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**Proceedings of the 52nd Annual Pearl Millet Workshop
All India Coordinated Research Project on Pearl Millet**

Held at

**Punjab Agricultural University
Ludhiana (Punjab)**

April 28-30, 2017



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

www.aicpmip.res.in



52nd Annual Group Meeting of All India Coordinated Research Project on Pearl Millet (Indian Council of Agricultural Research)

Date: April 28-30, 2017

Venue: PAU, Ludhiana

AGENDA

Day 1: 28th April 2017 (Friday)

08:30 – 10:00 Registration

Session I: Inaugural

10:00 – 12:00 Chief Guest	Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi
Welcome	Dr. Ashok Kumar, Director Research, PAU, Ludhiana
Project Coordinator's Review-Research Highlights 2016-17	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
Remarks by Guest of Honour	Dr. Balraj Singh, Hon'ble Vice Chancellor, AU, Jodhpur
Inaugural address by Chief Guest	Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi
Vote of Thanks	Dr. H.S. Dhaliwal, Dean, COA, PAU, Ludhiana
Rapporteurs	Dr. H.R. Bishnoi & Dr. P. Sumathi

12:00 – 12:30 High Tea

Session II: Review of Research Results and Progress Report of AICRP-PM 2016-17 by respective PIs

12:30 – 13:30 Chairperson	Dr. J.S. Sandhu, DDG (CS), ICAR, New Delhi
Co-Chairperson	Dr. Balraj Singh, Vice Chancellor, AU, Jodhpur
	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
Rapporteurs	Dr. Arvind Jukanti, Sr. Scientist, CAZRI, Jodhpur
	Dr. L.D. Sharma, Professor, RARI, Durgapura
Crop Improvement	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
Crop Production	Dr. Anil Kumar, Pr. Scientist, CCS HAU Hisar
	Dr. R.C. Meena, Asstt. Prof. (Physiology), AICRP-PM, Jodhpur
Crop Protection	Dr. H.R. Bishnoi, Pathologist, AICRP-PM, Jodhpur
	Sh. R.K. Juneja, Asstt. Res. Sci. (Ento.), JAU, Jamnagar

13:30 – 14:30 Lunch Break

Session III: Varietal Identification Committee Meeting

14:30 – 15:30 Chairperson	Dr. J.S. Sandhu, DDG (CS), ICAR, New Delhi
Member Secretary	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Members and facilitators

Session IV: Review of Research Results & Progress Report of ICAR-ICRISAT Collaborative Projects 2016-17 and Plan of Work 2017-18

15:30 - 16:30	Chairperson	Dr. Balraj Singh, Hon'ble Vice Chancellor, AU, Jodhpur
	Co-Chairperson	Dr. Sujoy Rakshit, Director, IIMR, PAU, Ludhiana Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur	Dr. K.D. Mungra, JAU, Jamnagar
	Speakers	Dr. B.R. Beniwal, STA, AICRP-PM, Jodhpur Dr. S.K. Gupta, Principal Scientist, ICRISAT Dr. Rakesh Srivastava, Principal Scientist, ICRISAT

16:30 -16:45 **Tea break**

Session V: Panel Discussion on Thrust Areas of Research in Pearl Millet "Enhancement of Production and Productivity in A₁ Zone"

16:45 - 17:30	Chairperson	Dr. Balraj Singh, Hon'ble Vice Chancellor, AU, Jodhpur
	Co-Chairperson	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur	Dr. S.P. Singh, Sr. Scientist, IARI, New Delhi
	Panelists	Dr. Sanjana Reddy, Sr. Scientist, IIMR, Hyderabad 1. Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur 2. Dr. L.D. Sharma, Professor, RARI, Durgapura 3. Dr. S.K. Gupta, Hytech Seed 4. Dr. S.K. Gupta, ICRISAT 5. Dr. Satish Pareek, Pioneer Hi-Bred Pvt Ltd.

Day 2: 29th April 2017 (Saturday)

Session VI: Review of research results of AICRP- PM centres 2016-17 (Centre-wise overall presentation of significant results and progress report by Centre Incharge)

09:30 - 13:00	Chairman	Co-chairman
	Dr. Sarvjeet Singh, ADR, Crop Improvement, PAU, Ludhiana	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Jaipur, Hisar, Aurangabad, Jamnagar & Kalai	
11:15 - 11:30	Tea Break	
	Session VI continued : Vijayapura, Mysore, Ananathapuram, Coimbatore & Gwalior	
13:00 - 14:00	Lunch	
14:00 - 15:00	Session VI continued :	Ludhiana, Bikaner & Dhule
	Rapporteurs	Dr. B.S. Rajpurohit, Dr. Manoj Kumar, Dr. H.R. Bishnoi, Dr. R.C. Meena, Dr. G. Ram Kherwa, Dr. Anil Kumar, Sh. R.K. Juneja

15:00 -15:15 **Tea break**

Session VII : Plan of work 2017-18 (Concurrent discipline wise technical programme preparation)

15:15 - 18:15	Chairperson	Co-Chairperson	Rapporteur
Crop Improvement	Dr. K.S. Thind, Head, PBG, PAU, Ludhiana	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur	Dr. B.S. Rajpurohit, Professor, AICRP-PM, AU, Jodhpur

Crop Production	Dr. Thakar Singh Head (Agronomy)	Dr. U.S. Tiwana Incharge, Forage Section, PAU, Ludhiana	Dr. Anil Kumar, Pr. Scientist, HAU, Hisar Manoj Kumar, Asstt. Prof., AICRP-PM, Jodhpur Dr. R.C. Meena Asstt. Prof., AICRP-PM Jodhpur
Crop Protection	Dr. P.S. Sekhon Head (Plant Pathology)	Dr. R.S. Gill Head (Entomology)	Dr. H.R. Bishnoi, Pathologist, AICRP-PM, Jodhpur Dr. R.K. Juneja, JAU, Jamnagar Dr. G. Prakash IARI New Delhi

Day 3: 30th April 2017 (Sunday)

Session VIII: Review and Crop Production Strategies and Value Chain for 2016-17 and Action Plan 2017-18

09:30 – 10:15	Chairperson	Dr. H.P. Yadav, Former Project Coordinator (PM)
	Co-chairperson	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur Frontline Demonstrations	Dr. P.S. Shekhawat, Professor, SKRAU, Bikaner Manoj Kumar, Asstt.Prof.(Agronomy), AICRP-PM, Jodhpur

Session IX: Review of BSP and DUS Testing Project & Progress Report 2016-17, Plan of Work 2017-18 and Review of DUS Guidelines

10:15 – 11:15	Chairperson	Dr. H.P. Yadav, Former Project Coordinator (PM)
	Co-chairperson	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur	Dr. P. Shanthi, Asstt. Professor, AICRP-PM, Ananthapuram
	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
	Review of DUS Guidelines	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur

11:15 -11:30 **Tea break**

Session X: Panel Discussion on Thrust Areas of Research in Pearl Millet “Enhancing the demand of pearl millet”

11:30 – 12:30	Chairperson	Dr. Savita Sharma, Head, Dept. of Food Science & Technology, PAU, Ludhiana
	Co-Chairperson	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur Panelists	Dr. P. Sumathi, Professor, TNAU, Coimbatore Dr. H.P. Yadav, Former Project Coordinator (PM) Dr. L.K. Chug, CCS HAU, Hisar Dr. Saikat Majumdar, ICRISAT

Session XI: Plenary Session

Session-wise Presentation of the Recommendations 2016-17 and Technical Programme of Work 2017-18

12:30 – 14:30	Chairperson	Dr. Sarvjeet Singh, ADR, Crop Improvement, PAU, Ludhiana
	Co-chairperson	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
	Rapporteur	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Inaugural I	Dr. H.R. Bishnoi & Dr. P. Sumathi
	Technical Session II	Dr. Arvind Jukanti, Sr. Scientist, CAZRI, Jodhpur
		Dr. L.D. Sharma, Professor, RARI, Durgapura
	Technical Session III	Dr. B.S. Rajpurohit, Professor, AICRP-PM, Jodhpur
	Technical Session IV	Dr. K.D. Mungra, JAU, Jamnagar
	Technical Session V	Dr. S.P. Singh, Sr. Scientist, IARI, New Delhi
		Dr. Sanjana Reddy, Sr. Scientist, IIMR, Hyderabad
	Technical Session VI	Dr. B.S. Rajpurohit, Dr. Manoj Kumar, Dr. H.R. Bishnoi, Dr. R.C. Meena, Dr. G. Ram Kherwa, Dr. Anil Kumar, Sh. R.K. Juneja
	Technical Session VII	Dr. B.S. Rajpurohit, Professor, AICRP-PM, AU, Jodhpur
		Dr. Anil Kumar, Pr. Scientist, HAU, Hisar
		Manoj Kumar, Asstt. Prof. (Agronomy), AICRP-PM, Jodhpur
		Dr. R.C. Meena, Asstt. Prof. (Physio.), AICRP-PM, Jodhpur
		Dr. H.R. Bishnoi, Pathologist, AICRP-PM, Jodhpur
		Dr. R.K. Juneja, JAU, Jamnagar
		Dr. G. Prakash, IARI New Delhi
	Technical Session VIII	Dr. P.S. Shekhawat, Professor, SKRAU, Bikaner
	Technical Session IX	Dr. P. Shanthi, Asstt. Professor, AICRP-PM, Ananthapuram
	Technical Session X	Dr. P. Sumathi, Professor, TNAU, Coimbatore
	Vote of thanks	Dr. K.S. Thind, Head, Dept. Of PBG, PAU, Ludhiana
14:30 – 15:30	Lunch Break	
15:30 onward	Visits : Fields/ Labs	

SESSION - I

INAUGURAL

Chief Guest	Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi
Welcome	Dr. Ashok Kumar, Director Research, PAU, Ludhiana
Project Coordinator's Review- Research Highlights 2016-17	Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur
Remarks by Guest of Honour	Dr. Balraj Singh, Vice-Chancellor, Agriculture University, Jodhpur
Inaugural address by Chief Guest	Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi
Vote of Thanks	Dr. H.S. Dhaliwal, Dean, COA, PAU, Ludhiana
Rapporteurs	Dr. H.R. Bishnoi & Dr. P. Sumathi
Date	28.04.2017
Time	10:00 AM

The 52nd Annual Group meet of AICRP on Pearl millet was inaugurated on 28th April, 2017 by Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi. The ceremony was witnessed by important dignitaries namely; Dr. Balraj Singh Choudhary, Vice-Chancellor, Agriculture University, Jodhpur, Dr. Ashok Kumar, Director of Research, PAU, Ludhiana, Dr. .H.S. Dhaliwal, Dean, COA, PAU, Ludhiana, Dr. R.L. Kapoor, Eminent plant breeder and Dr. C. Tara Satyavathi, Project Coordinator, AICRP on Pearl Millet.

The inaugural ceremony was started with the welcome address by Dr. Ashok Kumar, Director of Research, PAU Ludhiana. He briefed the importance and future needs of pearl millet in his welcome address. The Project Coordinator, Dr. C. Tara Satyavathi presented the highlights of AICRP on Pearl millet programme for the year 2016-17. She expressed the special features of pearl millet and the need to improve the demand of pearl millet to sustain this crop in the country. She also expressed the pleasure regarding notification of 13 hybrids during last year. She also appreciated the contributory role of both public and private sectors in meeting the demands of pearl millet growing farmers by seed production in terms of improved hybrids/ varieties package of practices for increasing the productivity and crop protection.

Dr. Balraj Singh, Vice-Chancellor, Agriculture University, Jodhpur in his remarks as a Guest of Honor expressed pleasure for the presence of Dr. R.L. Kapoor, who is the breeder of the hybrid HHB 67 which is responsible for the increase of the productivity in Rajasthan. He emphasized the issues to be explored viz., water productivity, nutrifarming, precision farming, hybrid seed production in Rajasthan and shelf life of pearl millet and role of pollinators during summer season.

A slide show was presented to felicitate the eminent breeders of PAU, Dr.G.S. Athwal who is responsible for the release of the first hybrid, HB 1 in the world.

The following scientists were felicitated by Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi.

Dr. R.L. Kapoor for his contribution in research and development of pearl millet. For superannuation Dr. G. Ram Kherwa, Professor, Dr. H.R. Bishnoi, Pathologist, AICRP on Pearl Millet Mandor and Dr. S.S. Gughe, Pathologist, NARP, Aurangabad.

DDG (Crop Science), ICAR, New Delhi released souvenir on All India Coordinated Pearl Millet Improvement Project, News Letter and Electronic Version of Annual Report 2016-17 and Magnapor the Blast of Pearl Millet in India.

In the inaugural address, the DDG (Crop Science), mentioned as the unique of this workshop is presence of Dr. R.L. Kapoor and new woman Project Coordinator, Dr. C. Tara Sathyavathi. He emphasized that though the area was decreased in the past one decade, there is four fold increase in productivity. He insisted that the following strategy is needed to exploit the potential of this pearl millet crop.

- Diversification of male sterile cytoplasm
- Exploring the *potential* as that of maize crop
- Maintain the uniformity of the parental lines
- Meteorological data can be *analyzed* over the years accordingly plan of work can be reoriented
- Eastern states i.e. non-traditional area can also be explored for the cultivation of pearl millet crop like sorghum

Dr. H.S. Dhaliwal, Dean, COA, PAU, Ludhiana proposed the vote of thanks.

