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Proceedings of the 48th Annual Pearl Millet Workshop
All India Coordinated Pearl Millet Improvement Project

Held at

Junagadh Agricultural University
Junagadh, Gujarat

March 22-24, 2013

भाकृअनुप
ICAR

All India Coordinated Pearl Millet Improvement Project
(Indian Council of Agricultural Research)
Mandor, Jodhpur 342 304
www.aicpmip.res.in

48th Annual Pearl Millet Workshop
All India Coordinated Pearl Millet Improvement Project
(Indian Council of Agricultural Research)

Date: March 22-24, 2013 **Venue: Auditorium Hall, JAU, Junagadh**

Day 1: March 22nd, 2013 (Friday)

0830 - 0900	**Registration**			
Interaction with Joint Secretary GOI				
0900-1000	**Chief Guest**	Dr. Atanu Purkayastha (Joint Secretary GOI)		
	Chairman	Dr. N.C. Patel (Vice-Chancellor, JAU, Junagadh)		
	Co-Chairman	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur		
	Rapporteur	Dr. C. Tarasatyavati, IARI, New Delhi		
Session I: General Issues (Joint Session) and action taken Report by PC				
1000-1100	**Chairperson**	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur		
	Rapporteur	Dr. B.S. Rajpurohit, AICPMIP, Jodhpur		
1100-1115	High Tea			
Session II: Review of Research Results of AICPMIP Centres 2012-13 and Plan of work 2013-14 (Concurrent discipline-wise, centre-wise presentation of significant results and progress report)				
1115-1600		**Chairperson**	**Co-Chairperson**	**Rapporteur**
	Crop Improvement (1st Floor, Seminar Hall, Agri. College)	Dr. M.M. Roy, Director, CAZRI & PC, AICPMIP, Jodhpur	Dr. C.J. Dangaria, Dir. of Res. JAU, Junagadh	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur Dr. K.D. Mungra, JAU, Jamnagar
	Crop Production (Seminar Hall, Dept. of Agro., Agri. College)	Dr. A. K. Joshi, Prof. & Head, Seed Tech. Unit., JAU, Junagadh	Dr. B.K. Sagarka Prof. & Head, Agronomy, JAU, Junagadh	Dr. M.S. Rathore, Agronomist, AICPMIP, Jodhpur Dr. A.C. Mehta (Agro), ARS, JAU, Jamnagar
	Crop Protection (Seminar Hall, Dept. of Entomology, Agri. College)	Dr. I.U. Dhruj, ADR, JAU Junagadh	Dr. K.B. Jadeja Prof & Head Pathology JAU, Junagadh	Dr. B.L. Tandi (Ento.) SKRAU, Bikaner Dr. H.R. Bishnoi, (Patho) AICPMIP, Jodhpur
1300-1400		Lunch		
1400-1600		Session II continue		

Session III: Review of Research Results and Progress Report of AICPMIP 2012-13		
1600-1800	**Chairperson**	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Co-Chairperson	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
	Rapporteur	Dr. C. Tarasatyavathi, IARI, New Delhi
	Crop Improvement	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
	Crop Production	Dr. M.S. Rathore, Agronomist, AICPMIP, Jodhpur
	Crop Protection	Dr. H.R. Bishnoi, Pathologist, AICPMIP, Jodhpur Dr. B.L. Tandi, Entomologist, ARS, Durgapura
Day 2: March 23nd ,2013 (Saturday)		
Inaugural session		
0900-1130	**Chairperson**	Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh
	Inaugurator/Chief Guest	Sh. Govindbhai Patel, Hon'ble Minister of Agriculture (State), GOG, Gandhinagar
	Guests of Honour	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi Dr. K.N. Rai, Principal Scientist, ICRISAT
	Welcome	Dr. C.J. Dangaria, Director Res., JAU, Junagadh Felicitation of Hon'ble Minister by JAU, Junagadh
	Highlights of Research Progress 2012-13	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
	Remarks by ADG (FFC)	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Remarks by Chief Guest	Hon'ble Minister of Agriculture, GOG, Gandhinagar
	Remarks by Chairperson	Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh
	Vote of Thanks	Dr. P.R. Padhar, Res. Sci. (PM), JAU, Jamnagar
1130-1145	High Tea	
Session IV: Review of BSP		
1145-1330	**Chairperson**	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
	Co-Chairperson	Dr. H.P. Yadav, Prof. & Head, Dept. PBG, HAU, Hisar
	Rapporteur	Dr. Vikas Khadelwal, CAZRI, RRS, Pali
	Speaker Breeder Seed Production Review and Programme	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
1330-1430	Lunch	
Session V: Review of Research Results & Progress Report of ICAR-ICRISAT Collaborative Projects 2012-13 and Plan of Work 2013-14		
1430-1500	**Chairperson**	Dr. Stefenia Grando, Director, Dryland, Cereal, ICRISAT, Patancheru
	Co-Chairperson	Dr. V.K. Manga, Principal Scientist, CAZRI, Jodhpur
	Rapporteur	Dr. Lila Dhar Sharma, Breeder, Jaipur Dr. S.P. Singh, Sr. Scientist, IARI, New Delhi
	Speakers	Dr. K.N. Rai, Principal Scientist, ICRISAT, Patancheru
	Results	Dr. Ramavtar Sharma Nodal Scientist, Jodhpur
	Program	Dr. Rakesh Srivastava, ICRISAT, Patancheru
Session VI: Review and Crop Production Strategies and Value Chain 2012-13 and Plan of Work 2013-14		
1500 - 1545	**Chairperson**	Dr. M.N. Singh Director, DMD, Jaipur
	Co-chairperson	Dr. Yogendra Singh, Breeder, SKRAU, ARS, Jaipur
	Rapporteur	Dr. Anil Kumar, Agro., HAU, Hisar

	Frontline Demonstrations	Dr. M.S. Rathore, Agronomist, AICPMIP, Jodhpur
1545 - 1600	Tea Break	
Session VII: Review of AICPMIP Centres		
1600 - 1630	**Chairperson**	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Co-chairperson	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur Dr. Ramavtar Sharma Nodal Scientist, Jodhpur
	Rapporteur	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
Session VIII: Variety Identification Committee		
1630 – 1815	**Chairperson**	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Member Secretary	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
	Varietal Identification Committee Meeting	Members and facilitators

Day 3: March 24th, 2013 (Sunday)

Session IX: Collaborations, Genetic Resource Management, DUS Testing & Registration		
0900–1100	**Chairperson**	Dr. R.K. Bhatt, CAZRI, Jodhpur
	Co-chairperson	Dr. Omvir Singh, Incharge, NBPGR, Jodhpur
	Rapporteur	Dr. P. Sumathi, TNAU, Coimbatore
	DUS Testing Project Discussion	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
1100–1115	Tea Break	
Plenary Session: Session-wise Presentation of the Recommendations 2012-13 and Technical Programme of Work 2013-14		
1115–1300	**Chief Guest**	Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh
	Chairperson	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Co-Chairperson	Dr. C.J. Dangaria, Dir. of Res., JAU, Junagadh
	Rapporteur	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
	Interaction	Dr. C. Tarasatyavathi, IARI, New Delhi
	Technical Session I	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
	Technical Session II	-
	Crop Improvement	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
	Crop Production	Dr. M.S. Rathore, Agronomist, AICPMIP, Jodhpur
	Crop Protection	Dr. H.R. Bishnoi, AICPMIP, Jodhpur Dr. B.L. Tandi, SKRAU, Bikaner
	Technical Session III	Dr. C. Tarasatyavati, IARI, New Delhi
	Technical Session IV	Dr. Vikas Khandelwal, CAZRI, RRS, Pali
	Technical Session V	Dr. Lila Dhar Sharma, Breeder, SKRAU, Jaipur
	Technical Session VI	Dr. Anil Kumar, Agronomist, Hisar
	Technical Session VII	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
	Technical Session VIII	Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur
	Technical Session IX	Dr. P. Sumathi, TNAU, Coimbatore
	Vote of thanks	Dr. K D Mungra, JAU, Jamnagar
1300–1400	Lunch Break	
1400 to onward	Visits: Fields/Labs	

INTERACTION WITH JOINT SECRETARY, MINISTRY OF AGRICULTURE GOVERNMENT OF INDIA

Chairman	:	Dr. N.C. Patel Vice Chancellor JAU, Junagadh	**Co-Chairman**	: Dr. M.M. Roy Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
			Rapporteur	: Dr. C. Tara Satyavathi Principal Scientist IARI, New Delhi
Date	:	March 22, 2013	**Time**	: 9:00 AM
Chief Guest	:	Dr. Atanu Purakayastha (Joint Secretary, GOI)		

During the discussion with the Joint Secretary, GOI the following points emerged out:

1. Pearl millet is receiving renewed attention due to its high nutritional value and is viewed as a potential option in the changing climate scenario.
2. Efforts need to be made to improve coarse cereal consumption to improve the nutritional security of the country as coarse cereals are rich in their nutritional value.
3. Information about the released high yielding hybrids and varieties of pearl millet need to be made available to different government departments for their popularization and effective implementation of Mission on Coarse cereals.
4. Efforts need to be strengthened to boost up seed production of released hybrids and varieties of pearl millet for effective implementation of Mission on coarse cereals. The pace of release of hybrids by public sector needs to match with that of private sector.
5. The seed production of released hybrids and varieties of pearl millet should be taken up in PPP mode or seed village mode.
6. The technologies available in improving the quality of pearl millet flour developed by CCSHAU should be made available to public and help in popularization and consumption of pearl millet.
7. Prospects of oil extraction from pearl millet need to be explored as the oil content is high in comparison to other cereals.

Finally pearl millet has to be viewed as an important crop in terms of its nutritional richness (high iron and zinc) in improving nutritional security and its resilience to climate change.

The session ended with thanks to the Chief Guest, Chair and Co-chair.

SESSION - I

GENERAL ISSUES

Chairman	: Dr. M.M. Roy Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur	**Rapporteur**	: Dr. B.S. Rajpurohit, Associate. Prof. (PBG) AICPMIP, Jodhpur
Date	: March 22, 2013	**Time**	10.00 AM

Recommendations of last workshop (47th) and action taken report was presented by Project Coordinator.

S. No.	Issue	Action
1.	It was suggested to add CCS HAU, Bawal location as a regular AICPMIP centre.	Project Coordinator requested to QRT regarding increase of locations in A1 zone & QRT may suggest the increase in locations.
2.	Dr. O.P. Yadav inquired about germplasm collection from Rajasthan at Jaipur and told that there was no germplasm collection after 1997 and it was agreed that it should be done during 2012 by ARS, Jaipur.	Jaipur centre collected the germplasm.
3.	Dr.Dua expressed his strong recommendation for public private partnership for seed production of public bred hybrids. He suggested that all universities take initiatives in this matter. It was agreed that Project Coordinator should write to vice-chancellor of SAU to take initiatives for providing seeds of their hybrids to farmers under public private partnership, if the hybrid seed is not produced in enough quantity through established public sector seed chain.	Vice-chancellor and Director Research were informed for making MOU with private companies to take up seed production of hybrids bred by them (especially SKRAU, Bikaner). The issue was discussed with Government officials also.
4.	Chairman expressed his serious concern regarding unauthenticated presentation of AICPMIP trial data of Kalai centre and suggested that vice-chancellor of the university should be informed. He also suggested to Kalai centre to prioritize work on hybrid breeding.	The issue has been brought to the notice of respective Vice Chancellor through letter.
5.	Bijapur centre was suggested to deposit collected germplasm to NBPGR with passport data with intimation to the Project Coordinator.	Characterized germplasm and ready for deposition
6.	Work on micro dosing of fertilizer and drip irrigation needs to be carried out.	Facilities have been created at Mandor for drip irrigation.

7.	There exists a rich gene pool for downy mildew resistance across the locations and that it should be exploited effectively.	Basic work has been initiated at Mysore centre. Identified six pathotypes, 14 differentials and distribution of pathotypes in the country.
8.	Ideal screening infrastructure needs to be developed at different centers and work needs to be initiated on new priority areas like blast.	Needs development of basic facilities.
9.	To look and explore pearl millet from a basic and strategic research perspective like bio-prospecting for new genes.	The work is being carried out at Mysore centre for downy mildew resistance gene isolation. IARI, isolated heat tolerant genes
10.	The type of research carried out in agronomy, pathology and other disciplines needs to be revisited.	Needs development of basic facilities.
11.	Mechanization of harvesting of millets also should be considered and this can be made possible by little architectural changes in plant ideotype.	Mechanized harvesting is being practices where ear-heads are collected after whole plant harvesting. Moreover semi tall hybrids (5-6 ft. tall) developed by public sector especially suit for mechanical harvesting.
12.	Downy mildew data at 30 days after sowing of AICPMIP Pathology trials should be submitted to the Project Coordinator within one week of data recording. The data should also be produced before the monitoring team.	The entire centres submitted the data.
13.	In view of increased incidence of blast disease during last few years, it was suggested that blast nursery should be developed at AICPMIP centers. It was also agreed that the Pathologists of AICPMIP centers who would be participating in Pearl Millet Field Day to be held during September 2012 at ICRISAT Patancheru should arrive one day advance at ICRISAT. They would be given training on the screening techniques and other aspects of blast disease.	All the pathologist participated in Pearl millet field day at ICRISAT Patancheru and attended training on screening techniques of blast.

- It was emphasized that screening for heat and drought tolerance and oil content be taken up. However, it needs infrastructure so possibilities for extra funds should be explored through other platform like NICRA.

- Biochemist from CCS HAU, informed about biochemical parameters of pearl millet. Oil content is maximum in HHB 94 (7.7%). The variation is low compared to protein 5-20%. Alternative/medicinal value of pearl millet oil was appraised by him, like changes in hair texture, wound healing and good for diabetic. There is technology for improving shelf life of pearl millet (by blanching).
- Dr. Rakesh Shrivastava from ICRISAT informed about the availability of lines with high oil content and informed that shelf life of pearl millet flour may also be enhanced by reducing enzyme activity.
- The Project Coordinator informed that in 12^{th} plan several modifications may be required. Positions vacant for a long time need not to be filled now. A letter to all concerned Vice Chancellors has already been sent by the PC.
- The Project Coordinator informed about the available budget and need for curtailing the projected BE in the light of sanctioned budget. Centres demanded contingent grants matching with last year release as they have already made the expenses. Requirement was taken from the centres and request was sent to ADG (FFC) who immediately sanctioned the required amount.
- The Project Coordinator suggested the participants to deposit collected germplasm to NBPGR and get it registered at PPV and FRA and/or NBPGR at the earliest.

