प्रकाशन के लिये नहीं
केवल कार्यालयीन उपयोग हेतु

All India Coordinated Research Project on Soybean
(Indian Council of Agricultural Research)

51st Online Annual Group Meeting
March 12-13, 2021

Proceedings and Technical Programme (2021-22)

ICAR-Indian Institute of Soybean Research
Khandwa Road, Indore-452001

Coordination and Compilation

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All India Coordinated Research Project on Soybean
(Indian Council of Agricultural Research)

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ICAR-Indian Institute of Soybean Research, Indore-452001

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20. Professor Jayashankar Telangna State Agricultural University, RRS, Adilabad- 504002, Telangna.
21. RVSKV Zonal Agricultural Research Station Morena. (M.P.)

Other Centres for need-based situation/location specific contingent activities

1. GBPUA&T, Regional Research Station, Majhera-263135, Dist. Nainital, Uttarakhand.
2. CSKHPKV, Regional Research Station Bajaura-175125, Distt. Kulu, Himachal Pradesh.
3. Rajendra Agricultural University, Tirhut College of Agriculture, Dholi–843121 (Muzaffarpur) Bihar.
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13. Wheat Research Center, Lokbharti, village - Sanosara, Taluqa - Sihor, Dist-Bhavnagar-364230, Gujarat

14. Collaborative Outstation Research Centre operating at Sipani Krishi Anusandhan Farm, Mandsaur (M.P.)

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

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Acknowledgement

I am highly thankful to the Indian Council of Agricultural Research, New Delhi for granting permission to conduct 51st Annual Group Meeting of All India Coordinated Research Project on Soybean in online mode from March 12-13, 2021.

All the research and development personnel of AICRP on Soybean are extremely obliged to Dr. Trilochan Mohapatra, Secretary, DARE, Govt. of India and Director General, ICAR for providing ceaseless guidance and direction for doing novel research and development of soybean in the country. I also sincerely thank Dr T R Sharma DDG (CS), ICAR for his direction, timely help and support in conducting this Annual Group Meeting. I am also thankful to Dr Sharma and all the members Varietal Identification Meeting for thoroughly discussing the performance of the entries for their release for cultivation in different zones of the country. I gratefully acknowledge the gracious presence and help, guidance and support rendered by Dr Sanjeev Gupta, Assistant Director General (O&P), ICAR in the Annual Group Meeting.

I would also like to express thanks to all the Chairpersons of the technical sessions for their valuable contributions in providing expert opinion and in formulating a sound technical programme of research for 2021-22. Thanks to all the rapporteurs, for recording the proceedings of technical sessions. The active participation, deliberation, discussion, contribution, cooperation and interaction of all the participants in the Group Meeting is duly recognized and highly appreciated.

(Nita Khandekar)
Director
ICAR-Indian Institute of Soybean Research, Indore

A. RECOMMENDATIONS

Recommendations

Plant Breeding: Following entries were identified for release for cultivation:

Zone	Entries
Central Zone	NRC 138, NRC 142, RVSM 2011-35, AMS 100-39
Southern Zone	MACSNRC 1667, NRC 142, KDS 992, Karue

Agronomy: Following recommendation was made for planting geometry:

Zone	Planting Geometry for Higher Yield and SYI
Central Zone	45 x 10 cm
Northern Plain Zone	45 x 10 cm
North Eastern Zone	45 x 10 cm
Central Zone	45 x 10 cm
Southern Zone	45 x 5 cm

Microbiology:
Combined application of *Paenibacillus polymyxa* HKA 15+AMF with 75% RDF was recommended for higher grain yield and B:C ratio (1.72) as compared to 100% RDF (1.39) by saving 20% chemical fertilizer usage in soybean.

Entomology: Following sources of insect resistance were identified:

Insect(s)	Genotype(s)
Stem fly	AMS 100-39, AMS 2014-1, MACS 1493, NRC 146, NRC 147, RSC11-07, DSb 34.
Girdle beetle	NRC 149, AMS-MB5-18, BAUS 102, DSb 32, NRC 132, NRC 137.
Defoliators	AMS 100-39, NRC 149, MACS 1493, DS 3108, DSb 34, NRC 148, DSb 33, KDS 992, SKF-SP-11, JS-20-34, CSB 10084, MACS-NRC1575, NRC 147.

Pathology: Following sources of disease resistance were identified:

Disease	Disease Reaction	Genotype(s)
Charcoal Rot	HR	AMS-1003 and JS 20-34
Rust	HR	DSb 21, DSb 23 DSb 28, EC 241778, EC 241780 and EC 242104
RAB	HR	SL 1123
FLS and PB (Ct)	HR	ASb 50

Technical Recommendations

Discipline	Recommendations
Plant Breeding	1. Strengthening of sharing of segregating material specially for centres with poor varietal developmental programme. More crosses should be shared by ICAR-IISR, Indore for this programme. 2. Explore the possibility of developing soy protein isolates in collaboration with ICAR-CIPHET 3. More concerted efforts to be made for directed pre-breeding

	programme. 4. Parents should be suggested to centres based on diversity analysis 5. Early maturity trials to be taken up in all zones.
Agronomy	6. A trial on 'effect of different ratios and levels of nitrogen and phosphorus fertilizers on the growth and yield of soybean [Glycine max (L.) Merrill.] during kharif under rainfed situations' should be taken up from Kharif 2022.
Plant Pathology	7. In collaboration with breeders and molecular biologists, decipher the molecular mechanism for showing multiple disease resistance in selected lines 8. Artificial screening facilities and sick plots have to be developed at ICAR-IISR at least for nationally important diseases. 9. If the number of F6 breeding lines is less (~20), artificial screening may be followed. 10. The confirmation of resistance should be done under artificially inoculated conditions.
Entomology	11. Screening of soybean genotypes for resistance viz., in case of antixenosis, traits related to its resistance to be studied which will be a recknor for breeders in using insect resistance breeding program as donors. 12. Efforts to be made to utilize wild species and wild relatives of soybean in insect screening trails.
Microbiology	13. To utilize the results of moisture stress tolerant rhizobia evaluated for three years under simulated stress conditions pots, for large scale utilization of soybean, the proposed field trail on field evaluation of B. daqingense at all the centres should be formulated from kharif 2021 (MB 2/21). 14. Promotion of outcome of MB4/14 field trial of microbial combination should be attempted as package of practice for large scale application in soybean
Transfer of Technology	15. FLD report should be made based on cost of cultivation and per day productivity as the present varieties have shorter days to maturity and the comparison with past decades would not be correct. A column of year of release of variety should also be there in the report. 16. Under STC and TSP the list of beneficiaries' should separately indicate (i) under FLDs and (ii) under Training and Awareness Programmes 17. conduct a small study indicating realistic data on cost of cultivation based on which request for enhanced budget under FLD component may be requested from DAC.
Food Technology	18. Identify popular soy food products, characteristics of soybean required for these products and initiation of programme on development of soy food indices.

B. PROCEEDINGS OF TECHNICAL SESSIONS

OPENING SESSION

Dr Nita Khandekar, Director, ICAR-IISR, Indore welcomed the dignitaries and briefly highlighted the research achievements of soybean accomplished during 2021-21. ADG (O&P) Dr Sanjeev Gupta congratulated the AICRP group on developing new soybean varieties with high yield, earliness and fodd usages. He expressed his concern related to poor varietal diversity and replacement rate and informed that out of 48 soybean varieties only 4 varieties make up the 60% of total breeder seed indent and if two more varieties are added the indent comes to 80%. He was seriously concerned that soybean is an exotic crop and is being introduced in regions with biotic and abiotic stresses and emphasized for increasing the varietal diversity. He suggested for innovative steps like breeding hubs in the zones where varietal development is poor, shuttle breeding, sharing of segregating material among centres, utilization of off-season nurseries. For large yield gaps resulting due to rainfed kharif nature of the crop, he suggested to develop good agronomy as contribution from varietal improvement is 40% but 60% is from management. He suggested for land engineering, residue management, conservation agriculture. He expressed his concern on non-sustainability of of soybean pigeonpea intercropping and suggested for taking up experiment for finding out the reasons and specially for deficiency of micro nutrients like boron. Chairman of the session Dr T.R. Sharma, DDG (Crop Science) ICAR, New Delhi congratulated the AICRP for developing 33 high yielding and disease resistant varieties during last 10 years. He emphasized that since soybean crop has high protein and other desirable components, it should be exploited as food crop. He suggested that experiments for use of soybean for protein isolate manufacturing may be taken up by utilizing the technology developed by ICAR-CIPHET, Ludhiana. Increasing production and productivity of the major oil seed crop is extremely important since it will help in reducing import of edible oil to a greater extent. He also emphasized that there is need to develop short duration varieties, herbicide tolerant soybean varieties and directed pre-breeding for specific traits. He further suggested that since soybean genome has been sequenced, focus may be given on integration of biotechnological tools like MAS, GWAS and Comparative genome analysis for genetic improvement. He further urged for strong human resource development programme (HRD) for AICRP scientists and to set mile stone driven research based on objectives identified for the centres and involving incentives and more resources to better performing centres.

TECHNICAL SESSION
(A) PLANT BREEDING AND GENETICS RESOURCES

Chairman : Dr S.P. Tiwari, Ex-Vice Chancellor,
SK Rajasthan Agricultural University, Bikaner
Co-Chairman: Dr. Prabhakar, Ex- Project Coordinator (Small Millets)
Rapporteurs : Dr B.S. Gill, PAU Ludhiana
Dr Subhash Chandra, ICAR-IISR, Indore

Dr S P Tiwai in his brief remarks commented to honor the decisions of previous workshop and asked if all the issues related to zonal CD, outliers presenting were sorted out, He told the breeders that after AVT II it is up to breeder to decide if the entry is to be put before identification committee or state varietal release committee. With brief introductory remarks, the chairman invited Dr Sanjay Gupta for presentation on Soybean improvement. Dr Sanjay Gupta, Principle Scientist, PI (Plant Breeding), ICAR-IISR presented the results of breeding trials conducted during 2020. He presented details of different trails i.e. coordinated trails for grain yield, Multi-location G x E trials and Vegetable soybean trails. He also presented the results of pre-breeding activities and performance of AICRP centres. Entries getting promoted to next round of AICRP; results of multilocation germplasm evaluation trials; GGE biplot analysis; national hybridization programme and performance of centres were discussed. Following entries were proposed for promotion.

Zone	**Trial**	**Entry**
NHZ	AVT II	VLS 99
NPZ	AVT I + II	NRC 149*, PS 1670, DS 9421
NEHZ	AVT I	KDS 1096, DLSb 1,
EZ	AVT I	KDS 1096, RSC 11-35
CZ	AVT I Early	PS 1569, JS 22-12, JS 22-18, JS 22-16, RVSM 2012-4, NRC 181,
	AVT II Early	NRC 165, NRC 152
	AVT I	RVS 2011-10
	AVT II	HIMSO 1689, JS 21-72

*AVT II Entry

Discussion:

Points	**Decision Taken**
Pre-breeding activities should be strengthened and diverse parents should be used after evaluation in different zones and diversity analysis should be made	• Number of crosses involving *G soja* would be increased. • Identified soybean germplasm for specific triats would be evaluated at various centres as per the targets/objectives fixed for the centres. Germplasm would be tested in RBD in place of Augmented design for D^2 analysis for suggesting diverse parents in hybridization
Off-season nursery should be used with full potential and large number of crosses should be tested there, after	• Breeders would send all the crosses and segregating populations for generation advancement to off-season nursery.

receiving from different centres.	
Dr Talukdar, IARI, New Delhi requested to promote the entry null KTi EDV DS 9421 to AVT II.	• The entry would be repeated in AVT 1-2021.
There should be sharing of breeding material between centres. Information of soybean genetic resources should be put on IISR web-site.	• Sharing of breeding materials belonging to various segregating generations would be strengthened among centres. IISR, Indore would coordinate the activity by supplying specific crosses of segregating genearations as per the targets fixed for centres. Besides, IISR, Indore would also supply breeding materials across centres for evaluation and suitability. • Sharing of breeding materials among centres will be as per the MTA (Material Transfer Agreement) to take of rights of contributing centres. • Information on the available soybean genetic resources (both indigenous and exotic), their conservation, maintenance, evaluation, distribution and utilization along with Germplasm catalogues will be included in IISR, Website in detail. • Information on list of Core collections and germplasm for specific traits will also be updated in website.
Dholi centre was in Northern Plain Zone till 2015 and was then shifted to EZ. Looking into the occurrence of YMV only at Dholi, it was suggested to shift the centre again to NPZ.	• Issue was discussed but house disagreed to the proposal.
5% yield advantage over the best check was suggested for entries having better biotic and abiotic stress resistance.	• Issue was discussed but house disagreed on the matter. • Grain/oil yield would be the main promotion criteria. Proper weightage will be given for criteria like resistance to diseases, insects, abiotic stresses for promotion to AVT-I and AVT-II as well as in identification of varieties in VIC.
Dr S K Lal, IARI, New Delhi requested to promote the entry DS 1312 from IVT to AVT-I.	• Entry to be re-entered in IVT. Breeder may send seed to Indore.
Adaptive trials for growing soybean in paddy fallows and spring season were proposed for Southern Zone for soybean expansion. Soybean is a potential crop for paddy fallows and suitable crops are not available. Trials were also proposed for North Eastern	• The house did not agree for fear of build up and spread of diseases like rust, YMV, insect pests like leaf minor, stem fly, pod borer in winter and summer seasons in Southern zone and also in North Eastern Zone and also policy issues of the concerned states in southern zone. .

zone in winter and summer.	• Dr Hanchinal presented the data for intercropping of soybean with sugarcane and supported spring season trial. The house did not agree to the proposal due to the build of more diseases and pests complex during winter and spring, which may create havoc in the ensuing Kharif season. Besides,the crop is not economical or remunerative for farmers in winter and summer seasons.
With the success of early maturity trials in identification of 2 soybean varieties in Central Zone, these trials were proposed for all zones.	• It was suggested to present a status paper to ICAR for the need of early maturity trial in Northern Plain Zone and availability of germplasm / breeding material for early maturity. Also, breeders were first asked to develop early maturing genotypes for the zones proposed. It was also suggested to define earliness for various zones. • However, DDG (CS) in the valedictory session remarked about the importance of early maturity trials and recommended for their conduction in all zones.
Dr Vineet Kumar requested for repetition of NRC 150 (null lox 2 and high oil) in AVT I (Early) of CZ.	• It was accepted by house.
Dr Nisar Khan requested for inclusion of two entries in IVT and adding Srinagar centre in trial	• The request was accepted.
Dr Basavraj requested for promotion of DLSb 1 to AVT I in CZ.	• The request was accepted
Criteria to be followed in promotion of Entries	• Criteria of promotion should be based on yield increase equivalent to zonal CD of 5% or more. • High oil entries should have equivalent grain yield to the best check in addition to zonal CD criteria for oil yield (Kg/ha). • EDVs would be given yield advantage equivalent to zonal CD (50%) over recurrent parent. CD (50%) is taken for providing only a little yield advantage over the recurrent parent.

TECHNICAL SESSION
(B) CROP PROTECTION

Chairman : Dr S.C. Dubey, ADG (PP), ICAR, New Delhi
Co-Chairman: Dr Kamla Jayanti, ICAR-IIHR, Bengaluru

Rapporteurs : Dr V. Nataraj, ICAR-IISR, Indore
Dr Rajesh Vangala, ICAR-IISR, Indore

I. Entomology

Dr Lokesh Kumar Meena, Principal Investigator (Entomology), ICAR-IISR, Indore presented the findings of coordinated trials of entomology discipline on screening for host plant resistance (5 trails) and management of major insect pests of soybean (2 trails. A new initiative apart from regular trials is the Management of major defoliators of soybean through intercropping with Suva, *Anethum graveolens* at Pantnagar, Sehore, Parbhani, Amravati, Indore and Dharwad was also presented**.** During discussions following recommendations emerged:

Specific Recommendations

1. Screening of soybean genotypes for resistance viz., in case of antixenosis, traits related to its resistance to be studied which will be a recknor for breeders in using insect resistance breeding program as donors.
2. Efforts to be made to utilize wild species and wild relatives of soybean in insect screening trails.

General Recommendations

1. In seasonal incidence of insects trail, many centers reported the mortality of insects of 55-60% when bio-controls are used. Hence, efforts need to be made to identify the causal organism.
2. The insect data to be correlated with weather parameters and host plant phenology to be studied.
3. Intercropping and trap crops with soybean to be utilized for studying the incidence of defoliators.
4. Surveillance of insects should be based on the scientific method.
5. In case of whitefly, efforts to be made to identify resistance lines with a phenotypic marker.
6. For field screening of insects, $100m^2$ area in at least two replications should be taken up at all locations for recording data as per the procedures described in technical programme.
7. It was suggested to include soybean and Suva intercropping trail at Indore for recording the incidence of defoliators.

The chairman appreciated the efforts of different centers regarding the progress achieved and opened the session for discussion.

II. Plant Pathology

PI, Plant Pathology presented the findings of *kharif* 2020 on occurrence of different diseases in India; reaction of IVT, AVTI and AVT II entries and germplasm accessions to diseases; reaction of previous year resistant entries; integrated insect and disease management; yield loss due to disease experiments. Dr Rajput informed about taking following 3 new initiatives which were accepted by the house.

1. Disease evaluation will be done in two replicates of each entry in IVT (N), IVT (E), AVT I and AVT II in order to avoid disease escape.
2. Local susceptible checks will be employed for logical promotion of entries.
3. Evaluation of F6 generation breeding material will be done under disease hot spots.

