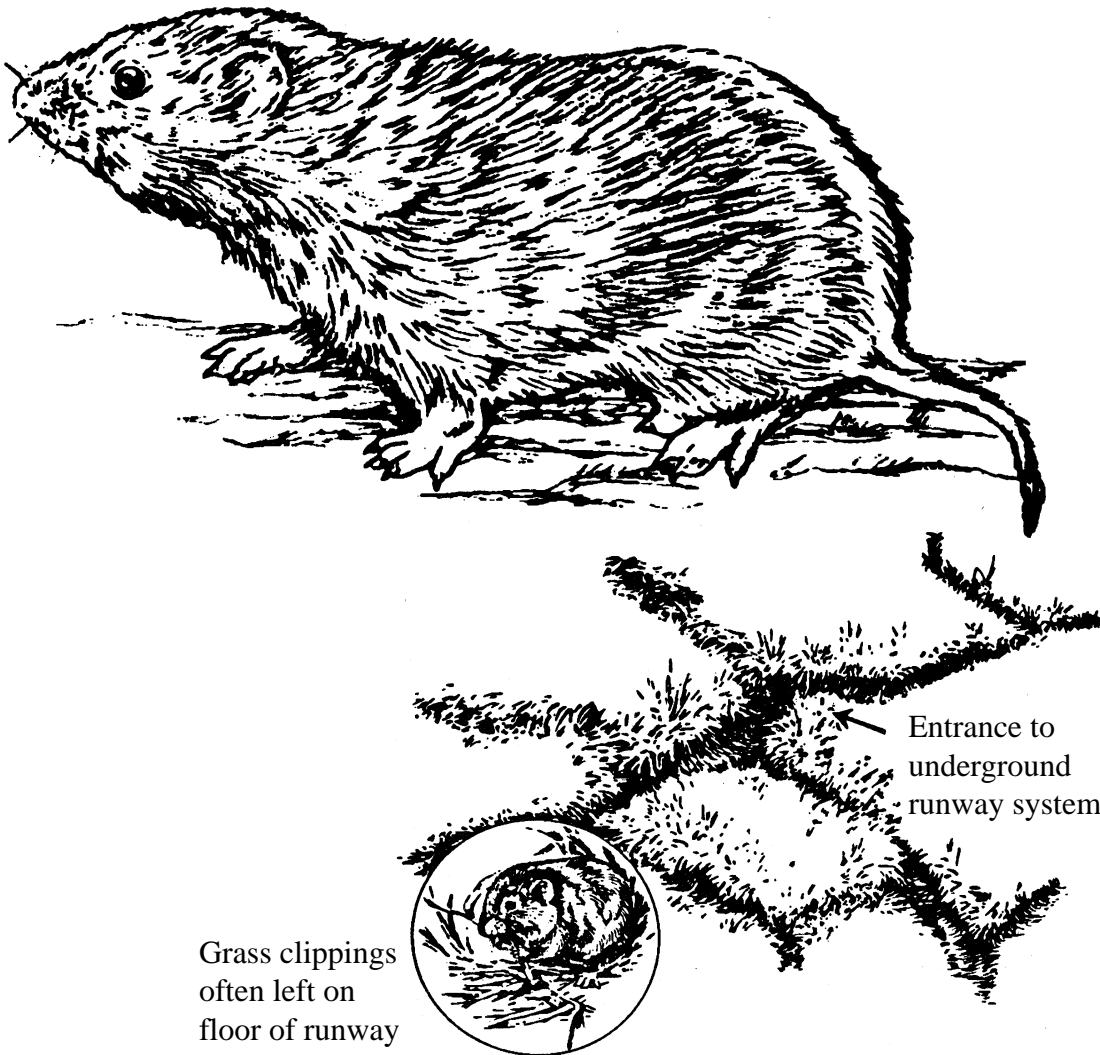


CONTROL OF VOLES IN NO-TILL CORN



Grass clippings
often left on
floor of runway

Entrance to
underground
runway system

CONTROL OF VOLES IN NO-TILL CORN

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INTRODUCTION

Voles have historically been a problem for farmers using minimum and no-till technologies to establish field corn. As land enrolled in the Conservation Reserve Program (CRP) is returned to row crops, this problem is expected to increase. Retaining established cover by no-till farming decreases erosion, improves water quality, increases wildlife habitat and conserves moisture when compared to conventional tillage practices. However, voles that have established colonies and flourished beneath the cover established under CRP, crop residue or hay crops can devastate crop plantings. Stand reductions of 80-100 percent have been reported in no-till corn where vole numbers are high.

