

Controlling Pocket Gophers in Nebraska

Dallas R. Virchow, Project Coordinator–Distance Education, Wildlife Damage Management;
 Scott E. Hygnstrom, Extension Wildlife Damage Specialist; and Bruce E. Anderson, Extension Forage Specialist

This NebGuide describes pocket gophers and the damage they can cause. Several methods of control are discussed. Another NebGuide, *Using Burrow Builders for Pocket Gopher Control*, G1510 is also available.

Pocket gophers are burrowing rodents with stocky bodies, small ears and eyes, and a sparsely-haired tail. They are adapted to an existence that is almost entirely below-ground (*Figure 1*). Typically, pocket gophers appear above-ground to excavate soil to the surface or to disperse to new areas.



Figure 1. The plains pocket gopher, *Geomys bursarius*, spends almost its entire existence belowground.

They are named for the large external fur-lined cheek pouches that carry food or bedding material to underground caches or nests. The lips of pocket gophers close behind the large incisors, giving them a buck-toothed appearance. Powerful front shoulders and limbs end in long claws that are adapted for excavating and moving hundreds of pounds of soil in a year.

The plains pocket gopher is found throughout Nebraska, particularly in alfalfa, pastures, rangelands, and roadside areas. The smaller northern pocket gopher is found in clay soils north of the Pine Ridge in northwestern Nebraska.

Adult pocket gophers range in size from 1 pound in eastern Nebraska to 1/3 pound in western Nebraska. Larger animals are about one-foot long, including a four-inch tail. Their short fur ranges in color from a dark chocolate brown in the east to a sandy brown in western Nebraska. Pocket gophers are not protected by law in Nebraska.

Life History

Pocket gophers usually live alone within their burrows, except during their breeding season in late winter to spring. A single litter of three to four young are born between March and May. Young leave their mother's burrow during late summer and may travel above ground before digging their own burrow.

Each adult pocket gopher occupies its own burrow system most of the year but animals in neighboring burrows can quickly re-occupy a vacant burrow. Populations of pocket gophers in Nebraska may exist at densities of one to eight animals per acre.

Pocket gophers usually forage belowground, feeding on roots and even pulling plants down into their burrows and feeding on stems and leaves. Pocket gophers prefer succulent forbs (prickly pear, dandelion) and legumes (alfalfa) to grasses and will eat many kinds of plants, including the roots of trees and garden vegetables. Pocket gophers deposit soil castes under snow. These are deposits of excavated soil placed into tunnels that are dug through the snow. The castes are seen in spring when the snow melts.

Pocket gophers create extensive burrow systems (*Figure 2*). The depth of their feeding tunnels are typically 8 to 18 inches deep while their nest chambers may be several feet below the surface of the soil. Tunnels remain open throughout the year. During winter, the animals slow their activity and periodically travel through existing tunnels to feed on caches of roots, stems and leaves. Pocket gophers do most of their mound-building in early spring and fall or in periods of wetter soil conditions. Each pocket gopher can create dozens of mounds, sometimes within a span of a few days. The burrow system of a pocket gopher may cover more than one acre.

Pocket gophers excavate soil through newly opened lateral burrows that run 45° to the soil surface. Mounds are fan- or bean-shaped, in contrast to the conical shape of mounds of moles. Mounds of pocket gophers may contain up to a bushel of soil whereas mole mounds are much smaller.

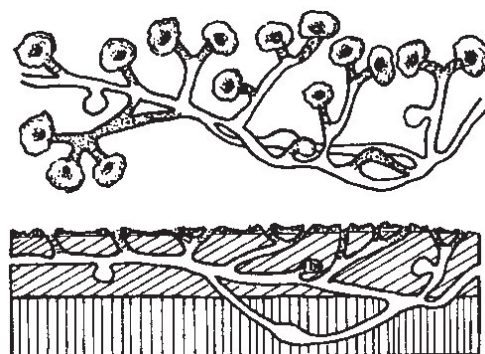


Figure 2. A single pocket gopher may exist within an extensive system of feeding tunnels and chambers.

