Delayed Harvest INCREASES Sugar Yields IN CUYAMA VALLEY

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Low sugar content, despite high root tonnage, has characterized sugar beet production for several years in the Cuyama Valley, of Santa Barbara and San Luis Obispo counties. Field trials indicate that large amounts of nitrogen available at the usual harvest time may be responsible. The sudden presence of this nitrogen is probably accounted for by the decomposition of previous crop residues as soil temperatures increase in late summer. However, as a result of this ample supply of nitrogen, beet root yields increased 1.6 tons per acre each week from August 16 (normal first harvest date) to November 10 and sugar production increased 2½ tons for a total of 6 tons of sugar produced per acre at this later harvest date.

A FIELD WAS SELECTED at the Ewald Goehring farm in 1960 to study reasons for low sugar content and to learn more about the growth pattern of sugar beets in the Cuyama Valley. This field was in milo in 1959 and produced an alfalfa seed crop prior to that. The 1960 crop of sugar beets was fertilized with 80 pounds of nitrogen per acre, the usual grower practice. A uniform area of beet growth was selected, and plots were laid out for five dates of harvest at three-week intervals, starting August 16. Petiole samples were collected from these plots at three-week intervals starting June 1.

Growing conditions throughout the season were very good. Petiole analyses indicated the plants were well supplied with phosphorus and potassium. Tensiometer readings showed the field was well irrigated. Diseases and weeds were not problems.

Beginning June 1, concentrations of NO_3-N (nitrate nitrogen) in the beet petioles decreased gradually until the first harvest on August 16, at which time they were found below the critical level of 1,000 parts per million. On this date, the percentage of sucrose in the roots was higher than at any subsequent time. At the next harvest, September 7, the sucrose percentage had dropped, following a pattern that had been observed in other fields in previous years. The drop in sucrose content was accompanied by a sharp rise in the NO_3-N content of petioles and an abrupt increase in top growth. Soil samples were collected and analyzed for NO_3-N. These samples did not reveal zones of extremely high nitrate, but did indicate relatively large amounts of nitrate throughout the first five feet of soil (180 pounds NO_3-N per acre).

The most plausible explanation for the sudden presence of this nitrogen is that it was released through the decomposition of the previous crop residues as soil temperatures warmed in late summer. After the second harvest, the NO_3-N concentration in petioles again fell; top growth was reduced, and the sucrose content of roots recovered to some extent.

One important result of this trial was the demonstration of root growth that is possible during the late summer and fall. Beet root yield increased at an average rate of 1.6 tons per acre per week from August 16 to November 10, and sugar production increased 2.5 tons per acre during this period. Insofar as this field may be typical of the area, it would appear that: (1) low sugar at the usual harvest time is likely to be due to a high availability of soil nitrate that maintains rapid top and root growth, and (2) there is a great potential for increasing sugar yields by delaying harvest until early winter—a practice that may be feasible in this low rainfall area.

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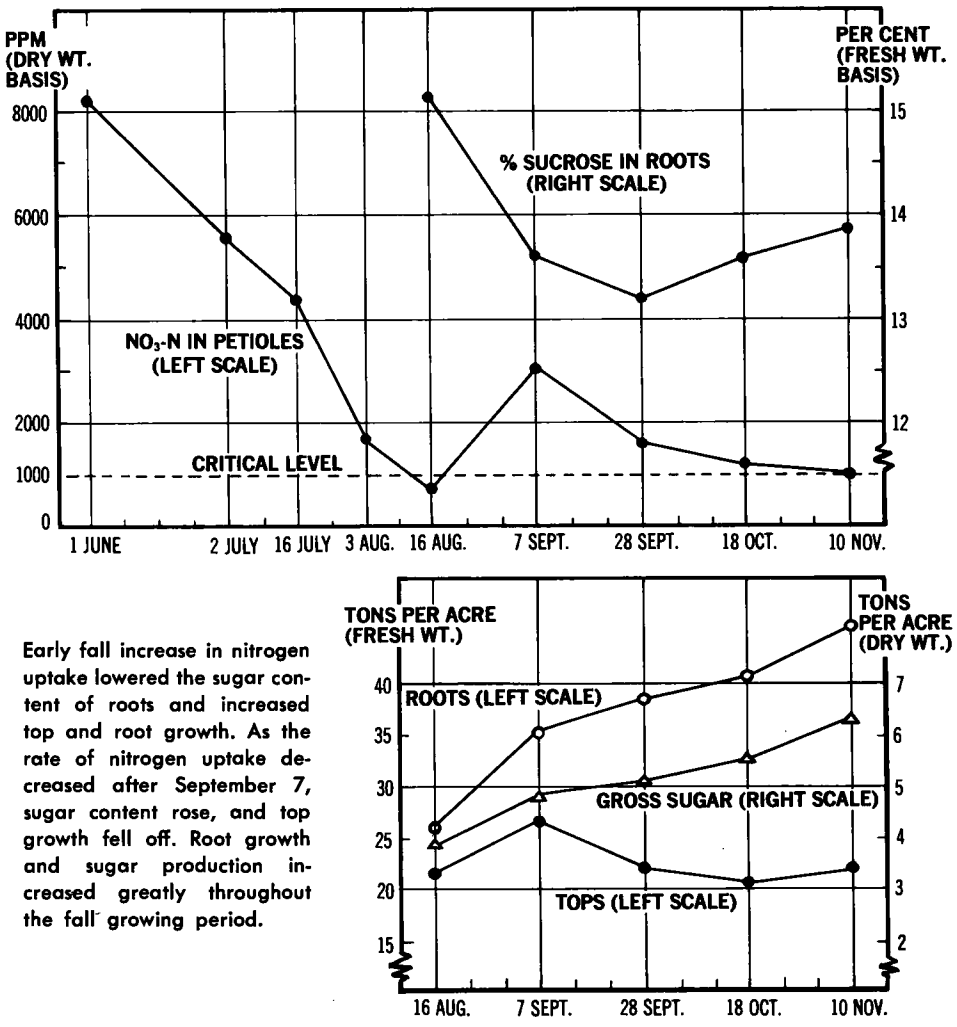
Matt Vanetti, of Union Sugar, assisted with the trials and the anlysis of samples for sucrose content.



Early fall increase in nitrogen uptake lowered the sugar content of roots and increased top and root growth. As the rate of nitrogen uptake decreased after September 7, sugar content rose, and top growth fell off. Root growth and sugar production increased greatly throughout the fall growing period.