Iron concentration was higher in tissue of plants grown in the soil from the high-yield fields.

REFERENCES


Sugarbeet Nutritional Research

John Nelson and Jim Abbott, Assistant Research Scientists,
University Cotton Research Center, Phoenix

Summary

Nitrogen and phosphorus sugarbeet fertilization problems continue to plague growers and researchers alike. Three wet winters since 1977 caused more difficulty than expected. Cold winter soils reduce phosphorus uptake, and soil kept wet by frequent winter rains loses nitrogen by denitrification. If sucrose concentration can be increased for a given yield of roots, growing this crop in Arizona can become much more profitable. Research continues to look for answers through soil and foliar application of needed nutrients, when they are needed, for production of a profitable crop.

Sugarbeet nitrogen and phosphorus availability problems studied during the past decade at the Mesa Experiment Farm have given some useful information, but more questions have arisen, particularly in the past three winters, when published fertilizer recommendations have been of little help to growers.

The information gained so far might be summarized as follows:

(1) Analysis of sugarbeet petioles for acetic acid-soluble nitrate and phosphorus may be helpful in judging whether a crop is getting enough of both nitrogen and phosphorus for its needs.
(2) Phosphorus plays a significant role in sugar production, as well as being a nutrient essential for growth.
(3) Phosphorus is not uniformly available to fall-planted sugar beets during the growing season--
(4) soil does not release phosphorus to beets as well during the winter months when soil is cold, as in fall and spring, when soil is warm. This is shown by a decrease in phosphorus in plant tissue when soil temperature at 8 inch depth, drops below about 60°F.
(5) Foliar sprays of phosphorus compounds can affect growth and sucrose percentage in beet roots, but concentration of spray and time of application are critical.

Two field experiments are underway at Mesa for 1981 harvest. One will evaluate three ways to apply phosphate fertilizer to soil, on high and low soil phosphorus levels. The other will follow up on what was learned in last season's pilot experiment testing foliar sprays as a means of getting nitrogen and phosphorus into sugar beets when the soil is unable to supply adequate amounts to the crop, and when ground field equipment cannot be used to apply fertilizers. More than two hundred sub-plots will test six spray solutions, in single and double applications.

Last year's foliar spray experiment demonstrated that:

(1) Phosphorus deficiency developed in both high-phosphorus and low-phosphorus soils earlier than expected, as soon as soil temperatures dropped in November.
(2) Timing of spray application is important--early February was too late for phosphorus.
(3) Solutions for foliar sprays must be slightly acid--near a pH of 5.8.
(4) Concentrations of phosphorus sprays was too low for the two rates used--0.2% and 0.4% phosphorus.

Results from the 1979-80 soil-applied phosphate experiment were inconclusive--likely because of the climatic conditions. Average yield was 29.7 tons per acre, with average sucrose concentration of 13.8%.