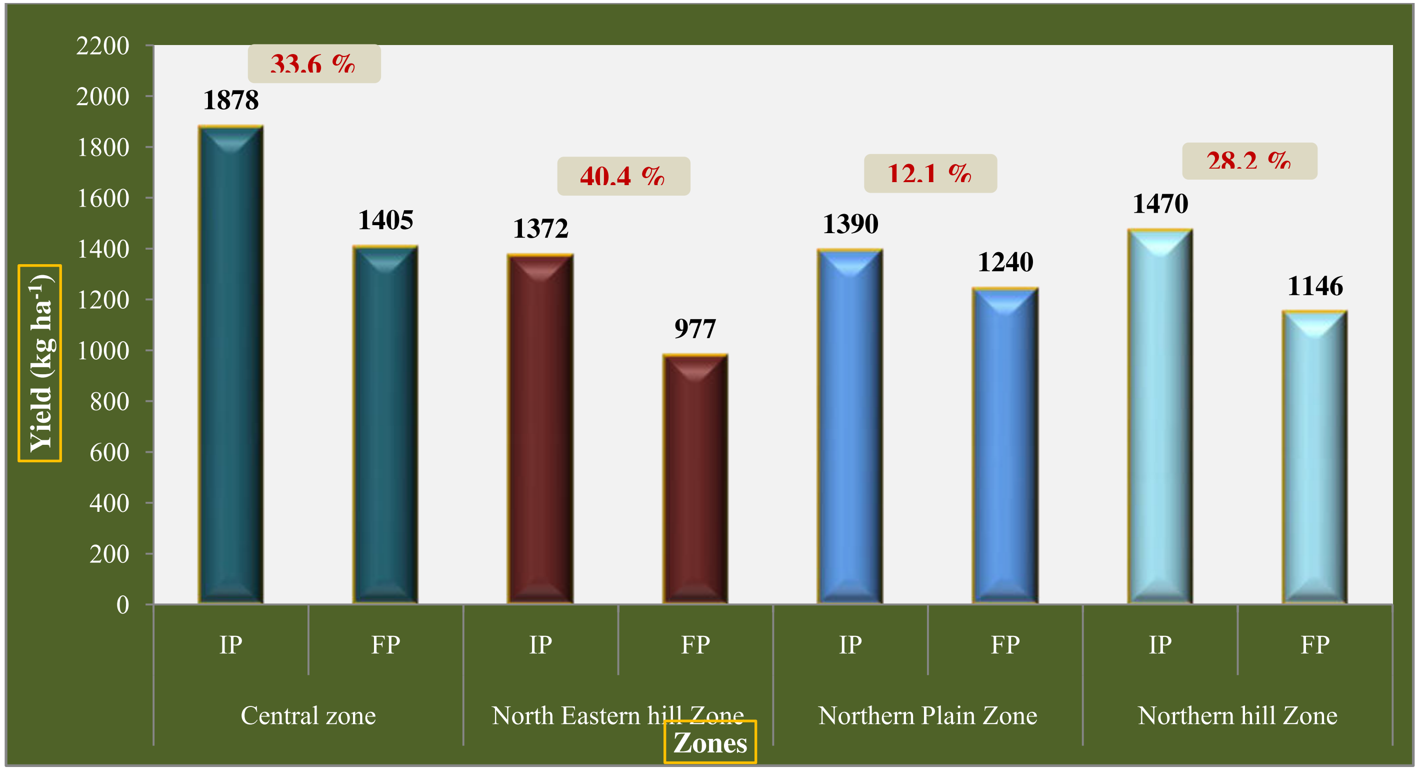


Figure 8.1e Zone wise soybean yield analysis under organic farming component. IP-Improved practices and FP-Farmers practices.

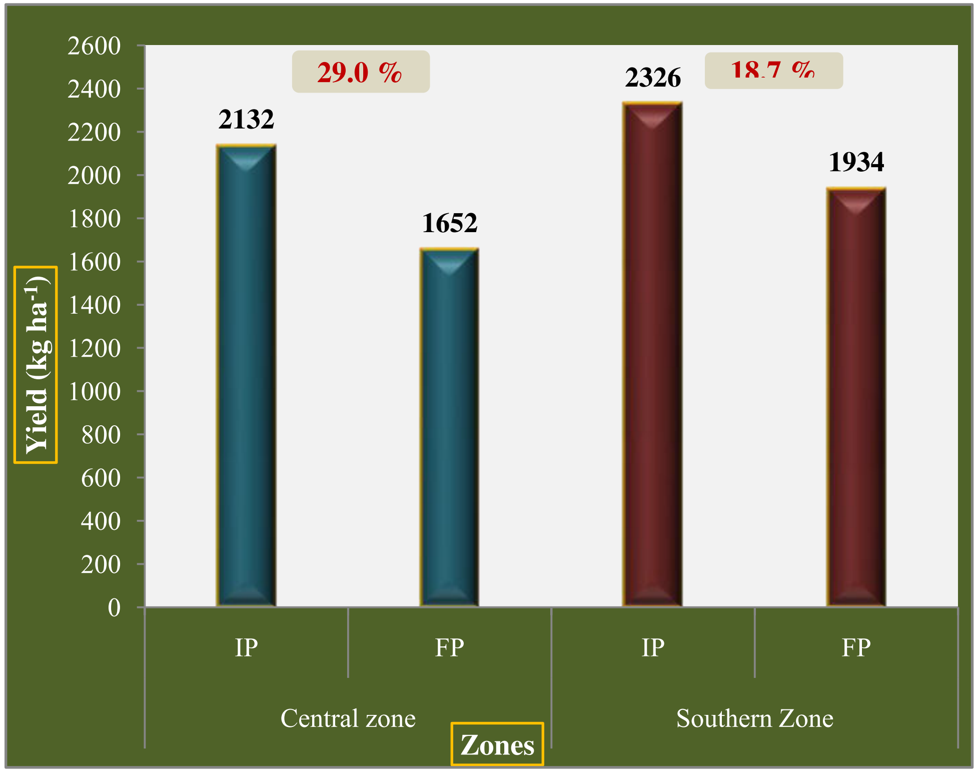
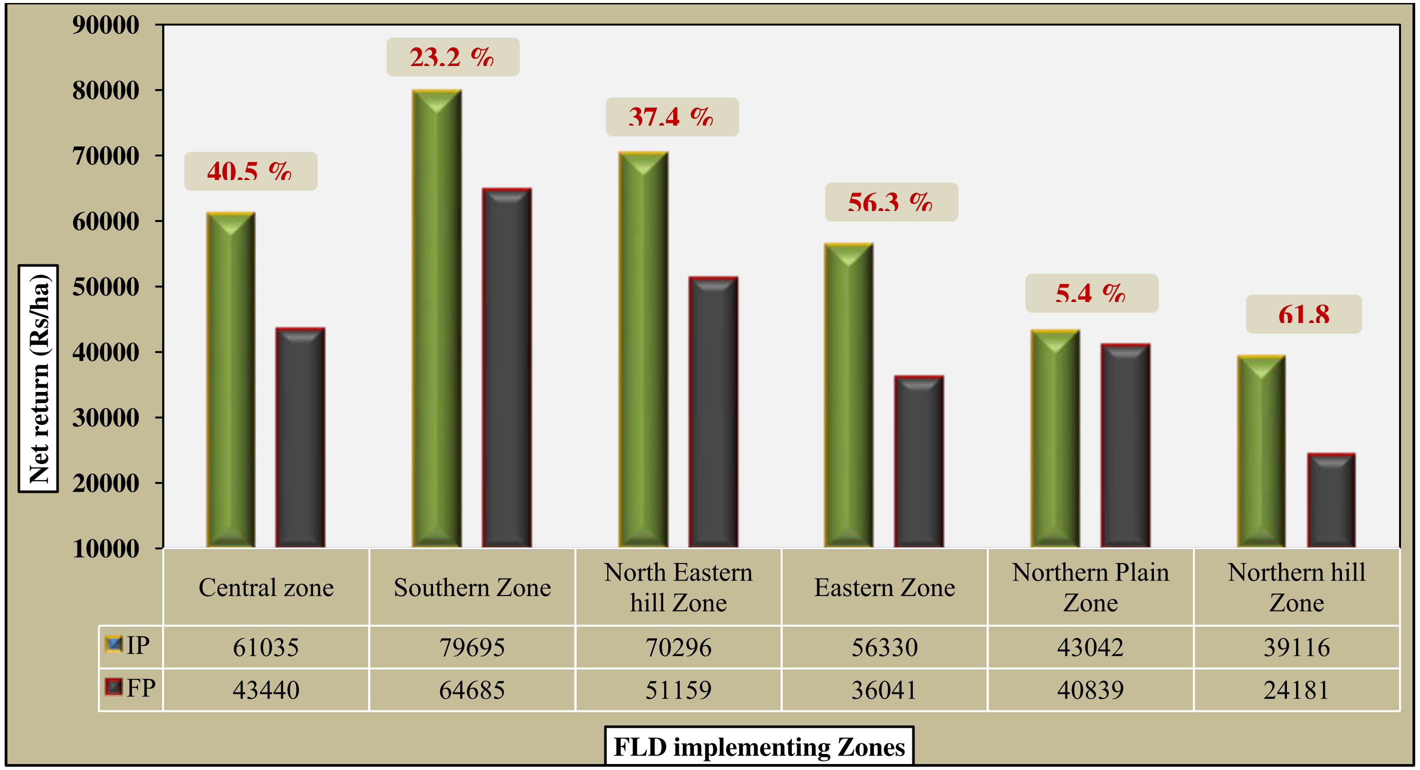


Figure 8.1f Zone wise soybean yield analysis under intercropping component. IP-Improved practices and FP-Farmers practices.



	Central zone	Southern Zone	North Eastern hill Zone	Eastern Zone	Northern Plain Zone	Northern hill Zone
IP	61035	79695	70296	56330	43042	39116
FP	43440	64685	51159	36041	40839	24181

Figure 8.2 Zone wise net profit analysis under different components of FLD (Mean of all components, Whole package, integrated weed management, integrated nutrient management, integrated pest management, organic farming and intercropping). IP-Improved practices and FP-Farmers practices.

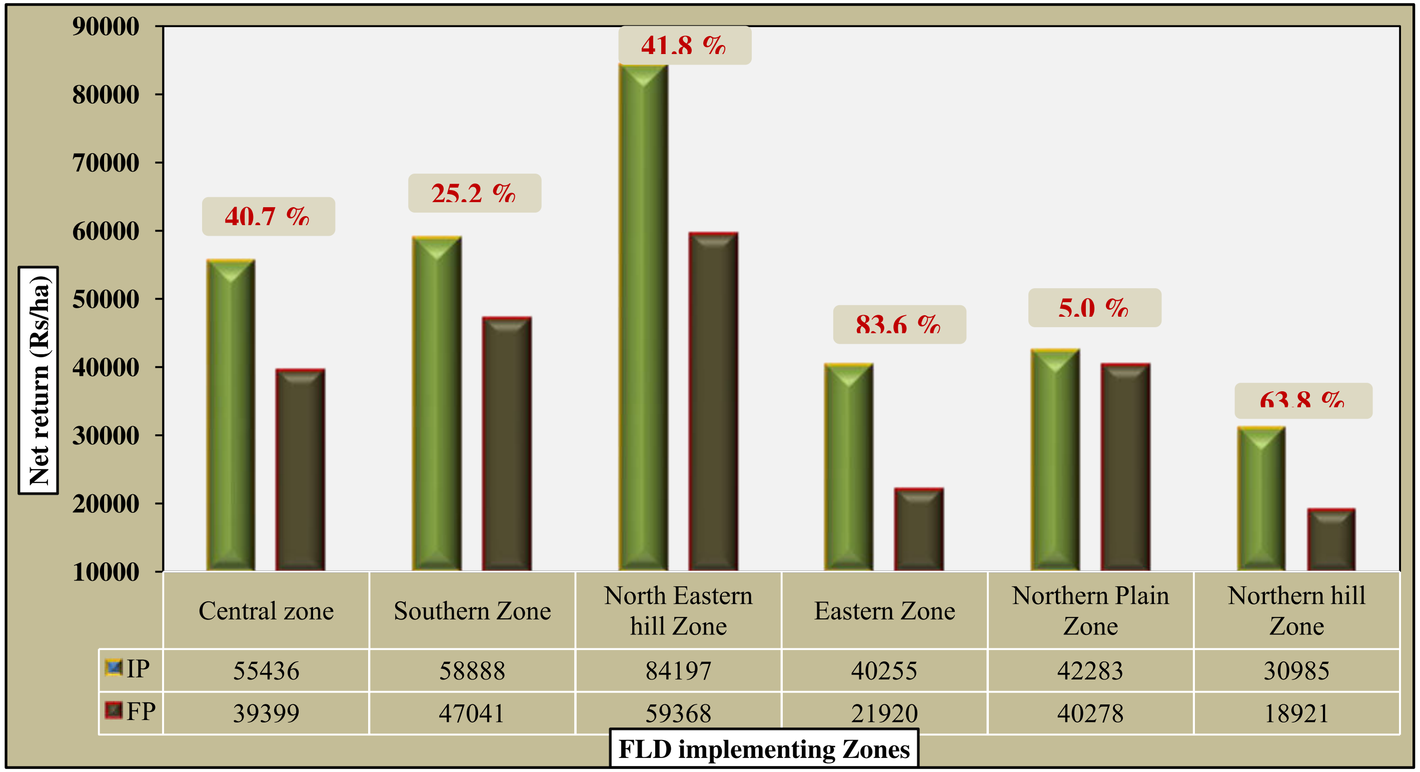


Figure 8.2a Zone wise net profit analysis under whole package component. IP-Improved practices and FP-Farmers practices.

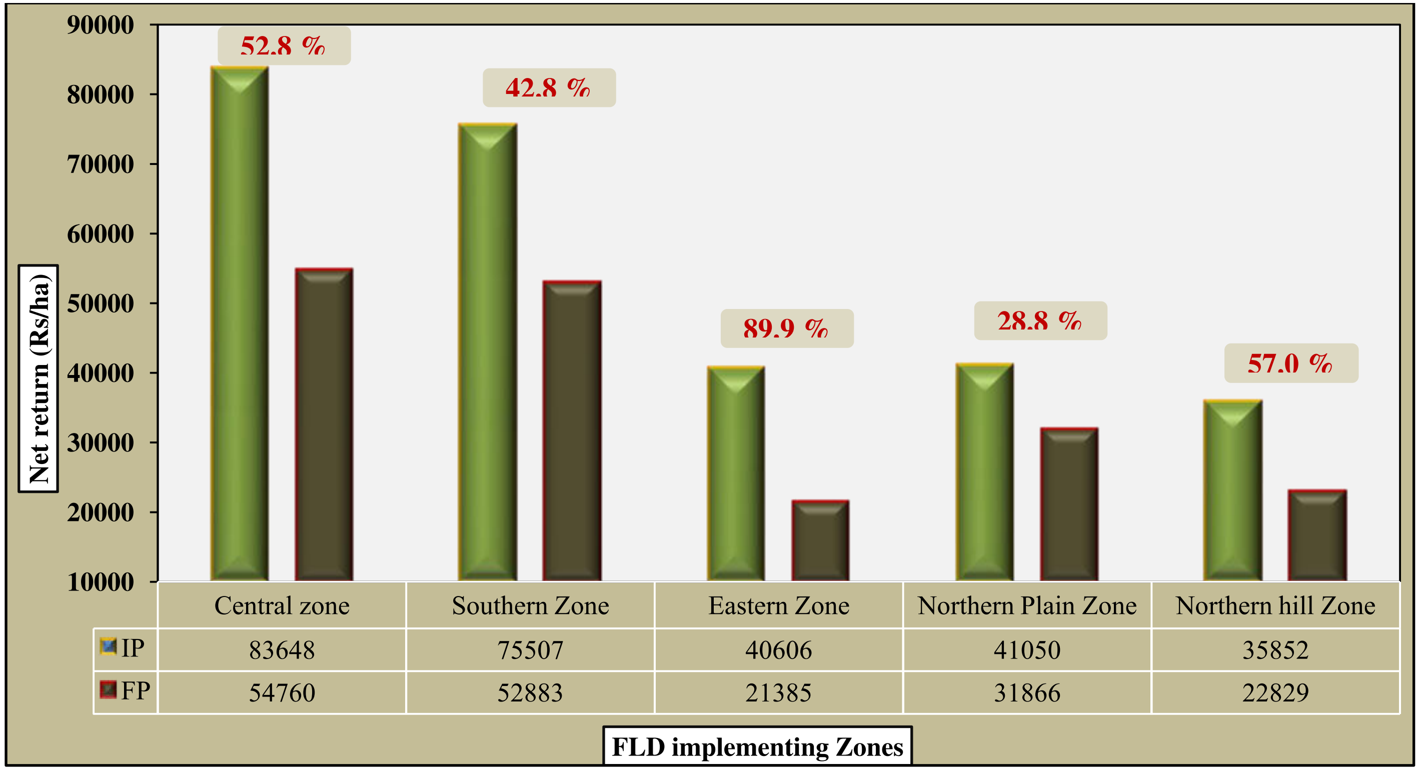


Figure 8.2b Zone wise net profit analysis under integrated weed management component. IP-Improved practices and FP-Farmers practices.

