UMass
Extension

CHECKLIST
WILDLIFE MANAGEMENT

Identify the problem wildlife before choosing a management practice.

Voles

- ✓ Monitor nurseries for signs of vole activity to detect vole population increases and to evaluate the effectiveness of baiting programs and the need for follow-up treatments.
- ✓ Lower rodent numbers by careful mowing, cultivation, and herbicide treatment because voles require green, growing vegetation for survival and breeding. Rotary mowers are much more effective than sickle-bar types for removing ground cover and thatch.
- ✓ Eliminate meadow voles by using an herbicide strip, or cultivating beneath the trees and along the tree rows.
- ✓ Use wire guards to protect younger trees from meadow voles and rabbits; ¼-inch wire mesh has proven most satisfactory.
- ✓ For baiting pine voles, hand place baits in tunnels or under roofing shingles, slabs of wood, or similar protected bait stations. The optimal time to apply baits is in the late fall.
- ✓ For nurseries with recurring meadow vole problems, an annual fall baiting program is recommended.
- ✓ Do not apply baits to areas with bare ground, including vegetation-free cultivated strips under trees, because this may increase the chance of feeding and mortality of non-target song and game birds.
- ✓ Always follow label directions for rates and observe all precautions. Because there is evidence that bait shyness may occur with repeated use of zinc phosphide baits, a single, complete bait coverage of the site during a period of fair weather is best. Ideally, this should follow close mowing of sod areas.
- ✓ Acute toxicants such as zinc phosphide should not be used more than once every six months, preferably only once a year.

Deer

- ✓ Use a variety of non-chemical alternatives such as exclusion and habitat modification to reduce wildlife damage to nursery stock and ornamental shrubs.
- ✓ Some damage must be tolerated with the use of repellents, even if browsing pressure is low.
- ✓ Repellents should be applied before damage is likely to occur and a feeding pattern is established.

Managing Wildlife in Overwintering Greenhouses

- ✓ Make overwintering greenhouses rodent tight. Use fine mesh screen wire such as hardware cloth around the perimeter of the greenhouse. Bury it under ground and bend it outward at a 90° angle, leaving it at least 6 inches deep.
- ✓ Mow and clean up the natural vegetation close around the greenhouses to eliminate protected areas for rodents.
- ✓ Trapping is not effective for controlling large vole populations, but can be used to control small populations. Place mouse snap traps containing bait perpendicular to the runways.

- ✓ Chemical repellents are available that can be used on plants. Some repel by giving off an offensive odor and others are taste repellents. Some of these products may not be persistent and some are easily washed off and need to be reapplied.

WILDLIFE DAMAGE MANAGEMENT

Rodent control must be considered in terms of the environment in which the pest is active. Control activities must have as an overriding principle the biology and behavior of the animal in concert with its whole environment.

Field Nurseries

Voles

Two species of voles commonly damage trees and shrubs in nurseries by burrowing and girdling plants, the meadow vole and pine vole. Meadow voles usually live on the surface of the ground and are active day and night, year-round. They do not hibernate. They feed all winter long on tubers, bulbs, rhizomes, stems, roots, and seeds and occasionally on insects and animal remains. Voles are prolific breeders. They may breed throughout the year, but most commonly in spring and summer. Meadow voles construct many tunnels and surface runways 1 to 2 inches wide through the vegetation, often with droppings and plant cuttings ¼- to ½-inch long with numerous burrow entrances. These surface runways are the most easily identifiable sign of voles. Pine voles construct small openings to underground burrows.

North Central Research Station Archive, USDA Forest Service, Bugwood.org

Chemical Baits for Meadow Voles

Meadow voles are active above ground and forage more widely than pine voles therefore broadcast baiting is more effective against meadow voles. Timing often determines the success of a baiting program. The optimal time to apply baits is in the late fall.