SESSION II

REVIEW OF RESEARCH RESULTS AND PROGRESS REPORT OF AICRP ON PEARL MILLET (2016-17)

Chairman	: Dr. J.S. Sandhu DDG (CS), ICAR, New Delhi	Co-Chairman	: Dr. Balraj Singh VC, AU, Jodhpur
			: Dr. Sujay Rakshit Director, IIMR, Ludhiana Dr. C. Tara Satyavathi Project Coordinator (Pearl Millet)
		Rapporteur	: Dr. L.D. Sharma Professor, RARI, Jaipur
Date	: April 28, 2017	Time	: 12:30 PM

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

This session was Chaired by Dr. Balraj Singh and Co-Chaired by Dr. Sujay Rakshit.

During *Kharif* 2016, in total 221 trials were allotted in A₁, A and B zones. Out of these, 214 trials were conducted with success rate of 97%. Chairman Dr. Balraj Singh appreciated Dr. Rajpurohit for his excellent presentation and efforts.

Dr. Sujoy Rakshit, Co-Chairman suggested for possibilities of long term check in AICRP trials. Preferably one each of varietal and hybrid to understand genetic gain and he appreciated that superior hybrids are available in A₁ zone. However, there is need to minimize the gap between experimental yield and yield obtained in demonstrations.

Agronomy (Presented by: Dr. Anil Kumar)

Total 65 experiments were allotted out of which 62 trials were conducted successfully. Seven agronomical experiments on the aspect of nutrient management, irrigation schedule and contingent crop planting were taken. In one of the trials related to response of pearl millet hybrids to foliar application of FeSO₄, it was suggested that Fe, Zn and protein content must be analyzed in grain in controls and treatments. In another trial-response of Fe and Zn rich hybrids to nitrogen application in zone A₁, Dhansakti should be included as a check only for Fe and Zn and a separate check hybrid must be included for grain yield comparison.

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

During *Kharif* 2016, eight pathological experiments were conducted at 12 locations. Results on screening against different diseases and data on management of downy mildew and blast were also presented.

Entomology (Presented by: Dr. R.P. Juneja)

Seven experiments were conducted. The damage caused by shoot fly and stem borer were found more at Jamnagar as compared to Jaipur. On the basis of 4 years data (2013-2016) seed treatment with imidacloprid 600 FS @ 8.75 ml or clothianidin 50 WDG @ 7.5 g/kg seed with sufficient quantity of water effectively controls the soil insect-pests (white grub and termite) infesting in pearl millet. Treated seed should be sown within 2 hours. DDG (CS) appreciated the presentation and suggested to formulate the experiment for termite and white grub with the coordination with Coordinator (AICRP on White grub), Durgapura.

Plant Physiology (Presented by: Dr. R.C. Meena)

Six experiments were conducted at three locations. The Chairman suggested that a complete recommendation should be given at the time of concluding the experiment and new product like hydrogel must be included in experiments.

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

SESSION III

VARIETAL IDENTIFICATION COMMITTEE MEETING

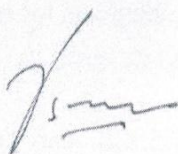
Date : April 29, 2017

Time : 14:30

Proceedings of Varietal Identification Committee Meeting held on 28.04.2017 at 2.30 pm at Committee Room, Department of Plant Breeding and Genetics, PAU, Ludhiana.

Varietal Identification Committee Meeting of AICRP on Pearl Millet was held on 28 April, 2017 2.30 pm at Committee Room, Department of Plant Breeding and Genetics, PAU, Ludhiana under the Chairmanship of Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi. The following committee members were present:

1	Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi	-Chairman
2	Dr. Sarvjeet Singh, ADR, Crop Improvement, PAU, Ludhiana	-Member
3	Dr. R.K. Pandya, Principal Scientist (Pathology), RVSKVV, Gwalior	-Member
4	Dr. Hari Ram Choudhary, STA, DMD, Jaipur-Director Nominee	-Member
5	Dr. Yogendra Verma, Research Head, Metahelix Life Science Ltd., Ahmedabad	-Member
6	Sh. K.C. Sharma, Assistant Manager (production), NSC, Chandigarh	-Member
7	Dr. C Tara Satyavathi, Project Coordinator (Pearl Millet), AICRP-PM, Jodhpur	-Member Secretary
Principal Investigator		
8	Dr. B.S. Rajpurohit, Professor (PB & G), AICRP-PM, Mandor, Jodhpur	- Facilitator
9	Dr. Anil Kumar, Prof. (Agronomy), CCS, HAU, Hisar	- Facilitator
10	Dr. H.R. Bishnoi, Assoc. Prof. (Pathology), AICRP-PM, Mandor, Jodhpur	- Facilitator



C. Tara Satyavathi
28/4/17

The proposals of 17 hybrids/varieties as per detail given below were discussed:

S. No.	Hybrid/ Variety	Identity	Zone/States/Maturity Group
1	MH 1998	RHB 223	Zone A1 (Early Maturity)
2	MH 1996	RHB 221	Zone A1 (Early Maturity)
3	MH 1993	CZH 233	Zone A1 (Early Maturity)
4	MH 2024	86M38	Zone A (Medium Maturity)
5	MH 2008	PB 1705	Zone A (Medium Maturity)
6	MH 2010	NMH 89	Zone B (Medium Maturity)
7	MH 2024	86M38	Zone B (Medium Maturity)
8	MH 2008	PB 1705	Zone B (Medium Maturity)
9	MH 2039	PB 1660	Zone A (Late Maturity)
10	MH 2047	KBH 3590	Zone A (Late Maturity)
11	MH 2035	NBH 4903	Zone B (Late Maturity)
12	MH 2047	KBH 3590	Zone B (Late Maturity)
13	MH 2053	86M92	Zone B (Late Maturity)
14	MH 2076	HHB 299	Zone A1, A & B (High Fe & Zn) of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Maharashtra, Tamil Nadu
15	MH 2072	AHB 1200	Zone A1, A & B (High Fe & Zn) of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Maharashtra, Tamil Nadu
16	MH 2077	Shakti 1201	Zone A1, A & B (High Fe & Zn) of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Maharashtra, Tamil Nadu
17	MP 552	ABV 04	Zone B (Population)

The Committee took following decision:

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

The proposal of three hybrids MH 1998 (RHB 223), MH 1996 (RHB 221) and MH 1993 (CZH 233) was considered for Drier part of Rajasthan, Gujarat and Haryana under early maturity group. Out of these hybrids, hybrid MH 1998 (RHB 223) recorded 12 to 32 percent higher grain yield and also found superior in dry fodder yield over the checks. This hybrid also found resistant to downy mildew, blast, smut and ergot. Hence the hybrid **MH 1998 (RHB 223)** was identified for release for cultivation in Drier part of Rajasthan, Gujarat and Haryana for early maturity group. Hybrids MH 1996 (RHB 221) and MH 1993 (CZH 233) does not have superiority in grain yield over best check, hence were not identified for release.

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

The proposal of two hybrids MH 2024 (86M38) and MH 2008 (PB 1705) was considered for Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi under medium maturity group. These two hybrids recorded superiority in grain yield and dry fodder yield as compared to all checks and found resistant to downy mildew, blast, rust, smut and ergot. Hence these hybrids **MH 2024 (86M38) and MH 2008 (PB 1705)** were identified for release for cultivation in Rajasthan, Gujarat, Haryana, UP, MP, Punjab and Delhi for medium maturity group.

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

The proposal of three hybrids MH 2010 (NMH 89), MH 2024 (86M38) and MH 2008 (PB 1705) were considered under medium maturity group for Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. The Hybrid MH 2024 (86M38) was found superior in grain yield and dry fodder yield as compared to all checks and also found resistant to downy mildew, blast, rust and ergot, hence **MH 2024 (86M38)** was identified for release in Maharashtra, Tamil Nadu, Karnataka and A.P. for medium maturity group. Hybrids, MH 2010 (NMH 89) and MH 2008 (PB 1705) were found susceptible to rust disease; hence these were not identified for release.

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

The proposals of two hybrids MH 2039 (PB 1660) and MH 2047 (KBH 3590) were considered by the committee for late maturity group. Hybrids MH 2039 (PB 1660) and MH 2047 (KBH 3590) were not found superior in grain yield and dry fodder yield as compared to best check KBH 108 hence, these were not identified.

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

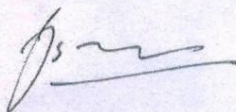
The proposals of three hybrids MH 2035 (NBH 4903), MH 2047 (KBH 3590) and MH 2053 (86M92) were considered by the committee for late maturity group. Hybrid MH 2035 (NBH 4903) was found superior in grain yield and dry fodder yield and resistance to diseases over checks, hence the hybrid **MH 2035 (NBH 4903)** was identified for release in the states of Maharashtra, Tamil Nadu, Karnataka and A.P. for late maturity group. Hybrids, MH 2047 (KBH 3590) and MH 2053 (86M92) were not found superior over best check, hence were not identified for release.

High Iron and Zinc hybrids for the state of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Maharashtra, Tamil Nadu of Zone A1, A & B

The proposals of three hybrids MH 2076 (HHB 299), MH 2072 (AHB 1200) and MH 2077 (Shakti 1201) were considered by the committee for high Iron and Zinc content along with comparable grain yield with checks. Two hybrids, viz., MH 2076 (HHB 299) and MH 2072 (AHB 1200) were found superior in Iron and Zinc content along with grain yield and also found resistant to diseases, hence hybrids, **MH 2076 (HHB 299) and MH 2072 (AHB 1200)** were identified for release in the states of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Maharashtra and Tamil Nadu of Zone A₁, A and B. Hybrid 2077 (Shakti 1201) was not found superior in grain yield over relevant check MPMH 17; hence it was not identified for release.

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

The proposals of population MP 552 (ABV 04) was considered by the committee. This Population MP 552 was found superior in grain and dry fodder yield and resistance to diseases; hence the population MP 552 (ABV 04) was identified for release in the states of Maharashtra, Tamil Nadu, Karnataka and A.P.

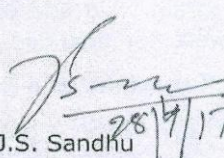


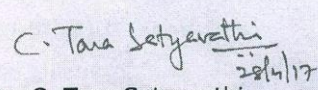
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C. Tara Sathyanarayanan
28/11/17

The list of identified hybrids/varieties is as per detail given below:

S. No.	Hybrid/ Variety	Identity	Zone/States/Maturity Group for which identified
1	MH 1998	RHB 223	Zone A1 (Early Maturity)
2	MH 2024	86M38	Zone A (Medium Maturity)
3	MH 2008	PB 1705	Zone A (Medium Maturity)
4	MH 2024	86M38	Zone B (Medium Maturity)
5	MH 2035	NBH 4903	Zone B (Late Maturity)
6	MH 2076	HHB 299	Zone A1, A & B (High Fe & Zn) of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Maharashtra, Tamil Nadu
7	MH 2072	AHB 1200	Zone A1, A & B (High Fe & Zn) of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Maharashtra, Tamil Nadu
8	MP 552	ABV 04	Zone B (Population)


Dr. J.S. Sandhu
Chairman


Dr. C. Tara Satyavathi
Member Secretary

Corrigendum

In the Proceeding of Varietal Identification Committee Meeting of AICRP on Pearl Millet held on 28.04.2017 at Committee Room, Department of Plant Breeding and Genetics, PAU, Ludhiana during Annual Group Meeting 28-30 April, 2017; in Zone B hybrid MH 2024 (86M38) (Medium maturity), hybrid MH 2035 (NBH 4903) (Late maturity) and population MP 552 (ABV 04) were identified in the states of Maharashtra, Karnataka, Andhra Pradesh, Telangana and Tamil Nadu instead of Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu.

C. Tara Satyavathi

Project Coordinator (PM) & Member Secretary

PROJECT COORDINATOR
AICPMIP P.C. Unit,
ARS, Mandor, Jodhpur

SESSION IV

REVIEW OF RESEARCH RESULTS & PROGRESS REPORT OF ICAR-ICRISAT COLLABORATIVE PROJECTS 2016-17 AND PLAN OF WORK 2017-18

Chairman : Dr. Balraj Singh
VC, AU, Jodhpur

Co-Chairman : Dr. Sujoy Rakshit
Director-IIMR, PAU,
Ludhiana
Dr. C. Tara Satyavathi
Project Coordinator
(Pearl Millet), AICRP-
PM, Jodhpur

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

Date : April 28, 2017

Time : 15.30

The results of ICAR –ICRISAT trials conducted during 2016-2017 was presented by Dr. B.R. Beniwal, Senior Technical Assistant, AICRP on pearl millet, Mandor, Jodhpur. He informed that a total of 21 trials were conducted successfully in 18 locations. Based on the results compiled, best entries which performed superior to the check entries were presented in all the trials. During discussion Project Coordinator suggested that, heat tolerance at seedling stage is important for farm and at flowering stage for seed production and house agreed with this suggestion. Considering the importance of heat tolerance she also suggested the physiology group to formulate the trials for studying seedling heat tolerance.

