A STUDY OF THE DIVERSITY OF ANTS (HYMENOPTERA: FORMICIDAE) IN TEAK MONOCULTURE IN MATO GROSSO STATE PANTANAL

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ABSTRACT: The study aimed to perform a survey of the diversity of ants in monoculture of *Tectona grandis*. The collections took place in the period from May 2015 to May of 2016, in the stand, within the physiographic zone of Mato Grosso state Pantanal. The experiment was attended by 20 Pitfall traps, responsible for collecting 12,649 individuals, which were duly forwarded to the Laboratory of Forest Protection (UFMT) for sorting of specimens, resulting in five subfamilies, 16 genera and 26 species. The faunistic indexes were obtained through the ANAFAU program, the study of the diversity index was calculated according to the series of Hill numbers. The qualitative and quantitative studies demonstrated that the subfamilies Myrmicinae and Ponerinae were the most representative in numbers of genres, while *pheidole* and *Camponotus* were the most expressive genres in species richness. Thus, it was confirmed that the collection effort was sufficient for sampling performed in the teak planting for the period.

Keywords: Ant fauna, pitfall, faunistic indexes, *Tectona grandis* L.f.

ESTUDO DA DIVERSIDADE DE FORMIGAS (HYMENOPTERA: FORMICIDAE) EM MONOCULTIVO DE TECA NO PANTANAL MATO-GROSSENSE

RESUMO: O estudo objetivou realizar o levantamento da diversidade de formigas em monocultura de *Tectona grandis*. As coletas ocorreram no período de maio de 2015 a maio de 2016, a campo, dentro da zona fisiográfica do Pantanal Mato-grossense. O experimento contou com 20 armadilhas do tipo Pitfall, responsáveis por coletar 12.649 indivíduos, que foram devidamente encaminhados para o Laboratório de Proteção Florestal (UFMT) para triagem dos espécimes, resultado em cinco subfamílias, 16 gêneros e 26 espécies. Os índices faunísticos foram obtidos através do programa ANAFAU, o estudo do Índice de diversidade foi calculado de acordo com a série de números de Hill. Os estudos qualitativos e quantitativos demonstraram que as subfamílias Myrmicinae e Ponerinae foram as mais representativas em números de gêneros, enquanto *Pheidole* e *Camponotus* foram os gêneros mais expressivos em riqueza de espécies. Constatando-se que o esforço de coleta despendido foi suficiente para amostragem realizada no plantio de teca quanto ao período.

Palavras chave: Mirmecofauna, pitfall, índices faunísticos, *Tectona grandis* L.f.

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INTRODUCTION

Studies carried out in plantations with exotic forest investigate about the possible impacts caused by these monocultures, its simplification of the environment may affect the local biodiversity. It is expected to find a greater richness of ants in environments of greater structural complexity, however, the presence or absence of ant fauna can be regarded as characteristic of the environment (DEAN & MILTON, 1995). According to Soares *et al*. (1998) in monocultures with eucalyptus there is reduction of species richness and less diversity of substrates for nesting and feeding, which restricts the development of the colonies and increases the competition among them.

The ants are insects that belong to a single family, the Formicidae (GALLO *et al*., 2002), and is within the order Hymenoptera, which occupies the third position in number of species, becoming one of the most representative evolved species and of greater ecological diversity (GRIMALDI & ENGEL, 2005; HÖLLDOBLER & WILSON, 1990). According to Lach *et al*. (2010) estimates indicate that the number of taxa of ants exceeds 25,000 being that the majority of unidentified species are found in tropical forests.

In spite of the biotic and abiotic factors, the ants are found in most terrestrial ecosystems, they are among the most evolved species and greater ecological diversity. The presence or absence of the ant fauna in a given location can be explained through the evaluation of different environmental factors (FREITAS *et al*., 2006). Making them efficient tool in the monitoring of degraded areas, in the assessment of environmental conditions, monitoring of regeneration of forest areas and post-fire savannas.

