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**Proceedings
of
60th Annual Maize Workshop
Held at
Maharana Pratap University of Agriculture and Technology, Udaipur
02-04 April 2017**



All India Coordinated Research Project on Maize
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Executive summary

The 60th Annual Group Meeting of the All India Coordinated Maize Improvement Project was held at the Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan during 02-04 April, 2017. The group meeting was held in 10 sessions over three days.

The workshop was inaugurated by Dr. J.S. Sandhu, DDG (CS). Dr. Sujay Rakshit, Director, IIMR presented the Annual Report of AICRP on Maize and presented the highlights of achievements in various disciplines. During the period, 7 hybrids have been released and 5 genetic stocks were registered with the NBPGR, besides 20 cultivars received protection under PPV&FR Act. Trial success rate in kharif 2016 was 92.1%, while that in rabi 2015-16 was 94.6%. FLDs conducted across 308 ha over 13 states recorded over 115% higher than national average.

Dr. I.S. Solanki, ADG (FFC), ICAR appreciated tremendous improvement in maize production and productivity over last six decades. Dr. J.S. Sandhu, DDG (CS) mentioned that shifting from double cross hybrids to single cross hybrids resulted in phenomenal increase in production of maize. He emphasized to work on weed management, conservation agriculture and precision farming. Dr. Uma Shankar Sharma, Vice Chancellor, MPAUT, Udaipur in his presidential address emphasized on the importance of short duration QPM for the state of Rajasthan to overcome the problem of malnutrition and specialty corn to generate employment through processing industries.

On the auspicious occasion of Diamond Jubilee, former maize Directors, *viz.*, Drs. N. N. Singh and Sain Dass were felicitated. In his lead talk on "Retrospect of maize research in India", Dr. N.N. Singh gave a brief historical recap of maize research in India starting with establishment of AICRP on Maize in 1957 and suggested roadmap ahead. The lead talk was followed by a panel discussion on "Challenges in maize under climate change", in which Drs. Sain Dass, P.H. Zaidi, M.L. Jat, Bijender Pal and Shri R.J. Aggarwal participated. It came out in discussion that the fluctuations in climatic conditions can be best addressed through increased coverage under single cross hybrids with ensured availability of quality seeds. Focus on getting stable yield in rainfed area is needed and further there is an urgent need to develop separate strategy for kharif and rabi seasons. Streamlining marketing and value chain are also needed. Seed treatment and rain-water harvesting were also points came out in discussion. Dr. J.S. Sandhu in his Chairman's remarks emphasized on seed pricing regulation by government and adopting state-wise strategies for maize cultivation.

In Variety Identification Committee, out of 32 proposals received 22 were identified; 5 were not identified and 5 each were asked to submit the application or to repeat.

Under ICAR-CIMMYT/International Collaborative Research and Private Participatory Research Session, it was highlighted that lipidomic studies showed significantly negative correlation between grain yield and galactolipid profile. Genomic selections for heat tolerance using multi-parent synthetic populations have been undertaken in this collaborative study.

In discipline-wise presentation of reports, the principal investigators presented the progress reports in details. A total of 28 centres were reviewed thoroughly. The

centres advised to improve their performance to meet the expectations of ICAR are: Bhubaneswar, Gosaingaon and Kanpur. In breeding, the average success rate of trials was 77.83%. In the rainfed trials during *Kharif* 2016, the yield penalty under stress conditions was highest (59.6%) for late maturity in Peninsular Zone and lowest (3.0%) for early maturity group in CWZ. In crop production, application of post-emergence herbicide, Tembotrione (120 g a.i./ha) has been recommended at 25 DAS for the control of weeds. In entomology trials, a total of 135 entries of different corn types and maturity period were evaluated for resistance against *C. partellus* under artificial infestation. Further in 34 trials comprising of 468 hybrids and nearly 1400 inbred lines were screened under artificial epiphytotics for major diseases and cyst nematode. It was pointed out to revisit the hot spots in the light of climatic changes. The Group meetings of different disciplines made following recommendations:

1. Genotypes HKI 1831, V 351, HKIPCBT3 and AEB(Y)1 found resistant to *Atherigona* spp.
2. Genotypes DMSC 28,, Win pop 8, CLQRCYQ42, CML 420, AEB(Y)C538-1, HKI164-3-(2-1)-1 and S87P66QBBB30 found resistant to *Atherigona naqvi*.
3. Genotypes WNZ EXOTIC POOLDC2, High Oil QPMc13BBB66BB, C M117-3-4-1, PFSR5106/1, CML 481, CML 261, CM 118, HKI2-6-2-4 CM 117 and 97P65BBB26B found resistant to *Atherigona soccata*.
4. Maize hybrids promoted in VIC viz.; HT 51412616, DKC 9151(IN8902), ADV 0990296 and JKMH 4848 were found to exhibit multiple disease resistance.
5. Foliar spray of Trifloxystrobin 25%+Tebuconazole 50% (0.05%) for management of BLSB.
6. Foliar spray of Tebuconazole 250 EC (0.1%) for management of TLB & Common rust.
7. *Trichoderma* spp. (0.5%ST); application of bioagent-fortified FYM (1:50) followed by bioagent spray (0.5%) for management of Fusarium Stalk Rot.
8. Seed treatment & foliar spray with Fosetyl-al (0.2%) for management of Rajasthan Downy Mildew.
9. Foliar spray of *Datura stramonium* (Datura), *Allium sativum* (garlic) bulb and *Azadirachta indica* leaves @ 10% for managing MLB & TLB.

A total of 287.9 hectares FLDs were undertaken in different states to demonstrate maize production technologies at farmers fields. Under TSP, 8 national level training programmes were held in which 268 tribal farmers from 10 states participated. GPS coordinate of all FLD fields are to be provided along with AADHAR details of the beneficiaries.

In plenary session, the Chief Guest Dr. Mohapatra in his address congratulated the maize scientists on completion of 60 years of Maize Co-ordinated programme. He put forth the challenge before maize scientist to increase maize productivity from 2.5 to 5.0 t/ha in next 5 years. He called upon the need of trait prioritization and selective introgression, collaboration with international organizations like CIMMYT and national institutes other than ICAR, characterization of maize growing environments, allele mining for water logging and drought tolerance, development of lines for drought tolerance by using QTLs for narrow ASI, bio-fortification, among others. He opined that scientists should look into partitioning of biomass and improvement of Harvest Index through improved sink source relationship. Importance of value addition towards doubling of farmer's income assumes much importance. He stressed upon

the need to rebuild relationship with private partners towards effective partnership. A total of 9 publications were released including IIMR website.

Major recommendations of workshop are as follows:

1. Days to anthesis in place of silking will be taken into consideration for deciding the maturity of entries.
2. Early and extra early will be read as early only with respect to both check as well as test entries.
3. In QPM, there will be only one common trial and all entries will be compared with the best check except for NHZ (Zone-1) where the test entries found to be early based on days to 50% anthesis criteria will be compared with VIVEK QPM-9.
4. Besides, monitoring report, CV and trial mean yield *versus* state mean yield, the plant population per hectare will also be taken into account for acceptance of trial data. Minimum plant population must be 80% of the standard one.
5. Replication-wise coding of entries will be carried out from kharif 2017. Hopefully all AICRP trials will be implemented using AICRP automation system from kharif 2017.
6. In advance trials, the yield of parental lines of the hybrids must be submitted (Minimum should be 2.0 t/ha).
7. Information on disease and pest dynamics should be generated in planting density trial with the help of pathologist and entomologist.
8. Inbred lines identified as resistant should be selfed at the screening location itself (hot spot locations) with the help of breeder available at the centres.

Proceedings of Diamond Jubilee Maize Workshop Session-Wise

Session I: Inaugural Session

Chief Guest	Guest of Honour	Chairman	Rapporteurs
Dr. J.S. Sandhu, DDG(CS), ICAR	Dr. I.S. Solanki, ADG (FFC). ICAR	Dr. Uma Shankar Sharma, Vice-Chancellor, MPAUT, Udaipur	Drs. A.K. Singh, J.C. Sekhar

The Director of Research, Maharana Pratap University of Agriculture and Technology, Dr. S.S. Burark welcomed all the guests and participants to the Diamond Jubilee Annual Maize Workshop at MPAUT, Udaipur. He thanked the Indian Council of Agricultural Research for choosing MPAUT, Udaipur as venue for the 60th Annual Maize Workshop. He briefed the achievements of MPAUT since its inception. He informed that maize fodder is the cheapest source of fodder in Rajasthan and the area under rabi maize is increasing in Banswara region of the state.

The workshop was inaugurated by Dr. J.S. Sandhu, DDG (CS) by lightening the lamp. 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 in the current year maize is expected to touch record production at 26 mt. During the period 7 hybrids have been released and 5 genetic stocks were registered with the NBPGR, besides 20 cultivars received protection under PPV&FR Act. Trial success rate in kharif 2016 was 92.1%, while that in rabi 2015-16 was 94.6%. During the period one germplasm field day was organized at WNC, Hyderabad on Feb 27, 2017, which was attended by 39 participants. Under TSP, FLDs were conducted across 174 ha spread over 5 states. Under TSP, 9 national and 18 regional trainings were organized and implements were distributed among the tribal farmers. In addition FLDs were also conducted across 308 ha over 13 states to demonstrate maize technologies. FLD yields were over 115% higher than national average. During the period 39 publications were made by the Institute and 150 by AICRP scientists.

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 put to improve production as well as crop protection technologies. He also mentioned that maize AICRP programme is the oldest in the country and productivity of maize has increased from 3.3 million metric tons to 22.6 million metric tons and increase of productivity for four times, which itself was commendable. However, more concentrated efforts are needed to meet the arising challenges due to climate change and Dr. J.S. Sandhu, DDG (CS), highlighted that AICRP on Maize has a unique place among all AICRPs, which provide platform for sharing views and exchange of germplasm. Because of its C₄ nature, maize can withstand the vagaries of climate change and can serve as future crop of India. The crop can be utilized not only for food but also for feed. He also mentioned that shifting from double cross hybrids to single cross hybrids resulted in phenomenal increase in production of maize. He emphasized to work on weed management, conservation agriculture and precision farming.

Dr. Uma Shankar Sharma, Vice Chancellor, MPAUT, Udaipur in his presidential remarks stated that maize is the third most important crop in India next to wheat and rice which is generating employment. He mentioned that six districts of southern Rajasthan occupy the highest area under maize. He emphasized on the importance of short duration QPM to overcome the problem of malnutrition and specialty corn to generate employment through processing industries.

On the occasion of Diamond Jubilee former maize Directors, viz., Drs. N. N. Singh and Sain Dass were felicitated for their immense contribution in maize R&D. Certificates of appreciation were given to following AICRP centres for their commendable performances:

1.	PJTSAU, Hyderabad	3.	CCS, HAU, Uchani, Karnal
2.	Punjab Agricultural University, Ludhiana	4.	M/s Bharatiya Beej Nigam Limited, Utrakhand
5.	M/s Arpan Seeds Pvt. Ltd., Udaipur Rajasthan		

During the inauguration the following technical bulletins were released by the Chief Guest and other dignitaries present:

Sl. No.	Title	Authors/ Editors
1	AICRP Annual Progress report Kharif 2016	-
2	AICRP Annual Progress report Rabi 2015-16	-
3	Identification and management of insect pest of maize	P. Lakshmi Soujanya, S.B. Suby, J.C. Sekhar, Praduman Kumar, Jawala Jindal, M.L.K. Reddy and Vinay Mahajan
4	Insect Pest of Maize and their management	P. Lakshmi Soujanya, S.B. Suby, J.C. Sekhar, Praduman Kumar, Jawala Jindal, M.L.K. Reddy and Vinay Mahajan
5	Maize germplasm decision support database	N Sunil, JC Sekhar, KP Singh, GK Chikkappa, P Lakshmi Soujanya, Ramesh Kumar and Vinay Mahajan
6	IIMR News Letter July to December 2016	Meena Sekhar, Chikkappa GK and S.L. Jat

The session ended with vote of thanks to the Chair by Dr. Dilip Singh, Organising Secretary.

Session II
Diamond Jubilee Session on Saga of Maize Research

Chairman	Co-Chairman	Speaker and Panellist	Rapporteurs
Dr. J.S. Sandhu, DDG (CS), ICAR	Dr. I.S. Solanki, ADG (FFC), ICAR	Drs. N.N Singh, Sain Dass, P.H. Zaidi, M.L. Jat, Shri R.J. Aggarwal and Bijender Pal	Drs. Ishwar Singh and Pradeep Kumar

Lead talk was delivered by Dr. N.N. Singh, ex-VC, BAU, Ranchi on "Retrospect of maize research in India". He gave a brief historical recap of maize research in India starting with establishment of AICRP on Maize in 1957. He emphasized that for doubling maize productivity from 2.56 t/ha to 5.0t/ha, the required growth rate is 7.18% and further to achieve this, 80% of maize area should be covered with single cross hybrids. These hybrids should be responsive to nutrients with higher WUE and NUE, nutritionally improved and should be tolerant/resistant to abiotic and biotic stresses.

The lead talk was followed by a panel discussion on "Challenges in maize under climate change", in which Drs. Sain Dass, P.H. Zaidi, M.L. Jat, Bijender Pal and Shri R.J. Aggarwal participated.

Dr. Sain Dass emphasized that the fluctuations in climatic conditions can be best addressed through increased coverage under single cross hybrids with ensured availability of quality seeds. He further elaborated that we need to shift to 100 days hybrids and adopt strategies state-wise. Dr. P.H. Zaidi was of view that for improving maize productivity under climate change we should focus on getting stable yield in rainfed area and further there was an urgent need to develop separate strategy for kharif and rabi seasons. Dr. M.L. Jat emphasized on the need to increase overall area under maize cultivation, which can be partially achieved by cultivating maize in fallow land after rice and wheat harvest with proper plant geometry. He further stressed on need for streamlining marketing and value chain. Dr. Bijender Pal presented a five-point strategy for sustaining maize productivity under climate change. These are: i. Development of area specific hybrids; ii. Trait prioritization for different ecologies; iii. Economic value of maize produce; iv. Exchange of germplasm; and v. Speed up of breeding program through use of markers and DH technology. Shri R.J. Aggarwal focused on need of seed production, proper seed treatment and rain-water harvesting. Dr. J.S. Sandhu in his Chairman's remarks emphasized on seed pricing regulation by government and adopting state-wise strategies for maize cultivation.

Session III
Variety Identification Committee Meeting

Chairman	Participants	Member Secretary
Dr. J.S. Sandhu, DDG (CS), ICAR	All Members of Variety Identification Committee Meeting	Dr. Sujay Rakshit, Director, IIMR

The total numbers of proposals received were 32, out of which 10 proposal were of previous years which were either not submitted in previous year or deferred for additional data requirement. For the present year 14 proposals were submitted for identification for rabi season and 8 for kharif season. Out of 14 proposal of rabi season 10 were of late maturity and 4 were of medium maturity, whereas 8 proposals of kharif season comprises 4 of late maturity, 1 of medium maturity, 1 each of popcorn, sweet corn and baby corn. Out of 32 applications, 22 were identified, 5 were not identified and 5 each were asked to submit the application or to repeat.

Proceedings of VIC meeting 60th Annual Maize Workshop

On the occasion of 60th Annual Maize Workshop held at Maharana Pratap University of Agriculture and Technology (MPUAT), Udaipur during April 2-4, 2017, the Variety Identification Committee Meeting was conveyed under the Chairmanship of Dr. J. S. Sandhu, Deputy Director General (Crop Sciences), Indian Council of Agricultural Research, New Delhi in the Committee Room, Directorate of Research, MPUAT, Udaipur at 14:30 on April 2, 2017.

The following were present in the meeting:

1. Dr. J. S. Sandhu, Deputy Director General (Crop Sciences), Indian Council of Agricultural Research, New Delhi : Chairman
2. Dr. Sain Dass, Eminent Maize Breeder, Ex-Director, ICAR-DMR, New Delhi : Member
3. Dr. B. R. Ranwah, Former ADR (Seeds), Emeritus Scientist, MPUAT, Udaipur : Member
4. Dr, S. K, Sharma, Zonal Director of Research, MPUAT, Udaipur : Member
5. Dr. Bijender Pal, Deputy Director Research, Global Lead, Corn Breeding, Sri Ram Bioseed, Hyderabad : Member
6. Dr. V. S. Sangam, Karnataka State Seed Corporation, Bangalore : Member
7. Mahesh Katli, Maharashtra State Seed Corporation : Member
8. Dr. J. S. Chawla, Sr. Maize Breeder, PAU, Ludhiana : Member
9. Dr. Sujay Rakshit, Director, ICAR-IIMR : Member Secretary

The meeting was also attended by the following resource persons

1. Dr. J. C. Sekhar, Pr. Scientist and PI, Entomology, ICAR-IIMR, Hyderabad
2. Dr. A. K. Singh, Pr. Scientist and PI Agronomy, ICAR-IIMR, New Delhi
3. Dr. Meena Sekhar, Pr. Scientist and PI Plant Pathology, ICAR-IIMR, New Delhi
4. Dr. Dharam Paul, Sr. Scientist, Biochemistry, ICAR-IIMR, Ludhiana
5. Dr. Chikkappa G. Karjagi, Scientist, Plant Breeding, ICAR-IIMR, New Delhi

The total numbers of proposals received were 32, out of which 10 proposal were of previous years which were either not submitted in previous year or deferred for additional data requirement. For the present year 14 proposals were submitted for identification for rabi season

and 8 for kharif season. Out of 14 proposal of rabi season 10 were of late maturity and 4 were of medium maturity, whereas 8 proposals of kharif season comprises 4 of late maturity, 1 of medium maturity, 1 each of popcorn, sweet corn and baby corn.

The entries for which the proposal have been submitted were critically examined for their superiority over best check by considering three years data of breeding, agronomy, entomology and pathology with respect to consistency of superiority, sufficiency of number of trials data and the decision on each of the following was taken by the Variety Identification Committee.

