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FIRST REPORT ON THE OCCURRENCE *Eunica bechina* (LEPIDOPTERA: NYMPHALIDAE) IN SETE LAGOAS, MINAS GERAIS STATE, BRAZIL

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ABSTRACT

Eunica bechina Hewitson, 1852 (Lepidoptera: Nymphalidae), a defoliator with urticating hairs, has medical and pest importance in urban areas, and in agricultural and forest crops. The fruits of *Caryocar brasiliense* Cambess (Caryocaraceae), a typical tree from the Brazilian cerrado biome and Bolivia, are an alternative income source for farmers and collectors. This paper reports injuries on trees of *C. brasiliense* caused by caterpillars of *E. bechina* in an urban area of cerrado in Sete Lagoas, Minas Gerais State, Brazil. Caterpillars were collected, brought to the laboratory, and placed in plastic pots (one liter) with branches of *C. brasiliense* at the temperature of 25 ± 1 °C, relative humidity of 70 ± 10% and a photoperiod of 12 h. Adults of this insect were obtained and identified as *E. bechina* in the Federal University of Viçosa (UFV) in Viçosa, Minas Gerais State, Brazil. This is the first report on the occurrence of *E. bechina* defoliating trees of *C. brasiliense* in Sete Lagoas, Minas Gerais State, Brazil and 49 species of Lepidoptera defoliators are registered for this host.

Key-words: Caterpillars; defoliation; injury; cerrado; leaves.

PRIMEIRO RELATO DE *Eunica bechina* (LEPIDOPTERA: NYMPHALIDAE) EM SETE LAGOAS, MINAS GERAIS, BRASIL

RESUMO

Eunica bechina Hewitson, 1852 (Lepidoptera: Nymphalidae), um desfolhador com pêlos urticantes, tem importância médica e de praga em áreas urbanas e cultivos agrícolas e florestais. Os frutos de *Caryocar brasiliense* Cambess (Caryocaraceae), uma árvore típica do bioma Cerrado brasileiro e Bolívia, são uma fonte alternativa de renda para os agricultores e coletores. Este artigo apresenta injúrias por lagartas de *E. bechina* sobre árvores de *C. brasiliense* em uma área urbana de Cerrado em Sete Lagoas, Minas Gerais, Brasil. As lagartas foram recolhidas, levadas para o laboratório e colocadas em copos de plástico (um litro), com ramos de *C. brasiliense* à temperatura de 25 ± 1 °C, humidade relativa de 70 ± 10% e fotoperíodo de 12 h. Adultos desse inseto foram obtidos e identificados como *E. bechina* na Universidade Federal de Viçosa (UFV) em Viçosa, Minas Gerais, Brasil. Este é o primeiro relato de *E. bechina* desfolhando árvores de *C. brasiliense* em Sete Lagoas, Minas Gerais, Brasil e 49 espécies de lagartas desfolhadoras são registradas para este hospedeiro.

Palavras-chave: Lagartas; desfolha; injúria; Cerrado; folhas.

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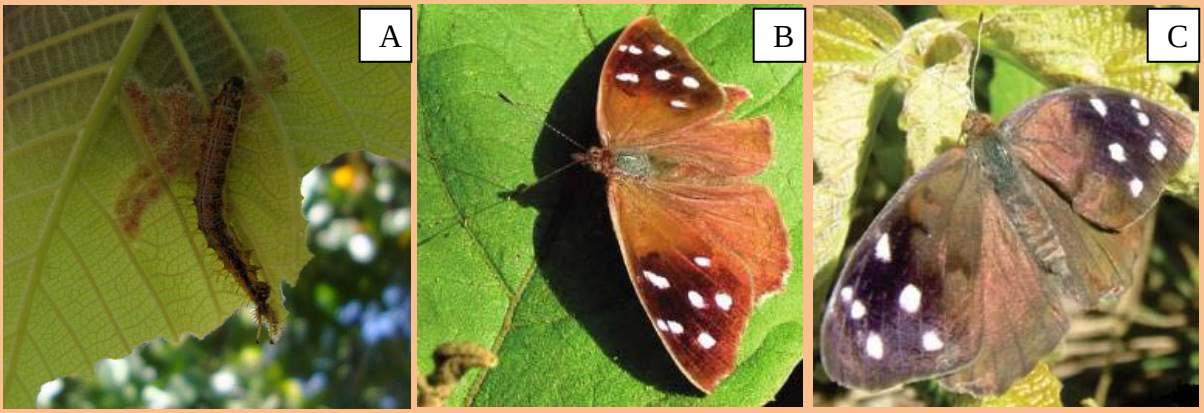
INTRODUCTION

