

(For office use only)

**Proceedings of the 49th Annual Pearl Millet Workshop
All India Coordinated Research Project on Pearl Millet**

Held at

RARI (SKNAU), Durgapura, Jaipur

March 13-15, 2014



**All India Coordinated Research Project on Pearl Millet
(Indian Council of Agricultural Research)**

Mandor, Jodhpur 342 304

www.aicpmip.res.in



49th Annual Pearl Millet Workshop
All India Coordinated Research Project on Pearl Millet
(Indian Council of Agricultural Research)

Date: March 13-15, 2014

Venue: RARI, Jaipur

Day 1: March 13th, 2014 (Thursday)

0830 – 0900 **Registration**

Session I: General Issues (Joint Session)

0900 – 1000 **Chairperson** Dr. H.P. Yadav, Project Coordinator (Pearl Millet),
AICRP-PM Jodhpur

Rapporteur Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur

1000 - 1015 **TEA BREAK**

Session II: Review of Research Results of AICRP-PM Centres 2013-14 and Plan of work 2014-15 (Concurrent discipline-wise, centre-wise presentation of significant results and progress report)

		Chairperson	Co-Chairperson	Rapporteur
1015 - 1300	Crop Improvement	Dr. R.P. Dua ADG (FFC)	Dr. K.N. Rai Principal Scientist ICRISAT	Dr. B.S. Rajpurohit Professor, AICRP-PM, Jodhpur Dr. K.D. Mungra, JAU, Jamnagar
	Crop Production	Dr. G.L. Keshwa Dean, SKN COA, Jobner	Dr. S.N. Sharma Professor Emeritus, RARI, Jaipur	Dr. Anil Kumar Agronomist, CCS HAU Hisar Dr. R.C. Meena Asstt. Physiologist AICRP-PM, Jodhpur
	Crop Protection	Prof. H. Shekhar Shetty, University of Mysore, Mysore	Dr. Swaroop Singh Director, RARI, Jaipur	Dr. H.R. Bishnoi Associate Professor, AICRP-PM, Jodhpur Dr. B.L. Tandil Professor, RARI, Jaipur

1300 – 1400 Lunch

Session II: Review of Research Results of AICRP-PM Centres 2013-14 and Plan of work 2014-15 (Concurrent discipline-wise, centre-wise presentation of significant results and progress report) - Continued

		Chairperson	Co-Chairperson	Rapporteur
1400 - 1700	Crop Improvement	Dr. R.P. Dua ADG (FFC)	Dr. K.N. Rai ICRISAT	Dr. B.S. Rajpurohit Professor, AICRP-PM, Jodhpur Dr. K.D. Mungra, JAU, Jamnagar
	Crop Production	Dr. G.L. Keshwa Dean, SKN COA, Jobner	Dr. S.N. Sharma Professor, Emeritus, RARI, Jaipur	Dr. Anil Kumar Agronomist, CCS HAU Hisar Dr. R.C. Meena Asstt. Physiologist AICRP-PM, Jodhpur

Crop Protection	Prof. H. Shekhar Shetty, University of Mysore, Mysore	Dr. Swaroop Singh Director, RARI, Jaipur	Dr. H.R. Bishnoi Associate Professor, AICRP-PM, Jodhpur Dr. B.L. Tandi Professor, RARI, Jaipur
-----------------	---	--	---

Day 2: March 14th, 2014 (Friday)

Session III: Review of Research Results and Progress Report of AICRP-PM 2013-14

0900 - 1100	Chairperson	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Co-Chairperson	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM Jodhpur
	Rapporteur	Dr. C. Tarasatyavathi, Principal Scientist, IARI, New Delhi
	Crop Improvement	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Crop Production	Dr. Anil Kumar, Agronomist, CCS HAU, Hisar
	Crop Protection	Dr. H.R. Bishnoi, Pathologist, AICRP-PM, Jodhpur and Dr. B.L. Tandi, Professor, RARI, Jaipur

Inaugural session IV:

1100 – 1230	Chairperson	Dr. N.S. Rathore, Vice-Chancellor, SKNAU, Jobner
	Chief Guest	Shri Meetha Lal Mehta, Ex-Chief Secretary (Govt. of Rajasthan), Chairman, Rajasthan Skill & Livelihoods Development Corporation, Jaipur
	Guests of Honour	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Introduction	Dr. Swaroop Singh, Director, RARI, Jaipur
	Welcome	Dr. K. Ram Krishna, Director Research, SKNAU, Jobner
	Highlights of Research Progress 2013-14	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM Jodhpur
	Remarks by ADG (FFC)	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Remarks by Chairperson	Dr. N.S. Rathore, Vice-Chancellor, SKNAU, Jobner
	Remarks by Chief Guest	Shri Meetha Lal Mehta, Ex-Chief Secretary (Govt. of Rajasthan)
	Vote of Thanks	Dr. L.D. Sharma, Professor, RARI, Jaipur

1230 – 1245	High Tea	Venue: Lawn, Front Auditorium
-------------	----------	-------------------------------

Session V: Review of BSP and DUS Testing Project & Progress Report 2013-14 and Plan of Work 2014-15

1245 – 1400	Chairperson	Dr. I.S. Khajrwal, Ex- Project Coordinator
	Co-chairperson	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM Jodhpur
	Rapporteur	Dr. K.D. Mungra, JAU, Jamnagar
	Speaker	
	Breeder Seed Production Review and Programme	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	DUS Testing Project	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur

1400 – 1500	Lunch	
-------------	-------	--

Session VI: Review of Research Results & Progress Report of ICAR-ICRISAT Collaborative Projects 2013-14 and Plan of Work 2014-15

1500 - 1600	Chairperson	Dr. K.N. Rai, Principal Scientist, ICRISAT
-------------	--------------------	--

	Co-Chairperson	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM Jodhpur
	Rapporteur	Dr. P. Sumathi, Professor, TNAU, Coimbatore
	Speakers	Dr. K.N. Rai, ICRISAT Dr. S.K. Gupta, ICRISAT Dr. Rakesh Srivastava, ICRISAT, Patancheru Dr. H.P. Yadav, Project Coordinator
1600 – 1615	Tea break	
Session VII:	Review and Crop Production Strategies and Value Chain for 2013-14 and Action Plan 2014-15	
1615 - 1715	Chairperson	Dr. K. Ram Krishna, Director Research, SKNAU, Jobner
	Rapporteur	Dr. P.S. Shekhawat, Professor, SKRAU, Bikaner
	Frontline Demonstrations	Dr. Anil Kumar, Scientist (Agro.), HAU, Hisar
Session VIII:	Variety Identification Committee	
1715 – 1915	Chairperson	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
	Member Secretary	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM Jodhpur
	Varietal Identification Committee Meeting	Members and facilitators

Day 3: March 15th, 2014 (Saturday)

Session IX:	Centre of Excellence on Processing and Value Addition of Pearl millet for Nutritional Security	
0930 - 1015	Chairperson	Dr. Sain Das, Advisor, NSC (Hybrid Crops), New Delhi
	Co-Chairperson	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM Jodhpur
	Rapporteur	Sh. Manoj Kumar, Asstt. Professor, AICPRP-PM, Jodhpur
	Speaker	Dr. Asha Kawatra Professor, Deptt. Of Food and Nutrition, CCSHAU, Hisar
1015 – 1030	Tea	
Session X: Plenary Session	Session-wise Presentation of the Recommendations 2013-14 and Technical Programme of Work 2014-15	
1030 – 1300	Chairperson	Dr. R.P. Dua, ADG (FFC)
	Co-chairperson	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM Jodhpur
	Rapporteur	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Technical Session I	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Technical Session II	
	Crop Improvement	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Crop Production	Dr. Anil Kumar, Agronomist, HAU, Hisar
	Crop Protection	Dr. H.R. Bishnoi, Pathologist, AICRP-PM, Jodhpur and Dr. B.L. Tandi, Professor, RARI, Jaipur
	Technical Session III	Dr. C. Tarasatyavathi, Principal Scientist, IARI, New Delhi
	Technical Session IV	Dr. C. Tarasatyavathi, Principal Scientist, IARI, New Delhi
	Technical Session V	Dr. K.D. Mungra, JAU, Jamnagar
	Technical Session VI	Dr. P. Sumathi, Professor, TNAU, Coimbatore
	Technical Session VII	Dr. Anil Kumar, Agro., HAU, Hisar
	Technical Session VIII	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Technical Session IX	Sh. Manoj Kumar, Asstt.Prof.(Agron.), AICRP-PM, Jodhpur
	Vote of thanks	Dr. L.D. Sharma, Professor, RARI, Jaipur
1300 – 1400	Lunch Break	
1400 onward	Visits : Fields/ Labs	

SESSION – I

GENERAL ISSUES

Chairman : Dr. H.P. Yadav
Project Coordinator,
AICRP on Pearl Millet,
Jodhpur

Rapporteur : Dr. B.S. Rajpurohit,
Professor (PB&G)
AICRP on Pearl Millet,
Jodhpur

Date : March 13, 2014

Time : 9.00 AM

Chairman welcomed all the delegates and presented recommendations of last workshop (48th) and action taken report. He informed the house that action on almost all recommendations as listed below had been taken except recommendation on establishment of alternative testing location for disease in zone-B.

S. No.	Issue	Action
1.	Bikaner, Ludhiana and Anantapur centres were advised to strengthen the hybrid breeding programme.	Action has been taken by respective centres
2.	Performance of Gwalior, Aurangabad and Bijapur centres was not considered satisfactory. They need to strengthen breeding work.	The Gwalior centre has contributed a hybrid
3.	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.	Need full done
4.	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.	Work is in-progress. Data on DUS traits has been recorded. Application will be submitted for registration.
5.	It is suggested that collection of germplasm may be done in collaboration with NBPGR. Joint exploration may be taken with NBPGR.	Work on germplasm collection will be taken up this year
6.	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.	Work is in-progress at Hisar, Durgapura, Jamnagar centers. The centers were advised to restrict work up to limited crosses
7.	On the basis of the study conducted at different locations for three years (<i>kharif</i> 2009 to <i>rabi</i> 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.	New experiment has been planned
8.	The House recommended that pathologists would visit Mysore centre for on hand exposure to disease screening and basic research during	Action will be taken during 2014 as it was not-convenient in the month of November

	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 up scaling their skills.	
9.	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.	A trial has been formulated and conducted at both centres.
10.	Honourable 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.	Need full done. Experiment was conducted. New IHT (biofortification) has been constituted. For heat tolerance, multilocation physiological trial will be conducted in summer 2014
11.	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.	Nurseries were planted at different centres.
12.	Honourable 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	Action to be taken by ICRISAT
13.	There is water scarcity at Anantapur center, therefore a test center at A.R.S., Perumallapalle, Tirupati may be considered without additional Scientist.	The test center at Perumallapalle has been started from kharif 2013
14.	Breeding work for moisture scarcity zone may be strengthened at Bikaner (SKRAU) and Bawal (HAU).	Proposal was submitted but not accepted by ICAR
15.	TNAU, Coimbatore-Erode center can be developed for blast screening.	Facility not available at the center
16.	Based on work requirements and fund allocations by ICAR for EFC of this project, suitable corrective measures within the available posts may be undertaken.	Need full done in EFC
17.	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.	Respective centres were requested for submission of proposals and work is in progress.
18.	It was emphasized to give importance to maintenance breeding to maintain the genetic purity of parental lines and inbreds.	Work on maintenance breeding is in progress
19.	Germplasm explored from different parts of the country may be registered under NBPGR and the IC number should be obtained.	The main centers have registered their elite material. Other centres were advised for taking necessary action.

