# THE DETERRENT EFFECT OF *CAMPONOTUS* ANTS ON POTENTIAL POLLINATORS OF *PITYROCARPA MONILIFORMIS* (BENTH.) LUCKOW & R. W. JOBSON (LEGUMINOSAE, MIMOSOIDEAE)

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## INTRODUÇÃO

INTRODUCTION Ants outnumber all other terrestrial organisms, and act as key predators of a great variety of arthropods (Hölldobler & Wilson, 1990). Several species are ubiquitous visitors of liquid food sources (*e.g.*, nectar at extrafloral nectaries (EFNs) and honeydew), and the diversity of ant - plant interactions make these associations good models to test many ecological hypotheses about trade - offs in plant fitness (Rico - Gray & Oliveira, 2007). Ant - plant - pollinator interactions may alter plant reproductive performance depending upon the partners and ecological settings involved. For example, ants may not only deter herbivores and thus function as "bodyguards" for the plant, but also displace or repel pollinators (Lach, 2008; Ness, 2006), to the detriment of the host plant (Blancafort & Gómez, 2005; but see Willmer & Stone, 1997). Ants promote decrease in pollinator visitation frequency and duration either by attacking approaching pollinators (*e.g.*, Lach, 2008) or due to exploitative consumption of nectar (Galen & Geib, 2007). *Pityrocarpa moniliformis* (Benth.) Luckow & R. W. Jobson is a mimosoid legume widespread in dry forests of Northeastern Brazil (caatinga) and Venezuela (Queiroz, 2009). A study about its reproductive biology at the same site (Ferreira, 2009) indicates that this species is self - incompatible and pollinated by a diverse guild of insects, with predominance of melittophily (bees from the families Halictidae, Megachilidae and Apidae, mainly the introduced *Apis mellifera* L.). Fourteen ant species belonging to 6 genera were recorded on EFNs. The genus *Camponotus* Mayr is the most abundant and diverse, with seven species patrolling leaves and foraging for EFN and honeydews at *P. moniliformis*, and often these ants patrol in the vicinity of inflorescences (Ferreira, 2009). These ants present a stressful omnivory, and many species are involved in aggressive interactions (Hölldobler & Wilson, 1990; Leal *et al.*, 2006).

## OBJETIVOS

AIMS In this work, we analyze the effect of agonistic behavior of *Camponotus* ants against potential pollinators of *P. moniliformis*. We address the question whether or not these ants repel these flower visitors by comparing (a) the frequency of visits by bees, Vespidae, Lepidoptera, and Diptera, and (b) the time spent in each inflorescence (visit length) for *Apis mellifera* L. (the main visitor during this study) and visitors of the Vespidae guild (secondary pollinators) in branches with and without ants.

## MATERIAL E MÉTODOS

MATERIALS AND METHODS The study population was located on the Campus of UEFS ($12^o12'10"$S, $38^o58'15"$W; about 243 m a.s.l.), Feira de Santana, BA, Brazil. Site comprises fragments of Caatinga, and anthropized areas in diverse successional stages. In Novem-

ber 2007, at each of eight trees, ten branches with pre - anthesis floral spikes were selected and tagged. Each branch was randomly assigned to be either an ant - excluded (five branches) or a control (five unmanipulated branches). A sticky Tanglefoot barrier was placed on the ant - excluded branches (revised each 2 - 3 weeks). We observed (on a week or two - weekly basis) ants presenting any agonistic behavior (*e.g.*, mandibular opening, antennal boxing, and biting attacks) against floral visitors. These ants were collected and stored in 2.0 ml eppendorf tubes pre - filled with 70% ethanol. Floral visitor's activity was observed between 08:00 and 13:00 hours. Each survey last for 15 minutes when we recorded all visits of flying insects belongs to six categories (*A. mellifera*, Halictidae bees, other bees, Vespidae, Lepidoptera, and Diptera). A total of 80 sets (flower shoots in tagged branches) were observed in different days ($n = 33$) from 1 December 2007 to 23 April 2008, when most of the *P. moniliformis* trees in the field were blooming. A total of 404 observations of 15 - min duration were made ($n = 101$ hours). For visit length analyses, we observed a total of 315 bees and 356 wasps.

## RESULTADOS

RESULTS AND DISCUSSION
Ants belonging to *Camponotus arboreus*, *C. blandus*, *C. crassus, C. fastigatus,* and *C. novogranadensis* exhibit a conspicuous agonistic behavior against some floral visitors of *P. moniliformis*. The presence of these ants in the vicinities of inflorescences significantly lowered the flower - visiting rate of Vespidae and bee foragers (post hocs, $P$ ¡ 0.05). This effect was unimportant for Lepidoptera and Diptera guilds (all $P$ ¿ 0.05). Similar results were found by Ness (2006), but see Lach (2008), and Blancafort & Gómez (2005), for a neutral effect of ants. The effect of ant presence on visit lengths of Vespidae was neutral ($t$ - test = 1.52, df = 136, $P$ = 0.064). Additionally, we hypothesis that the observed decrease in visit length of *A. mellifera* in presence of ants ($t$ - test = 6.48, df = 148, $P$ ¡ 0.001) possibly contributes to increase the pollen flow among plants, and this may potentially improve reproductive performance in this self - incompatible species. Indeed, we observed a lowered fruit and seed output in branches without ants (Ferreira & Queiroz, unpub. data), and this positive effect was also found by Willmer & Stone (1997) in a similar system. Alternatively, seed predation (*e.g.* by Bruchidae beetles) may be quantitatively inferior in branches with ants. Further investigation should clarify the observed positive impact on plant fitness.

## CONCLUSÃO

CONCLUSION
Whether agonistic behavior of *Camponotus* ants against potential pollinators in *P. moniliformis* is a selective force influencing the host plant fitness or a localized factor operating at the studied population is a matter requiring supplementary data (*e.g.*, additional observations comprising more populations). Further studies on the mechanisms behind the observed generalized absence of *Camponotus* ants in flowers of *P. moniliformis* are underway (*e.g.*, bioassays for testing ant responses to floral volatiles). (This work is part of the Master Thesis of Marcio H. S. Ferreira, and was supported by FAPESB (1712/2007) and CNPq (136460/2008 - 9) scholarships).

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