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Symptoms of Aphid Attack on Oil Palm Plants in the Main Nursery at the Sriwijaya State Polytechnic Experimental Garden, Banyuasin Campus

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Abstract

Aphids are diminutive sap-feeding insects that function not only as pests but also as vectors for various plant pathogens and viruses. This study, conducted between February and April 2024 at the Experimental Garden of Politeknik Negeri Sriwijaya, aimed to identify the symptomatic expressions and quantify the extent of damage caused by aphid infestation in main nursery oil palm (Elaeis guineensis Jacq.) seedlings. The parameters observed included plant height, stem diameter, and the lengths of the 5th and 6th leaf stalks. Findings revealed that infestation symptoms manifested primarily as discoloration, with affected leaves exhibiting pale yellow spots or streaks. Notably, the aphid population increased markedly between the 15th and 20th day of observation. Infested seedlings demonstrated an average reduction in plant height of 25.76 cm (ranging from 21.5 to 31.5 cm), alongside a decrease in average stem diameter to 0.81 cm (ranging from 0.45 to 1.15 cm). Interestingly, the average length of the 5th leaf stalk in infested plants was longer than in non-infested specimens, reaching 13.87 cm, with a recorded range of 5.0 to 23.2 cm.

Keywords: main nursery, oil palm, aphids.

Introduction

Oil palm (*Elaeis guineensis* Jacq.) remains a pivotal agricultural commodity within Indonesia's plantation subsector. According to the 2023 data published by the South Sumatra Central Statistics Agency (BPS), oil palm production in the region has demonstrated significant growth, particularly in South Sumatra, where the expansion of plantation areas continues to increase. The province now plays a major role in contributing to the national palm oil output, supporting Indonesia's status as one of the world's leading palm oil producers, with a contribution exceeding 44% of the global supply. Productivity levels in South Sumatra are reported to range between 46 and 47 million tons per hectare annually. Despite these achievements, oil palm plantations across various districts in the province face persistent challenges in improving production capacity—one of the most pressing being aphid (*Aphidoidea*) infestations. Aphids, small sap-feeding insects, act both as direct pests and as vectors for numerous plant pathogens and viruses. They are widespread across Indonesia and are known to attack a wide variety of crops.

In corn and chili plants, aphid infestations commonly manifest through leaf yellowing and desiccation (Hawiyah et al., 2022). In strawberry cultivation, aphid

attacks can impair plant development; during the vegetative phase, they may lead to stunted growth, while in the generative phase, they can significantly inhibit the formation of flowers and fruits (Limbanadi et al., 2015).

Aphid infestations in oil palm cultivation similarly represent a significant threat, as they negatively affect plant productivity and are responsible for the transmission of diseases. One notable example is their association with leaf spot disease in oil palm, as reported by Susanto and Prasetyo (2013). Given the critical function of aphids as disease vectors, This study aims to observe the symptoms caused by this pest infestation and to assess the intensity of their attacks. The findings of this research are anticipated to enhance the understanding of aphid population dynamics in oil palm nurseries and contribute to the formulation of more targeted and effective pest management strategies.

Research Method

This study was conducted from February to April 2024 at the practicum area of the Sriwijaya State Polytechnic campus, located in Banyuasin III District, Banyuasin Regency. The experimental materials consisted of eight-month-old oil palm seedlings in the main nursery phase, which were maintained following standard oil palm cultivation practices. The tools and equipment utilized included writing instruments, rulers, cameras, and observation logbooks.

Data collection involved daily observations over a 25-day period. The parameters observed included aphid population density, visual symptoms of pest infestation, and comparative assessments between infested and non-infested oil palm seedlings. A total of 60 seedlings were randomly selected as sample units. For each plant, the number of aphids was counted to determine population density and distribution patterns.

The observed variables included plant height, stem diameter, and the length of the 5th and 6th fronds. These specific fronds were chosen because they typically exhibit more pronounced symptoms of pest infestation compared to others. Aphids generally target the younger, more actively growing parts of the plant—primarily the upper fronds in oil palm seedlings. As such, evaluating these fronds provides a more accurate representation of the effects of aphid attacks on plant development. Observing these particular fronds also facilitates a clearer assessment of the plant's physiological response to pest stress, as well as the overall impact of infestation on growth parameters.

