प्रकाशन के लिये नहीं
केवल कार्यालयीन उपयोग हेतु

अखिल भारतीय समन्वित सोयाबीन अनुसंधान परियोजना

(भारतीय कृषि अनुसंधान परिषद्)

52वीं वार्षिक समूह बैठक

मई 17-18 2022

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

52nd Annual Group Meeting (Hybrid mode)

May17-18 2022

कार्यवाही एवं तकनीकी कार्यक्रम (**2022-23**)

Proceedings and Technical Programme (2022-23)

भा.कृ.अनु.प.–भारतीय सोयाबीन अनुसंधान संस्थान

खण्डवा रोड, इन्दौर–452001

ICAR-Indian Institute of Soybean Research

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

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CONTENTS

Acknowledgement

I am highly thankful to the Indian Council of Agricultural Research, New Delhi for granting permission to conduct 52nd Annual Group Meeting of All India Coordinated Research Project on Soybean in hybrid mode from May 17-18, 2022.

All the research and development personnel of AICRP on Soybean are extremely thankful to Dr Trilochan Mohapatra, Secretary, DARE, Govt. of India and Director General, ICAR for providing ceaseless guidance and direction for research related to soybean genetic improvement, developing production and protection technologies in the country. I also sincerely thank Dr T R Sharma DDG (CS), ICAR for his physically joining the meeting at Indore and all the help, support and guidance in organizing the AGM. 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 for active interaction in all the sessions and chalking out the technical programme for 2022-23.

I would also like to express thanks to all the Chairpersons and experts of the technical sessions for their valuable contributions in providing opinion and in formulating a sound technical programme of research for 2022-23. My sincere thanks are due to Sri D N Pathak Executive Director SOPA for arranging the AGM in his office and providing all the infrastructure for smooth conduction of the event. 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. Summary Recommendations of 52nd Annual Group Meeting

The recommendations made during 52nd Annual Group hybrid mode meeting of AICRP on Soybean held from March 17-18, 2022 are as follows:

A. Plant Breeding:

a) Varietal Identification:

Zone	Entries
Central Zone	NRC 150, NRC 152, JS 21-72, HIMSO 1689
Northern Plain Zone	NRC 149
Northern Hill Zone	VLS 99

b) Other Recommendations

1. Coding should be initiated in AVT-I and AVT-II trials as being done in IVT. Coding should be uniform in all trials.
2. IVT early trials should be stopped except Central Zone, However, the early maturing photo-insensitive soybean material should be shared with the Kashmir centres.
3. Local level monitoring of AICRP trials should be ensured by respective Director of Research of University.
4. Trials of vegetable soybean should be conducted in AICRP Vegetables.
5. The centers will share their segregating materials/local germplasm with IISR and other centers. Almora centre should share one set of local germplasm including black soybean with IISR, Indore.
6. Re grouping of zones should be initiated in near future as the cropping pattern has changed.
7. Criteria for promotion of entries must be uniform for all zones/trials and benchmarks for important traits should be fixed.
8. Centers from Kashmir should be included in NHZ. Seeds of entries should reach the centres by 1st week of June.
9. Fixed F_3 of Null KTi and Null Lox materials should be given for testing to respective cooperating centres.
10. In IVT, number of rows should be increased from 3 to 5 and In AVT, 8 rows with 3 replications should be used in layout.
11. While formulation of trials, recently released varieties, variety having maximum breeder seed indent and best zonal check should be used as checks.
12. Breeders from each centre can contribute maximum 2 entries in IVT with Station Trial data, pedigree, DUS traits and quantity of seed available.

B. Plant Pathology

1. Survey and surveillance of diseases should be carried out by using GPS locations
2. Only major two diseases should be considered for development of forewarning system with proper statistical analysis
3. Aspergillus niger should be avoided as an endophyte, commercially. Upscaling of other endophytes to the farmers field level is to be done
4. Entries showing consistent field resistance should be evaluated with optimized load of inoculum in artificial screening

C. Microbiology

1. A meeting of microbiologists of oilseed and pulses under the chairmanship of ADG (O&P) is to be convened for streamlining the entire microbiology discipline and for making a road map for making identified microbes available to farmers.
2. There is need to quantify the amount of nitrogen fixed in the soil through inoculation of N-fixing strains.
3. In MB 2/21 trial treatments are to be revised and only dose of nitrogen fertilizer is to be reduced and not P and K doses also.

D. Transfer of Technology

1. Remove the Dholi centre from FLD allotment.
2. Provision/conduct of Rabi FLDs should remove from the technical programme 2022.
3. Front Line Demonstrations on Organic farming should be restricted to five (05) only.
4. All centre should submit the quality photograph for the award.

E. FOOD TECHNOLOGY

1. For cooking time measurement use of pressure cooker followed by measurement of hardness was suggested.
2. For seed colour and milk/tofu colour, LAB chart should be used. Total solid content of milk should be reported.
3. Sensory analysis should be done by expert panel.
4. Finally some numerical Index should be developed for each variety.
5. Total solid content should be measured using hand refracto-meter.
6. For next year experiments, southern zone was added in addition to NEHZ, NPZ and CZ.
7. NRC 149, PS 1670 (NPZ) , DLSb 1, DSb 38, MACS 1460, JS 20-116 (NEHZ) and all entries from CZ were acceptable for tofu sensory

OPENING SESSION

Dr Nita Khandekar, Director, ICAR-IISR, Indore welcomed the dignitaries and briefly highlighted the research achievements of 2021-22. She highlighted the challenges for increasing the productivity and highlighted the thrust research areas. Dr Sanjeev Gupta, ADG (O&P) congratulated all stakeholders responsible for the spread of soybean crop in the country from 30,000 ha to 12 mha. He emphasized the need for area expansion of the crop to North eastern (Bodo land), Punjab, and Karnataka states. He urged the plant breeders to develop new varieties for popularizing and area expansion in these areas. He also mentioned to scale up the seed multiplication of new varieties for ensuring their availability to farmers. He urged the breeders to emphasize on rapid grain filling trait during the selection. He suggested use of new breeding techniques like MAS, gene pyramiding, gene editing and gene stacking. For bridging the large yield gap, he suggested to develop good agronomy including elimination of micronutrient deficiency from soil.

Chairman of the session Dr T.R. Sharma, DDG (Crop Science) ICAR, New Delhi emphasized on enhancement of the productivity of the crop from 1 t/ha to 2 t /ha. He suggested calculation of per day productivity of the crop to accurately compare the productivity of Indian soybean varieties with that of other countries like USA. He also emphasized on targeted pre breeding approach for trait of interest like high oil and disease resistance. He further suggested that since soybean genome has been sequenced, and the crop has emerged as a model crop for biotechnology, the focus must be given on integration of biotechnological tools like MAS, GWAS and insect/herbicide tolerance in soybean. He also emphasized on genome editing for few of the important traits like ideal plant architecture (IPA), Lox genes, KTI and high nodulation trait. He suggested on production technologies like conservation agriculture, use of precision agriculture tools, big data analysis, drones and new intercropping system to enhance the soybean production in the county. Systematic and careful survey of new pathogens, identification of differential host for key diseases, estimation of quantitative yield loss from important disease and insects, prediction models for outbreak of diseases and insects, development of high through put phenotyping facility for screening for key disease (Development of sick plots) were suggested for the scientists working in crop protection group. He also emphasized on development of seed coating methods and bio primers.

ब. तकनीकी सत्र की कार्यवाही

B. PROCEEDINGS OF TECHNICAL SESSIONS

A. TECHNICAL SESSION 1: PLANT BREEDING AND GENETICS RESOURCES

Chairman: Dr T. R. Sharma, DDG (CS), ICAR, New Delhi
Co-Chairman: Dr Sanjeev Gupta, ADG (O & P), ICAR, New Delhi
Expert: Dr Prabhakar Bhat, Ex-PC (Small Millets)
Rapporteurs: Dr Vedna Kumari and Dr Subhash Chandra

At the outset, Dr Sanjay Gupta, Principal Scientist & PI (Plant Breeding) welcomed the Chairperson, Co-Chair and Expert. With brief introductory remarks, the Co-Chair invited Dr Sanjay Gupta for presentation on soybean improvement. Dr Sanjay Gupta presented the results of breeding trials conducted during *kharif,* 2021. He presented the details of different trials *viz*., coordinated trials for grain yield, early trials and vegetable soybean trials. He also presented the results of pre breeding activities and performance of AICRP centres. During the session, entries being promoted to next round of AICRP, results of multi-location germplasm evaluation trials, national hybridization programme and performance of centres were discussed. The following points were raised during the discussion.

S. No.	Points	Decision Taken
1	Coding should be initiated in AVT-I and AVT-II trials as being done in IVT. Coding should be uniform in all trials (Plant Breeding, Plant Pathology, Entomology, Agronomy etc.) (ADG, O&P).	Coding will be initiated w.e.f. *kharif,* 2023 onwards. Concerned breeders of the centre, whose entry is being promoted, will multiply the seed and send to IISR, Indore. IISR, Indore will code and send the seed to different locations. In order to cross check, voucher sample of AVT will be retained by IISR, Indore.
2	IVT early trials should be stopped except Central Zone. However, the early maturing photo-insensitive soybean material should be shared with the Kashmir centres (ADG, O&P).	Early trials will be conducted in Central Zone only. Entries with early maturity and photo insensitivity will be shared with the Kashmir centres.
3	Local level monitoring of AICRP trials should be ensured by respective Director of Research of University (ADG, O&P).	Director, IISR will write the letters to respective Vice Chancellors for local level monitoring of AICRP trials.
4	Trials of Vegetable Soybean should be conducted in AICRP Vegetables (ADG, O&P).	The trials, which are already in AVT, will be conducted as such in next year. However, new trial(s) will be conducted under AICRP Vegetables.
5	While attempting the crosses with wild species for gene introgression, care should be taken to avoid negative traits such as shattering, small seed size etc. Wild species should be used for missing traits or future traits and broadening the genetic base (ADG, O&P and Expert).	Breeders would utilize both wild species and cultivated varieties in hybridization programme for broadening the genetic base.
6	The centers must share their segregating materials/local germplasm with IISR and other centers. Almora centre should	IISR, Indore will maintain pedigree register for sharing segregating materials and intra or inter zonal network will be

	share one set of local germplasm including black soybean with IISR, Indore	ensured by IISR. Almora centre will share local germplasm including black soybean with IISR, Indore.
7	Re grouping of zones should be initiated in near future as the cropping pattern has been changed (ADG, O&P, Expert and Dr Sain Dass)	Re grouping of zones should be initiated in near future considering the climate variability, stability analysis and cropping pattern.
8	Criteria for promotion of entries must be uniform for all zones/trials and benchmarks for important traits should be fixed. (Expert).	A committee in this regard will be constituted accordingly. Relaxation for trait specific entries will be decided by committee and will be approved in consultation with ICAR, New Delhi.
9	Centers from Kashmir should be included in NHZ. Seeds of entries should reach the centres by 1st week of June.	IISR, Indore will ensure the same.
10	Fixed F_3 of Null KTi and Null Lox materials should be given for testing to respective cooperating centres (ADG, O&P).	House agreed. IISR, Indore will ensure the same.
11	In IVT, number of rows should be increased from 3 to 5 and In AVT, 8 rows with 3 replications should be used in layout.	House agreed. IVT with 5 rows (3m) will be initiated w.e.f. IVT 2023 onwards; However, row length may be reduced in case of scarcity of land (NHZ & NEHZ). In AVT, 8 rows with 3 replications will be used w.e.f. AVT 2022.
12	While formulation of trials, recently released varieties, variety having maximum breeder seed indent and best zonal check should be used as checks.	House agreed.
13	Breeders from each centre can contribute maximum 2 entries in IVT with Station Trial data, pedigree, DUS traits and quantity of seed available.	House agreed. Concerned breeder will provide the same.

