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## Ground Squirrel Management

*Highlighting the Connection between Effective Control and Water Quality Issues*

California ground squirrels (Fig. 1) are found throughout most of the state. They are native and quite adaptable to most of California's diverse environments. They can live in close association with people and feed on crops and ornamental plants. A major problem associated with squirrels is their burrowing activity that can damage irrigation systems, landscapes, and other structures. When they cause these problems, control often is necessary.

Ground squirrels prefer dry climates and do not like areas with high soil moisture. Most of our irrigation systems, especially drip and sprinkler, do not create the continuous soil moisture that would deter squirrels from the area. Squirrels also are good at burrowing just outside the irrigated area or on slopes and other relatively dry places. Squirrels impact water use mostly by chewing on plastic pipes or burrowing in levees, berms, and other water structures. Because of their close association with irrigated areas, squirrel burrowing can lead to soil movement into water systems. Improper use of rodenticides such as broadcasting into waterways also can lead to contamination of surface



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Figure 1. California ground squirrel.

water. Contamination of subsurface water has not been identified as a problem with rodenticide use.

Dealing with ground squirrels takes a good understanding of the animal and the control options available. Ground squirrels have a distinct activity pattern throughout the year. Basically they hibernate in the winter, breed during the early spring, mature during the summer, and collect seeds during the fall. Some adult squirrels go into a summer hibernation to avoid the heat, but the young ones remain active, even during hot summer days. Another important seasonal activity is their feeding preferences. During the spring, they prefer fresh green



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Figure 2. Burrow entrance.



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Figure 3. Burrowing damage beneath a bridge.

vegetation, but in the summer and fall, they like seeds. Knowing these changes will help in understanding their seasonal activity and also in selecting the appropriate control strategy.

Ground squirrels live in underground burrows (Figs. 2 and 3). Often burrows interconnect and are home to several squirrels. Burrow systems usually are clumped together to form a squirrel colony. Once established, the squirrel colony can remain in that area for many years. Squirrels

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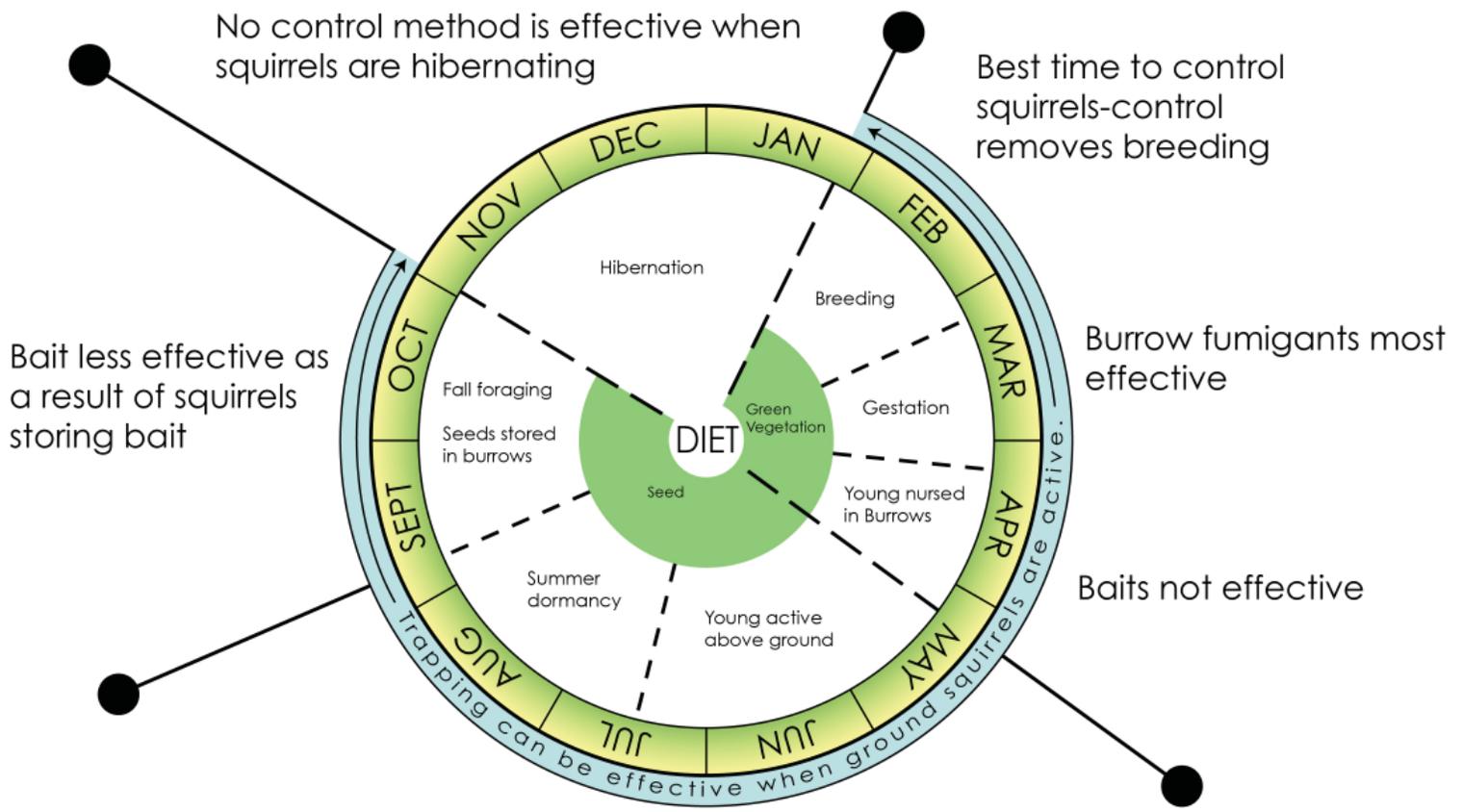
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# California Ground Squirrel - Calendar of Management



