Quest Journals
Journal of Research in Agriculture and Animal Science
Volume 13 ~ Issue 1 (January 2026) pp: 01-05
ISSN(Online): 2321-9459
www.questjournals.org

Research Paper

Identification of Rubber Plant Damage (*Hevea Brasiliensis* Muell. Arg.) Case Study in Lembah Asri, Marangkayu District, Kutai Kartanegara Regency, East Kalimantan

Iin Arsensi, Siti Mutmainah, and Lilit
Faculty of Agriculture, Widya Gama Mahakam University, Samarinda
Corresponding Author: Iin Arsensi

Abstract
Identifying damage to rubber plants is crucial for understanding the fundamental differences between damage caused by pests and diseases. Pest and disease attacks can substantially disrupt the growth and development of rubber plants, ultimately reducing their productivity. This disruption not only impacts the volume of harvests but can also hamper the supply of raw materials for downstream industries. Therefore, early detection of damage and the implementation of integrated control strategies are key to minimizing negative impacts and ensuring optimal production results. The objective of this study was to identify damage to rubber plants caused by pests and diseases. The study was conducted using observational methods from January to April 2025 on rubber plants belonging to the Lembah Asri Farmers Group in South Prangat Village, Marangkayu, Kutai Kartanegara Regency, East Kalimantan Province. The results showed that pest damage was categorized as light, with a termite attack intensity and frequency of 4%. Disease damage was categorized as light, with a leaf fall disease intensity of 11% and a 29% attack frequency. Fungal attack intensity was 0.5% and KAS 0.25% were light, with a 1% attack frequency.

Keywords:*Identification, Pests, Diseases, Rubber Plants*

R*eceived 02Jan., 2026;* ***R****evised 09Jan., 2026;* ***A****ccepted 11Jan., 2026 © The author(s) 2026.*
P*ublished with open access at* ***www.questjournas.org***

I. INTRODUCTION

Rubber plants (*Hevea brasiliensis* Muell. Arg.) are a plantation commodity that plays a vital role in the Indonesian economy. They are also an Indonesian export commodity, serving as a source of foreign exchange outside of oil and gas. Land area and rubber production in Indonesia continue to increase. Rubber plants play a strategic role and possess significant economic value for Indonesia. Their contribution to the national economy is reflected in the value of Indonesian rubber exports, which reached US$6.40 billion in 2022. Given this critical position, protecting rubber plants from various threats, particularly pests and diseases, is crucial to maintaining the productivity and sustainability of this industry (Directorate General of Plantations, 2023).

Pest and disease attacks can substantially disrupt the growth and development of rubber plants, ultimately reducing productivity. This disruption not only impacts harvest volume but can also hamper the supply of raw materials for downstream industries. Therefore, early detection of the damage caused and the implementation of integrated control strategies are the main foundations in minimizing negative impacts and ensuring optimal production results (Alimin et al., 2019).

Identifying damage is crucial for understanding the fundamental differences between pests and diseases. Pests are defined as organisms that directly cause physical or metabolic disturbances in plants, which can inhibit their growth and development, and even potentially lead to plant death. Pest damage often leaves clear visual traces, such as bites, holes, or mucus trails on plant parts. In contrast, disease is an abnormal and detrimental physiological process in plants. This condition can be triggered by primary factors, both biotic (such as fungi, bacteria, or viruses) and abiotic (such as nutritional deficiencies or extreme environmental conditions). Disease disturbances are continuous and manifest through abnormal cell or tissue activity, resulting in symptoms

such as discoloration, wilting, or rot (Plantation Protection Directorate Team, 2017). Pests damage rubber plants' roots, stems, leaves, or other plant parts, preventing them from growing properly or even causing them to die. A disease is anything that disrupts plants, preventing them from producing or gradually die (Hariyanto and Diyah, 2018).

Identifying damage to rubber plants caused by pests and diseases is a fundamental step in maintaining the productivity and sustainability of the rubber industry. This report outlines the major pests and diseases, along with the specific damage symptoms they cause in various plant parts, from seedlings to mature trees. A thorough understanding of the differences in damage mechanisms between pests (direct physical damage) and diseases (physiological dysfunction) is crucial for accurate diagnosis and the determination of appropriate control strategies.

The economic impact of pest and disease attacks is substantial, with potential latex production losses of up to 45-46% for some leaf fall diseases, and financial losses of billions of rupiah due to conditions such as Dry Tapping Furrows. These figures emphasize that rubber plant health management is not simply a technical agronomic issue but a pressing economic imperative.

