

## First record of anamorphic *Leveillula taurica* on *Vasconcellea goudotiana* (Caricaceae) in Brazil

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**Abstract.** *Oidiopsis haplophylli* was found on *Vasconcellea goudotiana* plants in Rio de Janeiro, Brazil. Illustrations and morphological description are provided. This is the first report of the occurrence of *O. haplophylli* on *Caricaceae* in Brazil.

Powdery mildew fungi (*Erysiphaceae*: *Ascomycota*) in the subfamily *Phyllactinioideae* have hemiendophytic (partly external and partly internal) mycelium (Braun 1987). The *Phyllactinioideae* contains the genera *Phyllactinia* Lév. (anamorph *Ovulariopsis* Pat. & Har.), *Leveillula* Arnaud (anamorph *Oidiopsis* Scalia), *Pleochaeta* Sacc. & Speg. (anamorphs *Streptopodium* R.Y. Zheng & G.Q. Chen emend. Liberato & R.W. Barreto) and the monotypic *Queirozia* Viégas & Cardoso emend. Liberato & R.W. Barreto (Zheng and Chen 1978; Braun 1987; Liberato *et al.* 2004, 2006).

The family *Caricaceae* contains five genera of plants, namely *Carica* L., *Vasconcellea* A. St.-Hil., *Jacaratia* A. DC., *Jarilla* Rusby and *Cylicomorpha* Urb. (Tropicos.org. Missouri Botanical Garden. 8 Nov. 2010, available at <http://www.tropicos.org>). *Carica papaya* L. (papaya, pawpaw) is the most important cultivated plant in this family and has been reported as host of four powdery mildew species belonging to the subfamily *Phyllactinioideae*, namely *Ovulariopsis papayae* Van der Byl in South Africa (van der Bijl 1921), *Phyllactinia caricaefolia* Viégas in Brazil (Viégas 1944), *Oidiopsis haplophylli* (Magnus) Rulamort, which is the anamorph of *Leveillula taurica* (Lév.) G. Arnaud, in Australia, India and Portugal (Clare 1964; Simmonds 1965; Ullasa and Sohi 1978; Sequeira 1992; Liberato *et al.* 2004) and *Streptopodium caricae* Liberato & R.W. Barreto in Brazil (Liberato *et al.* 2004).

In Brazil, *S. caricae* and *P. caricaefolia* have been reported (Viégas 1944; Liberato *et al.* 2004). A specimen reported as *L. taurica* (Nogueira *et al.* 1997) was re-examined and identified as *S. caricae* (Liberato *et al.* 2004). A report of the occurrence of *O. papayae* (Ribeiro *et al.* 1988) cannot be confirmed as a specimen was not retained and deposited in a herbarium. Liberato *et al.* (2004) examined published pictures of the specimen and concluded that the fungus was probably *S. caricae*.

In November 2008, powdery mildew was observed on 1-year-old potted plants of *Vasconcellea goudotiana* Triana & Planch. growing under shade in Campos dos Goytacazes-RJ, Brazil. A fresh specimen was collected and examined in the Plant

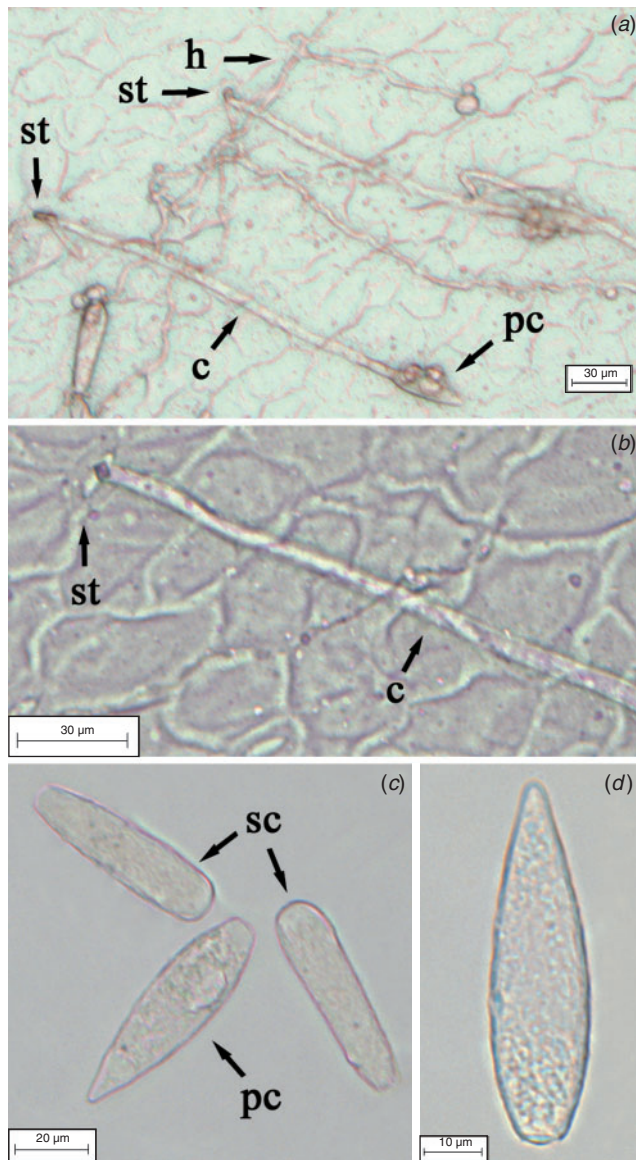
Pathology Laboratory of the North Fluminense State University. The origin of the conidiophores was determined by a technique commonly used for the examination of stomata, that is, a thin layer of clear nail varnish was painted onto the lower leaf surface, on areas with signs of the fungus and left drying for 10 min. A strip of transparent adhesive tape (sellotape) was placed over the dried varnish and light pressure applied for 1 min to obtain an imprint. The sellotape with varnish imprint was peeled off the leaf and mounted in lactoglycerol on a glass microscope slide (Ferris *et al.* 1996). The conidiophores were examined by light microscopy and found to originate from internal mycelium through the stomata, which is characteristic of the genus *Oidiopsis*. The specimen was identified as *O. haplophylli* and is described below.

