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केवल कार्यालयीन उपयोग हेतु

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50th Online Annual Group Meeting
Indian Institute of Soybean Research, Indore (M.P.)

मई 20, 2020/**March 20, 2020**

भाकृअनुप
ICAR

अखिल भारतीय समन्वित सोयाबीन अनुसंधान परियोजना
भा.कृ.अनु.प.–भारतीय सोयाबीन अनुसंधान संस्थान
All India Coordinated Research Project on Soybean
ICAR-Indian Institute of Soybean Research
खण्डवा रोड, इन्दौर/**Khandwa Road, Indore-452001**

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All India Coordinated Research Project on Soybean

(भारतीय कृषि अनुसंधान परिषद्)

(Indian Council of Agricultural Research)

समन्वयन एकक

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

1. GBPUA&T, Regional Research Station, Majhera-263135, Dist. Nainital, Uttarakhand.
2. CSKHPKV, Regional Research Station Bajaura-175125, Distt. Kulu, Himachal Pradesh.
3. Rajendra Agricultural University, Tirhut College of Agriculture, Dholi–843121 (Muzaffarpur) Bihar.
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* I.C.A.R. Institute-based centres

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Acknowledgement

The 50th Annual Group Meeting of All India Coordinated Research Project on Soybean was organized through video conferencing on 20th May, 2020 due to the COVID-19 pandemic. I am highly thankful to the Indian Council of Agricultural Research, New Delhi for accommodating this AGM amidst the tight schedule.

All the research and development personnel of AICRP on Soybean are extremely obliged to Dr Trilochan Mohapatra, Secretary, DARE, Govt. of India and Director General, ICAR for providing ceaseless guidance and direction for undertaking novel research and development of soybean in the country. I also sincerely thank Dr TR Sharma, DDG (CS), ICAR for being with the group for whole day and for giving his valuable inputs during various technical sessions and in the plenary session. Sincere thanks are due to Dr S.P. Tiwari, Ex-Vice Chancellor, SK Rajasthan Agricultural University, Bikaner for flagging the important issues of research in crop improvement and always being their as a guiding force.

I gratefully acknowledge the gracious presence and guidance rendered by Chairman of various technical sessions - Dr DK Yadava, ADG (Seeds), Dr SK Jha, ADG (OP), Dr P.K. Chakrabarty, Member, ASRB, Dr D.J. Bagyaraj, Professor Emeritus, Bengaluru, Dr L.H. Malligawad, Professor emeritus, UAS, Dharwad, Dr D.K. Agrawal, Director, ICAR-Indian Institute of Seed Research, Mau, Dr Rajan, ADG(PP) and Dr Katiha, TSP I/c, ICAR, New Delhi.

Thanks are due to all the rapporteurs, for recording the proceedings of respective technical sessions. The active participation, deliberation, discussion, contribution, cooperation and interaction of all the delegates in the Group Meeting is duly recognized and highly appreciated. A special thanks to Dr Savita Kolhe, Principal Scientist (Computer Application) for facilitating the video conferencing.

17/7/2020

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

Recommendations

The recommendations made during 50th Annual Group meeting of All India Coordinated Research Project on Soybean are as follows:

- Recent research advances made by the ICAR-IISR, Indore must be highlighted on institutional web site.
- Speed breeding must be an activity and Bangalore centre may be assigned this activity.
- Role of computational biology and its application in soybean improvement should be explored.
- Pre-breeding activity must be one of the important components in breeding programme and ICAR-IISR, Indore needs to initiate the same. *G max* X *G tomentella b*reeding lines developed by Dr R J Singh in University of Illinois should be introduced in India.
- AVT-2 entries should be compared with similar/respective maturity checks in Agronomical trials.
- Soybean genotype NRC-132 can be used as source for antixenosis resistance and NRC 128, DSb 34, KDS 992 and MACS 1493 can be used for antibiosis resistance.
- JS 20-71,JS 20-89,DS 3050 and AMS 1002 as resistant sources for CR, DSb 21,DSb 23 & DSb 28 for rust, can be used as resistant sources in breeding programme.
- EC 241778, EC 241780 & EC 242104 can be used as donors for rust resistant sources in breeding programme.

Proceedings of ALL INDIA COORDINATED RESEARCH PROJECT ON SOYBEAN (ICAR)
50th ANNUAL GROUP MEETING
Through Zoom Video Conferencing
May 20, 2020

The online annual general meeting of the AICRP on Soybean was held on 20th May, 2020. The inaugural session of the meeting was attended by:

- Dr T. Mohapatra, Secretary, DARE General, ICAR, New Delhi
- Dr T. R. Sharma, DDG (Crop Science) ICAR, New Delhi
- Dr S P Tiwari (Ex DDG, CS& Edn)
- Dr S. K. Jha ADG (OP), ICAR, New Delhi
- Dr D. K Yadava ADG (Seeds), New Delhi
- Dr V S Bhatia, Director, ICAR-IISR, Indore
- Dr T Radhakrishnan, Director, Directorate of Groundnut Research, Junagarh
- Principal Investigators of Plant Breeding, Agronomy, Plant Pathology, Entomology, Food Technology and Microbiology
- Scientists from AICRP Centres and ICAR-IISR, Indore

OPENING SESSION

Chairman of the session Dr T. Mohapatra, Secretary, DARE & Director General, ICAR congratulated the AICRP for developing more than 120 high yielding and disease resistant varieties including first KTI free variety. He emphasized that meeting of AICRP should be held twice a year and informed that low productivity of the crop is major concern. Increasing production and productivity of the major oil seed crop will help in reducing import of edible oil to a greater extent. He also emphasized that all the Directors of Oil seed crops must be invited for AICRP workshop. Dr Mohapatra informed that the current productivity of soybean must be enhanced by encouraging best production system and engaging KVK and State Agricultural Department. He urged all scientists to reduce the agronomical gaps by disseminating good agricultural practice and using advanced information technological tools. Promising germplasm may be imported and should be utilized in breeding programmes. He also stressed on speed breeding and value addition. Looking at increased problem of weeds in soybean crop, he urged the scientists to assess possibilities of using roundup ready/ herbicide tolerant soybean to reduce losses. He further urged for strong human resource development programme (HRD) for AICRP centers and expressed his concerns over varietal mismatch in breeder seed production.

Dr T.R Sharma, DDG (CS) requested the scientist to use the sequencing information of more than 46,000 genes available in the public domain. He stressed on improvement of narrow genetic base of the crop by employing and utilizing wild species. He urged that the scientists must take up breeding for tolerance to water logging, early maturity and food grade soybean. DDG also stressed on haplotypes breeding and strong HRD for all the AICRP centres.

Dr S.P. Tiwari, in his address mentioned the possibility of using genetic engineering to address the effects of climatic variability He expressed concern on reduction in area due to aberrant climate. He also urged that speed breeding program must be included in the technical program and appreciated the institute in taking up GGE biplots analysis.

Five technical sessions were organized:

TECHNICAL SESSION-I: CROP IMPROVEMENT AND GENETICS RESOURCES

Chairman : Dr T.R. Sharma, DDG (CS), ICAR, New Delhi
Dr S.P. Tiwari, Ex-Vice Chancellor, SK Rajasthan Agricultur
University, Bikaner

Rapporteurs : Dr G.T. Basavaraja, UAS, Dharwad
Dr Shivakumar M., ICAR-IISR, Indore

With brief introductory remarks, the chairman invited Dr Sanjay Gupta for presentation on Soybean improvement.

1. Breeding for Soybean improvement -Results of Coordinated trials in Plant Breeding

Dr Sanjay Gupta, PI (Plant Breeding), IISR, Indore presented the results of coordinated trials in plant breeding. Salient findings of the presentation are:

- In NHZ, three entries were superior to the best check IVT.
- In NPZ, NRC 149 and JS 21-71 were superior to the best check in IVT and AVTI, respectively. In this zone NRC 128, PS 1611 and PS 1613 were significantly superior to the best check in AVT II.
- In EZ, Himso 1690, SL 1213 and NRC 149 were superior the check in IVT. NRC 128, NRCSL 1, RSC 11-07, AMS 2014-1, NRC 136 and MACS 1493 surpassed the best check variety JS 97-52 by more than 12% in AVT II. NRC 136 is a drought tolerant line.
- In EZ AVT II NRC 132 was the null lox 2 entry with less beany flavour and it recorded an increase of 9% over the best check. NRC 147 the first high high oleic acid (~42%) entry in India was inferior to the best check in yield.
- None of the entries was superior to the best check in IVT of CZ. However, keeping in view the high oil content (21.5%) NRC 149 was proposed for promotion to AVT I.
- In IVT (Early) in CZ, NRC 157, NRC 158, NRC 165, NRC 152, Pusa-Sipani-408, NRC 164 and NRC 150 had yield equivalent to the best check (JS 20-34) and had up to 2.9 days (Zonal CD) of more maturity than it.
- In AVT I of CZ, RVSM 2011-35 was superior to the best check and NRCSL2, the EDV of JS 335 for YMV resistance, was superior to the recurrent parent.
- Among AVTI entries of CZ zone NRC 146 and NRC 138 were early maturing entries and the latter entry was comparable to the best check in yield and maturity.
- AMS 100-39 was superior to the best check in AVT II of CZ and early maturing entry NRC 130 was comparable to the early maturity check in yield and maturity.
- In SZ, none of the entries could perform better than the best check in IVT and in AVT I. DSb 34, MACS 1493, KDS 992 and AMS 100-39 were superior in AVT II.
- In SZ zone, EDV of MACS 450 for null KTI was inferior to the recurrent parent in AVT I. Two food grade varieties (NRC 132 and NRC 147) were superior to the best check in AVT II.
- In multi-location germplasm evaluation 159 accessions were evaluated in 8 centres of 6 zones and high yielding, early maturing and high seed weight accessions were identified.
- In National Hybridization Programme only 10 centres contributed the crosses but out of 717 seed received at UAS Bangalore (Off season Nursery) only 44 were true F1s.

- Only three centres (Imphal, Adilabad and Dharwad) utilized the off season generation advancement facility of Bangalore. IISR got 200 exotic soybean accessions multiplied at this facility in off season.
- For rapid submission of notification proposal 4 identified varieties of 2019 (SL 1104, MACS 1520, RSC 10-52, AMS-MB-5-18) were got fingerprinted from NBPGR.

2. Development of specialty varieties in soybean through marker assisted selection (MAS)

Dr Vineet Kumar, PS (Biochemistry), IISR, Indore presented the work on development of food grade soybean using marker assisted selection and the salient points are given below:

- NRC 127, an EDV of JS 97-52 for null KTI, has been released for cultivation in Central Zone.
- NRC 132 (Null lox 2) a less beany flavour entry was evaluated in AVT II of EZ and SZ.
- NRC 142, a double null entry for lox 2 and null KTI, was evaluated in AVTI in 2019 AICRP trials in all the zones.
- NRC 105 with bold seed and high sucrose content has been developed for vegetable purpose.
- IISR Indore has developed soybean breeding lines with upto 60% oleic acid content and a germplasm (IC 210) was in AVT II trials in EZ and SZ as NRC 147.
- NRC 149 a high oil entry performed better than the best check in NPZ and EZ and was comparable in CZ.
- Dr Vineet highlighted the research work on the use of markers for development of null KTI, null Lox 2 lines and on identification of genomic regions for oleic acid content.

3. Molecular tools for soybean improvement

Dr Milind Ratnaparkhe, Sr. Scientist (Biotech), IISR, Indore presented on Molecular tools for soybean improvement. Salient highlights of his presentation are:

- Identified candidate *RPP 1* gene for rust resistance in EC 241780 located at extreme end of chromosome No.18.
- Dr Milind presented the phenotyping results of 300 lines for abiotic stress/drought, root architecture, water logging, heat tolerance and yield contributing traits. This panel is also being sequenced using GBS approach at ICRISAT, Hyderabad.
- He also reported the development of multi trait allele specific gene marker assays for introgression of multiple traits like photoinsensitivity, oleic acid, salinity tolerance etc.

