Two field experiments were conducted at the agricultural, Minia university during 2001/2002 and 2002/2003 seasons, to study the effect of potassium, magnesium, and boron fertilization on growth, yield, and quality of sugar beet plants. Each experiment included 14 treatments which were the combinations of two levels of soil potassium application (24 and 48 kg K₂O/feddan), two levels of foliar magnesium application (5.4 and 10.8 kg MgSO₄/feddan) and one level of foliar boron application (0.9 kg H₃BO₃/feddan). These treatments were arranged in a randomized complete block design with 4 replications each plot area was 42 M² (6/7m), i.e. 1/100 feddan.

The results could be summarized as follows:

It could be concluded that potassium and magnesium and boron in combination increased growth parameters significantly (top fresh and dry weights/plant, root fresh and dry weight/plant, root diameter, root length and root/top ratio), similarity, top fresh and dry weights, root fresh and dry yield and gross sugar yield (ton/feddan) of sugar beet were significantly increased by increasing the applied doses of all tested fertilizers.

Application of potassium, magnesium, and boron caused a reduction in sucrose %, in contrast, T.S.S. and impurities (a-amino-N, sodium and potassium concentration) were increased. Concentrations and uptake of nitrogen, phosphorus, potassium, and magnesium were increased in tops and roots of sugar beet, also boron concentration and uptake were increased in sugar beet roots.