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Wildlife Damage Management Series

Voles

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Voles are rodents that belong to the genus *Microtus*, which translates to "small ear." This term appropriately describes vole's small, partially hidden ears. Voles are small (< 10 inches in total length) animals with stocky bodies, short legs and a short tail (Figure 1). Their underfur is dense and covered with thicker, longer guard hairs. Although many color variations may occur, voles typically are brown or gray.

Twenty-three vole species exist and occur throughout the United States. Of these 23 species, five occur within Utah; the prairie vole (*Microtus ochrogaster*), the meadow vole (*M. pennsylvanicus*), the long-tailed vole (*M. longicaudus*), the montane vole (*M. montanus*), and the water vole (*M. richardsonii*).

GENERAL BIOLOGY AND BEHAVIOR

Voles occupy a wide variety of habitats, depending on the species. Generally, voles prefer areas with heavy ground cover of grasses, grass-like plants, or litter. When two or more species inhabit an area, they generally occupy different habitats. Voles can be found in orchards and cultivated fields. They are active both day and night and throughout the year. Voles eat a variety of plants and animals. They frequently forage on grasses, forbs, roots, bark, snails, and insects. To find food, voles construct tunnels and surface runways with many burrow openings (Figure 2). Several adults and young can live in these runway systems. This intricate network of tunnels and

Figure 1. Montane vole, *Microtus montanus* (left), and Prairie vole, *M. ochrogaster* (right).

burrows provide voles with excellent shelter from the weather and protection from predators.

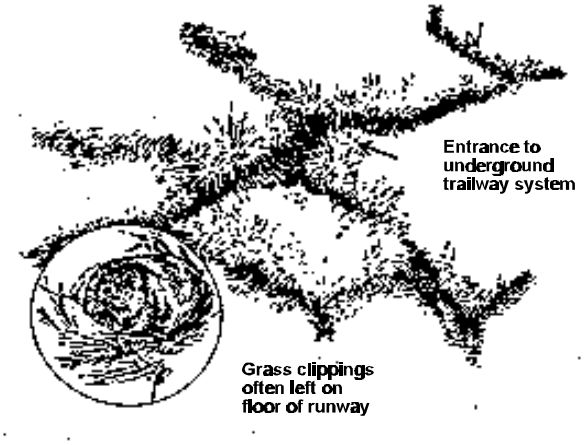

Figure 2. Surface runway system of the prairie vole.

Voles breed throughout the year, with peaks occurring during spring and summer. Voles can produce up to five litters per year ranging in size from 1 to 11 young. Although gestation periods vary slightly among species, 21 days is the average length of gestation for voles. Young are weaned by the time they are 21 days old, and females are sexually mature within 40 days.

All vole species are subject to large population fluctuations. Population levels generally peak every 2 to 5 years, but these cycles are not predictable. These populations shifts may result in densities ranging from a few to several hundred voles per acre. In rare cases, vole populations may become extremely dense. During the early 1900s, vole populations were estimated at 25,000 per acre in areas of Nevada. Factors which have been shown to influence population levels include dispersal rates, food quality, climate, predation, physiological stress, and genetics.

VOLE PROBLEMS

Voles can cause severe damage to orchards, ornamentals, and tree plantings by girdling seedlings and mature trees, especially when populations are high. Studies in New York have demonstrated that girdling by voles can reduce fruit yield in apple orchards by as much as 66%. Girdling of woody plants primarily occurs during fall and winter. Field crops, lawns, and golf courses also may be damaged by vole's extensive runway and tunnel systems.

Fortunately, voles pose no major public health problems because of infrequent contact with humans. However, they can harbor disease organisms, such as plague and tularemia. For this reason, voles should never be handled. If you have to handle a vole, or any other species of wildlife, you should wear the appropriate protective clothing (e.g., leather gloves).

LEGAL STATUS

Voles are classified as nongame mammals and are protected by Utah state law. However, controls can be implemented when voles are causing damage.

CONTROL

Identification of Damage

Girdling damage and gnaw marks caused by voles are similar to that of many other species of wildlife, particularly rabbits. This, coupled with vole's small size and inconspicuous nature, often leads individuals to believe vole damage is caused by other wildlife species. Vole girdling is characterized by non-uniform gnaw marks which occur at various angles and in irregular patches. In contrast, rabbits clip branches with neat, clean cuts. Additionally, gnaw marks left by voles characteristically are about 1/8 inch in width and 3/8 inch in length; gnaw marks caused by rabbits usually are larger than this. Careful examination of girdling damage may be needed to identify the animal that caused damage. However, perhaps the most prominent sign of vole damage is the presence of their extensive runway system. Runways are 1 to 2 inches in width and vegetation is often clipped close to the ground next to well-traveled routes (Figure 2).

