BEST PRACTICES FOR MANAGING RODENTS

Monitoring and Assessment

Effective rodent management requires more than selecting individual control tools. Successful programs integrate monitoring, decision-making, and evaluation to ensure that control measures are timely, effective, and appropriate for the level of risk present.

Rodent programs should begin with routine monitoring to detect activity early and assess population trends over time. Monitoring methods may include visual inspections for burrows, runways, droppings, gnaw marks, and damaged plants; use of tracking patches or chew cards; and focused inspections along field edges, irrigation infrastructure, fence lines, and adjacent non-crop areas. Monitoring should be conducted regularly and increased during periods known to favor rodent population growth.

MONITORING	• Routinely inspect fields, field edges, ditches, canals, fence lines, and adjacent non-crop areas for rodent activity. • Identify conditions that attract rodents, including standing water, dense vegetation, crop residue, cull piles, compost areas, and equipment yards. • Monitor for early signs of rodent presence to determine where populations may be establishing. • Regularly scout production blocks and perimeters for crop damage and newly formed burrows, tunnels, mounds, or runways. • Use traps, chew cards, tracking patches, or motion cameras to confirm rodent presence and movement into new areas. • Track changes in activity over time to identify increasing pressure. • The presence and number of fresh droppings can be used as an indicator of active populations; rodents produce multiple droppings per day, and fresh droppings indicate recent activity.

Action Thresholds and Decision-Making

Rather than responding to individual sightings, rodent management actions should be guided by action thresholds that reflect increasing pressure. Thresholds may be qualitative or quantitative and should be defined at the ranch or operation level. For example, low levels of activity may trigger intensified monitoring and habitat management, while persistent or widespread signs of burrowing or feeding damage may warrant escalation to trapping, rodenticides, or other methods of control. Establishing clear decision points helps ensure consistent responses and avoids delayed intervention.

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What methods are available to fruit, nut, and vegetables grower-shippers to manage rodents?

Rodent control programs should be preventive and systematic and not reactionary. Similar to other pests, use of two or more management methods is generally more effective than use of one method. See Table 1 for a list of rodent management methods.

Integrated pest management for rodents includes management of (Witmer, 2022):

- **Rodent population** – considers the rodent's biology, population dynamics, and ecology
- **Habitat** – involves physical environment and the living components of the ecosystem
- **Human** – involves human activities and land use and management considerations

Table 1: Rodent control methods (from Witmer, 2022 unless otherwise noted)

Rodent management method	Definitions	Pros/Cons	Examples/References
Habitat management	Elimination of conditions that serve as attractants (e.g., debris, food, shelter);	Plant removal can lead to soil erosion and/or moisture loss	Plant endophytic grasses that contain naturally unpalatable fungicide (Witmer & Pipas, 2018) Eliminate weeds, ground cover, litter and mow grass short (Brittingham, 2025) Experience and some research show that some, but not all, rodents are reluctant to cross open areas (Salmon, 2008). Flooding fields post-harvest Burn or remove plants after harvest
Barriers	Limits rodent access	Most useful for perennial crops such as trees or vines; often not practical for large production areas	Wire tree guards (Brittingham, 2025) Fibrous barriers of nonwoven ethylene vinyl acetate significantly lowered vole chewing damage to apple trees relative to the untreated checks (Agnello et al. 2014).

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Rodent management method	Definitions	Pros/Cons	Examples/References
Frightening devices	Deterrent devices emitting sound, sensations, light, etc.	Not very effective for outdoor use; rodents typically adapt/acclimate over time	Ultrasonic devices emitting high-frequency sound waves Flashing lights Devices that produce a vibration meant to discourage burrowing rodents.
Repellents	Odor mixtures that deter rodents from feeding on crops	Not practical for use over large areas; may cause flavor problems; capsaicin – expensive & requires high concentration to be effective	Natural products such as essential oils (Hansen et al. 2016) capsaicin - a compound found in chili peppers (Kaur & Singla, 2017) Thiram – a fungicide (Brittingham, 2025)
Fertility control	A palatable bait or liquid that contains a drug/chemical that reduces or prevents the rodent from being able to breed successfully	Long-term effects are unknown; not many products have achieved EPA registration	Reproductive targets for fertility control include disrupting the hormonal feedback associated with the hypothalamic-pituitary-gonadal axis, gonad function, fertilization, and/or early implantation (Jacoblinnert et al. 2022). Gonadotropin releasing hormone (Shiels et al. 2024); diazacon, nicarbazin, vinylcyclohexene, and triptolide

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Rodent management method	Definitions	Pros/Cons	Examples/References
Rodenticides	Oral toxicants	Not rodent-specific; often used in small and/or elevated bait boxes that prevents consumption by larger/non-target animals	Acute toxicants – kills fairly quickly with a single feeding in small amounts; alpha-chloralose, bromethalin, cholecalciferal, red squill, sodium fluoroacetate, strychnine, and zinc phosphide Anti-coagulants - kills more slowing from internal bleeding; warfarin, chlorophacinone, diphacinone, bromadialone, brodifacoum, difenacoum, flocoumafen, and difethialone
Traps and trapping methods	Lethal devices that lure rodents usually with the use of bait and typically kill by body constriction	Require manual reset, unless self-resetting and good for multiple killings	Snap traps, glue boards Following an initial bait application period, substantial success was achieved with trapping tunnels containing two snap traps, which maintained, and even increased, overall efficacy at reducing rat populations within IPM plots (Baldwin et al. 2024).
Biological control	The beneficial action of predators in managing rodents	Many rodents reproduce faster than predators can kill them (Brittingham, 2025).	Install perches and nest boxes to encourage natural predators (e.g., owls, hawks, falcons)
Fumigants	Toxic vapor/fume inhalation	Not species specific; very toxic to humans and domestic animals; more suitable for indoor use; not effective in shallow burrows	Chemical (e.g., aluminum phosphide, magnesium phosphide, acrolein, carbon/ sodium nitrate, and propane) placed in burrows then sealed

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Under what circumstance may there be more rodent pressure?

Population cycles – "There are generally four phases of a population cycle: increase, peak, crash and low phase. During cycles, rodent densities typically increase by 2–3 orders of magnitude from the low phase, often with < 1 ind./ha, to the peak" (Andreasson, 2021).

Non-cyclic outbreaks – "Non-cyclic rodent outbreaks are predominantly driven by an elevation of reproductive rates some 6–9 months preceding a population outbreak. The conditions that trigger this atypical breeding pattern vary depending on the rodent species and the ecosystem. Nevertheless, species that have population outbreaks exceeding > 1000 ind./ha are typically characterized by an ability to extend their breeding season and/or to increase their production of young in response to climatic conditions and human agriculture that increase food supply" (Andreasson, 2021).

Seasonality – "Mediterranean climates in both the northern and southern hemispheres provide a comparable response, with usually more intense breeding of small rodents in spring and early summer, and low or absent breeding in the hot dry late summer and colder winter. In both cases, the non-breeding season is characterized by almost no photosynthesis, and thus practically no vegetation growth and no replenishment of food resources" (Andreasson, 2021).

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