

Effect of Thiobacillus and Nitrocara Biological Fertilizers and Foliar Application of Zinc and Iron on Some Qualitative Characteristic and Remobilization of Rapeseed (*Brassica napus* L.)

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Abstract

Background and Objectives

Oil crops could be considered as a valuable resource for providing the plant oil for cooking. Canola is one of the main oil crops the third oil crop after soybean and oil palm. The macro and micro nutrients have an important role in plant nutrition. The biological fertilizer could be effective in sustaining agriculture program. Material remobilization is an important process in transporting the nutrition from leaf and stem to grains. The nitrogen fertilizer increases wheat grain yield, Nitrogen and phosphorus uptake, grain protein, zinc and iron. Application of nitrogen fertilizer improves the canola biological yield and stem dry weight at flowering stage. The main goal of this research was the comparison of the micro and macronutrients and biological fertilizer on some qualitative characteristics and remobilization of Rapeseed (*Brassica napus* L.)

Material and Methods

In order to evaluate the effect of biological fertilizers and micronutrients on some qualitative traits and remobilization of rapeseed (*Brassica napus* (L.) var. *Hyola 401*), an experiment was conducted in the Research Station of Shahid Chamran University of Ahvaz, Iran in 2012-13. The experimental design was factorial based on randomized complete blocks design with three replications. The treatments were microelements in six levels (control, zinc sulfate (2 and 4 cc.lit⁻¹), iron chelate (2 and 4 cc.lit⁻¹) and combined zinc and iron fertilizers (2 cc.lit⁻¹)) and the second factor was application of biofertilizers in 3 levels (seed inoculation with *Thiobacillus* with Sulfur Bentonite, Nitrocara + *Thiobacillus* Sulfur Bentonite and control). The canola (cv. *Hyola401*) was seeded on 13 Nov. 2013 and harvested on 21 Apr. 2014. Each plot size was 7.2 m² consisting of 5 rows of canola plants. Foliar application of zinc sulphate and iron was done at 2 %4 /1000 concentration in stem elongation and flowering stages.

Results

Due to the interaction of biological fertilizer and micronutrient elements, the highest plant individual yield (10/62 g/m²) and the lowest remobilization efficiency(13.85%) were achieved from Nitrocara + *Thiobacillus* bacteria with combined zinc and iron (2cc.lit⁻¹). The highest oil percent (48.47%) was also revealed at *Thiobacillus* bacteria with combined zinc and iron (2cc.lit⁻¹), While the lowest oil percent (31%) was obtained at control treatment.

Discussions

Finally, the results of this study revealed that the canola seeds inoculated with bio-fertilizers and with foliar application of micro-nutrients reduced consumption of chemical fertilizers such as nitrogen fertilizers can be useful in improving the quantitative and qualitative characteristics of oil varieties of canola. Also, the highest individual plant yield was obtained by application of *Thiobacillus* + Nitrocara and Zinc + iron application. The results suggested that the microelements not onlt increased the grain zinc and iron content (36-41%), but also improved economical yield and grain oil contents.

Keywords: Protein, Sustain photosynthesis, Inoculate, Oil, Micronutrient elements, Sulfur.