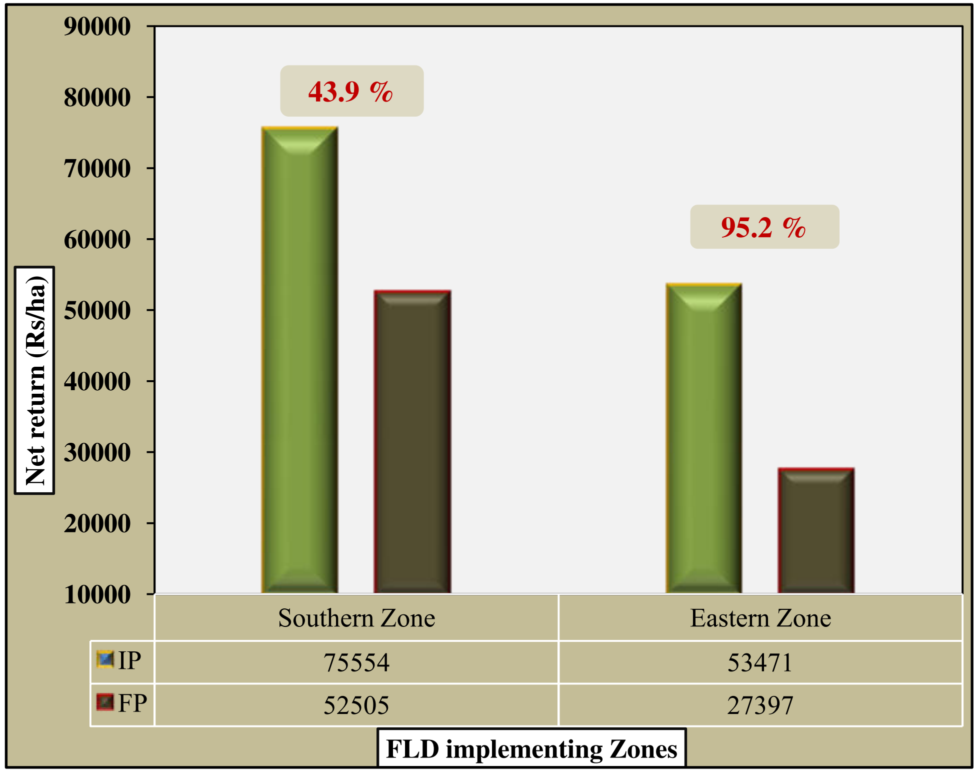


Figure 8.2c Zone wise net profit analysis under integrated nutrient management component. IP-Improved practices and FP-Farmers practices.

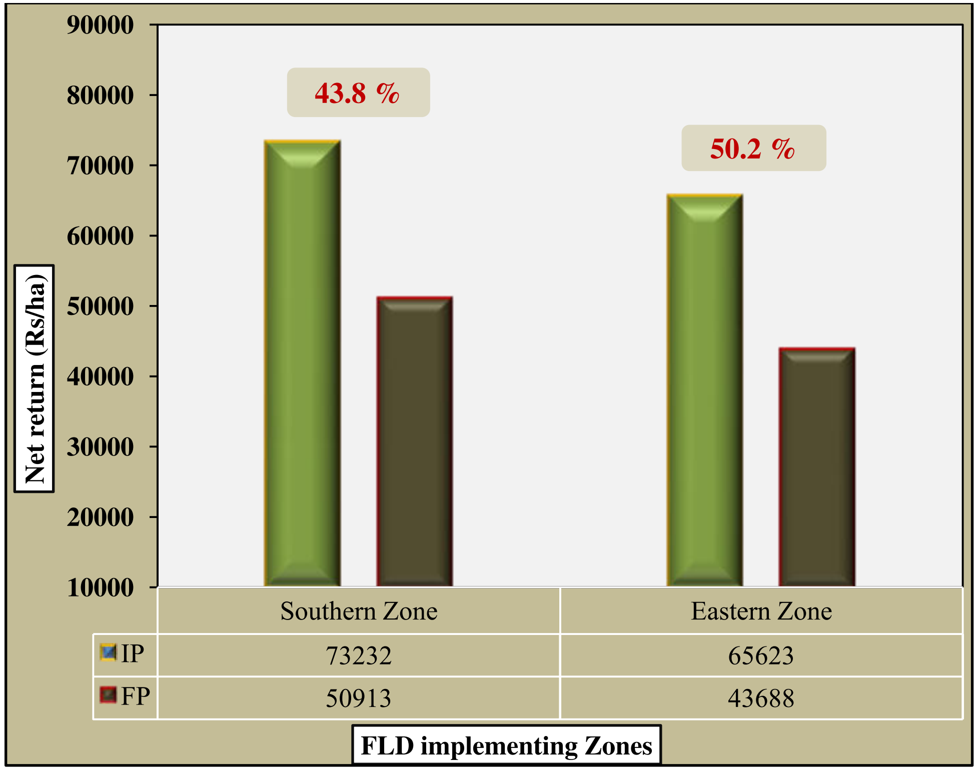


Figure 8.2d Zone wise net profit analysis under integrated pest management component. IP-Improved practices and FP-Farmers practices.

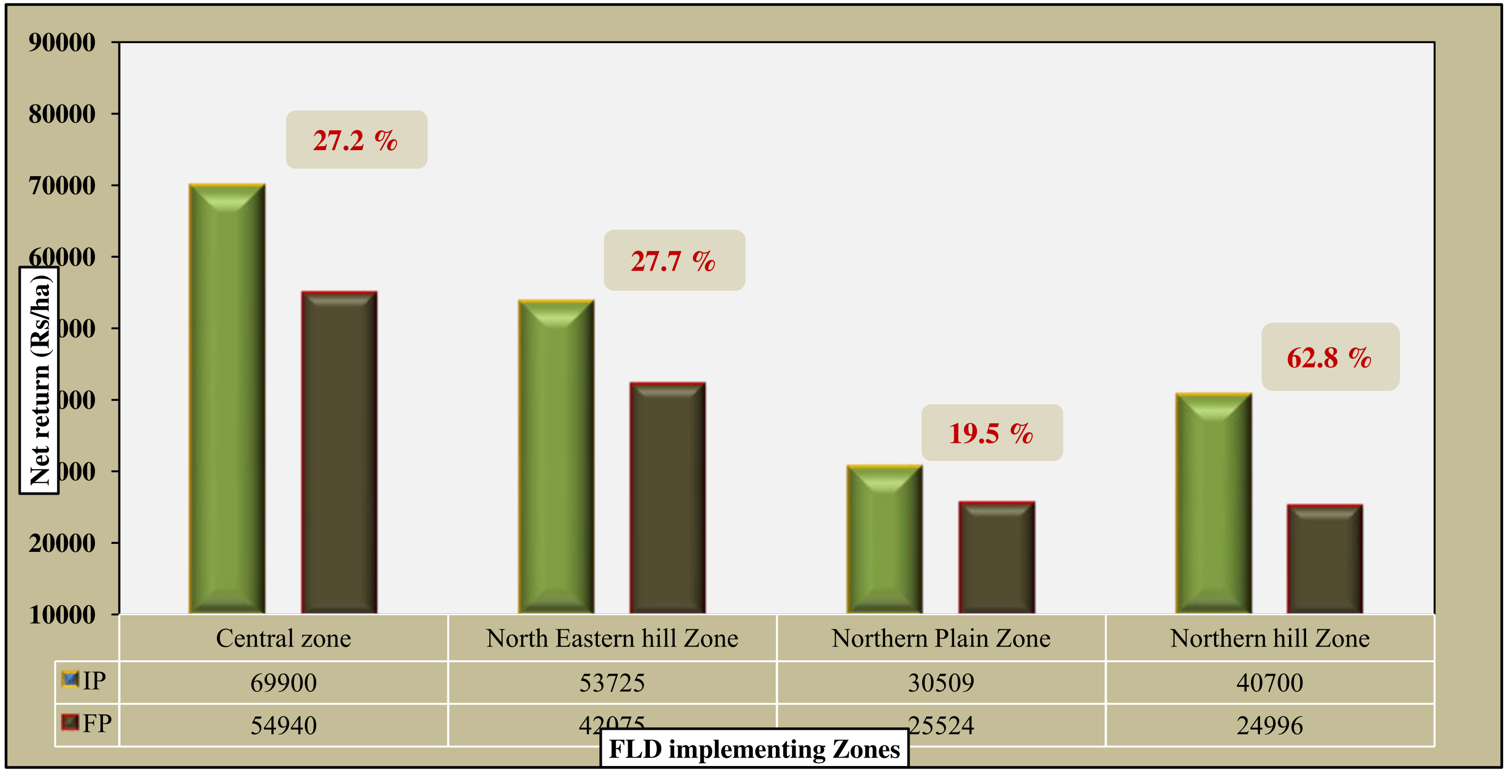


Figure 2e Zone wise net profit analysis under organic farming component. IP-Improved practices and FP-Farmers practices.

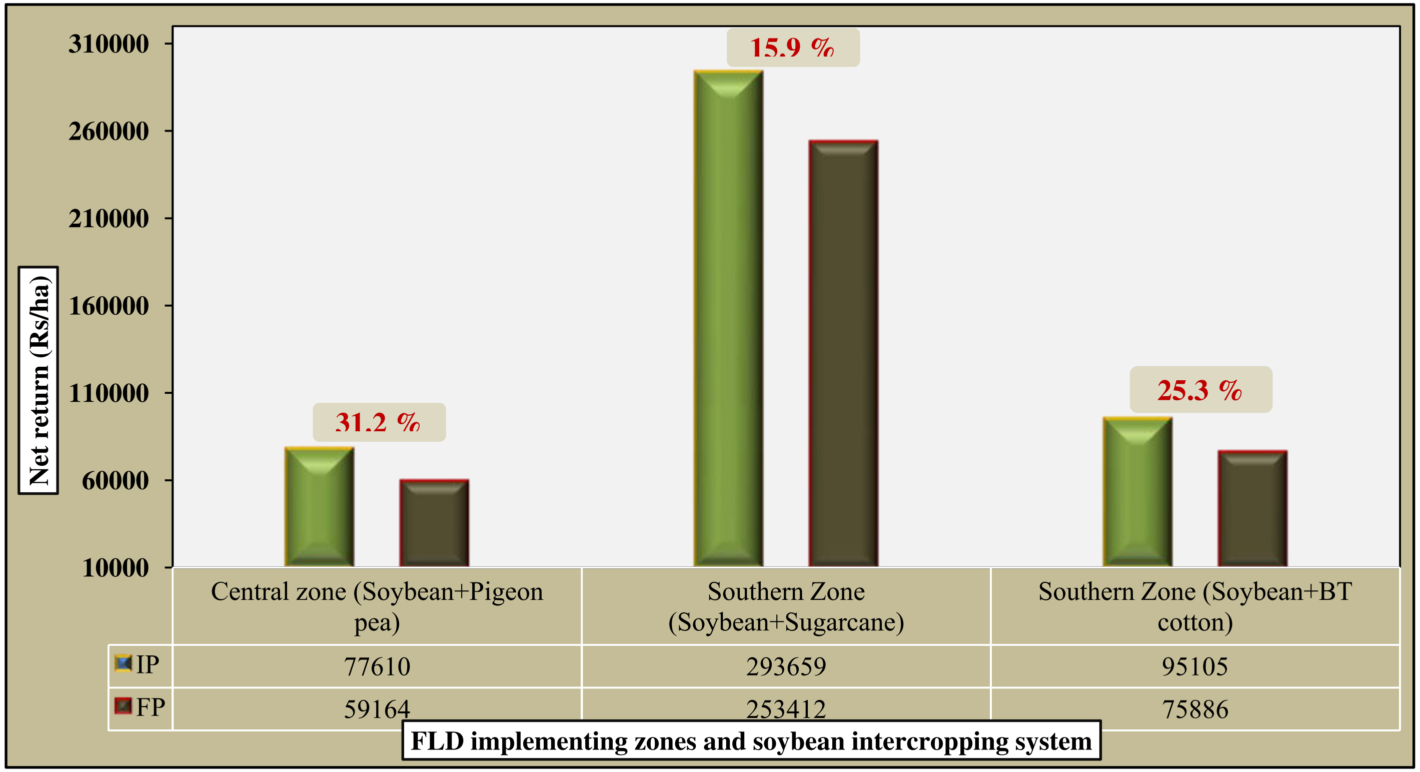


Figure 2f Zone wise net profit analysis under intercropping component. IP-Improved practices and FP-Farmers practices.

Note:

- ***Net return for sugarcane are estimated as sugarcane is 18months old crop not yet harvested during reporting period as received from respective center.***
- ***Net return is soybean +respective intercrop.***

Table 8.4 Performance of SOYBEAN varieties under different components of FLDs conducted at various locations in farmers' field 2022-23

S. N.	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
			IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	KDS 753	363	2125	1837	163084	144963	61005	56386	102079	88577	1.66	1.53
2	JS 20-34	267	2183	1756	104678	84265	35812	31614	68867	52651	1.97	1.85
3	JS 20-69	224	1896	1449	103330	78809	33400	23303	69930	55506	2.09	2.38
4	CG Soya-1	100	1677	998	72090	42906	24323	18295	47767	24611	1.96	1.35
5	KDS 726	78	2279	1828	110115	87247	51271	44871	58844	42376	1.48	1.10
6	MAUS 612	68	2531	2012	131553	101790	62047	53361	69506	48429	1.17	0.92
7	Dsb 21	60	2334	1842	116719	92078	52855	46416	63864	45662	1.31	1.05
8	SL 958	55	1660	1465	78515	71703	35348	33345	43167	38358	1.23	1.14
9	Dsb 34	53	2592	1792	129596	89584	44545	37560	85051	52024	1.91	1.39
10	VL Soya 89 (yellow)	34	1763	1409	106246	81080	55224	50561	51022	30520	0.93	0.61
11	VL Bhat 201 (black)	33	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
12	JS 20-24	30	1344	1132	57791	48686	36523	31922	21268	16764	0.58	0.53
13	PS 1347	29	1609	1319	68948	56419	35573	29711	33375	26708	0.94	0.90
14	PS 26	29	1707	1378	73100	58940	35919	29926	37181	29014	1.04	0.97
15	AMS 100-39	26	2371	1724	123716	92581	60457	51582	63259	40999	1.15	0.86
16	Hara Soya	21	1354	1068	87985	69442	53523	48671	34462	20771	0.64	0.43
17	JS 335	19	1824	1598	99509	87261	45125	40647	54384	46615	1.21	1.20
18	Him Soya	18	1274	1023	82810	66473	53523	48671	29287	17802	0.55	0.37
19	Phule Kimaya	18	1591	1314	55669	46002	49090	42040	6579	3962	0.13	0.09
20	MAUS 162	15	2333	1986	110143	93534	49381	48215	60762	45319	1.23	0.94
21	Palam Soya	15	1203	978	78175	63550	53523	48671	24652	14879	0.46	0.31
22	MACS 1460	14	2245	1784	121599	94828	41907	33183	79691	61645	1.91	1.86
23	JS 20-98	14	1936	1694	96812	84722	39166	32110	57646	52612	1.47	1.64
24	MAUS 158	12	2238	1863	109410	91063	49442	48261	59968	42802	1.21	0.89
25	KBS 23	11	1321	1158	79233	69507	34986	29204	44247	40303	1.26	1.38
26	Birsa Soy-3	10	1534	1042	65962	44785	32493	26180	33470	18605	1.03	0.71
27	NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37
28	NRC 37	10	1284	944	64215	47185	25875	21006	38340	26179	1.48	1.25
29	PS 1225	10	1965	1550	84495	66650	36264	30140	48231	36510	1.33	1.21
30	RSC 10-46	10	1509	1059	64887	45516	32493	26180	32395	19336	1.00	0.74
31	RVS 24	10	2363	1553	113400	74520	30405	26100	82995	48420	2.73	1.86
32	Phule Agrani	7	1613	1345	56465	47075	49090	42040	7375	5035	0.15	0.12
33	JS 93-05	6	2317	2060	114939	102160	55625	52167	59313	49994	1.07	0.96