In the environment the abiotic factors act as a filter by determining the functional redundancy of the community (WIESCHER *et al*., 2012), but the diversity of insects is also related to the diversity of plants, either perennial or annual.

The ants have various eating habits and they may be generalist and specialist predators, omnivorous, nectar-feeding, seeds collectors and pollen-feeding ants (HÖLLDOBLER & WILSON, 1990). There are also species with feeding preference by symbiotic fungi (TRIPLEHORN & JOHNSON, 2011), and ants that defend sap-sucking insects of plant exchanging "honeydew", a secretion released by insects with high content of carbohydrates and used as a source of food for the ants species (BUENO & CAMPOS-FARINHA, 1999).

The environment structural complexity has an influence on the surface of foraging and the ability to capture food (ANDERSEN, 2000), as well as the seasonality, can change the colonies routine. Della Lucia *et al*. (1982) further highlight that the structure of the canopy, brightness and the spacing between plants can affect these ants communities.

Structurally complex habitats increase the ability of the catalytic means opening opportunity for the installation and survival of a greater number of species, because they have a greater variety of available resources such as food and hiding places (LAWTON, 1983). That is, the environments that suffer from the process of substitution and simplification of its structure by forestry and agriculture are more vulnerable to the process of biodiversity deterioration in these locations (MAJER, 1983). The objective of this work was to perform a survey and evaluate the diversity of ants in a monoculture with *Tectona grandis*.

MATERIAL AND METHODS

The study was conducted at Fazenda Campina, owned by the company Teca do Brasil, located in Pirizal, district of Nossa Senhora do Livramento/MT, at coordinates 16º12'03" S and 56º22'44" W. within the physiographic zone of the pantanal, the climate type is Aw, according to Köppen, with well-defined dry and rainy seasons (PEEL *et al*., 2007). The relative humidity of the air varies from 70% to 75%, with a rainfall from 1200 mm to 1300 mm and annual

average temperature of 25ºC (CAMPELLO JÚNIOR *et al*., 1991). Gently wavy topography, soil type Haplic Eutrophic Planosol, Sandy Clay Loam texture.

The research was conducted from May 2015 to May 2016 in a stand of *T. grandis* with 14 years of age and spacing of 3 m x 2 m 20 Pitfall traps were used, composed of transparent plastic bottles of 15 cm in height and diameter of 2.5, completed in one-third of its volume, with a liquid compound containing water, neutral detergent and salt (AQUINO, 2006), which were installed inside the stand in rows, among the trees, with a distance of 20 meters between them and between lines, remaining in the stand for 15 days each month. After this period, they were removed and transported to the Laboratory of Forest Protection, Forestry Engineering School, Federal University of Mato Grosso, for screening of the collected material, which were separated and placed in appropriately labeled containers containing alcohol 70%.

The specimens were sent to Dr. Jacques Hubert C. Delabie - Myrmecology Laboratory of the Research Center of Cocoa (CEPEC), Ilhéus, Bahia for taxonomic identification. Qualitative and quantitative studies, faunal of constancy, dominance, abundance and frequency were carried out, through the program ANAFAU (MORAES *et al*., 2003) and diversity in accordance with the series of Hill numbers (LUDWING & REYNOLDS, 1988).

RESULTS AND DISCUSSION

In the survey 12,649 ants were collected within a period of one year, which were identified and distributed into five subfamilies, 16 genera and 26 species (Table 1).

Myrmicinae was the most representative in terms of the quantity of species of the subfamilies identified, which corroborates the results obtained by researchers as Lutinski & Garcia (2008) and Santos *et al*., (2006) who observed greater representativeness of myrmicinae in numbers of species sampled in environments of litter. According to Hölldobler & Wilson (1990), the subfamily Myrmicinae is the most diverse, at regional and global level. According to Bolton (1994) more than 45% of the species and more than 52% of the genera of Formicidae belong to the subfamily Myrmicinae.

