ISSN 1110-0419

Annals Of Agric. Sci., Moshtohor,
Vol. 46(4): Ag. 253-259, (2008).

GENOTYPE × ENVIRONMENT INTERACTION AND STABILITY ANALYSIS FOR GRIAN YIELD IN SOME WHITE MAIZE (*ZEA MAYS* L.) HYBRIDS.

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ABSTRACT

Genotypes showing stable grain yield under varying environments may be useful in a breeding programme for direct release as a commercial variety or for evolving high yielding maize genotypes well adapted to a wide range of macro-environments. Twelve white maize single crosses (denoted here as G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G11, and G12) developed at Giza Research Station, Agriculture Research Center, along with two commercial white check hybrids, *i.e.* SC10 and SC129 were field evaluated in replicated mega-environment trials (METs) at nine locations *i.e.*, Behaira (Env1), Kafr El Seikh (Env2), Dakahlia (Env3), Monofia (Env4), Sharkia (Env5), Beni Suief (Env6), Minia (Env7), Assuit (Env8), and Sohag (Env9) to test genotype × environment interaction (GEI) for some newly developed white maize hybrids and to estimate their yield stability under different METs conditions. Randomized complete block design (RCBD) with six replications was the design used. Each of these nine environments was considered as an independent environment in the statistical analysis. Significant differences among genotypes, environments, and GEI were detected. Partitioning of G x E interaction into G x E (linear) and pooled deviations (non-linear) revealed significance of both types when tested against pooled error, indicating that both components contributed for G × E interaction. Genotype × environment (linear) component was not significant when tested against pooled deviation from regression indicating equal importance of both predictable and unpredictable interactions in these materials. Regression coefficients of all the genotypes were not significantly different from unity. Coefficient of determination (R^2) values ranged from 0.65 to 0.96 for grain yield, suggesting a large portion of variation was existed. Single cross SC10 (check) had the highest value of regression coefficient and average grain yield more than the general mean, indicating its response to favorable conditions and improved environments. In contrary, G10 would be especially good for unfavorable environments. Single cross (G2) had the highest yield (32.00 ardabs feddan^{-1}), a regression coefficient similar to unity (b_i = 1.11), and small insignificant deviation from regression (S^2d_i = 10.13). In addition, its R^2 value was 0.94, confirming its stability. Single cross (G2) should be released as a commercial hybrid.

Key words: *Zea mays*, Maize, corn, Grain Yield, Stability Analysis, Genotype × Environment.

INTRODUCTION

Gene expression is subjected to modification by the environment; therefore, genotypic expression of the phenotype is environmentally dependent (Kang, 1998). Genotypes showing stable grain yield under varying environments may be useful in a breeding program for direct release as a commercial variety or for evolving high yielding maize genotypes well adapted to a wide range of macro-environments. Yield trial is one of the most common experiments in agricultural research, typically testing a number of genotypes in a number of environments. The improved maize genotypes are evaluated in mega-environment