

New species of *Passalora* (cercosporoid hyphomycete) from Western Ghats, India

SANJAY K. SINGH*, PARAS N. SINGH and PADAMNABH MISHRA

Mycology and Plant Pathology Group

Agharkar Research Institute, G.G. Agarkar Road, Pune 411 004, Maharashtra, India

* corresponding author, singhsksingh@rediffmail.com

Singh S. K., Singh P. N. and Mishra P. (2008): New species of *Passalora* (cercosporoid hyphomycete) from Western Ghats, India. – Czech Mycol. 60(2): 243–249.

The present paper describes two new species of *Passalora*, namely *P. macarangae* collected on *Macaranga peltata* (*Euphorbiaceae*), and *P. peltophori* on *Peltophorum pterocarpum* (*Fabaceae*). Both treated hyphomycetous taxa were collected in the forests of Western Ghats, India.

Key words: anamorphic fungi, biodiversity, taxonomy, India.

Singh S. K., Singh P. N. and Mishra P. (2008): Nové druhy rodu *Passalora* (hyfomycety z okruhu rodu *Cercospora*) z pohoří Západní Ghát v Indii. – Czech Mycol. 60(2): 243–249.

V článku jsou popsány dva nové druhy rodu *Passalora*, a sice druh *P. macarangae* nalezený na *Macaranga peltata* (*Euphorbiaceae*) a *P. peltophori* sbíraný na *Peltophorum pterocarpum* (*Fabaceae*).

INTRODUCTION

Passalora Fr. is a well-established anamorphic genus widely distributed throughout the world. Species of *Passalora* occur on many plant hosts, where they cause various leaf spots (Bhalla et al. 1999, Crous and Braun 2003, Beilharz et al. 2004, Arzanlou et al. 2008). Most species of *Passalora* are foliicolous in nature and distinguished by producing dematiaceous conidiophores and phragmo-
sporous conidia with conspicuous conidial scars and conidial hila. Crous et al. (2000, 2001) re-assessed the morphology of a number of well-established genera of the *Cercospora*-complex, including *Cercosporidium* Earle, *Mycovellosiella* Rangel, *Phaeoramularia* Munt.-Cvetk., *Eriocercospora* Deighton, *Tandonella* S.S. Prasad & R.A.B. Verma and other genera, and reduced several to synonymy with *Passalora*, providing a comprehensive overview of the genus. During our recent surveys and exploration of interesting and novel fungi from the Western Ghats regions in the states of Maharashtra and Karnataka (India), two undescribed species of *Passalora* were encountered. On the basis of their thickened and darkened

scars and conidial hila, pigmented conidia and conidiophores, these two species are placed into the genus *Passalora* and described and illustrated as *Passalora macarangae* and *P. peltophori* spp. nov. This paper represents the second in a series (Singh et al. 2004) dealing with cercosporoid hyphomycetes collected from Western Ghats, India.

MATERIALS AND METHODS

The fungi described here were collected in two different regions, namely Tilarighat (state of Maharashtra), and Mangalore (state of Karnataka), during periodic surveys (2004–2005). Semi-permanent microscopic slides were prepared by making scrape mounts and sections from infected parts of the leaves. Thin sections were obtained using a SLEE cryostat microtome. The morphological details were observed using an OLYMPUS CX 41 compound microscope. Specimens were mounted in lactophenol cotton blue for microscopic studies. Fungal structures were measured with an ocular micrometer ($n = 20$ per structure), and camera lucida drawings were made of characteristic morphological features. Holotype specimens are deposited at Ajrekar Mycological Herbarium (AMH), MACS' Agharkar Research Institute, Pune, India (AMH: sensu Holmgren et al. 1990).

In vitro culture. Attempts to culture the described species on artificial media, especially on V-8 Juice Agar and Potato-Carrot Agar (Tuite 1969), were unsuccessful.

RESULTS AND DISCUSSION

Passalora macarangae* S.K. Singh, P.N. Singh & P. Mishra, *anam. sp. nov.

