

Abstract

Two separate experiments were aimed at investigating and comparing the effects of foliar spray of nitrogen (N) and zinc (Zn) elements via nano- and chemical fertilizers on quantity and quality properties of colocynth (*Citrullus colocynthis* L.). In the first experiment, the effects of foliar application of nano-N chelate (0, 1000 and 2000 mg L⁻¹) and urea (0, 1 and 2%), and in the second experiment, the effects of foliar spray of nano-Zn chelate (0, 1000 and 2000 mg L⁻¹) and zinc sulphate (0, 1000 and 2000 mg L⁻¹) were evaluated based on a completely randomized block design. The results of the first experiment showed that foliar spray of N had a significant effect on yield and number of fruit per bush, whereas it had no effects on fruit average weight, fruit length and diameter and shoot length. Foliar urea application was more effective on yield and number of fruit per bush than nano-N chelate. So that, the highest yield and number of fruit per bush were obtained through the urea treatment at 1 % concentration. Foliar N application led to increases in weight of 100 seeds, seed protein and seed nitrogen percentage. The highest weight of 100 seeds, seed protein and seed nitrogen percentage was obtained with the foliar spray of nano-N chelate at concentration of 2000 mg L⁻¹. The results also showed that N foliar application had a negative effect on seed phenol content, seed soluble carbohydrate and seed oil content. So that, the highest values of all three indexes were obtained in the control treatment, and the lowest seed phenol content was obtained in the nano-N chelate at concentration of 2000 mg L⁻¹ treatment and the lowest concentration of carbohydrate and seed oil content were obtained with the urea treatment at 2% concentration. Nitrogen foliar spray increased seed protein content, and the effect of nano-N chelate on seed protein content was more than urea fertilizer. Foliar application of N increased leaf N concentration, whereas it had no effects on the leaf concentrations of P, K and Zn. The results of the second experiment showed that foliar application of Zn had a significant effect on yield and number of fruit per bush. The highest yield and number of fruit per bush were obtained through foliar spray with nano-Zn chelate at the concentration of 2000 mg L⁻¹. Foliar Zn application did not affect fruit average weight, fruit length and diameter, shoot length, weight of 100 seeds, seed protein content, seed nitrogen percentage, seed oil and leaf protein. Seed phenol content was increased by foliar Zn application. The highest seed phenol content was obtained with application of nano- Zn chelate at the concentration of 2000 mg L⁻¹. Zinc foliar application led to an increase in seed soluble carbohydrate content and the highest value of this index was obtained in the treatment of nano-Zn chelate at a concentration of 1000 mg L⁻¹. Foliar Zn application increased the leaf concentration of Zn, whereas it did not affect N, P and K leaf concentrations. Generally speaking, nano-Zn chelate fertilizer was more effective on yield, number of fruit per bush and seed phenol than zinc sulfate fertilizer.

Keywords: Seed protein, Foliar spray, Seed oil, Seed phenol, Soluble carbohydrates, Nano-fertilizer.



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**Investigation and comparison of the
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on quantity and quality properties of
colocynth (*Citrullus colocynthis* L.)”**

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