

IPM Action Plan for Rodents

Identification

Mice and rats are common problems in and around schools. Rodents cause fires by gnawing on electrical wires, transmit pathogens, and are associated with allergens and asthma triggers. Rodents should not be tolerated in and around schools. Effective, low hazard options are available to eliminate rodents.

The house mouse is about 1/2 ounce and is 3 to 4 inches in length with a dark tail of about the same length. Its rod-shaped feces are pointed at each end and 1/4-inch long.

Roof rats range in color from black to gray or tan with a lighter belly. Their tails are dark and longer than their combined head and body length.

Norway rats are reddish brown in color and are typically heavier than a roof rat. The length of a Norway rat's tail is shorter than the combined head and body length. The tail is also dark on top and light underneath.

In many areas of the United States, *Peromyscus* (deer mice and white-footed mice) commonly enter buildings and may be confused with house mice.

General Information

Mouse problems can occur at any time of year but especially in the fall when outdoor temperatures begin to cool. Open access points as small as 1/4 inch in diameter for mice 1/2 inch for rats act like beacons, attracting rodents with warm air and food smells. Roof rats prefer areas off the ground and are good climbers. They prosper in attics, roof spaces, and ornamental shrubbery. Roof rats generally enter buildings from overhanging trees or power lines. Norway rats are burrowers and thrive in environments where there is clutter or garbage. They burrow along foundations and under debris. They are good swimmers and may enter buildings through plumbing access points. The home range of these rats may be as much as 50 yards.

The best approach for rodent control takes an integrated pest management (IPM) approach that includes sanitation, exclusion, lethal control, and occupant education.

While inspecting, listen for scratching, look for droppings, damage, urine (using a black light), and rub marks. Rodents will forage on a variety of items, so sanitation in addition to exclusion is critical.

Rodents can cause damage by chewing wood and other items. They have also been known to start fires by gnawing on electrical wires. They carry many different kinds of diseases and bacteria that can lead to food poisoning. Take precaution when removing nest material, droppings, or debris. Rats are active at night. If they are seen during the day there is likely a large population, a scarcity of food, or illness within the population. They defecate wherever they go, so droppings can be spread across their foraging area. Note that Norway rats like to hoard food so they may not eat baits.

Suggested Thresholds

One rat, mouse, or evidence of rodent presence (e.g. fresh droppings, gnaw marks) is activity enough to suggest further measures including setting traps, improving sanitation, and rodent proofing the building.

Monitoring and Inspection

Rodent problems typically have obvious signs including droppings and pilfered food for mice and rats, as well as gnaw and grease marks for rats. Grease marks are dark oil stains from rats rubbing against surfaces such as along travel ways, entry points, and corners. These signs are most likely to be found along linear pathways including corners between walls and floors, along the base of foundations, and along pipes or electrical conduits. Rats and mice are more likely to be sighted from dusk through dawn.

Mice typically travel 30 feet or less from nesting sites so an intensive search near droppings or other signs will often uncover the nest in wall voids, cardboard boxes, wooden or plastic pallets, heating units, vending machines, appliances, or kitchen equipment.

Norway rats are known to travel approximately 150 feet if food, water, and harborage are adequate, but they can travel up to a mile if stressed. Norway rat burrows are typically found in existing cavities, softer soil, eroded areas adjacent to masonry or rocks, and where hard surfaces such as sidewalks or foundations meet soil. Entry holes are clean and smooth and may have grease marks on any hard edge. Inactive burrows may be obscured by plant growth, spider webs, or debris.

Roof rats are known to travel up to 300 feet in search of food. Roof rats prefer elevated nesting sites including attics, walls, roofs, some trees, and vine-covered fences and walls.



Rats often become active at dusk and can be seen traveling to food or water sources. Rats are active climbers and swimmers.

Rodent Exclusion and Sanitation Tips

- Seal any openings greater than ¼-inch in diameter in foundations, walls, fascia, and roofs. Screen vents and install door sweeps to prevent access. If rats are entering through floor drains, seal these with hardware cloth with mesh smaller than ½-inch. Install heavy-gauge kick plates at the base of any doors with evidence of rodent gnawing.
- Remove or trim ground cover and other landscape plants to expose ground and discourage rodent travel ways and rat burrowing. Avoid landscaping that creates ideal habitat for burrows including stone walls with unsealed gaps. Remove mulch from building foundations to reduce harborage. Do not allow grass clippings or leaf litter to accumulate adjacent to school buildings.
- Place exterior trash cans and dumpsters away from building entrances to avoid attracting rodents to building. Use exterior trash receptacles with tight-fitting or spring-loaded lids. Use self-contained, leak-proof compactors instead of dumpsters, or at least use dumpsters with tight-fitting lids. Empty exterior trash receptacles daily at the end of each day.
- Fix plumbing leaks and improve drainage to prevent water accumulation near the building. Clean gutters to prevent water retention.
- Remove debris, clutter, or stored materials from the building exterior and adjacent areas to reduce harborage and permit proper cleaning and inspection. Remove clutter and items stored on floors in interior entryways, storage, and other areas to reduce harborage and permit proper cleaning and inspection.
- Place nontoxic monitoring bait blocks in tamper-resistant stations in nonvisible, inaccessible areas and check regularly for feeding.
- Visually inspect vulnerable areas often (e.g. food service, custodial closets, laundry rooms, vending areas, garages, under sinks, sill plates, crawlspaces) for droppings or grease marks. Place glue

boards, snap traps, shock traps, or live traps in nonvisible, inaccessible areas to trap rodents. Clean up droppings, grease marks, and urine promptly using water and district-approved disinfectants. Wear proper personal protective equipment during cleanup.

