ABSTRACT

Mahmoud Shawky Abd El-Latif: Variation and Combining Ability among Maize Inbred Lines under Drought Stress in Relation to Biochemical Parameters as Marker Assisted Selection. Unpublished M.Sc. Thesis, Department of Agronomy, Faculty of Agriculture, Ain Shams University, 2011.

Twenty eight maize hybrids and their parental lines were evaluated under normal and drought at The Experimental Farms at Sakha and Sids Station of the Agriculture Research Center (ARC) in 2009 growing season.

Significant differences were detected between irrigation treatments at Sides location only for earliness traits (days to 50% anthesis, days to 50% silking and anthtsis-silking interval) while, such significant differences were detected at both locations for other studied traits. Significant differences were also observed among genotypes, parents and crosses for all studied traits under both environments at each of the two locations (except anthtsis-silking interval under normal irrigation, ears per plant under each water regimes and stay green under drought at Sakha). The interactions of genotypes, parents and crosses with the two irrigation regimes were generally significant for most studied traits (except anthtsis-silking interval, plant height and ear height at Sakha).

Both general (GCA) and specific combining abilities (SCA) under each and both water regimes at each of the two locations for studied traits (except anthtsis-silking under normal irrigation at Sakha, ears per plant under both regimes at the two locations and stay green under drought at Sakha) were significant. The two types of gene actions interact differently from one location to another in varying manner for studied traits. The relative importance of any of the two types of gene action to the other (GCA/SCA ratio) fluctuates (more or less than unity) from one location to another for the varying traits.

Drought sensitivity index indicated that, the best drought tolerant parents were Gz-628, Sd-34 and Gm-2 and the best drought tolerant hybrids were Sd-7×Sd-63, Sd-63×Gm-18, Sd-34×Sd-63, Gz-602×Gz-628 and Gz-628×Sd-34 which gave the highest yield under drought condition. The best general combiners for grain yield per plant and some of the other studied traits under drought conditions were Gz-628 and Gm-4. The best SCA hybrids under drought conditions for grain yield per plant and some of the other studied traits were Sd-7×Sd-63, Gz-602×Sd-34 and Sd-7×Gm-4. Protein electrophoresis showed that, the electrophoretic patterns of water soluble proteins could be a useful tool for the identification and characterization of the tolerant maize genotypes which differed in number and molecular weight of bands from normal to drought conditions.

Key Words: Maize, Combining ability, Drought sensitivity index, Drought tolerance, Protein Electrophoresis.

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