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Ant community composition in urban areas of Bangkok, Thailand

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Abstract

The impact of urbanization on biodiversity is well-documented and ant community composition can be a bio-indicator in habitat disturbance. This necessitates research to understand the diversity and abundance of ants in urban settings. Consequently, ant diversity and abundance were examined using a food baits method and direct sampling and the results were compared among three different habitat types in urban areas in Bangkok city, Thailand. Of the 67 ant species identified from six sub-families in the urban area, five were dominant ant species that had high levels of frequency of occurrence (FO; > 70%). The results indicated that ant richness decreased from green areas to commercial areas. The greatest abundance of ants was in commercial areas where high FO values were recorded for *Trichomyrmex destructor* (100%), *Paratrechina longicornis* (93%), *Tapinoma melanocephalum* (92%), *Monomorium pharaonis* (79%) and *Solenopsis geminata* (71%). The findings revealed that a difference in habitat type in the city had a negative impact on ant diversity and abundance, and a difference in nesting habitat for native ant species was identified for each habitat type. While urbanization might have a positive impact on the abundance of invasive ant species, it was concluded that six species of urban ants (*T. destructor*, *M. pharaonis*, *P. longicornis*, *T. melanocephalum*, *S. geminata* and *Tetraponora rufonigra*) might have become abundant pests in urban areas in Thailand. More research is required to examine the impact of each dominant ant species and their nesting habits in relation to different stages of land development.

Introduction

Land transformations during the process of urbanization affect the habitat structures and resource of native biodiversity (Czech, 2004). Land development such as houses, buildings and yards may occur as a result of increasing human population and human construction. This change results in the loss of local habitats, habitat degradation and increased habitat fragmentation, which have well-documented effects on biodiversity (McKinney, 2006; Clarke et al., 2008). Numerous studies have reported the decline of native biodiversity due to urbanization (Heterick et al., 2000; Sanford et al., 2008; Vepsäläinen et al., 2008) and the eventual extinction of certain species (Lessard and Buddle, 2005). For example, urbanization has negative effects on species richness and community composition, including those of native plants (Walker et al., 2009), birds (Aronson et al., 2014), amphibians (Riley et al., 2005; Scheffers and Paszkowski, 2012), bats (Coleman and Barclay, 2012) and arthropods (Yamaguchi, 2004; Hartley et al., 2007). Several studies have suggested that urbanization

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and human activities can also affect the activity, reproduction and survival of native animals (George and Crooks, 2006; Villaseñor et al., 2014). On the other hand, urbanization may increase the diversity of alien and invasive species of plants (Nock et al., 2013) and insects (Yamaguchi, 2004; Kamura et al., 2007; Mauro et al., 2007; Catterall, 2009; Menke et al., 2010). Urbanization has spread rapidly in present times, necessitating planning efforts in urban development to conserve urban biodiversity. Thus, it is important to understand how habitat development affects biodiversity.

Ants are one of the excellent bioindicators for studying land-use planning and conservation efforts (Andersen, 2000; Underwood and Fisher, 2006). Since ants are the most abundant and diverse group easily found in any type of habitat (Hölldobler and Wilson, 1990; Bolton, 1994), they can respond quickly to environmental change or human-altered habitats (Stringer et al., 2009). In addition, ants are sensitive to habitat disturbance conditions at the community level (Andersen, 2000) and the negative impacts of ants are well documented, especially invasive ants (Lach and Hooper-Bui, 2010; Rowles and Silverman, 2010). Many studies have reported habitat destruction and its effect on ant community composition (McKinney, 2008). For example, the size, age and shape of a park affected ant diversity and population (Yamaguchi, 2004; Carpintero and Reyes-López, 2013). The urban edge is associated with changes in ant species richness and community composition (Lessard and Buddle, 2005; Pacheco and Vasconcelos, 2007). Uno et al., (2010) reported that vegetation factors (patch size, number and size of trees, leaf litter, amount of concrete and buildings) correlated with differences in ant species composition. For these reasons, ants are useful organisms for examining the effect of habitat development on the biodiversity of urban habitats. The aims of the current study were to examine ant diversity and abundance in urban areas, and to determine the dominant ant species in such an urban ecosystem. The ant species likely to become pests to humans were also discussed.

