

The Resistance Two Woods Species Soaked in Cigarette Waste Water Against Subterranean Termite Attack

by

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Abstract

Many people use wood to fulfill their needs, so if they did not get a good quality wood the consequence is a short service life. The purpose of this research was to determine the resistance of two wood species cold soaked in waste water from a cigarette company warehouse. Wood species used were Durian (*Durio zibethinus*) and Rambutan (*Nephelium lappaceum* L) and preservation methods used were cigarette waste water with a concentration of 10%, 20%, 30%, 40% and 50%. Preservation methods used were to cold soak the wood for 1, 2, 3, 4, and 5 hours. The result was conducted in the laboratory in accordance to the Indonesian standard. The research showed that both preservation methods were effective at increasing wood resistant to subterranean termites. The preservation method of cold soaking for 5 hours was the best method.

Keywords: Subterranean termite, warehouses, preservation, laboratory test.

Introduction

Some cigarette company warehouses use tropical wood species with interesting properties like natural durability which is an important property for packing tobacco products in situations where there is a high risk of insect infestation. The endurance of a wood species to attack by degrading pests and the environment of the wood should be tested.

Two wood species Durian (*Durio zibethinus*) and Rambutan (*Nephelium lappaceum* L) are used for packing material by cigarette company warehouses and assessed by its durability and a low durability would mean a short service life. Tests for termite resistance of wood can be conducted under laboratory conditions to compare the susceptibility of materials or to examine the performance of protective chemicals (Howick and Creffield 1983).

In the other hand, cigarette companies produce waste water from clove marinade (*Syzygium aromaticum*). This is a problem for the 117 cigarette companies in Central Java, one company can produce 350 m³ of waste water per day (BPS, 2012). This research was to impregnate wood samples from cigarette company warehouse waste water and test it against attack by the subterranean termite *C. curvignathus* Holmgren.

Materials and methods

Samples two woods species Durian (*Duriozibethinus*) and Rambutan (*Nepheliumlappaceum* L) material from Semarang, Indonesia were used in the experiment. Then, the wood specimens (2.5 × 2 × 0.8 cm) were put in the oven at 100 °C until constant weight and then placed in a 450–500 ml wide-mouth round glass of jar with a bottom area of 25–30 cm². The methods used to treat the wood blocks with cigarette waste water at concentrations of 10%, 20%, 30%, 40% or 50%. Wood specimens were cold soaked for 1,2,3,4, or 5 hours. 200 g moist sand (7% moisture content under water holding capacity) and 200 healthy and active worker subterranean termites (*Coptotermes curvignathus* Holmgren) were added to each glass jar. The jar was then kept in a dark room at 25–30 °C with more than 70% relative humidity for four weeks. Each week the jars were weighed and if moisture content of the sand was reduced 2% or more, water was added to reach the standard moisture content. At the end of the four weeks, percent weight loss of the wood specimens and termite mortality were determined (SNI 2006). Weight loss (%) = [(Wo – W1) / Wo] x 100 Where, Wo is the oven dry weight before feeding and W1 is oven dry weight samples after feeding.

Results and Discussion

Two woods species Durian (*Durio zibethinus*) and Rambutan (*Nephelium lappaceum* L) impregnated with waste water from a cigarette company warehouses showed increased resistance to subterranean termite attack in the laboratory test. Impregnated wood was more resistant to subterranean termite attack in the laboratory test compared to not-impregnated wood.

Table 1 Percentage termite mortality from the efficacy test of cigarette waste water

Test specimen	Cons (%)	Soak Time (hour)				
		1	2	3	4	5
Control	0	5	10	15	25	36
<i>Durio zebethinus</i>	10	5	16	26	36	55
	20	5	15	26	37	56
	30	6	15	25	35	56
	40	6	14	25	35	54
	50	5	15	40	44	54
<i>Nephelium lappaceum</i> L	10	5	12	25	85	96
	20	5	13	24	96	95
	30	5	13	35	93	95
	40	6	25	84	93	100
	50	9	36	85	93	100

Termite mortality showed cigarette waste water has a highly toxic fraction (90% phenol). At its highest concentration of cigarette waste water (50%), managed 50% termite mortality by the end of the test period with *D. zebethinus*, while cigarette waste water with *N. lappaceum* gave 100% termite mortality with the 5 hoursoak in this bioassay.

Table 2. Weight loss (%) of wood treated by cigarette waste water against subterranean termite *Coptotermes curvignathus*

Test specimen	Cons (%)	Soak Time (hour)				
		1	2	3	4	5
Control	0	35,75	-	-	-	-
<i>Nephegium lappaceum</i> L	10	1,27	1,46	1,44	1,33	1,36
	20	1,29	1,30	1,34	1,34	1,38
	30	1,27	1,28	1,27	1,28	1,32
	40	1,34	1,43	1,31	1,29	1,34
	50	1,35	1,42	1,46	1,48	1,38
<i>Durio zebethinus</i>	10	2,09	2,55	1,45	1,61	1,51
	20	2,52	2,55	2,72	2,87	2,62
	30	1,65	1,41	1,69	1,68	1,65
	40	1,65	1,48	2,63	2,32	1,77
	50	2,77	2,61	2,10	2,09	2,15

As shown on the Figure 2, sample percent weight loss results confirmed that cigarette waste water gave highresistance efficacy. At the highest soak time (5 h) cigarette waste water gave between 1,32 to 2,62% weight loss. Efficacy performance is generalized based on sample weight loss and termite mortality rate at the end of bioassay observation. A bio-pesticide is considered ineffective and unable to deliver reliable protection against termite, if wood samples possess more than 2% weight loss. Should the weight loss be less than 2% and termite mortality is 100% at the end of the bioassay, the bio-pesticide is considered effective to provide protection against subterranean termite attack (Subekti, 2013).

Cigarette waste water main contains phenol (Subekti, 1995). This component in pure fraction isinexpensive and attracts many small-scale uses. It once was widely used as an antiseptic, especially in [carbolic soap](#) (Senter *et al.* 1089) More importantly, using a nature-based termicide will reduce our dependence on other toxic chemicals, and offer new perspectives for new environmentally friendly termite control methods.

Conclusions

Two woods species Durian (*Durio zibethinus*) and Rambutan (*Nephelium lappaceum* L) cold-soaked in cigarette company warehouse waste water has been showed to increase resistance to subterranean termite attack in a laboratory test. Phenol from Cigarette waste water is an alternative bio-pesticidesuitable as a wood preservation treatment.

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