Volumen 39, Nº 4. Páginas 39-48
IDESIA (Chile) Diciembre, 2021

Coleoborers (Insecta: coleoptera) in *Ochroma pyramidale* (Cav. Ex Lam.) Urb. Malvaceae (Pau-de-Balsa) in Mato Grosso, Brazil

Coleobroca (Insecta: coleoptera) en plant Ochroma pyramidale *(Cav. Ex Lam.) Urb. Malvaceae (Pau-de-Balsa) en Mato Grosso, Brazil*

Marcelo Lara Rodrigues[1*], *Alberto Dorval*[2], *Josamar Gomes Da Silva Junior*[4], *Otávio Peres Filho*[2], *Marcelo Dias De Souza*[3]

ABSTRACT

The objective of this work was to carry out qualitative and quantitative studies with species of the Cerambycidae, Bostrichidae, and Curculionidae families (Scolytinae and Platypodinae) in a plantation of balsa wood *(Ochroma pyramidale)*, in the State of Mato Grosso, Brazil, to contribute to the entomological knowledge about the coleoborer species that occur associated with this forest tree. The research was carried out at Fazenda Campina, located at the municipality of Nossa Senhora do Livramento - MT, from July 2015 to June 2016. Ten Escolitídeo/Curitiba modified impact traps were used in biweekly collections, with 3,244 individuals being collected, distributed in 42 species, with Cerambycidae being the most diversified group, with 20 (47.62%) species and Scolytinae (Curculionidae) with 2,681 specimens (82.64%) the most abundant one. *Hypothenemus eruditus* (Scolytinae) was the predominant species with 1,466 collected individuals, being the only one that occurred as a super-dominant, super-abundant, widespread, and constant species. *Chlorida festiva* (Cerambycidae), *Platypus linearis* (Platypodinae), *Cryptocarenus diadematus*, *Cryptocarenus heveae*, *Cryptocarenus seriatus*, and *Xyleborus affinis* (Scolytinae) were dominant, very abundant, very frequent, and constant species. The species of the Bostrichidae and Curculionidae families were more frequent in the dry season, while the species of the Cerambycidae family were more common in the rainy months. *Cryptocarenus heveae, Cryptocarenus seriatus*, and *Cryptocarenus diadematus* showed a significant correlation with relative humidity and the latter with rainfall. The other species analyzed did not show a strong correlation with any climatic element.

Keywords: Pau-de-balsa, Balsa wood, Coleoborers, Monitoring, Ethanol trap.

RESUMEN

El objetivo de este trabajo fue realizar estudios cualitativos y cuantitativos con especies de las familias Cerambycidae, Bostrichidae y Curculionidae (Scolytinae y Platypodinae), en una plantación de madera de balsa (Ochroma pyramidale) *en el estado de Mato Grosso, con el objetivo de contribuir al conocimiento entomológico de las especies de coleobrocas que se presentan asociadas a esta especie forestal. La investigación se llevó a cabo en la localidad de Fazenda Campina, ubicada en el municipio de Nossa Senhora do Livramento - MT, de julio de 2015 a junio de 2016. Se utilizaron diez trampas Scolito-Curitiba modificadas en las colectas quincenales. Se recolectaron 3.244 individuos, distribuidos en 42 especies, siendo Cerambycidae la familia diversificada con 20 especies (47,62%) y Scolytinae (Curculionidae) con 2.681 (82,64%), la más abundante en individuos recolectados.* Hypothenemus eruditus *(Scolytinae) presentó 1.466 (45,19%) predominó en número de individuos colectados, siendo la única especie que se mostró como superdominante, superabundante, superfrecuente y constante.* Chlorida festiva *(Cerambycidae),* Platypus linearis *(Platypodinae),* Cryptocarenus diadematus, Cryptocarenus heveae, Cryptocarenus seriatus *y* Xyleborus affinis *(Scolytinae) fueron dominantes, muy abundantes, muy frecuentes y constantes. Las especies de las familias Bostrichidae y Curculionidae fueron más representativas en los meses del período seco, mientras que las especies de la familia Cerambycidae fueron más importantes en los meses lluviosos.* Cryptocarenus heveae, Cryptocarenus seriatus *y* Cryptocarenus diadematus *mostraron una correlación significativamente más considerable con la humedad relativa, y esta última también con la lluvia. Las otras especies analizadas no mostraron una notable correlación con ningún elemento climático.*

Palabras clave: *balso, madera de bals, Coleobrocas, Monitoreo, Trampas de etanol.*

1 Postgraduate Program in Forestry and Environmental Sciences, Federal University of Mato Grosso, Cuiabá - MT, Brazil.
2 Federal University of Mato Grosso, Faculty of Forestry Engineering, Cuiabá - MT, Brazil.
3 University of Cuiabá, Cuiabá - MT, Brazil.
4 Postgraduate Program in Forestry Sciences Federal University of Paraná, Curitiba - PR, Brazil.
* Corresponding author: marcelo536@hotmail.com

Fecha de Recepción: 20 de agosto, 2020
Fecha de Aceptación: 1 de febrero, 2021.