Discussion

1. Dr S.K. Jha, ADG (OP), ICAR, New Delhi enquired about the criteria of promotion for high oil entries and about the protein content of high oil entry NRC 149. He was informed that such a criterion would be developed and except for NRC 7 which is a very old variety, no high oil soybean variety is presently available. He was also informed that protein content of NRC 149 is about 40% and oil content is 21.5%.

2. Dr S.P. Tiwari, Ex-Vice Chancellor, SK Rajasthan Agricultural University, Bikaner remarked that:
   - Performance of centres should be based on the area covered by crop and their varieties released. Speed breeding must be an activity and Bangalore centre may be assigned this activity.
   - Role of computational biology and its application in soybean improvement should be explored.
   - Low yield should not be criteria for variety release.

3. Dr Nita Khandekar, Principal Scientist (Agril. Extension), IISR, Indore enquired about the availability of seed of NRC 127 for farmer and was informed that it was available

4 Dr T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi appreciated all the three presentations and summarized with the following remarks:

   - Charcoal rot resistance is difficult. The resistant lines reported in the presentations might be tolerant and not resistant in reality.
   - Number of crosses attempted in breeding programme is very less. To broaden genetic base, the number of crosses need to be increased and diverse parents involved.
   - Pre-breeding activity must be one of the important component in breeding programe and IISR needs to initiate the same using *G. tomentella*
   - Varieties developed through marker assisted selection (MAS) have to be compared with their recurrent parents.
   - Some centres have not attempted any crosses and proper monitoring is required to ensure that breeding programme is taken up.
   - Phenotyping of the trait is important after genotyping since success of biotechnology tools depends on phenotyping.
   - The work under AICRP was appreciated and he suggested that efforts may be made to procure pre-breeding lines developed by Dr R.J Singh at University of Illinois. He further suggested that the 200 germplasm resequenced lines in NBPGR (brought from University of Missouri) may also be used in phenotying for various traits for genome wide association studies.
   - He also stated that ICAR-IISR website needs to be updated.

The session ended with a vote of thanks

TECHNICAL SESSION-II: CROP PRODUCTION
AGRONOMY AND MICROBIOLOGY

Chairman : Dr D.J. Bagyaraj,
Professor Emeritus, Bangaluru
Dr L.H. Malligawad,
Professor emeritus, UAS, Dharwad

Rapporteurs : Dr M.D. Vyas, CoA, Sehore
Dr Rakesh Kumar Verma, IISR, Indore

1. The session started with welcome remarks by chairpersons. Results of Coordinated trials in Agronomy were presented by PI Agronomy Dr S.D. Billore. The presentation was appreciated by the chairman and the following suggestions were made:

(a) AVT-2 entries should be compared with similar/respective maturity checks.

(b) Residual effect of herbicides on succeeding crop and on soil health should also be carried out.

2. Soybean management through rhizosphere micro flora- results of coordinated trials in Microbiology was presented by Dr M.P. Sharma, PI (Microbiology), IISR, Indore. The presentation was appreciated by the chairman (Dr D.J. Bagyaraj) and following suggestions were made:

(a) A proposal may be sent to council for carrying out microbiological work for AVT-2 entries in other zones where trails are not being taken-up.

(b) Development of microbial consortia to alleviate the biotic and abiotic stresses

(c) OTC work is very useful in current scenario of climate change therefore the OTC work at Dharward may be restarted.

The session ended with a vote of thanks

TECHNICAL SESSION III: CROP PROTECTION

(I) ENTOMOLOGY

Chairman : Dr P.K. Chakrvorty
Member, ASRB, New Delhi

Rapporteurs : Dr Lokesh Kumar Meena, ICAR-IISR, Indore

At the outset, the Chairman, Dr P.K. Chakrvorty welcomed the delegates and invited Dr A. N. Sharma, Principal Scientist and PI (Entomology) to present the research results of *Kharif* 2019. Dr A.N. Sharma presented the results of seven coordinated entomological experiments conducted at 12 coordinated centres. He mentioned about three main research areas focused on by the entomologists, i.e. identification of potential sources for resistance and / or tolerance against major insect pests; tapping new approaches for insect-pest management in soybean, and monitoring the incidence of insect-pests and bio-control agents.

Dr Sharma 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 Sharma mentioned several promising genotypes for insect resistance / tolerance.

Antixenosis and Antibiosis studies were taken up with AVT-II entries. NRC 132 was found to have **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 128, DSb 34, KDS 992 and MACS 1493 were found to be promising.

While presenting the results of management of insect-pests through microbial insecticides, 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. In general application of *B. bassiana* and *N. rileyi* was found effective against major defoliators. The trial will be repeated with consortia of microbial agents to widen the scope of insect management.

Dr Sharma informed the occurrence of 21 insect-pests on soybean at different coordinating centres. In North plain zone, whitefly, girdle beetle, *Spodoptera litura*, stem fly and aphids, in North eastern hill zone, Bihar hairy caterpillar, leaf folder, 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.

Chairman opened the session for discussion. Following suggestions were made:

1. Biochemical / volatile organic chemicals as principals for antixenosis, may be characterized in collaboration with Division of Agro-Chemicals, IARI or IICB, Kolkata or any other organization.

2. Seed treatment for pest management must be made mandatory in approved package of practices.
3. A consensus bio-intensive IPM approach may be developed after modifying / validating the natural IPM protocol available in NIPHM website.
4. The recommendations for pest management can be sent to ICAR for advocating during ICAR-DAC *kharif* interface.
5. Label expansion of chemical pesticides should be increased.
6. Efforts need to be continued for developing cropping system based bio-intensive IPM (Bt, Beauveria, Metarhizium, EPN, NPV, Pheromone etc)
7. Identification of markers for biotic stress management may be initiated.
8. Development of procedure for mass multiplication of *N. rileyi* and other potent bio-pesticides and their application in farmer fields.
9. Comparison of roles of natural enemies in pest management should be assessed in inundative release v/s natural conditions.
10. Studies on different strains of entomo-pathogenic fungi should be taken up.

TECHNICAL SESSION III: CROP PROTECTION

(II) Plant Pathology

Chairman : Dr P. K. Chakrabarty
Member ASRB, New Delhi

Rapporteurs : Dr Lokesh Kumar Meena
Scientist, ICAR-IISR Indore
Dr Laxman Singh Rajput,
Scientist, ICAR-IISR, Indore

Dr P. K. Chakrabarty Member ASRB, New Delhi welcomed everyone. Dr Shamarao Jahagirdar, Principal Scientist and PI (Plant Pathology) presented the results of coordinated trials and appraised that nine pathological field trials were conducted during *kharif* 2019 at 15 coordinated centres spread over six zones to generate the information on prevalence of diseases, their severity, sources of resistance to either a single disease or multiple diseases, screening of germplasm lines for identification of sources of multiple disease resistance and integrated management of the root rot complex and stem borers of soybean .

As reported by various centres, although a total of 19 diseases had appeared across the country but only 10 of them were wide spread occurring in three or more zones and four were zone specific. Two disease *viz*., PB (Ct) and YMV were found in all the five zones which were the key diseases across the locations. Soybean genotypes belonging to IVT, AVT-I, AVT-II of different zones were evaluated for disease resistance. During last three year, PB (Ct), YMV and RAB were highly wide spread across the different geographical locations, where as PB (Ct), YMV and rust were most severe diseases based on severity.

In IVT trial; entries PS 1641, PS 1642, NRC 49 and Himso 1690 showed HR reaction over three locations for PB (ct) and DSb 33 showed HR reaction at Ugarkhurd and Dharwad. The entries DS 1318, JS 22-01, NRC 49, Himso 1690 and RVSM 2011-77 showed HR at Delhi and Ludhiana centres for YMV. The entry DSb 37 showed HR reaction to rust at all three locations.

In AVT I trials, entries DS 3110 showed AR reaction, while Himso 1689 and JS 21-71 showed HR reaction to PB (Ct) at Palampur. Entries DS 3110 and NRC 138 showed HR reaction for YMV at Delhi center and DS 3110 & JS 21-71 showed MR reaction at Ludhiana center. The entries DS 3110 and NRC 38 showed HR reaction across the zones against PB (Ct). DSb 33 showed highly resistant reaction to only Race 2 of rust and MR reaction to Race 3 of rust prevalent in Maharashtra state.

In AVT ï II trial, twenty one entries were screened. The entries NRCSL 1 and PS 1613, PS 1611 showed either AR/HR reaction over three locations (Pantnagar, Ludhiana and Delhi). All the entries showed susceptibility at Ludhiana center except NRCSL 1 and PS 1611. The entries DS 3108, MACS 1493, NRC 132 and PS 1613 showed HR reaction over two locations (Palampur and Pantnagar). The entries DS 3108 and NRC 128 showed AR/HR reaction over three zones. The entry NRCSL 1 was resistant for YMV and PB (Ct) across the locations of CZ. None of the entries showed either AR/HR reaction to TLS at Sehore and SMV & MLS at Indore centres. In SZ, DSb 34 showed HR reaction to rust at Dharwad and MR reaction at Kasbe Digraj.

In the trial on performance of previous year resistant entries, the entries JS 20-71, JS 20-89, DS 3050 and AMS 1002 maintained AR reaction at 6th year of their testing at Amravati for CR. The entries DSb 21, DSb 23 & DSb 28 maintained their HR for rust. At Pantnagar, SL 1068, SL 1123 and DS 3108 maintained AR/HR status to YMV and RAB. At Jabalpur , the entries JS 20-34, JS 20-98, JS 20-36 and NRC 125 showed HR reaction to CR.

In evaluation of germplasm line for multiple disease resistance fifty germplasm lines were evaluated. At Palampur, five entries (CAT 1241,EC 107407,EC 241771,JS 20-51,JS 20-69 and EC 241696 and EC 291398 showed multiple disease resistance to PB(Ct) and BS. At Jabalpur, EC 107407, JS 20-53, EC 109540 showed resistance to YMV and RAB diseases. At Dharwad Center, DSb 21 and EC 242104 showed multiple resistance to rust and PSS diseases. At Pantnagar, the entries EC 109540 and JS 20-69 showed resistance to RAB & PB (ct).

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

Dr Anita Rani, briefed about the identification of markers for YMV resistance in *G. soja* and *G. max*. Using these markers two breeding lines NRCSL 1 and NRCSL 2 (EDV of JS 335) have been developed in which the former was in AVT II (EZ, SZ) and the latter in AVT I (CZ). Chairman appreciated the work and its publication in high impact factor journals.

The Chairman suggested the following points:

1. Develop seed protection protocol for charcoal rot/collar rot.
2. Carbendazim +Thiophanate methyl both are benzimidazoe group of fungicides, so the treatment validated for rust may be revisited. The speaker replied that these combinations are for management of pod blight not rust.
3. Thiram +Thiophanate methyl for pod blight has been recommended for ban as per gazette notification dated 18-5-2020.The speaker replied that Thiram +Carboxin has been recommended as seed treatment option not thiram alone. There is need to look for alternate fungicides to Thiophanate methyl.
4. Infection clones for agro-inoculation can be used in screening of resistance against YMV. The infection clone may be obtained or developed in collaboration with Division of Plant Pathology of IARI, New Delhi
5. For root rot complex and stem borer, propiconazole is recommended which is not registered for use in soybean. Please confirm. If not you may not use unless it is registered. The speaker replied that propiconazole has been registered on soybean for management of rust.
6. Genetic engineering should not be kept out of options for a crop in which country is still insecure and depend on import of edible oil worth spending Rs.75,000 crores foreign exchange.
7. Dr Annapurna opined that the efficient and effective biocontrol strain should be monitored for their survival at different climatic conditions.

