

Tanta University
Faculty of Agriculture
Department of Agronomy

BREEDING STUDIES ON MAIZE CROP **(*Zea mays*, L.)**

BY

Rafiq Halim Abd El-Aziz Alsebaey

B. Sc. Agric. (2003)
Kafr Elsheikh faculty,
Tanta Univ.

THESIS

Submitted in Partial Fulfillment of
the Requirements for the Degree of
Master
IN
Agricultural Science
(Agronomy)

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First researcher in Maize Res. Sec.,
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بكالوريوس علوم زراعية ٢٠٠٣ م
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جامعة طنطا

كأحد المتطلبات للحصول على درجة
الماجستير في العلوم الزراعية
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ABSTRACT

Through this work, an improvement cycle by S_1 progeny selection for the yield of Gemmeiza yellow maize population was conducted as follows; **in the first year of the cycle** (2004), S_1 progenies grains were formed, then 144 S_1 progenies were evaluated **in the second year** at Gemmeiza and Sakha Agricultural Research Stations. Each of variance components, heritability and expected genetic advance were estimated for S_1 progenies studied traits, and the highest-yielding among the 144 S_1 progenies were selected with selection intensities (10%) & (20%). **In the third year** (last year of the cycle), grains of the two new populations (C10 & C20) were formed by bulked-pollen mating among the selected S_1 progenies for both selection intensities, then were sown **in the forth year** with the original population and the check (Sakha 21) at Gemmeiza Agricultural Research Station to evaluate selection action on grain yield and another traits. Despite of high significant variations among S_1 progenies yield, the two means for the yield of selected S_1 progenies were not much higher than the mean for all S_1 progenies yield. Heritability estimates were either high or quite high at both locations with lower values in the combined data for most of the studied traits. Flowering date of the selected S_1 progenies should be taken in consideration to insure that each S_1 progeny will be represented during mating. Gemmeiza yellow maize populations exhibited superiority in the yield over the check. There was a discrepancy between expected gain and actual change for yield trait. At the end of this improvement cycle, we got a new improved population with an increase (8%) than the original population yield. This increase in the yield due to the increase in number of rows per ear.

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ARABIC SUMMARY & ARABIC ABSTRACT

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I- INTRODUCTION

Maize (*Zea mays*, L.) is one of the most important strategic cereal crops in Egypt. It is ranked the first in terms of area and total production. It is widely used in bread making in rural areas in the country. Recently, maize flour is melded with wheat flour by 20% in bread making in order to reduce the amount of wheat imports. Also, it is used as a feed for livestock and poultry, either as green fodder and silage or as a main component (grain) of dry feed. In addition, it is used for several industries such as starch, fructose and corn oil.

The grown area of maize in Egypt is about 1.6 million faddan (one faddan = 4200 m²) which produced 5.452 million ton of grain with an average 24.3 ardabs per faddan (one ardab = 140 kg.) in 2007 season.

S₁ families recurrent selection is widely used as an easy and simple procedure for intra-population improvement in maize. Estimation of genetic variance and its components are of great important for improvement in maize by any program. If the estimates of genetic variance indicate that, the additive genetic variance is of major importance, in this case, selection on the basis of S₁ progeny performance is effective for selection additive genetic effects and presents an opportunity of selection against major deleterious recessive gene that become homozygous with breeding. (**Genter**, 1973)

The genetic gain upon selection has been one of the most important contribution of quantitative genetics to maize breeders. **Burton et al** (1971), **Smith** (1983), **Sadek et al** (1988) and **Soliman** (1991) reported that, change in genetic variance resulting from S₁ selection for grain yield and late wilt resistant was related to the observed change with a significant increase in population mean.

Heritability estimates differed according to population characters, selection methods and environmental factors. However, estimation of heritability from S_1 families selection method were higher than that estimated from the other selection methods (**Hanson** (1963), and **El-Agamy *et al*** (1992)). This is due to that, S_1 selection utilizes additive genetic effects as reported by **Genter** (1973), **Embig *et al*** (1972), **Galal *et al*** (1984).

This research was designed to :

- 1) Improve the yield of Gemmeiza yellow maize population by S_1 progeny selection cycle.
- 2) Provide informations about genetic variance, heritability values and expected genetic advance for S_1 progenies studied traits.
- 3) Compare the expected gain from selection with the actual one for grain yield trait.