After the presentation the chairman opened the session for discussion and following recommendations emerged:

Specific Recommendations

1. In collaboration with breeders and molecular biologists, decipher the molecular mechanism for showing multiple disease resistance in selected lines
2. Artificial screening facilities and sick plots have to be developed at ICAR-IISR at least for nationally important diseases.
3. If the number of F6 breeding lines is less (~20), artificial screening may be followed.
4. The confirmation of resistance should be done under artificially inoculated conditions.

General Recommendations

1. Register potential and stable resistant sources with NBPGR.
2. Step down regression analysis must be employed to determine the contribution of single factor and data should be used for deriving prediction model.
3. Construction of disease distribution maps.
4. Standard procedure should be followed for disease survey and surveillance.

The session ended with vote of thanks by the Director (A) Dr Nita Khandekar

TECHNICAL SESSION
(C) CROP PRODUCTION

(I) Agronomy

Chairman : Dr D.J. Bagyaraj,
Professor Emeritus, Bengaluru

Co-Chairman: Dr L.H. Malligawad, Professor Emeritus, UAS, Dharwad

Rapporteurs : Dr M.D. Vyas, RAKCoA (RVSKVV), Sehore
Dr Raghavendra, ICAR-IISR, Indore

On behalf of Dr S D Billore (Principal Investigator, Agronomy) Dr R K Verma, Scientist, ICAR-IISR, Indore, presented the results of six agronomical trials conducted at all the coordinating centers respectively during *Kharif* 2020.

Out of the six experiments, one experiment was concluded with following recommendation:

> The planting geometry of soybean at 45 x 10 cm invariably higher yield and SYI in North plain zone, eastern zone, North eastern hill zone and Central zone which resulted in reduce the 50% seed cost and also reduce the unnecessary burden on quality seed production. While in Southern zone it was 45 x 5 cm.

Discussion: After presentation following points were discussed:

Points Discussed	**Decision Taken**
Co-chairman suggested to classify agronomic experiments according to headings like, drought management experiment, soil fertility, weed management, irrigation experiments etc.	Suggestions/comments were well noted and addressed accordingly by the Dr S.D. Billore and Dr R. K. Verma, PI (Agronomy), ICAR-IISR, Indore.
During technical session new trails were proposed : 1. Evaluation of novel bio-formulation for yield enhancement in soybean 2. Another trail which was suggested by co-chair "Effect of different ratios and levels of nitrogen and phosphorus fertilizers on the growth and yield of soybean [Glycine max (L.) Merrill.] during kharif under rainfed situations	This trial has been accepted for conduction. This experiment will be taken after internal discussion of house for kharif 2022.

The session ended with vote of thanks by the director (A) Dr Nita Khandekar

(II) MICROBIOLOGY

The Principal Investigator (Microbiology) Dr. M.P. Sharma, Principal Scientist, ICAR-IISR, Indore, presented the results of four AICRPS microbiological trials conducted at all the coordinating centers during *Kharif* 2020. Out of 4 experiments, one trial MB 3/14 has completed 3 years in northern plain and central zones and recommendations was made out. Based on 3 years field evaluation concluded that "combined application of *Paenibacillus polymyxa* HKA 15+AMF with 75% RDF produced higher grain yield and B:C ratio (1.72) as compared to 100% RDF (1.39) by saving 20% chemical fertilizer usage in soybean". PI also presented two new experiments formulated in place of MB 3/14 and MB 2a/18 on field evaluation *B. daqingense* (moisture tolerant strain) and other one on compatibility assessment of pre and post emergence herbicides with PGPR bio-inoculants including rhizobia available with the coordinating centres.

After the presentation following discussion and recommendation were made:

- To utilize the results of moisture stress tolerant rhizobia evaluated for three years under simulated stress conditions pots, for large scale utilization of soybean, the proposed field trail on field evaluation of *B. daqingense* at all the centres should be formulated from kharif 2021 (MB 2/21).
- Promotion of outcome of MB4/14 field trial of microbial combination should be attempted as package of practice for large scale application in soybean
- Formulation of new trail (MB3/21) on compatibility assessment (under in-vitro) of herbicides with PGPR and rhizobia.
- Keeping in view of area expansion in south zone, induction of regular post of microbiology in AICRPS- SZ should be considered.

The session ended with vote of thanks by the Dr. Nita Khandekar, Director, ICAR-IISR Indore

TECHNICAL SESSION
(D) TRANSFER OF TECHNOLOGY AND STC/TSP

Chairman : Dr S.K. Jha,
Principal Scientist, ICAR, New Delhi

Rapporteurs : Dr B.U. Dupare, IISR, Indore
Dr Viraj Kamble, IISR, Indore

The technical session started with welcome address by the Chairman. Dr SK Jha, Principal Scientist and Former I/C ADG (Oilseed & Pulses Unit) of ICAR, New Delhi. The session included two presentations. Initially, Dr Raghavendra, Principal Investigator (Agronomy) presented the results of "Bridging the Yield Gap in Soybean-Technology Transfer through Frontline Demonstrations" highlighting the overall achievements of the frontline demonstration conducted across the country.

The chairman appreciated the efforts of different centers regarding the progress achieved in the organization of FLDs. However, while analyzing the data meticulously, he remarked that the FLDs have not been successful in increasing the yield obtained under Improved Practice against the Farmers' Practice as the yield received under IT during 2020-21 is 1738 kg/ha compared to 1951 kg/ha obtained during 1989-90. He also advised to make a detailed report on the FLD based on the cost of cultivation and also based on data related to per day productivity of soybean so that this difference could be better explained since the present varieties have shorter days to maturity and the comparison with past decades would not be correct. He also emphasized to compile the zone-wise report of FLD data as the present PAN India report represents discrepancies in the yield. He also stressed to include the column on year of release of soybean variety proposed under FLD.

The second presentation in this Technical Session was made by Dr Sanjay Gupta on "Extending the benefits of improved technologies-activities undertaken by various centres under STC/TSP". The chairman appreciated the activities conducted in remote and tribal dominated areas for promotion of activities contributing livelihood security to the tribal population. He suggested having clarity in the reporting of FLD data which should clearly demark the list of beneficiaries' separately indicating supply of critical input, beneficiaries under FLDs and those for whom Training and Awareness Programmes have been conducted.

In his closing remark, Dr Jha also requested to conduct a small study indicating realistic data on cost of cultivation based on which request for enhanced budget under FLD component may be requested from DAC. He also advised for allotment of more FLDs to AICRPS centres than those Non-AICRPS agencies. Similarly he also requested for sending the brief report on the achievement of technologies/specialty varieties suitable for food grade characters which should also be highlighted in the appropriate DAC forum.

TECHNICAL SESSION
(E) FOOD TECHNOLOGY

Chairman : Dr. Nachiket Kotwaliwale,
Director, ICAR-CIPHET, Ludhiana

Co-chairman : Dr. Puneet Chandra, Head, Centre of Excellence on Soybean Processing & Utilization, ICAR-CIAE, Bhopal

Rapporteurs : Mrs. Neha Pandey, Scientist (Food Technology), ICAR-IISR, Indore

The session began with the presentation of technical programme for food technology, 20-21 'Multilocation trials for food grade characteristics in Soybean entries 'by Mrs. Neha Pandey, Scientist, Food Technology, ICAR-IISR, Indore. She proposed for evaluation of IVT entries of AICRPS in Indore (CZ), Ludhiyana & Delhi (NPZ) and Bangaluru (SZ) for food grade characteristics. The institutes to be involved in food quality analysis of soybean are mentioned below:

Following points emerged during the discussion:

1. The chairman of session, Dr. Nachiket Kotwaliwale Director, ICAR-CIPHET, Ludhiana suggested for the involvement of experts from CIAE and CIPHET in programme for development of soybean food quality indices. He elaborated need for identification of popular soy foods, identification of characteristics of soybean required for these products and identification of standard objective methods and instruments for index evaluation.
2. The co-chairman of the session Dr. Punit Chandra, Head, Centre of Excellence on Soybean Processing and Utilization, ICAR-CIAE, Bhopal also emphasized on need of inter institutional collaboration for fruitful outcome under AICRPS for food technology and need of collaboration for soy food indices development. Mrs. Neha Pandey mentioned inter institutional project in pipeline for soybean food indices development in collaboration with CIAE, Bhopal.
3. Dr. Sanjeev Gupta, ADG, O&P, ICAR suggested screening of AVT entries for food grade characteristics instead of IVT entries for more fruitful use of food grade .
4. The Director, IISR, Indore also emphasized on need of inter institutional collaboration for AICRPS and other Food Technology programmes. The session ended with thanks to the ADG, chairman, co-chair and other members.

C. TECHNICAL PROGRAMMES

C. Technical Programme of Research 2021-22

The technical programmes of research of Plant Breeding & Genetic Resources, Agronomy & Frontline Demonstrations, Entomology, Microbiology, Plant Pathology and Food Processing and Value addition for 2020-21 were proposed after in-depth deliberations by the scientists of respective disciplines under the chairmanship of various subject experts who chaired respective technical sessions in the workshop. Pertinent suggestions emanated during the discussions in the technical sessions have been included. The proposed technical programmes were finalized in the plenary session after incorporating modifications /changes as suggested and agreed upon in the session.

(A) TECHNICAL PROGRAMME OF PLANT BREEDING FOR KHARIF 2021

1. CO-ORDINATED VARIETAL TRIALS

A. NORTHERN HILL ZONE:

Advanced Varietal Trial II (AVT II)

DESIGN	R.B.D.
CROSS PLOT SIZE	12 rows, 5 m long (5.4 x 5 m sq)
NET PLOT SIZE	10 rows, 4.8 m long (4.5 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Almora, Palampur, Majhera
ENTRIES	VLS 99
CHECKS	VLS 89, PS 1556, VLS 63
SEED	1.5kg/entry/location

B. Northern Plain Zone (NPZ)

Advanced Varietal Trial I & Advanced Varietal Trial II (AVT I & II)

DESIGN	R.B.D.
CROSS PLOT SIZE	12 rows, 5 m long (5.4 x 5 m sq)
NET PLOT SIZE	10 rows, 4.8 m long (4.5 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Ludhiana, Delhi, Pantnagar
ENTRIES	NRC 149**, PS 1670, DS 9421 (KTI free) , DS 9422 (repeat EDV)
CHECKS	SL 955, SL 1074, SL 1104, DS 9712*, SL 958, PS 1347
SEED	1.0kg/entry/location

** AVT II entry; * Recurrent parent of KTI free DS 9422 & DS 9421

C. Eastern Zone (EZ)

Advanced Varietal Trial I (AVT I)

DESIGN	R.B.D.
CROSS PLOT SIZE	8 rows, 5 m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8 m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Bhawanipatna, Dholi, Raipur, Ranchi
ENTRIES	KDS 1096, RSC 11-35
CHECKS	JS 20-116, RSC 10-46, MACS 1460
SEED	1.0kg/entry/location

D. North Eastern Hill Zone (NEHZ)

Advanced Varietal Trial I and Advance Varietal Trial II (AVT I & II)

DESIGN	R.B.D.
CROSS PLOT SIZE	8 rows, 5 m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8 m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Jorhat, Imphal, Umiam

ENTRIES	DSb 38, KDS 1096, DLSb 1, DS 3108*
CHECKS	MACS 1460, JS 20-116, RKS 113, JS 335**, RKS 18**, JS 97-52**
SEED	1.0kg/entry/location

*Repeat AVT II entry as per the recommendation of Varietal Identification Committee. ** Checks for DS 3108

E. Central Zone (CZ)

Advanced Varietal Trial I (AVT I)

DESIGN	R.B.D.
CROSS PLOT SIZE	8 rows, 5 m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8 m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Sanosara, Mandsaur
ENTRIES	RVS 2011-10, DLSb 1,
CHECKS	MACS 1520, NRC 86, JS 20-116
SEED	1.0kg/entry/location

Advanced Varietal Trial I (AVT-I): Early

DESIGN	R.B.D.
CROSS PLOT SIZE	8 rows, 5 m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8 m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Jabalpur, Sehore, Parbhani, Amrawati, Kota, Morena, Anand, Amreli, Indore, Sanosara and Nagpur, Mandsaur
ENTRIES	PS 1569, JS 22-12, JS 22-18, JS 22-16, RVSM 2012-4, NRC 181, NRC 150
CHECKS	JS 95-60, JS 20-34
SEED	1.0kg/entry/location

Advanced Varietal Trial I (AVT-I): Vegetable

DESIGN	R.B.D.
CROSS PLOT SIZE	14 rows, 5 m long (3.6 x 5 m sq)
NET PLOT SIZE	12 rows, 4.8 m long (2.7 x 4.8 m sq) (6 rows for green pods & 6 for seed)
REPLICATION	Four
LOCATIONS	Parbhani, Kota, Indore
ENTRIES	NRC 188
CHECKS	Hara Soya, JS 95-60, Karune, JS 20-34*
SEED	1.0kg/entry/location

*****For increasing the error degree of freedom

Advanced Varietal Trial II (AVT II)

DESIGN	R.B.D.
CROSS PLOT SIZE	12 rows, 5 m long (5.4 x 5 m sq)
NET PLOT SIZE	10 rows, 4.8 m long (4.5 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Sanosara , Mandsaur

ENTRIES	HIMSO 1689, JS 21-72
CHECKS	NRC 86, JS 20-98, RSC 10-46
SEED	1.5kg/entry/location

Advanced Varietal Trial II (AVT II) Early

DESIGN	R.B.D.
CROSS PLOT SIZE	12 rows, 5 m long (5.4 x 5 m sq)
NET PLOT SIZE	10 rows, 4.8 m long (4.5 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Sanosara, Mandsaur
ENTRIES	NRC 165, NRC 152
CHECKS	JS 20-34, JS 95-60
SEED	1.5kg/entry/location

IVT Trials (Yield)

DESIGN, Plot Size	**R.B.D.; 3 rows, 3m long (1.35 x 3 m sq), 3 replications**
• NHZ	Almora, Palampur, Majhera , Srinagar
• NPZ	Pantnagar, Delhi, Ludhiana
• EZ	Ranchi, Raipur, Dholi and Bhawanipatna
• NEHZ	Umiam, Imphal and Jorhat
• CZ	Jabalpur, Sehore, Parbhani, Amrawati, Kota, Morena, Anand, Amreli, Indore, Sanosara and Nagpur, Mandsaur
• SZ	Pune, K. Digraj, Bengaluru, Dharwad, Adilabad, Bidar and Ugarkhurd
SEED	**8 kg/entry**
CHECKS	**There will be following checks in each zone:**
• NHZ	VLS 59, VLS 89, VLS 63
• NPZ	SL 955, SL 1074, PS 26
• EZ	NRC 128, JS 20-116, AMS 2014-1
• NEHZ	MACS 1407, JS 20-116, RKS 113
• CZ	RVSM 2011-35, AMS 100-39, RSC 10-52
• SZ	DSb 34, DSb 23, KDS 753

IVT Trials (Yield)

Name of the Centre	**Name of the entry**
Palampur	HIMSO-1693 and HIMSO-1694
Almora	VLS 102 and VLS 103
Ludhiana	SL 1230, SL 1282
Pantnagar	PS 1682, PS 1689, PS 1605
Delhi	DS 3124, DS 3168, DS 3163, DS 1312
Raipur	RSC 11-42, RSC 11-48
Jabalpur	JS 23-05, JS 23-08
Ranchi	BAUS-116, BAUS(M)-3
Amreli	AS 24 and AS 40
Imphal	CAUMS 2
Dharwad	DSb 39, DLSb 4 and DLSb 3

Indore	NRC 189, NRC 190, NRC 191, NRC 192, NRC 193, NRC 203 and NRC 195
Sehore	RVS 13-15, RVS 13-20
Morena	RVSM 16-20
Amravati	AMS 19-01, AMS 115
Kasbe Digraj	KDS 1150, KDS 1187 and KDS 1175
Kota	AUKS 224
Pune	ACS 1735, MACS 1672
Parbhani	MAUS 791 ,MAUS 818
Adilabad	ASb 11, ASb 15
Bangalore	KBS 21-1
BARC Mumbai	TS 21-1 and TS 21-2
Kashmir	SKAU-S-4, SKAU-WSB-101,
Sanosara (Lokbharti)	LOKSOY-1
Sikkim	RCS 1-10

IVT (Early) Trial

DESIGN, Plot Size	**R.B.D.; 3 rows, 3m long (1.35 x 3 m sq), 3 replications**
• NHZ	Almora, Palampur, Majhera
• NPZ	Pantnagar, Delhi, Ludhiana
• EZ	Ranchi, Raipur, Dholi and Bhawanipatna
• CZ	Jabalpur, Sehore, Parbhani, Amrawati, Kota, Morena, Anand, Amreli, Indore, Sanosara and Nagpur, Mandsaur
• SZ	Pune, K. Digraj, Bengaluru, Dharwad, Adilabad and Bidar
SEED	**9 kg/entry**
CHECKS	**There will be following checks in each zone:**
• NHZ	Palam Early Soya 1, VLS 89, VLS 63
• NPZ	SL 955, PS 26, SL 1104
• EZ	RSC 11-07, JS 20-116, MACS 1460
• CZ	JS 20-34, JS 95-60, NRC 130, NRC 138
• SZ	MACS 1460, JS 93-05, DSb 34,

IVT Trials (Early & Yield)

