

Fungi from two forests of southern India: a comparative study of endophytes, phellophytes, and leaf litter fungi

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Abstract: The species diversity and distribution of 3 ecological groups of fungi (viz., foliar endophytes, phellophytes, and leaf litter fungi) of 6 tree hosts of a dry thorn forest and 6 tree hosts of an evergreen forest of southern India) were studied. As the methods of sampling and the isolation procedure were maintained constant, the results could be compared across hosts and fungal assemblages. The diversity of endophytes was less in both forests, owing to host recurrence. The litter fungi showed a higher diversity in both forests when compared with endophytes or phellophytes. There was little overlap between the species assemblages of the 3 ecological groups of fungi. Hence, to be cost effective, diversity estimation exercises for fungi in the tropics should include different fungal substrates rather than one substrate (or ecological group); it appears that even small sample sizes of different substrates would provide an approximation that is the near-real species diversity, rather than using large sample sizes of any one particular indicator group of fungi.

Key words: endophyte, litter fungi, tropical forest, fungal diversity, diversity estimation.

Résumé : La diversité des espèces et la distribution de 3 groupes écologiques de champignons : les endophytes foliaires, les phellophytes et les champignons de la litière feuillue de 6 espèces d'arbres de la forêt sèche à épineux et de 6 espèces d'arbres de la forêt sempervirente du sud de l'Inde, ont été étudiées. Puisque les méthodes d'échantillonnage et les procédures d'isolement étaient constantes, les résultats ont pu être comparés d'un hôte à l'autre et d'une collection de champignons à l'autre. La diversité des endophytes était moindre dans les deux types de forêts à cause de la récurrence des hôtes. Les champignons de la litière feuillue présentaient la diversité la plus élevée dans les 2 types de forêts par rapport aux endophytes et aux phellophytes. Il n'y avait que peu de chevauchement entre les collections d'espèces des 3 groupes écologiques de champignons. Ainsi, afin d'optimiser les coûts, l'exercice d'estimation de la diversité des espèces de champignons des tropiques devrait inclure différents substrats fongiques plutôt qu'un seul substrat (ou groupe écologique); il semble que même des échantillons de petite taille de différents substrats devraient donner une approximation de la diversité plus proche de la réalité que des échantillons de grande taille d'une espèce particulière quelconque d'un groupe indicateur de champignons.

Mots-clés : endophyte, litière feuillue, forêt tropicale, diversité fongique, estimation de la diversité.

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Introduction

Fungi, as associates of higher plants in the form of mycorrhizas, endophytes, and pathogens, and as decomposers of plant litter, play a crucial role in structuring and maintaining plant communities (Rayner 1998; Dighton et al. 2005). The fungal kingdom is species-rich, and fungi perform a multitude of functions in ecosystems, yet the extent of fungal diversity is poorly known. At present, there is no consensus for the extant species of fungi because few fungal

substrates and habitats have been explored thoroughly (Hawksworth 2004; Suryanarayanan and Hawksworth 2005). Thus, the estimate of fungal species ranges from a low of 712 000 (Schmit and Mueller 2007) to a high of 9.9 million (Cannon 1997), with a general agreement on the figure of 1.5 million suggested by Hawksworth (2001). Of this, only about 100 000 species are currently known (Hawksworth 2004). As it is a difficult task to have an accurate estimate of species diversity for a hyperdiverse group such as the fungi, the diversity of a better studied group, namely the higher plants, is used as a base to predict fungal diversity, principally because different ecological groups of fungi with different resource requirements form temporary or prolonged associations with higher plants (Hawksworth 2001; Schmit and Mueller 2007). Extending this argument, it is logical to assume that the tropics, with their high plant diversity, should be housing most of the undescribed fungal species (Hyde 2001). Although there are reports from the tropics regarding the diversity, distribution, and contribution to global fungal variety of a few ecological groups of fungi such as leaf litter fungi (Rambelli et al. 2004; Paulus et al.

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