

Fall 2011

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This is a part of a series of quarterly newsletters designed to inform growers in Contra Costa County about issues important to the Agricultural community. We welcome your questions and comments about any topics in this newsletter as well as suggestions for future newsletters. Contact us at:

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## **Pocket Gopher Control**

Pocket gophers, *Thomomys* species, are a common agricultural pest in Contra Costa County. They feed on the roots of many crop plants, gnaw on irrigation lines, girdle trees and vines, divert irrigation water through their tunnels, and create weed seed beds in their mounds

There are five species of pocket gopher in California. Depending on the species, they are 6 to 10 inches long with large clawed front paws, short fur, small eyes and ears, and well developed whiskers. They are rarely found above ground although they can sometimes be seen at the edge of their burrows pushing dirt or feeding. The best sign of a gopher's presence is the mounds of dirt they create.

Gophers form mounds as they dig tunnels and push the loose dirt to the surface. One gopher can create several mounds in a day. Usually,

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Pocket gophers are rarely seen above ground.





A gopher mound (left) is typically fan-shaped while mole mounds (right) are more circular.

gopher mounds are fan or horseshoe-shaped when seen from above and have a hole that is set to one side and usually plugged. Mole mounds, which are often confused with gopher mounds, tend to be circular, volcano-shaped in profile, and have a plugged hole in the middle.

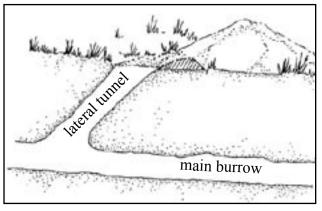
Gopher burrows are about 2.5 to 3.5 inches in diameter and can cover an area of up to 2,000 square feet. Feeding burrows are near the surface and nest chambers can be as deep as six feet. Gophers breed at one year old and live up to three years. In non-irrigated areas, breeding usually occurs in late winter and early spring. Gophers are active year-round, produce up to three litters of five or six young per year, and can reach populations as high as 60 or more per acre.

It's important to detect and control gophers before their populations seriously damage crops. The California Fish & Game Code classifies gophers as nongame animals so it is legal to kill them. The most commonly used control methods are trapping and baits. However, successful management plans can include other methods such as controlling the weeds that provide food for gophers and deep ripping to destroy their burrow systems.

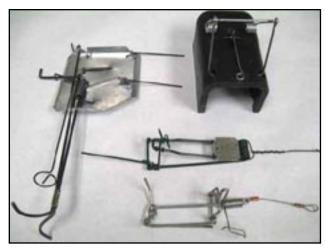
Predators, such as owls and snakes, will remove some gophers, but relying on predators alone is unlikely to be an effective control method. Gas explosive devices are somewhat effective but have a number of serious disadvantages such as fire risk, potential injury to people and property, and being extremely loud. Fumigation using aluminum phosphide may be effective but the material is a restricted-use pesticide that can only be used by licensed or certified applicators. Fumigation using gas cartridges usually doesn't work because gophers will rapidly seal off their burrows when they detect smoke or gas. Other ineffective control methods include: repellents, devices designed to frighten gophers, and placing chewing gum or laxatives in the burrows.

Before baiting or trapping for gophers, locate their main burrows using a gopher probe. Probes can be bought commercially or made from a pipe and metal rod. If the probe has an enlarged tip that is wider than the shaft, it will help to make burrow detection easier. To find the main tunnels, look in areas with recently dug mounds. Mounds with plugged holes are the openings to lateral burrows which the gopher uses to push dirt to the surface while constructing the main burrow. You can find the main burrow by probing about 8 to 12 inches from the plugged side of the burrow. When the probe hits the burrow, there will be a sudden drop of about 2 inches. Often, a tunnel that has been filled with loose dirt will feel

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When using a probe to find gopher tunnels, don't confuse the lateral tunnels the gopher uses to push dirt to the surface with the main burrow.



Above: some brands of gopher traps include (clockwise from upper right): Victor Black Box, Macabee, Gophinator, and Cinch.

similar to an active, open tunnel. Experienced probe users can learn to tell the difference. Beginners may want to dig down to confirm if the tunnel is active or plugged.

