

Shoot Dieback of Planted Sand Pine Caused by *Fusarium moniliforme* var. *subglutinans*

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ABSTRACT

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Fusarium moniliforme var. *subglutinans* was identified as the cause of shoot dieback in plantation-grown Ocala and Choctawhatchee varieties of *Pinus clausa* in Florida. Isolates cultured from sand pine were pathogenic to seedlings of both slash and sand pine. Sand pine seedlings were also susceptible to isolates of *F. moniliforme* var. *subglutinans* obtained from pitch cankers on slash pine.

Pitch canker disease, caused by *Fusarium moniliforme* Sheld. var. *subglutinans* Wollenw. and Reink., is widespread in southern pine plantations and seed orchards in the southeastern United States (2,6,9). Damage has been most severe in slash pine (*Pinus elliotii* Engelm. var. *elliotii*) plantations in the pine flatwoods regions of Florida, where the fungus causes branch cankers resulting in shoot dieback, reduced growth rates, stem deformity, and mortality (4,9,10). Although the known host range for *F. moniliforme* var. *subglutinans* is rather broad (1,2,5,7) and includes most of the economically important southern pines, neither the Ocala nor the Choctawhatchee varieties of sand pine (*Pinus clausa* (Chapm.) Vasey var. *clausa* Ward. and var. *immuginata* Ward., respectively) have been recognized as natural hosts.

We report the isolation of *F. moniliforme* var. *subglutinans* from cankers on sand pine, describe the symptomatology of the naturally occurring infections, and establish proof of pathogenicity.

MATERIALS AND METHODS

In December 1978, we observed shoot dieback on numerous trees in a 6- to 8-year-old plantation of Ocala sand pine in western Calhoun County, Florida. Similar symptoms were observed in December 1979 on several planted 5-year-old Choctawhatchee sand pines in Taylor County. In both instances, conspicuous, girdling cankers subtended symptomatic shoots, samples of which were collected for diagnostic evaluation and isolation.

The pathogenicity of several isolates obtained from the diseased trees was

tested (3) by inoculating actively growing shoots of 2-yr-old potted slash pine and 18-mo-old potted Choctawhatchee sand pine seedlings. At least three replicate seedlings were inoculated for each isolate-host combination. Additional sand pine seedlings (three per isolate) were inoculated with isolates of *F. moniliforme* var. *subglutinans* obtained from a branch canker on a slash pine (Volusia County), a sporodochium on a slash pine (Liberty County), and an adult deodar weevil (*Pissodes nemorensis*, Volusia County). Seedlings inoculated with sterile water served as controls for each inoculation series. All seedlings were incubated in a greenhouse for 8 wk under favorable conditions for plant growth.

RESULTS AND DISCUSSION

Field conditions and disease symptoms.

The affected Ocala and Choctawhatchee sand pines were growing on deep, excessively drained, sandy soils typical of the native sandhill habitat of the species. The Ocala sand pine plantation was adjacent to a planting of young slash pines heavily infected with pitch canker. No potential inoculum source for the Choctawhatchee sand pines was evident nearby.

Although the cankers were resinous and the xylem tissues beneath the cankers were resin soaked, the resin flow from the cankers on the sand pine shoots was much less copious than the resinosis associated with pitch cankers on slash pine. The symptoms were similar to pitch canker infections on shoots of loblolly pine (5,6). Small salmon-pink sporodochia were detected in bark crevices above the cankered areas on some of the Choctawhatchee shoots. Cankerred shoots ranged from 1 to 7 cm in diameter; both terminal and lateral shoots were infected.

Isolations and pathogenicity. Isolations from cankers on numerous trees consistently yielded *F. moniliforme* var.

subglutinans, as did cultures derived from conidia transferred from sporodochia. The fungus isolates were morphologically the same (8) as those regularly obtained from slash pine cankers as well as from sporodochia of *F. moniliforme* var. *subglutinans* from a variety of hosts and locations. (C. S. Moses [personal communication] has recently isolated *F. moniliforme* var. *subglutinans* from a naturally occurring stem canker on a young Ocala sand pine planted in a research area in Alachua County.)

All isolates of *F. moniliforme* var. *subglutinans* tested caused shoot dieback on inoculated slash and sand pine seedlings. All inoculated seedlings developed advanced pitch canker symptoms typical of those reported in previous inoculation tests (3,5). All water-inoculated controls were asymptomatic. The cross-pathogenicity of the slash and sand pine isolates on both hosts follows the pattern of nonspecificity among various pine hosts described by Dwinell (5).

Because of its currently limited distribution and low incidence on sand pine, pitch canker does not appear to pose an immediate threat to this species. However, the known destructive potential of this disease (4,6,9,10), the demonstrated cross-pathogenicity of slash and sand pine isolates, and the increasing interest in sand pine management suggest that pitch canker could become a pest management problem for this species in the future.

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