Morphology and Pathogenicity of Calonectria floridana, Calonectria kyotensis, and Calonectria uniseptata

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ABSTRACT

The perfect and imperfect states of *Calonectria floridana, C. kyotensis,* and *C. uniseptata* were compared morphologically and in pathogenicity tests with an isolate of *Cylindrocladium scoparium*. The three species of *Calonectria* reacted similarly to 20 hosts in leaf and root pathogenicity tests, but differed from *Cylindrocladium scoparium* in their pathogenicity to roots of three species of *Lupinus* and three cultivars of peach. They were morphologically indistinguishable, and all produced an imperfect state identified as *Cylindrocladium floridanum*. On the basis of priority, *Calonectria kyotensis* is correctly assigned as the perfect state of *Cylindrocladium floridanum*.

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In April 1967, *Cylindrocladium floridanum* Sob. & Seymour was designated as a new species occurring on peach roots in Florida (5), and in March 1969, its perfect state was described as *Calonectria floridana* Sob. (4). In January 1968, *Calonectria kyotensis* Terashita was described with a *Cylindrocladium* conidial state from leaves of *Acacia dealbata* (6), and in April 1968, *Calonectria uniseptata* Gerlach was described as the perfect state of *Cylindrocladium scoparium* Morgan (2). Because of the apparent similarity of the three descriptions, it was decided to compare the perfect and imperfect states of the three species of *Calonectria* morphologically and in pathogenicity tests with an isolate of *Cylindrocladium scoparium* used in previous studies (1, 3, 4, 5).

MATERIALS AND METHODS.—Inocula for leaf pathogenicity tests were prepared by suspending conidia scraped from 10-day-old cultures grown on rehydrated Difco potato-dextrose agar (PDA, 39 g/liter of distilled water) in 10-ml portions of distilled water. The resulting suspensions were filtered through a single thickness of cheesecloth, adjusted to contain 20,000 conidia/ml, blended for 30 sec after adding Triton B-1956 (active ingredient, 77% modified phthalic glyceryl alkyd resin) at a rate of 0.05 ml/20 ml of suspension, and sprayed on the leaves of test plants (Table 1). Mixtures containing 0.05 ml of Triton B-1956/20 ml of distilled water were sprayed on the leaves of control plants. All plants were maintained in a mist chamber for 24 hr at 28 C and 95 to 100% relative humidity after inoculation. Results were recorded 7 days after inoculation.

Inocula for root pathogenicity tests were prepared by comminuting 10-day-old cultures grown on PDA in 30-ml portions of distilled water. Sixty-five ml of the resulting suspensions were mixed into the top 3 cm of soil in each pot. Pots containing control plants received a like quantity of autoclaved inoculum. All plants were established in 6-inch clay pots containing soil fumigated with methyl bromide at a rate of 454 g/137.2 cm^3. Results of root pathogenicity tests were recorded 4 weeks after the soil was infested. Plants in both studies were maintained in a greenhouse where temperatures varied from 17 C at night to 35 C during the day. The hosts used are listed in Table 1.

Transfers from the type cultures of *C. floridana, C. kyotensis* (ATCC-18834), and *C. uniseptata* were

TABLE 1. Number of plants with leaves and roots infected by *Calonectria floridana, C. kyotensis, C. uniseptata,* and *Cylindrocladium scoparium*

	Cal. floridana		*Cal. kyotensis*		*Cal. uniseptata*		*C. scoparium*	
	Leaves	Roots	Leaves	Roots	Leaves	Roots	Leaves	Roots
Callistemon citrinus Stapf	8/10	7/10	8/10	7/10	10/10	8/10	10/10	8/10
C. rigidus R. Br.	10/10	6/10	9/10	6/10	9/10	5/10	10/10	7/10
Crotalaria spectabilis Roth	6/10	0/10			8/10	1/10	10/10	3/10
Eucalyptus camaldulensis Dehnhardt	10/10	10/10	10/10	10/10	10/10	10/10	10/10	10/10
E. grandis J. E. Sm.	9/10	6/10			10/10	7/10	10/10	9/10
E. robusta J. E. Sm.	10/10	8/10	10/10	8/10	9/10	6/10	10/10	9/10
E. rudis Endl.	10/10	9/10	10/10	10/10	10/10	9/10	10/10	10/10
E. saligna J. E. Sm.	10/10	7/10	10/10	7/10	10/10	10/10	10/10	8/10
E. tereticornis J. E. Sm.	10/10	7/10	10/10	8/10	10/10	9/10	10/10	10/10
Melaleuca leucadendra L.	10/10	6/10	10/10	7/10	10/10	7/10	10/10	9/10
Lupinus albus L.	0/10	2/10		2/10	2/10	3/10	3/10	8/10
L. angustifolius L.	1/10	3/10		4/10	1/10	1/10	3/10	9/10
L. luteus L.	1/10	2/10		2/10	0/10	3/10	3/10	5/10
Prunus persica L.								
'Elberta'		10/10		8/10		8/10		3/10
'Nemaguard'		10/10		9/10		10/10		4/10
'Okinawa'		10/10		9/10		10/10		1/10
Rhododendron obtusum (Lindl.) Planch.								
'Rentschler's Pink'	9/10	3/10			10/10	2/10	10/10	4/10
'Valentine'	10/10	1/10	10/10	2/10	10/10	1/10	10/10	2/10
'White Christmas'	10/10	4/10	9/10	3/10	10/10	5/10	10/10	5/10
'White Water'	10/10	3/10	10/10	3/10	10/10	4/10	10/10	5/10

