

# Controlling Pocket Gopher Damage to Agricultural Crops

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Pocket gophers cause considerable damage to hay and grain crops as well as to cherry, apple, pear, and filbert orchards. Some of the losses are a direct result of feeding activities of gophers: root-clipping apple and cherry trees, eating alfalfa hay and filbert nuts. Other losses result from tunneling and mound-building activities: soil and rocks from mounds damage harvesting machinery and degrade quality of crops. This publication describes activities designed to reduce damages by pocket gophers to hay, grain, and orchard crops.

Pocket gophers are also a serious problem to homeowners and gardeners: controls for gophers under these circumstances are outlined in Oregon State University Extension Service Circular 1115, *Controlling Damages by Pocket Gophers to Lawns, Gardens, and Golf Courses*. Damages to hay, grain, and orchards usually occur over larger acreages, calling for control methods that differ from those used by the homeowner and gardener.

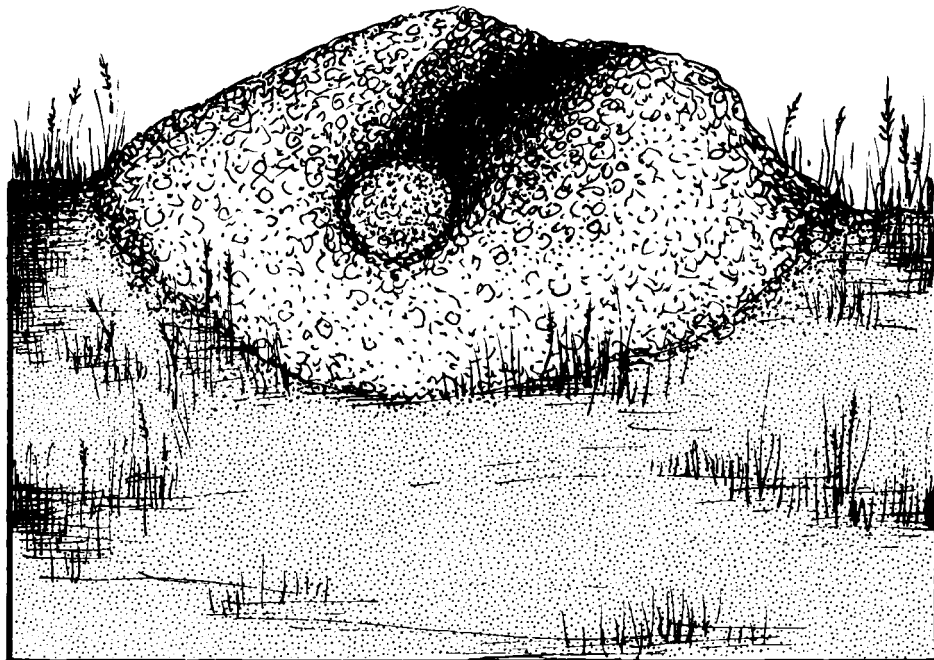


Figure 1.—Pocket gopher mound

## Identify the pest

As with any control program, your first step is to insure that you have properly identified the pest. Damages by other pests such as moles and mice may closely approximate those of gophers, but control methods for these pests are different and do not work for the pocket gopher.

Because the mole is also a burrower and mound builder, it's easy to make a mistake in identification. Pocket gophers extend lateral (side) tunnels to the surface from their deeper main tunnels and push out the excess soil in flattened or fan-shaped mounds. These vary from 12 to 24 inches in diameter and 4 or more inches in height.

The gophers then plug the surface opening through which this soil is pushed, leaving a noticeable dent or plug at one end of the pile (figure 1). The entire lateral may be backfilled to the main tunnel.

**Moles.** Mole mounds are the result of repeated eruptions from below and simply continue to grow or enlarge until the mole has disposed of the excess soil and moved on. Mole mounds are higher and generally rounder in shape than gopher mounds and look more like miniature volcanoes.

No hole at the side of the mound is evident. However, if you place your finger

in the middle of the mound and push it down in a circular fashion, you will discover the mole's hole is in the middle rather than on the edge of the mound.

