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Potatoes in the major producing areas of eastern Idaho are generally affected by a disease commonly referred to as **early dying.** The more scientific term is verticillium wilt. It has been estimated that throughout Idaho 20 per cent of the potential yield is lost. In some locations the loss is as much as 50 per cent. Verticillium wilt causes death of the potato plants in late August or early September just when the shorter days and cooler temperatures of late summer provide conditions favorable for maximum yield.

Causal Agent

The disease is caused by the fungus *Verticillium albo-atrum.*

Symptoms

Verticilium wilt in Idaho has been described as a chlorosis and wilting, which usually starts in the basal leaves on one side of the plant and progresses upward. In time most of the lower leaves wilt and die. Examination of the lower stem will show vascular discoloration. The tuber symptom of verticillium wilt may be a browning of the stem end, usually not extending more than ¼ inch into the tuber.

Symptoms caused by infection with *Verticillium albo-atrum* can easily be confused with four other plant diseases :

Fusarium oxysporum, which produces yellowing and death of the lower leaves.

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Bacterial ring rot, which is shown by wilting and leaf burning.

Late blight, under dry conditions.

Early blight, which produces spots on the leaves that are made up of concentric rings and causes death of potato foliage.

Perpetuation of the Organism

The verticillium organism is carried by both soil and seed. Potatoes produced in the seed areas of Idaho have a lower percentage of infected tubers than those grown in commercial areas. This points to the advisibility of using seed potatoes grown in the seed areas of Idaho to help reduce the possibility of soil infestation, particularly on the newer irrigated land coming under cultivation.

Effect of Temperature

The ideal temperatures for development of verticillium wilt are 70° to 75° F. The minimum temperatures are 50° to 60° F., and the maximum temperatures are 80° to 86° F. The occurrence of verticillium wilt and its severity is closely related to the temperature during the early part of the growing season. In years when June temperatures are high there will be an early appearance of early dying. When early summer temperatures are low, there will be a delayed appearance and less yield reduction.

Rotation

Continuous cropping with potatoes increases the losses due to early dying. Plowing under a green manure crop reduces early dying. In fields where potatoes have been planted more than one year in succession, early dying is more severe. Recently, *Verticillium albo-atrum* has been found associated with the roots of the common weeds nightshade and lamsquarter. It seems reasonable a good weed control practice in the rotation will help to prevent a buildup of the early-dying organism.

Fertilizer

High nitrogen fertility decreases early dying symptoms temporarily. Thirty tons of manure per acre delays early dying and increases the amount of U. S. No. 1's.

Irrigation

A delayed first irrigation postpones the onset of the disease. It also causes a poor grade of tubers and should not be practiced merely because it postpones the disease. During the growing season irrigate lightly, but more often. The cooling effect tends to reduce

early dying symptoms, increases U. S. No. 1's and decreases No. 2's and culls. Recent experiments indicate that sprinkler irrigation results in less early dying when compared to furrow irrigation.

Soil Fumigation Costly

Soil fumigants have been found that will control early dying and will increase yield. However, these soil fumigants are too expensive for commercial use.

Control Recommendations

1. Plant only certified seed grown at a cool temperature.
2. Maintain balanced soil fertility by using rotations of alfalfa or clover as a green manure as well as application of barnyard manure and high rates of nitrogen fertilizer. Follow the University of Idaho's fertilizer guide (Extension Bulletin 325) for the correct balance of soil nutrients.
3. Do not follow potatoes with potatoes in the rotation.
4. Practice weed control.
5. Irrigate lightly and frequently during the early and hot part of the season and irrigate less often during the later cooler weeks.

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