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Proceedings of the 50th Annual Group Meeting of Pearl Millet Workers

All India Coordinated Research Project on Pearl Millet

Held at

TNAU, Coimbatore

April 23-25, 2015

भाकृअनुप
ICAR

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

50th Annual Group Meeting of Pearl Millet Workers
All India Coordinated Research Project on Pearl Millet
(*Indian Council of Agricultural Research*)

Date: April 23-25, 2015 **Venue: TNAU, Coimbatore**

AGENDA

Day 1: April 23rd, 2015 (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 2014-15 and Plan of work 2015-16 (Concurrent discipline-wise, centre-wise presentation of significant results and progress report)

		Chairperson	**Co-Chairperson**	**Rapporteur**
1015 – 1300	Crop Improvement	Dr. I.S. Solanki ADG (FFC), ICAR, New Delhi	Dr. H.P. Yadav Project Coordinator (Pearl Millet)	Dr. B.S. Rajpurohit Professor AICRP-PM, Jodhpur Dr. K.D. Mungra, JAU, Jamnagar
	Crop Production	Dr. C. Jayanthi, Director, Crop Management Studies, TNAU, Coimbatore	Dr. P. Jeyakumar, Prof. & Head Dept. of Crop Physiology, TNAU, Coimbatore	Dr. Anil Kumar Agronomist, CCS HAU Hisar Dr. R.C. Meena Asstt. Physiologist AICRP-PM, Jodhpur
	Crop Protection	Dr. K. Ramaraju Director, Centre for Plant Protection Studies, TNAU, Coimbatore	Dr. D. Alice Prof. & Head, Dept. of Pathology, TNAU, Coimbatore	Dr. H.R. Bishnoi Associate Professor, AICRP-PM, Jodhpur Sh. R.K. Juneja, Asstt. Res. Scientist (Ento.), JAU, Jamnagar
1300 – 1400	***Lunch Break***			

Session II: Continued

1400 – 1700

Day 2: April 24th ,2015 (Friday)

Session III: Inaugural

1000 – 1130	**Chief Guest**	Dr. K. Ramasamy, Vice-Chancellor, TNAU, Coimbatore
	Guest of Honour	Dr.I.S. Solanki, ADG (FFC), ICAR, New Delhi
	Welcome	Dr. M. Maheshwaran, Director Research, TNAU, Coimbatore
	Research Highlights 2014-15	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur

	Remarks by Guest of Honour	Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi
	Remarks by Chief Guest	Vice-Chancellor, TNAU, Coimbatore
	Vote of Thanks	Dr. K. Ganesamurthy, Director (i/c), Centre for Plant Breeding & Genetics, TNAU, Coimbatore
1130 – 1145	***High Tea***	
Session IV: Review of Research Results and Progress Report of AICRP-PM 2014-15		
1145 - 1330	**Chairperson**	Dr.I.S. Solanki, 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 Sh. R.K. Juneja, Asstt. Res. Sci.entist Entomology), JAU, Jamnagar
1330 – 1430	***Lunch Break***	
Session V:Review of BSP and DUS Testing Project & Progress Report 2014-15 and Plan of Work 2015-16		
1430 – 1500	**Chairperson**	Dr. G. Harinaryana, Ex-Project Coordinator (Pearl Millet)
	Co-chairperson	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur	Dr. L.D. Sharma, Professor, (PB&G), RARI, Jaipur
	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
Session VI : Interactive Session on Thrust Areas of Research in Pearl Millet		
1500 - 1630	**Chairperson**	Dr. I.S. Solanki, 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
	Panellist	Dr. O.P. Yadav, Director (Maize), ICAR-IIMR, Delhi Dr. K.N. Rai, Ex. Principal Scientist, ICRISAT Dr. H.S. Shetty, Professor, UOM, Mysore Dr. Asha Kawatra, Professor, Dept. of Food & Nutrition, CCS HAU Hisar Dr. S.K. Gupta, Hitech Seeds Dr. R.S. Mahala, Pioneer Overseas
1630 – 1645	***Tea Break***	
Session VII: Varietal Identification Committee Meeting		
1800 – 2000	**Chairperson**	Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi
	Member Secretary	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
		Members and facilitators

Day 3: April 25th, 2015 (Saturday)

Session VIII: Review of Crop Production Strategies, Value Chain for 2014-15 and Action Plan 2015-16		
0915 - 1000	**Chairperson**	Dr. K.N. Rai, Ex-Principal Scientist, ICRISAT
	Co-Chairperson	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur	Dr. P.S. Shekhawat, Professor, SK RAU, Bikaner
	Frontline Demonstrations	Dr. Anil Kumar, Scientist (Agro.), HAU, Hisar
Session IX: Review of Research Results of ICAR-ICRISAT Collaborative Projects 2014-15 and Plan of Work 2015-16		
1000 - 1030	**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. S.K. Gupta, ICRISAT Dr. Rakesh Srivastava, ICRISAT, Patancheru Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
Session : Plenary Session		
Session-wise Presentation of the Recommendations 2014-15 and Technical Programme of Work 2015-16		
1030 – 1300	**Chairperson**	Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi
	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 Sh. R.K. Juneja, Asstt. Res. Scientist (Ento.), JAU, Jamnagar
	Technical Session III	Dr. P. Sumathi, Professor, TNAU, Coimbatore
	Technical Session IV	Dr. C. Tarasatyavathi, Principal Scientist, IARI, New Delhi
	Techncal Session V	Dr. L.D. Sharma, Professor, (PB&G), RARI, Jaipur
	Technical Session VI	Dr. P. Sumathi, Professor, TNAU, Coimbatore
	Technical Session VII	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Technical Session VIII	Dr. P.S. Shekhawat, Professor, SKRAU, Bikaner
	Technical Session IX	Dr. P. Sumathi, Professor, TNAU, Coimbatore
	Vote of thanks	Dr. K. Ganesamurthy, Director (i/c), Centre for Plant Breeding & Genetics, TNAU, Coimbatore
1300 – 1400	***Lunch Break***	
1400 onward	Visits : Fields/ Labs	

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SESSION – I

GENERAL ISSUES

Chairman	**:**	Dr. H.P. Yadav Project Coordinator, AICRP-PM, Jodhpur	**Rapporteur**	**:**	Dr. B.S. Rajpurohit Professor (PB&G), AICRP-PM, Jodhpur
Date	**:**	April 23, 2015	**Time**	**:**	09.00 AM

Chairman welcomed all the delegates and presented recommendations of last workshop (49^{th}) 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.	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.	The A5 source is being used in hybrid development. Fodder entries are being contributed in IGFRI by PAU.
2.	Project coordinator Dr. H.P. Yadav emphasized for utilization of alternate cytoplasm (A5) for the development of hybrids.	As in 1 above
3.	Dr. R.P. Dua, ADG (FFC) instructed for inclusion of monitoring report of different centres in the annual report.	Report will be included from 2015-16.
4.	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.	The Vice-Chancellor of the University was requested to look in to the matter. The University has transferred the breeder to improve the progress of the center.
5.	Chairman also emphasized to have trait specific improvement work in the programme.	The trait specific work is in progress at Durgapura, Dhule, Hisar and Jamnagar.
6.	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 equipment has purchased
7.	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.	A training programme was organized at Mysore from 10-15 Nov. 2014. Pathologist from all centers participated.
8.	The Pathology group strongly recommended that the seed should not be treated with chemicals for Pathological trials.	All concerned were informed for necessary action.

9.	A separate initial hybrid trial to be constituted for evaluation of Iron and Zinc content at 10-15 locations across both zones.	IHT (Fe & Zn) was constituted and conducted at 13 locations across the zones.
10.	Joint bio-fortification trial should be continued for next year.	The trial is continue
11.	Physiological experiments no. 1, 2, 3 at Mandor should be modified or dropped till facility is created.	The new experiments were framed is conducted
12.	4-5 Blast screening centres should be identified.	Screening for blast started at Jamnagar & Dhule
13.	In ICAR-ICRISAT collaborative trial temperature along with humidity should be recorded.	Needful done.
14.	Dr. Dua stressed to work on different source of cytoplasm.	Work is in progress on A1, A4 and A5 soruces.
15.	Chairman suggested to observe micro nutrient deficiency in the experiments.	Needful one in agronomic trials.
16.	One Brain storming session should be arranged for making MOU,s for taking seed production of public bred hybrids by the private companies.	A special interactive session has been arranged on this aspect in the 50th Annual Group Meeting.

- Chairman Dr. H.P. Yadav 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 along with 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 2014-15 AND PLAN OF WORK 2015-16 (CONCURRENT DISCIPLINE-WISE, CENTRE-WISE PRESENTATION OF SIGNIFICANT RESULTS AND PROGRESS REPORT)

A. CROP IMPROVEMENT (PLANT BREEDING)

Chairman	: Dr. I.S. Solanki ADG (FFC) ICAR, New Delhi	**Co-Chairman**	:	Dr. I.S. Khairwal Ex. Project Coordinator (Pearl Millet) Dr. H.P. Yadav Project Coordinator (Pearl Millet)
		Rapporteur	:	Dr. B.S. Rajpurohit Professor (PBG), AICRP-PM, Jodhpur Dr. K.D. Mungra Assoc. Research Scientist, JAU, Jamnagar
Date	: 23 April, 2015	**Time**	:	10.15 AM

Review of Research Results – Centre-Wise Presentation of Significant Results and Progress Report (2014-15)

The meeting of pearl millet breeding group was held at 10.15 AM in the Golden Jubli Hall, Tamil Nadu Agricultural University, Coimbatore to undertake the centre-wise discussion of research results of kharif/summer 2014-15 and formulation of technical programme of kharif /summer 2015-16.

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

Jaipur	:	Dr. L.D. Sharma
Bikaner	:	Dr. P.C. Gupta
Hisar	:	Dr. V.S. Malik
Ludhiana	:	Dr. Ruchika Bhardwaj
Aurangabad	:	Mr. R.C. Sawant
Dhule	:	Dr. A.J. Patil
Bijapur	:	Mr. Bandenamaj Athoni
Anantapur	:	Dr. P. Santhi
Gwalior	:	Dr. A.K. Singh
Jamnagar	:	Dr. K.D. Mungra
Coimbatore	:	Dr. P. Sumathi

- Dr. Satyavathi, IARI, New Delhi presented the research report including some basic and strategic activities carried out at IARI.
- Project coordinator Dr. H.P. Yadav requested to all the centres to deposit seed of designated A/B pairs to project coordinator for multiplication and utilization by all AICRP centres.
- Dr Gupta from Bikaner centre was advised to screen R lines for diseases at Jaipur or Mandor.
- Dr. H.P. Yadav emphasized for exchange of breeding materials for strengthening the breeding program of the AICRP centres.
- Dr. Yadav also advised all the centers to use national and zonal checks necessarily in the station and state trials at their centre.

- The work done at Kalai centre was not presented. This is continuing process for second year that nobody has presented the breeding research report of Kalai centre.
- Ludhiana centre was requested to contribute fodder entries to IGFRI, Jhansi for testing in AICRP trials.
- All the centres of B zone were requested to strengthen the work on hybrid breeding as there is no national release from public sector since many years.
- Chairman expressed his satisfaction on work being done at many centres and he advised still to work hard.
- ADG (FFC) suggested IARI voluntary centre to strengthen the work on hybrid breeding.

FORMULATION OF TECHNICAL PROGRAMME FOR 2015-16
PLANT BREEDING

Organization of trials

Criteria for promotion of entries

- Grain yield = higher than best check or 10% over relevant check in early and Medium group and 5% over relevant check in Late group.
- 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.
- In Fe & Zn Hybrid Trial: Grain yield 10% higher over Dhanshakti and Iron more than 65 ppm.

