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**Proceedings
56th Annual Maize Workshop
All India Coordinated Maize Improvement Project
held at
ANGRAU, Hyderabad
April 06-08, 2013**



**All India Coordinated Maize Improvement Project
Directorate of Maize Research
(Indian Council of Agricultural Research)
Pusa Campus, New Delhi 110 012
www.dmr.res.in**



56th Annual Maize Workshop
All India Coordinated Maize Improvement Project
(Indian Council of Agricultural Research)

Date: April 06 - 08, 2013
Hyderabad

Venue: ANGRAU,

PROGRAMME

Day 1: April 06, 2013 (Saturday)

0830 – 0930: Registration

Session I: General session

0930 – 1130 General Discussion, General issues, QRT recommendations and monitoring reports

Chairman: : O.P. Yadav, Project Director, DMR
Rapporteurs: : J. Kaul, Ashok Kumar and Bhupender Kumar

1130 – 1200 Tea Break

Session II: Review of research results of individual AICMIP centres for *Kharif* 2012 and *Rabi* 2011-12 and plan of work for *Kharif* 2013 and *Rabi* 2013- 14 (*Concurrent discipline-wise, centre-wise presentations of significant results and progress report*)

1200 – 1630

Concurrent session	Chairman	Co-chairman	Convener	Rapporteur/s
Crop Improvement	Dr. R.P. Dua, ADG (FFC)	---	Dr. O.P. Yadav	Drs. V. Mahajan, R.N. Gadag, Bhupender Kumar
Crop Production	Dr. J.S.Mishra, Pr. Scientist, DSR	Dr. M.L. Jat, Sr. Agronomist	Dr. Ashok Kumar	Drs. Dilip Singh , C.M. Parihar
Plant Pathology & Nematology	Dr. V.K. Rao, Prof & Head	---	Dr. Sangit Kumar	Drs. K.S. Hooda and S.S. Sharma
Entomology	Dr. T. Ramesh Babu, Prof and Head	Dr. S.J.Rahman, Head,Biocontrol	Dr. P. Kumar	Drs. J.C. Sekhar, J.C. Mehla

1300 – 1400 Lunch Break

Session III: Germplasm exchange, registration & seed issues

1630 - 0500

Chairman : Dr. O.P. Yadav
Rapporteurs : Drs. J. Kaul, Ramesh Kumar, R. Ambika Rajendran

Speakers: - Dr. Ashok Kumar (NBPGR)
 - Dr. R.C. Agarwal (PPVFRA)

Day 2: April 07, 2013 (Sunday)

0900 - 1040**Session IV: Inaugural Session**

0900 - 0905	Invocation	
0905 - 0915	Welcome	Dr. T. Pradeep, Pr. Scientist (Maize)
0915 - 0920	Lighting of lamp	Chief Guest and other dignitaries
0920 - 0935	Project Director's Review	Dr. O.P. Yadav, Project Director, DMR
0935 - 0945	Presidential address	Dr. R. Sudhakar Rao, Director of Research, ANGRAU
0945 - 1015	Felicitation	Dr. R.P. Dua, ADG (FFC), ICAR
1015 - 1030	Address by Chief Guest	Dr. R.P. Dua, ADG (FFC), ICAR
1030 - 1040	Vote of Thanks	Dr. R. Ranga Reddy, Pr. Scientist & Head, MRC, ANGRAU

1040 - 1100**High tea****Session V: Review of work during Kharif 2012 and Rabi 2011-12, and work plan for Kharif 2013 and Rabi 2013-14****1100 - 1300**

Chairman:	:	Dr. R.P. Dua, ADG (FFC), ICAR
Co Chairman	:	Dr. O.P. Yadav
Rapporteurs:	:	Drs. N.K. Vajpayee, Meena Shekhar, A.K. Singh, Chikkappa, G.K.

Discipline

Breeding	:	Dr. Bhupender Kumar
Agronomy	:	Dr. Ashok Kumar
Entomology	:	Dr. P. Kumar
Pathology/ Nematology	:	Dr. K.S. Hooda

Speaker**1300 - 1400****Lunch Break****Session VI: Lead lecture****1400 - 1500**

Chairman	:	Dr. R.P. Dua, ADG (FFC), ICAR
Co-chairman	:	Dr. O.P. Yadav
Rapporteurs	:	Dr. Ishwar Singh
Speakers	:	Dr. P. Anand, Poineer Overseas Corporation Topic: Maize improvement in India- perspective of private sector
	:	Dr. M. Maheshwari, Head, Division of Crop Improvement, CRIDA. Topic: Developing drought and heat stress tolerant maize

1500: 1515**Tea Break**

Session VII: Variety Identification Committee Meeting

1530 – 1730

Chairman : Dr. S.K. Datta, DDG (CS)
Co-chairman : Dr. R.P. Dua, ADG (FFC)
Member : Dr. O.P. Yadav, Project Director, DMR
Secretary
Participants : All Members of Variety Identification Committee

Day 3: April 08, 2013 (Monday)

Session VIII: ICAR-CIMMYT Collaboration

0900-1000

Chairman: : Dr. O.P. Yadav
Co-chairman : Dr. M.L. Jat, Cropping System Agronomist,
CIMMYT-India
Rapporteurs : Drs. C.M. Parihar, Bhupender Kumar, Yatish K.R.
Speakers : 1. DMR scientists (Dr. Avinash and Dr. A.K. Singh)
2. CIMMYT scientists

Session IX: Breeder Seed Production, FLDs and Training Programmes

1000 – 1100

Chairman : Dr. Gidda Reddy, Director of Extension, ANGRAU
Rapporteurs: : Drs. Vishal Singh, Abhijit Das and Pranjal Yadava
Speakers: : Drs. Avinash Singode (Seed), VK Yadav (FLDs),
Ranveer Singh (ISOPOM)

1100 – 1115

Tea Break

Session X: Plenary Session

1115 – 1300

Chairman: : Dr. S.K. Datta, DDG (CS), ICAR
Rapporteurs: : Drs. J.C. Sekhar, K.S. Hooda, S.L. Jat, Chikkappa,
G.K.

Speakers:

Dr. Jyoti Kaul : Breeding
Dr. Ashok Kumar : Agronomy
Dr. P. Kumar : Entomology
Dr. K.S.Hooda : Pathology/ Nematology

Vote of Thanks

Organizing Secretary

1300 – 1400

Lunch Break

1400 - 1630

Field Visit

Session I General session

Chairman	Rapporteurs
Dr. O.P. Yadav, Project Director, DMR	J. Kaul, Ashok Kumar and Bhupender Kumar

At the outset, Director recalled good work done by his predecessors and he promised to fulfill the aspirations of the maize group.

The session started with presentation of QRT recommendations by Dr. P. Kumar. The important recommendations of the QRT in relation to AICMIP were as follows:

- Pyramiding of genes and marker assisted selection for biotic and abiotic stress tolerance must be undertaken in order to develop multiple stress tolerant hybrids **(Action: All centres)**
 - Strengthening of specialty corn's research **(Action: All centres)**
 - DMR must acquire DH technology to fasten the inbred development programme **(Action: DMR)**
 - Resource conservation technologies need to be strengthened **(Action: DMR)**
 - Pathology work in zone II need to be strengthened **(Action: Ludhiana, Karnal, Delhi, Pantnagar, Kanpur)**
 - Bt corn programme need to be strengthened **(Action: DMR)**
 - Public-Private Partnership (PPP) need to be strengthened **(Action: All centres)**
 - Performances of AICMIP Centres viz., Karnal, Hyderabad and Coimbatore were identified as excellent, whereas, centres like Kanpur, Dholi, Baharaich and Srinagar as poor **(Action: DMR)**
- Several issues related to AICMIP centres, conduct of trials, trial demonstration, ICAR-CIMMYT collaborations etc were deliberated in detail and the following consensus emerged:**
- Financial issues: The in-charge of Ludhiana, Hyderabad, Udaipur and Banswara centres had raised the points related to financial matters. It was clarified that no additional grant would be given for 6th pay commission arrear, since the allocated funds have already been disbursed.
 - Except for teaching, no sharing of any positions, of AICMIP with the other crops is allowed at university **(Action: AICMIP centres)**
 - Scientists, who are working in AICMIP-Maize, are not allowed to draw their salary from AICMIP fund on their study leave **(Action: AICMIP centres)**
 - National demonstrations of released hybrids of maize (public & private) would be undertaken in *Kharif 2013* for which concerned breeder must provide 500g genetically pure seed of their hybrids. The parental lines of public-bred hybrids would be also demonstrated for which 200 g seed is required. The seed should reach to DMR, New Delhi, by 15th May, 2013. **(Action: DMR, all partners from public and private sectors)**

- Private as well as Public sector breeders are required to provide pedigree for IVT along with the performance data as per the format supplied **(Action: All public and private partners)**
- Breeders must ensure the supply of requisite quantity of seeds of check consistently over the testing periods
- In order to increase the number of test locations, the breeders from public/private institutions agreed to explore the possibility of provisions of at least two sub centres per state, where the trials could be conducted successfully. DMR/ICAR may provide working contingency for the centres belonging to public institutes. **(Action: DMR and partners)**
- It was agreed that AVT I trials would be conducted in zone specific mode.
- There is need to generate scientific information from the AICMIP. However, publication of the AICMIP data needs prior approval of Project Director since its belongs to national programme.
- Project Director informed the house that Govt. of India has decided to establish "Nutri Farm" on bio-fortified maize and this programme will be implemented through State Agriculture Department from forthcoming *Kharif* under which the seed of nutritionally enriched hybrids *viz.*, QPM, high iron and zinc, high beta-carotene content must be available.
- ICAR-CIMMYT collaborative programme needs to be documented and results should form the part of Annual Report. The AICMIP centres must conduct any CIMMYT trials as per the approved programme through DMR only. **(Action: AICRP centres/DMR/CIMMYT)**
- The issue of planting in Zone I was deliberated at a length, and it was felt that there is a need to delineate testing of Zone I from rest of the centres since sowing starts early in the season. However, no consensus emerged on this.

Session II
Review of research results of individual AICMIP centres for *Kharif* 2012 and *Rabi* 2011-12 and plan of work for *Kharif* 2013 and *Rabi* 2013-14 (Concurrent discipline-wise, centre-wise presentations of significant results and progress report)

Concurrent session (Crop Improvement)

Chairman	Convener	Rapporteur/s
Dr. R.P. Dua, ADG (FFC)	Dr. O.P. Yadav	Drs. V. Mahajan, R.N. Gadag, Bhupender Kumar

Promotion of entries

- Dr. Bhupender Kumar presented the proposed list of promoted entries, of all maturity groups, zones wise. Entries (Listed below) were promoted based on yield superiority over the best check, days to maturity (75% dry husk) and days to 50% silking.
- For specialty corn, 5% yield superiority should be considered over the best check.
- The concerned centres must make available 35kg/check variety seed for the *kharif* and 20kg for the *rabi* season.
- The list of checks was provided to each centre in the workshop.
- Should there be less number of entries in the AVT I and AVT II, trials can be merged to constitute a common trial for effective evaluation of the entries.
- The seed submitted for testing in AICMIP must be un-treated.
- The breeders must give full details of their hybrids submitted for testing under AICMIP. All breeders must confirm delivery of their entries at DMR.

Hybrid Trials and entries promoted to next higher stage of testing in *kharif* 2012 in various trials

Initial Varietal Trial (IVT) - New entries from different centers and companies	
Advance Varietal Trial(AVT) I+II Late Maturity Trials	
ZONE-I	FMH-11195, FMH-9184, Bisco X 4296, PFMH-97 I 57(AMAR), MCH 45, X35A180, GK 3103, MCH 46, PRO-385, HTMH 5402, HTMH 5106, PRO-384 + Checks (Bio 9681, Seed Tech. 2324, PMH 1, PMH 3)
ZONE-III	X35B396, X35B391, Ryder-M, LTH-20, CMH 10-477, VMH-4185, X35A180, CMH08-381, CMH08-381(G), Orbit, CMH09-464 +checks (Bio 9681, Seed Tech. 2324, PMH 1, PMH 3)
ZONE-IV	X35B391, NMH-1265, CP 802, A-7503, PRO-388, LTH-22, GEO Premium diamond, X35A180, MCH 46, PRO-385, HTMH 5106, CMH08-381, S6668, P4546, Laxmi 333(L333) + checks (Bio 9681, Seed Tech. 2324, PMH 1, PMH 3)
ZONE-V	FMH-11195, JH 31601, PRO-388, X35B390, CMH 10-540, X35B392, PFMH-97 I 57(AMAR), X35A180, MCH 46, P4546,

