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**Proceedings
Of
61st Annual Maize Workshop
Held at
CSK HPKV Hill Agricultural Research & Extension Centre, CSKHPKV,
Bajaura
07-09 April 2018**



All India Coordinated Research Project on Maize
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Executive summary

The 61st Annual Group Meeting of the All India Coordinated Research Project- Maize (AICRP-Maize) was held at the CSK HPKV Hill Agricultural Research & Extension Centre, Bajaura during 07-09 April 2018. The group meeting was held in 12 sessions over three days. The workshop was inaugurated by Dr. R.L. Markanda, Minister of Agriculture, Tribal Welfare and Information Technology, Himachal Pradesh. Dr. A.K. Sarial, Vice Chancellor, HPKV, Palampur was the Chairman of Inaugural Session. Dr. I.S. Solanki, Assistant Director General, Indian Council of Agricultural Research and Dr. S.K. Malhotra, Agriculture Commissioner, Ministry of Agriculture, Govt. of India were the special guests. Dr. Sujay Rakshit, Director, IIMR presented the Annual Report of AICRP on Maize and the highlights of achievements in various disciplines. During 2016-17 a total of 14 hybrids were released for commercial cultivation. Trial success rate in *kharif* 2017 was 69.9%, while that in *rabi* 2016-17 was 93.57%. Under NFSM, FLDs were conducted on 70.7 ha during *rabi* 2016-17, 40 ha during spring 2017 and 197.2 ha during *kharif* 2017. The average maize yield recorded in these demonstrations during *rabi*, spring and *kharif* showed an increase of 28% (10-59%), 51% (39-65%) and 67% (28-98%) over farmers practices, respectively. A total of 695 farmers from 13 major maize growing states were benefitted from these FLDs. TSP, FLDs were conducted across 174 ha spread over 6 states. Under NEH, 8 trainings were organized across the Manipur state and a total of 507 farmers were trained. Dr. I.S. Solanki, ADG (FFC), ICAR in his remarks mentioned that maize made tremendous improvement in production and productivity over last six decades. He also mentioned that more than 60% of maize production was realized during *kharif* and emphasized to increase the maize productivity during this season and stressed that more concerted efforts are needed to meet the arising challenges due to climate change. Dr. S.K. Malhotra, Commissioner Agriculture, Govt. of India highlighted the importance of AICRP system. The Chief Guest of the function, Dr. R.L. Markanda, Minister of Agriculture, Tribal Welfare and Information Technology urged the scientists to work hard and come up with newer ideas in order to double the income of farmers by 2022. On the auspicious occasion of workshop, two former maize scientists of HAREC, Bajaura, Dr. B.K. Sharma and Dr. S.K. Bhalla were felicitated and two publications on maize were also released. The Variety Identification Committee received 14 proposals for identification, Out of which, 13 of different maturity groups were identified for release.

Under ICAR-CIMMYT/International Collaborative Research it was recommended that the findings of AICRP-CIMMYT collaborative projects should be published as a part of AICRP report from the next AICRP Rabi report 2017-18. Knowledge should be shared on the districts identified under the ICAR-CIMMYT collaborative programs for strengthening the hybrids testing or production system through Front Line Demonstrations (FLDs). In centre-wise presentation of reports, the incharges presented the progress reports in details. The centres were advised to improve their performance otherwise non-performing centres will be closed. In *Kharif*, 2017, 375 maize entries were evaluated in all India coordinated trials, out of which, 212 were in National Initial Varietal Trial (NIVT), 47 in Advanced Varietal Trial-I (AVT-I), 8 in Advance Varietal Trial-II (AVT-II), 38 in Quality Protein Maize (QPM), and 34 in Specialty Corns Trials (10 in baby corn, 11 in sweet corn, and 13 in popcorn trials), 32 in rainfed and 4 in OPV trials [conducted in NHZ only]. Out of total 375, only 97

entries got promoted from *Kharif*, 2017 to *Kharif*, 2018 in different maturity group. In crop production, weed causes 27-50% losses in kharif maize for which atrazine (1.5 kg/ha) followed by Tembotrione (120 ml/ha) recommended for higher yield and net returns. In entomology trials, 65, 40, 45, 11 and 34 entries of different maturity period, speciality corn, QPM, rainfed and inbreds were evaluated for resistance against *C. partellus*, respectively under artificial infestation during kharif 2017. In pathology programme, total of 32 trials (23 in *kharif* 2017 and 9 in *rabi* 2016-17) were conducted in sick plot /artificially created epiphytotic condition at identified hot spot locations and testing centres. A total of 444 hybrids and 3758 inbred lines in both *kharif* and *rabi* seasons were screened against major diseases of maize. Newly released superior QPM hybrids should be included as checks and seed of the check Pratap QPM-1 should be procured from Udaipur centre.

Under NFSM, FLDs were conducted on 183.2 ha across 13 states (50 ha in rabi; 35 ha in spring & 98.2 ha in kharif). In *rabi*, spring and *kharif* FLDs showed an increase of yield by 22 (10 to 59), 41 (20 to 65) and 41 (15 to 98) per cent over farmer practices, respectively. The promising technologies, viz., single cross hybrids, specialty corn, intercropping, weed management, nutrient management, etc. were demonstrated at farmer's field. In TSP demonstrations yield improvement of 22-36% at Jhabua (MP) and 42-133% at Banswara (RJ) was recorded over existing farmer practices. Inputs including hybrid seed, knapsack, maize sheller, tarpaulin, and power operated sprayer, etc were distributed under TSP programme. A pilot project under NEH was also implemented by IIMR in collaboration with ICAR Manipur centre where 08 training programme to total 562 (333 female) farmers on promotion of improved maize cultivation in NEH region. Inputs were distributed for conduct of 178.5 ha FLDs to 379 farmers in 09 districts of Manipur under this programme.

In plenary session, Dr I S Solanki in the chairman's address appreciated the contribution of all scientists and congratulated the organizers for successful completion of 61st Annual Maize Workshop at Bajaura. He advised all the scientists to take the technologies to end users/farmers and suggested the participating scientists to extend their support and cooperation to other centre's scientists. He further requested the Director, IIMR to lay emphasis on pre-breeding in maize and distribution of Maize breeding material/population to different centres. Dr A.K. Sarial Vice Chancellor and Chief Guest of the session in his address told that 50% of the hybrids shown in various presentations have yield potential of >9 tons per hectare and if these hybrids are used in the cultivation, the goal of doubling maize production could be achieved. The area under maize in peninsular zone is increasing. If we want to save the environment then we have to replace the rice-wheat combination and maize could be the good substitute of rice. Director IIMR Dr Sujay Rakshit appreciated the contribution and hard work done by all PIs, scientific administrative and supporting staff of IIMR for successful planning and organising 61st Annual Maize workshop at Bajaura. The workshop ended with vote of thanks by Dr. D.R. Thakur, Organizing Secretary of the workshop. Major recommendations are as follows:

1. Data of quality traits will be recorded at two locations only (Ludhiana and Delhi) instead of three (Almora, Ludhiana and Delhi) due to poor quality of data received from Almora centre.
2. In sweet corn Misthi hybrid should be used as check for all three years for comparison.
3. Experiment on high density planting for sweet corn might not be beneficial hence, density shall be lesser than normal maize.
4. It has been suggested to formulate an experiment on organic maize under AICRP maize and also to include Bajaura as a centre.
5. While presenting data for disease/pest scores of multiyear experiments, previous year's data should also be presented simultaneously.
6. Passport data and accession number to be provided for already tested biopesticide formulations.
7. To test any bio-molecules of private company against any disease prior permission from the Director and ADG (PP), ICAR is required and after approval basic data of the formulation should be received from the company.
8. It was suggested that panchgavya experiment should also be conducted at Bajaura centre, HP.
9. In NIVT maximum of two best entries /centre/maturity group will be accepted from public sector for testing in AICRP. However wherever more than one breeders are working, this limit may be relaxed by Director IIMR on mail basis. This limit is not applicable to private sector.
10. Considering the rainfall pattern and availability of land in NHZ, for Barapani and Imphal only NIVT-early, AVT-I-II medium, early and SC-BC trials will be sent for evaluation during kharif season. No late trials of NIVT and AVT-I-II and other corns will be sent to these centres.
11. For Kalyani centre(WB), during kharif, only specialty corn trials (SC-BC-PC) will be sent for evaluation. During rabi season all trials will be evaluated at this particular centre. Further during kharif, all advance trials of field corns will be evaluated at Medinapur(WB). For Rabi RRS, UBKV, Majhian; RKM University Narendrapur and PSB, Vishwa Bharti, Sriniketan will be considered as voluntary centre.
12. Pathologist and entomologist should be included in long term experiments and planting density trials of agronomy to assess disease/pest and the beneficial microbial properties may also be assessed in such experiments.
13. With respect to experiments on water use efficiency, it was suggested to drop the high rainfall centers, viz., Dholi and Imphal center. After consideration the centers for WUE trials are as follows:
Karimnagar, Godhara, Srinagar, Chitrakoot, Chhindwara, Udaipur, Ludhiana.
14. The aspirational districts (39) identified by the government must be focused in the tribal sub plan programme of the maize for training and the input distribution.

15. In each screening trial both resistant as well as susceptible checks are to be included and the same will be added during constitution of trials itself so that same set goes to each centre.

Inaugural Session

Chief Guest	Special Guests	Chairman	Rapporteurs
Dr. R.L. Markanda, Minister of Agriculture, Tribal Welfare and Information Technology, Govt. of Himachal Pradesh	Dr. I.S. Solanki, ADG (FFC), ICAR and Dr. S. K. Malhotra, Agricultural Commissioner, Govt. of India	Dr. A.K. Sarial, Vice- Chancellor, HPKV, Palampur	Drs. D.P. Chaudhary and Ramesh Kumar

The workshop was inaugurated by lighting the lamp by the chief guest and other dignitaries followed by chanting of Vande Mataram. This was followed by felicitation of Chief Guest and other dignitaries by the organizers. The function started with the welcome address by the Vice-Chancellor, Dr. A.K. Sarial. He highlighted the importance of maize, both globally and at National level and expected doubling of maize production within next decade. He also highlighted the importance of the crop for Himachal Pradesh and expressed satisfaction on the performance of HAREC, Bajaura(HP).

Dr. Sujay Rakshit, Director, IIMR presented the Annual Report of AICRP on Maize and presented the highlights of achievements in various disciplines. He informed the house that 25.90 million MT of maize was produced during 2016-17 which is close to 15 times higher than the maize produced during 1950-51. During 2016-17, a total of 14 hybrids were released through AICRP-Maize for commercial cultivation. Trial success rate in *kharif* 2017 was 69.9%, while that in *rabi* 2016-17 was 93.57%. In specialty corn trials, some entries performed exceptionally well as baby corn and other specialty corns. The trials conducted on precision nutrient management, site specific nutrient management for maize hybrids and tillage practices suggested that adoption of either zero tillage or CT along with SSNM or RDF gave highest system productivity of maize-wheat-cowpea sequence, system net returns and B:C ratio. The trials constituted for Agronomy, pathology and Entomology were conducted nicely across the centers. During the period under review a large number of samples received from institute and AICRP centers were evaluated for various quality traits such as protein quality, carbohydrate profile, oil content and carotenoids composition etc in the Biochemistry laboratory of IIMR. Under NFSM, FLDs were conducted on 70.7 ha during *rabi* 2016-17, 40 ha during spring 2017 and 197.2 ha during *kharif* 2017. The average maize yield recorded in these demonstrations during *rabi*, spring and *kharif* showed an increase of 28% (10-59%), 51% (39-65%) and 67% (28-98%) over farmers practices, respectively. A total of 695 farmers from 13 major maize growing states were benefitted from these FLDs. TSP, FLDs were conducted across 174 ha spread over 6 states. Under NEH, 8 trainings were organized across the Manipur state and a total of 507 farmers were trained.

Dr. I.S. Solanki, ADG (FFC), ICAR in his remarks mentioned that maize made tremendous improvement in production and productivity over last six decades. He emphasized that more efforts are to be made to improve production as well as crop protection technologies so that maize productivity could further be enhanced to bring it at par to USA and China. He also mentioned that more than 60% of maize production was realized during *kharif* and emphasized to increase the maize productivity during this season and stressed that more concerted efforts are needed to meet the rising challenges due to climate change.

Dr. S.K. Malhotra, Commissioner of Agriculture, Government of India highlighted the importance of AICRP system. He particularly stated that AICRP on Maize has a unique place among all AICRPs, which provide platform for sharing views and exchange of germplasm. He also stresses on the importance of maize as food *vis-a-vis* fodder crop.

The Chief Guest of the function, Dr. R.L. Markanda, Minister of Agriculture, Tribal Welfare and Information Technology urged the scientists to work hard and come up with newer ideas in order to double the income of farmers by 2022. He also asked the scientific communities to develop better production technologies with minimum or no use of harmful insecticides or pesticides in order to produce safe and healthy maize.

During this session following publications were released by dignitaries:

S.NO.	Name of the publication	Authors	Organization
1	Annual Progress Report (Kharif) 2017	Director & All PI's	ICAR-IIMR
2	Annual Progress Report (Rabi) 2016	Director & All PI's	ICAR-IIMR
3	Mass Screening Techniques for Resistance to Maize Diseases	KS Hooda, PK Bagaria, Mukesh Khokhar, Harleen Kaur & Sujay Rakshit	ICAR-IIMR
4	Maize-Golden Crop for Himachal Pradesh	DR Thakur, SK Guleria, SD Sharma & rakesh Devlash	HARECH, Bajaura (HP)

The session ended with vote of thanks by Dr. D.R. Thakur, Associate Director, HAREC, Bajaura (HP).

Session I: Review of centres

Chairman	Convener	Rapporteurs
Dr. Kuldeep Singh Director, NBPGR, Delhi	Dr. Sujay Rakshit Director, IIMR, Delhi	Drs. Ishwar Singh & SB Singh

At the outset Chairman welcomed the members present in the review meeting. Based on critical review following observations emerged out.

In his opening remarks, Dr Kuldeep Singh emphasized that a number of maize landraces are available with NBPGR which needs to be utilized in maize improvement program. The convener of the session Dr Sujay Rakshit informed the house that ICAR is seriously monitoring the performance of centres and based on poor performance three centres viz. Udampur (Zone I), Kanpur(Zone II) and Jhabua(Zone V) have been closed. He called up all the centres to make efforts to improve their visibility. During this session following twelve centre made their presentations:

Srinagar: Performance is very good. Director suggested that Srinagar centre need to register thirteen identified inbred lines with NBPGR.

Pantnagar: Performance is satisfactory. They reported two high starch hybrids. Starch profiling of these hybrids and corresponding parental lines is to be done. The teosinte accessions with PAU Ludhiana (2), Pantnagar (1) and IIMR (3) must be shared among partners for maize breeding. House advised Dr Mukesh Chaudhary, Scientist-IIMR to coordinate with breeders at Pantnagar for breeding of fodder maize.

Sabour: Centre did not submit the data well in time and nearly 50% trial were rejected. Performance of Sabour centre was not satisfactory.

Godhra: The In-charge of Godhra centre was instructed to return the unutilised funds under pay and allowances. The centre must compare state entry in Zonal trial with state and national check. Performance of the centre was good.

Imphal: Water logging and shortage of land were major constraints. The centre needs to improve its performance.

New Delhi: Performance of the centre was excellent. Since IIMR has now moved to PAU campus, Ludhiana, it was proposed that *Kharif* 2018 onwards IARI must conduct all the AICRP trials in Delhi. It was observed that centre- in-charge is not attending the workshop which is not a good sign, if the present in-charge is not interested in AICRP the concerned authority is suggested to change the in-charge.

Karimnagar: The data quality of the centre was not up to mark. The centre needs to improve its performance.

