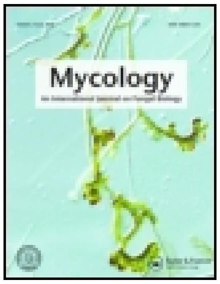

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The distribution of *Xylaria* endophytes in the leaves of 22 tree species of a dry thorn forest and 27 tree species of a stunted montane evergreen forest of the Western Ghats in southern India was studied. In addition, these endophytes were screened for the production of some bioactive metabolites and extracellular enzymes. All the tree species in both the forest types harboured xylariaceous endophytes. Generally, xylariaceous endophytic infection of the leaves increased during the wet season. Molecular analysis showed that most of the xylariaceous endophytes isolated belonged to *Xylaria* or *Nemania*. All endophytes produced cellulase, and most of the isolates produced laccase and lipase enzymes suggesting continuing their life in plant litter as saprotrophs. The culture extracts were inhibitory to fungi, bacteria and algae indicating that they can compete with such organisms in the forest floor while surviving as saprotrophs. Fungi with such dual life strategies appear to be a potential source for biotechnological exploitation.

Keywords: xylariaceous endophytes; diversity; lipase; laccase; antimicrobial activity

Introduction

The xylariaceous fungi of the tropics are diverse and colonize several substrata such as dung, ant and termite nests and decayed plant materials; these are phytopathogens and endophytes (Rogers 2000; Duong et al. 2004; Okane et al. 2008). Xylariaceous endophytes are common and have been isolated from tropical plant hosts such as palms, bromeliads, orchids, aroids and forest trees (Whalley 1996; Bayman et al. 1998; Okane et al. 2008; Linnakoski et al. 2012). Although their association with angiosperms probably developed along with the Cretaceous radiation of angiosperms (Rogers 2000), there are indications that host switching has occurred frequently among these fungi (Davis et al. 2003). Identification of xylariaceous endophytes is difficult because the taxonomic systems have largely been ascomata-based and most of them do not produce ascomata in culture (Brunner & Petrini 1992; Stadler 2011). Stroma characters are variable and hence unreliable (Lee et al. 2002; Fournier et al. 2011). Molecular data such as internal transcribed spacer (ITS) sequences and other marker sequences have been used for identification or classification of xylariaceous fungi (Lee et al. 2000).

Many xylariaceous endophytes produce novel metabolites with unique biological activities (Ondeyka et al. 1997; Schlingman et al. 2002; Smith et al. 2002; Koehn et al. 2008). Although there are a few records of *Xylaria* species from India (Thind & Dargan 1978; Dargan 1982), little information is available regarding xylariaceous endophytes (Rogers 2000; Naik et al. 2008; Nath et al. 2012) from here. In the present study, we studied the foliar xylariaceous endophytes from two types of forests of the Western Ghats for their distribution, production of bioactive compounds and plant cell wall-degrading enzymes.

Materials and methods

Collection sites

Leaves of dicotyledonous trees from a tropical dry thorn (DT) forest and a stunted montane evergreen (EG) forest were sampled. The DT forest lies in the eastern part of the Mudumalai Wildlife Sanctuary (11° 32′–11° 43′ N lat, 76° 22′–76° 43′ E long), southern India, and receives a mean annual rainfall of 800 ± 265 mm (Suresh & Sukumar 1999). The tropical EG forest is located along the southwest of Ootacamund (11° 14′ N lat, 76° 33′ E long), southern India. The mean annual rainfall here is 1300–2500 mm (Suresh & Sukumar 1999).

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