

## Two Mycoparasites on Powdery Mildews

N. N. RAGHAVENDRA RAO and M. S. PAVGI

Faculty of Agriculture, Banaras Hindu University, India

**Abstract.** *Cladosporium oxysporum* BERK. and CURT. was mycoparasitic on *Phyllactinia corylea* (PERS.) KARST. on mulberry (*Morus alba* L.). Early infection inhibited development and maturation of ascospores in the cleistothecia and late stage infection plasmolysed them resulting in loss of their survival.

*Verticillium lecanii* (ZIMM.) VIÉGAS parasitized *Oidium tingtanium* CARTER causing powdery mildew of *Citrus* spp. Infection by the mycoparasite resulted in premature dislodgement of the conidial chains and their subsequent incapacitation for germination and secondary spread.

### I. *Cladosporium oxysporum* on powdery mildew of mulberry:

Mulberry (*Morus alba* L.) is cultivated in India mainly as feed for the silkworms (*Bombyx mori* F.). A powdery mildew incited by *Phyllactinia corylea* (PERS.) KARST. incites premature defoliation during winter. The dark brown cleistothecia often appear in gregarious circular groups of 30—50 cleistothecia/group. A mycoparasitic infection was noticed on the maturing cleistothecia during December—January masking them by its greyish brown colonies. Infected cleistothecia were easily dislodged from the ectothallic mat. Preliminary examination of the mycoparasite indicated it a species of *Cladosporium* LINK ex FRIES.

Young cleistothecial initials were killed and disintegrated by the mycoparasite. On maturing cleistothecia, it initially built up an extensive growth on the walls and abundantly sporulated with the characteristic conidiophores and conidia (Fig. 1). The parasite established intraluminal hyphae in the bulbous-based cleistothecial appendages, ultimately rendering them functionless by dislodgement (YARWOOD 1957). Thus it interfered in the survival and/or dissemination of cleistothecia serving the primary inoculum. Infection of immature cleistothecia resulted in the inhibition of differentiation and maturation of ascospores; such cleistothecia remained sterile and devoid of ascospores. Mature cleistothecia were also infected. The asci and ascospores in them became crumpled and shrivelled due to plasmolysis, probably caused by the mycoparasitic toxin diffusing into them. These ascospores lost their germinability.

Young, dull white colonies of the mycoparasite on potato dextrose agar medium (pH 6.5) changed to greyish brown with a partially submerged growth. The conidiophores were macronematous, usually

straight, slightly flexuous, smooth and pale olive brown. Nodular intercalary swellings were prominent and the conidia were borne on the terminal swellings. The conidiophores continued growth by apical proliferation, bearing conidia on the swellings. The conidiophores measured  $237-450 \times 2.5-4.7 \mu$  and the terminal and intercalary swellings  $4-7.2 \mu$  in diam. The round conidiogenous cells were slightly flattened at the base and on the sides, producing conidia in simple or branched chains. They were subhyaline to pale brown, cylindrical, obpyriform or ellipsoidal, smooth, measuring  $7.5-22.5 \times 2-7 \mu$ . Morphology and cultural characters of the mycoparasite identified it with *Cladosporium oxysporum* BERK. and CURT. (IMI 191317). Fresh conidial suspension in sterile dist. water was sprayed on uncontaminated cleistothecia on the leaves and incubated at room temperature ( $16-18^\circ \text{C}$ ) (YARWOOD 1946). The mycoparasitic growth appeared 7-10 days after inoculation. The cleistothecia in the control blanks sprayed with sterile dist. water alone remained uninfected.

Few species of the genus *Cladosporium* such as *C. exoasci* LINDAU, *C. exobasidii* JAAP (*C. cladosporioides* (FRASER) de VRIES), *C. accidiicola* THUEMEN and *C. hemileiae* STEYART are reported mycoparasitic mainly on rust fungi (de VRIES 1952). ULLASA (1968) reported an unidentified species of *Cladosporium* parasitic on the telia of *Puccinia solmsii* P. HENN on *Polygonum chinensis* L.

*Cladosporium oxysporum* is a common saprophyte on the dead stems and leaves in the tropics (ELLIS 1971) and its mycoparasitism on a powdery mildew constitutes an interesting record.

