



Project Coordinator Review

Annual Workshop

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OP Yadav

**Project Coordinator
(Pearl Millet)**



All India Coordinated Pearl Millet Improvement Project

Jodhpur 342 304, Rajasthan, India

www.aicpmip.res.in



Review of Pearl Millet Research

Pearl millet improvement research in India is carried out through the All India Coordinated Pearl Millet Improvement Project (AICPMIP) administered by the Indian Council of Agricultural Research (ICAR). **AICPMIP is one of 61 coordinated projects working under the aegis of ICAR.**

The AICPMIP has a network of **14 AICRP centers** in Rajasthan, Gujarat, Maharashtra, Uttar Pradesh, Karnataka, Andhra Pradesh, Madhya Pradesh, Punjab, Haryana and Tamil Nadu. The AICPMIP centers located in 12 State Agricultural Universities (SAUs) and University of Mysore pursue mandated activities and strategic research on pearl millet in the area of germplasm utilization, genetic improvement, production, protection, value addition etc. Two states viz., Rajasthan and Maharashtra that have more than two-third of pearl millet area of country have two AICPMIP centres each. In addition, AICPMIP has **30 cooperating centres** located at the research centres of SAUs which are actively involved in coordinated evaluation programme. **Private sector** is also an important partner in AICPMIP testing and evaluation.

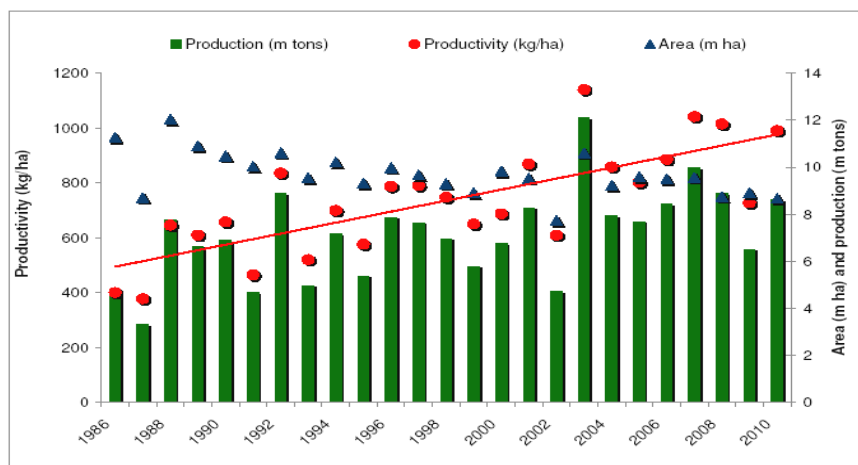
The All India Coordinated Millet Improvement Project (AICMIP) was established in 1965 with a mandate of improving millet crops including pearl millet, finger millet and other minor millets. Later, AICPMIP was created in 1985 for conducting and coordinating research activities exclusively in pearl millet improvement. It has been 25 years since then that AICPMIP has been endeavoring in improvement of pearl millet. Interestingly, hybrid breeding in pearl millet had started 50 years back. Hence, **it is an opportune time to assess the relative improvement made in two phases of 25 years each between 1961-2010.** An overview of coordinated research accomplished in pearl millet in the area of coordinated testing and evaluations, genetic and cultural improvement, disease and insect-pest management, seed production and value addition in India is presented below:

- The growing conditions for pearl millet vary from near-optimum with high external inputs to highly drought-prone environments. This led to the prioritization of research in cognizance of production constraints and differential requirement of various crop growing regions. Hence, the whole pearl millet area has been divided into **three zones viz., A₁, A and B.** Zone A₁ is composed of parts of Rajasthan, Gujarat and Haryana receiving less than 400 mm annual rainfall. Zone A is composed of the remaining parts of the states of Rajasthan, Gujarat and Haryana and the entire pearl millet growing areas of Uttar Pradesh, Madhya Pradesh, Punjab and Delhi. This zone has sandy loam soils and an annual rainfall of greater than 400 mm. Zone B is comprised of the states of Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh with rainfall greater than 400 mm, heavy soils and mild temperature conditions. The B zone has shorter days compared to A₁ and A zones.

