MANAGING SILVER SCURF IN POTATOES

by
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Introduction

Silver Scurf, caused by the fungus *Helminthosporium solani*, has been responsible for moderate to severe losses in potatoes in the Columbia Basin and elsewhere in recent years. Most damage has occurred on smooth skin cultivars and/or Russet Norkotah, sold primarily to the fresh market. In contrast to most other potato disease problems, yield and quality reductions in the field are not caused by this pathogen, nor do tubers become rotten in storage or quality reduced by internal discolorations. Rather this fungus causes blemishes and lesions only on the surface of the tubers, reducing both quality and marketability. Often this problem looks like "dirty" potatoes that, upon washing, does not return the potatoes to a nice light brown russet or uniform red appearance the consumers prefer. Other times the fungus appears as small and larger circular black patches on the tuber surface. Losses also occur due to increased inspection and sorting time required in lots with damage. Usually damage does not show up until the tubers have been stored for months. Increased difficulty in peeling russet burbank potatoes during processing also occurs due to increase skin thickness from infections on the potato surface.

Silver scurf is a relatively new problem, only becoming evident as a significant problem in the last few years. Potato disease compendia written in recent years list this fungus caused disease as "a minor problem". The first suggestion that this fungus was responsible for substantial financial loses was in a report by Dr. Kiran Shetty in 1993. He reported an estimated fresh market loss in Idaho of $7-8.5 million. Losses, of course, have not been confined to Idaho.

Controlling Silver Scurf

Controlling this disease begins with understanding the biology of this organism. This fungus will live in the soil, however, how long it can survive after a potato crop is unknown. Current thinking suggests 2 years, which is less time than most potato rotation sequences in the Columbia Basin. If true, then most infections in daughter tubers in commercial fields must be originating from infected seed.

The fungus has been found in potato storages, sporulating on wood surfaces and on other substrate. This association provides an easy opportunity for the spores, called conidia, to move in the air system of the storage and land on seed tubers and cause infection. Likewise spores could also contaminate equipment, i.e. belts, trucks, planters, etc., which would allow these spores to come into contact with seed potatoes.

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Based on information obtained from testing seed lots in 1998, considerable infection occurs while seed is stored due to the high level of "new" or spot infections occurring around the whole tuber. This point is further substantiated by the fact that tubers tested direct from the field often are infected only near the attachment to the stolen.

Seed treatments

Since most seed lots have some infection, many have considerable infection (based on Spring 1998 testing), the use of seed treatments to control this disease is warranted. Several products on the market today have shown good silver scurf control, TopsMZ, Maxim, and Mancozeb, when applied to the seed following cutting. Some additional benefits can be obtain related to controlling Fusarium Dry Rot and Black Scurf (Rhizoctonia) but results may vary. Also, Mancozeb has been reported to have reduce effectiveness during storage. Extensive tests are currently underway in Oregon and Washington to look more extensively at these and other treatments for their effectiveness to control this disease. Whatever seed treatment is used, be certain to follow the label.

Other products labeled for seed have little if any effect on Silver Scurf. In addition, Maxim is not labeled for seed growers use. Seed growers can use Dithane ST on seed tubers going into storage but potatoes subsequently can only be used as seed.

The use of one of these seed treatments, even in seed lots with Silver Scurf, need not be automatic. If growing Russet Norkotah or Russet Burbank, visible damage generally does not become visible until 4 months or so into storage. So, if the variety being grown is going to be packed out directly, or stored for less than 4 months, a seed treatment to control this fungus is not necessary. Of course storage conditions will cause this time to vary (see below). Red skinned potatoes may have silver scurf out of the field, so a seed treatment when growing these cultivars may be required. Seed treatments alone will not solve the problems associated with silver scurf.