SESSION - II

REVIEW OF RESEARCH RESULTS OF AICPMIP CENTRES 2012-13 AND PLAN OF WORK 2013-14 (CONCURRENT DISCIPLINE-WISE, CENTRE-WISE PRESENTATION OF SIGNIFICANT RESULTS AND PROGRESS REPORT)

A. CROP IMPROVEMENT (PLANT BREEDING)

Chairman	: Dr. M.M. Roy Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur	**Co-Chairman**	: Dr. C.J. Dangaria Director Research JAU, Junagadh
		Rapporteur	: Dr. B.S. Rajpurohit Associate. Prof. (PBG) AICPMIP, Jodhpur
			Dr. K.D. Mungra Assoc. Research Scientist, JAU, Jamnagar
Date	: March 22, 2013	**Time**	11.15 AM

Review of Research Results – Centre-Wise Presentation of Significant Results and Progress Report (2012-13)

The meeting of pearl millet breeding group was held at 11.00 AM in the Conference Hall, College of Agriculture, JAU, Junagadh to undertake the centre-wise discussion of research results of kharif /summer 2012-13 and formulation of technical programme of kharif /summer 2013-14.

- The results were presented by respective scientist of the station as under:

Bikaner	:	Dr. P.C. Gupta
Jaipur	:	Dr. Yogendra Singh
Hisar	:	Dr. H.P. Yadav
Gwalior	:	Dr. A.K. Singh
Jamnagar	:	Dr. K.D. Mungra
Ludhiana	:	Dr. R.K. Bajaj
Dhule	:	Dr. H.T. Patil
Aurangabad	:	Dr. N.B. Katare
Anantapur	:	Dr. P. Santhi
Coimbatore	:	Dr. P. Sumathi
Bijapur	:	Mr. Bandenamaj Athoni

- Chairman, Dr. M.M. Roy expressed his satisfaction over good work being done at Jaipur, Hisar, Jamnagar, Dhule and Coimbatore.

- Bikaner, Ludhiana and Anantapur centres were advised to strengthen the hybrid breeding programme.
- Performance of Gwalior, Aurangabad and Bijapur centres was not considered satisfactory. They need to strengthen breeding work.
- Kalai centre didn't present the progress report of the centre. It was taken very seriously. Project Coordinator may write to Vice Chancellor CSAUAT, Kanpur regarding this matter.
- Jaipur, Hisar and other centres were requested to move proforma for registration of newly developed hybrids along with seed of parental lines and hybrids to Project Coordinator for onward transmission to PPV & FRA. The Project Coordinator after completing other requirements may forward it to PPV and FRA.
- It is suggested that collection of germplasm may be done in collaboration with NBPGR. Joint exploration may be taken with NBPGR.
- Dr. Dangaria suggested that R x R and B x B crosses for the improvement of restorer and CMS should be restricted to 10-12 crosses for effective handling of segregating populations.

FORMULATION OF TECHNICAL PROGRAMME FOR 2013-14
PLANT BREEDING

Organisation of trials

The following entries were promoted to higher stage in various trials on the basis of performance in trials for the characters:

- Grain yield = higher than best check,
- Downy mildew (60 DAS) equal to or less than 5.4% in hybrids; less than or equal to 10% in populations,
- Days to 50% flowering in IHT (Early) and AHPT (Early) at par with best check, in IHT (Medium) and AHT (Medium) equal to or less than 50 Days.
- A grace of one day in days to 50% flowering may be given to hybrids yielding grains 15% higher to best check in early and medium group hybrids.
- The total promoted entries should not be more than 33% of total test entries in medium and late maturity hybrid trials.

  Note: (These were based on thorough discussion in the sessions with participants and ADG (FFC), ICAR)

Hybrid and Population Trials

Entries promoted to next higher stage of testing in kharif/summer 2013 Zone A_1 and A

S. No.	Advance Hybrid & Population Trial (E)	S. No.	Advance Hybrid Trial (L) Zone A
	IHT (E) to AHPT (E) I		**IHT (L) A to AHT (L) A I**
1	MH 1700*	1	MH 1890
2	MH 1837	2	MH 1888
3	MH 1841	3	MH 1898
4	MH 1836	4	MH 1894
5	MH 1832	5	MH 1900
6	MH 1831	6	MH 1886
	PT A to AHPT (E) I	7	MH 1887
	Nil	8	MH 1889
	AHPT (E) I to AHPT (E) II	9	MH 1880
7	MH 1771		**AHT (L) A I to AHT (L) A II**
8	MH 1777		Nil
	Checks		**Checks**
9	HHB 67 (Imp.)	10	GHB 558
10	RHB177	11	GHB 732
11	ICMH 356	12	Nandi 61
	*Retained for one more year		
S. No.	**Advance Hybrid Trial (M) Zone A [AHT (M)**	**S. No.**	**Population Trial Zone A (PT A)**
	IHT (M) A to AHT (M) A I		**PT A to PT A I**
1	MH 1875	1	MP 535
2	MH 1849	2	MP 534
	AHT(M)A I to AHT(M) A II	3	MP 543
3	MH 1790	4	MP 533
	Checks		**PT A I to PT A II**
4	RHB 121	5	MP 519
5	GHB 744	6	MP 520
6	RHB 173		**+ New entries of PT**
			Checks
			Raj 171
			Pusa 383
			JBV 2
			ICMV 221
			MBC 2

Entries promoted to next higher stage of testing in kharif/summer 2013 Zone B

S. No.	Advance Hybrid Trial (M) Zone B [AHT (M) B]	S. No.	Advance Hybrid Trial (L) Zone B [AHT (L) B]
	IHT (M) B to AHT (M) B I		**IHT (L) B to AHT (L) B I**
1	MH 1855	1	MH 1887
2	MH 1864	2	MH 1889
3	MH 1869	3	MH 1888
4	MH 1852	4	MH 1890
	AHT (M) B I to AHT (M) B II	5	MH 1901
5	MH 1790	6	MH 1904
6	MH 1792	7	MH 1899
7	MH 1785	8	MH 1886
8	MH 1795	9	MH 1894
9	MH 1796	10	MH 1884
	Checks	11	MH 1905
10	GHB 558		**AHT (L) B I to AHT (L) B II**
11	ICMH 356	12	MH 1815
12	Shradha	13	MH 1812
13	VBBH 3040	14	MH 1816
			Checks
		15	GHB 558
		16	B 2301
		17	86M64
S. No.	**Summer Hybrid Trial (SHT)**	**S. No.**	**Population Trial Zone B (PT B)**
	SHT to SHT I		**PT B to PT B I**
1	MSH 276	1	MP 535
2	MSH 278	2	MP 534
	SHT I to SHT II	3	MP 533
3	MSH 254	4	MP 543
4	MSH 257		**PT B I to PT B II**
5	MSH 259	5	MP 519
6	MSH 253		**+ New entries of PT**
	+ New entries		**Checks**
	Checks		Raj 171
	86M64		ICMV 221
	GHB 558		ICTP 8203
	Proagro 9444		ICMV 155

New entries approved for testing in initial trial kharif 2013 /Summer 2014

S. No.	Organization/Institution	Name of Entries				
		IHT (E)	IHT (M)	IHT (L)	PT	Summer
1	AICPMIP, Jodhpur	MPMH 25	MPMH 26			
		MPMH 27				
2	AICPMIP, Jaipur	RHB 214	RHB 217		RCB 23	
		RHB 215	RHB 218			
		RHB 216				
3	AICPMIP, Dhule		DHLB 1121			DHBH 9071
			DHLB 1113			
4	AICPMIP, SKRAU, Bikaner	BHB 1301				
		BHB 1302				
5	AICPMIP, JAU, Jamnagar	GHB 1013	GHB 993	GHB 953		GHB 1086
		GHB 997	GHB 996	GHB 997		GHB 1015
				GHB 1026		GHB 1023
				GHB 1107		
6	AICPMIP, CCS HAU, Hisar	HHB 282	HHB 285	HHB 289	HC-42	
		HHB 283	HHB 286	HHB 290	HC-43	
		HHB 284	HHB 287	HHB 291		
			HHB 288	HHB 292		
7	AICPMIP, Kalai				SPK-99	
8	IARI, New Delhi		Pusa 1304		Pusa Comp. 706	
			Pusa 1309			
9	CAZRI, Jodhpur	CZH 228	CZH 230			
		CZH 229				
10	AICPMIP, TNAU, Coimbatore			TNBH 08810		TNBH 08810
				TNBH 10885		
11	AICPMIP, RVSKVV, Gwalior		RVSBH-22			
12.	PAU Ludhiana			PHB 3142		
13	A.R.S. Anatapur		ABH 02			
			ABh 03			
14	Eco Agri Seeds Pvt. Ltd, Hyderabad		Eco.4799	Eco.22		
15	Trimurti Plant Sciencs Pvt. Ltd., Hyderabad			TMBH 612		
16	Prabhat Agri Biotech Ltd., Hyderabad		PBH 225	PBH 234		
			PBH 360	PBH 306		
17	Devgen Seeds & Crop Tech. Pvt. Ltd., Hyderabad	DB-66293		DB-66792		DB-80102
				DB-80036		
18	Bioseed Res. India Pvt. Ltd., Hyderabad			Bio 8141		Bio 8141
				Bio 8145		Bio 8437
				Bio 8147		
19	VNR Seeds Pvt. Ltd., Raipur (CG)		VNR-3245	VNR-3232		
20	Meta-helix Life Science Pvt. Ltd., Ahmedabad			MP7884		MP7876
				MP7886		MP7878
				MP7887		MP7879
21	Nuziveedu Seed Pvt. Ltd., Secunderabad		NBH 5815	NBH 5812		
				NBH 5782		
22	Kaveri Seed Com. Ltd., Secundrabad		KBH 2191	KBH 3940		
23	Krishidhan Seeds Pvt. Ltd., Jalna			12 KM 11		
24	Nu Genes Pvt. Ltd., Hyderabad		Nu 3356	Nu-3591		Nu-3591
				Nu-3501		
25	Mahodaya Hy. Seed Pvt. Ltd., Jalna			Mahodaya-333		
26	New Nandi Seeds Corporation, Ahmedabad	NMH 83	NMH 84	NMH 85		NMH 86
27	Bayer Bio Science Pvt. Ltd., Hyderabad		XMT 1497	Proagro 9450		Proagro 9450
				PB 1653		PB 1628
28	Pioneer Overseas Corporation, Hyderabad			86M91		86M84
						86M16
29	Krishna Seed (P) Ltd., Agra			KRISHNA 135		
30	Ganga Kaveri Seeds Pvt. Ltd Hyderabad			GK-1116		
				GK-1129		
				GK-1152		
31	Nirmal Seeds Pvt. Ltd., Pachora (MS)	NPH-4506		NPH-4911		
32	Bisco Bio Sciences Pvt. Ltd., Hyderabad		ATPMH-11073	ATPMH-11490		
			BLPMH 0486			
33	Hytech Seed India Pvt. Ltd., Hyderabad			HBH 09078		
				HBH 10354		
34	Ajeet Seeds Ltd., Aurangabad					APH-44
35	Godrej Seeds & Genetics Ltd.		GA 2012	GA 2012		
36	Ankur Seeds Pvt. Ltd., Nagpur			ARBH 11204		
				ARBH 11102		
37	Maharashtra State Seeds Corp. Ltd, Akola		Mahabeej-1203			
38	Nath Biogenes (I) Ltd., Aurangabad		NBBH-01			NBH-4303
39	JK Agri Genetics Ltd, Hyderabad	JKBH 1211	JKBH 1206	JKBH 1194		JKBH 1100
				JKBH 1196		
	Total	18	32	48	5	20

Table I.1 Details of Centres and Trials to be Conducted During Kharif13/Summer 2014 in Zone A_1 and A

LOCATIONS	IHT (E)	IHT (M)	IHT (L)	AHPT (E)	AHT (M)	AHT (L)	PT	RHVT	SHT
RAJASTHAN									
Mandor	*	*	*	*	*	*	*	*	
Jodhpur (CAZRI)	*			*					
Bikaner (RAU)	*	*	*	*	*	*	*	*	
Bikaner (CAZRI)				*					
Jaipur	*	*	*	*	*	*	*	*	
Fatehpur Shekhawati	*			*			*		
Tabiji					*		*		
Alwar (Pioneer)			*		*	*			
Alwar (DevGen)			*			*			
Samdari	*			*			*		
Jobner (SKRAU)				*			*		
Pali (CAZRI)				*					
GUJARAT									
Kothara	*	*		*	*				
Bhuj (CAZRI)	*			*					
S.K.Nagar	*	*	*	*	*	*			*
Mahuva		*	*		*	*			
Anand		*	*		*	*			*
Jamnagar		*	*		*	*	*	*	*
Ahmedabad (New Nandi)		*			*				*
Narsanda (Navbharat)			*			*			*
Palanpur (Pioneer)									*
Dhanera (JK Seed)			*			*			*
Dehgam (Devgen)									*
Deesa (Bioseed)									*
UTTAR PRADESH									
Kalai		*	*		*	*	*	*	
Eglas (Bioseeds)		*							
Agra (Krishna)			*						*
Aligarh (Bayer)			*						
HARYANA									
Hisar	*	*	*	*	*	*	*	*	
Bawal	*	*		*	*		*		
Rewari (Bayer)					*	*			
Suhana (Nuziveedu)						*			
MADHYA PRADESH									
Gwalior		*	*		*	*	*	*	
Morena					*		*		
PUNJAB									
Ludhiana		*	*		*	*	*	*	
DELHI									
New Delhi		*			*	*	*		
Total Trials	**11**	**16**	**17**	**14**	**19**	**18**	**15**	**8**	**10**

Contd.

