आज़ादी का अमृत महोत्सव

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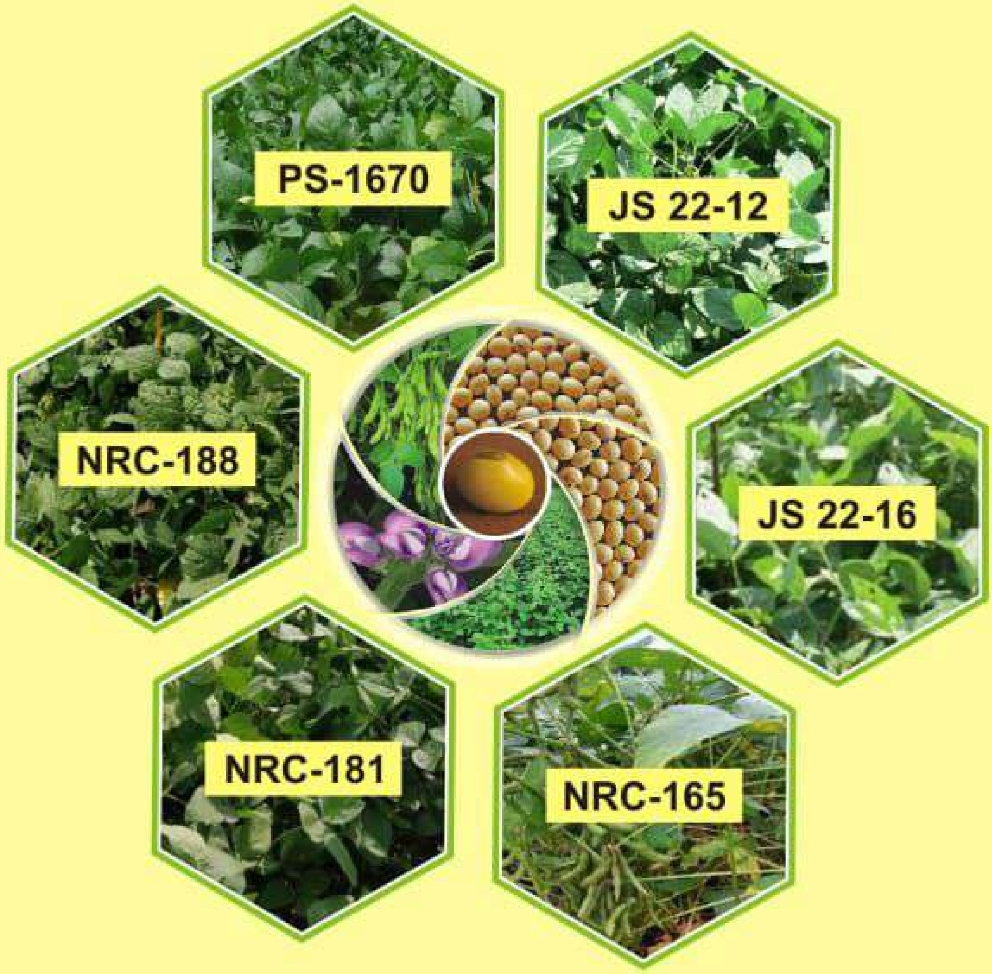
INTERNATIONAL YEAR OF MILLETS 2023

अखिल भारतीय समन्वित सोयाबीन अनुसंधान परियोजना

All India Coordinated Research Project on Soybean

Annual Progress Report

2023 - 24



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सारांश

मौसम :

बुवाई अवधि के दौरान केंद्रीय), उत्तरी मैदान और उत्तर पूर्वी पहाड़ी क्षेत्रोंइंदौर) और केंद्रीय क्षेत्र (, सीहोर, कोटा और अमरेली में (अत्यधिक वर्षा और पौधों की वृधी के समय दीर्घकालिक सूखा को छोड़कर खेती के लिए जलवायु स्थितियाँ फसल की विकास के लिए अनुकूल थीं। केंद्रीय क्षेत्र के कई केंद्रों में अक्टूबर में लगभग कोई वर्षा नहीं हुई थी।**अनुवांशिकी एवं पादपप्रजनन :**

समन्वित परीक्षण

पादप प्रजनन परीक्षण आवंटन और संचालन

सोलह राज्यों में फैले हुए इकतीस केंद्र ने स्वीकृत तकनीकी कार्यक्रम के अनुसार प्रजातिक विकास गतिविधियों में शामिल थे। ३१ केंद्रों को आठ परीक्षणों को सौंपा गया था, जिससे १५ राज्यों में कुल ८३ परीक्षण हुए। ८३ परीक्षणों में से ७९ को स्वीकृत किया गया (तालिका 1)। उगर खुर्द ने तकनीकी कार्यक्रम के अनुसार प्रयोग नहीं किए और ऊमियाम ने परीक्षण नहीं किए।

तालिका 1: पादप प्रजनन परीक्षण आवंटन और संचालन

Trial	**Zone**	**Allocation**	**Responded**	**Accepted**	**Trial Failed**	**Rejected Due To**	
						High CV	**Yield Below State Average**
AVT 2	उत्तरी पहरी शेत्र	3	3	2	0	-	1
AVT 2	पूर्वी शेत्र	3	3	3	0	-	-
AVT 1 (NM)	मध्य शेत्र	12	12	12	0	-	-
AVT 1 + 2 (EM)	मध्य शेत्र	12	12	12	0	-	-
AVT 1	दक्षिणी शेत्र	7	6	6	0	-	-
IVT	उत्तरी पहरी शेत्र	3	3	3	0	-	-
	उत्तरी मैदानी शेत्र	3	3	3	0	-	-
	पूर्वी शेत्र	3	3	3	0	-	-
	उत्तर पूर्वी पहरी शेत्र	3	2	2	0	-	-
	मध्य शेत्र	12	12	12	0	-	-
	दक्षिणी शेत्र	7	6	6	0	-	-
IVT (Early)	मध्य शेत्र	12	12	12	0	-	-
IVT (Repeat)	उत्तर पूर्वी पहरी शेत्र	3	2	2	0	-	-
	Total	83	80	79	0	-	1

***पादप प्रजनन* परीक्षणों में चिन्हित प्रविष्टियां**

2023-24 के *पादप प्रजनन* परीक्षणों के परीणामों के आधार पर, उन प्रविष्टियों को पहचाना गया जिन्होंने सर्वश्रेष्ठ चेक से 10% या इससे अधिक दाना या तेल उत्पन्नता में श्रेष्ठता दिखाई। खाद्य ग्रेड प्रविष्टियों को उन दाना / तेल उत्पन्नता के साथ पहचाना गया जो सर्वश्रेष्ठ चेक से बराबर या इससे अधिक हों। उन प्रविष्टियों को, जो चेक के

मुकाबले 5% से अधिक अनाज / तेल उत्पन्नता का लाभ दिखा रहे थे, पुनः परिक्षण हेतु चिन्हित किया गया। उम्मीदवार प्रविष्टियों की उत्पन्नता (किलोग्राम/हेक्टेयर) IVT, AVT-II, AVT-II, एवं सर्वश्रेष्ठ चेक से उत्पादन की अधिकता का प्रतिशत नीचे दिया गया है।

परिक्षण का नाम	जोन (शेत्र)	प्रविष्टी	दाना / तेल का उत्पादन	अधिकतम उत्पादन चेक से प्रविष्टी की अधिकता (%)
IVT (Normal Maturity)	उत्तरी पहरी शेत्र	VLS 106	2074	17.4
	उत्तर पूर्वी पहरी शेत्र	NRC 190	2971	13.4
		AMS 2021-4	3041	16.1
		KDS 1188	2991	14.2
		MAUS 824	2987	14.0
		Pusa Sipani 433	2936	12.1
		RSC 11-72	574 (oil)	11.8
		SL 1315	2972	11.3
	पूर्वी शेत्र	DS 1547	2490	12.1
		NRC 268#	468 (oil)	11.4
	मध्य शेत्र	NRC 270	2836	19.0
		DS 1527	2708	13.6
		JS 25.08	2775	16.4
		NRC 268#	2608	9.4
IVT (Early Maturity)	मध्य शेत्र	JS 25-03	2557	23.3
		JS 25-06	2427	17.1
		NRC 267	2315	11.7
AVT1 (Early Maturity)	मध्य शेत्र	JS 24-33	2434	36
		JS 23-09	2172	21

उपरोक्त के अतिरिक्त JS 25-08 उत्तरी पूर्व पहाड़ी क्षेत्र, BAUS(M)-6 को पूर्वी क्षेत्र, TS 101 और NRC 269 और NRC 264 को मध्य क्षेत्र में प्रारंभिक परिक्षण में पुनः जांच के लिए चिन्हित किया गया.

जनन द्रव्यों का मूल्यांकन

6 राज्यों में 6 एआईसीआरपी zones में फैले 8 केंद्रों पर चेक किस्मों सहित 221 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 8, 10, 12, 10, 8, 8, 6 समूहों में क्रमशः पालमपुर, पंतनगर, रायपुर, इम्फाल, इंदौर, परभानी, और पुणे में बांटा गया। सोयाबीन आनुवंशिक आधार को विस्तृतकरने के लिए खरीफ 2024 में संकरण कार्यक्रम में इसके उपयोग के लिए ज़ोन की लोकप्रिय सोयाबीन किस्मों से diverse जर्मप्लाज्म की पहचान की गई।

प्रजनकबीज उत्पादन:

खरीफ 2024 में सोयाबीन ब्रीडर सीड के लिए इंडेंट 13581.50 q था। इस इंडेंट में 79 प्रजातियां शामिल थीं। JS 20-98, JS 20-116, KDS 726, JS 335, KDS 753 और JS 20-34 के लिए क्रमशः 1693.80 q, 1134.9 q, 1034.26 q, 1018.65 q, 971.4 q, और 896.0 q, जो कुल इंडेंट का 12.5, 8.4, 7.6, 7.5, 7.1 और 6.6% हिस्सा थे, और कुल इंडेंट में 49.7% योगदान करते थे। इन इंडेंट्स के खिलाफ, विभिन्न AICRP सोयाबीन और अन्य NSP केंद्रों को 14084.5 q का लक्ष्य दिया गया था। खरीफ 2023 के दौरान कुल 21103.9 q ब्रीडर सीड उत्पन्न हुआ। उत्पन्न करने के लक्ष्य से 7019 q और DAC इंडेंट से 7522 q अधिक था. कुछ केंद्रों ने केंद्रीय क्षेत्र के लिए सिफारिश की गई कुछ प्रजातियों की खराब मौसमी स्थितियों के कारण आंशिक रूप से असफल रहीं। JNKVV, जबलपुर में गंभीर फसल असफलता के कारण JS 20-94, JS 20-98, और JS 20-34 में असफलता की दर 59.5%, 46.5%, और 36% थी।

JNKVV, जबलपुर में Rabi/Summer 2023-24 के दौरान इस प्रकार की कुछ विशिष्ट प्रजातियों की कमी की भरपाई के लिए ब्रीडर सीड को दूसरे सीजन में उत्पन्न करने की योजना बनाई गई एवं उत्पन्नता का आकलन 843.00 q है।

शस्य विज्ञान :

AgroN 1/23: AVT II में नई किस्मों का अलग-अलग पौध ज्यामिति पर मूल्यांकन

AVT II नई प्रविष्टि JS 23-09 और JS 23-03 का मध्य क्षेत्र में सस्य क्रियाओं एवं 30 एवं 45 सेमी की पंक्ति से पंक्ति की दूरी पर परीक्षण किया गया। नई प्रविष्टियाँ JS 23-03 और JS 23-09 की उपज सर्वोत्तम चेक किस्म NRC138 से क्रमशः केवल 1.80% और 1.85% अधिक पाई गई। मध्य क्षेत्र में सोयाबीन की उपज के संबंध में व्यापक रोपण (45 सेमी) और संकीर्ण रोपण (30 सेमी) के बीच कोई बहुत ज्यादा अंतर नहीं देखा गया। AVT II नई प्रविष्टि RSC11-42 का पूर्वी क्षेत्र में 30 और 45 सेमी की पंक्ति से पंक्ति की दूरी लिए परीक्षण किया गया था। नई प्रविष्टि RSC 11-42 ने सर्वोत्तम चेक NRC 128 की तुलना में 6.12% अधिक उपज दी। क्षेत्रीय औसत आधार पर, RSC 11-42 (10.6%) ने 45 सेमी की पंक्ति - पंक्ति की दूरी पर अधिक उपज दी।

AgroN 2/23: सोयाबीन उत्पादकता पर PGPR के साथ शाकनाशियों के प्रभाव का आकलन करना

खरपतवार प्रबंधन प्रथाओं में उत्तर मैदानी क्षेत्र, मध्य क्षेत्र, उत्तर पूर्वी क्षेत्र और दक्षिणी क्षेत्र में खरपतवार मुक्त जांच के बाद डायक्लोसुलम @ 26 ग्राम / हेक्टेयर + एक हाथ से निराई 40 दिन के बाद में अधिकतम खरपतवार नियंत्रण दक्षता एवं सोयाबीन की उपज दर्ज की गई। माइक्रोबियल स्ट्रेन में, सभी 5 क्षेत्रों में कंसोर्टिया (बी. डाकिंगेंस @ 10 ग्राम/किलो बीज + बैसिलस आर्यभटाई @ 10 ग्राम/किग्रा बीज) के साथ अधिकतम सोयाबीन उपज एवं खरपतवार नियंत्रण दक्षता दर्ज की गई।

AgroN 3/21: सोयाबीन में उपज बढ़ाने के लिए नवीन जैव सूत्रीकरण का मूल्यांकन

तीन साल के पूल्ड विश्लेषण के आधार पर, पूर्वी क्षेत्र, दक्षिणी और मध्य क्षेत्र में 75% आरडीएफ + राइजोबियम + एमडीएसआर14 + 12सी (12सी = बर्कहोल्डरिया आर्बोरिस-हाई पी घुलनशील) के अनुप्रयोग के साथ अधिकतम उपज दर्ज की गई। हालाँकि, उत्तर पूर्वी क्षेत्र में 75% आरडीएफ + बायो जेडएन + बायो एनपीके के अनुप्रयोग के साथ सोयाबीन की उच्च बीज उपज दर्ज की गई। उत्तरी मैदानी क्षेत्र में सोयाबीन की अधिक पैदावार केवल 100% आरडीएफ के साथ दर्ज की गई थी।

AgroN-4/22: सोयाबीन आधारित फसल प्रणालियों के लिए टिकाऊ प्रबंधन प्रथाओं (प्राकृतिक/जैविक/एकीकृत फसल प्रबंधन) का मानकीकरण

सभी क्षेत्रों में जैविक और प्राकृतिक खेती की तुलना में एकीकृत फसल प्रबंधन प्रथाओं के तहत अधिक उपज दर्ज की गई।

पादपरोग विज्ञान :

2023 में, भारत के छ: AICRP क्षेत्रों से कुल 17 बीमारियाँ सामने आईं। जबलपुर में सबसे अधिक बीमारी देखी गई, इसके बाद इंदौर, पंतनगर और रायपुर का स्थान है। रोगों की गंभीरता अलग-अलग थी, इंदौर में आरएबी गंभीर था और जबलपुर में येलो मोजाइक प्रचलित था। दक्षिण ज़ोन में के-दिगराज में येलो मोजाइक की बीमारी सबसे अधिक देखी गई, जहां लंबे समय तक शुष्क रहने के कारण गेरुआ रोग़ की बीमारी कम थी। मौसम की स्थिति जैसे कारकों से प्रभावित होकर अन्य बीमारियां विभिन्न क्षेत्रों में हल्के से मध्यम रूपों में दिखाई दीं। पालमपुर में शिवालिक और जेएस 95-60 ने क्रमशः FLS और PB(Ct) की उच्चतम गंभीरता प्रदर्शित की। मोनेटा ने जबलपुर और अल्मोडा में सबसे अधिक चारकोल रॉट की व्यापकता दिखाईं । जेएस-335 ने विभिन्न स्थानों पर एमएलएस, रस्ट, पीबी और आरएबी के प्रति संवेदनशीलता प्रदर्शित की। जेएस 93-05 और जेएस 95-60 विशिष्ट केंद्रों पर क्रमशः PB(Ct) और आरएबी के प्रति अतिसंवेदनशील थे। प्रमुख बीमारियों के खिलाफ उनकी प्रतिरोधक क्षमता का आकलन करने के लिए जोनों में 16 स्थानों पर 31 IVT(N) प्रविष्टियों की जांच की गई। पंतनगर में, 5 प्रविष्टियों ने आरएबी के प्रति मध्यम प्रतिरोध प्रतिक्रिया दिखाई, जबकि जबलपुर, डीएस 1589, एनआरसी 269 में पीबी)सीटी (के खिलाफ उच्च प्रतिरोध प्रतिक्रिया प्रदर्शित हुई। इंदौर में PB(Ct) के खिलाफ उच्च प्रतिरोध प्रतिक्रिया दिखाने वाली कई प्रविष्टियाँ थीं, जबकि जबलपुर ने विशिष्ट प्रविष्टियों के लिए CR के खिलाफ HR प्रतिक्रिया प्रदर्शित की। गेरुआ रोग़ प्रतिरोध अलग-अलग है, अधिकांश प्रविष्टियाँ थोड़ी संवेदनशीलता प्रतिक्रिया के प्रति उच्च संवेदनशीलता दिखाती हैं। एफएलएस रोग के लिए, कई प्रविष्टियों ने इंदौर में उच्च प्रतिरोध प्रतिक्रिया प्रदर्शित की। जेएस 20-69 और जेएस 20-20 ने एक दशक तक लुधियाना में येलो मोजाइक के खिलाफ प्रतिरोध बनाए रखा। जेएस 20-98 ने जबलपुर में दस वर्षों के बाद कई रोगों के प्रति प्रतिरोधक क्षमता प्रदर्शित की। हालाँकि, डीएसबी

21 प्रविष्टियों ने उगरखुर्द में गेरुआ रोग़ प्रतिरोध टूटने का अनुभव किया। जबलपुर में, आईसी 0419798 और ईसी 025478 सहित कई लाइनों ने येलो मोजाइक के खिलाफ उच्च प्रतिरोध प्रदर्शित किया। इसी तरह पालमपुर में, विशिष्ट लाइन ईसी 0528663 ने एफएलएस के खिलाफ उच्च प्रतिरोध प्रतिक्रिया प्रदर्शित की। बीज अनुप्रयोग ट्राइकोडर्मा और स्यूडोमोनास के स्थानीय उपभेदों ने जबलपुर, इंदौर और पंतनगर में आरएबी रोग को काफी हद तक कम कर दिया। इसी प्रकार, ट्राइकोडर्मा के पत्तों पर प्रयोग और स्यूडोमोनस फ्लोरोसेंस के बीज अनुप्रयोग ने अमरावती और जोरहट में पीबी) सीटी (रोग को प्रभावी ढंग से प्रबंधित किया। न्यूनतम तापमान ने वाईएमवी बीमारी के साथ अत्यधिक सकारात्मक सहसंबंध दिखाया, जबकि अधिकतम तापमान और बरसात के दिनों में येलो मोजाइक बीमारी के साथ काफी सहसंबंध देखा गया। इसके विपरीत, आरएबी बीमारी का वर्षा, न्यूनतम तापमान और बरसात के दिनों के साथ अत्यधिक नकारात्मक संबंध था। CR और एन्थ्रेक्नोज रोग के लिए, तापमान और वर्षा ने महत्वपूर्ण नकारात्मक सहसंबंध दिखाया। एकाधिक प्रतिगमन विश्लेषण से मौसम के मापदंडों के आधार पर रोग की गंभीरता के समीकरण सामने आए, लेकिन कम R^2 के मान रोग भिन्नता को समझाने के लिए अतिरिक्त कारकों की आवश्यकता का सुझाव देते हैं। जबलपुर केंद्र ने विभिन्न रोगों के लिए अतिसंवेदनशील किस्मों में 34% और प्रतिरोधी किस्मों में 12% का AYL दिखाया। जबलपुर, इंदौर और मेडजिफेमा केंद्रों में आरएबी रोग से प्रभावित अतिसंवेदनशील किस्मों में कवकनाशी संरक्षण ने क्रमशः 34%, 47% और 39% उपज हानि को रोका। पालमपुर और धारवाड़ केंद्रों ने एफएलएस रोग के लिए 27% और 29% का AYL दिखाया, और अतिसंवेदनशील और प्रतिरोधी किस्मों के लिए क्रमशः 33% और 15% दिखाया।

कीटविज्ञान :

ख़रीफ़-2023 के दौरान 9 समन्वय केंद्रों द्वारा कुल छह फ़ील्ड/प्रयोगशाला परीक्षण किए गए। सोयाबीन की फसल पर इक्कीस विभिन्न कीट प्रजातियों का संक्रमण मिला । सभी केन्द्रों पर तना मक्खी का प्रकोप देखा गया। स्टेम फ्लाई मैगॉट्स के कारण अधिकतम स्टेम टनलिंग (50%) अमरावती में दर्ज की गई। सीजन के दौरान सफेद मक्खी का प्रकोप पिछले साल की तरह ही रहा। मध्य क्षेत्र में पत्ते और तना मक्खी प्रमुख कीट बने रहे लेकिन गर्डल बीटल का संक्रमण बहुत कम था। गर्डल बीटल का संक्रमण कोटा (23.33%) में सबसे अधिक था और यह इस कीट के लिए एक हॉट स्पॉट बना हुआ है। सोयाबीन में खरीफ 2023 के दौरान साइडिया पाइचोरा (फली छेदक) के कारण फली की क्षति 14.23% तक कम देखी गई जो पिछले 10 वर्षों के दौरान पहली बार इस कीट-पतंग का इतना कम प्रकोप देखा गया। ऐसी सिथती पूरी फसल अवधि के दौरान पूर्णतः शुष्क मौसम की स्थिति और कम वर्षा के कारण हो सकता है क्योंकि उच्च तापमान वयस्क पतंगों के लिए अंडे देने के लिए अनुकूल नहीं होता है। इम्फाल में एफिड्स (36.00एफ़िड्स/पौधा), लीफ वेबर (12.67लार्वा/एम.आर.एल.) और बिहार हेयरी कैटरपिलर (30.00लार्वा/एम.आर.एल.) पाए गये। प्राकृतिक जैव-नियंत्रण एजेंटों, एंटोमोपैथोजेनिक कवक जैसेकि ब्यूवेरिया बैसियाना और नोमुरिया रिलेई ने अगस्त-सितंबर के दौरान लेपिडोप्टेरान डिफोलिएटर्स में मस्कार्डिन रोग का गंभीर संक्रमण पैदा किया।

IVT, AVT-I, AVT-II से संबंधित सोयाबीन जीनोटाइप का कीट प्रतिरोध के लिए मूल्यांकन किया गया। ए.वी.टी. में तीन साल के आंकड़ों पर विचार करते हुए, 5 प्रविष्टियों को स्टेम फ्लाई, डिफोलिएटर्स, गर्डल बीटल और कीट कॉम्प्लेक्स के खिलाफ प्रतिरोध पाया गया। खरीफ 2023 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 आई.वी.टी. (सामान्य जीनोटाइप) से तेईस (23) प्रविष्टियां और आई.वी.टी. (जल्दी परिपक्व होने वाले जीनोटाइप) से पांच (5) प्रविष्टियां में कीट प्रतिरोध मिला, जिनका आगामी सीज़न के दौरान मूल्यांकन किया जाएगा।

प्रतिरोध के प्रकार की पुष्टि करने के लिए, 10 AVT-II प्रविष्टियों का नोवल एप्रोच फ़ूड कंसम्पशन एवं यूटिलाइजेशन सूचकांक का उपयोग करते हुए ए.डी., ई.सी.आई. और ई.सी.डी. का इंदौर केंद्र में आकलन किया गया। परीक्षण किए गए 10 जीनोटाइपों में से, किसी भी प्रविष्टि ने स्पोडोप्टेरा लिटुरा लार्वा के खिलाफ मजबूत/अत्यधिक एंटीक्सेनोसिस प्रतिक्रिया प्रदर्शित नहीं की। जेएस 23-03 में सबसे कम ए.डी., एनआरसी 152 में सबसे कम ई.सी.आई. और एनआरसी 138 में ई.सी.डी. पाया गया। इन प्रविष्टियों में अच्छी एंटीबायोसिस प्रतिक्रिया पाई गई।

जर्मप्लाज्म का मूल्यांकन एक नियमित प्रक्रिया है। इस वर्ष भी हॉट स्पॉट पर प्रमुख कीटों की जांच के लिए कीट विज्ञानियों को 50 जर्मप्लाज्म लाइनें भेजी गईं। एनेथम ग्रेवोलेंस के साथ अंतरफसल के माध्यम से सोयाबीन के पत्ते खाने वालों कीटों के प्रबंधन के लिए कुल पांच प्रयोग सोयाबीन के साथ सुवा के विभिन्न पंक्तियों के संयोजन के साथ धारवाड़, प्रभनी और इंदौर केन्द्रों में किया गया था और प्रयोग के परिणामों से संकेत मिलता है कि 15 सोयाबीन: 2 सुवा पंक्तियों का संयोजन तम्बाकू कैटरपिलर (स्पोडोप्टेरा लिटुरा), सेमीलूपर्स, बिहार बालों वाले कैटरपिलर के

प्रबंधन में सबसे बेहतर पाया गया। परन्तु इंदौर में स्पोडोप्टेरा लिटुरा के प्रबंधन के मामले में, 18 सोयाबीन: 2 सुवा पंक्तियों का संयोजन सबसे बेहतर पाया गया।

सूक्ष्मजीवविज्ञान:

सोयाबीन पौधों में नत्रजन फिक्सेशन करने वाले बैक्टीरिया (राइजोबिया) मिट्टी एवं जड़ गठानों में मौजूद होते हैं और ये जीवाणु अजैविक तनाव के तहत विभिन्न प्रत्यक्ष और अप्रत्यक्ष क्रिया द्वारा पौधों के विकास को बढ़ावा देते हैं। इसलिए सोयाबीन रूट नोड्यूल में नत्रजन फिक्सेशन करने वाले राइजोबिया का पता लगाने के लिए विभिन्न केंद्रों पर एक प्रयोग (एमबी 1/16) आयोजित किया गया l इस प्रयोग में धारवाड़, रायपुर एवं जोरहट केंद्रों में कुल 26 राइजोबिया को चिन्हित किया गया। जोरहट केंद्र से l ब्रैडीराइजोबियम जपोनिकम को पहचाना गया।

एमबी 2/21 प्रयोग विभिन्न केंद्रों में सूक्ष्म जीवों का उपयोग उर्रुक की मात्र कम करने हेतु दर्शाया गया l जिसमें अनुशंसित नत्रजन (N) और फॉस्फोरस (P) का 75% और पोटाश (K) 100% उर्वरको का ब्रैडीराइजोबियम (बी.) दकीन्जेंस+ बेसिलस आर्यभट्टई के साथ उपयोग करने पर उच्चतम औसत उपज (किग्रा / हेक्टेयर) प्राप्त हुई l कुल मिलाकर यह कांसोर्टिया (बी.डिक्लोसुलम+ बेसिलस आर्यभट्टई) लगभग सभी केन्द्रों पर अच्छा परफॉर्म किया। इन दोनों के संयोजन के साथ टीकाकृत नोड्यूलेशन लक्षणों में काफी वृद्धि हुई है।

एमबी 3/23 प्रयोग में विभिन्न केंद्रों से चार माइक्रोबियल कांसोर्सिया (भा. सो.अनु.स. इंदौर, डी.जी. आर. जूनागढ़, क्रीडा, हैदराबाद, इन.बी. ए. आई. एम. मयु) का तुलनात्मक विश्लेषण साधारित एवं सूखे की परिस्थिति के अंदर सोयाबीन पर गमलों में किया गया। इन सभी में भा. सो.अनु.स. इंदौर, माइक्रोबियल कांसोर्सिया (बी.दकीन्जेंस+ बेसिलस आर्यभट्टई) एवं डी.जी. आर. जूनागढ़ कांसोर्सिया अच्छे प्रदर्शन किए गए।

एवीटीII- में सूचीबद्ध सोयाबीन जीनोटाइप को आत्मनिर्भर जैविक नाइट्रोजन निर्धारण के लिए एक महत्वपूर्ण विशेषता के रूप में चेक सोयाबीन जीनोटाइप के साथ नोड्यूलेशन के लिए परीक्षण किया गया है। सेंट्रल जोन से JS 20-09, JS 29-03 एवं ईस्टर्न जोन में RSC 11-42 चेक्स के साथ उच्च या तुलनीय नोड्यूलेशन क्षमता वाले प्रमुख सोयाबीन जीनोटाइप पहचाने गए।

खाद्य तकनीकी:

पकाने की अवधि VLS 99 (32.8 min), NRC 197 (33.3 min)), VLS 89 (35.9 min) (NHZ); JS 95-60 (38.3 min), JS 20-34 (38.7 min), NRC 130 (38.9 min), JS 20-116 (26.7 min) (CZ); RSC 11-42 (32.4 min) (EZ) में कम थी. प्रोटीन की मात्र VLS 63 (39.3%), NRC 197 (39.2%) VLS 99 (39%) in NHZ; NRC 130 & NRC 138 (40.2%), JS 20-116 (41.1%) in CZ में अधिक थी. दूध की उपज VLS 99 (8.5 l/kg), NRC 152 (8.43 l/kg), NRC 130 (8.4 l/kg) and JS 20-116 (8.17 l/kg) में अधिक थी. टोफू की उपज VLS 99 (1.79 kg/kg), JS 95-60 and RSC 11-42 (1.6 kg/kg) में अधिक थी. संवेदी मूल्याङ्कन में ६ को उपयुक्त मानने पर VLS 99, NRC 197, VLS 63, NRC 262, NRC 130, NRC 138 and JS 20-116 उपयुक्त पाई गईं. इनमे NRC 197 तथा NRC 262 AVT II प्रवीस्तियाँ हैं जबकी अन्य सभी चेक प्रविस्तियाँ हैं.

अग्रिमपंक्ति प्रदर्शन:

1. सोयाबीन अग्रिम पंक्ति प्रदर्शन खरीफ 2023 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 कृषक पद्धति की तुलना में सोयाबीन की उपज में 22.9% प्रतिशत एवं शुद्ध लाभ में 38.33% 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 21.64%, 29.56%, 33.01%, 36.72%, 35.79%, 30.53%, एवं 22.40% प्रतिशत उपज में वृद्धि तथा 30.67%, 40.17%, 38.34%, 44.54%, 18.99%, 36.65% एवं 34.40% प्रतिशत **शुद्ध लाभ** 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 **सांगली औसत** सोयाबीन की उपज 3043 किग्रा/हेक्टेयर और कृषक फसल उत्पादन तकनीक में औसत 2495 किग्रा/हेक्टेयर अधिकतम उपज प्राप्त हुई, साथ ही देवघर बारिया में न्यूनतम उपज

उन्नत तकनीक में 1253 किग्रा / हेक्टेयर और कृषक उत्पादन तकनीक में 942 किग्रा / हेक्टेयर उपज दर्ज की गई।

3. वही, विभिन्न घटकों के अलग–अलग प्रदर्शन एवं उन्नत उत्पादन पद्धति के अंतर्गत **सांगली** में सोयाबीन की संपूर्ण उत्पादन विधि में 3043 किग्रा / हेक्टेयर, **आदिलाबाद**. में एकीकृत खरपतवार प्रबंधन में 2216 किग्रा / हेक्टेयर, **धारवाड़ में** एकीकृत पोषक तत्व प्रबंधन में 1828 किग्रा / हेक्टेयर एवं **रायपुर में** एकीकृत कीट प्रबंधन में 1824 किग्रा / हेक्टेयर उपज, मेटजीफेमां में जैविक खेती घटक में 1313 किग्रा / हेक्टेयर तथा इंदौर में **खाद्य उपयोगी सोया किस्मों** के घटक में 1693 किग्रा / हेक्टेयर सोयाबीन की अधिकतम उपज दर्ज की गई। **सोयाबीन आधारित अंतरवर्ती फसल प्रणाली में केवल परभणी केंद्र को 3095 किग्रा/हेक्टेयर सोयाबीन समतुल्य उपज प्राप्त हुयी.** जबकि, सोयाबीन उत्पादन की कृषक पद्धति में सभी छह घटकों में अधिकतम उपज **सांगली** में संपूर्ण उत्पादन घटक में 2495 किग्रा / हेक्टेयर, अदिलाबाद में एकीकृत खरपतवार प्रबंधन में 1979 किग्रा / हेक्टेयर, **धारवाड़ में** एकीकृत पोषक तत्व प्रबंधन में 1645 किग्रा / हेक्टेयर और एकीकृत कीट प्रबंधन में 1641 किग्रा / हेक्टेयर, जैविक सोयाबीन फसल उत्पादन तकनीक में 967 किग्रा / हेक्टेयर उपज तथा इंदौर में **खाद्य उपयोगी सोया किस्मों** के घटक में 1297 किग्रा / हेक्टेयर न्यूनतम उपज दर्ज की गई।
4. सोयाबीन अग्रिम पंक्ति प्रदर्शन के 22 केंद्रों में उन्नत तकनीक एवं कृषक विधि में कुल उपज अंतर–। (YG-I) के आंकड़ो के अनुसार **रायपुर** में सबसे अधिक 779 किग्रा / हेक्टेयर और **बंगलुरु** में सबसे कम 141 किग्रा / हेक्टेयर में देखा गया। हालांकि, समस्त 22 केन्द्रो का कुल औसत अनुमानित उपज अंतर 354 किग्रा / हेक्टेयर रहा। सोयाबीन अग्रिम पंक्ति प्रदर्शन में प्रदर्शित 6 घटकों में **रायपुर**. केन्द्र में घटक एकीकृत पोषक तत्व प्रबंधन (INM) के तहत 804 किग्रा / हेक्टेयर अधिकतम उपज अंतर और **बेंगलुरु** में घटक सोयाबीन की संपूर्ण उत्पादन तकनीक (WP) के तहत् सबसे कम 141 किग्रा / हेक्टेयर न्यूनतम उपज अंतर–।। दर्ज किया गया।
5. अखिल भारतीय समन्वित परियोजना के समस्त 6 जोन के उपज विश्लेषण में उन्नत तकनीक के अंतर्गत कृषक विधि की तुलना में पूर्वी क्षेत्र (EZ) में सबसे अधिक (78.4 प्रतिशत) उपज वृद्धि प्रतिशत दर्ज किया गया एवं **दक्षिणी** (SZ) में सबसे कम (15.4 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 **खरपतवार** प्रबंधन (IWM) के अंतर्गत अधिकतम 78.9 प्रतिशत उपज वृद्धि एवं **दक्षिणी** (SZ) में एकीकृत कीट प्रबंधन घटक के अंतर्गत 10.5 प्रतिशत की नयूनतम वृद्धि दर्ज की गई।
6. समस्त 6 जोन के क्षेत्रवार (Zone wise) लाभ विश्लेषण पश्चात **उत्तर पूर्वी पहाड़ी** क्षेत्र (NEHZ) में अधिकतम शुद्ध लाभ रू. 61,071 प्रति हेक्टेयर सोयाबीन उत्पादन की उन्नत तकनीक में एवं रू. 49,253 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. 45,368 प्रति हेक्टेयर और कृषक पद्धति में रू. 31,551 प्रति हेक्टेयर सबसे कम शुद्ध लाभ दर्ज किया गया था। समस्त क्षेत्र (Zone) में प्रदर्शित छह घटकों में से, **पूर्वी** क्षेत्र (EZ) में सोयाबीन **में समेकित खरपतवार प्रबंधन** घटक में प्रति हेक्टेयर सबसे अधिक शुद्ध लाभ (114.2%) उन्नत तकनीक में और **दक्षिणी** (SZ) में एकीकृत कीट प्रबंधन घटक कृषक पद्धति में (5.8%) दर्ज किया गया।
7. अखिल भारतीय समन्वित परियोजना के समस्त 6 जोन के समग्र क्षेत्रवार औसत उच्चतम और नयूनतम उपज क्रमशः दक्षिणी क्षेत्र (SZ) में 2067 किग्रा / हेक्टेयर और उत्तर **पूर्वी पहाड़ी** क्षेत्र (NEHZ) में 1352 किग्रा / हेक्टेयर फसल उत्पादन की उन्नत तकनीक के तहत देखी गई। समस्त छह घटकों में से दक्षिणी क्षेत्र में **में समेकित खरपतवार प्रबंधन** (IWM) घटक के अंतर्गत 2170 किग्रा / हेक्टेयर फसल

उत्पादन की उन्नत तकनीक के तहत औसत उच्चतम उपज पाया गया और **उत्तर पूर्वी पहाड़ी** क्षेत्र (NEHZ) में 1302 किग्रा/हेक्टेयर जैविक खेती घटक में में औसत न्यूनतम उपज देखी गई।

8. सोयाबीन अग्रिम पंक्ति प्रदर्शन के 22 केंद्रों के द्वारा किसान के खेतों में कुल मिलाकर लगभग 33 उन्नत सोयाबीन किस्मों का प्रदर्शन किया गया। जिसमें, सबसे ज्यादा प्रदर्शन **एन.आर.सी. 142 (कुल 250 प्रदर्शन)** और उसके बाद केडीएस 726 **(104 प्रदर्शन)** किस्म पर किए गए। प्रदर्शन में प्रदर्शित विभिन्न घटकों के बीच, सोयाबीन की संपूर्ण उत्पादन तकनीक (Whole package) घटक में सबसे अधिक कुल 29 सोयाबीन की उन्नत किस्मों का प्रदर्शन के बाद घटते क्रम में एकीकृत खरपतवार प्रबंधन (IWM) में कुल 8, एकीकृत पोषक तत्व प्रबंधन (INM) में कुल 5 सोयाबीन की अधिकतम उन्नत किस्में प्रदर्शन में लायी गई। वही **खाद्य उपयोगी सोया किस्मों के घटक में केवल 1 किस्म का समावेश रहा (इंदौर केंद्र में एन.आर.सी. 142), इसके बाद जैविक खेती घटक में 2 किस्में तथा** एकीकृत कीट प्रबंधन (IPM) घटक में कुल 3 प्रजातियों का प्रदर्शन किया गया।
9. विभिन्न 6 घटकों के तहत परीक्षण की गई सोयाबीन की उन्नत किस्मों के समग्र प्रदर्शन में सोयाबीन की किस्म MAUS - 612 (दक्षिणी क्षेत्र तथा महाराष्ट्र) ने 2979 किग्रा/हेक्टेयर के बाद MAUS 158 (मध्य क्षेत्र तथा मध्यप्रदेश) (2774 किग्रा/हेक्टेयर) और MACS 1407 (दक्षिणी क्षेत्र तथा महाराष्ट्र) **ने** (2750 किग्रा/हेक्टेयर) अधिकतम सोयाबीन की उपज उन्नत तकनीक के तहत दर्ज की गई एवं सबसे कम उपज **करुणे** (दक्षिणी क्षेत्र तथा **कर्नाटक**) (1090 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 1407 में उच्चतम उपज 2750 किग्रा/हेक्टेयर (दक्षिणी क्षेत्र तथा महाराष्ट्र) RVS 11-35 (2647 किग्रा/हेक्टेयर (**मध्य क्षेत्र एवं मध्य प्रदेश)** तथा और **करुणे** (दक्षिणी क्षेत्र तथा **कर्णाटक**) (1090 किग्रा/हेक्टेयर) में न्यूनतम उपज दर्ज की गई।
10. सोयाबीन अग्रिम पंक्ति प्रदर्शन के कुल मिलाकर 22 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 11.50 प्रतिशत अधिक थी। प्रदर्शन में प्रदर्शित 6 घटकों में से जैविक खेती (Organic farming) में सबसे अधिक सोयाबीन की उत्पादन लागत 55.84 प्रतिशत एवं घटक **खाद्य उपयोगी सोया किस्में** (FGV) में न्यूनतम 11.50 प्रतिशत देखी गई।
11. 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 :

Except for the heavy rains (Central, NPZ and NHZ) during sowing period and prolonged drought in Central Zone during crop growth (Indore, Sehore, Kota and Amreli) climatic conditions were conducive for crop growth. Almost no rains was observed during October in many of the centres of CZ.

Genetics and Plant Breeding :

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. Eight trials were allotted to 31 centres resulting in a total of 83 trials in 15 states. Out of responded 83 trials 79 were accepted (Table 1). Ugar khurd did not conduct experiments as per the technical programme and Umiam did not conduct the trials.

Table 1: Plant Breeding Trial Allocation and conduction

Trial	Zone	Allocation	Responded	Accepted	Trial Failed	Rejected Due To	
						High CV	Yield Below State Average
AVT 2	NHZ	3	3	2	0	-	1
AVT 2	EZ	3	3	3	0	-	-
AVT 1 (NM)	CZ	12	12	12	0	-	-
AVT 1 + 2 (EM)	CZ	12	12	12	0	-	-
AVT 1	SZ	7	6	6	0	-	-
IVT	NHZ	3	3	3	0	-	-
	NPZ	3	3	3	0	-	-
	EZ	3	3	3	0	-	-
	NEHZ	3	2	2	0	-	-
	CZ	12	12	12	0	-	-
	SZ	7	6	6	0	-	-
IVT (Early)	CZ	12	12	12	0	-	-
IVT (Repeat)	NEHZ	3	2	2	0	-	-
	Total	83	80	79	0	-	1

Promising Entries in Plant Breeding Trials

On the basis of 2023-24 yield data, the entries that exhibited 10% or more grain or oil yield superiority over the best check were identified. Food grade entries with grain yield equivalent to or more from the best check were identified. Entries with more than 5% grain / oil yield advantage over the check have been suggested for repeat. The mean yield (kg/ha) of the promising entries in IVT, AVT-II, AVT-II, as well as, best check have been given below.

Trial	Zone	Entry	Grain / oil Yield (Kg/ha)	Grain / Oil Yield Superiority %
IVT (Normal Maturity)	Northern Hill Zone	VLS 106	2074	17.4
	North Eastern Hill Zone	NRC 190	2971	13.4
		AMS 2021-4	3041	16.1

		KDS 1188	2991	14.2
		MAUS 824	2987	14.0
		Pusa Sipani 433	2936	12.1
		RSC 11-72	574 (oil)	11.8
		SL 1315	2972	11.3
	Eastern Zone	DS 1547	2490	12.1
		NRC 268#	468 (oil)	11.4
	Central Zone	NRC 270	2836	19.0
		DS 1527	2708	13.6
		JS 25.08	2775	16.4
		NRC 268#	2608	9.4
IVT (Early Maturity)	Central Zone	JS 25-03	2557	23.3
		JS 25-06	2427	17.1
		NRC 267	2315	11.7
AVT1 (Early Maturity)	Central Zone	JS 24-33	2434	36

Based on the more than 5% yield superiority, 5 entries *viz* JS 25-08 for NEHZ; BAUS(M)-6 for EZ; and TS 101, NRC 269 and NRC 264 were identified for re-evaluation in IVT trial.

Genetic Resource Management:

During the year ICAR-IISR maintained 5946 soybean accessions including 74 accessions of 14 wild species. A total of 749 soybean varieties were introduced from USDA and quarantined at IISR Indore in collaboration with NBPGR. Two hundred sixty varieties have been cleared from quarantined and would be multiplied. Twenty five newly introduced and quarantined *Glycine soja* accessions were distributed to hot spots of various diseases and lines with 85 days maturity and resistance to YMV were identified. Two hundred seventy *G soja* and 50 tertiary gene pool accessions of 19 species are undergoing quarantine in ICAR-IISR Indore.

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

A set of 221 soybean germplasm along with check varieties were evaluated 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 8, 10, 12, 10, 8, 8, 6 clusters in Palampur, Pantnagar, Raipur, Imphal, 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 2024 for widening of soybean genetic base.

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

A total of 397 new crosses were attempted in different AICRP centres and 1745 crosses were advanced / evaluated in different generations (F2 to F9). A total of 1105 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* 2024, to be produced in 2023 was **13581.50** q. The indent comprised of 79 varieties. The higher indent was given for JS 20-98, JS 20-116, KDS 726, JS 335, KDS 753 and JS 20-34 i.e. **1693.80 q, 1134.9 q, 1034.26 q, 1018.65 q, 971.4 q, and 896.0 q** respectively which is **12.5, 8.4, 7.6, 7.5, 7.1** and **6.6**% of total indent and altogether contribute to 49.7% of indent.

Against these indents a target of **14084.5 q** was allotted to different AICRP Soybean and other NSP centres. A total of **21103.9 q** breeder seed was produced during *kharif* 2023. There was a surplus of **7019** q over production target and **7522q** over DAC indent. Some of the varieties recommended for Central zone which were highly indented partially failed due to adverse climatic conditions. The degree of failure in JS 20-94JS 20-98, and JS 20-34 were 59.5%, 46.5% and 36% respectively due to severe crop failure at JNKVV, Jabalpur. Most of other centre's production was satisfactory.

Compensatory breeder seed production had been planned to compensate the deficit of such few specific varieties during Rabi/Summer 2023-24 at JNKVV, Jabalpur. The compensatory production is estimated to be **843.00** q.

Agronomy:

Evaluation of AVT II entries under different row spacing

The AVT II new entry JS 23-09 and JS 23-03 were tested for agronomical responses to row spacing of 30 and 45 cm in Central Zone. The new entries JS 23-03 and JS 23-09 yielded only 1.80% and 1.85 higher than the best check variety NRC 138, respectively. Non- significant difference was observed among the wider planting (45 cm) and narrow planting (30 cm) with respect to yield of soybean in Eastern Zone.

The AVT II new entry RSC 11-42 was tested for agronomical responses to row spacing of 30 and 45 cm in Eastern Zone. The new entry RSC 11-42 yielded 6.12% higher than the best check NRC 128. On the zonal mean basis, the RSC 11-42 (10.6%) yielded significantly higher at a row spacing of 45 cm.

Assessing the impact of herbicides with PGPR on soybean productivity

On taking weed management practices into consideration, maximum yield was recorded with weed free check followed by the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS at north plain zone, central zone, north eastern zone and southern zone. However, weed control efficiency was observed to be maximum in weed free check followed by the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS in all the zones. Amongst the microbial strain, maximum soybean seed yield was recorded with consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed) at all five zones.

Evaluation of novel bio formulation for yield enhancement in soybean

On the basis of three year pooled analysis, the maximum yield was recorded with the application of 75 % RDF + Rhizobium + MDSR14 + 12c (12c= Burkholderia arboris-High P solubilizing) at eastern zone, southern and central zone. However, at north eastern zone the higher seed yield of soybean was registered with application of 75 % RDF + Bio Zn + Bio NPK. At north plain zone the higher yield of soybean was registered under the application of 100% RDF only.

Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems.

The higher yield was recorded under integrated crop management practices as compared to organic and natural farming at all the zones.

Plant Pathology :

In 2023, a total of 17 diseases were reported from six zones in India. Jabalpur reported the highest disease occurrences, followed by Indore, Pantnagar, and Raipur. Disease severity varied, with RAB being severe in Indore and YMD prevalent in Jabalpur. In SZ, high incidence of YMV was seen at K.digraj, where, rust incidence was low due to long dry spell.Other diseases appeared in mild to moderate forms across different regions, influenced by factors like weather conditions. Shivalik and JS 95-60 exhibited the highest severity of FLS and PB (Ct) respectively at Palampur. Monetta showed the highest CR incidence at Jabalpur and Almora. JS 335 demonstrated susceptibility to MLS, Rust, PB, and RAB across various locations. JS 93-05 and JS 95-60 were highly susceptible to PB(Ct) and RAB, respectively, at specific centers. Thirty-one IVT (N) entries were screened at 16 locations across zones to assess their resistance against major diseases. At Pantnagar, 5 entries showed a moderate resistance (MR) reaction to RAB, while at Jabalpur, DS 1589, NRC 269 exhibited HR reaction against PB (Ct). Indore had multiple entries showing HR reaction against PB (Ct), while Jabalpur demonstrated HR reaction against CR for specific entries. Rust resistance varied, with most entries showing high susceptibility (HS) to slight susceptibility (S) reaction. For FLS disease, multiple entries displayed HR reaction at Indore. JS 20-69 and JS 20-20 maintaining resistance against YMD at Ludhiana for a decade. JS 20-98 demonstrated resistance to multiple diseases after ten years in Jabalpur. However, DSb 21 entries experienced rust resistance breakdown at Ugarkhurd. At Jabalpur, several lines displayed high resistance (HR) against YMV, including IC 0419798 and EC 025478. Similarly, at Palampur, specific line EC 0528663 exhibited HR reaction against FLS. The seed application of local strains of *Trichoderma* and *Pseudomonas fluorescence* significantly reduced RAB disease at Jabalpur, Indore, and Pantnagar. Similarly, foliar application of *Trichoderma* and seed application of *Pseudomonas fluorescence* effectively managed PB (Ct) disease at Amravati and Jorhat. Minimum temperature showed a highly positive correlation with YMV incidence, while maximum temperature and rainy days correlated significantly with YMV incidence. Conversely, RAB severity had a highly negative correlation with rainfall, minimum temperature, and rainy days. For CR and anthracnose disease, temperature and rainfall showed significant negative correlations. Multiple regression analysis revealed equations for disease severity based on weather parameters, but low R^2 values suggest the need for additional factors to explain disease variation. Jabalpur center showed AYL of 34% in susceptible varieties and 12% in resistant varieties for various diseases. Fungicide protection prevented 34%, 47%, and 39% of yield loss in susceptible varieties affected by RAB disease at Jabalpur, Indore, and Medziphema centers respectively. Palampur and Dharwad centers showed AYL of 27% and 29% for FLS disease, and 33% and 15% for susceptible and resistant varieties respectively. A total of 9114 disease image dataset were collected model establishment.

Entomology :

Total six field/laboratory trials were conducted during *Kharif*-2023 by the 9 coordinating centres. Twenty one different insect species were reported to infest soybean crop. Infestation of stem fly was observed at all the centers. Maximum stem tunnelling (50%) due to stem fly maggots was reported from Amravati. White fly incidence was same as the last year during the season. In Central zone incidence of defoliators and stem fly continued to be major pests but girdle beetle infestation was very low. Girdle beetle infestation was highest at Kota (23.33%) and continued to be a hot spot for this pest. Pod damage due to *Cydia ptychora* was noticed lesser as compare to other previous years upto 14.23% during *Kharif* 2023 in soybean. It was noticed so lesser incidence of this insect-pest for the first time during past 10 years. This may be due to complete dry weather condition and low rainfall during the entire cropping period. And also because of higher temperature which is not congenial for the adult moths to lay the eggs. The incidence of aphids (36.00aphids/plant), leaf webber (12.67larvae/m) and Bihar Hairy caterpillar (30.00larvae/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.

Soybean genotypes belonging to IVT, AVT-I, AVT-II of different zones were evaluated for insect resistance. Considering three years' data in AVT, 5 entries were found to be promising with respect to resistance against stem fly, defoliators, girdle beetle and pest complex. In IVT of *kharif* 2023, two kinds of IVT trials viz., IVT (Normal genotypes) and IVT (Early maturing genotypes) were conducted and twenty three (23) entries from IVT (Normal genotypes) and five (5) entries from IVT (Early maturing genotypes) were found promising which will be evaluated further during coming season.

To confirm the type of resistance, 10 AVT-II entries were subjected to novel approaches, involving food consumption and utilization indices viz. Approximate Digestibility (AD), Efficiency of Conversion Index (ECI) and Efficiency of conversion of Digested food (ECD) at Indore. Among 10 genotypes tested, none of the entry exhibited **strong/extreme antixenosis** reaction against *S. litura* larvae. The lowest AD was found in JS 23-03, the lowest ECI in NRC 152 and ECD was found in NRC 138. These entries were found good antibiosis reaction.

Evaluation of germplasm is a regular process. This year also 50 germplasm lines were sent to the entomologists for screening against major insects at hot spots. As many as 11 lines viz., EC 39494, EC 39512, EC24154, EC 0291396, IC 0548636, IC 0218945, IC 0501673, IC 0421898, IC 0262123, IC 243779 and IC 0501852 exhibited insect resistance. These lines will also be tested further during next season.

In the Management of defoliators of soybean through intercropping with Suva, *Anethum graveolens* the total five treatment were of different rows combinations of suva with soybean alongwith one sole soybean crop treatment was taken at Dharwad, Prabhani and Indore and the results of the experiment indicated that 15 soybean: 2 suva rows combination was found be significantly superior by recording lower larval population of defoliators viz., tobacco caterpillar (*Spodoptera litura)*, semiloopers, bihar hairy caterpillar (*Spilarctia oblique)* except at Indore where in case of *Spodoptera litura* 18 Soybean: 2 suva rows combination was found be significantly superior by recording lower larval population.

Microbiology :

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

Plant growth-promoting rhizobacteria (PGPR) employ various direct and indirect mechanisms for plant growth promotion. Therefore, rhizobia and PGPR were isolated from the different AICRP centres. Among these, one *Bradyrhizobium japonicum* (Jorhat), twenty-one UAS-DBR 1 to 21 isolates (Dharwad), and four rhizobial isolates from AVT-II entries (Raipur), and 21 PGPR isolates (Pantnagar) were isolated and are being characterized

Response of N-fixing rhizobia and P solubilizing bacteria with RDF/farmers practice and with reduction of fertilization on latest release variety of soybean of a zone

The experiment aimed to curtail the doses by 25 % of nitrogen and phosphorus in recommended doses of fertilizer in soybean production using nitrogen-fixing and phosphorus-solubilizing bacteria. Therefore, combinations of recommended and reduced nitrogen and phosphorus fertilizers were compared with the local rhizobia, commercial rhizobia, and rhizobia developed at ICAR-IISR, Indore, along with the phosphorus solubilizing bacteria. We found that the combination of nitrogen-fixing (*Bradyrhizobium daqingense*) and zinc &phosphorus solubilizing (*Bacillus aryabhattai*) inoculation in the plot with 25 % reduced doses of nitrogen and phosphorus fertilizer gave statically similar results in yields than recommended doses of fertilizers across all the AICRP centres. Further, yield contributing traits like nodulations and chlorophyll enhanced upon the given treatments.

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

Pot trials aimed to assess soybeans' performance under drought conditions inoculated with different drought-tolerant microbial consortiums developed by ICAR-IISR, ICAR-CRIDA, ICAR-NBAIM, and ICAR-DGR. We found that among the different microbial consortiums inoculated in soybean plants, the ICAR-IISR and ICAR-DGR consortiums showed significant enhancement in plant biomass, nodulation and chlorophyll content compared to uninoculated and another consortium in most of the AICRP centres.

Nodulation ability of AVT-II entries of respective centres

The nodulation abilities of the AVT-II entries were tested to assess the genotypes' potential for nitrogen fixation using native rhizobia. We found that in central zone lines JS 23-09, followed by JS 23-03, were promising in having higher nodulating abilities and were at par with checks. In eastern zone AVT II entry RSC 11-42 was not found to be super-nodulating to their checks. However test entry nodulation was found at par with checks.

Food Technology :

Cooking time was lesser for check varieties VLS 99 (32.8 min), NRC 197 (33.3 min)), VLS 89 (35.9 min) (NHZ); JS 95-60 (38.3 min), JS 20-34 (38.7 min), NRC 130 (38.9 min), JS 20-116 (26.7 min) (CZ); RSC 11-42 (32.4 min) (EZ). Protein content was the highest in VLS 63 (39.3%), NRC 197 (39.2%) VLS 99 (39%) in NHZ; NRC 130 & NRC 138 (40.2%), JS 20-116 (41.1%) in CZ. Milk yield was higher in VLS 99 (8.5 l/kg), NRC 152 (8.43 l/kg), NRC 130 (8.4 l/kg) and JS 20-116 (8.17 l/kg).Tofu yield was higher for VLS 99 (1.79 kg/kg), JS 95-60 and RSC 11-42 (1.6 kg/kg). Keeping score 6 as acceptable sensory score during sensory evaluation, entries VLS 99, NRC 197, VLS 63, NRC 262, NRC 130, NRC 138 and JS 20-116 were acceptable for milk and tofu sensory.

Front Line Demonstration :

1. The overall adoption 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 2023 reported 22.9% increase in yield and 38.33% increase in net returns over local farmers practice (FP). Similarly, adoption of WP, IWM, INM, IPM, OF, FGV and IC reported to increase soybean yield by 21.64.6%, 29.56%, 33.01%, 36.72.7%, 35.79%, 30.53%, and 22.40% and net returns by 30.67%, 40.17%, 38.34%, 44.54%, 18.99%, 36.65% and 34.40% respectively over local farmers practice (FP).
2. The overall adoption of different components of improved production technology resulted in achieving soybean yield as much as 3043 and local farmer's practices of 2495 kg ha-1) at Sangli. The lowest yield under improved technology (1253 kg ha^{-1})) and farmer's practice (942 kg ha^{-1}) was recorded at Devgrah Baria.
3. Different components reported maximum yield at Sangli (WP-3043 kg ha-1), Adilabad (IWM-2216 kg ha-1, Dharwad (INM-1828 kg ha-1), Raipur (IPM-1824 kg ha-1), Metziphema (OF-1313 kg ha-1) and Indore (FGV-1693 kg ha) under improved production technology. As far as intercropping is concerned, only Parbhani center received soybean equivalent yield of 3095 kg ha-1 which is 18.4% over farmers practice. Whereas, maximum yield of all six components under farmer's practices was recorded at Sangli (WP-2495 kg ha-1) Adilabad (IWM-1979 kg ha-1), Dharwad (INM-1645 kg ha-1) and IPM-1641 kg ha-1), OF (967 kg ha-1) and Indore (FGV-1297 kg ha-1).
4. The overall yield gap I estimation across 22 centers revealed that, highest was observed in Raipur (779 kg ha^{-1}) and lowest was in Bengaluru (141 kg ha^{-1}). However, the overall average estimated yield gap I was 354 kg ha^{-1} across 22 centers of India. Among six components maximum yield gap-I was recorded under INM (804 kg ha^{-1}) at Raipur and minimum yield gap-I was under WP (141 kg ha^{-1}) at Bengaluru.
5. The overall zone wise yield analysis indicated that, among six zones, highest % yield increase under improved practices was recorded in eastern zone (78.4%). Lowest yield increase was observed in southern zone (15.4%) over farmer's practices. Among different components, highest % yield increase was observed in IWM at eastern zone (78.9%) under improved practices. Lowest % yield increase was reported in IPM at southern zone (10.5%) under improved technology as compared farmer's practices.
6. The zone wise overall profit analysis indicated that, highest net returns was recorded in North Eastern Hill Zone under IT (Rs 61,071 ha-1) and farmer's practices (Rs 49,253 ha-1). However, lowest net profit was recorded in northern hill zone (Rs 45,368 ha-1) under

improved practices and under northern hill zone in farmer’s practices (Rs 31,551 ha-1). Among six components, highest net return was recorded in IWM component at Eastern zone (114.2%) under improved practices. Lowest net profit was observed in IPM component at southern zone under improved practices (5.8%).

7. Overall zone wise average highest and lowest yield was observed in southern zone (2067 kg ha-1) and NEH zone (1352 kg ha-1), respectively under improved practices. Among six component average highest yield was observed in IWM at Central zone (2170 kg ha-1) and average lowest yield in OF at north eastern hill zone (1302 kg ha-1) under organic farming practices.
8. Overall around 33 improved soybean varieties were demonstrated in farmer’s field. The maximum demonstrations (250 Nos) were conducted on variety NRC 142 followed by KDS 726 (104 Nos). Among different components, maximum number of varieties were demonstrated in WP (29 varieties) followed by IWM (8 varieties), and INM (5 varieties). The minimum number of varieties were demonstrated in FGV (1) followed by organic farming (2 varieties) and IPM (3 varieties).
9. Overall performance of tested varieties under different components revealed that, MAUS 612 gave highest yield (2979 kg ha-1) followed by MAUS 158 (both in the Central zone and Madhya Pradesh) (2774 kg ha-1) and MACS 1407 (Southern zone and Maharashtra) (2750kg ha-1) under improved practices; and lowest yield was recorded with Karune (Southern Zone and Karnataka) (1090 kg ha-1). Among different components, highest yield (2750 kg ha-1) was obtained in WP demonstrations done with MACS 1407 (Southern zone and Maharashtra) and RVS 11-35 (2647 kg ha-1) varieties (Central zone and Madhya Pradesh); and lowest in Karune (Southern Zone and Karnataka) (1090 kg ha-1) under WP demonstrations.
10. Overall 22 centres, detailed cost of soybean cultivation has been worked out under different components. Soybean cultivation cost under improved technology was 11.50% higher than farmers practice cultivation cost. Among 6 components, highest increase in soybean cultivation cost was observed with OF component demonstrations (55.84%) and minimum soybean cultivation cost increase was reported with Food Grade Variety (FGV) demonstrations (11.50%) component over farmer's practices.
11. 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 2023 by physically visiting the centres:

S. No	Team Members	Centres Monitored	Date of Monitoring
1.	Dr V Natraj, Scientist, Plant Breeding, ICAR-IISR Indore Dr. R.S. Ghawde, Plant Pathologist, PDKV Amrawati Dr Raghvendra N, Scientist, Agronomy ICAR-IISR Indore	Delhi, Ludhiana, Palampur,	5th to 10th Oct 2023
2.	Dr K H Singh, Director, ICAR-IISR Indore Dr Sanjay Gupta, AICRP In-charge, ICAR-IISR Indore	Almora, Majhera, Pantnagar	25 and 26 Sept 2023
		Medeziphema	22nd Aug 2023
		Jabalpur	26th Aug 2023
3.	Dr Anita Rani, Principal Scientist, Plant Breeding Dr. R. Channakeshava, Entomologist, UAS, Dharwad Dr Santosh Jaybhay, Agronomist, ARI, Pune	Kota, Mandsaur, Morena, Sehore	25th to 29th Sep 2023
4.	Dr Sunil Kumar Nag, Plant Breeder, IGKVV, Raipur Dr Rakesh Kumar Verma, Agronomist, IISR, Indore Dr R S Jadhav, Entomologist, Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani	Amravati, Nagpur, Raipur, Bhawanipatna	5th to 8th Oct. 2023
5.	Dr Sunil Kumar Nag, Plant Breeder, IGKVV, Raipur Dr Lokesh Kumar Meena, Principal Investigator, Entomology	Adilabad, Parbhani, Bidar	2nd to 4th Oct 2023
6.	Dr MP Sharma, Principal Investigator, Microbiology, ICAR-IISR, Indore Dr T Onkarappa, Principal Scientist, Plant Breeding, UAS Bengaluru Dr Shalini Huilgol, Associate Professor(Plant Pathlogy), UAS Dharwad	Bengaluru, Dharwad, Kasbe Digraj, Ugarkhurd	6thto 9th Oct. 2023
7.	Dr Rajesh Vangala, Plant Breeding, IISR, Indore (Ranchi, Jorhat, Imphal (online)) Dr Munmi Borah (Ranchi and Imphal) Dr Pezanguli Chakruno (Jorhat)	Ranchi, Jorhat	29th Sep to 4th Oct 2023

Centre wise salient observations

Northern Hill Zone

Almora Small terraces limited the lay-out of experiments as per technical programme and minor modifications were made. Plant stand was good and crop was at podding stage. Germplasm trial failed due to heavy rains after sowing.

Palampur All the trials were conducted as per the technical programme. The overall performance of the centre was found to be excellent.

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

Northern Plain Zone

Pantnagar Trials of Agronomy and Mocrobiology were in excellent conditions. All the trials were conducted as per the technical programme. Data of PP 8 trial of plant pathology was not recommended for inclusion in annual report. Centre is maintaining good number of germplasm. The overall performance of the centre was outstanding.

Delhi All of the trials were conducted as per the technical programme. The overall performance of the centre is excellent.

Ludhiana Centre is collaborating with different centres like Indore, Dharwad, AVRDC Hyderabad for screening for YMD. All of the trials were conducted as per the technical programme. The overall performance of the centre was excellent.

Eastern Zone

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

Raipur The trials are well laid out as per approved technical programme and are nicely maintained. Overall performance of the centre was outstanding.

Bhawanipatna There was heavy rain after 2-3 days of sowing of trials and four entries SNM 23-3, SNM 23-6, SNM 23-11 and SNM 23-70 had very poor germination. Trials were conducted as per the technical programme. Overall performance of the centre was very good.

North Eastern Hill Zone

Jorhat Overall performance of the centre is good. The trails were sown late but standing plant population was good.

Medzipbema All of the trials were conducted as per the approved technical programme except for the plot size which was compromised due to limited land. Overall the performance of the centre is good.

Imphal (online) Monitoring was conducted online due to imposition of curfew. All the trials were conducted as per the technical programme and the performance of the centre is very good.

Central Zone: IVT entry SNM 23-06 did not germinate in any of the centres

Jabalpur	All the trials were conducted as per the approved technical programme. 26 G soja were not sown properly as per the instruction and got lost. Overall performance of the centre is excellent.
Sehore	All of the experiments were conducted as per the technical programme. Overall performance of the centre is good.
Parbhani	All of the trials were conducted as per the technical programme. Overall performance of the center was excellent.
Amravati	All of the trials were conducted as per the approved technical programme. AVT 1 entry SNM 75 did not germinate. Overall performance of the center was excellent.
Kota	All of the trials were conducted as per the approved technical programme. Seed production plots required good management. Overall performance of the center was very good.
Morena	All of the trials were conducted as per the approved technical programme. Entry 78 had poor germination and 75 did not germinate. Seed plots were in bad shape with heavy weed infestation and poor germination due to heavy rains after sowing. No seed production is expected. Oerall performance of the center is satisfactory.
Nagpur	All of the trials were conducted as per the technical programme. Overall performance of the trails at this centre is very good.
Mandsaur	All of the trials were conducted as per the technical programme. Overall performance of the center was good.

Southern Zone

K. Digraj	All of the trials were conducted as per the technical programme. Overall performance of the trails at this centre is outstanding.
Pune	All of the trials were conducted as per the technical programme. Overall performance of the trails at this centre is outstanding.
Bengaluru	All of the trials were conducted as per the technical programme. Overall performance of the trails at this centre is outstanding.
Dharwad	All of the trials were conducted as per the technical programme. Overall performance of the trails at this centre is outstanding
Adilabad	All of the trials were conducted as per the technical programme. Overall performance of the trails at this centre is outstanding.
Bidar	All of the trials were conducted as per the technical programme. Overall performance of the trails at this centre is outstanding.

4. Seasonal Conditions

Northern Hill Zone

Table 1.1 : Weather conditions during crop season in NHZ

Location	June 2023	July 2023	Aug. 2023	Sep. 2023	Oct. 2023	Nov. 2023
Max. Temp. (°C)						
Almora	32.1	29.4	29.7	30.0	28.6	25.3
Palampur	28.1	**27.0**	**27.3**	27.6	25.3	22.2
Majhera	-	-	-	-	-	-
Min. Temp. (°C)						
Almora	17.2	20.6	20.4	19.0	10.4	4.6
Palampur	17.8	19.0	19.1	17.4	11.8	8.4
Majhera	-	-	-	-	-	-
Rainfall (mm) (Rainy Days)						
Almora	47.598)	219.65(20)	11.95(14)	165.5(9)	22.0(2)	3.0(1)
Palampur	252.6 (13)	961.8 (27)	951.4 (25)	189.6 (12)	31.8(5)	20.8(2)
Majhera	-	-	-	-	-	-
Max.R.H. (%)						
Almora	82.1	93.8	93.8	95.3	97.1	93.4
Palampur	74	93	93	88	71	74
Majhera	-	-	-	-	-	-
Min. R.H. (%)						
Almora	47.9	71.6	70.1	59.1	40.9	39.3
Palampur	66	87	87	77	54	52
Majhera	--	-	-	-	-	-
Sunshine (Hours/Day)						
Almora	5.55	2.98	3.87	5.57	7.80	7.38
Palampur	6.4	3.2	3.8	5.5	5.2	5.2
Majhera	-	-	-	-	-	-

Northern Plain Zone

Table 1.2 : Weather conditions during crop season in NPZ

Location	June 2023	July 2023	Aug. 2023	Sep. 2023	Oct. 2023	Nov. 2023
Max. Temp. (°C)						
Pantnagar	36.6	32.4	39.0	32.7	35.4	27.7
Delhi	-	-	-	-	-	-
Ludhiana	36.8	33.0	34.6	33.2	30.8	26.3
Min. Temp. (°C)						
Pantnagar	25.5	26.6	26.1	24.7	20.5	12.7
Delhi	-	-	-	-	-	-
Ludhiana	26.3	27.3	27.4	25.0	17.9	13.2
Rainfall (mm) (Rainy Days)						
Pantnagar	119(6)	397.6(14)	395.2(15)	301.8(7)	7.4(1)	-
Delhi	-	-	-	-	-	-
Ludhiana	94 (7)	212.4(8)	77.0 (4)	56 (6)	34	28.6
Max.R.H. (%)						
Pantnagar	77.1	85.3	90.9	89.6	85.5	88.2
Delhi	-	-	-	-	-	-
Ludhiana	67	69	82	86	89	92
Min. R.H. (%)						
Pantnagar	50.9	74.3	72.5	67.5	44.9	43.6
Delhi	-	-	-	-	-	-
Ludhiana	41	69	62	61	43	45
Sunshine (Hours/Day)						
Pantnagar	6.8	4.5	4.1	6.2	8.6	6.5
Delhi	-	-	-	-	-	-
Ludhiana	8.2	4.7	6.8	7.3	8.8	5.5

Eastern Zone

Table 1.3 : Weather conditions during crop season in EZ

Location	June 2023	July 2023	Aug. 2023	Sep. 2023	Oct. 2023	Nov. 2023
Max. Temp. (°C)						
Ranchi	41.6	37.4	35.4	35.4	32.5	29.0
Raipur	39.5	32.2	31.7	31.4	32.0	30.7
Bhawanipatna	38.4	31.9	31.7	31.1	32.2	30.8
Min. Temp. (°C)						
Ranchi	23.3	21.4	20.4	19.5	15.3	9.4
Raipur	27.0	25.7	25.1	25.0	20.9	17.7
Bhawanipatna	26.2	24.9	24.3	24.1	20.3	18.0
Rainfall (mm) (Rainy Days)						
Ranchi	91.6 (7)	276.8(15)	193.8(11)	497.8(17)	223.7(5)	2.0(1)
Raipur	226.4(6)	501.8(18)	348.6(14)	479.6(15)	9.4(1)	7.5(1)
Bhawanipatna	98.2 (8)	364.6(18)	336.0 (11)	287.4 (12)	53.6 (2)	1.8 (0)
Max.R.H. (%)						
Ranchi	86.9	86.6	87.0	86.6	86.6	86.7
Raipur	614	88	89	91	88	86
Bhawanipatna	60.6	82.4	80.1	87.3	72.1	75.8
Min. R.H. (%)						
Ranchi	70.3	70.3	70.6	70.1	69.6	69.8
Raipur	42	72	68	72	44	44
Bhawanipatna	48.3	78.2	78.4	83.0	67.9	64.3
Sunshine (Hours/Day)						
Ranchi	-	-	-	-	-	-
Raipur	6.5	3.9	4.1	3.3	7.9	5.5
Bhawanipatna	2.9	1.4	1.8	2.3	6.6	4.9

North Eastern Hill Zone

Table 1.4 : Weather conditions during crop season in NEHZ

Location	June 2023	July 2023	Aug. 2023	Sep. 2023	Oct. 2023	Nov. 2023
Max. Temp. (°C)						
Umiam	-	-	-	-	-	-
Imphal	29.37	30.95	29.39	30.7	28.66	24.58
Jorhat	31.9	32.7	32.6	34.2	31.6	28.9
Min. Temp. (°C)						
Umiam	-	-	-	-	-	-
Imphal	21.64	23.01	22.77	22.19	18.82	12.47
Jorhat	23.9	24.9	24.8	25.1	21.1	15.2
Rainfall (mm) (Rainy Days)						
Umiam	-	-	-	-	-	-
Imphal	173.2(21)	256.2(12)	166(22)	150.3(14)	14.7(7)	63.9(3)
Jorhat	344.1(16)	282.0(15)	186.3(11)	125.7(9)	127.3(10)	19.4(1)
Max.R.H. (%)						
Umiam	-	-	-	-	-	-
Imphal	81.53	83.9	90.03	86.93	86	81.3
Jorhat	93	92	92	90	94	97
Min. R.H. (%)						
Umiam	-	-	-	-	-	-
Imphal	65.77	63.94	72.94	66.4	59.58	49.03
Jorhat	77	74	75	70	66	62
Sunshine (Hours/Day)						
Umiam	-	-	-	-	-	-
Imphal	3.84	4	2.76	5.39	5.94	7.09
Jorhat	3.6	3.7	3.5	6.1	6.3	7.2

Central Zone

Table 1.5 : Weather conditions during crop season in CZ

Location	June 2023	July 2023	Aug. 2023	Sep. 2023	Oct. 2023	Nov. 2023
Max. Temp. (°C)						
Jabalpur	37.7	32.4	30.2	31.6	31.8	29.3
Sehore	36.68	31.05	32.87	30.10	33.6	-
Parbhani	37.9	30.6	31.5	23.7	33.4	30.9
Amrawati	40.39	31.75	31.85	32.80	35.06	32.02
Kota	41.5	36.2	33.8	35.0	36.6	33.2
Morena	-	-	-	-	-	-
Anand	-	-	-	-	-	-
Amreli	36.0	31.6	32.5	33.6	35.4	33.5
Indore	35.4	28.8	27.3	29.0	32.4	-
Lokbharti	35	31	31	31	33	31
Nagpur	35.0	34.9	33.9	32.6	32.4	31.8
Mandsaur	-	-	-	-	-	-
Min. Temp. (°C)						
Jabalpur	25.9	25.5	23.9	24.2	17.8	13.4
Sehore	24.96	24.12	22.90	22.59	18.8	-
Parbhani	25.0	25.0	22.1	22.2	17.6	16.6
Amrawati	26.85	23.69	23.02	23.40	19.33	16.82
Kota	24.2	21.6	24.9	24.4	21.4	14.0
Morena	-	-	-	-	-	-
Anand	-	-	-	-	-	-
Amreli	26.0	25.1	25.1	24.8	22.7	19.5
Indore	24.8	24.0	23.1	22.8	17.8	-
Lokbharti	29	27	27	26	27	24
Nagpur	24.3	24.2	23.3	23.1	20.0	16.4
Mandsaur	-	-	-	-	-	-
Rainfall (mm) (Rainy Days)						
Jabalpur	298.4 (6)	259.6 (13)	502.9 (14)	236.9 (11)	0.6 (0)	19.5(3)
Sehore	194.0	480.0	67.60	393.20	0.0	-
Parbhani	42.0(5)	302.2 (15)	136.4 (6)	102.5 (10)	0.0	123.0 (3)
Amrawati	97.60 (7)	290.09 (17)	54.60 (7)	190.40 (10)	32.20 (2)	81.20 (3)
Kota	165 (6)	324 (15)	49.2 (5)	133.7 (10)	0.0	0.0
Morena	-	-	-	-	-	-
Anand	-	-	-	-	-	-
Amreli	281.3 (10)	495 (21)	10.4 (0)	125.4 (6)	-	56.4 (1)
Indore	143(5)	408 (20)	50 (7)	554 (11)	0.0	NIL
Lokbharti	77.6 (8)	386.75 (17)	236.47 (13)	219.85 (10)	21.53 (2)	6.42 (1)
Nagpur	129.8 (8)	536.8 (16)	170.8 (8)	359.1 (12)	18.2 (1)	20.2 (2)
Mandsaur	-	-	-	-	-	-
Max.R.H. (%)						
Jabalpur	67	84	89	89	80	84
Sehore	-	-	-	-	-	-
Parbhani	63	88	86	90	84	84
Amrawati	61.87	88.0	82.10	82.40	68.13	64.33
Kota	90.0	88.8	88.0	85.0	86.0	83.6

Morena	**-**	**--**	**--**	**-**	**-**	**-**
Anand	**-**	**-**	**-**	**-**	**-**	**-**
Amreli	**82.8**	**90.3**	**84.0**	**88.3**	**76.4**	**76.5**
Indore	**85.3**	**90.9**	**91.0**	**90.7**	**87.4**	**-**
Lokbharti	**76**	**95**	**98**	**86**	**82**	**65**
Nagpur	**79.3**	**73**	**79.6**	**89.8**	**69.4**	**81.8**
Mandsaur	**-**	**-**	**-**	**-**	**-**	**-**
Min. R.H. (%)						
Jabalpur	**44**	**69**	**73**	**71**	**46**	**45-**
Sehore	**-**	**-**	**-**	**-**	**-**	**-**
Parbhani	**34**	**66**	**58**	**65**	**34**	**41**
Amrawati	**55.80**	**79.90**	**69.68**	**77.0**	**53.61**	**53.63**
Kota	**25.4**	**64.8**	**72.6**	**63.1**	**55.0**	**61.4**
Morena	**-**	**-**	**-**	**-**	**-**	**-**
Anand	**-**	**-**	**-**	**-**	**-**	**-**
Amreli	**58.0**	**74.8**	**57.2**	**58.5**	**31.0**	**38.0**
Indore	**79.3**	**87.6**	**87.6**	**83.4**	**80.7**	**-**
Lokbharti	**38**	**55**	**57**	**46**	**42**	**26**
Nagpur	**61**	**60.3**	**68.0**	**72.5**	**47.4**	**62.0**
Mandsaur	**-**	**-**	**-**	**-**	**-**	**-**
Sunshine (Hours/Day)						
Jabalpur	**7.6**	**4.5**	**3.2**	**5.1**	**8.0**	**5.7**
Sehore	**-**	**-**	**-**	**-**	**-**	**-**
Parbhani	**7.8**	**2.6**	**5.5**	**4.3**	**8.4**	**6.2**
Amrawati	**-**	**-**	**-**	**-**	**-**	**-**
Kota	**-**	**-**	**-**	**-**	**-**	**-**
Morena	**-**	**-**	**-**	**-**	**-**	**-**
Anand						
Amreli	**4.6**	**1.7**	**3.6**	**4.1**	**9.1**	**7.7**
Indore	**-**	**-**	**-**	**-**	**-**	**-**
Lokbharti	**6.6**	**1.2**	**1.36**	**5.6**	**11.33**	**11.3**
Nagpur	**3.6**	**3.1**	**4.0**	**3.3**	**5.0**	**5.6**
Mandsaur	**-**	**-**	**-**	**-**	**-**	**-**

Southern Zone

Table 1.6 : Weather conditions during crop season in SZ

Location	June 2023	July 2023	Aug. 2023	Sep. 2023	Oct. 2023	Nov. 2023
Max. Temp. (°C)						
Pune	36.02	30.59	31.09	31.51	32.98	31.91
K. Digraj	32.2	25.4	29.2	28.2	31.4	30.0
Bengaluru	31.2	28.3	30.5	29.3	30.1	29.2
Dharwad	32.6	26.7	29.3	29.5	31.6	30.4
Adilabad	39.2	31.5	32.2	31.7	34.1	31.5
Bidar	35.0	28.4	29.9	28.9	30.9	-
Min. Temp. (°C)						
Pune	20.5	19.6	20.2	19.8	19.5	18.8
K. Digraj	23.9	22.2	21.3	21.5	22.6	21.2
Bengaluru	20.5	19.6	20.2	19.8	19.5	18.8
Dharwad	21.7	20.9	20.5	20.9	19.2	18.5
Adilabad	27.2	24.2	24.3	23	19.9	17.1
Bidar	24.0	22.1	21.9	22.0	18.8	-
Rainfall (mm) (Rainy Days)						
Pune	49.9 (5)	33.4 (4)	11.8	150.8(8)	44.0 (1)	0.00
K. Digraj	20.6(4)	151(30)	10.8(1)	69.9(7)	20.0(2)	42-2(1)
Bengaluru	67.0	115.2	25.8	194	67.6	154.2
Dharwad	36.2 (04 RD)	277.6(17 RD)	8.6(0 RD)	59.4 (04 RD)	10.4 (02 RD)	21.00 (3 RD)
Adilabad	81.4(7)	601.4 (23)	118.6 (7)	272.3 (15)	0.0	26.0 (2)
Bidar	96.0	322.0	18.5	375.10	0.0	-
Max.R.H. (%)						
Pune	80.5	86.1	86.6	90.3	88.1	85.7
K. Digraj	89.0	91.0	92.2	69.5	70.1	61.1
Bengaluru	82	81	84	86	87	85
Dharwad	85.7	91.7	90.7	89.8	85.6	72.8
Adilabad	61.5	88.4	85.8	88.3	76.2	80.6
Bidar	43	76	59	71	43	-
Min. R.H. (%)						
Pune	73.1	80.8	85.7	89.7	88.9	88.4
K. Digraj	45.0	73.8	55.0	62.0	33.6	38.7
Bengaluru	54	61	58	64	57	56
Dharwad	76.5	82.5	82.4	74.2	67.8	45.6
Adilabad	8.50	3.40	6.70	4.0	9.0	66.6
Bidar	-	-	-	-	-	-
Sunshine (Hours/Day)						
Pune	-	-	-	-	-	-
K. Digraj	-	-	-	-	-	-
Bengaluru	7.3	3.1	7.2	5.7	7.3	5.8
Dharwad	-	-	-	-	-	-
Adilabad	-	-	-	-	-	-
Bidar	-	-	-	-	-	-

Except for the heavy rains (Central, NPZ and NHZ) during sowing period and intermittent drought in Central Zone (Indore, Sehore, Kota and Amreli) climatic conditions were conducive for crop growth. Almost no rains was observed during October in many of the centres of CZ.

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
Northern Plain Zone	
Pantnagar (Uttarakhand)	Dr . M.K. Karanwal
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)	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. Lekh Ram
Nagpur (Maharashtra)	Dr. Sudhir Patil
Kota (Rajasthan)	Dr. B.L. Meena
Jabalpur (Madhya Pradesh)	Dr. Manoj Kumar Shrivastava
Amravati (Maharashtra)	Dr. G.D. Chandankar & Dr. Satish Nichal
Morena (Madhya Pradesh)	Dr. Jagendra Singh
Parbhani	Dr.S.P. Mehtre
Sanosara (Gujarat)	Dr. C.P. Singh
Devgadh Baria (Gujarat)	Dr G.J. Patel
Amreli (Gujarat)	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
Pune (Maharastra)	Dr. Suresh

5. 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	Generations	Pedigree	No. Of crosses/ Lines	Selection of plants (Bulks)
1	3	4	5	6
Ludhiana: high yield, early maturity, YMD resistant, food grade, photo-insensive varieties.				
Fresh crosses	**Parents involved:** PS1670, PS1647, SL1455, SL1456, SL1457, SL955, SL1074, IC993255, NRCSL-3, AGS329, AGS292, AGS351, IVT 2023-22, NRC142, JS20-69, JS20-98, JS 116, P3		22 crosses	-
F_2 to F_5	**Derived from hybridization between:** NRCSL 4, JS 335, NRCSL 5, G soja, NRC 94, SL 958, AGS 456, *Glycne soja* derived lines, SL 1311, NRC 195, AGS 351, JS 2171, PA 1 NRC 142, SL 955, NRC 130, NRCSL 6, JS 2034, NRC 138, NRC 105.		29 crosses	800
F_6 to F_9	SL 958, JS 2171, G soja, AGS 191, Dsb 23, NRC 101, JS 9752, DS 3105, NRC 107, IC 210, AGS 456, SL 744, JS 2069, , JS 335, SL 1116, SL 1120, SL 1184, IA 2067 Vasun NRC101		35 crosses	150 (15)
Pune: Earliness, High Yield, Null KTi & Lox, Vegetable type, Resistance to CR and YMV				
Fresh crosses	**Parents involved:** DSb 34, EC 242104, RSC 10-46, RVSM 11-35, MAUS 725, MAUS 612, KDS 726, MACS 1188, TGX 780-5A, KDS 753, WT 150, NRC 142, NRC132, MACSN 1667, MACS 1460, MACS 450		28	–
F1	**Derived by hybridization between:** KDS 753 x EC 2579, KDS 753 x DSb 34, KDS 753 x EC 103334, KDS 753 x EC 242104, DSb 34 x EC 2579, DSb 34 x AGS 143, DSb 34 x 958, DSb 34 x Lee, DSb 34 x EC 242104, DSb 34 x EC 103334, MACS 1188 x MACS 1460, MACS 1188 x AGS 460, MACS 1188 x EC 242104, MACS 1188 x EC 241778, EC 103 x EC 2579, MACS 1460 x EC 2579, MACS 1460 x EC 103334, MACS 1460 x MAUS 612, MACS 1460 x EC 242104, MACS 1460 x SL 958, MACS 1460 x KDS 729, MACS 14 DSb 34, EC 2579 x Lee, EC 2579 x KDS 753, MACS 1520 x Lee, AMS-MB-5-18 x EC 241780, AMS-MB-5-18 x MACS 1520, AMS-MB-5-18 x KDS 753, KDS 726 x SL 958, JS 52 x AGS 143, JS 97-52 x EC 242104, JS 97-52 x EC 2579, JS 97-52 x KDS 726, JS 97-52 x MACS 1520		34	120 True F_1s

F2	Derived by hybridization between: MACS 1460 x NRC 188, MACS 1460 x JS 93-05 , MACS 1460 x NRC 142 , MACS 1460 x NRCSL 1 , MACS 1460 x NRC 132 , MACS 14(AGS 25 , MACS 1460 x JS 95-60 , MACS 1460 x Swarnavasundhara, MACS 1724 x JS 93-05, MACS 1724 x JS 95-60,MACS 1724 x AGS 25, MACS 1724 x NRCSL 1, MACS 1 x KARUNE, MACS 1724 x Swarnavasundhara, AMS-100-39 x MACS 1520, AMS-100-39 x MACS 1460, AMS-100-39 x NRC 142, MACS 1188 x AGS 25, NRCSL 1 x MACS 1 NRCSL 1 x MACS 1520, NRCSL 1 x NRC 142, JS 97-52 x KDS 726, JS 97-52 x JS 95-60, JS 97-52 x NRC 188, JS 97-52 x AGS 25, JS 97-52 x DSb 34, NRC 132 x AMS 100-39, N 132 x JS 95-60, NRC 132 x MACS 1520, NRC 132 x AGS 25, NRC 132 x JS 95-60, NRC 132 x JS 93-05, NRC 132 x KDS 726, KDS 726 x JS 93-05 , DSb 34 x JS 93-05, Haraso NRC 105, Harasoya x NRC 142, Harasoya x Karune, Swarnavasundhara x Karune, Karune x NRC 142	40	274 (20)
F3	Derived by hybridization between: AMS-MB-5-18 x JS 95-60, HARA SOYA x NRC 142, HARA SOYA x MACS 1520, HARA SOYA x JS SH 93-37, JS SH 93-37 x NRC 142, Ka x JS SH 93-37, KDS 726 x NRC 142, MACS 1188 x AGS 25, MACS 1188 x MACSNRC 1667, MACS 1460 x NRC 142, MACS 1460 x SWARNAVASUNDHARA, MACS 14(MACSNRC 1667, MACS 1460 x MACS 1520, MACS 1460 x DSb 34, MACS 1460 x DSb 21, MACS 1520 x MACS 1460	16	205 (14)
F4	Derived by hybridization between: AMS-MB-5-18 x JS SH 93-37, DS 98-14 x JS 95-60, DS 98-14 x DSb 34, JS SH 93-37 x MACS 330, MACS 1188 x KARUNE, MACS 1188 x HA SOYA, MACS 1188 x HIMSO 1689, MACS 1188 x DSb 34, MACS 1460 x EC 241780, MACS 1460 x Karune, MACS 1460 x HARA SOYA, MACS 1460 x AMS-MB-5-18, MA 1460 x DSb 34, MACS 1460 x SL 958, MACS 1460 x HIMSO 1689, MACS 450 x DSb 34, MACS 450 x AMS-MB-5-18, MACS 450 x MACS 1460, NRC 142 x MACSNRC 1667 958 x NRC 142	20	348
F5	Derived by hybridization between: MACS 1188 x Hardee, MACS 1188 x TAMS 9821, MACS 1281 x RSC 10-46, MACS 1281 x TAMS 9821, MACS 1460 x PS 1613, MACS 14(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 450 x DSb 23, MACS 450 x DSb 21, VLS 75 x MA 612	13	73
F6	Derived by hybridization between: JS 93-05 x DS 98-14, MACS 1188 x EC 103332, MACS 1188 x EC 251396, MACS 1188 x CAT 2126 B, MACS 1188 x VLS 63, MACS 11 TAMS 98-21, MACS 1188 x JS 93-05, MACS 1188 x KDS 753, MACS 1454 x JS 335, MACS 1460 x EC 103332, MACS 1460 x EC 251396, MACS 1460 x JS 335, MACS 1460 x 3, MACS 1460 x EC 241780, MACS 1460 x MACS 1188, MACS 1460 x DSB 21, MACS 1460 x VLS 63, TAMS 98-21 x VLS 75	18	46
F7	Derived by hybridization between: MACS 1188 x KDS 753, MACS 1188 x SL 1074 , MACS 1460 x DSb 21 , MACS 1460 x KDS 753 , MACS 450 x VLS 63 , SL 958 x DSb 21 , MA 1188 x KDS 726 , MACS 1188 x VLS 63, MACS 1188 x JS 95-60 , MACS 1188 x MACS 1340 , MACS 1407 x JS 95-60, MACS 1407 x DSb 21, MACS 1407 x KDS 726, MACS x VLS 63 , MACS 1460 x NRC 122 , 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 97-52 x EC 572086, JS 97-52 x NRC 121, EC 383 x JS 335, MACS 1188 x RSC 10-46 , MACS 1460 x TAMS 9821, MACS 1407 x KDS 726, MACS 1281 x RSC 10-46, SL 958 x JS 93-05 , SL 958 x MAUS 612, SL 958 x TAMS 9 JS SH 93-37 x SL 1074	30	- (44)
CAU, Imphal centre: Breeding for high yield, vegetable purpose, rust resistance			
Fresh cross	JS 20-116, EC 287754, KDS 753, TGX B 1435 E	2	-
F_2 to F_6	EC 456613, KDS 753, EC 241995, JS 20-116, EC 391346, EC 538807, Karune, KDS 753, MACS 1460, NRC 127, JS 335, DSb 19, Cat 2086, CSB 10084, Cat 2018, SQL 37, EC 383 Local bold (CAU SLC1/P)	19	19
F_7 to F_{10}	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	86	86 (1)
ICAR-IISR, Indore: Dr Nataraj V: Disease resistance, High yield, early maturity			
F1	JS 20-38 x JS 20-34, NRC 181 x POP2, JS 20-20 x JS 22-18, JS 20-34 x JS 20-38, JS 20-34 x PP6, NRC 150 x YMV 16, POP2 x JS 95-60, JS 20-69 x (JS 20-69 x JS 95-60), NRC 1 NRC 142, EC 457254 x NRC 150, JS 21-05 x JS 22-18, NRC 127xEC 34372, NRC 142 x NRC 150, EC 18596 x JS 20-34, EC 18596 x NRC 150, JS 22-18 x PP6, NRC 150 x POP2 20-98 x NRC 150, 1289560F6 x JS 95-60, NRC 142 x 1289560F6, POP2 x NRC 142, 1289560F6 x POP2, PS 1569 x JS 20-34, JS 22-12 x POP2, NRC 150 x JS 20-34, JS 20-69 x N 150, JS 20-69 x JS 22-18, NRC 181 x YP43, JS 20-34 x EC 457464, YMV 16 x POP2, JS 20-98 x EC 34106 x JS 95-60, JS 20-20 x NRC 188, JS 21-05 x POP2, JS 22-18 x POP2, P(x PS 1569, JS 22-18 x NRC 188, JS 20-98 x PP6, NRC 127 x NRC 150, YMV 16 x NRC 150, JS 20-69 x JS 95-60, JS 20-20 x POP2, YP 49 x NRC 188, JS 20-98 x EC 18596, JS 2(x PO2	44	

ICAR-IISR, Indore: 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 at Indore	MACS-1460 x AGS 25,MACS-1460 X TGX-8116-21 D,MACS-1460 X EC 274713,MACS-1460 X EC 456613, MACS-1460 X EC 457475, 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 , AGS 25 X NRC 149, AGS 25 X KDS 753, 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 10334, KDS-753 X EC 241995, 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, EC-546882 X NRC-138, EC-538828 X NRC-158, 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 XNRC 128, 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.	57	
Fresh crosses and their generation advancement in Bengaluru	MACS-1460 x AGS 25, MACS-1460 X TGX-8116-21 D, MACS-1460 X EC 274713, MACS-1460 X EC 456613, MACS-1460 X EC 457475, NRC149 X RSC-10-46, NRC149 X DS3105, NRC149 X NRC-204, PS-1347 X AGS 25, 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 MACS 1460, VLS-89 X AGS 218, VLS-89 X NAN KING, SL 1074 X AGS 25, KDS-753 X EC 10334, KDS-753 XEC-241995, CAT 2797 X NRC-130, VLS-63 X EC-274713, EC-274713 X VLS-63, NRC-189 X DSB 21, NRC-192 X DSB 21.	26	
IISR, Indore: Dr. Gyanesh K. Satpute: Breeding for drought tolerance			
Fresh crosses	JS 20-34 x PI 159923,JS 20-34 x NRC 137,AMS 100-39 x TGX 709-50E,AMS 100-39 x EC 107407,AMS 100-39 x NRC 137,AMS 100-39 x NRC 256,AMS 100-39 x NRC 257, 10-46 x J 732,RSC 10-46 x PI 159923,RSC 10-46 x NRC 256,RSC 10-46 x NRC 189,RSC 10-46 x NRC 190,RSC 10-46 x NRC 257,DSb 34 x TGX 709-50E,DSb 34 x J 732,DSb EC 107407,DSb 34 x PI 159923,DSb 34 x NRC 137,DSb 34 x NRC 256,DSb 34 x NRC 257,KDS 753 x TGX 709-50E,KDS 753 x J 732,KDS 753 x EC 107407,KDS 753 x 137,KDS 753 x NRC 256,KDS 753 x NRC 189,KDS 753 x NRC 190,KDS 753 x NRC 257,NRC 136 x NRC 257	29	
F1	[(JS71-05xNRC 37) X (TGX 328-049) / (AMS MB 5-18xJS 95-60) X (PI 159923 x JS 95-60)],[(AMS MB 5-18xJS 95-60) X (PI 159923xJS 95-60) / (AMS MB 5-18 x JS 95-60) X 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)],[(38-11-265 x JS 95-60) X (JS71-05 x NRC 37) / (A 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) / (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 xJS 95-60)],[(AMS MB 5-18 x JS 95-60) X (PI 159923 x JS71-05)/ (38-11-265 95-60) X (JS71-05 x NRC 37)]	7	
F2	(AMS MB 5-18 x JS 95-60) X (PI 159923 x JS71-05),GKS 20-7 X NRC 137,(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 60),(JS 71-05 X NRC 37) X EC 602288,(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 Drt2 (TGX 049)] /[(AMS MB 5-18 x JS 95-60) X (PI 159923 x JS 95-60)],JS 71-05 X NRC 37 X PI 159923 X NRC 37	8	59
F3	JS 71-05 X NRC 37,NRC 136 X GKS 21-3,GKS 20-7 x NRC 137,NRC 137 X GKS 21-4,AMS MB 5 18 X JS 95-60,JS 71-05 X NRC 37	6	44
F5	[(C-2797 x JS 71-05) x (PK 472 x JS 335)] /(JS 335 x Young) x (EC 602288 x JS 90-41)]	1	7

F7	((NRC 37 x JS 97-52) x EC 572086) X SL 958,((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,((NRC 37 x JS 335) x 538828) x DS 3105,((NRC 37 x JS 71-05) x EC 538828) x DS 3106,((EC 602288-Cat 3293 x NRC 2) x EC 572154) X DS 3105,((EC 602288-Cat 3293 x NRC 2) x EC 572086) x 3106,(RVS 2001-18 x Kh 16 F6 20-2 Drt) x RVS 2001-18,(107-70 x 104-57rt) x RVS 2001-18,CAT 3293 X YOUNG	10	10
IISR, Indore: Dr. Shivakumar M			
F1	NRC 142 x F6 (NRC 128 x JS 95-60),NRC 150 x GW 53,JS 95-60 x GW 10,JS 95-60 x NRC 148,POP2 x NRC 142,F6 (NRC 128 x JS 95-60) x NRC 150,NRC 150 x GW 10,JS 3: py4-4-5,GW 30 x JS 95-60,NRC 150 x YP 48,JS 95-60 x EC 528226,GW18 X NRC 150,JS 95-60 x TGX 854-429,NEC 150 x JS 95-60,NRC 150 x YP 43,EC 95815 x JS 95-60,GW x NRC 142,JS 335 x Oy 49-4,POP2 x EC 95815,YP 43 x NRC 150,GW 18 x YP 48,NRC 142 x EC 95815,GW 53 x JS 95-60,F6 (NRC 128 x JS 95-60) x PoP2,GW 18 x NRC 142, 53 X NRC 142,NRC 252 x JS 20-34,YMV 16 x PY6-1-17,NRC 181 x NRC 142,YMV 16 x POP2,JS 95-60 x GW 53,NRC 142 xTGX85429,POP2 x NRC 181,YP 34 x OY49-4,JS 34 x TGX85883,F6 (NRC 128 x JS 95-60) x NRC 181,YP 34 x OY7-5-9,POP2 x JS 95-60,YP 47 x GW 10,JS 95-60 x EC 95815,e3e4 x e2 100 sw- JS 97-52-BC3F1,e3e4 x e2 100 NRC 127-BC3F1,JS 97-52 x e2100 sw- -BC2F1,NRC 127 x e2100 sw- -BC2F1	45	
AICRP on Soybean, University of Agricultural Sciences, Dharwad: High yielding, Earliness, Rust resistance and Yellow Vein Mosaic disease resistance, Photo period insensitivity			
Fresh crosses	DSb 34 x EC 241780, DSb 34 x EC 242104, DSb 34 x MACS 1460, DSb 34 x NRC 256, DSb 34 x EC 241778, JS 95-60 x EC 241780, JS 95-60 x MACS 1460, JS 95-60 x NRC 2: EC 242104 x EC 241780, EC 242104 x EC 241778, EC 241778 x EC 241780, EC 241780 x EC 241778, EC 241780 x EC 242104	13	-
F$_1$	DSb 27B x DSb 21, SL 1028 x DSb 21, SL 1028 x DSb 23, SL 1028 x JS 335, SL 1074 x DSb 34, DSb 21 x EC 242104, JS 335 x DLSb 1, DSb 34 x AGS 143, DSb 34 x Lee, DSb x SL 1074, DSb 34 x EC 2579	11	39
F$_2$	DSb 21 x EC 242104, JS 335 x DLSb 1, MACS 330 x JS 335, SL 1028 x DSb 21, SL 1028 x DSb 23, DSb 27B x DSb 23, SL 1074 x DSb 23, SL 1074 x DSb 34, SL 955 x JS 3	9	72
F$_3$	DSb 34 x EC 242104, DSb 27B x KDS 1194, DSb 27B x KDS 726, DSb 27B x DSb 21, DSb 27B x DSb 23, SL 955 x JS 335, SL 1028 x DSb 21, SL 1028 x DSb 23, SL 1074 x D 23, SL 1074 x DSb 34, DSb 21 x EC 242104, JS 335 x DLSb 1, MACS 330 x JS 335	13	97
F$_4$	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 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, DSb 27B x KDS 726, DSb 27B x KDS 1194	17	248
F$_5$	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, DL 1 x DSb 23, JS 335 x JS 20-34, DSb 34 x EC 242104, DLSb 1 x EC 242104, DSb 39 x DSb 34, DSb 23 x JS 20-116, DSb 23 x DSb 27B, DSb 39 x SL 955, DSb 34 x SL 1028, I 242104 x DSb 27B, EC 242104 x JS 95-60, DLSb 1 x SL 955	21	320 (19)
F$_6$	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, DL 1 x DSb 23, JS 335 x JS 20-34	11	41 (42)
F$_7$	DSb 23 x DLSb 1, DLSb 1 x DSb 23, 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 23 x DLSb 2, DSb 32 x EC 242104, DL 2 x DSb 32	10	-(40)
AICRP on Soybean, JNKVV, Jabalpur: Development of early maturing varieties resistant to Charcoal rot , YMV and RAB			
Fresh crosses (19)	**Parents Involved:** JS 95-60 , JS 20-34, JS 20-98, JS 20-53, JS 20-38, JS 21-08, JS 25-06, JS 21-72, JS 23-03, JS 22-11, JS 24-33, JS 22-16,JS 22-12, JS 24-25, JS 23-05,JS 23-08,JS 23-09, NRC 138,C 87,EC 481571	19	All
F$_1$	JS 20-98,JS 23-09, JS 21-72, NRC 202, NRC 138, JS 21-08, Cat 489 A, JS 21-05, JS 23-05, JS 22-18, RVSM 2011-35, JS 23-03, PS 10-92, PS 1225, PS 1637, NRC 193, PS 16(NRC 186, PS 1689, PS 1641, KDS 1169, RSC 11-20, DS 3106	18	75
F$_2$	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 1: CAT 87, JSM 126PS 1659,NRC 128,PS 1225,DS 31-09, AMS 100-39, PS 1092.	23	88
F$_3$	JS 95-60-, 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, 1225,NRC 128,AMS 100-39,PS 1092, DS 3106,DS 3109,NRC 130	23	92

F_4	JS 20-98, DSB 32, NRC 148, JS 335, JS 20-24, JS 95-60, JS 22-05, JS 20-34	04	15
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 20-94,JS 22-04, PB 1, JS 20-34JS 22-05, AMS 475,JS 93-05	10	76
F_6	JS 20-98, JS 95-60, DS 3105, JS 20-69, MAUS 740, PB 1, JS 22-04, JS 93-05, AMS MB 5-18, AMS 475, JS 20-94, JS 20-69, JS 22-05 SL 738, JS 20-116, NRC 148, JS 335	05	29 (5)
F_7	Cat 87, JS 20-94, SL 738, JS 95-60,JS 20-98,	02	06 (5 IISR)
F_8	S 20-30, JS 20-84, JS 21-09, JS20-24,JS 21-05, DS 3105, JS 20-69	02	09 (3 IISR)
F_{11} to F 15	JS 20-71, JS 20-87, JS 21-05, JS 20-24, JSM 128, PS 1556; JS 20-82, JS 95-60, JS 20-88, JS20-34, JS 20-29; JS 20-82 X JS 96-60; JS 20-88 x JS 20-34; JS 20-88 x JS 20-34	01	- (2)
ARS, Adilabad, PJTSAU: High yield, pod blight resistance, drought resistance and high oleic acid, photo-insensitivity,			
Fresh Crosses	AISb-50 x NRC 181, AISb-50 x NRC 150, JS 335 x NRC 136, JS 335 x NRC 128, AISb-50 x NRC 142	5	-
F2	Basara x Lee, Basara x AGS143, Basara x EC 103334	3	35
F3	Basara x EC34372, Basara x EC 457254, Basara x AKSS 67, MACS 1460 x RSC 10-46, MACS 1460 X NRC 128, MACS 1460 x LJ 137, MACS 1460 x LJ140, MACS 1460 x 119,MACS 1460 x NRC 130, MACS 1460 x LJ 124, MACS 1460 x RSC 10-46, LJ -137 x Dsb 34, NRC 138 x Dsb 34, Dsb 34 x LJ140, Dsb 34 x LJ 137, Dsb 34 x NRC 13 Dsb 34 x LJ 124, LJ 124 x Dsb 34, JS 9305 x AGS 25, LJ 140 x NRC 128, LJ 137 x NRC 138 , NRC 138 x LJ 140, LJ 137 x RSC10-46, LJ 124 x NRC138, NRC 138 x LJ - 124 , 137 x NRC 128, NRC 128 x LJ 124 , NRC 128 x LJ 140 , Basara x VLS 63, Basara x (F4P21 x Line 220), Basara x EC 481369, Basara x Karune, Basara x RSC 10-46, Basara x 2 98, Basara x NRC 130, JS 95-60 x RSC 10-46, RSC 10-46 x AGS 25, JS 20-69 x VLS 59, RKS 113 x SL 1104, F4P21 x RSC 10- 46, F4P21 x EC481369, JS 20-98 X G5P22, F4P x Line 202, F3P18 x JS 335, RSC 10-46 x EC 481369, JS 20-34 x EC 481369, F4P21 x Line 220	48	446
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-22-64, NHP-22-65, NHP-22-66, NHP-22-67, NHP-22-68, NHP-22-69, NHP-22-70, NHP-22-71, NHP-22-72, NHP-22-83, NHP-22-84, NHP-22-85,NHP-22-86, NHP-22-8 NHP-22-88	18	29
F5	NHP- 21-6, NHP-21-7 ,NHP- 21-8 ,NHP- 21-9 ,NHP- 21-10, NHP- 21-11 ,NHP- 21-12 ,NHP- 21-13 ,NHP- 21-14 ,NHP- 21-15 ,NHP- 21-16 ,NHP- 21-17 ,NHP- 21-18 ,NHP- 21- ,NHP- 21-20 ,NHP- 21-21 ,NHP- 21-23 ,NHP- 21-25 ,NHP- 21-26 ,NHP- 21-27, NHP- 21-28 ,NHP- 21-29 ,NHP-21-30 ,NHP- 21-32 ,NHP- 21-33 ,NHP- 21-35 ,NHP- 21-37 ,NH 21-38 ,NHP- 21-39 ,NHP- 21-42 ,NHP- 21-44 ,NHP- 21-45 ,NHP- 21-46 ,NHP- 21-48 ,NHP-21-49 ,NHP- 21-52 ,NHP- 21-53 ,NHP- 21-54 ,NHP- 21-56 ,NHP- 21-57 ,NHP- 21- ,NHP-21-62 ,NHP- 21-63 ,NHP- 21-66 ,NHP- 21-65 ,NHP- 21-67 ,NHP- 21-68 ,DSb 23 x MACS 450, Basara x JS 20-34, Basara x JS 20-34, JS 97-52 x AMS 5-18, NRC128 AMS 5-18, NRC128 x JS 20-69, JS 20-69 x NRC 128, AMS 5-18 x JS 20-69, JS 97-52 x JS 20-59	56	153 (23)
F6	MAUS 71 x JS 20-29, MAUS158 x EC 538828, EC 113778 x MAUS 162, MAUS 162 x JS 20-69, JS 20-69 x MAUS 612	5	20 (1)
F_7	RVS2001-18 x EC 5572086,(NRC37 x 97-52) x NRC-121,EC38316 x CAVLC, SL958 xAGS25,A3406 x RKS-18, RVS2001-2 x Code 13, 97-52 x AGS25, JS 20-34 x RVS2001- MAUS 2 x SL-688, EC34087 x 20-29, 70-4E x CS72154, JS21-08 x NRC121-1(25), (958 x11-58) x JS 90-41, JS 97-52 x PP6, SL96 x AGS25, JS 20-34 x AK8887, RVS2001-18 G27	17	-(10)
AICRP on Soybean, CSK HPKV, Palampur: Breeding for High yield; Early/mid maturity; Better quality oil; Disease resistance; Vegetable types			
Fresh crosses	**Parents involved:** VLS-89, EC 389167, EC 39177, VLS-59 and TGX 328-049. EC 274713, VLS-59, P 318, VLS-89 Himso-1685, JS 20-116 and DS 3163, P_1(Himso-1685), P_2 (PS-1556), F_1(PS-1556×Himso-1685), BR-15, TGX1016-19F, TGX855-32E, JS 79-82, EC242003, EC241756, EC39606 TGX803-99E, M1085, TGX849-143D, JSM-302, T 49, EC251498, JSM-245, CAT 1149, Himso-1685 and *G. Soja*	55	-
F_1	**Derived by hybridization between parents:** VLS-89, NANKING, P 318, AGS 218, VLS-63, EC274713and MACS-124	5/7	-
F_2	**Derived by hybridization between:** NRC 128, H 330, JS 20-94, NRC 136, Himso-1685, NRCSL-2, AMS MB 5-18, CAT 411A, NRC SL-1, CAT 2086 and GP 448	7/13	122
F_3	**Derived by hybridization between:** PS 1556 × Himso-1685, Palam Early Soya-I × Himso-1685, NRC 133 × EC 242105, PS 1556 × JS 20-98, Hardee × EC 390981, NRC 136 × E 242105, JS 20-94 × EC 39177 and JS 20-94 × EC 396059	8	588

F_4 to F10	**Advanced generation lines derived from available crosses**	62	642 (39)
Agriculture Research Centre, Lokbharti-Sanosara, Bhavnagar GJ: Breeding for High yield, Earliness, drought Tolerance and resistance against major insect pests			
Fresh Cross	JS 95-60 x JS 20-29/ JS 20-34 x JS 20-29/ JS 95-60 x JS 20-34 /PS 1569 x JS 20.34 / JS 95-60 x PS 1569	5	-
F1-F2	JS 20-29 x MACS 1520/MACS 1520 x JS 20-29/MACS 1520 x JS 20-29/ JS 95-60 x NRC 138/ JS 20-29 x JS 95-60/NRC 86 x JS 20-29	6	6
F2-F3	**Derived by hybridization between parents**-RSC10-46/(JS20-88/JS20-34),,JS20-98/(JS20-88/JS20-34),JS20-98/ NRC86,(JS97-52/RVS2009-9)/ RSC10-46,NRC86(JS 97-52 XR 2009-9)	6	12
F3-F4	**Derived by hybridization between parents**-JS20-29xJS335	1	7
F4-F5	**Derived by hybridization between parents**- JS-335xNRC86	4	5
F5-F6	**Derived by hybridization between parents**-Type-49xJS93-05,JS 97-52 x JS 71-05	51	18
AICRP on Soybean, Agricultural Research Station, Ummedganj, Kota: Breeding for high yielding,early maturing and disease & pest resistance (YMV, defoliators and girdle beetles)			
Fresh crosses	**Parents involved:** RVSM 2011-35, MAUS 795, JS 20-116, JS 22-14, NRC 138, JS 22-12, JS 22-16, JS 22-18	15	-
F_1	NRC 130 x NRC 138, NRC 130 x Cat 2797, JS 20-69 x cat 2797, NRC 130 x JS 20-34, MACS 1520 x EC 274713, NRC 138 x MACS 450, NRC 138 x EC 274713 and RKS 18 x NI 138	**8**	**-**
F_3	NRC 181 x RSC 10-46,JS 20-69 x EC 456556, RVSM 2011-35 x RSC 10-46, RVSM 201 1-35 x JS 20-34, AMS MB 5-18 x NRC 128, EC 602288 x TGX 37- E, RVSM 2011-35 NRC 130, JS 20-69 x NRC 128, JS 20-34 x RSC 10-46, NRC 181 x NRC 128, MACS 1460 x RSC 10-46, JS 20-69 x RSC 10-46, MACS 1460 x NRC 128,EC 602288 x NRC 12 MACS 1460 x LJ 137, MACS 1460 x LJ 140,MACS 1460 x 138, MACS 1460 x NRC 130,MACS 1460 x LJ 124,MACS 1460 x RSC 10-46,Dsb 34 x LJ 140, Dsb 34 x LJ 137,Dsb x LJ 124,RSC 10-46 x LJ 124,RVSM 20 11-35 x LJ-124,NRC 130 x JS 20-34,RSC 10-46 x LJ 140,JS 9305 x AGS 25,NRC 130 x LJ 124,LJ 140 x NRC 128,LJ 124 x RSC 10-46, 137 x NRC 138,RVSM 20 11-35 x JS 20-34,LJ 140 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, 137 x RSC10-46,LJ 137 x RSC10-46,LJ 124 x NRC138,LJ 124 x NRC 130,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, 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,NRC 128 x LJ 124,NRC 128 x LJ137,JS 20-34 x LJ 124,NRC 128 x 140,LJ 140 x RS 10-46,RKS 113 x SL 1104,F4P21 x RSC 10-46,F4P21 x EC 481369,JS 20-98 x G5P22,F4P21 x Line 202,F3P18 x Line 202, F3P18 x JS 335,F4P21 x Line 220.	66	258 (60)
F_4	NHP-64, NHP-65, NHP-66, NHP-67, NHP-68, NHP-69, NHP-71, NHP-72, NHP-77, NHP-83, NHP-84, NHP-88	12	176 (12)
F_5	JS 20-94 x JS 95-60, JS 20-98 x PUNJAB 1,JS 20-116 x PUNJAB 1,JS 20-116 x JS 95-60,JS 20-116 x AMS MB 5-18,JS 22-04 x JS 93-05,JS 22-04 x PUNJAB 1,JS 22-05 x JS 2 34,SL 738 x JS 95-60,MACS1460 x JS SH 93-37,MACS1460 x TAMS 9821,MACS 1460 x RSC 10-46,MACS 1460 x JS 95-60,MACS 450 x NRCSL 1,MACS 450 x Dsb 34,JS 2 29 x AMS 100-39,JS 20-69 x MAUS 612,MAUS 71x JS 20-2,MAUS 71 x JS 20-69,MAUS 71 x NRC 130,MAUS 162 x AMS 100-39,SL 958 x MACS 450,PK 416 x AGS 25,RV 2012-1 x JS 95-60,[SL 958 x (JS 97-52 x EC390977)] x EC 572154,JS 20-34 x EC 771186,EC 572154 x DS 3106,(NRC 37 x JS 97-52) x EC572086,RVS 2001-18 x AK 887,(NI 37 x JS 335) x NRC 121,(Cat 3293 x JS 9041) x F5(JS 97-52 x MACS 330), NHP 48, NHP 49, NHP 50, NHP 51, NHP 52, NHP 53, NHP 54, NHP 55, NHP 56, NHP 57, NHP 5 NHP 59, NHP 60, NHP 61, NHP 62, NHP 63,16 x17,SL 744 x [F1 SL 525 x AGS 328] x SL 958,USA-8 x G. Soja (A),(AGS 456 x G.soja) x AGS 456,(G.Soja x S.Vasundhara) x Vasundhara	54	145 (30)
F_6	JS 20-98 x JS 95-60,JS 21-17 x PS 1092,CAT 87 x JS 20-94,DS 3105 x JS 20-69,SL 958 X G.soja,SL 445 X SL 979,EC 107416 X SL 979,NRC 94 X G.soja,SL 979 X SL 445,I 528828 X SL 958,SL 958 X NRC 107,SL 958 X NRC 109,SL 979 X Ds 3105,SL 979 X NRC 109,SL 958 X AGS 456,SL 955 X AGS 191,(SL 525 X NRC 101) X SL 958,JS 97- X SL 958,SL 958 X IC 210,SL 1171 X SL 979,SL 979 X EC 538828,Dsb 23 X G.soja,(G.soja X NRC 94) X NRC 94,(JS 335 X G.soja) X JS 335,SL 744 X (SL 525 X G.soja)	25	45 (15)
F_7	JS 21-05 x JS 20-24,JSM 128 x PS 1556,JS 97-52 X PS 1029,JS 97-52 X Bragg,JS 97-52 X SL 958,JS 97-52 X EC 546882,JS 97-52 X Durga,JS 97-52 X PS 1225,JS 97-52 X TAM 98-21,JS 97-52 X SL688,JS 97-52 X JS 21-08,JS 97-52 X RVS 2007-09,JS 97-52 X ANKUR,JS 97-52 X SL 688,JS 335 X PK 416,PS 1042 X DS 98-14,JS 20-63 X JS 20-59,JS 2 69 X JS 20-59,PS 1586 X Bragg,JS 20-69 X EC 107407,JS 20-29 x MAUS 158,MACS 1188 X KDS 753,MACS 1340 X RVS 2007-06,MACS 1340 X RVS 2007-06-2,RVS 2007 MACS 1340	23	40 (10)

