



## **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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## **Mycorrhizal plant facilitation : a promising key tool for nickel mine site ecological restoration in Madagascar and New Caledonia**

**Marc Ducouso** <sup>(1)</sup>, Charline Henry <sup>(2)</sup>, Anne Houlès <sup>(1,3)</sup>, A. Razafimamonjy <sup>(4)</sup>, P. Andrianaivomahefa <sup>(4)</sup>, Antoine Leveau <sup>(3)</sup>, Laure Hannibal <sup>(5)</sup>, Fabian Carriconde <sup>(6)</sup>, H. Ramanankierana <sup>(7)</sup>, Michel Lebrun <sup>(8)</sup>, Marc-André Selosse <sup>(9)</sup> and Philippe Jourand <sup>(5)</sup>

<sup>(1)</sup> CIRAD, Laboratoire des Symbioses Tropicales et Méditerranéennes, TA A-82/C Campus International de Baillarguet, 34398 Montpellier cedex 5, France.

<sup>(2)</sup> AgroParisTech, Laboratoire des Symbioses Tropicales et Méditerranéennes, TA A-82/J Campus International de Baillarguet, 34398 Montpellier cedex 5, France.

<sup>(3)</sup> Koniambo Nickel SAS, BP 696, 98860 Koné, Nouvelle-Calédonie.

<sup>(4)</sup>: Ambatovy, Immeuble Tranofitaratra - 7ème étage, Rue Ravoninahitriniarivo – Ankorondrano, Antananarivo 101 - Madagascar

<sup>(5)</sup> IRD, Laboratoire des Symbioses Tropicales et Méditerranéennes, TA A-82/J Campus International de Baillarguet, 34398 Montpellier cedex 5, France.

<sup>(6)</sup> Institut Agronomique néo-Calédonien, BPA5, 98848 Noumea, New Caledonia

<sup>(7)</sup> Centre National de Recherches sur l'Environnement, Laboratoire de Microbiologie de l'environnement, Antananarivo, Madagascar

<sup>(8)</sup> Université de Montpellier, Laboratoire des Symbioses Tropicales et Méditerranéennes, TA A-82/J Campus International de Baillarguet, 34398 Montpellier cedex 5, France.

<sup>(9)</sup>: MNHN, Origine, Structure et Evolution de la Biodiversité, UMR 7205, 57 Rue Cuvier, 75005 Paris, France

### **Abstract**

Mycorrhizal symbiosis plays a key role in plant growth and development, especially in harsh contexts, where it may intervene in the facilitation process between plants. Madagascar and New Caledonia are considered as hot spot of biodiversity at plant level. Ecological restoration in these unique environments is challenging and facilitation constitutes a promising tool to succeed ecosystem reclamation. As mycorrhizal fungi can be associated with several plant species, one plant can facilitate the establishment of another by providing fungal inoculum in the form of already established and supported mycelia. Such a facilitation implies, however, that plants share a large and frequent portion of their ectomycorrhizal fungal partners. We characterized ectomycorrhizal communities on nickel and cobalt mining sites in Madagascar and New Caledonia to identify facilitator plants usable in ecological restoration technical itineraries. In Madagascar, four ectomycorrhizal tree species: *Asteropeia mcphersonii*, *Leptolaena* sp., *Rhodolaena bakeriana*, *Sarcolaena* sp. and *Uapaca* sp. locally dominate the canopy. In the wild, we demonstrate that these trees share most of their ectomycorrhizal partners, independent of tree age (adult or seedling). Following original ecosystem destruction, the only species spontaneously regenerating is *A. macphersonii*, making this species a candidate for its use as facilitator. In New Caledonia extreme soil constraints (heavy metal toxicities (Ni, Co, Mn, Cr), Ca/Mg unbalance ratio by Mg excess, nutrient (N, P, K) paucity and iron oxides (> 90%) excess), enable only a few planted species to grow after ecosystem destruction. Among them, we demonstrate that *Acacia spirorbis* shares most of its ectomycorrhizal fungal partners with endemic *Tristaniopsis* spp. (Myrtaceae) dominant species in some chaparrals, and it is now tested as facilitator within a set of field trials in the Koniambo massif. We demonstrate that facilitation is promising for successful ecological restoration of mine sites.