20.	The collaborative trial on bio fortification genotypes with AICPMIP and ICRISAT will be continued.	Needful done
21.	It was suggested that the selected released hybrids/varieties from public and private sectors should be tested at least at three locations in all the three zones to identify high Fe and Zn content varieties.	Needful done
22.	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.	Experiment was formulated and conducted
23.	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.	Needful done
24.	A treatment of biological and botanicals to be included in IPM module of insect pest management.	Needful done
25.	The criteria for promotion of entries to higher stage in breeding trials based on 50% flowering for early and medium group hybrids is fixed as under from next season: <ul style="list-style-type: none"> • 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. 	Implemented from 2013
26.	Agronomy including FLD report will be compiled by Dr. Anil Kumar, CCShAU, Hisar. Other activities relating to this will remain with PC unit.	Implemented

- Chairman Dr. H.P. Yadav, presented recommendation of QRT. He requested poor performing AICRP centres to improve their work.
- Issue regarding timely submission of testing fee was discussed & Dr. Yadav requested all the private companies to submit testing fee DD alongwith seed.
- Dr. Yadav also reviewed the financial position of AICRP centres and it was observed that all the centres had sufficient budget.

SESSION – II

REVIEW OF RESEARCH RESULTS OF AICRP-PM CENTRES 2013-14 AND PLAN OF WORK 2014-15 (CONCURRENT DISCIPLINE-WISE, CENTRE-WISE PRESENTATION OF SIGNIFICANT RESULTS AND PROGRESS REPORT)

A. CROP IMPROVEMENT (PLANT BREEDING)

Chairman	: Dr. R.P. Dua ADG (FFC) ICAR, New Delhi	Co-Chairman	: Dr. K.N. Rai Principal Scientist ICRISAT, Hyderabad
		Rapporteur	: Dr. B.S. Rajpurohit Professor (PBG) AICRP-PM, Jodhpur Dr. K.D. Mungra Assoc. Research Scientist JAU, Jamnagar
Date	: March 13, 2014	Time	: 10.15 AM

Review of Research Results – Centre-Wise Presentation of Significant Results and Progress Report (2013-14)

The meeting of pearl millet breeding group was held at 10.15 AM in the Conference Hall, State Institute of Agriculture Management, Durgapura, Jaipur to undertake the centre-wise discussion of research results of kharif /summer 2013-14 and formulation of technical programme of kharif /summer 2014-15.

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

Jaipur	: Dr. L.D. Sharma
Bikaner	: Dr. P.C. Gupta
Hisar	: Dr. Dev Vart Yadav
Ludhiana	: Dr. Ruchika Bhardwaj
Aurangabad	: Dr. N.Y. Satpute
Dhule	: Dr. H.T. Patil
Bijapur	: Mr. Bandenamaj Athoni
Anantapur	: Dr. P. Santhi
Gwalior	: Dr. V.K. Tiwari
Jamnagar	: Dr. K.D. Mungra
Coimbatore	: Dr. P. Sumathi
Kalai	: Dr. S.P. Singh

- Chairman, Dr. R.P. Dua expressed his satisfaction over good work being done at most of the centre except Kalai.
- Dr. Dua suggested to utilize the A5 type cytoplasm source for getting high biological yield for development of forage pearl millet. He also stressed that fodder entries should be submitted to IGFRI, Jhansi for testing.
- Project coordinator Dr. H.P. Yadav emphasized for utilization of alternate cytoplasm (A5) for the development of hybrids.

- Dr. Yadav also advised to all the centers that whenever there is need to collect germplasm there must be joint exploration with NBPGR and a portion of the collected germplasm should be deposited in NBPGR for long term preservation.
- Dr. R.P. Dua, ADG (FFC) instructed for inclusion of monitoring report of different centres in the annual report.
- Chairman was not satisfied with the work done at Kalai centre. This centre is being warned since last two workshops but no improvement in the work is observed. Therefore, chairman suggested to adjust the breeder's post to the place where it is required.
- Chairman also emphasized to have trait specific improvement work in the programme.

FORMULATION OF TECHNICAL PROGRAMME FOR 2014-15 PLANT BREEDING

Criteria for promotion of entries

- 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) equal to or less than 45 Days, 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 over HHB 67 Imp. in early group hybrids and yielding grains 15% higher over best check in medium group hybrids.
- The total promoted entries should not be more than 33% of total test entries in medium and late maturity hybrid trials.

Organization of trials

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

Hybrid and Population Trials

Entries promoted to next higher stage of testing in kharif/summer 2014 Zone A₁ and A

S. No.	Advance Hybrid & Population Trial (E)	S. No.	Advance Hybrid Trial (L) Zone A
	IHT (E) to AHPT I (E)		IHT (L) A to AHT I (L) A
1	MH 1910	1	MH 1969
2	MH 1913	2	MH 1970
3	MH 1915	3	MH 1951
4	MH 1918	4	MH 1974
	PT A to AHPT I (E)	5	MH 1984
	Nil		AHT I (L) A to AHT II (L) A
	AHPT I (E) to AHPT II (E)	6	MH 1890
5	MH 1771*	7	MH 1888
6	MH 1777*	8	MH 1889
7	MH 1828		Checks
8	MH 1837	9	GHB 558
9	MH 1831	10	GHB 732
	Checks	11	Nandi 61
10	HHB 67 (Imp.)	12	86M86
11	RHB 177		
	* Retained		
S. No.	Advance Hybrid Trial (M) Zone A [AHT (M)]	S. No.	Population Trial Zone A (PT A)
	IHT (M) A to AHT I (M) A		PT A to PT I A
1	MH 1928	1	MP 545
	AHT I (M)A to AHT II (M) A		PT I A to PT II A
2	MH 1875	2	MP 533
	Checks	3	MP 535
3	RHB 121	4	MP 534
4	GHB 744		+ New entries of PT
5	RHB 173		Checks
			Raj 171
			Pusa 383
			JBV 2
			ICMV 221
			MBC 2

Entries promoted to next higher stage of testing in kharif/summer 2014 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 I (M) B		IHT (L) B to AHT I (L) B
1	MH 1928	1	MH 1951
2	MH 1939	2	MH 1962
3	MH 1930	3	MH 1977
	AHT I (M) B to AHT II (M) B	4	MH 1969
4	MH 1852	5	MH 1964
5	MH 1864	6	MH 1957
	Checks	7	MH 1979
6	GHB 558	8	MH 1975
7	ICMH 356	9	MH 1974
8	VBBH 3040	10	MH 1976
9	Pratap		AHT I (L) B to AHT II (L) B
		11	MH 1889
		12	MH 1904
		13	MH 1887
		14	MH 1901
		15	MH 1888
			Checks
		16	GHB 558
		17	B 2301
		18	86M64
		19	Kaveri Super Boss
S. No.	Summer Hybrid Trial (SHT)	S. No.	Population Trial Zone B (PT B)
	SHT to SHT I		PT B to I PT B
1	MSH 282	1	MP 546
2	MSH 280		PT I B to PT II B
3	MSH 287	2	MP 533
	SHT I to SHT II	3	MP 534
4	MSH 276	4	MP 535
5	MSH 284		+ New entries of PT
6	MSH 278		Checks
	+ New entries		Raj 171
	Checks		ICMV 221
	86M64		ICTP 8203
	GHB 558		ICMV 155
	Proagro 9444		

New entries approved for testing in initial trial kharif 2014 /summer 2015

S. No.	Organization/Institution	Name of Entries					IHT Fe & Zn
		IHT (E)	IHT (M)	IHT (L)	PT	Summer	
1	AICRP-PM, Jodhpur	MPMH 27	MPMH 28				
2	AICRP-PM, Jaipur	RHB 222	RHB 224		RCB 24		
		RHB 223	RHB 225				
3	AICRP-PM, Dhule, (MPKV)		DHBH 1203	DHBH 1307		DHBH 1113	DHBH 1211
			DHBH 1399			DHBH 1399	DHBH 1212
			DHBH 13110				DHBH 1213
4	AICRP-PM, SKRAU, Bikaner	BHB 1401					
		BHB 1402					
		BHB 1403					
5	AICRP-PM, JAU, Jamnagar	GHB-1145	GHB-1120	GHB 1038		GHB-1147	
		GHB-1146	GHB-1126	GHB 1032		GHB-1148	
6	AICRP-PM, CCS HAU, Hisar	HHB 292	HHB 296	HHB 299	HBC 44		HHB 302
		HHB 293	HHB 297	HHB 300	HBC 45		HHB 303
		HHB 294	HHB 298		HBC 46		
					SPK-88		
7	AICRP-PM, Kalai						
8	IARI, New Delhi	Pusa 1404	Pusa 1405		Pusa Com. 707		
					Pusa Com. 708		
9	AICRP-PM, TNAU, Coimbatore		TNBH 121255			TNBH 121255	
			TNBH 121235				
10	AICRP-PM, RVSKVV, Gwalior		RVSBH-76				
11	AICRP-PM, PAU Ludhiana			PHB 3149			
12	CAZRI, Jodhpur	CZH 231					
		CZH 232					
		CZH 233					
13	A.R.S. Annapur		ABH05	ABH08	ABV04		
			ABH06	ABH09			
			ABH07				
14	NARP, Aurangabad			AHB-1190			AHB 1200
				AHB-1157			AHB 1201
							AHB 1202
15	AICRP-PM, RARS, Bijapur			BPMH-1	BPMV-1		
					BPMV-2		
16	ANGRAU, RARS, Palem		PBH-15				
17	Trimurti Plant SciencsPvt. Ltd., Hyderabad			TMBH 601			
18	PrabhatAgri Biotech Ltd., Hyderabad			PBH 307			
				PBH 235			
19	Devgen Seeds & Crop Tech. Pvt. Ltd., Hyderabad			DB 80214		DB-66760	
				DB 80200			
20	Bioseed Res. India Pvt. Ltd., Hyderabad			BIO 8534		BIO 8473	BIO 8462
				BIO 8402		BIO 8474	
21	VNR Seeds Pvt. Ltd., Hyderabad			VNR 3245			
				VNR 21457			
22	Meta-helix Life Science Pvt. Ltd., Ahmedabad			MP 7833			
23	Nuziveedu Seed Pvt. Ltd., Secunderabad		NBH 5884	NBH 4903			NBH 5865
				NBH 5867			
24	Kaveri Seed Com. Ltd., Secunderabad		KBH 3767	KBH 3590			
			KBH 4292	KBH 4153			
			KBH 4428				
25	Krishidhan Seeds Pvt. Ltd., Jalna			KDBH-5013		12KM11	
						KDBH-5013	
26	Nu Genes Pvt. Ltd., Hyderabad			NU 363		NU 363	
				NU 370			
27	Nandi Seeds Corporation, Ahmedabad		NMH 89	NMH 90		NMH 91	
28	J K Agri. Genetics	JKBH 1210	JKBH 1252	JKBH 1250		JKBH 1226	JKBH 1196
		JKBH 1304					JKBH 1252
29	Bayer Bio Science Pvt. Ltd., Hyderabad		PB1705	PB1660		PB1681	
			PB1710	PB1667		PB1685	
30	Pioneer Overseas Corporation, Hyderabad		86M38	86M92		86M18	
						86M17	
31	Krishna Seed (P) Ltd., Agra			Krishna 144			
32	Ganga Kaveri Seeds Pvt. Ltd Hyderabad			GK-1152			
				GK-1187			
33	Nirmal Seeds Pvt. Ltd., Pachora (MS)		NPH-4133				Nirmal - 7
34	Bisco Bio Sciences Pvt. Ltd., Hyderabad		LG 12.31	LG 12.51		LG 12.33	NPH - 4915
				LG 12.63			
35	Hytech Seed India Pvt. Ltd., Hyderabad		HTBH 4202				
36	Ajeet Seeds Ltd., Aurangabad					APH-41	
37	Maharashtra State Seeds Corp. Ltd, Akola		Mahabeej-1011				
38	NathBiogenes (I) Ltd., Aurangabad			NBBH-20		NBH-5151	
				NBBH-21			
39	ADVANTA Ltd. Aurangabad			PMH02-1002			
				PMH02-1007			
40	Proline Seeds Company (I) Pvt. Ltd.			Proline-4687			
41	Rasi Seeds (P) Ltd.			RBH-1827		RBH-1319	
				RBH-0918		RBH-0298	
42	Pravardhan Seeds Pvt. Ltd.			PRBH 77			
43	Yaganti Seeds Pvt. Ltd.			Laxmi 234			
44	ShakatiVardhak Hybrid Seed Pvt. Ltd. Hisar		ALBELA				Shakti-1201
Total Entries		17	33	47	10	23	15

