Introduction
INTRODUCTION

Fungi have significant functions in ecosystems and are found in all kinds of habitats. The ecological diversity of fungi was summarized by Subramanian (1992a). The many functional and ecological attributes of fungi are reflected by a great variety of forms, and physiological and biochemical properties. As biotechnological applications and bioprospecting become an issue for sustainable development for the future needs of mankind (Subramanian, 1986, 1992b; Reid, 1993) there may be an increasing demand for microorganisms with unusual properties. Given the role of fungi in decomposition processes, in mineral and nutrient cycling, in soil formation and structure, in causing animal and plant diseases, as well as the commercial exploitation of their fermentation, antibiotic and secondary metabolic capabilities, the need to know the extent of biodiversity of the fungi becomes compelling from both practical and scientific standpoints (Hawksworth et al., 1997; Hawksworth, 2004).

The importance of fungal diversity in the tropics has been stressed by several mycologists (Subramanian, 1982). The tropics cover an immense area and encompass the largest range of climates and habitats on Earth. Climatic convergence between altitude and latitude results in the presence throughout the tropical area of most of the ecological conditions found in the world (Moncalvo, 1997).

Palms (members of Family: Arecaceae) stand next to grasses in the socio-economy of the human race, apart from their significant contribution to beautify the urban landscapes as horticultural ornamentals. Palms are generally confined to the tropics. This group in India is represented by 20 genera and about 96 species among
which 24 species belonging to nine genera are endemic to India (Kulkarni and Mulani, 2004). In India, palms occur in three major geographical regions viz., Peninsular India, North Eastern India and Andaman & Nicobar Islands. Peninsular India is represented with 11 genera and about 32 species. Most of the genera are represented by one species with the exception of *Calamus*, the only rattan genus in South India, with a representation of 20 reported species (Renuka, 1999). In addition to indigenous species of palms, several exotic palms have become naturalised as cultivated ornamentals. They form a vital component of forest and agricultural ecosystems providing a wide range of economic products necessary for daily life. The African oil palm *Elaeis guineensis* is cultivated in South India on a plantation scale for extraction of crude palm oil. Palm leaves, especially those of *Cocos* and *Borassus*, serve as a cheaper thatching material in rural areas.

Mycology in India has grown steadily over a period of time alongside plant pathology. A large number of fungi have been collected from decaying leaf litter, especially, the dicot litter. However, intensive studies on the biodiversity of fungi associated with monocot litter, particularly those of palms, are very few in India. With large leaf surface area the monocots are considered to be good substrates for saprophytic microfungi. The fungi of palms in India have been poorly studied both ecologically and taxonomically. These fungi are of great interest, not only in our quest for knowledge, but also because of their potential to produce novel compounds. With only 5% of the world’s fungi presently known (Hawksworth, 1991) detailed documentation is highly desirable.

The palms, like many tropical plants, are colonized by a rich and diverse mycota (Fröhlich and Hyde, 2000). In view of the paucity of information on the biodiversity of fungi colonising the leaf litter of palms in India, the present study was initiated and the results are presented in the thesis in two parts.
The microfungi recorded and identified from dead and decomposing leaf litter of eight different palms viz., *Areca catechu*, *Borassus flabellifer*, *Cocos nucifera*, *Elaeis guineensis*, *Phoenix sylvestris*, *Caryota urens*, *Corypha umbraculifera*, *Roystonea regia* collected from different localities in the four States of South India (Tamil Nadu, Andhra Pradesh, Kerala and Karnataka) are described in Part I of the thesis.

**PRAT II** of the thesis describes the results of an ecological study aimed at understanding the pattern of fungal colonisation of leaves and litter of *Borassus flabellifer*, a most abundant and widely distributed palm, carried out over a period of 29 months (Sep. 2001 to Jan. 2004). For this study litter samples were collected at bimonthly intervals from under the *Borassus* trees in the campus of Indian Institute of Technology, Chennai which forms part of Guindy National Park. Litter of 3 categories were selected for study: Recently fallen senescent leaves (Grade 1), leaves which are actively decomposing (Grade 2); and those in late stages of decay (Grade 3). The nature, distribution, periodicity of occurrence and percentage frequency of fungi colonising the litter samples were investigated by moist chamber incubation as well as plating the surface washings of litter. Simultaneous studies were also made on the mycoflora of living foliage (Phylloplane mycoflora) of *Borassus* with a view to ascertain the fungi that colonise the leaves while they are still attached to the tree and the further role of these fungi, if any, in litter decomposition. In addition, soil samples from surface of the floor underneath the trees (after removing the litter) were also collected for fungal analysis. The results obtained in these investigations are presented and discussed in Part II of the thesis.