TESTING MANIPULATION OF HOST TREE GEOMETRY BY TWO ACACIA ANT SPECIES, *PSEUDOMYRMEX FLAVICORNIS* AND *P. SPINICOLA*, IN NORTHWESTERN COSTA RICA

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Abstract: *Pseudomyrmex spinicola* is known to manipulate the geometry of its host plant, *Acacia collinsii*. We hypothesized that *P. flavicornis* also has this capacity, and modifies host growth in ways that reduce contact with plants occupied by the known superior competitor, *P. spinicola*. We found no significant difference in the geometry of *A. collinsii* trees inhabited by *P. flavicornis* and *P. spinicola*, indicating that the two species of acacia ants do not differ in their manipulative behavior.

Keywords: Pseudomyrmex flavicornis, P. spinicola, Acacia collinsii*, acacia ants, escape in space, host manipulation*

INTRODUCTION

Acacia collinsii is a host for several species of acacia ants that provide protection in return for food and shelter. *Pseudomyrmex spinicola* colonies protect host trees against arthropod herbivores and encroaching plants more vigorously than does *P. flavicornis* (Janzen p. 764, in Janzen, 1983). This, along with *P. spinicola's* greater aggression (Janzen p. 764, in Janzen, 1983), suggests that *P. flavicornis* might avoid contact with *P. spinicola*. Growth manipulation of the host tree has been shown for *P. spinicola* in part of its range (Janzen p. 764 in Janzen, 1983). We hypothesized that *P. flavicornis* behaves similarly and would manipulates host tree geometry to avoid contact with acacias occupied by more aggressive *P. spinicola* colonies.

METHODS

We conducted our study on both sides of La Carreta Road, ca. 6 km SE of the OTS field station in Palo Verde National Park, Costa Rica. We haphazardly chose 27 A. collinsii trees of base diameter 3 – 7.5 cm, inhabited by one of two acacia ant species: *S. spinicola* or *S. flavicornis*. We sampled 12 trees inhabited by the black ant *P. flavicornis* and 15 inhabited by the red ant *P. spinicola*, and randomly selected two branches on each tree. We measured the horizontal distance from the tip of the branch to the base of the trunk and the number of secondary branches > 5 cm long on each branch. We then averaged the measurements for the two branches on each tree to obtain one value per tree.

RESULTS

We found no significant difference between the average number of secondary branches > 5 cm on *A. collinsii* trees inhabited by *P. flavicornis* and *P. spinicola* ($t = 0.25$, $df = 24.97$, $P = 0.80$). Mean horizontal distance from the branch tip to the tree trunk likewise did not differ between *A. collinsii* trees occupied by the two ant species ($t = 0.44$, $df = 23.23$, $P = 0.66$).

DISCUSSION

We found no evidence of a difference between the manipulative behavior of *P. flavicornis* and that of *P. spinicola*. Both species may manipulate their host trees similarly, but we have no clear evidence of manipulation by either species. Haphazard (rather than random) sampling could have influenced the outcomes of statistical tests.

P. flavicornis could conceivably alter branch shape in response to chemical cues from *P. spinicola* on a nearby branch. Such facultative behavior could be tested by examining the morphology and growth dynamics of paired trees (a *P. spinicola* colony in close proximity to a *P. flavicornis*) compared to interspecific pairs that are not in close contact.

LITERATURE CITED

Janzen, D.H., ed. 1983. Costa Rican Natural History. Chicago, Illinois: University of Chicago Press. pp. 762-764.