*=Trial allotted

Table I.1 Details of Centres and Trials to be Conducted During Kharif 2013/Summer 2014 in Zone B

LOCATIONS	IHT (M)	IHT (L)	AHT (M)	AHT (L)	PT	RHVT	SHT
MAHARASTRA							
Auarangabad (NARP)	*	*	*	*	*	*	*
Auarangabad (Ajeet Seed)			*	*			*
Auarangabad (Nath Seed)			*				
Auarangabad (DevGen)		*		*			
Niphad			*	*	*		
Dhule	*	*	*	*	*	*	*
Jalna (Vijay Seed)		*		*			
Jalna (Mahodaya)		*		*			
Pachora (Nirmal Seed)	*	*		*			
Buldana	*	*	*	*			
Vaijapur			*	*			
Ganewadi (Krishidhan)		*					
Malkapur (Ankur Seed)	*	*					
Ahmednagar (Pioneer)		*	*	*			
Nasik		*					
KARNATAKA							
Bijapur	*	*	*	*	*	*	
Malnoor	*		*				*
ANDHRA PRADESH							
Anantapur	*	*	*	*	*	*	
Palem	*		*		*	*	
Manoharabad (Zuari seeds)		*	*	*			
Hyderabad (Nuziveedu)		*		*			
Hyderabad (Vibha)			*				
Hyderabad (Atash)				*			
Hyderabad (Nu Gene)		*					
Hyderabad (Kaveri Seed)		*					
Medchal (Ganga Kaveri)		*					
Medhchal (Godrej)	*	*					
perumallapalle	*						
TAMIL NADU							
Coimbatore	*	*	*	*	*	*	*
Total Trials	**12**	**20**	**14**	**17**	**7**	**6**	**5**

* =Trial allotted

Observations to be recorded in initial and advance trials:

1. Days to 50% Flowering –Rounded to 0 decimals
2. Plant Height (cm) –Rounded to 0 decimal
3. No. of productive tillers/plant -Rounded to one decimal
4. Panicle length (cm) -Rounded to one decimal (Advance Trials only)
5. Panicle Diameter (cm) - Rounded to one decimal (Advance Trials only)
6. Seed set under bagging (In hybrid trials only) –Rounded to 0 decimal
7. Grain yield (kg/plot) -Rounded to three decimals
8. Fodder yield (kg/plot)- Rounded to three decimals
9. Days to maturity- Rounded to 0 decimal
10. Plant population at harvest (No./Plot)
11. 1000-seed wt (g) (Advance Trials only)
12. Diseases and pest incident (Under natural conditions)

Experimental details:

Intial Trials: No. of rows – 3 (net) Row length – 5m(net) Spacing- 50 cm x 15 cm Plot size – 5m x 1.5m (net) Fertilizer – As per recommendations	**Advance Trials:** No. of rows – 6 (net) Row length – 5m(net) Spacing- 50 cm x 15 cm Plot size – 5m x 3m (net) Fertilizer – As per recommendations
Population Trials: No. of rows – 6 (net) Row length – 5m(net) Spacing- 50 cm x 15 cm Plot size – 5m x 3m (net) Fertilizer – As per recommendations	

Proposed entries for initial trials

IHT (E) A1: 18	PT A & B Zone : 5
IHT (M) A & B Zone : 32	Summer 2013: 20
IHT (L) A & B Zone : 48	

Seed Requirement (per entry)

IHT (E) A1 Zone : 1.25 Kg	AHT (M) A : 2.50 kg	AHT (L) A: 2.0 kg
IHT (M) A & B Zone : 2.0 Kg	AHT (M) B : 2.0 Kg	AHT (L) B: 2.0 Kg
IHT (L) A & B Zone : 2.0 Kg	RHVT A : 2.0 kg	
Population Trial A & B Zone: 3.0 kg	RHVT B : 2.0 kg	
AHPT (E) A1 Zone: 1.5 Kg	Summer Hybrid Trial : 2.0 kg	

Additional seed requirement for entries of IIIrd year testing for agronomical trials (Separate pack)-

	AHT Zone A: 1.5 kg		AHT Zone B : 1.5 kg
	PT Zone A: 1.5 kg		AHPT Zone A1: 1.5 kg
	PT Zone B: 1.5 kg		Summer Hybrid Trial : 1.5 kg

Seed requirement of checks:

86M86: 7 kg	Saburi: 1 Kg	RHB 173: 7 kg	JBV 2: 5 kg
ICMH 356: 7 kg	Shradha: 4 kg	VBBH 3040: 7 kg	MBC 2: 3 kg
86M64: 7 KG	Nandi 61: 7 Kg	B 2301 : 7 kg	ICTP 8203: 3.0 kg
GHB 558: 12 kg	GHB 732: 7 kg	ICMV 155: 4 kg	Raj 171: 8 kg
HHB 67 Imp.: 6.0 kg	RHB 121: 7 kg	Pusa Comp.383:5 kg	Pratap: 5 Kg
RHB 177: 6 Kg	GHB 744: 7 kg	ICMV 221: 7 kg	Kaveri Super Boss: 5 Kg
GHB 538: 2 Kg			

The required quantity of seed material of entries along with pedigree selected for organizing the trials as above with new entries should reach the office of the Project Coordinator, AICPMIP, A.R.S., Mandor, Jodhpur 342304 (Raj.) **latest by 25th May 2013 for kharif and by 15th January 2014 for summer trials** along with required testing fee of Rs. 60,000 + 7416 (12.36% Service Tax)/entry (Private Sector) in form of DD/cheque at par in favour of Project Coordinator (Pearl Millet), Mandor, payable at Jodhpur. **Entries without fee and pedigree of hybrid/varieties will not be accepted.** Seed of each entry should be packed in cloth bag separately**.**

Following scientists were present:-

S.No.	Name with designation
1.	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Mandor, Jodhpur
2.	Dr. Stefenia Grando, Director Dryland Cereals, ICRISAT, Patancheru, Hyderabad
3.	Dr. C.J. Dangria, Director Research, JAU, Junagadh.
4.	Dr. R.K. Bhatt, Head Division III, CAZRI, Jodhpur.
5.	Dr. R.A. Sharma, Nodal Scientist, AICPMIP, Mandor, Jodhpur
6.	Dr. Omvir Singh, Incharge, NBPGR, Jodhpur

S.No.	Name with designation
7.	Dr. V.K. Manga, Principal Scientist (Plant Breeding), CAZRI, Jodhpur.
8.	Dr. B.S. Rajpurohit, Assoc. Prof. (PB & G), AICPMIP, Mandor, Jodhpur.
9.	Dr. P.C. Gupta, Assoc. Prof. (PB & G), ARS, SKRAU, Bikaner.
10.	Dr. C. Tara Satyavathi, Principal Scientist, IARI, New Delhi.
11.	Dr. H.T. Patil, Bajra Breeder, AICPMIP, COA, Dhule.
12.	Dr. N. B. Katare, Pearl Millet Breeder, NARP, Aurangabad.
13.	Dr. P. Sumathi, Assoc. Professor (PB & G), TNAU, Coimbatore.
14.	Dr. Rakesh Shrivastav, Senior Scientist, ICRISAT, Patancheru, Hyderabad
15.	Sh. Bandenamaj Athoni, Scientist (PB), Regional Agri. Res. Station, Bijapur.
16.	Dr. H.P. Yadav, Chief Scientist & Head, Bajra Section, CCS HAU, Hisar.
17.	Dr. R.K. Bajaj, Incharge Pearl Millet, PAU Ludhiana.
18.	Dr. P. Shanthi, Scientist (PB), AICPMIP, ARS, Anantapur
19.	Dr. S.P. Singh, Principle scientist, IARI, New Delhi.
20.	Sh. Satish Pareek, Res. Sci., Pioneer Over. Corporation, Hyderabad
21.	Sh. S.M. Rafiq, Principal Breeder, Nuzeevidu Seeds, Hyderabad.
22.	Dr. Y.S. Verma, Research Coordinator, Metahelix Life Sciences, Bangalore
23.	Dr. Shiv Kumar Singh, Metahelix Life Science, Bangalore
24.	Dr. H. Hemantha Kumar, Breeder, A.R.S Tirupati, ANGRAU.
25.	Sh. Narendera Sawarkar, Plant Breeder (Millets), Ankur Seeds, Nagpur.
26.	Sh. A. Ansari, Department of Millet Development, Jaipur.
27.	Dr. S.L. Indoria, Sr. Res. Officer, Vijay Seeds Co. Ltd, Jalna.
28.	Sh. Shankar Honyal, Bajra Breeder, Kaveri Seeds Co. Ltd., Secunderabad.
29.	Dr. B.R. Beniwal, Sr. TA (PBG), AICPMIP, Mandor.
30.	Dr. A.K. Singh, Professor & Head , RVSKVV, College of Agriculture, Gwalior.
31.	Sh. B.M. Patel, Asstt. Research Scientist, Center For Crop Imp., S.K.Nagar
32.	Dr. Vikas Khandelwal, Sr. Scientist, CAZRI, Pali.
33.	Dr. L.D.Sharma, Assoc.Prof. (PB&G), ARS, Durgapura, Jaipur.
34.	Dr. Indra Singh, SRA, Pioneer Over. Corporation, Palanpur
35.	Sh. Y.K.Singh, Production Manager, NSC, New Delhi.
36.	Dr. S.D. Ugale, Krishna Seed Pvt. Ltd., Agra.
37.	Sh. Sachin Vidhale, Pearl Millet Breeder, Bioseed Research India Pvt. Ltd.
38.	Sh. Prateek Goyal, Krishna Seed Pvt. Ltd., Agra.
39.	Sh. M.T. Pawar, Plant Breeder (Pearl Millet), Atash Seeds Pvt. Ltd., Hyderabad
40.	Sh. P.A. Pacharne, Breeder (Pearl Millet), Mahodaya Hybrid Seeds Pvt. Ltd.,
41.	Dr. M.L. Swami, Breeder, J K Agrigenetics Ltd., Hyderabad.
42.	Dr. V.L. Ameta, Breeder, Devgen Seeds and Crop Tech.
43.	Sh. Dinesh Kanawade, Scientist, ARS, Buldana.
44.	Sh. I.S.Halakude, Nirmal Seed Pvt. Ltd., Jalgaon.
45.	Sh. B.R. Anasse, Ajeet Seed Ltd., Aurangabad.
46.	Sh. Aditya Sharma, Devgen Seed Crop Technology, Hyderabad.
47.	Dr. V.K. Tiwari, Scientist, ZARS, Morena.
48.	Sh. A.M. Talawar, Bajra Breeder, ARS, Malnoor(UAS, Raichur)
49.	Dr. Yogendra Singh, Millet Breeder, ARS Durgapura, Jaipur

S.No.	Name with designation
50.	Sh. V.A. Deshmukh, Ganga Kaveri Seeds, Hyderabad
51.	Smt. Ruchika Bhardwaj, Assitt. Breeder, PAU, Ludhiana.
52.	Sh. K.N. Patel, Navbharat Seed Pvt. Ltd.
53.	Dr. D.P. Yadav, Sr. Breeder Bajara, Nath Biogenes (I) Ltd.
54.	Dr. Puneet Jain, Hytech Seed India Pvt. Ltd., Hyderabad
55.	Dr. Y. Kumar, Assitt. Botanist (Barley), , CCS HAU, Bawal
56.	Dr. Ramesh Kumar, Asstt. Sci. (Plant Breeding), CCS HAU, Hisar
57.	Dr. G. Ram Kherwa, Associate Prof, (Stat.), AICPMIP, Jodhpur
58.	Sh. M.N. Bijagare, Krishidhan Seeds, Jalna.
59.	Sh. R.K. Dwivedi, Plant Breeder, Proline Seeds Company (I) Pvt Ltd., Hyderabad
60.	Sh. Akhilesh Kumar Singh, Jr. Breeder Pearl Millet, VNR Seeds Pvt Ltd, Raipur
61.	Dr. Ved Prakash Yadav, Bayer Bioscience Pvt. Ltd.
62.	Dr. B.K. Pareek, Plant Breeder, New Nandi Seeds Co., Ahemadabad
63.	Sh. J.S. Sorathiya, Pearl Millet Research Station, JAU, Jamnagar
64.	Dr. K.C. Sharma, S.K.N.College of Agriculture, Jobner.
65.	Sh. S.D. Atara , Assoc. Research Scientist, JAU, Jamnagar
66.	Dr. K.D. Mungra, Asstt. Research Scientist, JAU, Jamnagar
67.	Sh. G.P. Dahale, Jr. Breeder, MSSCL, Akola
68.	Dr. P.R. Padhar, Research Scientist, JAU, Jamngar.
69.	Dr. F.B. Patil, Director Research, Kirtiman Agro Genetics Ltd., Aurangabad
70.	Dr. K.R. Reddy, Director Research, Nugenes, Secunderabad
71.	Sh. Shankar Lal Yadav, S.R.F., AICPMIP Mandor Jodhpur
72.	Sh. Dilip Singh, S.R.F., AICPMIP Mandor Jodhpur
73.	Sh. S.V. Bemalgi, Eco Agriseeds Pvt. Ltd., Hyderabad
74.	Sh. D.V. ChandraMohan Rao, Advanta, India Ltd., Hyderabad
75.	Sh. Sanjay Patil, Hytech Seed India Pvt. Ltd.
76.	Dr. Surendra Kumar, Principal Breeder, Godrej Seeds and Gen. Ltd., Hyderabad

Session ended with vote of thanks to the chair.

B. CROP PRODUCTION (AGRONOMY AND PHYSIOLOGY)

Chairman : Dr. A.K. Joshi,
Prof. & Head,
Seed Tech. Unit
JAU, Junagadh

Co-Chairman : Dr. B.K. Sagarka
Prof. & Head,
Agronomy
JAU, Junagadh

Rapporteur : Dr. M.S. Rathore,
AICPMIP, Jodhpur

Dr. A.C. Mehta
Agronomy
ARS, JAU Jamnagar

Date : March 22, 2013

Time : 11.15 AM

AGRONOMY

In the beginning, Dr M.S. Rathore welcomed the chairman and co- chairman of the session. He acquainted them about the trials conducted at different centers during *kharif* and summer seasons of 2012. Centre wise results of the agronomical trials conducted at different centers were presented by respective scientists. Chairman Dr. Joshi appreciated the excellent work and presentation made by Hisar and Mandore and advised other centers to improve their presentations. He also suggested to show CV during their presentation of results in future. In PMPHY 3 plant physiology trial, the chairman suggested that no irrigation should be given even under prolonged moisture stress situation so that efficacy of the chemical in mitigating the drought can be assessed properly. He suggested to keep hybrid GHB 538 as check in hybrid trial and restorer J 2430 in parental evaluation trial. He also advised to determine quality parameters particularly iron and zinc in PMAT 10 trial.

Dr. Sagarka, co-chairman of the session suggested to present the photograph of best treatments while presenting the results of different trials. In moisture conservation trial, he inquired whether the application of vegetative mulch is feasible and whether the moisture content data of the soil should be given in the report. He further pointed out that in weed control experiment, the weed free treatment should remain totally free from weed.

