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The Biology and
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THE BIOLOGY AND CONTROL OF THE

RICHARDSON GROUND SQUIRREL



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THE BIOLOGY AND CONTROL OF THE
RICHARDSON GROUND SQUIRREL

BIOLOGY:

The Richardson ground squirrel (Spermophilus richardsoni) is a medium-sized ground squirrel of rather uniform coloration. It is buffy yellow to grayish in color. The tail is about one-fourth of the total body length and is blackish to buff with whitish hairs on the outer edges and end. Adults are 7-9 inches long and weigh 11-18 ounces.

The Richardson ground squirrel is found in Montana east of the continental Divide, except in the southeastern areas. It is found throughout most agricultural areas, but is not common in high mountains or heavily forested ranges.

These ground squirrels emerge from hibernation in February to April, depending largely on elevation and local weather conditions. Males emerge first and establish breeding territories. Females begin emergence from hibernation about two weeks later. The breeding period is short and synchronous in a local area but may extend over several weeks from one part of the squirrels range to another. The young are usually born in April and May after a 24 day gestation period. Only one litter averaging 6 to 7 young is born per female each year. The young become active above ground about 4 weeks after birth. By the end of the summer juveniles are nearly adult size.

Ground squirrels are primarily herbivores and consume a wide variety of grasses and forbs. Green, succulent vegetation is preferred forage probably because free water is not generally available in habitats occupied by squirrels. Because of their high fat content, seeds of plants and domestic crops are an important dietary supplement. Squirrels will occasionally feed on insects and carrion.

As vegetation dries during mid to late summer many ground squirrels enter hibernation. Some portions of the adult population may begin hibernation in late July although the majority wait until August. Young of the year and some adults continue activity into September and October. During a mild autumn some activity may occur even into November.

Ground squirrels are true hibernators. Respiration, heart rate and other metabolic functions are severely depressed during hibernation. Squirrels are not known to eat or drink during hibernation but slowly metabolize the fat reserves accumulated during the summer activity period. One of the reasons juveniles and smaller adults remain active into September and October may be their need to acquire sufficient fat reserves to carry them through hibernation.

DAMAGE:

Because of the Richardson ground squirrel's extensive distribution in Montana and its ability to damage a wide variety of agricultural crops it is one of the most economically important rodent species in Montana. Ground squirrels damage grain crops by consuming and trampling the grain plants. Damage most often occurs when squirrels reside in unclutivated border areas and enter the crop edges to feed on the grain plants. Forage crops, such as alfalfa, pasturelands and rangelands are often inhabited by ground squirrels. Squirrel feeding and mounds covering the crop reduces production and available livestock forage. Squirrel mounds can cause costly equipment damage to machinery used to harvest forage crops. Mounds and burrow openings present a potential hazard to livestock. Burrowing activity may contribute to increased soil erosion and provide sites for undesirable weedy plants to grow.

CONTROL:

When cost versus benefit justifies a control program for Richardson ground squirrels, several control methods may be considered. The control method you select should be both safe and effective. Because of the reproductive capability of ground squirrels, it is necessary to reduce their numbers by 90% or greater for long term control. If reduction is much less than 90%, a ground squirrel population may return to or exceed its original level within one or two reproductive seasons.

Cultural and biological controls, while not being a total answer to reduce ground squirrel damage, are part of an integrated control approach. Frequent crop rotation or tillage of the soil often helps discourage dense populations of rodents within an area. However, border areas can still be populated with ground squirrels and severe damage to crops can occur along field edges. Frequent flood irrigation can reduce rodent problems in some cases. Coyotes, fox, weasels, owls, hawks, eagles, badgers, skunks, and snakes, and other predators prey upon Richardson ground squirrels and other rodents. While their impact on rodent populations may not eliminate rodent damage, predators contribute to the overall control effort and their presence should be encouraged.

Shooting may reduce damage in isolated areas or after baiting operations where small populations of ground squirrels are under constant shooting pressure. This is an expensive and time consuming practice. It may also be dangerous if conducted near occupied dwellings or livestock.

Traps may be used around schools, cemeteries, homes and populated areas where other methods may be considered too hazardous. When using livetraps, ground squirrels are easily caught using grains, peanut butter, or fresh greens for bait. Better results are obtained when traps are wired open and prebaited for several days.