F_8 to F_{10}	JS 20-87 x SL 900-2-1-1,B 1664 x JS 20-69-5-2-1,JS 20-87 x SL 900-3-2-1,JS 20-87 x SL 900-3-3-1,JS 20-65 x JS 20-53-2-5-1,JS 20-65 x JS 20-53-4-4-1,JS 20-69 x JS 20-79-2-1,Type 49 x EC 538828,JS 335 x EC 538828	9	15
AICRP on Soybean, ICAR-VPKAS, Almora: Yield components, earliness and resistance to frog eye leaf spot			
Fresh crosses	VLS 99 x Davis, VLS 99 x EC 528623, VLS 99 x Himso 1685, TG 23943 x EC 274713, TG 23943 x Palam Soya, TG 23943 x VLS 89, TS 23943 x VLS 63, VLS 63 x Himso 168 VLS 63 x EC 528623, VLS 63 x Davis, VLS 89 x Himso 1685, VLS 89 x Davis, VLS 89 x EC 528623, VLS 89 x NRC SL 7, VLB 202 x Kalitur, VLB 202 x HRC 142, VLB 201 Kalitur, VLB 201 NRC 142, EC 274713 x TG 23943, EC 274713 x Pulma soya, EC 274713 x Punjab – 1, EC 528623 x TG 23443, EC 528623 x JS 95-60, EC 528623 x VLS 9 Punjab -1 x TG 23943, Punjab-1 x NRC SL – 7, JS 93-60 x MIACS 250, JS 93-60 x VLS 99, Kalitur x Local, Kalitur x VLB 201, NRC 142 x VLB 201, NRC 142 x VLB 202	Approx 35	-
F1	VLS 99 x GW172, VLS 99 x JS 97-52, VLS 99 x RSC 10-17, VLS 99 x Himso 1685, VLS 99 x GW 378, VLS 99 x JS 95-60, VLS 47 x VLS 99, VLS 47 x Himso 1685, VLS 47 x 97-52, VLS 47 x RSC 10-17, VLS 89 x GW 170, VLS 89 x VLS 99, VLS 89 x RSC 10-17, VLS 89 x JS 95-60, VLS 89 x GW 172, VLS 89 x Himso 1685, VLS 2V x VLS 73, V 21 x JS 95-60, VRPH 1444 x VLB 202, VRPH 1444 x VLB 201, VRPH 1444 x VLS 47, VRPH 1444 x VLS 89, VLS 59 x VLS 99, PS 1556 x GW 172, PS 1556 x Himso 1685, 1556 x VLS 99, Kalitur x VLB 201, Kalitur x VLB 202, Kalitur x Local, Local x VLB 202, Local x Kalitur, Local x VLB 201, GW 378 x VLS 89, GW 378 x VLS 99, VL63 x V 99, Pusa 22 x VLS 99, Brisa Soya 1 x Local, PS 1092 x JS 95-60, JS 97-52 x RSC 10-17, GW 170 x VLS 99, GW 172 x VLS 89	41	-
F2	VLS 59 x NRC 127, VLS 21 x VLS 63, VLB 201 x Himso 1685, VLS 59 x Pusa 22, VLB 201 x NRC 127, VLS 63 x VLS 73, Local x PS 1092, VLB 201 x RSC 10917, VLS 8 NRC 142, VLS 63 x JS 95-66, VLS 89 x Himso 1685, Local x Himso 1685, Local x NRC 142, VLB 202 x NRC 127, VLB 202 x RSC 10-17, VLB 202 x Local, VLB 201 x NRC 1 VLS 65 x Local, VLS 63 x PUSA 22, VLS 63 x Himso 1685, VLS 21 x VLS 59, VLS 63 x JS 95-60, VLS 63 x RSC 10-17, Local x NRC 127, VLS 59 x NRC 142, Local x RSC 1 17, VLS 63 x NRC 127	27	-
F3	VLS 21 x NRC 142, PS 1092 x Himso 1685, JS 97-52 x Shivalk, VLS 63 x NRC 142, Brisa Soya x Kalitur, VLB 201 x Local 120, VLB 202 x VLS 73, VLS 63 x Shivalk, JS95-6 RSC 10-17, PS 1556 x VLS 47, VLB 202 x VLS 73, VLB 201 x Kalitur	14	36
F4	VLS 63 x VLS 89 to 4, VLB 201 x Pori Local to 4, VLS 89 x JS 45-60 to 4, VLB 201 x Local to 4, VLS 21 JS 95-60 to 4, VLS 21 x VLS 89-1 to 4, VLS 63 x Himso 1685 to 4, 1092 x Shivalk to 4, VLS 63 x VLS 47 to 4	9	36
F5	VLB 202 x JS 95-60 to 4, VLS 63 x VLS 47 1 to 4, VLS 63 x Himso 1685 to 4, VLS 47 x EC 34057, VLB 201 x VLS 73 to 4, VLB 202 x JS 95-60 to 4, VLB 63 x PS 1092 to 4, Pu 22 x EC 34057 to 4, VLB 202 x JS 95-60 to 4, VLB 59 x BC 34057 to 4, VLS 47 x RSC 10-17 to 4, VLS 63 x PS 1092 to 4, Pusa 22 x RSC 10-17 to 4, VLB 22 x VLS 47 to 4, V 201 x VLS 73 to 4, Pusa 22 x EC 340-57 to 4, VLS 63 x EC 34057 to 4	17	68
F6	VLS 59 x PS 1092 to 4, VLS 63 x Himso 1685 to 4, VLS 47 x EC 34057 1 to 4, VLS 47 x PS 1092 to 4, Kalitur x VLS 47 to 4, VLS 63 X Himso 1685 to 4 VLB 202 x VL 559 to VLS 59 x EC 34057 to 4, VLB 202 x JS 95-60 to 4, VLB 202 x VLS 47 to 2, VLS 63 x VL 47 to 3, VLS 59 x PS 1092 to 3, VLS 59 x PS 1092 to 3, Kalitur x VLS 47 to 3, VLS 4 PS 1042 to 3	15	40 (34)
AICRP on Soybean, Amravati Centre: Breeding for High yield with Charcoal rot resistance, YMV resistance, Earliness, Kuntiz trypsin inhibitor free, Lox-2 free, Good germinability, Mechanical harvesting, Long juvenility and Photo insensitivity.			
Fresh Crosses	**Parents involved**: AMS-MB 5-18, AMS 100-39, NRC 127, NRC 109, KDS 726, JS 21-71, MACS 450, JS 20-34, MAUS 162, RVSM 2011-35, Birsa Soya, AGS 25, NRC 130	11	---
F1	TAMS-38, AMS 100-39, AMS-MB 5-18, NRC 127, JS 97-52, MAUS 162, RVSM 2011-35, NRC 138, EC 546882, EC 274713, NRC 130, CAT 2797, UPSM 534, JS 20-34.	13	---
F2	**Derived by hybridization between parents:** AMS 100-39, JS 9752, RVSM 2011-35, RVSM 2011-35, TAMS 38, MAUS 162, NRC 127, TAMS 38, AMS MB-5-18	**6**	181
F3	Derived from hybridization between: AMS-MB-5-18, NRC 101, NRC 127, AMS-MB-5-19, TAMS-38, JS 21-71, AMS 100-39, NRC 37, NRC-7, AMS-99-33, UPSM-534, MAUS 158, , JS 335, Kalitur.	14	111
F4	Derived from 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	110 (8)
F5	Derived from hybridization between : JS 20-94, JS 95-60, JS 20-98, Panjab-1, JS 20-116, AMS-MB 5-18, JS 22-04, JS 22-05, MACS1460, TAMS 9821, RSC10-46, JS 20-29, AMS 100-39, JS 20-69, MAUS 612, MAUS 71, RVS 2012-1,NRC 37, JS 97-52, JS 335, NRC 12.	27	191 (7)

F6	Derived from hybridization between : NRC 37, JS 9752, NRC-21, AGS 25, JS-2911, JS 23-20, MACS 450, JS-2034, RVS-2001-18, SL-955,JS 11 SB, JS-335, JS-70-4, RVS-2001-2, JS 11-58,JS-335, JS 70-4, JS-7105, JS 20-98, JS 95-60,JS 21-71,PS 1092, JS 20-94, DS 3105, 20-69,DS 3105.	23	-(18)
F7	JS 97-52, JS-9041, Bragg, JS 21-08, Ankur, JS-9041, PS 1029, G 29, PS1029, Durga, DS 3105, Swarna Vasundhara, MAUS-71, AGS-25,DSb-2302, SL-958, Hara soya, RSC10-46 :	21	- (20)
- **AICRP on Soybean, VNMKV, Parbhani:** Early Maturity, High Seed yield, Non shattering, Tolerance to pest disease and Drought			
Fresh Crosses	NRC 142, NRC 150, NRC 181, NRC 188, MACS 1460 , MACS 1520, JS 22-16, JS 23-03, JS 22-12, JS 23-09, KDS 992, AMS 100-39 , MAUS 71,MAUS 81, MAUS 158, MAUS 162, MAUS 612	30	-
F_1	NRC 130, NRC 138, MAUS 71, CAT 2797, MAUS 81, MAUS 158, MAUS 162, MAUS 612, EC 274713, EC 457464, EC 546882, JS 20-69, RSC 10-52, TGX 854429, NANKING, MACS 450	43	-
F_2	NRC 136, NRC 147, KDS 726, KDS 992, MAUS 71, MAUS 158, MAUS 162, MAUS 612, JS 20-34, JS 95-60, JS 20-116, DLSb 1, DSb 34	21	330 (2)
F_3	MAUS 71, MAUS 158, MAUS 162, MAUS 612, JS 95-60, JS 20-116, EC 572109, EC 538828, EC 546882, RVS 2010-1, DS 31-05	24	435 (7)
F_4	MAUS 71, MAUS 158, MAUS 162, MAUS 612, JS 20-34, DS 31-05, RSC 10-52, EC 389174, MACS 1520, RVS 2010-1, AMS MB 5-18	29	503 (12)
F_5	SKF 10-50, AMS 100-39, NRC 130, JS 20-29, JS 20-34, JS 20-69, EC 538828, MAUS 71, MAUS 81, MAUS 162, MAUS 612, SHALIMAR, EC 113778	25	540 (8)
F_6	MAUS 71, MAUS 158, MAUS 162, MAUS 612, EC 113778, EC 538828, EC 107407, NRC 37, Bragg, JS 20-29, JS 20-69, JS 20-34	26	410 (31)
F_7	MAUS 71, MAUS 158, MAUS 162, MAUS 612, MAUS 710, MAUS 733, MAUS 711, MAUS 614, EC 546882, AGS 25, SL 958, SL 979, BC_1F_4, JS 20-89, JS 93-05, JS 20-96, JS 20-98, JS 20-71, JS 20-79, JS 97-52, KDS 344, NRC 99, NRC 107, NRC 121, RSC 10-29,VLS 63	28	326 (30)
DSR F_7	AGS 25, G 27, G 2911, EC 383165, EC 572154, EC 572086, EC 34087, EC 52086, EC542154, EC 771186, EC 251396, PS 10-29, RVS 2001-18, RVS 2001-2, JS 335, JS 20-34, JS 20-98, JS 21-08, JS 20-29, JS 93-05, JS 97-52,JS 90-41, CAUSLC, DSb 10, AK 887, NRC 37, NRC 121, PP6, 11-5B, Karune, PI 16937, MACS 1188, MAUS 2, SL 688, SL 955, SL 958, 450, 11-5B, JS 90-41,SL 96, 70-4, 70-5, 710-05, 23-2D, 71-05, CAT 3293, PI 416937, CAT 3406, RKS 18, Bragg, PI 16935	49	836 (35
DSR F_8	EC 602288, EC 538828, EC 390977, EC 290977, EC 546882, NRC 37, NRC 2,JS 97-52, JS 90-41, JS 71-05, JS 71-08, Bragg, G 27, Ankur, RVS 2009-9, PS 1556, PS 1225, PS 10-29, SL 688, SL 958, SL 96,TAMS 98-21, 70-A, DSb 21, BLR 5, KDS 726, LEE, DS 3105, Swarn Vasundhara, MAUS 612, MAUS 81, MAUS 71, MACS 452, AGS 25, DSb 23-02, Hara soya, RSC 10-46, PS 1556, DSb 1, JS 21-08	30	481 (26)
NHP F_3	NRC 181, RSC 10-46, JS 20-69, EC 456556, RVSM 2011-35, JS 20-34, AMS MB 5 -18, NRC 128, EC 602288, TGX 37-E, NRC 130, MACS 1460, LJ 137, LJ 140, 138, LJ 124, DSB 34, JS 93-05, AGS 25, NRC 138 , JS 20-24, LJ 119, RKS 113, SL 1104 , F4P21, EC 481369, JS 20-98, G5P22, Line 202, F3P18, JS 335	66	1242
NHP F_5	JS 20-94, JS 95-60, JS 20-116, PUNJAB 1, JS 22-04, JS 93-05, JS 22-05, JS 20-34,SL 738, JS 20-98, JS 21-17, PS 1092, CAT 87, DS 3105, JS 20-69, JS 21-05,JS 20-24, JSM 128, PS 1556, MACS 1460, JS SH 93-37, TAMS 9821, RSC 10-46, MACS 450, NRCSL 1, DSb 34, JS 20-29, AMS 100-39, MAUS 612, MAUS 71,JS 20-2, NRC 130, MAUS 162, Type 49, EC 538828, JS 335, SL 958, JS 97-52, EC 390977, EC 771112, RVS 2021-1, EC 771186, EC 572154, DS 3106, NRC 37, EC 5721086, RVS 2001-18, AK 887, NRC 121, CAT 3239, JS 9041, MACS 330	60	664 (25)

Table 2.2 : Evaluation of advance breeding lines at different centres

Centre	**Name of trials**	**No. of trials**	**No. Of strains tested**	**Strain excelling the check**	**Yield (kg/ha)**	**Check**	**Superiority over the Check (%)**	**Specific Objectives**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Imphal				CAUMS 4	3000	JS 20-116	21	High Seed Yield
				CAUMS 5	3056	JS 20-116	22	

Jabalpur	Station varietal trial	01	10	JS 25-50 (Early)	1300.0	1006.25 (JS 20-98, Normal)	57.57	High yielding resistance/tolerance to major disease
				JS 25-52 (Early)	1100.0	825.0 (JS 20-34, Early)	33.33	
				JS 25-55 (Early)	1356.25			
				JS 25-53 (normal)	1325.0			
Pune	PRT (Preliminary row trial)	1	40 + 3 (C)	MACS 1913	4133	**KDS 726, DSb 34** and MACS 1460	19.80	Breeding for High yield, High oil, Earliness, insect resistance and Vegetable and food grade type
				MACS 1908	3889		12.72	
				MACS 1917	3816		10.61	
				MACS 1905	3695		7.10	
				MACS 1929	3655		8.42	
	APT (Normal) Advanced plot trial (Normal)	1	10 + 3 (C)	MACS 1868	4368	**DSb 34, MACS 1188 and KDS 753**	16.76	
				MACS 1897	4218		12.75	
				MACS 1862	3994		6.76	
				MACS 1896	3978		6.34	
	APT (Early) Advanced plot trial (Early)	1	08 + 3 (C)	MACS 1884	4110	**MACS 1460, JS 93-05** andJS 95-60	20.49	
				MACS 1890	3953		15.89	
				MACS 1883	3868		13.40	
				MACS 1863	3773		10.61	
	LFT (Large scale field trial)	1	12 + 3 (C)	MACS 1859	3880	**MACS 1460, DSb 34** and KDS 726	15.44	
				MACS 1831	3830		13.95	
				MACS 1842	3767		12.08	
Dharwad	Advanced Yield trial	01	14	DSb 33-09	4400	DSb 34 (3545 kg/ha)	24.12	Breeding for rust and YMV resistance, earliness and High yield
				DLSb 6	4385		23.70	
				DSb 44	4377		23.47	
				DSb 45	4272		20.51	
	Preliminary Yield Trial	02	21	DSb 46	4012	DSb 34 (3412 kg/ha)	17.58	
				DSb 47	3635		6.54	
				DSb 48	3615		5.95	
				DSb 49	3575		4.78	
Lokbharti-Sanosara, Bhavnagar	IYT	01	17	R&D-2023-1	**4215.36**	NRC 130, JS 20-34, JS 20-98, RVSM 2011-35, JS 20-116	41	Breeding for High yield, Earliness, drought tolerance and resistance against major insect pests
				R&D-2023-6	**3091.89**		37	
				R&D-2023-12	**3892.39**		39	
				R&D-2023-16	**3887.46**		66	
	AYT	01	06	LOKSOY-2023-05	**2804.484**	JS20-34, NRC -130	112	
				LOKSOY-2023-11	**2744.479**		107	
				LOKSOY-2023-14	**2738.552**		107	
Amravati	**PYT**	**01**	**23**	AMS 24-4	3246	AMS 100-39, AMS-MB 5-18, AMS 1001, JS 93-05, JS 335, MAUS 158,	22.38	Breeding for High yield with Charcoal rot and YMV resistance,
				AMS 22-16	3156		19.01	
				AMS 24-3	3032		14.33	

				AMS 23-4	2992	RVSM 2011-35	12.82	Earliness and multiple pest resistance.
	MVT	**01**	**17**	AMS 22-14	2981		24.73	
				AMS 22-16	2844		19.00	
				AMS 2022-1	2704		13.14	
				AMS 2019-1	2694		12.72	
				AMS 23-1	2650		10.88	
ICAR-IARI, New Delhi Centre	PYT 1	1	11+6	Data recording under progress				Development of early, medium and late maturing genotypes with resistance against MYMV, RAB, Bud Blight, Bacterial pustule, Charcoal rot and Rust
	PYT 2	1	22+6	V-11	1893, 115 days	1867, 117 days	1.39%	
				V-3	2060, 111 days	1867, 117 days	10.33%	
	PYT 3	1	25+6	Data recording under progress				
	PYT 4	1	12+6	V-11	2010, 118 days	1776, 119 days	13.17	
				V-12	1794, 116 days	1776, 119 days	1.01	
	PYT 5	1	24+6	Data recording under progress				
	PYT6	1	30+6					
	PYT7	1	14+6					
	PYT8	1	24+6					
	PYT9	1	40+6	V-27	1894, 102 days	1552, 107 days	22.02	
				V-3	1624, 105 days	1552, 107 days	4.63	
				V-22	1360, 101 days	1552, 107 days		
	PYT10	1	10+6	Data recording under progress				
	MLT1	1	21+6	Data recording under progress				
	MLT2	1	24+6	Data recording under progress				
	MLT1D	1	26+6	V31	2567, 103 days	2277, 107 days	12.73	
				V25	2117, 100 days	2277, 107 days		
Punjab Agricultural University, Ludhiana	Initial Varietal Trial	1	53	Code no. 14 Code no. 9 Code no. 6 Code no. 7 Code no. 21	2970 2890 2624 2555 2479	-	-	High yield, YMD resistance, Early maturity
	Final Yield trial	1	6	SL 1431 SL 1441 SL 1442 SL 1443 SL 1446 SL 1497 SL 1516 PS 1670 NRCSL 5	3638 3499 3536 4084 3693 3509 3809 3541 3434	SL 958 (3210 kg/ha)	13.3 9.0 10.0 27.2 15.0 9.3 18.6 10.3 6.9	High yield, YMD resistance

	Advanced Yield Trial	1	15	SL 1373 SL 1444 SL 1376 SL 1455	4176 3650 3627 3534	SL 958 (3327 kg/ha)	25.5 9.7 9.0 6.2	High yield, YMD resistance
	Small Scale Trial*	3	137	SL 1535 SL 1550 SL 1536 SL 1537 SL 1538 SL 1457 SL 1488 SL 1531 SL 1505 SL 1512 SL 1461	6659 6548 5567 5444 5589 5350 5128 4783 4739 4725 4719	SL 958 (4178 kg/ha) SL 958 (3203 kg/ha)	59.3 56.7 33.2 30.3 33.7 67.0 60.0 49.3 47.9 47.5 47.3	High yield, YMD resistance, Early maturity
AICRP on Soybean, MACS-Agharkar Research Institute, Pune Centre	PRT (Preliminary row trial)	1	40 + 3 (C)	MACS 1913	4133	**KDS 726, DSb 34** and MACS 1460	19.80	Breeding for High yield, High oil, Earliness, insect resistance and Vegetable and food grade type
				MACS 1908	3889		12.72	
				MACS 1917	3816		10.61	
				MACS 1905	3695		7.10	
				MACS 1929	3655		8.42	
	APT (Normal) Advanced plot trial (Normal)	1	10 + 3 (C)	MACS 1868	4368	**DSb 34, MACS 1188** and KDS 753	16.76	
				MACS 1897	4218		12.75	
				MACS 1862	3994		6.76	
				MACS 1896	3978		6.34	
	APT (Early) Advanced plot trial (Early)	1	08 + 3 (C)	MACS 1884	4110	**MACS 1460, JS 93-05** and JS 95-60	20.49	
				MACS 1890	3953		15.89	
				MACS 1883	3868		13.40	
				MACS 1863	3773		10.61	
	LFT (Large scale field trial)	1	12 + 3 (C)	MACS 1859	3880	**MACS 1460, DSb 34** and KDS 726	15.44	
				MACS 1831	3830		13.95	
				MACS 1842	3767		12.08	
CAU Imphal				CAUMS 4	3000	JS 20-116	2100	High seed yield
				CAUMS 5	3056	JS 20-116	22200	
ARS, Adilabad, PJTSAU	Multilocation trial	1	8	ASb101 ASb 107 ASb 104	3243 3077 3044	KDS 753 (2693)	16.9 12.4 11.5	High yield and earliness
	AVT	1	3	ASb169 ASb 185	3350 3261	KDS 753 (2634)	27.1 23.8	High yield
	PVT	1	17	ASb 236	3331	KDS 753 (2829)	15.1	High yield

AICRP on Soybean, CSK HPKV, Palampur	BARC soybean multilocation trial	5	8	TS-11	1884	Himso-1685, Himsoya	15.44	Breeding for • High yield • Early/mid maturity • Better quality oil • Disease resistance • Vegetable types
				TS-6	1875		14.89	
				VLS 99	1873		14.77	
	Soybean station trial	1	8	P120-11-1-1 (Hardee × Hara Soya)	2611	Palam Early Soya-I	113.14	
				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 × G1-12)	2565		32.28	
				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	
AICRP on Soybean, VNMKV Parbhani (MS)	PVST AVST	1	34 Entry + 6 (C)	MAUS 817	2992	MAUS 612	27.31	Early Maturity, High Seed yield, Non shattering , Tolerance to pest disease and Drought
				MAUS 821	2564	MAUS 612	9.10	
				MAUS 825	2707	MAUS 612	15.19	
				MAUS 826	2790	MAUS 612	18.72	
				MAUS 834	2691	MAUS 612	14.51	
				MAUS 839	2510	MAUS 612	6.80	
		1	34 Entry + 6 (C)	MAUS 770	2710	MAUS 612	16.55	
AICRP on Soybean, Agricultural Research Station,	Station Trial-I and II (Normal)	2	38	AUKS 23-59	3180	RVSM 2011-35 (2118 kg/ha)	50.15	High-yielding with disease and pest resistance (YMV, defoliators and girdle beetles)
				AUKS 23-94	3142		48.35	
				AUKS 23-76	3030		43.05	
				AUKS 23-75	2939		38.75	
				AUKS 23-101	2904		37.10	

Ummedganj, Kota				AUKS 23-66	2889		36.42	
				AUKS 23-67	2841		34.15	
				AUKS 23-55	2810		32.65	
				AUKS 23-53	2768		30.70	
				AUKS 23-93	2697		27.35	
				AUKS 23-35	2648		25.00	
				AUKS 23-28	2586		22.10	
	ST-II (Early)	1	13	AUKS 23-99	2512	NRC 138 (1824 kg/ha)	42.36	High-yielding, early maturing and disease and pest resistance (YMV, defoliators and girdle beetles)
				AUKS 23-18	2440		38.18	
				AUKS 23-14	2325		30.85	
				AUKS 23-100	2253		26.42	
				AUKS 23-24	2132		18.97	
	SAT	1	14	AUKS 22-1	2559	RKS 113 (2027 kg/ha)	26.25	High-yielding, early maturing and disease and pest resistance (YMV, defoliators and girdle beetles)
				AUKS 22-10	2475		22.10	
				AUKS 22-48	2350		15.93	
				AUKS 22-52	2215		9.27	
				AUKS 22-34	2185		7.79	
ARS, Adilabad, PJTSAU	Multilocation trial	1	8	ASb101 ASb 107 ASb 104	3243 3077 3044	KDS 753 (2693)	16.9 12.4 11.5	High yield and earliness
	AVT	1	3	ASb169 ASb 185	3350 3261	KDS 753 (2634)	27.1 23.8	High yield
	PVT	1	17	ASb 236	3331	KDS 753 (2829)	15.1	High yield

Multi-location Germplasm Evaluation

A set of 221 soybean germplasm lines including checks was evaluated under RBD at multi-locations (8 centers). This trail was conducted with the purpose to identify superior germplasm lines for yield and attributing 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 trial **(Table 2.3)**, germplasm (Table 2.4), important descriptive statistics {(mean, range and CV (%)} of 221 germplasm lines over the 8 locations (Table 2.5) and identified germplasm for yield contributing traits (Table 2.6) and are given below:

Table 2.3: Detail of the Trial for Multi-Location Germplasm Evaluation

Zones & Centres	Traits	Checks
• NHZ: Palampur and Almora • NPZ: Pantnagar • NEHZ: Manipur • Eastern Zone: Raipur • Central Zone: Indore and Parbhani. • Southern Zone: Pune	Days to 50% flowering, Days to maturity, Plant height (cm), Number of nodes per plant, Number of pods per plant, 100 seed weight (g), Seed yield per plant (g)	**NHZ:** VLS59, VLS63, VLS 89, VLS 99, Palam Early Soya, Himso1685,Harasoya, PS 1556 **NPZ:** SL 958,SL 955,PS1347, PS 1670, NRC 149, SL 1074, PS 26, NRC 128 **NEHZ:** MACS 1460,RKS113,KDS753,RSC10-46, JS 97-52, DSb 32, JS 20-116, MACS 1407 **EZ:** MACS 1460,RKS 113,KDS753,RSC10-46, RSC 11-42, JS 20-116, NRC 128, RSC 11-07 **CZ:** JS 20-34,JS20-69,RSC 10-46, JS 20-116, NRC 138, NRC 142, JS 21-17, NRC 157, NRC 150, RVSM 2011-35 **SZ:** MACS 1460, KDS 753, DSb 23, DSb 21, MACS 1188, KDS 726, KDS 992, DSb 28, DSb 34, MACS 1281

Table 2.4: Details of soybean germplasm lines used in multi-location trails

S.No	Genotype	S.No	Genotype	S.No	Genotype	S.No	Genotype
1	IC 501585	56	IC 0501360	111	IC 24069	166	IC 0243130
2	IC 0501670	57	IC 0018646	112	IC 0042148	167	IC 241852
3	IC 0501775	58	IC 0243143	113	EC 389154	168	IC 0243758
4	EC 30208	59	IC 0243726	114	EC 291400	169	IC 0113775
5	EC 287456	60	IC 0100324	115	IC 0501820	170	IC 0118314
6	IC 0501258	61	IC 0243754	116	IC 0129025	171	IC 0501903
7	IC 0345660	62	IC 0501200	117	IC 0538042	172	IC 0118614
8	IC 296874	63	EC 0093747	118	EC 76755	173	IC 13056
9	EC 0241902	64	IC 0243142	119	IC 24060	174	IC 0392508
10	IC 0501663	65	IC 501548	120	IC 0501789	175	EC 0026691
11	EC 0172599	66	EC 62376	121	IC 0128949	176	IC 0026932
12	EC 172654	67	IC 0501249	122	IC 128935	177	EC 69729
13	IC 0118085	68	IC 0501267	123	IC 0501733	178	EC 104872
14	EC 37098	69	IC 0006426	124	IC 0026133	179	EC 18645
15	EC 0241848	70	EC 0251392	125	IC 0564120	180	IC 0501429
16	IC 0501813	71	IC 0243741	126	IC 444241	181	IC 0081830
17	IC 0128999	72	IC 118593	127	IC 0501438	182	EC 37184
18	IC 0128991	73	IC 0501196	128	IC 0391452	183	EC 39088
19	EC 0241924	74	IC 0243816	129	IC 436997	184	EC 0039498
20	IC 0263304	75	IC 0128933	130	IC 0567504	185	EC 0251439
21	EC 99991	76	IC 0243662	131	IC 118480	186	EC 172659
22	IC 128960	77	IC 0243814	132	IC 0501962	187	IC 0501815
23	IC 0338577	78	IC 0501208	133	IC 0118562	188	IC 0501692
24	IC 0501755	79	IC 0243565	134	IC 25764	189	IC 0356030
25	EC 251506-2	80	IC 0243588	135	IC 0501885	190	IC 0501861
26	IC 501469	81	EC 0095794	136	IC 0501876	191	EC 0076754
27	EC 62386	82	IC 0128982	137	IC 0501703	192	EC 0232044
28	IC 0501699	83	IC 100338	138	IC 0042150	193	EC 99551
29	EC 76757	84	IC 243794	139	IC 0419771	194	EC 0528662
30	IC 0501416	85	IC 0243688	140	IC 0128937	195	EC 34041
31	EC 34500	86	IC 15971	141	IC 0501967	196	VLGSDL-27
32	IC 0241852	87	IC 0501376	142	IC 128933	197	VLGSDL-36

33	EC 0341825	88	IC 0243043	143	IC 0049863	198	VLGSDL-17
34	EC 0061398	89	IC 501585	144	IC 0096342	199	VLGSDL-12
35	EC 57042	90	IC 0501245	145	EC 0100801	200	VLGSDL-38
36	EC 0309534	91	EC 0308281	146	IC 0118567	221	EC 915908
37	IC 26178	92	EC 0016729	147	IC 0118490		
38	IC 0316163	93	EC 39502	148	IC 0016833		
39	IC 0117914	94	IC 0501672	149	IC 0118335		
40	IC 0296199	95	EC 0241773	150	IC 009442		
41	IC 0501627	96	EC 274701	151	IC 0355881		
42	IC 42147	97	IC 0618728	152	IC 0391584		
43	EC 39718	98	IC 0016813	153	IC 202		
44	IC 0024996	99	IC 0128979	154	EC 0456620		
45	IC 0015974	100	IC 328971	155	IC 0096352		
46	EC 0241809	101	IC 0009476	156	IC 0243730		
47	IC 24071	102	IC 0243034	157	IC 0501972		
48	IC 0024055	103	IC 0118611	158	IC 0392479		
49	EC 0457236	104	EC 0241706	159	IC 0501791		
50	IC 0117989	105	EC 0039755	160	IC 0567507		
51	EC 0456537	106	IC 501603	161	EC 0393228		
52	EC 0241861	107	EC 0039501	162	EC 0251372		
53	EC 0241920	108	IC 0383477	163	IC 243017		
54	EC 0039730-A	109	IC 0501954	164	IC 0243065		
55	EC 0241913	110	IC 21747	165	IC 0501804		

Table 2.5: Mean, range and variance for yield attributing traits at different locations

Trait	*Almora*		*Palampur*		*Parbhani*		*Indore*	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Days to 50% flowering	-	-	69	56 - 80	47	31 - 59	55	29- 66
Days to maturity	-	-	127	116 - 142	105	89 - 117	109	92 - 120
Plant height (cm)	-	-	78	41-136	82	16 - 139	66	26 - 105
Number of nodes	-	-	15	8 - 25	16	10 - 23	16	8 - 36
Number of pods	-	-	53	25 -93	60	17 - 121	31	5 - 84
100 seed weight (g)	-	-	9.1	3.1 -15.7	9.08	3.3 - 17.0	8.01	2.7 - 15.3
Grain yield per plant (g)	-	-	11	2 - 27	8	2.9 - 15.1	2	0.4 - 6.9
Trait	***Imphal***		***Raipur***		***Pune***		***Pantnagar***	
	Mean	**Range**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**
Days to 50% flowering	55	31 - 65	46	34 - 54	47	32 - 61	54	37 - 65
Days to maturity	111	103 - 117	98	88 - 116	103	86 - 111	115	93 - 127
Plant height (cm)	81	26 - 128	58	25 - 102	88	24 - 144	46	19 - 107
Number of nodes	14	5 - 29	4	2 - 18	13	7 - 19	16	6 - 27
Number of pods	93	19 - 205	57	11 - 114	63	17 - 150	40	7 - 114
100 seed weight (g)	10.61	4.2 - 20.9	7.75	5.2 - 13.8	11.61	3.3 - 20.7	6.17	1.9 - 11.1
grain yield per plant (g)	19	3 – 42	11	2 - 27	12	2 - 25	5	0.5 - 28.3

Table 2.6: Prominent germplasm lines for high yielding traits

	Palampur	*Pantnagar*	*Imphal*	*Raipur*	*Indore*	*Parbhani*	*Pune*
#Yield per plant	IC 0117914, IC 0501804, IC 501585, IC 0501903, **IC 0501267**, IC 0501876, EC 76757, EC 0232044, EC 287456, IC 0567504	EC 69729, EC 172654, EC 57042, IC 0128982, IC 0243043, IC 24060, **IC 0118614**, IC 0118611, IC 0501967, EC 689154	IC 0243730, IC 0501815, IC 328971, EC 689154, **IC 0118614**, IC 0006426, EC 0241848, IC 0501196, IC 0243043, EC 0241902	**IC 0501196**, EC 0241773, IC 0118611, EC 76755, IC 0009476, IC 0501789, EC 689154, IC 501585, IC 0243816, IC 0243726	IC 202, EC 0456620, IC 0243043, IC 0243688, IC 0501967, EC 0016729, EC 172654, IC 128935, IC 128960, IC 0113775	IC 0501670, **EC 0241920**, IC 0501755, IC 0118614, **IC 0501258**, IC 0501876, **IC 296874**, EC 0026691, EC 0241773, EC 104872	EC 0241848, **EC 251506-2**, IC 0501672, IC 0096342, IC 0501876, EC 104872, EC 0251372, IC 0501627, IC 328971, **EC 0241902**
#Seed size	**IC 0243565**, IC 0501438, IC 0243588, IC 0243034, IC 0501196, IC 0501672, IC 0243662, EC 0241773, IC 0501703, IC 0618728	IC 501548, EC 0241809, **IC 0118490**, IC 0243814, EC 0061398, **IC 0501267**, EC 0039755, EC 34500, EC 0232044, IC 0129025	EC 0061398, EC 915908, IC 296874, IC 0243588, EC 0528662, IC 0501663, EC 0172599, IC 0501670, EC 26386, **IC 0118490**	IC 0618728, IC 0243565, **IC 0501196**, EC 0172599, EC 0241809, EC 39502, EC 291400, IC 0501258, IC 0241852, IC 0100324	**EC 915908**, IC 0501672, IC 0501196, IC 0501627, EC 2638, IC 0117989, IC 328971, IC 0501670, EC 0039755, IC 128960	**EC 0241920**, EC 104872, IC 0501672, IC 0501876, EC 274701, EC 0528662, IC 0501861, IC 0243758, **IC 0501258**, **IC 296874**	**EC 0241902**, EC 915908, IC 0501670, IC 0501416, **EC 251506-2**, IC 501548, EC 39718, EC 0241920, IC 0501813, EC 0241773
#Early maturity	IC 0501416, **IC 0501267**, IC 0501258, IC 0345660, EC 0309534, EC 34500, IC 0263304, IC 501548, IC 0241852, **IC 0243565**	**VLGSDL 12**, IC 0128982, IC 0501208, EC 0309534, IC 128960, EC 0241706, IC 0243142, EC 57042, VLGSDL 36, **IC 0118490**	IC 0618728, IC 100338, IC 0016813, EC 99551, IC 0501820, EC 291400, EC 0039730, EC 104872, EC 0456620, IC 0243142	IC 0618728, IC 15971, **VLGSDL 12**, EC 291400, EC 76755, IC 01186562, IC 0118490, IC 0026133, IC 0501245, IC 0042150	**EC 915908**, EC 291400, EC 2638, IC 0024055, IC 0128933, IC 128935, EC 0232044, IC 0129025, IC 0243814, IC 0243565	EC 287456, IC 0383477, IC 0345660, IC 0538042, IC 0096352, IC 0501360, IC 0316163, **IC 296874**, EC 99551, **IC 0501755**	EC 37098, **VLGSDL 12**, **EC 915908**, IC 296874, IC 0501258, IC 0618728, IC 0501954, EC 291400, **VLGSL 38**, EC 2638

#Genotypes performing better at more than one zone for the trait depicted in bold.

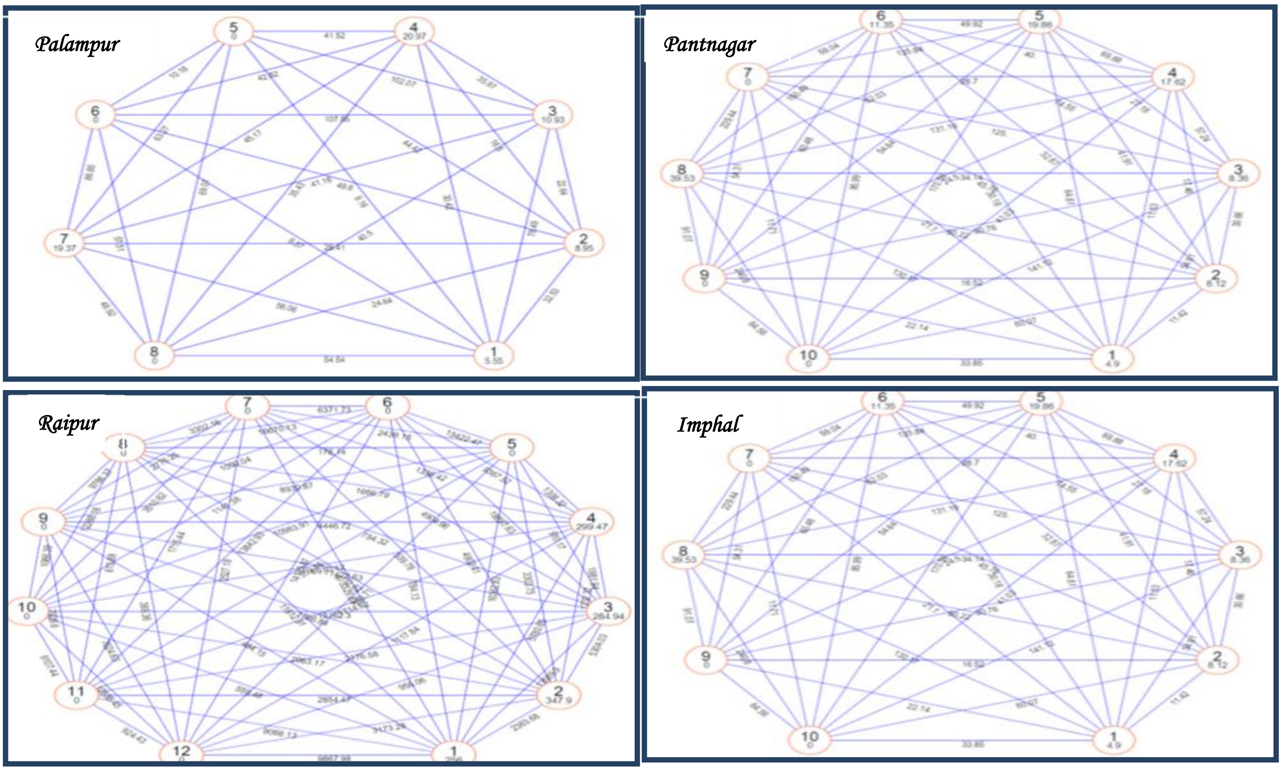
Genetic diversity studies of germplasm accessions across multilocations

The quantitative assessment of genetic divergence was made by adopting D^2 statistic for yield and its component traits (Rao, 1952). For all the seven 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 amount of heterosis will be manifested in cross combinations involving the parents belonging to most divergent cluster (Table 2.7).

Table2.7 : Contribution of Traits for the Diversity (In Percentage) & Genetic Divergence Clusters of 8 Locations

Trait	**Almora**	**Palampur**	**Pantnagar**	**Imphal**	**Raipur**	**Indore**	**Parbhani**	**Pune**
Days to 50% Flowering	-	44.2	5.6	45.7	81.5	59.7	3.3	63.4

Days to maturity	-	2.3	8.8	26.6	10.1	11.1	0.7	29.0
Plant Height	-	10.8	23.1	6.6	1.0	5.9	30.8	5.7
Number of nodes per plant	-	4.0	0.1	3.0	0.0	5.3	1.3	0.0
Number of pods per plant	-	2.5	11.6	3.8	5.5	11.7	22.0	0.9
100-seed weight	-	18.2	45.8	9.2	0.9	4.4	40.9	0.3
Seed yield per plant	-	18.0	5.1	5.1	1.0	1.8	1.0	0.6
Number of clusters based on D2 values	-	**8**	**10**	**10**	**12**	**8**	**8**	**6**



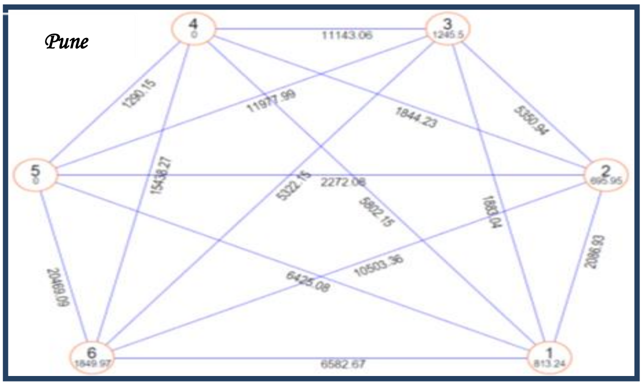


Fig 2.1: Mahalnobis Euclidean distance among 221 germplasm accessions across locations

Multilocation Evaluation of *Glycine soja* at AICRP centres

Twenty five *Glycine soja* were distributed to 10 AICRP centres with different agroclimatic zones viz., Indore, Almora, Palampur, Dharwad, Imphal, Jabalpur, Kasbe Digraj, Ludhiana, Pantnagar and Raipur for characterization, multiplication and utilization considering the hotspots for major diseases and insect pests.

Evaluation of *Glycine soja* for yield attributing traits at multilocations

Twenty five *Glycine soja* accessions were given to hot spots. Performance of accessions is given below. Plants did not survive or germination was poor at Dharwad, Almora and Jabalpur.

S.No	Genotype	Days to 50 % Flowering				Height(cm)			Days to Maturity		
		Indore	Palampur	Ludhiana	Imphal	Indore	Palampur	Imphal	Indore	Palampur	Imphal
1	EC1165891	35.00	59	39	37	95	55	132	73	112	70
2	EC1165824	37.00	49	42		130	125	-	81	97	-
3	EC1165933	41.00	53	50	43	52	70	127	84	101	72
4	EC1165787	83.00	53	73	44	80	132	132	133	124	80
5	EC1165790	36.00	50	39	-	95	105	-	82	102	-
6	EC1165850	73.00	-	51	-	130	-	-	114	-	-
7	EC1165879	42.00	51	37	-	140	110	-	83	104	-
8	EC1165842	71.00	50	50	-	120	80	-	110	98	-
9	EC1165822	37.00	50	38	-	120	60	-	91	107	-
10	EC1165791	36.00	55	33	45	90	111	149	89	121	70
11	EC1165914	55.00	50	44	-	90	100	-	101	122	-
12	EC1165863	44.00	56	37	-	50	138	-	85	108	-
13	EC1165789	43.00	57	32	-	80	140	-	92	116	-
14	EC1165820	41.00	54	39	38	140	90	119	87	118	71
15	EC1165892	43.00	54	39	-	100	160	-	89	99	-
16	EC1165826	47.00	53	39	-	110	111	-	94	99	-
17	EC1165813	79.00	49	56	-	50	130	-	123	100	-
18	EC1165849	74.00	50	50	48	130	140	150	113	103	78
19	EC1165808	75.00	54	73	47	85	145	124	119	107	78
20	EC1165807	73.00	51	71	-	40	130	-	117	100	-
21	EC1165839	70.00	50	54	45	120	150	137	107	104	125
22	EC1165814	73.00	61	73	-	70	120	-	117	118	-
23	EC1165897	41.00	49	56	-	18	125	-	91	97	-
24	EC1165923	55.00	53	50	45	17	60	127	99	98	125
25	EC1165928	54.00	55	44	-	30	85	-	101	102	-

S.No	Genotype	Seed yield per plant (g)			Row yield (g)		Resistance at Ludhiana	
		Indore	Palampur	Imphal	Indore	Palampur	**Yellow Mosaic Virus (YMV)**	**Cercospora Leaf spots**
1	EC1165891	1.20	1.25	16.93	7.20	1.25	Susceptible	**No incidence of cercospora leaf spot**
2	EC1165824	3.33	0.17	-	23.32	0.17	**Resistant**	Circular, grey necrotic spots
3	EC1165933	0.55	0.86	16.21	3.29	1.72	Susceptible	**No incidence of cercospora leaf spot**
4	EC1165787	2.21	-	33.66	15.44	-	**Resistant**	**No incidence of cercospora leaf spot**
5	EC1165790	4.94	0.44	-	24.72	0.44	Susceptible	**No incidence of cercospora leaf spot**
6	EC1165850	0.39	-	-	1.94	-	Susceptible	Circular, grey necrotic spots
7	EC1165879	3.45	0.96	-	17.26	0.96	Susceptible	**No incidence of cercospora leaf spot**
8	EC1165842	0.50	1.25	-	3.98	1.25	Susceptible	Circular, grey necrotic spots
9	EC1165822	3.79	1.32	-	22.72	2.65	**Resistant**	Circular, grey necrotic spots
10	EC1165791	5.15	0.84	8.84	30.90	0.84	Susceptible	Circular, grey necrotic spots
11	EC1165914	0.46	0.49	-	3.23	1.47	Susceptible	**No incidence of cercospora leaf spot**
12	EC1165863	2.52	0.51	-	15.11	0.51	Susceptible	Circular, grey necrotic spots
13	EC1165789	3.82	0.51		19.10	0.51	Susceptible	Circular, grey necrotic spots
14	EC1165820	2.42	0.69	9.56	14.53	1.38	Susceptible	Circular, grey necrotic spots
15	EC1165892	3.07	0.45	-	15.35	0.45	Susceptible	Circular, grey necrotic spots
16	EC1165826	3.24	0.72	-	22.65	2.17	Susceptible	Circular, grey necrotic spots
17	EC1165813	0.08	0.80	-	0.66	0.80	Susceptible	**No incidence of cercospora leaf spot**
18	EC1165849	0.02	0.84	22.7	0.10	1.67	**Resistant**	**No incidence of cercospora leaf spot**

19	EC1165808	1.09	1.45	9.75	6.56	2.90	Susceptible	**No incidence of cercospora leaf spot**
20	EC1165807	0.19	0.85	-	1.36	0.85	Susceptible	**No incidence of cercospora leaf spot**
21	EC1165839	0.49	2.00	16.58	2.94	4.00	Susceptible	**No incidence of cercospora leaf spot**
22	EC1165814	1.10	0.66	-	6.62	0.66	Susceptible	Circular, grey necrotic spots
23	EC1165897	1.17	0.77	-	6.99	0.77	Susceptible	**No incidence of cercospora leaf spot**
24	EC1165923	1.22	1.46	12.9	6.11	2.91	**Resistant**	Circular, grey necrotic spots
25	EC1165928	2.26	1.49	-	11.30	3.00	Susceptible	**No incidence of cercospora leaf spot**

- **In case of Dharwad, EC 1165891, EC 1165933, EC 1165790, EC 1165850, EC 1165791, EC 1165789 were germinated**

National Hybridization Programme

A total of 111 crosses (F3) were sent to 23 centres of different centres. Total number of plant stand, number of selected plants, grain yield of all plants in a cross and yield of the selected plants at different centres is given below.

Name of the Cross	Number of Plants		Mean Grain Yield / Plant (g)	
	Total	Selected	Whole Cross	Selected plants
1. Central Agricultural University, Imphal				
MACS 1460 X RSC 10-46	30	2	16.0	32.11
MACS 1460 x LJ 137	30	2	11.5	23.19
MACS 1460 X LJ 140	30	2	12.7	25.43
MACS 1460 X U 119	30	2	11.2	22.44
MACS 1460 X NRC 130	30	2	8.88	17.77
MACS 1460 X LJ 124	30	2	17.9	35.98
RSC 10-46 X LJ 124	30	2	20.3	40.78
RSC 10-46 X LJ 140	30	2	8.17	16.34
JS 9305 X AGS 25	30	2	16.7	33.51
LJ 140 X NRC 128	30	2	16.5	33.18
LJ 124 X NRC138	30	2	10.0	20.12
RSC 10-46 X NRC 138	30	2	12.1	24.38
LJ 137 X NRC 128	30	2	17.2	34.49
NRC 128 X LJ 124	30	2	18.0	36.00
NRC 128 X LJ 140	30	2	10.0	20.05
JS 9560 X RSC 10-46	30	2	12.4	24.96
RSC 10-46 X AGS 25	30	2	14.1	28.20
JS 20-69 X VLS 59	30	2	16.9	33.92
RKS 113 X SL 1104	30	2	17.9	35.91
F4P21 X RSC 10-46	30	2	21.8	43.75
\F4P21 X EC 481369	30	2	13.1	26.30
JS 20-98 X G5P22	30	2	13.9	27.87
F4P21 X Line 202	30	2	18.9	37.97
F3P18 X Line 202	30	2	15.8	31.71
F3P18 X JS 335	30	2	17.4	34.86
RSC 10-46 X EC 481369	30	2	7.91	15.82
JS 20-34 X EC 481369	30	2	11.7	23.47
F4P21 X Line 220	30	2	18.8	37.6
2. ARS, Adilabad				
MACS 1460 X RSC 10-46	358	9	25.8	25.8
MACS 1460 X NRC 128	350	14	23.3	23.3
MACS 1460 x LJ 137	357	5	28.4	28.4
MACS 1460 X LJ 140	340	8	28.4	28.4
MACS 1460 X U 119	359	12	35.6	35.6
MACS 1460 X NRC 130	341	7	40.1	40.1
MACS 1460 X LJ 124	355	8	18.6	18.6
MACS 1460 X RSC 10-46	364	10	28.1	28.1
LJ -137 X Dsb 34	346	19	16.9	16.9
NRC 138 X Dsb 34	348	6	43.2	43.2
Dsb 34 x LJ 140	356	9	31.4	31.4
Dsb 34 X LJ 137	357	7	34.4	34.4
Dsb 34 X NRC 138	349	9	23.3	23.3
Dsb 34 X LJ 124	351	4	33.3	33.3
LJ 124 X Dsb 34	349	5	29.8	29.8
JS 9305 X AGS 25	360	19	21.7	21.7
LJ 140 X NRC 128	348	5	18.0	18.0
LJ 137 X NRC 138	355	6	31.3	31.3
NRC 138 X LJ - 140	352	6	18.7	18.7
LJ 137 X RSC10-46	357	6	36.3	36.3
LJ 124 X NRC138	354	7	29.3	29.3
NRC 138 X LJ - 124	348	7	24.3	24.3
LJ 137 X NRC 128	349	11	29.0	29.0
NRC 128 X LJ 124	310	1	20.0	20.0
NRC 128 X LJ 140	348	5	33.6	33.6
Basara X VLS 63	360	8	36.5	36.5
Basara X (F4P21 X Line 220)	348	7	23.1	23.1
Basara X EC 481369	351	19	19.6	19.6
Basara X Karune	350	7	41.0	41.0
Basara X RSC 10-46	340	5	34.6	34.6
Basara X 20-98	358	6	37.3	37.3
Basara X NRC 130	340	13	41.4	41.4
JS 9560 X RSC 10-46	357	21	40.9	40.9
RSC 10-46 X AGS 25	354	6	24.7	24.7
JS 20-69 X VLS 59	360	10	29.1	29.1
RKS 113 X SL 1104	351	21	20.0	20.0
F4P21 X RSC 10-46	356	4	34.5	34.5
F4P21 X EC 481369	351	8	25.9	25.9
JS 20-98 X G5P22	347	17	23.4	23.4
F4P21 X Line 202	352	8	19.5	19.5
F3P18 x Line 202	356	2	29.0	29.0
F3P18 x JS 335	358	11	23.2	23.2
RSC 10-46 x EC 481369	351	11	23.5	23.5
JS 20-34 x EC 481369	360	7	24.1	24.1
F4P21 x Line 220	351	5	17.6	17.6
3. VPKAS Almora				
LJ-140 x VLS 59	-	3	-	12.11
Palam soya x VLS 59	-	2	-	22.96
VLS 59 x LJ-140	-	3	-	11.99
LJ-137 x VLS 59	-	1	-	12.01
Hara soya x VLS 59	-	5	-	19.28
Hara soya x Palam soya	-	5	-	26.31
Palam soya x NRC 138	-	4	-	14.22
VLS 59 x Palam soya	-	3	-	28.14
SK-4A-202 x Hara soya	-	2	-	13.10
4. RRS, Amravati				
NRC 181XRSC 10-46	15	4	24.2	27.25
JS 20-69 X EC 456556	15	2	12.5	14.59
RVSM 2011-35XRSC 10-46	15	3	3.00	3.43
RVSM 2011-35X JS 20-34	15	3	11.5	13.51
AMS-MB-5-18XNRC 128	15	4	8.26	9.25
EC 60228 X TGX 37-E	15	2	8.00	8.80
RVSM 2011-35XNRC 130	15	3	9.04	10.04
JS 20-69 X NRC128	0	0	0.00	0.00
JS 20-34X RSC 10-46	15	4	14.0	16.00
NRC 181X NRC 128	15	3	16.3	19.38
MACS 1460 XRSC 10-46	15	2	7.00	7.79
JS 20-69 X RSC 10-46	15	3	10.0	11.04
MACS 14-60 X NRC-128	15	3	5.00	5.32
EC 602288 X NRC 128	0	0	0.00	0.00
MACS 1460 X LJ 137	15	3	9.00	9.80
MACS 1460 X LJ 140	0	0	0.00	0.00
MACS 1460 X 138	15	2	11.0	11.43
MACS 1460 XNRC 130	15	3	6.00	6.72

MACS 1460 X Lj 124	15	4	6.00	6.65
MACS 1460 XRSC 10-46	15	4	9.25	10.25
Dsb 34 x LJ-140	15	2	4.00	4.11
Dsb 34 x LJ-137	15	3	6.00	6.85
Dsb 34 x LJ-124	20	4	5.00	5.27
RSC 10-46 X LJ 124	15	2	9.00	9.80
RVSM 2011-35 X LJ 124	15	2	4.00	4.71
NRC 130 X JS 20-34	15	3	9.00	9.82
RSC 10-46 X LJ 140	0	0	0.00	0.00
JS 93-05 XAGS 25	15	2	8.23	9.23
NRC 130 X LJ 124	15	2	3.00	3.70
LJ 140 X NRC 128	15	2	4.00	5.05
LJ 124 X RSC 10-46	15	3	6.00	6.30
LJ 137 X NRC 138	15	3	4.00	4.44
RVSM 2011-35 X JS 20-34	15	4	10.0	11.18
LJ 140 X JS 20-34	15	4	5.00	5.90
NRC 138 X LJ 140	15	2	7.00	7.24
LJ 137 X NRC 130	0	0	0.00	0.00
NRC 138 X LJ 137	0	0	0.00	0.00
LJ 140 X NRC 138	0	0	0.00	0.00
RSC 10-46 X LJ 137	15	5	2.30	2.45
LJ 137 X RSC10-46	15	3	4.00	4.13
LJ 124 X NRC 138	15	2	8.00	8.68
LJ 124X NRC 130	0	0	0.00	0.00
JS 20-34 X NRC 138	15	6	5.09	6.09
RSC 10-46 X NRC 138	15	4	7.00	7.77
NRC 130 X LJ 137	0	0	0.00	0.00
NRC 130 X LJ 140	0	0	0.00	0.00
JS 20-34 X LJ 137	15	4	3.30	3.60
JS 20-34 X LJ 119	15	2	5.00	5.91
JS 20-34 X NRC 130	15	3	3.50	3.87
NRC 138 X JS 20-34	15	6	8.91	9.91
RVSM 11-35 X NRC 138	15	6	16.1	18.07
NRC 138 LJ 124	0	0	0.00	0.00
LJ-140X NRC 130	0	0	0.00	0.00
NRC 128 LJ 124	15	3	9.12	10.12
NRC 128 X LJ 137	15	3	6.00	6.44
JS 20-34 XLJ 124	15	3	5.00	5.69
NRC 128 XLJ 140	15	3	7.00	7.23
LJ 140 X RSC 10-46	95	10	7.23	7.96
5. UAS Dharwad				
MACS 1460 x RSC 10-46		4		23
MACS 1460 x NRC 128		2		26.35
MACS 1460 x LJ 137		3		23.26
MACS 1460 x LJ 140		3		26.53
MACS 1460 x U 119		2B		
MACS 1460 x NRC 130		-		
MACS 1460 x LJ 124		3		26.6
MACS 1460 x RSC 10-46		-		
LJ 137 x DSb 34		3		27.63
NRC 138 x DSb 34		-		
DSb 34 x LJ 140		4		31.3
DSb 34 x LJ 137		3		23.06
DSb 34 x NRC 138		-		
DSb 34 x LJ 124		-		
LJ 124 x DSb 34		2		16.15
NRC 128 x LJ 140		-		
LJ 137 x NRC 138		1		23.5
NRC 138 x LJ 140		6		16..3 3
LJ 137 x RSC 10-46		-		
LJ 124 x NRC 138		5		17.46
NRC 128 x LJ 124		2		27.2
LJ 137 x NRC 128		8		27.7
NRC 138 x LJ 124		4		31.37
LJ 140 x NRC 128		5		20.96
RKS 113 x SL 1104		1B		15.8
F4 P21 x RSC 10-46		1B		14.73

F4 P21 x EC 481369		2B		16.3
JS 20-98 x G5P22		2		17.06
F4 P21 x Line 202		2		7.26
F3 P18 x Line 202		2		15.22
F3 P18 x JS 335		2		22.3
F40 P 21 x Line 220		2		21.28
6. PAU Ludhiana				
AMS MB 5-18 X NRC 128	200	4		26.3
JS 20-69 X NRC128	150	14		25.6
NRC 181 X NRC 128	180	1		27.0
MACs 1460 X NRC 128	145			
EC 602288 X NRC 128	215	3		25.3
L J 124 X NRC 128	1500	17		32.6
L J 140 X NRC 128	1000			
L J 124 X NRC 138	800			
L J 137 X NRC 128	750	24		25.3
NRC 128 X L J 124	900	11		23.8
NRC 128 X L J 137	725	7		29.1
NRC 128 X L J 140	945			
7. HPKVV, Palampur				
MACS 1460 × VLS 63	9			
VLS 59 × Palam Soya	40	4		6.4
VLS 59 × LJ 119	31	7		5.9
VLS 59 × LJ 124	35	3		16.9
VLS 59 × LJ 140	40	2		14.5
SKUA -202 × VLS 59	38	1		12.2
SKUA -202 × NRC 138	10	2		10.0
LJ-137 × VLS 59	43	2		9.1
JS 20-34 × SKUA -202	18	1		8.5
JS 20-34 × VLS 59	15	1		10.5
Hara Soya × Palam Soya	62	3		11.4
Hara Soya × SKUA-202	128	6		3.9
Hara Soya × VLS 59	84	17		9.8
Palam Soya × VLS 59	60	10		12.2
Palam Soya × NRC 138	27	5		12.1
LJ 124 × VLS 59	32	2		19.1
LJ 140 × VLS 59	74	17		7.1
SKUA-202 × Hara Soya	17			
8. G B P U A & T Pantnagar				
AMS MB 5-18 X NRC 128	22	nil	11.2	nil
JS 20-69 X NRC 128	31	nil	12.2	nil
NRC 181 X NRC 128	35	22	8.28	8.6
MACS 1460 X NRC 128	37	7	8.49	7
EC 602288 X NRC 128	18	nil	11.2	nil
LJ 124 X NRC 128	280	12	13.2	14.17
LJ 140 X NRC 128	229	10	8.56	9.7
LJ 124 X NRC138	29	8	5.65	8.25
LJ 137 X NRC 128	129	16	7.89	9.37
NRC 128 X LJ 124	111	8	6.69	7.5
NRC 128 XLJ137	133	7	9.19	10.43
NRC 128 X LJ 140	177	nil	12.1 9	nil
9. VNMKV, Parbhani				
NRC 181 X RSC 10-46	300	15	8.5	13.3
JS 20-69 X EC 456556	290	15	7.1	12.7
RVSM 2011-35 X RSC 10-46	215	11	5.6	10.9
RVSM 2011-35 X JS 20-34	312	10	9.7	15.0
AMS MB 5-18 X NRC 128	170	18	14.7	22.2
EC 602288 X TGX 37- E	504	12	5.2	7.5
RVSM 2011-35 X NRC 130	290	18	9.3	17.8
JS 20-69 X NRC 128	520	20	7.6	14.5
JS 20-34 X RSC 10-46	570	20	7.4	14.0
NRC 181 X NRC 128	290	19	7.2	15.8
MACS 1460 X RSC 10-46	480	18	8.3	15.0
JS 20-69 X RSC 10-46	520	20	7.9	15.0
MACS 1460 X NRC 128	440	18	7.4	12.8
EC 602288 X NRC 128	370	10	7.8	13.0

MACS 1460 x LJ 137	370	9	7.4	10.0
MACS 1460 X LJ 140	950	26	7.5	12.3
MACS 1460 X 138	504	23	8.4	13.5
MACS 1460 X NRC 130	300	6	6.5	11.7
MACS 1460 X LJ 124	630	12	6.5	12.5
MACS 1460 X RSC 10-46	220	12	7.9	11.8
Dsb 34 x LJ 140	700	16	10.3	12.5
Dsb 34 X LJ 137	620	15	7.3	13.3
Dsb 34 X LJ 124	635	16	7.2	13.1
RSC 10-46 X LJ 124	1250	26	7.2	12.5
RVSM 2011-35 X LJ-124	1524	25	6.2	10.8
NRC 130 X JS 20-34	360	15	6.4	10.7
RSC 10-46 X LJ 140	1720	21	5.2	10.5
JS 9305 X AGS 25	1890	22	5.2	9.5
NRC 130 X LJ 124	800	12	6.3	10.0
LJ 140 X NRC 128	1850	22	5.0	10.5
LJ 124 X RSC 10-46	1502	25	5.6	8.8
LJ 137 X NRC 138	1520	16	6.2	12.5
RVSM 2011-35 X JS 20-34	452	11	5.3	10.0
LJ 140 X JS 20-34	814	22	6.5	10.0
NRC 138 X LJ - 140	1200	17	7.5	14.1
LJ 137 X NRC 130	1640	21	5.5	9.5
NRC 138 X LJ 137	1500	24	6.7	12.5
LJ 140 X NRC 138	1800	11	4.1	6.4
RSC 10-46 X LJ - 137	1020	19	6.2	11.6
LJ 137 X RSC 10-46	1300	22	6.5	13.6
LJ 124 X NRC 138	1300	27	7.0	12.2
LJ 124 X NRC 130	1520	14	6.1	12.9
JS 20-24 X NRC 138	1610	25	6.3	12.8
RSC 10-46 X NRC 138	382	20	7.9	12.5
NRC 130 X LJ 137	1520	14	6.3	14.3
NRC 130 X LJ- 140	800	21	7.8	15.2
JS 20-34 X LJ -137	468	11	6.8	12.7
JS 20-34 X LJ -119	385	11	5.5	10.9
JS 20-34 X NRC 130	800	18	6.6	11.7
NRC 138 X JS 20-34	548	16	10.8	14.4
RVSM 11-35 X NRC- 138	120	8	8.3	15.0
NRC 138 X LJ - 124	1490	36	7.0	13.9
LJ-140 X NRC -130	1180	26	6.3	11.9
NRC 128 X LJ 124	1320	30	5.2	9.3
NRC 128 XLJ 137	1470	45	5.6	10.0
JS 20-34 X LJ 124	1305	18	6.1	12.8
NRC 128 X LJ 140	1375	21	6.1	11.4
LJ 140 X RS 10-46	1470	17	6.7	14.1
RKS 113 X SL 1104	1130	15	7.3	14.7
F4P21 X RSC 10-46	690	18	6.6	11.1
F4P21 X EC 481369	1360	27	5.8	8.9
JS 20-98 X G5P22	657	11	5.6	8.2
F4P21 X Line 202	1220	21	7.5	14.8
F3P18 X Line 202	750	28	5.2	10.4
F3P18 X JS 335	512	26	4.6	8.1
F4P21 X Line 220	960	37	7.6	13.8
10. ARI Pune				
MACS 1460 x RSC 10-46	10	2		11.5
MACS 1460 x NRC 128	12	2		16.4
MACS 1460 x LJ 137	11	3		15.4
MACS 1460 x LJ 140	8	2		18.1
MACS 1460 x U 119	9	2		11.6
MACS 1460 x LJ 124	12	2		18.1
MACS 1460 x RSC 10-46	10	2		13.0
LJ 137 x DSb 34	9	2		11.0
NRC 138 x DSb 34	8	2		20.3
DSb 34 x LJ 140	9	2		10.4
DSb 34 x LJ 137	7	2		13.4
DSb 34 x LJ 124	6	1		15.3
LJ 124 x DSb 34	10	2		19.0
JS 93-05 x AGS 25	18	5		6.1
LJ 140 x NRC 128	18	5		2.4
LJ 137 x NRC 138	18	5		3.4
NRC 138 x LJ 140	15	3		2.1
LJ 137 x RSC 10-46	19	5		2.1
LJ 124 x NRC 138	9	2		7.8
NRC 138 x LJ 124	16	5		7.1
LJ 137 x NRC 128	16	5		2.2
NRC 128 x LJ 124	18	6		7.0
NRC 128 x LJ 140	19	5		5.3
JS 95-60 x RSC 10-46	8	2		8.1
JS 20-69 x VLS 59	9	3		4.7
RSC 10-46 x EC 481369	8	2		9.4
JS 20-34 x EC 481369	9	2		21.0
11. BAU, Ranchi				
RVSM 2011-35 X RSC 10-46	57	12	9.1	9.9
AMS MB 5-18 X NRC 128	76	15	9.5	12.3
JS 20-69 X NRC 128	137	23	10	11.1
JS 20-34 X RSC 10-46	121	29	12	13.5
NRC 181 X NRC 128	60	16	9.8	11
MACS 1460 X RSC 10-46	124	26	11.4	12.5
JS 20-69 X RSC 10-46	112	22	12	13.1
MACS 1460 X NRC 128	77	18	13.5	14.6
MACS 1460 x LJ 137	47	09	11	240.2
MACS 1460 X LJ 140	169	20	10	8
MACS 1460 X U 119	360	28	18	18.6
MACS 1460 X NRC 130	84	22	10	11
MACS 1460 X LJ 124	111	18	11	12
MACS 1460 X RSC 10-46	45	10	17	18.7
RSC 10-46 X LJ 124	446	16	10	13
LJ 124 X NRC 128	1240	42	12	11.3
RSC 10-46 X LJ 140	1029	38	15	18.7
LJ 140 X NRC 128	390	19	13.5	13
LJ 124 X RSC 10-46	423	17	12.5	11.3
NRC 138 X LJ - 140	996	31	75	8.5
RSC 10-46 X LJ - 137	224	19	10	16.6
LJ 137 X RSC10-46	621	23	12	12
LJ 124 X NRC138	594	20	13	15.3
RSC 10-46 X NRC 138	93	11	11	13.9
LJ 137 X NRC 128	574	18	12	14.8
NRC 128 X LJ 124	1334	39	11	10.7
NRC 128 XLJ137	1018	32	13	12.4
NRC 128 X LJ 140	914	26	8.8	8.3
LJ 140 X RS 10-46	328	12	11	11.4
JS 9560 X RSC 10-46	211	11	9.8	12
RSC 10-46 X AGS 25	454	16	11	11.2
JS 20-69 X VLS 59	439	14	12	10
RSC 10-46 X EC 481369	400	12	8.5	7.6
JS 20-34 X EC 481369	630	17	9.3	13
12. RAK College Sehore				
RVSM 201 1-35 X JS 20-34	155	5	5	7
EC 602288 X TGX 37- E	122	4	5	6
JS 20-69 X NRC 128	135	5	5	6
JS 20-34 X RSC 10-46	155	6	5	8
NRC 181 X NRC 128	85	5	5	7
MACS 1460 X RSC 10-46	112	5	5	6
JS 20-69 X RSC 10-46	105	5	5	6
MACS 1460 X NRC 128	125	5	5	6
RVSM 20 11-35 X LJ-124	122	6	5	8
RSC 10-46 X NRC 138	155	5	5	6
NRC 128 X LJ 124	155	4	5	6.5
LJ 140 X RS 10-46	90	4	5	5.5

Determination of KTi and Lox2 in Released Soybean Varieties

Table 2.7: Screening of Released Soybean Varieties for KTi and Lox 2

S.N.	Variety	KTI	KTI conc. mg /g flour	Lox2	S.N.	Variety	KTI mg/g flour	KTI Conc.	Lox2
1.	ADT 1	+	8.4	+	45.	MACS 1520	+	8.32	+
2.	AISB 50	+	5.50	+	46.	MACS 158	+	8.00	+
3.	Alankar	+	7.12	+	47.	MACS 450	+	9.28	+
4.	AMS 1001	+	9.12	+	48.	MACS 57	+	7.96	+
5.	AMS 100-39	+	5.52	+	49.	MACS 58	+	7.68	+
6.	AMS 2014-1	+	7.04	+	50.	MACS 71	+	7.36	+
7.	AMS 5-18	+	5.76	+	51.	MACS 81	+	5.12	+
8.	Birsa Soya	+	7.6	+	52.	**MACS NRC 1667**	-	**0**	+
9.	Bragg	+	7.92	+	53.	MAUS 1	+	6.32	+
10.	CO SOY 2	+	8.12	+	54.	MAUS 162	+	6.64	+
11.	CO SOY 3	+	9.72	+	55.	MAUS 47	+	8.72	+
12.	DAVIS	+	9.92	+	56.	MAUS 61-2	+	9.52	+
13.	DS 228	+	9.08	+	57.	Monetta	+	11.84	+
14.	DSB 1	+	7.44	+	58.	NRC 12	+	10.08	+
15.	DSB 21	+	8.00	+	59.	**NRC 127**	-	**0**	+
16.	Gaurav	+	6.28	+	60.	NRC 128	+	6.96	+
17.	Gujarat Soya 1	+	8.00	+	61.	**NRC 132**	+	6.40	-
18.	HARDEE	+	9.68	+	62.	NRC 136	+	6.40	+
19.	JS 2	+	8.96	+	63.	**NRC 142**	-	**0**	-
20.	JS 20-116	+	8.08	+	64.	NRC 147	+	6.32	+
21.	JS 20-29	+	8.64	+	65.	**NRC 150**	+	2.08	-
22.	JS 20-34	+	9.68	+	66.	**NRC 152**	-	**0**	-
23.	JS 20-69	+	6.96	+	67.	NRC 157	+	7.60	+
24.	JS 20-94	+	7.04	+	68.	NRC 165	+	8.08	+
25.	JS 20-98	+	6.16	+	69.	**NRC 181**	-	**0**	+
26.	JS 21-72	+	6.88	+	70.	NRC 188	+	7.44	+
27.	JS 335	+	9.72	+	71.	NRC 2	+	9.12	+
28.	JS 71-05	+	8.44	+	72.	NRC 37	+	5.88	+
29.	JS 75-46	+	9.44	+	73.	NRC 7	+	10.32	+
30.	JS 76-205	+	7.80	+	74.	NRC 77	+	6.24	+
31.	JS 79-81	+	8.28	+	75.	NRC 86	+	8.60	+
32.	JS 80-21	+	8.40	+	76.	NRCSL 1	+	7.36	+
33.	JS 90-41	+	8.56	+	77.	Palam Soya	+	7.40	+
34.	JS 93-05	+	9.12	+	78.	PK 308	+	8.40	+
35.	JS 97-52	+	10.12	+	79.	PK 327	+	11.6	+
36.	Kalitur	+	9.12	+	80.	PK 471	+	8.96	+
37.	Karune	+	7.12	+	81.	PKS 24	+	5.20	+
38.	KB 79	+	8.96	+	82.	PKS 45	+	4.56	+
39.	Lee	+	6.08	+	83.	PRS 1	+	7.68	+
40.	LSB 1	+	6.48	+	84.	PS 1029	+	8.64	+
41.	MACS 1281	+	5.20	+	85.	PS 1092	+	7.92	+
42.	MACS 13	+	3.84	+	86.	PS 1225	+	6.16	+
43.	MACS 1447	+	5.84	+	87.	PS 1241	+	8.96	+
44.	MACS 1460	+	5.92	+	88.	PS 1347	+	6.16	+
89.	PS 21	+	10.64	+	105.	RVS 2002-4	+	5.92	+
90.	PS 23	+	7.76	+	106.	RVSM	+	10.48	+
91.	PS 564	+	7.44	+	107.	RVSM 11-35	+	9.20	+
92.	Punjab 1	+	0.16	+	108.	Shilajeet	+	7.76	+
93.	PUSA 16	+	10.68	+	109.	Shivalik	+	9.68	+
94.	PUSA 22	+	8.24	+	110.	SL 525	+	6.56	+
95.	PUSA 37	+	7.20	+	111.	SL 688	+	5.68	+
96.	PUSA 40	+	8.12	+	112.	SOYA 11-15	+	5.12	+
97.	PUSA 98-14	+	10.32	+	113.	TAMS 38	+	10.16	+
98.	RKS 18	+	8.24	+	114.	VL SOY 1	+	9.36	+
99.	RSC 10-46	+	6.40	+	115.	VL SOY 2	+	12.40	+
100.	RSC 10-71	+	5.92	+	116.	VL SOY 21	+	9.52	+
101.	RSC 10-92	+	4.88	+	117.	VL SOY 59	+	8.48	+
102.	RSC 11-07	+	8.16	+	118.	VL SOY 63	+	11.20	+
103.	RVS 18	+	7.44	+	119.	VL SOY 65	+	9.44	+
104.	RVS 2001-4	+	5.76	+					

[a] KTI polyacrylamide gel electrophoresis and Lox2 profiling of 119 varieties is presented in Plates 1-12 [b]Native gel electrophoresis followed by densitometry [c]Dye-bleaching method. + and - indicate presence and absence, respectively. Varieties mentioned in bold letters are devoid of KTI or Lox2 or both these characters

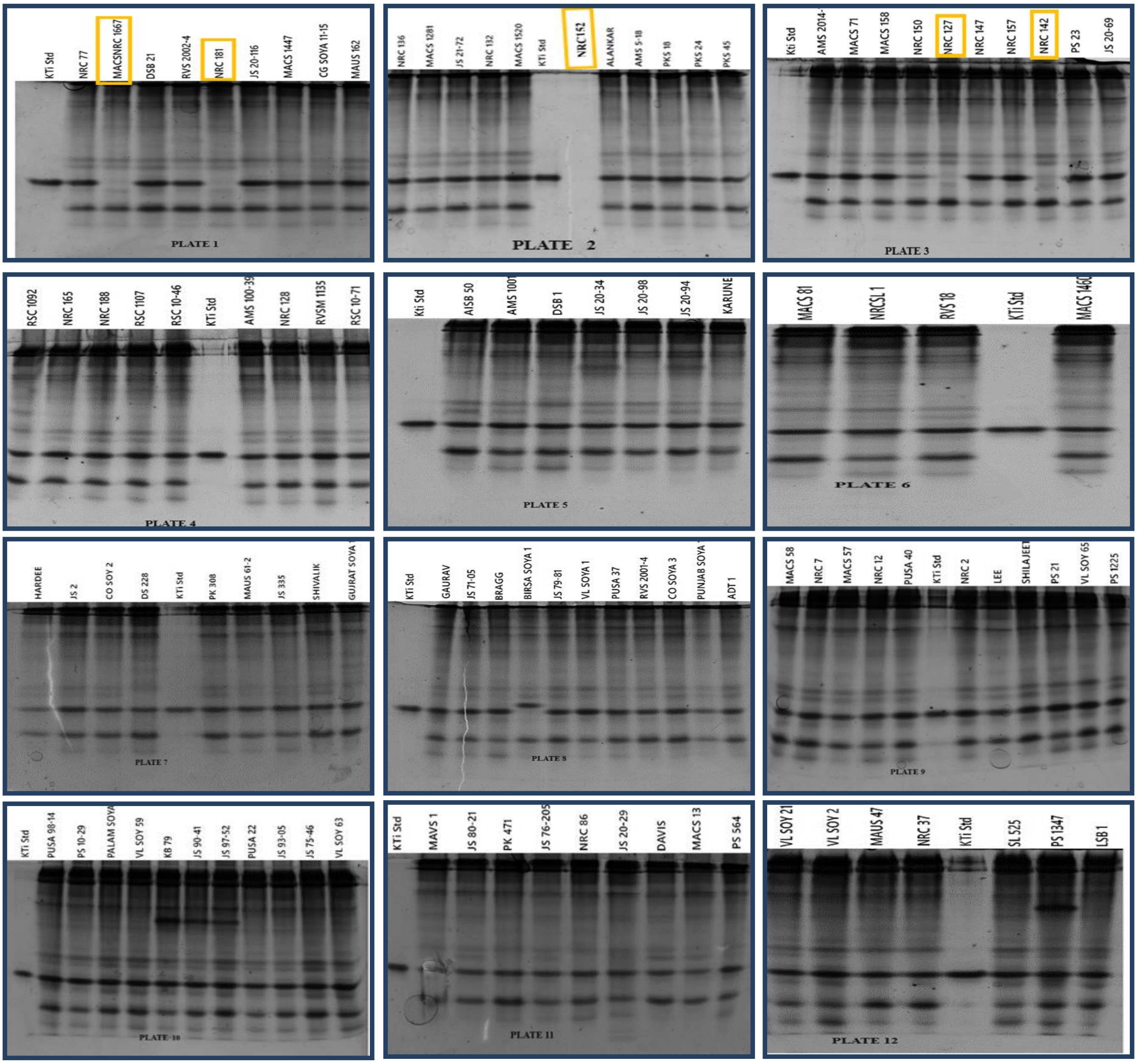


Table 2.8 Breeder seed production *Kharif*2022 and Rabi/Summer 2022-23

Sl. No.	Variety	Year of Notification	DAC Indent (q)	Centre		Allocation (q)	Production (q)	Surplus / Deficit
1	**JS 21-72**	2022	137.00	JNKVV, Jabalpur		140.00	61.14	-78.86
2	**JS 20-116**	2019	292.90	JNKVV, Jabalpur		540.00	812.10	272.10
3	**JS 20-116**	2020	842.00	RVSKVV, Gwalior		500.00	794.00	294.00
				IGKV, Raipur		100.00	110.00	10.00
				MPUAT, Udaipur		200.00	281.80	81.80
				VNMKVV, Parbhani		200.00	115.00	-85.00
				Sipani Farm		50.00	40.00	-10.00
		Total	**1134.90**		**Total**	**1590.00**	**2152.90**	**562.90**
4	**Jawahar Soybean 20-94**	2019	200.10	JNKVV, Jabalpur		75.00	59.25	-15.75
5	**JS 20-94**	2019	415.50	RVSKVV, Gwalior		100.00	0.00	-100.00
				AU, Kota		50.00	31.80	-18.20
		Total	**615.60**		**Total**	**225.00**	**91.05**	**-133.95**
6	**JS 20-98**	2018	1588.80	JNKVV, Jabalpur		500.00	95.37	-404.63
7	**Jawahar Soybean 20-98**	2018	105.00	RVSKVV, Gwalior		300.00	164.00	-136.00
				IGKV, Raipur		100.00	100.00	0.00
				MPUAT, Udaipur		400.00	225.00	-175.00
				AU, Kota		500.00	378.37	-121.63
		Total	**1693.80**		**Total**	**1800.00**	**962.74**	**-837.26**
8	**JS 20-69**	2016	338.00	JNKVV, Jabalpur		200.00	45.81	-154.19
				RVSKVV, Gwalior		20.00	25.00	5.00
					Total	**220.00**	**70.81**	**-149.19**
9	**JS 20-34**	2015	896.00	JNKVV, Jabalpur		100.00	0.00	-100.00
				RVSKVV, Gwalior		150.00	95.00	-55.00
				Sipani Farm		75.00	65.00	-10.00
				AU, Kota		500.00	351.05	-148.95
				Lokbharti, Gujarat		75.00	65.00	-10.00
					Total	**900.00**	**576.05**	**-323.95**
10	**JS 20-29**	2014	329.00	RVSKVV, Gwalior		20.00	16.00	-4.00
				Lokbharti, Gujarat		200.00	200.00	0.00
					Total	**220.00**	**216.00**	**-4.00**
11	**Jawahar Soybean 95-60**	2007	89.30	RVSKVV, Gwalior		100.00	83.00	-17.00
12	**JS 95-60**	2007	100.00	Sipani Farm		50.00	50.00	0.00
				AU, Kota		50.00	2.10	-47.90
		Total	**189.30**		**Total**	**200.00**	**135.10**	**-64.90**
								0.00
13	**JS 93-05**	2002	124.20	UAS, Dharwad		150.00	165.00	15.00
				MPKV, Rahuri		25.00	84.30	59.30
					Total	**175.00**	**249.30**	**74.30**
14	**JS 335**	1994	1018.65	RVSKVV, Gwalior			14.00	14.00
				UAS, Dharwad		200.00	230.00	30.00
				MPKV, Rahuri		50.00	51.00	1.00
				UAS, Bangalore		400.00	224.80	-175.20
				UAS, Raichur		100.00	100.00	0.00
				UAHS, Shivamogga		200.00	198.75	-1.25
				PJTSAU, Hyderabad		200.00	200.00	0.00
					Total	**1150.00**	**1004.55**	**-145.45**
15	**Raj Vijay Soybean 76**	2021	169.00	RVSKVV, Gwalior		195.00	154.00	-41.00
16	**RVS 76**	2021	10.00					
		Total	**179.00**					
17	**RVS 2011-35**	2021	249.70	RVSKVV, Gwalior		275.00	576.00	301.00
18	**Pragya (RVS-18)**	2017	67.0	RVSKVV, Gwalior		330.00	409.00	79.00
19	**Raj Soya 18 (Pragya)**	2017	250.00					

		Total	**317.00**				
20	**RAJ Soya 24 (RVS 2002-04)**	2017	117.30	RVSKVV, Gwalior	525.00	692.00	167.00
21	**Raj Soya 24 (RVS 2002-04)**	2017	382.90				
		Total	**500.20**				
22	**RVS 2001-4**	2014	14.10	RVSKVV, Gwalior	20.00	32.00	12.00
23	**NRC 157**	2023	51.00	IISR, Indore	25.00	30.00	5.00
24	**NRC 131**	2022	2.00	IISR, Indore	2.00	4.00	2.00
25	**NRC 150**	2022	53.00	IISR, Indore	53.00	71.00	18.00
26	**NRC 152**	2022	4.00	IISR, Indore	5.00	4.00	-1.00
27	**NRC 138**	2021	175.40	IISR, Indore	180.00	162.00	-18.00
				AU, Kota	60.00	14.75	-45.25
				Total	**240.00**	**176.75**	**-63.25**
28	**NRC 142**	2021	144.50	IISR, Indore	200.00	170.00	-30.00
29	**NRC 130**	2021	341.00	IISR, Indore	250.00	155.00	-95.00
30	**NRC 136**	2021	7.50	IISR, Indore	8.00	1.00	-7.00
31	**NRC 127**	2018	70.00	IISR, Indore	70.00	40.00	-30.00
32	**NRC 132**	2021	0.50	IISR, Indore	1.00	0.00	-1.00
33	**NRC 147**	2021	0.50	IISR, Indore	1.00	0.00	-1.00
34	**NRC 86**	2015	10.00	IISR, Indore	0.00	0.00	0.00
35	**NRC 128**	2021	20.00	BAU, Ranchi	25.00	20.75	-4.25
36	**NRCSL 1**	2021	7.50	BAU, Ranchi	2.00	2.00	0.00
37	**MAUS 725**	2023	127.00	VNMKVV, Parbhani	130.00	150.00	20.00
38	**MAUS 612**	2018	530.00	VNMKVV, Parbhani	600.00	650.00	50.00
39	**MAUS 162**	2014	8.00	VNMKVV, Parbhani	10.00	25.00	15.00
40	**MAUS 158**	2010	141.00	VNMKVV, Parbhani	150.00	160.00	10.00
41	**Samrudhi**	2002	55.00	VNMKVV, Parbhani	60.00	65.00	5.00
42	**Phule Durva (KDS 992)**	2021	301.30	MPKV, Rahuri	325.00	364.70	39.70
43	**Phule Kimaya (KDS 753)**	2020	971.40	MPKV, Rahuri	1000.00	1968.00	968.00
44	**Phule Sangam (KDS 726)**	2019	1034.26	MPKV, Rahuri	1100.00	1562.00	462.00
45	**Phule Agrani (KDS 344)**	2015	9.00	MPKV, Rahuri	10.00	0.00	-10.00
46	**Phule Kalyani (DS 228)**	2006	5.00	MPKV, Rahuri	25.00	40.00	15.00
47	**Phule-Kalyani (DS 228)**	2006	11.00				
		Total	**16.00**				
48	**MACS 1520**	2021	57.00	ARI, Pune	50.00	0.00	-50.00
49	**MACS 1407**	2021	3.00	ARI, Pune	4.00	48.60	44.60
50	**MACS 1460**	2020	33.00	ARI, Pune	35.00	71.40	36.40
51	**MACS 1281**	2016	10.60	ARI, Pune	15.00	45.00	30.00
52	**MACS 1188**	2013	35.00	ARI, Pune	45.00	22.50	-22.50
53	**PDKV Amba**	2021	253.50	PDKV, Akola	275.00	4953.50	4678.50
54	**AMS 2014-1 (PDVK Purva)**	2021	2.00	PDKV, Akola	2.00	2.00	
55	**AMS MB 5-18 (Suwam Soya)**	2021	266.20	PDKV, Akola	280.00	1659.46	1379.46
56	**PDKV Yellow Gold**	2019	7.00	PDKV, Akola	10.00	121.95	111.95
57	**DSb 34**	2021	371.00	UAS, Dharwad	400.00	415.00	15.00
58	**DSb 23 (DSB 23-2)**	2018	3.63	UAS, Dharwad	5.00	10.00	5.00
59	**DSb 21**	2014	303.06	UAS, Dharwad	325.00	340.00	15.00
60	**Karune**	2021	2.50	UAS, Bangalore	3.00	0.00	-3.00
							0.00
61	**AISB 50**	2021	5.00	PJTSAU, Hyderabad	7.00	7.00	0.00
62	**Basara (ASB-22)**	2018	17.00	PJTSAU, Hyderabad	20.00	20.00	0.00

63	**RSC 10-46**	2021	65.00	IGKV, Raipur	70.00	70.00	0.00
64	**RSC 10-52**	2021	199.00	IGKV, Raipur	225.00	142.00	-83.00
65	**Chhattisgarh Soya 1**	2018	25.00	IGKV, Raipur	30.00	45.80	15.80
66	**Pant Soybean 26**	2020	15.00	GBPUAT, Pantnagar	15.00	33.00	18.00
67	**Pant Soya (23-24)**	2017	10.00	GBPUAT, Pantnagar	10.00	8.00	-2.00
68	**Pant Soybean 24**	2017	3.00	GBPUAT, Pantnagar	3.00	0.00	-3.00
69	**Pant Soybean 19**	2013	3.00	GBPUAT, Pantnagar	3.00	2.00	-1.00
							0.00
70	**VL Bhatt 202**	2020	3.00	VPKAS, Almora	3.00	4.10	1.10
71	**VL Soya 89 (VLS 89)**	2019	3.00	VPKAS, Almora	3.00	5.00	2.00
72	**SL 958**	2015	0.35	PAU, Ludhiana	1.00	5.00	4.00
73	**Him Palam Soya 1**	2022	2.00	CSKHPKV, Palampur	1.00	1.10	0.10
74	**Him Soya**	2019	2.00	CSKHPKV, Palampur	2.00	3.14	1.14
75	**Hara Soya**	2001	1.00	CSKHPKV, Palampur	1.00	1.00	0.00
76	**Shiwalik**	1990	3.00	CSKHPKV, Palampur	3.00	3.51	0.51
77	**Pusa Soybean 06**	2021	2.00	IARI, New Delhi	2.00	0.00	-2.00
78	**DS 12-13**	2015		IARI, New Delhi	0.75	1.00	0.25
79	**Pusa 9712**	2005		IARI, New Delhi	0.75	1.00	0.25
80	**DS 3106**			IARI, New Delhi	1.00	2.00	1.00
81	**Birsa Soybean 4**	2022	1.50	BAU, Ranchi	1.50	2.00	0.50
82	**Birsa Soybean 3**	2021	2.00	BAU, Ranchi	2.00	2.00	0.00
	Grand Total		**13581.5**		**14084.5**	**21103.90**	**7019.40**

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

SN	Variety	Year	Centre	Rabi Prod. (Exp) (q)
1.	JS 21-72	2022	JNKVV, Jabalpur	80.00
2.	JS 20-94	2019	JNKVV, Jabalpur	20.00
3.	JS 20-98	2018	JNKVV, Jabalpur	405.00
4.	JS 20-69	2016	JNKVV, Jabalpur	40.00
5.	JS 20-34	2015	JNKVV, Jabalpur	50.00
6.	NRC 165	2023	IISR, Indore	30.00
7.	NRC 150	2022	IISR, Indore	150.00
8.	NRC 142	2021	IISR, Indore	10.00
9.	RSC 10-52	2021	IGKV, Raipur	58.00
	Grand Total			**843.00**

Northern Hill Zone

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

S.N.	Code	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield (Kg/ha)				
			AlM	PAM	MAJ	Mean	Rank	AlM	PAM	MAJ	Mean	Oil Yield (kg/ha)
			1	2	3	1-3		1	2	3	1-3	
1	SNM-23-1	NRC 270	1311	1448	1526	1428	XV	18.6	18.8	19.0	18.8	268
2	SNM-23-2	AMS 22-16	1756	1841	1617	1738	III	17.7	19.1	18.3	18.4	319
3	SNM-23-3	VLS 89 (c)	1690	1721	1616	1675	V	17.5	18.4	19.6	18.5	309
4	SNM-23-4	MAUS 816	1090	1263	1059	1137	XXV	18.4	18.3	19.9	18.9	214
5	SNM-23-5	Pusa Sipani BS 8	1371	1177	1362	1303	XIX	17.4	18.1	20.0	18.5	241
6	SNM-23-6	VLS 99 (c)	2391	1184	1154	1576	IX	17.7	18.8	18.8	18.4	290
7	SNM-23-7	DS 1589	1739	1752	1084	1525	XI	18.8	17.1	19.2	18.4	280
8	SNM-23-8	RSC 11-95	1198	1430	1539	1389	XVII	17.0	19.1	19.1	18.4	254
9	**SNM-23-9**	**VLS 63 (c)**	**1908**	**1228**	**2161**	**1766**	**II**	**19.1**	**19.1**	**19.2**	**19.2**	**338**
10	SNM-23-10	BAUS (M) 6	1406	1206	1162	1258	XX	18.0	19.1	19.5	18.8	237
11	SNM-23-11	NRC 142 (c)	293	1284	976	851	XXVII	18.1	19.0	19.1	18.7	159
12	SNM-23-12	KBSL 23-36	773	1252	1643	1223	XXI	17.4	19.0	19.3	18.6	226
13	**SNM-23-13**	**VLS 106**	**2488**	**1750**	**1984**	**2074***	**I**	**18.6**	**20.4**	**18.3**	**19.1**	**395***
14	SNM-23-14	SL 1315	1579	1716	1231	1508	XII	18.7	20.1	19.0	19.3	290
15	SNM-23-15	TS 101	1432	1121	2187	1580	VIII	18.7	19.7	18.6	19.0	299
16	SNM-23-16	THPS 6	1615	1787	1778	1727	IV	18.3	19.6	20.2	19.3	333
17	SNM-23-17	KDSIS 1394	1612	1733	1411	1585	VII	18.7	20.6	18.4	19.2	304
18	SNM-23-18	NRC 271	1478	1744	1055	1426	XVI	17.8	19.0	18.1	18.3	260
19	SNM-23-19	Lok-Soya 03	1736	1590	1128	1485	XIII	18.3	20.0	19.2	19.1	284
20	SNM-23-20	KSS 225	916	1333	1298	1182	XXIV	18.6	19.2	19.9	19.2	227
21	SNM-23-21	DS 1547	1353	1869	1380	1534	X	18.7	19.9	18.4	19.0	291
22	SNM-23-22	MACS 1810	1461	1090	828	1126	XXVI	18.8	19.4	19.0	19.1	214
23	SNM-23-23	JS 25-08	1660	1764	1387	1604	VI	19.2	19.2	18.6	19.0	305
24	SNM-23-24	ASb 101	1104	1042	1514	1220	XXII	18.6	19.2	19.4	19.1	232
25	SNM-23-25	NRC 268	1386	1609	1439	1478	XIV	18.8	19.4	19.3	19.2	283
26	SNM-23-26	DLSb 5	1546	1258	785	1197	XXIII	18.5	19.6	19.0	19.1	228
27	SNM-23-27	NRC 269	1152	1392	1531	1359	XVIII	19.0	18.7	19.6	19.1	259
		Mean	1461	1466	1401							
		DOS	**30/06/2023**	**23/06/2023**	**04/07/2023**							
		CD	246.3	219.2	235.5							
		CV (5%)	10.7	10.9	12.2							

***Strain out yielding the best check on the basis of 10% superiority for seed and oil yield**

Table . 2.10b 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)			
			AlM	PAM	MAJ	Mean	AlM	PAM	MAJ	Mean	AlM	PAM	MAJ	Mean	AlM	PAM	MAJ	Mean
			1	2	3	1-3	1	2	3	1-3	1	2	3	1-3	1	2	3	1-3
1	SNM-23-1	NRC 270	108	122	106	112	53	63	51	56	77	60	57	65	12.6	13.4	14.5	13.5
2	SNM-23-2	AMS 22-16	111	124	109	115	57	69	58	61	84	68	53	68	10.2	13.0	9.8	11.0
3	SNM-23-3	VLS 89	111	124	111	115	48	64	50	54	83	71	60	71	13.9	12.7	15.8	14.1
4	SNM-23-4	MAUS 816	107	126	108	114	50	59	49	53	64	52	46	54	14.5	12.7	14.8	14.0
5	SNM-23-5	Pusa Sipani BS 8	104	126	108	113	53	55	50	53	67	54	59	60	14.9	11.7	14.7	13.8
6	SNM-23-6	VLS 99	111	123	113	116	48	58	48	51	67	58	47	57	16.0	12.6	15.7	14.8
7	SNM-23-7	DS 1589	107	125	108	113	48	56	46	50	62	50	40	51	12.1	12.0	12.3	12.1
8	SNM-23-8	RSC 11-95	109	124	112	115	52	66	52	57	69	72	59	67	11.4	12.6	11.5	11.8
9	**SNM-23-9**	**VLS 63**	**111**	**125**	**112**	**116**	**51**	**59**	**51**	**54**	**51**	**52**	**41**	**48**	**14.2**	**14.1**	**15.1**	**14.5**
10	SNM-23-10	BAUS (M) 6	113	125	114	117	54	69	57	60	83	69	59	70	10.8	12.9	11.1	11.6
11	SNM-23-11	NRC 142	105	126	107	113	54	59	50	54	55	58	46	53	12.5	12.1	13.8	12.8
12	SNM-23-12	KBSL 23-36	103	125	99	109	50	59	50	53	77	63	62	67	10.9	13.6	13.9	12.8
13	**SNM-23-13**	**VLS 106**	**112**	**125**	**112**	**116**	**50**	**58**	**50**	**53**	**68**	**53**	**50**	**57**	**14.8**	**12.4**	**14.9**	**14.0**
14	SNM-23-14	SL 1315	107	124	111	114	48	65	49	54	67	60	54	60	11.2	12.2	12.5	12.0
15	SNM-23-15	TS 101	107	126	106	113	52	65	52	56	74	52	53	60	12.5	12.4	12.5	12.5
16	SNM-23-16	THPS 6	109	124	111	115	51	65	51	56	73	71	63	69	10.5	12.0	10.3	10.9
17	SNM-23-17	KDSIS 1394	102	122	107	110	46	58	47	50	59	48	44	50	12.0	11.2	14.1	12.5
18	SNM-23-18	NRC 271	107	126	103	112	52	64	50	55	53	50	39	47	10.6	12.5	9.7	10.9
19	SNM-23-19	Lok-Soya 03	113	122	106	114	50	57	49	52	60	65	42	56	12.1	12.8	12.8	12.6
20	SNM-23-20	KSS 225	107	124	103	111	46	55	45	49	60	54	40	51	11.6	12.0	12.4	12.0
21	SNM-23-21	DS 1547	104	124	103	110	50	62	48	53	48	58	51	52	9.0	13.6	11.5	11.4
22	SNM-23-22	MACS 1810	111	126	113	117	50	65	53	56	66	54	44	55	14.4	13.9	15.1	14.5
23	SNM-23-23	JS 25-08	103	122	104	110	50	65	49	55	71	76	55	67	10.3	11.8	10.3	10.8
24	SNM-23-24	ASb 101	107	123	105	112	46	53	46	48	44	46	45	45	16.9	14.2	15.6	15.5
25	SNM-23-25	NRC 268	105	127	104	112	51	58	49	53	69	60	49	59	10.3	12.7	11.3	11.4
26	SNM-23-26	DLSb 5	109	125	110	115	50	65	49	55	91	61	59	70	12.9	11.7	15.6	13.4
27	SNM-23-27	NRC 269	109	126	109	115	54	64	52	57	72	57	56	62	13.5	12.9	13.7	13.4

Table . 2.11a Performance of Soybean Strains in AVT-II, Zone : NHZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield (Kg/ha)				
			AlM	PAM	MAJ	Mean	Rank	AlM	PAM	MAJ	Mean	Oil Yield (kg/ha)
			1	2	3	1-2		1	2	3	1-3	
1	SNM-23-60	VLS 89 (Filler)	1741	2245	949	1993	IV	19.1	19.9	17.8	19.3	385
2	SNM-23-61	VLS 99 (c)	1914	2160	1088	2037	II	19.1	19.8	18.7	19.4	394
3	SNM-23-62	NRC 197	1444	1898	1034	1671	V	17.8	19.5	18.4	18.6	311
4	SNM-23-63	Palam Early Soya 1 (c)	1099	1481	1065	1290	VI	19.0	20.0	18.8	19.4	251
5	**SNM-23-64**	**VLS 63 (c)**	**1790**	**2500**	**1235**	**2145**	**I**	**18.7**	**19.5**	**18.8**	**19.1**	**409**
6	SNM-23-65	VLS 89 (c)	1691	2361	957	2026	III	18.6	19.9	18.5	19.2	388
		Mean	1613	2107	1055							
		DOS	**30/06/2023**	**22/06/2023**	**04/07/2023**							
		CD	**259.3**	**316.4**	**115.7**							
		CV (5%)	**10.7**	**10.1**	**7.2**							

#Data of Majhera (MAJ) centre not included due to grain yield lower than the state average (1186 Kg/ha)

Table . 2.11b Performance of Soybean Strains in AVT-II, Zone : NHZ

S.N.	Code	Strain	Days to Maturity				Days to Flower				Plant Height (cm)				100 Seed Weight (g)			
			AlM	PAM	MAJ	Mean	AlM	PAM	MAJ	Mean	AlM	PAM	MAJ	Mean	AlM	PAM	MAJ	Mean
			1	2	3	1-2	1	2	3	1-2	1	2	3	1-2	1	2	3	1-2
1	SNM-23-60	VLS 89 (Filler)	109	126	108	118	50	60	50	55	75	87	68	81	14.6	17.5	13.6	16.1
2	SNM-23-61	VLS 99 (c)	109	125	108	117	48	59	47	54	58	65	57	62	14.9	18.1	14.5	16.5
3	SNM-23-62	NRC 197	104	124	102	114	51	56	44	54	73	87	68	80	11.1	15.1	11.6	13.1
4	SNM-23-63	Palam Early Soya 1 (c)	107	122	104	115	52	59	49	56	62	69	69	66	12.8	17.1	13.3	15.0
5	**SNM-23-64**	**VLS 63 (c)**	**108**	**126**	**108**	**117**	**50**	**59**	**48**	**55**	**49**	**59**	**50**	**54**	**13.3**	**18.0**	**13.8**	**15.7**
6	SNM-23-65	VLS 89 (c)	107	125	112	116	49	60	48	55	67	90	72	79	14.5	15.1	14.5	14.8

Northern Plain Zone

Table . 2.12a Performance of Soybean Strains in IVT, Zone : NPZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield (Kg/ha)			
			DLH	LDH	PNT	Mean	Rank	LDH	PNT	Mean	Oil Yield (kg/ha)
			1	2	3	1-3		1	2	1-2	
1	SNM-23-1	NRC 270	933	1735	1796	1488	IV	18.5	19.0	18.8	280
2	SNM-23-2	AMS 22-16	0	641	1057	566	XIX	18.1	19.0	18.6	105
3	SNM-23-3	PS 1347 (C)	1467	1485	1014	1322	VIII	19.2	19.8	19.5	258
4	SNM-23-4	MAUS 816	0	276	1118	464	XXI	17.9	19.5	18.7	87
5	SNM-23-5	Pusa Sipani BS 8	0	0	241	80	XII	-	19.2	19.2	15
6	SNM-23-6	PS 1670 (C)	2978	2697	1994	2556	II	19.4	17.9	18.7	478
7	SNM-23-7	DS 1589	1970	2537	1798	2101	VII	17.9	19.0	18.4	387
8	SNM-23-8	RSC 11-95	0	779	1266	681	III	18.0	20.0	19.0	129
9	**SNM-23-9**	**NRC 149** (C)	**2637**	**2921**	**2186**	**2581**	**I**	**20.1**	**19.4**	**19.7**	**508**
10	SNM-23-10	BAUS (M) 6	0	1104	669	591	XXIV	18.9	19.8	19.4	115
11	SNM-23-11	NRC 142 (C)	-*	588	774	681	XX	17.8	20.4	19.1	130
12	SNM-23-12	KBSL 23-36	0	858	759	539	XXV	19.7	18.8	19.2	103
13	SNM-23-13	VLS 106	0	406	286	230	X	17.4	19.6	18.5	43
14	SNM-23-14	SL 1315	2119	2958	1819	2298	V	18.8	19.3	19.0	437
15	SNM-23-15	TS 101	0	768	1653	807	XVII	18.2	18.4	18.3	148
16	SNM-23-16	THPS 6	0	254	760	338	XVI	17.6	19.3	18.5	63
17	SNM-23-17	KDSIS 1394	-*	0	253	127	XXVII	-	18.8	18.8	239
18	SNM-23-18	NRC 271	0	1205	1031	745	XXII	18.1	19.8	19.0	142
19	SNM-23-19	Lok-Soya 03	0	313	808	373	IX	16.6	19.3	18.0	67
20	SNM-23-20	KSS 225	0	324	1052	458	XVIII	17.0	19.2	18.1	83
21	SNM-23-21	DS 1547	2341	2551	1670	2187	VI	19.2	18.7	19.0	416
22	SNM-23-22	MACS 1810	0	655	802	485	XXIII	19.0	20.0	19.5	95
23	SNM-23-23	JS 25-08	0	760	1801	853	XIII	18.5	18.7	18.6	159
24	SNM-23-24	ASb 101	0	513	680	397	XV	18.3	19.4	18.8	75
25	SNM-23-25	NRC 268	696	1122	1044	954	XI	19.8	19.8	19.8	189
26	SNM-23-26	DLSb 5	0	1547	744	763	XXVI	18.8	19.3	19.0	145
27	SNM-23-27	NRC 269	0	1508	1644	1050	XIV	19.3	20.2	19.7	207
		Mean	1892	1220	1137						
		DOS	**08/07/2023**	**22/06/2023**	**21/07/2023**						
		CD	**15.7**	**244.08**	**247.22**						
		CV (5%)	**0.8**	**14.5**	**10.9**						

^0 yield of entries at Delhi and Ludhiana centre due to YMV not included in centre average. *Entries not survived due to other than YMV

Table . 2.12b Performance of Soybean Strains in IVT, Zone: NPZ

S.N.	Code	Strain	Days To Maturity				Days To Flowering				Plant Height (cm)			100 Seed Weight (g)			
			DLH	LDH	PNT	Mean	DLH	LDH	PNT	Mean	LDH	PNT	Mean	DLH	LDH	PNT	Mean
			1	**2**	**3**	**1-3**	**1**	**2**	**3**	**1-3**	**2**	**3**	**4**	**1**	**2**	**3**	**1-3**
1	SNM-23-1	NRC 270	111	120	104	112	46	55	45	49	93	50	72	10	11.2	12	11.1
2	SNM-23-2	AMS 22-16	116	133	107	119	47	62	47	52	66	51	59	-	7.7	8.7	8.2
3	SNM-23-3	PS 1347	116	130	115	120	49	67	48	55	78	38	58	8.8	10.5	10.7	10.0
4	SNM-23-4	MAUS 816	117	129	106	117	41	52	45	46	63	42	53	-	9.8	11.3	10.6
5	SNM-23-5	Pusa Sipani BS 8	116	-	105	111	43	-	38	41	-	43	43	-	-	9.3	9.3
6	SNM-23-6	PS 1670	117	133	115	122	46	60	48	51	75	44	60	9.7	11.5	11.3	10.8
7	SNM-23-7	DS 1589	111	125	102	113	42	51	42	45	68	33	51	8.1	9.9	10	9.3
8	SNM-23-8	RSC 11-95	117	131	105	118	47	55	44	49	67	41	54	-	8	9.3	8.7
9	**SNM-23-9**	**NRC 149**	**121**	**133**	**108**	121	**46**	**61**	**47**	51	**75**	**73**	74	**11.8**	**11.8**	**11.3**	11.6
10	SNM-23-10	BAUS (M) 6	118	127	110	118	49	61	46	52	80	54	67	-	12	8.3	10.2
11	SNM-23-11	NRC 142	112	107	99	106	43	46	44	44	72	46	59	-	8.4	10.3	9.4
12	SNM-23-12	KBSL 23-36	106	111	100	106	44	54	46	48	84	55	70	8.1	8.9	8.7	8.6
13	SNM-23-13	VLS 106	116	115	103	111	39	46	43	43	59	41	50	-	8.5	11.3	9.9
14	SNM-23-14	SL 1315	115	131	108	118	45	60	45	50	77	44	61	9.3	9.7	10.7	9.9
15	SNM-23-15	TS 101	115	129	107	117	45	59	45	50	74	47	61	-	8.6	10.7	9.7
16	SNM-23-16	THPS 6	115	124	103	114	41	49	42	44	79	44	62	-	7.4	8.7	8.1
17	SNM-23-17	KDSIS 1394	-	-	104	104	40	-	41	41	-	32	32	-	-	10.3	10.3
18	SNM-23-18	NRC 271	113	117	105	112	43	52	44	46	69	31	50	-	8.1	9.7	8.9
19	SNM-23-19	Lok-Soya 03	116	129	106	117	43	51	42	45	61	34	48	-	7.4	9.3	8.4
20	SNM-23-20	KSS 225	114	114	102	110	41	50	42	44	81	35	58	-	6.7	9.7	8.2
21	SNM-23-21	DS 1547	109	122	103	111	46	59	47	51	69	36	53	7.4	8.7	9.3	8.5
22	SNM-23-22	MACS 1810	115	130	109	118	48	58	46	51	89	48	69	-	12.5	11.3	11.9
23	SNM-23-23	JS 25-08	115	120	102	112	42	49	45	45	74	49	62	-	6.7	9.7	8.2
24	SNM-23-24	ASb 101	106	109	96	104	38	44	36	39	62	35	49	-	8.9	11.7	10.3
25	SNM-23-25	NRC 268	112	107	99	106	42	48	42	44	92	43	68	7.1	7.9	9.7	8.2
26	SNM-23-26	DLSb 5	116	130	110	119	45	54	45	48	79	66	73	-	10.3	11.3	10.8
27	SNM-23-27	NRC 269	114	125	107	115	41	51	43	45	85	52	69	-	11.4	12	11.7

North Eastern Hill Zone

Table . 2.13a Performance of Soybean Strains in IVT, Zone : NEHZ

S.N	Code	Strain	Seed Yield(Kg/ha)				Oil Content % & Yield (Kg/ha)			
			IMP	JOR	Mean	Rank	IMP	JOR	Mean	Oil Yield (kg/ha)
			1	2	1-2		1	2	1-2	1-2
1	SNM-23-1	NRC 270	2867	1919	2393	XI	18.2	19.7	18.9	452
2	SNM-23-2	AMS 22-16	2267	1395	1831	XXIV	18.4	19.9	19.1	350
3	SNM-23-3	MACS 1407 (c)	1867	972	1420	XXVII	18.7	18.1	18.4	261
4	SNM-23-4	MAUS 816	3917	1661	2789	III	18.5	18.6	18.6	519
5	SNM-23-5	Pusa Sipani BS 8	3200	1448	2324	XIV	18.4	19.3	18.8	437
6	**SNM-23-6**	**KDS 753 (c)**	**3700**	**1642**	**2671**	V	**18.1**	**19.2**	**18.7**	**499**
7	SNM-23-7	DS 1589	1800	1479	1640	XXV	17.3	19.3	18.3	300
8	SNM-23-8	RSC 11-95	3417	1778	2598	VII	18.2	19.7	19.0	494
9	SNM-23-9	JS 20-116 (c)	2150	1519	1835	XXIII	18.8	20.2	19.5	358
10	SNM-23-10	BAUS (M) 6	2700	2103	2402	X	18.6	20.1	19.4	466
11	SNM-23-11	NRC 142 (c)	2517	732	1625	XXVI	18.0	20.0	19.0	309
12	SNM-23-12	KBSL 23-36	2583	1581	2082	XIX	17.7	19.6	18.6	387
13	SNM-23-13	VLS 106	3367	1400	2384	XIII	18.8	18.7	18.8	448
14	**SNM-23-14**	**SL 1315**	**4050**	**1894**	**2972***	I	**17.6**	**18.5**	**18.0**	535
15	SNM-23-15	TS 101	2767	1817	2292	XVI	18.7	19.9	19.3	442
16	SNM-23-16	THPS 6	1867	1811	1839	XXII	18.5	19.6	19.0	349
17	SNM-23-17	KDSIS 1394	3000	2226	2613	VI	18.6	19.3	19.0	496
18	SNM-23-18	NRC 271	3850	1602	2726	IV	18.8	19.7	19.2	523
19	SNM-23-19	Lok-Soya 03	2917	1284	2101	XVIII	18.3	19.2	18.8	395
20	SNM-23-20	KSS 225	2733	1720	2227	XVII	18.6	19.7	19.2	427
21	SNM-23-21	DS 1547	3500	1571	2536	VIII	18.3	19.2	18.8	477
22	SNM-23-22	MACS 1810	3350	1466	2408	IX	18.5	19.7	19.1	460
23	SNM-23-23	**JS 25-08**	4200	1549	**2875#**	II	18.0	19.1	18.5	**532#**
24	SNM-23-24	ASb 101	2417	1618	2018	XXI	19.7	19.4	19.6	395
25	SNM-23-25	NRC 268	3783	995	2389	XII	17.9	18.3	18.1	432
26	SNM-23-26	DLSb 5	2567	1520	2044	XX	19.5	18.6	19.1	390
27	SNM-23-27	NRC 269	2533	2060	2297	XV	17.9	19.2	18.5	425
		Mean	2628	1584						
		DOS	20/06/23	07/08/23						
		CD (5%)	833.3	216.1						
		CV	17.3	9.9						

***Strain out yielding the best check on the basis of 10% superiority for seed yield. #entries 5-10% superiority over the best check will be repeated in IVT again.**

Table . 2.13b Performance of Soybean Strains in IVT, Zone : NEHZ

S.N	Code	Strain	Days To Maturity			Days To Flowering			Plant Height (cm)			100 Seed Weight (g)		
			IMP	JOR	Mean	IMP	JOR	Mean	IMP	JOR	Mean	IMP	JOR	Mean
			1	2	1-2	1	2	1-2	1	2	3	1	2	1-2
1	SNM-23-1	NRC 270	109	89	99	47	41	44	76	42	59	17.3	11.0	14.1
2	SNM-23-2	AMS 22-16	113	91	102	48	40	44	79	37	58	13.5	10.5	12.0
3	SNM-23-3	MACS 1407 (c)	112	88	100	46	39	43	76	36	56	13.3	9.7	11.5
4	SNM-23-4	MAUS 816	111	94	103	41	38	40	60	33	47	20.5	13.8	17.2
5	SNM-23-5	Pusa Sipani BS 8	107	87	97	36	40	38	76	39	58	16.1	11.2	13.6
6	**SNM-23-6**	**KDS 753 (c)**	**107**	**91**	**99**	**47**	**43**	**45**	**72**	**37**	**55**	**19.0**	**11.3**	**15.1**
7	SNM-23-7	DS 1589	112	87	100	38	36	37	47	26	37	15.9	10.5	13.2
8	SNM-23-8	RSC 11-95	113	90	102	44	41	43	73	33	53	17.2	10.0	13.6
9	SNM-23-9	JS 20-116 (c)	108	88	98	49	40	45	77	36	57	13.4	8.2	10.8
10	SNM-23-10	BAUS (M) 6	116	94	105	49	42	46	85	39	62	15.1	10.8	13.0
11	SNM-23-11	NRC 142 (c)	110	93	102	49	39	44	67	46	57	15.1	11.8	13.5
12	SNM-23-12	KBSL 23-36	100	79	90	44	41	43	71	57	64	14.1	10.2	12.1
13	SNM-23-13	VLS 106	112	90	101	42	37	40	56	35	46	19.6	12.8	16.2
14	SNM-23-14	SL 1315	115	92	104	48	40	44	58	32	45	14.6	11.2	12.9
15	SNM-23-15	TS 101	109	87	98	46	41	44	71	44	58	14.4	9.7	12.1
16	SNM-23-16	THPS 6	112	86	99	46	38	42	68	38	53	14.0	9.5	11.8
17	SNM-23-17	KDSIS 1394	108	77	93	42	36	39	52	37	45	15.7	10.5	13.1
18	SNM-23-18	NRC 271	105	90	98	47	42	45	62	32	47	16.1	9.0	12.5
19	SNM-23-19	Lok-Soya 03	109	88	99	43	38	41	55	28	42	16.1	10.7	13.4
20	SNM-23-20	KSS 225	107	86	97	42	38	40	70	34	52	16.5	10.5	13.5
21	SNM-23-21	DS 1547	109	86	98	46	40	43	62	29	46	13.7	8.5	11.1
22	SNM-23-22	MACS 1810	112	94	103	47	40	44	66	38	52	22.6	13.5	18.1
23	SNM-23-23	JS 25-08	113	91	102	48	40	44	69	40	55	16.1	9.2	12.6
24	SNM-23-24	ASb 101	96	77	87	36	37	37	55	30	43	17.6	12.0	14.8
25	SNM-23-25	NRC 268	108	85	97	46	38	42	69	37	53	14.4	9.0	11.7
26	SNM-23-26	DLSb 5	111	94	103	47	42	45	95	60	78	17.6	11.7	14.7
27	SNM-23-27	NRC 269	111	91	101	47	39	43	74	40	57	19.3	11.3	15.3

Table . 2.14a Performance of Soybean Strains in IVT Repeat, Zone: NEHZ

S. N	Code	Strain	Seed yield (Kg/ha) 2023		Seed yield (Kg/ha) 2022	Seed Yield Mean	Oil Content % & Yield (Kg/ha) 2022			Oil Yield		Oil Yield Over 2 Years
			IMP	**JOR**	**IMP**		**IMP**	**JOR**	**Mean**	**2023**	**2022**	
			1	**2**	**3**	**1-3**	**1**	**2**	**1-2**	**1**	**2**	**1-2**
1	SNM-R-23-28	NRC 260	2733	1327	3012	2357	17.8	19.2	18.5	375	627	501
2	SNM-R-23-29	NRC 190	3617	1667	3630	2971*	19.1	19.7	19.4	512	806	659*
3	SNM-R-23-30	VLS 105	2117	1574	2963	2218	19.0	20.2	19.6	361	621	491
4	SNM-R-23-31	AMS 2021-4	3300	2639	3185	3041*	18.3	19.8	19.1	565	625	595*
5	SNM-R-23-32	MACS 1407 (c)	3283	1373	2272	2309	19.1	19.9	19.5	454	456	455
6	SNM-R-23-33	KDS 1188	3567	2269	3136	2991*	18.6	19.9	19.3	561	602	582*
7	SNM-R-23-34	Himso 1696	3267	1960	3185	2804	19.7	20.1	19.9	520	606	563
8	SNM-R-23-35	NRC 142 (C)	1917	1806	-	1862	18.9	19.5	19.2	357		357
9	SNM-R-23-36	MAUS 824	3600	2423	2938	2987*	18.2	19.3	18.8	564	619	592*
10	SNM-R-23-37	RSC 11-72	3017	2438	3086	2847	19.3	19.0	19.2	522	626	574*
11	SNM-R-23-38	NRC 259	3100	2145	3062	2769	18.5	19.7	19.1	501	604	553
12	SNM-R-23-39	AMS 2021-3	3533	2083	2988	2868	19.3	20.1	19.7	553	696	625*
13	SNM-R-23-40	JS 20-116 (C)	3283	1944	2222	2483	19.7	19.2	19.5	508	433	471
14	**SNM-R-23-41**	**KDS 753 (c)**	3083	2160	**2617**	**2620**	18.0	19.6	18.8	492	534	**513**
15	SNM-R-23-42	NRC 191	2350	1296	2691	2112	18.4	19.8	19.1	348	611	480
16	SNM-R-23-43	Pusa Sipani 433	3300	2593	2914	2936*	19.4	19.0	19.2	565	602	584*
		Mean	3067	1981								
		N.P.S.(Sqm)	6.00	6.48								
		DOS	26/07/2023	12/08/2023								
		CD	816.6	324.0								
		CV (5%)	16.0	9.8								

***Strain out yielding the best check on the basis of 10% superiority for seed and oil yield**

Table . 2.14b Performance of Soybean Strains in IVT Repeat, Zone : NEHZ

S.N	Code	Strain	Days To Maturity			Days To Flowering			Plant Height (cm)			100 Seed Weight (g)		
			IMP	JOR	Mean	IMP	JOR	Mean	IMP	JOR	Mean	IMP	JOR	Mean
			1	2	1-2	1	2	1-2	1	2	1-2	1	2	1-2
1	SNM-R-23-28	NRC 260	104	96	100	45	39	42	77	65	71	16.8	11.7	14.2
2	SNM-R-23-29	NRC 190	102	86	94	48	40	44	38	29	34	12.7	9.2	11.0
3	SNM-R-23-30	VLS 105	106	89	98	49	37	43	29	31	30	20.7	14.7	17.7
4	**SNM-R-23-31**	**AMS 2021-4**	**104**	**91**	**98**	**51**	**41**	**46**	**50**	**48**	**49**	**11.8**	**8.5**	**10.1**
5	SNM-R-23-32	MACS 1407 (c)	102	84	93	49	38	44	49	40	45	13.7	10.3	12.0
6	**SNM-R-23-33**	**KDS 1188**	**102**	**89**	**96**	**43**	**37**	**40**	**51**	**46**	**49**	**17.3**	**13.0**	**15.2**
7	SNM-R-23-34	Himso 1696	105	96	101	43	39	41	36	41	39	14.1	11.0	12.6
8	SNM-R-23-35	NRC 142 ©	105	87	96	50	38	44	51	55	53	15.4	11.5	13.4
9	**SNM-R-23-36**	**MAUS 824**	**105**	**94**	**100**	**43**	**37**	**40**	**45**	**36**	**41**	**18.5**	**14.5**	**16.5**
10	SNM-R-23-37	RSC 11-72	104	95	100	53	44	49	55	51	53	11.5	10.3	10.9
11	SNM-R-23-38	NRC 259	102	92	97	50	44	47	62	52	57	13.1	9.0	11.1
12	SNM-R-23-39	AMS 2021-3	104	91	98	49	41	45	49	46	48	11.7	7.8	9.8
13	SNM-R-23-40	JS 20-116 (C)	101	86	94	47	39	43	41	41	41	12.7	8.8	10.8
14	**SNM-R-23-41**	**KDS 753 (c)**	**101**	**92**	**97**	**50**	**43**	**47**	**49**	**39**	**44**	**15.7**	**12.8**	**14.3**
15	SNM-R-23-42	NRC 191	100	86	93	43	38	41	23	29	26	20.6	17.2	18.9
16	**SNM-R-23-43**	**Pusa Sipani 433**	**101**	**89**	**95**	**43**	**36**	**40**	**37**	**31**	**34**	**14.5**	**12.3**	**13.4**

Eastern Zone

Table .2.15a Performance of Soybean Strains in IVT Normal, Zone : EZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Oil content % & yield (Kg/ha)				
			BPT	RAP	RNC	Mean	Rank	BPT	RAP	RNC	Mean	Oil Yield (kg/ha)
			1	2	3	1-3		1	2	3	1-3	
1	SNM-23-1	NRC 270	2039	1743	2499	2094	IX	19.7	20.3	18.9	19.6	411
2	SNM-23-2	AMS 22-16	2118	1902	1782	1934	XV	18.7	19.6	19.8	19.4	374
3	SNM-23-3	NRC 128 (C)	-	2163	1619	1891	XVII	-	19.2	20.1	19.7	371
4	SNM-23-4	MAUS 816	2178	1528	3056	2254	IV	17.8	20.1	19.9	19.3	434
5	SNM-23-5	Pusa Sipani BS 8	1628	1036	2863	1842	XX	18.7	19.0	19.5	19.1	351
6	SNM-23-6	RSC 11-07 (C)	-	1548	1817	1683	XXIV	0.0	19.1	20.0	13.0	219
7	SNM-23-7	DS 1589	2040	1926	1910	1958	XIV	19.4	18.9	19.0	19.1	374
8	SNM-23-8	RSC 11-95	2292	2306	1862	2153	VII	19.3	19.2	19.8	19.4	418
9	**SNM-23-9**	**RSC 1046 (C)**	**1702**	**1860**	**3101**	**2221**	**V**	**19.1**	**19.2**	**18.6**	**19.0**	**421**
10	**SNM-23-10**	**BAUS (M) 6**	**2307**	**1164**	**3391**	**2287**	**III**	**19.6**	**20.3**	**19.1**	**19.7**	**449#**
11	SNM-23-11	NRC 142 (C)	--	811	1860	1335	XXVII	-	19.9	19.2	19.6	261
12	SNM-23-12	KBSL 23-36	1579	772	2105	1486	XXVI	19.7	19.8	20.0	19.8	294
13	SNM-23-13	VLS 106	2529	1369	2290	2063	XI	20.1	19.6	19.3	19.7	405
14	SNM-23-14	SL 1315	2097	1627	1872	1866	XVIII	19.8	20.1	19.8	19.9	371
15	SNM-23-15	TS 101	1964	2186	1995	2048	XIII	19.4	19.5	19.9	19.6	401
16	SNM-23-16	THPS 6	2297	1540	1699	1845	XIX	18.2	18.8	19.1	18.7	345
17	SNM-23-17	KDSIS 1394	1938	1704	1646	1763	XXII	19.9	19.4	19.5	19.6	345
18	SNM-23-18	NRC 271	2103	1964	2432	2166	VI	19.0	20.1	19.6	19.6	423
19	SNM-23-19	Lok-Soya 03	2055	1359	1784	1733	XXIII	19.3	19.6	19.9	19.6	339
20	SNM-23-20	KSS 225	2030	1341	1981	1784	XXI	19.1	20.6	20.3	20.0	356
21	**SNM-23-21**	**DS 1547**	**2268**	**2024**	**3179**	**2490***	**I**	**19.6**	**20.2**	**19.0**	**19.6**	**488**
22	SNM-23-22	MACS 1810	2096	1558	2079	1911	XVI	19.0	18.8	21.4	19.7	377
23	SNM-23-23	JS 25-08	2194	2002	2194	2130	VIII	20.4	16.7	19.9	19.0	404
24	SNM-23-24	ASb 101	1585	973	2079	1546	XXV	19.3	19.3	19.7	19.4	300
25	**SNM-23-25**	**NRC 268**	**1889**	**2294**	**2876**	**2353**	**II**	**20.1**	**20.2**	**19.5**	**19.9**	**469***
26	SNM-23-26	DLSb 5	1980	1704	2581	2088	X	18.8	18.6	19.8	19.1	398
27	SNM-23-27	NRC 269	2149	1679	2321	2050	XII	20.0	18.9	19.8	19.6	401
		Mean	2044	1633	2255							
		N.P.S.(Sqm)	6.48	11.25	6.48							
		DOS	12/07/2023	28/06/2023	4/07/23							
		CD	335.9	218.9	352.5							
		CV (5%)	11.97	9.7	11.4							

***Strain out yielding the best check on the basis of 10% superiority for seed and oil yield**
#Entries 5-10% superiority over the best check will be repeated in IVT again.

