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EVALUATION OF INFLUENCE OF LATE-SEASON MOISTURE STRESS ON YIELD AND MORPHO-PHYSIOLOGICAL CHARACTERISTICS OF WHEAT GENOTYPES

Pegah Zadfar[1] and Maryam Golabadi[2]
1-Faculty of Agriculture, Isfahan(Khorasgan) Branch, Islamic Azad University, Isfahan, Iran.
Corresponding author: P.Zadfar@Yahoo.Com

Introduction

Drought stress is one of the most important abiotic factors that limiting crop yield around the world. As climate change leads to increasingly hotter and drier summers, the importance of drought constraints on yield and yield components has increased in Asia and Iran. Bread wheat (*Triticum aestivum* L.) is one of the most important crops in the center and the west of Iran, where high temperatures and water stress often reduce plant growth and crop yield (Rashid et al, 2003). Some morphological traits such as spike number per m^2, grain number per spike, 1000-grain weight, peduncle length, spike weight and grain weight per spike affect wheat tolerance to the moisture shortage in the soil. Kianersi et al (2013) has reported that the days to 50 percent heading, number of spike per m^2, 1000-grain weight and grain yield of durum wheat is reduced in terminal moisture stress conditions. The plant height was reduced up to 25% in water stressed citrus seedlings (Wu et al., 2008). The objectives of current study were: (i) detection of the most important effective traits on grain yield under terminal moisture stress, (ii) evaluate the genetic diversity for drought adaptation among the studied genotypes under drought stress in terms of yield, components of yield and phenology attributes.

Materials and methods

Seeds of 8 winter wheat genotypes (*Triticum aestivum* L.), including, Pishtaz, Arvand, Qods, Sivand, Behrang, Bahar, Sepahan and Roshan, were prepared from the Natural Resources and Agriculture Research Center of Isfahanand Seed and Plant Improvement Institute of Karaj, Iran. This experiment was conducted in 2011- 2012 in a research field, located in the Islamic Azad University, Khorasgan Branch, Isfahan, Iran. Seeds were sown in plots of 4 m×1 m with five rows in each plot. The experiment was arranged as a randomized complete block design with three replications under terminal moisture stress conditions. Moisture stress condition was applied by irrigation stopping after initiation of wheat heading Some traits include; days to 50 percent physiological maturity plant height, peduncle length, harvest index, 1000-grain weight, biological and grain were measured. Data were analyzed using SAS software (version 9.1) and comparisons of means were tested at the level of 5% with LSD method. Simple stepwise regression was performed to detect the most effective agro-morphological traits on grain yield.

Results and Discussion

Analysis of variance

The results of ANOVA showed significant difference for all tested genotypes ($p<0.01$) for the traits of days to 50 percent physiological maturity, 1000-grain weight, plant height, peduncle length, harvest index, biological and grain yield. These results indicated high diversity under the moisture stress conditions among genotypes for the above-mentioned traits, particularly for grain yield.

- Stepwise regression

Stepwise regression analyses were done to detect the most effective traits on grain yield. Days to 50 percent physiological maturity was the first trait that was entered to the linear regression model, so that this trait explained about 65 percent of yield change under moisture stress conditions. The regression coefficient for this trait was remarkable and negative. It shows that, this trait has an effective and reverse role in increasing yield under moisture stress conditions. Higher yield seems attainable from those with a longer life cycle as a longer period grain filling by delays maturity. Plant height was the second most important trait for the final model. In fact, it may be stated that those genotypes with longer stems had a greater 1000-kernel weight that led to increased yield, because of high amount of dry matter in stem and

mobilization of them to seed under drought stress conditions. The third most important trait to have a positive effect on yield and increased source assimilates was harvest index.

According to results obtained in these experiment: (i) Days to 50 percent physiological maturity had a high and reverse effect on grain yield under conditions of terminal moisture stress, in other words, genotypes with a shorter period to physiological maturity had greater yield than genotypes with a longer maturity period, (ii) genotypes with longer plant height, peduncle and spike length had greater 1000-grain weight and grain number, recorded increased grain yield under moisture stress conditions. Furthermore, these genotypes may be used in hybridization programs and these crosses may yield more transggressive segregants for traits that effectively improve grain yield.

Keys Words: Bread wheat, Yield, Moisture stress, Stepwise regression.

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