First report of *Alternaria* sp. causing blight on *Incarvillea emodi*

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Abstract During 2006–2009, a blight on *Incarvillea emodi* cultivated in Himachal Pradesh, India, was determined to belong to *Alternaria* sp. The disease occurred on leaves, twigs and flowers, and caused severe dropping of flowers during the cooler months, i.e., November–February. This is the first record of *Alternaria* sp. affecting *I. emodi* worldwide.

Keywords *Alternaria* sp. · blight · *Incarvillea emodi*

Introduction

Incarvillea emodi (Wallich ex Royle) Chatterjee, family Bignoniaceae is a flowering and foliage plant having potential ornamental and medicinal values; it is listed among the rare plants of Himalayan region (Singh and Sharma 2006). During cultivation in 2006–2009 (Fig. 1), the plants exhibited circular to irregular dark brown lesions (2–5 mm diameter) with greyish centre on leaves. Similar types of lesions appeared on twigs with sporulation. In flowers, the small brown lesions gradually coalesced to form a larger one covering 2/3rd of the flowers and ultimately the flowers withered and dropped (Fig. 2a–c). The disease symptoms were predominant during November–February

when the climate was cool (15–20°C) and were less prominent towards the end of March.

Alternaria sp. was consistently isolated when sections of diseased twigs, leaf and flower were surface sterilised (2% sodium hypochlorite), and plated on potato dextrose agar (PDA). Colonies reached up to 8.0 cm diameter in 7 days at

Fig. 1 *Incarvillea emodi* infected with blight disease

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Fig. 2 Leaf blight symptoms on **a** leaf; **b** twig and **c** flowers

25°C on PDA (Fig. 3) and potato carrot agar. Single-spore isolates were described based on morphological characters (Simmons 2007). Colonies effuse and black to olivaceous black, reverse dark black. Mycelium immersed to partly superficial, hyphae hyaline, olivaceous brown to brown. Conidiophores usually simple, straight or curved, arising singly or in small groups, conidiogenous cells integrated, terminal becoming intercalary, polytretic, sympodial or monotretic and cicatrized. Conidia formed in long, often branching chains, ovate, obclavate, obpyriform, or rarely ellipsoidal, with a conspicuous basal pore, with or without a short conical or cylindrical apical beak not exceeding one third of the conidial length, medium brown, smooth-walled or slightly verruculose, with up to eight transverse septa and usually several longitudinal or oblique septa, $18\text{--}63 \times 7\text{--}18\text{ }\mu\text{m}$ (Fig. 4). The culture has been deposited in the Microbial Type Culture Collection (MTCC 9601) of the Institute of Microbial Technology, Chandigarh, India. The species was placed in the *A. alternata* group but could not be more accurately identified based on conidial morphol-

ogy. The rDNA ITS was sequenced (GenBank accession GQ121322) and was identical to sequences from many isolates of *A. alternata* and several other *Alternaria* species. Phylogenetic studies based on DNA sequences have been unable to resolve morphological species in *Alternaria* (Peever et al. 2004; Andrew et al. 2009).

Pathogenicity tests were done twice in a screen house by spraying a conidial suspension (1×10^6 conidia mL^{-1} in sterile tap water), obtained from 10 day old culture plates onto the healthy leaves of 10-month-old plants. Inoculated plants and water-sprayed controls were covered with polythene bags for 48 h. Symptoms started developing on the inoculated leaves after 8–10 days. The pathogen was re-isolated from the leaves, twigs and infected flowers of affected inoculated plants to confirm Koch's postulates. The control plants did not exhibit symptoms.

Alternaria spp. infecting several hosts of ornamental and medicinal values have been reported e.g. *Gerbera jamesonii* (Mirkova and Konstantinova 2003), *Stevia rebaudiana* (Maiti et al. 2006), and *Aloe barbadensis* (Kamalakaran

Fig. 3 Growth of fungal pathogen on PDA

Fig. 4 Conidia of *Alternaria* sp.. Scale bar = 20 μm

et al. 2008). This is the first record of *Alternaria* sp. on *I. emodi* worldwide.

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