

Distribution of Three Important Insect Transmitted Tree Diseases

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The oaks and elms of Indiana are seriously threatened by the increasing spread of oak wilt, Dutch elm disease and phloem necrosis. These three insect borne diseases have been spreading throughout the state and no records are available to show their present occurrence. Three maps have been prepared which show the counties in which the diseases are known to occur. These maps were developed through observations, consultations and questionnaires of interested persons.

Dutch Elm Disease

Dutch elm disease is caused by the fungus *Ceratostomella ulmi*, the spores of which are spread from diseased to healthy trees through natural root grafts and by the feeding and burrowing of two species of bark beetles, the smaller European elm bark beetle, *Scolytus multistriatus* (March) and the less important native elm bark beetle, *Hylurgopinus rufipes* (Eichh.).

This disease has been present in Indiana since about 1937, but was limited in its occurrence to the general vicinity of Indianapolis. During the past few years, however, it has spread rapidly, so that it now occurs in at least 68 counties from the Ohio River to the Michigan state line. See figures 1 and 2. There are several causes for this spread. The population of bark beetles has increased enormously because of the many elms killed by Dutch elm disease and phloem necrosis. The droughty conditions of 1953 and 1954 weakened the elm trees and also made them more susceptible to the beetles, thus accelerating the spread of the disease.

There are three things which can be done to help control this disease.

(1) Keep the trees healthy and vigorous by proper fertilization and watering. Healthy trees are not as attractive to the bark beetles as are trees in a low state of vigor.

(2) All diseased trees should be removed and burned as soon as possible. If they cannot be removed they should be treated with a one per cent DDT solution or the bark removed. These practices will cut down the number of bark beetles and consequently the incidence of Dutch elm disease.

(3) All healthy trees should be sprayed with DDT so that the bark beetles will be killed before they can infect the still healthy trees. These sprays should be applied during the delayed dormant period (March and April) and again the last of July or the early part of August (7).

Phloem Necrosis

Phloem necrosis is a native virus disease which has been endemic in Indiana and neighboring states for many years. On the basis of available evidence it is thought the disease came into the state from Kentucky where elms had been dying since before the turn of the century. This virus

disease is transmitted from diseased to healthy trees by the native white-banded elm leafhopper, *Scaphoideus luteolus* VanD. and through root grafts. At the present time elm trees in over half of the ninety-two counties in the state are infected with phloem necrosis with the heaviest infection being located in the central part of the state. See figure 3. The spread of phloem necrosis from diseased to healthy trees may be prevented by spraying twice a year with DDT emulsions since DDT kills the vector. The first spray is applied the last of May when the new leaves are formed and the second spray is applied the last of July (7).

