



University of Zabol

Graduate Management

School of Agriculture

Agriculture Group

Thesis for obtaining a specialized doctorate degree

Crop physiology

**Agronomic, physiological, biochemical and genetic evaluation of barley cultivars under salinity stress in Yazd region**

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Winter 1400

## **Abstract**

This experiment was performed during the two years of 2016-17 in Milshbar Ardakan region located in Yazd province. Experimental treatments included 9 six-row barley cultivars including Nik, Mehr, Khatam, Reyhan, Gohran, Nosrat, Morocco, Afzal and Fajr 30 cultivars with three levels of irrigation water salinity including 4, 10 and 14 dS / m as a split plot experimental design. Were evaluated so that water salinity as the main treatment and cultivars as a sub-treatment were randomly placed. The studied traits included number of days to emergence, number of days to tillering, number of days to maturity, final plant height, number of total and fertile tillers, number of nodes per stem, spike length, peduncle length, yield components including number of seeds per spike, number Spikelets were the number of spikes per unit area, 1000-seed weight, grain yield, total yield and grain harvest index. At the maturity stage, several plants were selected from each experimental plot and plant protein, seed protein, sodium and potassium were measured. Also, to study the enzymatic changes, samples of the plant were sent to the laboratory to measure the enzymes of catalase, peroxidase, guaiacol peroxidase and total phenol. The results showed that salinity and cultivar treatment had a significant effect on the number of days to emergence, tillering and maturity at the level of one percent probability. Salinity and cultivar treatment also had a significant effect on yield and yield components including total tiller number, number of fertile tillers, number of seeds per spike, number of spikelets per spike, number of spikes per square meter, 1000-seed weight, grain yield and total yield. Salinity stress on the one hand delayed germination and tillering, but on the other hand salinity stress caused faster grain ripening. Salinity stress also reduced grain yield components such as number of spikes per square meter, number of grains per spike and 1000-grain weight. . Considering the amount of sodium and potassium absorbed by the plant and the K / Na ratio and the amount of protein in the shoots, it seems that tolerant cultivars deal with salinity stress by the mechanism of more potassium uptake and excretion of sodium and regulation of cell osmotic potential. They counteract salinity through gene expression, producing oxidative enzymes such as catalase and peroxidase, and increasing tissue tolerance to salinity stress by eliminating reactive oxygen species. In general, among the studied cultivars, Nik, Mehr and Khatam cultivars had higher STI, MP and Tol stress tolerance indices and these cultivars can be used for cultivation in saline lands of the region as well as for hybridization and breeding programs.

**Keywords:** Salinity stress, six-row barley, K / Na, gene expression.