The new, revised edition of the Montana Master Gardener Handbook is now available. To learn more about the Montana Master Gardener Program in your area visit, www.mtmastergardener.org.

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$5 of every book sold at full price will go towards the Robert E. “Dr. Bob” Gough Memorial scholarship. For additional information regarding this endowment, contact the College of Agriculture’s Development Director, Darin Paine at (406) 994-7671, darin.paine@montana.edu.
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Farmer’s markets in Montana and across the country have experienced tremendous growth in recent years. There are currently more than 50 farmer’s markets in Montana. According to the Montana Department of Agriculture, farmer’s markets in Montana produced an estimated $2.2 million in revenue in 2010. The USDA reported there were an estimated 6,132 farmer’s markets nationwide in 2010, and 7,175 farmer’s markets in 2011, which is a 17 percent increase. Why the recent growth?

Farmer’s markets serve as business incubators and are one of the most economical means for new businesses to test and market their products to the public. For example, several business owners that started very small selling at the farmer’s market in Helena became so successful that today they have their own store-front businesses in town. Furthermore, consumers are understanding the economic and health benefits of buying local merchandise and produce. Consequently, more consumers are shopping at their local farmer’s markets.

If you are considering selling at a farmer’s market, here are tips to make your experience more enjoyable and profitable.

- Contact the farmer’s market manager (sometimes called market master). Go to the Montana Department of Agriculture’s website (agr.mt.gov/farmersmarkets) for a list of the markets in the state and their contact information. For each market you are considering, ask the manager for a copy of the market rules to familiarize yourself with any restrictions that may apply. For example, some markets only allow the sale of products that are made or grown in Montana, while others may allow the sale of out-of-state items, as long as they don’t compete with the locally made or grown products; some markets require that all products sold at the market originate within a specific distance from the market.

- If you are selling any food items, contact the County Sanitarian of the county where the market is located. Some County Sanitarians have different requirements than others for selling at farmer’s markets. You should establish a good relationship with the local County Sanitarian early because if you are in compliance with their regulations, it will make things much less stressful down the road.

- Make sure all of your products are clearly labeled with prices and product information. Some markets or County Sanitarians will have specific labeling requirements that you must follow. At a minimum, you should have the name of the product, the ingredients (if applicable), the price, and the contact information for the business. Use other ‘catchy’ labeling words if they apply to your product such as home-grown, artisan, locally-grown, sustainably-grown/raised, etc. Be careful not to advertise your product as organic unless you are certified organic according to the National Organic Program (NOP) standards, which can be found at www.ams.usda.gov/AMSv1.0/nop. If you follow the NOP standards and have annual gross agricultural revenues of $5,000 or less, you may advertise your product as organic. You may be inspected by a NOP certifier even if you fall under this exemption, so become familiar with the NOP standards. If you feed certified organic feed, you may advertise your product as ‘fed organic feed,’ but the product cannot be advertised as organic unless it is certified. Another eye-catching label scheme you can employ if your product is made or grown in Montana is to use the Made in Montana and/or Grown in Montana logos and stickers on your product(s). To obtain the Made in Montana and/or Grown in Montana logos, stickers, etc., contact the Montana Department of Commerce (www.madeinmontanausa.com). Don’t forget to have signage at
your booth that identifies who you are so you can build consumer recognition and brand loyalty.

- Sell your product! If you are not a salesperson, hire someone who is. Attend a couple of markets and you will quickly find out if you are comfortable in the role of sales. Regardless of how ‘cool’ your product is, you have to sell it. One of the biggest mistakes vendors make is they don’t engage the customers. Instead, they watch customers walk by their booth and go to a neighbor’s booth and buy their product instead. If finding a salesperson to help you isn’t feasible, then consider other ways of selling your product, such as a CSA (Community Supported Agriculture), on the Internet, through product placement in a retail store, selling directly to grocery stores and restaurants, or establishing a ‘you pick’ operation, sometimes also referred to as ‘pick your own.’

- Obtain liability insurance if necessary. Some markets have liability insurance that covers all the vendors selling at the market, while others may require you to obtain your own liability insurance. Contact an insurance company to see what kind of insurance you may need. The worst time to think about insurance coverage is after something has happened and you were not covered.

- Become familiar with the market’s location and its attributes. Is it windy? Will you be located in the sun or shade? Is there electricity? Can you maneuver your vehicle and/or trailer into the spaces? Where is the closest restroom? All of these things become very important when you are planning for the market. Try to obtain the same booth location within the market every time, so customers know where you are located.

Farmer’s markets or their equivalents have been in existence for centuries, essentially since farmers first began bringing their products into town to sell. In many countries worldwide, most people obtain most or all of their food from farmer’s markets. Just recently, farmer’s markets have gained momentum and a presence in communities across the United States. With the 17 percent growth in the number of farmer’s markets in the last year, there is clearly no turning back. Farmer’s markets are emerging as community staples. To ensure you have a successful experience as a vendor, plan ahead and follow the six steps mentioned above. Be a part of the growth in direct marketing of your local goods to consumers.
SUMMER INSECT PEST CONTROL ON
horses, sheep, and cattle

by Greg Johnson
Extension Veterinary Entomologist, Montana State University

Protecting livestock and companion animals from insect attacks can be a challenge. This is especially true with a wet spring followed by above average summer temperatures. These conditions are conducive to producing large populations of mosquitoes, biting gnats, black flies, and non-biting flies, including house flies and face flies. These insects annoy animals, causing them to be irritable, restless, and difficult to manage. Common defensive responses from the animals include head tossing, tail flicking, ear twitching, and foot stomping. It’s not unusual to see animals bunch up on a windy hilltop or completely avoid an area in a pasture because of biting insects. An additional concern with some insects is that they transmit diseases. Mosquitoes are vectors of several encephalitic viruses (those causing inflammation of the brain) including West Nile virus and western equine encephalitis, which can have devastating effects on horses and other equines; black flies transmit vesicular stomatitis, a debilitating, quarantinable disease of horses and cattle; and biting midges transmit bluetongue, a lethal viral disease of sheep and deer.

