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Effects of Spraying Iron and Zinc on Grain Yield and Some Morphological Characteristics of Two New Fodder Corn Hybrids in North Khouzestan

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Abstract: ***New corn cultivars introduced in Khuzestan include Karun and Valfajr 700 that are very well adapted to the climatic conditions of this province. Applying the required nutrients (including the microelements iron and zinc) to the soil is necessary for increasing the quality and quantity of fodder corn. The main subject of this research was to study the effects of supplying the full quantities of nutrients required by this crop on the quantitative yield of the new fodder corn cultivars. In this regard, the roles and importance of the elements iron and zinc in the structures of photosynthetic compounds are very important. Another subject of this research was related to the comparison of the two new commercial corn hybrids that were recently (in 2012) introduced by the Safiabad Agricultural Research Center to be planted by farmers. It is imperative that the nutrients needed by these hybrids be determined and recommended to the corn growers so that they can provide the nutrients for their crop. Moreover, we were interested in finding the mutual effects of spraying these elements and in comparing the hybrids to see planting which hybrid, and spraying which element, resulted in the highest seed, stems, and leaf yields.***

Keywords: Grain Yield, Spraying, Morphological Characters, Iron and Zinc, North Khouzestan.

1. Introduction

Brown et al. (1974) observed that the reduction of Fe3 to Fe2 was a necessary step in releasing iron from its chelate and for the absorption of iron by corn. They also believed that the sensitivity of plants to iron deficiency might have some relationship with the metabolic processes related to the release of iron from the chemical compound Fe EDDHA. With regard to the importance of zinc in human diet, it suffices to say that zinc deficiency causes hair loss and results in nail break and many other disorders such as asthma, Alzheimer’s disease, etc. This element plays a major role in the formation of plant hormones. In plants suffering from zinc deficiency, parallel yellow bands appear around midribs, carbohydrate production is lowered, and deficiency symptoms are observed most often in intense sunlight (that reduces the quantities of plant hormones). Zinc deficiency in fruit trees results in chlorosis of young leaves, and in cereals causes the cereal rosette disease (in which leaves are clustered together). Gandomkar et al. (2001) identified severe zinc deficiency, and moderate iron and manganese deficiencies, in the citrus orchards of north Khuzestan.

2. Materials and Methods

This experiment was conducted in the field belonging to the Safiabad Agricultural Research Center of the city of Dezful in the spring of 2012. The complete randomized block design in the form of a factorial experiment was used with three levels of spray (two sprays and a control that was not sprayed) and two levels of cultivars (the single cross Karun, and the single cross Valfajr 700 that is also called Scvalfajer700) in three replications. After soil samples were taken from the depths of zero-30 and 30-60 centimeters, the field preparation operations were carried out and the macronutrients, including the nitrogen and phosphorous and potassium required (based on the results of the soil analysis) were broadcast uniformly on and incorporated in the soil during these operations. Furrows were then constructed and the map of the experiment was designed. Each experimental treatment consisted of four six-meter long rows of planted corn, with a distance of two meters between adjacent rows to avoid drift. Neighboring replications were three meters apart. Therefore, each experimental plot of each replication contained three treatments (one sprayed with iron, one sprayed with zinc, and one, the control treatment, not sprayed with iron or zinc).

3. Results and Discussion

3.1 Corn seed (sprayed with iron): Results of analysis of the variance showed that iron absorption by seeds was greater in plants of hybrid 1 (H1) that were sprayed with iron compared to iron absorption by seeds in plants of hybrid 2 (H2) that were not sprayed with iron (Figure 1).

3.2 Corn stems and leaves (sprayed with iron) Results of analysis of the variance indicated that iron absorption by stems and leaves was greater in plants of hybrid 1 (H1) that were sprayed with iron compared to iron absorption by stems and leaves in plants of hybrid 2 (H2) that were not sprayed with iron (Figure 2).

3.3 Corn seed (sprayed with zinc) Results of analysis of the variance revealed that zinc absorption by seeds was greater in plants of hybrid 1(H1) that were sprayed with zinc compared to zinc absorption by seeds of plants of hybrid 2(H2) that were not sprayed with zinc.

3.4 Corn stems and leaves (sprayed with zinc) Results of analysis of the variance demonstrated that zinc absorption by stems and leaves was greater in plants of hybrid 1 (H1) that were sprayed with zinc compared to zinc absorption by stems and leaves of plants of hybrid 2 (H2) that were not sprayed with zinc.

