

Tuber Transmission of “Purple Top” Phytoplasma

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The Columbia Basin potato purple top phytoplasma, also known as the beet leafhopper transmitted virescence agent (BLTVA), causes purpling, leafrolling, stunting, and aerial tubers on infected plants. There have been reports of internal symptoms occurring in tubers produced on infected plants, but this has not been thoroughly studied in the Columbia Basin. Similarly, transmission of phytoplasmas in tubers of the major cultivars grown in the Pacific Northwest has not been investigated. Recent evidence does show that tubers from phytoplasma-infected plants can be of lower quality due to the production of darker fries and chips when the tubers are processed. We are currently studying (1) the susceptibility of the major cultivars to phytoplasma, (2) the tuber transmission of the phytoplasma in the Columbia Basin, and (3) the effects of tuber infections on the quality of processed potato products.

In 2005, greenhouse-grown plants of several cultivars were inoculated with beet leafhoppers carrying the phytoplasma, observed for the development of purple top symptoms, and tested by the polymerase chain reaction (PCR) for phytoplasma. Tubers from these plants were collected and similarly tested. Also, field-grown plants naturally exposed to the beet leafhoppers were observed, tested, and tubers were harvested and stored. After storage, some of the tubers from both greenhouse- and field-grown plants were planted in the greenhouse and the resulting plants were tested by PCR for phytoplasma.

The results so far show that:

1. Phytoplasma-infected plants of Ranger Russet, Shepody, Russet Norkotah, Atlantic, Russet Burbank, and Umatilla all produced phytoplasma-infected tubers.
2. 68% of phytoplasma-infected plants produced some infected tubers.
3. 35% of infected tubers gave rise to infected daughter plants.

These data clearly show that we can reliably detect the phytoplasma in plants and stored tubers and that the phytoplasma can indeed be transmitted through the tuber. Also, essentially all of the major potato cultivars grown in the Columbia Basin are susceptible to phytoplasma infection and that the tubers of these plants can be infected. The fact that the phytoplasma can be transmitted through the tubers to daughter plants has implications for the movement of phytoplasma in seed potatoes.

In 2006, larger-scale field trials are underway and plants of several cultivars are being grown and tested for phytoplasma infections. Similar to our previous work, we will be evaluating infected tubers from these plots to obtain more detailed information on the effects of infection on processing quality.