

## ***Abstract***

Japanese Brome (*Bromus japonicus* T.) is an invasive annual weed belongs to Poacea family. This weed is a serious threat to wheat fields in sistan. In order to study some physiological and molecular aspects of Japanese Borome weed series of experiments was conducted in the laboratories of the Institute of Plant Biotechnology (Biocenter) and research farm of Zabol University (Chah Nimeh) in 2014-2015 growing season. In the laboratory section, influence of environmental factors including temperature, alternating temperatures, high temperatures, water potential, salinity, burial depth, flooding, temperature and light interaction , temperature and water potential interaction and temperature and salinity interaction were investigated on seed germination and seedling emergence of Japanese Brome. Different models were used to determine cardinal temperatures. After evaluations, segmented model was selected as the superior model and base, optimum and ceiling temperatures were estimated 1.13, 10. 41.2 °C, respectively. This weed had a relatively high ability to tolerate drought and salinity stresses. NaCl and PEG concentrations required for 50% inhibition of maximum germination were 278.56 mM and -0.56 MPa, respectively. Germination was not affected by pH, as it was over 90% at all pH levels. Also pH was not a limiting factor for its germination. Seedling emergence was >98% when seeds were placed on the soil surface but decreased with increasing of burial depth; So that only 13.5% of seedlings emerged at a depth of 2 cm and no germination occurred at depth of 4 cm and above. High temperatures pretreatments resulted in reduce germination; germination decreased from 100% to 0% as temperature increased from 60 to 200 °C. Germination decreased with increasing flooding days to 7 days and maximum germination was observed in control treatment (no flooding). Evaluation of competitive ability of four wheat cultivars (Hamun, Hirmand, Bolani and Kalak afghani) in interference with different densities of Japanese Brome showed that this weed is a strong competitor to wheat cultivars. Also increasing weed density reduced grain yield and biological yield of studied wheat varieties non- linearly. Wheat cultivars had different sensitivity to weed interference. Compare the performance models was suggested excellence of weed relative leaf area and dry weight relative models to density-yield loss model. results of these models can be used to predict of wheat yield loss in interference with the Japanese Borome weed. The results showed this species had strong allelopathic potential. This factor increase the competitiveness of against wheat. The weed had inhibitive effect on growth of wheat seedlings by metabolites of phenolic compounds (tanin and flavone) at its flowering stage and also phenolic compounds and terpenoids at its maturity stage. Results of DREB2 gene expression showed that changes in the expression pattern of genes are dependent on the plant genotype. The highest expression of genes belonged to Afghani kalak cultivar (3.32), that compared to Bolani, Hamun, Hirmand cultivar and Japanese Borome was, 47, 60, 40 and 44% greater, respectively. Also there was not significant differences in gene expression between Bolani and Helmand cultivar and Japanese Bromes.

*Keyword:* Abiotic stress; Interference; Invasive weed; Regression model; Gen expression



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