STRUCTURE OF THE COPRO - NECROPHAGOUS BEETLE COMMUNITY (COLEOPTERA, SCARABAEINAE) IN THE BRAZILIAN CERRADO - PANTANAL ECOTONE

Vanesca Korasaki

César Murilo Albuquerque Correa; Anderson Puker; Tiago Ledesma Taira; Gilberto Souza Canuto

Vanesca Korasaki - Departamento de Biologia, Setor de Ecologia, Universidade Federal de Lavras, 37200 - 000 Lavras - MG, Brasil.
César Murilo Albuquerque Correa - Universidade Estadual de Mato Grosso do Sul, Rodovia Aquidauana/CERA km 12, 79200 - 000 Aquidauana - MS, Brasil. E - mail: cesar.lilo@hotmail.com.
Anderson Puker - Programa de Pós - Graduação em Entomologia, Departamento de Entomologia, Universidade Federal de Viçosa, 36570 - 000 Viçosa - MG, Brasil.
Tiago Ledesma Taira - Universidade Estadual de Mato Grosso do Sul, Rodovia Aquidauana/CERA km 12, 79200 - 000 Aquidauana - MS, Brasil.
Gilberto Souza Canuto - Universidade Estadual de Mato Grosso do Sul, Rodovia Aquidauana/CERA km 12, 79200 - 000 Aquidauana - MS, Brasil.

INTRODUÇÃO

The Brazilian Cerrado is a complex mosaic of native vegetation, including grassland, savanna and forest (Oliveira & Marquis, 2002). The Pantanal is a large wetland of about 160,000 km^2 in the center of the South American continent with average elevation of 100 meters and is located in Brazil (states of Mato Grosso and Mato Grosso do Sul), Paraguay and eastern Bolivia (Alho *et al.,* ., 1998). In forest ecosystems, Scarabaeinae beetles (Coleoptera: Scarabaeidae) promote the recycling of nutrients, improve soil aeration and assist in secondary dispersal of seeds (Halffter & Matthews, 1966). Feeding behavior of this group is quite diverse with an emphasis on coprophagia, but many species also feed on carcasses (necrophagous), fungi (mycetophagous), decaying fruit (carpophilous), decaying plant residues (saprophagic) and may be predators of millipedes, snails or generalist (Halffter & Matthews, 1966). Few studies have been performed with the objective of understanding the community structure of dung beetles in landscapes of the Cerrado and Pantanal (*e.g.*, Milhomem *et al.*, 2003; Louzada *et al.*, 2007) and this lack of knowledge is even more pronounced for the transition region between these ecosystems.

OBJETIVOS

This study provides information on community structure based on feeding of these beetles in a transition area between the Cerrado and Pantanal located in the Brazilian state of Mato Grosso do Sul.

MATERIAL E MÉTODOS

Trapping (duration 48 hours) was performed in October 2010 in two fragments (20° 27' 37" S, 49° 40' 2" W; 20° 26' 54" S, 49° 38' 39" W) of *sensu stricto* Cerrado, characterized by savannas of semideciduous forest in a transition area between the Cerrado and Pantanal ecosystems, Aquidauana, Mato Grosso do Sul, Brazil. In each fragment four plots separated by 50 m were used for allocation of pitfall traps (1000 mL). At each point four traps were deployed in the form of a square and separated by a distance of 10 m. Four types of bait were used (cattle dung, human feces, pig dung and decaying bovine stomach) placed in plastic containers (50 mL) at the center of the trap with a wire. Rarefaction analysis individuals - based was used to compare patterns of species richness and sampling strength for the different baits. Comparisons among the baits were made by visual assessment of overlapping at 95% CI of the rarefaction curves implemented in EstimateS 7.5 (Colwell, 2005). The percentage of the average sampling efficiency of three estimators of diversity (Chao 1, Jackknife 1 and ACE) was calculated with the program EstimateS 7.5 (Colwell, 2005). A Principal Coordinates Ordination (PCO) was performed based on the Bray - Curtis dissimilarity matrix with the standardized data and transformed in square root to verify if the community structure that uses the different sources of food resources is different. PERMANOVA was used to measure the difference between the community structures that uses the different resource sources. Later multiple comparisons were performed by the paired permutation procedure. The Multivariate Dispersion Test (PERMDISP) was used to verify homogeneity of the multivariate dispersions among the points of each system. These analyses were performed with the program Primer v.6 with PERMANOVA+ (Clarke & Gorley, 2006).