	CP 333 +checks (Bio 9681, Seed Tech. 2324, PMH 1, PMH 3)
AVT-I Late Maturity Trials	
ZONE-II	FMH-11195, JH 31555, JH 31601 + checks (Bio 9681, Seed Tech. 2324, PMH 1, PMH 3)
AVT I + II Medium Maturity Trials	
ZONE-I	X35B403, KMH-25K45, KMH-3110, NMH-1276, S6850, PRO 387, IJ8533, S6790, KMH-7148, EHL 161708 (Hyb), MCH 47 +checks (PMH 4, Bio 9637, HM 12, HM 8)
ZONE-IV	EHL 2211, X35A189, PRO-383, X35A194, JH 31470+checks (PMH 4, Bio 9637, HM 12, HM 8)
ZONE-V	IJ8533, MCH 47 + checks (PMH 4, Bio 9637, HM 12, HM 8)
AVT-I Medium Maturity Trials	
ZONE-II	X35B403, IJ8533, S6790, EHL 2211, CMH 10-473, BIO 719, Rasi-3033 +checks (PMH 4, Bio 9637, HM 12, HM 8)
AVT-II Medium Maturity Trials	
ZONE-III	X 35A 189 + Checks (PMH 4, Bio 9637, HM 12, HM 8)
AVT-I + II Early Maturity Trials	
ZONE-I	FH 3609, BIO 6008, EH-2223, FH 3605, FH 3626, REH 2011-2, EH-2212, JH 31602, Bisco 2238, K 21, DAS-MH-501, JH 31485+ checks (Prakash, PMH 5)
ZONE-III	FH 3605, JH 31602, DAS-MH-501, JH 31485+checks (Prakash, PMH 5)
ZONE-IV	FH 3605, KMH-7021, Bisco 2238, K 21, DAS-MH-501, FH 3548+ checks (Prakash, PMH 5)
ZONE-V	JH 31602, CMH-10-531, Bisco 2238, K 21, DAS-MH-501, JH 31485+checks (Prakash, PMH 5)
AVT I Early Maturity Trial	
ZONE-II	JH 31602, CMH-10-484+checks (Prakash, PMH 5)
AVT-I+II Extra Early Maturity Trial	
ZONE-I	DH-238, FH 3594, AH 1202, DH-262, FH 3556, FH 3554, K 75 + checks (Vivek QPM 9, Vivek Hybrid 9)
AVT-I Extra Early Maturity Trials	
ZONE-II	No trial will be conducted
ZONE-III	No trial will be conducted
ZONE-IV	No trial will be conducted
ZONE-V	No trial will be conducted
Advance Varietal trial -II	
AVT- II Late Maturity Trial	
ZONE-II	No trial will be conducted
AVT- II Medium Maturity Trials	
ZONE-II	No trial will be conducted
ZONE-III	X35A189+checks (PMH 4, Bio 9637, HM 12, HM 8)
AVT- II Early Maturity Trial	
ZONE-II	No trial will be conducted
AVT II Extra Early Maturity Trials	
ZONE-II	No trial will be conducted
ZONE-III	FH 3556, K 75, FH 3558+checks (Vivek QPM 9, Vivek Hybrid 9)

ZONE-IV	FH 3556+checks (Vivek QPM 9, Vivek Hybrid 9)
ZONE-V	FH 3556, FH 3554, K 75, FH 3555+checks (Vivek QPM 9, Vivek Hybrid 9)
Specialty Corns	
Quality Protein Maize (QPM)	
Across the Zones	VEHQ-3020, + QPM-I Trials entries + checks (Vivek QPM 9, HQPM 1, HQPM 5, HQPM 7)
Popcorn	
Across the Zones	Bajaura Popcorn, VL Amber Popcorn-2+ PC-I trial entries + Checks (VL Popcorn)
Baby corn	
Across the Zones	Almora Hybrid + BC-I Trial entries + checks (HM 4)
Sweet corn	
Across the Zones	Bisco Madhu, KSCH-333, KSCH-222, FSCH 17, FSCH 18, BSCH 63, Bajaura Sweet corn + SC-I Trial entries + checks (Madhuri, Priya, WOSC)

Technical Programme for 2013-14

Organization of trials

The advance trials for *kharif* 2013 will be constituted using promoted entries whereas initial varietal trials will be constituted with new entries received from different centres and organizations.

Observations to be recorded in initial and advance trials: Normal Maize

1. Days to 50% Flowering (Anthesis and silking)- Rounded to 0 decimals
2. Plant Height (cm) - Rounded to 0 decimal
3. Ear height/ placement (cm) - Rounded to 0 decimal
4. Days to maturity – 75% dry husk/appearance of black layer
5. Plant population at harvest (No./Plot)
6. Cobs count at harvest (No./plot)
7. Fresh cobs weight at harvest (Kg/plot)
8. Grain Moisture at the time of harvesting (%) - recorded in two replications
9. Shelling percentage (%) - recorded in two replications

Observations to be recorded in initial and advance trials: Quality Protein Maize (QPM)

1. Days to 50% Flowering (Anthesis and silking)- Rounded to 0 decimals
2. Plant Height (cm) - Rounded to 0 decimal
3. Ear height/ placement (cm) - Rounded to 0 decimal
4. Days to maturity – 75% dry husk/appearance of black layer
5. Plant population at harvest (No./Plot)
6. Cobs count at harvest (No./plot)
7. Fresh cobs weight at harvest (Kg/plot)

8. Grain Moisture at the time of harvest (%) - should be recorded in two replications
9. Shelling percentage (%) - recorded in two replications
10. Lysine and tryptophan (%) – recorded in the selfed cobs of two replications

Observations to be recorded in initial and advance trials: Popcorn

1. Days to 50% Flowering (Anthesis and silking) - Rounded to 0 decimals
2. Plant Height (cm) - Rounded to 0 decimal
3. Ear height/ placement (cm) - Rounded to 0 decimal
4. Days to maturity – 75% dry husk/appearance of black layer
5. Plant population at harvest (No./Plot)
6. Cobs count at harvest (No./plot)
7. Fresh cobs weight at harvest (Kg/plot)
8. Grain Moisture at the time of harvesting (%) - recorded in two replications
9. Shelling percentage (%) - recorded in two replications
10. Popping volume and percentage - recorded from selfed cobs

Observations to be recorded in initial and advance trials: Sweet corn

1. Days to 50% Flowering (Anthesis and silking) - Rounded to 0 decimals
2. Plant Height (cm) - Rounded to 0 decimal
3. Ear height/ placement (cm) - Rounded to 0 decimal
4. Green cob sweetness (%) - should be recorded in 3 selfed cobs in each replication at 18-20 days after pollination
5. Plant population at harvest (No./Plot)
6. Green cob count at harvest – (No/plot)
7. Fresh green cob weight at harvest (Kg/plot)-with husk
8. Fresh green cob weight at harvest (Kg/plot)- without husk
9. Fresh five cobs weight with husk and without husk
10. Days to maturity (75% dry husk) in Replication-3
11. Fresh cob weight at maturity (Kg/plot)-Replication-3
12. Moisture percentage-(Replication-3)
13. Shelling percentage
14. Sugar content (%) - On dry weight basis- calculated from selfed cob used for measuring sweetness.

Observations to be recorded in initial and advance trials: Baby corn

1. Days to 50% Flowering (Anthesis and silking)
2. Plant Height (cm) - Rounded to 0 decimal
3. Plant population
4. Ear height/ placement (cm) - Rounded to 0 decimal
5. Date of harvest of un-pollinated baby corn and number of baby corn from each harvest (No./plot)
6. Fresh weight of baby corn per plot with husk (Kg) - Rounded to 0 decimal

7. Fresh weight of baby corn per plot without husk (Kg) - Rounded to 0 decimal
8. Length of baby corn (cm) - Rounded to 0 decimal
9. Diameter of baby corn (cm)
10. Days to maturity (75% dry husk) in Replication-3
11. Fresh cob weight at maturity (Kg/plot)-Replication-3
12. Moisture percentage-(Replication-3)
13. Shelling percentage

Experimental details: IVT-I: No. of rows – 2 (net) Row length – 4m (net) Spacing- 75cm x 25cm Replications – 3 Fertilizer – As per recommendations	AVT-II or AVT I+II: No. of rows – 6 (net) Row length – 4m (net) Spacing- 75cm x 25cm Replications – 3 Fertilizer – As per recommendations
AVT-I: No. of rows – 4 (net) Row length – 4m (net) Spacing- 75cm x 25cm Replications – 3 Fertilizer – As per recommendations	Specialty corn (QPM/SC/PC/BC-I-II-III) : No. of rows – 4 (net) Row length – 4m (net) Spacing- 75cm x 25cm Replications – 3 Fertilizer – As per recommendations

- The required quantity of seed material of promoted entries along with pedigree details as per the given Performa (Table-1) for conducting the trials as above with new entries should reach the office of the Project Director, Directorate of Maize Research, Pusa Campus, New Delhi-110012, **latest by 10th May 2013 for *kharif* and by 10th October 2013 for *rabi* trials** along with required testing fee of Rs. 60,000 + 12.36% service tax/entry/trial/year (Private Sector) in the form of DD in favor of Project Director (Maize), Directorate of Maize Research, Pusa Campus, New Delhi, payable at New Delhi. **Entries without fee and pedigree of hybrid/varieties will not be accepted.** Seeds of each entry should be packed separately in cloth bag.
- After detailed deliberations, following decisions were taken with respect to maturity groups in different zones and seasons in testing under Initial and Advanced trials:

Trial to be evaluated in various zones during *kharif* season

ZONE	MATURITY GROUPS
Zone-I	Extra early, Early and Medium maturity
Zone-II	Early*, Medium and Late maturity
ZONE-III	Extra early, Early, Medium and Late maturity
ZONE-IV	Early*, Medium and Late maturity
ZONE-V	Extra early, Early, Medium and Late maturity

*extra early entries may be part of early maturity trial

Trial to be evaluated in various zones during *rabi* season

ZONE	MATURITY GROUPS
Zone-I	No trials will be conducted
Zone-II	Medium and Late maturity during <i>Rabi</i> and medium during spring in Punjab and Haryana
ZONE-III	Medium and Late maturity
ZONE-IV	Medium and Late maturity
ZONE-V	Medium and Late maturity

Vivek QPM will be check in QPM Trial for testing of entries which belongs to early and extra early maturity

Quantity of seed of test entries required in each trial

S. No.	Trial	Year of testing	Seed quantity (Kg)	Mode of conduct
1	Initial Varietal Trial (IVT)	First	5Kg/Entry	Across the zones
2	Advance Varietal Trial-I (AVT-I)	Second	4.5Kg/Entry/Zone	Zone specific
3	Advance Varietal Trial-II(AVT-II)	Third	5Kg/Entry/Zone	Zone specific
4	Baby corn	1 st , 2 nd , 3 rd	10Kg/ Entry	Across the zones
5	QPM	1 st , 2 nd , 3 rd	10Kg/ Entry	Across the zones
6	Sweet corn	1 st , 2 nd , 3 rd	3.5Kg/ Entry	Across the zones
7	Popcorn	1 st , 2 nd , 3 rd	3.5Kg/ Entry	Across the zones
8	National Maize Demonstration-	1 st	0.5Kg/Hybrids	New Delhi
9	National Maize Demonstration-	1 st	0.2Kg/Inbreds	New Delhi

Quantity of seed of check variety required for constitution of trials

S. No.	Check Name	Maturity Group	Centre/organization Responsible to provide seed	Quantity seed (Kgs)
Normal Maize				
1	PMH 1	Late	Ludhiana	35
2	PMH 3	Late	Ludhiana	35
3	HM 11	Late	Karnal	35
4	SeedTech2324	Late	Bio Seed	35
5	Bio 9681	Late	Bio Seed	35
6	PMH 4	Medium	Ludhiana	35
7	Bio 9637	Medium	Bio Seed	35
8	HM 8	Medium	Karnal	35
9	HM 9	Medium	Karnal	35
10	HM10	Medium	Karnal	35
11	Prakash	Early	Ludhiana	35
12	JH3459	Early	Ludhiana	35
13	Vivek QPM 9	Extra Early	Almora	35
14	Vivek Hybrid 9	Extra Early	Almora	35
Specialty Corns				
15	HQPM 1	QPM	Karnal	20
16	HQPM4	QPM	Karnal	20
17	HQPM 5	QPM	Karnal	20
18	HQPM 7	QPM	Karnal	20
19	HM 4	Baby corn	Karnal	20
20	HSC 1	Sweet corn	Karnal	8
21	Madhuri	Sweet corn	Hyderabad	8
22	Priya	Sweet corn	Hyderabad	8
23	WOSC	Sweet corn	WNC, DMR, Hyderabad	8
24	VL Amber Popcorn	Popcorn	Almora	12

-In addition, latest released hybrids can also be contributed which will be included as new check from initial varietal trials

Table 1. Format for providing details of the hybrids proposed for testing under AICMIP-Maize trials

S. No.	Hybrid	Centre/organization	Pedigree	Source germplasm	Maturity (days)*	Trial number	Cropping season	Quantity (Kg)
1								
2								
3								

*Late >95; medium >85<95; early >75<85; extra-early <7

S. No.	Hybrid	Yield (kg/ha)	% superiority over checks	1000 gr. wt (g)	Reaction to diseases/insect-pests	Quality	Any other
Year 1							
1							
2							
3							
	Checks						
Year 2							
1							
2							
3							
	Checks						

Note: At least two-year data need to be given

Name of the proposer:

Designation:

Address:

Email/mobile:

Signature with date

Centre-wise presentations:

Following decisions were taken during centre wise presentations:

1. Station in-charge should present results of all the discipline together **(Action: All centres)**
2. Additional contingency will be provided to each cooperating centre in SAUs to conduct AICMIP trials by DMR in all the zones **(Action: DMR)**
3. The work done/report like home science (Dholi centre), nutritionist (Mandya centre), Nematology (Udaipur), soil scientist (Pantnagar) etc. must be reflected in the annual report of AICMIP **(Action: Respective centres)**
4. **Srinagar Centre:** Keeping in view, the two positions of breeders at Srinagar centre, the performance was not up to the mark.
5. **Udhampur centre** (Jammu) has committed to provide 1-2 additional locations for testing of AICMIP trial in zone-I with the permission of university authority **(Action: Jammu centre)**
6. **Gossaigaon, Assam,** committed to provide total 3 centres (Dipu, Johrat and Gossaigaon) for testing of AICMIP trial in zone I, with permission of university authority **(Action: Gossaigaon centre)**
7. **Ludhiana Centre** also agreed to provide 2 more locations in Punjab, for testing of AICMIP trial in zone II, with the permission of university authority **(Action: Ludhiana centre)**
8. **ICAR research complex for NEH region** may also provide additional five centres for maize trial evaluation in north eastern region namely Barapani (Meghalaya), Tadong (Sikkim), Bassar (Arunachal Pradesh), Nagaland and Manipur **(Action: ICAR research complex for NEH centre)**
9. **Pantnagar** centre need to share their inbred lines/germplasm with other centres to strengthen the programme in zone I **(Action: Pantnagar centre)**
10. **Kanpur:** Chairman suggested that DMR should inform university in delay of submitting the release Azad Makka Hybrid proposal even after one year of its identification in AICMIP, Workshop 2012 **(Action: DMR)**
11. Sabour centre may be considered as volunteer centre under AICMIP-Maize **(Action: DMR)**
12. **Coimbatore:** Because of high consumption of maize in poultry it was emphasized that Coimbatore centre should put more efforts on QPM breeding programme. So additional breeder post needed at Coimbatore centre may be considered during 12th plan **(Action: DMR and Coimbatore centre)**
13. **Arbhavi:** The bullock-man post at the centres can be changed to tractor driver on the request from the breeder in-charge of the centre **(Action: breeder in-charge, Arbhavi)**
14. **Udaipur and Banswara** centres should share germplasm to strengthen hybrids programme and report to DMR **(Action: Udaipur and Banswara)**
15. **Jabua, MP** did not come up for the presentation in the session.