Name of the Centre	**Name of the entry**
Palampur	HIMSO 1695
Pantnagar	PS 1675, PS 1660, PS 1569
Delhi	DS 3121, DS 3122, DS 3123 and DS 3124 (NPZ)
Raipur	RSC 11-60
Jabalpur	JS 23-03 and JS 23-09
Indore	NRC 196, NRC 197, NRC 198, NRC 199,NRC 200, NRC 201, NRC 202, NRC 157, NRC 186
Sehore	RVS 13-7
Amravati	AMS 19-9, AMS 0542
Kasbe Digraj	KDS 1194, KDS 1169, KDS 1172, KDS 1192, KDS 1168
Pune	MACS 1724
Parbhani	MAUS 795, MAUS 819

Zone	Promotion Criteria
NHZ	1. Maturity equivalent* to Palam Early Soya-1 2. In case of non-survival of Palam Early Soya-1 in any of the centres: Maturity 10 days less than best check 3. Grain yield: Equivalent to Palam Early Soya-1. In case of death of Palam Early Soya-1 up to 10% (Zonal CD) less than the best check 4. Weightage for FLS and BP resistance
NPZ	1. Maturity: 10 days less than the best check 2. Grain yield: Up to 10% (Zonal CD) less than the best check 3. Weightage for YMV and IBB resistance
NEHZ	1. Maturity: 10 days less than the best check 2. Grain yield: Up to 10% (Zonal CD) less than the best check 3. Weightage for YMV and collar rot resistance
EZ	1. Maturity: 10 days less than the best check 2. Grain yield: Up to 10% (Zonal CD) less than the best check 3. Weightage for IBB and YMV resistance
CZ	1. There would be combined early (91-95 days maturity) and extra early (upto 90 days maturity) trials in CZ. Data of two trials would be compiled separately. o Entries with more than 95 days (95.01) maturity would not be promoted and entered in IVT of regular yield trial at any stage. o Extra early entries should be equivalent* to JS 20-34 / JS 95-60 in maturity. o Extra early entries with less yield (up to 10% zonal CD) to the best extra early check (JS 20-34) would be promoted. 2. Criteria for promotion for early entries would be 5% (Zonal CD) yield advantage over the best early check. 3. Weightage for YMV; CR; Anthracnose resistance
SZ	1. Maturity at least equivalent to MACS 1460 and JS 93-05. 2. Grain yield: Equivalent to best check 3. Weightage for rust and anthracnose resistance

*Maturity / yield equivalence has margin of zonal CD (50%)

2. Multi-location Germplasm Evaluation

- **Accessions**: 300
- **Duration**: Two Years
- **Design**: RBD Replication: 2 Row length: 1.5 m
- **Centres**:
  - NHZ: Palampur, Almora
  - NPZ: Pantnagar
  - NEHZ: Manipur
  - Eastern Zone: Raipur
  - Central Zone: Indore, Jabalpur and Parbhani.
  - Southern Zone: Pune
- **Checks:**
  - NHZ: VLS 59, VLS 63, PS 1556, Himso 1685, Harasoya
  - NPZ: SL 958, SL 955, SL 979, PS 24, PS 1347
  - NEHZ: MACS 1460, RKS 113, MACS 1407, KDS 753, RSC 10-46,
  - Eastern Zone: MACS 1460, MACS 1407, RKS 113, KDS 753, RSC 10-46,
  - Central Zone: NRC 86, JS 20-34, RSC 10-52, JS 20-69, NRC 130.

3. Hybridization Programme

All the scientists are to take up crossing programme as per the allotted objectives:

S. No	Centre	Breeding Objectives
1	**Sehore**	90 Days Maturity, Charcoal Rot
2	**Pune**	Food grade soybean, earliness (90 days), long juvenility
3	**Pantnagar**	Photoinsensitivity, YMV, RAB
5	**Delhi**	Photoinsensitivity, YMV, RAB
6	**Parbhani**	Stem fly, Girdle Beetle, Earliness (90 Days), Long juvenility, Drought
8	**Indore**	Drought, heat, water logging, CR resistance, Anthracnose resistance, up to 90 days maturity, seed coat strength, vegetable and food grade soybean, Insect (Defoliators) tolerance.
9	**Ludhiana**	Photoinsensitivity, YMV & RAB Resistance
10	**Jabalpur**	CR, YMV, RAB resistance and up to 90 days maturity
11	**Palampur**	Up to 110 days maturity, vegetable types, FLS resistance, Varieties for maize intercropping
13	**Dharwad**	Rust and YMV Resistance . Identification of resistant sources for pod borer Cydia ptychora.
14	**Almora**	Black soybean with KTI free, FLS resistance
15	**Amaravati**	CR resistance,upto 90 days maturity, drought tolerance
16	**Bangalore**	Off season nursery, Vegetable soybean,
17	**Raipur**	Indian Bud Blight, Pod Blight and RAB resistance, Tall high yielding varieties
18	**Kota**	Up to 90 days maturity, Insect tolerance (Girdle beetle and defoliators)
19	**Imphal**	Food usage
20	**Kasbe Digraj**	Rustresistance and Long juvenility
21	**Jorhat**	Waterlogging tolerance and collar rot resistance
22	**Ranchi**	Initiate programme on soil acidity tolerance, Vegetable soybean
23	**Morena**	Early and drought tolerance
24	**Amreli**	Early and drought tolerance
25	**Adilabad**	Drought tolerance, pod blight resistance

All the crosses would be multiplied in off season and F2s raised in IISR Indore / UAS Bengaluru. F3s would be supplied to centres by IISR Indore. At IISR following scientists would serve as nodal scientists for trait specific breeding. Segregating breeding material may be sent to these scientists for distribution to centres. There will be equal contribution of the material provider and the developer and name of the variety would reflect the names of both institutes.

Trait	Nodal Scientist at ICAR-IISR Indore
Yield	Dr Shivkumar M
Disease resistance	Dr Natraj V
Insect / waterlogging tolerance and pre-breeding	Dr Rajesh Vangla and Dr Subhash Chandra
Drought tolerance	Dr Gyanesh Satpute
Food Usages and YMV resistance	Dr Anita Rani and Dr Vineet Kumar
Photo insensitivity and long juvenility	Dr Sanjay Gupta
Seed Quality	Dr Punam Kuchlan and Dr Mrinal Kuchlan

Note: As per the technical programme of Plant Pathology, breeders must give their station trial entries (10-15 entries) for evaluation (single 3 mt row) in Hot spots (CR-Jabalpur; YMV-Ludhiana; Anthracnose-

Indore; FLS- Palampur; Rust- Ugar Khurd). Entries must have MR to any of these diseases for inclusion in IVT 2022.

Breeding Material Sharing

Centre	AICRPS code	Parents	Generation	Trait
Jabalpur	NHP 1	JS 20-94 X JS 95-60	F3	High yield, earliness, four seeded, YMV
	NHP 2	JS 20-98 X PUNJAB 1	F3	High yield, seed longevity, seed size, multiple resistant
	NHP 3	JS 20-116 X PUNJAB 1	F3	High yield, seed size, YMV resistance
	NHP 4	JS 20-116 X JS 95-60	F3	High yield, earliness, four seeded, YMV resistance.
	NHP 5	JS 20-116 X AMS MB 5-18	F3	High yield, seed longevity YMV and CR resistance
	NHP 6	JS 22-04 X JS 93-05	F3	High yield, earliness and four seeded
	NHP 7	JS 22-04 X PUNJAB 1	F3	High yield, earliness, longevity,
	NHP 8	JS 22-05 X JS 20-34	F3	Earliness, high yield,
	NHP 9	SL 738 X JS 95-60	F3	High yield, earliness, YMV & insect resistance, four seeded
	NHP 10	JS 20-98 x JS 95-60	F4	Earliness, four seeded and CR resistance
	NHP 11	JS 21-17 x PS 1092	F4	High yield, CR and YMV resistance
	NHP 12	CAT 87 x JS 20-94	F4	High yield and YMV resistance
	NHP 13	DS 3105 x JS 20-69	F4	High yield , CR & YMV resistance
	NHP 14	JS 21-05 x JS 20-24	F5	High yield, resistance to YMV and CR
	NHP 15	JSM 128 x PS 1556	F5	High yield, resistance to YMV and CR
Pune	NHP 16	MACS1460 x JS SH 93-37	F3	Yield
	NHP 17	MACS1460 x TAMS 9821	F3	Drought tolerance
	NHP 18	MACS 1460 x RSC 10-46	F3	Drought tolerance
	NHP 19	MACS 1460 x JS 95-60	F3	Earliness
	NHP 20	MACS 450 x NRCSL 1	F3	YMV resistance
	NHP 21	MACS 450 x Dsb 34	F3	Rust resistance
	NHP 22	MACS 1188 x EC251396	F4	Earliness
Parbhani	NHP 23	JS 20-29 X AMS 100-39	F3	High yield
	NHP 24	JS 20-69 X MAUS 612	F3	Charcoal rot resistance
	NHP 25	MAUS 71 X JS 20-2	F3	High yield
	NHP 26	MAUS 71 X JS 20-69	F3	Charcoal rot resistance
	NHP 27	MAUS 71 X NRC 130	F3	Earliness
	NHP 28	MAUS 162 X AMS 100-39	F3	High yield
Sanosara	NHP 29	Type 49 x EC 538828	F10	Earliness and diverse parents
	NHP 30	JS 335 x EC 538828	F10	Earliness, diversity and bold seed
Indore	NHP 31	JS 97-52 x EC 390977 x JS 90-41	F3	Photoinsensitivity, diversity
	NHP 32	SL 958 x MACS 450	F3	YMV resistance
	NHP 33	PK 416 x AGS 25	F3	Long juvenility
	NHP 34	(JS 97-52 x EC 390977) x EC 771112	F3	Earliness and photoinsensitivity
	NHP 35	RVS 2012-1 x JS 95-60	F3	Earliness
	NHP 36	[(JS 97-52 x AGS 25) x ADT 1] x NRC 130	F3	Photoinsensitivity and long juvenility
	NHP 37	[SL 958 x (JS 97-52 x EC 390977)] x EC 572154	F3	YMV resistance, earliness and photoinsensitivity
	NHP 38	JS 20-34 x EC 771186	F3	Earliness and diverse parents
	NHP 39	EC 572154 x DS 3106	F3	Multiple disease resistance, earliness anddiverse parents
	NHP 40	EC 572154 x EC 538828	F3	Earliness, photoinsensitivity
	NHP 41	[(JS 97-52 x EC 390977) x MACS 450] x EC 572086	F3	Earliness, photoinsensitivity
	NHP 42	(NRC 37 x JS 97-52) x EC 572086	F3	Earliness and diverse parents
	NHP 43	JS 97-52 x EC 390977	F3	Photoinsensitivity and earliness
	NHP 44	RVS 2001-18 x AK 887	F3	High yield
	NHP 45	(NRC 37 x JS 335) x NRC	F3	Earliness

		121		
	NHP 46	(Cat 3293 x JS 9041) x F5 (JS 97-52 x MACS 330)	F3	Drought tolerance and earliness
	NHP 47	F5 (JS 97-52 x NRC 37) x F5 (JS 97-52 x JS 90-41)	F3	Drought and water logging tolerance

4. Pre-breeding Initiatives: Following pre-breeding initiatives would be taken up

Centre	Initiatives
Indore	**1.** Crossing of recently released disease resistant late maturing varieties with G soja **2.** Back crossing of F1s of G soja x soybean varieties (JS 20-34, JS 95-60, JS 20-98, JS 335, JS 97-52 and EC 538828) with varieties for earliness, insect resistance and YMV resistance. **3.** Inheritance of *G soja* derived earliness
Pantnagar	**1.** New crosses with *G soja* for YMV resistance and insect resistance **2.** Generation advancement of 8 F1 combinations and one F3 combination **3.** Station trials of advanced lines
Ludhiana	**1.** Generation advancement of JS 335 x G soja to BC5 for developing JS 335 with YMV resistance

(B) TECHNICAL PROGRAMME OF ENTOMOLOGY FOR KHARIF 2021

A list of major insect-pests occurring at different centers' is given below and entomologists should report data of different experiments against these insect pests:

Zone	Centre	Major insect-pests
NEHZ	Imphal	Bihar hairy caterpillar, leaf webber, tobacco caterpillar, aphid and stem fly
NPZ	Delhi	white fly/YMV and stem fly
	Pantnagar	Defoliators, girdle beetle, white fly and aphid
	Ludhiana	White fly
CZ	Sehore	Stem fly, defoliators and girdle beetle
	Kota	Girdle beetle and defoliators,
	Parbhani	Stem fly, girdle beetle and defoliators
	Amrawati	Stem fly, girdle beetle and defoliators
SZ	Dharwad	Pod borers and defoliators
	Bidar	Pod borers and defoliators

ENT 1. Seasonal incidence of insect-pests and their bio-control agents

i) Fixed plot survey: At research station. Any insect susceptible soybean variety should be planted in at least 100 sq m area, to record seasonal incidence of both major and minor insect-pests and report it SMW wise with dates.

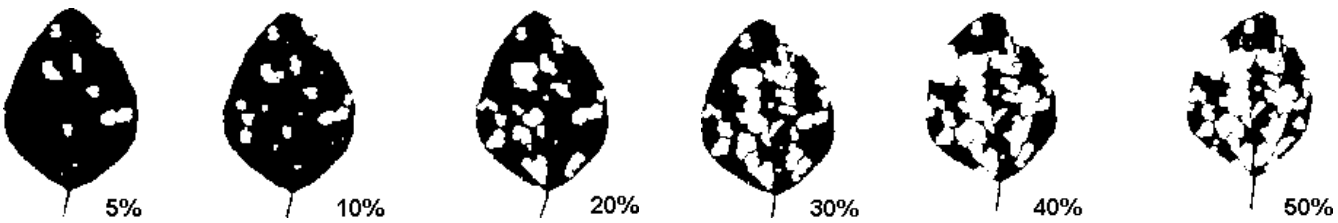
ii) Production oriented survey: At farmers' fields. Information on previous crop and farmers practices adopted should be recorded.

Centres : Delhi, Pantnagar, Sehore, Parbhani, Kota, Amrawati, Dharwad, Imphal
Replications : Two
Sampling/observation procedures: Observations should be recorded at 7 days intervals starting from 7 days after germination (DAG) following a uniform procedure as described below for different insect pests:

i) **Leaf damage**: Calculate leaf damage in 5 randomly selected plants on the basis of visual observations at flowering and at peak incidence of larvae.

Example: Leaf damage in a plant having 10 leaves will be calculated as follows -

3 leaves with 10 percent damage (3 x 10) = 30
5 leaves with 30 percent damage (5 x 30) = 150
2 leaves with 50 percent damage (2 x 50) = 100
Average damage = (30+150+100)/10 leaves = **28% Leaf damage**



Defoliation	Resistance level
< 25 %	Least Susceptible
25-50 %	Moderately Susceptible
50-75 %	Susceptible
> 75 %	Highly Susceptible

ii) **Defoliators and Bugs** : No. of larvae (**Spp. wise**) and bugs/m. Observations should be recorded at three places and mean should be reported in Nos. per meter. Dominant defoliators should be reported separately. Calculate the extent of defoliation as above.

iii) **Leaf miner** : No. of larvae/plant in 10 plants. No. of leaflets and damaged leaflets be recorded and presented in percentage.

iv) **Stem fly** : Seedling mortality - total number of plants and number of plants succumbed to stem fly infestation / m at 3 places per plot on 7-10 DAG. Express seedling mortality in per cent and give the mean. Stem tunnelling - Plant height and length of stem tunnelled in 10 plants at physiological maturity. Express stem tunnelling in per cent.

v) **Whitefly, Aphids, Leaf hoppers and Mites** : No. of insects (nymphs and adults) on 3 leaves/plant (upper, middle and lower leaf) in 10 plants each.

vi) **Girdle beetle** : Mark 1 meter area atleast at **3-5** places, depending upon the plot size and record number of total plants and girdled plants and present the data in per cent plant infestation. Label all the infested plants with date, in earmarked area and record number of plants showing typical 'cut-off' symptoms. Calculate percent damage out of total plants per meter (in earmarked area).

vii) **Bio-control agents** : Collect 20 lepidopteran larvae from untreated soybean field at the interval of 10 days from their appearance. Put them in petri-dishes and report mortality (%) due to different bio-control agents (e.g. parasitoids and insect pathogens). Incidence of predators should also be recorded.

Note: Incidence of minor insects should also be mentioned. Variety used for this trial, date of sowing, date of germination and dates of observation should be indicated in the report. Meteorological data (on SMW basis) should be essentially appended.

IMPORTANT:

1. Submission of Weekly pest-status report

Besides fixed plot survey and production oriented survey, the weekly pest status should also be recorded by keeping close liaison with Department of Agriculture officials and the farmers of the region. As per the instructions of ADG (PP), ICAR the **weekly pest status report** should be invariably E-mailed to PI (Entomology), ICAR-IISR, Indore (lokesharsnagpur@gmail.com) in following format:

Name of AICRPS Centre: **Date**:

Crop	Crop stage	Location	Major Insect-pests		Major Plant diseases		Other pests (Nema-todes, Rats etc)	Data collected by	Data checked by	Pest Advisories
			Name	Status (Low, Medium, Severe)	Name	Status (Low, Medium, Severe)				

ENT 2. Field screening of AVT-I & II entries for resistance to major insect-pests

Centres **:** Delhi, Pantnagar, Ludhiana, Sehore, Parbhani, Kota, Amrawati, Dharwad, Imphal, Bidar

Treatments **:Note: From 2021, only zonal test entries would be screened for resistance. Zonal susceptible checks of entomology would also be included in the trial.**

Zonal test entries with respective zonal checks as per the technical programme of Plant Breeding and susceptible checks of entomology would be screened. All entries should be grown in two sets, one with complete plant protection measures and other with no plant protection measures. All AVT test entries should be in alphabetical order followed by checks followed by entries found highly resistant, resistant, R-HY and S-HY (T) in previous years in alphabetical order.

