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An Inventory of Ants (Hymenoptera: Formicidae) at Melawi Sandy Beach, Bachok, Kelantan.

Nurul Ashikin Abdullah* and Rosli Hashim

Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur
*she_qinab@yahoo.com (*Corresponding author*)
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ABSTRACT An inventory of ant (Hymenoptera: Formicidae) fauna diversity was carried out at Melawi Beach, Bachok, Kelantan in April and May 2009. Two techniques, namely pitfall traps and manual hand collections were employed. A total of 28 species from 21 genera were recorded from an area in this coconut plantation. They belong to 6 subfamilies, comprising of Myrmicinae (9 species), Formicinae (13 species), Ponerinae (2 species), Dolichoderinae (2 species), Pseudomyrmecinae (1 species) and Aenictinae (1 species). The most common ants were the Weaver Ant (Oecophylla smaragdina) and the Yellow Crazy Ant (Anoplolepis *gracilipes*). They are tramps and are capable of invading and taking over local ants' niches.

ABSTRAK Kajian inventori berkenaan kepelbagaian fauna semut (Hymenoptera: Formicidae) telah dijalankan di Pantai Melawi, Bachok, Kelantan pada bulan April dan Mei 2009. Dua teknik yang terdiri daripada perangkap lubang dan kutipan secara langsung menggunakan tangan telah digunakan. Sebanyak 28 spesies daripada 21 genera telah direkodkan dari satu kawasan di dalam ladang kelapa ini. Ini meliputi 6 subfamili yang terdiri daripada Myrmicinae (9 spesies), Formicinae (13 spesies), Ponerinae (2 spesies), Dolichoderinae (2 spesies), Pseudomyrmecinae (1 spesies) dan Aenictinae (1 spesies). Semut yang biasa ditemui adalah semut kerengga (*Oecophylla smaragdina*) dan semut gila (*Anoplolepis gracilipes*). Mereka adalah semut 'tramp' dan mempunyai kebolehan untuk menceroboh dan menggantikan nic species semut asal yang wujud di kawasan ini.

(**Keywords:** ant, coconut plantation, Melawi Beach, pitfall trap, manual hand collection.)

INTRODUCTION

Species inventory of ants has been viewed as an important task in tropical biodiversity and conservation studies [1]. Ants (Hymenoptera: Formicidae) are probably the most successful of insect groups, occurring everywhere in terrestrial habitats (mainland and island) and may be considered as one of the most abundant and diverse animal groups in tropical ecosystems [3, 15]. They play important roles in ecosystems as decomposers, assist in nutrient cycling and seed dispersal. They are also responsible for the aeration of soil and allowing water absorption which would eventually lead to the reconditioning of soil [12]. Besides that, several species of ants such as *Anoplolepis gracilipes, Monomorium floricola, Paratrechina longicornis* and a few others had been reported to be pests or also known as invasive tramp ant species. Most of the tramp species have multi-sectoral impacts, and can affect plant and animal health, social and cultural values, and human health [5].

Ants are also a food source for reptiles, birds and mammals. They can control parasitism and predation, and some ants even exhibit mutualistic relationships with plants. Being abundant and diverse, ants are a potentially good bioindicator of the status of the forest [11]. Due to the important role played by the ants and the absence of any inventory of ants in the area, this research was carried out to document the diversity of ants in Bachok area.

MATERIALS AND METHODS

Melawi Beach is located in Bachok, Kelantan at latitude and longitude of 06°00.430' N and 102°25.616' E. It is approximately 25 kilometers from Kota Bharu. This study was conducted in a coconut plantation along the coastal area of about 4 hectares. The area is situated within a small village which comprised of kampong houses and several small cottage resorts. It is bordered by the beach on the seaside and a small brackish water stream in the interior. Besides the coconut trees (*Cocos nucifera*), there is also a small patch of casuarina trees (*Casuarina equisefolia*). As for the ground

vegetation, small bushes and grasses partially covered the sandy soils.

Melawi Beach has been a strategic and beautiful site for recreational activities. It is frequently visited by the locals and occasionally by foreign tourists. The common recreational activities are educational outdoor programmes, fishing related activities and family outings. The increasing human activities could affect the carrying capacity of the area and this in turn could jeopardize the stability of the flora and fauna.

