The Potato Horror Picture Show: Recognizing and Managing Storage Rots

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What do you find horrifying? Imaginary monsters or rotted potatoes? I pick the rotted potatoes. There are a number of potato tuber diseases that cause real problems for potato producers in storage. Some of them can be managed relatively easily while others are much more challenging. In this article we'll examine several of these diseases and the current state of our knowledge for managing them.

The Water Rots: Pink rot and Pythium leak. - Tubers that have water rot have a bloated, waterlogged appearance and will often be dotted with white tufts of fungal growth. There are actually two different types of water rot: pink rot and Pythium leak, and each is caused by a different fungus.

Pink rot. - Probably the most prevalent of the two water rots is pink rot caused by *Phytophthora erythroseptica*. This disease can be found in the field before harvest and is characterized by rotted tuber tissues that turn pink after exposure to air for twenty to thirty minutes. Another important diagnostic trait for pink rot is that the rot will usually appear to start from the stem end of the tuber and will then progress through the tuber in a very uniform manner, often with a nearly straight line between the healthy and the diseased portions of the tuber. Pure pink rot is not a slimy soft rot but infected tissues are easily, and often, invaded by soft rot bacteria which will cause this symptom. In a tuber that is infected with the pink rot fungus alone, the rotted tissues will still retain some structure and firmness but not nearly as much as the healthy portions of the tuber. The texture of the infected tuber tissue is much like that of a boiled or "cooked" potato.

Pythium leak - The other water rot is Pythium leak, often referred to as simply "leak." This disease is caused by fungi of the genus *Pythium* and may be either *P. debaryanum* or *P. ultimum*. The *Pythium* and *Phytophthora* genera are closely related and belong to a class of fungi known as the "water molds." This group also includes the late blight fungus, *Phytophthora infestans*, although the disease cycle for late blight is much different than either pink rot or leak. Leak is characterized by a rot that starts from an infection site on the surface of the tuber and generally rots out the entire central portion of the tuber while leaving the portion of the tuber from the vascular ring out to the skin of the tuber intact. This results in a condition that is aptly described as "shell rot." The rotted tissues are brown to black in color and may have cavities within them. The texture of the rotted tissues is much softer and more slimy than the "cooked potato" texture described above for pink rot. When a diseased tuber is squeezed a clear fluid can be readily expressed from the damaged tissues. This is the origination of the name "watery wound rot," another name for leak. Like pink rot, the diseased tubers can be easily invaded by bacterial soft rot.

Disease cycles - Both of these fungi are soilborne and can survive for long periods of time in the soil. The disease cycle for the two diseases is somewhat different, however. Pink rot infections are usually associated with wet conditions, low spots in the field, near wheel tracks or simply in overwatered areas. Infections occur in the soil through the lenticels or through the stolons of the tubers. This disease can rot a tuber very quickly, usually within just a couple of weeks. Pink rot studies at North Dakota State University indicate that infection of wounds made

during harvest and handling can also occur. Usually pink rot involves only the tuber but symptoms of the above ground portions of the plant sometimes occur. Infected plants may wilt, with the leaves becoming chlorotic and eventually drying up and falling off. Sometimes aerial tubers will form as well.

In contrast, Pythium invades the tuber wounds that occur during harvest, especially when tuber pulp temperatures are high. Wounds are necessary for the Pythium fungi to infect. Because of this requirment, Pythium is seldom found in the field before harvest like pink rot. Pythium can be responsible for seed piece decay in cut seed if conditions are warm and wet immediately after planting. There are no vine symptoms associated with Pythium leak.

Late Blight – There is probably no single disease that garners the respect and causes the horror that potato late does. This devastating disease can cause serious losses in the field and in the storage. It is truly the "Godzilla" of potato diseases. Late blight tuber symptoms are characterized by a reddish-brown, granular rot that starts from the outside of the tuber and works its way inward. Surprisingly, pure late blight is not wet and slimy but is actually a dry type of rot. Infection can occur in the field or during harvesting.

Soft rot problems. – There is also a silent horror lurking in your storage. Quietly, with little fanfare, this disease will sneak up on you and suck away your profits by rapidly rotting your potatoes. The sneaky rotter is bacterial soft rot. Whether you have late blight, pink rot, pythium or any one of a number of other storage rot diseases there is a very real danger that diseased tubers will succumb to the soft rot bacterium after the tubers have been stored. None of these three fungal diseases appear to move appreciably from tuber to tuber within the storage, but soft rot, which readily invades tubers infected with either disease, can move quite easily and rapidly in the storage. Storage management procedures may need to be modified to take this into account.

We do not know of any assay procedure that can predict the potential for pink rot or Pythium leak in a given field. The best guideline for making chemical application decisions is knowledge of the history of water rot problems on a particular circle. For late blight, a season-long program of disease management is your best insurance against storage problems.

Field Management Guidelines for Storage Rots.

1. Water management (avoid overly wet conditions).
2. Tuber pulp temperatures below 65 F.
3. Handle problem areas differently
4. Bruise management during harvest and handling.
5. Mefanoxam application.

Storage Management Guidelines for Storage Rots.

1. Rapidly cool known problem lots
2. Continuous ventilation
3. No humidity may be necessary for some situations
4. Long-term storage may not be an option
5. Monitor problem storages often and carefully.

Unfortunately we can't stop these storage disease problems with a wooden stake or a silver bullet. We can, however, follow some proven guidelines to first avoid and later manage these problems in storage.