For nurseries with recurring meadow vole problems, an annual fall baiting program using a zinc phosphide-treated bait is recommended. Some formulations/uses of zinc phosphide are a restricted use pesticide which can only be purchased and used by certified pesticide applicators. Pelletized baits are available from commercial sources. Hand-broadcasting, tractor-operated seeding devices, and whirling-disc fertilizer spreaders are satisfactory means of application. Complete coverage of tree rows and adjacent areas is required for reliable control. Do not apply baits to areas with bare ground, including vegetation-free cultivated strips under trees, because this may increase the chance of feeding and mortality of non-target song and game birds. Always follow label directions for rates and observe all precautions. Because there is evidence that bait shyness may occur with repeated use of zinc phosphide baits, a single, complete bait coverage of the site during a period of fair weather is best. Ideally, this should follow close mowing of sod areas.

Acute toxicants such as zinc phosphide should not be used more than once every six months, preferably only once a year. When acute toxicants are used repeatedly in the same area, local vole populations may develop an aversion and become bait shy. Several formulations are available.

Chemical Baits for Pine Voles

Because of their underground habits, pine voles can be difficult to manage. In nurseries with pine vole problems, the placement of toxic baits beneath previously established baiting stations can provide control. It is important to establish one or two bait stations at trees with vole activity and have them in place long enough for the pine voles to establish a burrow system. Place baits by hand in tunnels or under wooden slabs, tarpaper, shingles, or PVC pipe, creating bait stations. Do not broadcast bait like the method used for meadow voles. Late fall is the best time for rodenticide treatments.

Frequent use of zinc phosphide can lead to bait shyness (voles that consume sublethal doses no longer eat the bait). Rebaiting only results in reduced control and reinforces aversion to the rodenticide. Avoid using zinc phosphide more than once every six months if possible, preferably only once per year. However, heavy pine vole infestations, as indicated by numerous burrows and fresh dirt at several adjacent trees, may require a second application of bait about two weeks after the first.

Placement and Timing of Chemical Baits

With all management efforts, it is also important to treat adjacent edges and weedy areas to avoid vole reinvasion from nearby blocks. The most important consideration in timing a control program is to achieve the greatest vole reduction just before onset of winter. Voles that remain alive in the nursery will survive under the protection of snow cover and will cause plant damage during winter months.

Monitoring

Monitoring nurseries for signs of vole activity enables growers to detect increases in vole populations and to evaluate the effectiveness of their baiting programs and the need for follow-up treatments. Voles usually have sudden population irruptions every few years, and growers should monitor their nurseries even in years of low vole densities. Negligence may lead to rapid population increases and plant damage. Young trees (ranging in age from 1 to 15 years) are most susceptible to vole damage.

Cultural Practices to Reduce Vole Populations

Cultural practices can reduce or even eliminate the need for rodenticides. Careful mowing, cultivation, and herbicide treatment will lower rodent numbers because voles require green, growing vegetation for survival and breeding. Efforts to reduce the density of ground cover will aid vole control. The meadow vole is especially vulnerable to close mowing of turf areas, and rotary mowers are much more effective than sickle-bar types for removing ground cover and thatch.

The use of an herbicide strip, or cultivation beneath the trees and along the tree rows are cultural practices that can effectively eliminate meadow voles. In addition, wire guards will protect younger trees from meadow voles as well as rabbits; ¼-inch wire mesh has proven most satisfactory.

Repellents for Deer and Rabbits

A variety of commercial repellents, that contain ingredients such as egg solids, ammonium