Late maturity-rabi season

1. **DKC 9161:** The entry was proposed for NWPZ (Z2), NEPZ (Z3), PZ (Z4) and CWZ (Z5) under late maturity for rabi season. The entry has showed inconsistent performance in NWPZ (Z2), NEPZ (Z3) and PZ (Z4), *hence the committee did not recommend the entry for* NWPZ (Z2), NEPZ (Z3) and PZ (Z4). However, the committee suggested for re-testing in CWZ for requirement of one more year data as the numbers of trials was less in CWZ.
2. **X35F880:** The entry was tested in all the zones under late maturity in rabi season but it was proposed for NEPZ (Z3) and PZ (Z4) under late maturity for rabi season. The entry was not superior over the check with respect to diseases and pest resistance and was not superior over check under agronomic evaluation *hence the committee did not recommend* the entry either for NEPZ (Z3) or for PZ (Z4).
3. **CP 838:** The entry CP 838 is proposed for NWPZ (Z2), NEPZ (Z3), PZ (Z4) and CWZ (Z5) under late maturity for rabi season. The entry was found superior over the best check in proposed zones **hence the committee identified the entry for NWPZ (Z2), NEPZ (Z3), PZ (Z4) and CWZ (Z5).**
4. **KMH 1411:** The hybrid KMH 1411 is proposed for NWPZ (Z2), NEPZ (Z3), PZ (Z4) and CWZ (Z5) under late maturity for rabi season. The entry was found superior over the best check in NEPZ (Z3) **hence the committee identified the entry for NEPZ (Z3).**
5. **GK 3155:** The entry was tested in all the zones under late maturity in rabi season but it was proposed for NEPZ (Z3) under late maturity for rabi season. The entry GK 3155 was found superior over the best check **hence the committee identified the entry for NEPZ (Z3).**
6. **CP 999:** The entry CP 999 was proposed for NWPZ (Z2), NEPZ (Z3), PZ (Z4) and CWZ (Z5) under late maturity for rabi season. The entry found superior over the best check in PZ (Z4) **hence the committee identified the entry for PZ (Z4).**
7. **CP 333:** The entry was tested in all the zones under late maturity in rabi season but the entry CP 333 was proposed for NWPZ (Z2) and CWZ (Z5) under late maturity for rabi season. The entry found superior over the best check in CWZ (Z5) **hence the committee identified the entry for CWZ (Z5).**

8. **CP 111:** The entry was tested in all the zones under late maturity in rabi season but the entry CP 111 is proposed for PZ (Z4) and CWZ (Z5) under late maturity for rabi season. The entry was not superior over the best check *hence* the committee *did not recommend the entry* either for PZ (Z4) or for CWZ (Z5).
9. **HTMH 5108:** The entry was tested in all the zones under late maturity in rabi season but the entry HTMH 5108 was proposed for PZ (Z4) under late maturity for rabi season. Based on the superiority over the best check **the entry was identified for PZ (Z4).**
10. **DMRH 1308:** The entry was tested in all the zones under late maturity in rabi season but the entry DMRH 1308 is proposed for CWZ (Z5) under late maturity for rabi season. The entry was found superior over the best check **hence the committee identified the entry for CWZ.**

Late maturity-kharif season

11. **ADV 0990296 (ADV 756):** The entry was tested in PZ (Z4) and CWZ (Z5) under late maturity in kharif season, the entry ADV 0990296 was proposed for both the zones namely PZ (Z4) and CWZ (Z5) under late maturity for kharif season. The entry found superior over the best check **hence the committee identified the entry for PZ (Z4) and CWZ (Z5).**
12. **HT 51412616:** The hybrid HT 51412616 is proposed for PZ (Z4) under late maturity for kharif season. The entry found superior over the best check **hence the committee identified the entry for PZ (Z4).**
13. **DMH 192:** The hybrid DMH 192 is proposed for PZ (Z4) under late maturity for kharif season. The entry found superior over the best check **hence the committee identified the entry for PZ (Z4).**
14. **DKC 9151:** The hybrid DKC 9151 is proposed for CWZ (Z5) under late maturity for kharif season. The entry found superior over the best check **hence the committee identified the entry for CWZ (Z5).**

Medium maturity-rabi season

15. **BL 798:** The entry was tested in all the zones under medium maturity in rabi season but the entry BL798 is proposed for NWPZ (Z2), NEPZ (Z3) and PZ (Z4) under medium maturity for rabi season. The entry was found superior over the best check in NEPZ (Z3) **hence the committee identified the entry for NEPZ (Z3).**
16. **BL 147:** The entry was tested in all the zones under medium maturity in rabi season but the entry BL 147 was proposed for NEPZ (Z3) and PZ (Z4) under medium maturity for rabi season. The entry BL 147 was found superior over the best check in NEPZ (Z3) **hence the committee identified the entry for NEPZ (Z3).**
17. **BL 900:** The entry was tested in all the zones under medium maturity in rabi season but the entry BL 900 is proposed for NEPZ (Z3), PZ (Z4) and CWZ (Z5) under medium maturity for rabi season. The entry was found superior over the best check in proposed zones **hence the committee identified the entry for NEPZ (Z3), PZ (Z4) and CWZ (Z5).**

18. **DMRH 1301:** The entry was tested in all the zones under medium maturity in rabi season and the proposal of DMRH 1301 was submitted for NEPZ (Z3) and CWZ (Z5) under medium maturity for rabi season. It was found ranking first both the zones and hence identified for NEPZ (Z3) and CWZ (Z5).

Medium maturity-rabi season

19. **JKMH 4848:** The hybrid JKMH 4848 is proposed for zones PZ (Z4) medium maturity for kharif season. The entry was found superior over the best check **hence the committee identified the entry for PZ (Z4).**

Popcorn

20. **DMRHP 1402:** The entry DMRHP 1402 was tested under popcorn trial in NWPZ (Z2), NEPZ (Z3) and CWZ (Z5) and the proposal was submitted for NWPZ (Z2) and CWZ (Z5) for kharif season under popcorn. The entry was found superior over the best check **hence the committee identified the entry for NWPZ (Z2) and CWZ (Z5) for kharif season under popcorn.**

Sweet Corn

21. **BSCH 6:** The entry BSCH 6 was tested in all the zones namely NHZ (Z1), NWPZ (Z2), NEPZ (Z3), PZ (Z4) and CWZ (Z5) for kharif season under sweet corn. The proposal was submitted for all the zones. However, the entry was not superior over the latest sweet corn hybrid Mishti. **Hence the committee suggested for one more year testing in NHZ (Z1) because of only two years data was available and also did not identify for NWPZ (Z2), NEPZ (Z3), PZ (Z4), and CWZ (Z5).**

Baby Corn

22. **BVM 2:** The entry BVM 2 was tested in NHZ (Z1), NEPZ (Z3) and CWZ (Z5) and it was proposed for NHZ (Z1), NEPZ (Z3) and CWZ (Z5) for kharif season under baby corn. **The committee examined the proposal in detail and did not recommend as the proposed entry was a composite variety.**

Previous year proposals

Early maturity-rabi season

23. **HKH 329:** The entry was tested in all the zones under early maturity in rabi season and the proposal of HKH 329 was submitted for CWZ (Z5) under early maturity in rabi season. The committee examined the proposal in detail and deferred the decision by suggesting the entry should be re-tested against the latest released cultivar as check which is released and notified for the respective zones and rabi season as well.
24. **HKH330:** The entry was tested in all the zones under early maturity in rabi season and the proposal of HKH 330 was submitted for CWZ (Z5) under early maturity in rabi season. The committee examined the proposal in detail and deferred the decision by suggesting the entry should be re-tested against the latest released cultivar as check which is released and notified for the respective zones and rabi season as well.

EDVs

25. **APQH 9:** The committee examined the proposal of EDV APQH 9 and discussed regarding the loss of provitamin A under normal storage. Hence the committee **identified the entry APQH 9 as EDV enriched with provitamin A for NHZ (Z1) and PZ (Z4)**. However, the status of EDV of Vivek QPM 9 enriched with provitamin A is valid for the period of two months from the date of harvest.
26. **AQH 9:** The committee examined the quality report and identified AQH 9 for NEPZ (Z3) as EDV for high-lysine and tryptophan / QPM.
27. **AQH 4:** The committee examined the quality report and identified AQH 4 for NWPZ (Z2) as EDV for high-lysine and tryptophan / QPM.
28. **AQH 8:** The committee examined the quality report and identified AQH 8 for PZ (Z4) as EDV for high-lysine and tryptophan / QPM

Late maturity-rabi season:

29. **GK3150:** The entry was tested in all the zones under late maturity in rabi season and it was identified for NWPZ during 2016 VIC meeting. However, the proposal was submitted this year for CWZ (Z5). The entry was found superior over the best check hence the committee identified the entry for CWZ (Z5).

QPM-kharif season

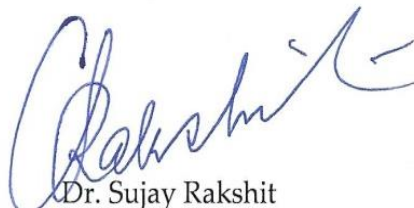
30. **Pratap QPM hybrid 4:** The entry was tested under QPM, the committee examined the proposal and found that the entry performance was inconsistent. Hence the committee did not recommend the entry.

Proposal with incomplete information

31. **DKC 9155:** The proposal were examined and found that the information submitted was incomplete hence the committee suggested for re-submission.
32. **DKC 9135:** The proposal were examined and found that the information submitted was incomplete hence the committee suggested for re-submission.



Dr. JS Sandhu
(Chairman, VIC)



Dr. Sujay Rakshit
(Member Secretary, VIC)

Session IV
ICAR - CIMMYT/ International Collaborative Research and Private Participatory Research

Chairman	Co-chairman	Speakers	Rapporteurs
Dr. N.N. Singh	Dr. I.S. Solanki	Dr. P.H. Zaidi Dr. Manoj Upadhyay	Drs. Dharam Paul Ramesh Kumar

The Chairman welcomed the speakers, i.e. Dr. PH. Zaidi, CIMMYT and Dr. Manoj Upadhyay, Dhanuka Agritech Ltd. In his presentation Dr. Zaidi highlighted salient achievements of ICAR-CIMMYT Collaborative program on maize for the year 2016-17. 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) and Heat Tolerant Maize for Asia (HTMA). 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. CRMA project was initiated on 1st January, 2016 and will culminate on 31st December, 2018 which is basically the phase - II of ATMA project. Some genotypes like CAH 153, CAH 1511 and CAH1424 have been identified as top ranking hybrids under optimum conditions. New generation stress resilient lines and hybrids have also been identified. The genomic selections for drought tolerance and water logging tolerance have been elucidated. In the HTMA project, the temperature regimes during spring and *kharif* maize were highlighted from 2008 to 2016. The lipidomic studies showed that grain yield and galactolipid profile had significantly negative correlation. Genomic selections for heat tolerance using multi-parent synthetic populations have been undertaken in this project. He also discussed the heat stress resilient hybrids developed and tested during spring 2016. 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 germplasm shared and joint research papers published during 2016.

Dr. Manoj Upadhyay from Dhanuka Agritech Ltd talked on "Management of *Cyperus rotundus* in maize". He informed that it can be effectively controlled with a new post-emergence herbicide, Sempra 75% WDG (Halosulfuron Methyl) at a dose of 90g/ha. The chemical is to be sprayed on 3-5 leaf stage of the weed or after 15-20 days of sowing maize crop. However, the house has strongly objected to the proposal. Dr. M.L. Jat from CIMMYT commented that proposal should come from maize group after thorough testing. Scientists from different centres (Pantnagar, Ludhiana and Godhra) also objected to the proposal and suggested thorough investigations including bio-safety studies before recommending any chemical proposal. Keeping in view the concerns raised by the house, the Chairman suggested that new chemicals should be tested thoroughly under AICRP mode by following ICAR guidelines before making any recommendation.

Session V
Review of work during Kharif 2016 and Rabi 2015-16

Chairman	Co-chairman	Speakers	Rapporteurs
Dr N.N. Singh	Dr I.S. Solanki	Bhupender Kumar (Breeding) AK Singh (Crop Production) JC Shekhar (Entomology) Meena Shekhar (Plant Pathology) Chikkappa GK (Breeder Seed Production) SL Jat (Outreach)	Drs. Ramesh Kumar, P.L. Soujanya, Pravin Bagaria and Mahesh Kumar

Plant Breeding

During the period under report 8 entries were notified, 5 germplasm lines have been registered with NBPGR and 20 hybrids were registered under PPVFRA. The average success rate of AICRP trials in different zones was 77.83%. A total of 21 entries recorded grain yield above 10.0 t/ha during Kharif, 2016. In the rainfed trials during Kharif 2016 the yield penalty under stress conditions was highest (59.6%) for late maturity in Peninsula Zone and lowest (3.0%) for early maturity group in CWZ. During the period 39 participants from SAU's have been selected 559 germplasm lines during germplasm Field Day. ICAR-IIMR has handled CRPs on Maize Bio-fortification, Agro-Biodiversity and Molecular Breeding. During discussion Dr. F. Hussain raised point regarding quality evaluation and requested that Quality evaluation may be done in case AVT II only, which was accepted by the house. Dr. I.S. Solanki advised that non-performing centres were to be closed down.

Crop Production

The findings of different zones and reasons for season-wise variation in the results were extensively discussed. Various aspects of maize agronomy, viz., evaluation of pre-release genotypes under varying planting density and nutrient management, production technologies for baby corn, sweet corn, quality protein maize, weed, water management in maize etc. were discussed. Based on two years data it has been recommended that post-emergence herbicide, Tembotrione (120 g a.i./ha) application at 25 days after sowing can effectively control of weeds, which was a long awaited need of maize farmers. High density planting of maize (1 lakh plants/ha) along with soil test crop response (STCR) or site specific nutrient management (SSNM) based nutrient management recommended for grain purpose maize in Northern Hill zone and Peninsular zone. Chairman and Co-chairman appreciated the findings of various agronomic interventions. Chairman also agreed and appreciated the new initiatives for the future agronomic research.

Entomology

The overall results of maize genotypes resistant and susceptible to *C. partellus*, *S. inferens* and *Atherigona* sp in different coordinated trials at different locations were summarized. During kharif 2016, a total of 135 entries of different maturity period,

speciality corn, QPM and inbreds were evaluated for resistance against *C. partellus* under artificial infestation. The population of *Helicoverpa armigera* was monitored from tasselling till harvesting stage by installing pheromone traps during spring, kharif and rabi 2016. The traps were regularly observed and number of moths per trap was recorded at weekly interval. The moths started appearing in third week of August and continued till first week of December at Hyderabad with maximum number of moths i.e. 4.50/trap/week noticed in the 3rd week of October. Moth appearance was observed in fourth week of August at Delhi and continued up to third week of October with maximum number of moths 6.88/trap/week noticed in third week of September. At Karnal, the moths appeared from first week of September and continued up to third week of October. Maximum number of moths (11.12/trap/week) was recorded during third week of September. Moths emergence was observed from second week of September at Udaipur with maximum activity (3.0 /trap/week) recorded during first week of October. The maximum catches of 23.67 were recorded in spring sown maize at Ludhiana in the 1st week of May.

Pathology

A total of 34 trials consisting of 468 hybrids were screened under artificial epiphytotics for major diseases and cyst nematode. Nearly 1400 inbred lines were also screened to identify resistant sources. More than 50 hybrids in NIVT and 30 hybrids in AVT groups were identified possessing multiple disease resistance. Study of nematode interaction to soil and maize genotypes showed that nematode population was least on Pratap Hybrid Maize-3 in medium textured soil followed by Pratap Makka-9 as compared to sandy soil. Under management strategy, the pathology group has come out with three findings for maize diseases, viz., foliar spray of Trifloxystrobin 25% + Tebuconazole 50% (0.05%) inhibit BLSB giving up to 65% disease control; Tebuconazole 250 EC (0.1%) as foliar spray check TLB and Common Rust up to 60%; *Trichoderma* spp. (0.5%) as seed treatment; bioagent-fortified FYM (1:50) and spray (0.5%) was effective against Fusarium Stalk Rot (>65% control) whereas Fosetyl-al (0.2%) as seed treatment and spray provided >80% control of Rajasthan Downy Mildew; Foliar spray of *Datura stramonium* (*Datura*), *Allium sativum* (garlic) bulb and *Azadirachta indica* leaves @ 10%, control MLB and TLB. Dr. Bijendra Pal from Bioseeds pointed out during discussion that due to climate change, hot spot locations for specific diseases are changing hence there was a need to revisit the hot spots and if need arises hot spot location may be changed. This is to be looked into critically.

Outreach programme

During rabi 2015-16, spring 2016 and kharif 2016 a total of 287.9 hectares FLDs were undertaken in different states. All promising technologies on maize, viz., the package of hybrid maize cultivation, intercropping, specialty corn production etc were demonstrated. Under TSP, eight national level training programmes were held in which 268 tribal farmers from 10 states participated. A flagship programme for improved maize technology demonstration was implemented by IIMR in collaboration with ICAR Research Complex for NEH region Manipur centre where 50 ha demonstration were conducted after training of farmers in the five districts. Dr. Sujay Rakshit, Director, IIMR advised that GPS coordinate of all FLD fields are to be provided along with AADHAR details of the beneficiaries.

Session VI
Review of research results of individual AICRP centres

Chairman	Co-Chairman	Speakers	Rapporteurs
Dr. Sain Dass	Dr. Sujay Rakshit	All scientists of AICRP program	Drs. J. C. Sekhar, Meena Sekhar, Sunil N, Ramesh Kumar, Bhupendra Kumar and Chikkappa G.K.

Centre wise presentation was made by the respective PIs of AICRP centres. Along with the achievements of 2016-17 significant achievements for last the five years were also presented.

Almora: Dr. Rajesh Khulbe presented the progress report.

- Nine varieties were released by the centre and registered with PPVFRA.
- Resistant lines for TLB and maize weevil were identified and tolerant lines for BLSB were also identified.
- A baby corn variety, VL Baby corn was recommended for central zone.

Comments: The centre is doing excellent work.

Bajaura: Dr. D. R. Thakur presented the progress report.

- Two lines were registered with PPVFRA.
- Double haploid facility was developed.
- Heterotic pools were developed.
- Agro techniques for seed production of SCH hybrid HQPM-1 were developed.
- Atrazine (1.5kg/ha) as PE and Tempotrione@120g/ha as PoE recommended.
- In maize-wheat cropping system, SSNM based on nutrient expert gave significantly higher maize grain yield over RDF.
- 1298 normal maize and 198 specialty corn (QPM, Pop Corn, Sweet Corn and Baby Corn) genotypes were screened artificially against Turcicum leaf blight (TLB) and 950 genotypes showed resistance against TLB.

Kangra: Dr. Uttam Chandel presented the progress report.

- Associated in evaluation and release of Palam Sankar Makka-2 (MM) and Palam Sankar Makka -1 (EM).
- Stable sources of resistance (60) were identified for ESR & BLSB.

