

Cylindrocladium scoparium Morgan — A New Pathogen of some Forest Tree Species in Peninsular Malaysia¹

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Key words: *Cylindrocladium scoparium* Morgan; pathogen; forest tree species.

RINGKASAN

Kulat *Cylindrocladium scoparium* Morgan telah dipencilkan dari bijibenih *Shorea talura* Roxb., *Horsfeldia* sp. dan *Maesopsis eminii* Engl. Musizi. Kulat ini belum pernah dilaporkan di Semenanjung Malaysia sebelum ini. Ujian penginokulasian anak-benih menunjukkan bahawa *Cylindrocladium scoparium* menjadi patogen ke atas anak benih *Dipterocarpus grandiflorus* Blanco, sejenis spesies asli pokok hutan di Malaysia, dan ke atas *Pinus caribaea* Mor., sejenis pain tropika asing yang telah ditanam di negara ini.

SUMMARY

Cylindrocladium scoparium Morgan was isolated from seeds of *Shorea talura* Roxb., *Horsfeldia* sp. and *Maesopsis eminii* Engl. Musizi. This fungus has not been previously recorded in Peninsular Malaysia. Inoculation tests showed that *Cylindrocladium scoparium* was pathogenic to seedlings of *Dipterocarpus grandiflorus* Blanco, a species indigenous to Malaysian forests, and *Pinus caribaea* Mor., an introduced species of tropical pine planted in this country.

INTRODUCTION

In May 1980, a species of *Cylindrocladium* was one of several fungi isolated from freshly collected seeds of *Shorea talura* Roxb. obtained from the arboretum of the Forest Research Institute, Kepong, Selangor. Subsequently the same fungus was isolated from seeds of *Maesopsis eminii* Engl. Musizi and *Horsfeldia* sp. obtained from the arboretum of the Forest Research Institute and Sungei Buluh, Selangor, respectively. Isolates were identified by the Commonwealth Mycological Institute, Kew, England, as *Cylindrocladium scoparium* Morgan (Herb. IMI No. 251124).

C. scoparium is a new record in West Malaysia (Lee, 1981) although *C. quinquesepatum* Boedijn and Rietsma (Anon., 1970), *C. pteridis* Wolf. (Ivory, 1973) and an unconfirmed species (Hong, 1976) have been recorded from this area.

C. scoparium is a widely distributed pathogen of many species of plants including trees in all major continents (Browne, 1968; Thies, 1969; Bakshi, 1972; Hodges and May, 1972; Peerally,

1973). It incites diseases, such as, leaf spots, root rots, stem lesions, damping-off of seedlings and dieback of older trees (Browne, 1968). This paper reports the potential pathogenicity of this organism to some forest tree species in Peninsular Malaysia.

MATERIALS AND METHODS

Unfortunately seedlings of the tree species from which *C. scoparium* had been isolated were not available hence pathogenicity was assessed on the following:

1. *Pinus caribaea* Mor. — 10 months old.
2. *Shorea acuminata* Dyer — 5 months old.
3. *Dipterocarpus grandiflorus* Blanco — 5 months old.
4. *Scaphium* sp. — 5 months old.

Inoculum for leaf pathogenicity tests was prepared by adding 10 ml of sterile distilled water to a 14-day-old culture of the fungus growing on potato dextrose agar and agitating the surface with a sterile needle. The resulting spore suspension was serially diluted with sterile distilled water.

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The test plants were watered from overhead three hours before inoculation. The spore suspension was sprayed on the seedling leaves in the evening when the temperature was lower in the greenhouse and the plants enclosed in polythene bags to maintain high humidity. The control seedlings were sprayed with sterile distilled water and kept under identical conditions. Following inoculation the plants were kept in the greenhouse where the temperature over 24 hrs. varied from 22 to 34°C. During the hottest parts of the day (noon to 2 p.m.), the polythene bags were sprayed with water to reduce the temperature. The bags were removed after 3 days and the plants were examined daily thereafter for the development of symptoms.

The pathogenicity of *Cylindrocladium scoparium* was tested also by wound inoculation of the stems of the seedlings. A 14-day-old culture growing on potato dextrose agar was cut into small pieces (about 1 mm²) to produce inoculum. The stem of the seedling was first wiped with alcohol and a vertical cut (about 1 cm) made in the bark at about 4 cm above the collar. A small piece of inoculum was then placed beneath a flap of bark, the point of inoculation covered with sterile damp cotton wool and wrapped with cellotape. Ten seedlings each of *S. acuminata*, *D. grandiflorus* and *Scaphium* sp. were inoculated. The controls were inoculated with small pieces of sterile potato dextrose agar. The seedlings were kept under cover in the nursery and after one week of incubation, observed daily for the development of symptoms.