There are many options for controlling these insects. In this article we will only focus on a few: on-animal insecticide treatments, insect trapping, and removing/secluding animals from areas of heavy insect pressure.

Horses
There are many insects that attack horses during the summer, but mosquitoes are noteworthy both as a nuisance and a vehicle for West Nile virus. Stabling horses during the night when mosquitoes are active may provide some relief but mosquitoes will enter dwellings to bite animals. In many situations, ready-to-use animal sprays may be the best option. These products can be sprayed on the animal or wiped-on using a clean cloth or sponge. Make sure the entire surface of the animal is covered, especially the head. Most sprays need to be re-applied every five to 10 days according to the product label. It is also important to remember to vaccinate horses against West Nile since it is an established disease in Montana.

Trapping mosquitoes with baited traps can provide some relief from mosquitoes but only in small, localized areas. Therefore, trapping has little impact on the overall population. Bug zappers (an electronic grid with an ultraviolet light and a chemical attractant) are used to attract insects and electrocute them. Mosquitoes, however, aren’t attracted to UV light, thus, bug zappers are ineffective on mosquitoes. Bug zappers kill a lot of insects, but mostly are beneficial insects and not pests.

Black flies and stable flies readily attack horses but feed only during the day and will not enter stables or barns. Moving horses inside during the day when these pests are abundant can provide relief. If this is not possible, ready-to-use animal sprays are again the best option.

Non-biting flies (house flies and face flies) are attracted to nasal and eye secretions, sweat, and pooled blood from previous insect bites or wounds on the animal. These insects are annoying because they keep buzzing around the animals’ heads. In many cases, insecticide treatments used for biting flies are also labeled for and effective against non-biting species. Physically preventing flies from annoying horses can be achieved by fitting the horses with a see-through fly mask.

Bot flies present another management challenge. There are two species in Montana, the common horse bot and the throat bot (often called the nose fly). These species neither bite nor sting, but they are problematic because they can frighten horses as they buzz around laying eggs. The common bot lays eggs on the animals’ front legs, which are then ingested during grooming. The throat bot lays eggs underneath the animals’ chin. The larvae of both species hatch, are swallowed, and end up attaching to the stomach lining where they remain for eight to 10 months. Using an oral paste treatment against the
larvae in the fall—about 30 days after the last killing frost—is an effective method of control. Bot egg combs, clipping egg-infested hair, or sponging with a warm-water insecticide rinse will provide some control of the larvae before they are ingested, but overall are not as effective as paste.

**Cattle**

The same species of flies that attack horses also attack cattle. The horn fly receives the most attention because of its abundance, and because cattle expend a lot of energy fighting these flies. This results in significant losses in milk production and weight gains. It has been reported that an individual horn fly will bite an animal up to 25 times a day. Multiplied by 200 or 300 flies equals a lot of irritation and annoyance for the animals.

Management of horn flies can be achieved using insecticidal ear tags. These tags contain one or more insecticides and should be applied to the mature animals (not their calves) in late spring or early summer. The insecticide is slowly released from the tag, providing season-long control. Horn flies can develop resistance, so use tags containing different insecticides each year. In addition to horn fly control, the Python® Magnum ear tag, containing zeta-cypermethrin, will reduce blood feeding by mosquitoes for four weeks. Other horn fly control methods include dust bags, oilers, animal sprays, and feed additives. Each provides acceptable control, but has disadvantages of needing frequent inspections or rounding up and working cattle to apply products during the summer. Pyrethroid sprays last a maximum of 14 days, so cattle need to be re-treated—especially during July and August. Dust bags and oilers require weekly checks to re-fill or, in the case of dust bags, replace if torn. Mineral tubs for animals on feed additives need to be checked every couple of days to assure sustained fly control. More information on controlling horn flies can be found in Montana State University Extension MontGuide Horn Flies on Cattle: Biology and Management (MT200912AG, www.msuextension.org/store).

**Sheep**

Biting midges and mosquitoes are detrimental for sheep because they can transmit sheep diseases. In 2007, biting midges were responsible for a bluetongue epidemic in eastern Montana resulting in a 16-county quarantine during September and part of October. Mosquitoes are the vector of Cache Valley virus—a disease that affects newborn lambs. A Cache Valley outbreak occurred in 2011 in North and South Dakota, Minnesota, and Wisconsin. The disease has not been detected in Montana but the species of mosquitoes that transmits Cache Valley virus in the Dakotas also occurs in Montana.

The 9.5-gram Python® ear tag, at one tag per animal, will disrupt feeding of biting midges for several weeks. This is long enough to interfere with disease transmission. One Python ear tag per sheep reduces blood feeding by mosquitoes by about 85 percent. Pyrethroid spray applied twice during a seven-week period reduces blood feeding by about 55 percent. More frequent spray applications will likely further reduce blood feeding. When using a pyrethroid spray for biting fly control, make sure the face, ears, and belly are treated because many biting flies prefer feeding on areas not covered by wool. Additional information can be found in Montana State University Extension MontGuide Managing Ectoparasites on Sheep (MT201110AG, www.msuextension.org/store).