Srinagar: Dr. Zahoor Ahmad Dar presented the progress report.

- Released two SCH, one each in Normal and QPM at State Level.
- Released a Pop corn OPV at National Level for all zones of the country except PZ during 2016.
- Developed Agro techniques for higher production of maize under rainfed conditions.

Comments: Centre was appreciated for the overall good work.

Udhampur: Dr. R. S. Sudan presented the progress report.

- Centre is involved in collection of germplasm, drought screening and development of inbred lines in speciality corn.
- Local germplasm have been characterized.
- Two hybrids in pipeline for state release in medium maturity group.
- Germplasm exploration request for collecting climate resilient germplasm from the region will be sent to Director, NBPGR.

Comments: Germplasm need to be exchanged with centres like Gossaigaon and Imphal.

Ambikapur: Dr. S.K. Sinha presented the progress report.

- Optimization of the K fertilizer for eastern India done.
- It was emphasized that the centre should focus on early and medium duration hybrids.

Comments: The centre initiated work on organic maize. It was advised that organic production of maize should be dissuaded as maize is an exhaustive crop.

Bahraich: Dr. M. V. Singh presented the progress report.

- Two maize hybrids and four composite were identified by State Agriculture department.
- Winter maize irrigated at critical stages, viz., knee height, tassel emergence and grain filling stage was recommended.

Comments: It was pointed out that UP is reaping higher yields than what is being reported as average state productivity, which is a matter of concern. The centre should follow the template for presentation.

Bhuwaneswar: Dr. Pramila Nayak presented the progress report.

- One Maize hybrid in the process for release by SVRC.
- For nutrient management SSNM/ STCR is found better than RDF.

Comments: Performance of the centre found unsatisfactory. It was advised that the centre should focus on development of SCH. They were also advised to follow the prescribed template for presentation.

Dholi: Dr. Mritunjay Kumar presented the progress report.

- Released two hybrids namely Deep Jwala and Shaktiman-5 through SVRC and CVRC respectively in year 2013.
- In Rabi season, high density (1.0 lakh plants/ha) was found effective.
- In maize-wheat-mungbean system, permanent bed system gave higher yield (MEY) with SSNM over RDF and FFP.

Comments: It was observed that voluntary centres under this centre are not submitting data. It was decided that the main centre will be intimated when the seed is being sent to the voluntary centres.

Ranchi: Dr. (Ms.) M. Chakraborty presented the progress report.

- Residue retention @ 5 t/ha as mulch enhances the maize production in rainfed areas.
- Application of nutrient as per site specific nutrient management enhances the productivity over RDF.

Comments: It was pointed out that proper check of QPM should be used for evaluation of QPM hybrids.

Kalyani: Dr. Sonali Biswas presented the progress report.

- Atrazine (1.5kg/ha) as PE fb Tempotrione@120g/ha as PoE recommended.

Comments: It was pointed out that appropriate population density for the state is to be worked out. High plant population may not work in West Bengal as it may lead disease infestation. Keeping emerging importance of the crop in the state additional voluntary centres are to be identified.

Varanasi: Dr. J.P. Shahi presented the progress report.

- One SCH (MHM-2) was identified by CVRC and one SCH (MHM-3) was identified by State VRC.
- Crosses with high oil content were identified. It was observed that high oil leads to low grain yields. Care is to be taken not to compromise grain yield while improving oil content.

Comments: For cold tolerance it was felt that the stage of the crop when it is exposed to cold is very important, and accordingly the sowing times are to be addressed.

Godhra: Dr. S.R. Khanorkar presented the progress report.

- During 2012-16 centre has contributed 11-13 entries for testing under coordinated system and two entries viz.GAYMH-1& GAYMH-2 have been identified by SVRC.
- 200:60:80 NPK Kg/ha alongwith 66,000 plants/ha found better.

Udaipur: Dr. S. S. Sharma presented the progress report.

- Developed and released two normal (Pratap Maize Hybrid-3, Pratap Makka-9) and one QPM (Pratap QPM Hybrid-1) maize hybrids.
- For fodder var. Pratap Makka Chari-6, population of 2,22,000/ha alongwith 130+50kg N+P₂O₅/ha is recommended.
- For QPM varieties-Fertilizer dose recommended is 175 Kg N + 40 kg P₂O₅ ha⁻¹ + 25 kg sulphur ha⁻¹
- Bio control agents were used as seed treatment and furrow application for control of PFSR.
- Rajasthan Downy Mildew can be controlled by seed treatment of Metalaxy 4g/kg seed.
- The survey was conducted to record the incidence of maize stem borer in major maize growing area of Southern Rajasthan.
- *Helicoverpa armigera* is also registered as major pest of maize crop in this area and threat for maize growers.

Comments: Since two breeders are posted, focus should be to evolve good early SCH for the zone.

Dharwad: Dr. M. C. Wali presented the progress report.

- Two hybrids: DMH-1 & DMH-2 are registered with PPV & FRA, EH-434042 & GH-0727 are also filed and registration is under process.
- Two single cross hybrids (GH-0727 & GPMH-110) are identified for release in Karnataka state.
- Atrazine (1.5kg/ha) as PE followed by Tempotrione@120g/ha as PoE recommended.
- Maize disease distribution map for northern Karnataka developed.

Comments: Voluntary centres under Dharwad have not submitted any data although funds were released. The centre was advised to look into it.

Karimnagar: Dr. D. Sravani presented the progress report.

- Two hybrids (KNMH-4010131 & KNMH-4010141) have been developed and released for Telangana state.
- Five drought resistant lines have been registered at NBPGR.
- Standardized planting density (83,000/ha) for rainfed situation.
- For nutrient management SSNM/ STCR is found better than RDF.

Vagarai: Dr. N. Kumari Vinodhini presented the progress report.

- Seven hybrids proposed for AICRP testing out of which two hybrids are in advanced stage of testing.
- For medium (83,000 plants/ha) and full season (1,00,000 plants/ha) maturity hybrids 250: 80: 100 kg NPK/ha fertilizer dose is recommended.

Comments: CV needs to be checked as it was reported too low.

Coimbatore: Dr. Ravi Keshvan presented the progress report.

- 9 hybrids have been developed and released.
- 3 hybrids have been commercialized by signing MOU with Pvt. Firms.
- Atrazine (1.5kg/ha) as PE fb Tempotrione@120g/ha as PoE recommended.
- Out of 436 entries 67 resistant inbred lines to PFSR identified.

Jhabua: Dr. Narender Kumawat presented the progress report.

- Application of nutrient as per site specific nutrient management enhances the productivity over RDF.
- Atrazine (1.5kg/ha) as PE fb Tempotrione@120g/ha as PoE recommended.

Hyderabad: Dr. V. Narismha Reddy presented the progress report.

- DHM-121 is released in 2014 by CVRC for Zone III and Zone IV.
- First Pop corn hybrid BPCH-6 is released for whole country during 2012.
- Ten Private companies have signed MOU for seed production of public sector hybrids.
- High density (83,000/ha along with 200-60-50 in *Kharif* and 240-80-80kg (N-P₂O₅-K₂O) in *Rabi*, based on soil test crop response studies found better than RDF.
- Suitable production technology was developed for cultivation of sweet corn and popcorn hybrids in peri-urban areas.
- Seven resistant inbreds were developed for Post flowering stalk rot.
- Intercropping of maize with cowpea in the ratio of 2:1 reduces the oviposition of *C. partellus* on maize. This technique gives an additional gain of cowpea & nitrogen fixation for the next crop.

Comments: The centre is doing good work.

Karnal: Dr. M. C. Kamboj presented the progress report.

- First public sector white grain maize SCH (HM-12) with medium maturity suitable for *kharif* season released for Zone III during 2012.
- HM-13 is released for Zone I.
- Atrazine (1.5kg/ha) as PE fb Tempotrione@120g/ha as PoE recommended.
- In *kharif* maize 200-80-80 N-P₂O₅ K₂O kg/ha fertility dose is recommended.

- Zero till gave significantly higher grain yield than crop sown on permanent beds followed by conventional sowing on flat beds.
- Several integrated management strategies were developed for various diseases of maize.
- Under artificial pest infestation condition 17 inbred lines were found tolerant to *Chilo partellus*.

Comments: The centre should also focus on production of seeds of hybrids released by them.

Ludhiana: Dr. J. S. Chawla presented the progress report.

- PMH-6 is released for Zone III during 2013.
- Five hybrids viz. PMH-7 (Spring), PMH-8 (Spring), PMH-9 (Rabi), PMH-10 (Spring), DKC-9108 (Spring) released for state.
- Six hybrids have been registered with PPVFRA.
- For spring maize drip is recommended which saves 40% water and fertigation saves 20% fertilizer.
- Bed planting yielded higher as compared to flat sowing during *kharif* season.
- Yield loss assessment of MLB and charcoal rot revealed an average yield loss of 20.3 and 19.3 per cent respectively during *kharif* season.
- For the management of maize stem borer in *Kharif* maize, Spray chlorantraniliprole 18.5 SC @ 75 ml/ ha on 2-3 week old crop is recommended (2016). Bio control by releases of *Trichogramma chilonis* @ 1,00,000/ ha gives better management of maize stem borer, *Chilo partellus* (2017).
- Nine lines identified as tolerant to maize stem borer, *Chilo partellus* (Under artificial infestation conditions)

Comments: The centre is doing excellent work.

Kolhapur: Dr. S. A. Patil presented the progress report.

- Developing heterotic pools and inbred lines are their focus.
- Developed agronomic techniques for cultivation of new hybrids including speciality corn, i.e. sweet corn, baby corn and popcorn.
- Evaluated of maize germplasm against *Chilo partellus* (*Kharif* and *rabi*).

Comments: The breeder is asked to focus on development of SCH.

Banswara: Dr. Pramod Rokadia presented the progress report.

- Taking hybrid seed production.
- Soybean/blackgram intercropped with maize in 2:2 paired row ratio with crop residue @ 5t/ha for enhancing productivity of maize under rainfed condition.
- Recommended nutrient level of 120:60:40 kg/ha NPK for maize hybrids instead to 90:40:30 kg/ha NPK for *kharif* season.
- Recommended nutrient level of 150:60:40 kg/ha NPK for maize hybrids instead to 120: 60:40 kg/ha NPK for *rabi* season

Comments: The breeder is asked to focus on development of SCH.

Gosaingaon: Dr. Nabajyoti Bhuyan presented the progress report.

- Under rain fed conditions residue retention @ 5 t/ha on the soil surface is recommended for enhancing maize productivity by 9-29%.
- The intercropping of soybean/black gram in maize grown during *kharif* season is recommended.

Comments: Performance of the centre found unsatisfactory. The centre was asked to get germplasm from other centres like Almora, Bajaura and Udhamnagar, and initiate breeding work immediately along with conduct of routine trials.

Pantnagar: Dr. S. S. Verma presented the progress report.

- Pant Sankar Makka-1 and Pant Sankar Makka-4 were released and Pant Sankar Makka-2 is notified by CVRC.
- Hybrids should be sown at high density (98765 plants/ha) and fertilized with RDF (120:60:40) or SSNM (120:30:46 kg N:P₂O₅:K₂O/ha).
- Sowing of maize can be advanced or delayed up to 10 days from normal date of sowing.
- Application of 100% RDF with either FYM 5t/ha or 5 kg Zn/ha produced the highest grain yield in maize – wheat system.
- Identified resistant lines for bacterial stalk rot and moderately resistance lines for banded leaf and sheath blight under artificially inoculated conditions.
- Loss assessment studies showed that BLSB is causing 33 % loss in yield.

Comments: The centre was advised to focus on development of medium maturity hybrids alone and not to go for early and very early.

Kanpur: Dr. H. C. Singh presented the progress report.

- Three SCH identified (REH-2011-1, REH2012-4 and REH-2012-1) and released by SVRC.

Comments: Performance of the centre was found extremely unsatisfactory. The agronomist from the centre does not attend workshop on regular basis. The house took the matter very seriously and advised the centre to improve performance or else the matter will be reported to the Council and appropriate action will be taken. The centre was advised to focus only on breeding for early and medium yellow types.

Imphal: Amit Kumar Singh presented the progress report.

- Germplasm need to be acquired from centres of similar environment like Almora and Srinagar centres.

General comments:

- While conducting the trials data should be recorded properly as it was generally observed that CV of trials from some centres were unrealistically low. Similarly ASI found to be same across replication, across genotypes, which is again not realistic.
- It was stressed that in future **fund disbursement will be linked with quality of trial execution and data submission.**
- Centres were advised to respond to the queries from IIMR promptly.
- Regional requirements are to be taken into priority while deciding the research programme.
- All the centres will prepare district-wise and season-wise data on area under maize, month-wise rainfall pattern, and possibility of creation of seed hubs in their states. The information will be sent to Director by July 04, 2017.

Session VII
Formulation of work plan 2017-18

Concurrent sessions on discipline-wise formulation of work plan were conducted separately. Detail proceedings of each discipline are given in Annexure.

CROP IMPROVEMENT

Chairman	Co-chairman	Convener	Rapporteurs
Dr. Sain Dass	Dr. Sujay Rakshit	Dr. Bhupender Kumar	Drs. Chikkappa G.K. and Ramesh Kumar

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

Major recommendations

- Promotion criteria: **Days to anthesis** in place of silking will be taken into consideration for deciding the maturity of entries. This will be implemented from Kharif 2016 data. In early and medium trials, besides yield superiority, the test entry should not exceed best check by two days to 50% anthesis.
- Early and extra early will be read as early only with respect to both check as well as test entries.
- In QPM, there will be only one common trial and all entries will be compared with the best check except for NHZ (Zone-1) where the test entries found to be early based on days to 50% anthesis criteria will be compared with VIVEK QPM-9.
- Besides, monitoring report, CV and trial mean yield *versus* state mean yield, the plant population per hectare will also be taken into account for acceptance of trial data. Minimum plant population must be 80% of the standard one.
- Initial plant population after thinning will be recorded. Similarly in the AVT II in agronomic trials dry fodder yields of entries will be recorded.
- Replication-wise coding of entries will be carried out from kharif 2017. Hopefully all AICRP trials will be implemented using AICRP automation system from kharif 2017.
- In advance trials, the yield of parental lines of the hybrids must be submitted (Minimum should be 2.0 t/ha).
- No seed will be received for AICRP Testing after the last date (Kharif: May, 10th and 5th Oct, for Rabi)
- Locations identified for TSS recording in sweet corn trial: **NHZ**: Bajaura, Almora; **NWPZ**: Delhi, Karnal; **NEPZ**: Ranchi, Dholi; **PZ**:Hyderabad, Dharwad, Mandaya; **CWZ**:Godhar, Udaipur.
- A separate quality trials (QPM & Pro-vitamin A) will be conducted only for final year entries at three locations viz., Ludhiana, Delhi and Almora for biochemical analysis in the laboratories.
- In pro-vitamin A trials, the content of pro-vitamin A should be ≥ 7.0 ppm after two months of storage for promotion/release of entries.

- Details of technical programme are given in Annexure I

CROP PRODUCTION

Chairman	Co-chairman	Convener	Rapporteur
Dr. G.S. Chauhan, Ex DRI, MPUAT, Udaipur	Dr. V. Nepalia, Prof. & Head, RCA MPUAT, Udaipur	Dr. A.K. Singh PI (Agronomy)	Dr. Mahesh Kumar & Dr. S.L. Jat

At the outset Chairman welcomed the members present in the review meeting. The work plan was discussed with Agronomist.

Based on critical review following observations emerged out.

- All existing MAT (Maize Agronomy Trials) were discussed in detail and suggestions were incorporated.
- Information on disease and pest dynamics should be generated in planting density trail with the help of pathologist and entomologist.
- MAT:7 on "Optimization of nutrient and plant geometry management in zero-till rabi maize" has completed three years at farmers field, hence agronomist at Hyderabad centre is asked to conclude the trail and submit its report with economic analysis.
- Two new trials were proposed viz. MAT12: Ecological intensification for climate resilient maize based cropping system and MAT:13 Validation of sensor based nitrogen management in maize. ICAR-CIMMYT collaboration was also discussed.

Details of technical programme are given in Annexure II

Plant Pathology & Nematology

Chairman	Convener	Rapporteurs
Dr. S.S. Sharma Head, Department of Plant Pathology	Dr. Meena Shekhar, Principal Scientist, IIMR	Drs. Harleen Kaur, Pravin Kumar Bagaria

The group meeting, comprising of maize pathologists from AICRP centres of pathology from various parts of the country was held at 6.30 PM at Director of Research Hall, MPUAT, Udaipur to review the results of AICRP pathology trials conducted during *kharif* 2016 and *rabi* 2015-16. After reviewing the last year's results, the technical programme for *kharif* 2017/*rabi* 2017-18 was formulated. Dr. Meena Shekhar convener, requested the chairman to take up following agenda items:

- i. Review of research results of AICRP centres for *kharif* 2016/*rabi* 2015-16
- ii. Actions taken on recommendations of last Workshop 2016
- iii. Formulation of Technical Program for *Kharif* 2017 & *Rabi* 2017-18

iv. Any other issue with permission of Chair

Dr. Meena Shekhar, PI Pathology and convener briefed the results of *Kharif* 2016 and *Rabi* 2015-16. All the pathologists of AICRP centres discussed about their work done in their respective centres. Chairman appreciated the uniformity of experiments conducted at different centres and the house agreed to repeat certain management and one resistant inducer trials, however the resistant inducer trials was reconstituted. Chairman stressed to all the centres that screening and management trials should be conducted under artificially created epiphytotics. The centres *viz.*, Almora, Bajaura, Barapani and Dhaulakuan were unrepresented.

Based on the critical review, the following observations emerged out from the group meeting:

A. Technical observations

1. In zone wise presentation, Kangra (H.P.) presented that the Dhaulakuan station identified resistant lines for Banded leaf and sheath blight and Bacterial stalk rot (BSR), it was suggested that the resistance of these lines should be reconfirmed this year and then registered with NBPGR, and one set should be submitted to IIMR for further utilization in breeding programme.

- Dhaulakuan centre

2. It was decided in the house that the inbred lines identified as resistant should be selfed at the screening location itself (hot spot locations) with the help of breeder available at the centres.

- All centres

3. Only locally available susceptible variety/hybrids, or identified susceptible variety will be used in all the management trials to be conducted.

- All centres

4. Kalyani centre will screen AICRP trials for MLB and TLB in *Kharif* season and for TLB in *Rabi*.

- Kalyani Centre

5. Chairman raised the point that some centres are not screening material under artificial epiphytotic conditions, therefore it was made mandatory to maintain proper disease pressure for disease screening and each centre should maintain their own culture.

