



Reforestation

Controlling Vole Damage to Conifer Seedlings

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Voies, or meadow mice as they're commonly called, can cause significant economic damage to conifer seedlings on reforestation sites and Christmas tree plantations (figure 1). Typically, damage occurs where there's an abundant cover of grasses and forbs (small, broadleaved plants).

The potential for vole damage is highest in conifer plantations established in old grass fields or pastures that have well-established vole populations. This publication helps you identify vole damage and conduct a control program, if you need one.

Vole biology

There are two voles that damage conifer seedlings in Oregon, Townsend's vole (bog rat) and the Oregon vole (creeping vole). Both are reddish to blackish brown on top and light grey to light brown underneath. They have short tails, small eyes, and ears so small the ears are hidden in the fur.

Both have high reproductive rates. They are capable of breeding at 3 weeks

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Figure 1.—Vole or common meadow mouse.



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of age, and can produce up to 13 litters of four to eight young a year.

Both species of voles construct well-used runways through and under vegetation, and they both build extensive underground burrow systems with many entrances. They're found in meadows, marshy areas, pastures, and riparian areas where there's dense ground cover for security from predators.

You can tell the two voles apart based on size and distribution. Townsend's vole is 6 to 9 inches long with a 1- to 3-inch tail, and it's found primarily on the coast and in the Coast Range. The smaller Oregon vole is 5 to 6 inches long and is found from the coast to the Cascade Mountains.

Identifying the pest

Conifer seedlings damaged by voles have distinctive characteristics. Bark is removed from ground level to about 5 inches up the stem and has a typically fuzzy appearance. Voles can remove only small portions of bark with each bite because their teeth are so small. So they chew bark off in small pieces (figure 2).

Close inspection of the exposed wood reveals minute tooth marks and small gashes. Feeding starts on one side of a seedling and progresses upward, so seedlings tend to be peeled only on one side at first. With later and more extensive girdling, all bark may be removed up to the lower lateral branches.

Voles girdle only small seedlings (less than 2 inches in diameter) at ground level, but occasionally they'll damage conifers of sapling or pole size. Damage is always less than 12 inches above the ground.

Voles must always have dense, overhead grassy cover, so the presence of this cover, coupled with fuzzy girdling, is a strong indicator of voles. Voles defecate where they eat, so you may find piles of droppings at the base of damaged seedlings. These droppings are dark brown, oval, and $\frac{1}{8}$ to $\frac{1}{4}$ inch long.

Damage by other pests

Insects. Damage by large, burrowing insect larvae, such as the strawberry root weevil, looks identical to vole damage. Unlike voles, however, these insects also remove bark from underground rootlets, so examining rootlets will provide positive identification of the pest.

Another positive way to separate insect from vole damage is to determine if vole burrows are present. Insects don't produce burrows or burrow entrances.

Rabbits and mountain beaver clip seedlings at ground level or remove upper branches and the leader rather than girdle at the base.

Pocket gophers girdle seedlings, but their much larger tooth marks are a clear indicator of their damage.

Gophers pull small seedlings underground or clip them at ground level. Unlike moles or pocket gophers, voles don't mound dirt at their tunnel entrances, so small burrow openings that are interconnected by trails and lack soil mounds are a sure sign of voles.

Deer and elk. When the bark is soft in spring, deer and elk damage to conifer seedlings may resemble that of voles. They cause this damage by grasping the seedling at ground level between their lower front teeth and their upper palate. They strip the bark of stem and lateral branches from bottom to top and often remove small needles in this process.

Voles typically don't eat needles, and their damage doesn't extend as far up the main stem or include removal of lateral branches.