Table I.1 Details of Centres and Trials to be Conducted During Kharif14/Summer 2015 in Zone A₁ and A

LOCATIONS	IHT (E)	IHT (M)	IHT (L)	AHPT (E)	AHT (M)	AHT (L)	PT	RHVT	SHT	IHT Fe & Zn
ZONE A1										
RAJASTHAN										*
Mandor	*	*	*	*	*	*	*	*		
Jodhpur (CAZRI)	*			*						
Bikaner (SKRAU)	*	*	*	*	*	*	*	*		
Jaipur	*	*	*	*	*	*	*	*		*
Fatehpur Shekhawati	*			*			*			
Jobner (SKNAU)				*			*			
Pali (CAZRI)				*						
Samdari	*			*			*			
Nagour (JK Seed)	*			*						
GUJARAT										
Kothara	*	*		*	*					
Bhuj (CAZRI)	*			*						
S.K.Nagar	*	*	*	*	*	*			*	
HARYANA										
Hisar	*	*	*	*	*	*	*	*		*
Bawal	*	*		*	*		*			
Hisar (Shaktivardhak)										*
Total Trials	12	7	5	14	7	5	8	4	1	4
ZONE A										
RAJASTHAN										
Tabiji					*		*			
Alwar (Pioneer)			*		*	*				
Alwar (DevGen)			*			*				
Alwar (Hitech)		*								
Behrod (Bayer)			*		*					
Alwar (J K Seed)										*
GUJARAT										
Talaja		*	*		*	*				
Anand		*	*		*	*			*	
Jamnagar		*	*		*	*	*	*	*	*
Ahmedabad (New Nandi)		*	*						*	
Narsanda (Navbharat)			*			*			*	
Palanpur (Pioneer)									*	
Palanpur (Ajeet)									*	
Dhanera (JK Seed)			*			*			*	
Dehgam (Devgen)									*	
Deesa (Bioseed)									*	
Deesa (Bayer)									*	
UTTAR PRADESH										
Kalai		*	*		*	*	*	*		
Eglas (Bioseeds)		*								
Agra (Krishna)			*						*	
Aligarh (Bayer)			*							
HARYANA										
Suhana (Nuziveedu)						*				
Shikohpur (KVK)					*					
MADHYA PRADESH										
Gwalior		*	*		*	*	*	*		
Morena					*		*			
PUNJAB										
Ludhiana		*	*		*	*	*	*		*
DELHI										
New Delhi		*			*		*			*
Total Trials	-	10	15	-	12	11	7	4	11	4

*=Trial allotted

Contd..

Table I.1 Details of Centres and Trials to be Conducted During Kharif 2014/Summer 2015 in Zone B

LOCATIONS	IHT (M)	IHT (L)	AHT (M)	AHT (L)	PT	RHVT	SHT	IHT Fe & Zn
MAHARASHTRA								
Aurangabad (NARP)	*	*	*	*	*	*	*	*
Aurangabad (Ajeet Seed)			*	*				
Aurangabad (Nath Seed)			*					
Aurangabad (DevGen)		*						
Aurangabad (Bayer)		*	*				*	
Niphad			*	*	*			
Dhule	*	*	*	*	*	*	*	*
Jalna (Vijay Seed)		*		*				
Jalna (Mahodaya)		*		*				
Jajna (Krishidhan)								*
Pachora (Nirmal Seed)	*	*		*			*	*
Buldana	*		*	*				
Vaijapur			*	*				
Ganewadi (Krishidhan)		*						
Malkapur (Ankur Seed)		*						
Waluj (Pioneer)		*	*	*				
Nasik (Krishna)		*	*	*				
KARNATAKA								
Bijapur	*	*	*	*	*	*		
Malnoor	*		*		*	*	*	
ANDHRA PRADESH								
Anantapur	*	*	*	*	*	*		
Palem	*		*		*	*		
Manoharabad (Zuari seeds)		*	*	*				
Hyderabad (Nuziveedu)		*		*				
Hyderabad (Bisco)				*				
Hyderabad (Nu Gene)		*						
Hyderabad (Kaveri Seed)		*						
Medchal (Ganga Kaveri)		*		*				
Medhchal (Godrej)	*	*						
Perumallapalle	*							
TAMIL NADU								
Coimbatore	*	*	*	*	*	*	*	*
Total Trials	11	20	16	18	8	7	6	5

* = Trial allotted

Observations to be recorded in initial and advance trials:

1. Days to 50% Flowering –Rounded to 0 decimal
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:

Initial 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 – 4 (net) Row length – 5m (net) Spacing- 50 cm x 15 cm Plot size – 5m x 2m (net) Fertilizer – As per recommendations	

Proposed entries for initial trials

IHT (E) A1: 17	PT A & B Zone : 10
IHT (M) A & B Zone : 33	Summer 2015: 23
IHT (L) A & B Zone : 47	IHT (Fe & Zn) : 15

Seed Requirement (per entry)

IHT (E) A1 Zone : 1.250 Kg	IHT Fe & Zn: 0.500 Kg	AHT (L) A: 2.0 kg
IHT (M) A & B Zone : 2.0 Kg	AHT (M) A : 2.0 kg	AHT (L) B: 2.0 Kg
IHT (L) A & B Zone : 2.250 Kg	AHT (M) B : 2.0 Kg	
Initial Population Trial A & B Zone: 2.0 kg	RHVT A : 1.0 kg	
Population Trial A Zone : 1.5 Kg	RHVT B : 1.0 kg	
Population Trial B Zone: 1.5 Kg	Summer Hybrid Trial : 2.0 kg	
AHPT (E) A1 Zone: 1.5 Kg		

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

AHT Zone A: 1.250 kg	AHT Zone B : 1.0 kg
PT Zone A: 1.250 kg	AHPT Zone A1: 0.500 kg
PT Zone B: 1.0 kg	Summer Hybrid Trial : 1.0 kg

Seed requirement of checks:

86M86: 7 kg	Kaveri Super Boss: 6 Kg	HHB 223: 3 kg	ICMV 221: 7 kg
ICMH 356: 3 kg	Nandi 61: 7 Kg	B 2301: 7 kg	JBV 2: 5 kg
86M64: 7 KG	GHB 732: 7 kg	Pratap: 6 Kg	Pusa Comp. 383: 5 kg
GHB 558: 12 kg	RHB 121: 4 kg	PAC 909: 3 kg	MBC 2: 1.5 kg
HHB 67 Imp.: 6 kg	GHB 744: 4 kg	GHB 905: 3 kg	ICTP 8203: 3 kg
RHB 177: 6 Kg	RHB 173: 7 kg	KBH 108: 5 kg	Raj 171: 8 kg
GHB 538: 2 Kg	VBBH 3040: 4 kg	ICMV 155: 4 kg	

The required quantity of seed material (**untreated**) of entries along with pedigree selected for organizing the trials as above with new entries should reach to the office of the Project Coordinator, AICRP-PM, ARS, Mandor, Jodhpur 342304 (Raj.) **latest by 25th May 2014 for kharif and by 15th January 2015 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 hybrids/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. R.P. Dua, ADG (FFC) ICAR, New Delhi
2.	Dr. H.P. Yadav, Project Coordinator, AICRP-PM, Mandor, Jodhpur
3.	Dr. Stefenia Grando, Research Programme Director, Dryland Cereals, ICRISAT, Hyderabad
4.	Dr. K.N. Rai, Director, Harvest Plus, ICRISAT, Hyderabad
5.	Dr. I.S. Khairwal Ex Project Coordinator (PM)
6.	Dr. K. Ram Krishna, Director Research, SKNAU, Jobner
7.	Dr. V.K. Manga, Principal Scientist (Plant Breeding), CAZRI, Jodhpur
8.	Dr. B.S. Rajpurohit, Professor (PB&G), AICRP-PM, Mandor, Jodhpur
9.	Dr. Omvir Singh, Incharge, Regional Station, NBPGR, Jodhpur
10.	Dr. C. Tara Satyavathi, Principal Scientist, IARI, New Delhi
11.	Dr. P.C. Gupta, Professor (PB&G), ARS, SKRAU, Bikaner
12.	Dr. L.D.Sharma, Prof. (PB&G), ARS, Durgapura, Jaipur
13.	Dr. H.T. Patil, Bajra Breeder, AICRP-PM, COA, Dhule
14.	Dr. P. Sumathi, Professor (PB&G), TNAU, Coimbatore
15.	Dr. P.R. Padhar, Research Scientist, JAU, Jamnagar
16.	Dr. K.D. Mungra, Assoc. Research Scientist, JAU, Jamnagar
17.	Dr. G. Ram Kherwa, Prof. (Stat.), AICRP-PM, Jodhpur
18.	Dr. S. K. Gupta, Sr. Scientist, ICRISAT
19.	Dr. Rakesh Shrivastav, Senior Scientist, ICRISAT, Patancheru, Hyderabad
20.	Sh. Bandenamaj Athoni, Scientist (PB), Regional Agri. Res. Station, Bijapur
21.	Dr. P. Shanthi, Scientist (PB), AICRP-PM, ARS, Anantapur (ANGRAU)
22.	Dr. S.P. Singh, Sr. Scientist, Division of Genetics, IARI, New Delhi
23.	Sh. Satish Pareek, Res. Scientist, Pioneer Over. Corporation, Hyderabad
24.	Sh. S.M. Rafiq, Principal Breeder, Nuzeevidu Seeds, Hyderabad
25.	Dr. Y.S. Verma, Research Coordinator, Metahelix Life Sciences Ltd., Bangalore
26.	Dr. Shiv Kumar Singh, Metahelix Life Science Ltd., Bangalore
27.	Sh. Shankar Honyal, Bajra Breeder, Kaveri Seeds Co. Ltd., Secunderabad
28.	Sh. B.M. Patel, Asstt. Research Scientist, Center For Crop Imp., S.K.Nagar
29.	Sh. Sachin Vidhale, Pearl Millet Breeder, Bioseed Research India Pvt. Ltd. Hyderabad
30.	Sh. Prateek Goyal, Krishna Seed Pvt. Ltd., Agra
31.	Sh. M.T. Pawar, Sr. Breeder (Pearl Millet), Bisco Biosciences Pvt. Ltd., Hyderabad
32.	Dr. M.L. Swami, Breeder, J K Agrigenetics Ltd., Hyderabad
33.	Sh. Dinesh G. Kanawade, Scientist, ARS, Buldana
34.	Dr. Aditya Sharma, Breeding Project Lead, Devgen Seeds Crop Technology, Hyderabad.
35.	Dr. V.K. Tiwari, Scientist, ZARS, Morena
36.	Sh. A.M. Talawar, Bajra Breeder, ARS, Malnoor (UAS, Raichur)
37.	Sh. V.A. Deshmukh, Ganga Kaveri Seeds, Hyderabad
38.	Dr. Ruchika Bhardwaj, Asstt. Breeder, PAU, Ludhiana
39.	Dr. D.P. Yadav, Sr. Breeder Bajara, Nath Biogenes (I) Ltd
40.	Dr. Puneet Jain, Scientist, Hytech Seed India Pvt. Ltd., Alwar
41.	Dr. Y. Kumar, Asstt. Scientist, CCS HAU, Bawal, Haryana
42.	Sh. M.N. Bijagare, Krishidhan Seeds, Jalna
43.	Dr. B.K. Pareek, Plant Breeder, New Nandi Seeds Co., Ahemadabad
44.	Sh. J.S. Sorathiya, Pearl Millet Research Station, JAU, Jamnagar
45.	Dr. K.C. Sharma, Prof., S.K.N. College of Agriculture, Jobner