The pattern of mounds helps to distinguish gopher from mole activity. Gopher mounds tend to be clumped in tight groups; the mole's tend to be spaced in a line as single mounds (figure 2).

**Meadow mice (voles).** Another pest commonly misidentified with the pocket gopher is the meadow mouse or vole. These small animals girdle the base of cherry and apple trees, often killing the trees.

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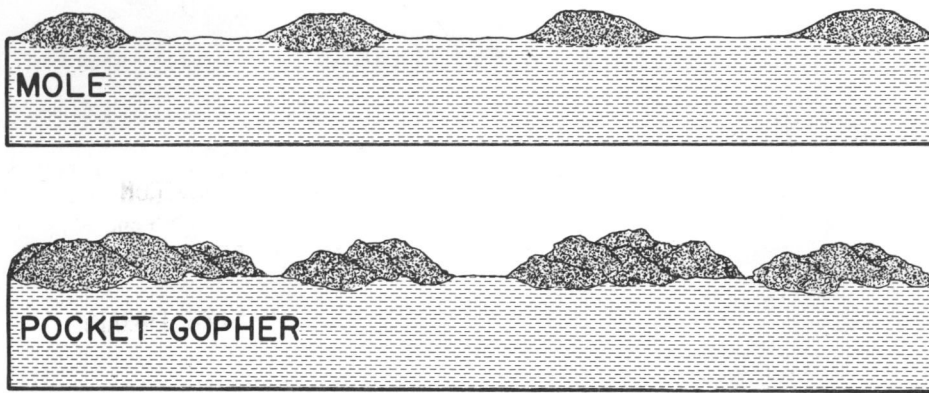


Figure 2.—Mound patterns, mole and pocket gopher

A good clue is the presence of small tunnel systems at or just below the surface of the ground in the shelter of grass or weedy cover. Meadow mice have no mounds at the entrance of their open burrows, which are about the size of a fifty-cent piece. The tooth marks of voles are very small and leave a fuzzy appearance on the bark of damaged trees.

Pocket gophers will girdle but more often tend to clip off roots and rootlets. When the root system of damaged trees is exposed, the loss of roots and rootlets is very typical (figure 3).

Voies will use pocket gopher burrow systems but may make their own excavations as well. Any area with pocket gopher burrows and mounds that also has small open holes with interconnecting surface tunnels can be suspected of harboring both voles and pocket gophers.

**Tree squirrels** have been known to strip bark from the base of filbert and other orchard trees. This type of damage is totally different from that caused by pocket gophers or voles, so there should be little confusion. Also, there are no burrow openings or mounds; tree squirrels make their homes in hollow openings in trees as well as in large, bulky leaf nests. Almost always there is an adjacent hardwood woodlot from which squirrels forage.

### Control methods

**Flood irrigation.** Years ago, farmers flooded hay and grain crops requiring irrigation with a thin sheet of water in spring and at intervals throughout early summer. This forced pocket gophers to leave their burrow systems or drown—and resulted in nearly 100 percent control. Invasion from adjacent non-irrigated lands or reinvasion

by animals forced to nearby higher ground is often a problem.

The advent of sprinkler irrigation increased acreages where irrigated crops could be grown, such as on hillsides and uneven lands, but pocket gophers are not flooded out under sprinkler irrigation, so this form of cheap control is not generally available.

In situations where you can use flood irrigation and pocket gophers are a serious problem, consider this method but give careful attention to control in surrounding areas, to prevent reinvasion.

**Vegetation management.** Studies have indicated that pocket gopher damages can be reduced by approximately 50 percent by the application of herbicides that remove vegetation pocket gophers require for food. This option is limited to orchards and to noncrop areas close to hay and grain crops.

Other studies have indicated that removal of existing crops such as alfalfa, followed by deep tilling, will disrupt burrow systems, remove food, and result in a significant reduction in pocket gopher numbers in fields so treated.

When alfalfa fields begin to decline in productivity for one reason or another, plow them up and plant some alternate crop rather than keep them in alfalfa for a few additional years at greatly reduced yields.