- Average number of entries tested each year in coordinated trials during 1986-2010 showed that the test cultivars have increased substantially during the period. The number of hybrids tested annually has gone up by 69%, from 77 to 130, while number of OPVs tested each year has come down from 32 to 17. This resulted in **an overall increase of 35% in number of experimental cultivars tested** in different zone of the country. It is thus evident that AICPMIP has a very strong research/development and testing network for field evaluation of pearl millet hybrids and OPVs.
- Utilization of different kinds of germplasm and breeding material is very critical in the diversification of cultivars. Hybrid parental lines are developed with considerable morphological diversity and hence germplasm from different geographical regions has been strategically utilized in male-sterile (A) and restorer (R) line breeding. In the development of A-lines, African germplasm has largely been used whereas locally adapted material has been utilized in R-line breeding in most of the public and private sector hybrid programmes in India to achieve adequate adaptation of hybrids to different agro-ecologies.
- More than **370 A-lines have been developed** since the last 25 years. The d₂ dwarf plant height has emerged as the most dominant plant type concept in seed parents breeding.
- **A very large number of restorer lines** have also been developed.
- High grain yield combined with maturity duration, mostly in the range of 75-85 days, as per the agro-ecological requirements and downy mildew resistance were accorded highest priority in the cultivar development programme.
- The new hybrids, OPVs and parental lines of hybrids have been screened for all important diseases of pearl millet across years and locations under artificially inoculated conditions. For instance, approximately 1000 genotypes have been screened for all pearl millet diseases during last five years. Most of the resistant material to the downy mildew also had adequate levels of resistance to blast, ergot, smut and rust. Some of the multiple disease resistant genotypes include MH 1753, MH 1759, MH 1699, GHB 558, MH 1716, PUSA Comp 443, MH 1706, SHRADHA, Nandi 62, PUSA 23, ICTP 8203, ICMV 221, RAJ 171, PUSA 383, JBV 2, JBV 3, ICMV 155, PUSA 266, CZP 9802 and hybrid parental lines viz., ICMA 843-22, H 77/833-2-202, ICMA 95444, J 2340, ICMA 95444, RIB 57 S/05, ICMA 97111, HBL 11, NMS 2-11A, NMP 4-1, HMS 37A, HTP 3/13, ICMA 94555, HBL 11, NMS 24A, NMP 64, NMS 24A, NMP 75, RHRB 13A and RHRBI 1314.
- Efforts towards molecular breeding started in 1990s with the development of a molecular marker-based genetic linkage map which largely comprised of

RFLP loci. Initial map development was followed by identification of QTLs using several different mapping populations. The target traits for pearl millet QTL mapping have been downy mildew resistance; grain and stover yield under drought and favourable conditions and stover quality. **Pearl millet hybrid 'HHB 67 Improved' was released in 2005 which was developed using parental lines bred through marker-assisted selection (MAS). 'HHB 67 Improved' was the first MAS product that was released in India and has been widely adopted by farmers.**

