



Managing Mole Problems in Kentucky

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Moles are remarkable animals known for their specialized abilities for life underground. They are seldom seen by humans and are often mistaken for pocket gophers, mice, or shrews. In fact, the mole is not closely related to any small mammal except the shrew, both belonging to the mammalian order *Insectivora*. Moles often come into conflict with homeowners when they burrow in yards.

Identification

Moles are not rodents and do not have characteristic rodent features such as large, sharp front teeth. Rather, they have sharp, pointed teeth (like a cat) used for catching and eating grubs and earthworms. The mole's most remarkable features are its adaptations for life underground. It has greatly enlarged paddle-like front feet and enlarged toenails uniquely adapted for digging. Mole fur is short, soft, and velvety, and when brushed, offers no resistance in either direction. These two adaptations allow moles to literally swim forward and backward through the soil. Other adaptations for this life include a cylindrical body, a long, tapered snout, and eyes and ears so tiny they almost appear to be missing. The hind legs are very small, enabling the mole to turn with ease in a narrow passage. Fully grown moles measure 4 to 7½ inches long complete with a very short tail. Fur color varies from black to brownish to grayish with silver highlights.

Mole Facts and Biology

The eastern mole (*Scalopus aquaticus*) is the most common and abundant mole in Kentucky and can be found in a variety of habitats dominated by loose, well-drained soil. Moles are found in suburban lawns, cemeteries, golf courses, pastures, meadows, woodlands, sandy soils near streams, and light, loamy soils in the Bluegrass region. Since they are adapted for life underground, they construct extensive underground tunnels, using two types: shallow surface tunnels in the spring, summer, and fall and deep permanent tunnels used year-round as the main avenues of travel. Nest cavities and home areas, 6 inches in diameter and lined with vegetation, can be found 12 to 18 inches beneath the soil surface connecting the deep tunnels. Moles are antisocial, solitary animals; they live alone except to breed. Males and females come together only for a brief encounter during February to mate. In



April, after a 45-day gestation period, two to five large, hairless, helpless young are born in the underground nest chamber. They are about half grown at five weeks and leave the next week to fend for themselves. They become sexually mature in one year.

Eastern moles are active any time of the day but are most active from 4 to 7 a.m. and 6 to 9 p.m. all year. Moles must be very active to meet high energy requirements. In fact, they can burrow as fast as 1 foot per minute. High-energy mole food comes as grubs, earthworms, beetles and beetle larvae, insects and insect larvae, snails, and spiders. Moles eat small amounts of plant parts occasionally. Their appetite is almost insatiable, and captive moles eat constantly as long as suitable food is put in the cage. If captive moles do not get suitable nourishment, they die within several hours. Thus, one mole can be responsible for considerable damage to a lawn or garden.

A mole typically travels 1/5 acre. No more than three to five moles live on each acre; two to three moles is a more common number. Thus, one mole will usually use more than one person's yard. For effective control, several neighbors may need to cooperate.

Moles live three to four years in the wild. Predators such as fox, skunk, owls, and even dogs and cats kill and eat moles. One method of control may be to get a good dog.

Burrowing and Tunnels

As mentioned previously, moles create shallow and deep tunnels. It is the only animal that creates a surface tunnel. These tunnels are usually temporary feeding burrows. Some may be used as travel lanes, while others may be travelled infrequently or abandoned immediately after being dug. Surface tunnels are most abundant after a warm rain or during the spring and fall when moles are actively searching for insects or earthworms. Underground tunnels are

often deep, and the only evidence that moles exist may be mounds of soil (molehills) pushed up to the surface. They are used as highways leading from cavities to feeding areas and are used most during hot, dry, or very cold weather when earthworms and insects move deeper into the soil.

Controlling Mole Damage

The first step in controlling moles is to actually determine if a mole is the culprit. Because moles are insectivores, they do not routinely eat garden seeds and bulbs, although they are often blamed. The real culprits are probably voles, white-footed mice, or house mice. If your garden has runways in it, the moles are looking for insects and earthworms.

