

BULLETIN 479

MAY 1943

# **Psyllid Control on Potatoes and Tomatoes in the Victory Garden**

GEORGE M. LIST

COLORADO AGRICULTURAL EXPERIMENT STATION  
COLORADO STATE COLLEGE  
Fort Collins



Colorado State College  
COLORADO AGRICULTURAL EXPERIMENT STATION  
Fort Collins, Colorado

STATE BOARD OF AGRICULTURE

LEON S. McCANDLESS, President \_\_\_\_\_ Craig  
CHARLES W. LILLEY, Vice President \_\_\_\_\_ Virginia Dale  
GEORGE McCLAVE \_\_\_\_\_ McClave  
ROBERT ROEMER \_\_\_\_\_ Fort Collins  
J. W. GOSS \_\_\_\_\_ Pueblo  
R. F. ROCKWELL \_\_\_\_\_ Paoni  
W. \_\_\_\_\_ I. \_\_\_\_\_ GIFFORD \_\_\_\_\_ Hesperus  
REX EATON \_\_\_\_\_ Eaton  
{ GOVERNOR JOHN C. VIVIAN  
Ex-officio ) PRESIDENT ROY M. GREEN

EXPERIMENT STATION OFFICERS

ROY M. GREEN, M.S., \_\_\_\_\_ D.Sc. \_\_\_\_\_ President  
HOMER J. HENNEY, M.S. \_\_\_\_\_ Director  
JAMES R. MILLER \_\_\_\_\_ Secretary  
MARVIN J. RUSSELL, \_\_\_\_\_ A.B. \_\_\_\_\_ Editor  
SADIE I. COOLEY, B.S. \_\_\_\_\_ Chief Clerk

AGRICULTURAL DIVISION SECTION CHIEFS

ALVIN KEZER, A.M. \_\_\_\_\_ Agronomy  
R. C. TOM, M.S. (Acting) \_\_\_\_\_ Animal Investigations  
L. W. DURRELL, Ph.D. \_\_\_\_\_ Botany and Plant Pathology  
J. W. TOBISKA, M.A. \_\_\_\_\_ Chemistry  
CHARLES R. JONES, Ph.D. \_\_\_\_\_ Entomology  
INGA M. K. ALLISON, S.M. \_\_\_\_\_ Home Economics  
A. M. BINKLEY, M.S. \_\_\_\_\_ Horticulture  
FLOYD CROSS, D.V.M. \_\_\_\_\_ Pathology and Bacteriology  
+ H.S. WILGUS, Jr., Ph.D. \_\_\_\_\_ Poultry  
E. W. NELSON, A.M. \_\_\_\_\_ Range and Pasture Management  
L. A. MOORHOUSE, M.S. \_\_\_\_\_ Rural Economics and Sociology  
BRUCE J. THORNTON, M.S. \_\_\_\_\_ Seed Laboratory

ENGINEERING DIVISION SECTION CHIEFS

\*N. A. CHRISTENSEN, Ph.D. \_\_\_\_\_ Chairman  
\*N. A. CHRISTENSEN, Ph.D. \_\_\_\_\_ Civil Engineering  
J. T. STRATE, M.S. \_\_\_\_\_ Mechanical Engineering

ENTOMOLOGY STAFF

CHARLES R. JONES, Ph.D. \_\_\_\_\_ Entomologist  
GEORGE M. LIST, Ph.D. \_\_\_\_\_ Associate Entomologist  
JOHN L. HOERNER, M.S. \_\_\_\_\_ Associate Entomologist  
LESLIE B. DANIELS, M.S. \_\_\_\_\_ Associate Entomologist

\*On leave  
+ On military leave

## Psyllid Control on Potatoes and Tomatoes in the Victory Garden

GEORGE M. LIST<sup>1</sup>

**P**OTATOES and tomatoes are two of the most important food producing crops for home gardens, yet on account of the small insect known as the potato and tomato psyllid the potatoes are left out of a large percentage of these gardens and tomatoes are not grown as generally or as successfully as they should be. Recent work of the Colorado Agricultural Experiment Station has shown that potatoes and tomatoes can be produced quite successfully in Colorado Victory Gardens.