**Trapping.** Techniques for trapping pocket gophers are outlined in the OSU Extension Service publication for homeowners and gardeners. In situations where infestations are limited to 5 or fewer acres, trapping might be an option. You could also trap as a followup to larger-scale poisoning operations, to remove pocket gophers that escaped or avoided the poison baiting.

Trapping is not recommended as the sole control measure on large acreages. The story is told of an alfalfa grower who spent 6 weeks trapping 400 pocket gophers in a 40-acre alfalfa field. Having completed the circuit of the field and returning to where the trapping began, the grower found that pocket gophers had totally invaded from an adjacent untrapped field. This story tells two lessons: first, do not attempt trapping on large acreages, simply because of time constraints; second, reinvasion is a problem with any control method, and you must consider it in the overall control program.

**Poison baiting.** This method is generally recommended when large areas (10+ acres) are heavily infested with pocket gophers. A variety of poison baits are available, ranging from oat and wheat seeds to alfalfa pellets to mixtures of seeds, raisins, and dried apples. A variety of toxicants is available including strychnine, sodium monofluoroacetate (1080), and powerful acute anticoagulants like chlorophacinone and diphacinone.

Field work in eastern Oregon indicated that there is little difference among the



Figure 3.—Root damage by pocket gophers

various toxicants when applied on seed bait, and that a factor more important in determining the success of control is the type of bait. Raw carrots treated with strychnine were found to be much more effective in reducing pocket gopher populations than any of the seed baits treated with the toxicants mentioned.

Most commercially available baits have a seed base, but the pelletized alfalfa and grain-raisin-apple mixtures have been highly effective under some circumstances.

Pocket gophers are active year-round, but the best times for baiting coincide with the best soil conditions for applying baits. Gopher burrowing activity seems to increase in late winter and early spring when the soil softens, and this is a good time to begin baiting, just before the pocket gophers reproduce and have young. Eliminating one female pocket gopher at this time will prevent several little pocket gophers from developing into problems later.

During summer, the soil generally hardens as it dries. There is less burrowing activity, and baits are more difficult to apply. With the rains in early fall, the soil begins to soften again, and burrowing activity of pocket gophers increases. Then you can once more apply baits effectively, now against adults plus the young that were produced earlier in the breeding season.

Apply baits only to fresh burrow systems. You can identify these by leveling mounds with a hard iron rake or by foot and then returning in a day or two to determine where fresh activity is occurring. Revisit areas 2 to 3 days after baiting to search for fresh mounds, which indicate where pocket gophers avoided control. Such areas require additional baiting or trapping. Because pocket gophers will rapidly reinvade areas that have been cleared by poison baiting, survey such areas periodically so that you can control any invading pocket gophers quickly.

Application of poison baits underground to pocket gophers results in low hazard to nontarget wildlife. Studies have shown that some mice and voles may be accidentally poisoned in the burrow systems, but relatively few other nontarget animals contact the baits directly.

Poisoned pocket gophers almost always die below ground, so their carcasses are rarely available on the surface to nontarget scavengers such as hawks and owls. Avoid bait spillage, but if it occurs, bury baits promptly to avoid hazard to nontarget birds and mammals.

**Hand-baiting.** Hand-baiting is described in the circular for home owners and gardeners and is recommended only where infestations are localized on small (2 to 5 acres) areas. Hand-baiting is slow, requiring 7 to 20 hours to treat 1 acre.

**Probe-bait dispensers.** Probe-bait dispensers (figure 4) allow you to probe for runways and dispense the poison bait in one

