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BACTERIAL WILT AND RING ROT OF POTATO
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During the last few years there has appeared in widely scattered parts of the United States and Canada a serious potato disease variously known as Bacterial Wilt and Soft Rot, Bacterial Ring Rot, Tuber Ring Rot, Ring Rot,^{1/} etc. This disease has been found in one or more localities in several states from the Atlantic Seaboard to the Pacific Coast and is spreading rapidly to other states. It has recently been found in Oregon and adjoining states. It is rapidly becoming serious and widespread throughout the United States.

This disease seriously threatens the potato-growing industry of Oregon. The potato growers of this state should be on guard against this menace and do everything in their power to prevent its further spread within the state.

SOURCE OF DAMAGE AND LOSS

Economic importance of the disease is indicated by losses from the following sources:

1. Poor Stands. Affected seed in some cases may rot before emergence, thus causing poor stands.

2. Rot in transit. Affected tubers are always difficult to sort out and sorting may be impossible. Decay in transit may follow, necessitating costly re-sorting at terminal markets. Dealers report that cars containing many sacks of rotten tubers are difficult to sell and prices for potatoes from areas originating such shipments may be widely depressed for the time being.

3. Rot in storage. If affected tubers are stored instead of sold from the field, loss from storage rot may be serious. In addition, rotting tubers contaminate others and the appearance of the entire bin is damaged.

4. Loss in yield. Affected plants often die prematurely and affected tubers may rot in the ground, causing losses in yields.

SYMPTOMS

Bacterial Wilt and Ring Rot affects both the foliage and the tubers.

The following descriptions of symptoms are compiled largely from literature sent out by the National Committee on Potato Disease Research appointed by the Potato Association of America. In addition the writer has made some field observations in Oregon.

^{1/} Caused by Phytophthora sepedonica

Symptoms on the foliage.---Symptoms appear relatively late in the growing season.

- (1) The first symptoms appear as upward rolling of the margins of the leaflets as is common in normal plants in hot, dry weather.
- (2) The leaflets lose their turgor and become first dull green, then yellow, and feel thin and soft to the touch. Later the margins of the leaflets die and become brown. Locally it is noted that sometimes the main body of the leaflet remains green until after the margin is dead and dry.
- (3) The terminal portion of the main axis of the leaf with the terminal leaflets may wilt while the basal part and petiole remain turgid. Eventually the entire leaf will wilt prematurely.
- (4) One or more stems of the plant may be affected, while other stems of the same plant remain healthy.

Symptoms in the tubers.--- Some of the tubers are already infected by the time wilt symptoms appear. Some tubers on the plant may be badly decayed, others apparently sound. The more prominent and typical symptoms are listed below:

- (1) The decay in the tubers begins at the stolon or stem end and follows the vascular ring causing a creamy, yellow, or light brown necrosis. The necrotic tissue is cheesy or crumbly in texture and without a distinct odor, unless secondary organisms are present.
- (2) The decay may come to the surface at the eyes, or the outer shell may crack exposing the inner decay. In badly affected tubers the outer shell may readily separate from the interior tissue along the vascular ring.
- (3) Tubers that have been in storage over winter may show a characteristic lemon-yellow decay of the vascular ring. The necrotic tissue is usually of a cheesy consistency and contains great quantities of bacteria from which pure cultures can be obtained or from which diagnostic smear stains can be made. Examination of tubers in the storage bin seems to be a worthwhile method to be used in discovering the presence of the disease.
- (4) Secondary organisms (other bacteria and fungi) usually enter after the original bacterial ring rot has made considerable headway, and complicate the situation, so that in advanced stages other colors and textures than those mentioned above may appear. Sometimes the "ring" may take the form of a brownish, irregular band around the pith area and inside the circle of strands usually referred to as the vascular ring. This brown or grayish color may be due, partly at least, to invasion by secondary organisms.

This disease should not be confused with Blackleg. The symptoms in both foliage and tubers are distinctly different from blackleg symptoms.

OVERWINTERING AND SPREAD OF THE DISEASE

Since the disease has been known in Oregon for only a short time we must rely upon the experience of other states for information on overwintering and

spread. It is known that the causal bacteria will remain alive in storage in slightly infected tubers which may show no sign of the disease in the spring, or at least be so slightly affected as to be overlooked. If any diseased tubers are in the seed lot the disease may be spread to healthy tubers by the cutting knife or by the picker point of some planters. It is also possible that the bacteria from decayed tubers smeared on healthy tubers may survive the winter and cause infection when the seed tubers are cut.

How long the disease organism will remain alive in the soil is not known but this may be a source of danger. There is still a great deal of uncertainty as to the longevity and manner of spread of this organism in the field. One publication states that there is apparently very little spread of the disease in the field. Another cautions against planting healthy seed stock in soil where the disease occurred last year. Still another states that seed stocks should not be planted adjacent to fields having wilt and ring rot.

CONTROL

In the light of present knowledge the following precautions should be taken.

(1) Insist upon having certified seed from fields where it is positively known that no ring rot disease occurred.

(2) Plant a seed plot on land isolated from other fields and where no potatoes have been grown for several years. Rogue from the seed plot all plants which die prematurely.

(3) If the disease has occurred on a farm, every sanitary precaution should be taken. Storage quarter, tools, planters, diggers and containers should be cleaned and disinfected. Thoroughly spray warehouses and cellars with a solution of copper sulfate (bluestone) made by dissolving 1 pound in 10 gallons of water. Use new bags, or disinfect used bags, as well as tools and machines, with a solution of formalin containing 1 pint in 25 gallons of water.

(4) If it is necessary to use seed which may be infected, cut a thin slice from the stem end of each tuber and discard all tubers showing discoloration or abnormal appearance or texture. Disinfect the cutting knife often.

(5) Treat seed after cutting with Semesan-Bel.
(Colorado workers report that this practice will greatly reduce the spread of the disease if a small amount is present.)

AVOIDING DAMAGE

If the disease appears in a field, rogue all visibly affected plants. Delay digging as long as possible to give infected tubers time to rot. If shipped at once, sort slowly, and look at the stem end of each tuber, discarding all of those which show any sign of discoloration or rot. If stored, try to leave room in the storage barn so that sorting may be done in case rot develops in a considerable number of tubers. This may prevent spread of the rot and in any case will help the appearance of the potatoes.

EXTRAORDINARY PRECAUTIONS NECESSARY

Everything indicates that this disease is an unusually dangerous one. All growers, inspectors, shippers and others concerned should cooperate closely in trying to stamp it out. Whenever this disease or any suspicious trouble on potatoes is discovered anywhere in the State it should be reported immediately to the County Agent, the Extension Service or the Agricultural Experiment Station at Oregon State College.