Table .2.15b Performance of Soybean Strains in IVT Normal, Zone : EZ

S.N.	Code	Strain	Days to Maturity				Days to Flower				Plant Height (cm)				100 Seed Weight (g)			
			BPT	RAP	RNC	Mean	BPT	RAP	RNC	Mean	BPT	RAP	RNC	Mean	BPT	RAP	RNC	Mean
			1	2	3	1-3	1	2	3	1-3	1	2	3	1-3	1	2	3	1-3
1	SNM-23-1	NRC 270	97	88	103	96	43	40	42	42	64	56	94	71	16.2	9.9	11.2	12.4
2	SNM-23-2	AMS 22-16	97	100	106	101	42	45	44	44	55	59	93	69	13.4	9.1	11.8	11.4
3	SNM-23-3	NRC 128 (C)	-	104	108	106	-	44	44	44	-	34	67	51	-	10.2	11.8	11.0
4	SNM-23-4	MAUS 816	98	104	111	104	39	38	42	40	58	45	66	56	17.8	10.4	15.3	14.5
5	SNM-23-5	Pusa Sipani BS 8	95	105	105	102	36	36	43	38	55	49	83	62	13.1	10.3	11.7	11.7
6	SNM-23-6	RSC 11-07 (C)	-	83	106	95	-	44	42	43	-	46	59	53	-	7.9	8.4	8.2
7	SNM-23-7	DS 1589	94	83	112	96	38	35	41	38	51	48	65	55	13.1	8.4	11.6	11.0
8	SNM-23-8	RSC 11-95	97	100	107	101	41	40	44	42	63	57	79	66	14.2	9.4	9.3	11.0
9	**SNM-23-9**	**RSC 1046 (C)**	**99**	**105**	**116**	**107**	**43**	**45**	**43**	**44**	**54**	**49**	**78**	**60**	**11.9**	**8.7**	**12.1**	**10.9**
10	SNM-23-10	**BAUS (M) 6**	101	105	115	107	41	42	45	43	74	65	92	77	13.9	9.8	12.0	11.9
11	SNM-23-11	NRC 142 (C)	-	86	102	94	-	45	44	45	-	50	78	64	-	9.7	11.0	10.4
12	SNM-23-12	KBSL 23-36	86	83	101	90	41	45	42	43	91	67	93	84	13.4	9.7	10.8	11.3
13	SNM-23-13	VLS 106	97	68	107	91	39	42	42	41	57	52	76	62	16.5	11.1	11.8	13.1
14	SNM-23-14	SL 1315	97	105	105	102	41	44	43	43	49	46	72	56	14.4	11.2	11.1	12.2
15	SNM-23-15	TS 101	95	100	101	99	42	38	43	41	55	54	82	64	12.0	9.4	8.4	9.9
16	SNM-23-16	THPS 6	96	99	101	99	39	41	42	41	70	55	87	71	13.4	8.8	8.3	10.2
17	SNM-23-17	KDSIS 1394	93	93	100	95	39	36	41	39	53	48	78	60	13.4	10.1	9.4	10.9
18	SNM-23-18	NRC 271	97	106	102	102	40	45	45	43	62	54	78	65	12.7	8.2	8.1	9.6
19	SNM-23-19	Lok-Soya 03	94	96	107	99	38	40	43	40	49	38	70	52	14.1	8.9	12.2	11.8
20	SNM-23-20	KSS 225	97	92	101	97	39	37	41	39	54	45	78	59	13.7	7.9	9.8	10.5
21	**SNM-23-21**	**DS 1547**	**94**	**101**	**106**	**100**	**42**	**42**	**42**	**42**	**64**	**48**	**73**	**62**	**12.0**	**7.0**	**8.9**	**9.3**
22	SNM-23-22	MACS 1810	98	98	106	101	41	47	45	44	57	53	71	60	17.7	10.1	12.4	13.4
23	SNM-23-23	JS 25-08	96	68	107	90	42	45	42	43	66	48	90	68	12.6	7.5	9.6	9.9
24	SNM-23-24	ASb 101	85	86	101	91	35	39	44	39	58	40	71	56	12.8	10.3	11.3	11.5
25	**SNM-23-25**	**NRC 268**	**94**	**88**	**103**	**95**	**41**	**41**	**44**	**42**	**63**	**56**	**98**	**72**	**10.8**	**9.0**	**9.2**	**9.7**
26	SNM-23-26	DLSb 5	100	105	107	104	42	41	45	43	92	74	93	86	16.2	10.7	11.4	12.8
27	SNM-23-27	NRC 269	97	96	109	101	42	46	42	43	55	50	77	61	16.1	10.9	11.6	12.9

Table .2.16a Performance of Soybean Strains in AVT- II, Zone : EZ

S.N.	Code	Strain	Seed Yield(Kg/ha)					Oil Content % & Yield (Kg/ha)				
			BPT	**RAP**	**RNC**	**Mean**	**Rank**	**BPT**	**RAP**	**RNC**	**Mean**	**Oil Yield (kg/ha)**
			1	2	3	1-3		1	2	3	1-3	
1	SNM-23-66	JS 20-116 (c)	1844	2172	1736	1917	IV	18.7	20.1	20.2	19.6	376
2	SNM-23-67	JS 20-116 (Filler)	1983	2156	1767	1969	II	19.3	18.9	19.8	19.3	379
3	**SNM-23-68***	**RSC 11-42**	**2245**	**2317**	**1991**	**2184**	**I**	**20.0**	**19.9**	**20.0**	**20.0**	**436**
4	SNM-23-69	NRC 128 (c)	-	-	278	278	V	-	-	20.5	20.5	57
5	SNM-23-70	AMS 2014-1 (c)	2346	1889	1628	1954	III	20.8	19.3	18.9	19.7	384
		Mean	2105	2134	1480							
		N.P.S.(Sqm)	12.96	18.00	12.96							
		DOS	14/07/2023	29/06/2023	07/07/2023							
		CD	285.4	127.7	339.5							
		CV (5%)	11.1	4.7	14.9							

***Strain out yielding the best check on the basis of 10% superiority for seed and oil yield**

Table .2.16b Performance of Soybean Strains in AVT- II, Zone : EZ

S.N.	Code	Strain	Days to Maturity				Days to Flower				Plant Height (cm)				100 Seed Weight (g)			
			BPT	RAP	RNC	Mean	BPT	RAP	RNC	Mean	BPT	RAP	RNC	*Mean*	BPT	RAP	RNC	Mean
			1	**2**	**3**	**1-3**	**1**	**2**	**3**	**1-3**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**1-3**
1	SNM-23-66	JS 20-116 (c)	95	94	105	98	41	41	44	42	77	50	78	68	10.1	8.1	8.6	8.9
2	SNM-23-67	JS 20-116 (Filler)	97	94	107	99	40	44	44	43	78	60	71	70	10.0	7.7	8.9	8.9
3	**SNM-23-68**	**RSC 11-42**	**101**	**99**	**109**	**103**	**42**	**41**	**45**	**43**	**76**	**59**	**76**	**70**	**11.3**	**7.8**	**11.6**	**10.2**
4	SNM-23-69	NRC 128 (c)	-	-	108	108	-	-	47	47	-	-	41	41	-	-	13.0	13.0
5	**SNM-23-70**	**AMS 2014-1 (c)**	**100**	**108**	**111**	**106**	**40**	**45**	**43**	**43**	**82**	**62**	**74**	**73**	**10.9**	**7.2**	**9.4**	**9.1**

Central Zone

Table . 2.17a Performance of Soybean Strains in IVT Normal Maturity, Zone : CZ

S.N.	Code	Strain	Seed Yield(Kg/ha)													
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**SEH**	**Mean**	**Rank**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1-12**	
1	**SNM-23-1**	**NRC 270**	**3631**	**3029**	**3190**	**2741**	**2241**	**2607**	**3480**	**2292**	**1877**	**3902**	**3006**	**2046**	**2836***	**I**
2	SNM-23-2	AMS 22-16	631	2697	2670	2151	0	775	3318	1769	922	373	2711	1074	1591	XXI
3	SNM-23-3	RSC 10-46 (c)	2836	2618	2576	732	556	1644	2897	1707	1432	3311	2493	1897	2058	XI
4	SNM-23-4	MAUS 816	3228	2305	2774	751	0	1850	2303	1159	1066	3042	3075	1638	1933	XIII
5	SNM-23-5	Pusa Sipani BS 8	1149	2880	3064	794	0	420	3003	1547	439	656	2723	1602	1523	XXII
6	SNM-23-6	RVSM 2011-35 (c)														
7	SNM-23-7	DS 1589	2852	1999	2892	1949	1274	2252	1833	2724	1882	2446	2086	2317	2209	X
8	SNM-23-8	RSC 11-95	3436	2664	2704	2428	1068	1256	3843	2109	1157	2712	2857	1985	2352	IX
9	**SNM-23-9**	**JS 20-98 (c)**	**3537**	**2394**	**2840**	**1510**	**1465**	**3333**	**3034**	**1686**	**1456**	**2752**	**2398**	**2198**	**2383**	**VIII**
10	SNM-23-10	BAUS (M) 6	810	2848	2434	529	0	89	2511	1539	778	470	2717	821	1295	XXV
11	SNM-23-11	NRC 142 (c)	1201	1969	2338	838	1136	2123	2791	1893	429	2713	2944	902	1773	XVIII
12	SNM-23-12	KBSL 23-36	1050	3048	2018	938	484	772	3162	1403	1024	885	2919	1594	1608	XX
13	SNM-23-13	VLS 106	229	2869	2383	284	0	419	2721	1213	855	291	2708	967	1245	XXVI
14	SNM-23-14	SL 1315	2613	1898	2308	1276	0	1904	3089	2455	2670	212	2240	1668	1861	XVI
15	**SNM-23-15**	**TS 101**	**3074**	**2780**	**3091**	**1344**	**1915**	**2781**	**3106**	**2229**	**2069**	**3827**	**2948**	**2014**	**2598[#]**	**V**
16	SNM-23-16	THPS 6	769	2678	2594	2280	531	522	3932	2181	744	279	2605	1084	1683	XIX
17	SNM-23-17	KDSIS 1394	3359	2499	2627	2202	721	1057	1754	1911	141	225	3521	1852	1822	XVII
18	SNM-23-18	NRC 271	2662	2739	2824	2529	1760	2649	3230	1266	1640	3948	2454	1814	2460	VII
19	SNM-23-19	Lok-Soya 03	2774	2543	2897	1764	604	1582	2386	1660	837	1826	2154	1710	1895	XV
20	SNM-23-20	KSS 225	2323	2520	2599	1200	1005	2564	1864	2194	268	2491	2547	1860	1953	XII
21	**SNM-23-21**	**DS 1547**	**4112**	**2802**	**3275**	**1078**	**1565**	**3167**	**3158**	**1529**	**2979**	**3850**	**2850**	**2130**	**2708***	**III**
22	SNM-23-22	MACS 1810	344	3013	2902	523	0	502	2780	1243	1069	491	2599	888	1363	XXIV
23	**SNM-23-23**	**JS 25-08**	**4004**	**2828**	**3377**	**2137**	**2164**	**3068**	**2855**	**1844**	**2159**	**4031**	**2661**	**2168**	**2775***	**II**
24	SNM-23-24	ASb 101	1796	2508	2599	2317	882	2080	3430	1729	706	448	2811	1827	1928	XIV
25	**SNM-23-25**	**NRC 268**	**3959**	**2093**	**2915**	**2529**	**2214**	**2731**	**2718**	**1586**	**2027**	**3247**	**3153**	**2120**	**2608[$]**	**IV**
26	SNM-23-26	DLSb 5	461	3249	2858	526	282	588	3213	1859	847	334	3066	774	1505	XXIII
27	**SNM-23-27**	**NRC 269**	**3502**	**3182**	**3243**	**2720**	**1277**	**2750**	**3140**	**1493**	**1483**	**3099**	**3390**	**1806**	**2590[#]**	**VI**
		Mean	2321	2640	2769	1541	1218^	1749	2906	1778	1268	1995	2755	1644		
		N.P.S.(Sqm)	6.48	6.48	6.48	6.48	6.48	6.48	6.48	4.05	6.48	6.48	6.48	10.00		
		DOS	10/07/23	03/0723	07/08/23	30/06/23	05/07/23	06/07/23	28/06/23	03/07/23	04/07/23	07/07/23	07/07/23	02/07/23		
		CD	282.4	376.2	302.3	147.8	223.65	261.3	547.3	262.9	158.9	249.1	382.8	361.0		
		CV (5%)	8.8	10.3	7.9	6.9	13.2	10.9	13.7	10.7	9.1	9.1	10.1	15.9		

***Strain out yielding the best check on the basis of 10% superiority for seed and oil yield.**

[$] Food grade entry with grain/oil yield superior than best check variety.

#entries 5-10% superiority over the best check will be repeated in IVT again.

^0 yield at Jabalpur not included in centre's average.

Table . 2.17b Performance of Soybean Strains in IVT Normal Maturity, Zone : CZ

S.N.	Code	Strain	Oil Content % & Yield (Kg/ha)												
			AMV	AMR	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	Seh	Mean	Oil Yield (kg/ha)
			1	2	4	5	6	7	8	9	10	11	12	1-12	
1	**SNM-23-1**	**NRC 270**	**19.0**	**19.8**	**20.4**	**19.3**	**17.5**	**19.5**	**19.8**	**19.9**	**19.2**	**20.4**	**21.5**	**19.7**	**572***
2	SNM-23-2	AMS 22-16	20.0	18.5	20.6	-	18.6	19.1	19.2	20.0	20.0	20.9	20.1	19.7	313
3	SNM-23-3	RSC 10-46 (c)	19.2	18.5	20.4	-	17.8	19.2	17.6	19.4	20.0	19.6	20.2	19.2	394
4	SNM-23-4	MAUS 816	19.0	18.6	20.0	-	18.0	19.8	18.6	19.4	19.0	18.9	19.2	19.0	368
5	SNM-23-5	Pusa Sipani BS 8	20.2	18.4	20.6	-	17.0	19.8	19.9	18.5	20.5	18.6	20.1	19.4	294
6	SNM-23-6	RVSM 2011-35 (c)													
7	SNM-23-7	DS 1589	19.2	19.1	20.8	18.8	18.2	19.7	20.0	19.8	20.2	20.1	20.9	19.7	435
8	SNM-23-8	RSC 11-95	19.6	18.8	20.1	19.1	17.4	19.3	19.2	19.6	19.8	20.3	21.4	19.5	458
9	**SNM-23-9**	**JS 20-98 (c)**	**19.0**	**20.0**	**20.9**	**19.7**	**17.6**	**20.3**	**19.7**	**20.3**	**19.7**	**19.3**	**21.2**	**19.8**	**471**
10	SNM-23-10	BAUS (M) 6	18.7	20.2	20.0	-	17.9	20.0	20.2	20.1	20.2	19.1	20.9	19.7	255
11	SNM-23-11	NRC 142 (c)	20.0	19.4	19.7	19.2	17.7	20.1	20.3	21.2	19.2	19.4	19.3	19.6	347
12	SNM-23-12	KBSL 23-36	20.0	19.0	20.6	-	18.5	19.4	19.8	20.5	19.7	19.0	19.6	19.6	315
13	SNM-23-13	VLS 106	20.4	18.9	22.5	-	17.6	19.7	19.9	19.3	19.2	19.9	18.8	19.6	244
14	SNM-23-14	SL 1315	18.8	20.4	20.1	-	18.8	19.8	20.2	20.2	19.7	19.5	20.9	19.8	368
15	**SNM-23-15**	**TS 101**	**19.5**	**20.5**	**20.7**	**18.7**	**17.3**	**19.4**	**19.8**	**20.4**	**20.2**	**19.3**	**19.3**	**19.6**	**508#**
16	SNM-23-16	THPS 6	20.2	20.0	19.9	19.5	17.8	18.8	18.5	19.7	19.6	20.6	20.4	19.6	329
17	SNM-23-17	KDSIS 1394	19.8	19.7	20.5	19.3	18.5	20.0	19.7	20.4	19.8	20.4	19.6	19.8	361
18	SNM-23-18	NRC 271	19.9	18.6	20.5	19.3	18.8	20.5	19.0	20.3	20.1	17.8	21.1	19.6	482
19	SNM-23-19	Lok-Soya 03	19.5	19.0	21.1	19.0	17.9	19.9	19.4	19.6	20.8	19.0	20.2	19.6	370
20	SNM-23-20	KSS 225	19.4	19.7	20.4	19.5	18.3	19.5	19.1	20.1	19.8	20.1	19.1	19.5	381
21	**SNM-23-21**	**DS 1547**	**19.4**	**18.8**	**20.6**	**18.8**	**18.0**	**20.4**	**18.4**	**20.0**	**19.2**	**20.3**	**20.8**	**19.5**	**528***
22	SNM-23-22	MACS 1810	19.7	18.9	20.7	-	17.6	19.0	19.0	18.4	20.3	20.0	20.8	19.4	265
23	**SNM-23-23**	**JS 25-08**	**17.4**	**19.4**	**21.2**	**19.2**	**19.0**	**19.7**	**19.2**	**19.7**	**20.0**	**19.1**	**19.3**	**19.4**	**537***
24	SNM-23-24	ASb 101	19.2	20.1	21.0	17.9	19.2	19.0	19.9	19.0	19.9	19.5	19.4	19.5	375
25	**SNM-23-25**	**NRC 268**	**19.1**	**19.3**	**21.2**	**18.8**	**-**	**18.9**	**19.6**	**20.8**	**19.6**	**19.6**	**20.0**	**19.7**	**514***
26	SNM-23-26	DLSb 5	19.8	20.0	20.5	-	18.0	20.3	20.1	18.1	19.9	20.6	20.4	19.8	298
27	SNM-23-27	NRC 269	19.1	19.4	20.8	19.3	17.3	19.6	18.9	18.7	19.6	20.3	20.2	19.4	502

Table . 2.17c Performance of Soybean Strains in IVT Normal Maturity,   Zone : CZ

S.N.	Code	Strain	100 Seed Weight (g)												
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**AMV**	**Mean**
			1	2	3	4	5	6	7	8	9	10	11	12	**1-12**
1	**SNM-23-1**	**NRC 270**	**13.6**	**13.8**	**12.9**	**13.5**	**13.3**	**12.1**	**13.0**	**13.7**	**7.8**	**11.3**	**14.3**	**12.3**	**12.6**
2	SNM-23-2	AMS 22-16	7.3	10.3	9.9	11.0	-	6.2	10.7	10.8	7.0	5.6	11.6	8.3	9.0
3	SNM-23-3	RSC 10-46 (c)	10.7	9.9	10.3	8.6	5.9	8.6	9.7	9.9	6.5	9.0	12.2	9.7	9.2
4	SNM-23-4	MAUS 816	17.0	13.6	13.4	10.8	-	10.8	14.3	13.4	8.6	12.1	15.0	11.8	12.8
5	SNM-23-5	Pusa Sipani BS 8	8.3	12.0	10.0	9.3	-	7.5	12.3	13.0	7.8	5.6	12.3	10.0	9.8
6	SNM-23-6	RVSM 2011-35 (c)	-	-	-	-	-	-	-	-	-	-	-	-	-
7	SNM-23-7	DS 1589	12.0	11.9	11.5	9.9	10.8	10.0	10.8	13.6	6.8	8.4	11.6	10.7	10.7
8	SNM-23-8	RSC 11-95	12.4	11.6	12.2	13.7	12.2	8.0	11.8	9.8	8.2	8.8	13.0	12.3	11.2
9	**SNM-23-9**	**JS 20-98 (c)**	**12.3**	**11.4**	**11.2**	**8.1**	**10.6**	**9.1**	**10.8**	**10.7**	**7.5**	**7.7**	**11.3**	**10.2**	**10.1**
10	SNM-23-10	BAUS (M) 6	8.0	12.2	9.9	9.0	-	7.1	11.8	9.4	6.3	6.5	12.9	7.5	9.1
11	SNM-23-11	NRC 142 (c)	11.7	11.1	11.8	11.3	11.5	12.6	12.8	11.4	9.2	7.9	12.6	12.2	11.3
12	SNM-23-12	KBSL 23-36	9.2	13.8	11.1	9.3	8.2	9.7	13.0	8.4	7.2	6.7	13.4	11.2	10.1
13	SNM-23-13	VLS 106	7.8	15.0	8.2	10.1	-	8.0	15.7	10.0	7.2	5.7	13.7	9.8	10.1
14	SNM-23-14	SL 1315	9.9	10.9	10.7	10.5	-	8.4	10.2	10.8	7.8	5.1	11.4	9.8	9.6
15	SNM-23-15	TS 101	11.8	11.8	11.0	9.3	11.4	9.8	11.0	11.6	7.3	7.7	11.3	10.8	10.4
16	SNM-23-16	THPS 6	7.8	10.5	9.4	10.9	9.6	7.1	10.5	8.4	6.7	4.1	11.6	8.2	8.7
17	SNM-23-17	KDSIS 1394	13.0	12.6	11.3	10.8	11.0	9.8	14.5	8.6	9.5	8.0	13.2	9.7	11.0
18	SNM-23-18	NRC 271	10.9	11.7	11.1	11.3	12.7	9.7	11.2	9.8	6.9	10.0	10.6	11.7	10.6
19	SNM-23-19	Lok-Soya 03	11.2	12.3	11.4	11.0	6.8	9.4	12.8	11.5	7.5	9.9	12.1	9.7	10.5
20	SNM-23-20	KSS 225	11.4	12.7	10.5	8.7	9.8	10.6	12.7	9.7	7.4	8.4	11.7	9.7	10.3
21	**SNM-23-21**	**DS 1547**	**10.8**	**10.7**	**9.9**	**8.5**	**10.0**	**8.3**	**9.5**	**11.4**	**6.6**	**10.3**	**10.5**	**8.7**	**9.6**
22	SNM-23-22	MACS 1810	8.0	15.0	11.0	9.7	-	9.6	12.8	8.8	9.7	7.1	15.8	8.7	10.6
23	**SNM-23-23**	**JS 25-08**	**11.2**	**11.5**	**11.1**	**10.1**	**10.7**	**8.7**	**11.5**	**10.7**	**5.7**	**8.8**	**10.9**	**9.7**	**10.0**
24	SNM-23-24	ASb 101	11.3	14.5	10.9	12.9	11.9	11.8	15.5	11.6	9.1	8.6	14.3	10.7	11.9
25	**SNM-23-25**	**NRC 268**	**10.4**	**10.4**	**10.7**	**9.9**	**10.0**	**9.3**	**11.2**	**9.0**	**6.5**	**8.5**	**11.2**	**9.7**	**9.7**
26	SNM-23-26	DLSb 5	8.1	13.7	10.8	10.6	6.5	10.3	12.3	9.1	10.4	7.2	15.1	9.7	10.3
27	SNM-23-27	NRC 269	14.1	14.4	13.0	13.6	12.8	10.7	12.7	9.8	9.2	9.9	15.0	9.7	12.1

Table . 2.17d Performance of Soybean Strains in IVT Normal Maturity, Zone : CZ

S.N.	Code	Strain	Days to Flower												
			Amravati	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	**SNM-23-1**	**NRC 270**	**44**	**48**	**46**	**46**	**45**	**49**	**44**	**44**	**43**	**44**	**42**	**46**	**45**
2	SNM-23-2	AMS 22-16	41	49	44	42	44	50	43	43	52	43	40	47	45
3	SNM-23-3	RSC 10-46 (c)	44	47	45	46	45	48	45	46	51	46	39	47	46
4	SNM-23-4	MAUS 816	45	40	44	40	41	42	41	36	46	39	35	46	41
5	SNM-23-5	Pusa Sipani BS 8	41	43	40	34	40	38	39	31	43	38	34	46	39
6	SNM-23-6	RVSM 2011-35(c)	-	-	-	-	-	-	-	-	-	-	-	-	-
7	SNM-23-7	DS 1589	45	47	45	39	40	37	39	38	48	36	34	43	41
8	SNM-23-8	RSC 11-95	45	47	48	42	43	44	43	49	43	43	39	44	44
9	**SNM-23-9**	**JS 20-98 (c)**	**43**	**49**	**45**	**39**	**41**	**42**	**41**	**40**	**49**	**40**	**37**	**43**	**42**
10	SNM-23-10	BAUS (M) 6	42	48	46	42	46	48	46	45	48	42	40	48	45
11	SNM-23-11	NRC 142 (c)	43	38	40	43	42	41	41	42	43	41	37	43	41
12	SNM-23-12	KBSL 23-36	41	39	39	40	42	43	41	37	43	41	36	44	41
13	SNM-23-13	VLS 106	42	48	44	41	42	40	40	38	40	41	38	45	42
14	SNM-23-14	SL 1315	41	49	44	41	43	44	45	45	48	40	37	43	43
15	SNM-23-15	TS 101	42	47	46	42	44	42	42	39	51	42	38	45	43
16	SNM-23-16	THPS 6	40	51	44	39	42	42	40	44	44	40	38	44	42
17	SNM-23-17	KDSIS 1394	38	42	42	41	40	41	39	37	41	37	37	42	40
18	SNM-23-18	NRC 271	45	45	46	42	45	46	42	36	44	45	40	47	44
19	SNM-23-19	Lok-Soya 03	42	46	44	39	40	42	40	42	48	39	34	44	42
20	SNM-23-20	KSS 225	44	41	44	34	40	39	40	42	44	39	35	42	40
21	**SNM-23-21**	**DS 1547**	**42**	**40**	**40**	**42**	**41**	**42**	**41**	**38**	**47**	**42**	**38**	**45**	**42**
22	SNM-23-22	MACS 1810	43	48	44	42	44	44	42	40	49	41	37	45	43
23	**SNM-23-23**	**JS 25-08**	**45**	**48**	**47**	**42**	**42**	**41**	**43**	**36**	**48**	**42**	**39**	**45**	**43**
24	SNM-23-24	ASb 101	37	39	38	39	40	38	38	36	40	37	35	40	38
25	**SNM-23-25**	**NRC 268**	**42**	**40**	**39**	**40**	**40**	**42**	**39**	**39**	**43**	**41**	**38**	**44**	**41**
26	SNM-23-26	DLSb 5	42	44	43	45	44	44	40	45	44	42	39	42	43
27	SNM-23-27	NRC 269	43	46	45	41	43	43	41	39	45	40	39	46	43

Table . 21.7e Performance of Soybean Strains in IVT Normal Maturity, Zone : CZ

S.N.	Code	Strain	Days to Maturity												
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	**SNM-23-1**	**NRC 270**	**104**	**111**	**107**	**111**	**104**	**101**	**113**	**100**	**96**	**97**	**100**	**105**	**104**
2	SNM-23-2	AMS 22-16	102	115	107	109	104	101	99	105	106	87	99	101	103
3	SNM-23-3	RSC 10-46 (c)	103	113	106	108	103	102	120	110	107	107	99	105	107
4	SNM-23-4	MAUS 816	107	104	104	108	103	99	113	111	103	96	94	105	104
5	SNM-23-5	Pusa Sipani BS 8	103	107	100	99	99	96	109	99	104	95	94	100	100
6	SNM-23-6	RVSM 2011-35(c)	-	-	-	-	-	-	-	-	-	-	-	-	-
7	SNM-23-7	DS 1589	106	110	104	103	101	95	108	100	99	94	93	99	101
8	SNM-23-8	RSC 11-95	107	113	110	110	105	97	121	110	99	97	98	103	106
9	**SNM-23-9**	**JS 20-98 (c)**	**104**	**115**	**110**	**111**	**104**	**99**	**116**	**117**	**103**	**95**	**96**	**101**	**106**
10	SNM-23-10	BAUS (M) 6	102	114	106	109	98	100	121	99	107	77	99	105	103
11	SNM-23-11	NRC 142 (c)	103	101	105	105	97	95	109	92	98	89	96	101	99
12	SNM-23-12	KBSL 23-36	102	101	105	97	97	96	101	94	91	87	95	101	97
13	SNM-23-13	VLS 106	102	113	105	102	100	95	101	101	105	92	97	102	101
14	SNM-23-14	SL 1315	103	113	105	110	105	102	120	110	105	85	96	106	105
15	SNM-23-15	TS 101	102	112	103	97	104	95	100	110	103	92	97	101	101
16	SNM-23-16	THPS 6	101	115	106	109	103	95	121	94	97	89	96	101	102
17	SNM-23-17	KDSIS 1394	98	103	101	97	96	95	100	117	92	86	96	97	98
18	SNM-23-18	NRC 271	107	109	109	97	100	96	101	108	96	95	100	104	102
19	SNM-23-19	Lok-Soya 03	103	111	105	108	104	99	113	100	106	95	93	99	103
20	SNM-23-20	KSS 225	105	105	107	97	98	96	109	93	105	95	95	101	101
21	**SNM-23-21**	**DS 1547**	**104**	**105**	**101**	**105**	**102**	**96**	**103**	**97**	**96**	**91**	**98**	**102**	**100**
22	SNM-23-22	MACS 1810	103	113	107	105	97	99	113	99	103	95	96	103	103
23	**SNM-23-23**	**JS 25-08**	**108**	**115**	**110**	**107**	**101**	**94**	**112**	**95**	**104**	**97**	**98**	**99**	**103**
24	SNM-23-24	ASb 101	98	103	99	97	95	94	98	112	93	85	94	97	97
25	**SNM-23-25**	**NRC 268**	**97**	**103**	**97**	**105**	**101**	**96**	**109**	**100**	**97**	**96**	**97**	**101**	**100**
26	SNM-23-26	DLSb 5	98	110	103	98	100	96	113	95	101	86	98	100	100
27	SNM-23-27	NRC 269	104	114	108	108	103	98	113	109	98	95	99	102	104

Table . 2.17f Performance of Soybean Strains in IVT Normal Maturity, Zone : CZ

S.N.	Code	Strain	Plant height (cm)												
			Amv	Amreli	Anand	Indore	Jabalpur	Kota	Lok Bharti	Mandsaur	Morena	Nagpur	Parbhani	Sehore	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	**SNM-23-1**	**NRC 270**	**58**	**50**	**52**	**72**	**55**	**86**	**48**	**84**	**59**	**53**	**67**	**53**	**61**
2	SNM-23-2	AMS 22-16	56	50	50	80	55	74	53	69	54	52	59	66	60
3	SNM-23-3	RSC 10-46 (c)	49	44	48	79	52	87	52	80	57	46	52	63	59
4	SNM-23-4	MAUS 816	47	43	45	59	49	74	39	81	50	39	52	42	52
5	SNM-23-5	Pusa Sipani BS 8	49	43	47	75	44	63	44	83	45	40	66	61	55
6	SNM-23-6	RVSM 2011-35(c)	-	-	-	-	-	-	-	-	-	-	-	-	-
7	SNM-23-7	DS 1589	42	24	34	59	45	68	31	54	40	31	38	42	42
8	SNM-23-8	RSC 11-95	59	48	53	84	58	90	57	82	56	50	62	53	63
9	**SNM-23-9**	**JS 20-98 (c)**	**39**	**32**	**38**	**71**	**44**	**80**	**40**	**78**	**49**	**40**	**42**	**46**	**50**
10	SNM-23-10	BAUS (M) 6	61	55	53	77	60	79	51	68	69	53	67	49	62
11	SNM-23-11	NRC 142 (c)	61	42	54	69	55	83	46	85	55	47	78	51	61
12	SNM-23-12	KBSL 23-36	73	63	63	80	59	90	82	61	72	61	78	59	70
13	SNM-23-13	VLS 106	50	40	42	62	42	71	42	62	41	41	53	63	51
14	SNM-23-14	SL 1315	47	33	39	73	54	68	38	79	53	44	42	61	53
15	SNM-23-15	TS 101	49	48	50	76	56	80	54	80	50	51	63	50	59
16	SNM-23-16	THPS 6	53	52	52	75	54	83	36	90	51	41	57	72	60
17	SNM-23-17	KDSIS 1394	48	37	46	73	49	70	40	79	49	44	41	55	53
18	SNM-23-18	NRC 271	44	42	50	75	57	79	37	64	57	44	54	69	56
19	SNM-23-19	Lok-Soya 03	40	38	34	67	48	71	36	74	45	37	42	41	48
20	SNM-23-20	KSS 225	49	36	39	59	46	74	32	78	42	41	51	48	50
21	**SNM-23-21**	**DS 1547**	**39**	**41**	**43**	**73**	**55**	**76**	**35**	**85**	**52**	**36**	**47**	**49**	**53**
22	SNM-23-22	MACS 1810	53	48	51	78	53	74	39	71	52	41	50	53	55
23	**SNM-23-23**	**JS 25-08**	**55**	**43**	**57**	**79**	**58**	**77**	**28**	**81**	**52**	**50**	**62**	**78**	**60**
24	SNM-23-24	ASb 101	44	36	47	57	38	71	46	65	51	39	51	47	49
25	**SNM-23-25**	**NRC 268**	**50**	**37**	**47**	**80**	**57**	**73**	**55**	**82**	**64**	**43**	**58**	**53**	**58**
26	SNM-23-26	DLSb 5	69	59	60	78	64	80	74	90	56	70	91	71	72
27	SNM-23-27	NRC 269	52	50	51	74	57	93	47	71	57	48	67	48	60

Central Zone

Table . 2.18a Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Seed Yield(Kg/ha)													
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean	Rank
			1	2	3	4	5	6	7	8	9	10	11	12	1-12	
1	SEM-23-44	NRC 266	2500	1944	2176	1682	741	679	3657	2765	108	-	2639	1900	1890	XII
2	SEM-23-45	NRC 138 (c)	1466	1728	2006	1512	1512	1975	2870	2593	664	2623	2670	1520	1928	XI
3	SEM-23-46	DS 1480	2963	2778	2809	1404	1636	2546	2824	3753	2269	3040	2870	2280	2598	I
4	**SEM-23-47**	**NRC 264**	**2778**	**2145**	**2840**	**1929**	**1358**	**2099**	**3148**	**2642**	**957**	**2315**	**2747**	**2170**	**2261#**	**V**
5	SEM-23-48	AUKS 21-5	2515	2299	2577	1790	926	2006	2546	2469	1528	2222	2639	1800	2110	VI
6	**SEM-23-49**	**NRC 150 (c)**	**1929**	**1512**	**1883**	**2006**	**1682**	**2037**	**1991**	**3457**	**1157**	**1975**	**2793**	**2450**	**2073**	**VII**
7	SEM-23-50	KDS 1193	262	2917	1852	1620	0	772	3210	2790	1759	324	1914	1330	1563	XVI
8	SEM-23-51	MACS 1834	108	2269	2469	1096	0	216	3426	2099	293	-	3364	1970	1574	XV
9	**SEM-23-52**	**JS 25-03**	**2361**	**1929**	**2701**	**2145**	**2546**	**2469**	**2407**	**3457**	**1914**	**3750**	**2778**	**2230**	**2557***	**II**
10	**SEM-23-53**	**JS 25-06**	**2593**	**1620**	**2222**	**2269**	**1960**	**2639**	**2577**	**3037**	**1574**	**2809**	**3395**	**2430**	**2427***	**III**
11	**SEM-23-54**	**NRC 267**	**2546**	**2022**	**2299**	**1867**	**2515**	**2191**	**3364**	**2716**	**833**	**2546**	**2778**	**2100**	**2315***	**IV**
12	SEM-23-55	MAUS 787	2052	1821	1559	1960	1497	1497	1590	3160	540	2037	2870	1900	1874	XIII
13	SEM-23-56	NRC 265	2207	1898	1759	1836	1049	556	3241	3383	1497	-	2855	2070	2032	VIII
14	SEM-23-57	JS 20-34 (c)	1049	1960	2191	1759	1559	864	2809	3383	432	1157	2269	1670	1759	XIV
15	SEM-23-58	Pusa Sipani 33	1049	2978	2392	1404	0	648	3549	3457	1049	664	3086	1870	1846	IX
16	SEM-23-59	KDS 1201	571	3148	2423	2469	1265	772	3472	3951	1327	262	2238	1570	1956	X
		Mean	1809	2186	2260	1797	1557	1498	2918	3070	1119	1979	2744	1954		
		N.P.S.(Sqm)	6.48	6.48	6.48	6.48	6.48	6.48	6.48	4.05	6.48	6.48	6.48	10.00		
		DOS	07/07/2023	03/07/2023	07/08/2023	30/06/2023	05/07/2023	05/07/2023	28/06/2023	03/07/2023	05/07/2023	07/07/2023	30/06/2023	02/07/2023		
		CD	262.35	385.8	277.7	108.0	401.2	246.9	339.5	716.0	277.7	339.5	339.5	420.0		
		CV (5%)	**8.57**	**10.6**	**7.3**	**3.5**	**19.3**	**9.8**	**7.0**	**14.0**	**14.9**	**12.6**	**7.4**	**13.0**		

***Strain out yielding the best check on the basis of 10% superiority for seed and oil yield along with days to maturity numerically on par best check NRC 150**
#entries 5-10% superiority over the best check will be repeated in IVT again.

Table . 2.18b Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Oil Content % & Yield (Kg/ha)												
			AMV	AMR	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean	Oil Yield
			1	2	4	5	6	7	8	9	10	11	12	1-12	(kg/ha)
1	SEM-23-44	NRC 266	20.0	20.4	20.3	18.6	18.5	18.7	20.4	19.9	-	19.4	20.0	19.6	370
2	SEM-23-45	NRC 138 (c)	20.3	20.1	20.2	20.0	19.8	20.1	19.7	19.8	20.4	19.8	19.3	19.9	384
3	SEM-23-46	DS 1480	20.4	19.9	20.8	19.2	18.2	21.6	19.4	19.5	20.6	18.3	20.1	19.8	514
4	SEM-23-47	NRC 264	20.3	19.1	20.0	19.0	18.4	18.6	19.7	19.5	20.0	19.3	19.4	19.4	439#
5	SEM-23-48	AUKS 21-5	19.5	20.4	25.8	19.7	18.0	18.8	19.7	19.4	19.0	19.2	19.4	19.9	420
6	**SEM-23-49**	**NRC 150 (c)**	**20.0**	**20.6**	**20.0**	**19.5**	**18.2**	**18.7**	**19.8**	**19.8**	**20.5**	**19.3**	**20.2**	**19.7**	**408**
7	SEM-23-50	KDS 1193	19.7	19.6	20.9	-	18.6	19.5	20.1	19.7	20.0	19.2	19.6	19.7	308
8	SEM-23-51	MACS 1834	19.9	20.0	20.7	-	18.2	19.4	19.9	18.4	-	20.0	19.8	19.6	308
9	**SEM-23-52**	**JS 25-03**	**19.7**	**19.4**	**21.2**	**20.2**	**19.8**	**19.0**	**20.2**	**20.2**	**20.2**	**19.9**	**19.9**	**20.0**	**511***
10	**SEM-23-53**	**JS 25-06**	**19.5**	**19.3**	**19.5**	**18.1**	**18.9**	**19.9**	**19.7**	**19.5**	**19.8**	**19.6**	**20.4**	**19.5**	473*
11	SEM-23-54	NRC 267	20.2	19.6	20.3	18.9	18.4	19.1	20.2	18.7	20.9	20.2	18.9	19.6	454*
12	SEM-23-55	MAUS 787	19.9	19.9	19.6	18.9	19.4	19.9	19.5	19.9	19.8	19.9	20.7	19.8	371
13	SEM-23-56	NRC 265	19.6	18.8	20.9	19.0	17.9	19.2	19.3	18.2	-	19.1	21.8	19.4	394
14	SEM-23-57	JS 20-34 (c)	19.8	19.1	19.2	19.2	18.2	20.2	20.0	19.5	19.5	19.0	20.5	19.5	343
15	SEM-23-58	Pusa Sipani 33	19.7	20.3	20.7	-	18.6	19.4	20.2	20.7	19.8	20.7	19.0	19.9	367
16	SEM-23-59	KDS 1201	19.6	19.1	20.8	18.6	18.5	19.7	19.9	19.5	20.1	20.0	19.6	19.6	383

Table . 2.18c Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	**Code**	**Strain**	**100 Seed weight (g)**												
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**SEH**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1-12**
1	SEM-23-44	NRC 266	8.5	8.0	9.6	7.2	7.0	9.1	10.5	7.4	6.8	-	8.9	8.3	8.3
2	SEM-23-45	NRC 138 (c)	9.4	10.6	9.9	8.8	9.2	9.9	13.3	8.9	7.6	8.3	10.8	10.3	9.8
3	SEM-23-46	DS 1480	8.9	10.6	9.9	8.4	11.7	9.8	11.5	10.0	8.6	8.2	10.9	9.3	9.8
4	SEM-23-47	NRC 264	9.7	9.9	10.4	9.5	9.8	11.3	12.0	8.2	5.9	7.5	10.4	10.3	9.6
5	SEM-23-48	AUKS 21-5	10.6	12.2	10.0	11.3	10.7	10.6	12.7	10.5	7.3	8.5	11.9	11.3	10.6
6	**SEM-23-49**	**NRC 150 (c)**	**10.7**	**10.0**	**10.0**	**12.3**	**12.2**	**12.5**	**12.3**	**11.1**	**8.5**	**8.9**	**13.8**	**12.7**	**11.2**
7	SEM-23-50	KDS 1193	7.5	10.4	9.0	11.6	-	9.9	11.5	10.3	8.2	5.5	10.2	9.0	9.4
8	SEM-23-51	MACS 1834	7.8	13.8	10.0	9.6	-	9.1	14.0	8.2	7.7	-	14.1	9.3	10.4
9	**SEM-23-52**	**JS 25-03**	**10.4**	**9.9**	**10.2**	**11.1**	**11.4**	**11.3**	**12.0**	**10.1**	**8.1**	**8.0**	**11.7**	**10.3**	**10.4**
10	**SEM-23-53**	**JS 25-06**	**10.7**	**9.9**	**10.7**	**11.2**	**12.1**	**11.5**	**11.0**	**10.5**	**6.9**	**8.3**	**12.3**	**12.0**	**10.6**
11	SEM-23-54	NRC 267	10.2	10.0	10.0	9.9	9.4	10.6	11.8	9.1	8.5	7.1	9.9	9.0	9.6
12	SEM-23-55	MAUS 787	10.9	12.4	10.6	11.5	11.9	11.4	13.3	8.2	9.2	7.7	12.1	12.0	10.9
13	SEM-23-56	NRC 265	10.2	9.9	10.2	8.6	8.7	11.8	11.0	10.4	6.0	-	10.1	9.3	9.6
14	SEM-23-57	JS 20-34 (c)	9.2	10.8	10.1	12.1	9.8	10.0	12.7	12.8	7.1	8.1	15.2	11.0	10.7
15	SEM-23-58	Pusa Sipani 33	7.4	11.4	9.5	8.6	-	7.6	13.0	8.1	7.0	5.6	11.6	8.3	8.9
16	SEM-23-59	KDS 1201	7.1	10.5	10.1	10.1	10.7	9.4	10.5	16.2	6.2	3.9	10.0	9.0	9.5

Table . 2.18d Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Days to flower												
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	**SEH**	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	**1-12**
1	SEM-23-44	NRC 266	30	41	37	39	39	38	39	35	41	39	37	39	38
2	SEM-23-45	NRC 138 (c)	32	47	38	34	34	33	42	31	37	32	33	37	36
3	SEM-23-46	DS 1480	41	48	44	42	40	41	42	36	46	41	39	44	42
4	SEM-23-47	NRC 264	29	44	36	39	39	39	39	37	40	40	37	41	38
5	SEM-23-48	AUKS 21-5	37	47	39	35	39	39	38	36	43	37	35	40	39
6	**SEM-23-49**	**NRC 150 (c)**	**31**	**48**	**36**	**34**	**35**	**33**	**39**	**36**	**39**	**34**	**33**	**35**	**36**
7	SEM-23-50	KDS 1193	37	48	39	39	43	42	39	32	45	39	37	43	40
8	SEM-23-51	MACS 1834	43	46	46	42	40	41	40	35	48	41	42	43	42
9	**SEM-23-52**	**JS 25-03**	**33**	**48**	**42**	**39**	**40**	**37**	**38**	**36**	**41**	**36**	**35**	**39**	**39**
10	**SEM-23-53**	**JS 25-06**	**39**	**41**	**40**	**39**	**39**	**37**	**39**	**37**	**42**	**35**	**33**	**41**	**39**
11	SEM-23-54	NRC 267	38	41	40	39	39	37	39	35	45	41	39	43	40
12	SEM-23-55	MAUS 787	37	48	41	40	39	39	38	35	43	38	38	44	40
13	SEM-23-56	NRC 265	37	42	40	39	38	37	40	36	41	38	36	42	39
14	SEM-23-57	JS 20-34 (c)	30	36	37	33	32	31	38	35	39	32	33	37	34
15	SEM-23-58	Pusa Sipani 33	40	48	42	40	41	43	40	34	47	40	39	43	41
16	SEM-23-59	KDS 1201	41	46	43	42	42	45	41	32	48	42	40	45	42

Table . 2.18e Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Days to Maturity												
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	SEM-23-44	NRC 266	85	86	89	91	92	91	94	85	93	-	96	91	90
2	SEM-23-45	NRC 138 (c)	86	111	94	96	93	92	109	86	98	82	92	94	94
3	SEM-23-46	DS 1480	94	106	97	106	94	98	103	84	92	88	97	99	97
4	SEM-23-47	NRC 264	84	100	88	95	91	93	96	90	95	83	95	92	92
5	SEM-23-48	AUKS 21-5	85	111	94	103	94	96	114	91	98	87	93	92	96
6	**SEM-23-49**	**NRC 150 (c)**	**80**	**110**	**85**	**92**	**92**	**92**	**101**	**84**	**97**	**82**	**90**	**91**	**91**
7	SEM-23-50	KDS 1193	95	111	97	106	97	102	112	80	104	98	95	101	100
8	SEM-23-51	MACS 1834	96	107	103	103	93	102	114	89	102	-	101	99	101
9	**SEM-23-52**	**JS 25-03**	**84**	**109**	**96**	**91**	**89**	**90**	**99**	**84**	**90**	**80**	**95**	**90**	**91**
10	**SEM-23-53**	**JS 25-06**	**90**	**87**	**90**	**99**	**90**	**91**	**100**	**91**	**90**	**83**	**91**	**93**	**91**
11	SEM-23-54	NRC 267	96	88	88	93	90	90	96	84	105	84	97	93	92
12	SEM-23-55	MAUS 787	95	106	94	96	93	96	102	84	96	88	96	97	95
13	SEM-23-56	NRC 265	95	87	91	92	93	92	95	90	108	-	95	92	94
14	SEM-23-57	JS 20-34 (c)	83	94	86	94	90	90	98	92	97	87	93	91	91
15	SEM-23-58	Pusa Sipani 33	94	110	95	108	97	96	112	94	100	97	96	101	100
16	SEM-23-59	KDS 1201	95	108	97	106	101	97	113	84	104	98	99	100	100

Table . 2.18f Performance of Soybean Strains in IVT Early, Zone : CZ

S.N.	Code	Strain	Plant Height (cm)												
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	SEM-23-44	NRC 266	42	44	44	65	49	76	59	67	51	-	62	51	55
2	SEM-23-45	NRC 138 (c)	32	28	33	48	45	68	31	60	43	36	52	37	43
3	SEM-23-46	DS 1480	36	25	33	56	41	74	33	51	46	33	42	48	43
4	SEM-23-47	NRC 264	42	44	42	78	55	85	49	81	63	46	77	61	60
5	SEM-23-48	AUKS 21-5	35	34	36	63	45	74	38	70	51	33	62	44	49
6	**SEM-23-49**	**NRC 150 (c)**	**48**	**36**	**41**	**70**	**60**	**80**	**43**	**71**	**61**	**48**	**62**	**63**	**57**
7	SEM-23-50	KDS 1193	51	50	49	77	55	82	47	69	62	49	58	69	60
8	SEM-23-51	MACS 1834	42	46	42	72	56	83	43	62	62	-	73	71	59
9	**SEM-23-52**	**JS 25-03**	**29**	**38**	**35**	**63**	**50**	**67**	**26**	**74**	**61**	**39**	**52**	**49**	**49**
10	**SEM-23-53**	**JS 25-06**	**33**	**37**	**29**	**59**	**50**	**78**	**37**	**68**	**53**	**46**	**53**	**52**	**50**
11	SEM-23-54	NRC 267	36	41	40	76	51	82	38	89	49	43	57	51	54
12	SEM-23-55	MAUS 787	35	34	31	69	50	85	31	88	46	39	48	52	51
13	SEM-23-56	NRC 265	37	37	38	75	47	77	35	75	51	-	61	46	53
14	SEM-23-57	JS 20-34 (c)	27	29	28	57	43	65	39	67	44	34	40	43	43
15	SEM-23-58	Pusa Sipani 33	42	37	37	68	47	84	38	54	55	43	58	65	52
16	SEM-23-59	KDS 1201	48	49	43	80	59	88	49	77	60	44	71	74	62

Table . 2.19a Performance of Soybean Strains AVT I, Zone : CZ

S.N.	Code	Strain	Yield (kg/ha)													
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean	Rank
			1	2	3	4	5	6	7	8	9	10	11	12	1-12	
1	**SNM-23-71**	**JS 21-72 (c)**	**2809**	**2948**	**2539**	**2608**	**1605**	**1829**	**2832**	**1644**	**517**	**2500**	**2855**	**2094**	**2232**	**I**
2	SNM-23-72	RSC 10-52 (c)	394	2539	2400	1443	1512	1111	2060	1397	764	85	2924	969	1467	VI
3	SNM-23-73	MAUS 824	2377	2269	2284	833	0	1682	2276	880	1111	1404	2816	2169	1675	IV
4	SNM-23-74	NRC 258	2554	3287	2809	602	949	1806	2384	1914	1528	1782	2809	1863	2024	II
5	SNM-23-75	RVSM 2011-35	-	-	-	-	-	455	-	-	-	-	-	-	455	VII
6	SNM-23-76	NRC 259	2199	2500	2423	826	0	2184	2508	972	1312	1250	2361	1713	1687	III
7	SNM-23-77	JS 20-98 (c)	1914	2647	2407	1481	1111	2052	1975	1644	988	1049	2577	1813	1805	V
		Mean	2041	2698	2477	1299	1294	1588	2339	1409	1037	1345	2724	1770		
		N.P.S.(Sqm)	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	16.00		
		DOS	10/07/2023	04/07/2023	07/08/2023	01/07/2023	04/07/2023	05/07/2023	28/06/2023	03/07/2023	06/07/2023	09/07/2023	06/07/2023	03/07/2023		
		CD	300.9	354.9	239.2	77.1	154.3	223.7	270.0	100.3	169.7	231.4	316.3	143.7		
		CV (5%)	11.6	10.2	7.4	4.8	13.8	9.5	8.9	5.5	12.8	13.5	9.0	6.2		

Table . 2.19b Performance of Soybean Strains AVT I, Zone : CZ

S.N.	Code	Strain	Oil Content % & Yield (Kg/ha)												
			AMV	AMR	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean	Oil Yield (kg/ha)
			1	2	4	5	6	7	8	9	10	11	12	1-12	
1	**SNM-23-71**	**JS 21-72 (c)**	**18.7**	**20.2**	**21.0**	**19.5**	**17.4**	**19.0**	**18.2**	**19.9**	**19.7**	**19.2**	**19.3**	**19.3**	**430**
2	SNM-23-72	RSC 10-52 (c)	19.7	20.4	20.6	-	18.1	20.0	19.5	19.8	20.3	19.4	18.1	19.6	287
3	SNM-23-73	MAUS 824	20.0	20.0	20.5	-	18.7	19.4	19.0	19.7	19.5	19.4	20.0	19.6	358
4	SNM-23-74	NRC 258	19.4	19.4	20.5	19.4	18.5	19.9	20.2	20.5	19.7	19.8	19.8	19.7	399
5	SNM-23-75	RVSM 2011-35	-	20.2	-	-	19.2	-	-	-	-	-	-	19.7	89
6	SNM-23-76	NRC 259	19.6	19.4	20.9	-	18.5	20.6	19.3	22.6	19.0	19.9	18.9	19.9	365
7	SNM-23-77	JS 20-98 (c)	18.6	19.9	20.6	20.1	18.7	19.8	18.9	20.2	19.1	18.7	21.0	19.6	353

Table . 2.19c Performance of Soybean Strains AVT I, Zone : CZ

S.N.	Code	Strain	100 seed weight (g)												
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**SEH**	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	**1-12**
1	**SNM-23-71**	**JS 21-72 (c)**	**13.8**	**14.4**	**13.4**	**13.2**	**12.7**	**12.4**	**11.6**	**13.5**	**9.4**	**12.3**	**14.7**	**12.1**	**12.8**
2	SNM-23-72	RSC 10-52 (c)	6.5	11.8	10.9	11.7	9.1	9.8	14.9	10.2	7.6	5.9	13.4	10.8	10.2
3	SNM-23-73	MAUS 824	13.5	14.1	13.9	10.3	-	11.8	10.4	9.0	7.8	11.1	15.3	14.0	11.9
4	SNM-23-74	NRC 258	8.9	9.0	9.6	7.7	7.9	9.3	10.1	10.0	8.5	8.4	9.7	8.6	9.0
5	SNM-23-75	RVSM 2011-35	-	-	-	-	-	11.1	-	-	-	-	-	-	11.1
6	SNM-23-76	NRC 259	10.6	8.7	9.7	10.2	-	8.9	14.8	11.2	7.7	7.6	12.2	10.4	10.2
7	SNM-23-77	JS 20-98 (c)	10.8	10.8	10.8	8.5	10.5	10.3	9.4	11.3	7.3	8.5	10.9	11.1	10.0

Table . 2.19d Performance of Soybean Strains AVT I, Zone : CZ

S.N.	Code	Strain	Days to Flower												
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	**SNM-23-71**	**JS 21-72 (c)**	**37**	**49**	**43**	**38**	**41**	**41**	**43**	**38**	**48**	**38**	**37**	**43**	**41**
2	SNM-23-72	RSC 10-52 (c)	43	49	47	41	45	47	44	38	50	44	41	46	45
3	SNM-23-73	MAUS 824	43	47	47	39	42	41	44	37	50	39	38	45	43
4	SNM-23-74	NRC 258	44	46	45	44	44	44	44	38	51	43	39	46	44
5	SNM-23-75	RVSM 2011-35	-	-	-	-	-	41	-	-	-	-	-	-	41
6	SNM-23-76	NRC 259	48	49	49	47	48	49	45	46	52	47	43	51	48
7	SNM-23-77	JS 20-98 (c)	40	47	45	40	40	41	42	39	50	40	38	44	42

Table . 2.19e Performance of Soybean Strains AVT I, Zone : CZ

S.N.	Code	Strain	Days to Maturity												
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	**SNM-23-71**	**JS 21-72 (c)**	**89**	**113**	**103**	**110**	**98**	**97**	**114**	**97**	**96**	**94**	**95**	**98**	**100**
2	SNM-23-72	RSC 10-52 (c)	96	115	110	110	103	102	120	110	106	105	99	104	107
3	SNM-23-73	MAUS 824	99	112	109	112	105	97	122	108	105	105	97	105	106
4	SNM-23-74	NRC 258	102	111	106	97	98	99	119	99	98	93	98	95	101
5	SNM-23-75	RVSM 2011-35	-	-	-	-	-	97	-	-	-	-	-	-	97
6	SNM-23-76	NRC 259	105	116	115	110	105	106	110	109	103	102	102	103	107
7	**SNM-23-77**	**JS 20-98 (c)**	**101**	**114**	**105**	**110**	**105**	**99**	**111**	**110**	**100**	**99**	**97**	**102**	**104**

Table . 2.19f Performance of Soybean Strains AVT I, Zone : CZ

S.N.	Code	Strain	Plant height (cm)												
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean
			1	2	3	4	5	6	7	8	9	10	11	12	1-12
1	**SNM-23-71**	**JS 21-72 (c)**	**48**	**43**	**46**	**73**	**55**	**78**	**42**	**65**	**60**	**42**	**48**	**45**	**54**
2	SNM-23-72	RSC 10-52 (c)	47	47	46	81	56	86	40	85	69	43	52	46	58
3	SNM-23-73	MAUS 824	41	43	42	74	54	82	40	72	67	34	42	60	54
4	SNM-23-74	NRC 258	55	47	53	82	54	85	63	70	68	50	42	62	61
5	SNM-23-75	RVSM 2011-35	-	-	-	-	-	61	-	-	-	-	-	-	61
6	SNM-23-76	NRC 259	71	63	66	94	79	89	70	85	81	49	89	82	77
7	SNM-23-77	JS 20-98 (c)	36	29	31	76	52	78	48	72	62	30	42	41	50

Table. 2.20 a Performance of Soybean Strains in AVT I&II, Zone : CZ- Early

S.N.	Code	Strain	Yield (kg/ha)													
			AMV	AMR	AND	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean	Rank
			1	2	3	4	5	6	7	8	9	10	11	12	1-12	
1	SEM-23-78	JS 95-60 (c)	602	1975	1836	1242	1042	648	2623	2199	262	347	2654	2113	1462	X
2	SEM-23-79	NRC 262	2238	1767	2299	1806	1227	872	3634	2006	278	1042	2600	2481	1854	V
3	SEM-23-80	NRC 130 (c)	1698	1898	2083	965	1420	1528	2384	1867	355	1458	2816	1725	1683	VIII
4	**SEM-23-81**	**JS 24-33**	**2539**	**2338**	**2654**	**2245**	**2245**	**2685**	**3488**	**2222**	**1775**	**2083**	**2623**	**2313**	**2434***	**I**
5	**SEM-23-82**	**JS 23-09**	**2431**	**2091**	**2361**	**1914**	**1944**	**2616**	**2778**	**2006**	**1481**	**1644**	**2546**	**2250**	**2172****	**IV**
6	SEM-23-83	NRC 152 (c)	463	1883	1914	1157	579	1011	2515	1836	795	949	2469	2063	1470	IX
7	**SEM-23-84**	**JS 23-03**	**2415**	**2523**	**2569**	**2276**	**1921**	**2400**	**2963**	**2508**	**1806**	**1636**	**2562**	**2138**	**2310****	**III**
8	SEM-23-85	NRC 138 (c)	1451	1713	1644	1111	1844	2423	2492	1620	1458	949	2515	1656	1740	VII
9	**SEM-23-86**	**JS 20-34 (c)**	**972**	**1890**	**1798**	**1952**	**1196**	**1605**	**2608**	**2315**	**1628**	**1327**	**2299**	**1875**	**1789**	**VI**
10	SEM-23-87	AMS 2022-1	2654	2670	2747	2060	2068	2168	3912	1813	2160	1944	2523	1875	2383	II
		Mean	1746	2075	2191	1673	1549	1796	2940	2039	1200	1338	2561	2049		
		N.P.S.(Sqm)	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	12.96	16.00		
		DOS	07/07/ 2023	04/07/ 2023	09/07/ 2023	01/07/ 2023	04/07/ 2023	05/07/ 2023	04/07/ 2023	03/07/ 2023	06/07/ 2023	09/07/ 2023	06/07/ 2023	02/07/ 2023		
		CD	270.0	347.2	239.2	54.0	239.2	254.6	393.5	408.9	177.4	262.3	339.5	393.7		
		CV (5%)	10.7	11.6	7.6	2.3	10.6	9.7	9.2	13.8	9.9	13.6	9.0	13.1		

***Strain out yielding the best check on the basis of 10% superiority for seed and oil yield along with days to maturity numerically on par best check JS 20-34.**
**** Entries for Varietal Identification**

Table . 2.20b Performance of Soybean Strains in AVT I&II, Zone : CZ- Early

S.N.	Code	Strain	Oil Content % & Yield (Kg/ha)											
			AMV	AMR	INR	JBR	KOT	LOB	MND	MOR	NAG	PRB	SEH	Mean	Oil Yield (Kg/ha)
			1	2	4	5	6	7	8	9	10	11	12	1-12	
1	SEM-23-78	JS 95-60 (c)	20.6	19.6	20.0	18.9	19.0	20.1	18.9	19.3	20.0	19.2	19.8	19.6	286
2	SEM-23-79	NRC 262	19.1	19.4	19.8	19.5	18.5	19.7	18.8	19.5	20.4	23.0	19.7	19.8	366
3	SEM-23-80	NRC 130 (c)	18.9	19.2	20.5	19.9	18.5	20.0	18.2	19.1	20.2	19.2	20.2	19.4	326
4	**SEM-23-81**	**JS 24-33**	**19.9**	**19.7**	**20.9**	**19.9**	**18.7**	**20.0**	**19.0**	**20.2**	**20.5**	**19.8**	**19.1**	**19.8**	**481**
5	SEM-23-82	JS 23-09	20.6	20.0	21.0	19.5	18.9	19.4	19.4	20.0	20.8	18.4	18.7	19.7	427
6	SEM-23-83	NRC 152 9c	24.7	19.3	20.7	19.0	18.9	19.3	19.0	20.0	23.5	18.9	19.2	20.2	297
7	SEM-23-84	JS 23-03	20.2	19.2	20.3	18.2	19.5	19.9	18.9	20.3	19.9	19.7	20.1	19.7	454
8	SEM-23-85	NRC 138 (c)	19.6	19.4	20.3	19.6	18.8	19.4	19.4	20.3	20.3	19.9	19.1	19.6	341
9	SEM-23-86	JS 20-34 (c)	19.3	21.1	20.7	19.2	18.5	20.0	19.1	21.1	20.8	18.1	19.4	19.8	353
10	SEM-23-87	AMS 2022-1	19.5	20.5	21.4	18.6	18.2	19.9	18.7	19.2	20.4	20.3	17.6	19.5	463

Table . 2.20c Performance of Soybean Strains in AVT I&II,   Zone : CZ- Early

S.N.	Code	Strain	100 seed weight (g)												
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**SEH**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1-12**
1	SEM-23-78	JS 95-60 (c)	8.9	11.9	11.2	9.5	11.3	11.8	14.9	13.5	9.4	10.1	12.8	11.8	11.4
2	SEM-23-79	NRC 262	11.2	9.6	10.5	9.9	8.8	13.1	12.3	10.2	7.3	8.0	10.1	10.3	10.1
3	SEM-23-80	NRC 130 (c)	13.5	13.5	13.0	12.0	12.1	12.4	14.4	15.9	9.7	10.6	15.3	12.8	12.9
4	**SEM-23-81**	**JS 24-33**	**10.0**	**10.4**	**10.5**	**10.8**	**9.8**	**11.5**	**14.3**	**11.6**	**7.7**	**10.4**	**11.3**	**10.3**	**10.7**
5	SEM-23-82	JS 23-09	10.6	10.3	10.8	10.7	10.0	11.1	12.0	10.0	8.2	8.8	11.4	12.0	10.5
6	SEM-23-83	NRC 152 9c	10.5	13.2	13.0	12.3	10.8	12.0	15.5	16.1	9.8	9.4	14.8	13.8	12.6
7	SEM-23-84	JS 23-03	12.0	12.8	11.3	12.7	11.0	12.6	13.6	13.2	8.8	9.2	13.0	11.8	11.8
8	SEM-23-85	NRC 138 (c)	9.9	9.7	10.6	8.9	10.4	10.4	10.8	10.2	7.3	8.5	10.1	10.5	9.8
9	SEM-23-86	JS 20-34 (c)	11.8	11.2	12.0	11.6	10.6	11.5	13.4	10.2	9.2	8.8	12.5	11.8	11.2
10	**SEM-23-87**	**AMS 2022-1**	**11.1**	**11.8**	**11.4**	**11.2**	**11.3**	**11.3**	**13.8**	**10.8**	**9.5**	**10.2**	**11.9**	**9.6**	**11.2**

Table . 2.20d Performance of Soybean Strains in AVT I&II,   Zone : CZ- Early

S.N.	Code	Strain	Days to flower												
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**SEH**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1-12**
1	SEM-23-78	JS 95-60 (c)	31	41	40	32	32	32	33	32	32	32	30	36	34
2	SEM-23-79	NRC 262	31	42	41	39	38	38	35	35	41	37	35	44	38
3	SEM-23-80	NRC 130 (c)	33	42	41	33	36	34	36	31	40	36	31	39	36
4	**SEM-23-81**	**JS 24-33**	**33**	**47**	**45**	**38**	**38**	**39**	**35**	**33**	**43**	**36**	**31**	**39**	**38**
5	SEM-23-82	JS 23-09	35	49	46	38	38	37	34	36	43	36	31	38	38
6	SEM-23-83	NRC 152 9c	33	41	39	30	37	31	34	30	38	30	27	35	34
7	SEM-23-84	JS 23-03	32	45	44	38	35	37	33	32	39	35	30	38	37
8	SEM-23-85	NRC 138 (c)	31	48	45	33	32	32	33	32	40	33	31	38	36
9	SEM-23-86	JS 20-34 (c)	41	45	45	32	33	34	33	29	42	31	28	38	36
10	SEM-23-87	AMS 2022-1	37	47	43	41	41	42	37	33	46	42	31	42	40

Table . 2.20e Performance of Soybean Strains in AVT I&II,   Zone : CZ- Early

S.N.	Code	Strain	Days to Maturity												
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**SEH**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1-12**
1	SEM-23-78	JS 95-60 (c)	80	87	89	92	86	88	90	75	95	81	88	92	87
2	SEM-23-79	NRC 262	82	92	94	91	86	93	94	81	93	83	92	90	89
3	SEM-23-80	NRC 130 (c)	86	92	94	92	85	90	92	80	96	84	89	94	90
4	**SEM-23-81**	**JS 24-33**	**84**	**98**	**109**	**91**	**86**	**93**	**102**	**78**	**88**	**85**	**90**	**89**	**91**
5	SEM-23-82	JS 23-09	93	102	111	93	86	93	102	75	91	86	91	91	93
6	SEM-23-83	NRC 152 9c	86	100	91	92	85	89	103	75	100	90	86	93	91
7	SEM-23-84	JS 23-03	85	102	105	95	91	94	102	81	94	91	89	93	94
8	SEM-23-85	NRC 138 (c)	82	102	110	91	91	90	106	84	92	91	89	97	94
9	SEM-23-86	JS 20-34 (c)	96	94	97	95	85	92	100	84	88	85	87	94	91
10	SEM-23-87	AMS 2022-1	91	103	106	101	91	95	101	94	93	84	90	99	96

Table . 2.20f Performance of Soybean Strains in AVT I&II, Zone : CZ- Early

S.N.	Code	Strain	Plant Height (cm)												
			AMV	**AMR**	**AND**	**INR**	**JBR**	**KOT**	**LOB**	**MND**	**MOR**	**NAG**	**PRB**	**SEH**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1-12**
1	SEM-23-78	JS 95-60 (c)	33	28	31	51	44	61	39	53	49	40	32	46	42
2	SEM-23-79	NRC 262	49	36	43	68	51	76	47	73	60	45	49	71	56
3	SEM-23-80	NRC 130 (c)	40	29	35	47	42	67	37	54	45	35	40	44	43
4	**SEM-23-81**	**JS 24-33**	**40**	**30**	**35**	**61**	**43**	**80**	**35**	**55**	**60**	**37**	**32**	**43**	**46**
5	SEM-23-82	JS 23-09	38	28	30	58	43	67	34	51	57	35	32	43	43
6	SEM-23-83	NRC 152 9c	49	36	45	64	38	72	48	63	71	39	42	49	51
7	SEM-23-84	JS 23-03	34	28	34	65	45	70	37	62	62	37	31	49	46
8	SEM-23-85	NRC 138 (c)	31	26	30	50	35	58	31	54	52	32	28	42	39
9	SEM-23-86	JS 20-34 (c)	33	27	30	59	36	66	30	54	56	30	37	46	42
10	SEM-23-87	AMS 2022-1	50	39	45	73	52	74	43	65	59	54	49	59	55

South Zone

Table . 2.21a Performance of Soybean Strains in IVT Normal Maturity, Zone : SZ

S. N.	Code	Strain	Seed Yield(Kg/ha)							
			ADB	**BDR**	**BGR**	**DHW**	**KDJ**	**PUN**	**Mean**	**Rank**
			1	**2**	**3**	**4**	**5**	**6**	**1-6**	
1	SNM-23-1	NRC 270	3467	1606	2747	3832	3370	3906	3155	I
2	SNM-23-2	AMS 22-16	3407	1955	2620	3610	3100	3720	3069	VIII
3	**SNM-23-3**	**DSb 34 (c)**	**2938**	**2036**	**2679**	**3403**	**3512**	**4134**	**3117**	**IV**
4	SNM-23-4	MAUS 816	3600	1420	1808	3242	2868	3732	2778	XX
5	SNM-23-5	Pusa Sipani BS 8	3349	1403	1735	2854	3459	3867	2778	XXI
6	SNM-23-6	KDS 992 (c)	3493	1917	2777	3380	2975	3941	3081	VII
7	SNM-23-7	DS 1589	3561	1155	1267	1980	2235	3576	2296	XXVI
8	SNM-23-8	RSC 11-95	3648	1913	2056	2803	3440	4024	2981	XIII
9	SNM-23-9	KDS 753 (c)	2846	1486	2710	3531	2849	4058	2913	XIV
10	SNM-23-10	BAUS (M) 6	3239	1690	2511	3732	2290	3940	2900	XV
11	SNM-23-11	NRC 142 (c)	3268	943	1225	2193	3246	2255	2188	XXVII
12	SNM-23-12	KBSL 23-36	3009	1114	2919	2914	3365	3662	2831	XVIII
13	SNM-23-13	VLS 106	3509	1659	2531	3515	2520	4283	3003	XI
14	SNM-23-14	SL 1315	3516	1363	1555	2640	2187	3952	2536	XXIV
15	SNM-23-15	TS 101	3709	1771	1458	2903	2803	4000	2774	XXII
16	SNM-23-16	THPS 6	3168	1928	2031	3167	3228	3733	2876	XVI
17	SNM-23-17	KDSIS 1394	3740	1860	2238	3298	3632	3974	3124	III
18	SNM-23-18	NRC 271	3247	1714	2734	3846	3519	3631	3115	V
19	SNM-23-19	Lok-Soya 03	3534	1264	1601	2373	2382	3815	2495	XXV
20	SNM-23-20	KSS 225	3605	1579	2601	2877	3899	4065	3104	VI
21	SNM-23-21	DS 1547	3666	1278	2199	2718	3356	3554	2795	XIX
22	SNM-23-22	MACS 1810	3162	1756	2430	3683	3376	4390	3133	II
23	SNM-23-23	JS 25-08	3688	1628	2166	2885	3733	3931	3005	X
24	SNM-23-24	ASb 101	3717	1771	2268	2409	3458	3436	2843	XVII
25	SNM-23-25	NRC 268	3543	1471	2442	2931	3722	3904	3002	XII
26	SNM-23-26	DLSb 5	2753	1218	1903	3534	2418	3860	2614	XXIII
27	SNM-23-27	NRC 269	3683	1632	2171	3308	3530	4043	3061	IX
		Mean	3410	1575	2199	3095	3129	3829		
		N.P.S.(Sqm)	6.48	5.76	6.75	6.48	6.48	6.48		
		DOS	28/06/2023	10/07/2023	11/07/2023	20/06/2023	03/07/2023	10/07/2023		
		CD	248.4	204.2	440.3	498.5	412.7	277.1		
		CV (5%)	5.3	9.4	14.5	11.7	9.6	5.2		

Table . 2.21b Performance of Soybean Strains in IVT Normal Maturity, Zone : SZ

S.N.	Code	Strain	Oil Content % & Yield (Kg/ha)							
			ADB	BDR	BGR	DHW	KDJ	PUN	Mean	Oil Yield (kg/ha)
			1	2	3	4	5	6	1-6	
1	SNM-23-1	NRC 270	19.4	18.4	21.5	19.0	18.8	19.3	19.4	611
2	SNM-23-2	AMS 22-16	20.2	18.6	19.3	18.2	18.7	19.3	19.1	584
3	**SNM-23-3**	**DSb 34 (c)**	**19.0**	**18.5**	**19.9**	**18.0**	**19.5**	**18.5**	**18.9**	**589**
4	SNM-23-4	MAUS 816	19.0	18.6	19.7	17.8	19.5	18.3	18.8	523
5	SNM-23-5	Pusa Sipani BS 8	20.1	19.2	20.8	18.4	18.9	18.9	19.4	538
6	SNM-23-6	KDS 992 (c)	19.1	18.2	19.8	19.2	19.2	19.6	19.2	590
7	SNM-23-7	DS 1589	18.3	19.2	19.9	17.9	18.9	19.4	19.0	435
8	SNM-23-8	RSC 11-95	20.0	20.0	20.3	18.3	18.3	20.9	19.6	585
9	SNM-23-9	KDS 753 (c)	20.2	18.7	18.6	18.5	19.0	19.7	19.1	556
10	SNM-23-10	BAUS (M) 6	19.5	17.9	19.5	17.8	19.1	19.3	18.9	546
11	SNM-23-11	NRC 142 (c)	20.1	19.2	20.5	18.4	18.5	20.2	19.5	426
12	SNM-23-12	KBSL 23-36	18.9	17.8	20.2	18.2	19.3	19.4	19.0	536
13	SNM-23-13	VLS 106	19.6	19.3	19.4	20.1	18.8	20.3	19.6	587
14	SNM-23-14	SL 1315	18.8	19.3	22.3	19.6	19.8	20.2	20.0	506
15	SNM-23-15	TS 101	19.4	18.7	20.2	17.9	19.3	20.3	19.3	534
16	SNM-23-16	THPS 6	19.9	19.5	20.2	17.9	17.6	19.7	19.1	550
17	SNM-23-17	KDSIS 1394	19.9	18.6	20.1	20.2	19.4	19.9	19.7	614
18	SNM-23-18	NRC 271	19.6	19.1	20.5	19.6	19.0	19.5	19.5	608
19	SNM-23-19	Lok-Soya 03	20.1	17.9	20.6	18.3	18.7	19.7	19.2	479
20	SNM-23-20	KSS 225	19.6	19.0	20.2	18.1	19.2	19.9	19.3	600
21	SNM-23-21	DS 1547	18.7	18.6	20.6	17.6	18.8	20.1	19.1	532
22	SNM-23-22	MACS 1810	18.9	19.8	19.8	17.0	19.5	21.8	19.5	610
23	SNM-23-23	JS 25-08	19.2	19.3	20.2	17.5	19.4	18.8	19.0	572
24	SNM-23-24	ASb 101	18.7	19.0	20.2	17.7	19.0	20.0	19.1	543
25	SNM-23-25	NRC 268	18.1	19.6	19.8	19.1	20.1	20.4	19.5	585
26	SNM-23-26	DLSb 5	19.9	19.9	19.5	19.7	19.6	19.9	19.8	516
27	SNM-23-27	NRC 269	19.4	18.2	20.2	18.7	19.4	20.4	19.4	592

Table . 2.21c Performance of Soybean Strains in IVT Normal Maturity, Zone : SZ

S.N.	Code	Strain	100 seed weight (g)						
			ADB	**BDR**	**BGR**	**DHW**	**KDJ**	**PUN**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**1-6**
1	SNM-23-1	NRC 270	15.1	16.6	18.6	17.5	13.0	16.0	16.1
2	SNM-23-2	AMS 22-16	13.2	15.8	14.2	13.3	11.1	13.7	13.5
3	**SNM-23-3**	**DSb 34 (c)**	**13.1**	**15.6**	**15.0**	**15.0**	**11.9**	**13.8**	**14.1**
4	SNM-23-4	MAUS 816	14.5	16.9	19.4	20.7	13.2	17.4	17.0
5	SNM-23-5	Pusa Sipani BS 8	13.6	13.4	14.7	15.0	12.2	13.3	13.7
6	SNM-23-6	KDS 992 (c)	14.8	16.7	16.0	16.2	14.5	16.9	15.8
7	SNM-23-7	DS 1589	14.0	11.9	12.2	15.4	9.8	13.2	12.8
8	SNM-23-8	RSC 11-95	14.4	14.5	14.6	16.1	12.3	15.1	14.5
9	SNM-23-9	KDS 753 (c)	15.0	17.7	18.4	18.2	13.7	18.3	16.9
10	SNM-23-10	BAUS (M) 6	14.2	16.1	15.6	15.1	10.0	13.3	14.1
11	SNM-23-11	NRC 142 (c)	14.3	15.7	13.5	14.4	12.3	12.7	13.8
12	SNM-23-12	KBSL 23-36	14.6	14.5	14.1	14.3	12.2	13.1	13.8
13	SNM-23-13	VLS 106	15.1	16.8	18.1	18.3	12.7	16.0	16.2
14	SNM-23-14	SL 1315	14.1	15.5	13.4	14.3	10.0	13.5	13.5
15	SNM-23-15	TS 101	12.8	14.0	14.3	15.2	11.4	13.0	13.5
16	SNM-23-16	THPS 6	13.6	14.7	14.5	13.9	11.2	13.1	13.5
17	SNM-23-17	KDSIS 1394	14.3	13.8	15.5	16.1	14.0	14.6	14.7
18	SNM-23-18	NRC 271	13.4	12.5	14.4	13.6	10.3	13.0	12.9
19	SNM-23-19	Lok-Soya 03	14.2	15.3	13.5	16.5	11.2	14.3	14.2
20	SNM-23-20	KSS 225	15.0	13.7	12.5	15.2	12.9	13.9	13.9
21	SNM-23-21	DS 1547	13.3	12.7	11.5	12.9	10.0	11.7	12.0
22	SNM-23-22	MACS 1810	14.7	17.3	20.1	22.8	14.6	18.3	18.0
23	SNM-23-23	JS 25-08	13.5	13.2	13.9	16.1	10.0	13.8	13.4
24	SNM-23-24	ASb 101	14.2	16.2	16.6	17.0	14.0	14.2	15.4
25	SNM-23-25	NRC 268	12.7	13.5	13.5	13.2	10.6	11.9	12.6
26	SNM-23-26	DLSb 5	14.8	16.6	16.3	16.1	11.9	14.9	15.1
27	SNM-23-27	NRC 269	15.3	14.4	18.0	17.5	13.2	16.6	15.8

Table . 2.21d Performance of Soybean Strains in IVT Normal Maturity, Zone : SZ

S.N.	Code	Strain	Days to flower						
			ADB	BDR	BGR	DHW	KDJ	PUN	Mean
			1	2	3	4	5	6	1-6
1	SNM-23-1	NRC 270	44	34	44	45	40	41	41
2	SNM-23-2	AMS 22-16	44	36	42	44	38	39	41
3	SNM-23-3	DSb 34 9 (c)	38	36	40	38	34	35	37
4	SNM-23-4	MAUS 816	39	32	40	41	34	35	37
5	SNM-23-5	Pusa Sipani BS 8	38	33	34	40	30	31	34
6	SNM-23-6	KDS 992 (c)	45	34	44	45	40	40	41
7	SNM-23-7	DS 1589	38	31	32	37	32	33	34
8	SNM-23-8	RSC 11-95	41	33	40	41	37	39	39
9	SNM-23-9	KDS 753 (c)	45	37	48	46	40	41	43
10	SNM-23-10	BAUS (M) 6	45	36	40	46	35	41	41
11	SNM-23-11	NRC 142 (c)	39	38	42	44	34	35	39
12	SNM-23-12	KBSL 23-36	38	33	40	41	32	33	36
13	SNM-23-13	VLS 106	40	35	40	41	36	35	38
14	SNM-23-14	SL 1315	40	30	38	41	32	33	36
15	SNM-23-15	TS 101	39	32	38	41	35	38	37
16	SNM-23-16	THPS 6	39	34	38	41	31	33	36
17	SNM-23-17	KDSIS 1394	39	35	40	40	34	33	37
18	SNM-23-18	NRC 271	45	36	40	46	40	38	41
19	SNM-23-19	Lok-Soya 03	36	32	36	39	36	35	36
20	SNM-23-20	KSS 225	38	36	40	40	32	33	37
21	SNM-23-21	DS 1547	40	32	40	42	36	38	38
22	SNM-23-22	MACS 1810	40	33	40	37	34	35	37
23	SNM-23-23	JS 25-08	39	34	40	40	36	36	38
24	SNM-23-24	ASb 101	37	32	36	41	32	33	35
25	SNM-23-25	NRC 268	39	34	40	40	36	35	37
26	SNM-23-26	DLSb 5	40	34	40	41	38	41	39
27	SNM-23-27	NRC 269	45	36	40	42	39	39	40

Table . 2.21e Performance of Soybean Strains in IVT Normal Maturity,   Zone : SZ

S.N.	Code	Strain	Days to Maturity						
			ADB	BDR	BGR	DHW	KDJ	PUN	Mean
			1	2	3	4	5	6	1-6
1	SNM-23-1	NRC 270	113	91	109	95	97	98	101
2	SNM-23-2	AMS 22-16	113	92	93	94	98	96	98
3	SNM-23-3	DSb 34 9 (c)	101	94	95	88	87	88	92
4	SNM-23-4	MAUS 816	103	92	105	91	94	93	96
5	SNM-23-5	Pusa Sipani BS 8	109	90	94	90	87	88	93
6	SNM-23-6	KDS 992 (c)	111	91	105	95	94	95	99
7	SNM-23-7	DS 1589	108	92	93	87	93	90	94
8	SNM-23-8	RSC 11-95	114	91	104	91	98	96	99
9	SNM-23-9	KDS 753 (c)	112	93	109	96	96	97	101
10	SNM-23-10	BAUS (M) 6	114	91	107	96	99	100	101
11	SNM-23-11	NRC 142 (c)	110	94	98	94	96	90	97
12	SNM-23-12	KBSL 23-36	98	84	97	91	86	88	91
13	SNM-23-13	VLS 106	104	92	109	91	95	96	98
14	SNM-23-14	SL 1315	106	86	101	91	97	96	96
15	SNM-23-15	TS 101	112	91	103	91	93	92	97
16	SNM-23-16	THPS 6	108	92	109	91	97	93	98
17	SNM-23-17	KDSIS 1394	99	94	101	90	87	89	93
18	SNM-23-18	NRC 271	114	92	99	96	93	92	98
19	SNM-23-19	Lok-Soya 03	108	90	98	89	93	92	95
20	SNM-23-20	KSS 225	101	92	98	90	90	89	93
21	SNM-23-21	DS 1547	108	91	95	92	92	91	95
22	SNM-23-22	MACS 1810	111	91	105	87	92	94	97
23	SNM-23-23	JS 25-08	108	93	107	90	94	92	97
24	SNM-23-24	ASb 101	95	90	97	91	86	87	91
25	SNM-23-25	NRC 268	111	92	100	90	92	91	96
26	SNM-23-26	DLSb 5	110	91	103	91	97	96	98
27	SNM-23-27	NRC 269	115	93	105	92	95	96	99

Table . 2.21f Performance of Soybean Strains in IVT Normal Maturity, Zone : SZ

S.N.	Code	Strain	Plant height (cm)						
			ADB	BDR	BGR	DHW	KDJ	PUN	Mean
			1	2	3	4	5	6	1-6
1	SNM-23-1	NRC 270	56	36	31	52	61	74	52
2	SNM-23-2	AMS 22-16	70	44	32	54	43	70	52
3	**SNM-23-3**	**DSb 34 (c)**	**41**	**33**	**30**	**47**	**44**	**64**	**43**
4	SNM-23-4	MAUS 816	52	26	29	42	36	53	40
5	SNM-23-5	Pusa Sipani BS 8	75	31	28	56	36	67	49
6	SNM-23-6	KDS 992 (c)	60	39	32	53	47	71	50
7	SNM-23-7	DS 1589	38	24	26	45	22	44	33
8	SNM-23-8	RSC 11-95	72	31	27	52	41	68	49
9	SNM-23-9	KDS 753 (c)	63	62	32	61	48	76	57
10	SNM-23-10	BAUS (M) 6	57	34	28	52	45	75	49
11	SNM-23-11	NRC 142 (c)	64	36	37	51	47	55	48
12	SNM-23-12	KBSL 23-36	103	45	42	55	53	85	64
13	SNM-23-13	VLS 106	54	37	33	50	43	69	48
14	SNM-23-14	SL 1315	55	28	27	41	33	42	38
15	SNM-23-15	TS 101	61	29	29	44	36	64	44
16	SNM-23-16	THPS 6	52	32	28	50	44	69	46
17	SNM-23-17	KDSIS 1394	52	29	28	45	36	61	42
18	SNM-23-18	NRC 271	53	34	29	43	40	64	44
19	SNM-23-19	Lok-Soya 03	60	28	26	44	32	56	41
20	SNM-23-20	KSS 225	51	30	26	43	45	49	41
21	SNM-23-21	DS 1547	38	28	27	41	38	49	37
22	SNM-23-22	MACS 1810	60	32	27	46	34	69	45
23	SNM-23-23	JS 25-08	59	39	29	52	47	65	49
24	SNM-23-24	ASb 101	52	33	31	41	37	45	40
25	SNM-23-25	NRC 268	56	41	28	53	47	73	50
26	SNM-23-26	DLSb 5	102	36	32	54	53	77	59
27	SNM-23-27	NRC 269	44	40	31	51	41	66	46

Table . 2.22a Performance of Soybean Strains in AVT I, EDV
Zone : SZ

S.N.	Code	Strain	Yield (Kg/ha)							
			ADB	BDR	BGR	DHW	KDJ	PUN	Mean	Rank
			1	2	3	4	5	6	1-6	
1	**SNM-23-88**	**MACS 1460 (c)**	**3241**	**2517**	**1968**	**4221**	**4769**	**3897**	**3436**	**I**
2	SNM-23-89	MACSNRC 1900	2770	1415	1265	3835	4853	3711	2975	V
3	SNM-23-90	NRC 142 (c)	2816	-	1181	2431	4182	2755	2673	VI
4	SNM-23-91	MACS 1188 (c)	3295	3238	1667	4012	3804	3657	3279	II
5	SNM-23-92	JS 93-05 (c)	3025	2821	1651	4005	3966	3503	3162	III
6	SNM-23-93	DSb 21 (c)	1960	2561	1674	3665	4406	3642	2985	IV
		Mean	2851.17	2510.40	1567.67	3694.83	4330.00	3527.50		
		N.P.S.(Sqm)	12.96	11.52	12.96	12.96	12.96	12.96		
		DOS	27/06/2023	10/07/2023	11/07/2023	20/06/2023	04/07/2023	10/07/2023		
		CD	246.9	477.4	208.3	408.9	408.9	493.8		
		CV (5%)	5.7	15.2	8.6	7.3	6.3	9.2		

Table . 2.22b Performance of Soybean Strains in AVT I, EDV
Zone : SZ

S.N.	Code	Strain	Oil Content % & Yield (Kg/ha)							
			ADB	BDR	BGR	DHW	KDJ	PUN	Mean	Oil Yield (kg/ha)
			1	2	3	4	5	6	1-6	
1	**SNM-23-88**	**MACS 1460 (c)**	**19.0**	**19.8**	**19.5**	**19.0**	**18.6**	**20.0**	**19.3**	**664**
2	SNM-23-89	MACSNRC 1900	18.4	19.2	19.1	18.8	19.1	18.5	18.9	561
3	SNM-23-90	NRC 142 (c)	19.1	-	18.9	19.9	20.2	19.9	19.1	568
4	SNM-23-91	MACS 1188 (c)	18.2	19.2	19.5	19.9	18.7	19.6	19.2	629
5	SNM-23-92	JS 93-05 (c)	19.9	21.3	18.2	18.8	19.5	20.3	19.7	621
6	SNM-23-93	DSb 21 (c)	19.4	18.9	18.7	18.2	19.0	19.5	19.0	565

Table . 2.22c Performance of Soybean Strains in AVT I, EDV
Zone : SZ

S.N.	Code	Strain	100 seed weight (g)						
			ADB	BDR	BGR	DHW	KDJ	PUN	Mean
			1	2	3	4	5	6	1-6
1	**SNM-23-88**	**MACS 1460 (c)**	**12.9**	**14.6**	**15.1**	**13.9**	**12.0**	**14.2**	**13.8**
2	SNM-23-89	MACSNRC 1900	14.3	16.1	14.7	14.8	12.8	15.3	14.7
3	SNM-23-90	NRC 142 (c)	13.6	-	14.7	13.7	12.1	14.0	13.6
4	SNM-23-91	MACS 1188 (c)	14.0	17.0	16.0	13.5	12.3	16.0	14.8
5	SNM-23-92	JS 93-05 (c)	13.1	15.1	14.7	15.2	13.4	15.5	14.5
6	SNM-23-93	DSb 21 (c)	13.1	15.7	14.0	12.2	10.6	13.5	13.2

Table . 2.22d Performance of Soybean Strains in AVT I, EDV
Zone : SZ

S.N.	Code	Strain	Days to flower						
			ADB	**BDR**	**BGR**	**DHW**	**KDJ**	**PUN**	Mean
			1	2	3	4	5	6	**1-6**
1	**SNM-23-88**	**MACS 1460 (c)**	**41**	**36**	**38**	**40**	**36**	**36**	**38**
2	SNM-23-89	MACSNRC 1900	39	36	38	41	31	32	36
3	SNM-23-90	NRC 142 (c)	40	-	42	42	36	36	39
4	SNM-23-91	MACS 1188 (c)	39	48	42	50	41	41	44
5	SNM-23-92	JS 93-05 (c)	37	36	38	39	35	37	37
6	SNM-23-93	DSb 21 (c)	40	41	42	50	39	41	42

Table . 2.22e Performance of Soybean Strains in AVT I, EDV
Zone : SZ

S.N.	**Code**	**Strain**	**Days to Maturity**						
			ADB	**BDR**	**BGR**	**DHW**	**KDJ**	**PUN**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**1-6**
1	**SNM-23-88**	**MACS 1460 (c)**	**111**	**94**	**104**	**90**	**94**	**92**	**98**
2	SNM-23-89	MACSNRC 1900	106	96	98	91	96	94	97
3	SNM-23-90	NRC 142 (c)	110	-	105	92	96	93	99
4	SNM-23-91	MACS 1188 (c)	112	98	107	100	103	107	105
5	SNM-23-92	JS 93-05 (c)	103	94	98	89	91	89	94
6	SNM-23-93	DSb 21 (c)	109	98	101	100	96	97	100

Table. 2.22f Performance of Soybean Strains in AVT I, EDV
Zone: SZ

S.N.	**Code**	**Strain**	**Plant height (cm)**						
			ADB	**BDR**	**BGR**	**DHW**	**KDJ**	**PUN**	**Mean**
			1	**2**	**3**	**4**	**5**	**6**	**1-6**
1	**SNM-23-88**	**MACS 1460 (c)**	**56**	**36**	**37**	**46**	**40**	**64**	**47**
2	SNM-23-89	MACSNRC 1900	82	39	39	58	52	68	56
3	SNM-23-90	NRC 142 (c)	58	-	38	53	45	58	50
4	SNM-23-91	MACS 1188 (c)	55	42	43	55	40	68	51
5	SNM-23-92	JS 93-05 (c)	59	34	33	45	34	53	43
6	SNM-23-93	DSb 21 (c)	62	41	38	52	54	67	52

सस्य विज्ञान
Agronomy

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Adilabad (Telangna)	Dr. Sreedhar Chauhan

6. Agronomy

Experiments on six major agronomic aspects were conducted during *kharif,* 2023 at 15 coordinating centres across the six zones.

1. AGRON 1/23. Evaluation of AVT II entries under different row spacing.
2. AGRON. 2/23. Assessing the impact of herbicides with PGPR on soybean productivity
3. AGRON. 3/21: Evaluation of novel bio formulation for yield enhancement in soybean.
4. AGRON 4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems.

   By and large, all the trials were conducted during *kharif,* 2023 at all the Centre representing 5 zones of the country as per technical programme. The experiment-wise salient findings (Table 3.1.1 to 3.4.20) 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 3.1.1-3.1.6).

1.1. Central Zone (Kota, Sehore and Amravati)

1.1.1. New Entry

The new entry JS 23-09 produced significantly lower yield than both the check varieties namely; NRC 138 and NRC 130 at Sehore centre. However, at Sehore centre the new entry JS 23-03 found statistical identical with the check variety NRC-138 and NRC 130 in respect to yield. On the contrary, at Kota centre, new entry JS 23-09 and JS 23-03 produced significantly higher seed yield than the check varieties JS 20-34 and NRC 130. However, both the new entries were found statistically at par with check variety NRC 138. At Amravati centre, new entry JS 23-09 yielded significantly higher than all check varieties. Whereas, new entry produced significantly higher yield than check JS 20-34 and NRC 130. Moreover, on zonal mean basis the new entries JS 23-09 and JS 23-03 yielded higher than the check varieties JS 20-34, NRC 138 and NRC 130. However, the yield increase was less than 10% as compared to best check variety NRC 138 (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 slightly influenced by different row spacing at all the centre (Table 3.1.1). At Sehore centre, significantly higher seed yield was recorded with narrow row spacing (30 cm) than wider row spacing (45 cm). However, at Kota the yield of soybean was didn’t influenced by different row spacing. At Amravati centre, the higher yield of soybean was observed under wider row spacing (45 cm) as compared to narrow row spacing (30 cm). A similar trend was also noted in all the growth and yield attribute parameters (3.1.2

1.1.3. Interaction effect

The interaction between entries and row spacing was found non-significant at all the centre (Table 3.1.1).

1.2. Eastern Zone (Ranchi, Raipur and Bhawanipatna)

1.2.1. New Entry

The new entry RSC 11-42 produce significantly higher yield than all check varieties at Raipur centre (Table 3.1.3). At Ranchi, the new entry RSC 11-42 produced significantly higher yield than check varieties JS 20-116 and AMS 2014-1 and found at par with check NRC 128. The new entry RSC 11-42 yielded significantly higher than all the checks at Bhawanipatna centre. On zonal mean basis, the highest seed yield was registered with new entry RSC 11-42 (1905 kg/ha) followed by checks NRC 128 (1795 kg/ha), JS 20-116 (1716 kg//ha) and AMS 2014-1 (1568 kg/ha) (Table 3.1.3). On zonal mean basis, 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

The seed yield of soybean was significantly influenced by different row spacing at Raipur and Ranchi centre (Table 3.1.3). The significantly higher seed yield was recorded with wider row spacing (45 cm) than narrow row spacing (30 cm). However, at Bhawanipatna centre, difference between row spacing is non-significant. The numerically higher yield was observed at narrow row planning as compared wider row spacing. On zonal mean basis, the higher seed yield was recorded under wider planting (10.6%) as compared to narrow planting. A similar trend was also noted in all the growth and yield attribute parameters (Table 3.1.4).

1.2.3. Interaction effect

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

1.3. North hill Zone (Almora)

1.3.1. New Entry

The new entry NRC 197 produce lesser yield than standard check varieties at Almora centre (Table 3.1.5).

1.3.2. Row spacing

The seed yield of soybean was influenced by different row spacing (Table 3.1.6). The higher seed yield was recorded with wider row spacing (45 cm) than narrow row spacing (30 cm). The seed yield was increased by 8.83% under wider planting as compared to narrow planting. 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.

2.AGRON. 2/23. Assessing the impact of herbicides with PGPR on soybean productivity

Five weed management practices and four microbial strains were tested in strip plot design with three replications to study the response of soybean to herbicides applications with PGPR (Table 3.2.1-3.2.22).

2.1. North plain zone (Delhi, Pantnagar and Ludhiana)

2.1.1. Weed management practices

Data pertaining to growth, yield attributes and yield under different weed management practices in North Plain Zone is presented in the table 3.2.1. The higher seed yield and yield attributes were observed with weed fee check (two hand weeding at 20 and 40 days after sowing) followed by the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS and then application of Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS. The yield increase by 81.9% under weed free check treatment and 69.0% with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. Similarly, highest cost of cultivation, gross return and net return was registered with weed free check followed by Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.1.1.1 Weed control efficiency and weed index

Use of different weed management practices significantly influenced weed control efficiency and weed index as shown in table 3.2.2. The highest weed control efficiency was reported under weed free check at both 30 DAS (79.06%) and 60 DAS (79.07%) followed by the application Diclosulam @ 26 g/ha + One hand weeding at 40 DAS (63.6% at 30 DAS and 73.7% at 60 DAS). Similarly, the weed index was zero under weed free check and minimum was observed with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.1.2. Microbial strains

Use of microbial strains with the herbicide application significantly influenced the soybean seed yield as evidenced in table 3.2.1. Maximum yield was observed in consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed) followed by *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed. The seed yield increased by 15.8% in case of consortia and 10.1% under application *Bacillus aryabhataii* @

10 g/kg seed on comparing with un-inoculated treatment. Similar trend was observed in yield attributes. Similarly, from the economics point of view, consortia reported highest cost of cultivation, gross return, net return and B:C ratio.

2.1.2.1 Weed control efficiency and weed index

Use of different microbial stains with herbicides significantly influenced weed control efficiency and weed index as shown in table 3.2.2. Among the different microbial strains, the highest weed control efficiency was registered under the application of *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed at 30 DAS (53.80%) and 60 DAS (54.5%) with minimum weed index. Maximum weed index was observed underrun-inoculated.

2.2. Central zone (Kota and Amravati)

2.2.1. Weed management practices

Data pertaining to growth, yield attributes and yield under different weed management practices in Central zone is presented in the table 3.2.3. The use of herbicides significantly influenced the seed yield of soybean. Maximum yield was reported in weed free check (2 hand weeding at 20 and 40 DAS) followed by Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. The yield was increased by 48.4% under weed free check and 41.2% with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. Similar trend was observed in yield attributes. Similarly, highest cost of cultivation, gross return and net return was registered with weed free check followed by Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.2.1.1 Weed control efficiency and Weed index

Use of different weed management practices significantly influenced weed control efficiency and weed index as shown in table 3.2.4. The highest weed control efficiency was reported under weed free check at both 30 DAS (71.46%) and 60 DAS (81.47%) followed by the application Diclosulam @ 26 g/ha + One hand weeding at 40 DAS (68.1% at 30 DAS and 67% at 60 DAS). Similarly, the weed index was zero under weed free check and minimum was observed with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.2.2. Microbial strains

Use of microbial strains significantly influenced the soybean seed yield as evidenced in table 3.2.3. The highest yield was observed in consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed) followed by *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed. Seed yield increased by 8.4% in case of consortia and 7.1% under application *Bacillus aryabhataii* @ 10 g/kg seed on comparing with un-inoculated treatment. Similar trend was observed in yield attributes. However, from the economics point of view, highest cost of cultivation, gross return, net return and B:C ratio was registered with *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed.

2.2.2.1 Weed control efficiency and Weed index

Use of different microbial stains with herbicides significantly influenced weed control efficiency and weed index as shown in table 3.2.4. Among the different microbial strains, the highest weed control efficiency was registered under the application of consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed) at 30 DAS (52.42%) and 60 DAS (54.81%) with minimum weed index. Maximum weed index was observed under un-inoculated.

2.3. Northern Eastern zone (Raipur and Ranchi)

2.3.1. Weed management practices

Data pertaining to growth, yield attributes and yield under different weed management practices in North Eastern Zone is presented in the table 3.2.10. Maximum seed yield and yield attributes were reported in weed free check (2 hand weeding at 20 and 40 DAS) followed by Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. The yield increased by 199.6% under weed free check and 197.4% with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. Similarly, highest cost of cultivation and gross return was registered with weed free check followed by Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. However, maximum net returns and B:C ratio was reported with Diclosulam @ 26 g/ha + One hand weeding at 40 DAS and Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS respectively.

2.3.1.1 Weed control efficiency and Weed index

Use of different weed management practices significantly influenced weed control efficiency and weed index. As evidenced in table 3.2.11. The highest weed control efficiency was reported under weed free check at both 30 DAS (82.74%) and 60 DAS (81.68%) followed by the application Diclosulam @ 26 g/ha + One hand weeding at 40 DAS (80.35% at 30 DAS and 81.17% at 60 DAS). Similarly, the weed index was zero under weed fee check and minimum was observed with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.3.2. Microbial strains

Use of microbial strains significantly influenced the soybean seed yield as evidenced in table 3.2.10. The highest soybean seed yield was observed in consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed) followed by *Bacillus aryabhataii* @ 10 g/kg seed. Soybean yield increased by 16.7% with application of consortia on comparing with uninoculated treatment. Similar trend was observed in yield attributes. Similarly, from the economics point of view, highest cost of cultivation, gross return, net return and B:C ratio was registered with the application of *B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia).

2.3.2.1 Weed control efficiency and Weed index

Use of different microbial stains with herbicides significantly influenced weed control efficiency and weed index as shown in table 3.2.11. Among the different microbial strains, the highest weed control efficiency was registered under the application of *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed at 30 DAS (56.81%) and 60 DAS (53.24%) with minimum weed index. Maximum weed index was observed under Uninoculated.

2.4 North Eastern Hill Zone ((Imphal and Medziphema)

2.4.1. Weed management practices

Data pertaining to growth, yield attributes and yield under different weed management practices in North Eastern Hill zone is presented in the table 3.2.13. Maximum yield and yield attributes were reported with the application of weed fee check (two hand weeding at 20 and 40 days after sowing) followed by Diclosulam @ 26 g/ha + One hand weeding at 40 DAS and Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS. The yield increased by 50.9% with application of weed fee check and 46.4% under Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. Similarly, highest gross return and net return was registered with Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.4.1.1 Weed control efficiency and Weed index

Use of different weed management practices significantly influenced weed control efficiency and weed index as shown in table 3.2.14. The highest weed control efficiency was reported under weed free check at both 30 DAS (57.15%) and 60 DAS (73.31%) followed by the application Diclosulam @ 26 g/ha + One hand weeding at 40 DAS (51.65% at 30 DAS and 68.1% at 60 DAS). Similarly, the minimum weed index was observed with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.4.2. Microbial strains

Use of microbial strains with the herbicide application significantly influenced the soybean seed yield as evidenced in table 3.2.13. Maximum yield was observed in consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed) followed by *Bacillus aryabhataii* @ 10 g/kg seed. The seed yield increased by 15.6% in case of consortia and 11.8% under application *Bacillus aryabhataii* @ 10 g/kg seed as compared to uninoculated treatment. Similar trend was observed in yield attributes. Similarly, from the economics point of view, highest gross return, net return and B:C ratio was registered with consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed).

2.4.2.1 Weed control efficiency and Weed index

Use of different microbial stains with herbicides significantly influenced weed control efficiency and weed index as shown in table 3.2.14. Among the different microbial strains, the highest weed control efficiency was registered under the application of *B. daqingense @ 10 g/kg seed + Bacillus aryabhataii @ 10 g/kg seed*

(Consortia) at 30 DAS (43%) and 60 DAS (54.22%) with minimum weed index. Maximum weed index was observed under un-inoculated.

2.5 Southern zone (Dharwad and Adilabad)

2.5.1. Weed management practices

Data pertaining to growth, yield attributes and yield under different weed management practices in North Plain Zone is presented in the table 3.2.16. The higher seed yield and yield attributes were reported in weed free check (2 hand weeding at 20 and 40 DAS) followed by Diclosulam @ 26 g/ha + One hand weeding at 40 DAS and then Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS. The yield increase by 49.1% under weed free check treatment and 39.1% with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS. Similarly, highest gross return and net return was registered with weed free check.

2.5.1.1 Weed control efficiency and weed index

Use of different weed management practices significantly influenced weed control efficiency and weed index as shown in table 3.2.17. The highest weed control efficiency was reported under weed free check at both 30 DAS (74.29%) and 60 DAS (71.59%) followed by the application Diclosulam @ 26 g/ha + One hand weeding at 40 DAS (60.45% at 30 DAS and 54.11% at 60 DAS). Similarly, the minimum weed index was observed with the application of Diclosulam @ 26 g/ha + One hand weeding at 40 DAS.

2.5.2. Microbial strains

Use of microbial strains with the herbicide application significantly influenced the soybean seed yield as evidenced in table 3.2.16. Maximum yield was observed in consortia (*B. daqingense* @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed) followed by *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed. The seed yield increased by 19.4% in case of consortia and 12.1% under application *Bacillus aryabhataii* @ 10 g/kg seed on comparing with uninoculated treatment. Similarly, from the economics point of view, highest cost of cultivation, gross return, net return and B:C ratio was reported with consortia followed by *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed.

2.5.2.1 Weed control efficiency and Weed index

Use of different microbial stains with herbicides significantly influenced weed control efficiency and weed index as shown in table 3.2.17. Among the different microbial strains, the highest weed control efficiency was registered under the application of *Bacillus aryabhataii* (Zn & P-solubilizing bacteria) @ 10 g/kg seed at 30 DAS (47.51%) and 60 DAS (48.24%) with minimum weed index. Maximum weed index was observed underrun-inoculated.

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 3.3.29).

3.1 Southern zone *(*Dharwad, Adilabad and Pune):

3.1.1 Dharwad

The data pertaining to seed yield 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 21.5% with the application of 100% RDF, 15.5% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c, and 13.9% 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 3.3.5.

3.1.2 Adilabad

The data pertaining to seed yield 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 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 was increased by 7.76% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c, as compared to application RDF only (Table 3.3.1).

3.1.3 Pune

The data pertaining to seed yield 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 Pune centre, the maximum soybean yield was registered with the application of 75 % RDF + Rhizobium + MDSR14 + 12c followed by 100% RDF only and then 75 % RDF + Bio Zn + Bio NPK.

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 similar trend was also observed in growth, development and yield attributes. 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-3.3.1).

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

3.2.1 *Sehore*

The data pertaining to seed yield of soybean for Sehore centre is presented in the table 3.3.6. The use of novel bio formulations significantly influenced the yield of soybean. At Sehore centre, the maximum soybean yield was registered with application of 75% RDF + Bio Zn + Bio NPK followed by 75 % RDF + Bio NPK and 75 % RDF + Bio Zn. The yield of soybean increased by 11.5% with the application of 75 % RDF + Bio Zn + Bio NPK, 9.4% with the application of 75 % RDF + Bio NPK and 2.8% with application of 75 % RDF + Bio Zn as compared to 100% RDF only.

3.2.2 Kota

The data pertaining to seed yield of soybean for Kota centre is presented in the table 3.3.6. 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 75 % RDF + Rhizobium + MDSR14 + 12c followed by 75 % RDF + Bio Zn and then 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 14.3% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c, 10.7% with the application of 75 % RDF + Bio Zn and 8.4% with the application of 75 % RDF + Bio Zn + Bio NPK as compared to 100% RDF only.

3.2.3 Amravati

The data pertaining to seed yield of soybean for Amravati centre is presented in the table 3.3.6. 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 37.6% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 27.2% with the application of 75 % RDF + Bio Zn + Bio NPK over 100% RDF only.

3.2.4 Devgadh baria

The data pertaining to seed yield of soybean for Devgadh baria centre was presented in the table 3.3.6. 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 11.2% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 14.6% over 100% RDF only.

3.2.5 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 17.2% under 75 % RDF + Rhizobium + MDSR14 + 12c and 11.1% under 75 % RDF + Bio Zn + Bio NPK treatment as compared to 100% RDF only (Table 3.3.6).

3.3 North Plain Zone *(*Delhi, Pantnagar and Ludhiana):

3.3.1 Delhi

The data pertaining to seed yield of soybean for Delhi centre is presented in the table 3.3.11. 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 4.5% with the application of 75 % RDF + Bio Zn + Bio NPK as compared to 100% RDF.

3.3.2 Pantnagar

The data pertaining to seed yield of soybean for Pantnagar centre was presented in the table 3.3.11. 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 + Rhizobium + MDSR14 + 12c and 75 % RDF + Bio Zn + Bio NPK. The yield of soybean increased by 59.3% with the application of 100% RDF, 50.1% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 46.5% with the application of 75 % RDF + Bio Zn + Bio NPK over the control treatment.

3.3.3 Ludhiana

The data pertaining to seed yield of soybean for Ludhiana centre was presented in the table 3.3.11. 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 75 % RDF + Bio Zn + Bio NPK and then 75 % RDF + Rhizobium + MDSR14 + 12c. The yield of soybean increased by, 11.9% with application of 75 % RDF + Bio Zn + Bio NPK and 11.7% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c over 100% RDF only.

3.3.4 Zonal mean

Overall, on the zonal mean basis the maximum soybean yield was registered with the application of 75 % RDF + Bio Zn + Bio NPK followed by 100% RDF and then 75 % RDF + Rhizobium + MDSR14 + 12c. The yield of soybean increased by 3.4% with the application of 75 % RDF + Bio Zn + Bio NPK over 100% RDF only (Table 3.3.11).

3.4 Eastern Zone *(*Ranchi and Raipur):

3.4.1 Ranchi

The data pertaining to seed yield of soybean for Ranchi centre is presented in the table 3.3.16. 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 128.0% with the application of 100% RDF, 120.7% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c and 109.3% with the application of 75 % RDF + Bio Zn + Bio NPK as compared to control treatment.

3.4.2 Raipur

The data pertaining to seed yield of soybean for Raipur centre is presented in the table 3.3.16. 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 17.9% with the application of 75 % RDF + Bio Zn + Bio NPK and 6.2% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c over 100% RDF only.

3.4.3 Zonal mean

Overall, on the zonal mean basis maximum soybean yield was registered with the 75 % RDF + Bio Zn + Bio NPK application followed by 75 % RDF + Rhizobium + MDSR14 +12c and 100% RDF. The yield of soybean increased by 3.6% with the application of 75 % RDF + Bio Zn + Bio NPK, 1.1% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c over 100% RDF (Table-3.3.16).

3.5 North Eastern Zone (Imphal and Medziphema):

3.5.1 Imphal

The data pertaining to seed yield of soybean for Imphal centre is presented in the table 3.3.21. The use of novel bio formulations significantly influenced the yield of soybean. At Imphal centre, the highest soybean yield was registered with application of 100% RDF followed by 75 % RDF + Rhizobium + MDSR14 + 12c and 75 % RDF Bio NPK. The yield of soybean increased by 33.5% with the application of 100% RDF only, 17.8% with the application of 75 % RDF + Rhizobium + MDSR14 + 12c as compared to control.

3.5.2 Medziphema

The yield data of soybean for Medziphema centre is presented in the table 3.3.21. At Medziphema centre, the maximum soybean yield was registered with the application of 75 % RDF + Bio NPK followed by 75 % RDF + Bio Zn + Bio NPK and then 100% RDF. The yield of soybean increased by 12.9% with the application of 75 % RDF + Bio NPK as compared to 100% RDF only.

3.5.3 Zonal mean

Overall, on the zonal mean basis the highest seed yield of soybean was registered with the application 75 % RDF + Bio NPK followed by 75 % RDF + Bio Zn + Bio NPK and 100% RDF only. The increase was 12.5% under 75% RDF + Bio NPK, 4% under 75% RDF + Bio Zn + Bio NPK application as compared to 100% RDF only (table 3.3.21).

4.AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems.

The sustainable management practices such as natural farming/organic farming/ integrated crop management for soybean based cropping systems were evaluated under field conditions with three replications in split plot design. (Table 3.4.1 to 3.4.20).

4.1. North Plain Zone (Ludhiana and Pantnagar)

Soybean yield didn’t vary significantly among the cropping systems at Ludhiana and Pantnagar center (Table 3.4.1). Among the management practices, the highest soybean yield was registered with Natural farming and integrated crop management practice at Ludhiana and Pantnagar respectively. Whereas, at Pantnagar, soybean yield was increased by 51.4% and 82.4% respectively under integrated crop management practices as compared to organic management and natural farming respectively. On the zonal mean basis, under integrated crop management practices the yield was increased by 15.8% and 14.7% as compared to organic farming and natural farming, respectively. Similarly, gross return, net return and B:C ratio was comparatively higher in integrated crop management practice. However, organic management reported higher cost of cultivation as compared to other crop management practices. (Table 3.4.1 to 3.4.4).

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

Soybean yield didn’t vary significantly among the cropping systems at Kota, Amravati center (Table 3.4.5). Among the management practices, the highest soybean yield was registered with integrated crop management practice at Kota, Amravati and Devgadh baria centers. At Kota, Amravati and Devgadh baria, the seed yield was increased by 0.97%, 30.6% and 16.9%, respectively under integrated crop management practices as compared to organic management practices and 17.7%, 56.2% and 10.3%, respectively as compared to natural farming. On the zonal mean basis, under integrated crop management practices the yield was increased by 15.9% and 27.7% as compared to organic farming and natural farming, respectively. Similarly, integrated crop management practice reported comparatively high gross return, net return and B:C ratio than other management practice at both the centers. However, the highest cost of cultivation was registered under organic management practices as compared to other management practice (Table 3.4.6 to 3.4.8).

