

Common Lettuce Mosaic Control

use of mosaic-free seed effectively reduced the seed-born aphid-transmitted disease in large-scale field plantings

R. G. Grogan, J. E. Welch, and Roy Bardin

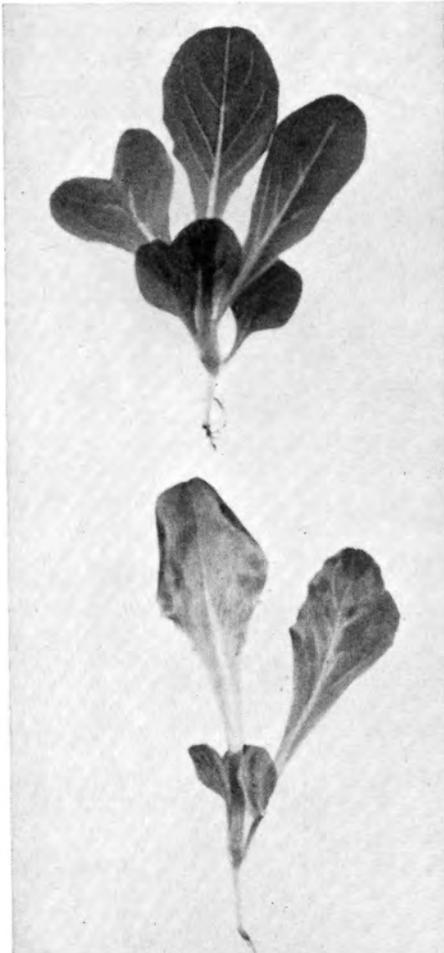
The use of mosaic-free lettuce seed effectively controls common lettuce mosaic.

The disease is caused by a virus and affects lettuce in all stages of growth.

The first symptom in seedling plants is a slight inward rolling of the leaves along the long axis, and the first true leaf is often irregularly shaped and slightly lobed. These symptoms are followed or accompanied by a light green to yellow mottling. Later in the young rosette stage the mottled leaves may show vein clearing and slight bronzing.

In half-grown to mature plants—those approaching marketable age—the disease is evidenced by a severe stunting and a

Symptoms of common lettuce mosaic in seedlings. Upper seedling is healthy, lower seedling diseased as a result of seed transmission. Note irregular shape, rolling and mottling of leaves.



dull-green to slightly yellow discoloration of the whole plant. The tips of the outer leaves are rolled downward giving the plants a wilted appearance although the leaves may be turgid. Mottling, if still distinguishable, may be seen best near the margins of the leaves.

Most mosaic-infected plants, especially those which were infected early, are extremely stunted and fail to head normally. The midribs of these stunted plants protrude abnormally on the underside of the leaf blades giving the underneath portion of the heads a ribby appearance. This symptom is especially prominent in the Great Lakes variety.

Varieties, such as Imperial D and Eiffel Tower Cos, are hypersensitive to the virus and when infected develop severe necrosis of the leaf blade. Occasional plants of the Great Lakes and Imperial 615 varieties may show similar necrotic symptoms which are often difficult to distinguish from early symptoms of spotted wilt.

Common lettuce mosaic is seed transmitted. Tests of standard varieties used in California showed that the percentage of infected seed usually varies from 1% to 3%. At average seeding rates, one seed-borne mosaic-infected plant was counted in every four feet of bed before thinning. Secondary spread by aphids from the seed-borne infected plants to adjacent healthy plants must take place before serious economic damage occurs.

Disease-free Seed Tested

As common lettuce mosaic virus is seed-borne, use of disease-free seed as a control was tested. A sample of mosaic-free seed was produced by roguing all seed-borne infected plants under aphid-free greenhouse conditions. The remaining healthy plants were grown to maturity in an isolated area. The resulting seed proved to be free of mosaic and was used to plant experimental plots in commercial fields.

Plantings were made in the Salinas Valley for the 1951 spring harvest. Most plots were approximately 180 feet square and usually situated near the centers of large commercial fields planted at the same time and with the same lettuce variety as the mosaic-free seed.

Counts of mosaic infected and total

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Healthy plant in the young rosette stage.



Plant showing mottling and vein clearing.



Plant showing necrosis of leaf blade.

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number of plants were made in the two 9-bed groups on each side of the plot planted with commercial seed and in the 9-bed groups within each plot planted with mosaic-free seed.

The first plot was planted December 13, 1950, near Gonzales. In the early stages of growth, no mosaic plants were found within the plot, whereas approximately 2% of the plants in the commercial field were infected. This initial infection is believed to have originated from infected seed.