Ant collection at Melawi Beach was carried out in April and May 2009. During the collection, weather was mainly sunny during the day, but was rainy in the night. Two methods, pitfall traps and manual hand collection were applied to collect ant specimens. A total of 60 pitfall traps was set up in three 100m line transect with 20 pitfalls for each transects. The traps were filled with a small volume (10%-20%) of glycerol to drown the ants that fell in. The traps were left opened for two days. Samples collected in the pitfall were transferred to respective coded vials filled with 80% ethanol for preservation. For manual hand collection, ants were collected using fine forceps from the sandy floor, as well as on the shrubs, bushes and tree trunks during daytime from 9am until 6pm. The ants were placed into coded vials with 80% ethanol. In the laboratory the ants were identified to the generic/morpho-species level with the identification key from Bolton [2] and Hashimoto [6] with the use of a stereomicroscope. Identification to the species level was done whenever possible since the availability of keys for ant species in the tropics is currently very limited.

RESULTS

A total of 28 species of ants were recorded from the coconut plantation (Table 1, Figure 1). The highest number of species is the Formicine, comprising a total of 13 species from 8 genera. There were 9. species in Myrmicinae represented by 7 genera. The Ponerinae and Dolichoderinae were represented by 2 species each. This is followed by Pseudomyrmecinae and Aenictinae with 1 species each. Table 1 show that 25 species of ants was collected manually while only 10 species were collected from the pitfall traps.

DISCUSSIONS

For all subfamilies of ants, the manual collections yielded the highest number of species compared to pitfall traps (Figure 2). This is due to the limitations of pitfall traps that could only sample ants or other invertebrates that move at ground level (for ground sampling). On the other hand, manual collection by hand allowed a larger variety of habitats to be explored, especially if the collector had a keen sense of observation. The species that were captured by both the methods were *Paratrechina* sp. 9, *Cardiocondyla* sp., *Meranoplus bicolor, Tetramorium* sp. 7, *Tetramorium* sp. 8, *Odontomachus simillimus* and *Tapinoma* sp. Based on observations carried out during the survey and specimens collected, *Meranoplus bicolor* was the most common species in the area. It can be found almost everywhere on sandy ground and on barks of trees. It has been reported that *Meranoplus* has been an agent of seed dispersal [12]. There were more arboreal species such as *Camponotus* spp., *Oecophylla smaragdina, Polyrhachis* spp., *Crematogaster* sp., *Platythyrea* sp., *Dolichoderus* sp. and *Tetraponera* sp. when compared to species that were collected on the ground.

The ponerine ants are usually larger in body size compared to the *myrmicine* ants. They can be easily detected on the forest floor. In the plantation area, the two species of *Ponerinae* were the *Odontomachus simillimus* and *Platythyrea* sp. *Odontomachus simillimus* is more widespread. They can be found everywhere, on the forest floor and also at the base of tree trunks. The occurrence of *Platythyrea* sp. in the coastal area was rather unique. This species was collected on the bark of living casuarina trees. There were several *Platythyrea* species that have been recorded in Peninsular Malaysia. So far, *Platythyrea* has been recorded in forest habitats in which they make nests in dead branches or in the bark of large logs on the ground in rainforests [7]. Malsch [9] recorded about 10 morpho-species of *Platythyrea* from a small area in Pasoh Forest Reserve. The number of species is considered high but since they are not properly identified to the species level, the total number of species is still undetermined.

Ants are very closely related to humans. Some are beneficial while others could be pests. For example the *Oecophylla smaragdina* can protect fruit trees such as mangoes and coconuts from being attacked by pests [4]. They act as biocontrol agents. *Dolichoderus thoracicus* has also been used as a biocontrol agent, against the mirid *Helopeltis theobromae* which stings young cocoa pods [4, 10].

Table 1. List of ant species collected from Melawi sandy beach, Bachok.

Species	Manual	Pitfall
Formicinae (13)		
Anoplolepis gracilipes	√	-
Camponotus sp. 1	√	-
Camponotus sp. 2	√	-
Camponotus sp. 3	√	-
Cladomyrma sp.	√	-
Oecophylla smaragdina	√	-
Paratrechina sp. 1	√	-
Paratrechina sp. 9	√	√
Paratrechina sp. 10	-	√
Plagiolepis sp.	√	-
Polyrhachis (Cyrtomyrma) sp. 1	√	-
Polyrhachis (Cyrtomyrma) sp. 2	√	-
Pseudolasius sp.	√	-
Myrmicinae (9)		
Cardiocondyla sp.	√	√
Crematogaster sp.	√	-
Meranoplus bicolor	√	√
Pheidole sp. 8	-	√
Pheidologeton sp. 1	-	√
Solenopsis sp.	√	-
Tetramorium sp. 2	√	-
Tetramorium sp. 7	√	√
Tetramorium sp. 8	√	√
Ponerinae (2)		
Odontomachus simillimus	√	√
Platythyrea sp.	√	-
Dolichoderinae (2)		
Dolichoderus sp.	√	-
Tapinoma sp.	√	√
Aenictinae (1)		
Aenictus sp.	√	-
Pseudomyrmecinae (1)		
Tetraponera sp.	√	-
Total: 28 species	**25**	**10**

Note: Species number allocated (for example *Camponotus* sp. 2) is number in our collection.

a. *Odontomachus simillimus*

b. Anoplolepis gracilipes

c. *Oecophylla smaragdina*

d. *Tetraponera* sp.

e. *Camponotus* sp. 3

f. *Crematogaster* sp.

g. Aenictus sp.

