Vol. 13(1): 45-59, January 2025

DOI: https://doi.org/10.23960/jsl.v13i1.1063

Jurnal Sylva Lestari

P-ISSN: 2339-0913
E-ISSN: 2549-5747

Journal homepage: https://sylvalestari.fp.unila.ac.id

Full Length Research Article

Feeding Preferences of Subterranean Termite *Schedorhinotermes javanicus* on Tusam (*Pinus merkusii*) Wood

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ARTICLE HISTORY:

Received: 26 August 2024
Peer review completed: 13 December 2024
Received in revised form: 23 December 2024
Accepted: 30 December 2024

KEYWORDS:

Field test
Pinus merkusii
Schedorhinotermes javanicus
Weight loss
Wood consumption

ABSTRACT

Wood-destroying termites are quite influential in Indonesia, and the subterranean termite *Schedorhinotermes javanicus* is one of them. This study was conducted to determine the feeding preferences of subterranean termites *S. javanicus* on tusam (*Pinus merkusii*) wood and the influence of their environment. The bait woods made of tusam boards were installed at the experimental site. The weight loss and consumption of bait woods were studied with three test times (one, two, three) months of burial. The subterranean termite specimens attacking the bait woods, soil characteristics, and weather at the experimental field were also identified. The results demonstrated that the average air temperature at the experimental site was 25.4 ± 0.4°C, the average air humidity reached 88.8 ± 2.4%, and the light intensity at the experimental site ranged from 175.67 lux to 3889.7 lux. The results showed that *S. javanicus* quite actively attacked the bait wood. This can be seen from the high weight loss (35.03%) and the wood consumption (38.78 g). The weight loss after three exposure times in the experimental field was up to 13.54%, 16.38%, and 35.03%, respectively. The wood consumption during the same experimental period reached 14.9 g, 18.25 g, and 38.78 g, sequentially. The high weight loss and the consumption of bait wood indicate the high feeding preference of the subterranean termites *S. javanicus* on tusam wood.

1. Introduction

Over the last thirty years, we have seen that termites are the most important organisms that destroy wood and buildings in Indonesia. The damage caused by the termite attack occurred in building construction, such as door and window frames, poles, and roof structures, and in building contents, such as furniture, archives, and other valuables. This damage occurs in buildings of varying ages (Indrayani et al. 2017). For example, a review found that subterranean termites are pests of major economic importance in Asia (Kuswanto et al. 2015). Financial losses caused by insect attacks on various lignocellulosic materials on buildings in Indonesia reached IDR 8.67 trillion per year (Nandika 2015). This tendency is understandable because Indonesia is one of the world's most important termite distribution areas. A total of 3,106 species of termites are identified in various parts of the world (Krishna et al. 2013), and 11.5% (300 species) are found in Indonesia.

Cases of termite attacks on buildings in Indonesia have been reported in 45 cities or regions, which is 10% of the total cities or areas in Indonesia (Nandika 2015).

One of the termite species that has a very wide geographical distribution in Indonesia and has a relatively large abundance of colony members compared to other species of the Rhinotermitidae family is *Schedorhinotermes javanicus* Kemner (Isoptera: Rhinotermitidae) (Mubin et al. 2019). This termite species have been found in several areas in Indonesia, such as Bogor, DKI Jakarta, Makassar, Banda Aceh, Riau, Jambi, Batam, Surabaya, and Bandung (Arif et al. 2019; Arinana et al. 2019; Kusumawardhani and Almulqu 2024; Nandika et al. 2015). This termite species also has a wide home range (100 m^2 to 295 m^2) and a large population size (508,138 to 719,038 individuals) (Rismayadi 1999). Its maximum cruising range (25 m to 118 m) also exceeds the cruising range of other termite species, such as *Coptotermes curvignathus* Holmgren (51 m) and *Microtermes inspiratus* Kemner (6 m) (Rismayadi 1999). Meanwhile, this termite species can also be found in all forest types, such as natural forests, pine plantation forests, and mahagony plantation forests (Arif et al. 2020; Nandika et al. 2015). Like *Coptotermes* sp., *S. javanicus* was also found to attack plantation crops and buildings in settlements (Arinana et al. 2020; Nandika 2014).

In addition to food sources, environmental factors also greatly influence the feeding preferences of subterranean termites. These factors include soil type, vegetation type, and climate. Subterranean termites generally prefer soil containing much clay to sandy soil (Lee and Wood 1971). Meanwhile, Lindsey (2010) reported that termite feeding activity and consumption were higher at low than high light intensity. Research about *S. javanicus* has been reported in several countries, such as Malaysia, Vietnam, Italy, and India (Curci et al. 2021; Jamil et al. 2017; Maiti and Saha 2014; Nguyen 2017). However, information about the feeding preferences of the subterranean termite *S. javanicus* on Indonesian wood species has not been widely reported. Tusam (*Pinus merkusii*) is used as bait wood, as Brischke and Alfredsen (2022) reported that this wood has a high extractive content that can attract termites. Therefore, this research is necessary to analyze the feeding preferences of the subterranean termite *S. javanicus* for tusam wood in the field and the soil and weather characteristics of its niche.

