

THE VALUE OF SPRAYING PEACH TREES FOR CONTROL OF THE  
GREEN PEACH APHID, MYZUS PERSICAE (SULZER), AND  
SUPPRESSION OF LEAF ROLL ON POTATOES IN THE  
COLUMBIA BASIN

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The millions of green peach aphids, *Myzus persicae* (Sulzer), that fly to potato fields are difficult to control with insecticides, and some of the aphids that escape may serve as potential vectors of leaf roll, a virus disease transmitted from diseased (usually volunteer potato plants) to healthy potato plants. Young potato plants are more susceptible to leaf roll infection than older potato plants (Powell 1966).

Hoyman (1963) estimated that in 1959 Washington growers lost between 3 and 4 million dollars in potato yields because of leaf roll. Bakes (1966) estimated that net necrosis--or the fear of having to contend with it--cost the Washington potato industry \$440,277 in 1965. However, Hoyman's estimate dealt with losses in yields whereas Bakes' estimate dealt chiefly with the visible, brown defect that is abhorrent to both the potato processor and the housewife. Thus Hoyman and Bakes reported on different types of loss resulting from leaf roll infection. Today the situation is improving. Washington growers, who are noted throughout the country for their high potato yields and excellent quality, should take much of the credit. As they have become more aware of leaf roll, they have made reasonable efforts to avoid it.

Both defensive and offensive actions can be integrated into a program to keep leaf roll in check. The judicious use of insecticides is a defensive and delaying action that allows individual growers to kill winged aphids as they appear in potato fields, and thereby delay the spread of leaf roll as long as possible. Four applications of endosulfan (Thiodan<sup>R</sup>)--one of the most reliable insecticides for aphid control--made after a soil application of disulfoton granules (Di-Syston<sup>R</sup>) are usually sufficient to control aphids and reduce the spread of leaf roll. Only at harvesttime, after a grower counts the cost of the insecticide program or the damage caused from leaf roll, can a grower determine whether he applied the minimum effective amount of insecticide.

Some limits on the control that can be achieved with endosulfan do exist. When potatoes are grown in the same fields for consecutive seasons, the spread of leaf roll may be difficult to control, even with 5 applications of endosulfan. Some potato growers that apply little or no insecticide to their potatoes may have little leaf roll and rarely enough net necrosis to cause concern; however, the presence of diseased plants in their fields many weeks before harvest may actually reduce yields. In addition, an occasional grower follows the prescribed program and still has a problem with net necrosis.

When a prescribed program of insecticide applications fails to control aphids sufficiently to prevent a damaging amount of leaf roll, the answer may be that the winged aphids migrating to the potato field were infected with the disease. The few viruliferous aphids that survive the applications may be capable of causing severe spread of the disease. An infective aphid may transmit the leaf roll virus to a healthy potato plant in 10 minutes of feeding (Klostermeyer 1953) and, thus, an endosulfan application may not kill an infective aphid before it transmits the virus to at least one healthy potato plant.

Two offensive actions can and should be taken to prevent the number of winged green peach aphids that feed on diseased volunteer potato plants and then fly to potato fields. The first step is a thorough field sanitation procedure designed to eliminate all volunteer potato plants; and the second is to reduce the number of aphids present on their overwintering host plants to delay the usual migration to spring host plants.

Our research indicates that these volunteer potato plants are the major source of the leaf roll virus in the Columbia Basin. The total spread of leaf roll during any season can be determined only by replanting tubers the following year, because tubers infected with leaf roll do not all show net necrosis; however, all produce plants with chronic leaf roll symptoms. In 1964 and 1965, as part of an investigation into the overall program of control, we collected tubers from 29 and 34 potato fields, respectively, and kept them until each following spring when one seed piece was removed from each tuber and planted. In June of 1965 and 1966 we found that 41.0 and 41.9% of the plants produced by these tubers, respectively, had chronic leaf roll. Therefore, between 40 and 45% of the volunteer potato plants present in growers' fields during the 1965 and 1966 growing seasons probably had chronic leaf roll.

Green peach aphids overwinter as eggs deposited on peach trees, and millions of winged aphids are produced in the spring. During mild winters, some wingless aphids overwinter on hardy weeds, but their survival is less certain than that of aphids in the egg stage on peach. These winged aphids easily acquire leaf roll virus from infected volunteer potato plants and transmit it to susceptible young potato plants.

In the early spring of 1966 we sprayed overwintering aphids on peach trees in an attempt to delay migration of aphids to potatoes and reduce leaf roll. A 275-mile<sup>2</sup> experimental area extending from Othello west to the Columbia River, north to the crest of the Royal Slope and south to the Saddle Mountains was selected because prevailing winds blow from that area toward one of the main potato-producing areas of the Columbia Basin and because the area contained relatively few peach trees. We located only about 5,500, and all but 18 were sprayed by the last of April with the amount of endosulfan

registered and recommended for this purpose. After the spraying had been completed, 63 yellow trap pans were placed about 2 miles apart in the treated area and arranged so they extended eastward into part of the contiguous potato-growing area. The number of aphids in the trap pans were counted twice each week, and weekly aphid counts on potato plants were made in several potato fields from May through August. The results provided a basis for determining the effectiveness of the area control program and the time and direction of the seasonal migration of green peach aphids in the Columbia Basin.

Spraying of practically all peach trees west of Othello reduced and delayed the spring migration of the green peach aphid from peach to potato fields. This delay provided time for the certified seed potatoes to produce larger plants that were less susceptible to damage from leaf roll. It also decreased the chances that aphids would find and feed on diseased plants by diluting their number with healthy plants and allowed time for volunteer plants to be destroyed by cultivation. The weekly aphid counts that were made in several potato fields indicated that the program reduced the number of flying aphids; also the commercial insecticide programs of individual growers were more effective than usual. The actual spread of leaf roll will be determined accurately when samples of tubers collected from potato fields are replanted in 1967. However, the preliminary results were promising. We hope to continue the area control program on peach trees in the same area in 1967 and solicit your interest and cooperation.

This is a report of research and does not constitute a recommendation of any of the materials tested.

#### REFERENCES CITED

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