4.3. Southern Zone (Pune, Adilabad and Dharwad)

Soybean yield didn’t vary significantly among the cropping systems at Pune, Adilabad and Dharwad center (Table 3.4.9). Among the management practices, the highest soybean yield was registered with integrated crop management practice at all the centers. At Pune, Adilabad and Dharwad, the seed yield was increased by 3.1%, 99.7% and 5.2%, respectively under integrated crop management practices as compared to organic management and 0.33%, 69.4% and 9.6%, respectively as compared to natural farming. On the zonal mean basis, under integrated crop management practices the yield was increased by 21.2% and 17.7% as compared to organic farming and natural farming, respectively. Similarly, cost of cultivation, gross return, net return and B:C ratio were comparatively high in integrated crop management practices than other management practices. (Table 3.4.10 to 3.4.12).

4.4. Eastern Zone (Ranchi and Raipur)

Soybean yield didn't vary significantly among the cropping systems at Raipur center (Table 3.4.13). Among the management practices, the highest soybean yield was registered with integrated crop management practice at both Ranchi and Raipur centers. At Ranchi and Raipur, the seed yield was increased by 10.8% and 12.1%, respectively under integrated crop management practices as compared to organic management and 38.6% and 48.4%, respectively as compared to natural farming. On the zonal mean basis, under integrated crop management practices the yield was increased by 11.2% and 41.4% as compared to organic farming and natural farming, respectively. Similarly, integrated crop management practice reported comparatively high gross return, net return and B:C ratio than other management practice at both the centers. However, the highest cost of cultivation was registered under organic management practices as compared to other management practice (Table 3.4.14 to 3.4.16).

4.5. North Eastern Zone (Imphal and Medziphema)

Soybean yield didn't vary significantly among the cropping systems at Imphal and Medziphema center (Table 3.4.17). Among the management practices, the highest soybean yield was registered with Natural farming and integrated crop management practice at Medziphema and Imphal respectively. At Imphal, soybean yield increased by 11.8% and 42.4% respectively under integrated crop management practices as compared to organic management and natural farming respectively. On the zonal mean basis, under integrated crop management practices the yield was increased by 8.5% and 19.9% as compared to organic farming and natural farming, respectively. Similarly, integrated crop management practice reported comparatively high gross return, net return other management practice at both the centers. However, the highest cost of cultivation was registered under organic management practices as compared to other management practice (Table 3.4.18 to 3.4.20).

Table 3.1.1

ASP-1/23. Evaluation of AVT II entries under different row spacing

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

Treatment	Sehore			Kota			Amrawati			Zonal mean		
	Row spacing											
Entries	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**
JS 23-09	1564	1008	1286	2080	2275	2177	1956	2647	2301	1867	1977	1921
JS 23-03	1728	1399	1564	2185	2184	2184	1642	2383	2012	1852	1989	1920
JS 20-34 (C)	1296	940	1118	1119	1293	1206	1598	1701	1649	1338	1311	1324
NRC – 138 (C)	1852	1420	1636	1998	2227	2113	1773	2047	1910	1874	1898	1886
NRC – 130 (C)	1872	1327	1600	1627	1465	1546	1565	1736	1651	1688	1509	1599
Mean	1662	1219		1802	1889		1707	2103		1724	1737	
Row spacing			66.29			NS			NS			-
Entries			166.11			187.85			261.85			-
Interaction			234.91			NS			NS			-

Table 3.1.2

ASP-1/23. Evaluation of AVT II entries under different row spacing (Zonal mean of Central zone)

Treatment	Dry matter (g/plant)			Mean CGR ($g/m^2/day$)		Mean RGR (g/g/day)		No. of branches /plant	No. of pods/ plant	100 seed weight (g)	Straw yield (kg/ha)	Harvest index (%)	Grain production efficiency (kg/ha/day)	RUE ($kgha^{-1}$ mm^{-1})
	30 DAS	45 DAS	60 DAS	30-45 DAS	45-60 DAS	30-45 DAS	45-60 DAS							
Row spacing														
30cm	2.74	6.55	12.61	9.96	16.75	0.031	0.040	3.02	32.79	10.33	1662	46.23	17.98	2.03
45cm	3.21	7.04	13.95	10.07	19.20	0.028	0.042	3.31	35.04	10.34	1858	45.76	18.12	2.20
Entries														
JS 23-09	3.02	6.94	14.02	10.23	19.63	0.043	0.044	3.41	35.33	10.24	2471	45.31	19.86	2.46
JS 23-03	3.13	6.94	13.90	9.94	19.20	0.040	0.043	3.35	37.47	11.03	2421	45.65	19.94	2.36
JS 20-34	2.74	6.32	11.79	9.36	15.43	0.043	0.041	2.73	27.25	10.43	1554	48.38	13.96	1.61
NRC - 138	3.04	6.93	14.42	10.21	20.89	0.042	0.046	3.25	36.71	8.86	2407	44.89	19.56	2.28
NRC - 130	2.95	6.86	12.29	10.33	14.72	0.045	0.033	3.09	32.78	11.13	1958	45.74	16.91	1.87

Table 3.1.3

ASP-1/23. Evaluation of AVT II entries under different row spacing

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

Treatment	**Raipur**			**Ranchi**			**Bhawanipatna**			**Zonal mean**		
	Row spacing											
Entries	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**	**30cm**	**45cm**	**Mean**
RSC 11-42	1839	2050	1944	1807	2376	2092	1718	1642	1680	1788	2023	1905
NRC 128 **(C)**	1731	1953	1842	1787	2370	2079	1549	1378	1464	1689	1900	1795
JS 20-116 **(C)**	1768	2028	1898	1756	2104	1930	1398	1239	1319	1641	1790	1716
AMS 2014-1 **(C)**	1666	1814	1740	1570	1906	1738	1307	1145	1226	1514	1622	1568
Mean	1751	1961		1730	2189		1493	1351		1658	1834	1751
Row spacing			90.12			399.044			NS			-
Entries			26.25			148.724			135.6			-
Interaction			63.31			NS			NS			-

Table 3.1.4

ASP-1/23. Evaluation of AVT II entries under different row spacing (Zonal mean of Eastern zone)

Treatment	**Dry matter (g/plant)**			**Mean CGR ($g/m^2/day$)**		**Mean RGR (g/g/day)**		**No. of branches /plant**	**No. of pods/ plant**	**100 seed weight (g)**	**Straw yield (kg/ha)**	**Harvest index (%)**	**Grain production efficiency (kg/ha/day)**	**RUE ($kgha^{-1} mm^{-1}$)**
	30 DAS	**45 DAS**	**60 DAS**	**30-45 DAS**	**45-60 DAS**	**30-45 DAS**	**45-60 DAS**							
Row spacing														
30cm	2.07	6.20	13.36	2.93	7.47	0.055	0.051	4.16	41.91	9.39	2587	40.40	16.82	2.21
45cm	2.36	7.41	16.12	2.50	5.48	0.245	0.052	4.55	47.37	9.80	1408	42.40	18.33	2.29
Entries														
RSC 11-42	2.43	6.97	15.31	2.28	6.48	0.050	0.052	4.51	50.67	9.60	2709	41.96	19.11	2.53
NRC 128	2.25	6.79	14.71	2.47	6.48	0.055	0.052	4.40	43.74	10.57	2584	42.17	17.97	2.32
JS 20-116	2.10	6.96	14.81	3.09	6.57	0.060	0.049	4.40	43.68	9.52	2574	40.85	17.48	2.17
AMS 2014-1	2.07	6.50	14.13	3.02	6.37	0.055	0.053	4.12	39.87	8.88	2434	40.61	15.74	1.99

Table 3.1.5

ASP-1/23. Evaluation of AVT II entries under different row spacing

Zone: North hill zone (Almora) **Design:** Split plot **Replications:** Three; Character**:** Seed yield (kg/ha)

Treatment	**Row spacing (cm)**		
Entry	**30**	**45**	**Mean**
NRC 197	1717.8	1622.2	1670.0
Palam early soya 1 **(C)**	1751.1	1825.3	1788.2
VLS 63 **(C)**	1628.0	1696.4	1662.2
VLS 89 **(C)**	1527.1	2031.1	1779.1
VLS 99 **(C)**	1923.6	2126.7	2025.1
Mean	1709.5	1860.4	
Row spacing (cm)			**165.7**
Entry			**133.2**
Interaction			**188.4**

Table 3.1.6

ASP-1/23. Evaluation of AVT II entries under different row spacing (North hill zone (Almora)**)**

Treatment	Branches/plant	Pods/ plant	Seed Index (g)	Dry weight/plant (g)			Straw yield (kg/ha)	HI (%)	Grain PE (kg/ha/day)
				30 DAS	45 DAS	60 DAS			
Row spacing (cm)									
30	3.9	72.9	15.8	7.3	13.8	21.7	2942	37.4	14.4
45	4.3	82.3	15.7	9.4	19.1	36.9	2801	41.2	15.6
SEm	0.22	2.27	0.44	0.38	1.43	2.94	343.9	2.4	0.43
CD(P=0.05)	0.59	7.80	1.16	1.24	4.91	9.91	982.8	6.4	1.33
Entries									
NRC 197	4.1	83.2	15.5	8.0	17.0	31.8	2922	37.1	13.9
PE Soya 1	3.6	64.9	14.8	7.0	12.4	24.6	2764	40.8	16.0
VLS 63	3.7	59.6	16.0	7.2	14.5	26.0	3074	35.6	14.3
VLS 89	4.2	80.4	16.3	9.3	17.6	29.7	2461	42.5	14.7
VLS 99	4.7	99.9	16.1	10.1	20.8	34.3	3136	40.6	16.2
SEm	0.22	4.15	0.47	0.59	1.28	2.62	304.4	2.3	0.37
CD (P=0.05)	0.66	12.45	1.35	1.77	3.85	7.87	912.8	7.2	1.116

Table 3.2.1

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity

Zone: North Plain Zone (Pantnagar, Ludhiana & New Delhi)

Variety: Delhi-DS 97 12 (Pusa 97); Pantnagar- PS 26; Ludhiana- SL 958

Treatment	Dr matter accumulations (per plant in gram)			Nodule dry weight (mg) at R5 stage	Chlorophyll content (SPAD meter) at R5 stage	No. of pods/ plant	100-seed weight (g)	Seed yield (kg/ha)	Biological yield (kg/ha)	Cost of cultivation (Rs.)	Gross returns (Rs.)	Net Returns (Rs.)	B:C ratio
	30 DAS	60 DAS	At harvest										
Weed Management Practices													
Diclosulam @ 26 g/ha	3.25	19.6	40.51	203.3	25.46	58.3	9.66	1793	7663	33606	90609	56846	2.70
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	3.99	22.5	42.50	236.1	26.45	60.5	9.89	1975	8125	39089	100088	60966	2.56
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	93.64	18.9	39.50	234.6	25.84	54.6	9.58	1799	7698	34680	90945	56265	2.62
Weedy check	2.30	13.9	30.35	110.1	23.67	40.8	8.88	1163	6398	31049	60088	32013	1.94
Weed-free check (2 hand weeding at 20 and 40 DAS)	4.40	24.0	44.03	276.9	26.09	65.6	10.00	2116	8371	43954	107214	63228	2.44
Microbial strains													
B. daqingense@ 10 g/kg seed	3.36	19.5	38.78	216.9	25.20	55.5	9.57	1764	7666	36479	89501	53022	2.45
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	3.40	20.1	39.65	218.4	25.61	56.2	9.65	1795	7671	36479	91186	54706	2.50
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	3.56	20.9	41.26	231.8	26.55	58.9	9.73	1889	7913	36671	95639	58968	2.61
Uninoculated	3.14	18.8	37.86	182.1	24.65	53.2	9.42	1630	7354	36271	82650	46379	2.28

Table 3.2.2

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity Zone: North Plain Zone

Treatment	Weed density (Nos)		Weed dry matter (g)		Weed control efficiency		Weed index
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS	
Weed Management Practices							
Diclosulam @ 26 g/ha	4.99	5.53	9.94	17.36	61.91	53.25	14.29
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	4.84	3.39	9.28	26.10	63.55	73.66	5.86
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	7.34	6.21	10.12	15.83	58.85	54.48	13.84
Weedy check	10.67	11.33	28.04	41.70	0.00	0.00	46.02
Weed-free check (2 hand weeding at 20 and 40 DAS)	2.99	3.07	5.43	12.36	79.06	79.07	0.00
Microbial strains							
B. daqingense @ 10 g/kg seed	6.08	5.72	12.47	18.16	52.38	52.23	16.32
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	6.21	5.71	12.49	17.98	53.80	54.46	15.40
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	6.04	5.93	12.46	18.27	52.23	50.82	15.59
Uninoculated	6.34	6.29	12.86	19.08	52.53	54.08	16.96

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity Zone: North Plain Zone **(Pantnagar centre) Soil data: Available N, P and K**

Treatment	Soil data: Initial N, P and K,			At harvest: N,P and K,		
	N (kg/ha)	P (kg/ha)	K (kg/ha)	N (kg/ha)	P (kg/ha)	K (kg/ha)
Weed Management Practices						
Diclosulam @ 26 g/ha	233.5	18.30	217.3	215.6	18.10	214.6
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	231.9	18.28	219.3	211.5	18.04	216.1
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	234.3	18.28	218.9	211.5	18.02	216.0
Weedy check	234.3	18.28	218.9	195.0	18.02	210.8
Weed-free check (2 hand weeding at 20 and 40 DAS)	234.3	18.28	218.9	213.0	18.02	216.0
SEm(±)	0.922	0.0187	0.27	1.24	0.048	0.98
CD	3.005	0.043	0.88	4.03	0.157	3.21
Microbial strains						
B. daqingense@ 10 g/kg seed	230.7	18.26	216.4	206.2	18.04	213.6
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	237.1	18.33	218.2	212.9	18.17	214.3
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	231.1	18.33	218.2	209.1	18.06	215.9
Uninoculated	235.8	18.21	221.9	208.8	17.89	215.09
SEm(±)	1.43	0.043	1.21	1.93	0.033	0.822
CD	4.13	0.126	3.49	5.58	0.094	2.37

Table 3.2.3

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity
Zone: Central Zone (Amravati, Devgadh baria, Kota, Sehore)
Variety: Amravati- AMS 100-39; Devgadh baria -NRC 37; Kota/Sehore-NRC 138

Treatment	**Dr matter accumulations (per plant in gram)**			**Nodule dry weight (mg) at R5 stage**	**Chlorophyll content (SPAD meter) at R5 stage**	**No. of pods/ plant**	**100- seed weight (g)**	**Seed yield (kg/ha)**	**Biological yield (kg/ha)**	**Cost of cultivation** (Rs.)	**Gross returns (Rs.)**	**Net Returns (Rs.)**	**B:C ratio**
	30 DAS	**60 DAS**	**At harvest**										
Weed Management Practices													
Diclosulam @ 26 g/ha	5.79	13.22	49.75	104.6	17.37	37.85	9.27	1620	3997	28842	83864	55022	2.91
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	6.54	15.16	46.50	111.1	18.14	40.18	9.42	1829	4472	33065	94639	61574	2.86
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	6.09	12.94	48.97	108.8	17.42	38.69	9.23	1651	4104	29679	88731	59052	2.99
Weedy check	5.43	13.34	51.78	102.7	17.95	34.64	9.34	1295	3207	27291	69718	42426	2.55
Weed-free check (2 hand weeding at 20 and 40 DAS)	6.06	14.57	57.94	116.0	17.63	42.87	9.59	1922	4694	34768	99753	64985	2.87
Microbial strains													
B. daqingense@ 10 g/kg seed	6.19	14.84	48.73	114.6	26.50	41.26	10.31	1782	4415	29988	84188	54201	2.81
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	6.91	15.85	53.31	116.7	26.89	43.98	10.35	1873	4603	30287	91096	60809	3.01
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	6.18	14.98	50.69	118.0	26.60	43.85	10.35	1895	4693	26538	85745	59207	3.23
Uninoculated	6.43	15.60	51.22	111.8	26.70	39.19	10.36	1748	4238	29692	89301	59285	3.01

Table 3.2.4

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity **Zone:** Central Zone

Treatment	Weed density (Nos)		Weed dry matter (g)		Weed control efficiency		Weed index
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS	
Weed Management Practices							
Diclosulam @ 26 g/ha	9.43	22.13	12.83	20.96	42.42	51.02	17.44
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	8.39	14.33	7.15	14.08	68.10	67.00	9.73
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	7.98	15.56	8.85	15.88	60.89	63.37	14.03
Weedy check	24.71	47.02	22.72	58.66	0.00	0.00	38.30
Weed-free check (2 hand weeding at 20 and 40 DAS)	5.45	10.39	6.35	9.26	71.46	81.47	0.00
Microbial strains							
B. daqingense @ 10 g/kg seed	11.91	22.82	12.51	24.09	48.41	50.53	15.63
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	10.34	20.33	10.68	22.46	47.30	52.72	15.83
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	9.44	18.35	9.76	21.50	52.42	54.81	15.03
Uninoculated	13.08	26.05	13.37	27.03	46.16	52.23	17.12

Table 3.2.5

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity **Zone:** Central Zone **(Kota centre)** **Soil data: Available Nutrient status**

Treatment	Initial N, P, K, Zn & Fe				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (ppm)	Fe (ppm)
Weed Management Practices					
Diclosulam @ 26 g/ha	250.15	23.87	348.45	0.555	3.86
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	250.78	24.01	349.36	0.559	3.87
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	250.26	24.00	348.84	0.556	3.87
Weedy check	250.38	24.11	349.53	0.559	3.90
Weed-free check (2 hand weeding at 20 and 40 DAS)	251.14	24.24	350.08	0.572	3.91
SEm(±)	0.18	0.05	0.23	0.003	0.01
CD (P=0.05)	NS	NS	NS	NS	NS
Microbial strains					
B. daqingense @ 10 g/kg seed	250.30	23.90	348.75	0.557	3.86
Bacillus aryabhataii (Zn & P-solubilizing bacteria) @ 10 g/kg seed	250.52	24.08	349.37	0.558	3.88
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	250.75	24.15	349.63	0.560	3.91
Uninoculated	250.59	24.05	349.25	0.566	3.87
SEm (±)	0.30	0.14	0.81	0.006	0.03
CD (P=0.05)	0.88	0.40	2.34	0.016	0.07
Interaction effect (Herbicides × Microbial trains)					
SEm(±)	0.43	0.20	1.14	0.008	0.04
CD (P=0.05)	NS	NS	NS	NS	NS

Table 3.2.6

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity **Zone:** Central Zone **(Kota centre)** **Soil data: Available Nutrient status**

Treatment	**At harvest: N, P, K, Zn and Fe**				
	N (kg/ha)	**P (kg/ha)**	**K (kg/ha)**	**Zn (ppm)**	**Fe (ppm)**
Weed Management Practices					
Diclosulam @ 26 g/ha	255.91	25.00	358.38	0.67	4.22
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	256.78	24.98	359.68	0.68	4.25
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	256.71	25.26	359.58	0.67	4.24
Weedy check	256.70	24.91	359.38	0.67	4.21
Weed-free check (2 hand weeding at 20 and 40 DAS)	256.88	25.27	359.53	0.68	4.26
SEm(±)	0.24	0.09	0.24	0.00	0.01
CD (P=0.05)	NS	NS	NS	NS	NS
Microbial strains					
B. daqingense @ 10 g/kg seed	256.27	24.98	358.76	0.67	4.22
Bacillus aryabhataii (Zn & P-solubilizing bacteria) @ 10 g/kg seed	257.06	25.20	359.58	0.68	4.25
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	257.06	25.22	359.79	0.69	4.24
Uninoculated	255.98	24.92	359.11	0.67	4.21
SEm(±)	0.42	0.17	0.41	0.002	4.26
CD (P=0.05)	1.23	NS	NS	0.01	0.01
Interaction effect (Herbicides × Microbial trains)					
SEm(±)	0.60	0.24	0.58	0.01	4.22
CD (P=0.05)	NS	NS	NS	NS	4.25

Table 3.2.7 (Kota centre)

Treatment	**Total nutrient uptake**				
	N (kg/ha)	**P (kg/ha)**	**K (kg/ha)**	**Zn (g/ha)**	**Fe(g/ha)**
Weed Management Practices					
Diclosulam @ 26 g/ha	222.23	12.96	108.59	97.70	369.84
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	252.63	14.91	123.37	109.46	413.72
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	239.41	13.93	116.79	104.04	392.87
Weedy check	148.86	8.57	73.94	65.65	251.61
Weed-free check (2 hand weeding at 20 and 40 DAS)	264.15	15.79	129.31	114.54	432.61
SEm(±)	3.11	0.20	1.51	1.21	4.47
CD (P=0.05)	9.55	0.63	4.64	3.70	13.70
Microbial strains					
B. daqingense @ 10 g/kg seed	222.48	13.01	108.84	97.21	368.17
Bacillus aryabhataii (Zn & P-solubilizing bacteria) @ 10 g/kg seed	230.01	13.54	112.42	100.18	377.84
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	240.50	14.30	117.97	104.34	393.23
Uninoculated	208.82	12.08	102.38	91.38	349.27
SEm(±)	3.47	0.26	2.03	1.45	5.94
CD (P=0.05)	10.05	0.75	5.89	4.21	17.21
Interaction effect (Herbicides × Microbial trains)					
SEm(±)	4.90	0.37	2.87	2.06	8.40
CD (P=0.05)	NS	NS	NS	NS	NS

Table 3.2.8

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity Zone: Central Zone **(Amrawati centre)** **Soil data: Available nutrient status**

Treatment	**At harvest: NPK, Zn and Fe**				
	N (kg/ha)	**P (kg/ha)**	**K (kg/ha)**	**Zn (ppm)**	**Fe (ppm)**
Weed Management Practices					
Diclosulam @ 26 g/ha	236.50	24.26	428.79	0.89	5.48
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	253.64	26.94	450.40	0.98	5.72
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	248.60	24.40	437.10	0.90	5.15
Weedy check	233.68	24.59	435.00	0.98	5.25
Weed-free check (2 hand weeding at 20 and 40 DAS)	254.77	28.40	467.32	1.03	5.41
SEm(±)	18.51	2.29	16.44	0.08	0.26
CD	60.36	7.45	53.59	0.25	0.84
Microbial strains					
B. daqingense @ 10 g/kg seed	244.71	24.56	442.53	0.94	5.29
Bacillus aryabhataii @ 10 g/kg seed	247.63	26.10	449.52	0.99	5.55
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	251.39	26.49	448.22	0.97	5.51
Uninoculated	238.02	25.73	434.62	0.92	5.27
SEm(±)	10.82	2.22	19.05	0.08	0.31
CD	31.23	6.40	55.01	0.24	0.90
Interaction effect (Herbicides × Microbial trains)					
SEm(±)	4.84	0.99	8.52	0.04	0.14
CD	NS	2.86	NS	0.11	0.40

Initial Nutrient Status in Soil: N- 184.5 kg/ha, P-23.9 kg/ha, K-390.2 kg/ha, Zn-0.72 ppm, Fe-5.21 ppm

Table 3.2.9 (Amravati centre)

Treatment	**Total nutrient uptake**				
	N (kg/ha)	**P (kg/ha)**	**K (kg/ha)**	**Zn (g/ha)**	**Fe (g/ha)**
Weed Management Practices					
Diclosulam @ 26 g/ha	144.63	16.60	107.82	2020	2455
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	166.65	22.33	150.42	2558	3294
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	152.42	20.30	132.14	2413	3029
Weedy check	125.05	17.20	115.33	2069	2375
Weed-free check (2 hand weeding at 20 and 40 DAS)	211.23	29.57	199.69	3680	4364
SEm(±)	15.48	3.65	16.24	360	325
CD	50.49	11.89	52.57	1175	1062
Microbial strains					
B. daqingense @ 10 g/kg seed	152.77	19.41	129.72	2293	3884
Bacillus aryabhataii @ 10 g/kg seed	163.96	21.92	147.52	2638	3296
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	183.94	25.28	164.25	3013	3621
Uninoculated	139.31	18.20	122.83	2249	2613
SEm(±)	17.90	2.46	15.68	346	464
CD	51.68	7.10	45.27	1000	1341
Interaction effect (Herbicides × Microbial trains)					
SEm(±)	**8.00**	**1.10**	**7.01**	**154.97**	**207.73**
CD	**NS**	**3.18**	**NS**	**NS**	**NS**

Table 3.2.10

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity

Zone: North Eastern Zone **(Ranchi, Raipur; Variety: -JS 97-52**

Treatment	Dry matter accumulations (per plant in gram)			Nodule dry weight (mg) at R5 stage	Chlorophyll content (SPAD meter) at R5 stage	No. of pods/ plant	100-seed weight (g)	Seed yield (kg/ha)	Biological yield (kg/ha)	Cost of cultivation (Rs.)	Gross returns (Rs.)	Net Returns (Rs.)	B:C ratio
	30 DAS	60 DAS	At harvest										
Weed Management Practices													
Diclosulam @ 26 g/ha	3.14	13.6	26.51	145.56	33.60	46.1	10.18	1925	5760	41702	86999	45298	2.09
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	2.78	16.4	34.70	149.79	34.46	55.9	10.53	2424	6650	50039	113487	63407	2.27
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	3.59	14.7	28.92	161.59	34.17	49.9	10.33	2180	6249	43439	105207	61768	2.42
Weedy check	2.74	12.7	23.35	134.70	32.35	37.4	9.86	815	3488	40063	38340	16833	0.96
Weed-free check (2 hand weeding at 20 and 40 DAS)	3.00	16.9	33.93	154.58	35.09	55.3	10.53	2442	6618	51509	114290	62781	2.22
Microbial strains													
B. daqingense@ 10 g/kg seed	3.17	14.7	31.14	156.94	34.09	49.3	10.31	1923	5781	45336	92956	47620	2.05
Bacillus aryabhataii @ 10 g/kg seed	2.93	15.2	27.52	149.03	34.26	48.5	10.14	1972	5741	45342	90645	45310	2.00
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	3.32	15.6	30.44	172.80	34.90	50.9	10.62	2095	5999	45445	98597	53146	2.17
Uninoculated	2.78	13.9	28.62	118.20	32.49	46.9	10.06	1794	5411	45278	84460	39159	1.87

Table 3.2.11

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity Zone: North Eastern Zone

Treatment	**Weed density (Nos)**		**Weed dry matter (g)**		**Weed control efficiency**		**Weed index**
	30 DAS	**60 DAS**	**30 DAS**	**60 DAS**	**30 DAS**	**60 DAS**	
Weed Management Practices							
Diclosulam @ 26 g/ha	34.34	49.75	11.46	54.31	57.67	35.09	25.03
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	33.62	20.00	11.39	8.68	80.35	81.17	2.54
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	11.53	29.54	4.66	33.47	57.20	60.83	8.23
Weedy check	65.94	84.68	31.47	85.06	0.00	0.00	66.40
Weed-free check (2 hand weeding at 20 and 40 DAS)	7.96	16.87	5.67	7.65	82.74	81.68	0.00
Microbial strains							
B. daqingense @ 10 g/kg seed	30.10	39.82	12.94	36.45	55.64	52.59	19.98
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	31.26	40.73	13.16	40.39	56.81	53.24	19.45
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	30.40	37.88	12.35	33.89	54.98	49.93	20.66
Uninoculated	30.95	42.25	13.28	40.60	54.94	51.32	21.57

Table 3.2.12

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity

Zone: Eastern **Centre:** Ranchi **Character:** Soil data: Available nutrient status

Treatment	**N, P, K, Zn and Fe At harvest**				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (ppm)	Fe (ppm)
Weed Management Practices					
Diclosulam @ 26 g/ha	270.17	21.83	165.25	2.18	12.29
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	272	22.58	167	2.18	12.67
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	273.33	22.33	168.33	2.22	13
Weedy check	269.92	21.75	164.92	2.17	12.08
Weed-free check (2 hand weeding at 20 and 40 DAS)	272.33	22.58	167.67	2.19	12.92
SEm(±)	0.52	0.22	0.53	0.02	0.32
CD	1.7	0.72	1.71	NS	NS
Microbial strains					
B. daqingense @ 10 g/kg seed	271.8	22.13	166.87	2.2	12.77
Bacillus aryabhataii (Zn & P-solubilizing bacteria) @ 10 g/kg seed	271.6	22.33	166.6	2.21	12.67
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	272.4	22.6	167.67	2.2	12.8
Uninoculated	270.4	21.8	165.4	2.14	12.13
SEm(±)	0.61	0.3	0.57	0.03	0.24
CD	1.75	0.86	1.65	NS	NS
Interaction effect (Herbicides × Microbial trains)					
SEm(±)	1.35	0.66	1.28	0.06	0.54
CD	NS	NS	NS	NS	NS
*Initial (N, P, K, Zn and Fe)	266.5	21.05	169.8	2.1	12.1

Initial Nutrient Status in Soil: N- 266.5kg/ha, P-21.05kg/ha, K-169.8kg/ha, Zn-2.1ppm, Fe-12.1ppm

Table 3.2.13

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity;
Zone: North Eastern Hill Zone (Imphal, Medziphema)
Variety: Imphal- MACS 1460; Medziphema- MACS 1460

Treatment	Dry matter accumulations (per plant in gram)			Nodule dry weight (mg) at R5 stage	Chlorophyll content (SPAD meter) at R5 stage	No. of pods/ plant	100-seed weight (g)	Seed yield (kg/ha)	Biological yield (kg/ha)	Cost of cultivation (Rs.)	Gross returns (Rs.)	Net Returns (Rs.)	B:C ratio
	30 DAS	60 DAS	At harvest										
Weed Management Practices													
Diclosulam @ 26 g/ha	1.31	7.34	12.85	145.96	38.92	44.67	11.07	1232	3541	42516	105691	63176	2.49
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	1.38	7.83	12.66	150.50	36.46	45.52	11.59	1380	3626	49726	110181	66216	2.21
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	1.31	7.06	12.53	148.71	37.64	43.52	10.99	1309	3400	45061	99488	54428	2.22
Weedy check	0.90	5.68	9.89	139.13	26.10	33.44	10.69	942	2747	40988	75783	34796	1.85
Weed-free check (2 hand weeding at 20 and 40 DAS)	1.19	7.30	12.12	178.67	36.99	42.58	11.74	1422	3603	55832	115941	54350	2.08
Microbial strains													
B. daqingense@ 10 g/kg seed	1.18	7.32	12.07	151.50	35.71	43.10	11.31	1247	3434	46824	104395	57571	2.23
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	1.21	6.94	12.20	162.07	35.20	42.59	11.04	1291	3356	46824	100910	54086	2.16
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	1.25	7.03	12.16	170.63	35.52	43.64	11.55	1335	3499	46824	108304	61479	2.31
Uninoculated	1.23	6.89	11.51	126.17	34.47	38.36	11.00	1154	3244	46824	92060	45236	1.97

Table 3.2.14

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity
Zone: North Eastern Hill Zone

Treatment	Weed density (Nos)		Weed dry matter (g)		Weed control efficiency		Weed index
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS	
Weed Management Practices							
Diclosulam @ 26 g/ha	4.58	6.09	2.03	4.47	37.5	57.54	13.79
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	4.28	4.12	2.38	2.4	51.65	68.1	13.41
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	6.89	7.49	2.5	6.18	49.65	45.04	19.77
Weedy check	9.01	9.63	4.25	9.97	0.00	0.00	42.64
Weed-free check (2 hand weeding at 20 and 40 DAS)	1.59	2.15	1.16	1.31	57.15	73.31	0.00
Microbial strains							
B. daqingense @ 10 g/kg seed	5.3	5.96	2.46	5.06	30	51.76	21.68
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	5.09	5.79	2.45	4.64	33	53.73	20.38
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	5.12	6.04	2.35	4.67	43	54.22	17.50
Uninoculated	5.56	5.88	2.59	5.1	26	47.73	22.67

Table 3.2.15

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity
Zone: North Eastern Hill Zone**; Soil data: Available nutrient status;** **Centre:** Medziphema

Treatment	Soil data: Initial N, P, K, Zn and Fe		
	N (kg/ha)	P (kg/ha)	K (kg/ha)
Weed Management Practices			
Diclosulam @ 26 g/ha	205.95	13.34	154.29
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	210.90	13.47	155.53
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	203.58	13.47	153.05
Weedy check	204.81	13.62	153.33
Weed-free check (2 hand weeding at 20 and 40 DAS)	208.47	13.23	156.98
SEm(±)	2.74	0.19	**2.13**
CD	**NS**	NS	**NS**
Microbial strains			
B. daqingense @ 10 g/kg seed	204.81	13.09	153.71
Bacillus aryabhataii (Zn & P-solubilizing bacteria) @ 10 g/kg seed	205.74	13.59	155.98
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	210.86	13.38	153.11
Uninoculated	205.55	13.64	155.75
SEm(±)	**2.29**	**0.17**	**1.86**
CD	**NS**	**NS**	**NS**
Interaction effect (Herbicides × Microbial trains)			
SEm(±)	5.11	0.39	4.16
CD	NS	NS	NS

Table 3.2.16

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity
Zone: Southern Zone (Adilabad, Dharwad, Pune)
Variety: Adilabad-JS 335; Dharwad-DSb 34, Pune-MACS 1460

Treatment	Dr matter accumulations (per plant in gram)			Nodule dry weight (mg) at R5 stage	Chlorophyll content (SPAD meter) at R5 stage	No. of pods/ plant	100-seed weight (g)	Seed yield (kg/ha)	Biological yield (kg/ha)	Cost of cultivation (Rs.)	Gross returns (Rs.)	Net Returns (Rs.)	B:C ratio
	30 DAS	60 DAS	At harvest										
Weed Management Practices													
Diclosulam @ 26 g/ha	5.20	30.46	37.72	96.62	46.33	39.10	13.00	2388	5318	49412	107147	57734	2.17
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	5.20	31.63	39.46	100.63	46.75	43.10	13.11	2625	5877	53351	118408	65057	2.22
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	5.44	31.92	40.49	99.65	47.01	42.23	13.14	2617	6033	51288	117475	66187	2.29
Weedy check	5.54	29.23	35.25	99.40	46.43	35.67	13.18	1886	5469	47378	83783	36405	1.77
Weed-free check (2 hand weeding at 20 and 40 DAS)	5.75	33.40	41.10	113.84	47.84	49.57	12.98	2813	6382	53418	126529	73111	2.37
Microbial strains													
B. daqingense@ 10 g/kg seed	5.57	31.70	39.93	101.80	46.60	42.00	13.26	2433	5610	50852	109910	59057	2.16
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	5.57	31.93	39.25	103.01	47.47	43.47	12.95	2514	5838	50881	112824	61943	2.22
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	5.45	31.07	38.29	103.75	47.47	44.83	13.12	2677	6077	51294	119173	67880	2.32
Uninoculated	5.12	30.60	37.73	98.27	45.95	37.17	13.03	2241	6738	50851	100767	49916	1.98

Table 3.2.17

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity Zone: Southern Zone

Treatment	Weed density (Nos)		Weed dry matter (g)		Weed control efficiency		Weed index
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS	
Weed management practices							
Diclosulam @ 26 g/ha	18.23	17.63	12.80	13.09	47.38	50.03	17.35
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	14.60	14.60	9.91	11.18	60.45	54.11	8.23
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	23.90	18.15	14.37	13.50	38.64	41.95	9.07
Weedy check	28.49	23.42	17.81	18.19	0.00	0.00	34.11
Weed-free check (2 hand weeding at 20 and 40 DAS)	9.12	10.29	6.82	7.29	74.29	71.59	0.00
Microbial strains							
B. daqingense @ 10 g/kg seed	17.86	16.66	12.40	12.22	46.67	43.52	14.09
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	18.73	16.75	11.80	12.37	47.51	48.24	12.38
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	19.50	16.77	12.37	13.13	45.29	45.22	14.44
Uninoculated	19.44	17.09	12.80	12.83	43.28	41.27	15.6

Table 3.2.18

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity

Zone: Southern Zone**; Soil Data: available nutrient status; Centre:** Adilabad

Treatment	Soil data: Initial N, P, K, Zn and Fe				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (ppm)	Fe (ppm)
Weed Management Practices					
Diclosulam @ 26 g/ha	237.0	48.4	361.4	0.48	3.87
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	228.0	50.3	362.7	0.47	3.83
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	238.8	48.0	361.8	0.47	3.77
Weedy check	233.5	48.6	361.9	0.49	3.81
Weed-free check (2 hand weeding at 20 and 40 DAS)	234.2	49.0	362.1	0.52	3.92
S.Em.(±)	5.78	1.91	4.15	0.01	0.06
CD (at 5%)	NS	NS	NS	NS	NS
Microbial strains					
B. daqingense @ 10 g/kg seed	235.0	49.5	368.9	0.45	3.78
Bacillus aryabhataii (Zn & P-solubilizing bacteria) @ 10 g/kg seed	232.0	48.4	361.7	0.50	3.87
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	241.8	47.5	353.2	0.50	3.78
Un-inoculated	229.0	50.1	364.2	0.48	3.93
S.Em.(±)	5.45	1.57	4.45	0.02	0.07
CD (at 5%)	NS	NS	NS	NS	NS
Interaction effect (Herbicides × Microbial trains)					
S.Em.(±)	11.5	3.82	8.30	0.03	0.12
CD (at 5%)	NS	NS	NS	NS	NS

Table 3.2.19

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity

Zone: Southern Zone**; Soil Data: available nutrient status; Centre:** Adilabad

Treatment	Soil data: At harvest: N P K, Zn and Fe				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (ppm)	Fe (ppm)
Weed Management Practices					
Diclosulam @ 26 g/ha	242.5	52.7	367.5	0.53	3.85
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	236.0	54.0	370.5	0.51	3.77
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	249.5	51.5	370.4	0.49	3.75
Weedy check	246.9	52.8	373.5	0.56	3.80
Weed-free check (2 hand weeding at 20 and 40 DAS)	246.2	54.2	374.5	0.61	3.85
S.Em.(±)	4.12	1.38	2.26	0.02	0.09
CD (at 5%)	NS	NS	NS	NS	NS
Microbial strains					
B. daqingense @ 10 g/kg seed	246.2	53.7	375.7	0.53	3.79
Bacillus aryabhataii @ 10 g/kg seed	243.4	53.6	372.8	0.54	3.80
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	232.7	52.4	365.2	0.55	3.81
Un-inoculated	232.7	52.6	371.4	0.54	3.83
S.Em.(±)	4.18	1.28	4.17	0.02	0.04
CD (at 5%)	12.1	NS	NS	NS	NS
Interaction effect (Herbicides × Microbial trains)					
S.Em.(±)	8.24	2.77	4.53	0.05	0.18
CD (at 5%)	NS	NS	NS	NS	NS

Table 3.2.20

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity

Zone: Southern Zone**; Plant nutrient uptake; Centre:** Adilabad

Treatment	Total nutrient uptake				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (g/ha)	Fe (g/ha)
Weed Management Practices					
Diclosulam @ 26 g/ha	165.2	28.7	55.0	132.5	771.4
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	154.5	30.0	56.1	135.0	772.9
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	170.1	27.5	56.0	135.3	727.3
Weedy check	166.2	28.8	59.2	136.1	726.9
Weed-free check (2 hand weeding at 20 and 40 DAS)	163.4	30.2	60.1	138.5	740.6
S.Em.(±)	5.25	1.38	2.50	3.70	19.2
CD (at 5%)	NS	NS	NS	NS	NS
Microbial strains					
B. daqingense @ 10 g/kg seed	167.8	29.7	62.8	132.1	786.8
Bacillus aryabhataii @ 10 g/kg seed	158.2	29.7	58.5	134.4	742.2
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	171.7	28.4	50.8	140.0	744.2
Un-inoculated	157.9	28.6	57.0	135.4	718.1
S.Em.(±)	4.73	1.28	4.09	3.55	17.5
CD (at 5%)	NS	NS	NS	NS	NS
Interaction effect (Herbicides × Microbial trains)					
S.Em.(±)	10.50	2.77	5.01	7.41	38.5
CD (at 5%)	NS	NS	NS	NS	NS

Table 3.2.21

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity; Zone: Southern Zone **Centre:** Dharwad

Treatment	**Soil at harvest**				
	N (kg/ha)	**P (kg/ha)**	**K (kg/ha)**	**Zn (mg/kg)**	**Fe (mg/kg)**
Weed Management Practices					
Diclosulam @ 26 g/ha	249.0	25.4	302.5	0.86	9.01
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	252.9	26.0	333.1	0.92	9.67
Propaquizafop 2.5% + Imazethapyr 3.75% at 2.0 l/ha at 15-20 DAS	251.4	26.7	317.6	0.87	9.20
Weedy check	241.2	19.4	270.8	0.75	7.84
Weed-free check (2 hand weeding at 20 and 40 DAS)	249.9	25.5	336.7	0.93	9.78
SEm (±)	**1.1**	**0.2**	**7.3**	**0.02**	**0.22**
CD	**3.5**	**0.7**	**24.0**	**0.07**	**0.73**
Microbial strains					
B. daqingense@ 10 g/kg seed	249.8	25.3	323.9	0.91	9.55
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	251.1	25.4	319.2	0.88	9.27
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	246.1	25.0	316.8	0.87	9.20
Uninoculated	248.6	22.8	288.6	0.80	8.37
SEm (±)	**1.2**	**0.2**	**4.6**	**0.02**	**0.16**
CD	**3.4**	**0.5**	**13.2**	**0.05**	**0.47**
Interaction effect (Herbicides × Microbial trains)					
SEm (±)	**2.6**	**0.4**	**10.2**	**0.04**	**0.36**
CD	**7.6**	**1.1**	**29.5**	**0.10**	**1.04**

Table 3.2.22

AGRON 2/23: Assessing the impact of herbicides with PGPR on soybean productivity; Zone: Southern Zone **Centre:** Dharwad

Treatment	**Crop uptake data : Total (seed + straw) N, P, K, Zn and Fe at harvest**				
	N (kg/ha)	**P (kg/ha)**	**K (kg/ha)**	**Zn (g/ha)**	**Fe (g/ha)**
Weed Management Practices					
Diclosulam @ 26 g/ha	95.3	12.09	74.9	942.4	2597.7
Diclosulam @ 26 g/ha + One hand weeding at 40 DAS	96.8	12.28	75.0	1013.4	2792.7
Propaquizafop 2.5% + Imazethapyr 3.75%at 2.0 l/ha at 15-20 DAS	96.2	12.21	78.4	968.5	2668.4
Weedy check	88.1	11.14	70.1	820.4	2223.0
Weed-free check (2 hand weeding at 20 and 40 DAS)	95.6	12.45	83.5	1024.2	2822.7
SEm(±)	**1.2**	**0.20**	**2.8**	**24.7**	**69.7**
CD	**4.0**	**0.65**	**9.0**	**80.7**	**227.4**
Microbial strains					
B. daqingense@ 10 g/kg seed	94.6	11.99	82.0	1001.7	2764.7
Bacillus aryabhataii(Zn & P-solubilizing bacteria) @ 10 g/kg seed	95.6	12.28	78.4	971.9	2677.5
B. daqingense @ 10 g/kg seed + *Bacillus aryabhataii* @ 10 g/kg seed (Consortia)	93.8	11.98	78.4	964.1	2656.8
Uninoculated	93.7	11.87	66.7	877.4	2384.6
SEm(±)	**0.6**	**0.10**	**3.1**	**15.9**	**44.3**
CD	**1.7**	**0.30**	**9.0**	**46.0**	**127.9**
Interaction effect (Herbicides × Microbial trains)					
SEm(±)	**1.3**	**0.23**	**7.0**	**35.6**	**99.0**
CD	**3.7**	**0.67**	**20.2**	**102.9**	**286.0**

Table 3.3.1

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Southern**)**
Variety: Adilabad-JS 335; Dharwad- DSb 21, Pune- DSb 21

Treatment	**Seed yield(kg/ha)**			
	Adilabad	Dharwad	Pune	Mean
Control	1856	2311	2341	2169
RDF only	2487	2809	3639	2978
75 % RDF	2117	2473	3458	2683
75 % RDF + Bio Zn	2244	2560	3564	2789
75 % RDF + Bio NPK	2377	2609	3581	2856
75 % RDF + Bio Zn + Bio NPK	2460	2634	3605	2900
75 % RDF + Rhizobium + MDSR14 + 12c	2680	2670	3668	3006
SEm±	157.0	89	110.75	
CD (P=0.05)	489.2	275	341.16	

12c= *Burkholderia arboris*-High P solubilizing

Table 3.3.2

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Southern**)**

Treatment	**Pods/ plant**	**Seed index**	**Seed yield (kg/ha)**	**Biological (kg/ha)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Control	40.46	12.84	2169	6310	41110	99330	58220	2.42
RDF only	54.61	13.53	2978	7221	49408	134180	84772	2.72
75 % RDF	44.79	13.33	2683	6828	43763	120215	76452	2.75
75 % RDF + Bio Zn	47.26	13.23	2789	6902	44466	125048	80582	2.81
75 % RDF + Bio NPK	49.73	13.31	2856	7093	45384	128182	82798	2.82
75 % RDF + Bio Zn + Bio NPK	51.80	13.36	2900	7057	46417	130578	84161	2.81
75 % RDF + Rhizobium + MDSR14 + 12c	56.81	13.29	3006	7278	46112	135009	88897	2.93

(12c= *Burkholderia arboris*-High P solubilizing)

Table 3.3.3

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Southern)

Treatment	**Plant dry weight (g)**			**Nodule parameters at R2**			**Nodule parameters at R5**		
	30 DAS	**45 DAS**	**60 DAS**	**Numbers**	**Fresh weight (mg)**	**Dry weight (mg)**	**Numbers**	**Fresh weight (mg)**	**Dry weight (mg)**
Control	4.63	16.05	30.51	25.30	72.27	25.66	30.41	68.34	17.24
RDF only	6.24	20.58	38.97	33.27	85.87	31.80	39.68	84.03	24.86
75 % RDF	4.96	17.08	31.41	30.93	75.49	24.91	35.19	73.27	19.31
75 % RDF + Bio Zn	5.02	16.91	33.22	33.19	79.41	26.45	38.44	79.35	20.87
75 % RDF + Bio NPK	5.36	17.73	33.52	30.60	81.42	27.32	42.74	84.03	22.19
75 % RDF+Bio Zn+Bio NPK	5.35	19.35	35.55	35.84	84.10	29.01	43.98	86.50	24.77
75 % RDF + Rhizobium + MDSR14 + 12c	5.58	20.26	37.03	39.10	89.42	29.87	46.94	88.02	26.21

(12c= *Burkholderia arboris*-High P solubilizing)

Table 3.3.4

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

Zone: Southern **Centre:** Adilabad **Character:** Soil and plant data: Available nutrient status and nutrient uptake

Treatments	Soil data: Initial					Soil data: at harvest					Crop uptake: at harvest				
	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (g/ha)	Fe (g/ha)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (g/ha)	Fe (g/ha)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (g/ha)	Fe (g/ha)
Control	245	55.1	354	0.54	3.67	256	52.9	329	0.55	3.55	144	20.2	48.2	112	626
RDF only	250	50	372	0.47	3.97	239	58.7	347	0.66	3.96	211	24.4	62	143	804
75 % RDF	240	61.7	345	0.58	3.74	242	52.8	363	0.52	4	159	17.7	48.2	121	723
75 % RDF + Bio Zn	277	57.9	355	0.55	3.8	221	60.8	349	0.63	3.67	166	19.3	52	129	757
75 % RDF + Bio NPK	243	54.7	372	0.53	3.72	236	43.7	382	0.52	3.77	179	20.4	55.4	137	776
75 % RDF + Bio Zn + Bio NPK	256	53.3	353	0.78	3.65	263	49.3	351	0.44	3.69	188	22.2	57.1	138	781
75 % RDF + Rhizobium + MDSR14 + 12c	252	54.5	327	0.65	4.19	242	58.9	36	0.62	3.57	207	23.2	63.7	150	799
S.Em.±	28.3	5.1	21.2	0.06	0.3	15.8	4.38	24.9	0.04	0.22	15.2	1.5	4.49	11.5	42.4
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

12c= *Burkholderia arboris*-High P solubilizing

Table 3.3.5

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

Zone: Southern **Centre:** Dharwad Character**:** Soil and plant data: Available nutrient status and nutrient uptake

	Available nutrient of soil at harvest					Crop uptake at harvest				
Treatment	**N (Kg/ha)**	**P (Kg/ha)**	**K (Kg/ha)**	**Zn (mg/kg)**	**Fe (mg/kg)**	**N (Kg/ha)**	**P (Kg/ha)**	**K (Kg/ha)**	**Zn (g/ha)**	**Fe (g/ha)**
Control	250	15.9	308	0.62	8.63	84	12.27	70.72	1069	1877
RDF only	219	18.8	343	0.75	9.57	104.36	18.04	92.92	1580	3893
75 % RDF	249	17.5	336	0.71	9.46	84.13	13.27	74.26	1137	2897
75 % RDF + Bio Zn	235	17.9	322	0.73	9.65	86.81	13.51	77	1275	3147
75 % RDF + Bio NPK	225	17.7	326	0.71	9.52	94.43	13.7	80.94	1361	3321
75 % RDF + Bio Zn + Bio NPK	233	17.9	313	0.63	9.26	100.54	16.57	87.19	1500	3620
75 % RDF + Rhizobium + MDSR14 + 12c	222	17.9	317	0.74	9.54	101.76	17.53	88.1	1506	3732
SEm	6	0.5	9	0.04	0.26	2.55	0.58	2.31	48	97
CD (P=0.05)	19	1.5	28	0.12	0.8	7.87	1.79	7.12	149	300

Table 3.3.6

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Central**)**
Variety: Amravati- JS 95-60; Devgadh baria -NRC 37; Kota- JS 20-34; Sehore

Treatment	Seed yield(kg/ha)				
	Sehore	Kota	Amravati	Devgadh Baria	Mean
Control	910	1215	963	1341	1107
RDF only	1080	1481	1509	1575	1411
75 % RDF	1049	1582	1266	1399	1324
75 % RDF + Bio Zn	1111	1640	1568	1455	1444
75 % RDF + Bio NPK	1182	1520	1900	1476	1520
75 % RDF + Bio Zn + Bio NPK	1204	1605	1919	1538	1567
75 % RDF + Rhizobium + MDSR14 + 12c	1096	1693	2076	1752	1654
SEm±	137	60.11	96.37	60.16	
CD (P=0.05)	423	185.28	296.94	178.8	

Table 3.3.7

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Central**)**

Treatment	Pods/ plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Control	24.62	9.88	1107	1397	2558	27944	57181	29237	2.05
RDF only	34.81	10.26	1411	1725	3174	31597	74064	42467	2.34
75 % RDF	29.18	10.17	1324	1571	2903	29872	68928	39056	2.31
75 % RDF + Bio Zn	31.24	10.30	1444	1688	3132	30666	75540	44874	2.46
75 % RDF + Bio NPK	31.37	10.54	1520	1801	3305	31027	79212	48185	2.55
75 % RDF + Bio Zn + Bio NPK	34.19	10.58	1567	1820	3336	31309	81982	50673	2.62
75 % RDF + Rhizobium + MDSR14 + 12c	39.73	10.80	1654	2119	3653	31290	89467	58177	2.86

Table 3.3.8

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Central)

Treatment	Plant dry weight (g)			Nodule parameters at R2			Nodule parameters at R5		
	30 DAS	45 DAS	60 DAS	Numbers	Fresh weight (mg)	Dry weight (mg)	Numbers	Fresh weight (mg)	Dry weight (mg)
Control	2.49	6.59	10.70	26.45	158	27.92	22.89	133	20.8
RDF only	2.82	7.24	11.25	32.44	206	36.48	27.89	181	28.4
75 % RDF	2.75	7.14	11.48	31.44	206	35.78	28.55	186	29.6
75 % RDF + Bio Zn	2.78	7.44	11.78	32.67	219	39.14	29.78	195	30.6
75 % RDF + Bio NPK	2.78	7.58	11.50	37.22	266	51.53	29.67	194	30.1
75 % RDF + Bio Zn + Bio NPK	2.85	7.44	11.43	40.33	295	57.11	30.55	204	31.5
75 % RDF + Rhizobium + MDSR14 + 12c	2.90	7.89	12.19	42.44	314	60.82	32.78	207	33.4

Table 3.3.9

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Central**; Centre**: ARS, Kota**)**

Treatment	Initial nutrient status					Available Nutrient status at harvest					Crop uptake 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)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (g/ha)	Fe (g/ha)
Control	249	23.4	347	0.55	3.77	253	24.1	356	0.655	4.04	75	6.38	55.4	50.6	195
RDF only	249	23.7	348	0.551	3.84	258	25.5	361	0.685	4.27	95	8.65	69.6	63.0	239
75 % RDF	251	23.9	349	0.553	3.87	256	25.1	359	0.667	4.17	102	9.37	76.5	68.1	258
75 % RDF + Bio Zn	251	24.3	350	0.567	3.94	256	25.3	359	0.67	4.19	107	10.02	80.3	70.7	267
75 % RDF + Bio NPK	250	23.9	349	0.552	3.83	256	25.2	360	0.675	4.2	98	8.8	72.3	64.8	245
75 % RDF + Bio Zn + Bio NPK	251	24.1	349	0.564	3.91	257	25.3	360	0.677	4.21	104	9.68	78.4	69.2	261
75 % RDF + Rhizobium + MDSR14 + 12c	252	24.6	352	0.568	3.96	258	25.4	360	0.68	4.26	112	10.58	83.7	73.2	275
SEm	0.65	0.22	1.29	0.005	0.04	0.69	0.32	0.52	0.005	0.04	4.28	0.39	2.91	2.4	8.37
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	13.19	1.2	8.96	7.41	25.8

Table 3.3.10

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Central **Centre:** RRC, Amravati**)**

Character: Soil and plant data: Available nutrient status and nutrient uptake

Treatment	Available nutrient of soil at harvest					Crop uptake at harvest				
	N (Kg/ha)	P_2O_5 (Kg/ha)	K_2O (Kg/ha)	Zn (ppm)	Fe (ppm)	N (Kg/ha)	P (Kg/ha)	K (Kg/ha)	Zn (ppm)	Fe (ppm)
Control	192	19.5	411	0.76	4.8	68	7.3	46	803	1025
RDF only	239	25.8	445	1.02	5.5	108	12.2	75	1345	1800
75 % RDF	243	25.0	428	0.96	5.8	93	9.9	63	1274	1359
75 % RDF + Bio Zn	244	26.8	447	0.85	5.8	118	12.8	99	1769	1743
75 % RDF + Bio NPK	249	26.7	451	1.05	5.9	143	15.9	126	1920	2452
75 % RDF + Bio Zn + Bio NPK	254	27.3	457	0.97	5.9	155	19.4	138	2476	2743
75 % RDF + Rhizobium + MDSR14 + 12c	263	29.1	468	1.06	5.9	174	25.1	153	2569	3320
SE(m)±	**10.03**	**0.95**	**10.9**	**0.03**	**0.13**	**8.04**	**1.07**	**7.58**	**152.71**	**159.03**
CD (P=0.05)	**30.9**	**2.93**	**33.58**	**0.09**	**0.39**	**24.77**	**3.31**	**23.25**	**470.52**	**489.98**
CV %	**7.22**	**6.4**	**4.25**	**5.44**	**3.88**	**14.11**	**12.71**	**13.13**	**15.23**	**13.35**

Initial Nutrient Status in Soil: N- 186.3 kg/ha, P-23.4 kg/ha, K-392.3 kg/ha, Zn-0.7ppm, and Fe-5.17ppm

Table 3.3.11

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

(Zone: North Plain Zone**)**

Variety: Delhi- SL 958; Pantnagar- PS 1347; Ludhiana- SL 958

Treatment	Seed yield(kg/ha)			
	Delhi	Pantnagar	Ludhiana	Mean
Control	1025	1217	2146	1463
RDF only	2044	1939	2326	2103
75 % RDF	1583	1656	2244	1828
75 % RDF + Bio Zn	1819	1643	2254	1905
75 % RDF + Bio NPK	1875	1689	2324	1963
75 % RDF + Bio Zn + Bio NPK	2137	1783	2604	2175
75 % RDF + Rhizobium + MDSR14 + 12c	1861	1827	2598	2095
SEm±	90	106.819	174	
CD (P=0.05)	278	329.08	NS	

Table 3.3.12

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

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

Treatment	Pods/ plant	Seed index	Seed yield (kg/ha)	Biological (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Control	52.08	10.19	1463	5636	33441	72480	39039	2.17
RDF only	72.24	11.06	2103	7107	38588	105102	66514	2.72
75 % RDF	66.23	10.60	1828	6605	36915	91429	54514	2.48
75 % RDF + Bio Zn	64.15	10.44	1905	6640	36932	95368	58436	2.58
75 % RDF + Bio NPK	65.88	10.62	1963	6881	37005	98314	61309	2.66
75 % RDF+Bio Zn+Bio NPK	70.16	10.89	2175	7148	37499	108786	71287	2.90
75 % RDF + Rhizobium + MDSR14 + 12c	71.35	10.71	2095	7027	37083	104320	67237	2.81

Table 3.3.13

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

Zone: North Plain Zone **Character:** yield attributes

Treatment	Plant dry weight (g)			Nodule parameters at R2			Nodule parameters at R5		
	30 DAS	45 DAS	60 DAS	Numbers	Fresh weight (mg)	Dry weight (mg)	Numbers	Fresh weight (mg)	Dry weight (mg)
Control	2.86	8.36	17.44	41.22	85.41	159.58	41.95	62.12	208.33
RDF only	3.53	11.22	23.50	31.98	114.84	140.29	32.99	82.88	177.04
75 % RDF	3.21	9.95	22.24	37.59	142.70	153.40	38.05	102.56	187.23
75 % RDF + Bio Zn	3.15	10.15	21.47	39.21	129.17	172.71	36.21	80.57	196.23
75 % RDF + Bio NPK	3.33	10.52	22.20	40.00	136.93	162.59	39.58	88.42	201.43
75 % RDF+Bio Zn+Bio NPK	3.41	10.79	23.08	39.01	148.75	185.83	41.26	112.70	215.37
75 % RDF + Rhizobium + MDSR14 + 12c	3.39	10.69	23.80	51.95	147.32	206.63	55.13	124.49	240.57

Table 3.3.14

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: North Plain Zone **Centre:** GBPUAT, Pantnagar)

Character: Soil and plant data: Available nutrient status and nutrient uptake

Treatment	Available nutrient of soil (Kg/ha)						Crop uptake at harvest (Kg/ha)								
	Initial N P K			Final N P K After harvest			N Uptake		Total N Uptake	P Uptake		Total P Uptake	K Uptake		Total K Uptake
	N	P	K	N	P	K	Grain	Straw		Grain	Straw		Grain	Straw	
Control	230	18.2	215	189	18.1	208	75	54.3	130	6.8	11.23	18.1	18.8	28	46.5
RDF only	236	18.4	224	225	18.2	215	125	72.8	198	12.6	16.30	28.9	31.9	37	68.8
75 % RDF	228	18.3	216	206	18	211	105	63.8	169	10.5	13.83	24.3	26.5	32	58.5
75 % RDF + Bio Zn	240	18.4	214	210	18.2	209	105	66.3	171	10.4	14.46	24.8	26.0	33	58.7
75 % RDF + Bio NPK	228	18.4	218	201	18.1	214	108	66.4	174	10.5	14.46	24.9	26.8	33	59.4
75 % RDF + Bio Zn + Bio NPK	242	18.1	217	209	18.06	212	114	63.9	178	10.7	14.00	24.7	28.8	33	61.7
75 % RDF + Rhizobium + MDSR14 + 12c	230	18.3	219	210	18	217	117	67.3	184	12.0	14.43	26.4	29.4	34	63.2
Sem	2.97	0.084	2.199	5.177	0.12	2.18	6.549	3.706	7.334	0.747	1.092	1.184	1.869	2	2.7
CD (P=0.05)	8.6	0.259	6.77	15.94	NS	NS	20.178	11.419	22.628	2.303	3.367	3.65	5.758	6.529	8.315

Table 3.3.15

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: North Plain Zone **Centre:** Delhi)

Treatment	N, P, K uptake in grain at harvest (Kg/ha)			Total N uptake (Kg/ha)	Total P uptake (Kg/ha)	Total K uptake (Kg/ha)
	N	P	K			
Control	52.5	5.11	11.9	119.8	6.8	65.5
RDF only	120.4	5.90	27.1	235.5	16.3	127.5
75 % RDF	91.8	5.79	19.4	197.1	12.0	101.4
75 % RDF + Bio Zn	105.6	5.81	22.6	211.2	12.2	109.1
75 % RDF + Bio NPK	109.1	5.85	24.1	220.7	13.5	117.4
75 % RDF + Bio Zn + Bio NPK	125.1	5.85	28.2	243.4	16.1	131.6
75 % RDF + Rhizobium + MDSR14 + 12c	109.9	5.90	24.0	218.5	15.5	115.9
SEm	5.19	0.11	1.14	6.59	0.76	3.23
CD (P=0.05)	16.00	0.35	3.52	20.31	2.34	9.96

Character: Soil and plant data: Available nutrient status and nutrient uptake

Table 3.3.16

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Eastern Zone)
Variety: JS 97-52

Treatment	**Seed yield(kg/ha)**		
	Ranchi	**Raipur**	**Mean**
Control	1011	1201	1106
RDF only	2306	1898	2102
75 % RDF	1609	1778	1693
75 % RDF + Bio Zn	1713	1815	1764
75 % RDF + Bio NPK	1957	1864	1910
75 % RDF + Bio Zn + Bio NPK	2117	2239	2178
75 % RDF + Rhizobium + MDSR14 + 12c	2232	2017	2125
SEm±	103.99	68	
CD (P=0.05)	320.44	205	

Table 3.3.17

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Eastern)
Character: Yield, yield attributes and economical parameters

Treatment	**Pods/ plant**	**Seed index**	**Seed yield (kg/ha)**	**Straw yield (kg/ha)**	**Biological (kg/ha)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Control	36.52	11.67	1106	2145	3250	22523	50866	28343	2.26
RDF only	61.37	14.56	2102	3437	5539	29213	96692	67479	3.31
75 % RDF	49.07	13.69	1693	3074	4767	27690	77894	50204	2.81
75 % RDF + Bio Zn	49.97	14.08	1764	3170	4934	28015	81134	53119	2.90
75 % RDF + Bio NPK	55.52	14.42	1910	3321	5231	28065	87873	59808	3.13
75 % RDF + Bio Zn + Bio NPK	61.94	15.26	2178	3656	5834	28390	100191	71801	3.53
75 % RDF + Rhizobium + MDSR14 + 12c	60.24	14.64	2125	3597	5721	28300	97728	69428	3.45

Table 3.3.18

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Eastern)
Character: Plant dry weight (g), CGR, RGR, Nodule parameters at R2, Nodule parameters at R5

Treatment	**Plant dry weight (g)**			**Nodule parameters at R2**			**Nodule parameters at R5**		
	30 DAS	**45 DAS**	**60 DAS**	**Numbers**	**Fresh weight (g)**	**Dry weight (g)**	**Numbers**	**Fresh weight (g)**	**Dry weight (g)**
Control	1.27	7.07	10.61	21.52	1.57	0.098	24.54	1.18	0.17
RDF only	1.85	9.22	14.52	32.82	2.54	0.163	33.90	1.70	0.23
75 % RDF	1.33	7.75	11.39	29.29	2.39	0.152	29.70	1.52	0.22
75 % RDF + Bio Zn	1.40	7.79	11.83	33.19	2.57	0.165	31.27	1.69	0.23
75 % RDF + Bio NPK	1.68	8.53	13.02	35.05	3.00	0.189	34.07	1.74	0.25
75 % RDF+Bio Zn+Bio NPK	1.88	10.48	15.44	37.25	3.05	0.196	38.72	2.07	0.30
75 % RDF +Rhizobium + MDSR14 + 12c	1.87	9.79	14.82	37.39	3.19	0.203	39.85	2.24	0.29

Table 3.3.19

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Eastern **Centre:** Raipur)

Character: Soil and plant data: Available nutrient status and nutrient uptake

Treatment	Available nutrient of soil						Crop uptake at harvest					
	Initial (Kg/ha)			At harvest (Kg/ha)			Content (Kg/ha)			Uptake (Kg/ha)		
	N	P	K	N	P	K	N	P	K	N	P	K
Control	163	12.5	451	166	12.5	451	7.43	0.41	0.96	104	6.6	50
RDF only	169	14.3	464	173	14.5	467	7.78	0.45	1.14	182	12	85
75 % RDF	166	13.3	452	167	13.4	454	7.56	0.42	1.01	156	9.6	67
75 % RDF + Bio Zn	169	13.4	462	172	13.6	464	7.58	0.43	1.08	165	10.4	76
75 % RDF + Bio NPK	169	14.1	464	171	14.3	465	7.66	0.44	1.1	169	10.8	79
75 % RDF + Bio Zn + Bio NPK	170	14.6	468	176	14.8	470	7.83	0.47	1.19	201	13.8	91
75 % RDF + Rhizobium + MDSR14 + 12c	170	14.5	466	174	14.6	467	7.8	0.45	1.16	197	13.1	89
SEm	4.96	0.45	15.87	5.06	0.5	16.24	0.13	0.04	0.03	6.27	0.47	3.66
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	19.32	1.43	11.28

Table 3.3.20

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean (Zone: Eastern **Centre:** Ranchi)

Character: Soil and plant data: Available nutrient status and nutrient uptake

Treatment	Available nutrient of soil at harvest					Crop uptake at harvest				
	Av. N (kg/ha)	Av. P (kg/ha)	Av. K (kg/ha)	Av. Zn ppm	Av. Fe ppm	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (g/ha)	Fe (g/ha)
Control	235	13.7	178	2.03	11.7	68	8.55	47	57	68.47
RDF only	267	16.5	182	2.23	12.7	145	17.9	94	127	164
75 % RDF	240	14.2	183	2.13	12.3	99	13.6	71	99	117
75 % RDF + Bio Zn	241	14.5	184	2.2	13	106	14.0	75	95	118
75 % RDF + Bio NPK	254	15.6	188	2.17	12.3	135	16.3	81	99	133
75 % RDF + Bio Zn + Bio NPK	259	16.1	188	2.23	13.2	142	16.9	86	118	150
75 % RDF + Rhizobium + MDSR14 + 12c	260	16.5	193	2.13	12.3	142	17.6	91	127	162
SEm(±)	4.13	0.5	5.75	0.04	0.5	7.68	0.57	2.68	4.13	7.41
CD (P=0.05)	12.73	1.53	17.73	0.14	NS	23.66	1.74	8.26	12.71	22.84

Table 3.3.21

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean
(Zone: North Eastern Zone**)**
Variety: Imphal- JS 97 52; Medziphema- JS 97 52

Treatment	Seed yield(kg/ha)		
	Imphal	Medziphema	Mean
Control	1045	889	967
RDF only	1396	1394	1395
75 % RDF	1229	1105	1167
75 % RDF + Bio Zn	1197	1181	1189
75 % RDF + Bio NPK	1564	1574	1569
75 % RDF + Bio Zn + Bio NPK	1504	1397	1451
75 % RDF + Rhizobium + MDSR14 + 12c	1231	1331	1281
SEm±	70.66	62.56	
CD (P=0.05)	217.73	192.76	

Table 3.3.22

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean
Zone: North Eastern Zone **Character:** Yield, yield attributes and economical parameters

Treatment	Pods / plant	Seed index	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
Control	37.5	10.2	967	2007	2975	35052	78144	43092	2.23
RDF only	49.4	10.5	1395	2536	3931	45583	111635	66052	2.45
75 % RDF	46.5	10.6	1167	2321	3488	43601	93965	50364	2.16
75 % RDF + Bio Zn	45.9	11.0	1189	2413	3602	43601	95205	51604	2.18
75 % RDF + Bio NPK	59.3	11.1	1569	2671	4240	43663	125481	81818	2.87
75 % RDF + Bio Zn + Bio NPK	52.2	10.9	1451	2572	4023	43726	116567	72841	2.67
75 % RDF + Rhizobium + MDSR14 + 12c	50.9	11.0	1281	2336	3550	43663	101942	58279	2.33

Table 3.3.23

AGRON 3/21.Evaluation of novel bio formulation for yield enhancement in soybean (Zone: North Eastern)

Treatment	Plant dry weight (g)			Nodule parameters at R2			Nodule parameters at R5		
	30 DAS	45 DAS	60 DAS	Numbers	Fresh weight (g)	Dry weight (g)	Numbers	Fresh weight (g)	Dry weight (g)
Control	1.11	3.98	7.05	19.25	0.28	0.199	13.35	0.365	0.150
RDF only	1.41	4.62	9.47	21.17	0.25	0.186	18.25	0.720	0.240
75 % RDF	1.17	4.29	8.29	21.59	0.31	0.220	17.90	0.510	0.161
75 % RDF + Bio Zn	1.38	4.37	8.70	24.44	0.32	0.209	19.25	0.855	0.297
75 % RDF + Bio NPK	1.53	5.01	10.51	23.15	0.30	0.205	25.50	1.165	0.318
75 % RDF+Bio Zn+Bio NPK	1.45	4.84	9.86	27.85	0.34	0.213	23.60	1.115	0.214
75 % RDF + Rhizobium + MDSR14 + 12c	1.37	4.53	8.66	23.60	0.28	0.177	23.82	0.760	0.241

Table 3.3.24

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean; Zone - North Plain zone (pooled 2021-2023)

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	1227.33^{e}	1531^{a}	1059^{f}	1272^{a}	31947^{a}	63419^{b}	29458^{b}	1.79^{b}
RDF only	1934^{a}	1839^{a}	2018^{b}	1930^{a}	36507^{a}	97025^{a}	58394^{a}	2.47^{a}
75 % RDF	1610.67^{d}	1666^{a}	1581^{e}	1619^{a}	35272^{a}	81572^{ab}	44174^{ab}	2.12^{ab}
75 % RDF + Bio Zn	1639.67^{cd}	1689^{a}	1801^{d}	1710^{a}	35539^{a}	86368^{a}	48703^{a}	2.24^{ab}
75 % RDF + Bio NPK	1719.67^{bc}	1802^{a}	1875^{cd}	1799^{a}	35583^{a}	90528^{a}	52818^{a}	2.35^{a}
75 % RDF + Bio Zn + Bio NPK	1800^{b}	1831^{a}	2144^{a}	1925^{a}	35740^{a}	97684^{a}	59859^{a}	2.54^{a}
75 % RDF + + Rhizobium + MDSR14 + 12c	1693^{cd}	1895^{a}	1940^{bc}	1843^{b}	35599^{a}	93494^{a}	57894^{a}	2.56^{a}

Table 3.3.25

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean; Zone - Eastern zone (pooled 2021-2023)

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	1132^{e}	1055^{e}	1335^{d}	23600^{b}	47497^{d}	23898^{d}	1.98^{b}
RDF only	1849^{cb}	2407^{a}	1803^{bc}	30467^{a}	90243^{ab}	59776^{ab}	2.94^{a}
75 % RDF	1711^{d}	1837^{d}	1793^{c}	28796^{ab}	74331^{c}	45535^{c}	2.56^{ab}
75 % RDF + Bio Zn	1750^{cd}	1873^{dc}	1772^{c}	29085^{a}	76369^{c}	47285^{bc}	2.6^{ab}
75 % RDF + Bio NPK	1824^{c}	2039^{bcd}	1869^{bc}	29129^{a}	81292^{bc}	52163^{abc}	2.77^{ab}
75 % RDF + Bio Zn + Bio NPK	2128^{a}	2176^{abc}	2021^{ab}	29418^{a}	92284^{ab}	62867^{a}	3.11^{a}
75 % RDF + + Rhizobium + MDSR14 + 12c	1958^{b}	2262^{ab}	2164^{a}	29324^{a}	89200^{ab}	59876^{ab}	3.03^{a}

Table 3.3.26

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean; Zone - Central zone (pooled 2021-2023)

Treatment	Seed Yield (kg/ha)					Economics			
	Sehore	Kota	Amravati	Devgadh baria	Mean of central zone	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1271[a]	1107[b]	1244[e]	1386[e]	1315[c]	33612[a]	55624[e]	27147[e]	1.61[a]
RDF only	1615[a]	1448[ab]	1688[cd]	1619[b]	1561[ab]	37427[a]	70335[cd]	38217[cd]	1.85[a]
75 % RDF	1477[a]	1357[ab]	1434[de]	1444[ed]	1444[cb]	35028[a]	64417[d]	33649[de]	1.76[a]
75 % RDF + Bio Zn	1527[a]	1443[ab]	1775[bcd]	1500[d]	1562[ab]	36082[a]	71110[cd]	39624[bcd]	1.91[a]
75 % RDF + Bio NPK	1581[a]	1405[ab]	2045[abc]	1521[cd]	1639[ab]	36442[a]	75611[bc]	44104[cb]	2.00[a]
75 % RDF + Bio Zn + Bio NPK	1618[a]	1441[ab]	2118[ab]	1583[bc]	1696[a]	36754[a]	78097[b]	46000[b]	2.05[a]
75 % RDF + + Rhizobium + MDSR14 + 12c	1544[a]	1493[a]	2255[a]	1797[a]	1754[a]	36662[a]	85030[a]	53035[a]	2.26[a]

Table 3.3.27

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean; Zone - Southern zone (pooled 2021-2023)

Treatment	Seed Yield (kg/ha)				Economics			
	Adilabad	Dharwad	Pune	Mean of southern zone	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1602[e]	2285[d]	2259[a]	2048[b]	38913[b]	94588[b]	55675[c]	2.46[b]
RDF only	2476[ab]	2783[a]	3004[a]	2754[a]	46352[a]	125595[a]	79243[ab]	2.81[ab]
75 % RDF	1841[de]	2444[c]	2790[a]	2358[ab]	41153[ab]	107786[ab]	66633[bc]	2.78[ab]
75 % RDF + Bio Zn	2020[cd]	2546[bc]	2917[a]	2494[a]	41811[ab]	113789[ab]	71745[ab]	2.88[ab]
75 % RDF + Bio NPK	2172[bcd]	258[b]	2974[a]	2576[a]	41893[ab]	117386[a]	75493[ab]	2.95[a]
75 % RDF + Bio Zn + Bio NPK	2331[abc]	2608[b]	3046[a]	2661[a]	43043[ab]	121154[a]	78111[ab]	2.97[a]
75 % RDF + + Rhizobium + MDSR14 + 12c	2556[a]	2644[b]	3104[a]	2768[a]	42531[ab]	125650[a]	83118[a]	3.12[a]

Table 3.3.28

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean; Zone - North Eastern zone (pooled 2021-2023)

Treatment	Seed Yield (kg/ha)			Economics			
	Imphal	Medziphema	Mean of eastern zone	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1345[a]	1139[b]	1242[a]	33673[b]	96229[b]	62556[a]	2.82[a]
RDF only	1679[a]	1714[ab]	1697[a]	44190[a]	130653[ab]	86463[a]	2.99[a]
75 % RDF	1545[a]	1565[ab]	1555[a]	41708[a]	119611[ab]	77403[a]	2.86[a]
75 % RDF + Bio Zn	1533[a]	1631[ab]	1582[a]	41858[a]	121378[ab]	79170[a]	2.9[a]
75 % RDF + Bio NPK	1841[a]	1586[ab]	1713[a]	41942[a]	133034[a]	90795[a]	3.15[a]
75 % RDF + Bio Zn + Bio NPK	1724[a]	1725[ab]	1725[a]	42271[a]	133088[a]	90818[a]	3.17[a]
75 % RDF + + Rhizobium + MDSR14 + 12c	1562[a]	1624[ab]	1593[a]	42095[a]	122354[ab]	80115[a]	2.93[a]

Table 3.3.29

AGRON 3/21. Evaluation of novel bio formulation for yield enhancement in soybean; Across 4 zone of India (pooled 2021-2023)

Treatment	Seed Yield (kg/ha)	COC (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C
Control	1443[d]	32349[a]	71472[d]	39747[d]	2.13[c]
RDF only	1949[a]	38989[a]	102770[a]	64419[a]	2.61[ab]
75 % RDF	1754[c]	36391[a]	89543[c]	53479[c]	2.41[b]
75 % RDF + Bio Zn	1824[bc]	36875[a]	93803[bc]	57305[bc]	2.5[b]
75 % RDF + Bio NPK	1919[ab]	36998[a]	99570[ab]	63075[ab]	2.64[ab]
75 % RDF + Bio Zn + Bio NPK	2006[a]	37445[a]	104461[a]	67531[a]	2.77[a]
75 % RDF + + Rhizobium + MDSR14 + 12c	2024[a]	37242[b]	103145[a]	66808[a]	2.78[a]

Table 3.4.1

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems

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

Variety: Pantnagar- PS 26; Ludhiana- SL 958

Management practices	Ludhiana			Pantnagar			Zonal mean		
	Cropping systems								
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	1778	1691	1734	1121	1244	1182	1450	1468	1458
Natural farming	2117	1813	1965	952	1010	981	1535	1412	1473
Integrated crop management	1630	1547	1589	1778	1800	1789	1704	1674	1689
Mean	1842	1683		1283	1351		1563	1517	
CD (P=0.05)									
Cropping system			NS			NS			**-**
Management practices			NS			NS			**-**

Table 3.4.2

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems: Character: Cost of cultivation

Management practices	Ludhiana			Pantnagar			Zonal mean		
	Cropping systems								
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	37851	37851	37851	45057	45057	45057	41454	41454	41454
Natural farming	33463	33463	33463	37217	37217	37217	35340	35340	35340
Integrated crop management	33286	33286	33286	39985	39985	39985	36636	36636	36636
Mean	34867	34867		40753	40753		37810	37810	

Table 3.4.3

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems: Character: B:C Ratio

Management practices	Ludhiana			Pantnagar			Zonal mean		
	Cropping systems								
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	2.16	2.05	2.11	1.44	2.7	2.07	1.80	2.38	2.09
Natural farming	2.68	2.3	2.49	1.76	2.47	2.12	2.22	2.39	2.30
Integrated crop management	2.25	2.14	2.2	1.04	1.071	1.06	1.65	1.61	1.63
Mean	2.37	2.16		1.41	2.08		1.89	2.12	

Table 3.4.4

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Yield and economical parameters

Treatment	**Seed yield (kg/ha)**	**Straw yield (kg/ha)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Cropping systems						
Soybean-Wheat	1563	5397	37810	71877	33521	1.90
Soybean-Chickpea	1517	5317	37810	69797	31521	1.84
Management practices						
Organic farming	1458	5266	41454	67078	25625	1.61
Natural farming	1473	5164	35340	67741	31001	1.91
Integrated crop management	1689	5641	36636	77691	41055	2.12

Table 3.4.5

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems

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

Variety: Amravati- RVS – 24; Devgadh baria -NRC 37; Kota- JS 20-34

Management practices	Kota			Amrawati			Devgadh Baria			Mean		
	Cropping systems											
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	1640	1656	1648	1568	1589	1579	1174	1394	1284	1461	1546	1504
Natural farming	1225	1600	1413	1315	1325	1320	1352	1372	1362	1297	1432	1365
Integrated crop management	1725	1603	1664	2068	2057	2063	1492	1512	1502	1762	1724	1743
Mean	1530	1620		1650	1657		1339	1426	-	1506	1568	
CD (P=0.05)												
Cropping system			NS			NS			125.20			
Management practices			NS			**42.37**			137.70			

Table 3.4.6

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Cost of cultivation

Management practices	Kota			Amrawati			Devgadh Baria			Mean		
	Cropping systems											
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	28358	28358	28358	63985	64029	64007	23050	23050	23050	38464	38479	38472
Natural farming	35308	35308	35308	35354	35375	35365	23605	23605	23605	31422	31429	31426
Integrated crop management	38319	38319	38319	50471	50448	50459	24450	24450	24450	37747	37739	37743
Mean	33995	33995		49937	49951		23702	23702	**-**	35878	35883	

Table 3.4.7

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: B:C Ratio

Management practices	**Kota**			**Amrawati**			**Devgadh Baria**			**Mean**		
	Cropping systems											
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	2.66	2.67	2.67	1.17	1.19	1.18	2.52	2.56	2.54	2.12	2.14	2.13
Natural farming	1.6	2.09	1.84	1.77	1.79	1.78	2.82	2.87	2.84	2.06	2.25	2.15
Integrated crop management	2.07	1.93	2	1.96	1.95	1.96	2.99	3.04	3.01	2.34	2.31	2.32
Mean	2.11	2.23		1.64	1.64		2.78	2.82	-	2.18	2.23	

Table 3.4.8

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Yield and economical parameters

Treatment	**Seed yield (kg/ha)**	**Straw yield (kg/ha)**	**HI (%)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Cropping systems							
Soybean-Wheat	1506	1947	43.85	35878	71552	36125	2.18
Soybean-Chickpea	1568	2016	43.78	35883	73685	38253	2.23
Crop management practices							
Organic farming	1504	1875	43.40	38472	67139	28434	2.13
Natural farming	1365	1759	44.06	31426	65167	33323	2.15
Integrated crop management	1743	2311	43.84	37743	85549	47106	2.32

Table 3.4.9

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems

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

Variety: Adilabad-JS 335; Dharwad-DSb 34, Pune-MACS 1460

Management practices	**Adilabad**			**Pune**			**Dharwad**			**Mean**		
	Cropping systems											
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	1250	1347	**1298**	3304	3135	3220	2592	3074	2722	2382	2519	2413
Natural farming	1608	1453	**1531**	3313	3310	3311	2621	2604	2613	2514	2456	2485
Integrated crop management	2601	2586	**2593**	3357	3288	3322	2812	3275	2864	2923	3050	2926
Mean	1820	1795		3325	3244		2675	2984		2607	2674	
CD (P=0.05)												
Cropping system			NS			NS			NS			
Management practices			NS			**NS**			NS			

Table 3.4.10

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Cost of cultivation

Management practices	**Adilabad**			**Pune**			**Dharwad**			**Mean**		
	Cropping systems											
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	52192	53041	52616	43375	43375	43375	31300	31300	31300	42289	42572	42430
Natural farming	55399	53340	54370	35375	35375	35375	32800	32800	32800	41191	40505	40848
Integrated crop management	62044	60585	61339	44539	44539	44539	35600	35600	35600	47394	46908	47159
Mean	56562	55655		41096	41096		33233	33233		43630	43328	

Table 3.4.11

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems

Zone: Southern **Design:** Strip plot **Replications:** Four **Character:** B:C Ratio

Management practices	**Adilabad**			**Pune**			**Dharwad**			**Mean**		
	Cropping systems											
	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**	Soybean-Wheat	Soybean-Chickpea	**Mean**
Organic farming	1.1	1.16	1.13	2.85	2.71	2.78	5.27	5.11	5.19	3.07	2.99	3.03
Natural farming	1.33	1.25	1.29	3.51	3.51	3.51	4.16	4.13	4.14	3.00	2.96	2.98
Integrated crop management	1.92	1.96	1.94	2.83	2.77	2.8	4.94	4.78	4.86	3.23	3.17	3.20
Mean	1.45	1.46		3.06	3		4.79	4.67		3.10	3.04	

Table 3.4.12

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems

Zone: Southern **Character:** Yield and economical parameters

Treatment	**Seed yield (kg/ha)**	**Straw yield (kg/ha)**	**HI (%)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Cropping systems							
Soybean-Wheat	2607	3906	40.35	43630	122469	78848	3.10
Soybean-Chickpea	2674	3877	41.47	43328	119812	76484	3.04
Management practices							
Organic farming	2413	3612	39.83	42430	114294	71864	3.03
Natural farming	2485	3729	40.52	40848	110155	69307	2.98
Integrated crop management	2926	4406	42.39	47159	138986	91826	3.20

Table 3.4.13

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems

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

Management practices	**Raipur**			**Ranchi**			**Mean**		
	Cropping systems								
	Soybean -Wheat	Soybean -Maize	**Mean**	Soybean -Wheat	Soybean -Maize	**Mean**	Soybean -Wheat	Soybean -Maize	**Mean**
Organic farming	4568	4551	4559	1923	1946	1935	3246	3249	3247
Natural farming	3644	3644	3644	1457	1469	1463	2550	2556	2553
Integrated crop management	5033	5074	5053	2168	2175	2171	3600	3624	3612
Mean	4415	4423		1849	1863		3132	3143	
CD (P=0.05)									
Cropping system			NS			287.8			-
Management practices			33.071			172.3			-

Table 3.4.14

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Cost of cultivation

Management practices	**Raipur**			**Ranchi**			**Mean**		
	Cropping systems								
	Soybean -Wheat	Soybean -Maize	**Mean**	Soybean -Wheat	Soybean -Maize	**Mean**	Soybean -Wheat	Soybean -Maize	**Mean**
Organic farming	34750	34750	34750	43525	43525	43525	39138	39138	39138
Natural farming	28300	28300	28300	18815	18815	18815	23558	23558	23558
Integrated crop management	30549	30549	30549	35605	35605	35605	33077	33077	33077
Mean	31200	31200		32648	32648		31924	31924	

Table 3.4.15

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: B:C Ratio

Management practices	**Raipur**			**Ranchi**			**Mean**		
	Cropping systems								
	Soybean -Wheat	Soybean -Maize	**Mean**	Soybean -Wheat	Soybean -Maize	**Mean**	Soybean -Wheat	Soybean -Maize	**Mean**
Organic farming	2.23	2.2	2.21	2.11	2.13	2.12	2.17	2.17	2.17
Natural farming	2.1	2.03	2.06	3.7	3.73	3.71	2.90	2.88	2.89
Integrated crop management	3.36	3.2	3.23	2.91	2.91	2.91	3.14	3.06	3.07
Mean	2.53	2.48		2.9	2.92		2.72	2.70	

Table 3.4.16

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Yield and economical parameters

Treatment	**Seed yield (kg/ha)**	**Straw yield (kg/ha)**	**HI (%)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Cropping systems							
Soybean-Wheat	3132	3482	34.85	31924	83415	51492	2.72
Soybean-Chickpea	3143	3494	34.65	31924	83068	51144	2.70
Crop management practices							
Organic farming	3247	3611	34.42	39138	84512	45375	2.17
Natural farming	2553	2833	33.84	23558	63899	40341	2.89
Integrated crop management	3612	4018	36.00	33077	101315	68238	3.07

Table 3.4.17

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Zone: North Eastern

Design: Strip plot **Replications:** Four **Character:** Soybean yield (kg/ha)

Management practices	**Imphal**			**Medziphema**			**Mean**		
	Cropping systems								
	Soybean-Maize	Soybean-Chickpea	**Mean**	Soybean-Maize	Soybean-Chickpea	**Mean**	Soybean-Maize	Soybean-Chickpea	**Mean**
Organic farming	1364	1358	1361	965	1018	991	1164	1188	1176
Natural farming	1081	1057	1069	1075	1045	1060	1078	1051	1064
Integrated crop management	1437	1606	1522	1015	1047	1031	1226	1327	1276
Mean	1294	1341		1018	1037		1156	1189	
CD (P=0.05)									
Cropping system			NS			**NS**			**-**
Management practices			NS			NS			**-**

Table 3.4.18

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Cost of cultivation

Management practices	**Imphal**			**Medziphema**			**Mean**		
	Cropping systems								
	Soybean-Maize	Soybean-Chickpea	**Mean**	Soybean-Maize	Soybean-Chickpea	**Mean**	Soybean-Maize	Soybean-Chickpea	**Mean**
Organic farming	56514	56514	56514	49314	49314	49314	52914	52914	52914
Natural farming	23610	23610	23610	26160	26160	26160	24885	24885	24885
Integrated crop management	45602	45602	45602	36268	36268	36268	40935	40935	40935
Mean	41909	41909		37247	37247		39578	39578	

Table 3.4.19

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: B:C Ratio

Management practices	**Imphal**			**Medziphema**			**Mean**		
	Cropping systems								
	Soybean - Maize	Soybean - Chickpea	**Mean**	Soybean - Maize	Soybean - Chickpea	**Mean**	Soybean - Maize	Soybean - Chickpea	**Mean**
Organic farming	2.2	2.2	2.2	1.37	1.45	1.41	1.79	1.83	1.81
Natural farming	4.1	4	4.1	2.87	2.8	2.84	3.49	3.40	3.47
Integrated crop management	2.8	3.2	3	1.96	2.02	1.99	2.38	2.61	2.50
Mean	3	3.1		**2.07**	**2.09**		2.54	2.60	

Table 3.4.20

AGRON-4/22: Standardization of sustainable management practices (Natural/organic/integrated crop management) for soybean-based cropping systems Character: Yield and economical parameters

Treatment	**Seed yield (kg/ha)**	**Straw yield (kg/ha)**	**HI (%)**	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C Ratio**
Cropping systems							
Soybean-Wheat	1156	2284	33.74	39578	93843	54265	2.54
Soybean-Chickpea	1189	2282	34.54	39578	96611	57033	2.60
Crop management practices							
Organic farming	1176	2311	33.98	52914	95947	43033	1.81
Natural farming	1064	2143	33.36	24885	85183	60298	3.47
Integrated crop management	1276	2394	35.05	40935	104551	63616	2.50

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7. PLANT PATHOLOGY

PP1: Survey and surveillance for soybean diseases

The disease scenario at various locations have been analysed through a combination of survey, surveillance and past records of soybean pathology trials (detailed in Tables 4.1 to 4.9). 17 diseases were reported from different centres, highest nine diseases were reported from Jabalpur followed by Indore, Pantnagar and Raipur. In CZ, a total of 4 diseases *viz.*, RAB, PB, BP and FLS appeared at Indore with RAB in severe form. In contrast to previous years, YMD was high in soybean varieties at Jabalpur and CR incidence was lowest, whereas, RAB, PB(Ct), CoR, SMV, FLS and PSS appeared in mild to moderate form. At Sehore, BS was severe but TLS, MLS were mild. In Amravati, RAB incidence was high, whereas, CR, YMV, PB(Ct), ALS appeared in moderate form. In Kota PB, CLS and YMD appeared in mild form. In SZ, high incidence of YMV was seen at K.digraj, where, rust incidence was low due to long dry spell. Rust appeared in lowest form at Dharwad due to low rainfall and high temperature, whereas, PB, FLS and PSS showed low to moderate severity at the same centre. At Ugarkhurd, rust incidence was high, whereas PB(Ct) and PSS incidence was less. In NPZ, YMD and SMD appeared in severe form with moderate incidence of CR at Ludhiana. At Pantnagar, diseases like RAB and YMD were severe, whereas, BP, BLB and PB(Ct) were in moderate form. In NEHZ, RAB, PB(Ct), YMV, CLS and RAB appeared in mild to severe form at Jorhat, whereas, in Medziphema, RAB, PB(Ct) and Rust appeared in moderate form. In NHZ, FLS was found to be severe at Almora and Palampur, whereas, PB(Ct), BP, YMV appeared in mild to moderate form at Palampur. In EZ, IBB was found to be severe at Raipur and PB(Ct) was in mild form.

PP2: Trap nursey trial for disease incidence

The study looked at the appearance of major diseases across 10 centres in different zones, using 10 susceptible varieties (Table 4.2.1a - 4.2.9b). The results showed that Shivalik had highest severity of FLS (77%) whereas, JS 95-60 (77%) highest severity of PB(Ct) at Palampur. Monetta showed highest incidence of CR at Jabalpur (73%) and Almora (74%). JS 335 showed susceptible reaction for MLS, Rust, PB and RAB at different locations, whereas NRC 7 was found to be susceptible for CoR at Jorhat. JS 93-05 was highly susceptible for PB(Ct) (65%) at Jabalpur; RAB at Indore(65%). JS 95-60 was found susceptible for RAB, FLS, PB(Ct) at different locations.

PP3: Evaluation of breeding materials for resistant donor(s)

Thirty-one entries of IVT (N) were screened at 16 locations across different zones to evaluate their resistance against major diseases (Table 4.3). IVT(N) entry NRC 270, AMS 22-16, SL 1315, NRC 268, DLSb 5 showed MR reaction to RAB disease at Pantnagar. The entries DS 1589, NRC 269 showed HR reaction against PB(Ct) at Jabalpur centre. The AVT(N) entry NRC 259 showed HR reaction, whereas, JS 21-72, NRC 258 showed R reaction for PB(Ct) at the same location. At Indore, IVT(N) entries NRC 270, AMS 22-16, VLS 89, Pusa Sipani BS 8, VLS 99, , DS 1589, RSC 11-95, VLS 63, BAUS (M) 6, NRC 142, SL1315, KDSIS 1394, KSS 225, ASb 101 and DLSb 5 showed HR reaction against PB(Ct), whereas, AVT(N) entries JS 21-72 (c), RSC 10-52 (c), MAUS 824, NRC 258 and NRC 259 showed HR reaction against PB(Ct) at the same location. For CR disease, IVT(N) entries, NRC 270, DS 1589, SL 1315, TS 101, NRC 271, Lok-Soya 03, KSS 225, DS 1547, ASb 101, NRC 268, NRC 269 and AVT(N) entries MAUS 824, JS 21-72, NRC 258 showed HR reaction at Jabalpur centre. From Ludhiana, IVT(N) entries DS 1589, VLS 99 (c) and SL 1315 showed R reaction to CR disease. For rust, all IVT(N) entries except VLS99 at K.digraj showed HS to S reaction, whereas, AVT(N) entry Dsb21 showed HR reaction; NRC 142, MACS 1188 showed MR reaction to rust disease at the same location. All the entries at Ugarkhurd showed HS to S reaction to rust disease. For YMV disease, IVT(N) entries, NRC 270, DS 1589, VLS 63, NRC 142, SL 1315, KSS 225, DS 1547, DLSb 5, NRC 269 and IVT(E) entry DS 1480 showed HR reaction at Jabalpur. Similarly, at Ludhiana IVT(N) entries VLS 89, VLS 63, SL 1315, DLSb 5, DS 1547 showed HR reaction to YMV. For FLS disease, IVT(N) entries NRC 266, NRC 138, DS 1480, NRC 150, JS 25-06, MAUS 787, NRC 265, JS 20-34, Pusa Sipani 33 and KDS 1201 showed HR reaction at Indore centre.

PP4: 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. For example, JS 20-69 and JS 20-20 showed resistance against YMD at Ludhiana after 10 years of testing. JS 20-98 showed resistance reaction against CR, SMD, YMD, and RAB after ten years of testing in Jabalpur under hotspot conditions. RVS 2001-4 continued resistance against MLS at Sehore centre after 8th year of testing. DSb 23 showed resistance to Rust, PB(Ct), after 11 years of testing at Dharwad and Ugarkhurd centre, whereas, DSb 21 showed breakdown of rust resistance at Ugarkhurd centre in 13th year of testing. Entries EC 242104 showed resistance to Rust and PSS both at Dharwad and Ugarkhurd centre after 11th years of testing. Himso 1685 and JS 20-116 continued resistance for FLS disease at Palampur centre. The results provide insights into the long-term resistance status of various disease-resistant varieties across multiple locations.

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

The study evaluated fifty germplasm lines across multiple centres to identify sources of multiple disease resistance (Table 4.5). The lines IC 0419798, IC 27150 , IC 0501765, IC 0118428, EC 025478, EC 14674, EC 0528651, EC 0241711, IC 0501941, EC 50057, IC 419847, EC 0097789, IC 9468 showed HR reaction for YMV at Jabalpur centre. EC 0528663, IC 0241857, IC 0128988, EC 114570, IC 0128992 showed HR reaction against FLS at Palampur centre.

PP6: Biological management of major diseases of soybean

Biological management was carried out at several regions including Indore, Dharwad, Amravati, Jabalpur, Pantnagar, palampur, Jorhat, and Sehore to effectively manage major soybean diseases (Table 4.6.1-4.6.6). The results showed that various types of microbial treatments were effective in reducing disease severity and improving yield. For ex: Seed application of local strain of *Trichoderma* @ 5 g/kg seed(T5), Foliar application of local strain of *Trichoderma* @ 10 g/litre water(T6); Seed application of local strain of *Pseudomonas fluorescence* @ 5 g/kg seed(T7) were most effective in reducing RAB disease at Jabalpur, Indore and Pantnagar respectively. Foliar application of local strain of *Trichoderma* @ 10 g/litre water(T6); Seed application of local strain of *Pseudomonas fluorescence* @ 5 g/kg(T7) were most effective in reducing PB(Ct) disease at Amravati & Jorhat, whereas, Seed application of local strain of *Pseudomonas fluorescence* @ 5 g/kg seed (T7) reduced PB(Ct) disease severity at Indore and Dharwad. T5 was most effective in managing CR incidence at Jabalpur and Amravati. Overall, these experiments demonstrated the potential of biological management as an effective strategy for managing soybean diseases in various regions.

PP7: 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 4.7.1-4.7.2). Results showed that minimum temperature had highly positive correlation with YMV incidence, while maximum temperature and number of rainy days had significant correlation for the YMV incidence at all the centres. The rainfall, minimum temperature and number of rainy days had highly negative correlation for RAB severity while maximum temperature showed significant correlation for all the locations. For CR, Rainfall, minimum temperature and number of rainy days was negatively correlated but the correlation was non-significant. For anthracnose disease all three parameters maximum temperature, minimum temperature and rainfall had highly negative correlation with Anthracnose disease severity, whereas number of rainy days showed significant negative correlation for this disease. The study also conducted a multiple regression analysis to determine the contribution of independent weather parameters and disease severity. The regression equation obtained for RAB disease was Y= 37.43 - 0.33(T_{max}) - 0.13(T_{min}) - 0.02 (Rainfall) - 2.09 (Rainy day) (R^2=0.13). For CR, Anth and YMD regression equation obtained was Y= - 31.48 + 3.00 (T max) – 1.69 (T min) -0.92 (Rainfall) + 9.10 (Rainy day) (R^2=0.13); Y= 119.14 – 3.26 (T max) - 0.07 (T min) + 0.01 (Rainfall) - 2.96 (Rainy day) (R^2=0.27); Y= - 61.90 + 0.95 (T max) + 2.23 (T min) -0.03 (Rainfall) + 0.39 (Rainy day) (R^2=0.26) respectively. The low R^2 value of the models for all the four diseases indicates that there should be more weather parameters to be considered to fit the regression model, to explain the variation for PDI.

PP8: Estimation of avoidable yield losses in soybean

At various AICRPS centre avoidable yield loss due to various diseases such as CR, RAB, PB(Ct), FLS, IBB and MLS were recorded (Table 8.1.1-8.1.5) showing that yield loss can be caused by various diseases. For CR disease, disease pressure was highest at Jabalpur centre, where the susceptible variety JS 20-29 showed AYL of 34%, however, resistant variety 20-98 showed AYL of 12%. At Amravati centre, chemical application of fungicides could not prevent all yield loss but managed to avoid 32% and 36% yield loss in susceptible and resistant variety respectively. For RAB disease, full protection of fungicides was able to prevent 34%, 47% and 39% of yield loss in susceptible varieties at Jabalpur, Indore and Medziphema centres respectively. At Palampur centre, for FLS disease resistant and susceptible varieties showed AYL of 27% and 33% respectively. Similarly, Dharwad centre showed AYL of 29% and 15% respectively for susceptible and resistant varieties. The PP8 trial at Pantnagar centre was not considered by the committee during the visit.

PP9: Image based identification of soybean diseases

A total of 9114 disease image dataset for 7 diseases were collected from Indore, Pantnagar and Jabalpur centres throughout the disease cycle during *Kharif* 2023. These dataset will be used for model establishment

PP1: Survey and surveillance for soybean diseases

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

S.N.	Location / Disease	Jabalpur	Indore	Pantnagar	Raipur	Amravati	Kota	Dharwad	Ugarkhurd	Ludhiana	K-Digraj	Jorhat	Medziphema	Sehore	Palampur	Almora	
1.	**Anth**	+	+	+	+		+	+	+		+	+	+		+		11
2.	**YMV**	+	+	+		+	+			+	+	+			+		9
3.	**RAB**	+	+	+	+	+						+	+				7
4.	**BP**	+	+	+	+	+	+								+		7
5.	**SMV**	+	+	+	+		+			+							6
6.	**FLS**	+	+					+							+	+	5
7.	**CR**	+			+	+				+							4
8.	**Coll. R**	+	+			+							+				4
9.	**Rust**							+	+		+		+				4
10	**CLS/PSS**	+					+		+			+					4
11	**TLS**							+						+			2
12	**MLS**				+									+			2
13	**ALS**					+		+									2
14	**BLB**			+													1
15	**FR/FW**			+													1
16	**BS**													+			1
17	**IBB**				+												1
Centre wise no. of diseases reported		**9**	**7**	**7**	**7**	**6**	**5**	**5**	**3**	**3**	**3**	**4**	**4**	**3**	**4**	**1**	

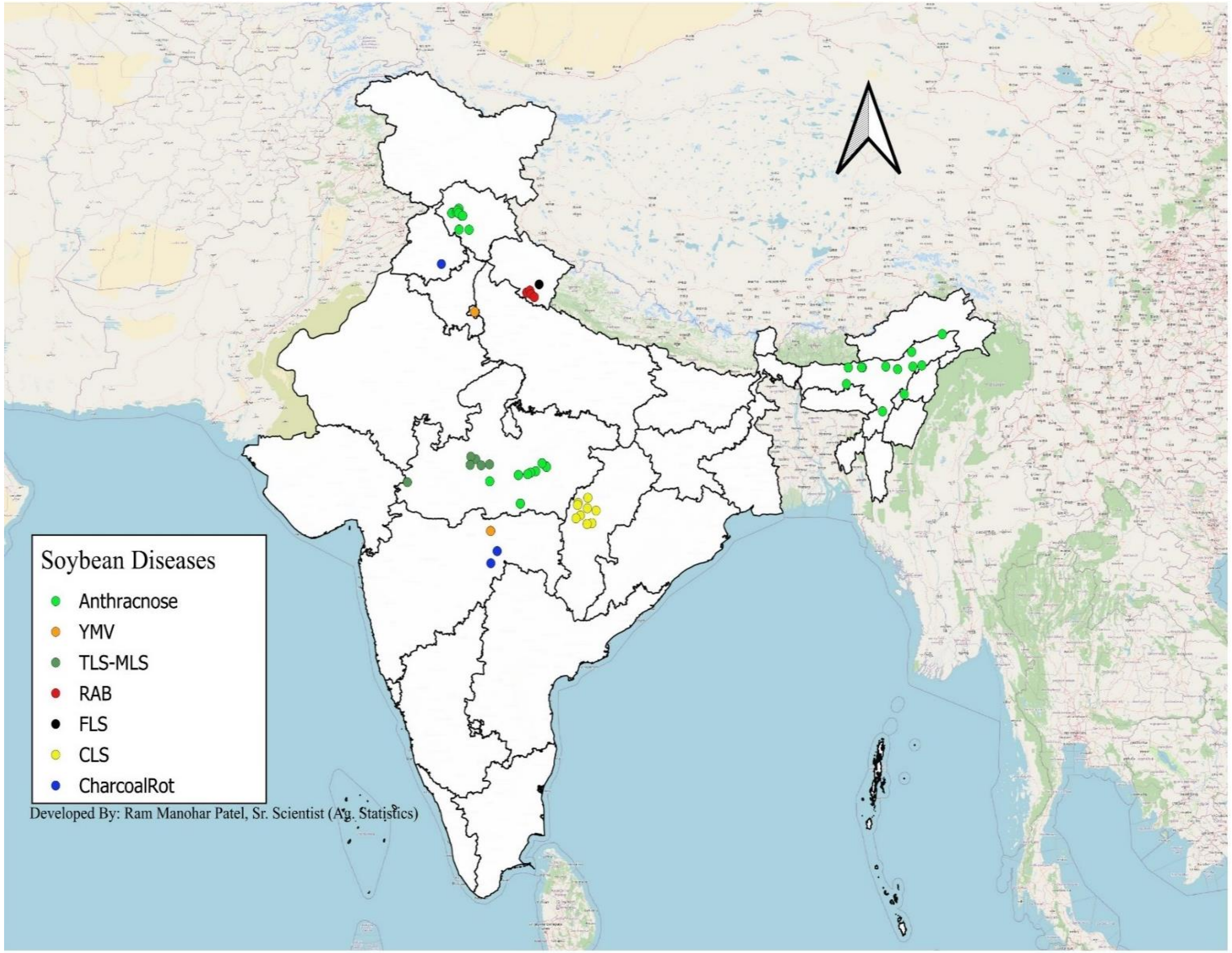

Fig 1: GIS based survey of soybean diseases across different zones during *Kharif* 2023.

