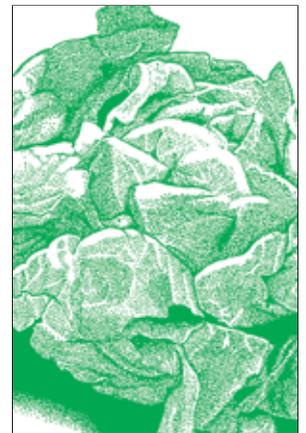
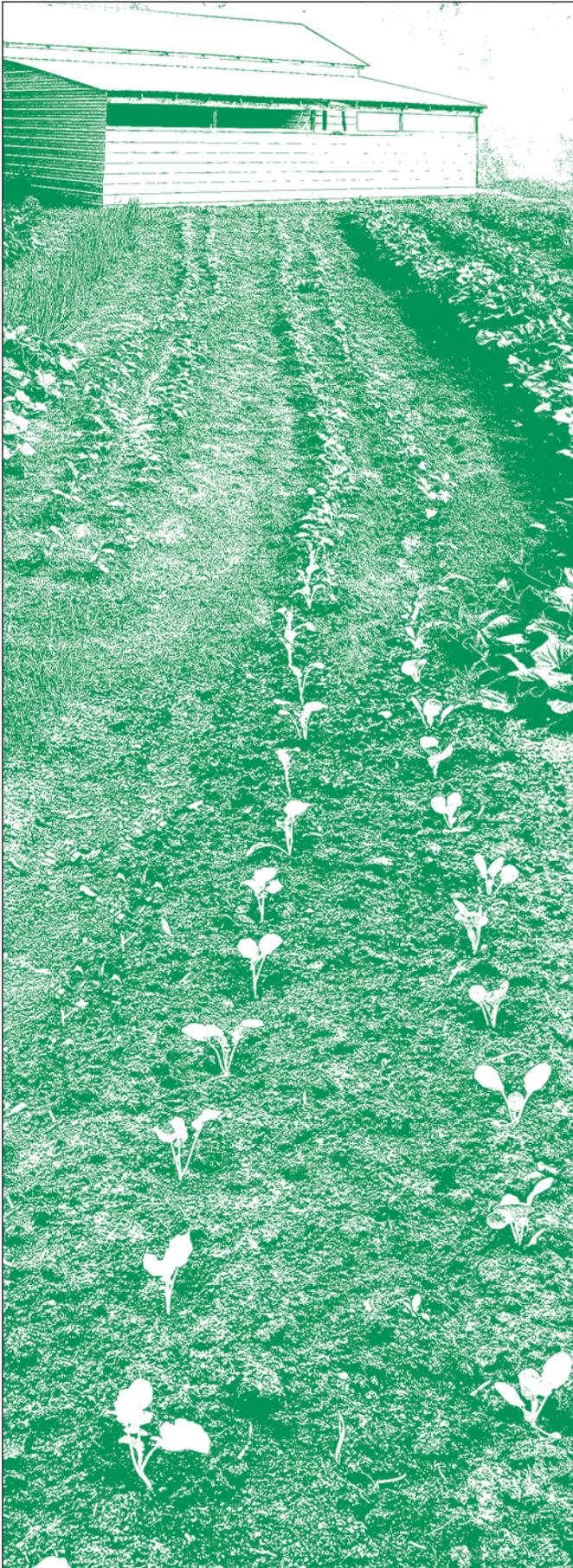


A Plain Language Guide

Growing Fresh Market Salad Greens

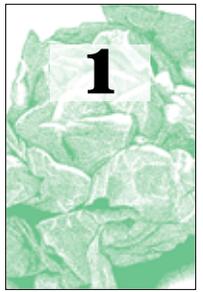


A. C. Newenhouse



The Wisconsin Farm Center has more information about services to help beginning farmers. To find this information on the internet look under the heading Farming and Agriculture at <http://datcp.state.wi.us/>.

Your local county Extension office also has more information for fresh market farmers. Go to <http://www.csrees.usda.gov/Extension/>. Click on your state and then your county to find the Extension office near you.



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Most salad greens grown in the Midwest are leafy annuals that like cool weather, but some varieties can grow in summer heat. Many growers offer salad greens or leafy greens early in the growing season and again in the fall. Salad greens grow well in an unheated plastic greenhouse or hoop house.

Salad greens spoil quickly so locally grown fresh greens are usually the best quality. You can sell leafy greens for a high price if you grow and market them well, but you may need to use a lot of hand labor. Salad mix is a collection of leafy greens sold together in a bag. Customers like salad mix because it is convenient. You can grow the greens as a mixture in the field or put them together after harvest. Salad greens are very healthy.

