



Zabul University

Management of supplementary education
Faculty of Basic Sciences
Department of Biology

Dissertation to obtain a master's degree in the field
Plant Physiology

Title:

The effect of different concentrations of iron oxide
nanoparticles on some physiological indicators of
watercress

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abstract

The aim of this study is the effect of different concentrations of iron oxide nanoparticles on some physiological indicators of watercress. These treatments were carried out factorially based on a completely randomized design with 7 treatment levels and in 3 replications on the watercress plant in the plant physiology laboratory of Zabul University Faculty of Science during the 1402-1403 crop year. The treatments applied in this experiment were prepared using iron and iron oxide nanoparticles. The iron oxide nanoparticle was ultrasonicated for 45 minutes and finally used as a foliar spray. Nanoparticles had 4 concentration levels (0, 25, 50, 100 mg/liter). According to the obtained results, the concentration of 25 mg/liter has caused a significant increase in root and stem length and root and stem weight of watercress and has significant growth compared to the control plant. The results of the comparison of the averages of the effects of treatment with different concentrations of nano iron oxide and iron in concentrations of 0, 25, 50, 100 showed that the highest concentration of chlorophyll, carotenoid, flavonoid was obtained in the treatments of 25 mg/liter, which compared to the control and Other treatments showed significant differences. In general, with the increase in the amount of iron nanoparticles, the morphological, physiological and biochemical characteristics of watercress decreased, which can be caused by the adverse effects of high concentrations of iron nanoparticles. In total, the application of 25 mg/liter of iron and iron nanoparticles can be one of the recommended ways to improve growth in watercress. The highest amount of root phenol was obtained at a concentration of 25 mg/liter, which was higher than the control. The highest amount of reduction of proline and malondialdehyde was related to the treatment of 25 nano iron oxide and iron chelate, and at the level of 100 mg/liter, due to the toxic effects of nano chelate, it had the highest amount of proline and malondialdehyde. The maximum amount of polyphenol oxidase and guaiacol peroxidase related to the treatment is 25 mg/liter, and according to the above results, the level of 25 mg/liter is effective for obtaining the desired results for the plant. According to the results of the present research and similar studies, it seems that more comprehensive results can be presented by conducting additional studies.

Keywords: physiological properties, watercress, iron nanoparticles, iron