Traps should be placed in areas where squirrels are active and should be anchored to the ground. Dogs can be a severe nuisance when livetrapping squirrels. They can damage the traps, carry them off entirely and unnecessarily maul the captured squirrel. If dogs are a problem, the trapping area should be carefully monitored. Squirrels may die of heat stress when caught in a trap exposed to the sun. For this reason traps should be shaded and the captured squirrels relocated or humanely killed.

Leg hold traps or body traps such as the Conibear can also be used effectively to control ground squirrels. These traps are set directly in front of or over a burrow entrance and must be securely anchored to the ground. No bait is needed. Although generally safe, certain nontarget animals can be injured or killed, particularly domestic dogs and cats and certain wildlife species such as weasels, badgers and skunks.

Trapping is an effective, generally safe control method for ground squirrels and no pesticide license is required. It is labor intensive and practical only for small areas.

Burrow fumigants are products that release toxic gases when used in a burrow system. Labor and cost of materials usually restrict the use of fumigants to small acreages or sparse populations. They are recommended as a cleanup method after the use of poison bait or in areas where it is considered unsafe to use poison baits.

The ignitable gas cartridge is the most commonly available burrow fumigant. When ignited they produce toxic gases, primarily carbon monoxide, and consume available oxygen in the burrow system. After the fuse is lit the cartridge is placed well down into the burrow. The burrow opening should then be sealed with soil and tamped tightly with a shovel. Any adjacent burrow opening from which smoke is escaping should be plugged with soil. Caution should be exercised when using gas cartridges in dry situations since they are a fire hazard. Gas cartridges are a general use pesticide.

Aluminum phosphide tablets are another type of burrow fumigant that release toxic phosphene gas in the presence of moisture. The tablets should be placed well down into the burrow. A length of 1-2 inch diameter plastic pipe can be used to place the tablet down into the burrow. After removing the pipe, plug the burrow opening with crumpled newspaper or sod, cover with soil and tamp tightly with a shovel. Treat every burrow opening. Atmospheric humidity and perspiration on the hands cause gas release. Since phosphene gas will absorb through the skin always wear gloves and stand up wind during application. Open the canisters only outdoors and store in a dry area not inhabited by humans, pets, or livestock. Follow label instructions carefully. This is a restricted use pesticide requiring a license to purchase and apply.

Use of Toxic Grain Baits is the most effective and economical method to control Richardson ground squirrel populations over large acreages. Bait should be applied only when the entire squirrel population is active and readily accepting grain. Bait application when the squirrels first emerge from hibernation is not advised since only males are present. The breeding period (two or three weeks after emergence), before vegetative growth has begun and when both sexes are active, is often an ideal time for control operations. Control at this time eliminates adults and potential young and insures minimal crop damage by the rodents for the current year. However, this period is relatively short in duration. Once the females begin bearing and rearing young, their activity is reduced and baiting is not as effective. After green-up of vegetation acceptance of grain bait by the squirrels is reduced. If bait is not applied during the breeding season, control should be postponed until the young appear above ground and are feeding independently. Baiting is not recommended after mid-July since squirrel activity declines as squirrels enter hibernation.

To help determine correct timing for early spring bait application, a sample of 12-20 ground squirrels should be collected by shooting or trapping. The specimens should be sexed and internally inspected. A sample of at least 50 percent females indicates good activity by both sexes. A sex ratio heavily favoring males indicates that female activity is minimal and baiting should be delayed. Baiting should be postponed if the sampled females are bearing or nursing young. Such sampling is not necessary for summer baiting.

After the timing of bait application has been determined, the correct bait must be applied. Currently, either 0.35% or 0.44% strychnine oats are most used for ground squirrel control. These baits are prepared by commercial bait mixing plants and the federal government. Contact you local County Extension Agent or Pesticide Dealer to obtain information concerning availability of bait in your area. Only fresh bait should be used. Buy only enough for one season. Bait dries out after long storage and is less acceptable to the squirrels. The bait is still toxic since the strychnine does not degrade in storage.

Before applying poison bait, read the label instructions carefully. The amount of bait specified on the label should be scattered near every burrow entrance or along trails between burrow openings. Do not drop the bait down the burrows or in thick grass. Do not place bait in piles. If the bait is scattered over a 2-3 square foot area acceptance by the squirrels will be unaffected and the hazard to livestock and other nontarget species will be decreased. Strychnine grain bait may be applied by hand using a calibrated dipper or spoon or broadcast with properly calibrated cyclone seeders. Aircraft are occasionally used to broadcast bait over large acreages. Before proceeding with any aircraft or broadcast application contact Department of Agriculture specialists for information on correct application techniques and calibration and application rates.

