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ANTS DIVERSITY AND COMPOSITION BETWEEN TWO WILDLIFE CORRIDOR OF BUKIT BELATA FOREST RESERVE AND BUKIT TUNGGAL FOREST RESERVE

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ABSTRACT

Understanding the diversity and composition of two forest corridors will provide invaluable information on the suitability of the proposed wildlife corridor. Ants were used as bioindicator to determine to health status Bukit Belata and Bukit Tunggal Forest Reserves. Sampling were done using pitfall traps and leaf litter sifting along a 500m line transect. A total of 35 species of ants belonging to 15 genera and 4 subfamilies were collected. Bukit Belata FR yielded higher number of species compared to Bukit Tunggal FR. However, the species composition in Bukit Tunggal comprised mainly forest specialist species instead of generalist species in Bukit Belata.

Keywords: ants, wildlife corridor, bioindicator

ABSTRAK

Memahami kepelbagaian dan komposisi yang terdapat di dalam dua corridor hutan akam memberikan maklumat yang berharga dalam mengenalpasti kesesuaian cadangan koridor haiwan liar. Menggunakan semut sebagai bioindikator, sebanyak 35 spesies yang tergolong dalam 15 genera dan 4 subfamili telah diperolehi Hutan Simpan Bukit BElata mempunayi kepelbagaian spesies yang lebih tinggi berbanding Hutan Simpan Bukit Tunggal. Namun, didapati komposisi spesies di bukit tunggal adalah merupakan spesies spesial hutan berbanding spesies biasa yang diperolehi di Bukit Belata

Kata kunci: semut, koridor haiwan liar, bioindikator

INTRODUCTION

Forest fragmentation is a major environmental concern in Malaysia where we risk loosing our biodiversity heritage due to the dwindling forest cover area. Malaysia, as one of the megadiverse countries, has taken proactive steps to overcome the problem of fragmented forest by establishing a Central Forest Spine (CFS) Masterplan in 2009, which aims to provide connectivities to animals between the fragmented forests in Peninsular Malaysia. In accessing the functionality of the connectivity, understanding of the structure and diversity of the flora and fauna that inhabit the area prior to the reconnection is important.

The role of ants in forest ecosystem has been proven through its function as pollinators, scavengers, nutrient cyclers and as biological control agents. The strong symbiosis between ants and forests makes this group of insects suitable to be used as an indicator to indicate forest disturbances. Studying the diversity and composition of ants will provide useful insights on the conservation of biodiversity value in the CFS linkage to ensure the sustainability of the ecosystem. In Selangor, one of the proposed connectivities is between Bukit Belata FR and Bukit Tunggal FR, which has been identifed as important secondary linkages (SL-3). Therefore, the objectives of the study are (i) To understand the diversity and distribution of ants along the two forest corridors of SL3 and (ii) To identify key species for the two corridors.

METHODOLOGY

Study Site: Sampling was conducted at two forest reserves gazetted as wildlife corridor in Selangor namely Bukit Belata Tambahan (3°34'00.0"; N 101°26'28.9") and Bukit Tunggal (3°33'32.6"N; 101°24'50.2"E).

Sampling method: A transect of 500 m long has been established at each forest, adjacent to the proposed wildlife corridor. At each transect, 10 pitfall traps were set and leaf litter sifting were conducted at every 50m interval.

The data collected from these samples were analysed using Margalef index, Shannon Wiener diversity index and evenness index for the diversity and distribution between the two corridors. All analyses were carried out using R statistical software.

RESULT AND DISCUSSION

A total of 35 species belonging to 15 genera and 4 subfamilies of ants were collected (Table 2). Bukit Belata FR recorded highest species richness with 30 species while Bukit Tunggal FR the lowest with 25 species. Margalef index, Shannon Wiener index and Evenness index for the Bukit Tunggal FR showed 7.3, 1.4 and 0.7 values respectively. Whereas, the value for

Margalef index was 8.0, Shannon Wiener index 1.4 and evenness index 0.8 showed at Bukit Belata FR (Table 1). Higher diversity index in Bukit Belata FR indicates that the forest hold higher diversity of ants compared to Bukit Tunggal FR. Dejean et al (1994) reported higher ant diversity in disturbed areas. Bruhl & Eltz (2010) has suggested that the biodiversity of a disturbed forest is likely to be impaired due to the alteration of the environment. Some particular ant species may need open habitat particularly true of some of the more invasive species in the tropics.