PP2: Trap nursery trial for disease incidence

Table 4.2.1a: PP2: Weekly Per cent disease index (PDI) of Myrothecium leaf spot in trap nursery during *Kharif* 2023 at Sehore centre

SMW	Month &date	JS 9560	JS 335	Shivalik*	JS 93-05	Punjab 1	PK 472	PK 262	Monetta	NRC 7
34	Aug 20-26	0.00	2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	Aug 27 –Sept 2	0.00	4.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	Sept 3-9	0	15.5	2.4	0	0	2.47	1.23	1.23	0
37	Sept 10-16	0	29.63	18.52	12.34	12.34	13.58	14.81	12.34	14.8
38	Sept 17-23	0	49.38	39.5	30.86	17.28	33.31	30.86	37.03	45.67
39	Sept 24-30	0	70.52	40.1	30.35	18.00	34.01	33.2	38.05	45.89

Table 4.2.2a: PP2: Weekly Per cent Disease Index (PDI) of Rust in trap nursery during *Kharif* 2023 at Dharwad centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	JS 95-60	Punjab 1	JS 93-05
39	24 - 30 Sep	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	1 - 7 Oct	14.11	8.66	9.55	11.11	**	11.11	**

** Due to earliness of the variety, disease escaped

Table 4.2.3a: PP2 : Weekly Per cent Disease Index(PDI) of Pod blight in trap nursery during *Kharif* 2023 at Dharwad centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	JS 95-60	Punjab 1	JS 93-05
39	24 - 30 Sep	26.33	18.25	16.32	15.85	19.21	15.64	14.45
40	1 - 7 Oct	58.23	36.25	36.52	45.22	55.32	42.22	46.32

Table 4.2.4a:PP2: Weekly Per cent Disease Index (PDI) of charcoal rot in trap nursery during *Kharif* 2023 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
36	Sept 3-9	0.00	2.00	0.00	8.50	0.00	0.00	4.00	0.00	0.00	0.00
37	Sept 10-16	1.50	6.50	5.00	31.50	0.00	0.00	19.50	0.00	0.00	1.50
38	Sept 17-23	6.50	17.50	15.00	58.50	0.00	1.00	28.00	0.00	14.50	9.00
39	Sept 24-30	14.50	26.50	30.50	73.00	0.00	14.00	28.00	0.00	19.00	12.00
40	Oct 1-7	17.00	27.50	30.50	73.50	0.00	14.00	-	0.00	-	12.00

Table 4.2.5a:PP2: Weekly Per cent disease index (PDI) of Yellow mosaic disease in trap nursery during *Kharif* 2023 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
31	July 30- Aug 5	0.31	0.74	0.00	0.74	0.00	0.31	2.96	0.00	6.11	1.48
32	Aug 6-12	2.78	5.62	1.60	4.32	0.00	3.09	9.75	1.79	19.51	7.65
33	Aug 13-19	20.99	22.22	9.51	14.14	5.18	16.17	22.10	10.74	39.50	23.09
34	Aug 20-26	27.28	35.06	22.34	22.84	11.79	25.74	25.31	17.34	52.65	35.80
35	Aug 27 –Sept 2	32.34	42.78	26.29	37.90	18.46	28.95	25.62	19.38	53.58	37.65
36	Sept 3-9	27.22	43.82	28.27	40.43	19.26	29.69	25.62	20.80	53.89	38.70
37	Sept 10-16	27.47	44.81	28.64	41.66	20.00	29.94	-	20.80	-	39.13

Table 4.2.6a:PP2: Weekly Per cent disease index (PDI) of RAB in trap nursery during *Kharif* 2023 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
35	Aug 27 –Sept 2	0.74	0.00	1.98	0.93	0.00	0.74	0.99	4.20	2.04	3.83
36	Sept 3-9	3.64	2.35	8.46	3.77	1.98	3.39	4.75	10.74	8.02	8.27
37	Sept 10-16	8.33	6.48	15.74	9.07	6.60	6.85	8.83	17.22	10.99	15.68
38	Sept 17-23	19.57	13.52	32.34	22.41	11.73	12.90	0.00	32.96	0.00	27.22

Table 4.2.7a:PP2: Weekly Per cent disease index (PDI) of Anthracnose in trap nursery during *Kharif* 2023 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
34	Aug 20-26	0.00	0.00	0.00	22.89	0.00	0.00	39.56	0.00	35.11	4.67
35	Aug 27 –Sept 2	0.67	0.00	0.00	33.78	0.00	1.11	56.00	0.67	49.56	13.56
36	Sept 3-9	6.22	2.00	1.11	39.78	0.00	5.11	66.00	3.11	60.22	23.11
37	Sept 10-16	13.33	6.00	4.22	43.78	1.11	13.56	68.22	9.56	63.78	32.89
38	Sept 17-23	18.89	10.22	6.44	44.00	5.56	21.56	69.78	13.78	64.89	34.22
39	Sept 24-30	19.56	12.22	6.89	45.11	7.11	22.22	-	14.89	-	34.22

Table 4.2.8a:PP2: Weekly Per cent disease index (PDI) of FLS in trap nursery during *Kharif* 2023 at Palampur centre

SMW	Month and date	JS 95-60	JS 335	Shivalik	JS 93-05	Punjab 1	Monetta	NRC 7	PK 262	PK 472
35	Aug 27 –Sept 2	6.66	5.55	11.11	5.55	13.33	11.11	0.00	1.11	0.00
36	Sept 3-9	16.66	24.44	24.44	11.11	24.44	24.44	3.33	4.44	3.33
37	Sept 10-16	24.44	30.00	33.33	16.66	33.33	26.66	6.66	5.55	11.11
38	Sept 17-23	26.66	38.66	55.55	24.44	55.55	48.88	11.11	6.66	24.44
39	Sept 24-30	33.33	55.55	77.77	26.66	66.66	55.55	11.11	11.11	33.33
40	Oct 1-7	33.33	55.55	77.77	33.33	66.66	55.55	11.11	11.11	33.33

Table 4.2.9a: Weekly Per cent disease index (PDI) of anthracnose of soybean in trap nursery during *Kharif* 2023 at Palampur centre

SMW	Month and date	JS 95-60	JS 335	Shivalik	JS 93-05	Punjab 1	Monetta	NRC 7	PK 262	PK 472
35	Aug 27 –Sept 2	12.66	11.11	6.66	6.66	3.33	1.11	8.66	1.11	0.00
36	Sept 3-9	18.88	18.88	14.66	11.11	6.66	3.33	11.66	3.33	3.33
37	Sept 10-16	26.66	33.33	26.64	26.66	9.66	8.66	18.88	8.66	8.33
38	Sept 17-23	33.33	48.88	28.88	33.33	16.66	16.66	24.66	8.66	9.66
39	Sept 24-30	55.55	66.66	33.00	48.88	24.44	24.44	33.33	9.33	16.64
40	Oct 1-7	77.77	66.66	33.33	55.55	26.66	33.33	55.55	11.11	33.33

Table 4.2.10a: Weekly Per cent disease index (PDI) of RAB of soybean in trap nursery during *Kharif* 2023 at Pantnagar centre

SMW	Month and date	JS 95-60	JS 335	Shivalik	JS 93-05	Punjab 1	Bragg	Monetta	NRC 7	PK 262	PK 472
35	Aug 27 –Sept 2	0	4.44	11.11	4.44	9.26	8.52	5.56	4.07	5.93	4.44
36	Sept 3-9	5.93	6.67	17.04	9.26	12.22	16.67	18.15	5.93	7.41	5.56
37	Sept 10-16	9.63	13.33	18.15	12.96	15.93	20.37	21.85	8.52	12.59	7.04
38	Sept 17-23	14.81	22.96	18.89	15.93	22.22	24.44	22.22	11.48	17.04	13.7
39	Sept 24-30	22.96	36.3	25.56	21.48	30.37	35.93	30.74	12.96	22.59	21.11
40	Oct 1-7	32.59	46.67	31.48	28.89	39.26	38.15	34.44	24.81	27.04	27.04
41	Oct 8-14	35.93	49.63	35.19	36.3	47.04	42.59	36.67	29.63	31.48	32.22
42	Oct 15-21	37.41	52.59	36.67	40	50.74	44.07	38.15	31.85	33.7	38.15
43	Oct 22-28	39.63	60.37	40.74	41.85	55.19	47.04	40.37	39.63	35.93	41.85

Table 4.2.11a: Weekly Per cent disease index (PDI) of SYMV of soybean in trap nursery during *Kharif* 2023 at Pantnagar centre

SMW	Month and date	JS 95-60	JS 335	Shivalik	JS 93-05	Punjab -1	Bragg	Monetta	NRC 7	PK 262	PK 472
33	Aug 13-19	1.25	0	1.02	1.5	2.45	1.5	1.5	1.15	2.25	2.75
34	Aug 20-26	6.8	1.5	2.5	3.5	8.9	4.5	2	2.7	5.5	5..5

35	Aug 27 –Sept 2	6.9	3.35	3.85	5.7	10.5	5.2	2.7	3.5	6.5	9.5
36	Sept 3-9	7.9	4.7	4.2	7.9	13.3	7.5	3.28	5.6	8.2	12.8
37	Sept 10-16	9.5	5.5	4.9	9.9	16.3	8.5	5.2	7.5	12	16.7
38	Sept 17-23	15.2	5.9	6.9	13.9	18.25	11.52	9.5	8.6	15.5	18.5
39	Sept 24-30	18.5	7.21	8.2	15.5	21.25	14.23	12.23	10.2	18.2	20.5
40	Oct 1-7	25.8	9.29	8.9	18.15	23.25	16.2	15.5	12.3	20.5	22.7
41	Oct 8-14	28.6	11.33	9.5	21.6	27.25	19.25	17.05	13.5	25.5	25.5
42	Oct 15-21	30.2	13.5	10.2	23.2	30.25	21.22	19.5	14.9	27.2	28.2
43	Oct 22-28	34.44	17.04	11.48	24.07	32.22	22.22	22.96	16.3	29.63	31.48

Table 4.2.12a: Weekly Per cent disease index (PDI) of collar rot of soybean in trap nursery during *Kharif* 2023 at Jorhat centre

SMW	Month and date	JS 335	PK 472	Shivalik	Punjab 1	NRC 7	Monetta	JS 95-60	PK 262	JS 93-05	Bragg
36	Sep 3-9	0	3.83	0	NG	0	NG	0	NG	9	0
37	Sept 10-16	0	3.83	0	NG	0	NG	0	NG	9	0
38	Sept 17-23	4.6	3.83	0	NG	0	NG	0	NG	9	0
39	Sept 24-30	4.6	7.5	0	NG	9.5	NG	0	NG	9	0
40	Oct 1-7	7.16	14.5	10.5	NG	9.5	NG	0.1	NG	15.5	0
41	Oct 8-14	7.16	14.5	10.5	NG	17.5	NG	2.77	NG	15.55	0
42	Oct 15-21	15.75	14.5	10.5	NG	17.5	NG	2.77	NG	21	9.8
43	Oct 22-28	15.75	19	16.33	NG	19.5	NG	2.77	NG	21	11.28
44	Oct 29-Nov 4	15.75	19	16.33	NG	19.5	NG	2.77	NG	24	11.28
45	Nov 5-11	15.75	24.04	16.33	NG	19.5	NG	2.77	NG	24	11.28
46	Nov 12-18	15.75	24.04	16.33	NG	19.5	NG	2.77	NG	24	11.28

Table 4.2.13a: Weekly Per cent disease index (PDI) of RAB of soybean in trap nursery during *Kharif* 2023 at Jorhat centre

SMW	Month and date	JS 335	PK 472	Shivalik	Punjab 1	NRC 7	Monetta	JS 95-60	PK 262	JS 93-05	Bragg
37	Sept 10-16	9	3.5	10	NG	0	NG	6.5	NG	0	9
38	Sept 17-23	11.11	3.5	10	NG	3.5	NG	6.5	NG	0	9
39	Sept 24-30	11.11	3.5	11.57	NG	3.5	NG	6.5	NG	4.5	9
40	Oct 1-7	17.78	9	11.57	NG	8.3	NG	11.5	NG	4.5	13.45
41	Oct 8-14	17.78	9	17.14	NG	8.3	NG	11.5	NG	9	13.45
42	Oct 15-21	20.83	9	17.14	NG	8.3	NG	11.5	NG	9	13.45
43	Oct 22-28	20.83	9	21.83	NG	12.77	NG	14.16	NG	11.11	13.45
44	Oct 29-Nov 4	20.83	9	21.83	NG	12.77	NG	14.16	NG	11.11	17.5
45	Nov 5-11	20.83	11.11	21.83	NG	12.77	NG	14.16	NG	11.11	17.5
46	Nov 12-18	20.83	11.11	21.83	NG	12.77	NG	14.16	NG	11.11	17.5

Table 4.2.14a: Weekly Per cent disease index (PDI) of Pod blight of soybean in trap nursery during *Kharif* 2023 at Jorhat centre

SMW	Month and date	JS 335	PK 472	Shivalik	Punjab 1	NRC 7	Monetta	JS 95-60	PK 262	JS 93-05	Bragg
40	Oct 1-7	0	4.5	0	NG	0	NG	0	NG	0	11.4
41	Oct 8-14	10	4.5	5	NG	11.5	NG	0	NG	4	11.4
42	Oct 15-21	10	4.5	5	NG	11.5	NG	15	NG	9.8	11.4

43	Oct 22-28	10	6	8.33	NG	18.05	NG	15	NG	11.38	11.4
44	Oct 29-Nov 4	10	6	8.33	NG	18.05	NG	19.5	NG	11.38	13.88
45	Nov 5-11	10	8	8.33	NG	18.05	NG	19.5	NG	11.38	13.88
46	Nov 12-18	10	8	8.33	NG	18.05	NG	19.5	NG	11.38	13.88

Table 4.2.15a: Weekly Per cent disease index (PDI) of Yellow mosaic of soybean in trap nursery during *Kharif* 2023 at Jorhat centre

SMW	Month and date	JS 335	PK 472	Shivalik	Punjab 1	NRC 7	Monetta	JS 95-60	PK 262	JS 93-05	Bragg
41	Oct 8-14	5.55	4.5	2.83	NG	5.5	NG	4.5	NG	6.5	1.67
42	Oct 15-21	5.55	9.09	2.83	NG	5.5	NG	4.5	NG	6.5	1.67
43	Oct 22-28	5.55	9.09	2.83	NG	9.167	NG	6	NG	8	1.67
44	Oct 29-Nov 4	5.55	9.09	2.83	NG	9.167	NG	6	NG	8	1.67
45	Nov 5-11	5.55	9.09	2.83	NG	9.167	NG	8.66	NG	8	1.67
46	Nov 12-18	5.55	9.09	2.83	NG	9.167	NG	8.666	NG	8	1.67

Table 4.2.16a: Weekly Per cent disease index (PDI) of charcoal rot of soybean in trap nursery during *Kharif* 2023 at Almora centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
36	Sept 3-9	0	2	0	8.5	0	0	4	0	0	0
37	Sept 10-16	1.5	6.5	5	31.5	0	0	19.5	0	0	1.5
38	Sept 17-23	6.5	17.5	15	58.5	0	1	28	0	14.5	9
39	Sept 24-30	14.5	26.5	30.5	73	0	14	28	0	19	12
40	Oct 1-7	17	27.5	30.5	73.5	0	14	-	0	-	12

Table 4.2.17a: Weekly Per cent disease index (PDI) of RAB of soybean in trap nursery during *Kharif* 2023 at Medziphema centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
38	Sept 17-23	1.00	4.30	0.00	6.05	NG	NG	2.50	2.60	3.00	6.60
39	Sept 24-30	7.61	9.80	3.50	13.83	NG	NG	10.44	7.60	8.93	11.75
40	Oct 1-7	11.86	15.35	8.21	21.25	NG	NG	15.93	9.57	14.32	17.02
41	Oct 8-14	18.47	21.50	11.58	29.99	NG	NG	21.33	16.25	23.20	23.05

Table 4.2.18a: Weekly Per cent disease index (PDI) of PB of soybean in trap nursery during *Kharif* 2023 at Medziphema centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
39	Sept 24-30	3.90	2.75	7.00	6.60	NG	NG	5.25	2.75	5.53	2.50
40	Oct 1-7	8.51	4.33	9.00	10.56	NG	NG	9.09	10.46	12.38	3.59
41	Oct 8-14	10.89	8.79	11.35	14.81	NG	NG	14.04	13.48	20.20	4.80
42	Oct 15-21	12.59	11.25	13.36	14.62	NG	NG	16.29	15.89	24.45	6.00

Table 4.2.19a: Weekly Per cent disease index (PDI) of Rust of soybean in trap nursery during *Kharif* 2023 at Medziphema centre

SMW	Month and date	JS 335	PK 472	Shivalik	Monetta	NRC 7	PK 262	JS 95-60	Punjab 1	JS 93-05	Bragg
37	Sept 10-16	0.00	1.00	2.00	4.08	NG	NG	4.36	1.78	3.56	3.10
38	Sept 17-23	5.86	4.25	3.24	5.33	NG	NG	8.69	1.90	4.29	4.86
39	Sept 24-30	7.59	5.81	5.00	8.73	NG	NG	12.89	3.95	6.73	9.33
40	Oct 1-7	8.88	7.61	7.85	11.74	NG	NG	15.66	5.90	9.19	12.61

Table 4.2.20a: Weekly Per cent disease index (PDI) of RAB of soybean in trap nursery during *Kharif* 2023 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	Bragg

35	Aug 27 –Sept 2	0.00	0.00	0.00	1.28	0.00	3.45	17.31	6.98	49.56	13.50
36	Sept 3-9	4.29	4.43	3.18	9.57	0.00	7.81	39.82	7.25	60.22	28.14
37	Sept 10-16	11.33	13.70	5.22	13.25	1.11	11.96	47.24	16.32	63.78	39.89
38	Sept 17-23	15.69	19.18	9.07	21.88	5.56	15.63	55.80	24.31	64.89	44.22
39	Sept 24-30	19.17	21.45	10.41	27.37	7.11	20.16	-	29.47	-	56.64

Table 4.2.21a: Weekly Per cent disease index (PDI) of Anthracnose of soybean in trap nursery during *Kharif* 2023 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	Bragg
36	Sept 3-9	9.27	8.31	9.46	5.21	3.58	13.90	12.35	11.54	5.02	14.87
37	Sept 10-16	15.32	11.48	21.99	11.24	15.87	21.88	22.93	27.22	12.38	16.53
38	Sept 17-23	19.88	16.74	30.56	15.28	28.53	29.61	34.87	32.96	26.37	27.31
39	Sep 24-3	28.45	-	35.27	19.87	40.31	35.37	43.98	38.69	38.35	31.98

Weather Data

Table 4.2.1b Weather parameters during cropping season of *Kharif* 2023 at Amravati

SMW	Months & Dates	Temperature (⁰C)		Relative Humidity (%)		Rainfall	Rainy Days
MW	Weekly Date	$T_{min.}$	$T_{max.}$	RH_I	RH_{II}	(mm)	
23	June 4-10	26.7	43.0	41.1	38.4	7.6	1
24	June 11-17	28.3	42.5	52.3	41.7	4.2	1
25	June 18-24	26.8	40.1	83.3	76.1	55.0	2
26	June 25-July 1	25.3	33.8	87.0	81.3	32.6	3
27	July 2-8	24.5	34.5	80.1	73.4	66.8	2
28	July 9-15	23.1	30.9	89.7	83.6	68.6	5
29	July 16-22	23.5	29.0	92.6	88.6	73.2	5
30	July 23-29	23.7	31.9	91.7	77.0	77.8	5
31	July 30- Aug 5	23.3	31.0	85.9	83.6	13.2	2
32	Aug 6-12	23.2	32.2	79.9	62.7	16.2	1
33	Aug 13-19	23.3	31.4	83.7	74.6	16.0	3
34	Aug 20-26	22.7	30.8	86.7	72.4	11.0	1
35	Aug 27–Sept 2	23.2	35.1	70.4	55.0	0.2	0
36	Sept 3-9	24.3	34.3	78.9	70.9	61.2	2
37	Sept 10-16	22.8	29.4	87.0	85.1	28.0	2
38	Sept 17-23	23.3	32.9	82.9	76.4	76.0	2
39	Sept 24-30	22.9	33.5	86.0	79.9	25.0	4
40	Oct 1-7	21.7	34.8	75.4	52.6	20.0	1
41	Oct 8-14	20.8	36.9	65.7	53.6	0.0	0
42	Oct 15-21	20.4	35.6	69.1	58.0	12.2	1

Table 4.2.2b Weather parameters during cropping season of *Kharif* 2023 at Sehore

SMW	Week	Temperature °C		Rainfall (mm)	No of rainy days
		Max	Min		
23	4-10 June	40.24	24.81	7.5	1
24	11-17	40.60	25.93	4.5	1
25	18-24	36.49	25.01	99.2	3
26	25-1	29.40	24.07	82.8	7
27	2-8 July	31.79	24.73	87.2	5
28	9-15	29.97	23.21	107.7	7
29	16-22	31.07	23.93	244.8	7
30	23-29	31.37	24.61	40.7	3
31	30-5 Aug	29.67	24.29	27.0	2
32	6-12	30.19	22.96	0.0	0
33	13-19	29.97	22.87	19.7	2
34	20-26	28.44	22.87	16.3	2
35	27-2	31.10	21.53	4.6	1
36	3-9 Sep	30.94	22.70	48.2	3
37	10-16	27.43	23.06	133.6	6
38	17-23	29.57	22.31	174.4	4
39	24-30	32.46	22.30	37.0	3
40	1-7 Oct	33.29	19.80	0.0	0.0
41	8-14	33.93	17.61	0.0	0.0
42	15-21	33.70	19.10	0.0	0.0

Table 4.2.3b: Weather parameters during cropping season of *Kharif* 2023 at Dharwad

SMW	Months & dates	Temp Max	Temp Min	Rain fall (mm)	RH (%) Max	RH (%) Min	rainy days
23	4-10 Jun	34.9	21.9	0.0	80.1	44.0	0
24	11-17 Jun	32.1	21.8	15.4	83.9	57.4	2
25	18-24 Jun	33.7	22.0	0.0	81.7	55.7	0
26	25 Jun – 1 Jul	29.3	21.0	8.8	85.6	76.4	1
27	2 – 8 Jul	27.4	21.1	31.6	92.3	84.6	4
28	9 - 15 Jul	28.3	21.2	4.2	87.9	85.6	1
29	16 - 22 Jul	25.8	20.7	114.4	94.3	92.7	7
30	23 - 29 Jul	24.5	20.6	126.0	95.4	92.4	5
31	30 Jul - 5 Aug	27.1	21.0	5.8	92.3	85.9	0
32	6 - 12 Aug	29.2	20.7	1.6	88.3	80.1	0
33	13 - 19 Aug	30.1	20.1	0.0	86.3	80.3	0
34	20 - 26 Aug	29.7	20.2	2.6	89.1	62.0	0
35	27 Aug - 2 Sep	30.3	20.6	27.6	87.6	63.4	1
36	3 - 9 Sep	29.3	20.6	16.8	89.3	75.1	1
37	10 - 16 Sep	29.6	20.7	0.6	86.1	72.7	0
38	17 - 23 Sep	29.0	20.9	11.8	90.0	73.7	2
39	24 - 30 Sep	29.7	20.9	2.6	90.1	72.9	0
40	1 - 7 Oct	27.9	20.4	10.4	88.7	77.1	2
Total rainfall				324.4	Total rainy		19

Table 4.2.4b: Weather parameters during cropping season of *Kharif* 2023 at jabalpur

SMW	Months & dates	Temperature Max.	Temperature Min.	Sun shine Hrs.	Rainfall (mm)	Relative humidity % Mor	Relative humidity % Eve	Wind velocity	No. of rainy days
22	May 28-3	38.0	21.2	9.4	25.6	68	34	3.8	1
23	June 4-10	40.3	24.3	10.2	0.0	61	25	4.6	0
24	June 11-	41.3	29.0	9.5	1.0	53	32	7.7	0
25	June 18-	37.2	28.0	6.6	8.6	68	53	6.9	1
26	June 25-	30.4	24.2	2.1	288.8	91	76	5.5	5
27	July 2-8	33.3	25.7	3.4	37.4	83	61	3.6	3
28	July 9-15	31.0	25.1	3.6	51.4	87	77	4.9	2
29	July 16-22	32.2	25.3	4.7	143.2	86	74	4.6	6
31	July 30-	29.0	24.1	1.2	285.8	93	85	8.4	5
32	Aug 6-12	29.4	24.0	1.8	23.6	89	70	6.4	2
33	Aug 13-19	31.6	23.9	3.9	160.2	89	70	5.1	2
34	Aug 20-26	29.9	24.3	2.3	25.1	87	75	5.3	3
35	Aug 27–	32.5	24.2	8.3	9.2	86	61	4.3	2
36	Sept 3-9	32.0	24.5	4.7	158.4	88	77	3.9	4
37	Sept 10-	29.9	24.3	1.8	56.6	93	81	5.3	5
38	Sept 17-	31.6	24.0	5.7	20.5	87	66	2.9	2
39	Sept 24-	32.3	23.6	6.9	1.4	88	65	2.7	0
40	Oct 1-7	31.9	20.6	6.8	0.6	83	57	3.0	0
41	Oct 8-14	33.9	20.6	8.5	0.0	81	43	2.1	0
42	Oct 15-21	31.9	18.4	7.7	0.0	84	48	2.2	0
43	Oct 22-28	30.0	13.9	9.0	0.0	73	41	1.7	0

Table 4.2.7b Weather parameters during cropping season of Kharif 2023 at Almora centre

SMW	Months & dates	Temperature Max.	Temperature Min.	Rain fall (mm)	Relative humidity % Max.	Relative humidity % Min	No. of rainy days
28	9 - 15 Jul	28.3	21.2	4.2	87.9	85.6	1
29	16 - 22 Jul	25.8	20.7	114.4	94.3	92.7	7
30	23 - 29 Jul	24.5	20.6	126	95.4	92.4	5

Table 4.2.8b Weather parameters during cropping season of Kharif 2023 at Indore

Std week	Months & dates	Temperature Max.	Temperature Min.	Rain fall (mm)	Relative humidity % Mor.	Relative humidity % Eve.	Wind velocity	No. of rainy days
22	May 28-3 June	37.57	24.42	2.18	79.97	75.75	1.70	1
23	June 4-10	37.86	24.86	2.59	83.19	77.00	1.09	1
24	June 11-17	39.07	27.00	0	82.90	82.29	1.52	0

31	30 Jul - 5 Aug	27.1	21	5.8	92.3	85.9	0
32	6 - 12 Aug	29.2	20.7	1.6	88.3	80.1	0
33	13 - 19 Aug	30.1	20.1	0	86.3	80.3	0
34	20 - 26 Aug	29.7	20.2	2.6	89.1	62	0
35	27 Aug - 2 Sep	30.3	20.6	27.6	87.6	63.4	1
36	3 - 9 Sep	29.3	20.6	16.8	89.3	75.1	1
37	10 - 16 Sep	29.6	20.7	0.6	86.1	72.7	0
38	17 - 23 Sep	29	20.9				
39	24 - 30 Sep	29.7	20.9	2.6	90.1	72.9	0
40	1 - 7 Oct	27.9	20.4	10.4	88.7	77.1	2

25	June 18-24	34.14	25.14	14.16	90.21	80.26	1.99	1
26	June 25-July 1	27.71	21.71	7.91	87.59	81.06	0.39	4
27	July 2-8	30.86	24.71	4.03	90.09	83.21	0.64	3
28	July 9-15	28.00	23.57	11.24	89.94	87.41	0.69	5
29	July 16-22	28.71	23.43	25.60	91.97	88.53	0.40	7
30	July 23-29	28.29	24.29	10.91	91.07	90.23	0.42	3
31	July 30- Aug 5	26.57	23.57	4.86	90.87	90.40	1.52	3
32	Aug 6-12	27.57	23.43	0.76	92.00	89.91	1.64	1
33	11.8	90	73.7	2	90.43	83.50	0.83	3
34	Aug 20-26	26.00	23.00	2.14	90.21	85.50	0.85	1
35	Aug 27–Sept 2	29.57	22.71	0	90.23	83.51	0.56	0
36	Sept 3-9	30.14	23.86	20.64	20.64	20.64	0.25	3
37	Sept 10-16	26.43	22.71	29.70	29.70	29.70	1.21	3
38	Sept 17-23	27.14	22.00	27.60	91.91	82.00	0.04	4
39	Sept 24-30	31.57	22.29	1.20	91.59	83.70	0.04	1
40	Oct 1-7	32.71	20.00	0	85.94	83.60	0.04	0
41	Oct 8-14	33.29	19.57	0	88.43	84.16	0.04	0
42	Oct 15-21	32.14	18.00	0	91.06	79.43	0.04	0
43	Oct 22-28	31.86	15.71	0	83.41	76.57	0.04	0
	Total rainfall			167.16		Total rainy		44

Table 4.2.5b Weather parameters during cropping season of Kharif 2023 at Pantnagar

SMW	Month	Date	Temp (ºC)		RH (%)		Rainfall (mm)	No. of Rainy Days
			Max.	Min.	7:12 am	14:12 pm		
29	July	16-22	32.9	26.6	83	66.7	119	2
30	July	23-29	33	26.3	84.3	76.3	103	3
31	July-Aug.	30-05	32.9	26.9	89.4	75.1	22.2	3
32	Aug	06-12	32.2	25.7	92.4	76	251.2	6
33	Aug	13-19	32.4	26.1	89.7	69.4	11.8	1

Table 4.2.6b Weather parameters during cropping season of Kharif 2023 at Jorhat

SMW	Month and date	Max T(oC)	Min T(o C)	RH (%)		RF(mm)	Rainy days	WS (kmph)
32	6 Aug - 12 Aug	32.6	24.9	93	77	51.2	3	3
33	13 Aug - 19 Aug	33.4	25.3	93	73	22.3	1	2.8
34	20 Aug - 26 Aug	30.7	23.9	95	80	93.4	3	2
35	27 Aug - 2 Sep	32.9	24.7	91	73	3.8	0	1.9
36	3 Sep - 9 Sep	36.6	25.7	88	63	4.2	1	2
37	10 Sep - 16 Sep	34.4	25.2	89	68	16.2	2	2.4

34	Aug	20-26	30.6	25.5	91.6	80.1	110	5	38	17 Sep - 23 Sep	32.1	24.7	94	77	38.1	4	1.7
35	Aug-Sep	27-02	34	25.6	91.3	62.1	0	0	39	24 Sep - 30 Sep	33.7	24.4	89	70	67.2	2	1.5
36	Sep	03-09	34.3	25.4	88.4	67.6	42	0	40	1 Oct - 7 Oct	32.2	23.5	94	79	104.7	6	1.6
37	Sep	10-16	31	25.4	91.1	74.6	152.2	2	41	8 Oct - 14 Oct	31.7	22.4	93	65	24.6	3	1.6
38	Sep	17-23	32.6	24.6	90.4	69.7	47.4	4	42	15 Oct - 21 Oct	32	20.6	94	62	0	0	1
39	Sep-Oct	24-30	32.9	23.5	88.6	57.9	60.2	1	43	22 Oct - 28 Oct	30.5	19.2	95	62	0	0	0.9
40	Oct	01-07	33.6	22.8	88.7	51.7	0	0	44	29 Oct - 4 Nov	31.3	17.4	95	60	0	0	8.8
41	Oct	08-14	33	19.3	79.6	46.7	0	0	45	5 Nov - 11 Nov	29.3	15.9	97	63	0	0	1.1
42	Oct	15-21	30.2	16.3	84.1	48.6	7.4	1	46	12 Nov - 18 Nov	28.5	15.2	97	60	19.4	1	1.3
43	Oct	22-28	30.9	14.3	88.9	36.9	0	0									

Table 4.2.9b Weather parameters during cropping season of Kharif 2023 at Palampur

MSW	Date	Temperature		Rainfall (mm)	No. of rainy days	Relative Humidity (%)		Evaporation (mm)	Sunshine (hours)
		Max(ºC)	Min (ºC)			Max	Min		
22	May-28 to Jun-03	23.79	13.6	9.49	6	73.86	58.29	3.64	4.21
23	Jun 04-10	28.64	16.79	0	0	59.14	47.71	6.43	9.14
24	Jun 11-17	29.64	17.57	3.83	4	67.29	59.14	4.99	7.71
25	Jun 18-24	29.81	19.96	9.8	3	80.14	72.17	4.47	11.58
26	Jun 25 to July-01	27.21	18.93	15.91	5	87.29	82.71	3.49	4.16
27	July 02-08	27.07	19.07	9.37	5	90.00	86.00	3.36	3.79
28	July 09-15	25.93	18.14	45.94	7	92.43	86.43	2.07	4.00
29	July 16-22	28.00	19.79	64.17	7	97.00	87.14	2.16	1.86
30	July 23-29	26.64	19.31	17.20	7	92.86	92.00	2.31	1.93
31	July 30-05	28.07	19.36	12.60	6	90.00	88.57	3.26	5.29
32	Aug 06-12	27.43	19.64	29.63	6	93.00	87.00	3.00	3.79
33	Aug 13-19	26.79	19.36	49.54	6	95.71	90.29	2.46	2.57
34	Aug 20-26	26.86	19.54	42.60	6	96.14	88.00	2.20	1.86
35	Aug 27-02	27.53	17.64	2.49	4	89.43	79.86	3.50	6.00
36	Sept 03-09	28.50	17.93	2.57	2	83.57	72.43	3.90	6.36
37	Sept 10-16	27.64	18.71	17.74	4	93.88	82.71	3.01	3.86
38	Sept 17-23	26.81	17.27	06.23	4	94.29	83.14	2.91	4.14
39	Sept 24-30	27.27	14.79	0.00	0	77.86	65.86	3.50	7.93
40	Oct 01-07	27.21	14.67	0.00	0	70.71	65.43	4.29	8.71
41	Oct 08-14	27.06	12.79	1.06	1	71.43	56.57	3.63	9.86
42	Oct 15-21	22.67	9.86	3.29	3	74.71	54.00	2.96	5.50
43	Oct 22-28	24.86	10.34	0.20	1	66.14	41.00	3.47	8.93
44	Oct 29-Nov 04	24.29	10.74	0.00	0	71.71	46.29	3.83	10.79

PP3: Evaluation of breeding materials for resistant donors

Table 4.3.1: PP3. Reaction of IVT, AVT I & AVT II entries for RAB disease

CODE	RAB																				
	Jabalpur				Indore				Amravati				CODE	Jorhat				Medziphema			
	R1	R2	Max Scor	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR		R1	R2	Max Score	DR	R1	R2	Max Scor	DR
IVT (N)																					
NRC 270	1	1	1	R	0	0	0	HR	0	0	0	HR	NRC 270	1	1	1	R	1	3	3	MR
AMS 22-16	3	3	3	MR	0	3	3	MR	6.33	5.82	6.07	MR	AMS 22-16	1	3	3	MR	0	1	1	R
VLS 89 (c)	5	3	5	MS	3	3	3	MR	0	0	0	HR	VLS 89 (c)	0	1	1	R	0	1	1	R
MAUS 816	5	5	5	MS	0	0	0	HR	0	0	0	HR	MAUS 816	0	3	3	MR	1	0	1	R
Pusa Sipani BS	5	3	5	MS	7	7	7	S	0	0	0	HR	Pusa Sipani BS 8	0	1	1	R	1	1	1	R
VLS 99 (c)	NG	NG	NG	NG	NG	NG	NG	NG	0	0	0	HR	VLS 99 (c)	1	0	1	R	0	1	1	R
DS 1589	0	0	0	HR	5	5	5	MS	0	0	0	HR	DS 1589	1	1	1	R	1	0	1	R
RSC 11-95	5	3	5	MS	3	3	3	MR	0	0	0	HR	RSC 11-95	1	3	3	MR	0	1	1	R
VLS 63 (c)	3	3	3	MR	0	0	0	HR	0	0	0	HR	VLS 63 (c)	1	1	1	R	1	0	1	R
BAUS (M) 6	5	5	5	MS	1	3	3	MR	0	0	0	HR	BAUS (M) 6	3	1	3	MR	1	0	1	R
NRC 142 (c)	5	5	5	MS	3	7	7	S	0	0	0	HR	NRC 142 (c)	1	1	1	R	1	0	1	R
KBSL 23-36	3	5	5	MS	9	9	9	HS	0	0	0	HR	KBSL 23-36	0	1	1	R	0	0	0	HR
VLS 106	3	5	5	MS	0	0	0	HR	0	0	0	HR	VLS 106	1	1	1	R	1	1	1	R
JS 20-98(RC)	3	3	3	MR	0	0	0	HR	0	0	0	HR	JS 20-116(RC)	3	1	3	MR	0	0	0	HR
JS 95-60(SC)	3	5	5	MS	0	0	0	HR	8.9	10.66	9.78	MR	JS 93-05(SC)	1	3	3	MR	1	1	1	R
SL 1315	1	3	3	MR	7	7	7	S	0	0	0	HR	SL 1315	0	1	1	R	1	0	1	R
TS 101	3	3	3	MR	0	0	0	HR	0	0	0	HR	TS 101	0	0	0	HR	1	1	1	R
THPS 6	5	3	5	MS	0	0	0	HR	0	0	0	HR	THPS 6	1	1	1	R	0	0	0	HR
KDSIS 1394	7	5	7	S	0	0	0	HR	0	0	0	HR	KDSIS 1394	1	3	3	MR	0	0	0	HR
NRC 271	0	1	1	R	3	5	5	MS	0	0	0	HR	NRC 271	3	1	3	MR	0	1	1	R
Lok-Soya 03	3	5	5	MS	7	7	7	S	0	0	0	HR	Lok-Soya 03	1	1	1	R	1	0	1	R
KSS 225	3	5	5	MS	0	0	0	HR	0	0	0	HR	KSS 225	5	3	5	MS	0	1	1	R
DS 1547	1	3	3	MR	0	0	0	HR	0	0	0	HR	DS 1547	3	3	3	MR	1	1	1	R

MACS 1810	5	3	5	MS	0	0	0	HR	0	0	0	HR	MACS 1810	1	1	1	R	0	1	1	R
JS 25-08	3	5	5	MS	0	0	0	HR	0	0	0	HR	JS 25-08	1	0	1	HR	1	0	1	R
ASb 101	3	3	3	MR	5	5	5	MS	0	0	0	HR	ASb 101	1	0	1	HR	0	0	0	HR
NRC 268	0	0	0	HR	0	0	0	HR	0	0	0	HR	NRC 268	1	1	1	R	1	1	1	R
DLSb 5	3	3	3	MR	0	0	0	HR	0	0	0	HR	DLSb 5	1	0	1	R	0	0	0	HR
NRC 269	1	1	1	R	0	0	0	HR	0	0	0	HR	NRC 269	1	1	1	R	0	0	0	HR
JS 20-98(RC)	0	3	3	MR	0	0	0	HR	0	0	0	HR	JS 20-116(RC)	1	1	1	R	1	0	1	R
JS 95-60(SC)	5	5	5	MS	0	0	0	HR	0	0	0	HR	JS 93-05(SC)	0	1	1	R	1	0	1	HR
AVT (N)													**IVT (R)**								
JS 21-72 (c)	1	0	1	R	0	0	0	HR	0	0	0	HR	NRC 260	3	1	3	MR	3	1	3	MR
RSC 10-52 (c)	3	5	5	MS	5	5	5	MS	0	0	0	HR	NRC 190	0	1	1	R	0	1	1	R
MAUS 824	1	0	1	R	7	5	7	S	0	0	0	HR	VLS 105	1	0	1	R	1	1	1	R
NRC 258	0	3	3	MR	5	5	5	MS	0	0	0	HR	AMS 2021-4	0	0	0	HR	0	0	0	HR
RVSM 2011-35	NG	NG	NG	-	NG	NG	NG	NG	0	0	0	HR	MACS 1407 (c)	1	1	1	R	0	0	0	HR
NRC 259	3	0	3	MR	3	5	5	MS	0	0	0	HR	KDS 1188	5	3	5	MS	1	1	1	R
JS 20-98 (c)	5	1	5	MS	5	7	7	S	0	0	0	HR	Himso 1696	0	1	1	R	3	1	3	MR
JS 20-98 (RC)	3	3	3	MR	7	7	7	S	0	0	0	HR	JS 20-116(RC)	0	1	1	R	1	1	1	R
JS 95-60 (SC)	3	5	5	MS	0	0	0	HR	0	0	0	HR	JS 93-05(SC)	1	1	1	R	1	1	1	R
IVT (E)													NRC 142 ©	1	3	3	MR	1	1	1	R
NRC 266	5	5	5	MS	0	0	0	HR					MAUS 824	1	1	1	R	3	1	3	MR
NRC 138 (c)	3	5	5	MS	7	7	7	S					RSC 11-72	1	1	1	R	1	1	1	R
DS 1480	3	1	3	MR	5	3	5	MS					NRC 259	3	3	3	MR	1	1	1	R
NRC 264	5	5	5	MS	0	0	0	HR					AMS 2021-3	5	3	5	MS	1	1	1	R
AUKS 21-5	3	3	3	MR	0	0	0	HR					JS 20-116 (C)	1	0	1	R	1	1	1	R
NRC 150 (c)	3	5	5	MS	7	7	7	S					KDS 753 (c)	1	1	1	R	1	1	1	R
KDS 1193	5	3	5	MS	0	0	0	HR					NRC 191	1	1	1	R	3	3	3	MR
MACS 1834	5	5	5	MS	0	0	0	HR					Pusa Sipani 433	0	0	0	HR	1	1	1	R
JS 20-98(RC)	3	3	3	MR	5	7	7	S					**IVT (N)**	**Pantnagar**							
JS 95-60(SC)	3	3	3	MR	5	5	5	MS					NRC 270	3	3	3	MR				
JS 25-03	0	3	3	MR	0	0	0	HR					AMS 22-16	3	1	3	MR				
JS 25-06	3	3	3	MR	5	5	5	MS					VLS 89 (c)	1	3	3	MR				

NRC 267	3	7	7	S	5	5	5	MS					MAUS 816	5	3	5	MS				
MAUS 787	5	3	5	MS	7	7	7	S					Pusa Sipani BS 8	7	3	7	HS				
NRC 265	5	5	5	MS	7	7	7	S					VLS 99 (c)	5	3	5	MS				
JS 20-34 (c)	3	3	3	MR	0	0	0	HR					DS 1589	5	3	5	MS				
Pusa Sipani 33	5	3	5	MS	0	0	0	HR					RSC 11-95	5	7	7	HS				
KDS 1201	5	5	5	MS	5	5	5	MS					VLS 63 (c)	5	7	7	HS				
AVT I & II													BAUS (M) 6	5	5	5	MS				
JS 95-60 (c)	3	1	3	MR	0	0	0	HR					NRC 142 (c)	5	7	7	HS				
NRC 262	1	3	3	MR	0	0	0	HR					KBSL 23-36	7	9	9	HS				
NRC 130 (c)	3	3	3	MR	0	0	0	HR					VLS 106	3	5	5	MS				
JS 24-33	3	0	3	MR	5	5	5	MS					NRC 149(RC)	5	3	5	MS				
JS 23-09	3	1	3	MR	0	0	0	HR					JS 335(SC)	1	1	1	R				
NRC 152 9c	1	0	1	R	0	0	0	HR					SL 1315	5	3	3	MR				
JS 23-03	3	1	3	MR	0	0	0	HR					TS 101	3	5	5	MS				
NRC 138 (c)	3	3	3	MR	3	5	5	MS					THPS 6	7	3	7	S				
JS 20-34 (c)	3	5	5	MS	0	0	0	HR					KDSIS 1394	3	5	5	MS				
AMS 2022-1	0	3	3	MR	5	7	7	S					NRC 271	7	5	7	S				
JS 20-98(RC)	3	3	3	MR	5	5	5	MS					Lok-Soya 03	3	7	7	S				
JS 95-60(SC)	3	5	5	MS	0	0	0	HR					KSS 225	3	7	7	S				
													DS 1547	9	5	9	HS				
													MACS 1810	5	3	5	S				
													JS 25-08	5	3	5	MS				
													ASb 101	3	5	5	MS				
													NRC 268	3	3	3	MR				
													DLSb 5	3	3	3	MR				
													NRC 269	5	7	7	S				
													NRC 149(RC)	3	5	5	MS				
													JS 335(SC)	7	5	7	S				

*IVT(N) data of Jabalpur, Indore, Amravati, Jorhat, Medziphema; IVT(R) data of Jorhat, Medziphema; AVT (N) data of Jabalpur, Amravati, Indore; IVT(E) data of Jabalpur; AVT I & II data of Jabalpur and Indore for RAB disease can't be considered as the disease pressure in susceptible check was less.

Table 4.3.2: PP3. Reaction of IVT, AVT I & AVT II entries for anthracnose disease

CODE	Anthracnose																				
	Jabalpur				Amravati				Kota				Indore				Palampur				
	R1	R2	Max Sco	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR	CODE	R1	R2	Max Score	DR
IVT (N)																					
NRC 270	1	0	1	R	0	0	0	HR	0	0	0	HR	0	0	0	HR	NRC 270	5	3	5	MS
AMS 22-16	1	3	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	AMS 22-16	1	0	1	R
VLS 89 (c)	1	1	1	R	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 89 (c)	1	1	1	R
MAUS 816	0	3	3	MR	0	0	0	HR	0	0	0	HR	0	1	1	R	MAUS 816	5	5	5	MS
Pusa Sipani BS	7	7	7	S	0	0	0	HR	0	0	0	HR	0	0	0	HR	Pusa Sipani BS	7	7	7	S
VLS 99 (c)	N	N	NG	NG	0	0	0	HR	NG	NG	NG	NG	0	0	0	HR	VLS 99 (c)	1	3	3	MR
DS 1589	0	0	0	HR	0	0	0	HR	0	0	0	HR	0	0	0	HR	DS 1589	7	5	7	S
RSC 11-95	3	3	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	RSC 11-95	1	3	3	MR
VLS 63 (c)	3	1	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 63 (c)	5	3	5	MS
BAUS (M) 6	0	1	1	R	0	0	0	HR	0	0	0	HR	0	0	0	HR	BAUS (M) 6	3	5	5	MS
NRC 142 (c)	3	1	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	NRC 142 (c)	3	3	3	MR
KBSL 23-36	1	3	3	MR	8.99	5.2	7.09	MR	0	0	0	HR	3	7	7	S	KBSL 23-36	5	7	7	S
VLS 106	1	1	1	R	0	0	0	HR	0	0	0	HR	7	7	7	S	VLS 106	3	0	3	MR
JS 20-98(RC)	0	1	1	R	0	0	0	HR	0	0	0	HR	5	5	5	MS	VLS 99(RC)	5	5	5	MS
JS 95-60(SC)	7	9	9	HS	0	0	0	HR	0	0	0	HR	7	7	7	S	Shivalik(SC)	1	0	1	R
SL 1315	1	1	1	R	0	0	0	HR	0	0	0	HR	0	0	0	HR	SL 1315	5	5	5	MS
TS 101	1	0	1	R	5.33	8.96	7.14	MR	0	0	0	HR	3	5	5	MS	TS 101	5	5	5	MS
THPS 6	1	0	1	R	7.66	9.9	8.78	MR	0	0	0	HR	5	5	5	MS	THPS 6	1	1	1	R
KDSIS 1394	9	5	9	HS	6.44	9.63	8.03	MR	0	0	0	HR	0	0	0	HR	KDSIS 1394	7	7	7	S
NRC 271	0	1	1	R	0	0	0	HR	0	0	0	HR	5	5	5	MS	NRC 271	5	5	5	MS
Lok-Soya 03	1	1	1	R	0	0	0	HR	0	0	0	HR	5	7	7	S	Lok-Soya 03	5	7	7	S
KSS 225	3	3	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	KSS 225	9	5	9	HS
DS 1547	0	0	0	R	5.22	6.33	5.77	MR	0	0	0	HR	7	9	9	HS	DS 1547	1	3	3	MR
MACS 1810	3	5	5	MS	0	0	0	HR	0	0	0	HR	9	9	9	HS	MACS 1810	5	5	5	MS

JS 25-08	0	1	1	R	0	0	0	HR	0	0	0	HR	7	5	7	S	JS 25-08	3	3	3	MR
ASb 101	3	1	3	MR	8.77	5.44	7.1	MR	1	1	1	R	0	0	0	HR	ASb 101	7	5	7	S
NRC 268	0	1	1	R	4.1	3.5	3.8	MR	0	0	0	HR	5	5	5	MS	NRC 268	7	5	7	S
DLSb 5	0	3	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	DLSb 5	5	5	5	MS
NRC 269	0	0	0	HR	0	0	0	HR	0	0	0	HR	7	7	7	S	NRC 269	3	3	3	MR
JS 20-98(RC)	0	0	0	HR	3.99	5.8	4.89	MR	0	0	0	HR	9	5	9	HS	VLS 99(RC)	3	3	3	MR
JS 95-60(SC)	3	3	3	MR	0	0	0	HR	1	1	1	R	0	0	0	HR	Shivalik(SC)	3	3	3	MR
AVT (N)																	**AVT II (N)**				
JS 21-72 (c)	1	0	1	R	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 89 (Filler)	3	3	3	MR
RSC 10-52 (c)	1	3	3	MR	5.6	8.4	7.03	MR	0	0	0	HR	0	0	0	HR	VLS 99 (c)	3	5	5	MS
MAUS 824	0	3	3	MR	3.4	6.2	4.82	MR	0	0	0	HR	0	0	0	HR	NRC 197	5	5	5	MS
NRC 258	1	1	1	R	0	0	0	HR	0	0	0	HR	0	0	0	HR	Palam Early	5	5	5	MS
RVSM 2011-	N	N	NG	NG	6.6	4.8	5.74	MR	NG	NG	NG	NG	NG	NG	NG	NG	VLS 63 (c)	3	1	3	MR
NRC 259	0	0	0	HR	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 89 (c)	3	3	3	MR
JS 20-98 (c)	1	0	1	R	0	0	0	HR	0	0	0	HR	5	3	5	MS	VLS 99 (RC)	3	5	5	MS
JS 20-98 (RC)	0	0	0	HR	3.1	4.7	3.94	MR	0	0	0	HR	0	0	0	HR	Shivalik(SC)	0	1	1	R
JS 95-60 (SC)	9	7	9	HS	7.6	3.8	5.77	MR	3	3	3	MR	7	5	7	S					
CODE	**Jabalpur**				**Amravati**				**Kota**				**Indore**				**Code**	**Raipur**			
	R1	**R2**	**Max Sco**	**DR**	**R1**	**R2**	**Max Score**	**DR**	**R1**	**R2**	**Max Score**	**DR**	**R1**	**R2**	**Max Score**	**DR**		**R1**	**R2**	**Max Score**	**DR**
IVT (Early)																	**IVT (N)**				
NRC 266	7	9	9	HS	0	0	0	HR	3	3	3	MR	0	0	0	HR	NRC 270	5	5	5	MS
NRC 138 (c)	0	3	3	MR	4.5	6.4	5	MR	0	0	0	HR	5	5	5	MS	AMS 22-16	7	7	7	S
DS 1480	1	0	1	R	0	0	0	HR	0	0	0	HR	5	5	5	MS	VLS 89 (c)	5	5	5	MS
NRC 264	0	1	1	R	6.1	3.9	5	MR	3	3	3	MR	0	0	0	HR	MAUS 816	5	5	5	MS
AUKS 21-5	1	3	3	MR	8.1	9.2	9	HS	0	0	0	HR	0	0	0	HR	Pusa Sipani BS	7	7	7	S
NRC 150 (c)	3	0	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 99 (c)	5	7	7	S
KDS 1193	3	3	3	MR	0	0	0	HR	0	0	0	HR	3	5	5	MS	DS 1589	7	7	7	S
MACS 1834	7	7	7	S	6.3	2.4	4.36	MR	0	0	0	HR	5	5	5	MS	RSC 11-95	7	9	9	HS
JS 20-98(RC)	3	1	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 63 (c)	7	9	9	HS
JS 95-60(SC)	9	5	9	HS	5.4	4.3	4.88	MR	0	0	0	HR	0	0	0	HR	BAUS (M) 6	5	5	5	MS

JS 25-03	1	3	3	MR	0	0	0	HR	0	0	0	HR	5	7	7	S	NRC 142 (c)	7	7	7	S
JS 25-06	3	5	5	MS	0	0	0	HR	0	0	0	HR	0	0	0	HR	KBSL 23-36	7	7	7	S
NRC 267	0	3	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 106	7	7	7	S
MAUS 787	3	3	3	MR	3.2	4.2	3.71	MR	0	0	0	HR	0	0	0	HR	NRC128(RC)	7	7	7	S
NRC 265	7	9	9	HS	0	0	0	HR	0	0	0	HR	0	0	0	HR	JS 95-60 (SC)	7	7	7	S
JS 20-34 (c)	3	1	3	MR	0	0	0	HR	0	0	0	HR	5	5	5	MS	SL 1315	5	7	7	S
Pusa Sipani 33	3	3	3	MR	0	0	0	HR	0	0	0	HR	0	0	0	HR	TS 101	7	7	7	S
KDS 1201	3	3	3	MR	5.8	6.4	6.14	MR	0	0	0	HR	0	0	0	HR	THPS 6	5	5	5	MS
AVT I & II																	KDSIS 1394	7	7	7	S
JS 95-60 (c)	5	3	5	MS	6.9	5.2	6.09	HR	3	3	3	MR	0	0	0	HR	NRC 271	9	7	9	HS
NRC 262	3	3	3	MR	3.4	4.1	3.77	HR	1	1	1	R	0	0	0	HR	Lok-Soya 03	7	7	7	S
NRC 130 (c)	1	0	1	R	5.4	3.8	4.65	HR	1	0	1	R	3	5	5	MS	KSS 225	7	7	7	S
JS 24-33	1	0	1	R	0	0	0	AR	0	0	0	HR	3	5	5	MS	DS 1547	7	9	9	HS
JS 23-09	0	0	0	HR	2.3	4.5	3.44	HR	0	0	0	HR	5	5	5	MS	MACS 1810	9	7	9	HS
NRC 152 9c	3	3	3	MR	0	0	0	AR	0	0	0	HR	9	9	9	HS	JS 25-08	7	7	7	S
JS 23-03	3	0	3	MR	0	0	0	AR	0	0	0	HR	3	3	3	MR	ASb 101	7	7	7	S
NRC 138 (c)	0	0	0	HR	4.8	6.7	5.78	HR	0	0	0	HR	0	0	0	HR	NRC 268	7	7	7	S
JS 20-34 (c)	0	3	3	MR	0	0	0	AR	0	0	0	HR	3	3	3	MR	DLSb 5	7	9	9	S
AMS 2022-1	0	1	1	R	3.9	2.6	3.32	HR	0	0	0	HR	0	0	0	HR	NRC 269	7	5	7	S
JS 20-98 (RC)	0	1	1	R	4.3	2.8	3.58	HR	0	0	0	HR	0	0	0	HR	NRC 128(RC)	7	7	7	S
JS 95-60 (SC)	7	5	7	S	5.2	2.4	3.82	HR	5	3	5	MS	5	5	5	MS	JS 95-60 (SC)	7	7	7	S
																	AVT II				
																	JS 20-116 (c)	9	7	9	HS
																	JS 20-116	7	7	7	S
																	RSC 11-42	7	5	7	S
																	NRC 128 (c)	7	7	7	S
																	AMS 2014-1 (c)	7	7	7	S
																	NRC 128 (RC)	9	9	9	HS
																	JS 95-60 (SC)	7	7	7	S

*IVT(N) data of Amravati, Kota, Palampur; AVT (N) data of Amravati & Kota; AVT II (N) data of Palampur; IVT (E) data of Amravati, Kota & Indore; AVT I & II data of Maravati, Kota & Indore for anthracnose disease can’t be considered as the disease pressure in susceptible check was less.

Table 4.3.3: PP3. Reaction of IVT, AVT I & AVT II entries for anthracnose disease

CODES	Anthracnose																								
	Kasbe-digraj				Dharwad				Ugarkhurd				CODES	Jorhat				Medziphema							
	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)													**IVT (N)**												
NRC 270	9	7	9	HS	5	5	5	MS	3	5	5	MS	NRC 270	0	0	0	HR	1	1	1	R				
AMS 22-16	9	9	9	HS	5	5	5	MS	5	5	5	MS	AMS 22-16	3	3	3	MR	1	1	1	R				
VLS 89 (c)	9	9	9	HS	5	5	5	MS	5	5	5	MS	VLS 89 (c)	3	1	3	R	0	1	1	R				
MAUS 816	9	7	9	HS	5	5	5	MS	5	5	5	MS	MAUS 816	5	3	5	MS	1	1	1	R				
Pusa Sipani	9	9	9	HS	5	5	5	MS	5	5	5	MS	Pusa Sipani BS 8	0	0	0	HR	1	1	1	R				
VLS 99 (c)	9	9	9	HS	5	5	5	MS	5	5	5	MS	VLS 99 (c)	0	1	1	R	1	3	3	MR				
DS 1589	5	5	5	MS	5	5	5	MS	5	5	5	MS	DS 1589	0	1	1	R	1	1	1	R				
RSC 11-95	7	7	7	S	5	5	5	MS	5	5	5	MS	RSC 11-95	1	3	3	MR	1	0	1	R				
VLS 63 (c)	9	7	9	HS	5	5	5	MS	5	5	5	MS	VLS 63 (c)	0	1	1	R	1	1	1	R				
BAUS (M) 6	9	9	9	HS	5	5	5	MS	5	5	5	MS	BAUS (M) 6	3	3	3	MR	1	1	1	R				
NRC 142 (c)	9	9	9	HS	5	5	5	MS	3	5	5	MS	NRC 142 (c)	1	1	1	R	1	1	1	R				
KBSL 23-36	9	9	9	HS	5	5	5	MS	5	5	5	MS	KBSL 23-36	0	0	0	HR	0	0	0	HR				
VLS 106	9	9	9	HS	5	5	5	MS	5	5	5	MS	VLS 106	0	1	1	R	1	1	1	R				
Dsb 34(RC)	9	7	9	HS	5	5	5	MS	5	5	5	MS	JS 20-116 (RC)	1	3	3	MR	1	1	1	R				
JS 335(SC)	9	9	9	HS	5	5	5	MS	1	3	3	MR	JS 93-05 (SC)	3	1	3	R	1	1	1	R				
SL 1315	9	9	9	HS	5	5	5	MS	3	5	5	MS	SL 1315	0	1	1	R	1	1	1	R				
TS 101	5	7	7	S	5	5	5	MS	5	5	5	MS	TS 101	1	3	3	MR	1	3	3	MR				
THPS 6	7	7	7	S	5	5	5	MS	5	5	5	MS	THPS 6	1	1	1	R	1	1	1	R				
KDSIS 1394	9	7	9	HS	5	5	5	MS	5	5	5	MS	KDSIS 1394	3	3	3	MR	0	0	0	HR				
NRC 271	7	7	7	S	5	5	5	MS	5	3	5	MS	NRC 271	3	5	5	MS	3	1	3	MR				
Lok-Soya 03	9	7	9	HS	5	5	5	MS	5	5	5	MS	Lok-Soya 03	1	3	3	MR	1	1	1	R				
KSS 225	9	9	9	HS	5	5	5	MS	5	5	5	MS	KSS 225	5	5	5	MS	1	1	1	R				
DS 1547	9	9	9	HS	5	5	5	MS	5	5	5	MS	DS 1547	0	0	0	HR	1	1	1	R				
MACS 1810	7	9	9	HS	5	5	5	MS	5	5	5	MS	MACS 1810	1	0	1	HR	1	1	1	R				
JS 25-08	9	9	9	HS	5	5	5	MS	5	5	5	MS	JS 25-08	1	1	1	R	1	0	1	R				

ASb 101	9	9	9	HS	5	5	5	MS	5	5	5	MS	ASb 101	3	3	3	MR	0	0	0	HR
NRC 268	9	7	9	HS	5	5	5	MS	5	5	5	MS	NRC 268	0	1	1	R	1	1	1	R
DLSb 5	9	9	9	HS	5	5	5	MS	5	5	5	MS	DLSb 5	1	1	1	R	0	0	0	HR
NRC 269	7	7	7	S	5	5	5	MS	5	5	5	MS	NRC 269	1	1	1	R	0	0	0	HR
Dsb 34(RC)	9	9	9	HS	5	5	5	MS	5	5	5	MS	JS 20-116 (RC)	1	1	1	R	1	1	1	R
JS 335(SC)	9	9	9	HS	5	5	5	MS	5	5	5	MS	JS 93-05 (SC)	1	0	1	MR	1	0	1	R
AVT (N)													**IVT (R)**								
MACS 1460	9	7	9	HS	5	5	5	MS					NRC 260	3	1	3	MR	3	1	3	MR
MACSNRC	9	9	9	HS	5	5	5	MS					NRC 190	0	1	1	R	0	1	1	R
NRC 142 (c)	9	9	9	HS	5	5	5	MS					VLS 105	1	0	1	R	1	1	1	R
MACS 1188	9	7	9	HS	5	5	5	MS					AMS 2021-4	0	0	0	HR	0	0	0	HR
JS 93-05 (c)	9	9	9	HS	5	5	5	MS					MACS 1407 (c)	1	1	1	R	0	0	0	HR
DSb 21 (c)	9	9	9	HS	5	5	5	MS					KDS 1188	5	3	5	MS	1	1	1	R
Dsb 34 (RC)	5	7	7	S	5	5	5	MS					Himso 1696	0	1	1	R	3	1	3	MR
JS 335 (SC)	7	9	9	HS	5	5	5	MS					JS 20-116 (RC)	0	1	1	R	1	1	1	R
													JS 93-05 (SC)	1	1	1	R	1	1	1	R
													NRC 142 ©	1	3	3	MR	1	1	1	R
													MAUS 824	1	1	1	R	3	1	3	MR
													RSC 11-72	1	1	1	R	1	1	1	R
													NRC 259	3	3	3	MR	1	1	1	R
													AMS 2021-3	5	3	5	MS	1	1	1	R
													JS 20-116 (C)	1	0	1	R	1	1	1	R
													KDS 753 (c)	1	1	1	R	1	1	1	R
													NRC 191	1	1	1	R	3	3	3	MR
													Pusa Sipani 433	0	0	0	HR	1	1	1	R

**IVT(N) data of K.digraj, Dharwad, Ugarkhurd, Jorhat, Medziphema; IVT (R) data of Jorhat, Medziphema; AVT (N) of Dharwad for anthracnose disease can't be considered as the disease pressure in susceptible check was less.

Table 4.3.4: PP3. Reaction of IVT, AVT I & AVT II entries for charcoal rot disease

CODE	CR																	
	Jabalpur				Amravati				CODE	Ludhiana				CODE	Jabalpur			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR		R1	R2	Max Score	DR		R1	R2	Max Score	DR
IVT (N)														**IVT (Early)**				
NRC 270	0	0	0	HR	0	0	0	HR	NRC 270	3	5	4	MS	NRC 266	0	0	0	HR
AMS 22-16	5	0	5	MS	0	0	0	HR	AMS 22-16	5	5	5	MS	NRC 138 (c)	0	7	7	S
VLS 89 (c)	3	3	3	MR	0	0	0	HR	VLS 89 (c)	2	2	2	MR	DS 1480	0	0	0	HR
MAUS 816	3	5	5	MS	0	0	0	HR	MAUS 816	3	5	4	MS	NRC 264	0	0	0	HR
Pusa Sipani	9	5	9	HS	3.66	4.33	3.99	MS	Pusa Sipani BS 8	7	7	7	S	AUKS 21-5	3	5	5	MS
VLS 99 (c)	NG	N	NG	NG	2.2	3.56	2.88	MR	VLS 99 (c)	1	1	1	R	NRC 150 (c)	0	5	5	MS
DS 1589	0	0	0	HR	0	0	0	HR	DS 1589	1	1	1	R	KDS 1193	5	5	5	MS
RSC 11-95	3	0	3	MR	0	0	0	HR	RSC 11-95	6	6	6	S	MACS 1834	7	0	9	HS
VLS 63 (c)	5	0	5	MS	0	0	0	HR	VLS 63 (c)	1	1	1	R	JS 20-98(RC)	3	0	3	MR
BAUS (M) 6	7	5	7	S	0	0	0	HR	BAUS (M) 6	3	5	4	MS	JS 95-60(SC)	3	3	3	MR
NRC 142 (c)	5	3	5	MS	0	0	0	HR	NRC 142 (c)	7	9	8	HS	JS 25-03	0	0	0	HR
KBSL 23-36	3	3	3	MR	0	0	0	HR	KBSL 23-36	5	7	6	S	JS 25-06	0	0	0	HR
VLS 106	7	9	9	HS	0	0	0	HR	VLS 106	3	5	4	MS	NRC 267	0	0	0	HR
JS 20-98(RC)	0	0	0	HR	0	0	0	HR	NRC 149(RC)	1	1	1	R	MAUS 787	3	0	3	MR
JS 95-60(SC)	5	9	9	HS	3.56	2.44	3	MR	JS 335(SC)	7	5	6	S	NRC 265	3	0	3	MR
SL 1315	0	0	0	HR	2.8	3.44	3.12	MR	SL 1315	1	1	1	R	JS 20-34 (c)	5	3	5	MS
TS 101	0	0	0	HR	0	0	0	HR	TS 101	1	3	2	MR	Pusa Sipani 33	3	3	3	MR
THPS 6	3	5	5	MS	0	0	0	HR	THPS 6	5	7	6	S	KDS 1201	7	5	7	S
KDSIS 1394	3	3	3	MR	0	0	0	HR	KDSIS 1394	9	9	9	HS	**AVT I & II**				
NRC 271	0	0	0	HR	0	0	0	HR	NRC 271	7	7	7	S	JS 95-60 (c)	0	0	0	AR
Lok-Soya 03	0	0	0	HR	0	0	0	HR	Lok-Soya 03	3	7	5	MS	NRC 262	3	3	3	MR
KSS 225	0	0	0	HR	0	0	0	HR	KSS 225	7	7	7	S	NRC 130 (c)	0	0	0	AR
DS 1547	0	0	0	HR	3.3	3.6	3.45	MS	DS 1547	1	3	2	MR	JS 24-33	1	0	1	HR
MACS 1810	9	5	9	HS	0	0	0	HR	MACS 1810	3	7	5	MS	JS 23-09	3	0	3	MR
JS 25-08	3	5	5	MS	0	0	0	HR	JS 25-08	7	7	7	S	NRC 152 9c	0	0	0	AR

ASb 101	0	0	0	HR	0	0	0	HR	ASb 101	7	7	7	S	JS 23-03	0	0	0	AR
NRC 268	0	0	0	HR	0	0	0	HR	NRC 268	5	5	5	MS	NRC 138 (c)	3	0	3	MR
DLSb 5	7	0	7	S	0	0	0	HR	DLSb 5	5	1	3	MR	JS 20-34 (c)	0	0	0	AR
NRC 269	0	0	0	HR	0	0	0	HR	NRC 269	5	7	6	S	AMS 2022-1	0	0	0	AR
JS 20-98(RC)	0	0	0	HR	0	0	0	HR	NRC 149(RC)	1	1	1	R	JS 20-98(RC)	5	0	5	MS
JS 95-60(SC)	9	5	9	HS	0	0	0	HR	JS 335(SC)	5	7	6	S	JS 95-60 (SC)	0	0	0	AR
AVT(N)																		
JS 21-72 (c)	0	0	0	HR	0	0	0	HR										
RSC 10-52 (c)	0	3	3	MR	0	0	0	HR										
MAUS 824	0	0	0	HR	0	0	0	HR										
NRC 258	0	0	0	HR	0	0	0	HR										
RVSM 2011-	NG	N	NG	NG	0	0	0	HR										
NRC 259	3	0	3	MR	0	0	0	HR										
JS 20-98 (c)	0	0	0	HR	0	0	0	HR										
JS 20-98(RC)	0	3	3	MR	0	0	0	HR										
JS 95-60(SC)	5	0	5	MS	0	0	0	HR										

**IVT(N) data of Amravati; IVT(E) data of Jabalpur; AVT(N) data of Amravati; AVT I&II data of Jabalpur for anthracnose disease can't be considered as the disease pressure in susceptible check was less.

Table 4.3.5: PP3. Reaction of IVT, AVT I & AVT II entries for rust disease

Rust																	
CODES	Medziphema				CODES	Kasbe-digraj				Dharwad				Ugarkhurd			
	R1	R1	R1	R1		R1	R2	Max Score	DR	R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (N)																	
NRC 270	1	1	1	R	NRC 270	5	5	5	MS	3	3	3	MR	9	9	9	HS
AMS 22-16	1	1	1	R	AMS 22-16	5	5	5	MS	3	3	3	MR	7	7	7	S
VLS 89 (c)	0	1	1	R	VLS 89 (c)	5	3	5	MS	##	##	##	##	3	3	3	MR
MAUS 816	1	1	1	R	MAUS 816	5	5	5	MS	3	3	3	MR	7	7	7	S
Pusa Sipani BS	1	0	1	R	Pusa Sipani BS 8	5	5	5	MS	3	3	3	MR	9	9	9	HS
VLS 99 (c)	1	1	1	R	VLS 99 (c)	1	3	3	MR	3	3	3	MR	7	7	7	S
DS 1589	1	1	1	R	DS 1589	7	7	7	S	##	##	##	##	9	9	9	HS

RSC 11-95	1	1	1	R	RSC 11-95	3	5	5	MS	3	3	3	MR	9	9	9	HS
VLS 63 (c)	0	1	1	R	VLS 63 (c)	1	3	3	MR	3	3	3	MR	9	9	9	HS
BAUS (M) 6	1	1	1	R	BAUS (M) 6	5	7	7	S	3	3	3	MR	7	7	7	S
NRC 142 (c)	1	1	1	R	NRC 142 (c)	5	5	5	MS	3	3	3	MR	7	7	7	S
KBSL 23-36	0	0	0	HR	KBSL 23-36	7	5	7	S	3	3	3	MR	7	7	7	S
VLS 106	1	1	1	R	VLS 106	7	7	7	S	3	3	3	MR	7	7	7	S
JS 20-116(RC)	1	1	1	R	Dsb 34(RC)	5	3	5	MS	3	3	3	MR	9	9	9	HS
JS 93-05(SC)	1	1	1	R	JS 335(SC)	9	9	9	HS	3	3	3	MR	9	9	9	HS
SL 1315	1	0	1	R	SL 1315	7	9	9	HS	3	3	3	MR	7	7	7	S
TS 101	1	3	3	MR	TS 101	5	5	5	MS	##	##	##	##	7	7	7	S
THPS 6	1	1	1	R	THPS 6	5	5	5	MS	3	3	3	MR	9	9	9	HS
KDSIS 1394	0	0	0	HR	KDSIS 1394	5	7	7	S	##	##	##	##	9	9	9	HS
NRC 271	1	1	1	R	NRC 271	7	5	7	S	3	3	3	MR	5	5	5	MS
Lok-Soya 03	1	1	1	R	Lok-Soya 03	9	9	9	HS	3	3	3	MR	9	9	9	HS
KSS 225	1	1	1	R	KSS 225	5	5	5	MS	##	##	##	##	7	7	7	S
DS 1547	1	1	1	R	DS 1547	7	7	7	S	3	3	3	MR	5	5	5	MS
MACS 1810	1	3	3	MR	MACS 1810	9	7	9	HS	3	3	3	MR	5	5	5	MS
JS 25-08	0	1	1	R	JS 25-08	7	7	7	S	3	3	3	MR	9	9	9	HS
ASb 101	0	0	0	HR	ASb 101	9	9	9	HS	3	3	3	MR	5	5	5	MS
NRC 268	1	0	1	R	NRC 268	5	7	7	S	3	3	3	MR	9	9	9	HS
DLSb 5	0	0	0	HR	DLSb 5	5	5	5	MS	3	3	3	MR	9	9	9	HS
NRC 269	0	0	0	HR	NRC 269	7	5	7	S	3	3	3	MR	9	9	9	HS
JS 20-116(RC)	1	1	1	R	Dsb 34	7	7	7	S	3	3	3	MR	9	9	9	HS
JS 93-05(SC)	1	1	1	R	JS 335	5	7	7	S	3	3	3	MR	7	7	7	S
IVT (R)					**AVT (N)**												
NRC 260	1	1	1	R	MACS 1460 (c)	5	5	5	MS	3	3	3	MR				
NRC 190	1	3	3	MR	MACSNRC 1900	3	3	3	MR	3	3	3	MR				
VLS 105	1	1	1	R	NRC 142 (c)	3	3	3	MR	3	3	3	MR				
AMS 2021-4	0	0	0	HR	MACS 1188 (c)	3	3	3	MR	3	3	3	MR				
MACS 1407 (c)	0	0	0	HR	JS 93-05 (c)	7	5	7	S	3	3	3	MR				
KDS 1188	3	1	3	MR	DSb 21 (c)	1	1	1	HR	3	3	3	MR				
Himso 1696	0	1	1	R	Dsb 34(RC) (RC)	1	0	1	HR	3	3	3	MR				
JS 20-116(RC)	0	1	1	R	JS 335 (SC)	1	3	3	R	3	3	3	MR				
JS 93-05(SC)	3	1	3	MR													
NRC 142 ©	0	1	1	R													
MAUS 824	1	0	1	R													
RSC 11-72	3	1	3	MR													

NRC 259	3	0	3	MR													
AMS 2021-3	1	1		R													
JS 20-116 (C)	1	1	1	R													
KDS 753 (c)	1	1	1	R													
NRC 191	1	1	1	R													
Pusa Sipani 433	1	1	1	R													

*IVT(N) & IVT(R) data of Medziphema for rust disease can't be considered as the disease pressure in susceptible check was less.

#Disease escaped due to earliness of the variety, also Severity was low in case of rust, data cannot be considered for resistance.

Table 4.3.6: PP3. Reaction of IVT, AVT I & AVT II entries for YMV disease

CODES	YMV																					
	Jabalpur				Amravati				Kota				CODES	Pantnagar					Ludhiana			
	R1	R 2	Max CI	DR	R1	R2	Max CI	DR	R1	R2	Max Score	DR		R1	R2	Max CI	DR	R1	R2	Max CI	DR
IVT (N)																					
NRC 270	0.00	0.	0.00	HR	0	0	0	HR	3	3	3	MS	NRC 270	3	2	3	MS	2	6	11.04	MR
AMS 22-16	42.0	57	57.0	S	0	0	0	HR	3	2	3	MS	AMS 22-16	1	3	3	MS	7	7	77.50	HS
VLS 89 (c)	21.0	1.	21.0	MS	4.	6.	5.26	MS	0	0	0	HR	VLS 89 (c)	3	3	3	MS	2	2	3.27	HR
MAUS 816	19.0	14	19.0	MS	3.	2.	3.07	MR	0	0	0	HR	MAUS 816	1	1	1	R	7	7	96.49	HS
Pusa Sipani	46.5	60	60.0	S	0	0	0	HR	0	0	0	HR	Pusa Sipani	1	1	1	R	5	7	95.59	HS
VLS 99 (c)	NG	N	NG	NG	0	0	0	HR	NG	NG	NG	NG	VLS 99 (c)	3	4	4	HS	3	3	5.02	R
DS 1589	0.60	0.	0.60	HR	1	2.	1.55	MR	0	0	0	HR	DS 1589	2	4	4	HS	3	3	5.90	R
RSC 11-95	7.50	23	23.0	MS	0	0	0	HR	3	2	3	MS	RSC 11-95	3	2	3	S	7	7	82.08	HS
VLS 63 (c)	0.40	0.	0.60	HR	0	0	0	HR	0	0	0	HR	VLS 63 (c)	2	3	3	S	3	3	2.00	HR
BAUS (M) 6	20.0	42	42.0	S	0	0	0	HR	0	0	0	HR	BAUS (M) 6	2	2	2	MR	9	7	100.00	HS
NRC 142 (c)	1.20	0.	1.20	HR	0	0	0	HR	3	2	3	MS	NRC 142 (c)	1	2	2	MR	3	5	18.50	MR
KBSL 23-36	7.50	24	24.0	MS	0	0	0	HR	0	0	0	HR	KBSL 23-36	2	3	3	MS	7	7	100.00	HS
VLS 106	6.50	1.	6.50	R	0	0	0	HR	0	0	0	HR	VLS 106	2	4	4	HR	7	7	98.33	HS
JS 20-98(RC)	0.60	1.	1.00	HR	0	0	0	HR	0	0	0	HR	NRC 149(RC)	3	1	3	MS	3	1	1.09	HR
JS 95-60(SC)	7.50	5.	7.50	R	0	0	0	HR	0	0	0	HR	JS 335(SC)	2	1	2	MR	5	5	97.92	HS
SL 1315	0.00	0.	0.60	HR	0	0	0	HR	0	0	0	HR	SL 1315	1	2	2	MR	1	1	0.29	HR
TS 101	24.0	7.	24.0	MS	0	0	0	HR	3	3	3	MS	TS 101	4	2	4	HS	9	7	100.00	HS
THPS 6	57.0	43	57.0	S	0	0	0	HR	3	2	3	MS	THPS 6	1	2	2	MR	9	7	100.00	HS

KDSIS 1394	42.0	21	42.0	S	0	0	0	HR	0	0	0	HR	KDSIS 1394	1	3	3	MS	1	1	-	HR
NRC 271	6.00	1.	6.00	R	0	0	0	HR	0	0	0	HR	NRC 271	2	2	2	MR	2	2	8.50	R
Lok-Soya 03	7.50	18	18.0	MR	0	0	0	HR	0	0	0	HR	Lok-Soya 03	2	2	2	MR	7	5	100.00	HS
KSS 225	1.20	0.	1.20	HR	0	0	0	HR	0	0	0	HR	KSS 225	3	3	3	MS	3	3	7.90	R
DS 1547	0.60	0.	0.60	HR	0	0	0	HR	1	1	1	R	DS 1547	3	2	3	MS	3	1	1.56	HR
MACS 1810	1.40	8.	8.00	R	0	0	0	HR	0	0	0	HR	MACS 1810	1	1	1	R	7	5	79.91	HS
JS 25-08	0.60	5.	5.00	R	0	0	0	HR	0	0	0	HR	JS 25-08	1	1	1	R	3	3	8.50	R
ASb 101	19.0	24	24.0	MS	0	0	0	HR	0	0	0	HR	ASb 101	3	2	3	MS	7	5	98.96	HS
NRC 268	0.40	4.	4.50	R	0	0	0	HR	0	0	0	HR	NRC 268	2	1	2	MR	3	3	13.64	MR
DLSb 5	0.40	0.	0.40	HR	0	0	0	HR	0	0	0	HR	DLSb 5	1	2	2	MR	1	3	3.86	HR
NRC 269	0.00	1.	1.60	HR	0	0	0	HR	0	0	0	HR	NRC 269	3	1	3	MS	3	3	8.08	R
JS 20-98(RC)	0.00	0.	0.40	HR	0	0	0	HR	0	0	0	HR	NRC 149(RC)	2	2	2	MR	2	1	3.28	HR
JS 95-60(SC)	21.0	49	49.5	S	0	0	0	HR	0	0	0	HR	JS 335(SC)	1	1	1	R	6	6	100.00	HS
AVT (N)																					
JS 21-72 (c)	0.6	1	1	HR	0	0	0	HR													
RSC 10-52	7	16	16	MR	3.	6.	4.8	MR													
MAUS 824	21	18	21	MS	2.	4.	3.6	MR													
NRC 258	1.4	1.	1.6	HR	0	0	0	HR													
RVSM	NG	N	NG	NG	4.	2.	3.4	MR													
NRC 259	0.4	0	0.4	HR	0	0	0	HR													
JS 20-98 (c)	0.6	0	0.6	HR	0	0	0	HR													
JS 20-98(RC)	0.4	1.	0.4	HR	0	0	0	HR													
JS 95-60(SC)	1.6	8	8	R	0	0	0	HR													
IVT (E)																					
NRC 266	15.0	43	43.5	S																	
NRC 138 (c)	0.60	7.	7.00	R																	
DS 1480	0.00	0.	0.00	HR																	
NRC 264	19.0	24	24.0	MS																	
AUKS 21-5	26.0	6.	26.0	MS																	
NRC 150 (c)	20.0	23	23.0	MS																	
KDS 1193	5.50	4.	5.50	R																	

MACS 1834	7.00	26	26.0	MS																	
JS 20-98(RC)	0.80	0.	0.80	HR																	
JS 95-60(SC)	23.0	51	51.0	S																	
JS 25-03	21.0	7.	21.0	MS																	
JS 25-06	4.50	5.	5.00	R																	
NRC 267	5.00	1.	5.00	R																	
MAUS 787	1.00	5.	5.50	R																	
NRC 265	7.50	4.	7.50	R																	
JS 20-34 (c)	9.00	27	27.0	MS																	
Pusa Sipani	24.0	37	37.5	MS																	
KDS 1201	18.0	39	39.0	S																	
AVT I &II																					
JS 95-60 (c)	10	6.	10	MR																	
NRC 262	5.5	24	24	MS																	
NRC 130 (c)	6.5	23	23	MS																	
JS 24-33	9.5	5.	9.5	MR																	
JS 23-09	8	1	8	R																	
NRC 152 9c	9.5	8	9.5	MR																	
JS 23-03	25	9.	25	MS																	
NRC 138 (c)	10.5	1.	10.5	MR																	
JS 20-34 (c)	7.5	26	26	MS																	
AMS 2022-1	2	8.	8.5	R																	
JS 20-98(RC)	1.2	5.	5.5	R																	
JS 95-60(SC)	0.8	7	7	R																	

**IVT(N) data of Amravati, Kota, Pantnagar; AVT(N) data of Amravati, Jabalpur; AVT I&II data of Jabalpur for YMV disease can’t be considered as the disease pressure in susceptible check was less.

Table 4.3.7: PP3. Reaction of IVT, AVT I & AVT II entries for PSS disease

PSS													
CODES	Indore				CODES	Dharwad				Ugarkhurd			
	R1	R2	Max Score	DR		R1	R2	Max Score	DR	R1	R2	Max Score	DR
IVT (N)													
NRC 270	0	0	0	HR	NRC 270	3	3	3	MR	1	3	3	MR
AMS 22-16	0	0	0	HR	AMS 22-16	3	3	3	MR	0	3	3	MR
VLS 89 (c)	0	0	0	HR	VLS 89 (c)	3	3	3	MR	3	3	3	MR
MAUS 816	3	3	3	MR	MAUS 816	3	3	3	MR	3	3	3	MR
Pusa Sipani BS	0	1	1	R	Pusa Sipani BS 8	3	3	3	MR	3	3	3	MR
VLS 99 (c)	NG	NG	NG	NG	VLS 99 (c)	3	3	3	MR	3	3	3	MR
DS 1589	0	0	0	HR	DS 1589	3	3	3	MR	0	3	3	MR
RSC 11-95	0	0	0	HR	RSC 11-95	3	3	3	MR	1	3	3	MR
VLS 63 (c)	0	0	0	HR	VLS 63 (c)	3	3	3	MR	3	1	3	MR
BAUS (M) 6	5	3	5	MS	BAUS (M) 6	3	3	3	MR	3	3	3	MR
NRC 142 (c)	0	0	0	HR	NRC 142 (c)	3	3	3	MR	3	3	3	MR
KBSL 23-36	7	7	7	S	KBSL 23-36	3	3	3	MR	3	3	3	MR
VLS 106	0	0	0	HR	VLS 106	3	3	3	MR	3	3	3	MR
JS 20-98(RC)	7	5	7	S	Dsb 34(RC)	3	3	3	MR	3	3	3	MR
JS 95-60(SC)	0	0	0	HR	JS 335(SC)	1	3	3	MR	3	3	3	MR
SL 1315	0	0	0	HR	SL 1315	3	3	3	MR	1	3	3	MR
TS 101	0	0	0	HR	TS 101	3	3	3	MR	3	0	3	MR
THPS 6	0	0	0	HR	THPS 6	3	3	3	MR	3	3	3	MR
KDSIS 1394	0	0	0	HR	KDSIS	3	3	3	MR	3	3	3	MR
NRC 271	0	0	0	HR	NRC 271	3	3	3	MR	1	3	3	MR
Lok-Soya 03	0	0	0	HR	Lok-Soya 03	3	3	3	MR	3	1	3	MR
KSS 225	0	0	0	HR	KSS 225	3	3	3	MR	3	1	3	MR
DS 1547	0	0	0	HR	DS 1547	3	3	3	MR	1	3	3	MR
MACS 1810	0	0	0	HR	MACS 1810	3	3	3	MR	3	1	3	MR
JS 25-08	5	9	9	HS	JS 25-08	3	3	3	MR	3	3	3	MR

ASb 101	0	0	0	HR	ASb 101	3	3	3	MR	3	3	3	MR
NRC 268	7	7	7	S	NRC 268	3	3	3	MR	3	3	3	MR
DLSb 5	0	0	0	HR	DLSb 5	3	3	3	MR	3	3	3	MR
NRC 269	0	0	0	HR	NRC 269	3	3	3	MR	3	3	3	MR
JS 20-98(RC)	0	0	0	HR	Dsb 34(RC)	3	3	3	MR	3	3	3	MR
JS 95-60(SC)	0	0	0	HR	JS 335(SC)	3	3	3	MR	3	3	3	MR
AVT (N)													
JS 21-72 (c)	0	0	0	HR									
RSC 10-52 (c)	0	0	0	HR									
MAUS 824	0	0	0	HR									
NRC 258	0	0	0	HR									
RVSM 2011-35	NG	NG	NG	NG									
NRC 259	0	0	0	HR									
JS 20-98 (c)	0	0	0	HR									
JS 20-98 (RC)	0	0	0	HR									
JS 95-60 (SC)	0	0	0	HR									

**IVT(N) data of Indore, Dharwad, Jabalpur for PSS disease can't be considered as the disease pressure in susceptible check was less.

Table 4.3.8: PP3. Reaction of IVT, AVT I & AVT II entries for TLS,MLS,BLS,SMD,IBB disease

CODES	TLS				MLS				BLS				CODES	IBB			SMD				
	Sehore													Raipur				Ludhiana			
	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)													**IVT (N)**								
NRC 270	0	0	0	HR	3	3	3	MR	0	0	0	HR	NRC 270	5	5	5	MS	3	3	3	R
AMS 22-16	0	0	0	HR	0	0	0	HR	3	3	3	MR	AMS 22-	5	5	5	MS	2	2	2	R
VLS 89 (c)	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 89 (c)	3	3	3	MR	3	3	3	R
MAUS 816	3	5	4	S	0	0	0	HR	0	0	0	HR	MAUS	3	3	3	MR	7	3	5	MR
Pusa Sipani BS 8	0	0	0	HR	0	0	0	HR	0	0	0	HR	Pusa Sipani BS 8	9	9	9	HS	3	3	3	R
VLS 99 (c)	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	VLS 99 (c)	3	3	3	MR	3	3	3	R
DS 1589	0	0	0	HR	0	0	0	0	3	3	3	MR	DS 1589	3	5	5	MS	5	3	4	MR
RSC 11-95	0	0	0	HR	0	0	0	0	0	0	0	HR	RSC 11-95	3	5	5	MS	3	3	3	R

VLS 63 (c)	0	0	0	HR	4	4	4	S	0	0	0	HR	VLS 63 (c)	3	3	3	MR	2	2	2	R
BAUS (M) 6	0	0	0	HR	4	4	4	S	0	0	0	HR	BAUS (M)	3	5	5	MS	1	1	1	HR
NRC 142 (c)	0	0	0	HR	0	0	0	HR	0	0	0	HR	NRC 142	3	3	3	MR	3	1	2	R
KBSL 23-36	0	0	0	HR	0	0	0	HR	0	0	0	HR	KBSL 23-	5	3	5	MS	2	2	2	R
VLS 106	0	0	0	HR	0	0	0	HR	0	0	0	HR	VLS 106	3	5	5	MS	2	2	2	R
JS 20-98(RC)	0	0	0	HR	3	5	5	MS	0	0	0	HR	NRC 128(RC)	0	0	0	HR	1	1	1	HR
JS 95-60(SC)	0	0	0	HR	0	0	0	HR	0	0	0	HR	JS 95-60(SC)	7	7	7	S	3	3	3	R
SL 1315	0	0	0	HR	6	9	9	HS	0	0	0	HR	SL 1315	3	5	5	MS	1	3	2	R
TS 101	3	4	3.5	MS	0	0	0	HR	0	0	0	HR	TS 101	3	3	3	MR	1	1	1	HR
THPS 6	0	0	0	HR	0	0	0	HR	0	0	0	HR	THPS 6	3	5	5	MS	3	1	2	R
KDSIS 1394	0	0	0	HR	0	0	0	HR	0	0	0	HR	KDSIS	9	9	9	HS	1	1	1	HR
NRC 271	0	0	0	HR	3	5	5	MS	0	0	0	HR	NRC 271	3	3	3	MR	2	2	2	R
Lok-Soya 03	0	0	0	HR	0	0	0	HR	3	3	3	MR	Lok-Soya	3	3	3	MR	2	2	2	R
KSS 225	0	0	0	HR	0	0	0	HR	0	0	0	HR	KSS 225	3	3	3	MR	3	3	3	R
DS 1547	0	0	0	HR	1	3	3	MR	3	3	3	MR	DS 1547	3	3	3	MR	2	2	2	R
MACS 1810	4	4	4	S	0	0	0	HR	0	0	0	HR	MACS	3	3	3	MR	3	3	3	R
JS 25-08	0	0	0	HR	4	7	7	S	0	0	0	HR	JS 25-08	3	3	3	MR	3	3	3	R
ASb 101	0	0	0	HR	0	0	0	HR	0	0	0	HR	ASb 101	5	5	5	MS	1	3	2	R
NRC 268	0	0	0	HR	0	0	0	HR	0	0	0	HR	NRC 268	5	5	5	MS	2	2	2	R
DLSb 5	5	3	4	S	3	7	7	S	0	0	0	HR	DLSb 5	3	3	3	MR	3	3	3	R
NRC 269	3	3	3	MR	7	4	7	S	0	0	0	HR	NRC 269	3	5	5	MS	3	3	3	R
JS 20-98(RC)	3	5	4	MS	3	3	3	MR	0	0	0	HR	NRC 128(RC)	3	3	3	MR	2	2	2	R
JS 95-60(SC)	0	0	0	HR	0	0	0	HR	3	3	3	MR	JS 95-60(SC)	9	9	9	HS	1	3	2	R
AVT (N)													**AVT II**								
JS 21-72 (c)	1.0	1	0	HR	0	0	0.00	HR	0	1	1	R	JS 20-116	3	3	3	MR				
RSC 10-52	0	0	0	HR	0	0	0.00	HR	0	0	0	HR	JS 20-116	3	5	5	MS				
MAUS 824	0	0	0	HR	0	0	0.00	HR	0	0	0	HR	RSC 11-	3	3	3	MR				
NRC 258	1	1	0	HR	0	0	0.00	HR	1	1	1	R	NRC 128	3	1	3	MR				
RVSM	-	-	-	-	NG	NG	NG	NG	0	0	0	HR	AMS	3	3	3	MR				
NRC 259	0	0	0	HR	3	3	3	MR	0	0	0	HR	NRC 128RC)	3	3	3	MR				
JS 20-98 (c)	0	0	0	HR	0	0	0	HR	0	0	0	HR	JS 95-60(SC)	9	9	9	HS				

JS 20-98 (RC)	0	0	0	HR	5	5	7	S	0	0	0	HR									
JS 95-60 (SC)	0	0	0.3	HR	0	0	0	HR	1	1	1	R									
IVT (E)																					
NRC 266	3	1	3	MR	0	0	0	HR	1	3	3	MR									
NRC 138 (c)	0	0	0	HR	0	0	0	HR	0	0	0	HR									
DS 1480	1	1	1	R	3	7	7	S	0	0	0	HR									
NRC 264	0	0	0	HR	0	0	0	HR	0	0	0	HR									
AUKS 21-5	0	0	0	HR	0	0	0	HR	0	0	0	HR									
NRC 150 (c)	0	0	0	HR	0	0	0	HR	1	3	3	MR									
KDS 1193	0	0	0	HR	3	5	5	MS	0	0	0	HR									
MACS 1834	0	0	0	HR	0	0	0	HR	0	0	0	HR									
JS 20-98(RC)	0	0	0	HR	5	5	5	MS	0	0	0	HR									
JS 95-60(SC)	0	0	0	HR	0	0	0	HR	1	1	1	R									
JS 25-03	3	3	3	MR	0	0	0	HR	0	0	0	HR									
JS 25-06	0	0	0	HR	0	0	0	HR	0	0	0	HR									
NRC 267	1	3	3	MR	0	0	0	HR	0	0	0	HR									
MAUS 787	0	0	0	HR	0	0	0	HR	0	0	0	HR									
NRC 265	0	0	0	HR	0	0	0	HR	3	1	3	MR									
JS 20-34 (c)	1	3	3	MR	0	0	0	HR	0	0	0	HR									
Pusa Sipani	0	0	0	HR	0	0	0	HR	0	0	0	HR									
KDS 1201	3	3	3	MR	5	5	5	MS	1	3	3	MR									
AVT I & II																					
JS 95-60 (c)	0	0	0	HR	3	3	3	MR													
NRC 262	0	0	0	HR	0	0	0	HR													
NRC 130 (c)	0	0	0	HR	3	1	3	MR													
JS 24-33	0	0	0	HR	0	0	0	HR													
JS 23-09	1	3	3	MR	0	0	0	HR													
NRC 152 9c	0	0	0	HR	0	0	0	HR													
JS 23-03	1	0	1	R	3	1	3	MR													
NRC 138 (c)	0	0	0	HR	0	0	0	HR													
JS 20-34 (c)	0	0	0	HR	0	0	0	HR													

AMS 2022-1	0	0	0	HR	0	0	0	HR													
JS 20-98(RC)	0	0	0	HR	0	0	0	HR													
JS 95-60(SC)	0	1	1	R	0	0	0	HR													

*IVT(N) data of Sehore for TLS, MLS, BLS; IVT(N) data of Ludhiana for SMD; AVT(N) data of Sehore for TLS, BLS; IVT(E) data of Sehore for TLS, MLS, BLS and AVTI &II data of Sehore for TLS, MLS, AVT II data of Raipur for IBB disease can't be considered as the disease pressure in susceptible check was less.

Table 4.3.9: PP3. Reaction of IVT, AVT I & AVT II entries for FLS and CLS disease

CODE	FLS													CLS				
	Almora				Palalmpur				CODE	Indore				CODE	Kota			
	R1	R2	Max Score	DR	R1	R2	Max Score	DR		R1	R2	Max Score	DR		R1	R2	Max Score	DR
IVT (N)									**IVT (Early)**									
NRC 270	1	1	1	R	5	5	5	MS	NRC 266	0	0	0	HR	NRC 266	1	1	1	R
AMS 22-16	3	3	3	MR	0	3	3	MR	NRC 138 (c)	0	0	0	HR	NRC 138 (c)	0	0	0	HR
VLS 89 (c)	3	3	3	MR	5	5	5	MS	DS 1480	0	0	0	HR	DS 1480	1	1	1	R
MAUS 816	3	3	3	MR	3	1	3	MR	NRC 264	5	7	7	S	NRC 264	0	0	0	HR
Pusa Sipani BS 8	3	3	3	MR	3	5	3	MR	AUKS 21-5	3	5	5	MS	AUKS 21-5	0	0	0	HR
VLS 99 (c)	1	3	3	MR	0	0	0	HR	NRC 150 (c)	0	0	0	HR	NRC 150 (c)	0	0	0	HR
DS 1589	5	5	5	MS	3	3	3	MR	KDS 1193	5	5	5	MS	KDS 1193	0	0	0	HR
RSC 11-95	5	3	3	MR	7	7	7	S	MACS 1834	5	5	5	MS	MACS 1834	0	0	0	HR
VLS 63 (c)	3	3	3	MR	3	5	5	MS	JS 20-98(RC)	0	0	0	HR	JS 20-98(RC)	0	0	0	HR
BAUS (M) 6	3	5	5	MS	5	5	5	MS	JS 95-60(SC)	7	7	7	S	JS 95-60(SC)	0	0	0	HR
NRC 142 (c)	5	5	5	MS	5	5	5	MS	JS 25-03	7	7	7	S	JS 25-03	0	0	0	HR
KBSL 23-36	5	5	5	MS	5	5	5	MS	JS 25-06	0	0	0	HR	JS 25-06	0	0	0	HR
VLS 106	3	1	3	MR	0	0	0	HR	NRC 267	5	5	5	MS	NRC 267	1	1	1	R
VLS 99(RC)	1	1	1	R	0	0	0	HR	MAUS 787	0	0	0	HR	MAUS 787	1	1	1	R
Shivalik(SC)	1	1	1	R	0	1	1	R	NRC 265	0	0	0	HR	NRC 265	0	0	0	HR
SL 1315	1	5	5	MS	3	1	3	MR	JS 20-34 (c)	0	0	0	HR	JS 20-34 (c)	1	1	1	R
TS 101	1	3	3	MR	1	1	1	R	Pusa Sipani 33	0	0	0	HR	Pusa Sipani 33	0	0	0	HR
THPS 6	3	3	3	MR	1	1	1	R	KDS 1201	0	0	0	HR	KDS 1201	3	3	3	MR
KDSIS 1394	3	3	3	MR	0	0	0	HR	**AVT I & II**					**AVT I & II**				
NRC 271	3	3	3	MR	3	3	3	MR	JS 95-60 (c)	0	0	0	HR	JS 95-60 (c)	5	5	5	MS
Lok-Soya 03	3	3	3	MR	3	1	3	MR	NRC 262	0	0	0	HR	NRC 262	3	3	3	MR

KSS 225	1	3	3	MR	1	5	5	MS	NRC 130 (c)	0	0	0	HR	NRC 130 (c)	0	0	0	HR
DS 1547	5	5	5	MS	7	7	7	S	JS 24-33	5	5	5	MS	JS 24-33	0	0	0	HR
MACS 1810	5	5	5	MS	5	7	7	S	JS 23-09	0	0	0	HR	JS 23-09	1	1	1	R
JS 25-08	5	5	5	MS	3	3	3	MR	NRC 152 9c	0	0	0	HR	NRC 152 9c	0	0	0	HR
ASb 101	3	3	3	MR	1	0	1	R	JS 23-03	0	0	0	HR	JS 23-03	0	0	0	HR
NRC 268	3	3	3	MR	5	3	5	MS	NRC 138 (c)	0	0	0	HR	NRC 138 (c)	3	3	3	MR
DLSb 5	3	3	3	MR	3	5	5	MS	JS 20-34 (c)	0	0	0	HR	JS 20-34 (c)	0	0	0	HR
NRC 269	5	1	5	MS	5	5	5	MS	AMS 2022-1	0	0	0	HR	AMS 2022-1	0	0	0	HR
VLS 99(RC)	3	1	3	MR	0	3	3	MR	JS 20-98 (RC)	0	0	0	HR	JS 20-98 (RC)	0	0	0	HR
Shivalik(SC)	1	1	1	R	0	0	0	HR	JS 95-60 (SC)	0	0	0	HR	JS 95-60 (SC)	3	3	3	MR
AVT II (N)																		
VLS 89 (Filler)	3	1	3	MR	5	3	5	MS										
VLS 99 (c)	3	1	3	MR	0	0	0	HR										
NRC 197	1	1	1	R	7	5	7	S										
Palam Early Soya	5	3	5	MS	5	3	5	MS										
VLS 63 (c)	3	3	3	MR	3	1	3	MR										
VLS 89 (c)	5	3	5	MS	5	3	5	MS										
VLS 99 (RC)	1	1	1	R	0	1	1	R										
Shivalik(SC)	1	1	1	R	1	0	1	R										

*IVT(N) and AVT II (N) data of Almora & Palampur for FLS; IVT(E) data of Kota for CLS; AVT I&II data of Kota for CLS; AVT I&II data of Indore for FLS disease can't be considered as the disease pressure in susceptible check was less.

PP-4.4.1 Performance of the previous year's resistant entries for RAB & CR disease

Variety	RAB	Year of testing	Variety	CR	Year of testing
Pantnagar			**Jabalpur**		
SL-1068	MR	3rd Year	JS 20-98	HR	10th
SL-1123	R	3rd Year	JS 20-20	AR	8th
DS-3108	R	3rd Year	JS 21-05	AR	6th
PS-1613	R	3rd Year	JS 21-72	AR	6th
SL-688	R	3rd Year	NRC 166	HR	5th
SL-1028	MR	3rd Year	JS 22-01	AR	5th
SL-1074	R	3rd Year	JS 22-12	HR	4th
MACS-1460	R	3rd Year	JS 22-18	AR	4th

DS-3101	MR	3rd Year	KDS 1073	MS	4th
MACS-1407	MR	3rd Year	NRC 186	AR	4th
DS-2705	MR	3rd Year	PS 1661	MR	4th
PS-1540	R	3rd Year	RVS 2011-10	MS	4th
PS-1611	MR	3rd Year	JS 23-09	AR	3rd
NRC-137	R	3rd Year	JS 23-03	AR	3rd
SL-1213	R	3rd Year	NRC 196	AR	3rd
VLS-63	R	3rd Year	NRC 181	AR	3rd
SL-1234	MR	3rd Year	RVS 13-7	MR	3rd
VLS-89	R	3rd Year	NRC 189	MR	3rd
NRC-128	R	3rd Year	NRC 192	AR	3rd

SL-979	MR	3rd Year	NRC 190	AR	3rd
Jabalpur			AS 26	AR	2nd
JS 20-98	MR	10th	AS 47	AR	2nd
JS 20-20	MR	8th	DS 1510	MS	2nd
JS 21-05	MR	6th	JS 24-25	AR	2nd
JS 21-72	HR	6th	JS 24-26	AR	2nd
NRC 166	MS	5th	JS 24-33	AR	2nd
JS 22-01	MR	5th	NRC 196	AR	2nd
JS 22-12	MR	4th	NRC 256	AR	2nd
JS 22-18	HR	4th	NRC 257	MR	2nd
KDS 1073	MR	4th	NRC 259	S	2nd
NRC 186	MR	4th	NRC SL - 5	MR	2nd
PS 1661	MS	4th	NRC SL - 7	AR	2nd
RVS 2011-10	MR	4th	NRC SL - 8	S	2nd
JS 23-09	MR	3rd	PS 1693	HS	2nd
JS 23-03	MR	3rd	PS 1696	S	2nd
NRC 196	MR	3rd	RSC 11-75	MS	2nd
NRC 181	MR	3rd	RVS 15-1	AR	2nd
RVS 13-7	MR	3rd	RVSM 2012-4	AR	2nd
NRC 189	MR	3rd	**Amravati**		
NRC 192	HR	3rd	AS-40	AR	2nd
NRC 190	MR	3rd	AMS-115	AR	3rd
AS 26	MR	2nd	AMS-1901	HR	2nd
AS 47	MR	2nd	DLSb-4	AR	2nd
DS 1510	MR	2nd	Dsb-39	AR	2nd
JS 24-25	HR	2nd	DS-3168	AR	4th
JS 24-26	MR	2nd	DS-3124	AR	3rd
JS 24-33	HR	2nd	JS-2034	AR	3rd
NRC 196	MR	2nd	JS-2303	AR	3rd
NRC 256	MS	2nd	JS-2309	AR	2nd
NRC 257	MR	2nd	JS-2308	AR	3rd

NRC 259	MR	2nd	HIMSO-1694	AR	3rd
NRC SL - 5	MR	2nd	HIMSO-1693	AR	3rd
NRC SL - 7	MS	2nd	JS-2305	AR	3rd
NRC SL - 8	MS	2nd	KDS-1201	MS	3rd
PS 1693	MS	2nd	**KDS-1173**	AR	2nd
PS 1696	MR	2nd	KDS-1169	MS	3rd
RSC 11-75	MS	2nd	KDS-21-1	HS	3rd
RVS 15-1	MR	2nd	MAUS-819	AR	2nd
RVSM 2012-4	MS	2nd	MAUS-818	HR	2nd
			NRC-186	AR	2nd
			PS-1660	AR	3rd
			RVS-13-7	AR	2nd
			RVS-13-15	AR	2nd

PP-4.4.2 Performance of the previous year's resistant entries for YMD & SMD disease

Variety	YMD	Year of testing	Variety	SMD	Year of testing
Ludhiana			**Pantnagar**		
DSB 38	HR	3rd	SL-1068	R	3rd Year
JS22-14	HR	3rd	SL-1123	MR	3rd Year
NRC-28	HR	3rd	DS-3108	R	3rd Year
NRC 109	HR	3rd	PS-1613	R	3rd Year
JS2-98	HR	3rd	SL-688	R	3rd Year
Pusa 97-12	HR	3rd	SL-1028	R	3rd Year
NRC 149	HR	3rd	SL-1074	MR	3rd Year
VLS 99	HR	3rd	MACS-1460	R	3rd Year
SL 1213	HR	3rd	DS-3101	MR	3rd Year
			MACS-1407	R	3rd Year
			DS-2705	R	3rd Year
Jabalpur			PS-1540	R	3rd Year
JS 20-69	R	11th	PS-1611	R	3rd Year
JS 20-98	R	10th	NRC-137	R	3rd Year

JS 20-20	R	10th	SL-1213	R	3rd Year
JS 21-05	R	8th	VLS-63	MR	3rd Year
PS 1611	HR	6th	SL-1234	R	3rd Year
DS 3106	R	6th	VLS-89	R	3rd Year
DS 3109	S	6th	NRC-128	MR	3rd Year
JS 21-72	R	6th	SL-979	R	3rd Year
JS 21-75	R	5th	**Ludhiana**		
JS 22-03	S	5th	DSB 38	R	3rd
NRC SL 1	HR	5th	JS22-14	R	3rd
RVS 2011-76	MR	4th	NRC-28	R	3rd
SL 955	MR	5th	NRC 109	HR	3rd
JS 22-12	MR	4th	JS20-98	R	3rd
JS 22-18	MR	4th	Pusa 97-12	HR	3rd
PS 1670	HR	4th	NRC 149	HR	3rd
RVSM 2012-11	MR	3rd	VLS 99	R	3rd
NRC 196	HR	3rd	SL 1213	HR	3rd
NRC 201	MS	3rd			
NRC 202	MR	3rd			
PS 1689	MR	3rd			
PS 1682	MR	3rd			
SL 1282	R	3rd			
RVS 2011-76	MR	3rd			
NRC 189	MS	3rd			
DS 1510	MS	2nd			
DS 1547	HR	2nd			
DS 1550	HR	2nd			
JS 23-03	R	2nd			
JS 23-09	R	2nd			
JS 24-25	HR	2nd			
JS 24-26	MR	2nd			
JS 24-33	R	2nd			
JS 24-34	MR	2nd			
NRC 256	MR	2nd			
NRC 257	MS	2nd			
NRC 259	MR	2nd			
NRC SL - 5	HR	2nd			

PP-4.4.3 Performance of the previous year's resistant entries for PB disease

Variety	PB	Year of testing	Variety	PB	Year of testing
Palampur			**Dharwad**		
KDS 1169	MS	2nd year	DSb 21	MS	13th
KDS 1201	S	2nd year	DSb 23	MR	11th
EC 350664	R	2nd year	DSb 34	MR	6th
EC 280129	HR	2nd year	DSb 40	MS	2nd
EC 308312	HR	2nd year	DLSb 1	MS	3rd
EC 291401	MR	2nd year	DLSb 2	MS	2nd
EC 393153 (late)	HR	2nd year	DLSb 4	MS	2nd
EC 393153	HR	2nd year	DLSb 5	MS	2nd
EC 390981A	HR	2nd year	EC 242104	MR	11th
PK 25	HR	3rd year	EC 251409	MR	4th
UGM 77	HR	3rd year	JS 335	S	-
EC 391181	R	3rd year	JS 95 60	MS	-
Harder	HR	3rd year	KDS 726	MS	5th
ASb 50	R	4th Year			
ASb 51	R	4th year			
EC 241778	HR	4th year			
Cat 411A	HR	4th year			
SKF 6029	R	4th Year			
MACS 1566	MS	4th year			
Himso 1685	R	7th year			
JS 20-116	MR	7th year			

PP-4.4.4 Performance of the previous year's resistant entries for rust and PSS disease

Variety	RUST	Year of testing	Variety	PSS	Year of testing
Dharwad			**Dharwad**		
DSb 21	MR	13th	DSb 21	MR	13th
DSb 23	R	11th	DSb 23	MR	11th
DSb 34	MR	6th	DSb 34	MR	6th
DSb 40	MR	2nd	DSb 40	MR	2nd
DLSb 1	MR	3rd	DLSb 1	MR	3rd
DLSb 2	MR	2nd	DLSb 2	MR	2nd
DLSb 4	MR	2nd	DLSb 4	MR	2nd
DLSb 5	MR	2nd	DLSb 5	MR	2nd
EC 242104	R	11th	EC 242104	MR	11th
EC 251409	R	4th	EC 251409	MR	4th
JS 335	MR	-	JS 335	MR	-
JS 95 60	MR	-	JS 95 60	MR	-
KDS 726	R	5th	KDS 726	MR	5th
Ugarhkurd			**Ugarhkurd**		
DSb 23	MR	11th	DSb 23	MR	11th
DSb 34	MR	6th	DSb 34	MR	6th
DSb 21	MS	13th	DSb 21	MR	13th
KDS 753	S	9th	KDS 753	MR	9th
EC 242104	MR	11th	EC 242104	MR	11th
EC 241780	MR	15th	EC 241780	MR	15th
EC 241778	MR	15th	EC 241778	MR	15th
EC 251409	MR	4th	EC 251409	MR	4th
DLSb-1	MS	3rd	DLSb-1	MR	3rd
DLSb -2	MS	3rd	DLSb -2	MR	3rd
DSb 40	MS	2nd	DSb 40	MR	2nd
KDS 726	MS	5th	KDS 726	MR	5th
JS 335	MS	-	JS 335	MR	-

PP-4.4.5 Performance of the previous year's resistant entries for FLS disease

Variety	FLS	Year of testing			
Palampur					
KDS 1169	HR	2nd year			
KDS 1201	HR	2nd year			
EC 350664	HR	2nd year			
EC 280129	R	2nd year			
EC 308312	HR	2nd year			
EC 291401	HR	2nd year			
EC 393153 (late)	HR	2nd year			
EC 393153	HR	2nd year			
EC 390981A	R	2nd year			
PK 25	HR	3rd year			
UGM 77	HR	3rd year			
EC 391181	HR	3rd year			
Harder	HR	3rd year			
ASb 50	HR	4th Year			
ASb 51	R	4th year			
EC 241778	HR	4th year			
Cat 411A	HR	4th year			
SKF 6029	HR	4th Year			
MACS 1566	HR	4th year			
Himso 1685	HR	7th year			
JS 20-116	HR	7th year			

Table 4.5. PP5: Evaluation of germplasm lines for identification of multiple disease resistant sources

S.No		Jabalpur			Palampur			Pantnagar			Indore			Dharwad	
	Genotypes	YMV	CR	RAB	Frogeye leaf spot	Pod blight	Brown spot	SYMV	RAB	Anth	Anth	RAB	BP	PSS	PB
1	IC 0419798	HR	S	MS	MR	MS	MS	NG	NG	NG	R	MS	MR	MR	MS
2	IC 27150	HR	S	MR	MR	R	MR	NG	NG	NG	MS	MS	MR	MR	MS
3	IC 107903	R	HS	MS	S	R	R	R	MR	R	HS	HS	R	MR	MR
4	IC 0548724	MR	HS	S	MR	R	R	MR	MR	MR	MR	HS	S	MR	MS
5	EC 0528663	MR	MR	S	HR	HR	R	NG	NG	NG	MR	HS	MS	MR	MS
6	IC 13005	MR	MR	MS	S	R	MR	R	MS	R	MR	MS	HR	MR	MR
7	EC 341825	S	HS	MS	MS	R	MR	MR	S	R	MS	MS	MR	MR	MS
8	IC 0129014	MR	S	S	MR	R	MR	NG	NG	NG	MS	S	S	MR	MS
9	IC 0501894	MS	MR	MR	MR	R	MR	MR	MR	S	MR	HS	MS	MR	MR
10	EC 57048	S	MS	MR	MS	MR	MR	MR	MS	MR	NG	NG	NG	MR	MS
11	IC 0501765	HR	HS	S	NG	NG	NG	NG	NG	NG	HS	S	MS	MR	MR
12	IC 0118465	MS	HS	MS	NG	NG	NG	MS	S	R	MS	S	MR	MR	MS
13	IC 0118428	HR	MR	MS	NG	NG	NG	NG	NG	NG	MS	S	MR	MR	MS
14	EC 025478	HR	HS	MR	NG	NG	NG	MR	MR	R	MS	MS	S	MR	MS
15	IC 0338729	MR	HS	MR	NG	NG	NG	R	MR	R	S	HS	HS	MR	MS
16	IC 0118427	S	MR	MS	NG	NG	NG	MR	MS	MR	MR	HS	MS	MR	MS
17	IC 0241857	MR	HS	MR	HR	R	MR	MR	MS	MR	MS	S	S	MR	MS
18	IC 0574385	MR	S	MR	NG	NG	NG	MR	S	R	MR	MS	HR	MR	MS
19	EC 14674	HR	HS	MR	MR	R	MR	MR	HS	R	MS	S	MR	MR	MS
20	EC 76750	MR	MS	MS	MS	R	MR	MR	MR	R	S	S	HS	MR	MS
21	EC 39743	MS	MR	MS	S	R	MR	NG	NG	NG	NG	NG	NG	MR	MS
22	EC 0528651	AR	AR	MS	MS	R	R	R	R	R	MS	MR	MS	MR	MS
23	EC 99552	MR	AR	MR	R	MS	MS	MR	MR	R	MS	S	MR	MR	MS

24	IC 0501916	NG	NG	NG	NG	NG	NG	NG	-	-	NG	NG	NG	MR	MS
25	EC 76757	MS	MR	MS	MS	R	R	MR	S	MR	S	MS	MR	MR	MS
26	IC 0548721	MR	HS	MS	MS	R	R	MR	MS	R	MR	S	S	MR	MS
27	EC 0241711	HR	MR	MS	MR	MR	MR	MR	S	R	MR	MS	R	MR	MR
28	IC 0501941	HR	MR	MS	R	MS	M	MS	MS	MR	MS	S	MR	MR	MS
29	EC 50057	HR	AR	MS	MR	R	MR	R	MR	R	HR	MS	MR	MR	MS
30	IC 419847	HR	MS	MS	MR	R	MR	NG	NG	NG	S	HS	MS	MR	MS
31	EC 0097789	HR	HS	MR	R	R	MR	MR	MS	R	NG	NG	NG	MR	MS
32	EC 76752	MR	HS	MR	MR	R	MR	R	MS	MR	MR	MR	HR	MR	MS
33	IC 0574382	MR	S	MS	MR	MR	MR	R	MR	MR	MS	MR	R	MR	MS
34	EC 58526	MR	MS	MS	MS	R	MR	MR	MR	MS	MS	MS	HS	MR	MS
35	IC 0316142	R	HS	MR	S	R	MR	R	MS	MS	S	S	MS	MR	MS
36	IC 0128988	S	MS	MR	HR	R	MR	NG	NG	NG	S	S	MS	MR	MS
37	IC 9468	HR	MS	MR	NG	NG	NG	NG	NG	NG	NG	NG	NG	MR	MS
38	EC 0257977	MS	HS	MS	HS	R	MR	R	MS	MR	MS	MR	MR	MR	MR
39	IC 0281845	MR	HS	MR	S	R	R	R	MR	S	S	MS	MR	MR	MS
40	EC 114570	MR	HS	MR	HR	R	MR	MR	S	MR	S	HS	HS	MR	MR
41	IC 0118431	MS	MS	MR	MR	R	MR	MR	MS	MS	MS	S	MS	MR	MS
42	EC 0039494	MR	MR	MS	MS	R	MR	MR	MR	MR	HS	HS	S	MR	MS
43	IC 0118409	MR	HS	HR	S	MR	MR	MR	MS	R	NG	NG	NG	MR	MS
44	EC 39766	MS	HS	MR	S	MR	MR	MR	MS	R	MS	MS	S	MR	MS
45	IC 0128992	MS	AR	MR	HR	R	R	NG	NG	NG	S	MR	MR	MR	MS
46	IC 0538013	MR	HS	MR	S	R	MR	MR	R	R	MS	MS	MR	MR	MS
47	IC 0501867	MR	HS	MS	MR	R	MR	R	S	MR	NG	NG	NG	MR	MS
48	EC 0251874	S	AR	MR	R	R	MR	R	HS	MR	MR	MS	R	MR	MS
49	EC 172669	MR	MS	HR	NG	NG	NG	NG	NG	NG	NG	NG	NG	MR	MR
50	IC 0574362	S	MR	MR	MS	R	MR	R	MS	R	R	HS	MR	MR	MS

PP6: Biological management of major diseases of soybean

Table 4.6.1: PP6 Biological management of RAB disease of soybean

T. M.	Jabalpur			Indore				Pantnagar				
	PDI(90 DAS)	AUDPC	Seed Yield (q/ha)	PDI (45 DAS)	PDI (60 DAS)	AUDPC	Seed Yield (q/ha)	45 DAS	60 DAS	75 DAS	AUDPC	Seed Yield (q/ha)
T1	12.33	162.50	9.25	39.25	49.62	893	16.29	8.15	27.56	48.58	900	22.58
T2	11.00	137.50	9.47	27.4	48.14	750	19.14	8.30	24.25	45.58	830	23.58
T3	14.33	182.50	9.06	45.18	49.32	887	14.95	7.85	22.25	43.25	776	20.26
T4	13.67	172.50	9.02	34.81	47.04	733	18.47	6.85	20.86	42.25	733	21.25
T5	8.00	90.00	10.34	34.81	39.25	593	19.78	4.25	12.25	30.25	474	23.5
T6	12.33	137.50	9.39	42.22	40.74	651	16.06	3.16	11.45	26.58	418	24.25
T7	9.33	130.00	10.02	17.03	21.48	311	21.79	5.56	20.24	32.25	629	22.9
T8	13.33	165.00	9.76	34.81	50.74	981	19.40	4.86	18.25	32.75	556	21.5
T9	15.33	215.00	8.75	49.63	66.29	1192	11.68	11.25	38.45	59.56	1192	19.5
CD	3.78	50.56	69.17	1.39	5.56	1.98	89.12	3.18	8.37	13.0	1.43	NS

Table 4.6.1: PP6 Biological management of Pod blight disease of soybean

Treatments	Amravati			Indore			Pantnagar				Dharwad			Jorhat		
	PDI(90 DAS)	AUDPC	Seed Yield (Q/Ha)	PDI (90 DAS)	AUDPC	Seed Yield (Q/Ha)	60 DAS	75 DAS	AUDPC	Seed Yield (Q/Ha)	75 DAS	AUDPC	Seed Yield (Q/Ha)	PDI (90 days)	AUDPC	Seed Yield (Q/Ha)
T1	15.88	240.22	15.42	70.37	2320.37	16.29	9.18	23.80	247.38	16.71	33.33	672.33	14.46	14.92	775.1	0.42
T2	16.33	256.42	14.66	77.78	1898.15	19.14	9.99	22.54	244.00	16.83	37.78	750.45	13.46	12.88	705.4	0.43
T3	15.66	234.2	15.86	83.77	2609.26	14.95	10.29	25.14	265.70	16.30	36.55	695.52	14.34	26.54	1187.6	0.41
T4	17.4	290.44	14.9	85.15	2212.96	18.47	6.29	21.25	206.58	17.28	38.88	775.32	13..33	9.71	616.3	0.51
T5	12.32	222.1	17.66	62.96	2012.96	19.78	8.25	25.17	250.65	16.26	37.78	750.45	14.66	9.04	569.8	0.55
T6	10.22	201.33	15.99	79.25	2387.04	16.06	8.03	23.96	239.95	17.00	36.56	694.32	14.35	6.83	474.8	0.48
T7	14.5	246.88	16.22	61.48	1661.11	21.79	10.29	31.21	311.25	16.05	35.78	680.21	14.33	17.46	905.7	0.43
T8	12.88	232.1	15.42	76.29	2194.44	19.40	9.99	22.54	244.00	16.46	36.55	695.52	14.24	19.61	1026.7	0.47
T9	22.66	367.42	12.88	92.59	2987.04	11.68	9.36	30.03	295.43	14.40	42.22	1344.22	12.33	33.64	1526.6	0.33
CD	3.886	35.658	145.923	13.28	250.37	89.12	-	NS	NS	1.108	3.56		1.21	1.32		0.07
SE(m)	1.32	11.99	51.23								1.05		0.32	0.44		0.02

Table 4.6.2: PP6 Biological management of Charcoal rot disease of soybean

Treatments	Jabalpur	Amravati

	PDI (90 DAS)	AUDPC	Seed Yield (q/ha)	PDI (90 DAS)	AUDPC	Seed Yield (q/ha)
T1	12.33	162.50	9.25	13.45	150.3	15.42
T2	11.00	137.50	9.47	9.22	110.3	14.66
T3	14.33	182.50	9.06	13.88	167.5	15.86
T4	13.67	172.50	9.02	12.6	142.33	14.9
T5	8.00	90.00	10.34	5.66	88.2	17.66
T6	12.33	137.50	9.39	8.2	85.4	15.99
T7	9.33	130.00	10.02	8.99	106.4	16.22
T8	13.33	165.00	9.76	9.1	109.5	15.42
T9	15.33	215.00	8.75	16.33	199.44	12.88
CD (P=0.05)	3.78	50.56	69.17	4.568	NS	145.923
SE(m)	1.25	16.72	22.87	1.422	20.21	51.23
C.V.	17.77	18.71	4.19			

Table 4.6.3: PP6 Biological management of Collar rot,MLS and FLS disease of soybean

T.M.	Jorhat (CoR)			Sehore (MLS)					Palampur (FLS)				
	PDI (90 DAS)	AUDPC	Seed Yield (q/ha)	PDI (45 DAS)	PDI (60 DAS)	PDI (75 DAS)	AUDPC	Seed Yield (q/ha)	PDI 45 DAS	PDI 60 DAS	PDI 75 DAS	AUDPC	Seed Yield (q/ha)
T1	21.31	1063.0	0.42	0	27.14	38.26	490.5	14.35	5.18	13.33	34.81	499.88	16.71
T2	7.73	606.5	0.43	0	25.52	33.74	444.45	13.19	4.81	14.44	35.55	519.30	16.83
T3	17.27	928.7	0.41	0	23.19	30.86	405.375	13.51	4.81	14.07	30.74	477.65	16.30
T4	8.73	667.0	0.51	0	22.15	28.80	382.125	14.67	4.44	13.33	36.29	505.45	17.28
T5	6.33	542.9	0.55	0	28.53	42.80	534.975	13.89	4.44	13.33	40.00	533.23	16.26
T6	5.44	481.2	0.48	0	26.07	33.33	445.5	13.89	5.92	13.70	37.77	533.15	17.00
T7	9.95	727.7	0.43	0	26.11	36.21	467.4	15.97	5.55	15.92	40.74	585.98	16.05
T8	12.73	797.5	0.47	0	19.74	30.86	379.5	14.12	5.92	16.66	38.51	583.15	16.46
T9	33.30	1536.8	0.33	0	35.33	55.96	684.675	11.80	6.29	15.51	39.92	579.30	14.40
CD	1.84		0.07	-	6.06	14.6		NS	-	-	NS	NS	1.108
SE(m)	0.61		0.02										

Table 4.6.4: PP6 Biological management of major diseases of soybean(Plant data)

Treatments	Jabalpur	Amravati	Indore

	Field Stand (%)	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Field Stand (%)	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Field Stand (%)	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (g)
T1	76.34	47.8	2.18	15.77	9.97	87.3	40.11	**6.3**	36.4	11.63	78.35	40.00	5.37	34.20	8.27
T2	77.96	49.7	2.14	15.83	10.02	88.1	39.77	6.8	35.8	11.3	80.68	42.87	5.12	41.13	9.50
T3	74.19	47.1	2.01	15.11	9.88	85.33	41.1	6.5	36	10.99	80.91	39.2	6.07	36.66	8.43
T4	74.73	47.9	1.95	15.22	9.95	85.1	39.77	6.3	36.11	11.7	80.35	41.13	5.98	36.87	8.90
T5	80.11	51.3	2.28	20.16	10.48	91	39.2	6.5	37.24	10.88	82.30	46.67	5.25	38.80	9.83
T6	74.73	47.6	2.18	17.33	10.18	89.5	41.22	6.8	36.44	11.98	79.34	41.87	5.60	39.66	9.03
T7	77.42	50.8	2.26	19.33	10.35	88.22	38.77	6.4	34.55	10.4	80.11	47.40	6.13	43.40	10.05
T8	75.27	48.0	2.03	17.25	10.19	87.1	37.99	6.2	35.2	10.7	81.63	45.6	5.64	39.73	9.73
T9	75.81	46.2	2.03	15.03	9.83	82.44	37.33	6.1	31.22	10.22	79.80	35.30	5.33	30.87	7.90
CD (P=0.05)	3.33	**NS**	**NS**	2.37	**NS**	NS	3.98	2.51	2.987	1.95	4.39	NS	NS	NS	NS
SE(m)	1.10	1.12	0.15	0.78	0.25	2.12	1.35	0.91	1.21	0.86					
C.V.	2.50	4.03	12.65	8.09	4.36										

Table 4.6.5: PP6 Biological management of major diseases of soybean(Plant data)

Treatments	Sehore					Pantnagar					Palampur				
	Field Stand (%)	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Field Stand (%)	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (g)	Field Stand (%)	Plant ht (cm)	No. of branches per plant	No. of pods per plant	100 seed weight (g)
T1	78.66	51.11	3.22	30.67	9.67	90.52	60.22	6.5	53	7.7	96.37	84.5	3.2	41.1	12.67
T2	66.66	50.223	3.22	30.45	10.00	89.5	62.25	6.4	54	7.7	96.50	83.5	3.4	42.7	12.83
T3	83.33	50.223	3.22	30.55	10.00	83.25	63.25	6.6	52	7.7	95.37	90.2	3.3	45.0	12.67
T4	61.33	52	3.45	30.67	9.33	82.25	62.55	6.2	53	7.7	95.60	85.2	3.0	44.7	13.00
T5	86.67	49.22	3.11	30.00	10.00	93.12	63.25	6.9	54	7.7	96.03	80.9	3.7	42.9	12.17
T6	63.34	48.89	3.11	29.67	9.33	85.25	68.96	7.5	58	7.7	96.23	83.1	3.2	39.4	12.33
T7	84.34	50.667	2.89	30.55	9.67	92.52	62.25	7.1	55	7.7	90.90	82.1	2.9	40.1	12.50
T8	70.33	48.443	3.33	29.78	9.33	83.54	66.25	6.7	52	7.7	96.03	81.5	3.0	42.9	12.33

T9	57	48.78	3.33	30.33	9.67	82.25	57.25	5.8	45	7.7	94.77	79.6	3.3	44.0	12.33
CD (P=0.05)	7.32	2.17	NS	NS	NS	4.97	4.90	NS	6.07	NS	NS	NS	NS	NS	NS
SE(m)						3.30	4.50	31.32	6.60	1.09					
C.V.						**1.65**	**1.63**	**1.19**	**2.02**	**0.48**					

Table 4.6.6: PP6 Biological management of major diseases of soybean(Plant data)

Treatments	**Dharwad**					**Jorhat**				
	Field Stand (%)	**Plant ht (cm)**	**No. of branches per plant**	**No. of pods per plant**	**100 seed weight (g)**	**Field Stand (%)**	**Plant ht (cm)**	**No. of branches per plant**	**No. of pods per plant**	**100 seed weight (g)**
T1	91.00	41.75	5.75	66.35	14.60	50	52.17	6.83	79.33	14.30
T2	89.00	40.30	5.70	63.25	14.65	50	40.73	8.23	54.67	12.07
T3	91.00	40.35	5.85	62.21	13.95	50	37.67	7.00	57.33	13.60
T4	89.70	42.60	5.80	61.55	14.10	50	35.93	9.53	57.67	12.00
T5	92.00	41.70	6.10	66.21	14.15	50	51.90	8.20	69.33	14.90
T6	89.50	40.25	5.90	64.21	13.95	50	66.33	7.43	81.00	14.87
T7	92.50	42.60	5.90	65.55	14.25	50	39.13	7.10	72.67	14.73
T8	90.00	41.25	6.00	65.75	14.10	50	43.33	8.05	55.33	13.80
T9	88.20	38.75	5.45	58.45	13.75	50	45.23	6.17	63.00	13.37
CD (P=0.05)	0.86	1.07	1.10	1.66	0.65		8.65	0.43	4.44	0.66
SE(m)	0.24	0.28	0.32	0.55	0.18		2.88	0.14	1.48	0.22

*T1: Seed application of *Bacillus amyloliquefaciens* @ 5 g/kg seed; T2: Seed application of *Bacillus subtilis* @ 5 g/kg seed; T3: Foliar application of *Bacillus amyloliquefaciens* @ 10 g/litre water; T4: Foliar application of *Bacillus subtilis* @ 10 g/litre water; T5: Seed application of local strain of *Trichoderma* @ 5 g/kg seed; T6: Foliar application of local strain of *Trichoderma* @ 10 g/litre water; T7: Seed application of local strain of *Pseudomonas fluorescence* @ 5 g/kg seed; T8: Foliar application of local strain of *Pseudomonas fluorescence* @ 10 g/ litre water; T9: Untreated

PP7: Development of forewarning systems against major diseases of soybean

Table 4.7.1: Multiple regression analysis for prediction of different diseases of soybean during *Kharif* 2023

Disease	**Prediction equation**	**R^2 value**
RAB	Y= 37.43 - 0.33 (T_{max}) - 0.13 (T_{min}) - 0.02 (Rainfall) - 2.09 (Rainy day)	0.13
CR	Y= - 31.48 + 3.00 (T_{max}) – 1.69 (T_{min}) -0.92 (Rainfall) + 9.10 (Rainy day)	0.06

Anth	Y= 119.14 – 3.26 (T_{max}) - 0.07 (T_{min}) + 0.01 (Rainfall) - 2.96 (Rainy day)	0.27
YMV	Y= - 61.90 + 0.95 (T_{max}) + 2.23 (T_{min}) -0.03 (Rainfall) + 0.39 (Rainy day)	0.26

Table 4.7.2 Correlation coefficients of major diseases of soybean in relation to weather variables during *Kharif* 2023

PDI %	**T_{max}**	**T_{min}**	**Rainfall**	**No of Rainy days**
YMV	0.27**	0.47***	0.05^{NS}	0.28**
RAB	0.13*	-0.19***	-0.24***	-0.31***
CR	0.06^{NS}	-0.12^{NS}	-0.20^{NS}	-0.17^{NS}
Anth	-0.38***	-0.38***	-0.33***	-0.23**

***Significance at p<0.001, **Significance at p<0.01, *Significance at p<0.05

PP8: Estimation of avoidable yield losses of soybean diseases

Table 8.1.1: Estimation of avoidable yield loss due to CR disease in soybean during *Kharif* 2023.

