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Determining Effective Attractants for Roof Rats in Citrus Orchards (Abstract)

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ABSTRACT: Roof rats (*Rattus rattus*) are a common invasive species within the United States. They are very destructive in nature and are a commonly known pest within tree fruit and nut orchards in California. Tools that are used to manage roof rats in agricultural fields include rodenticides, fumigants, traps, and habitat management. However, to manage for roof rats, monitoring techniques are needed to understand the effectiveness of these management tools. Monitoring techniques that are currently used include chewing indices, snap and live trapping, remote-triggered cameras, and tracking tunnels. All of these monitoring techniques require an attractant, but uncertainty exists as to which attractants are most effective. Thus, we established a study to compare commercially available soft bait (Liphatech Rat and Mouse Attractant™) and wax block (Liphatech NoTox™) attractants to creamy peanut butter to determine their attractiveness to roof rats in citrus orchards of the southern San Joaquin Valley, California. Attractants were placed within tracking tunnels and were compared to non-baited tracking tunnels to determine potential preferences.

This study was conducted across six sites in Tulare and Kern Counties, California. We generally created a 385-m × 385-m plot that contained a 10 × 10 grid structure of sampling locations at each separate orchard ($n = 100$ tracking tunnels at each site), although for one site we only included 96 tracking tunnels because the plot overlapped a parking area within the orchard. We used a stratified random sampling approach to determine which attractant was applied to each tracking tunnel, with an equal number of each attractant used per study site. Visitations to tracking tunnels were determined by recording the presence or absence of roof rat footprints on tracking cards located within each tracking tunnel, and we used a Fisher's exact test to determine if visitations varied across each attractant.

We determined that all three attractants increased visitation to tracking tunnels when compared to those with no attractant (visitation rate: soft bait = 54%, wax block = 57%, peanut butter = 56%, no bait = 44%; Fisher's exact test $p \leq 0.0998$). We did not observe a difference in attractiveness between any of the attractants (Fisher's exact test $p \geq 0.721$), indicating that any of the tested attractants could be used effectively. Interestingly, control tunnels without any attractant were visited at surprisingly high rates suggesting that tracking tunnels by themselves were attractive to roof rats, likely given the shelter they provide.

Our findings should help citrus producers and pest control professionals more effectively monitor for roof rats in citrus orchards. Furthermore, all three tested attractants would serve as effective tools for tracking changes in roof rat numbers. Such monitoring tools are needed for testing the efficacy of management approaches. Lastly, the attractiveness of tracking tunnels even when no attractant was used suggests that this monitoring tool may result in greater detectability of roof rats when compared to approaches that do not provide shelter for rats (e.g., remote-triggered cameras), although this needs to be verified. Please see Wales et al. (2021) for additional details on this study.

KEY WORDS: attractant, citrus, peanut butter, *Rattus rattus*, roof rat, soft bait, tracking tunnel, wax block

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LITERATURE CITED

Wales, K. N., R. Meinerz, and R. A. Baldwin. 2021. Assessing the attractiveness of three baits for roof rats in California citrus orchards. *Agronomy* 11(12):2417. DOI: 10.3390/agronomy11122417