VOLE DESCRIPTION AND BIOLOGY

Three vole species are native to Tennessee. The prairie vole (*Microtus ochrogaster*) is the primary rodent pest in no-till corn. These voles inhabit open dryer grassland sites, as opposed to the meadow vole (*M. pennsylvanicus*) which prefers moist areas, and pine voles (*M. pinetorum*) which are found in forested and open areas. Prairie and meadow voles depend on herbaceous, overhead cover to afford them protection from predators. This herbaceous cover is less important to pine voles. No-till farming provides high-quality forages and grain as a food source and large amounts of plant material at ground level to shield them from predators. This mixture of food and cover provides excellent habitat for voles.

Voles are small, stocky rodents with short legs and tails. Most range from brown to grey with dense under hair and longer guard hair. Their bodies are torpedo shaped and generally 4 to 7 inches long. Their eyes and ears are relatively small. The ears are partially hidden by hair.

The number of voles in an area can increase very rapidly under ideal conditions. Females become sexually mature at the age 35 to 40 days and then are capable of producing a litter of three to eight young every 21 days. Therefore, a population of a few voles with adequate cover and a good food source can, in a relatively short time, grow to numbers high enough to cause major damage to a corn crop.

Voles feed actively both day and night throughout the year on a wide variety of foods. High-protein grasses and legumes are their favorite foods; however, they readily feed on grains (such as corn, soybeans and wheat) when available. Voles create a network of aboveground runways 1 to 2 inches wide through the existing vegetation. Active runways are littered with grass clippings and droppings. Among the aboveground runways are holes leading to an associated underground tunnel system. This system of runways and tunnels can be home to a pair of adult

voles and their young or a colony of many adults and their young. The feeding radius of a vole colony may be 10 to 15 feet in excellent habitat; however, the average feeding area is approximately one-fourth acre.

PREPLANT SCOUTING

The first step to prevent vole depredation is to scout fields and borders to determine if voles are present at economically significant levels. This survey should be conducted 30 days before planting to allow time to implement damage-control measures.

Areas with good drainage and soil aeration are most attractive to prairie voles and should be surveyed first for active colonies. Dark green, high spots in grassy areas often indicate the presence of a colony. Nutrients added to the soil from urine and decaying feces are responsible for the dark green color and increased growth. Fresh clippings and/or fresh droppings next to a slick, open hole indicates the den is active. Other areas to check are around weed patches and big bales of hay, as these areas serve as nursery spots. Control measures should be planned when five or more active colonies per acre are located.

VOLE DAMAGE

Damage to no-till corn generally is restricted to the first 21 to 28 days after planting. Feeding damage generally ends when the corn kernel decays or when the plant reaches 8 to 10 inches high. When feeding on seed, voles generally dig into the planter slot, eat the endosperm and leave the remainder of the corn seed (see Figure 1.).

