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Neocordana gen. nov., the causal organism of Cordana leaf spot on banana

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Abstract

Cordana leaf spot of banana is shown to be associated with several species of a new genus described here as *Neocordana gen. nov.* Furthermore, *Neocordana* belongs to *Pyriculariaceae* (*Magnaporthales*) rather than *Cordanaceae* where the type species of *Cordana*, *C. pauciseptata* resides. *Neocordana* is established to accommodate *Cordana musae, C. johnstonii, C. versicolor*, and a previously undescribed species, *N. musicola*, which is morphologically and phylogenetically distinct. *Neocordana* species are found to be associated with leaves of *Musa* spp. (*Musaceae*) and *Canna denudata* (*Cannaceae*). Based on these results, *Cordanaceae* is best recognized in a separate order, established here as *Cordanales ord. nov*.

Key Words: *Cordanales*, *Magnaporthales*, *Musa,* plant pathogenic fungi, *Pyriculariaceae,* systematics

Introduction

Cordana leaf spot is a common and widespread disease on banana and plantain. Although it is considered as a minor pathogen of banana, it can cause serious defoliation of plantains in Central America during and following periods of wet weather (Jones 1999, Ploetz *et al.* 2003). Cordana leaf spot is characterised by large, pale brown, oval to fusiform necrotic lesions with pale grey concentric rings, with a dark brown border surrounded by a bright yellow halo, separating lesions from healthy leaf tissue (Jones 1999). Most damage occurs when the pathogen gains entry to leaf tissue weakened because of age, adverse environmental conditions, nutritional deficiencies, wounds or through lesions caused by other pathogens. The leaves ultimately turn brown and dry out (Jones 1999). This is especially apparent when the disease occurs together with Sigatoka leaf spots (Arzanlou *et al*. 2008), in which case the lesions may encompass the entire leaf margin and large portions of the lamina can be affected (Ploetz *et al.* 2003). Leaf infection normally occurs at night during rainy periods or when dew is present. The conidia germinate in a film of moisture on the leaf surface and after a few hours appressoria are formed. The appressoria enable the fungus to penetrate into the host epidermal cells. Species most commonly associated with Cordana leaf spot of banana include *Cordana musae* (Zimm.) Höhn. (1923: 60) and *C. johnstonii* M.B. Ellis (1971: 125). Cordana leaf spot has been reported mainly on *M. sapientum* L. but also can be found on *M. acuminata* ssp. *banksii* N.W.Simmonds, *M. acuminata* ssp. *banksii* × *M. schizocarpa* N.W.Simmonds, *M. balbisiana* Colla, *M. boman* Argent, *M. maclayi* F.Muell., *M. schizocarpa* N.W.Simmonds and *Enset glaucum* (Roxb.) Cheesman (Jones, 1999). Another plant pathogenic species, *Cordana versicolor* D.J. Soares & R.W. Barreto (2005: 18), was described from Brazil causing eye-spot disease on leaves of *Canna denudata* (Soares *et al.* 2005).

The asexual genus *Cordana* was erected by Preuss (1851) with *C. pauciseptata* Preuss (1851: 129) as type species. Species of *Cordana* are characterized by brown, septate conidiophores with swollen conidiogenous zones, terminal and intercalary conidiogenous cells, and pale brown to brown, 0–1-septate conidia. Ecologically, *Cordana* species can be separated into two groups, namely phanerogam leaf-inhabiting species (saprobic or pathogenic) or saprobic on rotten

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clade in the family *Cordanaceae*, as the sister clade of *Coniochaetales* in *Sordariomycetes*. *Cordanales* is here erected for the single family *Cordanaceae.* On the other hand, *Neocordana* is introduced to accommodate phytopathogenic species similar to *Cordana* but closely related to *Pyriculariaceae* (*Magnaporthales*) rather than *Cordanaceae*. The family *Pyriculariaceae* was recently introduced by Klaubauf *et al.* (2014) and includes important plant pathogens along with *Deightoniella* S. Hughes (1952: 48) and several pyricularia-like genera. *Deightoniella* can be easily differentiated from *Neocordana* since it produces conidiophores reduced to conidiogenous cells with a flattened scar, and conidia with a central pore in the base (Hughes 1952, Klaubauf *et al.* 2014), while *Neocordana* has septate conidiophores with denticulate conidiogenous cells and conidia with a protruding hilum. On the other hand, pyricularia-like fungi and *Neocordana* are similar in having brown, septate conidiophores with polyblastic, denticulate conidiogenous cells. Nevertheless, pyricularia-like fungi are different from *Neocordana* in having pyriform to obclavate, 2-septate conidia, and grow on grasses and other plants (Seifert *et al.* 2011, Klaubauf *et al.* 2014). *Neocordana* differs by having broadly ellipsoid, obovoid to pyriform, 1-septate conidia and are pathogenic to species of *Musa* or *Canna*.

In the phylogenetic analysis generated here (Figure 1), *Neocordana* is represented by *N. musae* and *N. musicola*. *N. musae* is designated as the type species of the genus, and *N. musicola* is introduced as a new species, similar but different from *N. musae*, based on morphological and molecular data. Unfortunately cultures of *N. johnstonii* and *N. versicolor* were not available to include in the phylogenetic analysis. Nevertheless we propose new combinations for *N. johnstonii*, and *N. versicolor,* based on morphology, pathogenicity and host association. Further studies are needed to confirm their phylogenetic affinities in *Neocordana*.

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