Abundance of the ants is also higher in Bukit Belata FR compared to Bukit Tunggal FR (Table 1). High abundance of ants in Bukit Belata is supported by results obtained in other fragmentation study, which showed higher ant abundance in secondary forest (Golden & Crist, 2000). More food availability in disturbed areas may facilitate the increase in the number of ants (Majer & Delabie, 1999).

Some of the species present in both sampling sites were *Odontoponera transversa, Diacamma scupturatum* (Table 2) with higher abundance in Bukit Tunggal FR. There are far higher numbers of tropical climate specialist (eg: *Lophomyrmex bedoti*, *Meranoplus mucronatus*, *Meranoplus malaysianus*, *Polyrhachis bellicose and Gnamptogenys* sp 1) species in Bukit Tunggal compared to Bukit Belata (Table 2). Vasconcelos (2003) concluded that forest ants are specialists, sensitive to ecological changes and thus cannot persist after disturbance. As the upper canopy was removed and disturbance occur in the soil, the habitat is far less stratified and ants that are capable of adapting to the changes are usually the ones that live on soil surface and not limited by nesting sites with specific soil structure (Floren & Linsenmair, 2001).

High numbers of the yellow crazy ant *Anoplolepis gracilipes*, was recorded at Bukit Belata compared to Bukit Tunggal (Table 2). This result also indicated that the degradation of forest in Bukit Belata is higher than in Bukit Tunggal as *A. gracilipes*, an opportunist species are usually found in disturbed, deforested environment, forest edges and urban areas (Wetterer, 2005). Presence of this invasive species may disrupt the indigenous invertebrate fauna and transform the entire ecosystem (Feare 1999).

CONCLUSION

There is higher diversity in Bukit Belata FR compared to Bukit Tunggal FR. However, composition of forest specialist species are better in Bukit Tunggal that may suggest that this forest reserve may serve as genetic pool areas for regeneration of the proposed wildlife corridor. Further study is needed to incorporate abiotic factors for a better understanding of the interaction of different functional groups within the proposed wildlife corridor.

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REFERENCES

Wetterer, JK. (2005). "Worldwide distribution and potential spread of the long-legged ant, Anoplolepis gracilipes (Hymenoptera: Formicidae)." *Sociobiology* 45(1): 77-97.

Feare, C. 1999. Ants take over from rats on Bird Island, Seychelles. Bird. Conservation International 9, 95-96.

Fowler, H.G., M.N. Schlindwein & M.A Medeiros 1994. Exotic ants and community simplification in Brazil: a review of the impact of exotic ants on native ant assemblages. Exotic ant: biology, impact, and control of introduced species (ed. by D.F. Williams), pp. 151-162. Westview Press, Boulder.

Majer, J.D. & Delabie, J.H.C. 1999. Impact of tree isolation on arboreal and ground ant communities in cleared pasture in the Atlantic rain forest region of Bahia, Brazil. *Insectes Sociaux,* 46: 281-290.

Dejean, A., Akoa, A., Djieto Lordon, C. & Lenoir, A. 1994. Mosaic ant territories in an African secondary rain forest (Hymenoptera: Formicidae). *Sociobiology,* 23: 275-292.

Brühl, C.A. & Eltz. T. 2010. Fuelling the biodiversity crisis: species loss of ground-dwelling forest ants in oil palm plantations in Sabah, Malaysia (Borneo). Biodiversity and Conservation.19(2): 519-529.

Floren, A. & Linsenmair, K.E. 2001. The influence of anthropogenic disturbances on the structure of arboreal arthropod communities. *Plant Ecology,* 153: 153-167.