### THE INSECT

The insect passes through three distinct stages in its cycle of development: the adult, the egg, and the nymph or immature stage. The adult psyllid is often called the jumping plant louse. This common name comes from its general similarity to the winged form of our common plant lice and from its habit of jumping much like a flea. The insect is more sturdily built than the plant louse and, as the jumping habit indicates, it is much more active. Adults are difficult to find in the garden except by the use of an insect net.

The egg is very small, about 1-32 of an inch in length. It is orange-yellow in color and is supported on the end of a slender stalk that is slightly longer than the egg. The egg is most frequently placed along the margin of the leaves but may be placed on either surface. The eggs hatch in from 6 to 10 days.

The newly hatched nymph is yellowish in color, but it becomes progressively greener through each of the four moults that take place before it changes to the winged adult. When almost mature it has nearly the same color as the leaf. The nymph is somewhat elliptical in outline, flat and scale-like in appearance, and has a band of short hairs around the entire margin of the body. The newly hatched nymph is difficult to see without a hand lens, but the mature nymph is plainly visible. Nymphs are more numerous on the underside of the leaves, but especially during cooler weather they may feed freely on the upper surfaces of shaded leaves. They are quite inactive and are seldom seen moving about. The nymphs give off a white, granular, sugary material that often collects on the lower

<sup>1</sup>Associate entomologist, Colorado Agricultural Experiment Station.

leaves and soil surface in quantities that are readily visible; this material is an aid in locating infestations. The nymph stage usually lasts from 14 to 22 days.

The number of generations of the psyllid per season is thought to vary from 4 to 7. However, there is so much overlapping of the broods that all stages are usually present in a garden after infestation occurs. The insects winter in the adult stage and appear in the garden or on certain wild hosts about the middle of May. They may migrate from wild or cultivated hosts to a garden at any time during the season.

### **Injury by the insect**

The adults and nymphs feed by sucking the plant juices. Their piercing mouth parts fit together to form two tubes. Food is drawn through one of these, and certain secretions, similar in origin to saliva, are injected into the plant through the other. The loss of sap is of some injury to the plant, but the greatest damage comes from the poisonous effects of the insect secretions.

The feeding of the nymphs is especially serious because it brings about an abnormal condition known as psyllid yellows or purple top. The symptoms on potatoes and tomatoes are quite similar. Usually the first abnormal condition noticed is a slight yellowing along the midribs and the edges of the top leaves. The basal portions of these same leaves show a tendency to curl upward. As the condition progresses the entire top changes to a yellowish-green, growth is checked, and the leaves remain small and narrow and stand upright, giving the top of a plant a feathery appearance. In the case of tomato plants and certain varieties of potatoes the leaf veins become purplish in color; hence the common name of purple top.

The leaves of infested plants become somewhat thickened, brittle, and harsh, giving off a dry rustle when handled. When the attack comes early in the development of the tomato plant, the dwarfing may be so severe that little or no fruit is set. Late attack on the tomato is inclined to cause the forming of blossoms almost to the ends of the branches with an abnormal number of fruits that never attain a desirable size or quality.

If the attack on potatoes occurs before tuber set takes place, a likely result is the formation of numerous tubers on each stolon. An attack after tubers are partially developed usually results in a greatly retarded growth and irregularly shaped potatoes. Potatoes

from infested plants may sprout prematurely in storage or sometimes even before they are dug.

The number of psyllid nymphs that will bring about serious symptoms may vary with the size, variety and vigor of the plant and a number of other factors. As few as two to six may at times cause serious results. Losses in small gardens are usually greater proportionally than in field plantings, but total loss of crop may occur in either case.

### Control

Diseased plants that are freed of the insects show some ability to recover but this is never complete. This is especially true with the potato plant, and our seasons are too short to permit much recovery by the tomato.

All home gardens are almost certain to have some degree of infestation, and few gardeners can detect this before serious injury occurs. Therefore, *the most certain and wisest course is to make a definite control procedure a part of the garden program*, just as much as irrigating and cultivating.

