INTRODUCTION

Maize (*Zea mays*, L.) is one of the major cereal crops on the cultivated land of Egypt. It has a high yield per both units of labour and area, and a short growth duration as compared to wheat. Also, it is widely grown in Egypt as compared to other crops which are confined to certain areas such as rice and sorghum. It is essential for human consumption and livestock. The crop itself is used for pasture, silage or soiling . Moreover, it is also used for industrial purposes such as manufacturing starch and cooking oils. The maize area in the world is about 136,245,000* hectars with an average production of 3776 kg per hectare in 1995 season (FAO production year book, Vol. 49, 1995). In Egypt, the total cultivated area of maize amounted to 2,193,741** feddans with a total grain yield of 43703781 ardab. The average grain yield/ fed. was 19.92 ardab (one ardab = 140 kg) in 1996.

Hybrid varieties are developed by crossing two or more inbred lines (Allard, 1960). Much efforts are devoted nowadays to increase the productivity of maize through genetical improvement . To carry out a successful breeding program, the breeder should have enough knowledge about the type and relative amount of genetic variance components and their interactions by environments for attribute in question. Therefore, the objectives of this study could be stated as follows :

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* One feddan = 4200 m^2 = 0.42 hectare.

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1- To estimate the amount of heterosis .

2- To evaluate the general and specific combining abilities (GCA and SCA) and their interaction by environment .

3- To compute the predicted yield for the possible double crosses.

4- To study genetic variance components, and

5- To estimate heritability in narrow sense.

It is hoped that the results of such a study would help in designing successful breeding programs for improving yield and its components in maize.