34	Vikrant	6	2362	2063	118414	103446	57611	52792	60803	50654	1.06	0.96
35	DSb 19	5	1656	1150	132480	92000	43944	28854	88536	63146	2.01	2.19
36	DSb 32	5	1204	854	96320	68320	47356	32760	48964	35560	1.03	1.09
37	JS 20-116	5	2908	2322	125044	99846	40307	39249	84737	60597	2.10	1.54
38	MACS 1188	4	2669	2219	120094	99844	40748	38169	79346	61675	1.95	1.62
39	Eagle seeds	3	2350	2000	127244	108304	56280	52113	70964	56191	1.26	1.08
40	Karishma	3	2353	2007	116718	99500	56035	50375	60683	49125	1.08	0.98
41	MACS 1281	2	2850	2500	128250	112500	41198	38778	87052	73723	2.11	1.90
42	MACS 1407	2	2875	2438	129375	109688	40210	38618	89165	71070	2.22	1.84
43	MACS 1520	2	3125	2563	140625	115313	43273	40600	97352	74713	2.25	1.84
44	PS 1556	2	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
45	PS 25	2	1325	1200	56975	50525	26251	23926	30724	26599	1.17	1.11
46	Himso-1685	1	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
47	MACSNRC 1667	1	2750	2250	123750	101250	42148	40300	81602	60950	1.94	1.51

Table 8.4a Performance of SOYBEAN varieties under whole packageof FLDs conducted at various locations in farmers' fields 2022-23

S. N.	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
			IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	KDS-753	250	2120	1838	112410	97414	44424	41373	67987	56041	1.72	1.52
2	JS 20-34	147	2202	1819	104937	86977	34946	32292	69991	54685	2.08	1.86
3	KDS-726	71	2251	1802	108416	85975	51381	44714	57035	41260	1.44	1.09
4	SL 958	55	1660	1465	78515	71703	35348	33345	43167	38358	1.23	1.14
5	CG Soya-1	50	1614	1005	69420	43230	22585	18295	46835	24935	2.07	1.36
6	JS 20-69	44	2044	1749	107461	91823	33539	27194	73922	64628	2.20	2.38
7	Dsb 21	33	2067	1894	103333	94712	61164	55272	42169	39440	0.69	0.71
8	JS 20-24	30	1344	1132	57791	48686	36523	31922	21268	16764	0.58	0.53
9	PS 26	28	1716	1380	73791	59355	36264	30140	37527	29215	1.03	0.97
10	Dsb 34	24	2551	1792	127569	89604	44545	37560	83024	52044	1.86	1.39
11	Phule Kimaya	18	1591	1314	55669	46002	49090	42040	6579	3962	0.13	0.09
12	Hara Soya	16	1367	1084	88855	70482	53523	48671	35332	21811	0.66	0.45
13	Him Soya	15	1261	1014	81970	65929	53523	48671	28447	17258	0.53	0.35
14	MAUS 612	15	2588	2195	111298	89988	49140	48030	62158	41958	1.26	0.87
15	JS 20-98	14	1936	1694	96812	84722	39166	32110	57646	52612	1.47	1.64

16	JS 335	14	1317	1166	79007	69939	34986	29204	44021	40735	1.26	1.39
17	MAUS 162	13	2362	2025	101566	87422	49140	48030	52426	39392	1.07	0.82
18	AMS 100-39	13	2385	1762	103304	75418	57606	48821	45699	26597	0.86	0.60
19	Palam Soya	12	1195	970	77643	63018	53523	48671	24120	14347	0.45	0.29
20	KBS 23	11	1321	1158	79233	69507	34986	29204	44247	40303	1.26	1.38
21	PS 1347	11	1514	1250	65086	53750	36264	30140	28822	23610	0.79	0.78
22	MAUS 158	10	2250	1890	96750	81270	49140	48030	47610	33240	0.97	0.69
23	NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37
24	NRC 37	10	1284	944	64215	47185	25875	21006	38340	26179	1.48	1.25
25	RVS 24	10	2363	1553	113400	74520	30405	26100	82995	48420	2.73	1.86
26	MACS 1460	9	2480	1975	132968	103875	41738	34849	91230	69026	2.18	1.98
27	Phule Agrani	7	1613	1345	56465	47075	49090	42040	7375	5035	0.15	0.12
28	Birsa Soy-3	5	1536	1040	66048	44720	32115	26180	33933	18540	1.06	0.71
29	DSb 19	5	1656	1150	132480	92000	43944	28854	88536	63146	2.01	2.19
30	JS 20-116	5	2908	2322	125044	99846	40307	39249	84737	60597	2.10	1.54
31	RSC 10-46	5	1524	1057	65532	45451	32115	26180	33417	19271	1.04	0.74
32	MACS 1188	3	2808	2333	126375	105000	42323	39833	84052	65167	1.99	1.64
33	MACS 1281	2	2850	2500	128250	112500	41198	38778	87052	73723	2.11	1.90
34	MACS 1520	2	3125	2563	140625	115313	43273	40600	97352	74713	2.25	1.84
35	PS-1556	2	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
36	Himso-1685	1	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
37	MACS 1407	1	3125	2750	140625	123750	43273	42875	97352	80875	2.25	1.89
38	MACSNRC 1667	1	2750	2250	123750	101250	42148	40300	81602	60950	1.94	1.51
39	PS 1225	1	1850	1450	79550	62350	36264	30140	43286	32210	1.19	1.07

Table 4b Performance of SOYBEAN varieties under integrated Weed management (IWM)of FLDs conducted at various locations in farmers' field 2022-23

S. N.	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
			IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	**CG Soya-1**	30	1770	977	76109	42031	27085	18295	49024	23736	1.81	1.30
2	PS 1347	16	1697	1375	72966	59125	36264	30140	36702	28985	1.01	0.96
3	Dsb 21	11	2601	1802	130036	90100	44545	37560	85491	52540	1.92	1.40
4	Dsb 34	9	2560	1774	127989	88711	44545	37560	83444	51151	1.87	1.36
5	PS 1225	9	1978	1561	85044	67128	36264	30140	48780	36988	1.35	1.23
6	Birsa Soy-3	5	1532	1043	65876	44849	32870	26180	33006	18669	1.00	0.71
7	RSC 10-46	5	1494	1060	64242	45580	32870	26180	31372	19400	0.95	0.74
8	JS-335	4	2320	2039	117535	103366	53830	51993	63706	51374	1.18	0.99
9	KDS-726	4	2257	1939	116404	96788	42691	43650	73713	53139	2.07	1.35
10	Him Soya	2	1455	1140	94575	74100	53523	48671	41052	25429	0.77	0.52
11	JS 93-05	2	2423	2195	119333	108104	54026	51752	65307	56353	1.21	1.09
12	Eagle seeds	1	2288	1880	123552	101520	49104	46988	74448	54532	1.52	1.16
13	Hara Soya	1	1655	1310	107575	85150	53523	48671	54052	36479	1.01	0.75
14	Karishma	1	2314	1940	122064	102335	51930	49546	70134	52789	1.35	1.07
15	Palam Soya	1	1015	850	65975	55250	53523	48671	12452	6579	0.23	0.14
16	Vikrant	1	2395	2140	123343	110210	52690	48743	70653	61467	1.34	1.26

Table 8.4c Performance of SOYBEAN varieties under integrated nutrient management (INM)of FLDs conducted at various locations in farmers' field 2022-23

S. N.	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
			IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	Dsb 34	10	2627	1798	131365	89920	44545	37560	86820	52360	1.95	1.39
2	Dsb 21	10	2661	1782	133070	89085	44545	37560	88525	51525	1.99	1.37
3	CG Soya-	10	1829	1063	78656	45692	25185	18295	53471	27397	2.12	1.50
4	Eagle	2	2382	2060	129090	111696	59868	54676	69223	57020	1.16	1.04
5	Karishma	2	2372	2040	114045	98082	58087	50790	55958	47293	0.96	0.93
6	Vikrant	2	2381	2052	119673	103097	59420	53626	60254	49472	1.01	0.92
7	JS 93-05	1	2374	2132	114427	102762	57755	53087	56672	49675	0.98	0.94
8	JS-335	1	2375	2001	129913	109455	61001	52476	68912	56979	1.13	1.09
9	KDS 753	1	2296	2010	126280	110550	58938	54699	67342	55851	1.14	1.02
10	KDS 726	1	2560	2240	131840	115360	61273	54754	70567	60606	1.15	1.11

Table 8.4d Performance of SOYBEAN varieties under integrated pest management (IPM)of FLDs conducted at various locations in farmers' field 2022-23

S. N.	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
			IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	CG Soya-1	10	1554	957	66813	41130	23860	18295	42953	22835	1.80	1.25
2	NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37
3	Dsb 34	8	2615	1789	130731	89438	44545	37560	86186	51878	1.93	1.38
4	Dsb 21	8	2618	1794	130906	89675	44545	37560	86361	52115	1.94	1.39
5	JS 93-05	3	2228	1945	112180	97997	55981	52136	56198	45861	1.00	0.88
6	Vikrant	3	2339	2046	115931	101424	58045	53586	57885	47838	1.00	0.89
7	KDS 753	2	2372	2090	124454	109713	58876	53781	65578	55932	1.11	1.04
8	KDS-726	2	2389	2091	121530	106383	57279	53718	64251	52665	1.12	0.98

Table 8.4e Performance of SOYBEAN varieties under Organic Farming (Org. Far.)of FLDs conducted at various locations in farmers' field 2022-23

S. N.	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
			IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	JS 20-69	180	1860	1375	102321	75627	33366	22351	68955	53276	2.07	2.38
2	JS 20-34	120	1903	1451	104684	79810	33366	22373	71319	57436	2.14	2.57
3	VL Soya 89 (yellow)	34	1763	1409	106246	81080	55224	50561	51022	30520	0.93	0.61
4	VL Bhat 201	33	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
5	DSb 32	5	1204	854	96320	68320	47356	32760	48964	35560	1.03	1.09
6	Hara Soya	4	1295	1006	84175	65406	53523	48671	30652	16735	0.57	0.34
7	MACS 1460	3	1540	1100	107800	77000	49314	28410	58486	48590	1.19	1.71
8	Palam Soya	2	1338	1083	86938	70363	53523	48671	33415	21692	0.62	0.45
9	PS 1347	2	1425	1250	58050	49450	26251	23926	31799	25524	1.21	1.07
10	PS 25	2	1325	1200	56975	50525	26251	23926	30724	26599	1.17	1.11
11	PS 26	1	1450	1300	53750	47300	26251	23926	27499	23374	1.05	0.98

Table 8.4f Performance of SOYBEAN varieties under Intercropping (IC)of FLDs conducted at various locations in farmers' field 2022-23.

S.N.	Variety (+Intercrop)	No. of trial	Yield (kg/ha)						#Gross return (Rs/ha)		#Cost of cultivation (Rs/ha)		#Net returns (Rs/ha)		#Net B:C Ratio (N/C)	
			IT			FP										
			soybean	Intercrop	SEY	soybean	Intercrop	SEY	IP	FP	IP	FP	IP	FP	IP	FP
1	KDS 753 (+Sugarcane and Bt-Cotton)	110	2023	68693	6874	1722	65300	6335	337646	308354	113223	103983	224423	204371	1.81	1.75
2	MAUS 612 (+Pigeonpea)	53	2327	803	2282	1809	612	1794	136350	107871	62801	53939	73549	53933	1.33	1.05
3	AMS 100-39 (+Pigeonpea)	13	1874	1015	3431	1488	905	2876	149075	124880	50325	47774	98750	77107	1.96	1.61
4	*MACS 1460 (+Sugarcane)	2	2438	153000	9963	2063	121000	7879	533213	427488	205744	193535	72477	58188	0.35	0.30
5	MAUS 158 (+Pigeonpea)	2	2175	1200	4017	1730	995	3257	172710	140030	50950	49417	121760	90613	2.39	1.83
6	MAUS 162 (+Pigeonpea)	2	2150	1115	3861	1730	925	3149	166023	135407	50950	49417	115073	85990	2.26	1.74
7	*MACS 1188 (+Sugarcane)	1	2250	144000	9377	1875	118000	7684	499950	411025	199178	185431	300772	225594	1.51	1.22
8	*MACS 1407 (+Sugarcane)	1	2625	150000	9767	2125	121000	7879	532875	430175	205393	192054	327482	238121	1.59	1.24

*** Gross and Net return, B:C Ratio, additional returns for sugarcane are estimated as sugarcane is 18months old crop not yet harvested during reporting period as received from respective center.**
 # Gross return, Cost of cultivation, Net return, Net B: C are soybean +respective intercrop.

Table 8.4.1 Zone wise performance of SOYBEAN varieties under different components of FLDs conducted at various locations in farmers' field 2022-23.

S. N.	Zone	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	CZ	JS 20-34	297	1904	1548	89049	72405	36049	31717	53000	40689	1.51	1.41
		JS 20-69	224	1896	1449	103330	78809	33400	23303	69930	55506	2.09	2.38
		JS 20-98	14	1936	1694	96812	84722	39166	32110	57646	52612	1.47	1.64
		RVS 24	10	2363	1553	113400	74520	30405	26100	82995	48420	2.73	1.86
		MAUS 612	68	2531	2012	131553	101790	62047	53361	69506	48429	1.17	0.92
		MAUS 158	12	2238	1863	109410	91063	49442	48261	59968	42802	1.21	0.89

		MAUS 162	15	2333	1986	110143	93534	49381	48215	60762	45319	1.23	0.94
		AMS 100-39	25	1892	1535	124882	104816	47383	44943	77499	59874	1.63	1.33
		KDS 726	64	2206	1691	103691	77565	46373	39101	57318	38464	1.72	1.20
		PKV-Amba	1	2850	1913	122550	80346	73530	58222	49020	22124	0.67	0.38
		NRC 37	10	1284	944	64215	47185	25875	21006	38340	26179	1.48	1.25
		JS 20-116	5	2908	2322	125044	99846	40307	39249	84737	60597	2.10	1.54
2	SZ	Phule Kimaya	18	1591	1314	55669	46002	49090	42040	6579	3962	0.13	0.09
		Phule Agrani	7	1613	1345	56465	47075	49090	42040	7375	5035	0.15	0.12
		MACS 1188	4	2669	2219	120094	99844	40748	38169	79346	61675	1.95	1.62
		MACS 1281	2	2850	2500	128250	112500	41198	38778	87052	73723	2.11	1.90
		MACS 1407	2	2875	2438	129375	109688	40210	38618	89165	71070	2.22	1.84
		MACS 1460	4	2844	2406	127969	108281	40429	37956	87540	70325	2.17	1.85
		MACS 1520	2	3125	2563	140625	115313	43273	40600	97352	74713	2.25	1.84
		MACSNRC 1667	1	2750	2250	123750	101250	42148	40300	81602	60950	1.94	1.51
		Dsb 21	60	2334	1842	116719	92078	52855	46416	63864	45662	1.31	1.05
		Dsb 34	53	2592	1792	129596	89584	44545	37560	85051	52024	1.91	1.39
		JS 93-05	6	2317	2060	114939	102160	55625	52167	59313	49994	1.07	0.96
		JS 335	19	1824	1598	99509	87261	45125	40647	54384	46615	1.21	1.20
		KDS-753	363	2125	1837	163084	144963	61005	56386	102079	88577	1.66	1.53
		KDS-726	14	2423	2101	122962	106612	61067	56413	61896	50199	1.01	0.89
		Eagle seeds	3	2350	2000	127244	108304	56280	52113	70964	56191	1.26	1.08
		Karishma	3	2353	2007	116718	99500	56035	50375	60683	49125	1.08	0.98
		Vikrant	6	2362	2063	118414	103446	57611	52792	60803	50654	1.06	0.96
		KBS 23	11	1321	1158	79233	69507	34986	29204	44247	40303	1.26	1.38
3	NHZ	Hara Soya	21	1354	1068	87985	69442	53523	48671	34462	20771	0.64	0.43
		Him Soya	18	1274	1023	82810	66473	53523	48671	29287	17802	0.55	0.37
		Himso-1685	1	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
		Palam Soya	15	1203	978	78175	63550	53523	48671	24652	14879	0.46	0.31
		PS 1556	2	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
		VL Bhat 201 (black)	33	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
		VL Soya 89 (yellow)	34	1763	1409	106246	81080	55224	50561	51022	30520	0.92	0.60

4	NPZ	PS 1347	29	1609	1319	68948	56419	35573	29711	33375	26708	0.94	0.90
		PS 25	2	1325	1200	56975	50525	26251	23926	30724	26599	1.17	1.11
		PS 26	29	1707	1378	73100	58940	35919	29926	37181	29014	1.04	0.97
		SL 958	55	1660	1465	78515	71703	35348	33345	43167	38358	1.23	1.14
		PS 1225	10	1965	1550	84495	66650	36264	30140	48231	36510	1.33	1.21
5	NEHZ	MACS 1460	10	1646	1163	115229	81375	43386	28410	71843	52965	1.66	1.86
		DSb 19	5	1656	1150	132480	92000	43944	28854	88536	63146	2.01	2.19
		DSb 32	5	1204	854	96320	68320	47356	32760	48964	35560	1.03	1.09
6	EZ	CG Soya-1	100	1677	998	72090	42906	24323	18295	47767	24611	1.96	1.35
		Birsa Soy-3	10	1534	1042	65962	44785	32493	26180	33470	18605	1.03	0.71
		RSC 10-46	10	1509	1059	64887	45516	32493	26180	32395	19336	1.00	0.74
		NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37

Table 8.4.1a Zone wise performance of SOYBEAN varieties under whole package of FLDs conducted at various locations in farmers' fields 2022-23.

