RESPONSE OF SIX POTATO CULTIVARS TO DROUGHT AND POTATO EARLY DYING:
AN UPDATE
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Potato early dying (PED) is a disease complex primarily caused by the soilborne fungus *Verticillium dahliae*. It is a major constraint to potato production worldwide, including the irrigated fields of the Pacific Northwest. Traditionally, this disease is controlled with soil fumigation and/or long crop rotations. Recently, cultivars with resistance to this disease have been released. Additionally, modification of irrigation practices early in the season has resulted in significant disease suppression. Our studies on cv Russet Burbank have shown that disease suppression has been brought about by maintaining a mild drought stress between emergence and tuber initiation. The mild drought stress during the time frame when most root infections by *Verticillium* occur may enhance host resistance to this disease.

Drought is defined as a shortage of water sufficient to adversely affect crop production. It can be caused by either lack of soil water or blockage of its transport by a pathogen. Infection of potato with *Verticillium* results in a water deficit stress (drought) within the plant that is not caused by a soil water deficit. Water becomes deficient as a result of a number of internal events within the water conducting tissue of the potato. Whether drought results from limited soil moisture or from infection by *Verticillium*, the plant responds to a limitation in water in a variety of ways. The end result is reduced plant growth and lower tuber yields.

We are exploring the relationship between drought tolerance and resistance to PED for several reasons. First, we are interested in determining if cultivars that are drought tolerant are also tolerant to PED. Second, if resistance to PED and tolerance to drought are related, then screening for drought tolerance may provide a tool for identifying germplasm with resistance to PED. Finally, water management guidelines for suppression of PED in a diversity of potato cultivars could be developed as have been for Russet Burbank.

Field plots were established at the Central Oregon Agricultural Research Center, Madras, Oregon, in May 1995, and 1996. In 1995, treatments included six potato cultivars (Katandin, Red La Soda, Ranger Russet, Russet Burbank, Shepody, and Viking) and three irrigation levels that were established using line source irrigation. In 1996, *Verticillium dahliae* was included as the disease variable.

**Preliminary Results**

**Foliar Senescence**
- The effect of *Verticillium* on senescence was cultivar dependent. Katandin was very resistant, Ranger Russet and Viking were moderately resistant, and Russet Burbank, Red La Soda, and Shepody were susceptible.
- For all cultivars, a decrease in soil moisture resulted in an increase in rate of senescence. However, the percent increase in severity of senescence was cultivar dependent. Ranger Russet was the most tolerant to moisture stress whereas Red La Soda and Shepody were the most susceptible.
- *Verticillium*-included foliar senescence was mediated by amount of soil water. The severity of foliar senescence increased with an increase in soil moisture; e.g. the increase in the amount of senescence in the presence of *Verticillium* was less under drought than under wet soil conditions.

**Yield**
- Katandin and Red La Soda out performed Shepody, Russet Burbank, Viking, and Ranger Russet in marketable tuber yield when grown under a mild moisture stress (65 percent estimated consumptive use).
- *Verticillium* had no effect on marketable yield.

We wish to thank Steve James and his crew for his valuable input, cooperation and labor into this study. His efforts were paramount to the success of this experiment.