

Abstract

Drought stress is one of the most important factors that reduce growth and yield of many crops, especially in arid and semi-arid of the world. In order to evaluate effects of superabsorbent and animal manure application on quantitative and qualitative characteristics of ajowan under different levels of drought stress, a farm experiment was conducted as split-factorial in base of randomized complete block. Design at cropping season 2014 in Agricultural research Institute, university of Zabol. The mainplot was drought stress in three levels (control: irrigation after 60 mm evaporation from class A basin, moderate stress: irrigation after 120mm evaporation from class A basin, high stress: irrigation after 180mm evaporation from class A basin). The subplot consisted of different amounts of superabsorbent at 3 levels (zero, 100 and 200 kg/ha) and manure at 2 levels (zero and 200 kg/ha). Data analysis showed that stress with adverse effects on plants, specialty reduction of photosynthetic pigments (chlorophylla, b and total carotenoids) significantly reduced plant height, number of umbrellae per plant, 1000-seed weight, yield, biological yield, harvest index and essential oil yield. In contrast, increased essential oil percent, proline, carbohydrate, catalase, and ascorbate oxidase and polyphenol oxidase enzymes. In addition drought stress significantly decreased guaiacol peroxidase activity. Application of superabsorbent caused significantly increase in yield, essential oil yield, yield and biological yield of Ajowan with modifying effects of drought stress and increase of photosynthetic pigments. Application of superabsorbent with amount of 200kg/ha was more effective for reducing the accumulation of proline, catalase, ascorbate oxidase, guaiacol peroxidase in comparison with other superabsorbent levels. Superabsorbent increased seed weight, harvest index and polyphenol oxidase activity but this increase was not statistically significant. Add manure to the soil caused similar effects of superabsorbent on plant. In contrast, the essential oil content, proline and carbohydrates, catalase, ascorbate, oxidase and polyphenol oxidase were added. In addition, drought significantly decreased guaiacol peroxidase activity. Among the different treatments of 200 kg per hectare in comparison with other absorbent surfaces in reducing the accumulation of proline and catalase, ascorbate, oxidase, guaiacol peroxidase was more effective. The superabsorbent increased seed weight, harvest index and polyphenol oxidase activity, but this increase was not statistically significant. Add manure to the soil superabsorbent similar effects on wheat. The use of superabsorbent with manure modified the stress effects on quantitative traits (plant height, number of umbrellae per square meter, grain weight, yield, biological yield, harvest index, and oil yield) and qualitative characteristics (concentration of photosynthetic pigment, proline, carbohydrates, catalase, ascorbate peroxidase, polyphenol oxidase, guaiacol peroxidase enzymes). The result can be stated that the use of manure and superabsorbent can reduce negative effects of drought stress by increasing the amount of chlorophyll and improvement of vegetative growth.

Keyword: Ajowan, Super absorbent, animal manure, Drought stress, Anti oxidant enzyme, Essential oil



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