Harvest

Besides the use of seed treatments, when necessary, another important control method relates to harvest. Increased infection may occur the longer the tubers are left in the field after vine kill. This would include vines killed early due to Verticillum Wilt. For that reason tubers should be harvested as soon as skin set is adequate. However, if late blight has been a factor in the area, delay harvest for two weeks after complete vine kill. Also eliminate as much dirt and debris before going into storage. These materials can carry silver scurf spores as well as other problems.

Spores of the silver scurf fungus can easily contaminate healthy tubers. For that reason care should be taken to disinfect all equipment used during harvesting, i.e. digger, conveyer belts, trucks, etc. This disinfection should be repeated each time a new seed lot is harvested since seed lots differ in their level of infection. Any use of post harvest disinfectants to the tubers themselves should be used with caution. Excess moisture going into storage may help increase infection.

Storage

Most tubers going into storage are likely free of infection. However, air movement in the storage provides an effective means for the fungus to be disseminated and contaminate the surface of healthy tubers. With the right conditions in storage, the fungus can infect, and with time produce the surface blemishes.

Before placing tubers in storage, a careful job must be done to disinfect all areas of the facility. Recent work in Idaho has shown that spores of the fungus can survive in soil and on organic debris within a storage. Therefore disinfection will reduce or eliminate spores surviving in a storage from the previous year. Make certain that the storage is allowed to dry before filling. Once tubers are in storage, there are two very important considerations; temperature and humidity. As with any storage problem, the cooler the temperature, the slower the fungus or bacterium can grow. The slower they grow, the less risk they produce. Therefore, temperature in storage should be reduced to healing temperatures (about 50^0 F) as quickly as possible, and held for two weeks, beginning as soon as the door is closed. This is particularly important when harvesting early in the season since pulp temperatures are at their highest. During this time maintain humidity at 90-95 % but make certain no condensation occurs in the storage. By the beginning of week three, the temperature should be reduced as quickly as possible to as low a temperature as possible. Where refrigerated storages are used, this will not be a problem to accomplish. If refrigerated air is not available, then constant air is very important, see below. Maintaining storage temperatures is also important and somewhat easier, once outside temperatures have fallen. Remember, rapid cooling is not recommended for tubers used for processing because of the potential buildup of sugar ends.

As with most fungi, high humidity is required for spore production and germination, both often require free moisture. Care should be taken to prevent any possibility of condensation occurring anywhere in the storage, such as the ducts or in the pile. This can be effectively done through the use of air.

The application of air should begin while filling the storage. The more air the better. This will help dry the wet areas and reduce the chance of new infections. Continuous air is better but bringing in outside air is not always possible. Scurf development will be reduced whenever air can be used to maintain the storage temperature throughout the pile while preventing condensation.

Use of Ozone

The use of ozone has not to this point been shown to be an effective measure to control silver scurf in storage but tests are currently underway in Oregon and Washington. Tests are also underway to see if chlorine treatments during storage will reduce severity and/or infection but again, data is not available to conclusively show a benefit when dealing with silver scurf.

Silver Scurf Assay

Seed tuber and commercial tubers going into storage can be tested for infections and hence the likelihood of problems in storage can be determined. By this method lightly rinsed (not washed) tubers (25 to 30 tubers/sample collected randomly three weeks prior to harvest from the field or about two feet below the surface of the pile). Tubers are then placed into a plastic bag with a few small holes (1/8 inch) and placed into a dark room at 60-75^0 F for three weeks. Tubers should be lightly sprayed with non-chlorinated water every five days. The pathogen can be seen in three weeks causing dark areas on the tuber surface. A hand lens can be used to see the fruiting structures and spores of the fungus which resemble tiny Christmas trees. Limited samples can also be tested at Oregon State University's Agricultural Research and Extension Center located in Hermiston Oregon.

References

Shetty, D.K,. M.J. Frazier, G.E. Kleinkopf, and P. Nolte. 1997. Silver scurf of potatoes. University of Idaho Cooperative Extension Publication CIS 1060.