General Points:

1. In order to reduce substantial loss (35-65%) due to weeds, clear field technique has become common in rice and other crops including sunflower & soybean.
2. IISR can also attempt to develop herbicide tolerant crop by conventional techniques, mutagenegsis or screening of wild species and germplasm that has single point mutation in AHAS (acetohydroxyacid synthase) or ALS(acetolactate synthase) genes substituting one AA ï alanine to valine rendering the plants insensitive to imidazole group broad leaved herbicides. This trait can be introduced by conventional breeding in imidazoline sensitive plants.

At the end chairman thanked the speaker for the nice presentation and compilation and also the delegates for their active participation and interaction. The sessions ended with vote of thanks to the Chairman and all participants.

TECHNICAL SESSION-IV: NUCLEUS AND BREEDER SEED PRODUCTION

Chairman : Dr D K Yadava,
ADG (Seeds), ICAR

Co-Chairman : Dr D K Agrawal
Director, ICAR-Indian Institute of Seed Research, Mau

Rapporteurs : Dr B S Gill, PAU Ludhiana
Dr Manoj Shrivastava, JNKVV, Jabalpur

The session started with review of breeder seed production during Kharif 2019. Dr M.K. Kuchlan, presented the figures for production of breeder seed of 41 varieties at various AICRP centres. He informed the house that last year was not a good year for production of breeder seed and there is a deficiency of seed of major varieties. As per DAC indent of 16881 quintals of breeder seed, a total of 11982 quintal was produced thus there was a deficit of 4899 quintal over the indent.

Against the total DAC indent of 16881q, AICRPS centres were allotted a target of 17891q for breeder seed production. The highest target of 3064q was for JS 20-34 followed by 2435 q for JS 335 and 1841 q for JS 20-29. Three major varieties, JS 20-34, JS 335 and JS 20-29 had a deficit of 1650, 247 and 1068 q, respectively, over the indent. To meet this deficiency a contingency seed production was taken up during rabi/summer 2019-20 and 1800q of production is expected.

The chairman expressed satisfaction over the contingent plan and also expressed concern over the shortfall of production of new varieties, JS 20-29 and JS 20-34. He stated that breeder seed being the sole responsibility of ICAR and SAUs we should make all out efforts to fulfill the countryôs demand of soybean seed.

The allocation for production of breeder seed during *kharif* 2020 was taken up. A total tentative indent of 13107.3 q has been received from DAC for 46 varieties. The total allocation of 14038 q has been made to different centres.

The session ended with thanks to the chairman.

Final Allotment of Soybean Breeder Seed Production for Kharif 2020 at AICRP Soybean

S. No.	Variety Name	Year	DAC indent	Centre	Allotment
1.	JS 20-116	2019	**169.50**	JNKVV	**170**
2.	JS 20-94	2019	**203.00**	JNKVV	**300**
3.	JS 20-98	2018	**1583.70**	JNKVV	1050
				RVSKVV	200
				Kota	100
				Udaipur	100
				Raipur	200
				Total	**1650**

4..	JS 20-69	2016	**602.20**	JNKVV	400
				RVSKVV	100
				Parbhani	100
				Raipur	50
				Total	**650**
5.	JS 20-34	2015	**2963.80**	JNKVV	500
				Kota	800
				Udaipur	600
				RVSKVV	800
				Amravati	150
				NSC	100
				Parbhani	100
				Total	**3050**
6.	JS 20-29	2014	**1208.85**	RVSKVV	315
				Kota	200
				Udaipur	200
				Lokbharti	260
				Parbhani	250
				Total	**1225**
7.	JS 97-52	2008	**67.00**	Raipur	70
				Ranchi	15
				Total	**85**
8.	JS 95-60	2007	**684.00**	RVSKVV	600
				Kota	150
				Total	**750**
9.	JS 93-05	2002	**252.00**	RVSKVV	100
				Dharwad	50
				Raipur	50
				Rahuri	75
				Adilabad	25
				Amravati	75
				Total	**375**
10.	JS 335	1994	**2037.40**	RVSKVV	200
				Dharwad	600
				Amravati	100
				Rahuri	500
				Bengaluru	300
				Raichur	150
				Adilabad	150
				Shimoga	100
				Total	**2100**
11	RVS 2001-4	2014	**569.80**	RVSKVV	600
12	Raj Soya -18	2017	**347.00**	RVSKVV	400
13	RVS 2002-4	2017	**320.00**	RVSKVV	320

14	RKS 18	2007	**3.13**	Kota	5
15	RAUS 5	2007	**3.13**	Kota	5
16	DSb - 21	2014	**270.80**	Dharwad	300
17	MAUS-612	2018	**175.20**	Parbhani	200
18	MAUS - 162	2014	**293.00**	Parbhani	325
19	MAUS 158	2010	**445.00**	Parbhani	500
20	MAUS-71	2002	**430.00**	Parbhani	500
21	NRC-86	2015	**120.00**	Indore	140
22	NRC-7	2001	**2.00**	Indore	2
23	NRC 127	2018	**2.00**	Indore	5
24	CG Soya 1	2018	**58.00**	Raipur	70
25	Basara	2018	**50.15**	Adilabad	60
26	MACS 1281	2016	**5.00**	Pune	7
27	MACS 1188	2013	**50.00**	Pune	60
28	KDS 726	2019	**35.00**	Rahuri	40
29	KDS 758	2018	**10.00**	Rahuri	12
30	KDS 344	2015	**5.00**		10
31	Phule Kalyani	2006	**23.00**	Rahuri	30
32	AMS 1001	2019	**21.00**	PDKV	25
32	PS-1480 (Pant Soya-21)	2017	**5.00**	Pantnagar	6
33	PS-1523 (Pant Soya-23)	2017	**5.00**	Pantnagar	6
34	PS-24 (Pant Soya-1477)	2014	**10.00**	Pantnagar	12
37	Him Soya	2019	1.00	Palampur	2
38	Hara Soya	2001	2.00	Palampur	2
39	VL Soya 89	2019	6.00	Almorah	6
40	VL Soya 65	2010	4.00	Almorah	4
41	SL 958	2015	0.35	Ludhiana	1
42	BSS-2	2019	2.50	Ranchi	3
43	Birsa Soya -1	1983	3.75	Ranchi	4
44	JS 61-24*		10.00		
45	RVS*		10.00		
46	JS 1025*		20.00		
	Grand Total		**13107.26**		**14038**

TECHNICAL SESSION-V:
TRANSFER OF TECHNOLOGY AND STC/TSP AND FOOD TECHNOLOGY

Chairman	**:**	Dr S.K. Jha, ADG(OP), ICAR, New Delhi Dr P. Katiha, I/c TSP, ICAR
Rapporteurs	**:**	Dr B.U. Dupare, IISR, Indore Dr Nilima Karam, CAU, Imphal

The technical session started with the welcome address by the Chairman. Dr SK Jha, Assistant Director General (Oilseed and Pulses), ICAR, New Delhi. The session included three presentations. Initially, Dr S. D. Billore, Principal Investigator (Agronomy) delivered presentation ñBridging the Yield Gap in Soybean-Technology Transfer through Frontline Demonstrationsò highlighting the overall achievements of the frontline demonstration conducted across the country. The chairman appreciated the efforts of different centers regarding the progress achieved in the organization of FLDs. However, while analyzing the data meticulously, he remarked that while allotting preference should be given to public funded research organizations rather than private agencies like SOPA & Solidaridad. Similarly, he also emphasized to include latest varieties in FLD while removing the varieties completing 10 years. The Chairman also requested to conduct Field Days along with FLDs inviting the extension staff of the concerned district to see the performance of the new technologies under FLD for its horizontal dissemination among the other farmers.

The second presentation in this Technical Session was made by Dr A. N. Sharma on ñExtending the benefits of improved technologies-Activities undertaken by various centres under STC/TSPò. The chairman appreciated the activities conducted in remote and tribal dominated areas for promotion of activities contributing livelihood security to the tribal population. He also suggested including organization of more training programmes along with frontline demonstrations in the tribal areas which may supplement these groups for more economic gain.

The last presentation in this technical session covered ñProcessing and value addition in Soybean in NEH regionò which was delivered by Dr L. Sophia Devi, CAI, Imphal. She presented the achievement of various activities conducted under the project in the area. She also informed the house regarding development, promotion and commercialization of fermented soy product ie Hawaijar which may gain the popularity in the region. The chairman asked the centre to explore the possibilities for applying the patent/copyright for the said product so that it is being made available to population of larger area. Dr A. N. Sharma suggested organizing a Research-Industry Interface involving the similar industries for taking up the commercial marketing of the soy products. Meanwhile, the centre may collaborate with some medico/nurtritionists for promotion of the soy products till the industries are approached.

Dr Katiah, also requested to upload the information on web portals specially developed for monitoring the data of the quarter-wise achievement of the progress made under TSP activities. The chairman congratulated all the three speakers for their outstanding contribution in achieving the targets during the year.

PLENARY SESSION

Proceedings of Plenary Session

The session was chaired by DDG (CS) ICAR, New Delhi and co-chaired by Ex-DDG (CS and Edn) Dr S P Tiwari. Technical programmes for kharif 2020 were presented by principal investigators of plant breeding, plant pathology, entomology, microbiology and food technology. Dr Sanjay Lal raised his concerns on promotion of his 3 entries. Chairman asked ADG (OP) to look into the matter and resolve the issue later. Rapporteurs of various technical sessions viz. Plant Breeding, Agronomy, Entomology, Plant Pathology, Microbiology and Seed Productions presented the proceedings and the Technical Programme for *kharif* 2020 season. At the end Dr Nita Khandekar, principal scientist (Agril. Extn.) IISR, Indore expressed gratitude to the DG, DDG, Dr S P Tiwari for providing valuable suggestions. She thanked ADG (OP), ADG (Seed), Dr P Chakrabarty, Member, ASRB, Dr D J Bagyaraja for chairing different suggestions.

TECHNICAL PROGRAMME OF PLANT BREEDING FOR KHARIF 2020

1. CO-ORDINATED VARIETAL TRIALS

A. NORTHERN HILL ZONE:

Advanced Varietal Trial I (AVT-I)

DESIGN	R.B.D.
GROSS PLOT SIZE	8 rows, 5m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Almora, Palampur, Majhera
ENTRIES	VLS 99, SL 1213
CHECKS	VLS 89, PS 1556, VLS 63
SEED	1.0 kg/entry/location

B. NORTHERN PLAIN ZONE (NPZ):

Advanced Varietal Trial I (AVT-I)

DESIGN	R.B.D.
GROSS PLOT SIZE	8 rows, 5m long (5.4 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8m long (4.5 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Pantnagar, Delhi, Ludhiana
ENTRIES	NRC 149, DS 9421
CHECKS	SL 958, SL 1074, PUSA 9712, PS 1347
SEED	1.5 kg/entry/location

DS 9421 is EDV of Pusa 9712 for null KTI. Its null KTI status would be checked at IISR, Indore, Oil content of NRC 149, other AVT I entries and checks would be done at IISR, Indore in all the zones where it is being promoted.

