MYCOTAXON

Volume LXXII, pp. 7-13 July-September 1999

ANGULAR LEAF SPOT DISEASE OF SAURURUS CAUSED BY PHAEORAMULARIA SAURURI COMB. NOV.

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ABSTRACT

A leaf spot disease of *Saururus cernuus* was recently observed in Florida, U.S.A. The causal organism proved to be a species of *Phaeoramularia*, identical to the fungus on the type specimen of *Cercospora saururi*. A new combination in *Phaeoramularia*, *P. saururi* is therefore proposed for the latter fungus. This species is contrasted and shown to be distinct from *Pseudocercospora saururicola*, which is known to occur on similar leaf spot symptoms on *Saururus* in Taiwan.

INTRODUCTION

An unknown cercosporoid leaf spot disease was recently observed on leaves of *Saururus cernuus* L. in Florida, U.S.A. (Figs. 1, 2). Presently, two cercosporoid species are known from this host, namely *Pseudocercospora saururicola* Goh & W.H. Hsieh, and *Cercospora saururi* Ellis & Everh. Chupp (1954) treated the latter two species as being synonymous, while Hsieh

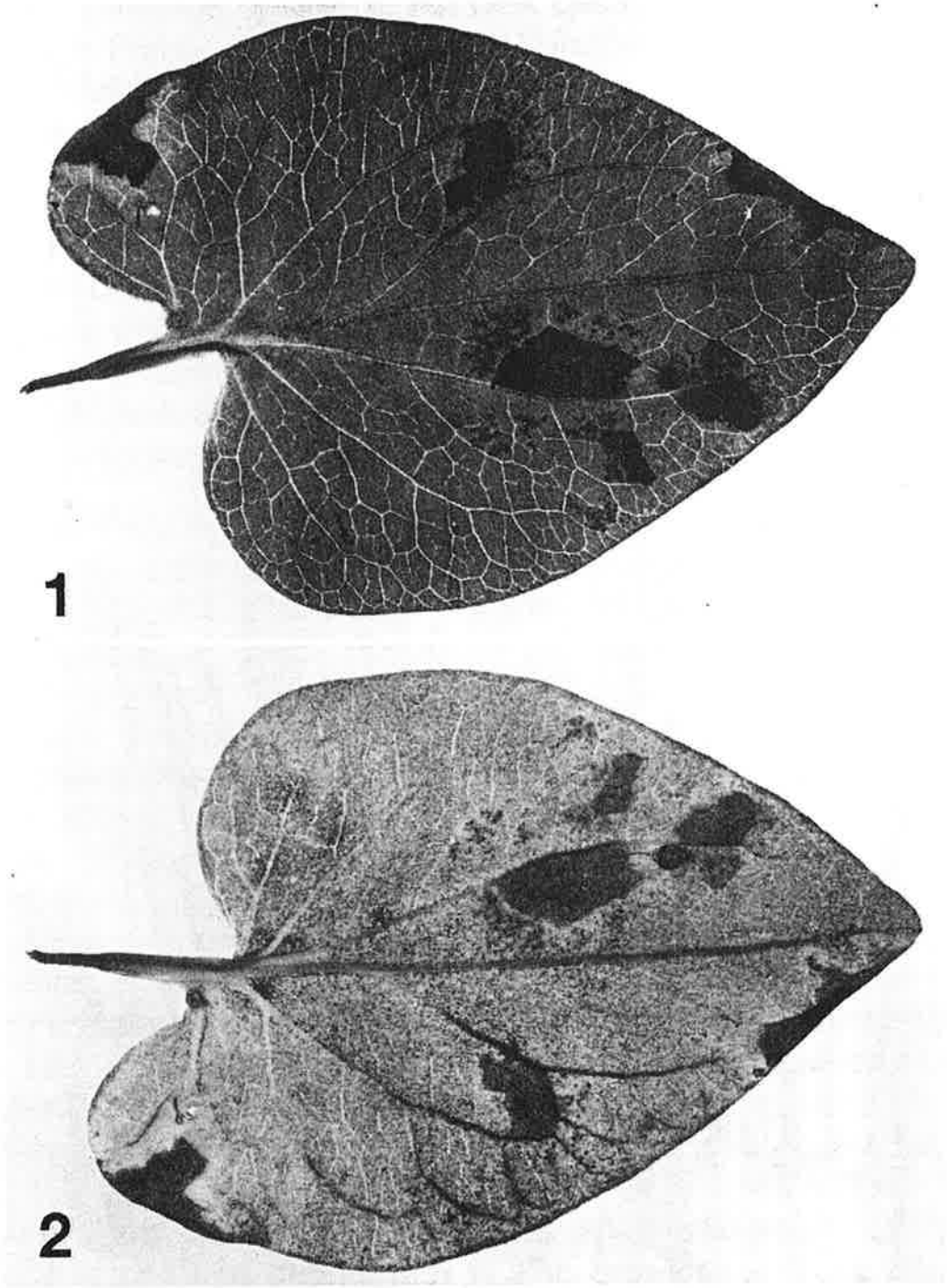
& Goh (1990) also considered them to be similar. The aim of the present study was to describe the cercosporoid fungus causing the leaf spot disease of *Saururus* in Florida, and to contrast it with the type specimens of the other two taxa discussed above.