Analysis shows that environmental factors such as temperature, humidity, rainfall, soil characteristics, vegetation type, and food availability significantly influence the prevalence and severity of infestations. Complex interactions between pests and diseases, such as the role of termites in accelerating the death of JAP-infected plants or the role of squirrel bite wounds as entry points for the fungus, underscore the need for a holistic approach. Furthermore, improper plantation management practices can exacerbate the problem, while good cultural practices can be an effective line of defense.

Based on the above description, research was conducted to determine the causes and extent of damage caused by pests and diseases in rubber plants (a case study in Lembah Asri, Marangkayu District, Kutai Kartanegara Regency, East Kalimantan Province).

II. RESEARCH METHODS

2.1. Time and Location

This qualitative research was conducted from January to April 2025 on rubber plantations of the Lembah Asri Farmers Group in Prangat Selatan Village, Marangkayu, Kutai Kartanegara Regency, East Kalimantan Province, Indonesia.

2.2. Research Stage

The research was conducted using an observational method, namely direct field observations and recording of the observed objects in the rubber plantations in Perangat Selatan Village, Marang Kayu District.

2.3. Sampling Techniques

Plant samples were collected using a purposive sampling method, selecting 100 rubber plants from a total of 500 plants.

2.4. Data Collection

Data were collected based on field observations, including observations of pest or disease types, damage to affected parts, and characteristics of damage or symptoms experienced by rubber plants.

2.5. Data Analysis

There are two methods of data analysis:

1. Attack Intensity (IS) is a measure that describes the level of damage caused by pests and diseases on the observed object, thus obtaining the attack intensity. The formula for measuring attack intensity according to Arsensi and Mardji (2018) is as follows:

$$IS = \frac{\Sigma_{i=o}^{z}(n_i \times v_i)}{Z \times N} x100\%$$

Description:
IS = Attack Intensity; ni = number of plants or i-th damage scale; vi = value of i-th damage scale; N = number of plants or plant parts observed; and Z = highest damage scale value.

The damage intensity scale of attacks is as follows: light (≤ 10%); moderate (≥ 10% - ≤25%); severe (≥25% - 50%); and very severe (≥50% - 75%).

2. Attack Frequency (FS) is the ratio of the number of attacked objects to the total number of observed objects in percentage units. The frequency of pest and disease attacks (FS) is calculated based on the formula from de Gusman (1985) as modified by Arsensi and Mardji (2018). The formula used to calculate attack frequency is as follows:

$$FS = \frac{n}{N} \times 100\%$$

Description:
FS = Attack Frequency (%); n = number of objects attacked; and N = total number of objects observed.

III. RESULTS AND DISCUSSION

3.1. Research Location Overview

Perangat Selatan is a village in Marang Kayu District, Kutai Kartanegara Regency, East Kalimantan Province, Indonesia. Originally, Perangat Selatan was a transmigration village during the era of Indonesia's second president, President Soeharto. Perangat Selatan Village was formerly known as Village E, as transmigration villages in the Marang Kayu area used letters to designate their territories. For example, the two villages flanking Perangat Selatan Village, named Village D and Village F, were previously part of Tanjung Santan III District, specifically within the rubber plantation area of PIR (People's Core Plantation) PTP. 26, which was later taken over by Plantation Company (PTP) Nusantara XIII.

The transmigration of the people in 1989 came from outside Kalimantan Island using sea transportation and anchored at the Toko Lima Port of Muara Badak village, because Muara Badak was the nearest port area. After all, the Samarinda Bontang Main Road was still under construction. Community ofthe transmigration population consists of several tribes, such as Javanese, Sundanese, Madurese, and Lombok/Sumbawa tribes. Then added to the residents around Marang Kayu, namely the Bugis tribe. The initial design of the driving force of the economy in Perangat Selatan Village was a rubber plantation, so until now, the majority of the economy of Perangat Selatan Village is still based on rubber plantations (Dolores, 2023).

3.2 Intensity and Frequency of Pest and Disease Attacks

Observations indicate that the pests attacking rubber plants are termites (*Coptotermes curvignathus*), and diseases include leaf fall (*Fusicoccum* spp.), stem rot (*Ganoderma* sp.), and tapping groove desiccation (*Lasiodiplodia theobromae*). The intensity and frequency of pest and disease attacks on rubber plants are presented in Table 1.

