

Diversity of ecological functions of the insect families found in Citalahab Area of Mount Halimun Salak National Park (TNGHS)

Keanekaragaman peran ekologi famili serangga di kawasan Citalahab Taman Nasional Gunung Halimun Salak (TNGHS)

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ABSTRAK

Kawasan Citalahab Taman Nasional Gunung Halimun Salak (TNGHS) menyimpan keanekaragaman serangga dengan peran ekologi yang berbeda. Di setiap tipe habitat terdapat komposisi peran ekologi serangga. Tujuan dari penelitian ini mengetahui keanekaragaman peran ekologi dari serangga pada tipe vegetasi hutan dan perkebunan di Kawasan Citalahab Taman Nasional Gunung Halimun Salak (TNGHS). Penelitian ini menggunakan metode *Simple Random Sampling* dengan menggunakan *pitfall trap* pada plot yang ditetapkan secara acak berukuran 20 x 20 meter (5 perangkap *pit fall trap*) di hutan dan perkebunan, dengan jumlah plot sebanyak 2 plot. Terdapat 8 ordo, 36 famili dengan peran ekologi seperti: vektor penyakit, saprofit, polinator, hama, predator, parasitoid, pemakan jamur dan dekomposer. Famili serangga yang berperan sebagai parasitoid dan vektor penyakit hanya ditemukan pada tipe vegetasi hutan. Kekayaan sumber daya yang terdapat pada habitat mempengaruhi keberagaman peran ekologi serangga yang terdapat di dalamnya.

Kata kunci: peran serangga, taman nasional, biodiversitas

ABSTRACT

The Citalahab area of Mount Halimun Salak National Park (TNGHS) contains a diversity of insects with different ecological roles. In each type of habitat, there was a composition of insect ecological roles. The study aimed to determine the diversity of ecological roles of insects in forest and plantation vegetation types in the Citalahab Area of Mount Halimun Salak National Park (TNGHS). This research uses the Simple Random Sampling method using pitfall traps in randomly determined plots measuring 20 x 20 meters (5 pitfall traps) in forests and plantations, with a total of 2 plots. There were 8 orders, and 36 families with ecological roles such as disease vectors, saprophages, pollinators, pests, predators, parasitoids, fungus eaters, and decomposers. Insect families that act as parasitoids and disease vectors were only found in forest vegetation types. The richness of resources found in a habitat influences the diversity of the ecological roles of the insects found in it.

Keywords: insect role, national park, biodiversity

INTRODUCTION

The Citalahab area of Mount Halimun Salak National Park (TNGHS) was one of the tropical rainforests in Indonesia which stores a variety of

biodiversity of fauna and flora, including insects. Administratively, the Citalahab TNGHS area was located in Sukabumi Regency, Bogor Regency, and Lebak Regency. In this area it was known

that 115 tributaries were used by many residents in the surrounding area (Munawir et al., 2023).

This National Park area was a natural habitat that provides various natural resources for the surrounding environment (Wang et al., 2020). Apart from that, the National Park Forest plays a role in maintaining the stability of the ecosystem components (biodiversity and quantity of organisms) within it (Rosyada and Budijastuti, 2021). In an ecosystem there were several diverse compositions of insect roles. Several types of insect roles were known, both beneficial and detrimental. Some insects were also known to have specific roles that other insects do not, which were specifically mutualistic (Dunn, 2020). Apart from their role as pests and disease vectors for humans, several groups of insects were also known to have beneficial roles known as ecosystem services (Sataral et al., 2023). Ecosystem services that could be provided by insects include pollination, natural enemies of pests, decomposers and others (Herdiawan et al., 2020).

Knowing the role of insects found in the Citalahab area of the Mount Halimun Salak National Park (TNGHS) was interesting information that could be used as basic information on insect biodiversity in this National Park. This was in accordance with the aim of this research, namely, to determine the various roles of insects found in forest and

plantation vegetation types in the Citalahab Area of the Mount Halimun Salak National Park (TNGHS). The objective of this research was to determine the diversity of ecological roles of insects in forest and plantation vegetation types in the Citalahab Area of the Mount Halimun Salak National Park (TNGHS).