Replications **:** Two

Design **:** RBD

Plot size **:** 2 rows of 3 m length each

Observations **:** Incidence of major insect-pests be recorded only from unprotected set of entries, at their peak incidence. Grain yield (kg/plot) should be recorded from both treated and untreated sets of entries for analysis by **Maximin-Minimax method**. ***For defoliators, entries should be rated based on defoliation* ALSO *as per the procedure given in Ent. 1.***

Data analysis:

Categorize the entries as per AICRP method to identify resistant sources against specific insect-pests. Replace mean (X) with 26 % for stem fly. Entries with traces of insect population or very less damage need not be categorized. Categorize the entries into resistant groups against prevailing insect pest-complex according to the **maximin-minimax method** (*Odulaja, A. and S. Nokoe.1993. A maximin-minimax approach for classifying crop varieties into resistant groups based on yield potential and loss. Intl J. Pest Mgmt., 39:64-67*)

IMPORTANT*:*

1. **Entries categorized as highly resistant (HR) / resistant (R) during last two seasons against the major pests of the centre/zone must be included in AVT trial of 2021 and be reported with separate identity.**
2. **In case of non availability of any entry, breeder of the centre may be requested for arranging the seed from him or from developer.**

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

Centres: Pantnagar, Dharwad and Indore

Test Entries: AVT-II entries of **ALL ZONES**. ***All concerned breeders are requested to send atleast 200 g of their AVT-II entries directly to Entomologists of above THREE centres.***

Sow susceptible variety JS 335 in about 100 sq m area so that its leaves can be used for rearing of larvae for lab studies.

Objective: To assess the effect of selected soybean genotypes on the food consumption and its utilization by *Spodoptera litura* larvae and antixenosis response exerted by genotypes. Rationale of this study is that when larvae are exposed to resistant genotypes, their feeding capacity is adversely affected, which is ultimately reflected in their growth and development. Three utilization indices [Waldbauer (1968); Jacob and Chippendale (1971); Brewer and King (1978)] will be used as the indicators of response of *Spodoptera litura* larvae exposed to soybean genotypes : (i) the **A**pproximate **D**igestibility (AD) is the measure of approximate percentage of food consumed that is utilized by the larvae; (ii) the **E**fficiency of **C**onversion **I**ndex (ECI) is an overall measure of ability of larvae to utilize the ingested food for their growth; (iii) the **E**fficiency of

Conversion of **D**igested food (ECD) is the percentage of digested food that contributes to weight gain of the larvae. These three indices will be calculated as follows:

AD = [(Fi – Wf) / Fi] x 100 ; **ECI** = (Wg / Fi) x 100 ; **ECD** = [Wg / (Fi – Wf)] x 100
where, Fi is weight of food ingested, Wf is weight of frass, and Wg is weight gain by larvae.
Antixenosis response exerted by the genotypes on defoliating larvae will be assessed by calculating the **Preference Index** (Kogan and Goeden, 1970).
Preference Index, **C** = 2A / M+A, where, A = Dry weight of leaves of test genotypes eaten by larvae and M = Dry weight of leaves of susceptible check eaten by larvae.

Methodology
Test Insect: *Spodoptera litura* larvae. Culture maintenance should be initiated well in advance so that sufficient larvae are available for the study. Pupae or egg masses of *S. litura* can be obtained on payment basis by sending a request to the Director, National Bureau of Agricultural Insect Resources (formerly PDBC), Pox Bag No. 2491, H.A. Farm Post Bellary Road, Bengaluru, Karnataka 560024. Price list is available at Bureau's web site http://www.nbair.res.in. E-mail: **nbaii.icar@gmail.com / nbair@icar.gov.in**.

Working conditions: Preferably 27 $\pm$ 1 ^{0} C, 80 $\pm$ 5 % RH
Replications: Three
Dry weight of leaves: Take fresh weight of 10 leaflets/genotype. Oven dry at 50 ^{0} C for 15 minutes and weigh. Use this relation between fresh and dry weight of leaves for calculating **Fi** (i.e. food ingested).
Dry weight of larvae: Take fresh weight of twenty 3rd instar *S. litura* larvae. Oven dry at 50 ^{0} C for 15 minutes and weigh. Use this relation between fresh and dry weight of larvae for calculating **Wg** (i.e. weight gain by larvae).
Dry weight of frass: Collect frass from each individual petri plate. Oven dry at 50 ^{0} C for 15 minutes and weigh. Use the frass dry weight for calculating **Wf**.

Antibiosis Studies:
Release FIVE 3rd instar, pre-weighed larvae in petri plates and provide pre-weighed leaves of soybean genotypes. After every 24 hr, remove the left over leaves and frass from the petri plates, oven dry them at 50 ^{0} C for 15 minutes and weigh. Record the larval weight daily. Record the larval mortality, if any. Continue this process up to pupation. Record larval duration in days. Observe the pupae and report if there is any deformity. Record pupal duration in days. Place the pupae (genotype and replication wise separately) in oviposition jars, observe adult emergence and report deformities in adults, if any.

Antixenosis Studies:
Place one pre weighed leaf (or a portion of leaf) of all the genotypes in circular manner in a petri plate having thin thermocol sheet at the base. Fix all the leaves with pin to ensure that they do not touch each other and are not displaced. Release TEN 3rd instar *S. litura* larvae at the centre of petri plate. After 8 hrs, remove the left over leaves of all the genotypes, oven dry at 50 ^{0} C for 15 minutes and weigh. Calculate the weight of leaves eaten by larvae for all the genotypes. Use the fresh and dry weight relationship as described above. Maintain 5 replications in the experiment. Calculate the **Preference Index (C)** and classify the genotypes as follows:

C value	Antixenosis response
0.10 to 0.25	Extreme antixenosis
0.26 to 0.50	Strong antixenosis
0.51 to 0.75	Moderate antixenosis
0.76 to 0.99	Slight antixenosis
1.00 or > 1.00	Preferred host

References:
Brewer F D and E G King. 1978. Effects of parasitization by a tachinid, *Lixophaga diatraeae*, on the growth and food consumption of sugarcane borer larvae. *Ann. Entomol. Soc. Am*., **71**: 19-22.
Jacob D and Chippendale G M. 1971. Growth and Development of the southwestern corn borer, *Diatraea grandiosella* on a meridic diet. *Ann. Entomol. Soc. Am*., **64**: 485-488.
Kogan, M and Goeden, RD. 19 70. The host plant range of *Lema trilineata daturaphila* (Coleoptera: Chrysomelidae). Ann. Entom. Soc. Amer., **63**(4):1175-1180.

ENT 4. Field screening of IVT entries for resistance to major insect-pests (ongoing activity)

ENT 4: Field screening of IVT entries for resistance to major insect-pests

Centres **:** Palampur, Delhi, Pantnagar, Ludhiana, Sehore, Parbhani, Kota, Amravati, Dharwad, Imphal, Bidar
Treatment **:** Test entries as per breeding programme with respective checks
Replications **:** Two
Design **:** RBD
Plot size **:** 3 rows of 3 m length each
Observations **:** On major insects as mentioned above + Grain yield (kg/ha). ***For defoliators, entries should be rated based on defoliation ALSO in a separate column as per the procedure given in Ent. 1.***

NOTE*: PI (Plant Breeding), IISR, Indore will arrange to send 200 g seed of each IVT entry to each entomologist / centre separately.*

AICRPS method of Categorization:

HR	=	values < mean – CD at 1%.
R	=	values between mean – CD at 1% & mean – CD at 5%.
MR	=	values between mean – CD at 5% & mean
LR	=	values between mean & mean + CD at 5%
S	=	values between mean + CD at 5% and mean + CD at 1%
HS	=	values > mean + CD at 1%.

NOTE: Centres must retain all IVT entries for further use in AVT next year.

ENT 5: Evaluation of germplasm lines at hot spots for resistance against major insect-pests

Hot spots	Major insect-pests
Imphal	Bihar Hairy Caterpillar, leaf webber, Aphids
Ludhiana	White fly / YMV
Sehore	Stem fly, defoliators, girdle beetle
Kota	Defoliators, girdle beetle
Dharwad	Defoliators, pod borers
Indore	Stem fly, girdle beetle, defoliators

No. of lines **:** ***As supplied to each of the above centers by PI, Plant Breeding, IISR, Indore***
Plot size **:** Single row of 3 m length (Non-replicated)
Observations **:** On insects as specified above at peak incidence / infestation and **grain yield**. Date of observation and crop age should be mentioned in the report. Screening procedure should be same as in case of IVT and AVT entries.

NOTE: One row of susceptible check variety (preferably JS 335) should be planted after every 5 germplasm lines.

NOTE: Centres must retain all germplasm lines for further use.

ENT 6: Integrated management of root rot complex and stem borers of soybean (3rd year)

Centers: Amravati, Dharwad, Jabalpur and Pantnagar

Note: Trial will be laid out by the pathologists and entomological observations will be made by entomologist as detailed in pathology technical programme.

ENT 7. Management of major insect-pests through microbial consortia (2nd year)

Centers: Pantnagar, Sehore, Parbhani, Kota, Amravati,Dharwad and Imphal

Variety : One susceptible variety (preferably JS 335)
Treatment :Seven (7)
Replications : Three (3)
Design : RBD
Plot size : 6 rows of 3 m length each

Treatments:
1. Beauveria bassiana (2kg/ha) +Metarhizium anisopliae (2kg/ha)
2. *Nomuraea rileyi(2kg/ha) + Bacillus thuringiensis* (Bt) (1 kg/ha)
3. Nomuraea rileyi(2kg/ha)+ Metarhizium anisopliae (2kg/ha)
4. Beauveria bassiana (2kg/ha)+ Nomuraea rileyi(2kg/ha)
5. *Beauveria bassiana (2kg/ha)+ Bacillus thuringiensis* (Bt) (1 kg/ha)
6. *Metarhizium anisopliae (2kg/ha)+ Bacillus thuringiensis* (Bt) (1 kg/ha)
7. Untreated control

Observations : On major insect-pests including species wise major defoliators/m row at 3 places/plot on 1 DBT, 3 and 7 DAT, per cent defoliation, Grain yield (to be reported in kg/ha)
No. of sprays : 2-3 Sprays : 1st: 15 to 20 DAG; 2nd: 35-40 DAG; 3rd: 55-60 DAG or coinciding with incidence of major insects.

ENT 8. Management of major defoliators of soybean through intercropping with *suva, Anethum graveolens*

Centers: Pantnagar, Sehore, Parbhani, Amravati, Indore and Dharwad.
Treatments details: Intercropping of suva, *Anethum graveolens* with soybean in different rows combinations as given below:

Variety : JS 335
Treatment : Five (5)
Replications : Four (4)
Design : RBD with five treatments and four replications
Row length : 5m
Sowing : Sowing of soybean and suva must be done simultaneously.

Treatments details: Intercropping of suva, *Anethum graveolens* with soybean in different rows combinations as given below:

1. Sole Soybean (12 rows)
2. Soybean + Suva (3soybean: 1suva: 3 soybean rows combinations)
3. Soybean + Suva (6 soybean: 1 suva: 6 soybean rows combinations)
4. Soybean + Suva (3 soybean: 2 suva: 3 soybean rows combinations))
5. Soybean + Suva (6 soybean: 2 suva: 6 soybean rows combinations)

Observations: 1. **Defoliators population**: Number of larvae per meter crop row at three random points per plot.

Instructions to Soybean Entomologists for uniformity in conduct of trials and reporting of data

1. **Weather data** of entire crop season should be supplied with trial data.
2. **Survey**: Mention variety name, DOS, DOG and dates of observations. Data on major and minor insects should be submitted in the **format** given in Summary Tables of Experiments. In case of defoliators, larval population andextent of defoliation (%) at flowering and at peak incidence should be given. Observations on BCAs, both in field as well as under lab conditions should be reported. Associate with Agronomists for Field surveys and report insect situation in the region.
3. **Screening** : While reporting screening data of AVT entries, sort the test entries in alphabetical order followed by zonal checks as given in Technical Programme. Previous years' resistant entries should also be sorted alphabetically **but** should appear after zonal checks. **Use all zonal checks** also and indicate them with (C). Transformed values and the resistance categories may be given in the **same column** below the original values. In case of defoliators, larval population andextent of defoliation (%) should be reported.
4. Seeds of all IVT entries should be **retained**, so that they can be used next year if some of them get promoted to AVT or found resistant to insect(s).
5. **Summary** : A brief summary of results may be given for each trial. Please try to analyze the results critically and give your valuable interpretations. In case of unexpected results, please try to find out the possible reasons.
6. **For lab experiment (ENT. 3) on *"Status of AVT-II entries for antixenosis and antibiosis against S. litura"*:** Take timely action for procurement of *Spodoptera litura* pupae or egg masses from NBAIR, Bangalore (if required).

(C) TECHNICAL PROGRAMME OF PLANT PATHOLOGY FOR 2021

PP-1 Survey and surveillance for soybean diseases

Centres: Almora, Amravati, Dharwad, Jabalpur, Jorhat, Kasbe Digraj, Medziphema Pantnagar, Palampur and Sehore

Note:

1. Disease score 0-9, and procedure given for calculating infection index (I.I.) at Appendix VII, pages 57-59 of "Technical Programme 2009-10" should strictly be followed.
2. Date of the appearance of disease and period of its rapid spread should be mentioned.
3. Previous crops to be recorded before soybean cropping.
4. Probable yield loss due to disease in the region should also be mentioned based on survey.
5. Pathogen of every disease should clearly be spelt out. Name and abbreviated form of diseases as given in page no. 35 of "Technical Programme 2009-10" should uniformly be followed.
6. Plant protection measures used by farmers to be recorded.
7. In case of viral diseases weed and insect population around the field and weather factors to be recorded.

PP-2: Trap nursery trial for disease incidence

Centres : Almora, Amravati, Dharwad, Delhi, Indore, Jabalpur, Jorhat, Medziphema, Pantnagar, Palampur and Sehore
Plot size : Three rows of 3 m length
Design : R.B.D.
Replications: Two

Treatments: Varieties listed below

1. JS 95-60 2. JS 335 3. Shivalik 4. JS 93-05 5. Punjab 1 6. PK 472
7. Bragg 8. Monetta 9. NRC 7 10. PK 262

Observations:

1. For root rot diseases exact value of % mortality should be mentioned. Additionally, % mortality should also be reflected in terms of 0-9 score to calculate infection index (I.I.) as mentioned at page 58 (Appendix VII, "Technical Programme 2008-09).
2. For diseases (foliar, cotyledonary spot (CS), PSS and viral diseases), scoring should be made in 9 scale as given in page 57; IB, C and D. Infection index should also be calculated. For foliar diseases observation is to be made on 10 plants/plot selected at random ignoring top 3 leaves.
3. Pathogen of every disease should clearly be spelt out.
4. Observations of diseases will be recorded at initiation and at weekly interval and used for forecasting model development.
5. To correlate with weather parameters and develop correlation coefficient and regression equations for various observed diseases.

PP-3: Evaluation of breeding materials for resistant donor(s).

Centres: Almora, Amravati, Dharwad, Delhi, Indore, Jabalpur, Jorhat, Kasbe Digraj, Kota, Ludhiana, Medziphema, Pantnagar, Palampur, Raipur Sehore and UgarKhurd (Glasshouse screening of AVT II entries for rust through artificial inoculation will be taken up at Dharwad center).

a. IVT& IVT (early)
b. AVT-I & AVT I (early)
c. AVT-II
For a to c - Replicated 2 rows x 3 m (2 replications) under RBD.

Note 1: Seeds for the IVT trial will be supplied by the ICAR-IISR, Indore

Note 2: All the centres will evaluate the AVT-I & II entries of **all the zones**. Seeds of previous year IVT and AVT I can be utilized.

Note 3: Photograph of susceptible variety should be submitted along the report

Note 4: AVT II entries will be evaluated under artificially inoculated conditions/hot spot locations for centre specific diseases as given below:

S.N.	Centre	Disease (s)
1.	RVSKVV, Sehore	TLS, RAB, Anthracnose (Anth.), YMV and CR
2.	GBPU&T, Pantnagar	RAB and YMV
3.	VPKAS, Almora	FLS and Anth.
4.	UAS, Dharwad	Rust, CLS/PSS and Anth.
5.	K.Digraj	Rust and Anth.
6.	JNKVV, Jabalpur	CR, YMV, Anth.and RAB
7.	AAU, Jorhat	Coll R and Anth.
8.	IGKVV, Raipur	IBB and Anth.
9.	CSKHPKVV, Palampur	Anth. and FLS
10.	Medziphema	Rust, Anth. and RAB
11.	Ludhiana	YMV and SMV
12.	UgarKhurd	Rust, CLS/PSS and Anth.
13.	Dholi	YMV
14.	Amravati	CR, Anth. and YMV
15.	Indore	Anth.,CR and SMV

Note 5: Pathologists should include susceptible checks for each disease as given below. However, more than one susceptible check should be used for each disease and their name should be mentioned. **In case of breeder's checks, use only zonal checks of your zone.**

Zone	Breeder's checks	Pathological Checks
NHZ	Breeders checks of respective zones	Shivalik, VLS 2
NPZ		JS 335, JS 93-05
NEHZ		JS 93-05, JS 335
EZ		NRC 37, JS 95-60
SZ		JS 335, JS 93-05
CZ		JS 95-60, JS 335

Note 6: For IVT, AVT-I and AVT II, after every five entries one row of susceptible checks should be planted. The disease reaction should be given on 0-9 scale only. Classify the entries based on 0-9 scale. For virus disease (s) screening follow instruction given in note 9.