## II. *Verticillium lecanii* (ZIMM.) VIÉGAS on powdery mildew of *Citrus*:

The powdery mildew of citrus plants incited by *Oidium tingtanium* CARTER severely occurs in the submountain tracts of Coorg, the Nilgiris, Pulneys, Wynaad and Shevaroy hills in South India and in the hills of Assam in the North East (REDDY 1968). The mildew appears during October to March on the leaves, twigs and young, immature fruits, hastening premature leaf and fruit drop. A mycoparasitic infection was noticed on the powdery mildew in early November on some varieties of Coorg oranges (*Citrus reticulata* BLANCO) in Gonicoppal and adjacent areas in Coorg, Karnatak State. Initially the infection remained masked with the greyish white, ectoparasitic mildew growth becoming distinct by pinkish color but escaped detection visually. The mycoparasite effectively inhibited the growth of the powdery mildew by circumventing its colonies. Preliminary examination showed verticillate branching of the conidiophores with accumulation of conidia at their tips held in mucilaginous droplets, characteristic of the genus *Verticillium* NEES ex WALLROTH.

The parasite gained initial entry into the fungus probably through broken hyphal ends or open apices of the conidiophores after conidial

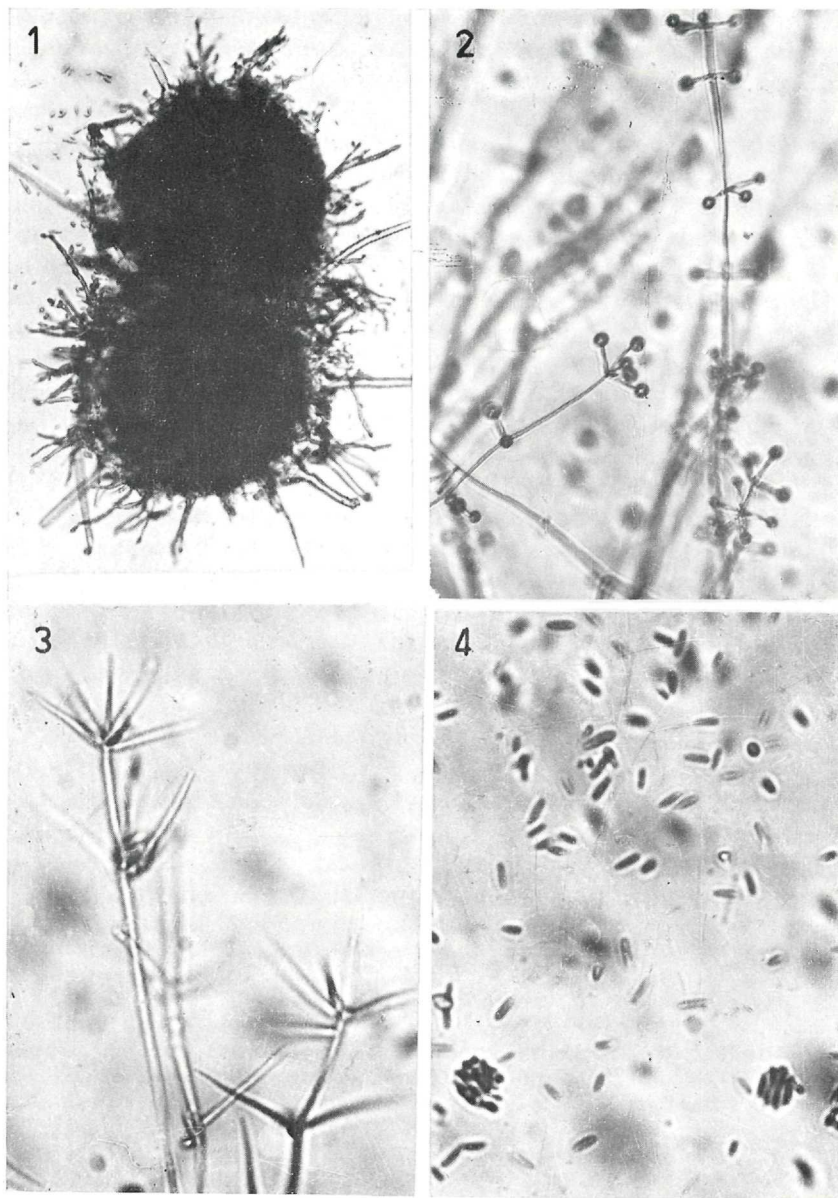


Fig. 1. Cleistothecia of *Phyllactinia corylea* parasitized by *Cladosporium oxysporum*; Fig. 2. Conidiophores bearing conidial balls of *Verticillium lecanii*; Fig. 3. Typical verticillate branching of conidiophores; Fig. 4. Typical conidia and conidia amassed in balls of *V. lecanii*. (Fig. 1:  $\times 200$ ; Fig. 2:  $\times 250$ ; Fig. 3:  $\times 500$ ; Fig. 4:  $\times 850$ ).

discharge, built intraluminal hyphae entering fresh conidiophores and conidia inciting premature dislodgement from the conidial chains. Abstricted conidia showed crumpled walls and contained the parasitic hyphae rendering them incapacitated for germination and secondary host infection. Single conidial isolates of the mycoparasite on potato dextrose agar medium (pH 6.5, at  $25 \pm 1^\circ \text{C}$ ) were slow-growing (2.5–3 cm in 10 days), cottony white and fluffy, with densely packed hyphae. No pigment was secreted into the medium by the colony. The conidiophores were hyaline, straight, branched, bearing 3–5 branchlets in verticillate whorls, which were slightly swollen at the base and tapered towards the tips, measuring 