16. **Chindwara and Godhra** centres could not produce the seed of their entries to enter into IET AICMIP maize (**Action: Chindwara and Godhra**)
 17. Chairman asked to prepare the report on performance of centres in AICMIP by DMR and also to deploy the positions in various AICMIP centres keeping in view the sanctioned positions to contribute in research/testing/germplasm development (**Action: DMR**)
 18. **Port blair:** The presentation by Dr. Naresh Kumar, showed the great importance of maize crop in the Island and potentiality of propagation of released hybrid. There is also an acute shortage of fodder. So the TSP money can be used for the dissemination of maize technology in Andaman and Nicobar Island. The possibilities of conduct of AICMIP trial in the Island may be explored (**Action: DMR**)
 19. The selected centres having strong breeding programme may be used to develop and maintain the populations as source germplasm for supplementing future hybrid breeding programme
 20. The nomenclatures Initial Evaluation Trial (IET)/Advanced Evaluation Trial I (AET I)/Advanced Evaluation Trial II (AET II) should be replaced with Initial varietal trial (IVT)/Advanced varietal trial I (AVT I)/Advanced varietal trial II (AVT II)
- The session ended with vote of thanks to the chair.

Concurrent Session (Crop Production)

Chairman	Co-chairman	Convener	Rapporteur/s
Dr.J.S. Mishra, Principal Scientist, DSR	Dr. M.L. Jat, Sr. Agronomist	Dr. Ashok Kumar	Drs. Dilip Singh, C.M. Parihar

At the outset, Dr. Ashok Kumar welcomed the chairman and co-chairman of the session. Chairman of the session also welcomed all agronomists and invited all the scientists to present salient findings of their centre. Co-Chairman in his remarks emphasized that agronomic management is very critical to bridge the yield gaps between attainable and potential yield hence, more emphasis is required for development of need based technologies. The meeting was attended by 29 scientists. The findings of *rabi*, 2011-12 and *kharif*, 2012 trials were presented from all the centres except from Almora. After observing the yield levels of maize (7.5 to 10.0 t/ha) during *kharif* season at Ludhiana, co-chairman suggested that rice during *kharif* season may be replaced with maize to address the emerging issue of water shortage in Punjab. After presentation the following points were finalised:

1. In all the cropping system (sequential and inter cropping) based experiments, economic returns and equivalent yield should be worked out along with yield data of main and inter crop. Further it was decided that economics of all other agronomic experiments should also be worked out (**Action: All AICMIP Scientists**)
2. Trials on tillage practices should be conducted on long term basis and the soil health in these trials should be monitored at the end of each

cropping sequence. It was also suggested that all the scientists should provide initial N, P and K status of the experimental (**Action: All AICMIP Scientists**)

3. In the trials for evaluation of pre-release genotypes under different nutrient levels, the issue related to nutrients levels was discussed and it was suggested that in these trials nutrient levels should be decided by considering nutrient use efficiency, nutrient uptake and yield potential of the hybrids. The nutrient levels for different maturity groups were finalised as 100:40:40, 150:50:60 and 200:60:80 kg/ha N: P₂O₅: K₂O for extra early and early maturity genotypes and 150:50:60, 200:65:80 and 250:80:100 kg/ha N: P₂O₅: K₂O for medium and late maturity genotypes during *kharif* and late maturing genotypes in *rabi* season (**Action: All AICMIP Scientists**)
4. For uniform and effective execution of the programme, a standard experimental protocol will be developed for each agronomic trial and all agronomists should follow that strictly (**Action: All AICMIP Scientists**)
5. For wider dissemination of AICMIP findings the data of concluded experiments should be published with the approval of PD, DMR (**Action: All Agronomists**)
6. Weed management trials need to be concluded as no new information was generated from ongoing trials. Further Co-chairman, suggested, that one trial may be formulated on weed management in consultation with "Directorate of Weed Science Research" using new post-emergence molecule, if available (**Action: P.I., Agronomy**)
7. Convener suggested that data of rejected trials (if any) by the monitoring team should not be reported. The data of all other trials must be submitted timely as per the format provided by DMR (**Action: All AICMIP Scientists**)

Recommendations

Early and extra early maturing hybrids are recommended for delayed rainfall conditions while for normal rainfall conditions planting of medium and late maturing hybrids are advisable.

Under rain-fed conditions, paired row planting of maize intercropped with green gram and residue retention @ 5 t/ha in maize is recommended for higher productivity.

Weed management practices for maize under different cropping systems are recommended as follows:

- In zero-till maize grown after rice, Glyphosate @ 1.0 kg/ha as pre plant followed by 2,4-D @ 0.4 kg/ha as post emergence application is recommended for best weed management.
- In maize-wheat cropping system, application of Atrazine @ 1.0 kg/ha as pre-emergence followed by Atrazine @ 0.75 kg/ha at 25-30 days

after sowing in maize is the most effective in controlling weeds and producing higher yield.

Trials to be continued during 2013-14

1. Performance of pre-release genotypes under varying nutrients levels
2. Effect of planting systems and intercropping with and without residue retention under rain-fed conditions
3. Nutrient management in maize-wheat-green gram cropping system under different tillage practices
4. Nutrient management in rice-maize cropping system under different tillage practices
5. Nutrient management in maize-chickpea/mustard cropping system under different tillage practices
6. Nutrient requirement of maize genotypes under different cropping systems

Trials concluded

1. Weed management strategies for diverse weed flora in maize based cropping system.
2. Performance of maize hybrids to adopt rainfall changes and climatic aberrations
3. Effect of planting systems and geometry with and without residue retention under rain-fed conditions

The meeting ended with vote of thanks to the chair.

Technical Programme for 2013-14

***MAT 1: Performance of pre-release genotypes under varying nutrients levels**

Objectives: To study the response of pre-release genotypes to different NPK levels

a) Performance of pre-release extra early maturity genotypes under varying nutrient levels in zone I

Nutrients levels (3)	:	100:40:40, 150:50:60 and 200:60:80 N: P ₂ O ₅ : K ₂ O kg/ha
Genotypes(3+ checks)	:	FH 3556, FH 3554, K 75
Design	:	Split plot
Main plots	:	Nutrient levels
Sub plots	:	Genotypes
Replications	:	3
Plot size	:	Gross: 5.00 m x 3.00 m Net: 5.00 m x 1.50 m
Locations	:	Bajuwara and Almora

b) Performance of pre-release extra early maturity genotypes under varying nutrient levels in zone III

Nutrients levels (3)	:	100:40:40, 150:50:60 and 200:60:80 N: P ₂ O ₅ : K ₂ O kg/ha
Genotypes(3+ checks)	:	FH 3556, FH 3558, K 75

Design : Split plot
Main plots : Nutrient levels
Sub plots : Genotypes
Replications : 3
Plot size : Gross: 5.00 m x 3.00 m
Net: 5.00 m x 1.50 m
Locations : Dholi, Ranchi

c) Performance of pre-release extra early maturity genotypes under varying nutrient levels in zone IV

Nutrients levels (3) : 100:40:40, 150:50:60 and 200:60:80 N: P₂O₅: K₂O kg/ha

Genotypes(1+ checks) : FH 3556
Design : Split plot
Main plots : Nutrient levels
Sub plots : Genotypes
Replications : 3
Plot size : Gross: 5.00 m x 3.00 m
Net: 5.00 m x 1.50 m
Locations : Kolhapur and Vagarai

d) Performance of pre-release extra early maturity genotypes under varying nutrient levels in zone V

Nutrients levels (3) : 100:40:40, 150:50:60 and 200:60:80 N: P₂O₅: K₂O kg/ha

Genotypes(4+ checks) : FH 3556, FH 3554, FH 3555, K 75
Design : Split plot
Main plots : Nutrient levels
Sub plots : Genotypes
Replications : 3
Plot size : Gross: 5.00 m x 3.00 m
Net: 5.00 m x 1.50 m
Locations : Ambikapur and Godhra

e) Performance of pre-release early maturity genotypes under varying nutrient levels in zone I

Nutrients levels (3) : 100:40:40, 150:50:60 and 200:60:80 N: P₂O₅: K₂O kg/ha

Genotypes(4+checks) : Bisco 2238, K 21, DAS MH 501, JH 31485
Design : Split plot
Main plots : Nutrient levels
Sub plots : Genotypes
Replications : 3
Plot size : Gross: 5.00 m x 3.00 m
Net: 5.00 m x 1.50 m
Locations : Almora and Bajaura

f) Performance of pre-release early maturity genotypes under varying nutrient levels in zone III

Nutrients levels (3) : 100:40:40, 150:50:60 and 200:60:80 N: P₂O₅: K₂O kg/ha

Genotypes(2+checks) : DAS MH 501, JH 31485

Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m
 Locations : Bhubaneswar and Ranchi

g) Performance of pre-release early maturity genotypes under varying nutrient levels in zone IV

Nutrients levels (3) : 100:40:40, 150:50:60 and 200:60:80 N: P₂O₅: K₂O kg/ha

Genotypes(4+checks) : K 21, DAS MH 501, Bisco 2238, FH 3548

Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m

Locations : Karimnagar and Arbhavi

h) Performance of pre-release early maturity genotypes under varying nutrient levels in zone V

Nutrients levels (3) : 100:40:40, 150:50:60 and 200:60:80 N: P₂O₅: K₂O kg/ha

Genotypes(4+checks) : K 21, Bisco 2238, DAS MH 501, JH 31485

Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m

Locations : Chnidwara and Godhra

i) Performance of pre-release medium maturity genotypes under varying nutrient levels in zone I

Nutrients levels (3) : 150:50:60, 200:65:80 and 250:80:100 N:P₂O₅:K₂O kg/ha

Genotypes(2+checks) : EHL 161708 (Hyd), MCH 47

Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m

Locations : Kangra and Bajaura

j) Performance of pre-release medium maturity genotypes under varying nutrient levels in zone III

Nutrients levels (3) : 150:50:60, 200:65:80 and 250:80:100 N:P₂O₅:K₂O kg/ha

Genotypes(1+checks) : X 35 A 189
 Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m
 Locations : Baharaich and Varanasi

k) Performance of pre-release medium maturity genotypes under varying nutrient levels in zone IV

Nutrients levels (3) : 150:50:60, 200:65:80 and 250:80:100 N:P₂O₅:K₂O kg/ha
 Genotypes(4+checks) : PRO 383, X 35 A194, X35 A189, JH 31470
 Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m
 Locations : Arbhavi and Hyderabad

l) Performance of pre-release medium maturity genotypes under varying nutrient levels in zone V

Nutrients levels (3) : 150:50:60, 200:65:80 and 250:80:100 N:P₂O₅:K₂O kg/ha
 Genotypes(1+checks) : MCH 47
 Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m
 Locations : Chindwara and Banswara

m) Performance of pre-release late maturity genotypes under varying nutrient levels in zone I

Nutrients levels (3) : 150:50:60, 200:65:80 and 250:80:100 N:P₂O₅:K₂O kg/ha
 Genotypes(9+checks) : PFMH 97 I 57(AMAR), MCH 45, X35A180, GK 3103, MCH 46, PRO 385, HTMH 5106, HTMH 5402, PRO 384
 Design : Split plot
 Main plots : Nutrient levels
 Sub plots : Genotypes
 Replications : 3
 Plot size : Gross: 5.00 m x 3.00 m
 Net: 5.00 m x 1.50 m
 Locations : Kangra and Bajaura

n) Performance of pre-release late maturity genotypes under

varying nutrient levels in zone III

Nutrients levels (3)	:	150:50:60, 200:65:80 and 250:80:100 N:P ₂ O ₅ :K ₂ O kg/ha
Genotypes(5+checks)	:	CMH 08-381, CMH08-381 (G), Orbit, CMH09-464, X35A180
Design	:	Split plot
Main plots	:	Nutrient levels
Sub plots	:	Genotypes
Replications	:	3
Plot size	:	Gross: 5.00 m x 3.00 m Net: 5.00 m x 1.50 m
Locations	:	Bahraich and Bhubaneswar

o) Performance of pre-release late maturity genotypes under varying nutrient levels in zone IV

Nutrients levels (3)	:	150:50:60, 200:65:80 and 250:80:100 N:P ₂ O ₅ :K ₂ O kg/ha
Genotypes(8+checks)	:	PRO 385, S 6668, MCH 46, HTMH 5106, CMH 08-381, P 4546, X 35A 180, L 333
Design	:	Split plot
Main plots	:	Nutrient levels
Sub plots	:	Genotypes
Replications	:	3
Plot size	:	Gross: 5.00 m x 3.00 m Net: 5.00 m x 1.50 m
Locations	:	Karimnagar and Hyderabad

p) Performance of pre-release late maturity genotypes under varying nutrient levels in zone V