Results and Discussion

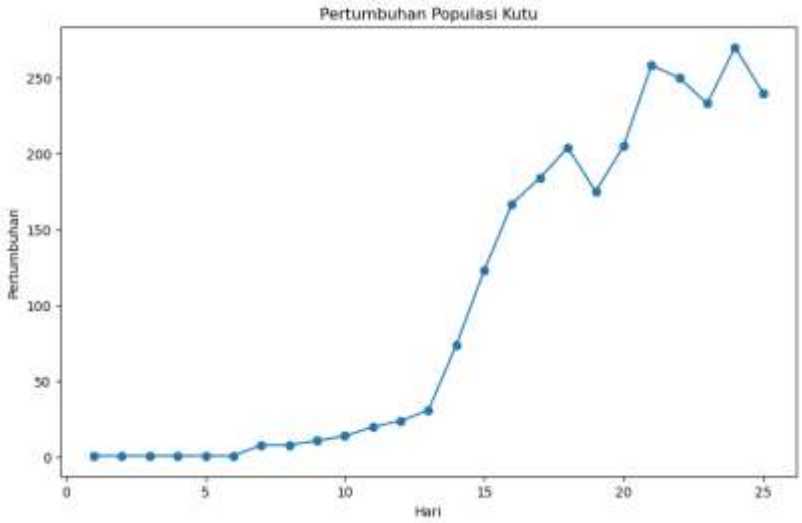
Observations conducted during the study revealed that aphid infestations produced distinct visual symptoms, primarily characterized by discoloration of the foliage. Affected leaves exhibited pale yellow spots or streak-like patterns. These visual markers closely resembled the typical symptoms of infestation caused by Hysteroneura setariae, commonly known as the Rusty Plum Aphid.

Aphids feed by extracting phloem sap from plant tissues using their piercing-sucking mouthparts. This feeding behavior disrupts the plant’s physiological processes, leading to alterations in leaf pigmentation and structure. Specifically, the damage can hinder chlorophyll production, thereby reducing the plant’s photosynthetic capacity and impairing overall growth. In many instances, leaf curling, yellowing, or chlorosis was observed as a result of the sustained feeding activity.

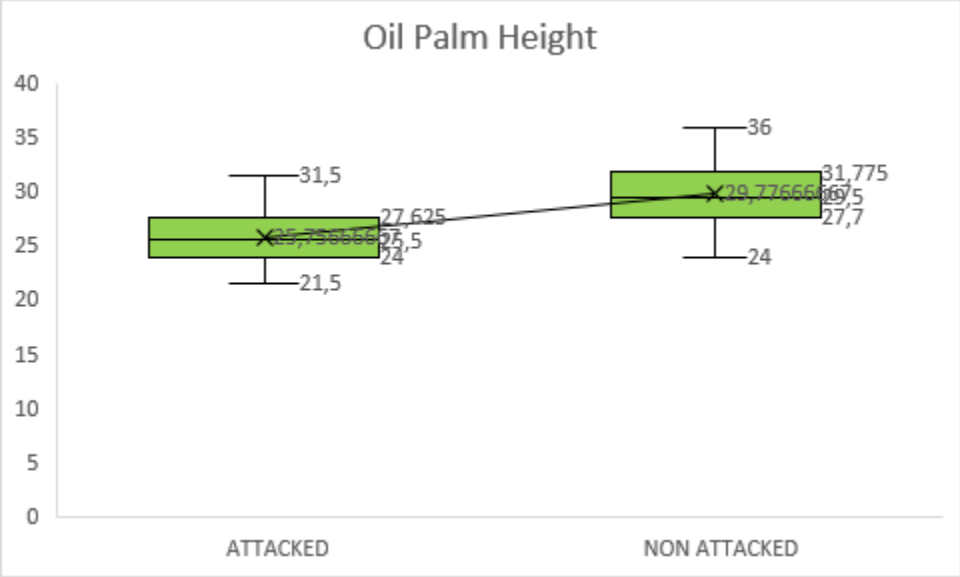
Hysteroneura setariae, commonly known as the Rusty Plum Aphid, is a species belonging to the superfamily Aphidoidea within the order Hemiptera. As a true sap-sucking insect, this aphid extracts plant fluids, disrupting essential physiological functions. Native to Yemen, H. setariae has also been documented infesting crops such as sorghum, various millets, rice, wheat, sugarcane, corn, and soybeans in several regions, including the United States. In rice cultivation, this species typically feeds on leaves and developing grains, contributing to substantial yield losses.