2. Materials and Methods

2.1. Materials

The materials used in this study were tusam (*Pinus merkusii*) wood with air-dried condition (moisture content of ± 12%) from a tree that was approximately seven years old (± 23 cm in diameter) that grows in a community forest area in Ciherang, Dramaga, Bogor Regency, West Java, 70% alcohol, paint, and aluminum foil. Bait wood was made from *P. merkusii* and cut into boards with a length of 200 cm and a thickness of 4 cm, then air-dried to a moisture content of 15%. The board was made into a size of (2 × 2 × 46) cm^3 (T × R × L), referring to the standard of the American Society for Testing and Materials (ASTM) D1758-06 (ASTM 2006). Furthermore, the bait wood was dried with the help of a fan until the moisture content was ± 10%. The bait wood surface was cleaned using sandpaper, then oven at 103 ± 2°C until the constant weight was obtained. Furthermore, the bait wood was weighed (W1).

2.2. Field Test

A total of 30 bait woods were buried in the Arboretum of the Faculty of Forestry and Environment, IPB, Dramaga Campus, Bogor Regency, West Java Province at coordinates 6°33'26.43"S and 106°43'44.99"E with a rectangular test location measuring 3.1 m × 2.4 m. The bait woods were buried randomly. The bait woods were buried vertically to a 25 cm depth, as represented in **Fig. 1**. The bait woods were buried at a distance of 30 cm in the longitudinal direction (row) and 60 cm in the wide direction (column) (**Fig. 2**). The bait woods were buried with three test time (one, two, three) months.

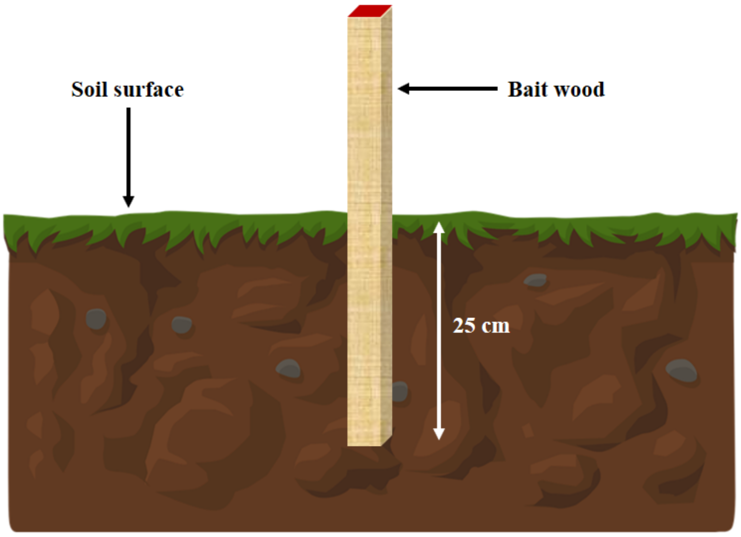

Fig. 1. Sketch how to install bait wood on the experimental site (Arinana et al. 2019).

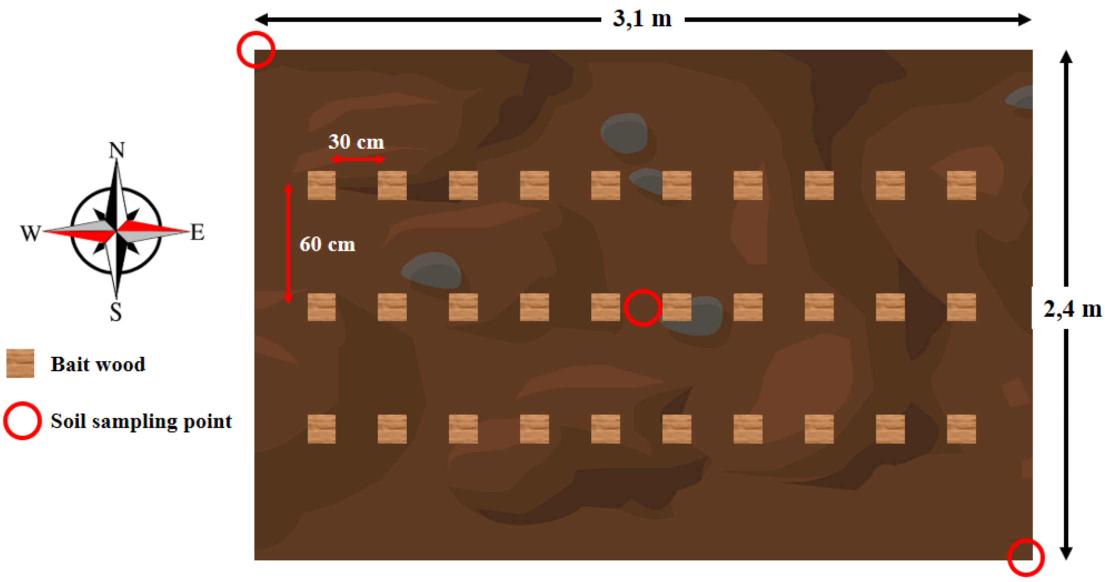

Fig. 2. The experimental site plan.

