

Soil Microbiological Studies at Sinharaja Forest

J. MAHESWARAN and I. A. U. N. GUNATILLEKE

Sinharaja is a tropical lowland rain forest located in the South-Western region of Sri Lanka with an extent of 22,000 acres (11,000 ha) which is now a Man and Biosphere reserve.⁵ Leaving out the encroached and selectively logged areas, however, the extent of primary forest remaining may be roughly estimated as 5,000 ha. Its general climate, topography and soils have been described by Merritt and Ranatunga (1959).

Microbes in general and soil microbes in particular, play an important role in maintaining the equilibrium of this luxuriant and complex ecosystem. This study was initiated in January 1979 to compare (a) the total soil microbial activity, (b) nature and quantity of one important group of microbes namely soil fungi, and (c) total and available nutrients, in a primary forest and an adjacent deforested area which at present is a *Dicranopteris* (S-Kekilla) fernland. Preliminary investigations were also made to determine the Nitrogen fixing capacity of some forest components, viz. soil, decomposing litter and a survey of mycorrhizas in seedlings and mature plants of the forest was also conducted.

In our study, forest soils were found to be consistently more acidic (pH 4.5 — 5.4) than fernland soils (pH 5.5 — 5.8) again, in contrast to observations made by Joachim and Kandiah who recorded a pH of 5.3 for both forest and fernland. Soil samples analysed from 100 cm deep pits indicated higher values for organic matter and moisture and lower values for soil temperature and pH in the forest than in the fernland.

Soil Mycoflora

So far 64 different species including 10 Phycomycetes, 6 Ascomycetes, 48 Fungi Imperfecti and 4 Mycelia Sterilia have been identified. The wood rotting Basidiomycetes have not yet been identified. The vertical distribution of fungi shows a gradual decrease from 0-100 cm in forest soils, while in fernland soils a sudden increase at a depth of 50 cm was shown. The qualitative distribution of some microfungi in the forest and fernland soils are found to be different. *Trichoderma harzianum*, *Penicillium simplicissimum* and to a lesser extent *Arthrinium arundinis* predominate in forest soils while *Eupenicillium ehrlichii* was the most dominant in fernland soil and was absent from forest soils. *Monilia sitophila* was also recorded only from the fernland

Seven species each of *Aspergillus* and *Penicillium* have so far been recorded from the forest. These two genera as well as *Trichoderma viride* are well represented in soils of rubber plantations in the Kalutara and Panadura districts. However, the absence of *T. viride* is quite striking. *T. harzianum* though found

to be abundant in forest soils at Sinharaja as well as Kottawa (U. Cumaraswamy, Personal Comm.) were recorded in lower frequency in rubber soils.²

Soil Microbial Activity

The percentage weight loss, a measure of microbial activity, recorded over a period of one year showed a decrease in the following order: *Cullenia* in fernland, *Dicranopteris* in forest and *Dicranopteris* in fernland. In the two experimental plots the rate of weight loss appeared to be positively correlated with the amount of rainfall except in the case of *Dicranopteris* in forest.

The rate of weight loss was slower in the fernland than in all the forest sites suggesting a lower microbial activity in the fernland as compared with the forest.

The preliminary experiments showed that only wood litter from the forest had any detectable activity. Of the 23 species studied, all but one had endotrophic vascular-arbuscular mycorrhizas. Only *Shorea trapezifolia* showed ectotrophic mycorrhizal associations.

References

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