

COMPLETED PROJECT REPORT

Project Title: Ground squirrel underground baiting

Research Agency: University of California - Cooperative Extension

Principal Investigator: T. Salmon

Budget: \$69,963

Background: California ground squirrels cause damage throughout California. In southern California, even though populations seem less dense than in other parts of the state, ground squirrels still cause significant damage in agricultural settings including avocado, citrus, nut orchards, other fruits, vines and nurseries. Ground squirrel populations in parks, school yards and other areas where close contact with people occurs are also common. In many sites, including nurseries, parks and agricultural properties near the suburban/urban interface, ground squirrel control is impacted by proximity to non-agricultural workers and the general public. In many cases, these individuals interfere with control programs.

The most common control method for ground squirrels in San Diego County is the use of anticoagulant baits. These are available commercially and through the Agricultural Commissioner's office. In meetings with pest control operators and county personnel, it appears that in-burrow baiting or use of underground bait stations are common strategies used in this area. According to these individuals, these baiting methods reduce primary bait exposure to non-target species, including children and pets.

Little or no published information is available concerning the efficacy of in-burrow baiting or underground bait stations.

Objectives:

1. Test efficacy and practicality of in-burrow baiting for California ground squirrel control using CDFA 0.005% diphacinone or chlorophacinone bait (whichever is available).
2. If appropriate, develop outreach materials including concept, design and use instructions of in-burrow baiting strategy.
3. Test efficacy and practicality of an underground bait station using a plastic sprinkle box design.
4. Develop outreach materials including concept, design and use instructions for above and below ground bait stations.

Summary:

In-burrow feeding and acceptance of clean oats by squirrels was readily observed using in-burrow and surface video cameras. A follow-up in-burrow field trial using 0.01% diphacinone bait treatments caused no reduction (treatment on Day 1 only) and 70% reduction (treatment Day 1, 3, 5, & 7) in comparison to 33% population growth of the untreated control. In-burrow baiting demonstrates promise as a method for deployment in the future, but due to its control level,

questions remain on how methods for in-burrow baiting of this study should be modified to control populations reliably and lessen the risk of failures.

Underground bait stations (irrigation valve box as described by Marsh, R.E. 1995) represent an alternative to other types of bait stations such as T-bait station designs, because they are readily used by squirrels at similar levels to the T-bait station designs. Pre-conditioning of the squirrels to the bait stations shortens the time before station use by squirrels.

Squirrels studied preferred bait stations in this order: standard-T-bait station > underground (irrigation valve box) station > modified-T-bait station.

There are instances where certain locations of bait stations are avoided and/or visited less by squirrels than others. This was evidenced by two cases: the modified-T-bait station in the choice-test study as well as a pair of underground and modified-T-bait stations (Location 3 in Underground versus Modified-T-Bait). This is an additional reason why pre-conditioning the squirrels to bait stations is used to ensure use of bait stations and to eliminate locations of stations not being visited. In areas where squirrels are not attending bait stations, the pest control operator should either consider relocating the bait station or use another method of control.

Trailmasters® as used in this study were unreliable for measuring passage of squirrels in/out of the burrows when compared to the results of the videotape when tracking movement at the opening of the underground bait stations.

An indirect method proposed is to measure success of a control program by measuring food consumption at bait stations before and after treatment as an indirect index of squirrel activity. In this case, the consumption of untreated bait from the bait station at the study location would serve to demonstrate levels of control at that location.

A survey of bait station users from southern California indicate that more education is needed to convey a) the time of year to use bait b) the use of pre-conditioning, c) the Agricultural Commissioner's Offices as a source of bait. Survey respondents showed good practices in the use of bait stations by servicing them often, using multiple bait stations at satisfactory distances apart, and securing their stations from people pets and wildlife. Also, survey respondents were satisfied with the level of control achieved by use of bait stations.

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