S. No.	Name with designation
46.	Sh. G.P. Dahale, Jr. Breeder, MSSCL, Akola
47.	Dr. K.R. Reddy, Director Research, Nugenes Pvt. Ltd., Secunderabad
48.	Sh. D.V. Chandra Mohan Rao, Sr. Research Assoc., Advanta, India Ltd., Hyderabad
49.	Dr. L. K. Dubey, Lead (Tech. Development), Devgen Seeds
50.	Sh. R.C. Sawant, SRA, NARP, Aurangabad
51.	Dr. N.Y. Satpute, Breeder, NARP, Aurangabad
52.	Dr. M. Subba Rao, Principal Scientist & Head (Millet), ARS, ANGRAU
53.	Dr. D. Shashibhushan, Scientist, ANGRAU, RARS, Palem
54.	Mr. O.P. Ariya, SPO, SFCI Ltd., Jetsar
55.	Sh. Yashpal Singh, Director, SFCI, Jetsar
56.	Dr. S.P. Singh, AICRP-PM, Kalai, ARS, Aligarh
57.	Dr. Yogendra Shama, Suraj Crop Sciences Pvt. Ltd., Tejpur, Gujrat
58.	Dr. B.C. Patel, Anand Agril. University, Gujrat
59.	Dr. Suresh Muralia, ARS, Navgaon, SKNAU, Jobner
60.	Mr. Vilas Bhagwat, Ajeet Seed Ltd., Aurangabad
61.	Mr. Bansidhar, Safal Seeds & Biotech Ltd., Jalna
62.	Dr. M. Govindraj, Scientist, ICRISAT, Patancheru
63.	Mr. Mukesh Sankar S., Division of Genetics, New Delhi
64.	Sh. Manoj Kumar, Ankur Seeds Pvt. Ltd., Nagpur, Maharashtra
65.	Dr. Dev Vart Yadav, CCS HAU, Hisar
66.	Sh. B.G. Ravindra, Super Agri Seeds Pvt. Ltd.
67.	Dr. L.K. Chugh, CCS HAU, Hisar
68.	Sh. Balchandra, Godrej Seeds & Genetics Ltd., Hyderabad
69.	Dr. Mohd. Abdullah, Principal Breeder, RASI Seeds P. Ltd.
70.	Sh. M.K. Sharma, Trial Manager, RASI Seeds
71.	Dr. Milind P. Kulkarni, Sr. Scientist (Cereal Crops), Nirmal Seeds Pvt. Ltd., Pachora, Jalgaon
72.	Dr. V.N. Kulkarni, VP (RAD), JK Agri Genetics Ltd., Hyderabad
73.	Sh. Saurabh Goyal, Krishna Seed Pvt. Ltd., Agra
74.	Dr. (Mrs.) A.K. Jayalekha, Lead Breeder-PM, Bayer
75.	Sh. S.K. Yadav, Breeder Millet, Bayer Bioscience
76.	Dr. Anjani Kumar, Principle Scientist & Coordinator, KVK, IARI, Gurgaon
77.	Dr. Kalyan Singh, VP-Research, Dhanlaxmi Crop Science Pvt. Ltd.
78.	Sh. B.S. Yadav, Sr. Research Officer, Dupont Pioneer, Jaipur
79.	Sh. G.C. Batra, Dy. General Manager Production, NSC, New Delhi
80.	Dr. Nisha Pareek, SRF, AICRP-PM, Jodhpur
81.	Ms. Sushila Bhanwariya, SRF, AICRP-PM, Jodhpur
82.	Mrs. Meeta Singh Tomar, TA, AICRP-PM, Jodhpur
83.	Sh. Shankar Lal Yadav, SRF, AICRP-PM, Jodhpur
84.	Sh. Sripal Singh, SRF, SRF, AICRP-PM, Jodhpur
85.	Sh. B.L. Mathur, TA, SRF, AICRP-PM, Jodhpur

Session ended with vote of thanks to the chair.

B. CROP PRODUCTION (AGRONOMY AND PLANT PHYSIOLOGY)

Chairman	: Dr. G.L. Keshwa Dean, SKN COA, Jobner	Co-Chairman	: Dr. S.N. Sharma Professor Emeritus Plant Physiology RARI, Jaipur
		Rapporteur	: Dr. Anil Kumar Agronomist, CCS HAU, Hisar
			Dr. R.C. Meena Asstt. Professor AICRP-PM, Jodhpur
Date	: March 13, 2014	Time	: 10.15 AM

AGRONOMY

In the beginning, Dr. Anil Kumar welcomed the chairman and co-chairman of the session. He acquainted them about the trials being conducted at different centres during *kharif* and summer seasons of 2013. At the outset, the chairman told about the importance of the Pearl millet as a grain and fodder crop particularly in reference to the Rajasthan state. Centre wise results of the agronomical trials conducted at different centers were presented by respective scientists. Chairman suggested to show the native nutrient status of the experimental site particularly for the nutrient management trials during their presentation of results in future. In one of the Plant Physiology trial, the co-chairman pointed out that instead of writing terminal stress situation it should be written as rainfed situation as the trial was not being conducted under controlled condition. Dr. Sharma, further suggested to frame out the technical programme of Plant Physiology according to the agro ecological situation of the irrespective zones.

During kharif 2013, 58 trials were allotted to different centers, one trial failed due to management problem and results of 57 trials were reported. Results from all the centres were presented except IARI, New Delhi.

Recommendations:

1. The study carried out for three years (*Kharif* 2011 to *Kharif* 2013) with an objective to quantify the optimum dose of N & P nutrients to exploit the full yield potential in pearl millet hybrids under assured moisture conditions at different locations it is recommended that in Zone A1 at Mandor, at all the locations in Zone A (Jaipur, Hisar, Jamnagar and Kalai) and at Aurangabad in Zone B, 25% extra nitrogen of the existing RDN should be applied whereas the present phosphorus recommendations of the respective zone were found optimum.
2. To work out the best sowing time for high yielding hybrids of pearl millet during summer season, it is recommended that crop should be planted in the first fortnight of February in Jamnagar and Aurangabad whereas during January month in Dhule. The Proagro hybrid 9444 was the best performing hybrid during summer season over the locations.

Trials to be continued during 2014 -15

- PMAT 1: Response of pearl millet advance hybrids and/or populations to different levels of nitrogen.
- 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.
- PMAT 11: Performance of pearl millet advance hybrids and/or populations to different sowing dates.

Trials concluded

- PMAT 3: Optimization of nutrients for pearl millet production under assured moisture conditions.
- PMAT 7: Suitability of hybrids under varying sowing times during summer.

New trials formulated

- PMAT 2: Integrated nutrient management for newly released hybrids of pearl millet under optimum management.
- PMAT 4: Irrigation scheduling for summer pearl millet hybrids.

TECHNICAL PROGRAMME FOR 2014-15

PMAT 1: Response of pearl millet advance hybrids or populations entries to N Levels

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

a) Performance of advance hybrids and populations for zone A₁

Nitrogen levels (3) : 20, 40 & 60 kg N/ha

Hybrid (5 +1 check) : MH 1771, MH 1777, MH 1828, MH 1837, MH 1831, Check HHB 67 (Imp.)

Design : SPD

Replication : Three

Plot size

Gross : 5.0 m x 3.60 m

Net : 4.0 m x 2.70 m

Locations : Mandor and Bikaner

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

Nitrogen levels (3) : 30, 60 & 90 kg N/ha

Hybrids (4+1 check) : MH 1875, MH 1888, MH 1889, MH 1890 and GHB 744 (c)

Populations (3+1 check) : MP 533, MP 534, MP 535 and Pusa 383(c)

Design : Split plot (Nitrogen in main plot and entries in sub-plots)

Replications : 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 maturing advance hybrids and populations to nitrogen levels in Zone B

Nitrogen levels (3)	: 30, 60 & 90 kg N/ha
Hybrids (8+2 checks)	: MH 1852, MH 1864, MH 1889, MH 1888, MH 1887, MH 1904, MH 1901, VBBH 3040(c) and 86 M 64(c)
Populations (3+1 check)	: MP 533, MP 534, MP 535 and Raj 171(c)
Design	: Split Plot Design, 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 level (3)	: 60, 90 & 120 kg N/ha
Hybrids (2+1 check)	: MSH 276, MSH 278 and 86 M 64
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 applied as basal application in all the above experiments.

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 will be reported before layout of the experiment: Soil texture, pH, EC, available Nitrogen, available Phosphorus and available Potash

PMAT 9: Integrated weed management in rainfed pearl millet

Objective: To find out the integrated approach 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:

- T₁ : Control
T₂ : Weed free
T₃ : Pre. em. Atrazine @ 0.5 kg a.i./ha + one hand weeding at 35 DAS
T₄ : Post em. Atrazine @ 0.1 kg ai./ha + one hand weeding at 35 DAS
T₅ : Post em. Atrazine @ 0.2 kg ai./ha + one hand weeding at 35 DAS
T₆ : Post em. Atrazine @ 0.3 kg ai./ha + one hand weeding at 35 DAS
T₇ : Post em. Atrazine @ 0.4 kg ai./ha + one hand weeding at 35 DAS
T₈ : Two hand weeding at 20 and 35 DAS

Location:

- A₁ : Mandor and Bikaner
A : Jaipur, Hisar, Kalai and Jamnagar
B : Aurangabad, Bijapur, Dhule and Coimbatore

Experiment

Design : RBD

Replications : 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
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 will be recorded before laying out the experiment: Soil texture, pH, EC, available Nitrogen, available Phosphorus and available Potash.

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 5.0 t/ha
2. Without FYM

B. Levels of inorganic fertilizers

1. Recommended dose of fertilizer (N:P:K)
2. RDF + ZnSO₄ @ 20 kg/ha
3. RDF + FeSO₄ @ 20 kg/ha
4. RDF + Borex @ 10 kg/ha
5. RDF + Gypsum @ 250 kg/ha
6. Control (No fertilizer)

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, available Zn, available Fe) before start of the experiment and after three years of study must be analyzed.

PMAT 11: Evaluation of pearl millet advance hybrids and populations under different sowing dates during Kharif season

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 dates in zone A₁

Sowing date (3) : July 10-15, July 25-30 and August 10-15

Hybrids (5 + 1 check) : MH 1771, MH 1777, MH 1828, MH 1837, MH 1831 Check
HHB 67 (Imp)

Design : SPD

Replication : Three

Plot size

Gross : 5.0 m x 3.60 m

Net : 4.0 m x 2.70 m

Locations : Mandor and Bikaner

b) Performance of advance hybrids and populations under different sowing dates in zone A

Sowing dates (3) : July 10-15, July 25-30 and August 10-15

Hybrids (4+1 check) : MH 1875, MH 1888, MH 1889, MH 1890 and GHB 744 (c)

Populations (3+1check) : MP 533, MP 534, MP 535 and Pusa 383(c)

Design : Split plot (Nitrogen in main plot and entries in sub-plots)

Replications : Three
Plot size
Gross : 5.0 m x 3.60 m
Net : 4.0 m x 2.70 m
Locations : Jaipur, Hisar, Jamnagar and Kalai

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

Sowing dates (3) : July 10-15, July 25-30 and August 10-15
Hybrids (7+2 checks) : MH 1852, MH 1864, MH 1889, MH 1888, MH 1887, MH 1904, MH 1901, VBBH 3040(c) and 86 M 64(c)
Population (3+1 check) : MP 533, MP 534, MP 535 and Raj 171(c)
Design : Split Plot Design, N in main plots and hybrids in Sub-plots
Replications : 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

Note: Recommended dose of N and P under rainfed situation in respective zones will be applied and similarly the soil properties as in PMAT 1 will be analyzed.

