

CHAPTER XII

ANIMAL PESTS

INSECTS and other animal pests while less important than weeds on putting-greens are, nevertheless, a source of frequent annoyance. They usually are first-hand agencies in turf destruction, while weeds accomplish their injurious work somewhat indirectly. More attention has been given to weeds and methods of their eradication than to the control of worms, ants, moles, and other animal pests, but some very definite results have been accomplished in the case of the latter, and there is good reason to expect better results as more study is given the problems.

MOLES

According to the Biological Survey of the United States Department of Agriculture, there are in America at least five groups of true moles. Two of these are found in the Pacific Coast region, and three in the eastern half of the country. In Wisconsin, Michigan, New York, and the New Eng-

land states the star-nosed mole (*Condylura cristata*), and Brewer's mole (*Parascalops breweri*) are the most important species, while south of this general region the common mole (*Scalopus aquaticus*) is the one that is most prevalent.

In the spring especially, and at other times when the ground is soft, moles cause no end of annoyance on putting-greens. Their work is more evident, perhaps, than that of other animals, and doubtless quite as serious for the unit of area which they cover. Almost every one is familiar with moles and the external evidences of their work, but a great many mistaken impressions prevail with regard to their food habits and the purpose of their tunnels.

The moles do not eat grass or grass roots, or, in fact, any vegetable matter, but restrict their diet almost solely to insects. Furthermore, the tunnels whose ridges are so prominent are not their living quarters, but are the results of their search for food. Frequently much of the trouble attributed directly to the moles is in reality caused by field mice or some other rodent which takes advantage of the former's runways to find grass roots and other vegetable food. Moles, however, after all, are responsible for the ridges on the greens, and, if

not properly treated, these ultimately result in streaks of dead or injured turf.

While moles are of some importance in killing injurious insects in the soil, their presence on putting-

greens is not to be tolerated. Trapping is the only practical method of destroying them.

The harpoon, scissors-jaw, and choker types of trap (Fig. 49) are very satisfactory if properly handled.

The nature of the trap itself seems to be rather less important than the method of setting it. Successful operation depends very largely upon proper setting

over the portion of the tunnel where the ridge is especially prominent, since this part of the runway is most likely to be frequented. Careful

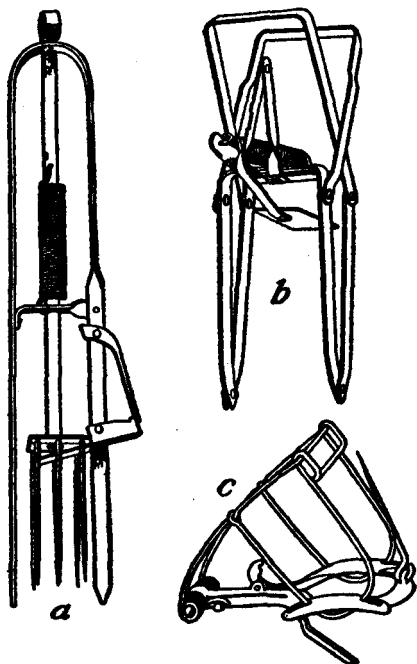


FIG. 49. — Mole traps. Three types that are effective.

observation soon will enable the operator to determine the best location. Ordinarily, the main line of the runway should be selected rather than one of its branches, as the latter are less commonly used. To set the trap properly, the course of the tunnel should be ascertained by the aid of a cane or small stick. This will permit the operator to place the trap in the best possible position with reference to the runway. It is found advantageous to push the spikes of the harpoon type of trap into the ground two or three times after the trap is set to break the way and provide against obstruction at the critical moment. Failure very often results from pressing down too much of the ridge. Only a small portion which is under the trigger should be depressed, and by the hand rather than by the foot. No other part of the runway should be molested. The manufacturers of the various traps always accompany them with detailed instructions for their operation, but nevertheless, close observation and a little experience on the part of the operator will contribute materially to the success of trapping.

Poisonous baits have never proved satisfactory. Moles are apparently too keen to be fooled with

anything of this sort, and even though they have neither external eyes nor external ears, they are shrewd enough to detect many kinds of danger, and doped food seems to be one of them.

While waiting for the trap to check the activities of moles, some steps should be taken to obviate the effects of their tunnels through the turf. Continuous use of the roller will prevent, or at least lessen, the injury to the grass, and also induce the moles to abandon their runways. However, the roller should not be used to the detriment of the adjacent turf. ,

Inasmuch as moles ordinarily work less than six inches below the surface of the soil, and upon meeting an obstacle in their paths turn to one side or the other rather than upwards or downwards, there is some reason to believe that they can be discouraged from invading areas of turf by surrounding the areas with a barrier which extends from the surface to a depth of twelve inches. Such a barrier could easily be constructed of boards or planks, and would be comparatively inexpensive. Experiments are now under way to determine the efficiency of various types and depths of barriers.