Moles play a beneficial role in the management of soil and in the control of undesirable grubs and insects. By tunneling and shifting soil particles, moles permit better aeration of soil, aid in drying out sod, and allow humus (organic matter) to travel deeper into the soil. This tunneling also allows subsoil material to be moved closer to the surface where nutrients may be more available to plant roots.

Perhaps the mole's greatest crime is the nuisance it creates in lawns and gardens. If you have this problem, take control measures.

Trapping

Because of the mole's unique biological attributes, the most effective way to control moles is trapping. As mentioned previously, moles are solitary and have a high energy requirement that dictates a large feeding territory. Thus, mole densities are not as great as you might imagine. A single lawn may have only one or two moles, which means the offending animals can be removed and the problem solved. In addition, mole reproduction is so low that areas are not repopulated quickly.

The habit of moles to quickly open and repair damaged runways provides another advantage in trapping. A mole becomes suspicious when it encounters anything unusual in its burrow such as a steel leg-hold trap, but it is not suspicious of soil blocking the runway. When it encounters a blockage, the mole immediately pushes its way into the blocked area, reopens it, and continues on its way. Specially designed mole traps take advantage of this habit. When preparing to trap moles, be aware that moles are sensitive to anything unnatural in their environment. Be careful not to tear up large amounts of soil or many sections of burrows when setting a trap. Also be aware that a poorly set or incorrectly placed trap is an immediate danger signal to the mole and will cause the mole to detour. Trapping moles takes patience and persistence. If you have an ongoing problem with moles, you may need to set traps during most of the summer.

Types of Mole Traps

Three types of mole traps are currently available and all work equally well if used properly. The names of these traps are harpoon trap, scissor-jaw trap, and choker-loop trap. The harpoon trap has sharp spikes that spear the mole as it passes. The scissor-jaw trap kills by grabbing the animal. These traps are shown in Figure 1. Finally, the choker-loop trap has a loop that tightens around the mole's body. You can buy traps at local hardware, agriculture supply, feed and seed stores, or from these manufacturers:

Harpoon and Scissor-Jaw Trap
Woodstream Corporation
69 N. Locust St.
Lititz, PA 17543
(717) 626-2125

Choker Loop Type Trap
Nash Mole Trap Company
5716 East "S" Avenue
Vicksburg, MS 49097-0990
(616) 322-2980

When and Where to Trap

Trap site selection and timing are critically important if trapping is to be successful. Because of the difficulty in placing a trap in a deep burrow, most trapping is done on surface burrows. Remember surface burrows are used most actively during the spring and fall and immediately after a warm rain. Trapping during these periods increases the likelihood of catching the animal. To be successful, you must find an active burrow. Active burrows are relatively straight runways that may connect two systems of foraging activity. A burrow system that ends abruptly has probably been abandoned, and a burrow system that is highly branched and turning back on itself, is probably a foraging burrow and may also be abandoned. In addition, burrows that have numerous mouse holes or breaks are probably not being used.

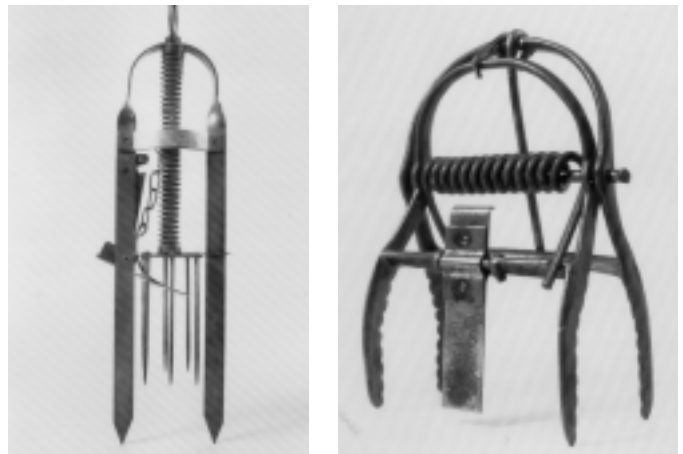


Figure 1. Harpoon trap, left, and scissor-jaw trap.

