CONDITIONAL ANT-PLANT MUTUALISM IN BRAZILIAN TROPICAL SAVANNA

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INTRODUÇÃO

The pressure that herbivores exert over plant fitness leads plants to develop defensive strategies, such as associations with ants. Many authors have demonstrated that ant visitation to extrafloral nectaries (NEFs) can benefit the host because the ants prey upon the herbivores and/or reduce their activity on foliage. However, data concerning the effectiveness of these mutualisms are controversial (see Rico-Gray & Oliveira 2007). Lack of protection can be explained by variable susceptibility of distinct herbivore groups to ant predation and differences in the deterring skills among species of visiting ants (Dejean *et al*., 2000). Some herbivore groups have developed an array of morphological and behavioral mechanisms to circumvent the ants' deterring capacities as the secretion of sweet substances by homopterans and butterfly larvae (Del-Claro & Oliveira 1999) or some kind of feeding patterns, such as endophytic behavior of Curculionidae beetles, that feed and complete their development inside the flower buds and can avoid ant attacks causing severe damages on the plant (Santos & Del Claro 2001). These strategies of herbivores are common in Cerrado and can vary the beneficial results of ant-plant interactions

OBJETIVOS

The aim was to answer if in Banisteriopsis laevifolia (Malpighiaceae), an abundant species that interact with ants through their NEFs in Cerrado: a) Are the interactions between ants and herbivores able to vary the results of ant-plant interactions? These results could be related to behavioral characteristics of herbivores and ants? Are these results harmful to the reproductive success of plant? Our main hypothesis is that some behavioral mechanisms of herbivores and ants, beyond their abundance could influence the results of ant-plant interactions.

MATERIAL E MÉTODOS

Fieldwork was carried out from October 2008 to January 2009 (first year) and August 2011 to November 2011 (second year) at the Reserva Ecológica do Clube Caça e Pesca Itororó de Uberlândia – CCPIU, Uberlândia, Minas Gerais State, Brazil. During the month in which B. laevifolia sprouted, we tagged 30 individuals that were divided in control and treatment group. In control groups, plants did not receive any manipulation and in treatment groups the trunk was covered with resin (Tanglefoot ®) to avoid ants climbing. Each plant was monitored every two weeks during its four-month reproductive period and the richness and abundance of herbivores and ants were recorded. Voucher specimens were collected from non-experimental plants for identification. Differences in leaf-area loss were compared using repeated-measures ANOVA after arcsin transformation of the percentage values. The fruit set and herbivore abundance were compared using the Mann-Whitney U test. We used the Statistica 6.0.

RESULTADOS

In the first year, the presence of ants did not produce any difference in fruit set production (U=97, p=0.52, n=30). However, in the second year, the ants effectively protected the reproductive structures of plants (U=62, p=0.03,

n=30). The plant had a group of more abundant herbivores and a secondary group of less abundant ones. Curculionids (Curculionidae: *Anthonomus* sp.) were the most numerous (n=3906), followed by thysanopterans (n=161), hemipterans (n=76), other coleopterans (n=15) and orthopterans (n=9). These beetles infested control and ant-excluded plants equally (U=102, p=0.66, n=30), while the other herbivores were more abundant on ant-excluded plants (U=59.5, p=0.03, n=30). *Cephalotes* sp. was the most common ant species. In the second year the numbers of curculionids were lower (n=305), followed by thysanopterans (n=138), hemipterans (n=204), other coleopterans (n=20), orthopterans (n=9) and lepidopteran (n=2). These beetles infested as much control as ant-excluded plants (U=156.5, p=0,067, n=30) while the other herbivores were more abundant in ant-excluded plants (U=19.5, p=0.001, n=30). *Camponotus* sp. was the most common ant species.

DISCUSSÃO

Variation in the morphological and behavioral traits of herbivore species associated with their abundance influences the outcome of ant-plant interactions in different manners (e.g. Del-Claro & Oliveira 2000) and our results corroborate this hypothesis. Interactions in the field are variable in strength because species composition and abundance varies from year to year (Thompson 1994). The endophytic behavior of the main herbivores of the plant, curculionids beetles, and their high abundance during the first year most likely caused extensive damage to the buds, which may not be intensely protected by ants. Again, in the second year the ants were not effectively in remove the curculionids, but their low abundance mitigated the damage to their plant hosts and the ants were effective in protecting the reproductive structures of plants. In addition, changes in richness and abundance of ants may also vary the results of interactions (Sendoya *et al*. 2009). In the first year, *Cephalotes* sp were the most frequent visitors while in the second year Camponotus sp were the main visitors of plants. The Cephalotes genus includes species, such as *Cephalotes pusillus*, considered one species that confer benefits to the plants but recent studies have demonstrated that this ant species may provide no plant protection (Sendoya *et al*. 2009) or may even act as a parasite of mutualism (Byk & Del-Claro 2010). On the other hand, Camponotus genus typically have more aggressive species that compete with other ants for the dominance of the food source supply (Silvestre 2000).

CONCLUSÃO

Our study aimed to illustrate how variable are the insect-plant interactions, which can contribute to the knowledge of co-evolutionary processes involved in the maintenance of trophic relationships in natural communities

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