

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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### CALIFORNIA AGRICULTURE

Progress Reports of Agricultural Research, published monthly by the University of California Division of Agricultural Sciences.

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California Agriculture

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# CALMAR

*... a new lettuce variety  
resistant to downy mildew*

J. E. WELCH · R. G. GROGAN · F. W. ZINK

G. M. KIHARA · K. A. KIMBLE

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.

**C**ALMAR 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 de-

veloped 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 similar 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

frilly, and the midribs protrude slightly more than Great Lakes 118. Because stem elongation is more rapid in Calmar, it may not attain good head solidity in the coastal districts (where it is best adapted) in the early fall harvesting season. The fold and texture of the head leaves are similar to Great Lakes 118 and other popular varieties of this type. Calmar has white seed.

### Tipburn resistance

Calmar is more resistant to tipburn than Great Lakes 118 and has a level of resistance similar to Great Lakes R200. It is highly resistant to downy mildew and possesses some tolerance to big vein. Downy mildew-infected wrapper leaves retained at harvest may be invaded during transit to distant markets by rot-producing organisms which result in some quality loss. But since Calmar is resistant to downy mildew, it is not subject to damage from secondary decay-producing organisms that invade tissues through downy mildew lesions.

Calmar has the following parentage: Great Lakes A-36 × F<sub>5</sub> (Great Lakes 6238 × USDA 45325-3-1-M). The Great Lakes 6238 × USDA 45325-3-1-M cross was made in 1950, and the cross involving Great Lakes A-36 and an F<sub>5</sub> generation plant of the above cross was made in 1955. The third generation (59-572-M IV) following the last cross was introduced as Calmar. The first two generations involved single selfed plants, and the last generation was a mass increase. USDA 45325 has a long, complex pedigree that started in 1932 with a cross between USDA Plant Introduction 104854, a wild-type lettuce (*Lactuca serriola* L.) collected in Russia, and a hybrid line involving Imperial D. PI 104854 which was the source of the downy mildew resistance in USDA 45325, and in Calmar. This same plant introduction probably also provided the downy mildew resistance in Imperial 410, a variety released in 1945 by the Arizona Agricultural Experiment Station and the U. S. Department of Agriculture, and did contribute the downy mildew resistance in Valverde, a variety introduced in 1959 by the Texas Agricultural Experiment Station and the U. S. Department of Agriculture. Downy mildew resistance in PI 104854 and in Calmar is conferred by a single dominant gene.

Frequent experimental tests on the PI 104854 source of downy mildew resistance in Calmar show that this resistance continues to be effective in California. Some commercial seed stocks of Calmar

have contained small amounts of seed of downy mildew-susceptible varieties, and consequently produce some infected plants. No evidence has been found to date for the presence in California of a new biological race of the downy mildew fungus that attacks Calmar.

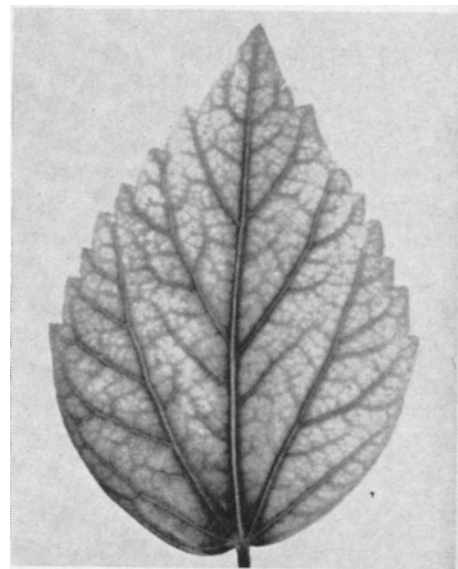
The breeders' seed of Calmar released to commercial lettuce seed-growing firms in 1960 contained 2.4% seed-borne lettuce mosaic virus. This percentage is in the infection range commonly found in ordinary lettuce seed lots. Most lettuce seed planted in California contains very low percentages of seed-borne mosaic infection, and in some districts county ordinances prohibit the planting of lettuce seed that contains more than 1/10 of 1% of seed-borne lettuce mosaic virus. Growers in the Salinas-Watsonville district now plant only seed lots in which a greenhouse-grown, seedling-plant sample showed no seed-borne mosaic in 30,000 seedlings.

The production of lettuce seed possessing no, or extremely low, percentages of seed-borne mosaic, requires special seed-growing techniques. More seed-growing seasons are usually required to rid stock seed of mosaic and obtain mosaic-controlled seed in volume, than merely to increase stock seed without concern for the mosaic content. The 1964 season was the first year that Calmar seed indexed as containing no seed-borne mosaic in 30,000-seedling samples was available in quantities large enough to plant significant acreages. 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 seed may now be obtained from all major vegetable seed companies that supply lettuce seed to California growers.

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*Financial assistance for lettuce breeding research has been obtained annually from the Grower-Shipper Vegetable Association of Central California, Salinas, and many lettuce growers in the State furnished land for field experiments and assumed other expenses in this program.*

# IRON



Iron deficiency results in chlorophyll deficiency. Leaves of trifoliate orange are characteristically yellow when insufficient chlorophyll is synthesized.

Iron-deficient avocado leaves.

