



Pearl Millet News

All India Coordinated Research Project on Pearl Millet

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From Coordinator's Desk....

India witnessed a major breakthrough in total production and productivity of pearl millet after the release of high yielding hybrids. However, this increase has been short lived as majority of the hybrids succumbed to the malady of downy mildew disease during mid seventies. The epidemic of downy mildew was mainly due to narrow genetic base of parental lines of the hybrids. In the present day hybrids the downy mildew disease is under control as the hybrids are based on diverse genetic background. Following the adoption of high yielding and disease resistant cultivars and production technology, pearl millet productivity has been consistently increasing since 1986. During the last 25 years, the productivity has gone up from 539 kg/ha during 1986-90 to 1138 kg/ha during 2012-13 registering a 101% improvement, which is highest among all food crops. 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 during last five decades at national level presents interesting information. During first 25 years (1960-85) of hybrid development, the crop productivity increased @ 6.3 kg/ha/year. This increase went up to over 20kg/ha/year in next 25 years. 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. During 1960-85, 43 cultivars were released in comparison to 107 during 1986-2012. 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 to provide quality seed of hybrids. Thirdly, there has been increasing investment of private sector in pearl millet research and development and finally, greater adoption of production technology along with high yielding hybrids proved synergistic in further augmenting the productivity gains. This quantum of increase assumes greater significance in view that 92% of pearl millet is grown as rainfed and often on marginal lands. This magnitude of improvement 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 dry lands.

Priority is needed for research in product development for A1 zone, biofortification and value addition preferably using conventional breeding and molecular breeding methodologies. A case in point is the ongoing bio-fortification research in pearl millet at ICRISAT, Hyderabad and participating NARS centers. A major thrust is given to bio-fortification under CGIAR funded research programme by ICRISAT. The aim of bio-

fortification in pearl millet is to develop varieties/hybrids with high iron and zinc content.

During the period under report a large number of activities have been performed. Brief resume of the activities is given below:

Submission of report by QRT: The ICAR constituted QRT to review the work done by various centers of AICPMIP for the period 2007 to 2012. The QRT had several meetings and discussions with vice chancellors, director of research and scientist of different SAU's. The QRT has submitted its report. The QRT has remarked that the centers at Hisar and Jaipur can be rated as very good; Dhule, Jamnagar, Mysore and Aurangabad as good; Ludhiana, Bijapur, Coimbatore and Bikaner as satisfactory; and centers at Gwalior and Ananthapur seem to have performed poorly. The performance of Kalai is unsatisfactory.

Annual Workshop of AICRP on Pearl Millet held at Junagadh

Pearl Millet Research Station, Junagadh Agricultural University, Jamnagar organized 48th Annual Group Meeting of All India Coordinated Pearl Millet Improvement Project (ICAR) during 22-24 March 2013 at the beautiful campus of JAU, Junagadh. The group meeting was inaugurated on 23rd March,

2013 by Hon'ble Minister of Agriculture (State), Govt. of Gujarat Shri Govindbhai Patel. The ceremony was witnessed by important dignitaries of JAU Junagadh and ICAR, New Delhi. Dr. N.C. Patel, Vice-Chancellor, JAU, Junagadh, Dr. R.P. Dua, ADG (FFC), ICAR, New Delhi, Dr. M.M. Roy, Director CAZRI & Project Coordinator (Pearl Millet) Mandor, Jodhpur and Dr. C.J. Dangaria, Director of Research and Dean PG, JAU, Junagadh. On first day 22 March, 2013, before formal inauguration of the group meeting, an interactive session was made with Dr. Atanu Purkayastha, Joint Secretary, DAC, Govt. of India, New Delhi.

National Demonstration Organized

The AICRP on Pearl Millet, Jodhpur organized a National Demonstration of Pearl Millet Commercial Hybrids on 21st September, 2013 at Jodhpur. Dr. A.S. Faroda, Former Chairman, ASRB and Founder Vice Chancellor, MPUAT, Udaipur addressed the gathering and asked researchers and scientists to develop the varieties according to suitability of climate in Western Rajasthan. He also emphasized that Rajasthan State Seed Corporation need to play a catalytic role in production of seed of hybrids developed by ICAR and SAUs to further enhance the pearl millet productivity in the country.

- Dr. B.S. Rajpurohit, Professor (PB&G), AICRP on Pearl Millet, Mandor highlighted that these demonstrations





provided unique opportunity to assess all commercial hybrids of pearl millet simultaneously at one place by all stakeholders. Such demonstration provided a whole range of choices in terms of maturity, plant type, seed size and color and different combinations of grain and dry stover yields.

