GENETIC ANALYSIS AND SELECTION EFFICIENCY UNDER WATER STRESS CONDITIONS IN SOME BREAD WHEAT GENOTYPES

BY

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ABSTRACT

Two experiments was carried out at the experimental farm of Kafr El-Hamam Agriculture Station, Egypt during the two successive seasons 2017/2018 and 2018/2019,For five crosses; (Sids12 x Line44), (Sids12 x Line35), (Line44 x Line20), (Line44 x Shandweel 1) and (Line20 x Sakha93) to study nature of gene action, heterosis, heritability and expected genetic advance for the first experiment and actual response, heritability, expected genetic gain and develop new wheat pure lines of high grain yield/ plant for second experiment under normal and water stress conditions. The results indicated that water deficit reduced means of all six generations compared with normal irrigation for all traits except proline content. The 4th cross showed positive significant relative heterosisand heterobeltosis under both conditions for days to heading, days to maturity and grain yield per plant. The six-parameter model (complex) was fitted for explaining genetic variation for days to maturity and grain yield/ plant in all crosses under irrigation and water stress conditions. Moderate to high estimates of narrow sense heritability (h^2) were found fordays to maturity, spike length, spike density, number of spikelets/spike, for number of grains /spike and 1000-grain weight/plant. Low to moderate estimates of narrow sense heritability (h^2) were found for number of spikes/plant, for grain yield/plant.Whereas, the secondexperiment, all studied traits of F_2 and F_3 families had significant differences in the five crosses under both conditions. The estimates of phenotypic coefficients of variability (PCV) were little higher than those of genotypic coefficients of variability (GCV) for all traits in five crosses

under both conditions, indicating the low effect of the environment on the studied characters.The ranges, means, genetic variances, PCV, and GCV estimates for most studied traits were higher under normal irrigation than corresponding estimates under water stress condition in five crosses for F_2 and F_3 populations. Estimation of heritability (h^2_{Bs}) and genetic advance (GA) were higher under normal irrigation than estimation under water stress condition for most studied traits in the F_2 and F_3 generations for the five wheat crosses. Positive values of correlation (r) between offsprings (F_3) and parents (F_2)in yield and its componentsunder normal irrigation and water stress conditions were estimated.

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