ABSTRACT

Studies on soil chemico-physical properties, soil microfungal distribution and some of the activities of soil microbes, carried out in Sinharaja, a tropical wet evergreen forest, and in an adjacent deforested area, presently covered by the fern Dicranopteris linearis, revealed the following:

(i) The exchangeable magnesium and calcium contents and the pH, in the surface soil of the fernland were higher than that of the forest. Temperatures recorded at different depths in the fernland profile, were always higher than those recorded for the forest profile. Though pH differences were noticed in the surface layers of these two areas, at depths below 25 cm, the pH ranges were the same.

(ii) Sorensen's floristic similarity quotients, for the diversity of fungi showed that, the floristic variation of fungi between the forest and the fernland was not different from the variation within the forest. However, while Trichoderma harzianum followed by Penicillium simplicissimum and Arthrinium arundinis dominated the surface soils of the forest, Eupenicillium erhlichii followed by T. harzianum dominated the surface soils of the fernland. The number of fungal colonies per gram of soil, at different depths, in the forest and fernland profiles did not differ markedly. T. harzianum dominated all

depths of the forest profile. Eupenicillium erhlichii dominated only the surface soils of the fernland. P. simplicissimum, recorded at all depths of both profiles, showed an increase in relative density at lower depths. Number of fungal colonies, in the surface soils of five of the six plots, showed a negative relationship with seasonal variation in soil moisture content.

(iii) Decomposition of Cullenia and Dicranopteris litter in the forest was more rapid than in the fernland, possibly due to better environmental factors and soil microbes in the forest. Cullenia litter was found to decompose faster than Dicranopteris litter in both areas. The percentage weight loss, of Cullenia and Dicranopteris litter, showed a significant correlation with rainfall. Decomposition rates, of both litter types in both areas, showed similar fluctuations with the distribution of rainfall. In both areas, the order of mobility of nutrient elements in decomposing Cullenia litter was K>Mg>Ca>P>N. In Dicranopteris in the forest, the order was Ca>Mg>K>N>P and in the fernland, Ca>K>Mg>P>N. Depletion of Mg, P and Ca in Cullenia leaves and Ca and Mg in Dicranopteris were dependent on dry matter loss.

The decomposition of different kinds of forest litter was much faster in all the forest plots than in the fernland. In a given plot, percentage weight lost by mixed litter was closely similar

to the mean of weights lost by individual litter. Of the litter types studied for 6 months, Gomphrea serrata showed the maximum weight loss, and the least by Anisophyllea cinnamomoides.

(iv) Among the terrestrial components (leaf litter, twig litter and soil), in both the forest and the fernland, the highest activity was observed in the soil (upto 10.5 cm depth). Soil nitrogen fixation activity among the plots showed negative relationships with total and exchangeable soil nitrogen and percentage carbon content. However, in one plot, where much accumulation of litter was seen in part of the plot, the activity within the plot showed positive relationships with the above factors. Nitrogen fixation in litter among the different plots showed a negative relationship with the decay constants recorded in those plots.