



Gardening Basics and Advise

Now that you've acquired a garden plot, what to plant and when? Should you begin your plants indoors, purchase starts or direct seed? In cold climates, we have to think about frost-free dates -- **Missoula's average first frost free date is May 19th.** Determine what is a cool season crop and warm season crop, in other words, what is frost hardy and can tolerate some cold vs. plants that have no tolerance for the cold.

Missoula's first frost free date - May 19th although watch the weather forecast as frosts can occur after May 19th.

Remay:

With unpredictable Montana spring weather, it's good to be prepared. Remay and similar agricultural fabrics can help protect against inclement weather and help in other ways too. The benefits of this fabric include:

- *Retaining heat*
- *Weed control*
- *Hail protection*
- *Pest control*

Cool vs. warm season crops -

Cool Season Crops:

<i>Beets</i>	<i>Chard</i>	<i>Peas</i>
<i>Broccoli</i>	<i>Chinese Cabbage</i>	<i>Radishes</i>
<i>Brussels Sprouts</i>	<i>Kale</i>	<i>Rutabagas</i>
<i>Cabbage</i>	<i>Kohlrabi</i>	<i>Spinach</i>
<i>Carrots</i>	<i>Lettuce</i>	<i>Turnips</i>
<i>Cauliflower</i>	<i>Onion</i>	
<i>Celery</i>	<i>Parsnips</i>	

Warm Season Crops:

<i>Beans</i>	<i>Melons</i>	<i>Squash (Summer & Winter)</i>
<i>Corn</i>	<i>Peppers</i>	<i>Tomato</i>
<i>Cucumbers</i>	<i>Potatoes</i>	
<i>Eggplants</i>		

Starting indoors vs. direct seed - Montana has a short growing season and some plants you'll want start indoors vs. direct seed. The following guide will give you a more in depth idea as to what to plant, how to plant it, and when in Montana:

<http://msuextension.org/publications/YardandGarden/MT199308AG.pdf>

Plant Spacing - When planning your garden, spacing is an important element to consider. Some vegetables require more distance between plants than others. For instance, if broccoli is planted too closely, it will "button," which means that it will produce a very small head of broccoli only about an inch or two across rather than a full head. Most plants, when competing for

resources like light, water, and nutrients in soil will not grow to full potential resulting in small beets, carrots, broccoli, etc.

Thinning - When thinning plants, plants should be about 3 inches tall and have one or two true leaves (not the cotyledons, which are the first one or two leaves to emerge from a seed) and the soil should be moist, not dry or soaking wet.

Watering 101:

When should I water? How much should I water? Plants need different amounts of water depending on where they are in their life cycle. The following will help you decide how much and when to water.

Germinating seeds:

Think of watering seeds and seedlings like feeding a baby. Babies need to be fed little in comparison to an adult, but more frequently. Think of where you want your water to go, germinating seeds are just under the soil surface where it can dry out more quickly. Make sure to keep the soil damp but not soaking and water whenever the soil looks dry.

Established plants:

Established plants need to be watered less frequently but more in quantity. Again think of where you want your water to go, the roots of established plants are further underneath the soil's surface. It's advised to water in the morning to allow plants to eventually dry off, rather than watering at night, which may encourage rot or fungal disease.

Watering-in transplants:

Transplanting is a stressful time for plants. Watering plants following transplanting is crucial to their survival. When transplanting, plant in the early morning, evening, or on a cloudy day. Avoiding sunlight, which will cause transpiring plants to continue doing so despite the roots not absorbing water through the roots and causing wilting. "Water in," which simply means to give the roots of a transplant a healthy watering, once established in the soil.

Composting Basics:

What is compost?

Composting is the controlled breakdown of biodegradable organic materials (kitchen and garden wastes) by animals and microorganisms in the soil. Compost is an extremely beneficial soil amendment as it contains a full spectrum of plant nutrients. At the community garden, you can add household waste (see the tables below of what to compost and what not to compost) or garden material to the compost pile. The compost is turned every so often and can be seen in various piles at various decomposition stages at each community garden. Weeds and stems can be added to the weed pile, which will eventually decompose as well and be used as compost.

