Germination of Spores of Wood Decay Fungi on Wood

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ABSTRACT

Basidiospores of wood-decay fungi produced in pure culture were used to compare germination and growth on pine (*Pinus* sp.) and sweetgum (*Liquidambar styraciflua*) wood sections. Two brown-rot fungi, *Lenzites saeparia* and *L. trabea,* germinated and grew better on pine than on sweetgum. The reverse was true for a white-rot fungus, *Polyporus versicolor.* These relationships were not affected by incubation temperature within the range of 15 to 41 C. Phytopathology 61:88-90.

Additional key words: Poria monticola, Schizophyllum commune, extraction.

Since the infection of wood by wood-rotting fungi results at least in part from spores, a knowledge of the effect of wood substrate on spore germination and development might help explain the prevalence of brown-rot fungi in coniferous products and white-rot fungi in hardwood products (2).

A few workers have investigated the germination of spores on wood (1, 3, 5, 6, 7, 8). But Morton & French (4) were the first to describe a method that allowed direct observation of the germination of spores of wood-rotting fungi on wood. They investigated the effect of wood sterilization, heartwood and sapwood, wood extractives, soaking, relative humidity, temp, and pentachlorophenol on germination of spores of *Lenzites saeparia, L. trabea,* and *Fomes roseus.* They used Douglas fir, *Pseudotsuga menziesii,* as their principal wood substrate.

This paper reports on the production of basidiospores of rot fungi in culture, and the effect of southern pine (*Pinus* sp.) and sweetgum (*Liquidambar styraciflua* L.) substrates on germination and early growth of two brown-rot fungi, *Lenzites saeparia* (Wulf.) Fr. and *Lenzites trabea* (Pers.) Fr.; and one white-rot fungus, *Polyporus versicolor* (L.) Fr.

Spore production.—Attempts to produce basidiospores of a number of wood-rotting fungi were made following the Morton & French (4) method. The test fungus was grown on 50 ml of 2% malt agar in storage dishes measuring 100 × 80 mm. When the colony had covered the agar, the dish was inverted and incubated at room temp. The results of a number of trials show that this method produced basidiospores of *Lenzites saeparia, L. trabea, Polyporus versicolor, Poria monticola* Murr., and *Schizophyllum commune* Fr., but failed with *Daedalea confragosa* (Bolt.) Fr., *Fomes annosus* (Fr.) Cke., *Peniophora gigiantea* (Fr.) Massee, and *Polyporus abietinus* (Dicks.) Fr. Although the basidiocarps formed by this method were not normal, the basidiospores formed in culture were normal. Spores produced under these conditions were always free of contaminating organisms. This method of producing basidiospores of decay fungi in culture has only been satisfactory for the brown-rot fungi, *Lenzites saeparia* and *L. trabea.* Even with these fungi, time to spore production and duration of sporulation is highly variable. There is still a need for a fast, simple, and reliable method for producing basidiospores in culture.

Spore germination.—For the study of spore germination, basidiospores were collected on wood sections and incubated in special chambers. Sterile conditions were maintained throughout. The pine and sweetgum wood sections were cut radially on a sliding microtome, and were 60 μ thick and 6 mm sq. The sections were sterilized in bottles at 100 C for 20 min. In extraction studies, sections were extracted in boiling distilled water for 3 hr before sterilization. Spores of the test fungus, produced as described above, were collected on the sterile test section by placing it under the fruiting body in the inverted dish for 1 hr. The inoculated sections were then placed in sterile glass bottles on glass slides supported over water and incubated at controlled temp. Incubation time was usually 24 hr. After incubation, the sections were stained in cotton blue and examined for germination.

The two brown-rot fungi, *Lenzites saeparia* and *L. trabea,* germinated significantly better on pine sections than on sweetgum sections after 24 hr at 30 C. In addition, the average length of the germ tubes was greater on pine than on sweetgum for both fungi, the difference being significant only for *L. trabea* (Fig. 1). The white-rot fungus, *Polyporus versicolor,* showed only slightly higher germination on sweetgum than on pine, but the germ tubes were significantly longer on sweetgum than on pine (Fig. 1).

Basidiospores of *L. trabea* were incubated for 24 hr at 15, 25, 30, 35, and 41 C, on pine and sweetgum sections. After incubation, germination per cent and length of germ tube were determined. This test was replicated twice. Analysis of variance of these data showed that germination was significantly higher (at 1%) on pine than on sweetgum at all temp, and that germination was significantly different (at 1%) at the different temp. Replications were not significantly different. Analysis of data for germ-tube length showed that length was significantly longer on pine than on sweetgum (at 5%), and that differences due to temp were significant at the 1% level (Table 1). Maximum germination and germ tube length occurred at 35 C.

After 48 hr incubation, a few hyphae of *L. saeparia* and *L. trabea* were observed growing through pits and in parenchyma cells of pine. No bore holes were observed.

