

MANAGING AGRICULTURAL RODENT PESTS WITH BAIT STATIONS

**Montana Dept. of Agriculture
302 N. Roberts
Helena, MT 59601**

Bait stations are devices commonly used to hold rodenticides (i.e., pesticides that control rodents) to control mice and rats. Bait stations can also be used for control of agriculture rodent pests (i.e., ground squirrels and voles). This document reviews methods to use bait stations for the control of pest rodents in agricultural settings.

Why Use Bait Stations?

Bait stations can provide several key benefits, including reducing non-target access to the bait (also known as preventing primary poisoning), protecting bait from weather and unwanted odors, and providing an easy way to remove unconsumed bait.

Caution: Understand that rodenticides can ONLY be used for the rodents listed on the label. For example, your label will tell you whether the rodenticide may be used on Richardson's ground squirrels, Columbian ground squirrels or voles. If the species is not listed, then the pesticide cannot be used to control that species.

Legal Issues: The Label Is the Law

Pesticide labels will state if the use of bait stations is permitted and/or mandated. **If the label does not mention bait stations, then you CANNOT legally use bait stations with the pesticide.** Tamper-resistant bait stations

may be required when a rodenticide is applied outdoors or accessible to children and non-target animals.

Consult the pesticide label of choice for assisting in selecting a bait station. Questions concerning a label's meaning, please contact the Montana Department of Agriculture (MDA) or the pesticide manufacturer for assistance.

Bait Station Types

Bait stations come in different sizes, shapes and colors (Figs. 1 & 2). Bait stations also differ in ability to resist tampering. The Environmental Protection Agency (EPA) categorizes bait stations based on their ability to withstand tampering and weather (Table 1). Some only protect bait from dust (Tier 4) while others protect bait from children and pets (Tier 1). Select bait stations appropriate to potential threats. For instance, if a bait station will be indoors in a locked room, select a Tier 4 rated station.



Figure 1. A professionally manufactured bait station by Wilco Distributors.

However, if a bait station will be in a field where raccoons frequent, select a Tier 1 station.

Note: steel bait stations are available for those situations where the station could be damaged by heavy equipment, other large objects or animals.

Caution: Bait stations MUST be strong enough to resist access by non-target animals in your area. This means, if you have raccoons, large, free-range dogs, deer, bears, etc., your stations must be strong enough to keep those animals from accessing the rodenticide bait. When in doubt, choose stronger stations. While professionally manufactured plastic outdoor stations are typically strong enough to protect bait against raccoons and dogs, you may need to purchase/construct steel bait stations. Ultimately, it is your responsibility to use the bait station strong enough and anchored securely enough to withstand assaults from non-targets in your area.



Figure 2. A homemade PVC style bait station.

In addition to Tier status, effective bait stations will have the following characteristics:

Table 1. EPA Classification Schedule for Rodenticide Bait Stations and Levels of Tamper- and Weather-Resistance

Bait Station Capabilities	Tier 1	Tier 2	Tier 3	Tier 4
Resistant to Children	Yes	Yes	Yes	No
Resistant to Dogs	Yes	Yes	No	No
Resistant to Outdoor Weather	Yes	No	No	No
Resistant to Indoor Conditions	Yes	Yes	Yes	Yes

1. Adequate-sized opening to allow target animals to enter:
 - 3 inches ground squirrels
 - 2 inches for rats and
 - 1½ inches for mice and voles.
2. Allow for convenient refilling of bait.
3. Able to protect bait from rain, snow and ground moisture.
4. Able to hold enough bait to require refilling only twice a week or less.
5. Able to be secured to prevent station upset and bait spillage by livestock, pets, wildlife, wind and young children.
6. Designed to prevent the fingers of children from reaching the bait (typically the bait is at a 90° angle to the entrance).

Bait stations are designed with different designs to meet the various needs applicators confront. The following are some of the main features available. This bulletin focuses on stations designed for outdoor use (Tier 1).

