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OAK WILT RESEARCH—A LESSON IN COOPERATION

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During a meeting of the Memphis Lumbermen’s Club in the early spring of 1950, the words of two men initiated one of the most unique research programs ever known in biological circles. On this day, Dr. Curtis May, a government forest pathologist, had been asked to speak to this group on the relatively new disease of oaks, oak wilt. At the conclusion of Dr. May’s discussion, the late Leonard R. Steidel, a Club member, challenged his group to do something constructive in meeting this threat to their chief lumber tree. From this simple beginning, the National Oak Wilt Research Committee was born.

What Did This Mean?

Although oak wilt research had been conducted previously in some states, Iowa and Wisconsin for example, the organization of the National Oak Wilt Research Committee met the need for a national program in combating this threatening menace. This committee is composed of representatives from the American Forest Products Industries, Inc.; Appalachian Hardwood Manufacturers, Inc.; Associated Cooperage Industries; Hardwood Dimension Assn.; The Veneer Association; National Hardwood Lumber Assn.; National Manufacturers Assn.; Railway Tie Association; and Southern Hardwood Producers, Inc. They asked the research institutions of the states affected by oak wilt to develop and conduct an all inclusive research program on this malady of our mighty oaks. These institutions responded and were led by Dr. A. J. Riker of the University of Wisconsin who acted as chairman of their Technical Advisory Committee. The first industrial grant was made in 1951 to five institutions. During the four intervening years, these industrial associations through the National Oak Wilt Research Committee have contributed approximately $180,000 to oak wilt research.

Expanded Research Program Brings Results

Oak wilt research can be grouped under four main headings. These are the host and geographical distribution of the disease, studies on the organism causing the disease, the transmission of the disease, and controls for the disease.

All known species of oaks which have been tested are susceptible to oak wilt. Of other tree species studied, the American and Chinese chestnuts have also been shown susceptible. The reaction of the disease is different within the oaks. The trees within the red oak group die within one growing season from oak wilt, while those of the white oak group can have the disease for a period of years with only a few branches dying each year. Although this reaction is not understood fully, differences in lateral translocation rates within the trees of the two groups is thought to be part of the answer.

The geographical distribution of oak wilt has been determined by aerial and ground surveys. At the present time, oak wilt has been found in eighteen states east of the Rocky Mountains.
The organism causing oak wilt was originally described in 1944 as a fungus with an imperfect or asexual name of *Chalara quercina*. In 1957, the perfect or sexual stage of this fungus was found and the fungus was renamed *Endoconidiophora fagacearum*.

Most of the early studies on the oak wilt organism were done under artificial, laboratory conditions. In 1951, the fruiting structure of this organism was found in nature. This structure, the mat and pad as it is called, appears between the bark and wood of oak wilt killed red oaks. They are rarely found on trees of the white oak group. The mat portion of the fruiting structure produces the spores, both sexual and asexual, by which the organism can spread. The center portion, the pad, is cushion-like and produces enough pressure to crack the bark. This mechanism exposes the fruiting structure to the external environment. These structures also exude a cidery-like odor which attracts birds, rodents and insects.

Oak wilt is transmitted in two ways; by root grafts between healthy and diseased trees and by some type of vector. Root graft spread was shown quite early in oak wilt research. Studies on overland transmission have produced much in the past few years. Several workers in 1953 showed experimentally that a few insects, principally the sap and fungus feeders, were able to spread the disease. Later that same year the disease was transmitted experimentally by squirrels.

Evidence at this time points to the need for the presence of certain conditions for usual vector transmission. These conditions can be briefly stated as the need for mats and pads on oak wilt killed trees, a fairly fresh wound on the tree to be infected, the spring or early summer growth period, and the presence of sexual spores on the mats. When all these conditions coincide, vector transmission appears to be at its maximum.

Although birds have also been suspected as carriers of the oak wilt fungus, no studies to date have placed them as vectors.

**Control Possibilities**

Control work has been slow but indications of progress are present. Root graft spread within a forest can be effectively stopped by the quick establishment of buffer zones around the diseased tree or trees. This zone acts as a break in the root connections of the trees. This can be done by cutting the roots with a blade, cutting the trees down which are within fifty feet of the diseased area or poisoning this ring of healthy trees with a silvicide.

The latter method has been shown to be the best under most conditions. The silvicide work in Iowa shows that a 10% solution of 2,4,5-T in kerosene applied to basal frills at dormant and budbreak conditions is the best. The use of such silvicides gives good root kill. Merely cutting trees does not produce this desired reaction.

Control of overland transmission has not been achieved yet. The only recommendation that can be made at present consists of destroying the diseased tree. This destroys the fungus which is needed for future overland spread. Studies are also being conducted on keeping these diseased-killed trees mat...
A sap and fungus feeding beetle known to be an oak wilt vector. (Courtesy W. H.)

and pad free, and to discourage insects from populating these trees.

The other control studies in oak wilt research have been on chemotherapy. This constitutes the application to a plant of a chemical which is absorbed by the plant and acts against the disease within the plant. Although much empirical testing has been done, no chemical shows promise on large trees. Our fundamental knowledge of the oak wilt disease reaction within the oak tree is so lacking that an approach of this kind to control is very difficult.

The Future

Although our knowledge of oak wilt has increased much during the past few years, the future still holds many secrets. How long does the organism remain alive in wood, what are the disease reactions that cause the death of the tree, are the sap and fungus feeding insects the only probable vectors, and why are the disease reactions different within the oaks are some of the questions to be answered.

In conclusion the writer would like again to pay tribute to the oak-using industry for their support of this scientific endeavor. This is truly, another example of our free, competitive, enterprise system at work.

ABOUT THE AUTHOR . . .

Dr. McNabb graduated from the University of Nebraska in 1949 with a Bachelor of Science Degree. His major subjects were botany and chemistry. Upon his graduation, he entered the Graduate School at Yale University for advance study in Forest Pathology under Dr. J. S. Boyce. He received his M.S. in 1951 and his Ph.D. in 1954 from Yale.

McNabb’s experience includes six summers with the U. S. Forest Service on the Kaniksu National Forest in Idaho where he advanced from a lookout-fireman to a district fire dispatcher. During the school year he held teaching assistantships both at Nebraska and Yale. While at Yale, he also worked on the Navy Tropical Wood Project. In February 1953 he became affiliated with Iowa State College as Assistant Professor of Forest Pathology in the Department of Botany and Plant Pathology. Besides being responsible for the work in Forest Pathology at the college, he also acts as coordinator for the forestry research at the college which is sponsored by the Iowa State Conservation Commission. In 1954, he also became an official member of the research staff of the Department of Forestry.

Professional and honor societies to which Dr. McNabb belongs include: Sigma Xi, American Phytopathological Society, Society of American Foresters, Iowa Academy of Science, National Shade Tree Conference, American Forestry Association and the American Association for Advancement of Science.

Sunde, as he is known to his friends, was born at Lincoln, Nebraska in 1927. He married Marguerite L. Nootz of Lincoln in 1949. They have a son and a daughter.