Plant Description

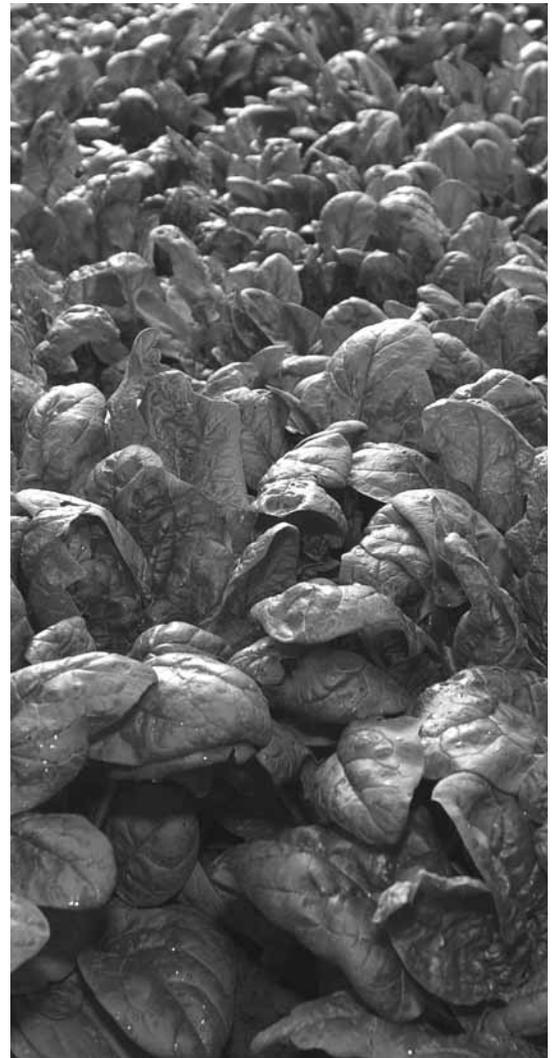
Lettuce

Lettuce (*Lactuca sativa*) is in the aster family, native to the eastern Mediterranean and Asia Minor. Even though lettuce is low in vitamins and nutrients, it is an important crop in the US because people eat a lot of it. Lettuce in your diet gives you fiber, vitamins A and C, calcium, and iron. Loose leaf lettuce has more nutrients than head lettuce, and dark green leaves have more nutrients than light colored leaves.

Lettuce varieties come in many colors and leaf shapes.

Spinach

Spinach (*Spinacia oleracea*) is native to Iran and is in the goosefoot family similar to lambsquarter (*Chenopodium*). Spinach is an annual that can grow in colder weather than lettuce. It contains vitamins A and C, calcium, phosphorus, iron, and potassium. Spinach also has a lot of fiber and some protein. Spinach plants grow with many leaves attached to a very short stem. Leaves can be smooth or crinkled.





Swiss chard

Swiss chard (*Beta vulgaris* var. *cicla*) is native to the Mediterranean and is in the goosefoot family similar to lambsquarter (*Chenopodium*). It is a variety of beet (*Beta vulgaris*) which grows large leaves while the root stays small. Swiss chard tastes like spinach and has crinkled leaves and fleshy leaf stalks. Chard keeps its high quality even in heat and does not produce a premature seed stalk. Therefore it is often grown in the summer in the Midwest.

Asian greens

Many greens that are common in Asia are also sold as salad greens in the U.S. Many of these greens are related to cabbage or mustards (*Brassica*) such as mizuna, tat soi, komatsuna, pac choi, hong vit, and hon tsai tai. They are easy to grow and like cool weather. Asian greens have a lot of vitamins.

Specialty greens

Many other crops are grown as salad greens in the Midwest. Some of these include arugula (*Eruca sativa*), cilantro (*Coriandrum sativum*), cress (*Lepidium sativum*), mâche (*Valerianella locusta*), miner's lettuce or claytonia (*Claytonia perfoliata*), dandelion (*Taraxacum officinale*), kale (*Brassica oleracea* and *Brassica napus pabularia*), collards (*Brassica oleracea*), orache (*Atriplex hortensis*), purslane (*Portulaca oleracea*), New Zealand spinach (*Tetragonia tetragonioides*), amaranth

(*Amaranthus tricolor*) and sorrel (*Rumex acetosa*). New Zealand spinach and purslane grow well in hot summer weather. Miners lettuce and cress tolerate cold and can extend the growing season. Small amounts of arugula, cilantro, mizuna, and dandelion are used to add flavor to salad mix.

Site selection

The small seeds of leafy greens like rich, fluffy soil high in organic matter. Choose a site where the soil warms up quickly in spring. Leafy greens have shallow root systems and lose a lot of water through their leaves, so plant them on soil that holds moisture. Be sure the soil drains well because that will help prevent diseases. You can plant early season crops on sandy soils which warm up quickly. Plant mid- to late-season crops on heavier soils or soils with high organic matter so they hold moisture. The small seeds to leafy greens cannot germinate in crusted soil. To prevent a soil crust use shallow cultivation, mulch, and only give the seed bed enough water to wet the soil at germination but not to drench it.





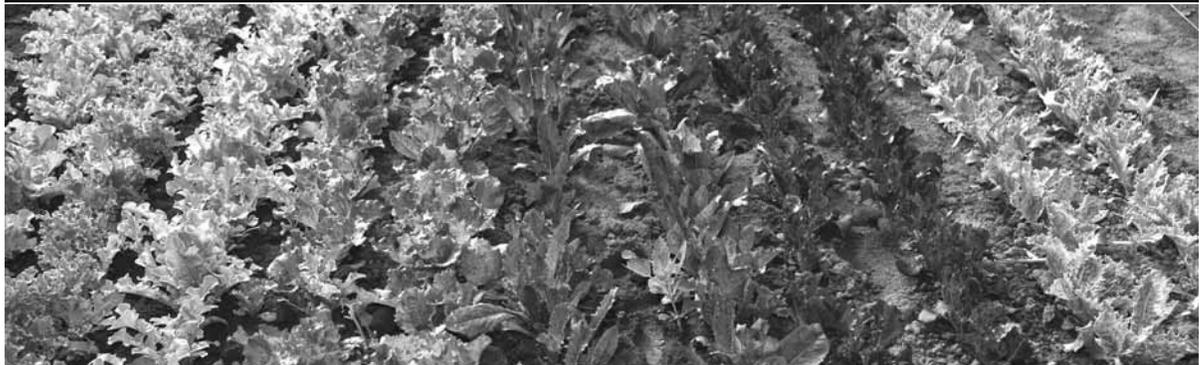
Variety Selection

Variety Selection

Choose varieties of leafy greens that suit market gardening in the Midwest. Look for varieties that resist disease, tolerate heat, have good flavor, and have different colors, shapes, and textures. Plants that cannot take heat will send up an early seed stalk, which is called bolting. Leaves from plants that have bolted do not taste good.

