

BEHAVIORAL RESPONSES OF *ATTA CEPHALOTES* TO INTRODUCED YOUNG AND OLD LEAF FRAGMENTS

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ABSTRACT (DJG)

We tested the behavioral response of the leaf cutting ant, *Atta cephalotes*, to introduced young and old leaf fragments of two different plant species in Corcovado National Park, Costa Rica. We expected the ants to prefer young leaves due to their higher nutrient concentration. A low acceptance rate of leaves of all age classes prevented us from obtaining an adequate test of our hypothesis.

Key Words: *Atta cephalotes*, leaf-cutter ant, foraging preference, leaf age

INTRODUCTION (DJG)

The leaf cutting ant, *Atta cephalotes*, forages on plant parts that are carried to the colony and used in the cultivation of a basidiomycete fungus. The plant parts serve as a substrate for the fungus and as a nutrient source for its growth.

Leaves of different ages have varying amounts of nutrients in their tissues. As leaves mature, there is a decrease in protein concentration and nutritional value (Deshmukh, 1986). Therefore, we hypothesized that *A. cephalotes* preferentially forage on younger leaves. We tested this by placing equal sized fragments of young and old leaves across a main foraging trail and observing *A. cephalotes*' response to these introduced fragments.

METHODS (PSW)

Our study site was located on Sendero Naranjo, 500m from Estacion Sirena in Corcovado National Park, Costa Rica. Both young

and old leaves were collected from a nearby, unidentified tree (Species Q) and torn by hand into small fragments similar in size to those carried by *A. cephalotes*. One new-leaf and one old-leaf fragment were placed together on the trail in the early morning and observed for up to 15 min. For each fragment, we recorded whether: 1) it was accepted into the flow of ant-cut fragments being transported back to the colony, 2) it was cleared from the trail, or 3) it was ignored and remained on the trail at the end of 15 min. A total of 21 pairs were placed on the trail. As a control, twenty, ant-cut leaf fragments were collected from the trail and the ants removed. Those fragments were reintroduced to the trail to see if handling of the fragments by the experimenters affected the ants' responses.

In the late afternoon, a second trial of 21 pairs of leaf fragments was performed. This time, however, the fragments were from young and old leaves of *Ochroma lagopus* (Bombacaceae).

Chi-square analysis was used to determine if different age classes of leaf fragments received differential treatment.

Table 1: Number of new and old growth leaf fragments cleared, accepted, or ignored in the Species Q trial.

	Cleared	Accepted	Ignored
New	14	3	4
Old	17	1	3

RESULTS (PSW)

A. cephalotes showed no preference for new-growth or old growth leaves in either Species Q ($X^2 = 0.93$, $df = 2$; Table 1) or *O. lagopus* ($X^2 = 2.40$, $df = 2$; Table 2). 100 percent of the control fragments were accepted back into the flow of fragments to the colony. The majority (74%) of all Species Q fragments were cleared from the trail, while the majority (81%) of all *O. lagopus* fragments were ignored (X^2 for species difference = 34.74, $df = 2$, $p < 0.001$)

DISCUSSION (MEB)

Low acceptance of leaf fragments of all age classes prevented us from obtaining an adequate sample size to test our hypothesis. High acceptance of control leaf fragments indicated that this was not due to our handling of the fragments. Low acceptance may have been due to a preference for leaves of the species currently being foraged on by the colony, a lack of a

Table 2: Number of new and old growth leaf fragments cleared, accepted, or ignored in the *O. lagopus* trial.

	Cleared	Accepted	Ignored
New	5	0	16
Old	2	1	18

chemical marking signal on the fragments (Gilmartin et al., 1991 FSP), or a physical difference between fragments cut by ants and those torn by us.

The high percentage of *O. lagopus* fragments ignored relative to Species Q can be explained by diurnal variation in foraging activity. During the morning trial with Species Q most fragments were cleared by ants moving away from the colony. In the afternoon trial with *O. lagopus* most ants on the trail were returning to the colony with leaf fragments, and trail clearing activity was minimal.

In a future study, it would be beneficial to examine leaf age preferences using the tree species *A. cephalotes* is foraging on at the time.

LITERATURE CITED

- Deshmukh, Ian. 1986. *Ecology and Tropical Biology*. Blackwell Scientific Publications, New York.
- Gilmartin, E., T. Gorman, A. Mattoon, L. Taboada, and T. Young. "Detection of sensory cues left on leaf segments selected by *Atta cephalotes*" pages 57-60 in T. Grabowski and G. York, editors, *Dartmouth Tropical Biology*, 1991. Dartmouth College; Hanover, NH.