FRUIT AND LEAF VISITATION BY *PSEUDOMYRMEX SPINICOLA* IN RESPONSE TO DISTURBANCE OF *ACACIA COLLINSII*

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Abstract: Acacia collinsii exists in an obligate mutualism with *Pseudomyrmex spinicola*, creating the potential for a conflict between ant protective response and seed dispersal. We hypothesized that when an *A. collinsii* branch is disturbed, *P. spinicola* would avoid fruits in their defensive response. We created a disturbance on *A. collinsii* and then recorded ant visits to fruits and leaves. There was no significant *P. spinicola* avoidance of fruits after disturbance.

Key Words: mutualism, seed dispersal

INTRODUCTION

The ant *Pseudomyrmex spinicola* is an obligate mutualist with the tree *Acacia collinsii*, in which the ant receives habitat and nutrients and defends the tree from herbivores and competitors. *P. spinicola* display aggressive host protection behavior in response to a disturbance on *A. collinsii*. This creates the potential for a conflict in which *P. spinicola* deter the visitation of their mutualists, such as pollinators and seed dispersers.

P. spinicola decrease visitation on mature flowers, which may prevent a conflict between ants and pollinators (Ghazoul 2001, Raine et al. 2002). A similar conflict may exist between ants and seed dispersers, because *A. collinsii* seeds are thought to be animal-dispersed (Hunter and Trierweiler 2005).

We hypothesized that *P. spinicola* would avoid fruits after disturbance on *A. collinsii*.

METHODS

Data were collected on 9 January 2005 from ten *P. spinicola*-inhabited *A. collinsii* trees 500 m east of the Palo Verde air strip and on El Pizote Trail, in Palo Verde National Park, Costa Rica. We selected branches with a green fruit opposite from a leaf (Fig. 1). Disturbances were created by tapping the branch for the first 30 s of every minute, for five minutes. Ant visits to the leaf and pod were recorded each minute by two recorders.

The difference between leaf and pod ant visitation was analyzed using a paired t-test. We analyzed the change of ant visitation on pods and leaves per minute with a one-way ANOVA.

RESULTS

There was no difference between the number of ant visits on leaves (22.7 ± 14.5) and visitation frequency on pods (20.9 ±

18.8); (t = 0.45, df = 7, P = 0.66). Mean difference between leaf and pod visits was 2.0 (SE = 4.40). There was no difference in ant visits with respect to time on leaves (F = 0.38, df = 4, 35, P = 0.82) or on pods (F = 1.53, df = 4, 30, P = 0.22; Fig. 2).

DISCUSSION

Our results refuted the hypothesis that *P. spinicola* would avoid fruits after disturbance on *A. collinsii*. We suggest two possible explanations for this behavior. First, *A. collinsii* fruits dehisce, potentially allowing seeds to fall to the ground. In this case, ants would never come into contact with dispersers, eliminating potential for a conflict. Second, we studied immature fruits; therefore, we cannot determine if ants alter their visitation on mature fruits.

We had to compromise our samples in two ways. Ideally, we wanted the ants to choose between defending a single healthy fruit or a leaf, as shown in Fig. 1. However, this specific condition was not always available. Also, two trees were excluded from our analysis because ants did not visit the focal leaf or fruit, despite ant presence on other parts of the tree.

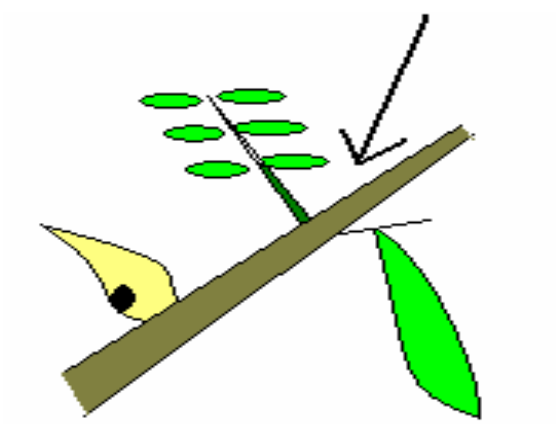

Figure 1. Idealized diagram of the configuration of leaf and fruit sampled for ant activity. The arrow refers to the junction of fruit and leaf. The structure at the stem's base represents a thorn that houses *P. spinicola*.

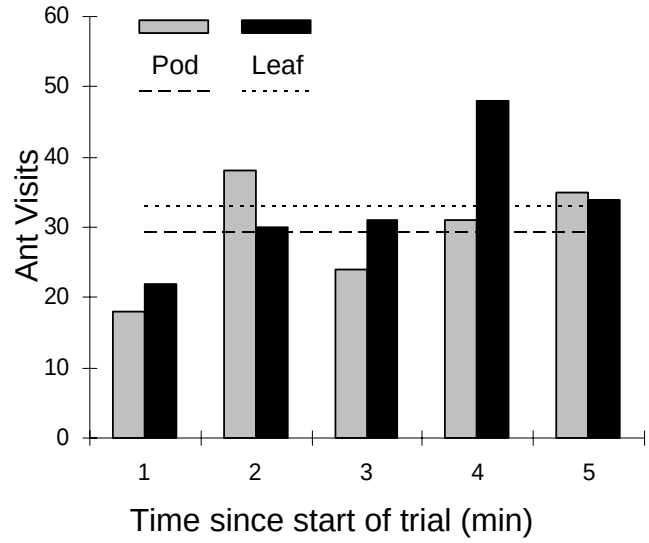

Figure 2. Ant visits per minute on fruits (n = 8) and leaves (n = 8) following disturbance of *Acacia collinsii* at Palo Verde National Park, Costa Rica.

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