Table A. - Lettuce varieties

Lettuce varieties for the Midwest					
Leaf	Butterhead (Boston and Bibb)	Romaine	Crisphead	Spinach	Chard
Black Seeded Simpson	Barbados	Coastal Star	Crispino	Space	Bright Lights
Grand Rapids	Buttercrunch	Freckles	Great Lakes	Tyee	Fordhook Giant
Great Lakes	Cherokee	Green Forest			Rhubarb
Tropicana	Concept	Parris Island Cos 714			
New Red Fire	Nancy				
Oakleaf types, Red and Green	Nevada				
Red Sails	Mottistone				
Red Salad Bowl	Red Cross				
Vulcan	Rex (for greenhouse)				
Royal Oakleaf	Sylvesta				
Waldmann's	Teide				





Lettuce varieties

There are four main types of lettuce commonly grown in the Midwest: crisphead, butterhead, romaine, and leaf (table A).

Crisphead varieties (*Lactuca sativa* var. *capitata*) are often called “iceberg” lettuce. Plants start with many leaves on a very short stem and then leaves begin to overlap each other and become tightly folded to form a dense head which is usually more than 6” across. Leaves are large, heavy, and brittle. The outer leaves are green and the inner leaves are white or yellow.

Butterhead lettuce varieties form smaller more compact heads than crisphead. Leaves are loosely crumpled and have thick veins and midribs. Butterhead lettuce has more flavor and a buttery texture compared to crisphead lettuce. There are two types of butterhead lettuce: **Boston**—a variety which produces large heads with light green leaves and can grow in midsummer, and **bibb**—a smaller, dark green variety for spring or fall. **Bibb** lettuces do not ship well since their leaves bruise and tear easily, so these types are good to grow for local markets.

Romaine is also known as cos (*Lactuca sativa* var. *longifolia*). Romaine lettuce forms long upright heads with long leaves that have thick midribs. Romaine lettuce has coarse outer leaves and tender, flavorful inner leaves. It tolerates changes in

temperature and moisture better than crisphead or bibb lettuce.

Leaf lettuce (*Lactuca sativa* var. *crispa*) varieties come in all types of shapes, colors, and textures which chefs and consumers like. They are particularly good to grow for local markets since they do not ship well and are not usually available from other states.

When you choose **spinach** varieties, look for ones that resist diseases, resist bolting, and are high in nutrition. Spinach varieties have either smooth leaves or crinkled (*savoy*).

Swiss chard varieties should also be disease resistant and can be different colors such as red, pink, orange, white, yellow, and green.





Planting and Care

Planting and Care

Refer to table B for the amount of seed you will need, how deep to plant seed, how far apart to plant, when to plant, days to first harvest, and yield.

Leafy greens or salad greens are ready for market quickly and farmers usually plant seeds every few weeks so they can sell lettuce all season. In the winter, make a calendar that lists the dates you plan to plant salad greens, since it can be hectic during the growing season to keep up with so many plantings. Plant seed as soon as possible in the spring. You can grow spinach, asian greens, and some other cold tolerant crops in late fall and winter under shelter such as floating row covers, a cold frame, or in a hoophouse with 1-2 layers of clear plastic. See the section on season extenders to learn more.

If you plant heat sensitive leafy crops in summer, you should pre-germinate seeds by soaking them in water until the first root just begins to form. This is because warm soil prevents seed germination. Change the water daily to give the seeds oxygen, or place them on a paper towel, roll up the towel, and keep it moist until the first root emerges. Then plant the seed by hand.

You can try to cool the crop by shading plants with a lightweight floating row cover (which lets light pass through) or by planting between rows of taller crops planted north to south.

Soil preparation

Work beds 6-7 inches deep to promote good rooting. Just before you plant, cultivate the soil lightly to prevent a crust. If erosion is not a





problem, prepare the soil in fall to plant in early spring. Cold wet soil in spring might delay planting. Never work wet soil because this can cause soil compaction. Compacted soils prevent oxygen and water from reaching roots, and plants do not grow as well or produce as much.

Raised beds

You can pile up soil to make raised beds to improve soil drainage and prevent compaction. Raised beds are usually 4-5 feet wide and 100 feet long. Leave a 1-foot aisle on either side of each bed for a path.



Seeding

Plant seeds by hand or with a seeder. After planting, give the seed bed water regularly until germination so the soil does not form a crust. Seeds for salad crops are often very small, and plants need to be thinned out to give them space to grow. Some companies sell pelleted seeds that are coated and rolled to make them uniform and easier to handle, especially for growers who plant with a precision seeder. If you are an organic grower, check to make sure that the coating on pelleted seed is organic, because some pelleted seeds have pesticides in the coating. Precision seeding is done with special planters and uniformly sized seeds, and is done in a way that you do not have to go back and thin the plants. Many different types of planters are available such as the gravity-feed cone seeder, belt-drive seeder, vacuum seeder, and walk-behind plate-type seeder. Some growers who do not use precision seeders thin salad greens by hand and sell the small plants that they remove from the rows.

If you have seeds left at the end of the year store them in an airtight glass jar in a cool, dark, dry place such as a cellar. You can sprout the seeds to test germination next year, or sprout them to sell as fresh leafy sprouts. In the best storage these seeds could keep for 2-3 years.



Planting and Care

Starting seeds

You can start leafy greens in the greenhouse and transplant them outdoors to get an earlier crop. Start your transplants 3-4 weeks earlier than you will plant them outdoors. You can buy or mix your own sterile potting mix. The mix should include compost, peat, or sphagnum to hold moisture; vermiculite or perlite for aeration; and mineral and nutrient sources to feed the new plants after the first roots form.

1. Fill plastic or styrofoam cell trays with potting soil, or make individual blocks with a soil blocker. Cells as small as 1 inch diameter are fine.
2. Barely cover the seeds with a small amount of soil, since they need light to germinate.
3. Label the trays with variety and planting date.
4. Keep soil moist but not wet.
5. The temperature at night should be 10-15 °F cooler than during the day.
6. Thin seedlings to one plant per cell or plug, or one plant every inch.
7. Ten days before transplanting out to the field, harden off the plants by putting them outside for a few hours each day during the warmest time of the day, or move plants into a cold frame. The section on season extension describes a cold frame.