- A very high priority has been given to diversify the genetic and cytoplasm base of male-sterile lines. A beginning has been made in this direction in utilization of **alternative CMS sources like A₅ and A₄ CMS systems** at AICPMIP centres and ICRISAT.
- Efforts in diversification of seed parents led to the development and use of a large number of seed parents. For instance, during 2008-11, each year new hybrids based on 35-37 A-lines (designated) from public sector and 46-63 A-lines (by name) from private sector have been contributed for coordinated evaluation in AICPMIP trials. The new hybrids that have been tested for the same period are based on 40-56 R- lines from public sector and 48-75 R-lines from private sector. Utilization of such a large number of parental lines in hybrid breeding ensured that no further major downy mildew epidemics could occur during the last 25 years.
- A total of **115 improved cultivars were released during last 25 years** which provided a wide range of choice to farmers for their cultivation in various agro-ecological regions.
- The high-yielding hybrids and OPVs have been widely adopted by Indian farmers. Currently, **65% of pearl millet area is under high-yielding cultivars** (mostly hybrids) which is highest among crops in which hybrids are targeted cultivar type.
- Following the adoption of high-yielding and disease resistant cultivars (mostly hybrids) and production technology, pearl millet **productivity has been consistently increasing since 1986.**
- Improvement in pearl millet productivity has resulted in **45% improvement in its grain production from 5.83 million tons during 1986-90 to 8.48 million tons during 2006-10**, in spite of 18% decline in crop area from 10.7 million ha to 9.1 million ha.
- Crop productivity has gone up **from 539 kg/ha during 1986-90 to 932 kg/ha during 2006-10 registering a 73% improvement, which is highest among all food crops.**

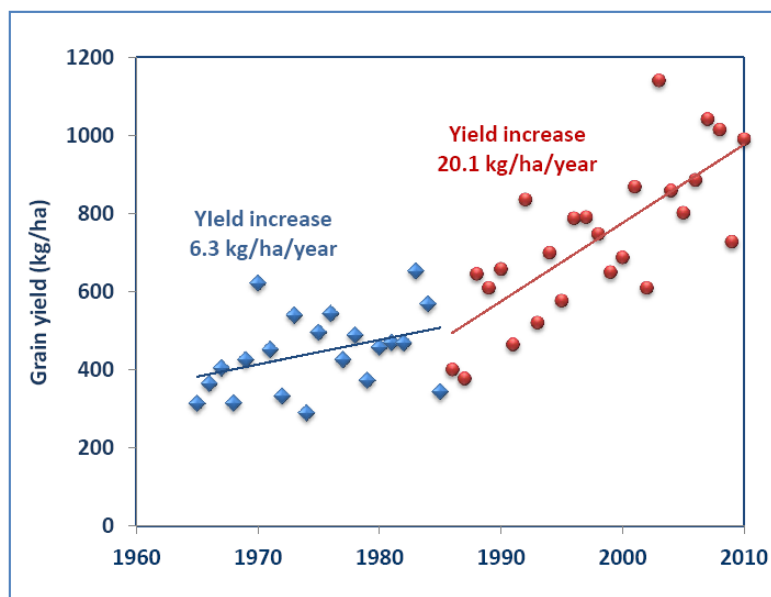


*Area, production and productivity of pearl millet in India during 1986-2010
(Source: DAC, Government of India as on 7 February 2012 available at <http://www.agricoop.nic.in>)*

Five-year means for grain yield and percent improvement in yield over average yield of 1986-90 of principal food crops in India during 1986-2010 (Source: DAC, Government of India as on 7 February, 2012 available at <http://www.agricoop.nic.in>)

Period	Grain yield (kg/ha)					Improvement (%) in yield over 1986-90				
	Rice	Wheat	Sorghum	Maize	Pearl millet	Rice	Wheat	Sorghum	Maize	Pearl millet
1986-90	1622	2113	744	1371	539	-	-	-	-	-
1991-95	1818	2429	827	1564	620	12	15	11	14	15
1996-2000	1918	2648	825	1768	733	18	25	10	29	36
2001-05	1997	2661	784	1913	856	23	26	5	40	59
2006-10	2161	2812	962	2124	932	33	33	29	55	73

- Crop productivity has increased enormously in various states. The **phenomenal increase (86-161%) has been recorded** in Haryana, Rajasthan, Madhya Pradesh, Maharashtra and Uttar Pradesh. Increase in average yields has also been around 60% in the states of Andhra Pradesh, Tamil Nadu and Karnataka.
- Annual rate of improvement in pearl millet productivity, for two periods of 25-year duration each, was assessed in order to compare the gain, in the two phases due to adoption of high-yielding cultivars and improved crop production technologies. **During first 25 years (1960-85) of hybrid development, the crop productivity increased @ 6.3 kg/ha/year. This increase went up to over 20 kg/ha/year in next 25 years (1986-2010).**