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 2015 Zone A_1 and A

S. No.	Advance Hybrid & Population Trial (E) Zone A_1	S. No.	Advance Hybrid Trial (L) Zone A [AHT(L) A]
	IHT (E) to AHPT I (E)		**IHT (L) A to AHT I (L) A**
1	MH 1998	1	MH 2039
2	MH 1999	2	MH 2053
3	MH 2002	3	MH 2047
4	MH 1993	4	MH 2035
5	MH 1996		**AHT I (L) A to AHT II (L) A**
	PT A to AHPT I (E)	5	MH 1984
	Nil	6	MH 1974
	AHPT I (E) to AHPT II (E)	7	MH 1970
	Nil		**Checks**
	Checks	8	GHB 732
6	HHB 67 (Imp.)	9	Nandi 61
7	RHB 177	10	86M86
		11	KBH 108
		12	MP-7792
S. No.	**Advance Hybrid Trial (M) Zone A [AHT (M) A]**	**S. No.**	**Population Trial Zone A (PT A)**
	IHT (M) A to AHT I (M) A		**PT A to PT I A**
1	MH 2024		Nil
2	MH 2008		**PT I A to PT II A**
3	MH 2013		Nil
4	MH 2027		**+ New entries of PT**
5	MH 2031		**Checks**
	AHT I (M)A to AHT II (M) A		Raj 171
6	MH 1928		Pusa Comp. 383
	Checks		JBV 2
7	RHB 121		ICMV 221
8	GHB 744		MBC 2
9	RHB 173		
10	MPMH 17		
	IHT (Fe & Zn) to AHT (Fe & Zn) I		
1	MH 2078		
2	MH 2072		
3	MH 2076		
4	MH 2077		
5	MH 2073		
6	MH 2075		

S. No.	Advance Hybrid & Population Trial (E) Zone A_1	S. No.	Advance Hybrid Trial (L) Zone A [AHT(L) A]
	Checks		
7	HHB 67 Imp.		
8	PRATAP		
9	MPMH 17		
10	ICMH 356		
11	86M86		
12	ICTP 8203		
13	Dhanshakti		

Entries promoted to next higher stage of testing in kharif/summer 2015 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 2010	1	MH 2041
2	MH 2024	2	MH 2035
3	MH 2008	3	MH 2053
4	MH 2012	4	MH 2047
5	MH 2009	5	MH 2038
6	MH 2021		**AHT I (L) B to AHT II (L) B**
7	MH 2007	6	MH 1964
	AHT I (M) B to AHT II (M) B	7	MH 1979
8	MH 1928	8	MH 1962
9	MH 1939	9	MH 1977
	Checks	10	MH 1976
10	GHB 558		**Checks**
11	ICMH 356	11	B 2301
12	Pratap	12	86M64
13	PAC 909	13	Kaveri Super Boss
S. No.	**Summer Hybrid Trial (SHT)**	**S. No.**	**Population Trial Zone B (PT B)**
	SHT to SHT I		**PT B to PT I B**
1	MSH 299	1	MP 552
2	MSH 297		**PT I B to PT II B**
	SHT I to SHT II		Nil
3	MSH 287		**+ New entries of PT**
4	MSH 284		**Checks**
5	MSH 282		Raj 171
	+ New entries		ICMV 221
	Checks		ICTP 8203
	86M64		ICMV 155
	GHB 558		
	Proagro 9444		

New entries approved for testing in initial trial kharif 2015 /summer 2016

S. No.	Organization/ Institution	Name of Entries					
		IHT (E)	IHT (M)	IHT (L)	PT	Summer	IHT Fe & Zn
1	AICRP-PM, Jodhpur	MPMH 29	MPMH 31				
2	AICRP-PM, SKNAU. Jaipur	RHB 226	RHB 229				RHB 232
		RHB 227	RHB 230				RHB 233
		RHB 228	RHB 231				RHB 234
3	AICRP-PM, MPKV, Dhule		DHBH 1389			DHBH 1390	DHBH 1411
			DHBH 1397				DHBH 1412
			DHBH 13128				
4	AICRP-PM, SKRAU, Bikaner	BHB 1501					
		BHB 1502					
		BHB 1503					
5	AICRP-PM, JAU, Jamnagar	GHB 1156	GHB 1129	GHB 1113		GHB 1201	GHB 1171
			GHB 1138	GHB 1168		GHB 1202	GHB 1151
							GHB 1152
6	AICRP-PM, CCS HAU, Hisar	HHB 300	HHB 303	HHB 306	HBC 48		HHB 308
		HHB 301	HHB 304	HHB 307	HBC 49		HHB 309
		HHB 302	HHB 305		HBC 50		HHB 310
7	IARI, New Delhi		Pusa 1501		Pusa Comp. 709		
			Pusa 1502		Pusa Comp. 710		
			Pusa 1503				
8	AICRP-PM, TNAU, Coimbatore		TNBH 121215		UCC 32/55	TNBH 121215	
			TNBH 121316				
9	AICRP-PM, RVSKVV, Gwalior		RVSBH-77				
10	AICRP-PM, PAU, Ludhiana			PHB 3144			
11	CAZRI, Jodhpur	CZH 234					
		CZH 235					
12	AICRP-PM, ANGRAU, Ananthapuram		ABH 10	ABH 04			
			ABH 11				
13	NARP, Aurangabad			AHB-1157			AHB-1268
				AHB-1199			AHB-1269
14	ARS, Malnoor, Raichur, Karnataka				GB-5		
					MB-1		
15	AICRP-PM , RARS, Vijayapur, (UAS, Dharwad)			BPMH-1	BPMV-3		
				BPMH-2	BPMV-4		
16	PrabhatAgri Biotech Ltd., Hyderabad			PBH 909			
17	Devgen Seeds & Crop Tech. Pvt. Ltd., Hyderabad			DB 80198		DB 80215	
						DB 80200	
18	Bioseed Res. India Pvt. Ltd., Hyderabad			BIO 8566		BIO 8402	
				BIO 8501		BIO 8544	
19	VNR Seeds Pvt. Ltd., Hyderabad			VNR 3255			
				VNR 3275			

S. No.	Organization/ Institution	Name of Entries					
		IHT (E)	IHT (M)	IHT (L)	PT	Summer	IHT Fe & Zn
20	Meta-helix Life Science Pvt. Ltd., Ahmedabad			MP 7779		MP 7883	
				MP 7876		MP 7793	
21	Nuziveedu Seed Pvt. Ltd., Secunderabad			NBH 5860			
22	Kaveri Seed Company Ltd., Secundrabad		KBH 4756	KBH 6080			
				KBH 5424			
23	Krishidhan Seeds Pvt. Ltd., Jalna		12KM55				
24	Nu Genes Pvt. Ltd., Hyderabad		NU 3872	NU 3858		NU 3838	
25	Nandi Seeds Corporation, Ahmedabad	NMH 90				NMH 91	
26	Bayer Bio Science Pvt. Ltd., Hyderabad	XMT 1358	PB1706	PB1744		PB1764	
		PB1756	PB1720	PB1779		PB1765	
27	Pioneer Overseas Corporation, Hyderabad		86M42	86M90		86M20	
						86M19	
28	Krishna Seed (P) Ltd., Agra			KRISHNA 171		KRISHNA 162	
29	Ganga Kaveri Seeds Pvt. Ltd., Hyderabad			GK-1200			GK-1116
				GK-1207			
30	Nirmal Seeds Pvt. Ltd., Pachora (MS)			NPH-5286			NPH-4604
				NPH-5423			
31	Bisco Bio Sciences Pvt. Ltd., Hyderabad		LG 73.04	LG 75.01		LG 75.02	LG 73.02
32	Hytech Seed India Pvt. Ltd., Hyderabad			HT 415256		HT 415256	
				HT 415078			
33	NathBiogenes (I) Ltd., Aurangabad		NBBH-27	NBBH-26		NBBH-22	
						NBBH-24	
34	Rasi Seeds (P) Ltd.		Rasi14K006	Rasi12K1827		Rasi14S294	
			Rasi14K607	Rasi14K1494			
35	Pravardhan Seeds Pvt. Ltd.			PRBH 99			
36	Godrej Seeds & Genetics Ltd., (Hyderabad)			GBH-2014			
				GBH-2015			
37	Spriha Biosciences Pvt. Ltd., Telangana			S-1183			S-1183
38	Ankur Seeds Pvt. Ltd., Nagpur			ARBH-11141			
				ARBH-14090			
39	Hi-Yield Agri-Genetics Pvt. Ltd., Hyderabad			Hy MH 5		Hy MH 5	
40	Namdhari Seeds Pvt. Ltd., Bangalore			NHB 999			
41	J K Agri Genetics Ltd.	JKBH 1288	JKBH 1489	JKBH 1486			
			JKBH 1455	JKBH 1477			
	Total Entries	**17**	**32**	**46**	**10**	**23**	**17**

Table I.1 Details of Centres and Trials to be Conducted during Kharif15/Summer 2016 in Zone A_1 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	*	*	*	*	*	*	*	*		*
Jaipur (Spriha)			*			*				
Jobner (SKNAU)				*			*			
Samdari	*			*						
Lalawas (JK Seed)	*			*						
GUJARAT										
Kothara	*	*		*	*					
Bhuj (CAZRI)	*			*						
S.K.Nagar	*	*	*	*	*	*			*	
HARYANA										
Hisar	*	*	*	*	*	*	*	*		*
Bawal	*	*		*	*		*			
Arya Nagar (Shaktivardhak)										*
Total Trials	**11**	**7**	**6**	**12**	**7**	**6**	**6**	**4**	**1**	**4**
ZONE A										
RAJASTHAN										
Alwar (Pioneer)			*		*	*				
Alwar (DevGen)			*			*				
Chikani (Hytech)			*							
Behrod (Bayer)			*		*	*				
GUJARAT										
Talaja		*			*					
Anand		*	*		*	*			*	
Jamnagar		*	*		*	*	*	*	*	*
Ahmedabad (Nandi)		*	*						*	
Narsanda (Navbharat)			*			*			*	
Palanpur (Pioneer)									*	
Dhanera (JK Seed)			*						*	
Dehgam (Devgen)									*	
Deesa (Ajeet)									*	
Deesa (Bio Seed)									*	
Himmat Nagar (Nath Biogene)									*	
UTTAR PRADESH										
Kalai		*	*		*	*	*	*		
Eglas (Bioseeds)		*				*				
Agra (Krishna)			*						*	
Aligarh (Nath Biogene)			*							
Hathras (Ganga Kaveri)			*			*				
HARYANA										
Sohana (Nuziveedu)						*				
Shikohpur (KVK)					*					
MADHYA PRADESH										
Gwalior		*	*		*	*	*	*		
Morena					*		*			
PUNJAB										
Ludhiana		*	*		*	*	*	*		*
DELHI										
New Delhi		*			*		*			*
Total Trials	**-**	**9**	**15**	**-**	**11**	**12**	**6**	**4**	**11**	**3**

*=Trial allotted

Contd..

Table I.1 Details of Centres and Trials to be Conducted During Kharif 2015/ Summer 2016 in Zone B

LOCATIONS	IHT (M)	IHT (L)	AHT (M)	AHT (L)	PT	RHVT	SHT	IHT Fe & Zn
MAHARASHTRA								
Auarangabad (NARP)	*	*	*	*	*	*	*	*
Auarangabad (Ajeet Seed)			*	*				
Auarangabad (DevGen)		*						
Auarangabad (Bayer)	*	*	*				*	
Auarangabad (Nath Biogene)	*							
Niphad			*	*	*			
Dhule	*	*	*	*	*	*	*	*
Jalna (Vijay Seed)		*		*				
Jalna (Mahodaya)		*		*				
Jalgaon (J K Seed)								*
Pachora (Nirmal Seed)	*	*		*				*
Buldana	*		*					
Ganewadi (Krishidhan)	*			*				*
Malkapur (Ankur Seed)		*					*	
Godegaon (Pioneer)		*	*	*				
Nasik (Krishna)		*	*	*				
KARNATAKA								
Vijayapur	*	*	*	*	*	*		
Malnoor	*		*		*	*		
ANDHRA PRADESH								
Ananthapuram	*	*	*	*	*	*		
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	**13**	**19**	**14**	**17**	**8**	**7**	**5**	**6**

*=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
5. Panicle Diameter (cm) - Rounded to one decimal
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)
12. Diseases and pest incident (Under natural conditions)

Experimental details:

Initial Trials: No. of rows – 3 (net) Row length – 4m (net) Spacing – 60 cm x 15 cm (Zone A_1) 50 cm x 15 cm (Zone A & B) Plot size – 4m x 1.8 m (net) (Zone A_1) 4m x 1.5 m (net) (Zone A & B) Fertilizer – As per recommendations	**Advance Trials:** No. of rows – 6 (net) Row length – 4m (net) Spacing – 60 cm x 15 cm (Zone A_1) 50 cm x 15 cm (Zone A & B) Plot size – 4m x 3.6 m (net) (Zone A_1) 4m x 3.0 m (net) (Zone A & B) Fertilizer – As per recommendations
Population Trials: No. of rows – 6 (net) Spacing – 60 cm x 15 cm (Zone A_1) 50 cm x 15 cm (Zone A & B) Plot size – 4m x 3.6 m (net) (Zone A_1) 4m x 3.0 m (net) (Zone A & B) Fertilizer – As per recommendations	

Proposed entries for initial trials:

IHT (E) A1: 17	PT A & B Zone : 10
IHT (M) A & B Zone : 32	Summer 2016: 23
IHT (L) A & B Zone : 46	IHT (Fe & Zn) : 17

Seed Requirement (per entry):

IHT (E) A1 Zone: 1.5 kg	IHT Fe & Zn: 1.250 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: 1.250 kg	
Population Trial A Zone: 1.5 kg	RHVT B: 1.250 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: 1.500 kg	AHT Zone B : 1.250 kg
PT Zone A: 1.500 kg	AHPT Zone A1: 0.750 kg
PT Zone B: 1.250 kg	Summer Hybrid Trial: 1.0 kg

Seed requirement of checks:

86M86: 10 kg	Kaveri Super Boss: 6 kg	HHB 223: 1 kg	ICMV 221: 6 kg
ICMH 356: 3 kg	Nandi 61: 4 kg	B 2301: 4 kg	JBV 2: 4 kg
86M64: 4 kg	GHB 732: 4 kg	Pratap: 5 kg	MPMH 17: 4 kg
GHB 558: 6 kg	RHB 121: 5 kg	PAC 909: 6 kg	MBC 2: 3.0 kg
HHB 67 Imp.: 4 kg	GHB 744: 5 kg	GHB 905: 1 kg	ICTP 8203: 3 kg
RHB 177: 4 kg	RHB 173: 7 kg	KBH 108: 6 kg	Raj 171: 7 kg
GHB 538: 2 kg	MP-7792: 6 kg	ICMV 155: 3 kg	Pusa Comp. 383: 4 kg
KBH 108: 5 kg	NBH 5061: 4 kg	NBH 5767: 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 (Pearl Millet), AICRP-Pearl Millet, ARS, Mandor, Jodhpur 342304 (Raj.) **latest by 25th May 2015 for kharif and by 15th January 2016 for summer trials** along with required testing fee of Rs. 60,000/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. I.S. Solanki, ADG (FFC) ICAR, New Delhi
2.	Dr. H.P. Yadav, Project Coordinator, AICRP-PM, Mandor, Jodhpur
3.	Dr. O.P. Yadav, Director, ICAR-DMR, New Delhi
4.	Dr. K.N. Rai, Ex. Principal Scientist , ICRISAT, Hyderabad
5.	Dr. G. Harinarayana, Ex. Project Coordinator (PM), Hyderabad
6.	Dr. I.S. Khairwal, Ex. Project Coordinator (PM)
7.	Dr. Asha Kawatra, Professor, Deptt. of Food and Nutrition, HAU, Hisar
8.	Dr. B.S. Rajpurohit, Professor (PB&G), AICRP-PM, Mandor, Jodhpur
9.	Dr. C. Tara Satyavathi, Principal Scientist, IARI, New Delhi
10.	Dr. P.C. Gupta, Professor (PB&G), ARS, SKRAU, Bikaner
11.	Dr. A.K. Singh, Prof., RVSKVV, Gwalior
12.	Dr. L.D. Sharma, Prof. (PB&G) and Incharge Millet Project, RARI, Durgapura, Jaipur
13.	Dr. A.J. Patil, Professor & I/C, AICRP-PM, Bajra Res. Project, Dhule, (M.S.)
14.	Dr. H.T. Patil, Assoc. Prof. (Breeding) , AICRP-PM, Bajra Research Scheme, COA, Dhule
15.	Dr. P. Sumathi, Professor (PB&G), Deptt. Of Millets, TNAU, Coimbatore
16.	Dr. P.R. Padhar, Research Scientist (Pearl Millet), JAU, Jamnagar
17.	Dr. K.D. Mungra, Assoc. Research Scientist, JAU, Jamnagar
18.	Dr. G. Ram Kherwa, Prof, (Stat.), AICRP-PM, Jodhpur
19.	Dr. P. Sanjana, Sr. Scientist (Plant Breeding), Indian Institute of Millet Research, Hyderabad
20.	Dr. Virender Malik, Bajra Breeder/Associate Prof., Bajra Section, Deptt. of GPB, CCS HAU, Hisar
21.	Dr. Ramesh Kumar, Asstt. Scientist, Bajra Section, Deptt. of GPB, CCS HAU, Hisar
22.	Sh. P.S. Patel, Research Scientist, Center For Crop Imp., SDAU, S. K. Nagar
23.	Sh. A.M. Talawar, Asstt. Prof. (GPB), ARS, Malnoor (UAS, Raichur)
24.	Dr. S.K. Gupta, Sr. Scientist, Pearl Millet Breeding, ICRISAT, Hyderabad
25.	Dr. Rakesh Shrivastav, Senior Scientist, ICRISAT, Hyderabad
26.	Dr. M. Govindraj, Scientist, ICRISAT, Hyderabad
27.	Dr. S.P. Singh, Sr. Scientist, Division of Genetics, ICAR-IARI, New Delhi
28.	Sh. Bandenamaj Athoni, Jr. Breeder, AICRP-PM, Regional Agri. Res. Station, Vijayapur
29.	Dr. P. Shanthi, Scientist (PB), AICRP-PM, ARS, ANGRAU, Ananthapuram
30.	Dr. Dev Vart Yadav, Asstt. Scientist, CCS HAU, Hisar
31.	Dr. Ruchika Bhardwaj, Asstt. Breeder, PAU, Ludhiana
32.	Dr. M. Subba Rao, Principal Scientist (Millet) & Head, ARS, Perumallapalle, (A.P.)
33.	Dr. D. Shashibhushan, Scientist (Pl. Br.), RARS, PJTSAU, Palem, T.S.
34.	Dr. B.C. Patel, Asstt. Res. Sci., Anand Agril. University, Anand, Gujrat
35.	Dr. D.K. Gothwal, Prof. (PBG), S.K.N. College of Agriculture, Jobner
36.	Dr. J. Aravind Kumar, Sr. Scientist, Pearl Millet Breeder, Div. III, ICAR-CAZRI, Jodhpur

S. No.	Name with designation
37.	Dr. V.K. Tiwari, Scientist (PB), ZARS, Morena (M.P.)
38.	Sh. R.C. Sawant, SRA, NARP, Aurangabad
39.	Dr. Subhash Chandra, Joint Director (Millets), DAC Ministry of Agri., GOI, Jaipur
40.	Umakant. Y. Gawande, Regional Manager (QC) & Incharge R&D, M.S.S.C. Ltd., Akola
41.	Mr. Vivek V. Thakare, Sr. Breeder, M.S.S.C. Ltd. (Mahabeej), Research & Development Unit, Shioni, Akola (M.S.)
42.	Sh. G.P. Dahale, Jr. Breeder, MSSCL, Akola, (M.S.)
43.	Mr. M. Ahamed Raza, Regional Manager, National Seeds Corporation Ltd., Chennai
44.	Dr. S.K. Gupta, Director-RA, Hytech Seed India, Hyderabad
45.	Dr. R.S. Mahala, Research Director, Dupont Pioneer
46.	Sh. Satish Pareek, Principal Scientist (Pearl Millet), Pioneer Over. Corporation, Hyderabad
47.	Sh. S.M. Rafiq, Principal Breeder, Nuzeevidu Seeds, Hyderabad
48.	Dr. Y.S. Verma, Head Breeding, Metahelix Life Sciences Ltd., Bangalore
49.	Sh. Shankar Honyal, Bajra Breeder, Kaveri Seeds Co. Ltd., Secunderabad, Hyderabad
50.	Sh. Sachin Vidhale, Pearl Millet Breeder, Bioseed Research India Pvt. Ltd. Hyderabad
51.	Sh. Prateek Goyal, Krishna Seed Pvt. Ltd., Agra
52.	Sh. M.T. Pawar, Sr. Breeder (Pearl Millet), Bisco Biosciences Pvt. Ltd., Hyderabad
53.	Dr. M.L. Swami, Principal Breeder, Nath Biogenes (I) Ltd
54.	Sh. V.A. Deshmukh, Senior Breeder, Ganga Kaveri Seeds, Hyderabad
55.	Dr. Puneet Jain, Scientist, Hytech Seed India Pvt. Ltd., Alwar
56.	Sh. M.N. Bijagare, Principal Scientist, Krishidhan Seeds, Jalna
57.	Dr. K.R. Reddy, Director Research, Nugenes Pvt. Ltd., Secunderabad, Hyderabad
58.	Mr. Bhagwat Vilas Ambadas, Breeder, Ajeet Seeds Ltd., Aurangabad
59.	Sh. Bal Chandra, Scientist, Godrej Seeds & Genetics Ltd., Hyderabad
60.	Dr. Mohammed Abdullah, Principal Breeder, RASI Seeds (P) Ltd.
61.	Mr. Milind P. Kulkarni, Sr. Scientist (Cereal Crops), Nirmal Seeds Pvt. Ltd., Pachora, Jalgaon
62.	Dr. V.N. Kulkarni, VP (R&D), JK Agri. Genetics Ltd., Hyderabad
63.	Sh. Saurabh Goyal, Krishna Seed Pvt. Ltd., Agra
64.	Dr. B.R. Beniwal, STA (PBG), AICRP-PM, Jodhpur
65.	Dr. Vishnu Ameta, Breeding Project Lead, Syngenta India, Ahmadabad
66.	Dr. Virendra Singh Deora, Senior Scientist, TATA Metahelix Life Sciences
67.	Mr. Ananda, Senior Research Associate, J. K. Agri. Genetics Ltd., Hyderabad
68.	Dr. Bhuwan Parihar, Jr. Breeder, J.K. Agri. Genetics Ltd., Hyderabad
69.	Dr. Santosh K. Pattanashetti, Scientist, ICRISAT, Patancheru
70.	Mr. Sudheer Singh, Assistant Breeder, VNR Seeds Pvt. Ltd., Raipur (C.G.)
71.	Dr. G. Selva Kumar, Assistant Breeder, Spriha Biosciences Pvt. Ltd.
72.	Mr. P.A. Pacharne, Sr. Breeder, Mahodaya Seeds Pvt. Ltd., Jalna
73.	Mr. Om prakash Patil, AGM, Product Development, Bayer Biosciences Pvt. Ltd., Hyderabad
74.	Mr. Sambhaji Y. Shedage, Sr. Breeder, Bayer Biosciences Pvt. Ltd., Hyderabad
75.	Mr. Narendra Sawarkar, Plant Breeder, Ankur Seeds Pvt. Ltd., Nagpur
76.	Ms. Sushila Bhanwariya, SRF, AICRP-PM, Jodhpur
77.	Ms. Dimpal Sankhla, SRF, AICRP-PM, Jodhpur
78.	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. C. Jayanthi
Director (Crop Management)
TNAU, Coimbatore

Co-chairman : Dr. P. Jayakumar
Professor & Head
Crop Physiology
TNAU, Coimbatore

Rapporteur : Dr. Anil Kumar
Principal Scientist,
CCS HAU, Hisar
Dr. R.C. Meena
Asstt. Professor
AICRP-PM, Jodhpur

Date : April 23, 2015

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 conducted at different centre's during *kharif* and summer seasons of 2014. At the outset, the chairman told about the importance of the Pearl millet as a grain and fodder crop particularly in reference to its nutritional values. Centre wise results of the agronomical and physiological trials conducted at different centers were presented by respective scientists. The chairman suggested that during the presentation of results the background of the study be also explained. In the nutrient management trials, the native nutrient status of the experimental site before start of the experiment and after completion of the trials is very necessary to draw some valid conclusion. The co-chairman emphasized that some physiological trials should also be formulated on partitioning coefficient and source sink relationship.

During *kharif* 2014, 55 trials were allotted to different centers and results of 55 trials were reported. Results from all the centre's except RARI, Durgapura (Jaipur) were presented during the session.

Recommendations:

1. Integrated weed management (IWM) studies in pearl millet under rainfed situation revealed that post emergence application of Atrazine @ 0.4 kg/ha followed by one hand weeding at 35 DAS was found better than recommended pre-emergence application of Atrazine @ 0.5 kg/ha followed by one hand weeding at 35 DAS practice in Zone A1 whereas both these treatments were at par in other two Zones A & B.
2. The application of 20 kg/ha $ZnSO_4$ in combination with RDF either with 5.0 ton FYM/ha or without FYM produced quite higher yield compared to exiting recommendations in Zone A1, A & B and use of other nutrient sources ($FeSO_4$, Borax and Gypsum) along with RDF marginally improved the yield.

Trials to be continued during 2015 -16

- PMAT 1: Response of pearl millet advance hybrids and/or populations to different levels of nitrogen.
- PMAT 2: Integrated nutrient management for pearl millet hybrids under optimum management.
- PMAT 4: Irrigation scheduling for summer pearl millet hybrids.
- PMAT 11: Performance of pearl millet advance hybrids and/or populations to different sowing dates.