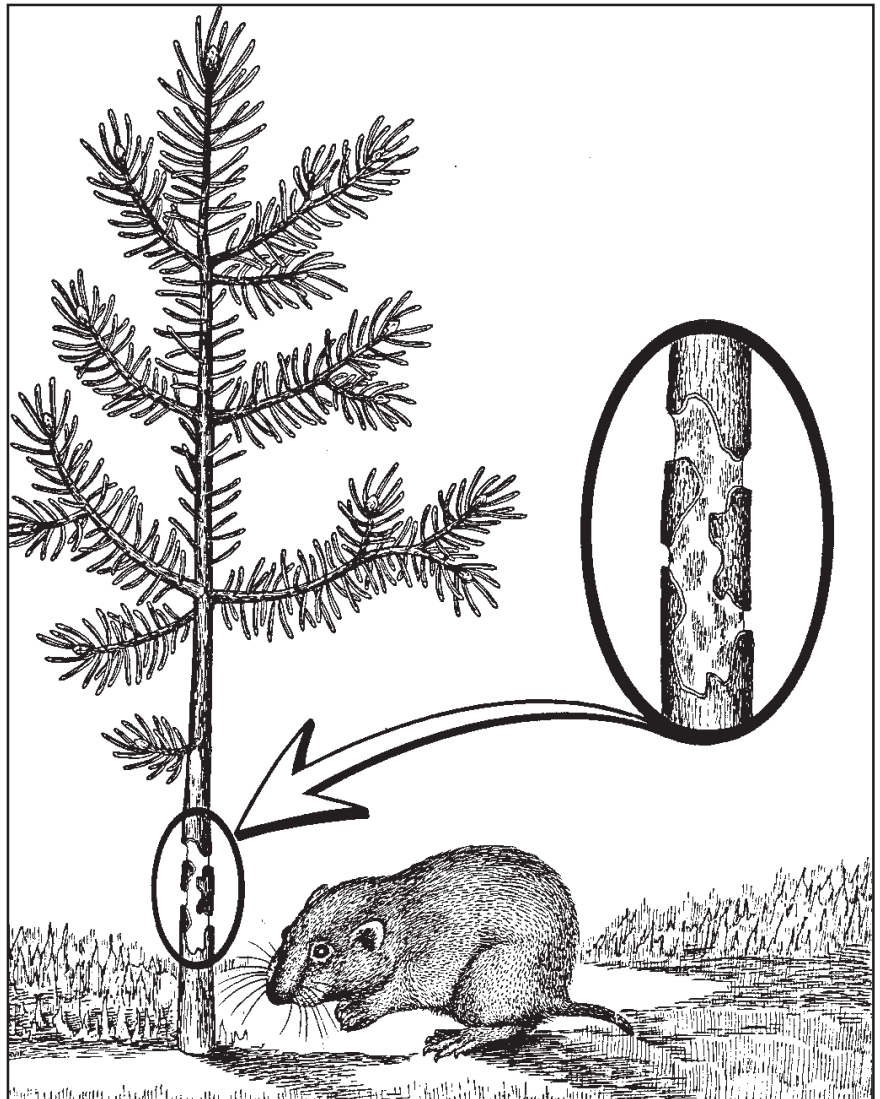


Figure 2.—Because of their small teeth, voles typically girdle young seedlings in stages.

Damage control techniques

Manipulating habitat

Voles are so dependent on protective cover from predators that one of the most effective means of reducing or eliminating vole damage is to remove this cover.

Two techniques often used to prepare regeneration sites for planting of conifer seedlings are burning and/or scarifying the slash

that results from clearcut logging. In areas where grasses and forbs quickly invade clearcut sites, slash burning and/or scarifying will reduce or eliminate vole cover and prevent damage by these pests to planted conifer seedlings.

Several herbicides—including Atrazine, Velpar, and Accord—are registered for ground cover control. Herbicides may be applied by ground

or aerial equipment. They're an effective tool when proper label recommendations are followed.

It may be necessary to reapply herbicides yearly for the first 2 to 3 years after planting or until the seedlings have grown large enough not to be vulnerable any longer to vole damage.

Important note: Most atrazine products are now listed as restricted chemicals that require a licensed applicator.

Mowing to remove vole cover is an option used mainly in Christmas tree plantations. Mowing must be conducted on a schedule that keeps grass and forb cover from growing over 6 inches.

In pastures being converted to conifer plantations, you must control preexisting grass cover the first year to get rid of voles. Sometimes, tree growers place seedlings in the middle of 2- to 3-foot squares of black plastic or kraft paper to reduce competition for nutrients, light, and water with grasses and forbs on these old pastures.

Unfortunately, the squares provide excellent vole cover—they concentrate vole activity around the seedlings, resulting in girdling by voles.

Predation

Hawks and owls are major predators of voles. You can encourage them to hunt on clearcut sites by leaving standing snags (figure 3). A study in California indicated that hawks and owls made high use of artificial perches constructed of 17-inch-long, 2 x 2 inch pine blocks screwed on top of 15-foot-high, galvanized, 3/4-inch pipe.

Likely, one snag or perch pole per acre would provide an adequate number of hunting sites for hawks and owls.

Predation by hawks and owls is more effective with reduced cover, so snags or artificial perches will be most effective when you combine them with methods for reducing vole cover.



Figure 3.—You can encourage predation by hawks and owls by leaving snags for perches.

Seedling protectors

Habitat manipulation isn't always possible. There will be sites where vole damage occurs. If other pests are present—such as deer, elk, or mountain beaver—using rigid plastic tubes (figure 4) to control damage by these animals will also control damage by voles.