- Dr. K.R. Solanki, Former Assistant Director General (NRM), stressed upon the role of hybrids to enhance the crop productivity under rainfed conditions in Rajasthan. He also informed that Rajasthan has more than 50% of pearl millet area in the country.
- Dr. P. Joshi, Former Dean and Former Director Research, SKRAU, Bikaner; Dr. Govind Singh, Director Research, SKRAU, Bikaner; Dr. A.K. Purohit, Former Director, ASCDEC and Former Director, Extension Education, SKRAU, Bikaner; Dr. S.C. Bhandari, Ex. Dean, PGS, MPUAT, Udaipur gave their remarks on the occasion.

Field Days /Kisan Mela organised

- One Field day was organized under the HOPE Project at Siwani (Haryana) on 27 Oct. 2013.



- Two hundred FLD were conducted to demonstrate newly developed hybrids and production technology

at Bhiwani and Mohindergarh districts in Haryana. The trials were conducted under HOPE Project. In addition 100 FLD on above aspects were conducted in all the bajra growing districts of Haryana.

- SKRAU Bikaner organized 20 demonstrations on pearl millet production technology and 1144 field trials / demonstrations under HOPE Project in the project area.
- One field day was organized at Gotan (Nagaur) under HOPE project during 2013 by SKRAU, Bikaner.
- Two days *Kisan Mela* was organized on 13-14 March 2013 at CCS HAU, Hisar.



Trainings organized

- Third International Training Course on “Pearl Millet Hybrid Parents Improvement and Seed Production” (Offered by the CGIAR Research Program on Dryland



Cereals) was organised during 10 to 19 September, 2013 at ICRISAT, Patancheru, Hyderabad. Thirty trainees participated in the training course from different states of India as well as abroad.





- One-day training programme for awareness on Protection of Plant Varieties and Farmers' Right and DUS testing was organized at AICRP on Pearl Millet, Mandor, Jodhpur on Sept. 20, 2013 in which 21 scientists/technical persons (17 public, 4 private) were practically trained for recording observation in pearl millet as per DUS guidelines given by PPV & FRA.
- SKRAU, Bikaner organized two trainings under organic farming project at Jaisalmer and Churu district.
- The Department of Plant Breeding & Genetics RVSKVV, Gwalior conducted one day awareness training on PPV & FR Act. 2001 on 25-01-2014. Hon'ble Vice Chancellor RVSKVV, Gwalior inaugurated the training. They have unfolded one published booklet of lectures on PPV & FR Act. 2001.

Pearl Millet Utilization and Value addition:

Dr. P. Shanthi (Plant Breeding) Ananthapuram, Delivered a Lecture on "Nutritional Importance of Pearl Millet" on 22nd January 2014 at KVK, Reddipalli, Ananthapuram, A.P. in the Training Programme on "Preparation of Bakery Products by using Millets" given to women farmers and organized jointly by RKVY and KVK, Reddipalli, Ananthapuram from 20th to 24th January 2014.



New Cultivars Released/ Registration with PPV & FRA

- Five hybrids were released and notified in 2013-14 for different growing regions and seasons. For kharif season hybrids MPMH 17 (MH 1663), 86M89 (MH 1747) and GHB-905 (MH 1655) were released and notified for zone A (high rainfall area of north and north-western India) comprising the states of Rajasthan, Gujarat, Uttar Pradesh, Haryana, Punjab, Madhya Pradesh and Delhi. Hybrid HHB 234 (MH 1561) was released and notified for zone A1 (low rainfall areas of northwestern India) comprising states of Rajasthan, Haryana and Gujarat. Hybrid Nandi-72 (MSH 238) was released and notified for summer growing areas of Gujarat, Tamil Nadu, Rajasthan and Maharashtra.
- Hybrid KBH 108 (MH 1737) for zone A (high rainfall area of north and north-western India) and variety Dhanlakshmi for Maharashtra, Rajasthan, Gujarat, Uttar Pradesh, Haryana, Punjab, Madhya Pradesh and Delhi were recommended for notification by CSC.
- During the year under report eleven hybrids/parental lines of pearl millet viz; HHB 197 (MH-1302), Proagro 555 (MSH 16) (PB 727), GHB-732 (MH-1307), GHB-757 (MH-1328), KPMH-1, 86M52, MRB 204, MRB 2210, BPM 901, Nirmal-40 (NPH-40) and NB-14A were registered with PPV & FRA. So far 55 cultivars and parental lines (33 Public and 22 private) have been registered with PPV and FRA and several are in the process of registration.