Following entries were proposed for promotion in respective zones

Zone	Trial	Entry	Checks
NHZ	AVT I	JS 23-03, NRC 197, MAUS 795, NRC 196	Palam Early Soya-1, VLS 89, VLS 63, VLS 99
NPZ	AVT I & II	AVT-I: NRC 195, PS 1682, SL 1282, NRC SL 6 AVT-II: PS 1670	SL 955 (AVT-II), SL 958 (EDV), SL 1074 (AVT-I), NRC 149
NEHZ	AVT II	KDS 1096, DLSb 1	MACS 1460, JS 20-116, RKS 113

EZ	AVT I & II	AVT-I: RVS 13-20, CAUMS-2, MAUS 791, RSC 11-42, AS 24, VLS 102, KDS 1149, DLSb 3, AVT-II: RSC 11-35	AVT-I: NRC 128, JS 20-116, AMS 2014-1 AVT-II: JS 20-116, MACS 1460, RSC 10-46
CZ	AVT –I (Main)	NRC 192, NRC 190, NRC 189, AS 24, RSC 11-42	RVSM 2011-35, AMS 100-39, RSC-10-52
	AVT –I (Early)	JS 23-03, JS 23-09, KDS 1169	NRC 130, NRC 138, JS 20-34, JS 95-60
	AVT –II (Early)	PS 1569, NRC 165, JS 22-12, JS 22-16, JS 22-18, RVSM 2012-4, NRC 181	NRC 130, NRC 138, JS 20-34, JS 95-60
	AVT-II (Vegetable)	NRC 188	Hara Soya, Karune, JS 95-60, JS 20-34

B. Entomology

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

Rapporteurs: Dr R.S. Jadhav, Jr. Entomologist, VNMKV, Parbhani
Dr P.K.Amrate, Scientist, JNKVV, Jabalpur

The technical session was chaired by Dr S.C. Dubey, ADG (PP), ICAR, New Delhi and Dr Kamla Jayanti, Principal Scientist and National Fellow, ICAR-IIHR, Bengaluru. Dr Lokesh Kumar Meena, Principal Investigator (Entomology), ICAR-IISR, Indore presented the results of eight entomological experiments conducted at 11 coordinated centres across the country. He mentioned about three main research areas focused on by the entomologists i.e. identification of potential sources for resistance/tolerance against major insects-pests, tapping new approaches for insect-pest and monitoring the incidence of insect-pests and bio-control agents in soybean management. The presentation includes the area of research on screening for host plant resistance (5 trials) and management of major insect pests of soybean (3 trials) followed by "Formulation of technical programme of entomology 2022-23".

The first trial on seasonal incidence of insect-pests of soybean recorded 21 insect species from different zones. In North plain zone, whitefly, *Spodoptera litura*, stem fly and aphids, in North eastern hill zone, Bihar hairy caterpillar, leaf webber, aphids, in Central zone, stem fly, semiloopers, tobacco caterpillar and girdle beetle and in southern zone, pink pod borer and leaf folder were the major pests of concern. Potential of natural bio-control agents (entomopathogenic fungus, *B. bassiana* and *N. rileyi*) in suppression of insect-pests population was also presented.

Dr Meena informed that emphasis was given on identification of insect resistant / tolerant genotypes through field and laboratory screening by employing different methods. Genetic material (entries of IVT, AVT-I, AVT-II, germplasm lines) were tested under natural infestations at hot spots. Potential sources identified in field screening trials and AVT-II entries were further tested under laboratory condition using antixenosis and antibiosis criteria. Dr Meena mentioned several promising genotypes for insect resistance / tolerance. Antixenosis and Antibiosis studies were taken up with AVT-II entries. None of the genotypes was found strong antixenosis reaction against test insect *S. litura*. On the basis of various digestibility indices viz. approximate digestibility (AD), efficiency of conversion index (ECI) and efficiency of conversion of digested food (ECD), entries NRC 152 and JS 21-72 were found good antibiosis. While presenting the results of management of insect-pests through with microbial consortia of microbial agents to widen the scope of insect management he stated that variability in efficacy was observed across the locations, and explained that it could be due to varying weather conditions prevailing at these locations as well as it might be due to different concentrations of microbial agents available at different locations in the market.

The trial on evaluation of Management of major defoliators of soybean through intercropping with Suva, *Anethum graveolens* in different rows combinations of soybean with suva it was found that combination of soybean+suva (3soybean: 2 suva :3 soybean rows combination) found significantly superior in defoliators population management.

The session ended with thanks to the chairman and Rapporteurs.

C. Plant Pathology

Chairman: Dr S.C. Dubey, ADG (PP), ICAR, New Delhi
Co-Chairman: Dr Kamla Jayanti, ICAR-IIHR, Bengaluru
Rapporteurs : Dr Pawan Kumar Amrate, J.N.K.V.V Jabalpur
Dr R.S. Jadhav, Jr. Entomologist, VNMKV, Parbhani

Presented by: Dr Laxman Singh Rajput, PI, Plant Pathology
Results of Coordinated trials in Plant Pathology

- Based on five year data on geographical distribution and disease severity, Pod blight was found to become predominant and major disease followed by RAB and YMV. In addition, severity of rust disease was found to be severe in southern zone.
- In IVT (Normal): 51 entries evaluated for 16 diseases across 15 locations.
    - NRC 189 AND NRC192 were shown resistance against CR and anthracnose. While PS 1689 against YMV and TLS in CZ.
    - In NPZ, DLSb 3, DS3124, SL 1282 and SL 1230 were found resistant against YMV and in NHZ, PS 1605 was found to be FLS resistant
- IVT (Early): 31 Entries were evaluated across 13 locations for five diseases (PB(Ct), RAB, YMV, CR and TLS). PS 1660 was found resistant against CR and Anthracnose in CZ and RAB and YMV resistant in NPZ and Anthracnose resistant in NHZ.
- AVT1 and 2 (Normal): 18 entries evaluated for different disease across 12 locations. JS 21-72 showed resistance against CR, RAB and Anthracnose in CZ. In NPZ, PS 1670 was resistant against YMV and SMV.
- AVT I and II (E)- 8 entries evaluated for different disease across 5 locations.JS 22-16 and NRC 150 showed resistance against CR and anthracnose
- EC 241780 and EC 241778, which were rust resistant since 8 years have become susceptible in SZ.
- In multiple resistance evaluation trial, EC 280129 showed multiple disease resistant against FLS, Anthracnose, BS, YMV and CR at Palampur, Jabalpur, Indore and Pantnagar center
- Yield loss in JS 20-29 was reported to be 21.35% due to CR, RAB and FLS. Most of the diseases caused nearly 40% of yield loss in soybean.
- **Recommendation:** After 3 yr of evaluation at 6 different locations, seed treatment with Trifloxystrobin + Penflufen @ 1g/kg of seed or Thiphanate methyl+ Pyroclostrobin @ 2ml/kg of seed along with Thiamethoxam 600 FS @ 2 ml/kg of seed was found effective in management of root rot complex and stem borers of soybean and enhanced the yield.

Comments:

- Survey and surveillance of diseases should be carried out by using GPS locations
- Only major two diseases should be considered for development of forewarning system with proper statistical analysis
- *Aspergillus niger* should be avoided as an endophyte, commercially. Upscaling of other endophytes to the farmers field level is to be done
- Entries showing consistent field resistance should be evaluated with optimized load of inoculum in artificial screening

D. AGRONOMY

Chairman: Dr Sanjeev Gupta, ADG (O&P), ICAR, New Delhi
Expert : Dr L.H. Malligawad, Professor Emeritus, UAS Dharwad
Rapporteurs: Dr G. Somanagouda, Professor (Agronomy), UAS, Dharwad
Dr Raghavendra, Scientist (Agronomy), ICAR-IISR, Indore

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* 2021.Based on the results of agronomy trails, the following discussion and recommendations were made by chairman and expert of the agronomy session.

- Micronutrients trails should be initiated under AICRP system based on soil test report from kharif 2023.
- Sponsored trails results should not be presented in agronomy technical session and report should directly submitted to concerned authority.
- All agronomic trails, initial (15 DAS) and final plant population (at harvest) count data must be taken for valid conclusion.
- Economic analysis (cost of cultivation, net returns and B:C ratio) data should include in all agronomic trails while presenting the data.
- In agronomic trails treatments should not be exceeded more than 12 treatments.

Suggestions/comments were well noted and addressed accordingly by the Dr R. K. Verma, PI (Agronomy), ICAR-IISR, Indore.

The following recommendation was made from previously conducted experiments:

1. The highest partial factor productivity was associated with minimum cost of cultivation like seed inoculation (Rhizobium and PSB) and seed treatment (Fungicide and insecticide). While, Omission of weed management from full package (seed treatment, seed inoculation, RDF, weed management, insecticide application and ridge furrow sowing) reported highest yield gap followed by omission of either RDF (Recommended Dose of Fertilizers)or pesticide application.

During technical session new trails were proposed

1. Organic farming experiment was proposed and approved in the technical session.

The session ended by felicitation with memento to expert and rapporteurs.

E. MICROBIOLOGY

Chairman : Dr Sanjeev Gupta, ADG Oilseed & Pulses), ICAR, New Delhi
Expert : Dr DJ Bagyaraj Professor Emeritus (Agri Microbiology), UAS Bengaluru
Rapporteurs : Dr P. Jones Nirmalnath, Professor (Agri. Microbiology), UAS Dharwad
: Dr Navneet Pareek, Professor (Soil Microbiology), GBPUA &T Pantnagar
: Mr. Hemant S. Maheshwari, Scientist (Microbiology), ICAR-IISR, Indore

At the outset, the session began with a brief introductory remark by Dr MB. Ratnaparkhe and Dr DJ Bagyaraj expert invited Dr M.P Sharma, PI of AICRPS-Microbiology for the presentation.

