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Verticillium Wilt in potatoes

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Verticillium wilt of potatoes, sometimes referred to as "early maturity" or wilt, is becoming more prevalent in the Red River Valley. The disease was reported from an isolated field in this area in 1957. During the 1964 growing season several isolations of the causal agent, *Verticillium alboatrum*, were made from specimens sent to the diagnostic plant disease laboratory.

Verticillium wilt has been of major concern to potato growers in the Pacific Northwest and the Northeast Atlantic states. Although its occurrence here is rather sporadic, the potential exists for extensive crop losses because of this disease. Wilt is of particular concern to growers of the varieties Kennebec and Irish Cobbler because of the adverse affects on chipping, following tuber infection.

Red River Valley potato growers should become familiar with the disease symptoms and take steps to control the disease while only a small percentage of the crop appears to be involved.

Symptoms

Wilt symptoms begin to appear in mid-August as yellowing and wilting of the lower leaves which progresses upward. Defoliation may occur with the stem retaining 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.

4-3 Stem streaking results from extensive infection by the fungus under conditions of high soil moisture and fertility. Internally the xylem (vascular ring) of the main stem turns reddish brown which may result in the vines dying prematurely. If the fungus reaches the tubers, the vascular ring at the stem-end usually turns brown (Fig. 1). All tubers do not show vascular discoloration. The browning of the vascular tissue

usually involves only the stem-end of the tuber and extends for not more than a quarter of an inch. However, stem-end browning may also occur as a result of freezing, chemical spray injury, or viruses.

In some varieties a pink discoloration occurs around the eyes, and pinkish brown blotches (Fig. 2) may appear on other parts of the tuber. The fungus does not cause a tuber rot, although infected tubers may show "pink eye", vascular browning and internal blotching.

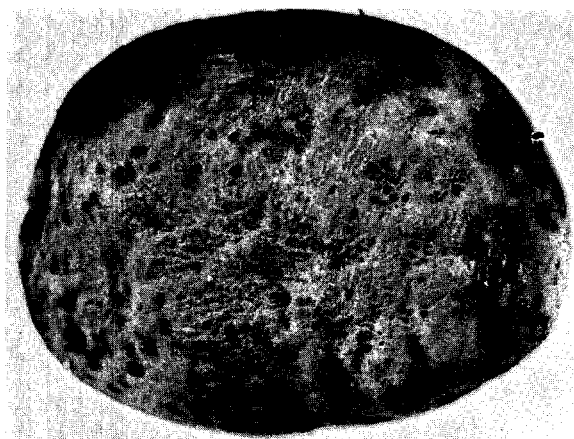


Fig. 2

If plants exhibit a persistent severe wilt between early August and September, with or without the "pink eye" condition of tuber, verticillium infection should be suspected. The marked browning of the vascular cylinder of immature vines, and a vascular browning of the stem-end of tubers are further indications that the verticillium pathogen is present.

Mature vines late in the season may show some light brown discoloration of the xylem, "a physiologic condition" that is not the result of a fungus pathogen.

If in doubt about the presence of Verticillium wilt, bring the condition to the attention of your

County Extension Agent, or the Plant Pathology Department, North Dakota State University, Fargo.

Disease Cycle

Field epidemics in other areas have occurred only in varieties easily infected through both roots and tubers. Many potato varieties may become readily infected with wilt when grown in infested soils, but the disease is not always transmitted extensively through tubers of these varieties.

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 is transmitted through the soil to roots of healthy plants. The fungus also grows through the stolans into the young tubers.

The pathogen may persist in the soil for long periods of time. Reports from other potato growing areas indicate that the pathogen has remained from 3 to 7 years in the absence of a host crop; longer if weed hosts are present. At least 140 species of plants are susceptible to the fungus, including such weeds as Night Shade, Lambs Quarter, Pig Weed 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, especially in Irish Cobbler, and may occur within 30 days after plant emergence. The wilting symptom is much later in appearance, usually occurring after 60 days. When the soil is extremely moist and soil fertility high, 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 under conditions of high soil moisture, but wilt severity increases when soil moisture levels are lowered. At harvest the "pink eye" symptoms of the disease may be seen on the infected tubers. Whether or not this latter symptom is due to the Verticillium fungus or due to pre-disposition of the tuber to a bacterial infection is questionable. This symptom has been observed in the Red River Valley and the Verticillium fungus has been isolated from these tubers.

Reduction in yield will result from a reduction in size of tubers. If the wilt is severe, a reduction in stand may also account for some loss in yield.

Control

At present, only a few basic recommendations may be made for the control of this potential disease problem. Because this fungus is a soil inhabitant and can attack a wide range of cultivated and weed plants, precautions should be taken to prevent, if possible, the establishment of this fungus in our soils. Therefore, it is of greatest importance not to introduce this disease into new or uninfested areas with diseased potato seed. Use disease-free seed.

To prevent further spread from fields known to have a wilt problem, do not plant potatoes in these fields. Repeated plantings of potatoes will increase the incidence of the disease. Contamination of the machinery used in infested fields may spread the disease to other fields in the soil particles that cling to the machinery. Even where the wilt is not a problem a 3-year rotation should be used with potatoes.

At this time, soil fumigation is not recommended. The amount of infestation in North Dakota fields must first be determined. Then, the chemicals to be used will have to be tested to determine their effectiveness under North Dakota conditions.