Of the 26 species identified Myrmicinae presented the largest number with 46%, followed by Formicinae with 23%, Dorylinae 12% and Ponerinae, with 15% and, to a lesser number Dolichoderinae with 4%. *Dolichoderinae* presented only one species, in spite of the species of this subfamily belong to the group of omnivorous ants, considered dominant in litter (DELABIE *et al*., 2000a). The most representative genera in number of individuals collected were *Labidus* with 7,615 individuals (60%), *Pheidole* with 2,344 (20%), *Solenopsis* (1,179) and *Camponotus* (1,054) both with 9%. The species *Labidus coecus* was quantitatively more important with 58.43% individuals caught in the Pitfall trap, followed by *Pheidole* group *Tristis* sp. 3 with 9.41%, and *Solenopsis* sp. with 8.78% specimens.

Several species of *Pheidole* have efficient system of recruitment, which makes them dominant in their area of occurrence and allow them to exploit food resources efficiently and effectively exclude their competitors (FOWLER, 1993). They are considered non-specialists, competitive with gatherer species of seeds, omnivorous, predatory and mutualistic in associations with plants and Homopterous (SUDD & FRANKS, 1987). The presence of *Pheidole fallax* was already expected, since they are usually found in places with some kind of disorder (MARINHO *et al*., 2002). In monocultures, such as teak planting, there is reduction of species richness and less diversity of nesting and feeding substrates (SOARES *et al*. 1998).

TABLE 1. Relation of the subfamilies, genus, species, food habit, number of individuals sampled in planting of *Tectona grandis* L.f., in the district of Nossa Senhora do Livramento/MT, May/2015 to May/2016.

Subfamilies – genus / species	Food habit	Individual	%
• Dolichoderinae			
Dorymyrmex pyramicus (Roger, 1863)	Onívora	86	0,68
• Dorylinae			
Labidus coecus (Latreille, 1802)	Predadora	7.391	58,43
Labidus praedator (Fr. Smith, 1858)	Predadora	224	1,77
Nomamyrmex esenbeckii (Westwood, 1842)	Predadora	40	0,32
• Formicinae			
Brachymyrmex admotus (Mayr, 1887)	Onívora	31	0,25
Brachymyrmex heeri (Forel, 1874)	Onívora	20	0,16
Camponotus blandus (Smith, F., 1858)	Onívora	517	4,09
Camponotus crassus (Mayr, 1862)	Onívora	209	1,65
Camponotus melanoticus (Emery, 1894)	Onívora	171	1,35
Camponotus novogranadensis (Mayr, 1870)	Onívora	157	1,24
• Myrmicinae			
Acromyrmex subterraneus subterraneus (Forel, 1893)	Fungívora	22	0,17
Atta sexdens (Linnaeus, 1758)	Fungívora	170	1,34
Crematogaster tenuicula (Forel, 1904)	Onívora	5	0,04
Pheidole sp.	Onívora	784	6,20
Pheidole grupo *Fallax* sp. 1	Onívora	337	2,66
Pheidole grupo *Flavens* sp. 2	Onívora	1	0,01
Pheidole grupo *Tristis* sp. 3	Onívora	1.190	9,41
Pheidole radoszkowskii (Mayr, 1884)	Onívora	32	0,25
Sericomyrmex sp. 1	Fungívora	7	0,06
Solenopsis globularia (Smith, F., 1858)	Onívora	69	0,55
Solenopsis sp.	Onívora	1.110	8,78
Strumigenys denticulata (Mayr, 1887)	Predadora	14	0,11
• Ponerinae – *Anochetus*			
Anochetus diegensis (Forel, 1912)	Predadora	8	0,06
Neoponera commutata (Roger, 1860)	Predadora	15	0,12
Odontomachus bauri (Emery, 1892)	Predadora	37	0,29
Pseudoponera gilberti (Kempf, 1960)	Predadora	2	0,02
	Total	**12.649**	**100**

Of the 16 genera registered in the inventory, *Pheidole* was represented by five species, *Camponotus* with four, *Solenopsis*, *Brachymyrmex*, *Labidus*, with two species each. According to Bolton (1994) *Pheidole*, *Solenopsis*, *Camponotus* are among the most abundant in number of species on the planet and frequent in the neotropical region, with more than 600 species in the neotropical region (WILSON, 2003), corroborate the results obtained here.