PP-4: Performance of the previous year's resistant entries

	Centres	**Diseases**
1.	RVSKVV, Sehore	TLS, Anth. and CR
2.	GBPUA&T, Pantnagar	RAB and YMV
3.	VPKAS, Almora	FLS
4.	UAS, Dharwad	Rust and PSS
5.	JNKVV, Jabalpur	CR, YMV and RAB
6.	Ugarkhurd	Rust and Anth.
7.	IGKV, Raipur	IBB and Anth.
8.	Amravati	CR and YMV
9.	Palampur	FLS and Anth.
10.	Ludhiana	YMV
11.	K. Digraj	Rust and Anth.

Plot size should be maintained uniformly as 3 rows of 3 meter length at all centers (non replicated). The disease reaction should be given on 0-9 scale only. Classify the entries based on 0-9 scale. Each centre will identify AR or HR entries (MR, where AR or HR entries is not available) for the diseases as given above and maintain nursery under inoculated conditions. Each year variety identified as AR or HR in PP 3 (a,b,c) and germplasm trial material will be added to this nursery**.** Entry should be rejected after showing susceptibility with year of testing. {**Note 6 : Year of testing of the entry must be shown in bracket with the entry. The exchange of resistant material for YMV, Anth., Rust, FLS, RAB and CR be taken up among the centers with intimation to PI (Plant Pathology)}.**

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

Centers: Dharwad (Rust, PSS and Anth.), Jabalpur (YMV, CR, RAB and Anth), Indore (Anth., YMV and SMV), Palampur (FLS, Anth. and BS), Pantnagar (YMV, RAB and Anth.)

Design: Augmented (2 lines x 3 m)

No. of germplasm: 50

Observations: The disease reaction should be given on 0-9 scale only. Classify the entries based on 0-9 scale.

Note 7: Seeds will be supplied from Germplasm Centre of ICAR-IISR, Indore

PP 6/ENT 8: (2019): Integrated management of the root rot complex and stem borers of soybean

Locations: Dharwad, Amravati, Jabalpur, Pantnagar, Palampurand Jorhat

Objective: To develop integrated pest and disease management strategies against root rot and stem borer in soybean
Variety: JS 335
Design: RBD
Plot size: 5 rows of 3 m length
Replications: Three
Treatment Details:

PP 6/ENT 8: (2019): Integrated management of the root rot complex and stem borers of soybean

Locations: Dharwad, Amravati, Jabalpur, Pantnagar Palampur and Jorhat
Objective: To develop integrated pest and disease management strategies against root rot and stem borer in soybean
Variety: JS 335
Design: RBD
Plot size: 5 rows of 3 m length
Replications: Three

Treatment Details:

Treatments	**Chemicals**	**Formulation**	**Dosage (g/ml/kg seed)**
T_1	Seed treatment (ST) with Carboxin + Thiram	75 % WP	3
T_2	ST with Trifloxystrobin + Penflufen	240 FS	1
T_3	ST with Thiophanate methyl + Pyroclostrobin	500 FS	2
T_4	ST with *Trichoderma harzianum*	-	10
T_5	ST with Thiomethoxam	600 FS	2
T_6	T1 +T5		3+2
T_7	T2 + T5	-	1+2
T_8	T3 +T5		2+2
T_9	T4+ T5		10+2
T10	STwith biopolymer chitosan based *Trichoderma* formulation (IIOR)	SC	10ml
T_{11}	STwithbiopolymer cellulose based *Trichoderma* formulation (IIOR)	SC	10ml
T12	STwithbiopolymer cellulose based *Trichoderma* formulation (IIOR)+Thiomethoxam		2+10
T13	Untreated control		

Note 8: Spraying with chlorantroniprole 0.2ml/L at 15 and 35 DAS and Propiconazole 1ml/L at 35 & 45 DAS for treatment T1 to T9.

Observations to be recorded: 1) % Field Stand 2) % Root rot incidence & anthracnose Severity (PDI) 3) % Stem tunneling 4) % Girdling, 5) Plant ht (cm), 6) No. of branches per plant, 7) No. of pods per plant, 8) 100 seed weight (g), 9) Seed yield(q/ha)

Project on (PP 7): Development of Forewarning systems against major diseases of soybean.
Source: Trap nursery data at weekly interval
Source: Disease data generated at these centers Weather data of respective centers.
Modules: Correlation & Regression

PP-8: Estimation of avoidable losses soybean diseases

Target disease and location

S.N.	Centre	Susceptible variety	Moderate resistance/ Resistance variety	Disease (s)
1.	Indore	JS 95-60	JS 20-98	ANTH
2.	RVSKVV, Sehore	JS 95-60	JS 20-98	TLS and CR
3.	UAS, Dharwad	JS 335	DSb 23	Rust and ANTH
4.	JNKVV, Jabalpur	JS 95-60	JS 20-29	CR, FLS and RAB
5.	GBPU&T, Pantnagar	JS 335	JS 20-98	RAB
6.	PAU, Ludhiana	JS 335	SL 955	YMV
7.	CSKHPKVV, Palampur	JS 335	VLS 59	ANTH. and FLS
8.	AAU, Jorhat	JS 9305	JS 335, Himso 1688	Coll Rot, ANTH
9.	Medziphema	JS 335	JS 97-52	ANTH, RAB
10.	IGKVV, Raipur	JS 335	RSC 10-46	IBB, ANTH
11	IARI, New Delhi	JS 335	DS 3050	YMV,IBB
12.	R & D Center, Ugarkhurd	JS 335	DSb 21	Rust
13.	ICAR-VPKAS, Almora	JS 335	KDS 992	Frog eye Leaf spot
14.	ARS, Amarvati	JS 335	AMS 1002	Charcoal rot

Design: Split Plot design with 3 replication

Treatment

Main Treatment T1: Susceptible variety
Main Treatment T2: Resistance/Moderate resistance variety
Sub T1 = Seed treatment + one spray (at 30 days after sowing);
Sub T2 = Seed treatment + two sprays (at 30 and 45 DAS);
Sub T3= Seed treatment + Three sprays at 30, 45 and 60 DAS;
Sub T4= Seed treatment + Four sprays at 30, 45, 60 and 75 DAS
Sub T5= Seed treatment + Water spray
Sub T6= No spray no seed treatment

Seed treatment: Thiophanate Methyl 450g/l + Pyraclostrobin 50g/l w/v FS @ 2ml/ kg of seed
Foliar spray: Tebuconazole @ 625 ml/ha

For YMV/IBB
Main Treatment T1: Susceptible variety
Main Treatment T2: Resistance/Moderate resistance variety
T1 = Seed treatment+one spray (at 30 days after sowing);
T2 = Seed treatment+two sprays (at 30 and 45 DAS);
T3= Seed treatment+Three sprays at 30, 45 and 60 DAS;
T4= Seed treatment+Four sprays at 30, 45, 60 and 75 DAS
T5= Seed treatment+Water spray
T6= No spray no seed treatment
Seed treatment: Thiomethoxam 70 S/600FS @ 3 g/kg seed
Foliar spray of Thiomethoxam 25 WG @ 100 gm/ha started from 21 DAS

Observation:
1. PDI will be calculated of 10 randomly selected plant at 30 DAS, 45 DAS, 60 DAS, 75 DAS for each disease
2. Percentage Incidence of each disease will be recorded at 30 DAS, 45 DAS, 60 DAS and 75 DAS for each disease.
3. Avoidable yield loss will be calculated as (YP – YU)/YP x 100, where YP = yield under protected condition, YU = yield under unprotected condition.
4. AUDPC will be calculated at 30 DAS, 45 DAS, 60 DAS and 75 DAS
5. Yield loss will be calculated as (EY – OY)/EY x 100, where EY = Expected yield, OY = Observed yield. EY = Expected yield will be five years average yield in corresponding area.

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

Centres: Amravati, Jabalpur –CR
Almora, Palampur, -FLS
Indore, Palampur –Anth.
Delhi, Ludhiana –YMV
K. Digraj, Dharwad and Ugar Khurd-Rust
Pantnagar & Jabalpur- RAB
Jorhat- Coll. R

Note 1. Sowing should done inReplicated 2 rows x 1 m in 2 replications under RBD.
Note 2. Total10 entry from each soybean breeder should supplied to ICAR-IISR, Indore for evaluation at hot spot

Note : Methodology for recording disease severity.

Uniform method of disease rating

Point scale (0 to 9) divided into 6 categories should be followed.
General interpretation of the scale is as follows:

0 = Highly resistant
1 = Resistant
3 = Moderately resistant
5 = Moderately susceptible

7 = Susceptible
9 = Highly susceptible

Rating scales for different diseases

A. Charcoal rot/Collar rot/Rhizoctonia rot

Rating Description
0: No mortality
1: 1% mortality
3: 1.1 to 10% mortality
5: 10.1-25% mortality
7 : 25.1-50% mortality
9: more than 50% mortality

B. Bacterial pustule/Rhizoctonia aerial blight/Cercospora leaf spot/Alternaria leaf spot/rust/Myrothecium leaf spot/Target leaf spot/Frogeye leaf spot

Rating Description
0: No lesions/spots
1: 1% leaf area covered with lesions/spots
3: 1.1-10% leaf area covered with lesions/spots, no spots on stem.
5:10.1-25% of the leaf area covered, no defoliation; little damage.
7: 25.1-50% leaf area covered; some leaves drop; death of a Few plants; damage conspicuous.
9 : More than 50% area covered, lesions/spot very common on All plants, defoliation common; death of plants common; Damage more than 50%.

C. **Cotyledonary spot/Purple seed stain/ Pod blight**

Rating Description
0: No lesions/spots/discoloration
1: 1% area covered with lesions/spots/discoloration
3: 1.1-10% area covered with lesions/spots/discoloration
5: 10.1-25% area covered with lesions/spots/discoloration
7: 25.1-50% area covered with lesions/spots/discoloration
9: More than 50% area covered with lesions/spots/discoloration

D Viral diseases: Yellow mosaic/ Indian bud blight/Green or soybean mosaic

Rating Description

0 No symptoms on any plant
1 Yellow mottle or necrotic mottle in up to 1% plants
3 Yellow mottle or necrotic mottle in traces on 1.1-10% plants
5 Necrotic mottle/mild mottle/ Mild symptoms; 10.1-25% plants; no reduction in plant growth; no yield loss.
7 Yellow mottle symptoms not covering the whole leaf lamina on 25.1-50% plants; reduction in leaf and plant growth.
9 Yellow mottle symptoms on more than 50% plants; severe reduction in leaf and plant growth as well as pod formation and death of plant.

Scale for classifying reaction of viral diseases under field conditions.

a. The percent disease incidence (percentage of number of infected plants over total number of plants in a given accession) and disease severity (number of leaves having symptom over total number of leaves in a single plant and averaged from 10 such plants).
b. Based on the disease severity, symptom severity grades, designated with numerical values of 0-4 and a scale of response value (0-1) corresponding to such grades, the coefficient of infection (CI) will be calculated by multiplying the percent disease incidence to the response value assigned for each severity grade following standard methodology

Symptoms	**Severity grade**	**Response value**D:\mcab\Downloads\YMV.rtf - page9[b]	**Coefficient of infection (CI)**D:\mcab\Downloads\YMV.rtf - page9[a]	**Disease reaction**
Symptoms absent	0	0	0-4	Highly resistant
Very mild symptoms upto 25% leaves	1	0.25	5-9	Resistant
Appearance of symptoms in 26-50% leaves	2	0.50	10-19	Moderately resistant
Appearance of symptoms in 51-75% leaves	3	0.75	20-39	Moderately susceptible
Severe disease infection in symptoms (>75% leaves)	4	1.00	40-69	Susceptible
			70-100	Highly susceptible

[a] CI ¼ Percent disease incidence (any value between 0 and 100) _ Response value.
[b] Response value is based on disease severity which is calculated on the basis of number of leaves showing symptoms in a single plant, not based on the types of symptoms or area covered by the symptoms.

(Singh, A.K. and Singh K.P., 2000, Screening for disease incidence of YVMV in Okra treated with gamma rays and EMS. *Veg. Sci*., 27:72-75).

Calculation of Percent Disease Index (PDI)

The above rating scales or grades are utilized for the calculation of PDI using the following formula of wheeler.

Percent disease index (PDI) = (Sum of individual rating *100) / (No. of leaves (plants) examined Maximum disease rating x maximum grade)

Statistical analysis will be perform after converting the PDI values by arc sine or angular transformations, if, required.

On the basis of PDI, the entry/variety can be classified as follows:

Infective Index Resistant category

0 = Highly resistant (AR)
0.01 – 11.11 = Resistant (HR)
11.12 – 33.33 = Moderately resistant (MR)
33.34 – 55.55 = Moderately susceptible (MS)
55.56 – 77.77 = Susceptible (S)
77.78 – 100.00 = Highly susceptible (HS)

(D) TECHNICAL PROGRAMME OF AGRONOMY & FRONTLINEDEMONSTRATIONS FOR 2021-22

A. Evaluation of new entries

AGRON-1/21: Evaluation of AVT-II entries under different row spacing

Zone	Centre
North hill	Almora, Palampur
North plain	Pantnagar, Ludhiana
Central	Sehore, Kota, Amravati
Eastern	Raipur, Ranchi, Bhawani Patna
Southern	Dharwad, Adilabad, Pune
North Eastern Hill	Imphal, Medziphema

Treatment:
(A) Main plot : Row spacing (2)
1. 30 cm 2. 45 cm

(B) Sub plot: Entries

Zone	Entries
North Hill Zone	VLS 99, **Check-**VLS 89, PS 1556, VLS 63, PS 1556
North Plain Zone	NRC 149, **Check-** SL 955, SL 1074, SL 1104, SL 958, PS 1347
Central Zone	Early-NRC 165, NRC 152, Medium to late- HIMSO 1689, JS 21 72, **Check-** JS 20 34, NRC 86
North Eastern Hill Zone	DS 3108, **Check-** JS 335, RKS 18, JS 97-52
Southern Zone	Nil
Eastern Zone	Nil

Design: Split plot, **Replication:** 3, **Plot Size:** 3.6 x 6 m
Observations: Branches per plant, pods per plant, seed index, dry weight per plant 30, 45 and 60 DAS, CGR, RGR, seed yield kg/ha, straw yield kg/ha, harvest index, grain production efficiency (kg/ha/day) and RUE
Note: *Concerned breeder will provide 4 kg seed of each entries up to31stMay, 2021.*

B. Sustainable soybean production

AGRON-2/15: Sustainable soybean production through crop diversification andtillage systems

Zone	Centre	Variety
North plain	Pantnagar, Ludhiana, ~~Delhi~~	PS 1347/SL 958
Central	Kota, Amravati	JS 95-60
North Eastern	Raipur, Ranchi	JS 97-52
Southern	Dharwad, Adilabad	DSb 21

Treatment:

A. Main plot: Tillage (2)
1. Minimum tillage (Two cultivator)
2. Conventional tillage (Deep ploughing, two cultivator & planking)

B. Sub plot: Crop rotation (4) ***Kharif***

1. Soybean-soybean-soybean-soybean
2. Soybean-maize-soybean-maize
3. Soybean-soybean-maize-soybean
4. Soybean-soybean-soybean-maize

(***Rabi* crops** – Wheat (Ludhiana, Pantnagar, Ranchi, Pune), Fallow (Bangalore), Chickpea remaining centres)

Design: Strip plot, **Replication:** 4 **Plot Size :** 3.6 x 6 m (fixed site)
Observations: Seed yield, straw yield, HI, SEY, Net Return, B:C ratio, initial N, P, K, N, P, K uptake, balance sheet of N, P, K, Organic carbon, physical properties (bulk density, WHC, porosity after four years)

C. Microbial consortium approach

AGRON-3/18: Evaluation of novel bio formulations for yield enhancement in soybean
Technical details

Zone	Centre	Variety	RDF ($N:P_2O_5:K_2O$:S kg/ha)
North plain	Pantnagar, Ludhiana, Delhi	PS 1347/SL 958	25:75:25:37.5
Central	Kota, Amravati	JS 95-60	25:60:40:20
North Eastern	Raipur, Ranchi	JS 97-52	25:100:50:50
Southern	Dharwad, Adilabad	DSb 21	25:80:20:30

Treatments:

1.	Control
2.	RDF only
3.	75% RDF
4.	75% RDF +Bio Zn
5.	75% RDF +Bio NPK
6.	75% RDF +Bio Zn + Bio NPK
7.	75% RDF+Rhizobium+MDSR14+MDSR 34

Design: RCBD **Replications**: 3 **Plot size:** 6m x 3.6m (21.6m^2)

Dose of biofomulation: 250 ml for 1-ha seed

Time and method of application: Mix 100 mL with 900 mL of water + 10 g of sugar. Take seeds in a bucket and pour the formulation and mix it thoroughly so as to coat the seeds uniformly. Spread the seeds under shade (prevent direct sunlight). Sow the seeds after half an hour of drying. The seed coating has to be done on the day of sowing only.
For treatment with BioNPK and Bio Zn together, mix 100 mL of BioNPK and 100 mL of BioZn with 800 mL of water +10 g sugar. Rest procedure is same as given above.

