



University of Zabol
Graduate School
Faculty of Soil and Water
Department of science

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Science (M.Sc) in Soil Science

Title

**Study and Comparison of the Effect of Chelated Iron (Fe- EDTA),
Iron Oxide Nanoparticles (Fe₃O₄) and Nano-Iron Chelate on the
Growth Parameters of Sunflower**

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Abstract :

To investigate the effects of nano-iron oxide chelates, iron oxide nanoparticles, and conventional iron chelate on quantitative and qualitative characteristics of sunflower an experiment in factorial randomized complete block design with 3 replications was conducted in research and educational greenhouse located in faculty of Agriculture, University of Zabol, in 1392. Factors examined in this experiment consisted of 9 manures (nano-iron oxide chelate, iron oxide nanoparticles, and conventional iron chelate) and the treatment was tested using both foliar and soil amendments. and applied in 4 stage and at 15 days. The results of this study showed that nano-iron oxide chelate and iron oxide nanoparticles play a significant role in improving the growth parameters (shoot fresh weight, dry weight, plant height, and number of leaves per plant), leaf chlorophyll contents (a, b, and total as well as Carotenoides), and nutrient uptake of aerial plant organs so that it was significant at the level of 1% in all the studied parameters. Generally, the effect of each nano-chelate on shoot parameters, chlorophyll content of leaves, and nutrient concentration of sunflower shoots was positive. In the case of treatment method, in both soil and foliar applications, the effect of nano-iron chelate and iron oxide nanoparticles on shoot parameters, chlorophyll content of leaves and nutrient concentration of sunflower shoots was positive. The highest rates of most of the growth indexes and leaf chlorophyll content was obtained through foliar method and this, on the one hand, shows the priority of the foliar method in most of the growth indexes as well as leaf chlorophyll content, and on the other hand, the priority of soil amendment for improving nutrient concentration of shoot organs in sunflower.

Key words: nanoparticles, nano-chelate, nanotechnology, sunflower, iron oxide