Table 1. Intensity and Frequency of Pest and Disease Attacks on Rubber Plants

No	**Type of Pest**	**Attack Intensity (%)**	**Attack Frequency (%)**
1	Termite (*Coptotermes curvignathus)*	4	4
No	**Type of Disease**	**Attack Intensity (%)**	**Attack Frequency (%)**
1	Leaf fall disease *(Fusicoccum spp)*	11	29
2	Stem rot disease (*Ganoderma* sp)	0,50	1
3	Dry tapping groove disease *(Lasiodiplodia theobromae)*	0,25	1

Source: Processed Primary Data (2025)

Data in Table 1 shows that only one type of pest attacks rubber plants, termites. The attack intensity is only 4% and the frequency is 4%. This termite infestation is considered mild. Signs of an infestation usually include the presence of termite trails covered in soil around the stem or along the stem/branches. Termites attack newly planted rubber seedlings, causing severe damage and even death. Termites can also attack the roots and shoots of the plant, causing damage to the tips of the shoots or young rubber plants. Although only 4% of 100 rubber tree trunks are infested, these plants will generally die. The results of other research reported by Antonius (2019) stated that the types of pests that frequently occur in natural rubber plants are termites (*Microternes inspiratus*), rats (*Rattus* sp), squirrels (*Callosciurus notatus*), pigs (*Sus venerrucosus*), deer (*Muntiacus muntjak*), and deer (*Rusa timorensis*). Puspitasari et al. (2022) stated that termites cause damage by biting the roots and stems of rubber plants. They form burrows and nests in plant tissue and can cause severe structural damage. This can weaken the plant and even lead to death if the infestation is left untreated. Termite infestations can significantly reduce rubber production. Production losses due to termite damage are estimated at 5-15% annually. Furthermore, Ardiansyah et al. (2025) reported that termite infestations increase in plantations whose management practices do not consider ecological balance, such as excessive chemical use and improper soil management. Therefore, termite pest control requires a holistic approach that includes the use of biological agents, termite habitat management, and ecologically based control to maintain ecosystem balance. These findings provide important guidance for plantation managers in developing environmentally friendly pest control strategies while supporting the sustainability of rubber plant productivity.

The results of the study showed that the most common type of disease attacking rubber plants was leaf fall disease with an average intensity and frequency of attacks of 11% and 29%; followed by stem rot disease

caused by the fungus *Ganoderma* sp with an average intensity and frequency of attacks of 0.5% and 1%, and dry tapping groove disease caused by the fungus *Lasiodiplodia theobromae* with an average intensity and frequency of attacks of 0.25% and 1%. Fairuzah (2019) stated that leaf fall disease is one of the main threats to rubber production in Indonesia, causing significant losses due to decreased latex production and even tree death if not controlled. Some common pathogens causing leaf fall in Indonesia include *Colletotrichum gloeosporioides*, *Pestalotiopsis microspora*, and *Fusicoccum* sp. (previously *Corynespora cassiicola*, although now Corynespora is known more specifically to cause leaf blight disease. Furthermore, Yosephine et al. (2020) stated that currently leaf fall disease attacks are still a threat to rubber plantations; the level of this attack is very intensive, especially on producing plants that are no longer fertilized.

Other disease attacks include stem rot caused by the fungus *Ganoderma* sp, with an average intensity and frequency of attacks of 0.5% and 1%, respectively, and dry groove disease caused by the fungus *Lasiodiplodia theobromae*, with an average intensity and frequency of attacks of 0.25% and 1%. Attacks of both diseases are categorized as mild. The results of research by Febbiyanti et al (2017) indicate that the rubber disease, whose attacks have increased in the last ten years in several rubber plantations, is stem cancer. Symptoms of this disease are characterized by the formation of scabs sporadically and then merging into lesions on the surface of the rubber stem. In the cambium, brown necrosis symptoms appear that spread to the crown of the plant. Severe infections can cause bleeding, bark cracks, and rot (gummosis). This stem cancer disease is found in almost all rubber plantation centers in Southern Sumatra and South Kalimantan.

Cameron (2023) stated that the symptoms of Dry Tapping Groove disease (KAS) are divided into 2, namely partial KAS and severe KAS. Partial KAS is characterized by latex only coming out in part of the tapping area, the presence of rubber lumps in the tapping groove which sometimes makes the flow of latex obstructed by the lumps. In partial KAS, rubber plants are still able to produce latex, but the quantity begins to decline. While in severe KAS, latex only clumps at several points in the tapping area and does not even produce any latex at all. The percentage of KAS disease attacks on rubber plants is 32.52%.

