

Evaluation of pearl millet as a potential grain crop for eastern Australia

P.D. Coaldrake^a, C.J. Pearson^a, M.J.T. Norman^a, D.H. png^a, P. Nixon, K. Pritchard, D.K. Muldoon and J. Ryan

^a Department of Agronomy and Horticultural Science,
University of Sydney

^b Victorian Department of Agriculture

^c New South Wales Department of Agriculture

Pearl millet (*Pennisetum americanum* L.) is the fourth most important cereal in the tropics and the only major cereal for which production in the tropics accounts for more than half of total world production. Nonetheless, it has potential as a grain crop in temperate climates because its grain filling period is lengthened but rate of filling is not affected by cool temperatures (1). This, together with its reputation for drought tolerance, led to an evaluation of pearl millet as a potential grain crop in south eastern Australia.

Methods

As the first stage of the evaluation, genotypes were introduced from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India, the USDA and Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres (IRAT) in France. These were grown from July 1980 to July 1981 in a quarantine glasshouse at Camden (lat. 34°S) where day/night temperatures were 30/23 ± 4°C and daylengths ranged from 10.9 to 15.2 h. Inbred lines (4 replicates each) from ICRISAT and IRAT and over 700 individuals from the U.S. Tift S1 germplasm (selected from a population of 2700 on the basis of seedling vigour) were observed for date of anthesis; at maturity we measured 14 characters relating to yield and morphology. Data were subjected to canonical variate and principal component analysis.

Numerical analysis permitted identification of 13 representative genotypes varying in growth duration from 61 to 153 days from emergence to anthesis. These were grown from October 1980 at four locations: Narrabri (lat. 30°S), Trangie (32°S), Camden (34°S) and Kyabram (36°S).

Results and Discussion

Growth duration (days to anthesis) under glasshouse conditions was not correlated to maturity in the field. Moreover, there was substantial variation in the rate of development between field sites: there was a 25% range between sites in temperature sum required for genotypes to reach anthesis. Individual grain weights under glasshouse conditions predicted the ranking among genotypes in the field, although seeds were smaller and more variable in the field.

Glasshouse measurements have allowed us to describe the variation in morphology and yield that exists in pearl millet. Field observations show genotype rankings that are consistent over the latitudinal range used and indicate that some of the selections are appreciably superior to genotypes currently available in Australia.

1. Fussel, L.K., Pearson, Craig J., and Norman, M.J.T., 1980. J. Expt. Bot. 31: 621-633.