2.3. Air Temperature, Air Humidity, and Light Intensity Measurement

The test site's temperature and humidity were measured by installing a Digital Temperature-Humidity Data Recording Logger Meter at one point. The device automatically records temperature and humidity data every hour for three months. Light intensity was measured using a lux meter every month with three observation times: morning (7.00 AM), noon (13.00 AM), and afternoon (17.00 AM).

2.4. Characteristic Soil Analysis

Soil sampling was carried out at three points on the field whose locations were determined diagonally, one each in the Northwest direction, in the middle of the test site, and in the Southeast direction (**Fig. 2**). Soil samples from a depth of 0–20 cm were taken as much as 1 kg compositely at each point using a crowbar (Handayani and Karmilasanti 2013). To find out the texture (percentage of sand, silt, and clay), pH, and the content of soil's C-organic, the soil samples were then investigated in the Indonesian Center for Biodiversity and Biotechnology (ICBB) Bogor.

2.5. Subterranean Termites Identification

This section utilized the soldier termite caste on the bait woods. Initially, termite specimens were put in 70% alcohol. The identification process was based on the identification key of the termite species (Ahmad 1958; Tho 1992). Morphological observation of termite specimens was carried out under a stereo microscope (Leica M205 C, Germany) equipped with LAS version 4.4 software with a magnification of 100×.

2.6. Wood Physical Properties Test

Test of wood's physical properties aims to the ASTM D143-03 standard (ASTM 2003). This test includes the moisture content's value and the wood's specific gravity. The tusam wood used is 2.5 x 2.5 x 2.5 cm^3. The wood that has been cut was measured for dimensions and weight. The wood was air-dried for 1 week using a fan until it reached a moisture content of approximately ± 15%. The wood that has been air-dried was measured for dimensions and weight. In the last stage, the wood was an oven with a temperature of 103 ± 2ºC until the weight was constant, and the dimensions and weight of the wood were measured again. Furthermore, the value of moisture content and specific gravity was calculated using the following formula:

$$MC = \frac{W_1 - W_0}{W_0} \times 100\% \quad (1)$$

where MC is moisture content (%), W_1 represents the air-dried mass of the bait wood sample (g), and W_0 explains the oven-dried mass of the bait wood sample (g).

$$SG = \frac{W_0}{V_0} \quad (2)$$

where SG is specific gravity, W_0 is the oven-dried mass of the bait wood sample (g), and V_0 is the initial volume of the bait wood sample before feeding (cm^3).

2.7. Wood Chemical Components Test

The tusam wood is cut into small pieces, ground into powder and sieved using a 40–60 mesh sieve.

2.7.1. Extractive free sample preparation

5 g of wood powder was prepared in an extraction thimble and placed in a soxhlet. Extraction was extracted with 300 ml of an ethanol-benzene mixture (1:2) for 8 hours. The sample was

washed with ethanol and aerated to evaporate the remaining solvent. Samples were extracted with hot water for 3 hours and then dried in an oven at a temperature of 103 ± 2ºC until the weight was constant.

2.7.2. Holocellulose content

This procedure used an Erlenmeyer containing 2 g of extractive-free sample and 100 ml of distilled water, then adding 1 g of $NaClO_2$ and 1 ml of acetic acid. The mixture was placed in a water bath and heated at 70–80ºC. Afterward, $NaClO_2$ (1 g) and acetic acid (0.5 ml) were added gradually up to 4 times every hour from reaction time. Hot distilled water and 25 ml of 10% acetic acid were used to filter and wash the sample. The sample was washed again with hot distilled water until it was acid-free. The sample was oven-dried at a temperature of 103 ± 2ºC to constant weight (Browning 1967).

$$Holocellulose\ (\%) = \frac{Holocellulose\ powder\ weight\ (g)}{Powder\ dry\ weight\ (g)} \times 100 \quad (3)$$

2.7.3. α-cellulose content

The 1.5 g of obtained holocellulose from the previous method was put in an Erlenmeyer, and 10 ml of 17.5% NaOH was also poured in it at 20ºC (room temperature). 5 ml of 17.5% NaOH was added each time interval of 5 minutes. The addition was carried out 3 times until the total volume of 17.5% NaOH was 25 ml. Samples were allowed to stand for 30 minutes at 25 ± 2ºC. Furthermore, 33 ml of distilled water was added to the sample and left for 60 minutes. 100 ml of 8.3% NaOH was used to filter and rinse the sample, then continued with the rinse using hot distilled water. After that, 10% acetic acid, followed by hot distilled water, was used to rinse the sample again until free of acid. Samples were dried at 103 ± 2ºC for 24 hours until the weight was constant (Browning 1967).

$$\alpha\text{-}cellulose\ (\%) = \frac{\alpha\text{-}cellulose\ powder\ weight\ (g)}{Powder\ dry\ weight\ (g)} \times 100 \quad (4)$$

2.7.4. Klason lignin content

The lignin content was determined using the standard TAPPI 222 om-88 (TAPPI 1996). A 0.5 g extractive-free sample was hydrolyzed with 5 ml of 72% sulfuric acid for 3 hours at room temperature while stirring every 15 minutes. The hydrolysis was conducted at 121ºC autoclave for 30 minutes until the sulfuric acid concentration became 3%. Then precipitation was carried out on the lignin, filtered, and rinsed using hot distilled water until free of acid and oven at 103 ± 2ºC to constant weight.