Trapping is the safest, most effective, and least expensive method for controlling gophers. There are two commonly used types. One is a two-pronged, pincer type trap such as the Macabee, Cinch, or Gophinator. Another type is a squeeze box trap type such as the Victor Black Box. It is not necessary to bait a gopher trap but if you wish to, you can use apples, peanut butter, lettuce, carrots, or alfalfa greens. Place the bait behind the trigger wire for a box type trap or behind the flat pan of a pincer type trap.

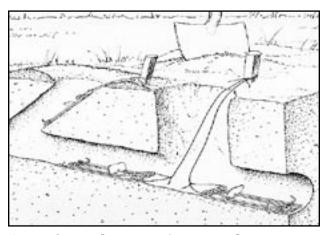
To set gopher traps, first use a probe to locate the main tunnel. Open the tunnel with a shovel and create a hole wide enough to set two traps facing in opposite directions. Box type traps will require a bigger hole than the pincer type but will be easier to use, especially when the tunnels are small. Very small diameter tunnels might need enlarging to make room for pincer-type traps to operate. For either type, be sure to wire the traps to stakes so it will be easier to recover them later.

After setting the trap, you can cover the opening to the tunnel with plywood, canvas, dirt, etc. Box type traps should always be covered but pincer type traps may be left uncovered if desired. Check traps often and reset when necessary. If a set of traps hasn't caught a gopher within two days, move the traps to a different location.

Strychnine and anticoagulant baits are both commonly used to control gophers. Anticoagulants have the advantage of being less toxic than strychnine and are preferred in areas where children, livestock, pets, and wildlife are present. Stychnine treated grain is lethal after a single feeding so it is applied in small quantities. Anticoagulant baits are designed to work after multiple feedings so the application rate will be about ten times that used for strychnine baits. For any type of bait, be sure to read and follow all the label directions.

Both strychnine and anticoagulant baits with chlorophacinone and diphacinone are subject to use limitations under the current Stipulated Injunction to protect threatened and endangered species in the San Francisco Bay area. For more information on the Injunction requirements, go to the EPA website at http://www.epa.gov/espp/litstatus/use-limitation.html as well as the article in our Fall 2010 newsletter. (Past newletters are available on our website.) Recently, both chlorophacinone and diphacinone were made

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A set of Macabee traps in a tunnel.





Place bait into the main tunnel by hand (left) or by using a bait applicator (right).

Restricted Use Pesticides by the EPA. This means that only licensed or certified applicators may buy or use them. For more information about the anticoagulant bait restrictions, see our Winter 2011 newsletter.

When using bait to control gophers, it is important to get the bait inside the main tunnel and not into a lateral tunnel. Use a probe to find the main tunnel and enlarge the opening by rotating the probe or by inserting a larger rod or stick. Following the labeled directions, place the bait in the opening using a spoon and funnel. Several bait placements within a burrow system will increase success. Be very careful not to spill any bait on the ground. Spilled bait can easily lead to the poisoning of children, pets, and other nontarget animals. Use application equipment dedicated for baiting only to avoid cross contamination. For large jobs, there are bait applicators available commercially that combine a probe with a bait dispenser.

After placing the bait in the tunnel, close the probe hole with sod, rocks, etc. that will exclude light and prevent dirt from falling on the bait. Tamp down or clear existing mounds so you can detect any new activity. If new mounds appear more than 2 days after baiting with strychnine or 7-10 days after baiting with anticoagulants, you will need to rebait or try trapping.

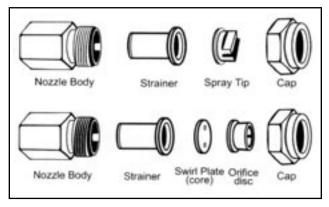
## **Sprayer Nozzles**

One of the most critical components on a pesticide sprayer is its nozzles. Nozzles regulate the spray output rate, break the liquid into droplets, and spread the droplets in a specific pattern. Nozzles are available in a wide variety of spray patterns, capacities, and materials.

Most nozzles have four main parts: the body, the screen or strainer, a tip, and the cap. Instead of a spray tip, disc core nozzles will have a swirl plate core and an oriface disc to help regulate droplet size. Tips can produce various spray patterns and are usually interchangeable on nozzles from the same manufacturer. The screen or strainer filters out particles that may clog the nozzle tip. Some nozzles will also have a quick shut-off device to prevent dripping. These use a diaphram or ball that closes the nozzle opening when the line pressure drops below a certain level.

