Storage Management Follows Proper Disease Identification
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By Nora Olsen, Jeff Miller, and Phil Nolte

Tuber rots come in many levels of wetness, smelliness and grossness. Proper identification of the disease causing rot is important to best manage the problem in storage. Storage diseases are not curable, but there are ways to help limit disease spread to healthy potatoes or from the problem getting worse. Knowing what tuber disease is causing the problem will also help in field management decisions for the following growing season.

The major diseases that often plague potato storages include: pink rot, Pythium leak, late blight, dry rot, soft rot, silver scurf, and black dot. Some diseases cause more severe damage and progress more rapidly than others, especially when secondary soft rot develops creating "hot spots" that can lead to breakdown of an entire pile of potatoes in storage.

The first step in diagnosing the type of rot either coming out of the field or in storage is to select a partially rotted potato. This means that at least half or more of the tuber is healthy. Often the potatoes that are completely rotted have succumbed to secondary soft rot invasion and it is nearly impossible to ascertain the initial problem. Dissect the tuber by cutting it in half and peeling areas of the skin off. Look for any disease entry points such as obvious or superficial wounds, the area of stolon attachment, and the lenticels and eyes. Match disease descriptions and photographs to the problem. Unfortunately, many tuber diseases can vary in their appearance and often do not look exactly like the textbook pictures so further examination by university personnel may be necessary.

The following are brief descriptions, photographs and basic management options for handling some of the more common diseased potatoes in storage. All of the described diseases are easily invaded by the ultimate nemesis, bacterial soft rot, with the exception of silver scurf and black dot.

Tubers affected by pink rot, caused by *Phytophthora erythroseptica*, often maintain a normal shape, but the outer skin turns dark, and upon cutting the internal flesh has a boiled potato consistency (Fig.1). The internal tissue will also turn a pink color after about 30 minutes of exposure to warm air. Do not confuse pink rot with the lighter pink color that occurs due to oxidation when healthy tissue is exposed to air.

Pythium leak, caused by *Pythium* spp., is often described as a "shell rot" but the term "leak" comes from the ability to squeeze the rotten tuber and causing a clear liquid stream from the tuber (Fig. 2). Since leak needs a wound to infect, inspect the tuber for any potential entry or initiation areas. This disease tends to cause a brown/black colored rot in the interior of the tuber leaving the outer part or "shell" intact.

Tubers with late blight, caused by *Phytophthora infestans*, tend to have a reddish or tan-brown, dry, granular rot that extends from the skin of the tuber inward up to an inch or more (Fig. 3). The rot development will depend upon how long the tuber has been infected as well as variety and temperature. It helps to peel away the skin and look for the reddish tissue color, but clinical diagnosis of this disease is always recommended.

Dry rot, caused by *Fusarium sambucinum* or *F. coeruleum,* typically has a final tuber decay that is dry, crumbly, and brown in color with collapsed tissue often infected with secondary white or other colored fungal growth (Fig. 4). These infected tubers often shrivel up and become mummified. Initial stages of dry rot can look very different. For instance, *F. sambucinum* infected tubers initially have a dark brown-black color tunneling through the tuber and that feels just like the healthy tissue. In other words, it has not broken down into the dry or papery rot yet. Early infections of *F. coeruleum* appear tan in color and spreads uniformly throughout most of the tuber (Fig. 5).

The most serious of all storage diseases is soft rot, caused by the bacterium *Erwinia carotovora*. Symptoms include tan to brown colored water soaked areas of granular, mushy tissue outlined by brown to black margins (Fig. 6). The rotted part of the tuber is clearly differentiated from the healthy part of the tuber, although with time, the healthy part will become overtaken by the bacteria. Soft rotted tubers tend to break down easily thus spreading bacteria to surrounding tubers. Soft rot bacteria can invade a tuber already infected with one of the previously described diseases.

Although not a disease that causes the tuber to actually rot, silver scurf, caused by the fungus *Helminthosporium solani***,** causes grey to silvery blotches or sheen on the surface of the tuber (Fig. 7). There is no internal damage with silver scurf infection but skin can appear thicker and unappealing to the consumer. It can be more prominent at the stem end indicating that a potential source of the silver scurf was seed-borne.

Black dot, caused by *Colletotrichum coccodes*, is another appearance problem that can look similar to silver scurf. Tubers with black dot will have areas where the skin is darkened. Small black sclerotia may also be visible with the aid of a magnifying lens. In extreme cases, the tuber surface can become bumpy (Fig. 8).