TREATMENT OF SPECIES

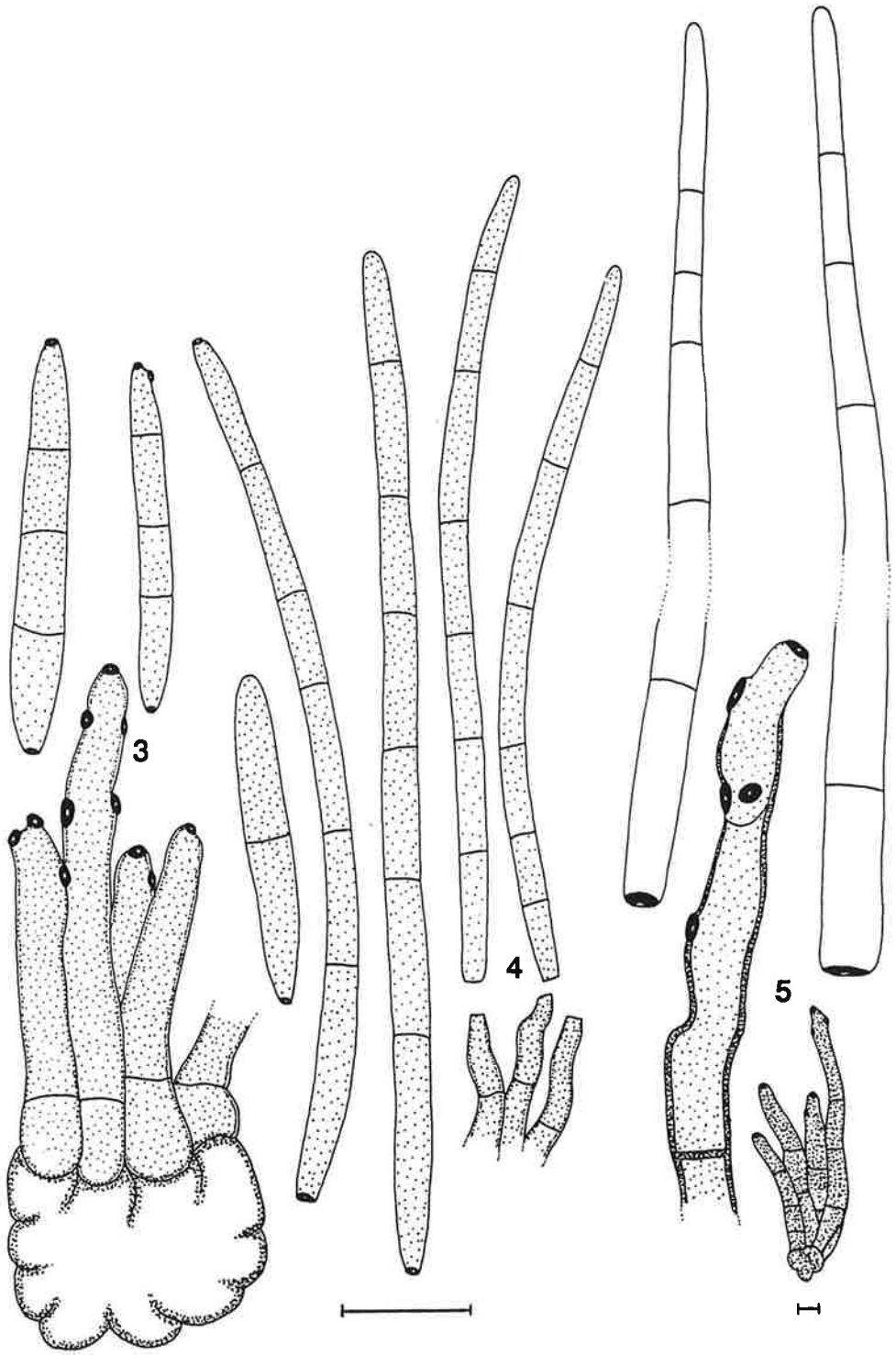
Phaeoramularia saururi (Ellis & Everh.), Crous & El-Gholl, comb. nov. Figs. 1-3

≡ *Cercospora saururi* Ellis & Everh., J. Mycol. 3: 14. 1887.