$$Lignin\ (\%) = \frac{Lignin\ weight\ (g)}{Powder\ dry\ weight\ (g)} \times 100 \quad (5)$$

2.7.5. Extractive content dissolved in NaOH 1%

The measurement of extractive content dissolved in NaOH 1% aimed to the standard TAPPI T 212 om 88 (TAPPI 1996). 2 g of sample was put into an erlenmeyer, and 100 ml of NaOH 1% solution was poured. Erlenmeyer was placed in a water bath for 60 minutes. The solution was stirred with a glass stirrer while heating for 10, 15, and 25 minutes. The sample was rinsed with hot water and added 25 ml of 10% acetic acid 2 times. The samples were rinsed with hot water until acid-free and dried at 103 ± 2°C to constant weight.

$$Extractive\ (\%) = \frac{Powder\ dry\ weight\ (g) - After\ extraction\ weight\ (g)}{Powder\ dry\ weight\ (g)} \times 100 \quad (6)$$

2.7.6. Extractive content dissolved in ethanol-benzene

The measurement of extractive content dissolved in ethanol-benzene aims to reach the standard TAPPI T 204 om-88 (TAPPI 1996). A 2 g sample whose weight was known is placed on a lead paper. The sample soxhletation and extraction were done using alcohol: benzene (mole ratio of 1:2) solution for 6–8 hours. The sample was rinsed with ethanol and aerated. The sample was dried at a temperature of 103 ± 2°C to constant weight.

$$Extractive\ (\%) = \frac{Powder\ dry\ weight\ (g) - After\ extraction\ weight\ (g)}{Powder\ dry\ weight\ (g)} \times 100 \quad (7)$$

2.8. Data Collection

After three test times (one, two, and three) months of burial, each 10 bait wood was taken, cleaned, and oven at 103 ± 2°C to constant weight (W2). Furthermore, measurements of weight loss of bait wood and consumption of bait wood due to *S. javanicus* termite attack were carried out with the following formula:

$$WL = \frac{W_1 - W_0}{W_1} \times 100\% \quad (8)$$

where WL is the weight loss of bait wood (%), W_1 is the oven-dried weight of bait wood before testing (g), and W_0 is the oven-dried weight of bait wood after testing (g).

$$WC\ (g) = W_1 - W_0 \quad (9)$$

where WC is the wood consumption of bait wood (g), W_1 is the oven-dried weight of bait wood before testing (g), and W_0 is the oven-dried weight of bait wood after testing (g).

2.9. Data Analysis

Data on weight loss and wood consumption of bait wood by subterranean termites *S. Javanicus* at each time of bait wood taking were analyzed by analysis of variance (ANOVA) and Duncan's follow-up test with the help of the SPSS 22 program.

3. Results and Discussion

3.1. Soil and Weather Characteristics of The Experimental Site

The results show that the soil texture at the experimental site was clay with a content of 11.3% sand, 11.3% silt, and 77.3% clay. Soil pH at the experimental site ranged from 4.54 to 4.78. Meanwhile, the C-organic content at the experimental site ranged from 2.14% to 2.66%. In other words, the C-organic content in the soil at the experimental site was categorized as moderate (2.47%) (Balai Penelitian Tanah 2009).

Soil characteristics such as texture, pH, and the soil's C-organic content greatly affect the survival of subterranean termites. Soil texture at the experimental site is classified as clay.

Research reported that the soil texture in a residential landscape in Bogor was clay (Arinana et al. 2020). Termites generally do not like sandy soil and prefer soil that contains much clay because the organic matter content is relatively high (Lee and Wood 1971). Meanwhile, subterranean termites were easier to build termite tunnels in soils with a balanced sand and clay content compared to soils with higher amounts of sand or clay (Robinson 1996). Jouquet et al. (2015) also reported that the mound construction of the sub-family Macrotermitinae was more stable on clay-textured soils.

Based on the analysis results, the soil pH at the experimental site was classified as acidic. These results aligned with Jembere et al. (2017) that subterranean termites could live with acidic soil pH (under 7). Meanwhile, several studies have shown that subterranean termites can live at a pH of 4.23 to 8.47 (Arinana et al. 2019; Arinana et al. 2020). Based on the assessment criteria, the C-organic content at the experimental site was categorized as moderate (Balai Penelitian Tanah 2009). Subterranean termites increase the soil's organic matter content by decomposition of litter and other organic matter (Khan et al. 2018). Meanwhile, Arinana et al. (2020) reported lower C-organic content in the soil in a residential landscape in Bogor, ranging from 0.69–1.78%.