Materials and Methods

Study site

Fourteen study sites were located in the Bangkok Metropolitan Region (BMR), which is considered a center of human activity (Table 1) as Bangkok is the capital city of Thailand. It is located between 13°45´N and 100°31´E, 2.31 m above sea level and its total area is 1,568.7 km^2. The current population is over 8 million and the average population density is 3,634 person/km^2 (Bangkok Geographic Information Technology Center, 2018). Bangkok is the political, social and economic center of Thailand and is surrounded by industrial, commercial and residential areas. In general, the climate in the BMR is influenced by the northeast and southwest monsoons. The southwest monsoon brings heavy rainfall from mid-May to mid-October while the northeast monsoon brings a cool and dry climate from mid-October to February (Limjirakan et al., 2012).

This study was conducted from 2010 to 2012. Sample collection was done separately during the dry season (between November and April) and the wet season (May and October). The study was conducted in three different habitat areas (commercial, residential and green areas) within the 14 study sites in Bangkok and the surrounding provinces. Each study site was classified into three different urban area types based on human activity (Table 1). Commercial area (CM) was defined as an area with buildings for industrial and commercial activities, residential area (RD) as where a group of people live in the same area and green area (GA) as a fragmented green space including gardens, yards, and city parks that is surrounded by commercial and residential areas.

Table 1 Sample site location details

District	Sample site	Coordinates	Urban area type
Bang Khen	Kasetsart University	13°50′51.89″N, 100°34′15.02″E	CM, RD, GA
Chatuchak	Mho Chi bus terminal	13°48′9.30″N; 100°33′13.80″E	CM, RD, GA
	Jatujak Matket,	13°49′43″N, 100°33′35″E	CM, RD, GA
	Queen Sirikit Public Park,	13°48′24″ N, 100°33′0″E	CM, RD, GA
	Vachirabenjatat Public Park	13°48′29″N, 100°33′20″E	CM, RD, GA
Klong Toei	Benchasiri Public Park	13° 43′49.22″N, 100°34′2.35″E	CM, RD, GA
Lat Krabang	Suvarnabhumi Airport	13°41′33″N, 100°45′0″E	CM, RD, GA
	Hua Takhe Railway Station	13°43′41.16″N, 100°46′55.92″E	CM, RD, GA
Phatum Wan	Lumpini Public Park	13° 44′36.79″N, 100°32′33.56″E	CM, RD, GA
Phra Nakhon	Sanam Luang	13°45′18″N, 100°29′35″E	CM, RD, GA
	Saran Rom Public Park	13°44′53.71″N, 100 29′42.8″E	CM, RD, GA
Pom Prap Sattru Phai	Shopping mall for import and expofrt of clothes	13.758°N, 100.513°E	CM, RD, GA
Rat burana	Chalermprakiat Public Park	13°40′56″N 100°30′20″E	CM, RD, GA
Ratchathewi	San Ti Pap Public Park	13°45′32″N 100°32′04″E	CM, RD, GA

CM = commercial area; RD = residential area; GA = green area.

Ant sampling design

In each study area, three line transects each 50 m long and 20 m apart were set up for the ant survey. The ants were collected using a food baits method. Baits were made of 5 cm × 5 cm white laminated cards with approximately 2 g of mixed food placed in the center. The food was a mixture of honey, tuna and crushed beans. In total, 10 baits were sampled per transect 5 m away from each other and were left undisturbed for 30 min. The outdoor baits were placed far from trees, garbage and pedestrian walkways and far from garbage for indoor sampling. Any ant that became attached to the bait was collected for identification in the laboratory. The number of individuals was counted for each species.

Direct sampling was used for extensive observation of ant diversity and the location of their nesting sites (tree stratum, above ground, below ground) for each sampling point (Bestelmeyer and Casanova, 2010). At each site, 20 sampling points were systematically established 10 m apart from each other. Ant species and their nesting sites were observed over a 10 min period within 2 m around each point. Nesting sites were identified by the extremely high number of ant workers swarming at their nest entrance hole or cavity or the presence of a queen and brood. All entrance holes or cavities of each species were counted, so that nest entrance numbers could be used to define suitable nesting sites for each ant species. The nesting sites were classified into five types: nesting on trees and lower vegetation (NT), inside or under the human constructions (UW), under or in the leaf litter layer (UT), nesting inside decaying logs (UL) and nesting in the ground (UG).