Nutrients levels (3)	:	150:50:60, 200:65:80 and 250:80:100 N:P ₂ O ₅ :K ₂ O kg/ha
Genotypes(5+checks)	:	PFMH 97 I 57 (AMAR), CP 333, X35A180, MCH 46, P 4546
Design	:	Split plot
Main plots	:	Nutrient levels
Sub plots	:	Genotypes
Replications	:	3
Plot size	:	Gross: 5.00 m x 3.00 m Net: 5.00 m x 1.50 m
Locations	:	Udaipur and Banswara

Note: Nitrogen to be applied in 3 splits

Observations to be recorded:

1. Plant population (thousands/ha) at harvest
2. Plant height (cm) at harvest
3. Days to 50% silking
4. Number of cobs/ha
5. Test weight (1000-seed weight)
6. Grain yield (kg/ha)
7. Stover yield (kg/ha)
8. Insect-pest and disease incidence, if any

9. Net return and B:C ratio

MAT 2: Effect of planting systems and intercropping with and without residue retention under rain fed conditions

A. Planting systems

1. Uniform row at 67 cm
2. Paired row at 84:50 cm

B. Intercrops

1. Soybean (Banswara, Ranchi)/Clusterbean (Udaipur)/Mungbean(Vagarai)
2. Black gram (Banswara, Vagarai, Ranchi and Udaipur)

C. Residue level

1. No residue
2. Residue retention as a mulch@ 5 t/ha

Design: Split Plot

Replications: 3

Locations : Udaipur, Banswara, Ranchi and Vagarai

Observations to be recorded:

1. Plant population (thousands/ha) at harvest
2. Plant height (cm) of maize and intercrop at harvest
3. Days to 50% silking
4. Yield attributes and yield of maize and inter crops
5. Maize equivalents of inter crop and cropping system
6. Stover yield of maize and inter crop
7. Net returns and B: C ratio
9. Moisture use efficiency
10. N, P and K uptake by all crops

MAT 3: Nutrient management in maize-wheat-green gram cropping system under different tillage practices

Main plots treatments: Tillage practices

1. Zero till
2. Conventional till
3. Permanent bed

Sub plots treatments: Fertility levels

1. Recommended dose of fertilizers
2. SSNM based on nutrient expert
3. 50 % of recommended dose of fertilizers

Design: Split plot

Replications: 3

Plot size: 150 m²

Observations to be recorded:

1. Plant population (thousands/ha) in maize and mungbean
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. 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

Locations: Almora, Udaipur, Pantnagar, Delhi, Dholi, Karnal, Banswara

MAT 4: Nutrient management in rice-maize cropping system under different tillage practices

Main plots treatments: Tillage practices

1. Zero tillage in both crops
2. Conventional tillage in both crops
3. Conventional tillage in rice and zero tillage in maize

Sub plots treatments: Fertility levels

1. Recommended dose of fertilizers
2. SSNM based on nutrient expert
3. 50 % of recommended dose of fertilizers

Design: Split plot

Replications: 3

Plot size: 150 m²

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

Locations: Dholi, Hyderabad

MAT 5: Nutrient management in maize based cropping systems under different tillage practices

Main plots treatments: Tillage practices

1. Zero till
2. Conventional till
3. Permanent bed

Sub plots treatments: Fertility levels

1. Recommended dose of fertilizers
2. SSNM based on nutrient expert
3. 50 % of recommended dose of fertilizers

Design: Split plot

Replications: 3

Plot size: 150 m²

Observations to be recorded:

1. Plant population (thousands/ha) in maize, chickpea and mustard
2. Plant height (cm) of all crops at harvest
3. Yield attributes and yield of all crops
4. Maize equivalents of component crops in cropping system
5. System productivity
6. Stover/straw yields (kg/ha)

7. Net returns and B: C ratio
8. N, P and K uptake by all crops
9. Initial and final (after completion of one year cropping sequence) physical and chemical parameters of soil

Locations: Maize-chickpea cropping system-Banswara, Delhi

Maize-mustard cropping system-Chhindwara, Delhi

MAT 6: Nutrient requirement of maize genotypes under different cropping systems

Main plots treatments: Five recommended hybrids of the region

Sub plots treatments: Fertility levels

1. Recommended dose of fertilizers
2. SSNM based on nutrient expert
3. 50% of recommended dose of fertilizers

Design: Split plot

Replications: 3

Plot size: 150 m²

Observations to be recorded:

1. Plant population (thousands/ha) in maize and mungbean/chickpea /mustard
2. Effective tillers of wheat per square meter Plant height (cm) 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 (kg/ha)
7. 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

Locations

Maize-wheat: Bajaura, Jhabua, Udaipur, Banswara, Ranchi, Ludhiana, Karnal, Delhi, Pantnagar

Maize-chickpea: Kanpur, Baharaich

Maize-mustard: Chhindwara, Ambikapur

Rice-maize: Hyderabad

Maize alone: Karimnagar, Arbhavi

MAT 7: Water management in spring maize

Main plots: Irrigation treatments:

1. Continuous furrow irrigation (45kPascal SMP)
2. Alternate furrow irrigation (45kPascal SMP)
3. Drip irrigation (45 k Pascal SMP)
4. Continuous furrow irrigation (60kPascal SMP)
5. Alternate furrow irrigation (60kPascal SMP)
6. Drip irrigation (60 k Pascal SMP)
7. Irrigation at critical stages

Sub plots: Mulching

1. No mulch
2. With mulch

Design: Split plot

Replications: 3

Plot size: 3m X5m

Observations to be recorded:

1. Plant population (thousands/ha)
2. Yield attributes and yield
3. Consumptive use and water use efficiency
4. Stover (kg/ha)
5. Amount of water applied and water saving
6. Net returns and B: C ratio

Center: Ludhiana

***MAT – Maize Agronomy Trial**

The list of the scientists in crop production session

S.No	Name	Address
1.	Dr Ashok Kumar	Directorate of Maize Research, New Delhi
2.	Dr C. M. Parihar	Directorate of Maize Research, New Delhi
3.	Dr S. L. Jat	Directorate of Maize Research, New Delhi
4.	Dr A. K Singh	Directorate of Maize Research, New Delhi
5.	Dr Vijay Pooniya	Division of Agronomy, IARI, New Delhi
6.	Dr V. K. Paradkar	ZARS, Chindwara
7.	Dr M. V. Singh	CRS, Bahraich (UP)
8.	Dr Keshav Arya	CSAUAT, Kanpur
9.	Dr Kavita	Dholi
10.	Dr R. Karthikayan	NRS, Vagarai
11.	Dr P.H. Deshmukh	AICMIP in maize Kolhapur (MS)
12.	Dr S.S. Hall	ARS, Arabhavi, Karnataka,
13.	Dr Anil Kumar	SAREC, Kangra
14.	Dr D.R. Thakur,	CSKHPKV, HAREC, Bajaura
15.	Dr Dilip Singh	AICMIP, Udaipur
16.	Dr Mahender Singh	ZARS, Jhabua
17.	Dr K.H. Patel	MMRS, AAU, Godhra (Gujrat)
18.	Dr G. Manjulatha	ARS, Karimnagar
19.	Dr Pramila Naik	AICMIP, OUAT Bhubaneswar
20.	Dr Sreelatha	ARI, Hyderabad
21.	Dr Satpal singh	PAU, Ludhiana
22.	Dr Ashok Kumar	RRS,HAU, Karnal
23.	Dr Bashik-Ahmad-Ali	SKUAST, Kashmir
24.	Dr Hargilas	ARS, Banswara
25.	Dr Amit Bhatnagar	GBPUA&T, Pantnagar
26.	Dr Veer singh	GBPUA&T, Pantnagar
27.	Dr M.S. Pal	GBPUA&T, Pantnagar
28.	Dr M Kumar	Agronomy , Dholi
29.	Dr A.K. Sinha	Agronomy, Ambikapur

Concurrent Session (Plant Pathology & Nematology)

Chairman	Convener	Rapporteurs
Dr. V.K. Rao Prof & Head, ANGRAU	Dr. Sangit Kumar	Drs. K.S. Hooda and S.S. Sharma

The meeting of Maize Pathology and Nematology group was held at 11.30 AM at DRR, Hyderabad to undertake the centre-wise discussion of research results of *kharif 2013/rabi 2011-12* and formulation of technical programme of *kharif 2013/rabi 2013-14*. At the outset, Dr. Sangit Kumar welcomed the chairman Dr. V.K. Rao. The Chairman requested all the scientists to present their achievements. He appreciated for conductance of all the trials allotted during *kharif 2012/rabi 2011-12* by all centres. The zone wise results of experiments were presented by the respective scientist of the centres. The Barapani and Midnapore (voluntary) centres were unrepresented. Dr R. Ranga Reddy, In-charge of Hyderabad centre, informed the house that *Cephalosporium maydis* causing late wilt disease was sporadic & confined to certain maize pockets in Andhra Pradesh.

The important research achievements were listed. Based on the observations, the recommendations were made by the group. The group also discussed and formulated the technical programme for *kharif 2013/rabi 2013-14*.

Significant Findings

*MPT I: Disease screening of IVT Late Season Maturity Maize

Hybrids and Varieties: A total of 44 genotypes were resistant out of 64 genotypes. Promising genotypes with multiple resistance (MLB, ESR, CLS TLB, P.RUST PFSR, RDM, ESR, SDM, RDM, DM) are *AMH-477, Bisco X 4296, DADA, FMH-11195, KDMH 4086, KMH-510, NMH-1265, NMH-3493, PMH-2277, Rasi-863, Rasi-932, Venus, LTH-20, LTH-22, X35B396, AH 1211, JH 31555, JH 31601, X35B392, CMH 10-546, REH-2011-06, PRO-388, X35B391, VNR-39029, A-7503, VMH-418 and Euri 10*.

MPT II: Disease screening of IVT Medium Maturity Maize Hybrids

and Varieties: A total of 45 genotypes showed resistant reaction out of 75 genotypes. Promising genotypes with multiple resistance (MLB, C.RUST, P.RUST, RDM, CLS, TLB, PFSR, C.RUST CLS, DM) are *FMH-603, Rasi-3033, AMH-455, NMH-1281, Bisco X 2711, NMH 1588, TI8334, JKMH 4511, S6850, S6790, KMH-7148, EHL 2211, NMH-1277, PRO 387, DAS MH-303, X35B403, CMH 10-529, REH 2011-03, CMH 10-485, JH 31599, MMH 12-7, MMH 12-8, DHM 117, BH-411001 and KNMH 4205*.

MPT III: Disease screening of IVT Early Maturity Maize Hybrids

and Varieties: A total of 17 genotypes showed resistant reaction out of 32 genotypes. Promising genotypes with multiple (MLB, P. RUST, PFSR, ESR, P. RUST, C. RUST, RDM) are *KMH-7021, FH 3605, CMH-10-537, CMH-10-484, CMH-10-527, CMH-10-531, BAUMH-2011-07, BIO 6008, and HKH 333*.

MPT IV: Disease screening of IVT Extra Early Maturity Maize

Hybrids and Varieties: A total of 8 genotypes out of 18 genotypes

showed resistant reaction. Only one promising genotype with multiple resistance (PFSR, C. RUST, P. RUST) is REH 2011-7.

MPT V: Disease screening of AVT Late Season Maturity Maize Hybrids and Varieties: A total of 27 genotypes were resistant out of 40 genotypes. Promising genotypes with multiple resistance (MLB, PFSR, C.RUST, TLB, P.RUST, RDM, ESR, C.RUST) are CMH08-381, CMH10-500, CP 333, DAS-MH-102, DMH 7705, HTMH 5106, MCH 45, MCH 46, NMH-1247, P4546, PRO-385, S6668, CMH08-287, NMH-713.

MPT VI: Disease screening of AVT Medium Maturity Maize Hybrids and Varieties: A total of 25 genotypes showed resistant reaction out of 38 genotypes. Promising genotypes with multiple resistance (PFSR, P.RUST, C.RUST, MLB, ESR, TLB) are B 53, EHL 161708 (Hyb), JH 31470, PRO-383, B 63, BIO 151, CMH08-292, CMH08-350, CMH08-433, IMH-666, KNMH401061, S6217, VMH 4106, X35A173.

MPT VII: Disease screening of AVT Early Maturity Maize Hybrids and Varieties: A total of 5 genotypes showed resistant reaction out of 15 genotypes. Promising genotypes with multiple resistance (TLB, PFSR, P.RUST, C. RUST) are CMH10-525, FH 3513, KDMH 755, REH 2009-12.

MPT VIII: Disease screening of AVT Extra Early Maturity Maize Hybrids and Varieties: A total of 5 genotypes showed resistant reaction out of 11 genotypes. Promising genotypes with multiple resistance (TLB, P.RUST, C.RUST, MLB) are FH 3555, FH 3556, FH 3510, FH 3525.

MPT IX: Screening of inbred lines against major diseases of maize: Thirty three entries were evaluated against PFSR at Delhi, Hyderabad, Ludhiana and Udaipur and out of them 5 were selected as resistant to PFSR. A total of 10 resistant pools for PFSR are being maintained and inbred lines from these pools are being extracted and evaluated against PFSR.

