

# GROWING PALMS

Horticultural and practical advice for the enthusiast

Edited by Randal J. Moore

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## Squirrel Damage and Control in Palms

Ground and tree squirrels can be severely damaging pests to palms. They are found in many agricultural and rural areas. Cultivated and native palms located in public parks, natural areas, nurseries and home gardens may suffer from their detrimental effects.

Identification of the species of ground or tree squirrel causing the injury to the palm is the first step in implementing a pest control program. The appropriate control method suited to the specific conditions (that is safe to humans, the environment and other wildlife) can then be undertaken to mitigate the harm.

Our investigation was prompted by the significant squirrel damage done to decades old, historic public plantings of *Brahea brandegeei* in the county of San Diego, California. In the process of this study, we noticed similar squirrel damage to *Howea fosteriana*, *Brahea edulis*, *Rhopalostylis sapida* and *Jubea chilensis*.

**Description.** The basic appearance of the tree and ground squirrel (Fig. 1) is very similar. In California, there are several species of tree and ground squirrels. From a distance, it can be difficult to distinguish between them. Some species of tree squirrel are smaller than ground squirrels, although other tree squirrel species are similar in size. The tree squirrel has a bushy tail, while the ground squirrel does not.



1. A California ground squirrel (*Spermophilus beecheyi*) is one of the most common squirrel pests found throughout the state (with the exception of the extreme desert regions and high mountains). Their gnawing and burrowing can cause severe or lethal damage to palms if not controlled.

Ground squirrels are brown-gray in color; tree squirrels tend to be reddish-brown. Also, at close range, some ground squirrel species can be distinguished by a noticeable triangle marking on their back. One of the best ways to differentiate between a ground and tree squirrel is also rather obvious: when pursued a ground squirrel will go into its burrow while the tree squirrel will seek safety in the upper canopy of the tree.

**Activity.** Ground and tree squirrels are active during the daytime (diurnal), particularly during mid-day hours on warm days. Activity is at a maximum during the breeding season. Ground squirrels breed once a year at various times depending on the species and average seven or eight per litter. The young grow rapidly to adult appearance in only six months.

Ground squirrels live in colonies in underground burrows. The burrows are about 4 inches (10 cm) in diameter and 5–30 feet (1.5–10 meters) in length extending 2–4 feet (0.5–1.25 m) below the surface (California Ground Squirrel, Pest Notes, University of California Agriculture and Natural Resources, Publication 7438, revised January 2002). The colony may include several dozen animals.

Ground squirrels hibernate during the extreme temperatures of the winter and summer (aestivation) months. While the entrance of the burrow is open, the burrow is plugged near the nest during this inactive time. By contrast, the tree squirrel does not hibernate. They are mostly confined to an arboreal life making nests in tree holes or building nests of leaves and twigs.

Tree squirrels are primarily arboreal. However, they do spend some of their time on the ground foraging for food. Unlike ground squirrels, they do not hibernate except during exceptionally cold winter weather. They are most active during the early morning and late afternoon hours.

**Diet.** Unlike rabbits or deer, squirrels cannot digest cellulose and must rely on foods rich in protein, carbohydrates and fat. Early spring is a hard time of year for squirrels since buried nuts are beginning to sprout and are not edible. Other food sources such as fruits and seeds have not yet become available.



2. Squirrel damage caused to the apical meristem and new petioles of a San Jose Hesper Palm (*Brahea brandegeei*) at a public park in San Diego, California. Gnawing damage in palms occurs mostly during the early Spring months when other types of food is not available.

Therefore, during the early spring months after emerging from hibernation, their diet consists primarily of green vegetation (green grasses and herbaceous plants). It is during these times that squirrels feed heavily on the buds of trees and palms and the most damage is caused.

With the onset of summer, plants began to dry and produce seed. The squirrel then changes its diet and begins eating seeds, grains, fruits and nuts. They always forage within a close range of their burrow or tree nest.

