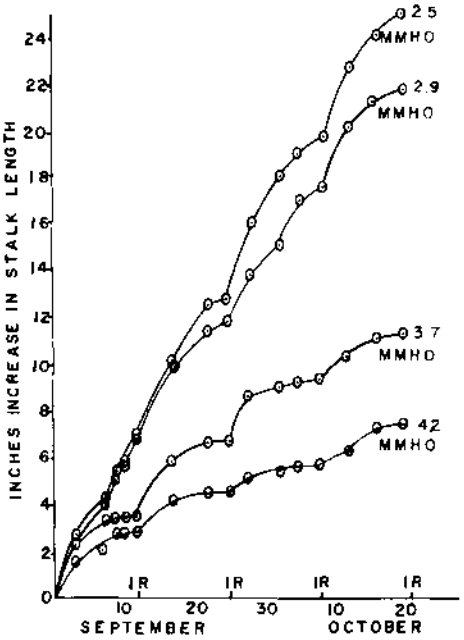
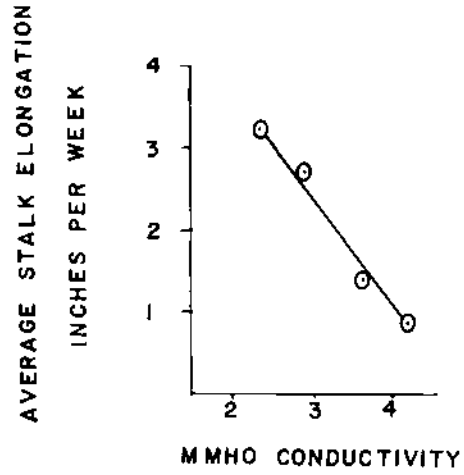
Growth of SUGAR CANE In Areas Irrigated with Colorado River Water

GRAPH 1. CUMULATIVE ELONGATION OF SUGAR CANE STALKS AND SATURATED SOIL PASTE EXTRACTS WITH DIFFERENT ELECTRIC CONDUCTIVITY RATES. DATES OF IRRIGATION ARE SHOWN ON THE ABSCISSA.



GRAPH 2. AVERAGE STALK ELONGATION AS A FUNCTION OF THE ELECTRIC CONDUCTIVITY IN SOIL SAMPLES.



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Both stalk elongation rates and dry matter analyses of sugar cane irrigated with Colorado River water indicate that such areas should be used for this crop only when soils are well drained and relatively salt free.

THE POSSIBILITY of growing sugar cane in southern California depends to a great extent on the effects of salt contained in the Colorado River water used for irrigation in that area.

This short-term investigation of saline effects on sugar cane was conducted at the Imperial Valley Field Station of the University of California. Soil at the test site was stratified alluvium deposited by the waters of the Colorado River which were impounded sporadically in the Salton Sink from the delta buildup in the Gulf of California. Water in the area has the following general composition in meq per liter: Ca, 5.05; Mg, 1.04; Na, 4.5; HCO_3, 2.55; SO_4, 7.00; and Cl, 2.30.

Four plots of the sugar cane variety, NCO 310 showed a wide difference in growth rate. This cane was a 10-month-old first ratoon crop. Soil treatment, fertilizer, and irrigation were uniform in all plots from the time of planting. On September 7, 1964, the electrical conductivity (mmho) of five extracts of saturated soil paste sampled from the 2- to 12-inch soil depths was obtained from five evenly spaced locations across the cane bed in each plot. Rates of stalk elongation were measured periodically in each plot until October 20th, when a second sample of soil was extracted. Soil pits were also opened to examine soil profiles and roots (which were located primarily in the upper foot of soil). On November 5, 1964, the plots were harvested.

Graph 1 shows the average cumulative length of three cane stalks in the center of each plot, irrigation dates, and electric conductivity of the soil. Graph 2 shows the average rate of elongation of the cane stalks as a function of electrical conductivity in the soil samples. The correlation coefficient for the relationship of salinity and growth rate is .99. The table presents the dry matter yield in the four plots. The agreement between dry matter yield and stalk elongation rates indicates that the saline condition existing during the period of the study was very likely prevalent during most of the growing period.