RESULTS

Regardless of the method of inoculation disease symptoms did not develop on seedlings of *Scaphium* sp. or *S. acuminata* even after two months (Table 1). However with the two higher levels of spray inoculum, lesions developed on the leaves and petioles (in one case) of *D. grandiflorus* after two weeks. The lesions were 0.5-2 mm in diameter, irregularly circular and reddish-brown in colour. The infected leaves progressively wilted from the tip towards the base and abscised. *C. scoparium* was isolated from the lesions. *Pinus caribaea* seedlings also developed symptoms of needle blight one week after spray inoculation. The needles initially became chlorotic, wilted and finally turned a reddish-brown colour. Affected needles abscised. *C. scoparium* sporulated on some of the affected needles and the fungus was reisolated from such needles when incubated on malt extract agar after surface sterilization.

Following wound inoculation, three of the ten seedlings of *D. grandiflorus* exhibited wilting of the lower leaves after one month. Later the wilting progressed basipetally in the individual leaves and acropetally in the shoots. While the fungus was not observed sporulating on the aerial parts of the seedlings, *C. scoparium* was isolated from excised pieces of stem (about one cm above the original wound) of the wilted seedlings. The controls remained healthy and pieces of stem did not yield any microorganisms.

DISCUSSION

Under the conditions of the experiment *D. grandiflorus* and *P. caribaea* were susceptible but *Scaphium* sp. and *S. acuminata* were resistant to disease induction by *C. scoparium*. In *Eucalyptus* sp. in West Malaysia *Cylindrocladium* (species not recorded) has been associated with symptoms similar to those recorded in this experiment (Hong, *pers. comm.*)

These results are a new record for *C. scoparium* as a pathogen of some forest tree species in West Malaysia and they suggest that it may have a wide host range. In the United States, *C. scoparium* has long been associated with disease in forest tree nurseries (Graves, 1915; Cox, 1954 cited in Thies, 1969; Bugbee and Anderson, 1963), and has caused serious losses of conifer seedlings in the Wisconsin State Forestry nurseries (Thies, 1969). Anderson *et al.*, (1962) reported that *C. scoparium* caused root rot in seedlings of twelve of thirteen conifer species tested in Minnesota, while Browne (1968) indicated that *C. scoparium* is parasitic on both angiosperms and gymnosperms. In Brazil, this fungus is a common agent of root rot and damping-off on seedlings of *Eucalyptus* spp. in many areas (Hodges & May, 1972). *C. scoparium* is also known to cause large scale mortality in eucalypt seedlings in Argentina, Java and Japan (Spaulding, 1961) and to a smaller extent in India (Bakshi *et al.*, 1972).

Little is known about the susceptibility of forest tree species in Peninsular Malaysia to *C. scoparium*. The present results which demonstrate the susceptibility of some forest tree species in this country, justify further surveys and investigations into the host range and impact of *C. scoparium* in Malaysian natural forests and forest tree nurseries.

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A NEW PATHOGEN OF SOME FOREST TREE SPECIES IN PENINSULAR MALAYSIA

TABLE 1
Pathogenicity of *Cylindrocladium scoparium* to seedlings of four tree species following spray inoculation of leaves and wound inoculation of stems

Tree species	Inoculum	No. of seedlings	Effects
<i>Scaphium</i> sp.	Spray inoculum ($\times 10^4$ spores/ml)		
	5.2	5	No effects after 2 months
	8.8	5	
	10.3	5	
Wound inoculum	10		
<i>Dipterocarpus grandiflorus</i>	Spray inoculum ($\times 10^4$ spores/ml)		
	5.2	5	No effects after 2 months
	8.8	5	Lesions on petiole and leaves of 1 plant after 2 weeks
	10.3	5	Lesions on leaves on 2 plants after 2 weeks
Wound inoculum	10	Wilting of lower leaves in 3 plants after 1 month, 1 plant subsequently died	
<i>Shorea acuminata</i>	Spray inoculum ($\times 10^4$ spores/ml)		
	5.2	5	No effects after 2 months
	8.8	5	
	10.3	5	
Wound inoculum	10		
<i>Pinus caribaea</i>	Spray inoculum ($\times 10^4$ spores/ml)		
	5.2	5	Browning foliage on 2 plants after 1 week
	10.3	5	Browning foliage on 4 plants after 1 week
Wound inoculum	—		
<i>Scaphium</i> sp. <i>S. acuminata</i> <i>D. grandiflorus</i> <i>P. caribaea</i>	Control spray inoculum (distilled water)	5 of each species	No effects after 2 months
	Wound inoculum (sterile piece of agar)	5 of each species	

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