The cerrado biome covers an area of 2,045,064 Km2 (20% of total area in Brazil) with vegetation cover composed of grasses, shrubs and trees with long roots and twisted stems (RATTER et al., 1997). The climate of this area is tropical seasonal with dry winters with an average annual temperature of 25 °C, reaching 40 °C in the summer. The minimum temperature can reach 10 °C in May, June and July (MIRANDA et al., 1997). The annual precipitation ranges from 1,200 to 1,800 mm and March and October are the wettest months. Short drought periods may occur in the spring and summer. Monthly precipitation rates reduce from May to September eventually reaching zero (RATTER et al., 1997). Solar radiation is intense; however, it may be reduced by to heavy clouds especially in the summer. The relief is hilly with a few flat areas (MIRANDA et al., 1997).

Many animals and plants endemic to the cerrado are endangered, which makes the identification of its biodiversity necessary. Fruits Caryocar brasiliense Cambess (Caryocaraceae), a native trees to the Brazilian cerrado and Bolivia, are used for cooking and in the production of cosmetics, lubricants and pharmaceuticals products (ARAÚJO, 1995; RABELO et al., 2008). The oil from its fruits has invigorating quality and is used to treat bronchitis, colds, the influenza virus and tumors. Tea of C. brasiliense leaves is a menstrual regulator (PASSOS et al., 2003). Fructification of C. brasiliense occurs between September and February in the Brazilian cerrado. Its wood is used to produce charcoal due to its diameter and good combustion (LEITE et al., 2006a). This species is listed as endangered species in São Paulo State, Brazil (VILELA et al., 2008).Fruits of *C. brasiliense* can be dispersed by *Didelphis albiventris* Lund, 1840 (Mammalia: Marsupialia) and *Cyanocorax cristatellus* Temminck, 1823 (Passeriformes: Corvidae). The multiple uses of *C. brasiliense* makes this species the main income source of communities from the cerrado in Brazil; however, its economic potential is little studied (LEITE et al., 2006a). Studies with *C. brasiliense* are necessary to preserve this plant in natural conditions, to establish commercial plantations and to develop pest control methods (HERMS, 2002). Refuge areas for *C. brasiliense* can attract beneficial insects to enhance natural biological control, to protect pollinating bees and to help reducing global warming (PEIGLER, 1994).

Eunica bechina Hewitson, 1852 (Lepidoptera: Nymphalidae) (Figures 1A, 1B and 1C), with urticating hairs, is an important defoliator in urban areas, and in agricultural and forest crops. This species and its natural hosts are little studied in tropical regions (BROWN and FREITAS, 1994); however, caterpillars can be found throughout the year on host plants of the Brazilian cerrado. The cerrado has more than 1,500 species of animals (except for insects), which represents the second largest diversity on earth. A total of 1,000 species of butterflies and 500 species of bees, wasps, and termites were cataloged in 1990 in a cerrado in the Federal District of Brazil. The cerrado flora is rich, although little known, comprising over 10,000 species, and 4,000 are endemic. *Caryocar brasiliense* is widely distributed in the Brazilian cerrado, and its tallest trees can reach over 10 m and crowns can reach 6 m wide (LEITE et al., 2006a).

Figures 1A, 1B and 1C. Larva and adult female (source: SENDOYA et al., 2009) and male (source: MUNIZ et al., 2012) of *Eunica bechina* (Lepidoptera: Nymphalidae) on leaves of *Caryocar brasiliense* (Caryocaraceae).



The objectives of this study were to record injuries caused by caterpillars of *E. bechina* on trees of *C. brasiliense in an urban area of cerrado in Sete Lagoas, Minas Gerais State, Brazil and to carry out a literature* review on Lepidoptera defoliators of this host.