However, on sites where voles are the only vertebrate pest, you could make cheaper but effective barriers to girdling from tinfoil. Cut 12-inch rolls of tinfoil in half with a hacksaw, producing two 6-inch rolls. Wrap the base of a seedling twice with 4 to 5 inches of the foil and loosely crimp it (figure 5 on page 5).

You can achieve nearly 100 percent reduction in vole damage at low cost with the foil, which lasts about 2 years. There's no evidence that the foil causes any scalding or encourages attack by pathogens.

However, don't use foil on seedlings less than 10 inches high—it can catch the wind and whip the seedlings, rubbing all the bark off at the base.

Poison baits

Poison baits have been used to control vole damage to conifer seedlings in the past, but there's little documentation of actual effectiveness. Commercial vole baits, consisting of wheat seeds treated with zinc phosphide, have been recommended for years.

A difficulty with poison baits is that mouse damage occurs generally in winter, and applying baits at this time is usually ineffective. Baits are rapidly degraded by the constant moisture, and they may become unpalatable before voles encounter them.

Attempts to protect baits from rain or snow by placing them in bait stations have been unsuccessful. Voles don't enter the bait stations, but rain does—which means rapid loss of bait acceptance by voles.

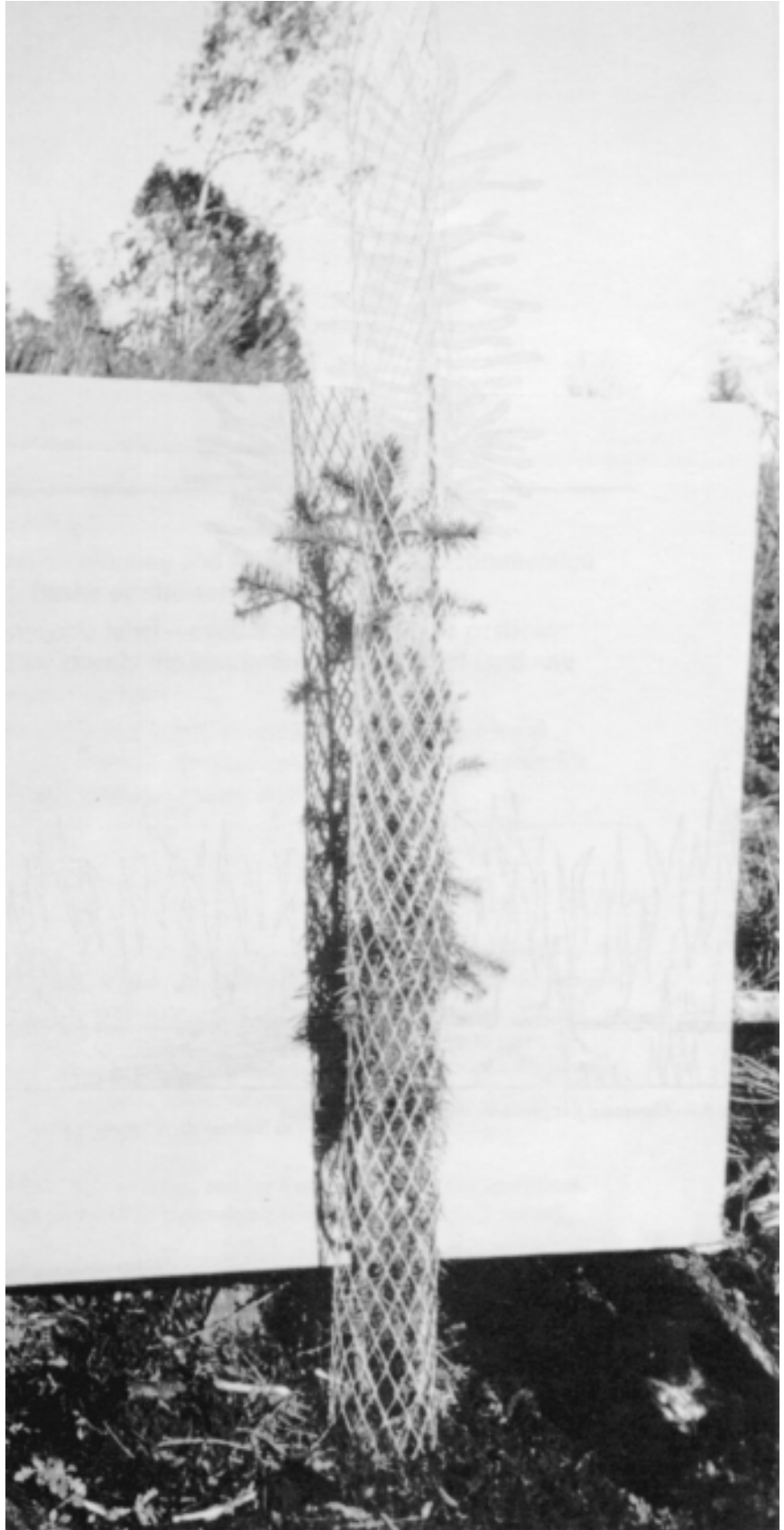


Figure 4.—Rigid tubes made of a plastic-like netting not only prevent vole damage but also protect against deer and elk browsing.

