



REVISTA BRASILEIRA DE
Entomologia
A Journal on Insect Diversity and Evolution

www.rbentomologia.com



Biology, Ecology and Diversity

Characterization of entomogen galls from Mato Grosso do Sul, Brazil

Maria Virginia Urso-Guimarães^{a,*}, Ana Carolina Devides Castello^b, Eric Yasuo Kataoka^a, Ingrid Koch^c

^a Universidade Federal de São Carlos, Campus de Sorocaba, Departamento de Biologia, Sorocaba, SP, Brazil

^b Universidade Estadual de São Paulo, Programa de Pós Graduação em Ciências Biológicas (Botânica), Campus de Botucatu, Botucatu, SP, Brazil

^c Universidade de Campinas, Departamento de Biologia Vegetal, Campinas, SP, Brazil

ARTICLE INFO

Article history:

Received 13 May 2016

Accepted 19 August 2016

Available online xxx

Associate Editor: Marcia Souto Couri

Keywords:

Atlantic Forest

Cerrado

Chaco

Pantanal

Neotropical region

ABSTRACT

In this paper we performed a study of occurrence and characterization of entomogen galls from natural vegetation areas in Mato Grosso do Sul. We surveyed natural areas of four biomes from Mato Grosso do Sul State: Pantanal (Corumbá), Atlantic Forest (Bodoquena), Cerrado (Aquidauana), and Chaco (Porto Murtinho). We identified 186 morphotypes of galls in 115 host plant species from 35 families and 73 genera. The richest families were Fabaceae ($N = 34$), Sapindaceae ($N = 24$), Bignoniaceae ($N = 17$), and Myrtaceae ($N = 15$). Fifty morphotypes of insects (27%) were found in galls of 38 host plants, 78% of which belongs to Diptera, 10% to Hymenoptera, and the other 12% are divided among Hemiptera, Thysanoptera, Coleoptera, and Lepidoptera. In this study, the geographic distribution of gall morphotypes associated to the cecidomyiids *Youngomyia pouteriae* Maia, 2004, and *Trotteria quadridentata* Maia, 2004 (Diptera, Cecidomyiidae), and the wasp *Mononeuron duguetiae* Fischer, 1981 (Hymenoptera, Braconidae, Doryctinae) are expanded to the localities sampled in MS. In addition, four genera and 24 species of plants were recorded for the first time as hosts to entomogen galls. All occurrences of Cecidomyiidae in Mato Grosso do Sul's localities are new records for this family.

© 2016 Sociedade Brasileira de Entomologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Galls are structures formed via abnormal cell growth in response to stimulation caused by organisms such as insects, nematodes, fungi or bacteria (Carneiro et al., 2009a; Rohfritsch and Shorthouse, 1982). The global richness of insect galls has been estimated to be about 130,000 species (Espírito-Santo and Fernandes, 2007). Galls are unequivocal markers of species-specific relationships, since about 90% of all gall-forming species are monophagous (Carneiro et al., 2009a; Raman, 2010), thus they can be applied to understand relationships between gall-maker species richness and plant species diversity of a given area (Butterill and Novotný, 2015), with the potential use of galls as bioindicators (Julião et al., 2005).

The insect orders associated with gall formation are Diptera, Lepidoptera, Hymenoptera, Coleoptera, Hemiptera, and Thysanoptera. There is a large predominance of galls induced by Diptera, especially Cecidomyiidae, with over a thousand records of gall morphotypes in the Neotropical region (Maia, 2006; Maia et al., 2008), and a calculated average of 64% of the gall-inducing insect species in the world (Espírito-Santo and Fernandes, 2007).

Cecidomyiidae is the main group of gall-forming insects in all zoogeographical regions, with around 4,800 described species of gall makers to the world (Gagné and Jaschhof, 2014).