Fig. 1

(Mycobank MB 512223)

Etymology. Specific epithet relates to the host genus *Macaranga*, from which this fungus was collected.

Diagnosis latina. Maculae amphigenae, angulares. Coloniae amphiphyllae, discretiae, griseobrunneae. Mycelium externum, e hyphis septatis, ramosis, subhyalinis, laevibus, 2–3 μm latis. Stromata subevoluta, interdum intraepidermalia, olivacea. Conidiophora ex myceliis superficialibus oriunda, micronemata, mononemata, laevia, luteo-olivacea, raro ramosa, transverse 0–2 septata, 5–25 \times 2,5–5 μm . Cellulae conidiogenae in conidiophoris incorporatae, terminales, sympodiales, polyblasticae, 5–15 \times 2,5–4 μm , cicatricatae, cicatrices incrassatae. Conidia holoblastica, acropleurogenosa, transverse 1–6 septata, solitaria vel catenulata, tenuitunicata, laevia, recta vel curvata, cylindrica vel obclavata, 10–85 \times 3–5 μm , apice subobtusa vel rotundata, basi obconicotruncata, luteo-olivacea, hilo incrassato.

Holotypus. On living leaves of *Macaranga peltata* (*Euphorbiaceae*), India, Tilarighat, Maharashtra, Mar. 2005, S. K. Singh, AMH 9024.

