Michigan State University Extension
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Mole Damage Control

Correct identification is vital to mole damage control. Both species of Michigan moles have large shovel-like front feet with long claws. The eastern mole has a naked red nose and a short tail; the star-nosed mole has a large red nose with 22 finger-like projections and a long tail. The eastern mole usually makes many shallow tunnels that raise the soil into long winding 2 inch high ridges. The few mounds it makes are low, rounded and often have bits of turf on them. It prefers well drained soils. The starnosed mole usually makes many deep tunnels not evident on the surface, but it pushes up soil from these tunnels into many conical mounds of raw earth. Some mounds may be more than 6 inches high and 12 inches wide. It prefers moist soils. NOTE: During the winter when the frost layer in the soil is only a few inches thick, the eastern mole will make mounds like the starnosed mole. In wet soils that are saturated to within a few inches of the surface, starnosed moles will make ridges like the eastern mole.

Moles frequently cause damage, but are also beneficial as they are insectivores that feed on insects, worms, and other invertebrates. They also irrigate and aerate the soil by burrowing. Occasionally they eat plant seeds, roots, and bulbs, but most damage is done while burrowing for insects when they uproot the plants and grass roots. They are most active in spring or fall and on cloudy days. During cold winters and dry midsummers they go deep into the ground. They have a very extensive underground tunnel system, including travel tunnels (which are used daily) and foraging tunnels (rarely re-used). When moles become a problem, the following methods can be used to control the damage.

1. Direct Killing - Although eastern moles may burrow at any time, they are usually most active at certain times, depending on the season. Note when most new activity occurs, or when flattened ridges or mounds are repaired. Once you have determined when the eastern moles are most active, look during those times to see the long winding ridges being pushed up by the eastern mole tunneling just below the surface of the ground. With practice you can quickly and quietly approach the tunneling mole and kill it by smashing the earth down with a shovel or similar instrument just behind where the earth is being lifted up. Repeated application of this method can rapidly remove eastern moles from an area. This method rarely works for the starnosed mole because it usually burrows too deeply.

2. Trapping - Eastern moles are easy to trap provided that the trap is placed on a tunnel that is actively being used every day and that problems with function of the trap are noted and resolved. Locate active tunnels of eastern moles by gently mashing a short section of every ridge that you can find with your foot and marking it in some way. Any ridge that has been pushed back up with 12 to 24 hours is over an active tunnel. Traps placed on these ridges should catch a mole every 24 to 48 hours until all moles using the tunnel beneath are caught. If a trap has not caught a mole in 3 days, it is in the wrong location, or it has caught all the moles using that particular tunnel and should be moved to a new location.

Of the three types of traps, the choker type seems to be the easiest for most people to use successfully on the eastern mole. In heavy clay soils, the frame of the harpoon trap will sometimes rise up out of the ground rather than the harpoons impaling the moles. If this happens, use coat hangers and small pieces of wood or metal to stake the trap to the ground. With all types of traps, work the harpoons or jaws of the trap back and forth or up and down through the soil to insure smooth penetration of the soil. If any trap is sprung prematurely, so that the mole is not caught, remove a small piece of sod from under the trigger pan so as to delay the action of the trap. If moles burrow around a trap, then the soil has been flattened too tightly, or part of the trap is projecting into the tunnel and alarming the mole, or light from around the trap can be seen by the moles. If necessary, reposition the trap and place top soil or sand over any openings in the soil around the trap.

To trap star-nosed moles, locate active tunnels of starnosed moles by scattering the soil of each mound until it is flat. Mounds that are pushed back up in 24-48 hours are over active tunnels. To set the trap, it is necessary to dig a hole beneath one of the mounds of earth. The hole should extend to the bottom of the mole's tunnel, usually 4 to 6 inches below the surface of the ground. Refill the hole with enough earth to cover the top of the mole's tunnel with approximately 2 inches of earth. Set the harpoon type trap in the hole.

3. Smoke fumigation - Smoke cartridges are widely available in most retail stores in Michigan. Smoke fumigation is difficult, but can eliminate moles if a sufficient number of smoke cartridges are introduced simultaneously into active tunnels. Locate the active tunnels as described above, and insert smoke cartridges in both directions into the tunnels about every 5-10 feet. The more frequently smoke cartridges are placed along an active tunnel the more likely they will be effective. Light all smoke cartridges as quickly as possible and seal the tunnels to prevent smoke from escaping. After lighting, wait 5-10 minutes to see if smoke escapes from

any holes along the tunnel. Insert additional cartridges at such points and plug the holes with damp wadded newspaper.