Introduction

The cultivation of pau-de-balsa has proved to be an important activity, and in recent years, the plantations of this tree have increased in the State of Mato Grosso, Brazil. According to Arefloresta (2015), there are seven thousand hectares planted with this forest species in this State.

In Mato Grosso, at the municipality of Nossa Senhora do Livramento, a plantation of balsa wood was made in May 2001 in soils with high fertility, with a spacing of 3 mx 3 m. After 16 months, the trees presented an average value of 12.7 cm of DBH (Diameter Breast Height) and 8.0 m in height, and after 28 months, the trees were 16.5 cm DBH and 15.1 m high (Caldeira *et al*., 2004).

The long-horned or longicorns, as the Cerambycidae are called, make incisions distant from each other on tree branches and deposit an egg deep inside. Below the section of each branch on which the female deposits a series of eggs, the branch is cut off, resulting in the sectioning of the branch in several portions (Lima, 1956).

Although insects are essential for the balance of ecosystems, being responsible for events such as nutrient cycling through litter decomposition and plant propagation through cross-pollination, they also cause damage by opening galleries in tree trunks, favoring their breaking by the wind that may result in the opening of clearings in the forest. Their harmful effects are particularly present in homogeneous plantations since this environment creates favorable conditions for the occurrence of insect pests, with deleterious effects on trees (Costa *et al*., 2011).

Materials and Methods

From July 2015 to June 2016, the fieldwork was carried out at the municipality of Nossa Senhora do Livramento, State of Mato Grosso, at the Campina farm, owned by the company Teca do Brasil Ltd.

The traps used were Escolitídeo/Curitiba impact traps modified by using a bait holder, consisting of a flexible pipe (Figure 1). The collections were carried out fortnightly, comprising two periods: dry (May to October) and rainy (November to April) seasons. After the collections, the attractive material was replaced at the collecting spots, and the damaged traps were substituted, as required.

The statistical design used was completely randomized (DIC). Considering the binomial distribution of the data and the occurrence of zero values, they were transformed by the formula $\sqrt{x+0,5}$ using the ASSISTAT software (Silva *et al*., 2002).

Figure 1. (a) modified escolitídeo-curitiba trap. (b) materials used in the collection. (c) positioning the trap at campina farm, Nossa Senhora do Livramento - MT. 2016.

Faunistic studies measuring the Frequency, Constancy, Dominance, and Abundance were carried out using the ANAFAU software (Moraes *et al*., 2003). The Margalef Wealth Indices (1958), Shannon-Weaner Diversity (1949), and Pielou Equality (1975) were also calculated.

The climate data were obtained from the Padre Ricardo Remetter Station (83364), the closest station to the experiment site, and from the National Meteorological Institute (INMET, 2016), at the municipality of Santo Antônio do Leverger, State of Mato Grosso.

The data were analyzed using the Pearson correlation index, and only correlations above 0.6 were considered since they represent a more consistent correlation with the analyzed climatic element. Finally, they were compared by the Student's t-test at the levels of 1%, 5%, and 10% probability errors.

The population variation of each of the most representative species was compared with the climatic parameters with which these species presented the most significant correlations.

Result and Discussion

From July 2015 to June 2016, 3,244 individuals were collected at the balsa wood plantation, distributed in 30 genera and 42 species belonging to the Bostrichidae, Cerambycidae, and Curculionidae families.

Since the balsa wood trees present many branch breaks and generate a large amount of litter, it might have contributed to the species richness recorded for the Cerambycidae and Curculionidae families. According to Barreto *et al.* (2013), the diversity of Cerambicids is high in secondary forests, which might be due to the large amounts of wood and flower remnants in young stands, which represent resources for oviposition and food for the adults. The Bostrichidae occurred with four identified species (9.52%), and 100 individuals were collected (3.08%) (Table 1).

Dall'Oglio and Peres Filho (1997) surveyed rubber plantations in Mato Grosso and found a predominance of Curculionidae species (Scolytinae and Platypodinae) compared to the number of species of the Cerambycidae and Bostrichidae families. In this study, the Curculionidae was the most represented quantitatively, regardless of the period analyzed, with 1,440 individuals in the drought and with 1,349 specimens in the rainy season (Table 2). Several works on Coleoborers showed that this family was significantly numerous in their collections (Dall'Oglio and Peres Filho, 1997; Dorval *et al*., 2012; Gonçalves *et al*., 2014).

Table 1. Number of genera, species, and individuals sampled with traps installed in a balsa wood plantation at Nossa Senhora do Livramento - MT.