Dholi: The centre was instructed to return the money under Pay and allowances need to be refunded to IIMR as the centre does not require the same. The performance of the centre needs to be improved. It was observed that centre- in-charge is not attending the workshop that is not a good sign; perhaps the present in charge is looking after after another AICRP scheme also if the University authority will not appoint a full time scientist to maize scheme, the post will be withdrawn.

Kolhapur: Performance of the centre was not satisfactory. It was observed that the centre submitted the release proposal for hybrids in state, they have used the breeding material provided by WNC, Hyderabad but in release proposal they have not included the names of WNC scientists. The Director-IIMR has taken this issue seriously and instructed the scientist in charge of the centre that contribution of any scientist must be fully acknowledged by adding their name in the release proposal.

Mandya: Performance of the centre was good. The value addition work is to be up scaled.

Rahuri: The centre needs to improve performance though the centre is new. Director IIMR instructed the centre –in-charge to collect the breeding material from IIMR and other AICRP centres.

Udaipur: The performance of centre was satisfactory. The Director IIMR appreciated their efforts for good publications.

This was followed by discussions on financial matters including PMFS system, pay and allowances, contingency related matters in the presence of AF&AO, IIMR, who replied to the queries of the scientists from different AICRP centres. All centres were instructed to submit the AUC by 20th June, 2018, failing which funds will not be released. They were advised to intimate the PFMS and bank details by May 30, 2018. All centres need to intimate the pay scales of AICRP staff to estimate the pay and allowances effectively by bringing parity to pay scales of central Government. At the end of session chairman Dr Kuldeep Singh, Director, NBPGR and convener Dr Sujay Rakshit Director-IIMR thanked all the scientists and presenters for good work done at their respective centre.

Session II:
Formulation of work plan (2018-19)-Breeding

Chairman	Convener	Rapporteurs
Dr. Kuldeep Singh Director, NBPGR, Delhi	Dr. Sujay Rakshit Director, IIMR, Delhi	Drs. Pardeep Kumar and Mukesh Chaudhary

Major recommendations pertaining to Breeding

- In pop corn trials popping %age and volume data should be provided by Bajaura (Z-I), Ludhiana (Z-II), Dholi (Z-III), Hyderabad (Z-IV), Mandya (Z-IV) and Udaipur (Z-V) centres.
- The 80% standard value of shelling %age will be uniformly considered for NIVT trials. Hence, for NIVT shelling % needs not to be measured. However, in AVT-I, AVT-II, QPM, and Popcorn it needs to be calculated for each entry on dry basis for minimum 2 replications. For this one kg fresh cobs weighed and after drying to 20% level shelling % will be calculated.
- In NIVT maximum of 2 best entries/center/maturity group will be accepted from public sectors for testing in AICRP, however wherever there are more than one breeders, this limit may be relaxed by Director IIMR on mail basis. This limit is not applicable to private sector.
- Data of Rabi trials at Ludhiana, Karnal, Pantnagar and any other centre taken during spring season will be analysed and reported separately.

- Three voluntary centers, viz., Almel, Belvatagi, (Karnataka) and Indore (MP) have not reported data for last 3-4 years, therefore they have been dropped and no trials will be sent to these centers in future. Request have been received from three new centers viz., Buldhana (MH); Raichur and Shimoga (Karnataka) for consideration as voluntary centres. The advance trials of *kharif* field corns will be sent to these centers from 2018 onward.
- Considering the rainfall pattern in NHZ, for Barapani, and Imphal only NIVT-Early, AVT-I-II Medium, Early and SC-BC trials will be sent for evaluation during Kharif season. No late trials of NIVT and AVT-I-II and other corns will be sent to these centers.
- For Kalyani center (WB), during kharif, only specialty corns trials (SC-BC-PC) will be sent for evaluation. During rabi season all trials will be evaluated at this particular center. Further during kharif, all advance trials of field corns will be evaluated at Medinapur (WB). For rabi RRS, UBKV, Majhian, RKM University, Narenderpur and PSB, Visva Bharati, Sriniketan will be considered as voluntary centres.

➤ *Details of technical programme are given in Annexure I*

Session III:

Formulation of work plan (2018-19)-Agronomy and outreach Programme

Chairman	Co-Chairman	Convener	Rapporteurs
Dr. Kaushik Majumdar IPNI	Dr. Suresh Gautam HoD, Deptt. of Agronomy, CSKHPKV, Palampur	Dr. A K Singh PS, Agronomy, ICAR-IIMR, Ludhiana	Drs. M C Dagla, S.L. Jat, Mahesh Kumar and Dilip Singh

Dr. A.K. Singh, Principal Scientist, Agronomy, ICAR-IIMR, Ludhiana presented work Plan. Major recommendations are as follows:

- Pathologist and entomologist should be included in long term experiments and planting density trials of agronomy to assess disease/pest scenario. The beneficial microbial properties may also be assessed in such experiments.
- With respect to experiments on water use efficiency, it was suggested to drop the high rainfall centers, viz., Dholi and Imphal center. After consideration the centers for WUE trials are as follows: Karimnagar, Godhara, Srinagar, Chitrakoot, Chhindwara, Udaipur, Ludhiana.
- It was suggested that Kalyani center should be dropped for trial on "validation of sensor based nitrogen management in maize".
- Due to availability of limited seeds it was decided to use only two treatments viz., RDF and 150 % RDF in "**Plant density x Nutrient level x germ plasm**" trials of normal and specialty corn.
- Big size sweet corn have good market and harvesting of big size corn is possible under low plant density. Hence, in mandatory trials of sweet corn

"Plant density x Nutrient level x germplasm" sweet corn must be tested with low-density *viz.*, 55000 and 66000 plant/ha.

- The long term tillage experiment on "Maize-Wheat-Greengram", "Rice/soybean-Maize" and "Maize-chickpea" cropping sequence will be continued at following locations:

Cropping system	AICRP center
Maize-Wheat-Greengram	Bajaura, Karnal, Udaipur, Ludhiana, Pantnagar
Rice-Maize	Dholi, Hyderabad, Kalyani, Bhubneshwar
Maize-Chickpea	Dharwad, Imphal

- Experiment of INM at Pantnagar will be continued. It was suggested to record soil properties along with diseases and insect infestation under natural condition at Pantnagar.
- In trial MAT-7 "Potassium management in eastern India", same hybrid at different locations be used and Delhi centre will arrange seed supply to the allotted centers. Potassium based observations in this experiment from soil and crop samples will be recorded as given in annexure II.
- Experiment on "Ecological intensification" should be continued with same standards at different locations.
- On presentation of CIMMYT trial data, detailed data of drip irrigation for strengthening agronomic practices in maize should be used.
- In outreach programme, it was suggested to include latest released hybrids for demonstration at the farmers' field and the hybrid already used by the farmers must be mentioned in check to assess the yield advantage.
- The aspirational districts (39) identified by the government must be focused in the tribal sub plan programme of the maize for training and the input distribution.
- In outreach programme it is mandatory to report the Aadhar number of the beneficiary.
- It was pointed out that quarterly reporting of data in TSP programme is essential in prescribed format. It was also suggested to distribute small maize sheller, sprayer etc. on community basis for their use in this programme.

Details of technical programme are given in Annexure II

**Session IV:
Formulation of work plan (2018-19)-Entomology**

Chairman	Co- Chairman	Convener	Rapporteurs
Dr. Sujay Rakshit Director, IIMR, Delhi	Dr. P.K. Mehta, Dean COA, HPKV, Palampur	Dr. P.Lakshmi Soujanya, Entomology	Drs. Lava Kumar Reddy and Jawala Jindal

The plan of work for Kharif 2018, Rabi 2018-19 and Spring 2019 was presented by Dr. P. Lakshmi Soujanya, Scientist (Entomology) and was reviewed and discussed in the house. The Chairman appreciated the experiments designed for all the centres. The recommendation emerged from the discussion are:

- Six inbred lines viz., IIMR SBT POOL, DMR E 63, AEB(Y)C534-1-1, IIMR PBT SYNTHETIC, IIMR PBTPOOL, and AEB(Y)C534-1-2 have been found moderately resistant to *Chilo partellus* (after three years of testing).

Details of technical programme are given in Annexure III

Session V:
Formulation of work plan (2018-19)-Plant Pathology & Nematology

Chairman	Co- Chairman	Convener	Rapporteurs
Dr. Sujay Rakshit Director, IIMR, Delhi	Dr. S.K. Rana (HOD), Plant Pathology HPKV, Palampur	Dr. K. S. Hooda PS (Plant Pathology)	Drs. Harleen Kaur and Pravin K. Bagaria

The plan of work for *Kharif* 2018 and *Rabi* 2018-19 was presented by Dr. K.S. Hooda, Principal Scientist (Plant Pathology) and was reviewed and discussed in the house. The following recommendations came out after thorough discussion:

- In each screening trials both resistant and susceptible checks are to be included and the same will be added during constitution of trials itself so that same set goes to all centres.
- There is need to sort out the association mapping panel/normal maize inbred lines screening, if there is any duplication, it should be removed.
- All the association mapping panel and mapping population trials should be formulated in augmented design with two checks each of breeding and pathology.
- Disease pressure of BLSB was comparatively low in coordinated trials conducted at Dhaulakuan centre because of delayed receipt of seeds. Hence it should be ensured that trials are sent to Dhaulakuan centre timely for screening against BLSB disease.
- Pathology & breeding trials will be constituted simultaneously under direct supervision of PI so that seeds reach in time.
- Inbred lines in Trap nursery trials sent to centres should be same for 5 years.
- Identification of races of TLB should be taken on priority.
- Yield loss assessment trials should be conducted for three years and data should be compiled centre-wise and yearly.

- Fungicides with label claim should be used for the management of maize diseases.
- MLB screening data needs to be reviewed very carefully taking into consideration disease score in both resistant and susceptible checks (list is provided in annexure IV). MLB trials may not be sent to Kalyani centre as there is no significant area under maize during kharif season.

➤ Details of technical programme are given in Annexure IV

Session VII

Review of work during *Kharif 2017* and *Rabi 2016-17*

Chairman	Co-chairman	Rapporteurs
Dr. Ashok Kumar Sarial, VC, CSKHPKV, Palampur	Dr. I. S. Solanki DG (FFC), ICAR	Drs. Abhijit Das, M. C. Dagla, Pravin K. Bagaria and Sapna

Trials and nurseries:

During *Kharif 2017*, a total of 375 entries were evaluated, of which 212 were in National Initial Varietal Trial (NIVT), 47 in Advanced Varietal Trial-I (AVT-I), 8 in Advanced Varietal Trial-II (AVT-II) of normal maize hybrids, whereas 38 entries in QPM trial, 34 entries in speciality corn trials (Baby corn-10; Sweet corn-11; Popcorn-13), 32 entries in Rainfed trials and 4 entries in OPV trials. Of these 375 entries, 273 entries were contributed by public sector and 103 by private sector. The entries were tested in 57 locations including 23 volunteer centers. During Rabi 2016-17, total 99 entries were tested of which 75 were in NIVT, 11 in AVT-I and 9 in AVT-II and 4 entries in QPM trial.

Breeding (Field Corn)

During *Kharif 2017*, 303 entries were received in normal field corns trials. Total 13 different trials were constituted for evaluation at 57 different testing sites across the five zones. Out of 303 entries, 212 entries were evaluated in national initial varietal trial (NIVT), 47 in advance varietal trial-I (AVT-I), 8 in advance varietal trial-II (AVT-II), 32 in rainfed and 4 in OPV. All normal maize entries were tested under three maturity groups, viz., late, medium, and early (extra early clubbed with early). Data received from various centres was reviewed and analyzed critically for yield and related traits. Of total 303 entries in field corns, 78 entries were promoted to their next stage of testing. The entries in late maturity showing more than 10% superiority over the best check were BIO 218,DKC 9185, JKM 150375, ADV 1390064, PM17101L, in medium e.g. KMH 16-42,KMH16-25, KMH16-40,NMH-4053, PM17102, MJKM 15303, IMHBG-17K-15, KMH 16-29, DKC8181 and DKC7181. In rainfed trials entry CMH 12-686 in late maturity, and Vivek Hybrid 51, and DMRH1417 in early showed more than 10% superiority over the best check.

During *Rabi 2016-17*, total 95 entries were received for multi-location evaluation in AICRP late, and medium maturity. Out of 95 test entries, 75 were tested in NIVT, 11 in AVT-I, and 9 in AVT-II. Total six different breeding trials were constituted and put for evaluation at 20 test centres across the four zones. There were 86 entries available for promotion from first and second year of testing, out of which only 33

entries got promoted to their advance stage of testing. Out of 44 test entries evaluated in NIVT late, 25 were found superior for set criteria and therefore were promoted to AVT I-Late. Similarly, in NIVT medium, 6 out of 31 entries; and in AVT-I medium, 2 out of 3 were superior and hence were promoted. In AVT-Late trials, none of the entries were superior over the check. The entries which were more than 10% superior over best checks were PM16207L, DAS-MH-903, PM16205L, VNR-32994, DAS-MH-904, BLH 116, DKC 9181(IR8494), PM16206L.

Breeding (QPM)

A combined QPM trial (QPM I, QPM II and QPM III) was conducted across 25 locations. The QPM trial had 45 entries including seven checks (HQPM 1, HQPM 4, HQPM 5, HQPM 7, Vivek Hybrid 27-C, APQH-9-C and Vivek QPM-9). For promotion of entries in QPM, all entries will be compared with the best check except for NHZ (Zone1) where the test entries found to be early based on days to 50 per cent anthesis criteria, and are compared with VIVEK QPM 9. For release of QPM hybrid, 5 per cent grain yield superiority over best relevant check along with >0.6 per cent tryptophan content is considered. VEQH 16-1 performed exceptionally well in this trial and ranked no.1 with 7.32 t/ha average yield. Following recommendations emerged:

- Newly released superior QPM hybrids should be included as checks and seed of the check Pratap QPM-1 should be procured from Udaipur centre.
- Data of quality traits will be recorded at two locations only (Ludhiana and Delhi) instead of three (Almora, Ludhiana and Delhi).

- **Breeding (Specialty Corn)**

During *kharif* 2017, 10 entries were tested under baby corn trial across five zones comprising 23 locations for baby corn yield against one check hybrid HM-4. Out of 10 entries, 2 (AHB 6005, PAC 321), 1 (AH-7043) and 7 (DMRHB 1305, GAYMH-1, IMHB 1529, IMHB 1532, IMHB 1538, IMHB 1539, MBC 11-15) entries were under NIVT, AET-I and AET-II stage of testing, respectively. In sweet corn trial, 11 entries were tested across five zones comprising of 18 locations. The mean ear yield without husk was very low (2368 kg/ha) in Godhra location. Out of 11 entries, 5 entries (ASKH-1, ASKH-61, FSCH 98, NSCH-130 and Nuzi 260) were in NIVT and 3 entries each in AET-I (BIO 4043, MITHAS and Madhula) and AET-II (ASKH-4, BSCH 6 and FSCH 75) stage of testing. The entries were evaluated against four check cultivars comprising three varieties (Madhuri, Priya and WOSC) and one hybrid (Misthi). The average ear yield (without husk) of check cultivars varied from 1875 kg/ha (Priya in central western zone) to 10935 kg/ha (Misthi in Peninsular Zone). Out of four check cultivars, Misthi topped in all the five zones, with average ear (without husk) yield of 10685 kg/ha, 10011 kg/ha, 10139 kg/ha, 10935 kg/ha and 2813 kg/ha in northern hill zone, north western plain zone, north eastern plain zone, peninsular zone and central western zone, respectively. The mean ear yield (without husk) of entries in AVT-II stage of testing varied from 1563 kg/ha (ASKH-4 in Godhra) to 10062 kg/ha (ASKH-4 in peninsular zone). In popcorn trial, 13 entries were tested across 24 locations over five zones against one common check cultivar VL Amber Popcorn. Out of 13 entries, 7, 2 and 4 entries were in NIVT (APCH-1, BPCH 415042, DPCH-316,

REPCH 2015-1, REPCH 2015-2, Shalimar Popcorn -1, Zea Maize DZ 50), AET-I (IHPC-1201, IHPC-1203) and AET-II (IMHP-1535, IMHP-1540, MPC 1-15, SJPCI) stage of testing. The check cultivar popcorn yield varied from 2613 kg/ha (north eastern plain zone) to 3701 (Peninsular Zone) kg/ha. The mean grain yield of entries in third year of testing (AET-II) varied from 2413 (IMHP-1540 in northern hill zone) kg/ha to 5044 kg/ha (SJPCI). Following recommendations emerged:

- In sweet corn Misthi hybrid should be used as check for all three years for comparison.

