

Effects of Foliar Application of Zinc and Iron on the Yield and Quality of Two Onion Cultivars

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INTRODUCTION

Imbalanced fertilization, especially the overuse of N and P-fertilizers, can deteriorate the quality of onions (*Allium cepa* L.), especially by decreasing onion shelf-life due to lower dry matter content and by making onions with higher NO₃ concentrations unsafe for human consumption (Malakouti et al. 2004). Considering the calcareous nature of soils in the state, environmental issues and the high cost of micronutrients, it seemed necessary to study the uptake of nutrients by onion after foliar applications of Fe and Zn.

METHODS

A factorial experiment with a randomized complete block design was conducted at the Khosrowshahr Research Station and in Bonab, East Azarbayjan, in 2004 to evaluate the effect of foliar application of Zn and Fe on the yield and quality of different onion varieties in a calcareous soil. The soil was characterized with Organic Carbon (OC) content < 0.80%, CaCO₃ content > 30%, and available Zn and Fe concentrations as measured in DTPA extract were 0.35 and 5 mg kg⁻¹, respectively. Iron and Zn sulfates were applied at three levels as 0, 0.2, 0.4% and 0, 0.5 and 1% solutions (Fe0Zn0, Fe0Zn1, Fe0Zn2, Fe1Zn0, Fe1Zn1, Fe1Zn2, Fe2Zn0, Fe2Zn1, Fe2Zn2), respectively. Two onion varieties, Red Ray and White Qom, were compared resulting in a total of 18 treatments with 3 replications.

RESULTS AND DISCUSSION

When Fe was applied alone, the best yield of 63 t ha⁻¹ was obtained with the highest Fe concentrations in Bonab during the second year. Similarly, for the Zn treatment, the best yield of 63.2 t ha⁻¹ was obtained with the highest Zn application. With regard to the combined effect on yield, the best results were obtained with Fe and Zn applications at level three. Red Ray produced a higher yield than White Qom under this treatment (Fig. 1). With regard to onion spoilage during storage, the highest rate of losses was seen in onions from control plots in the second year in Khosrowshahr. The best shelf-life resulted from foliar applications of Fe and Zn at the highest level. The highest content of total soluble solids (14%) was obtained with foliar application of Fe and Zn at level three in the second year in Bonab. The lowest NO₃ concentration of onion bulbs was also obtained in the second year in Bonab. Nitrate concentrations in the bulbs decreased significantly with increasing levels of Fe and Zn (Fig. 2). While NO₃ concentration in onions from control plots was 225 mg kg⁻¹ FW, NO₃ decreased to 72 mg kg⁻¹ FW.

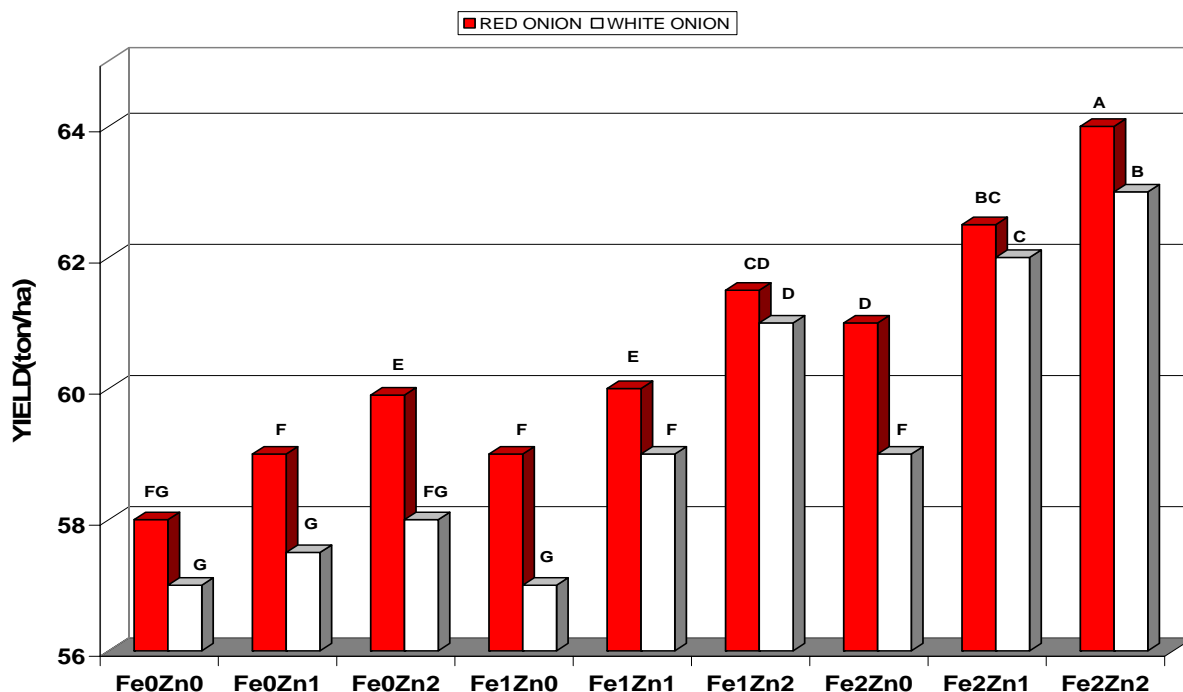


Fig. 1. The effect of foliar application of Zn and Fe on the yield of two onion cultivars.

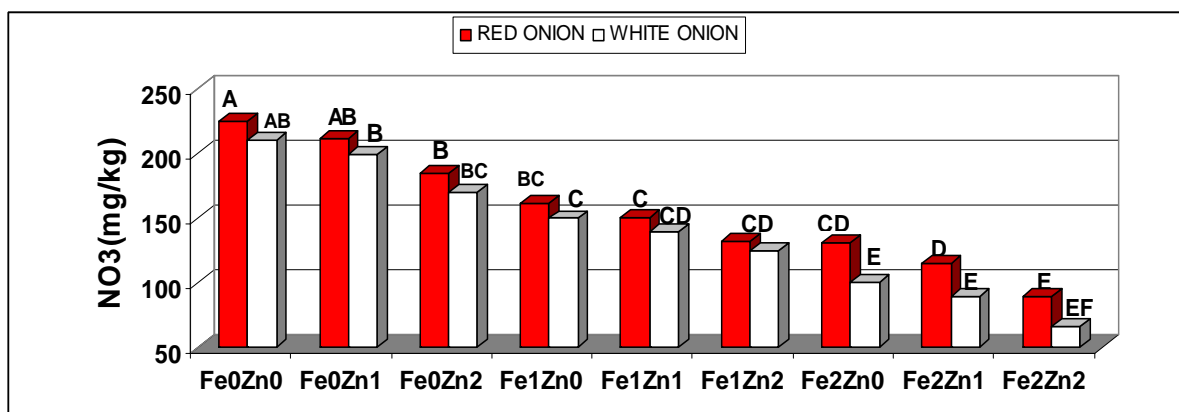


Fig. 2. The effect of foliar application of Zn and Fe on NO₃ concentrations in bulbs of two onion cultivars.

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