Planting lettuce

Lettuce prefers weather between 65°F and 70°F during the day and 45°F and 55°F at night. Some varieties of lettuce grow better under long days while for others day length does not matter (they are “day-neutral”). If lettuce gets too hot under the long days of summer it can produce an early seed stalk (“bolt”) and poor flavor. You can plant lettuce, like most salad greens, as early as April 15 in southern Wisconsin. Plant more every 2-3 weeks as long as there is cool weather. You can plant some varieties that tolerate heat as late as early July. Under the best conditions, lettuce seed will germinate in 2-4 days and come up shortly after. If the soil is cooler, then germination is slower; and if the soil is warmer (above 77°F) then germination stops.

Plant spacing

- ❖ For head lettuce, plant 3 seeds every 8 inches in rows 12-18 inches apart.
- ❖ Thin head lettuce to 1 plant every 8 inches.
- ❖ For leaf lettuce, plant either in rows 2-4 inches wide or in beds.
- ❖ Plant leaf lettuce close together and thin to 1-2 inches between plants.

Decide whether you want to combine seeds to mix varieties within the planting beds or grow them separately and mix leaves together after harvest. Since these seeds need light to germinate you should barely



cover the seeds with a small amount of soil when you plant them. Sprinkle lightly with water to give the plants even moisture.

You can start head lettuce from seed indoors and transplant it out in early May. Water transplants well at planting.

Planting spinach

Spinach grows best at 55-65°F. In the Midwest, grow spinach in the spring or fall. Plant spinach from mid April through early May and again in early August through early September. If you plant in the heat of summer, long days and warm temperature causes spinach to send up an early seed stalk (to bolt) and stop making large leaves. Spinach is very hardy. If the plant is used to cold it can take some freezing down to 14-20°F.

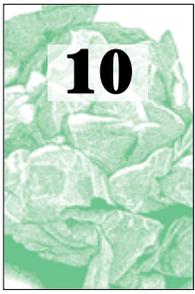
You can plant spinach in late fall the year before and plants will either grow to maturity before frost or grow big enough (3-4" diameter) to survive the

winter. Early the next spring they will begin to grow new leaves. If you plant spinach seeds in late fall or early winter and cover them with mulch they might sprout early the next spring.

- ❖ Plant in rows or in beds.
- ❖ For salad mix, plant seeds $\frac{3}{4}$ inch apart in rows 2-4 inches wide.
- ❖ For full sized leaves, plant $1\frac{1}{4}$ inches apart in rows 12-18 inches apart.
- ❖ For salad mix, clip leaves when they are small.
- ❖ For full sized leaves, pick outer leaves first.

Seed should be planted $\frac{1}{2}$ inch - $\frac{3}{4}$ inch deep. In cool weather, between 40-45°F, almost all of the seeds will germinate but will take up to 3 weeks to come up. In warmer weather, germination is faster (7-10 days) but the percent of seeds that germinate goes down.





Planting Swiss chard

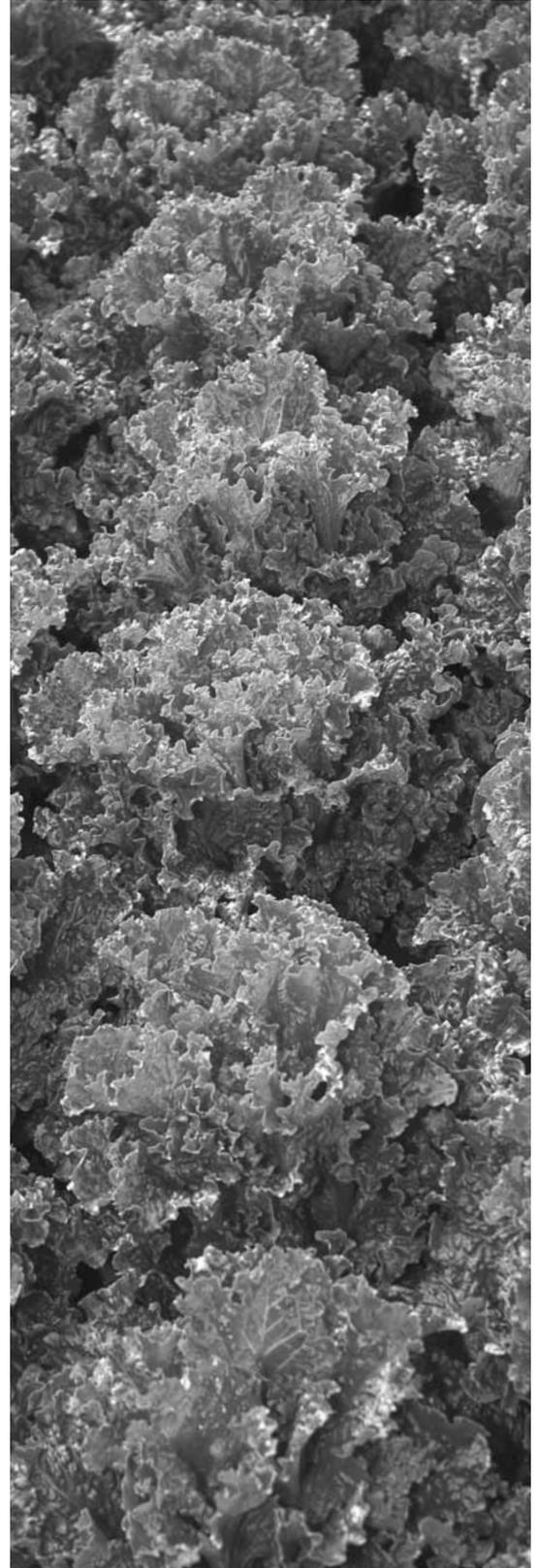
You can plant chard as early as mid-April and then every four weeks. If you grow it for salad mix pick it until 30 days before frost. If you grow it for full sized leaves pick it until 60 days before frost. Cold weather can cause bolting, an early seed stalk, which stops leaf growth and makes leaves bitter. Plant either in the field or use transplants.

