



# Pearl Millet News

All India Coordinated Research Project on Pearl Millet

Jodhpur 342 304, Rajasthan, India

www.aicpmip.res.in

Number: 6

April, 2017

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### From Coordinator's Desk....



Pearl millet is a major warm season coarse grain cereal grown on 26 million ha in semi-arid tropical environments of Asia and Africa. India is the largest producer of this crop, both in terms of area (7.12 million ha) and production (8.06 million t), with an average productivity of 1132 kg ha<sup>-1</sup>. As compared to the early 1980s, pearl millet area in India declined by 26% during 2015-16. The major pearl millet growing states in India are Rajasthan, UP, Haryana, Gujarat and Maharashtra. It is cultivated in the most sandy, infertile soils and droughty environments where no other cereal crop can survive. Even under these conditions, pearl millet yields 500–800 kg ha<sup>-1</sup> of grain. Pearl millet hybrids maturing in 80–85 days, when cultivated as irrigated summer season crop in parts of Rajasthan, Uttar Pradesh, Gujarat and Maharashtra states of India, have demonstrated grain yields as high as 5000–7000 kg ha<sup>-1</sup>.

Pearl millet is principal source of energy, protein, vitamins and minerals for millions of poorest people in the regions where it is cultivated. It generally has 9 to 13% protein, but large variation among genotypes ranging from 6 to 21% has been observed. Pearl millet contains more calories than wheat, probably because of its higher oil content of 5%, of which 50% are polyunsaturated fatty acids. It is rich in calcium, potassium, magnesium, iron, zinc, manganese, riboflavin, thiamine, niacin, lysine and tryptophan. Pearl millet grain is gluten-free and thus is the only grain that retains its alkaline properties after being cooked which is ideal for people with gluten allergies. Pearl millet grain compares favorably with maize and sorghum as high-energy and high-protein ingredient in feed for poultry, pigs, cattle and sheep. Several studies indicated that, compared to maize, pearl millet is 8–60% higher in crude protein, and 40% richer in amino acids such as lysine and methionine.

The National Agricultural Research System (NARS) in India and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) have played a pioneering role in developing a diverse range of improved breeding lines and parental lines of potential hybrids. These lines have been used extensively by breeding programs in both the public and private sectors to develop and commercialize a large number of hybrids (public 70 and private sectors 105 were under cultivation in 2016). These hybrids are cultivated on 70% of the total pearl millet area, leading to 124% increase in productivity since 1986-90. Since its inception in 1974, the All India Coordinated Research Project on Pearl Millet has developed production and protection technologies specific to agro-eco regions of different states. Their application holds the promise of further enhancing the productivity of improved cultivars to commercial farming scales, and hence increasing the profitability of their cultivation, similar to the one witnessed in the seed production sector.

This phenomenal success in pearl millet has been achieved despite the fact that much lesser investments, both in terms of funding and scientific manpower in public sector, have been made as compared to other crops like rice, wheat, maize and sorghum.

Therefore, keeping in view the achievements and future requirements, the major emphasis for pearl millet improvement, production and protection should be on development of Pearl millet hybrids/varieties, production technology to produce more yield per drop of water, high per day productivity, with high degree of resistance to downy mildew and blast and increased concentrations of Fe & Zn. Along with the yield improvement traits, focus should also be on breeding for low anti nutritional factors like phytate and poly phenols in grain and oxalic acid in fodder. Hence, the

twin goals of pearl millet improvement should be Increasing the production and productivity in A<sub>1</sub> zone and enhancing the demand of pearl millet through increased consumption and alternative food uses.

Refinement of technologies for processing for grain and development of value added products along with development of sound extension support for popularization of these technologies and products, spread of pearl millet cultivation in nontraditional areas and pearl millet hybrid seed production in North - Western part of the country is the need of the hour.

