

A Guide to Meadow Voles

Identification, Biology and Control Methods

Identification

There are 5 species of Meadow Vole common to California. They are the California Vole, Long-tailed Vole, Creeping Vole, Townsend's Vole, and the Montane Vole.

Physical Description

- Meadow voles are small rodents with _____ legs and tails, _____ bodies, and _____ ears.
- Their fur is long and coarse with coloration ranging from _____ to _____.
- Meadow voles are generally _____ than a house mouse, but _____ than a rat and average between ____ and ____ inches in length as adults.

Behavior

- Meadow voles are relatively _____ climbers and usually _____ enter buildings or invade homes and thus, should not be confused with the common house mouse.
- Meadow voles are _____, but forage at any time, day or night.
- They are usually found in _____ marked by numerous surface runways ____ to ____ inches wide in matted grass.
- Small piles of brownish _____ and short pieces of _____ along the runways are evidence of current activity.
- Female meadow voles are _____ except during a short period when they are in heat. At any other time, all strangers of either sex are driven away from the vole's home range around the burrow.
- This home range is less than a _____ foot radius around the burrow.
- On a side note, all meadow voles are very good _____.

Habitat: Burrows

- In areas where snow falls, _____ burrow openings to the surface of the snow is evidence of recent meadow vole activity.

- Meadow voles dig short, shallow burrows with numerous openings about _____ inches across. These burrows consist of shallow underground tunnels, nest chambers, and storage chambers.
- Meadow voles are found in areas of _____, grassy ground cover and likely to be found where there is good _____.
- They generally do not invade _____ crops until they are tall enough to provide food and shelter.
- Invasion generally occurs during _____ or when habitat becomes unfavorable, like when range grasses dry during the summer.
- Early detection of serious invasions may be done by using strategically located _____ or lines of _____. This may help to avoid major crop damage.
- It can be assumed in cultivated areas meadow vole populations are permanently based in what can be designated as favorable habitat. This generally consists of _____, _____, and adjacent _____ land.

Damage

- Permanent pasture, hay, alfalfa, artichokes, bustle sprouts, carrots, cauliflower, potatoes, sugar beets, tomatoes, grains, nursery stock and the bark of apple, avocado, citrus, cherry and olive trees all _____ to meadow vole attack.
- Voles often damage plants beneath thick _____ or _____ making detection difficult.

Biology

Dietary Habits

- Observations of Meadow Voles indicate that they forage beyond the shelter of there _____.
- Food consists of tubers, roots, seeds, grain, and succulent stems and leaves, but feed largely on _____ and _____.

Hibernation

- Meadow voles are active night and day all year and _____ hibernate.

Breeding

- There have been reports that meadow vole females have bred at as little as _____ days of age. However on average females breed at from _____ to _____ weeks of age, while males reach sexual maturity at _____ weeks (Hall, 1959).
- The average meadow vole litter size ranges by subspecies and directly correlates to the _____ content in the animals' diet.
- Meadow voles are capable of breeding in any season, but the major breeding season corresponds to the season of _____ growth.
- Gestation period is _____ days and young are weaned at _____ weeks of age.
- Breeding females are fertile within _____ hours after giving birth and are capable of producing from _____ to _____ litters in a year. However, it is unlikely that many individuals survive an entire breeding season.
- Population growth fluctuates dramatically, causing sudden _____ in vole populations. They then subside after their peak, even when no controls are implemented.
- Low populations may exist from _____ to _____ years before resurgence.
- Meadow vole populations generally build up to a peak every _____ to _____ years, followed by a rapid decline during the next breeding season.
- When an anticipated peak occurs in a _____ year, it may be barely noticeable, but if it occurs during a _____ year, it can be of serious proportions. The exact causes of the cycle of buildup and decline are unknown. Some issues such as disease, food shortage, physiological stress from overcrowding, and other dynamic characteristics have been implicated as effecting factors.

Control Methods

Exclusion

- Exclusion of meadow voles can be accomplished with the use of plastic, wire, or metal barriers _____ foot high or more, with a gauge of _____ inch or less.
- Meadow voles rarely climb but are capable of digging beneath exclusion attempts. To reduce the chance of this form of invasion, bury the bottom edge of barrier from _____ to _____ inches below the soil surface.

- Plastic or hardware cloth cylinders surrounding the _____ can protect young trees, vines, or garden ornamentals from meadow vole damage. Again bury the bottom at least 6 inches beneath the soil.

Habitat Modification

- Habitat modification can be very effective in deterring voles.
- Grassy weeds, heavy mulch, and other dense cover encourage meadow vole colonization by providing _____ and _____ from predators.
- Removal of such sources makes these areas much less suitable for vole population because meadow voles do not like to _____ in the open.
- A minimum width of _____ feet is recommended.
- If the meadow vole population is _____ this method will prove to be ineffective.