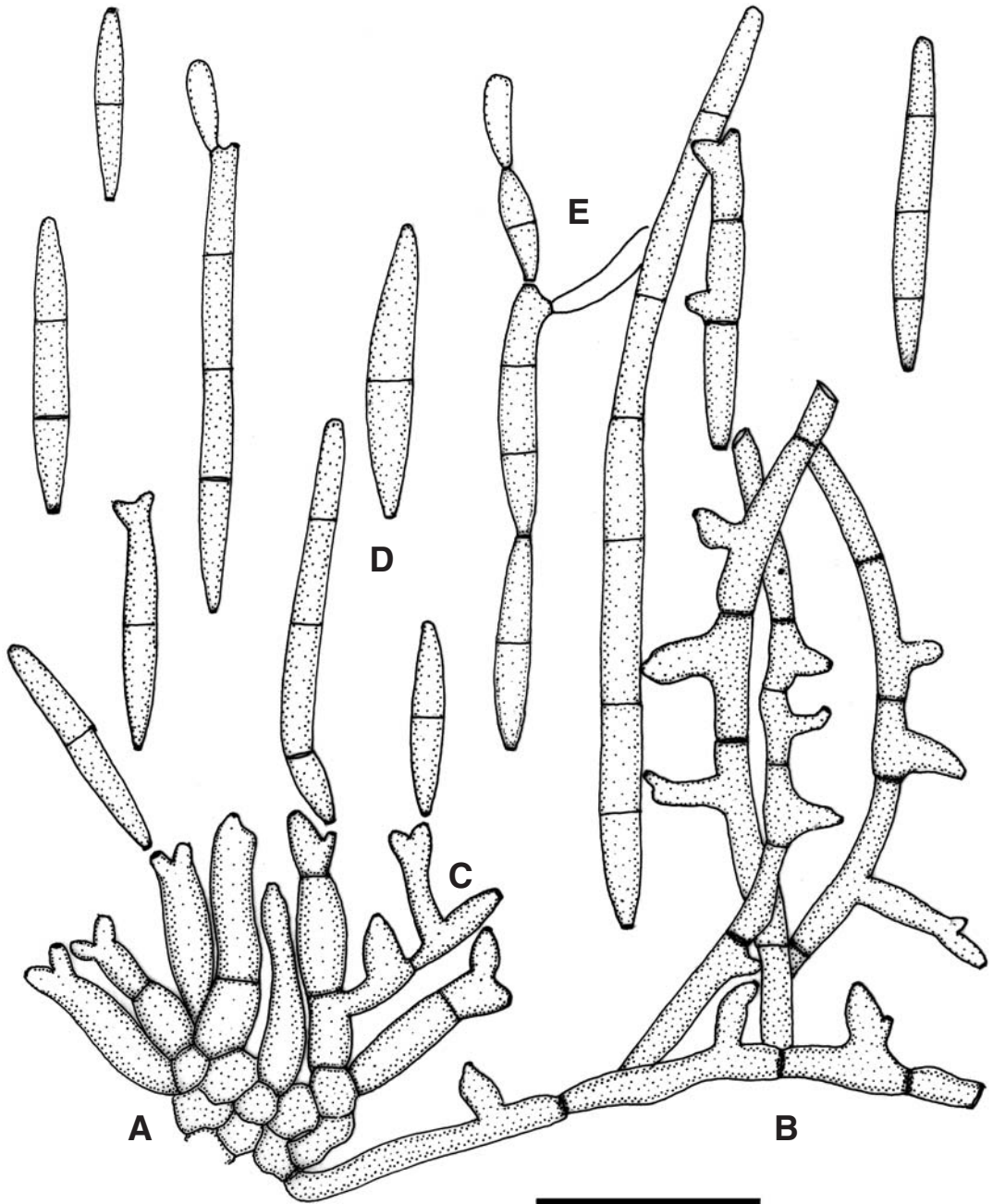


Fig. 1. *Passalora macarangae*. A. Feebly developed stromata. B. Well-developed, external mycelium bearing conidiophores. C. Branched conidiophores arising from stromatal cells. D. Solitary conidia. E. Conidia in branched chains. Scale = 20 μ m.

Description. Leaf spots amphigenous, angular, pale brown, surrounded by a chlorotic margin. Colonies amphiphylous, discrete, greyish brown. Mycelium external, septate, branched, subhyaline, smooth-walled, 2–3 µm wide. Stromata poorly developed, minute (few celled), intra-epidermal, olivaceous. Conidiophores arising from superficial mycelium, micronematous, mononematous, smooth-walled, pale olivaceous, rarely branched, 0–2 transversely septate, 5–25 × 2.5–5 µm. Conidiogenous cells integrated, terminal, sympodial, polyblastic, 5–15 × 2.5–4 µm, cicatrised, scars thickened and darkened. Conidia holoblastic, acropleurogenous, 1–6-septate, solitary or in branched chains, thin- and smooth-walled, straight to curved, almost cylindrical to narrowly obclavate, 10–85 × 3–5 µm, apex subobtuse to rounded, base obconicotruncate, pale olivaceous, hilum thickened and darkened, refractive.

Discussion. *Passalora macarangae* is a fungal pathogen of *Macaranga peltata*, causing leaf spots typically on the lower leaves of young trees. A survey of literature reveals that no other species of *Passalora* has previously been reported from *Macaranga*. However, the present collection is comparable with related taxa earlier described from *Euphorbiaceae*. *Passalora macarangae* is distinct from *Mycovellosiella malloti* Kharwar et al. (1996) and *M. subhyalinae* S.K. Singh & P.N. Singh (Singh et al. 2004) by producing vein-limited symptoms on infected leaves in contrast to the indistinct to irregular leaf spots in the type materials examined. The present collection is also distinct from *Passalora acalyphae* (Tharp.) U. Braun & Crous (Crous and Braun 2003) in having cylindrical to obclavate conidia, from *Mycovellosiella brideli* P. Kumar & Kamal (1981) in having significantly larger conidia, and from *Pseudocercospora malloti-repandi* (Bhalla et al.) U. Braun (Braun 2000) in having much smaller conidiophores and wider conidia.

The taxonomic status of *Mycovellosiella malloti* and *M. bridelliae* is considered 'unclear' by Crous and Braun (2003) and both have been excluded from the list of *Passalora*. *Mycovellosiella subhyalina*, which should be reduced to synonymy with a *Passalora* species, keeps its original status.

