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## CONTROLLING MOLE DAMAGE

by

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The kind of mole found in Kansas is the eastern mole, Scalopus aquaticus.

Moles are small, mouse-sized mammals adapted to living underground. They are characterized by enlarged forefeet with long claws, stout necks and powerful shoulders which make them capable burrowers. Unlike those of mice and shrews, the noses and forefeet of moles are pink and hairless.

Special sensory hairs on the noses and forefeet of moles enable them to find food in a subterranean environment where other senses are not as useful. The eyes of moles are almost entirely covered by skin and their ears are hidden. Although moles do not appear to sense light with their eyes, their ears may be used to hunt and to evade predators. Some sources attribute the successful establishment of moles underground to the increased development of senses which can detect changes in air pressure, temperature and movement.

Moles burrow by forcing their enlarged forefeet into the soil and pushing backward and to the side. The mole's velvety fur may be brushed in any direction without resistance. This enables the animal to move backwards or forward with a decreased expenditure of energy and increases its food-securing ability. Within a 24-hour period a mole may consume the equivalent of one-half its body weight. Moles feed during the day and night, generally stopping for three resting periods. Earthworms and soil invertebrates, such as the larval or grub forms of insects, constitute the largest portion of their diet. Moles also feed on spiders, snails, small vertebrates and eat small amounts of bulbous or fleshy-rooted vegetation. Moles have been observed to feed on the carcasses of buried animals. The Star-nosed mole, which frequently enters water, may consume aquatic insects and small fish.

Although moles prefer loose, sandy-loam soils, they have been observed to occupy a variety of habitats and soil types. Requirements for moles include adequate soil moisture and depth. The amounts of vegetation and organic matter present affects the abundance of soil animals upon which moles feed. Moles normally avoid dry, clay or high acidic soils because such soils contain a scarce supply of food and are difficult to burrow through. Conversely, moles will move into an area where food is abundant and soil conditions are optimal.

Two types of burrows are made by moles. Surface tunnels are created as moles move through the soil in search of food. Deeper passages are dug joining the nesting cavity to an elaborate system of burrows. The passages are marked by piles of excavated earth on the ground surface. The maze of burrows surrounding the nesting chamber increases the likelihood of escape from predators and may serve to aerate the moles' nests. Large numbers of surface tunnels are dug to insure a sufficient supply of food as moles depend on earthworms and insects which enter or fall into their runways for most of their diet. Moles form hardened chambers where they store large numbers of earthworms. Occasionally moles leave their burrows to feed above ground and to collect grasses and leaves for the nesting cavity.

Moles are strongly territorial and will defend their burrows against intrusion by others. Most burrow systems are separate, with only one male or female using the complex. Where contacts are made, fighting often occurs which may end in death. This serves to limit mole populations, which in turn, insures enough food for the occupants of individual territories. Contacts between moles occur infrequently except during the late winter (February to April) when they breed. During the breeding season male moles dig straight tunnels to intersect the territories of females. After mating, moles re-inhabit separate burrow systems. Gestation lasts for four to six weeks after which two to five (usually four) young are born. The young grow rapidly and leave the nest after four weeks to forage for themselves. Young moles which do not find abandoned burrows often live at the surface for brief periods of time before deeper burrows are made. Raised burrows are often observed after the spring snow melts.

The average lifespan of most moles is from two to three years. Animals which commonly prey on moles include hawks, owls, herons, foxes, skunks, weasels and snakes.

Moles become nuisances where their surface tunneling or burrow excavations extend into lawns, golf courses and gardens. Because of the burrowing ability of moles, numerous runways and piles of dirt may appear in a relatively short period of time. Where mole numbers are few and tunneling is minimal, they will normally not cause serious damage.

Grass, flower beds, vegetable gardens and shrubs may be indirectly damaged by the physical disturbance of plant roots which are in proximity to mole tunnels. Moles occasionally feed on the roots of plants. Gnawed or girdled trees and shrubs or chewed vegetables are usually the work of meadow mice which often use the surface tunnels of moles for runways. Although moles occasionally damage plants, their activities are beneficial since they aerate and mix the soil. Their burrowing increases the availability of water to plant roots and the numbers of unwanted insects may be reduced.

Mole activity is normally obvious. Continuous ridges of raised earth and small mounds of dirt will be observed where moles have burrowed. Star-nosed moles are rarely nuisances because they prefer wetter habitats.

Moles are usually difficult to control. Limited populations of moles may be satisfactorily reduced by trapping with the "harpoon" or "prong" type trap. Traps are available through farm and garden supply or hardware stores. Directions are supplied by the manufacturers.

Successful trapping involves the identification of actively-used tunnels and an understanding of mole activities. Runways which are not abandoned and are being used as moles feed and travel may be identified by depressing short sections of the raised ridges. Depressed sections should be marked with flagging and checked for repairs. Tunnels which have not been repaired are abandoned and should not be used for trapping. Set traps only at active locations and move them to other active sites within two to three days if no moles are caught.

Moles entering a garden may be deterred by sinking one-quarter-inch wire mesh fencing 1 1/2 to two feet into the ground, allowing at least one foot of mesh above ground. Where mounds of earth are present in the garden, trapping may be necessary to remove moles before the garden is enclosed.