C. NORTH EASTERN HILL ZONE (NEHZ):

Advanced Varietal Trial I (AVT-I)

DESIGN	R.B.D.
GROSS PLOT SIZE	8 rows, 5m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Jorhat, Imphal, Umiam
ENTRIES	NRC 142
CHECKS	MACS 1460, JS 20-116, RKS 113
SEED	1.5 kg/entry/location

D. EASTERN ZONE (EZ) :

Advanced Varietal Trial I (AVT-I)

DESIGN	R.B.D.
GROSS PLOT SIZE	8 rows, 5m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Bhawanipatna, Raipur, Ranchi, Dholi
ENTRIES	SL 1213, NRC 149, Himso 1690
CHECKS	MACS 1460, JS 20-116, RSC 10-46
SEED	1.0 kg/entry/location

Oil content of NRC 149, other AVT I entries and checks would be done at IISR, Indore

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

Advanced Varietal Trial I & Advanced Varietal Trial II (AVTI +AVT-II)

DESIGN	R.B.D.
GROSS PLOT SIZE	12 rows, 5m long (5.4 x 5 m sq)
NET PLOT SIZE	10 rows, 4.8m long (4.5 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti
ENTRIES	NRC 149, Himso 1689*, JS 21-72*, RVSM 2011-35**, NRCSL 2**#, NRC 138**, AMS 100-39***, NRC 142**$
CHECKS	NRC 86, JS 20-34, JS 20-98, RSC 10-46, JS 335**
SEED	1.5 kg/entry/location

*Repeat AVT I entries. **AVT II Entries, #NRCSL 2 is EDV and would be compared with JS 335 only. NRC 138 is early maturing entry and would be compared with JS 20-34 only. $NRC 142 to be analyzed for reduced beany flavor and null KTI in AICRP. Oil content of NRC 149, other AVT I entries and checks would be done at IISR, Indore. ***Repeat AVT II entry: Fresh seed supplied by breeder is to be used at all centres.

Advanced Varietal Trial I (AVT-I): Early

DESIGN	R.B.D.
GROSS PLOT SIZE	8 rows, 5m long (3.6 x 5 m sq)
NET PLOT SIZE	6 rows, 4.8m long (2.7 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Amravati, Anand, Indore, Jabalpur, Kota, Morena, Nagpur, Parbhani, Sehore, Amreli, Lok Bharti, Mandsaur
ENTRIES	NRC 158, NRC 152, NRC 157, NRC 165, NRC 164, NRC 150, Pusa Sipani 408
CHECKS	JS 20-34; JS 95-60
SEED	1.0 kg/entry/location

F. SOUTHERN ZONE (SZ) – Pune, K. Digraj, Bengaluru, Dharwad, Adilabad & Bidar

Advanced Varietal Trial II (AVT-II)

DESIGN	R.B.D.
GROSS PLOT SIZE	12 rows, 5m long (5.4 x 5 m sq)
NET PLOT SIZE	10 rows, 4.8m long (4.5 x 4.8 m sq)
REPLICATION	Four
LOCATIONS	Pune, K. Digraj, Bengaluru, Dharwad, Adilabad and Bidar
ENTRIES	DSb 33, AMS 100-39*, NRC 142$, MACSNRC1667, NRCSL1
CHECKS	KS 103, DSb 23, DSb 21, MACS 450, JS 335
SEED	1.0 kg/entry/location

*Repeat AVT-II entry. Fresh seed supplied by breeder is to be used at all centres. $NRC 142 and checks to be analyzed for reduced beany flavor.

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	Four

LOCATIONS	Pune, Bengaluru and Adilabad
ENTRIES	Karune
CHECKS	MACS 450, Harasoya, KDS 726 Other checks for increasing error DF: DSb 21
SEED	2.0 kg/entry/location (Dr Onkarappa, please ensure the availability of seed of Karune in test centers.

UAS Bengaluru would ensure the availability of seed of Karune in test centers.

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

DESIGN	R.B.D.
PLOT SIZE	3 rows, 3m long (1.35 x 3 m sq)
REPLICATION	Three
LOCATIONS	
• **NHZ**	Almora, Palampur, Majhera
• **NPZ**	Pantnagar, Delhi, Ludhiana
• **EZ**	Ranchi, Raipur, Dholi and Bhawanipatna
• **NEHZ**	Umiam, Imphal and Jorhat
• **CZ**	Jabalpur, Sehore, Parbhani, Amrawati, Kota, Morena, Anand, Amreli, Indore, Lok Bharti and Nagpur, Mandsaur
• **SZ**	Pune, K. Digraj, Bengaluru, Dharwad, Adilabad and Bidar
SEED	8 kg/entry
CHECKS	There will be following checks in each zone:
• **NHZ**	PS 1556, VLS 89, VLS 63
• **NPZ**	SL 955, SL 1074, SL 1104,
• **EZ**	MACS 1460, JS 20-116, RSC 10-46
• **NEHZ**	MACS 1460, JS 20-116, RKS 113
• **CZ**	NRC 86, JS 20-116, MACS 1520
• **SZ**	MACS 1460, DSb 23, DSb 21

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 1691, Himso 1692
2.	Almora	VLS 101
3.	Ludhiana	SL 1250, SL 1212
4.	Pantnagar	PS 1664, PS 1661, PS 1670
5.	Delhi	DS 3144, DS 3105, DS 1312
6.	Raipur	RSC 11-35, RSC 11-39
7.	Jabalpur	JS 22-11, JS 22-14
8.	BARC	TS 4 and TS 20-5
9.	Ranchi	BAUS- 96-17, BAUS- 31-17
10.	Amreli	AS 15
11.	Imphal	CAUMS 2
12.	Dharwad	DSb 38, DLSb 1, DLSb 2
13.	Indore	NRC 176, NRC 170, NRC 171, NRC 184, NRC 185, NRC 109, NRC 128
14.	Sehore	RVS 2011-10, RVS 2012-10
15.	Morena	RVSM 2012-11
16.	Amravati	AMS-0542, AMS-2017-1
17.	Kasbe Digraj	KDS 114, KDS 1096

18.	Kota	AUKS 206, AUKS 207
19.	Pune	MACS 1691, MACS 1701
20.	Parbhani	MAUS 768, MAUS 806
21.	Adilabad	ASb 9, ASb 36

H. 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 95-60, JS 20-34
Entries	
• **Jabalpur**	JS 22-12, JS 22-16, JS 22-18
• **Pantnagar**	PS 1659, PS 1660, PS 1569,
• **Sehore**	RVS 2011-4
• **Morena**	RVSSM 2012-4
• **Kota**	AUKS 203, AUKS 199
• **Delhi**	DS 3152
• **Indore**	NRC 172, NRC 173, NRC 174, NRC 175, NRC 177, NRC 178, NRC 179, NRC 180, NRC 181, NRC 182, NRC 183, NRC 186
• **Pune**	MACSNRC 1711

I. Vegetable soybean IVT trial:

DESIGN	R.B.D.
GROSS PLOT SIZE	6 rows (3 rows for vegetable and 3 rows for seed)
ROW LENGTH	3 meter
RxR	45cm
REPLICATION	Three
LOCATIONS	**NHZ:** Palampur, Almora, **CZ:** Indore, Amravati, Parbhani, Kota, **EZ:** Raipur, Ranchi, Dholi **SZ:** Pune, Bengaluru, Adilabad
ENTRIES	NRC 187, NRC 188
CHECKS	Harasoya, Karune (National Checks), VLS 59 (NHZ)~~Swarna Vasundhara~~* MACS 1460 (EZ), KDS 726 (SZ), JS 95-60 (CZ)
SEED	1 kg/entry/location

Data to be recorded	1. Germination percentage 2. days-to-flower 3. days-to-picking at R6 stage [when the pod cavity is completely filled but pods not started turning yellow] 4. Pod appearance at picking stage (Glabrous/pubescent) 5. 100 Green seed weight at picking 6. Moisture % at picking stage 7. Sucrose content of green seed at picking stage 8. Green Pod Yield (kg /ha) at picking stage 9. Plant height (cm) 10. Day-to -maturity 11. Yield (kg /ha) of Mature seeds 12. Hedonic scale (1-9) sensory evaluation of fresh green seeds (at R6 stage) to be conducted by expert panel

*In EZ, seed of Swarna Vasundhara not available. MACS 1460 would be used as check.

All checks for IVT trials will be provided by the concerned breeder to IISR-Indore.

2. G X E interaction trial

10 entries of IVT-2019 would be repeated for generating 2 year data for G X E analysis.

Seed Supply: Harvested seed of IVT-2019 is to be used in trial.

Entries:

SL 1213, DS 1318, JS 22-01, NRC 149, DS 1326, SL 1234, Himso 1690, JS 22-07, DS 1320, AUKS 218

Locations: All centres of all zones.

3. Multi-location Germplasm Evaluation Trial

Accessions: 125

Design: Augmented

Row length: 3m

1-25 Germplasm 3-4 zonal checks (c1, c2, c3, c4, c5) (Checks to be randomized in block) Block 1	26-50 Germplasm 3-4 zonal checks (c1, c2, c3, c4 c5) (Checks to be randomized in block) Block 2	51-75 Germplasm 3-4 zonal checks (c1, c2, c3, c4 c5) (Checks to be randomized in block) Block 3	76-100 Germplasm 3-4 zonal checks (c1, c2, c3, c4 c5) (Checks to be randomized in block) Block 4	101-125 Germplasm 3-4 zonal checks (c1, c2, c3, c4 c5) (Checks to be randomized in block) Block 5

Characters

1. Days to flower,
2. Days to maturity,
3. Plant height,
4. Number of nodes/plant,
5. Number of pod cluster /plant,
6. pods/plant,
7. row yield,
8. yield/plant,
9. 100 seed weight

Centres:

NHZ: Palampur, Almora

NPZ: Pantnagar
NEHZ: Manipur
Eastern Zone: Raipur
Central Zone: Jabalpur, and Parbhani.
Southern Zone: Pune
Checks: Zonal Checks after every 5 rows of the accessions. Same checks are to be repeated in all blocks.
NHZ: VLS 59, VLS 63, PS 1556, Himso 1685, Harasoya
NPZ: SL 958, SL 955, SL 979, PS 24, PS 1347
NEHZ: MACS 1460, RKS 113, KDS 753, RSC 10-46, RVS 2010-1
Eastern Zone: MACS 1460, RKS 113, KDS 753, RSC 10-46, CG Soya 1
Central Zone: : NRC 86, JS 20-34, JS 20-29, JS 20-69, JS 20-98.
Southern Zone: MACS 1460, KDS 753, DSb 23, DSb 21, MACS 1188

4. National Hybridization Programme:

- Thrust areas for all centres are given below. Centre would itself take up crosses based on these thrust areas. A few crosses would be suggested by IISR.
- F1s would be sent to UAS, Bangalore for off season growing and hybridity confirmation. Based on the parents F2s would be zonally multiplied and bulks would be sent to IISR Indore.
    - NHZ: Palampur
    - NPZ: Pantnagar
    - NEHZ: Imphal
    - EZ: Raipur
    - CZ: Jabalpur
    - SZ: Bangalore
- All centres are to use off season generation advancement facility of UAS Bangalore with intimation to IISR, Indore.

