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MONITORING OF PLANT PEST AND DISEASE ORGANISM ATTACKS ON PEANUT *(Arachis hypogaea* L.) PLANTS IN SINDUREJO VILLAGE

(*PEMANTAUAN SERANGAN HAMA DAN ORGANISME PENYAKIT PADA TANAMAN KACANG TANAH (Arachis hypogaea L.) DI DESA SINDUHARJO*)

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Abstract

Peanuts are one of the food commodities. The decline in peanut crop productivity is caused by the Plant Pests Organism (PPO). The dominant pests affecting peanut crops are cutworms (Agrotis spp.), Armyworm (Spodoptera litura), leaf beetle (Phaedonia inclusa) and mealybugs (Pseudococcus spp.). This study was conducted in October-November 2025 in Jalan Bima, Nglaban, Sinduharjo, Ngaglik, Sleman, Yogyakarta. This study used random sampling analyzed using analysis of variance (ANOVA). Data collection was carried out through direct observation of PPO attack symptoms and calculation of the intensity and frequency of PPO attacks on peanut plants.
Keywords: Peanut crops, plant pest organism, monitoring

Abstrak

Kacang tanah merupakan salah satu komoditas pangan. Penurunan produktivitas tanaman kacang tanah disebabkan oleh Organisme Pengganggu Tanaman (OPT). Hama dominan yang menyerang tanaman kacang tanah adalah ulat potong *(Agrotis* spp.*),* ulat grayak *(Spodoptera litura),* kumbang daun (*Phaedonia inclusa*) dan kutu putih *(Pseudococcus* spp.*).* Penelitian ini dilakukan pada bulan Oktober-November 2025 di Jalan Bima, Nglaban, Sinduharjo, Ngaglik, Sleman, Yogyakarta. Penelitian ini menggunakan metode sampling acak yang dianalisis menggunakan analisis variansi (ANOVA). Pengumpulan data dilakukan melalui pengamatan langsung pada gejala serangan OPT dan perhitungan intensitas serta frekuensi serangan OPT pada tanaman kacang tanah.
Kata Kunci: tanaman kacang tanah, hama tanaman, pemantauan

INTRODUCTION

Peanuts (*Arachis hypogaea* L.) are an important agricultural commodity in Indonesia, both as a food source and a source of income for farmers. Unfortunately, peanut productivity is often disrupted by pests and diseases. These attacks can significantly reduce crop yields, in some cases by as much as 50–80%. The main problem is the lack of accurate data on when attacks occur, how severe they are, and the types of Pests that attack. As a result, control measures are often untimely and ineffective, causing farmers to suffer losses and a decline in crop quality (Rahayu, 2016).

Some types of pests that commonly attack peanuts include cutworms (*Agrotis* spp.), armyworm (*Spodoptera litura*), leaf beetle (*Phaedonia inclusa*), mealybugs (*Pseudococcus* spp.), and stem borers. Meanwhile, diseases that cause considerable damage include leaf rust caused by the fungus *Puccinia arachidis*, as well as leaf spots caused by *Cercospora personata* and *Cercospora arachidicola*. Leaf rust spreads through uredospores that develop on plant debris, while leaf spot is characterized by the appearance of brown spots with yellow rings on the leaf surface. If not properly controlled, this disease can cause a drastic decline in crop yields (Kasim *et al.*, 2024).

Based on these issues, regular monitoring or observation of pest attacks on peanut fields is necessary. This monitoring aims to identify the types of pests and diseases that attack, the patterns of attack, and the severity of the attack. Through accurate data, farmers and extension workers can make more appropriate control decisions in accordance with the principles of Integrated Pest Management (IPM). IPM is a paradigm shift in agricultural practices that emphasizes a holistic approach to pest control that aligns economic, environmental, and social objectives. IPM uses a combination of biological, mechanical, and chemical control methods (Arsi *et al*., 2024).

Monitoring is carried out through direct observation in the field and the use of simple technologies such as pest traps. Identifying pest and disease attacks early can reduce the need for widespread pesticide application (Arsi *et al*. 2024). To obtain representative data, sampling is carried out using a random sampling method, so that each part of the land has an equal chance of being observed. This technique is expected to provide a more objective picture of the distribution and intensity of pest attacks, as well as the factors that influence them, such as climatic conditions, crop varieties, and planting patterns.

This study is based on the basic concept of pests, namely organisms that interfere with plant growth and production. A literature review shows that routine monitoring can reduce pest attacks by 30-50% and reduce the inappropriate use of pesticides. Several monitoring methods that have been applied in various previous studies include visual observation, the use of pheromone traps, and recording of attack symptoms. The principles of IPM are an important foundation in developing control strategies that not only kill pests but also maintain ecosystem balance and environmental health (Indiati and Marwoto, 2017).