Family	Genera		Species		Individuals	
	nº	%	nº	%	nº	%
Bostrichidae	3	10.00	4	9.52	100	3.08
Cerambycidae	18	60.00	20	47.62	355	10.94
Curculionidae	9	30.00	18	42.86	2.789	85.97
Total	30	100	42	100	3.244	100

Table 2. Number of individuals sampled in each family, in the dry and rainy periods, with traps installed in a balsa wood plantation at Nossa Senhora do Livramento - MT.

Family	Dry		Rainfall		Total	%	D/R
	nº	%	nº	%			
Bostrichidae	55	3.37	45	2.79	100	3.08	1,22
Cerambycidae	136	8.34	219	13.58	355	10.94	0,62
Curculionidae	1.440	88.29	1.349	83.63	2.789	85.97	1,07
Total	1.631	100	1.613	100	3.244	100	1,01

D/R = Dry/Rainy Ratio.

The higher occurrence of Bostrichidae in the dry season may be due to its preferential feeding on dry wood, whereas the Cerambycidae prefers the moist wood, explaining their higher occurrence in the rainy season.

The species with the highest number of collected individuals were *Chlorida festiva* (4.28%), *Platypus linearis* (3.33%), *Cryptocarenus diadematus* (6.60%), *Cryptocarenus heveae* (8.35%), *Cryptocarenus seriatus* (14.46%), *Hypothenemus eruditus* (45.19%), and *Xyleborus affinis* (4.28%). The other species together represented 13.51% of the total collected individuals (Table 3).

Hypothenemus eruditus was the most important coleoborer species collected at the balsa wood plantation, with 45.19% of the total number of

Table 3. Genera / Species with their number of individuals sampled in a Balsa wood plantation in the dry (d) and rainy seasons (r), at Nossa Senhora do Livramento - mt.

Species	D	R	Total	
			N	%
Bostrichidae				
Bostrychopsis uncinata (Germar, 1824)	26	16	42	1.29
Micrapate germaini (Lesne, 1899)	2	2	4	0.12
Micrapate sp.	3	4	7	0.22
Xyloperthella picea (Olivier, 1790)	24	23	47	1.45
Cerambycidae				
Achryson surinamum (Linnaeus, 1767)	16	9	25	0.77
Aegoschema moniliferum (White, 1855)	0	4	4	0.12
Aerenea brunnea (Thomson, 1868)	0	4	4	0.12
Brasilianus sp.	1	0	1	0.03
Callia fulvocincta (Bates, 1866)	0	7	7	0.22
Chlorida festiva (Linnaeus, 1758)	69	70	139	4.28
Epectasis sp.	0	1	1	0.03
Estola sp.	2	24	26	0.80
Gnomidolon sp.	0	1	1	0.03
Hylettus seniculus (Germar, 1824)	3	15	18	0.55
Lepturges virgatus (Monné 1978)	14	30	44	1.36
Neoclytus pusillus (Laporte & Gory, 1835)	14	26	40	1.23
Nesozineus sp.	1	0	1	0.03
Oreodera glauca (Linnaeus, 1758)	0	1	1	0.03
Oreodera quinquetuberculata (Drapier, 1820)	2	5	7	0.22
Oxymerus aculeatus (Dupont, 1838)	1	10	11	0.34
Psapharochrus lanei (Marinoni & Martins, 1978)	9	5	14	0.43
Steirastoma breve (Sulzer, 1776)	1	0	1	0.03
Steirastoma stellio (Pascoe, 1866)	2	4	6	0.18
Tropidozineus sp.	1	3	4	0.12
Curculionidae				
Cnesinus sp. 1	1	0	1	0.03
Cnesinus sp. 2	1	0	1	0.03
Coccotrypes sp.	0	1	1	0.03
Cryptocarenus diadematus (Eggers, 1937)	44	170	214	6.60
Cryptocarenus heveae (Hagedorni, 1912)	66	205	271	8.35
Cryptocarenus seriatus (Eggers, 1933)	133	336	469	14.46
Hypothenemus bolivianus (Eggers, 1931)	1	0	1	0.03
Hypothenemus eruditus (Westwood, 1836)	983	483	1.466	45.19
Hypothenemus sp. 1	17	45	62	1.91
Hypothenemus sp. 2	2	4	6	0.18
Platypus linearis (Chapuis, 1865)	62	46	108	3.33
Premnobius cavipennis (Eichhoff, 1878)	23	0	23	0.71
Sampsonius dampfi (Schedl, 1940)	5	1	6	0.18
Tricolus sp.	0	1	1	0.03
Xyleborus affinis (Eichhoff, 1867)	91	48	139	4.28
Xyleborus bisseriatus (Schedl, 1963)	2	1	3	0.09
Xyleborus ferrugineus (Fabricius, 1801)	9	7	16	0.49
Xyleborus gracilis (Eichhoff, 1868)	0	1	1	0.03
Total	1.631	1.613	3.244	100

these beetles. The work of Beaver (1976) on Scolytinae and Platypodinae observed the presence of *H. eruditus* and the genus *Xyleborus* attacking the balsa wood. A different result was found by Souza (2016), which investigated the occurrence of Scolytinae in *Tectona grandis*, at the same region of our research, which observed that *H. eruditus* occurred in high numbers during the rainy season. This difference was explained by the fact that teak is a deciduous tree, with its behavior affecting the local microclimate, which consequently affects the behavior of the insects.