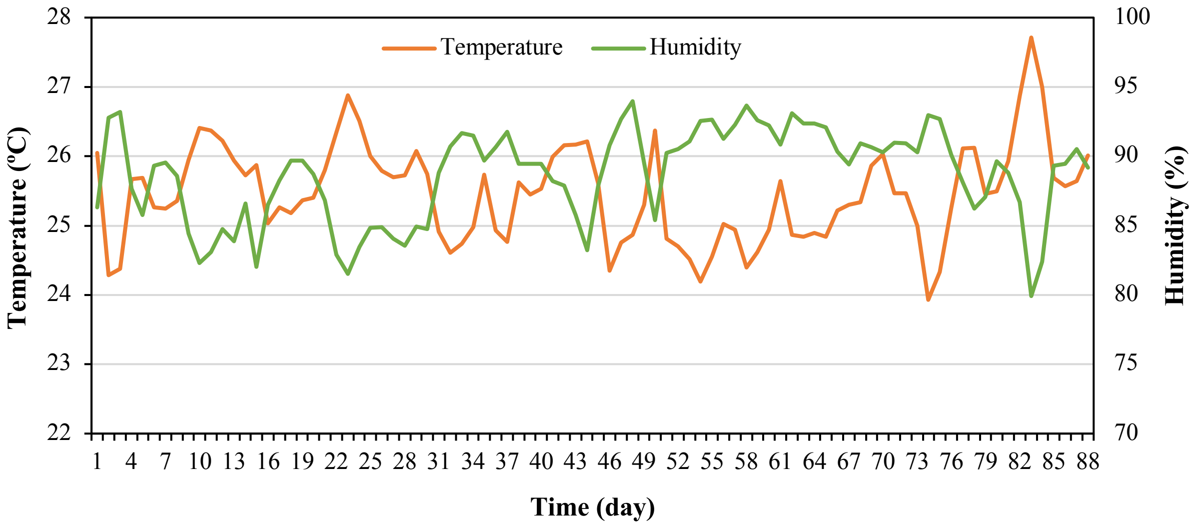

Fig. 3. Daily air temperature and humidity at the experimental site.

The results demonstrate that the average air temperature at the experimental site was 25.4 ± 0.4°C. Meanwhile, the average air humidity reached 88.8 ± 2.4% (**Fig. 3**). Meanwhile, the light intensity at the experimental site ranged from 175.67 lux to 3,889.7 lux. The highest light intensity at the experimental site occurred at 13.00, which was 3,889.7 lux, followed in the morning at 07.00 (359.71 lux) and in the afternoon at 17.00 (175.67 lux) (**Fig. 4**). The light intensity was not too high at the experimental site due to the cover of the tree canopy.

Weather characteristics (temperature, humidity, and light intensity) were very important to support the survival of subterranean termites. The optimum air temperature that supports the life of subterranean termites ranges from 28–32ºC, and the optimum air humidity that supports the life of subterranean termites ranges from 75–90% (Nandika et al. 2015). Arinana et al. (2019) reported that the minimum temperature around subterranean termite nests in DKI Jakarta Province ranges from 21.9ºC to 26.1ºC, while the maximum temperature ranges from 35.3ºC to 38.8ºC. This result aligns with Arinana et al. (2023) that temperature and humidity in Bogor are suitable for the survival of subterranean termites.

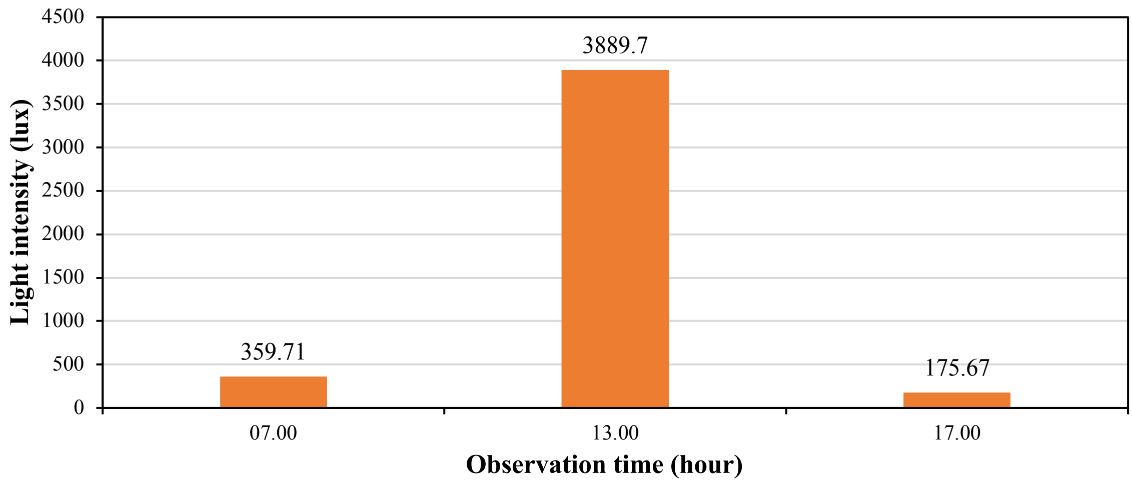

Fig. 4. Light intensity at the experimental site in the morning (07.00), noon (13.00), and afternoon (17.00).

The tree canopy cover at the experimental site shows the results of fairly low light intensity. Foraging activity and wood consumption of subterranean termites were higher at low-light-intensity locations than at high-light-intensity locations (Lindsey 2010). Meanwhile, subterranean termites often move away from the soil surface (enter the soil) when the sun's intensity shines directly on the soil surface with high intensity (Lee and Wood 1971). Research suggested that light intensity also affects the height of termite nests from the sub-family Microtermitinae, which were hill-shaped (mound) (Axelsson and Anderson 2012).

