بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

BREEDING FOR SOME QUANTITATIVE TRAITS IN COMMON WHEAT

BY

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THESIS

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INTRODUCTION

Wheat is the main winter cereal crop in Egypt. It occupies about 1.6 million feddans producing about 3.2 million tons of grains with an average of 2 tons per feddan. Area productivity could be improved through usage of high yielding varieties and optimum cultural practices through better crop management. In addition, varieties tolerant and/or resistant to pests, salinity, drought and heat have been released and proved to be suitable for cultivation in the newly reclaimed area utilizing new irrigation regimes.

The improvement of wheat yield is dependent upon a better understanding of the type of gene action underlying the inheritance of yield and yield contributing characters. Information about the mode of inheritance, combining ability and manifestation of heterosis would be of extreme importance for breeding high yielding wheat varieties.

It has been the practice of the wheat breeders to broaden the genetic base in their conventional and crossing programmes and apply several selection targeted to develop better wheat varieties to avoid yield plateau fluctuation of the crop from season to another.

This study was undertaken to determine the genetic variance components of wheat in two growing seasons for 5x5 half diallel cross for yield, yield components and some growth attributes.

This investigation was planned to study the following items:-

1- General and specific combining ability and their interaction with the two growing seasons, in the F1 crosses.

2- The potentiality of heterosis expression for yield, yield components and some growth attributes.

3- General and specific combining ability and remain heterosis in the F2 diallel crosses.

4- The importance which should be given to this material in a breeding programme by evaluating the five parental lines according to their general and specific combining ability effects.

REVIEW OF LITERATURE

Heterosis and combining ability has been extensively studied by several investigators. The following is a brief review of literature dividing into these two topics.

I-Heterosis:-

Heterosis in wheat has been reported as early as 1919 when Freeman studied heading date, plant height and leaf width in crosses involving a durum wheat and three common wheats. Non of the hybrids was significant earlier than the early parent. The F1 plants averaged taller than the tall parent in one durum x common wheat cross and in one common x common cross. In the other two crosses, the F1 plants were intermediate in height. No definite heterosis was evident in leaf width.

Rosenquist (1931) studied hybrid vigor in 26 spring wheat crosses. When F1 performance was compared with the mean of the parents; 18 crosses were earlier, 25 were taller, 18 produced more tillers and spikes, and 19 expressed more grain yield. When the higher parent was the criterion; 11 crosses were higher in tillering capacity and 19 were taller. Also, 14 crosses expressed high number of tillers bearing spikes and produced more grain yield than did the high yielding parent.

Harrington (1940) laid out a designed test to determine the value of heterosis expressed in early generations as an indicator of yield potential of progenies from specific parental combinations. It was concluded that amount of heterosis depended on the degree of genetic different between parental stocks and consequently could be used as an indication of inherent yield capacity of cross.

Palmer (1952) published results from a study involving one cross between an English wheat variety which had a large number of grains per spike and a New Zealand variety which had more spikes and more grains per plant. The F1 hybrid had a significant higher grain weight than the high yielding parent. The other two components of yield, i.e. number of spikes per plant and grains per spike were higher for the F1 but did not differ significantly from the better parent. Weight of grains per plant for the F1 was 31.6% greater than for the higher yielding parent.

Sikka et al., (1959) presented results of a study based on 12 inter-varietal wheat crosses. Over all the crosses, the F1 generation significantly surpassed the mid-parent value in grain yield per plant, number of spikes per plant, grain weight, number of grains per spike, plant height and earliness in maturity. No significant difference was detected between the F1 generation and the parental means in both of number of spikelets per spike and spike length. The crosses differed in the degree of heterosis expressed as yield in the F1 generation, ranging from 13.14 to 16.40% more than the mean of the parents. It was also concluded that the performance of the F1 for grain number per spike, kernel weight, length of spike, plant height, and heading date could be used with a reasonable degree of accuracy for predicting performance of later generations.

Gandhi et al., (1961) showed that ten wheat hybrids out of eleven were taller than the tall parent with maximum increase of 20.5%. Five hybrids produced more tillers than the better parent. The range in tillering of hybrids over that of the respective superior parent was 1.6 to 55.6%. No conspicuous hybrid vigor was observed for weight of 100 kernels. Number of spikelets per spike and spike length did significantly surpass the respective better parent except in only one hybrid for each. Seven hybrids yielded more grains than the

high yielding parent, but none was significantly superior. None of the hybrids headed earlier than the early parent.

Stuber et al., (1962) found that the F1, F2 and back cross populations of the cross between the varieties Wichita and Atlas 66, exceeded both parents in grain yield per plant. Grain yield per head was virtually the same in each population. Hence, it was concluded that superiority of the F1 and segregating generations was due to an advantage in tillering capacity. Plant height was significant greater in the F1 than the parental mean.

Knott (1965) studied seven F1 spring wheat hybrids. Three of these hybrids outyielded their respective higher parent. The yields of the F1 hybrids showed a significant positive correlation with mean yields of their parents. Therefore, it was concluded that high yielding F1 hybrids can be expected only from crosses involving high yielding parents. The data for days of heading indicated that the hybrids tended to be close to the earlier parent.

Mc-Neal et al., (1965) evaluated three hard red spring wheat crosses involving four varieties of some common germplasm. With two exceptions, differences could not be detected between the performance of F1 and F2 populations for any plant or quality characteristic. The F1 and F2 populations were usually intermediate between the parents, and in no case, they did exceed the high parent by a significant amount. Quality characteristic of F1 and F2 populations usually approached those of the best parent. It was concluded that closely related parents may give hybrid populations showing little or no heterosis.

Brown et al., (1966) found that five F1 populations out of 16 were significantly higher in grain yield than the respective higher parent. No F1 hybrid was significantly lower in grain yield than the mid-parent. Number of spikes per plant and kernel weight showed much less heterosis than grain yield. All the F1

hybrids were either equal to the high parent or surpassed significantly the mid-parent in protein percentage.

Rodriguez et al., (1967) presented results of a study based on 20 hybrids among Mexican, Canadian, Argentinian, and U.S.A varieties. Thirteen hybrids produced more grain than the highest yielding check variety. The degree of heterosis for grain yield ranged from 107 to 138% relative to the high yielding parent in each cross. It was concluded that the magnitude of heterosis which could be detected in wheat will be similar to that currently utilized in corn and sorghum for the production of commercial hybrids.

Fonseca and Patterson (1968) performed a diallel cross of seven varieties selected from hard red, soft winter and soft red winter wheats. The term "Heterobeltiosis" was proposed to describe the improvement of the heterozygote in relation to the better parent. Little heterobeltiosis was expressed for earliness. F1 hybrids were similar to the earlier parent or were intermediate in earliness. Plant height was intermediate between the two parents in all the 21 F1 hybrids. Heterobeltiosis estimates for yield were generally higher than for the individual components of yield. The estimates were greater than 100% for 10 of the 21 F1 hybrids, but were significant in only four cases. Excellent levels of Heterobeltiosis for yield occurred in crosses of hard red x soft white wheats, hard red x soft red wheats, soft white x soft red wheat's, and among varieties within the soft red class. Diversity of parents within soft wheat's was not a major factor in the expression of heterobeltiosis.

Gyawali et al., (1968) estimated heterosis in a seven parents diallel cross. Ten F1 hybrids yielded significantly more grain than the better parent. The average yield of all hybrids was 24% greater than the better parent. Hybrids with early and late maturing parents produced greater heterosis for grain yield than hybrids with both early parents or both late parents. Kernel weight was heavier