The reason why *H. eruditus* was the most abundant species in the collections carried out at the balsa wood plantation is that this species acts as a plant pest that may also be associated with fruits and seeds of this forest tree (Wood, 1977). Following that, the end of the blooming occurs in the rainy season and the fruiting in the dry season, the periods in which *H. eruditus* increase its numbers.

The family Cerambycidae occurred with 20 species, with *C. festiva* presenting the highest percentage (4.28%) of individuals. Duque *et al.* (2010), in a research conducted in Ecuador, reported that *Ochroma pyramidale* is a host of Cerambycidae, which attacks the wood and bark of the trees. Abreu *et al.* (2009) reported the occurrence of Cerambycidae in trunks and branches in a forest species from the family Malvaceae at Central Amazon.

Abreu *et al.* (2002) observed that the wood from trees of the Malvaceae family that was stocked in an industrial yard was attacked by different species of Cerambycidae and by *X. affinis*, *X. ferrugineus*, and *P. linearis*. The genera *Hypothenemus* (47.32%) and *Cryptocarenus* (29.41%) were the two most representative groups. Dorval and Peres Filho (2001) emphasized that the collection of high numbers of individuals from the Cryphalini tribe (*Hypothenemus* and *Cryptocarenus*) may indicate that they are highly associated with this family of plants.

Statistical test

There were significant differences between the population averages of the studied families, although not between the dry and rainy seasons (Table 4).

The averages of the individuals collected in different periods, from different families, and the totals did not present statistically significant differences. Unlike Stilwell *et al.* (2014), who reported in Ecuador a new species of Scolytinae, *Coptoborus ochromactonus*, attacking a balsa wood plantation more intensely during the dry period.

Several authors reported that these families presented differences between the dry and rainy seasons (Dorval and Peres Filho, 2001). This difference may be because the balsa wood is a perennial species in which the leaves are not lost during the dry season, thus presenting a favorable microclimate for the distribution of these species in the two analyzed periods.

Faunistic study

In the plantation of balsa wood, nine dominant species, six very abundant, six very frequent, and 19 constant occurred in the annual analysis. In the dry season, nine dominant species were present, six very abundant, six very frequent, and 19 constant, while in the rainy period, there were six dominant species, four very abundant, four very frequent, and 23 constant. Only *H. eruditus* occurred as super-dominant, super-abundant, and super-frequent (Table 5).

Correlation with Meteorological Factors

The species C. festiva, *P. linearis*, *H. eruditus*, and *X. affinis* did not obtain a correlation above 0.6 (Table 7), showing that these species did not present a significant correlation with the analyzed climatic elements. There was also no significance at 10% in the Student's t-test.

The species *C. diadematus* presented a positive correlation with relative humidity and rainfall at the level of 5% and 1%, respectively (Table 7). Rocha *et al.* (2011), working in the Cerrado, analyzed that

Table 4. Average comparison between the families of Coleoborers sampled in the Balsa wood plantation in the analyzed periods, at Nossa senhora do Livramento - MT.

Family	Average	
	Dry	Rainy
Bostrichidae	2.92419 a	2.63585 a
Cerambycidae	4.58873 a	5.93534 a
Curculionidae	14.71930 a	14.71443 a
Period Averages	16.02799 a	16.24328 a

Data transformed into: $\sqrt{x+0,5}$

(**) = significant at 1%.

The averages followed by the same lowercase letter on the same line do not differ at the 5% probability level in the Tukey's test.

Table 5. Faunistic indices of species sampled in the Balsa wood plantation, at Nossa Senhora do Livramento - MT.