MATERIALS AND METHODS

Twenty-five caterpillars and leaves with injuries (Figures 2A and 2B) were collected from 10-year-old and 3-feet-tall from five plants of C. brasiliense on 26 November 2011. We collected the samples from a residence yard in the neighborhood of Iporanga in Sete Lagoas, Minas Gerais State, Brazil (19º32' S, 44º09' W, 785 m above sea level) after a resident had contact with stinging hairs of this insect. The site had five trees of C. brasiliense, besides other fruit trees, ornamental shrubs, and flowers and the soil was covered by grass. A small lake near the C. brasiliense plant was used to irrigate and moist the garden.

Caterpillars found on branches of the upper and lower crown parts of the C. brasiliense trees were collected with a paintbrush, placed in plastic pots (one liter) with branches with leaves of these plants moistened with distilled water. The samples were sent to the entomology laboratory of the Federal University of the Jequitinhonha and Mucuri Valleys (UFVJM) in Diamantina, Minas Gerais State, Brazil. The samples were kept at 25 ± 1 °C, 70 ± 10% RH and a 12 h photophase. Adult caterpillars were sent to the Laboratory of Biological Control of Insects (LCBI) of the Institute of Biotechnology Applied to Agriculture (BIOAGRO) of the Federal University of Viçosa (UFV) in Viçosa, Minas Gerais, Brazil, for identification by Dr. José Cola Zanuncio. Lepidoptera defoliators of *C. brasiliense* were revised in the literature (Table 1).

Figures 2A and 2B. Defoliation caused by *Eunica bechina* (Lepidoptera: Nymphalidae) on branches of *Caryocar brasiliense* (Caryocaraceae) in the urban area of cerrado in the Municipality of Sete Lagoas, Minas Gerais State, Brazil.

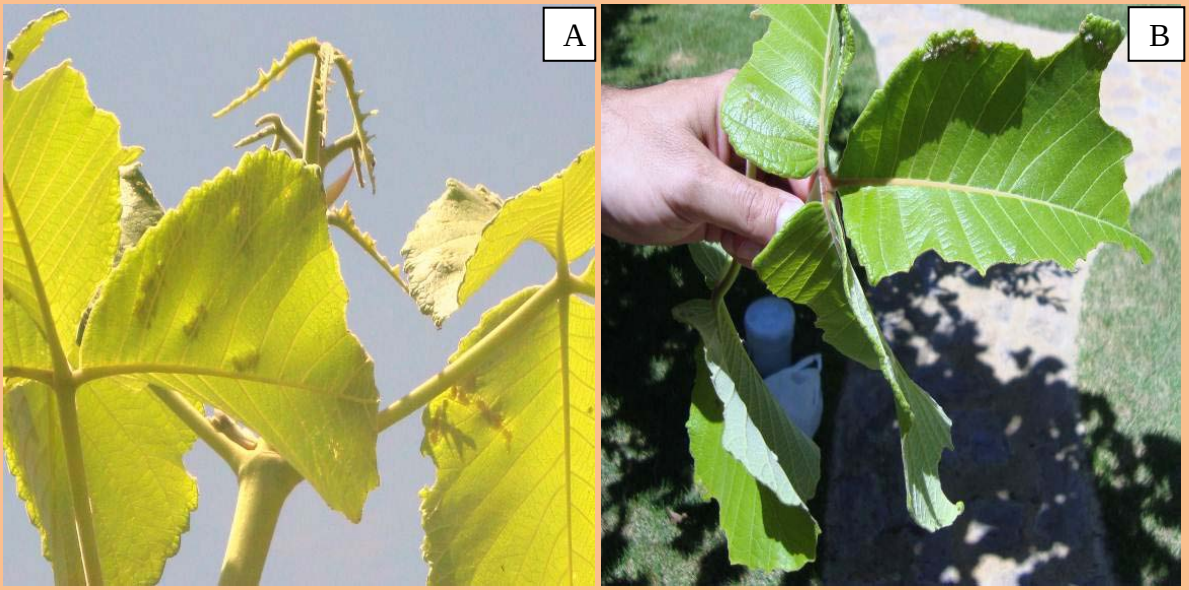


Table 1. Lepidoptera defoliators (Order: Family: Species) of *Caryocar brasiliense* (Caryocaraceae) and reference.