The result of Plant Physiology experiments were presented by Dr. Asha Mehta from Jamnagar. Results from all the centres were presented except IARI, New Delhi and A.R.S.S. Samdari centre.

Recommendation:

On the basis of the study conducted at different locations for three years (*kharif* 2009 to *rabi* 2011-12) with an objective to determine the impact of application of different organic sources of nutrients in pearl millet - chick pea cropping sequence, farm yard manure should be applied @ 7.5 ton/ha to obtain higher pearl millet equivalent yield, more net returns along with better B:C and to maintain/ improve the physico-chemical properties of the soil.

Trials to be continued during 2013 -14

PMAT1: Response of pearl millet advance hybrids and/or populations to different levels of nitrogen.

PMAT 3: Optimization of nutrients for pearl millet production under assured moisture conditions.

PMAT 7: Suitability of hybrids under varying sowing times during summer.

PMAT 9: Integrated weed management in rainfed pearl millet.

PMAT 10: Nutrient management through organic and inorganic sources for major and trace elements in rainfed pearl millet.

A) Trial concluded:

PMAT 2: Study of organic farming in pearl millet based cropping sequence

B) New trials formulated

Performance of advance hybrid/ population entries under different dates of sowing during kharif

TECHNICAL PROGRAMME FOR 2013-14

PMAT 1: Response of pearl millet advance hybrid or population entries to N Levels

Objective: To study the response of advanced hybrids and populations to nitrogen application.

a) Performance of advance hybrid and population entries for zone A1

Nitrogen levels (3)	:	20, 40 & 60 kg N/ha
Hybrid (2 +1 check)	:	MH 1771, MH 1777 Check HHB 67 (Imp)
Design	:	Factorial RBD
Replication	:	Four
Plot size	:	Gross: 5.0 m x 3.60 m Net: 4.0 m x 2.70 m
Locations	:	Mandor, ARSS Samdari and Bikaner

b) Performance of advance medium and late maturing hybrids/ populations to nitrogen levels in Zone A

Nitrogen levels (3)	:	30, 60 & 90 kg N/ha
Hybrids (1+1 check)	:	MH 1790 and GHB 744 (c)
Populations (2+1 check)	:	MP 519 and 520 Pusa 383(c)
Design	:	Split plot (Nitrogen in main plot and entries in sub-plots)
Replication	:	Three
Plot size	:	Gross: 5.0 m x 3.60 m Net: 4.0 m x 2.70 m
Locations	:	Jaipur, New Delhi, Hisar, Jamnagar and Kalai

c) Performance of medium and late advance hybrids and populations to nitrogen levels in Zone B

Nitrogen levels (3)	:	30, 60 & 90 kg N/ha
Hybrids (7 + 2 checks)	:	MH 1790, MH 1792, MH 1785, MH 1795, MH 1796, MH 1815, MH 1812, MH 1816, VBBH 3040(c) and 86 M 64(c)
Population (1 + 1 check)		MP 519 and Raj 171(c)
Design	:	Split Plot Design, keeping N in main plots and hybrids in Sub-plots
Replication	:	Three
Plot size	:	Gross: 5.0 m x 3.60 m Net: 4.0 m x 2.70 m
Locations	:	Aurangabad, Dhule, Bijapur and Coimbatore

d) Performance of advance summer hybrids

Nitrogen (3)	:	60, 90 & 120 kg N/ha
Hybrids (1 + 1 check)	:	MSH 238, Pro agro 9444(c)
Design	:	FRBD
Replications	:	Three
Plot size	:	Gross : 5.0 m x 3.60 m Net: 4.0 m x 2.70 m
Locations	:	Jamnagar, SK Nagar, Dhule & Aurangabad

Note: Recommended dose of P_2O_5 under rainfed situations in Zone A1 and recommended P_2O_5 for irrigated/optimum conditions of their respective zones (A & B) is to be added in all the treatments.

Observations to be recorded

1. Plant population (final) in thousands/ha
2. Plant height (cm)
3. Days to 50% flowering.

4. Total tillers/plant
5. Effective tillers/plant
6. Test weight (1000-seed weight)
7. Grain yield (kg/ha)
8. Dry Fodder yield (q/ha)

Note: The following soil properties of the field must be recorded before layout of the experiment: Soil texture, pH, EC, available Nitrogen, available Phosphorus and available potash

PMAT 3: Optimization of nutrients (N & P) for pearl millet production under assured moisture availability conditions

Objective: Determine N and P requirement of newly developed hybrids and work out the optimum economic dose of the nutrients.

Treatments:

(A) Nitrogen levels (4)

(i) Control
(ii) 75% of the recommended dose of respective zone
(iii) Recommended dose
(iv) 125% Recommended dose

(B) Phosphorous level (4)

(i) 0, 15, 30, 45 kg/ha.

Entries:

Mandor, Bikaner	GHB 538
Jaipur	RHB 121
Kalai, Hisar	HHB 223
Jamnagar	GHB 744
Aurangabad, Dhule, Bijapur, Coimbatore	86M64

No. of treatments: 4 x 4 = 16. **Design:** FRBD Replication: Three.
Gross plot size: 5.0 m x 3.6m **Net plot size:** 4.0 m x 2.7m

Locations

Zone A_1 : Mandor, Bikaner
Zone A : Jaipur, Hisar, Kalai, Jamnagar
Zone B : Aurangabad, Bijapur, Dhule & Coimbatore

Observations

1. Plant population (final) in thousands/ha
2. Plant height (cm)
3. Total tillers/plant
4. Effective tillers/plant
5. Test weight (1000-seed weight)
6. Grain yield (kg/ha)
7. Dry Fodder yield (q/ha)
8. Economic optimum dose of nitrogen
9. Nitrogen use efficiency

Note: The following soil properties of the field must be recorded before laying and harvesting of the experiment: Soil texture, pH, EC, available Nitrogen, available Phosphorus and available potash

PMAT 7: Suitability of Hybrids under varying time of sowing during summer (Jamnagar, Dhule & Aurangabad)

Year of start: Summer 2011

Center	Time of sowing	Hybrid
Jamnagar	D_1 15th Feb D_2 2nd March D_3 15th March	GHB 558, GHB 538 Proagro-9444
Aurangabad and Dhule	D_1 10th January D_2 25th January D_3 9th February	GHB 558 GHB 538 Proagro-9444

Location : Jamnagar, Dhule and Aurangabad
Year of start : Summer, 2011
Design : FRBD; Replication: 3
Plot size : Gross 5 x 3.6 m;
Net: 4 x 2.4 m

Observations:

1. Plant population
2. Plant height
3. Total tiller/ plant
4. Effective tiller/ plant
5. Test weight
6. Seed yield/plot
7. Stover yield/ plot
8. Economics

PMAT 9: Integrated weed management in rainfed pearl millet

Objective: To find out the effective herbicide or integrated module of weed control in pearl millet

Entries:

Mandor, Bikaner	GHB 538
Jaipur	RHB 121
Kalai, Hisar	HHB 223
Jamnagar	GHB 744
Aurangabad, Dhule, Bijapur, Coimbatore	86M64

Treatments:

T_1: Control (Weedy check)
T_2 : Weed free
T_3: Pre emergence application of *Atrazine* @ 0.5 kg a.i./ha + one hand weeding at 21 DAS
T_4: Post emergence application of *Atrazine* @ 0.4 Kg/ha at 10-14 Days after sowing (DAS)
T_5: Post emergence application of *Atrazine* @ 0.4 Kg/ha at 10-14 Days after sowing (DAS) and one hand weeding at 30 DAS
T_6: Post emergence application of Tembo Trione (Laudis) @ 80g a.i./ha at 2-4 leaf/10-15 DAS

T_7: Post emergence application of Tembo Trione (Laudis) @ 100g a.i./ha at 2-4 leaf/10-15 DAS
T_8: Post emergence application of Tembo Trione (Laudis) @ 120g a.i./ha at 2-4 leaf/10-15 DAS
T_9: Post emergence application of Tembo Trione (Laudis) @ 80g a.i./ha at 2-4 leaf/10-15 DAS and one hand weeding at 30 DAS
T_{10}: Post emergence application of Tembo Trione (Laudis) @ 100g a.i./ha at 2-4 leaf/10-15 DAS and one hand weeding at 30 DAS
T_{11}: Post emergence application of Tembo Trione (Laudis) @ 120g a.i./ha at 2-4 leaf/10-15 DAS and one hand weeding at 30 DAS
T_{12}: Two Hand Weeding/hoeing at 15 and 30 DAS

Location: A_1: Mandor, Bikaner
A: Jaipur, Hisar, Kalai, Jamnagar
B: Aurangabad, Bijapur, Dhule & Coimbatore

Design : RBD
Replication : Three
Plot size : Gross: 5.00 m x 3.60 m
Net: 4.00 m x 2.70 m

Observations :

1. Plant population (final) in thousands/ha
2. Plant height (cm)
3. Total tillers/plant
4. Effective tillers/plant
5. Test weight (1000-seed weight)
6. Grain yield (kg/ha)
7. Dry Fodder yield (q/ha)
8. Weed intensity
9. Weed control efficiency
10. Economics of the treatment

Note: The following soil properties of the field must be recorded before laying and after harvesting of the experiment: Soil texture, pH, EC, available Nitrogen, available Phosphorus and available potash. Also apply the RDF in the trial.

PMAT 10: Nutrient management through organic and inorganic source for major and trace elements in rainfed pearl millet

Objective: To find out the integrated nutrient management module for rainfed pearl millet

Entries:

Mandor, Bikaner	GHB 538
Jaipur	RHB 121
Kalai, Hisar	HHB 223
Jamnagar	GHB 744
Aurangabad, Dhule, Bijapur, Coimbatore	86M64

Treatment

A. Levels of organic manure

1. FYM 5 t/ha
2. Without FYM

B. Levels of inorganic fertilizers

1. Recommended dose of fertilizer (N:P:K)
2. RDF + $ZnSO_4$ @ 20 kg/ha
3. RDF + $FeSO_4$ @ 20 kg/ha
4. RDF + Borex @ 10 kg/ha
5. RDF + Gypsum @ 250 kg/ha
6. Control

Design: Factorial RBD, Rep: 3

Observations

1. Plant population (final) in thousands/ha
2. Plant height (cm)
3. Total tillers/plant
4. Effective tillers/plant
5. Test weight (1000-seed weight)
6. Grain yield (kg/ha)
7. Dry Fodder yield (q/ha)
8. Chemical analysis of soil prior to experimentation
9. Quality (Protein,Zn and Fe content) in grain

Note: The experiment must be conducted at permanent site and the soil properties (Soil texture, pH, EC, available Nitrogen, available Phosphorus and available potash, avalablle Zn, available Fe) before start of the experiment and after three years of study must be recorded.

PMAT 11: Performance of pearl millet advance hybrid and/or population entries to different sowing dates in kharif

Objectives: To find out the comparative performance of advance pearl millet entries under staggered sowings.

a) Performance of advance hybrid and population entries under different sowing dated in zone A_1

Sowing dates (3)	:	July 10-15, July 25-30 and August 10-15
Hybrid (2 +1 check)	:	MH 1771, MH 1777 Check HHB 67 (Imp.)
Design	:	SPD (Date in main and entries in sub plot)
Replication	:	Four
Plot size	:	Gross: 5.00 m x 3.60 m
		Net: 4.00 m x 2.70 m
Locations	:	Mandor, Bikaner

b) Performance of advance hybrid and population entries under different sowing dated in zone A

Sowing date (3)	:	July 10-15, July 25-30 and August 10-15
Hybrids	:	MH 1790 and check GHB 744
Populations (2+1 check)	:	MP 519 and 520 check Pusa 383
Design	:	SPD (Date in main and entries in sub plot)
Replication	:	Three
Plot size	:	Gross: 5.00 m x 3.60 m
		Net: 4.00 m x 2.70 m
Locations		Jaipur, Hisar, Jamnagar and Kalai

c) Performance of medium and late advance hybrids and populations to dates of sowing in Zone B

Sowing date (3)	:	July 10-15, July 25-30 and August 10-15
Hybrids (7 + 2 checks)	:	MH 1790, MH 1792, MH 1785, MH 1795, MH 1796, MH 1815, MH 1812 and MH 1816. Checks VBBH 3040 and 86M 64
Population (1 + 1 check)		MP 519 and check Raj 171
Design	:	SPD (Date in main and entries in sub plot)
Replication	:	Three
Plot size	:	Gross: 5.00 m x 3.60 m Net: 4.00 m x 2.70 m
Locations	:	Aurangabad, Dhule, Bijapur and Coimbatore

Note: Recommended dose of fertilizer under rainfed situation of the respective zones be applied and similarly the soil properties as above be carried out before sowing of the experiment.

PHYSIOLOGY

Experiments to be continued:

PMPHY-1: Evaluation of entries from initial trials for their response to terminal drought stress.

PMPHY-2: Testing of pearl millet restorers and maintainers against drought.

PMPHY-3: Efficacy of foliar spray of growth substances under rainfed condition on yield potential of pearl millet.

PMPHY-7: Screening for stay-green character in pearl millet

(PMPHY-1 and 2 shall be taken during summer at Jamnagar and *kharif* at Jaipur)

TECHNICAL PROGRAMME FOR 2013-14

PMPHY-1: Evaluation of entries from initial trials for their response to terminal drought stress.

Objectives:-

(i) To identify entries performing better under terminal moisture stress conditions for A and A1 (scanty rainfall) zone of India.

(ii) To supplement the information on their response to terminal stress.

*Year of Commencement-2012

Location: Summer (Jamnagar), *Kharif* – Mandor and Jaipur

Treatment: Entries (Entries selected from initial trial)

Note: (1) Terminal stress (Stress will be given from flowering to maturity)

(2) Block of irrigated control will be sown near experimental block for calculating Drought Susceptible Index (DSI).

Design: - RBD **Replication: -** Three

Spacing: - 60 X 10 cm **Plot size:** - 1.2 X 5.0 M (2 Rows of 5 M length)

Fertilizer: 120:60 kg/ha (N:P)

Observations:

1. Days to 50% flowering
2. Productive tillers
3. Grain yield Kg/plot
4. Fodder yield Kg/plot
5. Earhead weight Kg/plot
6. Total dry matter Kg/plot
7. Threshing percent

8. Harvest Index (HI %)
9. 1000grain weight (Test Weight)
10. Plant population at harvest
11. Drought Susceptible Index (DSI)
12. Days to Maturity
13. Soil moisture status at 10 days interval

PMPHY-2: Testing of pearl millet restorers (R) and maintainers (B) against drought

Objectives: (i) To assess and identify drought tolerance restorers.