Dr. S.K Gupta, Principal Scientist, ICRISAT presented 2017-18 ICAR-ICRISAT platform work plan for "Pearl millet hybrids for harshest drought prone environments and for new emerging markets". He also presented the trials to be taken up during 2017-2018 and the locations to be included for different trials. He presented the information about Seed parent progeny trials, Restorer parent progeny trials, Biofortification trials and other trials to be implemented in the next year. Dr. Rakesh Srivastava, Principal Scientist, ICRISAT presented 2017-18 work plan for Marker assisted breeding trials and nurseries. The chairman Dr. Balraj Singh, VC, AU, Jodhpur emphasized that locations should be identified having better drought screening facilities for conducting trials related to drought tolerance research.

The Project Coordinator suggested that ICRISAT also should be one location in the ICAR-ICRISAT partnership trials. The data generated on the partnership trials at ICRISAT should also be shared and presented in the results.

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

ICAR-ICRISAT Trials (Rainy 2017/Summer 2018)

Trial	Entries	Reps	Rows	Proposed locations
Seed Parent Progeny Trials				
Thick, Compact and Dwarf B line trial (TCDBLT)	20-25	2	1	Coimbatore, Jamnagar, Aurangabad, Gwalior
Blast Resistant B line trial (BRBLT)	30-40	2	1	Mandor, Jamnagar, Delhi, Aurangabad, Hisar, Dhule, Gwalior
Togo type B line trial (TBLT)	15-20	2	1	Vijayapur, Jamnagar
Early maturity B line trial (EMBLT)	15-20	2	1	Durgapura, Mandor, Malnoor, Dhule, Hisar, Bawal
GCA testing for designated B line Trial (CABLT)	40-50	2	2	Mandor, Hisar, Dhule, ICRISAT
A4 Thick head B-Composite (A4THBC)	-	-	40	Jamnagar, Hisar
Extreme stress B-Composite (ESBC)	-	-	40	Mandor, Jamnagar, Bikaner, Hisar, Bawal, IIMR
Restorer Parent Progeny Trials				
Promising designated R-lines Trial (PDRLT)	30	2	2	Durgapura, Coimbatore, Mandor, CAZRI, Gwalior, Malnoor, Bikaner, Delhi, Hisar, IIMR
Compact and Thick Panicle Restorer Trial (CTPRLT)	50	2	1	Durgapura, Coimbatore, Ananthapuram, Delhi, Aurangabad, Dhule
Stay green R lines Trial (SGRLT)	25-30	2	1	Ludhiana, Durgapura, Jamnagar, Bikaner, Delhi, Mandor
Drought tolerant R lines Trial (DTRLT)	25-30	2	1	Vijapur, Durgapura, Coimbatore, Ananthapuram, Bawal, Mandor, Jamnagar, CAZRI, Malnoor, Bikaner, Delhi, Hisar, Dhule
A5 Restorers Trial (A5RT)	25-30	2	1	Ludhiana, Durgapura, Mandor, Jamnagar, Bikaner, Delhi, Hisar, IIMR
GCA testing for designation R-line Trial (GCARLT)	50	2	1	Durgapura, Jamnagar, Ludhiana, ICRISAT
Thick Panicle R-Composite	----	----	40	Durgapura, Coimbatore, Ananthapuram, Jamnagar, Hisar, Gwalior
Elite R-Composite	----	----	40	Coimbatore, Jamnagar, CAZRI, Hisar
Other Trials- Rainy 2017				
Dwarf Hybrid Trial (DHT)	10-15	2	4	Dhule, ICRISAT
Biofortification Trials				
Elite Inbred Joint Biofortification Trial (Consisting of elite inbred lines from AICPMIP partners + ICRISAT)	40-50	2	1	Durgapura, Coimbatore, Ananthapuram, Mandor, Jamnagar, CAZRI, Bikaner, Delhi, Hisar, Dhule, ICRISAT
High-Fe Inbred trials	30-40	2	1	Durgapura, Coimbatore, Ananthapuram, Dhule, Mandor, Jamnagar, Bikaner, Delhi, Aurangabad
Summer - 2018 Trials				
Three way forage hybrid trial	30-40	2	6	Ludhiana, ICRISAT
New Forage OPVs trial	25	3	6	Ludhiana, Dhari (Jamnagar), Hisar, ICRISAT
Marker-Assisted Breeding Trials & Nurseries				
Development of improved hybrid parental lines for drought adaptation and other important agronomic traits using genomic selection (GS)	300	2	2	Bikaner, ICRISAT, Jamnagar, Delhi, Mandor
GHB 538-background DMR QTL Double Introgression Test Cross Trial	51	3	2	Jamnagar, Bikaner
J 2340-background DMR QTL Double Introgression Lines Trial	51	3	1	Jamnagar, Bikaner, Delhi
HHB67 Double Introgression High Fe and Zn lines Hybrids Observation Trial	12	3	2	CAZRI, Bikaner, Hisar
H77 Double Introgression High Fe and Zn Lines Observation Trial	12	3	1	CAZRI, Bikaner, Delhi, Hisar

SESSION V

PANEL DISCUSSION ON THRUST AREAS OF RESEARCH IN PEARL MILLET "ENHANCEMENT OF PRODUCTION AND PRODUCTIVITY IN A₁ ZONE"

Chairman : Dr. Balraj Singh,
Hon'ble Vice
Chancellor, AU,
Jodhpur

Co-Chairman : Dr. C. Tara Satyavathi,
Project Coordinator
(Pearl Millet), AICRP-
PM, Jodhpur

Rapporteur : Dr. S.P. Singh, Sr.
Scientist, IARI, New
Delhi
Dr. Sanjana Reddy, Sr.
Scientist, IIMR,
Hyderabad

Date : April 28, 2017

Time : 16:45 – 17:30

The panel discussion on thrust areas of research in pearl millet "Enhancement of production and productivity in A₁ zone" was chaired by Honourable Vice Chancellor, Agricultural University, Jodhpur Dr. Balraj Singh and Co-chaired by Dr. C. Tara Satyavathi, Project Coordinator, AICRP on pearl millet. The panellists were Dr. S.K. Gupta from ICRISAT, Dr. S.K. Gupta from Hytech seed, Dr Satish Pareek from Pioneer, Dr. L.D. Sharma from Durgapura and Dr. B.S. Rajpurohit from Mandor. Some of the delegates also participated in the discussions.

Dr. C. Tara Satyavathi presented action taken report on the meeting "Research priorities, partnership for increasing pearl millet production in A₁ zone" jointly organized by ICAR-AICRP on pearl millet and ICAR-CAZRI on June 18, 2016. The important recommendations that emanated are

- A Committee to be constituted for mapping, rezoning and sub-zoning of A₁ zone and permission will be obtained from the council for the same.
- Hybrids and OPVs are available and will be tested in three additional locations from this year ARS, Jalore, Regional Research Station, Chandan and Regional Research Station, Jaisalmer.
- Cultivar duration will be less than 75 days and will be evaluated in completely rainfed conditions
- Number of FLDs will be increased in A₁ Zone.
- All entries entered in third year of testing will be evaluated for fodder quality using PAU facilities. Extra contingency will be provided and additional infrastructure will be provided after discussion with the council.
- About 463 germplasm lines at Mandor will be grown and field day will be organized
- Eight centres will be involved in shuttle breeding for development of new restorers for A₁ Zone - Mandor, Hisar, Jaipur, Bikaner, Jamnagar, Delhi, Dhule and Ananthapuram.
- Jaisalmer and Barmer will be given mixed trials of OPVs and hybrids
- CV limit will be maintained at 30% for rainfed trials.
- Microbiologist will be involved in the formulation of new projects.
- Crop management technologies along with application of Phosphate solubilizing bacteria will be incorporated in FLDs
- RSSC to active initiation for seed production in *kharif* and summer seasons.

- Public-private sector partnership based seed production to be initiated through MOU's.
- Three years of testing to be retained as against two years of testing proposed

Important suggestions received from panelists and participants are

- Hybrids are available but hybrid seed production is a major constraint and needs to be strengthened.
- Demarcation of A and B zones is clear and A₁ zone needs to be further classified
- Genetic base of the CMS lines used for the development of hybrids for A₁ zone should be broadened.
- Robust screening for drought tolerance is required. Leasy Scan facility at ICRISAT can be used for screening.
- Breeding can be taken up in consortium mode involving private and public partners and shuttle breeding with F₂ and F₄ generations in target environments and F₃ in offseason nursery in south India without selection can be practiced.
- The technologies adopted in FLDs should be transferred to farmers.
- New locations for seed production need to be identified in Rajasthan, MOUs for seed chain should be done and seed production and distribution should be monitored for dissemination of hybrids in recommended areas only.
- One life saving irrigation should be allowed instead of continuous irrigations as being taken up by few partners.
- Hybrid blending and testing of new populations should be taken up to avoid the risk from biotic and abiotic stresses.
- Genomics and MAS for development of cultivars should also be considered.
- Popularisation of latest hybrids in line with HHB 67 should be explored. RHB 177 and MPMH 17 should be given priority and distributed in drought prone areas.
- A time line should be made for implementation of these recommendations.
- A joint meeting of state seed corporations of Rajasthan, Haryana and Gujarat should be called for speeding up seed production for A₁ zone.

Chairman remarks:

Dr. Balraj Singh suggested that Banswara, Dungarpur and Pratapgarh can be used for hybrid seed production of MPMH 17 in summer season. He emphasised on use of neem coated urea and super absorbents like Pusa hydrogel. This has to be taken as a policy issue with government. Addition of FYM in package of practices should be made. Dr. Singh also suggested on using simple techniques for improving quality of water by reducing TDS and EC.

Co-chairman remarks

Dr. C. Tara Satyavathi suggested that quality seed has to be made available by RSSC, seed village concept or by signing MOUs between private and public partners. All management practices recommended for A₁ zone have to be put in FLDs. For initiating shuttle/consortium breeding, 2-3 lines from each centre have to be brought into a common trial.

The session ended with thanking Chairman, Co-chairman, Panelists, Rapporteurs and the delegates for participation in this very important discussion.

SESSION – VI

REVIEW OF RESEARCH RESULTS OF AICRP-PM CENTRES 2016-17 (CENTRE-WISE PRESENTATION OF SIGNIFICANT RESULTS AND PROGRESS REPORT BY CENTRE INCHARGE)

Chairman : Dr. Sarvjeet Singh
ADR, Crop
Improvement, PAU,
Ludhiana

Co-Chairman : Dr. C. Tara Satyavathi,
Project Coordinator
AICRP on Pearl Millet

Rapporteur : Dr. B.S. Rajpurohit (Plant
Breeding)
Sh. Manoj Kumar (FLD)
Dr. H.R. Bishnoi (Pathology)
Dr. R.C. Meena (Physiology)
Dr. G. Ram Kherwa (Statistics)
Dr. Anil Kumar (Agronomy)
Sh. R.K. Juneja (Entomology)

Date : April 29, 2017

Time : 09.30 AM

Review of Research Results – Centre-Wise Presentation of Significant Results and Progress Report (2016-17)

The meeting of pearl millet group was held at 9.30 AM on 29.04.2017 in the Auditorium of PAU, Ludhiana to undertake the centre-wise discussion of research results of kharif /summer 2016-17.

The results of all discipline were presented by respective in charges of the centre as under:

Jaipur	: Dr. L.D. Sharma
Hisar	: Dr. Devvrat
Aurangabad	: Dr. S.S. Ghugge
Jamnagar	: Dr. M.D. Khanpara
Kalai	: Dr. M.F. Mirza
Vijayapur	: Dr. A.K. Guggari
Mysore	: Dr. S. Chandra Nayak
Ananthapuram	: Dr. P. Santhi
Coimbatore	: Dr. P. Sumathi
Gwalior	: Dr. A.K. Singh
Ludhiana	: Dr. Ruchika Bhardwaj
Bikaner	: Dr. P.S. Shekhawat
Dhule	: Dr. H.T. Patil

Recommendation made after discussion are as under:

A. CROP IMPROVEMENT (PLANT BREEDING)

- Project Coordinator Dr. C. Tara Satyavathi suggested that basic research for generating breeding materials for A₁ zone and sharing among other stations identified for this purpose – Mandor, Hisar, Jaipur, Bikaner, Jam Nagar, Delhi, Dhule and Ananthapuram.
- Project Coordinator requested all station incharges that if the stations have vacant positions, they may be filled immediately; otherwise post will be withdrawn by the ICAR.

- The work on pearl millet quality be initiated.
- Appropriate checks should be used while evaluating the breeding materials
- Where ever pathologist post is available, the screening of materials against blast disease should be done.
- Whenever scientist of AICRP gets promotion on higher rank than the sanctioned post, it should be informed to ICAR and permission should be obtained.
- Good breeding materials line should be registered with NBPGR by all the centres.
- Chair has suggested to develop hybrids responsive to better nutrient managements, water use efficiently and resistance to diseases.
- Registration of elite lines should be done with PPV&FRA.
- Project Coordinator Dr. C. Tara Satyavathi emphasised that new initiative should be taken up to improve shelf life of flour and post development of bakery, snacks or extruded product. She also stressed upon basic research in Plant Physiology, Bio-chemistry and good material should be generated for seedling heat tolerance in zone A₁.