Order: Family: Species (References)
Lepidoptera: Blastobastidae: *Platinota rostrata* (RODOVALHO et al., 2007)
Lepidoptera: n.i. (CARREGARO et al., 2009)
Lepidoptera: Cossidae: n.i. (LEITE et al., 2011)
Lepidoptera: Gelechiidae: n.i. (CARREGARO et al., 2009)
Lepidoptera: Geometridae: *Iridopsis* sp.; *Iridopsis paeocrossa* (RODOVALHO et al., 2007) *Thyrinteina arnobia* (FERREIRA et al., 2009)
Lepidoptera: Hypsidae: *Calodesma albiapex* (FERREIRA et al., 2009)
Lepidoptera: Lycaenidae: *Calycopis calar*; *Olynthus essus*; *Thecla socia* (CARREGARO et al., 2009); *Nicolaea socia* (FERREIRA et al., 2009)
Lepidoptera: Lymantriidae: *Thagona tibialis* (FERREIRA et al., 2009)
Lepidoptera: Megalopygidae: n.i.; *Megalogype* sp.; *Podalia* sp. (FERREIRA et al., 2009); *Megalogype amita*; *Megalopygidae albicoris* (RODOVALHO et al., 2007)
Lepidoptera: Noctuidae: *Nola* sp.; *Parangitia* sp. (RODOVALHO et al., 2007)
Lepidoptera: Notodontidae: n.i. (FERREIRA et al., 2009); *Rifargia onerosa* (RODOVALHO et al., 2007; FERREIRA et al., 2009)
Lepidoptera: Nymphalidae: *Eunica bechina* (OLIVEIRA and FREITAS, 1991; FREITAS and OLIVEIRA, 1992, 1996; OLIVEIRA, 1997; FERREIRA et al., 2009; SENDOYA et al., 2009; MUNIZ et al., 2012); *Eunica*

bechina magnipunctata (OLIVEIRA, 1997); *Hamadryas amphinome* (FERREIRA et al., 2009)
Lepidoptera: Oecophoridae: *Inga ancorata* (DINIZ et al., 2007; CARREGARO et al., 2009); *Inga encamina*; *Inga haemataula*; *Inga phaeocrossa* (DINIZ et al., 2007)
Lepidoptera: Psychidae: *Oiketicus kirbyi*; n.i.; n.i.; n.i. (FERREIRA et al., 2009)
Lepidoptera: Pyralidae: *Phidotricha* sp. (RODOVALHO et al., 2007); *Phidotricha erigens* (CARREGARO et al., 2009; FERREIRA et al., 2009); *Phycitinae* sp. (CARREGARO et al., 2009)
Lepidoptera: Riodinidae: *Apodemia paucipuncta* (RODOVALHO et al., 2007); *Lasaia agesilas esmeralda* (FERREIRA et al., 2009); *Theope eudocia* (CARREGARO et al., 2009)
Lepidoptera: Saturniidae: *Citheronia laocoon*; *Eacles imperiales magnifica*; *Hylesia* sp. (FERREIRA et al., 2009); *Dirphia rosacordis* (GARCIA, 1995; FERREIRA et al., 2009)
Lepidoptera: Sesiidae: *Carmenta* sp. (MACEDO and VÊLOSO, 2002; LOPES et al., 2003; VILELA et al., 2008; FERREIRA et al., 2009); *Synanthedon* sp. (GRIBEL and HAY, 1993)
Lepidoptera: Thiridiidae: *Rhodoneura intermedia* (RODOVALHO et al., 2007; CARREGARO et al., 2009; FERREIRA et al., 2009)
Lepidoptera: Tortricidae: *Platynota rostrana*; *Subtranstillospis* sp. (CARREGARO et al., 2009)
n.i.= unidentified

RESULTS AND DISCUSSION

This is the first report on the occurrence of *E. bechina* on trees of *C. brasiliense in an urban area of cerrado in Sete Lagoas, Minas Gerais State, Brazil*. The caterpillars survived on leaves of *C. brasiliense* in the laboratory of the UFVJM and adults were obtained and identified for species.