Before applying toxic bait to large acreages, treat a small area first. Return the following day to see if the bait was consumed and if ground squirrel activity has decreased. If the results were favorable, proceed with baiting larger acreages. If the results were poor, wait until bait acceptance improves. Strychnine grain bait should be applied only once per year. Continued baiting may cause "bait shyness" and control will become difficult and costly. Prebaiting, applying nontoxic grain several days prior to toxic bait application, may improve bait acceptance by conditioning the ground squirrels to a new food source.

In recent years anticoagulants have been used to control field rodents. Anticoagulants are agents that inhibit the ability of the blood to clot. Animals receiving a lethal dose die from internal hemorrhaging and external cuts that continue to bleed. Two anticoagulants, with the active ingredient diphacinone or chlorophacinone, are presently registered for ground squirrels in Montana. To be effective the bait must be placed in bait stations and fed on by the squirrels over a several day period. A bait station is a covered container which holds the bait and allows access by the squirrels while restricting access to most other animals. Bait stations must be maintained regularly to replenish the bait. They must be placed in sufficient density so all squirrels have an opportunity to feed on the bait and must be maintained for at least 30 days. For these reasons this control method is not generally practical for squirrel populations on large acreages. Like the burrow fumigants and trapping, it is a very useful and effective method for small acreages and public use areas.

Hazards to nontarget animals from toxic baits are present in two ways: primary poisoning - direct consumption of the bait material; and secondary poisoning - consumption of poisoned squirrel carcasses by predators or scavengers.

Nontarget animals most at risk from primary poisoning are domestic livestock and poultry and certain seed-eating wildlife species including waterfowl, grouse and some songbirds. Hazards from primary poisoning can be reduced by following pesticide label directions and precautions and common sense safety practices such as:

- 1) Keep baits in original labeled containers and store in locked weather tight storage when not in use.
- 2) During application keep excess bait in locked or latched storage to prevent access by children or livestock.
- 3) Use calibrated dippers or spoons for applying bait. Apply only the label recommended amount. Scatter the bait over a 2-3 square foot area near each active burrow. Do not pile the bait because this increases hazard to livestock and wildlife and it is not a natural food placement for squirrels.

- 4) Remove livestock from treatment areas when possible. In addition to reducing risk to livestock, ground squirrel control will improve if livestock are not trampling on bait placements.
- 5) In areas known to be frequented by waterfowl or other seed-eating birds consider additional precautions such as patrolling the area or using scarce devices after bait application. Consider use of alternative methods such as burrow fumigants or bait stations in high risk areas.
- 6) Pick up and bury any spilled bait.

Secondary hazard from strychnine is not caused by ingestion of carcass tissues but from residual bait kernels in the upper digestive tract and cheek pouches. Animals that consume the entire carcass such as dogs, coyotes, badgers and owls are most at risk. Animals that remove and discard the digestive tract such as most species of hawks are at considerably less risk from secondary poisoning. When practical, burial of ground squirrel carcasses helps reduce the hazards to potential nontarget animals. Always notify neighbors of your bait applications. Suggest confinement of dogs, cats or other animals for a period of time after bait application. In warm weather, carcasses decompose rapidly and present little hazard after 5 to 10 days.

As with most programs, rodent control will be most effective where a coordinated effort is established by all landowners. Department of Agriculture personnel, upon request, will work with County Commissioners, Extension Agents, and landowners to establish a program suited to local and county needs. Field demonstrations are provided free of charge to inform landowners how, when, and where to control Richardson ground squirrels and other field rodent pests.

Interested individuals should contact the Montana Department of Agriculture, Capitol Station, Helena, Montana 59620 (444-2944) or your area Vertebrate Specialists:

Monty Sullins - eastern Montana (Lewistown) - 538-2182
Daniel Sullivan - western Montana (Helena) - 444-2944

Additional ground squirrel control information in pamphlet form is available from the Montana Department of Agriculture:

"Managing Ground Squirrels with Bait Stations."

"Controlling Burrowing Rodents with Burrow Fumigants."

"Use and Calibration of the Cyclone Seeder for Control of the Richardson Ground Squirrel on Rangeland, Pasture and Harvested Fields."

"A Guide for Aerial Baiting of Ground Squirrels."



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