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Adaptation of timber plantations (*Gmelina arborea* and *Pachira quinata*) with Arbuscular Mycorrhizal Fungi in the Caribbean region, Colombia

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Highlights: The objective was select for timber plantations, the best interaction with arbuscular mycorrhizal fungi (AMF) considering both, agronomic and economic aspects, in order to get forest systems well adapted to the Caribbean Region. Four AMF genera (*Glomus, Acaulospora, Scutellospora* and *Gigaspora*) and 20 ecotypes were identified from the area of study, reflecting the high diversity present in tropical area.

Keywords: Arbuscular mycorrhizal fungi, ecotypes diversity, Caribbean soils, *Gmelina arborea, Pachira quinata*.

SUMMARY

The adaptation of timber plantations in the tropical Caribbean region is a good alternative for reforestation and land recovery for reducing pressure on natural forests, improving timber availability and the profitability for producers (Habte, *et. al,* 2001, Kogel, 2008, Kuypert. *et.al.,* 2004, Kernaghan,2005). This research consider both, agronomic and economics aspects in order to select the best AMF-plant association, adapted to the Caribbean area. For the evaluation the diversity of AMF in soils with *Gmelina arborea and Pachira quinata* plantations, almost 100 soil and root samples were collected during dry and rainy seasons. Chemical and physical soil analyses were performed in order to establish the relationships between soil characteristics and AMF diversity. Four AMF genera (*Glomus, Acaulospora, Scutellospora* and *Gigaspora*) and 20 ecotypes were identified from the area of study, reflecting the high diversity present in tropical forest, as was reported previously (Habte *et al*., 2001). There was high variation in spore count, between 1 to 121/g of soil, with a predominance of the *Glomus spp* not only in terms of abundance, but also in diversity. This result confirms *Glomus* plasticity and adaptability to different environments. In order to evaluate the effects of association between *Gmelina arborea* and *Pachira quinata* with 6 mixed isolates of AMF (4 native and 2 introduced + 50% of fertilizers), compared with controls with different doses of fertilization, 10, 50 and 100%, in a randomized complete blocks design, with three repetitions. Forest species showed high dependency of association with AMF and differential response linked with specific type of AMF isolated (Habte et al, 2001, Cardoso and Kuyper, 2006, Bainarda *et al*, 2010). The AMF association showed several benefits for timber plantations, expressed in improving plant growth and reduction in chemical fertilizers application (up to 50%) and in the cost of seedling production in 19%, for both plantation *G. arborea* and *P. quinata*, as consequence of the reduction of 37 days for the seedling under greenhouse. The biofertilization with native AMF in timber plantation should be included in the establishment model for improving to wood access and the profitability for producers.

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