Habitat Modification

The elimination of weeds, ground cover, and litter around lawns and ornamental plantings can reduce habitat suitability for voles and lead to a decreased likelihood of vole damage. For example, lawns should be mowed regularly and mulch should be cleared 3 feet or more from the base of trees. Additionally, soil cultivation destroys vole runway-systems and may kill voles outright. For these reasons, plots of annual plants often are less susceptible to vole damage than perennial plants.

Exclusion

Cylinders made of hardware cloth (available at most hardware stores) are often effective in excluding voles and protecting individual plants. The mesh size of the hardware cloth used to construct cylinders should be no larger than 1/4 inch in size. The cylinder should be buried at least 6 inches below the ground surface to ensure that voles will not burrow under the hardware cloth and gain access to the plant. Although this technique will protect individual plants, fencing typically is not effective in

protecting large areas (e.g., lawns) and probably is cost-prohibitive.

Repellents

The agency responsible for regulating chemicals used on wildlife, the Environmental Protection Agency (EPA), currently approves two chemicals for use in repelling voles. These two repellents may contain thiram (a fungicide) or capsaicin (chemical that makes peppers "hot") and act by altering the taste of plants and making them unpalatable to voles. Although these repellents may provide temporary protection for plants, their effectiveness usually is short-lived. Voles may become accustomed to such repellents and forage on plants even after treatment. For a more long-term prevention effort, other techniques should be considered.

Toxicants

The EPA also currently approves of two toxicants which may be used to lethally control vole populations. The toxicants are zinc phosphide and anticoagulants. Of these, zinc phosphide is more commonly used. Zinc phosphide (2%) is available in pelleted and grain bait formulations and typically is broadcast at rates of 6 to 10 pounds per acre. Additionally, zinc phosphide baits may be placed by hand in runways and burrow openings. Occasionally, it may be necessary to prebait (placement of nontreated bait prior to applying toxic baits) an area where voles hive become shy of toxic baits. Although zinc phosphide baits can be highly effective in reducing vole populations, you should be aware that this chemical is also toxic to ground-feeding birds, particularly waterfowl. Hand-placing baits in burrows and runways greatly reduces the risk of birds feeding on zinc phosphide baits. Zinc phosphide is also toxic to humans when ingested and may be absorbed through the skin. For these reasons, you should always wear gloves when handling zinc phosphide baits and dispose of the gloves in a safe manner. Additionally, zinc phosphide baits should be kept away from small children. Zinc phosphide is considered a restricted-use chemical. As such, to use zinc phosphide baits you must be a certified applicator. If you are interested in becoming a certified applicator, contact your local Utah State University county extension office.

Anticoagulant baits are also an effective means of reducing vole populations. Anticoagulants often are used to reduce rodent populations in general; approximately 95% of mouse and rat control is performed with anticoagulants. As with zinc phosphide baits, anticoagulants can be broadcast over an area or placed by hand in runways and burrows. Additionally, anticoagulant baits are often glued to the inside of a water repellent paper tube to make an effective, disposable bait container. Anticoagulants work much slower than zinc phosphide and death is delayed for several days following the ingestion of a lethal dose. This slow action offers an important safety advantage where pets or livestock frequent because it provides time to administer the antidote (Vitamin K_1) to an affected animal. Like zinc phosphide baits, anticoagulants can also be toxic to humans. Therefore, you should take precautions to prevent children from gaining access to anticoagulant baits.

For more information about these toxicants, their use, and how to obtain them, contact your local Utah State University extension office or any of the organizations listed at the end of this bulletin.

Other Methods

Frightening devices have been shown to be ineffective in reducing vole damage. Fumigants usually are not effective in controlling voles because the complexity and depth of vole runways and burrows allow the fumigant to escape before voles are exposed to it. Trapping may be effective in controlling very small vole populations, but, because of vole's high reproductive rate, the time and labor costs required to eliminate voles are probably prohibitive. In the event that voles invade your house (which is a rare event), individuals can be removed with snap traps or live traps as you would for house mice. Shooting generally is not regarded as a desirable method of vole population control.

ADDITIONAL SOURCES OF INFORMATION AND ASSISTANCE

For further information, contact:

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USDA/APHIS Wildlife Services
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Salt Lake City, UT 84126
Phone – (801) 975-3307

Additional Reading:

Burt, W. H., and R. P. Grossenheider. 1976. A field guide to the mammals. 3rd edition. Houghton Mifflin Company, Boston, Massachusetts.

Hall, E. R. 1981. The mammals of North America. Volume 2, 2nd edition. John Wiley & Sons, New York.

Hygnstrom, S. E., R. M. Timm, and G. E. Larson, editors. 1994. Prevention and Control of Wildlife Damage. University of Nebraska Cooperative Extension, Lincoln, Nebraska, USA.