For information on bait stations around structures obtain a copy of “Managing Rodents Around Structures with Bait Stations” available from the MDA website <https://agr.mt.gov/Vertebrate-Pests>.

Bait stations may be secured against movement and shaking by soil anchors, screws, or securing to fences (Fig. 3).



Figure 3. A PVC style bait station secured to a fence post.

Bait stations also have features enabling the station to hold snap traps (Fig. 4), bait trays, and even devices to capture other animals (i.e., rats).

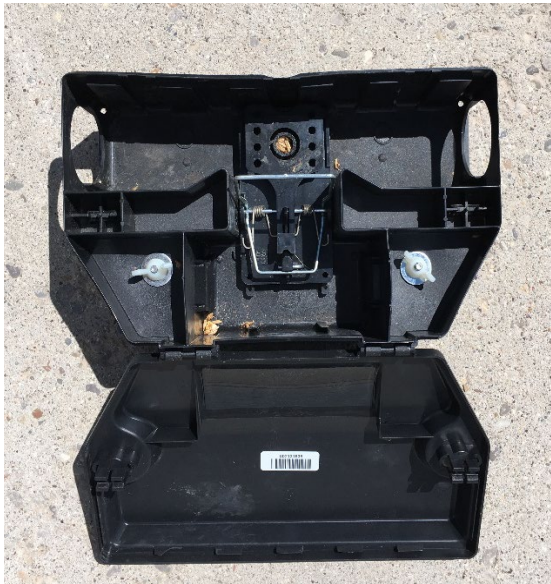


Figure 4. This Liphatech Aegis® bait station can hold a rat-sized snap trap.

Figure 5 is a rat station designed to look like a decorative landscape rock.

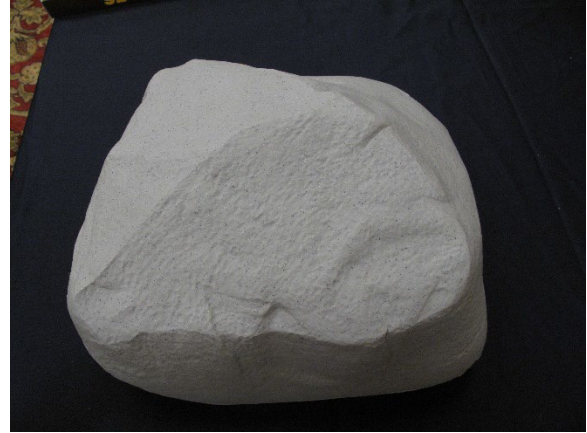


Figure 5. Bell Labs Protecta® Evo Landscape bait station.

Bait stations have different locking systems. Locking systems are to prevent unauthorized access to the bait. The keys to open one brand of stations will likely not work on another. MDA advises selecting a single brand to prevent managing multiple bait station keys.

Homemade Bait Stations

Properly constructed homemade bait stations can be effective and affordable tools. It is essential bait stations be constructed well to endure the effects of weather and persistent non-target animals looking for a meal.

Figures 6 and 7 illustrate affordable, easy to construct, and effective homemade bait stations.

The wood bait station is a simple box with a cover that can be opened (Fig. 6). The diagonal board inside should not touch the floor as it should act as a hopper to prevent too much bait from filling the box. The hole size is for ground squirrels. Adjust the opening for smaller rodents.

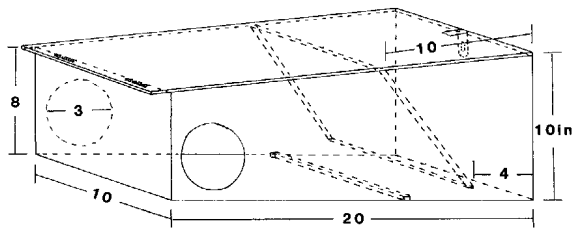


Figure 6. Wood bait station constructed of dimension lumber or exterior grade plywood or chipboard.

