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Section 1

Biology

**The High Decay Resistance in the Sapwood of the Naturally Durable  
Malaysian Hardwood Belian (*Eusideroxylon zwageri*)**

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# The High Decay Resistance in the Sapwood of the Naturally Durable Malaysian Hardwood Belian (*Eusideroxylon zwageri*)\*

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## ABSTRACT

It has long been assumed that the observed natural durability of the heartwood in certain timbers is perhaps associated with a relatively lower decay susceptibility also of the sapwood of these species. While the heartwood of Belian is reputedly highly decay resistant among the tropical hardwoods of Southeast Asia, laboratory decay tests reported in this paper have also confirmed the high decay resistance of the sapwood of this timber species. The sapwood of Belian is found to be resistant to decay by soft rot (*Chaetomium globosum*), white rot (*Pycnoporus sanguineus* & *Coriolus versicolor*) and brown rot (*Poria* sp. & *Gloeophyllum trabeum*) fungi after 12 weeks of decay testing, sustaining <2% mass loss, equivalent to that in its heartwood. The reference sapwood species Rubberwood (*Hevea brasiliensis*) and the heartwood of Kempas (*Koompassia malaccensis*) sustained significant mass losses from decay of up to 59% and 17%, respectively. Microscopic observations of Belian sapwood revealed extensive proliferation of extractives in the lumina of various cell types showing a pattern of extractive distribution similar extent to that in the heartwood tissues, although the extent of cell filling by extractives was not quite as high as for the heartwood. It is plausible that the inherent wood extractives deposited in the cells confer the same degree of anti-fungal properties to both the heartwood and sapwood of Belian.

**KEY WORDS:** *Eusideroxylon zwageri*, Belian, natural durability, sapwood, decay resistance, Basidiomycete, Soft rot, durable wood

## INTRODUCTION

It is acknowledged that the sapwood of most tree species is more susceptible to microbial deterioration than its physiologically formed heartwood within a tree stem, and this susceptibility is mainly attributable to the lack of anti-microbial extractives normally found in the heartwood (Scheffer & Cowling 1966, Wong & Wilkes 1988). Generally, the high susceptibility of the sapwood in hardwood species (*cf* softwoods) to white rot decay (Scheffer 1964, Eslyn & Highley 1976, Highley 1982) may be related to the wood's free phenolic "density" and antioxidant qualities of the extractives (Schultz & Nicholas 1997), or presence of hardwood (syringyl-guaiacyl) versus softwood (guaiacyl) lignins (Highley 1982). The sapwood species (or those species with poor heartwood-sapwood differentiation) of Malaysian hardwoods such as Jelutong (*Dyera* spp.), Rubberwood (*Hevea brasiliensis*), Ludai (*Sapium* spp.) Pulau (*Alstonia* spp.) and Ramin

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