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Study of Effect of Drought Stress on Morphological Traits Using Factor Analysis

[1]Houman Homayoun, [2]Morteza Sam Daliri and [2]Parisa Mehrabi

[1]Young Researchers Club, Chaloos Branch, Islamic Azad University, Chaloos, Iran
[2]Department of Agronomy and Plant Breeding,
Chaloos Branch, Islamic Azad University, Chaloos, Iran

Abstract: In order to assess this potential performance grain durum wheat genotypes in drought conditions and review some of the traits associated with yield and some selected superior genotypes, 10 genotypes of wheat in 2010-2011 crop year. The analysis of variance showed significant differences between the traits evaluated in terms of stress and there was no tension. Also among genotypes in terms of height, main spike length, grain weight and there was a significant difference in yield. Performing analysis Factor, through analysis, principal 4 components 81/24 percent of total operating changes were justified. The results indicate the importance of factor coefficients characteristics of total and fertile tillers, main spike lenght, 1000-seed weight and yield selected genotypes is desirable for dry conditions.

Key words: Drought · Durum wheat · Factor analysis

INTRODUCTION

For thousands of years, durum wheat (*Triticum turgidum*, L. var. Durum Defs) has been cultivated both irrigated and rain-fed in the west of Iran. Tetraploid durum wheat (*T. durum*) or hard wheats mainly are used to produce semolina flour used in the food industries especially pasta spaghetti. However, under cultivated area of this plant is less than other hexaploid wheats, but their resistance against disease and environmental stresses such as common consistencies, is more and remarkable in drought conditions [1]. Considering that performance is a polygenic adjective and its heritability is high to achieve high yield, selection used by Performance components [1]. Dryness of the most important factor limiting production of crops including wheat in the world and Iran. This Topic is more important in dry and semi-arid regions of the world [2]. Importance of this subject is determined when we know which more than 1/4 part ground is dry and estimated that about 1/3 of the world's cultivable land under water shortage conditions are in range [2]. Yield and the adjective little are controlled by many genes. Heritability of this trait also due to the interaction of genotype and environment, so choose based on lower yield in order to improve it may not be very effective [3]. Especially early generations of the large number of genotypes and genotypes assessed as having repeated testing does not return if no good genetic [4]. Morphological traits simply are measured with great precision and quality relatively high heritability for plant communities and improve screener performance is [5]. Decay correlation coefficients between different traits with grain yield to decisions about the relative importance of these attributes and their values as selection criteria helps [6]. According to several reports, between grain yield in wheat and grain weight, fertile tillers or spikes per plant, spikelet's per spike and spike has a significant correlation [7, 8]. Solidarity, especially in plant height and heading time, different results (depending on variety and planting systems used) is seen [9]. Renold and co-workers [10] with different grain Simit review concluded that a whole wheat linear relationship between stress and the yield is. Gupta *et al*. 17 attribute the generation of 40 advanced lines of wheat with 11 controls in a randomized complete block design were evaluated. Factor analysis, 15 traits associated with yield and grain quality to address five main characteristics of spike, grain characteristics and quality protein and reduced tillering [11]. Dawari and Luthra [12] in his studies on bread wheat cultivars

Corresponding Author: Houman Homayoun, Young Researchers Club, Chaloos Branch, Islamic Azad University, Chaloos, Iran. Tel: +9192058725.

showed that the harvest index, kernels per ear per plant and spike length were important components of performance and selection It could be the basis for improved performance to be effective. given that a significant proportion of land under wheat cultivation in arid and semiarid regions has been the aim of this research employing statistical methods on factor analysis the resulting data, to review the structure of complex traits and determine the relative importance of traits associated with performance, to identify genotypes resistant to drought, for use in future breeding programs for high yield per unit area in dry conditions.

MATERIALS AND METHODS

The present work was carried out at 2010-2011 cropping year using 10 wheat cultivars, arranged as randomized complete block design (RCBD) under irrigated and rain fed conditions with four replications.

Stress Treatments Included:

- Whole irrigated (100 percent used water based on the plant demand at various growing stages)
- Limited irrigation (water supply until anthesis and after wards drought employing as water withholding until the end of growing stage).