Additional specimens examined

1. Isotype of *Pseudocercospora malloti-repandi* (? *Mycovellosiella malloti-repandi*) on *Mallotus repandus*, India, Bansi, Siddharth nagar, U. P., Kamal, Mar. 1996, GPU 50/96.
2. Isotype of *Mycovellosiella malloti* (status considered unclear by Crous & Braun 2003) on *Mallotus philippinensis*, Nepal, Narayangarh, Kamal, Jan. 1995, HClO 41505, GPU 3008.
3. Holotype of *Mycovellosiella subhyalina* on *Putranjeeva roxburghii*, India, Gorakhpur, U. P., P. N. Singh, Oct. 2003, AMH 8866.

***Passalora peltophori* S.K. Singh, P.N. Singh & P. Mishra anam. sp. nov.**

Fig. 2

(Mycobank MB 512224)

E t y m o l o g y. Specific epithet relates to the host genus *Peltophorum*, from which this fungus was collected.

D i a g n o s i s l a t i n a. Maculae epigenae, raro amphigenae, irregulares atrobrunneae. Coloniae hypophyllae, effusae, griseae. Mycelium externum e hyphis ramosis, septatis, subhyalinis, 2–2.5 µm latis. Stromata absentia. Conidiophora e mycelio externo oriunda, micronematosa vel macronematosa, mononematosa, recta, 0–1 septata, cylindrica, subhyalina, 10–22 × 1.5–4 µm. Cellulae conidiogenae in conidiophoris incorporatae, terminales, polyblasticae, sympodiales, 7–16 × 1.5–4 µm, cicatricatae, cicatrices incrassatae. Conidia holoblastica, acropleurogena, curvata, transverse 1–5 septata, solitaria vel catenata, tenuitunicata, laevia, cylindrica vel obclavata, luteo olivacea, 10–84 × 2–4 µm, apice subacuta vel subobtusa, basi obconicotruncata.

H o l o t y p e. On living leaves of *Peltophorum pterocarpum* (*Fabaceae*), India, Mangalore, Karnataka, Nov. 2004, S. K. Singh, AMH 9025.

D e s c r i p t i o n. Leaf spots epigenous, rarely amphigenous, as irregular, brownish patches, more prominent in basal part of the leaf, but only a slight discoloration observed in the apical part. Colonies hypophyllous, effuse, greyish. Mycelium external, consisting of branched, septate, subhyaline, 2–2.5 µm wide hyphae. Stromata absent. Conidiophores arising from external mycelium, micronematous to macronematous, mononematous, straight, 0–1-septate, cylindrical, sub-hyaline, 10–22 × 1.5–4 µm. Conidiogenous cells integrated, terminal, polyblastic, sympodial, 7–16 × 1.5–4 µm, cicatrised, scars thickened and darkened. Conidia holoblastic, acropleurogenous, almost curved, transversely 1–5-septate, solitary to catenate, thin- and smooth-walled, subcylindrical to obclavate, pale olivaceous, 10–84 × 2–4 µm, apex subacute to subobtuse, base obconical subtruncate.

D i s c u s s i o n. No species of *Passalora* have so far been described from *Peltophorum*. However, 13 species have to date been reported from *Fabaceae* (Braun 1993, Bhalla and Singh 1996, Bhalla et al. 1999, Crous and Braun 2003). The present collection is morphologically comparable with *Passalora gliricidiae* (Syd. & P. Syd.) U. Braun & Crous (Crous and Braun 2003), and *P. passalorioides* (G. Winter) U. Braun & Crous (Crous and Braun 2003). It is distinct from these species by the absence of stromata. Moreover, it is also different from all other species of *Passalora* on *Fabaceae* by producing characteristic symptoms near the basal part of the leaves, and having subhyaline and considerably smaller conidiophores (10–22 µm), except *P. puerariae* (D.E. Shaw & Deighton) U. Braun & Crous (Crous & Braun 2003), which produces even smaller conidiophores (2.8–15 µm). Moreover, in addition to the marked differences in the combination of morphological features, *P. peltophori* is distinct from *P. macarangae* by causing brownish and irregular epigenous leaf symptoms in contrast to the pale brown amphigenous and angular symptoms induced by the latter species. Hence, based on these distinct morphotaxonomic differences, the present collection is described and illustrated as new.