## Annual Group Meeting

The 51<sup>st</sup> Annual Group Meeting of All India Coordinated Research Project on Pearl millet was inaugurated on 18th March, 2016 by Dr. K.S. Khokhar, Vice-Chancellor, CCSHAU Hisar (Haryana). The ceremony was witnessed by important dignitaries namely; Dr. I.S. Solanki, ADG (FFC), ICAR, New Delhi, Dr. H.P. Yadav, Project Coordinator, AICRP on Pearl Millet, Dr. S.S. Siwach, Director of Research, CCSHAU Hisar (Haryana), Dr. R.K. Pannu, Dean COA, CCSHAU Hisar and Dr. I.S. Yadav, I/c, Centre for Plant Breeding & Genetics, CCSHAU Hisar. The inaugural ceremony was started with the welcome address by Dr. S.S. Siwach, Director of Research, CCSHAU Hisar. The Project Coordinator, Dr. H.P. Yadav presented the highlights of AICRP on Pearl millet programme for the year 2015-16. In the inaugural address, the hon'ble Vice-Chancellor, CCSHAU Hisar complemented the role of public sector in the identification of heterosis in pearl millet. He advised the pearl millet scientists to provide quality seed to the farmer's.

K.S. Khokhar, Vice-Chancellor, CCS HAU Hisar was the Chief Guest of the Inaugural Function.



- One preliminary training (Farmers field school) was organized by PC Unit, Jodhpur before sowing of pearl millet to aware farmers about sowing time, depth of sowing, line sowing, seed rate, application of fertilizer and seed treatment with bio-fertilizers and other chemicals at village Dheerpura, Jodhpur on dated July 28, 2016.



## Field Days/Kisan Mela/Meetings

- The 5<sup>th</sup> National Seminar on Coarse Cereals Development – Challenges and Opportunities in the Country was organized during March 20-21, 2016 by Bajra Section, Deptt. of Genetics & Plant Breeding, CCSHAU Hisar in collaboration with Directorate of Millets Development. Dr.

- A farmers field day on Pearl Millet hybrids (MPMH 17 & RHB 177) was organized by ICAR-AICRP on Pearl Millet, Mandor at Kiramsariya village under ICRISAT- NFSM Project on September 22, 2016.





- One Field day was organized by Tamil Nadu Agricultural University and Department of Agriculture at Paradapattu village of Vilupuram district to popularize the newly released Pearl millet variety Composite CO10 on October 20, 2016.



- One Field day was organized by AICRP on Pearl millet at A.R.S. Kalai, Aligarh on May 30, 2016.
- Kisan Mela was organized by CCSHAU, Hisar on September 09-10, 2016.



- One day training programme on “Seed Production Technology in Pearl Millet” was organized by Pearl Millet Research Station, JAU at Jamnagar on August 04, 2016. Seventeen RAWE students of B.Sc. (Agri.), College of

Agriculture, JAU, Junagadh were present in this training programme.



- An exhibition was organized by the AICRP on Pearl millet, Vijayapura on Pearl millet technologies along with minor millets of other centre during the Kisan Mela held at UAS, Dharwad on September 24-27, 2016.
- One field day was organized on “Pearl Millet Crop (ABH-1)” at Kojjepalli village, Gooty mandal, Ananthapuram, Andhra Pradesh (at Grain filling stage) by District Agricultural Advisory & Transfer of Technology Centre (DAATT Centre), ANGRAU, Ananthapuram and AICRP on Pearl Millet, ARS, ANGRAU, Ananthapuram centre in collaboration with Department of Agriculture, Ananthapuram on September 16, 2016.



- One field day was organized at Naulakha, Ajmer on September 24, 2016. In which 110 farmers were take active participation and ICRISAT, Hyderabad, PC unit Mandor, SKNAU, Jobner and NGO Scientists and Officers were participated and visited the fields of farmer, as per their views crop was very good and farmers are enjoying the good variety in this area .

### Trainings organized

- Three day training programme on “Varietal Characterization and Seed Production Technology in Pearl millet” was organized on behalf of National Seed Project by Pearl Millet Research Station, Junagadh Agricultural University at Jamnagar on November 28-30, 2016. Twenty farmers of Theni District, Tamilnadu and four Students (girls) of BRS Collage, Dumiyani- Upleta, Rajkot and three students of BRS Collage, Sardagram- Mangrol, Junagadh attended this training programme.