Immediately after a mound is made, the gopher plugs the burrow with soil to a depth of several inches. Occasionally a lateral burrow is plugged without soil being excavated or a mound created. Below and offset to the lateral burrows lie the feeding burrows in which pocket gophers eat roots and pull down plants through quarter-size holes.

Economic Importance

Pocket gophers can cause extensive damage to native range, pasture, and hay fields. They can also damage trees and shrubs in windbreaks, orchards, and backyards, damage root crops in gardens, and create mounds that damage turf in backyards, public parks, and golf courses. Through their digging they can affect the integrity of airport runways, roadbeds, dikes, canals, and other earthen structures. Gophers also gnaw into buried utility cables and irrigation pipes. Their mounds damage or slow hay harvesting equipment.

Pocket gophers adversely affect crops by directly feeding on roots, stems and leaves, and by exposing plant roots to drying through their burrowing. Gophers also cover growing plants with excavated soil. In Nebraska, plains pocket gophers have reduced forage yield on western Nebraska rangelands by 21 to 49 percent and on hay meadows by as much as 30 percent. In irrigated alfalfa, yields have been reduced as much as 17 percent and in dryland alfalfa in eastern Nebraska, as much as 35 percent in those areas within fields that were occupied by pocket gophers.

Pocket gophers girdle the stems of young trees, chew or sever tree roots that are up to 6 inches in diameter, and can damage up to 10-year-old trees. Gophers are particularly troublesome when they move through tunnels created by tree-planting machines in windbreaks and eat the roots of young trees. Occasionally, pocket gophers burrow through snow and damage young tree trunks. Signs of gophers include a smooth gnawed surface, with 1/8-inch-wide tooth marks, or deeply gnawed wood on stems that leaves a sculptured effect.

Mounds created by pocket gophers also dull and plug hay harvesting equipment. Harvest operations are slowed and labor and equipment costs rise when pocket gopher mounds are present.

Ecological Role

Skunks, fox, bobcat, weasels, hawks, owls, and bull-snakes feed on pocket gophers but these predators have minimal affect on gopher numbers. This is probably because gophers are rarely exposed above ground and plug their tunnels immediately after excavating a mound. Pocket gophers also readily block attempts by predators to dig into their tunnels by fending them off with their strong teeth and claws, by retreating into their extensive burrow system, or by pushing soil between them and would-be predators. Pocket gophers play an important role in burrowing and excavating soil that promotes the vertical cycling and mixing of soil constituents.

Controlling Damage

Objectives. One objective in controlling damage caused by pocket gophers is to reduce the population to a level where losses could be tolerated. In forest plantations, research suggests that reducing populations to two pocket gophers per acre is an economic level. No comparable information is

available for other crops or rangelands. Reduction of pocket gopher numbers may be an appropriate objective for preventing damage to high value cash crops when the manager does not have control over adjacent areas that contain perennial populations of pocket gophers.

Another objective in managing damage is to eliminate populations entirely within an area or a portion of a field where immigration of pocket gophers is not a perennial problem. In this case, 100-foot buffers surrounding the treated field should also receive control.

Approaches to Maintenance. *Community Effort.* Control and maintenance of pocket gophers should be a community effort. Neighboring fields of perennial grasses, like those in native rangelands, pastures, land enrolled in the Conservation Reserve Program, and even roadside rights-of-way contain pocket gophers that will immigrate into your protected fields. Enlist the help of neighbors to develop a community-wide control program to limit gopher populations in these source areas. Consider mowing, cultivating or burning the source areas at the end of the growing season to allow for better detection of mounds and subsequent control of pocket gophers.

Border Patrols. Whether you use traps, toxic baits or cultural methods, new animals will immigrate into your protected fields. Mounds will most likely appear first near the edge of the field. Mounds also appear near bales, loaves, or stacks of hay where the gopher seeks warmth and food in the soil below. Once the initial control program is complete, you should patrol the 100 feet outside of the field perimeter at least three times during the growing season. To maintain a 100-acre field, you will likely spend as little as one hour (hand baiting) to six hours (trapping) three times each growing season.

Traps. Trapping requires much labor in both setting and checking the traps. Trapping is best employed in fields up to 20 acres, in larger fields that are sparsely or sporadically inhabited by pocket gophers, or as a follow-up control with toxic baits. Trapping also can be used as a substitute for chemical control in areas that are near surface water or where there is a high water table. Labor costs for trapping are about 35 percent higher than for baiting methods.

