

## **Abstract**

In this study, 72 barley double haploid lines with two parents were studied. The experiment was arranged in a completely randomized block design, with two replicates and two conditions, normal and boron stress in hydroponic condition at University of Zabol in 2013. Some of these traits measured in this experiment include: Fresh and dry weight of root and shoot and their ratio, length of root and shoot and their ratio, length of the largest leaf, length of total plant, the concentration of Chlorophyll, Membrane stability index and Relative water content. After measuring traits, statistical analysis achieved for phenotypic surveys such as analysis of variance, mean comparison, correlation between traits, principal component analysis and factor analysis were calculated. These results showed meaningful difference among the lines in most of those traits. The maximum correlation was seen between the length of root with length of total plant ( $r=0/925$  and  $r=0/934$ ) in two conditions. In The PCA (principal components analysis) analysis, the four principal components explained 62% of the total variability in the normal condition and the five principal components explained 67% of the total variability in the born stress condition. The factors analysis extracted several invisible factors in normal and born stress conditions that explained over 71 and 75 percent of total variance, respectively. QTL analysis was carried out using genetic linkage map derived 327 molecular marker of AFLP and using QTL cartographer software with composite interval mapping method. In general 40 QTL for studied traits were found (24 QTL for normal condition and 16 QTL for born stress condition) that their explained phonotypical variance was vitiated between 10-71/74 percent. The highest and lowest phonotypical variances were related to Relative water content trait and root and shoot length ratio in born stress condition, respectively. LOD ranged between 2/51-15/31. The highest and lowest LOD were attained for the QTL<sub>s</sub> of Relative water content and shoot fresh weigh, respectively. In this study, only one QTL was placed in the similar place and was stable (leaf length, 3H).

**Key words:** Barley, Hydroponic Condition, Boron Stress, QTL.