Nozzles are named according to the shape of the spray pattern they produce. Hollow cone nozzles produce a pattern with the spray concentrated on the outside of a conical circle. Hollow cone nozzles generally produce a uniform spray with smaller droplets and can be used at higher pressures. Solid cone nozzles make a pattern where droplets cover an entire circle and are used to penetrate thick foliage. Both hollow and solid

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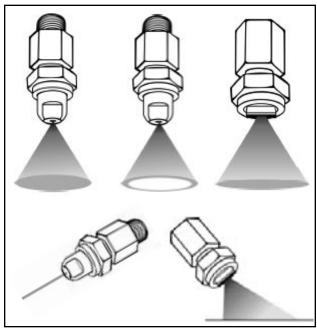


The parts of a nozzle: top row - standard spray nozzle; bottom row - disc core nozzle.

cone nozzle are available with angles of spray from 30 to 120 degrees.

Fan nozzles produce spray in a fan-shaped pattern. They can be operated at lower pressures and are used where foliage penetration is not as essential. Fan nozzles are often used for boom spraying and for applying bands of spray over row crops. Fan nozzles come in three general types. Tapered edge flat fan nozzles have a pattern with a lower spray volume at the edges to allow overlap of the nozzle patterns along a boom. Even flat fan nozzles produce uniform spray over the entire pattern. Flooding fan nozzles deliver a wide flat spray and are most often used for broadcast applications and boomless spraying.

Some other types of nozzles can be used for special applications. Offset nozzles produce a wide flat spray to one side of the nozzle and are often used for spraying along roadsides or ditches. Solid stream nozzles can be used with a handgun sprayer to spray directly at a target. Nozzle tips that can produce two fans or cones of spray on opposite sides are often used for row crop applications.



Common spray nozzle tip patterns: (clockwise from upper left:) cone, hollow cone, fan, offset, and solid stream.



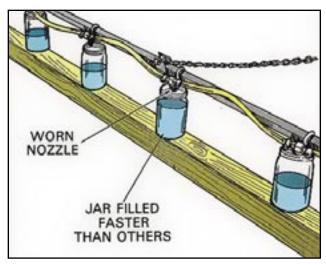
Worn nozzle tips cause higher application rates and changes in the spray pattern.

The flow rate for most nozzles will increase when the spray pressure is increased. However, it takes a large pressure increase to get even a small increase in nozzle output. Higher pressure will also create smaller droplets that are more likely to drift. That's why if a large adjustment in spray flow output is needed, it is best to change nozzle tips. The pesticide label will usually list the volume of spray to be applied per acre. The applicator can use that information to choose the best type of nozzle tips to produce the desired level of spray output and droplet size.

Nozzles tips will eventually wear out and need to be replaced. Wettable powder pesticide formulations and grit in the water used for the tank mix can wear tips out especially quickly. For this reason, maintaining the sprayer's filters and screens is essential to make nozzle tips last longer. Ceramic and hardened stainless steel nozzle tips will last the longest but are more expensive. Brass tips are inexpensive but wear out very quickly. Nylon and regular stainless steel tips fall somewhere in the middle.

Worn nozzles tend to have a higher rate of flow and may change their spray pattern. This raises the cost of the application and risks damaging the crop. It is not easy to tell by sight if a nozzle is

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Nozzle flow can be determined by catching the nozzle output for one minute and calculating the output rate.

worn. The best way is to test the flow rate and compare it to the flow rate of a new nozzle. Nozzles should be replaced if they vary more than 15% from the manufacturer's specifications.

Nozzle flow rates can be easily measured. Fill the sprayer with water and run the pump up to operational pressure. Then, turn on the nozzles and catch their output for one minute. Determine how many ounces of water each nozzle produced and divide that number by 128 to get the flow rate in gallons per minute. Add the values for all the nozzles to determine the sprayer's output.

Nozzle flow problems can result from wear, damage, plugged tips or strainers, and spray hose restrictions leading to the nozzle. If a large flow rate difference is found along the length of the boom, check for restrictions in the lines or install a larger diameter hose. An accurate pressure gauge is helpful.

