Studies on effect of litter quality on decomposition and nitrogen releases pattern of Agro-forestry species

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The decomposition and nitrogen release pattern of nine litter types were assessed by using litter-bag field technique in a field study conducted at Faculty of Agriculture, University of Ruhuna, Mapalana. Initial concentration of major nutrients and percent carbon, cellulose and lignin were varied considerably among freshly abscised leaf litter of the studied species. The highest concentrations of N, P, K, Ca and Mg were found in *Gliricidia sepium* (1.92%), *Artocarpus altilis* (0.71%), *Artocarpus altilis* (0.95%), *Artocarpus integrifolia* (2.57%) and *Alstonia macrophylla* (0.51%) respectively. *A. macrophylla*, *Mangifera indica* and *Acacia mangium* had the highest concentrations of carbon (42.39%), lignin (22.99%) and cellulose (32.77%), respectively. A salient feature of the leaf litter of *M. indica* was that it contained the lowest concentrations of N (0.39%), and cellulose (14.59%) and the highest concentration of lignin (22.99%), having the highest lignin to nitrogen ratio (58.2) and carbon to nitrogen ratio (92.7).

Mass loss was faster in *G. sepium* than *M. indica* and *Macaranga peltata* litter, with *Gliricidia* litter loosing 98% of the initial litter mass over nine months, in comparison with 80% of mass loss for *M. indica* and *Macaranga peltata* litter under the same condition. *G. sepium* and *Acacia auriculiformis* lost over 50% of their initial N content by 30 days where as *A. altilis*, *Terminalia catappa* and *M. indica* immobilized N from the soil. Greatest immobilization of N was recorded for *M. indica*. Of the nine agroforestry tree species studied, he decomposition constant varied from 1.66 to 8.46 yr-1. *G. sepium* showed the highest decomposition constant for litters and the rest in the following descending order : *Acacia auriculiformis> Acacia mangium > Artocarpus altilis > Artocarpus integrifolia > Terminalia catappa > Alstonia macrophylla > Macaranga peltata > Mangifera indica*. The half- life of litter types ranged from 29 (*G. sepium*) to 152 days (*M. indica)*. Initial quality parameters that best correlated with decomposition rate ($p<0.0001$) were nitrogen ($r^2=0.8547$) and carbon to nitrogen ratio ($p<0.01$, $r^2=0.58$). Nitrogen mineralization was also best correlated ($p<0.05$) with initial nitrogen ($r^2=0.51$) and carbon to nitrogen ratio ($r^2=0.44$). Nitrogen released pattern was also correlated to mass loss. Therefore, there is a potential of some plant materials to be used as sources of nutrients being green manures or as sources of mulches in tropical agro-ecosystems.

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