These sprouts are decaying subsequent to fusarium dry rot.

This photo shows the internal symptoms of fusarium dry rot.

Potato seed piece health management

Phillip Wharton for *Ag Proud*

As we begin the new year, it's time to start thinking about acquiring seed and planning for planting season, which will be here before you know it. When thinking about planting, potato seed piece health should be on your mind. Every year in the U.S., seed-borne diseases have a significant impact on potato production. Pathogens such as *Fusarium sambucinum* (fusarium dry rot) and *Phytophthora infestans* (late blight) are major potato pathogens, affecting tubers in storage and seed tubers and sprouts after planting. Fusarium dry rot of seed can reduce crop establishment through its ability to destroy developing potato sprouts, and crop losses can be up to 25%, while greater than 60% of tubers can be infected in storage. All the commonly grown potato varieties in North America are susceptible to the pathogen, although some are more tolerant than others.

There are two main opportunities in the potato crop cycle for the control of fusarium dry rot. The first is the post-harvest control of seed piece decay in the seed crop in the fall, and the second is the control of seed piece decay and sprout infection prior to planting of the commercial crop in the spring. The dry rot pathogen enters tubers mainly through wounds produced during harvest and transportation. The first symptoms of dry rot are usually dark depressions on the surface of the tuber and, as lesions increase in size, the skin becomes wrinkled in concentric rings as the underlying dead tissue desiccates. Small clumps of fungal mycelium and white or pink pustules containing spores may emerge through the dead skin.

Potato seed tubers should be maintained at 37ºF in storage. This is approximately the temperature at which *F. sambucinum* is dormant and, consequently, there is minimal development of dry rot in storage.

During the pre-planting phase of potato production, seed tubers should be warmed to about 54ºF, then cut into seed pieces prior to planting. Tubers infected with *F. sambucinum* are particularly susceptible to the development of seed piece decay during this phase and, in severe disease cases, seed pieces may completely rot before planting.

Alternatively, after planting over 50% of sprouts developing on infected tubers may become diseased and killed outright before emergence. Damage at this stage results in delayed emergence and is usually expressed as poor and uneven stands with weakened plants. Reduction in crop vigor then results from expenditure of seed energy used to produce secondary or tertiary sprouts to compensate for damage to primary sprouts.

Over the past couple of years several factors have enhanced dry rot problems in the Pacific Northwest.

1 There is an increase in fungicide resistance in fusarium strains and a corresponding lack of effective fungicides for their control.

2 There is an increase in the area of potatoes planted by growers, leading to management issues such as timing of pre-cutting and treating of seed.

3 Climatic factors, such as increased rainy periods during the planting phase, prevent growers from planting.

Current recommendations for seed cutting describe some guidelines for the cutting process but do not indicate a time period or management strategy for storage of cut seed. Some level of fusarium dry rot is almost always present in commercially available seed, and tubers infected with fusarium dry rot are particularly susceptible to the development of seed piece decay during this phase.

Studies at the University of Idaho have shown that the effect of timing of pre-cutting potato seed and timing of application of seed piece fungicides prior to planting on seed piece decay, plant establishment, subsequent vigor and early crop development is complex and can be affected not just by the presence of inoculum but also by seed storage conditions after cutting and prior to planting.

The most successful control of fusarium dry rot is achieved by the application of an effective fungicide prior to planting. Seed treatments provide a chemical barrier around healthy seed pieces and also reduce the number of spores produced on the cut seed surface of infected seed pieces, thereby reducing the number of spores that can be spread during the seed cutting and handling operation. In addition to maintaining seed health after cutting and restorage before planting, these products will also improve emergence and reduce incidence of bacterial soft rot and blackleg, as they also reduce secondary infection by bacterial pathogens.

Some effective seed treatments include products that contain fludioxonil (e.g.,

Maxim 4FS), penflufen (Emesto Silver) and flutolanil (Moncoat). These products are also effective against other seed-borne pathogens such as *Helminthosporium solani* (silver scurf), *Rhizoctonia solani* (rhizoctonia stem canker and black scurf) and *Colletotrichum coccodes* (black dot). However, none of these products provide effective control of late blight. In general, any seed treatment product containing mancozeb will provide effective control against seed-borne late blight. Seed treatments currently registered for use on potatoes in Idaho which contain mancozeb include Maxim MZ, Moncoat MZ and Nubark Mancozeb. Although Emesto Silver doesn't contain mancozeb, the label does recommend "a mancozeb-containing product specifically designed for application to potatoes in place of the inert absorbent."

Although the use of a seed treatment is important in the control of seed-borne diseases, effective management seed health management requires the implementation of an integrated disease management approach that also includes the use of certified seed, cultural practices and good seed cutting practices.

Cultural practices include the inspection of seed lots on delivery to ensure they are visibly free of tubers with symptoms of fusarium dry rot, storage of seed in clean and disinfected seed storage facilities, proper management of cull piles (don't store seed near cull piles) and maintaining the proper temperature of seed in storage prior to and after cutting. Good seed cutting practices include using a clean and disinfected seed cutter, use of water-impermeable seed cutter sponge (closed cell) rollers, keeping cutter blades sharp and adjusted to deliver an average seed piece weight of 2 ounces, and cleaning and disinfecting cutting equipment each day and definitely between seed lots.

Not cleaning seed cutters between seed lots is the easiest way to transmit diseases like fusarium dry rot and bacterial ring rot from infected seed in a contaminated seed lot to healthy seed in a clean seed lot. AG

Phillip Wharton
University of Idaho
Aberdeen Research
& Extension Center
pwharton@uidaho.edu

Photos by Phillip Wharton.

External symptoms include dark depressions on the surface of the tuber. As lesions increase in size, the skin becomes wrinkled in concentric rings as the underlying dead tissue desiccates. Small clumps of fungal mycelium and white or pink pustules containing spores may emerge through the dead skin.