Many insecticides used as on-animal treatments for horses, cattle, or sheep incorporate three or four different items. Typically there is the active ingredient, a pyrethrum (a natural botanical insecticide extracted from chrysanthemum flowers) and/or a pyrethroid (a synthetic insecticide with pyrethrum properties); a synergist, usually piperonyl butoxide, which enhances the insecticide activity by delaying de-toxification of the insecticide by the insect; and a repellent, a chemical which prevents landing and biting by the insect. These insecticides are relatively safe to humans and mammals but are highly toxic to bees and fish. When applying these or any other insecticide to livestock, make sure you wear proper protective clothing and equipment, follow the label directions, and avoid getting insecticide in the eyes and mucous membranes of the animals.
Grasshoppers are native insects that provide valuable food for songbirds and upland game birds such as sage-grouse and pheasants. Unfortunately, grasshoppers also can become troublesome pests, eating large, ragged holes in the leaves of garden vegetables and ornamental plants and damaging lawns, pastures, and crops. Rural homeowners and landowners must remain vigilant because grasshoppers can invade from surrounding rangeland and cropland. How many grasshoppers are too many? What are the best ways to control grasshoppers if they become too abundant?

Grasshoppers are always numerous during summer, especially in the eastern prairie counties of Montana where grasshoppers often damage rangeland and cropland. Grasshoppers especially thrive during years when springtime weather is warm and relatively dry. Warm temperatures accelerate grasshopper growth and limited rainfall diminishes the spread of fungal diseases that harm grasshoppers.

Some experts predict that the western U.S. is currently poised for a grasshopper outbreak on a scale last seen in 1985. That year, for reasons that remain unclear, grasshoppers were freakishly numerous. They invaded huge expanses of Montana’s cropland and rangeland, destroying crops and leaving little forage for livestock and wildlife. In some places, there were an astonishing 400 adult grasshoppers per square yard of ground. In late summer of 1985, multitudes of starving grasshoppers migrated into shelterbelts (i.e., trees planted to provide a windbreak for rural homes) and residential areas, devouring the foliage and even the bark of many valuable landscape plantings. There were reports of ravenous grasshoppers eating holes in clothing drying outside on clotheslines, gnawing the insulation off wires, and nipping people hard enough to draw blood.

**How Many Are Too Many?**

In pastures, it is easy to determine whether you have enough grasshoppers to warrant control. Simply count the number of grasshoppers per square yard. If the grasshoppers are nymphs (i.e., immature grasshoppers), control should be applied when density reaches 15 to 20 nymphs per square yard. If the grasshoppers are adults, treatment should be applied when density reaches eight to 10 grasshoppers per square yard. Keep in mind, however, that healthy pastures with adequate soil moisture can sometimes compensate for the feeding damage inflicted by grasshoppers and, therefore, tolerate greater numbers of grasshoppers.

Thresholds for treating grasshoppers in gardens and landscaping plantings are not well-established. This means that to some extent you must determine for yourself how much your garden produce is being impacted and how much aesthetic damage you can accept. We recommend you adopt a tolerant attitude when grasshopper feeding damage is moderate or low.

**What Are the Best Ways to Control Grasshoppers?**

Prevention and exclusion are the safest ways to manage grasshoppers because these methods do not use pesticides. However, the adults of most grasshopper species have wings that enable grasshoppers to be highly mobile, thus grasshoppers can continually reinvoke from surrounding areas. Properties surrounded by natural grassland are at highest risk of invasion.

**Prevention:** Grasshoppers lay their egg pods in fine gravel, sand, or silt. Disturbing these areas in late summer and fall by deep-raking or hoeing can reduce the numbers of grasshoppers that hatch the next year. For lawns, keep your grass cut short so that it does not attract grasshoppers from neighboring areas. In pastures, proper grazing management that limits the amount of bare ground will inhibit grasshoppers. Soil temperatures will be lower and less suitable to grasshoppers where ground
is covered by live vegetation or a thin layer of mulch (i.e., dead vegetation from previous years that has not yet decomposed).

**Exclusion:** Agricultural-grade pest netting (for example, Protek50 Insect / Pest Netting) can be draped over valuable shrubs. This netting is sold in large and rather expensive rolls, but the material can be reused for several years. Garden beds can be covered with “row cover” fabric, which allows sunlight and water to penetrate but keeps insects out. Row cover fabric is relatively inexpensive and available at most gardening centers. Row cover fabric can either be laid directly over the garden bed, or draped over some kind of structural support (this is called the “floating row cover method”). Structural supports are commonly metal hoops or raised frames of wood.

**Control:** Insecticides should not be used to control grasshoppers unless significant damage is occurring. Landowners should also be aware that when grasshopper populations are high, even repeated insecticide applications may be ineffective and exclusion may be a better option. Be sure to read all product labels thoroughly.

For edible crops, insecticides should be selected carefully. Foliage of edible crops can be treated with products containing neem oil and insecticidal soap, a mild and food-safe choice used on many organic crops to deter insects from feeding. Several formulations of Sevin insecticide also can be used to control grasshoppers on food plants. Turf and ornamentals can be treated with some pyrethroid products, such as Tempo SC Ultra.

For rangelands and pastures, insecticide treatments do not need to cover an entire area; insecticides applied in alternating bands that cover 50 percent of the area are usually very effective. Another option is to apply permethrin to a buffer strip around the edges of an area to reduce the number of grasshoppers that migrate in. Be advised, however, that buffers around small areas will be much less effective wherever surrounding pastures and rangelands remain untreated. Dimilin, an insect growth regulator, is effective against immature grasshoppers (not adults!) in pastures and rangeland. Dimilin is a “restricted use” pesticide and can only be applied by a licensed pesticide applicator.