In another set of inbreds tested over three years (*Kharif* 2010 to 2012) at multi-locations, 62 elite lines (Mas madu (sh2sh2), HKI 193-1, Win sweet corn, CML 172, 951-7, HKI-MBR-139-2, CUBA 380, CLQRCYQ-47-B, CLQ-RCYQ 30, DMSC 3, CLQ-RCYQ 36, DMSC16-1, CLQ-RCYQ41, DMSC-37-3, 02POOL 33 C24, HKI-PC-8-2-1, PFSR-R2, WINPOP-3, PFSR-R3, WINPOP-21, PFSR-R9, HKI 1040-5, PFSR-R10, ESM-11-3, PFSR-S2, PFSR/51016-1, PFSR-S3, Hyd05r/2-1, JCY2-1-2-1-1B-1-2-3-1-1, Hyd05R/13-2, JCY2-7-1-2-1-B-1-2-1-1, LM12, CM 117-3-4-1-2-2-1, LM16, CM 117-3-4-1-1-4-1, CM121, CM 117-3-4-1-2-3-1, 42048-2-2-1-1-1-2, HKI C 78, SW-93D-313-23-POP.49-S4-1, HKI 141-2, JCY3-7-1-2-1-B-2-3-2-1-3-1, HKI C 323, JCY2-2-4-1-1-1-3-1-3-1, HKI 1352-5-8-9, 42050-1-1-2-1-3, Pool 16 BNSEQ.C3F6x38-1, JCY3-7-1-2-1-B-1-1-2-3-1-1, ae-40, CM117-3-4-1-2-5-2, CML141, JCY3-7-1-2-2-1-3-1-1-2-7-1-1-1, CML 269, LM13, HKI 34(1+2)-1, CM117-3-4-1-2-2-3, HKI 164-7-4 ER-3, JCY3-7-1-2-1-B-2-1-2-1, HKI 164-4-(1-3), HKI 191-1-2-5, LTP4 and HKI 193-2-2-4) were found resistant to single or multiple diseases (BSDM, MLB, TLB, PFSR, RDM).

MPT X: Assessment of yield losses due to major diseases of maize: A range of 5.85 - 49.86% loss in yield due to MLB, TLB, BLSB, SDM and charcoal rot was recorded in different maize hybrids in different hot spot locations.

MPT XI: Trap nursery trial for disease occurrence: Maydis leaf blight, Turcicum leaf blight, Curvularia leaf spot, Polysora rust, Banded leaf and sheath blight, Rajasthan downy mildew, Sorghum downy mildew, Erwinia stalk rot are the major diseases recorded in moderate to severe form at various hot spot locations of the country.

MPT XII: Screening of maize genotypes against cyst nematode (*Heterodera zea*): Out of 293 maize entries of different maturity groups screened against cyst nematode, the entries viz.; KDMH 4086, X35B396, JH 31555, Meghan-G, CMH 10-473, CMH 10-485, REH 2011-1, CMH-10-527 and REH 2011-8 were moderately resistant to *H. zea*.

MPT XIII A: Survey and surveillance for maize diseases: Extensive surveys were conducted in maize growing areas of Rajasthan, Andhra Pradesh, Karnataka and Tamil Nadu during the year. The most common diseases of these areas were Turcicum Leaf Blight (TLB) in Karnataka, Banded leaf and sheath blight (BLSB) and Curvularia leaf spot (CLS) have shown widespread occurrence in Rajasthan this year by showing moderate incidence from all places surveyed whereas severe incidence was recorded from 22 places. The most common diseases from Andhra Pradesh were TLB and Charcoal rot. The most prevalent diseases from Tamil Nadu were Sorghum Downy Mildew followed by TLB. Polysora rust and CLS are emerging as a potential threat in Karnataka & Rajasthan respectively.

MPT XIII B: Survey and surveillance for maize nematodes: Maximum nematode population (16.42 cyst/plant, 12.92 cyst/100 cc soil and 460.83 larvae/100 cc soil) was observed in Rajsamand district with occurrence of 70.59% while minimum nematode population (9.00 cyst/plant, 7.25 cyst/100 cc soil and 282.50 larvae/ 100 cc soil) was obtained from Ajmer district of Rajasthan with 57.14% occurrence. On the whole, occurrence of maize cyst nematode, *H. zea* was observed 64.15 per cent in maize growing areas.

Recommendations

1. Score of susceptible check with name and range of disease of test entries should be given (**Action: All Centres**).
2. During survey and surveillance the disease scoring should be done along with the incidence of disease (**Action: All Centres**).
3. Susceptible check should be used at every 10th entry (**Action: All Centres**).
4. The centres which have not performed up to the mark should try to improve (**Action: Dholi Centre**).
5. Spore load of sick plot (cfu/g soil) for soil borne diseases should be determined (**Action: All Centres**).
6. Yield loss trial with 2 years data should be concluded and reported to DMR with net harvested area and grain moisture percentage [**Action: Mandya (TLB), DMR (PFSR)**].

***MPT – Maize Pathology Trial**

Technical Programme for 2013-14

Maize pathological trials to be conducted at various coordinating/cooperating centres during *Kharif* 2013 and *Rabi* 2013-14

Disease Screening Trials

Following procedures should to be adopted in conduct of disease screening trials

- I. Sorghum and Rajasthan Downy Mildews: Screening should be conducted in downy mildew sick plot using infector rows system and artificially created epiphytotics.
- II. TLB, MLB, BLSB, BSDM, PFSR, CLS, PFSR, polysora rust, ESR: to be inoculated artificially.

MPT I – MPT VIII: Disease screening of IVT and AVT of Maize Hybrids and Varieties of all Maturity Groups: Evaluation of maize entries of the coordinated trials (IVT, AVT I and AVT II) consisting of various maturity groups in different testing stages against diseases at locations mentioned below will be carried out:

Diseases	Locations
Maydis leaf blight	Delhi, Dholi, Ludhiana, Karnal Susc. Check: CM 600/Local Check/CM 119
Turcicum leaf blight	Mandya, Bajaura, Arbhavi, Almora, Dholi (R), Barapani Susc. Check: CM 202/Local Check
Banded leaf and sheath blight	Delhi, Pantnagar, Dhaulakuan, Udaipur, Midnapur, Bhubaneshwar, Karnal Susc. Check: CM 600/Local check
Sorghum Downy mildew	Mandya, Coimbatore Susc. Check: CM 500/Local Check
Brown stripe downy mildew	Pantnagar, Dhaulakuan Susc. Check: Local check
Rajasthan Downy mildew	Udaipur Local Susc. Variety
Curvularia Leaf spot	Udaipur Check: Surya local
Erwinia stalk rot	Pantnagar, Dhaulakuan Susc. Check: CM 500/Local Check
Post-flowering stalk rots	Udaipur, Ludhiana, Hyderabad Susc. Check: CM 600/Local Check
Common rust (During Winter)	Dholi, Arabahvi Susc. Check: Local Check
Polysora rust	Mandya

N.B.: Meteorological data of the centers during crop growth period should be provided along with the disease reaction data.

MPT IX: Screening of inbreds against major diseases of maize:

Diseases	Locations for testing under inoculated conditions
Maydis leaf blight	Delhi, Dholi, Karnal, Ludhiana
Turcicum leaf blight	Mandya, Almora, Dholi (R), Arabhavi

Fusarium stalk rolt	Udaipur
Charcoal rot	Hyderabad (R), Arabhavi, DMR, Ludhiana
Downy mildews	Mandya, Coimbatore, Udaipur
Banded leaf and sheath blight	Delhi, Pantnagar, Dhaulakuan, Bhubneshwar
Erwinia stalk rot	Pantnagar, Dhaulakuan
Polysora Rust	Mandya
Curvularia leaf spot	Udaipur

MPT X: Assessment of yield losses due to major diseases of maize:

Selected centers for TLB (Almora), MLB (Delhi, Ludhiana), CLS (Udaipur), BLSB (Pantnagar, Delhi, Dhaulakuan), SDM (Mandya and Coimbatore), PFSR (Ludhiana and Hyderabad) should conduct yield loss assessment trial as per the guidelines provided by the PI (Plant Pathology).

MPT XI: Trap nursery trial for maize disease occurrence:

1. Disease trap nursery is to be planted at all the centers including North Eastern Region.
2. Maximum disease score observed for all the major diseases is to be recorded.
3. Periodical observation during the cropping season in the disease trap nursery is to be taken for occurrence of new disease.

MPT XII: Screening of maize genotypes against cyst nematode (*Heterodera zae*), Udaipur:

1. Survey and surveillance to find out distribution and occurrence of important nematodes pests of maize.
2. Screening of maize entries/lines for locating sources of resistance against maize cyst nematode, *H. zae*.
3. Effect of seed treatment to check the initial infection of maize cyst nematode, *H. zae* on maize.
4. Development of integrated nematode management module for maize cyst nematode, *H. zae* on maize.

MPT XIII A: Survey and surveillance for maize diseases to identify the disease threat: During survey & surveillance the disease scoring should be done along with the incidence of disease (**Action: All Centres**)

MPT XIII B: Survey and surveillance for maize nematodes: Udaipur centre will undertake this programme in maize growing areas. (Action: Udaipur Centre)

The following scientists attended the session:

1. Dr. V.K. Rao, Professor and Head (Plant Pathology), ANGRAU, Hyderabad
2. Dr. Sangit Kumar, Pr. Scientist, DMR, New Delhi
3. Dr. Robin Gogoi, Pr. Scientist, Plant Pathology, IARI, New Delhi
4. Dr. K.T. Pandurang Gowda, Dean, COA, Mandya, Mysore
5. Dr. T.A. Sreerama Shetty, Maize Pathologist, UAS, Mandya, Karnataka
6. Dr. V.R. Kulkarni, Asstt. Maize Pathologist, ARS, Arabhavi, Karnataka

7. Dr. Rakesh Mehra, Maize Pathologist, CCS HAU, RRS, Karnal
8. Dr. Rakesh Devlash, Maize Pathologist, HAREC, CSK HPKV, Bajaura
9. Dr. Ashwani Kumar, Maize Pathologist, HAREC, CSK HPKV, Dhaulakuan
10. Dr. B.L. Baheti, Maize Nematologist, MPUAT, Udaipur, Rajasthan,
11. Dr. S.S. Sharma, Maize Pathologist, MPUAT, Udaipur, Rajasthan
12. Dr. V. Paranidharan, Assistant Maize Pathologist, TNAU, Coimbatore
13. Dr. Meena Shekhar, Pr. Scientist, DMR, New Delhi 12
14. Dr. R. Ranga Reddy, Pr. Scientist, MRC, ARI, ANGRAU, Hyderabad
15. Dr. Pradeep Kumar, Professor, Department of Plant Pathology, GBPUAT
16. Dr. Chandrashekharsa C., Scientist (Pl. Pathology), VPKAS, Almora
17. Harleen Kaur, Asstt. Plant Pathologist PAU, Ludhiana
18. Dr. R. N. Bunker, Asstt. Plant Pathologist RCA, MPUAT Udaipur
19. Dr N. Mallikarjuna, Scientist Pathology S.M. Sehgal Foundation ICRISAT
20. Dr. K.S. Hooda, Pr. Scientist, DMR, New Delhi
21. Ms. P. Behera, Jr. Scientist, OUAT, Odisha
22. Dr. Phool Chand, Maize Pathologist, AICMIPM, Dholi
23. Dr. Suhas B. Nimbalkar, BISCO Biosciences Pvt. Ltd. Secunderabad

Concurrent Session (Entomology)

Chairman	Co-chairman	Convener	Rapporteur/s
Dr. T. Ramesh Babu, Prof and Head	Dr. S.J. Rahman, Head, Biocontrol	Dr. P. Kumar	Drs. J.C. Sekhar, J.C. Mehla

The Entomologists presented the work done at their respective Centers. The work was reviewed and discussed. The Principal Investigator then presented the work of all the centers followed by the plan of work for next year.

Recommendations

1. Assessment of crop loss caused by *C. partellus* through the model developed

$$\text{Percent loss} = 100 \left[\frac{\sum \left(\frac{\text{Total loss}}{\text{sample size}} \right)}{\text{Yield of LIR 1}} \right]$$

Economic loss = Yield potential x Percent loss x Rate

2. For evaluation of germplasm against *C. partellus*, release 15 black headed eggs per plant and against *S.inferens* 10 neonate larvae per plant on 12 day old plants.

Technical Programme for 2013-14

*MET 1: Evaluation of maize AICMIP Trials entries under artificial infestation for AVT I and II

- Maize entries will be evaluated under artificial infestation with *Chilo partellus* during *kharif* at Delhi, Ludhiana, Karnal, Dholi, Hyderabad, Kolhapur and Udaipur.
- During *Rabi*, Maize entries will be evaluated under artificial infestation with *Sesamia inferens* at Kolhapur and Hyderabad.

MET 2 a. Evaluation of inbred lines under artificial infestation

- During *Kharif*, the inbred lines developed by breeders at the respective centers in the previous years will be evaluated for *resistance* against *C. partellus* for three years. The lines displaying *resistance* less than four leaf injury rating (LIR) will be sent to Headquarters to be shared among other centers. (Delhi, Ludhiana, Karnal, Dholi, Hyderabad, Kolhapur and Udaipur).
- During *Rabi*, the same lines will also be evaluated likewise against *S. inferens* at Hyderabad and Kolhapur.
- Inbred lines supplied by Headquarters will be will be evaluated against *C. partellus* during *Kharif* and the data reported to the Principal Investigator (Delhi, Ludhiana, Karnal, Dholi, Hyderabad, Kolhapur and Udaipur).
- During *Rabi*, the same lines will also be evaluated likewise against *S. inferens* at Hyderabad and Kolhapur.
- During spring these lines will be evaluated against *Atherigona* spp. at Delhi and Ludhiana.

MET 2 b. Evaluation of inbred lines under natural infestation

- During spring, the above mentioned inbred lines will be evaluated against *Atherigona* spp. at Delhi and Ludhiana.

MET 3: Evaluation of insecticides against maize stem borers

Treatments

1. Deltamethrin 2.8EC 0.4ml/l
2. Chloraniliprole 20 SC 0.4ml/l
3. Thiodicarb 75WP 1.25g/l
4. Novaluron 10EC 1ml/l
5. Flubendiamide 480 SC 0.1ml/l
6. Carbaryl 50WP 2.5g/l
7. Quinalphos 25EC 2.5ml/l
8. Control

Replications: 3 HQPM 1 will be used.

