

ENTOMOFAUNA VISITOR IN FLOWERS MERREMIA AEGYPTIA (CONVOLVULACEAE) IN QUIXERAMOBIM-CE, BRAZIL

Daniel Santiago Pereira

Engº Agrônomo, Doutorando em Ciência Animal/UFERSA. Pesquisador Colaborador do CETAPIS (Centro Tecnológico em Apicultura e Meliponicultura) / UFERSA, Mossoró-RN/Brasil. Email: santiagoesam@gmail.com

Raimundo Maciel Sousa

Engº Agrônomo, D.Sc., Instituto Federal de Educação, Ciência e Tecnologia, Rua Estevam Remígio, 1145, CENTRO, 62.930-000, Limoeiro do Norte-CE, Brasil

Patricio Borges Maracajá

Engº Agrônomo, D.Sc., Departamento de Ciências Vegetais, UFCG, Rua Coronel Leite, 517, CENTRO, 58.840-000, Pombal-PB, Brasil E-mail: patricio@ufcg.edu.br

Antonio Abreu da Silveira Neto

Zotecnista, Instituto Centro de Ensino Tecnológico, Avenida Geraldo Bizarria, DISTRITO INDUSTRIAL, 63.800-000, Quixeramobim-CE, Brasil

Charle da Silva Paiva

Estudante de graduação em Zootecnia, Universidade Federal Rural do Semi Árido, Mossoró-RN, 59.625-300.

Luci Cleide Farias Soares Sousa

Prof. Licenciada em Letras (Portuguesa e Inglês) Especialista em Língua Inglesa – Rua Odilon Jose de Assis nº 256, Pombal - PB. E-mail: Cleidesoares@msn.com.br

ABSTRACT - The purpose of this study was to identify the entomofauna visitors in flora of white jitirana (*Merremia aegyptia*). The survey was conducted in a conservation area of Caatinga in FATEC campus Hinterland Central, Quixeramobim-Ceará. It was found that the white jitirana presented a wide range of floral visitors' hymenoptera, beetles, true bugs, flies, and birds. The order Hymenoptera was the most present with Africanized honey bees (*Apis mellifera* L.) representing approximately 90% of visits observed.

Keywords: floral visitors; white jitirana; bee.

ESTUDO DA ENTOMOFAUNA VISITANTE DAS FLORES DE *Merremia AEGYPTIA* (CONVOLVULACEAE) EM QUIXERAMOBIM-CE, BRAZIL

RESUMO - O objetivo deste trabalho foi de identificar a entomofauna visitante da flora da jitirana branca (*Merremia aegyptia*). A pesquisa foi realizada em uma área de preservação de Caatinga, no Campus da FATEC Sertão Central, Quixeramobim-Ceará. Foi constatado que a jitirana branca apresentou ampla gama de visitantes florais (himenópteros, coleópteros, hemípteros, dípteros, e pássaros). A ordem mais presente foi a Hymenoptera, com as abelhas melíferas africanizadas (*Apis mellifera* L.) representando aproximadamente 90% das visitas observadas.

Palavras Chave: visitantes florais; jitirana branca; abelha.

INTRODUCTION

The richness of flora in caatinga is often only possible to see in the rainy season, when plants vegetate and flower attracting a huge amount of individuals which benefit from these plants during this period.

The family Convolvulaceae comprises about 1650 species, mainly climbing from arid regions around the world (MABBERLEY, 1987).

Correspond to this family 51 gender of widely distributed in the tropics and subtropics throughout the world. They are climbing plants in general, also occurring shrubs and small trees. The climbing plants can be annual herbaceous or strongly woody, then long-lasting like most

of the African bush vines. In Brazil, the genus *Merremia*, has 15 species, according to studies conducted in herbaria. (JOLY, 2002).

The semi-arid region, which includes the caatinga, shows vegetation with seasonal differences in flowering, and rainy season with a high diversity of flowering species, in contrast to the dry season. The variation in the availability of resources creates a seasonal pattern of intense foraging by bees in the rainy season followed by a significant drop in the dry season (MARTINS, 1994, AGUIAR et al. 1995; VIANA et al. 1997).