Poison baits are most effective during this period

From: University of California Ground Squirrel BMP website: <http://groups.ucanr.org/GSBMP/index.cfm>

Figure 4. Control calendar wheel, English.

... continued from the previous page usually remain within 150 feet of their burrow, so when you see them, there usually is a burrow nearby. It's important to find the burrow, because most control efforts are applied in or near active burrows.

The control calendar (wheel) (Fig. 4-English and Fig. 5-Spanish) shows when different control methods are most effective. Refer to it to help guide your control decisions. When you decide the squirrels need to be controlled, the first step is to locate their burrow systems. Check the burrows for recent activity.

## Burrow Fumigation

During spring or when soil moisture is relatively high, burrow fumigation is quite effective. The simplest fumigant is the gas cartridge or

smoke bomb. Follow use instructions carefully. All burrows need to be treated for effective control. Caution: These cartridges produce flames, so don't use them around dry grass or other flammable materials. Re-treat burrows that remain active one to two days after initial treatment. Aluminum phosphide is a restricted use fumigant that is very effective in controlling squirrels. Special restrictions apply to this material. Follow label directions and restrictions carefully.

## Rodent Bait

In late spring and early summer, rodent bait is effective and commonly used. Since these baits are oats or grain-based pellets, squirrels usually are attracted to them. Zinc phosphide bait is fast acting and requires one feeding to be effective. It



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Figure 6. Ground squirrel bait station.

is a restricted use pesticide, and care is needed to ensure other animals do not get access to the bait. One downside is that if the squirrel gets a sublethal dose, it will shy away from eating zinc phosphide bait again, so it should be used only once a year. Zinc phosphide is applied by hand treatment around active burrows