Observations to be recorded

1. Growth parameters: Plant dry matter30, 45 and 60 at DAS, CGR, RGR , nodule number and their fresh and dry weight at R2 and R5 stage
2. Yield attributes (No. of branches/plant, No. of pods/plant, seed index)
3. Seed yield, Straw yield, Biological yield (kg/ha), Harvest index
4. Soil data: Initial N,P, K, Zn and Fe; At harvest: NPK, Zn and Fe
5. Crop uptake data: N, P, K, Zn and Fe; At harvest N, P, K, Zn and Fe

D. Partial factor productivity evaluation

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

Zone	Variety
North plain	SL 958
Central	RVS 24
Eastern	RSC 10-46
Southern	MACS 1188
North Eastern Hill	JS 97-52

Treatment:

1. Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)
2. Full package – seed treatment
3. Full package – seed inoculation
4. Full package – RDF
5. Full package – weed management
6. Full package – insecticide application
7. Full package – Ridge furrow

Design: RBD **Replication:3** **Plot sze: 3.6 x 6 m**

Observations: Pods per plant, seed index, seed yield kg/ha, straw yield kg/ha, biological yield, harvest index, economics.

E. Drought management

AGRON- 5/20. Drought alleviation in soybean through foliar application of Thio-urea

Treatment:

A. Variety: 2

Zone	Centre	Variety
North plain	Ludhiana, Pantnagar, Delhi	PS 1092, SL 958
Central	Sehore, Kota, Amravati, Devharbaria	JS 20-29, JS 20 69
Eastern	Raipur, Ranchi	JS 95-60, RSC 10-46
Southern	Dharwad, Adilabad	JS 93-05, MACS 1188

B. Thio-urea spray: 5

1. Control
2. Water spray at 20-25 and 50 -55 days after sowing (DAS)
3. Thio-urea @ 250 ppm spray at 20-25 and 50 -55 days after sowing (DAS)
4. Thio-urea @ 500 ppm spray at 20-25 and 50 -55 days after sowing (DAS)
5. Thio-urea @ 750 ppm spray at 20-25 and 50 -55 days after sowing (DAS)

Replication: 4 **Design:** Factorial RBD **Plot size:** 3.6 x 6 m

Observations: Dry matter at 15, 30, 45, 60, 75 and at harvest, CGR, RGR, LAI, NAR, plant height, branches/plant, pods/plant, Seed yield/plant, seed index, seed and straw yield, Biological yield, Harvest index, Economics (cost of cultivation, gross and net returns and B:C ratio).

C. Biostimulant evaluation

AGRON- 6/21. Bio efficacy testing of Cytozyme biostimulant product Crop Max (Crop 100) on Soybean (*Glycine max*)

Zone	Centre	Variety
Central zone	Sehore, Kota, Amravati	JS 20 69
Southern zone	Adilabad, Dharwad	MACS 1188

Treatment:

Tl. Two foliar application of Crop Max @ 375 ml/ha at flower initiation (25-35DAS) and pod formation (45-50 DAS) stage,

T2. Two foliar application of Crop Max @ 500 ml/ha at flower initiation (25-35DAS) and pod formation (45-50 DAS) stage.

T3. Two foliar application of Crop Max @ 625 ml/ha at flower initiation (25-35DAS) and pod formation (45-50 DAS) stage.

T4. Two foliar application of Crop Max @ 750 ml/ha at flower initiation (25-35DAS) and pod formation(45-50 DAS) stage.

T5. Two foliar application of Biozyme liquid @ 625 ml/ha at flower initiation (25-35 DAS) and pod formation (45-50 DAS) stage.

T6. Two foliar application of water at flower initiation (25-35DAS) and pod formation (45-50 DAS) stage with recommended package of practices.

T7. Control (No Spray)–only recommended package of practices

Design: RBD **Replications:** 3 **Plot Size:** 3.6 m x 6 m

Observations to be recorded: 1. Plant height (cm), 2. Dry weight of plant (g), 3. Crop Vigour Index, 4. Leaf area Index (Crop density), 5. Chlorophyll content, 6. No. of pods per plant, 7. No, of grains/pod, 8. 100 seed weight (g), 9. Yield per ha, 10. Seed oil content (%), 11. Crop safety

Formulae

1. ***Crop growth rate (CGR)*** = 1/p x (W2 – W1) / T2-T1 (g/m^2/day)
2. ***Relative crop growth rate (RGR)*** = ($\log_{ln}W2 - \log_{ln}W1$) / T2 – T1 (g/g/day)
3. ***Rainfall use efficiency*** (RUE kg/ha-mm) = grain yield (kg/ha) / rainfall (mm) received during crop growing period.
4. Soybean equivalent yield= [(rabi crop yield x Price of rabi crop)/ Price of soybean] + soybean yield

FRONTLINE DEMONSTRATIONS
Allotment of FLDs at different AICRPS Centres for 2021-22

S.No.	Centre State	No. of FLDs	Varieties
1.	Palampur (CSKHPKV), Himachal Pradesh	10	Him Soya, Palam Soya and Hara Soya
2.	Almora (VPKAS), Uttrakhand	10	VL Soya 89 and VL Bhat 201
3.	Pantnagar (GBPUA&T), Uttaranchal	10	PS-19, PS-21, PS-23, PS-25 and PS-26
4.	Ludhiana (PAU), Punjab	50	SL 958, SL 1074, SL 1028 and SL 955
5.	Indore (IISR/AICRPS), Madhya Pradesh	635	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52
6.	Sehore (RVSKVV), Madhya Pradesh	10	RVS 24
7.	Kota (MPUA&T), Rajasthan	30	JS 20-34, RKS 113
8.	Parbhani (MAU), Maharashtra	50	MAUS 158, MAUS 162
9.	Amravati (PDKV), Maharashtra	20	AMSMB 5-18
10.	Sangli (MPKV), Maharashtra	25	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69
11.	Pune (ARI), Maharashtra	15	MACS 1188, MACS 1281, MACS 1460
12.	Dharwad (UAS), Karnataka	10	DSb 21, DSb 23, DSb 34, KSB 23, Karune
13.	Adilabad (ANGRAU), Telengana	100	Basara, KDS 726, KDS 753, MAUS 158, MACS 1188
14.	Medziphema, Nagaland	10	MACS 1460, JS 97 52
15.	Ugar Khurd (Ugar Sugar Works Ltd.), Karnataka	50	DSb 21, DSb 23, DSb 34, KSB 23, Karune
16.	Raipur (IGKVV), Chhattisgarh	100	CG SOYA, RSC 10-52 & RSC 10-46
17.	Ranchi (BAU), Jharkhand	10	RSC 10-46, BSS-2, JS 97-52
18.	Imphal (CAU), Manipur	15	MACS- 1460, DSb-19 and DSb-32
19.	SOPA, Indore Madhya Pradesh	250	JS.20-34, RVS.2002-4, Raj Soya 18, JS.20-98
20.	Soildaridad, Bhopal, Madhya Pradesh	250	JS 20 98, Raj Soya -24, Raj Soya -28, JS 20 69, NRC 86, RVS 2001-4, JS 20 34, JS 20 29
21.	KVK, Bharuch, Gujarat	15	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52
22.	KVK Karda, Maharashtra	100	DSb 21, DSb 23, DSb 34, KSB 23, Karune
23.	Dholi (RAU), Bihar	15	SL 958, NRC 128, NRCSL1
24	DevgrahBaria (TRTC), Gujarat	10	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52
25.	KVK, Belgavi	100	DSb 21, DSb 23, DSb 34, KSB 23, Karune
26.	Bengaluru (UAS), Karnataka	100	DSb 21, DSb 23, DSb 34, KSB 23, Karune
	Total	**2000**	

Note:

(i) All the centres are requested to follow the location/zone specific recommended soybean productiontechnology capsule as given below.

(ii) FLDs should be conducted in one cluster (10 FLDs) and that is to be in one village for consecutivetwo years.

(iii) If more than 10 FLDs allotted to any centre, they may increase the number of clusters in multiples of10 FLDs.

(iv) More than 10 years old varieties should be avoided in FLDs.

Zone-wise Production Technology Capsule

Input/practices	North HillZone (HP, Hills of Uttarakhand)	North Plain Zone (Punjab, Haryana, Delhi, NE Plains ofUP, Western Bihar)	Central Zone (MP, Raj., Guj., Bundelkhand Region of UP, Western Maharashtra)	Southern Zone (Karnataka, TN, AP, Kerala, Southern Maharashtra)	North Eastern Hill and Eastern Zone (Assam, W. Bengal, Meghalaya,Manipur, Nagaland, Eastern Bihar, Orissa, Chhatisgarh)
1. Variety	As given in allotment of FLD table in Proceeding and Technical Programme 2020-21				
2. Planting time	Last week of May to Juneend	15th June to 5th July	20th June to 5thJuly	15th June to30th June	15th June to 30th June
3. Planting geometry	45 x 5 cm	45 x 5 cm	45 x 5 cm	30 x 5 cm	45 x 5 cm
4. Plant population	0.4 million /ha	0.4 million /ha	0.4-0.6 million/ha	0.4-0.6 million/ha	0.4-0.6 million/ha
5. Depth of sowing	3 to 5 cm	3 to 5 cm	3 to 5 cm	3 to 5 cm	3 to 5 cm
6. Manure and Fertilizer (kg/ha)	10 t FYM/ha +20:80: 20: 20N:P_2O_5:K_2O:S kg/ha	5 t FYM/ha + 25:75:25:37.5:1.0 N:P_2O_5:K_2O:S:B kg/ha	5 t FYM/ha + 20:60: 40: 20:1.0N:P_2O_5:K_2O:S:Bkg/ha	5 tFYM/ha+20:80: 20: 30:0.5N:P_2O_5:K_2O:S:Bkg/ha	5 t FYM/ha +25:100:50:50:2.0 N:P_2O_5:K_2O:S:B kg/ha
7. Seed rate	75kg/ha	65 kg/ha	65 kg/ha	65 kg/ha	55 kg/ha
8. *In-situ* moisture conservation	-	Bed planting 67.5cm(2 rows per bed)	Conservation furrow each after6 rows	Conservation furrow each after 3rows	Ridge and furrow 60cm
9. Bio-regulator	-	Cycocel @ 500 ppmat flower initiation	Cycocel @ 500ppm at flower initiation	Ethrel @ 200 ppmor salicylic acid @50 ppm at podinitiation	Ethrel @ 200 ppm atflower and pod initiation
10. Seed treatment	Thiram 75 WP + Cabendazim 50 WP (2:1) @ 3 g/kg seed or Thiram + carboxin @ 2 g/kg seed or *Trichodermaviride*@ 4-5 g/kg seed for the management of seed and seedling diseases.				
11. Seed inoculation	About 5 g/ kg seed *Bradyrhizobiumjaponicum*culture + PSB/PSM 5 g/ kg seed				
12. Weed control	Two hand weedings at 20 and 40 DAS or Pendimethalin + Imazethapyr @ 2.5-3 l/ha **as pre-plantincorporation**ORDiclosulum @ 26 g/ha OR Sulfentrazone @ 750 ml /ha OR Chlomozone50 EC @ 2.00 l /ha OR Pendimethalin 30 EC @ 3.25 l/ha OR Pendimethalin38.7 CS @ 1.5 – 1.75kg /ha OR Flumioxazin @ 250 ml/ha OR Metolachlor 50 EC @ 2 l/ha OR Metribuzin @ 0.75- 1 kg /ha OR Pyroxasulfone @ 150 g /ha OR Sulfentrazone + Clomazone @ 1250 ml/ha as **pre-emergence**ORChlorimuron ethyl @ 36 g /ha OR Bentazone @2 l/ha as **early post emergence (10-12 DAS)** OR Imazethapyr @ 1 l/haORQuizalofop ethyl 5 EC @ 1 l/ha OR Quizalofop ethyl 10 EC @ 375-450 l/ha ORHaloxyfop ethyl @ 1-1.25 l/ha ORQuizalofop-p-tefuryl @ 1 l/ha OR Fenoxaprop-p- ethyl @ 1 l /ha OR Fluazifop-p-butyl @ 1 -2 l/ha OR Imazethapyr 70% WG + Surfactant @ 100 g /ha OR Propaquizafop 10 EC @ 0.5-0.75 l/ha OR Fluthiacet methyl @ 125 ml/ha OR Fluazifop-p-butyl + Fomesafen @ 1 l/ha OR Imazethapyr + Imazamox @ 100 g/ha OR Propaquizafop + Imazethapyer @ 2 l/ha OR Sodium Aceflourofen + ClodinafopPropargyl @ 1 l/ha as **post-emergence (15 –20 DAS)** in 750 to 800 liters water/ha.				
13. Insect control	**Blue beetle**- Quinalphos 25 EC @1500 ml/ha; **Stem fly & white fly**- Thiamethoxam 30 FS (seed treatment) @ 10 ml/kg seed OR Lambda Cyhalothrin+ Thiomethoxam @ 1.25 ml/ kg seed; **White fly**- Betacyfluthrin 8.49% +Imidacloprid @ 350 ml/ha; **Defoliators** (Semiloopers, Tobacco caterpillar, *Helicoverpaarmigera*)- Chlorantraniliprole 18.5 SC @ 150 ml/ha OR Indoxacarb15.8 EC @333 ml/ha OR Profenofos 50 EC @ 1250 ml/ha OR Quinalphos 25 EC @1500 ml/ha OR Spinetoram 11.7 SC @ 450 ml/ha OR Betacyfluthrin + Imidacloprid @350 ml/ha OR Flubendiamide 39.35 SC @150 ml/ha OR Flubendiamide 20 WG @250-300 g/ha OR Thiamethoxam + Lambda Cyhalothrin @125 ml/ha; **Girdle beetle**- Thiacloprid 21.7 SC @750 ml/ha OR Profenophos 50 EC @1250 ml/ha OR Betacyfluthrin +Imidacloprid @350 ml/ha OR Thiamethoxam + Lambda Cyhalothrin @125 ml/ha; **Pod borer** (*Helicoverpa armigera, Cidia ptychora*)- Profenophos 50 EC @1250 ml/ha OR Chlorantraniliprole 18.5 SC @ 150 ml/ha OR Indoxacarb 15.8 EC @333 ml/ha;***Insecticie + Herbicide combinations:***Stem fly**- Chlorantraniliprole + Imazethapyr/ Quizalofop ethyl; **Semi-loopers**- Chlorantraniliprole + Imazethapyr/Quizalofop ethyl OR Indoxacarb + Imazethapyr; **Tobacco caterpillar**–				

	Chloantraniliprole/Quinalphos + Imazethapyr OR Quinalphos + Quizalofop ethyl; **Girdle beetle**– Chlorantraniliprole/Indoxacarb + Imazethapyr.
14. Disease control	**Seed Treatment for** Charcoal rot, Anthracnose and Pod Blight, Collar rot Purple seed stain, Frog eye leaf spot: Thiophanate methyl 45% + Pyraclostrobin 5% FS OR Carboxin 37.5% + Thiram 37.5% OR Thiram+Carbendazim (2:1) @ 3 g/kg seed OR Penflufen + Trifloxystrobine 38 FS @ 1 ml/kg seed. **Seed treatment for YMV**, YMIV: Thiamethoxam 30 FS @ 10 ml/kg seed OR Imidacloprid 48 FS @25 ml/kg seed. **First spray during initiation of the disease and second after 15 days based on disease severity: Rust-** Hexaconazole 5% EC @ 800 ml/ha; Anthracnose and Pod Blight- Tebuconazole + Sulphur @1kg/ha; Charcoal rot- Tebuconazole @ 625 ml/ha OR Pyraclostrobin 20% w/w WG @500 g/ha; **Spray 20-25 days after sowing as preventive spray and immediately after initiation of symptom for** YMV, YMIV- Thiamethoxam 25WG @ 100 g/ha.

(E) TECHNICAL PROGRAMME OF AICRP SOYBEAN MICROBIOLOGY FOR 2021

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

Centre: Pantnagar, Delhi, Indore & Ludhiana
Traits: ACC deaminase, PEG tolerance (upto 25% PEG), Catalase, Superoxide dismutase, IAA under *in vitro*. Selected PEG tolerant isolates will be evaluated for the above functional traits.

Isolation: Fluorescent pseudomonads and rhizobia will be isolated from rhizosphere soil and nodules respectively using specific media (KB, YEMA). The colonies exhibiting fluorescence under UV light would be isolated using Kings B media for the further investigations.