3.2. Wood-Attacked Termite Species

The results show that the termites that attacked the bait wood after exposure at the experimental site for one, two, and three months were *Schedorhinotermes javanicus*, *Macrotermes gilvus*, and *Microtermes insperatus*. Among the three subterranean termite species, *S. javanicus* was the most dominant termite species attacking bait wood (**Fig. 5**).

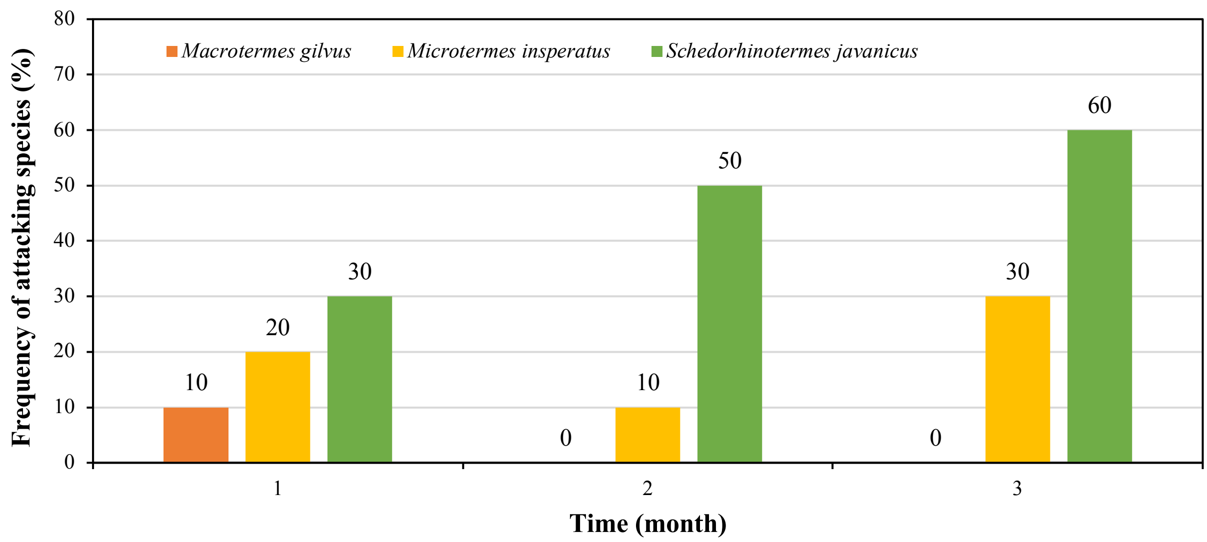

Fig. 5. Attack frequency of three subterranean termites on bait wood.

The results of morphometric observations of the major soldier caste of the subterranean termite *S. javanicus* that attacked the bait wood at the test site showed that the total body length of the termites ranged from 5.06–5.24 mm, the head length with mandibles ranged from 2.13–2.24 mm, The head without mandibles ranged from 1.41–1.54 mm, and the head width ranged from 1.42–1.54 mm with 16 antenna segments. Meanwhile, the morphometric observations of the minor soldier caste showed that the head length with mandibles ranged from 1.11–1.45 mm, the length of the head without mandible ranged from 0.70–0.89 mm, and the width of the head ranged from 0.71–0.80 mm with 16 antenna segments.

The dominant termite species attacking bait wood at the experimental site was *Schedorhinotermes javanicus*. *Schedorhinotermes* sp. is one of the dominant termite species attacking bait wood in the Arboretum of the Faculty of Forestry and Environment, IPB (Arinana et al. 2020). Research also reported that *Schedorhinotermes* sp. is a termite species with the most dominant presence in the Dramaga Campus of IPB, Bogor (Mubin et al. 2019). Haneda et al. (2017) stated that *S. javanicus* is a member of the Rhinotermitidae family, which is easy to find on Java Island. The morphological characteristics of the soldier caste of the termite species are presented in **Fig. 6**.

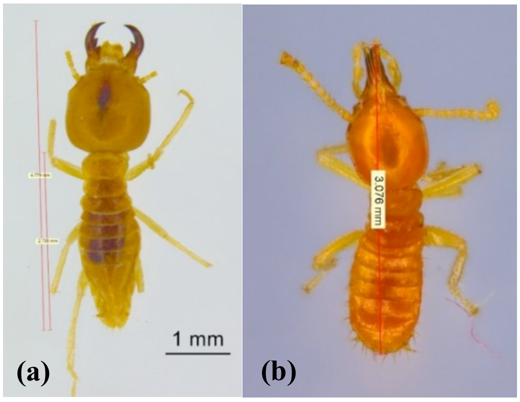

Fig. 6. Morphology of major soldier caste (a) and minor soldier caste (b) subterranean termite *S. javanicus*.