In addition, understanding the morphology of peanut plants is also important in the process of identifying attack symptoms. This plant has taproots, round stems that are red, purple, or green in color and up to 55 cm long, as well as double-pinnate compound leaves consisting of four oval-shaped leaflets that are slightly hairy. These characteristics help in recognizing the early symptoms of attack, so that early detection can be carried out more accurately.

It is hoped that the results of this study will produce a monitoring system that is easy for farmers to implement, provides accurate information, and supports more effective control decision-making. In addition, this study is also expected to serve as a reference in the development of agricultural extension programs and sustainable pest management policies. With systematic monitoring, farmers can be more productive, crop yields can increase, and the negative impacts of pesticide use can be minimized (Cahyaningrum dan Suhartini, 2023).

The main objectives of this study are to identify the types of pests that attack peanut plants, observe the patterns and severity of attacks, analyze the factors that influence the intensity of attacks, and provide recommendations for efficient, practical, and environmentally friendly control strategies. Through the achievement of these objectives, it is hoped that farmers can carry out more targeted control and harvest yields can increase sustainably. Overall, this research is an important scientific step to support more environmentally friendly, efficient, and sustainable peanut cultivation. With this approach, we are not only helping farmers, but also maintaining food security and the sustainability of the agricultural system in Indonesia (Mawarda *et al*., 2023).

MATERIALS AND METHODS

This research method was designed to measure plant pests attacks on peanut fields with a total population of 500 plants. This study used a quantitative approach with a field survey method conducted on peanut plantations on land on Bima Street, Nglaban, Sinduharjo, Ngaglik, Sleman, Yogyakarta, during October 2025-November 2025. Samples were collected using random sampling techniques by observing 50 random samples with diagonal X and identifying Plant Pests Organism (PPO) attacks on peanut plants. Data collection was carried out by directly observing PPO attack symptoms, with the frequency and intensity of attacks observed at 4-day intervals. The final observation was conducted 3 weeks before harvest time. The data obtained was then analyzed descriptively to determine the frequency and intensity of attacks, as well as analysis of variance (ANOVA) to compare the intensity of attacks. This method is expected to describe the intensity of PPO attacks on peanut fields and can be used to determine the appropriate control method.

To calculate absolute damage, use the following formula:

Incidence of attack

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

Description:
I = Incidence of attack (%)
n = Number of affected offspring
N = Number of offspring observed

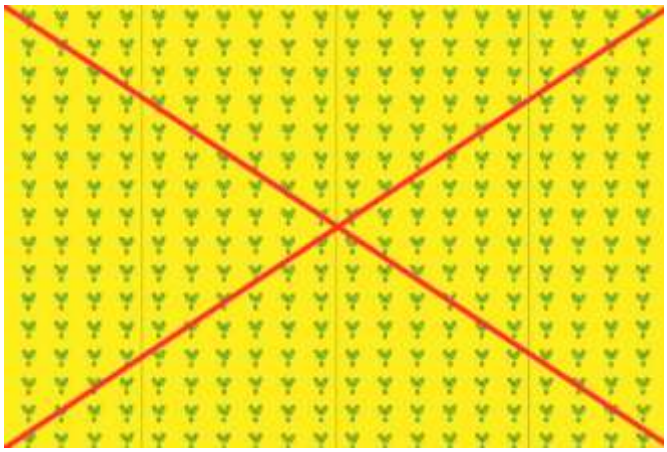

Figure 1. Pattern Sampling

Pest Attack Intensity Score:
0: No attack
1: Very light attack < 25%
2: Light attack 25-50%
3: Moderate attack 50-75%
4: Severe attack 75%-99%
5: Dead 100% (Susanto, 2009)

Disease damage level score:
0: No attack
1: Leaf surface damaged 1- ≤ 20%
2: Leaf surface damaged up to 20 - ≤ 40%
3: Leaf surface damaged up to 40 - ≤ 60%
4: Leaf surface damaged up to 60 - ≤ 80%
5: Leaf surface damaged up to >80% (Korwa *et al*., 2009)

RESULTS AND DISCUSSION

Pest and disease attacks are one of the main factors affecting the quality and quantity of peanut crops. The results of identifying pest and disease attacks on peanut crops in the fields of Sindurejo Village provide an important overview of the conditions that can affect crop growth and yield. Plant pests and diseases are major factors that need to be addressed because they can reduce productivity if not dealt with quickly and appropriately. The main pests found in this observation were armyworms (*Spodoptera litura*) and leaf beetles (*Phaedonia inclusa*), while the diseases found were chlorotic, which is one of the typical symptoms of infection by viruses from the Potyvirus group, especially Peanut Mottle Virus (PeMoV) and Peanut Stripe Virus (PStV), and leaf spots caused by *Alternaria* sp. fungi.

