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Investigation of Important agronomic traits of bread wheat genotypes in cold region of Ardabil via analyzing to factors

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ABSTRACT: In order to categorize 5 genotypes of bread wheat according to the evaluated traits, an experimental in agronomic year of 2011-2012 in the research farm of Islamic Azad University of Ardabil Branch with completely randomized block design was conducted. This experiment was repeated three times. In analyzing to the factors, two factors with high Eigen values were selected, where they have been making 90.95 percent of the main data variance. Based on the analyzing to the factors results, most of traits have a high coefficient of the same behaviors and the results show that the number of selected factors was appropriate to our aim and the selected factors have been able to justify and interpret the traits changes properly. The first factor have been able to explain about 45.625 percent of the main variables and in this factor, number of grains per spike, ash content, and the number of stomata per leaf area got large coefficients. The second factor explained and justified about 45.625 percent of the variations of the main data. In these factors, traits including fertile tiller number, plant height, one thousand grain weight and grain yield were studied and were affecting this factor and it was named as yield factor. Consequently these two factors set one special factor against to the other evaluated factors.
Keywords: Bread wheat, yield and yield components, Analyzing to factors

INTRODUCTION

Triticum aestivum is the most important crop in the world. Extensive extent and high adaptation of this plant as well as its diverse consumptions in the human nutrition lead to presented as the most important cereal in the world, especially in developing countries, and it can provided 20 percent food resources of the world people (Farzi and Shekari Mosta'li Bigloo, 2010).

Occurrence of continuous droughts in 2007-2008 farming year which influence extensive area of the country, sound the repeated alarm to agriculture goods and production stability. Therefore, it should be more notes to stable strategies for all of research and operation fields to reduce effects of this natural phenomenon. Of the years in which effect of this phenomenon over different dry and even irrigated farming productions was evident as well, the most obvious year was 2007-2008 (Mollasadeghi, 2010). On the other hand, the wheat consumption increased during 10 recent years (2000-2010) and with respect to climatically changes and their effect to farming and increasing world population, the wheat production under irrigated conditions reduce to 30 percent by 2050, while the population will be double. Since there are negative correlations between yield related traits, and with respect to complex relations of traits with each other, the last judgment can not performed only on the basis of simple correlation coefficients, but it is essential to utilize multivariable statistical methods to comprehend relations between traits, deeply. Multivariable analysis like stage regression and factor analysis used to explain existing relations between traits and to grouping them on the basis of these relations, so in this way the most important traits influenced to yield and also hidden factors are identified which result in appearing particular structure of covariance matrix among traits, and variables which have the most intergroup correlation and show the minimum correlation to other groups, are recognized. consequently, it can improve different traits simultaneously, which influenced by different factors and in order to achieve ideal yield, we can strengthen or weaken one or more hidden factors be hopeful that traits influenced by each one of the hidden factors, will never suffer from doubt by changing other factors or at least, these changes are not very much (Zaynali Nejad et al, 2003).

Factor analysis uses to reduce number of variables into some hidden factors, as well as to identify principal components of the yield, to classify traits on the basis of intra-relations between them and to research genetic diversity. So factor analysis can be complementary of stage regression analysis and path coefficient

analysis, and presents additional information (Azizi et al, 2001). This study investigates the relation between different traits and yield to use them in selection and introducing cultivars.

MATERIALS AND METHODS

This experiment was conducted in 2011-2012 in the research farm of Islamic Azad University of Ardabil Branch. To this aim 5 genotypes (Table 1) received from the Agricultural and Natural Resources Research Centre of Ardabil province. Genotypes were planted and studied in two separate experiments with completely randomized block design and was repeated three times. The experiment location had cold semi-arid climate and in winter temperature is often below zero and it had got 1350 m altitude from sea level, with 48.20 and 38.15 latitude and longitude, respectively. The genotypes were planted in two meters rows with spacing of one meter with 30 cm removal as marginal area. In this study, fertile tiller number, plant height, number of grains per spike, 1000 grain weight, number of stomata per leaf area unit, yield and ash content were evaluated. To measure the number of stomata per leaf area unit trait, on the leaf surface layer of discolored varnish applied and glass glue was put on it and the leaf was put under a microscope in different measurements the number of stomata was observed. To measure the ash content, first the ready seeds were set in oven at 80 C for 24 h, and then at the temperature of 750 degrees were turned into ashes in three hours, and then the ash content was measured. Data analysis was considered using SPSS-16 and MSTAT-C software and the averages were compared using Duncan's multiple range test.