- All centres

Details of technical programme are given in Annexure III

ENTOMOLOGY

Chairman	Co Chairman	Convener	Rapporteur
Dr. Swaminathan Dean, RCA MPUAT, Udaipur	Dr. B.S. Rana Professor (Entomology) RCA,MPUAT, Udaipur	Dr. J. C. Shekhar Principal Scientist (Entomology) IIMR	Dr. Jawala Jindal Dr. P. Lakshmi Soujanya

The convener briefed the overall results of kharif 2016, rabi 2015-16 and spring 2017 of different centres. Entomologists of different AICRP centres presented the work done at their respective centres. The work was reviewed and discussed. The Chairman appreciated the uniformity of the experiments conducted at all the centres flawlessly. He emphasized to evaluate insecticides as seed treatment for the management of *Chilo partellus* and *Sesamia inferens* during kharif and rabi, respectively at various locations. The plan of work for 2017-18 and recommendations were finalized.

RECOMMENDATIONS

1. Genotypes HKI 1831, V 351, HKIPCBT3 and AEB(Y)1 found resistant to *Atherigona* spp.
2. Genotypes DMSC 28, Win pop 8, CLQRCYQ42, CML 420, AEB(Y)C538-1, HKI164-3-(2-1)-1 and S87P66QBBB30 found resistant to *Atherigona naqvi*.
3. Genotypes WNZ EXOTIC POOLDC2, High Oil QPMc13BBB66BB, C M117-3-4-1, PFSR5106/1, CML 481, CML 261, CM 118, HKI2-6-2-4 CM 117 and 97P65BBB26B found resistant to *Atherigona soccata*.

Details of technical programme are given in Annexure IV

Session VIII **Presentations of work plan 2017-18**

Chairman	Speakers	Rapporteurs
Dr. Sujay Rakshit, Director, ICAR-IIMR	Dr. Bhupender Kumar Dr. A.K. Singh Dr. J.C. Sekhar Dr. Meena Shekhar	Drs. Sunil Neelum, Pravin Bagaria and S.L. Jat

BREEDING

Out of 290 entries in different maturity group tested for promotion in Kharif 2016, 102 entries were promoted to higher level for testing in Kharif 2017. The details of AICRP trials during Kharif 2017 are given in Annexure I.

CROP PRODUCTION

Dr. A. K. Singh presented the work plan, which is detailed in Annexure II.

PATHOLOGY

Dr. Meena Shekhar presented the work plan. A detail of the technical programme is given in Annexure III.

Entomology

Dr. J.C. Shekhar presented the report. The detail of technical programme is given in Annexure IV.

Session IX: General session

General Discussion and monitoring reports

Chairman	Members	Rapporteur
Dr. Sujay Rakshit Director, ICAR- IIMR	All PIs	Drs. S.B. Singh, Bhupender Kumar and S. L. Jat

Dr. AK Singh has presented the monitoring report and discussed the performance of all AICRP centres. Wherever the trials were rejected and graded average, they were advised to conduct the trial properly in future. Chairman took serious note of the persistent poor performance of Kanpur centre and non-participating of the agronomist in workshop.

Session X Plenary Session

Chief Guest	Chairman	Co-Chairman
Dr. T. Mohapatra Secretary DARE and DG, ICAR	Dr. U. S. Sharma, Vice Chancellor, MPUAT, Udaipur	Dr. Sujay Rakshit Director-IIMR

Dr. U.S. Sharma, Vice Chancellor, MPUAT, Udaipur welcomed Dr. T. Mohapatra, Secretary DARE and DG, ICAR and other participants to the Plenary Session. He thanked the Chief Guest for gracing the occasion. He recalled the major steps taken by Dr. Mohapatra for betterment of agricultural education particularly in the SAUs.

The Chief Guest in his address congratulated the maize scientists on completion of 60 years of Maize Co-ordinated programme. He stressed that an exemplary work has been done by the maize workers, which has paved the path for coordinated research in other crops. He emphasised that the hybrid technology which started with maize has been extended to many other crops like pearl millet, sorghum and cotton. This has contributed to increased production and productivity of cereals not only in our country but globally. He put forth the challenge before maize scientist to increase maize productivity from 2.5 to 5.0 t/ha in next 5 years. To achieve this there is a need to inject promising material in Indian maize programme from either temperate or high land germplasm. There is a need for in depth analysis of diversity in Indian maize by using large number of markers, which will help to exploit potential heterosis. This will further help to identify Gene Blocks having gene of interest. He called upon the need of trait prioritization and selective introgression, collaboration with international organizations like CIMMYT and

national institutes other than ICAR, characterization of maize growing environments, allele mining for water logging and drought tolerance, development of lines for drought tolerance by using QTLs for narrow ASI, bio-fortification, among others. He pointed out that with shifting in temperatures, insect-pests and pathogens are modifying themselves and to address these issues studies on new biotypes and races should be priority in plant protection research. In agronomic research identification of new molecules for post-emergence weed control, improvement of nutrient and water use efficiency should be focused on. Conservation agriculture practices need to be reviewed in the context of dynamics of soil microbiomes, insects, earth worms etc. He opined that scientists should look into partitioning of biomass and improvement of Harvest Index through improved sink source relationship. Importance of value addition towards doubling of farmer's income assumes much importance. In this context, he highlighted the importance of baby corn with enriched micronutrients. He stressed upon the need to rebuild relationship with private partners towards effective partnership. He pinned his hope with the new Director to organize the maize programme more effectively in a cohesive manner.

Dr Sujay Rakshit, Director, ICAR-Indian Institute of Maize Research, Ludhiana presented the proceedings of the last two days business of the workshop. Nearly 200 maize scientists from across the country both from public and private institutions participated in this workshop and presented the progress report of their respective centres. On this occasion the Website of ICAR-IIMR was formally launched by the Chief Guest. Following two publications were also released on this occasion:

- Maize Research in India: Retrospect and Prospect by ICAR-IIMR
- Phulli Makka ki Kheti by MPUA&T.

The session ended with vote of thanks by Dr Sujay Rakshit, Director, IIMR and Dr. Dilip Singh, Organizing Secretary.

Technical Programme of Breeding Group

A. National trial details

Trials	Zone	Entry Name
NIVT		
Late	All zone except-NHZ	New entries are invited
Medium	Across zone	New entries are invited
Early+Extra early	Across zone	New entries are invited
AVT-I		
Late	NHZ	No trial
	NWPZ	CMH11-583, DAS-MH-112, DH-300, DKC 9178(IQ8623), GK3204, HT 16607, JH 13023, JH 13278, JH 15011, JH 15080, JH 15130, JKMH 4152, MM 2626, NS 8001, OMH 14-16 (CAH1424), OMH 1462 (CAH 142), PM16103L, VaMH 13024, X-6,+Check
	NEPZ	IMH 1527, JH 13227, JH 15135+ Check
	PZ	BIO 716, DKC 9178(IQ8623), GK3202, JH 13227, JH 15130, JH 15135+ Check
	CWZ	BIO 274, JH 13337+ Check
Medium	NHZ	DAS-MH-310, DMRH 1410, IMH 1603, INDAM-1122, IQ7802, IQ8319, KH-2001 Gold, LMH 1016, LMH 1216, OMH 14-18(CAH 1519),+ Check
	NWPZ	JKMH 4157
	NEPZ	IMHBG-2016-6, IQ8319, IQ8627+ Check
	PZ	BLH 111, INDAM-1122, IQ8627, JKMH 4157, OMH 14-18(CAH 1519),+ Check
	CWZ	BH 414176, CCH 9999, DMRH 1410, DMRH 1419, EH-2906, IMH 1527, IMHBG-2016-4, IMHBG-2016-6, IQ8319, IQ8627,JKMH 1414, KH-2001 Gold, LMH 1016, LMH 1116, LMH 616, LMH 716+ Check
Early	NEPZ	JH 31816, JH 31784+ Check
	PZ	KH-102, FH 3768, FH 3765+ Check
	CWZ	KH-102+ Check

Trials	Zone	Entry Name
Extra Early	PZ	FH 3771+Check
AVT-II		
Late	NHZ	No trial
	NWPZ	No trial
	NEPZ	No trial
	PZ	ADV 7022 + Check
	CWZ	DKC9164 (IP9002) + Check
Medium	NHZ	No trial
	NWPZ	No trial
	NEPZ	JH 13347, VaMH 12014, JKMH 4103.
	PZ	No trial
	CWZ	JH 13347
Early	NHZ	DMRH 1305, FH 3754.
	CWZ	JKMH 4222.
Extra Early	NWPZ	No trial
QPM	Across the zone	BQPMH 16, FQH 106, IIMRQPMH 1601, IIMRQPMH 1602, IIMRQPMH 1603, IIMRQPMH 1605, IIMRQPMH 1606, IIMRQPMH 1608, IIMRQPMH 1609, IIMRQPMH 1610, IMHQPM 1530, QPM-MH-27, VEHQ-16-1,+New entries +Checks
BC	Across the zone	IMHB 1537, IMHB 1538, GAYMH-1, DMRH 1305, IMHB 1529, IMHB 1539, BVM-2, MBC-11-15, IMHB 1531, IMH 1525, IMHB 1532, AH5021,+New
SC	Across the zone	ASKH1, ASKH4, FSCH 75, BSCH 6, FSCH 55+New
PC	Across the zone	SJPC1, DMRHP 1402, IMHP 1540, IMHP 1535, MPC-1-15+New
Rainfed Trials	NIVT-RF	New entries are invited
	AVT-I-RF PZ (LM)	RCRMH-4 (CAH1525), IMH1533, CMH 08-292, Em, E+EE
	AVT-I-RF CWZ (LM)	OMH 14-27 (CAH1511), IMH 1618, GK3206,
	AVT-I-RF PZ,CWZ (E-EE)	No entries promoted

B. Zonal/Rainfed trials during Kharif 2017

CWZ, PZ	NIVT/AVT-I-RF: Late, Medium, Early maturity	CWZ: Banswara, Godhra, Bhiloda, Chindwara PZ: Kohlapur, Karimnagar, Vagarai, Dharwad
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C. Recommendation for Trials: AICRP/RAINFED

<p>National Initial varietal Trials (NIVT-I) (Across the zones): No. of rows – 2 (net) Row length – 4m (net) Spacing- 60cm 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 – 4m (net) Spacing- 60cm 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 – 4m (net) Spacing- 60cm 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 – 4m (net) Spacing- 70 cm x 25 cm Replications – 3 Fertilizer – As per the recommendations for zone Sowing must be done on residual moisture with no irrigation during crop duration</p>	<p>Rainfed Trials: AVT-I No. of rows – 4 (net) Row length – 4m (net) Spacing- 70 cm x 25 cm Replications – 3 Fertilizer – As per the recommendations for zone Sowing must be done on residual moisture with no irrigation during crop duration</p>

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

D. Seed Requirement-Kharif (2017):

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

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

E. Seed Requirement-Rabi (2017-18):

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

F. Seed quantity of checks varieties needed for Kharif 2017

S. No.	Check Name	Maturity Group	Centre	Qty seed (Kgs)
1	PMH 1	Late	Ludhiana	15
2	PMH 3	Late	Ludhiana	15
3	SeedTech2324	Late	Bio Seed	15
4	Bio 9681	Late	Bio Seed	15
5	PMH 4	Medium	Ludhiana	15
6	Bio 9637	Medium	Bio Seed	15
7	HM 8	Medium	Karnal	15
8	HM 9	Medium	Karnal	15
9	Prakash	Early	Ludhiana	15
10	Vivek Hybrid 21	Extra Early	Almora	-
11	Vivek Hybrid 43	Extra Early	Almora	-
12	Vivek QPM 9	QPM	Almora	15
13	HQPM 1	QPM	Karnal	30
14	HQPM4	QPM	Karnal	30

S. No.	Check Name	Maturity Group	Centre	Qty seed (Kgs)
15	HQPM 5	QPM	Karnal	30
16	HQPM 7	QPM	Karnal	30
17	HM 4	Baby corn	Karnal	30
18	Madhuri	Sweet corn	Hyderabad	20
19	Priya	Sweet corn	Hyderabad	20
20	WOSC	Sweet corn	Hyderabad	20
21	VL Amber Popcorn	Popcorn	Almora	20

G. Seed quantity of newly added checks for NIVT & AVT-I (Kharif 2017)

S. No.	Check Name	Maturity Group	Centre	Qty seed (Kgs)
1	CMH 08-287	Late	TNAU, Coimbatore	20
2	CMH 08-282	Late	TNAU, Coimbatore	20
3	BIO 9682	Late	Bio Seed Research India Ltd.	20
4	NK6240	Late	Syngenta India Pvt. Ltd.	20
5	CoHM 292	Medium	TNAU, Coimbatore	20
6	BIO 9544	Medium	Bio Seed Research India Pvt. Ltd.	20
7	HM-12	Medium	CCSHAU, Uchani, Karnal	20
8	DHM 121 (BH 41009)	Medium	ANGRAU, Hyderabad	20
9	PMH5	Early	PAU, Ludhiana	20
10	BIO605	Early	Bio Seed	20
11	DKC 7074	Early	Monsanto	20
12	Vivek Maize Hybrid 51	Extra Early	VPKAS, Almora	20
13	Vivek Maize Hybrid 45	Extra Early	VPKAS, Almora	20
14	Pratap QPM Hybrid 1	QPM	MPUA & T, Udaipur	15
15	Misthi	Sweet Corn	Nuziveedu Seeds Limited	10

H. Seed Quantity of checks for Rabi 2017-18

S. No.	Check Name	Maturity Group	Centre	Qty seed (Kgs)
1	SeedTech2324	Late	Bio Seed	25
2	Bio 9681	Late	Bio Seed	25
3	Buland	Late	Ludhiana	25
4	Bio 9637	Medium	Bio Seed	15
5	HM10	Medium	Karnal	15
6	HQPM 1	QPM	Karnal	20
7	HQPM4	QPM	Karnal	20
8	HQPM 5	QPM	Karnal	20
9	HQPM 7	QPM	Karnal	20
10	P3522	Late	Pioneer Overseas Corporation	15
11	BIO 9544	Medium	Bioseed Research India Pvt. Ltd.	15
12	DHM 117	Medium	PJTSAU-Hyderabad	15

I. Updated check list

Kharif				
Maturity Group	Check Name	Zone	Centre Name /Company	Date of Notification
Late	CMH 08-287	3, 4	TNAU, Coimbatore	30-07-2014
	CMH 08-282	5	TNAU, Coimbatore	19-09-2013
	BIO 9682	2, 5	Bio Seed Research	09-10-2012
	NK6240	2, 4	Syngenta India Pvt.	09-10-2012
Medium	CMH 08-292	2, 3, 4, 5	TNAU, Coimbatore	30-07-2014
	BIO 9544	All	Bio Seed Research	30-07-2014
	HM-12	3	CCSHAU, Uchani,	09-10-2012
	DHM 121 (BH	3,5	ANGRAU, Hyderabad	30/07/2014
Early+EE	PMH5	5	PAU, Ludhiana	25-03-2011
	BIO605	1, 4	Bio Seed	04-10-2013
	DKC 7074	2,4,5	Monsanto	27-08-2009
	Vivek Hybrid 51	5	VPKAS, Almora	30-07-2014
	Vivek Hybrid 45	1	VPKAS, Almora	02-01-2013
QPM	Pratap QPM Hybrid	5	MPUA & T, Udaipur	19-09-2013

Sweet Corn	Misthi	1,2,4	Nuziveedu Seeds Limited	19-09-2013
	VL Sweetcorn-1	1,2,4,5	VIPKAS, Almora	12-8-2016
Baby corn	VL Baby corn 2	1,2,4,5	VIPKAS, Almora	31-1-2017
Popcorn	Shalimar Pop Corn-1 (KDPC-2)	1,2,3,4,5	Shere-e-Kashmir UAS&T, Kashmir	31-1-2017
Rabi				
Maturity Group	Check Name	Zone	Company/Centre Name	Date of Notification
Late	P3522	2, 3, 4, 5	Pioneer Overseas Corporation	24-04-2014
	NMH713	3, 4	Nuziveedu Seeds Ltd.	28-1-2015
	KMH25K45	2,4,5	Kaveri Seed Company Ltd	28-1-2015
Medium	BIO 9544	1,2, 3, 4, 5	Bioseed Research India Pvt. Ltd.	19-09-2013
	HM10	2, 3, 4, 5	CCSHAU, Uchani, Karnal	16-10-2008
	DHM 117	4	ANGRAU, Hyderabad	29-1-2010
	Biscox1(Bisco 506)	3, 4	Bisco Biosciences Ltd	10-9-2012

*The check genotypes highlighted in bold are newly added (will be included in Rabi 2017-18 & Kharif 2018 trials), the remaining have already been added from 2016

*The entries will be promoted based on zone specific check (best check identified), however where the zone specific checks are not available (*in case of only Z-III for early and sweet corn*), the best check identified in that zone will be used in promotion. This will be applicable for all trials except in QPM, where the any of best QPM check identified in a zone will be considered in promotion.

J. General requirements:

Last Date for seed receipt at IIMR:

Kharif season 2017: **May 10, 2017**

Rabi season 2017-18 : **5th Oct, 2017**

- Testing Fee (Private/Non-ICAR organizations) – **60,000 + Service tax 15.0%/ entry/ trial**
- DD should be in favour **of ICAR Unit, PD- Maize, Pusa Campus New Delhi**
- Seed must be untreated and properly sorted
- Mailing Address: To Director Maize, ICAR-Indian Institute of Maize Research, Pusa Campus, New Delhi, PIN-110012
- No seed will be received with incomplete information viz. contact no., Name of person, email ID, organization name, trial for which entry is proposed, filled Performa (Distributed in workshop) etc.