FIELD MICE

Field mice occasionally find their way to putting-greens, usually following in the tunnels of moles, although sometimes digging tunnels of their own. Fortunately, these animals are very easily exterminated by means of poisonous bait. The Biological Survey of the United States Department of Agriculture recommends the following for use on a large scale:

“Crushed wheat, treated with strychnine (alkaloid). Dissolve $\frac{1}{4}$ oz. of strychnine in 1 qt. of boiling water. Mix one tablespoonful of gloss starch in $\frac{1}{2}$ cup of cold water, and add to the boiling strychnine solution to make a thin mucilage. Following this dissolve $\frac{1}{2}$ oz. of bicarbonate of soda in $\frac{1}{2}$ a cup of hot water. Add to the poisonous starch and mix well. Add $\frac{1}{2}$ tablespoonful of saccharine. Apply the poison to 15 pounds of crushed wheat and mix so as to distribute evenly. This bait should be put in the runways which can easily be located by means of a blunt-pointed stick.”

Mice usually are not sufficiently abundant on the greens to warrant the preparation of a large quantity of bait, and in many cases a small quantity of simply prepared material is to be preferred. Poisoned sweet potatoes may be found very satisfactory, especially where two or three greens are

to be treated. The potatoes should be cut into pieces about one-half inch square and thoroughly washed and drained. On a quart of these pieces sift one-thirty-second of an ounce of powdered strychnine (alkaloid), and about one-tenth of this quantity of saccharine previously ground together. A piece of potato should be placed in the turf or tunnels in the manner suggested for treated wheat.

POCKET GOPHERS

Occasionally pocket gophers invade putting-greens and cause inconvenience and considerable damage. These animals can be trapped successfully, but poisoning is a much more satisfactory method of destroying them. The Biological Survey of the United States Department of Agriculture recommends the following method for preparing and using poisoned baits of sweet potatoes and parsnips so as to be most effective.

“The baits should be cut about an inch long and a half inch square, and washed and drained. From a pepper box slowly sift $\frac{1}{8}$ ounce of powdered strychnine (alkaloid) and $\frac{1}{10}$ of this quantity of saccharine (ground together in a mortar) over about four quarts of the dampened baits, stirring to distribute the poison evenly.

“The runways, which are usually 4 to 8 inches

beneath the surface, can be located by means of a probe made of any strong handle an inch in diameter and 36 inches long. One end should be bluntly pointed. Into the other should be fitted a piece of $\frac{3}{8}$ inch iron rod, protruding about 12 inches, and bluntly pointed. A foot rest aids in probing in hard soils. By forcing down this iron rod near gopher workings, or a foot or two back of fresh mounds, the open tunnel can be felt as the point breaks into it. The blunt end of the instrument is now used carefully to enlarge the hole, a bait or two is dropped into the run and the probe hole closed."

EARTHWORMS

Earthworms, of which there are numerous species in the United States, rarely, if ever, do any serious damage even to the finest turfs. In fact, they have a beneficial tendency, although their presence is probably of less importance to the soil than Darwin and others would lead us to believe. That they do aërate and cultivate the soil to a considerable depth is beyond question. They may also add some nitrogen through the decomposition of their bodies, but there is reasonable doubt as to their value in promoting the decay of organic matter and its subsequent utilization. One thing, however, is certain — they are undesirable inhabitants of putting-greens.

Earthworms prefer clay and loamy soils, and are very much less troublesome in sandy soils. They commonly appear in considerable numbers during moist seasons on areas that are naturally inclined to be wet, and after continued heavy watering. The casts formed by earthworms are a source of great annoyance to the player, and make accurate putting practically impossible. These casts can be eliminated by brushing or sweeping, but such treatment does not lessen the activity of the worms.

Earthworms can best be eradicated from turf by the use of chemical solutions. One that is commonly used with almost uniformly good results is bichloride of mercury, one-half ounce to fifteen gallons of water. If this solution is sprinkled very freely on the greens, it will bring the worms to the surface where they can easily be swept up with a coarse broom and removed. Quicklime solution is also efficacious. To secure the best results from this, mix twenty pounds of caustic lime with forty gallons of water, and allow it to stand until the solution is clear. If the liquid is applied liberally to the infested areas, the outcome will be much the same as in the case of treatment with the bi-

chloride solution, but probably less pronounced. Another substance that has been well recommended is a fairly strong solution of acetic acid. A weak solution of ammonium carbonate also appears to be effective, but experience indicates that a solution of bichloride of mercury is the most economical and most dependable. There are on the market numerous proprietary compounds which have been extensively advertised for eradicating earthworms. Analyses indicate that with very few exceptions the poison in these compounds is mercuric chloride, either dry or in solution. One which is also advertised as a "plant-food" contains a vegetable poison. The proprietary worm-killers are very much more expensive than mercuric chloride and no more effective.