Solenopsis are small ants which first occupy the interior fraction of litter and rare are the times that go up the surface in search for food (SILVESTRE, 2000). This genus is composed of honeydew gatherer cosmopolitan species of mealybugs and aphids, in addition to immature insects and dead adults (GONÇALVES & NUNES, 1984). This genre is often regarded as influential on forest recovery process areas (RAMOS *et al*., 2003). Whereas species of the genus *Brachymyrmex* are widely distributed (DELABIE *et al*., 2000b), but are sensitive to changes in their habitat (FOWLER *et al*., 1991). *Camponotus* have predominantly nocturnal habits (OLIVEIRA & BRANDÃO, 1991), has a high capacity for adaptation, for being an invasive species with a high potential for interaction with other organisms, keeping associations with homopterous (FOWLER *et al*., 1991).

In the dry period, 8,141 individuals were collected, while in the rain season 4,508 were collected (Table 2).

TABLE 2. Survey of the ant fauna and its percentages in a stand with *Tectona grandis* L.f. in N. Sra. do Livramento/MT, May/2015 to May/2016.

Subfamilies/species	Pitfalls			
	Dry period		Rainy season	
	Individual	%	Individual	%
Dolichoderinae				
Dorymyrmex pyramicus	17	0,21	69	1,04
Dorylinae				
Labidus coecus	5.240	64,36	2.151	32,52
Labidus praedator	223	2,74	1	0,02
Nomamyrmex esenbeckii	39	0,48	1	0,02
Formicinae				
Brachymyrmex admotus	-	-	31	0,47
Brachymyrmex heeri	11	0,14	9	0,14
Camponotus blandus	381	4,68	136	2,06
Camponotus crassus	154	1,89	55	0,83
Camponotus melanoticus	63	0,77	108	1,63
Camponotus novogranadensis	127	1,56	30	0,45
Myrmicinae				
Acromyrmex subterraneus subterraneus	3	0,04	19	0,29
Atta sexdens	93	1,14	77	1,16
Crematogaster tenuicula	2	0,02	3	0,05
Pheidole araneioides	609	7,48	175	2,65
Pheidole grupo fallax sp. 1	141	1,73	196	2,96
Pheidole grupo flavens sp. 2	-	-	1	0,02
Pheidole grupo tristis sp. 3	-	-	3.292	49,77
Pheidole radoszkowskii	22	0,27	10	0,15
Sericomyrmex sp. 1	7	0,09	-	-
Solenopsis globularia	52	0,64	17	0,26
Solenopsis sp.2	926	11,37	184	2,78
Strumigenys denticulata	6	0,07	8	0,12
Ponerinae				
Anochetus diegensis	-	-	8	0,12
Neoponera commutata	8	0,10	7	0,11
Odontomachus bauri	16	0,20	21	0,32
Pseudoponera gilberti	1	0,01	1	0,02
Total	**8.141**	**100**	**6.610**	**100**

According to (KASPARI, 2000) the abundance of water in the vegetation decreases the activity of ants, especially the small-sized ones. Della Lucia *et al.* (1982) studied the ordination of ants in four agroecosystems and verified the same decrease in abundance of formicídae in the rainy period.

The largest number of individuals collected in the dry period can be attributed to the huge litter accumulation in the soil, in that period 8,141 individuals were collected, being 67.10%, *12.01% of Labidus solenopsis,* 9.48% of *pheidole* and 8.9% *Camponotus*, being quantitatively, the most representative ones. Of the 15 genera *Camponotus*, *Pheidole*, *Labidus* and *Solenopsis* were the most expressive in numbers of species.