17.5–35  $\mu$  in length (Figs. 2, 3). A nodular swelling occurred at the base. Conidia were abstricted singly over the tips of conidiophores. A mature conidium was pushed aside and the process repeated until 8–12 conidia were held in a mucilaginous droplet. The conidia were unicellular, hyaline, cylindrical to ovoid with ends rounded, measuring  $3.75\text{--}7.5 \times 1.25\text{--}2 \mu$  (Fig. 4). Morphology and cultural characters of the mycoparasite identified it with *Verticillium lecanii* (ZIMM.) VIÉGAS (1939) (IMI 191318).

Few species of the genus *Verticillium* such as *V. malhousii* WARE and *V. psalliotae* TRESCHOW are reported mycoparasites (DAYAL and BARRON 1970). *V. lecanii* has been reported earlier to parasitize several plant parasitic insects and few rust fungi (SINGH 1973, and PAVGI 1975, VIÉGAS 1939). Its parasitism on the powdery mildews may be utilized with advantage as a biological control against this major citrus disease.

### Acknowledgement

The first author (NNRR) is grateful to the Council of Scientific and Industrial Research, New Delhi for the award of a Senior Research Fellowship.

### Literature Cited

- DAYAL, R. and BARRON, G. L. (1970). *Verticillium psalliotae* as a parasite of *Rhopalomyces*. Mycologia 62: 826–830.
- DE VRIES, G. A. (1952). Contribution to the knowledge of the genus *Cladosporium* LINK ex FRIES. Baarn. 121 p.
- ELLIS, M. B. (1971). Dematiaceous Hyphomycetes. The Commonw. Mycol. Inst., Kew. England. 608 p.
- REDDY, G. S. (1968). Citrus diseases in India and their control. Tech. Bull. no. 9. Indian Coun. Agr. Research, New Delhi. 70 p.
- SINGH, S. K. (1973). Two hyperparasites of rusts. M. Sc. (Ag) Thesis, Banaras Hindu University, India. p. 1–33.
- SINGH, S. L. and PAVGI, M. S. (1975). Two hyperparasites on *Crinum* rust from Varanasi. Sci. & Cult. 41: 295–296.
- ULLASA, B. A. (1968). *Cladosporium*: a new mycoparasite on rust. Curr. Sci. 37: 505.
- VIÉGAS, A. P. (1939). Um amigo do fazendeiro *Verticillium lecanii* (Zimm.) n. comb. o causador do halo branco do *Coccos viridis* Green.
- YARWOOD, C. E. (1946). The detached leaf culture. Botan. Rev. 12: 1–56.
- (1957). Powdery mildews. Botan. Rev. 23: 236–301.

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Sydowia](#)

Jahr/Year: 1977/1978

Band/Volume: [30](#)

Autor(en)/Author(s): Rao N. N. Raghavendra, Pavgi M. S.

Artikel/Article: [Two Mycoparasites on Powdery Mildews. 145-147](#)