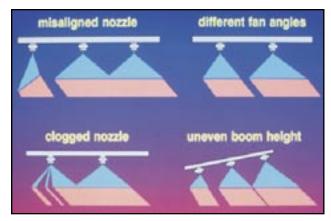
When cleaning nozzles, use a soft bristled brush and/or compressed air. Never use a knife or wire brush or blow out a nozzle by mouth. Assume that the nozzles will be contaminated with pesticide residues from prior applications. It is important to always wear the required personal

protective equipment (such as chemical resistant gloves, eye protection, and coveralls) to avoid exposure when inspecting or cleaning nozzles.

Once the nozzles' flow rates have been corrected, the spray pattern can be tested. An even spray distribution across the boom is important. Non-uniform distribution leads to streaking and possible crop damage from excessive spray overlap. Fill the sprayer with water and apply it on a concrete surface to look for streaking as the water dries. Streaking can be a result of mismatched or misaligned nozzles, clogged nozzles, low and/or uneven boom height, and improper nozzle spacing along the boom.

Nozzle output inspection is only one part of a sprayer calibration check. Sprayer application width, speed, and equipment condition are also important for proper application. Check for leaks, plugged filters and screen, kinked lines, bad hoses, loose fittings and seals, and pump function. Equipment calibration and maintenance should be a regular part of any operation.

For more information on calibrating nozzles and sprayers, see the Sprayer Calibration Fundimentals fact sheet on the Colorado State University Extension website at www.ext.colostate.edu/pubs/farmmgt/05003.html The U. C. Cooperative Extension also has a good calibration worksheet on their website at: ucanr.org/sites/UCCE\_Sacramento/files/74104.pdf



Streaking during a pesticide application can result from a variety of causes.

## **LBAM Biocontrol Releases**

A tiny stingerless wasp is the latest tool being used to help control the Light Brown Apple Moth in California. *Trichogramma platneri*, a pale yellow wasp native to California, is about the size of a grain of rice. They are harmless to people, pets, and livestock, but will prey on the eggs of many species of moths and butterflies.

Adult female *Trichogramma platneri* wasps seek out moth and butterfly eggs by smell and lay their eggs inside them. When the wasp eggs hatch, the larvae feeds on the caterpillar. After completing its development, the wasp pupates inside the moth egg and then emerges as an adult.

Various species of *Trichogramma* wasps have been used in agriculture to help control moth pests for many years. When their population numbers are high enough, they can be very effective to reduce pest numbers. *Trichogramma*, like most types of biocontrol, won't eradicate the pest, but will help keep pest populations low.

CDFA crews have been placing small cards with *Trichogramma platneri* pupae on them in infested neighborhoods in Sacramento and San Luis Obispo. When the wasps emerge, they will attack LBAM egg masses in the area. There will be no releases of wasps where there are also endangered butterfly species. Later, more areas on the edges of the LBAM quarantine will also be treated. Contra Costa County, like other heavily infested counties, will likely have to wait longer for LBAM biocontrol releases.



Trichogramma wasp

## **Contra Costa County Yesterdays**

The town of Clayton was founded in 1857 by Joel Clayton, an early settler in the Diablo Valley. It is said that the name of the town was decided by a coin toss between Joel Clayton and his partner, Charles Rhine. In it's early days, the town of Clayton was primarily a trading post for miners from the nearby coal, copper, and mercury mines. Later, as coal production declined, farms and ranches flourished in the area. Grapes, grain, and almonds were the main agricultural crops.

The land around Clayton proved to be especially good for growing grapes. By 1902, over 500 acres were planted in vineyards. The Clayton Sherry House, built in 1870 by Joel Clayton, was one of Contra Costa County's first wineries. It was bought by Paul DeMartini in 1876 and the DeMartini Winery was built at the site in 1885. Also located in Clayton was the Mt. Diablo Vineyards & Winery, the largest winery in the county by the turn of the 20th century.



courtesy Contra Costa County Historical Society

Clayton in the early 1920's.

Due to Prohibition in 1920, Clayton's wineries were forced to close and many vineyards were replanted into fruit and nut orchards. Clayton continued to be a rich farming area until increasing development beginning in the 1950's replaced orchards and fields with housing developments.



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