Despite an increasing number of studies on the occurrence and characterization of galls in Brazil made by Tavares (1909, 1917, 1918, 1920, 1922, 1925), Houard (1933), and Occhioni (1979, 1981), some biomes remain poorly sampled, such as the Pantanal, Caatinga and the Amazonian forest (Julião et al., 2002, 2014; Carvalho-Fernandes et al., 2012; Santos et al., 2011; Maia, 2011; Maia et al., 2014). In this study, we contributed providing the first survey of the galls and gall makers of Mato Grosso do Sul, including four areas of natural vegetation in the Cerrado, Atlantic Forest, Pantanal and Chaco biomes, which compose the flora mosaic in Mato Grosso do Sul. We documented and characterized gall morphology and identified host plants. Gall makers were also identified or inferred when obtained.

Material and methods

Study areas

Mato Grosso do Sul State has an approximate area of 358 km², 4.2% of the total Brazilian territory. The relief of the state consists of plateaus, tablelands and levels, within the Paraná and Paraguay

* Corresponding author.

E-mail: virginia@ufscar.br (M.V. Urso-Guimarães).

<http://dx.doi.org/10.1016/j.rbe.2016.08.002>

0085-5626/© 2016 Sociedade Brasileira de Entomologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

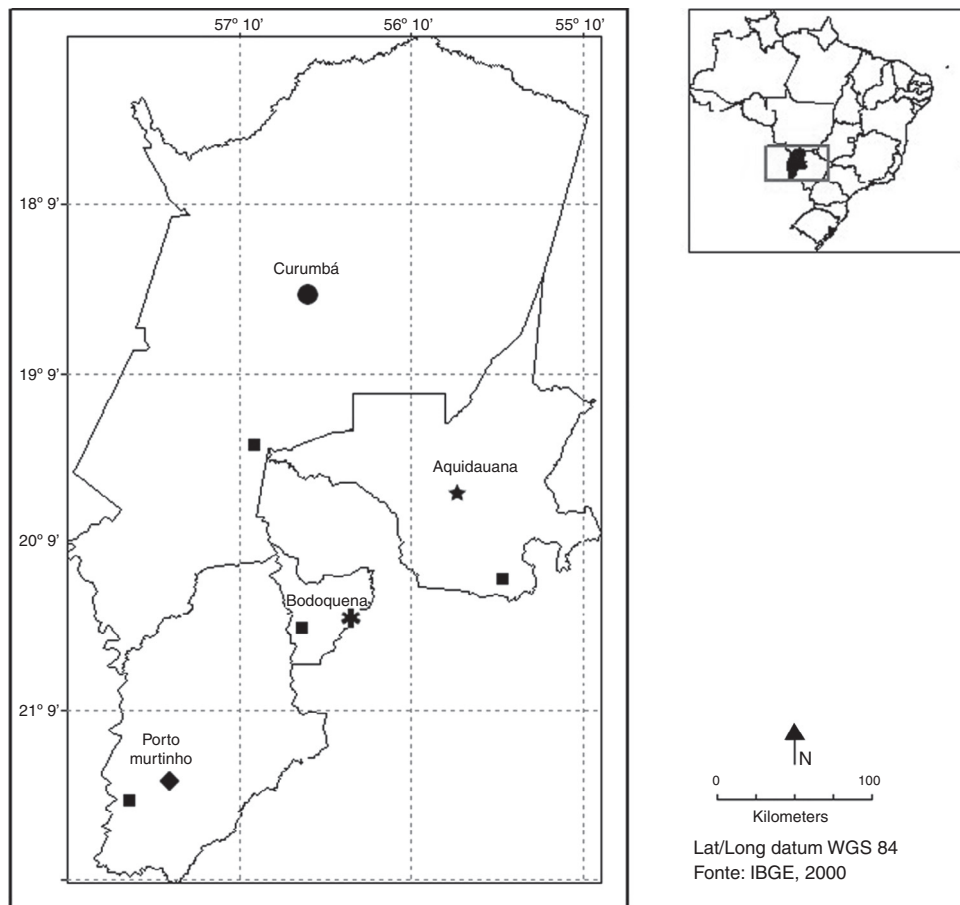


Fig. 1. Map of the sampling localities and their biomes of Mato Grosso do Sul State, Brazil. ■ sampling points in the municipality, ★ Cerrado, ✱ Atlantic Forest, ● Pantanal, ◆ Chaco.

