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Rodent pests of Iowa and their control

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Rodent Pests of Iowa and Their Control

By H. Gunderson and G. C. Decker

The destructive rodents which are the subject of this bulletin are ground squirrels, pocket gophers, woodchucks, rats and mice. In addition to the damage done to crops and stored products and injury to livestock, all of these rodent pests, except mice, are frequently responsible for important soil losses. Their burrows are commonly found along slopes, hillsides, ditch banks and road grades where their digging activities loosen and tunnel the ground. Heavy rains on slopes so undermined cause erosion and soil washing (fig. 1). Unless these rodents are controlled, such erosion may render the field unfit for farming.

Rats, mice and ground squirrels are abundant in all parts of Iowa. Pocket gophers are well established, particularly in the northern and western parts of the state. Ground hogs are found most frequently in the eastern and southern parts of Iowa, particularly in and near rough, wooded areas.

The payment of bounties for dead rodents has not been particularly successful in their eradication. It would seem unnecessary to offer bounties for the control of rodents on

Fig. 1. Gully started by ground hog burrow.
the farm. Increased financial returns following successful control or eradication should provide sufficient incentive.

**GROUND SQUIRRELS**

The striped or 13-striped ground squirrel (fig. 2) is found in all parts of Iowa. The adult is about 13 inches long from the nose to the tip of the tail. The fur is gray or tan with 13 stripes of brown or black which run lengthwise along the back. This squirrel produces one litter of young in the spring. Both adults and young usually are seed feeders and are economic farm pests when they dig up planted seed such as corn, soybeans, melons, etc. During the summer they feed to a great extent on insects, particularly crickets, grasshoppers and caterpillars. During the winter they hibernate in grass-lined pockets in their burrows. These burrows are deep and from 12 to 20 feet in length, while those used in the summer are shallow and are much shorter, running from 4 to 8 feet in length. One squirrel frequently may have several of these shallow burrows in its range.
The Franklin or gray ground squirrel (fig. 3) is not so widely distributed in the state as the 13-striped ground squirrel, although it is gradually spreading. The Franklin ground squirrel is considerably larger than the 13-striped ground squirrel, averaging 17 to 19 inches in length. The gray ground squirrel somewhat resembles the gray tree squirrel except for the longer ears and more bushy tail of the latter. The under parts are buff in color and some buff shows through the gray outer coat on the upper part of the body. The Franklin ground squirrel is similar in its burrowing habits to the 13-striped ground squirrel. One litter of young is produced in the spring.

In feeding habits the 13-striped ground squirrel and the Franklin ground squirrel are similar except that the latter being larger does more damage. This species also includes insects in its diet.

**CONTROL OF GROUND SQUIRRELS**

Trapping, shooting and drowning are three commonly used methods for reducing the population of ground squirrels. These methods are successful if followed persistently, but if used intermittently they will tend to make the ground squirrels wary and result in scattering the population.

Poison baits have been used successfully in controlling ground squirrels on a large scale. With baits it is possible to poison most of the burrows and thus kill a larger percentage of the squirrels at one time. Shelled corn soaked in a solution of strychnine (1 ounce of strychnine sulphate in 2 quarts of water) frequently has been used. Corn poisoned in this way should be placed where it is readily available to the ground squirrels. A poison bait recommended by the United States Fish and Wildlife Service is made as follows: Mix 1 tablespoon of laundry starch in ½ teacup of cold water, stir in ¾ pint of boiling water to make a thin, clear mucilage. Mix 1 ounce of powdered strychnine alkaloid with 1 ounce of powdered bicarbonate of soda and stir the mixture into the hot starch making a smooth, creamy paste free from lumps. Stir in ¾ pint of heavy corn syrup and 1 tablespoon of glycerine. Apply to 16 quarts of oats and mix thoroughly to coat
every kernel. A quart of the poison grain should be enough bait for 40 to 60 holes. Scatter lightly in teaspoonful quantities around the burrow entrance. Do not place in piles where hogs can pick it up. Because of the low susceptibility of pheasants and quail to strychnine-coated grain there is no hazard to them in the use of this formula.

Various fumigants have been used to fumigate the burrows of ground squirrels. Among these are carbon disulfide, car-exhaust gas and calcium cyanide. In some ways the use of one of these fumigants is more satisfactory than the poison bait since the fumigant penetrates to the very bottom of the burrow killing all of the animal life there. Furthermore the danger of poisoning non-game birds and game animals which might result from poisonous materials carelessly exposed is eliminated.

