Association of Two Cylindrocladium Species With "Short Life" of Peach Trees in Georgia

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ABSTRACT

Cylindrocladium floridanum was recovered from soil around roots of dying and dead peach trees in six of ten orchards with a history of "short life". Soil from one orchard also yielded *C. scoparium*. Both species caused root rot of peach seedlings, but isolates of *C. floridanum* were generally more virulent than were those of *C. scoparium*. Phytopathology 61:1095-1096.

The average life of peach (*Prunus persica* [L.] Batsch) trees in central Georgia is only 8 years (3) instead of 15 to 20 years, which is common in some peach-producing areas of the United States. This "short life" problem is often characterized by sudden collapse and subsequent death of peach trees after they blossom.

Certain root-rotting fungi, including *Clitocybe tabescens* Bres. (4, 5), species of *Pythium* (1), *Phytophthora cinnamomi* Rands (2), and *Cylindrocladium floridanum* Sobers & Seymour (7), have been associated with the premature death of peach trees.

In an orchard near Fort Valley, Ga., where many trees died shortly after they blossomed in 1970, *Cylindrocladium floridanum* was isolated from reddish-brown lesions on roots of surviving mature trees and volunteer seedlings. Preliminary pathogenicity tests showed that the *C. floridanum* isolates caused root rot and death of 3-month-old peach seedlings. Attempts to isolate the fungus from the same trees in May and June failed, and only *Fusarium solani, F. oxysporum, Trichoderma* spp., and *Pythium* spp. were recovered from diseased roots. Therefore, attempts were made during July and August 1970 to isolate *C. floridanum* from soil of this orchard and from nine additional orchards which had a history of "short life", and were located in the Fort Valley area, and to determine pathogenicity of the fungus to peach trees.

MATERIALS AND METHODS.—Approximately 500 cc of soil were collected from around the roots of each of 10 dying or dead peach trees in each orchard. All samples from an orchard were collected 1 day, stored overnight in a refrigerator at 10 C, and processed the following day. *Cylindrocladium* was isolated from the soil samples by the wet-sieving technique and selective medium of Thies & Patton (8).

All *Cylindrocladium* cultures recovered from the soil were maintained on potato-dextrose agar (PDA). Representative isolates from six orchards were tested for pathogenicity to roots of peach seedlings in the greenhouse. Eighteen 2-week-old cultures of *Cylindrocladium floridanum* and three of *C. scoparium* were each blended with 250 ml of sterile distilled water (SDW), and the volume was brought to 500 ml with additional SDW. These mixtures consisted of mycelial fragments, conidia, and microsclerotia. Inoculum was added into a steam-sterilized mixture of soil and peat moss (3:1, v/v) at the rate of 100 ml/liter soil. Controls were treated with a sterile PDA-SDW mixture. Each treatment was replicated 5 times. A 3-month-old Dixiland peach seedling grown in a 10-cm-diam clay pot was transplanted into each pot, and care was taken not to damage the roots. The seedlings were kept in the greenhouse and examined for evidence of root rot after 4 weeks.

RESULTS.—*Cylindrocladium* was recovered from six of ten sampled peach tree orchards. The number of soil samples yielding *Cylindrocladium* ranged from one to seven in any given orchard (Table 1). All isolates from five orchards were *C. floridanum,* but in the sixth orchard, both *C. scoparium* Morgan and *C. floridanum* were found. Identification of species was confirmed by E. K. Sobers.

After 2 weeks' growth on PDA, isolates of *C. floridanum* and *C. scoparium* produced conidia that were hyaline, cylindric, straight, one-septate, rounded at both ends, and essentially the same size (35-55.2 × 4-4.8 μ for *C. floridanum* and 38-63.6 × 4-4.8 μ for *C. scoparium*). The two species were readily distinguished by the shape of the vesicles, a characteristic which Sobers & Seymour (7) consider the most important in identification of species of *Cylindrocladium*. The vesicles of *C. floridanum* were globose to subglobose and 5.8-15.4 μ in diam, whereas those of *C. scoparium* were oval to ellipsoid, and 16.8-26.4 × 7.2-9.4 μ (Fig. 1).