Plot size: Four rows of 3m length, middle two rows will be infested artificially

- Spray on 10th day after germination (DAG) and artificial infestation on 12th DAG
 - Artificial infestation on 12th DAG and spray on 14th DAG
- Record LIR after 30 days of infestation

MET 4: Management of *Helicoverpa armigera* using *Trichogramma chilonis*

Treatment 1:

- Time of release: At tassel emergence
- No. of releases: Two at 5 day-interval
- Dose: Eight cards/ha
- Observation: Tassel damage, Silk damage, Cob damage

Treatment 2:

- Time of release: Silk emergence
- No. of releases: Two at 5 day-interval
- Dose: Eight cards/ha
- Observation: Tassel damage, Silk damage, Cob damage
- Area: 0.4 ha for each treatment at least 500 m apart (Hyderabad Centre)

MET 5: Evaluation of biocontrol agents

Egg parasitoids

To determine the availability of *Trichogramma* sp. in field up to 60 DAG, release 10 cards @ 50 *C. partellus* eggs/card in the area of 0.1ha at 10 days interval starting from 10 DAG. Collect the cards back after 24hrs. Observe parasitization by keeping the card in clear glass vial. Calculate the per cent parasitism.

Larval parasitoids

Collect infested plants @ 20 plants per interval of 10 days from unsprayed field from 30 DAG onward up to grain filling stage. Split open the stems and recover larvae/pupae and parasitoids, identify the parasitoids and calculate per cent parasitism (Delhi, Ludhiana, Karnal, Dholi, Hyderabad, Kolhapur and Udaipur).

MET 6: Assessment of crop loss caused by *C. partellus*

Collect data on LIR frequency of 200 plants per acre randomly at 5 locations on 40-45day old crop in farmers' field and record grain yield at 14%moisture. Calculate the yield loss assessment.

***MET – Maize Entomology Trial**

The following scientists attended the group meeting:

1. Dr.N.K. Bajpai, Prof., MPUAT,Udaipur
2. Dr.Ashok Kumar, Assoc.Prof., Dholi, RAU
3. Dr.R.S. Suresh Kumar, E.I. Dupont India Pvt. Ltd.
4. Dr. Hitendra Rajput, Pioneer Overseas Corporation
5. Dr. M. Anuradha, Sr. Scientist, MRC, ARI, Rajendranagar, Hyderabad
6. Dr. P. Lakshmi Soujanya, Scientist, WNC, DMR
7. Mr. Gurmail Singh, Asst. Entomologist, PAU, Ludhiana
8. Dr Sanjeev Kalia, Monsanto Ltd.

Session III
Germplasm exchange, registration & seed issues

Chairman	Speakers	Rapporteurs
Dr O. P. Yadav	Dr. Ashok Kumar (NBPGR) Dr. R.C. Agarwal (PPVFRA)	Drs. J. Kaul, Ramesh Kumar, R. Ambika Rajendran

Dr R. C. Agarwal presented overview of PPV&FR Act, 2001 and informed the house that DMR has filed 105 applications for registration of maize hybrids/varieties, a all time highest so far filed by a public Institution. Out of these 105 applications filed, 68 hybrids/ varieties have been registered. He encouraged the breeders to file more applications for protection of the newly developed hybrids/ varieties.

Dr. Ashok Kumar presented the overview of maize germplasm conservation at NBPGR. He informed that 9615 accessions have been introduced from outside during 2012-13 and till date 9381 accessions have been conserved in LTS including land races, released varieties, traditional varieties, genetic stocks and wild species. The utility of germplasm was emphasized to strengthen the breeding programme of maize.

Session IV Inaugural Session

Invocation	
Welcome	Dr. T. Pradeep, Pr. Scientist (Maize)
Lighting of lamp	Chief Guest and other dignitaries
Project Director's Review	Dr. O.P. Yadav, Project Director, DMR
Presidential address	Dr. R. Sudhakar Rao, Director of Research, ANGRAU
Felicitation	Dr. R.P. Dua, ADG (FFC), ICAR
Address by Chief Guest	Dr. R.P. Dua, ADG (FFC), ICAR
Vote of Thanks	Dr. R. Ranga Reddy, Pr. Scientist & Head, MRC, ANGRAU

Dr. R.P. Dua, the Chief guest and ADG (FFC), ICAR inaugurated the 56th annual maize workshop 2013. Dr. O.P. Yadav presented Project Director's review. In his presidential address, Dr. R. Sudhakar Rao extended a very warm welcome on behalf of ANGRAU and on his own behalf. He also told that Andhra Pradesh has made remarkable achievement on productivity front which jumped from 3.5 t/ha to 5.3 t/ha. This spectacular achievement would not have been possible without the technological intervention (which has come through the single cross hybrids) and the hard working farmers who are ever ready to embrace the new technology.

It is high time now that the seed corporations must compete with private sector and lead the seed business so that competitive products are available to the farmers besides the survival of public research. He also emphasized that there is an urgent need to develop drought tolerant/resistant hybrids and biotic problems which get aggravated in humid climate need to be addressed on priority basis to sustain the productivity levels in the long run.

Dr. R.P. Dua, ADG (FFC), ICAR, in his chief guest address, emphasized that maize is an important crop for food security in coming years and needs directional research in future and also elaborated the work done on single cross hybrids. Being a C₄ plant, it will also play a major role in climate change scenario due its better adaptability in changing climate. Soil health is degrading day by day, so he asked the scientists to promote legume component with maize cultivation to improve soil health. Agronomist must work towards input use efficiency and develop agronomic practices with low inputs and more input use efficiency.

QPM is going to play an important role as Government of India has provided special budget for three crops (Maize, Bajra and wheat) for establishment of "Nutri Farms". QPM will be helpful in solving malnutrition problem. Material must be screened for these traits and biofortified maize

is the need of hour. Non conventional methods must be used for further improvement of maize like DH technology for inbred line development and more use of biotechnology in crop improvement programme. Some centres which are having good facilities should initiate work on biotechnology and rest of the centres must emphasize on conventional breeding. Transgenic for biotic and abiotic work may be initiated.

SAU's must contribute their entries in AICMIP mode and then only go for release. Botanicals and bio-agents must be studied for reducing the use of chemicals. We must expand maize areas in non-traditional maize growing areas like Odisha, Kerala and other similar areas.

In the felicitation programme, Chief Guest felicitated Dr. R. Sai Kumar, Former Director, DMR for his outstanding contribution to the Indian Maize Programme. Subsequently, other superannuating scientists namely, Dr. Sangit Kumar, Principal Scientist, DMR and Dr. J.C. Mehla, Regional Director, RRS, Uchani were felicitated by Dr. R. Sudhakar Rao and Dr. Prem Kumar, Maize Breeder, Bahraich by Dr. O.P. Yadav. Besides this, website of DMR was re-launched by Dr. R.P. Dua, electronic version of AICRPM Report, 2012 was released by Dr. R. Sudhakar Rao. Best public sector centre award went to VPKAS, Almora and that of private sector to Kaveri Seed Company Limited.

Finally vote of thanks was extended by Dr. R. Ranga Reddy.

Session V
Review of work during *Kharif 2012* and *Rabi 2011-12*, and work plan for *Kharif 2013* and *Rabi 2013-14*

Chairman	Co Chairman	Rapporteurs
Dr. R. P. Dua	Dr. O.P.Yadav	Drs. N.K. Vajpayee, Meena Shekhar, A.K. Singh, Chikkappa, G.K.

During the session following suggestions have been emerged –

Breeding

- In zone I the centres which are not presenting data/ conducting trial, should be closed.
- Identify non-performing centres.
- Chairman suggested that centres which are not sending data, their money should be withheld.
- AET should be replaced by AVT or AHT.
- Include best hybrid as a check.
- Chairman suggested that DMR should select some centres to maintain population improvement programme so that they can develop inbred lines from different maturity group.
- Scientist from Bihar said that for getting parent lines of DHM-117, ANGRAU has asked money for MOU. In this regard house was of the view that no money can be charged for signing of MOU between public sector universities. For this purpose university has to send the requirement of breeder seed through state department to DAC and then seed production programme can be taken up.
- For AVT trials, chairman suggested that they can be taken up at zone wise and for more data besides AICMIP centre some voluntary centres can be taken up in consultation with AICMIP centres and some private centres can also be identified.
- For creation of heterotic gene pool, maintain population at select centres so that inbred line can be developed and AICMIP centres should not take readymade material for proper development of hybrids.

Agronomy

- For proper interpretation of agronomy trials besides yield data, economics and B: C ratio should also be given.
- Select the hybrids which are recommended for different zones in nutrient management trial.
- Regarding non-reporting of trial data, ADG suggested that PI (Agronomy) should remain in contact with concerned centres for conduct of experiment and data reporting.
- Some centres have not conducted the AICMIP trials; ADG suggested that funds of those centres have to be stopped.
- In long term trials on conservation agriculture and nutrient management, all soil physical, chemical and biological parameters

should be analyzed initially and after completion of one crop cycle at DMR and at some selected centres.

- For weed management trial, testing of post-emergence private molecules can be taken up after following protocols
- It was decided that trials on evaluation of pre-release genotypes under different nutrient levels should be conducted at 1 or 2 locations in each zone.
- Trial entitled 'Moisture conservation studies in maize for enhancing water use efficiency' at Srinagar centre should be dropped as it is a local problem and single station problem cannot be considered as part of coordinated trials.
- Regarding spring maize trial on irrigation it should be taken up at Ludhiana centres with existing contingency.

Entomology

- More work need to be done on habitat management.
- Crop loss assessment model developed need to be further validated.
- Work on oviposition preference need to be carried out on more number of inbred lines

Pathology

- Information on "Trends of distribution of different diseases in different Zones" should be compiled.
- The information of use of inbreds by breeders which are having multiple disease resistance over the years should be maintained and the outcome hybrid out of these inbreds be mentioned in the presentations.
- Every center should compulsorily carry out survey and surveillance of maize diseases during the season and should present the data in workshop.
- During survey and surveillance the data on disease intensity should be recorded as per standard rating scale.

Session VI Lead lectures

Chairman	Co-chairman	Speakers	Rapporteurs
Dr. R.P. Dua	Dr. O.P. Yadav	Dr. P. Anand, Poineer Overseas Corporation Dr. M. Maheshwari, Head, Division of Crop Improvement, CRIDA	Dr. Ishwar Singh

In this session two special lectures on “*Maize improvement in India-perspective of private sector*” and “*Developing drought and heat stress tolerant maize*” were delivered by two eminent and experienced scientists from private and public sector, respectively.

First special lecture was on “Maize improvement in India-perspective of private sector” by Dr. P. Anand, Pioneer Oversees Corporation. Dr. Anand in his presentation highlighted history of adaptation of technology for maize productivity improvement in US through double cross, single cross and transgenic approach, maize product improvement through crop modeling, addressing climate change by crop modeling and alternate cropping system. He also spoke on precision phenotyping for drought and heat stress tolerance in maize. He further emphasized on double haploid technology which has revolutionized maize breeding.

Another special lecture was delivered on “Developing drought and heat stress tolerant maize” by Dr. M. Maheshwari, Head, Division of Crop Improvement, CRIDA, Hyderabad. Dr. Maheshwari gave an overview of important physiological traits, which could be utilized in developing drought and heat stress tolerant maize germplasm. She further stressed on the need of field phenotyping and high thorough-put phenotyping for identifying stress tolerant maize genotypes.

At the end of the session the chairman thanked both the speakers for delivering nice presentations.

Session VII
Variety Identification Committee Meeting

- Chairman : Dr. S.K. Datta, DDG (CS)
Co-chairman : Dr. R.P. Dua, ADG (FFC)
Member : Dr. O.P. Yadav, Project Director, DMR
Secretary
Participants :
1. Dr. S.K. Datta: Chairman
 2. Dr. R.P. Dua: Co- chairman
 3. Dr. R. Sudhakara Rao: Member
 4. Dr. R. Sai Kumar: Member
 5. Sh. Radhey Shyam: Member
 6. Dr. S.S. Anwar: Member
 7. Dr. M.C. Wali: Member
 8. Dr. V.G. Makne: Member
 9. Dr. Devraj Arya: Member
 10. Sh. Vivek V. Thakare: Member
 11. Dr. O.P. Yadav: Member Secretary
 12. Dr. Pradyumn Kumar
 13. Dr. K.S. Hooda
 14. Dr. Ashok Kumar
 15. Dr. Jyoti Kaul

Proceedings of VIC meeting held at the 56th Annual Maize workshop

During the 56th Annual Maize Workshop, the Variety Identification Committed (VIC) meeting was convened under the chairmanship of Dr. Swapan K. Datta, DDG (CS), ICAR, New Delhi, in the committee room of DRR, Hyderabad at 5.30 P.M on April 7, 2013.