K. New voluntary Centers proposed

S. No.	Company Name	Location in state	Resource Person Name (who will conduct the trial)	Email-ID (official /resource person)	Contact (mobile and office landline)	Detail Address for seed dispatching
A. Private companies						
1	Nirmal Seeds pvt. Ltd.	Pachora, Dist-Jalgaon Maharashtra	Mr. I. S. Halakude (Research coordinator)	ishalakude@nirmalseedsindia.com	Mob- 8380047204. Phone: 02596-244366/262778 /262749	P.O.Box No.63 Bhadgaon Road Pachora-424201 Dist-Jalgaon (M.S.) India.
2	Bisco Bio Sciences Pvt.Ltd.	Aurangabad Kurnool	Vijai Tiwari	Vijai.tiwari@limargrain.in	77999299995	Bisco Bio Sciences Private Limited Ashoka May Home chambars,H No. 1-8-201 to 203 Flat No.208,209 SP Road, Secunderabad, 500003
				Vijai.tiwari@limargrain.in	77999299995	Bisco Bio Sciences Private Limited Ashoka May Home chambars,H No. 1-8-201 to 203 Flat No.208,209 SP Road, Secunderabad, 500003
				Vijai.tiwari@limargrain.in	77999299995	Bisco Bio Sciences Private Limited Ashoka May Home chambars,H No. 1-8-201 to 203 Flat No.208,209 SP Road, Secunderabad, 500003
3	VNR Seeds Private Limited	Raipur Chhattisgarh	Mr. Akhilesh Kumar Singh	Akhilesh.kumar@vnrseeds.com or kc@vnrseeds.com	9393806983 or 8008261509	VNR Seeds Pvt.Ltd. Corporate centre, canal Road Crossing, Ring Road # 1, Raipur Chhattisgarh pin-492006
4	JK AGRI GENETIC LTD	Aurangabad (Maharashtra)	Shantaram Kisan Nikam (Research Associate-R&D)	vnkulkurni@jkseeds.net ; shantaram@jkseeds.net ; rakeshjadhav@jk	Dr. V N Kulkarni (77999315151) Rajesh jadhav(9100722662),	Dr. V.N.Kulkarni Vice Predident (R & D) JK Agri Genetics Ltd. 1-10-177,4th Floor Verma Towers Begumpet, Hyderabad-500016 Talangana India. Mob. +91

S. No.	Company Name	Location in state	Resource Person Name (who will conduct the trial)	Email-ID (official /resource person)	Contact (mobile and office landline)	Detail Address for seed dispatching
A. Private companies						
				seeds.net ;	Office- Ph: 91 40 66316858	7799315151
5	Charoen Pokphand seeds India pvt Ltd.,	Andhra Pradesh	Mr.sadawud koomanee	Sadawud.k@cpse eds.in	9945230016	Charoen Pokphand seeds India pvt Ltd., Door no. 5/77 ,Opposite Porus Chemical plant,Akkireddy Gudem Village, Musunurumandal, Krishna District,A.P Pin:521213
6	Ganga Kaveri Seeds Pvt. Ltd.	Kamareddy , Talangana	D. Mahesh (Breeder) & B. Samson Suresh (RM-South)	d. Mahesh@gangakaveri.co.in Samsonsuresh@gangakaveri.co.in	09666638875 07893101666	Ganga Kaveri Seeds Pvt. Ltd. Sunanda Farm, kandlakoya medchal, Telangana-501401
		Aurangabad Maharashtra,	D. Mahesh (Breeder)& B. Samson Suresh (RM-South)	d. Mahesh@gangakaveri.co.in Samson Suresh@gangakaveri.co.in	09666638875 07893101666	Ganga Kaveri Seeds Pvt. Ltd. Sunanda Farm, kandlakoya medchal, Telangana-501401
7	TriMurti Plant Sciences Pvt. Ltd.	Toolpran-TS Aligarh-UP Ranchi-JH	Mr. R.Chandra Shekar	rcshekar@trimurti.in	9866926568 8374633388 040-30611989	TriMurti Plant Sciences Pvt. Ltd. 101,MGR Estate, Dwarakapuri Colony, Punjagutta, Hyderabad 500082
8	Spriha Bio Sciences	Bhilwara Rajasthan	Sarwan Singh	saimurali@spriha.in	09959777717 08696429201	Spriha Bio Sciences Pvt. Ltd# 1401, Babukhan Estate

S. No.	Company Name	Location in state	Resource Person Name (who will conduct the trial)	Email-ID (official /resource person)	Contact (mobile and office landline)	Detail Address for seed dispatching
A. Private companies						
	Pvt. Ltd.			sarwanshinghchauhan99@yahoo.com		Basheer Bagh, Hyderabad -500001
		Davangere Karnataka	G.karunakar	saimurali@spruha.in karunakar.gorla@gmail.com	09959777717 09866415509	Spruha Bio Sciences Pvt. Ltd# 1401, Babukhan Estate Basheer Bagh, Hyderabad -500001
9	Kanchan Ganga Seed Company Pvt Ltd.,	Bakarum Telangana	Ranga reddy,	kanchanseeds@gmail.com	09810126179 Ph : +91 40 23311915, 23396916	Kanchan Ganga Seed Company Pvt Ltd., 6-3-1085/D/202, Dega Towers, Rajbhavan Road, Somajiguda, Hyderabad - 500 082 Fax :+91 40 23396917
10	Thakora Crop Science Pvt.Ltd.	Anantapur, Andhra Pradesh	Dr. T Chakradar	chakradar@thakoracrops.in	M: 9573443691 L-08554-248517	M/S Thakora Crop Science Pvt. Ltd. vidyut Nagar, Anantapur-515001, Andra pradesh
11	Metahelix life sciences	Bangalore Karnataka	Manish Kumar Patel	Manishpatel@metahelix.com	Mob. 9008277344 (O). 08110-420500	Metahelix life sciences Ltd. A tata Interprise. Plot no. 3 K I A D B. 4 th phase.Bommasandra Bangalore Pin-560099
		Aurangabad (Maharashtra)	Manish Kumar Patel	Manishpatel@metahelix.com	Mob. 9008277344 (O). 08110-420500	Metahelix life sciences Ltd. A tata Interprise. Plot no. 3 K I A D B. 4 th phase.Bommasandra Bangalore Pin-560099
		Hoshiarpur	Manish Kumar	Manish	Mob.	Metahelix life sciences Ltd. A tata

S. No.	Company Name	Location in state	Resource Person Name (who will conduct the trial)	Email-ID (official /resource person)	Contact (mobile and office landline)	Detail Address for seed dispatching
A. Private companies						
12	Monsanto India Ltd.	Mumbai (Maharashtra)	Miskeen Ahmed	patel@metahelix.com	9008277344 (O). 08110-420500	Interprise. Plot no. 3 K I A D B. 4 th phase. Bommasandra Bangalore Pin-560099
13	Mahodaya Hybrid seed Pvt.Ltd.	Jalna (Maharashtra)	B.R. Wadedar Sr. Breeder	NA mhspl@mahodayaseeds.com	Tel. +91 22 2824 6450/6702 Mob. 09422217327	Ajits Cemtre. B wing 5th Floor, 96, Mahakali Caves Road, Andheri (East) Mumbai -400093 India. Mahalaxmi compound" plot no.10,11,12 OLD MIDC Industrial Area, JALNA -431203
14	Mycho Pvt.Ltd.	Maharashtra	-	-	-	-
15	Advanta Pvt Ltd	Karnataka	Dr Uday Shetty		9845292626	Advanta Pvt Ltd Hyderabad
16	Star Agrotech Pvt. Ltd Company	Hyderabad, Karnataka, Bihar,	Dr Rajesh Verma	vermadrrajesh402@gmail.com	8790368329	Star Agrotech Pvt Ltd, 1-8-308/4/B, Road No. 1, 2 nd floor, Baitul Khair, Patigadda, Begumpet, Secunrabad -500003
B. CGIAR Institutes						
17	CIMMYT (CGIAR)	Hyderabad (ICRISAT Campus)	Dr PH Zaidi	phzaidi@cgiar.org		ICRISAT Campus, Patencheru, Hyderabad

C. PUBLIC Sector Organizations

18	Department of Agricultural Chemistry and Soil Science	Nagaland	(Y.K. Sharma) Professor	yk2310sharma@rediffmail.com	Mob:9436263619	Department of Agricultural Chemistry and Soil Science Nagaland
19	Field Crop Research Station Burdwan	West Bengal	Dr santanu sankar Aich	NA	Mob. 9836061161	Field Crop Research Station Burdwan as Wheat Specialist West Bengal
20	MCRS, Larnoo	Sri Nagar	Dr. G.A Parray and Dr. M.A. Ahangar	mashtrafis@gmail.com , parray_2005@rediffmail.com	07298590079	SKUAST-K

*Trials allotment will be decided based on the seed availability during the season

Technical Programme of Crop Production Group

Following scientists of Crop Production attended the session VII:

S. No.	Centre	Name	Designation
1.	Almora	Dr. Dibakar Mahanta	Scientist
2.	Ambikapur	Dr. A.K. Sinha	Asst. Agronomist
3.	Bahraich	Dr. M.V. Singh	Sr. Agronomist
4.	Bajaura	Dr. Vinod Sharma	Sr. Agronomist
5.	Bangluru	Dr. Nagraju	Professor
6.	Banswara	Dr. Hargilas	Asst. Agronomist
7.	BCKV Kalyani	Dr. Sonali Biswas	Agronomist
8.	Bhubaneswar	Ms. Pramila Naik	Jr. Agronomist
9.	Chhindwara	Dr. V.K. Paradkar	Sr. Agronomist
10.	Chitrakoot	Dr. Harishankar Kushwaha	Agronomist
11.	Coimbatore	Dr. A. P. Sivamurugan	Agronomist
12.	Delhi	Dr. A.K. Singh	Pr. Scientist & PI
13.	Delhi	Dr. C.M. Parihar	Scientist
14.	Delhi	Dr. S.L. Jat	Scientist
15.	Delhi	Dr. Vijay Pooniya	Scientist
16.	Dharwad	Dr. U. K. Hulihalli	Asst. Agronomist
17.	Dholi	Dr. Mritunjay Kumar	Agronomist
18.	Godhara	Mr. K.H. Patel	Asst. Agron
19.	Gossaigaon	Mr Binod Kalita	Junior Scientist
20.	Hyderabad	Dr. (Ms.) D. Sreelatha	Scientist
21.	Imphal	Dr. Amit Kumar Singh	Agronomist
22.	Jhabua	Dr. Mahender Singh	SMS
23.	Karimnagar	Dr E Rajnikantha	Scientist
24.	Karnal	Dr. Narendra Singh Bagri	Scientist
25.	Ludhiana	Dr. Mahesh Kumar	Asst. Agronomist
26.	Pantnagar	Dr. Veer Singh	Asst. Soil Scientist
27.	Pantnagar	Dr. Amit Bhatnagar	Sr. Agronomist
28.	Ranchi	Dr. C.S. Singh	Asst. Agronomist
29.	Srinagar	Dr. Bashir Ahmad Alaie	Jr. Scientist
30.	Udaipur	Dr. Dilip Singh	Agronomist
31.	Vagarai	Dr. P.Thukaiyannan	Agronomist

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

Kharif 2017 and Rabi 2017-18

MAT1. 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

a) Performance of pre release late maturity genotypes in kharif under varying planting density and nutrients levels in PZ

Main-plot: Density (2) 83,000 & 100,000
Sub-plot: Nutrient Levels (3) State Recommendation, 200:65:80, 250:80:100 N:
P₂O₅: K₂O kg/ha.
Sub-sub plot: Genotypes (1) +checks
Design: Split-split plot
Replications: 3
Plot size: 10 m²

Locations: Dharwad, Coimbatore, Kolhapur, Karimnagar, Hyderabad, Vagarai

b) Performance of pre release late maturity genotypes in kharif under varying planting density and nutrients levels in CWZ

Main-plot: Density (2) 66,000 & 83,000
Sub-plot: Nutrient Levels (3) State Recommendation, 200:65:80, 250:80:100 N:
P₂O₅: K₂O kg/ha.
Sub-sub plot: Genotypes (1)+checks
Design: Split-split plot
Replications: 3
Plot size: 10 m²

Locations: Ambikapur, Chhindwara, Jhabua, Godhra, Banswara, Udaipur

c) Performance of pre release medium maturity genotypes in kharif under varying planting density and nutrients levels in NEPZ

Main-plot: Density (2) 66,000 & 83,000
Sub-plot: Nutrient Levels (3) State Recommendation, 200:65:80, 250:80:100 N:
P₂O₅: K₂O kg/ha.
Sub-sub plot: Genotypes (3) +checks
Design: Split-split plot
Replications: 3
Plot size: 15 m²

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

d) Performance of pre release medium maturity genotypes in kharif under varying planting density and nutrients levels in CWZ

Main-plot: Density (2) 66,000 & 83,000
Sub-plot: Nutrient Levels (3) State Recommendation, 200:65:80, 250:80:100 N:
P₂O₅: K₂O kg/ha.
Sub-sub plot: Genotypes (1) +checks
Design: Split-split plot
Replications: 3
Plot size: 15 m²

Locations: Ambikapur, Chhindwara, Jhabua, Godhra, Banswara, Udaipur

e) Performance of pre release Early maturity genotypes in kharif under varying planting density and nutrients levels in NHZ

Main-plot: Density (2) 83,000 & 1, 00,000

Sub-plot: Nutrient Levels (3) State Recommendation, 200:65:80, 250:80:100 N:
P₂O₅: K₂O kg/ha.

Sub-sub plot: Genotypes (2)+checks

Design: Split-split plot

Replications: 3

Plot size: 10 m²

Locations: Almora, Bajaura, Gossaingaon, Udhampur, Imphal

f) Performance of pre release Early maturity genotypes in kharif under varying planting density and nutrients levels in CWZ

Main-plot: Density (2) 66,000 & 83,000

Sub-plot: Nutrient Levels (3) State Recommendation, 200:65:80, 250:80:100 N:
P₂O₅: K₂O kg/ha.

Sub-sub plot: Genotypes (1) +checks

Design: Split-split plot

Replications: 3

Plot size: 15 m²

Locations: Godhara, Udaipur, Chindwara

g) Performance of pre release QPM genotypes in kharif under varying planting density and nutrients levels in all zones

Main-plot: Density (2) 66,000 & 83,000 (NWPZ, NEPZ, CWZ) 83,000 & 100,000
(NHZ and PZ)

Sub-plot: Nutrient Levels (2) 200:65:80, 250:80:100 N: P₂O₅: K₂O kg/ha.

Sub-sub plot: Genotypes (1) +checks

Design: Split-split plot

Replications: 3

Plot size: 10 m²

Locations:

NHZ: Almora, Bajaura, Gossaingaon, Udhampur, Imphal

NWPZ: Delhi, Kanpur, Ludhiana, Karnal, Pantnagar

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

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

CWZ: Ambikapur, Chhindwara, Jhabua, Godhra, Banswara, Udaipur

h) Performance of pre release QPM or medium/late maturity genotypes in rabi under varying planting density and nutrients levels in NEPZ, NWPZ, PZ & CWZ

Main-plot: Density (2) 83,000 & 100,000

Sub-plot: Nutrient Levels (2) 200:65:80, 250:80:100 N: P₂O₅: K₂O kg/ha.

Sub-sub plot: Genotypes (To be decided) +checks

Design: Split-split plot

Replications: 3

Plot size: 10 m²

Locations:

NWPZ: Delhi, Kanpur, Ludhiana, Karnal, Pantnagar

NEPZ: Bahraich, Kalyani, Varanasi, Bhubaneswar, Ranchi, Dholi
PZ: Dharwad, Coimbatore, Kolhapur, Karimnagar, Hyderabad, Vagarai
CWZ: Ambikapur, Chhindwara, Jhabua, Godhra, Banswara, Udaipur

Note: Split N application

- Nitrogen to be applied in three equal splits in all MAT 1(a to e) 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 (a to h):

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

i) Performance of pre release popcorn genotypes under varying planting density and nutrients levels in all zones

Main-plot: Density (2) 66,000 & 83,000 (NWPZ, NEPZ, CWZ) 83,000 & 100,000 (NHZ and PZ)

Sub-plot: Nutrient Levels (2) 150:50:60, 200:60:80 and N: P₂O₅: K₂O kg/ha.

Sub-sub plot: Genotypes (4) +checks

Design: Split-split plot

Replications: 3

Plot size: 10 m²

Locations:

NHZ: Almora, Bajaura, Gossaingaon, Udhampur, Imphal

NWPZ: Delhi, Kanpur, Ludhiana, Karnal, Pantnagar

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

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

CWZ: Ambikapur, Chhindwara, Jhabua, Godhra, Banswara, Udaipur

Note: Nitrogen to be applied in three equal splits in all MAT 1(g) at basal, knee high and tasseling stage.

Observations to be recorded in MAT 1 pop corn (g):

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

j) Performance of pre release sweet corn genotypes under varying planting density and nutrients levels in all zones

Main-plot: Density (2) 83,000 & 1,00,000

Sub-plot: Nutrient Levels (2) 150:50:60, 200:60:80 and N: P₂O₅: K₂O kg/ha.

Sub-sub plot: Genotypes (2) +checks

Design: Split-split plot

Replications: 3

Plot size: 10 m²

Locations:

NHZ: Almora, Bajaura, Gossaingaon, Udampur, Imphal

NWPZ: Delhi, Kanpur, Ludhiana, Karnal, Pantnagar

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

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

CWZ: Ambikapur, Chhindwara, Jhabua, Godhra, Banswara, Udaipur

Note: Nitrogen to be applied in three equal splits in all MAT 1(h) at basal, knee high and tasseling stage.

Observations to be recorded in MAT 1 sweet corn (h):

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

k) Performance of pre release baby corn genotypes under varying planting density and nutrients levels in all zones

Main-plot: Density (2) 111,000 & 1,30,000

Sub-plot: Nutrient Levels (2) 150:50:60, 200:60:80 and N: P₂O₅: K₂O kg/ha.

Sub- sub plot: Genotypes (7) + checks

Design: Split-split plot

Replications: 3

Plot size: 10 m²

Note: Nitrogen to be applied in three equal splits in all MAT 1(i) at basal, knee high and tasseling stage.