Year of Commencement-2012; Location: Jamnagar, Mandor and Jaipur

Treatment: Entries each from B and R lines (Entries from AICRP centre)

Note: (1) Terminal stress (Stress will be given from flowering to maturity)
(2) Block of irrigated control will be sown near experimental block to get data for calculating Drought Susceptible Index (DSI).

Design: - RBD **Replication: -** Three
Spacing: - 60 X 10 cm **Plot size:** - 0.6 X 5.0 M (Single Rows of 5 M length)
Fertilizer: 120:60 kg/ha (N:P)
Observations:

1. Days to 50% flowering
2. Productive tillers
3. Grain yield Kg/plot
4. Fodder yield Kg/plot
5. Earhead weight Kg/plot
6. Total dry matter Kg/plot
7. Threshing percent
8. Harvest Index (HI%)
9. 1000 grain weight (Test Weight)
10. Plant population at harvest
11. Drought Susceptible Index (DSI)
12. Days to Maturity
13. Soil moisture status at 10 days interval

PMPHY-3: Efficacy of foliar spray of growth substances under rainfed conditions on yield potential of pearl millet.

Objectives: -

(i) To increase the yield potential by foliar spray treatments.
(ii) To mitigate the drought stress under rainfed conditions.

Year of Commencement: *Kharif*-2011

Location: Jamnagar, Mandor and Jaipur

Treatment:

(A) Foliar spray at tillering and post-anthesis stages.

T1- Untreated control
T2- Distilled water
T3- Thiourea 1000 ppm
T4- Benzyl adenine 25 ppm
T5- Benzyl adenine 50 ppm

T6- Potassium chloride 0.75 %
T7- Potassium chloride 1.50 %

(B) Entry: GHB-558

Design: - RBD **Replication: -** Four

Spacing: - 60 X 10 cm

Plot size: Gross: 2.4 X 5.0 M (4 Rows of 5 M length)
Net: 1.2 X 5.0 M (2 Rows of 5 M length)

Observations:

1. Days to 50% flowering
2. Productive tillers
3. Grain yield Kg/plot
4. Fodder yield Kg/plot
5. Earhead weight Kg/plot
6. Total dry matter Kg/plot
7. Threshing percent
8. Harvest Index (HI%)
9. 1000 grain weight (Test Weight)
10. Plant population at harvest

PMPHY-7: Screening for stay-green characters in pearl millet

Objectives: (1) Rapid screening of entries for drought resistance on the basis of stay- Green character.
(2) Utilization of entries in breeding programme for drought tolerance.

Year of Commencement: *Kharif*-2012

Location: Jamnagar, Mandor and Jaipur

Treatment: Entries (Hybrids and Parental lines from AICPMIP centre)

Design: Augmented design Plot size: - 5.0 m X 0.6 m

Observation: Visual observations for stay green character at Flowering and Grain filling.

a) Stay green index: 1= Green 2 = Pale yellow 3 = Yellow

The following scientists attended the meeting and actively participated in the discussions:

1. Dr. H.R. Khafi, Research Scientist (Agronomy) MRS (JAU) Jamnagar
2. Dr. P.S. Shekhawat, Agronomist, A.R.S. Bikaner
3. Dr. R.C. Sawant, Senior Res. Asstt. NARP, Aurangabad (Maharashtra)
4. Dr. G.L. Yadav, Agronomist, ARS(SKRAU), Jaipur (Rajasthan)
5. Dr. A.K. Guggari, Sr. Scientist (Agronomy), RARS. Bijapur, UAS, Dharwad.
6. Dr. N. Meyyazhagan, Professor (Agronomy), TNAU, Coimbatore.
7. Dr. Anil Kumar, Agronomist, HAU, Hisar, Haryana
8. Dr. C.P. Jaybhaye, Associate Professor (Agronomy), ARS Buldana
9. Dr. K.S. Yadav, SMS(Agronomy), KVK (IARI), Shikohpur (Haryana)
10. Dr. M.N. Singh, DMD, Jaipur
11. Dr. M.S. Rathore, Agronomist, PC Unit, Mandor, Jodhpur
12. Dr. R.C. Meena, Asstt.Prof. (Plant Physiology), AICPMIP, Mandor, Jodhpur
13. Dr. M.F. Hussain, Agronomist, ARS, Kalai, Aligarh
14. Dr. P.P. Girase, Asstt. professor, (Agro) AICPMIP, Dhule
15. Dr. D.G. Patel, ARC, SDAU, Kothara
16. Mrs. Asha C. Mehta, Asstt. Res. Sci., JAU, Jamnagar
17. Dr. D.G. Patel, A.R.C.SDAU, Kothare
18. Sh. Shriaph Alam, Seed research Officer, SFCI Ltd, New Delhi

Session ended with thanks to the Chairman.

C. CROP PROTECTION (PATHOLOGY AND ENTOMLOGY)

Chairman	: Dr. I.U. Dhruj Associate Director of Research, JAU, Junagadh	**Co-Chairman**	: Dr. K.B. Jadeja Prof. and Head, Department of Plant Pathology JAU, Junagadh
		Rapporteur	: Dr. H.R. Bishnoi Associate Professor, AICPMIP, Jodhpur Dr. B.L. Tandi, Entomologist, ARS, Durgapura
Date	: March 22, 2013	**Time**	: 11:15 AM

Scientists of Plant Protection group from different AICPMIP centres and ICRISAT reviewed the research results of Kharif 2012 trials conducted at different locations.

At the outset, Dr. D. L. Kadavani welcomed the chairman Dr. I. U. Dhruj and Co-Chairman Dr. Jadeja. The Chairman requested all the scientists to present their achievements and appreciated for conductance of all the trials allotted during Kharif 2012 by the Pathology groups. The centre-wise results of experiments were presented by the respective scientist. Fatepur Shekhwati center did not conduct the PMPT IV. Data from Jaipur, and Anand were not included for calculation of mean data because DM pressure on indicator (7042S) was less than 70% at 60 days after sowing.

PATHOLOGY

The important research achievements were listed. Based on the discussion, the recommendations were made by the group and formulated the technical programme for the year 2013.

Significant Findings

PMPT-I: Disease screening trial of Initial Pearl Millet Hybrids and Varieties.

Out of 113 entries 94 entries were having high level of downy mildew resistance across the locations. Out of these only one entry MH 1878 exhibited multiple disease resistance. One entry MH 1899 exhibited multiple disease resistance except for rust. Eleven entries MH 1855, MH 1859, MH 1884, MH 1885, MH 1888, MH 1889, MH 1890, MH 1893, MH 1897, MP 543 and GHB 944 exhibited multiple disease resistance except for ergot.

PMPT- II: Disease screening trial of Advanced Pearl Millet Hybrids and Varieties.

Out of 54 entries 35 were highly resistant to downy mildew across the locations. Out of these, two entries MH 1747 and MH 1815 exhibited multiple disease

resistance except for ergot. Five entries Nandi 61, MH 1737, MH 1743 MH 1754 and MH 1816 exhibited multiple disease resistance except for rust and ergot.

PMPT-III: Monitoring disease resistance stability of released popular hybrid/varieties.

Out of 27 entries 16 entries showed downy mildew resistance across the zones. None of the entry exhibited multiple disease resistance. Two entries Nandi 61 and VBBH 3040 were resistant against downy mildew, smut and blast.

PMPT IV A (PMDMVN): Characterization of pathogen diversity in downy mildew of pearl millet.

The downy mildew virulence nursery was conducted at 12 centers demonstrated high level of variation in the population of *Sclerospora graminicola* across the locations.

PMPT-IVB: Basic Research

Objective: Molecular characterization of R & *Avr* genes in pearl millet downy mildew system and develop markers for utilization in breeding for DM resistance. A pearl millet fosmid library for molecular marker-based studies has been constructed to identify gene candidates involved in the plant defense mechanism. Using this library an extensin type of HRGP of pearl millet having fourfold genome coverage was constructed. Differential expression of the PM-HRGP gene was observed during compatible and incompatible interactions of pearl millet with the downy mildew pathogen. A full-length gene coding for an extensin type of HRGP, PM-HRGP in pearl millet was constructed which helps understanding of the mechanism of regulation of this gene. This library will be a valuable tool for several molecular marker-based studies in pearl millet and also to identify gene candidates involved in the plant defense mechanism.

PMPT- IVC: Pearl Millet Blast Variability Nursery (PMBVN) – 2012

Blast variability nursery trial was conduted at Anand, Dhule, Jaipur, Patancheru, Mandor, Jamnagar, Aurangabad, Gwalior, and Hisar centers. There was variation in blast pathogen populations at different centers.

PMPT V: Evaluation of Integrated Disease Management Module (IDM) using host plant resistance, bioagent and Chitosan formulation

The mean disease incidence at all India level at soft dough stage Chitosan + *Bacillus pumulis* INR7 treatment reduced downy mildew followed by *Pseudomonas fluorescens* and *Bacillus pumulis* INR7 individual treatments.

The IDM treatment was found to increase the emergence and increase in the grain and fodder yield at all the testing centers. These observations indicated that the IDM module is promising for the management of downy mildew

PMPT VI: Downy mildew disease monitoring trials at farmer's field

During field surveys it was observed that downy mildew remained to be the major disease of pearl millet. In general, downy mildew incidence was low as compared to previous year's field survey. The range of downy mildew in the framers field across all fields surveyed was from 0 – 36.8%. In Rajasthan (0-7%), in Haryana (0-10%), Tamil Nadu (0-3.9%), in Karnataka (0-10%) downy mildew was recorded up to 10%. Madhya Pradesh was free from downy mildew during the surveys. Severe Blast was observed in Maharashtra and traces of blast were observed in, Madhya Pradesh and Rajasthan. Fields in Tamil Nadu

were free from smut, blast and ergot incidence. Smut incidence was found only in traces in Rajasthan, Madhya Pradesh and all the other states were relatively free from smut incidence. Rust incidence was observed to be more severe in Maharashtra whereas, Rajasthan, Madhya Pradesh were relatively free from rust disease. Ergot was observed in Rajasthan and Karnataka

RECOMMENDATIONS

1. The House recommended that pathologists would visit Mysore centre for on hand exposure to disease screening and basic research during the month of November 2013. An interactive session may be arranged at Mysore centre during November 2013 for the benefit of all pearl millet pathologists for upscaling their skills.
2. Looking in to the magnitude of the blast disease, the group concluded to conduct basic research experiments on management of blast by testing different fungicides at Jamnagar and Dhule.

ENTOMOLOGY

Centre-wise experimental results were presented by respective scientists. Dr. B. L. Tandi, Entomologist, Rajasthan Agricultural Research Institute, Jaipur presented the results of the experiments conducted at Jaipur centre. He highlighted that comparatively high infestation (80.0%) of white grub was observed during survey at village Ramsinghpura (Boraj) of tehsil Dudu in Jaipur district. He further reported that seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by spray of imidacloprid 17.8 SL 0.009% at 35 DAG was found most effective against shoot fly and stem borer, showing lesser damage and higher yield as compared to standard check (seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by dusting of fenvalerate 0.4% dust at 35 DAG). He further reported that IPM module-seed treatment with imidacloprid 600 FS @ 8.75 ml/kg seed, fish meal trap @ 10/ha and NSKE 5% spray at ear head stage showed least damage of shoot fly, stem borer, grey weevil & chaffer beetle and highest grain as well as fodder yield. Against white grub, the seed treatment of clothianidin 50 WDG @ 7.5 g/kg seed or imidacloprid 600 FS @ 8.75 ml/ kg seed is effective.

Sh. R. P. Juneja, Assistant Research Scientist (Entomology), Pearl Millet Research Station, Jamnagar (JAU, Junagadh) reported the experimental results conducted at Jamnagar research station. He reported the high intensity of shoot fly and flea beetle infestation and low intensity of stem borer, jassids, thrips, leaf roller, grass hopper and ear head beetle infestation. He emphasized that seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by spray of imidacloprid 17.8 SL 0.009% at 35 DAG was found most effective against shoot fly, showing lesser damage and higher yield as compared to standard check (seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by dusting of fenvalerate 0.4% dust at 35 DAG). For the management of red rust flour beetle (*Tribolium castaneum)* in stored pearl millet seeds, neem leaves powder @ 10 g/kg seed showed least grain damage, adult emergence of the insect and highest viability of seeds.

Prof. Shekhar Shetty, University of Mysore, Mysore suggested that the intensity of infestation of insect-pest in screening of the entries should be categorized as resistant and susceptible.

TECHNICAL PROGRAMME FOR KHARIF – 2013

Pathology

Pearl millet pathological trials to be conducted at various coordinating/cooperating centers during Kharif 2013

Disease Screening Trials

Following procedures should be adopted in conduct of disease screening trials

I. Downy Mildew: Downy mildew sick plot using infector rows system
II. Smut and Ergot: to be inoculated artificially
III. Rust and Blast: natural disease incidence till facilities for artificial screening are created

PMPT I: Disease screening trial of Initial Pearl Millet Hybrids and Varieties.

PMPT II: Disease screening trial of Advanced Pearl Millet Hybrids and Varieties.

PMPT III: Monitoring disease resistance stability of released popular hybrid/varieties and A, B and R lines

Downy Mildew :

Location **Zone A**
Mandor, Jaipur, Hisar, Gwalior, Fatehpur Shekhawati, Jamnagar (Kharif and Summer trials) and Anand
Zone B
Mysore, Aurangabad, Dhule, Coimbatore and Patancheru (PMPT-III)

Smut

Location : **Zone A**
Jaipur, Jamnagar, Hisar and Gwalior
Zone B
Dhule

Blast

Location : **Zone A**
Jaipur, Jamnagar, and Gwalior
: **Zone B**
Dhule, Patancheru and Aurangabad

Rust

Location : **Zone A**
Jaipur, Jamnagar, Hisar and Gwalior
Zone B
Aurangabad, Dhule and Coimbatore

Ergot

Location : **Zone A**
Jaipur
Zone B
Aurangabad, Dhule and Coimbatore

PMPT IV A: Characterization of pathogen diversity in downy mildew of pearl millet

1. Pathogenic diversity analysis by virulence nursery

Location : Zone A

Jaipur, Hisar, Gwalior, Anand, Jamnagar, Mandor and Fatehpur Shekhawati

Zone B

Mysore, Aurangabad, Patancheru, Dhule and Coimbatore

2. Genetic analysis through DNA markers

Location : Mysore and Patancheru

PMPT IV B: Basic research: Molecular characterization of R and AVR gene in Pearl Millet Downy Mildew system and develop markers for utilization in breeding for DM resistance.