Crop Production

During *kharif* 2017 and *rabi* 2016-17, trials on different aspects, *viz.*, optimization of fertilizer dose and planting density for different maturity pre-released and notified maize hybrids, precision nutrient management, site specific nutrient management (SSNM) for maize hybrids and tillage practices, weed management, enhancing water-use efficiency in rainfed maize, long term trial on integrated nutrient management and ecological intensification for climate resilient maize systems were conducted in different zones. Following recommendations emerged:

- Experiment on high density planting for sweet corn might not be beneficial hence, density shall be lesser than normal maize.
- It has been suggested to formulate an experiment on organic maize under AICRP and Bajaura centre may be included.

Entomology

The overall results of maize genotypes resistant and susceptible to *Chilo partellus*, *Sesamia inferens* and *Atherigona* sp in different co-ordinated trials at different locations were summarized. During *kharif* 2017, 65, 40, 45,11 and 34 entries of different maturity period, speciality corn, QPM, rainfed and inbreds were evaluated for resistance against *C. partellus*, respectively under artificial infestation. Data on pheromone trap catches of *H. armigera* were also presented. Evaluation of different insecticides and biopesticides in managing *C. partellus* along with seasonal incidence of *C. partellus* was also presented. Out of 16 maize entries of late maturity group screened against *C. partellus* at Kolhapur, four entries KMH 3981(2.7), DKC 9175 (IP8514) (3.0), NMH 1290(2.6) and Buland (2.9) were found to be resistant. The late entries P 3522 (2.43) 115-08-01 (2.73), NMH 1290 (2.59) and BIO 9981 (2.78) were found to be resistant to *S. inferens* at Karnal centre. Forty nine inbred lines were evaluated against shoot fly during spring 2017. Five lines namely WNCDMR11R5881 (0.0), G18QC8-36 (0.0), P63C2BBB17B (0.0), PFSR/51016-1 (0.0), SO1SIYQBBB13B (0.0) had no dead heart formation. Following recommendations emerged:

- Six inbred lines namely, IIMR SBT POOL, DMR E 63, AEB(Y)C534-1-1, IIMR PBT SYNTHETIC, IIMR PBTPOOL, and AEB(Y)C534-1-2 have been found moderately resistant to *Chilo partellus* after three years of testing.
- While presenting data for disease/pest scores of multiyear experiments, previous year's data should also be presented simultaneously.

- Passport data and accession number to be provided for already tested biopesticide formulations
- To test any bio-molecules of private company against any insect prior permission from the Director and ADG (PP), ICAR is required and after approval basic data of the formulation should be received from the company.
- It was suggested not to take up insecticide trials without any testing fee.

Pathology/ Nematology

In pathology programme, total of 32 trials (23 in *kharif* 2017 and 9 in *rabi* 2016-17) were conducted in sick plot /artificially created epiphytotic condition at identified hot spot locations and testing centres. A total of 444 hybrids and 3758 inbred lines in both *kharif* and *rabi* seasons were screened against major diseases of maize. Maydis leaf blight (MLB), Turicum leaf blight (TLB), Banded leaf and sheath blight (BLSB), Bacterial stalk rot (BSR), Post flowering stalk rot (PFSR), Rajasthan downy mildew (RDM), Sorghum downy mildew (SDM), Curvularia leaf spot (CLS), Polysora rust (PR), Common rust (CR) and Brown spot (BS) were recorded in trace to medium intensities. However, anthracnose disease was reported at Pantnagar in low to moderate intensities. Yield losses were assessed up to 22.01 %, 19.82 %, 16.91 %, 41.52 % and 89.1 % due to MLB, TLB, CLS, RDM and SDM, respectively. During disease surveys at farmers' fields in different zones, important diseases like MLB, TLB, BLSB, PFSR, RDM, SDM, CLS, PR, CR and cyst nematode (MCN) were reported in low to moderate intensities. Stripping of lower leaves was effective in minimizing the BLSB disease and increasing the yield. Among organic approach, *Allium sativum* (garlic) bulb @ 10 % has provided effective disease control with increase in grain yield as compare to check followed by *Azadirachta indica* (neem) leaves @ 10 % and *Datura stramonium* (Datura) @ 10 % and were found superior over other treatments to manage MLB disease of maize. *Pseudomonas fluorescens* @ 0.5 % as seed treatment, bioagent-fortified FYM (1:50) and spray @ 0.5 per cent found effective in suppressing the PFSR. The treatment recorded 47.66 % disease control efficacy and resulted in 21.32 % increase in grain yield over untreated check. Amongst chemicals, Trifloxystrobin 25 % + Tebuconazole 50 % @ 0.05 % were found most effective (47.3%) against common rust as foliar spray followed by Propiconazole @ 0.1 % and Tebuconazole @ 0.05 %. Following recommendations emerged:

- To test any bio-molecules of private company against any disease prior permission from the Director and ADG (PP), ICAR is required and after approval basic data of the formulation should be received from the company
- It was suggested that panchgavya experiment should also be conducted to check it's effectivity against nematodes.

Breeder Seed Production (BSP)

During the year 2016-17, 94.58 quintals of breeder seed of maize (45.32 quintals of OPVs/composites and 49.26 quintals of parental lines of hybrids) was indented by DAC and 131.48 quintals (70.36 quintals of OPVs/composites and 61.12 quintals of parental lines of hybrids) of breeder seed was produced. However, following centres were deficit in production of desired quantity of indented seed of breeder

seed viz., CCSHAU, Karnal, UAS Mandya, TNAU, Coimbatore, BAU, Ranchi and PAU Ludhiana.

Outreach programme

The institute is providing extension service to the nation through organizing Frontline Demonstrations (FLDs) under NFSM on coarse cereals, Ministry of Agriculture, Government of India. The Institute organized FLDs in collaboration with different AICRP centres and by its own centres spread across the country. Under NFSM, FLDs were conducted on 183.2 ha across 13 states (50 ha in rabi; 35 ha in spring & 98.2 ha in kharif). Rabi, spring and kharif FLDs showed an increase of yield by 22 % (10 to 59), 41% (20 to 65) and 41 % (15 to 98) per cent over farmer practices, respectively. The promising technologies, viz., single cross hybrids, specialty corn, intercropping, weed management, nutrient management, etc. were demonstrated at farmer's field.

The institute implements TSP across the country in various tribal belts of maize growing states in the country with the help of AICRP centres. In TSP demonstrations yield improvement of 22-36% at Jhabua (MP) and 42-133% at Banswara (RJ) was recorded over existing farmer practices. Inputs including hybrid seed, knapsack, maize sheller, tarpaulin, and power operated sprayer, etc were distributed under TSP programme. Trainings for tribal farmers also conducted on value addition, specialty corn for enhancing farm income. A pilot project under NEH was also implemented by IIMR in collaboration with ICAR Manipur centre where 8 training programmes were conducted and a total of 562 (333 female) farmers were trained on promotion of improved maize cultivation in NEH region. Inputs were distributed for conduct of 178.5 ha FLDs to 379 farmers in 09 districts of Manipur under this programme.

Session VIII:

ICAR - CIMMYT/ International Collaborative Research

Chairman	Co-chairman	Speakers	Rapporteurs
Dr. S.K Malhotra	Dr. I.S. Solanki	Dr. P.H. Zaidi	Drs. Pardeep Kumar & Mukesh Choudhary

In his presentation Dr. Zaidi highlighted salient achievements of ICAR-CIMMYT Collaborative program on maize for the year 2017-18. Achievements under various projects were discussed. These included ICAR – CIMMYT collaborative work plan trials, quality protein maize trials funded by ICAR international collaboration, externally funded projects, viz., Climate Resilient Maize for Asia (CRMA), Heat Tolerant Maize for Asia (HTMA), International Maize Consortium for Asia (IMIC-Asia) and Improved Maize for Asian Tropics (IMTA). Under ICAR-CIMMYT collaborative program, results pertaining to improved yields under optimal conditions with tolerance to drought, heat and water logging, resistance to diseases of economic importance, combined drought + water logging tolerance, abiotic + biotic stress

and quality protein maize were presented with need to emphasize on niche specific enhancement of kharif maize productivity. CRMA project was initiated on 1st January, 2016 and will culminate on 31st December, 2018 which is basically the phase - II of ATMA project. New generation stress resilient lines and hybrids have also been identified. The genomic selections for drought tolerance and water logging tolerance have been elucidated. Genomic selections for heat tolerance using multiparent synthetic populations have been undertaken under HTMA project. He also discussed the heat stress resilient hybrids developed and tested during spring 2017. In the ICAR-CIMMYT collaborative work plan under AICRP maize, line evaluation trials for TLB, PFSR and BLSB were discussed in details. In the stress tolerant QPM project, high yielding QPM hybrids have been developed and identified. He also informed the house about the projects initiated on genome wide association studies on TLB resistance, mapping maize mega-environments, germplasm shared and joint research papers published during 2017.

Organisation of 13th Asian Maize Conference to be held from 8-10 October, 2018 at Ludhiana was discussed at length. All the AICRP centres were invited to submit abstracts and participate actively in the conference. Additionally the private and public partners were requested to provide sufficient seeds (~1 kg) for demonstration purpose. Further each company was requested to provide 500 cobs for decoration to show the national spirit and make the conference a grand success. All were invited to participate in the abovesaid conference.

Following recommendations emerged:

- The findings of AICRP-CIMMYT collaborative projects should be published as a part of AICRP report from the next AICRP Rabi report 2017-18 onwards.
- Knowledge sharing on the districts identified under the ICAR-CIMMYT collaborative programs for strengthening the hybrids testing or production system through Front Line Demonstrations (FLDs)

Session IX:

Presentations of the Monitoring Reports

Chairman	Rapporteurs
Dr. Sujay Rakshit Director, ICAR-IIMR, Ludhiana	Drs. SB Singh and Dr SL Jat

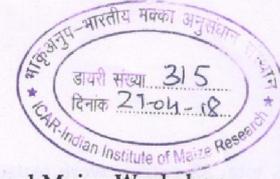
The presentation of the monitoring report was made by Dr K.S. Hooda. The following main points emerged out of the discussion:

- Owing to limitation of land in NEH, only early NIVT, Advance trial early and medium, baby corn, sweet corn will be sent at NEH centres.
- At Barapani centre no artificial inoculation was done and in absence of disease pressure the Pathology trials were rejected.
- No entomology trial will be sent at Bajaura as post is withdrawn from the centre.

- All volunteer Centres have to return the money if trials are not conducted properly. In Dhaulakuan, breeding trials was rejected due to negligence of breeder. Chairman take a serious note in this regard.
- At Pantnagar, soil science need to be strengthened to have at least very good ratings in the monitoring report.
- At Behraich, no breeding program is going on.No line is being maintained through selfing and having no isolation for maintenance of composite seed production program. Chairman took this very seriously and advised the centre and all other centres to undertake breeding program and present in the next workshop.
- A training for breeders is to be organised to enhance their efficiency and to know the new system adopted for automation.
- At Bhubneshwar, the data of Agronomy are not reported properly.It was pointed out by PI Agronomy that Agronomy data of Bhubneshwar centre is not reliable. This is a matter of serious concern and centre needs to address it seriously.
- At Dholi, three trials in Pathology failed due to late planting and waterlogging. Hence, timely planting was advised to have proper disease pressure and screening.
- At Kalyani, no trials to be sent in kharif season as crop suffers due to high moisture/water logging and only rabi trials should be sent. All center to be provided susceptible check and resistant check seeds.
- In Kharif season advance trials to be sent at Midnapur centre.
- At Mandya, 3 trials of Pathology could not be conducted due to drought which needs to be taken care of in future.
- Three volunteer center, viz., Almel, Belvatagi and Indore while three locations at Raichur, Shivmoga and Buldana will be new volunteer centres.
- There is need to strengthen the monitoring and Rabi trials are to be monitored as well. Plant population to be monitored carefully. The number of days must be sufficient for which team leader shall plan in consultation with AICRP Nodal Officer. At Gossaingaon, team Should visit in September. The monitoring team should also monitor TSP/FLD program wherever possible.
- The nodal officer will give to team leader all experimental details and outreach (TSP/FLD) programme at the centres to be visited by monitoring team.

Session X:

Varietal Identification meeting



Proceedings of VIC Meeting held during 61st Annual Maize Workshop

During 61st Annual Maize Workshop, held at Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV), Hill Agricultural Research and Extension Centre (HAREC), Bajaura, Himachal Pradesh, during 7-9 April, 2018, the Variety Identification Committee (VIC) meeting was convened under the Chairmanship of Dr. I. S. Solanki, Assistant Director General (Crop Sciences), ICAR, New Delhi at 1st Floor, Sandhya Palace, Shamshi Bhunter on 8th April, 2018.

The following were present during the meeting.

1. Dr. I. S. Solanki, Assistant Director General (FFC), : Chairman
Indian Council of Agricultural Research, New Delhi
2. Dr. S. K. Malhotra, Agriculture Commissioner, : Member
Ministry of Agriculture, Govt. of India
3. Dr. D. R. Thakur, ADR, CSKHPKV, HAREC, Bajaura : Member
4. Mr. M. N. Kathale, MSSC Ltd., Akola : Member
5. Dr. Bijender Pal, Deputy Director Research, Global : Member
Lead, Corn Breeding, Sri Ram Bioseed, Hyderabad
6. Dr. V. Narasimha Reddy, Pr. Sci. & Head, MRC, : Member
PJTSAU, Hyderabad
7. Dr. N. K. Singh, Professor, GBPUAT Pantnagar : Member
8. Director, ICAR-IIMR : Member Secretary

The meeting was also attended by the following resource persons

1. Dr. K.S. Hooda, PI Plant Pathology, ICAR-IIMR
2. Dr. A.K. Singh, PI, Agronomy, ICAR-IIMR
3. Dr. Dharam Paul Chaudhary, PI, Biochemistry, ICAR-IIMR
4. Dr. Ramesh Kumar, PI, Quality Protein Maize, ICAR-IIMR
5. Dr. Chikkappa G. Karjagi, PI, Specialty Corn, ICAR-IIMR
6. Dr. P. Lakshmi Soujanya, Entomology, ICAR-IIMR
7. Dr. Bhupender Kumar, PI, Normal Maize, ICAR-IIMR

I. S. Solanki
21.4.18

Rakesh
8/4/18

the entry was not superior over the best check with respect to agronomic performance, hence, the entry *was not identified thus not recommended* for release.

Kharif season Medium Maturity

4. **VaMH 12014:** The hybrid VaMH 12014 was proposed for NEPZ under medium maturity for Kharif season. The per cent superiority over the best check was 14.8 for yield and it was also superior over best check with respect to agronomic performance, hence it *was identified and recommended* for release for NEPZ.
5. **JKMH 4103:** The hybrid JKMH 4103 was proposed for NEPZ under medium maturity for kharif season. The entry was not superior over the best check for yield as well as for agronomic performance, hence it *was not identified thus not recommended* for release.
6. **JH 13347:** The hybrid JH 13347 was proposed for NEPZ and CWZ under medium maturity for kharif season. The entry was superior over the best check by 16.10 and 10.57 per cent for yield in NEPZ and CWZ. However, after careful consideration of agronomic performance data, the entry *was identified and recommended* for release for NEPZ.