- ❖ For salad mix, seed ½ inch deep in the same spacing as for leaf lettuce.
- ❖ For full sized leaves, space plants 8-12 inches apart in the row.
- ❖ For salad mix, clip leaves when they are small.
- ❖ For full sized leaves, pick outer leaves first.

Planting Asian greens

Plant Asian greens when the weather is cool, in spring and fall. If you plant in the heat of summer, Asian greens will start to flower and the leaf flavor will be bitter.

- ❖ For salad mix, plant seeds closer together.
- ❖ For full sized bunches, plant seeds ¼ inch deep and 2 inches apart in rows 18 inches apart.
- ❖ For salad mix, clip leaves when they are small.
- ❖ For full sized leaves, pick outer leaves first.



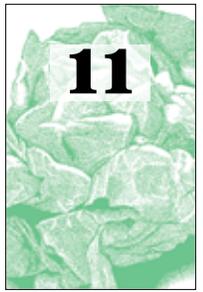


Table B. Planting guide

Vegetable	Planting time in Southern WI ^a		Plants or seeds needed for 100 ft of row	Seed depth (inches)	Spacing (inches) ^b		Days to first harvest ^c	Estimated yield (lb/ft of row) ^d
	Indoors	Outdoors			Between rows	Between plants		
Lettuce, head	March 15	May 1	100 plants	-	15-18	8-10	60-75	0.50
Lettuce, leaf	-	April 15	¼ oz	¼	15-18	2-3	40-60	0.25
Spinach	-	April 15	1 oz	¾-1	15-18	1-2	40-60	1.00
Chard	-	April 15	1-1¼ oz	½	15-18	12	40-50	2.00
Asian Greens	-	April 15	1/6 oz	¼	15-18	2-6	35-45	0.25-0.50

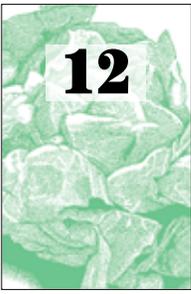
^a Plant about 1 week later along the lower lake shore and in the central part of the state and about 2 weeks later in the north.

^b If you use a plate-type seeder, the plate will make the spacing between plants.

^c Varieties are ready to harvest at different times; plant again and again to have a longer growing season.

^d Estimated yields under less than ideal growing conditions; actual yields will depend on weather, soil fertility and cultural practices.





Season extenders

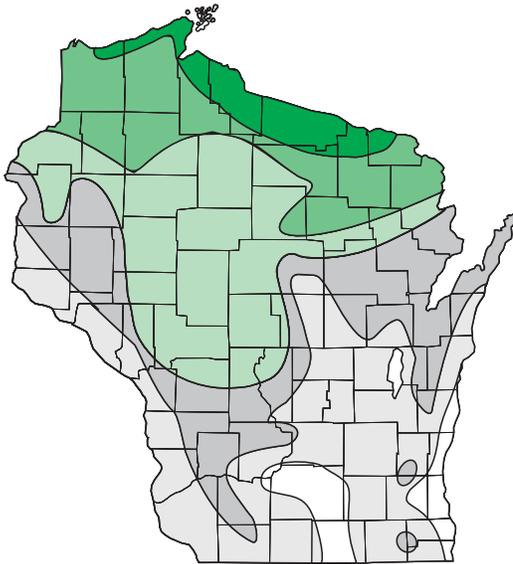
You can make the growing season longer by protecting plants from late spring frosts and early fall frosts using these methods.

Floating row covers. Floating row covers are special sheets of white fabric made of spun-bonded polypropylene which lets sunlight and water through the fabric but stops insects.

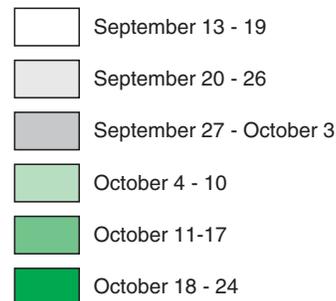
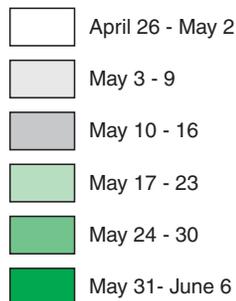
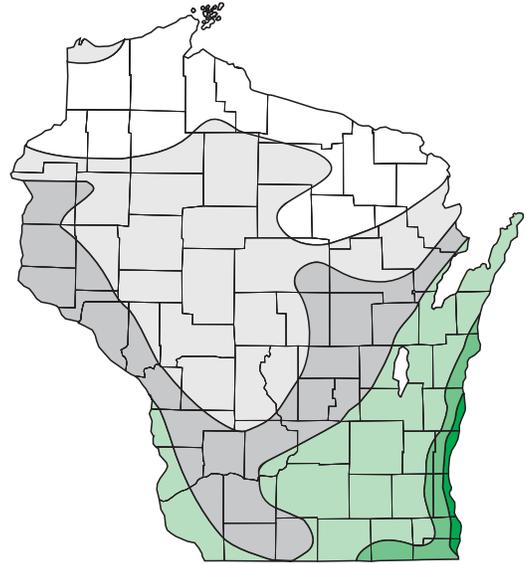
- ❖ You can use row covers to protect plants from frost, wind, and insects.
- ❖ Row covers come in different weights and the thicker ones can warm plants by 4-8°F.
- ❖ You can plant salad greens 3-4 weeks earlier in the spring and harvest 3-4 weeks later in the fall.
- ❖ You can wash and re-use row covers for two to three seasons.

Frost dates maps

Last spring killing frost



First fall killing frost





Put the row cover on top of the crop or hold it up with wire hoops. If you use wire hoops to hold up the row cover, use -gauge wire 6 feet apart and buried 1 foot deep on each side of the row.