Trends in pearl millet productivity during 1960-85 and 1986-2010 in India (values inside figure indicate rate of improvement in grain yield in kg/ha/year during 2 phases) (Source: DAC, Government of India as on 7 February 2012 available at <http://www.agricoop.nic.in>)

- The greater rate of improvement in pearl millet productivity during last 25 years is due to several reasons. Firstly, a far greater number of availability of pearl millet cultivars provided a wide range of choice for their cultivation in various agro-ecological regions. **The 43 cultivars were released during 1960-85 in comparison to 107 during 1985-2010.** As a result, there have been **no major disease epidemics during last 25 years** against quite a few prior to 1985. Secondly, involvement of private sector in seed production, distribution and marketing has helped provide quality seed of hybrids. Thirdly, there has been increasing investment of private sector in pearl millet research and development. Finally, greater adoption of production technology along with high-yielding hybrids proved synergistic in further augmenting the productivity gains.
- This high quantum of productivity increase in pearl millet **assumes greater significance in two ways.** Firstly, more than **90% of pearl millet is grown as rainfed** and often on marginal lands. Secondly, pearl millet has **attracted much lesser infrastructure and human resources** in comparison to other food crops. Despite this, magnitude of yield improvement in pearl millet under rainfed conditions is a successful demonstration of technology-led development and highlights greatly the role of hybrid technology in raising crop productivity in marginal drylands.

Review of work of 2011-12

Crop Season: Crop season during 2011 was relatively favourable from crop point of view. Though, the rains started late, but distribution of the rains during crop season was good. Delayed arrival of rains resulted in some decline in crop area (8.25 m ha according to estimates) (Table 1). The better distribution of the rains during crop season, at the same time, resulted in higher productivity (estimates 1066 kg/ha). This is second consecutive year in which pearl millet productivity at national level has gone beyond 1,000 kg/ha.

Table 1: Advance estimates of area, production and yield of pearl millet

S. No.	State/season	2010-11 (4 th Advance)			2011-12 (DMD estimates)		
		Area (lakh ha)	Production (lakh tons)	Yield (Kg/ha)	Area (lakh ha)	Production (lakh tons)	Yield Kg/ha)
1	Rajasthan	54.89	45.67	832	48.50	42.39	874
2	Maharashtra	10.29	10.97	1066	8.37	7.53	900
3	UP	9.35	15.57	1665	9.76	15.29	1566
4	Gujarat	8.43	12.25	1453	5.59	8.08	1445
5	Haryana	6.61	11.85	1793	5.15	9.27	1800
6	Karnataka	3.10	3.00	968	2.73	2.05	751
7	MP	1.62	3.08	1898	1.90	3.04	1600
8	Tamil Nadu	0.76	1.11	1461	0.36	0.50	1389
9	Andhra Pradesh	0.74	1.04	1405	0.35	0.42	1200
10	Others	0.28	0.21	750	0.18	0.14	778
Total	Kharif	94.3	100.85	1069	80.82	84.19	1042
	Rabi	0.07	0.07	1000	0.01	0.02	2000
	Summer	1.70	3.83	2253	1.71	3.81	2228
	Total	96.07	104.75	1090	82.54	88.01	1066

New releases: Nine cultivars including seven pearl millet hybrids and two OPVs were released and notified in 2011. The domain area of these hybrids includes states of Rajasthan, Gujarat, Uttar Pradesh, Haryana, Punjab, Madhya Pradesh, Delhi, Maharashtra, Tamil Nadu, Karnataka and Andhra Pradesh. Details are given under:

- Pearl millet hybrid **RHB 173 – MH 1446 (93333A x RIB 192) MH** developed at AICPMIP, Jaipur was notified vide S.O. 632(E) 25.3.2011 for cultivation in Rajasthan, Haryana, Gujarat, UP, Punjab, Delhi and MP.
- Pearl millet hybrid **HHB 226 – MH 1479 (ICMA 843-22 x HBL 11)** developed by AICPMIP, Hisar has been notified vide S.O. 632(E) 25.3.2011 for cultivation in the dry areas of Rajasthan, Gujarat and Haryana.