Kharif season Early Maturity

7. **FH 3754:** The hybrid FH 3754 was proposed for NHZ under early maturity for kharif season. The entry was found superior over best check for yield by 13.49% and also superior in agronomic performance, hence it *was identified and recommended* for release for NHZ.
8. **DMRH 1305:** The hybrid DMRH 1305 was proposed for NHZ under early maturity for kharif season. The entry was found superior over best check for yield by 16.68% and also found superior for agronomic performance, hence, it *was identified and recommended* for release for NHZ.
9. **JKMH 4222:** The hybrid was proposed for CWZ under early maturity for kharif season. The entry was superior over the best check with respect to yield by 12.40% and also superior in agronomic performance, reaction to pests and diseases, hence, it *was identified and recommended* for release for CWZ.

Kharif Season Sweet Corn

10. **ASKH 4:** The hybrid ASKH 4 was proposed for all the zones namely NHZ, NWPZ, NEPZ, PZ and CWZ under sweet corn for kharif season. The entry was found superior over the best check Madhuri which was evaluated for three years. Hence, it *was identified and recommended* for release for NHZ, NWPZ, NEPZ and PZ.
11. **FSCH 75:** The hybrid FSCH 75 was proposed for zones NHZ, NEPZ, PZ and CWZ under sweet corn for kharif season. The entry was found superior over the best check Madhuri which was evaluated for three years; hence it *was identified and recommended* for release for NHZ, PZ.

J. S. Sankar

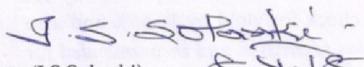
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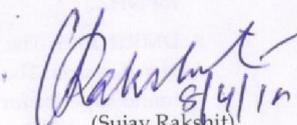
Kharif season Baby Corn

12. **IMHB 1532:** The hybrid IMHB 1532 was proposed for NWPZ and CWZ under baby corn for kharif season. The entry was superior over the best check HM-4 for baby corn yield without husk by 12.81 and 13.39 per cent in NWPZ and CWZ respectively; hence it *was identified and recommended* for release for NWPZ and CWZ.
13. **GAYMH-1:** The hybrid GAYMH-1 was proposed for NHZ, NEPZ, PZ and CWZ under baby corn for kharif season. The entry was superior over the best check HM-4 by 11.6, 6.9, 12.9 and 11.4 per cent for baby corn yield without husk in NHZ, NEPZ, PZ and CWZ respectively. Hence, the entry *was identified and recommended* for release for PZ and CWZ.
14. **IMHB 1539:** The hybrid IMHB 1539 was proposed for NHZ under baby corn for kharif season. The entry was superior over the best check HM-4 for baby corn yield without husk by 23.2% in NHZ, hence, the entry *was identified and recommended* for release for NHZ.

In addition to above 14 proposals, another proposal EHQ-64 was received based on zonal evaluation data generated at CWZ. The proposal was not considered as the zonal data will not be considered for identification and release.

The meeting ended with vote of thanks to the VIC.


(I.S.Solanki) 8-4-18
ADG (FFC) Chairman-VIC


(Sujoy Rakshit)
Member Secretary-VIC

Session XI

Lead Lectures of 61st Annual Maize Workshop

Chairman	Co-chairman	Speakers	Rapporteurs
Dr. A. K. Sarial, Vice Chancellor, HPKV, Palampur	Dr. Sujay Rakshit, Director, IIMR	Dr. A. Kumar, Dr. Rajender Parsad, Dr. A. Dandapani, Dr. Vinay Mahajan	Drs. D.P. Chaudhary and Dr. S.L. Jat

The Chairman welcomed the speakers, co-chair and rapporteurs. Dr. A. Kumar, Pr. Scientist, Division of Pathology, IARI, New Delhi gave an elaborate lecture on "New insights into phyllosphere microbiome: metagenic analysis of rice genotypes grown under contrasting climatic zones". He discussed different methods to elucidate the microbial composition of rice phyllosphere and its interaction with blast fungus using two rice genotypes with single gene difference. The susceptible genotype harboured significantly more bacterial communities than resistant cultivar. Bacterial species belonging to phylum Proteobacteria was found to be most dominating over other group of bacteria. Similar programmes may be initiated in maize as well.

Dr. Rajender Prasad, National Professor, ICAR-IASRI, delivered a lecture on designing and analysis of varietal trials. He emphasised that proper designing of the experiments is the most important component and is to be planned keeping in mind the data to be generated. He discussed various ways of blocking and informed that RBD is the most preferred design. However for big experiments alpha design is preferred. He also informed that statistical data can be generated online on design resource server of IASRI for trials having treatments upto 150, 10 blocks and 2-5 replications. He clarified that statistically 2 replications are enough and trials can be conducted with 1 degree of freedom. Upto 8 degree of freedom is good but preference should be for more than 12 degree of freedom.

Dr. A. Dhandapani, Principal Scientist, ICAR-NAARM delivered a lecture on "Automation System for AICRP on Maize". He discussed the automation system developed for AICRP sorghum and informed that automation system for maize has been developed and is being implemented from rabi 2018-19. All entries starting from initiation of experiment to randomization – layout – uploading – reviewing – acceptance and analysis etc will be carried out online. Before submission, data can be reviewed by experimental incharge. Data can not be submitted in case any erroneous value has been inserted mistakenly. The house desires that there is need to organize one training programme in AICRP automation.

The last lecture on “Doubling the Maize Production till 2025” was delivered by Dr. Vinay Mahajan, Principal Scientist, ICAR-IIMR. He discussed various issues and proposed various potential measures in order to increase the maize production. The zone wise data showed that maximum production and productivity comes from peninsular zone, whereas minimum was observed in NHZ. There is tremendous scope of increasing the maize production in the areas/districts having very low maize productivity. He also informed that specialty corn, value addition and silage making could play a significant role in doubling maize production.

**Session XII:
Presentations of Work Plan for the year 2018-19**

Chairman	Co- Chairman	Convener	Rapporteur
Dr. A. K. Sarial, V C, CSK HPKV, Palampur	Dr. I. S. Solanki ADG (F&FC), ICAR	Dr. Sujay Rakshit Director, ICAR-IIMR	Drs. N. Sunil, Sapna and Pravin Kumar Bagaria

The plan of work for *kharif* 2018, *rabi* 2018-19 and *spring* 2019 was presented by PIs of the respective disciplines and discussed in the house. The breeding work plan was presented by Dr. Bhupender Kumar, followed by crop production work plan presented by Dr. A.K. Singh. Work plans of entomology, pathology/ nematology and outreach programme were presented by Drs. P.L. Soujanya, K.S. Hooda and S.L. Jat, respectively. The Chairman appreciated the experiments designed for all the centres. The recommendation emerged during presentation on plan of work was as follows:

- Seed quantity of the entry for testing should meet the specified requirement of the trial, else the entry will not be considered.
- Demand draft of testing fees along with seed should be sent to Winter Nursery Centre, Hyderabad for trials testing.
- Two pages of Standard Operating Procedure (SOP) write up on data observation/recording should be prepared and provided to AICRP centres
- Only silking data is to be recorded for baby corn
- For data analysis, if any missing data is there, '999' should be entered in Automation system instead of keeping it blank so that it can be recorded as missing and may not interfere with data analysis.
- For specialty corn trials (baby corn/ sweet corn/pop corn) entries should not exceed ten.
- For testing baby corn and sweet corn, cobs should be sent both with and without husk compulsorily.

- Kangra centre may be included for organic trial in agronomy programme.
- The seed may be sent by person instead by post wherever necessary to avoid delay in receipt of the seed
- FLDs may be focused in the districts having yield less than 1 ton/ha based on CIMMYT analysis
- UC certificate of AICRP FLD/TSP is to be sent by 31st December duly signed by (by PI and ADR), otherwise the next release will be withheld. AUC should be sent by 30th June for TSP and FLD alongwith AUC of the AICRP programme.

Session XIII:

Plenary Session

Chief Guest	Chairman	Convener	Rapporteur
Dr. A.K. Sarial, VC, CSK HPKV, Palampur	Dr. I.S. Solanki ADG (F&FC), ICAR	Dr. Sujay Rakshit Director, ICAR-IIMR, Dr. Atul, Director- Extension- CSKHPKV	Drs. Ishwar Singh & SB Singh

Dr Chikkappa, Scientist-IIMR informed the house that a total of 14 proposals were received in the VIC. Out of these 12 were identified for release. Dr. Bhupender Kumar, Scientist-IIMR presented the recommendations of Plant breeding, while Dr A.K. Singh, PI Agronomy presented the recommendations of Agronomy. Recommendations of Entomology were presented by Dr. P. Lakshmi Soujanya Scientist, IIMR-WNC, Hyderabad on behalf of Dr. J.C. Sekhar, PI (Entomology). Dr. K.S. Hooda, PI (Pathology) presented the recommendations of Plant Pathology. This was followed by felicitation of three senior officers/maize scientists namely Dr. I.S. Solanki, ADG (FFC)-ICAR, Dr. B. Narsimha Reddy, Pr. Scientist, PJSTSAU, Hyderabad and Dr Mukesh Vyash, Sr. Maize Breeder, MPUAT, Udaipur who will be superannuating in the coming months of 2018.

Dr. I.S. Solanki in his address appreciated the contribution of all scientists and congratulated the organizers for successful completion of 61st Annual Maize workshop. He advised all the scientists to take the technologies to end users/farmers and suggested the participating scientist to extend their support and cooperation to other centre's scientists. He further requested the Director IIMR to lay emphasis on pre-breeding in maize and distribution of Maize breeding material/population to different centre. He told that due to climate change challenges we need to focus on precision breeding like double haploid and other technologies which reduce the cost

of production. He told that maize is the best crop to replace the rice in view of scarcity of water in near future, so scientist must think in this direction.

Dr. A.K. Sarial Vice Chancellor and Chief Guest of the session in his address highlighted that 50% of the hybrids shown in various presentations have yield potential of >9 tons per hectare and if these hybrids are used in the cultivation, the goal of doubling maize production could be achieved. The area under maize in peninsular zone is increasing. If we want to save the environment then we have to replace the rice-wheat combination and maize could be the good substitute of rice. He emphasised that 2nd green revolution is the need of the hour and to improve the health of soil and quality of food, so we need to opt for organic farming. He further stressed upon that scientist should voluntarily share their knowledge and experience with other scientists to get better results.

Director IIMR appreciated the contribution and hard work done by all the PIs, scientific, administrative and supporting staff of IIMR for successful planning and organising 61st Annual Maize workshop at Bajaura. The workshop ended with vote of thanks by Dr. D.R. Thakur, Organizing Secretary of the workshop.

Annexure – I

Technical Programme of Breeding Group

The details of AICRP trials during Kharif 2018 are given below:

Trial	Zone	Entry
NIVT		
Late	All zone except-NHZ	New entries are invited
Medium	Across zone	New entries are invited
Early	Across zone	New entries are invited-seeds to go to HAREC, Bajaura (HPKV)
AVT-I		
Late	NHZ	No trial
	NWPZ	ADV 1390164, BIO 218, HT 17169, JH 16040, PM17101L, Super-1818, DAS-MH-115, PM17105L, CP 858, JH 16081, DAS-MH-114, JH 16041, JH 13346, B-57, DKC 9185 (IR8449), Rasi-2432, JKMH 150375, CP 777, KMH 463+Check
	NEPZ	JH 16209,CP 858, JH 16031, Rasi-3499, BIO 218, JH 16041, DKC 9185 (IR8449), AH-8183, Rasi-2432,DKC9189 (IR8545), JH 16118, PM17101L, JH 16081+ Check
	PZ	DKC 9185 (IR8449), JKMH 150375, ADV 1390064, PM17101L+Check
	CWZ	BIO 218, JH 13346, DKC 9185 (IR8449), PM17101L, JH 16081, HT 17169, Rasi-2432, JH 16040, Super-1818+Check
Medium	NHZ	KMH 16-42, KMH 16-25, KMH 16-40, NMH-4053, PM17102M, JKMH 15303, IMHBG-17K-15, KMH 16-29, DKC8181 (IR8004), DKC7181 (IR8003),+Check
	NWPZ	IMHBG-17K-22, IMHBG-17K-6, IMHBG-17K-17, NMH-4053, BH 415100, BLH 118, AH-1606, JH 16045, WH-1094, AH-7067R+Check
	NEPZ	JKMH 15303, DKC7181 (IR8003), STAR-X-14, LMH 1017+Check
	PZ	ADV 140235, NMH-4053, ADV 140187, JKMH 15303,BLH 118,+Check
	CWZ	BLH 118, JH 16029,+Check
Early	NHZ	No trials
	NWPZ	JH 31983, AH-7080,+Check
	NEPZ	JH 31947,+Check
	PZ	JH 31947,+Check
	CWZ	No trials
AVT-II		
Late	NHZ	No trials
	NWPZ	DKC 9178 (IQ8623), PM16103L, JKMH 4152,+Check
	NEPZ	NA

	PZ	DKC 9178 (IQ8623), BIO 716+Check
	CWZ	NA
Medium	NHZ	DKC(7173)IQ 7802,+Check
	NWPZ	JKMH 4157,+Check
	NEPZ	DKC 8174 (IQ8319) +Check
	PZ	DKC 9179 (IQ8627) +Check
	CWZ	DKC 9179 (IQ8627), DKC 8174 (IQ8319), JKMH 1414, RCRMH 2+Check
Early	NHZ & NWPZ	No trials
	NEPZ	No trials
	PZ	No trials
	CWZ	No trials
QPM-I-II-III	Across the zone	QPM-I (new entries are invited)+EHQ 64, IIMRQPMH 1705, IIMRQPMH 1708, OQPMH-14191, IMHQPM 1530, QPM MH 27, VEQH-16-1, APQH 5, APQH 7, APH-1, IIMRQPMH 1601, APH27+Checks
BC-I-II-III	Across the zone	BCI (new entries are invited)+ PAC 321, AH-7043+Check
SC-I-II-III	Across the zone	SC-I (New entries are invited)+Nuzi 260, BIO 4043+Check
PC-I-II-III	Across the zone	PC-I (New entries are invited) Shalimar Popcorn -1, DPCH-306, IHPC-1203, IHPC-1201+Check
Rainfed Trials	NIVT-RF	New entries are invited
	AVT-I-RF late-PZ+CWZ	CMH 12-686, PMH3, PMH1+Check
	AVT-I-RF PZ+CWZ(M)	VaMH 15028, ADH 1620, OMH14-27+Check
	AVT-I-RF PZ+CWZ (E)	Vivek Hybrid 51, Vivek Hybrid 45, DMRH1417+Check
	AVT-II RF PZ+CWZ-(M)	OMH14-27+ Checks
OPV	OPV Zone-NHZ	RCM 1-76 (OPV), RCM 1-61 (OPV) +Check

Recommendations for Trials

<p>National Initial varietal Trials (NIVT-I) (Across the zones): No. of rows – 2 (net) Row length – 4 m (net) Spacing- 60 cm x 20 cm in Irrigated Replications – 3 Fertilizer – As per the recommendations for zone</p>	<p>Advance varietal Trials-II (AVT-II) or (AVT I+II) (Zone specific): No. of rows – 6 (net) Row length – 4 m (net) Spacing- 60 cm x 20 cm in Irrigated Replications – 3 Fertilizer – As per the recommendations for zone</p>
<p>Advance varietal Trials-I (Zone specific): No. of rows – 4 (net) Row length – 4m (net) Spacing- 60cm x 20 cm in Irrigated Replications – 3 Fertilizer – As per the recommendations for zone</p>	<p>Specialty corn (QPM/SC/PC/BC-I-II-III (Across the zone) : No. of rows – 4 (net) Row length – 4 m (net) Spacing- 60 cm x 20 cm in Irrigated, BC: 60cm x 15cm Replications – 3 Fertilizer – As per the recommendations for zone</p>
<p>Rainfed Trials: NIVT No. of rows – 2 (net) Row length – 4 m (net) Spacing- 70 cm x 25 cm Replications – 3 Fertilizer – As per the recommendations for zone Sowing must be done on residual moisture without irrigation during crop duration</p>	<p>Rainfed Trials: AVT-I/OPV No. of rows – 4 (net) Row length – 4 m (net) Spacing- 70 cm x 25 cm Replications – 3 Fertilizer – As per the recommendations for zone Sowing must be done on residual moisture without irrigation during crop duration</p>

Note: Data recording sheet for all trials is available at our institute website

Where ever entries exceed 25 in numbers, alpha design will be used for evaluation of entries.