***Oidiopsis haplophylli*** (Magnus) Rulamort, Bull. Soc. Bot. Centre-Ouest, N.S., 17: 191 (1986), anamorph of ***Leveillula taurica*** (Lév.) G. Arnaud, Ann. Epiphyt. 7: 94 (1921) on *Vasconcellea goudotiana* (Fig. 1)

*Mycelium* hypophyllous, hemiendophytic (partly external and partly internal), *Superficial hyphae* entering the leaves through stomata, branched, septate, hyaline, smooth. *Conidiophores* hypophyllous, produced from the internal mycelium, arising through the stomata, rarely branched, up to 227 µm long, cylindrical, hyaline, smooth. *Conidia* single, dimorphic: primary conidia lanceolate, apically pointed, base rounded, 61–85 × 12–22 µm, l/w ratio 3.0–5.4; secondary conidia subcylindrical to cylindrical with rounded ends, 49–73 × 12–20 µm, l/w ratio 2.8–5.2, aseptate, hyaline, smooth. *Teleomorph*: not found.

*Material examined*: **Brazil**: Rio de Janeiro: Campos dos Goytacazes, 12 Nov. 2008, M. Vivas (VIC 30735) on *Vasconcellea goudotiana* Triana & Planch. (≡ *Carica goudotiana* (Triana & Planch.) Solms).

Morphological measurements corresponded to those given for *L. taurica* by Braun (1987) and Palti (1988). The primary conidium of *Oidiopsis* is apically pointed or lanceolate, whereas secondary conidia are usually ellipsoid to cylindrical with



**Fig. 1.** *Oidiopsis haplophylli* on *Vasconcellea goudotiana* (Vic. 30735). (a, b) Hyphae (h) and conidiophores (c) arising from stomata (st); (c) primary (pc) and secondary conidia (sc); (d) primary lanceolate conidium.

rounded to truncate apices. The conidiophores of *Oidiopsis* originated from the internal mycelium, emerging through the stomata, which is a unique characteristic among the powdery mildews (Braun 1987). This feature is well observed under scanning electron microscopy or using a leaf-clearing technique (Liberato *et al.* 2005) with a light microscope. The technique used in this study was considered very practical to determine the origin of the conidiophores.

Ullasa *et al.* (1983) observed infection on *Vasconcellea cauliflora* (Jacq.) A. DC., *V. monoica* (Desf.) A. DC., *V. goudotiana* (referred to as *Carica cauliflora* Jacq., *C. monoica* Desf. and *C. goudotiana*, respectively), and *C. papaya* when 5-months old plants in the field were inoculated with *L. taurica*. In the same study, *Vasconcellea quercifolia*

A. St.-Hil. (referred to as *Carica quercifolia* (A. St.-Hil.) Hieron.) was resistant, showing no symptoms. Franceschini *et al.* (1989) described the occurrence of anamorphic *L. taurica* on babaco (*Vasconcellea* × *heilbornii* (V.M. Badillo) V.M. Badillo (≡ *Carica* × *heilbornii* V.M. Badillo, = *Carica pentagona* Heilborn)) in greenhouses in Sardinia, Italy.

*Oidiopsis haplophylli* is a collective species with worldwide distribution and more than 1000 host plant species (Braun 1987; Palti 1988). In Brazil, it was first reported in 1987 (Kurozawa 1987) and since then it has driven the attention of many plant pathologists as it has gradually spread through many regions and hosts causing important diseases in pepper (*Capsicum annum* L.) and tomato (*Solanum lycopersicum* L. = *Lycopersicon esculentum* Mill.) (Liberato *et al.* 1998, 2000), particularly in greenhouse crops (Café Filho *et al.* 2001). This is the first report of the occurrence of *O. haplophylli* on *Caricaceae* in Brazil.

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