XYLOTECH

Valorisation of sawmill waste and underexploited forest products from French Guiana – evaluation of the industrial potential of extractives

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Introduction

Which compounds are responsible for the natural durability of Amazonian woods, and are these compounds valorisable? On the other hand, is it feasible to valorise under-exploited or secondary woody species?
The Xylotech project partners proposed to evaluate the industrial potential of volatile and non-volatile Amazonian plants secondary metabolites.

Which pattern of VOCs emission for which species?

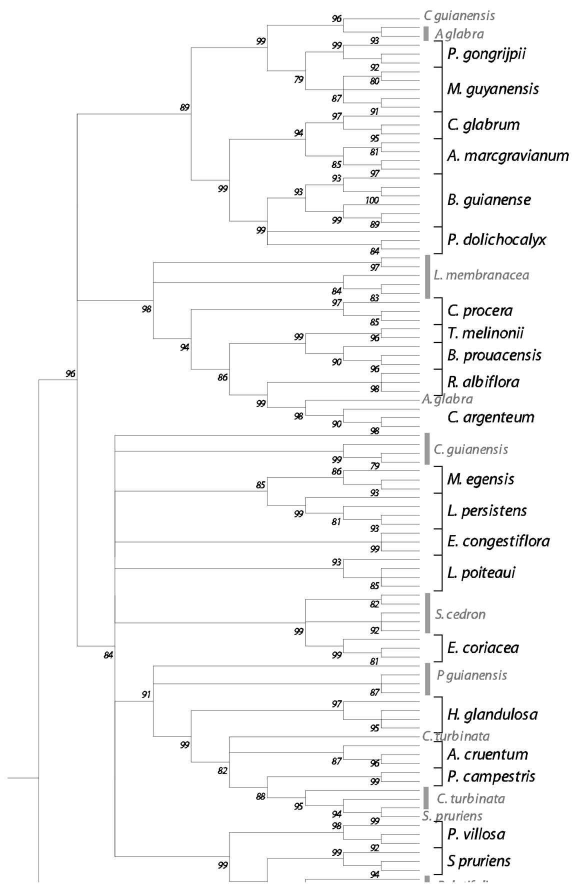

Fig. 1. Partial dendrogram displaying the dissimilarities in VOCs composition among individuals

The pattern of plant volatile organic compounds (VOCs) were constructed by an iterative process to counter the diversity of predators that plants have successively faced throughout evolution.
We have observed that each plant species possesses its own bouquet of VOCs and we were able to predict the relative composition of essential oils by recording the signature of trees scents before felling.

Which valorisation paths for these bouquets of VOCs?

It has been established that VOCs contribute to the defence of plants against herbivory and fungal diseases, and this latter ecological function suggests that essential oils (EO) may be used to treat cutaneous mycoses. The antifungal activities of 23 EOs have been measured towards dermatophytic fungi and pathogenic yeasts. Several of them, and in particular *Otacanthus azureus* EO displayed very promising activities. This EO is active against dermatophytes at MICs approaching those of reference compound itraconazole, and potentializes the activity of azoles in combination assays.

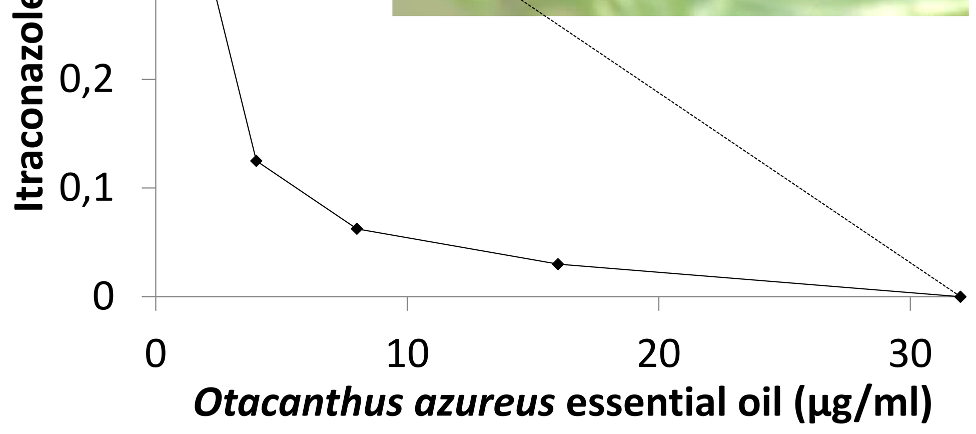

Fig. 2. Synergistic effect on *Microsporum gypseum* LMGO 10 growth inhibition (ICIF = 0,6). Dashed line represents additivity.

Chemical defences of woods as termiticide agents for wood preservation

Termites are degradation agents that inflict severe damage on wood. Several woods and in particular *Sextonia rubra* one were found to resist to termite-induced degradation. It has been demonstrated that this species naturally produces an ethyl acetate-soluble termiticidal metabolite, rubrynolide, to protect its wood. Assays in the presence of tropical and invasive termites established that both rubrynolide and crude ethyl acetate extract from *S. rubra* wood can be used as a treatment for the protection of sensitive woods against termites.

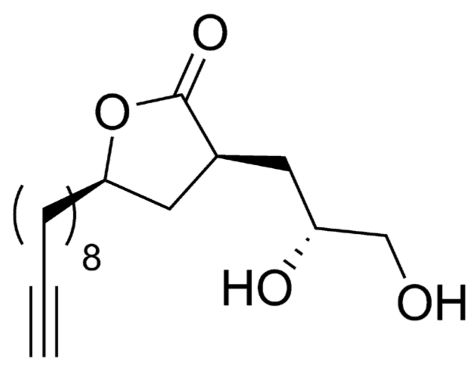

Fig. 3. Rubrynolide from *S. rubra*

Durability transfer and antifungal metabolites

We investigated the efficacy of extracts from exploited Amazonian woods with varying natural durability to reduce soft-rot degradation. Six of the wood extracts had shown efficacy against soft-rot fungi. In particular *Bagassa guianensis*, *Handroanthus serratifolius* and *Sextonia rubra* extracts, significantly reduced *Schefflera morototoni* wood hardness loss during the test. In standard wood preservation assay, *H. serratifolius* wood extract was very efficient at protecting *Pinus sylvestris* samples at 5.1 kg/m^3 against brown-rot. This extract could therefore be used as active ingredient in wood protectants formulation.

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