# ARDILLAS DE TIERRA DE CALIFORNIA – CALENDARIO DE MANEJO

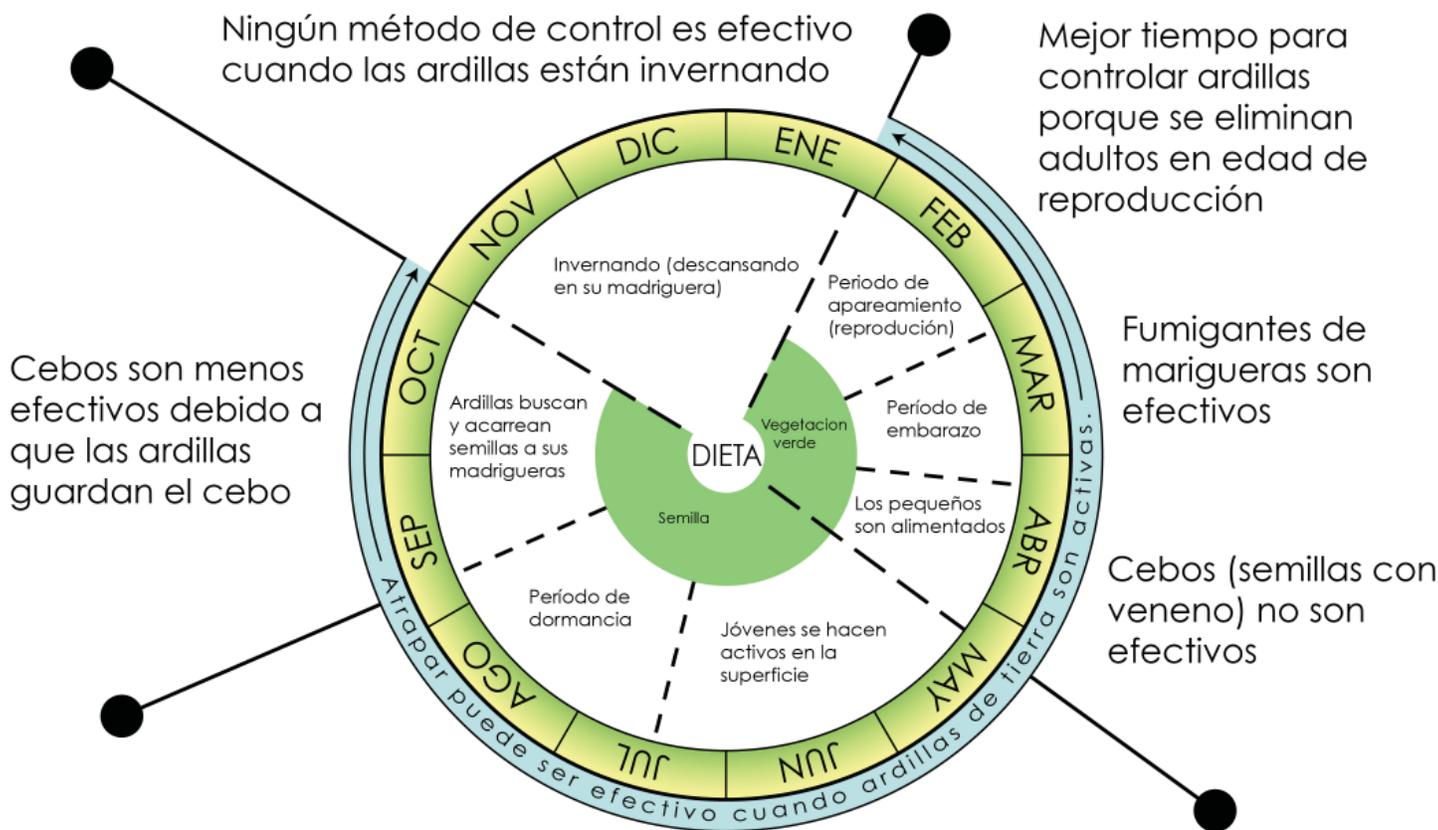


Figure 5. Control calendar wheel, Spanish.

or by broadcasting bait throughout the squirrel colony. An important positive fact with zinc phosphide is that it does not accumulate in the poisoned squirrel's tissues, so predators or scavengers are not likely to be affected. Anticoagulant baits require multiple feedings over several days. While there is no bait shyness with these materials, they can be rendered ineffective if the squirrels don't get enough bait over several days. To supply bait over several days, anticoagulants are either used in a bait station (Fig. 6) where the squirrels come and go to eat bait or by hand or broadcast baiting around active burrows. Squirrels are excellent foragers for seeds and will find them easily. Broadcasting bait spreads it very sparsely, and it generally does not pose a hazard to

pets or other wildlife. To ensure bait is available for several days, a second baiting will be necessary. Follow bait label instructions. Anticoagulants do accumulate in the tissues of poisoned rodents, so all carcasses should be removed or buried.