B. CROP PRODUCTION

- The Chairman in his concluding remarks also asked the fraternity to develop ideal genotypes for high WUE & FUE.
- Various FLDs conducted in 220 ha area against the target of 250 ha on different production aspects increased the grain yield to the tune of 57.4%, 24.4% and 29.5% in zone A₁, A and B, respectively by improved practices (IPs) compared to Farmers Practices (FPs). During summer season, the yield improvement was 7.3 and 44.2% in Jamnagar and Kalai by IPs and FPs.
- The experiment-efficacy of foliar spray of growth regulating Substances for enhancing seed yield under Rain-fed condition was concluded with the recommendation that the spray of Potassium chloride (MoP) 1.50% at the time of tillering (20- 25 DAS) and post-anthesis stages(35-40) produced maximum grain & fodder yield of pearl millet with the B:C ratio of 2.57.

C. CROP PROTECTION

- During the presentation of results pathology workers requested for creation of green house facilities and other basic requirements for screening purpose.
- Project Coordinator emphasized to standardize screening techniques of blast. She also suggested that the work on basic research for blast be started at Mysore centre.
- Recommendation for white grub and termite control on the basis of 4 years data (2013-2016). Seed treatment with Imidacloprid 600 FS @ 8.75 ml or Clothianidin 50 WDG @ 7.5 g/kg seed with sufficient quantity of water effectively controls the soil insect-pests (white grub and termite) infesting in pearl millet. Treated seed should be sown within 2 hours of these treatments.
- The Project Coordinator emphasized to the AICRP centres scientist to record the incidence of insect pest and diseases atleast through visual observations if the centres has no Entomologists/Pathologists.

Session ended with vote of thanks to the chair.

SESSION – VII

PLAN OF WORK 2017-18

A. CROP IMPROVEMENT (PLANT BREEDING)

Chairman : Dr. K.S. Thind,
Head, Plant Breeding &
Genetics, PAU, Ludhiana

Co-Chairman : Dr. C. Tara Satyavathi
Project Coordinator
(Pearl Millet)

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

Date : April 29, 2017

Time : 03.15 PM

FORMULATION OF TECHNICAL PROGRAMME FOR 2017-18 PLANT BREEDING

Organization of trials

Note: The HT (Fe & Zn) trial is discontinued from Kharif 2017. However those entries which were promoted from first year to second year and those from second year to third year will be tested in the coming two years and the trial will be closed.

Criteria for promotion of entries

- Grain yield = higher than best check or 10% higher over relevant check in early and Medium group and 5% over relevant check in Late group.
- Downy mildew (60 DAS) under sick plot equal to or less than 5% in hybrids and populations across all Zones.
- Blast (Score) equal to or less than 3 (by using 0-9 scale) in hybrids and populations across all Zones.
- Ergot (% severity) under artificial inoculation conditions equal or less than 20% across all Zones in hybrids and populations. (From Kharif 2017)
- Smut (% severity) under artificial inoculation conditions equal or less than 20% across all Zones in hybrids and populations. (From Kharif 2017)
- Rust (% leaf area) equal to or less than 20% in hybrids and populations across all Zones. (From Kharif 2017)
- 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 Improved in early group hybrids and yielding grains 15% higher over relevant 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.
- Iron content ≥ 42 ppm and Zinc content ≥ 32 ppm in Advance Trials from next season. (From Kharif 2017)
- In Fe & Zn Hybrid Trial: Grain yield $\pm 10\%$ higher over relevant maturity group check and Iron 10 ppm less than Dhanshakti.

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 2017 Zone A₁ and A

S. No.	Advance Hybrid & Population Trial (E)	S. No.	Advance Hybrid Trial (L) Zone A
	IHT (E) to AHPT I (E)		IHT (L) A to AHT I (L) A
1	MH 2189	1	MH 2267
2	MH 2190		AHT I (L) A to AHT II (L) A
3	MH 2192	2	MH 2155
4	MH 2209		Checks
5	MH 2210	3	86M86
6	MH 2204	4	KBH 108
7	MH 2187	5	MP-7792
	PT A to AHPT I (E)		
8	MP 575		
9	MP 576		
10	MP 577		
	AHPT I (E) to AHPT II (E)		
11	MH 2082		
12	MH 2089		
13	MH 2087		
14	MH 2098		
15	MH 2101		
	Checks		
16	HHB 67 (Imp.)		
17	RHB 177		
18	MPMH 21		
19	HHB 272		
S. No.	Advance Hybrid Trial (M) Zone A [AHT (M)]	S. No.	Population Trial Zone A (PT A)
	IHT (M) A to AHT I (M) A		PT A to PT I A
1	MH 2223	1	MP 574
2	MH 2228	2	MP 579
3	MH 2224	3	MP 577
4	MH 2218		PT I A to PT II A
5	MH 2219	4	MP 570
6	MH 2213		+ New entries of PT
7	MH 2235		Checks
8	MH 2220		Raj 171
	AHT I (M)A to AHT II (M) A		Pusa Comp. 383
9	MH 2114		JBV 2
10	MH 2106		ICMV 221
11	MH 2107		Dhanshakti
	Checks		Pusa Comp. 701
12	MPMH 17		
13	RHB 173		
14	GHB 744		
15	GHB 905		
16	86M01		
HT (Fe & Zn)			
	HT (Fe & Zn) to HT (Fe & Zn) I		Checks
1	MH 2278		HHB 67 Imp.
2	MH 2282		PRATAP
3	MH 2185		MPMH 17
	HT (Fe & Zn) I to HT (Fe & Zn) II		86M86
4	MH 2173		Dhanshakti
5	MH 2179		
6	MH 2174		
7	MH 2180		

Entries promoted to next higher stage of testing in kharif/summer 2017 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 2215	1	MH 2271
2	MH 2213		AHT I (L) B to AHT II (L) B
	AHT I (M) B to AHT II (M) B	2	MH 2155
		3	MH 2137
	Nil		Checks
	Checks	4	86M86
3	Pratap	5	Kaveri Super Boss
4	PAC 909	6	86M64
5	NBH 5767	7	NBH 5061
6	86M01		
S. No.	Summer Hybrid Trial (SHT)	S. No.	Population Trial Zone B (PT B)
	SHT to SHT I		PT B to I PT B
	Nil		Nil
	SHT I to SHT II		PT I B to PT II B
	MSH 312		Nil
	MSH 315		+ New entries of PT
	+ New entries		Checks
	Checks		Raj 171
	86M64		ICMV 221
	Proagro 9444		ICTP 8203
	Nandi 72		ICMV 155
			Pusa Comp. 612

Table I.1 Details of Centres and Trials to be Conducted During Kharif 2017/Summer 2018 in Zone A₁ and A

LOCATIONS	IHT (E)	IHT (M)	IHT (L)	AHPT (E)	AHT (M)	AHT (L)	PT	RHVT	SHT	HT Fe & Zn
ZONE A₁										
RAJASTHAN										
Mandor	*	*	*	*	*	*	*	*	*	*
Jodhpur (CAZRI)	*			*						
Bikaner (SKRAU)	*	*		*	*		*	*		
Jaipur (SKNAU)	*	*	*	*	*	*	*	*		*
Samdari	*			*						
Molasar (Bayer)	*			*						
Lalawas (JK Seed)	*			*						
Jasalmer (RRS, CAZRI)	*			*						
Chandan (RRS, CAZRI)	*			*						
ARS, Jalore (AU, Jodhpur)	*			*						
GUJARAT										
Kothara	*	*		*	*					
S.K.Nagar	*	*	*	*	*	*			*	
HARYANA										
Hisar	*	*	*	*	*	*	*	*		*
Bawal	*	*		*	*		*			
Arya Nagar (Shaktivardhak)		*			*					
Total Trials Zone A₁	14	8	4	14	8	4	5	4	2	3
ZONE A										
RAJASTHAN										
Tabiji		*			*					
Alwar (Pioneer)			*		*	*				
Malakhera (Hytech)			*							
Behrod (Bayer)		*	*		*					
Bansur (Spriha)			*							
Kherthal (Bisco)					*					
GUJARAT										
Talaja		*			*					
Anand		*	*		*	*			*	
Jamnagar		*	*		*	*	*	*	*	*
Ahmedabad (Nandi)		*	*						*	
Narsanda (Navbharat)			*			*			*	
Palanpur (Pioneer)									*	
Himat Nagar (Nath Biogene)									*	
Dhanera (JK Seed)			*			*			*	
Dehgam (Metahelix)						*			*	
Deesa (Bio Seed)									*	
Deesa (Ajeet)									*	
Deodar (Bayer)									*	
Thakarwada (Hytech)									*	
UTTAR PRADESH										
Kalai		*	*		*	*	*	*		
Eglas (Bioseeds)			*			*				
Agra (Krishna)			*						*	
Hathras (Ganga Kaveri)			*							*
HARYANA										
Sohana (Nuziveedu)			*			*				
Shikohpur (KVK)					*					
MADHYA PRADESH										
Gwalior		*	*		*	*	*	*		
Morena					*		*			
PUNJAB										
Ludhiana		*	*		*	*	*			*
DELHI										
New Delhi		*			*		*			*
Assam										
Jorhat								*		
Gossaingaon								*		
Total Trials Zone A	-	10	16	-	13	11	6	5	13	4

*=Trial allotted

Contd..

Table I.1 Details of Centres and Trials to be Conducted During Kharif2017 /Summer 2018 in Zone B

LOCATIONS	IHT (M)	IHT (L)	AHT (M)	AHT (L)	PT	RHVT	SHT	HT Fe & Zn
MAHARASHTRA								
Aurangabad (NARP)	*	*	*	*	*	*	*	*
Aurangabad (Ajeet Seed)			*	*				
Aurangabad (DevGen)		*					*	
Aurangabad (Nath Biogene)	*							
Niphad			*	*	*			
Dhule	*	*	*	*	*	*	*	*
Jalna (Mahodaya)		*		*				
Jalna (Mahyco)	*		*					
Jalgaon (J K Seed)	*		*					
Pachora (Nirmal Seed)	*	*						*
Buldana	*	*	*	*				
Ganewadi (Krishidhan)		*						*
Malkapur (Ankur Seed)		*						
Godegaon (Pioneer)		*	*	*				
KARNATAKA								
Vijayapur	*	*	*	*	*	*		
Malnoor	*		*		*	*		
ANDHRA PRADESH								
Ananthapuram	*	*	*	*	*	*		
Palem	*		*		*	*		
Manoharabad (Zuari seeds)		*	*	*				
Hyderabad (Nuziveedu)		*		*				
Hyderabad (Nu Gene)		*						
Hyderabad (Kaveri Seed)		*						
Medchal (Ganga Kaveri)		*		*				
Medhchal (Godrej)	*			*				
Ravalkol (Hytech)				*				
Ravalkol (Spriha)		*						
Perumallapalle	*							
Vizianagaram			*	*				
TAMIL NADU								
Coimbatore	*	*	*	*	*	*	*	*
Total Trials Zone B	14	18	15	16	8	7	4	5

*=Trial allotted

Observations to be recorded in initial and advance trials:

1. Days to 50% Flowering –Rounded to 0 decimal
2. Plant Height (cm) –Rounded to 0 decimal
3. No. of productive tillers/plant -Rounded to one decimal
4. Panicle length (cm) -Rounded to one decimal
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)