In the rainy period 4,508 individuals were collected, being 47.72% of the genus *Labidus*, 34.87% of *Pheidole* 7.30% of *Camponotus* and 4.46% of *Solenopsis*. With a total of 15 genera, *Pheidole* with five, *Camponotus* with four and *Labidus*, *Brachymyrmex*, *Solenopsis* with two species each. *Pheidole* and *Camponotus* were more representative in number of species, a result similar to those obtained by Monteiro *et al*. (2011) who found these two genera among the most representative of the study in a teak plantation.

Brachymyrmex admotus, Pheidole group flavens sp. 2, *Pheidole group tristis* sp. 3, and *Anochetus diegensis* were the species with less tolerance to drought conditions. In this period, they may move to the deeper layers of the soil or vegetation, resulting in lower abundance and

richness of these in the collections (BESTELMEYER *et al*., 2000). In contrast, this lower activity of ants species in the litter may create the conditions for the colonization of the environment and exploitation of resources by more tolerant species, becoming more abundant at this time of the year (KASPARI, 2000). Example of this could have happened in the collection of individuals of *Sericomyrmex* sp. 1 that occurred only during the dry period, even the rainy season having been the largest collection of individuals of other species of ants.

It was observed that *Sericomyrmex* was the only genus not common between the two collection periods, which can be explained by its feeding habit. These ants are fungi-farming and the collection of the material substrate to be arranged to its colony of cultivation is preferably dead material (HÖLLDOBLER & WILSON, 1990), common in the drought period.

TABLE 3. Frequency and indices of abundance, constancy and dominance of ant species sampled with pitfall trap in the stand of *Tectona grandis* **L.f., during one year, N. Sra. do Livramento/MT, May/2015 to May/2016.**

Species	Period											
	Dry				Rain				Annual			
	F	A	C	D	F	A	C	D	F	A	C	D
Dorymyrmex pyramicus	lf	s	w	d	f	c	w	d	f	c	w	d
Labidus coecus	sf	sa	w	sd	sf	sa	w	sd	sf	sa	w	sd
Labidus praedator	f	c	z	d	lf	r	z	nd	f	c	z	d
Nomamyrmex esenbeckii	f	c	y	d	lf	r	z	nd	lf	r	z	nd
Brachymyrmex admotus	-	-	-	-	f	c	y	d	lf	r	z	d
Brachymyrmex heeri	lf	s	w	d	lf	r	w	d	lf	r	w	d
Camponotus blandus	vf	va	w	d	vf	va	w	d	vf	va	w	d
Camponotus crassus	f	c	y	d	f	c	w	d	f	c	w	d
Camponotus melanoticus	f	c	w	d	vf	va	w	d	f	c	w	d
Camponotus novogranadensis	f	c	y	d	f	c	w	d	f	c	w	d
Acromyrmex subterraneus subterraneus	lf	r	y	nd	lf	s	w	d	lf	r	y	d
Atta sexdens	f	c	y	d	vf	a	z	d	f	c	y	d
Crematogaster tenuicula	lf	r	z	nd	lf	r	y	nd	lf	r	z	nd
Pheidole araneioides	vf	va	w	d	vf	va	w	d	vf	va	w	d
Pheidole grupo Fallax sp. 1	f	c	w	d	vf	va	w	d	vf	a	w	d
Pheidole grupo Flavens sp. 2	-	-	-	-	lf	r	z	nd	lf	r	z	nd
Pheidole grupo Tristis sp. 3	-	-	-	-	sf	sa	w	sd	vf	va	z	d
Pheidole radoszkowskii	lf	s	z	d	lf	r	z	d	lf	r	z	d
Sericomyrmex sp. 1	lf	s	y	d	-	-	-	-	lf	r	z	d
Solenopsis globularia	f	c	w	d	lf	s	w	d	lf	s	w	d
Solenopsis sp.	vf	va	wa	d	vf	va	w	d	vf	va	w	d
Strumigenys denticulata	lf	s	y	d	lf	r	w	d	lf	r	w	d
Anochetus diegensis	-	-	-	-	lf	r	y	d	lf	r	z	d
Neoponera commutata	lf	s	w	d	lf	r	w	d	lf	r	w	d
Odontomachus bauri	lf	s	w	d	lf	s	w	d	lf	s	w	d
Pseudoponera gilberti	lf	r	z	nd	lf	r	z	nd	lf	r	z	nd