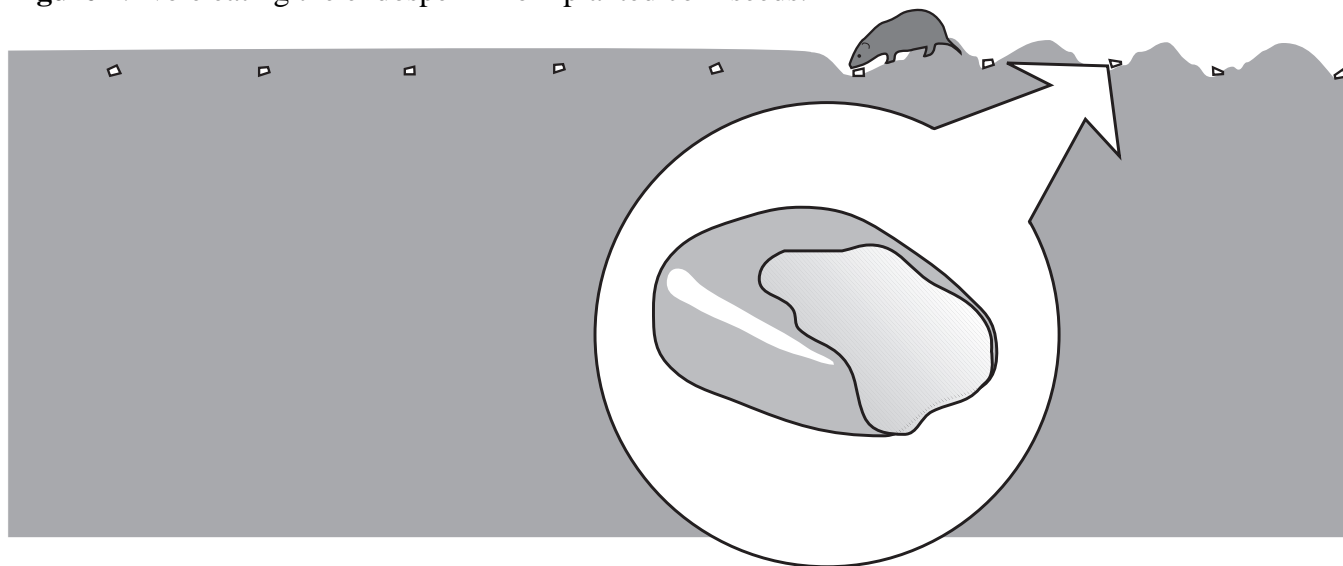
MANAGEMENT OF VOLE DAMAGE

Several vole control techniques have been studied at the University of Illinois Dixon Springs Agricultural Center since the 1970s, under the direction of Ron Hines. Success with some techniques was dependent on the vole population level 30 days prior to planting. Other techniques were successful regardless of the population level.

PREDATORS

Voles have a host of natural predators, including snakes, hawks, owls, coyotes and foxes. However, the predator community generally is ineffective at controlling vole populations when a dense herbaceous canopy is present. When overhead cover is significantly reduced or eliminated, voles become easier targets for predators.

Figure 1. Vole eating the endosperm from planted corn seeds.



TOXICANTS

The U.S. Environmental Protection Agency (EPA) recently granted a full label approval for the use of one-eighth inch, zinc phosphide-pelleted bait; the bait could be used in-furrow with conservation tillage (mulch, ridge and no-till) field corn. Special metering equipment is required for this placement and to regulate the flow to the recommended four to six pounds per acre. Additionally, special care is required to insure that the baits are not crushed and that the pellets are covered with soil. Covering the pellets insures non target animals have minimal exposure to the bait.

Positive Placement Kits designed for planters equipped with insecticide boxes and bait are available from Hacco, Inc. (1-800-642-4699). Cost of the bait is less than \$10 per acre. For additional information and price of the Positive Placement Kits, contact Hacco, Inc. Gandy PMD applicators are available for planters not equipped with insecticide boxes. Additional equipment is required to mount the Gandy boxes on planters and direct bait into the furrow. For additional information and price on this equipment, contact your local Gandy dealer or the Gandy Company directly at 1-800-443-2476.

REPELLENTS

No repellents currently are labeled as vole repellents in field corn.

ALTERNATIVE FEEDING

The critical period for the prevention of vole damage is the first 21 to 28 days after planting. For alternative feeding to be effective, voles must be provided a food source that is preferred, in amounts that will deter them from feeding on the crops for this critical period. In addition, it must be

- applied prior to planting,
- applied evenly across areas voles inhabit,
- weed-seed free!

Research has concentrated on whole corn, coarse-cracked corn and whole soybeans as alternative foods. Coarse-cracked corn has the advantage of not produc-

ing a competing volunteer crop. The grains should be distributed across the field using a fertilizer spreader two days prior to seeding. The existing vegetation should be dry to allow the grain to fall to the ground.

Best results in corn have resulted with four bushels of coarse-cracked corn or two bushels of whole corn. Two bushels of whole soybeans appears to be adequate for control. Increasing the amounts over these levels has not resulted in increased crop yields.

The introduction of herbicide-resistant and tolerant crops, such as Roundup Ready® corn, makes alternative feeding a more attractive option. Standard seed can be broadcast prior to planting Roundup Ready® crops. Later, the standard crops can be controlled with a Roundup® herbicide application with no harm to the field crop.

