Aerial Survey and Control of Oak Wilt in Indiana

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Introduction

Oak Wilt, caused by the fungus, *Ceratocystis fagacearum* (Bretz) Hunt, was first reported in Indiana by Cummins in 1949 (2). Surveys conducted by Stearns and Crowder (5) from 1952 to 1956 established the distribution of this disease. In the northern third of the state, the disease is epidemic and destructive while there are only scattered infection centers in the southern third of Indiana. The central portion of the state is relatively free from this disease.

Quercus spp. are the most important tree species utilized by the lumbering industry in Indiana and make up an important part of the perennial vegetation. Total harvest of native lumber in 1950 was 254 million bd. ft., with oaks comprising 38% of the total (1).

Aerial Survey and Control

Since 1959, emphasis in Oak Wilt investigations at Purdue University has been on the development of a suitable method for detection and control of this disease in southern Indiana (3). This has included aerial survey as a means of detecting the disease and the application of eradication practices to contain and finally eradicate Oak Wilt from the timberlands of southern Indiana.

Fig. 1. Aerial view of typical new Oak Wilt infection locus. Note the one dead tree exhibiting foliar symptoms.

Aerial survey is used because of the speed and efficiency in covering large areas of rough terrain. In 1960, 3 areas totaling approximately 1,000 sq. mi. were surveyed. During 1961, an area comprising some 6,200 sq. mi. was surveyed, including most of the important oak stands in south central Indiana. Included were most of the Hoosier National Forest, Clark County, Pike County, and Ferdinand State Forests and the Crane Naval Ammunition Depot.

A Piper Colt plane, which is a single engine, 2 place, high wing aircraft, with a cruising speed of 90 to 100 mph, was used for the aerial survey. The survey was flown at from 300 to 700 ft. altitude. The area was covered at approximately 2-mile intervals. Eighty flight hours were required to cover the designated area. During the survey, 123 possible Oak Wilt infection sites were located, 69 of these were later visited by ground crews and 29 of these were confirmed as Oak Wilt. The disease incidence is widely scattered throughout the survey area, although certain concentrations were noted, particularly in Brown County, Clark County State Forest and the Crane Naval Ammunition Depot.

All suspected infection centers, which consisted of at least 1 dying tree and 1 dead tree nearby, were accurately marked on 7.5 minute topographical maps. Later these maps were used in locating the suspect centers on the ground and specimens were taken for laboratory isolation of the pathogen. Single dead trees were not marked from the air because ground check of several of these revealed that most were due to lightning strikes.

In 1959, Oak Wilt infection sites were selected for eradication studies (3). It has been established that the pathogen may spread from tree to tree via natural root grafts and that such grafts may occur at distances of 30 to 50 ft. or more from the infected tree (4). It is necessary, therefore, to form a barrier of at least 30 ft. around an infection center to prevent the local spread of the pathogen. "Long distance" spread of the fungus is assumed to be via certain vectors, such as insects.

The following treatments were made in the selected Oak Wilt infection centers. All living oaks within the infection center and oaks within a radius of 35 to 50 ft. were poisoned by the application of either sodium arsenite or 2,4,5T (2,4,5 trichlorphenoxy acetic acid) as a silvicide (3). In some instances, the poisoned trees were saw-girdled to hasten drying, which is detrimental to ascospore production by the pathogen. After poisoning, the trees were either harvested for pulp or firewood, felled and piled or left standing.

The results from these studies for the past 3 years plus data from other similar investigations indicate that this method for control of Oak Wilt has promise. The low incidence of the disease on southern Indiana, at present, and the limited size of the infection centers appears to support the feasibility of a control program by the eradication of infection centers. Periodic aerial survey and coordinated ground checks and eradication of confirmed infection centers is suggested to maintain control. The following recommendations are being made to State foresters and others interested in the control of Oak Wilt disease.

1. In the spring or early summer, all oaks should be killed in the infection center and within a radius of 35 to 50 feet. The following methods may be used.

(a) Drill holes into the buttress roots 1½″ in diameter to a depth of 3″ to 4″. These holes should be no farther than 9″ apart around the base of the tree. Fill the holes with 2,4,5T (2,4,5 trichlorophenoxy acetic acid) in fuel oil or 9.25% sodium arsenite in water.

(b) Deep girdle or frill the lower trunk and spray with 2,4,5T in oil.

2. Trees that have died within the past year should be felled to reduce the spread of the fungus causing Oak Wilt disease. Care should be taken to avoid injury to standing trees and *tools should be sterilized* with denatured alcohol or bichloride of mercury (1/1000) after felling infected trees. The stump should be peeled to prevent fungus growth and insect colonization.
3. Spray the bole of cut trees and the stump with 5% DDT in fuel oil to eliminate insect vectors.
4. Following the death of poisoned trees, they may be felled if desirable. *Extreme care should be taken to prevent injury to standing oaks.* Trees should be felled so that there is no breakage of surrounding trees.
5. Any sucker sprouts that occur following poisoning and felling should be promptly sprayed with 2,4,5T.

Literature Cited

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