Trials concluded

- 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.

New trials formulated

- PMAT 3: Response of pearl millet hybrids to foliar application of Iron.
- PMAT 5: Maximization in the pearl millet productivity under late sown situations.

TECHNICAL PROGRAMME FOR 2015-16

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

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

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

Nitrogen levels (3)	: 30, 60 & 90 kg N/ha
Hybrids (3+2 check)	: MH 1928, MH 1974, MH 1984, RHB 173 (c) and 86M86 (c)
Design	: Split plot (Nitrogen in main plot and entries in sub-plots)
Replications	: Three
Plot size	
Gross	: 4.00 m x 3.60 m
Net	: 4.00 m x 2.70 m
Locations	: Jaipur, New Delhi, Hisar, Jamnagar and Kalai

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

Nitrogen levels (3)	: 30, 60 & 90 kg N/ha
Hybrids (7+2 checks)	: MH 1928, MH 1939, MH 1964, MH 1979, MH 1962, MH 1977, MH 1976, Pratap (c) and Kaveri super Boss (c)
Design	: Split Plot Design, N in main plots and hybrids in Sub- plots
Replication	: Three
Plot size	
Gross	: 4.00 m x 3.60 m
Net	: 4.00 m x 2.70 m
Locations	: Aurangabad, Dhule, Vijapur and Coimbatore

d) Performance of advance summer hybrids

Nitrogen level (3)	: 60, 90 & 120 kg N/ha
Hybrids (3+1 check)	: MSH 282, MSH 284, MSH 287 and 86M64 (c)
Design	: FRBD
Replications	: Three
Plot size	
Gross	: 4.00 m x 3.60 m
Net	: 4.00 m x 2.70 m
Locations	: Jamnagar, SK Nagar, Dhule & Aurangabad

Note: Recommended dose of P_2O_5 under rainfed situations in Zone A_1 and recommended dose of 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 number of tillers/plant
5. Effective number of tillers/plant
6. Test weight (g)
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 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 and 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) SPD (Date in main and entries in sub plot)
Replications	:	Three Four
Treatments	:	12
Plot size		
Gross	:	4.00 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 197 & GHB 905
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) SPD (Date in main and entries in sub plot)
Replications	:	Three Four
Treatments	:	12
Plot size		
Gross	:	4.00 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, Vijapur & 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) SPD (Date in main and entries in sub plot)
Replication	:	Three Four
Treatments	:	12
Plot size		
Gross	:	4.00 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 number of tillers/plant
4. Effective number of tillers/plant
5. Test weight (g)
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 3: Response of pearl millet hybrids to foliar application of Iron.

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

Treatment

Main Plots		**Entries**
	:	RHB 177, HHB 234 & HHB 226(Zone A1)
		HHB 197, RHB 173 and MPMH 17 (Zone A)
		GHB 558, 86 M 88 and Kaveri Super Boss (Zone B)
Sub Plots	:	**Foliar applications**
		Control
		0.25 % at tillering/jointing stage (25-30 DAS)
		0.50 % at tillering/jointing stage (25-30 DAS)
		0.75 % at tillering/jointing stage (25-30 DAS)
Locations	:	Mandor and Bikaner (Zone A1)
		Jaipur, Hisar, Jamnagar & Kalai (Zone A)
		Aurangabad, Dhule, Vijapur & Coimbatore (Zone B)
Design	:	SPD (Entries in main and foliar application of Iron in sub plot)
		SPD (Date in main and entries in sub plot)
Replications	:	Three
		Four
Treatments	:	12
Plot size	:	
Gross	:	4.00 m x 3.60 m
Net	:	4.00 m x 2.70 m

Observations to be recorded

1. Plant population (final) in thousands/ha
2. Plant height (cm)
3. Total number of tillers/plant
4. Effective number of tillers/plant
5. Ear head length (cm)
6. Ear head girth (mm)
7. Test weight (g)
8. Grain yield (kg/ha)
9. Dry Fodder yield (q/ha)

Note: Initial analysis of soil for Fe in grain (ppm) & other physico-chemical properties of the soil (pH, EC, organic carbon and available NPK).

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.

Treatment

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)	:	86M64, Proagro 9444 & Nandi 72
Treatments	:	12
Design	:	SPD
Replications	:	Three
Plot size		
Gross	:	4.00 m x 3.60 m
Net	:	4.00 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 number of tillers/plant
5. Effective number of tillers/plant
6. Test weight (g)
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.

PMAT 5: Maximization in the pearl millet productivity under late sown situations.

Objective: To develop the appropriate technology to realize maximum production under late onset of monsoon

Treatment

Main Plots		**Date of sowing**
	:	D1 : 25th July $\pm$5 days D2 : 10th August $\pm$5 days
Sub Plots	:	**Nutrient Management** T_1 : RDF* T_2 : RDF + FYM @ 5.0 t/ha T_3 : 125% of RDF (N:P:K) T_4 : T_2 + NPK foliar spray (19:19:19 grade) @ 0.5% at 20-25 DAS T_5 : 75% RDF + FYM @ 5.0 t/ha
Locations	:	Mandor and Bikaner (Zone A1) Jaipur, Hisar, Jamnagar & Kalai (Zone A) Aurangabad, Dhule, Vijapur & Coimbatore (Zone B) RDF* : Recommended dose of the location

Entries : Zone A1: RHB 177, Zone A: RHB 173 and Zone B: GHB 558

Design : SPD (Date of sowing in main and Nutrient Management in Sub plot)

Replications : Three

Treatments : 10

Plot size

Gross : 4.00 m x 3.60 m

Net : 4.00 m x 2.70 m

Observations to be recorded

1. Plant population (final) in thousands/ha
2. Plant height (cm)
3. Total number of tillers/plant
4. Effective number of tillers/plant
5. Ear head length (cm)
6. Ear head girth (mm)
7. Test weight (g)
8. Grain yield (kg/ha)
9. Dry Fodder yield (q/ha)

Note: Initial analysis of soil for physico-chemical properties of the soil (pH, EC, organic carbon and available NPK).

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

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

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

Sowing dates (3) : July 5-10, July 20-25 and August 5-10

Hybrids (3+2 check) : MH 1928, MH 1974, MH 1984, RHB 173 (c) and 86M86 (c)

Design : Split plot (Date of sowing in main plot and entries in sub-plots)

Replications : Three

Plot size

Gross : 4.0 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 to different dates of sowing in Zone B

Sowing dates (3) : July 5-10, July 20-25 and August 5-10

Hybrids (7+2 checks) : MH 1928, MH 1939, MH 1964, MH 1979, MH 1962, MH 1977, MH 1976, Pratap (c) and Kaveri Super Boss (c)

Design : Split Plot Design, Date of sowing in main plots and entries in Sub-plots

Replications : Three

Plot size

Gross : 4.0 m x 3.60 m

Net : 4.0 m x 2.70 m

Locations : Aurangabad, Dhule, Vijapur 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.

TECHNICAL PROGRAMME 2015-16 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 40, 50 and 60 DAS
2. Relative water content (RWC) at 40, 50 and 60 DAS (%)
3. Leaf area (cm)
4. Seed setting %
5. Days to 50% flowering
6. Grain yield (kg/ha)
7. Productive tillers/plant
8. Test weight (g) (1000 grains)
9. Threshing percentage
10. Fodder yield (q/ha)
11. Harvest index (%)
12. Days to Maturity
13. Ear head weight (kg/ha)

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 (cm)
4. Seed setting %
5. Days to 50% flowering
6. Grain yield (kg/ha)
7. Productive tillers/plant
8. Test weight (g) (1000 grains)
9. Threshing percentage
10. Fodder yield (q/ha)
11. Harvest index (%)
12. Days to Maturity
13. Ear head weight (kg/ha)

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
Fertilizer **:** N (40 kg/ha) P (20 kg/ha)

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. Chlorophyll content (mg/g f.wt.)
3. Productive tillers /plant (no)
4. Grain yield (kg/ha)
5. Fodder yield (kg/ha)
6. Ear head weight (kg/ha)
7. Total dry matter (kg/ha)
8. Threshing percent
9. Harvest Index (%)
10. Test Weight (1000 grains)
11. Days to Maturity

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

Location **:** Mandor, Jaipur and Jamnagar
Year of Commencement **:** Kharif-2014
Replication **:** Three **Design** **:** CRD
Treatments **:** HHB 67 Improved, RHB 177, RHB 173, GHB 558 and GHB 538 (Released hybrids of A and A_1 zone of India)

Five 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 (1:2) 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 (cm)
2. Root length (cm)
3. Shoot fresh Weight (g)
4. Root fresh Weight (g)
5. Shoot dry matter (g)
6. Root dry matter (g)
7. Root - shoot Ratio

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

Objectives: To identified drought tolerant genotype of pearl millet at seedling stage
Location **:** Jaipur, Mandor and Jamnagar
Season **:** Laboratory trial (*Kharif*)
Year of commencement **:** 2014
Replication **:** Three **Design:** CRD
Genotypes **:** MH 1928, MH 1984, MH 1974, RHB 173 and 86M86 (Advance hybrids of A and A_1 zone of India)
Treatment **:** Control, PEG 5% and PEG 10%
Observation time **:** 10 and 20 days after sowing.

Observations:
1. Root length (cm)
2. Shoot length (cm)
3. Seedling dry weight (g)
4. Membrane stability index (%)
5. Relative water content (%)
6. Chlorophyll content (mg/g f.wt.)
7. Antioxidants ($min^{-1}g^{-1}$f. wt)

PMPHY: 6 Manipulation of source- sink relationship in pearl millet through growth retardants

Objectives: To enhance the partitioning efficiency for increasing yield in pearl millet.

Location **:** Jaipur and Mandor
Season **:** *Kharif*
Year of commencement **:** 2015
Fertilizer **:** N (40 kg/ha) P (20 kg/ha)

Treatment:
(a) Foliar spray at tillering and post-anthesis stages.

T1- Untreated control
T2- CCC (chloromequet chloride) – 250 ppm
T3- CCC (chloromequet chloride) – 500 ppm
T4- CCC (chloromequet chloride) – 750 ppm
T5- Mapiquet chloride (MC) – 250 ppm
T6- Mapiquet chloride (MC) – 500 ppm
T7- Mapiquet chloride (MC) – 750 ppm

(b) Entry **:** RHB 173 **Replication** **:** Four
Design **:** RBD **Spacing** **:** 50 X 10 cm
Plot size Gross **:** 4 Rows of 5 M length
Net: 2 Rows of 5 M length

Observations:

1. Chlorophyll content at flowering stage (mg/g f.wt.)
2. Relative water content (RWC) at flowering stage (%)
3. Specific leaf weight at flowering stage (g)
4. Seed setting %
5. Grain yield (kg/ha)
6. Days to 50% flowering
7. Productive tillers/plant (no)
8. Test weight (g) (1000 grains)
9. Fodder yield (q/ha)
10. Harvest index (%)
11. Days to Maturity

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

1. Dr. C. Jayanthi, Director (Crop Management), TNAU, Coimbatore
2. Dr. P. Jayakumar, Professor & Head (Crop Physiology), TNAU, Coimbatore
3. Dr. Sunita Gupta, Professor (Pl. Physiology), RARI (SKNAU), Jaipur (Raj.)
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, Pr. Scientist (Agronomy), RARS, Bijapur, UAS, Dharwad
10. Dr. N. Meyyazhagan, Professor (Agronomy), TNAU, Coimbatore
11. Dr. G. Guru, Assistant Professor (Agronomy), TNAU, Coimbatore
12. Dr. Asha C. Mehta, Assistant Research Scientist, JAU, Jamnagar
13. Dr. D.G. Patel, Assistant Research Scientist, SDAU, Kothara, Gujrat
14. Dr. R.S. Bana, Scientist (Agronomy), Div. of Agronomy, IARI, New Delhi
15. Dr. Pargat Singh, SMS (Soil Science), KVK (IARI), Gurgaon
16. Dr. Anil Kumar, Agronomist, CCS HAU, Hisar, Haryana
17. Sh. Shankar Lal Yadav, SRF, AICRP-PM, Jodhpur
18. Sh. Manoj Kumar, Assistant Professor (Agronomy), AICRP-PM, Jodhpur

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

C. CROP PROTECTION (PATHOLOGY AND ENTOMLOGY)

Chairman	:	Dr. K. Ramaraju, Director, Centre for Plant Protection Studies, TNAU, Coimbatore	**Co-Chairman**	: Dr. D. Alice Prof & Head, Dept. of Pathology, TNAU, Coimbatore
			Rapporteur	: Dr. H.R. Bishnoi Associate Professor, AICRP on Pearl Millet, Jodhpur Dr. R.K. Juneja, Asst. Res. Scientist (Ento), JAU, Jamnagar
Date	:	April 23, 2015	**Time**	: 10.15 AM

At the outset, Dr. G. Karthikeyan welcomed the chairman Dr. K. Ramaraju and Co-Chairman Dr. D. Alice. The Chairman requested all the scientists to present their achievements and appreciated for conductance of all the trials allotted during Kharif and summer 2014 by the Pathology groups. The centre-wise results of experiments were presented by the respective scientist.