- Dr MP Sharma presented the salient achievements of AICRPS Microbiology particularly the identification of one package of practice (POP) involving microbial consortia consisting of *Paenibacillus polymyxa* and AM fungus-*Rhizophagus irregularis* identified during varietal identification meeting held during AICRPS 2021. He mentioned that the group has identified many plant growth-promoting rhizobacteria such as P solubilizer (*Burkholderia arboris*), Zn solubilizer (*Bacillus aryabhatti*), and nitrogen fixer (*Bradyrhizobium liaoningense*) which were found to be promising when compared with NBAIM, Mau NPK formulation evaluated last year in AICRPS-Agronomy trials. He also mentioned that centres has 07 potential bradyrhizobial strains isolated from Indore, Delhi, and Ludhiana centers from this one strain *Bradyrhizobium daqingense* reported for the first time from an Indian soil recovered from a drought-tolerant soybean variety (PK-472).
- He presented results of trials where in **MB-1/16** trial dealt with isolation of potential PGPR for drought stress mitigation, across all the centres, a total of 10 pseudomonads were recovered and characterized for moisture stress tolerant traits using PEG (up to 35%) and PGP functional traits. The strains are being characterized and identified at molecular level so that the sequences and strains can be deposited for public use. The MB2/21 trial dealt with evaluation of *Bradyrhizobium daqingense* with reduced and recommended doses of fertilizer to reduce the doses of recommended fertilizer doses. He showed that during first year, *Bradyrhizobium daqingense* was found to be highly responsive for nodulation and yield in CZ and SZ and saved 25% NPK fertilizer inputs than the North plain zone. The **MB3/21** invitro trial on **e**valuation/compatibility testing of PGPR and rhizobia against pre-and post-emergence herbicides showed that across all centres, *Bradyrhizobium daqingense* and *Pseudomonas fluorescence* were found compatible with both pre-and post-emergence herbicides particular used at recommended doses. He added that *B. daqingense* was highly compatible where higher and lower doses decrease the bacterial population and herbicide used at a moderate level increases the bacterial population. It may be due to herbicides acting as a source of carbon. The **MB4/13** trial dealt with finding the nodulation efficiency with the native homologous rhizobia of all the AVT-II entries which differed in influencing rhizosphere and nodulation parameters across the different zones. Across the zones, a total 04 AVT II entries (03 from CZ including early entries and 01 from North plain zone) were found promising when compared to their respective checks.

During the presentation following key suggestions were made-

- ✓ ADG (O&P) directed to streamline the entire microbiology discipline including oilseed and pulse AICRPs for making the roadmap on how these microbes being developed in AICRPs will reach to the farmers. He suggested Director, IISR to organize under the chairmanship of ADG (O&P) a meeting of all members of AICRPs microbiology covering both oilseeds and pulses.
- ✓ Include *Bacillus aryabhattai* (Zn and P solubilizing) potential strain in the trials. PI mentioned that it has already included in AICRPS Agronomy microbial consortia trial with NBAIM Bio NPK. However, this strain would be included in the field trial with rhizobial strain.
- ✓ Dr DJ Bagyaraj suggested including potential microbial strains of AICRPS Microbiology in the AICRP-plant pathology trials to control root-borne soybean pathogens.
- ✓ There is need to quantify the amount of nitrogen fixed in the soil through inoculation of N-fixing strains.
- ✓ Since MB 2/21 trial involves the evaluation of N-fixing soybean rhizobia and suggested to revise the treatment by reducing only dose of nitrogen fertilizer than the whole NPK fertilizer dose to avoid mining of P and K or to include P-solubilizing strain with reduction of NPK fertilizers. PI agreed to revise the treatment in the technical plan 2022 as per the suggestion.

The session ended with thanks to the Chairman and Expert.

F. TRANSFER OF TECHNOLOGY

Chairman: Dr Sanjeev Gupta, ADG (O&P), ICAR, New Delhi
Expert : Dr S. K. Jha, Principal Scientist, ICAR, New Delhi
Rapporteurs: Dr B. U. Dupare, Principal Scientist (Agri. Ext.), ICAR-IISR, Indore
Dr R. K. Verma, Scientist (Agronomy), ICAR-IISR, Indore

Nodal Officer/Principal Investigator (FLDs)) Dr Raghavendra M., Scientist, ICAR-IISR, Indore, presented the results of front-linedemonstrations conducted at all the coordinating centers respectively during *Kharif* 2021. Based on the results of front-linedemonstrations, the following discussion and recommendations were made by chairman and expert of the transfer of technology session.

- Remove the Dholi centre from FLD allotment.
- Provision/conduct of *Rabi* FLDs should remove from the technical programme 2022.
- Front Line Demonstrations on Organic farming should be restricted to five (05) only**.**
- All centre should submit the quality photograph for the award.

Suggestions/comments were well noted and addressed accordingly by the Dr Raghavendra M.,Nodal Officer/Principal Investigator (LFDs)), ICAR-IISR, Indore

Tribal Sub Plan: Nodal Officer of Tribal Sub Plan Activities Dr Subhash Chandra, Scientist ICAR-IISR, Indore, presented the achievement of the Tribal Sub Plan (TSP) in same session.

The session ended by felicitation with memento to expert and rapporteurs.

G. FOOD TECHNOLOGY

Expetrs:Dr Nachiket Kotwaliwale,
Director, ICAR-CIPHET, Ludhiana &
Dr Puneet Chandra, Head, Centre of Excellence on
Soybean Processing & Utilization, ICAR-CIAE, Bhopal
Rapporteurs : Dr Manoj Kumar Srivastava Principal Scientist (Biochemistry),
ICAR-IISR, Indore

Presented by: Dr L. Sophia Devi, Jr. Food Scientist, AICRP (Soybean), CAU, Imphal

Major recommendations

- For cooking time measurement use of pressure cooker followed by measurement of hardness was suggested.
- For seed colour and milk/tofu colour, LAB chart should be used. Total solid content of milk should be reported.
- Sensory analysis should be done by expert panel.
- Finally some numerical Index should be developed for each variety.
- Total solid content should be measured using hand refracto-meter.
- For next year experiments, southern zone was added in addition to NEHZ, NPZ and CZ.
- NRC 149, PS 1670 (NPZ) , DLSb 1, DSb 38, MACS 1460, JS 20-116 (NEHZ) and all entries from CZ were acceptable for tofu sensory

स. तकनीकी कार्यक्रम

C. TECHNICAL PROGRAMMES

A. TECHNICAL PROGRAMME OF PLANT BREEDING FOR KHARIF 2022

1. CO-ORDINATED VARIETAL TRIALS

A. NORTHERN Hill ZONE (NHZ):

Advanced Varietal Trial I (AVT I)

DESIGN	R.B.D.
GROSS PLOT SIZE	10 rows, 5m long (4.5 x 5 m sq)
NET PLOT SIZE	8 rows, 4.8m long (4.0 x 4.8 m sq)
REPLICATION	Three
LOCATIONS	Palampur, Almora, Majhera
ENTRIES	JS 23-03, NRC 197, MAUS 795, NRC 196
CHECKS	Palam Early Soya-1, VLS 89, VLS 63, VLS 99
SEED	1.5 kg/entry/location

B. NORTHERN PLAIN ZONE (NPZ):

Advanced Varietal Trial I and II (AVT I+II)

DESIGN	R.B.D.
GROSS PLOT SIZE	10 rows, 5m long (4.5 x 5 m sq)
NET PLOT SIZE	8 rows, 4.8m long (4.0 x 4.8 m sq)
REPLICATION	Three
LOCATIONS	Pantnagar, Delhi, Ludhiana
ENTRIES	**NRC195, PS1682, SL1282,** PS 1670*, NRCSL 6**
CHECKS	**SL1074, SL955,** NRC 149#**, SL 958(C)@**
SEED	1.5 kg/entry/location

*AVT II Entry, **EDV of SL 958 for Photoinsensitivity (Earliness), @check for NRCSL 6. #New check introduced for AVT I entries

C. NORTH EASTERN HILL ZONE (NEHZ):

Advanced Varietal Trial II (AVT II)

DESIGN	R.B.D.
GROSS PLOT SIZE	10 rows, 5m long (4.5 x 5 m sq)
NET PLOT SIZE	8 rows, 4.8m long (4.0 x 4.8 m sq)
REPLICATION	Three
LOCATIONS	Jorhat, Imphal, Umiam
ENTRIES	**KDS1096**, **DLSb1**
CHECKS	**MACS1460, JS20-116, RKS113**
SEED	1.5 kg/entry/location

D. EASTERN ZONE (EZ) :

Advanced Varietal Trial I and II (AVT I+II)

DESIGN	R.B.D.
GROSS PLOT SIZE	10 rows, 5m long (4.5 x 5 m sq)
NET PLOT SIZE	8 rows, 4.8m long (4.0 x 4.8 m sq)
REPLICATION	Three
LOCATIONS	Bhawanipatna, Raipur, Ranchi, Dholi
ENTRIES	RVS13-20,CAUMS2,MAUS791,RSC11-

	42,AS24,VLS102,KDS1149 & DLSb 3, **RSC11-35***
CHECKS	NRC128, JS20-116*^,AMS2014-1, MACS 1460*, RSC 10-46*
SEED	1.5 kg/entry/location

* AVT II entry and checks, *^JS 20-116 is common check for AVT I and AVT II trials

E. **CENTRAL ZONE (CZ)**:

Advanced Varietal Trial I (AVT I)

DESIGN	R.B.D.
GROSS PLOT SIZE	10 rows, 5m long (4.5 x 5 m sq)
NET PLOT SIZE	8 rows, 4.8m long (4.0 x 4.8 m sq)
REPLICATION	Three
LOCATIONS	Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti, Mandsaur
ENTRIES	NRC 189, NRC 190, NRC192 AS 24, RSC11-42
CHECKS	RVSM 2011-35, AMS 100-39, RSC 10-52
SEED	1.5 kg/entry/location

F. Advanced Varietal Trial I and II (AVT I+II): Early

DESIGN	R.B.D.
GROSS PLOT SIZE	10 rows, 5m long (4.5 x 5 m sq)
NET PLOT SIZE	8 rows, 4.8m long (4.0 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti, Mandsaur
ENTRIES	JS 23-03, JS 23-09, KDS 1169, PS 1569**, JS 22-12**, JS 22-18,** JS 22-16**, RVSM 2012-4**, NRC181**, NRC 165**^
CHECKS	NRC130, NRC138, JS95-60, JS20-34
SEED	1.5 kg/entry/location