Finally, think about getting some chickens to help control your grasshoppers. Chickens eat tremendous numbers of grasshoppers and convert them into genuinely useful products—fresh eggs and meat. ☀
The Special K Ranch is a non-profit, 220-acre working ranch and greenhouse facility located just above the Yellowstone River, eight miles east of Columbus, Montana. As a visitor, it doesn’t take long to realize you’re visiting an extraordinary place when you get a tour from ranch Program Director Mike Oberg.

“The ranch houses 24 developmentally disabled adults in a Christian environment where they learn and work with live-in advisors, raising livestock and growing tomatoes and bedding plants in our greenhouse facility,” Oberg said. The greenhouse, a 36,000-square foot facility, is where residents pot and seed bedding plants for the upcoming season.

“We have a waiting list for residents,” Oberg said. “The Special K Ranch allows many families who have been raising developmentally-disabled children to find them a permanent home in a caring environment when they become adults. Our residents come from all over the United States and there is a long waiting list of folks who may someday make their home here.”

During a recent visit to the greenhouse, I was accompanied by Program Director Oberg. We observed residents busy filling pots, seeding or transplanting. Oberg was met with great enthusiasm and often hugs from the residents as we went from station to station. “Where else can you go to work and get five hugs as you walk in the door?” Oberg said, explaining the social benefits that he and the staff enjoy while working with the ranch residents. “Anytime I feel the stress of working in the office, all I have to do is come over to the greenhouse for a visit and it puts my work into perspective.”

The bedding plants are marketed to nurseries and greenhouses in nine different Montana counties, as far away as Anaconda. In addition to growing bedding plants, the greenhouse facility workers also grow hothouse tomatoes that are sold to grocery stores and through local farmer’s markets.

A new project in the greenhouse is growing seedlings for land restoration plantings for the Bureau of Land Management (BLM). “We are excited to have this project to supplement the times when we don’t have much for the residents to do,” he said. He explained that while the residents are always tending to the sheep, cattle and horses, springtime is busiest with the bedding plant operation. “At the end of April, all the bedding plants in the greenhouse are sold,” he said. “The residents then tend to the tomatoes, but things start to slow down a bit. Now the BLM project gives us something to fill that void.”
The Special K Ranch, a 501(c)3, is governed by a board of directors. It is primarily funded through the sale of the products that the residents grow or raise, as well as, through contributions from community service groups and individuals. “The goal of the ranch is to be self-sufficient,” Oberg said. “We operate independently of government funding.”

Ranch residents pay a monthly fee, either paid by their families, or through their Supplemental Security Income (SSI). The fee includes 24-hour supervision, training, counseling, transportation, and other general assistance from the staff and the six home advisor couples who oversee houses where the residents live. In return, the residents learn vocational skills and participate in daily personal, household, and ranch responsibilities. “It is really neat to see how many of the residents have grown while they have been here,” Oberg said. “Most of them have been here for several years. The ranch has successfully fulfilled its mission for the past 26 years.”

The residents do get some compensation for their work. “With the money they earn, residents can buy snacks or go to the movies, or anything else,” Oberg said. “They cash their checks at the local bank, which helps them [residents] learn more life skills.”

The Special K Ranch was purchased in 1986 with loans from the Farm Service Agency and a consortium of four banks in Billings, Montana, with the remaining balance paid in cash funds raised from donations and pledges. The Billings-area Kiwanis was instrumental in the formation of the ranch. A steering committee of local Kiwanis members was formed in the summer of 1984. The steering committee was responsible for the original development of the ranch. In 1986, a board of directors was elected and Executive Director Larry Goehner, who still oversees the ranch today, was hired. From the ranch’s inception, the vision was to be able to assure families that their son or daughter would have a permanent home at the ranch.

The Special K Ranch recently finished a capital campaign for a new house for the aging population of residents so families on the waiting list can find a spot for their sons or daughters. The new house for older residents was just completed and is ready for them to move in. “We are really glad to see that go up,” Oberg said. “It will really help us provide housing for more residents.”

If you would like to learn more about Special K Ranch, how you can make a donation, or how your group can volunteer to assist the ranch, visit their website at www.specialkranch.org or call (406) 322-5520.
M A S T E R  G A R D E N E R  Q & A

cultivating your yard and garden knowledge

by Dara Palmer
Assistant Master Gardener Coordinator, Montana State University

Q Why is my compost pile not heating up to the proper temperature? —Judith Basin County

A The proper mix of oxygen, moisture, materials, and microorganisms are required to activate heat within a compost pile. Some reasons why this may not be occurring are:

1. the pile is too small (piles three cubic feet or larger work best),
2. there is not enough nitrogen or oxygen present, or
3. the pile is either too moist or too dry. The proper moisture content will produce material much like that of a wrung-out sponge.

While material will compost at temperatures between 50-105°F, the optimum temperature is between 110-150°F. A good ratio of carbon (brown material: dead leaves, straw, or paper) to nitrogen (green material: grass clippings, vegetable scraps, or manure) is also important for decomposition.

Ideally, you want a carbon to nitrogen ratio of 30:1; that’s 30 parts brown material to one part green material. Make sure you are turning the pile over when the temperature in the center begins to cool, thereby introducing new, un-decomposed materials and regenerating heat to the middle of the pile. Montana State University Extension MontGuide, Home Composting (MT199203AG, www.msueextension.org/store), offers more information on why and how to compost.

Q How often should I be fertilizing my lawn to keep it in peak condition? —Powell County

A A moderate regimen calls for fertilizer to be added three times a year: at Memorial Day, Labor Day and Columbus Day. To keep your lawn looking green and healthy, apply one pound of actual nitrogen per 1000 square feet per application. For prime conditioning, apply fertilizer five times throughout the year: in the early spring, around Memorial Day, again around Labor Day, in early October and once more in late October. When fertilizing, also be sure that you are watering sufficiently. Generally, one inch of water per week is recommended.