Compost Demystified:

The decomposition process of compost begins with larger soil fauna, such as beetles and worms, breaking down larger pieces in the pile and culminates with microorganisms (bacteria, fungus, and atinomycetes), which accounts for a bulk of the composting process. The formula of a successful compost pile comes down to the ratio of carbon (C) materials and nitrogen (N) materials present in the pile. An ideal ratio of carbon to nitrogen is 30:1. The 30:1 ratio does not need to be followed exactly, but a good rule of thumb is that two to three volumes of browns be mixed with one volume of greens in order to produce a mix with the correct C/N ratio for composting. Carbon is used by microorganisms as a source of energy, which allows them to keep on eating. In general, woody materials are high in carbon, and referred to as "browns". Dry leaves, corn stalks, straw, bark, and wood shavings are good sources of carbon. Shredding or clipping these materials increases the surface area and makes decomposing easier for the microorganisms. Nitrogen is used by microorganisms as a source of protein to grow their bodies and to reproduce. Nitrogen sources are often referred to as "greens." Grass clippings and pruning are good sources of nitrogen. Others are kitchen scraps and animal manures, including cow, horse, and poultry (not dogs, cats, humans). Avoid fats, meats, and bones in kitchen scraps. You can see from the table below that it takes a mix of lower carbon "greens" and higher carbon "browns" to achieve the desired ratio. If your compost mix is too low in nitrogen, it will not heat up, and you need to add some nitrogen rich materials. If the nitrogen proportion is too high, the compost may become too hot, killing the compost microorganisms, and you need to add some carbon rich materials, or it may go anaerobic, resulting in a foul-smelling mess.

To Compost or Not to Compost:

Carbon (Browns)	Nitrogen (Greens)	DO NOT COMPOST!
Most sawdust (only if you know it's untreated)	Tea bags	Bread products
Chopped woody prunings	Citrus rinds	Cooking oil
Pine needles	Coffee Grounds	Diseased plants and weeds (place them in weed pile)
Fallen/dried leaves	Coffee filters	Heavily coated or printed paper
Dried grass	Shrub and grass clippings	Human or animal feces
Straw	Fruit waste	Meat products
Shredded paper	Vegetable waste	Milk products
Shredded cardboard	Wilted flowers	Rice
Shredded newspaper		Used personal products
		Walnuts or walnut shells

Benefits of Compost:

- Contains macro and micronutrients often absent in synthetic fertilizers.
- Releases nutrients slowly—over months or years, unlike synthetic fertilizers
- Enriched soil retains fertilizers better and prevents runoff that can pollute waterways.
- Buffers the soil, neutralizing both acid & alkaline soils, bringing pH levels to the optimum range for nutrient availability to plants.
- Binds clusters of soil particles, called aggregates, which provide good soil structure. Such soil is full of tiny air channels & pores that hold air, moisture and nutrients.
- Helps sandy soil retain water and nutrients.
- Loosens tightly bound particles in clay or silt soil so roots can spread, water can drain, and air can penetrate.
- Makes any soil easier to work.
- Brings and feeds diverse life (bacteria, fungi, insects, worms and more) in the soil, which support healthy plant growth.
- May suppress diseases and harmful pests that could overrun poor, lifeless soil.
- Encourages healthy root systems
- Can reduce or eliminate use of synthetic fertilizers
- Helps retain water: Only a 5% increase in organic material quadruples soils water holding capacity

Harvesting Basics:

Your Guide to Harvesting the Best Tasting Vegetables and Fruits in Your Garden

Those broccoli plants definitely look beautiful with their vibrant yellow flowers all abuzz with honeybees, but I can assure you that they probably don't taste great. Why is that? When a plant flowers, also known as "bolting," all of its energy is sent to making a seed, which will detract sweetness from leaves and stems and send them to the seed. Plants will bolt when the weather gets warm or when day length increases. This is common, for example, if cool weather crops such as spinach, are planted too late and the weather becomes warmer. Of course, this is okay for some plants from which we eat seeds or fruits, such as peas, beans, and squash. A general rule of thumb is to harvest plants, from which we do not eat seeds, but instead the roots, leaves, and stalks, before they bolt. Bolting plants can be avoided by planting crops according to the cool or warm weather they prefer, respectively. The following chart will list what to harvest when to ensure that you will eat only the tastiest vegetables and fruits from your garden!