The armyworm (*Spodoptera litura*) is a polyphagous pest that attacks many types of food and horticultural crops, including peanuts. Its life cycle involves complete metamorphosis from egg, larva, pupa, to moth, with a total duration of approximately 30–60 days. Moths lay eggs in clusters of about 350 on the surface of leaves, and after 3–5 days the eggs hatch into larvae that initially feed on the leaf epidermis before spreading and eating away at the entire leaf surface until only the leaf veins remain. The larvae are pale green with black heads and two black spots on their abdominal segments. They

undergo five instars over 12–15 days before entering the pupal stage in the soil for 7–8 days and then becoming adult moths that are active at night. Symptoms of attack are characterized by irregular bite marks on the leaves, leaves that appear hollowed out or with only the leaf veins remaining, jagged leaf edges due to bites, the presence of larval excrement (frass) on the leaf surface or soil under the plant, and in severe attacks, the plant appears stunted, dwarfed, and its growth is inhibited due to a decrease in photosynthetic capacity. Caterpillar infestation can cause severe damage to leaves, thereby disrupting the photosynthesis process and overall plant growth. (Fattah and Ilyas, 2016).

According to Sundari (2023), the *Phaedonia inclusa* leaf beetle has a life cycle in which adult females lay eggs in clusters (± 10 eggs) on the underside of leaves; the eggs are slightly elongated and pale yellow in color, hatching in about 4 days into larvae that feed on flowers and young pods in their early instars. then after molting (± 3 times) the larvae walk into the soil to become pale yellow pupae 3–5 mm long that last for about 8 days, before emerging as adult beetles 4–5 mm in size with shiny black domed bodies and brown heads and wing edges. Imagoes are active mainly in the morning and evening, attacking leaves, plant shoots, flowers, and pods; when disturbed, these beetles drop to the ground as if dead. The symptoms of leaf beetle pest attacks on peanut plants are marked by the appearance of irregular holes on leaves, shoots, and flowers due to the feeding activity of adult beetles, which can progress from minor damage in the form of thin streaks to partial or total defoliation. This damage causes inhibited shoot growth, reduced pod formation, and decreased photosynthetic capacity, ultimately lowering the plant's vigor.

Alternaria sp. fungus on peanut plants (*Arachis hypogaea*) is a pathogen that causes leaf spot disease, characterized by the appearance of dark brown to black spots on the leaves, often forming concentric circles, with darker edges and a grayish center; the spots can spread and merge, causing the leaves to turn yellow, dry out, and fall prematurely. The morphology of the pathogen is characterized by dark brown hyphae, erect conidiophores, and elongated oval conidia with transverse and longitudinal septa, having a distinctive pointed tip (beak). Infection develops rapidly under high humidity and warm temperatures, especially in stressed plants, and results in reduced photosynthetic area and lower peanut yields (Afini *et al.*, 2023).

Chlorotic fan spot disease in peanut plants is one of the characteristic symptoms of infection by viruses from the Potyvirus group, especially Peanut Mottle Virus (PeMoV) and Peanut Stripe Virus (PStV), which attack young leaf tissue, causing early chlorosis in the form of pale yellow spots that then spread and form a fan-like pattern on the leaf blades. This symptom is often accompanied by mosaic, green-yellow mottling, mild necrosis on the leaf margins, and distortion or curling that interferes with photosynthesis. Morphologically, potyviruses have flexible filamentous particles without a coat, measuring approximately 700–900 nm, carrying a positive single-stranded RNA genome that replicates in the cytoplasm of host cells and moves between cells through plasmodesmata and phloem tissue. Further infection causes stunted plant growth, a reduction in the number of productive branches, decreased pod filling, smaller seed size, and a significant decrease in yield. the spread of this disease is largely transmitted by aphids (*Aphididae*) in a non-persistent manner, especially in fields planted with peanuts repeatedly without crop rotation, resulting in high vector populations and inoculum sources (Sutarman and Supriadi, 2019).

Table 1. Incidence of Pest Attacks on Peanut Plants

Pest	Week			
	1	2	3	4
Spodoptera litura	78%	86%	100%	100%
Phaedonia inclusa	34%	68%	98%	100%

Observations of pest attacks on peanut plants revealed two types of pests, namely armyworms and leaf beetles. Based on table 1. Incidence of pest attacks on peanut plants shows that the incidence of armyworms was 78% in the first week, 86% in the second week, and increased to 100% in the third and fourth weeks. Leaf beetles were recorded with an incidence of 34% in the first week, rising to 68% in the second week, 98% in the third week, and 100% in the fourth week.