If you gather the edges and loosely bury them along the crop row, then as the crop grows it will push up enough fabric to form a “floating” cover. You can also use rocks or heavy posts to hold down the edges. If you want the row cover to keep out insects you must seal all the edges tightly to the ground. If you use row covers for early spring or late fall crops, take them off when the air is warm enough for the crop to grow. Before this, let the plants harden off for a few days to prevent heat and sun from burning the crops. Do this by removing covers on cloudy days or for a few hours on sunny days. On very hot days, be sure to lift the row cover to give plants some air.

Tunnels and cold frames. Tunnels are large, unheated plastic hoop-frames that can also be used to lengthen the growing season. Use metal or plastic hoops to hold up clear plastic over the crop. Cut slits in the plastic for air flow. Tunnels made of clear plastic with slits increase daytime temperatures by 10-30°F and give 1-4°F of frost protection.

Cold frames are a type of planting bed made by building wooden sides on each side of a bed on the ground. The back is higher than the front and

the frame holds up a glass top at an angle to the sun facing south. You can use an old window to make a cold frame. Cold frames also warm the soil and let you grow crops earlier in the spring and later in the fall.

Greenhouse production. Salad greens grow well in greenhouses or plastic hoop houses, where you can plant 4-6 weeks earlier than outside. You can also plant through November before sunlight is too weak. You can use floating row covers on top of crops in a greenhouse or hoop house to give extra warmth.

Be careful to control nitrate levels when you grow salad greens inside in low light, especially spinach. Nitrate can build up in these plants and form nitrite which is toxic to people. Keep leaf nitrate levels down by using the least amount of nitrogen fertilizer and putting it just along the plants instead of over the whole area. Give plants many small amounts of fertilizer through the growing season instead of one large amount.



Soils and Nutrient Management

Get a soil test before you plant a field for the first time and then at least once every 3 years. For information on how to collect samples and where to send them for analysis, see University of Wisconsin Extension publication *Sampling Soils for Testing (A2100)*.

Most soil tests include pH, organic matter, phosphorus, and potassium. You can also ask to test for nitrate-nitrogen, calcium, magnesium, sulfur, boron, manganese, and zinc. You will receive the results of your soil test along with fertilizer recommendations based on how you will use your field. You can also test your potting soil and the soil inside your hoophouse or greenhouse.

Table C. - Soils and Nutrients

Annual nitrogen, phosphate, and potash for salad greens								
Vegetable	Nitrogen			Phosphate and potash				
	Organic matter	Amount to apply ^a		Soil test categories	Amount to apply ^a			
		lb/a	oz/100 sq ft		Phosphate (P ₂ O ₅)		Potash (K ₂ O)	
%	lb/a	oz/100 sq ft	lb/a	oz/100 sq ft	lb/a	oz/100 sq ft	lb/a	oz/100 sq ft
Asian Greens ^b	<2.0	145	5.4	–	Heavy feeder, more than lettuces			
	2.0-9.9	120	4.4	–				
	10.0-20.0	95	3.5	–				
	>20.0	50	1.9	–				
Lettuce and Swiss Chard	<2.0	120	4.4	optimum	40	1.5	160	5.9
	2.0-9.9	100	3.7	high	20	0.7	80	2.9
	10.0-20.0	80	2.9	very high	–	–	40	1.5
	>20.0	40	1.5	–	–	–	–	–
Spinach ^c	<2.0	100	3.7	optimum	20	0.7	50	1.8
	2.0-9.9	80	2.9	high	10	0.4	25	0.9
	10.0-20.0	60	2.2	very high	–	–	10	0.4
	>20.0	30	1.1	–	–	–	–	–

^a Follow guidelines from your soil test.

^b Pak choi used as example.

^c If you grow spinach with lettuce or chard, follow guidelines for lettuce.



Soil pH

Soil pH measures acidity and should be between 6.0 - 8.0 for salad greens so they can take up the most nutrients from the soil and have enough minerals. If they don't have enough minerals plants can turn yellow, form brown spots on leaves, or other problems. For lettuce, pH 6.0-8.0 is best and less than 5.5 is too acidic; for spinach, 6.0-7.5 is best, and for chard 6.5-7.5. If the pH is below 6.0, apply aglime to raise the pH.

Fertilizer needs

Leafy greens need nitrogen, phosphorus, and potassium in large amounts and many other nutrients in small amounts. Leafy greens have a shallow small root system, so they need small amounts of fertilizer often. Also, this schedule gives fast steady growth for crisp high quality leaves. Nitrogen is the most important nutrient for leafy greens. Put down no more than half the amount of nitrogen you need during the growing season when you make the field ready for planting. Later, such as when you thin the plants, put down more.

Table C gives the amount of fertilizer these plants need. When you give the plants fertilizer later in the season, put it in a strip near the plant roots. Give the plants more nitrogen in the last few weeks before harvest, because most of the plant's growth happens at that time.

Choose fertilizer from organic or inorganic sources. Healthy soil has

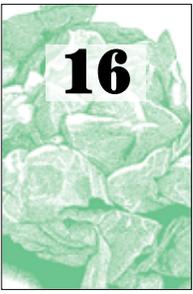
tiny organisms (microbes) that break down organic matter into nutrients that plants need to grow. Over time, organic fertilizer can build your soil and make the soil more healthy and fluffy which lets plants grow more easily.

Inorganic fertilizers give plants nutrients quickly but do not build the soil. Some inorganic fertilizers have a lot of salt which is bad for soil organisms. Organic fertilizers can come from manure, compost, fish meal, bone meal, and live compost tea that includes oxygen. Recent studies show that live compost tea helps prevent plant diseases and also gives nutrients to plants. Live compost tea is made by carefully mixing fungi, bacteria, sugars, water, and a steady stream of air to grow active soil micro organisms.

Irrigation

Salad greens need water regularly because they have big leaves and a small shallow root system. Before germination, water the soil so a crust does not form. As plants grow, notice if leaves wilt in the middle of the day. If so, they need water. Plants that wilt for a short time will not produce as big a yield. Plants that wilt often or for a long time might die.

