



**A STUDY OF DECOMPOSITION OF *Michelia nilagirica*  
AND *Semecarpus coriacea* LEAF LITTER IN THE  
HAKGALA FOREST RESERVE IN SRI LANKA**

**BY**

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## ABSTRACT

*Michelia nilagirica* and *Semecarpus coriacea* are major litter contributors to the lower parts of the Hakgala natural forest. Leaf decomposition ( $t_{0.99}$ ) of *Michelia* occurs within 2.4 years whereas that of *Semecarpus* leaves takes about 20.3 years. The present study was carried out to determine the causative factors for this slow decomposition of *Semecarpus* leaves. It was hypothesized that this slow decomposition is due to anti microbial polyphenolic compounds in the leaf tissues, which suppress the growth of fungi responsible for leaf decomposition.

Litter bag technique with freshly fallen leaves was used to provide leaves 3, 6 and 9 months after litter fall. Analogous decomposition stages for *Semecarpus* were chosen by careful examination of material on the forest. Various aspects of leaf litter characteristics of both leaves were studied, e.g. leaf chemical composition, effects of aqueous leaf leachates and extracts on fungal growth, leaf anatomy, leaf penetrability by fungi and leachability and water absorption of the leaves. Fungal successions on the two types of leaf debris were studied, isolations of fungi being made using a washing/plating method. Comparative studies on fungal biomass (using the agar film method), basal respiration, total microbial biomass carbon (substrate induced respiration) and metabolic quotient were made for the decomposition stages of the both leaf species. Substrate utilization abilities of the frequently isolated 1<sup>st</sup> and 2<sup>nd</sup> saprophytic fungi and of the bacterial and fungal communities of the two leaf types were studied using pure substrates and BIOLOG and FUNGILOG plates.

The fungal succession data showed that while there were differences between the fungi present on the two leaf types the number of spp. common to both types increased with increasing time of litter decomposition. Overall, *Broomella acuta* was the most frequent fungus in both litter types, persisting from freshly fallen to final decomposition stages. Fungal biomass values obtained for the 4 decomposition stages of *Michelia* leaf litter (ranging from 2570 to 18490  $\mu\text{g g}^{-1}$  dwt.) were significantly higher than those from *Semecarpus* litter (ranging from 680 to 11500  $\mu\text{g g}^{-1}$  dwt.). Similarly significantly higher values for total microbial biomass C were obtained for the 4 decomposition stages of *Michelia* litter (ranging from 6624 to 12691  $\mu\text{g C g}^{-1}$  dwt.) than for *Semecarpus* litter (ranging from 2858 to 6425  $\mu\text{g C g}^{-1}$  dwt.). Also basal respiration values for *Michelia* debris (35.07 to 79.43  $\mu\text{g CO}_2\text{-C g}^{-1}$  dwt.) were greater than for *Semecarpus* debris (24.28 to 39.05  $\mu\text{g CO}_2\text{-C g}^{-1}$  dwt.) over the time course of litter decomposition. Primary and secondary saprophytic fungi isolated from both leaf types showed versatile abilities in utilizing many of the pure substrates such as starch, cellulose, CMC, pectin, chitin and lignin. Bacterial and fungal communities in both leaf materials showed significant variations in utilizing simple organic compounds. Leaf anatomical studies showed that, unlike that of *Michelia*, the leaf structure of *Semecarpus* acts as a physical barrier for fungal colonization. Leaf surface sterilization experiments, which showed less internal leaf tissue colonization of *Semecarpus* than did *Michelia*, supported this.

It would appear that the slow decomposition of *Semecarpus* litter (c.f. *Michelia* litter) results from the lesser microbial colonization of this litter, and that the underlying causative factor for this is the leaf anatomy, not the presence of anti microbial plant secondary metabolites.