

PLANT DISEASES

POTATO LEAF ROLL

Leaf roll is probably the most serious virus disease of potatoes in Washington and is especially serious in the production of late potatoes. Losses are of two types, reduction in yields and poor quality tubers because of net necrosis.

Leaf roll may appear in one of two forms depending on when the plant is infected. If a tuber from an infected plant is used as a seed tuber, the plant may be infected from the time it develops from the eye or bud and is said to be "chronically" infected. These plants are stunted, have a pale green color, and stiff uprolled leaves. Chronically infected plants produce very few tubers and, therefore, are relatively unimportant as sources of infected seed tubers. They do, however, provide sources of virus for spread by aphids to healthy plants during the current growing season.

"Current season" leaf roll is not always easily recognized. Plants infected early in the season may have a slight rolling of the new leaves at the shoot tips. Later, a yellowish or reddish color may develop near the base of the rolled leaflets. Rolling and discoloration continues downward until the plant resembles one that is chronically infected. Plants infected late in the season may show no symptoms prior to harvesting.

Tubers from plants infected during the current season often develop in storage a discoloration of the tissue called net necrosis. This appears as brown strands arranged in a double ring about a centimeter beneath the skin and usually is most easily seen in the stem-end half of the tuber. The degree of net necrosis depends on the potato variety, when infection took place, the length of time the tubers have been stored, and the temperature of storage.



Fig. 1—Chronic leaf roll symptoms.

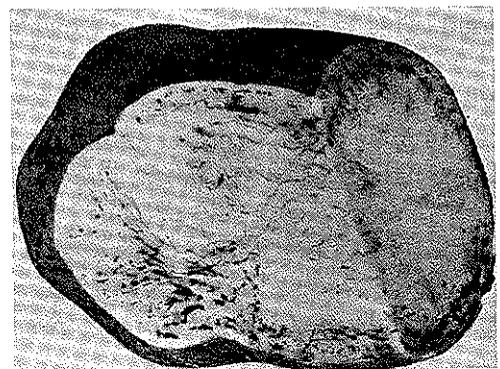


Fig. 2—Net necrosis in leaf roll infected tuber.

Potato varieties differ considerably in their susceptibility to leaf roll and net necrosis. The Russet Burbank, Washington's most important commercial variety, is highly subject to net necrosis. Some varieties such as Sebago, Pontiac, White Rose, and Kennebec, are susceptible to leaf roll infection but do not develop net necrosis. A few varieties such as Katahdin, Calrose, and Essex are somewhat resistant to all phases of the disease.

Storage temperature is a very important factor in the development of net necrosis. Net necrosis is greatest in tubers continuously stored at temperatures from 50 degrees to 70 degrees F. However, if tubers are first kept at low temperatures (about 32 degrees F.) for two months and then stored at higher temperatures, considerably less net necrosis develops.

Two other diseases can cause a rolling of potato leaves and may be confused with leaf roll. One of these is another virus disease known as purple top wilt or aster yellows. In certain varieties, this disease causes wilting and purpling of the undersides of leaves of affected plants and eventual collapse of the plant. Swollen nodes, and zig-zag internodes, as well as small aerial tubers produced in the axils of stems above the ground are other diagnostic symptoms of aster yellows. A second disease, Rhizoctonia, is a fungus disease that also results in the formation of aerial tubers but is always associated with stem lesions below.

Leaf roll is caused by a virus which is an extremely small particle—too small to be seen under the ordinary light microscope.

The leaf roll virus is spread from plant to plant by aphids, the most important being the green peach aphid. This aphid feeds on a large number of plants and is widely distributed. A virus-free aphid must feed on an infected plant for several hours before it can transmit leaf roll, but once it acquires the virus it may retain the ability to infect healthy plants for the rest of its life.

Control of leaf roll in commercial potatoes in Washington requires two considerations: (1) sources of the virus, (2) spread by aphids.

Only seed that is certified to be nearly free of leaf roll virus, and other important diseases, should be used. This is the only practical means of reducing the number of chronically infected plants.

Volunteer potatoes constitute an important source of leaf roll and should be eliminated by either rotating fields out of potatoes for one year so that volunteer plants can be destroyed, or by treating the potato crop with maleic hydrazide to prevent sprouting of tubers the following season.

Spread from one plant to another within a season is entirely by aphids so that insect control is one of the chief means of reducing current season spread of leaf roll. Controlling current season leaf roll controls the development of net necrosis, the greatest cause of economic loss.