Iranian Journal of Field Crops Research
Vol. 15, No. 2, Summer. 2017, p. 341-354

نشریه پژوهشهای زراعی ایران
جلد ۱۵، شماره ۲، تابستان ۱۳۹۶، ص. ۳۵۴-۳۴۱

Response of Agronomic Traits of Wheat and Barley to Sources and Different Rates of Selenium in Rainfed Condition

N. A. Sajedi[1*]- H. Madani[2]- A. Sajedi[3]

Received: 15-10-2015
Accepted: 28-05-2016

Introduction: Environmental stresses affect growth, metabolism and crops yield. Drought is an important stress and it decreases crop productivity. Drought stress symptoms vary, depending on intensity and duration of drought and growth stage of the plant. The first response of plant to drought stress is producing the active oxygen species (ROS) in cell that these cause injury to membranes and proteins. Selenium (Se) application could have beneficial effect on growth and stress tolerance of plants by increasing their activity of antioxidants and reduce the reactive oxygen species over production. Selenium is essential for growth and activities of human and animals. Absorption and accumulation of selenium in plant depend on chemical compound and concentration of selenium in soil. Recent studies have demonstrated that Se increases resistance and antioxidant capacity of plants to various stress. It is reported that selenium application in barley plant no changes the amounts of malondialdehyde and hydrogen peroxide under water deficit stress. The current paper studies the response of agronomic traits of wheat and barley to sources and different rates of selenium in rain fed condition.

Materials and Methods: In order to investigate response of agronomic traits of wheat and barley to sources and different rates of selenium in rainfed condition, an experiment was carried out as factorial based on randomized complete block design with three replications at the Research Station of Islamic Azad University, Arak Branch, during 2014-2015. Experimental factors were included selenium sources at two levels, Sodium selenate and Selenite, Selenium rates at three levels of zero, 18 and 36 g ha^{-1} and two crop plants of wheat and barley. The wheat rain fed seed Azar 2 cultivar and Barley cultivar Abidar were hand planted at 15 cm spacing in 6 m rows, with one meter borders between the plots. Foliar application of Se was performed at rate of 18 and 36 g ha^{-1} at appearance of 5th node of stem or Zadoks growth stage (ZGS) 43 and at appearance of 75% florescence spikelets or Zadoks growth stage (ZGS) 57. At harvesting time, one m^2 was harvested from the middle of each plot and the grain and biological yield was evaluated. The data were analyzed SAS software. Means were compared using Duncan's Multiple Range test at $P\leq0.05$

Results and Discussion: The results showed that, the spike length without awn of wheat was 10.4% more than barley, but in barley the spike length without awn was 11.2% more than wheat. The spike harvest index in barley was 21.7% more than wheat. Foliar application of 18 g ha^{-1} selenium increased the grain weight per spike by 4.9% compared with control. The maximum grain weight per spike was obtained from foliar application 18 g ha^{-1} sodium selenite. Foliar application of 18 and 36 g ha^{-1} selenium as sodium selenite increased the grain weight per spike by 13.7 and 5.1% compared with control, respectively. Foliar application of 18 g ha^{-1} Se increased grain and biological yield by 6 and 8.4% compared with control, respectively. The results showed that, the highest biological yield (5784kg ha^{-1}) in wheat was obtained in application of 18 g ha^{-1} selenium as sodium selenite treatment. The highest biological yield (5889 kg ha^{-1}) in barley was record from application of 18 g ha^{-1} selenium as sodium selenate. The grain yield of barely was 10% more than wheat in rain fed condition. The highest grain yield (1757 kg ha^{-1}) in wheat was record from foliar application of 18 g ha^{-1} sodium selenite that, grain yield increased by 9% compared with control. In barley, the highest grain yield was obtained in foliar application of 18 g ha^{-1} sodium selenite or selenite treatments. It is reported that, the foliar application of selenium under stress conditions was found that increase the antioxidant enzyme activity, consequently reducing oxidative stress and the free radicals which have a decisive effect on plant cells. Some reports showed that selenium could increase

1 and 2- Associate Professor, Department of Agronomy and plant Breeding, Arak Branch, Islamic Azad University, Arak, Iran
3- MSc in identify and weeds control, Member Young Researchers Club, Arak Branch, Islamic Azad University, Iran
(*- Corresponding Author Email: N-Sajedi@iau-arak.ac.ir)

the tolerance of plants to stressful environments.

Conclusions: In general, it could be concluded that foliar application of 18 $g\ ha^{-1}$ selenium as sodium selenate or selenite in stem elongation stage in wheat and barley in rain fed condition was led to obtain optimum grain and biological yield.

Keywords: Azar 2, Abidar, Biological yield, Spike traits