Closing down the garden

- *How to close down your garden for the season*
 - 1) Clean all debris, weeds, roots and plants from your plot – it should be ready to plant when you, or the next plot lease, starts next season.* Weeds go in the weed pile, other plant materials in compost pile.
 - 2) Weed and mulch paths around your garden.
 - 3) Place all stalks out of the compost, in a separate pile (look for the sign). This includes corn, sunflower, broccoli, kale and other brassicas. Leaves can be torn from the stalk and placed in the compost pile.
 - 4) Add a small wheelbarrow full of composted manure to your plot.
 - 5) Cover with a layer of straw – ½ a bale per plot.
- * If you are keeping your plot for next year, you can leave perennials. Please trim them for the winter and keep them neat.

Common Garden Weeds:

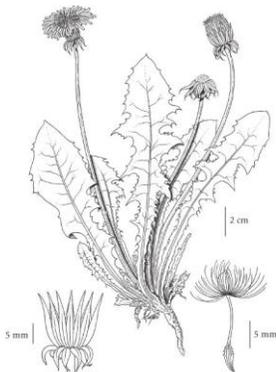
Bindweed (Convolvulus arvensis):



Identification: Creeping perennial often climbing or forming dense tangled mats with an extensive creeping root system that can penetrate the soil to a depth of 20 feet which gives rise to numerous long lateral roots. Bindweed has white to pale pink trumpet flowers.

Management: Handpulling and mowing are somewhat effective method of control as seeds are prevented this way, but the extensive, rhizomatous root system still causes problems. **Avoid using a rototiller where bindweed is present**

Common Dandelion (Taraxacum officinale):



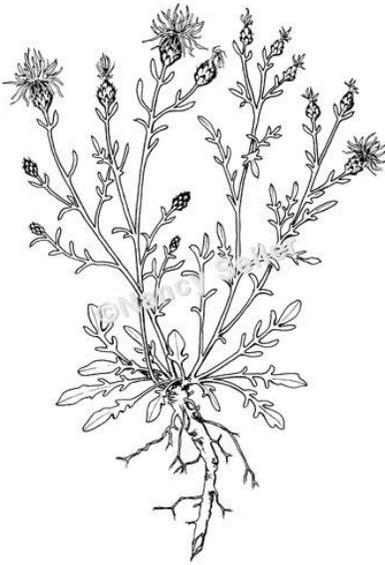
Taraxacum officinale



Identification: Dandelion is a perennial that produces a strong taproot that is capable of penetrating the soil to a depth of 10 to 15 feet – Deeply serrated Leaves are clustered in a rosette at the base of the plant and vary in length from 2 to 14 inches and from 1/2 to 3 inches wide. Flowering stalks are 6 to 24 inches in length and terminate in a compound inflorescence or head that contains 100 to 300 ray flowers and looks like a characteristic puffball.

Management: Dandelions can be dug out when very small plants by hand, taking care to remove the whole root rather than simply hoe off the top growth. However, it is very difficult to get the whole root, especially if the plants are large or the ground is dry, and any portion left in the ground can sprout at least one new plant. Mowing the flower heads as soon as they open helps reduce seed formation.

Knapweed (Spotted Knapweed) [Centaurea stoebe (syn. maculosa)]:



Identification: Grows 1-3 feet tall with leaves that are long and divided on lower, short and narrow above, covered with fine hairs. Flowers are pink to purple, rarely white. Knapweed has a well-developed and fibrous taproot.

Management: Hand pulling is an extremely effective method on small-scale infestations of spotted knapweed. Pulling is easiest when soil is moist; allowing you to remove most of the taproot and kill the plant. Any stage from flowering on should be bagged and removed from the site in order to minimize seed at the site. Mowing will help reduce seed production of spotted knapweed; however, repeated mowing will result in plants flowering and setting seed below the blades of the mower. Mowing should occur during the bud stage but before flower to prevent cut plants from producing viable seeds

Lambsquarters (*Chenopodium album*):



Fig. 48. Common lambsquarters (*Chenopodium album*)
Flowering plant, a. Enlarged seed.