(F) Frequency: (lf) less frequent; (f) frequent; (vf) very frequent; (sf) super frequent; (A) Abundance: (r) rare; (s) scattered; (c) common; (a) abundance; (va) very abundance; (sa) super abundance; (C) Constancy: (z) accidental; (y) accessory; (w) constant; (D) Dominance: (nd) non dominant; (d) dominant.

The highest abundance of ants collected in the dry period can be attributed to the huge litter accumulation in soil at that time, because the teak culture completely loses its leaves (deciduous) between the months of July and August. Making this environment seasonally subject to greater thermal and microclimate amplitude, because the greater the amount of litter, the greater the food availability and nesting sites (SANTOS *et al*., 2006). Whereas the smallest species occurrence in the rainy season may be related to the ants' behavior to protect themselves from the droplets of rain, strength of the winds and precipitation.

Santos *et al*. (2012) studied the wealth of ants related to seasonal periods and consisted that atmospheric seasonality of precipitation, air temperature and soil moisture influence the abundance of Formicidae. They concluded that the frequency of ants is greater when there is a decrease in precipitation, soil moisture, and the increase of temperatures. The faunistic analysis can be observed in Table 3 regarding the seasonality of the period.

In the dry period there was the occurrence of a super frequent species, three very frequent, eight frequent and ten little frequent. Regarding the indices a superabundant species, three very abundant, eight common, five dispersed, three rare, ten species constant, seven accessories, four accidentals, a species as super dominant, eighteen dominant and three non-dominant.

In the rainy period two super frequent species occurred, six very frequent, four frequent and thirteen little frequent. Regarding the indexes two superabundant species were found, five very abundant, one abundant, four common, three dispersed, ten rare, sixteen species demonstrated constance, three accessories, six accidental, two super dominant species, 18 dominant and five non-dominant.

Annually a super frequent species, five super frequent, five very frequent, six frequent and fourteen little frequent were classified by the faunistic analysis. As the indices a superabundant species, four very abundant, one abundant, six common, two dispersed, twelve rare, fourteen constant species, two accessories, 10 accidentals, whereas regarding the species dominance one species was classified as super dominant, 21 dominant and four non-dominant.

In the three periods the species *L. coecus* was more representative in the pitfall trap occurring as super frequent, superabundant, constant and super dominant. These species are known as ant-following bird, they are generalist predatory species. Whereas the species *C. tenuicula* and *P. gilberti)* were those that had lower representation regarding the analysis, this behavior can be discussed due to their geographical distribution and adaptation to the anthropized environment. *Crematogaster* is a very diverse genus in species in the tropical region and many are arboreal (ANDERSEN, 2000), other inhabits the soil or litter and some have interactions with other species of ants or with plants (FERNANDEZ, 2003).

The Shannon index for the annual period was 1.63 in the diversity index (Table 4). In environments where the limiting factors act intensely along with interspecific competition, the diversity index tends to decrease, due to the increase in the number of the most common species with a large number of individuals and reduction of the rarest species (SILVEIRA NETO *et al*., 1976). The low Shannon diversity index can be related to the time of creation of the planting area, because it has only a little more than 10 years. Because it is a young forest, other species of ant may not have had time to colonize the site.

The evenness of 0.56 for the dry period, 0.65 and 0.53 in the rainy season, in the annual considers the degree of uniformity in population densities of species (MAGURRAN, 2011). In the analysis of the annual period the lowest value was observed, because it presents species with many individuals as *l. coecus, P.* group *Tristis* sp. 3 and *Solenopsis* sp causing dominance of few species, while many species occurred with few individuals, causing the heterogeneous distribution of population and affecting substantially the equitability.