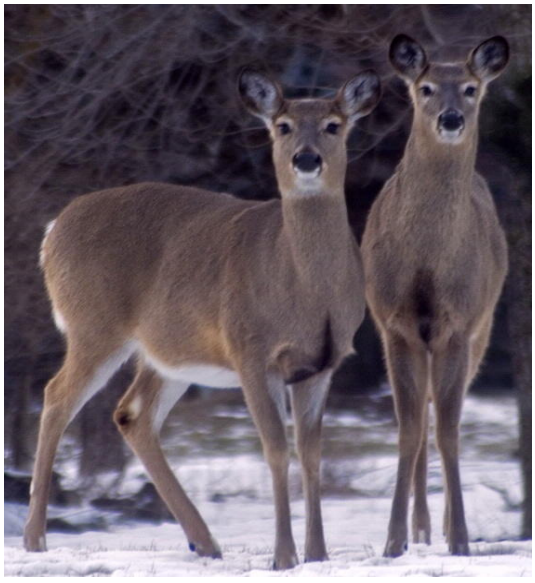
soaps, thiram, capsaicin, and garlic oil, are available to reduce deer or rabbit browsing on nursery stock and ornamental plants. Repellents fall into two categories: those that produce an offensive taste when consumed and those that repel with a disagreeable odor. The effectiveness of repellents is extremely variable and is affected by factors such as deer or rabbit numbers, feeding habits, and environmental conditions. Repellents may be cost-effective for controlling wildlife damage when (1) light to moderate damage is evident, (2) small acreages are damaged, and (3) three or fewer applications will be needed for adequate control. If these three conditions are not satisfied, a grower may want to look at the cost-benefit ratios of electric fence designs or other alternatives.

Some damage must be tolerated with the use of repellents, even if browsing pressure is low. Repellents should be applied before damage is likely to occur and a feeding pattern is established. With taste-based materials, new plant growth should be covered every four weeks during susceptible stages. Repeat applications of odor-based repellents should be made every four to six weeks while plants are susceptible to damage (usually November through April).

Follow direction on the label. Repellents are best applied when precipitation is not expected for 24 hours and temperatures will remain between 40 and 80 °F for that period. Applications should be thorough, covering all vulnerable portions of the plant. Hand spray applications may be cost-effective on small acreages, whereas machine sprays will reduce costs on large acreages if four or fewer applications are made each year. If the materials are compatible, spray costs may be reduced by adding repellents to a scheduled pesticide application.

Nonchemical Wildlife Damage Management Alternatives

A nursery owner can use a variety of non-chemical alternatives to reduce wildlife damage to nursery stock and ornamental shrubs, like exclusion and habitat modification. Exclusion and habitat modification provide the greatest efficacy and longer-term relief from damage problems.



David Cappaert, Michigan State University, Bugwood.org

Fencing

Fencing is the most reliable exclusion technique for preventing wildlife damage to nursery stock. Woven-wire designs are the most effective physical barrier to wildlife, with high-tensile woven-wire fencing providing the ultimate in protection and durability. Deer can be successfully eliminated from large areas (>50 acres) with an 8- to 10-foot woven-wire fence. The advantages of this design are its effectiveness and low maintenance requirements after construction. Disadvantages include the high initial cost and the difficulty in repairing damaged sections.

A variety of multi-strand, high-tensile, vertical or sloped, electric fence designs effectively exclude wildlife. Electric high-tensile fences may be complete physical barriers or, more commonly, may act as a behavioral deterrent. Deer can be excluded

from crops with a 5- to 6-foot electric fence, even though they can easily jump over woven-wire fences of this height. The most frequent reasons why electric fences fail to prevent wildlife damage include the selection of an unsuitable fence design, failure to install fencing according to manufacturers' specifications, and inadequate maintenance. Electric fences will not exclude wildlife unless adequate voltage is constantly maintained on the wires. High-tensile electric fences are easily repaired and may cost half as much as 8- to 10-foot woven-wire designs. Disadvantages include frequent monitoring and the need for vegetation control to maintain shocking power.

Physical Barriers

Other physical barriers that can prevent wildlife damage include wire cages, plastic tubing, bud caps, and bird netting. Large-scale use of these materials may be uneconomical because of the labor required to apply and remove these barriers. Wire or plastic tree guards can be used to protect trees from trunk girdling by rodents or rabbits. The more expensive wire guards provide longer-term damage prevention.

Habitat Modification

Habitat modifications can make areas less suitable for nuisance wildlife. Damage prevention with cultural manipulations should begin with site selection and plant establishment. In nurseries, plowing or disking reduces vole populations, facilitates the establishment of the desired cover crop between rows, and simplifies future vegetation control. Removal of brush, stone piles, and non-mowable wet areas will reduce the attractiveness of sites to rodents and rabbits. Mowing in established plantings can reduce preferred wildlife foods, remove protective cover, enhance predation, and expose animals to severe weather conditions. Sites adjacent to crop lands should also be mowed to reduce pest numbers.

