Genetic Analysis and Biofortification of Pearl Millet for Nutritional Values

Elfadil Bashir[1], Heiko Parzies[2], Bettina Hausmann[3], Abdelbagi Ali[4]

[1] University of Hohenheim, Institute of Plant Breeding, Seeds Science and Population Genetics, Germany
[2] University of Hohenheim, Department of Plant Breeding, Seed Science and Population Genetics, Germany
[3] Icrisat, Niger,
[4] Agricultural Research Corporation, Biotechnology Lab, Sudan

Abstract

Pearl millet (*Pennisetum glaucum* (L) R. Br.) is one of the most important cereal crops cultivated in the arid and semi-arid tropics of Asia and Africa, due to its unique adaptation to extreme environments. Currently, it is produced on about 26 million ha. Recently, efforts have been made by breeders worldwide towards the development of high yielding cultivars with elevated levels of micronutrients to provide sustainable solutions to some of the health-related problems associated with micronutrient malnutrition and food security. The aim of the current study was to identify promising genotypes that can be used as donors of important micronutrients in future breeding programs. 225 accessions collected from different geographical zones of western Sudan's Darfur and Kordofan states as well as from ICRISAT, Niger were used in the study. The accessions were evaluated for morphological and agronomic traits in three different locations. Grains of the accessions were then analysed for macro and micronutrients (Fe, Zn, Ca, P, K, Mg, Mn, S, Na, and Cu). The results showed highly significant variation ($p < 0.01$) among the accessions for the different elements studied. A large variability among the accessions was also observed for most of the other morphological and agronomic parameters such as grain yield, days to flowering, among others, which has an implication on a breeding program's objective setting. The promising accessions identified in this study could provide valuable sources of variability for macronutrients as well as micronutrients that can be used in breeding programs in an effort towards fighting malnutrition.

Keywords: Genetic diversity, germplasm, macro and micronutrients, malnutrition

Contact Address: Elfadil Bashir, University of Hohenheim, Institute of Plant Breeding, Seeds Science and Population Genetics, Fruwirthstrasse 21, 70599 Stuttgart, Germany, e-mail: adam@pz.uni-hohenheim.de