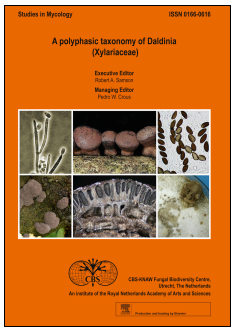
Accepted Manuscript



The *Colletotrichum dracaenophilum*, *C. magnum* and *C. orchidearum* species complexes

U. Damm, T. Sato, A. Alizadeh, J.Z. Groenewald, P.W. Crous

PII: S0166-0616(18)30010-1

DOI: 10.1016/j.simyco.2018.04.001

Reference: SIMYCO 75

To appear in: *Studies in Mycology*

Please cite this article as: Damm U, Sato T, Alizadeh A, Groenewald JZ, Crous PW, The *Colletotrichum dracaenophilum*, *C. magnum* and *C. orchidearum* species complexes, *Studies in Mycology* (2018), doi: 10.1016/j.simyco.2018.04.001.

The *Colletotrichum dracaenophilum*, *C. magnum* and *C. orchidearum* species complexes

U. Damm[1]*, T. Sato[2], A. Alizadeh[3], J.Z. Groenewald[4], and P.W. Crous[4,5,6]

[1]*Senckenberg Museum of Natural History Görlitz, PF 300 154, 02806 Görlitz, Germany;* [2]*Genetic Resources Center, National Agriculture and Food Research Organization, Kannondai, Tsukuba, Ibaraki 305-8602, Japan;* [3]*Department of Plant Protection, Azarbaijan Shahid Madani University, Tabriz, Iran and Department of Plant Protection, College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran;* [4]*Westerdijk Fungal Biodiversity Institute, P.O. Box 85167, 3508 AD Utrecht, The Netherlands;* [5]*Department of Genetics, Biochemistry and Microbiology, Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, Pretoria, South Africa;* [6]*Wageningen University and Research Centre (WUR), Laboratory of Phytopathology, Droevendaalsesteeg 1, 6708 PB Wageningen, The Netherlands*

*Correspondence: U. Damm, ulrike.damm@senckenberg.de.

Abstract: Although *Glomerella glycines*, *Colletotrichum magnum* and *C. orchidearum* are known as causal agents of anthracnose of soybean, *Cucurbitaceae* and *Orchidaceae*, respectively, their taxonomy remains unresolved. In preliminary analyses based on ITS, strains of these species appear basal in *Colletotrichum* phylogenies, clustering close to *C. cliviae*, *C. brevisporum* and other recently described species from tropical or subtropical regions. Phylogenetic analyses (ITS, *GAPDH*, *CHS-1, HIS3, ACT, TUB2*) of 102 strains previously identified as *Ga. glycines*, *C. magnum* and *C. orchidearum* as well as other related strains from different culture collections and studies placed these taxa in three species complexes, and distinguished at least 24 species, including 11 new species. In this study, *C. magnum*, *C. orchidearum* and *C. piperis* were epitypified and their taxonomy resolved, while *C. cliviicola* was proposed as a new name for *C. cliviae*. Furthermore, a sexual morph was observed for *C. yunnanense*, while *C. brevisporum*, *C. cliviicola* and *C. tropicicola* were reported from new hosts or countries. Regarding their conidial morphology, species in the *C. dracaenophilum, C. magnum* and *C. orchidearum* species complexes are reminiscent of *C. gloeosporioides* or *C. boninense* s. lat., and were likely to be confused with them in the past.

Key words: anthracnose, *Ascomycota*, *Colletotrichum*, *Gloeosporium*, *Glomerella*, phylogeny, systematics.

Taxonomic novelties: New name: *Colletotrichum cliviicola* Damm & Crous for *C. cliviae* Yan L. Yang *et al.* **New species:** *C. cacao* Damm**,** *C. cattleyicola* Damm & Toy. Sato**,** *C. coelogynes* Damm*, C. lobatum* Damm, *C. merremiae* Damm*, C. musicola* Damm, *C. okinawense* Damm & Toy. Sato*, C. panamense* Damm*, C. plurivorum* Damm, Alizadeh & Toy. Sato, *C. sojae* Damm & Alizadeh, *C. vittalense* Damm. **Epitypifications (basionyms):** *Glomerella magna* S.F. Jenkins & Winstead, *C. orchidearum* Allesch., *C. piperis* Petch.

INTRODUCTION

During a systematic study of *Colletotrichum* species, strains were detected that were reminiscent of *C. gloeosporioides* regarding conidial morphology, but did not belong to any of the well-studied species complexes (Cannon *et al.* 2012). Several of these strains were previously identified as *Glomerella glycines*, *Ga. magna* and *C. orchidearum.*

Glomerella glycines is known as the causal agent of anthracnose of soybean. It was described by Lehman & Wolf (1926) from soybean stems as the sexual morph of *Colletotrichum glycines* (Hemmi 1920). The Compendium of Soybean Diseases (Sinclair 1984) lists two species on soybean, the first being *C. dematium* var. *truncatum* (syn. of *C. truncatum*, Damm *et al.* 2009) represented by the line drawing of *C. glycines* by Hemmi (1920), which was apparently regarded as a synonym of *C. truncatum*, and the second being *Ga. glycines*. Further confusion was caused by connecting *C. destructivum* to *Ga. glycines* (Tiffany & Gilman 1954, Manandhar *et al.* 1986). However, a recent molecular study has shown that *C. destructivum* belongs to the *C. destructivum* species complex, while isolates from the study of Manandhar *et al.* (1986) were not closely related to *C. destructivum*, belonging to a different species complex (Damm *et al.* 2014). In contrast, von Arx & Müller (1954) treated *Ga. glycines* as a form of *Ga. cingulata* with large ascospores. Based on these records, *Ga. glycines* was previously thus connected to at least three different species complexes.

Glomerella magna (syn. *C. magnum*) was described on watermelon (*Citrullus lanatus*) in the USA and is heterothallic (Jenkins & Winsteat 1964). According to Jenkins & Winsteat (1964), *Ga. magna* is pathogenic to many species of *Cucurbitacea*e, including watermelon, cantaloup (*Cucumis melo*), squash and pumpkin (*Cucurbita* spp.),