University of Zabol
Graduate school
Faculty of Basic Sciences
Department of Biology

The Thesis Submitted for the Degree of M.Sc (in the field of plant physiology)

The interaction effect of mycorrhizal fungi and Fe3O4 nanoparticles on reducing the harmful effects of salinity stress in tomato *(Solanum Lycopersicum L.)*

Supervisors:
Dr. Sh. Najafi
Dr. S. Esmaeilzadeh Bahabadi

Advisors:
Dr. R. Rahmaty zadeh

By:
Z. Nikbakht

September 2024

Abstract

A pervasive and limiting issue of agricultural production in Iran is salinity, which covers many parts of arid and semi-arid regions of the country. Tomato is a herbaceous plant from the family of eggplants, which has an unfavorable salinity on its growth. One of the most important components of the soil biological community is the mycorrhizal fungus, which interacts with other rhizospheres and becomes one of the most important biological resources of the soil. In this research, the interaction effect of mycorrhizal fungus and iron oxide nanoparticles on reducing the harmful effects of salinity stress in tomato plants was investigated. Morphological indicators such as fresh weight and length of shoots and roots and biochemical traits such as chlorophyll a, chlorophyll b, total chlorophyll and carotenoid, total phenol, flavonoid, antioxidant activity (DPPH), protein, proline, lipid peroxidation (MDA) and activity of antioxidant enzymes. (polyphenol oxidase and guaiacol peroxidase) were measured by spectrophotometer method. Our results showed that salinity stress decreased the weight and length of shoots and roots, the amount of photocentric pigments (chlorophyll a, chlorophyll b, total chlorophyll, and carotenoid) and protein, and increased the amount of proline and total phenol, flavonoid, antioxidant activity, and peroxidation. lipids as well as the activity of antioxidant enzymes. The treatment of iron oxide nanoparticles at a concentration of 25 mg/liter and G. Mosseae fungus in stress and non-stress conditions improved all the above indicators. Based on the results of this research, foliar spraying of iron oxide nanoparticles along with mycorrhizal fungi is suggested to reduce stress conditions in tomato plants under salt stress.

Keywords: tomato, iron oxide nanoparticles, mycorrhizal fungus, salinity stress, phenolic compounds and antioxidant activity