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EFFECTIVENESS OF OAK WILT TREATMENTS IN SOUTHERN OHIO

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Introduction

Seventy-three per cent of the timber cut in southeastern Ohio in the period 1949-1953 was oak (2)^{1/}. The most serious pathological danger to these trees is oak wilt (Endoconidiophora fagacearum Bretz). Other states have tested numerous control measures and several have recommended treatments suitable to their locations and needs. Treatments ranging from dry girdling of infected trees plus establishing buffer zones around infected trees with silvicides to the peeling of the bark from infected trees are considered most effective in Iowa and Pennsylvania respectively (3). In order to study the seriousness, spread, and control of this disease in Ohio, research was initiated by the Ohio Agricultural Experiment Station.

Methods:

Sixty-three circular half-acre plots were established in southern Ohio in 1953. The plots were situated around infection centers ranging in age from more than five years to recently infected trees. Each plot was checked from two to ten times after establishment, the number of visits depending on severity of infection, accessibility of the plot, and time available. Records were kept of symptoms of disease, injury, and animal life for each tree in the plots. The plot locations were selected as being typical sites of infection in and near four state forests. The incidence of infection at Pike, Zaleski, and Shawnee State Forests is moderate, while in Scioto Trail State Forest the incidence is much higher. Treatments that were applied to these centers of infection varied between and within areas as follows:

Pike State Forest - Fell the infected tree and let lie.
Fell and split or salvage logs, pile slash.
Fell and salvage.
Fell and let lie, poison surrounding trees of like group.
Check - no treatment.

Scioto Trail Forest - Fell and let lie.
Girdle the infected tree.
Girdle and spray the girdle with an insect bomb.
Fell and burn the entire tree.
Fell and burn the top.
Fell and burn the entire tree on its stump.
Check.

^{1/} Figures in parenthesis refer to literature cited.

- Zaleski State Forest - Girdle the infected tree.
Girdle and scorch trunk below girdle.
Check.
- Shawnee Forest - Fell and let lie.
Check.

Table 1 shows the predominating oak groups and aspects of plots by areas.

Table 1. Group and Aspect of Oak Wilt Plots

Area	Predominance of Oak Groups	Aspect	
		Typical	Range
Pike	Red, nearly as many white	SW	180° - 270°
Scioto Trail	Red and white (even)	W	360°
Zaleski	White (chestnut oak ridge)	W	157° - 337°
Shawnee	Red, nearly as many white	S	135° - 45°

Predominating aspects of the oak wilt plots are south to west. In Pike Forest it was further observed that the large majority of centers (including those outside Ohio Agricultural Experiment Station plots) occur on south to west exposures. These sites face the prevailing winds and receive the most insolation, hence are the driest. Near this forest the high incidence of oak wilt was observed in small areas where scarlet oak-chestnut oak mixtures border the chestnut oak ridges.

Results

A treatment is considered effective if no trees are dead or suspected of dying of oak wilt from the date of treatment to the present time. A suspect tree is one which is believed, from available evidence, to have died of oak wilt, but which was not sampled and cultured positive in a laboratory. In some cases the effectiveness of a treatment is in doubt. For example, a plot was established around a new center on Pond Run in Shawnee State Forest where the only tree known to be infected, a red oak, was felled and let lie in 1953. No additional oak wilt was observed until 1956 when a second tree, a black oak forty feet from the old stump, became infected. It is not known at this time whether the infection was transferred through root grafts with the stump or was a reinfection from outside the plot^{2/}. Thus in this case the effectiveness of the treatment is in doubt and must be considered as not effective.

Of the treatments tried, one was common to three forest areas, one was common to two areas, and the remainder were used only in a single forest area. From one to ten plots received like treatments in any one area.

At Pike State Forest the one check plot was not effective, giving no control of oak wilt, while each of the four treatments tried indicated some measure of control, being about 67% effective.

At Shawnee State Forest, somewhat similar to the Pike area, one of three check plots, 33% showed no spread of oak wilt, while four of ten plots, 40%, treated by

^{2/} Local spread through root grafting is known to occur naturally (3), and transmission by insect vectors has been proven to occur under laboratory conditions (1). Birds and mammals, such as squirrels (3), are also considered possible vectors in overland spread of the disease.

felling the infected trees showed no further spread.

The Zaleski State Forest plots are composed predominately of the white oak group which generally is slower to die. These plots received two different treatments, neither of which appeared better than the check plots.

