

ABSTRACT

Two field experiments were conducted in two successive seasons of **2001/2002 and 2002/2003** at Sakha Agricultural Research Station (Kafr–El Sheikh Governorate) to study the effect of sowing date, sowing method and soil application of boron and zinc on growth, yield and quality of sugar beet crop (*Beta vulgaris* L.). The present work included twenty treatments which were the combination between five sowing methods of sugar beet and four micro-elements treatments (boron and zinc). These treatments were carried out in two sowing dates. The studied treatments were as follows:

Sowing dates:

1. 15th September.
2. 15th October.

Transplanting seedling old:

1. Sowing sugar beet by dried seeds (usual method).
2. Transplanting paper pots seedling of 15 days age.
3. Transplanting paper pots seedling of 25 days age.
4. Transplanting paper pots seedling of 35 days age.
5. Transplanting thinned seedling resulted from the permanent field at thinning.

Micro-nutrient treatments:

1. Unfertilized treatment (control).
2. 0.5 kg boron/fed. (recommended dose).

3. 4.0 kg zinc/fed. (recommended dose).

4. 0.5 kg boron + 4.0 kg zinc/fed.

The twenty combinations among the studied sowing methods and trace elements were distributed in a complete randomized block design with three replications at each of the two sowing dates studied. The seeds and paper pots were sown at 20 cm between hills. The commercial sugar beet variety **Gazelle** was used in both seasons.

The obtained results showed that sowing sugar beet early on 15th September significantly attained higher value of root length, root diameter, root fresh weight/plant, top fresh weight, total soluble solids% (TSS%), sucrose %, sugar recovery %, purity % as well as root, top and sugar yields/fed compared with that obtained at late sowing date 15th October. On the contrary, sowing sugar beet earlier on 15th September significantly reduced the value of potassium %, sodium %, juice impurities % in sugar beet roots compared with late sowing on 15th October. All of alpha-amino nitrogen %, zinc and boron concentrations in root or leaf of sugar beet, number of roots/fed., abnormal root % were unaffected by sowing dates.

Concerning the effect of transplanting seedling old, it was found that sowing sugar beet by using paper pots seedlings of 15 days age produced highest and

significant values of root length, root diameter, total root number/fed, as well as root, top and sugar yields/fed compared with that recorded by sowing by the direct seeds or by the others paper pots seedlings of the different ages, while it gave the lowest value of sodium %, impurities %, abnormal root %. The highest value of root fresh weight/plant, sucrose %, potassium%, total soluble solids %, purity %, sugar recovery % was significantly obtained from the transplanted seedling of 15 days age and/or sowing beet seeds by the usual method (dry seeds), however, these two methods of planting lowered the values of potassium % in roots. Transplanted sugar beet seedlings produced by using paper pots technique at age of 15 and 25 days significantly recorded a highest values of sugar beet top fresh weight/plant, total root number/fed, followed by dry seeds. There were no significant effects due to transplanting seedling old on the values of alpha-amino nitrogen, zinc and boron concentration in roots and leaves of sugar beet plants.

The results showed that the application of zinc element alone or in combination with boron element significantly resulted in higher values of root length, diameter, Zn-content in sugar beet root and leaves, sodium %, and top yield/fed. compared with those recorded by the unfertilized or applied with boron only.

Application of boron alone or in combination with zinc produced higher root fresh weight/plant, total soluble solids %, sucrose %, sugar recovery %, boron concentration in sugar beet roots and leaves as well as root and sugar yields/fed compared with those recorded by the unfertilized or applied with zinc alone, however, it produced the lowest values of impurities %. The applied treatments of boron, zinc or their combination had no significant effect on potassium %, alpha-amino nitrogen, total root number/fed and abnormal root percentage.

The interaction between sowing date and transplanting seedling old significantly affected root length, root fresh weight, percentages of sucrose, sodium, purity, sugar recovery, TSS, abnormal root and yields of root, top and sugar/fed. The interaction between the three studied factors significantly affected sodium and purity percentages.

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