- Pearl millet hybrid **RHB 177 – MH 1486 (ICMA 843-22 x RIB 494)** has been notified for the dry areas of Rajasthan, Gujarat and Haryana vide S.O. 632(E) 25.3.2011. This hybrid has been developed by AICPMIP, Jaipur.
- Pearl millet hybrid **86M64 – MH 1540 & MSH 203 (M096F x M117R)** has been recommended for cultivation for Kharif season in the Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu; and for summer growing areas of Gujarat Maharashtra, Rajasthan and Tamil Nadu. The hybrid is notified vide S.O.283(E) 7.2.2011 and developed by the Pioneer Overseas Corporation, Hyderabad.
- Pearl millet hybrid **PAC 909 - MH 1435** has been recommended for cultivation for Kharif season in the Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu for kharif. The hybrid is notified vide S.O.2326(E) 10.10.2011 and developed by the Advanta, Hyderabad.
- Pearl millet hybrid **86M66 – MH 1617 (M124F x M118R)** has been recommended for cultivation in kharif season for the states of Rajasthan, Gujarat, Uttar Pradesh, Haryana, Punjab, Madhya Pradesh. The hybrid is notified vide S.O.2326(E) 10.10.2011 and developed by the Pioneer Overseas Corporation, Hyderabad.
- Pearl millet hybrid **86M53 – MH 1541 (M096F x M119R)** notified vide S.O. 283(E) 7.2.2011 and developed by the Pioneer Overseas Corporation, Hyderabad is recommended for cultivation in Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu
- Pearl millet composite variety **Mandor Bajra Composite 2 (MBC 2) – MP 489** has been notified vide S.O.2326(E) 10.10.2011 for cultivation in dry areas of Rajasthan, Gujarat and Haryana. The variety is developed by AICPMIP Cooperating center, ARS, Mandor, Jodhpur.
- Pearl millet composite **Pusa Composite 612 – MP 480** has been notified vide S.O. 632(E) 25.03.11 for cultivation in Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu. The variety is developed by AICPMIP cooperating centre at IARI, New Delhi.

Pearl millet cultivars registered: Four pearl millet cultivars viz., Pusa Composite 443 (MP 443), GHB-744 (MH-1272), PHB-2168 and PCB 164 were registered with PPV & FRA raising the total number of registration from AICPMIP centres to 26.

Coordinated testing and evaluation: During the year 2011, a total of 143 experimental new cultivars were evaluated in 13 trials during kharif and summer in a combination of 74 locations in four agro-climatic zones of pearl millet (Table 2). A wide range in their grain and stover productivity was observed among test cultivars.

Table 2: Details of pearl millet experimental cultivar evaluated in 2011 and range in their grain and stover yields

Zone/ season	Trials	No. of entries	Grain yield (kg/ha)	Stover yield (q/ha)
A ₁	Initial Hybrid Trial (Early)	13	1715-2715	40-54
	AHPT Early	7	1896-2563	40-61
A	Initial Hybrid Trial Medium	26	1997-3697	60-91
	Initial Hybrid Trial Late	24	1868-3755	76-131
	Advance Hybrid Trial Medium	6	2767-3144	62-72
	Advance Hybrid Trial Late	12	2503-3553	70-113
	Population Trial	24	1895-3073	53-103
B	Initial Hybrid Trial Medium	26	2172-4919	46-72
	Initial Hybrid Trial Late	24	2654-4986	69-98
	Advance Hybrid Trial Medium	8	3144-3969	55-65
	Advance Hybrid Trial Late	9	3499-4462	75-97
	Population Trial	19	1558-3181	47-85
Summer	Summer Hybrid Trial	25	3522-5444	72-125

Genetic base of newly developed hybrids: A large number of male-sterile (A) and restorer (R) lines were used in hybrids that were tested during 2011. The new hybrids evaluated were based on **90 A-lines (by name) and 103 R-lines** (by name). This is contributing significantly towards genetic diversification of parental lines and ultimately of hybrids in the country.