S. N.	Zone	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	CZ	JS 20-34	177	1916	1590	89222	74213	35472	32169	53750	42045	1.58	1.41
		JS 20-69	44	2044	1749	107461	91823	33539	27194	73922	64628	2.20	2.38
		JS 20-98	14	1936	1694	96812	84722	39166	32110	57646	52612	1.47	1.64
		RVS 24	10	2363	1553	113400	74520	30405	26100	82995	48420	2.73	1.86
		MAUS 612	15	2588	2195	111298	89988	49140	48030	62158	41958	1.26	0.87
		MAUS 158	10	2250	1890	96750	81270	49140	48030	47610	33240	0.97	0.69
		MAUS 162	13	2362	2025	101566	87422	49140	48030	52426	39392	1.07	0.82
		AMS 100-39	12	1919	1611	84059	70490	41682	39420	42377	31071	1.05	0.83
		KDS-726	61	2171	1664	101372	76154	46004	38531	55368	37624	1.68	1.21
		PKV-Amba	1	2850	1913	122550	80346	73530	58222	49020	22124	0.67	0.38
		NRC 37	10	1284	944	64215	47185	25875	21006	38340	26179	1.48	1.25
		JS 20-116	5	2908	2322	125044	99846	40307	39249	84737	60597	2.10	1.54
2	SZ	Phule Kimaya	18	1591	1314	55669	46002	49090	42040	6579	3962	0.13	0.09
		Phule Agrani	7	1613	1345	56465	47075	49090	42040	7375	5035	0.15	0.12

		MACS 1188	3	2808	2333	126375	105000	42323	39833	84052	65167	1.99	1.64
		MACS 1281	2	2850	2500	128250	112500	41198	38778	87052	73723	2.11	1.90
		MACS 1407	1	3125	2750	140625	123750	43273	42875	97352	80875	2.25	1.89
		MACS 1460	2	3250	2750	146250	123750	43648	41288	102603	82463	2.35	2.00
		MACS 1520	2	3125	2563	140625	115313	43273	40600	97352	74713	2.25	1.84
		MACSNRC 1667	1	2750	2250	123750	101250	42148	40300	81602	60950	1.94	1.51
		Dsb 34	24	2551	1792	127569	89604	44545	37560	83024	52044	1.86	1.39
		KDS-753	250	2120	1838	112410	97414	44424	41373	67987	56041	1.72	1.52
		KDS-726	10	2411	2078	122505	105615	62136	57082	60369	48534	0.97	0.85
		Dsb 21	33	2067	1894	103333	94712	61164	55272	42169	39440	0.69	0.71
		JS 335	14	1317	1166	79007	69939	34986	29204	44021	40735	1.26	1.39
		KBS 23	11	1321	1158	79233	69507	34986	29204	44247	40303	1.26	1.38
3	NHZ	Hara Soya	16	1367	1084	88855	70482	53523	48671	35332	21811	0.66	0.45
		Him Soya	15	1261	1014	81970	65929	53523	48671	28447	17258	0.53	0.35
		Palam Soya	12	1195	970	77643	63018	53523	48671	24120	14347	0.45	0.29
		PS-1556	2	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
		Himso-1685	1	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
4	NPZ	PS 26	28	1716	1380	73791	59355	36264	30140	37527	29215	1.03	0.97
		PS 1347	11	1514	1250	65086	53750	36264	30140	28822	23610	0.79	0.78
		SL 958	55	1660	1465	78515	71703	35348	33345	43167	38358	1.23	1.14
		PS 1225	1	1850	1450	79550	62350	36264	30140	43286	32210	1.19	1.07
5	NEHZ	MACS 1460	7	1710	1200	119686	84000	39829	28410	79857	55590	2.00	1.96
		DSb 19	5	1656	1150	132480	92000	43944	28854	88536	63146	2.01	2.19
6	EZ	CG Soya-1	50	1614	1005	69420	43230	22585	18295	46835	24935	2.07	1.36
		RSC 10-46	5	1524	1057	65532	45451	32115	26180	33417	19271	1.04	0.74
		Birsa Soy-3	5	1536	1040	66048	44720	32115	26180	33933	18540	1.06	0.71
		NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37

Table 8.4.1b Zone wise performance of SOYBEAN varieties under integrated Weed management (IWM)of FLDs conducted at various locations in farmers' field 2022-23.

S.N.	Zone	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	CZ	KDS-726	3	2033	1668	111287	85287	27639	30526	83648	54760	3.03	1.79
2	SZ	Dsb 34	9	2560	1774	127989	88711	44545	37560	83444	51151	1.87	1.36
		Dsb 21	11	2601	1802	130036	90100	44545	37560	85491	52540	1.92	1.40
		JS-335	4	2320	2039	117535	103366	53830	51993	63706	51374	1.18	0.99
		JS 93-05	2	2423	2195	119333	108104	54026	51752	65307	56353	1.21	1.09
		KDS-726	1	2480	2210	121520	108290	57742	56773	63778	51517	1.10	0.91
		Eagle seeds	1	2288	1880	123552	101520	49104	46988	74448	54532	1.52	1.16
		Karishma	1	2314	1940	122064	102335	51930	49546	70134	52789	1.35	1.07
		Vikrant	1	2395	2140	123343	110210	52690	48743	70653	61467	1.34	1.26
3	NHZ	Hara Soya	1	1655	1310	107575	85150	53523	48671	54052	36479	1.01	0.75
		Him Soya	2	1455	1140	94575	74100	53523	48671	41052	25429	0.77	0.52
		Palam Soya	1	1015	850	65975	55250	53523	48671	12452	6579	0.23	0.14
4	NPZ	PS 1225	9	1978	1561	85044	67128	36264	30140	48780	36988	1.35	1.23
		PS 1347	16	1697	1375	72966	59125	36264	30140	36702	28985	1.01	0.96
5	EZ	CG Soya-1	30	1770	977	76109	42031	27085	18295	49024	23736	1.81	1.30
		Birsa Soy-3	5	1532	1043	65876	44849	32870	26180	33006	18669	1.00	0.71
		RSC 10-46	5	1494	1060	64242	45580	32870	26180	31372	19400	0.95	0.74

Table 8.4.1c Zone wise performance of SOYBEAN varieties under integrated nutrient management (INM)of FLDs conducted at various locations in farmers' field 2022-23.

S.N.	Zone	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	SZ	Dsb 34	10	2627	1798	131365	89920	44545	37560	86820	52360	1.95	1.39
		Dsb 21	10	2661	1782	133070	89085	44545	37560	88525	51525	1.99	1.37
		JS 93-05	1	2374	2132	114427	102762	57755	53087	56672	49675	0.98	0.94
		JS-335	1	2375	2001	129913	109455	61001	52476	68912	56979	1.13	1.09
		KDS 753	1	2296	2010	126280	110550	58938	54699	67342	55851	1.14	1.02
		KDS 726	1	2560	2240	131840	115360	61273	54754	70567	60606	1.15	1.11
		Eagle seeds	2	2382	2060	129090	111696	59868	54676	69223	57020	1.16	1.04
		Karishma	2	2372	2040	114045	98082	58087	50790	55958	47293	0.96	0.93
		Vikrant	2	2381	2052	119673	103097	59420	53626	60254	49472	1.01	0.92
2	EZ	CG Soya-1	10	1829	1063	78656	45692	25185	18295	53471	27397	2.12	1.50

Table 8.4.1d Zone wise performance of SOYBEAN varieties under integrated pest management (IPM)of FLDs conducted at various locations in farmers' field 2022-23.

S.N.	Zone	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	SZ	Dsb 34	8	2615	1789	130731	89438	44545	37560	86186	51878	1.93	1.38
		Dsb 21	8	2618	1794	130906	89675	44545	37560	86361	52115	1.94	1.39
		JS 93-05	3	2228	1945	112180	97997	55981	52136	56198	45861	1.00	0.88
		KDS 753	2	2372	2090	124454	109713	58876	53781	65578	55932	1.11	1.04
		KDS-726	2	2389	2091	121530	106383	57279	53718	64251	52665	1.12	0.98
		Vikrant	3	2339	2046	115931	101424	58045	53586	57885	47838	1.00	0.89
2	EZ	CG Soya-1	10	1554	957	66813	41130	23860	18295	42953	22835	1.80	1.25
		NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37

Table 8.4.1e Zone wise performance of SOYBEAN varieties under Organic Farming (Org. Far.)of FLDs conducted at various locations in farmers' field 2022-23.

S. N.	Zone	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	CZ	JS 20-34	120	1903	1451	104684	79810	33366	22373	71319	57436	2.14	2.57
		JS 20-69	180	1860	1375	102321	75627	33366	22351	68955	53276	2.07	2.38
2	NHZ	Hara Soya	4	1295	1006	84175	65406	53523	48671	30652	16735	0.57	0.34
		Palam Soya	2	1338	1083	86938	70363	53523	48671	33415	21692	0.62	0.45
		VL Soya 89 (yellow)	34	1763	1409	106246	81080	55224	50561	51022	30520	0.93	0.61
		VL Bhat 201 (black)	33	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
3	NPZ	PS 1347	2	1425	1250	58050	49450	26251	23926	31799	25524	1.21	1.07
		PS 25	2	1325	1200	56975	50525	26251	23926	30724	26599	1.17	1.11
		PS 26	1	1450	1300	53750	47300	26251	23926	27499	23374	1.05	0.98
4	NEHZ	MACS 1460	3	1540	1100	107800	77000	49314	28410	58486	48590	1.19	1.71
		DSb 32	5	1204	854	96320	68320	47356	32760	48964	35560	1.03	1.09

Table 8.4.1f Zone wise performance of SOYBEAN varieties under Intercropping (IC)of FLDs conducted at various locations in farmers' field 2022-23.

S. N.	Zone	Variety	No. of trial	Yield (kg/ha)						Gross return (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns Rs/ha		Net B:C Ratio (N/C)	
				IT			FP										
				soybean	Intercrop	SEY	soybean	Intercrop	SEY	IP	FP	IP	FP	IP	FP	IP	FP
1	CZ	PDKV Amba (AMS 100-39)+Pigeon pea	10	1731	813	2978	1349	796	2570	131151	112949	49700	46130	81452	66819	1.64	1.45
		MAUS 612+Pigeon pea	53	2327	803	2282	1809	612	1794	136350	107871	62801	53939	73549	53933	1.33	1.05
		MAUS 158 + Pigeon pea	2	2175	1200	4017	1730	995	3257	172710	140030	50950	49417	121760	90613	2.39	1.83
		AMS100-39 + Pigeon pea	3	2017	1217	3884	1627	1013	3182	166998	136812	50950	49417	116048	87395	2.28	1.77
		MAUS 162 + Pigeon pea	2	2150	1115	3861	1730	925	3149	166023	135407	50950	49417	115073	85990	2.26	1.74
2	SZ	MACS 1188+Sugarcane	1	2250	144000	9377	1875	118000	7684	499950	411025	199178	185431	300772	225594	1.51	1.22
		MACS 1407+Sugarcane	1	2625	150000	9767	2125	121000	7879	532875	430175	205393	192054	327482	238121	1.59	1.24
		MACS 1460+Sugarcane	2	2438	153000	9963	2063	121000	7879	533213	427488	205744	193535	72477	58188	0.35	0.30
		KDS-753 + Sugarcane and BT Cotton	110	2023	68693	6874	1722	65300	6335	337646	308354	113223	103983	224423	204371	1.81	1.75

*** Sugarcane yield, SEY, Gross and Net return, B:C Ratio, additional returns for sugarcane are estimated as sugarcane is 18months old crop not yet harvested during reporting period as received from respective center.**
 # Gross return, Cost of cultivation, Net return, Net B;C are soybean +respective intercrop.

Table 8.4.2State wise performance of SOYBEAN varieties under different components of FLDs conducted at various locations in farmers' field 2022-23.