Species	Dry				Rainy				Annual			
	F	D	C	A	F	D	C	A	F	D	C	A
Bostrichidae												
Bostrychopsis uncinata	f	d	w	c	f	nd	w	c	f	nd	w	c
Micrapate germaini	pf	nd	z	r	pf	nd	z	d	pf	nd	z	r
Micrapate sp.	pf	nd	w	r	pf	nd	w	d	pf	nd	w	d
Xyloperthella picea	f	d	w	c	f	nd	w	c	f	d	w	c
Cerambycidae												
Achryson surinamum	f	nd	w	c	pf	nd	w	d	f	nd	w	c
Aegoschema moniliferum	–	–	–	–	pf	nd	w	d	pf	nd	y	r
Aerenea brunnea	–	–	–	–	pf	nd	y	d	pf	nd	z	r
Brasilianus sp.	pf	nd	z	r	–	–	–	–	pf	nd	z	r
Callia fulvocincta	–	–	–	–	pf	nd	y	d	pf	nd	z	d
Chlorida festiva	mf	d	w	va	f	d	w	c	mf	d	w	va
Epectasis sp.	–	–	–	–	pf	nd	z	r	pf	nd	z	r
Estola sp.	pf	nd	z	r	f	nd	w	c	f	nd	w	c
Gnomidolon sp.	–	–	–	–	pf	nd	z	r	pf	nd	z	r
Hylettus seniculus	pf	nd	w	r	f	nd	w	c	f	nd	w	c
Lepturges virgatus	f	nd	w	c	f	nd	w	c	f	d	w	c
Neoclytus pusillus	f	nd	w	c	f	nd	w	c	f	nd	w	c
Nesozineus sp.	pf	nd	z	r	–	–	–	–	pf	nd	z	r
Oreodera glauca	–	–	–	–	pf	nd	z	r	pf	nd	z	r
Oreodera quinquetuberculata	pf	nd	y	r	pf	nd	y	d	pf	nd	y	d
Oxymerus aculeatus	pf	nd	z	r	pf	nd	w	d	pf	nd	y	d
Psapharochrus lanei	pf	nd	w	d	pf	nd	w	d	pf	nd	w	d
Steirastoma breve	pf	nd	z	r	–	–	–	–	pf	nd	z	r
Steirastoma stellio	pf	nd	y	r	pf	nd	w	d	pf	nd	w	r
Tropidozineus sp.	pf	nd	z	r	pf	nd	w	d	pf	nd	y	r
Curculionidae												
Cnesinus sp. 1	pf	nd	z	r	–	–	–	–	pf	nd	z	r
Cnesinus sp. 2	pf	nd	z	r	–	–	–	–	pf	nd	z	r
Coccotrypes sp.	–	–	–	–	pf	nd	z	r	pf	nd	z	r
Cryptocarenus diadematus	mf	d	w	va	mf	d	w	va	mf	d	w	va
Cryptocarenus heveae	mf	d	w	va	mf	d	w	va	mf	d	w	va
Cryptocarenus seriatus	mf	d	w	va	mf	d	w	va	mf	d	w	va
Hypothenemus bolivianus	pf	nd	z	r	–	–	–	–	pf	nd	z	r
Hypothenemus eruditus	sf	sd	w	sa	mf	d	w	va	sf	sd	w	sa
Hypothenemus sp. 1	f	nd	w	c	f	nd	w	c	f	d	w	c
Hypothenemus sp. 2	pf	nd	z	r	pf	nd	w	d	pf	nd	y	r
Platypus linearis	mf	d	w	va	f	nd	w	c	mf	d	w	va
Premnobius cavipennis	f	d	w	c	–	–	–	–	f	nd	y	c
Sampsonius dampfi	pf	nd	w	r	pf	nd	z	r	pf	nd	y	r
Tricolus sp.	–	–	–	–	pf	nd	z	r	pf	nd	z	r
Xyleborus affinis	mf	d	w	va	f	d	w	c	mf	d	w	va
Xyleborus bisseriatus	pf	nd	y	r	pf	nd	z	r	pf	nd	y	r
Xyleborus ferrugineus	pf	nd	w	d	pf	nd	w	d	f	nd	w	c
Xyleborus gracilis	–	–	–	–	pf	nd	z	r	pf	nd	z	r

In which F = Frequency (sf = super frequent; mf = very frequent; f = frequent; pf = infrequent); D = Sakagami & Laroca (1967) dominance (sd = super-dominant; d = dominant; nd = non-dominant); C = Constancy (w = constant; y = accessory; z = accidental); A = Abundance (r = rare; d = dispersed; c = common; a = abundant; va = very abundant; sa = superabundant). (-) = Did not occur in the analyzed period.

Table 7. Pearson correlation coefficient (r) and Student test of significance (t) between number of species of each species and climate factors at Nossa Senhora do Livramento - MT.

Species	Humidity		Precipitación		Average temperature	
	r	t	r	t	r	t
Chlorida festiva	–0.076	0.24^{ns}	0.223	0.72^{ns}	0.268	0.88^{ns}
Platypus linearis	0.570	2.19***	–0.115	0.37^{ns}	–0.518	1.91***
Cryptocarenus diadematus	0.606	2.41*	0.730	3.38**	0.319	1.07^{ns}
Cryptocarenus heveae	0.718	3.27**	0.493	1.79^{ns}	0.143	0.46^{ns}
Cryptocarenus seriatus	0.636	2.61*	0.403	1.39^{ns}	0.101	0.32^{ns}
Hypothenemus eruditus	–0.095	0.30^{ns}	–0.523	1.94***	–0.586	2.29*
Xyleborus affinis	–0.481	1.74^{ns}	–0.217	0.70^{ns}	0.308	1.02^{ns}

(ns) = not significant.
(**) = significant at 1%.
(*) = significant at 5%.
(***) = significant at 10%.