Scientists of Plant Protection group from different AICRP centers on Pearl Millet and ICRISAT reviewed the research results of the trials conducted during *Kharif* and summer 2014.

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 2015.

Significant Findings

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

Out of 124 entries; 78 showed high level of downy mildew resistance across the zones.

Out of these, **ten** entries viz., MH 2024, MH 2042, MH 2043, MH 2045, MH 2046, MH 2048, MH 2050, MH 2053, MH 2056, and MH 2080 exhibited multiple disease resistance against all the diseases except ergot.

Sixteen entries viz., MH 2040, MH 2039, MH 2032, MH 2012, KBH 108, 86M86, MH 2008 MH 2035, MH 2016, MH 2017, MH 2047, MH 2066, MH 2061, MH1998, MH 2054 and MH 2055 exhibited multiple disease resistance against downy mildew, blast and smut.

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

Out of 55 entries, 26 were highly resistant to downy mildew across the locations.
Two entries viz., MH 1962 and MH 1974 exhibited multiple disease resistance against all the diseases. Another seven entries viz., MH 1887, MH 1888, MH 1889, MH 1890, MH 1904, MH 1970 and GHB 744 also exhibited multiple disease resistance except ergot. Three entries namely; MH 1777, MH 1984 and Nandi 61 exhibited multiple disease

resistance except ergot and rust. MH 1816 and MH 1886 exhibited multiple disease resistance except blast and ergot.

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

Out of 30 entries, 15 entries showed downy mildew resistance across the zones.
Only one entry i.e. 86M86 exhibited multiple disease resistance. Three entries viz., KBH 108, MPMH 17 and HHB 197 exhibited multiple disease resistance except ergot and rust.

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

Among the 65 test entries evaluated, high level of resistance was observed in AIMP 92901-P8 as this entry recorded ≤10% DM incidence at all the test locations. Nine entries recorded ≤10% DM incidence at 10 of the 11 test locations, 17 entries showed resistant reaction at 9 locations and 10 entries at 8 locations.

Considering the disease incidence at the soft-dough stage, the pathogen population at Mysore appeared to be most virulent with 50 test entries exhibiting >10% DM incidence, followed by the pathogen population at Jamnagar (48 entries with >10% incidence) and the populations at Aurangabad and Gwalior were least virulent with only 2 and 4 entries showing >10% DM incidence.
B/R lines exhibiting resistant reaction to downy mildew at 9-10 locations could be selected for the development of commercial hybrids.

PMPT-IVB: Basic Research

- **Molecular characterization of R & *Avr* gene in pearl millet downy mildew system and development markers for utilization in breeding for DM resistance** - Genome sequencing have been initiated for PMDM pathogen to understand better R & Avr gene in pearl millet downy mildew system to develop gene based markers for utilization in breeding for downy mildew resistance
- Cloned and expression of PgMPK4 gene of pearl millet and demonstrated involvement in downy mildew disease resistance
- Developed SCAR ISSR 863 marker for downy mildew disease resistance and validated

PMPT- IVC: Pearl Millet Blast Variability Nursery (PMBVN) – 2014

None of the entries in the PMBVN 2014 was resistant at all the test locations. IP 5900 recorded minimum blast severity (2.2 score) across locations.

In addition to susceptible checks (ICMB 95444 and ICMB 89111), pearl millet lines ICMB 02444, ICMB 95222, ICMB 95222-760 and JMSB-101 were found to be susceptible to blast at all the test locations.

Considering the blast severity at hard dough stage, pathogen population at Jaipur appeared most virulent as none of the entry was found resistant at this location.

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

From mean disease incidence at all India level it was revealed that at soft dough stage chitosan + *Bacillus pumulis INR7* treatment reduced downy mildew followed by *P. fluorescens, Bacillus pumulis INR7* and Chitosan individual treatments. The IDM treatment was found to increase the seedling emergence at all the testing centers but

non-significant. However, there was increase in the grain and fodder yield recorded in all the testing centers. These observations indicate that the IDM module is promising for the management of downy mildew

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

During field surveys, it was observed that downy mildew 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 surveys. The range of downy mildew in the framers field across all fields surveyed was from 0 – 35%. In Rajasthan (0-35%) and Karnataka (0.5-3.8/%) downy mildew was recorded. The fields in Madhya Pradesh, Gujarat and Maharashtra were free from downy mildew during the surveys. It was observed that blast was more severe in the states like Rajasthan, Maharashtra and Madhya Pradesh. Fields in Tamil Nadu and Karnataka were free from blast incidence. Smut incidence was very low in the most of the surveyed states. High rust incidence was observed in Maharashtra and up to 30% rust was recorded during the field's survey. Ergot was observed in fields of Rajasthan, Tamil Nadu and Karnataka.

Recommendations:

1. On the basis of 3 years data, IDM module consisting seed treatment of chitosan @ 2.5g/kg seed + *Bacillus pumulis* INR 7@ 8g/kg found at par with chemical metalxyl seed treatment @6g/kg for the management of downy mildew.
2. Pathology group identified two entries viz., MH1962 & MH 1974 as multiple resistances among advanced entries.
3. Amongst the released hybrids, one hybrid 86M86 was identified as multiple disease resistance
4. The Pathology group strongly recommended for providing sprinkler irrigation facility to all the research centres.

ENTOMOLOGY

Recommendations:

1. Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg followed by spray of imidacloprid 17.8 SL 0.009% at 35 DAG gave effective control of shoot fly and stem borer and recorded highest ICBR. Moreover, the residues of the insecticides were below detectable limit at 42 days after spray.
2. Pearl millet seeds can be stored for six months by mixing of neem leaves powder @ 10 g/kg, recorded lowest grain damage and also recorded lowest adult population of *Tribolium spp* and *Rhizopertha dominica*. The seed viability was highest at both the locations i.e. above MSCS level of 75.00%.

TECHNICAL PROGRAMME FOR *KHARIF*/ SUMMER – 2015

PATHOLOGY

Pearl millet pathological trials to be conducted at various coordinating/ cooperating centers during *Kharif* / Summer 2015.

Disease Screening Trials

Following procedures will be adopted in conduct of disease screening trials:

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

PMPT I: Disease screening trial of Initial Pearl Millet Hybrids and Varieties.
PMPT II: Disease screening trial of Advanced Pearl Millet Hybrids and Varieties.
PMPT III: Monitoring disease resistance stability of released popular hybrid/varieties and A, B and R lines

Downy Mildew :
Location **Zone A**
Mandor, Jaipur, Hisar, Gwalior, Jamnagar and Anand
Zone B
Mysore, Aurangabad, Dhule, Coimbatore and Patancheru (PMPT-III)

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

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

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

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

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

1. Pathogenic diversity analysis by virulence nursery
Location : **Zone A**
Jaipur, Hisar, Gwalior, Anand, Jamnagar and Mandor
Zone B
Mysore, Aurangabad, Patancheru, Dhule and Coimbatore

2. Genetic analysis through DNA markers
Location : Mysore and Patancheru

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

PMPT IV C: Characterization of pathogenic variability in Pearl Millet blast pathogen (*Magnaporthe grisea)*
Location : **Zone A**
Gwalior, Anand , Mandor, Jamnagar, Hisar and Jaipur
Zone B
Dhule, Patancheru, Aurangabad and Coimbatore

PMPT V: Management of downy mildew by using bioagents and new generation anti oomycetes chemical Inititum. (New Experiment)

Treatments:

1. *Pseudomonas fluorescens* (MYS 14 @ 8g/kg) (will be supplied by Mysore)
2. *Bacillus subtilis* (TNAU EPCo 16 @ 8g/kg) (will be supplied by Coimbatore)
3. *Trichoderma viride* (MYS 13 @ 4g/kg) (will be supplied by Mysore centre)
4. *Trichoderma viride* (TNAU Tv -1 @ 4g/kg) (will be supplied by Coimbatore)
5. Initium (4g/Kg) (will be supplied by Mysore centre)
6. Metalaxyl (6g/Kg) (will be supplied by Mandor centre)
7. control

Replicates **:** 3 (4 rows in 5 meter length)
Entry **:** PAC 909

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 AICRP centers in their respective zones

Method: Record survey information by preparing chart listing field number, location, cultivar/area, crop stage (PT, F and SD), disease incidence and remarks. Also collect infected leaf samples from highly susceptible cultivars for pathogen characterization. The samples should 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 (*Magnaporthe grisea*) using fungicides

Objective: To find out effective and economical fungicides for management of pearl millet blast.

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

Year of starting and season: *Kharif* 2014

1. **Experimental details:**
   - (A) Design : RBD
   - (B) Treatments : 6
   - (C) Replication : Four
   - (D) Plot size (Gross) : 5.00 x 3.60 m (Net): 4.00 x 2.40 m
   - (E) Spacing : 60 x 15 cm.
2. **Crop and variety**: Pearl millet - Moderately susceptible (RHB 177)
3. **Location**: Jamnagar, Jaipur, Gwalior, Anand and Dhule
4. **Treatments**
   (i) Iprobenphos (Kitazin) (Organophosphorus) 48 EC @ 0.1%
   (ii) Tricyclazole (Beam) (5-methyl-1,2,4-triazolo[3,4-b][1,3] benzothiazole) P@ 0.1%
   (iii) Azoxistrobin (Methyl (E)-2-{2-[6-(2-cyanophenoxy) pyrimidin-4-yloxy] phenyl} -3-methoxyacrylate) 25 EC @ 0.05%
   (iv) Propiconazole @ 0.05%
   (v Trifloxystrobin + Tebuconazole @ 0.05%
   (vi) Control

Observation

1. Percent disease index (by using 0-9 scale)
2. Grain yield (kg/ha)
3. Fodder yield (q/ha)
3. Percent disease control

ENTOMOLOGY

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

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

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

Observations to be recorded:

1. **Shoot fly** – Per cent infestation at 28 DAG and ear head stage.
2. **Stem borer** – Per cent plant damage at vegetative stage and at ear head stage.
3. ***Helicoverpa* larvae** – Number of larvae/ 5 ear heads.
4. **Grey weevil** – Damage score (0-10) and number of grey weevil adults/ 5 plants.
5. **Leaf roller** – Damage score (0-10) and number of larvae/ 5 plants.
6. **Chafer beetle** – Damage score (0-10) and number of beetles/ 5 ear heads

PMET 2: Monitoring of major insect pests of pearl millet

Location: Jamnagar & Jaipur
Objective: To study the population fluctuation of key pests of pearl millet.

Methodology:
Sowing of released variety/ hybrid will be done over an area of 200 m^2 which will be kept free from insecticidal application during crop season. Incidence and population of various insect pests will be recorded at weekly interval from 30 randomly selected plants 15 Days after germination of the crop. Assessment of losses due to insect pest will be calculated for this purpose parallel sowing will be done in a plot of 200 m^2 which will be fully protected from the insect pests utilizing recommended practices. The presence of bio-agents will also be recorded.

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

Location: Jamnagar & Jaipur
Objective: To examine pest status in bajra in the region.
Observations to be recorded:
Survey of insect pests will be carried out at vegetative and ear head stages of bajra crop during *Kharif* season. Incidence of various insect pests infesting bajra will be recorded. The pest status (major and minor) and magnitude of damage will be worked out. The presence of bio-agents will also be recorded.

