

WILDLIFE CONTROL PROGRAMS

Vole (Mouse) Control

The majority of damage to trees from woodland voles (formerly known as pine vole) and/or meadow voles occurs from late fall to early spring when vole populations remain high. During this period, fresh green food resources and seed reserves become scarce, and these animals shift to feeding on the roots and above ground stems of woody plants such as apple trees. Accumulated dead grass and thick thatch beneath the trees create perfect cover for these animals and prevent growers from recognizing vole presence and properly treating the problem. Because natural predation often is lower in winter, the optimal time to implement a vole management program is after harvest (late October, November, or December) and just prior to the anticipated period of damage. Rodenticides described in this section are registered for use, but application should occur after harvest and during the dormant season (see VCE Publication 456-232, Vertebrate Pest Control: A Guide for Wildlife Managers in Virginia).

POPULATION MONITORING

Monitoring of vole populations and their damage should occur both prior to and after treatment. To evaluate the need for vole population reduction, growers should place a covered apple slice within the dripline of trees (at 20 tree intervals in each block) prior to treatment where vole runs or tunnels are evident. To mark where apple slices have been placed and to prevent consumption by other animals, growers can use split rubber tires, sections of straw, wood slabs, shingles, tar paper, or other coverings. Twenty-four hours after placement, check the apple for vole teeth marks. The percent of apples with gnawing provides an estimate to the size and activity level of the vole population. After the orchard has been treated, a second 24-hour apple slice assessment (after a 30-day interval and using new apples) will reveal the degree of control achieved. The maximum effect from hand baits is realized about 20 days after treatment. If an herbicide strip exists beneath the trees, monitoring must be done in adjacent vegetated areas because voles rarely range over bare ground.

HAND-PLACED BAITING

Baits should be placed by hand in active runs and holes at the rates shown in Table 22. Two bait placements per tree for plantings up to 100 trees/A is desirable. If bait covers are used, one treatment site per tree may be sufficient. In plantings with over 100 trees/A, one placement per tree is sufficient. For best results, baits should not be placed just before or just after a rain or when the soil is frozen more than an inch deep.

The proper use of bait covers greatly increases the effectiveness of bait applications and decrease baiting time considerably. Split rubber tires provide excellent bait covers, and bait placed in shallow plastic cups under the tires will extend the life expectancy of bait. Covers placed under trees 2-3 months ahead of baiting will attract voles and increase the likelihood of them finding baits later. Random placement of this sort may result in 50-80% of the covers with good activity at baiting time. If no runway exists under a cover, move it to another area under the same tree rather than waste bait. Bait covers may interfere with or be destroyed by mowing or cultivation activity, so proper marking is suggested. Please note that bait stations located within an herbicide strip generally are ineffective; covers should be placed in vegetated areas adjacent to the herbicide strip. At least 40, but no more than 80, covers will provide good contact with the population.

ZINC PHOSPHIDE BAITS

Pelleted zinc phosphide bait formulations are available to the apple industry and offer distinct advantages over grain baits for the control of woodland voles and meadow voles. Hand placed bait, at the rate of 1-3 lbs/A under covers or in holes and runs, will control both species. If populations are high, a second application of an anticoagulant may be required. Because of problems of bait recognition among the residual vole population, zinc phosphide is not recommended for use as the "mop up" bait; another toxicant should be used in a second application.

Accurate pre-treatment monitoring will increase the success of zinc phosphide applications. ZP-treated grain baits can provide adequate control of woodland vole or heavy meadow vole populations, but ZP-coated apple slices (1 teaspoon/qt) generally are more effective than grain baits. Commercial formulations often are better than apple baits, but neither is considered adequate as a once-a-year treatment for woodland voles.

ANTICOAGULANT BAITS

Several days of continuous feeding are required for voles to receive a lethal dose of diphacinone or chlorophacinone. For this reason, the rate per acre should not be reduced below suggested levels for hand placement treatment (Table 22). If populations are high, voles may consume all the bait before a lethal dose has been administered. A second application should not be made within 14 days of the first treatment. Voles that receive a lethal dose from the first treatment will die within 20 days; animals that were exposed to a sublethal-dose should receive a second treatment 20-30 days after first treatment.

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Woodland voles versus meadow voles: The anticoagulant chlorophacinone is more effective against woodland voles than meadow voles. Zinc phosphide is more effective against meadow voles than chlorophacinone. Consistent use of either bait against a mixed population of both species will shift the population to the species less impacted by that bait. Therefore, adopting a program of rotating hand placed baits—zinc phosphide in the first baiting and chlorophacinone in the second baiting—may be the most effective way to control both species. This treatment regimen will be more successful against meadow vole populations where zinc phosphide baits may be recognized after the first treatment. If only woodland voles are present, two applications of chlorophacinone may be more effective than a zinc phosphide and chlorophacinone follow-up approach.

Table 22. Rodenticides for the Control of Woodland and Meadow Voles in Orchards

	Rozol, Parapel¹ (Chlorophacinone) lb/A	ZP Rodent Ramik-Brown² (Diphacinone) lb/A	Bait AG1 (Zn P) lb/A
Hand-placed:			
Woodland Vole	10	10 + 10	2
Meadow vole	10	-	2

¹ If populations are high, a second application may be required 1-2 months later. An anticoagulant should be used for second application. Zinc phosphide is not a good repeat bait.

² Applications made at 20-40 day intervals.