Fumigants

- Fumigants are _____ usually effective.
- The _____ and _____ of vole burrow systems allows fumigant escape too readily.
- Aluminum Phosphide can be effective only in situations where the burrow openings are quite _____ such as immediately after discing.

Fumigant General Knowledge

Repellents

- Repellents _____ recommended and have not been proven to be effective or practical in California.
- There are several commercial repellents available.
- Some using _____ or _____ as an active ingredient are examples of repellents registered for protecting plants from meadow voles.
- Voles usually damage plants at or just beneath the _____. This makes the use of repellents difficult because rain, sprinklers, or even heavy dew can wash repellents away.

- Repellents should not be applied to _____ unless specifically specified on the product label.

Frightening

Frightening methods are _____ and not recommended for vole control.

Toxic Bait

- When using toxic baits always follow the product label carefully, taking care to ensure the safety of _____, _____, and _____.
- Use only baits registered for _____ control.
- There are three common toxicants used in meadow vole control: _____, _____, and _____.
- Paraffin bait blocks may also be available for vole control and should be place directly in _____ or in _____. When placed in runways bait is exposed and can present a hazard to dogs if picked up and chewed.
- Replace bait as eaten and remove remaining bait when _____ stops.

Chemical Baits

Anticoagulants

- Anticoagulant baits are slow acting and must be consumed over a period of _____ days to be effective.
- _____ and _____ baits are commonly recommended.
- Continuous feeding is required and the bait must be available to the voles until the population is _____.
- Bait must be placed in _____, next to _____, or in burrow _____. This allows the voles to come across baits during their normal travel.

- Remember baits are toxic so care must be taken to prevent exposure to non-target wildlife. Placing bait in _____, (1 foot) sections of plastic pipe 2-inch diameter can reduce the likelihood of this exposure, while also protecting of the bait from weather.

Anticoagulant General Knowledge

Bait Stations

Bait can be placed in bait stations (a 1 foot section of plastic pipe, 2 inches in diameter). This will reduce bait exposure to _____ and allows protection of the bait from weather.

Spot Baiting (with repeated treatments)

- Spot Baiting:
 - Lightly scatter teaspoon quantities of bait (above 80 baits per pound) in runways near _____ burrows.
- Anticoagulants:
 - Lightly scatter tablespoon amounts (1/4 to 1/2 ounce) of bait near active burrows or in _____.
- With first generation anticoagulants, repeat treatment _____ for _____ treatments.

Broadcast Baiting

- Always follow the _____ instructions exactly for application and reapplication when broadcast baiting.
- Broadcast baiting using zinc phosphide baits:
 - Spread bait evenly by hand, mechanical spreader, or aircraft through the infested area at the rate of _____ to _____ pounds per acre, depending on the density of the infestation.
- Broadcast bait will _____ most vegetation to the ground surface.
- Do not apply bait when trees or grass are _____, or when _____ is likely to occur within 24 hours.

Zinc Phosphide

Zinc phosphide is a common vole control toxicant.

- Zinc Phosphide is a _____ Pesticide.

- This toxic bait is usually applied in areas where meadow vole populations are _____ and occupy _____ areas, such as in agricultural settings.
- Zinc Phosphide is a _____ dose toxicant.
- It is available as _____ or _____ based bait.
- This bait is usually applied by _____ or _____ (placing small quantities close to burrow entrances).
- _____ follow product label directions.
- Zinc phosphide baits are potentially hazardous to ground feeding birds, especially waterfowl and should not be applied to _____.

Zinc Phosphide General Knowledge

Spot Baiting

Lightly scatter teaspoon quantities of bait (above 80 baits per pound) in runways near active burrows.

Broadcast Baiting

- Follow the _____ instructions for application and reapplication.
- Toxic baits should only be used if the _____ specifically states it is authorized for use on meadow voles by broadcast baiting.
- Broadcast baiting using zinc phosphide baits:
 - Spread bait evenly by hand, mechanical spreader, or aircraft through the infested area at the rate of ____ to ____ pounds per acre (depending on the density of the infestation).
- Broadcast bait will _____ most vegetation to the ground surface.
- Do not apply bait when trees or grass are wet, or when rain is likely to occur within ____ hours.

Trapping

Mouse Traps

- _____ is not necessary as voles operate the traps by passing right over them.
- If you plan on using bait _____, _____ or _____ slices are recommended.
- Meadow voles do not stray far from their _____. Traps should therefore, be set at right angles with the trigger directly in the path of the vole. For additional placement locations look for nests, burrow openings, and runways in or around mulch or grass.
- Traps must be set in _____ numbers to affect the population size in order to be effective.
- Inspection of traps should be done on a _____ basis.

Carcass Removal

- _____ directly handle meadow vole carcasses directly.
- For health and safety reasons always wear _____ or _____ while handling.
- Remove and bury dead voles or place bodies in a _____ and dispose of in the _____.