



Lignin Structure and Wood Properties

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Abstract

The objective of this study was to understand the relationship between lignin structural organization and certain wood properties. Lignin, which constitutes 20-30% of the weight of all woody plants, functions as a binding and encrusting material in the cell wall, giving rigidity to the overall plant structure. More than 60% of all linkages in lignins isolated (Björkman) from *Aspidosperma macrocarpum*, *Lophanthera lactescens*, *Gallesia gorazema*, *Peltogyne paniculata*, and *Aspidosperma polyneuron* were of the β -O-4 alkyl aryl ether type. This unit plays an important role in the physical and mechanical properties of wood. Percentages of β -O-4 unit were estimated by infrared spectroscopy. An Index of Molecular Flexibility (IMF) was introduced in order to hypothetically estimate the contribution of this unit toward wood flexibility, (under the assumption that the β -O-4 linkage is positively correlated with flexibility). Lignins from *Aspidosperma macrocarpum* (AM) and *Aspidosperma poly-neuron* (AP) show the highest and lowest structural complexity (diversity of linkage types β - β , β -5, β -O-4, etc.) with IMF values of 2.02 and 3.00, respectively. In this case, lignins AM and AP are supposedly contributing toward lowest and highest grade of wood flexibility, respectively, which demonstrates the hypothesis that β -O-4 linkages correlate well with flexibility.

Keywords

Lignin, infrared, wood, methoxyl group, index of molecular flexibility (IMF), guaiacyl-glycerol- β -aryl ether (β -O-4)