ABSTRACT

Two field experiments were carried out at Belkas district, Dakahlia Governorate in 2001/2002 and 2002/2003 seasons to study the effect of four sulfur rates *i.e.* 0, 30, 50 and 70 kg/feddan and four boron concentrations *i.e.* 0, 100, 150 and 200 ppm as boric acid on sugar beet growth, yield and its components as well as quality of the two varieties *i.e.* Helix and Desprez Poly-N. The experiments were laid out in split split plot designe with four replicates.

This study revealed that sugar beet variety Helix surpassed variety Desprez Poly-N in number of leaves/plant, leaf area index, root fresh weight, relative growth rate, net assimilation rate, crop growth rate, sucrose percentage at 105, 125 and 145 days from sowing, root length, root diameter, top yield, sugar yield, total soluble solids and purity percentage at harvest time, in both seasons.

The obtained results showed that average values of leaves number/plant, leaf area index, root fresh weight, relative growth rate, net assimilation rate, crop growth rate, sucrose percentage at 105, 125 and 145 days from sowing, root length, root diameter, top yield, sugar yield, total soluble solids and purity percentage at harvest time were significantly increased with increasing sulfur fertilizer rates, in both seasons. Applying sulfur fertilizer at the rate of 70 kg S/feddan gave the highest values of the mentioned previously traits, in both seasons. On the contrary, harvest index, root /top ratio, alpha-amino nitrogen percentage significantly decreased with increasing sulfur fertilizer rate up to 70 kg S/feddan, in both seasons.

The results recorded in this study indicated that average leaves number/plant, root fresh weight, leaf area index, relative growth rate, net assimilation rate, crop growth rate, sucrose percentage at 105, 125 and 145 days from sowing, root length, root diameter, top yield, sugar yield, total soluble solids and purity percentage at harvest time were significantly increased as boron concentrations increased, in both seasons. Spraying sugar beet plants with boron at the concentration 200 ppm as boric acid gave the highest values of mentioned previously characters, in both seasons. On the other hand, harvest index, root /top ratio, root nitrogen percentage significantly decreased with increasing boron concentrations up to 200 ppm as boric acid, in both seasons.

The mentioned results showed that the interaction effect among sulfur fertilizer rates and boron concentrations on top, root and sugar yields were significant in both seasons. Sugar beet plants fertilized with sulfur at the rare of 70 kg S/feddan and sprayed with 200 ppm boron as boric acid, gave the highest top, root and sugar yields, in both seasons.

The obtained results illustrated that the mentioned previously traits were significantly affected by interaction effect among sugar beet varieties, sulfur fertilizer rates and boron concentrations in both seasons. Sugar beet variety Helix fertilized with sulfur at the rate of 70 kg S/feddan and sprayed with boron at the concentrate of 200 ppm, as boric acid, gave the highest root, sugar, top yield, total soluble solids and purity percentage in both seasons.

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