PMET-4: Testing of efficacy of different insecticides against shoot fly and stem borer in pearl millet (New Experiment)

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:** 3 **Treatments:** 9
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 clothianidin 50 WDG @ 7.5 g/kg seed followed by spray of clothianidin 50 WDG @ 0.025% (5 ml/ 10 lit.) at 35 DAG.
2. Seed treatment of clothianidin 50 WDG @ 7.5 g/kg seed followed by spray of fipronil 40%+ imidacloprid 40% WG @ 0.04% (5 g/10 lit.) at 35 DAG.
3. Seed treatment of clothianidin 50 WDG @ 7.5 g/kg seed followed by spray of fipronil 5 SC @ 0.01% (20 ml/10 lit.) at 35 DAG.
4. Seed treatment of clothianidin 50 WDG @ 7.5 g/kg seed followed by spray of clorantraniprole 20 SC @ 0.006% (3 ml/10 lit.) at 35 DAG.
5. Seed treatment with fipronil 40% + imidacloprid 40% WG @ 2.5g /kg seed followed by spray of clothianidin 50 WDG @ 0.025% (5 ml/ 10 lit.) at 35 DAG.
6. Seed treatment with fipronil 40% + imidacloprid 40% WG @ 2.5g /kg seed followed by spray of fipronil 40%+ imidacloprid 40% WG @ 0.04% (5 g/10 lit.) at 35 DAG
7. Seed treatment with fipronil 40% + imidacloprid 40% WG @ 2.5g /kg seed followed by spray of fipronil 5 SC @ 0.01% (20 ml/10 lit.) at 35 DAG.
8. Seed treatment with fipronil 40% + imidacloprid 40% WG @ 2.5g /kg seed followed by spray of clorantraniprole 20 SC @ 0.006% (3 ml/10 lit.) at 35 DAG.
9. 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 with 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 with 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-7: Evaluation of different insecticides as seed dresser for the management of soil pests (white grub and termite) in pearl millet.

Location: Jaipur
Design: RBD **Replications: 3** **Gross plot size:** 5.0 X 3.6 m
Net plot size: 4.0 X 2.4 m **Spacing:** 50 X 15 cm

Treatments: 11

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

Observations to be recorded: - Per cent termite and white grub damage.

The following scientist attended the session:

1. Prof. H. Shekar Shetty, University of Mysore, Mysore
2. Dr. Ramaraju,Director, centre for plant protection studies, TNAU, Coimbatore
3. Dr. D. Alice, Prof & Head, Dept. of Pathology, TNAU, Coimbatore
4. Dr. H.R. Bishnoi, Associate Professor, AICRP on Pearl Millet, Mandor, Jodhpur
5. Dr. Rajan Sharma, Sr. Scientist, ICRISAT, Patancheru
6. Dr. S.S. Ghuge, Plant Pathologist, AICRP-PM (NARP), Aurangabad
7. Dr. S. Chandra Nayak, Asstt. Prof. University of Mysore, Mysore
8. Dr. G. Karthikeyan, Professor (Pathology), TNAU, Coimbatore
9. Dr. Kushal Raj, Asstt. Scientist (Plant Pathology) CCS HAU, Hisar
10. Dr. A.C. Mathur, Prof., RARI, Durgapura, Jaipur
11. Dr. D.L. Kadavani, Assoc. Res. Scientist, JAU, Jamnagar
12. Dr. C.S. Thakare, Pearl Millet Pathologist, College of Agriculture, Dhule
13. Dr. R.P. Juneja, Asstt. Research Scientist, JAU, Jamnagar
14. Dr. Y.M. Rojasara, RRS, AAU, Anand
15. Dr. I. Johnson, Assistant Prof. (Pathology), TNAU, Coimbatore.
16. Dr. R.K. Pandya, Principal Scientist (Pathology), RVSKVV, Gwalior

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

SESSION – III

INAUGURAL SESSION

Chairperson		
Inaugurator/ Chief Guest	:	Dr. K. Ramasamy, Vice-Chancellor Tamil Nadu Agricultural University, Coimbatore
Welcome of address	:	Dr. M. Maheswaran, Director of Research Tamil Nadu Agricultural University, Coimbatore
Highlights of Research Progress 2014-15	:	Dr. H.P. Yadav, Project Coordinator, AICRP on Pearl Millet, Jodhpur
Special address	:	Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi
Inaugural address	:	Dr. K. Ramasamy, Vice-Chancellor Tamil Nadu Agricultural University, Coimbatore
Vote of thanks	:	Dr. K. Ganesamurthy Director I/c, Centre for Plant Breeding & Genetics, TNAU, Coimbatore
Date	:	24.04.2015
Time	:	10:00 AM

The 50th Annual Group meet of AICRP on Pearl millet was inaugurated on 24th April, 2015 by Dr. Dr. K. Ramasamy, Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore. The ceremony was witnessed by important dignitaries namely; Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi, Dr. H.P. Yadav, Project Coordinator, AICRP on Pearl Millet. Dr. M. Maheswaran, Director of Research, Tamil Nadu Agricultural University, Coimbatore and Dr. K. Ganesamurthy, Director I/c, Centre for Plant Breeding & Genetics, TNAU, Coimbatore.

The inaugural ceremony was started with the welcome address by Dr. M. Maheswaran, Director of Research, Tamil Nadu Agricultural University, Coimbatore. The Project Coordinator, Dr. H.P. Yadav presented the highlights of AICRP on Pearl millet programme for the year 2014-15. He expressed his delight for the role of public sector in meeting the demands of pearl millet growing farmers, in terms of improved hybrids/ varieties package of practices for increasing the productivity and crop protection. A total of 115 cultivars were released so far, which resulted in increased productivity in India. Now the importance is given for Biofortification of pearl millet.

Three publications viz. Pearl Millet Seed Production and Processing, Pearl Millet an Excellent Tropical Nutri Rich Millet and Morphological Descriptors of Pearl Millet Accessions on pearl millet research were released in this ceremony by the ADG (FFC), ICAR, New Delhi and the Vice Chancellor, Tamil Nadu Agricultural University, Coimbatore.

The Lifetime Achievement Award was presented to Dr. K.N. Rai, Principal Scientist (Retired) Pearl Millet, ICRISAT. The outstanding scientific contribution in pearl millet improvement was presented to Dr. O.P. Yadav, Director IIMR. The best research centre was given to Choudhary Charan Singh Haryana Agricultural University, Hisar from public sector and in the private sector, the award was given to the Pioneer Overseas Corporation Ltd., Hyderabad.

Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi, in his remarks expressed the importance of developing single cross hybrids to increase productivity as the area under pearl millet cultivation is decreasing every year. Though anti-nutritional factors like tannin, oxalic

acid is present in pearl millet fodder and grain, it has to be taken as a challenge to develop materials with low anti-nutritional factors.

He emphasized to focus on the following aspects in future

- Reducing anti-nutritional factors
- Improving keeping quality of the flour
- Technologies for increasing productivity per drop of water
- Technologies for increasing per day productivity
- Research on resistance to downy mildew and blast
- Biofortification with iron and zinc

In the inaugural address, the honourable Vice Chancellor of Tamil Nadu Agricultural University, Coimbatore complemented the role of public sector in the identification of heterosis in pearl millet. He also insisted that though the millet grains are not popular among the consumers as food, it is maintained by the farmers as cultural heritage. He advised the pearl millet scientists to provide quality seed to the farmers. He emphasised the need for screening the available germplasm accessions for the presence of low anti-nutritional factors. Besides, he urged the scientists to go for inducing the immunity in plants by using symbiotic and associative microbes. Since, the crop is cultivated under resource limited environments, he insisted the need of using bio-inoculants instead of inorganic fertilizers.

Dr. K. Ganesamurthy, Director, Centre for Plant Breeding & Genetics, TNAU, Coimbatore proposed the vote of thanks.

SESSION – IV

REVIEW OF RESEARCH RESULTS AND PROGRESS REPORT OF AICRP-PM 2014-15

Chairman	:	Dr. I.S. Solanki 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	:	April 24, 2015	**Time**	:	11.45 AM

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

During *Kharif* and summer 2014, a total of 227 trials were allotted in A_1, A and B zones. Out of these, 211 trials were conducted with success rate of 93%.

During the discussion the following points emerged out:

- Inclusion of benchmark values in the plant breeding data in the yield tables and criteria of promotion.
- For promotion of new entries the data of blast infection needs to be considered.
- Emphasis to be laid on proper data recording so as to avoid elimination of data from different locations in the final tables – especially with reference to days to flowering, disease occurrence etc.

Agronomy (Presented by: Dr. Anil Kumar)

In agronomy, 5 different experiments constituting 55 trials were conducted in different zones. All the 55 trials were conducted with 100% success. The different experiments conducted were - Response of advance hybrids/Populations to N levels; Integrated nutrient management (INM) for pearl millet hybrids under optimum management; Integrated weed management in rainfed pearl millet; Nutrient management through organic and inorganic source for major and trace elements in rainfed pearl millet and Performance of pearl millet advance hybrid or population entries under different sowing dates. The following recommendations emerged out of the different experiments-

1. Integrated weed management (IWM) studies in pearl millet under rainfed situation revealed that post emergence application of Atrazine @ 0.4 kg/ha followed by one hand weeding at 35 DAS was found better than recommended pre-emergence application of Atrazine @ 0.5 kg/ha followed by one hand weeding at 35 DAS practice in Zone A1 whereas both these treatments were at par in other two Zones A & B.
2. The application of 20 kg/ha $ZnSO_4$ in combination with RDF either with 5.0 ton FYM/ha or without FYM produced quite higher yield compared to exiting recommendations in Zone A1, A & B and use of other nutrient sources ($FeSO_4$, Borax and Gypsum) along with RDF marginally improved the yield.

During discussion the following points emerged out:

- Contingent plan for sowing in case of delay in rainfall to be included in the proceedings.
- The seed of the check varieties to be included in the advanced hybrid and population trials must be obtained from only one source i.e. PI plant breeding at the Coordinating unit.
- Agronomy trials must be conducted at Bawal also from next year.
- In the experiment on Performance of pearl millet advance hybrid or population entries under different sowing dates – the dates have to be revised.

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

In *Kharif*, 2014 eight pearl millet pathological trials were conducted at 11 locations.

The following points were emerged from the presentation:

- During field surveys it was observed that downy mildew and blast remained to be the major disease of pearl millet
- In general, downy mildew incidence was low as compared to previous year's field surveys
- The range of downy mildew in the framers field across all fields surveyed was from 0 – 35%
- In Rajasthan (0-35%) and Karnataka (0.5-3.8%) downy mildew was recorded
- The fields in Madhya Pradesh, Gujarat and Maharashtra were free from downy mildew during the surveys
- It was observed that blast was more severe in the states like Rajasthan, Maharashtra and Madhya Pradesh.
- Fields in Tamil Nadu and Karnataka were free from blast incidence
- Smut incidence was very low in the most of the surveyed states.
- High rust incidence was observed in Maharashtra and up to 30% rust was recorded during the field's survey.
- Ergot was observed in fields of Rajasthan, Tamil Nadu and Karnataka.

Entomology (Presented by Sh. R.K. Juneja)

In *Kharif*, 2014 seven pearl millet entomological trials were conducted at different locations.

- The data on experiments relating to different entomological aspects of pearl millet conducted over different locations were presented.
- 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 – V

REVIEW OF BSP AND DUS TESTING PROJECT & PROGRESS REPORT 2014-15 AND PLAN OF WORK 2015-16

Chairman	**:**	Dr. G. Harinaryana Ex. Project Coordinator, AICRP-PM, Jodhpur	**Co-chairman**	**:**	Dr. H.P. Yadav Project Coordinator AICRP-PM, Jodhpur
			Rapporteur	**:**	Dr. L.D. Sharma Prof. (PB&G) RARI, Jaipur
Date	**:**	April 24, 2015	**Time**	**:**	02:30 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 2014-15. He has pointed out that:

Breeder seed production programme of 12 varieties and 13 parental lines of different hybrids were organized successfully in 2014-15 as against total DAC indent of 10.81 q. A total of 36.29 q breeder seed was produced including 7.63 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 2015.

Chairperson satisfied with production of breeder seed and says that there is no problem of breeder seed production in pearl millet.

Dr. Rajpurohit has also presented DUS testing progress report and informed that 34 candidate genotypes for first year and 25 for second year were characterized along with 22 reference varieties for DUS traits at AICRP-PM, Jodhpur and MPKV Rahuri in *kharif* 2014.

Up till now total 81 pearl millet hybrids/ varieties/ parental line both of public as well as private sector registered with PPV & FRA.

The chairperson suggested all the public centers for the registration of all recently released variety/ hybrid with PPV & FRA.

The session ended with vote of thanks to the Chair.