In fumigating with carbon disulfide, a wad of cotton or waste is saturated with the liquid and stuffed into the entrance of the burrow. Calcium cyanide either in the granular or dust form may be introduced into the burrow with a long-handled spoon or by means of a cyanide dust gun. In using car-exhaust gas for ground squirrel control, attach a length of garden hose to the exhaust pipe of the car, insert the hose into the burrow and run the motor with choke out for about 5 minutes. With any fumigant it is desirable to close the burrow entrance with dirt or with a sod following the introduction of the fumigant.

GROUND HOGS OR WOODCHUCKS

The ground hog (fig. 4) is the largest of our destructive rodents. Specimens may measure from 20 to 24 inches in length and weigh from 15 to 20 pounds. The color ranges from grayish brown to black.

Ground hogs frequently choose rough land in which to live. They dig their burrows in hillsides, ditch banks, rolling timberland and pastures. These burrows may be 30 feet or more in length and usually have several entrances. Alfalfa, clover and sweet clover fields are very attractive to these rodent pests. Their food consists of vegetation growing near their dens, particularly legumes, corn on the cob and acorns.
One litter of young is born in the spring and remains in the parent burrow until the latter part of the summer and early fall. At this time the young migrate to burrows of their own for hibernation.

CONTROL OF GROUND HOGS

Trapping, shooting and the use of dogs have been employed as control measures, but burrow fumigation is far more effective than any of these methods.

The same fumigants recommended for ground squirrel control may be used for ground hog control. Carbon disulfide is an effective fumigant if a wad of cotton saturated with the liquid is stuffed into the burrow and the entrance then closed. If calcium cyanide is used, the dust should be blown into the burrows with a dust gun, or 2 tablespoonsfuls of granular calcium cyanide may be placed in each entrance. All of the entrances of the burrow should be treated at one time, and the openings should then be closed with dirt or sod. It is wise to treat all of the ground hog burrows in the vicinity at the same time since these animals migrate considerably.

In order to control ground hogs effectively and still not kill valuable fur-bearing animals, it is best to do fumigating in the burrows only in the spring while the young are still with the parent. During the summer and fall ground hog burrows may be inhabited by foxes, raccoons, opossums and other harmless or fur-bearing animals. The indiscriminate digging out of ground hog burrows destroys the protection which may be vital to other animals, therefore this practice is not recommended.
POCKET GOPHERS

The Shaw pocket gopher (fig. 5) is found throughout Iowa but is most numerous in the northern and western parts of the state. The upper parts of the body are chestnut brown to black and the under parts lighter brown, sometimes with patches of white. The feet are frequently white, and often a white patch is found on the throat. The adult averages about 11 inches long. Males usually are larger than females. The pocket gopher is a powerful and efficient digging machine. It is heavily muscled, especially in the front quarters, with a short, thick neck and long digging claws on the forefeet. The pocket gopher is equipped with a fur-lined pouch or pocket on the outside of each cheek from which the animal takes its name. The four gnawing teeth are large, and the lips are adapted for closing in order to leave the teeth outside. This adaptation enables pocket gophers to use these two pairs of cutting teeth for digging.

Migration of pocket gophers is extensive at times. These movements occur in the spring after mating, in midsummer when the young start moving and in the fall before freezing weather when both old and young move into new fields.

Pocket gophers spend most of their lives underground. Tunnels or runways are constructed in which the animals live and feed and in which the litters of from four to six young are brought forth in the spring of the year. Except for the short period of mating and when the young are with the female, pocket gophers are solitary, living alone. This fact
accounts for the large amount of digging done by the animals. It has been estimated that one gopher will construct a mile of runway in a single season.

Pocket gophers usually prefer loam soil, although they may be found in sandy or rocky soils. The runways are from 4 to 24 inches beneath the surface of the ground. In digging a runway the pocket gopher digs the dirt loose, throws it back into the part already excavated and then brings it to the surface of the ground through short tunnels called laterals. This dirt forms the familiar pocket gopher mounds or hills that dot many of our Iowa fields. In the fall some of these mounds may be more than a foot high with a diameter of 6 to 8 feet.

This rodent pest feeds principally upon roots. Fair-sized succulent roots are preferred, but little choice seems to be made between kinds of roots. Among the crops attacked are alfalfa, clover, sweet clover, timothy and potatoes. In addition many garden crops and flowers are eaten as well as the roots of several kinds of trees. Among the weeds most often used for food may be found dandelion, morning glory, bindweed, rosin weed and wild onion. The roots encountered while the animal is digging are cut off and may be eaten at once or placed in the pouches to be eaten later or to be stored for winter use. The rodent cuts and stores many times more

Fig. 6. Pocket gopher mounds in alfalfa.
POCKET GOPHER CONTROL

The damage that pocket gophers do to crops, the damage that they do to fields in making them rough and uneven and the importance of their workings in the initiation and promotion of soil erosion make their control imperative. Trapping frequently has been practiced by farm operators where pocket gophers are not particularly numerous. Where trapping is carried on persistently good control will result.

