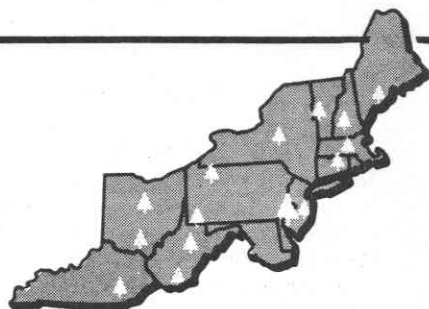


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DECAY ASSOCIATED WITH BORER WOUNDS IN LIVING OAKS

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Abstract. Wood-borer wounds serve as entry courts for decay fungi in oak species in the central hardwood region. Thirteen species of fungi were isolated from decayed areas surrounding borer galleries. *Polyporus compactus* was the most frequently isolated fungus, accounting for about 1/3 of the total decay volume caused by identified fungi.

Wood-boring insects, including the red oak borer (*Enaphalodes rufulus* Hald.), the white oak borer (*Goes tigrinus* DeG.), and the carpenter-worm (*Prionoxystus robiniae* Peck.), cause losses in both quality and quantity in oak species in the central hardwood region. Borer wounds are entry courts for decay fungi and sizeable amounts of decay are sometimes associated with borer galleries.

METHODS

This paper is based on a study of decay in upland oak stands in the central hardwood region. Scarlet (*Quercus coccinea* Muenchh.), black (*Q. velutina* Lam.), white (*Q. alba* L.), and northern red (*Q. rubra* L.) oaks on 150 sample plots 1/5-acre in size were felled and the amount and source of decay were determined. A total of 274 oaks—161 scarlet, 76 black, 20 white, and 17 northern red oaks—had decay associated with borer galleries. Cultures were prepared from decay samples to determine the fungi responsible for the decay. Sample blocks of decayed wood were

split, and from the freshly-exposed faces of the infected wood, six cores of wood, approximately 4mm in diameter, were extracted with a sterilized increment hammer and placed in test tubes containing 2.5 percent Fleishman's diamalt syrup with 2 percent agar. If the decay organism was not isolated on the first attempt, a second attempt was made.

RESULTS AND DISCUSSION

In Kentucky, borer wounds were second only to fire scars as entry courts for decay fungi. Almost 16 percent of 490 infections developed through borer wounds, accounting for about 9 percent of the total decay volume.

In oak forests in Ohio, Indiana, Illinois, and Missouri, about 10 percent of 1,824 infections developed through borer wounds, or about 5 percent of the total decay volume.

Thirteen different species of fungi were successfully isolated from decayed areas surrounding borer galleries (Table 1). *Polyporus compactus* Overh. was the most commonly isolated fungus. It

Table 1.—Volume of decay caused by fungi associated with borer galleries in four oak species, in cubic feet.

Fungus species	Scarlet oak	Black oak	Northern red oak	White oak	Total
<i>Polyporus compactus</i> Overh.	8.09	5.48	0.49	0.12	14.18
<i>Merulius tremellosus</i> Schrad. ex Fr.	6.24	3.10	—	—	9.34
<i>Stereum frustulatum</i> (Pers. ex Fr.) Fckl.	4.47	—	—	—	4.47
<i>Laetiporus sulphureus</i> (Bull. ex Fr.) Bond & Sing.	3.78	—	—	—	3.78
<i>Poria cocos</i> (Schw.) Wolf	3.57	—	—	—	3.57
<i>Inonotus andersonii</i> (Ell. & Ev.) Čerňý	2.48	.74	.13	—	3.35
<i>Phlebia chrysocrea</i> (Berk. & Curt. in Berk.) Burds.	1.35	—	—	—	1.35
<i>Hericium erinaceus</i> (Bull. ex Fr.) Pers.	.44	.37	—	.34	1.15
<i>Poria oleracea</i> Davidson & Lombard	.72	—	—	—	.72
<i>Poria mutans</i> Pk.	.36	—	—	—	.36
<i>Poria nigra</i> (Berk.) Cke.	—	.24	—	—	.24
<i>Stereum complicatum</i> (Fr.) Fr.	—	—	—	.04	.04
<i>Inonotus cuticularis</i> (Bull. ex Fr.) Karst.	.04	—	—	—	.04
Total identified	31.54	9.93	0.62	0.50	42.59
Unidentified	24.00	11.24	2.95	0.96	39.15
TOTAL	55.54	21.17	3.57	1.46	81.74

was responsible for 14.18 ft³ of decay, or about 1/3 of the total decay volume caused by identified fungi. It was the only fungus isolated from all four oak species. *Polyporus compactus* causes a white rot as do *Merulius tremellosus* Schrad. ex Fr. and *Stereum frustulatum* (Pers. ex Fr.) Fckl., which caused losses of 9.34 ft³ and 4.47 ft³, respectively. *Laetiporus sulphureus* (Bull. ex Fr.) Bond. & Sing. and *Poria cocos* (Schw.) Wolf, both brown rot fungi, ranked next as causes of decay. These five species accounted for 83 percent of the total decay volume caused by identified fungi associated with borer galleries.

Appreciable amounts of decay were associated with borer galleries in some of the trees. However, this volume loss represented a relatively small percentage of the gross volume of the 274 trees. In

scarlet oak, decay averaged 2.2 percent of the gross volume of 161 trees. Black oak was next, with decay averaging 1.3 percent of the gross volume of 76 trees, followed by northern red oak and white oak with decay volume less than 1.0 percent of the gross volume of 20 and 17 trees, respectively.

SUMMARY

Borer wounds will continue to serve as entry courts for decay fungi until these insects are controlled. Research is now underway to develop methods to reduce borer population in oak forests, which would result in less decay associated with borer galleries.