



Corky Ringspot of Potatoes

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Corky ringspot is a serious disease of potatoes that occurs in limited geographical areas in the Pacific Northwest, principally areas with coarse-textured, sandy soils. The disease is caused by the tobacco rattle virus, which is carried and transmitted by the stubby root nematode. Tuber flesh of potatoes expressing symptoms become discolored, making them unsuitable for fresh market or processing. This publication describes the symptoms, causes, and management alternatives to aid in corky ringspot control.

Symptoms

Foliar Symptoms

Foliar field symptoms of tobacco rattle virus have never been documented in the region. These symptoms typically range from leaves with a yellow-green mottle to foliage that resembles 2-4,D injury (Fig. 1, top). Leaf symptoms develop early in the season, and stems with symptoms are usually overgrown by healthy foliage.

Tuber Symptoms

Tuber symptoms are characterized by the appearance of rings or arcs of dead tissue that extend deep into the flesh (Fig. 1, bottom). Where the dead tissue intersects the surface of the tuber, the potato may show sunken, fissured, or corky areas on the skin. These typical symptoms led to the name corky ringspot as well as the lesser known names spraing or sprain. Early symptoms may appear as necrotic flecks that later develop into the ring pattern typifying the corky ringspot disease.



Fig. 1. Potato symptoms typical of the corky ringspot disease: (top) foliar symptoms; (bottom) internal necrotic flecking, rings, and arcs in tubers.

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The disease generally does not occur uniformly within a field. A single infected plant may produce tubers both with and without symptoms. Infected tubers will not always show symptoms. Symptoms in stored tubers will tend to become more severe with time.

Factors Affecting Symptom Expression

Expression of corky ringspot symptoms in potatoes is influenced by such factors as variety, nematode population, environmental conditions, and time of infection. Infection early in the growing season, for example, usually increases the severity of tuber symptoms.

The Russet Burbank variety is susceptible to the corky ringspot disease. Some other russet varieties including Nooksack and Lemhi Russet are slightly more resistant, but no russet varieties have sufficient resistance to prevent symptom expression. Merrimack, an old U.S. variety, and many European varieties are resistant to corky ringspot.

Populations of stubby root nematodes may vary throughout the year, with highest populations in the fall. Compared to many other nematode species, stubby root nematodes are not present at high population levels. Unfortunately, only a few nematodes are necessary to cause a high incidence of disease. An abundance of soil moisture favors stubby root nematode activity and leads to rapidly increasing population levels.

Causal Agents

Corky ringspot disease is caused by the tobacco rattle virus. In nature, the tobacco rattle virus is not found except in association with the stubby root nematode, although this disease is not caused by the nematodes. The nematodes transmit the virus as they feed on healthy plants. In the absence of the stubby root nematode, the virus is self-eliminating.

Tobacco Rattle Virus

Tobacco rattle is a rod-shaped virus with a protein coat surrounding strands

of RNA (ribonucleic acid). Many strains of the virus exist, and strains may differ in their ability to produce symptoms. It has a wide host range, including over 400 plant species in more than 50 broadleaf and grass families.

Stubby Root Nematodes

Stubby root is the common name of a group of nematodes that include two genera (*Trichodorus* and *Paratrichodorus*) and several species. Not all of these transmit tobacco rattle virus or feed on potatoes, however. The nematodes were named for their feeding behavior, which causes damaged roots to cease growing, resulting in "stubby roots." The nematodes do little damage to crops and cause no visible injury symptoms and little or no yield loss in potato. They are a serious threat only as vectors of the tobacco rattle virus.

Epidemiology

Corky ringspot disease may occur after tobacco rattle virus-carrying stubby root nematodes feed directly on the tubers of uninfected plants. The nematodes acquire the virus by feeding on diseased plant tissue. Once a population of nematodes acquires the virus, they may remain infective for up to 5 years.

Many common weeds found in the Pacific Northwest are good hosts and serve as symptomless reservoirs for the tobacco rattle virus. Among them are hairy nightshade, redroot pigweed, green foxtail, broadleaved cocklebur, creeping buttercup, purslane, wild buckwheat, broadleaf plantain, wild lettuce, sunflower, winterfat, and beggarticks. The presence of any of these weed hosts in a field may increase the incidence of disease "hot spots" and serve to spread the disease within the field.

Spread of corky ringspot disease to previously uncontaminated fields is usually accomplished by the introduction of virus-infected nematodes. This occurs through the movement of soil, plant residues, or water from contaminated to uncontaminated fields, and by planting infected potato seed. If non-

infected stubby root nematodes are present in a field, introduction of the virus alone can result in the spread of the corky ringspot disease. The virus can be carried in plant residues, in the seed of several weeds (nightshade, cocklebur, and purslane), and in manures from animals fed on infected plants.

Control

To Prevent Disease Spread

1. Wash or steam clean machinery after working in nematode- and virus-infested fields.
2. Avoid moving plant material from infested to noninfested fields. Infested material could include weed residues and manures from animals fed on plants from contaminated fields.
3. Eliminate cull potato piles without contaminating non-infested fields.
4. Prevent water movement from infested to noninfested areas. Do not use irrigation water that may contain runoff from contaminated fields.
5. Practice good weed control. Controlling nightshade is especially important because of its suitability as a host for the tobacco rattle virus.

To Reduce Nematode Populations

1. Fumigate in the fall with a suitable soil fumigant. Telone II is effective in reducing nematode populations if applied before the nematodes migrate downward.

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