** AVT II Entries; ^Repeat AVT II entry

G. Advanced Varietal Trial II (AVT-II): Vegetable

DESIGN	R.B.D.
GROSS PLOT SIZE	16 rows, 5m long (7.2 x 5 m sq)
NET PLOT SIZE	14 rows, 4.8m long (6.3 x 4.8 m sq)
REPLICATION	Three
LOCATIONS	Indore, Kota, Parbhani
ENTRIES	NRC 188
CHECKS	Hara Soya, Karune, JS 95-60 and JS 20-34
SEED	2.0 kg/entry/location

H. INITIAL VARIETAL TRIAL (IVT) (ACROSS ZONES):

Zone	R.B.D.; 3 rows, 3m long (1.35 x 3 m sq), 3 replications
NHZ	Almora, Palampur, Majhera ,
NPZ	Pantnagar, Delhi, Ludhiana (5 rows are must in Ludhiana and Delhi to overcome the problem of border effect in case of death of neighbouringentries.Only middle 3 rows to be harvested for yield)
EZ	Ranchi, Raipur 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 89, VLS 63, VLS 99
NPZ	PS 26, NRC 149, SL 1074
EZ	NRC 128, JS 20-116, RSC 10-46
NEHZ	MACS 1407, JS 20-116, KDS 753
CZ	RVSM 2011-35, JS 20-98, RSC 10-52
CZ (E)	NRC 152, NRC 138, JS 20-34
SZ	DSb 34, DSb 21, KDS 753

Repeat Entries in NEHZ in IVT	NRC 190, NRC 191, CAUMS 2, Himso 1694, Himso 1693, NRC 189, RVSM 16-20, KDS 1149
Checks	As given above in main table

Table 1: Centre wise entries for IVT Trial across zones. (Grain Yield)

S. No.	Name of the Centre	Name of the entry
1.	Palampur	Himso 1695, Himso 1696
2.	Almora	VLS 104, VLS 105
3.	Ludhiana	SL 1311, NRCSL 4, NRCSL 5
4.	Pantnagar	PS 1693, PS 1696
5.	Delhi	DS 1510, DS 1529
6.	Raipur	RSC 11-65, RSC 11-72
7.	Jabalpur	JS 24-26, JS 24-34,
8.	BARC, Mumbai	TS-156, TS-208
9.	Ranchi	BAUS 124
10.	Amreli	AS 34, AS 55
11.	Imphal	CAUMS 3
12.	Dharwad	DLSb 5,
13.	Indore	NRC 196, NRC 253, NRC 254, NRC 255, NRC 256, NRC 257, NRC 258,

		NRC 259, NRC 260, NRCSL 7, NRCSL 8
14.	Sehore	RVS 12-8
15.	Morena	RVSM 12-21
16.	Amravati	AMS 2021-3, AMS 2021-4
17.	Kasbe Digraj	KDS 1188, KDS 1203,
18.	Kota	AUKS 212, AUKS 217
19.	Pune	MACS 1756, MACS 1745
20.	Parbhani	MAUS 814, MAUS 824,
21.	Adilabad	Asb 85, Asb 93
22.	Mandsore	Pusa Sipani BS-9
23.	Lok Bharti	Lok Soya -2
24.	Basant Agro	KSS 213
25.	Kashmir	SKAUS 3

I. INITIAL VARIETAL TRIAL-EARLY (IVT-EARLY) CENTRAL ZONE

DESIGN	R.B.D.
PLOT SIZE	3 rows, 3m long (1.35 x 3 m sq)
REPLICATION	Three
LOCATIONS	Jabalpur, Sehore, Parbhani, Amrawati, Kota, Morena, Anand, Amreli, Indore, Lok Bharti and Nagpur, Mandsaur
SEED	3 kg/entry
CHECKS	JS 20-34, NRC 152 and NRC 138
Entries	
Delhi	DS 1547, DS 1550
Raipur	RSC 11-75
Jabalpur	JS 24-25, JS 24-33
Amreli	AS 26, AS 47
Dharwad	DLSb 40
Indore	NRC 141, NRC 261, NRC 262, NRC 263
Sehore	RVS 15-1
Amravati	AMS 2022-1
Kasbe Digraj	KDS 1275 , KDS 1271
Kota	AUKS 234, AUKS 238
Pune	MACS 1779
Parbhani	MAUS 749, MAUS 820
Mandsore	PusaSipani 433

2. Pre-Breeding

- Wide hybridization of soybean (G. max) with Glycine species of tertiary gene pool.
- Fresh hybridizations, back crossing and generation advancement

3. Multi-location Germplasm Evaluation Trial

2022 trial to continue at Almora, Palampur, Pantnagar, Raipur, Indore, Parbhani, Pune, Manipur for diverse, high yield and trait specific germplasm identification

- New 300 germplasm to be evaluated:

- Suggested centres: Ranchi, Sehore, Adilabad, Jorhat, Bidar

4. National Hybridization Programme

- F2 & F3 of 2021 crosses at Bengalore; F3 harvest (F40) distribution to centres
- Based on the diversity analysis following hybridizations were suggested different centres

Centre (Zone)	Cross
NHZ	1. VLS 63 × MCAS 124 2. VLS 89 × P 318 3. VLS 89 × NANKING 4. VLS 89 × AGS 218 5. VLS 63 × EC 274713
NPZ	**1.** SL 1074 x AGS 25 **2.** PS 26 x AGS 25
CZ	1. NRC 130 x CAT 2797 2. NRC 138 x CAT 2797 3. JS 20-68 x EC 457464 4. RSC 10-52 x TGX 854429 5. NRC 138 x EC 546882 6. NRC 138 x EC 274713 7. NRC 138 x Nanking 8. NRC 130 x MACS 450 9. JS 20-69 x MACS 450
NEHZ	1. MACS 1460 x EC 456613 2. KDS 753 x EC 241995 3. JS 20-116 x EC 391346 4. MACS 1460 x EC 456613 5. MACS 1460 x EC 538807
EZ	1. JS 97-52 x JS 75-46 2. MACS 1460 x TGX 8116-21D 3. MACS 1460 x EC 274713
SZ	1. KDS 753 x EC 2579 2. DSb 34 x EC 2579 3. KDS 753 x EC 103334 4. DSb 34 x AGS 143 5. DSb 34 x Lee

B. TECHNICAL PROGRAMME OF ENTOMOLOGY FOR KHARIF 2022

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	Pantnagar	Defoliators, girdle beetle, white fly and aphid
	Ludhiana	White fly
	Delhi	white fly/YMV and stem 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
	Indore	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 : Pantnagar, Sehore, Parbhani, Kota, Amrawati, Dharwad, Imphal and Delhi.

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

Treatments **:** Test entries of **all zones** with respective zonal checks, as per the technical programme of Plant Breeding. 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, concerned breeder should be requested timely to send the seed.

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

Centres: Pantnagar, Dharwad, Prabhani 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 Approximate Digestibility (AD) is the measure of approximate percentage of food consumed that is utilized by the larvae; (ii) the Efficiency of Conversion Index (ECI) is an overall measure of ability of larvae to utilize the ingested food for their growth; (iii) the Efficiency of Conversion of Digested 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

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

Centres **:** Sehore, Parbhani, Kota, Amravati, Pantnagar, Ludhiana, Delhi, Dharwad, Imphal and 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. Management of major insect-pests through microbial consortia

Centers: Pantnagar, Parbhani, Kota, Amravati, Ludhiana, 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 7. Management of major defoliators of soybean through intercropping with *suva*, *Anethum graveolens*

Centers: Pantnagar, 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.

2. Number of eggs laying on suva and soybean species wise

3. Number of larva on suva and soybean species wise and present them in percent form like 5% *Spodoptera*, 50% semiloopers species etc.

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 and extent 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 and extent 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 2022-23

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. **Prepare disease map with help of GPS locations.**
4. Previous crops to be recorded before soybean cropping.
5. Probable yield loss due to disease in the region should also be mentioned based on survey.
6. 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.
7. Plant protection measures used by farmers to be recorded.
8. 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. PK 262
8. Monetta
9. NRC 7

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 (2022): Biological management of major diseases of soybean

Locations: Amravati, Dharwad, Indore, Jabalpur, Jorhat, Pantnagar, Palampur and Sehore
Target Disease: Amravati (CR), Dharwad (Rust and Anth), Indore (Anth) Jabalpur (CR and RAB), Jorhat (Coll R, Anth), Pantnagar (RAB), Palampur (FLS and Anth) and Sehore (TLS)
Objective: To develop integrated disease management strategies against major diseases of soybean

Variety: JS 335

Design: RBD

Plot size: 6 rows of 3 m length

Replications: Three

Treatment Details:

Trt	Chemicals	Seed treatment Dosage (g/ml/kg seed)	Foliar application Dosage (g/ml/kg seed)
T1	Seed and foliar application of *Panibacillus macrens*	5	10
T2	Seed and foliar application of *Bacillus thuringiensis*	5	10
T3	Seed and foliar application of *Bacillus sp.* EF 53	5	10
T4	Seed and foliar application of *Bacillus sp.* EF 111	5	10
T5	Seed and foliar application of *Trichoderma viridae*	5	10
T6	Seed and foliar application of *Pseudomonas fluorescence*	5	10
T7	Untreated control		

Note: Foliar application will be done after 40 DAS and 55 DAS
Spraying with chlorantroniprole 0.2ml/L at 15 and 35 DAS and other pest will e control as per recommendation of ICAR IISR, Inodre.