## Trapping

Trapping can be an effective squirrel control method although it takes quite a bit of effort to control many squirrels. While live traps are sold for squirrels, they are not recommended because of the disposal problem with live squirrels. The California Department of Fish and Game prohibits releasing ground squirrels into other areas unless you are granted a written permit, something that is very unlikely. Traps can be baited with nuts or grains. Some are

placed directly in squirrel burrow openings. In parks and other areas where the public frequent, some people disturb and destroy traps because of their opposition to a management program.

## Other Options Aren't as Effective

Unfortunately there are no repellents, toxic plants, or frightening devices that are effective to rid an area of squirrels or to keep them from feeding on plants. Even so, using trapping, fumigants, and baits can solve squirrel problems around homes, farms, and in other areas where they are a problem.

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# Trapping to Manage Pocket Gophers

**P**ocket gophers (*Thomomys* spp.) are one of the most damaging vertebrate pests in California. Gophers are short, stout burrowing rodents, usually 6 to 8 inches long (Fig. 1). They spend most of their time below ground where they use their front legs and large incisors to create extensive burrow systems.

Pocket gophers cause extensive and quite varied forms of damage that includes girdling of stems and vines below ground, consumption of tap roots and aboveground vegetation, and mounding that poses a serious hazard to landscapers, homeowners, and the general public.

“Trapping is one of the best methods to use in urban/suburban settings.”

A number of options are available for controlling pocket gophers such as fumigation, toxic baits, and trapping. All three methods have their advantages and could be included in an integrated pest management program for controlling pocket gophers. However, trapping is one of the best methods to use in urban/suburban settings given its high efficacy, minimal risk to children and pets, and lack of potential runoff from gopher-related rodenticides.

## Which trap to use?

A number of pocket gopher traps currently are available for purchase including the Macabee®, Gophinator, Cinch, and a variety of box traps (Fig. 2). All can be

effective in a given setting, although some have proven more effective than others. For example, a recent University of California Cooperative Extension study found that the Gophinator trap outperformed the Macabee® trap due to its ability to capture larger gophers at a higher rate; both traps captured small gophers equally well and required an equivalent amount of time to set.

A similar study conducted by the USDA National Wildlife Research Center compared three traps—Macabee®, Cinch, and Blackhole®, a style of box trap. They found the Cinch trap to be most effective, although it took longer to set and required more excavation for placement. Selection of an appropriate trap will vary depending on the user's needs, but the Gophinator trap appears to provide an effective and quick option for gopher control.

## Other factors to consider

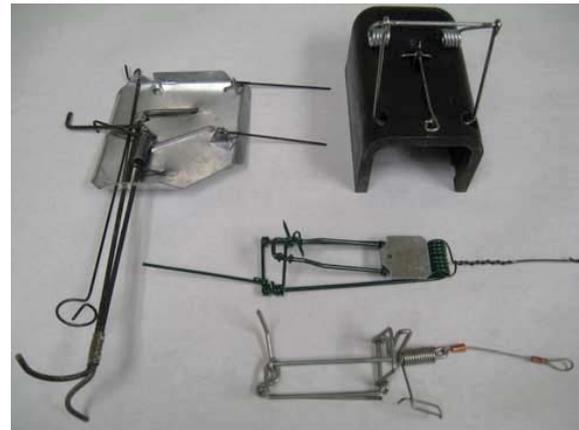
There also has been debate about the need to cover hole openings after setting traps. Recent tests have shown little influence of leaving holes uncovered vs. covering them up. If you are able to leave them uncovered, this will save time in setting and checking traps. However, in many cases, trappers will prefer to cover holes to limit access to pets and children. Clearly, in these cases, covering trap-sets is warranted.

