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Plant-Animal Interactions

Extrafloral Nectaries and Insect Interactions: Annotated Bibliography

Baker, D.A., Hall, J.L., and Thorpe, J.R. 1978. A study of the extrafloral nectaries of *Ricinus communis.* New Phytology 81, 129-137.

An analysis on the fine structure and exudates composition of the extrafloral nectarines of *Ricinus communis.* This is the only direct study that I could find that addresses the "sap-valve" theory of why extrafloral nectaries exist (sap-valve theory → to excrete excess sugar when organs are developing). They found that the gland exudates differed from the phloem contents, but there was only a small (20%) retention of nitrogen. These findings did not lend support to the sap-valve theory.

Barton, A. M. 1986. Spatial Variation in the effect of ants on an extrafloral nectary plant. Ecology 67(2): 495-504.

Hypothesized that extrafloral nectary possession would increase plant reproductive success only where ant density and potential herbivore density is high. Found that only where the abundance of both ants and potential herbivores was high did ants visiting extrafloral nectaries strongly increase the reproductive success of the plant *Cassia fasciculata.*

Beckmann, Jr., R. L. and Stucky, J. M. 1981. Extrafloral nectaries and plant guarding in *Ipomoea Pandurata* (L.) G. F. W. Mey (Convolvulaceae). American Journal of Botany 68(1):72-79.

A nice, older study to get you in the groove of thinking about extrafloral nectaries. The paper examines the estrafloral nectary system on *I. pandurata* and examines the relationship between *I. pandurata* and its ant & wasp visitors.

Eubanks M. D. *et al*. 1997. The exploitation of an ant-defended host plant by a shelter-building herbivore. Oecologia 109:454-460.

This paper goes beyond the general ant-Acacia interactions and investigates a specific herbivore of *Acacia cornigera.* The larvae of a *Polyhumno* species feed on this specific species of Acacia, and they build little sealed shelters to protect themselves from the ant defenders. This study explores the benefits of feeding on an ant defended plant.

Keeler, K. H. 1981. Function of *Mentzelia nuda* (Loasaceae) postfloral nectaries in seed defense. American Journal of Botany 68(2):295-299.

This study found that postfloral (which are considered extrafloral) nectaries attract ants whose presence significantly enhances seed set.

Pemberton, R.W. and Lee, J-H. 1996. The influence of extrafloral nectaries on parasitism of an insect herbivore. American Journal of Botany 83(9):1187-1194.

Looks at a fairly new aspect of extrafloral nectary research: parasitoid attraction. Researchers looked at the general effects that parasitoids had on gypsy moth larvae on

various types of trees (some with extrafloral nectaries and some without). They found that on average, the combined parasitism of gypsy moth larvae and pupae was significantly higher when collected from trees that had extrafloral nectaries. Thus, this study suggests that one function of extrafloral nectaries is to attract parasitoids that can kill plant herbivores.

Picket C.H. & Clark W.D. 1979. The function of extrafloral nectaries in *Opuntia acanthocarpa* (Cactaceae). American Journal of Botany 66(6): 618-625.

Found that ants consume the extrafloral nectar from this plant, and they defend the plant against cactus feeding insects. They also ran an analysis on the contents of the extrafloral nectar, and found that it had high amino acid content. They suggest that this nectar could provide as a sole food source for the ants.

Stephenson A.G. 1982. The role of the extrafloral nectaries of *Catalpa speciosa* in limiting herbivory and increading fruit production. Ecology 63(3): 663-669.

A nicely packaged study of the interaction between *Ceratomia catalpae* and *Catalpa speciosa*. They found that the extrafloral nectaries on the leaves of *Catalpa* secrete significantly more nectar when the leaves have been damaged by the herbivore. Also, the ants that are attracted to the nectaries attack the larvae of the herbivore, and they found this behavior allows for significantly more fruits on the plants to develop.

Wagner, D. 1997. The influence of ant nests on *Acacia* seed production, herbivory and soil nutrients. Journal of Ecology 85:83-93.

This study does exactly what the title says. They found that the acacia plants with nests produced nearly twice as many seeds as plants without nests. While there was an increase in the number of ants on the plants that had extrafloral nectaries, they did not find an increase of protection from herbivory. This is the only study that I could find that explores the nutrient enhancement hypothesis: extrafloral nectaries attract ant nests at the base of the plant and that this enhances the soil. Wagner found that while there was no relation between the presence of nests and chemical characteristics of plant tissue, the soil from under the plants with nests contained significantly higher concentrations of phosphorus, nitrate, ammonium and water.

Wagner, D. and Kay, A. 2002. Do extrafloral nectaries distract ants from visiting flowers? An experimental test of an overlooked hypothesis. Evolutionary Ecology Research 4:293-305.

Investigated the question "When presented with extra nectar sources, do fewer ants visit each nectary or does recruitment keep visitation constant?" In essence, they found that significantly fewer ants visited floral nectaries when presented with extra nectar sources, and that the presence of extra nectar did not significantly increase the numbers of ants coming to the plants. They built little model plants to conduct this study, and I wasn't completely sold on their modeling.