

The Effect of Zinc on Quality of Sugar Beet (*Beta vulgaris* L.)

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INTRODUCTION

Sugar beet (*Beta vulgaris* L.) is an important cash crop in Iraq. Information regarding the requirements of sugar beet for primary nutrients is abundant, but research on micronutrients is less common even though sugar beet is moderately sensitive to deficiencies of most micronutrients (Martens et al. 1991). Zinc and B availabilities in calcareous soils are limited due to high pH (> 7.0), high free calcium carbonate and low organic matter content, and interrelationships with other elements (Welch et al. 1991). Excess P additions induce Zn deficiency. Boron may be fixed also to some extent under the same condition. More B appears to be required by plants growing in soils with high pHs (Singh et al. 1988). In addition, foliar applications are also recommended sometimes to improve the efficiency of Zn and B assimilation (Stevens et al. 2004). The objective of our research was to highlight the effect of different levels of Zn and B fertilization on the quality of sugar beet including sugar percentage, prix, purity and crude sugar.

METHODS

Field experiments were conducted at two agricultural sites: AL-Sheikh MohameL (L¹) and Caber AL-Abed (L²) on an entisol and aridsol, respectively at Ninevah, which varied in some physical and chemical characteristics. The field experiments were conducted on each site during autumn season of 2002-2003 using a randomized complete block design (RCBD) with three replicates.

The treatments included five levels of Zn (0, 5, 10, 15, 20 ppm Zn) as ZnSO₄ and three B levels (0, 5, 10 ppm B) as H₃BO₃ that were added by foliar application to the leaves of sugar beet. After harvesting, sugar percentage, prix, purity, crude sugar and extere sugar were measured in roots.

RESULTS AND DISCUSSION

The quality of sugar beets improved significantly more by using Zn and B fertilizer in combination (together) than separately (alone) at both locations. The best root quality of sugar beet was found with the application of the 10 ppm Zn with 10 ppm B at both locations. The treatment combination (Zn₁₀B₁₀) affected significantly the quality by increasing, sugar percentage and sugar yield of sugar beet at both locations.

Higher response in the quality of sugar beet, namely increased sugar percentage and sugar yield, to fertilizer (Zn and /or B) application was found in the soil of location L1 compared to location L2.

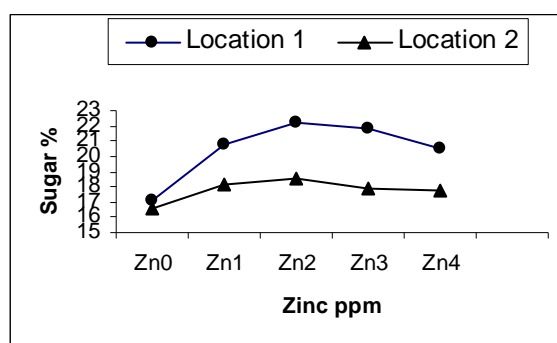


Fig. 1. Effect of Zinc on sucrose content (%) of sugar beet in two locations.

Table 1. The quality of sugar beet in two locations.

Applied Zn ppm	Sugar Percentage		Purity Percentage	
	L ¹	L ²	L ¹	L ²
0	13.5	11.93	82.19	75.66
5	14.70	13.61	83.09	82.46
10	15.1	14.17	83.44	84.38
15	14.56	13.94	81.14	82.79
20	14.25	13.77	80.46	80.79

CONCLUSIONS

High responses to fertilizer (Zn and /or B) by foliar application to the leaves of sugar beet was found in the soil at both locations L1 and location L2, in the quality of sugar beet including increased sugar percentage, and sugar yield. Zinc sulfate may be safely applied in sugar beets by foliar application to the leaves.

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