river basins; elevation ranges from 200 m to 700 m (Governo do Mato Grosso do Sul, 2016). According to Köppen's climate zone classification (Alvares et al., 2013), most of the state's territory is in the tropical climate zone. The following climate types occur in Mato Grosso do Sul: Af (tropical without dry season), Am (tropical monsoon), Aw (tropical with dry winter) and Cfa (humid subtropical with hot summer), with a rainy summer and a dry winter, characterized by average temperatures ranging from 25 °C in the lowlands of Paraguay to 20 °C in the plateau of Bodoquena and Maracaju, and mean annual precipitation of 1500 mm (Governo do Mato Grosso do Sul, 2016).

Vegetation includes Cerrado, Pantanal, Chaco, and Atlantic Forest biomes, with approximately 60% of the area occupied by Cerrado (Silva et al., 2011). The richest plant families in all biomes are Fabaceae, Sapindaceae, Bignoniaceae, and Myrtaceae (Damasceno et al., 2005; Pott and Pott, 1999; Frison, 2007). Fabaceae is the most speciose family in Mato Grosso do Sul (Frison, 2007; Mendonça et al., 2008; Baptista-Maria et al., 2009; Freitas et al., 2013).

Samplings were carried out in areas of natural vegetation remnants in four municipalities of Mato Grosso do Sul State (IBGE, 2000): Aquidauana, Bodoquena, Corumbá, and Porto Murtinho, in the Cerrado, Atlantic Forest, Pantanal, and Chaco biomes, respectively (Fig. 1).

Sampling

We selected eight areas for sampling, two areas for each biome: Cerrado, Atlantic Forest, Pantanal, and Chaco (Table 1 and Fig. 1). Samples were collected during three expeditions, April 2012, December 2012, and December 2013, according to a time-based

method described by Price et al. (1998). Each area was sampled once, with sampling effort of two hours in each biome, totaling eight hours. According to Fernandes et al. (1995), there is no significant difference in gall abundance in different seasons, thus sampling during one season is sufficient to evaluate the number of galls per habitat. Galls are sessile and remain attached to the host plants, which makes it possible to detect galls even after adult emergence. All samples were collected at trail edges. This environment has high solar incidence and low humidity, with increased gall richness (Price et al., 1998), because galls occurrence is associated with hydrothermal stress in several environments (Fernandes and Price, 1991; Julião et al., 2014). In addition, route length (L) of each area was measured to better understand gall richness in the sampled areas (Table 1).

We collected branches of gall-bearing plants, which were subsequently photographed, stored, and labeled in plastic bags. Morphological descriptions of galls and identification of host plants and gall makers were conducted in laboratory. Characterization of gall's morphological types followed Isaías et al. (2013). Gall-maker species not obtained by adult emergence were identified via comparisons to several studies of gall-maker's community characterization in dry vegetation (Julião et al., 2002; Malves and Frieiro-Costa, 2012; Urso-Guimarães et al., 2003; Maia and Fernandes, 2004; Urso-Guimarães and Scarelli-Santos, 2006; Carneiro et al., 2009b; Coelho et al., 2009; Maia, 2011; Santos et al., 2011; Saito and Urso-Guimarães, 2012; Araújo et al., 2014; Maia and Carvalho-Fernandes, 2016; Nogueira et al., 2016). Plant identification was performed using identification keys, comparison with herbarium material and consultations with experts, and the specimens were deposited in the Universidade Federal de São Carlos,

Download English Version:

<https://daneshyari.com/en/article/8877281>

Download Persian Version:

<https://daneshyari.com/article/8877281>

[Daneshyari.com](https://daneshyari.com)