Many styles of traps are available for controlling pocket gophers (*Figure 3*). Three lethal types are clutch-jawed, choker-loop, and box traps. Trap sizes vary among models or brands. Select traps that relate to the average size of pocket gophers in the local population.

In one technique, two traps are seated on the floor of the main burrow, pointing in opposite directions (*Figure 4*). In another technique, a single trap is seated on the floor of the lateral burrow. Some trappers prefer to close the burrow entrance after setting traps while others leave the burrow entrance open. The latter technique presumes that the gopher returns to the trap site because of the light and air movement

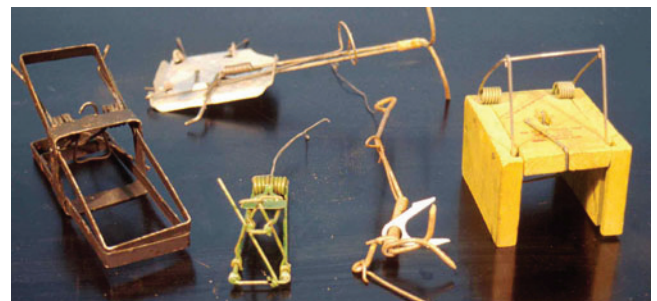


Figure 3. Pocket gopher traps.

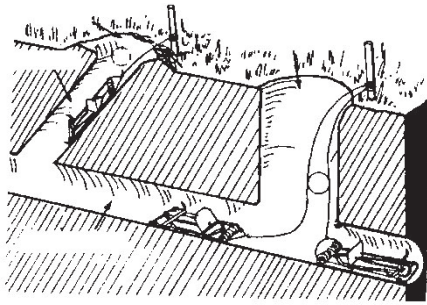


Figure 4. Two approaches to making a trap set belowground for pocket gophers.

associated with the opening. One caution in using this method is that pocket gophers respond by pushing soil in front of them to close the opening. Traps may be tripped by the soil rather than by the animal.

Pocket gophers quickly bury, and may even create new mounds, over top of tripped traps. Always secure traps with a wire that leads to a stake at the soil surface. This helps in retrieving either a buried trap or one in which there is a wounded animal. Pocket gophers can inflict painful bites, and extreme caution should be used in handling them.

Baits may be used when placing two traps in the main burrow and when burrow entrances are closed. Young carrots, tomatoes, and fresh alfalfa leaves and roots have been used as bait.

Toxic Baits. Toxic baits can be applied belowground to pocket gopher burrows in three ways: 1) hand baiting through opened mounds, 2) hand baiting through holes opened above burrows and 3) machine baiting. Applying bait aboveground for pocket gopher control is both ineffective and illegal.

Toxic baits have varying levels of effectiveness, ranging from 10 to 90 percent. As of February 2003, the only products registered for use on pocket gophers in Nebraska include:

- 0.5% strychnine-treated grain baits
- 2% zinc phosphide-treated pellets and grain baits
- 63% concentrate powder of zinc phosphide
- 0.005% chlorophacinone pellets and grain baits
- 0.005% diphacinone bait bars

Both strychnine and zinc phosphide are single-dose poisons. Quantities over 5 pounds of strychnine-treated bait and zinc-phosphide-treated bait are Restricted Use Pesticides. Individuals that purchase or apply the baits as commercial applicators must be certified by the U.S. Environmental Protection Agency and licensed by the Nebraska Department of Agriculture. Zinc phosphide should be rotated with other toxic materials in a baiting program so that pocket gophers do not develop a taste aversion to it.

Chlorophacinone and diphacinone act as an anticoagulant. Gophers must eat repeated applications of bait for it to have a lethal effect. Both chlorophacinone and diphacinone are General Use Pesticides. Check for current registrations with the Nebraska Department of Agriculture and follow all pesticide label instructions before purchasing or applying toxic baits.