Observations to be recorded in MAT 1 baby corn (i):

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)
1. Zero till 2. Conventional Till 3. Permanent bed	1.RDF 2.SSNM based on nutrient expert 3.Farmer's fertilizer practice

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.Farmer's fertilizer practice

Design: Split Plot Replications: three Main-plot size: 150 m²
Locations: Dholi, Hyderabad, Kalyani, Banswara

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. Farmer's fertilizer practice

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: Effect of planting density and nutrient management practices on the performance of hybrids in kharif season

Objective: To study the genotype x planting density x nutrient interactions for achieving higher yield in hybrid maize during kharif season

Locations	Cropping system	Main-plot (Hybrids: 2)	Sub-plot (Density:2)	Sub-sub plot (Nutrient Management:3)
Zone I (Bajaura, Srinagar, Imphal, Kangra, Gossaingaon, Udhampur)	Maize – Wheat/ Maize-mustard	Early/ medium maturity	60 x 20 cm 60 x 15 cm	RDF STCR SSNM
Zone II (Delhi, Ludhiana, Karnal, Kanpur, Pantnagar)	Maize – Wheat	Full maturity	67 x 20 cm 67 x 15 cm	RDF STCR SSNM
Zone III (Dholi, Ambikapur, Bahraich, Bhubaneswar, Varanasi, Ranchi, Kalyani)	Maize – Wheat/ Maize-mustard	Medium maturity	60 x 20 cm 50 x 20 cm	RDF STCR SSNM
Zone IV (Dharwad, Coimbatore, Kolhapur, Karimnagar)	Maize alone	Full maturity	60 x 20 cm 50 x 20 cm	RDF STCR SSNM
Zone V (Udaipur, Chhindwara, Banswara, Godhara)	Maize – Wheat/ Maize- Chickpea/ Maize-mustard	Early/ medium maturity	60 x 20 cm 50 x 20 cm	RDF STCR SSNM

Design: Split-split plot Replications: 3 Sub-sub plot size: 15 m²

Note: Select the hybrids from local market having maximum area at farmers filed and mention their names

Observation to be recorded:

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

MAT 6: Effect of planting density and nutrient management practices on the performance of hybrids in rabi season

Objective: To study the genotype x planting density x nutrient interactions for achieving higher yield in hybrid maize during rabi season

Locations	Cropping system	Main-plot (Hybrids: 2)	Sub-plot (Density: 2)	Sub-sub plot (Nutrient Management :3)
Zone III (Dholi, Kalyani, Bahraich)	Rice-Maize	Full maturity	60 x 20 cm 50 x 20 cm	RDF STCR SSNM
Zone IV (Karimnagar, Hyderabad, Coimbatore, Vagarai)	Pulse-maize/ Maize alone	Full maturity	60 x 20 cm 50 x 20 cm	RDF STCR SSNM
Zone V (Banswara)	Soybean-maize	Full maturity	60 x 20 cm 50 x 20 cm	RDF STCR SSNM

Design: Split-split plot Replications: 3 Sub-sub plot size: 15 m²

Note: Select the hybrids from local market having maximum area at farmers filed and mention their names

Observation to be recorded:

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

MAT 7: Long term trial on integrated nutrient management in maize-wheat cropping system

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

Location: Pantnagar

Treatment details:

T1	Unmanured
T2	100% RDF
T3	75% RDF
T4	50% RDF
T5	FYM 10t/ha + Azatobactor
T6	Maize + Cowpea 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

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 8: Weed management in maize systems

Objective: To develop weed management options in maize cropping system

Locations:

Maize-wheat: Pantnagar, Bajaura, Karnal, Ludhiana, Ranchi, Kalyani, Dholi, Udaipur, Banswara Chhindwara, Behraich, Udampur

Maize-oat: Srinagar

Maize-mustard: Ambikapur, Bhubneshwar, Imphal, Baharaich

Rice-maize: Dholi, Kalyani, Gossaigaon

Maize alone: Vagarai, Jhabua, Karimnagar, Dharwad, Hyderabad, Chitrakoot

Treatment details:

T1	Control (weedy check)
T2	Weed free
T3	Atrazine @ 1.5* kg a.i./ha pre-emergence
T4	Atrazine (750 g a.i./ha) + Pendemathalin (750 ml a.i./ha) pre-emergence
T5	Atrazine (1.5 kg a.i./ha) fb 2,4-D Amine 0.4 kg a.i./ha at 25 DAS as PoE
T6	Halosulfuron 90 g/ha at 25 DAS
T7	Atrazine @ 1.5 kg a.i./ha pre-emergence fb Halosulfuron 90 g/ha 25 DAS
T8	Tembotrione (Laudis) 120 ml a.i./ha PoE at 25 DAS
T9	Pendemathalin (1000 ml/ha) pre-emergence fb Atrazine (750 g a.i./ha) + 2,4-D Amine 0.4 kg a.i./ha at 25 DAS as PoE
T10	Atrazine @ 1.5 kg/ha pre-emergence fb Tembotrione (Laudis) 120 ml a.i./ha PoE at 25 DAS

*For light soil Atrazine 1.0 kg/ha

Design: RBD

Replications: 3

Plot size: 15 m²

Observations to be recorded:**For crop:**

- i. Plant population at 25 DAS and at harvest (thousands/ha)
- ii. No. of cobs (thousands/ha)
- iii. Cob yield (kg/ha)
- iv. Maize Grain yield (kg/ha)
- v. System productivity as Maize equivalent yield
- vi. Insect pest and disease incidence, if any
- vii. Economics: Net return and B:C ratio

For weeds:

- i. No. of grassy, broadleaf weeds and sedges/m² at 50 DAS and at harvest
- ii. Weed dry matter at harvest/m² of grassy, broadleaf weeds and sedges separately
- iii. Phototoxic effects on crops, if any

MAT-9: Enhancing water-use efficiency in rainfed maize**Objective: To enhance water productivity in rainfed maize****Locations:**

Maize-wheat: Dholi, Udaipur

Maize-mustard: Chhindwara, Bhubaneswar, Imphal(pre-kharif)

Maize alone: Karimnagar, Srinagar

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

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

MAT.10: Phosphorus Liquid Bio-fertilizers evaluation in maize

Objective: Identification of potential biofertilizers in maize

Locations:

Maize-wheat: Karnal, Pantnagar, Ludhiana, Dholi, Udaipur, Baharaich,
 Maize-mustard: Srinagar, Imphal, Chhindwara, Bhubaneswar, Ranchi, Nadia
 Maize-chickpea: Banswara, Jhabua, Kanpur, Ambikapur, Dharwad
 Maize alone: Karimnagar, Vagarai, Coimbatore, Kolhapur, Gossaingaon, Chitrakoot

T1	Control (Recommended N and K)
T2	PSB I
T3	PSB II
T4	NPK consortia
T5	60 kg P ₂ O ₅ /ha
T6	30 kg P ₂ O ₅ /ha + PSB I
T7	60 kg P ₂ O ₅ /ha + PSB I
T8	30 kg P ₂ O ₅ /ha + PSB II
T9	60 kg P ₂ O ₅ /ha + PSB II
T10	30 kg P ₂ O ₅ /ha + NPK consortia
T11	60 kg P ₂ O ₅ /ha + NPK consortia
T12	90 kg P ₂ O ₅ /ha

Design: RBD Replications: 3 Plot size: 15 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. Insect-pest and disease incidence, if any

MAT-11: 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 cropping sequence) physical and chemical parameters of soil

New Trials:

MAT-12: Ecological intensification for climate resilient maize based cropping systems

Objective:

- 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 under normal viz a viz climate abbatation.

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

Treatments:

T1	Farmer practice *
T2	EI (Ecological Intensification)**
T3	EI minus tillage practice (Conventional tillage without residue retention in all crops)
T4	EI minus Nutrient management (Absolute control for 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 (No weed management in all crops)
T8	EI minus Disease and insect management (No management in all crops)

Design: RBD

Replication: 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 for rice, maize, wheat and soybean and 4 R nutrient management guidelines for other crops (IPNI will provide the inputs); application of water at critical growth stages; integrated weed, disease and insect management.

This project is the entire new research programme involves high quality scientific and technical input and will be implemented in collaboration by ICAR (IIMR)-CIMMYT—IPNI.

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. Initial and post-harvest soil properties after each crop (pH, EC, OC, Available N, P₂O₅ and K₂O).
13. N, P, and K uptake in grain, straw/stover by all the component crops.
14. Nutrient use efficiency indicators, PFP (Partial Factor Productivity), AE (Agronomic efficiency), RE (Recovery efficiency), PNB (Partial Nutrient Balance).

MAT-13: Validation of Sensor based nitrogen management in maize

Treatments:

1	Control
2	RDF (1/3+1/3+1/3 N splitting at basal, knee high and tasseling)
3	STCR (1/3+1/3+1/3 N splitting at basal, knee high and tasseling)
4	Nutrient expert (1/3+1/3+1/3 N splitting at basal, knee high and tasseling)
5	33% basal N + Green Seeker based N at knee high & tasseling stage
6	60% basal N + Green Seeker based N at knee high
7	70% basal N + Green Seeker based N at knee high
8	60% basal N + Green Seeker based N at tasseling stage
9	70% basal N + Green Seeker based N at tasseling stage
10	30% Basal N + 30% at 25 DAS + Green Seeker based N at tasseling stage
11	35% Basal N + 35% at 25 DAS + Green Seeker based N at tasseling stage
12	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, Dholi, Jabalpur (BISA), Ludhiana, Delhi, Pantnagar, Ranchi, Kalyani, Hyderabad, Udaipur

Observations to be recorded:

1. Plant population (thousands/ha) in maize
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. Maize equivalents of component crops in cropping system
6. System productivity
7. Stover/straw yields of all crops (kg/ha)
8. Net returns and B: C ratio
9. N, P and K uptake by all crops
10. Initial and final (after completion of one year cropping sequence) physical and chemical parameters of soil

ICAR-CIMMYT collaboration in Agronomy

1. Estimation of green house gas emission in permanent conservation agriculture experiments at IIMR, Delhi

2. Precision-conservation agriculture for maximizing yield and nutrient use efficiency while reducing environmental foot prints in maize wheat cropping system of eastern IGP*

Background: The average productivity of kharif maize in Bihar is very poor (1.5 t/ha) due to poor agronomic management especially due to inadequate nutrient use and improper crop establishment coupled with multiple abiotic stresses. Technological solutions involving precision nutrient management layered with CA based management are needed not only to help adapting maize systems to multiple abiotic stresses in eastern Gangetic plains but also to improve productivity, profitability while reducing environmental foot prints.

***The trial will be conducted at BISA, Pusa, Bihar supported by CIMMYT-CCAFS and with strategic partnership with RAU Pusa, Dholi centre of AICRP on Maize. The results will be presented in annual maize workshop**

Technical program:

Treatments:

S. No	Tillage practices	Nutrient rate	Application method	Application time	
				Maize	Wheat
1	CT (FP)	FFP	FFP	FFP	FFP
2	PB	Ad-hoc state recommendation	Ad-hoc state recommendation (broadcast)	Ad-hoc state recommendation	Ad-hoc state recommendation
3	PB	Ad-hoc state recommendation (NPK)	Drilling	3 splits	3 splits
4	PB	Ad-hoc state rec (NPK)-80% N in 2 splits, 3 rd N split based on GreenSeeker	Drilling	3 splits	3 splits
5	PB	Nutrient Expert based NPK rates	Broadcast	3 splits	3 splits
6	PB	Nutrient Expert based NPK rates	Drilling	3 splits	3 splits
7	PB	Nutrient Expert based NPK rates-80% N in 2 splits, 3 rd N split based on GreenSeeker	Drilling	3 splits	3 splits

Replication: 03

Plot size: >150 m²

Observations:

1. Growth and yield parameters and yield
2. Input use
3. Production economics
4. Nutrient use efficiency
5. Green House Gases (GHGs)

3. Designing portfolios of precision water* and nutrient management in conservation agriculture based maize-wheat production systems in a sandy loam soils of western IGP*

***Sub-surface drip irrigation system. The irrigation water will be applied based on SMT**

Centers: &The trial will be conducted at BISA farm, Ladowal, Ludhiana, supported by CIMMYT-CCAFS and with strategic partnership with PAU and IIMR. The results will be presented in annual maize workshop

Objectives

- Optimize water and nutrient rates, time and method of application in CA based maize-wheat system
- Improve system productivity, water and nutrient use efficiency in maize-wheat system in sandy loam soil
- Reduce environmental foot prints of tillage, water and nutrient use.
- Capacity development of stake-holder on precision-conservation agriculture
- Develop science based policy guide for sustainable intensification in western IGP

Treatments

1. No-N control- both residues removed (-R)
2. No-N control- 50% of maize stover and 30% of wheat residue retained (+R)
3. 50% recommended N -R
4. 50% of recommended N +R
5. 75% of recommended N-R
6. 75% of recommended N +R
7. 100% of recommended N-R
8. 100 of recommended N +R
9. 100% of recommended N under CT system (fresh beds for maize and wheat on flat) -R
- 10.50% of recommended N -R (supplemented with GreenSeeker guided N at Flowering stage in maize and Feekes 7/8 in wheat)
- 11.50% of recommended N +R (supplemented with GreenSeeker guided N at Flowering

Replication: 03

Plot size:

Observations:

1. Growth and yield parameters and yield
2. Input use (water, nutrient, labour, energy etc)
3. Production economics
4. Nutrient use efficiency
5. Water use efficiency
6. Green House Gases (GHGs)

4. Validation of GreenSeeker optical sensor algorithms for precision N management in maize for India*

5. Strategic partnerships in SSNM (Nutrient Expert) x Tillage trials

- Joint capacity development events
- Joint publications

Researchers involved from CIMMYT-BISA: ML Jat, RK Jat, HS Sidhu

Annexure – III

Technical Programme of Plant Pathology & Nematology Group

Following scientists of Plant Pathology and Nematology attended the session VII:

Sr No	Centre	Presented/ not presented	Sr No	Centre	Presented/ not presented
1.	Almora	Not presented	11.	Udaipur	Dr. S.S. Sharma
2.	Bajaura	Not presented	12.	Godhra	Dr. S.K. Singh
3.	Barapani	Not presented	13.	Hyderabad	Dr. S. Aneer Basha
4.	Dhaulakuan	Not presented	14.	Karnal	Dr. Rakesh Mehra
5.	Delhi	Dr. Robin Gogoi	15.	Ludhiana	Dr. Harleen Kaur
6.	Dharwad	Dr. S.I. Harlapur	16.	CIMMYT Hyderabad	Dr. Zerka Rashid
7.	Dholi	Dr. Phool Chand	17.	NCIPM, N. Delhi	Dr. M. K. Khokhar
8.	Kalyani	Dr. Shrabani Debnath	18.	IIMR, Ludhiana	Dr. Meena Shekhar
9.	Mandya	Dr. Mallikarjuna N.	19.	IIMR, Ludhiana	Mr. Pravin K. Bagaria
10.	Udaipur	Dr. B.L. Baheti	20.	Coimbatore	Dr. P. Renuka Devi

The group had discussion on various points and formulated the Technical Programme for *kharif 2017/rabi 2017-18*.

A. *Kharif 2017*:

MPT 1-8. Disease screening of NIVT (4) and AVT (4 trials) of all maturity groups under artificially created epiphyotics (All centers)

Hot spot locations:

1. Maydis leaf blight (MLB) - Dholi, Karnal, Ludhiana, Delhi (IARI), Kalyani
2. Turcicum leaf blight (TLB) - Bajaura, Almora, Mandya, Dharwad, Srinagar
3. Banded leaf and sheath blight (BLSB) - Pantnagar, Delhi (IARI), Karnal.
4. Curvularia Leaf spot (CLS) - Udaipur, Dhaulakuan.
5. Bacterial stalk rot (BSR) - Pantnagar, Dhaulakuan
6. Charcoal rot (CR) - Ludhiana, Hyderabad
7. Common rust - Dharwad
8. Polysora rust - Mandya
9. Sorghum Downy mildew (SDM) - Mandya
10. Rajasthan Downy mildew (RDM) - Udaipur
11. Cyst nematode – Udaipur

List of 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, CM 501, Hishell	Charcoal rot
10.	CM 202, 219 J, Local Checks	Polysora rust
11.	Local Checks	Common rust

Observations: Record the all 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	R1	R2	Mean
	Resistant Check			
	Susceptible Check			

- Follow uniform method of disease screening under sick plot/ artificial inoculated disease condition. [PDI = (Sum of individual ratings)/ (No. of leaves examined) ×100/ (Maximum disease rating)]
- 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/20th 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, CR and late wilt), score of each individual disease be mentioned

Rating scales to be used for uniform disease screening/data recording

Season	1-9 Scale	1-5 Scale
Rabi 2016-17	NIVT	AVT I & II
Kharif 2017	NIVT & AVT I	AVT II
Rabi 2017-18	NIVT & AVT I	AVT II

MPT 9-12 Disease screening of specialty corn (4 trials) under artificially created epiphyotics (All centres): As mentioned in case of MPT 1-8.

MPT 13. Screening of maize hybrids (all maturity groups) against cyst nematode (*Heterodera zae* at Udaipur): All the hybrids of IVT, AVI, AVT II and Specialty corns will be screened against cyst nematode under sick plot condition.

Hot spot location: Udaipur

Observations: 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	R1	R2	Mean
1.				
2.	Resistant Check			
3.	Susceptible Check			

MPT 14-17. Disease screening of inbred lines (Normal, QPM, association panel & mapping population) under artificially created epiphyotics. The inbred lines will be screened at the following hot spot locations:

- **Normal** - All 14 centres
- **QPM** -
 - MLB - Dholi, Karnal, Ludhiana, Kalyani
 - TLB - Bajaura, Almora, Mandya, Dharwad
 - BLSB - Pantnagar, Delhi (IARI), Karnal, Ludhiana
- **Mapping population- MLB** - Dholi, Karnal, Ludhiana, Delhi (IIMR)

- **Association panel**

- **TLB** - Bajaura, Dharwad, Mandya
- **C.Rot** - Ludhiana, Hyderabad, Delhi (IIMR)

List of susceptible checks: As mentioned in MPT 1-8.

Observations: As mentioned under disease screening trials of hybrids.

MPT 18. Assessment of avoidable yield losses due to major diseases of maize at selected centers This trials will be conducted at following locations using paired plot technique with nine replications under sick plot/ artificially created epiphytotics.

Locations:Udaipur-RDM; Bajaura-TLB; Dhaulakuan, Dholi, Kalyani - MLB; Mandya-SDM; Hyderabad-C.rot; Udaipur, Godhra-CLS

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 19. 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.

Locations: Almora, Bajaura, Coimbatore, Delhi, Dharwad, Dhaulakaun, Dholi, Hyderabad, Karnal, Ludhiana, Mandya, Pantnagar, Udaipur, Kalyani (14 centres)

Observations: Disease screening data should be recorded in following format:

S.No	Plot No.	Pedigree (Code No.)	Germination (%)	Disease incidence rating (Natural condition)	Remarks
1.					

- 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)
- For foliar diseases (MLB, TLB, CLS and rusts), scoring should be made in revised standard rating scale of 1-9.

