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A COMPARISON OF THREE TRAPS FOR REMOVAL OF COLUMBIAN GROUND SQUIRRELS

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ABSTRACT: A study to determine the relative effectiveness of three trap types for Columbian ground squirrel (Spermophilus columbianus) removal was conducted during May and July 1985 in Missoula County, Montana. A Two-way Analysis of Variance was used to test for differences in reduction of burrow activity between conibear, box, and live traps versus controls. All trap types significantly reduced ground squirrel activity when compared to the controls for each month, but no trap type was significantly more effective than the others. Ground squirrels are more easily caught in July; trapping during both months is recommended for maximum reduction in ground squirrel populations.

INTRODUCTION

Columbian ground squirrels have been a persistent source of agricultural damage in Montana for a least 75 years (Birdseye 1912). An estimated $1.2 million of damage occurred in western Montana during 1972 (Seyler 1973 in Record 1978). Ground squirrels are effectively controlled with various rodenticide baits (Record 1978, Matschke et al. 1982, Salmon and Schmidt 1984, Sullivan 1986). However, concerns about environmental hazards, especially to nontarget wildlife (Miller 1988, Record and Marsh 1988, Sullivan 1988), have resulted in limitations on use of rodenticides. The Environmental Protection Agency’s new program to protect threatened and endangered species will likely result in localized restrictions on some rodenticides that are currently registered. These restrictions and use limitations require the development of additional control methods. In relatively small areas, or where use of toxics pose special problems, trapping is the logical alternative control method, but information is not available on efficacy of trapping and the comparative merits of various trapping methods. The purpose of this study was to determine the efficiency of box traps, live traps, and conibear traps during May and July for reducing Columbian ground squirrel activity.

METHODS

Study Area

The study was conducted on Lindbergh Cattle Company property, in the Blackfoot Valley, approximately 56 km east of Missoula, Montana. Vegetation was a sagebrush (Artemisia tridentata) and bluebunch wheat grass (Agropyron spicatum) community, adjacent to irrigated hay pastures. At this latitude and elevation, squirrels first emerge from hibernation in late March and immerge in early August. The young appear above ground in early June (Moore 1937).

Study Design

The study area was divided into 24 0.5-ha (50 x 100- m) plots. Two factors, trap type (box traps, live traps, conibear traps, and an untrapped control) and trapping period (May and July) were examined during this study. Three plots were randomly assigned to each of the eight factor cells (trap type x trapping period). Because ground squirrel density varied among plots, an index to population reduction (burrow activity), was the variable used for this analysis. All active burrows, identified by open, unobstructed holes with fresh digging or runways, were numbered within each plot, and 20 were randomly selected and covered with dirt 3 days prior to trapping, and again immediately after trapping. The number of burrows uncovered was counted when trapping began, and again 3 days after trapping. Percent reduction in ground squirrel burrow activity was determined by the following formula:

\[
\frac{\text{Burrows opened pretreatment} - \text{Burrows opened post-treatment}}{\text{Burrows opened pretreatment}} \times 100 = \% 
\]

Two-way Analysis of Variance was used to test the hypothesis of equal mean reduction in the ground squirrel burrow activity (Sokal and Rohlf 1984:321-367). Percent reduction in burrow activity was transformed using the arcsine transformation. Transformed data complied with analysis of variance assumptions of normality and homogeneous variances. Duncan’s multiple range test was used to determine which treatments were different when the null hypothesis was rejected. Chi-square tests of fit were used to test for differences in sex ratios (Sokal and Rohlf 1984:702).

Eight burrows within each plot, except for controls, were randomly assigned traps. The box trap\(^a\), a 10-cm wood cube with bottom and side open, contained a spring-loaded wire that caught squirrels at the neck or shoulders when the baited trigger was pulled. Conibear traps (size \(\frac{1}{10}\) ) were manufactured by the Woodstream Corporation\(^b\), Lititz, Pennsylvania. Live traps, 15 x 15 x 48 cm, were manufactured by the Tomahawk Trap Company, Tomahawk, Wisconsin. Traps were baited with rolled oats, peanut butter, and apples. Oats were used to prebait traps 1 day prior to trapping. All traps were placed within 0.5 m of active burrows. Each month trapping ran for 4 consecutive days; sex and age (yearling or adult in May and juvenile or adult during July) were determined for all captured squirrels.

\(^a\)Box traps were obtained from Joseph Cook, 11508 Keith Drive, Whittier, CA 90606.

\(^b\)Note: The use of trade names and/or manufacturers’ names is not intended to constitute an endorsement.
and reproductive status of females in May was determined by examining reproductive tracts (Murie et al. 1980). The daily percent of total captures within a plot was averaged for each trap type to calculate a mean percent capture per day.

RESULTS

A total of 263 ground squirrels were captured; 100 between 19 and 22 May, and 163 between 7 and 10 July. Sex ratio of captures did not deviate from an expected 50:50 for total (49:51; $X^2 = 0.103; P > 0.1$), May (46:54; $X^2 = 0.516; P > 0.1$), or July (50:50; $X^2 = 0.0027; P > 0.1$) capture periods. Proportion of adults captured was 81% and 51% for the May and July trapping periods, respectively. All adult females were lactating during May. The mean percent of captures was low on day 1 for the box trap (Fig. 1), and mean percent of captures on day 4 ranged from 18% for the live traps to 28% for the conibear traps.

![Fig. 1. Mean percent Columbian ground squirrel captures per day for three trap types, May and July 1985.](image)

Trapping period and trap type were both significant factors in reduction of ground squirrel populations based on the burrow activity index (Fig 2). All treatments were significantly different from the control plots ($F = 4.90$; d.f. = 3, 16; $P = 0.01$), but no difference in percent reduction was observed among trap types. Percent reduction in burrow activity ranged from 40% for the live traps to 42% for the conibear traps. Mean percent reduction in burrow activity for all traps was greater in July than in May ($F = 5.19$; d.f. = 1, 16; $P = 0.04$). There were no interactions between the two factors ($F = 0.91$; d.f. = 3, 16; $P = 0.46$).

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LITERATURE CITED


