Habitat requirements and population structure of selected multipurpose-tree species of primary rainforests as a basis for integration in landrehabilitation in the rainforestation farming system on Leyte, The Philippines

Master thesis of **Melvin Lippe**

Tropical forests are cut down and partly extinct in the Philippines. Deforestation on Leyte Island is mainly caused by the conversion of timberland into agricultural use and non-timber plantations. Thus agroforestry systems and reforestation are propagated on the island to stop deforestation process and to convert degraded areas in valuable land. In this context the so called "Rainforestation Farming System" was developed.

Knowledge of habitat and dendrological features of *Cinnamomum mercadoi* and *Dillenia megalantha* are required for a successful integration in rainforestation farming systems. *Cinnamomum mercadoi* Vidal and its regeneration are able to grow in different habitats: in altitudes from 300 to 700 m a.s.l., in almost all relief positions, from low to steep slopes, in primary and secondary forests, successions, at pH levels up to 4,5 and GSC up to 50 %, within exposition south, east and west. Fruits are animal dispersed (assumed), mainly by birds, probably in a high percentage by fruit specialized hornbills, and thus results in a scattered occurrence of trees species and regeneration in the forest, with an exception for Cienda, where a concentration of regeneration was found in areas of high bird densities and especially nest wholes of two hornbill families.

Dillenia megalantha Merr. mother trees were found in altitude levels of around 650 to 800 m a.s.l in Cienda and Canbintan, similar features of the research areas have resulted in the assumption that *Dillenia megalantha* grows within areas of high precipitation of around 3000 mm/a. Within investigated research areas *Dillenia megalantha* tree species were able to inhabit almost all relief positions from river creeks and plain areas, to lower,- middle,- and upper slopes and ridges. Inclination levels varied between 5 to 55°, and shows together with exposition of south, east and west that species is able to grow in topographical different locations, but needs high precipitation levels or good water availability, e.g. provided in river creeks to grow and establish its regeneration.

Investigations has shown that *Cinnamomum mercadoi* growth performance of mother trees in Cienda were fairly better than in Canbintan, but no evidence was found if observation was influenced by different climatic and topographic features of the research areas, or has resulted due to the difference in investigated mother tree locations of primary rainforests stands in Cienda, and secondary forest and slash-and-burn fields in Canbintan.

Comparison of growth performance of *Dillenia megalantha* mother trees in Cienda and Canbintan found no significant differences in growth performance, and this fact has resulted in the assumption of similar climatic features of the mother tree locations in Cienda and Canbintan shown by the same elevation range of occurrence for the species.

Regeneration analysis of *Cinnamomum mercadoi* and *Dillenia megalantha* found beside differences in fruit and seed dispersal, a general tendency of regeneration to establish under the forest canopy. It is thus assumed, that both species are belonging to climax tree species (Whitmore, 1984, 1995, Whitten 1987, Richards, 1996). Climax tree species germinate and establish below the forest canopy and seedlings are shade-tolerant (Whitmore, 1984, 1995).

Cinnamomum mercadoi and *Dillenia megalantha*, which are assumingly B storey trees therefore require shade, or similar under canopy conditions to establish their regeneration. This fact has to be considered for an successful integration of both species in the rainforestation farming system.

Nevertheless, precise outake values of regeneration of the tree species from natural rainforests cannot be given. The number of seven investigated mother trees is too small to use it for in depth statistical analysis. Obtained data can only show tendencies of regeneration patterns of both tree species in the natural rainforest, but it was shown that *Cinnamomum mercadoi* regeneration does not occur next to the mother tree stand, and a collection of e.g. seedlings for nurseries might fail because of lack of seedlings. Thus, information of the seed dispersal vectors (here: birds) are very crucial to find areas were seeds of *C. mercadoi* might be dropped, and then be collected for breeding in nurseries.

Regeneration of *D. megalantha* was found next to the mother trees, and thus knowledge of seed dispersal vectors is not required. As investigations have shown, regeneration densities can differ significantly between different locations, especially between primary (low) and secondary forest (high) sites. The relative high number of regeneration of *D. megalantha* in secondary forest sites shows the possibility to take out regeneration of these sites for breeding in nurseries, and for a probable direct planting in rainforestation farms.

As mentioned already, precise outtake values of regeneration cannot be given. How a collection of regeneration of both tree species in forests can be done was discussed, and it was shown that for an integration in nurseries, natural regeneration cycles of tree species should be known to have opportunities for take out seeds and or regeneration form natural forests and different mother trees to minimise impact or disturbance of natural regeneration cycles and to maintain genetic diversity.

Supervisor: PD K. Martin, Institute for Plant Production and Agroecology in the Tropics and Subtropics

Sponsor: Eiselen Foundation Ulm

November 2003

URL: http//www.troz.uni-hohenheim.de/research/Thesis/MScEE