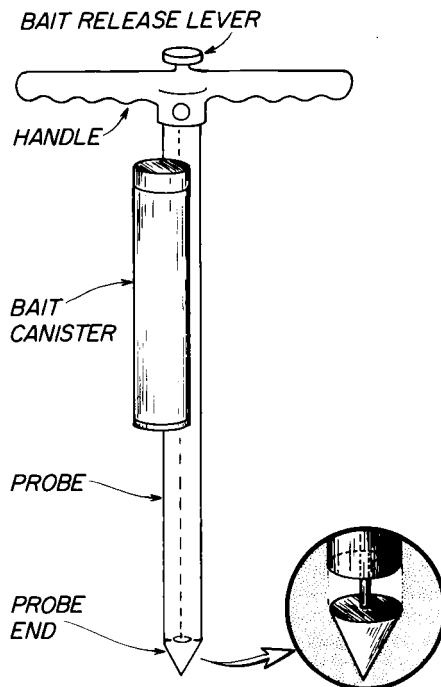


Figure 4.—Probe-bait dispenser

step. Their use is about twice as fast as hand-baiting. The probe-bait dispensers generally can operate only with grain baits. (Pelleted baits and baits containing raisins and dried fruits usually will not pass through the dispensing mechanism).

Push the probe-bait dispensers into the ground in a circular pattern around fresh mounds as you seek the runways. Once you find a runway (the dispenser suddenly sinks 2 to 4 inches deeper in the ground), a twist of a lever dispenses a measured amount of bait into the runway. Place three to five baits in runways around each cluster of fresh gopher mounds.

**Burrow builder.** For situations where pocket gopher infestations are severe on 10 or more acres, the burrow builder (figure 5) is the most effective way to dispense baits.

The burrow builder is designed for use with a tractor of at least 25 horsepower and having a conventional three-point hitch. The device consists of a supporting frame, a depth-adjustable, burrow-forming torpedo at the end of a shank, a rolling coulter to cut surface trash and shallow roots ahead of the shank, a bait-metering device, and press wheels to drive the metering unit and close the knifelike slit made by the upper portion of the shank. The bait is dropped into the artificial burrow through a tube built into the shank.

The torpedo is pulled 6 to 10 inches below ground level, forming an artificial burrow. Baits are dispensed every 18 to 48 inches. Pocket gophers use the artificial burrows, where they intercept their own burrow system. When they discover and eat the machine-placed baits, they are poisoned.

Pull the burrow builder at a speed of 2½ to 3½ miles per hour. You can treat an acre in 6 to 12 minutes, a marked improvement over baiting by hand or with the probe-bait dispenser.

For maximum effectiveness, the artificial burrow must be at the same approximate depth as natural gopher burrows. You can determine this by digging into a burrow system, measuring the depth, and adjusting the depth of the torpedo.

The torpedo must be level under ground. If it is angled downward, it will be hard for the tractor to pull. If the torpedo is angled upward, it will not stay below ground. Build these artificial burrows 20 to 25 feet apart.

Soil conditions are critical for proper use of the burrow builder. If the soil is too dry, the burrow builder will not penetrate well, will pull hard, and the burrow will tend to cave in. A good rule of thumb: if the soil is too hard to easily push a hand probe 10 inches into the soil, it's too hard for the burrow builder.

The soil is moist enough when a handful of it is squeezed and retains its shape and does not crumble. If the soil is sticky when squeezed in a ball and sticks to the press

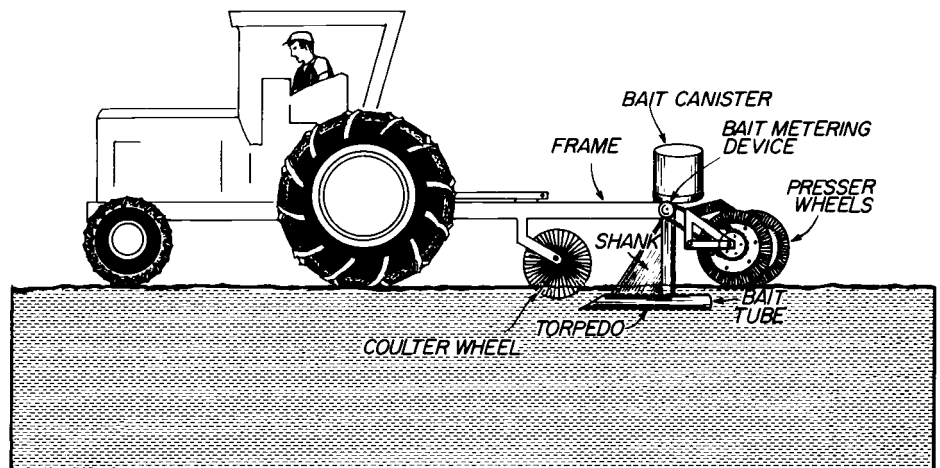


Figure 5.—Burrow builder

wheels, it is too wet. In eastern Oregon, burrows may be formed in sandy soils 2 days after irrigation. Generally the soil moisture should be near the upper limits of the range for good plowing or cultivating.