CULTURAL PRACTICES

Modifying the vole's habitat by removing the cover and/or the food source can effectively decrease the vole population in an area. These methodologies are not designed to kill the voles, although the voles may become more vulnerable to predators as a result, and a small number may die as a result of mechanical treatments. Therefore, an adequate time must be allowed between treatment and planting to allow the rodents to leave. Rapid regrowth of vegetation can eliminate the effectiveness of these methods.

Tillage eliminates the burrows and runways, cover and food of the voles. However, all the advantages of conservation tillage are lost. Tillage costs increase, erosion will be increased, water quality may be decreased, wildlife habitat will be lost and allelopathic (one plant inhibiting the establishment or growth of another) releases from the destroyed plants may reduce stands. Tillage also may violate the farm's conservation plan.

Application of herbicide at least 30 days prior to planting has consistently produced good results and is available to all no-till farmers. This early preplant herbicide application would replace the pre-emerge herbicide application over the top after planting. For

appropriate herbicides and rates, contact your local county Extension office or refer to the current **Weed Control Manual for Tennessee Field Crops** (Extension PB 1580).

Hay removal, low mowing, pasturing and controlled burning prior to planting can be successful methods of reducing damage in no-till crops. However, regrowth following these practices is highly nutritious. Thus, the desired effect may not match these practices.

Low mowing of fields and borders should be conducted in the late fall to discourage voles from establishing colonies. However, this practice eliminates winter cover that may be essential for other wildlife species.

Haying and controlled burns should be completed 30 days prior to planting, allowing the voles time to leave the field before seeds are planted. A combination of cutting and bailing the vegetation, then applying a herbicide to kill the root stock, was found to be effective in Nebraska. A producer who eliminates vole food sources, then plants before they have moved, is sure to have a depredation problem.

Pasturing can be used to eliminate standing vegetation. Grazing should be intensive to eliminate as much cover as possible. Livestock should remain on the area until planting is imminent to allow little time for cover to be reestablished and voles to reinvade.

CONCLUSIONS

Voles are not a problem in all fields planted to no-till corn. Therefore, it is important that areas to be planted to this crop be surveyed to determine if control measures are needed. Use of effective damage control techniques has consistently returned at least an additional \$100 per acre at harvest. Use of a combination of techniques may prove most effective. Researchers at The University of Illinois recommend a program including early preplant herbicide applications to be the most effective, lowest cost, easiest to complete and safest to the environment.

The best prescription for vole control in corn without the use of zinc phosphide pellets may be to:

- Mow fields low in the fall before they are to be planted the following spring.
- Scout fields for voles at least 30 days prior to the time crops are to be planted.
- Plan a prevention program if more than five active colonies per acre are found during the survey.
- Apply no-till early preplant herbicides, if used, approximately 30 days prior to planting.
- Scout again for active vole colonies approximately one week before planting. If few colonies are located, plant when ready. If vole densities remain high, apply alternative foods.
- Apply “weed-seed-free” grains alone or mixed with dry fertilizer a minimum of two days prior to planting. Insure the vegetation is dry when spreading to allow the grain to fall to the ground.
- Plant the field no-till.

However, if surveys find significant vole populations, zinc phosphide pellets have been approved for in-furrow rodent control. Four to six pounds of zinc phosphide pellets per acre placed in-furrow can effectively reduce vole damage in no-till field corn.

Vole damage can be minimized in fields planted to corn by using conservation tillage practices. The control of damage must be an ongoing project of surveying for voles and implementing control methods when substantial populations of voles are discovered.

Information in this publication was adapted from *Vole Damage Control When Converting CRP To Crop Production in The Midwest in 1997*, Ron Hines, senior research specialist, University of Illinois, Dept. of Crop Sciences, R.R.#1, Box 256, Simpson, Illinois 62985 and Dennis Epplin, Extension educator, Crop Systems, University of Illinois Extension Center, 4112 N. Water Tower Place, Mt. Vernon, Illinois 62864 and *Voles*, John M, O'Brien, agricultural programs coordinator, Nevada Department of Agriculture, Reno, Nevada 89510, in *Prevention and Control of Wildlife Damage-1994*, University of Nebraska. B-177-182.

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Precautionary Statement

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