

---

## ***Phyllachora xanthii*: redescription and designation of a new type**

---

**Jânia L.S. Bentes<sup>1</sup>, Robert W. Barreto<sup>1</sup> and Paul F. Cannon<sup>2\*</sup>**

<sup>1</sup>Departamento de Fitopatologia, Universidade Federal de Viçosa, 36571-000, Viçosa, MG, Brazil

<sup>2</sup>CABI Bioscience, Bakeham Lane, Egham, Surrey TW20 9TY, UK

Bentes, J.L.S., Barreto, R.W. and Cannon, P.F. (2003). *Phyllachora xanthii*: redescription and designation of a new type. Fungal Diversity 12: 1-5.

A tar-spot fungus found in the state of Paraná, Brazil on living leaves of *Xanthium strumarium* was identified as probably belonging to the previously known species *Phyllachora xanthii*. Available descriptions of this fungus are incomplete and the type material could not be located. A full description with illustrations and designation of a neotype is therefore provided.

**Key words:** biocontrol, invasive weeds, morphology, *Phyllachora*, *Xanthium*.

### **Introduction**

*Xanthium strumarium* L. is a variable member of the *Asteraceae* with a worldwide distribution. With *Xanthium spinosum* L., *X. strumarium* is listed among the world's worst weeds (Holm *et al.*, 1977). This species is particularly damaging to the wool industry because of the difficulty of separating its spiny fruits from sheep fleeces. Its origin is uncertain. During a survey for pathogenic fungi on weeds in the states of Paraná and Minas Geraes (Brazil) *X. strumarium* plants showing symptoms of a tar-spot disease were collected. Microscopic examination showed that the fungus belonged to the genus *Phyllachora* (*Phyllachoraceae*: Ascomycota).

### **Materials and methods**

Fungi on living leaves were dried using a plant press, prior to storage. Fungal fruiting bodies were studied directly and after rehydration with tap water, using a dissecting microscope. Samples were sectioned using a cryomicrotome and examined with a compound microscope. Squash mounts were made using water and lactofuchsin. Slides were examined with a compound microscope, and measurements of microscopic features were made of material mounted in lactofuchsin.

---

\* Corresponding author: P.F. Cannon; e-mail: p.cannon@cabi.org

## Results

***Phyllachora xanthii*** (DC) Sacc., Sylloge Fungorum 2: 614 (1883). (Figs. 1-2)  
= *Xyloma xanthii* DC, Mémoires du Muséum National d'Histoire Naturelle Paris 3: 323 (1817).

= *Dothidea xanthii* (DC.) Fr., Systema Mycologicum 2: 562 (1823).

*Lesions* on living leaves, roughly circular to irregular, often following the secondary leaf veins, 2-9 mm diam.; on the adaxial surface pale yellow to yellow-brown with aggregations of black punctiform spots, sometimes forming black lines that follow the leaf veins; on the abaxial surface pale yellow with whitish centres. *Internal mycelium* intra- and intercellular, 2-3.5 µm diam., branched, septate, pale brown. *External mycelium* absent.