Vasconcelos, H.L., Macedo, A.C.C. & Vilhena, J.M.S. 2003. Influence of topography on the distribution of ground-dwelling ants in an Amazonian forest. *Studies on the Neotropical Fauna and Environment,* 38: 115-124

Feare, C. "Ants take over from rats on Bird Island, Seychelles." *Bird Conservation International* 9.1 (1999): 95-96.

Table 1 Margelef Index (R'), Shannon Index (H'), Simpson Index (1-D') and Pielou evenness index (E') of ants for each forest reserve.

Distance from VJR[2]	Number of species	Abun dance	Margalef index (R')	Shannon-Wiener Index (H')	Evenness Index (E')
Bukit Belata FR	30	139	7.3 ±0.6	1.4 ± 0.1	0.8 ±0.1
Bukit Tunggal FR	25	117	8.0 ±0.1	1.4 ± 0.1	0.7 ±0.4

Means in columns followed by the same letter are not significantly different (P<0.05).

Table 2 List of ant species collected in each forest

No.	Subfamily	Species	Functional group	Bukit Belata	Bukit Tunggal
1	Dolichoderinae	*Dolichoderus sp.*	*DD*	1	
2	Dolichoderinae	*Dolichoderus thoracicus*	*DD*	4	
3	Dolichoderinae	*Tapinoma sp 1*	*DD*	3	2
4	Ectatominnae	*Gnamptogenys sp 1*	*TCS*		1
5	Formicinae	*Camponotus festinus*	*SC*	5	3
6	Formicinae	*Camponotus sp 1*	*SC*	7	4
7	Formicinae	*Camponotus sp 4*	*SC*		3
8	Formicinae	*Camponotus sp 2*	*SC*	2	
9	Formicinae	*Camponotus sp 3*	*SC*	2	
10	Formicinae	*Paratrechina sp 1*	*O*	12	2
11	Formicinae	*Paratrechina sp 2*	*O*	5	2
12	Formicinae	*Polyrhachis abdominalis*	*SC*		1
13	Formicinae	*Polyrhachis striata*	*SC*		1
14	Formicinae	*Pseudolasius sp 2*	*TCS*	7	5
15	Formicinae	*Pseudolasius sp.1*	*TCS*	4	1
16	Myrmecinae	*Lophomyrmex bedoti*	*TCS*	1	12

17	Myrmecinae	*Anoplolepis gracilipes*	*O*	25	7
18	Myrmecinae	*Craematogaster sp 1*	*GM*		6
19	Myrmecinae	*Craematogaster sp 2*	*GM*	5	1
20	Myrmecinae	*Crematogaster modiglianii*	*GM*	9	3
21	Myrmecinae	*Meranoplus malaysianus*	*TCS*		1
22	Myrmecinae	*Meranoplus mucronatus*	*TCS*	4	8
23	Myrmecinae	*Monomorium sp 1*	*GM*	4	3
24	Myrmecinae	*Monomorium sp 2*	*GM*	1	3
25	Myrmecinae	*Myrmecaria sp*	*O*		1
26	Myrmecinae	*Pheidole sp 2*	*GM*	4	7
27	Myrmecinae	*Pheidole sp 3*	*GM*	6	5
28	Myrmecinae	*Pheidole sp.*	*GM*	8	
29	Myrmecinae	*Tetramorium sp 1*	*O*		3
30	Myrmecinae	*Tetramorium sp 2*	*O*		2
31	Myrmecinae	*Tetramorium sp.3*	*O*	5	3
32	Ponerinae	*Leptogenys sp.*	*SP*		1
33	Ponerinae	*Diacamma scupturatum*	*O*	1	5
34	Ponerinae	*Odontomachus rixosus*	*SP*	7	14
35	Ponerinae	*Odontoponera transversa*	*SP*		7

C: Cryptic species; DD: Dominant Dolichoderinae, GM: Generalised Myrmicinae; TCS: Tropical Climate Specialists; O: Opportunists; SC: Subordinate Componitini; SP: Specialist Predators.