To find a frequently used burrow, tramp down with your foot on each runway (see Figure 2). Within 12 to 24 hours active runways will be repaired. Then, you can put a trap in this location. If the trap has not captured a mole in three days: (1) the trap was placed in the wrong location, (2) the runway was disturbed too much, (3) the trap was improperly set, and the mole detected it, (4) the mole changed its habits and was not actively using the burrow, or (5) you captured all the moles in the general area.



Figure 2. To determine which runways are active, flatten a small section of the runway with your foot and check the next morning.

Traps are generally more effective if set in the late afternoon or early evening (4 to 6 p.m.) coinciding with the activity period of the mole. Be sure to check the spring mechanism several times to ensure the trap is working adequately before placing it in the burrow system. If traps need to be relocated, wait until after the morning activity period. Be sure to handle the traps safely, keep them away from children, and follow the manufacturer's directions. Put a small bucket over them if children or pets are present. Instructions below show the proper use of each type of trap.

Setting a Harpoon Trap

1. Level and lightly pack down the runway ridge with your foot.
2. Set the trap (with the safety catch in place) so that it straddles the active runway and is inserted deeply enough to prevent recoil when the trap is sprung. The trigger pan should touch the flattened ridge (see Figure 3).
3. Release the safety catch allowing the spikes to be forced into the runway (or raise and release the spikes several times to make holes in the soil for the spikes to enter).
4. Set the trap and leave it alone. Do not disturb any other part of the mole's runway system.

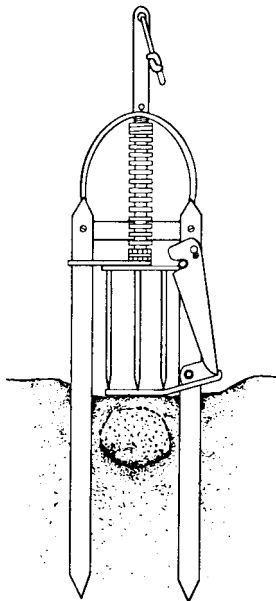


Figure 3. The harpoon trap is set directly over the runway so that its supporting stakes straddle the runway and its spikes go into the runway when it is tripped.

Setting a Scissor-Jaw Trap

1. Dig out a section of a straight runway with a garden trowel across the runway a little deeper than the burrow and as wide as the trap. Note the exact direction of the tunnel indicated by the open ends.
2. Replace and repack the loose soil.
3. Set the trap (be sure to secure the safety catch). Place the trap in the runway so that it straddles the open runway. Be sure the trigger mechanism touches the packed soil between the jaws (see Figure 4).
4. Place the trap so that the ends of the jaws are set about 1 inch below the runway opening. Make sure the trap is in line with the runway so the mole has to pass between the jaws.
5. Set the trigger mechanism so that it will spring easily. Release the safety catch. **Caution: Be extremely careful when handling these traps.**

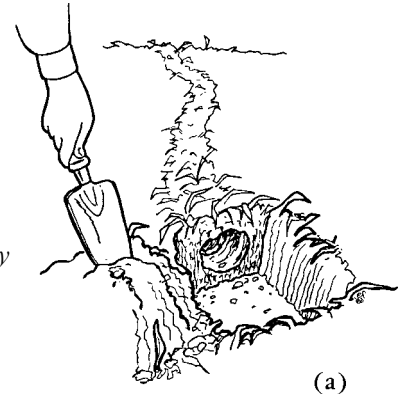
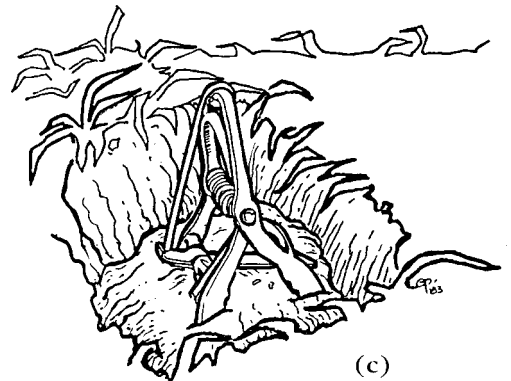
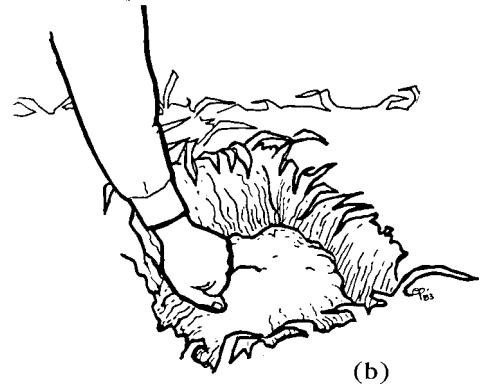