Variety	**Treatment**	**Jabalpur (CR)**				**Amravati (CR)**						
		Incidence (%)	**AUDPC**	**Yield (Kg/ha)**	**Avoidable Yield loss (%)**	Varieties	Treatment	60 DAS	75 DAS	Yield (kg.ha.)	AUPDC	Avoidable Yield Loss (%)
JS 20-29	T1	15.00	112.50	1047.2	24.40	JS 335	T1	6.88	8.4	1288.4	166.2	25.24
	T2	14.67	110.00	1116.7	29.10		T2	5.46	7.52	1322.47	138.3	27.17
	T3	12.67	95.00	1186.1	33.25		T3	4.3	7.6	1344.56	121.5	28.36
	T4	12.00	90.00	1200.0	34.02		T4	2.55	4.42	1422.3	71.4	32.28
	T5	16.00	120.00	916.7	13.63		T5	7.66	10.22	1235.22	191.55	22.02
	T6	23.00	172.50	791.7			T6	11.23	19.22	963.12	312.6	25.24
JS 20-98	T1	0.00	0.00	1616.7	6.02	Mean		6.34	9.56	1262.67	-	-
	T2	0.33	17.50	1655.5	8.22	AMS-1002	T1	0	3.45	1566.44	25.87	27.46
	T3	1.00	7.50	1722.2	11.78		T2	2.11	3.4	1641.11	57.15	30.76
	T4	0.00	0.00	1727.8	12.06		T3	1.22	3.12	1658.99	41.7	31.51
	T5	0.67	5.00	1600.0	5.04		T4	0	0	1780.2	0	36.17
	T6	0.67	5.00	1519.4			T5	3.4	4.63	1356.88	85.22	16.26
	CD (p=0.05)	2.73	25.24	-	-		T6	2.54	5.66	1136.22	80.55	27.46
	SE(m)	0.92	8.55	-	-	Mean		1.54	3.37	1523.30		
	CV	20.09	24.18	-	-	Js335		SEm±	SEm±	SEm±		

						MT		0.38	1.08	14.22		
						ST		0.62	1.99	20.13		
						MT x ST		1.02	2.46	32.33		
						AMS-1002		CD @ 5%	CD @ 5%	CD @ 5%		
						MT		1.11	3.12	34.18		
						ST		2.05	5.88	31.13		
						MT x ST		3.03	8.1	98.22		
						CV		10.22		20.11		

Table 8.1.2: Estimation of avoidable yield loss due to RAB and MLS disease in soybean during *Kharif* 2023.

Variety	Treatment	Jabalpur (RAB)				Indore (RAB)						
		Incidence (%)	**AUDPC**	**Yield (Kg/ha)**	**Avoidable Yield loss (%)**	Varieties	Treatment	60 DAS	75 DAS	AUPDC	Yield (kg.ha.)	Avoidable Yield Loss (%)
JS 20-29	T1	26.67	15.80	1047.2	24.40	JS 95-60	T1	31.87	52.87	650.71	11.59	27.41
	T2	20.33	13.58	1116.7	29.10		T2	30.09	49.38	625.25	12.36	31.95
	T3	13.00	11.42	1186.1	33.25		T3	21.52	45.67	595.63	14.21	40.81
	T4	12.00	10.25	1200.0	34.02		T4	17.91	40.22	520.37	15.97	47.33
	T5	33.00	19.88	916.7	13.63		T5	34.59	55.60	759.38	9.92	15.32
	T6	45.33	25.68	791.7			T6	40.11	60.31	860.09	8.41	
JS 20-98	T1	9.67	2.72	1616.7	6.02	JS 20-98	T1	19.52	35.63	498.27	17.16	24.30
	T2	7.00	2.10	1655.5	8.22		T2	17.10	27.89	358.21	17.95	27.63
	T3	3.67	1.30	1722.2	11.78		T3	13.74	26.66	352.31	19.37	32.93
	T4	2.67	1.36	1727.8	12.06		T4	11.89	21.57	253.69	21.99	40.92
	T5	11.33	3.89	1600.0	5.04		T5	24.05	36.08	502.43	14.38	9.66
	T6	14.33	5.56	1519.4			T6	31.77	43.05	556.91	12.99	
	CD(p=0.05)	4.24	2.03	-	-		CD (p=0.05)	2.31	29.65	2.03	-	-
	SE(m)	1.43	0.97	-	-		SE(m)	0.91	5.36	0.97	-	-
	CV	15.03	12.61	-	-		CV	13.85	26.87	16.28	-	-

Variety	Treatment	Medziphema (RAB) Incidence (%)	AUDPC	Yield (Kg/ha)	Avoidable Yield loss (%)	Variety	Treatment	Sehore (TLS) Incidence (%)	AUDPC	Yield (Kg/ha)	Avoidable Yield loss (%)	Incidence (%)
V1	T1	8.88	12.59	17.77	113.83	V1	T1	9.61	22.22	238.725	1227.777	7.24
	T2	7.40	9.25	11.48	83.96		T2	8.83	22.39	234.15	1305.553	12.77
	T3	6.29	8.51	10.36	74.93		T3	7.77	17.69	190.95	1455.553	21.76
	T4	5.92	8.14	10.00	71.48		T4	5.86	17.69	176.625	1477.78	22.93
	T5	14.81	16.29	17.03	148.56		T5	11.34	27.57	291.825	1200	5.09
	T6	17.03	24.07	23.33	197.87		T6	14.38	20.16	259.05	772.223	-
V2	T1	6.29	9.99	14.07	87.43	V2	T1	0.00	0.00	0	1750	5.40
	T2	5.55	7.77	10.36	69.38		T2	0.00	0.00	0	1916.667	13.62
	T3	5.18	5.92	8.51	57.58		T3	0.00	0.00	0	1955.557	15.34
	T4	4.81	5.18	5.92	48.56		T4	0.00	0.00	0	2066.667	19.89
	T5	6.66	14.44	13.33	104.12		T5	0.00	0.00	0	1816.667	8.87
	T6	7.77	16.66	18.14	125.63		T6	0.00	0.00	0	1655.557	-
		CD 5%	CD 5%	CD 5%			CD 5%	NS				
	Variety (V)	5.04	1.22	4.72			Variety (V)		2.15		219.135	
	Treatment (T)	3.02	4.79	4.28			Treatment (T)		3.73		179.166	
	VXT	4.27	6.77	6.05			V X T		5.28		253.379	

Table 8.1.3: Estimation of avoidable yield loss due to FLS disease in soybean during *Kharif* 2023.

Variety	Treatment	FLS (Jabalpur) Incidence (%)	PDI	AUDPC	Yield (kg.ha.)	Avoidable Yield loss (%)	FLS (Palampur) Variety	Treatment	16^{th} Aug	1st Sept	16^{th} Sept	30^{th} Sept	AUDPC
JS 20-29	T1	24.00	8.15	61.11	1047.2	24.40	VLS 59	T1	4.44	10.15	18.88	34.43	726.85
	T2	18.67	5.19	53.70	1116.7	29.10		T2	3.70	5.18	14.06	27.95	526.05
	T3	16.00	3.77	28.24	1186.1	33.25		T3	3.03	5.18	5.92	18.51	328.05
	T4	14.00	3.39	30.09	1200.0	34.02		T4	2.96	5.18	5.18	11.84	266.43
	T5	25.67	9.32	81.94	916.7	13.63		T5	3.70	10.37	22.95	38.85	818.93
	T6	32.67	12.84	99.07	791.7			T6	4.81	14.07	30.36	39.24	996.80
JS 20-	T1	4.67	2.84	21.30	1616.7	6.02	JS 335	T1	5.92	15.17	28.87	42.45	1023.48
	T2	3.33	2.04	15.28	1655.5	8.22		T2	5.92	8.14	21.47	37.02	766.23

98	T3	2.33	1.42	13.43	1722.2	11.78		T3	6.29	7.40	10.37	22.21	480.23
	T4	1.00	1.42	10.65	1727.8	12.06		T4	6.29	6.66	8.51	16.28	396.85
	T5	4.33	3.27	30.09	1600.0	5.04		T5	7.77	23.69	37.02	45.54	1310.40
	T6	8.33	3.83	31.48	1519.4			T6	7.77	28.14	46.26	50.72	1554.70
	CD (p=0.05)	4.30	1.29	13.31	-	-						V=2.662 T=4.611 V x T= NS	V=54.685 T=94.717 V x T= 133.95

Table 8.1.4: Estimation of avoidable yield loss due to Pod blight disease in soybean during *Kharif* 2023.

Variety	**Treatment**	**Palampur**					**Dharwad**						
		15th Sept	30th Sept	AUDPC	Yield (kg.ha.) %)	Avoidable Yield loss	Varieties	Treat.	PDI of 60 DAS	PDI of 75 DAS	AUDPC	Yield (q/ha.)	Avoidable yield loss
VLS 59	T1	8.14	23.94	240.65	16.05	22.66	JS 335	T1	15.21	30.86	674.40	14.46	14.37
	T2	6.66	17.77	183.25	17.78	14.27		T2	14.36	32.10	750.45	15.86	17.84
	T3	4.07	12.22	122.15	19.75	4.78		T3	14.25	27.16	582.30	16.34	21.66
	T4	3.70	6.66	77.70	20.74	-		T4	12.25	20.99	481.43	16.37	28.75
	T5	9.99	22.95	247.10	16.15	22.13		T5	16.34	50.61	1136.03	13.81	4.70
	T6	12.22	26.66	291.55	15.01	27.63		T6	20.21	56.78	1259.55	12.33	-
JS 335	T1	21.00	41.62	469.63	13.33	25.03	Mean		15.73	36.41		14.86	
	T2	14.81	26.45	309.45	14.86	16.42	DSb 34	T1	12.64	10.01	315.30	17.76	5.48
	T3	10.37	17.39	208.20	15.65	11.67		T2	10.99	5.92	242.40	18.07	7.70
	T4	6.29	10.36	124.90	17.78	-		T3	9.62	4.81	227.63	19.21	13.60
	T5	28.28	45.55	553.75	12.35	30.54		T4	9.52	3.70	226.13	19.71	14.16
	T6	33.69	46.29	599.85	11.85	33.35		T5	15.55	10.70	362.85	16.48	4.13
CD (P=0.05)			V=1.93 T=3.342 V x T= 4.727	V=22.539 T=39.039 V x T= 55.209	V= 1.293 T= 2.240 VxT=NS	-		T6	18.32	11.11	398.70	16.56	-
							Mean		12.56	7.65		17.55	
							Js335		SEm±	SEm±		SEm±	
							MT		0.51	0.78		16.08	
							ST		0.88	0.94		27.86	

							MT x ST		1.25	1.36		39.40	
							Dsb34		CD @ 5%	CD @ 5%		CD @ 5%	
							MT		1.49	1.32		47.18	
							ST		2.59	2.38		81.75	
							MT x ST		3.67	3.42		115.57	
							CV		7.39	5.65		4.21	

Variety	**Treatment**	**Medziphema (PB)**					**Indore (PB)**					
		60DAS	**75DAS**	**AUDPC**	Yield (kg.ha.) %)	Avoidable Yield loss	Varieties	Treat.	**PDI 60 DAS**	**AUDPC**	Yield (q/ha.)	Avoidable yield loss
V1	T1	14.44	25.55	133.97	1277.33	11.25	**JS 95-60**	T1	22.97	235.31	11.59	27.41
	T2	9.62	14.81	86.04	1374.33	17.51		T2	17.58	201.32	12.36	31.95
	T3	9.25	10.37	74.94	1499.00	24.37		T3	19.35	215.33	14.21	40.81
	T4	7.03	8.88	62.44	1639.33	30.85		T4	13.24	194.06	15.97	47.33
	T5	15.18	15.55	120.77	1216.67	6.82		T5	29.87	350.43	9.92	15.32
	T6	22.22	27.77	183.99	1133.67			T6	32.59	376.14	8.41	
V2	T1	11.10	16.29	92.98	1655.33	20.82						
	T2	8.14	9.63	59.68	1760.00	25.53	**JS 20-98**	T1	30.54	256.38	17.16	24.30
	T3	8.88	8.51	58.97	1986.33	34.02		T2	28.87	223.36	17.95	27.63
	T4	5.55	8.14	47.18	2164.00	39.43		T3	19.62	199.71	19.37	32.93
	T5	12.96	13.33	88.86	1579.33	17.01		T4	9.35	107.5	21.99	40.92
	T6	14.07	21.84	110.36	1310.67			T5	35.31	320.56	14.38	9.66
		CD 5%	CD 5%					T6	38.04	392.00	12.99	
Variety (V)		0.71	5.55					CD (p=0.05)	2.31	29.65	-	-
Treatment (T)		3.57 3.85	5.31					SE(m)	0.91	5.36	-	-
VXT		5.04 5.45	7.51					CV	13.85	26.87	-	-

Table 8.1.5: Estimation of avoidable yield loss due to IBB disease in soybean during *Kharif* 2023.

Varieties	Treatment	Raipur				Yield Kg/ ha	Avoidable Yield loss
		30 DAS	45 DAS	60 DAS	75DAS		
JS 95-60							
	T1	15.07	29.08	36.92	49.65	233.33	55.71
	T2	12.95	24.12	35.06	47.23	211.66	51.18
	T3	14.75	25.38	37.64	52.61	211.66	51.18
	T4	9.72	20.75	33.63	32.82	201.66	48.76
	T5	8.98	19.27	31.37	46.93	190.00	45.61
	T6 (Control)	13.33	23.58	39.97	50.50	103.33	
RSC 40-46							
	T1	3.15	5.95	9.64	12.76	2350	3.97
	T2	2.76	5.80	10.62	15.33	2333.33	3.28
	T3	2.78	5.93	9.79	14.07	2416.66	6.62
	T4	2.43	5.42	10.57	15.47	2373.33	4.91
	T5	2.56	5.05	9.74	14.08	2633.33	14.30
	T6(Control)	4.50	9.43	12.30	14.99	2256.66	

PP9: Image-based identification of soybean diseases

Collection of dataset

Centre	RAB	Anthracnose	BP	FLS	PSS	YMV	CR	Total
Indore	2114	1100	2500	1500	1700	-	-	8914
Pantnagar	50	-	-	-	-	-	-	50
Jabalpur	50	40	-	-	-	40	20	150

कीट विज्ञान
Entomology

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Northern Plain Zone

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North Eastern Hill Zone

Imphal (Manipur)	Dr. (Smt.) Nilima Karam

Central Zone

Indore (Madhya Pradesh)	Dr. Lokesh Kumar Meena
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Kota (Rajasthan)	Dr. B.K. Patidar
Amravati (Maharashtra)	Dr. S.S. Munje

Southern Zone

Dharwad (Karnataka)	Dr. R. Channakeshava
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8. ENTOMOLOGY

Six entomological field trials were conducted during *kharif* 2023 at 9 coordinated centres viz. Parbhani, Kota, Amrawati and Indore (Central Zone), Dharwad and Bidar (Southern Zone), Pantnagar and Ludhiana (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* 2023 at 9 different coordinating centres:

Zone	Insects
North Plain Zone (Pantnagar)	*Bemisia tabaci, Obereopsis brevis,* ***S. obliqua****, S. litura,* semilooper, ***Melanagromyza sojae*****, Aphids**.
North Eastern Hill Zone (Imphal)	*Helicoverpa armigera,* ***Spilarctia obliqua****, A. modicella,* **Aphids**, *M. sojae, Bemisia tabaci, S. litura, C. acuta, Obereopsis brevis,* Bean bug, Thrips.
Central Zone (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 – 4.32% stem tunneling; Aphids –2.08; BHC- 2.43 larvae/mrl
Parbhani	Girdle beetle – 5%; Stem fly – 12.15 % stem tunnelling; Semiloopers – **12.33** larvae/mrl
Kota	Girdle beetle – 30.00% infestation; Semiloopers – 2.33larvae/m; Defoliation – 5.0% at flowering and 21.5% at peak larval incidence
Dharwad	The peak incidence of *S. litura* (6.78 larva/mrl) and *S. obliqua* (17.22 larva/mrl) was observed on first week of September and continued upto last week. During *Kharif* 2023, *C. ptychora* pod damage was lesser as compare to other previous years up to 14.23%
Imphal	*S. obliqua* – 30.00larvae/m; Leaf Webber – 12.67larvae / mrl; *S. litura* – 6.33larvae/m; Defoliation – 28.6% % ; Aphids – 36.00aphids /plant
Amravati	Stem fly with 50 % 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:

Location	**BCAs**	**Period**	**Extent**
Kota	*Cotesia*	35th SMW	4.50% parasitisation
	Coccinelid beetle		1.67 beetle/mrl
	Spiders		1.00 spider/plant
Dharwad	*N. rileyi,*	September 36th SMW to 39th SMW	Upto 22 per cent % larval mortality
	Apanteles	September 33rd SMW to38th SMW	6 to 9 % parasitisation
Imphal	*N. Rileyi*, *Metarhizium anisopliae* and *B. bassiana*	--	5 to 10 % larval mortality
Pantnagar	Bacterial infection		40% larval mortality
	Fungi		10.0% larval mortality
	Virus infection		7.5% larval mortality in *Spodoptera litura*
Parbhani	*Coccinella* Spiders	36th SMW	2.33/MRL 3.00 spiders/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 (2021, 2022 and 2023) 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:

Insect(s)	**Genotype(s)**
Defoliators	DLSb 1, NRC 152.
PC	KDS 1096, RVS 2011-10, RSC 10-46.

ENT 3: Status of AVT-II entries for antixenosis and antibiosis against *S. litura*

Antixenosis and Antibiosis reaction of AVT-II entries:

Antixenosis and Antibiosis studies have been done on 10 AVT-II entries at Indore. Among 10 genotypes tested, none of the entry was exhibited **strong/extreme** antixenosis against *S. litura*. Antibiosis also studies have also been done on 10 AVT-II entries and results showed that the lowest AD was found in JS 23-03, the lowest ECI in NRC 152 and ECD was found in NRC 138. These entries were found good antibiosis reaction.

Sr. no.	Genotype	Antixenosis		Antibiosis			
		Indore		Indore			
		'C' Values	Interference	Wt of per pupae (mg)	AD (Approximate Digestibility)	ECI (Efficiency of Conversion of Ingested food)	ECD (Efficiency of Conversion of Digested food)
1.	JS 95-60	1.00	Preferred host	2.312	77.25 (61.51)	62.82 (52.43)	89.12 (70.74)
2.	NRC 262	0.98	Slight antixenosis	2.210	73.81 (59.22)	64.69 (53.54)	97.30 (80.54)
3.	NRC 130	1.02	Preferred host	2.401	69.56 (56.51)	67.92 (55.50)	98.64 (83.30)
4.	JS 24-33	0.77	Slight antixenosis	0.120	78.74 (62.54)	76.91 (61.28)	97.43 (80.77)
5.	JS 23-09	0.95	Slight antixenosis	0.198	78.68 (62.50)	65.45 (54.00)	93.54 (75.28)
6.	NRC 152	0.97	Slight antixenosis	2.104	79.24 (62.89)	61.54 (51.67)	85.19 (67.37)
7	JS 23-03	0.85	Slight antixenosis	0.172	68.69 (55.98)	65.50 (54.03)	94.05 (75.88)
8	NRC 138	0.80	Slight antixenosis	0.164	88.58 (70.25)	66.96 (54.91)	82.70 (65.42)
9	JS 20-34	0.91	Slight antixenosis	0.181	82.54 (65.30)	65.24 (53.87)	98.69 (83.43)
10	AMS 2022-1	0.78	Slight antixenosis	0.147	71.30 (57.61)	63.30 (52.71)	97.62 (81.13)
CD at 5%				0.08	(8.03)	(5.39)	(14.65)
SEm±				0.04	(3.85)	(2.58)	(7.02)

Ent. 4. Field screening of IVT entries for resistance to major insect-pests

Forty nine (49) coded entries were screened against major insect-pests in **IVT (Normal)** at different coordinating centres. Promising entries showing desirable reaction against one major insect-pest at more than one location and/or against more than one insect spp. at one or more locations are listed below, which will be tested further in next season:

Insect	Promising entries (IVT Normal)
Stem fly	MAUS 816, Pusa Sipani BS 8, RSC 11-95, KBSL 23-36, TS 101, NRC 271, Lok-Soya 03, ASb 101
Girdle beetle	NRC 270, MAUS 816, DS 1589, BAUS (M)6, SL 1315, KSS 225, DS 1547, NRC 268

Defoliators	MAUS 816, AMS 22-16, Pusa Sipani BS 8, VLS 106, RSC 11-95, TS 101, THPS 6, Lok-Soya 03, ASb 101, NRC 270, MAUS 816, DS 1589, BAUS (M) 6, SL 1315, KSS 225, DS 1547, NRC 268, JS 25-08, DLSb 5, NRC 269
Whitefly	Pusa Sipani BS 8, NRC 270, SL 1315, KSS 225, JS 25-08, DLSb 5, NRC 268, KBSL 23-36, KDSIS 1394
Aphid	Pusa Sipani BS 8, TS 101, THPS 6, Lok-Soya 03, ASb 101, BAUS (M) 6, KSS 225, DLSb 5, NRC 271, KDSIS 1394

Eighteen (18) coded entries were screened against major insect-pests in **IVT (Early)** at different coordinating centres of Central Region (Kota, Prabhani, Indore and Amravati). Promising entries showing desirable reaction against one major insect-pest at more than one location and/or against more than one insect spp. at one or more locations are listed below, which will be tested further in next season:

Insect	**Promising entries**
Girdle beetle	AUKS 21-5, NRC 267
Stem fly	JS 25-03, Pusa Sipani 33
Defoliators	DS 1480, AUKS 21-5

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 (Indore, Kota, Ludhiana, Dharwad and Imphal). On the basis of insect reaction these following promising lines were identified for further evaluation during next season:

Insect	**Promising entries**
Girdle beetle	IC0501673, IC 0421898, IC 0262123, IC243779, IC0501852
Defoliators	EC39494, EC 39512, EC 0291396, EC24154, IC 0548636, IC0218945, IC0501673, IC0262123,

ENT 6. Management of major defoliators of soybean through intercropping with suva, *Anethum graveolens*

In the Management of defoliators of soybean through intercropping with Suva, *Anethum graveolens* the total five treatment were of different rows combinations of suva with soybean alongwith one sole soybean crop treatment was taken at Dharwad, Prabhani and Indore. These combinations were as follows-

T1. Sole Soybean (18 rows)
T2. Soybean + Suva (15 soybean: 1suva rows combinations)
T3. Soybean + Suva (18 soybean: 1 suva rows combinations)
T4. Soybean + Suva (15 soybean: 2 suva rows combinations)
T5. Soybean + Suva (18 soybean: 2 suva rows combinations)

At Dharwad, treatments T4 of the combination of Soybean + Suva (15 Soybean: 2 suva rows combination) was found be significantly superior by recording lower *Spodoptera litura* (2.17 larvae/mrl), *Thysanoplusia orichalcea* (4.16 larvae/mrl), *Spilarctia obliqua* (12.54 larvae/mrl) larval population and recorded less leaf damage (15.82%) followed by **T5: Soybean + Suva (18 Soybean: 2 suva rows combination)** intercropping system. 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.

At Parbhani, the incidence of semilooper was observed that, among different treatments T4: Soybean + Suva (15:2) recorded lower (4.50 larvae/mrl) semiloopers larval population. It was followed by treatments T2: Soybean + Suva (15:1) (5.83 larvae/mrl) and T3: Soybean + Suva (18:1) (7.08 larvae/mrl) which were found at par with each other. Highest of 7.42 semilooper larvae/mrl were recorded in treatment T1: Sole soybean (18 rows). The incidence of *Spodoptera litura* was observed that, among different treatments T4: Soybean + Suva (15:2) recorded lower (1.33 larvae/mrl) *Spodoptera* larval population which was followed by T5: Soybean + Suva (18:2) (1.67larvae/mrl). Highest of 2.25 *Spodoptera* larvae/mrl was recorded in treatment T1: Sole soybean (18 rows).

At Indore, also the treatment T4 of the combination of Soybean + Suva (15 Soybean: 2 suva rows combination) was found be significantly superior by recording lowest population of semiloopers (5.50 larvae/mrl). But, the population of *Spodoptera litura* was found lowest in treatment T5 (18 Soybean: 2 suva rows combination) recorded lowest population (0.25 larvae/mrl).

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				4.21	4.38	5.89	2.23	2.49	2.79	3.40	4.78	4.19	2.98	6.08	2.29	3.76
Stem fly % Stem tunneling				0	0	0	1.02	1.91	0.58	0.98	2.54	2.98	4.32	0	0	0
Aphids / 3 leaf				0	0	0	10.07	11.51	8.67	9.96	12.41	16.46	12.61	0	0	0
Semilooper/m				0	0	0	0.23	0.49	0.79	1.40	1.78	1.19	0.98	2.08	0.29	0
Spodoptera litura Fb (l/mrl)				0	0	0	0	0	0	0	1.04	0.76	0	1.76	1.42	0
Spilosoma obliqua (W.) (l/mrl)				0	0	0	0.48	0	2.43	1.09	1.31	0.45	1.20	0	0	0
PARBHANI (Var. MAUS 2)																
S. litura larvae/mrl		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	2.00	1.33	0.67			
Green semilooper larvae/mrl		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	5.00	12.33	6.67	1.67			
White fly/plant		0.00	0.00	0.00	0.00	0.20	1.70	3.30	4.10	5.20	3.70	2.80	1.90			
Jassids/plant		0.00	0.00	0.00	0.00	0.00	0.20	0.30	0.20	2.80	1.50	1.00	0.60			
Aphids/plant		0.00	0.00	0.00	0.00	0.00	0.00	3.10	4.70	5.50	3.20	0.90	0.30			
Stem fly % Stem tunneling	**12.15** %															
AMARAWATI (Var. JS 335)																
Girdle beetle %		0.00	0.00	0.00	0.00	0.00	0.4	0.2	0.2	0	0	0	0	0	0	
Stem fly % Infest.		0	0	5	5	20	10	10	30	30	40	50	50	0		
Semilooper		0	0	0	0	0.13	0.06	0.33	0.33	0	0	0	0			
Spodoptera litura		0	0	0	0	0.06	0.13	0.26	0.33	0.06	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	10.00	10.00	13.33	16.67	20.00	20.00	23.33	23.33	
Semi loopers/m	-	-	-	-	0.33	0.67	1.33	1.67	2.00	2.00	2.33	1.00	0.33	0.00	0.00	
S. litura / m	-	-	-	-	-	-	-	0.33	0.67	1.00	1.33	0.67	0.33	0.00	0.00	
H. armigera/m	-	-	-	-	-	-	0.33	0.67	1.00	1.00	1.67	0.67	0.33	0.33	0.00	
White fly/plant	-	-	-	0.67	1.67	2.00	2.67	4.00	5.67	5.33	6.00	5.67	4.33	2.33	0.67	
Jassids/plant	-	-	-	0.33	1.33	1.33	2.00	2.67	3.33	4.33	5.33	4.33	3.33	2.00	0.67	
Defoliation (%)	5.5 at flowering and 20.5 at peak larval incidence at 37 (SMW)															

Minor insects	*grass hoppers, field cricket, hairy caterpillars & grey weevil*															
DHARWAD (Var. JS 335)																
Spodoptera litura Fb (l/mrl)			-	-	1.98	3.47	4.15	6.23	6.78	5.21	3.17	1.78	0.76	-	-	-
Thysanoplusia orichalcea Fab (l/mrl)			-	-	-	1.27	6.34	9.25	10.84	12.69	9.25	4.47	1.32		-	-
Spilosoma obliqua (W.) (l/mrl)			-	-	-	2.89	10.26	12.37	15.19	17.22	10.11	8.07	4.23	1.97	-	-
Omiodes indicata Infestation (%)			-	-	5.45	6.79	7.14	7.96	9.62	10.35	12.37	9.73	8.09	-	-	-
O. brevis Infestation (%)			-		-	1.89	3.27	5.13	6.67	7.26	8.74	5.93	4.31	-	-	-
M. sojae Stem tunneling (%)			-	-	5.45	7.78	12.48	16.65	18.17	13.37	9.87	3.34	-	-	-	-
C. ptychora Pod damage (%)			-		-	-	-	-	-	-	-	11.24	13.17	14.23	12.68	-
Helicoverpa armigera (l/mrl)			-		-	-	0.79	1.39	2.07	2.29	2.37	1.42	0.49	-	-	-
Myllocerus beetles/plant.			-		-	-	-	0.43	1.46	2.02	2.95	1.03	0.58	0.37	-	-
Green stinkbugs *Nezara viridula* (number/plant)			-		-	-	-	1.23	1.87	2.67	3.02	2.75	2.02	1.46	0.67	-
% Defoliation	15.45 % at Flowering and 32.39 % at peak incidence of larvae (32-35 SMW)															
IMPHAL (Var. JS 335)																
S. obliqua/m	0	11.67	23.33	38.00	**30.00**	27.33	28.67	13.33	3.33	0.00	0.00	0.00	0.00	**0**	0	0
Leaf Weber /m	0	9.33	9.67	10.67	**12.67**	10.33	11.67	10.67	11.33	7.00	4.00	2.00	0.00	0	0	0
S. litura/m	0	0.00	0.00	0.67	4.33	6.00	**6.33**	5.33	5.67	4.67	2.67	2.33	0.00	0	0	**0**
Aphids / plant	0	0.00	0.00	0.00	1.00	25.00	**36.00**	11.00	15.00	4.00	1.00	0.00	0.00	0	**0**	0
Seedling mortality at 7-10 DAG	6.00 % due to stem fly attack at seedling stage															
Stem tunneling at physiological maturity	11.01%															
% Defoliation	At peak incidence – 28.60%								At flowering - 26.81%							
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
PARBHANI																
Lady bird beetle/m		0.00	0.00	0.00	0.00	0.00	0.33	0.33	0.67	2.33	1.67	1.33	0.67			
Spider/m		0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	1.33	3.00	1.67	0.67			
PANTNAGAR																
Coccinelid beetle/mrl				0	0	0.12	0.57	0.58	0.59	0.95	1.21	1.45	0.99	076	0.57	0.62
Bugs/plant				0	0	0	0.19	0.28	0.76	1.29	1.88	1.86	1.68	2.39	0.86	1.19
Bacterial infection	30%															
Virus infection	7.5%															
Fungal infection	10%															
AMRAVATI																
Lady bird beetle		0	0	0	0	1	1	1	1	0	0	0	0			
KOTA																
Coccinelid beetle/mrl	-	-	-	-	-	0.33	0.67	0.67	1.00	1.33	1.67	1.00	0.67	0.00	0.00	
Cotesia parasitization (%)	-	-	-	-	-	1.0	-	2.5	3.5	3.5	4.00	2.0	1.00	0.00	0.00	
Spiders/plant	-	-	-	-	0.2	-	0.3	0.5	0.7	0.7	0.8	0.6	0.4	0.2	0.00	
DHARWAD																
Coccinelid beetle/mrl							0.93	1.94	2.37	3.24	3.51	2.57	1.93	-	-	-
C. carnea /mrl							0.82	1.29	2.02	2.81	3.07	2.13	1.58	-	-	-
Spiders/plant							0.32	0.49	0.88	1.26	1.39	1.15	0.49	-	-	-
Apanteles sp. Parasitization (%)	-	-	-	-	-	-	4.35	5.79	6.62	9.12	8.19	7.12	-	-	-	-
N. rileyi Infection (%)							-	-	-	3.16	5.39	4.78	3.58	-	-	-
IMPHAL																
Spiders/plant	0	0	0.2	0.4	0.3	0.4	0.3	0.1	0.2	0.1	0.0	0.1	0	0	0	0
Coccinelids/plant	0	0	0.2	0.4	0.4	0.4	0.5	0.3	0.1	0.4	0.2	0.1	0	0	0	0
Larval mortality %	5 to 20%															

Table 5.3 : Ent. 2 a. Field screening of AVT (Normal) entries (Central Zone) for resistance to major insect-pests (Defoliators and stem borers)

S. No.	Entry	Defoliators (larvae / m)	Reaction to Insect-Pest complex		Semilooper	*S. litura* (larvae/m)	Girdle beetle damage (%)	% Stem tunnelling due to stem fly	
		Kota	Kota	Prabhani	Prabhani	Prabhani	Kota	Prabhani	Amravati
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.	JS 21-72 (c)	1.50 (1.41) MR	SLY	**S-HY(T)**	6.50(2.64)- MR	1.00(1.22)	15.00 (22.76)MR	1.75 (7.26) MR	11.18 (0.34)
2.	RSC 10-52 (c)	1.84 (1.53) - LR	SLY	S-LY	**5.25-(2.39)- R**	1.50(1.41)	21.67 (27.72) – LR	**0.30(3.16) R**	6.98(0.27)
3.	MAUS 824	**1.00 (1.22) - R**	**RHY**	**R-HY**	10.50(3.30)- S	1.25(1.31)	**08.34 (16.70) – HR**	1.11(5.96) MR	23.56(0.51)
4.	NRC 258	2.00 (1.58) - LR	SLY	**S-HY(T)**	7.25(2.77)-MR	1.50(1.41)	16.67 (24.10) –MR	1.98(8.07) MR	13.78(0.38)
5.	RVSM 2011-35	NG	NG	NG	NG	NG	NG	NG	16.03(0.41)
6.	NRC 259	**1.00 (1.22) - R**	**RHY**	**S-HY(T)**	8.00(2.89)- LR	1.25(1.31)	**08.34 (16.70) – HR**	5.05(12.75) LR	12.91(0.37)
7.	JS 20-98 (c)	1.67 (1.47) - MR	SLY	S-LY	9.75(3.20)- LR	1.50(1.40)	18.34 (25.33) – LR	11.48(19.76) HS	24.47(0.52)
8.	JS 355 (c)	**0.84 (1.15) - HR**	**RHY**	**S-HY(T)**	5.75(2.48)- MR	1.75(1.49)	**10.00 (18.43) – R**	11.86(20.13) HS	19.59(0.46)
9.	G5P22(c)	2.17 (1.63) - LR	SLY	S-LY	8.50(2.99)- LR	1.00(1.22)	21.67 (27.72) – LR	4.73(12.38) S	17.33(0.43)
	SEm ±	(0.07)			(0.11)	NS	(1.38)	(1.65)	(0.03)
	CD at 5 %	(0.21)			(0.38)	--	(4.25)	(5.51)	(0.11)

Table 5.4 : Ent. 2b. 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 9560 (c)	25.55 (0.53)	2.17 (1.63)*- LR	25.00 (29.99)**- LR	SLY
2.	NRC 262	11.49 (0.35)	2.00 (1.58) - LR	16.67 (23.99) - MR	SLY
3.	NRC 130 (c)	11.70 (0.35)	1.34 (1.35) - MR	11.67 (19.92) - MR	**SHY**
4.	JS 24-33	10.05 (0.32)	**1.00 (1.22) - R**	**10.00 (18.43) - R**	**RHY**
5.	JS 23-09	10.88 (0.33)	1.67 (1.47) - MR	11.67 (19.92) - MR	**RHY**
6.	NRC 152	13.91 (0.38)	2.17 (1.63) - LR	16.67 (24.10) - MR	SLY
7.	JS 23-03	23.99 (0.51)	2.17 (1.63) - LR	18.34 (25.33) - LR	**SHY**
8.	NRC 138 (c)	20.12 (0.47)	2.50 (1.73) - LR	21.67 (27.60) - LR	**RHY**
9.	JS 20-34 (c)	15.09 (0.40)	2.00 (1.58) - LR	18.34 (25.33) - LR	SLY
10.	AMS 2022-1	15.28 (0.40)	**1.00 (1.22) - R**	15.00 (22.76) - MR	**RHY**
11.	CAT 146 (c)	7.14 (0.27)	2.34 (1.68) - LR	23.34 (28.83) - LR	SLY
	SEm ±	0.03	0.09	1.74	
	CD at 5 %	0.09	0.27	5.37	

Table 5.5 : Ent. 2c. Field screening of AVT-I for EDV (Southern Zone) for resistance to major insect-pests

Sl. No.	AVT I & II entries	Defoliators (larvae/mrl)*		Leaf damage** (% Defoliation)		Stem fly (% stem tunneling)	Girdle beetle damage(%)	Reaction to Insect pest complex
		(Bidar)	(Dharwad)	(Bidar)	(Dharwad)	(Dharwad)	(Dharwad)	(Dharwad)
1	NRC 197		3.19(1.92)MR		26.37(30.89)MS	27.54(31.64)MR	10.17(18.59)MR	**R-HY**
2	RSC 11-42		4.21(2.17)LR		36.47(37.14)MS	34.17(35.76)S	15.27(22.99)LR	S-LY
3	NRC 258		3.87(2.09)MR		31.12(33.89)MS	28.41(32.20)LR	14.22(22.14)LR	S-HY
4	NRC 259		4.03(2.13)LR		35.34(36.46)MS	30.19(33.32)LR	13.78(21.78)LR	S-LY
5	MAUS 824		3.68(2.04)MR		29.43(32.84)MS	32.17(34.54)S	11.21(19.55)MR	**S-HY**
6	MACSNRC 1900		3.39(1.97)MR		27.65(31.71)MS	26.54(31.00)MR	9.54(17.98)MR	**R-HY**
7	MACS 1460 (c)	2.72 (1.79)	6.31(2.61)S	25.79 (30.52)	57.71(49.42)S	31.35(34.04)S	10.57(18.96)MR	S-LY
8	MACSNRC 1900	3.25 (1.94)	3.24(1.93)MR	28.59 (32.32)	27.85(31.84)MS	25.64(30.41)MR	**8.23(16.66)R**	**R-HY**
9	NRC 142 (c)	4.47 (2.23)	5.63(2.48)S	30.66 (33.62)	47.86(43.76)MS	33.17(35.15)S	12.18(20.42)MR	S-LY
10	MACS 1188 (c)	2.67 (1.78)	3.57(2.02)MR	25.50 (30.33)	30.13(33.28)MS	27.89(31.87)MR	**9.19(17.64)R**	**R-HY**
11	JS 93-05 (c)	3.00 (1.90)	4.38(2.21)LR	26.14 (30.75)	42.59(40.72)MS	35.16(36.35)S	14.53(22.40)LR	**S-HY**
12	DSb 21 (c)	2.7 (1.79)	**2.97(1.86)R**	25.79 (30.52)	21.45(27.58)LS	23.75(29.15)MR	11.17(19.52)MR	**R-HY**
13	JS 355(c)	3.05 (1.88)	4.89(2.32)LR	27.99 (31.94)	43.68(41.35)MS	34.39(35.89)S	16.27(23.78)S	S-LY
14	G5P22(c)	3.68 (2.04)	3.15(1.91)MR	28.59 (32.32)	32.27(34.60)MS	28.54(32.28)LR	9.89(18.32)MR	**S-HY**
15	JS 93-05 (C)		5.22(2.39)S		51.45(45.81)S	32.15(34.53)S	12.23(20.46)LR	S-LY
16	DSb 21 (C)		3.63(2.03)MR		33.14(35.13)MS	33.58(35.40)S	10.18(18.60)MR	**R-HY**
17	MACS 1188 (C)		4.02(2.13)LR		42.69(40.78)MS	29.45(32.85)LR	13.45(21.51)MR	**S-HY**
18	NRC 142 (C)		5.15(2.38)S		53.47(46.97)S	35.64(36.64)HS	14.57(22.43)LR	S-LY
19	MACS 1460 (C)		4.36(2.20)LR		44.38(41.76)MS	30.12(33.27)LR	12.94(21.07)MR	**S-HY**
	S.Em±	--	0.12	--	1.18	1.07	0.84	--
	CD @ 5%	--	0.35	--	3.55	3.22	2.53	--

Table 5.6: ENT 3: Status of AVT-II entries for Antixenosis and Antibiosis against *S. litura* (Indore)

Sr. no.	Genotype	Antixenosis		Antibiosis			
		Indore		Indore			
		'C' Values	Interference	Wt of per pupae (mg)	AD (Approximate Digestibility)	ECI (Efficiency of Conversion of Ingested food)	ECD (Efficiency of Conversion of Digested food)
1.	JS 95-60	1.00	Preferred host	2.312	77.25 (61.51)	62.82 (52.43)	89.12 (70.74)
2.	NRC 262	0.98	Slight antixenosis	2.210	73.81 (59.22)	64.69 (53.54)	97.30 (80.54)
3.	NRC 130 (c)	1.02	Preferred host	2.401	69.56 (56.51)	67.92 (55.50)	98.64 (83.30)
4.	JS 24-33	0.77	Slight antixenosis	0.120	78.74 (62.54)	76.91 (61.28)	97.43 (80.77)
5.	JS 23-09	0.95	Slight antixenosis	0.198	78.68 (62.50)	65.45 (54.00)	93.54 (75.28)
6.	NRC 152	0.97	Slight antixenosis	2.104	79.24 (62.89)	61.54 (51.67)	85.19 (67.37)
7	JS 23-03	0.85	Slight antixenosis	0.172	68.69 (55.98)	65.50 (54.03)	94.05 (75.88)
8	NRC 138 (c)	0.80	Slight antixenosis	0.164	88.58 (70.25)	66.96 (54.91)	82.70 (65.42)
9	JS 20-34 (c)	0.91	Slight antixenosis	0.181	82.54 (65.30)	65.24 (53.87)	98.69 (83.43)
10	AMS 2022-1	0.78	Slight antixenosis	0.147	71.30 (57.61)	63.30 (52.71)	97.62 (81.13)
	CD at 5%			0.08	(8.03)	(5.39)	(14.65)
	SEm±			0.04	(3.85)	(2.58)	(7.02)

* Figures in the parenthesis are Transformed angular values

Table 5.7: ENT.4 a. Field screening of IVT (Normal) entries for resistance to stem borers (Stem fly- % Stem tunneling and Girdle beetle - % Plant infestation)

Stem fly- % Stem tunneling							Girdle beetle - % Plant infestation	
Sr. No.	**Entries**	**Pantnagar**	**Parbhani**	**Amravati**	**Imphal**	**Dharwad**	**Dharwad**	**Kota**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
1	NRC 270	19.38(25.98) MR	4.32(11.98) LR	6.585(14.75)MR	4.73(13.19)#MR	27.39(31.54)LR	10.12(18.54)MR	**10.00 (18.43)**-R**
2	AMS 22-16	19.35(26.07)MR	5.33(13.29) LR	6.525(14.60)MR	5.11(13.66) MR	26.58(31.02)MR	15.28(23.00)LR	21.67 (27.72) - LR
3	VLS 89 (c)	32.09(34.46)LR	3.20(10.27) MR	6.515(14.71)MR	**3.89(12.01) R**	36.98(37.44)S	13.14(21.25)MR	23.33 (28.88) - LR
4	MAUS 816	**13.61(21.5)R**	2.28(8.64) MR	9.63(18.06)MR	5.15(13.66) MR	29.87(33.12)LR	10.75(19.13)MR	**8.34 (16.70) -HR**
5	Pusa Sipani BS 8	60.38(51.02)HS	3.06(10.02) MR	**2.55(9.08)HR**	8.93(17.87) LR	19.70(26.34)MR	9.33(17.78)MR	26.67 (31.09) -S
6	VLS 99 (c)	32.65(34.75) LR	NG	NG	8.33(17.26) LR	31.04(33.85)S	12.88(21.03)MR	NG
7	DS 1589	25.37(29.96)MR	3.19(10.25)MR	6.55(14.82)MR	7.21(16.11) LR	28.82(32.46)LR	18.54(25.50)S	**6.67 (14.97) - HR**
8	RSC 11-95	34.95(35.99)LR	4.45(12.14) LR	**4.89(12.77)R**	8.88(17.78) LR	31.82(34.33)S	10.40(18.81)MR	18.34 (25.33) -LR
9	VLS 63 (c)	20.82(27.04)MR	3.84(11.19) MR	21.97(27.95)HS	10.18(18.87)LR	19.62(26.28)MR	**8.72(17.17)R**	16.67 (24.10) -MR
10	BAUS (M) 6	23.44(28.73)MR	7.05(15.38) S	15.87(23.48)S	8.75(17.64) LR	23.73(29.14)MR	**7.85(16.27)R**	26.67 (31.05) -S
11	NRC 142 (c)	29.25 (32.69)LR	3.93(11.42) MR	9.12(17.50)MR	5.46(13.88) MR	34.73(36.09)S	**8.19(16.63)R**	26.67 (31.09) -S
12	KBSL 23-36	**14.58(22.29)R**	**2.03(8.16) R**	8.42(16.77)MR	7.06(15.88) MR	29.15(32.67)LR	16.86(24.24)LR	20.00 (26.57) - LR
13	VLS 106	27.31(31.37)MR	6.71(14.88) LR	8.12(16.07)MR	8.58(17.43) LR	31.34(34.03)S	14.83(22.64)MR	16.67 (24.10) -MR
14	JS 355 (c)	20.76(27.07)MR	**2.06(8.13) R**	10.26(18.58)LR	7.86(16.50) MR	22.42(28.25)MR	9.35(17.80)MR	13.34 (20.77) -MR
15	G5P22 (c)	41.46(39.58)S	2.93(9.78) MR	8.58(17.00)MR	8.69(17.41) LR	19.15(25.94)MR	13.46(21.52)MR	20.00 (26.57) - LR
16	SL 1315	43.39(41.1)S	5.66(13.74) LR	6.82(14.97)MR	8.71(17.63) LR	26.63(31.06)MR	10.78(19.16)MR	**8.34 (16.70) - HR**
17	TS 101	**15.56(23.21)R**	**0.38(2.51) HR**	18.81(25.68)HS	8.40(17.26) LR	33.81(35.54)S	19.14(25.94)S	16.67 (24.10) -MR
18	THPS 6	26.70(30.91)MR	3.26(10.40) MR	12.53(20.64)LR	7.72(16.66) MR	29.82(33.09)LR	16.25(23.77)LR	13.34 (21.27) -MR
19	KDSIS 1394	65.40(53.95)HS	7.73(16.02) S	22.52(28.30)HS	7.35(16.18) MR	28.14(32.03)LR	13.98(21.95)MR	20.00 (26.49) - LR
20	NRC 271	33.97(35.56)LR	**2.48(9.05) R**	17.29(24.54)S	7.46(16.13) MR	30.52(33.52)S	13.40(21.47)MR	23.34 (28.83) - LR
21	Lok-Soya 03	28.73(32.33)LR	11.34(19.47)HS	**4.83(12.64)R**	4.37(12.67) MR	32.85(34.96)S	20.12(26.64)HS	20.00 (26.49) - LR
22	KSS 225	18.83(25.69)MR	4.55(12.29) LR	9.8(18.24)LR	7.81(16.75) MR	27.53(31.63)LR	18.93(25.78)S	**10.00 (18.19) -R**
23	DS 1547	29.19(32.61)LR	10.54(18.94)HS	6.06(14.23)MR	7.45(16.28) MR	22.44(28.27)MR	**8.01(16.44)R**	16.50 (23.97) -MR
24	MACS 1810	18.03(24.92)MR	7.56(15.91)S	12.71(20.82)LR	8.70(17.63) LR	26.73(31.12)MR	11.20(19.55)MR	21.67 (27.72) - LR
25	JS 25-08	22.84(28.43)MR	2.51(9.11)MR	17.54(24.74)S	9.58(18.46) LR	27.02(31.31)LR	11.96(20.23)MR	20.00 (26.49) - LR
26	ASb 101	**15.05(22.78)R**	**1.85(7.81)R**	**3.9(11.05)HR**	7.89(16.84) MR	26.53(30.99)LR	14.29(22.21)MR	21.67 (27.72) - LR
27	NRC 268	23.66(29.09)MR	3.83(11.27)MR	6.48(14.67)MR	5.45(14.02) MR	27.54(31.64)LR	10.16(18.58)MR	**6.67 (14.97) - HR**
28	DLSb 5	18.16(25.18)MR	1.61(7.24)R	13.16(21.26)LR	NG	24.31(29.53)MR	11.42(19.75)MR	25.00 (29.99) - S

29	NRC 269	35.96(36.81)LR	2.08(8.22)MR	11.77(20.02)LR	NG	33.31(35.24)S	10.64(19.03)MR	13.34 (21.27) -MR
30	JS 355 (c)	**17.27(24.21)R**	5.09(13.02)LR	12.33(20.40)LR	7.52(16.37) MR	31.84(34.34)S	15.47(23.16)LR	18.34 (25.33) –LR
31	G5P22 (c)	30.14(33.28)LR	15.45(22.97)HS	10.50(18.91)LR	9.67(18.55) LR	38.82(38.53)HS	19.93(26.51)S	18.34 (25.33) –LR
32	NRC 260				10.90(19.73)LR			
33	NRC 190				7.80(16.74) MR			
34	VLS 105				7.51(16.43) MR			
35	AMS 2021-4				11.19(19.91)LR			
36	MACS 1407 (c)				7.87(16.82) MR			
37	KDS 1188				7.54(16.46) MR			
38	Himso 1696				11.32(20.11)LR			
39	NRC 142 (c)				10.25(19.14)LR			
40	MAUS 824				9.68(18.58) LR			
41	RSC 11-72				10.96(19.52)LR			
42	JS 355 (c)				7.12(15.99) MR			
43	G5P22 (c)				8.79(17.72) LR			
44	NRC 259				10.90(19.56)LR			
45	AMS 2021-3				5.89(14.54) MR			
46	JS 20-116 (c)				10.75(19.59)LR			
47	KDS 753 (c)				9.51(18.41) LR			
48	NRC 191				NG			
49	Pusa Sipani 433				9.23(18.11) LR			
CD at 5%		(10.20)	(3.59)	(5.04)	(4.06)	(3.25)	(0.96)	(1.85)
SEM±		(3.51)	(1.24)	(1.74)	(2.02)	(1.08)	(2.89)	(5.36)

Table 5.8: ENT. 4 b. Field screening of IVT (Normal) entries for resistance to major insect pests (Defoliators)

Code No.	Entries	Defoliators (Number of larvae / m)								No. of semilooper/ Mrl	No. of *S. litura* larvae/mrl
		Pantnagar			Bidar	Kota	Dharwad	Imphal		Parbhani	
		BHC	TC	GSL				BHC	TC		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	NRC 270	9.25(3.19)HS	**0.65(1.28)HR**	**0.00(1.00)HR**	3.00(1.87)MR	**0.84(1.15)R**	3.74(2.06)MR	2.40(1.69)MR	1.40(1.38)MR	**3.17(1.90)R**	1.00(1.22)
2	AMS 22-16	7.29(2.87)HS	2.00(1.72)HS	**0.70(1.30)HR**	3.33(1.96) LR	1.84(1.53)LR	3.92(2.10)MR	**0.80(1.13) R**	1.10(1.26)MR	5.67(2.47)LR	1.50(1.40)
3	VLS 89 (c)	**2.27(1.80)HR**	2.30(1.81)HS	1.60(1.61)HS	2.83(1.82)MR	2.17(1.63)LR	5.06(2.36)S	6.40(2.63) LR	1.80(1.48) LR	5.50(2.44)MR	0.83(1.15)
4	MAUS 816	**2.00(1.73)HR**	**0.70(1.30)HR**	**0.00(1.00)HR**	3.33(1.96) LR	**0.84 (1.15) R**	4.11(2.15)LR	2.90(1.74)MR	0.90(1.18)MR	4.50(2.19)MR	0.83(1.15)
5	Pusa Sipani BS 8	**3.29(2.06)HR**	1.52(1.58)HS	3.00(1.99)HS	3.17(1.92)MR	2.50 (1.73) S	3.81(2.08)MR	3.00(1.85)MR	1.50(1.41)MR	5.83(2.50)LR	1.83(1.52)
6	VLS 99 (c)	9.13(3.17)HS	**0.00(1.00)HR**	**0.00(1.00)HR**	2.83(1.82)MR	NG	4.53(2.24)S	9.60(3.18) LR	1.10(1.25)MR	NG	NG
7	DS 1589	**3.33(2.07)HR**	**0.00(1.00)HR**	**0.00(1.00)HR**	4.00(2.12) HS	**0.67(1.07)HR**	5.50(2.45)HS	4.40(2.21)MR	1.30(1.33)MR	6.17(2.57)LR	1.17(1.28)
8	RSC 11-95	**4.35(2.31)HR**	2.67(1.91)HS	2.50(1.86)HS	3.00(1.87)MR	2.17(1.63)LR	3.71(2.05)MR	8.00(2.92) LR	1.40(1.37)MR	5.17(2.36)MR	1.17(1.28)
9	VLS 63 (c)	8.77(3.12)HS	**0.00(1.00)HR**	**0.00(1.00)HR**	**2.17(1.63)HR**	**1.84 (1.53) R**	**2.92(1.85)R**	3.80(2.06)MR	1.50(1.41)MR	5.83(2.48)LR	1.00(1.22)
10	BAUS (M) 6	**1.37(1.52)HR**	**0.00(1.00)HR**	**0.00(1.00)HR**	**1.50(1.41)HR**	3.00(1.87)S	**2.10(1.61)R**	2.00(1.58)MR	1.80(1.52) LR	7.33(2.78)LR	1.00(1.22)
11	NRC 142 (c)	**3.08(2.02)HR**	**0.95(1.39)HR**	**0.00(1.00)HR**	2.67(1.78)MR	1.84(1.53)LR	3.28(1.95)MR	4.80(2.30) LR	3.40(1.97) LR	5.17(2.36)MR	1.17(1.28)
12	KBSL 23-36	20.42(4.62)HS	3.10(2.02)HS	2.10(1.75)HS	3.50(2.00) LR	2.00(1.58)LR	4.23(2.18)LR	1.00(1.22)MR	2.00(1.58) LR	5.50(2.44)MR	1.00(1.22)
13	VLS 106	5.30(2.50)HS	1.70(1.64)HS	**0.00(1.00)HR**	3.33(1.96) LR	2.33(1.68)LR	4.04(2.13)LR	**0.50(0.97) R**	0.80(1.13)MR	6.50(2.64)LR	1.33(1.33)
14	JS 355 (c)	**3.07(2.01)HR**	**1.05(1.43)HR**	**0.00(1.00)HR**	3.12(1.90)MR	1.17(1.29)MR	3.82(2.08)MR	5.40(2.43) LR	1.60(1.45) LR	6.17(2.57)LR	0.83(1.15)
15	G5P22 (c)	**3.35(2.07)HR**	1.95(1.71)HS	**0.00(1.00)HR**	3.65(2.04) LR	1.84 (1.50)LR	4.34(2.20)LR	4.40(2.21)MR	0.90(1.18)MR	5.33(2.41)MR	1.17(1.28)
16	SL 1315	4.79(2.40)MR	2.95(1.98)HS	3.17(2.04)HS	4.00(2.11) HS	**0.67 (1.08) R**	4.71(2.28)S	1.20(1.29)MR	**0.60(1.04) R**	5.50(2.44)MR	1.17(1.28)
17	TS 101	**3.72(2.17)HR**	**0.90(1.37)HR**	**0.00(1.00)HR**	4.83(2.31) HS	1.67 (1.47)LR	5.80(2.51)HS	4.20(2.13)MR	1.30(1.34)MR	5.00(2.33)MR	0.83(1.15)
18	THPS 6	11.58(3.54)HS	3.00(1.99)HS	2.25(1.803)HS	3.50(2.00) LR	**0.84 (1.15) R**	4.24(2.18)LR	4.00(2.12)MR	2.20(1.64) LR	6.00(2.54)LR	1.00(1.21)
19	KDSIS 1394	**2.42(1.84)HR**	1.25(1.50)MR	1.00(1.41)LR	3.33(1.96) LR	1.84 (1.53)LR	4.03(2.13)LR	8.00(2.69) LR	1.90(1.55) LR	5.33(2.39)MR	1.17(1.28)
20	NRC 271	6.04(2.65)HS	2.60(1.89)HS	1.50(1.573)HS	3.23(1.93) LR	3.33 (1.96) –S	3.93(2.11)MR	11.00(3.36) S	1.60(1.45) LR	6.67(2.67)LR	1.17(1.27)
21	Lok-Soya 03	5.04(2.44)S	1.70(1.64)HS	**0.80(1.34)R**	3.67(2.04) LR	1.33(1.35)MR	4.39(2.21)LR	6.00(2.55) LR	1.60(1.44) LR	5.17(2.35)MR	1.00(1.22)
22	KSS 225	**1.33(1.52)HR**	**0.00(1.00)HR**	**0.00(1.00)HR**	3.17(1.92)MR	1.00(1.22)MR	3.94(2.11)MR	7.60(2.84) LR	2.20(1.63) LR	8.17(2.94)S	0.83(1.15)
23	DS 1547	6.13(2.65)HS	**0.90(1.37)HR**	2.10(1.76)HS	**2.33(1.68)HR**	1.17(1.29)MR	2.96(1.86)MR	7.40(2.76) LR	2.30(1.67) LR	4.00(2.12)MR	1.33(1.35)
24	MACS 1810	5.42(2.52)HS	2.10(1.76)HS	1.90(1.70)HS	3.17(1.92)MR	1.84 (1.53)LR	3.85(2.09)MR	3.20(1.91)MR	1.30(1.33)MR	5.17(2.36)MR	1.17(1.28)
25	JS 25-08	**2.29(1.79)HR**	**0.00(1.00)HR**	**0.75(1.32)HR**	3.00(1.87)MR	1.17(1.29)MR	3.71(2.05)MR	4.20(2.17)MR	1.60(1.43)MR	5.50(2.39)MR	1.17(1.28)

26	ASb 101	**3.53(2.12)HR**	2.25(1.79)HS	2.20(1.78)HS	2.86(1.83)MR	1.50(1.41)MR	3.55(2.01)MR	4.20(2.13)MR	1.50(1.40)MR	4.67(2.22)MR	1.33(1.34)
27	NRC 268	**1.58(1.60)HR**	2.15(1.77)HS	1.85(1.68)HS	2.97(1.86)MR	**0.50(1.00)HR**	3.68(2.05)MR	4.40(2.21)MR	0.70(1.09)MR	5.17(2.31)MR	1.00(1.22)
28	DLSb 5	**1.02(1.42)HR**	**0.00(1.00)HR**	0.90(1.37)MR	3.26(1.94) LR	2.17 (1.63)LR	3.95(2.11)LR	NG	NG	7.67(2.84)LR	1.00(1.21)
29	NRC 269	5.00(2.44)S	**0.00(1.00)HR**	1.10(1.44)LR	3.00(1.87)MR	1.17(1.28)MR	3.74(2.06)MR	NG	NG	6.17(2.58)LR	1.17(1.28)
30	JS 355 (c)	**2.71(1.92)HR**	1.20(1.48)MR	**0.00(1.00)HR**	3.17(1.92)MR	1.84 (1.53)LR	3.83(2.08)LR	4.00(2.12)MR	1.60(1.43) LR	4.83(2.27)MR	1.50(1.41)
31	G5P22 (c)	**1.20(1.48)HR**	**0.00(1.00)HR**	0.85(1.36)MR	3.67(2.04) LR	1.67 (1.47)LR	4.37(2.21)LR	2.60(1.71)MR	1.00(1.22)MR	5.00(2.31)MR	1.67(1.46)
32	NRC 260							4.80(2.09)MR	1.30(1.34)MR		
33	NRC 190							10.20(3.25)LR	1.80(1.52) LR		
34	VLS 105							4.00(2.12)MR	1.50(1.41)MR		
35	AMS 2021-4							7.40(2.76) LR	2.00(1.57) LR		
36	MACS 1407 (c)							5.20(2.39) LR	1.40(1.37)MR		
37	KDS 1188							6.80(2.69) LR	1.20(1.30)MR		
38	Himso 1696							7.80(2.86) LR	1.70(1.47) LR		
39	NRC 142 (c)							5.00(2.33) LR	2.00(1.58) LR		
40	MAUS 824							6.20(2.57) LR	1.80(1.52) LR		
41	RSC 11-72							3.40(1.94)MR	1.90(1.54) LR		
42	JS 355 (c)							5.40(2.42) LR	1.50(1.41)MR		
43	G5P22 (c)							4.00(2.07)MR	1.20(1.30)MR		
44	NRC 259							5.60(2.47) LR	1.60(1.45) LR		
45	AMS 2021-3							4.20(2.10)MR	1.80(1.49) LR		
46	JS 20-116 (c)							4.40(2.21)MR	1.70(1.48) LR		
47	KDS 753 (c)							7.40(2.68) LR	1.20(1.29)MR		
48	NRC 191							NG	NG		
49	Pusa Sipani 433							8.20(2.86) LR	1.30(1.34)MR		
	S.Em±	0.13	0.05	0.05	0.18	0.09	0.19	0.55	0.18	0.14	NS
	CD @ 5%	0.40	0.15	0.16	0.52	0.27	0.57	1.10	0.37	0.41	

Table 5.9: ENT. 4 c. 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	Coccinella /mrl*
		Dharwad	Imphal	Pantnagar	Pantnagar	Parbhani	Ludhiana	Parbhani	Pantnagar
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	NRC 270	31.33(34.02)MS	12.00(3.49)S	3.60(2.14)LR	**2.33(1.82)-HR**	3.10(1.89)	1.58 (1.56)	1.40(1.37)	1.00 (1.40)-HS
2	AMS 22-16	33.17(35.15)MS	2.70(1.79) MR	3.83(2.18)LR	3.44(2.09)MR	2.40(1.70)	1.67 (1.59)	1.30(1.34)	1.00(1.41)HS
3	VLS 89 (c)	43.35(41.16)MS	9.00(3.08) LR	4.78(2.40)HS	**2.72(1.92)HR**	2.30(1.67)	2.42 (1.81)	1.10(1.26)	2.00(1.70)HS
4	MAUS 816	35.52(36.57)MS	3.30(1.94) MR	3.39(2.09)MR	4.00(2.23)HS	2.40(1.70)	2.33 (1.81)	1.30(1.34)	0.00(1.00)HR
5	PusaSipani BS 8	32.57(34.79)MS	6.30(2.60) LR	**1.56(1.60)HR**	**3.00(1.99)HR**	2.90(1.84)	0.91 (1.34)	1.20(1.30)	0.50(1.20)LR
6	VLS 99 (c)	34.92(36.21)MS	6.50(2.64) LR	**3.06(2.01)HR**	**2.72(1.92)HR**	NG	1.67 (1.62)	NG	1.00(1.40)HS
7	DS 1589	51.32(45.74)S	7.00(2.68) LR	4.22(2.28)HS	3.72 (2.17)S	2.50(1.72)	1.58 (1.58)	1.00(1.22)	0.50(1.20)LR
8	RSC 11-95	39.90(39.16)MS	3.70(2.02) MR	4.5(2.34)HS	3.45(2.10)LR	3.10(1.89)	2.00 (1.67)	1.20(1.30)	0.50(1.20)LR
9	VLS 63 (c)	29.87(33.12)MS	4.30(2.19) MR	6.06(2.65)HS	3.44(2.10)MR	3.40(1.97)	1.16 (1.46)	1.00(1.22)	2.00(1.72)HS
10	BAUS (M) 6	21.91(27.90)LS	4.00(2.11) MR	**1.83(1.68)HR**	3.39(2.09)MR	2.50(1.72)	0.58 (1.25)	1.20(1.30)	0.00(1.00)HR
11	NRC 142 (c)	33.59(35.41)MS	2.20(1.64) MR	4.28(2.29)HS	4.67(2.36)HS	2.40(1.70)	2.42 (1.78)	1.30(1.34)	1.50(1.58)HS
12	KBSL 23-36	46.61(43.04)MS	9.20(3.11) LR	3.61(2.14)LR	**2.95(1.98)HR**	2.80(1.81)	1.42 (1.54)	1.20(1.30)	0.50(1.20)LR
13	VLS 106	38.36(38.25)MS	2.50(1.73) MR	3.89(2.21)LR	3.89(2.20)HS	3.00(1.87)	1.16 (1.46)	1.50(1.41)	0.00(1.00)HR
14	JS 355 (c)	29.12(32.65)MS	7.40(2.81) LR	4.33(2.30)HS	4.72(2.38)HS	3.10(1.89)	2.17 (1.76)	1.20(1.30)	0.00(1.00)HR
15	G5P22 (c)	34.27(35.82)MS	14.00(3.77) S	3.50(2.12)MR	**3.06(2.00)HR**	2.60(1.75)	3.75 (2.05)	1.30(1.34)	0.00(1.00)HR
16	SL 1315	39.92(39.17)MS	2.30(1.67) MR	3.95(2.21)LR	**2.72(1.92)HR**	3.20(1.92)	1.92 (1.69)	0.90(1.18)	0.00(1.00)HR
17	TS 101	59.24(50.31)S	4.50(2.23) MR	**1.28(1.50)HR**	4.39(2.31)HS	2.60(1.75)	2.58 (1.81)	1.50(1.41)	0.00(1.00)HR
18	THPS 6	38.11(38.11)MS	**13.60(3.75) S**	**1.56(1.59)HR**	4.28 (2.29)HS	2.70(1.78)	2.34 (1.80)	0.90(1.18)	0.00(1.00)HR
19	KDSIS 1394	34.31(35.84)MS	4.50(2.23) MR	**1.72(1.64)HR**	**2.67(1.91)HR**	2.80(1.81)	1.16 (1.44)	1.30(1.33)	0.00(1.00)HR
20	NRC 271	33.17(35.15)MS	6.60(2.65) LR	**1.45(1.56)HR**	4.61(2.35)HS	3.00(1.87)	2.17 (1.71)	1.20(1.30)	0.00(1.00)HR
21	Lok-Soya 03	48.22(43.96)MS	9.00(3.08) LR	**0.78(1.33)HR**	3.50(2.11)LR	3.10(1.89)	1.92 (1.60)	1.30(1.34)	0.50(1.20)HR

22	KSS 225	32.46(34.72)MS	4.30(2.12) MR	**2.89(1.97)HR**	**2.56(1.88)HR**	2.50(1.72)	2.25 (1.76)	1.10(1.26)	0.00(1.00)HR
23	DS 1547	22.47(28.29)LS	4.10(2.13) MR	6.44(2.72)HS	4.78(2.40)LS	2.60(1.75)	1.58 (1.59)	1.30(1.34)	0.00(1.00)HR
24	MACS 1810	31.02(33.83)MS	3.60(1.98) MR	3.00(1.99)HR	3.56(2.13)LR	2.90(1.84)	2.83 (1.88)	1.30(1.34)	0.00(1.00)HR
25	JS 25-08	35.54(36.58)MS	5.00(2.27) MR	6.11(2.66)HS	**2.00(1.73)HR**	2.50(1.72)	3.34 (1.98)	1.20(1.30)	1.50(1.57)HS
26	ASb 101	42.22(40.51)MS	3.80(2.03) MR	**1.06(1.43)HR**	4.11(2.22)HS	2.80(1.81)	1.00 (1.41)	1.50(1.41)	0.00(1.00)HR
27	NRC 268	31.22(33.96)MS	3.00(1.85) MR	**2.89(1.97)HR**	3.39(2.08)MR	2.20(1.64)	2.58 (1.85)	1.20(1.30)	0.00(1.00)HR
28	DLSb 5	37.27(37.61)MS	NG	**2.06(1.74)HR**	**3.17(2.04)R**	3.00(1.86)	1.75 (1.64)	1.00(1.22)	0.00(1.00)HR
29	NRC 269	42.04(40.40)MS	NG	4.94(2.43)HS	6.33(2.68)HS	2.70(1.78)	4.17 (2.13)	1.20(1.30)	1.50(1.57)HS
30	JS 355 (c)	31.52(34.14)MS	4.60(2.24) MR	5.83(2.61)HS	**2.83(1.95)HR**	2.50(1.72)	1.58 (1.59)	1.50(1.41)	0.50(1.20)LR
31	G5P22 (c)	42.42(40.62)MS	**1.30(1.34) R**	4.28(2.29)HS	4.28(2.29)HS	2.60(1.76)	2.33 (1.75)	1.10(1.26)	0.50(1.20)LR
32	NRC 260		3.00(1.85) MR						
33	NRC 190		1.70(1.46) MR						
34	VLS 105		3.50(2.00) MR						
35	AMS 2021-4		4.20(2.17) MR						
36	MACS 1407 (c)		5.50(2.45) LR						
37	KDS 1188		3.60(1.98) MR						
38	Himso 1696		5.70(2.47) LR						
39	NRC 142 (c)		3.20(1.85) MR						
40	MAUS 824		5.50(2.45) LR						
41	RSC 11-72		6.40(2.53) LR						
42	JS 355 (c)		6.50(2.60) LR						

43	G5P22 (c)		9.60(3.18) LR						
44	NRC 259		5.00(2.30) MR						
45	AMS 2021-3		6.80(2.70) LR						
46	JS 20-116 (c)		7.10(2.73) LR						
47	KDS 753 (c)		9.90(3.22) LR						
48	NRC 191		NG						
49	Pusa Sipani 433		5.80(2.50) LR						
S.Em±		1.25	0.41	0.09	0.14	NS	NS	NS	0.13
CD @ 5%		3.76	0.83	0.27	0.41		0.33		0.38

ENT. 5.10: ENT. 4 d. 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)	
		Kota	Prabhani		Kota	Prabhani	Amravati
			Semilooper	*S. litura*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	NRC 266	2.34(1.68)*- LR	5.17(2.37)MR	1.33(1.35)	20.00 (26.49)- LR	1.91(7.64) HR	6.675(14.87)MR
2	NRC 138 (c)	1.17(1.29) – MR	4.67(2.26)MR	1.50(1.41)	15.00 (22.76) - MR	14.18(22.04)HS	10.825(19.16)LR
3	DS 1480	**0.67 (1.08) – HR**	4.50(2.23)MR	0.67(1.08)	11.67 (19.92) - MR	11.81(20.10) S	9.555 (17.97)LR
4	NRC 264	2.33 (1.68) – LR	4.67(2.27)MR	1.17(1.28)	19.83 (26.36) - LR	7.90(16.31) LR	5.45(13.50)MR
5	AUKS 21-5	**0.67 (1.08) – HR**	**3.83(2.08)HR**	1.00(1.21)	**8.34 (16.70) -R**	11.86(20.12) S	7.49(15.81)MR
6	NRC 150 (c)	1.34 (1.35) – MR	4.83(2.30)MR	1.33(1.35)	18.33 (25.15) -LR	4.02(11.55)MR	8.225(16.67)LR
7	KDS 1193	2.17 (1.63) – LR	6.00(2.54) LR	1.83(1.51)	16.67 (23.99) - MR	6.71(14.83) LR	15.56(23.17)HS
8	MACS 1834	2.17(1.63) – LR	6.17(2.58) LR	1.00(1.21)	23.34 (28.83) - LR	4.98(12.84)MR	10.17(18.58)LR
9	JS 95-60(c)	3.00(1.87) -S	**4.33(2.19) R**	0.67(1.08)	25.00 (29.99) -S	7.48(15.87) LR	6.38(14.58)MR
10	CAT 146 (c)	3.00 (1.87) -S	5.33(2.41)MR	1.00(1.21)	26.67 (31.05) -S	5.54(13.27) MR	9.185(17.61)LR
11	JS 25-03	2.34(1.68) - LR	7.67(2.85) S	0.83(1.15)	18.34 (25.33) - LR	**1.97(7.99) R**	**4.125(11.58)R**
12	JS 25-06	2.34(1.68) - LR	7.83(2.88) S	1.33(1.35)	23.34 (28.83) - LR	14.55(22.40)HS	8.365(16.75)LR
13	NRC 267	0.83 (1.13) - R	5.17(2.37)MR	0.67(1.06)	**6.67 (14.97) - HR**	4.00(11.48) MR	5.89(14.05)MR
14	MAUS 787	1.00 (1.22) - MR	7.50(2.82) S	1.00(1.22)	18.34 (25.33) - LR	5.33(13.18) MR	5.65(13.71)MR
15	NRC 265	1.17 (1.29) - MR	5.33(2.41)MR	1.17(1.28)	15.17 (22.90) - MR	4.17(11.70) MR	7.8(16.21)MR
16	JS 20-34 (c)	1.17(1.29) - MR	6.17(2.58) LR	1.00(1.21)	**10.10 (18.43) -R**	**1.47(6.59)HR**	5.065(12.89)MR
17	Pusa Sipani 33	2.22 (1.64) -LR	9.33(3.13)HS	0.83(1.15)	18.34 (25.33) -LR	**1.94(7.82) HR**	6.33(14.27)MR
18	KDS 1201	2.34 (1.68) - LR	8.33(2.97) HS	1.17(1.27)	14.67 (22.48) - MR	18.07(25.15)HS	13.14(21.23)S
	SEm±	0.10	0.09	NS	1.91	1.62	1.44
	CD at5%	0.29	0.29	--	5.69	4.83	4.30

Table 5.11: 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 **	Yield (Kg/ha)
1	IC 0218945	3.82(2.08)LR	34.67(36.06)MS	1126
2	IC 0421898	2.48(1.73)MR	29.16(32.67)MS	1248
3	EC 39494	**1.85(1.53)R**	18.24(25.27)LS	1475
4	IC 0501833	3.57(2.02)MR	32.45(34.71)MS	1069
5	EC 113779	3.19(1.92)MR	30.12(33.27)MS	1017
6	EC 113396	2.31(1.68)MR	27.56(31.65)MS	1324
7	IC 469833	2.36(1.69)MR	27.69(31.74)MS	1357
8	IC 0096297	3.87(2.09)LR	33.56(35.39)MS	1084
9	IC 0567505	3.56(2.02)LR	32.87(34.97)MS	1065
10	EC 103154	3.20(1.92)MR	31.05(33.85)MS	1106
11	IC 172624	3.14(1.91)MR	29.46(32.86)MS	1214
12	IC 0129008	2.94(1.86)MR	29.34(32.78)MS	1249
13	IC 129009	2.69(1.79)MR	31.27(33.99)MS	1205
14	EC 528624	3.39(1.97)LR	33.58(35.40)MS	1080
15	IC 21757	2.08(1.61)MR	24.52(29.67)LS	1289
16	IC 02128917	2.19(1.64)MR	26.64(31.06)MS	1275
17	IC 0501788	2.78(1.81)MR	29.85(33.10)MS	1167
18	IC 0263334	Not germinated		
19	IC 0501673	2.64(1.77)MR	31.67(34.23)MS	1217
20	IC 0501931	3.62(2.03)LR	33.59(35.41)MS	1068
21	IC 0341347	3.26(1.94)LR	27.05(31.33)MS	1030
22	IC 0574366	3.89(2.10)S	38.19(38.15)MS	916
23	IC 0024996	2.95(1.86)MR	30.22(33.33)MS	1251
24	IC 0118437	3.65(2.04)LR	35.37(36.48)MS	1108
25	IC 0281647	2.50(1.73)MR	26.48(30.96)MS	1309
26	EC 0251843	3.78(2.07)LR	34.68(36.06)MS	1103
27	EC 37656	Not germinated		
28	IC 16832	4.51(2.24)S	42.87(40.88)MS	875
29	EC 0057039	3.16(1.91)MR	31.54(34.15)MS	1149
30	IC 0262123	3.73(2.06)LR	36.67(37.25)MS	1087
31	EC 39512	**1.82(1.52)R**	18.91(25.77)LS	1438

32	EC 251396	3.59(2.02)LR	34.55(35.99)MS	1067
33	EC 0241870	3.09(1.90)MR	31.87(34.36)MS	1110
34	IC 0548636	2.53(1.74)MR	27.41(31.56)MS	1269
35	EC 0287458	3.51(2.00)LR	37.64(37.83)MS	1042
36	IC 13053	2.65(1.78)MR	25.67(30.43)LS	1304
37	IC 0128934	3.05(1.88)LR	31.25(33.97)MS	1137
38	IC 0032730	2.71(1.79)MR	29.68(33.00)MS	1268
39	EC 39570	3.53(2.01)LR	36.64(37.24)MS	1086
40	EC 39730	Not germinated		
41	IC 49857	2.28(1.67)MR	26.48(30.96)MS	1324
42	EC 0291396	**1.89(1.55)R**	17.57(24.77)LS	1536
43	EC 81822	4.93(2.33)S	45.26(42.26)MS	824
44	IC 243779	5.06(2.36)HS	53.63(47.06)S	756
45	EC 24154	**1.74(1.50)R**	16.42(23.90)LS	1578
46	IC 0501852	2.54(1.74)MR	27.51(31.62)MS	1271
47	IC 0117395	2.27(1.67)MR	26.94(31.26)MS	1312
48	EC 93718	2.65(1.78)MR	28.56(32.29)MS	1279
49	IC 207	2.18(1.64)MR	27.34(31.51)MS	1264
50	EC 0232051	3.95(2.11)S	39.15(38.72)MS	889
51	JS 335 (C)	3.18(1.92)MR	33.58(35.40)MS	1208
S.Em±		0.15	1.25	
CD @ 5%		0.45	3.75	

Table 5.12: ENT. 5b. Screening of germplasm line at hot spots for resistance against major insect-pests (Central region)

		Parbhani			Ludhiana	Indore			Kota	
S. No.	**ACC. No.**	**Stem tunneling (%)**	**No. of semilooper / MRL**	**No. of *S. litura* larvae/MRL**	**Mean whitefly adults /trifoliate leaf**	**Stem fly (% stem tunneling)**	**Girdle beetle (% Infestation)**	**Defoliation (per cent)**	**Defoliators (Larvae/mrl)**	**Girdle Beetle (% Infestation)**
1.	IC 0218945	21.64(27.65)	1.50(1.40)	0.50(0.96)	1.00	31.79(34.32)LR	2.57(9.22)MR	8.34(16.78)LR	**1.17 (1.29)*R**	14.83(22.62)**MR
2.	IC 0421898	26.11(30.41)	2.50(1.72)	0.00(0.70)	1.16	45.45(42.39)HS	5.00(12.92) MR	5.00(12.92)MR	1.34(1.35)MR	**13.34 (21.27) - R**
3.	EC 39494	19.71(26.34)	4.00(2.10)	0.00(0.70)	**0.33**	57.79(49.48)HS	32.15(34.54)HS	10.00(18.43)LR	2.00 (1.58)LR	18.34 (25.33) -MR
4.	IC 0501833	22.58(28.36)	1.50(1.40)	0.00(0.70)	0.83	Very poor	germination	3.33(10.51)MR	NG	NG
5.	EC 113779	22.39(27.95)	2.00(1.54)	0.00(0.70)	1.33	37.95(38.03)	2.78(9.60) MR	10.00(18.43)LR	2.50 (1.73)LR	21.67 (27.72) – LR
6.	EC 113396	27.22(30.56)	3.00(1.85)	0.00(0.70)	3.17	54.18(47.39)HS	2.94(9.87) MR	4.17(11.78)MR	1.84(1.53)MR	23.34 (28.83) – LR
7.	IC 469833	17.93(24.34)	3.50(1.99)	0.00(0.70)	1.00	58.74(50.03)HS	1.10(6.02) MR	3.34(10.52)MR	2.33 (1.68)LR	20.00 (26.57) – LR
8.	IC 0096297	20.18(26.63)	5.50(2.43)	0.00(0.70)	1.00	34.91(36.21)LR	10.27(18.69)) LR	9.17(17.62) LR	2.34 (1.68)LR	25.00 (29.99) – LR
9.	IC 0567505	16.69(24.08)	2.50(1.72)	0.50(0.96)	1.83	20.22(26.72)LR	6.67(14.96) MR	15.84(23.45)S	2.17 (1.63)LR	21.67 (27.72) – LR
10.	EC 103154	9.18(17.61)	5.00(2.30)	1.00(1.14)	1.83	33.08(35.11)LR	1.50(7.03) MR	8.33(16.78) LR	3.00 (1.87) -S	26.67 (30.91) – LR
11.	IC 172624	13.34(21.11)	5.50(2.44)	0.50(0.96)	0.50	28.30(32.14)LR	7.90(16.32)) LR	4.17(11.78)MR	1.84(1.53)MR	23.33 (28.88) – LR
12.	IC 0129008	11.71(19.99)	4.00(2.12)	0.50(0.96)	1.67	38.36(38.27) S	46.97(43.26) HS	7.50(15.89)MR	2.00 (1.58)LR	23.34 (28.83) – LR
13.	IC 129009	23.11(28.54)	6.50(2.64)	1.00(1.14)	0.16	31.43(34.10)LR	19.17(25.96)) LR	5.00(12.92)MR	1.50(1.41)MR	15.00 (22.76) –MR
14.	EC 528624	13.88(21.65)	5.50(2.44)	0.50(0.96)	2.16	22.83(28.54)LR	1.14(6.13) MR	6.67(14.97)MR	0	0
15.	IC 21757	16.35(23.70)	4.50(2.23)	1.00(1.14)	2.16	15.03(22.81)MR	2.86(9.73) MR	11.67(19.98)LR	1.34(1.35)MR	18.34 (25.33) MR
16.	IC 02128917	21.14(27.12)	5.00(2.33)	0.50(0.96)	No germination	61.80(51.83) HS	1.00(5.74) MR	16.67(24.10) S	2.17 (1.63)LR	18.34 (25.33) –MR
17.	IC 0501788	8.43(16.74)	3.50(1.99)	0.50(0.96)	No germination	56.94(48.99) HS	1.08(5.97) MR	NG	NG	NG
18.	IC 0263334	NG	NG	NG	0.67	Very poor germination			2.33 (1.68)LR	26.67 (30.91) – LR
19.	IC 0501673	15.59(22.87)	5.00(2.33)	0.50(0.96)	1.50	18.76(25.67)MR	25.10(30.06) S	9.17(17.63) LR	**0.67(1.07)HR**	**8.34 - (16.70) –HR**
20.	IC 0501931	10.83(19.04)	5.00(2.33)	0.00(0.70)	1.33	35.63(36.65) LR	9.67(18.11)) LR	9.17(17.63) LR	1.84(1.53)MR	23.34 (28.83) – LR
21.	IC 0341347	15.69(23.32)	6.00(2.54)	1.00(1.22)	0.83	38.85(38.56) S	4.17(11.78) MR	5.84(13.98)MR	2.00 (1.58)LR	20.00 (26.49) - LR
22.	IC 0574366	21.69(27.74)	5.50(2.44)	0.50(0.96)	0.33	36.45(37.14) LR	1.43(6.87) MR	7.50(15.89)MR	2.34 (1.68)LR	23.33 (28.88) - LR
23.	IC 0024996	NG	NG	NG	0.83		Very poor germination		NG	NG
24.	IC 0118437	19.86(26.44)	1.50(1.40)	0.00(0.70)	No germination	63.31(52.72) HS	25.00(30.00) S	8.33(16.78) LR	3.17 (1.91)HS	28.34 (32.15) - S
25.	IC 0281647	27.12(31.37)	4.00(2.10)	0.50(0.96)	0.50	40.64(39.60) S	6.25(14.48)MR	8.34(16.78) LR	2.34 (1.68)LR	26.67 (31.05) - LR
26.	EC 0251843	28.84(32.45)	4.50(2.23)	0.50(0.96)	**1.67**	58.39(49.83) HS	25.00(30.00) S	11.67(19.98)LR	2.17 (1.63)LR	21.67 (27.72) - LR
27.	EC 37656	22.17(27.98)	4.50(2.23)	1.00(1.14)	0.50		No germination	5.00(12.92) MR	2.34 (1.68)LR	25.00 (29.99) - LR

28.	IC 16832	NG	NG	NG	1.83	No germination			NG	NG
29.	EC 0057039	22.02(27.98)	4.00(2.12)	0.00(0.70)	0.16	36.38(37.10) LR	9.73(18.17)) LR	8.34(16.78) LR	1.67(1.47)MR	15.00 (22.76) MR
30.	IC 0262123	14.81(22.63)	3.50(1.99)	0.00(0.70)	1.00	48.26(44.00) HS	1.30(6.55) MR	7.50(15.89) MR	**1.00(1.22)HR**	**10.00 (18.43) HR**
31.	EC 39512	26.32(30.83)	7.00(2.71)	1.00(1.22)	1.16	33.66(35.46) S	1.62(7.30) MR	10.00(18.43)LR	2.17 (1.63)LR	18.34 (25.33) –MR
32.	EC 251396	18.10(25.16)	5.00(2.34)	0.50(0.96)	0.33	38.57(38.39) S	21.03(27.29) S	11.67(19.97)LR	1.84(1.53)MR	21.67 (27.72) – LR
33.	EC 0241870	32.96(35.03)	4.50(2.23)	0.00(0.70)	0.67	33.65(35.45) LR	2.18(8.48) MR	13.34(21.42)LR	1.84(1.53)MR	25.00 (29.99) – LR
34.	IC 0548636	34.95(36.23)	7.00(2.73)	0.50(0.96)	1.00	57.70(49.43) HS	1.45(6.92) MR	**1.67(7.43) R**	2.17 (1.63)LR	21.84 (27.84) – LR
35.	EC 0287458	34.32(35.79)	3.00(1.85)	0.00(0.70)	No germination	60.06(50.80) HS	1.32(6.60) MR	5.00(12.92) MR	1.84(1.53)MR	23.33 (28.88) – LR
36.	IC 13053	28.18(32.05)	2.50(1.72)	0.50(0.96)	1.16	36.04(36.89) LR	2.22(8.57) MR	4.17(11.78) MR	2.67 (1.78)LR	18.34 (25.33) MR
37.	IC 0128934	24.72(29.89)	6.00(2.51)	0.50(0.96)	0.67	40.29(39.40) S	12.91(21.05)) LR	6.67(14.97) MR	2.67 (1.78)LR	16.67 (23.99) –MR
38.	IC 0032730	16.84(24.09)	4.00(2.10)	0.00(0.70)	0.33	49.31(44.60) HS	5.25(13.24) MR	8.34(16.78) LR	3.00 (1.87) S	21.67 (27.72) – LR
39.	EC 39570	15.12(22.79)	6.00(2.54)	0.00(0.70)	1.33	46.94(43.25) HS	2.50(9.10) MR	7.50(15.89) MR	2.33 (1.68)LR	23.33 (28.88) – LR
40.	EC 39730	NG	NG	NG	No germination	No germination			NG	NG
41.	IC 49857	38.49(38.23)	2.50(1.72)	0.00(0.70)	0.67	76.06(60.71) HS	1.24(6.39) MR	6.67(14.97) MR	1.84(1.53)MR	25.00 (29.99) – LR
42.	EC 0291396	24.01(29.24)	6.00(2.51)	0.00(0.70)	1.16	50.54(45.31) HS	1.53(7.11) MR	5.00(12.92) MR	2.17 (1.63)LR	16.67 (24.10) MR
43.	EC 81822	23.93(29.08)	5.50(2.44)	0.00(0.70)	0.50	33.70(35.48) LR	5.72(13.83) MR	6.67(14.97) MR	2.50(1.73) LR	15.00 (22.76) –MR
44.	IC 243779	37.73(37.88)	6.50(2.63)	0.00(0.70)	0.67	33.65(35.46) LR	21.52(27.64) S	9.17(17.62) LR	0.84(1.15)HR	**11.67 (19.92) – R**
45.	EC 24154	18.56(25.51)	6.00(2.54)	0.50(0.96)	2.00	22.87(28.57) LR	3.01(9.98) MR	13.34(21.42)LR	1.67(1.47)MR	15.00 (22.76) –MR
46.	IC 0501852	21.64(27.72)	4.00(2.12)	0.00(0.70)	1.16	45.22(42.26) HS	17.43(24.67)) LR	14.17(22.11)LR	1.34(1.35)MR	**13.33 (21.41) – R**
47.	IC 0117395	9.85(17.47)	4.00(2.10)	1.00(1.22)	0.16	46.09(42.76) HS	12.69(20.87)) LR	11.67(19.97)LR	1.50(1.40)MR	18.34 (25.33) MR
48.	EC 93718	25.70(29.80)	3.50(1.99)	1.00(1.14)	2.16	31.26(33.99) LR	26.43(30.94)S	5.84(13.98) MR	2.17 (1.63)LR	25.00 (29.89) - LR
49.	IC 207	8.81(16.95)	5.00(2.34)	0.00(0.70)	0.83	27.92(31.89) LR	9.09(17.55)) LR	5.83(13.97) MR	2.00 (1.58)LR	25.00 (29.99) - LR
50.	EC 0232051	24.77(29.51)	4.50(2.23)	0.50(0.96)	0.67	33.96(35.64) LR	12.50(20.70)) LR	10.00(18.43)LR	1.67(1.47)MR	18.34 (25.33) MR
CD at 5%		9.12	0.52	--		(12.04)	(12.04)	(6.73)	0.25	4.94
SEm±		3.29	0.18	NS		(5.97)	(5.97)	(3.34)	0.09	1.73

Table 5.13: 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	IC 0218945	3.00	1.20	27.14 MS	30.00	0.220
2	IC 0421898	1.20	2.20	26.36 MS	26.67	0.255
3	EC 39494	1.20	1.40	22.73 LS	6.67	0.190
4	IC 0501833	Did not germinate				
5	EC 113779	2.40	1.60	24.74 LS	8.67	0.180
6	EC 113396	0.80	1.00	21.11 LS	3.33	0.310
7	IC 469833	0.00	1.20	20.00 LS	6.67	0.300
8	IC 0096297	0.40	0.60	20.91 LS	6.00	0.290
9	IC 0567505	2.40	2.60	25.00 MS	13.33	0.250
10	EC 103154	Did not germinate				
11	IC 172624	1.20	0.60	20.40 LS	5.00	0.245
12	IC 0129008	6.00	1.40	24.29 LS	10.00	0.195
13	IC 129009	4.40	2.20	25.38 MS	33.33	0.190
14	EC 528624	Did not germinate				
15	IC 21757	2.40	1.20	18.89 LS	16.67	0.245
16	IC 02128917	Did not germinate				

17	IC 0501788	Did not germinate				
18	IC 0263334	Did not germinate				
19	IC 0501673	4.00	2.20	23.85 LS	33.33	0.150
20	IC 0501931	6.00	2.20	23.33 LS	16.67	0.170
21	IC 0341347	2.40	1.40	25.00 MS	8.67	0.180
22	IC 0574366	0.80	1.00	16.67 LS	4.00	0.340
23	IC 0024996	Did not germinate				
24	IC 0118437	3.40	1.40	21.43 LS	3.67	0.180
25	IC 0281647	6.40	2.20	27.14 MS	6.67	0.150
26	EC 0251843	1.00	1.60	18.89 LS	2.00	0.285
27	EC 37656	Did not germinate				
28	IC 16832	10.00	2.20	25.38 MS	16.67	0.220
29	EC 0057039	4.00	2.00	23.33 LS	10.00	0.255
30	IC 0262123	2.40	1.60	21.67 LS	7.33	0.210
31	EC 39512	Did not germinate				
32	EC 251396	3.60	2.40	22.73 LS	4.67	0.180
33	EC 0241870	1.20	1.40	20.00 LS	5.33	0.170
34	IC 0548636	4.80	1.60	24.00 LS	3.67	0.195
35	EC 0287458	Did not germinate				

36	IC 13053	6.40	2.60	20.53 LS	23.33	0.205
37	IC 0128934	4.00	1.80	20.00 LS	16.67	0.200
38	IC 0032730	5.20	2.40	21.85 LS	6.67	0.250
39	EC 39570	1.60	2.20	22.38 LS	9.33	0.240
40	EC 39730	Did not germinate				
41	IC 49857	Did not germinate				
42	EC 0291396	3.40	2.00	24.00 LS	6.67	0.190
43	EC 81822	2.80	2.60	22.00 LS	4.00	0.260
44	IC 243779	1.60	0.80	18.89 LS	1.33	0.275
45	EC 24154	3.20	1.80	24.00 LS	7.33	0.230
46	IC 0501852	Did not germinate				
47	IC 0117395	Did not germinate				
48	EC 93718	3.60	2.40	23.91 LS	13.33	0.190
49	IC 207	3.60	1.40	20.00 LS	8.00	0.170
50	EC 0232051	5.20	1.20	25.00 MS	8.67	0.125
51	**JS 335** (Mean of 10 lines)	7.20	2.80	26.19 MS	18.67	0.200

Table 5.14: ENT. 5d. Multilocation evaluation of fifty resistant lines against major insect pests of soybean (Parbhani)

Multilocation evaluation of resistant lines to *Spodoptera litura* (Antixenosis and field)											
Centre: AICRP on Soybean, VNMKV, Parbhani (M.S.)											
S.N.	**Accession**	**Days to 50% flowering**		**Days to maturity**		**Plant height**		**Test weight**		**Grain yield / plant (gm)**	
		R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
1	IC 0218945	48	49	103	104	62.67	68.60	6.17	7.09	6.40	5.97
2	IC 0421898	46	47	102	101	48.20	50.60	8.43	9.50	7.30	7.50
3	EC 39494	47	46	102	103	59.80	62.60	8.77	8.56	7.90	6.68
4	IC 05801833	39	40	102	102	40.60	40.00	7.24	8.35	8.60	8.10
5	EC 113779	43	44	104	102	62.00	60.80	8.92	7.47	5.46	4.41
6	EC 113396	45	44	102	102	43.75	41.40	6.42	6.44	5.56	5.10
7	IC 469833	46	4	104	103	113.40	109.33	4.18	3.95	3.18	3.40
8	IC 0096297	45	44	105	103	81.60	80.80	8.14	7.01	5.04	4.95
9	IC 0567505	46	45	103	104	90.00	102.60	8.88	8.50	5.79	5.15
10	EC 103154	47	46	100	101	81.00	73.00	10.95	9.14	4.49	3.97
11	IC 172624	50	49	105	104	70.80	70.80	9.26	8.25	5.75	5.20
12	IC 0129008	43	42	106	102	87.00	83.00	8.62	8.22	5.62	4.37
13	IC 129009	45	46	105	104	68.00	69.20	9.03	8.23	5.29	4.87
14	EC 528624	40	41	102	103	50.00	49.00	13.35	11.83	5.82	4.65
15	IC 21757	39	40	98	99	79.60	80.00	6.43	7.02	3.48	3.30
16	IC 02128917	42	43	106	104	29.00	32.40	12.66	11.76	5.01	4.83
17	IC 0501788	43	42	106	105	70.67	70.20	8.98	10.43	6.29	4.53
18	IC 0263334	NG									
19	IC 0501673	42	43	106	105	80.00	79.80	5.87	6.30	7.56	5.93
20	IC 0501931	44	43	101	102	88.50	89.50	8.74	7.57	5.13	5.62

S.N.	Accession	Days to 50% flowering		Days to maturity		Plant height		Test weight		Grain yield / plant (gm)	
		R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
21	IC 0341347	39	40	100	101	63.60	63.00	9.29	10.03	5.93	7.01
22	IC 0574366	43	42	98	99	59.80	58.60	7.33	8.29	3.39	5.23
23	IC 0024996	NG									
24	IC 0118437	43	44	101	102	71.50	56.80	8.40	7.07	6.22	4.29
25	IC 0281647	45	44	102	103	88.20	86.00	7.02	7.42	5.95	5.57
26	EC 0251843	44	45	103	104	58.60	58.20	5.86	6.46	3.14	2.10
27	EC 37656	41	42	104	103	72.80	65.00	5.75	5.30	3.19	2.01
28	IC 16832	NG									
29	EC 0057039	42	43	106	105	90.00	88.60	5.66	6.53	3.96	3.38
30	IC 0262123	44	45	104	105	51.80	53.40	8.84	10.22	4.76	6.81
31	EC 39512	44	45	101	100	59.60	58.80	5.92	7.03	3.63	3.82
32	EC 251396	43	44	100	101	84.00	86.80	5.46	6.33	3.30	3.12
33	EC 0241870	40	42	99	98	40.20	42.20	6.62	5.84	3.71	3.84
34	IC 0548636	39	40	100	101	86.40	86.20	3.88	4.79	1.58	1.51
35	EC 0287458	40	41	101	102	46.00	51.80	8.61	7.85	4.57	4.84
36	IC 13053	42	43	102	103	62.67	60.60	7.35	8.27	4.27	3.58
37	IC 0128934	40	41	101	102	79.80	82.20	6.63	6.76	2.76	3.52
38	IC 0032730	39	40	100	101	99.80	98.40	6.09	7.12	3.43	3.89
39	EC 39570	43	42	99	101	62.60	62.80	7.72	7.76	7.70	6.92
40	EC 39730	NG									

S.N.	Accession	Days to 50% flowering		Days to maturity		Plant height		Test weight		Grain yield / plant (gm)	
		R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
41	IC 49857	45	46	104	105	60.20	57.40	7.25	8.20	4.05	3.85
42	EC 0291396	42	44	105	106	59.60	60.80	6.66	7.95	3.32	3.11
43	EC 81822	38	40	101	100	94.40	88.80	6.64	5.86	4.26	4.01
44	IC 243779	39	38	100	101	69.00	70.40	7.06	6.54	3.17	3.01
45	EC 24154	42	41	101	102	101.00	103.40	6.49	7.43	3.85	4.13
46	IC 0501852	43	42	99	100	60.80	62.60	8.99	7.92	3.45	2.99
47	IC 0117395	40	39	98	101	73.00	73.20	7.93	8.21	5.44	4.80
48	EC 93718	41	42	101	102	78.60	78.60	8.98	9.36	6.36	7.70
49	IC 207	40	41	100	101	147.80	142.00	3.80	4.25	2.21	2.53
50	EC 0232051	42	43	101	102	70.20	65.80	7.71	8.13	3.36	3.51

Table 5.15: ENT 6a: Management of major defoliators of soybean through intercropping with suva, *Anethum graveolens*

Treatments and Treatment Details		Indore		Dharwad			Prabhani	
		Semi-loopers	*S. litura*	Semi-loopers	*S. litura*	*Spilarctia obliqua*	Semi-loopers	*S. litura*
T1	Soybean (18 R)	8.25(2.96)	1.00(1.22)	13.58(3.75)	6.03(2.56)	18.96(4.41)	7.42(2.80)	2.25(1.65)
T2	Soybean + Suva (15:1)	5.70(2.55)	0.42(0.96)	9.96(3.23)	4.59(2.26)	17.75(4.27)	5.83(2.51)	1.83(1.52)
T3	Soybean + Suva (18:1)	7.08(2.75)	0.42(0.96)	8.75(3.04)	4.52(2.24)	16.98(4.18)	7.08(2.74)	1.92(1.54)
T4	Soybean + Suva (15:2)	5.50(2.45)	0.75(1.12)	4.16(2.16)	2.17(1.63)	12.54(3.61)	4.50(2.23)	1.33(1.34)
T5	Soybean + Suva (18:2)	7.00(2.74)	0.25(0.87)	4.24(2.18)	2.24(1.66)	12.67(3.63)	5.08(2.36)	1.67(1.46)
S.E. ±		(0.13)	(0.20)	0.25	0.31	0.26	0.09	NS
C.D. at 5%		(0.29)	(0.43)	0.75	0.94	0.79	0.27	--

Table 5.16: ENT 6b – Number of eggs laid on suva and soybean and percent larvae found (species-wise) (Dharwad)

Tr. No.	Treatment details	No. of eggs laid by						Per cent larvae					
		Spodoptera litura		*Thysanoplusia orichalcea*		*Spilarctia obliqua*		*Spodoptera litura*		*Thysanoplusia orichalcea*		*Spilarctia obliqua*	
		Soybean	Suva	Soybean	Suva	Soybean	Suva	Soybean	Suva	Soybean	Suva	Soybean	Suva
T_1	Sole soybean (18 rows)	6.57 (2.66)	--	12.38 (3.59)	--	19.23 (4.44)	--	80%	-	55%	-	45%	-
T_2	Soybean + Suva (15 soybean:1suva rows combination)	4.38 (2.21)	2.59 (1.76)	9.38 (3.14)	3.59 (2.02)	15.47 (4.00)	4.56 (2.25)	40%	20%	40%	30%	35%	15%
T_3	Soybean + Suva (18 soybean: 1 suva rows combination)	4.57 (2.25)	2.38 (1.70)	8.94 (3.07)	3.74 (2.06)	16.21 (4.09)	4.24 (2.18)	45%	15%	50%	25%	30%	15%
T_4	Soybean + Suva (15soybean: 2 suva rows combination)	3.15 (1.91)	4.63 (2.26)	7.37 (2.81)	11.57 (3.47)	11.38 (3.45)	8.77 (3.04)	25%	45%	30%	50%	25%	35%
T_5	Soybean + Suva (18soybean: 2 suva rows combination)	3.42 (1.98)	4.52 (2.24)	7.64 (2.85)	10.69 (3.35)	11.75 (3.50)	7.86 (2.89)	30%	40%	35%	45%	30%	30%

सूक्ष्मजीव विज्ञान
Microbiology

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9. MICROBIOLOGY

MB 1/16: Isolation and functional characterization of selected rhizobia/rhizobacteria for developing inoculants to mitigate abiotic stress in soybean

The aim of this trial is to isolate and identify rhizobacteria that can help soybeans to mitigate abiotic stress. 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 investigation. The rhizobia were isolated on YEMA medium with congo-red and white/creamy colonies selected based on generation time.

At Jorhat centre, colonies of gram-negative rod-shaped, motile *Bradyrhizobium japonicum* were isolated from soybean root nodules which later showed enhanced seed germination and growth in the pot study. Biochemically, the bacterium showed positive for citrate utilization **(Table 1.1 to 1.2).**

At the Dharwad centre, twenty-one rhizobial isolates (UAS-DBR 1 to 21) were isolated. All the colonies showed morphologically gram-negative, rod-shaped with smooth, raised, circular, milky white, semi-translucent and mucilaginous colonies on the YEMA medium. Similarly, biochemically the isolates showed IAA production activity, ketolactose negative, and were alkali producer. Additionally, a few isolates showed phosphorus solubilization and siderophore production activity **(Table 1.3).**

At Raipur, four putative rhizobial isolates were recovered from the AVT II entries, and all the isolates showed positive for phosphorus solubilization **(Table 1.4).** At Pantnagar center, out of 21 bacteria isolated, 12 were found to be gram-negative and these are being further characterized for biochemically.

MB 2/21: Response of N-fixing rhizobia and P solubilizing bacteria with 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 at reduced doses of recommended N and P chemical fertilizers and with microbial inoculants. Reducing the doses of nitrogen and phosphorus by 25% i.e., 75 % of recommended fertilizers combined with the microbial inoculants was followed in the trials. In total there were nine combinations of treatments with recommended and reduced 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 aryabhattai*). These two bacteria are known to have 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 and fresh and dry biomass were recorded at the R5 stage. Soybean yield was taken at physiological maturity **(Table 1.5 to 1.11).**

At ICAR-IISR Indore centre, shoot fresh and dry biomass, root fresh weight dry nodule biomass, and leghaemoglobin content were not significantly influenced by microbial inoculation or reducing the dose of fertilizer. However, the root dry biomass significantly increased upon microbial inoculated treatments compared to uninoculated treatments. Similarly, the total chlorophyll content and soybean yield of *Bradyrhizobium daqingense* (T5) or co-inoculated with *Bradyrhizobium daqingense* and *Bacillus aryabhattai* (T8) inoculated plant grown at reduced fertilizer had a statistically similar yield to the recommended dose of fertilizer **(Table 1.5).**

At the Sehore centre, results showed that microbial inoculated plants grown at reduced doses showed significantly higher nodules per plant and nodule dry weight. However, the highest dry weight was recorded with a local rhizobial inoculated plant (T6). Similarly, leghaemoglobin content was significantly higher when plants were grown in co-inoculated nitrogen-fixing and phosphorus-solubilizing bacteria (T8 and T9). Grain yield and benefit: cost ratio was significantly higher in treatment with either native or Indore nitrogen-fixing with phosphorus solubilizing bacteria (T8 and T9) **(Table 1.6).**

At the Dharwad centre, the microbial inoculated plants generally had significantly higher nodulation, chlorophyll, soil dehydrogenase activity and yield than their uninoculated counterparts. The nodule parameters *viz.,* nodule number, nodule dry weight and leghaemoglobin content were significantly higher in the soybean plants that received 75 % of recommended N & P and 100 % of recommended K+ *B. daqingense* + *Bacillus aryabhattai* (T8) than the uninoculated recommended dose of fertilizer (T1) by 34.81 %, 27.4 % and 134.3 %, respectively. Additionally, it enhanced the relative chlorophyll content and seed yield by 8.73 % and 21.70 %, respectively, compared to treatment with the recommended dose of fertilizer (T1) **(Table 1.7).**

At the Pantnagar Center, nodule dry weight and leghaemoglobin content were significantly higher in the *Bradyrhizobium daqingense* (T5 or T8) rhizobia or pant 2 (T9) rhizobia inoculated treatments than uninoculated treatments (T1-T4). However, the effect of microbial inoculation (T7-T9) on plant dry weight, total chlorophyll and yield were non-significant ($p < 0.05$). It showed that microbial inoculation amendment could reduce the doses of chemical fertilizer by 25 %, thereby giving a comparable yield with recommended doses of fertilizer (T1) **(Table 1.8).**

At IARI, New Delhi, nodulation parameters viz. nodule number, dry nodule weight, leghaemoglobin content, total chlorophyll and yield were significantly higher in microbial inoculation with either only *B. daqingense* (T5) or in combination with *B. daqingense* and *Bacillus aryabhattai* (T8) or *B. aryabhattai* with local rhizobia (T9). It showed that microbial inoculation significantly enhanced the nodulation and yield parameters **(Table 1.9).**

At the Raipur centre, results showed that microbial inoculation either singly *B. daqingense* (T5) or local rhizobia (T6) or in combination with *Bacillus aryabhattai* (T8) had significantly higher nodulation traits viz number, weight, and leghaemoglobin content than their uninoculated counterparts grown in reduced fertilizer doses. Similarly, inoculation of *Bradyrhizobium daqingense* (T5) or local rhizobia (T6) inoculated treatment had statically similar chlorophyll content to the recommended doses of fertilizer treatment (T1). Similarly, grain yield showed that microbial inoculated plants grown at reduced doses of fertilizer had statically similar grain yield compared to recommended doses of fertilizer treatment (T1). Additionally, the benefit-cost ratio of microbial inoculated treatment with reduced fertilizer doses had a statistically similar ratio to the recommended dose of fertilizer (T1). Moreover, the microbial inoculation enhanced the saving of NPK inputs by >20 % across treatments. Therefore, an additional yield of > 4 quintals was obtained in microbial inoculated treatments with reduced fertilizer doses **(Table 1.11).**

At the Ludhiana Centre, microbial inoculation at reduced doses of fertilizer showed significantly higher nodule dry weight and leghaemoglobin content. However, nodule number and grain yield showed non-significant differences among treatments. However, a higher benefit, cost ratio and net return were found in nitrogen-fixing and phosphorus-solubilizing bacterial co-inoculated plants grown with reduced fertilizers (T8 and T9) **(Table 1.10).**

MB 3/23: Evaluation of promising consortia for conferring drought tolerance in soybean under pot conditions

At Indore centre, the shoot dry weight, root dry weight, leghaemoglobin content, and leaf chlorophyll content were significantly higher in plants inoculated with the ICAR-IISR, ICAR-DGR, and ICAR-CRIDA microbial consortia under both normal and stressed conditions. The nodule dry weight was significantly higher in the ICAR-IISR and ICAR-DGR consortium inoculated plants under normal and drought-stressed conditions **(Table 1.12 to 1.13).**

At the Sehore centre, nodule dry weight and leghaemoglobin content in the nodules of inoculated plants under stress and normal conditions did not influence by the microbial inoculations over the control. However, plants inoculated with IISR and DGR microbial consortia showed comparatively higher relative water content, plant growth and plant nutrient (P and N uptake in shoots) parameters than other two (CRIDA and NBAIM consortia) bioformulations. There was significantly highest RWC was observed in plants inoculated with ICAR-IISR, Indore and ICAR-DGR endophytes over the other inoculations including control. Among the consortia, the ICAR-IISR Indore consortium inoculated plant had significantly higher biomass than other consortia **(Table 1.14 to 1.16).**

At Dharwad centre, the highest relative chlorophyll content, relative water content, nodule number, nodule dry weight, shoot dry weight and root dry weight were recorded in the treatment received by Indore microbial consortia. Interaction studies showed that seed treatment with Indore microbial consortia influenced the relative chlorophyll content, nodule number, nodule dry weight and root dry weight. In contrast, inoculation of archaea formulation influenced the relative water content and shoots dry weight **(Table 1.17 to 1.20).**

At Pantnagar, nodule number and nodule dry weight were significantly enhanced upon inoculating microbial consortia compared to uninoculated plants. Further, the interaction between moisture stress and consortia was also significant. Similarly, irrespective of microbial consortia the influence of microbial consortia on relative water content, dry shoot biomass, chlorophyll a, and total chlorophyll in the leaf was non-significant. However, plant growth and stress parameter has significantly enhanced upon consortia amendments. Overall, across all the microbial consortia, soybean plants inoculated with ICAR-CRIDA followed by IISR consortia showed comparatively higher response than DGR and NBAIM formulations **(Table 1.21 to 1.24).**

At IARI New Delhi, nodule dry weight, root dry weight and shoot dry weight were found to be non-significant upon inoculation with the microbial consortium. However, leghaemoglobin content was significantly higher in ICAR-IISR, Indore and ICAR-DGR endophyte formulation inoculated plants **(Table 1.25).**

At the Ludhiana Center, ICAR-IISR Indore microbial consortia performed best for most of the parameters studied, with the highest values for nodule dry weight, chlorophyll content, and plant biomass under non-stressed conditions. However, the effect of microbial consortium under drought stress was found to be non-significant **(Table 1.26).**

At the Raipur centre, nodule dry weight, leghaemoglobin content, relative water content, and chlorophyll content were significantly higher in plants inoculated with ICAR-CRIDA drought tolerant microbial consortium. Similarly, plant biomass, nitrogen, and phosphorus uptake in root and shoot were significantly highest in the CRIDA- microbial consortium inoculation, followed by NBAIM-archeal inoculations **(Table 1.27 to 1.29).**

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

At the Sehore Centre, the AVT-II entries JS 23-09 and JS 23-03 were statistically similar to all the check varieties except NRC 142 and NRC 152 showed lower values than test entries. Similarly, leghaemoglobin content was significantly higher in the JS 23-09 compared to all the check varieties used. It showed that lines JS 23-03 followed by JS 23-09 found to be promising in terms of having higher nodulating abilities. At the Indore centre, comparatively JS 23-03 found to better than JS 23-09. However both the entries are at par with checks in terms of nodulation parameters **(Table 1.30).**

At the Raipur centre, when compared to checks AVT II entry RSC 11-42 did not perform well in terms of nodulation. However, found to be better when compared to check AMS 2014-1 **(Table 1.30).**

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Tables and Figures:

MB 1/23: Isolation and functional characterization of selected rhizobia for N-fixing abilities in soybean

Table 1.1: *Bradyrhizobium japonicum* isolates characteristics (AAU, Jorhat)

Strain characteristics	Rhizobial strain
Shape	Circular
Size	2-2.5 mm
Colour	White
Opacity	Translucent
Bacterium shape	Rod-shaped
Gram staining	Gram-negative
Motility	Mobile

Table 1.2: Biochemical characterization of rhizobial isolates (Jorhat Centre)

Test	Original Colour of Medium	Positive reaction	Negative reaction
Clirate utilization	Green	Blue	
Lysis utilization	Olive green to light purple		Dark yellow
Orinithine utilization	Olive green to light purple		Orange
Urease	Orangish yellow		Orangish yellow
Phenylalanine Deamination	**c**olourless		Colourless
Nitrate reduction	**c**olourless		Colourless
H_2S production	Orangish yellow		Orange yellow
Glucose	Pinkish Red/Red		Orange yellow
Adonitol	Pinkish Red/Red		Red/ Pink
Lactose	Pinkish Red/Red		Pink
Arabinose	Pinkish Red/Red		Pink
Sorbitol	Pinkish Red/Red		Red

Table 1.3: Plant growth promoting traits characterization of the rhizobia isolated from the soybean nodules (Dharwad centre).

Sl. No.	**Native isolates**	**P - Solubilization (mm)**	**Siderophore Production (mm)**	**IAA (µg/ml)**	**Ketolactose test**	**Growth on YEMA + BTB medium (Alkali/Acid)**
1	UASDBR-1	-	-	19.20	Negative	Alkali
2	UASDBR-2	-	-	8.20	Negative	Alkali
3	UASDBR-3	12	-	16.80	Negative	Alkali
4	UASDBR-4	10	-	17.70	Negative	Alkali
5	UASDBR-5	13	-	12.00	Negative	Alkali
6	UASDBR-6	13	-	10.20	Negative	Alkali
7	UASDBR-7	11	-	13.40	Negative	Alkali
8	UASDBR-8	10	-	12.50	Negative	Alkali
9	UASDBR-9	8	-	8.50	Negative	Alkali
10	**UASDBR-10**	**10**	**-**	**43.50**	**Negative**	**Alkali**
11	UASDBR-11	15	-	13.70	Negative	Alkali
12	UASDBR-12	10	-	11.50	Negative	Alkali
13	UASDBR-13	-	-	45.80	Negative	Alkali
14	**UASDBR-14**	**17**	**20**	**9.50**	Negative	Alkali
15	UASDBR-15	-	-	15.30	Negative	Alkali
16	**UASDBR-16**	**-**	**-**	**48.20**	**Negative**	**Alkali**
17	**UASDBR-17**	**20**	**22**	**20.50**	Negative	Alkali
18	UASDBR--18	-	-	29.00	Negative	Alkali
19	UASDBR-19	-	-	16.50	Negative	Alkali
20	UASDBR-20	-	-	21.50	Negative	Alkali
21	UASDBR-21	-	-	19.20	Negative	Alkali
	S. Em. ±			**0.47**		
	C.D. (p=0.01)			**1.34**		

Table 1.4: Putative soybean rhizobia isolates (from nodules of AVT-II entries (Raipur centre)

Biochemical Tests	**SNM23-66**	**SNM23-67**	**SNM23-68**	**SNM23-70**
Glucose peptone agar	Poor growth	Poor growth	Poor growth	Poor growth
Acid alkaline production	Acid	Acid	Acid	Acid
Keto lactose agar	Negative/absence of yellow zone	Negative	Negative	Negative
Phosphate Solubilization	Positive	Positive	Positive	Positive

MB 2/21:
Response of N-fixing rhizobia and P solubilizing bacteria with RDF/farmers practice and with reduction of fertilization on latest release variety of soybean of a zone

Table 1.5: Field response of N-fixing rhizobia and P-solubilizing bacteria with RDF/farmer practice and with reduction of fertilization on soybean (JS 20-69) on growth (A), nodulation and yield parameters (B) (Indore center)

A. Growth parameters					
Treatments	Shoot fresh weight (g/plant)	Shoot dry weight (g/plant)	Root fresh weight (g/plant)	Root dry weight (g/plant)	Chlorophyll ab (mg g^{-1} of fresh weight)
T1	31.55a	17.36a	2.89a	1.00bc	3.99bc
T2	32.67a	20.08a	2.66a	0.93bc	3.51c
T3	28.78a	17.05a	2.55a	0.91c	3.73bc
T4	31.89a	19.79a	2.95a	0.98bc	3.75bc
T5	25.55a	19.71a	3.32a	1.47ab	5.05a
T6	33.22a	16.02a	2.66a	1.08abc	4.10bc
T7	28.33a	17.52a	3.02a	1.07abc	4.19b
T8	24.67a	14.91a	3.64a	1.61a	5.28a
T9	25.22a	15.83a	2.95a	0.91c	4.24b
LSD (p = 0.05)	11.92	6.69	1.09	0.49	0.55

B. Nodulation and yield				
Treatments	Nodule number/Plant	Nodule dry weight (g/plant)	Leghaemoglobin m/g fresh nodules	Yield (q/ha)
T1	72.22ab	0.29a	7.97a	1566.66abc
T2	59.44ab	0.32a	6.51a	1483.33abc
T3	50.55b	0.27a	6.29a	1386.66bc
T4	68.55ab	0.30a	6.54a	1320c
T5	77.5a	0.44a	12.30a	1763.33ab
T6	61.11ab	0.34a	7.67a	1503.33abc
T7	68.55ab	0.31a	9.72a	1613.33abc
T8	78.55a	0.43a	12.32a	1386.66bc
T9	67.33ab	0.30a	10.79a	1636.66abc
LSD (P = 0.05)	21.08	0.15	5.35	367.87

Data are mean of 3 replications; treatment means followed by same letter did not differ significatly by ANOVA of DMRT (p= 0.05) ; LSD, least significant difference

*Where T1=RDF (100% recommended dose of NPK fertilizers in the zone; example for central zone the recommended dose of NPK is 25 Kg N/ha, 60 Kg P/ha and 40 Kg/ha K); T2=75% of recommended N and 100% of recommended P and K; T3=75% of recommended P and 100% of recommended N and K; T4=75% of recommended N&P and 100% of recommended K; T5= 75% of recommended N and 100% of recommended P and K+ *Bradyrhizobium daqingense;*T6=75% of recommended N and 100% of recommended P and K +Commercial/local rhizobial strain available in the zone/market; T7=75% of recommended P and 100% of recommended N and K+ *Bacillus aryabhataii* ;T8=75% of recommended N & P and 100% of recommended K+ *B. daqingense*+*Bacillus aryabhataii* ; T9=75% of recommended N & P and 100% of recommended K+*Bacillus aryabhataii* RDF+ Commercial/local rhizobial strain available in the zone/market.