Q The trunks of my aspen trees have small, brownish-grey bugs all over them. What are they and how do I get rid of them? —Sweet Grass County

A Based on your description, I would say you have an infestation of Oystershell scales. This insect pest attaches itself to the bark of trees and sucks the plant’s sap. You can lightly scrub the scales off with a plastic scrub pad, being careful not to damage the tree bark. Horticultural oil is another popular method for controlling these pests, but it must be applied in the spring prior to the tree buds opening in order to be effective against the waxy coating of the Oystershell scale. Late May or early June is when the newly-hatched insects, called crawlers, are active. The small, pale crawlers are mobile shortly after hatching and quickly find a suitable feeding area, usually in a shady spot on the tree. It is here they will pierce the tree with their mouthparts and feed on its sap for the remainder of their lives. The insects then develop their waxy coating within a week or so, which protects them from most insecticides and makes timing of application critical.

Do you have Master Gardener questions?
Send them to bssa@montana.edu, subject: Master Gardener.
Purple loosestrife is a non-native plant that is infamously listed on The Nature Conservancy’s “America’s Least Wanted-the Dirty Dozen.” Native to Europe and Asia, it may have been introduced to North America by immigrants for its medicinal properties. Horticulturists promoted it in the mid-1900s as an ornamental. Many thought it beneficial for honey production. However, purple loosestrife results in poor quality honey and aggressively proliferates beyond planted environments to dominate marshes, wet meadows, ditches, and streambanks. Deemed the “purple plague,” purple loosestrife grows more aggressively than native plants after a disturbance. It has no natural enemies in its introduced range and some believe its hybridization with the native *Lythrum alatum* (common name: winged lythrum) has given it adaptive advantages. It is particularly problematic for birds because it restricts access to open water and provides cover for predators like foxes, while providing very little food or cover for birds.

Purple loosestrife is a Priority 1B noxious weed in Montana. Priority 1B means it has limited presence across the state at this time. Informing citizens about purple loosestrife including its identification, impacts, and management is important. Where infestations are known to exist, management objectives should include eradication or containment, depending on the size of the population. In Montana, purple loosestrife has been reported in 10 counties: Dawson, Flathead, Lake, Lewis and Clark, Meagher, Missoula, Ravalli, Rosebud, Toole, and Yellowstone.

Here are three things you can do to address purple loosestrife:

- Learn to recognize the plant: tall plant (up to eight feet), grows in wet areas, has distinct five- to seven-petaled purple flowers that bloom from July until October, flowers grow in a spike (flowers attach directly to the stem, no stalk), square stem (does not roll easily between your fingers because of the square angles). **Note:** Purple Loosestrife looks very similar to the native plant fireweed (*Chamerion angustifolium*). Fireweed does not have a square stem and its flowers have four distinct, linear sepals (petal-like structures that surround the petals, in contrast to purple loosestrife which has fused sepals (Figure 1).

- Report sightings to your county or reservation Extension agent or county weed coordinator. If it is a relatively small infestation, it may be possible to eradicate it before it spreads.

- Before introducing plants into your home landscape, spend time researching to verify they are not invasive or call a specialist for assistance.

Purple loosestrife can be controlled mechanically, biologically, and chemically. Mechanical control is the most practical on small infestations of young plants by removing all roots and underground stems. The plant will resprout, therefore, it is important to get the entire plant and to thoroughly clean the area and properly dispose of plant parts to reduce the chance of reinfestation. It is also important to monitor the area closely for new plants in subsequent years.

Herbicides labeled for purple loosestrife control include glyphosate, triclopyr, and imazapyr. Extra caution should be used when using herbicides near streams or in marshy areas. Biological control, including two leaf feeding beetles (*Galerucella calmariensis* and *G. pusilla*), a flower bud weevil (*Nanophyes marmoratus*), and a root mining weevil (*Hylobius transversovittatus*) can also be used for purple loosestrife control. More information on control of purple loosestrife read University of Idaho’s *Idaho’s Noxious Weeds: 2011 Control Guidelines* (www.cals.uidaho.edu/edcomm/pdf/BUL/BUL0865.pdf).

By learning to identify purple loosestrife, and how to report it, we can prevent purple loosestrife from plaguing Montana. For more information, refer to the USDA/NRCS Plant Guide *Purple Loosestrife* (http://plants.usda.gov/plantguide/pdf/pg_lysa2.pdf), or contact your local county or reservation Extension agent.

**Figure 1. Sepal arrangement of fireweed (l) and purple loosestrife (r).**
Living in the country can put us next to some great neighbors, but when these neighbors are wild rodents such as pocket gophers, ground squirrels, and prairie dogs, it’s time to take action. Pocket gophers are found throughout Montana. Ground squirrels are everywhere except the southeastern part of the state. Prairie dogs are found throughout the eastern two thirds of the state, with highest populations in the eastern-most counties.

Ground squirrels are sometimes called “gophers,” so understanding differences is important. Pocket gophers spend 99 percent of their life underground feeding on roots and tubers, while ground squirrels feed entirely above ground. Pocket gophers plug their tunnel entry tightly with soil, while ground squirrels have an open entrance to their tunnel system. Ground squirrels look like squirrels, and pocket gophers have cheek pouches and external incisors and look more like short-tailed rats.

**Ground Squirrels**

Ground squirrels typically found in Montana are the Richardson and Columbian varieties. They live in extensive underground burrows with many entrances (i.e., holes). Densities of ground squirrels can range from two to 20 or more per acre. Ground squirrels are not protected in Montana.

