

Role of chitosan in improving salinity resistance through some morphological and physiological characteristics in fenugreek (*Trigonella foenum-graecum* L.)

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Abstract

Soil salinity is a serious environmental problem that has negative impacts on growth and production of plants. On the other hand, application of chitosan has recently been increased to enhance the resistance to different stresses, such as salinity. In order to study the effect of chitosan seed-priming on alleviation of salinity stress in fenugreek (*Trigonella foenum-graecum* L.) a factorial experiment, based on completely randomized design with three replications, was conducted in 2014 in the Research Greenhouse of University of Zabol. Chitosan pretreatment, taken as the first factor, was applied at three levels (0, 0.5 and 1 g/l) and sodium chloride (NaCl) was the second factor at four levels (0, 50, 150 and 250 mM). Before planting, the seeds were soaked for 6 hours in the chitosan solutions. NaCl was applied to the plants by irrigation water (after 2-leaf stage), with 3-day intervals. Results indicated that increasing salinity stress reduced growth characteristics, content of photosynthetic pigments, leaf relative water content, chlorophyll index and increased the amount of anthocyanin and proline. Seed-pretreatment by application of 0.5 mg/L chitosan, under salinity stress, increased plant dry weight, length of stem and roots, and leaf relative water content, as compared to the control treatment. In addition, under the salinity level of 250 mM, application of 1 g/L chitosan increased chlorophyll *a*, chlorophyll *b* and carotenoids content by 43.7, 65.4 and 28 percent, respectively, as compared to the control treatment. The highest amount of anthocyanin was found in the 1 g/L chitosan treatment. In general, these results suggested that in salt-affected areas, seed pretreatment by application of chitosan could be utilized efficiently for reducing the salinity stress on leaf relative water content and photosynthetic pigments, and better growth and establishment of fenugreek plant.

Keywords: Anthocyanin, Proline, Total chlorophyll, Medicinal plants.

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