The three basic tools of storage management, temperature, humidity, and airflow, will help in managing many of these diseases in storage. The wound healing or curing period is an important time to properly heal cuts and bruises, reduce disease spread, and reduce shrinkage. This is an especially important time for diseases that require a wound to infect such as dry rot. Wound healing and curing typically occurs at 50-55°F over 2-3 weeks. The warmer temperatures will promote faster breakdown of water rots, such as pink rot and Pythium leak, therefore curing temperatures may need to be at 50°F. Lower holding temperatures typically decrease the rate of disease infection and can be used to your advantage although this will be dictated by the end-use of the potato. Depending upon the percentage of rot in the storage, the pile may need additional drying through reductions in humidity, but realize additional shrinkage will result. A lack of humidification will also

delay wound healing, but can decrease the infection of silver scurf. Continuous fan operation and high airflow are necessary to dry out wet or problem potatoes, especially soft rot, thus reducing the likelihood for further disease development.

Management for one disease may be counter productive for another, so it is important to recognize the disease culprit and manage accordingly.

Figure 1. Tuber affected by pink rot infected tuber with a darkened skin and pink, boiled-like internal tissue.

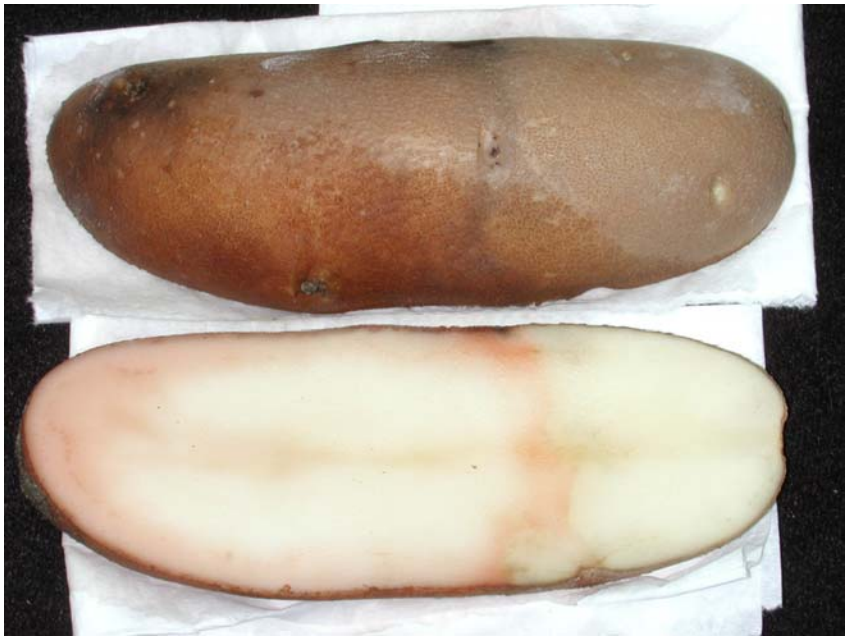

Figure 2. The blackish brown colored interior rot of *Pythium* leak

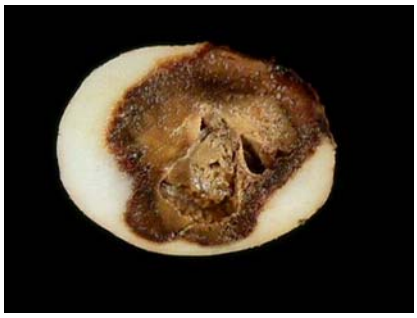

Figure 3. Early stages of late blight development on potato tubers. Note the reddish corky look to the late blight infected tuber.

Figure 4. The papery, dry appearance of *Fusarium* dry rot.

Figure 5. *F. coeruleum* infection appears tan in color in early stages, and spreads uniformly throughout most of the tuber.

Figure 6. Tuber decay and breakdown due to bacterial soft rot.

Figure 7. The unappealing sheen of silver scurf.

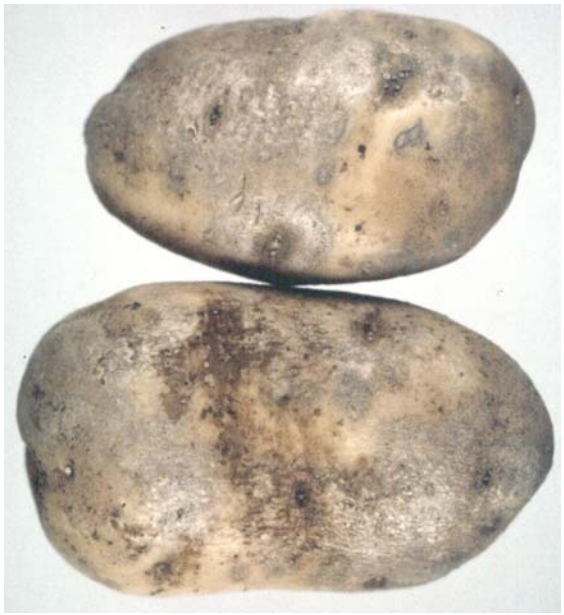

Figure 8. Black dot causing “bumpy” skin on Ranger Russets.