شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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HANAA ALY

DROUGHT AND LOW NITROGEN TOLERANCE IN EGYPTIAN MAIZE (*Zea mays* L.) GENOTYPES

By

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B.Sc. Agric. Sci. (Agronomy), Fac. Agric., Upper Nile Univ., Sudan, 1999
M. Sc. Agric. Sci. (Agronomy), Fac. Agric., Khartoum Univ., Sudan, 2007

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SUPERVISION SHEET

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APPROVAL SHEET

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Title of Thesis: Drought and Low Nitrogen Tolerance in Egyptian Maize (*Zea mays*) Genotypes
Supervisors: Dr. Ahmed Medhat Mohamed Al-Naggar
Dr. Magdy Mohamed Shafik
Department: Agronomy **Branch:** Crop Breeding
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ABSTRACT

Exposing maize plants to drought and/or low nitrogen (N) stresses results in a huge reduction in grain yields. Current breeding programs should pay great attention to develop hybrid corn of high tolerance to these stresses. The objectives of the present study were to assess the genetic diversity of 19 maize hybrid cultivars and populations for tolerance to these stresses and stability across combinations of two irrigation and three N levels, to estimate heritability under both stresses and to identify the selection criteria for tolerance to such stresses. A two-year field experiment was conducted using a split-split-plot design with three replications. Main plots were allotted to two irrigation regimes; sub-plots to three nitrogen fertilizer rates and sub-sub-plots to nineteen maize genotypes. Twenty-two traits were recorded. Combined analysis of variance showed that variances due to genotype, irrigation and N level and their interactions were significant ($P \leq 0.05$ or 0.01) for most studied traits. Water stress, low N stress and water stress along with low N stress caused a significant reduction ($P \leq 0.05$ or 0.01) in grain yield/plant (GYPP) by 28.56 %, 31.63 % and 51.42%, respectively. The highest yielding and highest nitrogen use efficiency (NUE) and the most drought and/or low N tolerant genotype was the single cross SC-101 followed by SC-30K8, SC-131 and SC-10, in descending order. Significant ($P \leq 0.01$) superiority of tolerant (T) over sensitive (S) genotypes in GYPP under low N (109.5 %), under drought (39.6 %), and under both severe stresses (141.9 %) was associated with significant ($P \leq 0.01$) superiority expressed in all yield attributes, shorter anthesis silking interval (ASI), higher nitrogen utilization efficiency (NUTE), higher NUE. The superiority of T to S genotypes was even shown under the optimum environment for all studied traits, indicating their superiority in responsiveness to optimum environmental conditions. Estimates of heritability ranged from 55.5 % for chlorophyll conc. index under optimum environment to 98.0 % for 100-kernel weight under the same environment. Results of the GT biplot in the present study indicated that high values of 100-Kernel weight, ears/plant, kernels/plant, kernels/row, plant height, NUE, NUTE, and grain nitrogen content and short ASI could be considered reliable secondary traits for improving grain yield under stressed and non-stressed conditions. The highest genetic distance was found between SC-2055 and each of American Early Dent, Midland or Ried Type. Based on AMMI model, SC-30K8, SC-131 and SC-10 could be considered stable across the test environments. SC-101 had the highest yield, but was average in stability.

Key words: Maize collections, Drought tolerance, Low-N tolerance, Phenotypic data, PCA, GT-biplot, AMMI model, GGE-biplot, clustering, G×E interaction, adaptability, stability.

DEDICATION

I dedicate this humble work to the soul of my beloved grandmother, Maria Mario Juma Gogei

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