More About Pinkeye[2]

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Pinkeye is a disease of potato tubers that can effect most varieties including round white, red and russet cultivars. In Wisconsin it is of particular concern on Russet Burbank used for processing. However, it can effect quality and grade of other potato varieties and can lead to soft rot in storage. This disease should be of general concern to growers because incidence of pinkeye is correlated with poor storage potential of the crop.

Pinkeye is characterized by a pink or brownish coloration around at least some of the eyes of the tuber, often at the bud end where most of the eyes are concentrated. This pink discoloration may be superficial and even disappear shortly after digging the tubers. Alternatively, the pink/brownish coloration may extend below the surface of the tuber. Tubers are scored positive for pinkeye during inspection if pink or brownish discoloration of the flesh is evident after peeling the skin around the eyes. These areas of discoloraion may dry out producing a corky appearance on the skin. This is sometimes referred to as "bullhide" and is a problem for the processor since it will not easily peel. Alternatively, the discolored areas may begin to decay leading to soft rot.

Pinkeye has been reported to occur in most of the production areas in North America including Maine, Florida, the Red River Valley, Idaho and Wisconsin. It was first reported in Maine and studied during the 1950's. From the beginning the disease was associated with Verticillium wilt or potato early dying. A particular type of bacterium was isolated from 50-70% of tubers with pinkeye symptoms. This bacterium, known as Pseudomonas flourescens, is a common soil inhabiting bacterium. Researchers were able to reproduce symptoms of pinkeye in the greenhouse by drenching the soil in pots in which potatoes were growing with the bacterium.

How could a common saprophytic (grows on nonliving substrates => ordinarily not a pathogen) soil bacterium found in all soils cause this disease? This question is significant because other researchers were able to isolate this bacterium from the surfaces of healthy tubers. In the field the disease is somewhat mysterious due to its sporadic occurrence. In some years the disease is much worse then other years and it seems much more likely to occur in some places then others. This is true despite the fact this bacterium is always present in the soil.

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There are several possible explanations. One possibility is that Pseudomonas flourescens does not cause this disease. Since it is found on healthy tubers and is fast growing it may simply be the easiest organism to isolate. The real causal agent may not be isolated because of interference by P. flourescens. It may be that only certain strains of the bacterium are capable of causing disease. It is also possible that disease is only expressed under certain specific conditions. This seems to be likely regardless of the role of the bacterium since many observations indicate pinkeye incidence may be related to soil conditions, especially water stress.

The two most consistent observations about pinkeye are its apparent correlation with Verticillium wilt and water stress. We made our own observations in the central sands by conducting a survey in 1991 and 1992. In several cases where parts of fields were fumigated pinkeye was found to be much greater in the nonfumigated then fumigated portions of the field. Pinkeye was also associated with wet areas of fields, for example, low areas or along rows used by spray equipment. Pinkeye typically occurred beginning the first of August. We were able to isolate several kinds of bacteria from tubers with pinkeye. Pseudomonas florescens was the most frequently isolated bacterium.

It may be that potato early dying and excess soil moisture function in the same way to increase the likelihood of pinkeye. Potato early dying results in reduced transpiration. This means the soil will have a higher moisture content where the disease occurs. Another observation reported to us was that herbicide stress increased pinkeye incidence. Again reduced transpiration associated with that stress might explain the incidence of pinkeye.

Pinkeye is highly correlated with other tuber quality factors. Several of these including hollow heart and internal browning and necrosis are known to be associated with stress during tuber bulking in the field. The highest and most consistent factor correlated with pinkeye was soft rot. Soil moisture stress has been associated with all of these disorders in one way or another. This constitutes another observation suggesting a role for soil moisture in pinkeye incidence.

To test these observations we conducted an experiment at Hancock. The frequency and amount of irrigation were varied to establish potato plots with different levels of soil moisture. Although we selected locations for the experiment at Hancock where pinkeye had been observed previously the 1991 and 1992 growing seasons were not conducive to a high incidence of pinkeye. Nevertheless we observed slightly higher pinkeye in plots that received excess irrigation.

In 1992 we also added bacteria to the soil in the plots. We observed considerably higher pinkeye with some of the bacterial treatments although the highest pinkeye was in a plot receiving a bacterium that was not Pseudomonas florescens. We are repeating

these experiments one last time at Hancock this summer. With the high rainfall levels we have had it may be a bad year for pinkeye. At least we will have a chance to determine the effect of our treatments under wet conditions.

In the mean time, it is clear that careful management of the crop to avoid excessive water can only help reduce disease problems. It is also clear that controlling potato early dying will also significantly reduce pinkeye.