Deer Management

Deer can cause serious problems in apple orchards, particularly where the orchard is surrounded by forested habitat. Deer prefer to feed on leaf and fruit buds and young shoots, and bucks rub their antlers on larger limbs and trunks of young trees. Young trees, particularly spur types, may be seriously stunted and misshapen. Although “horning” damage occurs most often in late summer and early fall, plantings should be examined often, as damage may occur at other times of the year; feeding damage can occur at any time. It is difficult to change the feeding habits of deer once they have become established; therefore, it is important to anticipate when problems will occur and apply controls before damage begins. The best approach to deer damage management is an integrated pest management strategy, one that incorporates fencing, repellents, modification of adjoining habitats, and population management.

Dogs - Trained dogs confined to orchards by invisible fencing successfully have reduced the presence of deer and perhaps woodchuck and rabbits in orchards. The purchase, care, and maintenance of electronic collars worn by dogs, invisible fencing, and training of dogs often can be considerably less expensive than the typical electrified fencing for deer.

PERMITS

Permits are required to reduce deer populations outside the normal fall hunting season. These “kill permits” may be obtained from the Virginia Department of Game and Inland Fisheries or the West Virginia Department of Natural Resources. Bonus tags also are available and can be provided by an orchard manager to hunters who offer to help

increase the “in-season” harvest of deer and thereby reduce local herd density. However, population management alone rarely will solve a depredation problem.

FENCING

Fencing has been shown to be the most reliable method of deer management. Recent evaluation of several high-tensile, high-voltage low-impedance electric fences indicated that a 7-wire vertical design 6 feet in height was very cost-effective for reducing deer damage. The top 6 strands are spaced 10 inches apart with the bottom strand 8 inches above ground level. Deer typically try to crawl under a wire fence rather than jump it. The wire spacing, high voltage, and proper baiting of the fence will keep animals at bay.

Electric fencing can be less expensive than other permanent fence designs, but it requires frequent inspection to insure that proper wire spacing and voltage are maintained.

The only deer-proof fence is a 10 ft. non-electric woven wire fence. Woven wire is available in 49 and 75 in. heights. Sections of woven wire can be stacked one above the other or strands of high-tensile smooth wire can be added above the woven wire to create a 10-foot fence height. Although less maintenance is required for this fence design, growers still must be vigilant in periodically checking for damage (i.e., blow-downs of adjacent trees or branches or post failure).

Light-weight high-tensile electric deer fences are a cost effective option for use around young plantings <10 acres in size where deer pressure is not severe. Such fences utilize wooden corner posts without bracing and 4 or 5 16-gauge high-tensile Class 3 zinc-galvanized smooth wires.

Although voltage, height, and wire spacing are key determinants of a fence's success, visibility is more important. Any fence that is erected in or immediately bordering woods will have noticeably lower success than one built out in the open and away from the wood's edge. Jumping over fences is more common when the deer can't see the fence on approach until the last minute.

For more information about fences contact your horticultural specialist or order West Virginia University Publication Number 810, "High-Tensile Fencing for Deer Control.

CHEMICAL REPELLENTS

Taste and odor repellents may provide some relief when other natural foods are abundant and available to deer, but efficacy will decline as these natural supplies become diminished and deer density increases. The length of time these materials remain effective will be influenced by weather, particularly rainfall. Deer activity and weather should be monitored carefully so that applications are properly timed.

Currently, the only active ingredients registered for use on deer include the following: ammonium soaps of higher fatty acids (*Hinder*®), bone tar oil (*Magic Circle*®), capsaicin (*Hot Sauce*®), denatonium saccharide (*Ro-pel*®), putrescent egg solids (*Deer Away*®), denatonium benzoate (*Bitrex*®), and thiram. Food additives (e.g., garlic, pepper, fish oils) don't need registration, but usually offer little protection. In terms of effectiveness, *Deer Away*®, *Deer Off*®, and *Deer Stopper*® have been successful, but over large acreages, they become uneconomical. Previously, soap bars in rural or secluded orchards have been effective, but because of development pressure and the proximity of residences to orchards, human smells today are more common in the environment, and there may be decreased response by deer and diminished usefulness of soap in some areas.

Rabbit Control

Rabbits cause serious damage by chewing bark on tree trunks and low scaffold limbs particularly on young trees. Trees over 5 years old are seldom damaged unless high rabbit populations exist or overgrown dwarf rootstock pieces provide a good gnawing angle. Damage usually occurs in late fall and winter. Unmowed fields that adjoin newly planted orchards provide cover and food for rabbits, and may lead to potential problems later in the dormant season. Removal of brush piles and heavy weed growth, especially along fences, and hunting will reduce populations in the area.

Tree guards made of plastic, wire mesh, heavy foil, and other materials can reduce damage caused by rabbits to trees, but, where accumulated snow builds up, rabbits will gain access above these guards. Rabbits may be fenced from small nursery areas, but tree guards generally are more economical and effective in larger orchards. Chemical repellents (as discussed under deer control) applied to trunks above the tree guard may offer additional protection.

Following rabbit damage, a considerable amount of live cambium may remain in the girdled area. If damaged trees are treated immediately with bees wax or a non-toxic, water-based tree dressing, the tissue will not dry out and cambium activity may be sufficient to cause healing of the damaged area.

Woodchuck Control

Woodchucks are particularly damaging to roots, trunks, and scaffold limbs of young and newly planted trees. In addition, open burrows are a hazard to man, livestock, and machinery. A number of control methods have been used. Trapping or shooting may be effective, but require constant vigilance, which may not be practical on a large scale. The most practical method of control is to fumigate the animals in the underground burrow.

Sodium nitrate cartridges (commonly referred to as a "smoke bomb") may be used as a fumigant. They are stable, require no special permits, and work effectively if administered properly and with good timing (try to place in tunnels before the year's young are born). There is a slight fire risk, so ambient conditions must be monitored. Sodium nitrate cartridges must not be used under a building or other structure.