Variation in grain quality: A total of 49 genotypes were assessed for quality parameters like protein and fat. A wide range in protein (7.35-13.87%) and fat (4.95-7.02%) contents was observed in the test material demonstrating that their existed enough opportunity to select for quality parameters in addition to high grain and stover yields.

Breeder seed production: During the current year the breeder seed production of 15 parental lines (A, B & R) of hybrids and of 11 OPVs was organized. A total of **28.90 q of breeder seed** was produced which is 91% higher over indented quantity of 15.13 q from Department of Agriculture and Cooperation, Ministry of Agriculture.

ICAR-ICRISAT partnership project: Under the partnership projects, a diverse range of breeding material was supplied to AICPMIP centres and trials were conducted for evaluation of selected genetic materials at different locations. In the activity related to supplying improved material to AICPMIP centres, **115 R lines through selected 4 nurseries and 140 B lines through 5 selected nurseries** were grown by AICPMIP breeders for their selection and utilization in

breeding programme. One genetically diverse B-composite having multiple downy mildew resistance was grown in order to derive hybrid parental lines. A total of 184 lines with high iron content and 36 lines with high salinity tolerance were also assessed for their performance at different locations. The number of entries phenotyped for mapping QTLs for drought tolerance was 237 which were accommodated in 11 trials conducted at different locations.

DUS testing and registration of cultivars with PPV & FRA: The DUS testing was undertaken as per approved guidelines of PPV & FRA during kharif 2011. **Five candidate varieties** (KBMS 329, KBR 621, BIO 448 H, KBH BOSS 65 and HT-PM-4201) were tested for second year and **seven candidate varieties** (KBR 780, DGB-013, MRB 2210, MRB 204, BPM 901, GK 1044 and 86M52) were tested for first year' along with 11 reference/example varieties. The testing was done at AICPMIP, Jodhpur and MPKV, Rahuri w.r.t. 26 traits as per approved guidelines for DUS. The monitoring team led by Dr. S. Dass visited the DUS experiments at AICPMIP, Jodhpur on 22.09.2011 and at Rahuri on 8.10.2011.

One-day training on awareness on PPV & FR and DUS testing was organized at AICPMIP, Jodhpur in which 38 researchers from public and private sectors participated.

Screening for diseases: During *kharif* 2011, 296 entries were screened against downy mildew, smut, rust, blast and ergot (Table 3). Five pathology trials were conducted at Mandor, Jaipur, Fatehpur Shekhawati, Hisar, Gwalior, Morena, Jamnagar and Anand in zone A; and at Mysore, Aurangabad, Dhule, Coimbatore and Patancheru in zone B. Data were generated on the disease incidence of experimental cultivars and hybrids parental lines. In addition, surveys were conducted at farmer's field to assess overall disease scenario during the crop season. The diversity in downy mildew was also characterized in pathogen.

The mean downy mildew incidence at 60 days after sowing (DAS) was 3.8% in Zone A and 4.8% in Zone B indicating good resistance to downy mildew in test entries evaluated in Initial Trials. Similarly, mean downy mildew incidence in genotypes evaluated in Advance Trials was <4% in zones A and B. During field surveys, it was observed that downy mildew continued to be the main disease of pearl millet. The range of downy mildew in the farmers' field varied according to the cultivar. In general, on farmer's field the downy mildew disease incidence was less as compared to previous year's field survey. It was observed that blast was becoming more severe in the states like Gujarat, Maharashtra, Rajasthan and Madhya Pradesh. Fields in Tamil Nadu were free from blast incidence. Rust incidence was observed in Gujarat and in Tamil Nadu up to 16%. Some incidence of ergot was observed in Rajasthan, Karnataka and Maharashtra.