4. Reduction of the moles food supply - Moles feed on earthworms, centipedes, insect larvae, and other invertebrates. The use of insecticides to reduce insect larvae and related invertebrates may/can eliminate enough of the moles' food supply, especially in sandy or light soils, so that they either starve to death or move elsewhere. The following insecticides are registered for insect and related invertebrate control in lawns:

a. Diazinon - liquid - 2 oz./1000 sq. ft.
- 5% granular - 2.5 lbs./1000 sq. ft.
CAUTION: Diazinon may kill lawn feeding birds - robins, ducks and geese. KEEP PETS AND CHILDREN OFF LAWN WHILE DAMP. Do not use on golf courses or turf areas.

b. Oftanol - 5% granular - 0.45 - 0.91 oz./sq. ft.
Effectiveness may take months to become apparent. Do not collect clippings after first mowing. DO NOT GRAZE OR FEED CLIPPINGS TO LIVESTOCK.

c. dursban - liquid - 0.6-1.2 oz./1000 sq. ft.

d. insect larvae diseases

Bacillus popilliae diseases
(milky spore disease)

Bacillus thuringiensis - liquid - 7.5 oz./100 sq.ft.; dust - 20 lbs/acre. Effectiveness is questionable and may take months to become apparent.

These insecticides will be most effective if -- 1) any thatch is completely broken up prior to application; 2) applications of diazinon and dursban are made in late May and August; 3) 250-500 gal. of water/acre (1 inch of water) is applied to the lawn after insecticide application; 4) evaluation of effectiveness of diazinon and dursban is made about 2 weeks after application -- a second application may be successful if the first was not.

All of these insecticide applications seem to be most effective in sandy to sandy-loam and loam soils and seem

to be less effective in clay-loam, clay and organic soils. This may be because earthworms are more abundant in the latter soils and insecticide penetration is most reduced in these kinds of soils.

Any insecticide treatment will have limited effect if only one portion of the mole's burrow system is treated, such as a yard. Moles will still burrow through a treated area containing little food to get to an adjacent area with abundant food.

5. Poison baiting - Poison baits for moles that contain 2% zinc phosphide (mole & gopher bait) and chlorophacinone (Mole Patrol) can be used to control moles. Place teaspoon quantities every 10-15 feet along mole travel tunnels. To place the bait in the tunnel, punch a hole in the tunnel roof with a 1/2 inch wood or metal rod. Pour the bait through the hole into the tunnel and then repair the hole with a piece of sod or wadded newspaper. Repeat treatment weekly until mole activity ceases.

CAUTION: ZINC PHOSPHIDE IS TOXIC TO BIRDS AND MAMMALS. USE WITH CAUTION

6. Repellants - The repellents Mole-Med and Scoot Mole are liquid containing castor oil that is applied to lawns as a spray to prevent eastern mole damage. Apply according to label directions, thoroughly watering lawn before and after application. These repellents may take 3-7 days to become effective and may not be effective against star-nosed moles. Heavy rain may reduce effectiveness. Effectiveness lasts for at least 30-75 days and reapplication renews the effectiveness.

7. Other control methods effective in special situations -

A) Any device that imparts a vibration into the ground repels moles. The range of these devices is limited, making them practical only in small areas such as a small garden or flower bed. The more vibration the device imparts into the ground, the more effective it will be.

B) Treatments of bulbs with 20% thiram prior to planting will repel moles for several weeks after planting.

C) Certain plants appear to deter moles from burrowing under them. Planted singly, they are of little use, but if planted in a strip around the area to be protected they

seem to reduce invasion by surface tunneling. These plants include marigolds, castor beans, fritillaria, (crown imperial), and the mole plant or gopher purge (Euphorbia).

8. Mole control methods that do not seem to work -

A) Home remedies such as placing hair, broken glass, mothballs, motor oil, etc. in tunnels, liming the soil, and flooding are rarely effective although such actions may repel the moles for a short time. Flooding eastern mole tunnels in a dry soil using hundreds of gallons of water may drown the mole or may force it to the surface where it can be killed. Attempting to drown moles in a sand to loam soil is usually futile. Where starnosed moles are involved, the flooding of their tunnels is beneficial to the moles, since they prefer moist soils. Chewing gum, Alka-Seltzer, etc. are not effective.

B) Some cats provide good mole control. Occasionally a cat learns to catch them as they push excavated earth out onto the surface of the ground. Cats may also learn to catch starnosed moles because starnosed moles will search for food on the surface of the soil. In most cases, the small gray animals cats catch are shrews and since shrews are predatory on moles, such cats are actually contributing to the mole problem. Dogs can be taught to dig up moles without digging up the entire lawn, but it is difficult.

RESTRICTED USE MATERIALS

Fumigants - THESE PRODUCTS PRODUCE TOXIC GASES IN THE MOLE TUNNELS; USE WITH CAUTION

1. Calcium Cyanide locate active tunnels and use adjuster to blow calcium cyanide into the tunnels in both directions every 5-10 yards. Seal openings. Two to three pumps on the duster is sufficient.

Note: Calcium cyanide may kill the roots of plants in the tunnels.

2. Aluminum phosphide (Phostoxin) - Locate active tunnels and place a tablet into all the tunnels every 5-15 yards during the afternoon and evening. Use as many tablets as necessary to obtain complete coverage of the entire mole system, not just the tunnels in one area, such as a yard. If the first treatment is not successful, repeat

treatments eventually are. DO NOT USE WITHIN 15 FEET OF ANY BUILDING.

Experimental Materials

Several products are now being tested. Check with your County Extension Agent for current status.

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