Observations to be recorded: 1) % Field Stand 2) % Disease severity at 45 DAS, 60 DAS, 75 DAS 3) AUDPC 4) Plant ht (cm),5) No. of branches per plant, 6) No. of pods per plant, 7 100 seed weight (g), 8) 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 20-29	JS 20-98	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	Coll Rot, ANTH
9.	Medziphema	JS 335	JS 97-52	ANTH, RAB
10	IGKVV, Raipur	JS 335	RSC 10-46	IBB, ANTH
11	R & D Center, Ugarkhurd	JS 335	DSb 21	Rust
12	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 in Replicated 2 rows x 1 m in 2 replications under RBD.
Note 2. Total 10 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 (HR)
1 = Resistant (R)
3 = Moderately resistant (MR)
5 = Moderately susceptible (MS)
7 = Susceptible (S)
9 = Highly susceptible (HS)

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[b]**	**Coefficient of infection (CI)[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 (HR)

0.01 – 11.11 = Resistant (R)

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 2022-23

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 cm2. 45 cm

(B) Sub plot: Entries

Zone	Entries
North Hill Zone	Nil
North Plain Zone	PS 1670, **Check**- SL 955, PS 1347
Central Zone	Early- PS 1569, NRC 165, JS 22-12, JS 22-16, JS 22-18, RVSM 2012-4, NRC 181 **Check**- NRC 130, NRC 138, JS 20-34, JS 95-60 **Vegetable** type = NRC 188, Check- Hara soya, Karune, JS 95-60, JS 20-34
North Eastern Hill Zone	KDS 1096, DLSb 1, **Check**- MACS 1460, JS 20-116, RKS 113
Southern Zone	Nil
Eastern Zone	RSC 11-35, **Check**- MACS 1460, JS 20-116, RSC 10-46

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 entriesup to31st May, 2021.*

B. Sustainable soybean production

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

Zone	Centre	Variety
North plain	Pantnagar, Ludhiana	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), Chickpearemainingcentres)

Design: Strip plot, **Replication:** 4 **PlotSize :**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-3/21: Evaluation of novel bio formulations for yield enhancement in soybean Technical details (All Centres)

Zone	Centre	Variety	RDF (N: P2O5:K2O:S kg/ha)
North plain	Pantnagar, Ludhiana, Delhi	PS 1347/SL 958	25:75:25:37.5
North hill	Almora		As per zonal recommendations
Central	Sehore, Kota, Amravati, Devgarh Baria	JS 95-60	25:60:40:20
North Eastern	Raipur, Ranchi, Bhawani Patna	JS 97-52	25:100:50:50
Southern	Dharwad, Adilabad, Pune	DSb 21	25:80:20:30
North Eastern Hill	Imphal, Medziphema	JS 97-52	As per zonal recommendations

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

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

Dose of bioformulations: 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-4/22: Organic farming for soybean-based cropping systems (2022-2032)

(A) Main plot treatment (cropping systems)				
North Plain (Pantnagar, Ludhiana)	Central (Kota, Amravati, Devgadhbaria)	Southern (Dharwad, Adilabad, Pune)	Eastern (Raipur, Ranchi)	North Eastern Hill (Imphal, Medziphema)
Soybean-wheat Soybean-chickpea	Soybean-wheat Soybean-chickpea	Soybean-wheat Soybean-chickpea	Soybean-wheat Soybean-maize	Soybean-Mustard (rape seed) Soybean-maize

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

(B) Sub plot treatment

1. **Organic farming**
2. **Inorganic farming**

Replication= 5 **Design= Split plot design**

Plot size: 10 m x 5 m (50 m^2), 250 m^2 for organic treatment and 250 m^2 for inorganic treatment for each cropping system (fixed site, two cropping systems)

Observations: Seed yield, straw yield, HI, SEY, Net Return, B:C ratio, initial N, P, K in soil, N, P, K uptake, balance sheet of N, P, K, Organic carbon, physical properties (Initial and completion= bulk density, WHC, porosity)

Sub plot treatment details		
	1. Organic farming	2. Inorganic farming
Seed treatment	Rhizobium culture, PSB, vesicular arbuscular mycorrhizal (VAM) fungi @ 5-10 g/ kg seed; *Trichoderma viride* @ 5 g/kg seed	Thiophanate-methyl + Pyraclostrobin (45%+5%) @ 2ml kg-1 seed. Thiamethoxam (10 ml/kg of seed). Bradyrhizobium japonicum @ 5g/kg.
Fertilizer application	FYM @ 10 t/ha (soybean and chickpea) + rock phosphate (16% P2O5) @ 375 kg/ha FYM @ 25 t/ha for wheat /maize	Inorganic fertilizers (RDF): 20 N: 60 P_2O_5: 20 K_2O kg/ha
Weed management	Two hand weeding at 20 and 40 DAS or hoeing at 15-25 DAS.	Pre-emergent; Diclosolam @ 26 g/ha and post-emergence; Imazethapyr + propaquizafop @ 2.0 litter/ha
Insect pests and disease management	*1) Pseudomonas syringae* is also used as foliar spray @ 10g per litre. *2) Bacillus thuringiensis* (Dipel) @ 1.0 lit/ha, *Nomuriyarileyi* @ 1 kg/ha, *Beauveria bassiana*@ 1 kg/ha and nuclear polyhedrosis virus (NPV) @ 250 larval equivalent per hectare 3) Trap/border crops-Suva (*Anethum graveolens*), Marigold cowpea Dhaincha (*Sesbania rostrate*) 4) Yellow sticky trap and pheromone traps	Spraying of Tebuconazole @ 500 ml/ha. Spraying of Chlorentranilipore @ 100 ml/ ha

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 1347, 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).

F. Biostimulant evaluation

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

Zone	Centre
North plain	Pantnagar
Central	Sehore, Kota, Amravati
Southern	Dharwad, Pune

The general recommended variety at the specific respective Center

Treatment: Three products; four treatment per product (three trails)

1. VININ - Biostimulant-Antioxidant (Gibberellin Augmenter)

Dosage

(1) 1.5 ml / lit. + GA (10ppm)- first spray followed by 3.0 ml / lit. - Second Spray.
(2) 2.0 ml / lit. + GA (10ppm)- first spray followed by 4.0 ml / lit. - Second Spray.
(3) 2.5 ml / lit. + GA (10ppm)- first spray followed by 5.0 ml / lit. - Second Spray.
(4) Control

Time of Application

First Spray - at 3-4 nodal growth stage after germination.
Second Spray - at 8-9 nodal growth stage after germination.

2. TULIP - Cytokinin supplement

Dosage

1. 1.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 1.5 ml / Lit and Third Spray @ 2.0 ml / lit., at 15 days interval.
2. 2.0 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.0 ml / Lit and Third Spray @ 2.5 ml / lit., at 15 days interval.
3. 2.5 ml / lit. - First Spray along with post-emergence herbicide application, followed by Second Spray @ 2.5 ml / Lit and Third Spray @ 3.0 ml / lit., at 15 days interval.
4. Control

Time of Application

First Spray along with post-emergence herbicide application, after germination and crop establishment.
Second Spray - at 10 % flowering.
Third Spray after Pod setting (nearly 15 days after second spray).

3. WINSTOP - Auxin supplement

Dosage

1. 1.5 ml / lit. - first spray followed by 2.5 ml / lit. - Second Spray.

2. 2.0 ml / lit. - first spray followed by 3.0 ml / lit. - Second Spray.
3. 2.5 ml / lit. - first spray followed by 3.5 ml / lit. - Second Spray.
4. Control

Time of Application
First Spray - at pre-flowering stage approximately 30 DAG. (Days after germination)
Second Spray - after Fruit and Seed Setting stage 50 DAG.

PS : Mandatory Preventive ZILLON - Anti-Viral spray for all treatments at 12 days DAG, followed by Second Spray at 45 DAG.
DAG : Days After Germination

Design: RBD **Replications:** 5 **Plot Size:** 3.6 m x 6 m

Observations to be recorded:
1. Herbicidal injury, (phytotoxicity)
2. Branches per plant
3. Number of Pods per plant
4. 100-Pod weight
5. 100- Seed weight
6. Biological and seed yield (kg/ha)
7. Harvest Index
8. Impact analysis on the nodule numbers and nodule dry weight
9. Final conclusions and recommendations arising out of the test trials.

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 to different AICRPs Centres and KVKs - 2022-23

S. No.	Centres	Zone	State	No. of FLDs allotted	Varieties	Whole package	Component wise					
							IWM	INM	IPM	IC	FGV	Org. F.
1.	ICAR-IISR Indore	CZ	**MP**	500	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52, RSC 10-46, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98	400	-	-	-	-	100	-
2.	CoA, Sehore	CZ	**MP**	10	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52, RSC 10-46, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98	5	5	-	-	-	-	-
3.	MAU, Parbhani	CZ	**MH**	50	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69, NRC 130, RSC 10-46, RSC l0-52, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98, MAUS 612	25	-	-	-	25	-	-
4.	PDKV, Amravati	CZ	**MH**	20	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69, NRC 130, RSC 10-46, RSC l0-52, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98, MAUS 612	10	-	-	-	10	-	-
5.	KVK Karda	CZ	**MH**	100	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69, NRC 130, RSC 10-46, RSC l0-52, AMS-MB-5-I8 (Suvarn Soya), NRC 127, JS 20-98, MAUS 612	50	-	-	-	50	-	-
6.	AU, Kota	CZ	**RJ**	30	JS 20-34, RKS 45, PK 113, NRC 130, RSC 10-46, RSC l0-52, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98	30	-	-	-	-	-	-
7.	KVK Bharuch	CZ	**GJ**	15	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98	10	5	-	-	-	-	-
8.	DevgrahBaria	CZ	**GJ**	10	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98	10	-	-	-	-	-	-

9.	Sipani farm, Mandsaur	CZ	**MP**	10	NRC 130, JS 20-34, JS 20-69, JS 20-116, RSC 10-52, RSC 10-46, AMS-MB-5-I8 (Suvarn Soya), NRC 127, NRC 138 , NRC 142 , MACS 1520 , RVSM 2011-35 , AMS 100-39 , JS 20-98	10	-	-	-	-	-	-
10.	Raipur	EZ	**CG**	100	CG SOYA, RSC 10-52 & RSC 10-46, NRC 132, MACS 1407, MACS 1460, NRC 147, NRC 128, NRC 136, NRCSL 1, RSC 11-07, AMS 2014-l (PDKV Purva), JS 20-116	50	30	10	10	-	-	-
11.	BAU, Ranchi	EZ	**JK**	10	CG SOYA, RSC 10-52 & RSC 10-46, NRC 132, MACS 1407, MACS 1460, NRC 147, NRC 128, NRC 136, NRCSL 1, RSC 11-07, AMS 2014-l (PDKV Purva), JS 20-116	5	5	-	-	-	-	-
12.	KVK, Begusarai	EZ	**BR**	10	SL 958, NRC 128, NRCSL1, MACS 1407, MACS 1460, NRC 147, NRC 136, RSC 11-07, RSC 10-46, JS 20-116	10	-	-	-	-	-	-
13.	CAU, Imphal	NEHZ	**MN**	10	MACS 1460, DSb 19, DSb 32, JS 20-116, RKS 113, MACS 1460,	5	-	-	-	-	-	5
14.	Medziphema	NEHZ	**NL**	10	MACS 1460, DSb 19, DSb 32, JS 20-116, RKS 113, MACS 1460	3	2	-	-	-	-	5
15.	Almora	NHZ	**UK**	10	PS 1347, PS 1225, PS 25 & PS 26, VLS 89, PS 1556	3	2	-	-	-	-	5
16.	Palampur	NHZ	**HP**	10	VLS 59, VLS 63, VLS 89, VLS 89, PS 1556, HIMSO 1685	3	2	-	-	-	-	5
17.	Pantnagar	NPZ	**UK**	75	PS 1347, PS 1225, PS 25 & PS 26, NRC 128, SL 1028 , SL 1074, SL 955, SL 979	45	25	-	-	-	-	5
18.	PAU, Ludhiana	NPZ	**PB**	50	SL 958, SL 979, NRC 128, SL 1028 , SL 1074, SL 955,	50	-	-	-	-	-	-
19.	ARI, Pune	SZ	**MH**	15	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69, MACS 1460, NRC132, NRC147, RSC 11-07, DSb 34, DSb23, KS 103, KDS 726, NRC 132 , NRC 147 , NRC 142, KDS 992 , Karune , MACSNRC 1667	8	-	-	-	7	-	-
20.	KVK, Kaneri Math, Kolhapur-II	SZ	**MH**	150	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69, MACS 1460, NRC132, NRC147, RSC 11-07, DSb 34, DSb23, KS 103, KDS 726, NRC 132 , NRC 147 , NRC 142, KDS 992 , Karune , MACSNRC 1667	100	-	-	-	50	-	-
21.	Kasbe digraj, MPKV, Sangli	SZ	**MH**	25	AMS-MB-5-18, KLDS 334, JS 20-34, JS 20-69, MACS 1460, NRC132, NRC147, RSC 11-07, DSb 34, DSb23, KS 103, KDS 726, NRC 132 , H19, NRC 142, KDS 992 , Karune , MACSNRC 1667	15	-	-	-	10	-	-