Ant identification

All ant samples were stored in 95% ethyl alcohol for identification using the available taxonomic keys of Bolton (1994), Hölldobler and Wilson (1990) and Bolton et al. (2006). Later, ants were identified to species or morphospecies level by reference to the ant collection in the Insect Collection at the Department of National Parks, Wildlife and Plant Conservation (DNP), Bangkok, Thailand and a reliable digital resource (http: //www.antweb.org and http://www.antbase.de). Questionable specimens were sent to an expert for confirmation to the species level. Vouchers were deposited in the Insect Collection at the DNP. The general character of ants was characterized based on functional groups of ant to at least the generic level based on Andersen (2000), and invasive ant species were classified according to the literature by McGlynn (1999), Holway et al., (2002) and Office of Natural Resources Environmental Policy and Planning (2009).

Data analyses

Species richness was determined by the total number of ant species pooled from the food baits method and direct sampling at each site. The frequency of occurrence of each species was analyzed for each habitat site using the presence or absence of the ant species in each habitat type. The frequency of occurrence of each species was calculated separately for each habitat type. Ants were divided into three groups using the frequency of occurrence values (Bourmas, 2005; Hasin, 2008), where a value in the range 0−35% was considered as an uncommon ant species, a value in the range 36−70% was considered as a common ant species and a value in the range 71−100% was considered as the dominant ant species .Abundance was defined as the number of individual workers visiting bait stations.

A univariate analysis of variance (ANOVA) was used to test the effects of habitat type and season on species richness and abundance, with habitat area and season as explanatory variables. All pairwise comparisons were made based on Bonferroni post-hoc tests where the differences were considered significant at $p < 0.05$. Normality and homoscedasticity of the data were confirmed prior to the analyses using the Shapiro-Wilk and Levene tests, respectively. All data were log-transformed to reduce heteroscedasticity prior to analysis. All univariate statistical analyses were performed with PASW ver. 20.0.0 for Windows (SPSS Inc., Chicago, IL, USA).

Results

Community composition of ants

In total, 67 species representing six sub-families and 39 genera were collected (Table 2). The highest richness (67 species) was observed in the green areas, followed by residential areas (29 species) and commercial areas (17 species). A comparison of species richness data from both the food baits method and direct sampling showed significant differences among habitat areas ($F_{2, 78} = 69.90$; $p < 0.001$). The average ant species richness was higher in the green areas (28.7 ± 2.6 SE) than in the commercial (5.2 ± 0.3 SE) and residential areas (6.7 ± 0.5 SE) (post-hoc: $p < 0.001$: Fig. 1A). However, ant species richness was not affected significantly by dry and wet seasons ($F_{1, 78} = 0.17$; $p = 0.69$), and there was no interaction between study area and season ($F_{2, 78} = 0.31$; $p = 0.73$).

A comparison of the ant abundance data from the food baits methods showed significant differences among habitat areas ($F_{2, 78} = 5.39$; $p < 0.05$), where the average ant abundance was significantly higher in commercial areas (451.8 ± 32.3 SE) than residential (370.6 ± 36.8 SE) and green areas (311.1 ± 24.4 SE; post-hoc: $p < 0.001$: Fig. 1B). There was no significant difference between the dry and wet seasons ($F_{1, 78} = 1.09$; $p = 0.30$), and no interaction between study area and season ($F_{2, 78} = 0.20$; $p = 0.82$).

Dominant urban ants

Five ant species dominated the urban areas, namely, *Trichomyrmex destructor* (100%), *Paratrechina longicornis* (93%), *Tapinoma melanocephalum* (92%), *Monomorium pharaonis* (79%) and *Solenopsis geminata* (71%), as shown in Table 2. There were slight differences in frequencies of occurrence of some ant species within the study areas, with *P. longicornis* having higher frequency values in the green areas, and lower in the commercial and residential areas (Table 2).

