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التوثيق الالكتروني والميكروفيلم

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لم ترد بالاصل

Alexandria University
Faculty of Agriculture
(Saba Basha)

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By

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For the degree of

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To

my Mother,

Father,

Wife,

and my sweet heart Ahmed

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I. INTRODUCTION

The cultivated tomato (*Lycopersicon esculentum*, Mill; 2n= 24) is one of the most important and a very popular solanaceous vegetable crops; that is successfully grown in Egypt as well as in most of countries around the world. As a cash crop it has great demand in the international market (Hannan *et al.*, 2007a). Tomato's fruit is known to be rich in its content of vitamins A and C, as well as some minerals. Such contents are very important for human nutrition. Tomato fruits are usually consumed fresh, cooked, pickled and juice. Also, tomato fruits are the most important ingredients in preparation of many vegetables dishes in Egypt.

As a result of the continuous increase in inhabitants and their realization of the important nutritional value of tomato, the consumption of this solanaceous vegetable crop was noticed to increase in the recent years. So, the devoted area for tomatoes production in Egypt was estimated as 523,809 feddans in 2006 and increased to 595,238 feddans in 2009, and the total production during the same period was found to be 8.58 and 10 million tonnes, respectively. The averages yield production for these two years were estimated by 16.3 and 16.8 tonnes per feddan, respectively (FAOSTAT, 2011).

Tomato hybrid cultivars were extensively used in commercial production since tomato growers prefer to grow their hybrids, in spite of the relatively high prices of their seeds, in order to maximize the net return of their investments, since, the hybrids are usually known to be characterized by high yield and good quality, as well as, many other attractive traits such cold and heat tolerance, and diseases resistance.

Accordingly, tomato breeders directed most of their attention towards their breeding programs to produce new hybrids to suffice the increased and changeable demands of both growers and customers. However, the hybrid cultivar is, usually, produced thought the crossing of two, or more, inbred lines or cultivars. Therefore, it is necessary to tomato breeders to test and evaluate the ability of a great numbers of cultivars and inbred lines to be combined and select those which can combine well with others to produce good hybrids. This means that the breeders are always interested in selecting the lines having high average performances; i.e. high general combining ability (GCA); which estimates the additive gene action and means that these lines possess good genes, in general. To determine which hybrid to produce, breeders have to direct their attention towards the particular combination which surpasses all others; i.e. which has the highest specific combining ability (SCA), that estimate the non-additive gene action and means that the parents of this particular cross can combine well to produce a hybrid with a superior general performance.

Tomato is normally, highly self-pollinated, whereas flowers are easily to be emasculated and pollinated and individual crosses may yield as many as several hundreds of seeds. As most of hybrid seed production is done manually, thus require skills extensive and expensive technical labour. Therefore, Egypt could be an ideal place for the production of hybrid seed due to relatively cheaper labour availability.

Therefore, the main objectives of the present investigation are to obtain clear and determined information about the relative importance of the different types of gene action involved in the inheritance of some growth and yield characters of tomato. Also, it was aimed to estimate and evaluate both the general and specific combining abilities, for some important characters of tomato, and their all possible combinations in one direction in a

diallel cross among five parental tomato cultivars. This information will be of a worth value in establishment one or two cultivars as common tester parents, thereby providing a beginning toward testing the combining ability of numerous cultivars and selected lines of tomato breeding program. Heritability percentages, in both broad and narrow senses, were also estimated to provide more understanding for the significance of the various types of gene effects contributing to the genetic variation of the studied tomato characters. The correlation coefficients between different pairs of characters were, also, estimated.