Liquid lime-sulfur as a spray has been the standard control material used by commercial potato producers for a number of years. It has been found, however, that it is rather injurious to the tomato plant and also is difficult and disagreeable to use in the garden. Research has shown dusting sulfur and wettable sulfur to be as effective as the lime-sulfur in controlling the insect, and these are being used effectively by commercial tomato growers. During the last two seasons the Experiment Station has made extensive tests with these sulfurs on potatoes. In no case has either of them proved significantly less effective than the lime-sulfur. They are the most practical materials for psyllid control in the home garden.

### Materials

Wettable sulfur is a finely ground sulfur that has been so treated that it will readily wet with water and go into suspension in the spray tank. Dusting sulfur is a similar product that has been so conditioned that it will not pack in a duster but will feed through freely and float as a dust in the air. Either type of sulfur to be efficient should be of a fineness that it will pass through a screen having 325 mesh to the inch. The choice between wettable and dusting sulfur may be determined by the equipment available for application.

### Application

Wettable sulfur should be used at the rate of 1 pound to 10 gallons of water (2 tablespoonfuls to 1 gallon). Sulfur settles out of water quickly, so the mixture must be well agitated. It is important to have the spray nozzle on an angle so the spray can be directed to the under side of the leaves. The spraying should be thor-



**Dusting potatoes with a plunger-type hand gun.**

ough. About 125 gallons of spray to the acre should be the minimum. This is approximately 1 gallon to 115 feet of row. With small, less-efficient sprayers it should be applied at a rate of 1 gallon to 75 feet of row.

It is recommended that dusting sulfur be used at the rate of 25 pounds to the acre when an efficient dusting machine is used. This equals 1 pound to 580 feet of row. With the small plunger-type hand duster generally used in the home garden it will take 1 pound to each 300 or 400 feet of row at each application to do an efficient job. Tomatoes may take somewhat less than potatoes. The duster should be equipped with an angular dust outlet that will permit blowing the dust into the side of the row as well as on the tops. For the larger plantings in the home garden or in small commercial

plantings the rotary or bellows-type—hand duster will be found practical and efficient.



**Dusting potatoes with a rotary-type hand duster.**

In one test with potatoes under conditions of medium to heavy infestation, efficient protection was obtained by dusting the sulfur onto the plant through a double muslin cloth bag. This method took about 1 pound of sulfur to 250 feet of row, or about 60 pounds per acre. This method of application is not generally recommended, but can be used in emergencies where other equipment is not available. If this method is used it is well to select a time for dusting when there is a slight air movement, then shake some of the sulfur somewhat at the side of the plants so it will drift through the foliage of the plants in the row. Dusting with other equipment should be at a time when the wind is not blowing so the dust will float among the plants.

### **Treatment Schedule**

#### **Tomatoes**

Usually the most severe injury to tomatoes takes place during the forepart of the season. Often many eggs may be placed on the plants while they are still in the greenhouse or coldframe. If the plants were not sprayed or dusted before they were pulled, it is well at transplanting time to dip the tops into wettable sulfur used at the rate of 2 tablespoonfuls to 1 gallon of water. The plants

should be allowed to dry before setting in the garden. If this is done the first garden treatment should be made about 10 days after setting. This should be followed with additional applications each week or 10 days until the fruit is well formed.

Usually four treatments will suffice in the most heavily infested gardens, but if late evidence of injury appears the treatments can be continued without injury to the fruit. Recent work by the Experiment Station has shown that the small amounts of sulfur remaining on the fruit following late treatments do not affect keeping qualities of canned tomatoes if the fruit is given the usual washing.

The efficiency in dusting with small dust guns early in the season can be increased and sulfur saved by placing a grocery box upside down over a plant and blowing the dust through a hole in the bottom of the box. The box should be allowed to remain in position a few seconds.

### **Potatoes**

Small nymphs may be hatching on potato plants by the time they are from 4 to 6 inches tall. The first application should be made at this time, followed with three additional applications from 7 to 10 days apart. Treatment should not be delayed until psyllid-yellow symptoms are seen; it is then too late for complete protection. With this pest, prevention is much more effective than attempting to cure after symptoms of injury are noted. It is best not to irrigate by sprinkling since this tends to wash the sulfur off the plants.