Centre Wise Thrust Areas

1	**Sehore**	90 Days Maturity, Charcoal Rot
2	**Pune**	Food grade soybean, earliness (90 days), long juvenility
3	**Pantnagar**	Photoinsensitivity, YMV, RAB
5	**Delhi**	Photoinsensitivity, YMV, RAB
6	**Parbhani**	Stem fly, Girdle Beetle, Earliness (90 Days), Long juvenility, Drought
8	**Indore**	Drought, heat, water logging, CR resistance, Anthracnose resistance, up to 90 days maturity, seed coat strength, vegetable and food grade soybean, Insect (Defoliators) tolerance.
9	**Ludhiana**	Photoinsensitivity, YMV & RAB Resistance
10	**Jabalpur**	CR, YMV, RAB resistance and up to 90 days maturity
11	**Palampur**	Up to 110 days maturity, vegetable types, FLS resistance, Varieties for maize intercropping
13	**Dharwad**	Rust and YMV Resistance . Identification of resistant sources for pod borer Cydia ptychora.
14	**Almora**	Black soybean with KTI free, FLS resistance
15	**Amaravati**	CR resistance,upto 90 days maturity, drought tolerance
16	**Bangalore**	Off season nursery, Vegetable soybean,
17	**Raipur**	Indian Bud Blight, Pod Blight and RAB resistance, Tall high yielding varieties

18	**Kota**	Up to 90 days maturity, Insect tolerance (Girdle beetle and defoliators)
19	**Imphal**	Food usage
20	**Kasbe Digraj**	Rustresistance and Long juvenility
21	**Jorhat**	Waterlogging tolerance and collar rot resistance
22	**Ranchi**	Initiate programme on soil acidity tolerance, Vegetable soybean
23	**Morena**	Early and drought tolerance
24	**Amreli**	Early and drought tolerance
25	**Adilabad**	Drought tolerance, pod blight resistance

(B) TECHNICAL PROGRAMME OF AGRONOMY & FRONTLINE DEMONSTRATIONS FOR 2020-21

AGRON-1/20: Evaluation of AVT-II entries under different row spacing

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

Treatment:
(A) Main plot : Row spacing (2)

1. 30 cm
2. 45 cm

(B) Sub plot: Entries- ASP II entries as per technical programme of plant breeding 2020-21.

Zone	Entries
North Hill Zone	**Nil**
North Plain Zone	**Nil**
Central Zone	RVSM 2011-35, NRCSL 2, NRC 138, AMS 100-39, NRC 142, NRC 86 (c), JS 20-34 (c)
Southern Zone	DSb 33, AMS 100-39, NRC 142, Karune, KS 103 (c), DSb 23 (c)
Eastern Zone	**Nil**
North Eastern Hill Zone	**Nil**

Design: Split plot, **Replication:** 3, **Plot Size:** 3.6 x 6 m

Observations: Branches per plant, pods per plant, seed index, dry weight per plant 30, 45 and 60 DAS, CGR, RGR, seed yield kg/ha, straw yield kg/ha, harvest index, grain production efficiency (kg/ha/day) and RUE

Note: *Concerned breeder will provide 4 kg seed of each entries up to 31st May, 2020.*

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** ï Wheat (Ludhiana, Pantnagar, Ranchi, Pune), Fallow (Bangalore), Chickpea remaining centres)

Design: Strip plot, **Replication:** 4 **Plot Size :** 3.6 x 6 m (fixed site)

Observations: Seed yield, straw yield, HI, SEY, Net Return, B:C ratio, initial N, P, K, N, P, K uptake, balance sheet of N, P, K, Organic carbon, physical properties (bulk density, WHC, porosity after four years)

AGRON-3/18: System intensification for soybean productivity augmentation under Ridge Furrow Planting

Treatment:
A. Main Plot: Variety (2)

Zone	Centre	Variety
North plain	Pantnagar, Ludhiana, Delhi	PS 1092, SL 958
Central	Kota, Amravati, Sehore, Deogarh Baria	JS 20-34, RVS 24
Eastern	Raipur, Ranchi	JS 95-60, RSC 10-46
Southern	Dharwad, Adilabad	JS 93-05, MACS 1188
North Eastern Hill	Imphal, Medziphema	JS 93-05, JS 97-52

B. Sub-plot: Plant Geometry (4)
I. 45 × 5 cm
II. 45× 10 cm
III. 45 × 15 cm
IV. 45 × 20 cm

Note: The seed rate will be based on seed index and 70% germination basis.

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 and 60 DAS, seed yield kg/ha, straw yield kg/ha, harvest index.

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

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

Treatment:
1. Full package (Seed treatment, seed inoculation, RDF, weed management, insecticide, Ridge furrow)
2. Full package ï seed treatment
3. Full package ï seed inoculation

4. Full package ï RDF
5. Full package ï weed management
6. Full package ï insecticide application
7. Full package ï Ridge furrow

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

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

AGRON- 5/20. Drought alleviation in soybean through foliar application of Thio-urea (in collaboration with BARC, Mumbai)

Treatment:
A. Variety: 2

Zone	Centre	Variety
North plain	Ludhiana, Pantnagar, Delhi	PS 1347, SL 958
Central	Sehore, Kota, Amravati, Devharbaria	NRC 86, RVS 24
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 30, 45, 60, 75 and at harvest, CGR, RGR, 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).

AGRON-6/20. Bio-efficacy evaluation of Potassium Salt of Active Phosphorous (PSAP) on Soybean

Zone	Centre	Variety
Central	Amravati, Sehore, Kota	RVS 24
Southern	Pune, Dharwad, Adilabad	MACS 1188
North plain	Pantnagar	PS 1347
Eastern	Ranchi, Raipur	JS 97 52
North eastern hill	Imphal	JS 97 52

Treatment: 12
T1 - RDF + Recommended plant protection measures without PSAP
T2 - T1 + PSAP @ 6g/l
T3 ï T1 + PSAP @ 9g/l
T4 - 75% RDF (75% P & K) + 75% Recommended plant protection measures (No. of insecticides and pesticides sprays reduced to 75%) without PSAP
T5- T4 + PSAP @ 6g/l
T6 ï T4 + PSAP @ 9g/l

T7 - 50% RDF (50% P K) + 50% Recommended plant protection measures (No. of insecticides and pesticides sprays reduced to 50%) without PSAP
T8 ï T7 + PSAP @ 6g/l
T9 ï T7 + PSAP @ 9g/l
T10 - 00% RDF (100% N, 00% P & K) + 00% Recommended plant protection measure (No. of insecticides and pesticides sprays reduced to 00%) without PSAP
T11 ï T10 + PSAP @ 9g/l
T12 ï T10 + PSAP @ 12g/l

Replication: 3 Design: RBD Plot size: 3.6 x 6 m

Product application: Foliar sprays at: (i) 40 days after sowing (Pre-flowering)- 300 L PSAP Solution per Hector in first spray, (ii) 55 days after sowing (Post-flowering) - 450 L PSAP Solution per Hector in second spray, (iii) 70 days after sowing (Pod-development) - 600 L PSAP Solution per Hector in third spray.

NOTE: Spray the leafs thoroughly inside out with PSAP solution.

Observations: Branches/plant, Pods/plant, Seed index, Number of nodules/plants at 50% flowering and their dry weight, Average height of plant, Plant dry matter at 30, 45 and 60 DAS, CGR (crop growth rate) & RGR (relative growth rate) at 30-45 and 45-60 DAS, Seed yield/plant, Seed yield, Straw yield, Biological yield, Harvest index, Phytotoxicity symptoms (on 1 to 10 scale), Economics (Cost of cultivation, Gross and net returns, B:C ratio, Incremental cost benefit ratio-IBCR)- ***Cost of PSAP is Rs.1750/Kg***

Note: *Pre harvest and after harvest soil samples and plant (seed and straw) samples provided by each centre for chemical analysis to the concerned firm.*

Formulae
1. ***Crop growth rate (CGR)*** = 1/p x (W2 ï W1) / T2-T1 (g/m2/day)
2. ***Relative crop growth rate (RGR)*** = (logln W2 - logln W1) / T2 ï T1 (g/g/day)
3. ***Rainfall use efficiency*** (RUE kg/ha-mm) = grain yield (kg/ha) / rainfall (mm) received during crop growing period.

FRONTLINE DEMONSTRATIONS

Allotment of FLDs at different AICRPS Centres for 2020-21

S. No.	Centre State	No. of FLDs	Varieties
1.	Palampur (CSKHPKV) Himachal Pradesh	10	Himso 1588, Hara Soya
2.	Almora (VPKAS) Uttrakhand	10	VLS 49, VLS 65
3.	Pantnagar (GBPUA&T) Uttaranchal	10	PS 1347, PS 1092, PS 1042, PS1225, PS 19
4.	Ludhiana (PAU) Punjab	10	SL 525, SL 744
5.	Indore (IISR/AICRPS) Madhya Pradesh	40	JS 20-29, JS 20-34, JS 20-69
6.	Sehore (RVSKVV) Madhya Pradesh	10	RVS 18, JS 20-34, JS 20-69, RVS 2001-4, RVS 24
7.	Kota (MPUA&T) Rajasthan	30	RKS 113, JS 20-34, RKS 24, RKS 45
8.	Parbhani (MAU) Maharashtra	50	MAUS 158, MAUS 162
9.	Amravati (PDKV) Maharashtra	20	AMSMB 5-18
10.	Sangli (MPKV) Maharashtra	25	DS 228, KDS 344
11.	Dharwad (UAS) Karnataka	10	DSb 21, DSb 23-2
12.	Adilabad (ANGRAU) Telengana	10	ASb 22, LSb 18
13.	Medziphema Nagaland	10	JS 97 52, RKS 18
14.	Ugar Khurd (Ugar Sugar Works Ltd.), Karnataka	50	DSb 21, JS 93 05
15.	Raipur (IGKVV) Chhattisgarh	10	CG Soya 1, RSC 10 46, JS 97 52
16.	Ranchi (BAU) Jharkhand	10	BSS 2, JS 97 52, RKS 18
17.	Imphal (CAU) Manipur	15	RKS 18, DSb 19, MACS 1460, JS 335
18.	SOPA, Indore Madhya Pradesh	270	JS 95 60, Ahilya 3, JS 93 05
19.	Soildaridad, Bhopal Madhya Pradesh	160	JS 95 60, Ahilya 3, JS 93 05
20.	KVK, Bharuch Gujarat	15	JS 95 60, JS 93 05
21.	KVK Karda Maharashtra	100	MAUS 162, JS 93 05, AKS 311
22.	Dholi (RAU) Bihar	15	JS 97-52, RKS 18
23.	DevgrahBaria (TRTC) Gujarat	10	JS 95 60, JS 93 05
	Total	**900**	

Note:
(i) All the centres are requested to follow the location/zone specific recommended soybean production technology capsule as given below.
(ii) FLDs should be conducted in one cluster (10 FLDs) and that is to be in one village for consecutive two years.
(iii) If more than 10 FLDs allotted to any centre, they may increase the number of clusters in multiples of 10 FLDs.
(iv) ***More than 10 years old varieties should be avoided in FLDs.***

Zone-wise Production Technology Capsule

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 2020-21				
2. Planting time	Last week of May to June end	15th June to 5th July	20th June to 5th July	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 + Cabendazim 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 ï 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; ***Insecticie + Herbicide combinations:*** **Stem fly**- Chlorantraniliprole + Imazethapyr/ Quizalofop ethyl; **Semi-loopers**- Chlorantraniliprole + Imazethapyr/Quizalofop ethyl OR Indoxacarb + Imazethapyr; **Tobacco caterpillar** ï Chloantraniliprole/Quinalphos + Imazethapyr OR Quinalphos + Quizalofop ethyl; **Girdle beetle** ï 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.				

(c) TECHNICAL PROGRAMME OF ENTOMOLOGY FOR *KHARIF* 2020

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

Zone	Centre	Major insect-pests
NHZ	Palampur*	Bean bug
NEHZ	Imphal	All defoliators, Aphids, Stem fly
NPZ	Delhi	Stem fly, white fly/YMV
	Pantnagar	White fly, defoliators, girdle beetle
	Ludhiana*	White fly
EZ	Raipur*	Major insect-pests
CZ	Sehore	Stem fly, defoliators, girdle beetle
	Kota	Defoliators, girdle beetle
	Parbhani	Stem fly, girdle beetle, defoliators
	Amrawati*	Stem fly, girdle beetle, defoliators
SZ	Dharwad	Defoliators, pod borers
	Bidar	

* Need based Testing Centers

ENT 1. Seasonal incidence of insect-pests and their bio-control agents (ongoing activity)

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 farmersô fields. Information on previous crop and farmers practices adopted should be recorded.