PMAT 2: Integrated nutrient management for pearl millet hybrids under optimum management

Objective: To study the effect of INM on growth, yield and quality of pearl millet hybrids.

a) Integrated nutrient management of pearl millet hybrids under optimum management in zone A1

Treatment

Entries : RHB 177, HHB 234 & HHB 67 (Imp)

Locations : Mandor, Bikaner

Nutrient management

1. RDF
2. RDF + PSB + *Azospirillum*
3. 75% of RDF + PSB + *Azospirillum* + 5.0 t FYM/ha
4. 50% of RDF + PSB + *Azospirillum* + 7.5 t FYM/ha

Design : SPD (Entries in main and nutrient in sub plot)

Replications : Three

Treatments : 12

Plot size

Gross : 5.00 m x 3.60 m

Net : 4.00 m x 2.70 m

b) Integrated nutrient management of pearl millet hybrids under optimum management in zone A

Entries : RHB 173, HHB 223 & MPMH 17

Locations : Jaipur, Kalai, Hisar and Jamnagar

Nutrient management

1. RDF
2. RDF + PSB + *Azospirillum*
3. 75% of RDF + PSB + *Azospirillum* + 5.0 t FYM/ha
4. 50% of RDF + PSB + *Azospirillum* + 7.5 t FYM/ha

Design : SPD (Entries in main and nutrient in sub plot)

Replications : Three

Treatments : 12

Plot size

Gross : 5.00 m x 3.60 m

Net : 4.00 m x 2.70 m

c) Integrated nutrient management of pearl millet hybrids under optimum management in zone B

Entries : 86M64, 86M86 & GHB 558

Locations : Aurangabad, Dhule, Bijapur & Coimbatore

Nutrient management

1. RDF
2. RDF + PSB + *Azospirillum*
3. 75% of RDF + PSB + *Azospirillum* + 5.0 t FYM/ha
4. 50% of RDF + PSB + *Azospirillum* + 7.5 t FYM/ha

Design : SPD (Entries in main and nutrient in sub plot)

Replication : Three

Treatments : 12

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. Quality analysis(Protein %) in grain and straw

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

PMAT 4: Irrigation scheduling for summer pearl millet hybrids

Objectives: To find out appropriate irrigation schedule to obtain higher productivity of summer pearl millet hybrids.

Treatments :

- Irrigation schedule (4)**
- i. 50 mm CPE
 - ii. 75 mm CPE
 - iii. 100 mm CPE
 - iv. Critical growth stages (3rd leaf stage, tillering, boot stage, flowering, soft dough and hard dough stage)

Entries (3) : 86 M 64, Proagro 9444 & Nandi 72

Treatments : 12

Design : SPD
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

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)
9. Total water applied-cm
10. Water use efficiency kg/ha-cm

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

TECHNICAL PROGRAMME 2014-15 PLANT PHYSIOLOGY

PMPHY 1: Screening of advance summer hybrids against terminal stress

Objectives: Screening of advance summer hybrids to Terminal stress

Year of Commencement: 2014

Location: Jamnagar and Mandor

Season: Summer

Treatment: 1. Main plot treatments

a. Irrigated control

b. Terminal stress (Flowering to maturity) after boot leaf stage

2. Sub-plot treatment: Entries 24 hybrids

Design : RBD **Replication** : Three

Spacing : 50 X 10 cm **Plot size** : 2 Rows of 4 M length

Fertilizer : N (40 kg/ha) P (20 kg/ha) Mandor
N (120 kg/ha) P (60 kg/ha) Jamnagar

Observations:

1. Chlorophyll content at 40, 50 and 60 DAS
2. Relative water content (RWC) 40, 50 and 60DAS
3. Leaf area index
4. Seed setting %
5. Grain yield kg/ha its components:
 - a. 50% flowering
 - b. Grain yield per ha, productive tillers/plant, 1000 grain weight
 - c. Threshing percentage
 - d. Fodder yield q/ha
 - e. Harvest index
 - f. Plant population at harvest 1000/ha
 - g. Days to Maturity

PMPHY 2: Characterization For drought tolerance in pearl millet genotype

Objectives: To identify donor parents for crossing programme

Year of Commencement: 2014

Location: Jamnagar and Mandor (summer)

Treatment: 20 inbred (R lines and B lines)

Design : RBD **Replication** : Three

Spacing : 50 cm X 10 cm **Plot size** : 2 Rows of 4 M length

Fertilizer : N (40 kg/ha) P (20 kg/ha) Mandor
N (120 kg/ha) P (60 kg/ha) Jamnagar

Observations:

1. Chlorophyll content 40, 50 and 60 DAS
2. Relative water content (RWC) at 40, 50 and 60 DAS
3. Leaf area index
4. Seed setting %
5. Grain yield and its components traits:
 - a. 50% flowering
 - b. Grain yield kg/ha, productive tillers/plant, 1000 grain weight
 - c. Threshing percentage
 - d. Fodder yield q/ha
 - e. Harvest index
 - f. Plant population at harvest 1000/ha
 - g. Days to Maturity

PMPHY-3: Efficacy of Foliar Spray of Growth regulating Substances for enhancing seed yield under Rain-fed condition

Objectives: To increase the seed yield by foliar spray

Year of Commencement: Kharif-2011

Location: Mandor, Jaipur and Jamnagar

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 : 50 X 10 cm

Plot size : **Gross** : 4 Rows of 5 M length
Net : 2 Rows of 5 M length

Observations:

1. Days to 50% flowering
2. Leaf area index
3. Chlorophyll content
4. Productive tillers
5. Grain yield kg/ha
6. Fodder yield q/ha
7. Earhead weight kg/ha
8. Total dry matter kg/ha
9. Threshing percent

10. Harvest Index (HI %)
11. 1000grain weight (Test Weight)
12. Plant population at harvest 1000/ha
13. Days to Maturity
14. Soil Temperature

PMPHY-4: Varietal characterizations in pearl millet on the basis of root shoot traits

Location : Mandor, Jaipur and Jamnagar
Replication : Three **Design:** RBD
Treatments : HHB 67 Improved, RHB 177, HHB 256, RHB 173, GBH 558
 (Released hybrids of A and A₁ zone of India)

Fifteen selected genotypes will be grown in PVC tubes (approx 4 inch diameter and 1.0 m Height), each containing one plant. PVC tubes will be filled up with soil/vermiculite (1:1) ratio and will be irrigated before sowing the seed. All PVC tubes will be kept inside a trench filled with cereal straw. After 60-75 days each tube will be kept out and cut longitudinally to expose the soil without disturbing the plant. Soil mixture will be removed from root surface by flow of water till all intact roots will appear. Photographs will be taken for each genotype before taking observations.

Observations:

1. Shoot length
2. Root length
3. Shoot fresh Wight
4. Root fresh Wight
5. Shoot dry matter
6. Root dry matter

PMPHY-5: Physiological mechanism of drought tolerance in pearl millet at early seedling stage

Objectives: To identified drought torrent genotype of pearl millet at seedling stage

Location : Jaipur, Mandor and Jamnagar
Season : Laboratory trial
Year of commencement : 2014
Replication : Three **Design:** CRD
Genotypes : MH 1928, MH 1875, MH 1969, MH 1970, MH 1951
 (Advance hybrids of A and A₁ zone of India)
Treatment : Control, PEG 5% and PEG 10%
Observation time : 10 and 20 days after sowing.

Observations:

1. Root length
2. Shoot length
3. Seedling dry weight
4. Membrane stability index
5. Relative water content
6. Chlorophyll content
7. Antioxidants

Recommendation

1. For selecting the parents/hybrid for PMPHY-1 and 2, the data generated in the preceding year and the information available with the concerned PC/Breeder shall be used to select the set of genotypes for the coming/next year.
2. Purchase of SPAD meter for measurement of Chlorophyll Index and purchase of root scanner for studying the root mass shall be made mandatory to at least two centers.

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

1. Dr. G.L. Keshwa, Dean, SKNAU, Jobner
2. Dr. S.N. Sharma, Professor (Emeritus), RARI, Jaipur
3. Dr. G.L. Yadav, Agronomist, ARS (SKRAU), Jaipur (Rajasthan)
4. Dr. P.S. Shekhawat, Professor (Agronomy), ARS Bikaner
5. Dr. M.F. Hussain, Agronomist, ARS, Kalai, Aligarh
6. Dr. P.P. Girase, Asstt. professor, (Agronomy), AICRP-PM, Dhule
7. Dr. R.S. Raut, Agronomist, NARP, Aurangabad
8. Dr. R.C. Meena, Asstt. Prof. (Plant Physiology), AICRP-PM, Mandor, Jodhpur
9. Dr. A.K. Guggari, Sr. Scientist (Agronomy), RARS, Bijapur, UAS, Dharwad
10. Dr. Shubash Chandra, Jointed Director, DMD, Jaipur
11. Sh. A. Ansari, Statistical Investigator, DMD, Jaipur
12. Dr. C.P. Jaybhaye, Associate Professor (Agronomy), ARS, Buldana
13. Dr. N. Meyyazhagan, Professor (Agronomy), TNAU, Coimbatore
14. Dr. G.M. Parmar, Assistant Research Scientist, JAU, Jamnagar
15. Sh. H.K. Kandoria, Assistant Research Scientist, JAU, Jamnagar
16. Dr. Anil Kumar, Agronomist, CCS HAU, Hisar, Haryana
17. Sh. Manoj Kumar, Asstt. Agronomist, AICRP-PM, Jodhpur

Session ended with thanks to the Chairman.

C. CROP PROTECTION (PATHOLOGY AND ENTOMOLOGY)

Chairman : Prof. H. Shekar Shetty
University of Mysore
Mysore

Co-Chairman : Dr. Swaroop Singh
Director, RARI, Jaipur

Rapporteur : Dr. H.R. Bishnoi
Associate Professor
AICRP-PM, Jodhpur

Dr. B.L. Tandi
Professor, RARI, Jaipur

Date : March 13, 2014 **Time** : 10.15 AM

Scientists of Plant Protection group from different AICRP on Pearl Millet centres and ICRISAT reviewed the research results of Kharif 2013 trials conducted at different locations.

At the outset, Dr. A.C. Mathur welcomed the chairman Dr. H. Shekar Shetty and Co-Chairman Dr. Swaroop Singh. The Chairman requested all the scientists to present their achievements and appreciated for conductance of all the trials allotted during Kharif 2013 by the Pathology groups. The centre-wise results of experiments were presented by the respective scientist. Fatehpur Shekhwati center did not conduct the allotted trials. Data from Jaipur, Jamnagar, Gwalior and Anand were not included for calculation of mean data because DM pressure on indicator (7042S) was less than 70% at 30 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 2014.

Significant Findings

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

- Out of 106 entries 57 entries were having high level of downy mildew resistance across the zones
- Out of these Four entries MH 1950, MH 1951, MH 1969, and MH 1970 exhibited multiple disease resistance except ergot
- Two entries MH 1976 and MH 1978 exhibited resistance against downy mildew, blast and smut

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

- Out of 63 entries 43 were highly resistant to downy mildew across the locations
- Out of these, none of the entry exhibited multiple disease resistance against all the diseases
- Four entries MH 1828, MH 1889, MH 1890 and MH 1894 exhibited multiple disease resistance except ergot. MH 11816 and MH 1886 exhibited multiple disease resistance except blast and ergot

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

- Out of 31 entries 18 entries showed downy mildew resistance across the zones
- Only one entry GHB 744 exhibited multiple disease resistance except ergot
- Four entries, ICMH 356, MPMH 17, GHB 538 and GHB 558 exhibited multiple disease resistance except ergot and rust

PMPT-IVA (PMDMVN): Characterization of pathogen diversity in downy mildew of pearl millet

The downy mildew virulence nursery was conducted at 11 centers, demonstrated high level of variation in the population of *Sclerospora graminicola* across the locations. ICMR 01007, HHB 67-2 Improved, H/77/833-2-202, H/77/833-2, DHLB 731 and PIB 957 recorded high level of resistance at most (10) of the test locations. Seventeen Hybrid parental lines with high levels of DM resistance can be used to develop commercial hybrids. Pathogen population at Jamnagar was found to be most virulent with 40 test entries exhibiting >10% DM incidence.

