I. INTRODUCTION

Increasing grain yield of cereal crops is considered one of the more important national goals in Egypt to face the needs of increment of Egyptian people. Wheat production in Egypt increased from 2.08 million ton in 1982/1983 to 7.18 million ton in 2003/2004 season, 245% increase (**Statistical Year's Book, 2004, ARC, Giza**). This increase was achieved by both increasing wheat area (from 554,400 to 1085617.9 hectares) and the continuous rise in grain yield ha^{-1} as a result of cultivating high yielding genotypes (from 3.595 to 6.61 ton $ha-^{1}$) and improved cultural practices at newly reclaimed areas. It has become necessary to develop wheat lines adapted to salt affected soils and rainfed areas (drought region).

Today, the world's agriculture is seriously affected by drought. In particular, drought is the number one environmental limitation to many crops. It was predicted that drought is becoming the largest constraint to productions of some water-consuming crops such as wheat in the new century. On the other hand, approximately 20% of the world's cultivated land and nearly half of all irrigated lands are affected by salinity. Egypt has also a total of million feddan of saline.

In general, screening and discovering drought and salinity tolerant gene resources are urgently needed for creating productive breeding materials with improved drought and salinity tolerance.

Diallel cross technique is the good tool for identification of hybrid combinations that have the potentiality of producing maximum improvement and identifying superior lines among the progenies in early segregating generations.

Combining ability is one of the powerful tools in identifying the best combiners which may be hybridized either to exploit heterosis or to accumulate fixable genes. Heterosis in wheat has not been exploited yet.

The main objectives of the present investigation are:

* To assess the variations amongst a few wheat genotypes and available crosses for several drought and salinity tolerance characters.
* To estimate the magnitude of heterosis, general combining ability and specific combining ability to improve wheat under stress conditions.
* To estimate Susceptibility index (*SI*) for yield and some of its components.
* To determine suitable measurements for drought and salinity resistance in wheat genotypes.