Hand Baiting. Several tools may be useful for hand baiting (Figure 5). To place bait into a pocket gopher's burrow, dig through the mound and soil plug or use a probe to directly enter the burrow from above. To dig, choose a freshly excavated mound that is small and bean- or fan-shaped. The most recently excavated mounds generally are

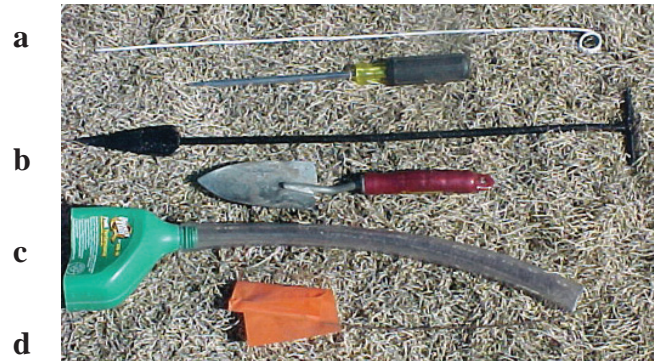


Figure 5. a) two-foot length of stiff wire or a long-handled screwdriver for probing, b) long-handled spade or spoon or a hand trowel for digging, c) a funnel for dispensing bait, and d) a flag for marking mounds .

at the perimeter of the burrow system. Use a 2-foot length of 9-gauge wire or a long screwdriver blade to probe through the mound on the concave side or at the apex of the fan to locate the soil plug and the open burrow below (Figure 6). Use a hand trowel or small shovel to excavate through the plug. Place a quantity of bait specified by the label (usually a teaspoonful) deep into the burrow using a long-handled spoon. Bait bars also can be applied using this technique. To probe and enter a burrow from above, use a pointed 3/8-inch diameter metal rod to probe about 12 to 18 inches from the concave side of the mound. The burrow will typically lie from 8 to 18 inches below the surface. The probe will accelerate as you enter the burrow. Apply bait through the opening made by the probe.

Several commercial probes have bait holders to dispense the bait through the hollow probe. You may have to use a 3/8-inch metal rod as a probe prior to probing with the larger diameter models to enter soils that are dry, compacted, or of high clay content. Whether hand baiting through the mound or via probes, always close the opening by kicking it with the heel of your shoe. Be careful to prevent loose soil from covering the baits in the burrow.

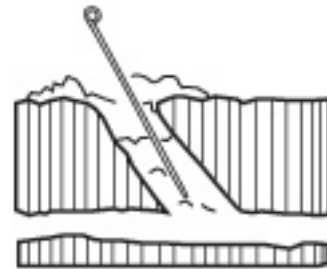


Figure 6. Probing through the soil plug.

For best results when hand baiting, apply baits to all freshly excavated mounds. A pocket gopher may excavate several mounds at different areas of its tunnel system. Apply bait at two to five locations within a single tunnel system so the animal quickly consumes the bait. Baits that remain in the tunnel will be consumed by gophers that subsequently enter the system.

Machine Baiting. Machine baiting can be done by using a tractor-drawn burrow-building machine or "gopher getter" to create tunnels in which bait is applied. Gophers enter the tunnels created by the machine during their normal digging activities and find the bait. Several models of burrow builders are available. Custom rates for burrow builder operations usually start at about \$5.00 per acre at 2003 prices. For detailed

information, see the NebGuide *Using Burrow Builders for Pocket Gopher Control* G1510, which is available at a University of Nebraska–Lincoln Extension office near you.

Frequency and Time of Baiting. Regardless of the application method, toxic baits can be of most benefit when applied during early March or April, when pocket gophers are most active and their populations are at their lowest. Toxic baits are effective at any time of year when applied in tunnels below new mounds. In hand or probe-applied baiting, if new mounds appear within three to seven days, apply toxic baits again. Burrow builders are typically used in alfalfa before spring growth and after the last harvest of the crop. New mounds may appear for 10 to 14 days after burrow builders are used because it usually takes time for the pocket gophers to find the baits in the machine-made tunnels.

Fumigants. Generally, fumigants are not effective in controlling pocket gophers. The effects of fumigants are reduced when pocket gophers respond to the gases by blocking the tunnels. Fumigants are unlikely to spread through the extensive burrow system, particularly if they are not similar in weight to the air that exists within the burrows.