### New Cultivars (Released/Registration)

- Thirteen pearl millet hybrids/varieties were notified and released for cultivation for various agro-ecologies of the country viz., three hybrids MPMH 21, HHB 272 and JKBH 1008 were released for cultivation in drier parts of the country (Rajasthan, Gujarat and Haryana), four hybrids KBH 3940, Bio 8145, 86M82 and 86M84 were released for cultivation in late maturity group for the state of Rajasthan, Gujarat, Haryana, Punjab, Delhi, Uttar Pradesh and Madhya Pradesh, two hybrids Nandi 75 (NMH 82) and 86M13 were released for cultivation in summer growing areas of Gujarat, Rajasthan, Uttar Pradesh, Maharashtra and Tamil Nadu, two hybrids JKBH 1100 and JKBH 1105 were released for the state of Uttar Pradesh. Hybrid Proagro Tejas was released for the drier part of state of Rajasthan, hybrid PHB 2884 was released for the state of Punjab.
- One hybrid Pusa 1201 was identified for Delhi and its adjoining areas.
- CCSHAU Hisar has given non-exclusive licence for seed production and marketing of newly developed hybrids HHB 234 and HHB 272 to M/s Sampoorana Seeds Pvt Ltd., Adoni, and M/s Shri Lakshmi Venkateshwara Seeds Ltd., Kurnool, Andhra Pradesh.
- One germplasm PPMI 904 was registered in NBPGR (Registration number: INGR 16004)

### Appointments

- Dr C. Tara Satyavathi was selected as Project Coordinator for All India Coordinated Research Project on Pearl millet. She joined in the afternoon of March 31, 2017.

### Trainings/ Seminars/Symposiums attended

- Dr. B.S. Rajpurohit, Professor (PB&G), Dr. H.R. Bishnoi, Associate Professor (Plant Pathology), Dr. R.C. Meena, Assistant Professor (Plant Physiology) attended Germplasm Field Day held at CAZRI, Jodhpur on September 24, 2016.
- Dr. M.D. Khanpara, Dr. K.D. Mungra, Dr. D.L. Kadvani, Dr. M.K. Sharma, Dr. R.P. Juneja and Dr. A.C. Detroja attended the 5th National Seminar on “Coarse Cereals Development-Challenges and Opportunities in the Country” held at CCSHAU, Hisar during March 20-21, 2016.
- Mr. Mukesh Sankar S. (Scientist Pearl millet) attended a 21 days training course entitled, 'Recent Advances in Statistical Genetics and Genomics' held at IASRI, New Delhi during January 17, 2017 to February 06, 2017.
- Dr. R.C. Meena, Assistant Professor, PC Unit , Mandor attended National Workshop on "Use of Technical Technology in Higher Education" at Jai Narain Vyas University, Jodhpur, March 27-28, 2016.
- All the Bajra Section Scientists participated in the 5th National Seminar on “Coarse Cereals Development-Challenges and Opportunities in the Country” held at CCS, HAU, Hisar during March 20-21, 2016.
- Dr. Narender Singh, Assistant Scientist (Plant Pathology) attended workshop on “Horticulture Vision-2025” on April 21-22, 2016 at NASC complex, ICAR, New Delhi.
- Dr. R.C. Meena, Assistant Professor, PC Unit, Mandor attended the National Conference of Plant Physiology Challenges in Crop Physiology Research: From Molecular to Whole Plant, organized by Department of Crop Physiology, University of Agricultural Sciences, GKVK, Bengaluru, December 8-10, 2016.
- Dr. R.C. Meena, Assistant Professor, PC Unit, Mandor attended training Programme on IPM in Important Field and Horticultural Crops at ARS Mandor, Agriculture university Jodhpur, Rajasthan on December 28, 2016
- Dr. H.R. Bishnoi, Associate Professor, Dr. R.C. Meena, Assistant Professor, Sh. Manoj Kumar, Assistant Professor, PC Unit, Mandor attended the National Seminar on "Research and Development Advance in Medicinal and



Aromatic Crop, Cultivation, Processing and trade for Prosperity of Indian Farmers" organized by Society For Intergraded Development of Agriculture (SIDA) & Agriculture University, Jodhpur, Mandor on February 1-2, 2017.