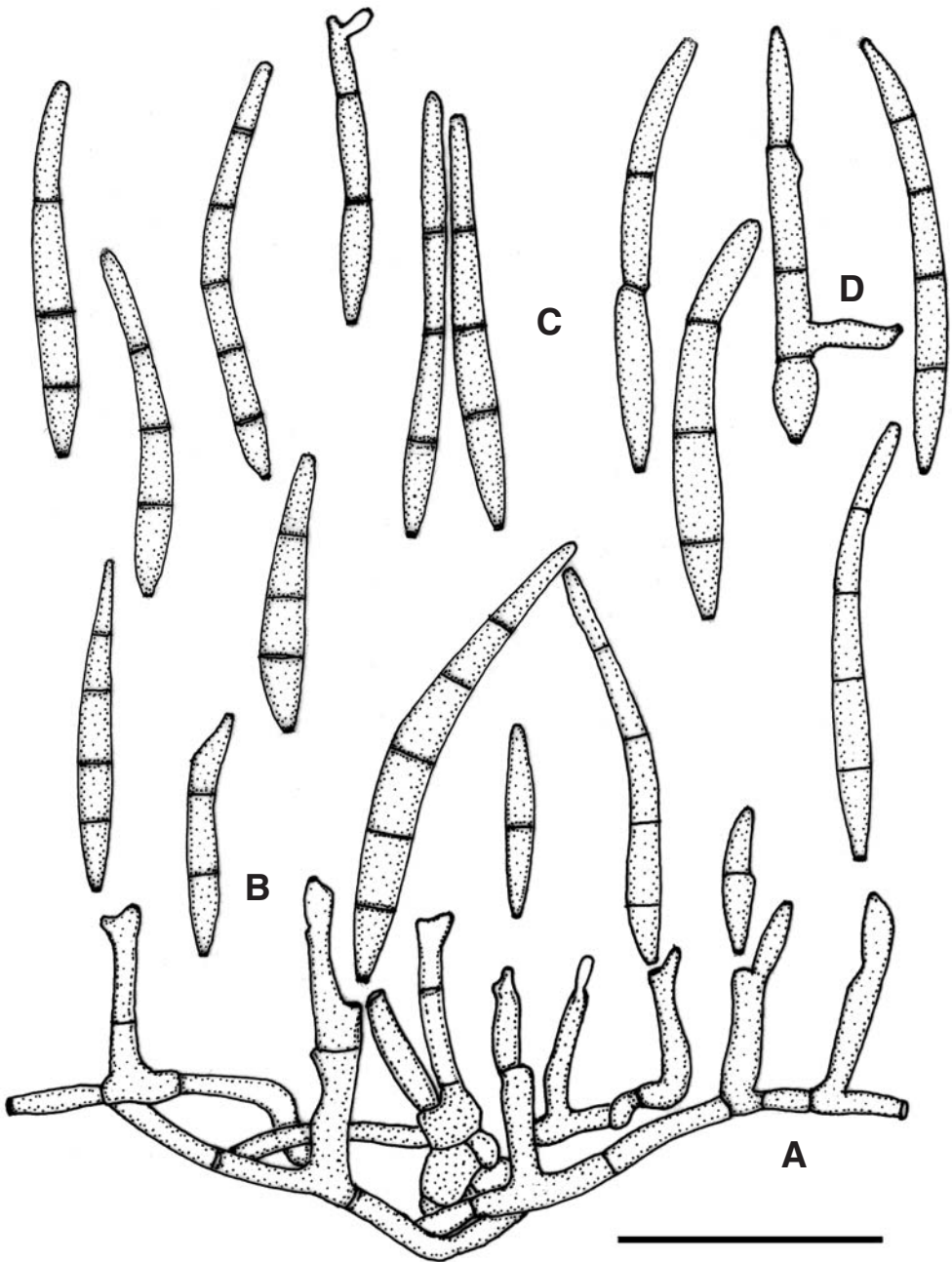


Fig. 2. *Passalora peltophori*. A. External mycelium bearing conidiophores. B. Conidiophores. C. Solitary conidia. D. Branched conidium. Scale = 20 μ m.