Figure 1 (a-g). Some of the ant species found at Melawi Sandy Beach, Bachok.

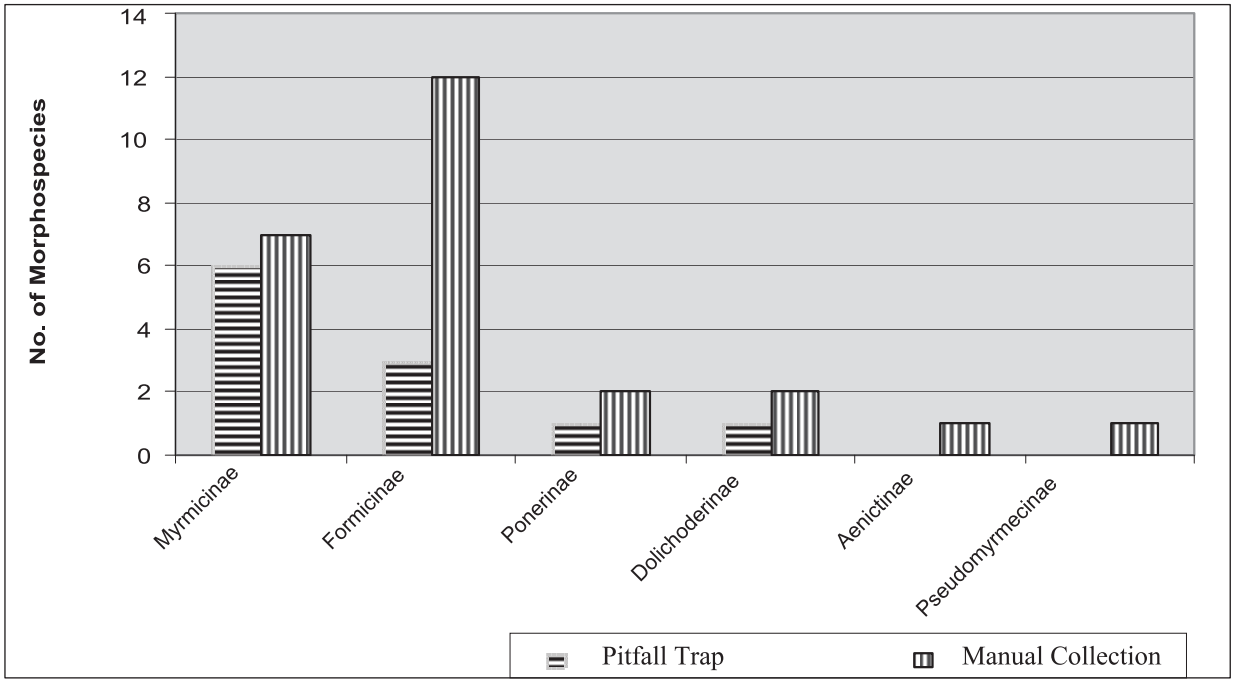

Figure 2. Number of ant morphospecies collected manually and by using pitfall trap at Melawi sandy Beach, Bachok

Ants that act as pests to humans are *Anoplolepis gracilipes, Paratrechina longicornis, Tapinoma melanocephalum, Solenopsis* sp. and a few others [13]. Their infestations include food contamination, stings, bites, and allergies [8]. For example, *Anoplolepis gracilipes* are abundant at sites where land has been modified, but rare or absent in natural or undisturbed sites [14]. They have the ability to displace native species from their territory. The presence of *A. gracilipes* in this area needs to be controlled; otherwise the native species will be replaced permanently.

Coastal areas play an important role as economic resources for fishing, ecotourism and culture. The increasing human activities in the area could possibly increase the diversity of tramp species. These tramp species have the ability to affect the native biodiversity through predation or competition, or indirectly by modifying habitat structure [5]. These ants can easily monopolize resources, by increasing their population size at the expense of other species. They need to be controlled, or otherwise they can reduce the diversity of local fauna in the area.

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