22.	UAS Dharwad	SZ	**KA**	80	DSb 21, DSb 23, DSb 34, KSB 23, Karune, MACS 1460, NRC132, NRC147, RSC 11-07, KS 103, KDS 726, NRC 142, KDS 992 , MACSNRC 1667	25	20	20	-	15	-	-
23.	Ugarkhurd Sugar	SZ	**KA**	50	DSb 21, DSb 23, DSb 34, KSB 23, Karune, MACS 1460, NRC132, NRC147, RSC 11-07, KS 103, KDS 726, NRC 142, KDS 992 , MACSNRC 1667	25	-	-	-	25	-	-
24.	ICAR-KLE-KVK, Belagavi	SZ	**KA**	200	DSb 21, DSb 23, DSb 34, KSB 23, Karune, MACS 1460, NRC132, NRC147, RSC 11-07, KS 103, KDS 726, NRC 142, KDS 992 , MACSNRC 1667	140	-	-	-	60	-	-
25.	Bangalore	SZ	**KA**	150	DSb 21, DSb 23, DSb 34, KSB 23, Karune, MACS 1460, NRC132, NRC147, RSC 11-07, KS 103, KDS 726, NRC 142, KDS 992 , MACSNRC 1667	100	50	-	-	-	-	-
26.	PJTSAU, Adilabad	SZ	**TS**	50	BASARA, KDS 726, KDS 753, MAUS 158, MACS 1188, NRC132, NRC147, RSC 11-07, DSb 34, DSb23, KS 103, NRC 142, KDS 992 , Karune , MACSNRC 1667	20	10	10	10	-	-	-
27.	ICAR-KVK, Myrada, Erode district.	SZ	**TN**	50	DSb 21, DSb 23, DSb 34, KSB 23, Karune, MACS 1460, NRC132, NRC147, RSC 11-07, KS 103, KDS 726, NRC 142, KDS 992 , MACSNRC 1667	25	-	-	-	25	-	-
Grand total				**1800**		**1192**	**156**	**40**	**20**	**277**	**100**	**25**

Note:

- ✓ All the centers are requested to follow the location/zone specific recommended soybean production technology capsule as given below.
- ✓ FLDs should be conducted in one cluster (10 FLDs) and that is to be in one village for consecutive two years.
- ✓ If more than 10 FLDs allotted to any centre, they may increase the number of clusters in multiples of 10 FLDs.
- ✓ More than 10 years old varieties should be avoided in FLDs. Preference should be given to recently released 5 years old varieties to conduct under FLDs.
- ✓ All centers are requested to record Geo-referencing of the FLD/Geo tagging invariable.
- ✓ The Pantnagar center is also requested to cover adjoining places of Uttarakhand such as Pilibhit, Varanasi (FAARD) etc of Uttar Pradesh state for conduct of FLDs to expand soybean area under nontraditional areas by providing technical support and required critical inputs.

Location/Zone Specific Recommended Soybean Production Technology Capsule

1. Whole package

Input/practices	North Hill Zone (HP, Hills of Uttarakhand)	North Plain Zone (Punjab, Haryana, Delhi, NE Plains of UP, 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 2022-23				
2. Planting time	Last week of May to June end	15thJune 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: 20 N: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: 1.0 N:P_2O_5:K_2O:S:B kg/ha	5 t FYM/ ha + 20:80:20: 30: 0.5 N:P_2O_5:K_2O:S:B kg/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 67.5 cm (2 rows per bed)	Conservation furrow each after 6 rows	Conservation furrow each after 3 rows	Ridge and furrow 60 cm
9. Bio-regulator	-	Cycocel @ 500 ppm at flower initiation	Cycocel @ 500 ppm at flower initiation	Ethrel @ 200 ppm or salicylic acid @ 50 ppm at pod initiation	Ethrel @ 200 ppm at flower and pod initiation
10. Seed treatment	Thiram 75 WP + Carbendazim 50 WP (2:1) @ 3 g/kg seed or Thiram + Carboxin @ 2 g/kg seed or *Trichoderma viride* @ 4-5 g/kg seed for the management of seed and seedling diseases.				
11. Seed inoculation	About 5 g/ kg seed *Bradyrhizobium japonicum* 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-plant incorporation OR Diclosulum @ 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 OR Chlorimuron ethyl @ 36 g /ha OR Bentazone @2 l/ha as early post emergence (10-12 DAS) OR Imazethapyr @ 1 l/ha OR Quizalofop ethyl 5 EC @ 1 l/ha OR Quizalofop ethyl 10 EC @ 375-450 l/ha OR Haloxyfop ethyl @ 1-1.25 l/ha OR Quizalofop-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, *Helicoverpa armigera*)- 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; Insecticide + 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.

2. FLDs component wise

S. No.	FLD components	
1.	IWM (Integrated Weed Management)	Diclosulum @ 84% WDG 22g a.i. ha^{-1} as PE fb 1 hand weeding at 40 DAS.
2.	IPM (Integrated Pest Management)	Seed treatment Thiamethoxam 30 FS @ 10ml kg^{-1} seed, Spray Chlorantraniprole 18.5%SC @150ml ha^{-1} at flowering, Yellow sticky trap and pheromone traps @ 20-25 ha^{-1} for mass trapping and Spray *Bacillus thuringiensis* @ 1.0 l ha^{-1}, Trap/border crops such as Suva (*Anethum graveolens*), Marigold (*Tagetes patula*), cowpea (*Vigna unguiculata*), Dhaincha (*Sesbania rostrate*)
3.	INM (integrated Nutrient Management)	(50% RDF +50% Organic) As per the zonal recommendation
4.	Intercropping	Soybean + Pigeonpea 4:2, Soybean + Sugarcane, 2:1, Soybean+Maize 4:2 etc
5.	Food grade varieties	NRC 127, NRC 132, NRC 142, NRC 147, NRCMACS 1660, Karune and Hara Soya
6.	Organic farming	FYM @ 10 t ha^{-1}, rock phosphate (16% P_2O_5) @ 375 kg ha^{-1}, Seed treatment*Trichoderma viride* @ 5 g kg^{-1} seed, rhizobium culture, phosphate solubilizing micro-organism and vesicular arbuscular mycorrhizal (VAM) fungi @ 5-10 g kg^{-1} seed, Hand weeding at 20 and 40 DAS, *Pseudomonas syringae* foliar spray @ 10g per litre of water at initiation of fungal diseases, Yellow sticky trap and pheromone traps @ 20-25 ha^{-1} for mass trapping and *Bacillus thuringiensis* @ 1.0 l ha^{-1}, Trap/border crops such as Suva (*Anethum graveolens*), Marigold (*Tagetes patula*), cowpea (*Vigna unguiculata*), Dhaincha (*Sesbania rostrate*) for control of insect pests

E. TECHNICAL PROGRAMME OF AICRP SOYBEAN MICROBIOLOGY FOR 2022

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 N-fixing rhizobia and P solubiling bacteria with RDF/farmers practice and with reduction of fertilization on latest release variety of soybean of a zone (Ludhiana, Delhi, Pantnagar, Indore, Sehore, Raipur and Dharwad)

Treatments-

T1=RDF (100% recommended dose of NPK fertilizers in the zone; example for central zone the recommended dose of NPK is 25 Kg N/ha, 60 Kg P/ha and 40 Kg/ha K)
T2=75% of recommended N and 100% of recommended P and K.
T3=75% of recommended P and 100% of recommended N and K.
T4= 75% of recommended N and 100% of recommended P and K+ *Bradyrhizobium daqingense*
T4=75% of recommended N and 100% of recommended P and K +Commercial/local rhizobial strain available in the zone/market
T5=75% of recommended P and 100% of recommended N and K+ *Bacillus aryabhataii*
T6=75% of recommended N & P and 100% of recommended K+ *B. daqingense*+*Bacillus aryabhataii*
T7=75% of recommended N & P and 100% of recommended K+*Bacillus aryabhataii* RDF+ Commercial/local rhizobial 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 3/21a: Assessing the impact of pre and post emergence herbicides with PGPR on soybean nodulation in unsterilized microcosms (All centres)

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)

Treatments & Design: 20 (4×5, Inoculation: 4; herbicides: 05); CRD 4×5 Factorial
Microbial strains: 03+1 uninoculated control) –seed priming

- *B. daqingense* (Rhizobial strain)
- *Paenibacillus polymyxa* (PSB strain) or *B. arboris*
- Local strain available in the respective zone

Herbicides: 05 (recommended doses)

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

Parameters (at R5 stage):

- Nodulation, LegHb, shoot height, chlorophyll content, weed population

	Details of herbicides and doses to be used in the pot 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	Propaquizafop 10EC Recommended dose 600ml/ha	Imazethapyre 10 SL(Pursuit) Recommended dose 2000ml/ha
2	Sulfentrazone 48 SC (Spartan) Recommended dose 750 ml/ha	Imazethapyre 10 SL(Pursuit) Recommended dose 1000ml/ha	-
3	Pendimethalin 38.7CS (Stamp/Panida) or Pendimethalin 30E Recommended dose 1.6 Kg/ha or 3 L/ha	-	-

* 500 L water will be used/ha for all the herbicides

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

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

Zone	**AVT II Entries**
NPZ	PS 1670
NEHZ	KDS 1096, DLSb 1
EZ	RSC 11-35
CZ (Early)	PS 1569, NRC 165, JS 22-12, JS 22-16, JS 22-18, RVSM 2012-4

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 2022-23

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

Objectives:

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

Parameter to be analysed	**Instrument/ method used**
100 seed weight	Weighing balance
Seed colour	Lab hunter colour/ horticulture colour chart
Hilum colour	Horticulture colour chart
Seed dimension	Vernier calipars
Seed lustre	Lab hunter colour

2. **To analyse soybean entries sown in different zones for cooking 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 removed during cooking per 10g seed
Sensory of cooked bean	Parameters: Softness/ Mouth feel, Beaniness, Overall acceptability
Milk yield	• Weigh 5g seed blanch for 2 minutes and soak in water overnight • Grind imbibed seed in pestal mortar • Add 50ml hot water and cook for one minute • Sieve through muslin cloth • Measure volume in measuring cylinder • Measure TSS
Tofu yield	• Take hot milk (80^0C) 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
Sensory of milk and tofu	Colour, texture/consistency, beaniness/ flavour, overall acceptability

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 and CZ

Proceedings of Plenary Session

The session was chaired by Dr Sanjeev Gupta, ADG (O&P). Dr Nita Khandekar welcomed ADG (O&P) and all the experts of the session and informed the house that six soybean varieties viz., VLS 99, NRC 149, JS 21-72, NRC 152, NRC 150 and HIMSO 1689 have been identified for the notification by CVRC. It is followed by the presentation by the Rapporteur of the various technical sessions. Dr Vineet Kumar requested to promote the entry NRC 197 (KTi free) from IVT early to AVT-I in NHZ. House agreed for promotion of NRC 197 and based on this analogy, JS 23-03, MAUS 795 and NRC 196 were also promoted from IVT early to AVT –I (normal yield trials).