Table 1.6: Response of N fixing rhizobia and P solubilizing bacteria with RDF/Farmers practice and with reduction of fertilization on latest release variety of soybean (RVS - 24) during 2022 – 23 (Sehore centre)

Treatment	Nodules per plant	Nodule dry weight (mg/plant)	Legheamoglobin (mg /g)	Chlorophyll content (%)	Grain yield (kg/ha)	Economics of various and B: C ratio
T1	35.87	84.47	3.59	**35.62**	**1833.04**	2.68:1
T2	31.25	97.19	2.51	37.05	1807.45	2.70:1
T3	36.15	90.93	2.24	34.28	1831.72	2.72:1
T4	37.25	97.96	2.24	34.33	1827.16	2.80:1
T5	40.11	89.54	2.22	37.36	1834.02	2.86:1
T6	40.15	100.90	2.29	36.75	1822.32	2.82:1
T7	42.45	89.55	2.37	37.84	1834.06	2.83:1
T8	47	90.59	3.47	38.43	1822.69	3.38:1
T9	41.36	86.30	3.48	38.88	1901.90	2.90:1
SEM	1.16	1.45	0.28	37.53	25	-
CD	3.48	4.35	0.85	0.24	8.643573	-

Table 1.7: Field response of N-fixing rhizobia and P-solubilizing bacteria with RDF/farmer practice and with reduction of fertilization on soybean nodulation, enzymes and yield parameters (Dharwad centre)

Treatments	Nodule number	Nodule dry weight (g plant^{-1})	Leghaemoglobin content (mg/g fresh nodules	Dehydrogenase (µg TPF formed g^{-1} soil d^{-1})	Relative chlorophyll content (SPAD)	Yield (Kg/ha)
T1	29.27	1.836	0.35	17.92	39.16	2350.00
T2	27.59	1.594	0.30	13.98	39.46	2087.33
T3	27.03	1.504	0.34	13.93	36.83	2220.00
T4	26.40	1.353	0.26	14.13	35.57	1995.00
T5	34.42	2.143	0.71	22.12	46.26	2600.00
T6	34.10	2.113	0.55	20.49	39.43	2286.67
T7	33.18	2.033	0.54	21.49	40.64	2450.00
T8	39.46	2.339	0.82	25.26	42.58	2860.00
T9	38.06	2.261	0.74	22.84	45.24	2686.67
S.Em ±	0.795	0.13	0.015	0.744	1.746	137.37
C D at 5%	2.404	0.392	0.044	2.251	5.281	415.39

Table 1.8: Field performance of N-fixing rhizobia and P solubilizing bacteria with RDF and reduced fertilization on nodulation, chlorophyll, biomass and yield in soybean variety PS-1347 (Pantnagar centre)

Treatment	Nodule Number (No./plant)	Nodule dry weight (g/plant)	LegH content in nodules (mg/g)	Chlorophyll a+b	Plant dry weight (g/plant)	Grain yield (Kg/ha)	Biological yield (Q/ha)
T1	55.3	0.20	0.492	2.69	39.4	1321	5300
T2	61.0	0.24	0.462	2.61	29.5	1228	4633
T3	68.0	0.37	0.450	2.62	31.3	993	4100
T4	59.7	0.31	0.388	2.63	29.3	1149	3567
T5	81.7	0.69	0.538	2.65	27.0	945	4500
T6	60.0	0.58	0.520	2.64	31.6	1073	4000
T7	62.7	0.51	0.453	2.62	32.6	1301	4467
T8	63.3	0.61	0.527	2.63	32.7	1313	4700
T9	71.0	0.53	0.528	2.61	37.5	1380	4600
C.D. at 5%	12.8	0.09	0.07	NS	NS	165.9	682.5
CV	11.04	11.55	8.34	4.62	13.46	8.06	8.90

Table 1.9: Field performance of N-fixing rhizobia and P solubilizing bacteria with RDF and reduced fertilization on nodulation, chlorophyll, biomass and yield in soybean HIMSO 1563 (Delhi Centre)

Treatment	No. of Nodules /Plant	Nodule Dry Wt (mg/Plant)	Total Chlorophyll content (µg/ mg fresh leaves)	LegH in content (mg/g FWt.)	Yield /ha (kg)
T1	0.17	1.23	0.559	0.14	176.367
T2	1.00	3.23	0.869	0.231	301.367
T3	0.17	0.95	0.683	0.177	304.493
T4	0.33	1.68	1.153	0.211	360.182
T5	22.17	131.10	1.583	0.377	507.495
T6	0.17	1.02	0.967	0.187	305.637
T7	2.17	11.57	1.286	0.259	341.912
T8	29.33	139.67	1.794	0.386	529.666
T9	22.33	100.43	1.483	0.339	490.176
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 1.10: Effect of N_2-fixing rhizobia and P solubilizing bacteria on symbiotic traits, yield, and economics in soybean genotype SL 958 (Ludhiana Centre)

Treatment	No. of nodules/ plant	Nodules Dry Wt. (mg/ plant	LegH content (mg/g Nodules)	Grain yield (kg/ha)	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Net returns (Rs /ha)	B: C ratio
T1	54.0	149.5	1.45	1902	36090	87502	51412	1.42
T2	50.0	146.5	1.38	1867	35989	85867	49877	1.39
T3	51.0	145.5	1.35	1894	35387	87110	51724	1.46
T4	50.0	146.7	1.48	1874	35286	86207	50921	1.44
T5	55.7	161.5	1.68	1901	36089	87451	51362	1.42
T6	54.0	158.1	1.69	1889	36089	86889	50799	1.41
T7	52.0	150.5	1.52	1879	35487	86412	50925	1.44
T8	54.3	164.5	1.78	1978	35486	90978	55491	1.56
T9	50.0	162.7	1.76	1957	35486	90022	54536	1.54
CD@5%	NS	5.758	0.189	NS	-	-	-	-

Table 1.11: Effect of N_2-fixing rhizobia and P solubilizing bacteria on symbiotic traits, yield, and economics in soybean genotype C.G. Soya 11-15 (IGKV Raipur)

Treatment No. & description	**No. of Nodules/ plant**	**Dry weight of nodules (g/plant)**	**Lb Content (mM^{-1} cm^{-1})**	**Chlorophyll Content (µmol/sq. m)**	**Grain yield (q/ha)**	**B: C ratio**
T1	45	0.39	1.17	46.8	20.8	1.82
T2	46	0.44	0.90	32.4	18.2	1.47
T3	43	0.36	1.16	37.7	16.7	1.31
T4	44	0.38	1.07	39.1	18.6	1.58
T5	66	0.90	1.43	46.8	20.9	1.83
T6	63	0.85	1.39	44.0	20.8	1.82
T7	53	0.81	1.19	41.2	20.1	1.78
T8	54	0.78	1.25	39.1	19.8	1.75
T9	58	0.79	1.30	42.6	20.5	1.85
SE(m)	**2.00**	**0.02**	0.052	**1.51**	**0.90**	**-**
C.D	**5.99**	**0.06**	0.110	**4.51**	**2.5**	**-**

MB 3/23:
Evaluation of promising consortia for conferring drought tolerance in soybean under pot conditions

Table 1.12: Evaluation of promising consortia for conferring drought tolerance based on chlorophyll content and leghaemoglobin content in nodules of soybean (variety JS 95-60) under pot conditions (Indore Centre)

Treatments	Chlorophyll ab (mg g of fresh weight)			Leghaemoglobin		
	Normal	Drought	Mean	Normal	Drought	Mean
T1	4.36b	3.96bc	4.15ab	9.19a	6.22ab	7.70a
T2	4.96a	4.16b	4.56a	8.52ab	6.87ab	7.69a
T3	3.90bc	3.12d	3.50c	8.11ab	5.40ab	6.75ab
T4	3.85bc	3.75bc	3.8bc	5.02b	4.90b	4.96b
T5	3.81bc	3.49cd	3.64c	4.94b	4.71b	4.82b
Mean	4.17a	3.69b		7.15a	5.62b	
LSD (one way)	0.57			3.42		
LSD at 1% (Two way)						
Inoculation	0.40***			2.42**		
Stress	0.25***			1.53**		
Inoculation*Stress	ns			ns		

Where T1=ICAR-IISR, Indore microbial Consortia; T2=ICAR-DGR endophyte formulation; T3=ICAR-CRIDA drought tolerant microbial consortium; T4=ICAR-NBAIM Archaea formulation/consortium; T5=Un-inoculated control

Table 1.13: Evaluation of promising consortia for conferring drought tolerance based on shoot, root and nodule dry weights of soybean (variety JS 95-60) under pot conditions (Indore Centre)

Treatments	Shoot dry wt. (g plant^{-1})			Root dry wt. (g plant^{-1})			Nodule dry wt. (g plant^{-1})		
	Normal	Drought	Mean	Normal	Drought	Mean	Normal	Drought	Mean
T1	11.33a	7.63ab	9.48a	5.21ab	4.43abc	4.82ab	13.53a	6.29d	9.91a
T2	10.53a	8.18ab	9.35ab	5.93a	4.86abc	5.39a	12.31ab	5.70de	9.00ab
T3	7.95ab	7.45ab	7.70abc	4.43abc	4.23abc	4.32ab	10.85bc	4.40de	7.62bc
T4	8.26ab	5.42b	6.84bc	4.04abc	2.46c	3.25b	9.63c	3.57e	6.60c
T5	7.78ab	5.42b	6.60c	3.96abc	2.81bc	3.38b	10.02bc	3.71e	6.86c
Mean	9.17a	6.82b					11.26a	4.73b	
LSD (one way)	3.45			2.31			2.20		
LSD at 1% (Two way)									
Inoculation	2.44**			1.63**			1.56***		
Stress	1.54***			1.03*			0.98***		
Ino*Stress	ns			ns			ns		

Table 1.14: Evaluation of promising consortia for conferring drought tolerance based on nodule dry weight, Leghaemoglobin content in nodules and RWC in leaves of soybean (variety RVS 24) under pot conditions (Sehore Centre)

Treatments	Nodule dry wt. (g $plant^{-1}$)			Leghaemoglobin in nodules (mg/g nodule)			Relative water content (%)		
	Normal	Drought	Mean	Normal	Drought	Mean	Normal	Drought	Mean
T1	0.483	0.442	0.463	2.92	2.847	2.884	40.368	35.85	38.112
T2	0.395	0.488	0.442	2.83	2.887	2.860	38.155	39.347	38.751
T3	0.433	0.607	0.520	2.835	2.958	2.897	33.618	31.233	32.426
T4	0.543	0.540	0.541	2.838	2.828	2.833	28.88	27.840	28.362
T5	0.578	0.550	0.564	2.937	2.857	2.897	31.03	28.378	29.708
Mean	0.486	0.525	-	2.873	2.875	-	34.41	32.531	-
CD at 1% (Two way)									
Inoculation	0.022			0.018			0.966		
Stress	0.014			NS			0.610		
Ino*Stress	0.031			0.025			1.363		

Table 1.15: Evaluation of promising consortia for conferring drought tolerance based on shoot dry weight, N and P uptake in shoots of soybean plants (variety RVS 24) under pot conditions (Sehore Centre)

Treatments	Shoot dry weight (g/plant)			N uptake in shoots (mg/plant)			P uptake in shoots (mg/plant)		
	Normal	Drought	Mean	Normal	Drought	Mean	Normal	Drought	Mean
T1	2.15	1.86	2.00	1.33	1.245	1.288	1.39	1.305	1.348
T2	1.82	2.11	1.96	1.22	1.30	1.26	1.263	1.36	1.312
T3	1.76	1.95	1.86	1.23	1.26	1.247	1.207	1.353	1.28
T4	1.62	1.50	1.56	1.20	1.20	1.20	1.243	1.292	1.268
T5	1.88	1.52	1.70	1.25	1.19	1.225	1.310	1.168	1.239
Mean	1.85	1.79	-	1.25	1.24	-	1.283	1.296	-
CD at 1% (Two way)									
Inoculation	0.055			0.014			0.028		
Stress	0.034			NS			NS		
Ino*Stress	0.077			0.020			0.039		

Table 1.16: Evaluation of promising consortia for conferring drought tolerance based on root dry weight, N and P uptake in roots of soybean plants (variety RVS 24) under pot conditions (Sehore Centre)

Treatments	Root dry weight (g/plant)			N uptake in roots (mg/plant)			P uptake in roots (mg/plant)		
	Normal	Drought	Mean	Normal	Drought	Mean	Normal	Drought	Mean
T1	0.797	0.622	0.709	0.345	0.268	0.307	0.402	0.33	0.366
T2	0.530	0.773	0.652	0.245	0.325	0.285	0.278	0.383	0.331
T3	0.685	0.723	0.704	0.253	0.243	0.248	0.233	0.347	0.290
T4	0.660	0.565	0.613	0.173	0.175	0.174	0.248	0.272	0.260
T5	0.648	0.528	0.588	0.235	0.168	0.202	0.292	0.150	0.221
Mean	0.664	0.642	-	0.25	0.236		0.291	0.296	-
CD at 1% (Two way)									
Inoculation	0.018			0.015			0.019		
Stress	0.011			0.009			NS		
Ino*Stress	0.025			0.021			0.027		

Table 1.17: Evaluation of promising consortia for conferring drought tolerance based on chlorophyll content and RWC in soybean variety DSB-34 under pot conditions (Dharwad Centre)

Treatments	Chlorophyll (SPAD Value)			Relative water content (%)		
	Normal	Drought	Mean	Normal	Drought	Mean
T1	39.41	35.73	37.57	97.57	38.84	68.20
T2	37.08	34.88	35.98	80.16	24.0	52.08
T3	38.22	33.88	36.05	93.85	16.54	55.19
T4	37.88	34.09	35.99	37.42	59.13	48.28
T5	36.03	32.38	34.21	52.86	36.16	44.51
Mean	37.73	34.19	-	72.37	34.94	
CD at 1%						
Inoculation	NS			4.95		
Stress	1.82			3.13		
Inoculation*Stress	ns			7.00		

Table 1.18: Evaluation of promising consortia for conferring drought tolerance based on chlorophyll content and RWC in soybean variety DSB-34 under pot conditions (Dharwad Centre)

Treatments	**Chlorophyll (SPAD Value)**			**Relative water content (%)**		
	Normal	Drought	Mean	Normal	Drought	Mean
T1	39.41	35.73	37.57	97.57	38.84	68.20
T2	37.08	34.88	35.98	80.16	24.0	52.08
T3	38.22	33.88	36.05	93.85	16.54	55.19
T4	37.88	34.09	35.99	37.42	59.13	48.28
T5	36.03	32.38	34.21	52.86	36.16	44.51
Mean	37.73	34.19	-	72.37	34.94	
CD at 1%						
Inoculation	NS			4.95		
Stress	1.82			3.13		
Inoculation*Stress	ns			7.00		

Table 1.19: Evaluation of promising consortia for conferring drought tolerance based on nodule number and nodule dry weights of soybean variety DSB-34 under pot conditions (Dharwad Centre)

Treatments	Nodule number/plant			Nodule dry wt. (g/plant)		
	Normal	Drought	Mean	Normal	Drought	Mean
T1	16.33	11.0	13.67	0.096	0.080	0.088
T2	14.33	10.67	12.50	0.097	0.053	0.075
T3	18.0	8.0	13.0	0.090	0.063	0.077
T4	15.67	10.0	12.83	0.075	0.073	0.074
T5	9.67	10.33	10.0	0.053	0.060	0.057
Mean	14.80	10.00	-	0.080	0.067	-
CD at 1%						
Inoculation	NS			NS		
Stress	2.69			0.015		
Inoculation*Stress	NS			0.033		

Table 1.20: Evaluation of promising consortia for conferring drought tolerance based on root and shoot dry weights of soybean variety DSB-34 under pot conditions (Dharwad Centre)

Treatments	Shoot dry weight g/plant			Root dry weight (g/plant)		
	Normal	Drought	Mean	Normal	Drought	Mean
T1	5.44	2.95	4.20	0.96	0.77	0.87
T2	4.73	3.08	3.91	1.04	0.55	0.80
T3	5.14	2.78	3.96	0.60	0.67	0.64
T4	4.63	3.24	3.93	1.00	0.60	0.80
T5	4.91	2.79	3.85	0.81	0.49	0.65
Mean	4.97	2.97	-	0.88	0.62	-
CD at 1%						
Inoculation	0.365			NS		
Stress	0.231			0.142		
Inoculation*Stress	0.516			NS		

Table 1.21: Effect of different consortia on nodule number and dry nodule weight under normal and moisture stress conditions on soybean (variety PS 1347) in a pot trial (Pantnagar Centre)

Moisture level/ Consortium	**Nodule number**			**Nodule dry weight (g/plant)**		
	No stress/ Normal	**Stress**	**Average**	**No stress/ Normal**	**Stress**	**Mean**
T1	60.6	59.8	60.2	0.178	0.168	0.173
T2	53.2	57.0	55.1	0.152	0.162	0.157
T3	65.0	61.8	63.4	0.308	0.248	0.278
T4	59.6	57.8	58.7	0.208	0.168	0.188
T5	46.4	43.0	44.7	0.128	0.118	0.123
Mean	**56.9**	**55.9**		**0.195**	**0.173**	
C.D. (≤ 0.05)	**Moisture stress (M.S.)** 3.10	**Consortia (C)** 4.90	**MS X C** N.S.	**Moisture stress (M.S.)** N.S.	**Consortia (C)** 0.023	**MS X C** 0.033

Table 1.22: Effect of different consortia on relative water content and total chlorophyll under normal and moisture stress conditions on soybean (variety PS 1347) in a pot trial (Pantnagar Centre)

Moisture level/ Consortium	Relative water content (%)			Total chlorophyll (a+b (mg g of fresh weight)		
	No stress/ Normal	Stress	Average	No stress/ Normal	Stress	Average
T1	58.5	53.4	56.0	2.79	3.07	2.93
T2	52.4	54.6	53.5	3.26	2.90	3.08
T3	56.4	59.9	58.2	3.38	3.42	2.40
T4	56.8	54.7	55.7	2.99	2.81	2.90
T5	54.8	49.1	52.0	3.53	2.86	3.19
Average	**55.8**	**54.4**		**3.19**	**3.01**	
C.D. (≤ 0.05)	**Moisture stress (MS)** 3.64	**Consortia (C)** NS	**MS X C** NS	**Moisture stress (MS)** 0.23	**Consortia (C)** NS	**MS X C** NS

Table 1.23: Effect of different consortia on dry shoot and root biomass production under normal and moisture stress conditions on soybean (variety PS 1347) in a pot trial at Pantnagar Centre

Moisture level/ Consortium	Dry shoot biomass (g per plant)			Dry root biomass (g per plant)		
	No stress/ Normal	Stress	Average	No stress/ Normal	Stress	Average
T1	9.5	11.2	10.3	7.69	6.74	7.21
T2	13.2	12.7	12.9	8.23	7.69	7.96
T3	11.0	11.2	11.1	8.61	8.17	8.39
T4	10.6	10.5	10.6	7.66	6.78	7.22
T5	11.1	9.8	10.4	6.59	5.92	6.26
Average	**11.1**	**11.1**		**7.76**	**7.06**	
C.D. (≤ 0.05)	**Moisture stress (MS)** 1.43	**Consortia (C)** NS	**MS X C** NS	**Moisture stress (M.S.)** 0.59	**Consortia (C)** 0.93	**MS X C** NS

Table 1.24: Effect of different consortia on nitrogen and phosphorus uptake in shoot under normal and moisture stress conditions on soybean (variety PS 1347) in a pot trial (Pantnagar Centre)

Moisture level/ Consortium	Nitrogen uptake in shoot (mg per plant)			Phosphorus uptake in shoot (mg per plant)		
	No stress/ Normal	**Stress**	**Average**	21.2	19.7	20.4
T1	35.33	34.80	35.06	18.4	19.3	18.9
T2	30.67	35.50	33.08	36.8	29.1	32.9
T3	61.33	52.54	56.94	24.8	19.7	22.2
T4	41.33	35.50	38.42	15.2	13.8	14.5
T5	25.23	24.85	25.09	**23.3**	**20.3**	
Average	**38.80**	**36.64**		**Moisture stress (M.S.)** N.S.	**Consortia (C)** 2.75	**MS X C** 3.89
C.D. (≤ 0.05)	**Moisture stress (M.S.)** 3.05	**Consortia (C)** 4.82	**MS X C** NS	21.2	19.7	20.4

Table 1.25: Evaluation of promising consortia for conferring drought tolerance in soybean based on plant growth and nodulation parameters under pot conditions (Delhi Centre)

Treatment No. & description	Nodule DW (mg/plant)	Root DW (g/plant)	Shoot DW (g/plant)	Total Chlorophyll content (µg/ mg FW)	Leghaemoglobin content (mg/g FW)
T1	0.14	4.28	10.89	1.483	0.277
T2	0.11	4.05	10.10	1.076	0.229
T3	0.11	3.90	9.93	0.669	0.211
T4	0.10	3.84	9.55	0.883	0.19
T5	0.12	4.13	10.22	1.253	0.238
C.D.	N/A	N/A	N/A	0.518	0.008
SE(m)	0.022	0.486	1.26	0.102	0.003
SE(d)	0.03	0.688	1.782	0.185	0.005
C.V.	31.428	19.696	19.324	23.514	1.485

Table 1.26: Effect of inoculating promising consortia for conferring drought tolerance in soybean (Variety SL 958) under pot conditions (Ludhiana Centre)

Treatment	Treatments details	Nodule dry weight (mg)		Leghaemoglobin content (mg/g)		Chlorophyll content (mg/g of fresh leaf)		Shoot dry weight (g/plant)		Root dry weight (g/plant)	
		Non-Stressed	**Stressed**	**Non-Stressed**	**Stressed**	**Non-Stressed**	**Stressed**	**Non-Stressed**	**Stressed**	**Non-Stressed**	**Stressed**
T1	ICAR-IISR Indore Microbial Consortia	13.25	11.22	1.89	1.60	1.48	1.15	6.80	6.41	0.614	0.602
T2	ICAR-DGR endophytic formulation	12.81	10.20	1.68	1.51	1.40	1.10	6.75	6.35	0.604	0.595
T3	ICAR-CRIDA drought tolerant microbial consortium	12.75	10.08	1.55	1.24	1.37	1.08	6.11	6.92	0.512	0.497
T4	ICAR-NBAIM Archaea formulation/ consortium	11.05	10.15	1.48	1.04	1.30	0.95	6.80	6.48	0.510	0.498
T5	Un-inoculated control	10.80	8.32	1.32	0.98	1.25	0.84	5.17	4.92	0.427	0.422
	CD@5%										
	A: Non-Stressed	1.746		NS		0.054		0.144		0.439	
	B: Stressed	NS		NS		NS		NS		NS	
	Interaction (AxB)	NS		NS		0.076		NS		0.621	

Table 1.27: Evaluation of promising consortia for conferring drought tolerance based on nodule dry weight, Leghaemoglobin content in nodules and RWC in leaves of soybean (variety RSC 11-52) under pot conditions (Raipur Centre)

Treatments	Nodule dry wt. (g $plant^{-1}$)			Leghaemoglobin in nodules (mg/g nodule)			Relative water content (%)		
	Normal	Drought	Mean	Normal	Drought	Mean	Normal	Drought	Mean
T1	1.85	0.743	1.299	0.642	0.483	0.562	79.40	60.38	69.89
T2	1.68	0.780	1.231	0.709	0.514	0.611	79.43	59.71	69.57
T3	2.05	0.812	1.431	0.876	0.593	0.735	79.40	65.28	72.34
T4	1.99	0.776	1.383	0.757	0.566	0.662	79.38	62.22	70.80
T5	1.89	0.856	1.373	0.738	0.566	0.652	78.45	57.37	67.91
Mean	1.893	0.793	-	0.746	0.544	-	79.21	60.99	-
CD at 1% (Two way)									
Inoculation	0.173			0.037			2.04		
Stress	0.299			0.064			3.54		
Ino*Stress	0.423			0.090			5.01		

Table 1.28: Evaluation of promising consortia for conferring drought tolerance based on chlorophyll content and dry weights of shoots and roots of soybean (variety RSC 11-52) under pot conditions (Raipur Centre)

Treatments	Chlorophyll content (SPAD unit)			Shoot dry wt. (g/plant)			Root dry wt. (g/plant)		
	Normal	Drought	Mean	Normal	Drought	Mean	Normal	Drought	Mean
T1	19.70	15.37	17.53	0.813	0.637	0.725	0.697	0.547	0.622
T2	20.46	15.50	17.98	0.810	0.790	0.795	0.710	0.670	0.690
T3	20.0	19.57	19.78	0.883	0.857	0.870	0.627	0.780	0.703
T4	19.86	16.40	18.13	0.860	0.810	0.835	0.743	0.647	0.695
T5	18.40	14.56	16.48	0.827	0.560	0.693	0.603	0.457	0.530
Mean	19.68	16.28	-	0.838	0.730	-	0.676	0.620	-
CD at 1% (Two way)									
Inoculation	2.13			0.051			0.080		
Stress	3.69 (NS)			0.088			0.138 (NS)		
Ino*Stress	5.23			0.124			0.196		

Table 1.29: Evaluation of promising consortia for conferring drought tolerance based on uptake of N and P in shots and N uptake in roots of soybean (variety RSC 11-52) under pot conditions <u>(Raipur Centre)</u>

Treatments	N uptake by shoots (mg/plant)			N uptake by roots (mg/plant)			P uptake by shoots (mg/plant)		
	Normal	Drought	Mean	Normal	Drought	Mean	Normal	Drought	Mean
T1	18.31	10.48	14.39	13.98	7.75	10.86	2.96	2.10	2.53
T2	17.88	9.43	13.66	13.55	6.99	10.27	2.86	1.63	2.25
T3	20.20	16.79	18.50	15.69	12.25	13.97	3.47	3.03	3.25
T4	19.49	14.72	17.10	15.15	11.21	13.18	3.27	2.69	2.98
T5	18.40	8.63	13.51	13.62	6.41	10.02	2.78	1.73	2.26
Mean	18.85	12.01	-	14.40	8.92	-	2.56	2.24	-
CD at 1% (Two way)									
Inoculation	1.97			2.42			0.18		
Stress	3.41			4.20 (NS)			0.31		
Ino*Stress	4.82			5.94			0.44		

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

Table 1.30: Response of AVI II entries for nodulation abilities with homologous rhizobia (Central Zone-Indore, Sehore and Eastern zone-Raipur)

Indore Centre

Treatments	**Nodule number/plant**	**Nodule dry weight (gm/plant)**	**Leghaemoglobin mg/g fresh nodules**
NRC-142	45.67b	0.17a	0.20d
JS 23-03	**46.66b**	**0.09d**	**0.72bc**
JS 20-34	41.67b	0.08d	1.08b
NRC-138	43.5b	0.1d	0.93bc
JS 23-09	**45.17b**	**0.05e**	**0.61c**
JS 95-60	61.66a	0.15b	0.78bc
NRC-152	55.33ab	0.13c	1.67a
LSD (p = 0.05)	13.34	0.01	0.39

Sehore Centre

Treatments	**Nodule number/plant**	**Nodule dry weight (g/plant)**	**Leghaemoglobin mg/g fresh nodules**
NRC-142	37.84	0.071	2.80
JS 23-03	**44.57**	**0.098**	**2.58**
JS 20-34	-	0.092	3.14
NRC-138	38.27	0.090	2.62
JS 23-09	**41.93**	**0.085**	**8.49**
JS 95-60	38.44	0.090	2.67
NRC-152	31.25	0.098	2.78
LSD (p = 0.05)	12.84	0.32	

Raipur Centre

Entry	Number of nodules (per plant)	Fresh weight of nodule (g/plant)	Dry weight of nodule (g/plant)
JS 20-116-C	57.50	1.82	0.69
JS 20-116-C	66.25	1.69	0.79
RSC 11-42	**62.25**	**1.49**	**0.50**
AMS 2014-1-C	64.50	1.16	0.38
CD @ 5%	7.24	0.15	0.06

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खाद्य प्रौद्योगिकी

FOOD TECHNOLOGY

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10. Food Technology

Results of Northern Hill Zone Advanced Varietal Trial II (NHZ-AVT II):

1. 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. Comparative analysis of AVT II entries grown in three agro climatic zones viz. Northern Hill Zone (Palampur, Almora and Majhera), Eastern Zone (Raipur, Ranchi and Bhawanipatna) and Central Zone (Amravati, Anand, Amreli, Indore, Jabalpur, Kota, Parbhani, Sehore, Nagpur, Morena and Lokbharti) were studied for given parameters and results are depicted in Table 1 to 24.

In Northern Hill Zone (NHZ), VLS 63(C) (14.71g) and VLS 99(C)(14.15g) gave the highest 100 seed weight followed by VLS 89(C) (13.63g) [Table 1]. 100 seed weight and seed dimension data suggested that in NHZ entries viz. Palam Early Soya, VLS 89(C), VLS 63(C) and VLS 99(C) has largest seed size and seed dimension [Table 1]. All entries had pale brown to yellow seed colour which makes them suitable for soymilk processing [Table 1].

2. 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 VLS 99(C) (32.78 min), NRC 197(33.33 min) and VLS 89(Filler)(35.89 min) (Table 3). Hydration ratio was found highest in AVT entries VLS 89(Filler) (2.27) and VLS 89(C) (2.27) (Table 3). Hull fragility was found highest in the VLS 89(Filler), VLS 89(C), VLS 99(C) and NRC 197 of NHZ AVT II entries (Table 3).

Milk yield of NHZ, AVT II entries VLS 99(C)(8.51), VLS 63(C) (8.31), NRC 197 (8.28) and VLS 89(C) (8.27) were found maximum and tofu yield for VLS 99(C)(1.79), NRC 197 (1.58) and VLS 89(Filler) (1.57) were found highest among the AVT II entries (Table 4). TSS of soymilk was found maximum in VLS 89 (Filler)(4.66%) followed by VLS 89(C) (4.41), NRC 197 (4.29) and Palam Early Soya(4.23) (Table 5). Maximum protein content of 39.33% was observed in VLS 63(C) followed by NRC 197 (39.20%) and Palam Early Soya (38.49%).

Results of Central Zone (CZ) Advanced Varietal Trial I+II (AVT I+II):

1. Physical analysis:

The hundred seed weight of soybean genotypes ranged from 9.65- 13.06 g. In CZ-AVT I+II trial, NRC 130 and NRC 138(C) had the largest and smallest seed weight respectively (Table 6). Maximum hydration ratio of 2.36 and maximum hull fragility of 8.42 was observed in entry NRC 130 of AVT I+II trial (Table 14 and 15).

In CZ-AVT I+II trials, seed dimension data suggested that JS 95-60(C) have highest seed dimension followed by NRC 130 (Table 8). All entries of AVT I+II had pale brown to yellow seed colour which makes them suitable for soymilk processing. Entries NRC 130 had white hilum colour so is considered suitable for soymilk and tofu processing whereas JS 24-33 had black hilum colour among all the AVT I+II of CZ (Table 9 and 10). Maximum protein content was recorded in NRC 130 (40.16%) followed by NRC 138(C) (40.09%) and JS 95-60(C) (39.84%) (Table11).

2. 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. From the tables of AVT I+II trials we may interpret that cooking time among all AVT I+II entries was lesser for entries JS 95-60 (38.33min), JS 20-34(38.70min), NRC 130 (38.94 min) respectively (Table 12). Hydration ratio did not vary significantly among entries. Hull fragility was highest for NRC 130 (8.42) followed by JS 95-60(C) (7.09) (Table 13).

Maximum soymilk was obtained from NRC 1529(C) and JS 20-34(8.43lit/kg) followed by NRC 130 (8.35lit/kg) and NRC 138(C) (8.31lit/kg), and yield of soymilk ranged from 7.92-8.43lit/kg (Table 15).

Tofu prepared from entries AVT I+II of CZ showed statistically significant difference in the yield of fresh tofu. Maximum yield of fresh tofu was obtained from JS 95-60(C) (1.61kg/kg), JS 23-03(1.56kg/kg) and JS 95-60(1.56kg/kg) (Table 17).

Sensory evaluation was done by panellist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, all entries NRC 262, NRC 130, NRC 138(C) of CZ AVT I+II were acceptable for milk and tofu sensory. The maximum overall acceptability score of soymilk were exhibited by entry NRC 138(C), NRC 130, NRC 1529(C) of CZ AVT I +II (Figure 3).

Table1: Physical parameters (100 seed weight and dimension) of AVT II-NHZ entries

S.No.	Varieties	100 Seed weight (g)					Seed dimension (mm)				
		Palampur	Almora	Majhera	Mean	Rank	Palampur	Almora	Majhera	Mean	Rank
1	VLS 89(Filler)	14.71	13.64	12.53	13.63	III	5.53	6.30	6.33	6.05	V
2	VLS 99(C)	14.80	14.62	13.04	14.15	II	5.76	6.43	6.03	6.07	IV
3	NRC 197	13.02	11.77	10.41	11.73	VI	6.27	5.80	5.73	5.93	VI
4	Palam Early Soya	13.06	12.12	12.65	12.61	V	6.17	6.10	6.36	6.21	I
5	VLS 63(C)	16.62	14.34	13.17	14.71	I	6.66	5.93	5.80	6.13	III
6	VLS 89(C)	13.70	13.73	12.97	13.47	IV	6.00	6.26	6.23	6.16	II
	S.Ed (+)	0.19	0.31	0.40			0.19	0.21	0.25		
	CD	0.42	0.70	0.90			0.43	0.47	0.57		

Table2: Physical parameters (Seed and hilum colour, seed lustre) of AVT II-NHZ entries

Sl.No	Varieties	Seed Colour			Hilum colour			Seed Lustre		
		Palampur	Almora	Majhera	Palampur	Almora	Majhera	Palampur	Almora	Majhera
1	VLS 89(Filler)	Pale brown (2.5Y 7/4)	Pale brown (2.5Y 7/4)	Yellow (2.5YR 8/6)	Light olive brown (2.5Y 5/4)	Reddish brown (2.5YR 5/3)	Pale brown (2.5Y 8/3)	Shiny	Shiny	Shiny
2	VLS 99(C)	Pale brown (2.5Y 7/4)	Pale brown (2.5Y 7/4)	Yellow (5Y 7/6)	Black (2.5Y 2.5/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Shiny	Shiny	Shiny
3	NRC 197	Yellow (2.5Y 8/6)	Pale brown (2.5Y 7/4)	Yellow (2.5Y 8/6)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Yellow (2.5Y 8/6)	Shiny	Shiny	Shiny
4	Palam Early Soya	Pale brown (2.5Y 7/4)	Pale brown (2.5Y 7/4)	Yellow (2.5Y 8/6)	Very dark greyish brown (2.5Y 3/2)	Light olive brown (2.5Y 5/4)	Pale brown (2.5Y 8/2)	Shiny	Shiny	Shiny
5	VLS 63(C)	Pale brown (2.5Y 7/4)	Pale brown (2.5Y 7/4)	Yellow (2.5Y 8/6)	Reddish brown (2.5YR 5/4)	Pale brown (2.5Y 7/4)	Pale brown (2.5Y 8/2)	Shiny	Shiny	Shiny
6	VLS 89(C)	Pale brown (2.5Y 7/4)	Pale brown (2.5Y 7/4)	Yellow (2.5Y 8/8)	Reddish brown (2.5YR 5/3)	Reddish brown (2.5YR 5/4)	Pale brown (2.5Y 8/4)	Shiny	Shiny	Shiny

Table 3: Food grade characteristics (cooking time, hydration ratio and hull fragility) of AVT II-NHZ

S.No.	Varieties	Cooking time					Hydration ratio					Hull fragility				
		Palampur	Almora	Majhera	Mean	Rank	Palampur	Almora	Majhera	Mean	Rank	Palampur	Almora	Majhera	Mean	Rank
1	VLS 89 (Filler)	37.33	20.67	49.67	35.89	IV	2.33	2.23	2.24	2.27	I	3.67	11.67	12.67	9.33	II
2	VLS 99(C)	38.67	38.67	21.00	32.78	VI	2.24	2.21	2.33	2.26	II	2.67	18.33	8.33	9.77	I
3	NRC 197	42.00	27.67	30.33	33.33	V	2.24	2.22	2.17	2.21	IV	4.00	6.33	9.67	6.67	IV
4	Palam Early Soya	41.33	23.33	50.67	38.44	III	2.19	2.31	2.24	2.25	III	1.67	3.67	6.67	4.00	VI
5	VLS 63(C)	45.33	38.33	52.67	45.44	I	2.15	2.27	2.16	2.19	V	1.33	19.33	5.33	8.66	III
6	VLS 89(C)	49.33	29.00	51.33	43.22	II	2.31	2.24	2.26	2.27	I	2.67	8.67	5.33	5.56	V
	S.Ed (+)	0.96	0.89	1.05			0.12	0.09	0.09			0.57	0.49	0.61		
	CD	2.15	1.98	2.34			0.27	0.21	0.20			1.28	1.10	1.36		

Table 4: Food grade characteristics (milk and tofu yield) of AVT II-NPZ

S.No.	Varieties	Milk yield (lit/kg)					Tofu yield (kg/kg)				
		Palampur	Almora	Majhera	Mean	Rank	Palampur	Almora	Majhera	Mean	Rank
1	VLS 89 (Filler)	7.86	7.33	8.00	**7.73**	VI	1.49	1.51	1.70	1.57	III
2	VLS 99(C)	8.70	8.46	8.36	**8.51**	I	1.89	1.52	1.95	1.79	I
3	NRC 197	8.60	8.02	8.23	**8.28**	III	1.60	1.96	1.19	1.58	II
4	Palam Early Soya	7.96	8.36	8.33	**8.22**	V	1.63	1.10	1.18	1.30	VI
5	VLS 63(C)	8.50	8.50	7.93	**8.31**	II	1.56	1.42	1.37	1.45	V
6	VLS 89(C)	8.39	8.40	8.02	**8.27**	IV	1.42	1.68	1.55	1.55	IV
	S.Ed (+)	0.12	0.10	0.19			0.16	0.12	0.17		
	CD	0.28	0.24	0.43			0.36	0.27	0.38		

Table 5: Food grade characteristics (TSS of milk and protein content) of AVT II-NHZ

S.No.	Varieties	TSS of soymilk					Protein (%)				
		Palampur	Almora	Majhera	Mean	Rank	Palampur	Almora	Majhera	Mean	Rank
1	VLS 89(Filler)	4.93	5.33	3.73	4.66	I	39.24	35.88	37.84	37.65	VI
2	VLS 99(C)	3.56	4.53	4.50	4.20	V	38.68	40.08	38.40	39.05	III
3	NRC 197	4.46	4.20	4.20	4.29	III	40.92	38.68	38.00	39.20	II
4	Palam Early Soya	4.16	4.10	4.43	4.23	IV	38.68	39.24	37.56	38.49	IV
5	VLS 63(C)	3.40	4.00	4.90	4.10	VI	38.40	39.24	40.36	39.33	I
6	VLS 89(C)	4.43	4.03	4.76	4.41	II	35.88	39.80	38.96	38.21	V
	S.Ed (+)	0.22	0.17	0.65			0.29	0.28	0.20		
	CD	0.50	0.39	1.45			0.65	0.62	0.46		

Table 6: 100 Seed weight (g) CENTRAL ZONE

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	10.25	12.54	12.24	9.63	10.70	11.26	15.64	10.51	8.18	12.27	11.99	11.38	IV
2	NRC 262	12.05	10.97	10.08	10.01	9.15	12.09	12.22	9.80	8.44	9.80	9.06	10.33	IX
3	NRC 130	13.79	15.01	14.89	12.13	10.38	12.70	15.73	10.19	9.95	15.00	13.88	13.06	I
4	JS 24-33	9.92	10.02	11.13	10.73	9.58	11.80	13.50	9.11	8.78	11.27	9.50	10.49	VII
5	JS 23-09	10.61	9.94	11.37	10.47	9.20	11.91	12.75	9.31	8.80	11.49	9.71	10.51	VI
6	NRC 1529(C)	10.90	14.62	12.78	12.05	10.24	11.57	16.33	11.70	9.04	14.16	12.99	12.39	II
7	JS 23-03	12.42	11.86	13.27	12.55	10.60	13.04	12.65	10.50	9.72	12.30	10.96	11.80	III
8	NRC 138(C)	10.11	10.55	10.14	8.52	9.87	9.81	11.26	8.95	8.62	8.99	9.32	9.65	X
9	JS 20-34	11.76	11.92	11.36	10.98	9.40	10.89	13.44	9.80	8.35	11.84	9.17	10.81	V
10	JS 95-60	9.41	11.90	12.04	10.87	11.27	10.81	12.82	10.61	5.34	10.38	9.27	10.43	VIII
	S.Ed (+)	0.46	0.45	0.49	0.59	0.25	0.04	0.27	0.28	0.43	0.03	0.41		
	CD	0.97	0.96	1.04	1.25	0.53	0.10	0.56	0.59	0.91	0.07	0.87		

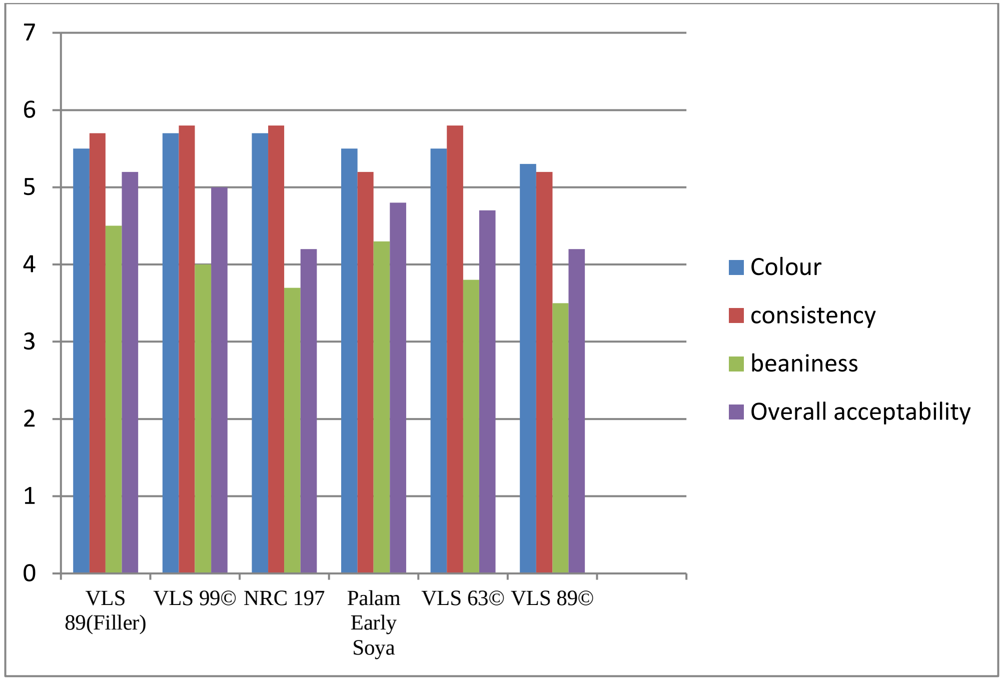

Figure 1: Representation of various sensory parameters of Soymilk in AVT II entries of Northern Hill Zone (NHZ)

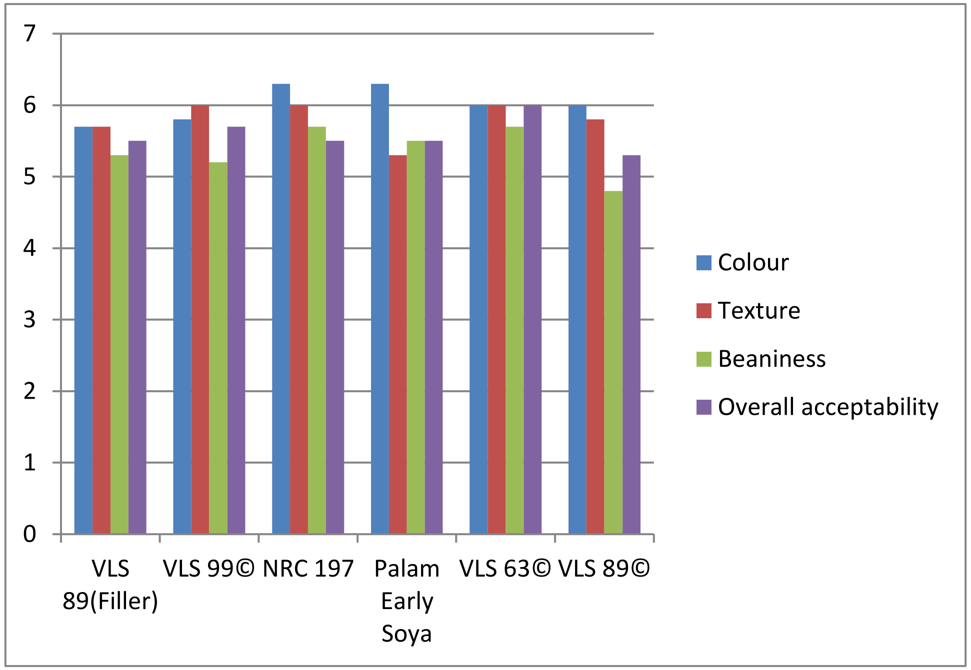

Figure 2: Representation of various sensory parameters of Tofu in AVT II entries of Northern Hill Zone (NHZ)

Table 7: Seed dimension (mm) CENTRAL ZONE

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	6.53	6.20	6.16	6.00	6.06	6.16	6.56	5.96	5.73	6.50	6.50	6.81	I
2	NRC 262	6.16	5.90	5.90	5.73	5.23	6.06	6.00	5.86	5.53	5.86	5.80	5.82	VII
3	NRC 130	6.56	6.80	6.33	6.43	5.56	6.26	6.53	5.80	5.76	6.60	6.63	6.29	II
4	JS 24-33	5.83	5.93	6.00	5.93	5.70	5.83	6.20	5.43	5.53	5.96	6.06	5.82	VII
5	JS 23-09	5.86	5.70	6.33	5.90	5.40	5.93	5.83	5.50	5.36	5.96	6.00	5.79	VIII
6	NRC 1529(C)	5.73	6.50	5.86	5.90	5.93	5.90	6.60	5.86	5.80	6.43	6.43	6.08	III
7	JS 23-03	6.10	6.16	6.40	6.10	6.03	5.76	6.00	5.70	5.70	5.83	6.26	6.00	V
8	NRC 138(C)	5.56	5.36	5.33	5.63	5.53	5.23	5.80	5.40	5.46	5.36	5.83	5.50	IX
9	JS 20-34	6.16	6.03	6.36	6.06	5.76	6.10	6.43	5.53	5.70	6.06	5.93	6.01	IV
10	JS 95-60	5.83	6.20	5.83	5.93	5.53	5.90	6.50	6.00	5.10	6.03	6.10	5.90	VI
	S.Ed (±)	0.26	0.27	0.23	0.22	0.19	0.22	0.32	0.26	0.29	0.14	0.25		
	CD	0.55	0.56	0.49	0.46	0.40	0.47	0.67	0.55	0.62	0.30	0.52		

Table 8: Seed Colour (Munsell chart of color) CENTRAL ZONE

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore
1	JS 95-60(C)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
2	NRC 262	Pale brown (2.5Y 8/4)	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)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 7/4)
3	NRC 130	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	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)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)
4	JS 24-33	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
5	JS 23-09	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
6	NRC 1529(C)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
7	JS 23-03	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
8	NRC 138(C)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
9	JS 20-34	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)
10	JS 95-60	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)

Table 9: Hilum Colour (Central Zone)

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore
1	JS 95-60(C)	Light olive brown (2.5Y 5/3)	Light brownish grey (2.5Y 6/2)	Light yellowish brown (2.5Y 6/3)	Light olive brown (2.5Y 5/3)	Light brownish grey (2.5Y 6/2)	Dark grayish brown (2.5Y 4/2)	Dark grey (2.5Y 4/1)	Light grey (2.5Y 7/2)	Pinkish white (5YR 8/2)	Light brownish grey (2.5Y 6/2)	Light pink (7.5R 8/3)
2	NRC 262	Olive brown (2.5Y 4/4)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Dark grey (2.5Y 4/1)	Very dark grey (2.5Y 3/1)	Dark grey (2.5Y 4/1)	Gray (10YR 5/1)	Dark grey (2.5Y 4/1)	Pinkish white (5YR 8/2)	Very dark grey (2.5Y 2.5/1)	Light pink (7.5R 8/4)
3	NRC 130	White (2.5Y 8/1)	White (2.5Y 8/1)	Pale brown (2.5Y 7/3)	White (2.5Y 8/1)	White (2.5Y 8/1)	White (2.5Y 8/1)	White (2.5Y 8/1)	White (2.5Y 8/1)	White (2.5Y 8/1)	White (2.5Y 8/1)	White (2.5Y 8/1)
4	JS 24-33	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Dark gray (10YR 4/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)
5	JS 23-09	Black (2.5Y 2.5/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Dark gray (2.5Y 4/1)	Very dark grey (2.5Y 2.5/1)	Very dark grey (2.5Y 3/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)
6	NRC 1529(C)	Grayish brown (2.5Y 5/2)	Dark grey (2.5Y 4/1)	Light olive brown (2.5Y 5/3)	Light olive brown (2.5Y 5/3)	Dark grey (2.5Y 4/1)	Grey (2.5Y 5/1)	White (2.5Y 8/1)	Light yellowish brown (2.5Y 6/3)	Grey (5YR 6/1)	Dark grey (2.5Y 4/1)	Light pink (7.5R 8/2)
7	JS 23-03	Black (2.5Y 2.5/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Black (2.5Y 2.5/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Dark grey (2.5Y 4/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Dark reddish grey (7.5R 4/1)
8	NRC 138(C)	Light olive brown (2.5Y 5/4)	Very dark grey (2.5Y 3/1)	Light olive brown (2.5Y 5/3)	Light olive brown (2.5Y 5/3)	Light olive brown (2.5Y 5/3)	Grey (2.5Y 5/1)	Very dark grey (10YR 3/1)	Light olive brown (2.5Y 5/3)	Very dark grey (2.5Y 3/1)	Very dark greyish brown (2.5Y 3/2)	Weak red (7.5R 4/2)
9	JS 20-34	Black (2.5Y 2.5/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Black (2.5Y 2.5/1)	Reddish black (7.5R 2.5/1)
10	JS 95-60	Gray (2.5Y 4/1)	Dark grey (2.5Y 4/1)	Very dark grey (2.5Y 3/1)	Dark grey (2.5Y 4/1)	Very dark grey (2.5Y 3/1)	Dark grey (2.5Y 4/1)	Very pale brown (10YR 7/4)	Dark grey (2.5Y 4/1)	Pinkish grey (5YR 7/2)	Dark grey (2.5Y 4/1)	Reddish black (7.5R 2.5/1)

Table 10: Seed lustre (CENTRAL ZONE)

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore
1	JS 95-60(C)	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny
2	NRC 262	Shiny	Dull	Dull	Dull	Shiny	Shiny	Dull	Shiny	Shiny	Dull	Shiny
3	NRC 130	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny
4	JS 24-33	Shiny	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	Dull	Shiny	Shiny	Shiny
5	JS 23-09	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Dull	Dull	Shiny	Shiny	Shiny
6	NRC 1529(C)	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny
7	JS 23-03	Dull	Shiny	Shiny	Dull	Shiny	Shiny	Dull	Dull	Shiny	Shiny	Shiny
8	NRC 138(C)	Shiny	Dull	Shiny	Shiny	Shiny	Dull	Shiny	Shiny	Shiny	Dull	Shiny
9	JS 20-34	Dull	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	Dull	Shiny
10	JS 95-60	Dull	Shiny	Shiny	Shiny	Shiny	Shiny	Shiny	Dull	Shiny	Shiny	Shiny

Table 11: Protein (%) CENTRAL ZONE

S.N	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	40.80	38.40	40.92	39.80	39.80	40.64	42.32	39.24	40.08	38.40	37.84	39.84	III
2	NRC 262	40.64	38.40	36.44	37.84	40.08	36.72	37.28	38.40	38.40	40.08	41.76	38.73	VII
3	NRC 130	39.52	40.08	41.48	36.44	37.84	42.04	41.48	42.04	40.92	40.92	38.96	40.16	I
4	JS 24-33	42.04	38.68	32.04	37.84	39.52	36.72	41.20	37.84	37.84	37.84	38.12	38.15	X
5	JS 23-09	36.07	38.40	35.19	36.72	38.40	38.12	42.88	39.80	37.37	41.20	39.80	38.54	VIII
6	NRC 1529(C)	33.96	38.68	41.04	38.12	38.12	36.44	40.64	38.68	40.36	38.96	38.40	38.49	IX
7	JS 23-03	38.52	39.52	38.91	37.84	38.12	41.48	42.04	39.24	38.96	40.64	40.08	39.58	V
8	NRC 138(C)	40.97	39.24	38.69	37.00	38.96	39.52	44.00	41.20	40.36	41.76	39.24	40.09	II
9	JS 20-34	38.17	41.20	37.64	39.80	38.40	41.20	40.92	40.92	38.40	42.32	38.96	39.81	IV
10	JS 95-60	40.80	39.24	36.59	35.88	40.08	39.80	38.96	40.08	40.08	38.96	41.20	39.24	VI
	S.Ed (±)	0.33	0.73	0.70	0.82	0.38	0.22	0.61	0.67	0.30	0.22	0.32		
	CD	0.70	1.55	1.48	1.72	0.81	0.47	1.29	1.41	0.63	0.46	0.68		

Table 12: Cooking time (min)

S.N	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	44.00	39.00	41.00	42.00	50.67	50.33	38.00	36.33	23.33	41.33	38.67	40.42	IV
2	NRC 262	46.67	43.67	44.33	46.00	28.67	37.33	41.67	42.67	27.00	35.33	37.00	39.12	VII
3	NRC 130	31.00	45.67	43.67	46.33	29.67	51.00	44.33	47.33	28.66	39.33	21.33	38.94	VIII
4	JS 24-33	43.67	45.33	47.00	47.67	52.00	31.67	47.00	29.00	31.33	42.00	19.00	39.61	VI
5	JS 23-09	45.00	48.00	39.00	38.00	56.00	54.33	47.33	50.67	30.66	43.33	20.00	42.94	II
6	NRC 1529(C)	49.00	45.33	35.33	39.00	59.33	33.33	47.33	52.33	30.00	47.33	24.33	42.03	III
7	JS 23-03	49.00	46.67	50.67	41.67	59.33	58.00	21.33	50.33	38.33	39.33	25.00	43.61	I
8	NRC 138(C)	34.67	42.00	48.67	44.67	44.67	54.00	21.33	56.67	20.33	42.33	27.00	39.67	V
9	JS 20-34	38.33	40.67	39.67	47.00	50.67	33.33	31.33	41.33	35.66	43.67	24.00	38.70	IX
10	JS 95-60	39.67	41.33	41.33	50.00	53.33	39.67	31.33	41.33	23.33	28.67	31.67	38.33	X
	S.Ed (±)	2.30	0.92	0.71	1.48	0.72	1.31	1.13	1.37	0.79	0.66	0.94		
	CD	4.84	1.94	1.50	3.12	1.52	2.75	2.38	2.89	1.66	1.39	1.98		

Table 13: Hydration ratio (CENTRAL ZONE)

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	2.32	2.13	2.38	2.39	2.29	2.33	2.26	2.11	2.54	2.17	2.15	2.27	III
2	NRC 262	2.15	2.15	2.28	2.11	2.15	2.19	2.38	2.29	2.29	2.19	2.11	2.20	VII
3	NRC 130	2.38	2.26	2.35	2.40	2.45	2.35	2.32	2.40	2.46	2.31	2.28	2.36	I
4	JS 24-33	2.30	2.22	2.26	2.22	2.25	2.17	2.23	2.29	2.24	2.20	2.20	2.23	VI
5	JS 23-09	2.25	2.18	2.32	2.22	2.31	2.29	2.18	2.34	2.40	2.23	2.23	2.26	IV
6	NRC 1529(C)	2.06	2.22	2.19	1.99	2.08	2.38	3.06	2.37	1.97	2.21	2.22	2.25	V
7	JS 23-03	2.26	2.20	2.29	2.25	2.25	2.36	2.39	2.28	2.37	2.23	2.21	2.28	II
8	NRC 138(C)	2.22	2.21	2.26	2.32	2.20	2.14	1.88	2.09	2.26	2.25	2.16	2.18	VIII
9	JS 20-34	2.36	2.19	2.29	2.25	2.32	2.30	2.43	2.34	2.34	2.20	2.15	2.28	II
10	JS 95-60	1.87	2.12	2.19	2.22	2.03	2.19	2.16	2.25	2.23	2.31	2.25	2.16	IX
	S.Ed (±)	0.15	0.08	0.07	0.07	0.14	0.07	0.23	0.12	0.18	0.02	0.07		
	CD	0.32	0.17	0.16	0.16	0.29	0.15	0.50	0.27	0.39	0.05	0.16		

Table 14: Hull fragility CENTRAL ZONE

S.N	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	1.67	7.00	12.33	13.33	3.67	8.00	16.67	2.00	2.67	9.00	1.67	7.09	II
2	NRC 262	3.33	1.33	8.00	9.33	1.67	2.00	9.33	7.33	3.00	2.67	5.33	4.85	VIII
3	NRC 130	6.00	18.00	7.67	17.33	6.67	3.00	15.33	3.33	4.33	6.67	4.33	8.42	I
4	JS 24-33	1.00	1.33	6.67	9.00	6.67	2.00	13.33	4.67	1.67	2.00	5.33	4.88	VII
5	JS 23-09	2.67	2.00	5.67	12.67	2.67	1.00	5.67	9.67	3.67	2.67	6.33	4.97	VI
6	NRC 1529(C)	1.00	2.00	3.67	4.33	1.67	1.00	6.33	3.33	2.67	2.33	8.67	3.36	IX
7	JS 23-03	1.67	2.67	2.67	15.33	6.33	2.00	3.33	5.67	8.00	7.67	5.33	5.52	V
8	NRC 138(C)	1.67	1.67	2.67	6.67	2.67	1.00	3.00	1.67	4.33	3.67	4.00	3.00	X
9	JS 20-34	3.67	7.00	6.67	20.33	7.67	2.00	4.33	2.67	3.67	4.67	10.67	6.67	IV
10	JS 95-60	9.00	4.00	6.33	12.67	2.67	3.00	17.67	7.00	5.00	5.67	3.33	6.94	III
	S.Ed (+)	0.52	0.74	0.92	1.17	0.48	0.55	0.67	0.42	0.40	0.45	0.68		
	CD	1.10	1.55	1.93	2.47	1.02	1.15	1.42	0.89	0.85	0.95	1.44		

Table 15: Milk yield (lit/kg)(CENTRAL ZONE)

S.N	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	8.03	8.06	8.10	7.98	8.03	8.19	7.46	8.20	7.70	7.80	7.53	7.92	VIII
2	NRC 262	7.20	7.36	8.30	7.80	7.92	7.88	7.83	8.26	7.86	7.73	7.46	7.78	IX
3	NRC 130	8.40	8.49	8.40	8.06	8.46	8.73	7.96	8.60	8.25	8.30	8.16	8.35	II
4	JS 24-33	7.86	8.36	8.46	8.30	8.23	8.36	7.29	8.53	7.94	7.80	7.63	8.07	VII
5	JS 23-09	8.13	8.06	8.33	8.46	8.26	8.54	8.50	8.40	8.10	7.87	7.60	8.20	VI
6	NRC 1529(C)	8.43	8.66	8.34	8.06	8.46	8.59	8.39	8.63	8.40	8.66	8.06	8.43	I
7	JS 23-03	8.06	8.73	8.59	8.20	8.38	8.59	8.53	8.34	8.36	7.73	7.73	8.29	IV
8	NRC 138(C)	8.26	8.39	8.72	8.08	8.26	8.44	8.26	8.40	8.66	8.33	7.63	8.31	III
9	JS 20-34	8.63	8.66	8.57	8.36	8.20	8.72	8.33	8.23	8.16	8.46	8.43	8.43	I
10	JS 95-60	8.00	8.26	8.06	7.50	8.70	8.40	8.57	8.46	7.90	8.26	8.17	8.21	V
	S.Ed (+)	0.11	0.17	0.11	0.23	0.15	0.21	0.15	0.19	0.18	0.29	0.15		
	CD	0.24	0.37	0.24	0.48	0.32	0.44	0.31	0.40	0.39	0.62	0.32		

Table 16: TSS of milk (^{0}Brix) (CENTRAL ZONE)

S.N	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	5.90	6.00	5.83	6.53	5.73	5.43	5.23	5.13	5.00	6.13	5.46	5.67	IV
2	NRC 262	6.20	6.00	6.03	6.80	6.43	6.53	6.33	5.10	5.23	6.56	4.66	5.99	I
3	NRC 130	5.73	5.60	6.30	6.30	6.23	5.83	6.56	5.23	4.90	5.56	5.46	5.79	III
4	JS 24-33	5.83	5.86	6.40	6.56	5.66	6.06	5.43	4.96	4.46	6.26	4.63	5.64	V
5	JS 23-09	5.30	6.13	6.66	6.06	5.70	5.13	6.10	5.60	4.00	5.76	4.10	5.50	VIII
6	NRC 1529(C)	5.66	6.33	5.66	5.66	5.53	5.66	6.30	5.23	3.76	5.90	4.16	5.44	IX
7	JS 23-03	5.60	5.90	5.50	6.26	6.06	6.00	5.10	5.26	3.56	6.10	5.40	5.52	VII
8	NRC 138(C)	6.10	6.23	5.66	6.13	5.70	5.43	6.53	5.73	3.76	5.50	5.60	5.67	IV
9	JS 20-34	5.26	6.10	6.13	6.50	5.73	5.46	6.20	5.53	4.26	6.06	4.63	5.62	VI
10	JS 95-60	5.16	6.30	6.56	6.90	5.80	5.70	7.03	5.40	4.80	6.36	5.53	5.96	II
	S.Ed (+)	0.40	0.27	0.32	0.26	0.26	0.26	0.36	0.27	0.34	0.27	0.31		
	CD	0.86	0.58	0.69	0.56	0.56	0.55	0.76	0.58	0.71	0.58	0.65		

Table 17: Tofu yield (kg/kg) (CENTRAL ZONE)

S.No.	Varieties	Amravati	Anand	Amreli	Indore	Jabalpur	Kota	Lokbharti	Morena	Nagpur	Parbhani	Sehore	Mean	Rank
1	JS 95-60(C)	1.74	1.25	1.99	1.51	1.68	1.38	1.80	2.04	1.14	1.56	1.65	1.61	I
2	NRC 262	1.42	1.44	1.91	1.54	1.57	1.31	1.43	1.84	1.05	1.32	1.44	1.48	VI
3	NRC 130	1.52	1.38	1.89	1.32	1.74	1.71	1.13	1.39	1.36	1.54	1.61	1.51	IV
4	JS 24-33	1.26	1.14	1.45	1.34	1.57	1.95	1.49	1.52	1.01	1.58	1.61	1.45	VIII
5	JS 23-09	1.81	1.13	1.55	1.41	1.40	1.96	1.18	1.63	1.23	1.32	1.23	1.44	IX
6	NRC 1529(C)	1.60	1.42	1.48	1.62	1.39	1.64	1.47	1.60	1.25	1.54	1.21	1.47	VII
7	JS 23-03	1.94	1.57	1.40	1.54	1.54	1.95	1.04	1.87	1.53	1.49	1.32	1.56	II
8	NRC 138(C)	1.71	1.54	1.80	1.50	1.48	1.56	1.41	1.54	1.39	1.23	1.36	1.50	V
9	JS 20-34	1.73	1.49	1.42	1.80	1.37	1.53	1.77	1.83	1.22	1.46	1.36	1.54	III
10	JS 95-60	1.44	1.70	1.47	1.61	1.44	2.17	1.59	2.02	0.81	1.54	1.33	1.56	II
	S.Ed (+)	0.15	0.08	0.10	0.09	0.11	0.21	0.12	0.19	0.08	0.15	0.15		
	CD	0.32	0.18	0.22	0.19	0.24	0.45	0.26	0.40	0.17	0.32	0.32		

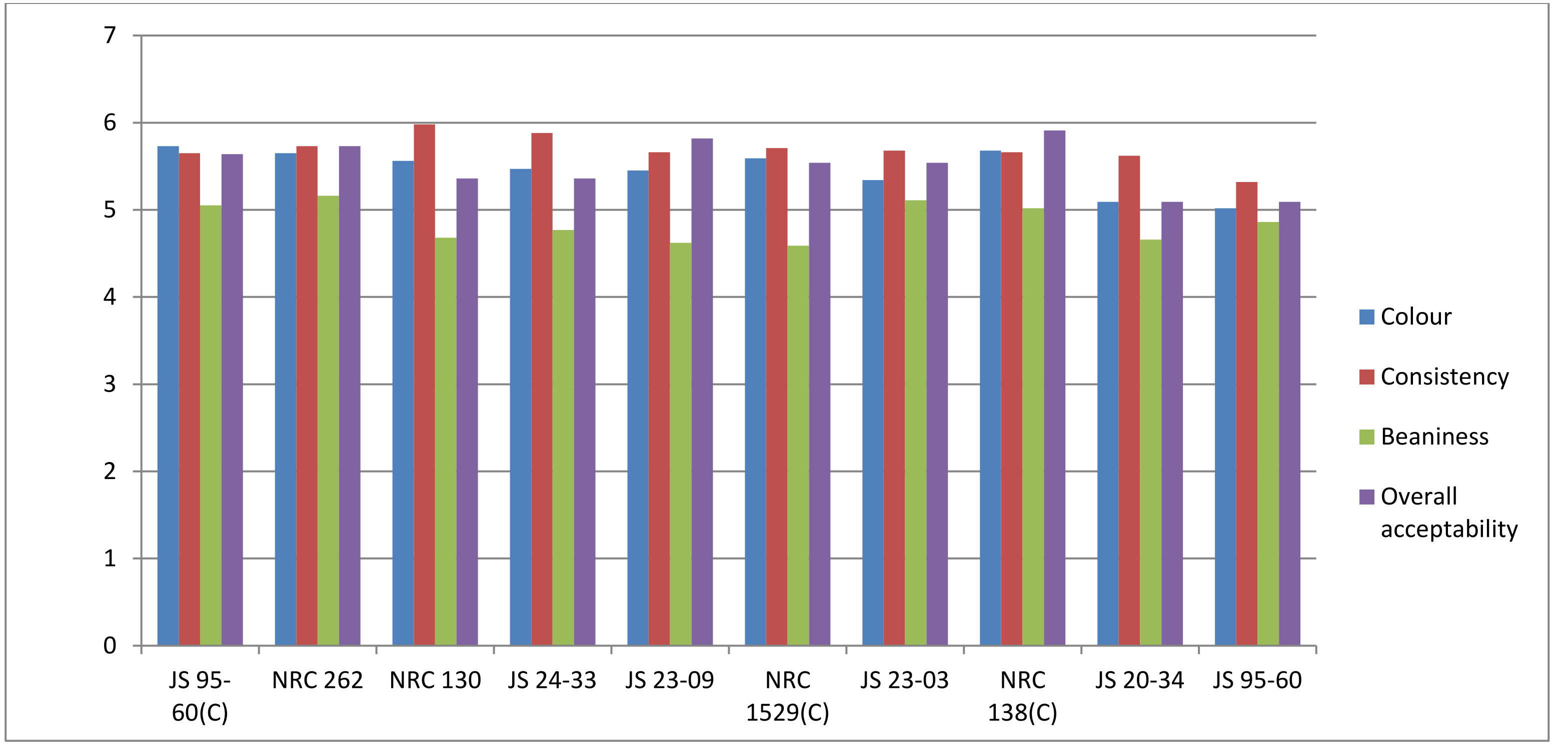

Figure 3: Representation of various sensory parameters of soymilk in AVT I+II entries of Central Zone (CZ)

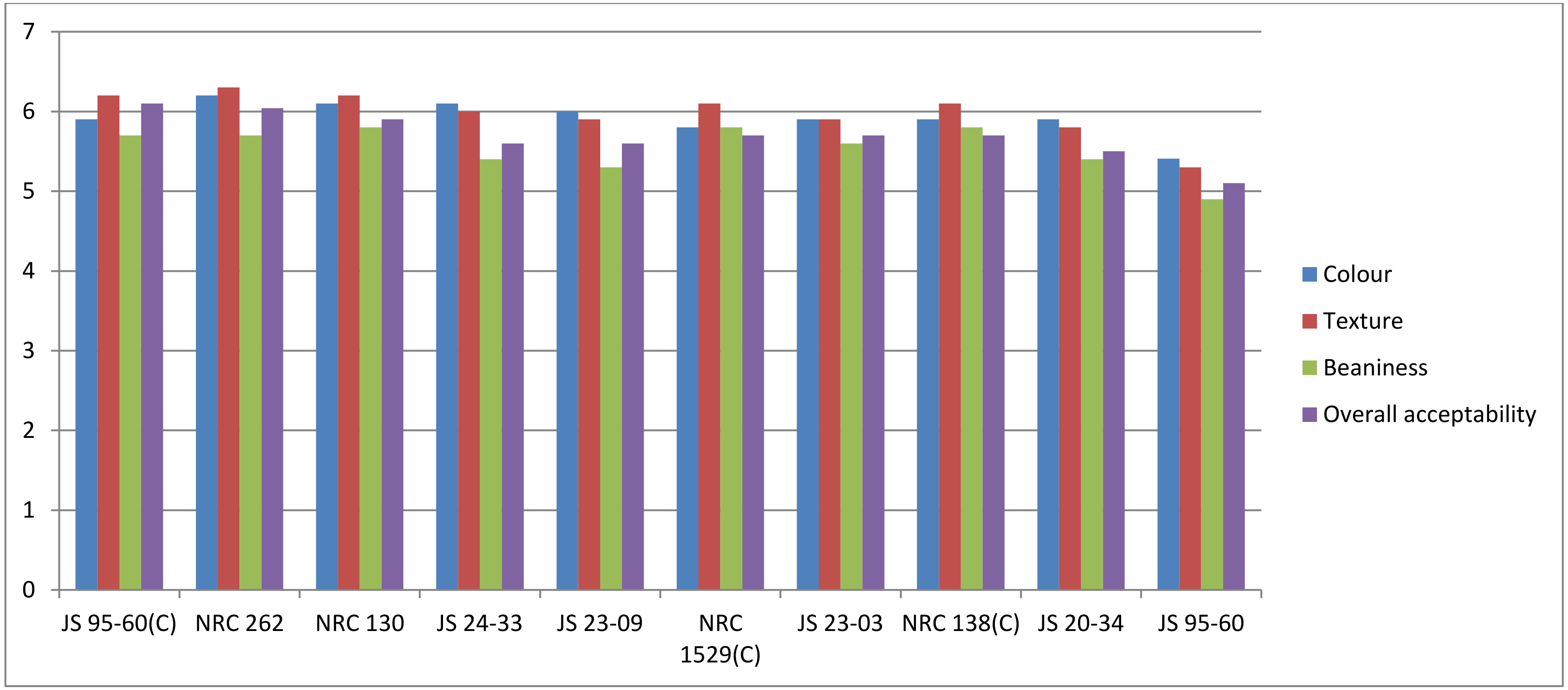

Figure 4: Representation of various sensory parameters of Tofu in AVT I+II entries of Central Zone (CZ)

Results of Eastern Zone (EZ-AVT II):

1. Physical analysis:

In EZ-AVT II trial, 100 seed weight and seed dimension data suggested that entry RSC 11-42 has largest seed weight of 10.01g among all entries [Table 18] and seed dimension of entry RSC 11-42 (5.70mm) were found maximum among all entries.

All entries of EZ had pale brown to yellow seed colour which makes them suitable for soymilk processing [Table 19]. However, entries JS 20-116(C), JS 20-116(Filler), RSC 11-42 had black hilum colour which makes them unsuitable to use in milk analogue processing [Table 19]. However entry AMS 2014-1(C) of EZ had light brown to white hilum colour which is most suitable for milk analogue processing [Table 19].

2. Food grade characteristics

From the tables we may interpret that cooking time among all AVT II entries of Eastern Zone was lesser for entries JS 20-116(C) (26.67min), JS 20-116(Filler) (27.66min) and RSC 11-42 (32.44min) (Table 20). Hydration ratio was highest for JS 20-116(Filler) (2.22) followed by AMS 2014-1(C) and RSC 11-42 for EZ-AVT II entries. Hull fragility was found highest in entries AMS 2014-1(C) (12.56) and RSC 11-42 (12) (Table 20). Maximum protein content of 41.11% was observed in code JS 20-116(C) followed by RSC 11-42 (40.83%) and AMS 2014-1(C) (39.52%) in all the entries of AVT II trial of EZ (Table 22)

Milk yield of entry JS 20-116(C) (8.17 lit/kg) for EZ AVT II were found maximum and tofu yield for entry RSC 11-42 (1.62kg/kg) of EZ AVT II trial was found highest among all entries (Table 21). Sensory evaluation was done by panellist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, our results identified entries JS 20-116(C) and AMS 2014-1(C) of EZ AVT II to be a desirable entry from EZ for soymilk and tofu preparation (Fig 5 and 6).

Table 18: 100 Seed weight (g)

S.No.	Varieties	100 Seed weight (g)					Seed dimension (mm)				
		Raipur	Ranchi	Bhawanipatna	Mean	Rank	Raipur	Ranchi	Bhawanipatna	Mean	Rank
1	JS 20-116(C)	7.64	8.63	10.37	8.88	IV	5.20	5.40	5.36	5.32	IV
2	JS 20-116(Filler)	7.81	9.07	10.64	9.17	III	5.26	5.40	5.50	5.39	III
3	RSC 11-42	7.46	11.33	11.26	10.01	I	5.53	5.83	5.73	5.70	I
4	NRC 128(C)	0.00	12.65	0.00	4.22	V	0.00	6.20	0.00	2.07	V
5	AMS 2014-1(C)	7.74	10.27	11.22	9.74	II	5.26	5.83	5.93	5.67	II
	S.Ed (±)	0.18	0.19	0.29			0.18	0.13	0.18		
	CD	0.43	0.44	0.59			0.42	0.30	0.41		

Table 19: (Seed colour, Hilum colour, Seed lustre)

Sl. No	Varieties	Seed Colour			Hilum colour			Seed Lustre		
		Raipur	Ranchi	Bhawanipatna	Raipur	Ranchi	Bhawanipatna	Raipur	Ranchi	Bhawanipatna
1	JS 20-116(C)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Dark grey (2.5Y 4/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Dull	Shiny	Shiny
2	JS 20-116(Filler)	Pale brown (2.5Y 8/3)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Very dark grey (2.5Y 3/1)	Very dark grey (2.5Y 3/1)	Black (2.5Y 2.5/1)	Shiny	Shiny	Shiny
3	RSC 11-42	Pale brown (2.5Y 8/8)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 7/4)	Black (5YR 2.5/1)	Very dark grey (2.5Y 3/1)	Black (2.5Y 2.5/1)	Dull	Shiny	Shiny
4	NRC 128(C)	-	Pale brown (2.5Y 8/4)	-	-	Greyish brown (2.5Y 5/2)	-	-	Shiny	-
5	AMS 2014-1(C)	Yellow (2.5Y 8/6)	Pale brown (2.5Y 8/4)	Pale brown (2.5Y 8/4)	Brown (10YR 5/3)	Olive brown (2.5Y 4/3)	White (2.5Y 8/1)	Shiny	Shiny	Shiny

Table 20: Cooking time and hydration ratio

S.No.	Varieties	Cooking time					Hydration ratio					Hull Fragility				
		Raipur	Ranchi	Bhawanipatna	Mean	Rank	Raipur	Ranchi	Bhawanipatna	Mean	Rank	Raipur	Ranchi	Bhawanipatna	Mean	Rank
1	JS 20-116(C)	21.67	22.67	35.67	**26.67**	IV	2.02	2.00	2.28	**2.10**	III	7.33	7.00	5.67	6.67	III
2	JS 20-116(Filler)	21.67	23.00	38.33	**27.66**	III	2.22	2.24	2.19	**2.22**	I	4.33	8.67	6.67	6.56	IV
3	RSC 11-42	27.00	33.00	37.33	**32.44**	II	2.19	2.10	2.36	**2.21**	II	13.33	18.00	4.67	12.00	II
4	NRC 128(C)	0.00	33.33	0.00	**11.11**	V	0.00	2.32	0.00	**0.77**	IV	0.00	13.33	0.00	4.44	V
5	AMS 2014-1(C)	26.33	49.67	40.67	**38.89**	I	2.22	2.16	2.27	**2.21**	II	9.33	19.67	8.67	12.56	I
6	S.Ed (±)	0.67	0.83	0.64			0.05	0.04	0.07			0.49	0.50	0.55		
	CD	1.55	1.91	1.49			0.11	0.10	0.17			1.14	1.16	1.28		

Table 21: Food grade characteristics (milk and tofu yield) of AVT II-EZ

S.No.	Varieties	Milk yield (lit/kg)					Tofu yield (kg/kg)				
		Raipur	Ranchi	Bhawanipatna	Mean	Rank	Raipur	Ranchi	Bhawanipatna	Mean	Rank
1	JS 20-116(C)	8.28	7.90	8.33	**8.17**	1	1.51	1.71	1.55	**1.59**	II
2	JS 20-116(Filler)	7.93	8.17	7.80	**7.97**	III	1.67	1.33	1.40	**1.47**	III
3	RSC 11-42	8.06	8.06	8.13	**8.08**	II	1.51	1.68	1.68	**1.62**	I
4	NRC 128(C)	0.00	8.40	0.00	**2.80**	IV	0.00	1.78	0.00	**0.59**	V
5	AMS 2014-1(C)	8.14	7.96	8.14	**8.08**	II	1.64	0.86	0.87	**1.12**	IV
6	S.Ed (±)	0.11	0.07	0.24			0.10	0.03	0.15		
	CD	0.27	0.17	0.56			0.24	0.08	0.35		

Table 22: Food grade characteristics (TSS of milk protein) of AVT II-EZ

S.No.	Varieties	TSS of soymilk (^{0}Brix)					Protein (%)				
		Raipur	Ranchi	Bhawanipatna	Mean	Rank	Raipur	Ranchi	Bhawanipatna	Mean	Rank
1	JS 20-116(C)	5.73	6.30	5.73	**5.92**	III	41.20	40.64	41.48	**41.11**	I
2	JS 20-116(Filler)	6.36	6.56	6.40	**6.44**	I	40.92	38.96	39.80	**39.89**	IV
3	RSC 11-42	5.76	6.40	5.46	**5.87**	IV	41.48	40.92	40.08	**40.83**	II
4	NRC 128(C)	0.00	6.53	0.00	**2.18**	V	0.00	38.40	0.00	**12.80**	V
5	AMS 2014-1(C)	6.26	5.93	5.86	**6.02**	II	39.24	39.52	39.80	**39.52**	III
6	S.Ed (+)	0.29	0.20	0.29			0.98	0.44	0.37		
	CD	0.69	0.46	0.67			2.26	1.02	0.85		

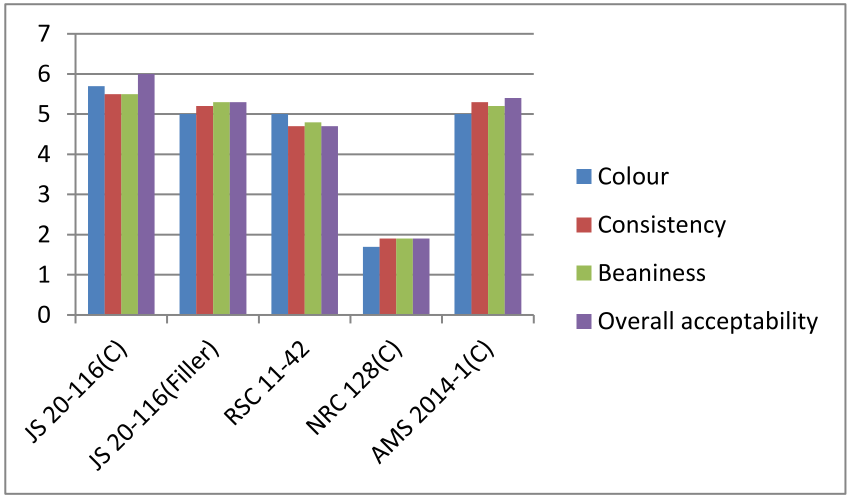

Figure 5: Representation of various sensory parameters of soymilk in AVT II entries of Eastern Zone (EZ)

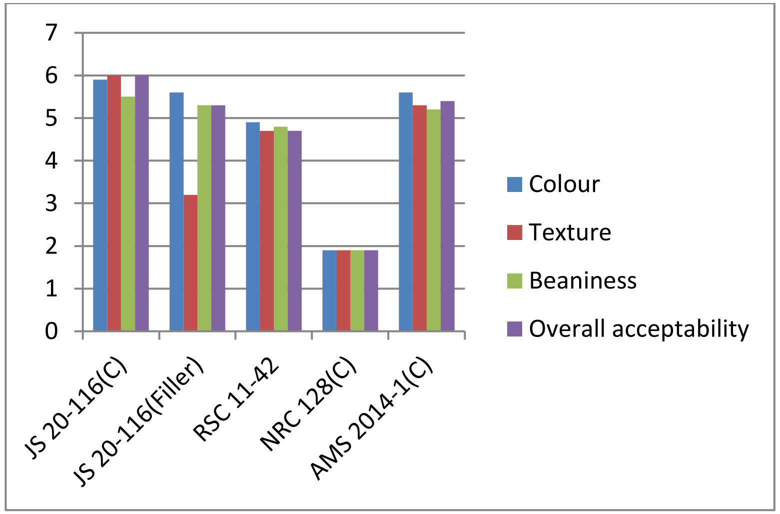

Figure 6: Representation of various sensory parameters of tofu in AVT II entries of Eastern Zone (EZ)

Summary and conclusion

From our multi-location analysis of food grade characteristics tables from three different zones viz., Northern Hill Zone (NHZ), Central Zone (CZ) and Eastern Zone (EZ), we may interpret that cooking time among all AVT II entries was lesser for VLS 99(C)(32.78min), NRC 197(33.33min) and VLS 89 (Filler)(35.89min) for NHZ-AVT II trial, JS 95-60(38.33min), JS 20-34(38.70min) and NRC 130(38.94min) for CZ-AVT I+II; JS 20-116(C)(26.67min), JS 20-116(Filler)(27.66min) and RSC 11-42(32.44) for EZ-AVT II trial. Hydration ratio was highest for VLS 89 (Filler) and VLS 89(C) with 2.27 among all entries (NHZ-AVT II); NRC 130 (2.36) for CZ AVT I+II trial; JS 20-116 (Filler)(2.22) followed by AMS 2014-1(C) and RSC 11-42 for EZ-AVT II entries. Hull fragility was found highest in entries (VLS 99(C), VLS 89(Filler) and VLS 63(C) of NHZ AVT II trial; NRC 130, JS 95-60(C) and JS 95-60 of CZ AVT I+II trial; and for EZ, AMS 2014-1(C), RSC 11-42 were found highest for hull fragility.

Protein content was found highest in VLS 63(C)(39.33%), NRC 197(39.20%) and VLS 99(C) (39.05%) for NHZ AVT II; for CZ AVT I+II trial, NRC 130(40.16%) and NRC 138(C) (40.09%); and JS 20-116(C) with protein content of 41.11 was found highest among all the entries of AVT II trial.

Milk yield of entry VLS 99(C) (8.51lit/kg) of NHZ-AVT II; NRC 1529(C)(8.43) and NRC 130(8.35) for CZ AVT I+II; and JS 20-116(C)(8.17 lit/kg) for EZ AVT II were found maximum and tofu yield for VLS 99(C) (1.79 kg/kg) of NHZ AVT II trial, JS 95-60(C) (1.61kg/kg) of CZ-AVT I+II trial, RSC 11-42 (1.62kg/kg) of EZ AVT II trial was highest. Sensory evaluation was done by panellist on 9 point hedonic scale by semi-trained panellists. Keeping score 6 as acceptable sensory score, entries VLS 99(C), NRC 197, VLS 63(C) of NHZ AVT II; NRC 262, NRC 130, NRC 138(C) of CZ AVT I+II; and JS 20-116(C) of EZ 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 Hill Zone (NHZ), Central Zone (CZ) and Eastern Zone (EZ).

अग्रिम पंक्ति प्रदर्शन
Frontline Demonstration

Principal Investigator : Dr. B.U. Dupare, 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

- **Central Zone**
  Indore (Madhya Pradesh) : Dr. B.U. Dupare
  Sehore (Madhya Pradesh) : Dr. R. P. Singh
  Kota (Rajasthan) : Dr. D.S. Meena
  Parbhani (Maharashtra) : Dr. S.P. Mehtre
  Amravati (Maharashtra) : Dr. M.S. Dandge

  Devgadh Baria (Gujarat) : Dr. H . K. Desai
  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 : Mr. G.B. Vishwanath
  Ugarkhurd (Karnataka) : Mr. Jagadish S. Patwardhan
  Sangli (Maharastra) : Dr. Ratan Kumar Dixit
  KVK, Kanerimath Kolhapur : Dr. Ravindra Singh
  Pune (ARI) : Dr. Pandurang Kale

11. Frontline Demonstration

Progress of the research project: Frontline Demonstrations on Soybean *Kharif* 2023

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, 22 cooperating centres of AICRPS/ ICAR institutes/ Ag. Universities/NGOs/FPOs conducted 869 frontline demonstrations (FLDs) against the allocation of 892 FLDs in plot of 0.40 ha each (Table 8.1 & 8.1a) under rainfed condition with 6 components in 38 districts across 12 states during 2023-24. Madhya Pradesh had maximum FLDs (310) followed by Maharashtra (185), Karnataka (122), Chhattisgarh (100) and Uttarakhand (35). Out of 22 FLDs conducting centres, 5 were in Maharashtra, 4 in Karnataka, 3 in Madhya Pradesh, 2 in Uttarakhand; and one each in rest of the 8 states. Maximum districts (7) were covered in Maharashtra and Karnataka both followed by 6 in Madhya Pradesh, 3 each in Uttarakhand, Himachal Pradesh, Punjab and Manipur, 2 in Nagaland and one each in Rajasthan, Gujrat, Chhattisgarh, Telangana state, (Table 8.1c). The sowing time for soybean crop ranged from June 22 to 04 July in Madhya Pradesh, June 11 to July 25 in Maharashtra, June 22-23 in Rajasthan, July 2 to 15 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* 2023

The physical and financial targets and achievements are presented in (Table 8.1b). The center namely Ugar Khurd, conducted only 12 out of 35 FLDs, adverse climatic conditions and partly due to non-availability of seeds. Of the 869 FLDs conducted during *kharif* 2023, man and farmwomen, respectively represented 86.71% and 13.29%. However, the representation of categories wise beneficiaries was 6.23% by SC, 7.68% by ST, 48.39% by OBC and 37.69% by general (Table 8.2). Data accrued from successful 869 FLDs on all the components (whole package, integrated weed management, integrated nutrient management, integrated pest management, organic farming, food grade variety (FGV) and intercropping) across 22 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 22.90% and 38.33%, respectively over farmers practice. This was succeeded by the additional expenditure of only ₹4523ha^{-1} (Table 8.3). The difference in gross returns due to improved technology and farmer’s practice was 22.33%. Soybean yield as high as [3043 kg ha^{-1} (IP)] and [2495 kgha^{-1} (FP)] could be obtained in some farmer’s field under the improved production technology and farmer's practice at Sangli. The lowest yield under improved technology (1253 kg ha^{-1})) and farmer's practice (942 kg ha^{-1}) was recorded at Devgrah Baria. The zone wise yield analysis indicated that, among six zones, highest % yield increase under improved practices was recorded in eastern zone (78.4%), followed by (fb) north eastern hill zone (33.9%), northern plain zone (31.7%) central zone (23.9%), northern hill zone (21.6%), and southern zone (15.9%) lowest in over farmer's practices. Further, zone wise average highest and lowest yield was observed in southern zone (2067 kg ha^{-1}) and northern hill zone (1352 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 610,71ha^{-1}) and farmer's practices (Rs 49,253 ha^{-1}). Similarly, lowest net profit was recorded in northern hill zone under improved practices (Rs 45368ha^{-1}) and northern hill zone under farmer's practices (Rs 31,551 ha^{-1}). However, highest % net profit increase was observed under eastern zone (109.6%), fb northern plain zone (61.1%) northern hill zone (43.8%), central zone (37.2.5%), north eastern hill zone (24.0%), and southern zone (21.3%) lowest % net profit increase was observed in over farmer's practices (Figure 2). The yield gap II estimation (Table 8.3) across 22 centers revealed that, highest was observed at Raipur (779 kgha^{-1}) and lowest was at Kota (141 kg ha^{-1}). However, the average estimated yield gap II was 354 kg ha^{-1} across 26 centers in India. Total 33 improved varieties were demonstrated in farmer's fields (Table 8.4, 8.4.1 & 8.4.2). The maximum demonstrations were conducted on variety NRC 142 followed by KDS 726. Among the varieties MAUS 612 (Southern zone & Maharashtra) gave highest yield (2979 kg ha^{-1}) followed by MAUS 158 (Southern zone & Maharashtra) (2774 kg ha^{-1}), MACS 1407 (Southern zone & Maharashtra) (2750 kg ha^{-1}) under improved practices. However, lowest yield was recorded with Karune (Southern zone and Karnataka) (1090 kg ha^{-1}). The details of cost of soybean cultivation of 22 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 12.80% 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, hand weeding and inter-culture operations, threshing, harvesting, other cost, insecticide application, herbicide application, irrigation, bird watching, fungicide application and seed treatment. However, in case of farmer's practices the trend was manure application, seed and sowing, hand weeding and inter-culture operations, land preparation, harvesting, fertilizer application, threshing, other cost, insecticide application, herbicide application, fungicide application irrigation, bird watching, and seed treatment.

2. Types of demonstrations

The 869 FLDs on soybean were conducted with 7 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 (466) FLDs were conducted on WP component followed by FGV (250), IWM (60), IC (51), INM (20), IPM (15) and OF (7). Variety wise analysis was also done to see the performance of demonstrated improved varieties. There were total of 33 improved soybean varieties demonstrated under different FLDs components (Table 8.4, 8.4a-8.4g). Maximum (29) varieties were demonstrated in WP followed by IC (07), IWM (08), INM (05), IPM (03), and OF (02). 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* 2023, 20 centers have conducted 466 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 21.64 and 30.67 %, respectively over farmers practice. This was achieved by the additional expenditure of only ₹4547 ha^{-1} (Table 8.3a). The difference in gross returns due to improved technology and farmer's practice was 21.08%. The highest soybean seed yield was received under the improved production technology at Sangali (3043 kg ha^{-1}) and Kolhapur (2445 kg ha^{-1}). Whereas, under farmer's practices, highest seed yield obtained at Sangali (2495 kg ha^{-1})). The lowest yield under improved technology Bangaluru (1244 kg ha^{-1}) and farmer's practice (942 kg ha^{-1}) was recorded at DevgrahBaria. The zone wise yield analysis indicated that, among six zones, highest percentage yield increase under improved practices was recorded in eastern zone (77.9.%) followed by (fb) north eastern hill zone (31.8%) and northern plain zone (31.7%). Lowest yield increase percentage was observed in southern zone (16.3%) followed by central zone (19.6%) and northern hill zone (22.7%) over farmer's practices. Further, zone wise average highest and lowest yield was observed in southern zone (2112 kg ha^{-1}) and north eastern hill zone (1379 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 66366 ha^{-1}) and farmer's practices (Rs 52549 ha^{-1}), same as lowest net profit was recorded in northern hill zone (Rs 45368 ha^{-1}) under improved practices and eastern zone (Rs 23803 ha^{-1}) under farmer's practices. However, highest percentage net profit increase was under eastern zone (110.5%), followed by northern hill zone (43.8%) and central zone (28.3%). Lowest percentage net profit increase was observed in northern plain zone (11.3%), followed by southern zone (19.5%) and north eastern hill zone (26.3%) over farmer practices (Figure 8.2a). The yield gap II estimation (Table 8.3a) across 24 centers revealed that, highest was observed in Raipur (781 kg ha^{-1}) and lowest was in Bengaluru (141 kg ha^{-1}). However, the average estimated yield gap I was 332 kg ha^{-1} across 20 centers under whole package demonstrations. The details of soybean cost of cultivation have worked out in all 20 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 11.5% as compared to farmers practice. Under the improved production technology, the trend of expenditure was in line- manure application, followed by seed and sowing, hand weeding and inter-culture operation, land preparation, fertilizer application, threshing, harvesting, other cost, insecticide, herbicide application, irrigation, bird watching, fungicide application, and seed treatment. However, in case of farmer's practices the trend was manure application, followed by, seed and sowing, hand weeding and inter-culture operation, land preparation, harvesting, fertilizer, threshing, other cost, insecticide, herbicide application, fungicide application, irrigation, bird watching, and seed treatment.

2.1.2 Soybean varietal performance under WP demonstrations

In 466 frontline demonstrations under whole package component, a total of 29 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 726 followed by CG Soya-1. Among the cultivars, MACS 1407 (Southern zone and Maharashtra) and RVS 11-35 (Central zone Madhya Pradesh) gave highest yield (2750 kg ha^{-1}) and (2647 kg ha^{-1}) respectively followed by KDS-753 (Southern zone and Maharashtra) (2416 kg ha^{-1}), AISb-50 (Southern zone and Telangana) (2347 kg ha^{-1}) under improved practices. However, lowest yield was recorded with Karune (Southern zone and Karnataka) (1090 kg/ha)

2.2. Integrated Weed Management (IWM) FLDs of soybean

2.2.1 Soybean yield and economics under IWM demonstrations

In IWM component, around 05 centers were conducted 60 FLDs during *kharif* 2023. 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 29.56 and 40.17%, respectively over farmers practice. This was achieved by the additional expenditure of only ₹5830 ha^{-1} (Table 8.3b). The difference in gross returns due to improved technology over farmer's practice was 29.02%. Soybean yield, high as 2216-2170 kg ha^{-1} (IP- Adilabad and Sehore) and 1979-1538 kg ha^{-1} (FP-Adilabad and Sehore) 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 Dharwad (1698 kg ha^{-1}) and farmer's practice was recorded at Raipur (968 kg ha^{-1}). The zone wise yield analysis showed that, among four zones, % yield increase under improved practices was recorded highest in eastern zone (78.9%) followed by (fb) central zone (41.1%) and Lowest yield increase % was shown in southern zone (11.6%) fb northern plain zone (27.9%) over farmer's practices. Furthermore, zone wise average highest and lowest yield was observed in Central zone and Eastern Zone respectively (2170 kg ha^{-1} and 1732 kg ha^{-1}) under improved practices. Whereas, in farmer practices maximum yield in Southern Zone (1754 kg ha^{-1}) and minimum yield in eastern zone (968 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 67245 ha^{-1}) and farmer's practices (Rs 43088 ha^{-1}). Similarly, lowest net profit was recorded in northern plain zone under IP (Rs 44958 ha^{-1}) and eastern zone under FP (Rs 22270 ha^{-1}). However, highest % net profit increase was observed under eastern zone (114.2%), fb central zone (56.1%) and northern plain zone (41.4%), Lowest net profit increase % was observed in southern zone (11.9%) over farmer practices (Figure 8.2b). However, the yield gap II estimation (Table 8.3b) across 05 centers was found highest in Raipur (764 kg ha^{-1}) and lowest was in Dharwad (169 kg ha^{-1}). The average estimated yield gap I was 441 kg ha^{-1} under IWM component across 5 centers. The details of cost of soybean cultivation of 05 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 16.51% 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, fungicide application, insecticide application, hand weeding and inter-culture operations, herbicide application, threshing, harvesting, bird watching, other cost, and seed treatment, irrigation, manure application. Conversely, in case of farmer's practices the trend was seed and sowing, land preparation, fertilizer application, herbicide application, hand weeding and inter-culture operations, harvesting, threshing, insecticide application, fungicide application, bird watching, other cost, seed treatment, irrigation and manure application,.

2.2.2 Soybean varietal performance under IWM demonstrations

Under integrated weed management component, a total of 8 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 26. Among the varieties, RVS 11-35 gave highest yield (Central zone Madhya Pradesh) (2260 kg ha^{-1}) followed by MAUS-612 (Southern zone and Telangana) (2147 kg ha^{-1}) and RVS 24 (Central zone Madhya Pradesh) (2080 kg ha^{-1}) under improved practices. However, lowest yield was recorded with KDS 726 (Southern zone and Karnataka as 1577 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 20 FLDs conducted by 03 centers during *kharif* 2023. 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 33.01 and 38.34 %, respectively. Which was achieved by the additional expenditure of ₹8199 ha^{-1} (Table 3c). The gross returns increase percentage was observed 31.92 % in improved technology over farmer's practice. Soybean yield, high as 1828-1795 kg ha^{-1} (IP-Dharwad and Raipur), 1645-1390 kg ha^{-1} (FP- Dharwad and Pantnagar), and the lowest yield under improved practices (IP) and farmer's practice (FP) was recorded at (IP-1760 kg ha^{-1} Pantnagar and FP-1012 kg ha^{-1} Raipur$^{)}$. The zone wise yield analysis showed that, among three zones, percentage yield increase under improved practices was recorded highest in eastern zone (77.4%) and lowest was in southern zone (11.1%) over farmer's practices. Further, zone wise average highest yield in southern zone (1828 kg ha^{-1}) and lowest yield (1760 kg ha^{-1}) was observed in Northern Plain Zone under improved practices. Whereas, southern zone was recorded highest (1645 kg ha^{-1}) and lowest yield (1012 kg ha^{-1}) in eastern zone under farmer's practices (Figure 1c). The zone wise profit analysis indicated that, highest (Rs 49068 ha^{-1}) in southern zone and lowest (Rs 40473 ha^{-1}) net returns was recorded in Northern Plain Zone under improved practices. Similarly, under farmer's practices, the southern recorded maximum (Rs 45869 ha^{-1}) and eastern zone recorded minimum net profit (Rs 24287 ha^{-1}). However, highest net profit increase percentage was recorded under eastern zone (95.7%) and lowest in southern zone (7%) (Figure 2c). The yield gap I estimation (Table 8.3c) across 03 centers, recorded maximum YG-II in Raipur (783 kg ha^{-1}) and minimum in Dharwad (183 kg ha^{-1}). However, the average estimated yield gap I was 445 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 25.37% as compared to farmers practice. Under the improved production technology, the trend of expenditure was in line: seed and sowing, fertilizer application, land preparation, weeding and inter-culture operations, threshing, insecticide application, herbicide application, harvesting, bird watching, other cost, seed treatment, fungicide application, irrigation, manure application. In case of farmer's practices the trend was seed and sowing, land preparation, hand weeding and inter-culture operations, fertilizer application, threshing, herbicide application, harvesting, insecticide application, bird watching, other cost, fungicide application, seed treatment, irrigation, and manure application.

2.3.2 Soybean varietal performance under INM demonstrations

Total of 5 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 JS 20-116 followed by PS-26 and JS 93-05. Among the varieties, JS 93-05 (Southern zone and Karnataka) gave highest yield (1895 kg ha^{-1}) followed by DSb 21 (Southern zone and Karnataka) (1833 kg ha^{-1}) and JS 20-116 (Eastern zone and Chhattisgarh) (1795 kg ha^{-1}) under improved practices. However, lowest yield was recorded with KDS 726 (Southern zone and Karnataka) (1625 kg ha^{-1}).

2.4 Integrated Pest Management (IPM) FLDs of soybean

2.4.1 Soybean yield and economics under IPM demonstrations

The 02 centers were conducted 15 FLDs on IPM component during *kharif* 2023. The adoption of research shown improved soybean production technology in IPM component increased soybean yield and net returns to the tune of 36.72% and 44.54 %, respectively over farmer's practice. Further, was achieved with the additional expenditure of only ₹8389 ha^{-1} (Table 8.3d). Around, 34.77% increased gross return was recorded in improved technology over farmer's practice. However, highest soybean yield was recorded in Raipur (1824 kg ha^{-1}) and lowest in Dharwad (1814 kg ha^{-1}) under improved practices. Similarly, Dharwad recorded maximum yield (1641 kg ha^{-1}) and Raipur recorded minimum yield ((1020 kg ha^{-1}) under farmer's practice. The zone wise yield analysis showed that, between two zones, percentage yield increase under improved practices over farmer's practices was recorded highest in eastern zone (78.8%) and lowest in southern zone (10.5%). Further, highest (1824 kg ha^{-1}) in eastern zone and lowest yield (1814 kg ha^{-1}) was recorded in southern zone under improved practices. Whereas, under farmer practices southern zone was recorded maximum (1641 kg ha^{-1}) and minimum (1020 kg ha^{-1}) in eastern zone soybean yield (Figure 8.1d). The zone wise profit analysis indicated that, highest (Rs 51185 ha^{-1}) in eastern zone and lowest (Rs 48298 ha^{-1}) net returns was recorded in southern zone under improved practices. Whereas, under farmer's practices, southern zone was recorded maximum (Rs 50913 ha^{-1}) and zone eastern minimum net profit (Rs 24645 ha^{-1}). However, highest net profit increase % under improved practices was recorded at eastern zone (107.7%) and lowest (5.8%) was in southern zone over farmer practices (Figure 8.2d). Yield gap II estimation (Table 8.3d) across 02 centers, recorded maximum YG-I at Raipur (804 kg ha^{-1}) and minimum at Dharwad (173 kg ha^{-1}). However, the average estimated yield gap I was 489 kg ha^{-1} across two centers. The details of cost of soybean cultivation of 02 centers were worked out. The cost of cultivation (Table 8.5d) showed that, soybean cultivation cost increased under improved technology to the tune of 27.09% over farmers practice. Under the improved technology, the trend of expenditure was in line: seed and sowing, fertilizer application, land preparation, hand weeding and inter-culture operations, threshing, insecticide application, bird watching, harvesting, herbicide application, other cost, seed treatment, irrigation, fungicide application and manure application. In case of farmer's practices the trend was seed and sowing, hand weeding and inter-culture operations, land preparation, threshing, fertilizer application, harvesting, bird watching, other cost herbicide application, insecticide application, fungicide application, seed treatment, irrigation and manure application.

2.4.2 Soybean varietal performance under IPM demonstrations

Under component IPM, total 03 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 DSb 21 and JS 9305. Among the varieties, JS 93-05 (Southern zone and Karnataka) gave highest yield (1923 kg ha^{-1}) followed by CG Soya-1 (Eastern zone and Chhattisgarh) (1824 kg ha^{-1}) under improved practices. However, DSb 21 (Southern zone and Karnataka) (1741 kg ha^{-1}) recorded lowest yield.

2.5 Organic farming (OF) FLDs of soybean

2.5.1 Soybean yield and economics under OF demonstrations

During *kharif* 2023, 02 centers have conducted 7 FLDs on organic farming component. The adoption organic farming practices under improved technology increased the soybean yield and net returns to the tune of 35.79% and 18.99%, respectively, over farmer's practices, which was achieved with the additional expenditure of only ₹18883 ha^{-1} (Table 8.3e). The increased percentage of gross returns in improved technology over farmer’s practice was 35.22%. The highest soybean yield was recorded at Medziphema (1333 kg ha^{-1}) under improved practices. Whereas, under farmer's practices highest yield was recorded at Imphal (967 kg ha-1). The lowest yield under improved technology Imphal (1270 kg ha^{-1}) and farmer’s practice (950 kg ha^{-1}) was recorded at Medziphema. The zone wise yield analysis showed that, zone yield increase % under improved practices over farmer’s practices was recorded in north eastern hill zone (35.8%). The yield was recorded with north eastern hill zone (IP-1302 kg ha^{-1} and FP-959 kg ha^{-1}) under both improved and farmer's practices (Figure 1e). The zone wise profit analysis indicated that, net profit was recorded in north eastern hill zone (IP-Rs 51103 ha^{-1} and FP- Rs 42946 ha^{-1}) However, net profit % increased under improved practices was recorded in north eastern hill zone (19.0%) over farmer practices. (Figure 8.2e). The yield gap I estimation (Table 8.3e) across 02 centers revealed that, maximum YG-I was observed in Medziphema (383 kg ha^{-1}) and minimum in Imphal (303 kg ha^{-1}). However, the average estimated YG-I was 343 kg ha^{-1} across two centers. The details of cost of soybean cultivation of 02 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, threshing, land preparation, insecticide application, harvesting, other cost, seed treatment and bird watching. In case of farmer's practices the trend was seed and sowing, hand weeding and inter-culture operations, manure application, threshing, land preparation, harvesting, other cost, insecticide application, bird watching and fertilizer application.

2.5.2 Soybean varietal performance under OF demonstrations

In organic farming component, only 2 improved varieties were demonstrated (Table 8.4e, 8.4.1e and 8.4.2e). The maximum demonstrations were conducted on variety MACS 1460 followed by DSb 32. Among the varieties, MACS 1460 (North eastern hill zone and Nagaland) gave highest yield (1333 kg ha^{-1}) and lowest yield was recorded with DSb 32 (North eastern hill zone and Manipur) (1270 kg ha^{-1}) under improved practices.

2.6 Food Grade Variety (FGV)

2.6.1 Soybean yield and economics under FGV demonstrations

During *kharif* 2023, only 01 centers, i.e. Indore have conducted FLDs (250 Nos.) on food grade variety component. The adoption food grade variety under improved technology increased the soybean yield and net returns to the tune of 30.53% and 36.65%, respectively, over farmer's practices and was achieved with the additional expenditure of only ₹6577 ha^{-1} (Table 8.3f). The increased percentage of gross returns in improved technology over farmer’s practice was 30.53%. The soybean yield was recorded at Indore (1693 kg ha^{-1}) under improved practices. Whereas, under farmer's practices yield was recorded at Indore (1297 kg ha^{-1}). The zone wise yield analysis showed that, zone yield increase percentage under improved practices over farmer’s practices was recorded in Central zone (30.53%). The yield of 1693 kg ha^{-1}was recorded in this zone under improved technology compared to 1297 kg ha^{-1} under farmer's practices (Figure 1f). The zone wise profit analysis indicated that, net profit of 36.7% was recorded in Central zone (IP-Rs 43403 ha^{-1} and FP- Rs 31762 ha^{-1}). (Figure 8.2f). The yield gap I estimation (Table 8.3f) of Indore center revealed that, YG-I was observed in Indore (396 kg ha^{-1}). The details of cost of soybean cultivation of 01 centers have worked out. The cost of cultivation (Table 8.5f) showed that, the soybean cultivation cost increased under improved technology to the tune of 23.57% over farmers practice. Under the improved technology, the trend of expenditure was in line: seed and sowing, manure application, land preparation, fertilizer application, harvesting, herbicide application, threshing, insecticide application, hand weeding and inter-culture operations, Irrigation, fungicide application, seed treatment, bird watching and other cost. In case of farmer's practices the trend was seed and sowing, fertilizer application, harvesting, land preparation, threshing, hand weeding and inter-culture operations, herbicide application, insecticide application, seed treatment, manure application, other cost and bird watching.

2.6.2 Soybean varietal performance under FGV demonstrations

In food grade variety component, only 1 improved variety was demonstrated (Table 8.4e, 8.4.1e and 8.4.2f). The demonstrations were conducted on variety NRC 142 (Central zone Madhya Pradesh) gave yield (1693 kg ha^{-1}) under improved practices.

2.6 Intercropping (IC) FLDs of soybean

2.6.1 Soybean yield and economics under IC demonstrations

Under intercropping component, 5 centers were allotted to conduct FLDs, out of which only one centers has send the report with intercrop data. Parbhani center has conducted 10 FLDs under intercropping component during *kharif* 2023. The adoption of IC component has improved soybean yield and net returns to the tune of 22.40% and 34.40% over farmer's practices with the additional expenditure of only Rs 1900 ha^{-1} under intercropping systems (soybean + pigeon pea,) (Table 8.3g). The 21.77% more gross return was recorded in improved technology over farmer's practice. The soybean yield under intercropping systems were recorded under improved technology at Parbhani (2131 kg ha^{-1} Whereas, in farmer practices Parbhani (1741 kg ha^{-1}), The soybean equivalent yield (SEY) was recorded under improved practices and farmer's practices at Parbhani (3701 kg ha^{-1} and 3095 kg ha^{-1}) under soybean + pigeon pea intercropping However, the SEY increased under improved technology over farmer practices was 19.6%. The zone wise yield analysis showed that 78.4% soybean yield increase was recorded in Eastern zone under improved practices as compared to farmer practices. Further, soybean yield recorded in Eastern zone (IP-1773 kg ha^{-1} and FP-994 kg ha^{-1}) and lowest seed yield was recorded in Northern Hill zone (IP-1475 kg ha^{-1} and FP-1213 kg ha^{-1}) under improved (IP) and farmer's practices (FP), respectively (Figure 1g). The zone wise profit analysis indicated that, the highest net return was recorded in Eastern zone under soybean + pigeonpea intercropping system (IP- Rs 49208 ha^{-1} and FP- Rs 23476 ha^{-1}). The percent increase net profit (114.2%) was recorded under Eastern zone with integrated weed management component (Figure 8.2b). The yield gap SEY estimation and I (Table 8.3g) showed, yield gap I was observed in Parbhani (390 kg ha^{-1}) and similarly, SEY yield gap I highest observed in Parbhani (606 kg ha^{-1}). The details of cost of soybean cultivation of 01 centers have worked out. The cost of cultivation (Table 8.5g) observed that, the soybean intercropping cultivation cost increased under improved technology to the tune only of 3.51% over farmer's practices. Under the improved technology, the trend of expenditure was in line: threshing, seed and sowing, fertilizer application, harvesting, land preparation, insecticide application, other cost, fungicide application hand weeding and inter-culture operations, seed treatment, manure application, irrigation, herbicide application, and bird watching. In the case of farmers' practice, the trend was seed and sowing, harvesting, threshing, land preparation, insecticide application, fertilizer application, other cost, fungicide application, hand weeding and inter-culture operations, irrigation, manure application, herbicide application, bird watching and seed treatment

2.6.2 Soybean varietal performance under IC demonstrations

With regard to the FLDs on intercropping component, the data related to only one FLD center, i.e. Parbhani is included as the sugarcane as intercrop is not yet harvested in other FLD centers. Total 04 improved soybean varieties were demonstrated at Parbhani centers in intercropping system (Table 8.4g, 8.4.1g and 8.4.2g). The maximum demonstrations included soybean varieties like MAUS 612 followed by MAUS 158 and MAUS 162. Among the varieties, AMS100-39 gave highest yield (2270 kg ha^{-1}) fb MAUS 612 (2055 kg ha^{-1}), MAUS 158 (2210 kg ha^{-1}) (Central zone and Maharashtra) and lowest yield was recorded with MAUS 162 (Central zone and Maharashtra) (1988 kg ha^{-1}) under improved practices. However, highest SEY observed in AMS100-39 (3943 kg ha^{-1}), MAUS 612 (3744 kg ha^{-1}) and MAUS 158 (3684kg ha^{-1}) (Central zone and Maharashtra). Lowest SEY was recorded with MAUS 162 (3433kg ha^{-1}) (Central zone and Maharashtra) under improved technology.

3. Training of field level extension workers and farmers under FLDs programme

Three farmers' training (Raipur, Devgrah Baria and Pune) and two-extension officers/input dealer's trainings (IISR Indore and Raipur) have been successfully conducted by four centers across 4 states (Madhya Pradesh, Chhattisgarh, Gujarat and Maharashtra) in India during 2023-24.

S. No.	Organizing FLDs centers	Type of training	Zone	State of participants	Place of training	Dates	No. of participants
1	IISR Indore	Ext. officers/Input dealers training	CZ	Madhya Pradesh	ICAR-IISR, Indore	6-8 Feb 2024	63
2	Raipur	Ext. officers/Input dealers training	EZ	Chhattisgarh	KVK, Kanker	18.10.2023	57
3	Raipur	Farmers training	EZ	Chhattisgarh	Kawardha	10.10.2023	54
4	DevgrahBaria (TRTC)	Farmers training	CZ	Gujarat	TRTC, AAU, Devgarh Baria,	13.12.2023	50
5	Pune (ARI)	Farmers training	SZ	Maharashtra	ARI, Pune	28.02.2024	95

Table 8.1 Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop 2023-24.

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	2023-24

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	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
2	Almora (VPKAS)	UK	NHZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
3	Pantnagar (GBPUA&T)	UK	NPZ	10	10	5	0	0	0	0	**25**	4	4	2	0	0	0	0	**10**
4	Ludhiana (PAU)	PB	NPZ	12	0	0	0	0	0	0	**12**	4.8	0	0	0	0	0	0	**4.8**
5	Indore (IISR/AICRPS)	MP	CZ	0	0	0	0	0	250	0	**250**	0	0	0	0	0	100	0	**100**
6	Sehore (RVSKVV)	MP	CZ	0	10	0	0	0	0	0	**10**	0	4	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	14	0	0	0	6	0	0	**20**	5.6	0	0	0	2.4	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	10	0	0	0	5	0	0	**15**	4	0	0	0	2	0	0	**6**
12	UAS, Dharwad	KA	SZ	10	5	5	5	0	0	0	**25**	4	2	2	2	0	0	0	**10**
13	PJTSAU,Adilabad	TS	SZ	10	5	0	0	0	0	0	**15**	4	2	0	0	0	0	0	**6**
14	Medziphema	NL	NEHZ	5	0	0	0	0	0	5	**10**	2	0	0	0	0	0	2	**4**
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	35	0	0	0	0	0	0	**35**	14	0	0	0	0	0	0	**14**
16	Raipur (IGKVV)	CG	EZ	50	30	10	10	0	0	0	**100**	20	12	4	4	0	0	0	**40**
17	CAU, Imphal	MN	NEHZ	8	0	0	0	0	0	2	**10**	3.2	0	0	0	0	0	0.8	**4**
18	DevgrahBaria (TRTC)	GJ	CZ	30	0	0	0	0	0	0	**30**	12	0	0	0	0	0	0	**12**
19	KVK, Belagavi	KA	SZ	60	0	0	0	15	0	0	**75**	24	0	0	0	6	0	0	**30**
20	AICRP Bengaluru	KA	SZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
21	KVK, Kanerimath, Kolhapur	MH	SZ	60	0	0	0	15	0	0	**75**	24	0	0	0	6	0	0	**30**
22	Sipani farm, Mandsaur	MP	CZ	50	0	0	0	0	0	0	**50**	20	0	0	0	0	0	0	**20**
Total				**489**	**60**	**20**	**15**	**51**	**250**	**7**	**892**	**196**	**24**	**8**	**6**	**20.4**	**100**	**2.8**	**357**

*FLD not conducted

Table 8.1a Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop 2023-24.

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	10	0	0	0	0	0	0	**10**	3.3	0	0	0	0	0	0	**3.3**
2	Almora (VPKAS)	UK	NHZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
3	Pantnagar (GBPUA&T)	UK	NPZ	10	10	5	0	0	0	0	**25**	4	4	2	0	0	0	0	**10**
4	Ludhiana (PAU)	PB	NPZ	12	0	0	0	0	0	0	**12**	4.8	0	0	0	0	0	0	**4.8**
5	Indore (IISR/AICRPS)	MP	CZ	0	0	0	0	0	250	0	**250**	0	0	0	0	0	100	0	**100**
6	Sehore (RVSKVV)	MP	CZ	0	10	0	0	0	0	0	**10**	0	4	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	14	0	0	0	6	0	0	**20**	5.6	0	0	0	2.4	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	10	0	0	0	5	0	0	**15**	4	0	0	0	2	0	0	**6**
12	UAS, Dharwad	KA	SZ	10	5	5	5	0	0	0	**25**	4	2	2	2	0	0	0	**10**
13	PJTSAU,Adilabad	TS	SZ	10	5	0	0	0	0	0	**15**	4	2	0	0	0	0	0	**6**
14	Medziphema	NL	NEHZ	5	0	0	0	0	0	5	**10**	2	0	0	0	0	0	2	**4**
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	12	0	0	0	0	0	0	**12**	4.8	0	0	0	0	0	0	**4.8**
16	Raipur (IGKVV)	CG	EZ	50	30	10	10	0	0	0	**100**	20	12	4	4	0	0	0	**40**
17	CAU, Imphal	MN	NEHZ	8	0	0	0	0	0	2	**10**	3.2	0	0	0	0	0	0.8	**4**
18	DevgrahBaria (TRTC)	GJ	CZ	30	0	0	0	0	0	0	**30**	12	0	0	0	0	0	0	**12**
19	KVK, Belagavi	KA	SZ	60	0	0	0	15	0	0	**75**	24	0	0	0	6	0	0	**30**
20	AICRP Bengaluru	KA	SZ	10	0	0	0	0	0	0	**10**	4	0	0	0	0	0	0	**4**
21	KVK, Kanerimath, Kolhapur	MH	SZ	60	0	0	0	15	0	0	**75**	24	0	0	0	6	0	0	**30**
22	Sipani farm, Mandsaur	MP	CZ	50	0	0	0	0	0	0	**50**	20	0	0	0	0	0	0	**20**
Total				**466**	**60**	**20**	**15**	**51**	**250**	**7**	**869**	**186**	**24**	**8**	**6**	**20.4**	**100**	**2.8**	**346.9**

Table 8.1b Final Progress Report of Frontline Demonstrations (FLDs) of SOYBEAN crop 2023-24.

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	-	-	-	-	0	30000	30000
2	Almora (VPKAS)	UK	NHZ	-	-	-	-	0	30000	30000
3	Pantnagar (GBPUA&T)	UK	NPZ	-	-	-	-	0	75000	75000
4	Ludhiana (PAU)	PB	NPZ	-	-	-	-	0	36000	36000
5	Indore (IISR/AICRPS)	MP	CZ	1	1	-	-	36000	750000	786000
6	Sehore (RVSKVV)	MP	CZ	-	-	-	-	0	30000	30000
7	Kota (MPUA&T)	RJ	CZ	-	-	-	-	0	90000	90000
8	Parbhani (MAU)	MH	CZ	-	-	-	-	0	150000	150000
9	Amravati (PDKV)	MH	CZ	-	-	-	-	0	60000	60000
10	Kasbe digraj, Sangli (MPKV)	MH	SZ	-	-	-	-	0	75000	75000
11	Pune (ARI)	MH	SZ	-	-	1	1	24000	45000	69000
12	UAS, Dharwad	KA	SZ	-	-	-	-	0	75000	75000
13	PJTSAU,Adilabad	TS	SZ	-	-	-	-	0	45000	45000
14	Medziphema	NL	NEHZ	-	-	-	-	0	30000	30000
15	*Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	-	-	-	-	0	105000	105000
16	Raipur (IGKVV)	CG	EZ	1	1	1	1	60000	300000	360000
17	CAU, Imphal	MN	NEHZ	0	0	-	-	0	30000	30000
18	DevgrahBaria (TRTC)	GJ	CZ	-	-	1	1	24000	90000	114000
19	KVK, Belagavi	KA	SZ	-	-	-	-	0	225000	225000
20	AICRP Bengaluru	KA	SZ	-	-	-	-	0	30000	30000
21	KVK, Kanerimath, Kolhapur	MH	SZ	-	-	-	-	0	225000	225000
22	Sipani farm, Mandsaur	MP	CZ	-	-	-	-	0	150000	150000
Total				**2**	**2**	**3**	**3**	**144000**	**2676000**	**2820000**

* not conduct all FLD only 12 conducted

Table 8.1c State Wise Frontline Demonstrations (FLDs) on Soybean conducted during *Kharif* 2023-24.

