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1974 PROGRESS REPORT

RODENT SEED FORAGING STRATEGIES AND
COMPETITION WITH ANTS IN THE
SONORAN DESERT

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ABSTRACT

By December 1973, eight experimental plots were established on the Silverbell Validation Site. Two plots were subjected to each of the following treatments: ants excluded, rodents excluded, both rodents and ants excluded, and unmanipulated control. Although the plots were set up prior to the beginning of the year, most of the year was required to complete the removal of the appropriate taxa. Sampling the rodents, ants and plants showed no significant effect of our experimental treatments (except for elimination of excluded granivores) during 1974. This lack of immediate effect was expected because there had been little opportunity for seeds to be produced and to accumulate in differential numbers in the absence of predation.

INTRODUCTION

The purpose of our work was to examine interactions among distantly related taxa that feed on seeds and to evaluate the impact of these granivores on the plant community. Previous work (Brown et al. 1975) indicated that in desert ecosystems rodents and ants were important predators of seeds and they overlapped greatly in their tendency to harvest similar sizes and species of seeds from the surface of the substrate. The present research was designed to evaluate the interactions among rodents, ants and plants by experimentally manipulating the two major taxa of granivores.

METHODS

In August 1973 four experimental plots were established on the northeast corner of the Silverbell Validation Site. Each plot was 36 m in diameter and was located on flat terrain in *Larrea-Ambrosia* habitat. One of the plots was subjected to each of the following treatments: 1) rodents removed by trapping and kept excluded by fencing (with ¼-inch mesh hardware cloth, 3 feet wide, buried in the ground and turned over on top); 2) ants removed and kept excluded by application of the insecticide "Myrex" to individual colonies; 3) both rodents and ants removed and kept excluded by trapping and fencing, and by application of insecticide, respectively; and 4) unmanipulated control. A replicate set of four plots was set up in December 1973.

During 1974 the study site was visited three times to remove rodents and ants from those plots from which they were to be excluded and to census rodents, ants and plants in order to obtain baseline data. Rodents were censused by live trapping. Twenty Sherman live traps were set in a regular configuration on each of the unfenced plots. The fenced pens were trapped with Museum Special dead traps to remove any rodents that were present. Ants were censused by locating and counting individual colonies. Annual plants were censused by cutting the above-ground portions of all individuals within a 1-dm² ring. Equal numbers of haphazardly chosen sites and under *Larrea* shrubs were censused on each plot.

RESULTS AND DISCUSSION

It required a number of efforts to complete the removal and exclusion of rodents and ants from the experimental plots. This was owing to the fact that several ant species are

active for only a brief period each year; it is necessary to treat the colonies during that period in order to remove them. A number of trapping efforts were required to remove the rodents. Apparently there were several deep burrows that enabled the rodents to make their way under the fences. Repeated dead trapping within the pens and filling in of those burrows near the fences resulted in the gradual elimination of the rodents.

The results of the experimental manipulations did not produce any significant effects in 1974. There were no significant changes (relative to controls) in populations of either rodents or ants on those plots where the other taxon had been removed. We also censused the summer annuals that had produced a good crop in response to rains in July and August. There was a great deal of variance in plant population density, biomass and species composition among subsamples from a plot, and no significant differences could be detected between plots.

It is not surprising that we were unable to detect effects of our manipulations during 1974. Even by the end of the year the oldest plots had had only 16 months to produce effects of removing one or both taxa of granivores. Almost certainly this is not sufficient time for at least two reasons. First, there was a significant lag between the establishment of the plots and the successful exclusion of the appropriate granivores. Second, only one heavy seed crop was produced after the plots were established. That occurred in the autumn of 1974 in response to rains the preceding July and August. Presumably, the seeds in the soil prior to midsummer 1975 had been heavily worked over by granivores prior to establishment of the plots and exclusion of the granivores, so one would expect a minimal effect of our treatments until after that time.

In conclusion, I note parenthetically that by early 1975 there was evidence of a dramatic effect of our experimental manipulations on ants and a smaller effect on rodents. Each taxon appeared to have increased on those plots where the other had been excluded. There may also have been a significant effect on the winter annuals, but those samples are still being analyzed.

LITERATURE CITED

- BROWN, J. H., J. J. GROVER, D. W. DAVIDSON, and G. A. LIEBERMAN. 1975. A preliminary study of seed predation in desert and montane habitats. *Ecology* 56:987-992.