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SEM-EDXA of CCA-treated Rubberwood (*Hevea brasiliensis*)

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ABSTRACT

The microdistribution of chromated copper arsenate (CCA) preservative in rubberwood was studied using scanning electron microscope in conjunction with energy dispersive X-ray analyzer (SEM-EDXA). Bulk X-ray analysis showed that there was a high accumulation of chromium, copper, and arsenic in the vessels and lower concentration of the three preservative elements in fibres. Chromium appeared to record the highest while copper the lowest X-ray intensity in all cells. SEM-EDXA of semi-thin sections demonstrated that X-ray intensities of Cr, Cu, and As were concentrated in the fibre-to-vessel cell corner (FV_{CC}) and fibre-to-vessel middle lamella (FV_{ML}) while the lowest intensity was recorded in S_2 layer of fibre. Linescan analyses illustrated that higher count rates of chromium, copper, and arsenic were found in the middle lamella compared to the fibre S_2 layer in CCA-treated rubberwood. The increase of the solution strength in chromium, copper, and arsenic corresponds to an increase in Cr, Cu, and As level in wood cells.

Keywords: SEM-EDXA, CCA, microdistribution, *Hevea brasiliensis*, fibre-to-vessel cell corner

1.0 INTRODUCTION

In preservative treatment of wood, various toxic chemicals are impregnated into wood. It is well known that preservative effectiveness depends not only upon the amount of uptake or retention, but also upon its uniform distribution in the wood cells. The efficacy of preservatives is also the function of its permanence in wood. The performance of CCA in protecting softwoods both in laboratory evaluation and field tests is well established. The excellent performance of CCA-treated softwood, particularly the *Pinus* species, is attributed to deep penetration of preservatives into the cell wall of tracheids (Petty and Preston 1968), preservative loading (Ryan and Drysdale 1988), uniform preservative distribution at cell level (Bodner and Pekny 1991; Dickinson and Sorkhoh 1976; Greaves 1972), and even preservative distribution within the cell wall (Newman and Murphy 1996). In hardwoods, the poor performance of CCA is associated with failure to obtain even distribution and difficulty in achieving a desired level of chemical retention (Kamdem and Chow 1999).

The location and distribution of metal elements in wood treated with copper-based preservative may influence wood performance (Chou *et al.* 1973, Greaves 1978, Bodner and Pekny 1991).