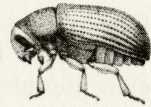
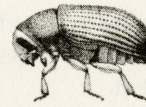


## An Imported Problem



DUTCH ELM DISEASE, 1918 TO 1966

In 1918, the elms in the city of Rotterdam suddenly began to die. Some thought the movement of heavy trucks along the roads during the Great War had jarred the root systems loose; others felt it was the result of atmospheric contamination from the use of war gases. However, it was the plant pathologists at Baarn who isolated and identified the actual cause of the elm fatalities. What they discovered was a fungus in the vascular system of the tree, which has become popularly known as "Dutch elm disease."

Where did the disease come from? No one knows for certain, but it would seem likely that it may have originated in some region of the world where the native elm species have developed a high degree of resistance to the disease. Such a place is Asia, where the native Siberian elm, *Ulmus pumila*, and the Chinese elm, *Ulmus parvifolia*, are both highly resistant. It may also be significant that during World War I, Chinese laborers were transported to Europe, along with their equipment. Many of them moved through the port of Rotterdam and may have introduced the disease into the Netherlands at that time.

In the United States, the first reported occurrence of the disease was in 1930 when declining trees in the vicinity of Cleveland and Cincinnati were shown to contain the fungus organism. In 1933, it was discovered in a relatively large area of New Jersey, near New York City. The means by which the fungus was introduced into this country became apparent when investigators intercepted elm logs imported from France for use as veneer stock. The fungus was isolated from the wood and infestations of the insect carrier were found. The subsequent decimation of the native elm tree population in the eastern part of this country is well known.

### WHAT ARE THE SYMPTOMS OF THE DISEASE?

The first and most easily detected symptom of infection is *flagging*, an abnormal leaf condition which generally occurs in the spring or early summer, when the leaves of one or more branches curl or wilt and turn yellow or brown, though sometimes remaining gray-green. When twigs from flagging branches are carefully stripped of their bark, the presence of brown streaks or discoloration in the wood is indicative of the disease. In those areas where Dutch elm disease is not widespread, laboratory examination of infected material may be needed for positive identification, since other wilts may produce these symptoms.

### HOW DOES THE DISEASE SPREAD?

The two insect carriers which spread the disease are the European elm bark beetle, *Scolytus multi-striatus*, and the native elm bark beetle, *Hylurgopinus rufipes*. These beetles reproduce under the bark of declining or recently dead elm wood. The female burrows into the bark, excavating an egg gallery between the bark and wood; along the sides, she lays from 60 to 140 eggs. At this time, if she is carrying the fungus spores of Dutch elm disease on her body, the fungus will develop in the gallery as a saprophyte. When the eggs hatch, the larvae begin to feed in the cambial region, producing smaller brood galleries which radiate outward from the larger egg gallery. At this stage of growth, the young beetles are in contact with the fungus, if present, and when they emerge, they carry the spores on their bodies to infect other trees.

Emergence of the adult beetle begins in May and continues until late September. Because a second brood appears during the summer, there are two peak emergence periods. In the Chicago area,



these are in mid-May and mid-August. The dark reddish-brown adult beetles, about 1/8 inch in length, feed in one and two year old twig crotches, and it is during this feeding period that healthy elms are infected.

#### ARE ANY ELMS RESISTANT TO THE DISEASE?

No elm is immune to Dutch elm disease, and all native elm species common to the eastern United States have proved to be susceptible. Unfortunately, the American elm (*Ulmus americana*), one of the most widely planted street and shade trees, is highly vulnerable.

Among European species, the Belgian elm (*Ulmus hollandica* var. *belgica*), once widely planted in Holland, is very susceptible. The smooth-leaved elm of Europe, *Ulmus carpinifolia*, has a variable reaction to the disease. From the species *U. carpinifolia*, two resistant clones have been selected out. 'Bea Schwarz,' not yet readily obtainable, and 'Christine Buisman' which is sometimes available.

Two elms which have been reported as moderately resistant are the Huntington elm, *Ulmus hollandica* var. *vegeta*, and the Wheatley elm, *Ulmus carpinifolia* forma *sarniensis*. The European white elm, *Ulmus laevis*, and the English elm, *Ulmus procera*, are moderately susceptible. The Wych elm, *Ulmus glabra*, is susceptible, but a hybrid of *U. glabra* and *U. carpinifolia* called the 'Groenveld' elm is said to be resistant. It is not yet obtainable. The Siberian elm, *Ulmus pumila*, and the Chinese elm, *Ulmus parvifolia*, are highly resistant, as mentioned earlier.

#### CAN OUR ELM TREES BE PROTECTED FROM THE DISEASE?

In any program of protection for elm trees, the following statements should serve as guidelines:

- Dutch elm disease is caused by a fungus that affects the vascular system of the tree. The principal vector or carrier is the elm bark beetle.
- There has been no scientifically demonstrated cure once an elm has become infected.
- The only positive control is the elimination of the vector.
- Sanitation (the destruction of all favorable breeding-sites of the beetle) will reduce beetle populations and destroy centers of infection. Elm wood which has been dead for two years or more and wood without bark no longer offers breeding-sites for the beetle.
- Spraying elms with DDT or methoxychlor is effective in protecting elms from beetle feeding and thereby reduces the chance of infection.
- In areas of congested elm growth, root grafts between trees are often a major means of transmission. Severing root grafts in places where many elms grow relatively close together, such as in parkways, will reduce the spread of infection.

#### HOW CAN A CURE BE RECOGNIZED?

As with most problems besetting mankind, a small army of nostrum peddlers has arisen, eager to separate the ill-informed tree-lover from his money and, incidentally, from his trees. The truth is that none of these secret mixtures or potions have shown any valid therapeutic or nutritional effects. At present, many responsible researchers at universities, experiment stations, and in the chemical industry are expending large amounts of time, money, and energy in trying to solve the problem. When and if a cure is developed, reports will indicate that it has been thoroughly tested according to acceptable scientific methods and it will be given clearance by the U. S. Department of Agriculture.

W. R. C.

*Further references:* Carter, J. Cedric. *Dutch elm disease in Illinois*. Urbana, Illinois Natural History Survey, 1964; *Guide for community-wide control of Dutch elm disease*. River Forest, Illinois, Midwestern Chapter, International Shade Tree Conference, 1961; Whitten, Russell R. *Dutch elm disease control*. Columbus, Ohio, Central States Forest Experiment Station, U. S. Forest Service Miscellaneous Release 12, 1957.