According to the Rubber Research Center (2019), the intensity of pest and disease attacks is significantly influenced by the rubber clone planted, seasonal conditions (humidity), and cultivation practices. Susceptible clones and poorly maintained gardens during the rainy season significantly increase the severity of attacks. Selecting more resistant rubber clones, implementing good cultivation practices (including ideal plant spacing, pruning, and sanitation), and implementing timely disease control programs are crucial, especially during seasons favorable for disease development.

IV. CONCLUSIONS AND RECOMMENDATION

4.1. Conclusions

Based on the research results and discussion, the following conclusions are drawn:

1. Damage to rubber plants due to pest attacks is categorized as light, with an intensity and frequency of termite attacks of 4%.
2. Damage to rubber plants due to disease attacks is categorized as light, with an intensity of leaf fall disease of 11% and an attack frequency of 29%. Fungal attacks are 0.5% and KAS is 0.25%, with an attack frequency of 1%.

4.2. Recommendation

These results emphasize the importance of selecting more resistant rubber clones, implementing good cultivation practices (including ideal plant spacing, pruning, and sanitation), and implementing timely disease control programs, especially during seasons that favor pest and disease development.

REFERENCES

[1]. Alimin, Yuni A, and Nur I. (2019). Introduction and Control of Plant Pest Organisms (OPT) in Rubber Plants (Revision I). Directorate of Plantation Protection, Directorate General of Plantations, Ministry of Agriculture, Jakarta.

[2]. Antonius. 2019. Inventory Study of Pest Attacks on Natural Rubber (*Hevea brasilliensis L.*) in Baras Village, Dedai District, Sintang Regency. PIPER Journal No. 29, Volume 15, October 2019: 145-153.

[3]. Ardiansyah, F., T.H. Hasibuan, V. Irdina, Z.A.R. Hasibuan, Z. Khairullah, and E.B. Febrianto. 2025. Analysis of Termite Behavior in Rubber Plantation Ecosystems: Implications for Pest Management. Tabela Journal of Sustainable Agriculture. 3 (1): 14-22.

[4]. Arsensi, I., and D. Mardji, D. 2018. Identification of Pathogens Causing Stem Rot In*Eucalyptus* Sp. Pellita Seedlings In Nurseries. Tropical Forest Journal 2(1): 21-25

[5]. Cameron, R.R. 2023. Tapping Furrow Dry Disease Attack on Rubber (*Hevea Brasiliensis L.*) Plantations in Residents Aged 15 Years in Pulau Harapan Village, Banyuasin Regency, South Sumatra. Agrinula: Journal of Agrotechnology and Plantations. 6 (1): 31-39.

[6]. Directorate of Plantation Protection. (2023). Technical Guidelines for Plantation Pest Management Areas in 2023. Directorate General of Plantations, Ministry of Agriculture, Jakarta.
[7]. Dollores, N. C. (2023). South Perangat Village Focuses on Infrastructure Development and Poverty Alleviation. Tenggarong.kotaku.ac.id. Downloaded June 2025.
[8]. Fairuzah, Z. (2019). Incidence of Leaf Drop Disease in Rubber Plants in Indonesia. Sungai Putih Research Institute. Rubber Research Center. Medan.
[9]. Febbiyanti, Tri Rapani, Widodo Wiyono, Suryo Yahya, and Sudirman. (2017). Diagnosis and Status of Rubber Stem Cancer in South Sumatra. http://repository.ipb.ac.id/handle/123456789/90899
[10]. Hariyanto R. and Sa'diyah K. (2018). Expert System for Diagnosing Diseases and Pests in Sugarcane Plants Using the Certainty Factor Method, Journal of Information Technology and Computer Science. Vol. 3, No. 1.
[11]. Rubber Research Center. (2019). Outbreak of Pestalotiopsis Leaf Drop Disease. Nusantara Plantation Research. Bogor.
[12]. Plantation Protection Directorate Team. (2017). Work Instructions for Observation and Control of Important Plantation Pests. Directorate General of Plantations, Ministry of Agriculture. Jakarta.
[13]. Puspitasari, M., Susilawati, S., & Mubin, N. (2022). Termites on Plantation Crops and Their Management Techniques. Perspectives, 20(2), 121. https://Doi.Org/10.21082/Psp.V20n2.2021.121-132
[14]. Yosephine I.O. et al. (2020). The Use of Potassium and Silicon Minerals to Suppress Leaf Drop Disease in Rubber Plants (*Hevea brasiliensis* L.), USMU Journal, Vol. 22, No. 3