ESSAI

Volume 7 Article 24

4-1-2010

# The Effects of *Lasius Alienus* Nests on the Floral Richness of a Disturbed Path in a Re-created Tallgrass Prairie

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# The Effects of *Lasius Alienus* Nests on the Floral Richness of a Disturbed Path in a Re-created Tallgrass Prairie

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(Honors Biology 1151)

## ABSTRACT

The study analyzed the relationship between myrmecochorious plant richness and *Lasius alienus* nests in a recreated tallgrass prairie, located in Northeastern Illinois. Eighty $1m^2$ quadrants were established along a disturbed path, half with nests of *L. alienus* and half without. Floral richness was quantified in each quadrant. The results showed that floral richness was greater in quadrants where ant nests were present. It was also determined by a chi-square goodness-of-fit test that the nests were uniformly distributed. The effect of the disturbance on the myrmecochorious relationship is discussed in the discussion.

## INTRODUCTION

Ants play a large role in the ecology of a prairie. Ants are a major distributor of seeds in a relationship called myrmecochory. Beattie, et al. (1979) estimate that 44% to 61% of spring floral in a West Virginia study site have a myrmecochoric relationship with ants. Of the plant diasporas studied there was not a general distinction that certain ants moved certain seeds, except for *Lasius alienus*, which is apparently too small to move some of the larger diaspores. A later study done by Pudlo, et al. (1980) shows how ants spread the seeds of *Sanguinaria canadensis,* a small perennial herb, in relation to disturbance in the site. The ants moved seeds less often in more disturbed areas resulting in clumps of asexually reproducing *S. canadensis*. In undisturbed sites the ants would carry the seeds up to twelve meters, out of the range of the parent. This facilitated sexual propagation. One of the myrmecochorius ants observed was *L. alienus*, the focus of the following paper.

Our objectives were to look for evidence of intraspecific competition among the ant colonies based on the distributional patterns and thereby gain knowledge about the ecology of the ant in disturbed systems and examine how floral richness varies according to the presence of nests of *L. alienus*.

## METHODS

The study site was the 7.1 ha Russell Kirt Tallgrass Prairie located on the main campus of College of DuPage in Glen Ellyn, IL. Re-creation of the site began in 1984 with plantings representing the historic local prairie. The most common tall grasses are big bluestem (*Andropogon gerardii* Vitman), prairie dropseed (*Sporobolus heterolepis* Gray), and Indian grass (*Sorghastrum nutans* (L.) Nash). The prairie is burned annually during early spring, including the spring of 2008.

A regularly mowed trailed though the Russel Kirt Tallgrass Prairie was selected as the study site. The trail was about 1.5m wide and 200m long. The trail was measured off into $1m^2$ quadrants at regular intervals based on the presence of and absence of *L. alienus*. The floral richness was recorded in each quadrant. Forty quadrants were sampled where there were *L. alienus* nests present and forty quadrants where *L. alienus* nests were absent. Counts of *L. alienus* nests per quadrant were also

recorded. The results were put into a graph (Table 1) and analyzed.

The Student t-test was used to examine differences in floral richness where nests of *L. alienus* were present as to where they were absent. Significance was determined as $P \leq 0.05$. The Chi-square goodness of fit test was used to determine if the distribution of *Lasius alienus* colonies departed from a uniform distribution. It was predicted that the colonies would be uniform in distribution if the colonies are territorial.

## RESULTS

Common plants found along the prairie trail were Kentucky bluegrass (*Poa pratensis*), common plantain (*Plantago major*), dandelion (*Taraxacum officinale*), hop clover (*Trifolium agrarium*), and red clover (*T. pretense*). The distribution of *L. alienus* nests followed that of a uniform distribution ($\chi^2 = 54.6$; df = 39, $P<0.05$). The mean number of nests of *L. alienus* present along the prairie trail was $1.800 \pm 0.758$ (mean + standard deviation, n = 40).

The floral and ant nest counts from the quadrants are summarized in Table 1. Mean floral richness was significantly greater where the nests of *L. alienus* were present than where they were absent ($t = 5.632$; df = 78; $P<0.001$).

## DISCUSSION

The uniform distribution of *L. alienus* nests indicated territoriality, a behavior often shown by ants to reduce intraspecific competition between colonies (Doncaster 1981). This finding supports Brian et al. (1965) who reports that *L. alienus* maintains a food territory.

Disturbance of ants can also play a role in an ant species relationship with a plant. The Russell T. Kirt prairie that the experiment was performed on is burned every year, a form of disturbance that could affect the myrmecochoric relationships along the trail. However, Brian, et al. (1976) concluded that regular burnings doe not affect the types of flora and ants. Seed dispersal by ants may be promoted by fire (Parr et al. 2007). This observation supports that fires do not really disturb the myrmecochoric relationship on the prairie and can actually enhance them.

If the ants affect the floral richness in the disturbance of path it is highly possible that the ants affect the floral richness in undisturbed areas of the prairie to a larger degree, as most of the studies done showed that the majority disturbance resulted in the a decrease of floral richness (Heithaus and Humes 2003).

If myrmecochorious ants affect the floral richness of the path it can also logically be assumed that the ants are affecting the floral richness of the prairie. Further tests would be required to test this hypothesis. Mlot (1990) observed that many species of ants showed up the recreated prairie on their own and did not need to be introduced. Native ant species are an important part of a restored prairie's ecology. This knowledge and findings presented on the current paper indicate ants cannot be ignored in prairie recreation projects.

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Table 1. Summary (mean ± standard deviation, n=40) of counts of floral richness and nests of *Lasius alienus*.

| Treatment | Mean ± standard deviation |
|---|---|
| Ant nests absent | 5.18 ± 1.24 |
| Nest of *Lasius alienus* present | 6.87 ± 1.45 |