The inverted “T” bait station is a popular homemade bait station used frequently for control of ground squirrels.

Materials needed to make six stations (Fig. 7):

- 2 ten-foot sections of three-inch PVC pipe (Schedule 40 or higher).
- 1 ten-foot section of two-inch PVC pipe (Schedule 40 or higher).
- 6 end caps sized for two-inch pipe.
- 6 three-inch x three-inch x two-inch PVC all-hub sanitary tees.
- PVC pipe adhesive and applicator.

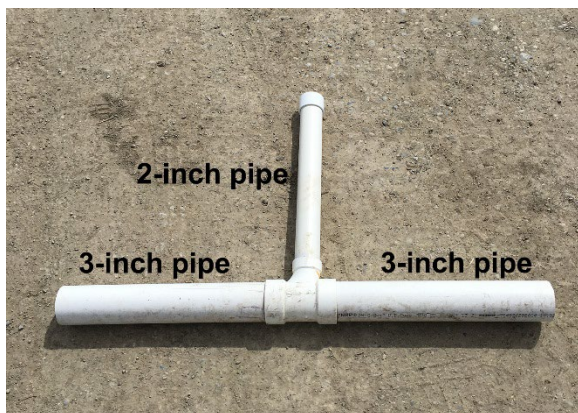


Figure 7. The inverted “T” PVC pipe bait station.

Cut all the pipes into 20-inch lengths. The two three-inch pipes are connected to an all-hub sanitary tee forming the cross bar of the inverted T. The two-inch pipe will form the vertical part of the inverted T. Using the narrower two-inch pipe reduces cost. In addition, the narrower vertical pipe can

reduce spillage by lowering the weight of bait pressing down into the horizontal pipes (MDA thanks Michael Brownell for sharing this information).

Experience has shown that this bait station made with Schedule 40 pipe (or greater) will last at least 5 years under Montana weather conditions.

Best Practices with Bait Stations

Timing. Bait stations may be set out any time when rodents are active. Initially, rodents may avoid the stations. A familiarization period ranging from a few days to two weeks may be required before the rodents fully engage the station. As a rule, small rodents (e.g., mice and voles), will only take a few days to enter, whereas ground squirrels may take up to a week, and rats may take up to two weeks.

Security. Labels require bait stations be strong enough to protect the bait from access by children and large animals. Thin-walled stations can be broken by wild animals or children, thereby allowing access to the bait. Stations must be strong enough to withstand attempts by the largest animal present, such as dogs, raccoons, deer, livestock or bears. In some situations, stations need to be constructed with stronger Schedule 80 PVC pipe (or higher). The diameter of the pipe must be large enough to allow target animal entry. When bait must be protected from large and aggressive non-target animals, applicators should consider using steel-walled stations.

Stations must be secured against movement as disturbance can dislodge bait from the station. Anchoring systems can be as simple as

attaching stations to lath stakes, fences, or earth anchors. (Fig. 8).

Preventing Bait Spillage. Spillage is common when using grain or pelletized baits in inverted T stations.



Figure 8. Michael Brownell securing an inverted T bait station in a lath stake with wire.

To reduce bait spillage in inverted “T” stations, reduce the diameter of the vertical pipe. Alternatively, place caps on the horizontal pipes to reduce spillage (Fig. 10).

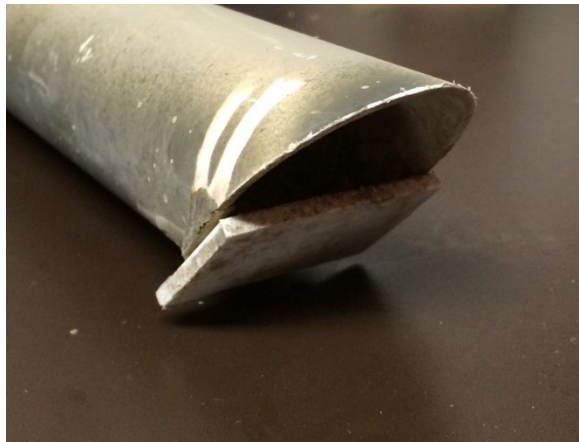


Figure 9 . An end cap to reduce bait spillage.