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

Crop **:** Pearl millet **Year of Production :** 2015
Year of supply **:** February 2016

S. No.	Name of Producing center/state	Name of parental line/ variety	DAC indent (q)	Target set (q)
A	**Varieties**			
1	MPKV, Rahuri	Dhanshakti	1.90	1.90
2	NARP, Aurangabad	ABPC4-3 (MP 484)	0.05	0.05
3	AUJ, Mandor	Mandor Bajra Composite 2 (MBC 2)	1.00	1.00
4	IARI, New Delhi	Pusa Composite-612 (MP-480)	0.06	0.06
5	PAU, Ludhiana	FBC 16	0.20	0.20
6	RVSKVV, Gwalior	JBV-4 (MP-403)	0.02	0.02
7	RVSKVV, Gwalior	JBV-2 (GKKV-93191)	0.40	0.40
8	CCS HAU, Hisar	Haryana Composite-20	0.02	0.02
9	ICRISAT, Patancheru	ICMV-221	0.03	0.03
10	SKNAU, Jaipur	RAJ 171	0.40	0.40
	Total	**Total (A)**	**4.08**	**4.08**
B.	**Parental lines**			
11	ICRISAT, Patancheru	ICMA 04999 (A line GHB 905 & MPMH 17)	0.80	0.80
12	ICRISAT, Patancheru	ICMB 04999 (B line GHB 905 & MPMH 17)	0.30	0.30
13	ICRISAT, Patancheru	ICMA 93333 (A line RHB 173)	0.10	0.10
14	ICRISAT, Patancheru	ICMB 93333 (B line RHB 173)	0.05	0.05
15	ICRISAT, Patancheru	843-22A (A line HHB 67 Imp., RHB 177 & HHB 226)	1.05	1.05
16	ICRISAT, Patancheru	843-22B (B line HHB 67 Imp., RHB 177 & HHB 226)	0.42	0.42
17	MPKV, Dhule	RHRB 13A (A line RHRBH-9808)	0.10	0.10
18	MPKV, Dhule	RHRB 13A (B line RHRBH-9808)	0.05	0.05
19	MPKV, Dhule	RHRBI 1314 (R line RHRBH-9808)	0.05	0.05
20	Dr. PDKV, Buldana	BMS-5-23A (A line PKV-Raj)	0.02	0.02
21	Dr. PDKV, Buldana	BMS-5-23B (B line PKV-Raj)	0.01	0.01
22	Dr. PDKV, Buldana	BR-333 (R line PKV-Raj)	0.01	0.01
23	JAU, Jamnagar	J-2454 (R line GHB 905)	0.20	0.20
24	HAU, Hisar	HBL-11 (R line HHB 226)	0.18	0.18
25	HAU, Hisar	HMS 37A (A line HHB 216)	0.30	0.30
26	HAU, Hisar	HMS 37B (B line HHB 216)	0.09	0.09
27	HAU, Hisar	H 77/833-2-202 (R line HHB 67 Imp.)	0.25	0.25
28	HAU, Hisar	HTP 3/13 (R line HHB 216)	0.09	0.09
29	SKNAU, Jaipur	RIB 192 S/99 (R line RHB 173)	0.05	0.05
30	SKNAU, Jaipur	RIB 494 (R line RHB 177)	0.07	0.07
31	AICRP-Pearl Millet, Jodhpur	MIR 525-2 (R Line MPMH 17)	0.10	0.10
		Total (B)	**4.29**	**4.29**
		Total (A)+(B)	**8.37**	**8.37**

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

SESSION - VI

INTERACTIVE SESSION ON THRUST AREAS OF RESEARCH IN PEARL MILLET

Chairman	:	Dr. I.S. Solanki 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	:	April 24, 2015	**Time**	: 03:00 PM

An interactive session was held where in seven panellists were invited to give important areas of research which need to be undertaken for future research in pearl millet.

Guidelines for improvement of pearl millet production in A_1 zone - Dr. O.P. Yadav, Director (Maize), ICAR-IIMR, Delhi

He presented the features of A1 zone and later suggested the points to be considered for improvement of pearl millet in this zone.

Features of A1 zone:

- Arid zone constitutes 40% of pearl millet growing area which remains constant without any other crop option.
- Live stock farming brings resilience to the A1 zone and sustainability of live stock depends on the pearl millet dry stover.
- The yield gap in arid and non arid pearl millet areas is increasing.
- Soil fertility in A1 zone is very poor.
- Hybrid adoption in A1 zone is very less due to the poor financial conditions of the farmers.

Points suggested for improvement:

- Very limited choice of cultivars available (early to medium maturing). The cultivars for this zone need to adapt to moisture stress i.e. high tillering.
- Non availability of replacement for HHB 67
- Widening of the base breeding material for this zone – material to come from Hisar, Jamnagar, Jaipur and ICRISAT
- Generation of quality data
- Increased number of entries for testing from the private sector for this zone
- Strengthening of the seed production programmes of the good hybrids identified for this zone.
- Input management, availability of proper agricultural machinery very essential to attain proper plant stands in the fields.
- Genotypes targeted for this zone should adopt to low nitrogen levels.
- Need to generate data to explore the feasibility of pearl millet as nutri-cereal and feed crop.
- Optimization of water use efficiency, fertilizer dosage and population densities in summer pearl millet

Biofortification in pearl millet - Dr. K.N. Rai, Ex. Principal Scientist, ICRISAT

Dr. Rai expressed that food and nutritional security are inter related whereas breeding for increased iron content and grain yield are different.

- By 2020 the pearl millet lines coming from ICRISAT will have minimum iron content of 55ppm and zinc content of 35 ppm.
- A central facility for analysis of iron and zinc needs to be created in the system.
- Use of atleast one parent with high iron content is essential in the breeding programme to breed for high iron content as iron content and yield are negatively correlated.
- Increase the number of plants to be selected by 1.5 times in F2s for generation advancement

Disease resistance in Pearl millet - Dr. H.S. Shetty, Professor, University of Mysore, Mysore

- Downy mildew and blast are the major diseases in Pearl millet.
- The strains of downy mildew and blast are highly diverse, and are changing from time to time and location to location with respect to change in the climate.
- Hence there is need for new molecular tools, study of R Avr relationships, genome sequencing of the causal organisms.
- Cataloguing of plant microbes related to pearl millet is essential as they play a significant role in disease expression pattern or disease epidemiology.

Bridging gap between potential and realized yields in pearl millet – Dr. Harinarayana, Ex- Project Coordinator, AICPMIP.

He expressed that pearl millet yields increased dramatically in zones A and B in the past decade. The yield increase was not to that extent in A1 zone. He suggested some of the following points for bridging the yield gap:

- Need to develop three way cross hybrids in the public sector for A1 zone
- Development of cropping systems and improved crop management in the A1 zone
- Conservation of moisture in the arid zones by mulching or intercropping.

Value addition in pearl millet – Dr. Asha Kawatra, Professor, Dept of Food & Nutrition, CCSHAU, Hisar

Dr. Kawatra showed the various traditional, baked, extruded and health food products developed from pearl millet under the CoE project at CCSHAU, Hisar. She expressed that:

- In spite of greater productivity, low cost and comparatively good nutritional value, use of pearl millet in food industry is very low due to grey colour of the pearl millet grain and poor shelf life of flour.
- Processing treatments like malting, blanching improve the nutritional quality and consumer acceptability
- Blanching is one of the effective processing treatment which aids in increasing the shelf life of pearl millet by effectively retarding the enzymatic activity without much altering the nutrient content.
- As a health product for diabetics – pearl millet offers high fibre content and low glycemic index.
- For celiac disease sufferers – pearl millet provides gluten free products that are nutritionally superior and acceptable

ADG (FFC) suggested that there is need for commercialization of pearl millet foods and awareness campaigns have to conducted involving media for popularization.

Role of private sector for A1 zone – Dr. S.K. Gupta, Director (Regulatory Affairs), Hytech Seeds India Private Ltd.

- A1 zone, receiving <400 mm of annual rainfall, was carved out by AICRP-PM as a special zone. Western Rajasthan constitutes >80% of the A1 zone and Pearl millet is the only cereal crop of the A1 zone, that can be reliably grown under harsh climatic conditions prevalent in this zone.
- Most of the hybrids don't meet requirements of A1 zone, as they are bred for high grain yield potential under favorable environmental conditions and suitable for A and B zones. Special efforts are required to develop suitable pearl millet genotypes for A1 zone.
- The seed requirement for A1 zone is 5467 metric tons, At least 1/3 area must get covered under suitable hybrids. Both sectors need to share R&D responsibilities for A1 zone in a Public-Private-Partnership mode

Dr. Gupta suggested the utilization of existing resources in PPP mode as follows:

- For Collaborative Hybrid Development, the use of A lines of public sector with restorers of private sector and use of A lines of private sector with restorers of public sector.
- Consortium approach needed to achieve the objectives of a collaborative hybrid development project.
- Faster spread of proven public sector hybrids of A1 zone by utilization of the commercial seed production capability of the private sector for increasing seed availability.
- Availability of segregating material for A1 zone to all researchers, irrespective of their organization – whether public sector or private sector
- Sharing of the Germplasm collected at ICAR Institutes and SAUs with clear PVP understanding

It was also observed that a small group meeting of the stake holders need to be organized to come out with a workable preposition.

Public private partnership with special reference to seed industry – Dr. R.S. Mahala, Pioneer Overseas Corporation, Hyderabad

Dr. Mahala defined the PPP, its purpose, basic requirements for good partnership, stake holders, complementarities of public and private sectors with reference to seed industry. He suggested four potential areas of collaboration involving germplasm, services, co-innovation and technology transfer as follows:

- Joint R&D projects from conception to commercialization (joint IPR)
- Licensing of the public research output to private sector for commercialization
- Private sector sponsored chairs and fellowships in public institutions
- Public sector infrastructure - Testing private - sector products for agronomic performance / lab tests
- Academia-industry interface
- Agri research parks
- Technology demonstration
- Manpower development
- Seed production & marketing

ADG (FFC) thanked all the panellists for their valuable inputs and uniqueness of this workshop in conducting this session.

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

SESSION - VII

Proceeding of Varietal Identification Committee Meeting held on 24.4.2015 at Committee Room, Centre for Plant Breeding and Genetics, TNAU, Coimbatore

Varietal Identification Committee Meeting of AICRP on Pearl Millet held on April 24, 2015 at 6.00 pm at Committee Room, Centre for Plant Breeding and Genetics, TNAU, Coimbatore under the Chairmanship of Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi. The following committee members were present:

1	Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi	-Chairman
2	Dr. M. Maheshwaran, Director Research, TNAU, Coimbatore	- Member
3	Dr. O.P. Yadav, Director (Maize), ICAR-IIMR, Delhi	-Member
4	Dr. H. Shekar Shetty, Professor, University of Mysore, Mysore	-Member
5	Dr. Subhash Chandra, Joint Director, DMD, Jaipur	-Member
6	Dr. Y.S. Verma, Head Breeding-Field Crops, Metahelix Life Science Ltd., Hyderabad	-Member
7	Dr. V.A. Deshmukh, Senior Breeder, Kaveri Seeds, Hyderabad	-Member
8	Mr. Venkatachalam, Asst. Director Of Agriculture, Department of Seed Certification, Coimbatore, Tamil Nadu	-Member
9	Mr. M. Suresh, Seed Certification officer, Seed Certification Department of Agriculture, Coimbatore, Tamil Nadu	-Member
10	Dr. H.P. Yadav, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur	-Member Secretary
Principal Investigator		
11	Dr. B.S. Rajpurohit, Professor (PB & G), AICRP-PM, Mandor, Jodhpur	- Facilitator
12	Dr. Anil Kumar, Prof. (Agronomy), CCS, HAU, Hisar	- Facilitator
13	Dr. H.R. Bishnoi, Assoc. Prof. (Pathology), AICRP-PM, Mandor, Jodhpur	- Facilitator

The proposals of 16 hybrids/varieties as per detail given below were discussed:

S. No.	Hybrid/ Variety	Identity	Zone
1	MH 1777	MPMH 21	Zone A1 (Early Maturity)
2	MH 1837	HHB 272	Zone A1 (Early Maturity)
3	MH 1828	JKBH 1008	Zone A1 (Early Maturity)
4	MH 1831	BHB 1202	Zone A1 (Early Maturity)
5	MH 1875	RHB 211	Zone A (Medium Maturity)
6	MH 1852	Mahabeej-1005	Zone B (Medium Maturity)
7	MH 1890	86M84	Zone A (Late Maturity)
8	MH 1888	86M82	Zone A (Late Maturity)
9	MH 1889	86M83	Zone A (Late Maturity)
10	MH 1887	86M35	Zone B (Late Maturity)
11	MH 1889	86M83	Zone B (Late Maturity)
12	MH 1904	NBH 5809	Zone B (Late Maturity)
13	MH 1901	ATPM-11005	Zone B (Late Maturity)
14	MP 535	Pusa Composite 701	Zone A
15	MSH 276	86M13	Summer
16	MSH 278	NBH 5782	Summer

I.S. Solanki 24.4.15

24.4.15

The Committee took following decision:

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

The proposal of hybrids MH 1777 (MPMH 21), MH 1837 (HHB 272), MH 1828 (JKBH 1008) and MH 1831 (BHB 1202) were considered for drier part of Rajasthan, Gujarat and Haryana. Hybrid MH 1777 showed more than 10% superiority in grain yield and also showed superiority for dry fodder yield over the best check. Hybrid MH 1837 and MH 1828 also showed superiority in grain yield as well as in dry fodder yield. Hence, three hybrids MH 1777 (MPMH 21), MH 1837 (HHB 272), MH 1828 (JKBH 1008) were identified for release for Zone A1 (Drier part of Rajasthan, Gujarat and Haryana). Hybrid MH 1831 (BHB 1202) has not shown superiority over best check hence it was not identified by the committee.