Table 3: Details of pathology trials conducted in 2011

Trial	Zone	No. of entries/ treatments	Locations	Diseases
PMPT I	A & B	101	11	Downy mildew, Smut, Rust, Ergot and Blast
PMPT II	A & B	57	11	Downy mildew, Smut, Rust, Ergot and Blast
PMPT III	A & B	25	12	Downy mildew, Smut, Rust, Ergot and Blast
PMPT IVA	A & B	60	12	Downy mildew
PMPT IVC	A & B	25	8	Blast
PMPT V	A & B	6	11	Downy mildew
PMPT VI	A & B	Monitoring	Farmers field	Downy mildew, Smut, Rust, Ergot & Blast
SHPT	A & B	28	2	Downy mildew and rust

Screening for insect-pests: Trials were conducted at Jaipur, Fatehpur Shekhawati and Jamnagar in which 57 genotypes were tested against key pests of pearl millet (Table 4). There was a wide range in insect infestation in various treatments.

Table 4. Summary of entomology trials conducted in 2011

Trial	No. of entries/ treatments	Major insect-pests
PMET I	57	Shoot fly, stem borer, grey weevil, chaffer beetle
PMET II	Monitoring (Res Station)	Shoot fly, stem borer, leaf binder, grass hopper, jassid, thrips
PMET III	Monitoring (Farmers field)	Key pest of pearl millet during the season
PMET IV	7	Shoot fly and stem borer
PMET V	5	Shoot fly, stem borer, white grub, chaffer beetle
PMET VI	11	Storage grain pest of pearl millet
PMET VII	13	White grub

Integrated pest management module i.e. seed treatment with Imidacloprid 600 FS @ 8.75 g/kg seed, spray of endosulfan 0.07% 30 days after germination and

dusting of malathion 5% @ 20 kg/ha at milky grain stage was most effective and economical.

Resource management: During the season, five agronomic trials were evaluated in A₁, A, B and summer zones (Table 5).

SN	Title	Entries/Treatment
1	Response of advance hybrids to nitrogen levels Zone A ₁ Zone A Zone B Summer	9 (cultivar 3, N levels 3) 24 (cultivar 8, N levels 3) 15 (cultivar 5, N levels 3) 9 (cultivar 3, N levels 3)
2	Organic cultivation in pearl millet - chick pea cropping sequence	8
3	Optimization of nutrients under assured moisture available situation	16 (N levels 4, P ₂ O ₅ levels 4)
4	Effect of planting time on productivity of different hybrids and varieties	18 (Dates of sowing 3, cultivars 6)
5	Find out appropriate time of sowing and hybrid to obtain higher productivity of summer pearl millet	9 (Dates of sowing 3, Cultivar 3)

Twelve entries were evaluated at 3 doses of nitrogen (20, 40 and 60 kg N/ha for zone A₁; 30, 60 and 90 kg N/ha for zone A and zone B and 60, 90 and 120 kg N/ha for both the A and B zone for summer season) in order to generate their response data for varietal release. In studies on organic cultivation in pearl millet based crop sequence, application of 7.5 ton FYM/ha recorded maximum grain and fodder yield of pearl millet in Kharif 2011 as well as higher PMYE, net return and B:C ratio of the pearl millet-chick pea crop sequence during 2010-11. Various other production technologies fine-tuned included:

- Optimization of nutrients under assured moisture available situation
- Effect of planting time on productivity of different hybrids and varieties
- Find out appropriate time of sowing and hybrid to obtain higher productivity of summer pearl millet.

Four physiological trials were conducted at Jaipur and Jamnagar during summer and kharif 2011 (Table 6). The hybrids MH 1560, MH 1570 in summer, were found drought tolerant.