Nymphalidae caterpillars can damage agricultural and forest crops; however, species of these defoliators of *C. brasiliense* and other plants native to the Brazilian cerrado are little studied, especially regarding their biology. The gall wasp *Eurytoma* sp. (Hymenoptera: Eurytomidae), caterpillars of Lepidoptera (LEITE et al., 2009), termites and ants (OLIVEIRA, 1997; LIMA-RIBEIRO et al., 2006) were observed on plants of *C. brasiliense*. This suggests that they are important for the biological balance in the cerrado biome. *Eunica bechina* did not oviposit on *C. brasiliense* trees infested by aggressive species of *Camponotus* and *Cephalotes* (Hymenoptera: Formicidae), showing that this species avoid ovipositing on plants foraged by these natural enemies (SENDOYA et al., 2009; MUNIZ et al., 2012). However, *ants ignore E. bechina* eggs laid on *C. brasiliense*; however, its caterpillars are attacked and killed (OLIVEIRA, 1997; Muniz et al., 2012). *Cariocar brasiliense* with flower buds and fruits can produce nectar attractive to ants aggressive to *E. bechina* caterpillars (Sendoya et al., 2009). The climate influences the phenology of *C. brasiliense*, which in turn, affects the activity of this pest and ants. Visit rates of this natural enemy are higher at the beginning of the rainy season, when defoliators are most abundant (Muniz et al., 2012).

Studies on biology and rearing methods of caterpillars collected from plants of *C. brasiliense* are scarce hindering their maintenance in the laboratory. Furthermore, edaphic and climatic

factors, parasitoids, predators and/or pathogen, besides size, nutritional content, density, spatial distribution, penology and chemical composition of hosts may affect the survival of herbivorous insects (KURSAR and COLEY, 2003; STILING and MOON, 2005).

The development of shoots of *C. brasilense*, leaves and flowers before the rainy season is common in the cerrado biome. The development of the photosynthetic areas before the rainy season increases the efficiency and reduces insect predation due to adverse conditions for them. The small number of leaves in *C. brasiliense* before the rainy period may reduce foraging by caterpillars and its flowers facilitates pollinators and predators to find this plant. Wind speed above 2 $m.s^{-1}$ can reduce the foraging of insects and plants (LEITE et al., 2006b). Environment diversity can increase the natural biological control, likewise, larger amounts of food can increase the occurrence of harmful insects, such as Lepidoptera defoliator on plants of *C. brasiliense* (LANDIS et al., 2005; GONÇALVES-ALVIM and FERNANDES, 2001; GRATTON and DENNO, 2003).

CONCLUSIONS

This is the first report on the occurrence of *E. bechina* defoliating trees of *C. brasiliense* in Sete Lagoas, Minas Gerais State, Brazil. This plant is used as shade by livestock, ornamental plant and its fruits are an alternative income source for farmers and farm workers. The cerrado biome should be preserved as a natural gene bank of *C. brasiliense*. The potential of Nymphalidae caterpillars to damage *C. brasiliense* plants in the cerrado of Minas Gerais State, Brazil should be further studied. *Eunica bechina* should be monitored in areas with *C. brasiliense* to prevent outbreaks of this pest.

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REFERENCES

ARAÚJO, F. D. A review of *Caryocar brasiliense* (Caryocaraceae) - an economically valuable species of the central Brazilian cerrados. **Economic Botany**, v.49, n.1, p.40-48, 1995.

BROWN, K. S.; FREITAS, A. V. L. Juvenile stages of Ithomiinae: An overview and systematics (Lepidoptera: Nymphalidae). **Tropical Lepidoptera Research**, v.5, n.1, p.9-20, 1994.

CARREGARO, J. B.; DINIZ, I. R.; HAY, J. D.; MORAIS, H. C. Herbivorous insects in flower buds of *Caryocar brasiliense* Camb. (Caryocaraceae), with special emphasis on Lepidoptera. **Revista Brasileira de Zoociências**, v.11, n.3, p.255-259, 2009.

DINIZ, N. R.; BERNARDES, C.; RODOVALHO, S.; MORAIS, H. C. Biology and occurrence of *Inga* Busk species (Lepidoptera: Oecophoridae) on cerrado host plants. **Neotropical Entomology**, v.36, n.4, p.498-494, 2007.

