

Public Abstract

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Title: Stand Structure development effects on wood quality of Melina (*Gmelina arborea* Roxb.)

Silvicultural studies have demonstrated that thinning increases residual tree growth and increases utilizable wood volume. However, it is not clear if reductions in stand density have measurable effects on important factors such as residual tree quality, wood properties and tree architecture. The purpose of this study is to examine the effects of thinning treatments on Melina (*Gmelina arborea* Roxb) stand structure, wood quality and tree architecture. Melina is a fast growing tropical tree species highly used in commercial plantations for wood products such as firewood, pulpwood, plywood, sawtimber, furniture, veneer and paper in most of the tropical areas of the world.

A stem analysis was performed to examine the effects of thinning treatments on Melina wood quality and tree architecture in the North Coast of Colombia. 27 plots under forest management regimes and age classes were evaluated. Split-plot experimental design, stepwise regression and ANOVA were developed to analyze the data. The results reveal that high precipitation regions have the higher values in most of the physics and mechanicals properties of the wood and dry regions have the lower values. No management regime improves wood properties rather than other regimes; but the log grade analysis was the lowest. Intermediate thinning regime was the best treatment applied to increase wood properties, wood quality and log grade in Melina trees. Estimation of log grade through the harvest cycle shows the highest increments at Cordoba region. Dendrometric variables such as heartwood, sapwood, and diameter and crown height are good estimators of tree volume, taper and branch modeling.

The ability to accurately predict lumber grade, wood quality and tree architecture is an important step to improved log sorting, pricing, wood quality, product differentiation and enhanced silvicultural planning. Wood quality is one of the most important factors to manage in the forest management plan. This study and methodology provide a procedure to understand the tree growth-wood quality relationship for forest research purpose and important guidelines for forest managers in the conservation and productive field of the forestry activity.