- Dr. R.C. Meena, Assistant Professor and Sh. Manoj Kumar, Assistant Professor, PC Unit, Mandor participated in the 5th National Seminar on "Coarse Cereals Development-Challenges and Opportunities in the Country" held at CCS, HAU, Hisar during March 20-21, 2016.
- Sh. Manoj Kumar, Assistant Professor participated in the Global Rajasthan Agritech Meet-2016 (GRAM-2016 ) at JECC, Sitapura, Jaipur organized by Directorate of Agriculture, Government of Rajasthan, Jaipur from November 09-11, 2016.
- Sh. Manoj Kumar, Assistant Professor attended Model Training Course on "Recent Innovations in Organic Farming" organized by Division of Agronomy, ICAR- Indian Agricultural Research Institute, New Delhi from January 2-9, 2017.
- Sh. Manoj Kumar, Assistant Professor participated in the National Seminar on "Climate Resilient Saline Agriculture: Sustaining Livelihood Security" held at SK RAU, Bikaner (Rajasthan) organized by Indian Society of Soil Salinity & Water Quality, Karnal and SKRAU, Bikaner during January 21-23, 2017.
- Dr. M.F. Husain, Dr. Pramod Kumar, Dr. H.K. Singh, Dr. K.D. Dixit and Dr. Maryam Faiyaz attended 4<sup>th</sup> Uttar Pradesh Agricultural Science Congress-2016, at Kanpur March 02-04, 2016.
- Dr. C. Tara Satyavathi and Dr. S.P Singh attended the Platinum Jubilee Celebration of ISGPB and Brainstorming Session on "Role of Plant Breeding and Genetics in Meeting Sustainable Development Goals" held at Dr B.P. Pal Auditorium, IARI, Pusa, New Delhi on February 11, 2017.
- AICRP on Pearl Millet, ARS, Ananthapuram centre has participated in the organization of Exhibition on March 28-29, 2016 at Agricultural Research Station, Ananthapuram, Andhra Pradesh.
- Dr. P. Shanthi, Scientist (Plant Breeding), AICRP-PM, ANGRAU, Ananthapuram centre was attended one National Seminar on "Trends in Farm Mechanization and Engineering Interventions for sustainable Agriculture" organized by ANGRAU at RARS, Tirupati from January 19-20, 2017.

## Pearl Millet Value Addition

- Pearl millet utilization and value addition: PAU composite PCB 164 was used to prepare extruded snacks in comparison to IARI composite PC 443.



## Awards and Nominations

- Dr. Sumer Pal Singh, IARI, New Delhi received 'Reviewer Excellence Award' from Agricultural Research Communication Center, Karnal.
- Prof. S. Chandra Nayaka, AICRP-PM, Mysore is conferred with Best Research Poster Award at 6<sup>th</sup> International Conference on "Plant, Pathogens and People" NASC Complex, New Delhi, 2016.
- Prof. S. Chandra Nayaka, AICRP-PM, Mysore is conferred with Best Research Publication Award by Defense Food Research Laboratory (DFRL), Mysore.

## Visits

- Dr. J.S. Sandhu, DDG (Crop Science) chaired the meeting on Research priorities partnership for increasing pearl millet production in A<sub>1</sub> Zone Jointly organized by ICAR-AICRP (PM) and ICAR-CAZRI Jodhpur on June 18, 2016.



- Dr. J.S. Sandhu, DDG (Crop Science), ICAR, New Delhi, visited AICRP-PM Jodhpur and farmer field at Newra (Osian) on September 14, 2016.





