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Characterisation of Sudanese Pearl Millet Germplasm as Source in Breeding for Adaptation to Climate Change

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Abstract

Pearl millet (*Pennisetum glaucum* [L.] R. Br.) is one of the most important crops for millions of poor rural households in the whole Sahelian region from Senegal to Sudan. The objective of this study was to morphologically characterise and identify superiorly adapted pearl millet genotypes which can be used as sources of resistance to climate-change-related stresses and for other consequent breeding activities. A set of 225 pearl millet accessions collected from different geographical zones of Sudan, including 10 accessions provided from ICRISAT, Niger were planted in three different locations in Sudan, in lattice design with three replications during 2010 rainy season. Twenty morphological and agronomical traits were collected from each accession under study. The results showed wide range of variability among the accessions for all of the morphological traits investigated such as, days to 50 % flowering, plant height, panicle length, 1000 seeds weight and grain yield. Different accessions possess high potential for selection of desirable traits. B9 Tabi is the earliest genotype in term of days to flowering (62 days), while HSD 7197 was the shortest genotype with a height of 118 cm. The early maturing genotypes recorded by PE 08030, HSD 2166 and B9 Tabi while HSD 2168 and HSD 2281 were the highest yielding genotypes. There were 19 genotypes had 5 to 6 tillers while 35 % of the genotypes had 4 tillers. 30 % of genotypes had panicle length range from 25 to 34 cm while 6 % had medium to long bristle length. 11 % of the genotypes with white seeds colour while 26 % had gray seed colour. However, high grain yield was associated with early flowering genotypes. High heritability was estimated for most of the traits under study such as days to flowering ($h^2 = 0.80$), panicle length ($h^2 = 0.85$), seeds colour ($h^2 = 0.73$) and spike density ($h^2 = 0.83$). This study provided useful information about the investigated genotypes in terms of morphological characterisation and phenotypic plasticity and therefore, the most valuable and promising accessions can be recommended for commercial cultivation and/or used as source of desirable traits for further breeding programs.

Keywords: Climate change, germplasm, morphological characterisation