2nd BioAsia Mycodipt Workshop

Role of mycorrhizal fungi in the natural regeneration, sustainable management and biodiversity of Dipterocarp forests in South-Est Asia

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Role of mycorrhizal fungi in the natural regeneration, sustainable management and biodiversity of Dipterocarps forests in South-Est Asia - Contribution of the BioAsia Mycodipt project

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Abstract

The overexploitation of forests in South-East Asia and their replacement by industrial plantations led to their progressive disappearance in lowland and mountain areas in the last decades. Consequently, policies of forest preservation and the implementation of restoration programs have become priorities in view of sustainable production of timber and soil conservation. However, forest regeneration is highly dependent on the presence of their mycorrhizal symbiotic partners in soils. In the framework of the Mycodipt-BioAsia research project funded by the French Ministry of Foreign and European Affairs in a tripartite partnership between FORDA, FRIM and CIRAD, the first objective of our work was to describe the diversity of ectomycorrhizal trees and that of their associated fungi in two natural forests in South-Sumatra.

The Sungai Telang forest site (Muara Bongo District, 01.69635° S; 101.78889° E; alt. 300 m), was chosen as a typical lowland forest dominated by Dipterocarps. The second site, Rimbo Candi (Pagar Alam District, 04.16563° S; 103.19810° E; alt. 1450 m), was chosen as a typical mountain forest dominated by Myrtaceae and Fagaceae species. Systematic forest surveys were performed along appropriate transects in both sites. All the ectomycorrhizal tree species and their individuals observed were identified according to botanical traits. In addition, sapwood samples were collected for further molecular characterization of the different tree species by partial sequencing of the intron region of chloroplast tRNA gene (*trn*L). Fruit bodies of ectomycorrhizal fungi found in these experimental plots were collected and identified based on morphological traits. In parallel, ectomycorrhizal root tips were collected at the basis of each tree for further molecular characterization of the fungal partner through partial sequencing of rDNA in the ITS region, and that of the associated host plant species through *trn*L sequencing.

A high diversity of ectomycorrhizal tree species was found in both forest types. Twelve different species, mostly *Shorea* spp. were identified from the 2 ha plot in Sungai Telang Dipterocarp forest. The Rimbo Candi mountain forest was dominated by trees of the Myrtaceae, Fagaceae and Lauraceae families represented by species of *Zyzygium*, *Lithocarpus* and *Cinnamomum* respectively. A low diversity of ectomycorrhizal fungi fruiting bodies were observed in lowland Dipterocarp forest contrary to the mountain forest site. The molecular analyzes showed that the mycorrhizal roots of the Dipterocarp forest were predominantly colonized by Thelephoraceae (*Tomentella* and *Thelephora* spp.) and *Russula* spp. although a high diversity of other fungal genera was found.

The understanding of mycorrhizal diversity and its exploitation in the frame of reduced-impact logging strategies is a key element to be considered for sustainable forest management and soil conservation in Southeast Asia.