

CONSIDERING OPTIONS FOR CONTROLLING VOLES IN ALFALFA

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ABSTRACT

Voies (also known as meadow mice; *Microtus* spp.) are one of the most damaging vertebrate pests in alfalfa. The amount and form of damage they cause can vary but includes a loss in vigor and/or mortality of plants and damage to irrigation infrastructure. Unfortunately, relatively few options are available for managing voles in alfalfa. Some of the most effective strategies include a zinc phosphide bait application, as well as cultural practices such as flood irrigation and deep tillage when taking a field out of production. Other options that could be considered in some situations include exclusionary fencing and biocontrol via barn owl nest boxes. Be sure to engage in regular monitoring for vole activity in alfalfa fields, and plan to take action whenever you see an uptick in vole activity in your fields.

Key Words: alfalfa, baiting, cultural practices, *Microtus* spp., vole, zinc phosphide

INTRODUCTION

Although many vertebrate pests cause problems in alfalfa, one of the most frequent offenders are meadow voles (also known as meadow mice; *Microtus* spp.). Meadow voles are small, blunt nosed stocky rodents with small eyes and short ears and legs. They are typically dark grayish brown in color with size intermediate to that of a house mouse and a rat. Female voles may produce from 5 to 10 litters per year. Therefore, continuous monitoring and control of vole populations is needed to keep their numbers low. Although voles can breed at different times throughout the year, there is typically a pulse in reproduction in late winter and early spring depending on location and weather patterns. As such, control measures implemented before this reproductive pulse will often be more effective as there will be fewer voles to control at that time. Additionally, because voles mature rapidly and can bear many litters annually, vole populations can increase rapidly. Typically, their numbers peak every 6 to 8 years when population numbers can be as high as hundreds or even thousands of voles per acre.

If left unchecked, voles will cause extensive damage to alfalfa (11.3% loss in revenue; Baldwin et al. 2014b). This damage includes consumption of tap roots and above-ground vegetation that can result in reduced vigor and/or mortality of alfalfa plants and chewing on subsurface drip lines in some situations.

For voles, control options in alfalfa are limited and center on toxic baits and cultural practices. I will briefly detail each of these approaches, and a few other potential options, in the following section.

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CONTROL METHODS

Toxic baits

The use of toxic baits is the primary method for controlling voles in alfalfa. Within alfalfa fields, only zinc phosphide can be applied. Zinc phosphide is a restricted-use rodenticide; it can only be used by or under the direct supervision of a Certified Applicator. Zinc phosphide is applied in the area of vole burrows and runways through spot treatments or broadcast applications. Spot treatments are used when only a few burrows are to be treated. Otherwise, broadcast applications are more efficient. If overused, problems with bait shyness can occur. As such, zinc phosphide should not be applied more than twice per year, with applications separated by at least 30 days. Additionally, zinc phosphide must be applied when new growth is less than 2-inches tall. Zinc phosphide can off-gas when it comes into contact with water. As such, it should not be applied during heavy fog or when dew or precipitation are expected within the following 24–48 hours. Carefully read the label for more information on restrictions for zinc phosphide application in alfalfa.

Both zinc phosphide and anticoagulant baits (e.g., chlorophacinone and diphacinone) can be applied in non-crop areas adjacent to alfalfa fields. If adjacent fields or non-crop areas harbor large vole populations, these areas should be treated as well to reduce immigration into alfalfa fields after bait application.

Cultural practices.

Habitat modification is an example of a cultural practice. This approach involves altering rodent habitat to reduce its desirability for that site. This is one of the best approaches for mitigating damage from voles in many crops, but unfortunately it is not practical in alfalfa given that the crop is both the food resource and cover.

Cultivation is a more practical example of a cultural practice in alfalfa. If you have an alfalfa field that you are going to replant, deep tillage will eliminate many of the vole burrow systems and will kill some voles in the process. Destroying the burrow systems helps slow down potential reinvasion into fields, and when combined with an aggressive vole management program pre- or post-cultivation, can provide a “clean slate” for a newly planted alfalfa field.

Where still feasible, flood irrigation can help control vole populations. When a field is flooded, the voles must come to the surface or drown. When at the surface, they can be picked off by a number of predators; growers and their dogs can also actively seek out voles at this time to further reduce populations of these damaging pests.

Other control approaches.

A variety of other control options are sometimes used to control voles in alfalfa. They are briefly discussed in the following paragraphs.

Biocontrol. This approach relies on natural predation to control vole populations. From a management perspective, this typically involves the use of owl boxes to encourage owl predation of voles over alfalfa fields. Some recent studies have shown some utility in using barn owls to reduce pocket gopher (*Thomomys bottae*; Hansen and Johnson 2022) and mouse (*Peromyscus*

spp., *Mus musculus*; K. Larson, Cal Poly Humboldt, unpublished data) populations in vineyards, but limited investigations into the effect of barn owls on vole populations in alfalfa were not as positive (Jareño et al. 2023). That said, barn owls are widely used for vole control in many parts of the Mediterranean region (Bontzorlos et al. 2024), and barn owls do eat a large number of rodents per year, so their use could be considered. To date, though, their effectiveness for vole control in alfalfa remains unproven.

Exclusion. Although not often practical, exclusionary fencing consisting of aluminum flashing can be used along field borders. The fencing should be buried at least 6 inches below ground and should extend 12 inches above ground. Drive rebar or wooden stakes into the ground every 15 feet to provide support for the fencing. The efficacy of such fencing is greatly increased if bare soil is present around the base of the fence. Be aware that equipment must frequently move in and out of fields, thereby limiting sites where fencing is practical. Fencing is expensive, so significant damage should be expected to justify the cost of installation.

Fumigation. Although fumigation can be a highly effective strategy against pocket gophers and ground squirrels, fumigants are not typically used for vole control in alfalfa given the large amount of labor required to treat every burrow opening.

Trapping. Trapping is not typically used to control vole populations. Voles can easily be captured with standard mouse snap-traps, but the amount of labor, time, and resources required to remove voles from an alfalfa field is counter-productive.

MONITORING

Regular monitoring for vole activity can be challenging, but it is an important step for keeping vole populations from overrunning an alfalfa field. The most practical approach may be to place a network of snap traps in vole runways with the trap placed perpendicular to the runway so that the trigger part of the trap overlaps the runway. This can be repeated for a representative sample of runways throughout the field (probably 50–100). Traps do not need to be baited if placed in the runway as mentioned above. The number of voles captured should be recorded and tracked over time to gain an understanding of when vole activity is increasing in a field. General observations of burrow activity and feeding sign can also be used to help assess vole activity in alfalfa fields. If you see a substantial uptick in vole activity, be prepared to take action immediately to reduce this population. Keep in mind that voles can reproduce approximately every 30 days, so populations can get out of hand very quickly if management actions are not taken in an appropriate timeframe.

LITERATURE CITED

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