Each genotype was planted on five rows placed 2 cm apart. Distances between irrigated and drought blocks were 2 m but were 3 m between the two irrigated or drought blocks. Upon the planting, irrigated was performed for whole blocks to moistent soil profile in the rhizosphere of all cultivars to facilitate germination. Irrigation was done as flooding at the harvest time, to prevent border effect, 50 cm of each row from both sides were eliminated to harvest and following traits were measured: plant height, total number of tillers, fertile tillers, main spike length, main spike weight, total plant dry weight, number of seeds per spike, number of seed seeds per main spike and seed weight per main spike. Also, seed yield of each block was measured.

Data were analyzed using SPSS10 for analysis of variance and Duncan's multiple range tests was employed for the mean comparisons.

RESULTS

Results showed that the drought stress affected majority of traits (Table1).

It was cleared that the differences between irrigated and drought, were significant for the majority of traits. Plant height, main spike length, Total plant weight, grains per main spike, Grain weight per main spike, 1000-seed weight, yield ($P<0.01$) were significant and the rest, were insignificant. Investigation of interaction effect between genotypes and irrigation status illustrated that except plant height and yield ($P<0.01$), total tillers ($P<0.05$) was significant and the rest did not show significant difference traits. Golibagh and barakatli genotypes possessed the higher yields under rain fed than irrigation while mean yield of genotypes under irrigated significantly was more. By exerting stress, yield was decreased in the majority of genotypes but in Germi, Sarab, Sharg, 110117, Golibagh and barakatli, genotypes this trend was increasingly which caused interaction effect.

Table 1: Results of Analysis of variance for studied traits

	MS						
S.O.V	df	Plant height	Total tillers	Fertile tillers	yield	Main spike length	Main spike weight
Rep	1	**	**	**		**	0.012
Condition	1	**			**	**	**
Genotype	21	**		*	**	**	**
C*G	21	**	*		**		
Error	43	113.36	2.205	2.46	474.41	0.61	0.15

	MS				
S.O.V	df	Total plant weight	Grains per main spike	Grain weight per main spike	1000 grain weight
Rep	1				
Condition	1	**	**	**	**
Genotype	21				
C*G	21				
Error	43	64.36	17.16	0.07	18.63

**And * significant at the 0.01 and 0.05 levels, respectively

Table 2: Especially bases in factor analysis

	Initial Eigenvalues	
Component	% of Variance	Cumulative%
1	41.72	41.72
2	18.57	60.29
3	11.24	71.56
4	9.68	81.24

Since the correlation coefficients may complete information on the relationship between different traits and not to provide benefits according to several multivariate statistical analysis to understand the deep structure of data, factor analysis was used. Table 2 shows the especially bases in factor analysis. Note that in terms of entering or not yield the factor analysis of differences of opinion among experts there [15], so in order to compare the two views presented in two modes, factor analysis For existing data was conducted. Damania and Jackson [16] as examples in the factor analysis did not yield the intervention. While most researchers entering the performance together with the other characters in the factor analysis were emphasized [17, 18]. As seen in Table 3, the total four factors 81/24 percent of the data changes were justified.

First factor the highest volume (41.72 percent) of changes in the data. The second factor (18.57percent) of changes in the data fills large and positive coefficients for grain weight per main lavender, seed number and weight of the original lavender lavender was the original as we can factor in the spike characteristics Rate Nanm said. damania and Jackson [16] in the third factor as spike features were introduced. These coefficients indicate that the genotypes have high levels of second factor regardless of other characteristics has a long and fertile spike with more grain number and grain weight would be greater. Spike components (length, spikelet number, number of fertile florets and grain number) have more impact on performance.

The third factor in having (11.24 percent) of the changes has positive and large coefficients for the 1000-grain weight and yield. Having the fourth factor (9.68 percent) of the changes has positive and large coefficients for main spike lenght. damania and Jackson [16] reported in the third factor. Evaluation of advanced bread wheat genotypes has shown that more Figures with a height of Early access and enjoy high performance [9]. rostaei [9] the relationship between grain yield quantitative traits through factor analysis in wheat expressed changes from entering or failure in performance analysis results were not significant impact on factor was achieved. Bramel [17] while race (quoting 3) by performing factor analysis with and without grain yield reported in the second case (remove the grain) the number of operating changes are less justified.

in general the results of such inference is that the traits related to grain yield and spike characteristics can index important for the evaluation and improvement of wheat varieties to be. So we can use these traits for increasing yield. This test is recommended on most varieties and wider levels also done.

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