

Habitat diversity in mushrooms

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The major factor determining the distribution of any living organism is its requirements for growth. Fungi are known to colonise diversified habitats in nature. Some species are relatively unfussy and can therefore be found flourishing in a wide range of habitats (Dickinson and Lucas, 1979). The 'habitats' mean the typical places in which fungi grow. There are species, which require a very specialized set of conditions to exist and are consequently restricted to one or a few specific habitats. There are three broad modes of life which fungi have adopted in order to satisfy their nutritional requirements. Some are parasitic on plants or animals and obtain food by the destructive exploitation of the host organism. Others are symbiotic with their hosts and obtain carbon from the host without harming their host organism and the contact may be a prolonged one or a permanent one. The third category is the major group the saprophytes depend on the dead, decaying organic matter.

Mushrooms are among the most abundant colourful and well known of fleshy fungi. Although they can be found during all growing seasons, mushrooms are most abundant during rains in soil, humus and on wood. Many species form mycorrhizal associations with the forest trees. They are worth looking particularly closely at cracks in the ground, among roots and rocks in tree stumps, among grasses and mosses, on rotting tree trunks, on litter and on dung of herbivorous animals. All these habitats may harbour different types of fungi. The most favourable places for the emergence of mushrooms are the woods. Various types of forests have their own mycological stock, made up of epigeal, hypogean and mycorrhizal fungi; fungi, which are saprophytic on leaves and pieces of wood and parasitic fungi.

Saprophytic fungi form the majority and play vital active part in the process of organic recycling since they can efficiently and rapidly transform and utilize the dead remains. These fungi make an important contribution to the decomposition process particularly where large plant wastes such as logs or tree stumps are concerned. In a wide ecological context this biodegradation is of obvious benefit to all organisms. On land, the most obvious example of recycling is the regular fall of leaf litter. Tropical rain forests and related types of woodlands are generally much richer in species of plant life than their temperate equivalents. The litter fall in tropical rain forests is four times more than those deposited on the floors of broad leaved and coniferous forests in temperate regions (Cooke, 1977). This debris is available for mushrooms and toadstools to grow on. Species of *Marasmius*, *Collybia* are common saprophytes found on plant litter. They in association with other microfungi, bacteria and animals decompose the litter. Some litter dwelling species have long 'tap roots' which may be traced to buried debris. For eg. the tall, tough-stemmed *Oudemansiella radicata* always grows from buried wood. Most of the agarics, which colonize smaller twigs and branches, belong to the genera of *Coprinus*, *Marasmius*, *Marasmiellus*, *Crepidotus* and *Mycena*. The larger stumps and logs are often colonized by the extensively lignicolous genera like *Lentinus*, *Pleurotus*, *Hypholoma*, *Flammulina* and *Pholiota*. The hyphal growth habit of fungi is uniquely suited to the penetration and digestion of plant substrates. The field mushroom *Agaricus campestris* and its close relatives grow on the humus in the soil. The ink caps are common on rubbish dumps where they grow on buried wood and other debris. Another important group of the saprophytic species is the dung fungi. These fungi play important role in the

breakdown of manure and its recycling. During our study we could collect several genera of this group viz., *Stropharia*, *Panaeolus*, *Copelandia*, *Conocybe*, *Psilocybe* and *Coprinus*.

Another important group of mushrooms collected is specifically associated with certain tree species to form the mycorrhizal symbiosis. Symbiotic associations between ectomycorrhizal mushrooms and higher plants are of considerable value in forestry and nursery establishment of seedlings of some tree species. We could collect several species belonging to the genera *Inocybe*, *Amanita*, *Boletus*, *Russula* and *Lactarius* during our study, which are mostly ectomycorrhizal.

The third major group of fungi is the parasites, which cause serious damage to trees and other plants. There are only very few species of mushrooms belong to this category. The honey fungus, *Armillaria mellea* is a good example for this, which cause serious damage to a wide range of trees. A few mushrooms are actually parasitic on other fungi such as *Boletus parasiticus* which grows on *Scleroderma aurantium* and *Asterophora parasitica* is found growing on rotting *Lactarius/Russula*. However, we could not collect any such mushrooms from the Western Ghat forests during our study.

During a survey of the agaric flora of the Western Ghats of Kerala, carried out since 1993, 5414 individual collections were made from various forest localities. It is observed that out of the 5414 collections, 108 (2%) were dung inhabiting (coprophilous), 216 (4%) were litter dwelling, 1354 (25%) were wood inhabiting (lignicolous) and the rest 3736 (69%) were terrestrial. Among the 1354 lignicolous members, 95% were from the rotting wood and the rest 5% were from roots, stems or barks of living plants.

The study revealed that 92% of the total collections were saprophytes. This can further be divided in to terrestrial (69%), lignicolous (25%), litter dwelling (4%) and coprophilous (2%). The frequency of collection of various genera in different habitat is represented graphically.

In the terrestrial habitat the most common and dominant genera collected are *Hygrocybe* (8%), *Entoloma* (7%), *Russula* (6.5%) *Lepiota* (6%), *Agaricus* (3.7%) and *Inocybe* (3%).

The dominant and commonly encountered lignicolous genera includes the common tropical genera like *Pleurotus*, *Lentinus* followed by *Gymnopilus*, *Hydropus*, *Marasmius*, *Marasmiellus*, *Crepidotus* and *Pluteus*.

The major litter dwelling genera encountered in the present study are *Collybia* (8%), *Mycena* (3.5%), *Marasmius* (3%), *Marasmiellus* (2.5%) and *Psathyrella* (2%).

The coprophilous genera are rather poorly represented by *Panaeolus* (2.5%), *Conocybe* (2%), *Psilocybe* (1.7%), *Agrocybe* (1%), *Copelandia* (0.7%) and *Coprinus* (0.5%).

The study revealed that the Western Ghat forest are very rich both in habitat and species diversity.

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REFERENCES

- Cooke, R. C. (1977). *Fungi, man and his environment*. Longman, London. pp. 144.
 Dickison, C and Lucas. (1979). *The Encyclopedia of Mushrooms*. Orbis pub. Co. London. pp. 280.

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