S. N.	State	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	MH	MAUS 612	68	2531	2012	131553	101790	62047	53361	69506	48429	1.17	0.92
		MAUS 158	12	2238	1863	109410	91063	49442	48261	59968	42802	1.21	0.89
		MAUS 162	15	2333	1986	110143	93534	49381	48215	60762	45319	1.23	0.94
		AMS 100-39	25	1892	1535	124882	104816	47383	44943	77499	59874	1.63	1.33
		Phule Kimaya	18	1591	1314	55669	46002	49090	42040	6579	3962	0.13	0.09
		Phule Agrani	7	1613	1345	56465	47075	49090	42040	7375	5035	0.15	0.12
		MACS 1188	4	2669	2219	120094	99844	40748	38169	79346	61675	1.95	1.62
		MACS 1281	2	2850	2500	128250	112500	41198	38778	87052	73723	2.11	1.90
		MACS 1407	2	2875	2438	129375	109688	40210	38618	89165	71070	2.22	1.84
		MACS 1460	4	2844	2406	127969	108281	40429	37956	87540	70325	2.17	1.85
		MACS 1520	2	3125	2563	140625	115313	43273	40600	97352	74713	2.25	1.84
		MACSNRC 1667	1	2750	2250	123750	101250	42148	40300	81602	60950	1.94	1.51
		KDS 726	49	2666	1932	114646	81129	68055	52236	46591	28893	0.68	0.55
		PKV-Amba	1	2850	1913	122550	80346	73530	58222	49020	22124	0.67	0.38
		KDS 753	150	2205	1890	248405	226136	80971	74455	167434	151681	2.07	2.04
2	MP	JS 20-34	267	2183	1756	104678	84265	35812	31614	68867	52651	1.97	1.85
		JS 20-69	224	1896	1449	103330	78809	33400	23303	69930	55506	2.09	2.38
		JS 20-98	14	1936	1694	96812	84722	39166	32110	57646	52612	1.47	1.64
		RVS 24	10	2363	1553	113400	74520	30405	26100	82995	48420	2.73	1.86
		JS 20-116	5	2908	2322	125044	99846	40307	39249	84737	60597	2.10	1.54
3	KA	Dsb 21	60	2334	1842	116719	92078	52855	46416	63864	45662	1.31	1.05
		Dsb 34	53	2592	1792	129596	89584	44545	37560	85051	52024	1.91	1.39
		KDS 753	200	1765	1526	116797	100682	40236	37994	76561	62688	1.90	1.65
		JS 335	14	1317	1166	79007	69939	34986	29204	44021	40735	1.26	1.39
		KBS 23	11	1321	1158	79233	69507	34986	29204	44247	40303	1.26	1.38
4	GJ	KDS 726	15	1747	1450	92736	74001	24690	25966	68045	48035	2.76	1.85
		NRC 37	10	1284	944	64215	47185	25875	21006	38340	26179	1.48	1.25

5	UK	VL Bhat 201 (black)	33	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
		VL Soya 89 (yellow)	33	1850	1497	103617	76361	56925	52450	46692	23911	0.82	0.46
		PS 1347	29	1609	1319	68948	56419	35573	29711	33375	26708	0.94	0.90
		PS 25	2	1325	1200	56975	50525	26251	23926	30724	26599	1.17	1.11
		PS 26	29	1707	1378	73100	58940	35919	29926	37181	29014	1.04	0.97
		SL 958	5	1710	1400	73530	60200	36264	30140	37266	30060	1.03	1.00
		PS 1225	10	1965	1550	84495	66650	36264	30140	48231	36510	1.33	1.21
6	HP	Hara Soya	21	1354	1068	87985	69442	53523	48671	34462	20771	0.64	0.43
		Him Soya	18	1274	1023	82810	66473	53523	48671	29287	17802	0.55	0.37
		Himso-1685	1	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
		Palam Soya	15	1203	978	78175	63550	53523	48671	24652	14879	0.46	0.31
		PS 1556	2	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
		VL Soya 89 (yellow)	1	1675	1320	108875	85800	53523	48671	55352	37129	1.03	0.76
7	PB	SL 958	50	1610	1531	83500	83206	34432	36550	49068	46656	1.43	1.28
8	RJ	JS 20-34	30	1344	1132	57791	48686	36523	31922	21268	16764	0.58	0.53
9	TS	JS 93-05	6	2317	2060	114939	102160	55625	52167	59313	49994	1.07	0.96
		JS 335	5	2331	2031	120011	104584	55264	52089	64747	52495	1.17	1.01
		KDS-753	13	2406	2096	124050	108069	61807	56709	62243	51361	1.01	0.91
		KDS-726	14	2423	2101	122962	106612	61067	56413	61896	50199	1.01	0.89
		Eagle seeds	3	2350	2000	127244	108304	56280	52113	70964	56191	1.26	1.08
		Karishma	3	2353	2007	116718	99500	56035	50375	60683	49125	1.08	0.98
		Vikrant	6	2362	2063	118414	103446	57611	52792	60803	50654	1.06	0.96
10	NL	MACS 1460	10	1646	1163	115229	81375	43386	28410	71843	52965	1.66	1.86
11	CG	CG Soya-1	100	1677	998	72090	42906	24323	18295	47767	24611	1.96	1.35
12	JH	Birsa Soy-3	10	1534	1042	65962	44785	32493	26180	33470	18605	1.03	0.71
		RSC 10-46	10	1509	1059	64887	45516	32493	26180	32395	19336	1.00	0.74
13	MN	DSb 19	5	1656	1150	132480	92000	43944	28854	88536	63146	2.01	2.19
		DSb 32	5	1204	854	96320	68320	47356	32760	48964	35560	1.03	1.09
14	BR	NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37

Table 8.4.2a State wise performance of SOYBEAN varieties under whole packageof FLDs conducted at various locations in farmers' fields 2022-23.

S. N.	State	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	MH	MAUS 612	15	2588	2195	111298	89988	49140	48030	62158	41958	1.26	0.87
		MAUS 158	10	2250	1890	96750	81270	49140	48030	47610	33240	0.97	0.69
		MAUS 162	13	2362	2025	101566	87422	49140	48030	52426	39392	1.07	0.82
		AMS 100-39	12	1919	1611	84059	70490	41682	39420	42377	31071	1.05	0.83
		Phule Kimaya	18	1591	1314	55669	46002	49090	42040	6579	3962	0.13	0.09
		Phule Agrani	7	1613	1345	56465	47075	49090	42040	7375	5035	0.15	0.12
		MACS 1188	3	2808	2333	126375	105000	42323	39833	84052	65167	1.99	1.64
		MACS 1281	2	2850	2500	128250	112500	41198	38778	87052	73723	2.11	1.90
		MACS 1407	1	3125	2750	140625	123750	43273	42875	97352	80875	2.25	1.89
		MACS 1460	2	3250	2750	146250	123750	43648	41288	102603	82463	2.35	2.00
		MACS 1520	2	3125	2563	140625	115313	43273	40600	97352	74713	2.25	1.84
		MACSNRC 1667	1	2750	2250	123750	101250	42148	40300	81602	60950	1.94	1.51
		KDS-726	49	2666	1932	114646	81129	68055	52236	46591	28893	0.68	0.55
		PKV-Amba	1	2850	1913	122550	80346	73530	58222	49020	22124	0.67	0.38
		KDS- 753	100	2201	1912	116660	101319	42379	40225	74281	61094	1.75	1.52
2	MP	JS 20-34	147	2202	1819	104937	86977	34946	32292	69991	54685	2.08	1.86
		JS 20-69	44	2044	1749	107461	91823	33539	27194	73922	64628	2.20	2.38
		JS 20-98	14	1936	1694	96812	84722	39166	32110	57646	52612	1.47	1.64
		RVS 24	10	2363	1553	113400	74520	30405	26100	82995	48420	2.73	1.86
		JS 20-116	5	2908	2322	125044	99846	40307	39249	84737	60597	2.10	1.54
3	KA	Dsb 34	24	2551	1792	127569	89604	44545	37560	83024	52044	1.86	1.39
		Dsb 21	33	2067	1894	103333	94712	61164	55272	42169	39440	0.69	0.71
		KDS 753	140	1736	1496	96826	83431	28212	26399	68613	57032	2.43	2.16
		JS 335	14	1317	1166	79007	69939	34986	29204	44021	40735	1.26	1.39
		KBS 23	11	1321	1158	79233	69507	34986	29204	44247	40303	1.26	1.38
4	GJ	KDS-726	12	1675	1396	88098	71180	23953	24826	64145	46354	2.68	1.87
		NRC 37	10	1284	944	64215	47185	25875	21006	38340	26179	1.48	1.25
5	UK	PS 26	28	1716	1380	73791	59355	36264	30140	37527	29215	1.03	0.97

		PS 1347	11	1514	1250	65086	53750	36264	30140	28822	23610	0.79	0.78
		SL 958	5	1710	1400	73530	60200	36264	30140	37266	30060	1.03	1.00
		PS 1225	1	1850	1450	79550	62350	36264	30140	43286	32210	1.19	1.07
6	HP	Hara Soya	16	1367	1084	88855	70482	53523	48671	35332	21811	0.66	0.45
		Him Soya	15	1261	1014	81970	65929	53523	48671	28447	17258	0.53	0.35
		Palam Soya	12	1195	970	77643	63018	53523	48671	24120	14347	0.45	0.29
		PS-1556	2	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
		Himso-1685	1	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
7	PB	SL 958	50	1610	1531	83500	83206	34432	36550	49068	46656	1.43	1.28
8	RJ	JS 20-34	30	1344	1132	57791	48686	36523	31922	21268	16764	0.58	0.53
9	TS	KDS-753	10	2424	2106	123746	107492	62680	57495	61066	49997	0.97	0.87
		KDS-726	10	2411	2078	122505	105615	62136	57082	60369	48534	0.97	0.85
10	NL	MACS 1460	7	1710	1200	119686	84000	39829	28410	79857	55590	2.00	1.96
11	CG	CG Soya-1	50	1614	1005	69420	43230	22585	18295	46835	24935	2.07	1.36
12	JH	RSC 10-46	5	1524	1057	65532	45451	32115	26180	33417	19271	1.04	0.74
		Birsa Soy-3	5	1536	1040	66048	44720	32115	26180	33933	18540	1.06	0.71
13	MN	DSb 19	5	1656	1150	132480	92000	43944	28854	88536	63146	2.01	2.19
14	BR	NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37

Table 8.4.2b State wise performance of SOYBEAN varieties under integrated weed management (IWM)of FLDs conducted at various locations in farmers' field 2022-23.

S. N.	State	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	KA	Dsb 34	9	2560	1774	127989	88711	44545	37560	83444	51151	1.87	1.36
		Dsb 21	11	2601	1802	130036	90100	44545	37560	85491	52540	1.92	1.40
2	GJ	KDS-726	3	2033	1668	111287	85287	27639	30526	83648	54760	3.03	1.79
3	UK	PS 1225	9	1978	1561	85044	67128	36264	30140	48780	36988	1.35	1.23
		PS 1347	16	1697	1375	72966	59125	36264	30140	36702	28985	1.01	0.96
4	HP	Hara Soya	1	1655	1310	107575	85150	53523	48671	54052	36479	1.01	0.75
		Him Soya	2	1455	1140	94575	74100	53523	48671	41052	25429	0.77	0.52
		Palam Soya	1	1015	850	65975	55250	53523	48671	12452	6579	0.23	0.14
5	TS	JS-335	4	2320	2039	117535	103366	53830	51993	63706	51374	1.18	0.99
		JS 93-05	2	2423	2195	119333	108104	54026	51752	65307	56353	1.21	1.09
		KDS-726	1	2480	2210	121520	108290	57742	56773	63778	51517	1.10	0.91
		Eagle seeds	1	2288	1880	123552	101520	49104	46988	74448	54532	1.52	1.16
		Karishma	1	2314	1940	122064	102335	51930	49546	70134	52789	1.35	1.07
		Vikrant	1	2395	2140	123343	110210	52690	48743	70653	61467	1.34	1.26
6	CG	CG Soya-1	30	1770	977	76109	42031	27085	18295	49024	23736	1.81	1.30
7	JH	Birsa Soy-3	5	1532	1043	65876	44849	32870	26180	33006	18669	1.00	0.71
		RSC 10-46	5	1494	1060	64242	45580	32870	26180	31372	19400	0.95	0.74

Table 8.4.2c State wise performance of SOYBEAN varieties under integrated nutrient management (INM)of FLDs conducted at various locations in farmers' field 2022-23.

S.N.	State	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	KA	Dsb 34	10	2627	1798	131365	89920	44545	37560	86820	52360	1.95	1.39
		Dsb 21	10	2661	1782	133070	89085	44545	37560	88525	51525	1.99	1.37
2	TS	JS 93-05	1	2374	2132	114427	102762	57755	53087	56672	49675	0.98	0.94
		JS-335	1	2375	2001	129913	109455	61001	52476	68912	56979	1.13	1.09
		KDS 753	1	2296	2010	126280	110550	58938	54699	67342	55851	1.14	1.02
		KDS 726	1	2560	2240	131840	115360	61273	54754	70567	60606	1.15	1.11
		Eagle seeds	2	2382	2060	129090	111696	59868	54676	69223	57020	1.16	1.04
		Karishma	2	2372	2040	114045	98082	58087	50790	55958	47293	0.96	0.93
		Vikrant	2	2381	2052	119673	103097	59420	53626	60254	49472	1.01	0.92
3	CG	CG Soya-1	10	1829	1063	78656	45692	25185	18295	53471	27397	2.12	1.50

Table 8.4.2d State wise performance of SOYBEAN varieties under integrated pest management (IPM)of FLDs conducted at various locations in farmers' field 2022-23.

S. N.	State	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	KA	Dsb 34	8	2615	1789	130731	89438	44545	37560	86186	51878	1.93	1.38
		Dsb 21	8	2618	1794	130906	89675	44545	37560	86361	52115	1.94	1.39
2	TS	JS 93-05	3	2228	1945	112180	97997	55981	52136	56198	45861	1.00	0.88
		KDS 753	2	2372	2090	124454	109713	58876	53781	65578	55932	1.11	1.04
		KDS-726	2	2389	2091	121530	106383	57279	53718	64251	52665	1.12	0.98
		Vikrant	3	2339	2046	115931	101424	58045	53586	57885	47838	1.00	0.89
3	CG	CG Soya-1	10	1554	957	66813	41130	23860	18295	42953	22835	1.80	1.25
4	BR	NRC 128	10	1976	1642	135028	111656	46736	47115	88292	64541	1.89	1.37

Table 8.4.2e State wise performance of SOYBEAN varieties under Organic Farming (Org. Far.)of FLDs conducted at various locations in farmers' field 2022-23.

S.N.	State	Variety	No. of trial	Grain yield (kg/ha)		Gross Returns (Rs/ha)		Cost of cultivation (Rs./ha)		Net returns (Rs/ha)		Net BC Ratio (N:C)	
				IT	FP	IT	FP	IT	FP	IT	FP	IT	FP
1	MP	JS 20-34	120	1903	1451	104684	79810	33366	22373	71319	57436	2.14	2.57
		JS 20-69	180	1860	1375	102321	75627	33366	22351	68955	53276	2.07	2.38
2	UK	VL Bhat 201 (black)	33	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
		VL Soya 89 (yellow)	33	1850	1497	103617	76361	56925	52450	46692	23911	0.82	0.46
		PS 1347	2	1425	1250	58050	49450	26251	23926	31799	25524	1.21	1.07
		PS 25	2	1325	1200	56975	50525	26251	23926	30724	26599	1.17	1.11
		PS 26	1	1450	1300	53750	47300	26251	23926	27499	23374	1.05	0.98
3	HP	Hara Soya	4	1295	1006	84175	65406	53523	48671	30652	16735	0.57	0.34
		Palam Soya	2	1338	1083	86938	70363	53523	48671	33415	21692	0.62	0.45
		VL Soya 89 (yellow)	1	1675	1320	108875	85800	53523	48671	55352	37129	1.03	0.76
4	NL	MACS 1460	3	1540	1100	107800	77000	49314	28410	58486	48590	1.19	1.71
5	MN	DSb 32	5	1204	854	96320	68320	47356	32760	48964	35560	1.03	1.09

Table 8.4.2f State wise performance of SOYBEAN varieties under Intercropping (IC)of FLDs conducted at various locations in farmers' field 2022-23.

S. N.	State	Variety	No. of trial	Yield (kg/ha)						Gross return (Rs/ha)		Cost of cultivation (Rs/ha)		Net returns Rs/ha		Net B:C Ratio (N/C)	
				IT			FP										
				soybean	Intercrop	SEY	soybean	Intercrop	SEY	IP	FP	IP	FP	IP	FP	IP	FP
1	MH	MACS 1188+Sugarcane	1	2250	144000	9377	1875	118000	7684	499950	411025	199178	185431	300772	225594	1.51	1.22
		MACS 1407+Sugarcane	1	2625	150000	9767	2125	121000	7879	532875	430175	205393	192054	327482	238121	1.59	1.24
		MACS 1460+Sugarcane	2	2438	153000	9963	2063	121000	7879	533213	427488	205744	193535	72477	58188	0.35	0.30
		PDKV Amba +Pigeon pea	10	1731	813	2978	1349	796	2570	131151	112949	49700	46130	81452	66819	1.64	1.45
		MAUS 612+Pigeon pea	53	2327	803	2282	1809	612	1794	136350	107871	62801	53939	73549	53933	1.33	1.05
		KDS-753 + Sugarcane	50	2214	136622	11905	1847	129951	11064	511895	475771	158154	142915	353741	332856	2.24	2.33
		MAUS 158 + Pigeon pea	2	2175	1200	4017	1730	995	3257	172710	140030	50950	49417	121760	90613	2.39	1.83
		AMS100-39 + Pigeon pea	3	2017	1217	3884	1627	1013	3182	166998	136812	50950	49417	116048	87395	2.28	1.77
		MAUS 162 + Pigeon pea	2	2150	1115	3861	1730	925	3149	166023	135407	50950	49417	115073	85990	2.26	1.74
2	KA	KDS 753 + BT Cotton	60	1833	763	1844	1596	648	1605	163397	140936	68292	65050	95105	75886	1.39	1.17

*** Sugarcane yield, SEY, Gross and Net return, B:C Ratio, additional returns for sugarcane are estimated as sugarcane is 18months old crop not yet harvested during reporting period as received from respective center.**
 # Gross return, Cost of cultivation, Net return, Net B;C are soybean +respective intercrop.

