

CHARACTERIZATION AND EVALUATION OF SOME WHEAT GENOTYPES UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

1- Heterosis and combining ability and their relationship to SSRs- based on genetic distances

By

H. A. Dawwam¹, F. A.Hendawy¹, A.M. Zanaty², A.K .Mustafa³ and S. A. Arab³

1-Agronomy Dep., Faculty of Agric., Shibin El-Kom, Minufiya University.

2- Genetics Dep., Faculty of Agric., Shibin El-Kom, Minufiya Universit

3-National Gene Bank and Genetic resources, Agricultural Research Center,Giza.

ABSTRACT

Heterosis and combining ability analysis were studied in a 8×8 diallel set of bread wheat for number of spikes per plant, 1000- grain weight, number of kernels per spike, grain yield per plant, protein and carbohydrate percentages under Gemmeiza location (normal temperature) and Mataana location (high temperature). Genotype and the resultant twenty eight crosses mean squares were found to be highly significant for most traits studied at the two different locations and their combined data. Parents vs. crosses mean squares as an indication to average heterosis overall crosses, were found to be highly significant for protein and carbohydrate percentages at the two different locations and their combined data. For 1000-grain weight and number of kernels per spike the estimated values of parents vs. crosses were found to be highly significant at Gemmeiza location and their combined data. General combining ability and specific combining ability were found to be highly significant for most characters under examination at the each location together with the combined data. The wheat Line 1 exhibited highly significant general combining ability effects in number of spikes per plant and grain yield per plant. Also, Line 5 proved to be good combiner number of spikes per plant and number of kernels per spike. For grain yield per plant, three hybrid combinations Line 1 x Sids 1, Line 2 x Line 5 and Line 4 x Line 5 showed significant specific combining ability effects at the two different locations and their combined data. The GCA / SCA ratios were found to be greater than unity. Simple Sequence Repeats (SSR) analysis was performed using ten SSR primers on the eight wheat genotypes. A total of 39 alleles ranging from 95.475 bp to 301.471 bp were obtained by the tested primers with an average 3.9 alleles per locus. SSR data analysis using the similarity matrix and the genetic distance estimates showed that similarity index ranged from 62% to 93%. The most distantly related cultivar and

landraces were Sahel 1 and Line 1 with lowest similarity index (0.62) between them. The most related genotypes were Line 4 and Sids 1 with highest similarity index (0.93). Low correlation coefficient between genetic distances coefficient, heterosis over better parent and specific combining ability at Gemmeiza and Mataana locations noticed among most examined traits. Information generated from this study can be useful to predict hybrid for selecting parents and hybrid development to maximize the grain yield and its components.

Key words: Wheat, Diallel cross, Heterosis, Combining ability, General and specific combining ability, Simple sequence repeats, and Genetic distances coefficient.

Key words: Wheat, Diallel Cross, Heterosis, Combining Ability, General and Specific Combining Ability, Simple Sequence Repeats, and Genetic Distances Coefficient.