

Elm yellows

By JAMES L. SHERALD, Ph.D.

After successfully withstanding Dutch elm disease for over 50 years, the majestic elms of Washington, D.C., are now facing a new threat. Elm yellows, another systemic and lethal disease, is occurring 50 miles west of the nation's capital. The disease was first detected in eastern West Virginia in 1995, and is now occurring in epidemic proportions along a 75-mile front from Chambersburg, Pennsylvania, to Winchester, Virginia. In addition to the 2,700 elms managed by the National Park Service on the National Mall and throughout the monumental core, the epidemic threatens 9,000 city-street elms, and many other elms on private property. Hundreds of riparian elms along Rock Creek and the Potomac and Anacostia Rivers are also in jeopardy.

Cause of disease

Yellows was first reported in Ohio in 1918, but may have occurred as early as 1880 in Kentucky, Indiana, and Illinois, where elms with yellows-like symptoms were reported. Elm yellows, formerly known as elm phloem necrosis, was believed to be caused by a virus. We now know that it is caused by a phytoplasma. Phytoplasmas are unicellular obligate parasites that, lacking a rigid cell wall, occur in a variety of shapes from spheres to branching filaments. These organisms have not been cultured and are not well understood, yet they are responsible for a number of serious plant diseases including ash yellows, aster yellows, lethal yellowing of palms, pear decline, and X-disease of peach.

The elm yellows phytoplasma is transmitted by the white-banded elm leaf hopper, *Scaphoideus luteolus*, but many other leaf hoppers are probably also capable of transmission. The pathogen occupies the phloem sieve cells—tissue responsible for translocation of photosynthates and hormones—causing abnormal tissue proliferation and death of the current-season phloem.

Symptoms

Infected trees are noticeable by the appearance of bright yellow, drooping leaves (figure 1) in mid to late summer. Symptoms usually affect the entire tree, but sometimes

only a portion may show symptoms initially. By the time leaf symptoms are obvious, the fine feeder roots have been destroyed and the tree will die very soon or early the next year. The most obvious diagnostic symptom is the scent of oil of wintergreen (methyl salicylate) that emanates from the inner bark, which has butterscotch to dark brown discoloration.

Five of our six native elms are susceptible to elm yellows: American or white elm (*Ulmus americana*); cedar elm (*U. crassifolia*); red or slippery elm (*U. rubra*); September elm (*U. serotina*); and winged elm (*U. alata*). The susceptibility of the sixth native elm, the rock elm (*U. thomasii*), is unknown. European and Asiatic elms are only mildly susceptible. They exhibit some leaf discoloration and “witches’-brooms,” a common, abnormal growth of small branches caused by other phytoplasmas. The resistance of European and Asiatic elms suggests that the elm yellows phytoplasma, like the Dutch elm disease fungus, is nonnative and probably an introduction from Europe or the Orient.

On the move?

Elm yellows has the habit of quickly reaching epidemic proportions and then subsiding after most of the elms are gone. Until the 1970s, elm yellows was principally found in the Midwest. However, in the 1970s the disease began to appear in the East with outbreaks in New Jersey, New York, and Pennsylvania. Elm yellows has had a devastating effect in communities where Dutch elm disease has been under control. In central New York State, cities such as Syracuse have lost most of their elms. Recently the disease has resurfaced in the Midwest affecting elms in the Chicago suburbs. The current outbreak west of Washington, D.C., is the closest the disease has ever been to the nation's capital.

In 1998, the USDA Forest Service Northeastern Area State and Private Forestry Division conducted an elm yellows survey along the Potomac River following the tow-path of the C & O Canal National Historical Park from western Maryland into Washington. Elms are prolific along the Potomac floodplain and may provide an avenue for the disease into Washington.



Figure 1. Bright yellow, drooping leaves and the development of butterscotch-brown inner bark, which has the aroma of oil of wintergreen, are symptoms of elm yellows, a serious disease that affects elms in the midwestern and eastern United States.

Fortunately, no infected trees were seen beyond the general area of infestation 50 miles away. The survey was repeated again in 1999 and no additional infested trees were located. The NPS National Capital Region participates with the Forest Service and the District of Columbia's Tree and Landscape Division in annual Dutch elm disease surveys throughout the city. The disease survey now includes close examination for elm yellows symptoms.

Prognosis

Sanitation, the rapid detection and removal of affected trees, is the only management approach available. Unfortunately, sanitation is not as effective as a management tactic for yellows as it is for Dutch elm disease. Trunk injections with tetracycline can sometimes bring a temporary remission of symptoms, but will not cure infected trees. Plant pathologists continue their search for elms resistant to Dutch elm disease; we are all hopeful that some of those that now show promise will also be resistant to elm yellows. Although the elms account for only 16% of the tree population in the monumental core, their contribution to the landscape is unsurpassed by any other species. Undoubtedly, an elm yellows epidemic would drastically alter the character of the monumental core and much of the landscape of our nation's capital. **P_S**

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