Table 5Details of soybean cost of cultivation (Rs ha^{-1}) under different components of FLD in improved technology and farmers practices2022-23.

S. No.	Name of implementing centre		Land preparation	Seed & Sowing	ST & Ino'n	Manure & appl'n	Ferti., organic ferti. & appli'n	Irrigation	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e & appli'n	Harv-esting	Thres-hing	Any other	Total cost of cultivation
1	Palampur (CSKHPKV)	IT	11000	13507	60	5298	4998	-	4296	1596	-	-	-	5586	4788	2394	**53523**
		FP	11000	11625	-	5298	-	-	-	-	7980	-	-	5586	4788	2394	**48671**
2	Almora (VPKAS)	IT	4800	7238	800	-	22200	-	-	-	16000	-	-	4000	3200	-	**58238**
		FP	4250	9400	-	-	22200	-	-	-	16000	-	-	4000	3200	-	**59050**
3	Pantnagar (GBPUA&T)	IT	6000	5964	107	1200	2732	-	1967	732	5000	1508	-	3660	1916	366	**31151**
		FP	6000	5123	57	1200	1767	-	890	732	4500	1325	-	3477	1600	366	**27036**
4	Ludhiana (PAU)	IT	4163	3750	75	-	3120	368	1575	-	-	950	-	-	-	18720	**32721**
		FP	3885	3750	-	-	3120	276	750	-	-	950	-	-	-	16200	**28931**
5	Indore (IISR/AICRPS)	IT	3989	7718	703	7500	3849	-	2301	-	1075	1631	1149	2837	2034	-	**34786**
		FP	3311	9373	427	-	4412	-	-	-	2470	608	-	3414	2694	-	**26709**
6	Sehore (RVSKVV)	IT	6000	7000	336	-	4169	-	2500	-	-	2500	-	4500	2400	1000	**24405**
		FP	6000	8000	-	-	3400	-	2500	-	-	2500	-	3700	-	-	**20100**
7	Kota (MPUA&T)	IT	7500	9000	233	-	2368	-	2258	-	-	4316	-	6048	4800	-	**36523**
		FP	7500	7000	-	-	-	-	2258	-	-	4316	-	6048	4800	-	**31922**
8	Parbhani (MAU)	IT	7500	7870	370	-	7362	-	2813	-	1800	4583	1773	7469	9912	-	**51452**
		FP	7500	8270	-	-	5475	-	2813	-	1800	6146	1773	8125	8229	-	**50130**
9	Amravati (PDKV)	IT	6750	9938	505	-	5684	-	2425	-	3950	4768	900	6000	4439	-	**45358**
		FP	6750	11173	-	-	3538	-	2280	-	3950	3729	824	6000	3582	-	**41825**
10	Kasbe Digraj, Sangli (MPKV)	IT	2300	5550	203	-	2743	-	840	-	1000	1250	750	2000	3000	-	**19636**
		FP	2300	4125	90	-	2711	-	840	-	1000	1250	-	2000	2500	-	**16816**
11	Pune (ARI)	IT	17239	16938	1430	7200	17037	14730	5300	-	15469	7875	-	11970	8123	-	**123310**
		FP	16926	16938	801	6000	14828	14530	2775	-	19383	5450	-	11306	6815	-	**115752**
12	Dharwad (UAS)	IT	8800	9051	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**44545**
		FP	8800	7500	-	-	3475	-	-	2400	6400	846	900	3000	4250	-	**37571**
13	Adilabad (PJTSAU)	IT	5892	11755	478	1386	10021	1672	3035	1130	1277	4804	2715	7382	6975	500	**59022**
		FP	5892	11343	138	246	9099	1672	3075	834	1398	4530	2316	7382	6062	500	**54487**
14	Medziphema	IT	3000	7500	177	9000	7930	-	770	-	4290	4315	-	2640	4950	-	**44572**
		FP	3000	7890	-	3000	-	-	-	-	6600	-	-	3960	3960	-	**28410**
15	Ugar Khurd (Ugar Sugar Works Ltd.)	IT	6500	6756	127	-	12170	-	-	-	12356	1750	1550	12356	4000	3600	**61164**
		FP	6500	6756	-	-	10520	-	-	-	11473	-	-	11473	3400	3600	**53722**
16	Raipur (IGKVV)	IT	1800	7125	460	650	4500	-	2400	-	1125	2119	-	2500	-	2000	**24679**
		FP	1800	7125	370	-	4500	-	-	-	-	-	-	2500	-	2000	**18295**
17	Ranchi (BAU)	IT	4250	8275	340	-	7980	-	1138	-	2100	2050	-	2800	3500	-	**32433**
		FP	2550	7590	-	-	5690	-	-	-	3500	1250	-	2450	3150	-	**26180**
18	Imphal (CAU)	IT	3500	10474	225	8000	6429	-	-	-	7360	368	184	2944	4416	1750	**45650**
		FP	3000	7880	-	4000	1429	-	-	-	5520	368	-	2944	4416	1250	**30807**
19	KVK, Bharuch	IT	3500	8850	299	-	2670	-	1500	-	3000	600	-	3750	500	-	**24669**
		FP	3500	10325	-	-	1660	-	1600	-	4000	600	-	3750	500	-	**25935**
20	KVK Karda	IT	12100	6320	2025	-	7034	1000	4450	4500	7000	5805	2100	8185	5200	5000	**70718**

		FP	2500	4520	2025	-	5456	1000	4450	4500	7000	5752	2100	7800	3800	4390	**55292**
21	KVK, Begusarai	IT	6000	9770	680	2550	6455	1800	1600	-	1050	900	300	7636	8000	-	**46741**
		FP	6000	12500	680	2550	6455	1800	1600	-	1050	1650	580	7500	8000	-	**47515**
22	DevgrahBaria (TRTC)	IT	4800	7350	450	-	3300	-	2040	-	-	4672	-	1200	1800	-	**25612**
		FP	4800	5150	-	-	1600	-	-	-	2500	2500	-	1200	1800	-	**19550**
23	KVK, Belagavi	IT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**
		FP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**
24	Bengaluru (UAS)	IT	2500	5750	282	-	3554	1250	3750	-	6250	2400	1750	4500	-	-	**31986**
		FP	2500	5500	-	-	1554	1000	2750	-	6250	1650	1750	3750	2500	-	**29204**
25	KVK, Kane. kolhapur	IT	8400	28850	285	30000	11322	18000	2125	-	14250	1780	-	2600	7717	-	**125329**
		FP	8400	31350	-	15000	8325	18000	-	-	16000	1780	-	2600	6615	-	**108070**
26	Sipani farm, Mandsaur	IT	5700	7400	400	-	5796	-	2649	-	1200	2878	1559	7000	5725	-	**40307**
		FP	5700	8200	-	-	3750	-	2649	-	1200	4618	1559	7000	4573	-	**39249**
Mean		**IT**	**6166**	**9188**	**462**	**7278**	**6875**	**5546**	**2429**	**1997**	**5538**	**2926**	**1339**	**5109**	**4620**	**3926**	**45713**
Percentage			13.5	20.1	1.01	15.92	15.0	12.1	5.31	4.37	12.1	6.40	2.93	11.2	10.1	8.6	
Mean		**FP**	**5599**	**9136**	**573**	**4662**	**5680**	**6080**	**2231**	**2116**	**6446**	**2591**	**1475**	**5040**	**4147**	**3838**	**40047**
Percentage			14.0	22.8	1.43	11.64	14.2	15.2	5.57	5.28	16.1	6.47	3.68	12.6	10.4	9.58	
Overall increase in soybean cultivation cost over farmers practices																	**14.15**

Table 8.5a Details of soybean cost of cultivation ($Rsha^{-1}$) under whole packageof FLD in improved technology and farmers practices2022-23.

S. No.	Name of implementing centre		Land preparation	Seed & Sowing	ST & Ino'n	Manure & appl'n	Ferti., organic ferti. & appli'n	Irrigation	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e & appli'n	Harv-esting	Thres-hing	Any other	Total cost of cultivation
1	Palampur (CSKHPKV)	IT	11000	13507	60	5298	4998	-	4296	1596	-	-	-	5586	4788	2394	**53523**
		FP	11000	11625	-	5298	-	-	-	-	7980	-	-	5586	4788	2394	**48671**
2	Pantnagar (GBPUA&T)	IT	6000	5964	163	-	5464	-	3933	732	5000	3016	-	3660	1966	366	**36264**
		FP	6000	5214	113	-	3534	-	1780	732	4500	2650	-	3660	1600	366	**30149**
3	Ludhiana (PAU)	IT	4163	3750	75	-	3120	368	1575	-	-	950	-	-	-	18720	**32721**
		FP	3885	3750	-	-	3120	276	750	-	-	950	-	-	-	16200	**28931**
4	Indore (IISR/AICRPS)	IT	5578	8775	1090	-	4818	-	2301	-	-	1631	1149	3694	2089	-	**31125**
		FP	3622	9506	427	-	4412	-	-	-	1500	1136	-	3528	2089	-	**26219**
5	Sehore (RVSKVV)	IT	6000	7000	336	-	4169	-	2500	-	-	2500	-	4500	2400	1000	**24405**
		FP	6000	8000	-	-	3400	-	2500	-	-	2500	-	3700	-	-	**20100**
6	Kota (MPUA&T)	IT	7500	9000	233	-	2368	-	2258	-	-	4316	-	6048	4800	-	**36523**
		FP	7500	7000	-	-	-	-	2258	-	-	4316	-	6048	4800	-	**31922**
7	Parbhani (MAU)	IT	7500	8200	400		7735	-	2813	-	1800	3248	1773	7250	8421	-	**49140**
		FP	7500	9000	-		4200	-	2813	-	1800	4776	1773	9000	7168	-	**48030**
8	Amravati (PDKV)	IT	6750	10450	260	-	5421	-	2350	-	3950	2664	900	4500	3800	-	**41045**
		FP	6750	11470	-	-	3275	-	2060	-	3950	1930	748	4500	2850	-	**37533**
9	Kasbe digraj, Sangli (MPKV)	IT	2300	5550	203	-	2743	-	840	-	1000	1250	750	2000	3000	-	**19636**
		FP	2300	4125	90	-	2711	-	840	-	1000	1250	-	2000	2500	-	**16816**
10	Pune (ARI)	IT	7275	7375	185	-	8225	500	1688	-	-	3925	-	4500	8933	-	**42605**
		FP	6820	7375	-	-	6260	510	-	-	4728	2775	-	4363	7535	-	**40365**

11	Dharwad (UAS)	IT	8800	9051	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**44545**
		FP	8800	7500	-	-	3475	-	-	2400	6400	846	900	3000	4250	-	**37571**
12	Adilabad (PJTSAU)	IT	6449	13235	675	2000	9480	-	3665	-	3192	5402	2941	7755	7116	500	**62409**
		FP	6449	12657	64	-	7940	-	3798	293	3495	5327	2867	7755	6145	500	**57288**
13	Medziphema	IT	3000	7500	270	6000	8359	-	1540	-	2640	2930	-	2640	4950	-	**39829**
		FP	3000	7890	-	3000	-	-	-	-	6600	-	-	3960	3960	-	**28410**
14	Ugar Khurd (Ugar Sugar Works Ltd.)	IT	6500	6756	127	-	12170	3600	-	-	12356	1750	1550	12356	4000	-	**61164**
		FP	6500	6756	-	-	10520	3600	-	-	11473	-	-	11473	3400	-	**53722**
15	Raipur (IGKVV)	IT	1800	7125	460	-	4500	-	2400	-	-	1800	-	2500	-	2000	**22585**
		FP	1800	7125	370	-	4500	-	-	-	-	-	-	2500	-	2000	**18295**
16	Ranchi (BAU)	IT	4250	8275	340	-	7980	-	-	-	2800	2050	-	2800	3500	-	**31995**
		FP	2550	7590	-	-	5690	-	-	-	3500	1250	-	2450	3150	-	**26180**
17	Imphal (CAU)	IT	3500	10474	450	4000	8196	-	-	-	7360	736	368	2944	4416	1500	**43944**
		FP	3000	7880	-	-	2858	-	-	-	5520	736	-	2944	4416	1500	**28854**
18	KVK, Bharuch	IT	3500	8850	299	-	2670	-	1500	-	3000	600	-	3750	500	-	**24669**
		FP	3500	10325	-	-	1660	-	1600	-	4000	600	-	3750	500	-	**25935**
19	KVK Karda	IT	12100	4500	1550	-	7034	1000	3200	4500	7000	5800	2100	7800	5200	5000	**66784**
		FP	2500	3000	1550	-	5456	1000	3200	4500	7000	5828	2100	7800	3800	4390	**52124**
20	DevgrahBaria (TRTC)	IT	4800	7350	450	-	3300	-	2040	-	-	4672	-	1200	1800	-	**25612**
		FP	4800	5150	-	-	1600	-	-	-	2500	2500	-	1200	1800	-	**19550**
21	Bengaluru (UAS)	IT	2500	5750	282	-	3554	1250	3750	-	6250	2400	1750	4500	-	-	**31986**
		FP	2500	5500	-	-	1554	1000	2750	-	6250	1650	1750	3750	2500	-	**29204**
22	KVK, Kanerimath, Kolhapur	IT	6500	10100	285	-	7572	-	2125	-	4500	980	-	2600	7717	-	**42379**
		FP	6500	11300	-	-	4230	-	-	-	8000	980	-	2600	6615	-	**40225**
23	Sipani farm, Mandsaur	IT	5700	7400	400	-	5796	-	2649	-	1200	2878	1559	7000	5725	-	**40307**
		FP	5700	8200	-	-	3750	-	2649	-	1200	4618	1559	7000	4573	-	**39249**
Mean		**IT**	**5794**	**8084**	**395**	**4325**	**5919**	**1344**	**2457**	**2214**	**4484**	**2681**	**1484**	**4665**	**4468**	**3935**	**39356**
Percentage			14.7	20.5	1.00	11.0	15.0	3.41	6.24	5.63	11.4	6.81	3.77	11.9	11.4	10.0	
Mean		**FP**	**5135**	**7736**	**436**	**4149**	**4207**	**1277**	**2250**	**1981**	**4810**	**2454**	**1671**	**4662**	**3922**	**3907**	**34145**
Percentage			15.0	22.7	1.28	12.2	12.3	3.74	6.59	5.80	14.1	7.19	4.89	13.7	11.5	11.4	
Overall increase in soybean cultivation cost over farmers practices																	**15.26**

Table 5b Details of soybean cost of cultivation (Rsha^{-1})under integrated weed management (IWM)of FLD in improved technology and farmers practices2022-23.

