



**Graduate School**

**Faculty of Science**

**Department of Biology**

**The Thesis Submitted for the Degree of M.Sc**

**( in the field of Plant Physiology)**

**Title:**

**Effect of three metallic complex of iron and its nanoparticles on  
the some growth physiologic parameters of Triticum aestivum**

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September2020

## **Abstract**

The use of nanotechnology in all fields, including agriculture is expanding. Using nanotechnology in designing and manufacturing nanofertilizers, new opportunities in order to increase the efficiency of nutrient consumption and minimize the costs of environmental protection have opened up for humans. In this study, the effect of different concentrations of iron complex and the resulting nanoparticles (100, 200 and 500 ppm) on germination, growth and physiological parameters of wheat plants including total phenols and flavonoids and antioxidant activity were investigated. The morphology and biosynthesis of iron nanocomplexes were identified and confirmed by visible-ultraviolet spectroscopy, X-ray diffraction (XRD) and transmission electron microscopy (TEM). The amount of total phenol compounds was measured by the Folin-Ciocalteu method and the amount of flavonoid compounds was measured by the method of aluminum chloride colorimetry and mizelin antioxidant activity was investigated by FRAP method. The synthesis results showed that the prepared iron oxide nanoparticles have a smaller particle size and a larger specific surface area than the iron nanocomplex. The results showed that under the influence of all concentrations of iron complex and iron nanoparticles, all growth and physiological indices increased significantly compared to the control. The highest seed germination (94%) is at the concentration of 500 ppm iron nanoparticles. Maximum root length (27 cm), stem length (16.3 cm), stem dry weight (0.0017 g), root dry weight (0.0012 g), root length (0.03 cm), stem dry weight (0.04 cm), root length (29.33 cm) and stem length (29 cm) were observed at a concentration of 500 ppm iron nanoparticles. The highest phenol content (2.3), flavonoid content (2.5) and antioxidant activity (2.55) were obtained at a concentration of 500 ppm iron nanoparticles. In general, depending on the composition and concentration, the compounds showed positive biological effects, therefore, optimization of compounds and concentrations is important.

**Keywords:** Iron complex, Iron nanoparticles, Physiological indicators, Wheat plant