Notably, this study presents the first documented instance of H. setariae infesting oil palm seedlings in nursery conditions. The symptoms observed in infected oil palm plants include abnormal curling of leaves and the appearance of alternating yellow and green streaks along the central and basal parts of newly emerging leaves. These streaks follow the vein structure of the leaf and are most visible when exposed to direct sunlight. In mildly affected foliage, the leaves appear mostly green with intermittent pale yellow lines. In more severe cases, widespread chlorosis is evident across the entire leaf surface, and some leaves turn yellow to whitish with only minor green pigmentation or limited necrotic spots.

Monitoring of aphid population dynamics over a 25-day observation period revealed a marked increase in population density between the 15th and 20th day. During this interval, a significant surge in the number of aphids was recorded across the observed samples. This sharp rise suggests a critical phase in the pest's reproductive cycle or a favorable shift in environmental conditions supporting rapid colony expansion. The acceleration in aphid numbers during this period emphasizes the importance of timely intervention in pest management to prevent irreversible damage to oil palm seedlings.

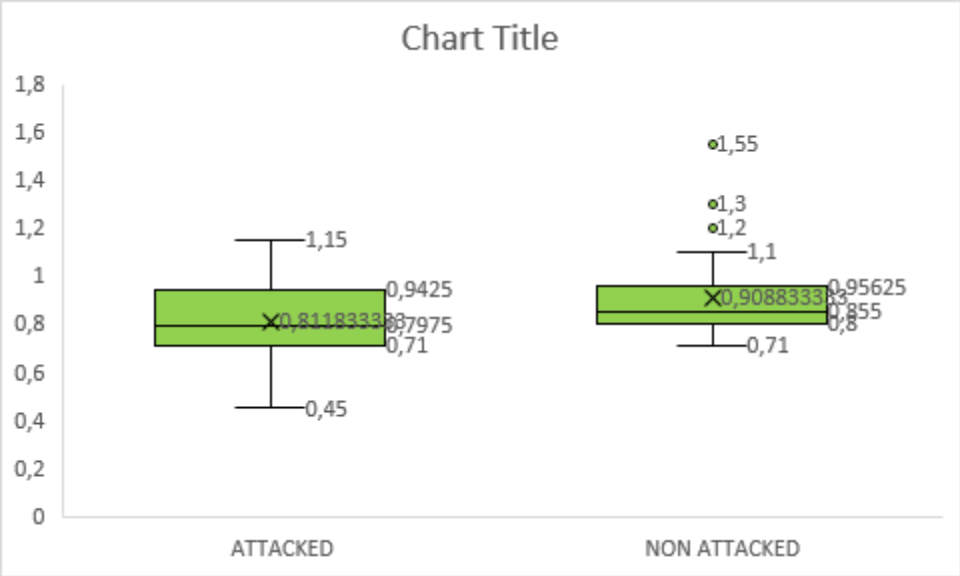


Statistical analysis of plant height revealed that aphid infestation had a significant negative effect on growth at the 5% confidence level. Oil palm seedlings subjected to aphid attacks exhibited a reduction in average plant height, recording a mean of 25.76 cm with a range between 21.5 and 31.5 cm. In contrast, non-infested plants demonstrated a higher average height of 29.78 cm, ranging from 24 to 36 cm. This decline in vertical growth highlights the detrimental impact of aphid feeding behavior, likely due to nutrient loss and impaired physiological functions caused by sap extraction.