By March 24 the percentage of mosaic in the commercial planting had increased to about 2.5%, and a small amount—up

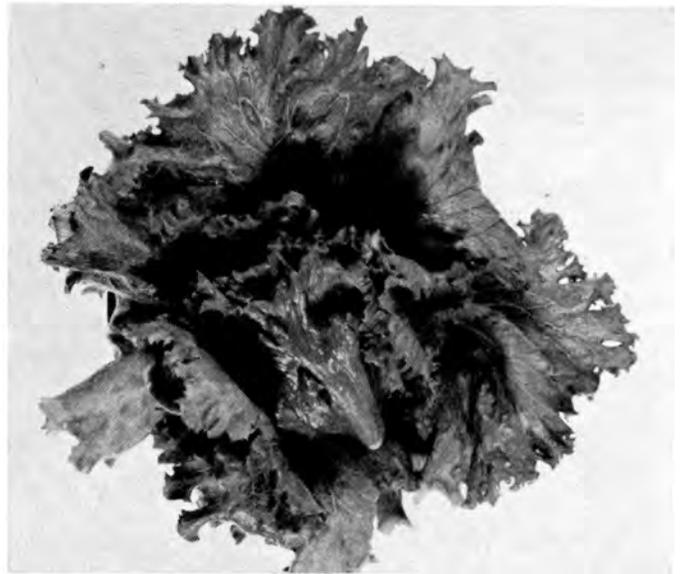
ing the plot on the windward side were infected with mosaic, while only 11% of the plants in the beds bordering the leeward side were infected. This same relationship was also apparent within the plot inasmuch as there was a gradual reduction from 6.5% infection in the first 9-bed group on the windward side to only 1.8% infection in the corresponding group on the leeward side, the average being 3.2%. The high percentage of mosaic on the windward side resulted from a heavy migration of aphids from a nearby field of weeds which was disked when the lettuce was in the early rosette stage.

Plot three was planted March 22, 1951, near Watsonville. Unlike plots one and two, plot three was a 6-acre triangular

fect plants in group one and 89% in the 10th group.

This decrease in percentage of mosaic infection from windward to leeward was even more pronounced in beds 10, 11 and 12 which were planted with clean seed and separated from the adjacent commercial planting by several other beds planted with mosaic-free seed. Here the infections were 85%, 80%, and 99% in the first group, and 10%, 8%, and 19% in group 10. This difference was probably due to a partial elimination of the border effect from the commercial field.

Plot three represents as severe a test of the efficacy of mosaic-free seed for the control of lettuce mosaic as is likely to be encountered under natural field conditions. Although the area planted with



Left, healthy lettuce plant approaching head maturity. Right, mosaic-infected plant of the same age.

to 0.2% infected plants—had spread into the plot. At the time of the final reading on April 17, just prior to harvest, the percentage of infection within the plot was still very low, about 2%, but infection in the commercial field had increased to about 12%.

There was a striking difference in the percentage of mosaic-infected plants in the two adjacent individual beds inside and outside the plot. The first bed on the west side of the commercial field showed 14.9% mosaic plants whereas the first bed inside the plot showed only 2% mosaic plants. This indicated that aphid movement was for the most part from plant to plant down the bed rather than across the furrow.

Plot two was planted December 18, 1950, near Salinas. Again, there was a much higher percentage of mosaic infection in the commercial field than within the virus-free seed plot. On April 24, just prior to harvest, approximately 30% of the plants in the commercial beds border-

section of a 14-acre field bordered on the windward side by an old lettuce field. This old field, which was on a level approximately 20 feet below the test plot, was disked nine days after the test plot was thinned.

The data revealed that a considerable number of virus-carrying aphids migrated into the test field from the old lettuce planting on the windward side. Considering the field as a whole, there was a noticeable decrease in the percentage of mosaic from the windward to the leeward side of the test plot which was not reflected in the commercial planting. For example, bed three inside the plot—planted with clean seed—had 92% infected plants in the first 100-plant group—closest to the old lettuce field on the windward side—while there were only 30% infected plants in the 10th 100-plant group which was farthest from the old field on the windward side. In contrast, bed three in the commercial field—which was only five beds distant—had 93% in-

fection of mosaic due to the migration of virus-carrying aphids from the adjacent older lettuce planting—averaging from 35% to 72% infected plants—the 6-acre test plot yielded 238 crates per acre as against 100 crates per acre in the commercial field. Had the test plot been small the benefit of clean seed might not have been evident.

The results of this study confirmed previous conclusions that spread of common lettuce mosaic is mainly a local phenomenon and can be controlled by the use of mosaic-free seed.

R. G. Grogan is Assistant Professor of Plant Pathology, University of California College of Agriculture, Davis.

J. E. Welch is Associate Olericulturist, University of California College of Agriculture, Davis.

Roy Bardin is Plant Pathologist in the Monterey County Department of Agriculture, Salinas.

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