

# PROJECT REPORT

Project Title: A test of efficacy of three rodenticide baits for roof rat and deer mouse control in California orchards.

Research Agency: University of California – Kearney Agricultural Research and Extension Center

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## Background:

Roof rats (*Rattus rattus*) and deer mice (*Peromyscus* spp.) are occasional pests of nut and tree fruit orchards throughout California and in many other parts of the U.S. and beyond. The most practical and efficacious control option for these rodents in orchards is rodenticides, yet no information exists on the efficacy of these rodenticides on roof rat and deer mouse control in orchards. Therefore, we tested the efficacy of three California Department of Food and Agriculture (CDFA) rodenticide baits (0.005% chlorophacinone treated grain, 0.005% diphacinone treated grain, and 0.005% diphacinone wax block) to determine their utility for controlling these damaging pests in agricultural orchards.

## Results:

1. We were able to develop an effective index to monitor rodent populations using remote-triggered cameras. Our findings indicated that the number of roof rat photos taken at a minimum of a 5-min interval were strongly correlated ( $r = 0.96$ ,  $P = 0.008$ ) to the minimum number known estimate of roof rats in that treatment plot. Therefore, we used this indexing approach to monitor roof rat populations pre- and post- treatment to determine the efficacy of the above-listed rodenticides. These findings corroborate those of many past studies; as such, this same indexing procedure was used to monitor deer mice as well.
2. Of the baits we tested, the 0.005% diphacinone grain was most effective for both roof rats ( $x$  efficacy = 90%) and deer mice ( $x$  efficacy = 99%); the 0.005% diphacinone wax block was also effective against roof rats ( $x$  efficacy = 83%).
3. The 0.005% diphacinone wax block ( $x$  efficacy = 63%) and 0.005% chlorophacinone grain ( $x$  efficacy = 67%) were less effective against deer mice, but this lower efficacy was likely driven by low numbers of mice in two plots. Further testing may show these to be effective control options for deer mice as well.

4. The 0.005% chlorophacinone grain was ineffective against roof rats ( x efficacy = – 170%). Reasons for this low efficacy are unknown and surprising given high efficacy reported in other studies. Nonetheless, the low efficacy we observed suggests the 0.005% chlorophacinone grain bait sold by CDFA is not a good option for roof rat control in California orchards.
5. Our findings suggest the continued use of 0.005% diphacinone grain for roof rat control in orchard crops. The 0.005% diphacinone grain was also highly effective against deer mice. However, this product is not currently registered for deer mouse control in orchard crops. We suggest seeking registration for this product for deer mouse control.
6. We administered baits in elevated bait stations secured to branches in trees. This approach was effective for controlling both roof rats and deer mice. The bait stations also were effective at keeping grain baits from spilling on to the ground, thereby substantially reducing non-target exposure.
7. We utilized 30-m spacing between bait stations to ensure that most, if not all, deer mice had access to at least one bait station. However, past research has shown that 50-m spacing is likely sufficient for roof rat control. Therefore, if roof rats are the only species of concern in an orchard, 50-m spacing of bait stations could be tried as a cost-cutting measure.