MB 2/21: Response of *Bradyrhizobium daqingense** with RDF/farmers practice and with reduced 75% RDF on latest release variety of soybean of a zone (Ludhiana, Delhi, Pantnagar, Indore, Sehore, Raipur and Dharwad)

Treatments-

T1=RDF
T2=RDF+*Bradyrhizobium daqingense*
T3=RDF+ Commercial/local strain available in the zone/market
T4=75% RDF
T5= 75% RDF+ *Bradyrhizobium daqingense*
T6= 75% RDF+Commercial/local strain available in the zone/market

Treatments and design: 6 (RBD with 4 replications); Plot size: 3.6 × 5
Parameters:

- At R5 stage-Nodules per plant, nodule dry weight, Leghaemoglobin, chlorophyll content
- At harvest: Grain yield, cost benefit ratio, savings of NPK inputs

***Cultures for *B. daqingense* will be supplied by the Indore centre**

MB 3/21: Assessing the compatibility of pre and post emergence herbicides with PGPR including soybean rhizobia under invitro and their impact on soybean nodulation in unsterilized microcosms (All centres)

Treatments*
Microbial strains: 03

1. *B. daqingense* (Rhizobial strain)
2. *Penbacillus polymyxa* (PSB and bio-control strain) or *B. arboris*
3. Local commercial strain available in the respective zone

Herbicides: 05

1. Pre-emergence: 02-Diclosulam (Strogarm), Sulfentrazone (spartan)/Pendimethalin (stamp)
2. Post emergence (15-20 days):03- Propaquizafop, Imazethapyr (pursuit), Combination- Propaquizafop 2.5% + Imazethapyr 3.75% (Saked)

Duration: 2-7 days (depending on growth/ generation time of strain) and would be carried out in several batches
Parameters (under invitro-solid in petridish and liquid)

1. Colony growth (spotting technique in solid)
2. Growth in liquid (OD) in TSA/YEMA CR media* amended with herbicides

	Details concentration of herbicides to be used in the invitro trial		
S.No.	**Pre-emergence**	**Post emergence**	**Cocktail mix of Propaquizafop 10EC+ Imazethapyre 10 SL(Pursuit)**
1	Diclosulam 84 WDG (strogarm) Recommended dose 26 g/ha Amount of water required per ha= 500L Concentration =0.052g/L or 52 ppm **The levels for invitro trial: 52, 56 and 60 ppm**	Propaquizafop 10EC Recommended dose 600ml/ha Amount of water required per ha= 500L Concentration =1.2 ml/L=1.2 ppm **The levels for invitro trial: 1.2, 1.5 and 2.0 ppm**	Imazethapyre 10 SL(Pursuit) Recommended dose 2000ml/ha Amount of water required per ha= 500L Concentration =4ml/L=4 ppm **The levels for invitro trial: 4, 5 and 6 ppm**
2	Sulfentrazone 48 SC (Spartan) Recommended dose 750 ml/ha Amount of water required per ha= 500L Concentration =1.5/ml= 1.5 ppm **The levels for invitro trial: 1.5, 1.75 and 2.0 ppm**	Imazethapyre 10 SL(Pursuit) Recommended dose 1000ml/ha Amount of water required per ha= 500L Concentration =2ml/L=2 ppm **The levels for invitro trial: 2, 2.5 and 3 ppm**	**-**
3	Pendimethalin 38.7CS (Stamp/Panida) or Pendimethalin 30E Recommended dose 1.6 Kg/ha or 3 L/ha Amount of water required per ha= 500L Concentration (CS) =3200mg/L=3200ppm For 30%EC= 6ml/L = 6 ppm **The levels for invitro trial:** **Pendimethalin 38.7CS: 3200 ppm, 3400 ppm, 3600 ppm** **Pendimethalin 30%EC: 6ppm, 8 ppm, 10 ppm**	**-**	**-**

***The protocol (media, conditions, concentration of herbicides etc.,) for the above trail would be sent to all the centres by the PI-Microbiology to all the centres separately.** the doses may vary as per the formulation of herbicide**

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

Centres: Pantnagar, Delhi, Indore, Sehore, Ludhiana, Raipur & Dharwad

Zone	AVT II Entries
NHZ	VLS 99 (Checks VLS 89, PS 1556, VLS 63, PS 1556)
NPZ	NRC 149 (Checks SL 955, SL 1074, SL 1104, SL 958, PS 1347)
NEHZ	DS 3108 (Checks JS 335, RKS 18, JS 97-52)
EZ	--
CZ	HIMSO 1689, JS 21-72 (Checks NRC 86, JS 20-98, RSC 10-46)
CZ (Early)	NRC 165, NRC 152 (Checks JS 20-34, JS 95-60)
SZ	--

Experimental design and replication: As per breeder's trial (Either take samples, whole plants with intact roots and soils, from breeder trials in triplicates or procure seeds from breeders to conduct trial separately in which case each entry should have 3 replications).

Observations:

1. Nodule number and nodule dry weight
2. Leghaemoglobin content in nodules at 50 % flowering stage.

(F) TECHNICAL PROGRAMME OF FOOD TECHNOLOGY 2020-21

Multi-location analysis of food grade characteristics AVT entries
Design: RBD
Number of Rows: 3
Row Length: 3mt
Repllications: 3

Objectives:

1. To analyse soybean varieties in different zones for physical characteristics of seed

Parameter to be analysed	Instrument/ method used
Yield	Seed weight (g)/ line
Seed color	Lab hunter color/ horticulture color chart
Hilum color	Horticulture color chart
Seed dimension	Vernier calipars
100 seed weight	Weighing balance
Seed lustre	Lab hunter color

2. To analyse soybean entries sown in different zones for food grade characteristics of seed

Parameter to be analysed	**Instrument/ method used**
Cooking time	Time to cook seed in boiling water, cooking index-pressing between fingers
Hydration ratio	Ratio between weight of seed after absorption of water/weight of dry seed
hull fragility	Number of hulls removd during cooking per 10 g seed
sensory of cooked bean, milk and tofu	Parameters: Beaniness, nuttiness, sweetness, aftertaste, mouthfeel
Milk yield	• Weigh 5 g seed blanch for 2 minutes and soak in water overnight • Grind imbibed seed in pestal mortar • Add 50 ml hot water and cook for one minute • Sieve through muslin cloth • Measure volume in measuring cylinder
Tofu yield	• Take hot milk (80℃) prepared and coagulate using 0.2% $MgCl_2$ • Centrifuge the curd to separate whey at 5000 rpm for 15 minutes • Weigh the curd for tofu yield

3. To study effect of location of sowing on food grade qualities of seed

Comparative analysis of data of seed samples grown in NPZ, NEHZ, CZ and SZ

4. PLENARY SESSION

The session was chaired by Dr T R Sharma Hon'ble DDG (Crop Science). Dr Sanjay Gupta presented the proceedings of all the sessions.

- DDG (CS) suggested that early maturity trials should be taken up in all zones. Seven entries were identified for release for cultivation.
- For CZ four entries RVSM 2011-35, NRC 138, NRC 142 and AMS 100-39 and for SZ three entries MACSNRC 1667, Karune and KDS 992 were identified for release.
- One technology of plant geometry of 45 x 10 cm for NPZ, NEHZ and CZ and of 45 x 5 cm for SZ was recommended for incorporation in production practices. A technology on application of microbial consortia of Paenibacillus polymyxa HKA 15 + AMF with 75% RDF was also recommended for incorporation in soybean cultivation practices. DDG (CS) suggested that technology should be made available in the public domean.
- Dr Hanchinal former chairman PPVFRA emphasized the need of introduction of soybean in paddy fallows and in spring season in intercropping with sugarcane; conduction of FLDs and off season seed multiplication for rapid dissemination of new varieties; use of exotic and wild species (in addition to G. soja); induced mutation breeding programme; increasing number of crosses involving diverse parents, shuttle breeding and supplying segregating material to centres; gene pyramiding; development of EDVs of JS 335 using biotechnological tools.
- DDG (CS) suggested that institute should invite renowned scientists like Dr Hanchinal for lectures and interaction with scientists.
- Dr Sanjeev Gupta appreciated the work done by the group but highlighted the need of developing:
  - 100 days maturity varieties for intensifying crop production;
  - photo thermo-insensitive varieties;
  - using early maturing pre-bred G. soja derived material in breeding programmes;
  - advertising, broadcasting, displaying and telecasting food usages varieties through Ministry of Consumer Affairs so as to broaden their stakeholder base;
  - incorporating long juvenility; creating epiphytotic facilities at ICAR-IISR for key diseases;
  - Increasing oil content by 1-2%; developing varieties with at least 2t/ha yield and meeting breeder seed shortfall through off-season multiplication.
- DDG (CS) remarked that the circulated slide template for pre-breeding should be completed and sent to the division for his perusal.
- He informed that speed breeding platform is being created in ICAR but a small facility of 10x10m2 may be created in the institute.
- He also emphasized on modernization of tissue culture laboratory.
- He endorsed the views of Dr Hanchinal and ADG (O&P) and suggested for talks with Director, ICAR-IISR, Lucknow for intercropping of soybean with sugarcane where a few trials have been conducted.

In the end he congratulated the whole group and thanked all. The session ended with the formal vote of thanks from Director, ICAR-IISR.

D. APPENDICES

Appendix-I

Proceedings of Varietal Identification Committee (VIC) Meeting held in Virtual Modeon 12thMarch, 2021 during 51st Annual Group Meet of AICRP on Soybean

A meeting of Varietal Identification Committee of AICRP on Soybean was held under the Chairmanship of Dr T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi on in Virtual Mode on 12th March, 2021. Dr Nita Khandear, Acting Director, ICAR-IISR, Indore was the Member Secretary of the Varietal Identification Committee. Following members were present:

1. Dr T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi
2. Dr Sanjeev Gupta, ADG (O&P), ICAR, New Delhi
3. Dr D.K. Yadava, ADG (Seed), ICAR, New Delhi
4. Dr Sanjay Kumar, Director, ICAR-IISS, Mau
5. Shri D.N. Pathak, Executive Director, SOPA, Indore
6. Shri Jagdish Kumar, Vice President (R&D), Ruchi Hi-Rich Seeds Pvt. Ltd., Indore
7. Dr S.K. Srivastava, Ex-Director (IISR, Indore) Bhopal
8. Dr Nita Khandear, Acting Director, ICAR-IISR, Indore – Member Secretary
9. Dr Sanjay Gupta, Principal Scientist & PI (Plant Breeding), ICAR-IISR, Indore
10. Dr S.D. Billore, Principal Scientist & PI (Agronomy), ICAR-IISR, Indore
11. Dr M.P. Sharma, Principal Scientist & PI (Microbiology), ICAR-IISR, Indore
12. Dr Laxman Singh Rajput, Scientist & PI (Plant Pathology), ICAR-IISR, Indore
13. Dr Lokesh Kumar Meena, Scientist & PI (Entomology), ICAR-IISR, Indore

Varietal identification committee considered 8 proposals for identification. Following recommendations were made.

1. **DS 3108:** The candidate variety DS 3108 was considered for identification in Northern Eastern Hill Zone. Based on its inconsistent performance in breeding trials and only 4.6% yield superiority over the best check JS 335 the candidate entry was given one more chance to repeat in AVT II.
2. **RVSM 2011-35:** The candidate variety was considered for its identification in Central Zone. RVSM 2011-35 has shown yield superiority (2200 kg/ha) of 17.1% over the best check. It is moderately resistant to YMV and Pod Blight (PB (Ct) and categorized as multiple resistant for Stem fly, Girdle beetle and Defoliators in field conditions. RVSM 2011-35 has been identified for release to cultivate in states of Madhya Pradesh, Bundelkhand region of UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra.
3. **NRC 138:** The candidate variety was presented for identification in Central Zone. It is a YMV resistant and early maturing (93 days) entry with an yield of 1789 kg/ha which was higher than the best check JS 20-34 (1722 kg/ha). Considering its early maturity, it was identified for release in CZ comprising the states of Madhya Pradesh, Bundelkhandregion of UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra.
4. **NRC 142:** It is India's first double null variety free from anti-nutritional factor Kunitz trypsin inhibitor and lipoxygenase-2 developed through Marker Assisted Selection and was presented for identification in Central and Southern Zone. Its yield 1999 kg (Central Zone) and 2206 kg (Southern Zone) was equivalent to the best respective

checks. The entry has been identified for release in the states of Madhya Pradesh, Bundelkhand regionof UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra in Central Zone and Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu in South Zone excluding rust prone areas on banks of river Krishna like Southern Maharstara, entire area of Belagavi, Dharwad, Haveri Bidar & Bagalkot districts.

5. **AMS 100-39:** The entry was presented for identification in Central Zone. It had 2087 kg/ha yield and was superior to the best check by 11.2%. The entry was identified for release in the states of Madhya Pradesh, Bundelkhand region of UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra.
6. **KDS 992:** The candidate entry was evaluated for identification in Southern Zone. The entry is bold seeded (15.8 g/100g seed). It showed 17% higher mean (2658 kg/ha) yield over the best check. The entry was moderately susceptible to rust and pod blight. It was identified for release in the states of Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu excluding rust prone areas on banks of river Krishna like Southern Maharstara, entire area of Belagavi, Dharwad, Haveri Bidar & Bagalkot districts.
7. **MACSNRC 1667:** The candidate variety, an EDV of MACS 450 for Null KTI, was considered for Southern Zone and based on its equivalent yield (2051 kg/ha) to the recurrent parent (2080 kg/ha) and early maturity (96 days) it was identified for release in the states of Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu excluding rust prone areas on banks of river Krishna like Southern Maharstara, entire area of Belagavi, Dharwad, Haveri Bidar & Bagalkot districts.
8. **Karune:** This is the first vegetable soybean candidate variety of India and it was considered for identification in Southern Zone. Considering its 8% higher green pod yield(10640 kg/ha) over the best check, high sucrose content (5 – 6%) and bold green seed weight (77g/ 100 seed) it was identified for release in the states of Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu.

In addition to above entries Varietal Identification Committee identified two more technologies for release:

Agronomy: Following recommendation was made with respect to planting geometry:

Zone	**Planting Geometry for Higher Yield and SYI**
Central Zone	45 x 10 cm
Northern Plain Zone	45 x 10 cm
North Eastern Zone	45 x 10 cm
Central Zone	45 x 10 cm
Southern Zone	45 x 5 cm

Microbiology:

Combined application of Paenibacillus polymyxa HKA 15+AMF with 75% RDF was recommended for higher grain yield and B:C ratio (1.72) as compared to 100% RDF (1.39) by saving 20% chemical fertilizer usage in soybean.

Appendix-II

MONITORING TEAMS FOR *KHARIF* 2019

Team 1

Centres: Ludhiana, Palampur and Srinagar

Dr Sanjay Gupta, PI-Plant Breeding, IISR, Indore-Team Leader

Dr MP Sharma, PI-Microbiology, IISR, Indore

Dr P K Amrate, Plant Pathologist, JNKVV, Jabalpur

Team 2

Centres: Delhi, Pantnagar, Almora and Majhera

Dr Anita Rani, Plant Breeder, ICAR-IISR Indore

Dr Anirban Roy, Soybean Pathologist, IARI, New Delhi

Dr Raghvendra Madar, ICAR-IISR Indore

Team 3

Centres: Kota, Morena, Sehore and Jabalpur

Dr V Natraj, Soybean Breeder, ICAR-IISR Indore-Team Leader

Dr Laxman Singh Rajput, PI Plant Pathology, IISR, Indore

Dr R S Jadhav, Jr Entomologist, Marathwada Agricultural University, Parbhani

Team 4

Centres: Amravati, Nagpur, Raipur and Ranchi

Dr Gyanesh Kr Satpute, Soybean Breeder, ICAR-IISR Indore- Team Leader

Dr Arvind Kumar, Soybean Agronomist, BAU, Ranchi

Dr Munmi Borah, Pathologist, AAU Jorhat

Team 5

Centres: Parbhani, Amreli, Anand and Bhavnagar

Dr Shivkumar M, ICAR-IISR Indore -Team Leader

Dr R Channakeshava, Soybean Entomologist, UAS, Dharwad

Dr Amar Singh, Pathologist, CSKHPKV, Palampur

Team 6

Centres: Sangli, Ugar Khurd and Adilabad

Dr M D Vyas, Agronomist, RVSKVV, Sehore- Team Leader

Dr Rajesh Vangala, Plant Breeding, IISR, Indore

Dr Shalini Huilgol, Scientist, Plant Pathology

Team 7

Centres: Pune, Dharwad and Bangalore

Dr K P Singh, Plant Pathologist, G B Pant Univ. of Ag & Technology, Pantnagar

Dr B S Gill, Plant Breeder, PAU, Ludhiana

Dr Rakesh Verma, Soybean Agronomist, IISR, Indore

Team 8

Centres: Jorhat, Imphal, Medziphema and Umiam (Barapani)

Dr Sunil kumar Nag, Scientist, Plan Breeding, IGAU, Raipur- Team Leader

Dr M Saxena, Pathologist, RVSKVV, Sehore

Dr Lokesh Kumar Meena, PI-Entomology, ICAR-IISR Indore

Note:

1. Monitoring teams shall use the proforma given in Appendix-III for monitoring report.

2. Monitoring teams should also monitor and report the sponsored field agrochemical testing trials, if any.

Appendix-III

MONITORING PROFORMA-2018

Objectives Assigned to Centre:

Centre					
Date of monitoring					
Weather conditions	**Onset of monsoon on**	**Sowing commenced on**	**Rainfall**		
			Distribution	**Total till date**	**Rainy days**

1. Evaluation of AICRPS Trials

Discipline	**No. of trials allotted**	**No. of trials conducted**	**General maintenance**	**Specific comments of team**
1. Plant breeding				
2. Agronomy				
3. Entomology				
4. Plant pathology				
5. Microbiology				
6. Food Technology				

1.1 Discipline-wise evaluation

1.1.1 Name of discipline ……..

Trial / experiment	**Crop stage**	**Conducted as per technical programme or any deviation ?**	**Specific comments of team**

Sponsored / Station trials, if any	**Objective(s)**	**Specific comments of team**

2. Information on Germplasm

Total germplasm collection ……..
Number of germplasm acquired during the year ……..
Number of germplasm acquired for the trait assigned to the centre……..