At Scioto Trail State Forest, the most highly infected area studied, only one treatment appeared effective with a control of 60%. None of the other five treatments used showed any degree of control. Of eight check plots, only one showed no further spread of oak wilt (12.5%).

Table 2 shows the effectiveness of the treatments used.

Table 2. Effectiveness of 1953 Oak Wilt Treatment as of October 1, 1956

		Pike	Scioto Trail	Zaleski	Shawnee	Total
Fell, let lie	(e)	3			4	7
	(n)	2	2		6	10
Fell, split or salvage logs Pile remainder	(e)	3				3
	(n)	1				1
Fell, salvage	(e)	1				1
	(n)	1				1
Fell, poison surrounding trees	(e)	1				1
	(n)					0
Check (no treatment)	(e)		1	2	1	4
	(n)	1	7	1	2	11
Girdle	(e)			2		2
	(n)		1	2		3
Girdle, spray girdle w/insect bomb	(e)		3			3
	(n)		2			2
Fell, burn	(e)					0
	(n)		5			5
Fell, burn top	(e)					0
	(n)		3			3
Fell, burn on stump	(e)					0
	(n)		3			3
Girdle, scorch trunk below girdle	(e)			2		2
	(n)			1		1
Total	(e)	8	4	6	5	23
	(n)	5	23	4	8	40

Numbers indicate the number of plots involved.

(e) - Treatment effective. (n) - Treatment not effective

Table 3 summarizes the results of treatments which utilize felling, girdling, or burning as a common factor. It may be seen that girdling appears to be slightly better than felling, and that burning was ineffective.

Table 3. Comparative Effectiveness of Similar Treatments
1953-1956

Common Treatments	No. of Plots		Total	Percent Effective
	Effective	Not Effective		
Felling	11*	12	23	47.8
Girdling	7	6	13	53.8
Burning	0	11	11	0.0
Check (no treatment)	4	11	15	26.7
Total	22	40	62	

*Plot not included in which surrounding trees were poisoned.

Some form of burning as a treatment was tried on 11 plots without success. One plot near Caldwell Lake in Scioto Trail State Forest was originally infected about 1950 when two trees died. Two additional trees died of oak wilt in 1951 and 12 more in 1952. In 1953 five newly infected trees were felled and burned by the Ohio Division of Forestry. Four more trees became infected in 1954 and were treated in like manner. Two additional trees became infected late the same season, but were not felled and burned. In 1955 the treatment was changed to: fell, burn the infected tree on its stump and frill and kill trees of like group within root grafting distance (up to a maximum of 50 feet). Seven trees were burned in 1955, one additional tree died in 1955 and another in 1956, but were not given the aforementioned treatment due to lateness of the season. Seventeen trees were frilled and treated with 2,4,5-T and kerosene in 1955.

Table 4 shows the change in the composition of this half-acre plot because of oak wilt and the control measures applied in six seasons. A loss of 38.6% from the total stand of trees 6" d.b.h. and over is due to oak wilt. In an attempt to stop the continued spread of oak wilt an additional 18.3% loss was incurred. This plot is one of the most highly infected under observation. While not typical, it shows what has happened to one oak wilt center. It was observed here and at several other centers where the canopy is now sufficiently open that other species such as pine and tulip are becoming established.

Table 4. Change in Stand Composition in the Period 1950-56 in One One-half Acre Plot on Scioto Trail Forest*

Species	No. 1950	% of Stand	No. 1956	% of Stand	% Loss	
					Oak Wilt	2,4,5-T (From Pre-Oak Wilt Stand)
Scarlet oak	60	64.5	22	55.0	29.0	11.8
Black oak	18	19.4	6	15.0	7.5	5.4
Red oak	7	7.5	4	10.0	2.1	1.1
White oak	4	4.3	4	10.0	-	-
Bitt. hickory	2	2.1	2	5.0	-	-
White ash	1	1.1	1	2.5	-	-
Black cherry	1	1.1	1	2.5	-	-
Total	93	100.0	40	100.0	38.6	18.3

*Only trees 6" d.b.h. and over are included.

Conclusions

Burning the infected tree does not appear to be a satisfactory control for oak wilt in areas of high infection.

Treatments other than burning appeared to be more effective than no treatment, girdling appearing somewhat more effective than felling.

A treatment in a given center may appear effective for several seasons before another tree shows infection.

Literature Cited

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