Seed Requirement-kharif,2018

S.N.	Trial	Year of testing	Seed quantity (Kg)
1	National Initial Varietal Trial (NIVT)	First	3.5 Kg / entry
2	Advance Varietal Trial-I (AVT-I)	Second	6.0 Kg /entry/zone
3	Advance Varietal Trial-II(AVT-II)	Third	10.0 Kg /entry/zone
4	Baby corn	1 st , 2 nd , 3 rd	10.0 Kg / entry

5	QPM	1 st , 2 nd , 3 rd	8 Kg/entry for 1 st & 2 nd years; 10.0 Kg/entry for 3 rd year entry
6	Sweet corn	1 st , 2 nd , 3 rd	3.5 Kg/ entry for 1 st and 2 nd , 6.0 Kg/entry for 3rd year
7	Popcorn	1 st , 2 nd , 3 rd	3.5 Kg/ entry for 1 st and 2 nd , 6.0Kg/entry for 3rd year
8	National Maize Demonstration-Hybrids	-	1.0 Kg/hybrids
9	National Maize Demonstration-Inbreds	-	0.3 Kg/hybrids
10	For rainfed trials	1 st /2 nd	2 Kg/entry (1 st); 3 kg for 2 nd year
11	Biofortification Trials		1 Kg/entry
12	Check variety seed		List circulated in the workshop.

Seed Requirement-rabi-2018-19:

S.N.	Trial	Year of testing	Seed quantity (Kg)
1	National Initial Varietal Trail (NIVT)	First	3.5 Kg/entry
2	Advance Varietal Trial-I (AVT-I)	Second	6.0 Kg/entry/zone
3	Advance Varietal Trial-II(AVT-II)	Third	10.0 Kg/entry/zone
5	QPM	1 st , 2 nd , 3 rd	8.0 Kg/ entry
10	Check variety seed		List circulated among all in the workshop

Seed quantity of checks varieties needed for *Kharif*, 2018

S.N.	Name	Maturity	Institute/Center	Seed quantity (kg)
1	CMH 08-287	Late	TNAU, Coimbatore	30
2	CMH 08-282	Late	TNAU, Coimbatore	30
3	BIO 9682	Late	Bio Seed Research India Ltd.	30

4	NK6240	Late	Syngenta India Pvt. Ltd.	30
5	CMH-08-292	Medium	TNAU, Coimbatore	30
6	BIO 9544	Medium	Bio Seed Research India Pvt. Ltd.	30
7	HM-12	Medium	CCSHAU, Uchani, Karnal	30
8	DHM 121 (BH 41009)	Medium	PJTSAU, Hyderabad	30
9	PMH5	Early	PAU, Ludhiana	30
10	BIO605	Early	Bio Seed	30
11	DKC 7074	Early	Monsanto	30
12	Vivek Maize Hybrid 51	Early	VPKAS, Almora	30
13	Vivek Maize Hybrid 45	Early	VPKAS, Almora	30
14	Pratap QPM Hybrid 1	QPM	MPUA & T, Udaipur	20
15	HQPM 1	QPM	HAU, Center Karnal	20
16	HQPM 4	QPM	HAU, Center Karnal	20
17	HQPM 5	QPM	HAU, Center Karnal	20
18	HQPM 7	QPM	HAU, Center Karnal	20
19	APQH-9	Provit-A	IARI, New Delhi	20
20	Misthi	Sweet Corn	Nuziveedu Seeds Limited	10
21	VL Sweet corn 1	Sweet Corn	VPKAS, Almora	10
22	HM 4	Babycorn	HAU, Center Karnal	25
23	VL Babycorn 2	Babycorn	VPKAS, Almora	25
24	VL Amber popcorn	Popcorn	VPKAS, Almora	12
25	Shalimar popcorn 1	Popcorn		12

	(KDPC)		SKUA&T, Srinagar	
26	Vjay	OPV	VPKAS, Almora	5
27	Hemant	OPV	VPKAS, Almora	5

Seed Quantity of check varieties required for constitution of rabi 2018-19 trials (Kgs)

1	P 3522	Late	Pioneer	25
2	NMH 713	Late	Nuziveedu	25
3	KMH 24K45	Late	Kaveri Seeds	25
4	Bio 9544	Medium	Bio Seeds	25
5	HM 10	Medium	HAU, Karnal	25
6	DHM 117	Medium	MRC, PJTSAU Hyderabad	25
7	Bisco 506	Medium	Bisco Biosciences	25
8	Pratap QPM Hybrid 1	Early	MPUA&T, Udaipur	25
9	HQPM 1	Medium	HAU, Center Karnal	25
10	HQPM 4	Medium	HAU, Center Karnal	25
11	HQPM 5	Medium	HAU, Center Karnal	25
12	HQPM 7	Medium	HAU, Center Karnal	25

Note: The 15 Kgs seed each of checks viz., Seedtech 2324; Bio9681 (Late), and Bio9637 (Medium) should be provided only for rabi trials continuously for two years. After two years, these checks will also be removed from the rabi trials. These checks (Seedtech 2324; Bio9681, Bio9637) are not required for Kharif season now.

General requirements:

- Last Date for seed receive at WNC, ICAR-IIMR, Rajendranagar, Hyderabad- **Kharif season-May 10th, 2018 and For Rabi- 10th Oct, 2018**
- For zone NHZ, covering sates J&K, H.P., UK., and North Eastern Hill regions (Z-1): The seed must be send to Dr S.K.Guleria, Maize Breeder, Hill

Agricultural Research & Extension Center, Bajaura-H.P, and the last date for this will be 1st May, 2018, then seed from Bajaura should reach the NHZ centers, latest by 15th May, 2018

- For rest of zones (Except NHZ), seed, DD and all correspondence must be dispatch to: In-charge, Winter Nursery Center, Maize, ICAR-IIMR, Rajendranagar, Hyderabad, Telangana-500030
- Testing Fee (Private/Non-ICAR organizations) – 60,000 + 18%GST/entry/trial
- DD should be in favour of Director, Maize, ICAR-Indian Institute of Maize Research, Ludhiana, Punjab-141004
- Seed must be untreated and graded properly
- Breeders who submit the entry must mention their contact no. and email ID in covering letter for further communication
- Detailed information of Breeders, institute and testing entry in a given format must be provided; the entries showing minimum of 10% superiority over the best zone specific check in one year data, along with it's female productivity should be reflected in the format. **Without prescribed performance entries will not be considered for inclusion in the trial.**

Annexure – II A

Technical Programme of Crop Production Group

The approved plan of work for AICRP Maize (Agronomy) is as follows:

MAT-1. Performance of pre release genotypes under varying planting density and nutrient levels

Objective: To study the response of pre-release genotypes to different planting density and NPK levels with their interactions

Main-plot: Density (2) Normal and high (plant population/ha)

Kharif (normal, QPM, PC): 66,000 & 83,000 (NWPZ, NEPZ and CWZ) 83,000 & 100,000 (NHZ and PZ)

Rabi season (normal, QPM, PC): 83,000 & 100,000

Sweet corn: 55000 & 66,000

Baby corn: 111,000 & 1,30,000 (NHZ) & 100,000 & 1,25,000 (NWPZ, NEPZ, PZ and CWZ)

Sub-plot: Nutrient Levels (2) RDF and 150% RDF

Sub-sub plot: Genotypes (as per promotion list) + checks

Design: Split-split plot

Replications: 3

Plot size: 10 m²

Locations:

NHZ: Bajaura, Gossaingaon, Imphal, Almora

NWPZ: Ludhiana, Karnal, Pantnagar, Delhi

NEPZ: Bahraich, Kalyani, Varanasi, Bhubaneswar, Ranchi, Dholi

PZ: Dharwad, Coimbatore, Kolhapur, Karimnagar, Hyderabad, Peddapuram, Vagarai

CWZ: Ambikapur, Chhindwara, Godhra, Banswara, Udaipur

(Details of the MAT-1 at each centre will be communicated one month in advance)

Note: Split N application on MAT 1

- Nitrogen to be applied in **three equal splits** at basal, knee high and tasseling stage in kharif season.
- Nitrogen to be applied in **four equal splits** in all MAT 1(f) at basal, knee high, pre-tasseling and tasseling stage in rabi season.

Observations to be recorded in MAT 1 Normal maize:

1. Plant population at 25 DAS & at harvest (thousands/ha)
2. Plant height at harvest (cm)
3. Days to 50% tasseling
4. Days to 50% silking
5. Number of cobs (thousands/ha)
6. 100-seed weight (g)

7. Grain yield at 15% moisture content (kg/ha)
8. Stover yield sun dry basis (kg/ha)
9. Insect-pest and disease incidence, if any
10. Net return and B:C ratio

Observations to be recorded in MAT 1 pop corn:

1. Plant population at 25 DAS and at harvest (thousands/ha)
2. Plant height at harvest (cm)
3. Number of cobs (thousands/ha)
4. Days to 50% tasseling
5. Days to 50% silking
6. Popping (%)
7. 100-seed weight (g)
8. Grain yield (kg/ha)
9. Stover yield (kg/ha)
10. Insect-pest and disease incidence, if any
11. Net returns and B:C ratio

Observations to be recorded in MAT 1 sweet corn:

1. Plant population at 25 DAS and at harvest (thousands/ha)
2. Number of cobs (thousands/ha)
3. Plant height at harvest (cm)
4. Days to 50% tasseling
5. Days to 50% silking
6. TSS (Total soluble solids) at harvest (%)
7. Green Cob yield (kg/ha)
8. Green fodder yield (kg/ha)
9. Insect-pest and disease incidence, if any
10. Net returns and B:C ratio

Observations to be recorded in MAT 1 babycorn:

1. Plant height at harvest (cm)
2. Plant population at 25 DAS and at harvest (thousands/ha)
3. Days to first picking
4. Number of pickings
5. Baby corn yield with husk in each picking (kg/ha)
6. Baby corn yield without husk in each picking (kg/ha)
7. Green fodder yield (kg/ha)
8. Insect-pest and disease incidence, if any
9. Net returns and B:C ratio

MAT-2: Nutrient management in maize-wheat-green gram cropping system under different tillage practices

Objective: To find out effective SSNM and tillage practices for yield maximization in intensified cropping system

Tillage practices (Main-plots)	Nutrient management (Sub-plots)
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1. Zero till 2. Conventional Till 3. Permanent bed	1.RDF 2.SSNM based on nutrient expert 3.60%RDN + Green seeker guided N application
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Design: Split Plot Replications: three Main-plot size: 150 m²

Locations: Udaipur, Pantnagar, Delhi, Dholi

Observations to be recorded:

1. Plant population (thousands/ha) in maize and mungbean at harvest
2. Effective tillers of wheat per square meter
3. Plant height (cm) at harvest of all crops
4. Yield attributes and yield of all crops
5. Days to reproductive stage of each crop
6. Days to maturity of each crop
7. System productivity
8. Stover/straw yields of all crops (kg/ha)
9. Net returns and B: C ratio
10. N, P and K uptake by all crops
11. Insect-pest and disease incidence, if any
12. Initial and final (after completion of three year cropping sequence) physical and chemical parameters of soil

MAT-3: Nutrient management in rice-maize/ Soybean-maize cropping system under different tillage practices

Objective: To find out effective SSNM and tillage practices for yield maximization in emerging cropping system

Tillage practices (Main-plots)	Nutrient management (Sub-plots)
1. Zero till 2. Conventional Till 3. Permanent bed	1.RDF 2.SSNM based on nutrient expert 3. 60%RDN + Green seeker guided N application

Design: Split Plot Replications: three Main-plot size: 150 m²

Locations: Dholi, Hyderabad, Kalyani

Observations to be recorded:

1. Plant population (thousands/ha) in maize at harvest
2. Effective tillers of rice per square meter
3. Plant height (cm) at harvest of all crops
4. Yield attributes and yield of all crops
5. Days to reproductive stage of each crop
6. Days to maturity of each crop
7. System productivity
8. Stover/straw yields of all crops (kg/ha)
9. Net returns and B: C ratio
10. N, P and K uptake by all crops
11. Insect-pest and disease incidence, if any

12. Initial and final (after completion of three year cropping sequence) physical and chemical parameters of soil

MAT-4: Nutrient management in maize based rainfed cropping systems under different tillage practices

Objective: To find out effective SSNM and tillage practices for yield maximization in rainfed cropping system

Tillage practices (Main-plots)	Nutrient management (Sub-plots)
1. Zero till 2. Conventional Till 3. Permanent bed	1.RDF 2.SSNM based on nutrient expert 3. 60%RDN + Green seeker guided N application

Design: Split Plot Replications: three Main-plot size: 150 m²

Locations: Maize-chickpea cropping system- Delhi, Banswara

Maize-Oat/ mustard cropping system-Srinagar, Chhindwara, Delhi

Observations to be recorded:

1. Plant population in maize, chickpea and mustard at harvest
2. Plant height (cm) of all crops at harvest
3. Yield attributes and yield of all crops
4. Days to reproductive stage of each crop
5. Days to maturity of each crop
6. System productivity
7. Stover/straw yields (kg/ha)
8. Net returns and B: C ratio
9. N, P and K uptake by all crops
10. Insect-pest and disease incidence, if any
11. Initial and final (after completion of three year cropping sequence) physical and chemical parameters of soil

MAT-5: Long term trial on integrated nutrient management in maize system

Objective: To assess the long-term effect of integrated nutrient management in maize system

Location:

Maize –wheat: Pantnagar, Ludhaina, Behraich, Banswara, Dharwad

Maize alone/-Mustard: Chindwara, Kangra, Srinagar

Maize alone: Karimnagar, Kolhapur, Ambikapur, Bhubneshwar, Bajaura, Coimbatore

Treatment details*:

T1	Unmanured
T2	100% RDF
T3	75% RDF
T4	50% RDF
T5	FYM 10 t/ha + Azatobactor
T6	Maize + legume intercropping with FYM 10 t/ha + Azatobactor
T7	100% RDF + 5 t/ha FYM
T8	75% RDF + 5 t/ha FYM
T9	50% RDF + 5 t/ha FYM
T10	100% RDF + 5 kg Zn/ha
T11	FYM 5 t/ha (state practice)

Design: RBD

Replications: 3

Sub-sub plot size: 15 m²

***Important note:**

- In treatment T1, T5, T6 and T11 it is advised not to use any of the agrochemical and instead manual weeding, biopesticide should be used, and it is desirable to go for crop residue recycling, if any.
- The experiment to be conducted on the fixed site over the years.