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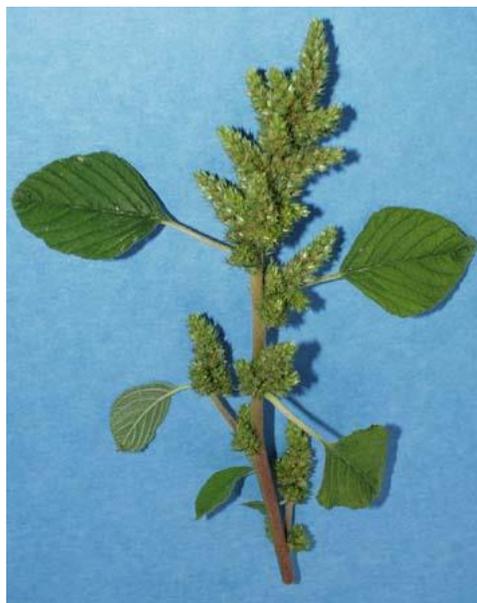
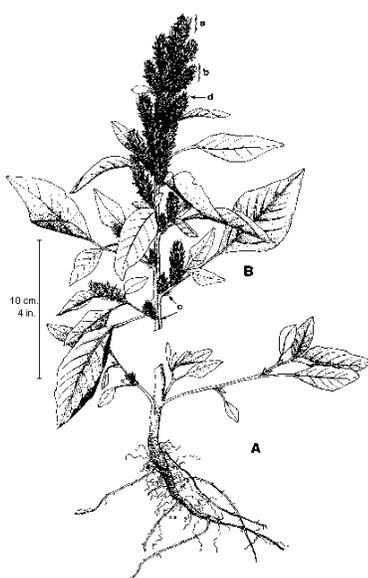


Identification: Lambsquarters is a rapidly growing summer annual weed. Height averages 3 feet (90 cm), but may vary from a few inches to 6 feet (1.8 m). The most distinguishing feature of common lambsquarters is its white mealy coating. The smooth stem below the seed leaves is light green, tan, or light maroon. Flowers are small, mealy, and green.

Management: The best control method is to prevent infestation and spreading by minimizing seed production. Tillage is another useful control method, because common lambsquarters cannot recover from uprooting or mechanical damage. Mowing is another way to prevent seed production.

Other Notes: Lambsquarters is an edible weed and delicious when harvested while the plant is young. You can add to salad, or cook it similar to spinach or chard.

Pigweed (Redroot Pigweed) (*Amaranthus retroflexus*):



Identification: A summer annual broadleaved weed, redroot pigweed usually grows about 2 to 3 feet (0.6 to 0.9 m) high, but sometimes as high as 6 feet (1.8 m). The leaves are dull green on the upper surfaces and reddish purple on the lower surfaces, alternating along the stem and are oval or long and narrow. Upper surfaces are green; lower surfaces vary from green with reddish tinges to completely red. Flowers are small, green, and crowded into dense fingerlike spikes that form long, terminal clusters. Each flower is surrounded by three stiff, awl-shaped bracts. Bracts are twice as long as the flowers and have spiny tips that protect developing seeds from predators.

Management: Because redroot pigweed is an annual and has a relatively shallow root system, its seedlings are easily destroyed by cultivation. Seedlings are most susceptible to cultivation during the first four weeks after germination, when growth is fairly slow, especially if the weather is cool. Once it is well established, redroot pigweed is difficult to control. It can recover from extreme disturbances, such as clipping and trampling, and can rapidly produce axillary flower clusters. Redroot is quite competitive with crops; it grows rapidly and uses water very efficiently. Control at early growth stages is essential. One can remove small numbers of plants with a spade or dandelion fork (a tool for cutting weeds just below the soil line). After removing weeds by hand, we recommend bagging and removing them to ensure seeds are not left in the field.

Purslane (Common or Summer) (Portulaca oleracea):



Fig. 62. Common purslane (*Portulaca oleracea*). Flowering plant, a. Flower, b. Seed. 133



Identification: Common purslane is a prostrate, succulent, annual that often forms a dense mat. The reddish stems originate from a central rooting point, radiating out like spokes of a wheel. The stems vary in length, commonly up to 12 inches. Leaves are stalkless (sessile), oval, smooth, succulent, and shiny, and vary from 1/2 to 2 inches in length. The leaves, although generally arranged opposite, may also occur alternately along the stem, particularly near the base. Small (3/8 inch), five-petaled, yellow flowers are borne singly in leaf axils and open only in sunshine. Seeds are borne in a small pod with a top that comes off like the lid on a cookie jar. Seeds are reddish brown to black, oval, and tiny (about 1/64 to 1/32 inch in diameter).