Use either drip irrigation or sprinkler. Drip irrigation saves water and helps prevent leaf diseases. Prevent tipburn (see page 22) with frequent watering. Mulch can help keep moisture in the soil.



Harvest, Handling, and Storage

Most people pick salad greens by hand in the Midwest. Growers either pick and sell the outer, older leaves from each plant or cut all the leaves at once. Either way, plants grow new leaves and you can get many harvests from each planting.

Taste your own crop to learn the best time to harvest from your field. If you know your own crop well you can talk about the high quality of your produce with customers. Most salad greens can be cut when they are young and on to a point where they begin to lose their flavor. Some salad greens turn bitter if you harvest too late. Also, plants harvested late tend to get more diseases. Some growers sell “micro”

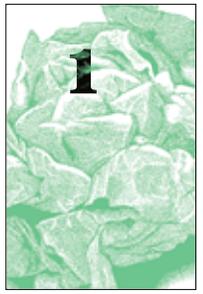
greens: tiny leaves picked when the first true leaves appear.

If you cut bunches of leaves or heads, use a sharp knife or scissors. Cut heads below the lowest leaf. Remove the outer leaves and any other leaves that don't look good. Take a mesh bag such as you use for laundry and use it to line the harvest container. Pick leafy greens into the mesh bag to save time later.

Leafy greens stay fresh and crisp if you cool them quickly and keep them in high humidity.

- ❖ Put the bagful of greens in a cool water bath for a few minutes right after harvest.
- ❖ If the leaves are dirty, change the water once or twice.



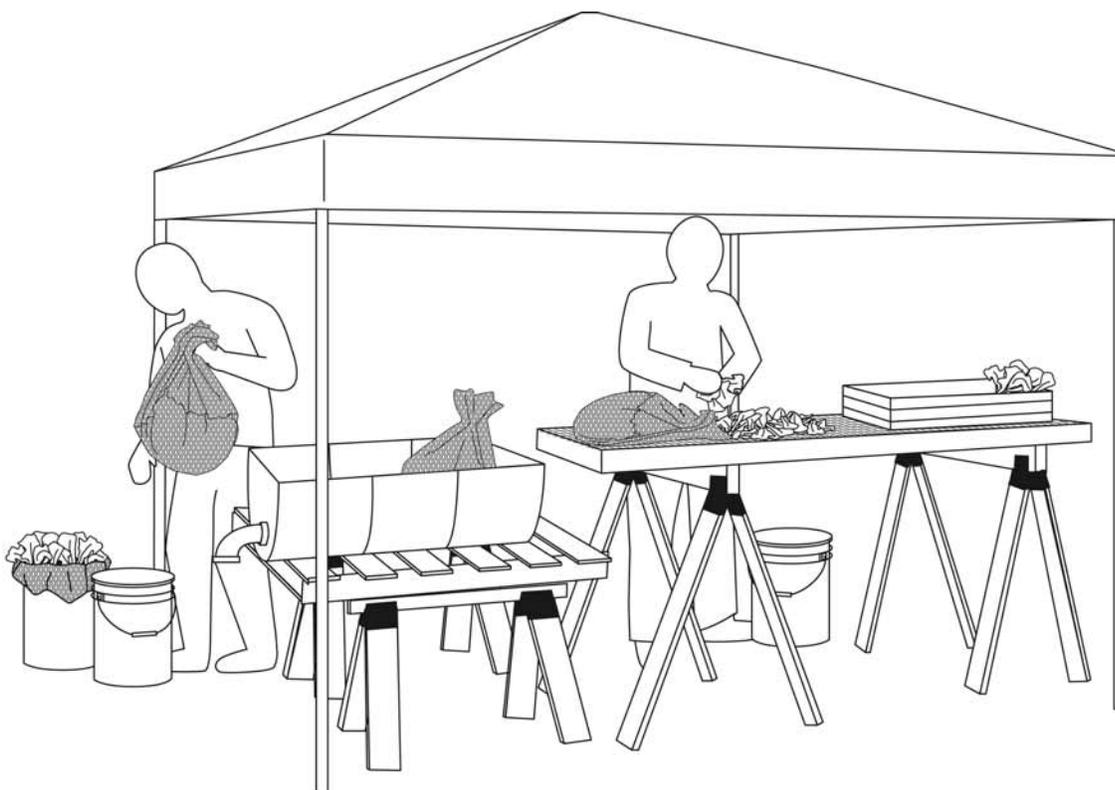


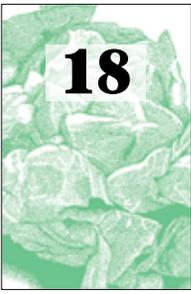
Harvest, Handling, and Storage

Buy or make washtubs. You can use plastic food barrels cut in half the long way. Build a wooden framework to hold the washtubs at a good height for work. Cut a hole in the short end to put in a plastic (PVC) pipe elbow and valve (from the plumbing section of your hardware store). Put this pipe into a long plastic (PVC) pipe to drain the water away from your work station. Or choose a bigger tank to wash greens, such as an old stainless steel bulk milk tank from a dairy farm. Some growers use a jacuzzi-spa type of motor for a bulk milk tank to make a bubble-type washing system for salad greens.

Dry greens by spinning them for a few minutes or laying them out on screen tables.

- ❖ You can spin dry a small amount of washed greens by swinging the mesh bag in wide circles over your head.
- ❖ Some growers use a small tabletop salad spinner that you crank by hand.
- ❖ If you have larger amounts to dry you can build a spinner from an old washing machine. Put two bags of greens into the washing machine and set it to “spin cycle” for a few minutes.
- ❖ You can also use a restaurant salad spinner with an electric motor to spin dry a lot of greens.





Pack greens into waxed cardboard boxes and store them in a cooler.

- ❖ Line the box with a clean damp cloth to keep humidity high.
- ❖ Do not let the temperature fall below 32°F. See below for storage details about each crop.
- ❖ Do not store apples, melons, or tomatoes in the same cooler as greens because those crops give off a gas as they ripen (ethylene). This gas makes leafy greens turn yellow.

