

## COMBINING ABILITY, GENE ACTION AND HERITABILITY OF SOME DIALLEL VARIETAL CROSSES IN BREAD WHEAT UNDER NORMAL IRRIGATION AND DROUGHT CONDITIONS

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### ABSTRACT

Five bread wheat varieties representing different agronomic characters were crossed in a half-diallel model in 2005/2006 season. The five parents and their 10 F<sub>1</sub> crosses were evaluated under normal irrigation and drought conditions in 2006/2007 season to study the mode of gene action for some wheat traits.

Mean squares of genotypes, general and specific combining ability were significant for all traits under normal and drought conditions, except specific combining ability for plant height at normal irrigation. The best combiners at both environmental conditions for days to heading, days to maturity (earliness), flag leaf area and spikes number/plant was Sakha61; for plant shortness were Sakha8 and Sakha-93; for kernels/spike, 100-kernel weight and grain yield/plant were Gemmeiza9 and Giza168. These results indicated that these genotypes could be considered as good combiners for improving these traits. The best combinations at both conditions for days to heading was Giza168×Gemmeiza9, for days to maturity was Sakha61×Gemmeiza9; for flag leaf area was Giza168× Sakha61; for plant height (shortness) and 100-kernel weight was Sakha61×Sakha-93; for spikes/plant and kernels/spike was Sakha8×Gemmeiza9; for grain yield/plant were Giza168 x Gemmeiza9 at normal condition and Sakha-93×Gemmeiza9, at drought condition. These crosses could be selected and used in breeding programs to improving these traits.

Both additive and dominance gene effects were significant for most traits at both conditions. The results showed that the role of partial dominance gene effects in controlling all traits under both studied conditions, except grain yield/plant at normal condition, 100-kernels weight at drought stress condition and spikes number/plant at both conditions, which controlled by over dominance gene effects. Each one of studied characters were governed at least by one gene group, except days to maturity and 100-kernel weight at normal condition; flag leaf area and grain yield/plant at stress conditions, which were governed at least by two gene groups. Grain yield/plant at normal condition and spikes number/plant at stress condition were governed by at least three gene groups. Also, spikes number/plant at normal condition was governed by at least four gene group. Heritability in narrow sense ( $h^2_{n.s.}$ ) estimates were moderate or high for all studied traits at both conditions, reflecting the role of additive gene action in governing these traits, therefore selection for these traits could be applied in early segregating generations, except spikes number/plant at both conditions, which had low values of heritability in narrow sense.

The parents Sakha-61 and Giza-168 and Gemmeiza-9 could be used in breeding for drought tolerance. Selection for days to heading, days to maturity, flag leaf area, plant height and kernels/spike at both conditions and for grain yield/plant at drought condition may be practiced in early segregating generations to improved bread wheat with respect to these genetic materials.

**Keywords:** Wheat, Crosses, GCA, SCA, Gene Action, Heritability, Drought