**Damage.** Ground squirrels cause damage



3. Lethal damage caused to an entire historic grove of San Jose Hesper Palms (*Brahea brandegeei*). A safe and effective control program must be implemented early when damage is first identified. Sometimes there is reluctance to take immediate and firm steps toward control due to public concern for the wildlife.

many agricultural and ornamental plants. In our case, we were specifically concerned about the damage being caused to plantings of mature palms in public spaces within the County of San Diego, California.

Squirrels are rodents, so most of the damage to palms is caused by gnawing. They eat the soft tissue of the apical meristem and devour seedling palms (Fig. 2). When left unchecked, the damage can be lethal to palms and destroy entire groves (Fig 3). The damage is not limited to the meristem and petioles; a squirrel will also strip clean the palm inflorescence and infructescence (Fig. 4). In the case of ground squirrels, the burrows can cause palm root damage and desiccation.

There are other ancillary problems that can be caused by squirrels. Gnawing by squirrels causes damage to sprinkler heads and irrigation lines. Gnawing also damages wood buildings, utility lines and the cambium of other trees. Ground squirrel burrows can present a hazard to people and machinery and cause soil erosion. Squirrels can also carry diseases.

**Legal Considerations.** Most vertebrate pests, including many ground and tree squirrel species discussed here, are subject to the protection of State Fish & Game and Federal Regulations. This may restrict the allowed control methods used to limit damage to palms.

Generally, native squirrel species are considered game mammals and are therefore subject to game management rules. They can be taken only as provided by hunting regulations. When documented evidence of damage or destruction can be provided to wildlife officials, a revocable permit is usually issued with restrictions on the poison and traps that can be used. For example, non-native pests, such as the red fox squirrel (*Sciurus niger*) introduced from the Eastern United States and now common in city parks and adjacent areas in the Western U.S., are exceptions and can be taken at any time and any manner.

Squirrel populations are affected by the available food supply. When squirrels are provided food by public feeding, or the improper securing of food waste, populations will increase. Convincing



4. Squirrels feed on the inflorescence and infructescence of palms. A Guadalupe Fan Palm (*Brahea edulis*) has been stripped of its flowers and fruit. Similar damage has been noticed in many other species of cultivated palms.

the public to avoid feeding squirrels has proven to be a difficult challenge for wildlife control officials. Posting signs with warnings is one method intended to discourage public feeding (Fig. 5).

For example, in the State of California, the feeding of squirrels is prohibited by Fish & Game laws (California Dept. of Fish & Game, Regulation 251.1). Feeding artificially increases the squirrel population beyond natural levels exacerbating pest problems. It can also increase their aggression towards humans and make them more dependent on human food.

**Controlling Damage to Palms.** The objective of a squirrel control program is to reduce or eliminate the specific damage being caused to palms in a cost-effective and acceptable manner. It should also be safe to the environment, humans, and other non-target species. In some cases, great care must be taken to protect populations of other endangered wildlife species from the detrimental effects of the pest control method.

A case in point are programs that attempt to control the California ground squirrel (*Spermophilus beecheyi*) which are found in the same agricultural areas as several species of the endangered kangaroo rat (*Dipodomys* spp.). Many kangaroo rat species are dwindling and traditional ground squirrel control methods may threaten them with extinction. A modified bait station for the ground squirrel was developed that avoids the incidental poisoning of kangaroo rats (Modified Bait Stations for California Ground Squirrel Control in Endangered Kangaroo Rat Habitat, Desley A. Whisson, Proceedings of the 18<sup>th</sup> Vertebrate Pest Conference, Univ. of Calif., Davis, 1988, pp. 233–235.).

**Trapping Methods.** A trapping program can reduce or eliminate squirrels from an area. Traps are effective for controlling smaller populations of squirrels in restricted areas. Individual trapping can become impractical for larger infestations.

A wooden box-type squirrel trap is generally used. They are available commercially, or may be constructed from a modified box-type gopher trap. The traps should be enclosed to minimize

the chance of accidental harm to children, pets or other wildlife. For ground squirrels, control can be achieved using an unbaited wire trip inside the burrow that the animal will pass through and trip the trigger.