C. diadematus correlated significantly with only one of the meteorological factors, obtaining a negative correlation with relative humidity.

A significant positive correlation at 1% level was found between *C. heveae* and relative humidity (Table 7). Results obtained by Dorval and Peres Filho (2001) showed that *C. heveae* is significantly affected by climatic factors, such as rainfall and temperature.

The species *C. seriatus* also presented a positive correlation with relative humidity but at the 5% level (Table 7). Dorval *et al.* (2007) found that *C. seriatus* correlated negatively with relative humidity at the 1% level.

Population fluctuation

In the family Curculionidae, population peaks occurred in dry period months, in July 2015 and May 2016, increasing their numbers after December 2015 (Figure 2).

The species *H. eruditus* presented the largest number of collected individuals, with population peaks in July 2015, with 399 individuals, and April 2016, with 195 individuals (Figure 3). Dorval and Peres Filho (2001), in a study on the coleopterans from the Baixada Cuiabana, found that *H. eruditus* presented peaks in September and October, with the lowest population densities in July and February.

The highest population peak for *C. festiva* was observed in October 2015, in the dry season. The lowest numbers occurred in February 2016 in the studied region, during the rainy period (Figure 4). Dall'Oglio and Peres Filho (1997) reported that *C. festiva* occurred almost constantly during the sampling period, with a higher number of individuals in June and August to November.

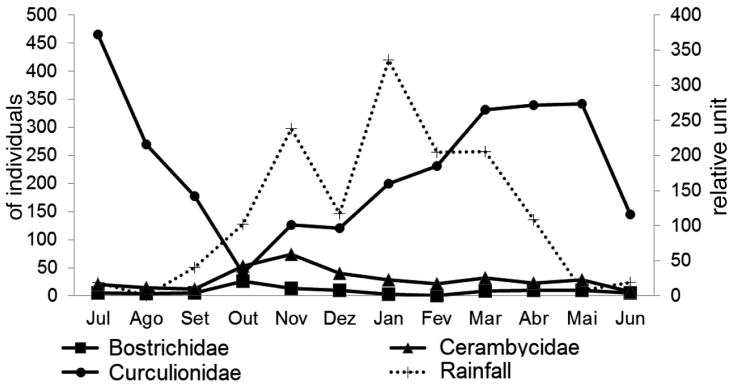

Figure 2. Population variation of Bostrichidae, Cerambycidae, and Curculionidae collected in a Balsa wood plantation at Nossa Senhora do Livramento - MT, from july 2015 to june 2016.

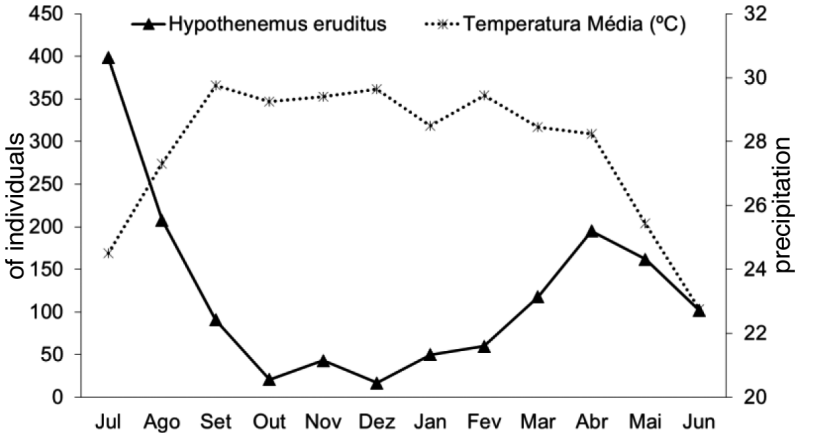

Figure 3. Population variation of *Hypothenemus eruditus* (Scolytinae) collected in a balsa wood plantation at Nossa Senhora do Livramento - MT, from july 2015 to june 2016.

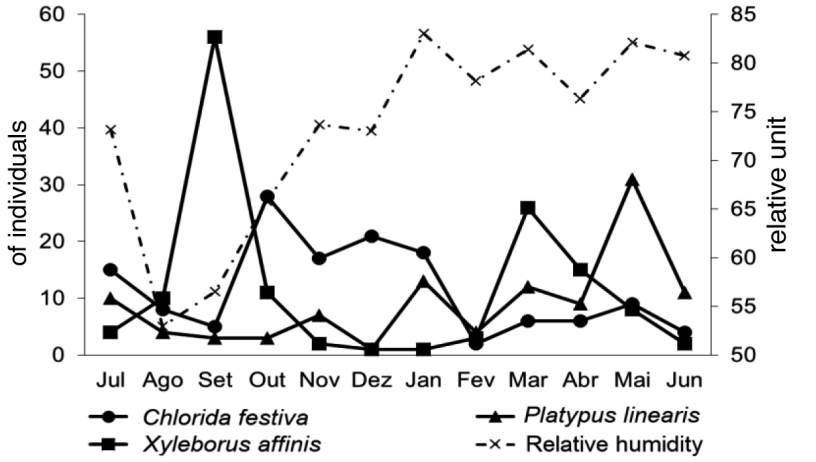

Figure 4. Population variation of *Chlorida festiva* (Cerambycidae), *Platypus linearis* (Platypodinae), and *Xyleborus affinis* (Scolytinae) collected in a Balsa wood plantation at Nossa Senhora do Livramento - MT, from july 2015 to june 2016.