Dr Sanjeev Gupta, ADG (O&P), congratulated the whole group and thanked all for the fruitful discussions in the all the technical session. He assured all the support from the council for the soybean crop. Superannuated life time members of Society of Soybean Research and Development were facilitated by ADG sir. He congratulated the scientists on identification of 6 soybean varieties. The session ended with the formal vote of thanks from Director, ICAR-IISR.

द. परिशिष्ट

D. APPENDICES

Appendix-I

Proceedings of Varietal Identification Committee (VIC) Meeting held in hybrid mode on 17th May, 2022 during 52nd 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 in hybrid mode on 17th May, 2022. 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, NewDelhi
2. Dr Sanjeev Gupta, ADG (O&P),ICAR, NewDelhi
3. Dr D.K.Yadava, ADG(Seed), ICAR, NewDelhi
4. Dr Sanjay Kumar, Director, ICAR-IISS,Mau
5. Shri D.N. Pathak, Executive Director, SOPA, Indore
6. Shri Jagdish Kumar,VicePresiden t(R&D), Ruchi Hi-Rich Seeds Pvt. Ltd., Indore
7. Dr S.K. Srivastava, Ex-Director (IISR,Indore) Bhopal
8. Dr Nita Khandekar, Acting Director, ICAR-IISR, Indore–MemberSecretary
9. Dr Sanjay Gupta, Principal Scientist & PI (PlantBreeding), ICAR-IISR,Indore

Following principal investigators of different disciplines were also present:

1. Dr R. K. Verma, Principal Scientist & PI(Agronomy), ICAR-IISR, Indore
2. Dr Laxman Singh Rajput, Scientist & PI(PlantPathology),ICAR-IISR,Indore
3. Dr Lokesh Kumar Meena,Scientist &PI(Entomology), ICAR-IISR,Indore

Varietal identification committee considered 7 proposals for identification. Following recommendations were made.

1. **VLS 99:** The candidate variety VLS 99 was considered for identification in Northern Hill Zone. Based on its 11% higher yield (2359 Kg/ha) over the best performing checks in three years of testing in AICRP the entry was recommended for release in Himachal Pradesh and hills of Uttarakhand.
2. **NRC 149:** The candidate variety was considered for its identification in Northern Plain Zone. Based on its yield (2400 kg/ha) superiority of 32.6% over the best check the entry was identified for release in Punjab, Haryana, Delhi and Uttar Pardesh excluding Bundelkhand region.
3. **JS 21-72:** The candidate variety was presented for identification in CentralZone. It has an yield of 2140 kg/ha and out yielded the best check by 7.3%. The entry is moderately resistant to charcoal rot, YMV and Anthracnose. It was identified for release in CZ comprising the states of

Madhya Pradesh,Bundelkhand region of UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra.

4. **NRC 152:** The yield of the entry (1822 Kg/ha) is 4.2% higher than the best check JS 20-34. It is double null variety free from anti-nutritional factor Kunitz trypsin inhibitor and lipoxygenase-2 developed through Marker Assisted Selection. It was identified for release in CZ comprising the states of Madhya Pradesh,Bundelkhand region of UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra.
5. **NRC 181:** The candidate variety was tested for two years in IVT and AVT I and it had inconsistent yield performance. Its testing for one more year in AICRP and presentation of proposal with other qualifying entries was recommended.
6. **NRC 150:** The entry has been tested for three years in AICRP trials and has the yield of 1757 Kg/ha with and yield advantage of 2.2% over the best check. The entry is MAS derived Lox 2 free and developed through MAS. The entry was identified for release in CZ comprising the states of Madhya Pradesh,Bundelkhand region of UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra.
7. **Himso 1689:** The entry was tested for four years and had the yield of 2078 Kg/ha which was 4.2% higher than the best check. It is moderately resistant to charcoal rot, anthracnose, target leaf spot and RAB. It was identified for release in CZ comprising the states of Madhya Pradesh,Bundelkhand region of UP, Rajasthan, Gujarat and Marathwada and Vidarbh region of Maharashtra.

Appendix-II

MONITORING TEAMS FOR *KHARIF* 2022

MONITORING TEAMS FOR *KHARIF* 2022

Team 1
Centres: Ludhiana, Palampur and Srinagar
Dr Gyanesh Satpute, Plant Breeder, ICAR-IISR, Indore- Team Leader
Dr Laxman Singh Rajput, Plant Pathologist, ICAR-IISR Indore

Team 2
Centres: Pantnagar, Almora and Majhera
Dr B S Gill, Soybean Breeder, PAU, Ludhiana
Dr. R.S. Ghawde, Soybean Pathologist, Amravati

Team 3
Centres: Mandsaur, Kota, Morena
Dr Rakesh Kumar Verma, Agronomist, IISR, Indore- Team Leader
Dr Rajesh Vangala, Plant Breeding , IISR, Indore

Team 4
Centres: Amravati, Nagpur, Raipur, Bhwanipatna
Dr S P Mehtre, Plant Breeder. VNMKV, Parbhani
Dr D S Meena, Agronomist, ARS, Kota

Team 5
Centres: Parbhani, Bidar, Adilabad
Dr Anita Rani, Soybean Breeder, ICAR-IISR Indore - Team Leader
Dr Lokesh Kumar Meena, PI-Entomology, ICAR-IISR Indore

Team 6
Centres: Pune, Sangli, Dharwad, Bengaluru
Dr Manoj Kumar Srivastava, Plant Breeder, JNKVV, Jabalpur
Dr Pawan Amrate, Plant Pathologist, JNKVV, Jabalpur

Team 8
Centres: Jorhat, Imphal, Medziphema and Umiam (Barapani)
Dr Sanjay Gupta, PI-Plant Breeding, IISR, Indore-Team Leader
Dr MP Sharma, PI-Microbiology, IISR, Indore

Team 9
Centres: Amreli, Anand and Sanosara (Bhavnagar)
Dr V Natraj, Soybean Breeder, ICAR-IISR Indore- Team Leader
Dr Raghvendra Madar, Agronomist, IISR, Indore

Team 10
Centre: Sehore, Jabalpur, Ranchi
Dr Shivkumar M, ICAR-IISR Indore -Team Leader- Team Leader
Dr Sanjeev Kumar, Plant Pathologist, 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-2022

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

Parents	Traits	No. of F1s harvested in previous year	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

ICAR-Indian Institute of Soybean Research, Indore, Madhya Pradesh, 452001
All India Coordinated Research Project on Soybean (ICAR)
52nd Annual Group Meeting
May 17-18, 2022

Venue: Soybean Processor Association of India, Scheme No. 53, Near Malviya Nagar, A.B. Road, Indore

AGENDA

17th May 2022 (Tuesday)		
09.00-10.00 hrs	REGISTRATION	
10.00-10.35 hrs	**OPENING SESSION**	
	Chairman	Dr T. R. Sharma, Deputy Director General, (CS), ICAR, New Delhi
	Co-chairman	Dr Sanjeev Gupta, ADG (O&P), ICAR, New Delhi
10.00-10.10 hrs	Welcome address, research highlights and action taken report	Dr Nita Khandekar, Director (A),ICAR-IISR, Indore
10.10-10.20 hrs	Address by Co-chairman	Dr Sanjeev Gupta, ADG (O&P), ICAR, New Delhi
10.20-10.30 hrs	Chairman's Remarks	Dr T. R. Sharma, Deputy Director General, (CS), ICAR, New Delhi
10.30-10.35 hrs	Vote of thanks	Dr Sanjay Gupta, Principal Scientist, ICAR-IISR, Indore
10.35-11.00 hrs	**Tea Break**	
11.00-13.00 hrs	**TECHNICAL SESSION I: Plant Breeding and Genetic Resources**	
	Experts	Dr S.P. Tiwari, Ex-Vice Chancellor, SK Rajasthan Agricultural University, Bikaner Dr Dr.Prabhakar,Ex-ProjectCoordinator(SmallMillets)
	Rapporteurs	Dr VednaKumari, Principal Scientist, CSKHPKV, Palampur Dr Subhash Chandra, Scientist, ICAR-IISR, Indore
11.00-11.45 hrs	Breeding Trials and Genetic Resources	Dr Sanjay Gupta, PI-Plant Breeding, ICAR-IISR Indore
11.45-12.30 hrs	Technical Programme Presentation	
12.30-13.00 hrs	Session concluding remarks	Dr S.P. Tiwari, DrSanjeev Gupta, Dr T R Sharma
13.00-14.00 hrs	**Lunch Break**	
14.00-17.15hrs	**TECHNICAL SESSION II: Plant Pathology and Entomology**	
	Experts	Dr S.C. Dubey, ADG (PP), ICAR, New Delhi Dr Kamla Jayanti, Principal Scientist & National Fellow, ICAR-IIHR, Bengaluru
	Rapporteurs	Dr P. K. Amrate, Scientist, JNKVV, Jabalpur Dr R. S. Jadhav, Jr. Entomologist, VNMAU, Parbhani