TABLE 4. Index of diversity in accordance with the series of Hill numbers of evenness of species of ants sampled in the stand of *Tectona grandis* L.f., N. Sra. do Livramento/MT, May/2015 to May/2016.

Components of Diversity	Pitfalls		
	Periods		
	Dry	Rain	Annual
N_0	23	26	26
N_1	4,05	4,28	5,14
N_2	2,29	2,80	2,73
H'	1,39	1,45	1,63
E	0,56	0,65	0,53
β	0,43	0,35	0,36
α	2,44	2,84	2,38

N_0 = total number of species; N_1 = number of abundant species; N_2 = Number of very abundant species; E = equitativity between species; β = Simpson index; α = Margalef Richness Index.

The values observed for the four periods indicate the non-uniform distribution of abundance, causing strong dominance of some species, because the evenness varies from 0 to 1 (MAGURRAN, 1988). This evenness contributes positively to the construction of a more diverse population of ants (LUTINSKI *et al*., 2008).

The Margalef Richness Index seeks to compensate for the effects of sampling with the division of the number of species recorded by the total number of individuals in the sample, which in this study was 2.44 for the dry period, in the rainy period 2.84 and 2.38 in the annual period.

Analyzing the curve of sample sufficiency through the collector curve (Figure 1) with the collection method used, it was observed that there was stabilization, because it reached the saturation, which occurred on the 10th collection. Therefore, the collection effort spent was enough to sample the existing species in the studied teak planting, and probably future collections, using the same methodology, did not include a large number of new species.

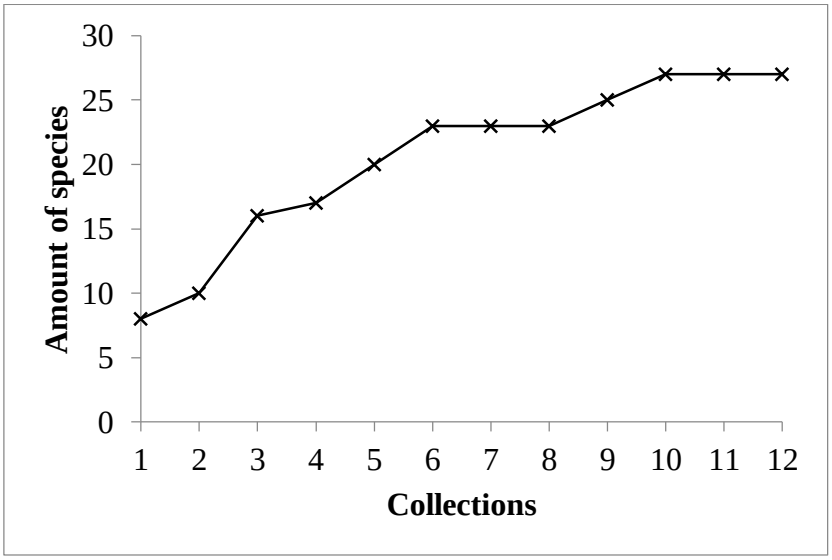

FIGURE 1. Accumulation curve of species of ants sampled in the stand of *Tectona grandis* L.f., in the district of Nossa Senhora do Livramento/MT, May/2015 to May/2016.

CONCLUSION

The periods, dry and rainy, influenced the collections when compared annually, however in the dry period the collection was more successful.

Atta sexdens which is considered a pest in forest plantations in *Tectona grandis* L.f., was not representative, which made believe that due to the area being a recent installation this species may become a future problem.

The monoculture may have generated an abstruse environment for the development of these colonies of ants from the entomological survey, and still it is presumed that the low representativeness of some of them can be justified also by sampling methodology, once the species may present nesting behavior, foraging and predation that lead to the low number of individuals per collection.

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