MATERIALS AND METHODS

Research Location

The research was conducted on 11-15 July 2022, in the Citalahab Area of Mount Halimun Salak National Park (Figure 1), in 2 different vegetation, namely rain forest and plantations.

Research Method

This study used Simple Random Sampling. Specimens were taken using pitfall traps installed in 2 types of vegetation, namely forests and plantations. In forests and plantations, 2 plots were determined, each measuring 20 x 20 meters. In each plot, 5 traps were placed with the trap position scheme attached in Figure 2. After being left for 2 days, the insects trapped in the traps were taken and put into a collection bottle that had been filled with 70 % alcohol. Insect specimens were then identified at the Zoology Laboratory, Faculty of Biology, National University.

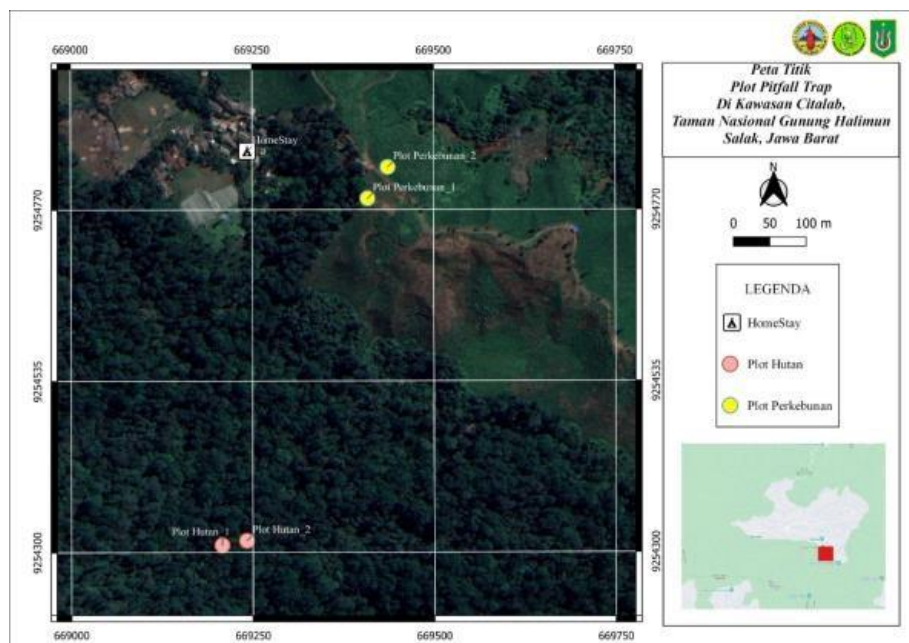


Figure 1. Research location

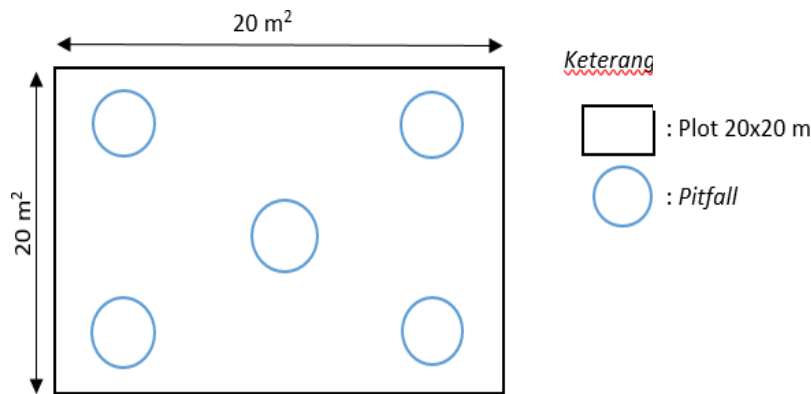


Figure 2. Position of traps per plot

RESULTS

Insect Orders and Families

Based on the identification carried out in both types of vegetation, namely forest and plantation vegetation, 8 insect orders were obtained, with a total of 36 families which have several ecological roles as shown in Table 1. Apart from that, a comparison between the ecological roles of insects found in forest and plantation vegetation types is in Figure 3.

