Cytospora species associated with canker disease of three anti-desertification plants in northwestern China

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Abstract

Cytospora species are important phytopathogens causing severe canker disease with a worldwide distribution and broad host range. However, identification of taxa for species level is difficult due to poor phylogenetic understanding and lack of sequenced type species. Morphological and phylogenetic studies have been carried out on several important hosts such as Eucalyptus and Malus in China, Iran, and South Africa. In this study destructive canker diseases of the anti-desertification plants, Elaeagnus angustifolia, Hippophae rhamnoides, and Salix psammophila, were investigated in northwest China. Multilocus phylogenetic analyses of ITS, nrLSU, RPB2, and ACT gene regions, combined with detailed morphological analyses and comparison with ex-type strains revealed six Cytospora species, C. chrysosperma, C. elaeagni, C. hippophaes, C. nivea, C. populina comb. nov. and C. gigaspora sp. nov. causing cankers on these hosts. The novel species C. gigaspora has flat multiple locules with a conceptacle and unusually long 12 µm conidia. Detailed descriptions and molecular data for the Cytospora species causing cankers on the three psammophilic host plants are provided. Cytospora elaeagni and C. hippophaes have previously been recorded from Elaeagnus angustifolia and Hippophae rhamnoides, whereas the other species causing Cytospora canker of Elaeagnus angustifolia and Salix psammophila are new records.

Key words: Ascomycota, Diaporthales, Morphology, New species, Phylogeny

Introduction

The genus Cytospora (Ascomycota: Diaporthales) was established by Ehrenberg (1818). It includes important phytopathogens that cause dieback and canker disease on a wide range of plants, causing severe commercial and ecological damage and significant losses worldwide (Adams et al. 2005, 2006). Cytospora has been categorized under several coelomycetous genera in the dual-classification system, including asexual states of Leucostoma, Valsa, Valsella, and Valseutypella (Fries 1823; Saccardo 1884; Deng 1963; Tai 1979; Wei 1979; Spielman 1985; Wang et al. 2011; Adams et al. 2002). All the genera were recently combined under Valsa, either as subgenera or species with no additional infrageneric rank (Adams et al. 2005). The current International Code of Nomenclature for algae, fungi, and plants (ICN) requires a single-name for pleomorphic taxa, and the dual-nomenclature system has become redundant (Hawksworth 2011). A single name for complex genera such as Diaporthella, Phomopsis, Glomerella, Colletotrichum, Pestalosphaeria/Pestalotiopsis, and Phyllosticta/Guignardia have followed the oldest or the most conserved name (Hyde et al. 2009; Wikee et al. 2011; Huang et al. 2013; Wei et al. 2013; Udayanga et al. 2014). Cytospora (1818) is an older name than Valsa (1849) and the asexual state more common in nature; therefore, we chose to adopt Cytospora and treat Valsa species as synonyms for Cytospora. More than 560 species epithets named Cytospora have been recorded in Index Fungorum (2014) with an estimated 110 species in Kirk et al. (2008). Ex-type sequence data, however, is available for only a very few species and many taxa need epitypifying, thus identification to species level is difficult. Therefore, research towards a backbone tree for Cytospora species is needed so that backbone trees to species can be updated as in previous studies in other genera (Hyde et al. 2014).
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