ACKNOWLEDGEMENTS

The authors thank Prof. Kamal (Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, Uttar Pradesh) for his helpful suggestions, and the curator of Herbarium Cryptogamae Indiae Orientalis (HCIO), New Delhi, for providing the type materials for examination. The senior author (SKS) thanks Department of Science and Technology (DST), Government of India, New Delhi for financial assistance (SP/SO/PS-55/2005).

REFERENCES

- ARZANLOU M., GROENEWALD J. Z., FULLERTON R. A., ABELN E. C. A., CARLIER J., ZAPATER M.-F., BUDDENHAGEN I. W., VILJOEN A. and CROUS P. W. (2008): Multiple gene genealogies and phenotypic characters differentiate several novel species of *Mycosphaerella* and related anamorphs on banana. – *Persoonia* 20: 19–37.
- BEILHARZ V. C., PASCOE I. G., WINGFIELD M. J., TIAHJONO B. and CROUS P. W. (2004): *Passalora perplexa*, an important pleoanamorphic leaf blight pathogen of *Acacia crassicarpa* in Australia and Indonesia. – *Studies in Mycology* 50: 471–479.
- BHALLA M. K. and SINGH S. K. (1996): New phytoparasitic hyphomycetes from the Terai belt of Uttar Pradesh, India. – *Mycological Research* 100: 610–612.
- BHALLA K., SINGH S. K. and SRIVASTAVA A. K. (1999): New taxa of *Mycovellosiella* parasitizing forest plants of Indian subcontinent. – *Australian Systematic Botany* 12: 365–374.
- BRAUN U. (1993): Taxonomic notes on some species of the *Cercospora*-complex (II). – *Cryptogamic Botany* 3: 235–244.
- BRAUN U. (2000): Miscellaneous notes on some micromycetes. – *Schlechtendalia* 5: 31–56.
- CROUS P. W., APTROOT A., KANG J. C., BRAUN U. and WINGFIELD M. J. (2000): The genus *Mycosphaerella* and its anamorphs. – *Studies in Mycology* 45: 107–122.
- CROUS P. W. and BRAUN U. (2003): *Mycosphaerella* and its anamorphs. I. Names published in *Cercospora* and *Passalora*. – *CBS Biodiversity Series* 1: 1–571.
- CROUS P. W., KANG J. C. and BRAUN U. (2001): A phylogenetic redefinition of anamorph genera in *Mycosphaerella* based on ITS rDNA sequence and morphology. – *Mycologia* 93: 1081–1101.
- HOLMGREN P. K., HOLMGREN N. H. and BARNETT L. C. (1990): *Index Herbariorum*. Part 1: The Herbaria of the World. 8th Ed. – 693 p. New York.
- KHARWAR R. N., SINGH P. N. and CHAUDHARY R. K. (1996): New species of *Mycovellosiella* associated with foliar spots in Nepal. – *Mycological Research* 100: 689–692.
- KUMAR P. and KAMAL (1981): Two new species of *Mycovellosiella* Rangel from Gorakhpur. – *Biological Bulletin of India* 3: 117–120.
- SINGH S. K., DHANORKAR M. N. and WANGAIKAR V. M. (2004): Cercosporoid fungi from Western Ghats, India. I. – *Journal of Mycology and Plant Pathology* 34: 692–694.
- SINGH S. K., SINGH P. N. and MISHRA P. (2004): Some new species of *Mycovellosiella*. – *Indian Phytopathology* 57: 155–160.
- TUITE J. (1969): *Plant pathological methods in fungi and bacteria*. – 239 p. Minneapolis.