Observations to be recorded:

1. Soil chemical, physical and biological parameters before start of the experiment
2. Soil chemical, physical and biological parameters after completion of every cropping cycle
3. Disease and insect incidence monitoring
4. Weed dynamics study
5. Plant population (thousands/ha) in maize at harvest
6. Effective tillers of wheat per square meter
7. Plant height (cm) at harvest of all crops
8. Yield attributes and yield of all crops
9. Days to reproductive stage of each crop
10. Days to maturity of each crop
11. System productivity
12. Stover/straw yields of all crops (kg/ha)
13. Net returns and B: C ratio of each crop and cycle
14. N, P, K and micronutrient content and uptake by crops
15. Insect-pest and disease incidence, if any

MAT-6: Enhancing water-use efficiency in rainfed maize

Objective: To enhance water productivity in rainfed maize

Locations:

Maize-wheat: Udaipur, Ludhiana

Maize-mustard: Chhindwara

Maize alone: Karimnagar, Godhara, Srinagar, Chitrakoot

Treatment details

Main-plot: Tillage practices

1. Conventional till
2. Conventional till + mulching
3. Zero tillage
4. Zero tillage + residue (4 t/ha)

Sub-plot:

1. Control (no hydrogel)
2. Hydrogel 2.5 kg/ha
3. Hydrogel 5.0 kg/ha

Note: Hydrogel application method important steps

- Take one part hydrogel + 8 part of sand
- Mix it well just before application
- Apply in furrows before fertilizer application
- Apply fertilizer separately. Don't mix it with DAP as it forms lumps.

Design: Split -plot

Replications: 3

Sub plot size: 50 m²

Observations to be recorded:

1. Plant population 25 DAS and at harvest (thousands/ha)
2. Plant height (cm) of maize
3. Days to 50% silking
4. Days to maturity
5. Yield attributes and yield of maize
6. Maize equivalents of crop and cropping system (kg/ha)
7. Stover yield of maize (kg/ha)
8. Net returns and B: C ratio
9. Moisture-use efficiency
10. Insect-pest and disease incidence, if any
11. Soil chemical, physical and biological parameters after completion of every cropping cycle

MAT-7: Optimization of potassium fertilization for eastern India

Objective: Optimization of Potassium doses in Eastern India

Locations: Baharaich, Dholi, Ranchi, Ambikapur and Kalyani

	Potassium kg/ha
T1	0
T2	30
T3	60
T4	90
T5	120
T6	150

Design: RBD Replications: 3 Plot size: 15 m²

Observations to be recorded:

1. Plant population (thousands/ha) in maize
2. Plant height (cm) at harvest of all crops
3. Yield attributes and yield of all crops
4. Maize equivalents of component crops in cropping system
5. System productivity
6. Stover/straw yields of all crops (kg/ha)
7. Net returns and B: C ratio
8. Initial and final (after completion of one year crop sequence) chemical parameters of soil

MAT-8: Ecological intensification for climate resilient maize based cropping systems

Objectives:

- To develop the ecological intensification practice that could improve the current farmer practice in the identified cropping system while reducing the climatic risk.
- To evaluate the performance of ecological intensification over the existing farmer practice in terms of crop yields, farmer profitability and environmental sustainability.
- To quantify the attributions of various practices alone or in combination on gain/loss in productivity and farmers profitability under normal *vis-a-vis* climate aberration.

Cropping system	AICRP center
Maize-Wheat-Greengram	Bajaura, Karnal, Udaipur, Ludhiana, Pantnagar
Rice-Maize	Dholi, Hyderabad, Kalyani, Bhubneshwar
Maize-Chickpea	Dharwad, Imphal
Maize-Mustard/ Oats	Srinagar, Chhindwara, Delhi
Soybean-Maize Pulse-Maize/Maize alone	Banswara, Karimnagar, Coimbatore, Vagarai, Kolhapur, Ranchi, Ambikapur, Chitrakoot

Treatments:

T1	Farmer practice *
T2	Ecological Intensification (EI)**
T3	EI minus tillage practice (Farmer adopted tillage and residue management in all crops)
T4	EI minus Nutrient management (Farmer adopted nutrients in all crops)
T5	EI minus Planting density (Farmer adopted genotype and density in all crops)
T6	EI minus Water management (Complete rainfed for maize and farmers practice for rest of the crops)
T7	EI minus Weed management (Farmer adopted weed management in all crops)
T8	EI minus Disease and insect management (Farmer adopted management in all crops)

Design: RBD

Replications: 3

Plot size: 25 m²

* Farmers practice will be based on survey of 50 farmers from the adjoining area of region and mode will be selected

** EI comprises of best tillage and residue management practices; best planting density and genotype; precision nutrient management based on nutrient expert (IPNI) for rice, maize, wheat and soybean and 4 R nutrient management guidelines for other crops; application of water at critical growth stages; integrated weed, disease and insect management.

Observations to be recorded:

1. Plant height (cm) at harvest.
2. Effective tillers of rice and wheat at harvest.
3. Number of cobs (thousand/ha) in maize.
4. Days to reproductive stage of each crop.
5. Days to maturity of each crop.
6. 100-seed weight (g).
7. Grain yield (kg/ha) of all crops in the cropping system.
8. Stover yield (kg/ha) of all crops in the cropping system.
9. Insect-pest and disease incidence.
10. Assessment of weed population.
11. Net returns and B: C ratio.
12. Amount of residue applied in each crop and treatment (t/ha)

13. Initial and post-harvest soil properties after each crop (pH, EC, OC, Available NPK).
14. N, P, and K uptake in grain, straw/stover by all the component crops.
15. Nutrient use efficiency indicators, PFP (Partial Factor Productivity), AE (Agronomic efficiency), RE (Recovery efficiency), PNB (Partial Nutrient Balance).

MAT-9: Validation of Sensor based nitrogen management in maize

Objective: To validate sensor base N management in maize.

Treatments:

T1	Control
T2	RDF (1/3+1/3+1/3 N splitting at basal, knee high and tasseling)
T3	STCR (1/3+1/3+1/3 N splitting at basal, knee high and tasseling)
T4	Nutrient expert (1/3+1/3+1/3 N splitting at basal, knee high and tasseling)
T5	33% basal N + Green Seeker based N at knee high & tasseling stage
T6	60% basal N + Green Seeker based N at knee high
T7	70% basal N + Green Seeker based N at knee high
T8	60% basal N + Green Seeker based N at tasseling stage
T9	70% basal N + Green Seeker based N at tasseling stage
T10	30% Basal N + 30% at 25 DAS + Green Seeker based N at tasseling stage
T11	35% Basal N + 35% at 25 DAS + Green Seeker based N at tasseling stage
T12	N rich strip (300:60:40) (1/3+1/3+1/3 N splitting at basal, knee high and tasseling)

Design: RBD

Replications: 3

Plot size: 15 m²

Centre: Bajaura, Ludhiana, Delhi, Pantnagar, Ranchi, Hyderabad, Udaipur, CIMMYT-Karnal and IIFSR Modipuram

Observations to be recorded:

1. Plant population (thousands/ha) in maize
2. Plant height (cm) at harvest
3. Yield attributes and yield of maize
4. Stover yield (kg/ha)
5. Net returns and B: C ratio
6. N, P and K uptake by maize
7. Initial and final (after completion of maize crop) NPK status of soil

Other research priorities:

1. Survey of the farmers field for the Farmer practices for cultivation of kharif, rabi and specialty corn practices in the various states.
2. Zone-wise and national level publications shall be brought out on the experiment completed on nutrient management, tillage management, density, weed management, biofertilizers, etc. For this zone coordinators decided as NHZ (Dr. Sanjenbam Dayananda Singh), NWPZ (Dr Veer Singh), NEPZ(Dr Sonali Biswas), PZ (Dr Rajnikant) and CWZ (Dr A.K. Sinha).

Annexure – II B

Technical Programme of Outreach Programme

(Nodal email: totdmr12@gmail.com)

A. Frontline demonstrations (total : 750 acres)

Allocation of FLDs is as follows:

Implementing centre	Allocation (Acre)*		Aspect/s
	Target	Season	
PAU, Ludhiana	50	Kharif	Hybrids maize
IIMR, Ludhiana	50	Kharif/spring	Hybrid/fodder maize
WNC, Hyderabad	25	Rabi	Hybrid maize /IPM
RMRSPC, Begusarai	25	Rabi	Intercropping/hybrid
SKUAST, Srinagar	25	Kharif	Sweet corn/baby corn/normal
MPUAT, Udaipur	50	Kharif	Hybrid/intercropping
MPUAT, Banswara	25	Rabi	Hybrid/tillage management
VPKAS, Almora	25	Kharif	Hybrid maize
AAU, Godhara	25	Kharif	Intercropping/weed management
PJTSAU, Hyderabad	50	Kharif & Rabi	Weed management/ ZT maize
DrRPCAU, Dholi	50	Rabi	Intercropping and hybrid
NDUAT, Bahraich	25	Kharif/rabi	Hybrid/ intercropping
JNKVV, Chhindwara	25	Kharif	Intercropping/ weed management
UAS, Dharwada	25	Kharif	Micronutrient application/ IPM
CCSHAU, Karnal	25	Rabi/spring	Specialty corn/intercropping
TNAU, Coimbatore	50	Kharif/Rabi	Hybrid maize
BCKV, Kalyani (WB)	50	Rabi	Hybrid maize
CAU, Imphal (Manipur)	25	Kharif	Sweet corn/hybrid maize
CAU, Barapani	50	Kharif	Specialty corn/hybrid maize
UAS, Mandya	25	Kharif	IDM/hybrid
GBPUAT, Pantnagar	25	Kharif	Hybrid maize
BAU, Sabour	25	Kharif	Hybrid maize
Total	750		

***The allocation is subject to grant received by the NASF/Ministry of agriculture**

Major Guidelines for FLDs (As per NFSM cell, Ministry of Agriculture):

1. The FLDs must be focused on the <1 t/ha or least productivity districts of the region.
2. The varieties which are within 3 years (5 years for problematic areas viz., hills, saline, Alkaline soil, etc.) from the date of notification/ release/ identification should only be included in the demonstration purpose and those varieties in the borderline should be avoided.
3. All the FLDs must be conducted in close supervision of SAUs/KVK/ICAR institute.
4. Farmers practice, crop production and protection technologies used in FLDs should be obtained in the progress report. The reasons for the yield gap between FLDs and farmer practice must be mentioned in the report.
5. No chemical fertilizer is allowed as input under FLD programme. However, payment to various farm operations / farm services and other critical inputs (seed, biofertilizers, lime, gypsum, and micronutrients, etc) are allowed. Farmers have to apply the recommended doses of fertilizers.
6. The FLD programme should be conducted in a cluster of 10 ha as per already circulated guidelines.
7. Field days should be regularly organized and prior information should be sent to DAC&FW and Director, ATARI of ICAR with copy to pdmaize@gmail.com and totdmr12@gmail.com
8. The details of FLD beneficiary –farmers along with contact and Aadhar number should be furnished to DAC&FW.
9. Critical input of Rs 4200/- out of Rs 5000/- should be provided to beneficiary farmers (the ratio will change, if grant increases)

Reporting of FLD:

Annexure I: Détails of the input distributed. (to be given 15 days after input distribution)

Name of the implementing agency :

S. No.	State	Districts	Name of the farmers with address	Gender, SC/ST/OBC/General	Contact No.	FLDs to be conducted (ha)	Aadhar No	Input given (Name, price and quantity)

Annexure II: FLD performance. (to be given 15 days after harvest of the crop, before March 31, 2018)

Name of the implementing agency :

Sl. No.	Name of the farmer	Address (name of village)	Addhar no.	New technology demonstrated in FLDs	FLD conducted Area (ha)	Farmer practice details (variety, production and protection practice)	Yield (q/ha)		Gains (%)
							Farmer's practice	FLD	

Note for FLD programme:

1. 3-4 Good quality photograph will be required alongwith final report
2. Report on Field Day having number for farmers participated along with photograph should be given

B. TSP programme

Centre	Tribal populated aspiration districts	Amount* (Rs in lakh)
CAU, Imphal (Manipur)	Chandel	6.00
RARS, AAU, Gossaingaon (Assam)	Baska	5.00
MPKV, Kolhapur (MH)	Nandurbar	3.00
IGKV, Ambikapur (Chhattisgarh)	Bastar, Sukma, Kanker, Dantewada, Kondagaon, Narayanpur, Korba, Rajandgaon	7.00
MMRS, AAU, Godhra (GJ)	Narmada	5.00
BAU, Ranchi (Jharkhand)	Paschim Singhbhum, Lohardaga, Simdega, Khunti, Gumla, Godda, Latehar, Pakur, Purbi Singhbhum, Ranchi	8.00
JNKVV, Chindwara (M.P.)	Barwani	10.00
OUAT, Bhubneshwar (Odisha)	Kandhamal, Rayagada, Koraput, Gajapati, Malkangiri	7.00
BCKV, Kalyani#	24 Parbaganas (N)	2.00

Centre	Tribal populated aspiration districts	Amount* (Rs in lakh)
TNAU, Vagarai#	Dindigul	2.00
BHU, Varanasi#	Sonabhadra	3.00
GBPUAT, Pantnagar#	Udham Singh Nagar	2.00
PJTSAU, Hyderabad#	Malkajgiri, Ranga Reddy and Meboobnagar	5.00
MPUAT, Udaipur#	Pratapgarh, Rajsamand, Chittorgarh, Udaipur	7.00
MPUAT, Banswara#	Banswara, Dungarpur	5.80
Total		77.80

*As per the BE allocation of the ICAR and may increase or decrease accordingly.

1. **Capacity building and training:** Training on best management practices, value addition
2. **Seed: production, storage, bank and village:** FLDs on QPM, normal maize, baby corn, sweet corn and fodder maize.
3. **Infrastructure for grain storage:** Storage bins distribution
4. **Demonstrations on the poultry and goat production**
5. **Interventions and demonstrations for post-harvest technologies/primary processing:** Value added product from maize.
6. **Demonstrations on integrated farming:** QPM, normal maize, baby corn, sweet corn and their linkages with livestock and poultry production
7. **Linkage to Gramin Retail Infrastructure**
8. **Study of agriculture and allied production and management system, marketing and value addition**

Reporting TSP Programme report (Quarterly basis)

Output 1 (Farm material distribution) : Number of farmers benefitted /Individual farmers / farm families benefitted/ Supply of farm inputs/ seeds/ farm tools/ Honey production/ pollinators boxes/ inputs for / bio-fertilizer/ biopesticides etc.

SL. No.	Description	Unit	Q1/Q2/Q3/Q4 Targets	Q1/Q2/Q3/Q4 Achievements

Output 2 (knowledge and skill dissemination): Number of demonstration trials/ field days/ kisan goshdhis/ trainings/ plant protection technology demonstration/ biofertilizer/ biopesticides technology

SL. No.	Description	Unit	Q1/Q2/Q3/Q4 Targets	Q1/Q2/Q3/Q4 Achievements

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Final TSP programme report (Annexures)

Annexure I: Beneficiary details of the TSP programme.

S. No.	State	District	Sub-district	Village	Individual section amount	ST population benefitted

Annexure II: Report on input distribution programme.

S. No.	State	Districts	Name of the farmers with address	Aadhar No	Contact number	Input given (Name, price and quantity)

Annexure III: Report on the FLD under TSP Programme

Sl. No.	Name of the farmer	Address (name of village)	Aadhar no.	New technology demonstrated in FLDs	FLD conducted Area (ha)	Farmer practice details (variety name/practice)	Yield (q/ha)		Gains (%)
							Farmer's practice	FLD	

Important note for TSP programme:

- ❖ Please spent whole money by 31st November 2018 and send report by 31st December, 2018.
- ❖ 5-7 Good quality photograph for each activity required alongwith final report.
- ❖ It is desired to give information on activity in print & electronic media.