Small populations can be controlled with body-gripping traps (also known as Conibear®) placed over the hole. Trapping can begin on one side of the colony and progress across the area.

Fumigants can be used in small areas of ground squirrel infestations if the soil is dense and moist. Gas cartridges and aluminum phosphate are fumigants registered for use in ground squirrel control. Aluminum phosphate is a restricted use pesticide, which requires users to have a Private Pesticide Applicator’s License to purchase and apply.

Toxicants registered for ground squirrel control include anticoagulant and zinc phosphate baits. Anticoagulant baits require multiple ingestions to be effective, spaced two to three days apart. Anticoagulant baits are very palatable and there is less risk to non-target animals because of the need for multiple feedings. Zinc phosphate, a restricted use pesticide, is a single, lethal-dose poison. However, because zinc phosphate is distasteful, it is necessary to pre-bait with clean, untreated oats two to three days prior to distributing the poisoned grain to increase acceptance. Use toxicants in early spring after all animals are active, but before grass green-up and prior to the birth and emergence of young ground squirrels.

Bait stations distributed through the area, used with approved anticoagulant baits, such as Ramik Green®, can also be effective. Using one bait station per acre is recommended and one standing bait station can be attached to a fence post or posts driven into the ground every 50 yards. More information on bait stations can be found at http://agr.mt.gov/agr/Producer/VertebrateFest/Bulletins/pdf/ManagingGroundSquirrelsWithBaitStations.PDF.

**Pocket Gophers**

Pocket gophers get their name from the fur-lined pockets in their cheeks. They can be identified by their large front incisors on the outside of their lips, two-inch tails used to guide them when they move backward through their tunnel, and large, well-developed front claws used for digging and pushing soil. Pocket gophers leave a characteristic fan-shaped mound of dirt on the surface, created by pushing dirt out of the hole and then backing down the hole. Pocket gophers plug the hole tightly with soil to keep intruders out. The tunnel system is composed of a main runway with numerous lateral runways. A single gopher usually occupies about 2,000 square feet and depending on the quality of the habitat, pocket gopher density can be from one to 20 per acre.

Pocket gophers are not protected in Montana, although there have been a few observations of the Idaho pocket gopher.
Trapping can be effective and economical for control because there are typically very few pocket gophers in any one area. Pocket gopher traps designed to be set in the main runway require probing with a rod to locate the main runway, digging a hole to access the main runway, placing a trap in each direction, and then covering the hole so the gopher doesn’t cover the trap with dirt while trying to seal off the tunnel system. A new trap has been designed to be placed in a lateral runway after opening the plugged entrance at a fresh mound. This trap is triggered when the gopher pushes dirt to plug the open tunnel system.

Gas cartridges and aluminum phosphide are registered fumigants for pocket gopher control. However, because they often plug portions of their system, it is difficult to get good results using fumigants.

Poison baits, such as milo or oats treated with strychnine, are registered for underground pocket gopher control. Landowners can hand-place the bait by probing to find the main runway and using a funnel to put a measured amount of bait into the hole. It is important to avoid knocking dirt onto the bait after you place it and to plug the access hole when you’re done.

**Prairie Dogs**

Black-tailed prairie dogs could be confused with ground squirrels, but prairie dogs have a more blocky body conformation and a relatively short black-tipped tail, and weigh one and a half to three pounds compared to a ground squirrel that weighs only about one pound.

Prairie dogs live in much larger colonies with higher densities than ground squirrels. If conditions are right, colonies can grow 30 to 295 percent in just a few years. Twenty to 40 burrows per acre are common.

Black-tailed prairie dogs are classified as a Species of Concern in Montana. Prairie dogs are managed under the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana. However, because black-tailed prairie dogs are also classified as Vertebrate Pests by MDA, they can be controlled on private land to manage damage to agricultural and grazing lands. If more than 80 acres are going to be controlled, consult the U.S. Fish & Wildlife Service (USFWS). Prairie dog towns should be thoroughly searched for evidence of the endangered black-footed ferret before control is initiated. Techniques for identification of black-footed ferrets or their signs may be obtained from the Montana Department of Agriculture (MDA), Montana Fish, Wildlife & Parks, or the USFWS. When prairie dog control is warranted, it is necessary to reduce their numbers by approximately 90 percent if long-term control is desired.

Shooting prairie dogs is expensive and not very effective for reducing populations, however, shooting may provide some level of relief in small colonies. Trapping is labor-intensive and not often practical on large acreages. However, body-gripping traps such as the Conibear® have been used to control colonies on small acreages. These unbaited traps are anchored securely to the ground and set directly over the burrow entrance. Although generally safe, dogs, weasels, badgers, and other predators may be injured or killed by such traps.

Aluminum phosphide, a restricted use pesticide, is a burrow fumigant that can be used, however, it is very dangerous to use. Aluminum phosphide products release deadly phosphine gas in the presence of moisture.

Toxic grain baits are the most common control for prairie dogs. Zinc phosphide, a restricted use rodenticide, is the only grain bait registered for prairie dog control in Montana. Normally, poison grain will only work before vegetation green-up in the spring or after vegetation has dried up in late summer or early fall. Pre-bait the area with untreated, plain whole oats to familiarize the prairie dogs with the bait. Follow the label instructions for bait placement and amounts for best results.

No matter which rodent you are controlling, it is important to notify neighbors of your bait applications or that you are trapping, and advise them to keep pets confined. Any rodent control program will be most effective with a coordinated effort with nearby landowners.