Location : Mysore

PMPT IV C: Characterization of pathogenic variability in Pearl Millet blast pathogen

Location : Zone A

Gwalior, Anand , Mandor, Jamnagar, Hisar and Jaipur

Zone B

Dhule, Patancheru and Aurangabad

PMPT V: Evaluation of Integrated Disease Management Module (IDM) using host plant resistance, bioagent and Chitosan formulation

Treatments:

1. Chitosan (2.5g/kg)
2. *Bacillus pumilus* (INR-7) (8g/kg seed)
3. *Bacillus pumilus* (INR-7) @ 8g / kg of seeds + Chitosan @ 2.5g/kg of seeds
4. *Pseudomonas fluorescens* (Pf -1) (8g/kg seed)
5. Apron (Metalaxyl 35 SD) (6g/kg)
6. Untreated control

Mode of treatment: seed treatment (moderately resistant hybrid B 2301)

The seed and apron (metalaxyl 35 SD) will be supplied by the PC unit and the other treatment materials will be supplied by the Mysore centre.

Replicates: 4 (4 rows in 5 meter length)

Observation to be recorded:

a) Seedling emergence

b) Per cent Downy Mildew Incidence at 30 and 60 DAS

c) Grain and Fodder Yield

Location : Zone A

Mandor, Jaipur, Hisar, Gwalior, Jamnagar

Zone B

Aurangabad, Dhule, Coimbatore, Mysore and Patancheru

PMPT VI: Monitoring of Pearl Millet diseases at Farmer's field
Locations: All AICPMIP centers in their respective zones
Method: Record survey information by preparing chart listing field number, location, cultivar/area, crop stage (PT, F and SD), disease incidence and remarks. Also collect infected leaf samples from highly susceptible cultivars for pathogen characterization. The samples should to be sent to the project coordinator
NOTE: - Observations to be recorded on all prevalent diseases in the area.

PMPT VII: Disease screening trial of pearl millet hybrids in summer
Locations: Anand and Coimbatore

PMPT VIII: Management of pearl millet blast (*Pyricularia grisea*) using fungicides (New)
Objective: To find out effective and economical fungicides for management of pearl millet blast.

Background information: The pathogen *Pyricularia grisea* is causing pearl millet blast disease in kharif season. The pearl millet crop is dual propose and it is important for green and dry fodder. Since last few years the disease intensity is increasing in different states and due to that fodder and grain yield is decreasing in highly infected crop. There is no good control measure and now new fungicides are available in market so it was decided to formulate new technical programme for management of the disease.

Year of starting and season: *Kharif* 2013

1. **Experimental details:**
   (A) Design: RBD
   (B) Treatments: 4
   (C) Replication: Four
   (D) Plot size (Gross): 5.00x3.60m (Net): 4.0x2.40m
   (E) Spacing: 60 x 15 cm.
2. **Crop and variety**: Pearl millet -Moderately susceptible
3. **Location**: Jamnagar and Dhule
4. **Treatments**
   A. Iprobenphos (Kitazin) (Organophosphorus) 48 EC @0.1%
   B. Tricyclazole (Beam) (5-methyl-1,2,4-triazolo[3,4-b][1,3] benzothiazole) P@ 0.1%
   C. Azoxistrobin (Methyl (E)-2-{2-[6-(2-cyanophenoxy) pyrimidin -4-yloxy]phenyl}- 3-methoxyacrylate) 25 EC @ 0.05%
   D. Control

Observation
1. Percent disease intensity (by using 1-9 scale)
2. Grain and fodder yield/ha
3. Percent disease control

Entomology

PMET-1: Screening of pearl millet lines against major insect pest

Objective: To find out resistant promising bajra material against major insect pests.

Location: Jamnagar, Jaipur and Fatehpur-Shekhawati

Experimental details: Design: RBD, No of replications: 3, No. of rows: Two, Row length: 3 m and Spacing: 50 x 15 cm. No. of entries: Promising bajra lines to be provided by Project Coordinator.

Observations to be recorded:

1. **Shoot fly** – Per cent infestation at 28 DAG and ear head stage.
2. **Stem borer** – Per cent plant damage at vegetative stage and at ear head stage.
3. ***Helicoverpa*** larvae – Number of larvae/ 5 ear heads.
4. **Grey weevil** – Damage score and number of grey weevil adults/ 5 plants.
5. **Leaf roller** – Damage score and number of larvae/ 5 plants.
6. **Chafer beetle** – Damage score and number of beetles/ 5 ear heads

PMET-2: Monitoring of major insect pests of pearl millet

Location: Jamnagar, Jaipur and Fatehpur-Shekhawati

Objective: To study the population fluctuation of key pests of pearl millet.

Methodology: Sowing of released variety/ hybrid will be done over an area of 200 m^2 which will be kept free from insecticidal application during crop season. Incidence and population of various insect pests will be recorded at weekly interval from 30 randomly selected plants. Meteorological data such as temperature, rainfall, relative humidity and sunshine hours will be recorded and correlated with pest incidence. Assessment of losses due to insect pest will be calculated. For this purpose parallel sowing will be done in a plot of 200 m2 which will be fully protected from the insect pests utilizing recommended practices.

PMET-3: Survey of insect- pests of the pearl millet crop on farmers' field.

Location: Jamnagar, Jaipur and Fatehpur-Shekhawati

Objective: To examine pest status in bajra of the region.

Observations to be recorded:

Survey of insect pests will be carried out at vegetative and ear head stages of pearl millet crop during *Kharif* season. Incidence of various insect pests infesting pearl millet will be recorded from 25 randomly selected fields. The pest status (major and minor) and magnitude of damage will be worked out.

PMET-4: Testing of efficacy of different newer insecticides against shoot fly and stem borer in pearl millet

Objective: To assess the effectiveness of newer insecticides against shoot fly and stem borer infesting pearl millet.

Location: Jamnagar and Jaipur

Experimental details: Design: RBD, No. of Replications: Three,
Gross plot size: 5.0 x 3.6 m, Net plot size: 4.0 x 2.4 m & Spacing: 50 x 15 cm

Treatment details:

1) Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by spray of imidacloprid 17.8 SL @ 0.009% at 35 DAG.
2) Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by spray of thiamethoxam 25 WG @ 0.005% at 35 DAG.
3) Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by spray of spinosad 45 SC @ 0.009% at 35 DAG.
4) Seed treatment of thiamethoxam 35 FS @ 9.0 ml/kg seed followed by spray of imidacloprid 17.8 SL @ 0.009% at 35 DAG.
5) Seed treatment of thiamethoxam 35 FS @ 9.0 ml/kg seed followed by spray of thiamethoxam 25 WG @ 0.005% at 35 DAG.
6) Seed treatment of thiomethoxam 35 FS @ 9.0 ml/kg seed followed by spray of spinosad 45 SC @ 0.009% at 35 DAG.
7) Standard Check (Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by dusting of fenvalerate 0.4% @ 20 kg/ha at 35 DAG).
8) Untreated control

Methodology and observation to be recorded

1) Per cent shoot fly infestation at 28 DAG and ear head stage.
2) Per cent stem borer infestation at 28 DAG and ear head stage.
3) Yield and economics of the treatments.

PMET-5: Testing of IPM modules with farmers practice against pest complex of pearl millet.

Objective: To test the effectiveness of IPM modules against major insect pest of pearl millet.

Location: Jamnagar and Jaipur

Experimental details: Design: RBD, No. of Replications: 5,
Gross plot size: 5.0 x 3.6 m, Net plot size: 4.0 x 2.4 m & Spacing: 50 x 15 cm

Treatment details:

1) IPM module-I (seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + higher seed rate i.e. 10% + removal of shoot fly dead hearts).
2) IPM module-II (seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + spraying of Bt. @ 1.0 kg/ha at 30 DAG + NSKE 5% spray at ear head stage)
3) IPM module-III (seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + fish meal trap @ 10/ha + spraying of NSKE 5% at ear head stage)
4) Untreated control

Methodology and observation to be recorded

1. Per cent infestations of shoot fly at 28 DAG and at ear head stage.
2. Per cent infestation of stem borer at vegetative stage and at ear head stage.
3. Per cent infestation of grey weevil, termite and white grub.
4. Larval population of *Helicoverpa* to be recorded on 5 ear heads in each replication.
5. Yield and economics of the treatments.

PMET-6: Eco-friendly management of stored grain pests of pearl millet seed

Objective: To study the effectiveness of plant materials against storage pest of pearl millet.

Location: Jamnagar and Jaipur.

Experimental details: Design: CRD, Replications: 5, Sample size: 500 g bajra seed

Treatments:

1. Neem leaves powder @ 5 g/kg seed
2. Neem leaves powder @ 10 g/kg seed
3. Karanj leaves powder @ 5g/kg seed
4. Karanj leaves powder @ 10 g/kg seed
5. Dhatura leaves powder @ 5g/kg seed
6. Dhatura leaves powder @ 10g/kg seed
7. Untreated control

Methodology and observation to be recorded:

1. Seed dressing with fine plant leaves powder.
2. Release 10 pairs of *Rhizopertha/Tribollium* for egg laying for 10 days in a jar containing 500 g of bajra seed.
3. Fasten the jars with muslin cloth.
4. Take 100 seeds from each treatment and count the number of healthy and damaged seed to assess the per cent damage after 6 months of storage.
5. Count the number of adults emerged after 6 months of release.
6. Record the germination percentage after 6 months.

PMET-7: Evaluation of different insecticides as seed dresser for the management of soil pests (white grub and termite) in pearl millet

Location: Jaipur, **Design:** RBD, **Replications:** 3, **Gross plot size:** 5.0 X 3.6 m

Net plot size: 4.0 X 2.4 m, Spacing: 50 X 15 cm

Treatments: 11

1. Seed treatment of imidacloprid 600 FS @ 5 ml/kg seed
2. Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed
3. Seed treatment of clothianidin 50 WDG @ 5 g/kg seed
4. Seed treatment of clothianidin 50 WDG @ 7.5 g/kg seed
5. Seed treatment of thiamethoxam 35 FS @ 7.5 g/kg seed
6. Seed treatment of thiamethoxam 35 FS @ 10 g/kg seed
7. Seed treatment of fipronil 5 SC @ 15 ml/kg seed
8. Seed treatment of fipronil 5 SC @ 25 ml/kg seed
9. Seed treatment of quinalphos 25 EC @ 15 ml/kg seed
10. Seed treatment of quinalphos 25 EC @ 25 ml/kg seed
11. Untreated control

Observations to be recorded:

1. Per cent termite and white grub damage.
2. Yield and economics of the treatments.

The following scientist attended the session:

1. Dr. I.U. Dhruj, Associate Director of Research, JAU, Junagadh
2. Dr. K.B. Jadeja, Prof. & Head, Dept. of Plant Pathology, JAU, Junagadh
3. Dr. H.R. Bishnoi, Associate Professor, AICPMIP, Mandor, Jodhpur
4. Prof. H. Shekar Shetty, University of Mysore, Mysore
5. Dr. Rajan Sharma, Sr. Scientist, ICRISAT, Patancheru
6. Dr. S.S. Ghuge, Plant Pathologist, AICPMIP (NARP), Aurangabad
7. Dr. Niranjan Raj, Asstt. Prof. University of Mysore, Mysore
8. Dr. G. Karthikeyan, Assoc.Prof. (Pathology), TNAU, Coimbatore
9. Dr. Kushal Raj, Asstt. Scientist . (Plant Pathology) CCS HAU, Hisar
10. Dr. Asha Shivpuri, Assoc.Prof., ARS (SK RAU), Durgapura, Jaipur
11. Dr. D. L. Kadavani, Assoc. Res. Scientist, JAU, Jamnagar
12. Dr. C.S. Thakare, Pearl Millet Pathologist, College of Agriculture, Dhule
13. Dr. B.L. Tandi, Entomologist, ARS, Durgapura
14. Dr. R.P. Juneja, Asstt. Research Scientist, JAU, Jamnagar
15. Mr. B.V. Girish, Bayer Bioscience, Hyderabad
16. Dr. M.N. Kapadiya, Prof. & Head, Dept. of Entomology, JAU, Junagadh

The scientists from Gwalior, Fatehpur Shekhwati and Anand did not attend meeting.

The session ended with vote of thanks to the Chair and Co-chair.

SESSION - III

REVIEW OF RESEARCH RESULTS AND PROGRESS REPORT OF 2012-13

Chairman	:	Dr. R. P. Dua ADG (FFC), ICAR, New Delhi	**Co-Chairman**	:	Dr. M. M. Roy Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
			Rapporteur	:	Dr. C. Tara Satyavathi Principal Scientist IARI, New Delhi
Date	:	March 22, 2013	**Time**	:	4:00 PM

Plant Breeding (Presented by: Dr. B.S. Rajpurohit)

During *Kharif* 2012, a total of 217 trials were allotted in A1, A and B zones. Out of these, 188 trials were conducted with success rate of 86%.

During the discussion the following points emerged out:

1. The checks for A_1 zone should be reconsidered as the number of relevant checks with suitable flowering available are limited

2. The criteria for promotion of entries to higher stage in breeding trials for 50% flowering for early and medium group hybrids is fixed as under from next season:

   Days to 50% flowering in IHT (Early) and AHPT (Early) equal to or less than 45 days and in IHT (Medium) and AHT (Medium) equal to or less than 50 Days.

   Grace of two days in days to 50% flowering may be given to hybrids yielding grains 15% higher per day over best check in early and medium group hybrids.

Agronomy (Presented by: Dr. M.S. Rathore)

In agronomy, 6 experiments in 59 trials were conducted in different zones. During discussion, the following points were made -

- The results of agronomic experiments must be presented along with the soil test analysis for better comparison and visualization of the effect of the fertilizer dosage or date of sowing or micronutrient or any treatment.
- All the entries of AHT -II/APT-II should be tested for different dates of sowing.

Plant Pathology (Presented by: Dr. H.R. Bishnoi)

In *Kharif*, 2012 6 pearl millet pathological trials were conducted at 12 locations. The following points have emerged out of discussion -

- The findings of the screening of pathological and entomological data should be considered even during promotion of entries rather than at the final stage of submission of identification proposals.
- Regarding the basic work carried out at Mysore, it was suggested that information generated by the centre regarding pathogen variability could be used in developing gene based markers and used in the breeding programmes. In this respect, it was suggested that a combined research

proposal may be submitted by Mysore centre, IARI and ICRISAT for funding.