Although it is notorious to know about the diversity of insect visitors in the present flora in the Caatinga vegetation, it is necessary to deepen this knowledge with regard to the entomofauna of white jitrana (*Merremia aegyptia*), to know the individuals their flowers both with the purpose of gathering food (nectar, pollen, floral parts and / or other plant parts), shelter, or as the setting for procreation.

The main objective of this study was to identify the taxonomic order of floral visitors of the white jitrana flower (*Merremia aegyptia*).

MATERIALS AND METHODS

Location

The experiments were conducted in the Experimental Farm of Fatec - Hinterland Central / beekeeping sector, in the city of Quixeramobim - CE. Located in the region of Hinterland Central, State of Ceara, 200 km away from Fortaleza.

Climate

The climate of Quixeramobim can be classified as type / dry sub-humid (C2), with rainfall patterns characterized by summer rains, presenting two defined seasons: the rainy season, which concentrates 90% of precipitations between the months of January and June, and the another drought, which extends from July to December.

Soil and relief

The topography of the area is classified as a plan, with minor ripples with slopes ranging from 0 to 3%. The soil of the area is formed by the type Podizólico Eutrophic Red-Yellow, with sandy loam texture.

Assembly of Experiments

The experiments were conducted in the period of 9 to 19 July 2008, being these studies conducted during the flowering of the white jitrana floral the flower visitors insects were collected in entomological net on three

consecutive days during the hours of 5:00, 7:00, 9:00, 11:00, 13:00, 15:00 and 17:00 hours, and were later identified to the corresponding order. Flower visitors were considered those which were collecting nectar and / or pollen, or those fed on the floral parts, and even individuals which used the camera as a floral environment copulation and / or rest.

RESULTS AND DISCUSSION

Behavior of Pollinators and entomofauna

The field observation was accompanied from the moment that preceded the opening of the flowers, being observed the beginning of flower opening (anthesis) from 5:30 (AM), and concluded at approximately 7:30 AM (AM). The closing of flowers (senescence) started at 11:30 hrs (AM), concluding at approximately 2:30 pm (PM), at that time were observed all the closed flowers. In the collection of insects was identified from 9:00 hrs (AM) with the highest incidence of insect visitors.

During the data collection was observed insects with several objectives within the flowers were from the collection of rewards (pollen and / or nectar), consumption of plant parts (petals, reproductive organs, fruits and seeds), shelter, and still environment as copulation.

The entomofauna visitor of white jitrana during the study varied widely, was observed the following orders of insects on flowers collecting pollen and / or nectar, and / or floral parts: hymenoptera with 95% frequency in the flowers; beetle 2% 1% lepdoptera ; 1% Diptera, even of Hemiptera 1% (Table 01). Were also checked a few visits by hummingbirds (FIGURES 01 and 02).

Table 01 - Frequency of the insects orders on flowers of white jitrana, in Quixeramobim-CE.

The fact that it was found a wide variety of floral visitors, probably beyond the gathering of food are also potential pollinators, corroborates with many plant species in tropical and temperate regions may have more of a syndrome of pollination, and plant-pollinator interaction is a flexible relation (PROCTOR et al. 1996).

Simpson & Neff (1983) indicated that floral parts, in several species, over time, have been taken into tissues nutritious for visiting insects. These tissues are from epidermal and parenchyma, containing sugars, starches, proteins and lipids

Most of the groups of flowers visiting insects, especially Coleoptera, Hymenoptera, Lepidoptera and Diptera, use pollen (protein source) and nectar (energy source) for the flight of adults and / or also for the maturation of eggs. Bees, however, are totally dependent on floral resources during the larval stage and adult. The high degree of reliance on bees for floral resources is

reflected in numerous morphological adaptations for collecting and transporting these resources (MICHENER 1974, ROUBIK, 1989, RAMALHO et al. 1991; NEFF & SIMPSON 1993).