MPT 20. 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: Bajaura, Coimbatore, Dharwad, Dhaulakaun, Dholi, Godhra, Hyderabad, Karnal, Ludhiana, Mandya, Pantnagar, Udaipur, Kalyani (13 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 21-28. Management strategy for major diseases of maize

MPT 21. Management of downy mildews (SDM & RDM) with bioagents and fungicides

Locations: Mandya (SDM), Udaipur (RDM)

Observations: Disease data should be recorded in following format:

Season	No. of Rows
Date of Sowing	Row Length
Date of Inoculation	Date of Observation
Test variety (local susceptible)	Date of Harvesting
Replication	

Treatments		Incidence (%)	Disease control (%)	Grain yield	
				(q/ha)	Increase (%)
T ₁	<i>Bacillus amyloliquefaciens</i> @10g/kg as seed treatment, bioagent-fortified FYM (1:50) and spray@ 1.0%				
T ₂	TH-3 @ 0.5% as seed treatment, bioagent-fortified FYM (1:50) and spray @ 0.5%				
T ₃	TV-3 (<i>Trichoderma viride</i>)@0.5% as seed treatment, bioagent-fortified FYM (1:50) and spray@ 0.5%				
T ₄	Fosetyl-al@ 0.2% seed treatment and spray @ 0.2%				
T ₅	Azoxystrobin @ 0.2% seed treatment and spray @ 0.15%				
T ₆	Metalaxyl+Mancozeb @ 0.25% seed treatment and spray @ 0.25%				
T ₇	Metalaxyl @ 0.25% seed treatment and spray @ 0.25%				
T ₈	Untreated check (water spray)				
SEM+					
CD (0.05)					
CV (%)					

Note: Incubate bioagent fortified FYM under moist condition at least for 10 days before sowing of experiment.

MPT 22. Efficacy of salicylic acid (SA) on incidence of maize diseases

Locations: Bajaura (TLB), Coimbatore (Ch. Rot in *Kharif*), Dharwad (TLB, Common rust), Dhaulakaun (BLSB, BSR), Dholi (MLB), Godhra (BLSB), Hyderabad (Ch. Rot), Karnal (BLSB, MLB), Ludhiana (MLB, BLSB, Ch. Rot), Mandya (SDM, TLB, Polysora rust), Pantnagar (BLSB, BSR), Udaipur (RDM, FSR), Kalyani (TLB) (13 centres).

Observation: Disease data should be recorded in following format

Season : No. of Rows
 Date of Sowing : Row Length
 Date of Inoculation : Date of Observation
 Test Hybrid : Date of Harvesting
 Replication :

Treatments		Germination (%)	PDI	Disease control (%)	Grain yield	
					(q/ha)	Increase (%)
T ₁	50ppm as seed priming (SP)					
T ₂	100ppm(SP)					
T ₃	150 ppm(SP)					
T ₄	50ppm (SP)+50 ppm foliar spray (48hrs before inoculation).					
T ₅	100ppm (SP)+100 ppm foliar spray (48 hrs before inocula.)					
T ₆	150ppm (SP) + 150 ppm foliar spray (48 hrs before inocula.)					
T ₇	Check (inoculated, no SP & no foliar spray)					
T ₈	Check-No inoculation (water spray)					
	SEM+					
	CD (0.05)					
	CV (%)					

***Commercial grade of SA; **Number of réplifications =4**

Note: Methodology of treatment:

(i) ***Seed priming with Salicyclic Acid (SA)** : For priming, soak seeds in solution SA (50 mg/ litre) for 18 h using 1:5 (w/v) ratio. After priming, seeds were rinsed thoroughly and surface dried under shade for 48 h close to original weight.

(ii) **Check (control)**: Dip seed in distilled water (water control) for same time and spray same volume as in case of chemicals.

Methodology for solution - First of all dissolve salicyclic acid in a suitable solvent either in ethanol or acetone (drop by drop) when a clear solution observed then add desired amount of distilled water to obtain desired volume and dilute further to prepare lower concentrations as required by serial dilution.

MPT 23. Effect of bioextracts natural products on the incidence of maize diseases

Locations: Bajaura (TLB), Karnal (MLB), Delhi (MLB), Dholi (MLB), Kalyani (TLB), Mandya (TLB), Udaipur (CLS).

Treatments		Mean disease score	PDI	Disease control (%)	Grain yield	
					(q/ha)	Increase (%)
T ₁	<i>Azadirachta indica</i> leaves@ 10%					
T ₂	<i>Pongamia pinnata</i> (Kranj) @ 10% extract					
T ₃	<i>Datura stramonium</i> (Datura)@ 10%					
T ₄	<i>Calotropis sp.</i> (Madar)@ 10%					
T ₅	<i>Cymbopogon flexuosus</i> @ 10% (Lemon grass)					
T ₆	<i>Allium sativum</i> bulb@ 10%					
T ₇	<i>Eucalyptus sp.</i> @ 10%					
T ₈	<i>Polyalthia longifolia</i> (False Ashoka) @ 10%					
T ₉	<i>Ocimum sanctum</i> (Tulsi)@ 10%					
T ₁₀	<i>Parthenium hysterophorus</i> @ 10%					
T ₁₁	Cow urine @ 50%					
T ₁₂	Lantana camara@ 10%					
T ₁₃	Fungicidal check I					

T ₁₄	Check II (water spray)					
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NOTE: First spray 2 DAI (days after inoculation) and second spray 10-15 days after first spray. Number of treatments can be taken as per availability of botanicals/ bioproducts.

MPT 24. Management of TLB with bioagents and fungicides

Locations: Mandya

Observations: Disease data should be recorded in following format:

Season	No. of Rows
Date of Sowing	Row Length
Date of Inoculation	Date of Observation
Test variety (local susceptible)	Date of Harvesting
Replication	

Treatments	Incidence (%)	Disease control (%)	Grain yield	
			(q/ha)	Increase (%)
T ₁ <i>Pseudomonas fluorescens</i> @ 0.5% as seed treatment + bioagent-fortified FYM (1:50) and spray@ 0.5%				
T ₂ <i>Trichoderma viride</i> @ 0.5% as seed treatment + bioagent-fortified FYM (1:50) and spray @ 0.5%				
T ₃ Propiconazole @ 0.1% spray at 40 DAS				
T ₄ Difenconazole @ 0.1% spray at 40 DAS				
T ₅ Tebuconazole@ 0.1% spray at 40 DAS				
T ₆ Nativo (Trifloxystrobin + Tebuconazole) @ 0.05% spray at 40 DAS				
T ₇ Mancozeb @ 0.25% spray at 40DAS				
T ₈ Untreated check (water spray)				

SEM+				
CD (0.05)				
CV (%)				

Note: Incubate bioagent fortified FYM under moist condition at least for 10 days before sowing of experiment.

MPT 25. Efficacy of leaf stripping on severity of BLSB of maize

Entries :5

Rows :4/entry

Treatments: Stripping & Unstripping

Locations: Ludhiana, Godhra, Karnal, Panthnagar, Delhi

Entries	PDI		Disease control (%)	Grain yield (q/ha)	Increase over control (%)
	Unstripped	Stripped			
1					
2					
3					
4					

***Four rows of each variety.**

MPT 26. Eco-safe management of maize cyst nematode, *Heterodera zae* on maize through bio-agents

Treatments: 8

Replication: 3

Design: R.B.D.

- * *Glomus fasciculatum* 1% w/w as seed treatment
- * *Glomus fasciculatum* 2% w/w as seed treatment
- * *Glomus fasciculatum* 4% w/w as seed treatment
- * *Metarhizium anisopliae* 1% w/w as seed treatment
- * *Metarhizium anisopliae* 2% w/w as seed treatment
- * *Metarhizium anisopliae* 4% w/w as seed treatment
- * *Pseudomonas fluorescens* 1% w/w as seed treatment
- * *Pseudomonas fluorescens* 2% w/w as seed treatment
- * *Pseudomonas fluorescens* 4% w/w as seed treatment
- * *Trichoderma viride* 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

MPT 27. Preliminary screening of cow products for the management of maize cyst nematode, *Heterodera zae* on maize as seed treatment

Treatments: 8 Replication: 3 Design: R.B.D.

- * Cow milk 5% w/v
- * Cow milk 10% w/v
- * Cow milk 20% w/v
- * 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
- * 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
- Drying agent: Cow dung

MPT 28. Impact of various maize varieties with varied soil type in field infested with *Heterodera zae* on maize

B. Rabi 2017-18:

MPT 1-5. Disease screening of hybrids of Rabi maize (NIVT & AVTs)

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

Hot spot locations:

1. Maydis leaf blight (MLB): Kalyani
2. Turcicum leaf blight (TLB): Mandya, Dholi, Kalyani
3. Fusarium stalk rot (FSR): Udaipur
4. Charcoal rot (CR): Ludhiana, Hyderabad, Dharwad, Coimbatore
5. Common rust: Karnal, Dholi
6. 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, 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	R1	R2	Mean
1.				
2.				
Susceptible Check				
Resistant Check				

Rating scales to be used for uniform disease screening/ data record

Season	1-9 Scale	1-5 Scale
Rabi 2016-17	NIVT	AVT I & II
Kharif 2017	NIVT & AVT I	AVT II
Rabi 2017-18	NIVT & AVT I	AVT II

MPT 6. Disease screening of maize inbred lines under artificially created epiphyotics (8 centres)

Evaluation of maize inbred lines against major diseases will be done under artificially created epiphyotics at above hot spot locations.

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	R1	R2	Mean
1.				
2.				
Susceptible Check				
Resistant Check				

MPT 7. Disease screening of inbred lines (association mapping panel) under artificially created epiphytotics:

The inbred lines will be screened against C. Rot at Coimbatore

List of susceptible checks: As mentioned in MPT 1-5.

Observations: As mentioned under disease screening trials of hybrids.

MPT 8. Assessment of avoidable yield losses due to major diseases of maize at selected centers:

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

Locations: Coimbatore, Dharwad-C.rot

MPT 9. Efficacy of salicylic acid (SA) on incidence of maize diseases

Locations: Dharwad (Ch. Rot)

Observation: Disease data should be recorded in following format

Season : No. of Rows
 Date of Sowing : Row Length
 Date of Inoculation : Date of Observation
 Test Hybrid : Date of Harvesting
 Replication :

Treatments	Germination (%)	PDI	Disease control (%)	Grain yield	
				(q/ha)	Increase (%)
T ₁ 50ppm as seed priming (SP)					
T ₂ 100ppm(SP)					
T ₃ 150 ppm(SP)					
T ₄ 50ppm (SP)+50 ppm foliar					

	spray (48hrs before inoculation).					
T ₅	100ppm (SP)+100 ppm foliar spray (48 hrs before inocula.)					
T ₆	150ppm (SP) + 150 ppm foliar spray (48 hrs before inocula.)					
T ₇	Check (inoculated, no SP & no foliar spray)					
T ₈	Check-No inoculation (water spray)					
	SEM+					
	CD (0.05)					
	CV (%)					

***Commercial grade of SA; **Number of réplifications =4**

Note: Methodology of treatment:

(i) *Seed priming with Salicylic Acid (SA) : For priming, soak seeds in solution SA (50 mg/ litre) for 18 h using 1:5 (w/v) ratio. After priming, seeds were rinsed thoroughly and surface dried under shade for 48 h close to original weight.

(ii) Check (control): Dip seed in distilled water (water control) for same time and spray same volume as in case of chemicals.

Methodology for solution - First of all dissolve salicylic acid in a suitable solvent either in ethanol or acetone (drop by drop) when a clear solution observed then add desired amount of distilled water to obtain desired volume and dilute further to prepare lower concentrations as required by serial dilution.

MPT 10. Management of TLB with bioagents and fungicides

Locations: Mandya

Observations: Disease data should be recorded in following format:

Season	No. of Rows
Date of Sowing	Row Length
Date of Inoculation	Date of Observation
Test variety (local susceptible)	Date of Harvesting
Replication	

Treatments	Incidence (%)	Disease control (%)	Grain yield	
			(q/ha)	Increase (%)
T ₁ <i>Pseudomonas fluorescens</i> @ 0.5% as seed treatment + bioagent-fortified FYM (1:50) and spray@ 0.5%				
T ₂ <i>Trichoderma viride</i> @ 0.5% as seed treatment + bioagent-fortified FYM (1:50) and spray @ 0.5%				
T ₃ Propiconazole @ 0.1% spray at 40 DAS				
T ₄ Difenconazole @ 0.1% spray at 40 DAS				
T ₅ Tebuconazole@ 0.1% spray at 40 DAS				
T ₆ Nativo (Trifloxystrobin + Tebuconazole) @ 0.05% spray at 40 DAS				
T ₇ Mancozeb @ 0.25% spray at 40DAS				
T ₈ Untreated check (water spray)				
SEM+				
CD (0.05)				
CV (%)				

Note: Incubate bioagent fortified FYM under moist condition at least for 10 days before sowing of experiment.

C. ICAR-CIMMYT trials: Following ICAR-CIMMYT trials (2017-18) would be conducted at centres mentioned against each trial:

Diseases	Material Description	No of Entries	Total Reps	Rows No	Total rows	Sets available	Centres
Turicum Leaf Blight	Advance and early generation CIMMYT –	100	2	1	200	3	Dharwad (K), Kalyani, Mandya

	Asia lines for TLB resistance						
Banded leaf and sheath blight	Advance and early generation CIMMYT – Asia lines for BLSB resistance	100	2	1	200	3	Pantnagar, Karnal, IIMR Ludhiana
Fusarium stalk rot	Advance and early generation CIMMYT – Asia lines for FSR resistance	100	2	1	200	3	Udaipur, Mandya
Charcoal stalk rot (<i>Macrophomina</i>)	Advance and early generation CIMMYT – Asia lines for MSR resistance	100	2	1	200	3	PAU Ludhiana Dharwad-R, Hyd (K)

The group meeting has come out with recommendation for the management of the following diseases:-

A. Banded leaf and sheath blight:

Azoxystrobin @ 0.05 %

or

Trifloxystrobin 25% + Tebuconazole 50% @ 0.05% at first appearance of BLSB symptoms, 1-2 spray at 10 days interval

B. Turicum leaf blight and Common rust:

Trifloxystrobin 25% + Tebuconazole 50% @ 0.05%

or

Difenconazole @ 0.1% at first appearance of TLB/ Common rust symptoms, 1-2 spray

C. Cyst nematode (*H. zaeae*):

Bioagent, *Pochonia chlamydosporia* at 2% w/w as seed treatment along with *Lantana* leaves powder at 1 q/ha as soil application at the time of sowing

The Group meeting ended with vote of thanks to the Chair and all scientists proposed by Dr. Meena Shekhar, Principal Scientist, IIMR.

Annexure – IV

Technical Programme of Entomology Group

The approved plan of work for AICRP Entomology is as follows:

Kharif

ET 1: Evaluation of maize AICRP trials entries against *Chilo partellus* under artificial infestation for AVT I and II (All Centres) – Delhi, Bajaura, Dholi, Hyderabad, Kolhapur, Karnal, Ludhiana and Udaipur

ET 2 : Evaluation of inbred lines against *Chilo partellus* under artificial infestation (3rd year)-All locations- Delhi, Hyderabad, Kolhapur, Karnal, Ludhiana and Udaipur

ET 3: Monitoring of *Helicoverpa armigera* by pheromone traps (Kharif, Rabi & Spring) Delhi, Bajaura, Dholi, Hyderabad, Kolhapur, Karnal, Ludhiana and Udaipur

ET 4: Efficacy of insecticides as seed treatment against *C. partellus* (1st year)-

Insecticide	Dose
Thiamethoxam 30 FS	6 ml/kg seed
Thiamethoxam 30 FS	8 ml/kg seed
Thiamethoxam 30 FS	10 ml/kg seed
Imidacloprid 600 FS	4 ml/kg seed
Imidacloprid 600 FS	6 ml/kg seed
Imidacloprid 600 FS	8 ml/kg seed
Chlorpyriphos 20 EC	5 ml/kg seed
Fipronil 5 SC	6 ml/kg seed
Untreated Control	

ET 5: Evaluation of bio-pesticides against *C. partellus* (2nd Year)- All locations Delhi, Hyderabad, Kolhapur, Karnal, Ludhiana and Udaipur

Bio-pesticides	Dose
Bb-5a isolate of <i>Beauveria bassiana</i>	1 x 10 ⁸ Spores per ml
Bb-23 isolate of <i>Beauveria</i>	1 x 10 ⁸ Spores per ml
Bb-45 isolate of <i>Beauveria</i>	1 x 10 ⁸ Spores per ml
Ma-35 isolate of <i>Metarhizium</i>	1 x 10 ⁸ Spores per ml
Bt formulation	5 gm per lit.
Neem formulation	5 ml per lit.

State recommended chemical	
Untreated Control	

ET 6: Study on the incidence of spotted stem borer, *Chilo partellus* and *Sesamia inferens* in Kharif sown maize/Rabi sown maize in relation to plant age and metrological factors.

Purpose: 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. Note that the total number of plants decreases as the weeks of observation progress.

Results requested on: Pest incidence and weakly average weather data on

1. Maximum and minimum temperatures
2. Morning and afternoon RH
3. Bright sunshine hours
4. Rain fall
5. Number of rainy days

Rabi 2017-18

ET 7: Evaluation of maize AICRP Trials entries against *Chilo partellus* and *S. inferens* under artificial infestation for AVT I and II (Kolhapur & Hyderabad)

ET 8: Evaluation of inbred lines against *C. partellus* and *S. inferens* under artificial infestation (Kolhapur, Karnal & Hyderabad) (2nd year).