- During the result presentation for the disease survey and screening experiments in the farmers fields, the data related to temperature, rain etc should also be provided to facilitate the correlation of disease incidence with the prevailing conditions.

Entomology (Presented by: Dr. B.L. Tandi)

The chairman inquired whether any recorded data is available regarding the pest incidence and yield losses in pearl millet. He also suggested that entomologists should find out which pearl millet growing area is prone to what kind of pest and provide the extent of yield losses caused in a scientific manner and develop a pest incidence map in pearl millet.

Emphasis was also laid on following aspects:

- While formulating the experiments of Agronomy and Plant Protection relevance of the experiment should be considered along with the B:C ratio and practicability of adoption of the technology.
- The AICPMIP centres should focus on trait specific material development. In this regards, direction from the project coordinator should be taken in developing trait specific breeding material depending on the strength of the centre.
- The information generated by different disciplines should be effectively utilized in promoting the entries to different stages of testing.
- Depending on the farmer's practice, suitability of agronomic trials should be taken up.

The session ended with vote of thanks to the Chair and Co-chair.

INAUGURAL SESSION

Chairperson	:	Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh
Inaugurator/Chief Guest	:	Sh. Govindbhai Patel, Hon'ble Minister of Agriculture (State), GOG Gandhinagar
Guests of Honour	:	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
		Dr. K.N. Rai, Principal Scientist, ICRISAT
Welcome	:	Dr. C.J. Dangaria, Director Res., JAU, Junagadh
		Felicitation of Hon'ble Minister by JAU, Junagadh
Highlights of Research Progress 2012-13	:	Dr. M.M. Roy, Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
Remarks by ADG (FFC)	:	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
Remarks by Chief Guest	:	Hon'ble Minister of Agriculture, GOG, Gandhinagar
Remarks by Chairperson	:	Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh
Vote of Thanks	:	Dr. P.R. Padhar, Res. Sci. (PM), JAU, Jamnagar
Date	:	23rd March, 2013
Time	:	9:00 am

48th Annual Pearl Millet Workshop of All India Coordinated Pearl Millet Improvement Project (Indian Council of Agricultural Research) was inaugurated on 23rd March 2013 by Hon'ble Minister of Agriculture (State), Govt. of Gujarat Shri Govindbhai Patel. The ceremony was witnessed by important dignitaries of JAU Junagadh and ICAR, New Delhi. Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh, Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi, Dr. M.M. Roy, Director CAZRI & Project Coordinator (Pearl Millet), Dr. C.J. Dangaria, Director of Research and Dean PG, JAU, Junagadh, Dr. K.N. Rai, Principal Scientist, ICRISAT, Patancheru and Dr. P.R. Padhar, Incharge AICPMIP, Jamnagar.

In the inaugural address Hon'ble Minister expressed his happiness over the achievements made in the AICPMIP in terms of varieties and package of practices. He emphasised the importance of bajra in low cost agriculture of Gujarat where most holdings are small and farmers are marginal.

Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh,emphasized the need to improve fodder yield and quality of this crop to meet the need of growing dairies. He acknowledged the use of molecular tools to improve biotic and abiotic tolerance and quality traits in pearl millet.

Dr. Dua ADG (FFC) ICAR described bajra as a future crop under climate change scenario. The need for a strong production programme in this crop was

emphasized for meeting nutritional security. This crop may serve as a good gene source for drought and heat tolerance.

Dr MM Roy, Director, CAZRI, Jodhpur highlighted achievements made during 2012-13 under AICPMIP. During this period thirteen hybrids and two varieties were released and a range of A and R lines were also developed and tested at various locations.

Dr. K.N. Rai, Principal Scientist, ICRISAT,described pearl millet as most heat, salinity and acidity tolerant crop. Also it has the potential to meet the fodder requirement increasing in view of intensification of dairy activities in India.

Earlier Dr. C.J. Dangaria, Director of Research, JAU, Junagadh, welcomed the delegates and in the end Dr. P.R. Padhar, Incharge, AICPMIP, Jamnagar proposed vote of thanks.

SESSION - IV
REVIEW OF BSP

Chairperson	:	Dr. M.M. Roy Director, CAZRI & Project Coordinator AICPMIP, Jodhpur	**Co-chairperson**	: Dr. H.P. Yadav Prof. & Head CCS HAU Hisar
Rapporteur	:	Vikas Khandelwal CAZRI, RRS, Pali		
Date	:	March 23, 2013	**Time**	: 11:45 AM

In the beginning, Dr. K.D. Mungra welcomed the Chairperson and Co-chairperson of the session. Dr. B.S. Rajpurohit, PC Unit, Mandor presented report on current position of BSP. He pointed out that:

- Indented quantity of seed for different varieties and parental lines from DAC during 2012 was allotted and produced. Actual availability is more than the indent received for both.
- Indenters are needed to pay 25% amount in advance along with the seed indent to Directorate of Seed Science, MAU.
- Production Program (BSP 1) for 2013-14 was presented. A total of 10.84 q DAC indent of breeder seed of 12 varieties and 19 parental lines was received for 2014 and same was allotted to respective breeders.

Program of production of Breeder Seed of Pearl millet varieties and parental lines (BSP 1)

Crop: Pearl millet Year of Production: 2013 Year of supply: February 2014

S.No.	Name of Producing center/state	Name of parental line/ variety	DAC indent (q)	Target set (q)
A	**Varieties**			
1	NARP, Aurangabad	ABPC4-3 (MP 848)	0.02	0.02
2	SKRAU, Mandor	MBC 2	1.00	1.00
3	IARI, New Delhi	Pusa Composite-612	0.43	0.43
4	PAU, Ludhiana	FBC 16	0.90	0.90
5	PAU, Ludhiana	PCB 164	1.20	1.20
6	RVSKVV, Gwalior	JBV-4 (MP-403)	0.11	0.11
7	RVSKVV, Gwalior	JBV-2 (GKKV-93191)	0.10	0.10
8	CCS HAU, Hisar	HC 10	0.01	0.01
9	CCS HAU, Hisar	HC 20	1.22	1.22
10	ICRISAT, Patancheru	ICMV-221	0.03	0.03
11	ICRISAT, Patancheru	ICTP-8203	1.96	1.96
12	SKRAU, Jaipur	RAJ BAJRA CHARI 2	0.10	0.10
	Total	**Total (A)**	**7.08**	**7.08**
B.	**Parental lines**			
13	MPKV, Rahuri	RHRBH 1 A	0.10	0.10
14	MPKV, Rahuri	RHRBH 1 B	0.05	0.05
15	MPKV, Rahuri	RHRBI 138	0.05	0.05
16	MPKV, Rahuri	RHRBH 13 A	0.20	0.20
17	MPKV, Rahuri	RHRBH 13 B	0.10	0.10
18	MPKV, Rahuri	RHRBI 1314	0.10	0.10
19	ICRISAT, Patancheru	ICMA 95444	0.10	0.10
20	ICRISAT, Patancheru	ICMB 95444	0.05	0.05
21	ICRISAT, Patancheru	843-22 A	1.21	1.21
22	ICRISAT, Patancheru	843-22 B	0.44	0.44
23	ICRISAT, Patancheru	ICMA 93333	0.30	0.30
24	ICRISAT, Patancheru	ICMB 93333	0.10	0.10
25	JAU, Jamnagar	J 2340	0.05	0.05
26	HAU, Hisar	H 77/833-2-202	0.31	0.31
27	SKRAU, Jaipur	RIB 192 S/99	0.10	0.10
28	SKRAU, Jaipur	RIB 494	0.10	0.10
29	Dr. PDKV, Buldana	BMS-5-23 A	0.20	0.20
30	Dr. PDKV, Buldana	BMS-5-23 B	0.10	0.10
31	Dr. PDKV, Buldana	BR 333	0.10	0.10
		Total (B)	**3.76**	**3.76**
		Total (A) +(B)	**10.84**	**10.84**

Note: Production of RAJKO and Avika Bajra Chari is to be made by IGFRI, Jhansi

The composition of monitoring team for breeder seed production is as follows:

1. Project Coordinator AICRIP-Pearl Millet/ Representative
2. Breeder Concerned
3. Representative of NSC
4. Representative of concerned SSC
5. Representative of concerned SSCA

The meeting ended with thanks to the Chairperson and participants.

SESSION - V

REVIEW OF RESEARCH RESULTS AND PROGRESS REPORT OF ICAR–ICRISAT COLLABORATIVE PROJECTS 2012 – 2013 AND PLAN OF WORK 2013 -14

Chairperson :	Dr. Stefenia Grando Director, Dryland Cereal, ICRISAT	**Co-Chairperson :**	Dr. V.K. Manga Principal Scientist CAZRI
		Rapporteur :	Dr. Lila Dhar Sharma, RARI, Durgapura Dr. S.P. Singh, IARI, New Delhi
Date :	March 23, 2013	**Time :**	2:30 PM

- The chairperson in her introductory remarks made a mention about the importance of this session. The session started with the presentation of Dr. Ramavtar Sharma, Nodal scientist CAZRI. He presented brief results of the ICAR – ICRISAT partnership trials taken during 2012-13. The improved genetic materials and genetic stocks developed at ICRISAT were evaluated at various locations of the All India Coordinated Pearl Millet Improvement Programme. The breeders selected promising materials from ICRISAT genetic stocks to utilize in their respective crop improvement programme.
- Honorable ADG (FFC), Dr. R.P. Dua suggested that every center should contribute entries to ICAR-ICRISAT partnership program. ADG also emphasized that hybrids and varieties released for A_1 zone should be tested for their Fe and Zn content. He also pointed out that multi-location screening should be conducted for heat tolerance.

- Dr. K. N. Rai, Principal Scientist, ICRISAT, presented results for Fe and Zn content, he mentioned that great extent of variability is present in the materials. He also suggested materials developed for high Fe and Zn should be tested at various locations of different zones.

- Dr. Rakesh Srivastava, Senior Scientist (Molecular Breeding), ICRISAT presented the work plan for 2013-14 *Kharif* and *Summer* seasons. He presented the information about the following trials.
  1. Seed parent progeny trials
  2. Restorer parent progeny trials
  3. Other trials includes salinity tolerant population trials, high forage population trial, flowering stage heat tolerance trials and flowering stage heat tolerance B-composite and elite inbred joint biofortification trials.
  4. Disease resistance and pathogen virulence- Pearl millet downy mildew virulence nursery, pearl millet blast variability nursery and surveys of farmers field , collection and characterization of DM and blast isolates

He presented the information about marker-assisted breeding trials and nurseries to be provided by ICRISAT to different locations.

He also presented proposed activities for the ICAR-ICRISAT partnership project for the XII plan. In addition to the existing activities in the current phase, it was proposed to include whole-genome sequencing of pearl millet, and formation of heterotic pools for hybrid parent lines, and QTL mapping and introgression for rust resistance, drought and heat tolerance, and grain quality and stover quality.

Honorable ADG (FFC), Dr. R.P. Dua suggested ICRISAT to collaborate with relevant ICAR and AICPMIP centres for implementing the proposed project activities for ICAR-ICRISAT project in the XII plan.

At the end of the programme, the chairperson congratulated the speakers of this session for providing a good overview of the results and future plans, including materials to be tested in the ensuing year. She also informed that these trials are very effective in sharing materials, information and experience of the pearl millet researchers for different locations. The technical programme for *Kharif* 2013 and *Summer* 2014 was also finalized.

Progrramme of ICAR-ICRISAT Collaborative trial 2013-14

S. No.	Nursery/Trial	Ent. X Reps x Rows	Locations
	Seed parent Progeny trials		
1	Thick panicle B line trial	20 X 2 X 1	Jamnagar, Coimbatore, Aurangabad, Bijapur, Ludhiana.
2	Bristeled panicle B line trial	15 X 2 X 1	Ludhiana.
3	Early B line trial	40 X 2 X 1	CAZRI Jodhpur, Durgapura, Jamnagar, Mandor, Coimbatore,Ludhiana.
4	Compact panicle B line trial	20 X 2 X 1	Hisar, Durgapura, Mandor, Coimbatore, Dhule, Bijapur
5	Blast resistant B line trial	15 X 2 X 1	CAZRI Jodhpur, Durgapura, Jamnagar,Gwalior,Buldana, Dhule.
	Restorer Parent Progeny Trials		
6	Early Maturing Restorer trial	40 X 2 X 1	CAZRI Jodhpur, IARI Delhi, Durgapura, Mandore, Coimbatore, Buldana, Bikaner, Aurangabad, Bijapur, Ludhiana, Anantpur.
7	Long panicles R line trial	20 X 2 X 1	IARI Delhi, Durgapura, Jamnagar, Coimbatore, Gwalior, Buldana, Bikaner, Bijapur, Anantpur.
8	Thick panicle R line trial	20 X 2 X 1	IARI Delhi, Jamnagar, Coimbatore, Buldana, Bijapur, Ludhiana.
9	Compact panicle R line trial	20 X 2 X 1	CAZRI Jodhpur, Hisar, IARI Delhi, Durgapura, Jamnagar, Mandor, Coimbatore, Buldana, Bikaner, Dhule, Bijapur.
10	A4 restorers trial	20 X 2 X 1	CAZRI Jodhpur, Hisar, IARI Delhi, Durgapura, Jamnagar, Dhule, Aurangabad, Ludhiana.
12	A5 Restorer Composite	25 rows of 4m	CAZRI Jodhpur, Jamnagar, Dhule,
	Other Trials		
13	Salinity tolerant population trial	15 X 3 X 4	Ludhiana, CAZRI Pali
14	High Fe inbred trial	44 X 2 x1	CAZRI Jodhpur, Hisar, IARI Delhi, Durgapura, Jamnagar, Coimbatore, Gwalior Bijapur, Ludhiana.
15	Elite inbred high Fe joint Biofortification trial	10 X 2 X 1	Hisar, IARI Delhi, Durgapura, Jamnagar, Mandor, Coimbatore, Gwalior, Tirupati, Ludhiana.
16	High forage population trial, summer 2014	15 X 3 X 4	Mandor, Coimbatore,Buldana
17	Flowering stage heat tolerance trial, summer 2014	100 x 3 planting dates x 1	Hisar, Mandor, Dhule, Bijapur, Ludhiana.
18	Flowering stage heat tolerance B composite, summer 2014	25 rows of 4m	Dhule, Ludhiana.
	Marker Assisted Breeding Trials and Nurseries		
19	HHB 67-background DMR QTL introgression Hybrid Observation Trial	40 x 2 x 2	Patancheru, Hisar, Bawal, IARI Delhi, Anantpur.
20	H 77/833 -2- HHB 67-background DMR QTL introgression lines Observation Nursery	40 x 1 x 2	Patancheru, CAZRI Jodhpur, Hisar, Bawal, IARI Delhi, Anantpur.
21	GHB 538-background DMR QTL introgression Line X Tester trial	48 x 2 x 3	Patancheru, IARI Delhi, Durgapura, Jamnagar, Bijapur, Anantpur.
22	J 2340- background DMR QTL introgression Line trial	24 x 1 x 3	Patancheru, CAZRI Jodhpur, IARI Delhi, Jamnagar, Anantpur.
23	863B-LG4 Blast Resistance QTL Introgression Line Observation Nursery	40 x 1 x 2	Patancheru, IARI Delhi.
	Total trials		

The session ended with a vote of thanks to the chairperson and co chairman.