The existence of the major and minor soldier castes of the subterranean termite *S. javanicus* and their morphometry followed the morphological characteristics listed in the identification key for that species (Ahmad 1958). In this case, the major soldier caste was characterized by a labrum extending to three-quarters of the mandible. The number of antenna segments was 16, and the second segment was shorter than the third. The center of the postmentum was narrower than the tip. The edge of the pronotum was rather broad. The head was yellowish red. Head length with mandible 2.15–2.30 mm, without mandible 1.48–1.52 mm, head width 1.38–1.41 mm. The length of the pronotum was 0.40–0.53 mm with a width of 0.74–0.81 mm. Meanwhile, the minor soldier has a labrum extending beyond the mandible's tip. The difference in the proportion of the length and width of the pronotum was very small, namely 0.11–0.15 mm. Head with a few long hairs. Antenna segments 15–16. Head length with mandible 1.41–1.52 mm, without mandible 0.85–0.90 mm, head width 0.74–0.82 mm. The pronotum was 0.38 mm long and 0.49–0.53 mm wide.

3.3. Physical Properties and Chemical Components of Tusam Wood

The physical properties and chemical components of tusam wood are shown in **Table 1**. The results show that tusam wood has physical properties: a moisture content of 15.46% and a specific gravity of 0.55. In addition, Martin and Lopez (2023) reported that wood density affects termite feeding preference, which termites attack wood with high density because it has small lumens and thick cell walls. While the chemical components, namely the levels of holocellulose and α - cellulose, respectively around 60% and 78.7%, the lignin content ranges from 23.88%, and the levels of extractive substances are quite low, both dissolved in NaOH 1% and dissolved in ethanol-benzene, namely respectively around 14.94% and 7.39%. Martin and Lopez (2023) also reported that the presence of extractive contents attracts termites to wood, which wood with high extractive contents also has high wood durability.

Table 1. Physical properties and chemical components of tusam wood

Properties	Value
Physical properties:	
Moisture content (%)	15.46
Specific gravity	0.55
Chemical properties:	
α-cellulose (%)	60.00
Holocellulose (%)	78.70
Lignin (%)	23.88
Extractive dissolved in NaOH 1% (%)	14.94
Extractive dissolved in ethanol-benzene (%)	7.39

3.4. Weight Loss

The results show that the attack of subterranean termites *S. javanicus* on bait wood had occurred one month after the bait wood was installed. This result indicates that the subterranean termite *S. javanicus* is quite an active foraging at the experimental site. The foraging activity of the termites resulted in significant weight loss of bait wood, ranging from 13.54–35.03%. The weight loss of the bait wood occurred progressively, with an average monthly increase rate of 67.41% (**Fig. 7**).

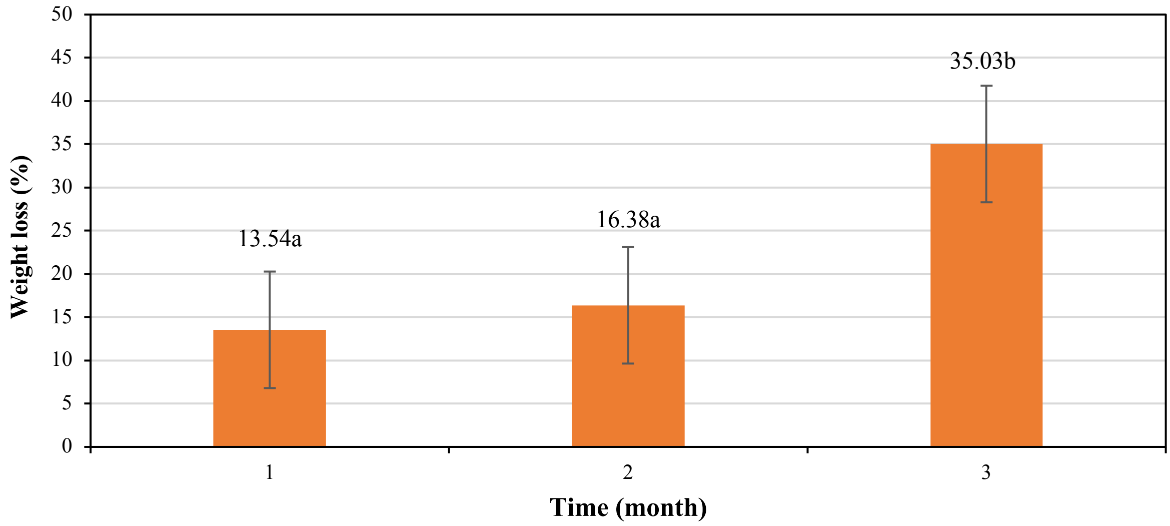

Fig. 7. Weight loss of bait wood due to subterranean termite *S. javanicus* attack after three exposure test periods at the experimental site.

Fig. 7 shows that the longer the exposure time of the bait wood at the experimental site, the greater the weight loss. The variance results demonstrate that the weight loss of bait wood in each month of observation for three months was significantly different (significant level 5%). Duncan's further test analysis showed that exposure to the bait wood at the experimental site for three months gave very different results than exposure to the bait wood at the experimental site for one and two months. Arinana et al. (2020) reported that the weight loss of tusam wood due to subterranean termite attacks in the same location as the test site ranged from 21.88% to 36.78% for three months of exposure. Meanwhile, Nurhadi et al. (2023) reported that tusam wood in residential areas had the highest weight loss by the subterranean termites. This can be influenced by the higher extractive content of tusam wood, which attracts termites (Brischke and Alfredsen 2022).