Following were present during the meeting:

1. Dr. S.K. Datta: Deputy Director General (CS), ICAR, New Delhi : Chairman
2. Dr. R.P. Dua: Asstt. Director General (FFC), ICAR, New Delhi: Co-chairman
3. Dr. R. Sudhakar Rao: Director Research, ANGRAU: member
4. Dr. R. Sai Kumar: Former Director , DMR, New Delhi :member
5. Sh. Radhey Shyam: DGM (P) RM NSC – Hyderabad : member
6. Sh. S.S. Anwar: Gen. Manager (Prdn. & Q.C.),A.P.S.S.D.C Ltd., Hyderabad: member
7. Dr. M.C. Wali: maize Breeder, ARS, Arabhavi: member
8. Dr.V.G. Makne Consultant VRDC, KSSC. Ltd., Dharwad. :member
9. Dr. Devraj Arya: Tech. Development lead Monsanto India:member
10. Sh. Vivek V. Thakare: Senior Breeder Maharashtra State Seed Corporation Ltd., (MAHABEEJ), Akola, (M.S):member
11. Dr. O. P. Yadav: Project Director, DMR, New Delhi : Member Secretary

Resource Persons:

1. Dr. Pradyumn Kumar : PI Entomology, DMR, New Delhi
2. Dr. K.S. Hooda: PS Pathology, DMR, New Delhi
3. Dr. Ashok Kumar: PI Agronomy, DMR, New Delhi
4. Dr. Jyoti Kaul: PS Breeding, DMR, New Delhi

A total of 35 proposals were received for consideration of VIC. Each proposal was considered and discussed in detail. The recommendations are given below:

1. **Bisco New 704:** The proposed hybrid Bisco New 704 has been identified under late maturity group for the states of zone 1 (J & K, HP, UA & NE hills) as it has shown consistent yield superiority over the checks. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
2. **CMH 08 – 287:** Based on the consistent yield superiority over checks, the proposed hybrid CMH 08 -287 has been identified under late maturity group for the states of zone 3 and 4 (UP, Bihar, Jharkhand, Odisha, Andhra Pradesh, TN, Karnataka and Maharashtra). The centre is required to provide information on the source Germplasm used for deriving parental lines.
3. **A 7501:** The proposed hybrid was compared with the checks and due to its non superiority over checks, it was not recommended for any zone.
4. **M 9977:** The proposed hybrid has not shown yield superiority over the checks and qualifying varieties. Hence, it was not identified for any zone.
5. **BH 41009:** The proposed hybrid has shown yield superiority and hence recommended for zones 3 and 5 (UP, Bihar, Jharkhand, Odisha, Rajasthan,



Gujarat, MP & Chhattisgarh) due to its consistent performance in these zones under medium maturity group. The centre is required to provide information on the source Germplasm used for deriving parental lines.

6. **Bio 151:** The proposed hybrid has shown consistent performance in all the states of the country and based on its yield superiority, it has been recommended for all zones (I, II, III, IV and V) across the states under medium maturity group. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
7. **Bisco 2668:** The proposed hybrid has been identified for states of zone 3 (UP, Bihar, Jharkhand, Odisha) based on its yield superiority under medium maturity group. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
8. **CMH 08 – 350:** The proposed hybrid has shown superiority in yield over the best check based on which it has been approved for the states of zone 3 & 5 (UP, Bihar, Jharkhand, Odisha, Rajasthan, Gujarat, MP & Chhattisgarh) under medium maturity group. The centre is required to provide information on the source Germplasm used for deriving parental lines.
9. **CMH 08- 292:** Based on the yield superiority, the proposed hybrid CMH 08 -292 has been identified for the states of zones 2, 3, 4 and 5 (Punjab, Haryana, Delhi, UP, Bihar, Jharkhand, Odisha, Rajasthan, Gujarat, MP & Chhattisgarh) under medium maturity group. The centre is required to provide information on the source Germplasm used for deriving parental lines.
10. **CMH – 08- 433:** The proposed hybrid has shown yield superiority, over checks in all three years of testing based for which it has been identified for the states of zones 4 & 5 (Rajasthan, Gujarat, MP, Chhattisgarh, Andhra Pradesh, Tamil Nadu, Maharashtra & Karnataka) under medium maturity group. The centre is required to provide information on the source Germplasm used for deriving parental lines.
11. **KDMH – 176:** Based on the yield superiority over the checks, the proposed hybrid KDMH - 176 has been identified under medium maturity group for the states of zone 1 (J & K, HP, UA & NE hills). However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
12. **NMH 1242:** Based on its yield superiority, as well as dent type kernel texture, the proposed hybrid NMH 1242 has been identified for the states of zone 4 & 5 (Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Rajasthan, Gujarat, MP & Chhattisgarh). However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
13. **P 3396:** The proposed hybrid was not found superior to check PMH -4 and other qualifying varieties. Hence, it has not been recommended for any zone.



14. **S 6217:** On the basis of yield superiority over checks in different zones, the proposed hybrid has been recommended for the states of zones 2, 3, 4 and 5 (Punjab, Haryana, Delhi, UP, Bihar, Jharkhand, Odisha, Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Rajasthan, Gujarat, MP & Chhattisgarh) under medium maturity group. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
15. **S 6304:** The proposed hybrid was not recommended for any zone as it was found inferior to the qualifying hybrid S 6217 in zone 3 & 4.
16. **Yuvaraj Gold:** Based on the consistent performance of the proposed hybrid in zones 1, 2, 3, 4 & 5 under medium maturity group, it has been identified across the zones i.e. in all the states of the country. However, the company needs to submit DNA fingerprinting of the hybrid and its parental lines, field view of the crop and information on source Germplasm at the time of its release and notification.
17. **KNMH 401061:** The proposed hybrid has not shown yield superiority over the best check in zone 3 hence not approved for identification.
18. **VMH 4106:** The proposed hybrid has shown yield superiority over the best check in zone 3 in medium maturity group. Hence, it has been approved for the states of UP, Bihar, Jharkhand and Odisha. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
19. **FH 3513:** The proposed hybrid has shown yield superiority over the checks in zone 1, 4 & 5 under early maturity group and hence, recommended for the states of J&K, HP, UA & NE hills, Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Rajasthan, Gujarat, MP & Chhattisgarh. The centre is required to provide information on the source Germplasm used for deriving parental lines.
20. **HKH 317:** Under early maturity group the proposed hybrid has shown yield superiority over the checks. Based on its high starch content and superior yield, it has been approved for the states of zone 1 (J &K, HP, UA & NE hills). The centre is required to provide information on the source Germplasm used for deriving parental lines.
21. **Sun Vamman:** The proposed hybrid has shown consistently superior performance over the checks in zone 1 & 4 under early maturity group, hence, approved for the states of J&K, HP, UA & NE hills, Andhra Pradesh Tamil Nadu, Maharashtra and Karnataka. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
22. **31 Y 45:** On the basis of the yield Superiority of the proposed hybrid over the checks its has been approved under early maturity group for the state of zone 2, 3 & 5 (Punjab, Haryana, Delhi , UP, Bihar, Jharkhand, Odisha, Rajasthan, Gujarat, MP & Chhattisgarh). However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.



23. **X 8 F 984:** Based on the yield superiority of the proposed hybrid over the checks in Zone 2, it has been identified for the states of Punjab, Haryana, Delhi, UP under early maturity group. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
24. **KDMH – 755:** The proposed hybrid has shown yield superiority over the checks in zone 2 on basis of which it has been identified for the states of Punjab, Haryana, Delhi, UP under early maturity group. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
25. **REH 2009 -12:** The proposed hybrid REH 2009-12 has been identified for the states of zone 3 (UP, Bihar, Jharkhand, Odisha) under early maturity group based on its yield superiority over the checks in this zone. However, the centre needs to resubmit the proposal with verified data and duly signed/forwarded by the University Authority and provide information on the source Germplasm used for deriving parental lines.
26. **Bio 265:** The proposed hybrid was not recommended as it has not performed well against the checks and qualifying varieties in the proposed zone.
27. **X 35 A 019:** Based on the yield superiority over the best check, the proposed hybrid has been recommended for states of zone 2, 3, 4 & 5 (Punjab, Haryana, Delhi, UP, Bihar, Jharkhand, Odisha, Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Rajasthan, Gujarat, MP & Chhattisgarh) in rabi season. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
28. **Pro 379:** Based on the yield superiority, the proposed hybrid is recommended for the states of zones 3, 4 & 5 (UP, Bihar, Jharkhand, Odisha, Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka, Rajasthan, Gujarat, MP & Chhattisgarh) in rabi season. However, the company is required to provide information on pedigree and source of material used to derive parental lines and DNA fingerprint in its release & notification proposal.
29. **DMR NH 2:** The hybrid DMR NH 2 has not been recommended for the proposed zone 4 in rabi as it has not shown yield superiority over the checks and qualifying hybrids.
30. **MH QPM 09-06:** The proposed hybrid has not shown yield superiority over the checks in any of the five zones. Hence, not recommended.
31. **MH QPM 09-7:** The proposed hybrid has not shown yield superiority over the checks in any of the five zones. Hence, not recommended.
32. **MH QPM 09-08:** The proposed hybrid has shown yield superiority over the best check and high lysine/ tryptophan content (>2.4 %/> 0.6%) in zone 3, hence identified for the states of UP, Bihar, Jharkhand and Odisha. However, the centre must resubmit the proposal in the required format and mention the testing name and the denomination of the hybrid under reference.

33. **EHQ – 16:** Based on its yield superiority and high tryptophan / lysine content (>2.4 %/> 0.6%), the proposed hybrid has been identified for the state of zone 5 (Rajasthan, Gujarat, MP & Chhattisgarh). The centre has been advised to give due credit to the breeders of DMR as well as AICRP (Maize) Uchani who developed the lines of the hybrid under the reference.
34. **NSCH – 12:** The Proposed hybrid is recorded for zones 1, 2 & 4 comprising the states of (J & K, HP, UA, & NE hills, Punjab, Haryana, Delhi, UP, Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka) based on its yield superiority over the checks as well as % TSS. The centre is required to provide information on the source Germplasm used for deriving parental lines.
35. **Kaveri 218 Plus:** The company must spell-out the reasons for re-submission of the proposal of Kaveri 218 plus (medium maturity group; zone 4) as the hybrid under reference is already notified vide notification number SO 2125 (E) dated 10/09/2012 for the states of zone 3 comprising UP, Bihar, Jharkhand and Odisha.

Meeting ended with thanks to the Chairman.



O.P. Yadav
Project Director
Directorate of Maize Research
New Delhi



Swapan K. Datta
Deputy Director General (Crop Science)
ICAR, New Delhi

Session VIII

ICAR-CIMMYT Collaboration

Chairman	Co-chairman	Speakers	Rapporteurs
Dr. O. P. Yadav	Dr. M.L. Jat	DMR scientists (Dr. Avinash and Dr. A.K. Singh) CIMMYT scientists	Drs. C.M. Parihar, Bhupender Kumar, Yathish K.R.

The Chairman of the session welcomed the delegates and all the maize scientists from different parts of the country. Results of ICAR-CIMMYT Collaborative trials conducted during 2012 were presented by DMR and CIMMYT scientists.

After the presentations of ICAR-CIMMYT Collaboration, following points have emerged:

- The reporting of the results of these trials should be improved.
- Proper monitoring should be done for each of the trials conducted at different centers.
- The technical programme for the next year should be decided in advance and presented in the workshop.
- The data analysis can be done either by CIMMYT or DMR but the analyzed data should be submitted to DMR and data should be properly documented.
- Data of each centre involved in multi-location trials should be presented.
- The lines evaluated against various biotic and abiotic stresses by CIMMYT scientists and found resistant should be made available to the Indian maize scientists.
- All the QPM lines evaluated in this project should be made available to the Indian maize breeding programme.
- The presentation of the results should be in relevance to the AICMIP workshop.
- Instead of separate presentation from both the partners, there should be only one combined presentation in relevance to the AICMIP.
- It was emphasized that the allocation of trials and fund of ICAR-CIMMYT Collaboration at different AICMIP Centers should be based on the resource availability of the respective centre.
- Some of ICAR-CIMMYT Collaborative trials may be conducted at voluntary centres of the respective zones.
- It was also suggested to identify few voluntary centres for quality breeding programme.

Session IX
Breeder Seed Production, FLDs and Training Programmes

Chairman	Co-Chairman	Rapporteurs
Dr. Gidda Reddy	Dr. O.P. Yadav	Drs. Vishal Singh, Abhijit Das and Pranjal Yadava

Dr. Avinash Singode presented the progress of maize breeder seed production during *kharif*-2012. The following points emerged out of the presentation:

- A total of 108.65 quintals of breeder seed produced against an indent of 99.0 quintals from Department of Agriculture and Cooperation, Ministry of Agriculture, GOI.
- The short-fall in production of certain entries is taken up during *rabi*-2012-13 and spring 2013.
- Centers taking up breeder seed production during *rabi*-2013 and spring 2013 must update the production figures as early as possible so that breeder seed can be lifted in right time.
- To avoid non-lifting of breeder seed, centers may take up breeder seed production during *kharif* season.
- Parental lines of Pratap Hybrid Makka-1 was reported non-satisfactory in BSP-III, hence the center should purify the lines and take up breeder seed production of the same.
- All the centers should keep a minimum amount of nucleus seed in short and long term storage so that purity can be maintained at times.
- Universities are responsible to maintain the purity of varieties and parental lines of hybrids released from their centers.
- A contingency plan should be ready in case of failure of breeder seed production.
- All the centers must strengthen maintenance of nucleus and breeder seed.
- All the centers must follow calendar of operation of seed production and reporting.
- The maize breeder seed indent for *kharif*-2013 allocation was provided to the centers and a copy of the DAC Breeder Seed Indent is attached as Annexure-I.

Frontline Demonstrations and Training Programmes

Dr. Virendra Kumar Yadav, Senior Scientist (Agricultural Extension) presented the review of frontline demonstrations (FLDs), Officers' Training Programmes, Kisan Melas & Exhibitions and Tribal Sub-Plan (TSP) organized during last year and plan for FLDs during 2013-14. A total of 2664 FLDs during *rabi* 2011-12, 788 in spring 2012 and 5063 FLDs during *kharif* 2012 were organized in 23 states of India through 48 agencies of public and private sectors. An average grain yield of 5074 kg/ha was recorded which showed an increase of 104.76 per cent over all India average yield of maize. All promising technologies were demonstrated at

farmers' field. Fourteen Officers' training programmes were organized in five states of the country by five AICMIP centres. The Directorate of Maize Research (DMR) participated in ten Kisan Melas and Exhibitions by putting up stalls. DMR implemented TSP in tribal populated states of India. 973 demonstrations, 5 national level trainings, 16 regional level training programmes, 8 field days and 5 exhibitions were organized and inputs (seed, fertilizer, sprayer, weeder, sheller, storage bins, etc) were distributed by DMR and AICMIP centres.