Management: This weed is generally managed by cultural means such as hand-weeding and mulching. Cultivation following irrigation when common purslane seedlings are small can reduce the weed population. However, because common purslane germinates at or near the soil surface, cultivation can bring up a fresh supply of weed seeds from deeper regions of the soil for future germination. If they screen out all light, mulches can be used to control common purslane. To be effective, organic mulches should be at least 3 inches thick. Synthetic mulches (plastic or fabric mulch) which screen out light and provide a physical barrier to seedling development, also work well. Fabric mulches, which are porous and allow flow of water and air to roots, are preferred over plastics.

Other Notes: Purslane is an edible delicious weed and can be added to salads for a lemony/zesty addition.

Quackgrass (*Agropyron repens*):



Identification: Quackgrass grows from underground rhizomes to an unmowed height of 1 to 4 feet. It has thin, flat, bright ashy green leaf blades. The seed spike grows from 3 to 8 inches long and appears in July. Each quackgrass plant produces about 25 seeds; they remain viable 3 to 5 years in the soil. It takes 2 to 3 months for a newly germinated plant to develop rhizomes. It is very important to eliminate the plants before they reach this stage. Rhizomes (underground stems) are yellow to white, 1/8" in diameter, with distinct joints or nodes every inch or so. Each node is capable of producing fibrous roots, and sending a new blade of grass through the soil. The creeping rhizomes are so tough they can grow through a potato tuber, or push up through asphalt pavement. If left to grow, they will form a dense mat 4" thick in the upper part of the soil. One plant can produce 300 feet of rhizomes each year. **Avoid using a rototiller where quackgrass is growing**, because it amounts to propagating thousands of new plants from the chopped up rhizomes.

Management: Several spring cultivations should sprout and kill any weed seeds before they develop rhizomes. Extremely shallow cultivation works best where there is existing quackgrass as any cutting of the rhizomes means rapid multiplication of plants. Mulch should be used as much as possible to smother plants, but you can be assured that the rhizomes will creep along until there is an area in which it can send up a shoot. Rhizomes will have to be hand dug as much as possible without breaking them off in the soil, then dried and disposed of. The main thing is to repeatedly eliminate the blades by slicing them off with a hoe. Without photosynthesis the plant will not be able to store food reserves in the rhizomes and will eventually die. Any newly germinated plants can be easily hoed out and they will dry up and die on a sunny day.

Sow Thistle (*Sonchus arvensis*):



Identification: Perennial herbaceous plant, 2 - 5' tall erect, single stem, branches near the top into several flower stalks. Broken stems emit a sticky milky bitter juice with a sour odor. Alternate, lower leaves are deeply lobed, upper leaves clasp the stem; similar to dandelion leaves except with teeth ending in small weak prickle. Flowers are bright yellow up to 2" wide daisies, blooming from June through August. Seeds are tufted, dispersed by the wind. The roots are widely spreading white brittle roots penetrating five to ten feet, producing new plants from small root pieces.

Management: Cutting and pulling sow thistle is an effective method. Try not to break the stem off from the root when pulling as a root left in the ground can regrow the plant.

Whitetop or Hoary Cress (*Cardaria draba*):



Identification: Whitetop is a perennial, grows up to 2 feet tall. Leaves are blue-green and stem leaves are blue-green to gray-green and arrow-shaped with occasional finely toothed edges. All leaves are covered with soft white hairs. Leaves of the lower stem are on stalks, while leaves of the upper stem attach directly to the stem with two clasping lobes. Flowers have four white petals arranged in a cross. Dense clusters of small flowers create the white, flat-top appearance.

Management: Whitetop can be managed in fall or early spring is appropriate when it is in the form of small seedling stands. When pulling, hoeing or tilling the seedlings, make sure to get the lateral and vertical roots. If fragments of the root remain, new plants will develop. Pulling and cultivation must be done on a regular basis, sometimes several times a season. For example, tilling white top must be repeated every 10 to 21 days until no seedlings emerge. Do not till or mow an established stand; this stimulates the rhizomes to grow new plants.