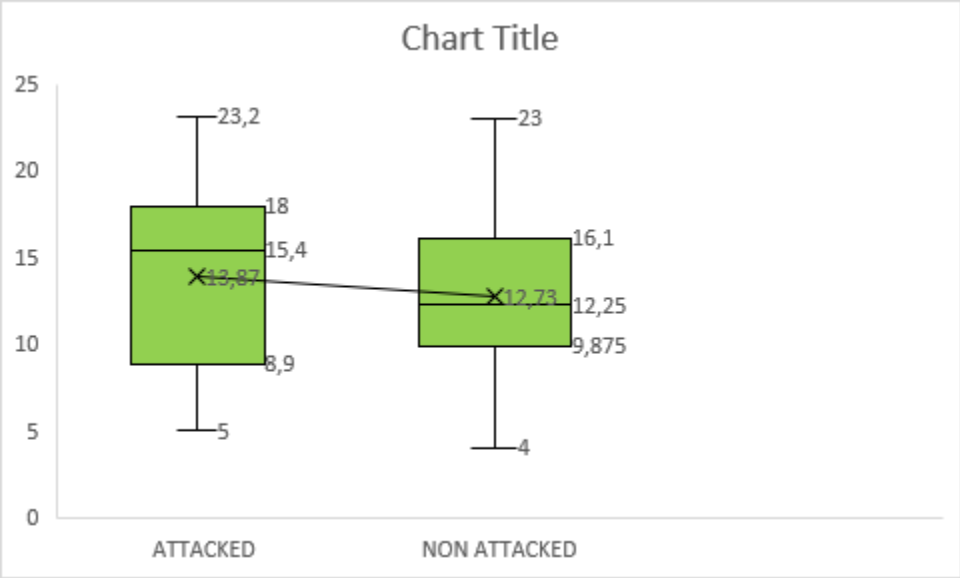
Analysis of stem diameter further confirmed the negative impact of aphid infestations. At the 5% significance level, aphid attacks were found to cause a substantial reduction in stem girth. Infested oil palm seedlings had an average stem diameter of 0.81 cm, with a range of 0.45 to 1.15 cm. In contrast, non-infested plants exhibited a higher average diameter of 0.91 cm, ranging from 0.71 to 1.1 cm. This decline mirrors findings by Anggraini et al. (2018), who reported reduced plant height and stem diameter in large chili (Capsicum annuum L.) due to aphid infestations. Aphids disrupt plant metabolism by extracting sap and transmitting pathogens, which can ultimately lead to stunted growth and diminished development of vital plant structures.

In corn plants entering the generative phase, aphids not only deplete nutrients but also excrete honeydew—a sugary substance that fosters the growth of sooty mold and further stresses the plant. Such infestations commonly present as yellowing leaves that later dry out (Hawiyah et al., 2022). Similarly, Ma'ruf et al. (2024) observed that aphid attacks on chili plants resulted in stunted or curled foliage, underscoring the broader pattern of growth disruption linked to aphid activity across various crop species.



Analysis of the 5th frond length revealed an unexpected pattern: oil palm seedlings infested by aphids exhibited a significantly greater frond length compared to non-infested plants, with statistical significance at the 5% level. The average length of the 5th frond in aphid-attacked plants was 13.87 cm, ranging from 5.0 to 23.2 cm. In contrast, the average length observed in healthy, non- infested plants was 12.73 cm, with a similar length distribution ranging from 4.0 to 23.0 cm.

This counterintuitive result may reflect a compensatory growth response, in which infested seedlings allocate additional resources to frond elongation as a stress adaptation mechanism. Alternatively, it is possible that the variation in frond length was influenced by the aphids' feeding behavior, which may have stimulated localized growth in certain tissues. Further investigation into hormonal or physiological changes induced by aphid feeding could provide a deeper understanding of this phenomenon.



Conclusion

Based on the results of the study, aphid infestation in oil palm seedlings produced visible symptoms in the form of leaf discoloration, specifically pale yellow

spots and streaks. These symptoms are consistent with those caused by *Hysteroneura setariae*, commonly known as the Rusty Plum Aphid. This study marks the first documented incidence of *H. setariae* attacking oil palm nurseries, previously known only as a pest of cereal crops and legumes.

Aphid population growth was observed to surge significantly between days 15 and 20 of the observation period, indicating a critical window for pest monitoring and control. Quantitative analysis revealed that infested seedlings experienced an average reduction in plant height of 25.76 cm (range: 21.5–31.5 cm) and a decrease in average stem diameter to 0.81 cm (range: 0.45–1.15 cm), highlighting the negative effects of infestation on plant vigor and development. Interestingly, the 5th leaf sheath in infested plants exhibited a longer average length of 13.87 cm (range: 5–23.2 cm) compared to non-infested plants.

These findings emphasize the significant threat aphid infestations pose to oil palm growth during the nursery phase. Early detection and prompt management interventions are essential to minimize potential losses and ensure healthy seedling development before field transplantation.

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