The species *P. linearis* had the highest population peak in May 2016, the dry season. In the rainy season, this species presented its lowest occurrence in December 2015 (Figure 4). Martinez and Atkinson (1987) reported that three species of the genus *Platypus* occurred associated with species of the Malvaceae family, one of these being *P. linearis.*

The species *X. affinis* showed two population peaks during the survey, with the highest in September 2015 and the lowest in March 2015. Peaks occurred in both seasons (Figure 4). Dall'Oglio and Peres Filho (1997) observed that X. affinis occurred in almost all the sampling periods and in higher numbers from January to May.

The highest population peak for *C. diadematus* was recorded in February 2016, in the rainy season, and the lowest occurrence in September 2015, during the dry season. The species *C. heveae* showed higher population peaks in March and May 2016. The lowest occurrences were in July and October 2015 (Figure 5).

The species *C. seriatus* occurred with population peaks in March and May 2016 and lowest numbers in October 2015, in the dry period (Figure 5). Dorval and Peres Filho (2001) reported that *C. seriatus* showed population peaks in May, July, and October, and later in June, November, and February, when the lowest numbers of individuals were collected.

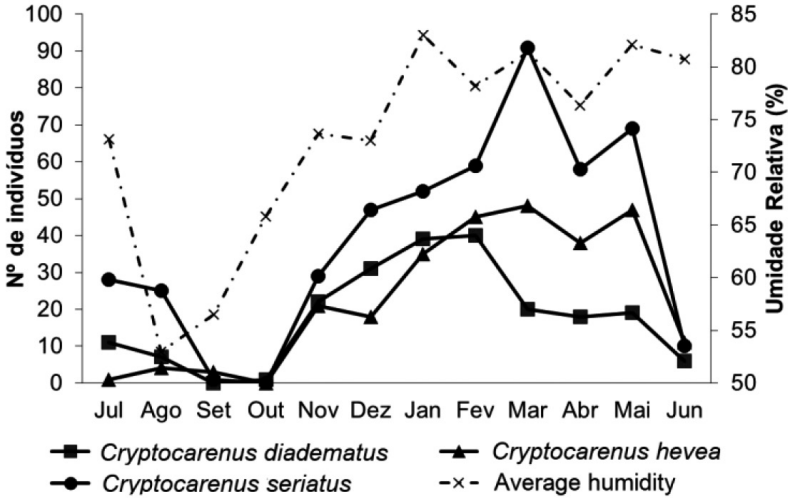

Figure 5. Population variation of *Cryptocarenus diadematus, Cryptocarenus heveae*, and *Cryptocarenus seriatus* (Scolytinae) collected in a Balsa wood planting, at Nossa Senhora do Livramento – MT, from july 2015 to june 2016.

Conclusions

This work showed that regardless of the time of the year, an imbalance in the food supply might result in Scolytinae attacks on the balsa wood plantation since the Curculionidae family presented the highest species richness.

The favorable microclimatic conditions observed in the area of the balsa wood plantation enabled the occurrence of a diverse entomofauna of coleoborers.

The rainfall positively affects the species richness of the families Bostrichidae, Curculionidae, and Cerambycidae in the plantation of the *Ochroma pyramidale*.

Acknowledgment

To the Postgraduate Program in Forestry and Environmental Sciences / FENF / UFMT for the opportunity and CAPES for the scholarship for the development of this study.

Literature Cited

Abreu, R.L.S.; Sales-Campos, C.; Hanada, R.E.; Vasconcelos, F.J.; Freitas, J.A.
2002. Avaliação de danos por insetos em toras estocadas em indústrias madeireiras de Manaus, Amazonas, Brasil. Sociedade de Investigações Florestais. *Revista Árvore*. 26(6): 789-796.

Abreu, R.; Ronchi-Teles, B.; Monne, M.; Vianez, B.
2009. First record of species of Cerambycidae (Coleoptera) in cardeiro (*Scleronema micranthum*) (Bombacaceae) in the Central Amazon. *Neotropical Entomology*, 38(3): 432-433.

Arefloresta. *Marcos regulatórios de florestas plantadas*.
2015 Cuiabá: Arefloresta. (Seminário PDFS-MT).

Barreto, M.R.; Machiner, R.; Smiderle, E.C.
2013. Cerambycinae (Coleoptera, Cerambycidae) em Mato Grosso, Brasil. *Biota Neotropica*, 13(1): 331-335.