PMPT-IVB: Basic Research

Pathotype specific SCAR marker was developed for the identification of pathotypes of *Sclerospora graminicola* among a mixture of isolates obtained across different pearl millet growing regions of India. The developed marker helps in identifying different pathotypes and also helps for detecting new emerging pathotypes.

In R & Avr gene interaction viz., polygalacturonase inhibitor protein (PGIP), Map Kinase (MAPK), Chitinase and HRGP genes were characterized and transcript analysis were carried out.

PMPT- IVC: Pearl Millet Blast Variability Nursery (PMBVN)–2013

Three entries viz., IP 21187, ICMR 06444 and ICMB 02111 were found resistant at any five of the nine test locations. Ten entries, ICMB 01333, ICMB 09999, HHB 146 - Improved, DHLB 22, DHLB 23, RHRB 13B, J-2480, RIB 12 S 156, Pusa 2013-2 and Pusa 2013-3 were resistant at any of the four locations. These lines can be used for blast resistance breeding programme.

PMPT–V: Module (IDM) using host plant resistance, bioagent and Chitosan formulation

The mean disease incidence at all India level revealed that at soft dough stage chitosan + *Bacillus pumilus* INR7 treatment reduced downy mildew followed by *Bacillus pumilus* INR7, *P. fluorescens*, and Chitosan individual treatments. The IDM treatment was found to increase the emergence at all the testing centers. However, an increase in the grain and fodder yield was recorded in all the testing centers. These observations indicate that the IDM module is promising for the management of downy mildew in pearl millet.

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

During field surveys it was observed that downy mildew and blast remained to be the major diseases 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 farmers field across all fields surveyed was from 0 – 67.5%. In Rajasthan (0-4%) and Tamil Nadu (0-4.2%) downy mildew was recorded. Madhya Pradesh was free from downy mildew during the surveys. Blast incidence was also found to be more severe in Maharashtra, Rajasthan and Gujarat. Fields in Tamil Nadu were free from blast incidence and however, high rust incidence was observed in Tamil Nadu,

Karnataka, Gujarat and Maharashtra. Smut incidence was observed in Rajasthan and Madhya Pradesh, whereas, the other states were relatively free from smut incidence.

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 2014. An interactive session may be arranged at Mysore centre during November 2014 for the benefit of all pearl millet pathologists for up-scaling their skills.
2. The Pathology group strongly recommended that the seed should not be treated with chemicals for Pathological trials.
3. The Pathology group strongly recommended that the greenhouse facility should be created at major research centres.

TECHNICAL PROGRAMME 2014-15

Pearl millet pathological trials to be conducted at various coordinating/cooperating centers during *Kharif* /Summer 2014.

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

Downy Mildew

Location : **Zone A**
Mandor, Jaipur, Hisar, Gwalior, Jamnagar and Anand
: **Zone B**
Mysore, Aurangabad, Dhule, Coimbatore and Patancheru

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-IVA: 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 and Mandor
Zone B
Mysore, Aurangabad, Patancheru, Dhule and Coimbatore

2. Genetic analysis through DNA markers

Location : Mysore and Patancheru

PMPT-IVB: 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-IVC: Characterization of pathogenic variability in Pearl Millet blast pathogen

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

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 must 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, Jamnagar and Coimbatore

PMPT-VIII: Management of pearl millet blast (*Pyricularia grisea*) using fungicides

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 purpose 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 | : 4 |
| (D) Plot size (Gross) | : 5.00 x 3.60 m (Net): 4.0 x 2.40 m |
| (E) Spacing | : 50 x 10 cm. |

2. **Crop and variety:** Pearl millet - Moderately susceptible

3. **Location:** Jamnagar, Dhule and Jaipur

4. Treatments

1. Iprobenphos (Kitazin) ([Organophosphorus](#)) 48 EC @0.1%
2. Tricyclazole (Beam) (5-methyl-1,2,4-triazolo[3,4-b][1,3] benzothiazole) P@ 0.1%
3. Azoxistrobin (Methyl(E)-2-{2-[6-(2-cyanophenoxy) pyrimidin-4-yl]oxy}phenyl}-3-methoxyacrylate) 25 EC @ 0.05%
4. Propiconazole @ 0.05%
5. Trifloxystrobin + tebuconazole @ 0.05%
6. Control

Observation

1. Percent disease index (by using 1-9 scale)
2. Grain and fodder kg/ha
3. Percent disease control

ENTOMOLOGY

Pearl Millet Protection Group met on March 13, 2014 in the Conference hall of Department of Entomology, Rajasthan Agricultural Research Institute, Durgapura, Jaipur (SKN Agriculture University, Jobner) under the chairmanship of Prof. H. Shekhar Shetty, University of Mysore, Mysore, Co-Chairmanship of Prof. Swaroop Singh, Director, Rajasthan Agricultural Research Institute, Durgapura, Jaipur and Rapporteur Dr. B.L. Tandi, Professor (Entomology), Rajasthan Agricultural Research Institute, Jaipur.

Centre-wise experimental results were presented by respective scientists. Dr. B.L. Tandi, presented the results of the experiments conducted at Jaipur centre. He highlighted that during survey, maximum infestation of shoot fly i.e. 50.0% was recorded at village Titaria Gujuran of Tehsil Chaksu (Jaipur) and maximum infestation (60.0%) of white grub was observed at village Nidoda of tehsil Lalsot. 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 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 against white grub, seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed and clothianidin 50 WDG @ 7.5 g/kg seed is effective.

Prof. Rajkumar P. Juneja, Assistant Research Scientist (Entomology), Pearl Millet Research Station, Jamnagar (JAU, Junagadh) reported the experimental results conducted at Jamnagar. He reported the high intensity of shoot fly i.e. 23.58%. He also reported the high population of ear head cater pillars (*Helicoverpa* & *Eublemma silicula*). He emphasized that seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by spray of Spinosad 45 SC 0.009% at 35 DAG was found most effective against shoot fly and stem borer. However, it was statistically at par with seed treatment of imidacloprid 600 FS @ 8.75 ml/kg seed followed by spray of imidacloprid 17.8 SL 0.009% 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 per cent grain damage, adult emergence of the insect and highest viability of seeds.

Prof. Swaroop Singh, Director, Rajasthan Agricultural Research Institute, Durgapura, Jaipur suggested that now a day's farmers are using hybrid seeds and they do not store bajra for seed purpose hence there is no need to continue the storage trial (PMET 6: Eco-friendly management of stored grain pests of pearl millet seed). Thus, this trial should be concluded.

FORMULATION OF TECHNICAL PROGRAMME FOR KHARIF 2014

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

Objective: To find out resistant promising pearl millet 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 pearl millet 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

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

Location: Jamnagar, Jaipur and Fatehpur-Shekhawati

Methodology: Sowing of released variety/ hybrid will be done over an area of 200 m² 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 15 Days after germination of the crop. Meteorological data such as temperature, rainfall, relative humidity and sunshine hours will be recorded and correlated with 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.

Objective: To examine pest status in pearl millet in the region.

Location: Jamnagar, Jaipur and Fatehpur-Shekhawati

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 and 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 observations 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 and 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 pearl millet seed

Treatments:

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

Methodology and observation to be recorded:

1. Seed dressing with fine plant leaves powders.
2. Release 10 pairs of *Rhizopertha/Tribolium* 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 on start of experiment and 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 cms

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 g/kg seed
8. Seed treatment of fipronil 5 SC @ 25 g/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.

SESSION - III

REVIEW OF RESEARCH RESULTS AND PROGRESS REPORT OF AICRP-PM 2013-14

Chairman : Dr. R.P. Dua ADG (FFC), ICAR New Delhi	Co-Chairman : Dr. H.P. Yadav Project Coordinator AICRP-PM, Jodhpur
	Rapporteur : Dr. C. Tara Satyavathi Principal Scientist IARI, New Delhi
Date : March 14, 2014	Time : 09.00 AM

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

During *Kharif* 2013, a total of 225 trials were allotted in A₁, A and B zones. Out of these, 200 trials were conducted with success rate of 88%.

During the discussion the following points emerged out:

1. The pedigree of the populations entered in coordinated trials need to be provided and it is essential for registration of the varieties during the time of release and notification.
2. The need for the Released Hybrids and Varieties Trial and whether the outcome of this trial is used for planning seed production strategies by different agencies.
3. Emphasis was laid on public private partnership for the spread of the public bred hybrids and varieties through MoUs. Various aspects related to MoUs like license fee and exclusivity of rights were raised. The need for a brain storming session related to these aspects was felt and accordingly a separate session or discussion to be undertaken in future.

Agronomy (Presented by: Dr. Anil Kumar)

In agronomy, 6 different experiments constituting 58 trials were conducted in different zones. Out of them 57 were conducted with a success rate of 98%. The experiments covered different management aspects like nutrient management, weed management and to work out the best sowing time for summer and kharif over different locations and zones.

During the discussion the following points emerged out:

1. Fertilizer use efficiency of newly developed advanced hybrid and populations should be categorized in future presentations.
2. 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.

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

In *Kharif*, 2013 seven pearl millet pathological trials were conducted at 11 locations.

The following points were emerged out of discussion:

1. While presenting the data on disease incidence, the incidence and severity of disease on the susceptible check should be included wherever needed.
2. Downy mildew survey should also be done in the areas where high incidence is reported.

3. During the result presentation for the disease survey and screening experiments in the farmer's fields, the disease incidence survey report should be based on team observations rather than individual observations. It should also consider the monitoring team report before submission.
4. In the experiment on management of pearl millet blast using fungicides, other chemicals available in the market for control of blast should also be considered for experimentation.

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

1. The data on experiments relating to different entomological aspects of pearl millet conducted over different locations were presented.
2. It was observed that some insects are becoming serious in some locations. In relation to this a video on shoot fly infestation in Jamnagar was shown.

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

SESSION - IV

INAUGURAL

Chairperson	:	Dr. N.S. Rathore, Vice-Chancellor, SKNAU, Jobner
Inaugurator/Chief Guest	:	Sh. Meetha Lal Mehta, Ex- Chief Secretary, (Government of Rajasthan), Chairman, Rajasthan Skill & Livelihood Development Corporation, Jaipur
Guests of Honour	:	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
Introduction	:	Dr. Swaroop Singh, Director, RARI, Jaipur
Welcome	:	Dr. K. Ram Krishna, Director Res., SKNAU, Jobner
Highlights of Research Progress 2013-14	:	Dr. H.P. Yadav, Project Coordinator, AICRP-PM, Jodhpur
Remarks by ADG (FFC)	:	Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi
Remarks by Chairperson	:	Dr. N.S. Rathore, Vice-Chancellor, SKNAU, Jobner
Remarks by Chief Guest	:	Sh. Meetha Lal Mehta, Ex- Chief Secretary, (Government of Rajasthan), Chairman, Rajasthan Skill & Livelihood Development Corporation, Jaipur
Vote of Thanks	:	Dr. L.D. Sharma, Professor, RARI, Jaipur
Date	:	14 th March, 2014
Time	:	11:00 am

The 49th Annual Pearl Millet Workshop of All India Coordinated Pearl Millet Improvement Project (Indian Council of Agricultural Research) was inaugurated on 14th March, 2014 by Sh. Meetha Lal Mehta, Ex- Chief Secretary, (Government of Rajasthan), Chairman, Rajasthan Skill & Livelihood Development Corporation, Jaipur. The ceremony was witnessed by important dignitaries of SKNAU, Jobner and ICAR, New Delhi. Dr. N.S. Rathore, Vice-Chancellor, SKNAU, Jobner, Dr. O. P. Gill, Vice-Chancellor, MPUA&T, Udaipur, Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi, Dr. Swaroop Singh, Director, RARI, Jaipur, Dr. H.P. Yadav, Project Coordinator (Pearl Millet), Dr. K. Ram Krishna, Director Res., SKNAU, Jobner, and Dr. L.D. Sharma, Incharge AICRP-PM, Jaipur.

