

IPM

POTATO FACT SHEET

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HISTORY

Ring Rot (bacterial wilt) is probably the most feared of all potato diseases. It can reduce yields, and cause tuber rot and breakdown in storage. Ring Rot is regarded as so serious that one diseased potato plant in a field is cause for rejection of all fields grown from that seed lot. Growers spend millions of dollars annually for labor and chemicals to clean and disinfest equipment and storages in an effort to control this disease. Millions of dollars in potential seed sales are also lost annually due to Ring Rot being found on seed producers farms.

Ring Rot was discovered in Germany in 1906. Ring Rot was first reported in North America in eastern Canada in 1931 and in Maine in 1932. Because it is easily disseminated in infected seed lots, it has since appeared in rapid succession in various parts of Canada and the United States, until, presently, it is found in all major potato producing areas. It can cause extremely heavy storage losses. Extensive decay due to secondary invasion by soft rot bacteria also contributes to market losses.

SYMPTOMS:

Ring Rot symptoms can vary with potato variety as well as within a variety. Symptoms of the disease can be different from year to year, depending on temperature, soil fertility and moisture, populations of bacteria in the seed tuber and plant, age and size of the plant and time of season that symptoms develop.

FOLIAR SYMPTOMS:

The first symptoms of the disease usually appear late in the growing season as a pale yellow-green mottling on the lower leaves (fig. 1) which may be restricted to a single stem or found on numerous stems of the hill. The edges

BACTERIAL RING ROT



of these leaves eventually curl upward and start to die. The symptoms progress up the stem and eventually the entire stem wilts, turns yellow, and dies. The fact that the entire stem wilts is a key symptom for distinguishing between Ring Rot and Verticillium Wilt. A brown ring can be seen if stems showing advanced symptoms are cut and if these stems are squeezed, a thick milky bacterial exudate may be forced out.

TUBER SYMPTOMS:

Some tubers from wilted plants may be very badly decayed while others may "appear" healthy. The first symptom in the tuber is a yellowish-white cheesy appearance in the vascular ring (fig. 2) followed by milky, creamy ooze which may be forced out if the tuber is squeezed. The decay begins in the region near the vascular ring and may affect only a small portion or the entire vascular ring. When the entire vascular ring is decayed (fig. 2) a ring of rot is evident, hence the name "Ring Rot".

Infected tubers often show very characteristic surface cracks (fig. 3) which penetrate into the tuber to the vascular ring. Other soil micro-organisms enter the tuber through these cracks and cause rotting and eventually, the entire tuber is completely decayed.

Not all infected plants show foliar or tuber symptoms. Tubers from infected plants may appear healthy even though it is very likely that they are infected by the Ring Rot bacterium. Absence of symptoms is especially likely under cool, moist growing conditions.

CAUSAL AGENT:

Ring Rot is caused by a bacterium Corynebacterium sepedonicum (Spieck and Kotth) Skapt and Burkh. It is a nonmotile rod 0.3-0.4 by 0.8-1.0 m.m. in size.

The bacteria can overwinter in dried slime on harvesting and grading machinery, sacks, barrels and in infected tubers. The causal organism has not been found to live freely in the soil, however, volunteer plants from infected tubers provide an excellent source of inoculum. Therefore, fields known to have Ring Rot should never be replanted the following year.

The Ring Rot bacterium is highly contagious and gains entry into the plant or tuber through wounds. The principal and most rapid dissemination happens during the seed cutting and planting operations. There is very little

spread of the disease from plant to plant in the field. The bacteria in infected tubers are also more active in the spring of the year. When the seed is warmed up the bacterial activity increases. Seed lots with trace amounts of infection may require a year or longer to develop detectable levels.

Infected tubers with no visible evidence of the disease at harvest may develop positive symptoms in storage. Although healthy tubers can be infected through fresh wounds that penetrate as deeply as the vascular ring, there is generally little, if any, spread from diseased to healthy tubers during storage. Secondary micro-organisms (soft rot bacteria) will cause a general breakdown in storage. Ring Rot develops in infected tubers most rapidly at 64° to 72°F but only slightly at 37°F. While resistance to Ring Rot exists there is no immunity. Resistant varieties may serve as symptomless carriers of the disease.