SESSION-VI

REVIEW AND CROP PRODUCTION STRATEGIES AND VALUE CHAIN FOR 2012-13 AND ACTION PLAN FOR 2013-14

Chairman	:	Dr. M.N. Singh, Director, DMD, Jaipur	**Co-Chairman**	:	Dr. Yogender Singh, AICPMIP, Jaipur
			Rapporteur	:	Dr. Anil Kumar
Date	:	March 23, 2013	**Time**	:	3:00 PM

The progress report of FLD's organized during 2012-13 was presented by Dr. M. S. Rathore, Agronomist, PC Unit, Mandor. As against the target of 300 ha, FLDs were organized over an area of 279 ha (including 50 ha area under summer) in the States of Gujarat, Haryana, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu on six components *i.e.* improved practices, recommended nutrient application, weed management, improved hybrids, wide row spacing in Zone A1, intercropping with legumes and integrated nutrient management. Overall yield advantage was in the range of 7.2 to 83.7% among these trials. However, in summer trials, the yield advantage was 13.4 % in improved practices than the farmer's practices in the Gujarat state.

The Director, DMD raised some points for discussion and these were addressed as below:

1. Shelf life of pearl millet flour is the major problem and technologies need to be developed. In this context, Dr. L.K. Chugh, Biochemist explained that higher concentration of polyphenols and high activity of peroxidase are few of the reasons for the rancidity problem and apprised that technologies are available for producing pearl millet flour with improved shelf life up to three months.
2. Timely submission of the AUC and results shall be ensured to the DMD, Jaipur.
3. The hybrids desired by the farmers in specific area need to be demonstrated with the up to date package and practices of respective states and zones.
4. Presently the iron rich hybrids and composites recognized are; Pusa 443, 86M86, Pusa 23, Saburi, HC 20 and Ajeet 38.
5. For effective implementation of FLD's the budget for at least two years in advance should be provided.

The centre-wise action plan will be finalized after the approval of number of FLDs from Ministry of Agriculture.

The meeting ended with thanks to the chair.

SESSION - VII

REVIEW OF AICPMIP CENTRES

Chairman	: Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi	**Co-Chairman**	: Dr. M.M. Roy Director, CAZRI & Project Coordinator, AICPMIP, Jodhpur
			Dr. Ramavtar Sharma, Nodal Officer, AICPMIP, Jodhpur
		Rapporteur	: Dr. B.S. Rajpurohit, Associate Prof. (PBG) AICPMIP, Jodhpur
Date	: March 24, 2013	**Time**	4:00 PM

Chairman Dr. R.P. Dua and Co-Chairman Dr. M.M. Roy critically reviewed the work done by each of project centre during last five years. Following recommendations were made during assessment of each centre:

- The matter of downy mildew nursery at Aurangabad centre was discussed. It was decided that such nursery is important. Also its advantage should be taken for screening of materials from other centres.
- There is water scarcity at Anantapur center, therefore a test center at A.R.S., Perumallapalle, Tirupati may be considered without additional Scientist.
- Breeding work for moisture scarcity zone may be strengthened at Bikaner (SKRAU) and Bawal (HAU).
- TNAU, Coimbatore-Erode center can be developed for blast screening
- Based on work requirements and fund allocations by ICAR for EFC of this project, suitable corrective measures within the available posts may be undertaken.

SESSION – VIII

PROCEEDING OF VARIETAL IDENTIFICATION COMMITTEE MEETING HELD ON 23.3.2013 AT JAU, JUNAGADH (GUJARAT)

Varietal Identification Committee Meeting of AICPMIP held on March 23, 2013 at 4.30 pm in Conference Hall, Directorate of Research, JAU, Junagadh (Gujarat) under the Chairmanship of Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi. The following committee members were present:

1	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi	-Chairman
2	Dr. C.J. Dangaria, Director Research, JAU, Junagadh (Guj.)	- Member
3	Dr. K.N. Rai, Principal Scientist, ICRISAT, Hyderabad	-Member
4	Dr. Ramavtar Sharma, Principal Scientist, CAZRI, Jodhpur	-Member
5	Dr M.N. Singh, Director, DMD, Jaipur	-Member
6	Dr. H. Shekar Shetty, Professor, University of Mysore, Mysore	-Member
7	Dr. A.K. Singh, Breeder, Bayer BioScience, Hyderabad	-Member
8	Dr. Surendra Kumar, Principal Breeder and Incharge R & D, Godrej Seed and Genetics, Hyderabad (AP)	-Member
9	Sh. J.G. Rathore, Branch Manager,GSSC, Junagadh, Gujarat	-Member
10	Sh. Y.K. Singh, Asstt. Production Manager, NSC, New Delhi	-Member
11	Dr. M.M. ROY, Project Coordinator (Pearl Millet), AICPMIP, Jodhpur	-Member Secretary
Principal Investigator		
12	Dr. M.S. Rathore, Assoc. Prof. (Agronomy), AICPMIP, Mandor	- Facilitator
13	Dr. B.S. Rajpurohit, Assoc. Prof. (PB & G), AICPMIP, Mandor, Jodhpur	- Facilitator
14	Dr. H.R. Bishnoi, Assoc. Prof. (Pathology), AICPMIP, Mandor, Jodhpur	- Facilitator

The proposals submitted for varietal identified are:

S.No.	Hybrid/ Variety	Identity	Zone
1	MH 1700	HHB 256	Zone A1 (Early Maturity)
2	MH 1720	Bio 13	Zone A (Medium Maturity)
3	MH 1723	KBH 1952	Zone A (Medium Maturity)
4	MH 1734	RHB 198	Zone A (Medium Maturity)
5	MH 1719	NMH 77	Zone B (Medium Maturity)
6	MH 1720	Bio 13	Zone B (Medium Maturity)
7	MH 1723	KBH 1952	Zone B (Medium Maturity)
8	MH 1747	86M89	Zone A (Late Maturity)
9	MH 1737	KBH 108	Zone A (Late Maturity)
10	MH 1743	NBH 4903	Zone A (Late Maturity)
11	MH 1746	86M36	Zone A (Late Maturity)
12	MH 1759	KBH 287-36	Zone A (Late Maturity)
13	MH 1743	NBH 4903	Zone B (Late Maturity)
14	MH 1751	DB 61515	Zone B (Late Maturity)
15	MH 1754	HP 50	Zone B (Late Maturity)
16	MP 508	SPK 33	Zone A
17	MP 509	SPK 35	Zone A
18	MP 511	SPK 41	Zone B
19	MSH 238	NMH 75	Summer

The Committee took following decision:

Zone A1 (Drier part of Rajasthan, Gujarat and Haryana)

The proposal of hybrid MH 1700 (HHB 256) was considered for drier part of Rajasthan, Gujarat and Haryana. It was found that data of check HHB 67 Improved was not available for three years and proposed hybrid was inferior to check ICMH 356. Therefore this entry may be tested for one more year along with the checks.

Zone A (Medium maturity)(Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi)

The proposals of hybrids MH 1720 (Bio 13), MH 1723 (KBH 1952) and MH 1734 (RHB 198) were considered for Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi. It was found that hybrid MH 1720 (Bio 13) did not show consistence superiority over check GHB 744. It was also found to be susceptible for rust and blast. Hence it was not identified for release. Hybrids MH 1723 (KBH 1952) and MH 1734 (RHB 198) were not found superior over qualifying hybrid MH 1720 and also susceptible to smut and rust. Hence these hybrids, MH 1723 (KBH 1952) and MH 1734 (RHB 198), were not identified.

Zone B (Medium maturity) (Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu).

The proposals for hybrids MH 1719 (NMH 77), MH 1720 (Bio 13) and MH 1723 (KBH 1952) were considered for Zone B under medium maturity group. These hybrids were found susceptible to rust, blast and ergot. Hence these hybrids MH 1719 (NMH 77), MH 1720 (Bio 13) and MH 1723 (KBH 1952) were not identified.

Zone A (Late maturity) Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi)

Proposal of five hybrids MH 1747 (86M89), MH 1737 (KBH 108), MH 1743 (NBH 4903), MH 1746 (86M36) and MH 1759 (KBH 287-36) were considered by the committee for late maturity group. Hybrid MH 1747 (86M89) showed consistence superiority in grain and dry fodder yield over the best check GHB 732 combined with multiple disease resistance, hence it was identified for release. Hybrid MH 1737 (KBH 108) also had consistent superiority in grain yield having excellent dry fodder yield. This hybrid also had tolerance to downy mildew, smut and blast, hence the hybrid was identified for release. The hybrids MH 1743 (NBH 4903), MH 1746 (86M36) and MH 1759 (KBH 287-36) did not have significant superiority in grain yield over the best check GHB 732. Hence these three hybrids were not identified.

Zone B (Late maturity)(Maharashtra, Tamil Nadu, Karnataka and A.P.)

The proposals for hybrids MH 1743 (NBH 4903), MH 1751 (DB 61515) and MH 1754 (HP 50) were considered by the committee for late maturity. Hybrid MH 1743 (NBH 4903) was found to be susceptible to rust and ergot, hence it was not identified. Hybrids MH 1751 (DB 61515) and MH 1754 (HP 50) were not found significantly superior over the checks and were also found susceptible to rust and ergot. Hence these hybrids were not identified.

Zone A (Populations)(Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi)

Proposal of two varieties MP 508 (SPK 33) and MP 509 (SPK 35) were considered by the committee. Both the population MP 508 (SPK 33) and MP 509 (SPK 35) were found susceptible to smut, rust and blast. Hence these populations were not identified by the committee for release.

Zone B (Populations) (Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu)

Population MP 511 (SPK 41) was considered by the committee. The variety was found susceptible to rust and blast. Hence this population was not identified.

Summer(Rajasthan, Gujarat, Maharashtra and Tamil Nadu)

Proposal of hybrid MSH 238 (NMH 75) was considered by the committee for summer cultivation. The hybrid was found two days earlier than best check and found marginally superior in grain yield over best check 86M64.Hence considering the importance of summer cultivation, the hybrid MSH 238 (NMH 75) was identified for release in summer areas of Rajasthan, Gujarat, Maharashtra, A.P and Tamil Nadu.

Sd/-
Dr. R.P. Dua
Chairman

Sd/-
Dr. M.M. Roy
Member Secretary

SESSION - IX

COLLABORATIONS, GENETIC RESOURCE MANAGEMENT, DUS TESTING AND REGISTRATION

Chairman	:	Dr. R.K. Bhatt, CAZRI, Jodhpur	**Co-Chairman**	:	Dr. Omvir Singh, Incharge, NBPGR, Jodhpur
			Rapporteur	:	Dr. P. Sumathi, TNAU, Coimbatore
Date	:	March 24, 2013	**Time**	:	9:00 AM

The chairman in his introductory remarks made a mention about the importance of registration of all crop varieties and hybrids under PPV & FRA. The session was started with the presentation of Dr. B.S. Rajpurohit, Breeder, AICPMIP, Jodhpur on DUS testing project. He mentioned that about 30 pearl millet hybrids and varieties were registered under PPV and FRA, these includes only public varieties. It was suggested that the hybrids registered by private centres should also be included while mentioning the total number of hybrids / varieties registered under PPV & FRA. The following points were discussed and emphasized by the Chairman.

- The registration of private hybrids under PPV &FRA is higher than the public hybrids, hence, the public centres should give priority to registration of their hybrids/varieties which are under seed chain with PPV & FRA.
- It was emphasized to give importance to maintenance breeding to maintain the genetic purity of parental lines and inbreds.
- Germplasm explored from different parts of the country may be registered under NBPGR and the IC number should be obtained.
- The collaborative trial on biofortification genotypes with AICPMIP and ICRISAT will be continued.
- It was suggested that the selected released hybrids/varieties from public and private sectors should be tested atleast at three locations in all the three zones to identify high Fe and Zn content varieties.

PLENARY SESSION

Chief guest	: Dr. N.C. Patel, Vice Chancellor, JAU, Junagadh	**Chairman**	: Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
Special Guest	Dr. Stefenia Grando Director Dryland Cereals, ICRISAT, Patancheru	**Co-Chairman**	Dr. M.M. Roy Director, CAZRI & Project Coordinator,AICPMIP, Jodhpur
		Rapporteur	: Dr. B.S. Rajpurohit, Associate. Prof. (PBG) AICPMIP, Jodhpur
Date	: March 24, 2013	**Time**	11:15 AM

The recommendations of different sessions were presented by respective rapporteurs of the session. All the observations were approved and following recommendations/ action points were decided:

- Performance of AHT-II entries may be tested on different dates of sowing in agronomical trials so as to identify better performing entries under delayed monsoon.
- A separate trial of selected released hybrids/varieties is to be constituted for evaluation of Iron and Zinc content at 3-4 locations in each zone.
- A treatment of biologicals and botanicals to be included in IPM module of insect pest management.
- The criteria for promotion of entries to higher stage in breeding trials for 50% flowering for early and medium group hybrids is fixed as under from next season:

  Days to 50% flowering in IHT (Early) and AHPT (Early) equal to or less than 45 days and in IHT (Medium) and AHT (Medium) equal to or less than 50 Days.

  Grace of two days in days to 50% flowering may be given to hybrids yielding grains 15% higher per day over best check in early and medium group hybrids.
- Agronomy including FLD report will be compiled by Dr. Anil Kumar, CCSHAU, Hisar. Other activities relating to this will remain with PC unit.

Dr. N.C. Patel thanked ICAR for choosing JAU, Junagadh for organization of this group meeting.

Meeting ended with vote of thank to chair.