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Unveiling Plant Distress: Symptomatic Manifestations of Insect Infestation in Bukit Kor, Terengganu

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ABSTRACT

Insect infestations pose a significant threat to plant health and agricultural productivity. Early and accurate identification of symptoms is crucial for effective management strategies. This article investigates the diverse symptomatic manifestations of insect infestation on various plant species in Bukit Kor, Terengganu, Malaysia. By examining morphological changes, growth abnormalities, and patterns of damage, this study aims to provide a comprehensive overview of how plants signal the presence of insect pests. Understanding these visual cues is vital for timely intervention, mitigating economic losses, and preserving biodiversity within the region. The findings contribute to local agricultural practices and entomological knowledge.

KEYWORDS: Insect infestation, Plant symptoms, Bukit Kor, Terengganu, Plant pathology, Pest management.

INTRODUCTION

Plants are fundamental to life on Earth, providing sustenance, oxygen, and maintaining ecological balance [15]. Their health is intrinsically linked to human well-being and economic stability, particularly in agricultural communities [2, 10]. However, plants are constantly exposed to various biotic and abiotic stresses, with insect pests being a major challenge globally [5]. Insect infestations can lead to significant reductions in crop yield, aesthetic damage to ornamental plants, and even plant death if left unchecked [11].

The diverse flora of regions like Bukit Kor, Terengganu, Malaysia, which includes economically important crops and native species, is susceptible to a wide array of insect pests. The identification of insect infestations often relies on observing the physical symptoms exhibited by the affected plants. These symptoms are the plant's visual indicators of stress and damage, varying widely depending on the insect species, the plant part affected, and the severity of the infestation [4]. Early recognition of these symptomatic manifestations is paramount for implementing timely and effective pest management strategies, thereby minimizing economic losses and ecological disruption [1].

While comprehensive studies on insect pests and their impact on specific plant species are available [3, 12], a focused investigation into the symptomatic expressions of insect infestations across a range of plants in a specific geographical area like Bukit Kor, Terengganu, is valuable. This article aims to address this gap by systematically documenting and categorizing the common symptoms observed on plants in the study area when subjected to insect attacks. Understanding these visual cues is a critical first step in integrated pest management, allowing for targeted interventions and reducing reliance on broad-spectrum pesticides that can harm beneficial insects and the environment. This research contributes to a deeper understanding of plant-insect interactions and supports sustainable agricultural practices in the region.

MATERIALS AND METHODS

Study Area The study was conducted in Bukit Kor, Terengganu, Malaysia. This region was selected due to its rich biodiversity, encompassing various agricultural lands, residential gardens, and natural vegetation, offering a diverse range of plant species susceptible to insect infestations.

Plant Observation and Data Collection Field observations were conducted over a period of six months (December 2024

- May 2025). A systematic approach was employed to observe a wide range of plant species, including common agricultural crops (e.g., banana plants, as mentioned in [7, 12]), ornamental plants, and native vegetation. Visual inspections were performed to identify any signs of insect presence or plant damage. Digital photographs were taken to document the observed symptoms.

Symptom Categorization Observed symptoms were meticulously categorized based on their morphological characteristics and the type of damage inflicted. Categories included, but were not limited to:

- **Leaf Damage:** Chewing marks, holes, skeletonization, leaf rolling, gall formation [6, 13].
- **Stem Damage:** Girdling, tunneling, wilting of upper parts, cankers.
- **Root Damage:** Stunting, wilting (inferred from overall plant health).
- **Flower and Fruit Damage:** Deformities, premature dropping, discoloration, presence of frass.
- **Overall Plant Symptoms:** Stunted growth, discoloration (chlorosis, necrosis), wilting, distorted growth patterns.

Insect Identification (Preliminary) While the primary focus of this study was on plant symptoms, efforts were made to visually identify the insect pests responsible for the damage whenever possible. This involved observing the insects directly on the plant, examining their size, shape, color, and behavior. Preliminary identification was often made to a broader taxonomic group (e.g., caterpillars, aphids, beetles) based on general entomological knowledge [4, 16]. Samples of insects were collected for more precise identification where feasible, though detailed insect taxonomy was beyond the scope of this symptom-focused study.

Data Analysis Qualitative data regarding the types of symptoms observed and the associated plant species were compiled and analyzed. Patterns of damage and common symptomatic manifestations across different plant types were identified. The frequency of certain symptoms on particular plant groups was noted to highlight prevalent insect-plant interactions in the study area.

RESULTS

Observations in Bukit Kor, Terengganu, revealed a wide array of symptomatic manifestations of insect infestations on various plant species. These symptoms provided clear visual cues regarding the presence and activity of insect pests.

Common Leaf Damage Symptoms Leaf damage was the most frequently observed symptom, indicating a high prevalence of foliar-feeding insects.

- **Chewing Marks and Holes:** Irregularly shaped holes and ragged edges on leaves were commonly observed, characteristic of damage inflicted by chewing insects such as caterpillars and beetles [6]. For instance, certain ornamental plants exhibited significant defoliation due to caterpillar activity.
- **Skeletonization:** This symptom, where insects consume the softer leaf tissue leaving only the veins, was evident on a variety of broad-leaved plants.
- **Leaf Rolling and Folding:** Some plants, particularly young shoots and leaves, displayed tightly rolled or folded leaves, often housing smaller larvae or aphids within the protective folds.
- **Galls:** Abnormal growths or swellings on leaves, stems, or flowers were occasionally noted, indicating the presence of gall-inducing insects.

Stem and Branch Symptoms Damage to stems and branches, while less ubiquitous than leaf damage, was indicative of more severe infestations or specific types of pests.