There also appears to be little benefit to using many proposed attractants for gopher trapping, as recent tests comparing trap-sets with no attractant to trap-sets baited with peanut butter, anise oil,



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Figure 1. Pocket gopher (*Thomomys* spp.) excavating its burrow system.



R. A. Baldwin, UC

Figure 2. Types and brands of gopher traps include (clockwise from upper right) Victor® Black Box™, Macabee®, Gophinator, and Cinch.

carrot oil, and a grapefruit-based attractant showed no difference in capture success. This does not preclude potential benefits from other attractants but certainly, at a minimum, indicates that attractants are not needed to effectively capture pocket gophers.

Trapping provides a relatively safe and efficacious approach to pocket gopher control, although it does take practice and patience to become proficient. If you are interested in further details on gopher trapping, check out the UC IPM Pest Note *Pocket Gophers* at <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html>.

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# Ask the Expert!

**Q** I've been finding large mounds of fresh soil (about 6 to 12 inches in diameter) in my customer's turf. How can I determine what is causing the problem?

**A** Mounds of fresh soil are typical indicators that there might be a vertebrate pest present. If the mounds are crescent or horseshoe shaped when viewed from above, the pest is most likely a pocket gopher. If the mounds are more circular in shape when viewed from above and have a volcano-shaped profile, the pest is most likely a mole. For more information about pocket gophers and moles see articles on the UC IPM Web site, <http://www.ipm.ucdavis.edu/PMG/menu.vertebrate.html>.

**Q** My clients have reported damage on their property that they suspect might be caused by ground squirrels. Where can I get information on how to manage California ground squirrels?

**A** UC has several resources devoted to California ground squirrel management. Visit your local UC Cooperative Extension office, access the UC IPM Pest Note about California ground squirrels (<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7438.html>), or visit the California Ground Squirrel Best Management Practices Web site at <http://groups.ucanr.org/gsbmp>.

**Q** How can I develop an effective strategy for managing rats?

**A** A successful rat management program includes sanitation measures, building construction and rodent proofing, and, if necessary, population control including trapping and baiting. For details about how to create a rat management program, view the UC IPM Pest Note *Rats* at <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74106.html>.

Have a question? E-mail it to [ucipm@ucdavis.edu](mailto:ucipm@ucdavis.edu).

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# INVASIVE PEST ALERT! Red Palm Weevil

Red palm weevil (RPW), *Rhynchophorus ferrugineus*, (Fig. 1) has been detected in California. Worldwide, the RPW is considered the most destructive pest of palms. RPW is a native of Southeast Asia, and its discovery in a residential planting in Laguna Beach is the first time this weevil has been found in the United States. The presence of the red palm weevil in California represents a serious threat to common types of landscape palms and to the date palm industry.

Female RPWs bore into the trunks of palm trees, forming holes to lay their eggs. Each female can produce an average of 250 eggs, taking about three days to hatch. Larvae (Fig. 2) emerge and chew into the tree, making tunnels up to a yard long. After about two months of feeding, larvae pupate inside the tree for about three weeks before the reddish-brown adults emerge; their color varies from black to dark orange. Adults live for two to three months, feeding on palms, mating multiple times, and laying eggs.

## How YOU can help

During your normal day-to-day duties, keep an eye out for signs of this pest. The most visible signs are excessive dead and dying palm fronds (Fig. 3), a wilting palm crown, chewed fiber or sawdust falling from the tree, oozing brown sap, and exit holes. In heavily infested trees, fallen pupal cases and dead adult weevils can be found around the base of the tree.

If you see and/or suspect any signs of the RPW, please report these findings to the California Department of Food and Agriculture's (CDFAs) Pest Hotline at 1-800-491-1899 or go to the CDFAs Report A Pest Web site, <http://www.cdca.ca.gov/go/reportapest>. You also can call your local Agricultural Commissioner's office, <http://www.cdpr.ca.gov/docs/county/comenu.htm>.



USDA

Figure 1. Adult Red Palm Weevil.



USDA

Figure 2. Larvae and pupae.



USDA

Figure 3. Red Palm Weevil has severely damaged this palm.