3.5. Wood Consumption

The results show that the consumption of bait wood by subterranean termites *S. javanicus* occurred one month after the bait wood was installed. This result indicates that the feeding preference of the subterranean termite *S. javanicus* towards bait wood made from tusam wood is quite high. The consumption of bait wood by this termite species for one, two, and three months reached 14.9 g, 18.25 g, and 38.78 g, respectively (**Fig. 8**). The result is also in line with Hadi et al. (2020) that tusam wood is one of the high consumption by termites during baiting. Meanwhile, *S. javanicus* was also found attacking wood such as *Agathis damara* and *Tectona grandis* and was even found in oil palm plantations (Heriza 2023; Pratiknyo et al. 2020; Pratiknyo and Setyowati 2020).

Fig. 8 shows that the longer the exposure time of bait wood at the experimental site, the greater the consumption of bait wood by *S. javanicus*. The variance results show that the consumption of bait wood by *S. javanicus* in each month of observation for three months was significantly different (significant level 5%). Duncan's further test analysis showed that exposure to the bait wood at the experimental site for three months gave very different results than exposure to the bait wood at the experimental site for one and two months. The average consumption of bait wood made from tusam wood by the subterranean termite colony *S. javanicus* in the IPB Dramaga Campus landscape reached 1.23–2.24 g per day (Husni 1999). Meanwhile, Rudi and Nandika (1999) reported that the consumption of tusam wood by subterranean termites *C. curvignathus* per individual for 21 days in the laboratory was 0.665–1.670 mg.

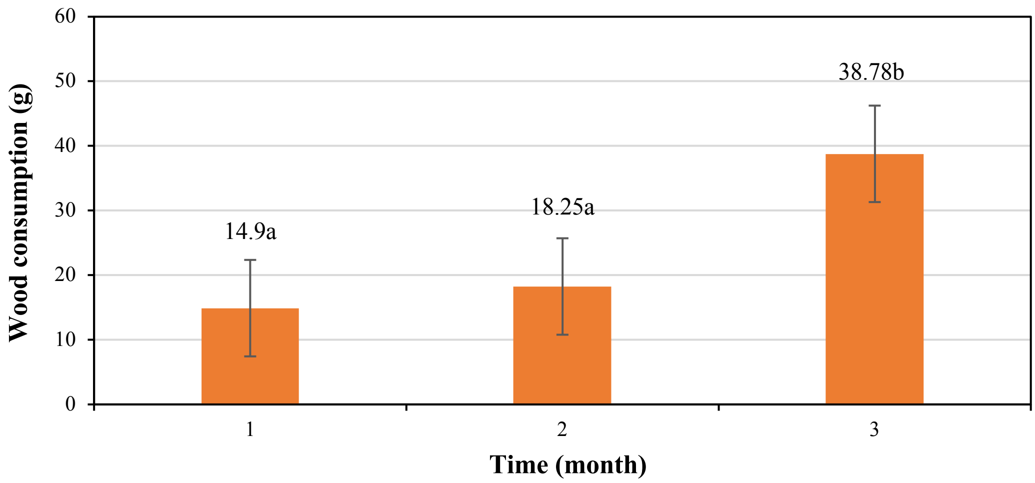

Fig. 8. Wood consumption by *S. javanicus* after three exposure test periods at the experimental site.

The high weight loss and consumption of tusam wood were also influenced by the wood's physical properties and chemical components. Based on its relatively low specific gravity, tusam wood was categorized as strong class III. Meanwhile, the content of extractive substances was quite low, making this tusam wood favored by subterranean termites. It has been reported that tusam wood has a high consumption rate by subterranean termites such as *Coptotermes curvignathus*, *Coptotermes gestroi, Microcerotermes serrula, and Odontotermes javanicus* (Arif et al. 2019; Arif et al. 2021; Cornelius and Osbrink 2015; Fajar et al. 2019). Controlling the high consumption of wood by subterranean termites can be done by applying biopesticides, as reported by Prayogo et al. (2022) that the fraction of *Melia azedarach* leaf can be developed as a bioactive to controlling termite attack. Furthermore, treated wood with additions of MEG-Silica 1% and active charcoal can increase wood resistance to termite attack (Indrayani et al. 2022; Rahayu et al. 2024).

4. Conclusions

The feeding preference of subterranean termite *S. javanicus* on *P. merkusii* is quite high. This can be seen from the high weight loss (35.03%) and consumption of bait wood (38.78 g) after being exposed to the experimental site for three months. Judging from the time of the attack, as well as the frequency and intensity of the attack on the bait wood, the subterranean termites *S. javanicus* were very active foraging at the experimental site, supported by the suitability of the soil (pH, C-organic content, and texture) and weather (temperature and humidity and light intensity) in the area. Given its relatively high feeding preference for tusam wood, *S. javanicus* can be considered as a test insect in testing wood resistance to termites in the laboratory as an alternative to using *C. curvignathus* or *C. gestroi*. However, further research was needed on the survival of these species in the laboratory.

Acknowledgments

This research was supported by IPB University, Indonesia, and the Integrated Laboratory of Termite and Laboratory of Wood Quality Improvement Technology, IPB University.

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