The most successful method of controlling pocket gophers on a large scale is the use of poison bait. Because baiting takes less time and is much less expensive than trapping, it is preferred as a control measure. Baiting is most easily done...
in April, May or October, before or after the period when rank vegetation hides the mounds. Poison bait can be prepared from carrots, parsnips, turnips, rutabagas, sweet potatoes or Irish potatoes.

To prepare the bait, cut the vegetables into pieces about \( \frac{3}{8} \) inch square and 1 to 1\( \frac{1}{2} \) inches long. One quart of cut-up bait makes from 75 to 100 individual baits or enough for 25 to 30 burrows. In preparing these baits it is important to get the poison evenly distributed over the individual baits. In order to do this most satisfactorily mix \( \frac{1}{6} \) of an ounce of powdered strychnine alkaloid with 1 tablespoonful of ordinary flour for each quart of cut-up bait. Place the freshly cut-up bait in a paper sack, sprinkle about half the flour and strychnine mixture over the bait, close the sack and shake it thoroughly for a minute, then add the other half of the powdered strychnine mixture and shake again. In this way an even distribution of poison over the bait is assured. After the poison has been applied the baits are ready to distribute. Since strychnine is a very dangerous poison the bait and containers must be kept away from children, domesticated animals and irresponsible persons. Any unused bait should be destroyed.

Poison baits are introduced into pocket gopher runways by probing the runway with an anchor post of a corn planter, an endgate rod or a broom handle. The broom handle is preferred since it makes an opening large enough to drop the bait down into the runway easily. The hole should be made into the main runway near a new mound. The runway usually can be located by observing the position of the high point of the mound. This high point generally is near the edge of the mound, and the mound is usually flat instead of round at this edge. The main runway may be from 10 to 16 inches from the mound on the flat side. When the runway has been located two or three pieces of bait should be dropped in and the probe hole carefully closed in order to prevent entrance of light. In most soils the probe hole can be pinched shut with the heel.

Poison grain (wheat, whole oats or corn) prepared in the strength of 1 ounce of strychnine alkaloid to 16 pounds of
grain may be used in place of the vegetable bait. Six to eight kernels of poison grain should be dropped into the runway. Poison grain probably is not as effective in controlling pocket gophers as the cut-up vegetable bait, since the gopher may not be hungry when he finds the poison grain and may store it for future feeding. Since the pocket gopher stores many times more food than he can possibly eat there is a good chance that he will never eat the poisoned grain. Where vegetable baits of the proper size are used the gopher must cut the baits before he can even store them. In doing so he will get enough poison to kill him.

After poisoning a field, scatter all the mounds at once with a harrow or hand rake. Since a complete kill following one baiting is unusual, this procedure simplifies the second baiting. Only new mounds need be poisoned by subsequent baatings.

With an average infestation of 10 to 15 pocket gophers per acre, one man can treat 40 to 60 acres per day. When the baits are carefully prepared and properly distributed good kills are secured. Since pocket gophers migrate extensively, control of this pest is best attained through community cooperation. All of the farmers in a given area should distribute poison bait upon the same day in order to wipe out...
as nearly as possible the pocket gopher population of that area. In this way relief can be secured for a period of years. Where the individual farmer must distribute bait alone he will have to combat gophers every season since new ones will come in from his neighbor’s fields.

RATS

Rats are present on nearly every farm in Iowa, in many cases in extremely large numbers. During the past few years the rat population in Iowa has increased rapidly due to the large amount of stored corn and other grains upon Iowa farms. Rats are probably the most destructive rodents we have in the state since they destroy many times the amount of food they actually eat and in addition do extensive damage to farm buildings. For these reasons rat control is of great importance in this state.

RAT CONTROL*

Rat-proof construction, rat-proofing of existing farm buildings, thorough clean-up and elimination of breeding and hiding places around buildings, poisoning, gassing, trapping and the use of a dog are the recommended methods of rat control in the order of their importance.

MICE

Several different kinds of mice are found in fields. The worst of these are meadow mice and the less frequent pine mice which attack young trees and are troublesome in orchards. Mice in fields are frequently troublesome when they dig out grain shortly after planting.

MOUSE CONTROL

In houses mice can be controlled successfully through the use of mouse traps baited with bacon, cheese, bread or cotton. These traps should be so placed that mice will naturally visit them. Outside doors and windows, particularly those leading to the basement, should be kept closed during the fall months.

to prevent mice from entering, since they come into houses for protection from winter weather.