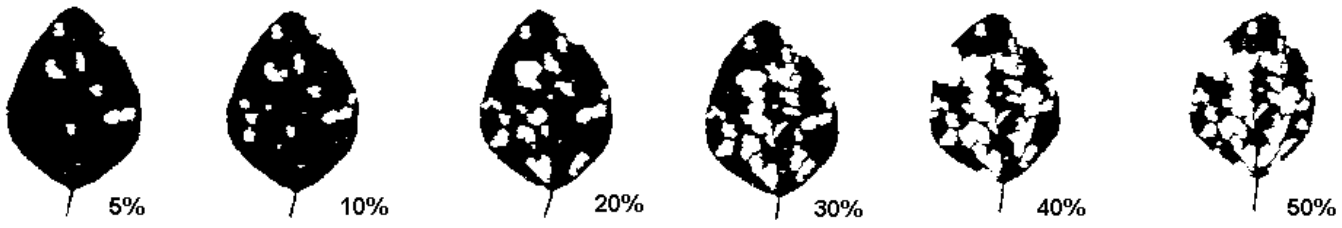
Centres : Delhi, Pantnagar, Sehore, Parbhani, Kota, Amrawati, Dharwad, Imphal

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 ócut-offô 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 (amarnathsharma2@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 (ongoing activity)

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

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 2020 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* (ongoing activity)

Centres: Pantnagar, Dharwad, Indore

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

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

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

AD = [(Fi ï Wf) / Fi] x 100 ; **ECI** = (Wg / Fi) x 100 ; **ECD** = [Wg / (Fi ï 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 Bureauõs web site http://www.nbair.res.in. E-mail: **nbaii.icar@gmail.com / nbair@icar.gov.in**.

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

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

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

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

References:

Brewer F D and E G King. 1978. Effects of parasitization by a tachinid, *Lixophaga diatraeae*, on the growth and food consumption of sugarcane borer larvae. *Ann. Entomol. Soc. Am*., **71**: 19-22.

Jacob D and Chippendale G M. 1971. Growth and Development of the southwestern corn borer, *Diatraea grandiosella* on a meridic diet. *Ann. Entomol. Soc. Am*., **64**: 485-488.

Kogan, M and Goeden, RD. 19 70. The host plant range of *Lema trilineata daturaphila* (Coleoptera: Chrysomelidae). Ann. Entom. Soc. Amer., **63**(4):1175-1180.

Waldbauer G P. 1968. The consumption and utilization of food by insects. *Adv. Insect Physiol*., **5**: 229-288.

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 ï CD at 1%.

R = values between mean ï CD at 1% & mean ï CD at 5%.

MR = values between mean ï 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 (ongoing activity)

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

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

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

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

ENT 6: Integrated management of root rot complex and stem borers of soybean (2nd year)

Centers: Amravati, Dharwad, Jabalpur, Pantnagar and Palampur

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

ENT 7. Management of major insect-pests through microbial consortia (1st year)

Centers: Pantnagar, Sehore, Parbhani, Kota, Amravati, Dharwad, 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) and *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. 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 : Three (3) Sprays : 1st: 15 to 20 DAG; 2nd: 35-40 DAG; 3rd: 55-60 DAG or coinciding with incidence of major insects.

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 yearsô 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).

(D) TECHNICAL PROGRAMME OF MICROBIOLOGY FOR 2020

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.

MB2a/18: Evaluation of promising soybean rhizobia for conferring drought tolerance in soybean under pot conditions

(Ludhiana, Delhi, Pantnagar, Indore, Sehore, Raipur and Dharwad)

This trial would be conducted in unsterilized soil in pots. Following treatments will be tested-

Treatments: 8 (4×2)

1. Un-inoculated control
2. Local rhizobial strain
3. *B. daqingense*
4. *B.liaoningense*

Stress level

1. No moisture stress
2. Stress at R5 stage for 10 days (by stopping irrigation) or until plants started showing wilting symptoms whichever is earlier

Design: Factorial CRD (4×2); replications 6
Observations:
After stress (7-10 days of imposing stress treatments at R5 stage)

1. Nodule dry weight
2. Leghaemoglobin in nodules
3. Relative water content
4. Chlorophyll content and proline in leaves
5. Shoot and root dry weight
6. N and P uptake in roots and shoots

At harvest

7. N and P uptake in grains
8. Grain yield

Note: The sampling will be done before irrigation (after stress treatment at R5 stage).

Cultures for *B. daqingense* and *B.liaoningense* and protocol of proline and chlorophyll estimation in leaves will be supplied by Indore centre

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

Centres: Delhi, Indore, Pantnagar, Sehore and Ludhiana

Latest released soybean variety of that centre
Locations: 6 (six centers)
Plot size: one acre
Treatments: 02

1. *Paenibacillus polymyxa* (HKA 15)+AMF consortia at 75% RDF
2. Farmers practice (100% RDF)

Observations:

1. Nodule number, nodule dry weight at 50 % flowering stage
2. Grain yield and B:C ratio

Note:
1. Seed (cultivar of the region) should be procured by the conducting centre
2. The cultures will be supplied by the Indore centre (AMF) and IARI centre (*Paenibacillus polymyxa* (HKA 15).
3. Soil N and P has to be tested before demonstrating the trial.
4. Follow the farmers practice prevailing in that area in both the treatments

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

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

Zone	AVT II Entries
NHZ	-
NPZ	JS 21-71
NEHZ	-
EZ	-
CZ	RVSM 2011-35, NRCSL 2, NRC 138, AMS 100-39, NRC 142
SZ	DSb 33, AMS 100-39, NRC 142, MACSNRC 1667, Karune

Experimental design and replication: As per breederôs 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.

(E)TECHNICAL PROGRAMME OF PLANT PATHOLOGY FOR 2020

PP-1 Survey and surveillance for soybean diseases

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

Note:

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

PP-2: Trap nursery trial for disease incidence

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

1. JS 97-52	2. JS 95-60	3. JS 72-280	4. RKS 18
5. PK 262	6. PK 472	7. MACS 58	8. JS 93-05
9. Punjab 1	10. Bragg	11. Monetta	12. KHSb 2
13. NRC 7	14. VLS 58	15. JS 335	16. Shivalik

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, ñTechnical 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 important diseases will be recorded at initiation and at weekly interval.
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) -Non replicated 2 rows each x 5 m.
b. AVT-I & AVT I(early)
c. AVT-II
For b & 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: 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, ALS YMV and CR
2.	GBPU&T, Pantnagar	RAB and YMV
3.	VPKAS, Almora	FLS
4.	UAS, Dharwad	Rust CLS/PSS and PB(Ct)
5.	K.Digraj	Rust, PB(Ct)
6.	JNKVV, Jabalpur	CR, YMV and RAB
7.	AAU,Jorhat	Coll R,PB(Ct)
8.	IGKVV, Raipur	IBB, PB(Ct)
9.	CSKHPKVV, Palampur	PB(Ct) and FLS
10.	Medziphema	Rust, PB(Ct), RAB
11.	Ludhiana	YMV, SMV
12.	UgarKhurd	Rust, CLS/PSS and PB(Ct)
13.	Dholi	YMV
14.	Amravati	CR and YMV
15.	Delhi	YMV and BND
16.	Indore	PB(Ct) ,CR and SMV

Note 4: 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.**

Disease	**Susceptible checks**	**Breeder's checks**
FLS	Shivalik/VLS 58/VLS 2	Breeders checks of respective zones
Rust, YMV, Coll R & TLS	JS 335, JS 93-05	
BP and CR	Punjab 1, MAUS 47	
SMV	JS 75-46, JS 335	
MLS and ALS	JS 72-44, JS 335	
RAB and RRR	Punjab 1/Bragg	

Anth/PB(Ct.)	Bragg, JS335	
IBB	NRC 37	
CLS/PSS	JS 335, VLS 58	
BS	JS 93-05, JS 335	

Note 5: 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**
RVSKVV, Sehore	TLS, PB(Ct) and CR
GBPUA&T, Pantnagar	RAB and YMV
VPKAS, Almora	FLS
UAS, Dharwad	Rust and PSS
JNKVV, Jabalpur	CR , YMV and RAB
R & D Center, Ugarkhurd	Rust & Pod blight
IGKV, Raipur	IBB and PB(Ct)
RRS, Amravati	CR and YMV
CSKHPKV,Palampur	FLS & PB (Ct)
PAU, Ludhiana	YMV
ARS, Kasbe Digraj	Rust and PB(Ct)

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, PB (Ct), 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, PB(Ct)), Jabalpur (YMV, CR, RAB), Indore (PB(Ct), SMV,CR) Palampur (FLS, PB(Ct), BS), Pantnagar (YMV, RAB and PB(Ct))

Design: Augmented (2 lines x 3 m)

No. of germplasm: 50

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

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

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

Locations: Dharwad(Ugarkhurd), Amravati, Jabalpur, Pantnagar Palampur and Jorhat

Objective: To develop integrated pest and disease management strategies against root rot and stem borer in soybean

Variety: JS 335

Design: RBD

Plot size: 5 rows of 3 mt length

Replications: Three

Treatment Details:

Treatments	Chemicals	Formulation	Dosage (g/ml/kg seed)
T_1	Seed treatment (ST) with Carboxin + Thiram	75 % WP	3
T_2	ST with Trifloxystrobin + Penflufen	240 FS	1
T_3	ST with Thiophanate methyl + Pyroclostrobin	500 FS	2
T_4	ST with *Trichoderma harzianum*	-	10
T_5	ST with Thiomethoxam	600 FS	2
T_6	T1 +T5		3+2
T_7	T2 + T5	-	1+2
T_8	T3 +T5		2+2
T_9	T4+ T5		10+2
T10	ST with biopolymer chitosan based *Trichoderma* formulation (IIOR)	SC	4 ml
T_{11}	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR)	SC	10ml
T12	ST with biopolymer cellulose based *Trichoderma* formulation (IIOR) +Thiomethoxam		2+10
T13	Untreated control		

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

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

New Trial as per QRT recommendations:

PP 7(2020): Development of Forewarning systems against major diseases of soybean.

Center	Target Disease
Pantnagar	YMV,RAB
Dharwad	Rust PB(Ct)
Jabalpur	CR,YMV
Sehore	CR.MLS

Source: Disease data generated at these centers over last twenty years & Weather data of respective centers.

Modules: Correlation & Regression / Computer based models

Time Frame: Two years (2020-2021)

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	PB(Ct)
2.	RVSKVV, Sehore	JS 95-60	JS 20-98	TLS and CR
3.	UAS, Dharwad	JS 335	DSb 23	Rust and PB(Ct)
4.	JNKVV, Jabalpur	JS 95-60	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 58	PB(Ct) and FLS
8.	AAU, Jorhat	JS 9305	JS 335, Himso 1688	Coll Rot, PB(Ct)
9.	Medziphema	JS 335		Rust, PB(Ct), RAB
10.	IGKVV, Raipur	JS 335	RSC 10-46	IBB, PB(Ct)
11	IARI,New Delhi	JS 335	DS 3050	YMV,IBB
12.	R & D Center, Ugarkhurd	JS 335	DSb 21	Rust
13.	ICAR-VPKAS, Almora	JS 335	KDS 992	Frog eye Leaf spot
14.	ARS,Amarvati	JS 335	AMS 1002	Charcoal rot

Design
Split Plot with 3 replication
Treatment
Main Treatment T1: Susceptible variety
Main Treatment T2: Resistance/Moderate resistance variety

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

For YMV/IBB
1. **Seed treatment**: Thiomethoxam 70 S/600FS @ 3 g/kg seed
2. Foliar spray of Thiomethoxam 25 WG @ 100 gm/ha started from 21 DAS
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

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, 75 DAS for each disease.
3. Avoidable yield loss will be calculated as (YP ï 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, 75 DAS

(F) TECHNICAL PROGRAMME OF FOOD PROCESSING AND VALUE ADDITION OF SOYBEAN FOR 2020

Programme1: Optimization of manufacturing processes for selected soy health foods

- Whole soybean items : Soy nuts, fermented soybean and soy yoghurt
- Ready to eat soy based multigrain sweet/ savory items: cookies, laddoo, chakli and namakpare
- Ready to cook soy based snacks : upma and noodles

Programme 2: Proximate analysis of optimized soy health foods

Biochemical analysis:

- Moisture
- Protein
- Fat
- Sensory analysis

Programme 3: Optimization of packaging conditions of soy health foods and shelf life analysis

- Standardization of packaging material (polyethylene/ laminate) and storage temperature
- Shelf life evaluation using sensory analysis and microbiological techniques.