Ecological Roles of Insects

Based on the results of the identification carried out, it was known that there were various insect families with diverse ecological role groups, both found in forest and plantation vegetation types (Table 1). At both observation locations, it was known that there were insect families that acted as predators, pests, fungus eaters, pollinators, decomposers, and saprophages (Figure 3). Parasitoid insects and disease vectors were only found in forest vegetation types, this could be due to the presence of hosts in forest vegetation. The distribution of parasitoids generally follows the distribution of their hosts (Burte et al., 2023). The same distribution pattern was shown by disease vector insects, which follow the distribution pattern of their hosts (Strauss et al., 2020). The forest vegetation type is a habitat type with a high diversity of flora and fauna (Kasmiatun et al., 2020), so that in this habitat you generally find many insects with more diverse ecological roles compared to plantation habitats which have limited resources.

Domination of Pests and Predators

Pests and Predators were the role group with the largest number of families. Pests or plant eaters (herbivores) were known to have the highest number of family types compared to other role groups. This could be because the two types of vegetation at the research location have high vegetation diversity which then indirectly influences the presence of pests/plant eaters (herbivores). The existence of diverse vegetation in high quantity influences the abundance of pests found in that habitat (Amiruddin et al., 2023). The abundance of predator family types in the two types of vegetation in this study could be caused by the high abundance and diversity of pests found in the habitat. both types of vegetation were observed. Predators were one of the tri-trophic components which were influenced by the other 2 trophic levels (Cividanes, 2021). In the same publication, it was said that the presence of predators was not only influenced by the presence of pests (herbivores) at the second trophic level, but was also influenced by the presence of plant vegetation at the first trophic level which was a food resource for their prey.

Fungus Eaters, Saprophages, Decomposers, and Pollinators

Apart from that, there were other role groups such as fungus eaters, saprophages, decomposers, and pollinators which belong to several insect families. This role group (saprophages, detritivores, fungus eaters) was generally found in natural habitats where there were no buildings

or houses, such as forests and plantations (Dampney et al., 2022). Forest and plantation habitats were generally dominated by plants and woody plants which produce a lot of litter and piles of dead and rotting wood or twigs which become a resource for decomposer, saprophagous

and fungus-eating insects. This showed that the diversity of vegetation and the presence of natural structures such as forests and plantations have an impact on the composition of the roles of more diverse insect groups.

Table 1. Ecological role of insect families found in forest and plantation vegetation types

Order	Taksonomi		Type of Vegetation		Role
	Family	Forest	Plantation		
Blataria	Blatidae	1			Vector ¹⁾
Coleoptera	Carabidae	3	1		Predator ²⁾
	Curculionidae	1			Pest ³⁾
	Elateridae			1	Pest ⁶⁾
	Hydrophilidae	4	1		Predator ⁷⁾
	Mycetophagidae	2			Detritivore ⁸⁾
	Nitidulidae	11			Polinator ³⁾
	Phalacridae	2			Detritivore ⁹⁾
	Plataspidae			1	Pest ¹⁰⁾
	Ptiliidae	6			Detritivore ¹¹⁾
	Scarabaeidae	5	3		Pest ³⁾
	Scolytidae	5			Pest ¹²⁾
	Silphidae	1			Decomposer ¹³⁾
	Staphylinidae	54	5		Predator ³⁾
	Dermaptera	Carcinophoridae	2	1	
Forficulidae		2			Predator ¹⁵⁾
Diptera	Carnidae		1		Saprofag ¹⁸⁾
	Drosophilidae	31	14		Saprofag ⁵⁾
	Phoridae	16	5		Decomposer ³⁾
	Platypozidae		1		Detritivore ¹⁶⁾
	Rhiniphoridae	2			Parasitoid ¹⁷⁾
	Sciaridae	3			Saprofag ¹⁸⁾
	Simuliidae	1			Vector ¹⁹⁾
	Sphaeroceridae	13	3		Saprofag ²⁰⁾
Hemiptera	Cydnidae	2	1		Pest ³⁾
	Lygaeidae	2			Pest ³⁾
	Reduviidae		2		Predator ²¹⁾
Homoptera	Aphididea		1		Pest ³⁾
Hymenoptera	Agaonidae		1		Polinator ²²⁾
	Encyrtidae	1			Parasitoid ⁴⁾
	Formicidae	69	201		Polinator, Predator ³⁾
	Mymaridae	5			Parasitoid ⁴⁾
Orthoptera	Acrididae	1			Pest ³⁾
	Gryllidae	14	3		Pest ³⁾
	Gryllacrididae	1			Pest ²³⁾
	Rhaphidophoridae	2			Pest ²⁴⁾

