Abstract

Nodayse, antioxidants and plant growth regulators has been proposed to reduce the negative effects of stress. To reduce the damages caused by drought stress in plants, using biological fertilizers, such as growth promoting phosphate fertilizer2, Jasmonic acid, and also the improvement of physiological parameters and raising the level of plant yield in arid and semiarid regions are the necessary management to reduce drought stress in plants, including the calendula officinalis plant. So, the current study was performed to triplicate the form of factorials based on a randomized complete design with three levels of drought stress, 80% of field capacity as a control, 60% of field capacity and 40% of the field capacity, phosphate fertilizer2 (inoculated and non-inoculated) and Jasmonic acid (zero as a control and 100 mM). The results of variance analysis showed that the different levels of drought, Jasmonic acid, phosphate fertilizer2, and their interactions on the growth of calendula officinalis were effective. Drought stress reduced some measured traits, while it increased the activities rate of antioxidant enzymes (catalase, peroxidase, polyphenol oxidase). Jasmonic acid alone increased traits such as, pigments, antioxidants, carbohydrates, proline and flavonoids and also reduced the oxidative damage. Antioxidants have no significant effect on phosphate fertilizer2. Phosphate fertilizer2 and jasmonic acid effects on all traits, except carotenoids, carbohydrates, and antioxidant enzyme were significant. Carotenoid Isomerase gene expression study was carried out by QReal time PCR method. The results showed that the effects treatment on gene expression were significant at 5% level. The findings of the current study indicated that the use of phosphate fertilizer 2 and jasmonic acid is an appropriate way to increase plants’ resistance to water stress.

Keywords: calendula officinalis, Drought stress, Antioxidant enzymes, jasmonic acid, Carotenoid, gene expression.
The effects of drought stress, phosphate fertilizer and Jasmonic acid on gene expression pattern of carotenoid isomerase in plant *calendula officinalis*

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