Performance and Genetic Parameters for Some Wheat Genotypes under Different Nitrogen Fertilizer Levels in New Reclaimed Land

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ABSTRACT

Wheat growing has been extended to newly reclaimed lands. This investigation was carried out at the Experimental Farm at El-Bustan area, ARC (sandy soil and sprinkler irrigation) during the two winter seasons, 2006/2007 and 2007/2008. Three experiments were conducted side by side, included three different nitrogen levels (N1=120, N2=180 and N3=240 Kg / ha), one level for each experiment. Fourteen bread wheat genotypes were evaluated and used to estimate coefficient of variability, heritability and expected genetic advance for grain yield, its components and some agronomic characters. The results indicated highly significant differences between the two seasons for number of kernels per spike, 1000-kernel weight and plant height under low nitrogen fertilizer level (N1). On the other hand, seasons mean squares were highly significant for grain yield t/ha, number of kernels per spike, 1000-kernel weight, harvest index and plant height in N2 and N3, respectively. However, all wheat genotypes, at the highest amount of nitrogen level (N3), produced higher grain yield, number of spikes/m^2 , number of kernels / spike and 1000-kernel weight, compared with N1 or N2. Genotype No. 7 gave the highest value of grain yield (3.96 t/ha) under low nitrogen level (N1), while, genotype No. 14 had the highest mean value of number of spikes/m^2 and 1000-kernel weight under high nitrogen level (N3). In general, all garin yield components decreased with decreasing nitrogen fertilizer levels. The genotypic coefficients of variability (GCV) values for all studied characters were lower than those of phenotypic coefficient of variability (PCV) under all nitrogen levels. PCV values were quite higher for biological yield (30.49), harvest index (29.96), grain yield (23.14) and number of spikes /m^2 (21.43) in N1. The same results were recorded in N2, except for number of spikes /m^2 . Whereas, in N3, the high value of PCV was for grain yield (19.75), follwed by biological yield (16.84). On contrast, the number of days to maturity showed considerable low variability, under all nitrogen levels, which indicated little opportunity for improvement through selection. GCV values for biological yield, grain yield, harvest index and number of spikes /m^2 also, were high under all nitrogen levels, except for number of spikes /m^2 in N2. Heritability, in broad sense, ranged from 51 %, for number of spikes /m^2, to 98 % for the number of days to maturity and plant height. In general, high estimates of heritability were found for all traits under this study, except for number of kernels/spikes in N3. The highest, heritability was recorded for plant height, the number of days to maturity and biological yield under all nitrogen levels. The lowest value of heritability was recorded for number of kernels/spikes in all nitrogen levels. Genetic advance showed a wide range of variation across the different nitrogen levels, where it varied from 10.4, for number of days to maturity, to 59.8 for number of biological yield in N1, from 5.32 for number of days to maturity to 55.1 for biological yield, in N2, and from 5.9 for number of days to maturity to 36.4 for grain yield in N3.

Key words: Wheat (Triticum aestivum L.), GCV, PCV, Genetic advance, Heritability.

INTRODUCTION

Wheat is the most important food crop in Egypt and ranks first among all cereals for human food. Wheat growing has been extended to the newly reclaimed land, but, wheat production in the newly reclaimed land is much lower, as compared to many other regions due to abiotic stresses, such as drought, salinity and low fertility. Nitrogen had the largest effect on development, crop growth and achievement of grain yield potential, especially under limited fertilizer conditions (low input system). Wheat genotypes show that a large variation exists for nitrogen utilization and for their tolerance to nitrogen deficiency. Heritability estimates and genetic advance help the prediction of the response to selection (Larik *et al.*,1989). For these reasons, adaptation of wheat genotypes to medium or low soil nutrient content, especially nitrogen, is the main target for recent national policy in wheat production. The main objectives of this study were to: 1- Screen some bread wheat genotypes for high yielding ability under normal and low nitrogen fertilizer levels, 2- Estimate the coefficient of variability, heritability and genetic advance in some elite lines of wheat for grain yield and some other important traits, as selection criteria, for improving grain yield under different nitrogen fertilizer levels.