YIELD OF SUGAR CANE PLOTS WITH DIFFERENT RATES OF ELECTRICAL CONDUCTIVITY IN THE SOIL EXTRACTS

Plot number	1	2	3	4
Electrical conductivity (mmho)	4.2	3.7	2.9	2.5
Green weight, tons/acre	30.5	33.2	48.7	55.7
Per cent dry matter	23.8	23.1	22.4	23.3
Dry matter, tons/acre	7.26	7.67	10.9	13.0

Since the length of cane stalks is a good indicator of crop yield, this parameter was used to define the influence of soil salinity. The range of salinity does not encompass the extremes of salt content, however, so that the response curve in these regions is still undefined. However, the data present a linear response curve in the range of salinity values commonly found where Colorado River water is used for irrigation. A 1-inch sand layer at the 16-inch depth was observed in the two plots with lower salinity, while no sand was seen in the two plots with higher salinity. The drainage provided by this layer possibly accounts for the differing salinity values. Graph 2 shows that a 50% reduction in growth rate occurred when the conductivity of the 2- to 12-inch soil extract reached 3.3 mmho.

Stalk lengths at the outset of the measurement period were 24.6 inches in plot 1, 26.5 inches in plot 2, 39.6 inches in plot

3 and 43.0 inches in plot 4—indicating that the differences in conductivities had existed during a major period of the crop life. The minor changes in conductivity over the two-month period of observation indicate that a balance had been reached in the salt content of each plot for some period prior to the time that measurements were taken. For these reasons, and for the purpose of associating dry matter production to soil salinity, the mmho values are assumed to have existed for a major period of the crop life. In this comparison, the yield of dry matter of the 4.2-mmho plot was 45% lower than the 2.5-mmho plot. This indicated that a conductivity slightly greater than 4.2 would reduce the yield by 50%.

Stalk elongation

The stalk elongation analysis showed a 50% decline in growth rate associated with a soil sample extract of 3.3 mmho conductivity. The dry matter analysis indicated an extract in excess of 4.2 mmho conductivity would reduce yield to 50%. Additional work is necessary to pinpoint the limiting value. Both analyses agree that sugar cane variety NCO 310 is sensitive to soil salinity. Pending reports from other areas and on other varieties, the sugar cane plant should be tentatively considered in the group of plants which are salt sensitive. Specifically, for the area where Colorado River water is used, these data indicate that only the best drained soils in this area should be used to grow sugar cane.

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CALMAR

. . . a new lettuce variety resistant to downy mildew

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Calmar is a new crisphead lettuce belonging to the traditional Great Lakes varietal type. It is equal to or surpasses Great Lakes 118 in many characteristics, including uniformity of maturity, and is also resistant to downy mildew. About 10,000 acres of Calmar were estimated to have been planted for harvest in 1964 in the Salinas-Watsonville district and a larger acreage is predicted for the 1965 season.

CALMAR IS A TYPICAL, shipping-type, crisphead variety of lettuce similar in appearance to many of the popular Great Lakes varieties, but is also resistant to downy mildew (*Bremia lactucae* Regel), a leafspotting disease common in California lettuce districts having cool, moist weather. This new variety is adapted to the coastal areas of California for harvest primarily during the early spring season. In the Salinas-Watsonville district, Calmar is particularly suited for harvest during late April and May in the early spring season, and during June in the summer season.

Harvesting can be extended into the latter part of the summer season (July and August) in the cooler portions of the Salinas-Watsonville district. The availability to commercial lettuce seed growers of breeders' seed of Calmar and the release of this variety for sale to the public as soon as seedsmen's supplies would permit were announced on April 15, 1960. Calmar seed containing the extremely low seed-borne mosaic percentages demanded by most California growers was not available for planting significant acreages until the 1964 season. Calmar was developed at the University of California, Davis, and introduced jointly with the U. S. Department of Agriculture. This new variety was tested during the 1959 season in the Imperial Valley and in a series of trials in the Salinas Valley. The name Calmar is a contraction of California and mar, the Spanish word for sea.

Great Lakes type

This new crisphead lettuce belongs to the Great Lakes varietal type, which includes almost all lettuce shipped in the United States. Calmar is similiar in appearance to Great Lakes 118, matures slightly earlier, and has good uniformity of maturity that may sometimes surpass Great Lakes 118. Yields of Calmar, maturing during periods of the year suited to the variety and grown under good cultural practices, may sometimes exceed those of Great Lakes 118.

The head color of Calmar is medium green to medium-dark green and may be slightly darker green than Great Lakes 118. The margins of the wrapper leaves are slightly more frilly than Great Lakes 118. The heads are round, possess a good cover, and the variety shows very little tendency to produce spiral-shaped heads. Calmar head size is two dozen per "Iceberg standard carton" when crops are grown under good cultural practices and mature during periods of the year adapted to the variety. Heads are solid and sometimes larger than Great Lakes 118.

Harvested heads of Calmar, like Great Lakes 118, show no suckering. Overall butt appearance of Calmar is good with color ranging from medium to dark green and glossier than Great Lakes 118. Leaf margins near the core are slightly more