used in pathogenicity and morphological studies. The culture of *Cylindrocladium scoparium* was obtained from lesions on leaves of azalea collected at Fort Myers, Fla., in 1965.

Morphological comparisons of the *Cylindrocladium* state of *Calonectria floridana, C. kyotensis,* and *C. uniseptata* with *Cylindrocladium scoparium* were made from fructifications found in 10-day-old cultures on PDA. Sexual structures of the three species of *Calonectria* were compared after 21 days' growth on PDA.

RESULTS AND DISCUSSION.—Similar results were obtained with the imperfect states of *Calonectria floridana, C. kyotensis,* and *C. uniseptata* in leaf and root pathogenicity tests. They differed from the isolate of *Cylindrocladium scoparium*, however, in that they were highly virulent to roots of three cultivars of peach and slightly virulent to roots of three species of *Lupinus*, whereas *C. scoparium* was slightly virulent to peach roots and highly virulent to roots of lupines. These results agree with previous comparative studies with *C. floridanum* and *C. scoparium* (3).

A comparison of the imperfect states of the three species of *Calonectria* revealed only minor differences, and suggested that they were the same (Table 2). Vesicles of the imperfect state of *C. uniseptata* were globose and typical of *Cylindrocladium floridanum*, rather than ellipsoidal as expected in isolates of *C. scoparium*. It was concluded that the imperfect states of the three species of *Calonectria* are *Cylindrocladium floridanum*, and that Gerlach (2) incorrectly identified the imperfect state of *Calonectria*

TABLE 2. Physical aspects of *Calonectria floridana, C. kyotensis,* and *C. uniseptata* after 10 days' growth on potato-dextrose agar

	C. floridana	*C. kyotensis*	*C. uniseptata*
Perithecia	Orange to reddish brown 335-510 X 310-405μ	Orange to reddish brown 330-490 X 285-420μ	Orange to reddish brown 310-480 X 300-425μ
Asci	Clavate 83-145 X 14-22μ	Clavate 74-136 X 14-21μ	Clavate 79-133 X 13-19μ
Ascospores	Mostly 1 septate 19-45 X 5.5-6.3μ	Mostly 1 septate 18-49 X 5.5-6.3μ	Mostly 1 septate 19-50 X 5.3-6.8μ
Vesicles	Globose 8.2-17.9μ	Globose 8.8-19.0μ	Globose 8.2-20.4μ
Conidia	Mostly 1 septate 34-55 X 3.5-4.9μ	Mostly 1 septate 30-56 X 3.5-5.4μ	Mostly 1 septate 36-47 X 3.5-4.8μ

uniseptata as *Cylindrocladium scoparium*.

Examination of the sexual states of the three species of *Calonectria* showed no essential differences among them (Table 2). The paraphyses reported by Gerlach (2) for *C. uniseptata* were not observed, nor were they found in the other species. It was concluded, therefore, that *C. floridana, C. kyotensis*, and *C. uniseptata* are synonymous. Because *C. kyotensis* predates *C. floridana* and *C. uniseptata* by several months, *C. kyotensis* is correctly assigned as the perfect state of *Cylindrocladium floridanum*.

LITERATURE CITED

1. ALFIERI, S. A., JR., C. P. SEYMOUR, & E. K. SOBERS. 1970. Brown leaf necrosis of Mahonia bealei caused by Cylindrocladium ellipticum species nova. Phytopathology 60:1212-1215.
2. GERLACH, W. 1968. Calonectria uniseptata n. sp., die bisher unbekannte Hauptfruchtform von Cylindrocladium scoparium Morgan. Phytopathol. Z. 61:372-381.
3. SOBERS, E. K. 1967. Morphology and pathogenicity of Cylindrocladium floridanum and C. scoparium. Phytopathology 57:832 (Abstr.).
4. SOBERS, E. K. 1969. Calonectria floridana sp. nov., the perfect stage of Cylindrocladium floridanum. Phytopathology 59:364-366.
5. SOBERS, E. K., & C. P. SEYMOUR. 1967. Cylindrocladium floridanum sp. n. associated with decline of peach trees in Florida. Phytopathology 57:389-393.
6. TERASHITA, T. 1968. A new species of Calonectria and its conidial state. Trans. Mycol. Soc. Japan 8:124-129.