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5. SUMMARY

This work aims to evaluate the responsive role of different K, Zn and B fertilizer levels added solely or together as well as their interactions for sugar beet yield and its quality under two procedures of application, i.e., soil application and foliar spray.

To achieve this target, a field experiment was carried out on a calcareous soil at Nubaria Agriculture Station, Northern Tahrer Sector during winter season of 2004/2005. The fertilizers of K, Zn and B were added in the forms of potassium sulphate, zinc sulphate and borax, respectively. These fertilizers were added at three rates of 0, 20 and 40 kg K/fed as soil application vs 0, 500 and 1000 mg K/L as foliar spray; 0, 3.5 and 7.0 kg Zn/fed as soil application vs 0, 100 and 200 mg Zn/L as foliar spray; 0, 1.0 and 2.0 kg B/fed as soil application vs 0, 35 and 70 mg B/L as foliar spray.

The applied fertilizers at the different studied rates were homogeneously mixed through 0–15 cm soil depth in case of soil application. As for the foliar spray

procedure, the tested fertilizers were dissolved through a total volume of 1800 L water solution/fed for each applied rate and sprayed on plant at three equal doses after 30, 60 and 90 days from planting.

The obtained results could be summarized as follows:

1. Application of K, Zn and B added either alone or together as well as in the form of soil or foliar application had a markedly positive effect on dry weight of sugar beet leaves at 100 days from planting.
2. Addition of different rates of K, Zn and B added solely and combined with them to the studied calcareous soil as soil or foliar application caused a significantly increased in the contents of Zn and B in sugar beet leaves.
3. The positive effect of K combined with Zn and B on sugar beet plants grown on a calcareous soil was stimulated their vegetative growth, and consequently increased the uptake of N, P and K by sugar beet leaves.

4. K, Zn and B fertilization at the different studied rates, as soil application or foliar spray, significantly increased top and root yields of sugar beet plants.
5. Increment of K rates as solely or in combination with the applied Zn and B rates as well as they added as soil application or foliar spray, consistently increased the contents of Zn and B for sugar beet root.
6. Increasing K, Zn and B rates alone or together as well as added as soil application or foliar spray was associated with significantly increased of N, P and K in sugar beet root.
7. By increasing the applied rates of K, Zn and B, added alone or together as soil application or foliar spray, some quality parameters of sugar beet, i.e., root diameter and length tended to improve gradually.
8. The percentages of total soluble solids, sucrose and juice purity were significantly increased with increasing the applied K, Zn and B rates added alone or together as soil application or foliar spray.

9. The application of K, Zn and B fertilizers added as soil application or foliar spray had a markedly stimulatory effect on the sugar yield (ton/fed), which tended to increase with increasing their applied rates.
10. The greatest values of the abovementioned sugar beet parameters were achieved when applying the highest rates of the tested fertilizers (K, Zn and B) to the experimental calcareous soil, either as soil application (40 k + 7 kg Zn + 2 kg B/fed) or foliar spray (1000 mg K + 200 mg Zn + 70 mg B/L).
11. Application of the tested fertilizers as foliar application was more effective than added as soil application, presumably due to their easily absorption and translocation through the plant tissues as well as their positive roles in physiological processes in plant.

SUMMARY