Appointments

1. Dr. H. P. Yadav Professor & Head cum Chief Scientist (Bajra) at CCS HAU Hisar joined as Project Coordinator,

at AICRP on Pearl Millet, Jodhpur. Dr. Yadav assumed office with effect from 10.2.2014. He has vast research experience of 36 years in the field of pearl millet improvement. Dr. Yadav has contributed significantly in pearl millet improvement by way of developing 18 hybrids / varieties. He has 180 publications to his credit. His significant achievements / award / recognitions are listed below:

- Recognized as Best Teacher of the CCS HAU for the year 2000.
 - Received ICAR Team Research Award for the biennium “1999-2000” for outstanding contributions in the field of pearl millet improvement.
 - Member of the team receiving Chaudhary Devi Lal Award for the Best All India Coordinated Research Project for the year 2003 by Indian Council of Agricultural Research, New Delhi.
 - Leader of the pearl millet team of CCS HAU receiving certificate for best “AICRP Pearl Millet Centre” by the Millet Research Society and AICPMIP (ICAR), Mandor on 12.4.06 at Junagadh Agricultural University, Junagadh.
 - Received certificate from Project Coordinator for making outstanding contribution in the field of pearl millet Improvement during 2010.
 - Received certificate of recognition from Project Coordinator pearl millet for taking initiative to promote adoption of pearl millet hybrids during 2011.
 - Leader of the team of CCS HAU, Hisar, declared “Best AICRP Pearl Millet Centre” by the AICPMIP (ICAR) during 2012.
2. Mr. Manoj Kumar Assistant Professor (Agronomy) joined the project at AICRP Pearl Millet, Jodhpur on 29.7.2013.

Promotions

- Dr. G.R. Kherwa, Dr. G.L. Yadav, Dr. B.L.Tandi and Dr. P.S. Shekhawat has been promoted as Professors w.e.f. Jan., 2009.
- Dr. B.S. Rajpurohit, Dr. L.D. Sharma, and Dr. P.C. Gupta has been promoted as Professors w.e.f. May., 2011.
- Prof. L.D. Sharma Plant Breeder Millet, RARI Durgapura took the charge of AICRP on Pearl Millet on 1st February, 2013.
- Dr. M. Subba Rao, Principal Scientist (Plant Breeding) transferred from ARS, Nellore to ARS, Perumallapalle

as Principal Scientist (Millets) & Head, ARS, Perumallapalle, Tirupati in ANGRAU and joined the post on 16.06.2013.

- Dr. A.C. Mathur, Professor (Plant Pathology), joined the project at RARI, Durgapura on 3.7.2013.
- Dr. (Mrs.) Sunita Gupta, Professor (Plant Physiology), joined the project at RARI, Durgapura on 12.8.2013.

Superannuation

- Dr. M.S. Rathore Professor Agronomy on 31.3.2013.
- Dr. (Mrs.) Asha Shivpurai, Professor Plant Pathology on 30.6.2013.
- Dr. Yogendra Singh, Professor & Plant Breeder Millet on 31.01.2014.
- Shri S.D. Atara, Associate Research Scientist (Plant Breeding), Pearl Millet Research Station, JAU, Jamnagar volunteer retired on 28th February, 2014.

Meetings/Trainings/ Seminars/ Symposiums attended

- Scientists of Bajra section CCS HAU Hisar led by Drs HP Yadav, Anil Kumar, LK Chugh, Ramesh Kumar, Kushal Raj and Dev Vart participated in National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.



- Dr. P.R. Padhar, Research Scientist (Pearl Millet), Sh. J.S. Sorathiya, Asstt. Research Scientist (PB), Mr. Bandenamaj Athoni, Jr. Breeder (Pearl millet), Dr. P. Shanthi and Mr. Bal Chandra (Pearl Millet Breeder) of Godrej Seeds & Genetics Limited participated in Third International Training Course on Pearl Millet Hybrid



Parents Improvement And Seed Production held at ICRISAT from September 10-19, 2013.

- Dr. Dev Vart, Assistant Scientist, Bajra section, CCS HAU, Hisar participated in Refresher course on “Communication Skills and Technical Writing” conducted by the Academy of Agricultural Research and Education Management, DHRM, CCS HAU, Hisar from May 8-28, 2013.
- Dr. Surendra Kumar (Principal Breeder Pearl Millet) of Godrej Seeds & Genetics Limited participated in Global Millet Meet held at DSR Hyderabad from December 18-20, 2013.
- Dr. Ridhi Shankar Sharma & Dr. R.S. Bajia, Senior Technical Assistants attended the DUS Training on 20 Sept., 2013 held at AICRP on Pearl Millet, Jodhpur.