Leaf spots initially dark maroon to black in color with reddish margins, angular to irregular, 1-10 mm diam. Upon maturing, spots may coalesce into blotches with the centre sometimes becoming lighter as the tissue becomes dry and necrotic. Tip and marginal necrosis may also occur. *Mycelium* internal, composed of smooth, branched, hyaline hyphae, 2-3 µm diam. *Caespituli* fasciculate, hypophyllous, brown, up to 50 µm wide and 70 µm high. *Conidiophores* aggregated in loose to dense fascicles, arising from the upper cells of a brown stroma up to 30 µm wide and 20 µm high; conidiophores medium brown, smooth, subcylindrical, 1-3-septate, straight to slightly curved, unbranched, 35-50 x 3-5 µm. *Conidiogenous cells* terminal, unbranched, light brown, smooth, tapering to rounded apices with flattened, thickened, darkened, refractive loci, proliferating sympodially, 20-25 x 3-4 µm. *Conidia* catenulate, chains simple or branched, pale olivaceous, smooth, sometimes guttulate, subcylindrical, apex subobtuse, base long obconically truncate, straight to curved, 1-8-septate, (20-)60-90(-150) x (2-)3-4 µm; hila darkened, refractive, thickened; conidia 18-100 x 3-5 µm *in vitro*. Colonies dark red to red-brown, erumpent, with sparse to no aerial mycelium and smooth, irregular margins on 2% malt extract agar (MEA; Biolab, Midrand, Jhb., South Africa); a diffuse red pigment becomes visible in the agar with time. Cardinal temperature requirements for growth (in 5°C intervals), above 10°C minimum, 25°C optimum, and below 35°C maximum. Colonies reached 15 mm in diameter at 25°C on MEA after 8 days in the dark.



Figs. 1, 2. Angular to irregular leaf spots of *Phaeoramularia saururi* on the adaxial (Fig. 1) and abaxial (Fig. 2) leaf surface of *Saururus cernuus*.



Figs. 3-5. Conidiophores and conidia. Fig. 3. *Phaeoramularia saururi* (BPI 419211). Fig. 4. *Pseudocercospora saururicola* (BPI 441031). Fig. 5. *Cercospora* sp. (BPI 441030). Bars = 10 µm.

Specimens examined: U.S.A., Louisiana, on leaves of *Saururus cernuus*, A.B. Langlois No. 599, 27 Jul. 1886, BPI 419211 (holotype); Eustis Lake County, on *S. cernuus*, G.V. Nash, Jun. 1895, No. 2006, BPI 441015; Florida, Alachua County, S.E. Walker, 16 Jul. 1998, culture STE-U 2221, P98-2535; D.C., Chain Bridge, on *S. cernuus*, D.G. Fairchild, 15 Oct. 1890, ex HBG; Canada, Ontario, London, J. Dearness, 1893, Ellis & Everh. Fungi Columbiani 94, ex HBG.

Pathogenicity: To confirm Koch's postulates, 25 ml of a conidial suspension (73000/ml) was used to spray-inoculate two plants till run-off. Control plants were sprayed with sterile water. Plants were maintained in a moist chamber at room temperature (25 ± 2 °C). Plants were uncovered after three days and moved to a greenhouse. The greenhouse temperature fluctuated between 10°C (night) and 34°C (day). Symptoms appeared after 30 days and the fungus was recovered from the spots and margins of symptomatic leaf tissue.