CONTROL:

1) Dispose of all potatoes grown on the farm when the disease is found. This includes next year's seed plots.

2) Use certified seed: Know the history of your seed source. This is the only way to stay "clean" or to get rid of the disease. The disease cannot be eliminated from a lot of seed by roguing or seed treatment. Equipment such as seed cutters, sacks, barrels, bulk bodies, conveyors, and planters can spread the disease. A seed lot with only a trace of the disease may produce a crop with 10% to 30% infected plants. Nothing less than Certified Seed should be used. Seed growers should use only Foundation Seed. Even seed listed as certified may contain undetected trace amounts of Ring Rot.

3) Plant on clean ground: Although bacteria may not overwinter freely in the soil, they will overwinter in infected tubers. The bacteria can spread from infected to healthy plants within the field, therefore, infected volunteers are a source of inoculum. Ring Rot will invariably show up in the new crop if fields where ring rot was found are replanted to potatoes the next year.

4) Clean and disinfest all equipment: Due to the ease by which the disease can be spread, everything used to handle potatoes or everything that potatoes have come in contact with should be suspected of carrying causal organisms. Therefore, before handling seed and starting a new crop year, all equipment, bins and containers should be thoroughly

cleaned and disinfested. This means everything -- nothing can be overlooked, even if the disease has not been found on the farm. A thorough clean-up job involves the following:

a) All surfaces must be absolutely free of mud, caked dirt and debris for the disinfestant to be effective. Surfaces must remain wet for at least ½ hour after being treated to allow sufficient contact between bacteria and disinfestant.

b) Use steam or water under pressure, plus "elbow grease" to remove dirt and debris.

c) Disinfestants must be mixed to their proper strength. When mixed too strong they will not work as well.

d) Disinfestants must come in contact with all surfaces, a halfway job will not be effective. Planters, seed cutters, conveyers, etc. should be partially disassembled in order to do a thorough job.

e) Remember, the Ring Rot organism is not destroyed by cold or exposure to the weather, therefore, planters, harvesters, etc. must be cleaned and disinfested even though they have been exposed to winter weather for 10 to 11 months. Also, used potato bags are one of the primary ways Ring Rot is spread.

5) Disinfest storage facilities: Remove all soil, potato refuse, sacks, etc. from the storage before disinfesting. If the storage has a dirt floor, remove 2 to 3 inches of soil before disinfesting.

6) Keep all seed lots separated from each other and from other potatoes. Because the rates and materials are subject to change consult your local company fieldman or area potato specialist for the latest recommendations. Be sure to read the label carefully.

ADDITIONAL SUGGESTIONS TO SEED GROWERS:

Most seed growers increase their own seed in seed plots using seed from the Porter Farm or other good sources. In addition to the suggestions outlined above, growers should:

1) Plant their seed plots first.

2) Spray, hoe and cultivate the seed plots first and disinfest all equipment before working the seed plots.

3) Harvest the seed plots first and store in bins which have been thoroughly disinfested.

4) Be sure the seed plots are large enough to provide all the seed needed for next year. This

will eliminate the temptation to "fill in" with seed from another source, a practice that very often leads to trouble.

5) Store seed potatoes by themselves--preferably in a separate house.

6) Disinfest all equipment between varieties or lots when cutting seed, planting, working in the field, harvesting or handling.

7) Keep visitors out of fields and storages. Have provisions for disinfesting the footwear of anyone who must enter your fields and make it impossible to enter your seed storage without first passing through an area that will disinfest footwear and the surface of truck tires.

8) Furnish clean gloves for all workers.

9) Do not loan equipment, unless you are absolutely sure there is no Ring Rot on their farm and then disinfest it before using it again on your farm.

10) Equipment used to haul potatoes to starch factories, processing plants, or commercial packing plants should be suspected of carrying Ring rot and treated accordingly.

11) Beware of employees who may work for someone else part-time such as another grower or a processing plant.

12) Discard all potatoes that have been handled by anyone other than you or your regular employees!

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