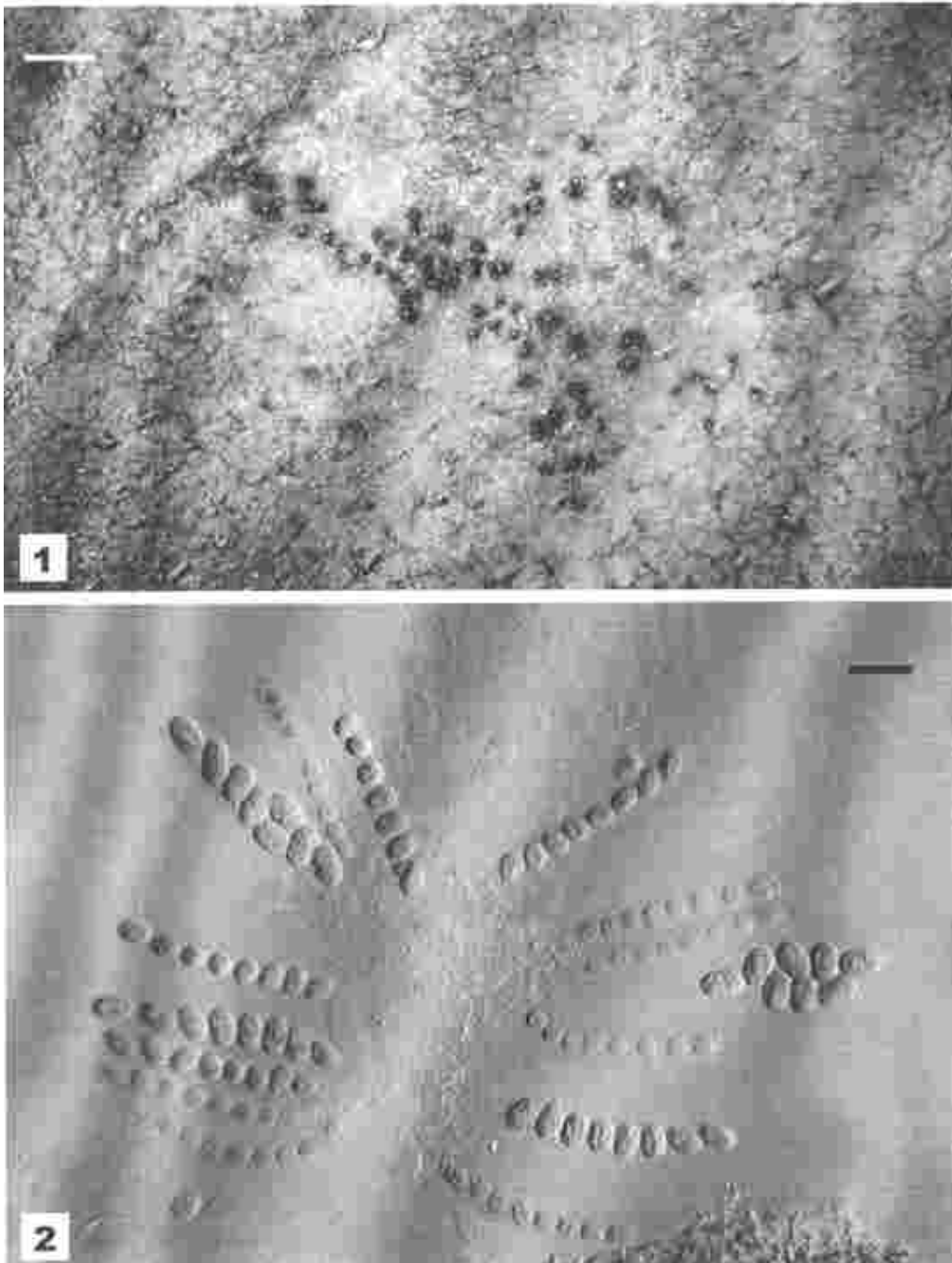
*Anamorph*: not seen.

*Teleomorph*: *Stromata* uniloculate, clypeate on the upper surface, the clypeus merged with the upper wall of the ascoma, composed of a number of layers of dark brown thick-walled *textura angularis* which are almost completely occluded by melanins. *Ascomata* 121-237 µm diam., perithecial, epigenous, immersed, solitary or forming groups of 2-3, ± globose, the ostiole inconspicuous, not or only weakly papillate. *Ascomatal walls* 13-25 µm thick, 3-4 cells thick, composed of thin-walled irregular *textura angularis* with cells to 5 µm diam., dark brown outside, the inner layers paler. *Interascal tissue* of true paraphyses to 144 × 1.5-3 µm, rather longer than the asci, copious, filiform, septate, hyaline, thin-walled, not constricted at the septa. *Asci* 56-92 × 13-17 µm when mature, thin-walled, apparently unitunicate, cylindrical at first but sometimes becoming ovoid to clavate as the ascospores increase in size and become biseriate, short-stalked, the apex widely rounded to ± truncate, with a refractive apical ring 4-5 µm diam. and < 0.5 µm thick which does not blue in iodine, 8-spored. *Ascospores* at first uniseriate but eventually sometimes partially biseriate, 11-12.5 × 7-8.5 µm when mature, at first almost globose but eventually becoming ellipsoidal to cylindric-ellipsoidal, the ends rounded, thin-walled, aseptate, hyaline, smooth, without a mucous sheath or appendages.