S. No.	Name of implementing centre		Land preparation	Seed & Sowing	ST & Ino'n	Manure & appl'n	Ferti., organic ferti. & appli'n	Irrigation	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e & appli'n	Harv-esting	Thres-hing	Any other	Total cost of cultivation
1	Palampur (CSKHPKV)	IT	11000	13507	60	5298	4998	-	4296	1596	-	-	-	5586	4788	2394	**53523**
		FP	11000	11625	-	5298	-	-	-	-	7980	-	-	5586	4788	2394	**48671**
2	Pantnagar (GBPUA&T)	IT	6000	5964	163	-	5464	-	3933	732	5000	3016	-	3660	1966	366	**36264**
		FP	6000	5214	113	-	3534	-	1780	732	4500	2650	-	3660	1600	366	**30149**
3	Dharwad (UAS)	IT	8800	9051	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**44545**
		FP	8800	7500	-	-	3475	-	-	2400	6400	846	900	3000	4250	-	**37571**
4	Adilabad (PJTSAU)	IT	5689	10539	90	554	10971	3242	1135	3450	-	3171	567	6804	6772	500	**53484**
		FP	5689	10539	90	554	11487	3242	1370	1398	-	3171	567	6804	5942	500	**51352**
5	Raipur (IGKVV)	IT	1800	7125	460	-	4500	-	2400	-	4500	1800	-	2500	-	2000	**27085**
		FP	1800	7125	370	-	4500	-	-	-	-	-	-	2500	-	2000	**18295**
6	Ranchi (BAU)	IT	4250	8275	340	-	7980	-	2275	-	1400	2050	-	2800	3500	-	**32870**
		FP	2550	7590	-	-	5690	-	-	-	3500	1250	-	2450	3150	-	**26180**
7	KVK, Bharuch	IT	3500	8850	299	-	2670	-	1500	-	3000	600	-	3750	500	-	**24669**
		FP	3500	10325	-	-	1660	-	1600	-	4000	600	-	3750	500	-	**25935**
Mean		**IT**	**5863**	**9044**	**273**	**2926**	**6148**	**3242**	**2465**	**1952**	**3824**	**2354**	**567**	**4020**	**3629**	**1315**	38920
Percentage			15.1	23.2	0.70	7.52	15.8	8.33	6.33	5.01	9.82	6.05	1.46	10.3	9.32	3.38	
Mean		**FP**	**5620**	**8560**	**191**	**2926**	**5058**	**3242**	**1583**	**1510**	**5276**	**1703**	**734**	**3964**	**3372**	**1315**	34022
Percentage			16.5	25.2	0.56	8.60	14.9	9.53	4.65	4.44	15.5	5.01	2.16	11.7	9.91	3.87	
Overall increase in soybean cultivation cost over farmers practices																	**14.40**

Table 8.5c Details of soybean cost of cultivation (Rs ha^{-1})under integrated nutrient management (INM)of FLD in improved technology and farmers practices2022-23

S. No.	Name of implementing centre		Land preparation	Seed & Sowing	ST & Ino'n	Manure & appl'n	Ferti., organic ferti. & appli'n	Irrigation	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e & appli'n	Harv-esting	Thres-hing	Any other	Total cost of cultivation
1	Dharwad (UAS)	IT	8800	9051	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**44545**
		FP	8800	7500	-	-	3475	-	-	2400	6400	846	900	3000	4250	-	**37571**
2	Adilabad (PJTSAU)	IT	5412	11360	360	2000	11318	2493	3375	1116	0	4133	2765	7290	7088	500	**59209**
		FP	5412	10458	180	300	9270	2493	3075	1116	0	4133	2765	7290	6136	500	**53126**
3	Raipur (IGKVV)	IT	1800	7125	460	2600	4500	-	2400	-	-	1800	-	2500	-	2000	**25185**
		FP	1800	7125	370	-	4500	-	-	-	-	-	-	2500	-	2000	**18295**
Mean		**IT**	**5337**	**9179**	**440**	**2300**	**7424**	**2493**	**2496**	**1572**	**2609**	**3140**	**2765**	**4277**	**5669**	**1250**	**42980**
Percentage			12.4	21.4	1.02	5.35	17.3	5.80	5.81	3.66	6.07	7.31	6.43	10.0	13.2	2.91	
Mean		**FP**	**5337**	**8361**	**275**	**300**	**5748**	**2493**	**3075**	**1758**	**3200**	**2489**	**1833**	**4263**	**5193**	**1250**	**36331**
Percentage			14.7	23.0	0.76	0.83	15.8	6.86	8.46	4.84	8.81	6.85	5.04	11.7	14.3	3.44	
Overall increase in soybean cultivation cost over farmers practices																	**18.30**

Table 8.5d Details of soybean cost of cultivation (Rs ha^{-1})under integrated pest management (IPM)of FLD in improved technology and farmers practices2022-23

S. No.	Name of implementing centre		Land preparation	Seed & Sowing	ST & Ino'n	Manure & appl'n	Ferti., organic ferti. & appli'n	Irrigation	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e & appli'n	Harv-esting	Thres-hing	Any other	Total cost of cultivation
1	Dharwad (UAS)	IT	8800	9051	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**44545**
		FP	8800	7500	-	-	3475	-	-	2400	6400	846	900	3000	4250	-	**37571**
2	Adilabad (PJTSAU)	IT	5464	10407	590	375	8856	2628	3336	1084	-	5914	3601	7305	6786	500	**56843**
		FP	5464	10407	295	375	8856	2628	3336	1070	-	4690	2289	7305	5939	500	**53151**
3	Raipur (IGKVV)	IT	1800	7125	460	-	4500	-	2400	-	-	3075	-	2500	-	2000	**23860**
		FP	1800	7125	370	-	4500	-	-	-	-	-	-	2500	-	2000	**18295**
4	KVK, Begusarai	IT	6000	9770	680	2550	6455	1800	1600	-	1050	900	300	7636	8000	-	**46741**
		FP	6000	12500	680	2550	6455	1800	1600	-	1050	1650	580	7500	8000	-	**47515**
Mean		**IT**	**5516**	**9088**	**558**	**1463**	**6566**	**2214**	**2262**	**1556**	**3134**	**3344**	**1951**	**5121**	**6345**	**1250**	42997
Percentage			12.8	21.1	1.30	3.40	15.3	5.15	5.26	3.62	7.29	7.78	4.54	11.9	14.8	2.91	
Mean		**FP**	**5516**	**9383**	**448**	**1463**	**5821**	**2628**	**2468**	**1735**	**6400**	**2395**	**1256**	**5076**	**6063**	**1250**	39133
Percentage			14.1	24.0	1.15	3.74	14.9	6.71	6.31	4.43	16.4	6.12	3.21	13.0	15.5	3.19	
Overall increase in soybean cultivation cost over farmers practices																	**9.87**

Table 8.5e Details of soybean cost of cultivation(Rs ha^{-1}) underorganic farming (Org. Far.)of FLD in improved technology and farmer's practices2022-23

S. No.	Name of implementing centre		Land preparation	Seed & Sowing	ST & Ino'n	Manure & appl'n	Fertili., organic ferti. & appli'n	Irrigation	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e & appli'n	Harv-esting	Thres-hing	Any other	Total cost of cultivation
1	Almora (VPKAS)	IT	4800	7238	800	-	22200	-	-	-	16000	-	-	4000	3200	-	**58238**
		FP	4250	9400	-	-	22200	-	-	-	16000	-	-	4000	3200	-	**59050**
2	Pantnagar (GBPUA&T)	IT	6000	5964	50	2400	-	-	-	732	5000	-	-	3660	1866	366	**26038**
		FP	6000	5031	-	2400	-	-	-	732	4500	-	-	3294	1600	366	**23923**
3	Indore (IISR/AICRPS)	IT	2400	6660	315	15000	2881	-	-	-	2150	-	-	1980	1980	-	**33366**
		FP	3000	9240	-	-	-	-	-	-	3440	80	-	3300	3300	-	**22360**
4	Medziphema	IT	3000	7500	84	12000	7500	-	-	-	5940	5700	-	2640	4950	-	**49314**
		FP	3000	7890	-	3000	-	-	-	-	6600	-	-	3960	3960	-	**28410**
5	Imphal (CAU)	IT	3500	10474	-	12000	4662	-	-	-	7360	-	-	2944	4416	2000	**47356**
		FP	3000	7880	-	8000	-	-	-	-	5520	-	-	2944	4416	1000	**32760**
Mean		**IT**	**3940**	**7567**	**312**	**10350**	**9311**	**-**	**-**	**732**	**7290**	**5700**	**-**	**3045**	**3282**	**1183**	42862
Percentage			9.19	17.7	0.73	24.1	21.7	-	-	1.71	17.0	13.30	-	7.10	7.66	2.76	
Mean		**FP**	**3850**	**7888**	**-**	**4467**	**22200**	**-**	**0**	**732**	**7212**	**80**	**0**	**3500**	**3295**	**683**	33301
Percentage			11.6	23.7	-	13.4	66.7	-	0	2.20	21.7	0.24	0.0	10.5	9.90	2.05	
Overall increase in soybean cultivation cost over farmers practices																	**28.71**

Table 8.5f Details of soybean cost of cultivation (Rs ha^{-1})under intercropping (IC)of FLD in improved technology and farmers practices 2022-23.

S. No.	Name of implementing centre		Land preparation	Seed & Sowing	ST & Ino'n	Manure & appl'n	Ferti., organic ferti. & appli'n	Irrigation	Herb'e & appli'n	Bird watching	Hand weeding/ Iner-Culti'n	Insec'e & appli'n	Fungi'e & appli'n	Harv-esting	Thres-hing	Any other	#Total cost of cultivation
1	Parbhani (MAU) (Soybean+Pigeonpea)	IT	7500	7539	340	-	6989	-	-	-	1800	5918	1773	7688	11403	-	**50950**
		FP	7500	7539	-	-	6750	-	-	-	1800	7515	1773	7250	9290	-	**49417**
2	Amravati (PDKV) (Soybean+Pigeonpea)	IT	6750	9425	750	-	5946	-	2500	-	3950	6872	900	7500	5078	-	**49671**
		FP	6750	10875	-	-	3800	-	2500	-	3950	5528	900	7500	4314	-	**46117**
3	Pune (ARI) (Soybean + Sugarcane)	IT	27203	26500	2675	14400	25850	28960	8913	-	30938	11825	-	19440	7313	-	**204015**
		FP	27033	26500	1602	12000	23397	28550	5550	-	34038	8125	-	18250	6095	-	**191139**
4	KVK Karda (Soybean+Pigeonpea)	IT	12100	8139	2500	-	7034	1000	5700	4500	7000	5809	2100	8570	5200	5000	**74652**
		FP	2500	6039	2500	-	5456	1000	5700	4500	7000	5675	2100	7800	3800	4390	**58460**
5	KVK, Kanerimath, Kolhapur (Soybean+Sugarcane)	IT	10300	47600	285	30000	15072	18000	-	-	24000	2580	-	2600	7717	-	**158154**
		FP	10300	51400	-	15000	12420	18000	-	-	24000	2580	-	2600	6615	-	**142915**
Mean		**IT**	**12771**	**19841**	**1310**	**22200**	**12178**	**15987**	**5704**	**4500**	**13538**	**6601**	**1591**	**9160**	**7342**	**5000**	**107488**
Percentage			11.9	18.5	1.22	20.7	11.3	14.9	5.31	4.19	12.6	6.14	1.48	8.52	6.83	4.65	
Mean		**FP**	**10817**	**20471**	**2051**	**13500**	**10365**	**15850**	**4583**	**4500**	**14158**	**5885**	**1591**	**8680**	**6023**	**4390**	**97610**
Percentage			11.1	21.0	2.10	13.8	10.6	16.2	4.70	4.61	14.5	6.03	1.63	8.9	6.17	4.50	
Overall increase in soybean cultivation cost over farmers practices																	**10.12**

 # Total cost of cultivation (including all operational costs) is soybean +respective intercrop cost

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-452001

S.No.	Name	Designation	Discipline
1.	Dr. K.H. Singh	Director	Plant Breeding
2.	Dr. Sanjay Gupta	AICRP In-charge and PI- Plant Breeding	Plant Breeding
3.	Dr. M.P. Sharma	Principal Scientist and PI-Microbiology	Microbiology
4.	Dr. Rakesh Kumar Verma	Scientist and PI - Agronomy	Agronomy
5.	Dr. Raghvendra Nargund	Scientist and PI –FLD (Agronomy)	Agronomy
6.	Dr. Sanjeev Kumar	Scientist and PI- Plant Pathology	Plant Pathology
7.	Dr. Lokesh Kumar Meena	Scientist and PI- Entomology	Entomology
8.	Dr. G.K. Satpute	Principal Scientist (Platn Breeding)	Plant Breeding
9.	Dr. Shivakumar M.	Senior Scientist (Plant Breeding)	Plant Breeding
9.	Dr Neha Pandey	Scientist (Food Technology)	Food Technology)
10.	Dr. Mrinal K. Kuchlan	Senior Scientist (Seed Technology)	Seed Technology
11.	Ravindra Kumar (Up to 13-01-2023)	Finance and Account Officer	

B. MAIN CENTRE STAFF POSITION AICRP ON SOYBEAN

S. No.	Name of the Centre and particulars of posts and scale of pay	No. of posts sanctioned	Date of appointment to the post	Name of the Incumbent	If the post is vacant, date from which it is lying vacant	Name of the Scientists working on soybean other than mentioned in the project and mentioned in Col.5
1	2	3	4	5	6	7
1.	**GBPUA&T, PANTNAGAR (MAIN CENTRE)**					
a)	**Plant Breeder (S-2) (37400-67000)+9000**	1	**03/12/2021**	**Dr. M.K. Nautiyal** (I/c AICRPS) 9412120767 hybridricebreeder@gmail.com		Dr M.K. Karanwal SRO, G&PB, Co-PI, Soybean Breeding 9639778002 Karan.mk30@gmail.com
b)	Agronomist **37400-67000)+10000**	1	**December, 2021**	**Dr. D. C. Dimari**		Dr Ajay Kumar Shrivastava, Ass. Proff. Agronomy 9412925737 drajaysrivastava@gmail.com
c)	Microbiologist **(37400-67000)+9000**	1	**June, 2018**	**Dr. Naveneet Pareek 941132050 pareeknav@gmail.com**		Dr K.P. Ravekar, Proff. Soil Science 9412364837 kravekar@gmail.com
d)	Jr. Entomologist **(37400-67000)+9000**		17.05.2006	**Dr. Neeta Gaur 9457407231 05944-233737 neetagaur_ento@rediffmail.com**		Dr K.P. Singh Proff. Plant Pathology 9412142537 Kpsingh.gbpuat@gmail.com
			December 2021	**Dr Renu Pandey**		
e)	Jr. Plant Pathologist (8,000-13,500)	1			vacant	
f)	Technical Assistant (9300-34800)	4	20-09-2019	Shri Susil Kumar		
			July 2017	Dr H.R. Jaiswal		
			04-12-1992	Dr M.K. Gupta		
			September 2019	Shri A.K. Sani		
2.	***IARI, NEW DELHI (MAIN CENTRE)**					
a)	Breeder Principal scientist (37400-67000) + GP 8000 - 9000	1	01-01-2009	Dr. S.K. Lal (Center I/C) Genetics and Plant Breeding 9773911521 sklal68@gmail.com		Dr. A Talukdar (Plant Breeding) 9810879176 akshayassam@hotmail.com
b)	Microbiologist Principal scientist (37400-67000) + GP 8000 - 9000	1	20-04-2014	Dr. V. Govinda Samy 9910133586 Govindamic1980@gmail.com		Dr. A. Rajendra (Plant Breeding) 9958682271 rambikarajendran@gmail.com

c)	Agronomist Principal scientist (37400-67000) + GP 8000 - 9000	1	20-04-2015	Dr. Anchal Das 9999204817 anchal_iari@rediffmail.com		Dr. B. P. Mallikarjuna (Plant Breeding) 8185838253
d)	Pathologist Principal scientist (37400-67000) + GP 8000 - 9000	1	01-09-2015	Dr. Anirban Roy 9560083999 Anirbanroy75@yahoo.com		Dr. Manisha Saini 9935164358
e)	Entomologist 15600-39100+6000	1	04-01-2019	Dr. Archana Anokhe 8506978167 Anokhearchana12@gmail.com		
3.	**RVSKVV, R.A.K. COLLEGE of AGRICULTURE, SEHORE (MAIN CENTRE)**					
a)	Principal Scientist (Plant Breeding) (37400-67000) + GP 8000 - 9000	1	03.01.2006	Dr. S.R. Ramgiry (I/c AICRPS) 08982305368 sr.ramgiry57@gmail.com	-	
b)	Principal Scientist (Agronomy) (37400-67000) + GP 8000 - 9000	1	27-07-2000	Dr. M.D. Vyas 9425080108 vyasmd@rediffmail.com	-	-
c)	Principal Scientist (Ento.) (37400-67000) + GP 8000 - 9000	1	05-08-2006	Dr. (Smt.) N. Khandwe 09826685106 nandakhandwe@rediffmail.com		
d)	Principal Scientist (Plant Pathology) (37400-67000) + GP 8000 - 9000	1	04-09-2009	Dr. Smt. Moly Saxena 7000795962 molysaxena@gmail.com	-	-
e)	Principal Scientist (Microbiology) (37400-67000) + GP 8000 - 9000	1	21-8-2012	Dr. R. C. Jain 9826449874 Rcj2011@gmail.com	-	-
f)	Technical Assistants	3	25-09-2014 10-04-2001 -	Mr. P K Sharma Shri Trilochan Singh Dr. A.K Saxena	- - - -	- - - -
	FEO	2	- 29.07.2008	- Shri Pawan Singh Maravi	Vacant	-
4.	**ARS, UMMED GANJ, KOTA (MPUA&T, UDAIPUR) (MAIN CENTRE)**					
a)	Soybean Agronomist Associate Proffessor (37400-67000) + GP 8000 - 9000	1	22-08-2005	Dr. D. S. Meena (I/c AICRPS) 9414893694 dsmeena1967@gmail.com	-	Dr. C .B. Meena Assi. . Prof. Plant. Pathology 09024617024 cbmeena76@yahoo.com
b)	Soybean Entomologist Associate Proffessor (37400-67000) + GP 8000 - 9000	1	01-10-2020	Dr. B. K. Patidar 9414885932 bk_patidar@yahoo.com	-	
c)	Soybean Breeder Associate Proffessor (37400-67000) + GP 8000 - 9000	2	10-08-2017	Dr. Bharat Lal Meena 08619771927 blmeena.ubi45@gmail.com	-	
d)	Technical Assistant (9300-34800/-)		01-10-2020	Miss. Sushila Kalwaniya 08742893315 susheelakalwaniya@gmail.com		
			-	-	vacant	