Lepidoptera Order, Hemiptera and Hummingbirds

Bedbugs (Hemiptera) and hummingbirds (birds) were not considered potential pollinators, as often the flowers still closed in the early hours of the day, a fact that prevented the visit of the parties and male / female or already matured. The butterflies (lepidopteros) were observed from flower opening (anthesis) until the end of senescence.

Pollination by hummingbirds and butterflies was also recorded in species of *Ipomoea* (Convolvulaceae) invasive of cultures (MACHADO & SAZIMA, 1987).

Kinoshita (2006), listed the species *Ipomoea quamoclit* L. with the syndrome of psicofilia and ornitofilia.

Coleoptera order

It was also observed the behavior of beetles in the flowers that were sheltering from the opening of the flowers and there were feeding on the floral parts (sexual) and petals, and probably also used as the floral receptacle mating environment, since they generally were found in pairs within the flowers. GOTTSBERGER (1994) noted similar behavior in two types of pollination in *Annonaceae* in Brazilian cerrado: one conducted by two groups of insects (Coleoptera and Thysanoptera) and the other exclusively by beetles. He also observed in several species, the petals form a pollination chamber, where the insects remain, the start of anthesis to their abscission, feeding on tissue constituents of the flowers.

Family Bruchidae beetles are important seed predators of 33 plant families (JOHNSON, 1981). Approximately 84% of host plants are *Leguminosae*, followed by Convolvulaceae (4.5%), *Palmae* (4.5%), *Malvaceae* (2%) and the remaining 5% are distributed in 29 other families (Johnson, 1989). *Megacerus baeri*, a neotropical species, a distribution in Bolivia, Argentina, Uruguay (TERAN AND KINGSOLVER, 1977) and Brazil (SCHERER AND ROMANOWSKI, 2000; CASTELLANI, 2003). According to Teran and Kingsolver (1977), the host plant of *M. baeri* is *dissect Merremia* (Convolvulaceae).

Hymenoptera

Solitary bees and wasps were seen collecting nectar and pollen from floral parts of white jitirana during the period in which it remained open after the period of senescence, were observed specimens representative of those examined previously using the floral receptacle as

an environment of rest to enter the flowers using his first pair of legs in order to open the petals and introduce themselves inside the flower.

Among the Hymenoptera was highlights the Africanized bees visiting the flowers with 90% frequency. Solitary bees showed frequency of 8%, among hymenoptera visitors of white jitirana, and the wasps had frequency of approximately 2% (Table 02)

Table 02 - Frequency of the order himenoptora in flowers of white jitirana, presenting the bee *Apis mellifera* as the main floral visitors in Quixeramobim-CE.

Aguiar & Zanella et al. (2003) found in the Paraiba pollinator *Centris leprieuri* and *C. hyptidis* as patrons of the species *Ipomoea pes-cabrae*, *I. stolonifera*, and *I. Martii*, *Jaquemontia densiflora*, respectively.

For Free (1993) and Freitas (1995), different from the other pollinators, bees are extremely efficient pollinators of both wild and cultivated plants because they have the floral resources (pollen, nectar and oils) as their only sources of food or products and necessary services for their survival as in the case of flower essences (used by males of some species to produce their sex pheromones and attract females for mating), shelter from enemies and bad weather, plant resins, places and finding mating partners, the source heat (males of some species flowers in warm on cold nights) sleep on cold nights, etc.. This obligate the bees are in constant contact with the flowers, greatly increasing the chance of transferring pollen grains within the same flower or between different flowers of the same species of plant. The visits to flowers made by other animals are eventually and most do not have flowers as your only food source and / or to visit only in isolated moments.

BEES *Apis mellifera* L.

Bees are insects that were more often seen visiting flowers of *Merremia aegyptia*, comprising 90% of total visits this plant species, the remaining 10% correspond to dopteros, beetles, true bugs and birds. The low frequency of other species may be related to the large populations of colonies of *A. mellifera*, when compared to other species of bees and other insects, and also the fact that there was an apiary with 25 colonies is about 500 m of the study area.

