GENETIC DIVERSITY AMONG SOME EGYPTIAN BREAD WHEAT LANDRACES IN DROUGHT TOLERANCE

By

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ABSTRACT

Genetic diversity analysis is fundamental for successful crop improvement. The present study aimed at evaluating genetic diversity of 20 Egyptian bread wheat landraces and two cultivars, identifying landrace(s) showing tolerance to drought and/or carrying one or more desirable traits using morphological and SSR markers. Wheat accessions were planted in the field under normal and water stress conditions and their morphological traits (13) were recorded. The studied phenotypic traits illustrated significant differences among the wheat accessions. Water stress caused a reduction in all studied traits, except grain protein content (GPC), which was increased. The landrace G17 had the highest GPC (20.87%). The highest yielding genotypes were G22, Sakha 94, G2 and G3. The highest drought tolerant genotypes in this study were Sakha 94 and the landraces G2, G3, G4, G7, G12 and G15 and therefore could be recommended to future wheat breeding programs for use in developing drought tolerant and high yielding genotypes. Estimates of heritability (h^2_b) and genetic advance (GA) from selection for the majority of studied traits, especially for grain yield and its components were higher under non-stress than those under stress, but for the rest of studied traits our results showed that h^2_b and GA are higher under stress than non-stress conditions. Based on phenotypic trait dissimilarities among genotypes, the landrace G2 was the most dissimilar genotype with each of G11, G6 and G17. The ten SSR primers amplified a total of 27 bands in the set of 22 wheat accessions, of which 23 bands (85.2%) were polymorphic. The majority of the primers showed high polymorphism information content (PIC) values (0.67-0.94), indicating diverse nature of the wheat accessions and/or highly informative SSR markers used in this study. Based on SSR analysis, the two pairs of genotypes (G11 and G21) and (G22 and G3) could be recommended to Hybridization Breeding Program for improving grain yield and drought tolerance. The analyzed wheat accessions showed a good level of genetic variability for both assessed morphological and molecular characters. However, the cluster analysis based on microsatellite data showed a weak correlation with the groupings based on morphological data. Molecular variation in combination with morphological traits of wheat landraces can be useful in conventional and molecular breeding programs.

Key words: Bread wheat, Simple sequence repeats (SSR), morphological markers, Landraces, Principle components analysis (PCA), Clustering, Drought tolerance index.