Germplasm received and used:

Donor centre	**No. of lines**	**Traits**	**No. of accession used in breeding programme (trait-wise)**	**Specific comments of team**

3. Information on crosses made as per the objectives assigned to centre:

Parents	Traits	No. of pollinations	Specific comments of team

4. Information on Generation Advancement:

Number of advanced generation received from various centres (centre-wise) : ……
Generation advanced at the centre:

Generation	No of crosses	No. of population	Trait	Specific comments of team

5. Information of crosses contributed to the National Hybridization Programme:
6. Information on breeding population received from other centres:
7. Seed Production Programme:

Breeder seed						
Variety	**Target (q)**	**Area sown (ha)**	**Date of sowing**	**Expected production**	**Crop stage**	**Specific comments of team**

Nucleus seed						
Variety stage I /stage II	**Target (q)**	**Area sown (ha)**	**Date of sowing**	**Expected production**	**Crop stage**	**Specific comments of team**

8. Front Line Demonstrations:

	FLD allotted	Number of FLD conducted	Number of FLD visited	General condition of FLDs	Specific comments of team
Full package					

9. For regular centres:

Manpower: Sanctioned: In position:

Financial: AUC Status -

10. Overall Specific comments of the monitoring team about the performance of the centre

AICRPS I/c **Monitoring team members**

Appendix-IV

ALL INDIA COORDINATED RESEARCH PROJECT ON SOYBEAN (ICAR)
ICAR-Indian Institute of Soybean Research, Indore
51st ANNUAL GROUP MEETING
March 12-13, 2021
(Online Mode)

12.03.2021 (Friday)		
10.00-12.00 hrs	**Welcome and Presentation of overall achievements of AICRP on Soybean**	
Chairman	Dr. T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi	
Co-Chairman	Dr. Sanjeev Gupta, Assistant Director General (O&P), ICAR, New Delhi	
Presentation of Highlights 2020		Dr. Nita Khandekar, Director, ICAR-IISR, Indore
11.00-12.00 hrs	**TECHNICAL SESSION-I: Group discussion on Crop Improvement and Genetics Resources**	
Chairman	Dr. T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi	
Co-Chairman	Dr. S.P. Tiwari, Ex-Vice Chancellor, SKRAU, Bikaner	
Co-Chairman	Dr. Prabhakar, Former HOD, Bengaluru	
Rapporteurs	Dr. B.S. Gill, PAU, Ludhiana Dr. Subhash Chandra, IISR, Indore	
1. Presentation of results on Breeding for Soybean improvement-Results of Coordinated trials in Plant Breeding 2. Formulation of technical programme of plant breeding		Dr. Sanjay Gupta, PI (Plant Breeding), ICAR-IISR, Indore
12.00-14.00 hrs	**TECHNICAL SESSION-II: Group discussion on Crop Protection**	
Chairman	Dr. P.K. Chakrabarty, Member, ASRB	
Co-Chairman	Dr. S.C. Dubey, ADG (PP), ICAR, New Delhi Dr. Kamla Jayanti, ICAR-IIHR, Bengaluru	
Rapporteurs	Dr. V. Nataraj, ICAR-IISR, Indore Dr. Rajesh Vangala, ICAR-IISR, Indore	
1. Identification of resistant sources against **insects** and their management- Results of Coordinated trials in Entomology 2. Formulation of technical programme of entomology.		Dr. Lokesh Kumar Meena, PI (Entomology), ICAR-IISR, Indore
1. Identification of resistant sources against **diseases** and their management- Results of Coordinated trials in Plant Pathology 2. Formulation of technical programme of plant pathology		Dr. Laxman Singh Rajput, PI (Plant Pathology), ICAR-IISR, Indore
14.00-14.30 hrs	**Lunch Break**	
14.30-15.45 hrs	**TECHNICAL SESSION-III: Group discussion on Crop Production**	
Chairman	Dr. D.J. Bagyaraj, Professor Emeritus, Bengaluru	
Co-Chairman	Dr. L.H. Malligawad, Professor Emeritus, UAS, Dharwad	
Rapporteurs	Dr. M.D. Vyas, RAKCoA (RVSKVV), Sehore Dr. Raghavendra, IISR, Indore	
1. Agronomic management of Soybean- Results of Coordinated trials in Agronomy 2. Formulation of technical programme of Agronomy		Dr. S.D. Billore, PI (Agronomy), IISR, Indore/Dr. Rakesh Kumar Verma ICAR-IISR, Indore
1. Soybean management through rhizosphere micro flora-Results of Coordinated trials in Microbiology 2. Formulation of technical programme of microbiology		Dr. M.P. Sharma, PI (Microbiology), ICAR-IISR, Indore

15.45-16.30 hrs	**TECHNICAL SESSION-IV: Group discussion on Nucleus and Breeder Seed Production**	
Chairman	Dr. D.K. Yadava, ADG (Seeds), ICAR, New Delhi	
Co-Chairman	Dr. Sanjay Singh, Director ICAR-IISS, Mau	
Rapporteurs	Dr. Punam Kuchlan, IISR, Indore Dr. Shivaji Mehtre, MAU, Parbhani	
1. Scenario of breeder seed production and status of Seed Hub Project in the country 2. Targets and allocation of Breeder seed production -2020		Dr. Mrinal Kuchlan, I/c BSPS, ICAR-IISR, Indore
16.30-17.15 hrs	**TECHNICAL SESSION-V: Group discussion on Food Technology**	
Chairman	Dr. Nachiket Kotwaliwale, Director, ICAR-CIPHET, Ludhiana	
Co-Chairman	Dr. Punit Chandra, I/c. Head, CE for SPU, ICAR-CIAE, Bhopal (M.P.)	
Rapporteurs	Dr. Neha Pandey, ICAR-IISR, Indore Dr. Nilima Karam, CAU, Imphal	
Processing and Value Addition in Soybean in NEH Region		Dr. L. Sophia Devi, CAU, Imphal
Formulation of technical programme of Food Technology		Dr Neha Pandey, ICAR-IISR, Indore
17.15-18.00 hrs	**TECHNICAL SESSION-VI: Group discussion on Transfer of Technology and STC/TSP**	
Chairman	Dr. S.K. Malhotra, Agriculture Commissioner, GOI, MOA&FW, New Delhi	
Co-Chairman	Dr. S.K. Jha, Principal Scientist, ICAR, New Delhi	
Rapporteurs	Dr. B.U. Dupare, ICAR-IISR, Indore Dr Viraj Kamble, ICAR-IISR, Indore	
Bridging the yield gap in Soybean-Technology Transfer through Front Line Demonstrations		Dr. Raghavendra (Agronomy), ICAR-IISR, Indore
Extending the benefits of improved technologies-Activities undertaken by various centers under TSP/STC		Dr. Sanjay Gupta, PS (Plant Breeding), IISR, Indore
18.00-18.30 hrs	**Varietal Identification Committee**	
Chairman	Dr. T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi	
Members	Dr. Sanjeev Gupta, ADG (O&P), ICAR, New Delhi Dr. D.K. Yadava, ADG (Seed), ICAR, New Delhi Dr. Sanjay Kumar, Director, ICAR-IISS, Mau Dr. N.S. Bains, Director of Research, PAU, Ludhiana (Punjab) Dr. S.K. Malhotra, Agriculture Commissioner, GOI, MoA&FW, New Delhi Ms. Preeti Maithil, Director of Agriculture, Govt of MP, Bhopal Shri Gulveer Singh, Regional Manager, NSC, Bhopal Shri D.N. Pathak, Executive Director, SOPA, Indore Shri Prakash Shenoy, Consultant, ADM India Pvt. Ltd., Dharwad Shri Jagdish Kumar, Vice President (R&D), Ruchi Hi-Rich Seeds Pvt. Ltd., Indore Dr. S.K. Srivastava, Ex-Director (IISR, Indore) Bhopal Dr. P.G. Karmakar, Ex-Director, ICAR-CRIJAF, Barrackpore Dr. Nita Khandear, Director, ICAR-IISR, Indore – Member Secretary **Note:** "The Principal Investigators of different disciplines and In-charge, AICRP on Soybean will assist the committee"	
13.03.2021 (Saturday)		
10.30-12.30 hrs	**PLENARY SESSION**	
Chairman	Dr. T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi	
Co-Chairman	Dr. Sanjeev Gupta, Assistant Director General (O&P), ICAR, New Delhi	
Summary Recommendation		

10.30-11.30 hrs	Highlights of deliberations of different sessions 1. Dr. B.S. Gill, PAU, Ludhiana 2. Dr. Rajesh Vangala, ICAR-IISR, Indore 3. Dr. M.D. Vyas, RAKCoA, Sehore 4. Dr. Shivaji Mehtre, MAU, Parbhani 5. Ms. Neha Pandey ICAR-IISR, Indore 6. Dr. B.U. Dupare, ICAR-IISR, Indore	
11.30-11.40 hrs	Address by Special Invitee	Dr. R.R. Hanchinal, Former Chairperson, PPV&FRA, MoA&FW, GOI
11.40-12.00 hrs	Presidential Address	Dr. T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi
	Vote of thanks	Dr. Nita Khandekar

Appendix-V

LIST OF PARTICIPANTS FOR THE
51st ANNUAL GROUP MEETING OF AICRP ON SOYBEAN

LIST OF PARTICIPANTS

INDIAN COUNCIL OF AGRICULTURAL RESEARCH, KRISHI BHAWAN, NEW DELHI - 110 001

1. Dr. T. R. Sharma, DDG (Crop Science)
2. Dr Sanjeev Gupta, ADG (O&P)
3. Dr D K Yadav, ADG (Seed)

COORDINATING UNIT

ICAR-INDIAN INSTITUTE OF SOYBEAN RESEARCH, KHANDWA ROAD, INDORE-452001

4. Dr. Nita Khandekar, Director
5. Dr. S.D. Billore, Principal Scientist (PI-Agronomy)
6. Dr. Sanjay Gupta, Principal Scientist (PI-Plant Breeding)
7. Dr Anita Rani, Principal Scientist (Plant Breeding)
8. Dr. M.P. Sharma, Principal Scientist (PI-Microbiology)
9. Dr. Vineet Kumar, Principal Scientist (Biochemistry)
10. Dr Maharaj Singh, Principal Scientist (Plant Physiology)
11. Dr Savita Kolhe, Principal Scientist (Computer Scienc)
12. Dr B U Dupare, Principal Scientist (Extension)
13. Dr D V Singh, Principal Scientist (Agril Engineering)
14. Dr Rajkumar Ramteke, Principal Scientist (Plant Breeding)
15. Dr. G.K. Satpute, Senior Scientist (Genetics & Plant Breeding)
16. Dr Milind Ratnaparkhe, Senior Scientist (Plant Biotechnology)
17. Dr Punam Kuchlan, Senior Scientist (Seed Technology)
18. Dr. Mrinal. K. Kuchlan, Scientist (Seed Technology)
19. Dr Ram Manohar Patel, Scientist (Statistics)
20. Dr. Shiva Kumar, Scientist (Plant Breeding)
21. Dr Neha Pandey, Food Technology
22. Dr. Lokesh Meena, Scientist (Entomology)
23. Dr. Rakesh Verma, Scientist (Agronomy)
24. Dr. Laxman Singh Rajpoot, Scientist (Plant Pathology)
25. Dr V Natraj, Scientist (Plant Breeding)
26. Dr Rajesh Vangla, Scientist (Plant Breeding)
27. Dr Subhash Chandra, Scientist (Plant Breeding)
28. Dr Viraj Kamble, Scientist (Plant Biotechnology)
29. Dr Raghvendra Madar, Scientist (Agronomy)

COORDINATING CENTRES

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30. Dr. P.S. Shukla(Plant Breeding),
31. Dr Kamendra Singh (Plant Breeding)
32. Dr. Navneet Pareek
33. Dr. K.P. Raverkar (Microbiology)
34. Dr. D.K. Shukla , Agronomy
35. Dr. Ajay Srivastava (Agronomy)
36. Dr. Neeta Gaur (Entomology)

37. Dr. S.K. Mishra , Plant Pathology
38. Dr. K.P. Singh (Plant Pathology)
39. Dr. Mukesh Kr. Karnawal, SRO (Pl. Breeding)
40. Dr. Ajay Kumar, Asstt. Professor
41. Dr. Rakesh Kumar Sharma , GBPUAT, Pantnagar

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42. Dr. S.K. Lal, Pr. Scientist (Plant Breeding)
43. Dr. (Mrs.) K. Annapurna, Pr. Scientist (Microbiology)
44. Dr. Anirben Roy, Pr.. Scientist (Plant Pathology)
45. Dr Anchal Das, Sr. Scientist (Agronomy)
46. Dr Rajan S, Scientist (Entomology)

RVSKVV, R.A.K. COLLEGE OF AGRICULTURE, SEHORE-466001, M.P.

47. Dr. S.R. Ramgiry, Pr. Scientist (Plant Breeder)
48. Dr. (Smt.) Moly Saxena, Pr. Scientist (Plant Pathology)
49. Dr. M.D. Vyas, Pr. Scientist (Agronomy)
50. Dr. (Smt.) Nanda Khandwe, Pr. Scientist (Entomology)

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51. Dr. H.R. Chaudhary, Professor (Entomology)
52. Dr. D.S. Meena, Assistant Professor (Agronomy)
53. Dr. Bharat Lal Meena, Assistant Professor (Plant Breeding)

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54. Dr. Satish Nichal, Sr. Scientist (Plant Breeding)
55. Dr. M.S. Dandge, Jr.Scientist (Agronomy)
56. Dr. R.S. Ghawade, Jr. Scientist (Plant Pathology)
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59. Dr. G.T. Basavaraja, Pr. Scientist & Soybean Breeder
60. Dr. Channakeshava Jr. Scientist (Entomology)
61. Dr. Somangoade, Jr. Scientist (Agronomy)
62. Dr. Shalinin Huilgol, Jr. Pathologist

UNIVERSITY OF AGRICULTURAL SCIENCES, GKVK, BANGALORE

63. Dr. Onkarappa,T. Professor (Plant Breeding)

CSK HIMACHAL PRADESH KRISHI VISHVAVIDYALAYA, DEPARTMENT OF PLANT BREEDING & GENETICS, PALAMPUR-176062 (H.P.)

64. Dr. (Mrs.) Vedna Kumari Pr. Scientist (Plant Breeding)
65. Dr. Amar Singh, Sr. Scientist (Plant Pathology)

PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA - 141001 (Punjab)

66. Dr. B.S. Gill, Plant Breeder
67. Dr. (Ms.) Harpreet Kaur, Asstt. Agronomist
68. Dr. Poonam Sharma, Microbiologist

CENTRAL AGRICULTURAL UNIVERSITY, IMPHAL, MANIPUR

69. Dr H Nanita , Devi, Jr Plant Breeder

70. Dr. Toijam Sunanda Devi, Jr. Scientist (Agronomy)
71. Dr. Nilima Karam, Jr. Scientist (Entomology)
72. Dr. L. Sophia Devi, Jr. Scientist (Food Technology)

ASSAM AGRICULTURAL UNIVERSITY, JORHAT, ASSAM

73. Dr Jaffar Ullah, Pr. Scientist (Plant Breeding)
74. Dr. Munmi Bora, Pr. Scientist (Plant Pathology)

SCHOOL OF AGRICULTURAL SCIENCES & RURAL DEVELOPMENT, NAGALAND UNIVERSITY, MEDZIPHEMA, NAGALAND-797106

75. Dr. A.K. Singh, Scientist I/c. Soybean
76. Dr. Pezangulie Chakruno (Plant Pathology)

BIRSA AGRICULTURAL UNIVERSITY, KANKE, RANCHI-834006 (JHARKHAND)

77. Dr.(Mrs.) Nutan Verma, Jr. Scientist (Plant Breeding)
78. Dr. Arvind Kumar Singh, Jr. Scientist (Agronomy)

INDIRA GANDHI KRISHI VISHWA VIDYALAYA, RAIPUR-492012 (CHHATTISGARH)

79. Dr. Sunil Kumar Nag, Scientist (Plant Breeding)
80. Dr. Rama Mohan Savu (Agronomy)

J.N. KRISHI VISHWA VIDALAYA, JABALPUR - 482004 (MADHYA PRADESH)

81. Dr. M.K. Srivastava, Sr. Scientist (Plant Breeding)
82. Dr. P.K. Amrate, Scientist (Plant Pathology)

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94. Dr. Ashwani Kumar Lokbharti, Village - Sanosara, Taluqa - Sihor, Dist-Bhavnagar, Gujrat
95. Shri J.G. Manjayya,, Nuclear Agriculture Division, Bhaba Atomic Research Centre(BARC), Govt.
96. Dr. Ramraj Sen, IARI-CORC, Mandsuar
97. Dr. A.N. Srivastava, principal Scinetist, Eagle seeds & Biotech

Appendix-VI

INSTRUCTIONS FOR DOING ON-LINE DATA-ENTRY OF AICRPS PLANT BREEDING TRAILS DATA*

1. On the desktop click the Internet explorer icon.
2. In the internet explorer type http://www.nrcsoya.nic.in and open this website.
3. In the home page of the official website, click on the hyperlink "AICRPS Data entry" available at the bottom.
4. Enter the username and the password as informed to you.
5. Now select the trail, character and start entering the final data for each and save every time by clicking the save button provided on the screen at the bottom.
6. Using the 5^{th} – step, repeat the data- entry for all the trials and characters and save it every time.
7. At last, view the data-entered and recheck it.

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*In case of any difficulty/clarification please feel free to contact Mrs. Savita Kolhe, Scientist (Computer Application) at e-mail savitasoham@gmail.com or savita_kolhe@rediffmail.com