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

The proposal of hybrid MH 1875 (RHB 211) was considered for Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi under medium maturity group. This hybrid does not have appreciable superiority in grain yield. Hence it was not identified for release for Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi.

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

The proposals of one hybrids MH 1852 (Mahabeej-1005) was considered for Zone B under medium maturity group for Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. The Hybrid MH 1852 is susceptible to rust and ergot diseases, hence it was not identified for release in Maharashtra, Tamil Nadu, Karnataka and A.P.

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

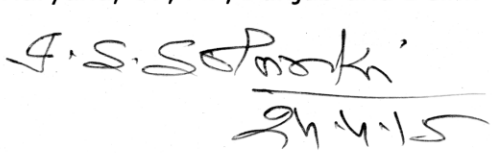
The proposals of hybrids MH 1890 (86M84), MH 1888 (86M82) and MH 1889 (86M83) were considered by the committee for late maturity group. Hybrids MH 1890, MH 1888 were recorded more than 9.7% superiority in grain yield over the best checks and more than 21% over other checks. Hence two hybrids viz MH 1890 (86M84) and MH 1888 (86M82) were identified for release in Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi for late maturity group. Hybrid MH 1889 is not superior in grain yield over best check; hence it is not identified.

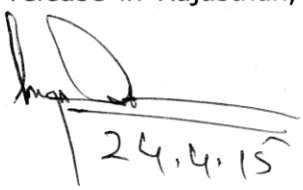
Zone B (Late maturity) (Maharashtra, Tamil Nadu, Karnataka and A.P.)

The proposal of four hybrids MH 1887 (86M35), MH 1889 (86M83), MH 1904 (NBH 5809), and MH 1901 (ATPM-11005) were considered by the committee for late maturity group. All the hybrids were found susceptible to ergot disease, hence all the four hybrids viz. MH 1887, MH 1889, MH 1904 and MH 1901 were not identified for release in Maharashtra, Tamil Nadu, Karnataka and A.P.

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

Proposal of one variety MP 535 (Pusa Composite 701) was considered by the committee. Population MP 535 was found 5.8 % superior in grain yield over best check Pusa Composite 383 and 13-27% over all other checks. Hence, the population MP 535 (Pusa Composite 701) was identified for release in Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi.





Summer (Rajasthan, Gujarat, U.P., Maharashtra and Tamil Nadu.)

Two proposals of summer hybrid MSH 276 (86M13) and MSH 278 (NBH 5782) were considered by the committee. Hybrid MSH 276 exhibited 8-34% superiority in grain yield over all the checks and also has superiority in dry fodder yield over the checks and was found resistant to downy mildew. Hence MSH 276 (86M13) was identified for release for summer cultivation in states of Rajasthan, Gujarat, U.P., Maharashtra and Tamil Nadu.

Dr. I.S. Solanki
Chairman

Dr. H.P. Yadav
Member Secretary

SESSION – VIII

REVIEW OF CROP PRODUCTION STRATEGIES, VALUE CHAIN FOR 2014-15 AND ACTION PLAN FOR 2015-16

Chairman	**:**	Dr. K.N. Rai ICRISAT	**Co-Chairman**	**:**	Dr. H.P. Yadav Project Coordinator AICRP-PM, Jodhpur
					Dr. Subhash Chandra Joint Director (DMD)
			Rapporteur	**:**	Dr. P.S. Shekhawat Professor, SKRAU, Bikaner
Date	**:**	April 25, 2015	**Time**	**:**	9:15 AM

The progress report of FLD's organized during 2014-15 was presented by Dr. Anil Kumar, Agronomist, CCS HAU, Hisar. As against the target of 200 ha, FLD's were organized over an area of 186 ha (including 40 ha area under summer) in the States of Gujarat, Haryana, Maharashtra, Rajasthan, Andhra Pradesh, Madhya Pradesh and Tamil Nadu on six components *i.e.* improved practices, recommended nutrient application, weed management, improved hybrids, wide row spacing and micronutrient management. Overall yield advantage was in the range of 12.5 to 91.7% among these trials.

1. The Joint Director, DMD Dr. Subhash Chandra suggested that the plan of FLD will be continued for the year 2015-16 and 250 ha area FLD's is proposed for the year 2015-16 is under consideration with Government of India.

2. The Chairman raised quarries regarding providing the budget of 2014-15 which was provided late in month of August. He suggested that timely fund must be available to the center. So that FLD's may be conducted smoothly.

3. Joint Director DMD assured that we will try to provide the fund in time in future but the report of FLD's must be compiled well in time and reached to DMD up to December in prescribed format.

4. The centre-wise action plan will be finalized after the approval of number of FLD's from Ministry of Agriculture.

5. The practice "Local and Farmer's practices" may be define in proper way.

6. The centre-wise results were compare with state and district average yield for presentation.

The meeting ended with thanks to the chair.

SESSION IX

REVIEW OF RESEARCH RESULTS OF ICAR-ICRISAT COLLABORATIVE PROJECTS 2014-15 AND PLAN OF WORK 2015-16

Chairman	:	Dr. K.N. Rai, Principal Scientist, ICRISAT	**Co-Chairman**	:	Dr. H.P. Yadav Project Coordinator AICRP-PM, Jodhpur
			Rapporteur	:	Dr. P. Sumathi, TNAU Coimbatore
Date	:	April 25, 2015	**Time**	:	10:00 AM

The results of ICAR –ICRISAT trials conducted during 2014 -2015 were presented by Dr. H.P. Yadav, Project Coordinator (Pearl Millet). He informed that based on the results compiled, only two numbers of A4 lines were selected in the ICAR – ICRISAT trails. The chairman suggested that while going for selection of A4 and A5 lines, relaxation in selection may be given at least for few years that will help to select few more A4 and A5 lines. The second recommendation was given based on the discussion of source of male sterile lines. The information on cytoplasmic source of the male sterile lines should be given where ever possible. The chairman also stressed the point that the forage breeding programme on pearl millet should be transferred to AICRP on pearl millet programme and it should be strengthened.

Dr. Rakesh Srivastava presented the ICAR –ICRISAT trials on QTL mapping nursery to be conducted during 2015-16. Dr. S.K. Gupta presented the ICAR –ICRISAT (Breeding) trials to be taken up during 2015 – 2016 and the locations to be included for different trials and different locations. He presented the information about Seed parent progeny trials and Restorer parent progeny trials.

List of ICAR-ICRISAT Trials during Rainy 2015/Summer 2016 (as finalized during AICRP-PM meeting at Coimbatore)

Seed Parent Progeny Trials

Trial	Entries	Reps	Rows	Locations
Newly designated B-lines	50-60	2	2	Bikaner, Anathapuram, Jamnagar, Jodhpur (CAZRI), Dhule, Durgapura, New Delhi, NARP Aurangabad, Coimbatore
Erect plant type- B-line trial	25-30	2	1	Bikaner, Coimbatore, ARS Malnoor
Blast resistant B-line trial	25-30	2	1	Hisar, Durgapura, Dhule, Jamnagar, Gwalior, New Delhi, Vijayapur
White seeded B-line trial	15-20	2	1	Bikaner, Durgapura, Coimbatore,Ludhiana, New Delhi, Vijayapur
D2 dwarf thick panicle B-line trial	20-25	2	1	Coimbatore, Dhule, NARP Aurangabad
Long–Compact Panicle B-Composite	30-40 rows per center			Bikaner, Durgapura, Hisar, Jamnagar, ARS Malnoor
Thick–Compact Panicle B-Composite	30-40 rows per center			Hisar, Jamnagar, Dhule, Coimbatore, NARP Aurangabad

Restorer Parent Progeny Trials

Trial	Entries	Reps	Rows	Locations
Newly designated R-lines	40-50	2	2	Bikaner, Anathapuram, Jamnagar, Jodhpur (CAZRI), Durgapura, New Delhi, Dhule
Early Maturing Restorer trial	50-60	2	1	Bikaner, Durgapura, Hisar, Jamnagar, Ludhiana, Jodhpur(CAZRI)
DM and Blast R-lines trial	25-30	2	1	Jamnagar, Gwalior, Durgapura, Dhule, Hisar, Ludhiana, Bikaner, Anathapuram, Jodhpur(CAZRI), New Delhi, Anand, ARS Malnoor, Vijayapur
Lodging tolerant R-lines trial	20-25	2	1	Hisar, Durgapura, Dhule, Ludhiana, Jamnagar
A4 Restorers Nursery	15-20	2	1	Jamnagar, Dhule, Coimbatore, Gwalior, Ludhiana, Anathapuram, New Delhi, ARS Malnoor, Vijayapur
Heat Tolerant R-Composite	30-40 rows per center			Durgapura, Jamnagar, Mandor, Hisar, Gwalior, Bikaner

Biofortification Trials

Trial	Entry	Reps	Rows	Locations
High-Fe Inbred Prog. trial	35	2	1	Durgapura, Gwalior, Mandor, Palem, Patancheru, Anantapur, Coimbatore, Dhule, Ludhiana, Jodhpur(CAZRI), New Delhi, ARS Malnoor, Vijayapur
Elite Inbred Joint Biofortification Trial	40	2	1	Durgapura, Hisar, Delhi, Mandor, Jamnagar, Delhi, Patancheru, Coimbatore, Ludhiana

Other Trials

Trial	Entries	Reps	Rows	Locations
Heterotic pool formation trial	360	2	2	Hisar, Jamnagar, Dhule, Coimbatore
High-forage population trial (Summer season-2016)	15-20	3	6	Ludhiana, Dhari, Vijayapur
High-forage Hybrid trial (Summer season- 2016)	15-20	3	4	Jamnagar, Ludhiana
Flowering-stage heat tolerance trial (Summer season- 2016)	60-70	3 sowings	1	Mandor, SK Nagar
Arid-type Hybrid trial	40	2	2	Bikaner, Durgapura, Bawal
Heat tolerant R-Composite	30-40 rows/center			Mandor, Bikaner, Dhule, Hisar, Ludhiana, Durgapura

Marker-assisted Breeding Trials & Nurseries

Trial	Entries	Reps	Rows	Locations
Genome-wide association studies (GWAS) for high grain Iron and Zn density	300	2 (30 blocks)	1	New Delhi
HHB 67-background DMR QTL Introgression Hybrid Observation Trial	40	2	2	Bawal, Bikaner, Jodhpur (CAZRI)
H 77/833-2-background DMR QTL Introgression Lines Observation Nursery	40	2	1	Bawal, Bikaner, New Delhi
GHB 538-background DMR QTL Introgression Line x Tester Trial	48	3	2	Jamnagar
J 2340-background DMR QTL Introgression Line Trial	24	3	1	Jamnagar, Bikaner, New Delhi

The session ended with vote of thanks by chairman.

PLENARY SESSION

Chairman	: Dr. I.S. Solanki 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	: April 25, 2015	**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

The Chairman has serious concerned about non-participation of Breeders from Kalai and NARP Aurangabad

Dr. Solanki suggested to do work on quality aspects and he also suggested to strengthen the work on hybrid breeding in zone B to increase the productivity, where the area is decreasing.

During Agronomy presentation Chairman suggested that in PMAT 11 there should be 15 days gap between each date of sowing.

Dr. H.P. Yadav, Project Coordinator (Pearl Millet) suggested all the project centre to submit the AUC well in time for proper accounting and he also emphasized for research on summer hybrids by SAUs.

Assistant Director General (FFC) emphasized quality publication of research data and he requested private seed companies to produce seed for zone A_1, for which only SAUs are working.

Joint Director (DMD) suggested that FLD results should be compared with district and state average.

At the end Chairman thanked all the participants and remarked that very good work in pearl millet is being done.

Meeting ended with vote of thank to chair.

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