- **Wilting of Upper Parts:** Sudden wilting of shoots or entire branches, despite adequate water supply, suggested damage to the vascular system, often caused by stem borers or sap-feeding insects.
- **Presence of Frass and Exit Holes:** Accumulation of insect excrement (frass) near small holes on stems or branches was a clear sign of borers tunneling within the plant tissue.

Flower and Fruit Symptoms Reproductive parts of plants were also susceptible to insect damage, impacting yield and aesthetic value.

- **Deformed or Aborted Flowers/Fruits:** Infestations on developing flowers or fruits led to deformities, premature dropping, or a complete failure of fruit development.
- **Discoloration and Lesions:** Spots, lesions, or unusual discoloration on fruits indicated feeding by piercing-sucking insects or fruit flies.

Overall Plant Health and Growth Disturbances Beyond localized damage, insect infestations often manifested in systemic effects on the entire plant.

- **Stunted Growth:** Severely infested plants, particularly those with root or stem damage, exhibited significantly stunted growth compared to healthy counterparts. This aligns with observations of overall plant health being crucial for their survival [15].
- **Chlorosis and Necrosis:** Yellowing (chlorosis) or browning and death of plant tissues (necrosis) were

common, especially with sap-feeding insects that deplete plant nutrients or inject toxins.

- **Honeydew and Sooty Mold:** The presence of a sticky substance (honeydew) on leaves and stems, often followed by the growth of black sooty mold, was a strong indicator of sap-sucking insects like aphids or mealybugs.

Table 1 provides a summary of common symptoms observed and their likely insect culprits in Bukit Kor, Terengganu.

Table 1: Common Plant Symptoms and Associated Insect Damage in Bukit Kor, Terengganu

Symptom Category	Specific Symptom	Likely Insect Type(s)
Leaf Damage	Irregular holes, chewed margins	Caterpillars, Beetles [6]
	Skeletonization	Beetle larvae, Sawfly larvae
	Leaf rolling/folding	Leaf rollers, Aphids
	Galls	Gall wasps, Midge larvae
	Yellowing (chlorosis), discoloration	Aphids, Whiteflies, Mites
	Sticky residue (honeydew), sooty mold	Aphids, Mealybugs, Whiteflies
Stem/Branch Damage	Wilting of shoots/branches	Stem borers, Sap-feeding insects
	Tunnels, frass, exit holes	Stem borers
	Girdling	Certain beetles
Flower/Fruit Damage	Deformed or aborted flowers/fruits	Fruit flies, Thrips, Moths
	Spots, lesions, discoloration on fruits	Fruit flies, Bugs
Overall Plant Health	Stunted growth, reduced vigor	Various pests (severe infestation)
	General wilting (without direct root damage)	Sap-feeding insects (severe)

DISCUSSION

The diverse range of symptoms observed in Bukit Kor, Terengganu, underscores the pervasive nature of insect infestations and their significant impact on plant health. The prevalence of leaf damage symptoms, such as chewing marks and skeletonization, highlights the common occurrence of defoliating insects like caterpillars and beetles [6, 13]. These findings are consistent with general entomological principles, which categorize insects based on their feeding mechanisms and the corresponding damage they inflict [4]. The plant's ability to respond to such damage, sometimes by attracting natural enemies of the herbivores, is a fascinating aspect of plant defense mechanisms [14].

The presence of honeydew and sooty mold was a strong indicator of sap-sucking insects. These pests, by extracting vital nutrients from the phloem, can lead to widespread chlorosis and stunted growth, severely impacting plant vigor and productivity [15]. The identification of galls, while less frequent, points to highly specialized insect-plant interactions where the insect manipulates plant growth for its own development.

Observations of stem and root damage, although less directly visible, are critical as they often lead to more severe and systemic plant decline. Wilting, a common symptom of vascular disruption, can be caused by stem borers or root-feeding insects that compromise water and nutrient uptake [9]. This is particularly relevant for economically important plants like banana, where specific diseases and pests can cause significant damage [7, 12].

The current study, by focusing on visual symptoms, provides a practical tool for farmers and gardeners in Bukit Kor to identify potential insect problems early. This aligns with the principles of integrated pest management (IPM), which emphasizes early detection and targeted interventions to minimize the reliance on chemical pesticides. Understanding the specific symptoms can guide the selection of appropriate management strategies, whether it be mechanical removal, biological control, or targeted application of insecticides if necessary [1].

While this study provides a valuable overview of symptomatic manifestations, future research could delve deeper into the specific insect species responsible for each symptom through more rigorous insect collection and identification methods [4, 16]. Quantitative assessments of damage levels and their correlation with yield losses would also be beneficial for developing more precise economic thresholds for pest management decisions. Furthermore, exploring the effectiveness of various control measures based on symptom identification would be a valuable extension of this work.

Conclusion

This investigation into the symptomatic manifestations of insect infestation on plants in Bukit Kor, Terengganu, provides a comprehensive overview of the visual cues indicating insect presence. The study confirms that plants exhibit a diverse range of symptoms, from localized leaf damage to systemic growth disturbances, depending on the type of insect and the severity of the infestation. Common symptoms include chewing marks, skeletonization, leaf rolling, wilting, stunted growth, chlorosis, and the presence of honeydew and sooty mold. Early and accurate recognition

of these symptoms is crucial for effective and sustainable pest management, enabling timely interventions that can mitigate economic losses and preserve the ecological balance of the region. The findings contribute to the practical knowledge of plant health in Bukit Kor and serve as a foundation for further entomological and plant pathology research in the area.

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