Felling Infected Oaks in Natural Stands Reduces Dissemination of Polyporus hispidus Spores

F. I. McCracken and E. R. Toole

Plant Pathologist, Southern Hardwoods Laboratory, Stoneville, Mississippi 38776; and Assistant Professor, Forest Products Utilization Laboratory, Mississippi State University, State College 39762, respectively.

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ABSTRACT

Felling or girdling willow oaks which exhibited *Polyporus hispidus* cankers reduced sporophore production within 3 yr. Since spore dissemination was horizontal and downward, spores produced on felled trees did not spread as far as those from standing trees. Felling, therefore, is a more advantageous means of control.

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Pathologists recommend eliminating infected trees to control spore-disseminated fungi like *Polyporus hispidus* (Bull.) Fr., which causes heart rot and cankers in bottomland red oaks (4). Hepting and Roth (1) found that felling infected trees in the Appalachians reduced the period of *P. hispidus* fruiting to 5 yr. This study reports effects of girdling or felling on sporophore production and on spore dissemination among southern bottomland oaks in west-central Mississippi.

MATERIALS AND METHODS.—Sixty cankered willow oaks (*Quercus phellos* L.) were randomly selected in a pole-size stand in the Delta Experimental Forest, Stoneville, Mississippi, in July 1964. Twenty trees were felled; 20 were girdled; and 20 were left untreated. Annual sporophore production was observed from 1964 through 1967. Spore dissemination was compared in 1968 by placing four Rotorod (Metronics Assoc., Palo Alto, Calif.) spore samplers (5) 1.0 m high at cardinal points 5.0 m to 10.0 m from sporophores on two treated, and two check, trees. Sporophores were small, and sporulation was scant.

In July 1971 six more trees were felled and six more girdled to provide new sporophores. Dissemination was measured on 17 days in September, October, and November with four Rotorod samplers located at heights of either 0.3 m or 3.0 m and placed up to 120 m away from the sporophores. Other active sporophores were removed from the area to prevent contamination.

Two of the felled and three of the girdled trees were observed for 10 days in September and October 1972. Sporophores averaged 0.3 m above ground on cut trees and 3.0 m above ground on standing trees. Hourly spore production was determined with a Kramer-Collins (K-C) (G-R-Electric Co., Manhattan, Kans.) sampler (2) placed and operated as previously described (3). Dissemination was measured by 27 Rotorod samplers surrounding each tree. Three samplers were placed on a pole at heights of 0.3 m, 3.0 m, and 6.0 m. One pole with samplers was positioned 0.3 m from the sporophores. Eight others were placed in cardinal directions at 8 m and 16 m from the tree. Beginning at about 0900, samplers were operated for 3-5 h a day. Spore density at the various locations was estimated by counting the number of spores visible with a microscope in five 0.15 mm^2 areas on the collecting rods.

RESULTS AND DISCUSSION.—Each year *Polyporus hispidus* sporophores were produced from July through October, more of them appeared in wet years than in dry years. Before treatment in 1964, 45% of the trees in each group bore sporophores. Sporophores occurred on 80% of all trees in 1965 and on 55% in 1966; differences among treatments were not significant (P = 0.05). In 1967, 8% of the girdled, 20% of the felled, and 45% of the check trees had sporophores; the difference between treated and untreated trees was significant (P = 0.05). In each of the 4 yr following treatment, cut trees had more sporophores earlier (July or August) than girdled or check trees. The effect of earlier sporulation on infection rate was not determined.

In 1968, spores were collected at ground level 10 m away from sporophores 3 m high on untreated trees, but no spores were collected at any distance from felled or girdled trees. Sporophores on girdled trees were small and produced only a few spores. Most sporophore pores on felled trees were filled with mycelium, probably due to moist conditions near the ground.

In the 1971 samples, spores were collected up to 60 m away from sporophores on felled trees and up to 120 m from sporophores 3.5 m high on standing trees. For both felled and girdled trees, spore concentrations were greatest near the source and at heights equal to or below that of sporophores.

In 1972, spores disseminated about equally in all cardinal directions; they spread horizontally and

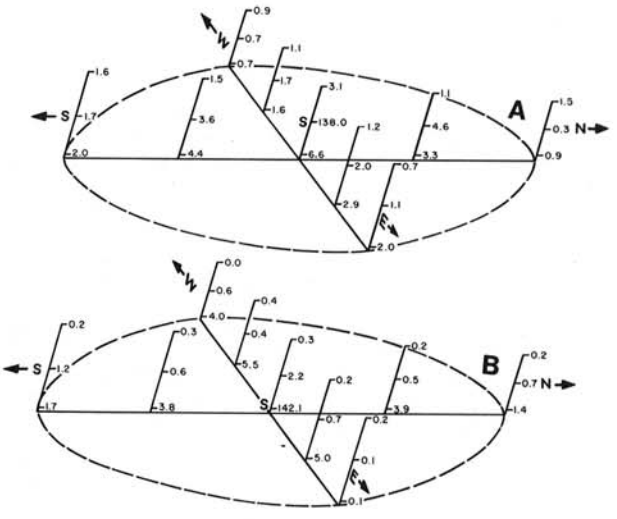

Fig. 1-(A, B). Mean number of *Polyporus hispidus* spores collected per 4-hr period by Rotorod samplers on poles at heights of 0.3 m, 3.0 m, and 6.0 m, located centrally and in cardinal directions at 8 m and 16 m from sporophores (S). **A.** Sporophores are about 3.0 m high on girdled trees. **B.** Sporophores on felled trees were about 0.3 m above ground level.

downward from all sporophores (Fig. 1). On all 10 sampling days, spores accumulated at each of the 27 collecting points around sporophores 3.0 m high on standing trees. Frequently no spores were collected by samplers 3.0 m high and 8 m away from felled trees or by samplers 3.0 or 6.0 m high and 16 m from the felled trees. Spore production estimates were in close agreement with earlier findings (3).

Felling or girdling willow oak trees with *P. hispidus* cankers reduced sporophore production within 3 yr. Felling limited spore discharge in moist areas and reduced dissemination distances, thus lessening the danger to branch stubs on adjacent trees. This practice during logging operations should not significantly increase infection courts on remaining trees and should be conducted over the entire logging site since a few spores, <1 in 4 hr, were collected 120 m from the source.

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