Observations show that the older the plant, the higher the incidence of pest attacks. Symptoms of attacks caused by S. litura include young larvae eating the upper epidermis of leaves, while older larvae eat the entire leaf except for the leaf veins, causing the affected leaves to appear white (Mirsam, 2016). Symptoms of leaf beetle infestation on peanut plants are characterized by the appearance of irregular holes on leaves, shoots, and flowers due to the feeding activity of imagoes, which can develop from minor damage in the form of thin scratches to partial or total defoliation. This damage causes stunted shoot growth, reduced pod formation, and decreased photosynthetic capacity, which ultimately reduces plant vigor (Sundari, 2023).

Tabel 2. Intensity of Pest Attacks on Peanut Plants

Pest	Week			
	1	2	3	4
Spodoptera litura	21,2%	28%	44,8%	50,8%
Phaedonia inclusa	7,6%	16,8%	29,6%	38,8%

Based on Table 2, the intensity of pest attacks on peanut plants showed the following results: 21.2% in the first week, 28% in the second week, continuing to increase to 44.8% in the third week, and 50.8% in the fourth week. Leaf beetles were recorded with an incidence of 7.6% in the first week, then rose to 16.8% in the second week, then 29.6% in the third week, and 38.8% in the fourth week.

The increase in pest attack intensity is caused by nutritional differences at each stage of plant growth and vegetation in peanut fields. It can also be caused by the influence of climate on high pest reproduction when the average air humidity is 70% and the air temperature is 18-23%. The larger the population of a particular pest species, the greater the food requirements of that pest, in this case the host plant, so that the damage caused by the pest is proportional to the increase in the pest population (Palit et al., 2016).

Tabel 3. Incidence of Diseases Attacks on Peanut Plants

Disease	Week			
	1	2	3	4
Chlorotic	88%	88%	100%	100%
Leaf Spot	56%	72%	96%	100%

Based on Table 3, the incidence of chlorotic disease attacks on peanut plants showed results of 88% in the first and second weeks, then increased to 100% in the third and fourth weeks. Leaf spot disease was recorded with an incidence of 56% in the first week, then rose to 72% in the second week, then increased again to 96% in the third week, reaching 100% in the fourth week.

Symptoms of leaf spot disease are characterized by the appearance of blackish-brown spots spreading across the leaf surface. In mild cases, the spots appear small and scattered, but over time they enlarge and become surrounded by a yellow halo. In severe cases, the spots merge and cover most of the leaf surface (Mahendra *et al*., 2025). Chlorotic symptoms caused by PstV that appear on infected peanut leaves include mottling, chlorosis between dark green leaf veins, and wrinkling. The initial symptoms of PstV infection are seen on the youngest peanut leaves, which appear slightly wrinkled and have irregular dark green spots. On older leaves, these symptoms develop into mottling or mosaic patterns (Mirsam, 2016).

Tabel 4. Intensity of Disease on Peanut Plants

Disease	Week			
	1	2	3	4

Chlorotic	29,6%	30,4%	51,2%	62,4%
Leaf Spot	17,2%	23,2%	45,2%	57,2%

Based on Table 4, the intensity of chlorotic disease attacks on peanut plants showed results of 29.6% in the first week, 30.4% in the second week, continuing to increase to 51.2% in the third week and 62.4% in the fourth week. Leaf spot disease was recorded with an intensity of 17.2% in the first week, then rose to 23.2% in the second week, then 45.2% in the third week, and 57.2% in the fourth week.This increase occurs in line with the growth phase of peanut plants and is supported by environmental conditions that are suitable for growth. Factors such as plant variety, virus strain, plant age at infection, and environmental conditions determine the level of PStV infection (Kasim et al., 2023). Environmental conditions with high humidity and warm temperatures accelerate the pathogen's life cycle and increase the likelihood of infection. Rainfall can lower the ambient temperature and increase air humidity, creating conditions that support pathogen development (Nasution and Siregar, 2019).

CONCLUSION

This study shows that the dynamics of pest and disease attacks on peanut plants increase with the age of the plants and the progression of the growth phase. Both groups of pests—caterpillars and leaf beetles—as well as chlorotic and leaf spot diseases show a progressive pattern of attack, indicating that plant susceptibility increases in line with morphological development and favorable environmental conditions. This emphasizes the importance of implementing pest and disease control strategies early, continuously, and in an integrated manner to minimize damage to plants. Further research is recommended to evaluate the effectiveness of integrated control and to examine the influence of environmental conditions and plant physiological responses so that pest and disease control strategies for peanuts can be developed in a more adaptive and efficient manner.

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