Enjoy living in the country and don’t panic when a wildlife problem arises. These situations can be solved. Often, a variety of methods must be tried and persistence is critical for success. For more detailed information on controlling wildlife species, contact your local county or reservation Extension agent.
PRACTICAL HOOF CARE for horses

by Shannon Moreaux
DVM and Assistant Professor of Equine Science, Montana State University

The basic principles of horse health care and welfare include hoof management. The hoof is a vital part of the horse, and healthy hooves are essential to the well-being and usefulness of your horse. Hoof maintenance is necessary to prevent excessive joint wear, tendon and ligament strains, infection, hoof wall cracks, and avulsions (breaking off of the hoof wall), which often result in lameness. Overgrown hooves place an abnormal strain on the soft tissues, bones, and joints of the lower limbs, which may result in chronic ailments such as navicular syndrome, ring bone, and tendonitis. Failure to properly manage the horse’s feet may also result in chronic derangements and infections like thrush, seedy toe, corns, sheared heels, and sidebone (hardening of the collateral cartilages).

Anatomy of the hoof

The foot of the horse is a complex, elastic, efficient, and dynamic structure (Figures 1 and 2). The hoof wall is the incomplete cone structure forming the external part of the foot and can be divided into four regions; the toe, the quarters, the heels, and the bars. The hoof wall is made of insensitive parallel fibers called horn tubules that grow from the dermal corium (the deep inner layer of the skin) at the coronary band or coronet. The horn tubules grow continuously at about ¼ inch per month. The interior of the hoof wall is lined with insensitive laminae (thin, parallel plates of soft tissue) which become interlocked with sensitive laminae that cover the coffin bone. The bottom of the foot is covered with insensitive sole and the frog, both of which connect to underlying sensitive tissues. The internal structures of the foot include the digital cushion, two collateral cartilages connected to each wing of the coffin bone, the coffin joint, the navicular bone, and the insertion of the deep digital flexor tendon, which is protected from the navicular bone by a fluid-filled structure, the navicular bursa.

Function of the hoof

The horses’ foot has five basic functions:
1. carry weight
2. dissipate concussion
3. assist with limb circulation
4. protect sensitive internal structures
5. provide traction

The hoof wall, sole, and frog all bear weight to some degree, but the hoof wall carries the bulk of the burden. The foot dissipates impact and assists with circulation by deformation. The semi-rigid horn tissues expand and contract when the internal soft tissues are compressed and decompressed with every step. The hoof wall, sole, and frog are tough, insensitive, and non-vascular tissues that protect the sensitive and vascular internal structures – the digital cushion, navicular bursa, navicular bone, deep digital flexor tendon, and coffin bone.

Figure 1. Internal anatomy of the horse foot.

Figure 2. Solar surface anatomy.
Basic principles of quality hoof care

Horse’s feet should be inspected and cleaned frequently and should receive routine maintenance to remove overgrown hoof wall, frog, and sole at intervals of four to eight weeks. Maintenance intervals for removing excess growth depend on several factors, including how often and where the horse is ridden and hoof growth rate. Frequency of hoof maintenance also depends on whether a horse is wearing shoes or is bare footed. Factors determining whether the horse should be shod (i.e., wearing shoes) or maintained bare footed include the health of the hooves, the potential or anticipated use of the horse, the amount of traction desired, defects in gait or conformation, and/or injuries or diseases affecting the horse. Trimming and selecting shoes should be consistent with the amount and type of work required of the animal, the environmental conditions, and the surface upon which the horse will be used. For example, horses should be sharp-shod to help them maintain traction and balance if ridden on snow or icy ground. If hoof wear exceeds growth rate, then the hoof should be protected with shoes. Shoeing horses requires training and experience. Trimming horses with abnormal hoof growth, underlying lameness, or conformational abnormalities should also be performed cautiously and horse owners should seek the services of a trained professional farrier.

Hoof inspection and cleaning

Horses housed in stalls, small pens, or dry lots should have their feet inspected and cleaned daily to reduce the risk of infection. Horses at pasture are less likely to have hooves packed with manure. All horses should be evaluated for hoof cracks, excessive moisture, excessive dryness, excessive growth or wear, asymmetric growth or wear, and damage from infection.

Hooves should be cleaned to prevent growth of harmful bacteria trapped in feces, urine, dirt, and stall bedding. Bacteria trapped in the feet may result in thrush which can invade the hoof, causing lameness. The hoof is best cleaned with a hoof pick, but a wire brush may also be useful. For best results, a hoof should be picked from the heel toward the toe, being especially careful to clean each sulcus (also known as commissures) adjacent to the frog and the central sulcus of the frog itself.

Hooves should also be inspected for symmetry and balance on a routine basis. Symmetry and balance are dependent on an individual horse’s conformation. A well-managed horse with ideal conformation should have symmetrical and balanced feet. Symmetry simply means that each front foot and each hind foot should be similar in size and shape and that each half of the foot should be similar in size and shape to the other half. A horse’s front feet are slightly larger and rounder than their hind feet. Hind feet are also slightly steeper and narrower, and the soles have more convexity than front feet. In general, when viewing a horse from the front, the foot is considered balanced if the toe is in the center of the boney column of the limb and each heel and quarter is the same length from the top of the hoof to the ground surface. When viewing a horse from the side, the foot is considered balanced when the hoof wall angle is in alignment with the pastern (the sloping part of a horse’s foot between the fetlock and the hoof).

Proper hoof cleaning, trimming, and shoeing all work together to keep horses healthy and fit to move naturally without stress. Consult a farrier or veterinarian for more information about hoof care for your horse. ■
Have you ever wondered about a low-cost method to store your fruits and vegetables for extended periods of time? For many rural homesteaders, a root cellar was a necessary method of storing their crops over the winter so that they could have a variety of vegetables all year long. With the national trend of growing food locally there is renewed interest in preserving the quality of the food, which can be accomplished with root cellar storage.

