
MOLES

Integrated Pest Management for Home Gardeners and Landscape Professionals

The mole, *Scapanus* species, is a small insect-eating mammal (Figure 1). Contrary to a commonly held belief, it isn't part of the rodent family. In California, moles inhabit the Sierra Nevada, coastal range mountains and foothills, and the entire coastal zone. They aren't usually found in the dry southeastern regions of the state or in much of the Central Valley, except for moist areas where the soil is rich in humus, such as riverbanks.

Moles live almost entirely underground in a vast network of interconnecting tunnels. They frequently create shallow tunnels just below the surface where they capture worms, insects, and other invertebrates. They may infrequently consume roots, bulbs, and other plant material, although rodent species (e.g., pocket gophers, meadow voles, and deer mice) are almost always the cause of such chewing damage. By far the greatest damage from moles occurs through their burrowing activity (Figure 2), which dislodges plants and dries out their roots. In lawns, the resulting mounds and ridges are unsightly and disfiguring.

BIOLOGY AND BEHAVIOR

Moles have cylindrical bodies with slender, pointed snouts and short, bare, or sparsely haired tails. Their limbs are short and spadelike. Their eyes are poorly developed, and their ears aren't visible. The fur is short, dense, and velvety. Moles typically have one litter of three to four young per year. Because moles are antisocial, you will find only one mole per tunnel, except during the breeding season, which typically occurs during later winter through early spring.

Mounds and surface runways are obvious indicators of the presence of moles. The mounds are formed when moles push up soil to the surface from under-

ground runways (Figure 3). The excavated soil may be in small chunks, and single mounds often appear in a line over the runway connecting them.

Surface feeding burrows appear as ridges that the mole pushes up by forcing its way through the soil. Some of the surface runways are temporary. More permanent tunnels are deeper underground and are usually about 2 inches in diameter and 8 to 12 inches below the surface. Moles are active throughout the year, although surface activity slows or is absent during periods of extreme cold, heat, or drought. Greatest mole activity occurs usually after rainfall or watering events when digging new tunnels is easiest.

LEGAL STATUS

The California Fish and Game Code classifies moles as nongame mammals. If moles threaten growing crops or other property, the owner or tenant may control the moles using any legal means.

MANAGEMENT

Moles can cause significant problems in landscape or garden areas, especially in turf. Because mole damage can be unsightly, makes lawn maintenance difficult, and destroys valuable plants, the number of moles that can be tolerated is usually quite low, sometimes even zero. As soon as you see an active mound or surface runway, initiate appropriate control actions. Once you have controlled damage, establish a system to monitor for reinfestation.

Several methods of control are available, but no single method has proven fail proof, so it may be necessary to use a combination of techniques.



Figure 1. Adult mole.



Figure 2. Moles create surface burrows when searching for insects.



Figure 3. Top view of a mole mound; the margin tends to be circular, as compared to mounds of pocket gophers, which tend to be crescent shaped.

PEST NOTES

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Trapping

Trapping is the most universally applicable and dependable method of mole control. Several different kinds of mole traps are available at hardware stores, nurseries, or directly from the manufacturer. Keep in mind that the best mole traps differ from those for pocket gophers; very few traps are effective for both animals.

Understanding mole behavior helps improve the efficacy of trapping. To be effective, the trap must be set to catch the mole underground. When a mole's sensitive snout encounters a foreign object in the burrow, the mole is likely to plug off that portion and dig around or under the object. Therefore, traps should be set to straddle or encircle the tunnel or be suspended above it.

Moles are undeterred by soil blocks in the tunnel, which occur naturally from cave-ins, and will continue digging through them rather than around them. The upward pressure of the mole's body or the movement of soil against a triggering plate springs the trap.

Moles are active throughout the year and can be trapped at any time. Before setting mole traps, determine which runways are currently in use. Moles dig a system of deep tunnels that are more or less permanently used as well as a network of surface runs used for feeding. Some of the surface tunnels are only temporary, so they may not make a good trap set. Moles are more likely to be trapped in the deep runways, which they reuse almost permanently.

To determine where moles are active, tamp down short sections of surface runways and mounds. Observe these areas daily and retamp any raised sections, making note of the areas of activity. Selecting a frequently used runway is very important to the success of your control efforts. Set traps at least 18 inches from a mound and only in those runways moles use frequently. You can locate deeper tunnels by probing between or next to a fresh mound with a pointed stick, slender metal rod, or gopher probe. When the earth sud-

denly gives way, the probe has probably broken through the burrow.

Mole traps are fairly expensive, so most people tend to buy only one. Although one trap may solve the problem, increasing the number of traps will increase the speed and overall success of the trapping program. In California, two major types of mole traps are most commonly used. These are the harpoon type and the scissor-jaw type. Moles have sometimes been caught with certain pincer-type gopher traps set in mole runways, but these are rarely as effective as the harpoon or scissor-jaw mole traps. Trap manufacturers often provide detailed instructions, which should be followed carefully.