New entries approved for testing in initial trial kharif 2017 /summer 2018

S. No.	Organization/Institution	Name of Entries				
		IHT (E)	IHT (M)	IHT (L)	PT	Summer
1	AICRP-PM, Jodhpur	MPMH 31	MPMH 32			
2	AICRP-PM, RARI, SKNAU, Jaipur	RHB-246	RHB-249	RHB-254	RCB-29	
		RHB-247	RHB-250	RHB-255		
		RHB-248	RHB-251			
3	AICRP-PM, MPKV, Dhule		DHBH 16122	DHBH 1611		
			DHBH 16149	DHBH 1612		
				DHBH 1613		
4	AICRP-PM, SKRAU, Bikaner	BHB 1701	BHB 1706			
		BHB 1702	BHB 1707			
		BHB 1703	BHB 1708			
5	AICRP-PM, JAU, Jamnagar	GHB 1228	GHB 1221	GHB 1231		GHB 1235
		GHB 1229	GHB 1230	GHB 1232		GHB 1236
			GHB 1233	GHB 1234		
6	AICRP-PM, CCS HAU, Hisar	HHB 325	HHB 328	HHB 332		
		HHB 326	HHB 329	HHB 333		
		HHB 327	HHB 330	HHB 334		
7	IARI, New Delhi	PUSA 1703	PUSA 1701		PUSA COMPOSITE 715	
			PUSA 1709		PUSA COMPOSITE 716	
			PUSA 1712		PUSA COMPOSITE 717	
8	AICRP-PM, TNAU, Coimbatore		TNBH 1526		UCC 37	TNBH 1525
			TNBH 1525			
			TNBH 1514			
9	AICRP-PM, RVSKVV, Gwalior		RVBH- 79			
10	CAZRI, Jodhpur	CZH 239	CZH 242			
		CZH 240	CZH 243			
		CZH 241	CZH 244			
11	AICRP-PM ANGRAU, Ananthapuram		ABH 13	ABH 15	ABV 06	
12	NARP, Aurangabad		ABH 14	ABH 16		
				AHB-1214		
				AHB-1199		
13	AICRP-PM, RARS, Vijayapur		VPMH-5	VPMH-4	VPMV-7	
					VPMV-8	
14	PJ TSAU, Palem		PBH-1603			
			PBH-1625			
15	Maharashtra State Seeds Corporation, Akola			MBH-1701		
16	IIMR, Hyderabad	IHB 1	IHB 2			
17	Agriculture Research Station, Malnoor (UAS Raichur)		MBH-14			
18	Devgen Seeds & Crop Technology (Syngenta)			DB 80364		
19	Bioseed Research India Pvt. Ltd., Hyderabad			Bio 409		Bio 407
				Bio 494		Bio 422
20	Metahelix Life Sciences Pvt. Ltd., Ahmedabad			MP 7171		
21	Nuziveedu Seeds Pvt. Ltd., Secunderabad		NBH 5920	NBH 5922		
				NBH 5855		
22	Kaveri Seed Co. Ltd., Secunderabad		KBH 4756	KBH 4814		
23	Krishidhan Seeds Pvt. Ltd., Jalna			12KM107		
24	Nu Genes Pvt. Ltd., Hyderabad		NU 395	NU 412		NU 393
25	Nandi Seeds Pvt. Ltd., Ahmedabad		NMH-101	NMH-102		NMH-103
26	Bayer Bio Science Pvt. Ltd., Hyderabad		PB 1853	PB 1797		PB 1830
			PB 1858	PB 1812		PB 1869
27	Pioneer Overseas Corporation, Hyderabad		86M20	86M79		86M19
28	Nirmal Seeds Pvt. Ltd., Pachora (MS)	NPH-4828		NPH-5541		
29	Bisco Bio Sciences Pvt. Ltd., Hyderabad			BLPMH 106		BLPMH 107
30	Spriha Biosciences Pvt. Ltd., Telangana			S-1236		
31	J K Agri Genetics Ltd., Hyderabad		JKBH 1386	JKBH 1511		JKBH 1490
32	Shakti Vardhak Hybrid Seeds Pvt. Ltd., Arya Nagar		SVPMH-77			
33	Hytech Seed India Pvt. Ltd.		HBH 150756	HBH 150388		HBH 150902
34	Mahodaya Hybrid Seeds, Jalna		Mahodaya-351	Mahodaya-348		
35	Ganga Kaveri Seeds Pvt. Ltd., Hyderabad			GK-1191		
36	Krishna Agri. Research & Development Centre, Agra			KH 207		
				KH 405		
37	Eco Agriseeds Pvt. Ltd., Hyderabad			ECO-742		
				ECO-755		
38	Kanchan Jyoti Agro Industries, Jaipur			KHB-203		
39	AICRP-PM, PAU, Ludhiana			PHB 3281		
				PHB 3518		
	Total	18	43	42	08	13

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: 18	PT A & B Zone : 8
IHT (M) A & B Zone : 43	Summer 2018: 13
IHT (L) A & B Zone : 42	

Seed Requirement (per entry)

IHT (E) A1 Zone : 1.5 Kg	HT 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: 3.500 kg	AHT Zone B : 3.500 kg
PT Zone A: 2.500 kg	AHPT Zone A1: 2.500 kg
PT Zone B: 2.500 kg	Summer Hybrid Trial : 2.0 kg
HT Fe & Zn: 2.250 Kg	

Seed requirement of checks:

86M86: 10 kg	Kaveri Super Boss: 6 Kg	PAC 909: 10 kg	Raj 171: 7 kg
ICMH 356: 3 kg	RHB 173: 8 kg	GHB 905: 5 kg	Pusa Comp. 383: 5 kg
86M64: 4 KG	MP-7792: 6 kg	86M01: 6 kg	Pusa Comp. 701: 2 kg
GHB 558: 6 kg	NBH 5061: 8 kg	HHB 272: 2 kg	Dhanshakti: 7 kg
HHB 67 Imp.: 4 kg	HHB 223: 2 kg	NBH 5767: 8 kg	Pusa Comp. 612: 2 kg
RHB 177: 7 Kg	Pratap: 6 Kg	ICMV 155: 3 kg	
GHB 538: 2 Kg	MPMH 17: 8 kg	ICMV 221: 6 kg	
KBH 108: 8 kg	MPMH 21: 2 kg	JBV 2: 4 kg	

Seed requirement of Released Hybrids/varieties: 1.5 kg seed of all national released hybrids/varieties since 2005 should be sent for RHVT Trial positively

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 2017 for kharif and by 15th January 2018 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. **If the testing fee is increased by the council, upon the receipt of information from council, increased testing fee will be charged from this season. Entries without fee and pedigree of hybrids/varieties will not be accepted.** Seed of each entry should be packed in cloth bag separately for each zone and also for agronomic trials.

Following scientists were present:-

S. No. Name with designation

1. Dr. Sarveet Singh, ADR-Crop Improvement, PAU, Ludhiana
2. Dr. K.S. Thind, Head, Deptt. PB & G, PAU, Ludhiana
3. Dr. C. Tara Satyavathi, Project Coordinator, AICRP-PM, Mandor, Jodhpur
4. Dr. H. P. Yadav, Ex. PC, Pearl Millet
5. Dr. B.S. Rajpurohit, Professor (PB&G), AICRP-PM, Mandor, Jodhpur
6. Dr. P.C. Gupta, Professor (PB&G), ARS, SKRAU, Bikaner
7. Dr. A. K. Singh, Prof.& HOD (PB&G), RVSKVV, Gwalior
8. Dr. H.T. Patil, Assoc. Prof. (Breeding) , AICRP-PM, Bajra Research Scheme, COA, Dhule
9. Dr. P. Sumathi, Professor (PB&G) & Head, Deptt. Of Millets, TNAU, Coimbatore
10. Dr. K. D. Mungra, Assoc. Research Scientist, JAU, Jamnagar
11. Dr. G. Ram Kherwa, Prof, (Stat.), AICRP-PM, Jodhpur
12. Dr. P. Sanjana Reddy, Sr. Scientist (Plant Breeding), IIMR, Hyderabad
13. Dr. Ramesh Kumar, Asstt. Scientist, Bajra Section, Deptt. of GPB, CCS HAU, Hisar
14. Sh. A.M. Talawar, Asstt. Prof. (GPB), ARS, Malnoor (UAS, Raichur)
15. Dr. S. K. Gupta, Sr. Scientist, Pearl Millet Breeding, ICRISAT, Hyderabad
16. Dr. M. Govindraj, Scientist Millet Breeder, ICRISAT, Hyderabad
17. Dr. P. Shanthi, Scientist (PB), AICRP-PM, ARS, ANGRAU, Ananthapuram
18. Dr. Dev Vart Yadav, Asstt. Scientist (PB), CCS HAU, Hisar
19. Dr. Ruchika Bhardwaj, Asstt. Breeder, PAU, Ludhiana
20. Dr. J. Aravind Kumar, Sr. Scientist, Pearl Millet Breeder, ICAR-CAZRI, Jodhpur
21. Sh. R.C. Sawant, SRA, NARP, Aurangabad
22. Dr. M. S. Patel, Asstt. Res. Scientist (Pearl Millet), Centre for Crop Improvement, SDAU, S K Nagar
23. Dr. N. Y. Satpute, Pearl Millet Breeder, NARP, Aurangabad
24. Dr. M. D. Khanpara, Res. Scientist (Pearl Millet) MPRS, JAU, Jamnagar
25. Sh. Satish Pareek, Principal Scientist (Pearl Millet), PIONEER HIBRED Pvt. Ltd.
26. Sh. S.M. Rafiq, Principal Breeder, Nuzeevudu Seeds, Hyderabad
27. Sh. Shankar Honyal, Manager-R&D (Bajra), Kaveri Seeds Co. Ltd., Secunderabad
28. Sh. Sachin Vidhale, Pearl Millet Breeder, Bioseed Research India Pvt. Ltd. Hyderabad
29. Sh. Madhukar Pawar, Sr. Breeder (Pearl Millet), Bisco Biosciences Pvt. Ltd., Hyderabad
30. Sh. V.A. Deshmukh, Breeder, Ganga Kaveri Seeds, Hyderabad
31. Sh. M.N. Bijagare, Principal Scientist, Krishidhan Seeds, Jalna
32. Mr. Milind P. Kulkarni, Sr. Scientist (Cereal Crops), Nirmal Seeds Pvt. Ltd., Pachora, Jalgaon
33. Dr. Vishnu Ameta, Breeding Project Lead, Syngenta India Ltd., Ahmadabad
34. Mr. Ananda, Jr. Breeder, J. K. Agri. Genetics Ltd., Hyderabad
35. Dr. Bhuwan Parihar, Jr. Breeder, J. K. Agri. Genetics Ltd., Hyderabad
36. Mr. Sudheer Singh, Assistant Breeder, VNR Seeds Pvt. Ltd., Raipur (C.G.)
37. Mr. Sambhaji Y. Shedage, Sr. Breeder, Bayer Biosciences Pvt. Ltd., Hyderabad
38. Mr. Narendra Sawarkar, Research Coordinator, Ankur Seeds Pvt. Ltd., Nagpur
39. Mr. Radheshyam Chouhan, Sr. Breeder, Green Gold Seeds (P) Ltd., Aurangabad, (M.S.)
40. Mr. B. G. Ravindra, Navbharat seeds, Ahmedabad
41. Mr. S. V. Bemalgi, Director Research, Eco Agri Seeds Pvt. Ltd.
42. Dr. Brijendra K. Pareek, Head R&D, Nandi Seeds Pvt. Ltd., Ahmadabad
43. Dr. Raj Bahadur, Head, R&D Division, Shakti Vardhak Hyb. Seeds Pvt. Ltd., Hisar
44. Mr. NarendrakumarPatil, Breeding Lead-Bajra, Mahyco, Jalna

S. No. Name with designation

45. Sh. Indra Singh, PIONEER HIBRED Pvt. Ltd.
46. Sh. Akhilesh kumar Singh, Sr. Breeder, Bayer, Hyderabad
47. Dr. B. L. Patel, Asstt. Res. Sci., AAU, Anand
48. Dr. B. R. Nakrani, Asso. Res. Sci., RRS, SDAU, Kothara, Gujarat
49. Dr. Aditya Sharma, Sr. Breeder, Advanta Ltd., Hyderabad
50. Dr. K. R. Reddy, Nu Genes, Pvt. Ltd., Hyderabad
51. Dr. K.D. Sehrawat, Asstt. Economic Botanist, CCS HAU, Hisar
52. Dr. Rakesh K. Srivastava, Principal scientist (Genomics), ICRISAT, Hyderabad
53. Sh. Vinod Kumar Yadav, Head of Research, Limagrain
54. Dr. S. K. Gupta, Dir. Res. & Regulatory Affairs, Hytech seed India Pvt. Ltd., Hyderabad
55. Sh. Puneet Jain, Hytech seed India Pvt. Ltd., Hyderabad
56. Sh. Gopal B, Hytech seed India Pvt. Ltd., Hyderabad
57. Dr. V. Y. Pawar, MPKV, AICRP, Dhule
58. P. A. Pacharne, Sr. Breeder, Mhodaya Seeds, Jalna
59. A.K. Goyal, Krishna Seed, Agra
60. S.P. Singh, Sr. Scientist, ICAR-IARI, New Delhi
61. Dr. H. R. Chodhary, STA, DMD, Vidhyadhar Nagar, Jaipur
62. Dr. C. P. Jaybhaye, Assoc. Prof. (Agronomy), ARS, Buldana (MH)
63. Dr. Devender Pal Singh, Asstt. Breeder (Forage), PAU, Ludhiana
64. Dr. Upasna Rani, Plant Pathologist, PBG, PAU, Ludhiana
65. Sh. V. R. Sapkal, Asstt. Field Officer, MSSCL, Akola
66. Dr. K. S. Brar, Incharge (Research) Punjab ,Spriha Bioscience, Hyderabad
67. Sh. Bandenamaj Athoni, RARS, Vijayapur, UAS, Dharwad
68. Sh. Anind Kumar, ZM, Bayer
69. Dr. B. R. Beniwal, STA (PBG), AICRP-PM, Jodhpur
70. Mr. Shankar Lal Yadav, SRF, AICRP-PM, Jodhpur
71. Ms. Sushila Bhanwariya, SRF, AICRP-PM, Jodhpur
72. Mr. Shripal Singh, AICRP-PM, Jodhpur
73. Mr. Mahesh Chand Kumawat, SRF, AICRP-PM, Jodhpur
74. Mr. Dharampal Saini, TA, AICRP-PM, Jodhpur

Session ended with vote of thanks to the chair.