Only two fumigants are registered for controlling pocket gophers: tablets or pellets of 55 percent - 60 percent aluminum phosphide, and gas cartridges with various active ingredients. Products that contain aluminum phosphide are Restricted Use Pesticides. Gas cartridges are General Use Pesticides and are commonly sold at discount stores and lawn, garden, or farm supply stores. Aluminum phosphide slowly releases a toxic gas over a period of hours while gas cartridges are ignited and burn quickly while eliminating the oxygen within the burrow. Fumigants are applied into the burrow as in the procedure for hand baiting. The burrow entrance is then closed with soil, being careful not to cover the pellet, tablet, or burning cartridge. Low soil moisture can reduce the effect of aluminum phosphide or of gas cartridges.

Propane exploders with wands are dangerous because of their percussion and fire hazard and have not been proven as effective. For more information on fumigants, see the NebGuide *Fumigation of Burrowing Rodents with Aluminum Phosphide or Gas Cartridges* G1477.

Evaluating Your Results. Evaluating your trapping, baiting, or fumigation efforts depends upon your situation. For owners of backyards, the evaluation may be to monitor the treatment area for a period of seven to 10 days, looking for the appearance of new mounds.

Farm and ranch managers, orchardists, and others, can do a more thorough evaluation by flagging at least 25 mounds in separate burrow systems within the treatment area. Open each burrow with a hand trowel and revisit the opened holes about 24 to 48 hours later. When using anticoagulant baits, wait at least two weeks to open holes and evaluate your success. If machine baiting with burrow builders, wait at least one week to open holes.

Leveling Mounds. Hand or tractor-drawn implements can be used to scrape or rake the mounds to spread the soil over the surface. You can then examine a field for any new mounds that may appear in the days following treatment. You can also reduce the damage caused by mounds during harvest operation by spreading the soil away from the mounds.

Exclusion. Underground cable or pipe can be protected by backfilling the trench with 6 inches of large gravel 1-inch or greater in diameter to surround the pipe. Cable companies use steel armor or spaced wire basket protectors around the cable to protect them from gophers.

Use pipe that is greater than 2.1 inches in diameter for underground water lines or conduit. They are much less likely to be gnawed than pipes of a smaller diameter because pocket gophers cannot gain a purchase with their teeth.

Cultural Methods. Eliminate weeds and other broad-leaved plants in grasslands by hand digging or by using herbicides.

Alfalfa that borders range, pastures, or other perennial crops is more susceptible to pocket gopher damage than alfalfa that borders weed-free, clean-tilled row crops. Small grain crops can also serve as buffers around alfalfa or tree plantations.

In annual crop rotations, row crops used in two successive years with alfalfa can reduce pocket gopher populations. Also, try varieties of alfalfa that are less susceptible to damage from pocket gophers. Use varieties with fibrous roots rather than a single taproot or with crowns that are broad and positioned close to the soil surface, instead of those with crowns that are small and partially elevated.

What Doesn't Work. Repellents, like moth balls, and others do not work because the animal may likely close and reroute its burrows, even if the odor or taste is obnoxious to them. Plants, like chrysanthemum, castor bean (*Ricinus*), and "gopher" spurge (*Euphorbia*) have not been proven as repelling to pocket gophers. Repellents, like capsaicin, have been used to reduce gnawing on buried cable, but no products are currently registered for use against pocket gophers. Electronic, magnetic, and vibrating devices have not been proven as effective. Barn owl nest boxes and perch poles have been used to promote owl predation but there is no evidence that this reduces damage by pocket gophers.

Acknowledgments

The authors thank Mr. Monty Sullins, Montana Department of Agriculture and Tom Holman, UNL Cooperative Extension for their review of the manuscript and Mr. Elton Weich, Hoskins, Nebraska for his valued suggestions.

Reference to commercial products or trade names is made with the understanding that no discrimination is intended of those not mentioned and no endorsement by University of Nebraska–Lincoln Extension is implied for those mentioned.

This publication has been peer reviewed.

UNL Extension publications are available online at <http://extension.unl.edu/publications>.

**Index: Wildlife Management
Wildlife Damage Control**

Issued May 2003