FERREIRA, G. A.; VELOSO, V. R. S.; NAVES, R. V.; NASCIMENTO, J. L.; CHAVES, L. J. Biodiversidade de insetos em Pequizeiro (*Caryocar brasiliense*, Camb.) no cerrado do Estado de Goiás, Brasil. **Agrociencia**, v.13, n.2, p.14-31, 2009.

FREITAS, A. V. L.; OLIVEIRA, P. S. Biology and behavior of the neotropical butterfly *Eunica bechina* (Lepidoptera: Nymphalidae) with special reference to larval defense against ant predation. **Journal of Research on the Lepidoptera**, v.31, n.1-2, p.1-11, 1992.

FREITAS, A. V. L.; OLIVEIRA, P. S. Ants at selective agents on herbivore biology: effects on the behaviour of a non-myrmecophilous butterfly. **Journal of Animal Ecology**, v.65, n.2, p.205-210, 1996.

GARCIA, A. H. Ação do parasitóide *Anastatus* sp. (Eupelmidae - Hymenoptera) em ovos de *Dirphia rosacordis* Walker, 1885 (Lepidoptera - Saturniidae) em pequizeiro (*Caryocar brasiliense* Cambess). **Pesquisa Agropecuária Tropical**, v.25, n.2, p.161-164, 1995.

GONÇALVES-ALVIM, S. J.; FERNANDES, G. W. Biodiversity of galling insects: historical, community and habitat effects in four neotropical savannas. **Biodiversity and Conservation**, v.10, n.1, p.79-98, 2001.

GRATTON, C.; DENNO, R. F. Seasonal shift from bottom-up to top-down impact in phytophagous insect populations. **Oecology**, v.134, n.4, p.487-495, 2003.

GRIBEL, R.; HAY, J. D. Pollination ecology of *Caryocar brasiliense* (Caryocaulaceae) in Central Brazil cerrado vegetation. **Journal of Tropical Ecology**, v.9, n.2, p.199-211, 1993.

HERMS, D. A. Using degree-days and plant phenology to predict pest activity. **Tactics and Tools for IPM**, v.11, n.1, p.49-59, 2002.

KURSAR, T. A.; COLEY, P. D. Convergence in defense syndromes of young leaves in tropical rainforests. **Biochemistry Systematics and Ecology**, v.31, n.8, p.929-949, 2003.

LANDIS, D.; WRATTEN, S. D.; GURR, G. M. Habitat management to conserve natural enemies of arthropod pests in agriculture. **Annual Review of Entomology**, v.45, n.1, p.175-201, 2000.

LEITE, G. L. D.; VELOSO, R. V. D.; ZANUNCIO, J. C.; FERNANDES, L. A.; ALMEIDA, C. I. M. Phenology of *Caryocar brasiliense* in the Brazilian cerrado region. **Forest Ecology and Management**, v.236, n.2-3, p.286-294, 2006a.

LEITE, G. L. D.; VELOSO, R. V. S.; REDOAN, A. C. M.; LOPES, P. S. N.; MACHADO, M. M. L. Artrópodes associados a mudas de pequizeiro. **Arquivos do Instituto Biológico**, v.73, n.3, p.365-370, 2006b.

LEITE, G. L. D.; VELOSO, R. V.; SILVA, F. W. S.; GUANABÉNS, R. E. M.; FERNANDES, G. W. Within tree distribution of a gall-inducing *Eurytoma* (Hymenoptera, Eurytomidae) on *Caryocar brasiliense* (Caryocaraceae). **Revista Brasileira de Entomologia**, v.53, n.4, p.643-648, 2009.

LEITE, G. L. D.; ALVES, S. M.; NASCIMENTO, A. F.; LOPES, P. S. N.; FERREIRA, P. S. F.; ZANUNCIO, J. C. Identification of the wood borer and the factors affecting its attack on *Caryocar brasiliense* trees in the Brazilian Savanna. **Acta Scientiarum. Agronomy**, v.33, n.4, p.589-596, 2011.

LIMA-RIBEIRO, M. D.; PINTO, M. P.; COSTA, S. S.; NABOUT, J. C.; RANGEL, T. F. L. V. B.; MELO, T. L.; MOURA, I. O. Associação de *Constrictotermes cyphergaster* Silvestri (Isoptera: Termitidae) com espécies arbóreas do Cerrado brasileiro. **Neotropical Entomology**, v.35, n.1, p.49-55, 2006.

