

METHODS PROPOSED FOR DETECTION AND CONTROL OF RING ROT
AND OTHER DISEASE IN SEED POTATOES

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Ring rot was first reported in 1913 in Germany. In 1937 it was found in Maine and was soon spread to all potato-producing areas in the U. S. A. Certification programs were developed and provided satisfactory control, but have not eradicated ring rot since the causal bacterium is latent under the cool climatic conditions of seed-producing areas. Ring rot bacteria do not overwinter in the soil but can remain latent in very low concentrations and symptomless in certified potato seed tubers grown in cool growing areas.

The disease is spread by infected seed and by surface-contaminated handling equipment. The introduction of bulk handling of seed potatoes beginning about 1975 may well be associated with increased ring rot. Chemical disinfectants are about 90% effective in killing the bacteria on wooden, unpainted surfaces of potato-handling equipment, but are much less effective on contaminated cut potato seed pieces.

The Columbia Basin climatic conditions are ideal for the expression of disease symptoms. Norgold Russet planted early April and Russet Burbank planted early May usually show symptoms of ring rot and other diseases by June 28. Ring rot symptoms are favored by our warm environment rather than the cool environments of seed-growing areas. Low nitrogen fertility (100 lb N/A or less) also favors expression of ring rot leaf roll and other disease symptoms. Heavy nitrogen fertilization may mask symptoms.

We have experienced a serious bacterial ring rot epidemic in the potato fields of Washington. Acreage of affected potatoes has increased from about 500 to 6,000 acres in commercial fields since 1975.

Seed growers have difficulty in providing ring rot-free seed because infected plants frequently fail to express symptoms in the cool climates where seed is grown. They are at a loss as to where clean sources of seed can be found.

The question then becomes what can you as a commercial producer do to protect yourself. First I would like to point out that there probably is nothing that you can do that will guarantee you that you will not come up with ring rot at one time or another, but there are things that you can do that will decrease your chances and if you do get ring rot, they will decrease the severity of it.

Secondly, I would like to point out that the purchase of good seed is the most important thing that you do as far as that potato crop is concerned. If you start out with poor seed and a poor stand, no matter what you do after that, your potato crop will never improve over that original potential. I recognize that all of you are busy during the growing season but I feel that all of you should take a break during the summer and visit the seed producing areas where you buy your seed. Doing this will give you a first hand knowledge of what kind of a producer your seed grower is and how good his program is. By looking at the growing crop you can tell much more about his disease problems than you ever can from looking at a cellar full of seed. You can get an idea of how much roguing he has had to do and what his sanitation program is. You are able to decide which lots you want to buy and those that you don't want to buy, they are not all the same. Last of all - don't buy just from one seed source, either, buy more than one seed lot or buy from more than one grower.

If you do purchase your own seed and cut it yourself, then there are things that you should do to minimize the chances of spreading ring rot. Remember ring rot may not express

symptoms in the seed producing area, so there is always the possibility of having some infection. Your job is to keep the spread of the disease to a minimum. This can be done by certain precautions such as:

1. disinfect the trucks and tarps used in hauling the seed and make sure that the trucker hauling your seed disinfects before loading at the producers.
2. disinfect the area where the potatoes are to be stored
5% formaldehyde - 5% Clorox
3. thoroughly clean and disinfect all handling equipment, such as loaders, pilers, belts, and seed cutters.
4. set up a method where such equipment can be cleaned periodically during the cutting operation.
5. clean up between seed lots.
6. do not mix seed lots.
7. keep lot identity on each seed lot all the way to the field.
8. keep a performance record on each lot as to germination, growth and vigor, disease and yield.

What to do if you purchase seed from a broker who also cuts your seed:

1. know for certain whose seed you are purchasing.
2. insist on Lot identity when purchasing.
3. make certain that they do not mix Lots.
4. make certain that they clean up between Lots of seed.
5. get the Lot identity of each truck load of seed delivered and if they split Lots on delivery insist that you are notified when they change Lots.
6. make a permanent record such as the number of rows from point A to B where each Lot is planted - in case of ring rot, you may have to go to court and positive identification of seed Lots become very important.
7. last of all, become familiar with ring rot symptoms so you can detect the disease early - it is much better to take ring rot potatoes to a processor than to let them rot out in the field.
8. these points are important if you ever have to have a lawsuit, but remember the only persons that I have ever seen make any money in lawsuits are the attorneys.