In the inaugural address the chief guest expressed his happiness over the achievements made in the AICPMIP in terms of varieties and package of practices. He mentioned that bajra crop is the most important crop and the backbone of the economy at the micro level in Rajasthan. Though the MSP was increased for bajra and included in the National Food Security Mission, the procurement by different agencies in NFSM is not recorded compared to rice and wheat. Unless bajra is not procured by NFSM for distribution to poor people and proper marketing support, the crop would be facing the same situation in terms of research fund in comparison to other major crops.

In such cases, the alternate use of the crop should be exploited and more research and extension efforts should be directed on the nutritional importance and gain the market support.

Dr. N.S. Rathore, Vice-Chancellor, SKNAU, Jobner, emphasized the need for processing and value addition essential for increasing the marketability of pearl millet.

Dr. Dua ADG (FFC) ICAR described Pearl millet as a future crop under climate change scenario. The need for a strong seed production programme through public private partnership was emphasized for successful spread of the public bred hybrids and varieties.

Dr H.P. Yadav, Project coordinator, highlighted achievements made during 2013-14 under AICRP-PM.

Earlier Dr. K. Ram Krishna, Director Res., SKNAU, Jobner, welcomed the delegates and in the end Dr. L.D. Sharma, Incharge AICRP-PM, Jaipur proposed vote of thanks.

SESSION – V

REVIEW OF BSP AND DUS TESTING PROJECT & PROGRESS REPORT 2013-14 AND PLAN OF WORK 2014-15

Chairperson : Dr. I.S. Khairwal
Ex. PC, AICRP-PM
Jodhpur

Co-chairperson : Dr. H.P. Yadav
Project Coordinator
AICRP-PM, Jodhpur

Rapporteur : Dr. K.D. Mungra
Assoc. Res. Scientist
JAU, Jamnagar

Date : March 14, 2014 **Time** : 12.45 PM

Dr. B.S. Rajpurohit, Professor, AICRP on Pearl Millet, Mandor presented the report of breeder seed production and progress of DUS testing for the year 2013-14. He has pointed out that:

Breeder seed production programme of 12 varieties and 19 parental lines of different hybrids were organized successfully in 2013-14 as against total DAC indent of 10.84 q. A total of 36.95 q breeder seed was produced including 9.03 q carry over stock.

Indent for production of breeder seed in *kharif* 2014-15 received from DAC is given below in BSP 1. Respective centers are requested to take production programme as per BSP 1 during *kharif* 2014.

Chairperson satisfied with production of breeder seed and says that there is no problem of breeder seed production in pearl millet. He has emphasized on the feedback from various indenting agency regarding data on foundation seed produced from breeder seed and certified and truthful seed produced from indented breeder seed quantity.

Dr. K.N. Rai, ICRISAT said that now onward indent should be only for the ICTP 8203 Fe (Dhanshakti newly released high Fe version of ICTP 8203) instead of ICTP 8203.

Dr. Rajpurohit has also presented DUS testing progress report and informed that 36 candidate genotypes for first year and 19 for second year were characterized along with 22 reference varieties for DUS traits at AICRP-PM, Jodhpur and MPKV Rahuri in *kharif* 2013.

Up till now total 55 pearl millet hybrids/ varieties/ parental line both of public as well as private sector registered with PPV & FRA.

The chairperson satisfied with job done by AICRP-PM, Jodhpur for the registration of variety/ hybrid with PPV&FRA and congratulates the team.

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

Crop: Pearl millet

Year of Production: 2014

Year of supply: February 2015

S.No.	Name of Producing center/state	Name of parental line/ variety	DAC indent (q)	Target set (q)
A	Varieties			
1	MPKV, Rahuri	Dhanshakti	5.00	5.00
2	NARP, Aurangabad	ABPC4-3 (MP 484)	0.05	0.05
3	AUJ, Mandor	Mandor Bajra Composite 2(MBC 2)	2.06	2.06
4	IARI, New Delhi	Pusa Composite-612 (MP-480)	0.08	0.08
5	IARI, New Delhi	Pusa Composite-383 (MP-383)	0.01	0.01
6	PAU, Ludhiana	FBC 16	0.10	0.10
7	RVSKVV, Gwalior	JBV-4 (MP-403)	0.01	0.01
8	RVSKVV, Gwalior	JBV-2 (GKKV-93191)	0.01	0.01
9	CCS HAU, Hisar	Haryana Composite-10	0.02	0.02
10	ICRISAT, Patancheru	ICMV-221	0.03	0.03
11	ICRISAT, Patancheru	ICTP-8203 (MP 124)	0.67	0.67
12	SKNAU, Jaipur	RAJ 171	1.00	1.00
	Total	Total (A)	9.04	9.04
B.	Parental lines			
13	MPKV, Rahuri	RHRBH 1 A (Shradha A line)	0.10	0.10
14	MPKV, Rahuri	RHRBH 1 B (Shradha B line)	0.05	0.05
15	MPKV, Rahuri	RHRBI 138 (Shradha R line)	0.05	0.05
16	ICRISAT, Patancheru	843-22 A (A line HHB 67 Imp. & RHB 177)	0.53	0.53
17	ICRISAT, Patancheru	843-22 B (B line HHB 67 Imp. & RHB 177)	0.32	0.32
18	ICRISAT, Patancheru	ICMA 93333 (RHB 173 A line)	0.10	0.10
19	ICRISAT, Patancheru	ICMB 93333 (RHB 173 B line)	0.05	0.05
20	ICRISAT, Patancheru	ICMA 04999 (MPMH 17 A Line)	0.14	0.14
21	ICRISAT, Patancheru	ICMB 04999 (MPMH 17 B Line)	0.09	0.09
22	HAU, Hisar	H 77/833-2-202 (HHB 67 Imp. A line)	0.09	0.09
23	SKNAU, Jaipur	RIB 192 S/997 Imp. (RHB 173 R line)	0.05	0.05
24	SKNAU, Jaipur	RIB 494 (RHB 177 R line)	0.13	0.13
25	AICRP-Pearl Millet, Jodhpur	MIR 525-2 (MPMH 17 R Line)	0.07	0.07
		Total (B)	1.77	1.77
		Total (A) + (B)	10.81	10.81

Note: Production of RAJKO and GIANT BAJRA is to be made by IGFR, Jhansi

Monitoring team for breeder seed production:

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

The session ended with vote of thanks to the chair.

SESSION - VI

REVIEW OF RESEARCH RESULTS & PROGRESS REPORT OF ICAR-ICRISAT COLLABORATIVE PROJECTS 2013-14 AND PLAN OF WORK 2014-15

Chairperson : Dr. K.N. Rai
Director Harvest
Plus, ICRISAT

Co-chairperson : Dr. H.P. Yadav
Project Coordinator
AICRP-PM, Jodhpur

Rapporteur : Dr. P. Sumathi,
Professor, TNAU,
Coimbatore

Date : March 14, 2014 **Time** : 15.00 PM

In the introductory remarks, the chairman complemented that the collaboration of ICAR and ICRISAT is good and strong especially in pearl millet.

Dr. H.P. Yadav, Project Co-ordinator has focused the results of ICAR-ICRISAT collaborative projects of the year 2013-14, which includes, B line inbred trials, Restorer progeny trials, high Fe inbred trials, marker assisted breeding trials and nurseries, summer forage trial and heat tolerance progeny trials. Since the results are presented in the report, there was no further discussion.

Later, Dr. S.K. Gupta, ICRISAT brought out the work plan of ICAR -ICRISAT collaborative projects for the year 2014-15. He elaborately explained the breeding and pathology aspects of the project. He also presented the details of different trials which are being conducted now and also the trials to be conducted for the coming year. They are, seed parent progeny trials, restorer parent progeny trials, bio-fortification trials and special trials like high forage population/ hybrid trials, flowering stage heat tolerance trial, heat tolerance crop modelling trials and heat tolerant B composite trial.

He has also presented the locations for early maturity, stay green, high tillering, long panicle and thick panicle trials and seed parent progeny trials. However, he emphasised the centres to select voluntarily. He added some ongoing activities viz., genome sequencing, heterotic pool formation in pearl millet and studies on variability for shelf life of flour.

Finally he has explained about the disease resistance and pathogen virulence through pearl millet downy mildew virulence nursery and Pearl millet blast variability nursery.

Thirdly, Dr. Rakesh Srivastava, ICRISAT has emphatically talked about 'Marker assisted breeding trials and nurseries' under ICAR – ICRISAT collaborative research with the work plan of 2013-15. He has explained the 'Studies on mapping genes for enhanced shelf life of flour' through different approaches viz., PMiGAP, Tilling and Bi-parental MPs. He has also discussed the activities of 'International Pearl millet Genome Sequencing Consortium'.

In the discussion, there was a query on the level of maximum temperature for heat tolerance. Dr. Gupta replied that 42^oC and above at flowering is considered for heat tolerance lines. Dr. H.P. Yadav added the role of microclimate in the heat tolerance.

In the concluding remarks the chairman Dr. Rai commented ICAR–ICRISAT collaboration as 'Faster Progress and Better Results'.

Details of Centres and Trials to be Conducted Under ICAR-ICRISAT Partnership Programme During Kharif 2014/Summer 2015

Seed Parent Progeny Trials				
Trial	Entries	Reps	Rows	Proposed locations
Early Maturing B-line trial	25-30	2	1	Hisar Jaipur, Coimbatore, IARI, Kalai
Long panicle B-line trial	20-25	2	1	Hisar, Jaipur, Jamnagar
High tillering B-line trial	20-25	2	1	Hisar, Bikaner, IARI
Thick Panicle B-line trial	25-30	2	1	Hisar, Coimbatore, Jamnagar, Ludhiana
Stay-green B-line trial	20-25	2	1	Mandor, Hisar, Jamnagar
Restorer Parent Progeny Trials				
Early Maturing Restorer trial	50-60	2	1	Mandor, Hisar, Bikaner, IARI, Jaipur, Kalai, Malnoor, Anantpur, Buldhana, Coimbatore
Stay Green R-lines trial	25-30	2	1	Mandor, Bikaner, Hisar, Bijapur, Kalai, Malnoor, Buldhana
High tillering R-line trial	20-25	2	1	CAZRI, Bikaner, Jaipur, Jamnagar, IARI, Bijapur
Long panicle R-line trial	15-20	2	1	Hisar, Bikaner, Coimbatore, Jamnagar, Buldana, IARI, Kalai, Malnoor
A5 Restorers Nursery	30-35	2	1	Hisar, IARI, Jaipur, Jamnagar, Dhule, Bijapur, Mandor
A4 Restorer Composite	30-40 rows/center			Hisar, IARI, Jaipur, Jamnagar, Coimbatore, Dhule, Mandor
Biofortification Trial				
High-Fe inbred trial	40-50	2	1	Jamnagar Jaipur, Ludhiana, Gwalior, Mandor, IARI, Patancheru, Coimbatore, Dhule
Summer - 2015 trials				
Forage Population trial (Summer season- 2015)	15-20	3	6	Jaipur, Ludhiana, Hisar
Forage Hybrid trial (Summer season- 2015)	15-20	3	6	Jaipur, Ludhiana, Hisar
Flowering-stage heat tolerance trial (Summer season- 2015)	70-80	3 sowings	1	Mandor, SK Nagar
Heat tolerant B-line Composite (Summer season- 2015)	30-40 rows/center			Mandor, SK Nagar, Hisar
Marker-assisted Breeding Trials & Nurseries				
HHB 67-background DMR QTL Introgression Hybrid Observation Trial	40	2	2	Hisar, CAZRI, IARI, Bikaner
H 77/833-2-background DMR QTL Introgression Lines Observation Nursery	40	2	1	Hisar, Bikaner, Anantapur
GHB 538-background DMR QTL Introgression Line x Tester Trial	48	3	2	Jamnagar, SK Nagar, IARI, Jaipur
J 2340-background DMR QTL Introgression Line Trial	24	3	1	Jamnagar, SK Nagar, IARI, Jaipur, CAZRI, Bikaner
863B-LG4 Blast Resistance QTL Introgression Line Observation Nursery	15	2	1	Jaipur, IARI, CAZRI

The session was concluded with a formal vote of thanks by the chairman.