A few helpful tips (from Marsh and Cummings 1977—see list of references at the end of this publication) are:

1. Scour the burrow-forming shank and torpedo thoroughly like a plow so they will form a smooth burrow. They will scour more quickly if you temporarily give the coulter a shallow setting (3 to 5 inches) in the ground.
2. Adjust the machine so that the torpedo is drawn through the soil parallel to the surface. This requires a certain amount of trial and error.
3. Carefully align the coulter wheel to cut directly in front of the burrow-forming shank at a depth of 4 to 6 inches, to minimize soil or sod disturbances.
4. Run the press wheels firmly on the ground, to close the narrow slit in the soil formed by the upper portion of the burrow-forming shank.
5. Lower the torpedo into the ground while the machine is in forward motion; likewise, withdraw it while you're still moving forward.
6. Raise the torpedo out of the ground to make turns. Some models will permit moderate turns; however, with all models, raise torpedo out of the ground to make sharp turns.
7. Avoid stopping the tractor on an uphill pull with the torpedo buried; even a slight backward movement can clog the bait outlet.
8. At the end of each artificial burrow transect or intervals of 1,000 feet, whichever is lesser, check the torpedo to make sure it is not clogged and that the bait tube is open.

To prevent pocket gophers in adjacent areas from invading treated areas, bait the perimeter of treated areas. Generally, building two additional burrows 20 to 25 feet apart around the treated areas will do the job.

Check the treated area after two weeks to make sure that gophers have not invaded from adjacent areas. You can quickly treat such small invasions by spot baiting or trapping.

## Sources of supply

Manufacturers of probe-bait dispensers and burrow builders are listed below with approximate prices. Your local county Extension agent will have a listing of nearby distributors. The list is not exhaustive but represents major manufacturers. The list is offered as an example only, and it does not represent endorsement by Oregon State University Extension Service.

### Probe-bait Dispensers

Elston Co. Inc.  
815 E. 79th St.  
Minneapolis, MN 55420  
Tel: (509) 535-0121  
Estimated Price: \$100

Leppert Machine & Welding  
5635 S. 6th  
Klamath Falls OR 97601  
Tel: (503) 884-9131  
Estimated Price: \$95

### Burrow Builders

Elston Co. Inc.  
(Same address as above)  
Estimated Price: \$725 + freight  
Blackwelder  
P.O. Box 808  
Rio Vista CA 94571  
Estimated Price: \$975 + freight

## Useful references

- Bogges, E. K., "Pocket gophers," in Henderson, F. R., and E. K. Bogges (eds.), *Prevention and control of animal damage*, Great Plains Agricultural Council, Kansas State University (Manhattan, 1978).
- Hansen, R. N., *New dispenser aids gopher control*, Colorado State University Agricultural Experiment Station Pamphlet I-S (Ft. Collins, 1956, 8 pp.).
- Kepner, R. A., W. E. Howard, M. W. Cummings, and E. M. Brock, *U. C. mechanical gopher-bait applicator use*, University of California Agricultural Extension Series Publication Series AXT32 (Davis, 1962, 11 pp.).
- Kuhn, L. A., *Controlling damages by pocket gophers to lawns, gardens, and golf courses*, Oregon State University Extension Service Circular 1115 (Corvallis, 1983, in press). Single copy 25¢ plus 25¢ postage. Order from Bulletin Mailing Office, OSU, Corvallis, OR 97331.
- Marsh, R. E. and M. W. Cummings, *Pocket gopher control with mechanical bait applicator*, University of California Division of Agriculture SCI Leaflet 2699 (Davis, 1977, 7 pp.).

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