



University of Zabol
Management of graduate education
Department of Plant Breeding and Biotechnology

Dissertation to obtain a master's degree in the field of agricultural
biotechnology

**Investigating the effects of nitric oxide and
salicylic acid on some physiological and
biochemical characteristics of Capparis
spinosa under drought stress**

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Abstract

Considering the increasing development of dry lands and the lack of suitable lands for agriculture in the world, the use of drought-resistant species with the use of compounds that reduce the effects of drought stress and induce resistance to stress in plants is very important. Today, the external use of stress messenger molecules such as nitric oxide and salicylic acid play an effective role in many plants to environmental stresses, including drought. In this study, the effect of drought stress and its interaction with the application of salicylic acid and nitric oxide on changes in the physiological and biochemical indices of snake grass were investigated. For this purpose, a factorial experiment was carried out in the form of a randomized complete block design with three replications in Zabul University. The test factors included three levels of drought (zero, 20 and 75% of the agricultural capacity of the field), two levels of salicylic acid (zero, 26 millimolar) and three levels of nitric oxide (zero, 250 and 500 micromolar). Induced cellular responses of snake grass under the influence of drought stress and salicylic acid and nitric oxide by measuring membrane lipid peroxidation index and antioxidant enzyme activity (catalase, peroxidase, guaiacol peroxidase, polyphenol oxidase), the amount Flavonoid, anthocyanin, the amount of photosynthetic pigments and proline were evaluated. The results showed that drought stress caused a significant increase in membrane lipid peroxidation and salicylic acid and nitric oxide decreased membrane lipid peroxidation. According to the results, it was found that with the increase of drought stress with the application of salicylic acid and the application of nitric oxide separately, the activity of antioxidant enzymes increases. Also, the results showed that the combined application of drying with salicylic acid and drying with nitric oxide increased the amount of chlorophyll. With increasing drought, the amount of carotenoid and proline increased, and salicylic acid and nitric oxide treatments also caused a significant increase in the amount of carotenoid and proline under drought stress conditions. According to the results, salicylic acid at 2 mM and nitric oxide at 250 μ M decreased malondialdehyde and increased the activity of enzymatic and non-enzymatic antioxidant systems. The results showed that the best treatment is salicylic acid at a level of 2 mM and nitric oxide at a concentration of 250 μ M, which has increased the resistance to drought stress in snake grass plants.

Keywords: antioxidant, phenolic compounds, fat peroxidation