

Abstract

the study was conducted to identify the effects of bacterial bio-fertilizers on quantitative and qualitative characteristics of three species *Bromus tomentellus*, *Onobrychis sativa* and *Avena sativa* under drought stress. the experimental design was factorial in a completely randomized design under greenhouse condition (University of Zabol). The treatments were comprised the following levels: Azoto barvar1, Phosphorus barvar2, combination of Azoto barvar1 and Phosphorus barvar2 and control. Water stress was applied at three levels of field capacity, 0.7 field capacity and 0.4 field capacity, with three replications. Quantitative parameters such as germination rate, germination percentage, root and shoot dry weight, root and shoot height, photosynthesis pigments (chlorophyll a, chlorophyll b, total chlorophyll and carotenoids), percentage of macro and micro-nutrients in the plant were measured. Results showed that impact of bio-fertilizer and interaction between different levels of drought stress were significantly different with the exception of germination percentage *B. tomentellus*, the roots of *O. sativa* and Mg in *A. sativa* ($P \leq 0.01$). Results revealed that bio-fertilizer Barvar 1 increased, germination rate, shoot length, potassium, magnesium, iron, manganese and zinc in *A. sativa*, However, dry weight of shoots and roots, chlorophyll and phosphorus decreased. Data obtained for *B. tomentellus* showed that bio-fertilizer Barvar 1 increased germination rate, fresh weight of shoot, dry weight of roots, potassium, zinc and manganese. The fertilizer increased the germination percentage of *O. sativa* root length, potassium, magnesium, zinc, iron however, it depressed shoot's fresh weight, iron in the shoot and potassium in the roots. Phosphorus barvar2 increased the germination rate and percentage of *B. tomentellus* and *O. sativa*, The fertilizer produced the high amount of nitrogen and phosphorus in *B. tomentellus* and *A. sativa* and, dry and fresh weight of shoots of *A. sativa*. The combined application of bio-fertilizers increased photosynthesis pigments in *A. sativa*. In addition, there were an increase in fresh and dry weight of the shoot and root in *O. sativa*, and reduction in elements such as phosphorus, manganese and iron. Data obtained for the drought stress showed that 0.7FC increased the study characteristics of *A. sativa* and *O. sativa* while, 0.4FC decreased plants yield and amount of micro and macro nutrients. In *B. tomentellus*, FC level increased germination rate, shoot and root length, shoot fresh weight, nitrogen, phosphorus, magnesium and iron. While, photosynthesis pigments and some elements also led to decline. In this species, 0.7FC and 0.4FC had the highest effect on plant nutrients respectively. In general, Results of the study showed that use of bio-fertilizers 1 and 2 could increase the germination and growth of the plants. Also, according to these results, it seems that the fertilizers had positive impacts on the plants in 0.7FC and FC conditions and, they have no significant role to mitigating the effects of drought. the results of the study showed that application of bio-fertilizers on *B. tomentellus*, *O. sativa* and *A. sativa* could be useful for restoration and improvement of rangelands.

Keywords : Growth Promoter, Drought Stress, Seed Germination, Bio Fertilizers.



University of Zabol
Graduate school
Faculty of Soil and Water
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**Effects of Plant Growth Promoting Rhizobacteria on Seed Germination
and Growth of *Bromus tomentellus*, *Onobrychis sativa* and *Avena sativa*
in Drought Stress**

Supervisors

Dr. M. Ebrahimi

Advisers

MS. E. Shir mohammadi

By

Somaye. Delshadi

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