Technical Program of Entomology group

ET1: Evaluation of maize AICRP entries against *Chilo partellus* under artificial infestation (AVT I and II)

Locations: Dholi, Hyderabad, Karnal, Ludhiana, Kolhapur, Coimbatore and Udaipur

Number of Entries: To be decided by PI Breeding

Row length: 3.0 m; Replications: 2; Spacing: 75×20 cm

Date of Infestation: Release of 10-12 neonate larvae or 15-20 black head stage eggs into the whorl of maize plant at 12 days after germination

Observations: Leaf injury rating on 1-9 scale at 35 days after infestation

ET 2: Evaluation of inbred lines against *Chilo partellus* under artificial infestation (1st year)

Locations: Dholi, Hyderabad, Kolhapur, Karnal, Ludhiana, Udaipur and Coimbatore

Number of Entries: 30; Row length: 3.0 m, Replications: 2, Spacing 75×20 cm

Date of Infestation: Release of 10-12 neonate larvae or 15-20 black head stage eggs into the whorl of maize plant at 12 days after germination

Observations: Leaf injury rating on 1-9 scale at 35 days after infestation

ET 3: Monitoring of *Helicoverpa armigera* by pheromone traps (Kharif, Rabi & Spring)

Locations: Dholi, Hyderabad, Kolhapur, Karnal, Ludhiana, Udaipur, Coimbatore and Manipur

4 Traps to be installed in one acre area commencing from 30 DAG to monitor the adult moths at weekly interval at two locations till harvest of the crop.

ET 4: Evaluation of bio-pesticides against *C. partellus* (3rd Year)

Locations: Dholi, Hyderabad, Kolhapur, Karnal, Ludhiana and Udaipur

Cultivar to be used : Any notified hybrid for that zone

No. of rows: 6 rows of 3m

Number of rows/ treatment: 6 (thus each plot comprise of 6 rows; central four rows will be treated and border rows will act as buffer. It is advisable to separate each plot by leaving a row blank).

Seeds to be sown/row: 16 (15 seedlings will be maintained)

Total no. of plots: 8 (treatments)*3 (replications)- 24

Bio-pesticides	Dose
Bb-5a isolate of <i>Beauveria bassiana</i>	1×10 ⁸ Spores per ml

Bb-23 isolate of <i>Beauveria</i>	1×10 ⁸ Spores per ml
Bb-45 isolate of <i>Beauveria</i>	1×10 ⁸ Spores per ml
Ma-35 isolate of <i>Metarhizium</i>	1×10 ⁸ Spores per ml
Bt formulation	5 gm per lit.
Neem formulation	5 ml per lit.
State recommended chemical	-
Untreated Control	-

Out of the four rows, middle two rows will be infested artificially. The plants will be infested with 10-12 neonate larvae at 12 DAG. First Spray of the pesticide will be done two days after the infestation and second spray 10 days after first spray. Record LIR (1-9 scale) 30 days after infestation. Grain yield/plot at harvest to be recorded. Bio pesticides will be supplied to you by post. However you have to arrange seed for the trial on your own.

ET 5: Study on incidence of spotted stem borer, *Chilo partellus*/Sesamia inferens in Kharif /rabi sown maize in relation to plant age and meteorological factors (2nd year).

Locations: Hyderabad, Kolhapur, Karnal, Ludhiana, Udaipur, Coimbatore and Manipur

Objective: To develop pest incidence prediction model for maize growing ecologies

Number of cultivars: one susceptible and one resistant

Number of rows: 5 rows of 3 m for each cultivar

Number of sowings: At least 6 sowing dates from June to July for *Chilo partellus* and from October to November for *Sesamia inferens*,

Method of observation: After taking total number of plants, pull out all the plants showing symptoms. Dissect and record the number of larvae. Incidence of different insect pests will also be recorded at weekly intervals along with weather data.

ET 6: Study on pest succession of insect pests in Kharif, Rabi and Spring sown maize

Locations: Dholi, Hyderabad, Kolhapur, Karnal, Ludhiana, Udaipur, Coimbatore and Manipur

Number of cultivar: one susceptible; Number of rows: 10 rows of 3 m

Method of observation: Weekly observations on occurrence of various insect pests on predetermined plants will be observed during the cropping season.

Rabi 2018-19

ET 7: Evaluation of maize AICRP entries against *C. partellus* and *S. inferens* under artificial infestation (AVT I and II)

Locations: Kolhapur (*Chilo partellus*); Hyderabad, Karnal and Coimbatore (*Sesamia inferens*)

Number of Entries: To be decided; Row length: 3.0 m, Replications: 2

Spacing: 75x20 cm; Date of Infestation: 12 days after germination; Release of 10-12 neonate larvae; Observations: Leaf injury rating on 1-9 scale at 35 days after infestation

ET 8. Evaluation of inbred lines against *C. partellus* and *S. inferens* under artificial infestation at Kolhapur, Karnal and Hyderabad (3rd Year)

Entries: 38, Row length 3.0 m; Number of rows: 2, Replications: 2

Date of Infestation: 12 days after germination, Release of 10-12 neonate larvae

Data to be recorded: LIR at 35 days after infestation

Spring 2019

ET 9: Evaluation of maize AICRP entries against *Atherigona sp.*(AVT I and II) using fish meal technique

Locations: Karnal and Ludhiana

Entries: To be decided by PI – Breeding; Row length: 3.0 m , Number of rows: 2, Replications:2; Date of Infestation: Within 3 days of germination through Fish meal technique; Data to be recorded: Number of dead hearts formed at 21 days after germination

ET 10. Evaluation of inbred lines against shoot fly *Atherigona naqvii* using Fishmeal

technique (Ludhiana)-3rd year

ET 11: Evaluation of inbred lines against shoot fly *Atherigona sp* using Fish meal technique (Karnal and Ludhiana) 1st year

Entries: 30; Row length: 3.0 m; Number of rows: 2, Replications: 2

Date of Infestation: Within 3 days of germination through Fish meal technique

Data to be recorded: Eggs laid /plant, number of dead hearts formed at 21 DAG

The above discussion was approved by the Chairman with agreement of AICRP Scientists of all centres.

Technical program of Plant Pathology & Nematology

A. Kharif 2018:

MPT 1-6. Disease screening of NIVT (3 trials) and AVT (3 trials) of all maturity groups under artificially created epiphytotics (All centres)

Hot spot locations:

1. Maydis Leaf Blight (MLB) -Delhi, Karnal, Ludhiana, Dholi
2. Turcicum Leaf Blight (TLB) -Almora,Bajaura, Larnoo, Dharwad, Mandya,Imphal (AVTs only), Barapani (AVTs & specialty corn only)
3. Banded Leaf and Sheath Blight (BLSB) - Delhi, Karnal,Pantnagar, Dhaulakuan, Sabour
4. Curvularia Leaf Spot (CLS) –Udaipur
5. Bacterial Stalk Rot (BSR) - Dhaulakuan,Pantnagar
6. Charcoal Rot (ChR) - Ludhiana, Coimbatore, Hyderabad
7. Fusarium Stalk Rot (FSR) - Udaipur
8. Common Rust (CR) - Dharwad
9. Polysora Rust (PR) - Mandya
10. Sorghum Downy Mildew (SDM) - Mandya
11. Rajasthan Downy Mildew (RDM) - Udaipur
12. Maize Cyst Nematode (MCN) – Udaipur

Note: All the pathologists are requested to use susceptible and resistant checks from the following list mentioned against each disease.

A. Susceptible checks

S. No.	Check	Diseases
1.	CML 186, CM 600, CM 119, Local Checks	Maydis leaf blight
2.	Dhari, 219J, CM 202, Local Checks	Turcicum leaf blight
3.	CM 600, CM 501, Hishell, Local Checks	Banded leaf and sheath blight
4.	CM 500, Local Checks	Sorghum downy mildew
5.	Surya	Rajasthan downy mildew
6.	Surya	Curvularia leaf spot
7.	CM 600, DAC 7074, Local Checks	Bacterial stalk rot
8.	Surya, CM 500,	Fusarium stalk rot
9.	CM 600, 30V92, CM501, Hishell	Charcoal rot
10.	CM 202, 219 J, Local Checks	Polysora rust

11.	Local Checks	Common rust
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B. Resistant checks

S. No.	Check	Diseases
1.	DMSC16-1, PFSR/51016-1, HKI 1352-5-8-9, CML141, CML 269, CLQRCYQ-47-B, CLQ-RCYQ30, CLQ-RCYQ36, CLQ-RCYQ41, PFSR-R3, PFSR-R9, PFSR-R10, PFSR-S2, PFSR-S3, JCY2, CM 117-3, 42048-2, 42050-1, JCY3, LM13, LTP4, HKI 1105, HKI Talar, EI 670, CUBA 377, DTPWC 9-F31-1-1-3	Maydis leaf blight
2.	HKI 1352-5-8-9, CML141, CML 172, HKI-MBR-139-2, PFSR-R3, PFSR-R9, PFSR-R10, PFSR-S3, JCY2, JCY3, CM117-3	Turcicum leaf blight
3.	PFSR-R9, JCY3, HKI 1105, HKI Talar, CML 451Q, CML165	Rajasthan downy mildew
4.	WINPOP-3, HKI 1040-5, HKI 1105, HKI 1344, HKI Talar, EI 561, BML 8, CM 128, DMSC 1, DMSC 6, Hyd05R/204-1, CML 3, DMSC 16-1, DTPWC 9-F31-1-1-3, HKI 141	Curvularia leaf spot
5.	CML 446, HKI Talar, EI 670, EI 561, BML 8, G18seqcef 74-2-1, CM 132, CM 105, CM 128, CML 451(P2), CUBA 377, IIMRQPM 03-113, HKI 226, HKI-2-6-2-4(1-2)-4, SKV 18, CML 451Q, CML 321	Fusarium stalk rot
6.	DMSC-37-3, HKI-PC-8-2-1, CM121, HKI 193-1, CML 172, PFSR-R3, PFSR-R9, PFSR-R10, JCY2, CM 117-3, 42048-2, 42050-1, JCY3, CM117-3, LM13, JCY3, LTP4	Charcoal rot
7.	ae-40	Polysora rust
8.	IIMR QPM-03-124, HKI 31-2	Common rust

Observations: Record all the disease screening data in following format:

Season : Replication :

Date of Sowing : No. of Rows :

Date of Inoculation : Row Length :

Name of Sus. check : Date of Observation :

Name of Resis. Check : Date of Harvesting :

S. No.	Genotype	Disease score (1-9)/ DI (%)
Replication 1(R1)		
1.		
2.		
	Resistant Check	
	Susceptible Check	
Replication 2 (R2)		
1.		
2.		
	Resistant Check	
	Susceptible Check	

- Follow uniform method of disease screening under sick plot/ artificial inoculated disease condition as described in Technical Bulletin on "Mass Screening Techniques for resistance to maize diseases (Hooda et al., 2018)". "
- Overall mean score of foliar diseases of all plants in row should be recorded by averaging of score of each plant.
- Use susceptible and resistant checks at every 10th(artificially created epiphytotics) /20th(sick plot) row as per availability of land.
- Meteorological data of the centers during crop growth period should be provided along with the disease reaction data.
- Pathogen(s) of every disease should clearly be spelt out.
- In case of complex disease like PFSR (FSR, ChR and late wilt), score of each individual disease should be mentioned

MPT 7-10 Disease screening of Specialty corn hybrids(4 trials)underartificially created epiphytotics (All centres):

As mentioned in case of MPT 1-6.

MPT 11 Disease screening of Rainfed hybrids under artificially created epiphytotics (All centres):

As mentioned in case of MPT 1-6.

MPT 12-13. Disease screening of inbred lines (Normal, QPM) under artificially created epiphytotics:

The inbred lines will be screened at the following hot spot locations:

- **Normal & QPM-** All centres against major diseases of maize

S. No.	Centre	Scientist	No. of Inbred	Testing	
				Disea	Centres

			s	se	
1.	Ambikapur	Dr. S. K. Sinha	10	MLB	Delhi, Karnal
				TLB	Almora, Mandya
				BLSB	Delhi, Karnal
2.	Bajaura	Dr. S. K. Guleria	10	TLB	Almora, Bajaura, Dharwad, Mandya, Larnoo, Barapani
			10	BSR	Pantnagar, Dhaulakuan
3.	Ludhiana	Dr. J.S. Chawla	10	MLB	Delhi, Karnal, Ludhiana, Dholi
			10	ChR	Ludhiana, Coimbatore, Hyderabad
4.	IIMR	Mr. Mukesh Choudhary	15	MLB	Ludhiana (IIMR), Karnal, Dholi, Kalyani
			25	ChR	Ludhiana (IIMR), Coimbatore, Hyderabad
			25	SDM	Mandya
5.	IIMR	Dr. Meena Sekhar	100	ChR	Delhi, Ludhiana, Hyderabad
				FSR	Udaipur
6.	VPKAS, Almora	Dr RK Kulbe	05	BLSB	Delhi, Karnal, Pantnagar, Dhaulakuaon and Sabour

7.	IIMR	Dr. Ramesh Kumar	25	MLB	Delhi, Karnal, Ludhiana (IIMR)
				TLB	Bajaura, Dharwad, Mandya
				BLSB	Delhi, Karnal, Pantnagar, Dhaulakuan
				ChR	Ludhiana (IIMR), Coimbatore, Hyderabad
8.	IIMR	Dr. Chikkappa G. Karjagi	150	MLB	Delhi, Karnal, Ludhiana, Dholi
				TLB	Almora, Bajaura, Larnoo, Dharwad, Mandya
				ChR	Ludhiana, Coimbatore, Hyderabad
				BLSB	Delhi, Karnal, Pantnagar, Dhaulakuan
				RDM	Udaipur
				FSR	Udaipur
				SDM	Mandya
9.	IIMR	Mr. Vishal Singh	60	MLB	Delhi, Karnal, Ludhiana, Dholi, Kalyani
				TLB	Almora, Bajaura, Larnoo, Dharwad, Mandya
				BLSB	Karnal, Pantnagar, Dhaulakuan, Ludhiana

As mentioned in MPT 1-6.

MPT 14. Assessment of avoidable yield losses due to major diseases of maize at selected centres.

These trials will be conducted at following locations using paired plot technique with nine replications under sick plot/ artificially created epiphytotics.

Locations: Dhaulakuan (MLB), Kalyani (MLB), Bajaura(TLB), Mandya(SDM), Coimbatore(ChR), Godhra(CLS),Udaipur(MCN).

Replication	Treatment	Disease Incidence(%)	PDI	Yield (q/ha)	Yield loss (%)
R1	Protected				
	Unprotected				
R2	Protected				
	Unprotected				
.	Protected				
	Unprotected				
.	Protected				
	Unprotected				
R9	Protected				
	Unprotected				
Mean					
Disease control (%)					
Avoidable yield losses (%)					
CD (5%)					
CV (%)					

MPT 15. Trap nursery trial for disease incidence (All centres)

The trial will be conducted to find out the occurrence of disease and/or any new disease on a set of maize inbred lines (10-12 lines) susceptible to different diseases at various locations. A special care has to be taken in observing the incidence of viral diseases, if any.

A. Observations: Disease prevalence should be recorded in following format:

S.No.	Entry Name	Germination (%)	Disease incidence rating (Natural condition)	Remarks
1.				

- **Locations:** Almora, Bajaura, Barapani, Coimbatore, Delhi, Dharwad, Dhaulakuan, Dholi, Hyderabad, Imphal, Karnal, Larnoo, Ludhiana, Mandya, Pantnagar, Udaipur, Kalyani, Sabour (18 centres)

B. Observations: Weekly disease prevalence – Record weekly disease prevalence data of nursery for use in weather forecasting in the following format:

Week	Entry Name	Disease name	Disease incidence rating (Natural condition)	Remarks
1.	a			
	b			
	c			
2.	a			
	b			
	c			

• **Hot spot locations:**

MLB:- Karnal, Ludhiana, Dholi; **TLB:-** Bajaura Dharwad, Mandya; **BLSB:-** Delhi, Karnal, Pantnagar; **ChR:-** Ludhiana, Coimbatore, Hyderabad; **SDM:-** Mandya

- For soil borne diseases (PFSRs, BLSB, BSDM, SDM, RDM, cyst nematode), exact value of percent incidence should be mentioned. Additionally, percent incidence should also be reflected in terms of mean disease score of foliar diseases and percent disease index (PDI)

MPT 16. Disease survey and surveillance (including cyst nematode) in different maize growing areas (All centres)

During survey & surveillance of diseases (including cyst nematode), scoring should be done along with the incidence of disease in prescribed proforma.