Foreign Visits

- Dr. P.S. Shekhawat, Professor (Agronomy), SKRAU Bikaner attended the International meeting of HOPE project for planning HOPE phase II at Nairobi (Kenya) during 1-3rd July, 2013.

Awards and Nominations

- The poster titled “Variability for iron and zinc content in diverse pearl millet genotypes” by Dev Vart Yadav, Mukesh kumar, R. Kumar, L.K. Chugh, Anil Kumar, H.P. Yadav was adjudged 2nd best in the theme 'Crop Improvement For Stress Management And Biofortification' in National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.
- Dr. Surendra Kumar (Principal Breeder Pearl Millet) of Godrej Seeds & Genetics Limited, nominated to Advisory Committee of Hybrid Parent Research Consortia at ICRISAT for 2014-2015.
- Dr. Surendra Kumar nominated for outstanding New Comer for Godrej Awards 2014.

Research papers

- Bhadalia AS Dhedhi KK and Joshi HJ (2013). Heterosis studies in diallele crosses of pearl millet. J. Agric. Res. Technol., 38(3): 360-365.
- Dangaria CJ Dhedhi KK Raghavani KL Mungra KD Sorathiya JS Atara SD and Bunsu BD (2013). A high yielding downy mildew resistant pearl millet hybrid GHB-732 for Gujarat, India. Agric. Sci. Digest, 33(3): 219-222.

- Guggari AK and Patil MB (2013). Performance of different maturity pigeon pea varieties in pearl millet + pigeon pea (2:1) intercropping system in Northern Dry Zone of Karnataka. Crop Research, 46(1,2 & 3): 88-93.
- Gupta PC and Narayan S (2013). Stability behavior of hybrids and populations of pearl millet in arid region of Rajasthan. Green Farming Int. J., 4(1): 49-51.
- Gupta PC Narayan S Shekhawat PS and Jakhar ML (2013). Genetic expression of yield ability in wheat (*Triticum aestivum* L.) under sulphhydryl enriched biophysio-environment. Inroads, 2(1): 16-19.
- Gupta PC Narayan S Shekhawat PS and Jakhar ML (2013). Pearl millet: A Compulsory crop in hyper arid zone 1C. LS-An International Journal of Life Sciences, 2(1): 58-66.
- Gupta SK Rathore A Yadav OP Rai KN Khairwal IS Rajpurohit BS and Das RR (2013). Identifying mega-environments and essential test locations for pearl millet cultivar selection in India. Crop Science 53: 2444-2453.
- Kumhar SR Rajpurohit BS and Choudhary BR (2013). Comparative performance of pearl millet [*Pennisetum glaucum* (L.) R. Br.] composite variety MBC-2 with other varieties in drier part of Rajasthan, Gujarat and Haryana. Green farming 4(4): 421-423.
- Meena RL Mathur AC and Majumdar VL (2012). Management of Pearl Millet smut through cultural practices & fungicides. Indian Phytopathology, 65(3): 268-271.
- Rai KN Yadav OP Rajpurohit BS Patil HT Govindraj M Khairwal IS Rao AS Shivade H Pawar VY and Kulkarni MP (2013). Breeding pearl millet cultivars for high iron density with zinc density as an associated trait. SAT eJournal 11.
- Rajpurohit BS Beniwal BR Yadav OP Khairwal IS Bishnoi HR Rathore MS (2013). Notification of crop varieties and registration of Hybrid MPMH 17. Indian J. Genet., 73(4): 466-467.
- Shekhawat PS Shaktawat RPS and Rathore DS (2013). Effect of nitrogen and potassium levels on growth and yield of barley (*Hordeum vulgare* L.) in loamy sand soil of Rajasthan. Environment and Ecology, 31(3): 1303-1306.
- Shekhawat PS Shaktawat RPS Kumar V and Pareek D (2013). Effect of different agronomical practices on amelioration of drought stress in pearl millet under hyper arid region of Western Rajasthan. Green Farming, 4(2): 143-146.