According to Piedade (1998), in *Merremia aegyptia* observed that the nectar was foraged by *A. mellifera*, while the pollen was collected by *Trigona spinipes*. This difference in behavior among the bees is attributed to floral morphology, which select the bees with a length of appropriate tongue to access the nectar. In the case of *T. spinipes*, they present length of proboscis shorter than the length of the corolla tube of *M. aegypti*, preventing this bee has access to the nectar, justifying the

behavior of exclusive collection of pollen in flowers of this weed.

It is important to say that, while collecting nectar to 15:00 hours the flowers were closed, yet some Africanized bees used the first couple of feet away and into the petals on the flowers, as this view has become feasible to nectar collection in the schedule above. This fact is confirmed by Winston (2003), he affirms that for closed flowers, bees force with their front legs to separate the petals and then the pollen joins with the mouthparts and forelegs, the same author also informs tubular flowers that for the operator enters the proboscis in the corolla search of nectar and pollen is collected incidentally when adheres to the mouthparts or forelegs, which was also observed in this study with *Merremia aegyptia*. During this gathering pollen involuntary self-pollination can occur, and even more frequent, since the large number of bees visiting flowers, cross-pollination. During collection, the Africanized honey bee and some wasps, contact the reproductive structures with the ventral part of the body, where the pollen is deposited, featuring esternotribica pollination. *Merremia* The species *Merremia aegyptia* can be classified as melittophily (FAEGRE & VAN DER PIJL 1980).

It was observed that some solitary bees visitors of jitirana used the floral receptacle as shelter, near dusk, so that was initiated senescence

Other species of the family Convolvulaceae, belonging to the genus *Ipomoea* and *Merremia*, studied in Brazil are visited mainly by families *Anthophoridae* bees, *Apidae* and *Halictidae*. Among the *Apidae*, *Apis mellifera* and *Trigona spinipes* are considered effective pollinators and / or occasional *Merremia cissoides* and *M. dissect*, *Ipomoea acuminata*, *I. cairica* and *I. aristolochiaefolia* (MAIMON-RODELLA et al. 1982; MAIMON RODELLA 1991, MAIMON-RODELLA & RODELLA 1986, 1986/87 and 1992). For Convolvulaceae caatinga, bees dominate as pollinators, and *A. mellifera* and *Diadasina riparia* pollinators frequently observed in seven species (PIEIDADE 1998). Machado (1990) also considers the bees as effective pollinators in 77.4% of the taxons studied in savanna and *A. mellifera* and *T. spinipes* species more expressive. It appears that bees *Apidae* play an important role in the pollination of plants and other Convolvulaceae species of caatinga.

Zanella (2000) reported that there is not a relatively high number of species *Diadasina*, *Melitoma* *Leiopodus* in Caatinga. The first two belong to the tribe Emphorini, preferably a group that visits flowers of plants of the Convolvulaceae family.

Piedade (1998), reinforces the general pollination by bees such as *A. mellifera* and *T. spinipes*, coupled with the possibility of self-and cross-pollination, gives this Convolvulaceae adequate adaptation of invasive weeds and other cultures. Thus, *J. multiflora* present features that allow to classify it as an "ideal weed" (BAKER 1974), as

besides the self-compatibility, high rates of fruit and seed production / fruit, and high germination rates.

CONCLUSION

The *M. aegyptia* presented a diurnal; anthesis began at 5:30 and it was concluded at approximately 11:30 hours.

The peak visitation of white jitirana flowers was at 9:30 am, the order Hymenoptera was the most present with 95% attendance in white jitirana flowers.

Among the species of the order hymenoptera which most visited the flowers stood out the Africanized bees *Apis mellifera* L. representing approximately 90% of the visits, the rest refers to solitary bees and wasps, and other orders such as Coleoptera, Hemiptera, Diptera, lepdoptera and even hummingbirds.