Set the scissor-jaw trap in the mole's main underground tunnel, which is usually 8 to 12 inches below the surface (Figure 4). Using a garden trowel or small shovel, remove a section of soil slightly larger than the trap width, about 6 inches. Build a plug of soil in the center of the opened runway for the trigger pan to rest on. Moist soil from the opened tunnel or from a nearby fresh mound can be squeezed together to build the plug. With the safety catch in place, set the trap and wedge it firmly into the opened burrow with the trigger placed snugly against the top of the soil plug. Next, scatter loose soil onto the set trap to about the level of the top of the tunnel. This excludes light from the opened burrow and probably makes the mole less suspicious of the plugged tunnel. Release the safety catch, and the trap is completely set.

The harpoon trap (Figure 5) will work in deeper tunnels if you set it on a soil plug as described for the scissor-jaw trap. It can also be set on the surface over an active runway ridge that has been pressed down under the trigger pan.

Repellents

Many home remedies have been suggested to solve mole problems. These remedies include placing irritating materials such as broken glass, razor blades, thorny rose bush branches,

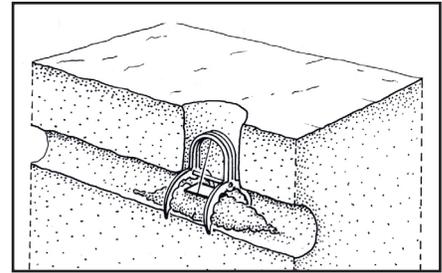


Figure 4. A scissor-jaw trap placed in a mole's main tunnel.



Figure 5. A harpoon trap installed in a mole tunnel.

bleach, mothballs, lye, castor oil, and even human hair in the burrow in an effort to drive moles away. "Frightening" devices such as mole wheels, vibrating windmills, and whistling bottles are also commonly recommended in garden literature as repellent techniques. Some garden literature advises using the gopher and mole plant, *Euphorbia lathyris*, as a repellent. Various electrical devices that vibrate soil, produce sound, or do both are frequently advertised for mole control, but research doesn't support their effectiveness. None of these approaches has proved successful in stopping mole damage or in driving moles from an area.

Commercially available mole repellents, usually castor oil solutions, are also available. Research on the effectiveness of these castor oil commercial repellents has shown some efficacy for eastern moles. No research has been done on moles in the western United States, so their effectiveness on these species remains unclear. However, repellents work by moving animals from one location to another by deterring their presence in the area where the repellent is

applied. As such, they may have limited utility in residential areas, as “repelled” moles will simply move to neighboring lawns and gardens and will continue to cause damage in these areas.

Toxic Baits

Because the mole’s main diet consists of earthworms and insects, poisoning with traditional grain-based baits is rarely effective. However, several new forms of toxic control have been developed that better mimic the moles natural food source. One example is a new gel-type warfarin anticoagulant bait (Kaput Mole Gel Bait, Scimetrix Ltd. Corp.) that is squeezed directly into the tunnel. Another example is a worm-shaped gel containing bromethalin (Talpirid, Bell Laboratories Inc.) that can be placed directly into the tunnel. Although rigorous testing is still needed to better estimate their effectiveness, limited studies have indicated these gel-type baits are more efficacious than grain baits and appear to be a viable alternative for mole control. Be sure to follow label instructions when applying these baits.

Other Control Methods

Some gardeners have found that moles can be detected by watching for “moving” ridges, which appear when moles are digging surface runs. If you can see such movements, try using a shovel or other garden tool to dislodge and dispatch the animal.

Installing a vertical underground barrier may provide temporary relief. To protect existing plantings, bury hardware cloth or 1/4-inch wire mesh in a 6-inch wide trench at least 2 feet deep with an additional 6-inch lip of mesh bent at a 90-degree angle away from the planting. This lip will help deter moles from digging under the fencing. A small length (about 6 inches) of fencing should protrude aboveground to eliminate aboveground dispersal into the exclusion area. Burying wire can be difficult and time consuming, so galvanized or stainless steel wire is recommended to prolong the life of the fence.

Exclusionary fencing is not perfect, however, as persistent moles can eventually find a way to burrow around the fencing. Eventually, removal techniques may be required to eliminate moles that find their way into exclusion areas. Alternative exclusion approaches include wire-mesh baskets that will prevent moles from heaving planted bulbs out of the ground and wire mesh bottoms in raised beds, which will totally exclude moles.

Attempting to flood tunnels with water to drown moles or force them to the surface for dispatch isn’t recommended. Flooding is typically ineffective and wastes water, as moles have deep and extensive burrow systems that require much water to fill.

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This and other Pest Notes are available at www.ipm.ucdavis.edu.

For more information, contact the University of California Cooperative Extension office in your county. See your telephone directory for addresses and phone numbers, or visit <http://ucanr.org/ce.cfm>.

REFERENCES

- Courtney, A., and T. G. Barnes. 2002. The efficacy of Molexit for reducing damage from eastern moles (*Scalopus aquaticus*). Proc. of the Vertebrate Pest Conf. 20:299–302.
- Poché, R. M. 2002. Field tests of a warfarin gel bait for moles. Proc. of the Vertebrate Pest Conf. 20:295–298.
- Salmon, T. P., D. A. Whisson, and R. E. Marsh. 2006. *Wildlife Pest Control Around Gardens and Homes*, 2nd ed. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 21385. ❖

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original, labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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