Table 2 List of ant species sampled and percentage frequency of occurrence in three habitat types and within all habitats combined

Subfamily / species [1)]	Direct sampling			Food Bait			$F_{habitat}$ (n=28)			F_{total} (n=84)	Nest site
	CM	RD	GA	CM	RD	GA	CM	RD	GA		
Cerapachyinae											
Cerapachys longitarsus Mayr	-	-	+	0	0	0	0	0	7	3	not found
Dolichoderinae											
Iridomyrmex anceps (Roger)	-	+	+	0	0	102	0	4	36	14	UG
Ochetellus glaber (Mayr)	-	-	+	0	0	0	0	0	18	6	not found
Tapinoma indicum Forel	-	-	+	0	0	3	0	0	18	6	not found
Tapinoma melanocephalum (Fabricius) [1]	+	+	+	2,451	1,582	1,517	86	89	100	92	UG, UW
Technomyrmex butteli Forel	-	-	+	0	0	0	0	0	36	12	UL, UT
Technomyrmex albipes Smith [1]	-	-	+	0	0	98	0	0	11	4	UL, UT
Technomyrmex kraepelini Forel	-	-	+	0	0	24	0	0	14	5	UL, UT
Formicinae											
Anoplolepis gracilipes [1]	-	+	+	0	0	124	0	7	61	23	UL, UT
Camponotus rufoglaucus (Jerdon)	-	+	+	0	2	71	0	4	54	19	UG
Camponotus sp.1	+	+	+	0	0	0	29	50	61	47	UW, UL, UT
Camponotus sp.2	-	-	+	0	0	0	0	0	11	5	not found
Camponotus sp.3	-	-	-	0	0	13	0	0	14	5	not found
Oecophylla smaragdina Fabricius	+	+	+	0	65	44	7	32	68	36	NT
Paratrechina longicornis Latreille [1]	+	+	+	2,132	1,361	807	89	89	100	93	UW,UL,UT,UG
Nylanderia sp.1	-	+	+	0	258	89	0	7	7	3	UW, UL, UT
Nylanderia sp.2	-	-	+	0	0	8	0	0	50	19	not found
Nylanderia sp.3	-	+	+	0	10	13	0	7	21	8	not found
Nylanderia sp.4	-	-	+	0	0	0	0	0	64	22	not found
Plagilepis sp.1	-	-	+	0	0	17	0	0	29	10	not found
Plagilepis sp.2	-	-	+	0	0	33	0	0	21	8	not found
Polyrhachis dives Smith	-	+	+	0	12	5	0	0	36	12	not found
Polyrhachis laevissima Smith	-	-	+	0	0	0	0	0	79	27	not found
Polyrhachis proxima Roger	-	-	+	0	0	3	0	0	43	15	not found
Myrmicinae											
Cardiocondyla emeryi Forel	+	+	+	55	21	18	4	11	96	37	not found
Cardiocondyla nuda (Mayr)	+	+	+	0	6	16	4	7	96	36	not found
Cardiocondyla wroughtonii (Forel)	-	-	+	0	0	0	0	0	4	2	not found
Cataulacus granulatus Latreille	-	-	+	0	0	0	0	0	46	16	not found
Crematogaster rogenhoferi Mayr	-	-	+	0	0	201	0	0	64	22	NT
Crematogaster sp.1	-	-	+	0	0	42	0	0	25	9	not found
Crematogaster sp.2	-	-	+	0	0	55	0	0	43	15	not found
Crematogaster sp.3	-	-	+	0	0	80	0	0	32	11	not found
Meranoplus bicolor Guérin-Méneville	-	-	+	0	0	95	0	0	54	18	UG
Monomorium chinense Santschi	+	+	+	84	4	18	7	11	36	18	UW,UG
Monomorium floricola (Jerdon)	+	+	+	289	38	119	21	32	86	47	UW,UG,UL
Monomorium pharaonis (Linnaeus) [1]	+	+	+	1,029	308	228	64	75	96	79	UW,UG,UL
Monomorium sechellense Emery	-	-	+	0	0	0	0	0	18	7	not found
Monomorium sp.1	-	-	+	0	0	198	0	0	50	17	not found
Myrmicina sp.1	-	-	+	0	0	0	0	0	14	5	not found
Myrmicina sp.2	-	-	+	0	0	0	0	0	7	3	not found
Paratopula macta Bolton	-	-	+	0	0	0	0	0	7	3	not found
Pheidole bugi Wheeler	+	+	+	43	132	55	21	46	93	54	UW,UL, UG
Pheidole fervens (Smith F.)	+	+	+	11	0	0	4	18	29	17	not found
Pheidole plagiaria (Smith F.)	-	+	+	34	0	39	7	4	71	28	UW, UL, UG
Pheidole sp.1	-	-	+	0	0	0	0	0	14	5	not found
Pheidologeton diversus Jerdon	+	+	+	136	62	495	7	21	57	27	UW,UL, UG
Solenopsis geminata Fabricius [1]	+	+	+	1,680	1,024	461	54	57	100	71	UW, UG
Strumigenys sp.1	-	-	+	0	0	0	0	0	11	4	not found
Strumigenys sp.2	-	-	+	0	0	0	0	0	7	3	not found
Tetramorium bicarinatum (Nylander)	+	+	+	0	0	0	7	14	50	24	not found
Tetramorium lanuginosum Mayr	+	+	+	102	62	105	4	36	100	47	UG
Tetramorium simillimum Smith	-	-	+	0	46	56	0	14	43	19	UG