When using end caps, ensure the hole opening is large enough to allow target rodent species to enter. One way to cap pipes is to cut an end cap in half and glue a half on both ends

of the horizontal pipe. When using this method, it is often necessary to use pipes an extra inch in diameter for the horizontal tubes to ensure target rodent entry. Always monitor bait stations for spillage as this can occur with any bait formulation or bait station due to rodent activity.

Methods Not Recommended

Pre-Baiting. Pre-baiting is the practice of filling stations with non-toxic grain with the goal of encouraging rodents to use the station. Once the rodents are conditioned, toxic bait is applied.

In general, pre-baiting is not necessary and can delay control efforts. If consumption of toxic bait is lower than expected, the bait may have been contaminated by pesticides through drift or possibly has become stale. Ensure the bait station is located where target animals can find it.

Scattering Bait Before Station Entrance. Bait (toxic or not) should not be scattered outside the station to lure animals to the station (Fig. 10). Placing bait outside the station increases hazards to non-target animals and exposing the bait to weather.



Figure 10. Grain bait outside the bait station (indicated by the red circle).

Altering Bait. MDA does not recommend altering baits as changes may reduce consumption.

Although use of bait stations usually reduces non-target hazards, baits in bait stations may increase hazards to non-target animals. If the contents of a bait station are spilled a large quantity of bait will be exposed, greatly increasing the hazards to livestock and wildlife.

Toxic Baits

Rodenticide baits are classified as anticoagulant or non-anticoagulant. Different categories of baits work in different ways; therefore, it is critical applicators use baits correctly. Applicators should avoid using the same active ingredient for multiple years to reduce the risk of rodents becoming resistant to the toxicant.

Anticoagulants inhibit the ability of the blood to clot and cause death by internal bleeding. Anticoagulants permitted for use in the field include warfarin and chlorophacinone. These anticoagulants are known as multi-dose anticoagulants because rodents must feed on the bait on several occasions to receive a lethal dose. Death begins within four days of the initial consumption.

Non-anticoagulants kill rodents by means other than bleeding. Zinc phosphide is the only non-anticoagulant rodenticide registered for use in bait stations in the field. Zinc phosphide releases phosphine gas ultimately leading to heart failure. Death typically occurs in 12 to 48 hours. Thus, zinc phosphide is called an acute toxicant because it acts so quickly.

Best Use of Anticoagulants

Multi-dose anticoagulants cannot kill a rodent in one feeding. Since rodents must feed on the bait for several times to achieve a lethal dose, it is essential that bait remains available. Failure to maintain the stations may result in rodents receiving a less-than-lethal dose, causing illness, and bait avoidance in the future.

Applicators using anticoagulant baits, must be patient. All anticoagulants act slowly. It may take three to five days of feeding before the first rodent succumbs.

Delay in mortality can be caused by the territorial behavior of certain animals, such as ground squirrels. Dominant animals may prevent subordinate animals from accessing bait. As a result, subordinate animals wait until the dominant animals die before being able to access the stations. It is critical for applicators to follow label recommendations for bait station maintenance. Failure to follow station maintenance recommendations will likely result in diminished efficacy.

The majority of poisoned animals will die in or around their dens. Animals may die in exposed locations presenting a hazard to scavengers. Scavengers may eat carcasses and be at risk for secondary poisoning. To reduce non-target exposure to secondary poisoning, monitor the treated area for carcasses and dispose of the remains according to label. The best time to scout for sick and dead animals is the afternoon for day-time animals and the morning for nocturnal animals.

