Diagnostic Aids for Phytosanitary Field Inspections

Pantoea stewartii (syn. *Erwinia stewartii*)

Time of inspection:
Corn plants in early flowering stage

Field symptoms:
Leaf: Leaves show linear, pale-green to yellow streaks with irregular or wavy margins that run parallel to veins and may extend the length of the leaf (Figure 1). These streaks soon become dry and brown. Masses of bacteria may also stream from the cut edges of infected leaf tissue. When diseased tissue was placed near the edge of a water drop, the drop quickly became cloudy.

Stalk: Conducting vessels become plugged with bright-yellow slime. If infected stems are cut in cross section, the yellow slime will often exude. Cavities form in the stalk near the soil line in severely infected plants.

Whole plant: Plants infected early in the season may show wilting and stunting (Figure 2).

Indicators of disease presence:
The corn flea beetle, *Chaetocnema pulicaria*, is generally recognized as the most important carrier of inoculum for *E. stewartii* in the USA (Pepper, 1967). The pathogen overwinters in the alimentary tract of this insect, which emerges from hibernation and feeds on young maize. The occurrence of substantial numbers of the corn flea beetle at the beginning of the growing season (Figure 3) and subsequent feeding scars of this insect on leaves of the growing corn plant are strong indictors of infection by *E. stewartii*.

In the US Corn Belt, survival of the corn flea beetle is greatly reduced by low winter temperatures. Severity of Stewart's wilt can be forecast on the basis of the average temperatures during December, January, and February.

Laboratory diagnosis:
Leaf sections with suspect Stewart's wilt lesions may be cut across veins and observed under the microscope for bacterial streaming from the vascular tissue.

Suspect colonies of *E. stewartii* on culture medium can be tested for pathogenicity on susceptible seedlings.

The presence of the *E. stewartii* in plant tissue can also be detected with an ELISA test kit (Agdia. Elkhart, Indiana). This kit is adapted from the method of Lamka et al, 1991). The method, described in Method 2.1 in Section 1 of this manual for detection of seedborne *E. stewartii,* can also be used to detect the pathogen in leaf or stalk tissue and in insects.

References:
Lamka GL, Hill JH, McGee DC, and Braun, EJ. 1991. Development of an immunosorbent assay for seed-borne *Erwinia stewartii*. Phytopathology 81:839-846.

Pepper EH, 1967. Stewart's Bacterial Wilt of Corn. Monogr. 4. St. Paul, Minnesota, USA: American Phytopathological Society.

Alternaria dauci

Time of inspection:
Buds on carrot plants are just beginning to flower and tops still green

Field symptoms:
Leaf: Lesions produced on leaf and petiole tissues are generally dark-brown to black, and chlorosis of surrounding tissues is observed. Gradually, the spots increase in size and become confluent. Finally, the whole leaf becomes grayish-black, while the leaflets become curly and convolute. The older leaves are more heavily infected than the young ones (Figure 2).

Stalk: The stem bark is discolored.

Root: Root lesions are irregular in shape, dark-brown to black. The decay is dark-brown to black, firm and shallow.

Floral structures: *Alternaria dauci* causes dark, longitudinal spots on flower-stalks and umbels, and attacks flowers and immature seeds, causing them to be discolored (Figures 3 & 4).

Whole plant:
When infection is severe, the top part of the may be killed (Figure 1).

Indicators of disease presence:
The pathogen requires the presence of moisture for infection. Heavy dews and rains are favorable for this process. The optimum temperature for infection is 82ºF.

Laboratory diagnosis:
For lesions on plant parts, incubation in a moist chamber on blotters at 20-25°C or on agar media will lead to the production of conidiophores and conidia for final identification (Figures 5 & 6). The methods of isolation of *A. dauci* from diseased carrot leaves, seedlings and seeds and the ways to achieve abundant sporulation are described in detail by Strandberg (1987).

References:

Strandberg JO. 1987. Isolation, storage, and, inoculum production methods for *Alternaria dauci*. Phytopathology. 77(7):1008-1012.