Appendix-I

Proceedings of Varietal Identification Committee Meeting held on 19th June 2020

The online meeting of Varietal Identification Committee (VIC) of AICRP on Soybean was held under the Chairmanship of Dr T.R. Sharma, Deputy Director General (CS), ICAR, Krishi Bhavan, New Delhi on 19th June, 2020. Dr Nita Khandekar, 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, Krishi Bhavan, New Delhi
2. Dr S.K. Jha, Asstt. Director General (O&P), ICAR, Krishi Bhavan, New Delhi
3. Dr D.K. Yadava, Asstt. Director General (Seed), ICAR, Krishi Bhavan, New Delhi
4. Dr D.K. Agarwal, Acting Director, ICAR-IISS, Mau
5. Dr M.P. Jain, Director of Research, RVSKVV, Gwalior (M.P.)
6. Shri Jaiprakash, NSC, Sanwer Road, Indore
7. Shri D.N. Pathak, Executive Director, SOPA, Scheme No.53, Near Malviya Nagar, Indore-452008 (M.P.)
8. Dr Jagdish Kumar, Vice President (R&D) Ruchi Hi-Rich Seeds Pvt. Ltd.,101, The Horizon, 11//5, South Tukoganj, Nath Mandir Road, Indore-452001 (M.P.)
9. Dr S.K. Srivastava, Ex-Director, ICAR-IISR, Indore
10. Dr S.M. Husain, Ex-Principal Scientist (Plant Breeding), ICAR-IISR, Indore
11. Dr Nita Khandekar, Acting Director, ICAR-Indian Institute of Soybean Research, Indore (M.P.)
12. Dr Sanjay Gupta, Principal Investigator (Plant Breeding), ICAR-Indian Institute of Soybean Research, Indore
13. Dr A.N. Sharma, Scientist I/c AICRPS and Principal Investigator (Entomology), ICARï Indian Institute of Soybean Research, Indore
14. Dr S.D. Billore, Principal Investigator (Agronomy), ICAR ï Indian Institute of Soybean Research, Indore
15. Dr M. P. Sharma, Principal Investigator (Microbiology), ICARï Indian Institute of Soybean Research, Indore
16. Dr Shamarao Jahagirdar, Principal Investigator (Plant Pathology), University of Agricultural Science, Main Agriculture Research Station, Dharwad
17. Dr L. Sophia Devi, Principal Investigator, Food Science, Central Agricultural University, Imphal.

A total of 18 proposals were presented and discussed for identification in different zones. Thirteen candidate entries (9 (for single zone) + 4 (for 2 zones each) were identified as mentioned below:

PS 1611: The entry was presented for identification in North Plain Zone (NPZ). It was inferior to both of the qualifying entries and the best check in yield and its seed size was small as well. The candidate entry was **not identified** for release.

PS 1613: The candidate entry was presented for identification in NPZ. The candidate entry was **not identified** for release due to its highly susceptible reaction to YMV.

NRC 128: The entry was evaluated for 3 years in AICRPS and was presented for identification in NPZ and Eastern Zone (EZ). Based on its wider adaptation in two zones and yield superiority of 20% in NPZ (2269 Kg/ha) and 23% in EZ (1871 Kg/ha) it was **identified** for release in the states of Punjab, Uttar Pradesh (except Bundelkhand region of UP), Delhi, West Bengal, Bihar, Jharkhand, Chhattisgarh, Orissa.

NRCSL 1: The entry was evaluated for 3 years in AICRP and was presented for identification in EZ and Southern Zone (SZ). In EZ, it recorded yield of 1706 Kg/ha (12% yield superiority over check) and was **identified** for release in the states of West Bengal, Bihar, Jharkhand, Chhattisgarh, Orissa. The committee recommended **one more year of evaluation in AICRP in SZ** for its identification in that zone.

RSC 11-07: The candidate entry was evaluated for identification in EZ and SZ. The entry is highly resistant to Indian Bud Blight in Eastern Zone. It showed 26% higher mean (1916 Kg/ha) yield over the best check in EZ. In SZ, the entry yielded 2515 Kg / ha and recorded 11% yield increase in SZ. The entry was moderately susceptible to rust in SZ. It was **identified** for release in West Bengal, Bihar, Jharkhand, Chhattisgarh, Orissa in EZ and the states of Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu **excluding rust prone areas** on banks of river Krishna like Southern Maharstara, entire area of Belagavi, Dharwad, Haveri Bidar & Bagalkot districts in Southern Zone.

AMS 2014-1: The entry was presented for identification in EZ. It had 1804 Kg/ha yield and was superior to the best check by 19%. It is highly resistant to YMV. The entry was **identified** for release in the states of West Bengal, Bihar, Jharkhand, Chhattisgarh, and Orissa.

NRC 136: It was presented for identification in Eastern Zone. It yielded 1700 Kg/ha and recorded an increase of 12% over the best check. The entry has been **identified** for release in the states of West Bengal, Bihar, Jharkhand, Chhattisgarh, Orissa.

NRC 137: NRC 137 was presented for identification in EZ. It yielded 1569 Kg/ha and recorded a marginal increase of 3% over the best check. The candidate entry was **not identified** for release.

NRC 132: NRC 132 was presented for identification in Eastern and Southern Zones. It is the first soybean variety of India with less beany flavour. Its yield in EZ was 1652 Kg/ha and it recorded an increase of 9% over the best check. Its yield in SZ was 2287 Kg/ha which was 1% higher than the best check. It has been **identified** for release in the states of West Bengal, Bihar, Jharkhand, Chhattisgarh, Orissa in EZ and Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu in SZ.

NRC 147: NRC 147 is the Indiaôs first high oleic acid (42 ± 5%) and was presented for identification in Eastern and Southern Zone. It was directly introduced in AVT I and evaluated for 2 years. Its yield in SZ was 2362 Kg and was 4% higher in

yield over the best check. In EZ its average yield (1400 Kg/ha) was less than the best check but it matured 9 days earlier. The entry has been **identified** for release in the states of West Bengal, Bihar, Jharkhand, Chhattisgarh, Orissa in Eastern Zone and Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu in South Zone.

NRC 130: NRC 130 was presented for identification in CZ. It is an early maturing entry (92 days) and its yield (1515 Kg/ha) was equivalent to the best check JS 20-34 (1508 kg/ha). Considering its early maturity, 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.

NRC 131: It was presented for identification in CZ. It is an early maturing entry but its yield was 4% less than the best check and the entry was not identified for release.

DSb 34: The candidate entry was presented for identification in SZ. Its yield (2655 Kg/ha) was 17% higher than the best check. It is a rust resistant entry. It was **identified** for release in Southern Maharashtra, Karnataka, Telengana, Andhra Pradesh and Tamil Nadu.

Appendix-II

MONITORING TEAMS FOR *KHARIF* 2020

Team 1
Centres: Delhi, Ludhiana and Palampur
Dr Manoj Srivastava, Soybean Breeder, JNKVV, Jabalpur -Team Leader
Dr Laxman Singh Rajput, Soybean Pathologist, IISR, Indore

Team 2
Centres: Pantnagar, Almora and Majhera
Dr Sunil Kumar Nag, Soybean Breeder, IGKV, Raipur-Team Leader
Dr Amar Singh, Soybean Pathologist, HPKV, Palampur

Team 3
Centres: Kota, Morena, Sehore and Jabalpur
Dr SP Mehtre, Soybean Breeder, MAU, Parbhani-Team Leader
Dr Lokesh Kumar Meena, Soybean Entomologist, IISR, Indore

Team 4
Centres: Amravati, Nagpur, Raipur and Ranchi
Dr MD Vyas, Soybean Agronomist, CoA, Sehore - Team Leader
Dr Raghvendra, Soybean Agronomist, IISR, Indore

Team 5
Centres: Parbhani, Amreli, Anand and Bhavnagar
Dr VK Tiwari, Soybean Breeder, RVSKV, Gwalior -Team Leader
Dr Rakesh Verma, Soybean Agronomist, IISR, Indore

Team 6
Centres: Sangli, Ugar Khurd and Adilabad
Dr M Shivakumar, IISR, Indore - Team Leader
Dr Sanjeev Kumar, Soybean Pathologist, IISR, Indore

Team 7
Centres: Pune, Dharwad and Bangalore
Dr Sanjay Gupta, PI-Plant Breeding, IISR, Indore-Team Leader
Dr MP Sharma, PI-Microbiology, IISR, Indore

Team 8
Centres: Jorhat, Imphal, Medziphema and Umiam (Barapani)
Dr Kamendra Singh-Plant Breeding, GBPUAT-Team Leader
Dr KP Singh, Soybean Pathologist, GBPUAT, Pantnagar

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

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 é é é é é é é é ..
Number of germplasm acquired during the year é é é é ..

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:

Parents	Traits	No. of pollinations	Specific comments of team

4. Information on Generation Advancement:

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

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

5. 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**

6. Front Line Demonstrations:

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

7. For regular centres:

Manpower: Sanctioned: In position:

Financial: AUC Status -

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

AICRPS I/c **Monitoring team members**

Appendix-IV

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 = Absolutely resistant
1 = Highly resistant
3 = Moderately resistant
5 = Moderately susceptible
7 = Susceptible
9 = Highly susceptible

Rating scales for different diseases

I. Fungal/Bacterial 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 then 50% mortality

(B) *Bacterial pustule/Rhizoctonia aerial blight/Cercospora leaf spot/Alternaria leaf spot/rust/Myrothecium leaf spot/Target leaf spot/Frogeye leaf spot*

Scale	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

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

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.

$$\text{Percent disease index (PDI)} = \frac{\text{Sum of individual rating}}{\text{No. of leaves examined}} \times \frac{100}{\text{Maximum disease rating}}$$

Example:

(Leaves Grades)

R_1 (Rep.) T_1 (Treat.) P_1 (Plant) L_1-3 L_3-1 L_5-0 L_7-5 L_9-7 L_2-5 L_4-3 L_6-5 L_8-7

$$\text{PDI} = \frac{(1 \times 0) + (1 \times 1) + (2 \times 3) + (3 \times 5) + (2 \times 7)}{10 \text{ (total no. of leaves examined)}} \times \frac{100}{9}$$

(no. of leaves x grade)

(max. grade used in the rating scale)

$$= \frac{0 + 1 + 6 + 15 + 14}{9} \times 11.11$$

$$= \frac{36}{9} \times 11.11 = 44.44$$

Similarly calculate PDI for all the ten plants ($R_1 T_1 P_2$, $R_1 T_1 P_3$ ..... $R_1 T_1 P_{10}$) and make an average which gives the PDI of the particular treatment in a replication. Calculate similarly for the same treatment in other replications. Then go for statistical analysis 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:

0 = Absolutely resistant (AR)
0.01 ï 11.11 = Highly resistant (HR)
12.22 ï 33.33 = Moderately resistant (MR)
34.44 ï 55.55 = Moderately susceptible (MS)
56.66 ï 77.77 = Susceptible (S)
78.88 ï 100.00 = Highly susceptible (HS)

(Test lines with II 0 to 11.11 are considered acceptable for a breeding programme, lines with II rating 12.22 to 33.33 are acceptable only in exceptional cases when lines with II 0 to 11.11 are not available, lines with II higher than 33.33 are not acceptable).