Keep pets and livestock out of treatment areas. Notify neighbors of treatment occurring and advise confinement of pets to prevent straying into the treatment area. Any domestic animal found displaying

anticoagulant symptoms, such as difficulty breathing, lethargy, loss of appetite, bleeding, bruising or weakness should be placed under veterinary care as soon as possible.

Best Use of Zinc Phosphide Baits

Zinc phosphide-based baits are fast acting poisons requiring one feeding to kill rodents. Symptoms of poisoning occur shortly after ingestion often within 12 to 48 hours.

Animals exposed to zinc phosphide may become sick and stop eating before consuming a lethal dose. Follow label instructions for advice on handling rodent refusal to eat the bait.

Station Placement

Following label guidelines, place bait stations where the target animals occur (Fig. 11). Avoid forcing vertebrate animals to travel great distances to access bait stations. It is most effective to place bait stations where rodent activity is the highest.



Figure 11. Inverted "T" PVC bait stations placed in a field.

To control pest rodents, use enough stations staying within the label's application limits. Failure to use enough stations increases the likelihood of rodents eliminating the bait

before bait can be replenished. In general, rodent consumption is highest in the early portion of the control period and decreases as the population declines.

The cost of bait station construction, as well as the labor in maintenance, generally limits the use of bait stations to relatively small acreages (e.g., approximately 100 acres). Areas may include ditch banks, small acreage crops and pastures, orchards and truck farms, cemeteries, golf courses and recreation areas.

Use of bait stations on larger acreages might be considered in cases where grain bait has become ineffective or certain environmental hazards prevent the use of exposed baits. Although initially more expensive, bait stations are an efficient long-term control method for rodents.

Bait stations may be used along crop borders to intercept squirrels moving from adjacent areas into the crop to feed or set up residence. The sole use of bait stations might reduce crop damage below a level of economic concern.

Concluding Thoughts

Bait stations do offer protection from primary poisoning of many non-target wildlife species and domestic animals. Stations provide an alternative control method in areas where traditional control methods may be considered too hazardous to wildlife, domestic animals and people.

It is advised that applicators place warning signs when using bait stations in public locations. Signs or labelling should state that the stations contain poison bait, the active ingredient, and where readers can obtain further information.

Before using these or any other pesticide products carefully read and understand the pesticide label. Follow label storage and disposal instructions. If none are provided, then store pesticides in a locked storage area and always keep pesticides in the original, labeled container.

Department Services

Rodent control will be most effective when all affected landowners work together. The Montana Department of Agriculture Vertebrate Pest Program Specialist will work with county commissioners, extension agents and landowners to establish a program suited to local and county needs. Field demonstrations are provided free of charge to inform landowners how, when and where to control rodents and other damaging vertebrate pests. Interested individuals should contact the Montana Department of Agriculture.

Stephen M. Vantassel, CWCP®, ACE®
Vertebrate Pest Specialist
625 NE Main St. Ste 3
Lewistown, MT 59457
Phone (406) 406-538-3004
svantassel@mt.gov

For information on bait stations around structures obtain a copy of “Managing Rodents Around Structures with Bait Stations” available from the MDA website <https://agr.mt.gov/Vertebrate-Pests>.

Additional printed information on the control of ground squirrels and other vertebrates is available from the Montana Department of Agriculture website <https://agr.mt.gov/Vertebrate-Pests>

MONTANA POISON CONTROL
(Emergencies)
1-800-222-1222

MONTANA DEPARTMENT of PUBLIC HEALTH
& HUMAN SERVICES
Injury Prevention Program
1-406-444-4126
<https://dphhs.mt.gov/>

Disclaimer: Reference to commercial products or trade names is made with the understanding that no discrimination is intended of those not mentioned and no endorsement by the Montana Department of Agriculture is implied for those mentioned.

Credits

Figs. 1-5. Stephen M. Vantassel.

Figs. 6. Montana Department of Agriculture.

Figs. 7-11. Stephen M. Vantassel.

Acknowledgements:

MDA wish to acknowledge the contributions of Linda Johns and Jenn Bergner.