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# Fusarium Yellows of Sugarbeet

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**Figure 1. Lower, older leaves become yellow between the larger veins, and eventually die but remain attached to the plant.**

**Figure 2. Some plants infected with *Fusarium* may have half a leaf with necrosis.**

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**Fusarium yellows of sugarbeet** was identified in the Red River Valley in a few fields located between Moorhead, Minnesota and Drayton, North Dakota in 2002. Fusarium yellows is caused by the fungus, *Fusarium oxysporum* f. sp. *betae*, although other *Fusarium* species can be involved as secondary invaders. The disease causes significant reduction in root yield and recoverable sucrose. In storage, quality of infected roots may deteriorate more rapidly than in non-infected roots.

## Symptoms

Fusarium yellows first appears on older leaves as chlorosis (yellowing) between the larger veins. As the disease progresses, younger leaves also become chlorotic, and the older, symptomatic leaves become necrotic (Figure 1). Occasionally, only half a leaf is chlorotic or necrotic (Figure 2) (a symptom more typical of Verticillium wilt, which also was recently identified on sugarbeet in this region). In early stages of the disease, foliage tends to wilt during the day but recovers overnight. Entire leaves eventually die but remain attached to the plant and collapse in a heap around the crown.There are no external root symptoms. A transverse section through the root shows a grayish brown vascular discoloration (Figures 3-5). Mature plants rarely die, but yield is reduced.

**Figure 3. Infected root with grayish-brown to black discoloration of vascular bundles.**

**Figure 4. Outer surface of infected root shows no symptoms. Transverse section through the root shows grayish-brown to black discoloration.**

**Figure 5. Disintegration of cells in the vascular tissue in advanced stage of the disease.**

## Biology

*Fusarium oxysporum* f. sp. *betae* survives in soil and plant residues as spores, chlamydospores, or mycelium. When conditions are favorable, the fungus enters sugarbeet roots and invades the vascular system where it produces toxins that are transported upward in the plant, causing foliar symptoms. The fungus also acts as a "plug" that clogs the vascular tissue, and subsequently causes wilting. The disease is favored by high soil temperatures — above 75°F; symptoms typically do not appear early in the growing season. Fields that are waterlogged or with poor soil structure provide favorable conditions for infection. The fungus survives in soil for many years. Nematode infection will often increase severity of *Fusarium* wilt. Fortunately, nematodes have not been identified on sugarbeet grown in Minnesota and North Dakota.

## Management

Crop rotation may reduce inoculum buildup in the soil but this practice is unreliable because *F. oxysporum* f. sp. *betae* has a wide host range and chlamydospores survive for many years. Movement of infested soil on contaminated field equipment should be avoided to prevent spread to non-infested fields. Because the disease is new to the Red River Valley, other methods of managing the disease are not currently available. Identification and development of resistant varieties will be an important step in managing this disease in the Red River Valley.

### Photo credits

Figures provided by C. A. Bradley, M. F. R. Khan, and R. Nelson.

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