Note 9 : Methodology for recording virus disease severity.

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).

Appendix-V

ALL INDIA COORDINATED RESEARCH PROJECT ON SOYBEAN (ICAR)
50th ANNUAL GROUP MEETING
Through Zoom Video Conferencing
May 20, 2020

20.05.2020 (Wednesday)		
10.00-11.00 hrs	**INAUGURAL SESSION**	
10.00 hrs	Welcome address	Dr V.S. Bhatia, Director, ICAR-IISR, Indore
10.05 hrs	Address by	Dr T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi
10.15 hrs	Address by Special Guest	Dr S.P. Tiwari, Ex-Vice Chancellor, SK Rajasthan Agricultural University, Bikaner
10.30 hrs	Address by Chief Guest	Dr T. Mohapatrta, Secretary (DARE) & Director General, ICAR, New Delhi
10.50 hrs	Project Coordinatorôs Report	Dr V.S. Bhatia, Director, ICAR-IISR, Indore
11.00 hrs	Vote of thanks	Dr A.N. Sharma, I/c AICRPS, IISR, Indore
11.05-13.00 hrs	**TECHNICAL SESSION-I: CROP IMPROVEMENT AND GENETICS RESOURCES**	
Chaired by	Dr T.R. Sharma, DDG (CS), ICAR, New Delhi Dr S.P. Tiwari, Ex-Vice Chancellor, SK Rajasthan Agricultural University, Bikaner	
Rapporteurs	Dr G.T. Basavaraja, UAS, Dharwad Dr Shiva Kumar, IISR, Indore	
Speakers:		
Dr Sanjay Gupta, PI (Plant Breeding), IISR, Indore	Breeding for Soybean improvement -Results of Coordinated trials in Plant Breeding	
Dr Vineet Kumar, PS (Biochemistry), IISR, Indore	Development of specialty varieties in soybean	
Dr Milind Ratnaparkhe, Sr. Scientist (Biotech), IISR, Indore	Molecular tools for soybean improvement	
13.00 hrs	**Lunch Break**	
13.30-14.30 hrs	**TECHNICAL SESSION-III: CROP PROTECTION**	
Chairman	Dr P.K. Chakrvorty, Member ASRB, New Delhi	
Rapporteurs	Dr Lokesh Meena, IISR, Indore Dr Laxman Singh Rajput, IISR, Indore	
Speakers:		
Dr A.N. Sharma, PI (Entomology), IISR, Indore	Identification of resistant sources against **insects** and their management- Results of Coordinated trials in Entomology	
Dr Shamarao Jahagirdar, PI (Plant Pathology), UAS, Dharwad	Identification of resistant sources against **diseases** and their management- Results of Coordinated trials in Plant Pathology	
Dr Anita Rani, PS (Plant Breeding), IISR, Indore	Mapping of YMV resistance genes in cultivated and wild soybean and their deployment in development of YMV resistant soybean varieties.	
14.30-15.15 hrs	**TECHNICAL SESSION-II: CROP PRODUCTION**	
Chaired by	Dr D.J. Bagyaraj, Professor Emeritus, Bangaluru DrL.H. Malligawad, Professor emeritus, UAS, Dharwad	
Rapporteurs	Dr M.D. Vyas, CoA, Sehore Dr Rakesh Kumar Verma, IISR, Indore	
Speakers:		
Dr S.D. Billore, PI (Agronomy), IISR, Indore	Agronomic management of Soybean- Results of Coordinated trials in Agronomy	
Dr M.P. Sharma, PI (Microbiology),	Soybean management through rhizosphere micro flora- Results of	

IISR, Indore		Coordinated trials in Microbiology
15.15-15.45 hrs	**TECHNICAL SESSION-IV: NUCLEUS AND BREEDER SEED PRODUCTION**	
Chairman	Dr D.K. Yadava, ADG (Seeds), ICAR	
Co-Chairman	Dr D.K. Agrawal, Director, ICAR-Indian Institute of Seed Research, Mau	
Rapporteurs	Dr B.S. Gill, PAU, Ludhiana Dr Manoj Shrivastava, JNKVV, Jabalpur	
Speakers:		
Dr Mrinal Kuchlan, I/c BSPS, ICAR-IISR, Indore		Scenario of breeder seed production and status of Seed Hub Project in the country Targets and allocation of Breeder seed production -2020
15.45-17.00 hrs	**TECHNICAL SESSION-VI: TRANSFER OF TECHNOLOGY AND STC/TSP AND FOOD TECHNOLOGY**	
Chaired by	Dr S.K. Jha, ADG(OP), ICAR, New Delhi Dr Rajan, ADG(PP), ICAR, New Delhi / Dr Katiha, TSP I/c, ICAR, New Delhi	
Rapporteurs	Dr B.U. Dupare, IISR, Indore Dr Nilima Karam, CAU, Imphal	
Speakers:		
Dr S.D. Billore, PI (Agronomy), IISR, Indore		Bridging the yield gap in Soybean-Technology Transfer through Front Line Demonstrations
Dr A.N. Sharma, I/c AICRPS, IISR, Indore		Extending the benefits of improved technologies-Activities undertaken by various centers under STC/TSP
Dr L. Sophia Devi, CAU, Imphal		Processing and Value Addition in Soybean in NEH Region
17.00-18.00 hrs	**PLENARY SESSION**	
Chairman	Dr T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi	
Convener	Dr V.S. Bhatia, Director, ICAR-IISR, Indore	
All PIs		Presentation of **Technical Programme for *kharif* 2020:** Dr Sanjay Gupta ï Plant Breeding Dr A.N. Sharma ï Entomology Dr Shamarao Jahagirdar ï Plant Pathology Dr S.D. Billore ï Agronomy and FLD Dr M.P. Sharma - Microbiology
Chairman / Rapporteurs of different sessions.		Summary recommendations and highlights of deliberations of different sessions
Felicitation of retiring Scientists		Convener-Dr M.P. Sharma, Staff Welfare Club, IISR, Indore
Concluding Remarks		Dr T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi Dr S.P. Tiwari, Ex-Vice Chancellor, SK Rajasthan Agricultural University, Bikaner Dr T. Mohapatrta, Secretary (DARE) & Director General, ICAR, New Delhi
Vote of thanks	Dr Neeta Khandekar, Principal Scientist (Agril. Extension), IISR, Indore	

Appendix-VI

LIST OF PARTICIPANTS FOR THE
50th ANNUAL GROUP MEETING OF AICRP ON SOYBEAN

LIST OF PARTICIPANTS

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

1. Dr T. Mohapatrta, Secretary (DARE) & Director General, ICAR, New Delhi
2. Dr T.R. Sharma, Deputy Director General (CS), ICAR, New Delhi
3. Dr D.K. Yadava, ADG (Seeds), ICAR
4. Dr S.K. Jha, ADG(OP), ICAR, New Delhi
5. Dr Rajan, ADG(PP), ICAR, New Delhi
6. Dr Katiha, TSP I/c, ICAR, New Delhi

DIRECTORS AND MEMBERS OF OTHER ORGANIZATIONS

7. Dr P.K. Chakravarty, Member ASRB, New Delhi
8. Dr D.K. Agrawal, Director, ICAR-Indian Institute of Seed Research, Mau
9. Dr D.J. Bagyaraj, Professor Emeritus, Bangaluru
10. Dr L.H. Malligawad, Professor emeritus, UAS, Dharwad
11. Dr Jagdish Kumar, Vice President, Ruchi HiRich Seeds Pvt. Ltd., Indore

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12. Dr V.S. Bhatia, Director
13. Dr A.N. Sharma, Principal Scientist (PI-Entomology)
14. Dr Nita Khandekar, Principal Scientist (Agril. Extension)
15. Dr S.D. Billore, Principal Scientist (PI-Agronomy)
16. Dr Sanjay Gupta, Principal Scientist (PI-Plant Breeding)
17. Dr Anita Rani, Principal Scientist (Plant Breeding)
18. Dr M.P. Sharma, Principal Scientist (PI-Microbiology)
19. Dr Vineet Kumar, Principal Scientist (Biochemistry)
20. Dr B.U. Dupare, Principal Scientist (Agril. Extension)
21. Dr A. Ramesh, Principal Scientist (Soil Science)
22. Dr Maharaj Singh, Principal Scientist (Plant Physiology)
23. Dr Savita Kolhe, Principal Scientist (Computer Application)
24. Dr D.V. Singh, Principal Scientist (FM&P)
25. Dr Manoj Srivastava, Principal Scientist (Biochemistry)
26. Dr Milind Ratnaparkhe, Senior Scientist (Biotechnology)
27. Dr G.K. Satpute, Senior Scientist (Genetics & Plant Breeding)
28. Dr Rajkumar Ramteke, Senior Scientist (Genetics & Plant Breeding)
29. Dr Punam Kuchlan, Senior Scientist (Seed Technology)
30. Dr Mrinal Kuchlan, Scientist (Seed Technology)
31. Shri R.M. Patel, Scientist (Agril. Statistics)

32. Dr Shiva Kumar, Scientist (Plant Breeding)
33. Dr Lokesh Meena, Scientist (Entomology)
34. Dr Rakesh Verma, Scientist (Agronomy)
35. Dr V. Natraj, Scientist
36. Shri Sanjeev Kumar, Scientist (Plant Pathology)
37. Dr Rajesh Vangala,
38. Dr Subhash Chandra
39. Dr Raghavendra Madar
40. Dr Laxman Singh Rajput, Scientist (Plant Pathology)
41. Mr. Viraj Kamble

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43. Dr Pushpendra (Plant Breeding)
44. Dr Navneet Pareek
45. Dr K.P. Raverkar (Microbiology)
46. Dr D.K. Shukla , Agronomy
47. Dr Ajay Srivastava (Agronomy)
48. Dr Neeta Gaur (Entomology)
49. Dr S.K. Mishra , Plant Pathology
50. Dr K.P. Singh (Plant Pathology)
51. Dr Mukesh Kr. Karnawal, SRO (Pl. Breeding)
52. Dr Ajay Kumar, Asstt. Professor
53. Dr Rakesh Kumar Sharma , GBPUAT, Pantnagar

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76. Dr (Ms.) Harpreet Kaur, Asstt. Agronomist

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77. Dr Nanita Devi, Jr. Scientist (Plant Breeding)
78. Dr Toijam Sunanda Devi, Jr. Scientist (Agronomy)
79. Dr Nilima Karam, Jr. Scientist (Entomology)
80. Dr L. Sophia Devi, Jr. Scientist (Food Technology)

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82. Dr Munmi Bora, Scientist (Plant Pathology)

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83. Dr A.K. Singh, Scientist I/c Soybean
84. Dr Engrala Ao, Scientist (Agronomy)
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91. Dr S.P. Mehtre, Sr. Scientist (Plant Breeding & Genetics)
92. Dr R.S. Jadhav, Jr. Scientist (Entomology)

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93. Dr C. Sreedhar, Jr. Scientist (Agronomy)

RVSKV ZONAL AGRICULTURAL RESEARCH STATION, MORENA– 476001 (M.P.)

94. Dr V.K. Tiwari Pr. Scientist (Plant Breeding)

OTHER SCIENTISITS / PERSONNEL involved in Soybean research / extension activities

95. DrDr C. P. Singh, Wheat Research Center, Lokbharti, Village - Sanosara, Taluqa - Sihor, Dist-Bhavnagar, Gujrat
96. Dr Ramraj Sen, IARI-CORC, Mandsuar

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 ñAICRPS Data entryò 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 ï 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