14.00-14.45 hrs	Plant Pathology Trials	Dr Laxman Singh Rajput, Scientist & PI- Plant Pathology, ICAR-IISR, Indore
14.45-15.30 hrs	Technical Programme Presentation - Plant Pathology	
15.30-16.15 hrs	Entomology Trials	Dr Lokesh Kumar Meena, Scientist & PI-Entomology, ICAR-IISR, Indore
16.15-16.45 hrs	Technical Programme Presentation - Entomology	
16.45-17.15 hrs	Session concluding remarks	Dr S C Dubey, Dr KamlaJayanti, Dr T R Sharma, Dr Sanjeev Gupta
17.15-17.30hrs	**Tea Break**	
17.30-18.30 hrs	**TECHNICAL SESSION III: Breeder Seed Production**	
	Expert	ADG (Seeds), ICAR
	Rapporteurs	Dr PunamKuchlan, Scientist, ICAR-IISR, Indore
17.30-18.00	Scenario of breeder seed production at various centres	Dr MrinalKuchlan, Senior Scientist, Seed Technology, ICAR-IISR, Indore
18.00-18.30	Variety-wise breeder seed production programme as per DAC indent	
18.30-19.30 hrs	**Varietal / Technological Identification Committee Meeting**	
18th May 2022 (Wednesday):		
10.00-11.45	**Technical Session IV: Agronomy**	
	Experts	Dr L.H. Malligawad, Professor Emeritus, UAS, Dharwad
	Rapporteurs	Dr. Somanagoude, Professor Agronomy, UAS Dharwad DrRaghvendraMadar, Scientist, ICAR-IISR, Indore
10.00-10.45	Agronomy Trials	Dr R. K. Verma, PI-Agronomy, ICAR-IISR, Indore
10.45-11.30	Technical Programme Presentation - Agronomy	
11.30-11.45	Session concluding remarks	Dr L.H. Malligawad, Dr T R Sharma, Dr Sanjeev Gupta
11.45-12.00	**Break**	
12.00-13.15	**Technical Session V: Microbiology**	
	Experts	Dr D.J. Bagyaraj, Professor Emeritus, Bengaluru
	Rapporteurs	Dr. P. Jones Nirmalnath, Professor, Microbiology, UAS Dharwad Dr NavneetPareek, Professor, Microbiology, GBPUA&T Pantnagar
12.00-12.45	Microbiology Trials	Dr M.P. Sharma, PS& PI-Microbiology, ICAR-IISR, Indore
12.45-13.15	Technical Programme & Presentation of Microbiology	
	Session concluding remarks	Dr D.J. Bagyaraj, Dr T R Sharma, Dr Sanjeev Gupta
13.15-14.00	**Lunch**	
14.00-15.45	**Technical Session V:** Transfer Of Technology	
	Expert	Dr S.K. Jha, Principal Scientist, ICAR, New Delhi
	Rapporteurs	Dr B.U. Dupare, Principal Scientist, ICAR-IISR, Indore Dr R K Verma, Scientist, ICAR-IISR Indore

14.00-14.45	Presentation and review of results of FLD	Dr RaghvendraMadar, Scientist & Nodal office FLD, ICAR-IISR, Indore
	Allotment of FLDs	All concerned centres
14.45-15.15	Tribal Sub Plan Activities	Dr Subhash Chandra, Scientist & Nodal officer, ICAR-IISR, Indore
15.15-15.45	Session concluding remarks	Dr S. K. Jha, Dr T R Sharma, Dr Sanjeev Gupta
15.45-17.00	**Technical Session VI: Food Technology**	
	Experts	Dr Nachiket Kotwaliwale, Director, ICAR-CIPHET, Ludhiana Dr Puneet Chandra, Head, Centre of Excellence on Soybean Processing & Utilization, ICAR-CIAE, Bhopal
	Rapporteurs	Dr Manoj Kumar Srivastava, Principal Scientist, Plant Biochemistry ICAR-IISR-Indore
15.45-16.15	Results of Food Technology Experiments	Dr L. Sophia Devi, Jr Food Technologist, CAU, Imphal
16.15-16.45	Technical Programme Presentation	
16.45-17.00	Session concluding remarks	DrNachiketKotwaliwale, Dr Puneet Chandra, Dr T R Sharma, Dr Sanjeev Gupta
17.00-17.30	**Break**	
17.30-19.20	**Plenary Session**	
	Chairman	DDG (CS), ICAR, New Delhi
	Co-Chairman	ADG (OP), ICAR New Delhi
	Convener	Director (A), ICAR- IISR, Indore
17.30-17.40	Welcome and Remarks	Dr Nita Khandekar, Director (A), ICAR-IISR Indore
17.40-18.30	Presentation of summary recommendations and highlights of deliberations	Rapporteurs of different sessions.
18.30-18.50	Remarks by Co-chairman	Dr Sanjeev Gupta, ADG (O&P), ICAR New Delhi
18.50-19.10	Remarks by	Dr T. R. Sharma, DDG (CS), ICAR, New Delhi
19.10-19.20	Vote of thanks	Dr Nita Khandekar, Director (A), ICAR-IISR Indore

Appendix-VI

LIST OF PARTICIPANTS FOR THE
52nd ANNUAL GROUP MEETING OF AICRP ON SOYBEAN

ICAR-New Delhi

Dr T R Sharma, DDG, Crop Science
Dr Sanjeev Gupta, ADG Crop Science
Dr D K Yadav, ADG (Seed), Online
Dr S C Dubey, ADG (PP), Online

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

1. Dr Nita Khandekar, Director (A)
2. Dr S.D. Billore, Principal Scientist, Principal Scientist (Agronomy)
3. Dr Sanjay Gupta, Principal Scientist (PI-Plant Breeding)
4. Dr Anita Rani, Principal Scientist (Plant Breeding)
5. Dr M.P. Sharma, Principal Scientist (PI-Microbiology), Online
6. Dr Vineet Kumar, Principal Scientist (Plant Biochemistry)
7. Dr B.U. Dupare, Principal Scientist (Agri. Extension)
8. Dr A. Ramesh, Principal Scientist (Soil Science)
9. Dr SavitaKolhe, Principal Scientist (Comp. Appl. In Agri.)
10. Er. D.V. Singh, Principal Scientist (Farm Machinery & Power)
11. Dr ManojShrivastava, Principal Scientist (Plant Biochemistry)
12. Dr M.B. Ratnaparkhe, Principal Scientist (Plant Biotechnology)
13. Dr G.K. Satpute, Principal Scientist (Plant Breeding)
14. Dr R. Ramteke, Principal Scientist (Plant Breeding)
15. Dr PunamKuchlan, Principal Scientist (Seed Science & Technology)
16. Dr Mrinal. K. Kuchlan, Sr. Scientist (Seed Science &Technology;
17. Dr Giriraj Kumawat, Senior Scientist (Biotechnology), Online
18. Mr. Ram Manohar Patel, Scientist (Statistics)
19. Dr Shivakumar M., Senior Scientist (Plant Breeding)
20. Dr Prince Choyal, Scientist (Plant Physiology)
21. Shri Hemant Singh Maheshwari (Microbiology)
22. Dr LokeshMeena, Sr. Scientist (PI-Entomology)
23. Dr RakeshVerma, Sr.Scientist (PI-Agronomy)
24. Dr V. Natraj, Sr. Scientist, (Plant Breeding)
25. Dr Laxman Singh Rajput, Scientist (PI-Plant Pathology)
26. DrVangla Rajesh, Scientist (Plant Breeding)
27. Dr SubhashChandr, Scientist(Plant Breeding)
28. Dr RaghvendraMadar, Scientist (Agronomy)

COORDINATING CENTRES

G.B. PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY, PANTNAGAR-263145 (Uttarakhand)

29. Dr M.K Nautiyal (Plant Breeding)
30. Dr NavneetPareek (Microbiology)
31. Dr Neeta Gaur (Entomology)
32. Seed Production In-charge (Soybean)

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

33. Dr S.R. Ramgiry, Pr. Scientist (Plant Breeder)
34. Dr (Smt.) Moly Saxena, Pr. Scientist (Plant Pathology)
35. Dr R.C. Jain, Pr. Scientist (Microbiology)
36.

AGRICULTURE UNIVERSITY, KOTA - 324001

37. Dr B.K. Patidar, Professor (Entomology)
38. Dr D.S. Meena, Assistant Professor (Agronomy)
39. Dr Bharat Lal Meena, AssistantProfessor (Plant Breeding)

REGIONAL RESEARCH CENTRE, PUNJABRAO KRISHI VIDYAPEETH (PKV), AMRAVATI (MAHARASHTRA)

40. Dr S.S. Nichal, Sr. Scientist (Plant Breeding)
41. Dr M.S. Dandge, Jr.Scientist (Agronomy)
42. Dr R.S. Ghawade, Jr. Scientist (Plant Pathology)

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43. Dr S.A. Jaybhay, Scientist (Agronomy)

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44. Dr Somana Gaude, Professor (Agronomy)
45. Dr Gopal Krishna Naidu, Sr. Scientist & Soybean Breeder
46. Dr Channakeshava Jr. Scientist (Entomology)
47. Dr ShaliniHuilgol, Scientist (Plant Pathology)

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48. Dr Onkarappa, T. Professor & Pr. Scientist (Genetics & Plant Breeding)

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

49. Dr (Mrs.) Vedna Kumari Pr. Scientist (Plant Breeding)

ICAR-VIVEKANANDA PARVATIYA KRISHI ANUSANDHAN SANSTHAN, ALMORA-263601 (Uttarakhand)

50. Dr Anuradha Bhartiya Scientist I/C(Plant Breeding)

PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA - 141001 (Punjab)

51. Dr B.S. Gill, Plant Breeder
52. Dr Guriqbal Singh, Agronomist

CENTRAL AGRICULTURAL UNIVERSITY, IMPHAL, (MANIPUR)-795004

53. Dr Heisnam Nanita Devi, Jr. Scientist (Plant Breeding)
54. Dr Toijam Sunanda Devi, Jr. Scientist (Agronomy)

55. Dr Nilima Karam, Jr. Scientist (Entomology)
56. Dr L. Sophia Devi, Jr. Scientist (Food Technology)

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57. Dr Zafar Ullah , Pr. Scientist (Plant Breeding),
58. Dr Munmi Borah, Pr. Scientist (Plant Pathology),

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59. Dr A.K. Singh, Scientist I/c. Soybean,
60. Dr PezangulieChakruno (Plant Pathology),
61. Dr Engrala Ao, Jr. Scientist (Agronomy),

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

62. Dr(Mrs.) NutanVerma, Jr.Scientist I/C (Plant Breeding),
63. Dr Arvind Kumar Singh, Jr. Scientist (Agronomy),

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

64. Dr Sunil Kumar Nag, Scientist I/C (Plant Breeding),
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92. Dr Phillips Varghese, Basant Agro Tech (I) Ltd, Akola, Maharashtra
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Appendix-VII

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 5th – 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