It was decided that 5175 FLDs in *kharif* 2013, 2973 FLDs in *rabi* 2013-14 and 1452 FLDs in spring 2014 will be proposed for AICMIP centres, KVKs and NGOs (Table 1) for approval of TMOP, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.

Annexure-I
Allocation of Breeder seed production for 2013-14 (BSP-I)

	CROP : MAIZE HYBRID	Variety Name	YEAR	Quantity in quintals												UK	Total		
				CG	DADH	JH	KK	MP	MH	NDDB	NSC	PB	RJ	SAI	SFCI				
1		Vivek Maize Hybrid 39 (V-373) (F)	2012														0.03	0.03	
		Vivek Maize Hybrid 39 (CM-212) (M)															0.01	0.01	
2		PMH 4 (LM-5) (F)	2011															0.42	
		PMH 4 (LM-16) (M)																0.13	
3		PMH 5 (JH 3110) (LM16) (F)	2011															0.42	
		PHM-5 (LM18) (M)																0.13	
4		HQPM-4 (HKI-193-2) (F)	2010										4.50					4.5	
		HQPM-4 (HKI-161) (M)											1.50					1.5	
5		Pusa Extra Early Hybrid Makka -5 (CM-150) F	2009													1.00	0.04	1.04	
		Pusa Extra Early Hybrid Makka -5 (CM-151)M														0.50	0.02	0.52	
7		HM-10 (HKH-1200) (HKI 1128) (M)	2008													0.20	1.00	1.2	
		HM-10 (HKH-1200)(HKI 193-2)(F)	2008													0.30	2.00	2.3	
8		HQPM-7 (HKI 161) (M)	2008														1.15	1.2	
		HQPM-7 (HKI 193-1) (F)	2008														0.35	0.5	
9		PMH-3 (JH 10704) (LM-17) (F)	2008															0.42	
		PMH-3 (JH 10704) (LM-14) (M)																0.13	
10		Vivek Maize Hybrid 33 (FH 3352) (V-372)(F)	2008															0.04	
		Vivek Maize Hybrid 33 (CM212)(M)																0.02	
11		Vivek QPM-9 (FQH 4567) (VQL1) (F)	2008															0.03	
		Vivek QPM-9 (VQL2) (M)																0.01	
12		HQPM-5 (HKI-163) (F)	2007													0.15	1.50	2.65	
		HQPM-5 (HKI-161) (M)														0.05	0.50	0.85	
13		HM-4 (HKI-1105) (F)	2005															0.37	
		HM-4 (HKI-323) (M)																0.13	
14		Vivek Maize Hybrid-17 (FH-3186) (CM-153)(F)	2005					1.50										1.5	
		Vivek Maize Hybrid-17 (FH-3186) (CM-212)(M)						0.50										0.5	
15		HM-8 (HKI-1105) (F)	2007															0.15	
		HM-8 (HKI-161) (M)																0.05	
16		HQPM-1 (HKI-193) (F)	2006													0.15	4.00	4.15	
		HQPM-1 (HKI-163) (M)														0.05	2.00	2.05	
18		Pratap Hybrid Maize-1 (EI-116) (F)	2004															3	
		Pratap Hybrid Maize-1 (EI-364) (M)																1.5	
19		Shaktiman-2 (CML-176) (M)	2002	0.65														0.65	
		Shaktiman-2 (CML-186) (F)		0.35														0.35	
		TOTAL :b		1.00				2.00					3.45		21.50		6.50	0.20	34.65

Breeder seed indent: Kharif-2014

MAIZE COMPOSITE

	Variety Name	YEAR	CG	DA DH	JK	JH	KK	MP	MH	NDDB	NSC	PB	RJ	SAI	SFCI	UK	Total
1	PRATAP MAKKA-4 (EC-1108)	2006													2.00		2.00
2	PRATAP MAKKA-5 (EC-3116)	2006											2.00				2.00
3	Azad Kamal (R 9803)	2005						0.20									0.20
4	Pusa Composite-3 (Composite-85134)	2005	1.00					0.20			0.07						1.27
5	Pusa Composite-4(Composite-8551)	2005						0.20			0.10						0.30
6	Pratap Kanchan-2 WC-236(Y) F-Line	2004											1.00				1.00
7	JAWAHAR MAKAI-216 (JM-216)	2002	1.00					11.00									12.00
8	AMAR (D-941)	2001						0.20									0.20
9	JAWAHAR COMPOSITE MAKKA-12 (JM-12)	1999						1.00									1.00
10	BIRSA MAKKAI-1	1996				2.00								0.30			2.30
11	BIRSA MAKKAI-2	2005				2.00											2.00
12	KANCHAN	1986												0.05		0.12	0.17
13	SONARI (SHWETA)	1982														0.04	0.04
14	NAC 6004	2001	1.00								0.10						1.10
15	Vijay Composite				0.10												0.10
Total			3.0		0.10	4.0		12.80			0.27		3.0	0.35	2.00	0.16	25.68

Table 1: Annual action Plan of FLDs for 2013-14**Public Sector**

S. No.	Name of the Centres/ Agencies /Organizations	No. of FLDs (one FLD is of one acre) to be allotted			Total
		Kharif 2013	Rabi 2013-14	Spring 2014	
1	ANGRAU, Hyderabad (A.P.)	500	100	0	600
2	AAU, Assam	50	70	0	120
3	Dholi, RAU, Samastipur (Bihar)	100	200	50	350
4	Ambikapur, IGAU, Raipur (Chattisgarh)	50	50	0	100
5	DMR, New Delhi	50	30	100	180
6	RMR&SPC, DMR, Begusarai (Bihar)	100	100	50	250
7	WN, DMR, Hyderabad (A.P.)	100	100	0	200
8	Godhra, GAU, Ahmedabad (Gujarat)	100	100	0	200
9	Dantewada Agril. University (Gujarat)	75	50	0	125
10	Bajaura, HPKVV, Palampur, HP	75	0	0	75
11	Dhaulakuan, HPKVV, Palampur (HP)	50	0	0	50
12	Kangra, HPKVV, Palampur (HP)	50	0	0	50
13	CCSHAU, Uchani, Haryana	100	0	100	200
14	Birsa Agril. Univ. Ranchi, Jharkhand	60	40	0	100
15	SKUAT, Jammu (J&K)	25	0	0	25
16	SKUAT, Srinagar (J&K)	500	0	0	500
17	Arbhavi, UAS, Dharwad (Karnataka)	100	50	0	150
18	Mandya, UAS, Bangalore (Karnataka)	100	0	0	100
19	Kolhapur, MPKVV (Maharashtra)	100	0	0	100
20	Chhindwara, JNKVV(MP)	100	50	0	150
21	KVK, Jhabua (MP)	100	100	0	200
22	OUAT, Bhubaneshwar (Orissa)	150	200	0	350
23	Ludhiana, PAU, Ludhiana (Punjab)	100	0	50	150
24	Banswara, MPUAT (Rajasthan)	50	50	0	100
25	Udaipur, MPUAT (Rajasthan)	200	0	0	200
26	Coimbatore, TNAU (Tamilnadu)	200	150	50	400
27	Vaghrai, TNAU (Tamilnadu)	50	50	0	100
28	GBPUAT, Pantnagar, Uttarakhand	50	0	0	50
29	VPKAS, Almora, Uttarakhand	25	0	0	25
30	Varanasi, BHU (UP)	75	25	0	100
31	Kanpur, CSAUA&T (UP)	100	50	50	200
32	Bahraich, NDUAT (UP)	100	50	50	200
33	KVKs of Zone I	275	0	115	390
34	KVKs of Zone III	135	143	87	365
35	KVKs of Zone IV	200	165	130	495
36	KVKs of Zone VII	300	300	300	900
37	BAU, Sabour (Bihar)	50	150	50	250
38	Central Agricultural Research Institule, Port Blair	5	50	20	75
Total		4550	2423	1202	8175

Private Sector

S.No	Name of the Agencies/ Non Governmental Organizations (NGOs)	No. of FLDs (one FLD is of one acre) to be allotted			
		Kharif 2013	Rabi 2013-14	Spring 2014	Total
1	Indian Maize Development Association (IMDA)	100	100	75	275
2	Gram Vikas Samiti, Barabanki (U.P.)	100	100	50	250
3	U.P. Maize Development Association (UP)	100	100	50	250
4	Bhartiya Shiksha Gramin Vikas Awam Anusandhan Samiti (UP)	50	50	0	100
5	VARDAN, New Delhi	50	50	25	125
6	Udyaniki Krishi Anusandhan Samiti	50	50	50	150
7	Speciality Corn Farmers Forum (H.P.)	75	0	0	75
8	SPARK, Patna (Bihar)	25	50	0	75
9	VASFA, Vaishali (Bihar)	25	50	0	75
10	Ambedekar Seva Sansthan Lucknow (U.P.)	25	0	0	25
11	Apna Ghar , Lucknow (U.P.)	25	0	0	25
Total		625	550	250	1425
Grand Total		5175	2973	1452	9600

Besides review of progress of last year and plan of action for 2013-14, following decisions have been taken in the workshop session for proposing to TMOP, Ministry of Agriculture, Government of India for approval:

- i) Seed village concept is effective for seed production to meet the requirement of isolation. It would be tried to produce seed of one hybrid in one village in many acres of land. Seed should be certified by the seed certification agency. Farmers may sell seed produced by them.
- ii) Demonstration of quality protein maize and sweet corn is effective in cluster approach because there is chance of mixture of normal maize grain from adjoining plots. Therefore, group of farmers may be selected for demonstration of particular quality protein maize and sweet corn in one or more than one village.
- iii) Generally one acre of land of one farmer at one place is not available in hilly, terrain areas and where consolidation of land holding was not implemented. In such cases, FLDs may be conducted in available piece of land as per convenience.
- iv) Monitoring and follow-up actions are vital for success of any programme. Therefore, an amount of Rs.10,00,000/- (Rs. ten lakhs only) should be provided to the Directorate of Maize Research (DMR) for outsourcing, monitoring, hiring vehicles, miscellaneous expenses, etc.
- v) It was also decided to propose raising of funds required for organizing FLDs. It should be raised to Rs. 6000/- per acre from present level of Rs. 2000/- per acre.

- vi) It was decided that unspent balance of FLDs and Officers training left over stands revalidated for expenses during 2013-14.
- vii) Officers Training Programme should be continued but fund should be raised from Rs.16000/- to Rs.48000/-. Besides Officers of State Department of Agriculture, the progressive farmers, farm women, field workers of Non Governmental Organizations (NGOs) and key workers involved in implementing FLDs should be trained in the Officers' Training Programme for bringing more effectiveness in FLDs and improving linkage of farmers - extension agencies - researchers.
- viii) Performae for data collection of FLDs should be revised and simplified.

Dr. Ranvir Singh, Nodal Officer (Maize), TMOP praised efforts of DMR and AICMIP centres for effective implementation of FLD programme.

The session was concluded with thanks to the chair.

Session X Plenary Session

Chairman	Co-chairman	Speakers	Rapporteurs
Dr. S.K. Datta, DDG (CS), ICAR	Dr. O.P. Yadav	Dr. Jyoti Kaul (Breeding) Dr. Ashok Kumar (Agronomy) Dr. P. Kumar (Entomology) Dr. K.S. Hooda (Pathology)	J.C. Sekhar, K.S. Hooda, S.L. Jat, G.K. Chikkappa,

At the outset, Dr. O.P. Yadav, Director, DMR, apprised to Dr. S.K. Datta, DDG (CS) about the discussions held and decisions taken during past two days of workshop regarding zone-wise AICMIP testing in AET-I, delineating of zone I from other zones, deletion of late trials testing in zone I, number of test locations (inclusion of voluntary centres from both public and private organizations), reviewing and reporting of ICAR-CIMMYT work plan, etc. He also highlighted the need of clear landscape of maize research in coming years especially in the context of 12th five-year plan and emerging challenges to cope up with present and future world scenario of maize research. In addition, the plan of work for *Kharif* 2013 and *Rabi* 2013-14 was also presented in the august house.

Vice Chancellor, ANGRAU, gave his valuable remarks about research needs to maintain sustainable soil health under intensive and highly exhaustive rice – maize cropping system especially in coastal Andhra Pradesh. He also highlighted the need to develop new high yielding sweet corn hybrids which can suit small and marginal farm holdings due to increased popularity of sweet corn.

The recommendation of newly developed hybrids for release by CVRC was announced by Dr. O.P. Yadav, Project Director, DMR. It was very successful workshop because as high as 25 hybrids out of 34 proposals were recommended for release which was a landmark in the history of Indian Maize Programme. This is the highest number ever recommended for release.

The DDG (CS) made his remarks that the past success in maize research was highly appreciative but, the future is very challenging, so there is need to concentrate more on vertical expansion rather than horizontal expansion. He highlighted that the future for maize research is very bright so there is need to put more concentrated efforts in enhancing the yield by achieving potential yield. He also congratulated the scientists who are involved in release of hybrids. He highlighted that niger yield is increasing substantially in West Bengal. He also encouraged maize group to work towards doubling the present maize production in another 7-8 years. He recalled his own remarks made with reference to 100mt of wheat production by India in front of Raja Ram, a world renowned wheat scientist a couple of years back and the present wheat production in India is almost close to 100 m t. He stressed the need of research on maize starch and also refereed DMR that it should take up that kind of research. Coming back to again maize, he compared with Bangladesh's maize productivity which is more than 6t/ha. So if India doubles its present productivity of 2.5t/ha to 5t/ha then there is no doubt that India would achieve its feat in coming years.

The minutes of various sessions were presented and they were adopted as such. Finally the vote of thanks was extended by Dr. P. Kumar.



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