Capturing and Moving Animals

To protect people and wildlife, do not relocate problem wildlife. Often people want to catch the problem animals and release them someplace else. Capturing a wild animal and releasing it in another area is prohibited by Massachusetts law. This law has been in effect for many years. Rabies in raccoons is spreading throughout the eastern United States. Moving animals from one area to another may spread this or other diseases to new areas.

Information on methods or techniques to control damage caused by wildlife is available from the Massachusetts Division of Fisheries and Wildlife (http://www.mass.gov/dfwele/dfw/wildlife/wildlife_home.htm) or by contacting the MassWildlife District office (http://www.mass.gov/dfwele/dfw/facilities/districts.htm) that serves your community.

Trapping

Trapping in Massachusetts is a highly regulated activity. Regulations and laws are restrictive and can be complex. Know the current laws and regulations before you trap. Environmental Police Officers enforce trapping laws.

Problem Animal Control (PAC) agents are private individuals licensed by the Division of Fisheries and Wildlife to assist the public in situations involving sick animals or animals causing

property damage. To become a PAC agent, one must possess a valid trapping license and register and tag all traps and submit an application to the Division of Fisheries and Wildlife. For more information contact the Massachusetts Division of Fisheries and Wildlife (http://www.mass.gov/masswildlife, [617] 626-1590).

Reducing animal numbers by lethal methods may fail to provide long-term relief from damage. Where habitat conditions are suitable and exclusion is not attempted, most pest species will repopulate the site soon after control efforts have ceased, as animals will move into the control area from adjacent lands. Habitat modification and exclusion methods often require more initial effort and expense, but these techniques may provide longer-term damage prevention, especially when a few pest individuals can inflict substantial losses.

Container Nurseries

Wildlife Damage Management in Overwintering

Small animals will invade overwintering structures, girdle stems, and burrow into pots if given the chance. The most likely critter to cause havoc is the meadow vole. Meadow voles construct many tunnels and surface runways with numerous burrow entrances. These surface runways are the most easily identifiable sign of voles. By the time the runways are noticed, damage is usually done.

The first step to prevent damage caused by rodents is to deny them access to overwintering greenhouses. Make them rodent tight by using fine mesh screen wire such as hardware cloth around the perimeter of the greenhouse. Bury it under ground and bend it outward at a 90° angle leaving it at least 6 inches deep.

Next, mow and clean up the natural vegetation close around the greenhouses to eliminate protected areas for rodents. Most of our wildlife animals will not venture across a wide-open space because they are much more vulnerable to natural predators.

Trapping is not effective for controlling large vole populations, but can be used to control small populations. Place mouse snap traps containing bait perpendicular to the runways.

Chemical repellents are available that can be used on plants. Some repel by giving off an offensive odor and others are taste repellents. These products reportedly work for a number of animal pests. Some of these products may not be persistent and some are easily washed off and need to be reapplied.

Finally, when all else fails, there are toxic baits that are effective for reducing the population. One of the most effective and common baits is zinc phosphide treated cracked corn or oats. It is a single-dose toxicant available in pelleted and grain bait formulations and as a concentrate. Anti-coagulant baits are also effective in controlling voles. Anticoagulants are slow acting toxicants requiring from 5 to 15 days to take effect. Multiple feedings are needed for most anti-coagulants to be effective. Toxic baits can be harmful to children, pets and wildlife and should be used with utmost caution. Read and carefully follow the directions and safety precautions on the label of any of these products.

PLANT PROBLEM DIAGNOSTIC SERVICE
The University of Massachusetts Amherst recognizes the importance of reliable and prompt diagnosis of plant problems for the turf, floriculture, vegetable, nursery, urban forestry and landscape industries. To this end, the UMass Extension Plant Diagnostic Laboratory serves farmers, horticulturists, landscape contractors, turf managers, arborists, nurseries, and others in agriculture and the green industries. The laboratory also assesses ticks for Lyme disease as a service to the public.

