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Multivariate analysis of yield and drought resistance indexes in barley

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Abstract

Barley is one of the most important crops that play a major role in providing need of food for people. Stress of biotic and non biotic is a limiting factor of crop plants. Among these factors, drought stress has been identified as the most important one, So producing drought tolerant varieties that have an optimal yield under stress is a very important of quantitative traits and their relationships with yield seed in normal and drought conditions and determine the best resistance index to drought in barley, an experiment in a randomized complete block design with three replications. And thus it is important to introduce criteria that by these criteria could be used for determine best genotypes.

Therefore, to study the variation was performed using full irrigation and no irrigation after 50% flowering. Traits measured were days to maturity, days to heading, plant height, flag leaf sheath length (length peduncle), number of grains per spike, grain weight, spike length, awn length and seed yield. (Analysis of variance, multiple regression, path analysis, cluster analysis, principal components analysis, and factor analysis) was conducted to identify the best genotypes and traits. moreover indices of drought resistance tolerance was analyzed that include, Tolerance (TOL), Mean Productivity (MP), Geometric Mean Productivity (GMP), stress tolerance index (STI), the mean index harmonics (HM), drought susceptibility index (DSI) and index sensitivity to stress (SSI).

ANOVA showed that there is a significant difference between genotypes on most morphological characters. The correlation between genotypes was studied in terms of morphological traits and indices of drought resistance. Based on cluster analysis based on all morphological characters, genotypes were is in normal conditions in the five groups and under stress four groups based on indices of drought resistance also in years 2008, 2009 and 2009-2008 settled in 5, 5, 4 separate groups, respectively. Principal components Analysis was justified in normal conditions with three elements extracted from more than %73 of the total diversity in examination stress by four components about %86 of the of total data variation Correlation was positive and highly significant at p=0.01 probability level between indices STI, HM, GMP and MP- with water yield and under stress showed that mentioned indices are most appropriate indices considered for screening drought resistant varieties in terms of water and stress have high yields

Keywords: barley, drought stress, drought resistance indicators, yields