Sell greens bulk by the pound or in plastic produce bags as soon as you can after harvest. You can keep greens in a cooler for 1-2 weeks.



Details about Harvest and Storage for Each Type of Salad Greens

Butterhead lettuce is mature and ready 42-70 days after planting. The exact length of time depends on weather and the variety you grow. Leaf lettuce is mature in 48-58 days, Romaine lettuce in 50-70 days, and crisphead lettuce in 60-120 days. You can cut and sell all of the lettuce types (except crisphead) before they are mature. You can also pick and sell some leaves from each plant at least 3 weeks before they are mature. Many types of lettuce will keep growing leaves. Store lettuce at 33-35°F and 90-95% relative humidity. This way it can keep good quality for up to 2-3 weeks.

Spinach matures in 35-50 days and you can start to harvest it earlier, when 5-7 leaves grow on the plant. Keep harvesting until the new leaves are too small or a seed stalk forms. Spinach keeps well for up to 2 weeks if stored at 32°F and a relative humidity of 85-95%.

Swiss chard is mature in 50-60 days but can also be harvested early, about 3 weeks before. Store chard for up to 2 weeks at 32°F and a relative humidity of 85-95%.

Asian greens are mature in 35-45 days and can also be harvested early. You can start picking leaves after 4-5 weeks. Asian greens will keep well for up to 2 weeks if stored at 32°F and a relative humidity of 90-95%.



Preventing Stress on Your Body

Try to prevent stress on your body when you grow leafy greens.

- ❖ Try to prevent stooping or bending.
- ❖ Change your position often.
- ❖ Sit on a stool or a pail. You can use a stool that you wear as a belt, or a stool on wheels that rolls along the row like a cart.
- ❖ Use garden carts and wagons as often as you can so you do not lift and carry so much.
- ❖ If you use a standard plastic container that stacks and is easy to load, unload, and clean, you will save time.

In the place where you pack your crops, try to have a smooth level floor so it is easier to work with carts and wagons.

- ❖ Set up your wash and pack area so you walk, carry, stoop, and bend as little as possible.
- ❖ Set up work areas the same height as a table.
- ❖ Short people might want to stand on a stool to reach the tables more comfortably.
- ❖ To move boxes of produce, there are systems you can use with small pallets and hand pallet trucks.
- ❖ You can also buy roller table to move heavy boxes of produce.

There are examples of tools that make work easier from the University of Wisconsin-Madison Department of Biological Systems Engineering. Go to the department website <http://bse.wisc.edu/> and look under 'Department Links' for the Healthy Farmers, Healthy Profits Project. Click on Tip Sheets and go to the category for vegetable growers. One example is a cart you can make to help harvest greens.



Weed Management

You must control weeds to grow a good crop of salad greens. Weeds take water, nutrients, space, and light away from your crop. Also, weeds left in the field might be picked by mistake with the salad greens. Before you plant, remove perennial weeds. Do this by hand, by smothering with a cover crop (such as buckwheat), by heating the soil with black plastic, or by using herbicide sprays.

- ❖ Cultivate or hoe regularly to remove annual weeds. If you cultivate early in the season you prevent most weed problems.
- ❖ Cultivate shallow, not deep. Do not harm the small roots of the salad greens.
- ❖ You will probably need to weed by hand also.
- ❖ If you use weed killers (herbicides), check the rules on the label.
- ❖ Certified organic growers can only use approved organic weed killers.

If you use chemical weed killers, be sure you check the label and understand that the one you choose is legal for crops you sell. Chemicals legal for a home garden might not be legal to use if you sell the crops.





Pest and Disease Management

The common insects that attack leafy greens are aphids, thrips, cutworm, leaf miner, and flea beetles.

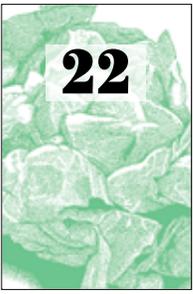
Aphids and thrips are both tiny insects you will see more easily with a magnifying glass. Look on the under side of leaves. Aphids have a soft pear shaped body which can be white, yellow, black, brown, red, or green. They suck plant juices and their waste is a clear sticky sap. Thrips have a long, shiny body that is black or yellow. They suck plant juices and also cut into leaves, causing tiny silvery white spots. Both aphids and thrips can carry viruses into salad greens. Viruses can cause disease. Keep your fields and the edges of

neighboring areas as weed free as you can to prevent aphids and thrips. You can add helpful insects (beneficial insects) such as lady bugs to eat aphids and thrips. If the insects caused a lot of damage, use a soap spray meant to kill insects.

Cutworms can also chew on young leaves and stems. They are a long (1 ½" -2") white larvae of a moth and they curl into a "C" shape. Crush them to kill them.

Leafminers are small larvae from a fly. The larvae eat and make tunnels in between the top and bottom parts of a leaf. They live in soil over winter. Use row covers to protect plants. Remove leaves that have leaf miners. Also remove weeds that attract leaf miners, such as lambsquarter and nightshade.





Flea beetles are small (1/8" long) shiny black beetles that jump. In spring and summer they eat small holes in leaves and stems. Asian greens attract flea beetles. Flea beetles attack young plants more easily than older plants, and they attack plants that do not have enough water or nutrients. Remove weeds to prevent flea beetles. Use row covers to protect plants.

Tipburn on lettuce looks like brown and rotted areas on the edges of inside leaves. Tipburn happens when the lettuce plant loses more water from leaves than it can take up from the roots. This is more common during hot weather when plants do not get water often enough and do not take up enough calcium. It is more

common on soils that have a lot of nitrogen.

Fungal diseases also affect leafy greens and are worse when it is wet. Choose disease resistant varieties, plant in well drained soil or on raised beds, and space plants so air flows between them. Water plants early in the day so they can dry. Rotate crops in a field to keep the spores from building up in the soil. Sprays of compost tea may work to prevent and control fungal infections.





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