REFERENCIAS

AGUIAR, C.M., MARTINS, C.F. & MOURA, A.C. A.. Recursos florais utilizados por abelhas (Hymenoptera, Apoidea) em área de caatinga (São João do Cariri, Paraíba). **Revista Nordestina de Biologia** 10:101-117. 1995.

AGUIAR, C.M.L.; ZANELLA, F.C.V.; MARTINS, C.F.; CARVALHO, C.A.L. de. Plantas Visitadas por Centris (Hymenoptera-Apidae) na Caatinga para Obtenção de Recursos Florais. **Ecology, Behavior and Bionomics**. Neotropical Entomology, 32(2): 247-259 (2003).

BAKER, H.G.. The evolution of weeds. **Annual Review of Ecology and Systematics** 5:1-24.1974.

CASTELLANI, T. T.. **Estrutura e dinâmica populacional de *Ipomoea pes-caprae* (L.) R. Brown (Convolvulaceae) na Ilha de Santa Catarina**. Tese de Doutorado, Universidade Estadual de Campinas, Brasil, 206 pp, 2003.

FAEGRI, K. & VAN DER PIJL, L.. **The principles of pollination ecology**. Pergamon Press, Oxford. 1980.

FREITAS, B.M. The pollination efficiency of foraging bees on apple (*Malus domestica* Borkh) and cashew (*Anacardium occidentale* L.). 1995. Thesis, **University of Wales**, Cardiff, UK. 197p. 1995.

GOTTSBERGER, G. As anonáceas do cerrado e sua polinização. **Rev. Bras. Biol.**, v. 54, n. 39, p. 391-402, 1994.

JOHNSON, C. D.. Interactions between bruchid (Coleoptera) feeding guilds and behavioral patterns of

pods of the Leguminosae. **Environmental Entomology**, 10: 249-253. 1981.

JOLY, A.B.. **Botânica: Introdução a Taxonomia Vegetal**. 13. ed. São Paulo: Companhia Editora Nacional, 777 p. 2002.

KINOSHITA, S.K.; TORRES, R.B.; FORNI-MARTINS, E.R.; SPINILLI, T.; AHN, Y.J.; CONSTANCIO, S.S.. Composição Florística e Síndromes de Polinização e de Dispersão da Mata do Sítio São Francisco, Campinas-SP, Brasil. **Acta Bot. Bras.** 20(2): 313-327, 2006.

MABBERLEY, D.J.. *The Plant Book*. Cambridge Univ. Press, **Cambridge**. 1987.

MACHADO, I.C.S. & SAZIMA, M.. Estudo comparativo da biologia floral em duas espécies invasoras: *Ipomoea hederifolia* e *I. quamoclit* (Convolvulaceae). **Revista Brasileira de Biologia** 47:425-436.1987.

MAIMONI-RODELLA, R.C.S.. Biologia floral de *Ipomoea aristolochiaefolia* (H.B.K) Don. (Convolvulaceae). **Turrialba** 41:344-349.1991.

MAIMONI-RODELLA, R.C.S. & RODELLA, R.A.. Aspectos da biologia floral de *Merremia dissecta* (Jacq.) Hall. f. var. *edentata* (Meissn.) O'Donnell (Convolvulaceae). **Revista de Agricultura** 61:213-222.1986.

MAIMONI-RODELLA, R.C.S. & RODELLA, R.A.. Biologia floral de *Merremia cissoides* (Lam.) Hall F. (Convolvulaceae). **Naturalia** 11/12:117-123.1986/87.

MAIMONI-RODELLA, R.C.S. & RODELLA, R.A.. Biologia floral de *Ipomoea acuminata* Roem. Et Schult. (Convolvulaceae). **Revista Brasileira de Botânica** 15:129-133.1992.

MICHENER, C. D.. *The social behavior of bees: a comparative study*. **Cambridge**, The Blacknap Press, 404 p. 1974.

Recebido em 10/03/2011

Aceito em 12/12/2012