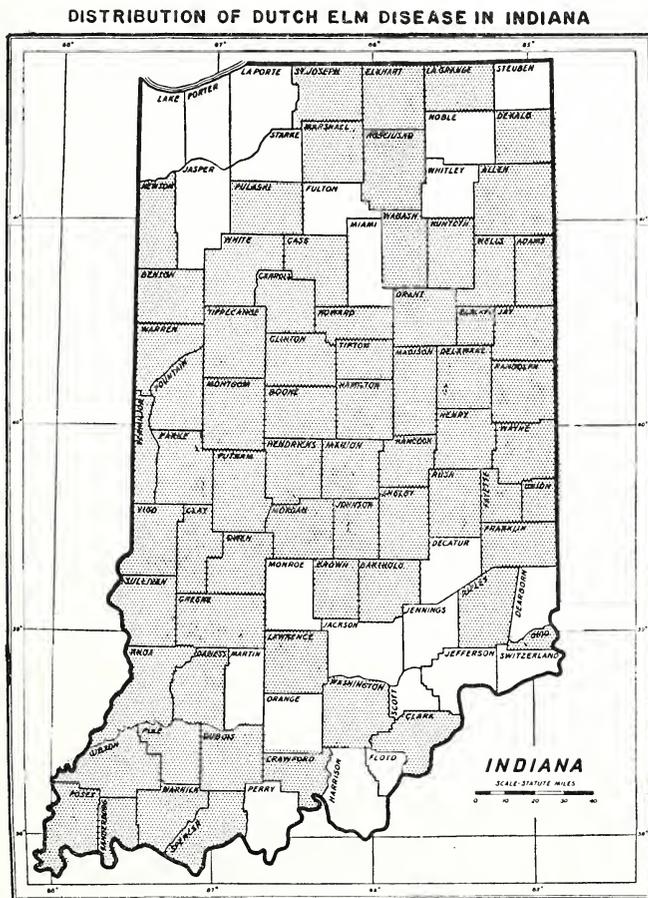


Figure 1. Distribution of Dutch elm disease in Indiana, 1954. Infested counties indicated by black shading.

Oak Wilt

Oak wilt is caused by a fungus disease, *Endoconidiophora fagacearum* Bretz (*Chalara quercina*). This is a disease which attacks red, black, white

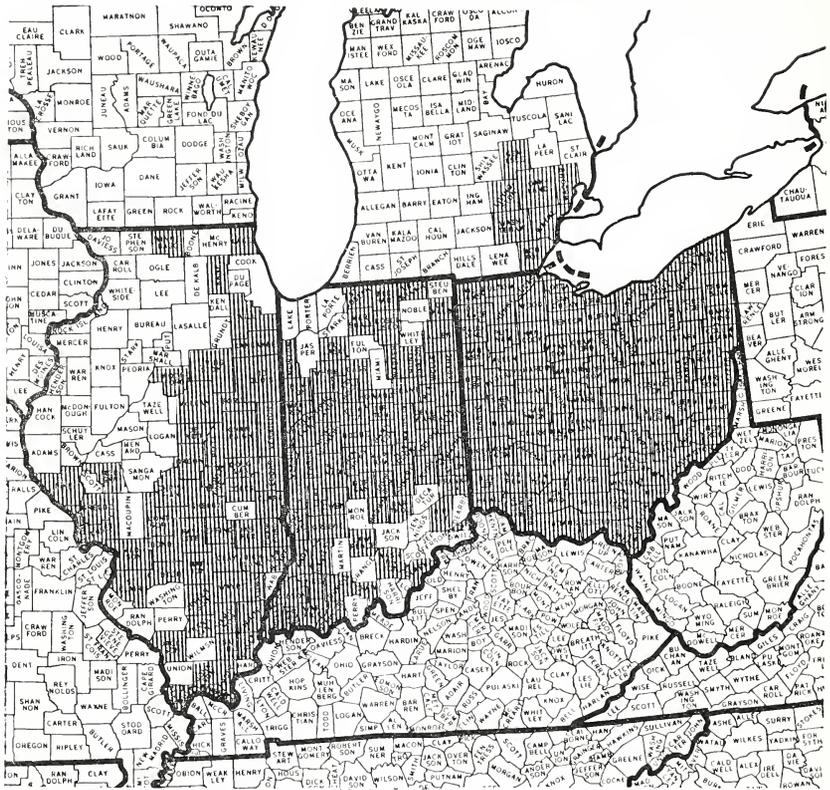


Figure 2. Distribution of Dutch elm disease in Indiana and neighboring states in 1954. Infested counties indicated by shading.

and burr oaks but is more severe in the first two groups. This disease first entered the state sometime before 1950 in the northwest corner of the state (2). Since that time the disease has spread rapidly south and east until it has now reached all borders of the state. See figure 4. Until recently the disease was known only to spread from tree to tree by natural root grafts. Now several workers, Dorsey, 1953; Himelick, 1954; and Norris, 1953, have found several species of insects which can experimentally transmit this disease from diseased to healthy trees. They are all species of sap beetles (Nitidulidae) found associated with the spore mats beneath the bark of diseased trees, such as: *Glichrochilus sanguinolentus* Oliv., *G. fuscatus* (Oliv.), *G. quadristignatus* (Say), *G. confluentus* Say, *Colopterus semitectus* Say, *C. truncatus* Rand, *Carpophilus lugubris* Murr, and *Epurea corticina* Erichs. In addition a species of oak bark beetle, *Pseudopityophthorus pruinosa* (Eichh.) and the pomace or fruitfly, *Drosophila melanogaster* Meig. have been indicted by Griswold, 1953 and 1954. Nearly all of these insects require a break in the bark in order to successfully transmit the disease. One method of preventing the spread of this disease

