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Voles (right) are tiny rodents that can cause big damage for nurseries by gnawing at tree trunks and roots. They can breed rapidly, generating up to 17 litters per year at 4-6 babies per litter. Some growers use pesticides to control them, while others have put in barn owl boxes and raptor perches to help predators take them out.

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JENNIFER GERVAIS

Controlling rodents

VOLES, POCKET GOPHERS,
SQUIRRELS AND EVEN RABBITS
CAN CAUSE CONSIDERABLE
DAMAGE IF THEY GET OUT OF
HAND IN YOUR NURSERY

By Chip Bubl

Nurseries don't normally consider rodent damage to be much more than a nuisance. But rodent populations can explode. Let your guard down and rodents can destroy significant numbers of woody or herbaceous plants, chewing dollars away from your bottom line.

In 2005, there was a population spike of native gray-tailed voles (*Microtus canicaudus*) in western Oregon. The grass seed industry lost an estimated \$35 million to vole feeding. Vineyards and nurseries lost another \$5-6 million.

While attention was focused on the mid-lower Willamette Valley, all portions of the valley appeared to have

experienced a significant increase in vole numbers. The following year, numbers declined. But in 2008-2009 vole populations appear to be rebuilding.

Voles and their habits

The gray-tailed vole has upper fur that is brown in the summer and turns darker in the winter. Underbelly fur is grayish. The body minus the tail is 3-5 inches long and rather stout. Tails are 1.75 inches or less.

They can't climb much but are fair jumpers. Voles have surface runways and underground burrows. They readily use mole and gopher tunnels where available. Vole burrow entrances are generally about a 50-cent piece in size but can be up to three inches wide. More holes are noticed after extended snow cover because their foraging pattern changes with snow on the ground.

Vole densities average 25-100 per acre but can climb to several thousand in "good" vole years. The gray-tailed vole can breed at four weeks after birth. Not a pretty picture. They can breed throughout the year and could produce

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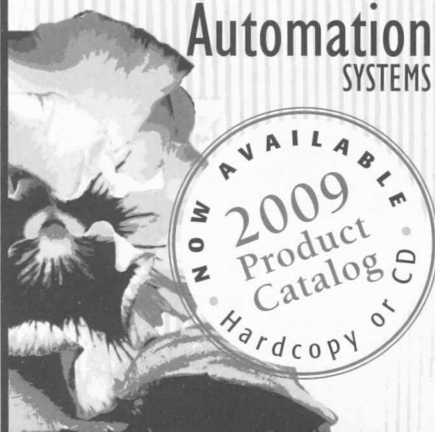
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up to 17 litters averaging 4-6 new voles per litter.

Normally, litter numbers per year are much lower since few voles live through one year. Populations rise and fall in five- to seven-year cycles for reasons that are not completely clear. Food base, predation, winter flooding and disease all probably play a role in the cycle expression.

Green grass and some forbs are preferred feeds, but woody plants and bulbs are consumed when the grass dries down in the summer or is less available in the winter. Fortunately, there are several predators that like to eat voles, especially owls, hawks and kestrels, foxes, coyotes, herons and cats.

Vole damage to plants

Voles damage woody plant material by gnawing roots and trunks. Small-caliper material is preferred, though larger trees are not safe. Gnaw marks are usually evident and generally extend from the roots to above the soil line up 5-6 inches.

After a period of extended snow cover such as we experienced in the northern Willamette Valley this winter, feeding damage may be seen higher up on the stem.

Damage is generally worse in both container yards and bare-root fields after a major snow event. They like to seek cover in overwintering houses or around mulched containers. Trees with heavily gnawed stems or roots generally won't recover to produce a saleable product.

Herbaceous green material and bulbs can also be damaged. One grower of ferns reported significant vole feeding injury as have several container growers of flowering or foliage herbaceous perennials.

Other growers have reported modest damage to drip irrigation tubes that they attribute to voles in pot-in-pot situations.

Bare-root or B&B nurseries take most of the vole damage. Within those nurseries, portions of fields adjacent to waste areas, grass seed fields or pastures,

and the headlands/margins are most vulnerable. Holding beds can harbor voles. Grass provides cover and feed for population increases that spill into the tree/shrub operation. Harvest or tillage operations in adjoining fields encourage voles to migrate into the nursery.

It is possible that grass aisles may, in some situations, increase voles. It is clear that tillage disturbs vole burrows and runways as well as reducing gopher and mole tunneling. However, grass aisles are valuable for managing field operations in wet weather as well as protecting soils from compaction so there are trade-offs to consider.

Keeping aisles mowed tight will increase vole predation and discourage occupancy. Also, periodic tilling at the margins of fields that adjoin your production areas may reduce the incidence of vole in-migration.

Holding beds and container yards sometimes develop vole issues. One grower reported that increasing the container spacing away from "can-tight" greatly reduced the cover and thus the problem during winter.

Vole control methods

There has been interest in trying to manage vole population increases through predator encouragement. Several growers have installed raptor perches and an OSU scientist is testing barn owl nest boxes near grass seed fields. These ongoing efforts focus on biological control solutions that have garnered a lot of interest.

There are several pesticides registered for vole control in nurseries. Most rely on zinc phosphide as the toxicant in vole-attractive bait. All of these formulations are restricted use products (RUPs) and must be used with great care.

Zinc phosphide-based nursery bait labels allow for both below-ground and above ground placement through either broadcast application or hand-baiting. But because of concerns that non-target species will eat the bait, the labels state not to broadcast bait on bare ground.