SESSION VII

PLAN OF WORK 2017-18 FOR CROP PRODUCTION (AGRONOMY AND PLANT PHYSIOLOGY)

Chairman	: Dr. Thakar Singh Head, Department of Agronomy PAU, Ludhiana, Punjab	Co-chairman	: Dr. U.S. Tiwana Incharge, Forage and Millet Section PAU, Ludhiana, Punjab
		Rapporteur	: Dr. Anil Kumar Principal Scientist (Agronomy) Bajra Section, CCS HAU, Hisar, Haryana
			Manoj Kumar Asstt. Professor (Agronomy) AICRP-PM, Mandor (Jodhpur)
			Dr. R.C. Meena Asstt. Professor (Pl. Physiology) AICRP-PM, Mandor (Jodhpur)
Date	: April 29, 2017	Time	: 03.30 PM

AGRONOMY

Dr. Anil Kumar welcomed the chairman and co- chairman of the session. He apprised them about the different types of resources management trials being conducted at various centre's during *kharif* and summer seasons of 2016. At the outset, the chairman welcomed the participants for coming to PAU, Ludhiana for attending this workshop. The chairman initiated the discussion by describing the importance of bajra as food and feed crop besides as nutriceal in the national scenario. The Co chairman also described its importance as a fodder crop. A Total of 65 trials were allotted to different centers and results of 62 trials were reported by the centres with a success rate of 95 per cent. Some of the significant findings of previous year are as follows;

- The foliar application of FeSO_4 @ 0.50% at tillering stage (25-30 DAS) improved the grain yield to the tune of 30.7, 16.0 and 31.4%, respectively over the control in Zone A₁, Zone A and Zone B.
- Irrigation scheduling for summer pearl millet hybrids revealed that the application of irrigation at 50 mm CPE recorded maximum grain (41.48 q/ha), however, the water use efficiency recorded maximum in 100 mm CPE treatment (133.41 kg/ha-cm).
- The contingent planning for maximization in the pearl millet productivity under late sown situations (July 25-30 & August 10-15) revealed that applying the nutrients in combination of RDF + FYM @ 5.0t/ha + NPK (19:19:19 Grade) foliar spray @ 0.50% at 20-25 DAS in August sowing produced equivalent yield to RDF treatment in July 25-30 sowing thereby, compensating the yield loss due to the delayed sowing in Zones A₁, & B.

Recommendation Generated:

- INM experiments conducted during 2014 to 2016 among different pearl millet hybrids in each zone showed the superiority of treatment 75% of RDF + PSB + *Azospirillum* + 5.0 t FYM/ha by 13.9 & 7.8% over RDF alone for grain yield in Zone A₁ & A, respectively besides improving the physico-chemical properties of the soil (lowering pH, improving organic carbon, available N & P) in the sandy loam soils of Haryana & Gujarat.

In Zone B, the seed treatment with bio inoculants *Azospirillum* and *PSB* in addition to RDF improved the grain yield to the tune of 7.3% over the RDF but was found comparable with 75% of RDF + PSB + *Azospirillum* + 5.0 t FYM/ha.

Trials to be continued during 2017-18

- **PMAT 1:** Response of pearl millet advance hybrids and/or populations to different levels of nitrogen.
- **PMAT 3:** Response of pearl millet hybrids to foliar application of Iron.
- **PMAT 4:** Irrigation scheduling for summer pearl millet hybrids.
- **PMAT 5:** Maximization in the pearl millet productivity under late sown situations.
- **PMAT 6:** Response of Fe & Zn rich hybrids to nitrogen levels.
- **PMAT 7:** Performance of pearl millet advance hybrids and/or populations to different sowing dates.

New trial formulated during 2017-18

- **PMAT 2:** Effect of mulching and hydrogel on the productivity of pearl millet under rainfed conditions.

Recommendation in Plant Physiology

PMPHY 3 trial is concluded with the following recommendation that the spray of Potassium chloride (MoP) 1.50% at the time of tillering (20- 25 DAS) and post-anthesis stages(35-40) produced maximum grain & fodder yield of pearl millet with the B : C ratio of 2.57.

Trials to be continued during 2017-18 in Plant Physiology

PMPHY 1: Screening of advance summer hybrids against terminal stress

PMPHY 2: Characterization for drought tolerance in pearl millet genotype

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

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

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

New trial formulated during 2017-18 in Plant Physiology

PMPHY 7: Identification of heat stress tolerance in pearl millet genotypes at seedling stage in pearl millet

TECHNICAL PROGRAMME FOR 2017-18

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

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

a) Performance of advance hybrids or populations to nitrogen levels in Zone A1

Year of Start	: 2017
Nitrogen levels (3)	: 20, 40 & 60 kg N/ha
Hybrids (5+1 check)	: MH 2082, MH 2089, MH 2087, MH 2098, MH 2101 & RHB 177 (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 : Bikaner and Mandor

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

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

Hybrids (5+3 check) : MH 2114, MH 2106, MH 2107, MH 2155, MP 570, MPMH 17 (c), KBH 108 (c) & Pusa Composite 383 (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 advance medium and late maturing hybrids or populations to nitrogen levels in Zone B

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

Hybrids (2+1 checks) : MH 2155, MH 2137 and 86M86 (c)

Design : Split Plot (Nitrogen in main plots and entries 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, Vijayapur and Coimbatore

d) Performance of advance summer hybrids

Nitrogen level (3) : 60, 90 & 120 kg N/ha

Hybrids (2+1 check) : MSH 312, MSH 315 and Nandi 72 (c)

Design : FRBD

Replications : Three

Plot size

Gross : 5.0 m x 3.60 m

Net : 4.0 m x 2.70 m

Locations : Jamnagar, SK Nagar, Aurangabad & Dhule

Note: Recommended dose of P_2O_5 under rainfed situations in Zone A₁ 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 (q/ha)
8. Dry Fodder yield (q/ha)

Note: The following soil properties of the field will be recorded before layout of the experiment: Soil texture, pH, EC, available nitrogen, available phosphorus and available potash.

PMAT 2: Effect of mulching and hydrogel on the productivity of pearl millet under rainfed conditions (New Experiment)

Objective: To find out the effect of mulching and hydrogel on the productivity and water use efficiency of pearl millet

*To find out the effect of different treatments on microbial activity in the soil (at Mandor and New Delhi)

Year of Start	: 2017
Treatments	T ₁ : Control T ₂ : Crop residue mulch @ 5.0 t/ha T ₃ : Hydrogel @ 2.5 kg/ha T ₄ : Hydrogel @ 5.0 kg/ha T ₅ : Hydrogel @ 7.5 kg/ha T ₆ : T ₂ + Hydrogel @ 2.5 kg/ha T ₇ : T ₂ + Hydrogel @ 5.0 kg/ha T ₈ : T ₂ + Hydrogel @ 7.5 kg/ha
Locations	: Bikaner and Mandor (Zone A ₁) Jaipur, Hisar, Jamnagar, Kalai, and New Delhi (Zone A) Aurangabad, Dhule, Vijayapur & Coimbatore (Zone B)
Entries	: Zone A ₁ : MPMH 17, Zone A: RHB 173 and Zone B: GHB 558
Design	: RBD
Replications	: Three
Treatments	: 8
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. Test weight (g)
 6. Grain yield (q/ha)
 7. Dry Fodder yield (q/ha)
 8. Water use efficiency (kg/ha-cm)
 9. *Soil Microbial biomass \bar{C}
 10. *Soil enzymes (Urease, Dehydrogenase, acid Phosphatase and Alkaline Phosphatase)
 11. *Fungal, Bacterial and Actinomycetes counts
- * (at Mandor and New Delhi only)

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.

Year of Start	: 2015
Treatment	
Main Plots	Entries
	: RHB 177, HHB 234 & HHB 226 (Zone A ₁) HHB 197, RHB 173 & MPMH 17 (Zone A) GHB 558, 86M88 & 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	: Bikaner and Mandor (Zone A1) Jaipur, Hisar, Jamnagar & Kalai (Zone A) Aurangabad, Dhule, Vijayapur & 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 (q/ha)
9. Dry Fodder yield (q/ha)
10. Iron (ppm) and Protein content (%) in grain

Note: Initial Fe status in the soil (ppm) & other physico-chemical properties of the soil (pH, EC, organic carbon and available NPK) before sowing & Final Fe status in soil (ppm) among the treatments after the harvest of the crop.

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.

Year of Start	: 2015
Treatment	
Irrigation schedule (4)	i. 50 mm CPE ii. 75 mm CPE iii. 100 mm CPE iv. Critical growth stages (3 rd 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, Aurangabad & Dhule

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 (q/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

Year of Start : 2015

Treatment**Main Plots** **Date of sowing**

- : D1 : 25th July \pm 5 days
D2 : 10th August \pm 5 days

Sub Plots : **Nutrient Management**

- T₁ : RDF*
T₂ : RDF + FYM @ 5.0 t/ha
T₃ : 125% of RDF (N:P:K)
T₄ : T₂ + NPK foliar spray (19:19:19 grade) @ 0.5% at 20-25 DAS
T₅ : 75% RDF + FYM @ 5.0 t/ha

Locations : Bikaner and Mandor (Zone A1)
Jaipur, Hisar, Jamnagar & Kalai (Zone A)
Aurangabad, Dhule, Vijayapur & 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-plots)

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 (q/ha)
9. Dry Fodder yield (q/ha)
10. Protein content in grain

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

PMAT 6: Response of Fe and Zn rich hybrids to N level

Objective: To study the response of Fe and Zn rich hybrids to nitrogen application

Year of Start : 2017

a) Response of Fe and Zn rich hybrids to nitrogen application in zone A1

Nitrogen level (3) : 20, 40 & 60 kg N/ha
Hybrids (5+2 check) : MH 2173, MH 2179, MH 2174, MH 2180, MH 2185, Dhanshakti, & RHB 177 (c)
Design : SPD
Replications : Three
Treatments : 21
Plot size
Gross : 4.00 m x 3.60 m
Net : 4.00 m x 2.70 m
Locations : Bikaner and Mandor

b) Response of Fe and Zn rich hybrids to nitrogen application in zone A

Nitrogen level (3) : 30, 60 & 90 kg N/ha
Hybrids (5+3 check) : MH 2173, MH 2179, MH 2174, MH 2180, MH 2185, Dhanshakti (c), MPMH 17 & 86M86 (c)
Design : SPD
Replications : Three
Treatments : 24
Plot size
Gross : 4.00 m x 3.60 m
Net : 4.00 m x 2.70 m
Locations : Jaipur, Hisar, Jamnagar & Kalai

c) Response of Fe and Zn rich hybrids to nitrogen application in zone B

Nitrogen level (3) : 30, 60 & 90 kg N/ha
Hybrids (5+3 check) : MH 2173, MH 2179, MH 2174, MH 2180, MH 2185, Dhanshakti (c), Pratap (c) and 86M86 (c)
Design : FRBD
Replications : Three
Treatments : 24
Plot size
Gross : 4.00 m x 3.60 m
Net : 4.00 m x 2.70 m
Locations : Aurangabad, Dhule, Vijayapur & Coimbatore

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 (q/ha)
8. Dry Fodder yield (q/ha)
9. Fe & Zn (ppm)
10. Protein content (%) in grain

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

PMAT 7: Evaluation of pearl millet advance hybrids under different sowing dates

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

Year of Start : 2017

a) Performance of advance hybrids under different sowing dates in zone A₁

Sowing dates (3) : July 5-10, July 20-25 and August 5-10
Hybrids (5+1 check) : MH 2082, MH 2089, MH 2087, MH 2098, MH 2101 & RHB 177 (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 : Bikaner and Mandor

b) Performance of advance medium and late maturing hybrids under different sowing dates in zone A

Sowing dates (3) : July 5-10, July 20-25 and August 5-10
Hybrids (5+3 check) : MH 2114, MH 2106, MH 2107, MH 2155, MP 570, MPMH 17 (c), KBH 108 (c) & Pusa Composite 383 (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 & Kalai

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

Sowing dates (3) : July 5-10, July 20-25 and August 5-10
Hybrids (2+1 checks) : MH 2155, MH 2137 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 : Aurangabad, Dhule, Vijayapur & Coimbatore

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 (q/ha)
8. Dry Fodder yield (q/ha)

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 2017-18 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 : As per PoP

Observations:

1. Chlorophyll content 65 DAS
2. Relative water content (RWC) at 65 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 terminal stress 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 : As per PoP

Observations:

1. Chlorophyll content 65 DAS
2. Relative water content (RWC) at 65 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-4: Characterizations in pearl millet hybrids on the basis of root shoot traits

Location	:	Mandor, Jaipur and Jamnagar
Year of Commencement	:	Kharif-2014
Replication	:	Four
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
8. Bulk density

Field trail Observation

Observations:

1. Days to 50% flowering
2. Grain yield (kg/ha)
3. Grain yield (kg/ha)
4. Productive tillers/plant (no)
5. Test weight (g) (1000 grains)
6. Fodder yield (q/ha)
7. Harvest index (%)
8. Days to Maturity
9. Bulk density

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 (<i>Kharif</i>)
Year of commencement	:	2014
Replication	:	Three
Design:		CRD
Genotypes	:	MH 2082, MH 2089, MH 2087, MH 2098, MH 2101 MH2155 & RHB 177 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 ($\text{min}^{-1}\text{g}^{-1}\text{f. wt}$)
8. Germination percentage 10 and 20 DAS
9. Seedling vigour

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, Mandor and Jamnagar
Season : *Kharif*
Year of commencement : 2015 Modified 2017
Fertilizer : As per PoP

Treatment:

(a) Foliar spray (20-25 DAS) at tillering and pre-anthesis (40-45) 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
12. Plant height

PMPHY 7: Identification of heat stress tolerance in pearl millet genotype at seedling stage in pearl millet

Objectives

- i) To identify heat stress tolerance mechanism in pearl millet at seedling stage.
- ii) To identify physio-biochemical parameters for identification of heat stress tolerance mechanism in pearl millet