RESULTADOS

A total of 1,271 individuals were captured belonging to 28 species, 14 genera and six tribes of dung beetles: Ateuchini (three genera, six species); Canthonini (two genera, four species); Coprini (three genera, 12 species); Oniticellini (one species); Onthophagini (one species) and Phanaeini (four genera, four species). From the accumulation curve the greatest number of species was found on human dung, followed by pig feces, cattle feces and bovine stomach (CI, 95%). From the mean of the estimators (Chao 1, Jackknife 1 and ACE) the traps baited with human dung captured 92.56% of the estimated species, while those baited with pig feces, cattle feces and bovine stomach captured 83.58, 66.50 and 59.40%, respectively. Cattle dung and human feces formed two groups separated by the PCO. The two primary axes explain 38.4% of the variation. The points formed by traps baited with cattle stomach and pig feces showed to be spread. With the exception of these two groups captured with these bait types, the beetles captured on the different baits showed difference between the community structure (PERMANOVA, pseudo - F = 3.40, p ¡ 0.001). The traps with different baited presented a difference in the multivariate dispersion of the points (PERMDIPS, F = 5.28, p ¡ 0.05). This study reports the existence of a distinction in the structure of communities using different sources of food resources. The group of species captured on the bovine stomach, pig and cattle dung baits had greater spatial variation of the points compared with human feces, this may indicate that the community attracted to human feces is more stable. Food used by most scarab beetles includes the excrement of large mammals, particularly bovine and human (Halffter & Matthews, 1966). However, in the tropical region there is a great diversification (Vaz - de - Mello, 1999). In the rainforest most species are coprophagous, instead of necrophagous or generalist (Halffter & Arellano, 2002), a pattern similar to that encountered in the landscapes studied.

CONCLUSÃO

This was the first study performed in patches of Brazilian savanna (Cerrado) in a transition area between Cerrado and Pantanal ecosystems in order to understand the community structure of dung beetles. This wok demonstrated that there are marked differences between communities that feed on different food resources within the fragments studied. Any disturbance in these environments may result in loss of species from different feeding guilds, simplifying the community of scarab beetles and may therefore result in the loss of ecological functions performed by these important insect detritivores. CMAC thanks to his father, Agenor Martinho Correa, for the encouragement and logistical support for execution of this research. VK thanks CNPq for the scholarship granted (Processo: 157020/2010 - 0). AP thanks CNPq for the scholarship granted (Processo: 140989/2011 - 0) and the Graduate Program in Entomology of the Federal University of Viçosa. We thank Prof. Dr. Cristiano Lopes - Andrade (UFV, Brazil) for providing space and equipment of the "Laboratório de Sistemática e Biologia de Coleoptera" for screening and identification of Scarabaeinae. We also thank Mr. Gélio Proença Brum for allowing execution of this study on their property and Jorge Adriano de Deus Ricardo (UEMS, Brazil) for his help during field work.

REFERÊNCIAS

ALHO, C. J. R.; LACHER, T. E.; CONÇALES, H. C. Environmental degradation in the Pantanal ecosystem. *Bioscience*, United States, v. 38, n. 3, p. 164 - 171, 1988. CLARKE, K. R.; GORLEY, R. N. *Primer v6 Permanova+*. Primer - E Ltd., Plymouth, UK, 2006. COLWELL, R. K. *EstimateS - statistical estimation of species richness and shared species from samples*. Version 7.5. University of Connecticut, Storrs, 2005. HALFFTER, G.; ARELLANO, L. Responses of dung beetle diversity to human - induced changes in a Tropical landscape. *Biotropica*, United States, v. 34, n. 1, p. 144 - 154, 2002. HALFFTER, G.; MATTHEWS, E. G. The natural history of dung beetles of the subfamily Scarabaeinae (Coleoptera, Scarabaeidae). *Folia Entomologica Mexicana*, Mexico, n. 12 - 14, p. 1 - 312, 1966. LOUZADA, J. N. C.; LOPES, F. S.; VAZ

- DE - MELLO, F. Z. Structure and composition of a dung beetle community (Coleoptera, Scarabaeinae) in a small forest patch from Brazilian Pantanal. *Revista Brasileira de Zoociências*, Juiz de Fora, v. 9, n. 2, p. 199 - 203, 2007. MILHOMEM, M. S.; VAZ - DE - MELLO, F. Z.; DINIZ, I. R. Técnicas de coleta de besouros copronecrófagos no Cerrado. *Pesquisa Agropecuária Brasileira*, Brasília, v. 38, n. 11, p. 1249 - 1256, 2003. OLIVEIRA, P. S.; MARQUIS, R. J. The cerrados of Brazil: ecology and natural history of a Netropical savanna. Columbia University Press, New York, 2002. VAZ - DE - MELLO, F. Z. Scarabaeidae *s. str.* (Coleoptera: Scarabaeoidea) de um fragmento de floresta amazônica no estado do Acre, Brasil. 1. Taxocenose. *Anais da Sociedade Entomológica do Brasil*, Londrina, v. 38, n. 3, p. 447 - 453, 1999.