- Fill in inactive burrows with appropriate filler such as mortar for burrows in or under concrete and soil.

Tips for Successful Trapping

- Both Roof and Norway rats are leery of new things in their environment, so traps should be in place for several days before being set.
- After being set, traps should remain in place for a week before being moved to a new location.
- Traps should be set along rodent runways to be most effective.
- The trigger side of the trap should be on the wall side.
- Large rodents may move traps so all traps in a school should be secured, even if traps are set on weekends or during holidays.

Tips for Successful Baiting

- Rodent populations may have a food preference. They may be feeding on ketchup packages or only on bread. If that is the case, you may use those items for bait.
- Roof rats generally prefer fruit and nuts.
- Norway rats prefer fish (sardines) or meat.
- Other baits include chocolate or dry oatmeal.
- Peanut butter should be avoided at schools due to potential peanut allergies.
- Use multiple baits to provide a variety of choices. For instance, set several traps with chocolate, several with fruit, and several with dry oatmeal.

- Bait some traps with cotton balls or a ball of string. Pregnant females will scavenge for these items to make a nest.
- Remember rats are afraid of new objects (neophobic), so be patient when setting traps and baits.

Physical/Mechanical Control Measures

These types of nonchemical control measures that include habitat modification, exclusion, and sanitation are effective in eliminating rodent problems. A mouse can squeeze through a hole as small as $\frac{1}{4}$ -inch diameter. The first line of defense against mouse problems should include sealing up entry holes, cleaning up clutter, and storing items off the floor to allow proper cleaning and inspection. A rat can enter through a $\frac{1}{2}$ -inch gap. Primary IPM strategies for rats are exclusion, keeping exterior trash handling areas clean, and removing or trimming any vegetation that obscures the ground.

Snap traps can be baited with various attractants including food items and cotton string. Peanut butter or honey can be used to stick other foods to the trigger. Snap traps can also be placed in cardboard or plastic boxes designed to hold snap traps. Snap traps should not be used in classrooms unless they are placed in tamper-resistant containers or other areas inaccessible to students. Alternatively, snap traps may be set at night and removed in the morning before students arrive. These should be labeled with a number and marked on a diagram to ensure all are recovered.

Biological Control Measures

Outdoors in rural and suburban environments, rodents face many natural enemies including predators such as raptors, coyotes, dogs, and cats. In urban environments, biological control is typically insufficient to suppress outdoor populations which readily move into and adjacent to unprotected structures.

Chemical Control Measures

When nonchemical measures are inadequate, rodenticides can be used in a manner that greatly reduces potential for nontarget exposure. Place bait-block formulations on rods in tamper-resistant bait stations that are secured so that they cannot be easily moved, such as attached to permanent



masonry or 40-pound concrete blocks.

Both the EPA and FDA have regulations that require the use of tamper-resistant containers when using rodenticides around food handling areas, children, pets, and other non-target wildlife. EPA requires that rodent baits must be in block, paste, or pelleted forms and require use of tamper-resistant bait stations.

If bait is to be placed in any indoor or outdoor location to which children under six years-of-age, pets or non-target wildlife have access.

For all applications made outdoors and above ground.

Baiting of burrows outdoors is *permitted only for pelleted baits* that are placed at least six inches down rat burrows.

Rodenticides

In 2008, EPA reviewed rodenticides and in 2010 they released changes that restricted the use of certain types of rodenticides for consumers (bought at the local store) and also how pest management professionals and agricultural operations can purchase and use these products as well.

First generation anticoagulants kill by preventing blood from clotting and it does take multiple feedings to gain success. The problem with this class of product is that when it was on the market for the public (consumer), children and animals could pick up the poison and ingest it, resulting in injury or death. Now the only way first generation anticoagulants can be used in the consumer market are ready-to-use bait stations that contain and/or are packaged with rodenticide bait that is in block or paste form. This means if you were to go to your local hardware store, you would find this product in one large container and there is no easy way for children or pets to tamper with it. For PMPs to use this product they must place bait inside tamper resistant contain-

There are a couple of non-anticoagulants that require mentioning. Bromethalina single dose rodenticide stops the cells in the nervous system from producing energy. You must be licensed to purchase this product. Zinc phosphide is an inorganic compound that combines phosphorus with zinc. When an animal eats the bait, the acid in the animal's stomach turns the zinc phosphide into phosphine. Phosphine gas blocks cells from making energy which means the heart, brain, kidney and liver fail to work. Products with cholecalciferol and zinc phosphide are classified as restricted-use by U.S. EPA. Restricted-use products raise the potential to cause unreasonable adverse effects to the environment and injury to applicators or bystanders without added restrictions. The "Restricted Use" classification restricts a product, or its uses, to use by a certified applicator or someone under the certified applicator's direct supervision.