Note: (Reff: Zeng et al., 2019¹⁾; Cividanes, 2021²⁾; Escobar, et al., 2022³⁾; Ikhsan et al., 2023⁴⁾; Herdiawan et al., 2020⁵⁾; Kasmiatun et al. 2020⁶⁾; Kang et al., 2020⁷⁾; Eason & Mason, 2022⁸⁾; Gimmel & Leschen, 2020⁹⁾; Diedrick et al., 2020¹⁰⁾; Jang & Park. 2021¹¹⁾; Rasiska, et al., 2022¹²⁾; Engasser, et al., 2021¹³⁾; Setiawan, et al., 2021¹⁴⁾; Da Silva et al., 2022¹⁵⁾; TKOČ et al., 2020¹⁶⁾; Menzel et al., 2020¹⁷⁾; Struwe et al., 2023¹⁸⁾; Mukherjee et al., 2022¹⁹⁾; Roháček & Przhiboro²⁰⁾; Diratika et al., 2020²¹⁾; Dunn, 2020²²⁾; Mathew et al. 2022²³⁾; Kurniawan, et al., 2022)

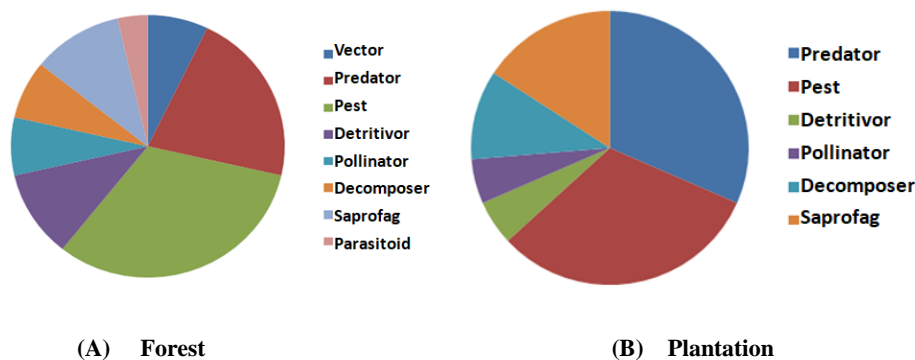


Figure 3. Comparison of the number of insect types based on their ecological role in forests (A) and plantations (B)

DISCUSSION

Based on the identification carried out in both types of vegetation, namely forest and plantation vegetation, 8 insect orders were obtained, with a total of 36 families which have several ecological roles as shown in Table 1. Apart from that, a comparison between the ecological roles of insects found in forest and plantation vegetation types was in Figure 3.

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CONCLUSION

There are 8 orders and 36 families of insects found in two types of vegetation, forests and plantations in the Gunung Halimun Salak National Park (TNGHS). There are several insect families that fall into ecological role groups such as disease vectors, predators, pests, fungus eaters, pollinators, decomposers, and saprophages. Disease vector insects and parasitoids are found in forests, but are not found in plantation vegetation types. Vegetation and resource diversity influence the richness of insects with diverse ecological roles.

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