Location : Jaipur and Mandor
Season : Laboratory trial (*Kharif*)
Year of commencement : 2017

Entries Study material : Parental line(A and B lines) of pearl millet (15-20)

Replication : Four **Design** : CRD

(a) Temperature - 20 DAS

T1 40 °C
T2 42 °C
T3 44 °C
T4 46 °C

Observations:

Growth parameters – 25 DAS

1. Seedling length,
2. Seedling dry weight, root;
3. shoot ratio,
4. seedling vigour index

Physiological parameters –

1. RWC
2. Membrane stability index
3. Pigment content (chlorophyll and carotenoids)
4. Proline content

Anti-oxidants –

1. Superoxide dismutase
2. catalase,
3. Malonaldehyde content

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

1. Dr. Thakar Singh, Head, Department Agronomy, PAU, Ludhiana
2. Dr. U.S. Tiwana, Incharge, Forage and Millet Section, PAU, Ludhiana
3. Dr. P.S. Shekhawat, Professor (Agronomy), ARS Bikaner
4. Dr. Anil Kumar, Principal Scientist (Agronomy), Bajra Section, CCS HAU, Hisar
5. Dr. M.F. Hussain, Agronomist, ARS, Kalai, Aligarh
6. Dr. Minakshi Grover, Principal Scientist (Microbiology), IARI, New Delhi
7. Dr. R.S. Bana, Scientist (Agronomy), IARI, New Delhi
8. Dr. P.P. Girase, Asstt. Professor, (Agronomy), AICRP-PM, Dhule
9. Dr. Dinesh M Lomte, Agronomist, NARP, Aurangabad
10. Dr. R.C. Meena, Asstt. Prof. (Plant Physiology), AICRP-PM, Mandor, Jodhpur
11. Dr. A.K. Guggari, Pr. Scientist (Agronomy), RARS, Bijapur, UAS, Dharwad
12. Dr. G. Guru, Assistant Professor (Agronomy), TNAU, Coimbatore
13. Dr. Asha C Detroja, Assistant Research Scientist, JAU, Jamnagar
14. Sh. Manoj Kumar, Assistant Professor (Agronomy), AICRP-PM, Jodhpur
15. Dr. P.K Sharma, Professor (Agronomy), RARI (SKNAU), Jaipur (Raj.)
16. Dr. Manoj Kumar Sharma, Assoc. Professor (Plant Physiology), JAU, Jamnagar
17. Dr. N.K. Gupta, Professor (Plant Physiology), RARI (SKNAU), Jaipur (Raj.)

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

SESSION VII

PLAN OF WORK 2017-18

PROCEEDINGS OF CROP PROTECTION FOR TECHNICAL PROGRAMME

Chairman	: Dr. P.S. Shekon, Head (Plant Pathology), PAU, Ludhiana	Co-Chairman	: Dr. R.S. Gill, Head (Entomology), PAU, Ludhiana
		Rapporteur	: Dr. H.R. Bishnoi Assoc. Prof. AICRP-PM, Jodhpur Dr. R.K. Juneja, Asstt. Res. Sci., JAU, Jamnagar Dr. G. Prakash, Scientist, ICAR-IARI, New Delhi
Date	: April 29, 2016	Time	: 04.30 PM
Venue	: Placement cell Hall		

At the outset Dr. H.R. Bishnoi welcomed the Chairperson Dr. P.S. Sekhon, and Co-Chairperson Dr. R.S. Gill. The Chairperson discussed on various technical aspects on pathological trials and further technical details of entomology trials discussed by Co-Chairperson.

TECHNICAL PROGRAMME FOR KHARIF / SUMMER – 2017-18

PATHOLOGY

The group discussed regarding the acceptability of new genotypes for disease. The following opinion emerged during discussion in the group.

Downy mildew: Up to 5% downy mildew incidence under sick plot condition be considered for varietal promotion.

Smut: Up to 20% smut severity under artificial inoculation be considered for varietal promotion.

Ergot: Up to 20% ergot severity under artificial inoculation be considered for varietal promotion.

Blast: It was opined by the group to submit the data using 0-9 scale. Up to the Scale 3 for blast be considered for promotion of genotypes: Considered for varietal promotion under the category of Resistance in case of natural infection.

Rust: The group concluded to have the observations of rust disease during hard dough stage and genotypes having rust up to 20% be considered for promotion.

Chairperson also discussed about various trials to be conducted at different AICRP/Co-operating centres

Disease Screening Trials

Following procedures should be adopted to conduct the disease screening trials

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

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

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

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

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

Downy Mildew	:	
Location	:	Zone A Mandor, Jaipur, Hisar, Gwalior, Jamnagar and Anand Zone B Mysore, Aurangabad, Dhule, Coimbatore and Patancheru (PMPT-II)
Smut	:	
Location	:	Zone A Jaipur, Jamnagar, Hisar and Gwalior Zone B Dhule
Blast	:	
Location	:	Zone A Jaipur, Jamnagar, Gwalior, Hisar and New Delhi (PMPT-II) Zone B Dhule, Aurangabad and Mysore (PMPT-II)
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

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
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2. Genetic analysis through DNA markers

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

Location	:	Zone A Gwalior, Anand, Mandor, Jamnagar, Hisar, New Delhi and Jaipur Zone B Dhule, Patancheru, Aurangabad and Mysore
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PMPT V: Management of downy mildew by using bioagents and new generation anti oomycetes chemical Inititum.

Treatments:

1. *Pseudomonas fluorescens* (MYS14 @8g/kg) (Mysore centre will supply)
2. *Bacillus subtilis* (TNAU EPCo16@8g/kg) (Coimbatore centre will supply)
3. *Trichoderma viride* (MYS 13 @ 8g/kg) (Mysore centre will supply)
4. *Trichoderma viride* (TNAU Tv -1@ 8g/kg) (Coimbatore centre will supply)
5. *Trichoderma harzianum* (JAU @ 8g/kg) (Jamnagar centre will supply)
6. Amectotradin + Dimethomorph (0.4ml /500 ml water) (Mysore centre will supply)
7. Metalaxyl (6g/Kg) (Mandor centre will supply)
8. control

Replication: 3(4 rows in 5 meter length), Entry:

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-PM centers in their respective zones

Method: Record survey information by preparing chart listing field number, location, cultivar/area, crop stage (PT, F and SD), disease incidence and remarks. Also collect infected leaf samples from highly susceptible cultivars for pathogen characterization. The samples should to be sent to the project coordinator

NOTE: - Observations to be recorded on all prevalent diseases in the area.

PMPT VII: Disease screening trial of pearl millet hybrids in summer

Locations:Anand, Jamnagar and Coimbatore

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

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

Background information: The pathogen *Pyricularia grisea* is causing pearl millet blast disease in *kharif* season. The pearl millet crop is dual propose and it is important for green and dry fodder. Since last few years the disease intensity is increasing in different states and due to that fodder and grain yield is decreasing in highly infected crop. There is no

good control measure and now new fungicides are available in market so it was decided to formulate new technical programme for management of the disease.

1. **Experimental details:**

(A) Design: RBD (B) Treatments: 6 (C) Replication: 4
(D) Plot size (Gross): 5.00x3.60m (Net): 4.0x2.40m (E) Spacing: 60 x 15 cm. (f) Entry:

2. **Crop and variety:** Pearl millet -Moderately susceptible (RHB 177)

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

Treatments

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

Observation

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

ENTOMOLOGY

Recommendation:

Seed treatment with Imidacloprid 600 FS @ 8.75 ml or Clothianidin 50 WDG @ 7.5 g/kg seed with sufficient quantity of water effectively controls the soil insect-pests (white grub and termite) infesting in pearl millet. Treated seed should be sown within 2 hours of these treatments.

Technical Programme for *Kharif* & Summer 2017-18

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: 3.0 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 (Vegetative stage) and ear head stage.
2. **Stem borer** – Per cent plant damage at 28 DAG (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.

Experimental details:

Design: Nil (Observation plot)

Replications: Nil

Spacing: 50 x 15 cm.

Variety: Any released hybrid

Methodology:

- Sowing of released variety/ hybrid will be done over an area of 300 m² which will be kept free from insecticidal application during crop season.
- Incidence and population of various insect pests (all the insects) will be recorded at weekly interval from 20 randomly selected plants 15 days after germination (DAG) of the crop.
- The presence of bio-agents will also be recorded.
- The population of insect-pests & incidence should be correlated with parameters.

Assessment of losses (%): The losses due to different insect pests will be calculated on the basis of protected and un-protected plots. For this purpose parallel sowing will be done in a plot of 300 m² which will be fully protected from the insect pests utilizing following recommended practices.

1. Seed treatment of imidacloprid 600 FS will be given @ 9.0 ml/kg
2. 1st foliar application of imidacloprid 17.8 SL, 0.009% will be given at 35 DAG (Shoot fly & stem borer)
3. 2nd foliar application of (profenophos 40 % + cypermethrin 4%) 0.044% will be given at 45 DAG-boot leaf stage (stem borer, leaf roller and grey weevil)
4. 3rd foliar application of DDVP 0.05% will be given at ear head stage (*Helicoverpa* , *Eublemma* , *blister beetle*, *chaffer beetle*, etc.).

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 (minimum 25-50 fields) out at vegetative and ear head stage of bajra crop during *Kharif* season at different locations.
- 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

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 4.2 m (7 rows), Net plot size: 4.0 x 3.0 m (5 rows) 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 g / 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 cloranthraniprole 20 SC @ 0.006% (3 ml/10 lit.) at 35 DAG.
- 5) Seed treatment fipronil 40% + imidacloprid 40% WG @ 2.5g /kg seed followed by spray of clothianidin 50 WDG @ 0.025% (5 g / 10 lit.) at 35 DAG.
- 6) Seed treatment 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 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 fipronil 40% + imidacloprid 40% WG @ 2.5g /kg seed followed by spray of cloranthraniprole 20 SC @ 0.006% (3 ml/10 lit.) at 35 DAG.
- 9) Untreated control

Methodology and observation to be recorded

- 1) Per cent shoot fly infestation at 28 DAG (vegetative stage) and ear head stage.
- 2) Per cent stem borer infestation at 28 DAG (vegetative stage) and ear head stage.
- 3) Yield and economics of the treatments.
- 4) Residue data to be presented at the time of recommendation (along with phytotoxicity).
- 5)

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: 4

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: 6

1. IPM module-I (Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + removal of shoot fly dead hearts + fish meal trap @ 10/ha + spraying of NSKE 5% at 35 DAG).
2. IPM module-II (Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + removal of shoot fly dead hearts + fish meal trap @ 10/ha + Spraying of Novaluron 10 EC 0.01% (10 ml/10 litres of water) at 35 DAG) .
3. IPM module-III (Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + removal of shoot fly dead hearts + fish meal trap @ 10/ha + spraying of *Beauveria bassiana* (2×10^6 cfu/g) , 40 g/10 litres of water at 35 DAG).
4. IPM module-IV (Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + removal of shoot fly dead hearts + fish meal trap @ 10/ha + spraying of Dimethoate 30 EC 0.03 % (10 ml/10 litres of water) at 35 DAG).
5. IPM module-V (Seed treatment of imidacloprid 600 FS @ 8.75 ml/kg + removal of shoot fly dead hearts + fish meal trap @ 10/ha + spraying of *Bt* (15 g/10 litres of water at 35 DAG).

6. Untreated-Control (This plot will be kept 100 m far from this experiment to avoid the effect of fish meal trap)

Methodology and observation to be recorded

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

PMET-6: Evaluation of different insecticides as a soil drenching for the management of soil pests (white grub and termite) in pearl millet.

Location: Jaipur,

Design: Large plot technique,

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: 9

1. Imidacloprid 17.8 SL, 60 g a.i./ha.
2. Thaimethoxam 70 WS, 150 g a.i./ha.
3. Fipronil 5 SC, 150 g a.i./h.a
4. Clothianidin 50 WDG, 150 g a.i./ha.
5. Imidacloprid 600 FS, 750 g a.i./ha.
6. Acephate 50% + Imidacloprid 1.8% SP, 1.25 kg/ha.
7. Fipronil 40% + Imidacloprid 40% WG 300 g a.i./ha.
8. Chlorantrainiprole 18.5
9. Untreated- control.

N.B.: The insecticides taken for the experiment are registered under CIB & RC guidelines as per 30-06-2016.

Methodology:

These insecticides will be applied by soil drenching method in standing crop after 21 days of sowing.

Observations to be recorded: -

- Percent termite and white grub damage at 28 DAG and at harvest.
- Yield and economics of the treatments.

PMET 7: Survey of insect- pests of summer bajra on farmers' field.

Location: Jamnagar

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

Observations to be recorded:

- At least 25-50 fields will be observed in bajra growing area of Gujarat twice *i.e.* vegetative stage & ear head stage.
- From each field 20 plants will be observed for insect-pests incidence and population.