A nut-meat bait is placed behind the trigger mechanism to trap the squirrel. Supplementing the bait with rolled corn available from a feed store has proven highly effective in attracting ground squirrels (Donald Martin, pers. comm.). Some bait should also be placed in front of the trap entrance to attract the squirrels.

Generally, the trapper will leave a baited trap in place without setting it for several days so that the squirrels can first become accustomed to it. After the squirrels are used to taking the bait, the trap can be re-baited and set.

For tree squirrels, the trap is generally placed in a tree, on a fence, or on a rooftop. They are nailed or fastened securely in place. The bait must be tied to the trigger with a string. For ground squirrels, the box trap is placed on the ground near the burrows.

Live catch traps (such as HavAHart™ brand traps) can also be used. However, these traps present a problem of how to dispose of the live squirrel. Because squirrels can carry disease and may be an agricultural pest, it is usually illegal to release them elsewhere.

If a ground or tree squirrel problem is present, a trapping program can be successful if it is constantly monitored and operated. Of course, it is best to initiate a program as soon as the pest problem is identified.

**Repellents.** Some repellents are available for protecting plants from squirrels. They appear to have limited effectiveness. The repellent must be applied before extensive damage has occurred. Maintaining an adequate level of repellent can be difficult. It can be washed off by rain, spray irrigation and dew, and it must be reapplied steadily and frequently to be even marginally effective.

**Fumigation.** Large infestations of ground squirrels over a wide area may require fumigation. The squirrels will be killed in their burrows using toxic gas. A special permit is often required from the local agricultural official. Of course, fumigation cannot be used to control tree squirrels.

Fumigation is most effective in the spring months when the soil is moist. The gas is better contained within the burrow and does not escape through cracks found in dry soil. Since burrows can be large with several entrances, each needs to be treated and sealed. During hibernation periods (mid-winter and mid-summer), fumigation is not as effective since the ground squirrel will plug the burrow near its nest.



5. Posting public warnings not to feed wildlife provides some natural control over squirrel populations. Food provided by public feeding and unsecured waste receptacles is one cause of large squirrel infestations in public parks.



6. Multiple feeding box-type bait station that uses moisture-resistant paraffin bait blocks. The anticoagulant bait used here is slow acting and must be continuously consumed over a period of 5 days or more. This station has the capacity to hold a large quantity of bait so that it lasts longer without re-supply and can handle larger infestations.

Fumigation cartridges are available that are ignited and emit a toxic gas. Many of these are available in retail garden supply stores and can be used without a permit. Place the fuse into the cartridge, light the fuse and push it far into the burrow with a pole, then seal the opening with soil and tamp it lightly. Cartridges should not be used around buildings, dry grass or other flammable materials.

**Toxic Baits.** Toxic baits are commonly used for squirrel control. Use of some baits (primarily those for commercial use) require a permit issued through a local agricultural agency. Home gardeners generally use baits that do not require a permit.

The baits used for squirrel control (and rat control) are anticoagulants. They alter the animal's blood clotting mechanisms and eventually lead to its death. They are most effective if consumed in several consecutive feedings over a relatively short period of time. This characteristic along with an effective antidote (Vitamin  $K_1$ ) make them somewhat safe to use around humans and pets.

A bait box can be used (Fig 6) to keep people and pets away from the bait. The entrance to the bait box should use a 4-inch (10 cm) hole which will allow squirrels to enter but not other larger animals. It should hold sufficient bait for several repeated feedings. And it should be secure so it does not tip over or is easily opened.

If the infestation is over a large area, use of multiple bait boxes spaced apart will be required. Use of fresh bait over a 2–4 week period is usually required. Control is indicated when feeding at the bait station stops and squirrels are not present. Dead squirrels should be buried or discarded and use of gloves is important.

Protecting palms through a control program dedicated to ground and tree squirrels can be challenging, costly and time consuming. Once control is achieved, the success will be temporary since the area will usually be reinvaded. Periodic monitoring to keep squirrel populations under control before they are firmly reestablished is the best preventative measure to avoiding extensive palm damage. – *Mike Marika, Park Arborist, City of San Diego, California and Randal J. Moore, Poway, California USA.* 🌴