The UMass Extension Plant Diagnostic Laboratory is located in Holdsworth Hall on the UMass Amherst campus. Each diagnosis performed by the laboratory includes a written report with pest management strategies that are research based, economically sound, and environmentally appropriate for the situation.

Notes for Diagnostic Sample Submission
A completed Diagnostic Form is required for each specimen (or particular problem). Diagnostic forms for various types of samples, along with instructions, can be accessed by following the links below. Remember that accurate diagnosis requires both a representative sample and sufficient information about the cultural practices and environmental conditions associated with the problem. The information you record on the form can be more important to the diagnosis than the sample itself! Photos of the problem are also extremely helpful. *No sample will be diagnosed without a completed submission form.*

There is a fee per specimen (or particular problem) payable to the University of Massachusetts, and the appropriate fee must accompany each sample. For a list of fees and to obtain a submission form see http://www.umass.edu/agland/diagnostics. The UMass Extension Plant Diagnostic Laboratory will call and/or send a written report when a conclusion has been reached on the diagnosis or identification. Detailed management recommendations are included with disease, insect, and weed diagnoses.

Tree & Shrub Diagnostics

Guidelines for Sending Tree & Shrub Specimens
Please submit samples based on the following guidelines for tree and shrub diseases, tree and shrub insect identification, and landscape weed identification.

For proper diagnosis, specimens must be received in good condition. Contact the UMass Extension Plant Diagnostic Laboratory first at (413) 545-3208 to see if sending a sample is necessary. Hand-deliver samples if possible, or send them by the fastest means available. Include accompanying information (such as photos) regarding the symptoms that are of particular concern to you.

1. Ship samples so that they will be delivered in 48 hours or less. Federal Express, UPS, and Two-day Priority Mail through the U.S. Postal Service deliver directly to the building. Be sure to pack the specimen in a sturdy envelope or box.

2. Fill out the *Tree and Shrub Diagnostic Form* as completely as possible. This form must

accompany each specimen sent to the laboratory. The information supplied will allow a more thorough and accurate diagnosis. Include your phone number, e-mail, and a fax number, if available, so that we may contact you for further information or inform you of the diagnosis.

3. Disease Samples: Send several plants/leaves/branches etc. showing a range of symptoms that are representative of the problem. Select samples from the area at the margin between the diseased portion of the plant and the healthy tissue. Dead plant material usually is of little value because it often contains secondary organisms that may make detection of the primary pathogen difficult.

Place leaves, branches, and other plant parts in a plastic bag and seal it. Do not add moist towels or moisten the sample before sealing it.

When sending entire plants, dig, rather than pull, roots from the soil. Wrap roots and attached soil in a plastic bag and secure to the trunk with a twist tie. Place a second bag over the foliage and punch a few holes through this bag for ventilation. Do not add additional water or moist towels.

Vascular wilt specimens: Plants or plant parts that suddenly wilt may be infected with a vascular disease. Branch or stem sections ¼ to 1 inch in diameter and 4 to 6 inches long should be taken from the wilting plant or recently wilted plant part. Avoid sending plant material that has been dead for any length of time.

4. Insect Samples: Immature and soft-bodied insects should be placed in 70% ethyl alcohol (rubbing alcohol is not ideal, but may work). Other insects must be carefully packaged. Do not place loose insects into envelopes for mailing, as the automatic process for handling mail will most likely destroy the specimens.

5. Weed Samples: Collect whole plant, including the roots, if possible. Wrap roots in a wet paper towel. Place plant in a zip-lock or freezer bag and seal with some air in the bag in order to prevent crushing. Place bag in a sturdy box or envelope for mailing.

Address packages to:
UMass Extension Plant Diagnostic Laboratory
Holdsworth Natural Resources Center, 160 Holdsworth Way
University of Massachusetts, Amherst, MA 01003-9285
Phone (413) 545-3208
Fax (413) 545-4385
Use exact address to ensure delivery. Call for fees for diagnosing