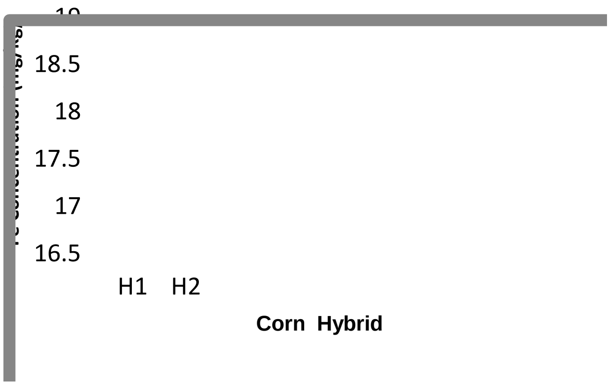

Figure 1: Iron absorption in grain of corn plants sprayed with iron

The vertical axis: iron concentration in corn seeds; the horizontal axis: iron absorption by seeds of corn plants sprayed with iron (H1) compared to iron absorption by seeds of corn plants not sprayed with iron (H2)

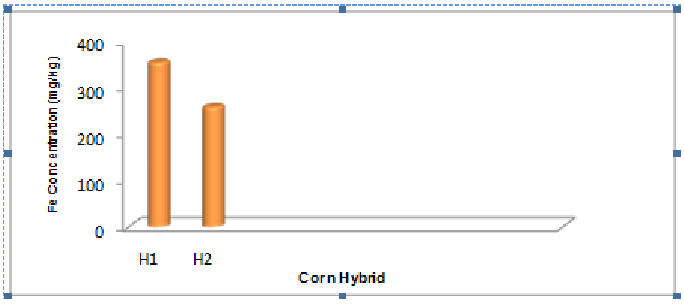

Figure 2: Iron absorption by stems and leaves of corn plants sprayed with iron

The vertical axis: Iron concentration in stems and leaves of corn plants; the horizontal axis: iron absorption by stems and leaves of corn plants sprayed with iron (H1) compared to iron absorption by stems and leaves of corn plants not sprayed with iron (H2)

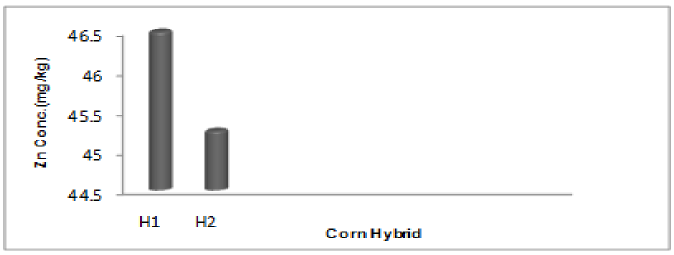

Figure 3: Zinc absorption by grain in corn plants sprayed with zinc

The vertical axis: Zinc concentration in corn seeds; the horizontal axis: zinc absorption by seeds in corn plants sprayed with zinc (H1) compared to zinc absorption by seeds in plants not sprayed with zinc (H2)

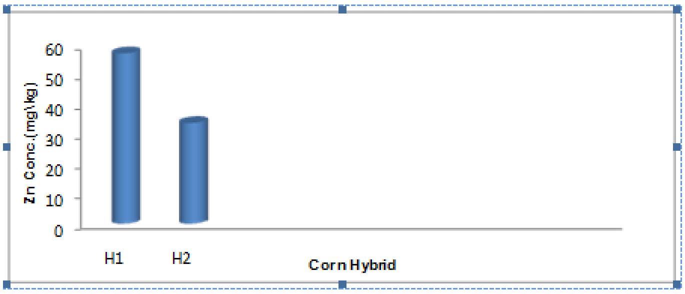

Figure 4: Zinc absorption by stems and leaves of corn plants sprayed with zinc

The vertical axis: Zinc concentration in stems and leaves of corn plants; the horizontal axis: zinc absorption by stems and leaves in corn plants sprayed with zinc (H1) compared to zinc absorption by stems and leaves in corn plants not sprayed with zinc (H2).

4. Conclusion

Fresh seeds with high germinative power be selected for experiments. A plan be formulated with the help of results obtained in this research (and of those observed in similar studies) to encourage and increase the application of micronutrients, particularly iron and zinc, in fields under corn cultivation.

References

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