ET 9 :Evaluation of insecticides against *S. inferens* (Hyderabad) -2nd Year

Insecticide	Dose
Chlorantaniliprole 20 SC	0.3 ml/lit
Chlorantaniliprole 20 SC	0.4 ml/lit
Flubendiamide480 SC	0.1 ml/lit
Flubendiamide480 SC	0.2 ml/lit
Novaluron 10 EC	0.75ml/lit
Novaluron 10 EC	1 ml/lit
Deltamethrin 2.8 EC	0.4 ml/lit

Deltamethrin 2.8 EC	0.8 ml/lit
State recommended chemical	
Untreated Control	

Spring 2018

ET 09: Evaluation of inbred lines against Sorghum shoot fly under natural infestation (Delhi and Karnal) 3rd year

ET 10: Evaluation of inbred lines against Sorghum shoot fly under natural infestation (Delhi and Ludhiana) 3rd year



**60th Annual Workshop (Diamond Jubilee)
All India Coordinated Research Project on Maize
(Indian Council of Agricultural Research)**

Date: April 02-04, 2017

**Venue: MPUAT, Udaipur
PROGRAMME**



Day 1: April 02, 2017 (Sunday)

0830-1015: Registration

0930-1105 Session I: Inaugural Session (RCA Auditorium)

	Chief Guest	:	Dr. J.S. Sandhu, Dy. Director General (CS), ICAR
	Guest of Honour	:	Dr. I. S. Solanki, ADG (FFC), ICAR
	Chairman	:	Dr. Uma Shankar Sharma, Vice-Chancellor, MPAUT, Udaipur
	Rapporteurs	:	Drs. A.K. Singh and J.C. Sekhar
0930-0935	Welcome Address	:	Dr. S.S. Burark, Director of Research, MPUAT, Udaipur
0935-0940	Lighting of lamp	:	Chief Guest and dignitaries
0940-1000	Director's Review	:	Dr. Sujay Rakshit, Director, IIMR
1000-1010	Address by Guest of Honour	:	Dr. I. S. Solanki, ADG (FFC), ICAR
1010-1025	Address by Chief Guest	:	Dr. J.S. Sandhu, DDG (CS)
1025-1100	Presidential address	:	Dr. U. S. Sharma, Hon'ble VC, MPUAT, Udaipur
1100-1105	Vote of Thanks	:	Dr. Dilip Singh, Organizing Secretary, MPUAT, Udaipur

1105-1130

High tea

1130-1330 Session II: Diamond Jubilee Session on Saga of Maize Research

1.	Lead talk: Retrospect of maize research by Dr. N. N. Singh	
2.	Panel discussion: Challenges in maize under climate change	
Chairman	:	Dr. J.S. Sandhu, DDG (CS), ICAR
Co-chairman	:	Dr. I.S. Solanki, ADG (FFC), ICAR & Dr. Sujay Rakshit, Director, IIMR
Panellist	:	Drs. Sain Dass, P.H. Zaidi, M.L. Jat, R.J. Aggarwal and Bijender Pal
Rapporteurs	:	Dr. Ishwar Singh and Pradeep Kumar

1330-1430

Lunch Break

1430-1630 Session III: Variety Identification Committee Meeting

Chairman	:	Dr. J.S. Sandhu, DDG (CS), ICAR
Member Secretary	:	Dr. Sujay Rakshit, Director, IIMR
Participants	:	All Members of Variety Identification Committee

1430-1630 Session IV: ICAR-CIMMYT/ International Collaborative Research and Private Sector Participatory Research

Chairman : Dr. N. N. Singh, Ex-VC, BAU, Ranchi
Co-chairman : Dr. I.S. Solanki, ADG (FFC), ICAR
Rapporteurs : Drs. Ramesh Kumar and Dharam Paul
1. ICAR-CIMMYT collaborative research - Dr. P.H. Zaidi, CIMMYT
2. Weed management in maize: Dr. Manoj Upadhyay

1630-1645 Tea Break

1645-1645 Session V: Review of work during *Kharif* 2016 and *Rabi* 2015-16

Chairman : Dr. N. N. Singh, Ex-VC, BAU, Ranchi
Co-Chairman : Dr. I.S. Solanki, ADG (FFC), ICAR
Rapporteurs : Drs. Ramesh Kumar, P.L Soujanya, Parveen Bagria

Speakers

Breeding : Dr. Bhupender Kumar
Crop Production : Dr. A.K. Singh
Entomology : Dr. J.C. Sekhar
Pathology : Dr. Meena Shekhar
BSP : Dr Chikkappa G.K.
Outreach programme : Dr. S.L. Jat

Day 2: April 03, 2017 (Monday)

0900-1300 Session VI: Review of research results of individual AICRP centres for *Kharif* 2016 and *Rabi* 2015-16 (Common centre-wise presentations of significant results and progress report by PI, AICRP) – Zone I & II

Chairman : Dr. N. N. Singh, Ex-VC, BAU, Ranchi
Co-chairman : Dr. I.S. Solanki, ADG (FFC), ICAR
Member Secretary : Dr. Sujay Rakshit , Director, IIMR
Participants : All scientists of AICRP program
Rapporteurs : Drs. J. C. Sekhar, Meena Sekhar, Sunil N, Ramesh Kumar, Bhupendra Kumar and Chikkappa G.K.

1300-1345 Lunch Break

1345-1830 (Tea break 1630-1645) Session VII: Review of research results of individual AICRP centres for *Kharif* 2016 and *Rabi* 2015-16 (Common centre-wise presentations of significant results and progress report by PI, AICRP) – Zone III & IV

Chairman : Dr. Sujay Rakshit , Director, IIMR
Participants : All scientists of AICRP program
Rapporteurs : Drs. J. C. Sekhar, Meena Sekhar, Sunil N, Ramesh Kumar, Bhupendra Kumar and Chikkappa

G.K.

1830-2030 **Session VIII: Formulation of work plan 2017-18** (Concurrent session discipline-wise)

Concurrent session	Chairman	Co-chairman	Convener	Rapporteurs
1. Crop Improvement	Dr. Sain Dass	Dr. Sujay Rakshit	Dr. Bhupender Kumar	Drs. Chikkappa G.K. and Ramesh Kumar
2. Crop Production	Dr G.S. Chauhan Ex. DRI, MPUAT, Udaipur	Dr. V. Nepalia, Head, Agronomy MPUAT, Udaipur	Dr. A.K. Singh	Drs. Mahesh Kumar and S.L. Jat
3. Plant Pathology & Nematology	Dr. S. S. Sharma, Head Plant Pathology, MPUAT, Udaipur		Dr. Meena Shekhar	Drs. Parveen Bagria and S.S. Sharma
4. Entomology	Dr. R. Swaminathan Dean RCA	Dr. B.S. Rana Professor Entomology	Dr. J.C. Sekhar	Dr. Jwala Jindal, P .L Soujanya

1. RCA, Auditorium; 2. Pragya Hall DEE; 3. Directorate of Research; 4. Dept of Agronomy

Day 3: April 04, 2017 (Tuesday)

0930-1100 **Session IX: Presentations of work plan 2017-18**

Chairman	:	Dr. Sain Dass, Ex Director, Maize
Co-Chairman	:	Dr. Sujay Rakshit, Director, IIMR
Rapporteurs	:	Drs. Sunil Neelum, Parveen Bagria and S.L. Jat

Speakers

Breeding	:	Dr. Bhupender Kumar
Crop Production	:	Dr. A.K. Singh
Entomology	:	Dr. J.C. Sekhar
Pathology	:	Dr. Meena Shekhar

1100-1115

Tea Break

1115-1200 **Session X: Presentation of monitoring reports and general discussion**

Chairman	:	Dr. Sujay Rakshit , Director, IIMR
Members	:	All PIs
Rapporteurs	:	Drs. S. B. Singh, Bhupender Kumar and S. L. Jat

1200-1330 **Session XI: Plenary Session**

Chief Guest	:	Dr. T. Mohapatra, Secretary DARE and DG, ICAR
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	Chairman	:	Dr. U. S. Sharma, Vice Chancellor MPUAT, Udaipur
	Co-Chairman	:	Dr. Sujay Rakshit, Director, IIMR
	Rapporteurs	:	Drs. Ishwar Singh and Ramesh Kumar
1200-1210	Recommendations of Workshop	:	Dr. Sujay Rakshit, Director, IIMR
1210-1220	Chairman's Address	:	Dr. U. S. Sharma, Vice Chancellor MPUAT, Udaipur
1220-1315	Address of Chief Guest	:	Dr. T. Mohapatra, Secretary DARE and DG, ICAR
1315-1330	Vote of thanks	:	Dr. Sujay Rakshit , Director, IIMR
	Vote of thanks	:	Dr. Dilip Singh, Organizing Secretary

1340-1430

Lunch Break

1430-1700

Session XII: Lab and field visit

उदयपुर, रविवार 2 अप्रैल, 2017 | 6

कार्यशाला : मक्का पर शोध करने आज से जुटेंगे 200 कृषि वैज्ञानिक

सिटी रिपोर्टर | उदयपुर

प्रदेश की प्रमुख फसल मक्का पर गत वर्ष किए गए शोध और आने वाले समय में संभावनाएं तलाशने के लिए एमपीयूएटी के अनुसंधान निदेशालय में रविवार से अखिल भारतीय मक्का अनुसंधान परियोजना की वार्षिक कार्यशाला शुरू होगी जिसमें राष्ट्रीय-अंतरराष्ट्रीय स्तर के कृषि वैज्ञानिक भाग लेंगे। एमपीयूएटी ने पिछले 10 वर्षों में मक्का की 10 उन्नत किस्में और 2 संकर किस्में विकसित की हैं। इस वर्ष भी संकर मक्का की नई किस्म प्रताप क्यू पीएम मक्का-5 विकसित की है जो 55 क्विंटल प्रति हेक्टेयर उपज देती है। इसमें 8.56 प्रतिशत प्रोटीन, 0.58 प्रतिशत ट्रिप्टोफोन और 2.38 प्रतिशत लाइसिन एमिनो एसिड होता है। इस कार्यशाला में इससे भी अधिक गुणवत्तायुक्त मक्का के शोध पर चर्चा की जाएगी। अनुसंधान निदेशालय ने बांसवाड़ा, डूंगरपुर और प्रतापगढ़ में रबी मक्का की शुरुआत 40 हजार हेक्टेयर में की जिससे गेहूं की फसल के मुकाबले दो गुना से अधिक उत्पादन और आय वृद्धि हुई। कृषि अधिकारियों का कहना है कि प्रदेश में मक्का की कांशत 9.26 लाख हेक्टेयर में की जाती है जिसका कुल उत्पादन 162 लाख क्विंटल और औसत उत्पादन 17.40 क्विंटल प्रति हेक्टेयर है। प्रदेश में मक्का आधारित उद्योगों की आवश्यकता है। आईसीएआर के उच्च अधिकारियों से इस बारे में भी चर्चा की जाएगी।

मक्का अनुसंधान कार्यशाला आज से

उदयपुर. महाराणा प्रताप कृषि एवं प्रौद्योगिकी विवि में रविवार से तीन दिवसीय मक्का अनुसंधान कार्यशाला होगी। कुलपति उमाशंकर शर्मा ने बताया कि इसमें भारतीय कृषि अनुसंधान परिषद के महा निदेशक डॉ. टी. महापात्रा, अतिरिक्त महानिदेशक डॉ. जे.एस. संधू, उप महानिदेशक डॉ. आई. एस. सोलंकी, डॉ. पीके चक्रवर्ती, भारतीय मक्का अनुसंधान संस्थान के निदेशक डॉ. सुजेय रक्षित भी मौजूद रहेंगे।

आदेश जारी नहीं कर रही है।

कार्यशाला में मक्का अनुसंधान केंद्रों की हुई समीक्षा

उदयपुर | एमपीयूएटी में चल रही मक्का अनुसंधान कार्यशाला में सोमवार को अखिल भारतीय मक्का अनुसंधान परियोजना केंद्रों के अनुसंधान परिणामों की प्रस्तुति और समीक्षा हुई। साथ ही आगामी खरीफ और रबी की कार्य योजना पर चर्चा हुई। तकनीकी सत्र में आईआईएमआर के पूर्व निदेशक डॉ. एनएन सिंह ने मक्का अनुसंधान में किसानों की प्राथमिकता और मांग को ध्यान में रखकर मक्का अनुसंधान की कार्ययोजना बनाने के लिए वैज्ञानिकों को कहा। साथ ही समानांतर तकनीकी सत्रों में विषयवार अनुसंधान परिणामों पर चर्चा और समीक्षा हुई। आईआईएमआर निदेशक डॉ. सुजेय रक्षित ने बताया कि मंगलवार को साल 2017-18 की कार्ययोजना और मॉनिटरिंग रिपोर्ट प्रस्तुत की जाएगी।

कृषि क्षेत्र में प्रोटीन मक्का पर शोध जरूरी

उदयपुर | भारतीय कृषि अनुसंधान परिषद के उपमहानिदेशक डॉ. जेएस संधू ने कहा कि देश में खाद्य पोषण सुरक्षा को स्थापित करने में मक्का की महत्वपूर्ण भूमिका है। देश में अधिकांश मक्का का उत्पादन वर्षा आधारित है।

ऐसे क्षेत्रों में मक्का की संकरित प्रजातियों के विकास और जैव प्रौद्योगिकी माध्यम से क्वालिटी प्रोटीन मक्का के उत्पादन पर शोध जरूरी है। यह बात उन्होंने एमपीयूएटी में रविवार को शुरू हुई तीन दिवसीय मक्का अनुसंधान कार्यशाला में कही। कार्यशाला एमपीयूएटी और अखिल भारतीय मक्का अनुसंधान संस्थान, लुधियाना के साझे में हुई।

इसमें तमिलनाडु, महाराष्ट्र, कर्नाटक, गुजरात, मध्यप्रदेश, छत्तीसगढ़, पंजाब, हिमाचल प्रदेश, आसाम, पश्चिम बंगाल, हरियाणा, अरुणाचल प्रदेश और राजस्थान से 200 से अधिक वरिष्ठ मक्का वैज्ञानिकों ने भाग लिया। एमपीयूएटी कुलपति प्रो. उमा शंकर शर्मा ने बताया कि विश्व में उत्पादकता की दृष्टि से विश्व के औसत मक्का उत्पादन 50 क्विंटल प्रति हैक्टेयर की तुलना में देश में मक्का उत्पादन 26 क्विंटल प्रति हैक्टेयर है। जिसे बढ़ाने की आवश्यकता है। दक्षिणी राजस्थान के 6 जिलों भीलवाड़ा, उदयपुर, चित्तौड़गढ़, बांसवाड़ा, डूंगरपुर और प्रतापगढ़ देश के मक्का उत्पादन में अग्रणी है।

आईसीएआर उपमहानिदेशक आईएस सोलंकी ने कहा कि यह देश की सबसे बड़ी समन्वित परियोजना है, जिसमें 32 केंद्रों के निजी बीज उत्पादक कंपनियों जुड़ी हुई हैं। कार्यक्रम के अनुसंधान निदेशक डॉ. एसएस बुरडक और भारतीय मक्का अनुसंधान संस्थान के परियोजना निदेशक डॉ. सुजय रक्षित विचार व्यक्त किए। कार्यक्रम सचिव डॉ. दिलीप सिंह ने बताया कि 9 सत्रों में मक्का उत्पादन तकनीकी संबंधित विचार-विमर्श होगा। मक्का अनुसंधान और कीट व्याधि नियंत्रण के लिए महत्वपूर्ण कार्ययोजना तैयार करने के उद्देश्य कार्यशाला हो रही है। कार्यशाला के प्रथम दिन 4 तकनीकी सत्र हुए।

कृषि गोल्डलाइन

1 से 15 अप्रैल, 2017

वर्ष: 9, अंक: 17, पेज: 3

मक्का में जैव प्रौद्योगिकी आधारित अनुसंधान की आवश्यकता



उदयपुर। महाराणा प्रताप कृषि एवं प्रौद्योगिकी विश्वविद्यालय, उदयपुर में तीन दिवसीय स्वर्ण जयंती 60वीं मक्का अनुसंधान कार्यशाला के अंतिम दिन अखिल भारतीय मक्का अनुसंधान परियोजना के विभिन्न केंद्रों से आए प्रतिभागियों को कार्यशाला के प्लेनेरी सेशन में भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के महानिदेशक डॉ. टी. मोहापात्रा ने संबोधित किया। वे कार्यक्रम में मुख्य अतिथि थे तथा अध्यक्षता एमपीयूएटी के कुलपति प्रो. उमा शंकर शर्मा ने की।

भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के महानिदेशक डॉ. टी. मोहापात्रा ने इस अवसर पर आईआईएमआर की वेबसाइट आईआईएमआर.आईसीएआर.जीओवी.इन का उद्घाटन किया। उन्होंने विगत 60 वर्षों में मक्का परियोजना के वैज्ञानिकों ने प्रशंसनीय कार्य किया है। उन्होंने निजी बीज उत्पादक कंपनियों का

मक्का उन्नयन हेतु सहयोग की अपील की तथा मक्का वैज्ञानिकों को उपलब्ध अंतरराष्ट्रीय डाटाबेस के उपयोग आनुवंशिकी के प्रयोगों द्वारा मार्कर एसिस्टेड चयन द्वारा समय और धन की बचत पर जोर दिया। डॉ. मोहापात्रा ने मक्का में जल प्रबंधन, जैव तनाव प्रबंधन और पोषक तत्वों के समुचित उपयोग की सलाह दी।

एमपीयूएटी के कुलपति प्रो. उमा शंकर शर्मा ने बताया कि देश की आर्थिकी में मक्का का योगदान 10,000 करोड़ रुपए का है, जबकि राजस्थान एक सूखा प्रभावित प्रदेश होते हुए भी 1,000 करोड़ रुपए का योगदान मक्का से करता है। उन्होंने खरीफ मक्का की उत्पादन दर 2 से 3 क्विंटल प्रति हैक्टेयर करने की आवश्यकता जताई। इस अवसर पर दो पुस्तकों का विमोचन भी किया गया। अखिल भारतीय मक्का अनुसंधान संस्थान के निदेशक डॉ. सुजय रक्षित ने तीन दिवसीय मक्का उन्नयन कार्यशाला

का प्रतिवेदन प्रस्तुत किया। उन्होंने बताया कि इस कार्यशाला के दौरान 23 राज्यों के 32 केंद्रों ने केन्द्रवार खरीफ 2016 एवं रबी 2015-16 के अनुसंधान परिणामों की प्रस्तुति एवं समीक्षा की। साथ ही आगामी खरीफ एवं रबी 2017-18 की कार्ययोजना पर गहन चर्चा हुई। इस कार्यशाला में मक्का किस्म पहचान समिति ने खरीफ के 19 प्रस्ताव और रबी के लिए 13 प्रस्तावों को पंजीकृत किया। परिपक्वता आधारित गुणवत्ता युक्त मक्का के विभिन्न परीक्षणों को सामूहिक रूप से करने की आवश्यकता, शुष्क क्षेत्रों में मक्का की कड़प को भी चारे की उपज में शामिल करना तथा नवाचार पर बल देते हुए समन्वित मक्का अनुसंधान परीक्षणों को प्रतिकृति कोडिंग अपनाते हुए एकीकृत स्वचालित पद्धति से करने की सलाह दी गई। कार्यशाला के आयोजन सचिव डॉ. दिलीप सिंह ने धन्यवाद ज्ञापित किया तथा कार्यक्रम का संचालन डॉ. वीरन्द्र नेपालिया ने किया।

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**Director (IIMR)
& Project Coordinator (AICRP on Maize)**

