



AG-FS-1160
Plant Pathology
Howard L. Bissonnette
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Verticillium Wilt of Potatoes

Verticillium wilt of potatoes, sometimes called "early maturity" or "wilt," is appearing more often in the Red River Valley. The disease was reported from an isolated field in the area in 1957. During the 1963 growing season, *Verticillium albo-atrum*, the causal agent, was isolated from specimens sent to the University of Minnesota plant disease diagnostic laboratory from 25 fields in the Red River Valley.

Verticillium wilt is a major potato disease in the Pacific Northwest and the Northeast Atlantic states. This disease is now spread throughout all areas of our potato growing area. It is a potentially serious disease and causes extensive crop losses. Growers of Kennebec and Irish Cobbler varieties should be especially concerned about wilt because affected tubers are poor chippers.

Potato growers should learn the disease symptoms and control the disease while only a small percentage of the crop is involved.

Symptoms

Lower leaves begin to yellow and wilt in mid-August. These symptoms progress upward on the plant. Defoliation may be so severe that the stem retains only the wilted upper apical whorl of leaves.

External stem streaking has been associated with Verticillium wilt in varieties such as Irish Cobbler and Sebago. It usually appears with extensive fungus infection under conditions of high soil moisture and fertility. Inside of the stem the disease may cause the xylem (vascular ring) to turn reddish brown and may kill the vines prematurely. If the fungus reaches the tubers, the first quarter inch of the vascular ring at the stem-end usually turns brown (Figure 1). All tubers do not show vascular discoloration. However, stem-end browning may also be caused by freezing, chemical spray injury, or viruses.

Some varieties may turn pink around the eyes or show pinkish brown blotches (Figure 2) on other parts of the tuber. The fungus usually does not cause a tuber rot.

Late in the season (mid-September) mature vines may show some light brown discoloration of the xylem. This is a physiologic condition that is not the result of a fungus pathogen.

If you suspect Verticillium wilt, call your county extension agent, area potato agent, the Plant Pathology Department of North Dakota State University, Fargo, North Dakota, or the University of Minnesota, St. Paul.



Figure 1. Vascula discoloration in tuber infected by the *Verticillium* spp. fungus.

Disease Cycle

The importance of tuber transmission is generally known and accepted. The seed piece may carry the fungus on the surface or in the vascular tissue. The wilt fungus grows from diseased seed pieces into a new plant or through the stolons into the young tubers.

The fungus may overwinter in the field in infected plant parts, for example in stems as pseudosclerotia. The fungus may also colonize other organic non-potato crop residue in the soil. Therefore, infected plant debris is an important source for carryover of the fungus.

The pathogen may remain in the soil for as long as 3 to 7 years without a host crop or longer if weed hosts are present. At least 140 species of plants are susceptible to the fungus including such weeds as nightshade, lambsquarters, pigweed, and horse nettle.

The occurrence and severity of *Verticillium* wilt is related closely to temperatures during the early part of the growing season. When June temperatures are medium to high, wilt may be expected earlier with greater severity. Wilt may be more severe in soil with high pH levels (pH 6.5) and in soil of low fertility.

Stem streaking usually is the first symptom observed. It may occur within 30 days after plant emergence. Leaves begin to wilt about 60 days after emergence. When the soil is extremely moist and fertile, the stem streaking symptoms are most pronounced. With high soil moisture and low fertility, the wilting symptoms will be most prominent.

The fungus grows and spreads faster when soil moisture is high, but wilt severity increases when soil moisture levels are lowered. At harvest the pinkeye symptoms appear on the infected tubers. Research workers are not certain if pinkeye is caused by the *Verticillium* fungus or a bacterial infection. *Verticillium* fungus has been isolated from tubers with pinkeye.

Reduction in yield will result from a reaction in tuber size. If the wilt is severe, a stand reduction may account for some yield loss. Tuber quality is usually affected, especially in processing potatoes by the presence of the brown colored vascular ring. It has been found that nematodes, in particular the lesion nematode, may increase the disease severity. It appears that these nematodes increase in numbers on corn in the corn/potato rotation.

Control

Control of this potentially serious disease involves prevention. Don't introduce this disease into new or uninfested areas with diseased potato seed. Use disease-free seed.

Don't plant potatoes in fields known to have a wilt problem. Repeated plantings of potatoes will increase the incidence of the disease. Machinery used in infested fields may spread the disease to other fields. Even where wilt is not a problem, a 3-year rotation should be used with potatoes.

Certified seed growers should seriously consider burning the vines because this will reduce the amount of fungus returned to the soil. This can be done by raking the vines into windrows and burning them when they are dry.

At this time, soil fumigation is the only control for *Verticillium* wilt. Soil fumigation is not always successful plus it is difficult to do and is expensive. There are several chemicals (fumigants) that may be used.¹

¹See Extension Folder AG-F0-1879 for information on soil fumigants.



Figure 2. Discoloration of tuber infected with the *Verticillium* spp. fungus.

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