- Vagadiya KJ Dhedhi KK and Joshi HJ (2013). Genetic variability, heritability and genetic advance of grain yield in pearl millet. *Agric. Sci. Digest*, 33(3): 223-225.
- Yadav OP Rai KN Bidinger FR Gupta SK Rajpurohit BS Bhatnagar SK (2012). Pearl millet (*Pennisetum glaucum*) restorer lines for breeding dual-purpose hybrids adapted to arid environments. *Indian Journal of Agricultural Sciences*, 82(11): 922-927.
- Yadav OP Rajpurohit BS Kherwa GR Kumar A (2012). Prospects of enhancing pearl millet (*Pennisetum glaucum*) productivity under drought environments of North-Western India through hybrids. *Indian J. Genet.*, 72(1): 25-30.

Paper contributed in seminar/symposium:

- Dehinwal K Yadav YP Yadav HP and Dev Vart (2014). Variability and association studies for biofortification traits in pearl millet. In National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.
- Dev Vart Kumar M Kumar R Chugh LK Kumar A and Yadav HP (2014). Variability for iron and zinc content in diverse pearl millet genotypes. In National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.
- Jain S Sharma B Kumar M Goyal P Verma K and Chugh LK (2013). Biochemical studies on shelf life of Pearl Millet [*Pennisetum glaucum*(L.) R. Br.] flour. In Proc. International Conference on Role of Plant Biochemistry and Biotechnology in Food and Nutritional Security. Sri Venkateshwara University, Tirupati, India. December 11-14, 2013. p114.
- Kumar A Dev Vart Kumar R and Yadav HP (2014). Comparative performance of hybrids and populations under different management conditions for sustainable pearl millet production. In National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.
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- Rani A Yadav RC Yadav NR Dev Vart Kumar A Kumar R and Yadav HP (2014). Use of molecular markers in pearl millet [*Pennisetum glaucum* (L.) R. Br.] to improve terminal drought stress. In National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.
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- Singh J Kumar A Singh B and Yadav SS (2014). Phosphorus management in mustard-pearl millet cropping system in south-western Haryana. In National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.
- Singh S Yadav YP Yadav HP Dev Vart and Yadav N (2014). Studies on morphological characterization of pearl millet [*Pennisetum glaucum* (L.) R. Br.] hybrids and their parents. In National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.
- Yadav R Nanwal RK and Kumar A (2014). Maximization in pearl millet productivity through potash, zinc and



biofertilizer application. In National Seminar on Reorientation of Agricultural Research to Ensure National Food Security, organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government of India at Hisar on January 6-7, 2014.

Oral presentation/Lectures

- Dr. B.S. Rajpurohit delivered a lecture on "Multilocation testing and cultivar release in pearl millet" in 3rd International training course on "Pearl Millet Hybrid Parents Improvement and Seed Production" held at ICRISAT, Patancheru from 10-19 Sept. 2013.
- Dr. Anil Kumar delivered a lecture on "Improved agronomic practices in pearl millet in the 3rd International Training Course on "Pearl Millet Hybrid Parents Improvement and Seed Production" held at ICRISAT, Patancheru from 10-19 Sept. 2013,.
- Dr. P Shanthi, Delivered a Lecture on "Techniques to be followed in groundnut seed production" in "Agricultural Technology Management Agency (ATMA)" sponsored farmers training programme conducted at ARS, Ananthapuram on 10th December 2013.
- Oral paper presented in "National Seminar on Reorientation of Agricultural Research to Ensure National Food Security", organized by Directorate of Research, CCS HAU Hisar and sponsored by Department of Science and Technology, Government

of India at Hisar on January 6-7, 2014 by Dr. Dev Vart, Assistant Scientist, Bajra section, Department of Genetics and Plant Breeding, CCS HAU, Hisar entitled 'Genetic analysis for micronutrients and grain yield in pearl millet hybrids involving diverse cytoplasmic male sterile seed parents (Authors: Sharma S, Yadav HP Kumar R and Dev Vart).

- Kumar A Dev Vart and Yadav HP (2013). Present scenario and status of pearl millet production. In Proc. Training on Post Harvest Processing and Value Addition of Pearl millet conducted by Centre of Excellence on Pearl millet, Department of Food and Nutrition, I.C. College of Home Science, CCS HAU Hisar: 5-9.

Books/Technical bulletins published:

- Dhedhi KK Padhar PR and Ghelani YH (2013). "Gujaratna Mukhy Pakoni Beej Utpadanp Technology". Booklet, Published by Seed Technology Research Unit, Pearl Millet Research Station, JAU, Jamnagar.
- Mungra KD Kadvani DL Dhedhi KK Ghelani YH Borkhataria PR Atara SD Sorthiya JS Mehta AC Juneja RP Mungra LK and Padhar PR (2013). "Research Achievements in Pearl Millet". Booklet, Published by Pearl Millet Research Station, JAU, Jamnagar.
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