Table 1 . Genotype names used in this research

Number	Genotypes
1	Sabalan
2	Azar2
3	Fenkang
4	Gaspard
5	Mv17

RESULTS AND DISCUSSION

Factor analysis was used to evaluate and comprehend complex relations of traits, as well as to identify hidden factors. This analysis performed for the measured traits by principal components in the stress conditions and then the factors rotation performed by varimax rotation. As you see figure 1, factor analysis complemented on the basis of special values which are larger than one and was done by considering two factors. These two factors justified 90.95 percent data variation, as a whole. It is essential to say that achieved KMO (Kaiser Meyer Oltin) values and also significance of Bartlett Asphersity test refers to be sufficient of correlation values of first variables to do factor analysis. Selection for factors number was on the basis of roots number larger than 1, and the number of used primary variables in factor analysis was equal to 7, according to formula F< (P+1)/2 (in which P and F refer to number of variables and number of factors, respectively) selection of four factors for stress conditions is compatible with the presented principles (Tousi Mojarad et al, 2005). Traits placed which on the subdivision of a factor with similar sign, all of them influenced by an unknown nature in similar direction. Each factor has not individual existence, but it is resultant of processes and characteristics which influenced by those traits [8]. Two factors justified 90.95 percent changes among traits, as a whole (Table-1). Community rate in majority of traits was high and selected factors can optimally justified alternations of traits. Share of each factor from first to forth is 45.625 and 45.325 percent, respectively.

The first factor have which had the maximum of data variation (45.625 %), number of grains per spike, ash content, and the number of stomata per leaf area got large positive coefficients. The second factor explained and justified about 45.625 percent of the variations of the main data. In these factors, traits including fertile tiller number, plant height, one thousand grain weight and grain yield were studied and were affecting this factor and it was named as yield factor. Consequently these two factors set one special factor against to the other evaluated factors.

Sio-se Mardeh et al. (2006) called tall varieties as an optimal trait under drought condition. In forth factor, the most factor coefficients related to the number of fertile tiller, spike length and peduncle length and it can be called as plant growth factor. Walton (Zaynali Nejad et al, 2003) used from factor analysis to identify growth and morphological traits relevant to yield in spring wheat and they introduced four factors which include yield components, morphological traits, spike length and number of grain per plant, as well as relation of large grains and grain filling duration with high yield. Tousi Mojarad et al (2005) introduced five factors by complementation of factor analysis via principal components analysis which they justified 67.7 percent of data variations as a whole.

Table 2. Factor analysis by principal components using varimax rotation

traits	Special vectors of component 1	2	Communalities
number of fertile tillers	-0.318	0.915	0.938
plant height	-0.074	0.958	0.924
number of grains per spike	0.946	-0.217	0.941
1000 grain weight	-0.149	0.866	0.772
ash content	0.901	-0.352	0.935
number of stomata per leaf area unit	-0.956	-0.007	0.914
Grain yield	0.667	0.705	0.942
%of Variance	45.625	45.325	
Cumulative %	45.625	90.95	
Total	3.194	3.173	

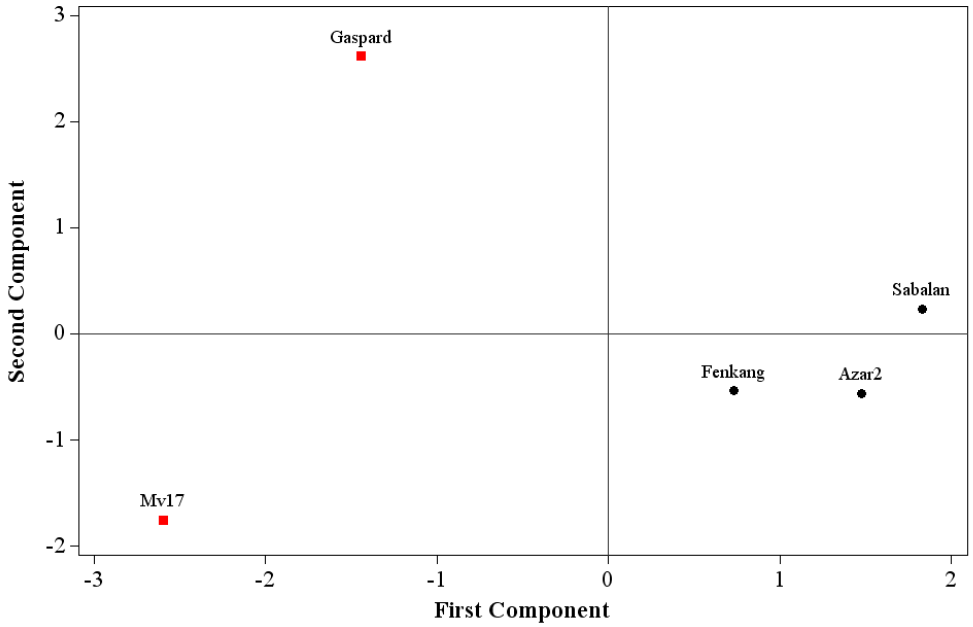

Figure 1 . Distribution of hybrids based on the first and second

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