SESSION – VII

REVIEW AND CROP PRODUCTION STRATEGIES AND VALUE CHAIN FOR 2013-14 AND ACTION PLAN FOR 2014-15

Chairman : Dr. K. Ram Krishna
Director Research
SKNAU, Jobner

Rapporteur : Dr. P.S. Shekhawat
Professor, SKRAU
Bikaner

Date : March 14, 2014

Time : 4:00 PM

The progress report of FLD's organized during 2013-14 was presented by Dr. Anil Kumar, Agronomist, CCS HAU, Hisar. As against the target of 200 ha, FLDs were organized over an area of 177 ha (including 30 ha area under summer) in the States of Gujarat, Haryana, Maharashtra, Rajasthan, Andhra Pradesh 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 8.5 to 100.7% among these trials. However, in summer trials, the yield advantage was 24.36% in improved practices than the farmer's practices in the Gujarat state.

1. The Joint Director, DMD Dr. Shubash Chandra suggested that the plan of FLD will be continued for the year 2014-15. Although, the input cost will be reduced from Rs. 6250/- to Rs. 5000/- per demonstration per ha.
2. The Project Coordinator raised queries regarding the budget of 2013-14 which was not received till date whereas the all demonstrations were conducted by different centres. The Project Coordinator emphasized that the programme of 2014-15 will be conducted only if previous year budget is released by the DMD.
3. Joint Director DMD will inform about the plan of year 2014-15 within 2-3 days. He also required the UC of previous year for early release of fund. Timely submission of the AUC and results shall be ensured to the DMD, Jaipur by different centres.
4. 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 – VIII

PROCEEDING OF VARIETAL IDENTIFICATION COMMITTEE MEETING HELD ON 14.3.2014 AT RARI, SKNAU, DURGAPURA, JAIPUR

Varietal Identification Committee Meeting of AICRP on Pearl Millet held on March 14, 2014 at 6.00 pm at Seminar Hall, Department of Entomology, RARI, SKNAU, Durgapura, Jaipur 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. K. Ram Krishana, Director Research, SKNAU, Jobner	- Member
3	Dr. K.N. Rai, Principal Scientist, ICRISAT, Hyderabad	- Member
4	Dr. Subhash Chandra, Joint Director, DMD, Jaipur	- Member
5	Dr. H. Shekar Shetty, Professor, University of Mysore, Mysore	- Member
6	Dr. A.K. Jayalekha, Lead Breeder, Bayer Bio-Science Pvt. Ltd., Hyderabad	- Member
7	Dr. Aditya Sharma, Breeding Project Lead, Dev Gen Seeds and Crop Tech. Pvt. Ltd. Hyderabad	- Member
8	Dr. Sain Dass, Adviser, NSC (Hybrid Crops), New Delhi	- Member
9	Sh. B.S. Gupta, Seed Certification Officer, RSSCA, Jaipur, Rajasthan	- Member
10	Sh. G.C. Batra, Deputy General Manager Production, NSC, New Delhi	- Member
11	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur	- Member Secretary
Principal Investigator		
12	Dr. B.S. Rajpurohit, Professor (PB & G), AICRP-PM, Mandor, Jodhpur	- Facilitator
13	Anil Kumar, Assoc. Prof. (Agronomy), CCS, HAU, Hisar	- Facilitator
14	Dr. H.R. Bishnoi, Assoc. Prof. (Pathology), AICRP-PM, Mandor, Jodhpur	- Facilitator

The proposal of 14 hybrids/varieties as per detail given below was discussed:

S. No.	Hybrid/ Variety	Identity	Zone
1	MH 1700	HHB 256	Zone A1 (Early Maturity)
2	MH 1771	HHB 265	Zone A1 (Early Maturity)
3	MH 1790	86M01	Zone A (Medium Maturity)
4	MH 1790	86M01	Zone B (Medium Maturity)
5	MH 1785	NBH 5767	Zone B (Medium Maturity)
6	MH 1792	DHBH 9071	Zone B (Medium Maturity)
7	MH 1796	GHB 941	Zone B (Medium Maturity)
8	MH 1816	86M88	Zone B (Late Maturity)
9	MH 1815	86M85	Zone B (Late Maturity)
10	MH 1812	NBH 5061	Zone B (Late Maturity)
11	MP 520	SPK 30	Zone A
12	MP 519	SPK 21	Zone A
13	MP 519	SPK 21	Zone B
14	MSH 254	JKBH 1105	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. Looking its grain yield and days to flowering in comparison to HHB 67 Improved, it was found that MH 1700 had about 11% grain yield improvement and early in flowering which is desirable trait for drier areas. Hence, hybrid MH 1700 was identified for release for Zone A1 (Drier part of Rajasthan, Gujarat and Haryana)

The proposal of MH 1771 (HHB 265) was considered for drier part of Rajasthan, Gujarat and Haryana. The data of check hybrid HHB 67 Improved was not available for 2011. Hence it was decided to evaluate hybrid MH 1771 for one more year along with qualifying Hybrid MH 1777 (MPMH21).

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

The proposals of hybrids MH 1790 (86M01) was considered for Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi under medium maturity group. It was found that hybrid MH 1790 (86M01) is superior to all the checks over the years in term of grain yield. It has also exhibited superiority in fodder yield over all the checks. Hence it was identified for release for Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi (Zone A).

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

The proposals of four hybrids MH 1790 (86M01), MH 1785 (NBH 5767), MH 1792 (DHBH 9071) and MH 1796 (GHB 941) were considered for Zone B under medium maturity group for Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. Hybrid MH 1790 (86M01) and MH 1785 (NBH 5767) showed more than 20% superiority in grain yield and also showed superiority for dry fodder yield over all the checks. Hence, both the hybrids MH 1790 (86M01) and MH 1785 (NBH 5767) were identified for release in Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu). Other two hybrids namely MH 1792 (DHBH 9071) and MH 1796 (GHB 941)

had more rust and blast susceptibility; therefore these hybrids were not identified for release.

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

The proposal of hybrids MH 1816 (86M88), MH 1815 (86M85) and MH 1812 (NBH 5061) were considered by the committee for late maturity group. All the hybrids were found superior in term of grain yield by 5% over the best checks and more than 20% over other checks. Hence all the three hybrids viz. MH 1816 (86M88), MH 1815 (86M85) and MH 1812 (NBH 5061) were identified for release in Maharashtra, Tamil Nadu, Karnataka and A.P. for late maturity group.

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

Proposal of two varieties MP 520 (SPK 30) and MP 519 (SPK 21) were considered by the committee. Population MP 520 (SPK 30) was found 11% superior in grain yield over best check Raj 171. Hence, the population MP 520 (SPK 30) was identified for release in Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi. Population MP 519 (SPK 21) was not found superior over best check hence it was not identified by the committee for release.

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

Population MP 519 (SPK 21) 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 254 (JK 1105) was considered by the committee for summer cultivation. It was found that this hybrid has not given consistence and appreciable superiority over the locations during 2013. Hence this hybrid was not identified for release.

Sd/-
Dr. R.P. Dua
Chairman

Sd/-
Dr. H.P. Yadav
Member Secretary

SESSION - IX

CENTRE OF EXCELLENCE ON PROCESSING AND VALUE ADDITION OF PEARL MILLET FOR NUTRITIONAL SECURITY

Chairman : Dr. Sain Das
Advisor, NSC (Hybrid Crops)
New Delhi

Co-Chairman : Dr. H.P Yadav
Project Coordinator
AICRP-PM Jodhpur

Rapporteur : Sh. Manoj Kumar
Asstt. Professor
AICRP-PM Jodhpur

Date : March 15, 2014

Time : 09.30 AM

In the beginning, Dr. H.P. Yadav welcomed the chairman of the session. He acquainted the audience about the centre of excellence (COE) on processing and value addition of pearl millet for nutritional security. Dr. Asha Kawatra Professor, Deptt. Of Food and Nutrition, CCSHAU, Hisar presented the lecture on Processing and Value addition of Pearl millet for Nutritional Security and also about Research highlights on pearl millet at Centre of excellence.

She informed the house about constraints in utilization of pearl millet, theoretical and practical requirement about primary and secondary processing equipments including pulveriser, hammer mill, parboiler, blancher, solar tunnel drier. Preparation of various value added pearl millet products i.e. bakery products such as Bajra Cake, various types of biscuits and Nan khatai and traditional products such as Ladoo, Sev, Matar, Dhokla, Shakkarparah, Extruded Bajra Noodles, Bajra Pasta and ready to eat foods. Dr. Kawatra also informed about work done on value addition, refinement of technology, malting, blanching, various products developed from pearl millet.

She presented future plan of work about variety of new value added traditional, non-traditional, ready to eat convenience food development from processed and unprocessed pearl millet in combination with pulses and quality protein maize, fine tuning and up scaling of successful technologies and refinement of already developed technologies to meet need of end users.

Session ended with thanks to the Chairman.

PLENARY SESSION

Chairman : Dr. R.P. Dua,
ADG (FFC),
ICAR, New Delhi

Co-Chairman : Dr. H.P. Yadav
Project Coordinator
AICRP-PM, Jodhpur

Rapporteur : Dr. B.S. Rajpurohit,
Professor (PB&G)
AICRP-PM, Jodhpur

Date : March 15, 2014

Time : 10.30 AM

The recommendations of different sessions were presented by respective rapporteurs of the session. All the observations were approved and following recommendations were made

- A separate initial hybrid trial to be constituted for evaluation of Iron and Zinc content at 10-15 locations across both zones.
- The criteria for promotion of entries to higher stage in breeding trials is fixed as under from next season:
 - Grain yield = 5% higher than best check.
 - Downy mildew (60 DAS) equal to or less than 5.0% in hybrids; less than or equal to 10.0% in populations.
 - Blast equal to or less than 20.0% in hybrids as well as populations.
 - Days to 50% flowering in IHT (Early) and AHPT (Early) equal to or less than 45 Days, 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 HHB 67 Imp. in early group hybrids and yielding grains 15% higher to best check in medium group hybrids.
 - The total promoted entries should not be more than 33% of total test entries in medium and late maturity hybrid trials.
- Joint bio-fortification trial should be continued for next year.
- Physiological experiments no. 1, 2, 3 at Mandor should be modified or dropped till facility is created.
- 4-5 Blast screening centres should be identified.
- In ICAR-ICRISAT collaborative trial temperature along with humidity should be recorded.
- Dr. Dua stressed to work on different source of cytoplasm.
- Chairman suggested to observe micro nutrient deficiency in the experiments.
- Dr. Dua also suggested to include monitoring report in the annual report so that the performance of centre observed by monitoring team can be seen.
- One Brain storming session should be arranged for making MOU,s for taking seed production of public bred hybrids by the private companies.

At the end Dr. Dua thanked all the participants and remarked that very good work in pearl millet is being done at all the centres except one or two.

Meeting ended with vote of thank to chair.