

## **Using IPM techniques to Improve Cooperator Effectiveness to Mitigate Damage Caused by Townsend's Ground Squirrels in Irrigated Alfalfa**

Project Personnel: Mark Nelson (Project Leader). Terry Messmer (Collaborator). Cooperators: Billy Dalton, Beaver County Commissioner; Arlan Mayer, SCD Chairman; Keith James, grower.

### **Situation Statement**

Townsend's ground squirrel's (*Spermophilus townsendi*) populations on agricultural lands in Beaver County are increasing. High populations of ground squirrels can compete with livestock for forage; destroy food crops, golf courses, and lawns; and can be reservoirs for diseases such as plague. Their burrowing activities alter irrigation systems. Burrow mounds not only cover and kill vegetation, but damage haying machinery.

Hundreds of acres of alfalfa ground in western Beaver County are currently infested with the ground squirrel. This past year we surveyed farmers on the Milford Flat and they reported that the squirrels are costing them over \$100,000 a year. Farmers also reported that because of the control program initiated by USU Extension last year that numbers of ground squirrels went down in 2009. We feel that by continuing our education program for another year we can continue to lower the number of ground squirrels significantly.

### **Objectives**

1. To train Beaver County cooperators impacted by ground squirrels about integrated pest management approaches to mitigate damage in irrigated alfalfa fields.
2. To assess landowner application of integrated pest application approaches, levels of success, and satisfaction in response to training.
3. To compare the effectiveness of pre-baiting in field trials using rodenticides registered in Utah to control ground squirrels.

### **Procedures**

#### Objective 1.

A workshop will be conducted in Milford, Utah in late January to train cooperators about the application of integrated pest management to mitigate ground squirrel damage in alfalfa fields. During the workshop we will present the results of last year's baiting/prebaiting trial. We will also discuss the results of last year's follow up survey.

This training will include identification of the species, methods to assess population densities, methods and timing of control measures, tips to mitigate impacts on non-target species, and techniques to evaluate effectiveness. The control measures trained will include lethal and non-lethal or cultural approaches.

#### Objective 2.

A follow-up mail survey will be conducted of participating cooperators at the end of the growing season. This survey will assess landowner perceptions regarding ground squirrel damage in alfalfa fields to include estimates of economic losses. The survey will also assess landowner effort regarding implementation of controls to include costs, man hours, effectiveness, and satisfaction. We will compare the results of last year's survey to this year's survey to see if we are helping the farmers in their squirrel control program.

### Objective 3.

Prebaiting may increase bait acceptance with treated grain baits. Prebaiting means exposing squirrels to untreated grain bait several days before using toxic grain. Conditioning the squirrels to eating this new food improves the likelihood of their eating a lethal dose of toxic grain. Prebaiting often improves bait acceptance and, therefore, control. However, many cooperators often overlook this step in the name of expediency.

To demonstrate to producers the effectiveness of pre-baiting we will establish a series of plots to compare the effects of the baiting programs. These field trials will be conducted in cooperation with a local alfalfa producer. We will select 12 plots at least 10 X 50 m in length located adjacent to alfalfa fields that have a past history of ground squirrel infestations. The plot will be located at least 400 meter from each other. The plots will be randomly assigned to treatment and controls. The treatments will consist of 4 plots that will be pre-baited and then baited with zinc phosphide, 4 plots baited with zinc phosphide without pre-baiting, and 4 plots that receive no treatments. The plots will be randomly assigned.

We will conduct visual census of each plot to determine ground squirrel activity. We will count all ground squirrels on the study plots during a three day period prior to baiting and for three days after treatment. Each plot will be scanned 4 times during a 10 minute period. All squirrels observed during each scan will be recorded. The order which each plot is counted will be varied daily.

After the 3 day pre-treatment counts are completed we will pre-bait 4 randomly selected plots using oats. We will use a hand spreader to spread the prebait and bait over the plot area. The prebait areas will be marked with survey flagging to facilitate relocation. We will monitor prebait sites for three days to determine bait use. After that time or as soon as the prebait is consumed we will initiate the baiting treatment. The prebait and bait will be broadcast at a rate of 10 lb/ac.

### **Data Analysis & Presentation of Results**

We will use the maximum number of ground squirrels observed the four scan as an index of the population density in each plot for the day counted. We then will calculate the average maximum number of squirrels recorded for each 3-day count period for each plot. We will use Kolmogorov-Smirnov nonparametric test to compare the number of ground squirrels recorded in pre- and post-treatment periods. We also will use a one-way ANOVA and Duncan's multiple range test to compare results from pre- and post-treatment counts. The measure of the success will ultimately be a reduction in the numbers squirrels counted.

The results will be discussed in the county extension newsletters and presented at local and regional farmer meetings. A paper reporting the results will be submitted for presentation at the 2011 Vertebrate

Pest Conference sponsored by the Vertebrate Pest Council. A USU Extension Bulletin will also be prepared.

### **Evaluation**

The post growing season survey, in addition, to assessing cooperator application of control measures, success and satisfaction, will also ask them how much it is costing them to control the squirrels and if they feel like our control program is helping them lower their damage costs. .

### **Educational Products**

Peer-reviewed paper presented and professional meetings and published in a peer-reviewed journal.

A PowerPoint presentation will be put together to use at local and state farmer meetings.

Extension Bulletin and Fact Sheet.

### **Educational Outreach**

The results of the research will be presented at the National Agricultural Agents Association National meeting.

The information will also be shared with other USU Extension Agents at the Utah Ag Agent meetings and will be distributed in the proceedings.

The fact sheet will be peer reviewed and posted to the Extension Website.

A paper reporting the results will be submitted for presentation at the 2011 Vertebrate Pest Conference sponsored by the Vertebrate Pest Council. A USU Extension Bulletin will also be prepared.

### **Budget**

Category	Requested
Travel	\$500
Supplies	\$300
Publications	\$400
Total	\$1200