Table 2 Continued

Subfamily / species [1)]	Direct sampling			Food Bait			$F_{habitat}$ (n=28)			F_{total} (n=84)	Nest site
	CM	RD	GA	CM	RD	GA	CM	RD	GA		
Tetramorium smithi Mayr	-	-	+	0	103	12	0	18	64	28	UG
Tetramorium walshi Forel	-	-	+	0	95	12	0	14	29	15	UG
Trichomyrmex destructor (Jerdon) [1]	+	+	+	3,603	3,357	2,003	100	100	100	100	UW,UG,UL
Ponerinae											
Anochetus graeffei Mayr	-	-	+	0	0	0	0	0	32	11	UL, UG
Diacamma rugosum LeGuillou	-	-	+	0	0	17	0	0	50	17	UL, UG
Diacamma vagans Smith	-	-	+	0	3	15	0	4	46	16	UL, UG
Hypoponera sp.1	-	-	+	0	0	0	0	0	32	11	not found
Odontomachus simillimus Smith	-	-	+	0	12	24	0	4	54	18	not found
Pachycondyla astuta Smith	-	-	+	0	0	0	0	0	7	3	not found
Pachycondyla leeuwenhoeki Forel	-	-	+	0	0	0	0	0	14	5	not found
Pachycondyla sp.1	-	-	+	0	0	0	0	0	14	5	not found
Pachycondyla sp.2	-	-	+	0	0	0	0	0	11	4	not found
Pachycondyla sp.3	-	-	+	0	0	0	0	0	14	5	not found
Pseudomyrmecinae											
Tetraponera allaborans (Walker)	-	-	+	0	0	0	0	0	11	4	not found
Tetraponera rufonigra Jerdon	-	-	-	0	17	67	0	21	93	39	NT
Total species richness	16	23	65	14	24	42					
Total abundance				11,403	8,826	7,402					

$F_{habitat}$ = three different habitats: CM = commercial area; RD = residential area; GA = green area; F_{total} = within all habitats combined; five nest site abbreviations: NT = on trees and lower vegetation; UW = inside or under human constructions; UT = nesting inside or under dead and living plant material and around base of trees; UL = nesting under or inside leaf litter and decaying logs; UG = nesting in soil.

[1] Invasive pest species were documented using Invasive Species Specialist Group (2010).