- HIMELICK, E. B., E. A. CURL and BERT M. ZUCKERMANN. 1954. Tests in insect transmission of oak wilt in Illinois. *Plant Disease Reporter* 38 (8) : 588-590.
- NORRIS, DALE M., JR. 1953. Insect transmission of oak wilt in Iowa. *Plant Disease Reporter* 37 : 417-418.
- SWINGLE, R. V., R. R. WHITTEN and H. C. YOUNG. 1949. The identification and control of elm phloem necrosis and Dutch elm disease. *Ohio Agri. Exp. Sta. Spl. Cir.* 80 : 11 pages.

DISTRIBUTION OF OAK WILT IN INDIANA

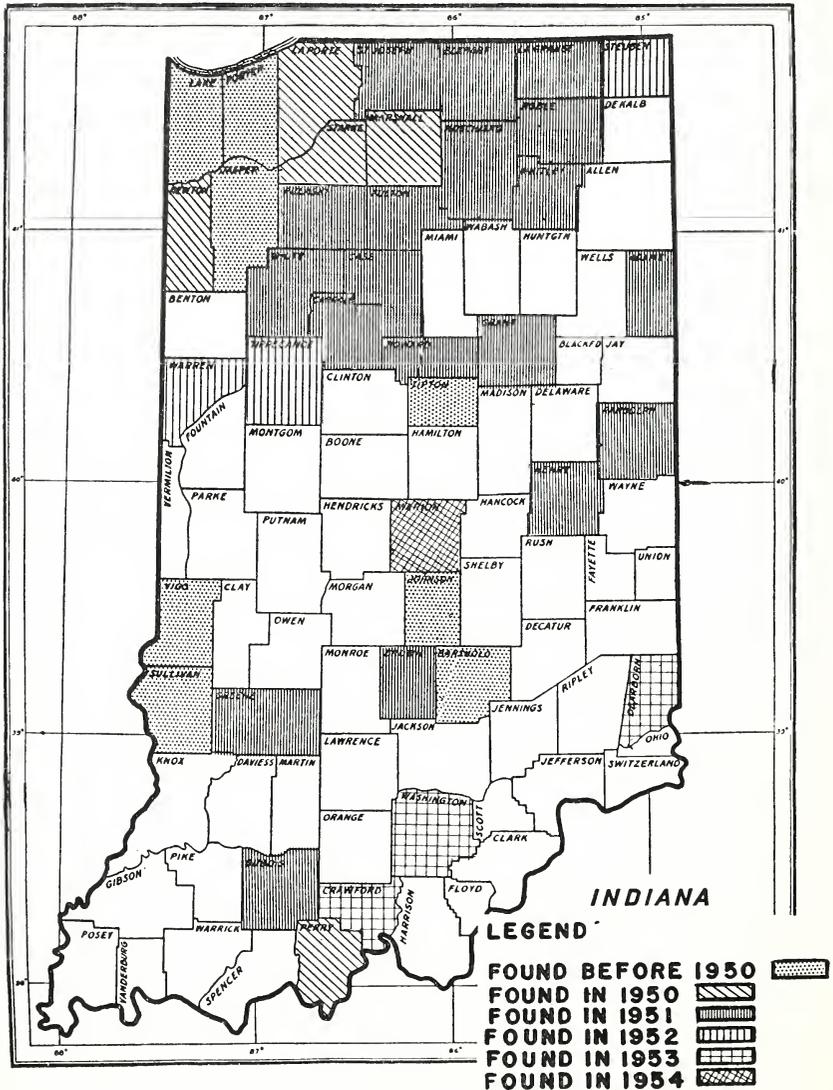


Figure 4. Distribution of oak wilt in Indiana. Various shadings indicate year the infestation was found.