5.	**PDKV, MORSHI ROAD AMRAVATI (MAIN CENTRE)- 444603**					
a)	Sr. Plant Breeder (37400-67000) + GP 8000 - 9000	1	01-09-2022	DR. G.D. Chandankar (I/c AICRPS) 8275553087 gchandankar@rediffmail.com	-	Dr. S. S. Munje Jr. Antomologist 9423862889 shyammunje@yahoo.com
	Sr. Plant Breeder (37400-67000) + GP 8000 - 9000	1	01-11-2018	Dr. Satish Nichal 9423473550 9488414144 Nichal_satish@rediffmail.com		
b)	Jr.Agronomist 15600-39100+ GP 7000	1	10-07-2012	Shri. Mangesh S. Dandge 9657725820 msdandge@rediffmail.com	-	-
	Jr. Plant Pathologist 15600-39100+ GP 7000	1	08-08-2018	Shri. R. S Ghawde 9420841421 rajiv_ghawde@rediffmail.com		
	Technical Assistant	1	10-06-2015	Mr. Umesh S. Tarale 9890972278		
		1	01-07-2018	Mr. Unkeshwar N. Shinde 9325575561		
6.	**AGHARKAR RESEARCH INSTITUTE (MACS), PUNE (MAIN CENTRE)**					
a)	Jr. Soybean Entomologist (8,000-13,500)	1			vacant	-
b)	Jr. Soybean Breeder	1	01-07-2020	Dr. S .A. Jaybhay (I/C AICRP) 7588559910 9284509057 santoshagricos@gmail.com sajaybhay@aripune.org	-	-
c)	Jr Agronomist (8,000- 13,500)	1		-	-	
c)	Sr. Tech. Assistant (T4) (5,500-9,000)	1	01-07-2014	B. N. Wagmare 9762502294 balashebpulje@gmail.com	-	-
d)	Fieldman (T-1)	2			-	-
					- -	- -
7.	**UAS, KRISHI NAGAR DHARWAD (MAIN CENTRE) 580005**					
a)	Agronomist Professor And Head (144200-218200 AL 14)	1	01-07-2019	Dr. Somanagouda (I/C AICRP) 9900213620 Sgouda111@gmail.com	-	-
b)	Entomologist Associate Professor (68900-205500) +AL 11	1	02-03-2017	Dr. R Channakeshava 9900934831 channakeshvar@uasd.in	-	-
c)	Breeder (131400-217100) + AL 13A	1	01-12-2021	Dr. Gopal Krishna Naidu K. 9448823556 naidug@uasd.in	-	-
d)	Pathologist Associate Professor (131400-217100) + AL 13A	1	23-06-2017	Dr. Shalini Huilgol 9740264000 sagarshalini@uasd.in	-	-
e)	Technical Assts. (44900-142400)	2	09-03-2020	Dr. Harshiya Banu (Genetic and Plant Breeding) 9513129166 harshiyagpb@gmail.com	1 post is vaccant -	- -
f)	Fieldmen (37000-70850)	2	01-04-2013	Mr. B. S. Shyagoti 9480750602		
			01-04-2021	Mr. S M Talawar 8861594427		

8.	**UAS, GKVK BANGALORE (MAIN CENTRE)**					
a)	Prinicipal Scientist Plant Breeding (37400-67000+AGP 10000)	1	12-11-2018	Dr. Onkarappa T. (Genetics and Plant Breeding) 9590739123	-	-
b)	Technical Assistant (49000-142400+GP 4600)	1	21-02-2022	Ms. Manasa N. (Agronomy) manu.mancy@gmail.com	-	-
9.	**HPKVV, PALAMPUR (SUB CENTRE)**					
a)	Principal Scientist Plant Breeder (37,400-67000+ 10000 AGP)	1	08-01-2014	Dr. Vedna Kumari (I/c AICRPS) 9418112681 01894-230391	-	Dr. Janardan singh Principal Scientist (Agronomy) 9418927836 singhjdr@rediffmail.com
b)	Principal Scientist Plant Pathologist (37,400-67000+ 10000 AGP)	1	27-01-2011	Dr Amar Singh 9418149782 Singhamar008@gmail.com	-	Dr. Surjeet Kumar (Principal Scientist) Entomologist 9418153087 skumarhpau@gmail.com
c)	Technical Assistant	2	14-09-2017	Mr. Mehar Chand 7807600419	vacant	
10.	***VPKAS, ALMORA- (SUB CENTRE)-263601 (U.K.)**					
a)	Breeder (15600-39100)+8000	1	21.04.2009 07-01-2008	1. Dr. Anuradha Bhartiya (I/c AICRPS) 7707911506 9410560611 anuradhagpb@gmail.com abhartiyagpb@gmail.com 2. Dr. J. P. Aditya 9401795850 jay.aditya@icar.gov.in		
b)	Plant Pathologist (15600-39100)+8000	1	July 2020	Dr. Jeevan B 8638585958 jeevanbscag@gmail.com		
c)	Agronomist	1			vacant	
11.	**PAU, LUDHIANA (SUB CENTRE)**					
a)	Asstt. Plant Breeder (37400-67000) +10000AGP	1	22-01-1997	Dr. B.S. Gill (I/c AICRPS) 9872163567 gbalwinder@hotmail.com	-	Dr. Ravinder singh Entomologist 09780029107 ravindergurvara@pau.edu
b)	Asstt. Agronomist (15,600-39,100)+9000 GP	1	28.01.2010	Ms. Harpreet Kaur 08146080300 hkmand@rediffmail.com		Dr. Guriqbal Singh (Agronomist) 0161-2251362 Singhguqibal@rediffmail.com
c)	Tech. Asstt. (10,300-34,800)	1	06-08-2020	Shri.Gurtej Singh	-	Dr. (Mrs) Poonam Sharma (Microbiologist) 9915004976 poonam1963in.yahoo.co.in
d)	Field man (10,300-34,800)	1	28-04-2017	Shri Karnail Singh 9872303428	-	Dr (Mrs) Asmita Sirari, Plant Pathologist. 0161-240196-0413 asmitasirari@gmail.com Dr. G K Tagger Entomologist 9814422183 gauravtagger@pau.edu Dr. Shayla Bindra 9418877813 shaylabindra@pau.edu Dr. Sunita Sharma Biochemistry 9876130110

12.	**CAU, IMPHAL (SUB CENTRE)**					
b)	Jr. Plant Breeder (15600-39100)+6000GP	1	30-08-2011	Heisnam Nanita Devi (I/c AICRPS) 7005702681 heisnamnaita@rediffmail.com	-	-
c)	Jr. Entomologist (15600-39100)+6000GP	1	30-08-20211	NilimaKaram 7005112467 nilikaram@gmail.com	-	-
d)	Jr. Food Scientist (15600-39100)+6000GP	1	30-08-2011	Dr. L. Sophia Devi 9856939623 8837223476 Rush2sophia@gmail.com		
e)	Jr. Agronomist (15600-39100)+6000GP	1	30-08-2011	ToijamSunanda Devi 9856117141 sunandabckv@gmail.com		
f)	Fieldman (5200-20200+2400)	4	09-12-2012 20-12-2012 03-01-2014 12-03-2014	H. Sharat Singh 7085411341 N Daya Singh 9774941381 K Lalit Singh 9436683166 H. Shubhash Chandra Singh 8787596910		
13.	**AAU, JORHAT (ASSAM) 785013 –SUB CENTRE**					
a)	Principal Scientist Plant Breeder (144200-218200)	1	-	I A Sheikh idrish.a.sheikh@aau.ac.in +917002729044		
b)	Jr. Plant Pathologist (8,000-13,500)	1	01.04.2018	Dr, Munmi Borah 9127164720 Mborah56@gmail.com		
c)	Fieldman/Tech. (T-1) (14000-49000)+8700 GP	2	11-12-2017	Mr. Diganta Hazarika 9365543837		
			12-12-2017	Mr. Bimal Deori 9613665059		
14.	*** ICAR RC FOR NEH REGION, UMIAM – MEGHALAYA- SUB CENTRE**					
a)	Breeder	1	-	Shri Amit Kumar (I/c AICRPS) 8974630789 amit4118@gmail.com		
b)	Pathologist	1		Dr. P Baiswar 9436107733 pbaiswar@yahoo.com		
15.	**SCHOOL OF AGRI. SCI. & RURAL DEVELOPMENT, NAGALAND UNIVERSITY, MEDZIPHEMA, NAGALAND- SUB CENTRE-797106**					
a)	Jr. Agronomist Level 10 Baisc: 82200	1	20-03-2013	Dr. Engrala Ao 9436824141 engralaao@yahoo.com engralaao@yahoo.in		Proff. Amarendra Kumar Singh (I/C) 9436075153 Aksingh_1967@yahoo.co.in
b)	Jr. Plant Pathologist (S-1) (8000-13500/-)	1	26-06-2018	Dr. Pezangulie Chakruno 8837367355 pezangulie@gmail.com		Proff. L. Toungpang Longkumaer 9436061354
c)	Technical Assistant	2	25-07-2012	Dr. Imliakum Ao 8415991497		
					vacant	
16.	**BAU, KANKE, RANCHI (JHARKHAND) 834006-SUB CENTRE**					
a)	Plant Breeder	1	-	-		Dr. Nutan Verma Jr. Scientist I/C AICRP on Soybean 9123485245 nvbau2012@gmail.com

b)	Agronomist (15600-39100)+6000	1	24.07.2004	Dr. Arvind Kumar Singh 9431315705 aksbau@gmail.com		
c)	Technical Asstt. (9300-34800)+4600	2	-	Vacant		
			01-04-2018	Mr. C. S. Toppo 9973671186		
17.	**IGKVV, RAIPUR-492 012 (C.G.) –SUB CENTRE**					
a)	Plant Breeding & Genetics (15600-39100)+8000 AGP	1	02-11-2010	Mr. Sunil Kumar Nag (I/C AICRP) 9926159853 8770981396 Nagsk_igkv@yahoo.com		Dr. S B Gupta Microbiologist 7803013547 0771-2442581 Sbgupta_igau2002@yahoo.co.in
b)	Agronomist (15600-39100)+8000 AGP	1	29-12-2021	Dr. Arun kumar Tripathi 07587065514 9753345714 Aruntripathi847@gmail.com		
c)	Plant Pathologist Assistant Proff.	1	01-03-2023	Dr. Ashwarya Lalit Tondon		Dr. R K Dantre Plant Pathologist 9424514723 Ravikantdantre@yahoo.com
d)	Technical Asstt. (5200-20200)+2000GP	2	29-08-2017 31-08-2019	1. Mr. Neeraj kumar thakur 2. Mr. Deepak Kindo		Dr. B. P Katlam Entomologist 6260854580 Kaltambp1947@gmail.com
18.	**JNKVV, JABALPUR (SUB CENTRE)**					
a)	Principal.Scientist Plant breeder Level 14 144200	1	10-08-2017	Dr .M. K.Shrivastava (I/c AICRPS) 9827256494 7987299126 shrivastava.manoj03@gmail.com	-	-
b)	Scientist Plant Pathology level 11 68900	1	19-05-2017	Dr.P.K. Amrate 8224821863 pawanamrate@gmail.com	-	-
c)	Technical Assistance Level 10 42600	2	20-03-2019	1.Mr. Gyanendra Singh 8839498002 Singh.gyan14@gmail.com	-	-
					vacant	-
19.	**MAU, PARBHANI 431402 (SUB CENTRE)- (M.S.)**					
a)	Principal Scientist Soybean Breeder (37400-6700)+10000 AGP	1	12-09-2014	Dr. S. P. Mehtre (I/c AICRPS) 9421462282 7588156210 Shivajimehtre19@gmail.com	-	-
b)	Jr. Entomologist (Rs.8000-12000)	1	01-03-2018	Dr .R S Jadhav 7588053939 rsjadhav@gmail.com	-	- -
c)	Sr. Res. Assitt. (80100) as 7th Pay	2	14-07-2021 ‘ 15-04-2021	1.Shri M V Kale 8766533976 2.Shri. D V Surnar 9403492371		- -

20	**AGRICULTURAL RESEARCH STATION, RAMNAGAR, ADILABAD- 504 002 (A.P.)**					
a)	Scientist Breeder (68900-205500) level 11/82300	1	24-07-2014	Dr. M Rajendar Reddy (I/c AICRPS) 08732-226863 9704134304 Rajendar0536@gmail.com		Dr. K. Raj Shekhar, Entomologist 9908556659 kanjarlarajashekar@gmail.com kanjarla28@yahoo.co.in
b)	Scientist Agronomist (144200-218200) level 14/ 162300	1	23-07-2013	Dr. Sreedhar Chauhan 08732-236863 9441167821 Chauhan. sreedhar@gmail.com		
c)	Technical Asstt. (15030-46060)	2	13-03-2018 15-01-2021	1. Sri J Sumit Kumar 7989096665 2. Shri. N. Arun kumar 7702796050		
21.	**RVSKV ZONAL AGRICULTURAL RESEARCH STATION MORENA-476001 (M.P)**					
a)	Jr.Breeder (PBG)	1	23-01-2021	Dr.Jagendra Singh (I/c AICRPS) 9893861622 Jagendra.gwl@gmail.com	-	-
d)	Technical Assistant	1			vacant	

C. NEED BASED TESTING CENTRE STAFF POSITION AICRP ON SOYBEAN

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	Oficer Incharge (Biochemistry)	(O) 05942-245538 (M)M 7500241431 E-mail : oicmajhera@gmail.com
2. Rajendra Agricultural University, Tirhut College of Agruculture, Dholi – 843121, (Muzaffarpur), Bihar			
1.	Dr. Anil Pandey	Univ. Prof. (Plant Breeding & Genetics) –cum- Chief Scientist & Team Leader (Oil seeds)	E-mail- aniltcadhole@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
3.OUA&T, Reginal Research and Technology Transfer Station, Bhawanipatna, Arkabahalipada Farm, Bhawanipatna – 766001, Kalahandi, Odisha			
1.	Dr. Susanta Kumar Mohanty	Junior Breeder (Plant Breeding and Genetics)	(O) 06670-230274 (M) 09437124090 E-Mail: susantamohanty.2008@rediffmail.com
2.	Dr. Anshuman Nayak	Jr. Scientist Agronomy	(O) 06670-230274 (M) 9438110299 E-Mail: ashumanouat@gmail.com

4. PDKV, Department of Agricultural Botany, College of Agriculture, Nagpur - 440001			
1.	Dr. A. D. Banginwar	Asst. Professor (Plant Breeding)	8830646927, 937307238 (M) atulbanginwar@gmail.com
5. R & D Unit, The Ugar Sugar Woks Ltd., Ugar-khurd, Karnataka-591316			
1	Mr. Jagadish S. Patwardhan	Deputy Manager R & D	08339-272230 (Ext-214) (O), 9900559159 (M) Fax-08339-272232 Jagadish.kilkarni@ugarsugar.com agdishpatwardhan@yahoo.com helpdesk@ugarsugar.com
2.	Mr. R. D. Patil	Agronomist	7259186041 (M) helpdesk@ugarsugar.com
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