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Laboratory Evaluation of Natural Decay Resistance and Efficacy of CCA-Treated Rubberwood (*Hevea brasiliensis* Muell. Arg.)

By Ismail Jusoh and D. Pascal Kamdem

Department of Forestry, Michigan State University, East Lansing, MI, USA

Keywords

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Summary

Information on the natural decay resistance and efficacy of CCA-treated rubberwood is important for the development rubberwood industry. The purpose of this study was to determine the natural decay resistance of rubberwood and the efficacy of CCA-pressure treatment in order to explore a new opportunity for this abundant raw material. Natural decay resistance and efficacy of CCA was estimated using soil-block test according to AWPA E10-91. Cubes were exposed to six wood-decay fungi: two each from white, brown, and soft rot. The moisture content of test cubes exposed to *Irpex lacteus* and *Trametes versicolor* increased with weight loss increase, while that exposed to *Gloeophyllum trabeum* and *Postia placenta* decreased. After a 12-week incubation period the average weight loss by white rot and brown rot fungi was about 1.5 times higher than that of soft rot fungi. CCA retention of 4.1 kg/m^3 reduced weight loss to between 8 % and 10 %, retention of 14.5 kg/m^3 protected weight loss by all test fungi from exceeding 2 %.

Introduction

Rubber (*Hevea brasiliensis* Muell. Arg.) plantations are found in more than 30 countries around the world. The total plantation area worldwide is approximately 9 million hectares with almost 90 % located in Asia. About 75 % of these are in Malaysia, Indonesia and Thailand (Ismariah and Norini 1994). Rubber trees reach their prime in 25 years, after which it is no longer economical to use them for producing latex (Hong *et al.* 1994). After 25 years, rubber trees normally have a clear bole of 3 to 10 meters in height, depending on the clone, and the diameter can reach up to 50 centimeters at breast height.

Several decades ago, old rubber trees were simply burned in the field prior to planting new stock, or used as firewood for brick-making and for the production of charcoal briquettes. In recent years, due to the shortage of forest timbers and the pressure of seeking new wood resources, rubberwood has become an important source of timber, particularly for furniture manufacturing. It is also used extensively to manufacture wood composites and panel products such as particleboard, blockboard and medium density fiberboard (Hong and Sim 1994). Despite the rapid expansion of the rubberwood industry, Lew (1992) reported that 67 % of rubber plantations are still burned in the field or used for firewood.

Today, rubberwood is used mainly for the manufacture of indoor furniture. Its potential for exterior use has been hampered by its high susceptibility to biological degradation. To minimize degradation and increase the service life of rubberwood in exterior applications, preservation treatments are needed.

Oil-based wood preservatives have been reported to provide good protection for rubberwood (Hong *et al.* 1994). Field tests showed that rubberwood stakes pressure-treated with a mixture of creosote and copper naphthenate can last for 20 years in ground contact (Martawijaya 1971). In an accelerated laboratory evaluation, rubberwood treated with borax and/or in combination with NaPCP (0.5 %) can provide protection against white rot fungi (*Ganoderma applanatum* and *Lenzites palisotii)* (Balasundaran and Gnanaharan 1990). Sodium pentachlorophenate and borax have been shown to be the most commonly used anti-sapstain formulations in green rubberwood logs and sawed timber (Ashari *et al.* 1999).

The effectiveness of CCA in protecting softwoods both in laboratory tests and in field exposures is well documented (Butcher and Drysdale 1978; Zabel and Morell 1992; Smith *et al.* 1996). However, the performance of CCA-treated hardwood is still a source of debate (Englund and Gardner 1993). Although CCA is an established wood preservative in the tropics, available information as to the performance of this preservative on rubberwood is limited.

In a previous study, the authors reported the retention and penetration of CCA in rubberwood (Jusoh and Kamdem 2000). This study is a continuation; the objectives are to evaluate the natural decay resistance or natural durability and efficacy of CCA-treated rubberwood by using a laboratory soil block test with a pure monoculture of *Irpex lacteus*, *Trametes versicolor*, *Gloeophyllum trabeum*, *Postia placenta*, *Chaetomium globosum* and *Phialophora* sp. after 12 weeks of incubation.