S. No.	State	Name of implementing center	Total FLDs conducted	Zone	District covered	Period of sowing 2023
1	Himachal Pradesh	Palampur (CSKHPKV)	10	NHZ	Kangra, Solan, Mandi	25.05.2023 to 30.06.2023
2	Uttarakhand	Almora (VPKAS)	10	NHZ	Almora	2nd forthnight of June
3	Uttarakhand	Pantnagar (GBPUA&T)	25	NPZ	Nainital, Udham Singh nagar	2nd forthnight of June
4	Punjab	Ludhiana (PAU)	12	NPZ	Hoshiarpur, Ludhiana, Sangrur,	06.06.2023 to 02.07.2023
5	Madhya Pradesh	Indore (IISR/AICRPS)	250	CZ	Indore, Khandwa, Khargon, Betul	22.06.2023 to 04.07.2023
6	Madhya Pradesh	Sehore (RVSKVV)	10	CZ	Sehore	25.06.2023 to 02.07.2023
7	Rajasthan	Kota (MPUA&T)	30	CZ	Kota	22 & 23.06.2023
8	Maharashtra	Parbhani (MAU)	50	CZ	Parbhani, Hingoli	first week of July to last week of July
9	Maharashtra	Amravati (PDKV)	20	CZ	Amravati	22.06.2023 to 07.07.2023
10	Maharashtra	Kasbe digraj, Sangli (MPKV)	25	SZ	Sangli,Satara	11.06.2023 to 25.06.2023
11	Maharashtra	Pune (ARI)	15	SZ	Pune,	16.06.2023 to 24.07.2023
12	Karnataka	Dharwad (UAS)	25	SZ	Dharwad, Belagavi, haveri	27.05.2023 to 23.06.2023
13	Telangana State	Adilabad (PJTSAU)	15	SZ	Adilabad	05.06.2023 to 30.06.2023
14	Nagaland	Medziphema	10	NEHZ	Dimapur, Niuland	07.07.2023 to 28.07.2023
15	Karnataka	Ugar Khurd (Ugar Sugar Works Ltd.)	12	SZ	Belgaum	15.06.2023 to 30.06.2023
16	Chhattisgarh	Raipur (IGKVV)	100	EZ	Kabirdham (Kawardha)	15.06.2023 to 30.06.2023
17	Manipur	Imphal (CAU)	10	NEHZ	Imphal East, Kangpokpi, Bishnupur	25.05.2023 to 30.06.2023
18	Gujrat	Devgrah Baria (TRTC)	30	CZ	Dahod	02.07.2023 to 15.07.2023
19	Karnataka	KVK, Belagavi	75	SZ	Belagavi	15.06.2023 to 30.06.2023
20	Karnataka	Bengaluru (UAS)	10	SZ	Mysore, Ramanagara	10.06.2023 to 30.06.2023
21	Maharashtra	KVK, Kanerimath, Kolhapur	75	SZ	Kolhapur	15.06.2023 to 30.06.2023
22	Madhya Pradesh	Sipani farm, Mandsaur	50	CZ	Mandsaur,	17.06.2023 to 05.07.2023

Table 8.2 Details of category wise beneficiaries of frontline demonstrations (FLDs) 2023-24.

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	12	0	6	6	**24**	0	-	4	3	**7**	**31**
2	*Almora (VPKAS)	UK	NHZ	-	-	-	23	**23**	14	-	-	46	**60**	**83**
3	Pantnagar (GBPUA&T)	UK	NPZ	-	-	-	22	**22**	-	-	-	3	**3**	**25**
4	Ludhiana (PAU)	PB	NPZ	-	-	-	12	**12**	-	-	-	-	**0**	**12**
5	Indore (IISR/AICRPS)	MP	CZ	10	2	189	36	**237**	2	-	11	-	**13**	**250**
6	Sehore (RVSKVV)	MP	CZ	3	-	7	-	**10**	-	-	-	-	**0**	**10**
7	Kota (MPUA&T)	RJ	CZ	2	9	16	3	**30**	-	-	-	-	**0**	**30**
8	Parbhani (MAU)	MH	CZ	-	3	4	28	**35**	-	-	6	9	**15**	**50**
9	Amravati (PDKV)	MH	CZ	3	2	13	-	**18**	-	-	2	-	**2**	**20**
10	Kasbe digraj, Sangli (MPKV)	MH	SZ	-	-	-	25	**25**	-	-	-	-	-	**25**
11	Pune (ARI)	MH	SZ	3	2	4	6	**15**	-	-	-	-	**0**	**15**
12	Dharwad (UAS)	KA	SZ	3	1	-	17	**21**	-	-	-	4	**4**	**25**
13	Adilabad (PJTSAU)	TS	SZ	-	8	1	1	**10**	-	3	2	-	**5**	**15**
14	Medziphema	NL	NEHZ	-	3	-	2	**5**	-	4	-	1	**5**	**10**
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	-	-	-	11	**11**	-	-	-	1	**1**	**12**
16	Raipur (IGKVV)	CG	EZ	2	21	45	19	**87**	-	-	10	3	**13**	**100**
17	Imphal (CAU)	MN	NEHZ	4	2	4	-	**10**	-	-	-	-	**0**	**10**
18	DevgrahBaria (TRTC)	GJ	CZ	-	10	20	-	**30**	-	-	-	-	**0**	**30**
19	KVK, Belagavi	KA	SZ	-	3	72	-	**75**	-	-	-	-	**0**	**75**
20	Bengaluru (UAS)	KA	SZ	2	1	1	6	**10**	-	-	-	-	**0**	**10**
21	KVK, Kanerimath, Kolhapur	MH	SZ	-	-	-	75	**75**	-	-	-	-	**0**	**75**
22	Sipani farm, Mandsaur	MP	CZ	-	-	49	1	**50**	-	-	-	-	**0**	**50**
Total				**44**	**67**	**431**	**293**	**835**	**16**	**7**	**35**	**70**	**128**	**963**
Percentage				**5.27**	**8.02**	**51.62**	**35.09**	**86.71**	**12.50**	**5.47**	**27.34**	**54.69**	**13.29**	**100**
Total (Men+Women)				**87**	**60**	**74**	**466**	**363**	**963**					
Percentage (Men + Women)				**6.23**	**7.68**	**48.39**	**37.69**	**6.23**						

* 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 2023-24.

S. No.	Name of implementing center	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-I (kg/ha)
						IT	FP		IT	FP	IT	FP	IT	FP	IT	FP	IT	FP	
1	Palampur (CSKHPKV)	HP	NHZ	10	3.3	1394	1149	21.7	97572	80435	56093	51562	41479	28873	0.74	0.56	1.74	1.56	245
2	Almora (VPKAS)	UK	NHZ	10	4.0	1556	1276	23.8	109535	93782	60278	59554	49257	34228	0.82	0.58	1.82	1.57	280
3	Pantnagar (GBPUA&T)	UK	NPZ	25	10.0	1829	1433	27.6	84134	65918	40487	35019	43647	30899	1.08	0.88	2.08	1.88	396
4	Ludhiana (PAU)	PB	NPZ	12	4.8	1946	-	-	89508	-	33581	-	55927	0	1.67	-	2.67	-	0
5	Indore (IISR/AICRPS)	MP	CZ	250	100.0	1693	1297	30.8	77890	59671	34486	27909	43403	31762	1.26	1.14	2.26	2.14	396
6	Sehore (RVSKVV)	MP	CZ	10	4.0	2170	1538	41.3	97650	69188	30405	26100	67245	43088	2.21	1.65	3.21	2.65	632
7	Kota (MPUA&T)	RJ	CZ	30	12.0	1864	1640	13.7	85765	75440	37795	33590	47970	41850	1.27	1.25	2.27	2.25	224
8	Parbhani (MAU)	MH	CZ	50	20.0	2089	1763	18.5	96108	81080	55964	54772	40144	26307	0.72	0.48	1.72	1.48	327
9	Amravati (PDKV)	MH	CZ	20	8.0	1885	1564	20.8	90091	74766	42349	40503	47742	34263	1.13	0.85	2.13	1.85	321
10	Kasbe Digraj, Sangli (MPKV)	MH	SZ	25	10.0	3043	2495	22.1	106525	87333	27840	30322	78685	57011	1.08	0.95	3.83	2.88	548
11	Pune (ARI)	MH	SZ	15	6.0	2200	1908	15.2	99000	85875	38217	34768	60783	51107	1.59	1.47	2.59	2.47	292
12	Dharwad (UAS)	KA	SZ	25	10.0	1807	1613	12.9	93986	83872	46009	39671	47977	44201	1.06	1.12	2.04	2.11	194
13	Adilabad (PJTSAU)	TS	SZ	15	6.0	2216	1979	12.0	101918	91029	50258	46911	51660	44118	1.01	0.93	2.03	1.94	237
14	Medziphema	NL	NEHZ	10	4.0	1372	1016	35.5	96040	71085	44572	28410	51469	42675	1.20	1.50	2.15	2.50	356
15	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	12	4.8	2082	1786	16.6	104083	89312	64068	56195	40015	33118	0.62	0.59	1.62	1.59	296
16	Raipur (IGKVV)	CG	EZ	100	40.0	1773	994	78.4	81553	45746	32345	22270	49208	23476	1.51	1.05	2.52	2.05	779
17	Imphal (CAU)	MN	NEHZ	10	4.0	1332	1003	32.8	119835	90288	49161	34458	70674	55830	1.45	1.63	2.44	2.62	329
18	Devgrah Baria (TRTC)	GJ	CZ	30	12.0	1253	942	33.2	62615	47075	25875	21006	36740	26069	1.42	1.24	2.42	2.24	311
19	KVK, Belagavi	KA	SZ	75	30.0	1504	1323	13.7	72210	63520	29952	29351	42311	34288	1.40	1.20	2.41	2.16	181
20	Bengaluru (UAS)	KA	SZ	10	4.0	1244	1103	12.7	74640	66195	34986	29204	39654	36991	1.13	1.27	2.13	2.27	141
21	KVK, Kanerimath, Kolhapur	MH	SZ	75	30.0	2437	2061	18.4	112087	94797	45925	43282	66162	51515	1.44	1.19	2.44	2.19	376
22	Sipani farm, Mandsaur	MP	CZ	50	20.0	2385	2019	19.3	109710	92889	40307	39249	69403	53640	1.72	1.37	2.72	2.37	366
Total				**869**	**347**	**1867**	**1519**	**24.8**	**93748**	**76633**	**41862**	**37338**	**51886**	**37509**	**1.25**	**1.09**	**2.33**	**2.13**	**354**
Percent increase (%)						**22.90**			**22.33**		**12.11**		**38.33**		**14.81**		**9.22**		**779**

Table 8.3a Results of Frontline Demonstrations (FLDs) on whole package used in SOYBEAN at various locations in farmer's field 2023-24.

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	50	20.0	2385	2019	19.3	109710	92889	40307	39249	69403	53640	1.72	1.37	2.72	2.37	16821	366
2	Ugar Khurd (Ugar Sugar Works Ltd.)	KA	SZ	12	4.8	2082	1786	16.6	104083	89312	64068	56195	40015	33118	0.62	0.59	1.62	1.59	14771	296
3	Dharwad (UAS)	KA	SZ	10	4.0	1890	1637	15.7	98254	85129	46009	39671	52245	45458	1.14	1.15	2.14	2.15	13125	253
4	Devgrah Baria (TRTC)	GJ	CZ	30	12.0	1253	942	33.2	62615	47075	25875	21006	36740	26069	1.42	1.24	2.42	2.24	15540	311
5	Pune (ARI)	MH	SZ	10	4.0	2400	2075	15.7	108000	93375	42539	39090	65461	54285	1.53	1.38	2.54	2.39	14625	325
6	Amravati (PDKV)	MH	CZ	14	5.6	1893	1550	22.4	90461	74100	42364	40475	48097	33624	1.14	0.83	2.14	1.83	16361	343
7	Almora (VPKAS)	UK	NHZ	10	4.0	1556	1276	23.8	109535	93782	60278	59554	49257	34209	0.82	0.58	1.82	1.57	15753	280
8	Kota (MPUA&T)	RJ	CZ	30	12.0	1864	1640	13.7	85765	75440	37795	33590	47970	41850	1.27	1.25	2.27	2.25	10325	224
9	Bengaluru (UAS)	KA	SZ	10	4.0	1244	1103	12.7	74640	66195	34986	29204	39654	36991	1.13	1.27	2.13	2.27	8445	141
10	Medziphema	NL	NEHZ	5	2.0	1411	1081	30.8	98770	75670	39829	28410	58941	47260	1.50	1.70	2.48	2.66	23100	330
11	Pantnagar (GBPUA&T)	UK	NPZ	10	4.0	1835	1435	27.9	84410	66010	40487	35019	43923	30991	1.08	0.88	2.08	1.88	18400	400
12	Imphal (CAU)	MN	NEHZ	8	3.2	1347	1012	33.1	121219	91103	47429	33266	73790	57837	1.56	1.74	2.56	2.74	30116	335
13	KVK, Kaneri Math, Kolhapur	MH	SZ	60	24	2445	2071	18.2	112447	95258	45925	43282	66522	51976	1.40	1.20	2.45	2.20	17189	374
14	Raipur (IGKVV)	CG	EZ	50	20.0	1783	1002	78.1	82015	46073	31960	22270	50111	23803	1.57	1.07	2.57	2.07	35942	781
15	Ludhiana (PAU)	PB	NPZ	12	4.8	1946	-	-	89508	-	33581	-	55927	-	1.67	-	2.67	-	-	-
16	Palampur (CSKHPKV)	HP	NHZ	10	3.3	1394	1149	21.7	97572	80435	56093	51562	41479	28873	0.74	0.56	1.74	1.56	17137	245
17	Adilabad (PJTSAU)	TS	SZ	10	4.0	2284	2030	12.6	105073	93362	53962	49159	51111	44203	0.95	0.90	1.95	1.90	11711	254
18	KVK, Belagavi	KA	SZ	60	24.0	1504	1323	13.7	72210	63520	29952	29351	42311	34288	1.40	1.20	2.41	2.16	8690	181
19	Kasbe digraj, Sangli (MPKV)	MH	SZ	25	10.0	3043	2495	22.1	106525	87333	51155	44833	55370	42500	1.08	0.95	2.08	1.95	548	548
20	Parbhani (MAU)	MH	CZ	40	16.0	2088	1776	17.5	96054	81673	55956	54941	40098	26732	0.71	0.48	1.72	1.49	14381	313
Total/Average				**466**	**186**	**1882**	**1547**	**23.6**	**95443**	**78828**	**44027**	**39480**	**51421**	**39353**	**1.22**	**1.07**	**2.22**	**2.07**	**15946**	**332**

Table 8.3b Results of Frontline Demonstrations (FLDs) on Integrated Weed management (IWM) used in SOYBEAN at various locations in farmer's field 2023-24.

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	5	2.0	1698	1529	11.3	88306	79508	46009	39671	42297	39837	0.92	1.00	1.92	2.00	8798	169
2	Sehore (RVSKVV)	MP	CZ	10	4.0	2170	1538	41.3	97650	69188	30405	26100	67245	43088	2.21	1.65	3.21	2.65	28462	632
3	Pantnagar (GBPUA&T)	UK	NPZ	10	4.0	1858	1453	27.9	85445	66815	40487	35019	44958	31796	1.11	0.91	2.11	1.91	18630	405
4	Raipur (IGKVV)	CG	EZ	30	12.0	1732	968	79.1	79658	44540	31960	22270	47698	22270	1.49	1.00	2.49	2.00	35118	764
5	Adilabad (PJTSAU)	TS	SZ	5	2.0	2216	1979	12.0	101918	91029	50258	46911	51660	44118	1.01	0.93	2.03	1.94	10889	237
Total/Average				**60**	**24**	**1935**	**1493**	**34.3**	**90595**	**70216**	**39824**	**33994**	**50772**	**36222**	**1.35**	**1.10**	**2.35**	**2.10**	**20379**	**441**

Table 8.3c Results of Frontline Demonstrations (FLDs) on Integrated Nutrient Management (INM) used in SOYBEAN at various locations in farmer's field 2023-24.

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	5	2.0	1828	1645	11.4	95077	85540	46009	39671	49068	45869	1.07	1.16	2.07	2.16	9537	183
2	Raipur (IGKVV)	CG	EZ	10	4.0	1795	1012	77.6	82584	46557	35060	22270	47524	24287	1.36	1.09	2.36	2.09	36027	783
3	Pantnagar (GBPUA&T)	UK	NPZ	5	2.0	1760	1390	26.7	80960	63940	40487	35019	40473	28921	1.00	0.83	2.00	1.83	17020	370
Total/Average				**20**	**8**	**1794**	**1349**	**38.5**	**86207**	**65346**	**40519**	**32320**	**45688**	**33026**	**1.14**	**1.03**	**2.14**	**2.02**	**20861**	**445**

Table 8.3d Results of Frontline Demonstrations (FLDs) on Integrated Pest management (IPM) used in SOYBEAN at various locations in farmer's field 2023-24.

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	5	2.0	1814	1641	10.5	94307	85311	46009	39671	48298	45640	1.05	1.15	2.05	2.15	8996	173
2	Raipur (IGKVV)	CG	EZ	10	4.0	1824	1020	78.9	83895	46915	32710	22270	51185	24645	1.56	1.11	2.56	2.11	36980	804
Total/Average				**15**	**6**	**1819**	**1331**	**44.7**	**89101**	**66113**	**39360**	**30971**	**49742**	**35143**	**1.31**	**1.13**	**2.31**	**2.13**	**22988**	**489**

Table 8.3e Results of Frontline Demonstrations (FLDs) on Organic Farming (Org. Far.) used in SOYBEAN at various locations in farmer's field 2023-24.

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	5	2.0	1333	950	40.3	93310	66500	49314	28410	43996	38090	0.90	1.30	1.89	2.34	26810	383
2	Imphal (CAU)	MN	NEHZ	2	0.8	1270	967	31.4	114300	87030	56090	39228	58210	47802	1.04	1.22	2.04	2.22	27270	303
Total/Average				**7**	**3**	**1302**	**959**	**35.9**	**103805**	**76765**	**52702**	**33819**	**51103**	**42946**	**0.97**	**1.26**	**1.96**	**2.28**	**27040**	**343**

Table 8.3f Results of Frontline Demonstrations (FLDs) on Food Grade Variety (FGV) used in SOYBEAN at various locations in farmer's field 2023-24.

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	Indore (IISR/AICRPS)	MP	CZ	250	100.0	1693	1297	30.53	77890	59671	34486	27909	43403	31762	1.26	1.14	2.26	2.14	18219	396
Total/Average				250	100.0	1693	1297	30.53	77890	59671	34486	27909	43403	31762	1.26	1.14	2.26	2.14	18219	396

Table 8.3g 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	Parbhani (MAU)	MH	CZ	10	Soybean+ Pigeon pea	4	2131	1059	3701	1741	891	3095	18.4	170246	139806	55997	54097	114279	85001	2.04	1.57	3.04	2.58	30441	390	606
Total/Average				10		4	2131	1059	3701	1741	891	3095	18.4	170246	139806	55997	54097	114279	85001	2.04	1.57	3.04	2.58	30441	390	606

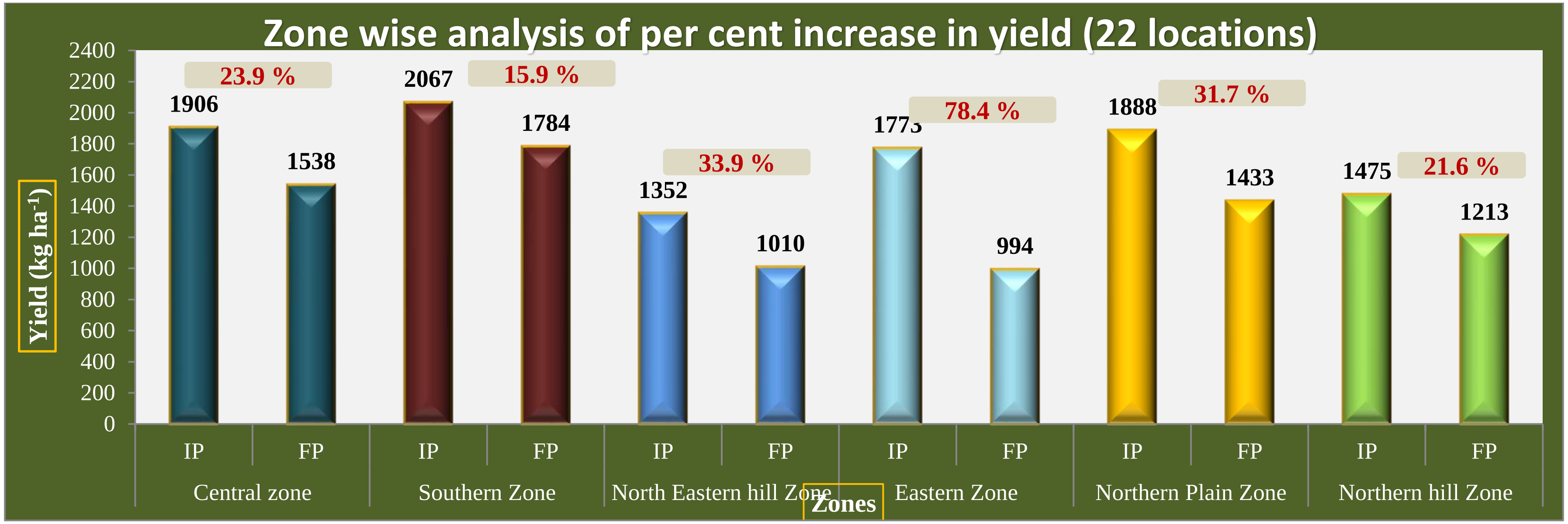

Figure 8.1 Zone wise soybean yield analysis under different components of FLD (Mean of all components, Whole package, integrated weed management, integrated nutrient management, integrated pest management, organic farming and intercropping). IP-Improved practices and FP-Farmers practices.

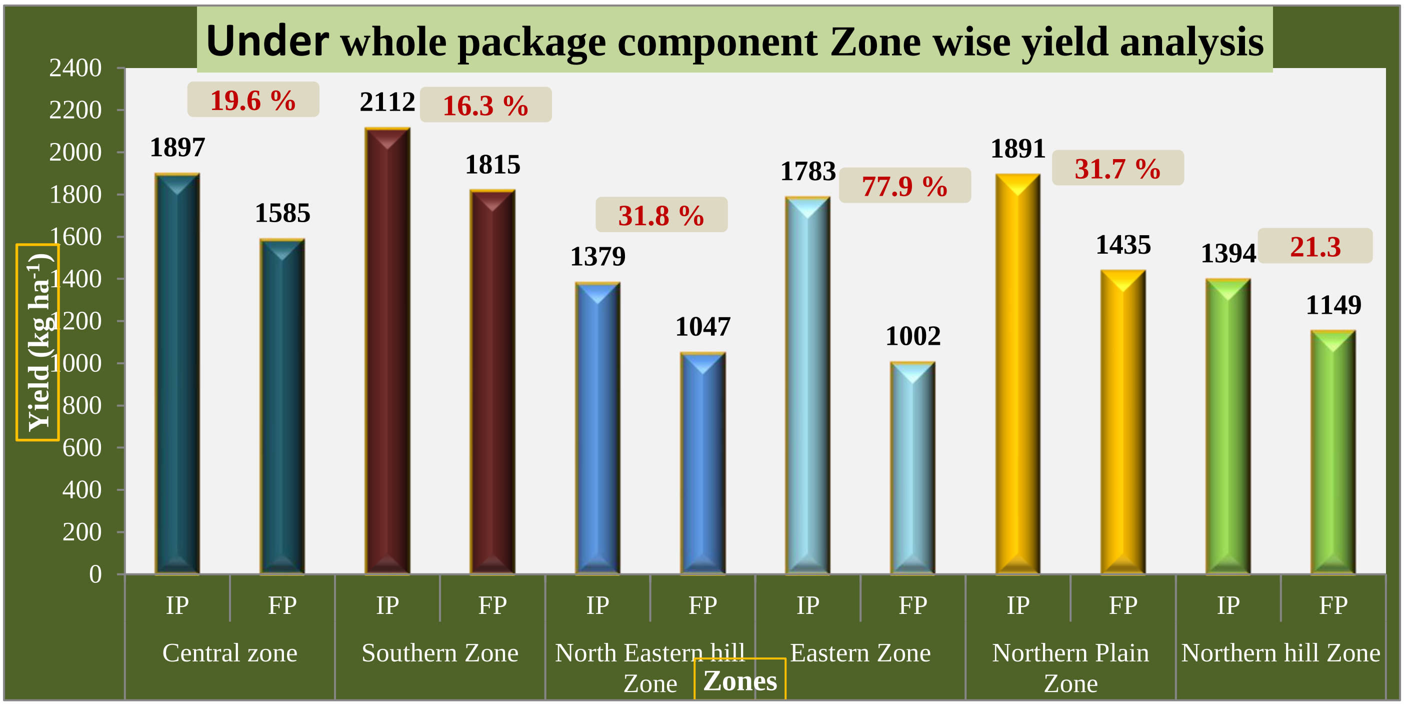

Figure 8.1a Zone wise soybean yield analysis under whole package component. IP-Improved practices and FP-Farmers practices.

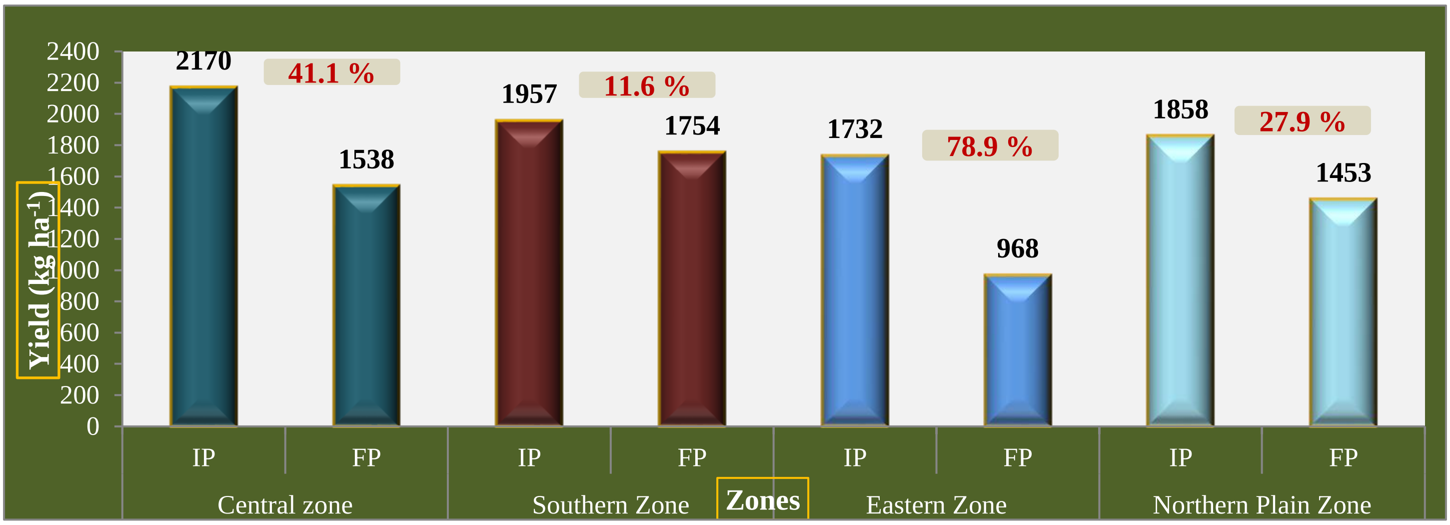

Figure 8.1b Zone wise soybean yield analysis under integrated weed management component. IP-Improved practices and FP-Farmers practices.

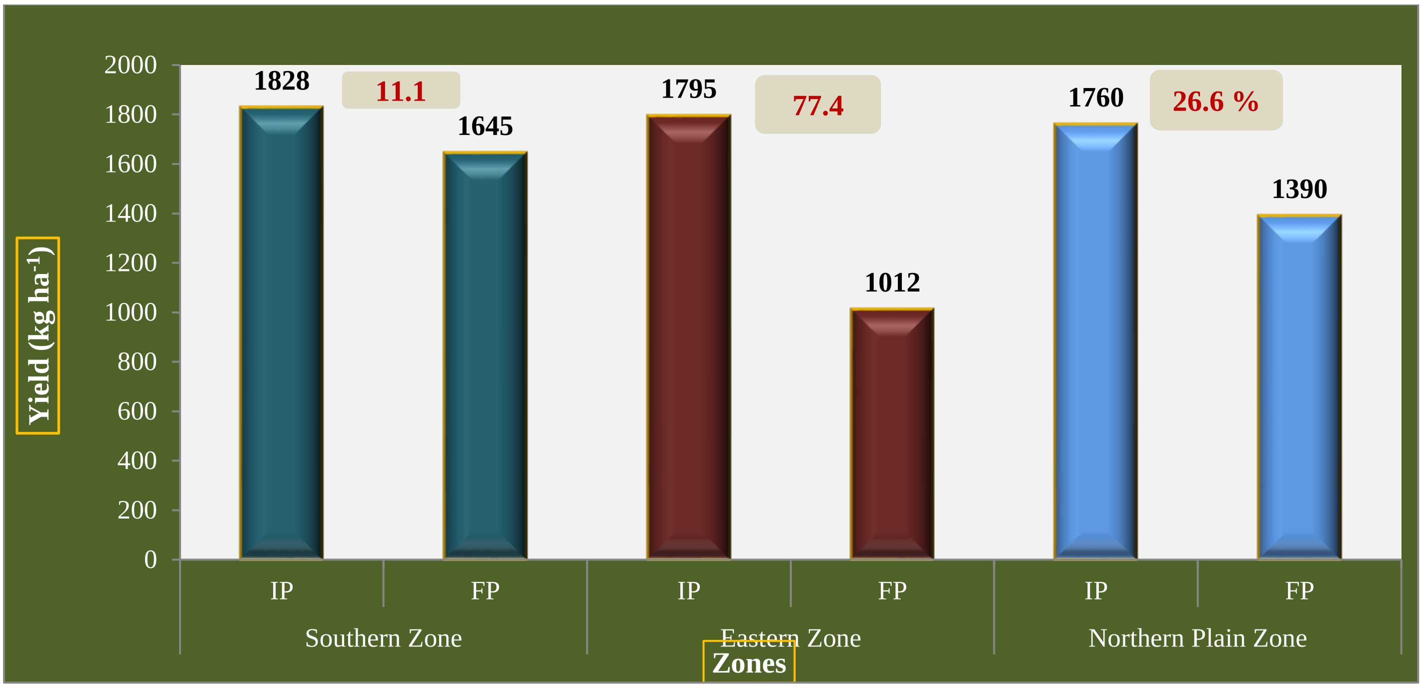

Figure 8.1c Zone wise soybean yield analysis under integrated nutrient management component. IP-Improved practices and FP-Farmers practices.

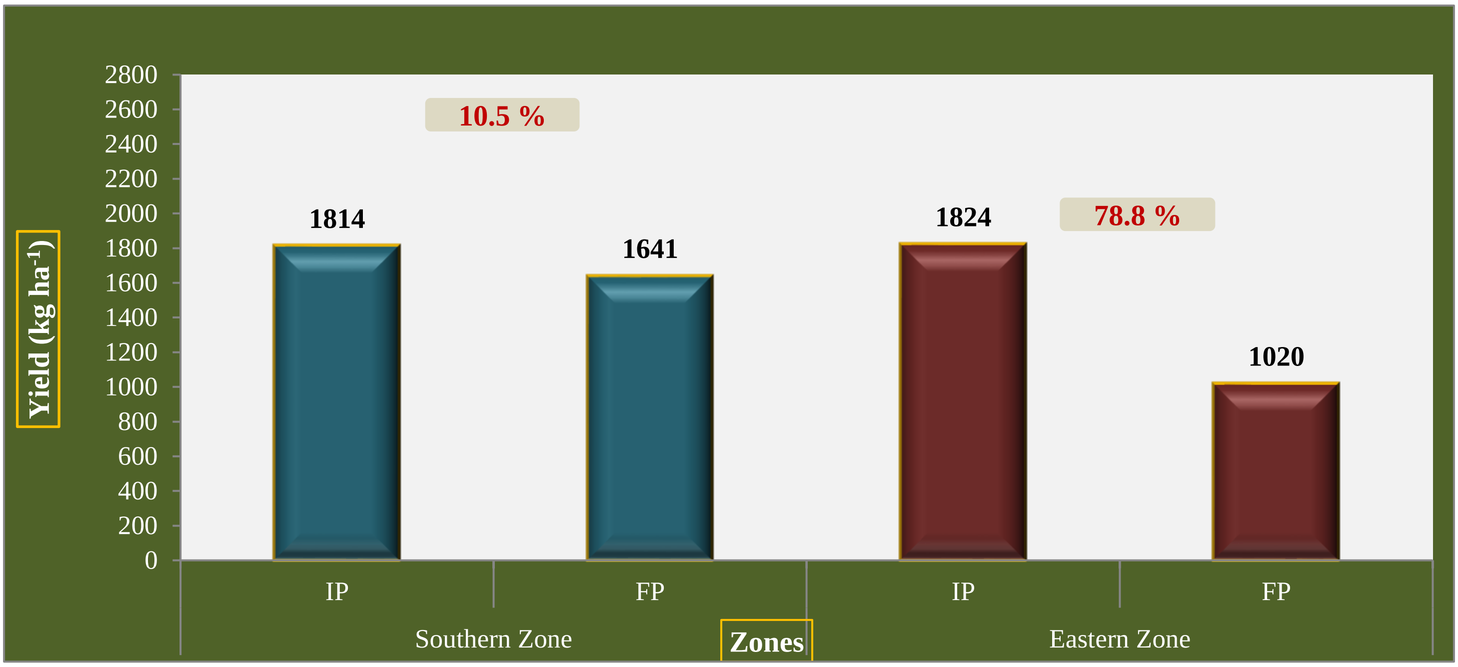

Figure 8.1d Zone wise soybean yield analysis under integrated pest management component. IP-Improved practices and FP-Farmers practices.

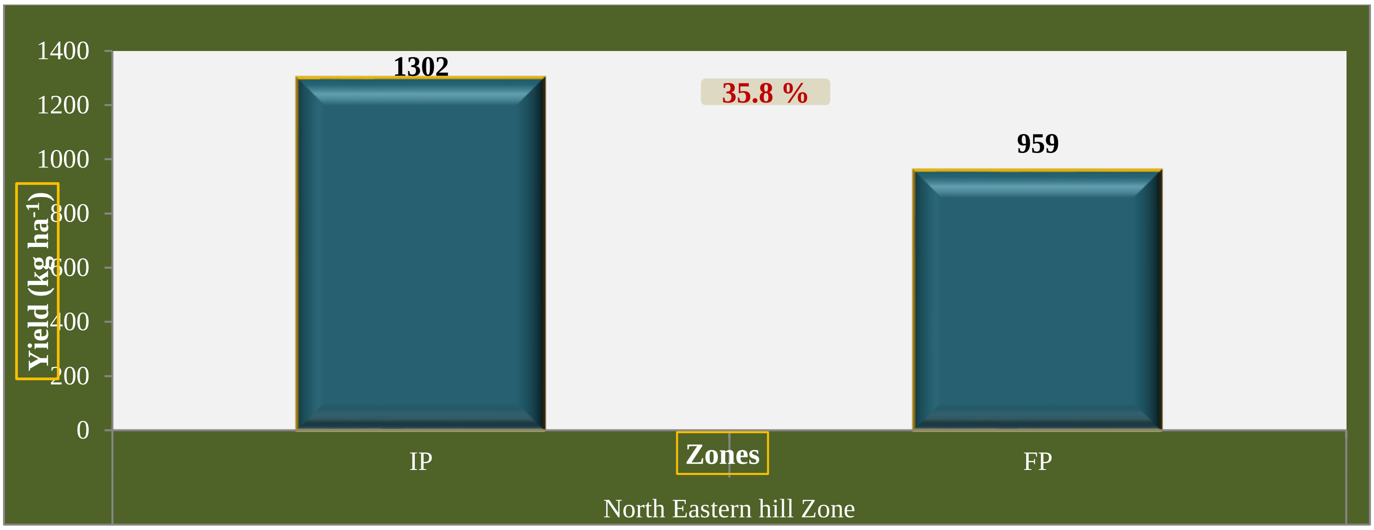

Figure 8.1e Zone wise soybean yield analysis under organic farming component. IP-Improved practices and FP-Farmers practices.

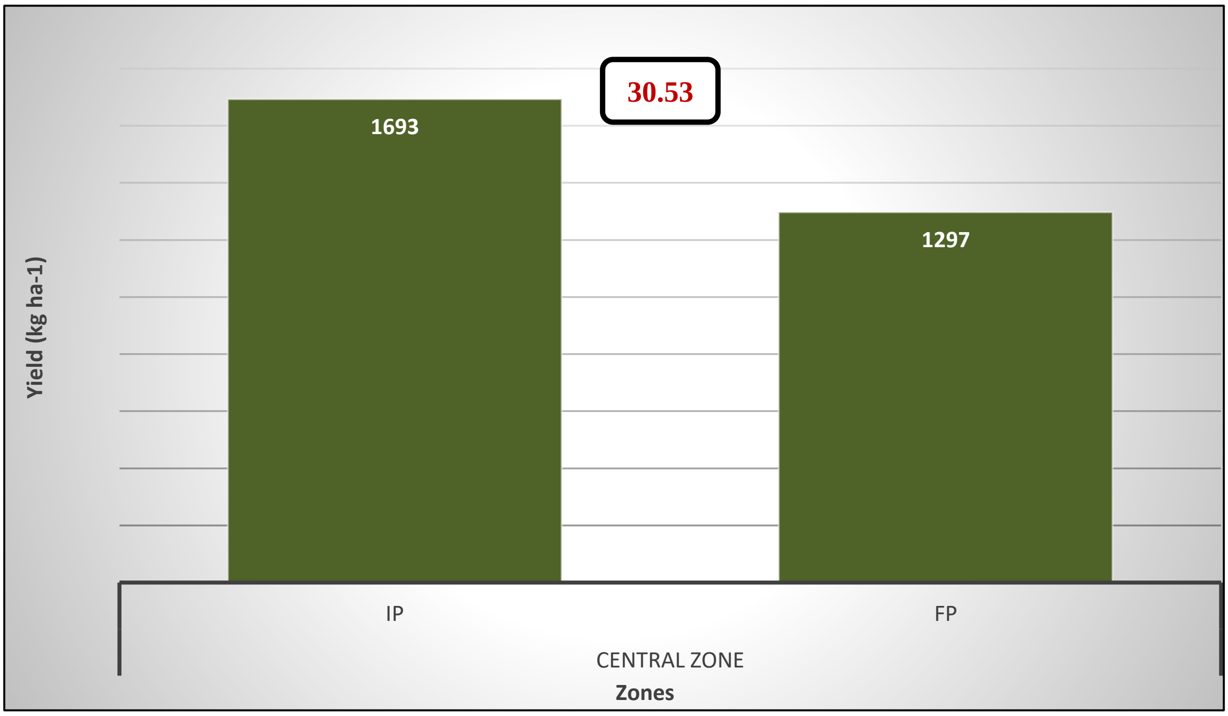

Figure 8.1f Zone wise soybean yield analysis under Food Grade Variety component. IP-Improved practices and FP-Farmers practices

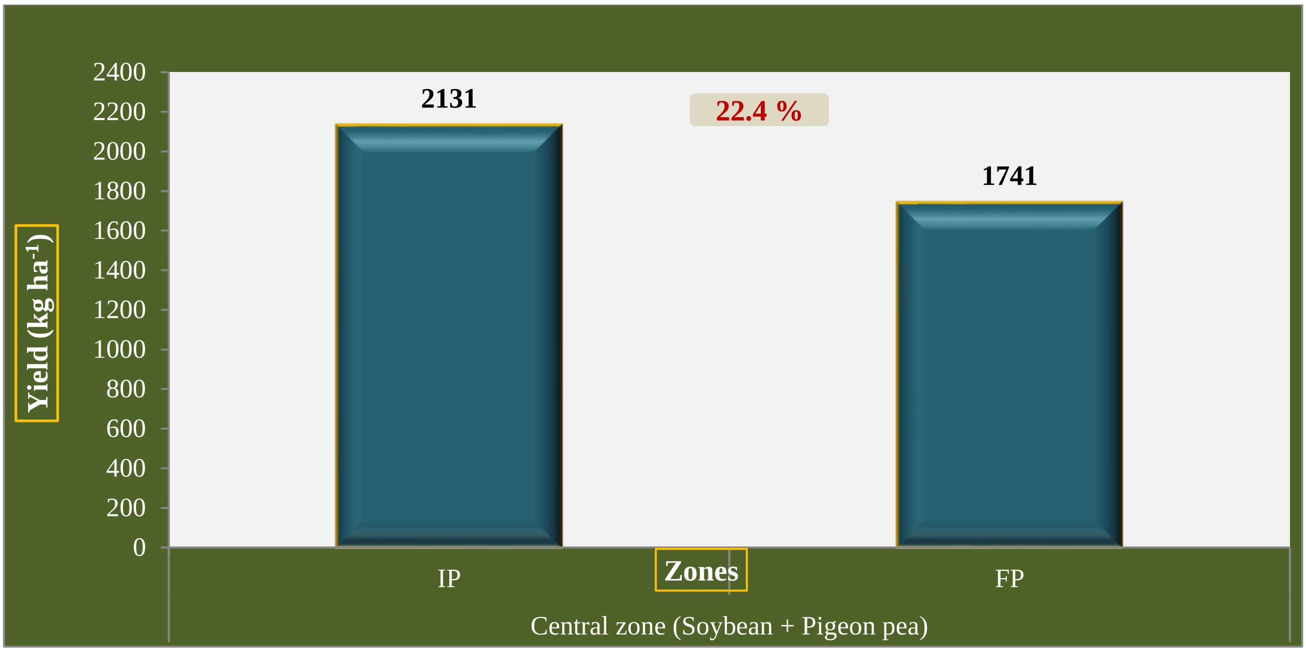

Figure 8.1g Zone wise soybean yield analysis under intercropping component. IP-Improved practices and FP-Farmers practices.

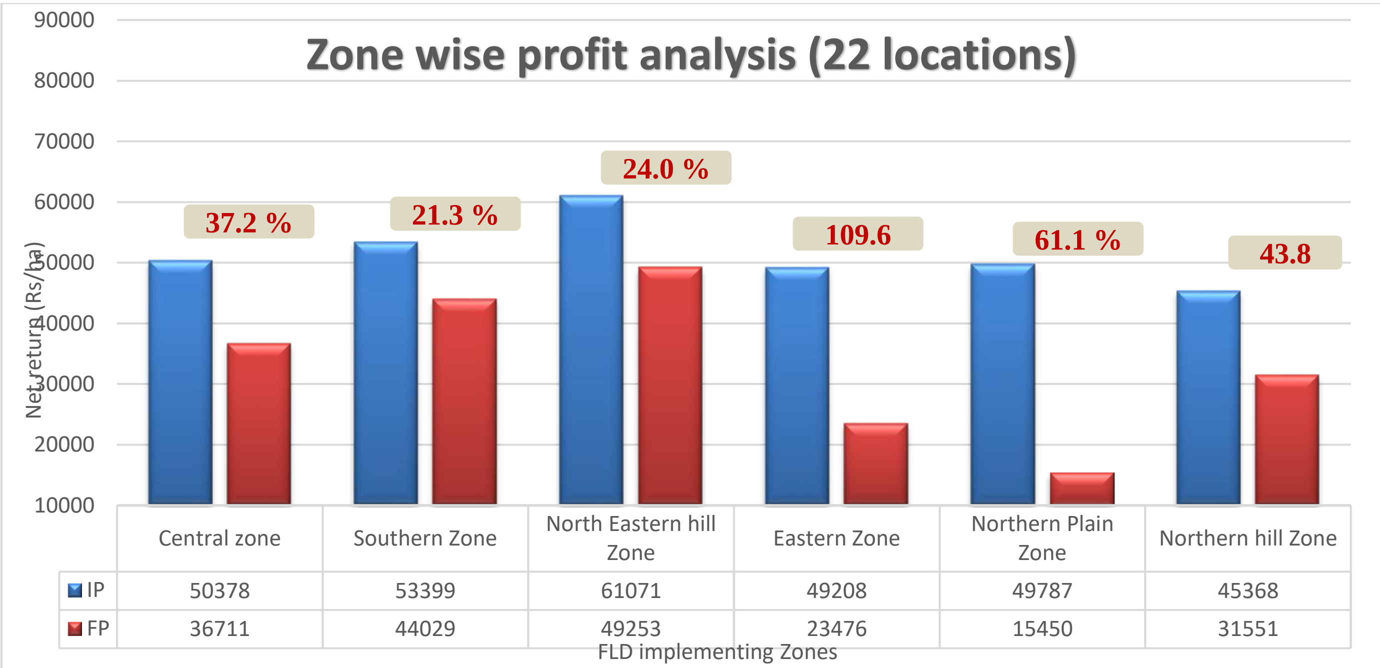

Figure 8.2 Zone wise net profit analysis under different components of FLD (Mean of all components, Whole package, integrated weed management, integrated nutrient management, integrated pest management, organic farming and intercropping). IP-Improved practices and FP-Farmers practices.

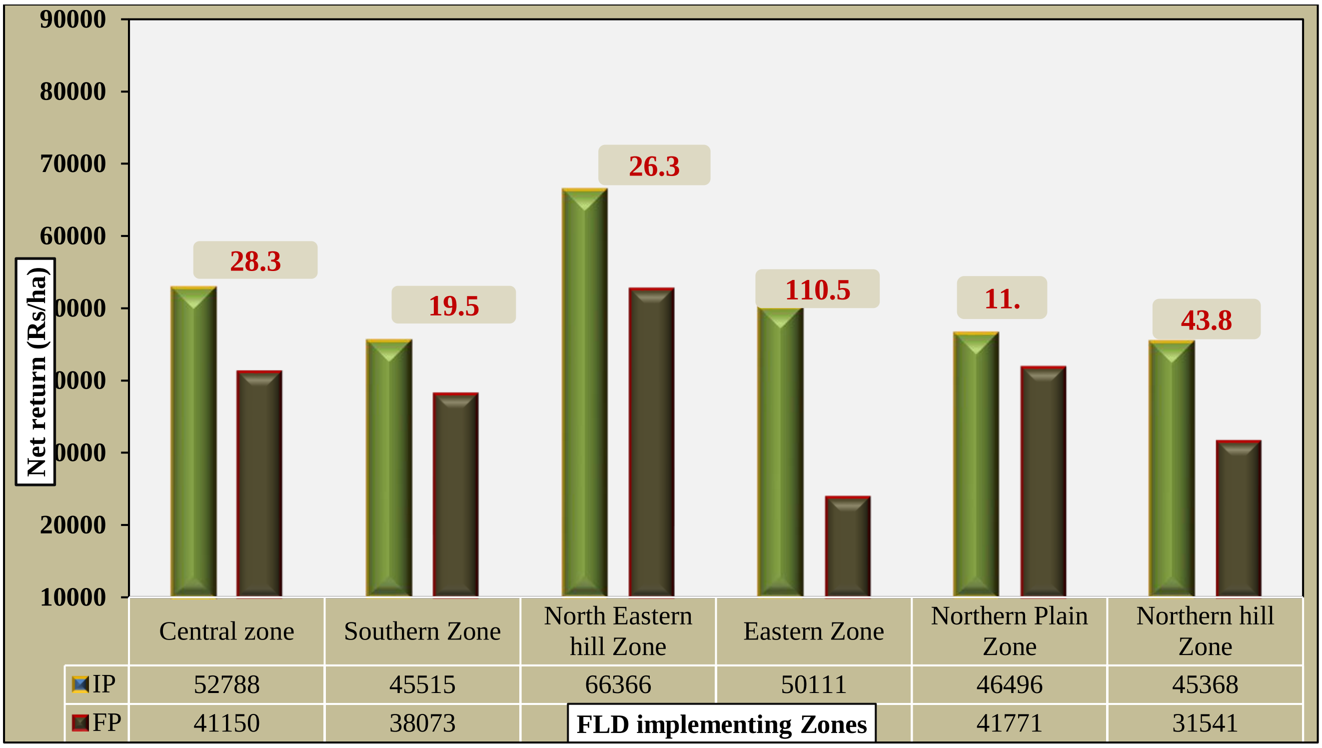

Figure 8.2a Zone wise net profit analysis under whole package component. IP-Improved practices and FP-Farmers practices.

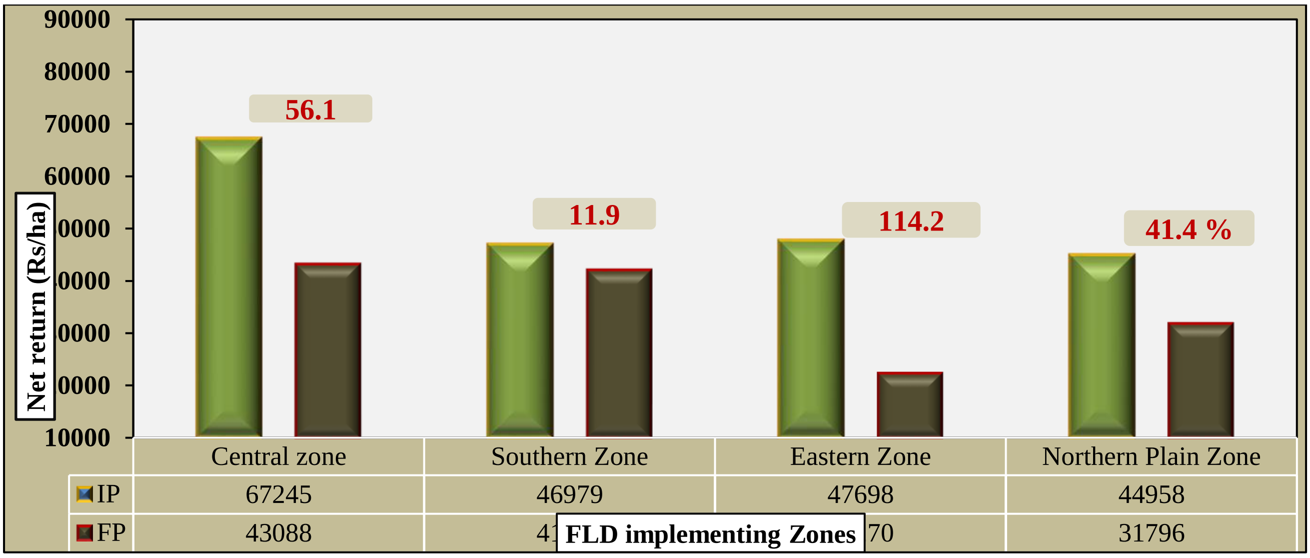

Figure 8.2b Zone wise net profit analysis under integrated weed management component. IP-Improved practices and FP-Farmers practices.

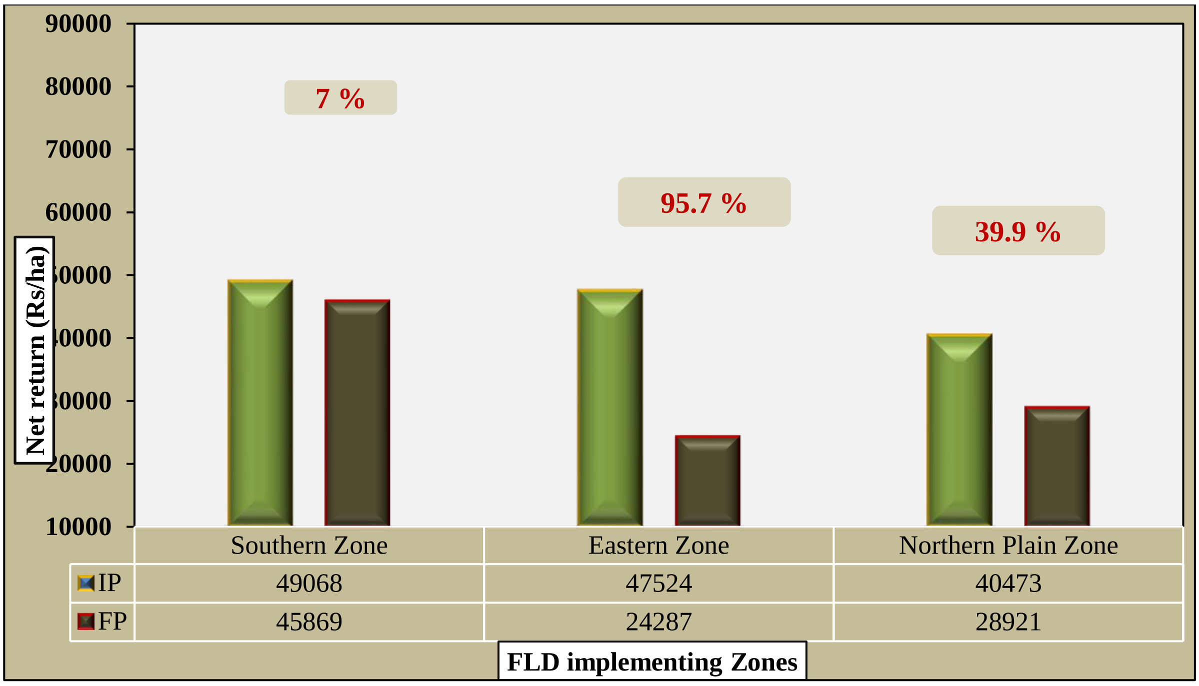

Figure 8.2c Zone wise net profit analysis under integrated nutrient management component. IP-Improved practices and FP-Farmers practices.

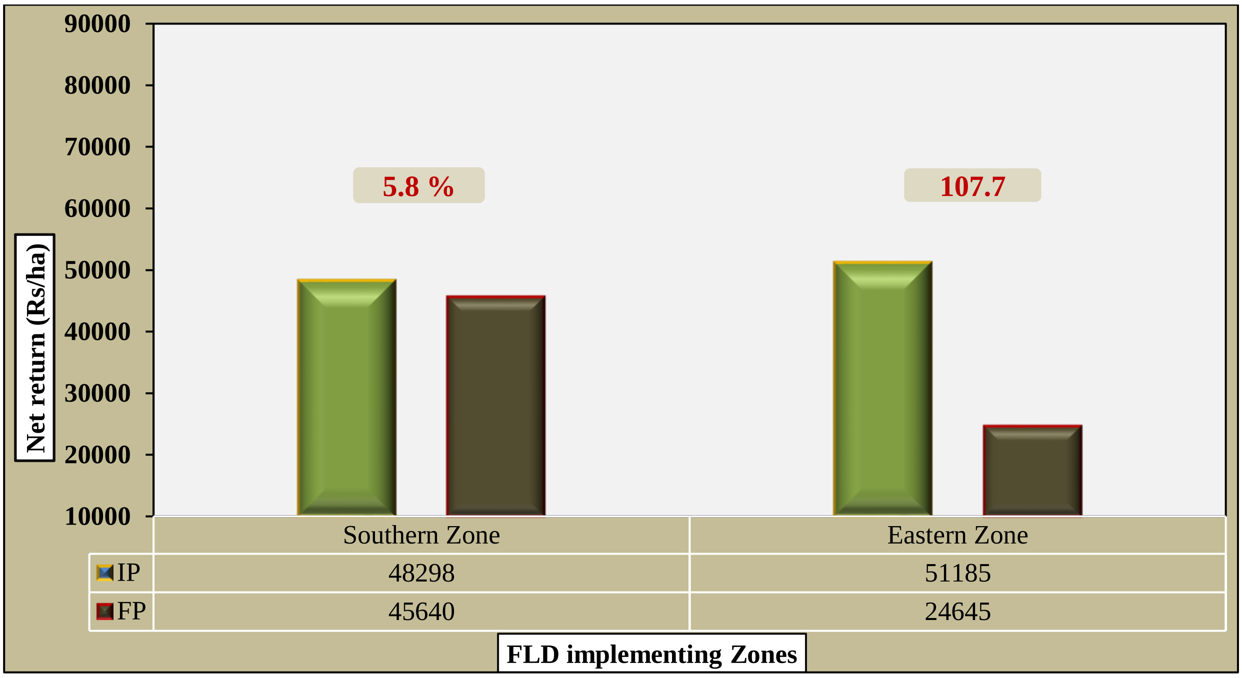

Figure 8.2d Zone wise net profit analysis under integrated pest management component. IP-Improved practices and FP-Farmers practices.

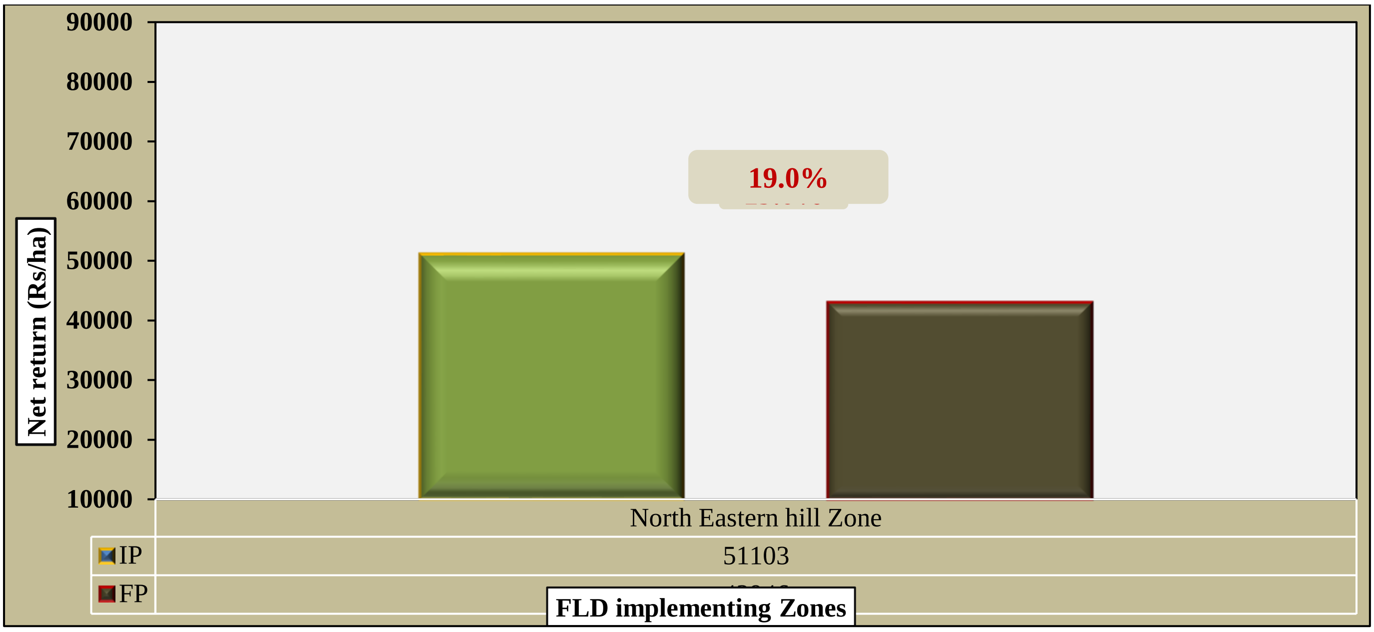

Figure 2e Zone wise net profit analysis under organic farming component. IP-Improved practices and FP-Farmers practices.

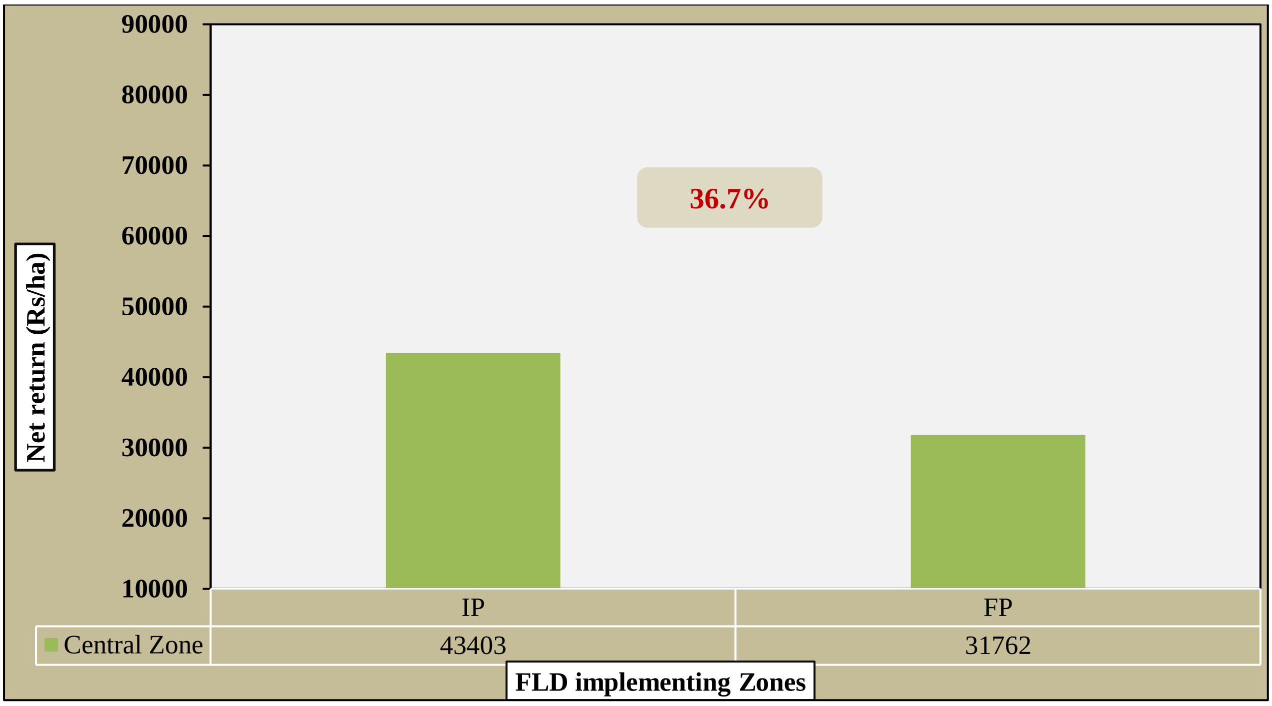

Figure 2f Zone wise net profit analysis under Food Grade Variety component. IP-Improved practices and FP-Farmers practices.

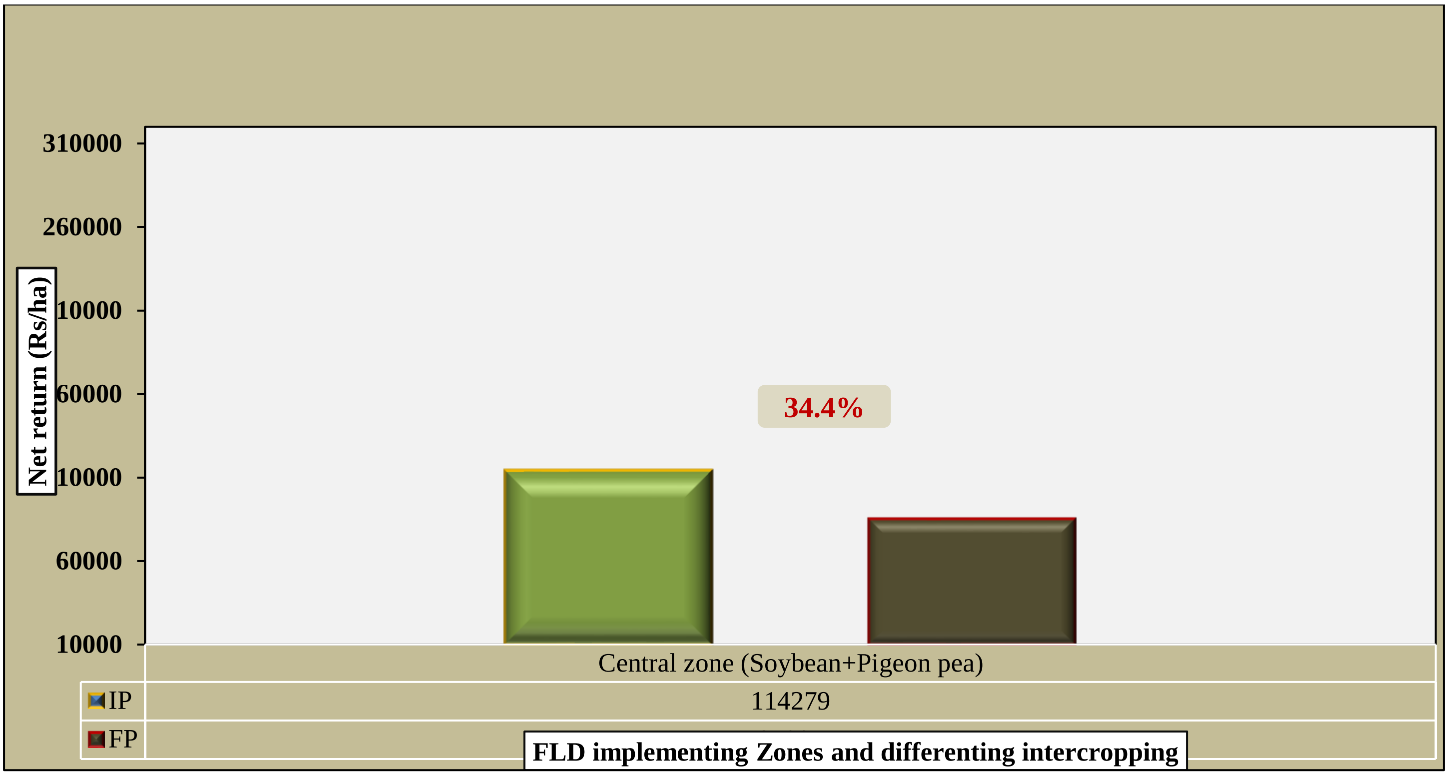

Figure 2g Zone wise net profit analysis under intercropping component. IP-Improved practices and FP-Farmers practices.

Table 8.4 Performance of SOYBEAN varieties under different components of FLDs conducted at various locations in farmers' field 2023-24.

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	NRC142	250	1693	1297	77890	59671	34486	27909	43403	31762	1.26	1.14
2	KDS 726	104	2155	1831	93900	80111	42893	38932	51007	41179	1.21	1.06
3	CG Soya-1	83	1786	997	82145	45874	32210	22270	49953	23604	1.55	1.06
4	KDS 753	60	2413	2037	111006	93694	45925	43282	65081	50412	1.42	1.16
5	JS 20-34	44	1874	1592	86221	73222	39051	36420	47170	36803	1.21	1.03
6	RVS 11-35	36	2454	1938	111733	88325	35356	32675	76377	55650	2.18	1.71
7	VL Soya 99 (yellow)	33	1883	1619	105467	90686	58938	55328	46458	34600	0.79	0.63
8	NRC 37	30	1253	942	62615	47075	25875	21006	36740	26069	1.42	1.24
9	VL Bhat 201 (black)	29	1254	973	114158	98318	61554	63578	52604	34740	0.85	0.55
10	MACS 1460	28	1580	1269	101809	80159	42106	31084	59704	49076	1.45	1.58
11	MAUS 612	25	2979	2482	137011	114149	55977	54519	81055	59208	1.45	1.08
12	AMS 100-39	25	2415	2002	89013	76372	73034	64643	63732	45781	1.28	0.96
13	JS 20-116	22	1947	1362	89575	62625	36909	30760	52667	31866	1.42	1.05
14	PS 26	21	1806	1417	83068	65179	40487	35019	42581	30160	1.05	0.86
15	Dsb 21	18	1950	1735	99311	88427	55039	47933	44272	40495	0.84	0.90
16	Hara Soya	17	1425	1183	99727	82787	56093	51562	43634	31225	0.78	0.61
17	Palam Soya	14	1355	1107	94879	77496	56093	51562	38786	25934	0.69	0.50
18	SL 958	14	2011	1625	92479	74750	37034	35019	55445	39731	1.52	1.13
19	VL Bhat 202 (black)	13	1238	952	112700	96190	61554	63578	51146	32612	0.83	0.51
20	MAUS 158	10	2774	2306	127581	106076	55977	54519	71624	51135	1.28	0.93
21	MAUS 162	10	2720	2266	125097	104236	55977	54519	69141	49295	1.24	0.91
22	Dsb 34	10	1890	1637	98254	85129	46009	39671	52245	45458	1.14	1.15
23	VL Soya 89 (yellow)	8	1870	1534	104720	85890	58938	55328	45782	30562	0.78	0.55
24	KBS 23	8	1399	1208	83910	72480	34986	29204	48924	43276	1.40	1.48
25	DSb 32	6	1362	1022	122550	92010	51425	35869	71125	56141	1.40	1.58
26	RVS 24	5	2080	1480	93600	66600	30405	26100	63195	40500	2.08	1.55
27	JS 93-05	5	1909	1690	99259	87858	46009	39671	53250	48187	1.16	1.21
28	Basara	5	2222	1971	102194	90675	54409	49579	47785	41096	0.88	0.83
29	AISb-50	5	2347	2088	107953	96048	53515	48738	54438	47310	1.02	0.97
30	MAUS-612	5	2147	1928	98762	88697	46554	44663	52208	44034	1.12	0.99
31	PS 1347	2	1700	1325	78200	60950	40487	35019	37713	25931	0.93	0.74
32	Karune	2	1090	999	65370	59910	34986	29204	30384	30706	0.87	1.05
33	MACS 1407	1	2750	2250	123750	101250	43915	41025	79835	60225	1.82	1.47

Table 8.4a Performance of SOYBEAN varieties under whole package of FLDs conducted at various locations in farmers' fields 2023-24.

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 726	100	2340	1973	97452	82464	41854	38685	55598	43779	1.35	1.14
2	CG Soya-1	50	1783	1002	82015	46073	31960	22270	50111	23803	1.57	1.07
3	KDS- 753	45	2416	2042	111126	93942	45925	43282	65201	50660	1.42	1.17
4	JS 20-34	44	1874	1592	86221	73222	39051	36420	47170	36803	1.21	1.03
5	VL Soya 99 (yellow)	33	1883	1619	105467	90686	58938	55328	46458	34600	0.79	0.63
6	RVS 11-35	31	2647	2280	121767	104874	40307	39249	81459	65625	2.01	1.67
7	NRC 37	30	1253	942	62615	47075	25875	21006	36740	26069	1.42	1.24
8	VL Bhat 201 (black)	29	1254	973	114158	98318	61554	63578	52604	34740	0.85	0.55
9	MAUS 612	20	2213	1880	101798	86480	55956	54941	45842	31539	0.83	0.58
10	AMS 100-39	18	1924	1603	66170	58303	73209	64521	41059	27407	0.87	0.61
11	MACS 1460	18	1686	1371	106928	85292	42660	33209	64267	52083	1.51	1.59
12	Hara Soya	17	1425	1183	99727	82787	56093	51562	43634	31225	0.78	0.61
13	Palam Soya	14	1355	1107	94879	77496	56093	51562	38786	25934	0.69	0.50
14	SL 958	14	2011	1625	92479	74750	37034	35019	55445	39731	1.52	1.13
15	VL Bhat 202 (black)	13	1238	952	112700	96190	61554	63578	51146	32612	0.83	0.51
16	Dsb 21	12	2082	1786	104083	89312	64068	56195	40015	33118	0.62	0.59
17	Dsb 34	10	1890	1637	98254	85129	46009	39671	52245	45458	1.14	1.15
18	VL Soya 89 (yellow)	8	1870	1534	104720	85890	58938	55328	45782	30562	0.78	0.55
19	MAUS 158	8	1863	1584	85698	72864	55956	54941	29742	17923	0.53	0.33
20	MAUS 162	8	2006	1711	92276	78706	55956	54941	36320	23765	0.67	0.45
21	KBS 23	8	1399	1208	83910	72480	34986	29204	48924	43276	1.40	1.48
22	PS 26	6	1800	1408	82800	64783	40487	35019	42313	29764	1.05	0.85
23	Basara	5	2222	1971	102194	90675	54409	49579	47785	41096	0.88	0.83
24	AISb-50	5	2347	2088	107953	96048	53515	48738	54438	47310	1.02	0.97
25	JS 20-116	5	2162	1736	99452	79856	40307	39249	59145	40607	1.46	1.06
26	DSb 32	4	1408	1050	126675	94500	49092	34190	77583	60310	1.58	1.76
27	PS 1347	2	1700	1325	78200	60950	40487	35019	37713	25931	0.93	0.74
28	Karune	2	1090	999	65370	59910	34986	29204	30384	30706	0.87	1.05
29	MACS 1407	1	2750	2250	123750	101250	43915	41025	79835	60225	1.82	1.47

Table 4b Performance of SOYBEAN varieties under integrated Weed management (IWM)of FLDs conducted at various locations in farmers' field 2023-24.

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	23	1751	970	80524	44634	31960	22270	48564	22364	1.52	1.01
2	PS-26	10	1858	1453	85445	66815	40487	35019	44958	31796	1.11	0.91
3	JS 20-	7	1670	962	76813	44232	31960	22270	44853	21962	1.40	0.99
4	RVS 24	5	2080	1480	93600	66600	30405	26100	63195	40500	2.08	1.55
5	RVS 11-	5	2260	1595	101700	71775	30405	26100	71295	45675	2.34	1.75
6	MAUS-	5	2147	1928	98762	88697	46554	44663	52208	44034	1.12	0.99
7	KDS 726	3	1577	1397	81987	72627	46009	39671	35978	32956	0.78	0.83
8	Dsb 21	2	1881	1728	97786	89830	46009	39671	51777	50159	1.13	1.26

Table 8.4c Performance of SOYBEAN varieties under integrated nutrient management (INM)of FLDs conducted at various locations in farmers' field 2023-24.

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 20-116	10	1795	1012	82584	46557	35060	22270	47524	24287	1.36	1.09
2	PS-26	5	1760	1390	80960	63940	40487	35019	40473	28921	1.00	0.83
3	JS 93-05	3	1895	1702	98523	88487	46009	39671	52514	48816	1.14	1.23
4	Dsb 21	1	1833	1707	95316	88764	46009	39671	49307	49093	1.07	1.24
5	KDS 726	1	1625	1413	84500	73476	46009	39671	38491	33805	0.84	0.85

Table 8.4d Performance of SOYBEAN varieties under integrated pest management (IPM)of FLDs conducted at various locations in farmers' field 2023-24.

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	1824	1020	83895	46915	32710	22270	51185	24645	1.57	1.11
2	Dsb 21	3	1741	1616	90515	84032	46009	39671	44506	44361	0.97	1.12
3	JS 93-05	2	1923	1678	99996	87230	46009	39671	53987	47559	1.17	1.20

Table 8.4e Performance of SOYBEAN varieties under Organic Farming (Org. Far.) of FLDs conducted at various locations in farmers' field 2023-24.

S. No.	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	MACS 1460	5	1333	950	93310	66500	49314	28410	43996	38090	0.90	1.30
2	DSb 32	2	1270	967	114300	87030	56090	39228	58210	47802	1.04	1.22

Table 8.4f 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	NRC142	250	1693	1297	77890	59671	34486	27909	43403	31762	1.26	1.14

Table 8.4g Performance of SOYBEAN varieties under Intercropping (IC) of FLDs conducted at various locations in farmers' field 2023-24.

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	Inter-crop	SEY	soybean	Inter-crop	SEY	IP	FP	IP	FP	IP	FP	IP	FP
1	MAUS 612 + Pigeon pea	5	2055	1110	3744	1670	929	3083	172224	141818	55997	54097	116268	86877	2.08	1.61
2	MAUS 158 + Pigeon pea	2	2210	1075	3684	1845	925	3251	169464	139288	55997	54097	113505	84347	2.03	1.56
3	MAUS 162 + Pigeon pea	2	1988	950	3433	1623	788	2821	157918	129766	55997	54097	101962	74525	1.82	1.38
4	AMS100-39 + Pigeon pea	1	2270	1100	3943	1825	920	3225	181378	148350	55997	54097	125381	94253	2.24	1.74

Table 8.4.1 Zone wise performance of SOYBEAN varieties under different components of FLDs conducted at various locations in farmers' field 2023-24.

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	NRC142	250	1693	1297	77890	59671	34486	27909	43403	31762	1.26	1.14
		JS 20-34	44	1874	1592	86221	73222	39051	36420	47170	36803	1.21	1.03
		RVS 11-35	36	2454	1938	111733	88325	35356	32675	76377	55650	2.18	1.71
		NRC 37	30	1253	942	62615	47075	25875	21006	36740	26069	1.42	1.24
		MAUS 612	25	2979	2482	137011	114149	55977	54519	81055	59208	1.45	1.08
		AMS 100-39	25	2415	2002	89013	76372	73034	64643	63732	45781	1.28	0.96
		MAUS 158	10	2774	2306	127581	106076	55977	54519	71624	51135	1.28	0.93
		MAUS 162	10	2720	2266	125097	104236	55977	54519	69141	49295	1.24	0.91
		RVS 24	5	2080	1480	93600	66600	30405	26100	63195	40500	2.08	1.55
		JS 20-116	5	2162	1736	99452	79856	40307	39249	59145	40607	1.46	1.06
2	SZ	KDS 726	104	2155	1831	93900	80111	42893	38932	51007	41179.3	1.21	1.06
		KDS 753	60	2413	2037	111006	93694	45925	43282	65081	50412	1.42	1.16

		Dsb 21	18	1950	1735	99311	88427	55039	47933	44272	40495	0.84	0.90
		MACS 1460	14	2081	1816	93625	81688	35981	32500	57645	49188	1.62	1.54
		Dsb 34	10	1890	1637	98254	85129	46009	39671	52245	45458	1.14	1.15
		KBS 23	8	1399	1208	83910	72480	34986	29204	48924	43276	1.40	1.48
		JS 93-05	5	1909	1690	99259	87858	46009	39671	53250	48187	1.16	1.21
		Basara	5	2222	1971	102194	90675	54409	49579	47785	41096	0.88	0.83
		AISb-50	5	2347	2088	107953	96048	53515	48738	54438	47310	1.02	0.97
		MAUS-612	5	2147	1928	98762	88697	46554	44663	52208	44034	1.12	0.99
		Karune	2	1090	999	65370	59910	34986	29204	30384	30706	0.87	1.05
		MACS 1407	1	2750	2250	123750	101250	43915	41025	79835	60225	1.82	1.47
3	NHZ	VL Soya 99 (yellow)	33	1354	1068	87985	69442	53523	48671	34462	20771	0.64	0.43
		VL Bhat 201 (black)	29	1274	1023	82810	66473	53523	48671	29287	17802	0.55	0.37
		Hara Soya	17	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
		Palam Soya	14	1203	978	78175	63550	53523	48671	24652	14879	0.46	0.31
		VL Bhat 202 (black)	13	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
		VL Soya 89 (yellow)	8	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
4	NPZ	PS 26	21	1806	1417	83068	65179	40487	35019	42581	30160	1.05	0.86
		SL 958	14	2011	1625	92479	74750	37034	35019	55445	39731	1.52	1.13
		PS 1347	2	1700	1325	78200	60950	40487	35019	37713	25931	0.93	0.74
5	NEHZ	MACS 1460	14	1329	996	105902	79395	45169	30376	60733	49020	1.37	1.61
		DSb 32	6	1362	1022	122550	92010	51425	35869	71125	56141	1.40	1.58
6	EZ	CG Soya-1	83	1786	997	82145	45874	32210	22270	49953	23604	1.55	1.06
		JS 20-116	17	1733	987	79699	45395	33510	22270	46189	23125	1.38	1.04

Table 8.4.1a Zone wise performance of SOYBEAN varieties under whole package of FLDs conducted at various locations in farmers' fields 2023-24.

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	44	1874	1592	86221	73222	39051	36420	47170	36803	1.21	1.03
		RVSM-2011-35	31	2647	2280	121767	104874	40307	39249	81459	65625	2.01	1.67
		NRC 37	30	1253	942	62615	47075	25875	21006	36740	26069	1.42	1.24
		MAUS 612	20	2213	1880	101798	86480	55956	54941	45842	31539	0.83	0.58
		AMS 100-39	18	1924	1603	66170	58303	73209	64521	41059	27407	0.87	0.61
		MAUS 158	8	1863	1584	85698	72864	55956	54941	29742	17923	0.53	0.33
		MAUS 162	8	2006	1711	92276	78706	55956	54941	36320	23765	0.67	0.45
		JS 20-116	5	2162	1736	99452	79856	40307	39249	59145	40607	1.46	1.06
2	SZ	KDS-726	100	2340	1973	97452	82464	41854	38685	55598	43779	1.35	1.14
		KDS- 753	45	2416	2042	111126	93942	45925	43282	65201	50660	1.42	1.17
		Dsb 21	12	2082	1786	104083	89312	64068	56195	40015	33118	0.62	0.59
		Dsb 34	10	1890	1637	98254	85129	46009	39671	52245	45458	1.14	1.15
		MACS 1460	9	2361	2056	106250	92500	42386	38875	63864	53625	1.50	1.37
		KBS 23	8	1399	1208	83910	72480	34986	29204	48924	43276	1.40	1.48

		Basara	5	2222	1971	102194	90675	54409	49579	47785	41096	0.88	0.83
		AISb-50	5	2347	2088	107953	96048	53515	48738	54438	47310	1.02	0.97
		Karune	2	1090	999	65370	59910	34986	29204	30384	30706	0.87	1.05
		MACS 1407	1	2750	2250	123750	101250	43915	41025	79835	60225	1.82	1.47
3	NHZ	VL Soya 99 (yellow)	33	1354	1068	87985	69442	53523	48671	34462	20771	0.64	0.43
		VL Bhat 201 (black)	29	1274	1023	82810	66473	53523	48671	29287	17802	0.55	0.37
		Hara Soya	17	1680	1205	109200	78325	53523	48671	55677	29654	1.04	0.61
		Palam Soya	14	1203	978	78175	63550	53523	48671	24652	14879	0.46	0.31
		VL Bhat 202 (black)	13	1410	1155	91650	75075	53523	48671	38127	26404	0.71	0.54
		VL Soya 89 (yellow)	8	1305	942	105717	95093	59550	61150	46167	33943	0.78	0.56
4	NPZ	SL 958	14	2011	1625	92479	74750	37034	35019	55445	39731	1.52	1.13
		PS 26	6	1800	1408	82800	64783	40487	35019	42313	29764	1.05	0.85
		PS 1347	2	1700	1325	78200	60950	40487	35019	37713	25931	0.93	0.74
5	NEHZ	MACS 1460	9	1349	1028	107267	81688	42798	30376	64469	51312	1.52	1.71
		DSb 32	4	1408	1050	126675	94500	49092	34190	77583	60310	1.58	1.76
6	EZ	CG Soya-1	50	1783	1002	82015	46073	31960	22270	50111	23803	1.57	1.07

Table 8.4.1b Zone wise performance of SOYBEAN varieties under integrated Weed management (IWM) of FLDs conducted at various locations in farmers' field 2023-24.

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	RVS 24	5	2080	1480	93600	66600	30405	26100	63195	40500	2.08	1.55
		RVS 11-35	5	2260	1595	101700	71775	30405	26100	71295	45675	2.34	1.75
2	SZ	MAUS-612	5	2147	1928	98762	88697	46554	44663	52208	44034	1.12	0.99
		KDS 726	3	1577	1397	81987	72627	46009	39671	35978	32956	0.78	0.83
		Dsb 21	2	1881	1728	97786	89830	46009	39671	51777	50159	1.13	1.26
3	NPZ	PS-26	10	1858	1453	85445	66815	40487	35019	44958	31796	1.11	0.91
4	EZ	CG Soya-1	23	1770	977	76109	42031	27085	18295	49024	23736	1.81	1.30
		JS 20-116	7	1532	1043	65876	44849	32870	26180	33006	18669	1.00	0.71

Table 8.4.1c Zone wise performance of SOYBEAN varieties under integrated nutrient management (INM)of FLDs conducted at various locations in farmers' field 2023-24.

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 21	1	1833	1707	95316	88764	46009	39671	49307	49093	1.07	1.24
		KDS 726	1	1625	1413	84500	73476	46009	39671	38491	33805	0.84	0.85
		JS 93-05	3	1895	1702	98523	88487	46009	39671	52514	48816	1.14	1.23
2	NPZ	PS-26	5	1760	1390	80960	63940	40487	35019	40473	28921	1.00	0.83
3	EZ	JS 20-116	10	1795	1012	82584	46557	35060	22270	47524	24287	1.36	1.09

Table 8.4.1d Zone wise performance of SOYBEAN varieties under integrated pest management (IPM) of FLDs conducted at various locations in farmers' field 2023-24.

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 21	3	1741	1616	90515	84032	46009	39671	44506	44361	0.97	1.12
		JS 93-05	2	1923	1678	99996	87230	46009	39671	53987	47559	1.17	1.20
2	EZ	CG Soya-1	10	1824	1020	83895	46915	32710	22270	51185	24645	1.57	1.11

Table 8.4.1e Zone wise performance of SOYBEAN varieties under Organic Farming (Org. Far.) of FLDs conducted at various locations in farmers' field 2023-24.

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	NEHZ	MACS 1460	5	1333	950	93310	66500	49314	28410	43996	38090	0.90	1.30
		DSb 32	2	1270	967	114300	87030	56090	39228	58210	47802	1.04	1.22

Table 8.4.1f Zone wise performance of SOYBEAN varieties under Organic Farming (Org. Far.) of FLDs conducted at various locations in farmers' field 2023-24.

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	NEHZ	MACS 1460	5	1333	950	93310	66500	49314	28410	43996	38090	0.90	1.30
		DSb 32	2	1270	967	114300	87030	56090	39228	58210	47802	1.04	1.22

Table 8.4.1g Zone wise performance of SOYBEAN varieties under Intercropping (IC)of FLDs conducted at various locations in farmers' field 2023-24.

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	Inter-crop	SEY	soybean	Inter-crop	SEY	IP	FP	IP	FP	IP	FP	IP	FP
1	CZ	MAUS 612 + Pigeon pea	5	2055	1110	3744	1670	929	3083	172224	141818	55997	54097	116268	86877	2.08	1.61
		MAUS 158 + Pigeon pea	2	2210	1075	3684	1845	925	3251	169464	139288	55997	54097	113505	84347	2.03	1.56
		MAUS 162 + Pigeon pea	2	1988	950	3433	1623	788	2821	157918	129766	55997	54097	101962	74525	1.82	1.38
		AMS100-39 + Pigeon pea	1	2270	1100	3943	1825	920	3225	181378	148350	55997	54097	125381	94253	2.24	1.74

Table 8.4.2 State wise performance of SOYBEAN varieties under different components of FLDs conducted at various locations in farmers' field 2023-24.

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	KDS 753	60	2413	2037	111006	93694	45925	43282	65081	50412	1.42	1.16
		KDS 726	40	2787	2326	111468	93270	48540	44058	62928	49212	1.30	1.12
		MAUS 612	25	2979	2482	137011	114149	55977	54519	81055	59208	1.45	1.08
		AMS 100-39	20	1880	1564	42349	40503	90091	74766	47743	34263	1.13	0.85
		MACS 1460	14	2081	1816	93625	81688	35981	32500	57645	49188	1.62	1.54
		MAUS 158	10	2774	2306	127581	106076	55977	54519	71624	51135	1.28	0.93
		MAUS 162	10	2720	2266	125097	104236	55977	54519	69141	49295	1.24	0.91
		AMS 100-39	5	2950	2440	135677	112240	55977	54519	79721	57299	1.42	1.06
		MACS 1407	1	2750	2250	123750	101250	43915	41025	79835	60225	1.82	1.47
2	MP	NRC142	250	1693	1297	77890	59671	34486	27909	43403	31762	1.26	1.14
		RVS 11-35	36	2454	1938	111733	88325	35356	32675	76377	55650	2.18	1.71
		JS 20-34	14	1884	1544	86677	71004	40307	39249	46370	31755	1.15	0.82
		JS 20-116	5	2162	1736	99452	79856	40307	39249	59145	40607	1.46	1.06
		RVS 24	5	2080	1480	93600	66600	30405	26100	63195	40500	2.08	1.55
3	KA	KDS 726	64	1523	1336	76332	66952	37246	33806	39086	33146	1.12	1.01
		Dsb 21	18	1950	1735	99311	88427	55039	47933	44272	40495	0.84	0.90
		Dsb 34	10	1890	1637	98254	85129	46009	39671	52245	45458	1.14	1.15
		KBS 23	8	1399	1208	83910	72480	34986	29204	48924	43276	1.40	1.48
		JS 93-05	5	1909	1690	99259	87858	46009	39671	53250	48187	1.16	1.21
		Karune	2	1090	999	65370	59910	34986	29204	30384	30706	0.87	1.05
4	GJ	NRC 37	30	1253	942	62615	47075	25875	21006	36740	26069	1.42	1.24
5	UK	VL Soya 99 (yellow)	33	1883	1619	105467	90686	58938	55328	46458	34600	0.79	0.63
		VL Bhat 201 (black)	29	1254	973	114158	98318	61554	63578	52604	34740	0.85	0.55
		PS 26	21	1806	1417	83068	65179	40487	35019	42581	30160	1.05	0.86
		VL Bhat 202 (black)	13	1238	952	112700	96190	61554	63578	51146	32612	0.83	0.51
		VL Soya 89 (yellow)	8	1870	1534	104720	85890	58938	55328	45782	30562	0.78	0.55
		SL 958	2	2075	1625	95450	74750	40487	35019	54963	39731	1.36	1.13
		PS 1347	2	1700	1325	78200	60950	40487	35019	37713	25931	0.93	0.74
6	HP	Hara Soya	17	1425	1183	99727	82787	56093	51562	43634	31225	0.78	0.61
		Palam Soya	14	1355	1107	94879	77496	56093	51562	38786	25934	0.69	0.50
7	PB	SL 958	12	1946	-	89508	-	33581	-	55927	-	1.67	-
8	RJ	JS 20-34	30	1864	1640	85765	75440	37795	33590	47970	41850	1.27	1.25
9	TS	Basara	5	2222	1971	102194	90675	54409	49579	47785	41096	0.88	0.83
		AISb-50	5	2347	2088	107953	96048	53515	48738	54438	47310	1.02	0.97
		MAUS-612	5	2147	1928	98762	88697	46554	44663	52208	44034	1.12	0.99
10	NL	MACS 1460	10	1372	1016	96040	71085	44572	28410	51469	42675	1.20	1.50
11	CG	CG Soya-1	83	1786	997	82145	45874	32210	22270	49953	23604	1.55	1.06
		JS 20-116	17	1733	987	79699	45395	33510	22270	46189	23125	1.38	1.04
12	MN	DSb 32	6	1362	1022	122550	92010	51425	35869	71125	56141	1.40	1.58
		MACS 1460	4	1286	975	115763	87705	45766	32341	69997	55364	1.53	1.71

Table 8.4.2a State wise performance of SOYBEAN varieties under whole package of FLDs conducted at various locations in farmers' fields 2023-24.

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	KDS- 753	45	2416	2042	111126	93942	45925	43282	65201	50660	1.42	1.17
		KDS 726	40	2787	2326	111468	93270	48540	44058	62928	49212	1.30	1.12
		MAUS 612	20	2213	1880	101798	86480	55956	54941	45842	31539	0.83	0.58
		AMS 100-39	18	1924	1603	66170	58303	73209	64521	41059	27407	0.87	0.61
		MAUS 158	8	1863	1584	85698	72864	55956	54941	29742	17923	0.53	0.33
		MAUS 162	8	2006	1711	92276	78706	55956	54941	36320	23765	0.67	0.45
		MACS 1460	9	2361	2056	106250	92500	42386	38875	63864	53625	1.50	1.37
		MACS 1407	1	2750	2250	123750	101250	43915	41025	79835	60225	1.82	1.47
2	MP	RVSM 2011-35	31	2647	2280	121767	104874	40307	39249	81459	65625	2.01	1.67
		JS 20-34	14	1884	1544	86677	71004	40307	39249	46370	31755	1.15	0.82
		JS 20-116	5	2162	1736	99452	79856	40307	39249	59145	40607	1.46	1.06
3	KA	KDS 726	60	1446	1268	69420	60852	28483	27940	40938	32912	1.44	1.18
		Dsb 21	12	2082	1786	104083	89312	64068	56195	40015	33118	0.62	0.59
		Dsb 34	10	1890	1637	98254	85129	46009	39671	52245	45458	1.14	1.15
		KBS 23	8	1399	1208	83910	72480	34986	29204	48924	43276	1.40	1.48
		Karune	2	1090	999	65370	59910	34986	29204	30384	30706	0.87	1.05
4	GJ	NRC 37	30	1253	942	62615	47075	25875	21006	36740	26069	1.42	1.24
5	UK	VL Soya 99 (yellow)	33	1883	1619	105467	90686	58938	55328	46458	34600	0.79	0.63
		VL Bhat 201 (black)	29	1254	973	114158	98318	61554	63578	52604	34740	0.85	0.55
		VL Bhat 202 (black)	13	1238	952	112700	96190	61554	63578	51146	32612	0.83	0.51
		VL Soya 89 (yellow)	8	1870	1534	104720	85890	58938	55328	45782	30562	0.78	0.55
		PS 26	6	1800	1408	82800	64783	40487	35019	42313	29764	1.05	0.85
		SL 958	2	2075	1625	95450	74750	40487	35019	54963	39731	1.36	1.13
		PS 1347	2	1700	1325	78200	60950	40487	35019	37713	25931	0.93	0.74
6	HP	Hara Soya	17	1425	1183	99727	82787	56093	51562	43634	31225	0.78	0.61
		Palam Soya	14	1355	1107	94879	77496	56093	51562	38786	25934	0.69	0.50
7	PB	SL 958	12	1946	-	89508	-	33581	-	55927	-	1.67	-
8	RJ	JS 20-34	30	1864	1640	85765	75440	37795	33590	47970	41850	1.27	1.25
9	TS	Basara	5	2222	1971	102194	90675	54409	49579	47785	41096	0.88	0.83
		AISb-50	5	2347	2088	107953	96048	53515	48738	54438	47310	1.02	0.97
10	NL	MACS 1460	5	1411	1081	98770	75670	39829	28410	58941	47260	1.50	1.70
11	CG	CG Soya-1	50	1783	1002	82015	46073	31960	22270	50111	23803	1.57	1.07
12	MN	DSb 32	4	1408	1050	126675	94500	49092	34190	77583	60310	1.58	1.76
		MACS 1460	4	1286	975	115763	87705	45766	32341	69997	55364	1.53	1.71

Table 8.4.2b State wise performance of SOYBEAN varieties under integrated weed management (IWM) of FLDs conducted at various locations in farmers' field 2023-24.

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	KDS 726	3	1577	1397	81987	72627	46009	39671	35978	32956	0.78	0.83
		Dsb 21	2	1881	1728	97786	89830	46009	39671	51777	50159	1.13	1.26
2	UK	PS-26	10	1858	1453	85445	66815	40487	35019	44958	31796	1.11	0.91
3	MP	RVS 24	5	2080	1480	93600	66600	30405	26100	63195	40500	2.08	1.55
		RVS 11-35	5	2260	1595	101700	71775	30405	26100	71295	45675	2.34	1.75
4	TS	MAUS-612	5	2147	1928	98762	88697	46554	44663	52208	44034	1.12	0.99
5	CG	CG Soya-1	23	1751	970	80524	44634	31960	22270	48564	22364	1.52	1.01
		JS 20-116	7	1670	962	76813	44232	31960	22270	44853	21962	1.40	0.99

Table 8.4.2c State wise performance of SOYBEAN varieties under integrated nutrient management (INM) of FLDs conducted at various locations in farmers' field 2023-24.

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	JS 93-05	3	1895	1702	98523	88487	46009	39671	52514	48816	1.14	1.23
		Dsb 21	1	1833	1707	95316	88764	46009	39671	49307	49093	1.07	1.24
		KDS 726	1	1625	1413	84500	73476	46009	39671	38491	33805	0.84	0.85
2	UK	PS-26	5	1760	1390	80960	63940	40487	35019	40473	28921	1.00	0.83
3	CG	JS 20-116	10	1795	1012	82584	46557	35060	22270	47524	24287	1.36	1.09

Table 8.4.2d State wise performance of SOYBEAN varieties under integrated pest management (IPM) of FLDs conducted at various locations in farmers' field 2023-24.

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 21	3	1741	1616	90515	84032	46009	39671	44506	44361	0.97	1.12
		JS 93-05	2	1923	1678	99996	87230	46009	39671	53987	47559	1.17	1.20
2	CG	CG Soya-1	10	1824	1020	83895	46915	32710	22270	51185	24645	1.57	1.11

Table 8.4.2e State wise performance of SOYBEAN varieties under Organic Farming (Org. Far.)of FLDs conducted at various locations in farmers' field 2023-24.

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	NL	MACS 1460	5	1333	950	93310	66500	49314	28410	43996	38090	0.90	1.30
2	MN	DSb 32	2	1270	967	114300	87030	56090	39228	58210	47802	1.04	1.22

Table 8.4.2f State wise performance of SOYBEAN varieties under Food Grade Variety (FGV) of FLDs conducted at various locations in farmers' field 2023-24.

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	NRC142	250	1693	1297	77890	59671	34486	27909	43403	31762	1.26	1.14

Table 8.4.2g State wise performance of SOYBEAN varieties under Intercropping (IC) of FLDs conducted at various locations in farmers' field 2023-24.

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	Inter-crop	SEY	IP	FP	IP	FP	IP	FP	IP	FP
1	MH	MAUS 612 + Pigeon pea	5	2055	1110	3744	1670	929	3083	172224	141818	55997	54097	116268	86877	2.08	1.61
		MAUS 158 + Pigeon pea	2	2210	1075	3684	1845	925	3251	169464	139288	55997	54097	113505	84347	2.03	1.56
		MAUS 162 + Pigeon pea	2	1988	950	3433	1623	788	2821	157918	129766	55997	54097	101962	74525	1.82	1.38
		AMS100-39 + Pigeon pea	1	2270	1100	3943	1825	920	3225	181378	148350	55997	54097	125381	94253	2.24	1.74

Table 5 Details of soybean cost of cultivation (Rs ha^{-1}) under different components of FLD in improved technology and farmers practices2023-24.

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	14769	60	5362	5062	-	4333	1723	-	-	-	6031	5169	2585	**56094**
		FP	11000	12800	-	5362	-	-	-	-	8615	-	-	6031	5169	2585	**51562**
2	Almora (VPKAS)	IT	4800	7238	796	22299	-	-	-	-	17320	-	-	4330	3464	-	**60247**
		FP	3200	9832	-	22299	-	-	-	-	17320	-	-	4330	3464	-	**60445**
3	Pantnagar (GBPUA&T)	IT	6000	7881	163	-	6916	-	5150	762	3000	3041	-	3812	3381	381	**40487**
		FP	6000	5931	50	-	3866	-	4795	762	3000	3041	-	3812	3381	381	**35019**
4	Ludhiana (PAU)	IT	4163	4500	75	-	1680	368	1575	-	-	2500	-	-	-	1872	**33581**
		FP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Indore (IISR/AICRPS)	IT	3989	7718	703	6000	3849	1200	2301	-	1075	1631	1149	2837	2034	-	**34486**
		FP	3311	9373	427	-	4412	-	1200	-	2470	608	-	3414	2694	-	**27909**
6	Sehore (RVSKVV)	IT	3250	8563	480	-	4032	-	1730	-	3000	3000	-	3750	2600	-	**30405**
		FP	3250	6950	-	-	2805	-	2745	-	1000	3000	-	3750	2600	-	**26100**
7	Kota (MPUA&T)	IT	7500	9800	425	-	2396	-	2286	-	-	4372	-	6216	4800	-	**37795**
		FP	7500	8416	-	-	-	-	2286	-	-	4372	-	6216	4800	-	**33590**
8	Parbhani (MAU)	IT	7500	11574	370	-	9361	-	1406	-	1800	4729	1818	8250	9169	-	**55977**
		FP	7500	12300	-	-	5487	-	1507	-	1800	6100	1818	10365	7632	-	**54509**
9	Amravati (PDKV)	IT	7400	7850	260	-	5421	-	2650	-	5000	3248	1250	5500	4000	-	**42579**
		FP	7400	9600	-	-	3275	-	2450	-	5000	3250	900	5500	3000	-	**40375**
10	Kasbe digraj, Sangli (MPKV)	IT	11500	13375	506	-	6336	-	1313	-	2500	3125	-	5000	7500	-	**51156**
		FP	11500	13375	-	-	520	-	1313	-	2500	3125	-	5000	7500	-	**44833**
11	Pune (ARI)	IT	4688	6625	161	-	7118	1562	2263	-	-	3623	-	4125	6300	-	**36463**
		FP	4625	6625	-	-	5040	1500	1968	-	3125	2575	-	3988	5475	-	**34920**
12	Dharwad (UAS)	IT	9900	9415	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**46009**
		FP	9900	7900	-	-	3475	-	-	2700	6700	846	900	3000	4250	-	**39671**
13	Adilabad (PJTSAU)	IT	2284	11326	483	-	8291	-	5918	1395	3368	8019	3865	3123	3125	500	**51697**
		FP	2249	11015	133	-	6374	-	5300	450	5391	6828	3572	3049	3122	500	**47982**
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	IT	6500	6971	127	-	13032	3788	-	-	13176	1750	1550	13176	4000		**64068**
		FP	6500	6971	-	-	11382	3788	-	-	12078	-	-	12078	3400		**56196**
16	Raipur (IGKVV)	IT	3200	7400	460	-	5975	-	3100	-	3600	4388	-	2800	-	2000	**32923**
		FP	2400	7100	370	-	4200	-	1800	-	-	1600	-	2800	-	2000	**22270**
17	Imphal (CAU)	IT	5600	11482	225	6000	9976	-	-	-	8480	848	212	3392	5088	1500	**52803**
		FP	5200	8864	-	4000	1457	-	-	-	6360	848	-	3392	5088	1500	**36709**
18	DevgrahBaria (TRTC)	IT	4800	7350	450		3300		2040	-	-	4672	-	1400	1800	-	**25812**
		FP	4800	5150	-		2200		-	-	3000	2500	-	1600	1800	-	**21050**
19	KVK, Belagavi	IT	2750	8063	476		4161		775		1308	2500		3750	3700	1000	**28483**
		FP	3000	7125			3744		2200		1071	3300		3000	3500	1000	**27940**

20	Bengaluru (UAS)	IT	2500	8750	282	-	3554	1250	3750	-	6250	2400	1750	4500	-	-	**34986**
		FP	2500	5500	-	-	1554	1000	2750	-	6250	1650	1750	3750	2500	-	**29204**
21	KVK, Kanerimath,	IT	6500	12350	285	-	7572	-	2125	-	4500	980	-	2600	9013	-	**45925**
		FP	6500	12350	-	-	4230	-	-	-	9000	980	-	2600	7622	-	**43282**
22	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**	**5660**	**8995**	**357**	**9732**	**6105**	**1634**	**2518**	**1477**	**5005**	**3275**	**1644**	**4632**	**4740**	**3812**	**43039**
Percentage			13.2	20.9	0.83	22.61	14.2	3.8	5.85	3.43	11.6	7.61	3.82	10.8	11.0	8.9	
Mean		**F**	**5573**	**8727**	**245**	**8665**	**3987**	**2096**	**2536**	**1304**	**5394**	**2897**	**1750**	**4697**	**4277**	**1328**	**38154**
Percentage			14.6	22.9	0.64	22.71	10.4	5.5	6.65	3.42	14.1	7.59	4.59	12.3	11.2	3.48	
Overall increase in soybean cultivation cost over farmers practices																	**12.80**

Table 8.5a Details of soybean cost of cultivation (Rsha^{-1}) under whole package of FLD in improved technology and farmers practices 2023-24.

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	14769	60	5362	5062	-	4333	1723	-	-	-	6031	5169	2585	**56094**
		FP	11000	12800	-	5362	-	-	-	-	8615	-	-	6031	5169	2585	**51562**
2	Pantnagar (GBPUA&T)	IT	6000	7881	163	-	6916	-	5150	762	3000	3041	-	3812	3381	381	**40487**
		FP	6000	5931	50	-	3866	-	4795	762	3000	3041	-	3812	3381	381	**35019**
3	Ludhiana (PAU)	IT	4163	4500	75	-	1680	368	1575	-	-	2500	-	-	-	18720	**33581**
		FP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Kota (MPUA&T)	IT	7500	9800	425	-	2396	-	2286	-	-	4372	-	6216	4800	-	**37795**
		FP	7500	8416	-	-	-	-	2286	-	-	4372	-	6216	4800	-	**33590**
5	Parbhani (MAU)	IT	7500	12425	400		10443	-	2813	-	1800	3289	1773	8250	7263	-	**55956**
		FP	7500	13875	-		4900	-	3013	-	1800	4406	1773	11500	6174	-	**54941**
6	Amravati (PDKV)	IT	7400	7850	260	-	5421	-	2650	-	5000	3248	1250	5500	4000	-	**42579**
		FP	7400	9600	-	-	3275	-	2450	-	5000	3250	900	5500	3000	-	**40375**
7	Kasbe digraj, Sangli (MPKV)	IT	11500	13375	506	-	6336	-	1313	-	2500	3125	-	5000	7500	-	**51156**
		FP	11500	13375	-	-	520	-	1313	-	2500	3125	-	5000	7500	-	**44833**
8	Pune (ARI)	IT	6875	7625	185	-	7892	1562	2025	-	-	4175	-	5000	7200	-	**42539**
		FP	6750	7625	-	-	5280	1500	810	-	3125	3175	-	4600	6225	-	**39090**
9	Dharwad (UAS)	IT	9900	9415	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**46009**
		FP	9900	7900	-	-	3475	-	-	2700	6700	846	900	3000	4250	-	**39671**
10	Adilabad (PJTSAU)	IT	2377	11533	359	-	9568	-	5660	1913	3377	8915	3778	3135	2938	500	**54049**
		FP	2324	11066	147	-	6692	-	5555	495	6442	7129	3337	3023	2933	500	**49641**
11	Medziphema	IT	3000	7500	270	6000	8359	-	1540	-	2640	2930	-	2640	4950	-	**39829**
		FP	3000	7890	-	3000	-	-	-	-	6600	-	-	3960	3960	-	**28410**
12	Ugar Khurd (Ugar Sugar Works Ltd.)	IT	6500	6971	127	-	13032	3788	-	-	13176	1750	1550	13176	4000		**64068**
		FP	6500	6971	-	-	11382	3788	-	-	12078	-	-	12078	3400		**56196**

13	Raipur (IGKVV)	IT	3200	7400	460	-	5200	-	3100	-	3600	4200	-	2800	-	2000	**31960**
		FP	2400	7100	370	-	4200	-	1800	-	-	1600	-	2800	-	2000	**22270**
14	Almora (VPKAS)	IT	4800	7238	796	22299	-	-	-	-	17320	-	-	4330	3464	-	**60247**
		FP	3200	9832	-	22299	-	-	-	-	17320	-	-	4330	3464	-	**60445**
15	Imphal (CAU)	IT	5600	11482	450	4000	8252	-	-	-	8480	848	424	3392	5088	1500	**49516**
		FP	4800	9288	-	-	2914	-	-	-	6360	848	-	3392	5088	1500	**34190**
16	DevgrahBaria (TRTC)	IT	4800	7350	450		3300		2040	-	-	4672	-	1400	1800	-	**25812**
		FP	4800	5150	-		2200		-	-	3000	2500	-	1600	1800	-	**21050**
17	KVK, Belagavi	IT	2750	8063	476		4161		775		1308	2500		3750	3700	1000	**28483**
		FP	3000	7125			3744		2200		1071	3300		3000	3500	1000	**27940**
18	Bengaluru (UAS)	IT	2500	8750	282	-	3554	1250	3750	-	6250	2400	1750	4500	-	-	**34986**
		FP	2500	5500	-	-	1554	1000	2750	-	6250	1650	1750	3750	2500	-	**29204**
19	KVK, Kanerimath, Kolhapur	IT	6500	12350	285	-	7572	-	2125	-	4500	980	-	2600	9013	-	**45925**
		FP	6500	12350	-	-	4230	-	-	-	9000	980	-	2600	7622	-	**43282**
20	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**	**5978**	**9184**	**346**	**9415**	**6389**	**1742**	**2676**	**1606**	**5291**	**3295**	**1726**	**4820**	**4955**	**3812**	44069
Percentage			13.6	20.8	0.79	21.4	14.5	3.95	6.07	3.65	12.0	7.48	3.92	10.9	11.2	8.7	
Mean		**FP**	**5909**	**8947**	**189**	**10220**	**4132**	**2096**	**2693**	**1319**	**5886**	**2989**	**1703**	**4905**	**4408**	**1328**	39524
Percentage			15.0	22.6	0.48	25.9	10.5	5.30	6.81	3.34	14.9	7.56	4.31	12.4	11.2	3.4	
Overall increase in soybean cultivation cost over farmers practices																	**11.50**

Table 5b Details of soybean cost of cultivation (Rsha^{-1}) under integrated weed management (IWM)of FLD in improved technology and farmers practices2023-24.

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	Pantnagar (GBPUA&T)	IT	6000	7881	163	-	6916	-	5150	762	3000	3041	-	3812	3381	381	**40487**
		FP	6000	5931	50	-	3866	-	4795	762	3000	3041	-	3812	3381	381	**35019**
2	Dharwad (UAS)	IT	9900	9415	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**46009**
		FP	9900	7900	-	-	3475	-	-	2700	6700	846	900	3000	4250	-	**39671**
3	Adilabad (PJTSAU)	IT	2100	10912	292	-	5739	-	6435	360	3350	6226	4041	3100	3500	500	**46554**
		FP	2100	10912	106	-	5739	-	4791	360	3290	6226	4041	3100	3500	500	**44663**
4	Raipur (IGKVV)	IT	3200	7400	460	-	5200	-	3100	-	3600	4200	-	2800	-	2000	**31960**
		FP	2400	7100	370	-	4200	-	1800	-	-	1600	-	2800	-	2000	**22270**
5	Sehore (RVSKVV)	IT	3250	8563	480	-	4032	-	1730	-	3000	3000	-	3750	2600	-	**30405**
		FP	3250	6950	-	-	2805	-	2745	-	1000	3000	-	3750	2600	-	**26100**
Mean		**IT**	**4890**	**8834**	**379**	-	**5668**	-	**3626**	**1050**	**3634**	**3991**	**4041**	**3301**	**3433**	**960**	39083
Percentage			12.5	22.6	0.97	-	14.5	-	9.28	2.69	9.30	10.21	10.34	8.4	8.78	2.46	
Mean		**FP**	**4730**	**7759**	**175**	-	**4017**	-	**3533**	**1274**	**3498**	**2943**	**2471**	**3292**	**3433**	**960**	33545
Percentage			14.1	23.1	0.52	-	12.0	-	10.53	3.80	10.4	8.77	7.36	9.8	10.23	2.86	
Overall increase in soybean cultivation cost over farmers practices																	**16.51**

Table 8.5c Details of soybean cost of cultivation (Rs ha^{-1}) under integrated nutrient management (INM)of FLD in improved technology and farmers practices2023-24

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	9900	9415	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**46009**
		FP	9900	7900	-	-	3475	-	-	2700	6700	846	900	3000	4250	-	**39671**
2	Pantnagar (GBPUA&T)	IT	6000	7881	163	-	6916	-	5150	762	3000	3041	-	3812	3381	381	**40487**
		FP	6000	5931	50	-	3866	-	4795	762	3000	3041	-	3812	3381	381	**35019**
3	Raipur (IGKVV)	IT	3200	7400	460	-	8300	-	3100	-	3600	4200	-	2800	-	2000	**35060**
		FP	2400	7100	370	-	4200	-	1800	-	-	1600	-	2800	-	2000	**22270**
Mean		**IT**	**6367**	**8232**	**374**	-	**7224**	-	**3321**	**1395**	**3939**	**3576**	-	**3218**	**3816**	**1191**	**40519**
Percentage			15.7	20.3	0.92	-	17.8	-	8.20	3.44	9.72	8.83	-	7.9	9.4	2.94	
Mean		**FP**	**6100**	**6977**	**210**	-	**3847**	-	**3298**	**1731**	**4850**	**1829**	**900**	**3204**	**3816**	**1191**	**32320**
Percentage			18.9	21.6	0.65	-	11.9	-	10.20	5.36	15.01	5.66	2.78	9.9	11.8	3.68	
Overall increase in soybean cultivation cost over farmers practices																	**25.37**

Table 8.5d Details of soybean cost of cultivation (Rs ha^{-1}) under integrated pest management (IPM)of FLD in improved technology and farmers practices2023-24

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	9900	9415	500	-	6455	-	1713	2028	5218	3488	-	3042	4250	-	**46009**
		FP	9900	7900	-	-	3475	-	-	2700	6700	846	900	3000	4250	-	**39671**
2	Raipur (IGKVV)	IT	3200	7400	460	-	5200	-	3100	-	3600	4950	-	2800	-	2000	**32710**
		FP	2400	7100	370	-	4200	-	1800	-	-	1600	-	2800	-	2000	**22270**
Mean		**IT**	**6550**	**8408**	**480**	-	**5828**	-	**2407**	**2028**	**4409**	**4219**	-	**2921**	**4250**	**2000**	**39360**
Percentage			16.6	21.4	1.22	-	14.8	-	6.11	5.15	11.20	10.72	-	7.4	10.8	5.08	
Mean		**FP**	**6150**	**7500**	**370**	-	**3838**	-	**1800**	**2700**	**6700**	**1223**	**900**	**2900**	**4250**	**2000**	**30971**
Percentage			19.9	24.2	1.19	-	12.4	-	5.81	8.72	21.6	3.95	2.91	9.4	13.7	6.46	
Overall increase in soybean cultivation cost over farmers practices																	**27.09**

Table 8.5e Details of soybean cost of cultivation (Rs ha^{-1}) under organic farming (Org. Far.) of FLD in improved technology and farmer's practices2023-24

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	3000	7500	84	12000	7500	-	-	-	5940	5700	-	2640	4950	-	**49314**
		FP	3000	7890	-	3000	-	-	-	-	6600	-	-	3960	3960	-	**28410**
2	Pantnagar (GBPUA&T)	IT	5600	11482	-	8000	11700	-	-	-	8480	848	-	3392	5088	1500	**56090**
		FP	5600	8440	-	8000	-	-	-	-	6360	848	-	3392	5088	1500	**39228**
Mean		**IT**	**4300**	**9491**	**84**	**10000**	**9600**	-	-	-	**7210**	**3274**	-	**3016**	**5019**	**1500**	**52702**
Percentage			8.16	18.0	0.16	19.0	18.2	-	-	-	13.7	6.21	-	5.72	9.52	2.85	
Mean		**FP**	**4300**	**8165**	-	**5500**	-	-	-	-	**6480**	**848**	-	**3676**	**4524**	**1500**	**33819**
Percentage			12.7	24.1	-	16.3	-	-	-	-	19.2	2.51	-	10.9	13.38	4.44	
Overall increase in soybean cultivation cost over farmers practices																	**55.84**

Table 8.5f Details of soybean cost of cultivation (Rs ha^{-1}) under food grade variety (FGV) of FLD in improved technology and farmer's practices2023-24

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	Indore (IISR/AICRPS)	IT	3989	7718	703	6000	3849	1200	2301	-	1075	1631	1149	2837	2034	-	**34486**
		FP	3311	9373	427	-	4412	-	1200	-	2470	608	-	3414	2694	-	**27909**
Mean		**IT**	**3989**	**7718**	**703**	**6000**	**3849**	**1200**	**2301**	-	**1075**	**1631**	**1149**	**2837**	**2034**	-	**34486**
Percentage			7.57	14.6	1.33	11.4	7.3	-	-	-	2.0	3.09	-	5.38	3.86	-	
Mean		**FP**	**3311**	**9373**	**427**	-	**4412**	-	**1200**	-	**2470**	**608**	-	**3414**	**2694**	-	**27909**
Percentage			9.8	27.7	-	-	-	-	-	-	7.3	1.80	-	10.1	7.97	-	
Overall increase in soybean cultivation cost over farmers practices																	**23.57**

Table 8.5g Details of soybean cost of cultivation (Rs ha^{-1}) under intercropping (IC)of FLD in improved technology and farmers practices 2023-24.

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	10724	340	-	8278	-	-	-	1800	6168	1863	8250	11074	-	**55997**
		FP	7500	10724	-	-	6750	-	-	-	1800	7120	1863	9250	9090	-	**54097**

 # Total cost of cultivation (including all operational costs) is soybean +respective intercrop cost.

Abbreviations Used for Centre Names

Abbreviation	Centre Name
ALM	Almora
PAM	Palampur
MAJ	Majhera
DLH	Delhi
LDH	Ludhiana
PNT	Pantnagar
IMP	Imphal
JOR	Jorhat
BPT	Bhawanipatna
RAP	Raipur
RNC	Ranchi
AMV	Amrawati
AMR	Amreli
AND	Anand
INR	Indore
JBR	Jabalpur
KOT	Kota
LOB	Lokbharti
MND	Mandsaur
MOR	Morena
NAG	Nagpur
PRB	Parbhani
SEH	Sehore
ADB	Adilabad
BDR	Bidar
BGR	Bengaluru
DHW	Dharwad
KDJ	Kasbedigraj
PUN	Pune

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. B U Dupare	Principal Scientist and Nodal Officer FLD	Agronomy
6.	Dr. Sanjeev Kumar	Scientist and PI- Plant Pathology	Plant Pathology
7.	Dr. Lokesh Kumar Meena	Scientist and PI- Entomology	Entomology
10.	Dr. Mrinal K. Kuchlan	Senior Scientist (Seed Technology)	Seed Technology

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
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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)					
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d)	Technical Assistant	1			vacant	

C. NEED BASED TESTING CENTRE STAFF POSITION AICRP ON SOYBEAN

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