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Micromorphological and Chemical Characteristics of Cengal (*Neobalanocarpus heimii*) Heartwood Decayed by Soft Rot Fungi*1

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ABSTRACT

The heartwood of cengal (*Neobalanocarpus heimii*) is known to have a high degree of decay resistance by virtue of its high extractive content. After 30 years in ground contact an utility pole of this tropical hardwood was found to be degraded only in the surface layers by cavity-forming soft rot fungi. The present work was undertaken 1) to characterize the degradation of cengal heartwood from the aspect of ultrastructure and chemistry and 2) to investigate the correlation between soft rot decay and its extractive microdistribution in wood tissues. The chemical analysis of cengal heartwood revealed the presence of a high amount of extractives as well as lignin. The wood contained a relatively high amount of condensed lignin and the guaiacyl units. Microscopic observations revealed that vessels, fibers and parenchyma cells (both ray and axial parenchyma) all contained extractives in their lumina, but in variable amounts. The lumina of fibers and most axial parenchyma were completely or almost completely filled with the extractives. TEM micrographs showed that cell walls were also impregnated with extractives and that pit membranes connecting parenchyma cells were well coated and impregnated with extractives. However, fungal hyphae were present in the extractive masses localized in cell lumina, and indications were that the extractives did not completely inhibit fungal growth. The extent of cell wall degradation varied with tissue types. The fibers appeared to be more susceptible to decay than vessels and parenchyma. Middle lamella was the only cell wall region which remained intact in all cell types which were severely degraded. The microscopic observations suggested a close correlation between extractive microdistribution and the pattern and extent of cell wall degradation. In addition to the toxicity to fungi, the physical constraint of the extractive material present in cengal heartwood cells is likely to have a profound effect on the growth and path of invasion of colonizing fungi, thus conferring protection to wood by restricting

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