- Dr. P.S. Shekhawat and Dr. P.C. Gupta monitored AICRP trials at IARI, New Delhi on September 09, 2016.



- Dr. Om Vir Singh, Project Coordinator-Pearl Millet (Acting), AICRP-PM, visited AICRP on Pearl Millet, Ananthapuram centre on October 17, 2016.



## Research papers

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- Nandaniya K.U, Mungra K.D. And Sorathiya J.S. (2016). Assessment of combining ability for yield and micronutrients in pearl millet. *Elect Jr. Pl. Br.*, 7(4): 1084-1088.
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- Mungra, K.D., Sorathiya, Parmar S.K. and Khanpara M.D. (2016). Pearl Millet: A Climate smart crop. Paper presented in “5<sup>th</sup> National Seminar on “Coarse Cereals Development-Challenges and Opportunities in the Country” held at CCS HAU, Hisar during March 20-21, 2016, pp: 114-119.
- Juneja R.P., D.L. Kadvani and M.D. Khanpara (2016). Development of eco-friendly management strategies for stored grain pest red rust flour beetle [*Tribolium castaneum* (Herbst)] in pearl millet seed. Paper presented in “5<sup>th</sup> National Seminar on “Coarse Cereals Development-Challenges and Opportunities in the Country” held at CCS, HAU, Hisar during March 20-21, 2016, pp: 177-179.
- Kadvani D.L., I.U. Dhruj, R.P. Juneja and M.D. Khanpara (2016). Management of pearl millet rust through fungicides in artificial inoculated condition. Paper presented in “5<sup>th</sup> National Seminar on “Coarse Cereals Development-Challenges and Opportunities in the Country” held at CCS HAU, Hisar during March 20-21, 2016, pp: 166-172.
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- Prakash G., Srinivasa N., S. Mukesh Sankar, Singh S.P. and C. Tara Satyavathi. (2016). Standardization of pearl millet blast (*Magnaporthe grisea*) phenotyping under artificial conditions. *Annals of Agricultural Research*, 37, 2: 200-205.
- Anuradha N., C. Tara Satyavathi, Meena M.C., S. Mukesh Sankar, Bharadwaj, C., Bhat, J., Singh, O. and Singh S.P. (2017). Evaluation of pearl millet [*Pennisetum glaucum* (L.) R. Br.] for grain iron and zinc content in different agro climatic zones of India. *Indian J. Genet.*, 77 (1): 65-73.



- S.K. Parmar, A.H. Rathod, D.B. Kajale, A.A. Khule, V.H. Kanbi and N.H. Patel (2016). Genetic analysis for tuber yield and its quality traits in potato (*Solanum tuberosum* L.). *Green Farming* 7(5): 1029-1033.
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### Books/Technical bulletins

- Downy Mildew of Pearl Millet and its Management. Shetty H.S., Raj Niranjana S., K.R. Kini., Bishnoi H.R., Sharma R., Rajpurohit B.S., Hash C.T., Mahala R.S., Yadav H.P., Gupta S.K., and Yadav O.P. (2016). pp 53
- Proceedings of 5<sup>th</sup> National Seminar on Coarse Cereals Development: Challenges & Opportunities in the Country (Editors: Dev Vart Yadav, Kushal Raj, V. Malik, Anil Kumar, L.K. Chugh, R. Kumar, Narender Singh, M.S. Dalal and I.S. Yadav) Organized by Bajra Section, Department of Genetics & Plant Breeding Chaudhary Charan Singh Haryana Agricultural University Hisar (Haryana) from March 20-21, 2016 and Sponsored by Directorate of Millets Development, Jaipur, Department of Agriculture, Cooperation & Farmers Welfare, Government of India.



Published by the

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

Mandor, Jodhpur 342 304, Rajasthan, India. Phone: 0291-2571408, Fax: 0291-2571909

**Website:** <http://www.aicpmip.res.in>, **Email:** [pcunit@outlook.com](mailto:pcunit@outlook.com), [aicpmip@gmail.com](mailto:aicpmip@gmail.com)

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