شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

بعض الوثائق الاصلية تالفة

بالرسالة صفحات لم ترد بالاصل

BREEDING STUDIES ON MAIZE FOR STRESS CONDITIONS

BY

Abd-El-Rahman Fathy Mohamed El-Enany

B.Sc. Agric., Ain Shams University, 1981

M.Sc. Agric., Ain Shams University, 1989

A thesis submitted in partial fulfillment
of
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Abd-El-Rahman Fathy Mohamed El-Enany

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This thesis for Ph.D. degree has been approved by :

Prof. Dr. G. A. Morshed G. A. Morshed
Prof. of Agronomy and Vice- Dean.,
Faculty of Agriculture., Al-Azhar University

Prof. Dr. A. A. Mohamed A. A. Mohamed
Prof. of Agronomy., Faculty of Agriculture
Ain Shams Univers

Prof. Dr. K. A. El-Shouny El Shouny K.A.
Prof. of Agronomy., Faculty of Agriculture
Ain Shams University

Date of examination : 12 / 3 / 1998

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Abd-El-Rahman Fathy Mohamed El-Enany

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Under the supervision of :

Prof. Dr. K. A. El-Shouny

Prof. of Agronomy, Ain Shams University.

Prof. Dr. A. M. Esmail

Prof. of Agronomy, Ain Shams University.

Assoc. Prof. Dr. K. I. M. Ibrahim

Assoc. Prof of Agronomy, Ain Shams University.

ABSTRACT

Abd-El-Rahman Fathy Mohamed El-Enany, Breeding studies on maize for stress conditions, Unpublished Doctor of Philosophy, Agronomy Department, Faculty of Agriculture, Ain Shams University, 1998.

The present study was undertaken in an attempt to; identify the more simplest and useful criteria for screening genotypes for drought tolerance under field conditions, find out plant attributes for selecting cultivars suited for drought conditions in order to reach a better judgment on the validity of using these traits in breading for drought tolerance in maize crop, and identify the parental-lines with good general combining ability and high specific combinations which express high heterotic effects that would be of great importance to hybrid production for drought stress under field conditions.

The experimental work was carried out at The Faculty of Agriculture, Ain Shams University, Farms at Shoubra El-Kheima and Shalakan, Kaluobia Gavernorate, Egypt during four successive growing seasons lasted in 1994 using half diallel. Crosses among 10 maize inbred lines

Our results demonstrate that a genotypes with a short grain filling period, high number of leaves, long ear leaf and roots, high number of rows/ear and heavy grains will be more desirable for this conditions while the genotype with a short grain filling period and maturity period, taller plants, thick ears, heavy stalks, high number of leaves, rolled leaves and light grains will be more tolerant and suitable for drought conditions. Genotypes that are; early in tasseling with high number of leaves / plant, long ear leaf, high ear position, low number of grain rows and, high number of grains / row could be more suitable for normal and / or drought conditions,

Mean squares due to genotypes for all accepted characters under normal and/or drought conditions were highly significant and large

magnitude suggesting, the existence of large genetic variation which resulted from the crossing among parents with wide divergent ecogeogrophic origins. Mean values and heterosis for all selected characters under normal condition revealed that the best crosses were cross 42 for filling period, cross 2 for total number of leaves/plant, cross 28 for leaf length, cross 45 for leaf angle and root length, cross 7 for number of rows/ear, cross 5 for seed index, crosses 2, 11 and 14 for grain yield/plant. The results for mean performance and heterosis under drought conditions indicated that the best crosses for the accepted characters were 16, 17 and 50 for maturity date , 39 for filling period, 33 for number of leaves/plant, crosses 6 and 32 for leaf rolling, 27 for plant height, 15 for ear circumference, 10 for seed index and stalk weight and 11 for grain yield/plant.

Mean squares due to irrigation conditions were highly significant for all accepted characters except ear leaf length and number of rows/ear. The significance of irrigation indicates that the crosses performance varied from normal to drought conditions. Also, mean square of genotypes by irrigation conditions interaction was highly significant and it seems that these traits are greatly influenced by irrigation conditions.

Partitioning genetic variance into general (GCA) and specific (SCA) combining ability variance under normal and/or drought conditions indicated that both GCA and SCA mean squares were highly significant under all conditions suggesting that both additive and non-additive genetic effects were involved in the inheritance of all characters. However, SCA/ GCA ratio revealed that the magnitude of SCA variance was greater than that of SCA variance for all traits. Highly significant interactions between irrigation treatments and both types of combining ability effects were detected for all characters. The magnitude of the interactions for GCA by irrigation were generally higher than those for SCA for all traits. This finding indicated that additive and additive by additive types of gene action

appeared to be more affected by irrigation treatments than non-additive genetic type.

Narrow sense heritability for accepted characters under normal conditions showed high value for filling period, moderate values for total number of leaves/plant, ear leaf length, ear leaf angle, number of rows/ear and seed index, and low value for total roots length. While narrow sense heritability for accepted characters under drought conditions showed high values for days to maturity and filling period, moderate values for total number of leaves/plant, leaf rolling, ear circumference, seed index and stalk weight, and low value for plant height.

It is generally concluded that;

1-In breeding program designed to develop germplasm for abiotic stress, careful consideration should be given to select material under the environment for which the product is intended. With reference to moisture stress, it has been suggested that direct selection in a moisture deficit environment should be most useful.

2- It would be recommended that additional experiments are required to study the genetic behavior of maize tolerance to drought and its effect on both various stages and different organs of maize plant.

3- Estimates of genetic behavior are influenced by the amount of genotypic variance present for a trait in the population being studied. Thus the number and genetic diversity of parents used to from a population will have a direct bearing on the amount of genetic variation present. A population derived from crosses between many divergent parents is expected to express more genetic variance than a population derived from a few related parents.

Key words: **Plant breeding, *Zea mays*, Drought, Stepwise regression, Stepwise discriminant, Factor analysis, Diallel, Combining ability, Heterosis, Heritability, ANOVA, Selection index, Morphological, physiological and morphophysiological characters.**