In orchards mouse damage consists principally of barking and girdling the trees. Where the soil does not erode seriously clean orchard cultivation prevents the occurrence of mice as they do not have the vegetation in which to hide. On soils which may erode, damage can be largely prevented by keeping the vegetation in the orchard cut close and by guarding the trees with wire netting or hardware cloth set 2 inches into the ground. Clean cultivation and dirt mulch maintained around the tree over an area about 2 feet in radius tends to decrease mouse activity.

Where mice are doing considerable damage in the orchard, they may be greatly decreased through trapping or through poisoning. A successful poison grain bait has been developed by the U. S. Fish and Wildlife Service. Directions for mixing the poison are given on page 425, under ground squirrel control. Apply this mixture to 12 pounds of wheat or preferably steam-crushed oats and mix thoroughly to coat each kernel. Steam-crushed rolled oats are preferred by most rodents to wheat or other grains and are less likely to be eaten by birds. Bait should be exposed in October or November for orchard protection and if damage appears, should be placed in the orchard later in the winter.

Poison bait should be used in poison stations that will protect the grain from weather and will also prevent game birds or other animals from getting it. Within the drip area under each tree where there is mouse sign, place some kind of cover, consisting of a forkful of hay, an old cement sack, a piece of roofing paper 18 inches square or a board. This should be done from 2 to 4 weeks before poison bait is put out. Use one to three protective covers per tree. When applying poison bait raise the cover and put a teaspoonful of bait directly into the runway which the mice will have constructed in the meantime, and replace the cover.

**TREE SQUIRRELS**

Tree squirrels, especially the fox squirrel, are sometimes blamed for holes gnawed in the roofs of corncribs, molested
bird's nests and barked regions on trees. Such damage appears not to happen normally but may occur when food becomes scarce or when the number of squirrels in a given area has so increased that crowded conditions may exist.

If damage can be traced directly to tree squirrels, permission to dispose of the animal in order to check the damage should be obtained from the local game warden. If the local Conservation Officer is not known, write to the Conservation Commission, 10th and Mulberry Streets, Des Moines, Iowa.

RABBITS

Rabbits are considered game animals and cannot be killed, except during the open season, without legal permission. Probably much of the damage laid to rabbits is caused by other animals, but, during severe winters particularly, much damage may be done to young orchards and even to old trees since the rabbits strip bark from the trees for food.

A cylinder of ¼-inch mesh hardware cloth placed around the trunk of the tree and forced into the ground about 2 inches will prevent damage to the bark. The cylinder should be at least 18 inches high. Some protection may be secured by pruning the trees of excessive twigs in the fall and placing them on the ground for rabbits to eat. Another method which has been used successfully is the cutting of alders and other succulent growth and placing them at rabbit-feeding stations. Avoid or remove fences or obstacles that catch and pile up snow in the orchard on which rabbits may walk to get at higher parts of the trees. Clean cultivation in and around orchards prevents the occurrence of rabbits and consequently lessens chances of damage.

Washes and repellents of various kinds have been used in an attempt to protect the bark of trees from rabbit attacks. Most of these have been only partly successful. One fairly effective repellent consists of 7 pounds of rosin dissolved in 1 gallon of low-priced denatured ethyl alcohol. Care should be taken to keep all water out of the solution. This is painted on the trunks of the trees and on the scaffold branches. One gallon of solution will treat 150-200 2-year-old trees.
Poisons and poison trunk washes are quite dangerous to use and are against the law.

Generally, the shooting season for rabbits is open during the winter and their numbers may be decreased by hunting, although others may move in from nearby locations.

GARDEN MOLES

Moles are not rodents, but their damage is sometimes similar to that of some rodents. The common garden mole with its mounds of earth and slightly raised runways does considerable damage in lawns and gardens. A large part of the normal food of the mole is earthworms and insects. Some of the insects eaten are white grubs, wireworms and other harmful insect larvae, and to that extent the animal is useful.

When it is desired to destroy moles trapping may be used most effectively. Most types of mole traps have been used successfully in Iowa.

Probably the quickest method of destroying moles is the use of calcium cyanide dust in a cyanide dust gun. The hose of the dust gun is inserted into the tunnel or runway as close to the mole as is possible or about every 10 feet along the runway. Cyanide is pumped in rapidly and the hole is plugged up. This treatment may need to be repeated two or three times in order to kill the moles.

Naphthalene flakes or moth balls introduced into the tunnel will repel the mole and probably drive it over to the neighbors, or it may just make a new burrow and abandon that portion of the old burrow containing the naphthalene flakes. In this case it would destroy a larger part of the lawn.


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