The following scientist attended the session:

- 1 Dr. P.S. Shekon, Head (Plant Pathology), PAU, Ludhiana
- 2 Dr. R.S. Gill, Head (Entomology), PAU, Ludhiana
- 3 Dr. H.R. Bishnoi, Associate Professor, AICRP-PM, Mandor, Jodhpur
- 4 Dr. Rajan Sharma, Sr. Scientist, ICRISAT, Patancheru
- 5 Dr. S.S. Ghuge, Plant Pathologist, AICRP-PM (NARP), Aurangabad
- 6 Dr. S. Chandra Nayak, Asstt. Prof. University of Mysore, Mysore
- 7 Dr. Kushal Raj, Asstt. Scientist (Plant Pathology), CCS HAU, Hisar
- 8 Dr. D.L. Kadavani, Assoc. Res. Scientist, JAU, Jamnagar
- 9 Dr. R.P. Juneja, Asstt. Research Scientist, JAU, Jamnagar
- 10 Dr. V.K. Chaudhri, RRS, AAU, Anand
- 11 Dr. I. Johnson, Assistant Prof. (Pathology), TNAU, Coimbatore.
- 12 Dr. R. K. Pandya, Principal Scientist (Pathology), RVSKVV, Gwalior
- 13 Dr. B.R. Nakrani, Associate Research Scientist, SDAU, Kothara, Gujarat
- 14 Dr. J.S. Suryawanshi, SRA (Plant Pathology) MPKV, Dhule, Maharashtra
- 15 Dr. R.S. Bajiya, STA, RARI, Durgapura, Jaipur
- 16 Dr. R.S. Sharma, STA, RARI, Durgapura, Jaipur
- 17 Dr. G. Prakash, Scientist (Plant Pathology), IARI, New Delhi
- 18 Dr. A.C. Mathur, Professor(Plant Pathology), RARI, Durgapura, Jaipur

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

SESSION – VIII

REVIEW OF CROP PRODUCTION STRATEGIES AND VALUE CHAIN FOR 2016-17 AND ACTION PLAN FOR 2017-18

Chairman	: Dr. H.P. Yadav Ex-Project Coordinator (PM)	Co-Chairman	: Dr. C. Tara Satyavathi Project Coordinator (PM)
		Rapporteur	: Dr. P.S. Shekhawat Professor (Agro.) SKRAU, Bikaner
Date	: April 30, 2017	Time	: 09:30 AM – 10:15 AM

The progress report of FLD's organized during 2016-17 was presented by Sh. Manoj Kumar, Asstt. Professor (Agronomy), PC Unit, Jodhpur. As against the target of 250 ha, FLD's were organized over an area of 220 ha (including 30 ha area under summer) in the States of Gujarat, Haryana, Madhya Pradesh, Rajasthan Maharashtra, Andhra Pradesh, Uttar Pradesh, Delhi, Karnataka, Pusa (Bihar) and Tamil Nadu on six components *i.e.* improved practices, recommended nutrient application, weed management, improved cultivar, wide row spacing and moisture conservation. The results revealed that overall yield advantage was in the range of 7.0 to 84% among these trials using various technologies. The Kalai centre of UP, IARI, Pusa (Bihar) and ARS Mandor were not conducted the kharif FLD *i.e.* objectionable. Many of centres organized the Field Day/ Kisan Mela at Farmer's Field during the season. All the centres were requested to organize Field Day/ Kisan Mela during the season.

1. The Co- Chairman suggested that no private hybrids be tested in the FLDs without prior permission of Project Coordinator.
2. Chairman and Co-Chairman suggested that plantation of FLD may be spread in more districts to achieve above state average yield specially in Andhra Pradesh.
3. Scientists of B zone to take care of Package of Practices for selecting cultivars and technology for FLD.
4. According to DMD, 450 FLDs proposed for 2017-18. Out of that 410 FLDs for *Kharif* and 40 FLDs for summer season 2017-18.
5. Allot summer FLD to SK Nagar (Gujarat) in addition to Jamnagar.

The meeting ended with thanks to the chair.

SESSION – IX

REVIEW OF BSP AND DUS TESTING PROJECT & PROGRESS REPORT OF 2016-17, PLAN OF WORK 2017-18 AND REVIEW OF DUS GUIDELINES

Chairman	: Dr. H.P. Yadav Ex. Project Coordinator (Pearl Millet)	Co-Chairman	: Dr. C. Tara Satyavathi Project Coordinator (Pearl Millet), AICRP on PM, Jodhpur
Date	: April 30, 2017	Rapporteur	: Dr. P. Shanthi
Time	: 12.00 PM		: Scientist (Plant Breeding), AICRP on PM, ANGRAU, ARS, Ananthapuram

Dr. B.S. Rajpurohit, PI – Crop Improvement, AICRP – PM, Mandor, Jodhpur Presented the report of breeder seed production programme undertaken during 2016-17.

He presented that the breeder seed production programme was organized as per DAC indent in *kharif* and *summer* seasons in different AICRP – PM centres during 2016-17. A total 31.81q breeders seed of nine varieties and 29 parental lines of different hybrids were produced successfully as against the indent of 8.45q along with carry over stock of 23.36q. The report of BSP I was sent to DAC and the allotment for supply made to different centres as per the indent for the next year is given below in BSP I.

Dr. B.S. Rajpurohit also presented progress report on DUS testing and characterization taken up during 2016-17 at Mandor and Rahuri centres. He also told that two years data is now ready for presenting before PPV & FRA for consideration in due course and up till now a total of 101 pearl millet hybrids/ varieties / parental lines both public (34) and private (67) were registered with PPV & FRA. He suggested that the registration of public sector varieties / hybrids needs to be improved further.

Dr. B.S. Rajpurohit, also presented DUS testing progress report and informed that a total of 165 candidate varieties were characterized from 2008-09 to 2016-17. This year 2016-17, 13 candidate genotypes for first year and 31 candidate genotypes for second year were characterized along with 20 reference varieties for DUS testing at Mandor & Rahuri centres. He presented the changes / modification for DUS characters for discussion and informed that these changes will be circulated by mail for suggesting further modifications in this regard. He also expressed his views to include Hyderabad as another location for DUS testing as the expected expression will be good at Hyderabad due to moderate climate as compared to harsh climate of Mandor. Dr. C.Tara Satyavathi, the Co – Chairman indicated the testing centres will be finalized after further discussion.

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

Crop: Pearl millet

Year of Production: 2017

Year of supply: February 2018

S.No.	Name of Producing center/state	Name of parental line/ variety	DAC indent (q)	Target set (q)
A	Varieties			
1	ICRISAT, Patancheru	Dhanshakti	2.11	2.11
2	IARI, New Delhi	Pusa Composite-701	0.10	0.10
3	IARI, New Delhi	Pusa Composite-612 (MP-480)	0.70	0.70
4	NARP, Aurangabad	ABPC4-3 (MP 848)	0.79	0.79
5	RVSKVV, Gwalior	JBV-4 (MP-403)	0.52	0.52
6	RVSKVV, Gwalior	JBV-2 (GKKV-93191)	0.55	0.55
7	SKNAU, Jaipur	RAJ 171	0.20	0.20
	Total	Total (A)	4.97	4.97
B.	Parental lines			
8	MPKV, Dhule	DHLB-8A (A line Adishakti)	0.03	0.03
9	MPKV, Dhule	DHLB-8B (B line Adishakti)	0.01	0.01
10	MPKV, Dhule	DHLR-967 (R line Adishakti)	0.01	0.01
11	MPKV, Dhule	RHRBI 138 (R line Shradha)	0.05	0.05
12	Dr. PDKV, Buldana	BMS-5-23A (A line PKV-Raj)	0.02	0.02
13	Dr. PDKV, Buldana	BMS-5-23B (B line PKV-Raj)	0.01	0.01
14	Dr. PDKV, Buldana	BR-333 (R line PKV-Raj)	0.01	0.01
15	ICRISAT, Patancheru	ICMA 04999 (A line GHB 905)	0.10	0.10
16	ICRISAT, Patancheru	ICMB 04999 (B line GHB 905)	0.05	0.05
17	ICRISAT, Patancheru	843-22A (A line HHB 67 Imp. , RHB 177 & HHB 226)	0.52	0.52
18	ICRISAT, Patancheru	843-22B (B line HHB 67 Imp., RHB 177 & HHB 226)	0.28	0.28
19	ICRISAT, Patancheru	ICMA 93333 (A line RHB 173)	0.18	0.18
20	ICRISAT, Patancheru	ICMB 93333 (B line RHB 173)	0.09	0.09
21	ICRISAT, Patancheru	ICMA 94555 (A line GHB 558)	0.04	0.04
22	ICRISAT, Patancheru	ICMB 94555 (B line GHB 558)	0.02	0.02
23	ICRISAT, Patancheru	ICMA 97111 (A line HHB 197)	0.03	0.03
24	ICRISAT, Patancheru	ICMB 97111 (B line HHB 197)	0.02	0.02
25	JAU, Jamnagar	J-2454 (R line GHB 905)	0.05	0.05
26	JAU, Jamnagar	J-2290 (R line GHB 558)	0.02	0.02
27	HAU, Hisar	HBL-11 (R line HHB 226 & HHB 197)	0.04	0.04
28	HAU, Hisar	HMS 47A (A line HHB 272)	0.08	0.08
29	HAU, Hisar	HMS 47B (B line HHB 272)	0.02	0.02
30	HAU, Hisar	H 77/833-2-202 (R line HHB 67 Imp.)	0.10	0.10
31	SKNAU, Jaipur	RIB 192 S/99 (R line RHB 173)	0.09	0.09
32	SKNAU, Jaipur	RIB 494 (R line RHB 177)	0.09	0.09
		Total (B)	1.96	1.96
		Total (A)+(B)	6.93	6.93

Note: Production of HHB 67 stopped. This production included in HHB 67 Improved.

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 SCA

Then the session ended with vote of thanks to Chairman and Co - Chairman.

SESSION X

PANEL DISCUSSION ON THRUST AREAS OF RESEARCH IN PEARL MILLET "ENHANCING THE DEMAND OF PEARL MILLET"

Chairman : Dr. Savita Sharma
PAU, Ludhiana

Co-chairman : Dr. C. Tara Satyavathi,
Project Coordinator (Pearl
Millet), AICRP-PM, Jodhpur

Rapporteur : Dr. P. Sumathi,
Professor (PBG) and
Head,
TNAU, Coimbatore

Panellists : Dr. H.P. Yadav, Ex. Project
Coordinator, AICRP on Pearl
millet
Dr. Saikat Majumdar,
ICRISAT
Dr. L.K. Chug, Professor,
Hisar

Date : April 30, 2017

Time : 10.15 – 11.15 AM

Dr. C. Tara Satyavathi, Project Coordinator (Pearl Millet), emphasized about the two important points for the future improvement of pearl millet.

1. Increase in production and productivity of pearl millet in A1 zone.
2. Enhancing demand of pearl millet.

She presented the special features of pearl millet, chemical and micronutrient content of pearl millet and said that chemical score is high for pearl millet among all other millets and mentioned the constraints of pearl millet like rancidity. She also mentioned that the colour of grain and forage quality should also be concentrated focussed in future while breeding.

Dr. H.P. Yadav, Ex. Project Coordinator suggested that utilization must be enhanced through food, feed and industrial uses, edible oil such as rice bran, health products, health drinks and beverages, etc., and green fodder should also be concentrated. Biochemical research have to be done for screening of the germplasm for the traits *viz.*, low phytate, digestability, high carotenoids, shelf life and rancidity, etc., He suggested that the inclusion of food and nutrition and animal nutrition department in AICRP programme will be helpful to enhance the demand for pearl millet. Strengthening the programme should be done by industrial uses, subsidy, public and private involvement in popularization of pearl millet and transfer of technology. He said that as government intervention, pearl millet should be included in PDS system and incentives to farmers for pearl millet cultivation and mission mode system on pearl millet may be introduced.

Dr. Saikat Mazumdar panellist from ICRISAT presented the opportunities, challenges and approaches with regard to pearl millet. He named pearl millet as healthy cereal based on its nutritional aspects. As a challenge-wide variability for rancidity is available among the germplasm. Pearl millet is free from gluten, its health claim should be ensured and he mentioned about the value chain approach. Dr. Chug, Professor, Hisar, stressed the points

that the lipase and lipoxygenase are more responsible for rancidity and also variability was observed among the consumers with regard to rancidity. Medicinal value of the pearl millet may also be exploited

The chairman of the session, Dr. Savita Sharma made a presentation on nutritional components, health benefits of millets and processing of millets. During interactive session, the points *viz.*, consumer of pearl millet, consumer awareness, rancidity and involvement of biotechnology for silencing the enzymes responsible for rancidity, scientific perception on grain, poultry and cattle feed. etc, were discussed.

The chairman concluded the session by mentioning that successful and good discussions were taken up in this session. A brain storming session may be conducted in future to formulate a plan of work to enhance the demand for pearl millet.

PLENARY SESSION

Chairman : Dr. Sarvjeet Singh
ADR, Crop
Improvement, PAU,
Ludhiana

Co-Chairman : Dr. H.P. Yadav
Ex Project Coordinator
AICRP on Pearl Millet
Mandor, Jodhpur

Dr. C. Tara Satyavathi,
Project Coordinator
AICRP on Pearl Millet
Mandor, Jodhpur

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

Date : April 30, 2017

Time : 11:15 AM

The recommendation of different sessions were presented by respective rapporteurs of the session. All the observations and recommendations of each session were approved as such.

Chairman expressed his satisfaction for very good scientific presentations and discussions during the workshop.

The session ended with vote of thank to the Chair.