A reduction of soil insects and earthworms with the use of insecticides may cause moles to starve or to seek other food sources nearby. Careful consideration should be given to the detrimental effects of insecticide use. Insecticides are highly toxic and may be harmful to people, pets and other forms of wildlife such as birds which eat toxic earthworms. Elimination of soil organisms which aerate and mix lawn or garden soils may do more damage to vegetation than digging by moles. Because soil organisms limit fungus growth in soils, a reduction of these organisms may result in the spread of lawn or crop-damaging fungi. Fungus growth can result in large patches of brown and dying grass. Before insecticides are used current information on chemical controls should be obtained from the county Cooperative Extension Service office. The addition of fertilizers or humus to lawns will increase the numbers of earthworms and insects present, creating a habitat which may attract moles.

Gassing is normally ineffective because of the moles' extensive burrow system and its numerous openings. Repellents have not been successful and the use of poisonous baits is currently illegal.

Although moles become nuisances, their presence in pastures or overgrown fields is seldom noticed. They aerate and loosen the soil which improves conditions for vegetative growth. Because moles require large amounts of food, they act to limit some species of insects while providing an important food source for a number of predators. The removal of individuals causing damage in localized situations is more desirable than complete elimination.

Moles aren't really a problem in the Great Plains, only in the eastern edges of the area. Probably the best idea would be to train retired people in a community how to handle mole problems and they could in turn charge local people for mole control services rendered. Since mole trapping is difficult and takes a great deal

of training and persistence and experience, it might be best if there were such mole trappers in communities where moles are really a problem. Since these people have time on their hands and would like to do something, I am sure there is someone in every community who would be interested in this type of activity. In the Great Plains area moles are usually not a problem in agricultural situations, but in localized places such as golf courses, parks and private lawns.

Bob Smith of Missouri advised that mole reduction can be achieved in localized areas by gassing winter burrows which go deep into the ground and are not associated with surface burrows where normal gassing becomes ineffective due to the escape of gas into the atmosphere. Gassing in the winter may be effective in reducing the population of moles in localized areas in the deep burrows.

Moles are poisoned in England with the use of strychnine. Since the major food item of moles is earthworms and grubs, strychnine is dusted onto earthworms. A one-pound jar or can of worms can be treated by mixing 1/8 oz. strychnine with the worms. The worms should be put singly, in deep burrows and the holes must be carefully covered with earth. Precaution should be taken in using strychnine to avoid accidents to man, stock and wildlife. In England, the ordinary householder is not advised to use this method and in America it would be presently unlawful since strychnine does not carry label approval for this use.

Some repellents have been tried such as certain plants, moth balls, sump oil, carbide, smale bombs and a plant called casper spurge, sometimes called mole spurge, but research on the use of this plant has proved inconclusive as to its value in mole control.

Also, windmills that make a thumping noise on the ground are believed to be effective by some people, but again has not proven to be effective. The use of poison peanuts using thalium and various kinds of poisons in the United States has been used against moles. However, since moles do not normally eat peanuts, it is believed that these types of poisons merely drive the moles away into other localities and not actually kill them.

Bob Schendel, pest control operator from Topeka, Kansas, brought up the fact that he disagrees with the idea that moles do not eat peanuts and that these types of baits are effective in reducing mole populations.

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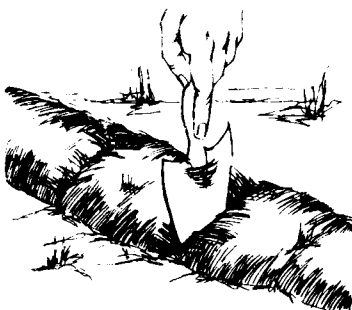
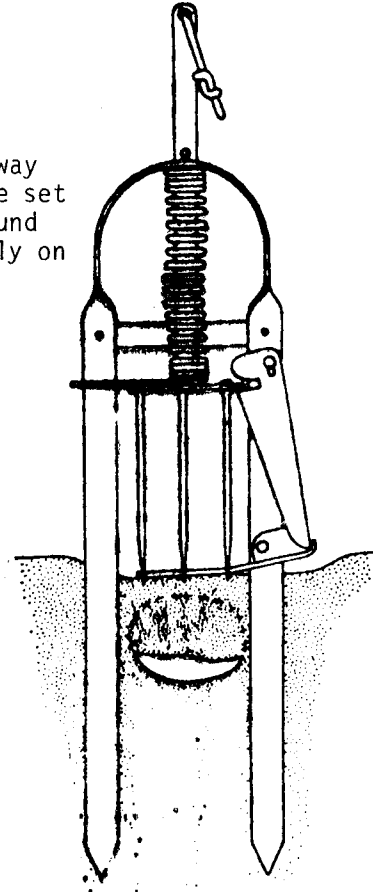
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New Hampshire Department of Fish and Game, 34 Bridge Street, Concord, New Hampshire 03301.



Pack down the runway ridge and push the set trap into the ground with trigger snugly on depressed ridge.

Harpoon Type Trap

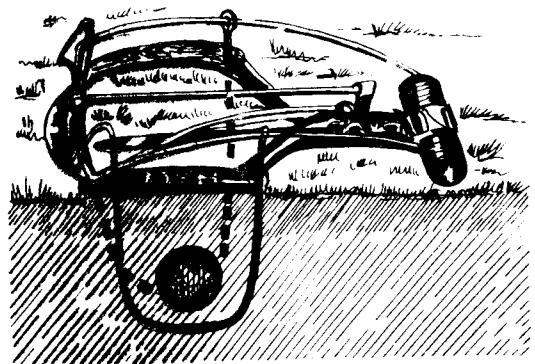


Make an excavation across the burrow.

Place set trap so jaws evenly straddle course.



Choker Type Trap



Block section with damp soil, set trap and fill with loose dirt.