Basidiospores of *L. trabea* were incubated for 24 hr at 30 C on pine and sweetgum sections that had been

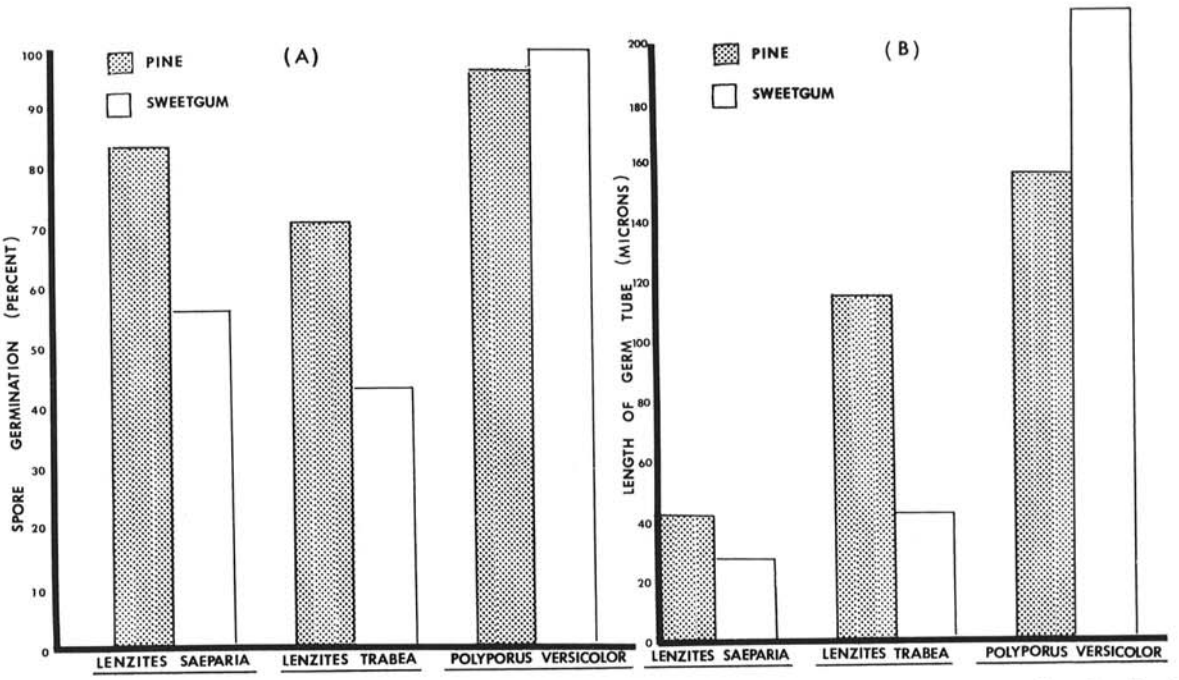

Fig. 1. Germination and length of germ tube after 24-hr incubation at 30 C of basidiospores of 3 wood-rotting fungi on pine and sweetgum sapwood. *Lenzites saeparia* based on an average of four replications, *L. trabea* on two replications, and *Polyporus versicolor* on one replication. Each replication based on 100 spores on each of 2 wood sections for germination, and measurement of 20 germinating spores on each of 2 wood sections for germ-tube length. **A)** Differences in germination between pine and sweetgum for *L. saeparia* significant at the 5% level; For *L. trabea* at the 1% level and for *P. versicolor* not significant. **B)** Differences in length of germ tube between pine and sweetgum significant at the 5% level for *L. trabea* and *P. versicolor;* not significant for *L. saeparia.*

TABLE 1. Germination and length of germ tube after 24-hr incubation of *Lenzites trabea* basidiospores on pine and sweetgum sapwood[a]

Temp (C)	Germination (%)		Length of germ tube (μ)	
	Pine	Sweetgum	Pine	Sweetgum
15	27.5 ± 17.5	9.5 ± 6.5	22.0 ± 0.0	17.0 ± 1.0
25	48.0 ± 3.0	16.5 ± 0.5	80.5 ± 30.5	49.5 ± 21.5
30	72.0 ± 16.0	44.5 ± 12.5	119.5 ± 11.5	41.5 ± 11.5
35	99.0 ± 0.0	75.0 ± 0.0	225.0 ± 0.0	162.0 ± 0.0
41	62.5 ± 19.5	32.5 ± 4.5	127.5 ± 97.5	60.0 ± 15.0

[a] Based on two replications. Each replication based on 100 spores on each of two wood sections for germination percentages, and measurement of 20 germinating spores on each of two wood sections for length of germ tube.

extracted in hot water and on nonextracted sections. This test was replicated 6 times with at least 10 different sections for each subdivision. There was as much variation between and within replications as between extracted or nonextracted treatments. Therefore, no effect of extraction was evident. As in other tests, however, *L. trabea* germinated significantly better on pine than on sweetgum. Spores were not available to test the effect of extraction on other fungi.

These data show wood substrate to have important effects on germination and early growth of basidiospores of some wood-rot fungi. Whether these effects are due to differences in wood extractives in pine and sweetgum or to other causes is a question that remains to be answered.

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