

KAFFKA, STEPHEN R., DAXUE, DONG, and GARY R. PETERSON. Department of Agronomy and Range Science, University of California, Davis, CA 95616-8515. **The response of sugarbeets (*Beta vulgaris*) to saline soils and irrigation water.**

Saline water from tile drains or shallow wells can be used for the production of sugarbeets. Sugarbeet was grown in a trial in western Fresno County in plots that differed in the amount of salt, nitrogen and boron present. EC_e averaged over 0 to 2.5 m varied from 1.5 to 7.0 $dS\ m^{-1}$, depending on the prior irrigation history of the plots. Plots were irrigated with different rates and times of application of saline well water (EC_w : 6.7 $dS\ m^{-1}$) that also contained nitrate (NO_3-N : 25.6 $mg\ kg^{-1}$) and boron (5.9 $mg\ kg^{-1}$). Control plots were irrigated with low salinity water (0.4 $dS\ m^{-1}$) that had little nitrate or boron. Crop growth, yield, and root quality characteristics were evaluated and compared based on irrigation treatments and differences in residual soil salinity and N content. Cumulative water use (ET_c) over the growing season was equal among the different irrigation treatments and averaged 860 mm. Sugarbeet clean root yields averaged 70 $Mg\ ha^{-1}$ and were unaffected by the application of saline irrigation water. Sugarbeet tolerated the range of salinity and boron of the soils and water observed, but were adversely affected by the nitrogen present in soils and irrigation water. Sugar concentration in roots and gross sugar yield declined from 134 $g\ kg^{-1}$ and 9.6 $Mg\ ha^{-1}$ to 110 $g\ kg^{-1}$ and 8.0 $Mg\ ha^{-1}$ with increasing amounts of saline irrigation water. Different application patterns and rates of saline irrigation had little effect on sugar yield because of large amounts of N present in irrigation water and in soils as residual N from previous saline irrigation treatments. In reusing drainage water or applying shallow well water, farmers must take account of both salinity and N. For sugarbeet, N accounting is necessary to assure larger sugar concentrations when saline water is used in a cyclic reuse program or to extend irrigation water supplies for other crops.