



Acacia: Characteristics, Distribution and Uses

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Book Description:

Acacia: Characteristics, Distribution and Uses opens with a chapter describing the wood of *A. melanoxylon* grown in Portugal in view of determining its technological quality for use in the construction and furniture industry. The characterization includes stem features, wood anatomical characteristics, chemical composition, wood density and mechanical properties.

Next, the authors aim to describe and analyze common characteristics among *Acacia* s.l. species and to trace some parallelisms of their performance throughout several ecosystems that hold such species. It is well-known that *Acacia* s.l. species have the ability to fix atmospheric nitrogen and may modify soil chemistry and physics by enabling microorganisms/soil fauna to alter the microhabitat beneath the tree, and such characteristics are significant in the recovery of ecosystems.

The potential of *Acacia mangium*, an exotic species, for restoration of a degraded land in Mt. Makiling Forest Reserve (MMFR), Philippines was also examined. Results suggested a general trend of changes in *A. mangium* plantation which was once a grassland dominated by *Imperata cylindrica* and *Saccharum officinarum*. Both (stems ha⁻¹) and basal area (m² ha⁻¹) increased significantly in 2010-2018 (P=0.001).

The authors discuss the way in which NMR spectroscopy applied to the study of gum exudates has become important since the 1990s in Venezuela. Analytical and structural studies of 23 species belonging to different genera and families have been reported through the combination of classic methodology for carbohydrates and NMR spectroscopy.

The footprints left by evolution in the distribution of characters among current organisms have been one of the main tools in the study of organic evolution. The authors propose that the reconstruction of ancestral character states offers the possibility of knowing the changes suffered by characters in a species throughout evolutionary time.

Pollinosis, also known as pollen allergy, hay fever or seasonal allergic rhinitis is one the most common respiratory disorders throughout the world. The inhalation of *Acacia* pollen is one of the main causes of respiratory allergic diseases in semiarid countries such as Iran, Saudi Arabia, and the United Arab Emirates. This book suggests that the recognition of allergenic components of pollens is essential for component-resolved diagnosis, the design of patient-specific immunotherapy, and the explanation of sensitization mechanisms to various allergens. The authors analyze *Acacia*-*Pseudomyrmex* mutualism which includes 15 species of acacias and a group of 10 species of mutualistic ants whose geographical distribution is similar. This relationship is frequently cited as an example of coevolution, a term that has been used to refer to the reciprocal change of interacting species where each of them acts as an agent of natural selection with respect to the other and where the reciprocal selection would result in congruent phylogenies.

The concluding chapter characterizes the *A. melanoxyton* wood pulping performance regarding yield and kappa number as well as the pulp and paper properties. The application of fast spectroscopic technologies for pulp quality determination is also described.

Chapter 8.

POTENTIAL OF *Acacia melanoxyton* FOR PULPING

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ABSTRACT

Most of the fibre raw materials used by the pulp and paper industry are from a small number of tree species. For instance, *Eucalyptus* and *Pinus* species are the major industrial pulpwood sources obtained from forests characterized by a relatively low biodiversity. The large monoculture areas also increase environmental risks such as those related to biotic attacks or forest fires. Diversification of industrial fibre sources has therefore been a matter of research and the characterization of different raw materials has been made in view of their pulping potential.

Acacia melanoxyton R. Br. (blackwood) grows well in Portugal in pure or mixed stands with *Pinus pinaster* Aiton, and is valued as a timber species with potential for sawmills. In addition, the wood anatomical and chemical characteristics also allow to consider the species as an alternative raw material for the pulp industry. *Acacia* species, with their relatively short, flexible and collapsible fibres, have potential to produce papers with good trade-offs between light scattering/tensile strength and smoothness/tensile strength, at low energy consumption in refining. The pulping and paper making potential of blackwood has been studied by several authors showing an overall good pulping aptitude under the same experimental conditions of kraft pulping as used for eucalypt pulping with pulp yields ranging between 47 and 58 %. The presence of heartwood should be taken into account because it decreases the raw-material quality for pulping due to the higher extractives content. Heartwood proportion should therefore be considered as a quality variable when using *A. melanoxyton* wood in pulp industries.

This chapter describes the characterization of the *A. melanoxyton* wood pulping performance, regarding yield and kappa number, and the pulp and paper properties. The application of fast spectroscopic technologies for pulp quality determination is also described.

Key words: *Acacia melanoxyton*; pulp yield, Kraft pulp, fibres morphology, papermaking potential.