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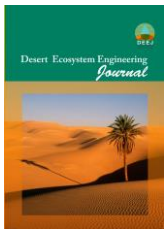

Effect of Nitrogen and Phosphorus Bio Fertilizers on Some Seed Germination Traits of Two Cultivars of Quinoa under Salinity Stress

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Extended Abstract

Introduction: salinity is known as the most important inhibitor of seed germination of most plants and limits the establishment of plants in arid and semi-arid regions such as Iran. The first effects of salinity on plant growth are associated with reduced seed germination and lack of uniformity in plant emergence. Currently, identification and utilization of tolerant cultivars are one of the most important methods in exploiting and increasing the yield in dry and saline soils. Because of tolerance to drought stress and salinity, quinoa can produce seed in a zone of soil salinity, which wheat, barley or other crops are not able to produce.

Materials and Methods: In order to study the effect of nitrogen and phosphorus bio fertilizers on seed germination indices of quinoa (Sajama and Titicaca cultivars) under salinity stress, a factorial experiment was conducted in a completely randomized design with three replications in 2018. In this experiment, Sajama and Titicaca cultivars as the first factor, four levels of salinity stress (0, 4, 8 and 12 dS/m) as the second factor and four levels of biofertilizer including control, nitroxin, biophosphorus and the combination of nitroxin and biophosphorus as the third one factor was evaluated. In this research, some germination traits including germination percentage, germination rate, vigor index, primary shoot length, primary root length, primary root to primary shoot length ratio and Seedling fresh and dry weight were investigated.

Discussion and Conclusion: The results of the experiment showed that both quinoa cultivars are highly adapted to salinity in the germination stage and application of bio fertilizers could increase the tolerance to salinity in both cultivars so that, except for germination rate in Sajama cultivar, all traits measured in both cultivars at salinity level of 4 dS/m increased significantly under the influence of biological fertilizers in both cultivars compared to the control treatment. By increasing the salinity level to 12 dS/m, the values of seed germination traits decreased. However, even at this salinity level, inoculation treatment with biofertilizers in both cultivars could increase the traits compared to non-biofertilizer treatment at the same salinity level.

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Among the two cultivars, Sajama cultivar had higher primary shoot length, primary root length and vigor index, but the percentage and rate of germination were higher in Titicaca cultivars. Totally, the results showed that seed germination of Titicaca cultivar under biophosphorus fertilizer treatment at salinity level 4 dS/m was more than other treatments, which indicated the higher level of tolerance in Titicaca cultivar to this level of salinity in the germination stage, and since one of the most sensitive steps against salt stress is the germination stage that affects the establishment and optimum plant density. Titicaca cultivar can be recommended as a promising cultivar with high yield potential, which has high yield in terms of saline agronomic conditions, as well as high quality products for cultivation in arid and salty areas.

Keywords: Primary Root Length, Primary Shoot Length, Vigor Index, Seedling Weight, Quinoa.