Beaver, R.A.
1976.Biological studies of brazilian Scolytidae and Platypodidae (Coleoptera).V the tribe Xyleborini. *Zeitschrift für Angewandte Entomologie,* 80(1): 15-30.

Caldeira, S.F.; Frozi, T.
2004. Desenvolvimento de *Melia azedarach* e *Ochroma pyramidale* em Nossa Senhora do Livramento, MT, Brasil. In: Simpósio Internacional Sobre Manejo Sostenible De Los Recursos Forestales, 3. Pinar del Rio, Cuba, 21-23 abr., 2004. *Memórias*. Pinar del Rio: Universidade de Pinar del Rio.

Costa, E.C.; D'Ávila, M.; Cantarelli, E.B.; Murari, A.B.
2011. *Entomologia Florestal*. 2.ed. Editora da UFSM. Santa Maria, Brasil. 244 p.

Dall'Oglio, O.T.; Peres Filho, O.
1997. Levantamento e flutuação populacional de coleobrocas em plantios homogêneos de seringueira em Itiquira-MT. *Scientia Forestalis*, 51(2): 49-58.

Dorval, A.; Peres Filho, O.
2001. Levantamento e flutuação populacional de coleópteros em vegetação do cerrado da baixada cuiabana, MT. *Ciência Florestal*, 11(2): 171-182.

Dorval, A.; Peres Filho, O.; Marques, E.N.; Moura, R.G.
2007. Coleópteros em plantios de *Eucalyptus citriodora* e *E. urophylla* em Cuiabá, estado de Mato Grosso. *Revista de agricultura,* 82(3): 254-268.

Dorval, A.; Rocha, J.R.M.; Peres Filho, O.
2012. Coleópteros em ambientes florestais, no município de Cuiabá, estado de Mato Grosso. *Multitemas*, 42(1): 21-40.

Duque, C.J.; Santos-Silva, A.; Wolff, M.
2010. Parandrinae (Coleoptera: Cerambycidae) from Colombia. *Revista Colombiana de Entomología,* 36(1): 135-157

Gonçalves, F.G.; Carvalho, A.G.; Cardoso, W.V.M.; Rodrigues, C.S.
2014. Coleópteros broqueadores de madeira em ambiente natural de Mata Atlântica e em plantio de eucalipto. *Pesquisa Florestal Brasileira,* 34(79): 245-250.

INMET. 2016.
Boletim agroclimatológico mensal. Boletins de Agroclimatológicos de julho de 2015 a junho de 2016. Instituto Nacional de Meteorologia. Brasília, Brasil.

Lima, A.C.
1956. Insetos do Brasil. Itaguaí: Escola Nacional de Agronomia. Cap. 29: Coleópteros (v. 8; 9 e 10). Série didática, 10; 11 e 12.

Margalef, R.
1958. Information theory in ecology. *General Systems*, 3(1): 36-71.

Martinez, A.E.; Atkinson, T.H.
1987. Catalogo de Platypodidae (Coleoptera) de Norte y Centroamerica. *Folia Entomológica Mexicana*, 72(1): 5-31.

Moraes, R.C.B.; Haddad, M.L.; Silveira Neto, S.; Reyes, A.E.L.
2003. Software para análise faunística. In: 8º Simpósio de controle biológico. S. Pedro, SP. Anais do 8º Siconbiol, 1(1): 195.

Pielou, E.D.
1975. *Ecological diversity*. John Wiley & Sons. New York, US. 325 p.

Rocha, J.R.M.; Dorval, A.; Peres Filho, O.; Silva, A.L.
2011. Coleópteros (Bostrichidae, Platypodidae e Scolytidae) em um fragmento de cerrado da baixada cuiabana. *Ambiência*, 7(1): 89-101.

Shannon, C.E.; Weaver, W.
1949. The mathematical theory of communication. University of Illinois Press. Urbana, US. 125 p.

Silva, F.A.S.; Azevedo, C.A.V.
2002. Versão do programa computacional ASSISTAT para o sistema operacional Windows. *Revista Brasileira de Produtos Agroindustriais*. 4(1): 71-78.

Souza, M.D.; Sousa, N.J.; Peres Filho, O.; Dorval, A.; Marques, E.N.; Jorge, V.C.
2016. Ocorrência de Scolytinae com armadilhas etanólica contendo diferentes concentrações de etanol. *Espacios*, 37 (16): 27-37.

Stilwell, A.R.; Smith, S.M.; Cognato, A.I.; Martinez, M.; Flowers, R.W.
Coptoborus ochromactonus, n. sp. (Coleoptera: Curculionidae: Scolytinae), an emerging pest of cultivated balsa (Malvales: Malvaceae) in Ecuador. *Journal of Economic Entomology*, 107(2): 675-683.

Wood, S.L.
1977. Introduced and exported american Scolytidae (Coleoptera). *Great Basin Naturalist*, 37(1): 67-74.