Table 6: Summary of physiology trials conducted in 2011

Trial	No. of treatments	Trial
PMPHY I	12	Agronomic performance under drought and normal conditions
PMPHY II	20	Agronomic performance under drought and normal conditions
PMPHY III	7	Effect of foliar spray on agronomic parameters
PMPHY IV	16	Establishment of pearl millet under stress conditions

Technology demonstration: Front-line demonstrations were organized over an area of 312.4 ha during kharif 2011 in Rajasthan, Gujarat, Maharashtra, Karnataka, U.P., Haryana, Tamil Nadu, Madhya Pradesh and Andhra Pradesh in kharif and 32 ha in summer in Gujarat. The yield results indicate a wider yield gap over control plots. The overall yield advantage of 13.7% was observed in FLDs with improved practices over farmers' practice during kharif season. The average yield improvement in summer season was 11.3%.

New initiatives taken

- The website of AICPMIP was launched during 2011, which was regularly updated. Information on varietal choice for different states, production technologies, diseases and insect-pests management has been provided on the website. **Annual Reports, Project Coordinator's Review and other information related to pearl millet has been regularly uploaded on the website.** This site has been **visited about 5000 times** within a year.
- **National Demonstration of Pearl Millet Hybrids** was held at AICPMIP, Jodhpur on 23rd September, 2011 at Jodhpur. The purpose of demonstrations was to educate the farmers and seed production agencies with the latest released hybrids in order to reduce the time gap between hybrid development and its adoption. The demonstrations provided unique opportunity to assess all commercial hybrids of pearl millet simultaneously at one place by all stakeholders. Dr. S.K. Datta, Deputy Director General (Crop Sciences); Dr. A.S. Faroda, former Chairman, ASRB; Dr. Gurbachan Singh, Agriculture Commissioner, DAC, Govt of India; Dr. A.K. Dahama, Vice-Chancellor of the SK Rajasthan Agricultural University, Bikaner; Dr. M.M. Roy, Director, Central Arid Zone Research Institute; Dr. Sain Dass, Former Project Director, Directorate of Maize Research; Dr. R.P. Jangir, Director Research, SK RAU and several state government officials from Rajasthan, Andhra Pradesh, Karnataka and Uttar Pradesh were present

during demonstrations. More than 200 participants including farmers, policy makers, researchers, states department of agriculture, states seed corporations, national seed corporations, seed traders, seed dealers and all 13 Project In-Charges of AICRP on Pearl Millet attended these demonstrations. In addition, and more than 50 Plant Breeders from public and private sectors participated.

- **Pearl Millet News is being launched in this workshop** covering all news on pearl millet research and development. Its e-version has also been made available at AICPMIP website www.aicpmip.res.in

Recognition / Awards

- AICPMIP **Success Story on 'Genetic Diversification Pays Rich Dividends in Pearl Millet'** was highlighted on ICAR website in June 2011. The story highlighted the role of genetic diversification of hybrid parental lines which resulted in controlling the downy mildew epidemics and improving the rate of improvement in pearl millet productivity. The success story can be accessed at <http://www.icar.org.in/en/node/2919>
- All India Coordinated Pearl Millet Improvement Project was **awarded for its outstanding contribution towards registration of crop varieties** with the PPVFRA. Project Coordinator (Pearl Millet) received the award on 11 November 2011 in a function held at New Delhi. A total of 26 cultivars have been registered with PPVFRA and several are in the process of registration. AICPMIP is a nodal agency for undertaking DUS testing of pearl millet.
- Dr. O.P. Yadav was admitted to the **fellowship of the National Academy of Agricultural Sciences (NAAS)** for his significant contribution in pearl millet improvement. He is the youngest Fellow elected during 2011.
- Pearl millet breeders from AICPMIP were **invited to function as resource person in International Training Course** on 'Pearl Millet Improvement and Seed Production' organized from 30 October to 5 November 2011 at Moshi, Tanzania for Eastern and Southern Africa. The training was attended by 37 participants from Eritrea, Ethiopia, Kenya, Tanzania, Sudan, Uganda and Zimbabwe. They were given hands-on training on various aspects that are important in pearl millet improvement, production, protection and seed production.



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