What are we doing about ring rot? Well, hopefully, through the cooperation of Washington State University, the State Department of Agriculture, the Washington State Potato Commission, and the Washington State Potato Growers Association, we will put together a new seed Lot program that will cover ring rot. This program will be open to the seed producers of all states supplying seed to Washington growers. This program will be for the producers of foundation seed. Here is how the program will operate. Samples of each lot of potato seed to be grown for certification will be voluntarily collected at random from storage by the seed grower and submitted to his local grower's association. The grower's seed association will

have the responsibility of delivering samples to the Othello Research Unit prior to planting. Washington State University personnel will plant them by hand in single 400-ft rows. WSU personnel and Washington State Department of Agriculture inspectors will read plant symptoms later for disease. Representatives of the certification agencies from the seed-producing areas will be invited and encouraged to be present during the readings. The plots will be the subject of an annual field day and disease readings will be made public. The results of these trials are for information purposes only and are not a part of any regulatory program.

Specific Procedures

1. Cost per sample -- Seed growers belonging to the Washington State Potato Seed Commission will be charged an entry fee of twenty-five dollars (\$25.00) per sample. Other Washington seed growers and out-of-state or Canadian seed growers will be charged a fee of fifty dollars (\$50.00) per sample. This cost differential is because Washington seed growers contribute to the Washington Potato and Seed Potato Commission.
2. Sample containers -- New cardboard containers approximately 24 x 18 x 16 inches, information labels and fiber tape will be furnished by Washington State University and mailed to each grower when his entry fee is received. The containers will be mailed collapsed and consist of an inner and outer box. Boxes will have off-set holes in sides for air ventilation. Seed growers will be responsible for reconstructing boxes, taping securely, and attaching correct labels to the boxes. Seed growers will gather at random no less than 400 tubers (about 75 lbs.) for each of his seed lots to be submitted. The sample should contain a composite of sizes (1/2 oz. to 6 oz.) to be truly representative. Growers will tape both boxes closed and deliver the samples to his association for shipment to the Othello Research Unit. Samples should be stored in the same or similar storage conditions of original supplies prior to shipment.
3. Last date to pay fee and request sample containers -- Requests for containers and fee payments will be submitted to IAREC, Attention: Dr. L. R. Faulkner, Box 30, Prosser, Wa. 99350, by February 1 of each year. Checks should be made payable to the Washington State Potato Commission. Seed growers will receive sample containers about March 1 each year.
4. Last date Washington State University will accept samples for planting -- Samples will be delivered to the Othello Research Unit, 1471 Cox's Road, Othello, Wa. 99344, no later than March 10 of each year.
5. Cutting and planting samples -- Each sample will be assigned a number and planted on about March 20. All tubers will be split lengthwise with a sterilized knife to increase spread of ring rot, black leg and mosaic viruses within the sample and deposited in their outer box for planting. Knives will be rinsed with clean water, soaked 5 to 10 minutes in a chemical disinfectant, boiled in water for 10 minutes, and alcohol flamed between each seed sample. Personnel will wear plastic throw-away gloves and will discard them after cutting and planting each lot. Extreme care will be taken to assure that bacteria from one sample cannot be spread to the next sample. Seed will be planted 12 inches apart by hand into open furrows of a 400-ft 36-inch wide row. Plastic throw-away gloves and containers will be discarded after planting each row. Furrows will be covered and hilled immediately after planting. All gloves, cardboard containers, etc., will be destroyed.
6. Herbicide application for weed control -- Prior to potato emergence herbicides will be incorporated twice over the hills of rows by a Lilliston cultivator for weed control.
7. Systemic soil insecticide application -- A systemic soil insecticide will be sidedressed when 50 of the potatoes have emerged, for aphid, Colorado potato beetle and mite control.

8. Further cultivation or field work -- No further cultivation or field work will occur until vines are killed within 10 days after Field Day except for normal row irrigation, to eliminate any possibility of disease spread by mechanical means.

9. Foliage insects and powdery mildew control -- Foliage insects and powdery mildew will be controlled by aircraft application of pesticides.

10. Dates of disease readings -- On about June 10 plants will be read for mosaic virus mottles, early leaf roll, and early black leg symptoms. On about June 30 plants will be read for ring rot, leaf roll, black leg and miscellaneous diseases. On about July 20 final readings will be taken of ring rot and black leg.

11. Field day and publication of disease content in samples -- A field day will be held for the public to view disease content in the samples. Identity of samples and their disease content will be made available through the Washington State Potato Commission.

In the meantime, plant pathologists will be checking out various methods of detecting ring rot directly from tubers. If one of these methods proves out then it will be possible to run tests on tubers from seed fields in the fall. If ring rot is found, then the grower will be able to dispose of the crop as commercials. This will prevent the build-up of Ring Rot in a grower's lot and give him the opportunity to clean up and get new seed stock. In addition, it will allow him to buy seed stock that has been shown to be clean.

The success of the program will be no better than the integrity of the people submitting the samples or the care taken by the people handling seed to prevent spread in case theirs has ring rot. This means that we all have a responsibility if the program is to work. If the medical profession can clean up polio, small pox, and other diseases, then we in the potato industry should be able to clean up ring rot in the Pacific Northwest.