Effect of some soil amendments and boron content of water on soil properties and the biochemical components of sugar beet yield under irrigation with saline water

Ismail Ali Imam Ashour

plants grown under such conditions.The experiments were carried out in a split plot design in whichthe boron levels, i.e. (BI), I ppm; (B2), 4 ppm; (B3), 7 ppm; and (B4),10 ppm occupied the main plots whereas the sulphur levels, i.e. (So),without sulphur application, (SI), 0.25 ton/fed.; and (S2), 0.5 ton/fed.occupied the submain plots.Sugar beet seeds (Beta vulgaris L.) var. Desperz poly N, at therate of 5 kg/fed. was the tested crop.All plots received N, P, and K at the rates of 70, 24 and 60units/fed., respectively.Surface irrigation from well was applied every week after theaddition of boron levels in the form of boric acid. Also, the necessarymanagement practices were conducted at the appropriate time. Thecrop was harvested at maturity and the yield of roots and leaves wererecorded in which the Biochemical composition and nutrients contentwere determined for each season.Soil samples were taken at the end of harvesting each seasonsfrom equal depths of 0-5, 5-15 and 15-30 cm depth for the chemicalanalysis.The obtained results can be summarized as follows:1- The application of sulphur resulted in decreasing soil pH, EC,SAR and ESP values with different magnitudes. Also, theconcentrations of soluble Ca+Mg, Na, K, and Cl were remarkablydecreased. whereas the concentrations of soluble SO” and HCOJions were increased with increasing sulphur application rates.However, boron application led to increase the EC, SAR and ESPvalues as well as the concentrations of soluble Ca+Mg, Na, K,HC03, Cl and S04.2- Total and water soluble boron concentrations increased withdifferent magnitudes as a result of increasing boron level of theapplied saline water, while the application of sulphur reduced suchions concentration.On the other hand, the sulphur-boron interaction indicated thepositive role of sulphur on creating the hazards previouslymentioned for boron.3. The availability of Fe, Mn and Zn was increased as a result ofsulphur and/or boron applications. The rate of increment wasdependent upon the rate of sulphur and/or boron to be the highestunder the S2B4treatment in the two growing seasons.4. The yield of sugar beet roots and leaves significantly increased asa result of sulphur or boron application. However, the effect ofcombined treatments of sulphur and boron was not significant.5. The nutrient contents, i.e. N, P, K, Ca and S04 of both roots andleaves were increased whereas Mg and Na contents weredecreased due to increasing sulphur application rates. The sametrends were also obtained except that the content of Na wasincreased whereas the S04-S contents of both root and leaves weredecreased due to boron application.6. Increasing boron levels in water caused a gradual increase inboron content of both roots and leaves while the application ofsulphur reduced such nutrient.7. The micronutrients contents of Fe, Mn, Zn were increased in bothroots and leaves of the two growing seasons due to sulphur and/orboron applications, the rate of increment was dependnt upon therate of S or/and B application.8. The total soluble solids (TSS), sugar yield and juice purity ofroots were affected favourably by sulphur and/or boronapplications.9. The soluble sugars, i.e. total, reducing and non reducing sugars ofboth roots and leaves were increased as a result of increasingsulphur application rates, while boron application increased bothtotal and non reducing sugars of roots.10. The total protein of both roots and leaves increased

as a result ofincreasing rates of both sulphur and/or boron applications.11. The proline content of sugar beet leaves increased by boronapplication. However the application of sulphur reduced suchparameter.