ANTS

The treatment for ants is quite different from that for earthworms, and is much more tedious and expensive. No matter what kind of solution is used, sprays are far from satisfactory. A few individuals, it is true, can be killed by spraying with the proper liquids, but the wholesale slaughter that is necessary to bring about extermination can only be produced by treating each nest separately.

Liquids, when sprayed, do not penetrate sufficiently deep into the nests to be effective, and even if numerous applications are made, the results are far from satisfactory.

Various solutions have been used and recommended for direct application. Of these, carbon bisulfide is probably the best known and most popular. This liquid is very efficacious, and for the ants that commonly infest putting-greens a comparatively small quantity is sufficient for each colony. There is no special apparatus on the market for applying it, but a common oiler, such as is used by mechanics for oiling engines and similar machinery, answers the purpose very well. The spout should be at least two feet long, with a curved end and a small aperture. If the oiler is equipped with a spring bottom, a squirt or two will be sufficient for each nest. Carbon bisulfide is readily volatile and forms a gas that is appreciably heavier than air. This being the case, it permeates the various lower chambers of the nests, killing almost instantly the ants with which it comes in contact.

Within recent years, potassium cyanide has been used for ant repression and promises to replace even carbon bisulfide on account of its efficiency

and low cost. One ounce of 98 per cent potassium cyanide to one quart of water is about the proper proportion. The two should be carefully mixed and the solution liberally injected into each ant hill by means of an oiler such as has been previously described. A second application may be necessary after a day or two, but even so, the treatment is cheap, practical, and productive of good results.

Neither carbon bisulfide nor potassium cyanide is harmful to the grass, and may be used with impunity. The former, however, is highly explosive, and the latter is very poisonous to animal life. A little ingenuity should develop a simple and inexpensive piece of apparatus that would be far superior to the oiler for dispensing these liquids. A long glass tube fitted with a reservoir and plunger, something after the fashion of a large compound syringe, could be made to force the desired quantity of solution to the extreme chambers of the ants' nests, thereby greatly increasing the effectiveness of the treatment.

GRUBS

In the larval or grub stage, the beetle commonly known as the June beetle (*Cotinis nitida*) frequently does serious injury to turf. It is particularly trou-

blesome in soil that has been heavily manured or well supplied with humus. The beetles, shortly after emerging from the ground during the late spring and summer, bore back into the soil to a depth of several inches and lay their eggs. It requires but a short time for the eggs to hatch, and the young grubs to become active. These grubs tunnel through the soil and feed on the humus contained in it. When their tunnels come to the surface, as is commonly the case, the larvæ throw out small piles of earth which resemble ant hills. The grubs continue feeding on the humus in the soil until cold weather commences. They are then about two-thirds their full size. At this time they burrow into the soil to a depth of several inches, and as they throw up considerable quantities of earth at the mouths of the burrows, their presence is soon noticed. The grubs do not become entirely dormant during winter, and with the advent of warm days resume feeding. By the last of June they have ordinarily completed their life's cycle. The injury done by the grubs results from the loosening of the turf when they are actively feeding in the soil.

A few treatments have been recommended and

seem to be fairly efficacious. The application of carbon bisulfide by means of a large oiler or syringe has given very satisfactory results but is a tedious method. Some greenkeepers have found it practicable to kill the grubs by means of a rod about one-fourth inch in diameter. The openings in the ground made by the grubs can be seen, and if the rod is pushed into them, the grubs can in many cases be killed. This method is also tedious, but it is considered by some to be more satisfactory than poisoning with carbon bisulfide. Excessive watering frequently brings the grubs to the surface so that they can be killed by hand. This method is very slow and not very practicable. In some cases it appears that heavy rolling stops the activities of the larva and prevents injury to the turf. If this method can be depended upon, it is the most feasible one so far devised. Since the beetles seem to infest only areas that have been heavily treated with manure, it is suggested that the use of humous fertilizers be discontinued where the grubs appear, and that further applications should be of inorganic fertilizers or bone-meal.

CRAWFISH

On poorly drained greens, especially in the South, crawfish, also known as crayfish, are sometimes very troublesome and destructive. The soil which they throw up from their burrows interferes with play, and definite injury results to the grass from the work of these animals. The most effective remedy for crawfish is to lower the water table materially by deep tile drains, or some other effective means. This should be done, if possible. Poisons afford temporary relief and if used continuously prove very effective. Carbon bisulfide is the most satisfactory poison that has been found. If a small quantity of this liquid is placed in the burrow and the opening immediately closed, the gas which develops will kill the crawfish in a few hours. An oiler with a long spout, having a small aperture, can be used for dispensing the poison. One squirt to each hole is sufficient. Chloride of lime and certain other poisons are cheaper than carbon bisulfide, but they are less effective.