LOPES, P. S. N.; SOUZA, J. C.; REIS, P. R.; OLIVEIRA, J. M.; ROCHA, I. D. F. Caracterização do ataque da broca dos frutos do pequizeiro. **Revista Brasileira de Fruticultura**, v.25, n.3, p.540-543, 2003.

MACEDO, J. F.; VÊLOSO, J. M. Entomofauna associada ao pequizeiro *Caryocar brasiliense* Camb. (Caryocaraceae). **Entomologia y Vectores**, v.9, n.1, p.263-273, 2002.

MIRANDA, A. C.; MIRANDA, H. S.; LLOYD, J.; GRACE, J.; FRANCEY, R. J.; MCINTYRE, J. A.; MEIR, P.; RIGGAN, P.; LOCKWOOD, R.; BRASS, J. Fluxes of carbon, water and energy over Brazilian cerrado: an analysis using eddy covariance and stable isotopes. **Plant, Cell and Environ**, v.20, n.3, p.315-328, 1997.

MUNIZ, D. G.; FREITAS, A. V. L.; OLIVEIRA, P. S. Phenological relationships of *Eunica bechina* (Lepidoptera: Nymphalidae) and its host plant, *Caryocar brasiliense* (Caryocaraceae), in a Neotropical savanna. **Studies on Neotropical Fauna and Environment**, v.47, n.2, p.111-118, 2012.

OLIVEIRA, P. S. The ecological function of extrafloral nectarines: Herbivore deterrence by visiting ants and reproductive output in *Caryocar brasiliense* (Caryocaraceae). **Functional Ecology**, v.11, n.1, p.323-330, 1997.

OLIVEIRA, P. S.; FREITAS, A. V. L. Hostplant record for *Eunica bechina magnipunctata* (Nymphalidae) and observations on oviposition sites and immature biology. **Journal of Research on the Lepidoptera**, v.30, n.1-2, p.140-141, 1991.

PASSOS, X. S.; CASTRO, A. C. M.; PIRES, J. S.; GARCIA, A. C. F.; CAMPOS, F. C.; FERNANDES, O. F. L.; PAULA, J. R.; FERREIRA, H. D.; SANTOS, S. C.; FERRI, P. H.; SILVA, M. D. R. Composition and antifungal activity of the essential oils of *Caryocar brasiliensis*. **Pharmaceutical Biology**, v.41, n.5, p.319-324, 2003.

RABELO, A. M. D. S.; TORRES, M. C. L.; GERALDINE, R. M.; SILVEIRA, M. F. A. Extração, secagem e torrefação da amêndoa do pequi (*Caryocar brasiliense* Camb.). **Ciência e Tecnologia de Alimentos**, v.28, n.4, p.868-871, 2008.

RATTER, J. A.; RIBEIRO, J. F.; BRIDGEWATER, S. The Brazilian cerrado vegetation and threats to its biodiversity. **Annals of Botany**, v.80, n.3, p.223-230, 1997.

RODOVALHO, S. R.; LAUMANN, R. A.; DINIZ, I. R. Ecological aspects of lepidopteran caterpillar parasitoids from *Caryocar brasiliense* Camb. (Caryocaraceae) in a cerrado sensu stricto of Central Brazil. **Biota Neotropica**, v.7, n.3, p.239-243, 2007.

SENDOYA, S. F.; FREITAS, A. V. L.; OLIVEIRA, P. S. Egg-laying butterflies distinguish predaceous ants by sight. **The American Naturalist**, v.174, n.1, p.134-140, 2009.

STILING, P.; MOON, D. C. Quality or quantity: the direct and indirect effects of host plants on herbivores and their natural enemies. **Oecologia**, v.142, n.3, p.413-420, 2005.

VILELA, G. F.; CARVALHO, D.; VIEIRA, F. D. Fenologia de *Caryocar brasiliense* Camb. (Caryocaraceae) no Alto Rio Grande, sul de Minas Gerais. **Cerne**, v.14, n.4, p.317-329, 2008.