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The baits can degrade in the rain. For vole control, there is currently no label that allows bait to be placed in constructed, tamper-proof bait stations. However, Rose Kachadoorian of the Oregon Department of Agriculture (ODA) indicated that the agency would grant a "special local need" pesticide registration if adequate supporting data were submitted.

Zinc phosphide is very toxic to birds that feed directly on bait, and has been implicated in numerous geese kills in grass seed fields.

These products must be used with careful attention to the label and by crews trained in their use and fully conscious of their responsibilities as applicators.

Recently, the anti-coagulant chlorophacinone (trade name Rozol Vole Bait, EPA Reg. No. 7173-242) received a label allowing its use on voles in nurseries in Oregon. This is also an RUP. To use in nurseries, you must have the product with the most recent label.

The label states that it can be applied by hand baiting or broadcast application. The label warns not to apply the bait to bare ground. Hand-bait placements have to be either covered with a shingle or grass.

Rozol is treated to reduce rain deterioration of the bait. The product cannot be used within 50 feet of water and cannot be used where vole-predator birds like hawks, kestrels or owls are hunting.

The label reflects the significant concern that injury or death can occur in birds that eat voles that had consumed chlorophacinone baits. There was also a recent situation in California in which 70 geese died from directly eating Rozol pellets.

When spot treatment isn't enough

If a vole infestation is confined to isolated areas, spot treatment with any of the products may be enough.



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However, if there is a generalized problem, burrows that were occupied by successfully baited voles may be quickly re-occupied by voles from areas that weren't baited.

Bait shyness can develop when the population is exposed to the same bait formulation repeatedly. You might need to change bait formulations and/or placement strategies within the limits of the rodenticide labels as well as continue with traps and glue boards.

On occasion, voles, rats, or mice may move into nursery buildings. There have been cases of voles living in seed starting and storage areas, overwintering houses, and bare-root storage areas, nibbling occasionally on seeds, roots or stems. Trapping and exclusion is the first line of defense, though exclusion is often

complicated in actively used agricultural structures.

Within the context of agricultural buildings, there are a large number of rodenticides registered; many of them are not RUPs. These include both anti-coagulant and zinc-phosphide-based materials. Talk to your agricultural chemical supplier for options that best fit your situation.

Other threats to nurseries

There are other rodents that damage nursery crops. Pocket gophers, given free rein, have a passion for roots and stems of some woody plants. They also are known to have chewed through buried plastic irrigation mainline or smaller distribution pipes.

Gopher numbers and damage can become quite significant if they are left alone. Periodic scouting can pay great dividends in gopher country.

Fortunately, gophers don't relish ground disturbance. Gopher mounds are flatter and more crescent shaped than more "volcanic" mole mounds. They generally have a very obvious soil plug centered on the inside curve of the mound.

Voies may use gopher tunnels. A carefully planned tillage and mowing program supplemented with judicious trapping and/or gassing in the adjacent non-crop areas with the Roxide International/Revenge Rodent Smoke Bomb (apparently the only labeled product for gophers and ground squirrels), often does the job.

Baits are the other choice. Use directions on rodenticide labels are by rodent species. This means if you are trying to control gophers, you need to follow the directions provided to control gophers.

There are several bait types available. All gopher baits require placement underground, either into the hole or into the runways with a bait probe/dispenser. Dead animals are to be removed from the field and destroyed to reduce the potential for non-target injury.

Ground squirrels (also known as "gray diggers") can do an amazing amount of damage. They often come in from burrows adjoining the nursery.

The picture shows maple damage by ground squirrels in a container operation. Not only did they pull the bark off the trunks, they buried filberts in the pots.

Ground squirrels build a permanent burrow system that expands and develops more complexity every year. Entrance holes are not plugged. They like to burrow under debris or rock piles for predator protection.

Removing cover piles and tight mowing encourages predation and discourages ground squirrels. There are baits that can be used with, as always, careful attention to label directions and restrictions (placement underground or in bait stations, and removal of dead animals). It is also legal to



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hunt ground squirrels where hunting is legal and appropriate.

Rabbit problems are sporadic but can be serious if their numbers are high. Generally, problems are far worse in nurseries in the southern end of the Willamette Valley, in Southern Oregon or on the east side of the Cascades.

That said, growers near Portland have had problems with both "brush rabbits" and feral domestic rabbits. One nursery owner reported 700 one-gallon containers chewed down to one-inch stubs overnight by feral domesticated rabbits. Overwintering houses also have been hit.

Reducing cover near the nursery and aggressive lethal control can help. If you are in high-pressure jack-rabbit country, your problems are far more complex.

Fencing is an option, but the fences have to be dug into the ground (or fanned out on the surface away from the field) as well as fastened above ground.

Summary

Rodents can be a challenge. Field scouting pays big dividends and prompt treatment of developing problems will save plants and reduce ultimate treatment costs.

Make use of the non-chemical tools (like mowing and tillage) to help manage rodents. Finally, know what losses you can accept as part of doing business, but be prepared to respond if the situation gets suddenly worse.

Above all, if using toxicants, know how these products are to be used (read and carefully follow the labels) and work with an agri-chemical supplier that can guide you to a successful outcome. ☺

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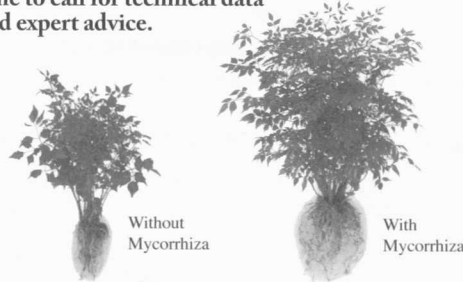
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