Chupp (1954) studied material from *Saururus* collected in the U.S.A. and Taiwan, and concluded that they represented one species. Tharp (1917) observed that the conidia of *C. saururi* were catenulate, and therefore proposed the combination *Ramularia saururi* (Ellis & Everh.) Tharp. In his treatment of *Ramularia*, Braun (1998) commented that as the conidiophores were reported to be pigmented by Chupp (1954), this specimen did not belong in *Ramularia*. The conidia occurring in chains, as well as the pigmented structures were confirmed in the present study. Furthermore, the absence of superficial mycelium on the type specimen, and thickened, darkened, refractive hila determine that this species would be best accommodated in *Phaeoramularia*. However, a Canadian specimen sent to us from HBG differed in some aspects to the others examined in this study. Conidia were observed to occur singly, and although conidiophores were primarily fasciculate, some also occurred singly on superficial mycelium. The latter features suggest that this specimen can also be placed in *Mycovellosiella*. Profuse mycelial growth of other fungi is also present on these lesions, and the latter may have been due to high humidity conditions that existed shortly before the specimen was collected. When sporulating on peanut stem agar (1.8% autoclaved water agar, cooled to 50°C, poured over dried, sterile, gamma irradiated pieces of *Arachis hypogaea* L. stem, 4-6 cm long), cultures were observed to form well-developed stromata that give rise to dense

fascicles of conidiophores. The distinction between *Mycovellosiella* and *Phaeoramularia* is sometimes difficult. However, based on the integrated conidiogenous cells with terminal loci, and generally unbranched conidiophores, the present species would be better placed in *Phaeoramularia*. The type specimen of *C. saururi* and the recent collections from Florida on *Saururus cernuus* represent the same fungus, for which the name *Phaeoramularia saururi* is proposed. This species is distinct, however, from *Pseudocercospora saururicola* Goh & W.H. Hsieh, which is discussed below.

Pseudocercospora saururicola Goh & W.H. Hsieh, *Cercospora* and similar fungi from Taiwan, Hsieh & Goh (1990, p. 301). Fig. 4

≡ *Cercospora saururicola* Sawada, Taiwan Agric. Res. Inst. Rept. 87: 88. 1944. (*nom. inval.*).

Leaf spots subcircular to angular, 3-9 mm diam., brown with gray centres and dark brown margins. *Mycelium* internal, composed of smooth, branched, light brown hyphae, 2.5-3 µm diam. *Caespituli* fasciculate, amphigenous, brown on leaves, with a weakly developed stroma. *Conidiophores* fasciculate, light brown, smooth, unbranched, straight to curved, subcylindrical, 1-3-septate, 20-40 x 2.5-3.5 µm. *Conidiogenous cells* terminal, unbranched, light brown to olivaceous, smooth, tapering to truncate apices, proliferating sympodially, 5-15 x 2.5-3 µm. *Conidia* solitary, olivaceous, smooth, subcylindrical, tapering from truncate bases to subobtuse apices, straight to mildly curved, 4-10-septate, 45-100 x 2.5-4 µm; hila unthickened, not darkened.

Specimens examined: Taiwan, Hsinchu, on leaves of *Saururus chinensis* L., K. Sawada, 22 Aug. 1908, holotype in NTU-PPE (not seen), BPI 441031, 441031 (isotypes !).

When Sawada described *C. saururicola*, he deposited two collections at BPI. These specimens have the same collection data as that of the material in Herb. NTU-PPE (Hsieh & Goh, 1990). *C. saururicola* was never validly described, as it lacked a Latin diagnosis. A re-examination of the type in NTU-PPE found that the Sawada specimen would be better accommodated in *Pseudocercospora*, which led Hsieh & Goh (1990) to validate

the name as *P. saururicola*. Since they designated the material in NTU-PPE as holotype, the two duplicates at BPI have to be considered as isotypes. An examination of the two isotypes in the present study found some caespituli of the fungus described by Hsieh & Goh (Fig. 4), but also found material of a true *Cercospora* species (Fig. 5). In their description, Hsieh & Goh (1990) noted that the conidiophores of *P. saururicola* were much narrower and shorter (20-40 x 2.5-3.5 µm) than those seen by Sawada (47-87 x 4.5-5.5 µm). The latter dimensions, however, fit that of the *Cercospora* sp. also observed on the isotypes. It is therefore possible that the original, invalidly described species (Sawada, 1944), was in fact based on two different elements, viz. the true species of *Cercospora* as well as a species of *Pseudocercospora*, which was subsequently treated by Hsieh & Goh (1990). Nevertheless, *P. saururicola* is a validly published name, and more material would have to be collected before the *Cercospora* sp. that also occurs on the rather poor isotype specimens can be treated further.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the assistance of the curator of BPI for providing the specimens that formed the basis of this study. Dr Uwe Braun (Martin-Luther Universität, Halle, Germany) is thanked for reviewing the script, and for providing additional material (HBG) examined in this study.

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