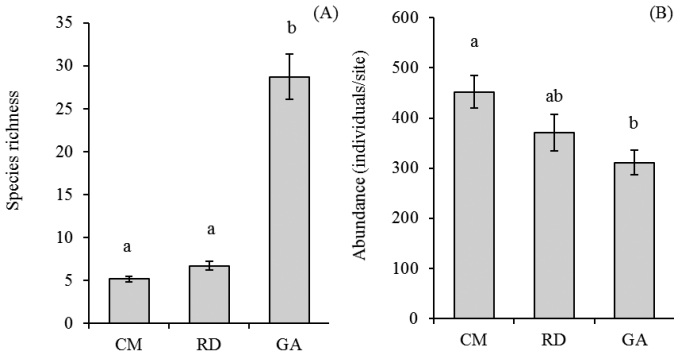

Fig. 1 Average values (±SE): (A) species richness; (B) abundance of ants, where CM = commercial area; RD = residential area; GA = green area, different letters represent significant differences among habitat sites (post-hoc test; $p < 0.001$) and bars with the same lowercase letter are not significantly different.

The dominant ant species differed within habitat areas as indicated by their frequency of occurrence values ($FO_{habitat}$) of at least 71% (Table 2). Dominant species in the commercial areas were *T. destructor, P. longicornis* and *T. melanocephalum*, and in the residential areas were *M. pharaonis, T. destructor, P. longicornis and T. melanocephalum*. Higher richness of the dominant ant species was recorded in the green areas with 11 species. Five of these ant species, namely, *T. destructor, P. longicornis, T. melanocephalum, S. geminata* and *T. lanuginosum,* had large values of frequency of occurrence of 100%. A comparison of the abundance of these ant species showed that ant abundance was significantly different among habitats (one-way ANOVA; $p < 0.01$; Fig. 2). The mean abundance of *T. melanocephalum* and *P. longicornis* was significantly higher in both the commercial and residential areas than in the green areas (post-hoc: $p < 0.001$). The species *M. pharaonis* and *S. geminata* both had higher abundance values in the residential areas than in the commercial and green areas (post-hoc: $p < 0.05$). There were no differences among habitat types for *T destructor* ($p > 0.05$).

Interestingly, in the urban areas, invasive ant species were represented by five species of dominant ant, namely *T. destructor*, *P. longicornis*, *T. melanocephalum, M. pharaonis* and *S. geminata*, having greater than 50% frequency of occurrence values within all habitats combined (FO_{total}; Table 2).

Nesting site preference

In total, 29 ant species were found at five sites. The ants had a considerable range in nesting site preferences. Most of the ant species constructed their nests outdoors, particularly in the ground (UG) with 19 species (43% of the total in this observation), inside or under dead or living plant material and around tree bases (NT) with 10 species (24%), inside or under human constructions (UW) with 9 species (21%), under or inside leaf litter and decaying logs (UL) with 3 species (6.9%); and on trees and lower vegetation (UT) with 2 species (5%), as shown in Table 2. Of the studies of the five nest sites, eight ant species were present at only one nesting site and most of the ant species were present at 2–4 nesting sites, excluding the trees (Table 2).

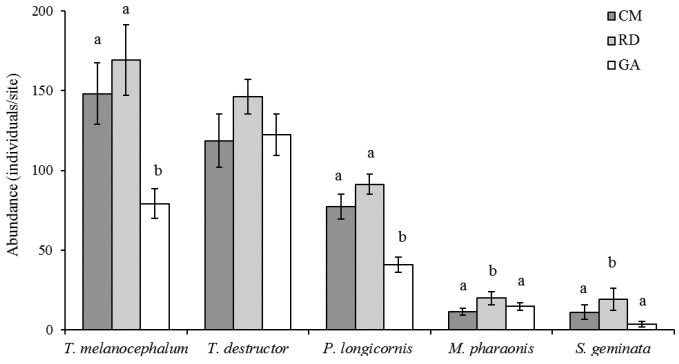

Fig. 2 Average values (±SD) abundance of common pest ant species for each study areas from urban ecosystems, where CM = commercial area; RD = residential area; GA = green area and different lowercase letters indicate highly significant differences ($p < 0.01$) within species.