The weekly disease status should be sent in the following proforma:

Weekly Status of Maize Pests/Diseases

Crop Stage	State/District No of field visited	Pest/ disease	Intensity*

***Disease intensity: T - Traces; L - Low; M - Medium; H - High**

Locations: Almora, Bajaura, Coimbatore, Delhi, Dharwad, Dhaulakuan, Dholi, Hyderabad, Imphal, Karnal, Larnoo, Ludhiana, Mandya, Pantnagar, Udaipur, Kalyani, Sabour (17 centres)

Observations:

- Mean disease score for calculating PDI should strictly be followed.
- Weather data of locations may be given with disease prevalence.
- Weather data should be recorded in following format and give its correlation

S.No.	Station Name	Month	Temperature (°C)		Rainfall of Month (mm)	R.H (%)		Sun shine Hrs.
			Min	Max		Min	Max	

MPT 17. Development of IDM strategy for major diseases of maize

Exp. 1 Efficacy of fungicides (with label claim) in the control maize diseases

Location: Imphal (TLB)

Exp. 2 Evaluation of IDM modules for management of major diseases of maize

Locations: Kalyani (MLB); Dharwad and Mandya (TLB); Ludhiana, Karnal and Delhi (BLSB); Hyderabad and Coimbatore (ChR); Udiapur (FSR & CLS)

Exp. 3 Eco-safe management of maize cyst nematode, *Heterodera zae* on maize through bio-agents

Treatments: 8	Replication: 3	Design: R.B.D.
* <i>Glomus fasciculatum</i>	1% w/w as seed treatment	
* <i>Glomus fasciculatum</i>	2% w/w as seed treatment	
* <i>Glomus fasciculatum</i>	4% w/w as seed treatment	
* <i>Metarhizium anisopliae</i>	1% w/w as seed treatment	
* <i>Metarhizium anisopliae</i>	2% w/w as seed treatment	
* <i>Metarhizium anisopliae</i>	4% w/w as seed treatment	
* <i>Pseudomonas fluorescens</i>	1% w/w as seed treatment	
* <i>Pseudomonas fluorescens</i>	2% w/w as seed treatment	
* <i>Pseudomonas fluorescens</i>	4% w/w as seed treatment	
* <i>Trichoderma viride</i>	4% w/w as seed treatment	
* Check		

Observations:

- * Initial nematode population/100 cc soil
- * Number of females / 5g root
- * Cysts/100 cc soil
- * Final nematode larvae population / 100 cc soil
- * Yield/plot expressed in q/ha
- * Shoot weight (g)
- * Root weight (g)
- * Number of females / 5g root
- * Cysts/100 cc soil
- * Final nematode larvae population / 100 cc soil
- * Yield/plot expressed in q/ha

Exp. 4 Preliminary screening of cow products towards the management of maize cyst nematode, *Heterodera zae* on maize as seed treatment

Treatments: 8	Replication: 3	Design: R.B.D.
* Cow urine	5% w/v	
* Cow urine	10% w/v	

- * Cow urine 20% w/v
- * Butter milk 5% w/v
- * Butter milk 10% w/v
- * Butter milk 20% w/v
- * Curd 20% w/v
- *Panchgavya 10% w/v
- *Panchgavya 20% w/v
- * Check

Observations:

- * Initial nematode population/100 cc soil
- * Shoot weight (g)
- * Root weight (g)
- * Number of females / 5g root
- * Cysts/100 cc soil
- * Final nematode larvae population / 100 cc soil
- * Yield/plot expressed in q/ha

B. Rabi 2018-19:**MPT 1-5. Disease screening of Rabi maize hybrids (NIVT & AVTs)**

Evaluation of maize hybrids of the coordinated trials of *Rabi* maize against major diseases will be done under artificially created epiphytotics at following hot spot locations.

Hot spot locations:

1. Turcicum leaf blight (TLB): Dholi, Kalyani, Mandya
2. Charcoal rot (ChR): Ludhiana, Coimbatore, Dharwad, Hyderabad
3. Common rust (CR): Karnal
4. Sorghum Downy mildew (SDM): Mandya

List of susceptible checks

S. NO	Check	Diseases
1.	Dhari, 219J, CM 202, Local Checks	Turcicum leaf blight
2.	CM 500, Local Checks	Sorghum downy mildew
3.	CM 600, 30V92, CM 501, Hishell, G-25 Local Checks	Charcoal rot
4.	CM 202, 219 J, Local Checks	Polysora rust

Observation:

- Record the disease screening data in following format :

Season : Replication :

Date of Sowing : No. of Rows :

Date of Inoculation : Row Length :

Name of Sus. check : Date of Observation :

Name of Resis. Check : Date of Harvesting :

S. No.	Genotype	Disease score (1-9)/ DI (%)
Replication 1(R1)		
1.		
2.		
	Resistant Check	

	Susceptible Check	
Replication 2 (R2)		
1.		
2.		
	Resistant Check	
	Susceptible Check	

MPT 6-7. Disease screening of inbred lines (Normal, QPM) under artificially created epiphytotics:

The inbred lines will be screened at the following hot spot locations:

Normal & QPM- All centres against major diseases of maize

S. No.	Centre	Scientist	No. of Inbreds	Testing	
				Disease	Centres
1.	IIMR	Mr. Mukesh Choudhary	25	ChR	Ludhiana (IIMR), Coimbatore, Dharwad, Hyderabad
			25	SDM	Mandya
2.	IIMR	Dr. MeenaSekhar	100	ChR	Ludhiana, Hyderabad
3.	IIMR	Mr. Vishal Singh	40	TLB	Dholi, Kalyani, Mandya
				ChR	Ludhiana (IIMR), Coimbatore, Dharwad, Hyderabad

C. ICAR-CIMMYT trials: Following ICAR-CIMMYT trials (2018-19) would be conducted at centres mentioned against each trial:

Trial name	Disease	Material description	No. of entries	No. of Reps.	Total Plots	Locations
TLBIT	Turcicum leaf blight (TLB)	Advance generation CIMMYT Asia lines	100	2	200	SKUAST, Kashmir & AICRP Kalyani
BLSBIT	Banded Leaf and Sheath blight (BLSB)	Advance generation CIMMYT Asia lines derived from BLSB resistant pedigree crosses	100	2	200	GBPUAT, Pantnagar
FSRIT	Fusarium Stalk rot (FSR)	S ₄ -S ₅ inbred lines derived from FSR and FMSR (Fusarium-Macrophomina stalk rot) multi parent synthetic populations	100	2	200	MPUAT, Udaipur
MSRIT	Charcoal rot/ Macrophomina stalk rot (MSR)	S ₄ -S ₅ inbred lines derived from MSR and FMSR (Fusarium-Macrophomina stalk rot) multi parent synthetic populations	100	2	200	PAU, Ludhiana and UAS, Dharwad



**61st Annual Workshop
All India Coordinated Research Project on Maize
(Indian Council Of Agricultural Research)**



**Date: April 07-09, 2018
Venue: CSKHPKV, HAREC, Bajaura**

Final Programme

Day 1: April 07, 2018 (Saturday)

08:30 Registration

09:00-13:00 Session I: Review of Centres

Review of research results of individual AICRP centres for *Kharif* 2017 and *Rabi* 2016-17

(10 min presentation & 5 min discussion)

(Common centre-wise presentations of significant results and progress report by PI, AICRP)

Chairman	: Dr. Kuldeep Singh, Director, ICAR-NBPGR
Convener	: Dr. Sujay Rakshit, Director, ICAR-IIMR
Participants	: All scientists of AICRP programme
Rapporteurs	: Drs. Ishwar Singh and S.B. Singh
13:00-14:00	: Lunch

**14:00-15:30 Session II: Formulation of Work Plan (2018-19)-
Breeding**

Chairman	: Dr. Kuldeep Singh, Director, ICAR-NBPGR
Convener	: Dr. Sujay Rakshit, Director, ICAR-IIMR
Rapporteurs	: Drs. Pardeep Kumar and Mukesh Choudhary

**15:30-17:00 Session III: Formulation of Work Plan (2018-19)-
Agronomy & Outreach Programme**

Chairman	: Dr. Kaushik Majumdar, IPNI
Co-Chairman	: Dr. Suresh Gautam, HOD (Agronomy)
Convener	: Dr. A.K. Singh, Principal Scientist, ICAR-IIMR
Rapporteurs	: Drs. S.L. Jat, M.C. Dagla, Mahesh Kumar and Dilip Singh

**17:00-18:30 Session IV: Formulation of Work Plan (2018-19)-
Entomology**

Chairman	: Dr. Sujay Rakshit, Director, ICAR-IIMR
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Co-Chairman : Dr. P.K. Mehta, Dean COA, HPKV, Palampur
 Convener : Dr. P.L. Soujanya. WNC, IIMR
 Rapporteurs : Dr. L.K. Reddy, PJTSAU and Jwala Jindal,
 PAU, Ludhiana

18:30-20:00 Session V: Formulation of Work Plan (2018-19)-Plant Pathology

Chairman : Dr. Sujay Rakshit, Director, ICAR-IIMR
 Co-Chairman : Dr. S.K. Rana, HOD (Plant Pathology)
 Convener : Dr. K.S. Hooda, Principal Scientist, ICAR-IIMR
 Rapporteurs : Drs. Harleen Kaur and Pravin K. Bagaria

Day 2 : April 08, 2018 (Sunday)

09:00-10:25 Session VI: Inaugural Session

Chief Guest : Dr. Ram Lal Markanda, Minister of
 Agriculture, Govt. of Himachal Pradesh
 Guest of Honor : Sh. Ram Swaroop Sharma, MP, Mandi
 Special Guest : Dr. S.K. Malhotra, Agriculture
 Commissioner, Ministry of Agriculture,
 Govt. of India
 Special Guest : Dr. I.S. Solanki, ADG (FFC), ICAR
 Chairman : Dr. Ashok Kumar Sarial, Vice-Chancellor,
 CSKHPKV, Palampur
 Rapporteurs : Drs. D. P. Chaudhary and Ramesh Kumar
 09:00-09:05 ICAR/CSKHPKV Song
 09:05-09:10 Welcome by : Prof. Ashok K. Sarial, Vice-Chancellor,
 CSKHPKV, Palampur
 09:10-09:15 Lighting of lamp : Chief Guest and other Dignitaries
 09:15-09:30 Director's Review : Dr. Sujay Rakshit, ICAR-IIMR
 09:30-09:35 Address by Special : Dr. I.S. Solanki, ADG(FFC), ICAR
 Guest
 09:35-09:40 Address by Special : Dr. S.K. Malhotra, Commissioner
 Guest Agriculture, MOA, Govt. of India
 09:40-09:55 Address by Guest : Dr. A.K. Singh, Dy. Director General (CS),
 of Honor ICAR
 09:55-10:05 Address by Guest : Sh. Ram Swaroop Sharma, MP, Mandi
 of Honor Parliamentary Constituency
 10:05-10:20 Address by Chief : Dr. R. L. Markanda, Ministry of
 Guest Agriculture, Tribal Welfare & Information
 Technology, Govt. of Himachal Pradesh
 10:20-10:25 Vote of Thanks : Dr. R. S. Jamwal, Director of Research

10:25-11:00 High Tea

Session VII

11:00-13:30 Review of work during Kharif 2017 and Rabi 2016-17

- Chairman : Dr. A.K. Singh, DDG (CS), ICAR
 Co-Chairman : Dr. S.K. Malhotra, Commissioner
 Agriculture, DAC
- Rapporteurs : Drs. Abhijit Das, M.C. Dagla, Pravin K.
 Bagaria & Ms. Sapna
- Trials & Nurseries : Dr. N. Sunil
 Breeding (Field Corn) : Dr. Bhupender Kumar
 Breeding (QPM) : Dr. Ramesh Kumar
 Breeding (Specialty Corn) : Dr. Chikkappa G.K.
 Crop Production : Dr. A.K. Singh
 Entomology : Dr. P.L. Soujanya
 Pathology/ Nematology : Dr. K.S. Hooda
 Biochemistry : Dr. D.P. Chaudhary
 BSP : Dr. Chikkappa G.K.
 Outreach programme : Dr. S.L. Jat
- 13:30-14:30 : Lunch**
- 14:30-16:30 Session VIII: ICAR-CIMMYT/International Collaborative
 Research**
- Chairman : Dr. S.K. Malhotra, Commissioner
 Agriculture, DAC
- Co-Chairman : Dr. I.S. Solanki, ADG (FFC), ICAR
- Rapporteurs : Drs. Vishal Singh and Pardeep Kumar
- ICAR-CIMMYT Collaborative : Dr. P.H. Zaidi, CIMMYT
- Research
- Nutrient management : Dr. Kanshik Majunder, IPN
 challenges of maize
 intensification
- Discussion on 13th Asian : All participants
 Maize Conference
- 16:30-18:00 Session IX: Presentation of Monitoring Reports**
- Chairman : Dr. Sujay Rakshit Director, ICAR-IIMR
 Presenter : Dr. K.S. Hooda
 Member : All PIs
 Rapporteurs : Drs. S.B. Singh and S.L. Jat
- Session X:
 Varietal Identification meeting**
- 18:00-20:00**

Day 3 : April 09, 2018 (Monday)

09:00-11:00 Session XI: Lead Lectures

- Chairman : Dr. A. K. Sarial, Vice Chancellor, HPKV,
 Palampur
- Co-Chairman : Dr. Sujay Rakshit, Director, IIMR
 Dr. A. Kumar, ICAR-IARI : New insights into phyllosphere microbiome

- Dr. Rajender Prasad, ICAR- IASRI : Advances in field designs for experiments and its relevance in multi location trails (MLT)
- Dr. A. Dhandapani, ICAR- NAARM : AICRP on Maize- Automation System
- Dr. VinayMahajan, ICAR-IIMR : Doubling the Maize Production

11:00-13:00 Session XII: Presentations of Work Plan 2018-19

- Chairman : Dr. A. K. Sarial, V C, CSK HPKV, Palampur
- Co-Chairman : Dr. I. S. Solanki, ADG (F&FC), ICAR
- Convener : Dr. Sujay Rakshit, Director, IIMR
- Rapporteurs : Drs. N. Sunil, Sapna and Pravin Kumar Bagaria
- Breeding (Field Corn) : Dr. Bhupender Kumar
- Breeding QPM : Dr. Ramesh Kumar
- Breeding (Specialty Corn) : Dr. Chikkappa G.K.
- Crop Production : Dr. A.K. Singh
- Entomology : Dr. P.L. Soujanya
- Pathology/ Nematology : Dr. K.S. Hooda
- Outreach Programme : Dr. S.L. Jat

13:00-14:00

: Lunch

14:00-15:30

Session XIII: Plenary Session

- Chief Guest : Dr. Ashok Kumar Sarial, Vice-Chancellor, CSKHPKV
- Chairman : Dr. I.S. Solanki, ADG (FFC), ICAR
- Co-Chairman : Dr. Atul, Director (Ext.), CSKHPKV, Palampur
- Convener : Dr. Sujay Rakshit, Director, IIMR
- Rapporteurs : Drs. Ishwar Singh and S. B. Singh
- Recommendations of VIC Meeting : Director, ICAR-IIMR
- Plant Breeding : Dr. Bhupender Kumar
- Crop Production : Dr. A.K. Singh
- Entomology : Dr. P.L. Soujanya
- Pathology/ Nematology : Dr. K.S. Hooda
- Chairman's Address : Dr. I.S. Solanki, ADG (FFC), ICAR
- Address of Chief Guest : Dr. Ashok Kumar Sarial, Hon'ble Vice-Chancellor, CSKHPKV, Palampur
- 15:30-15:40 Vote of Thanks : Dr. D.R. Thakur, Organizing Secretary, CSKHPKV, HAREC, Bajaura

15:40-17:00

Session XIV: Field Visit