*Material examined*: BRAZIL, Minas Geraes, Pouso Alto, on living leaves of *Xanthium strumarium*, 13 March 2002, R. Barreto (VIC 22199; **here designated neotype** of *Dothidea xanthii* DC.; IMI 389402, isoneotype); Paraná, Curitiba, Tanguá, on living leaves of *Xanthium strumarium*, 30 March 1998, R. Barreto 559 (VIC 22164; IMI 387083); Paraná, Curitiba, on living leaves of *Xanthium strumarium*, comm. 30 January 1980, I.W. Forno (IMI 245022a).

## Discussion

Species of *Phyllachora* are frequently regarded as host-specific at least to the family level and more usually at the genus level, although there is little experimental evidence for this approach (Cannon, 1991). Only one species in



**Figs. 1, 2.** *Phyllachora xanthii* **1.** IMI 387083. External appearance of ascomata. **2.** IMI 389402, isoneotype. Asci and ascospores. Bars: 1 = 1 mm; 2 = 20  $\mu$ m.

this genus has been recorded on *Xanthium* spp., *Phyllachora xanthii* (DC.) Sacc. (Saccardo, 1883), based on *Xyloma xanthii* DC. (1817). Very little information is available on this species. In de Candolle's work, only a very brief and non-diagnostic description is given, and no information is given on ecology. The description given by Saccardo (1883) is very brief and is apparently based on de Candolle's original publication (de Candolle, 1817) without further study. It indicates that the fungus occurs on the underside of leaves, it has small dark brown convex pustules (presumably stromata), aggregated within round leaf spots. The species was described from a (presumably) North American collection on *Xanthium canadense* Mill., now treated as *X. strumarium* var. *canadense* (Mill.) Torr. & A. Gray (Farr *et al.*, 1989). No type material could be found in De Candolle's herbaria in Geneva and Paris. As the dubious status of this species cannot be resolved, it is appropriate to designate a neotype and make a comprehensive description and illustration based on recent collections.

Species of *Phyllachora* associated with *Compositae* have not recently been monographed (Cannon, 1996). The only species about which much is known is *P. ambrosiae* (Schwein.) Sacc., which occurs commonly on species of *Ambrosia* and *Iva* in North America (Farr *et al.*, 1989). It was the subject of a developmental study by Miller (1951). A specimen examined (IMI 154443, on *Ambrosia psilostachys* from California) appears very similar to *P. xanthii* judging from outside appearance, but has larger ascospores measuring 13-16 × 7.5-9 µm which are cylindrical with rounded ends.

Although the damage caused by *P. xanthii* to its host was easily noticed in the field, this group of fungi is generally regarded as having little relevance for weed biological control. *Phyllachora* spp. are generally weak biotrophic parasites that cause little impact on their hosts (e.g. Cannon, 1991), and cannot be grown in culture.

## Acknowledgements

J. Mouchacca (Museum National d'Histoire Naturelle, Paris) is warmly thanked for supplying a photocopy of the de Candolle paper cited below, and for searching (albeit unsuccessfully) for authentic material of *Xyloma xanthii*.

## References

- Candolle, A.P. de (1817). III<sup>m</sup>e mémoire sur les champignons parasites. Mémoire sur le genre *Xyloma*. Mémoires de la Museum d'Histoire Naturelle, Paris 3: 312-327 + 1 pl.
- Cannon, P.F. (1991). A revision of *Phyllachora* and some similar genera on the host family *Leguminosae*. Mycological Papers 163: 1-302.
- Cannon, P.F. (1996). Fungal diversity associated with the *Compositae* and its potential for coevolutionary studies. In: *Compositae: Biology and Utilization* (eds. P.D.S. Caligari

## Fungal Diversity

- and D.J.N. Hind). Proceedings of the International *Compositae* Conference, Kew, 1994. Vol. 2. Royal Botanic Gardens, Kew, UK: 245-259.
- Farr, D.F., Bills., G.F., Chamuris, G.P. and Rossman, A.Y. (1989). *Fungi on Plants and Plant Products in the United States*. APS Press, St Paul, Minnesota, USA.
- Holm, L.G., Plucknett, D.L., Pancho, J.V. and Herberger, J.P. (1977). *The World's Worst Weeds. Distribution and Biology*. University Press of Hawaii, Honolulu.
- Miller, J.H. (1951). Studies in the *Phyllachoraceae* I. *Phyllachora ambrosiae* (Berk. & Curtis) Sacc. *American Journal of Botany* 38: 830-834.
- Saccardo, P.A. (1883). *Sylloge Fungorum*. Vol. 2. Saccardo: Padova.

(Received 16 September 2002; accepted 17 October 2002)