The results clearly showed that the ant diversity and abundance in urban areas were affected by habitat type ($p < 0.001$), and not by season ($p > 0.05$). A larger number of ant species was found in green areas (67 species) compared to the other areas, with all identified species being found in green areas. This suggested that human disturbance of habitat had a negative impact on the number of ant species in urban areas. Similar results were reported by Pacheco and Vasconcelos (2007) and Philpott et al. (2010) who indicated that ant species richness in urban ecosystems declined from parks at urban edges to inner city squares and also around human construction. A larger number of species were found in green areas. One reason for this may have been that the variety in habitat, food and nesting sites within green areas provided a more suitable living environment for ants than did the other areas. Ant community composition is more diverse in green areas especially for species of native ants, which are also the most sensitive regarding habitat disturbance (Menke et al., 2010).

A significant difference was found in ant abundance among habitat types. The commercial areas had greater ant abundance compared to the other two habitats (Fig 1B). However, the results clearly showed that the difference in ant abundance in the study areas may have been related to ant species as there was a higher species abundance in the commercial area than for the other areas, especially for the five dominant ant species of *T. destructor, P. longicornis, T. melanocephalum, M. pharaonis and S. geminata* (Salyer et al., 2014; Vonshak and Gordon, 2015).

The results showed that the ant species *T. destructor*, *P. longicornis*, *T. melanocephalum*, *M. pharaonis* and *S. geminata* were the dominant ant species in urban areas. These results were similar to those in CABI (2020), which reported that these ant species have spread widely across Southeast Asia, where there has been higher abundance of them recorded in human habitation. Interestingly, these ant species are members of the list of recognized invasive ant species which are able to adapt and live in human structures and buildings and it is probable that a continuum of anthropogenic activity in urban areas by human disturbance has had a positive effect on the abundance of these five invasive ant species (Lessard et al., 2009; Stringer et al., 2009; Buczkowski and Richmond, 2012; Vonshak and Gordon, 2015).

The five dominant urban ant species in the current study have been identified as household pest that negatively impact the economy and human health (Lee and Robinson, 2001; Eow and Lee, 2007; Man and Lee, 2012). They are characterized by a large number of workers when foraging and their abundance is closely associated with human activities (Schultz and McGlynn, 2000). The current results showed that these dominant urban ants could build their nests in all human environments including structures and buildings in urban areas (Passera 1994; Holway et al., 2002). Moreover, it is possible to classify those ant species as urban bio-indicators that can easily be found in high abundance and can adapt their nesting habits to various human environments.

It was concluded that six species of urban ant (*T. destructor*, *M. pharaonis*, *P. longicornis, T. melanocephalum, S. geminata*, *T. rufonigra*) might have become considerable pests in the human environment in Thailand, not only due to their variety of nesting sites but also because of their high population numbers. This conclusion was similar to those in previous studies. For example, three species (*T. destructor*, *M. pharaonis*, *S. geminata*) were reported to be ant pests in human environments in Asia (in houses and buildings) by gnawing holes in fabrics and rubber goods and damaging polyethylene cables (Harris et al., 2005). In addition, they can cause damage and threaten human health. For example, *P. longicornis, M. pharaonis* and *T. melanocephalum* can transport pathogenic microorganisms, resulting in bacterial infection in hospitals (Moreira et al., 2005; Pantoja et al., 2009; Castro et al., 2015). Some species are aggressive and have painful stings for humans and domestic pets bitten in particular by *S. geminata* and *T. rufonigra* (Piromrat et al., 2008; Potiwat and Sitcharungsi, 2015). Normally, a systemic allergic reaction to ant venom and anaphylactic shock result following being stung by *S. geminata* and *T. rufonigra* (Harris et al., 2005; Potiwat and Sitcharungsi, 2015). In Thailand, *T. rufonigra* has been reported to have a sting that can cause a serious allergic reaction and lead to human death (Potiwat and Sitcharungsi, 2015).

The current research has provided basic information about the ant species that are considered ant pests and their habitat preference in urban areas in Thailand. Therefore, future work should concentrate on examining the environmental and economic harm and the impact on human health caused by the dominant urban ant species, and also investigate changes in ant pest abundance and diversity in relation to different stages of land development. This information will offer direction for future research concerning household pest management in Thailand in relation to the impacts of climate change.

Conflict of Interest

The authors declare that there are no conflicts of interest.

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