INTRODUCTION

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The cultivated sunflower (*helianthus annuus* L.) is one of the most important oil crops in the world. It was introduced into Europe in the 16 th century and then spread widely all over the world. it became the main source of edible oil in most countries like U.S.S.R., Argentine, Rumania, Turkey, France and Italy due to its wide range of adaptability in addition to high percent of excellent edible oil in the seed (45 - 55 %).

The cultivated form was re- introduced to North America about 1880 (Heiser, 1951) and all cultivars now grown in America are either direct introduction from Europe or have European cultivars in their pedigree (Eric and Dorrel , 1975).

Sunflower became the third oil seed crop grown in the world (after cotton and soybean), although it is the second liquid oil produced and consumed in the world. The cultivated area in 1985 reached 15 million hectars produced 19.7 million tons of oil in the world (El- Ahmer, 1989).

U.S.S.R. is the largest single producer of sunflower seed, the success of Russian breeders in producing cultivars of good yield and high oil content and their introduction into other countries are major factors in this surge in interest (Pustovoit, 1973).

In Egypt, due to the severe shortage of edible oil, sunflower received a great attention from the high authorities since 1987; so that the area devoted to oil type sunflower was increased from 3000 hectars in 1987 with an average of seed yield of 0.5 ton/ ha to 7000 hectars in 1988 with 1.5 ton/ ha. in 1989. The area devoted to this crop is 8000 hectars concentrated mainly in Fayoum and Behera Governorates. The average

seed yield of the harvested area was 2.97 and 2.2 tons/ ha in the two governorates, respectively, (El- Ahmer, 1989).

Sunflower seed contain a high concentration with a high proportion of polyunsaturated fatty acids, where oil contains a high percentage of linoleic acid reaching a level of 52- 62 % from the total fatty acids content, this high percentage of linoleic acid reduces the cholesterol content in human blood and the remainder after oil extraction contains a high percentage of protein from 13 to 19 %, so it could be considered as a good feeder for cattle and poultery, the green leaves of sunflower could be utilized as a forge crop due to their high content of protein. Furthermore, sunflower oil may be used as a fuel energy source, the sunflower inflorecence contains 18 % pectin that is considered as an important material used in many industrial processes.

The amino acid composition of sunflower protein is such that the meal could be a valuable ingredient in food materials (Earle *et al.* 1969). These amino acids are lysine, tryptophan, methionine and cystine, the contents of the majority amino acids in the protein of sunflower and soybean meals are approximately the same.

Due to rapid increase in population in Egypt, there is a growing demand for vegetable oils. At present, Egypt imports about 4/5 of its annual requirements for edible vegetable oils. These imports draw a heavy bill on the foreign currency reserves of the country.

A possible remedy to the present gap between the domestic production of and demand for edible oil could be the use of new sunflower genotypes imported from different countries in the world. After being grown under local climatic conditions these genotypes should be

evaluated for further introduction. It classified as being suitable for cultivation in Egypt these genotypes could then be either introduced as such or developed into a cultivar that suits the local growing conditions best.

Much efforts are devoted nowadays to increase its productivity through genetical improvement. To carry out a successful breeding program, the breeder should have enough knowledge about the type and relative amonut of genetic variance components and their interactions by environments for the attribute in question. Improving cultural treatments such as providing the nutritive requirements by fertilization and using high yielding hybrids are best tools for higher yields. Therefore, the main objectives of this investigation were :

1) To determine the importance of genotype x nitrogen fertilizer interaction,
2) To evaluate the general combining ability (G.C.A) and specific combining ability (S.C.A) and their interactions by nitrogen fertilizer,
3) To estimate the heterosis,
4) To estimate the genetic components and heritability,
5) To identify the breeding potentialities of superior parental sunflower inbred lines to be used in sunflower breeding programs, and
6) To estimate correlation, and path analysis between yield and its main components.