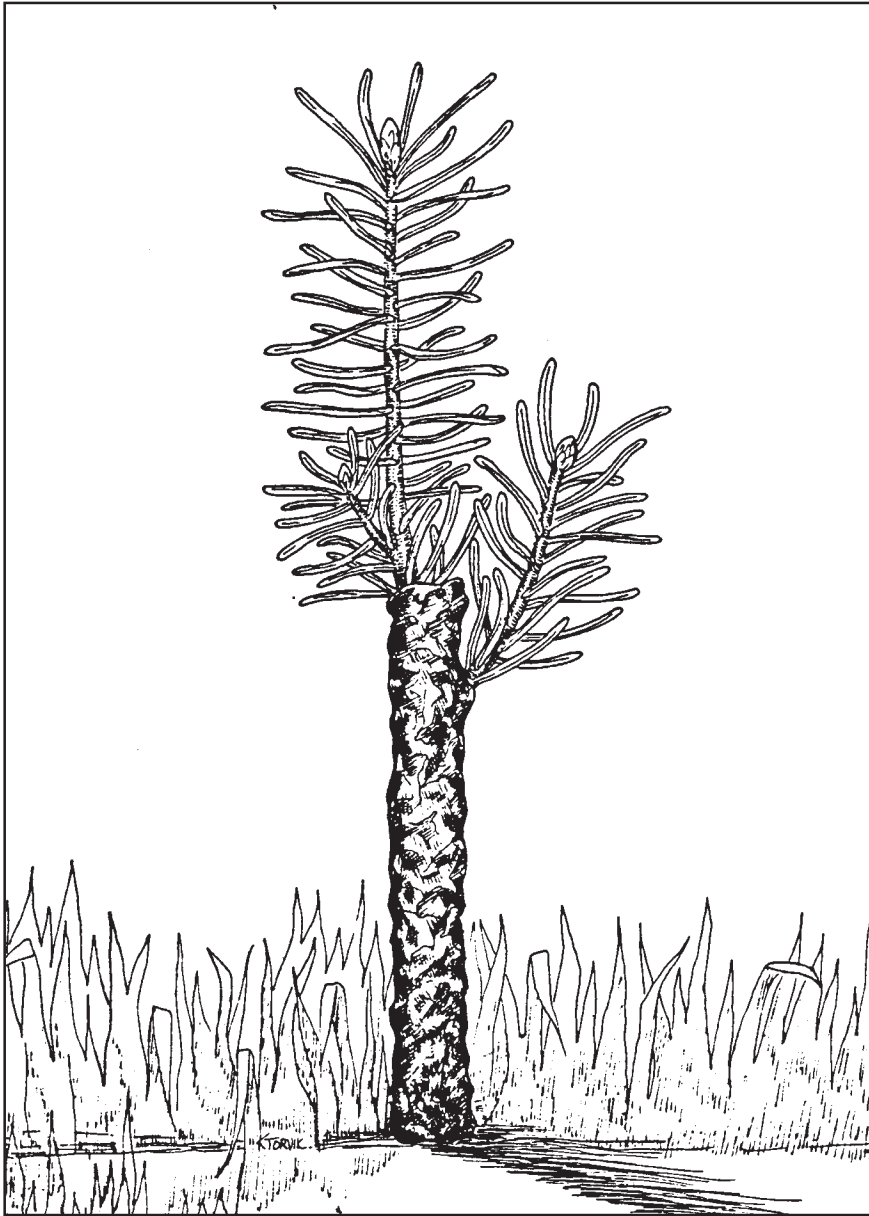


Figure 5.—Aluminum foil provides inexpensive protection.

Summary

Successful management of vole damage is greatly enhanced if you eliminate grasses and forbs from regeneration sites, or manage so that resulting vegetation doesn't provide required overhead cover.

You can also protect conifer seedlings from vole attack by tubing, netting, or tinfoil. Baits haven't generally proven effective.

Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
 - **Read** the pesticide label—even if you've used the pesticide before. **Follow closely** the instructions on the label (and any other directions you have).
 - **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.
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