Millet Research Reports

Genetics and Plant Breeding

Evaluating Farmers' Pearl Millet Cultivars: Results from a Workshop on Farmer Participation in Breeding and Conservation of Genetic Resources

A Christinck[1], K vom Brocke[2], O P Yadav[3], and E Weltzien R[4] (1. Department of Agricultural Communication and Extension, University of Hohenheim (430A), 70593 Stuttgart, Germany; 2 Institute of Plant Breeding, Seed Science and Population Genetics, University of Hohenheim (350), 70593 Stuttgart, Germany, 3. Central Arid Zone Research Institute (CAZRI), Jodhpur 342003, Rajasthan, India; 4. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), BP 320, Bamako, Mali).

Institutional framework

On 11 September 1998, 17 scientists from India, Germany, and the United States attended a workshop organized within the framework of the project 'Enhancing Quality, Diversity and Productivity of Farmers' Pearl Millet Genetic Resources in Rajasthan, India'. This project was a collaborative activity of ICRISAT, and the University of Hohenheim, Germany, funded by the German Federal Ministry for Economic Cooperation and Development, Bundesministerium fur wirtschaftliche Zusammenabeit und Entwicklung (BMZ).

The workshop participants were plant breeders and germplasm specialists, representing the Central Arid Zone Research Institute (CAZRI), the Rajasthan Agricultural University (RAU), the National Bureau for Plant Genetic Resources (NBPGR), and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

Objectives

The objectives of the workshop were to describe the effects of farmers' own seed management practices on pearl millet [*Pennisetum glaucum* (L.) R. Br.] populations and to identify possible implications for breeding and conservation of genetic diversity in this crop. Farmer cultivars were compared with selected improved varieties that had similar characters or were being used in the region.

Evaluation

Fifteen demonstration plots were grown at the Agricultural Research Station Mandore (RAU) near Jodhpur, Rajasthan. The plant material (Table 1) included 2 traditional landraces, 5 improved varieties, and 8 farmer cultivars, samples of which had been collected over a period of 3 years (1994-96). All plots were grown without irrigation and with moderate fertilizer application.

Results

The overall performance of all cultivars was influenced by the unfavorable rainfall conditions of the season (90 mm of erratic rainfall after sowing). Therefore, symptoms of severe drought stress were observed in most of the plots at the time of evaluation, and flowering was delayed. The landrace populations and those improved populations that had been developed mainly from landrace material performed better under these conditions than other improved varieties. This observation confirms the often-stated opinion of farmers, that the risk of failure is higher in most improved varieties than in their landraces.

Effects of farmers' seed management on yield, morphological traits, earliness, quality aspects, and variability were observed. The farmer strategies were:

- Mixing exotic material into a landrace over 3 consecutive years
- Mixing exotic material into a landrace, followed by positive mass selection by the farmer
- Mixing seed from different sources
- Growing seed of an improved variety over several years under farmers' conditions

The improved cultivars recommended for western Rajasthan (FCB-IC 846 and Raj 171) performed relatively well, whereas the other three were clearly not adapted to the local growing conditions.

Group discussion

Participants agreed that farmers' participation could contribute to the quality of agricultural research. They identified the following topics that have possibilities for farmers' participation:

- Understanding farmers' strategies
- Identifying objectives for breeding programs and selection for local adaptation
- Developing strategies for germplasm collection/ evaluation

Table 1. Pearl millet genotypes evaluated by workship participants at Rajasthan Agricultural University, Agricultural Research Station, Mandor, Jodhpur, Rajasthan, rainy season 1998.

Landraces (ICRISAT genebank)	
Nokha	Landrace from Nokha, Bikancr district (annual rainfall <350 mm)
Jakharana	Landrace from Jakharana, Alwar district (annual rainfall >650 mm)
Farmers' cultivars	
4 samples	Collected from three farmers in the village Aagolai (Jodhpur district), representing different seed management strategies
2 samples	Collected from one farmer in the village Kichiyasar (Bikaner district), representing seed grain from two different seasons
2 samples	Collected from one farmer in the village Nunwa (Ajmer district), representing grain from two different seasons following distribution of the varieties RCB-IC 911 and CZP-IC 923
Improved varieties and hybrids (adapted from Yadav and Weltzien 1998)	
Raj 171	A full-season grain and stover variety, bred from selections from Inter-Varietal Composite, released in 1992
ICMV 155	A full-season grain and stover variety, bred from 59 plants of New Elite Composite C4 (ICMV 84400), released in 1991
RCB-IC 911	Rajasthan Composite, bred by random mating 140 S_1 progenies of RCB-IC 901 (Bold Seeded Composite of ICRISAT)
CZ-IC 923	Bred by random mating 21 S_1 progenies selected from ICMV 82132 x ICMV 87901, released in 1996
FCB-IC 846	A product of RAU-ICRISAT collaboration, based on Early High Tillering Population (CO) selected for grain yield

It was suggested that participatory variety selection could be a possibility for the higher rainfall areas of Rajasthan, or where farmers have access to irrigation. For the marginal regions of western Rajasthan, identifying ready-made solutions seems to be more difficult. Participants, therefore, suggested that farmer participation in earlier breeding stages could help to produce adapted plant material. Germplasm specialists underlined the need to conserve landraces from those regions where the mixing strategy is prevalent. Institutional challenges emerging from more farmer-oriented research work were also discussed.

A detailed workshop report is available free of cost from the authors.

References

Yadav, O.P. and E. Weltzien R. 1998. New pearl millet populations for Rajasthan, India. Integrated Systems Project Report Series 10. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Patancheru 502 324, Andhra Pradesh, India.

Agronomy

Participatory Evaluation of Pearl Millet Cultivars in Northern Nigeria

R Tabo[1], A O Ogungbile[2], S C Gupta[3], and O Ajayi[3]
(1. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), BP 320, Bamako, Mali; 2. Institute for Agricultural Research, Ahmadu Bello University, PMB 1044, Zaria, Nigeria; 3. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), IITA Office, PMB 3491, Kano, Nigeria).

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is the most important food crop in the drier areas of the Sudan Savanna agro-ecological zone of Nigeria where rainfall is inadequate for such other cereal crops as maize (*Zea mays* L.) and sorghum. Major constraints to millet production are poor soil fertility, drought, and biotic stresses e.g., *Striga* and downy mildew [*Sclerospora graminicola* (Sacc.) J. Schrot.] (Singh and Thakare 1986; Yusuf 1996). Although many improved varieties have been developed and released by the Institute for Agricultural Research (IAR), Zaria, Nigeria, only Ex-Bornu (SAMMIL-1) has been adopted by farmers.