Eighteen isolates (three/orchard) of *C. floridanum* and three of *C. scoparium* were pathogenic to peach roots. Within 3 weeks after inoculation, the leaves on many seedlings became chlorotic, and in some instances the seedlings collapsed and died a few days later. At least one of five seedlings was killed by each isolate of both species of *Cylindrocladium,* but isolates of *C. floridanum* were generally more virulent than were those of *C. scoparium* (Table 1). The pathogens were readily isolated from dead seedlings and from brown, water-soaked areas on roots of the seedlings that were inoculated and had survived. Controls were healthy when examined at the end of the experiment.

DISCUSSION.—This is the first report of *Cylindrocladium floridanum* causing root rot of peaches in Georgia. Association of this pathogen with diseased roots of declining peach trees in Florida was previously reported (7).

There are no previous reports for the USA of a natural association of *C. scoparium* with declining

TABLE 1. Isolation of *Cylindrocladium floridanum* and *C. scoparium* from soil around roots of dying peach trees in "short life" orchards, and relative virulence of the two species to peach roots

Orchard	No. samples yielding *Cylindrocladium*[a]	Total no. *C. floridanum* isolates	Avg % peach seedlings killed by 3 isolates[b]	Total no. *C. scoparium* isolates	Avg % peach seedlings killed by 3 isolates[b]
1	7	93	73.3	18	33.3
2	3	22	60.0	0	
3	7	56	66.6	0	
4	1	9	53.3	0	
5	7	107	73.3	0	
6	4	33	60.0	0	

[a] Ten 500-cc soil samples were collected from each orchard and assayed for *Cylindrocladium* spp.

[b] One 3-month-old peach seedling was transplanted into each of five pots of soil infested with an isolate of *Cylindrocladium* and left in the greenhouse. Results were recorded 4 weeks later.

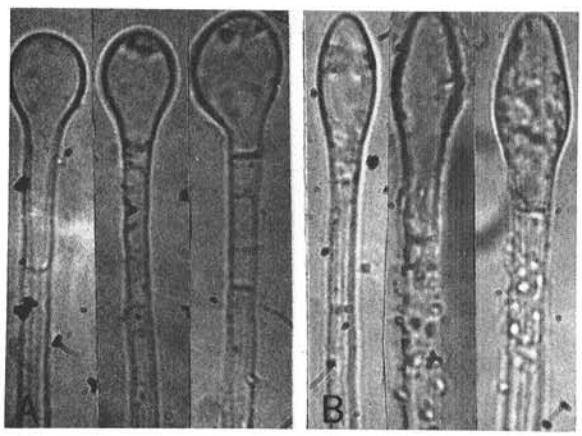

Fig. 1. Vesicles and stipes produced on potato-dextrose agar by **A)** *Cylindrocladium floridanum;* and **B)** *C. scoparium*. Vesicles in A from left to right are 8.5, 7.4, and 11 μ in diam.

peach trees, although pathogenicity of this fungus to peach roots has been established (6). However, *C. scoparium* has been reported as the cause of lesions on stems below ground and subsequent wilting of shoots arising from layered plum, cherry, peach, and apricot in England (10) and plums in France (9). In the former report, vesicles of the fungus are described as being globose, which suggests that the fungus was probably *C. floridanum* rather than *C. scoparium*. Plant roots infected by species of *Cylindrocladium* are rapidly invaded by secondary organisms, making recovery of the pathogen difficult or impossible. This may have accounted for the failure to isolate *C. floridanum* from peach roots both in the present study and that of Hendrix et al. (1), who sampled roots from hundreds of peach trees in Georgia and Florida. Isolation from soil appears to be the best method for detecting the presence of *C. floridanum* and *C. scoparium* in peach orchards.

Isolation of pathogenic species of *Cylindrocladium* from the soil of more than half the orchards sampled in the Fort Valley area suggests that *Cylindrocladium* may contribute to the short life of peach trees. However, the role of this organism in the problem of the short life of the peach tree has not been clearly established.

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