GENETICAL PARAMETERS AND STATISTICAL INDICES FOR ABIOTIC TOLERANCE OF SOME WHEAT GENOTYPES UNDER LAB. AND FIELD CONDITIONS

BY

Mohamed Gamal Aboud Ahmed

B.Sc. Agric. (Agronomy), Fac. Agric.,

Fayoum Univ., Egypt, 2013

Of

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ABSTRACT

Increasing wheat production and productivity is the major challenge across the nation. The experiments were carried out at the Lab and Experimental farm of the Fac. of Agric., Fayoum Univ. at Demo. Each of these experiments was done on thre parts (salinity , drought and both together) experiments. Each sub-experiment was carried out in three treatments (control, low stress and high stress). Ensuring a good germination is one of the key steps to ensure proper plant stand and moisture assurance during seed germination may help to speed up the germination at the lab, the study was carried out to select the best drought-tolerant genotypes using mannitol and the best salinity-tolerant genotypes using sodium chloride for thirty-six wheat genotypes (*Triticum aestivum* L.).

The 1st experiment in Lab. was designed to study fourty wheat genotypes (Triticum aestivum. L) of hybrid origin in their F5 generation and subjected to selection among and within them. The experimental design was complete randomized blockdesign (CRBD) with three replicates in both experiments (salinity and drought) during 1st season of 2015/2016. Under salinity conditions, the results exhibited that the mean squares due to wheat genotypes (G) and genotypes x salinity levels, (GxS) were highly significant for all studied traits (P ≥ 0.01). Also, the study of growth parameters, genetic parameters, and statistical indicators showed that the following genotypes G2-2, G2-4, G4-3, G4-8, G4-9, G6-4, G6-7, G6-10, and G6-1 are the most tolerant to salinity stress under laboratory conditions. Under drought conditions, the results showed that mean squares due to wheat genotypes (G) and genotypes x drought levels, (G x D) were highly significant for all studied traits (P ≥ 0.01). Also, showed the same trend for obvious genotypes G2-2, G2-4, G4-3, G4-8, G4-9, G6-4, G6-7, and G6-10 were the most tolerant factors for drought stress the study of growth parameters, genetic parameters, and statistical indicators in laboratory conditions.

In the 2nd experiment in the field was split-plot design with three replicates per treatment (salinity or drought) during the 2016/2017 and 2017/2018 seasons. Under saline soil the results exhibited that mean squares due to salinity levels (S), genotypes (G), and interaction between genotypes and salinity levels (GxS) were highly significant for all studied traits (P ≥ 0.01). In addition, the results of the study showed that the behavior of nine wheat genotypes under salinity stress in the field of yield and yield components, in addition to genetic parameters, as well as the assessment of six indicators for soil salinity stress, found that the best saline resistant genotypes were as follows No. G4-3, G2-4, and G4-8 while the following genotypes were moderately tolerant to salinity stress No. G4-9 and the contrary the genotypes No. G2-2, G6-1, G6-4, G6-7 and G6-10 as most salinity sensitive genotypes. Also, under drought the results showed that mean squares due to drought levels (D), genotypes (G), and interaction between genotypes and drought levels (GxD) were highly significant for all studied traits (P ≥ 0.01). As well as, the

results presented for the study of yield and yield components, genetic parameters, and six statistical indicators for the behavior of nine genotypes of wheat under drought stress in the field, it is found that the best tolerant genotypes were as follows No. G4-3, G2-4, G4-8 and G6-1) while the following genotypes (G2-2 and G4-9) were moderately tolerant to drought stress. Conversely, the following genotypes (G6-4, G6-7, and G6-10) were sensitive to drought stress. The results under double stress (salinity and drought stress) revealed that mean square values were highly significant for all studied traits for yield and yield components. The genetic parameters, and seven statistical indicators, it was observed that the best genotypes under double tolerance stress were No. G4-8 followed by No. G4-3. The superiority of both hybrids is due to the parents that originated from them, namely Sakha93 and Sids1, which are characterized by stress. Genotype No.G2-4 showed that superiority through the inherited traits of Sakha93 parents which tolerant stress and Gemmiza5 which high yields. This study shows that the following genotypes No G4-3, G2-4, and G4-8 are the best-tolerated to stress and are referred to as a good nucleus in breeding programs. In order to produce more stress-tolerant genotypes by combining a variety of traits bearing different stresses in a single genotype while preserving its productivity and quality of its yield.