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Growth of Tree Seedlings on Leyte/ Philippines
Correlated with Litter Production and Decomposition

Bachelor Thesis by
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5. Summary

In the Philippines, more than 90% of the forests have been cleared. An annual deforestation rate of 1,4% was reported in the Countries Appendix of Mongabay.com. This development led to erosion and flooding in many mountainous areas. However, trees reduce surface run-off and protect the soil from raindrop impact. Furthermore, tree roots increase the permeability of lower soil layers and leaf litter has a great effect in facilitating infiltration. The special importance of forest cover to soil protection in watershed areas is widely recognized. In Leyte, Philippines, the so-called Rainforestation approach combines biodiversity and soil conservation through the use of indigenous tree species in degraded upland areas.

This study was focused on the initial growth period of ten indigenous tree species with special reference on litter dynamics.

Three indigenous Dipterocarp tree species, a fast growing pioneer species and six fruit tree species were planted under crown canopy of different density in June 2004. An inventory of the existing vegetation showed different species composition and densities of plants >1,5m height all over the study site. A wide spectrum of tree species was identified (40 different species) on site with *Ficus* being the dominant one (8-39% of all trees on different plots). According to the existing vegetation it was distinguished between closed canopy, open area and a banana plantation.

Litter fall and leaf litter decomposition rates were measured in a mixed reforestation site.

Litter was collected in 60 litter traps (0,25 m², 50 x 50 cm) during the wet season.

The areas with closed canopy showed the highest litter production while in the open area open area least litter was produced.

Leaf litter summed up to 57% in average. However high percentages of coconut bark and branches were found. High percentages (38-67% for each subplot) of banana plants were found on the site. Nevertheless the amount of banana leaf litter collected was small (16%). The litter traps and their distribution were not appropriate to measure the litter production of banana. Hence impact of banana on litter dynamics might be important due to the high density of bananas (up to 900 bananas ha⁻¹) and their medium ratio of carbon (C) and nitrogen (N) contents (C:N = 28).

Litter quantity collected was similar to that of banana, however quality was lower due to the low nitrogen contents of the leaves (0,7% N; C:N = 64).

The decomposition process of *Ficus sp.* leaves, a common secondary forest species on site, was observed in decomposition cages (15 x 15 x 10cm) over a period of 6 weeks. The decomposition of *Ficus leaves* (1,3 % N; C:N = 25) was the highest in areas with a high percentage of trees in present vegetation and high amount of tree leaf litter. The decomposition process showed a tendency to be faster under dense existing vegetation and high litter production.

The height and diameter (measured 5cm above the ground) of timber and fruit trees (463 trees) were measured directly after transplanting the seedlings. A second measurement was done 6 months later and the percentage increment was calculated.

The *Dipterocarpaceae*, which are indigenous timber trees, showed high increment in both height and diameter in those areas with high litter fall and high decomposition rates. Also they were identified as shade loving in the initial growth phase.

Fruit trees like *Durio zibethinus* (Durian) and *Garcinia mangostana* (Mangosteen) were also shade loving and showed best development in areas with intensive litter dynamics of existing vegetation.

Other fruit trees like *Artocarpus* species tolerated more intense solar radiation. They showed good development in open areas with smaller amounts of leaf litter fall and lower decomposition rates. *Artocarpus ordoratisissimus* (Marang) was observed to be more sun demanding than *Artocarpus heterophyllus* (Jackfruit, Langka).

Nephelium lappaceum (Rambutan) did not show special preferences, *Lansium domesticum* (Lansones/ Langsat) showed irritations under direct exposure to sun radiation.

An impact of litter fall and litter decomposition on the development of tree seedlings could not be proven. Nevertheless shade-demanding species showed better development in areas with high litter production and a fast decomposition process.

Especially *Dipterocarpaceae* like Hagakhak showed percentage height increment three times higher in closed than open areas.