A root cellar can be a variety of sizes and placed in a variety of locations. The basic premise is that they use the soil’s natural temperature to regulate the climate within the storage area. Root cellars can have a very long lifespan if they are built down into the ground and are constructed out of cement or cinder block-type material.

Maintaining the highest quality and nutritional value of fruits and vegetables can be attained with proper storage in well-built root cellars. Successful storage is best achieved by understanding the requirements of individual crops, as all crops are not stored at the same temperature or humidity. Table 1 outlines the storage requirements for many Montana crops.

Determining what crops you are going to store in your root cellar can have a huge impact on where and how you build your cellar. One of the biggest factors to consider is humidity because vegetables are primarily water. Many root crops store best with high humidity, such as potatoes, whereas onions, for example, are more effectively stored in a drier environment. Humidity is very detrimental to wood products, so consider using vapor barriers to protect the structure of the building when constructing your root cellar. The easiest way to keep high humidity in a root cellar is to have cement walls and a dirt floor. If you are modifying an existing

Table 1. Storage Time and Temperature for Some Crops Grown in Montana

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Temp F.</th>
<th>% Humidity</th>
<th>Storage Time</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beets</td>
<td>32</td>
<td>90-95</td>
<td>3 months</td>
<td>Leave 1-inch stem</td>
</tr>
<tr>
<td>Brussels Sprouts</td>
<td>32</td>
<td>90-95</td>
<td>3 months</td>
<td>Wrap to avoid drying</td>
</tr>
<tr>
<td>Cabbage</td>
<td>38</td>
<td>90-95</td>
<td>4 months</td>
<td>Late-maturing varieties**</td>
</tr>
<tr>
<td>Carrots</td>
<td>32</td>
<td>90-95</td>
<td>5 months</td>
<td>Top, leaving ¼” stem*</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>32</td>
<td>85-90</td>
<td>3 weeks</td>
<td>Wrap in leaves*</td>
</tr>
<tr>
<td>Celery</td>
<td>32</td>
<td>90-95</td>
<td>4 months</td>
<td>Dig with roots***</td>
</tr>
<tr>
<td>Chinese Cabbage</td>
<td>32</td>
<td>90-95</td>
<td>2 months</td>
<td>Dig with roots***</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>50</td>
<td>85-90</td>
<td>3 weeks</td>
<td>Waxed or moist packing*</td>
</tr>
<tr>
<td>Kohlrabi</td>
<td>38</td>
<td>90-95</td>
<td>3 months</td>
<td>Trim leaves*</td>
</tr>
<tr>
<td>Onions</td>
<td>32</td>
<td>55-60</td>
<td>8 months</td>
<td>Dry for two weeks</td>
</tr>
<tr>
<td>Parsnip</td>
<td>32</td>
<td>90-95</td>
<td>6 months</td>
<td>Top, leaving ¼” stem*</td>
</tr>
<tr>
<td>Potatoes</td>
<td>38</td>
<td>85-90</td>
<td>8 months</td>
<td>Pack in mesh bags, unwashed</td>
</tr>
<tr>
<td>Squash</td>
<td>60</td>
<td>55-60</td>
<td>3 months</td>
<td>Winter types, leave 2” stem</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>60</td>
<td>55-60</td>
<td>8 weeks</td>
<td>Single layer in covered boxes</td>
</tr>
<tr>
<td>Turnips</td>
<td>38</td>
<td>90-95</td>
<td>3 months</td>
<td>Waxed or moist packing*</td>
</tr>
<tr>
<td>Small Fruits</td>
<td>32</td>
<td>85-90</td>
<td>7 days</td>
<td></td>
</tr>
</tbody>
</table>

* Pack in moistened sawdust or sand. ** Wrap in clean newspaper. *** Replant in moist sand.
Dear Steward:

I want to put up some birdhouses around my property, especially for bluebirds. Can you give me any ideas for plans? I don’t even know how big to drill the holes!

– Blue for Birds

Dear Blue for Birds:

For information about building birdhouses, go to the North American Bluebird Society’s website. This site contains publications that have birdhouse plans for several species of bluebirds, including Western and Mountain bluebirds that live in Montana. These bluebird house plans give specific dimensions for different birdhouses, including minimum floor area, depth of the interior, height from the floor to the entrance hole, as well as the entrance hole diameter and the height at which to place the birdhouse above the ground. You can find the publications online at www.nabluebirdsociety.org/nestboxplans.htm. Additional information on bluebirds can be found at their general website (www.nabluebirdsociety.org/).

If you have a question for Ask Steward, please send it to bssa@montana.edu or bigskysmallacres@montana.edu.

Prior to storing crops in a root cellar, it is necessary to get the storage area to the desired temperature. This is often achieved by having an air duct system that can be opened and closed to let cool air into the cellar. If you do not have a separate venting system, a trap door can be used to regulate the temperature. In the fall before storing crops, open the door in the evening to allow the cool night air to flow in and close the door during the day to keep that cool air in. When the air temperature inside the root cellar is near 40°F, it is generally safe to start moving in produce.

Once you have filled the root cellar, you will need to continually monitor the temperature in the storage area. During long, cold winters, you may notice a frost line creeping down the walls of the root cellar. This frost is created by the moisture inside the cellar. Once the frost gets within six inches of the top of your crops, you will need to add heat to avoid freezing your vegetables. Heat can be added by turning on a light if it’s available or by using a long-burning candle to minimally raise the temperature within the storage area.

If you are considering building or using a root cellar, North Dakota State University Extension (www.ag.ndsu.edu/extension-aben/buildingplans/crops) and University of Alaska Extension (www.uaf.edu/ces/gardening/) offer additional information on planning, constructing, using, and maintaining root cellars.
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