Figure 4.
a. Before setting a mole trap, first excavate a tunnel.
b. Replace the soil loosely in the excavation.
c. Set the scissor-jaw trap so that the jaws straddle the runway.



Fumigation

The extent to which gas cartridges or aluminum phosphide are effective depends on a variety of factors. This method is recommended only if the entire burrow system can be located and fumigated. This usually requires a neighbor's cooperation since a burrow system is found over three to four lawns. Fumigation is rarely effective if the soil is porous or dry, the fumigant is not correctly placed, the complete burrow system is not treated, or there are numerous shallow feeding tunnels. **Warning: Never use a fumigant in a manner inconsistent with its labeling.**

Fumigants appear to be most successful in controlling star-nosed moles, which are uncommon in Kentucky. Their usefulness in controlling eastern moles is questionable and requires extensive work in locating the burrow system, determining active burrows, and digging out an area to place the cartridges.

Repellents

If moles eat bulbs, an aversive taste repellent, Thiram, is available from a variety of sources including agriculture supply stores, feed and seed stores, and garden shops. Thiram is available as a liquid so you can dip bulbs in it before planting. Be sure to follow the instructions on the package.

There is some new evidence that mole repellents containing the active ingredient castor oil are effective in repelling moles from lawns. These repellents are available under a wide variety of trade names. You should understand that these repellents do not actually kill the offending animal and, if suitable habitat remains, the moles will return. Be sure to follow the manufacturer's label closely.

Control Methods Not Recommended for Kentucky

No known short cuts or magic potions are useful in controlling moles. One of the most common of these so-called "sure-fire remedies" is to place chewing gum in the burrow. Research has shown that doing so has no effect on moles even if they eat it. Do not place broken glass, razor blades, rose branches, bleaches, diesel fuel, lye, sheep dip, or human hair down the burrow system to drive the mole away.

Do not use poison peanuts. Remember moles eat insects and earthworms, not nuts. Poisons are also a danger to family pets or other wildlife. Zinc phosphide is federally registered for mole control; however, it is a Restricted Use Pesticide, which requires that the applicator be certified by the Environmental Protection Agency (EPA) or work

under a certified applicator's direct supervision. **Warning: Never use a pesticide in a manner inconsistent with its labeling.** Failure to comply with all the provided directions may subject you to federal and/or state penalties.

The use of pesticides or insecticides to destroy the mole's food source is also not recommended. If you have a grub problem, contact your county Extension agent for information on treating the problem. Therefore, treat your lawn for a grub problem, not a mole problem.

Some people think that mole plants, *Euphorbia lathyris*, and castor bean plants repel moles. However, these plants' repellent properties are doubtful. In addition, they are poisonous to humans. Also, because they easily escape cultivation, they may become a problem weed.

For More Information

The Mammals of Kentucky. R. W. Barbour and W. H. Davis. 1974. The University Press of Kentucky, Lexington.

Home Range, Movements, and Diet Activity of the Eastern Mole, *Scalopus aquaticus*. M. J. Harvey. 1967. Ph.D. Thesis, University of Kentucky, Lexington.

"Moles." F. R. Henderson. 1984. *Prevention and Control of Wildlife Damage*. R. M. Timm, ed. Great Plains Agricultural Council and Nebraska Cooperative Extension Service, University of Nebraska, Lincoln.

Important Mole Facts to Remember

- Trapping is the only effective control method.
- Locate active travel tunnels.
- There are fewer moles in your yard than you think—two or three moles per acre, at most.
- Moles have a low reproductive rate; removing a few moles has a great impact on the population.
- Be patient and persistent; keep moving the trap until you are successful.
- Do not put chewing gum, chemicals, broken glass, or other objects in the burrows.

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