

Garden Scale Cover Crops

Claire Strader



What is a cover crop?

A cover crop is grown specifically to hold soil in place and improve soil structure and fertility. It is not harvested or eaten. Cover crops are also often called green manures when they are grown specifically to increase fertility or organic matter.

Why use cover crops?

The primary use of cover crops is often to keep the soil covered and prevent erosion. They can also increase biodiversity in the garden, attract beneficial insects, improve soil structure, and increase soil organic matter and fertility. Because bare soil is an open invitation to weeds, cover crops planted in aisles or between vegetable crops also play a role in preventing and reducing weeds.

How to choose a cover crop

When choosing a cover crop is important to consider first what your goals are for the soil. For example, do you need to increase fertility, are weeds your biggest concern, or do you really want to attract beneficial insects? Different cover crops will be better suited to specific goals. Next, you have to know which of your main crops will be planted before and after the cover crop. The timing of those main crops will be an essential consideration when identifying which cover crops can work in that niche. Finally, you need to know how you will terminate the cover crop. Will be able to incorporate it into the soil before planting a vegetable crop? Will you cut it down and use it for mulch? Do you want it to die over winter? Or would you rather it live through the winter and be terminated in the spring. Once you have answered all these questions, you can compare your needs to the specific characteristics and requirements of the cover crop choices below and choose the best one for your situation.

Generally, the easiest cover crops to start with are those that are winter-sensitive. These crops, when planted in late summer or fall, will be dead by spring and will leave behind a layer of mulch, thus protecting the soil and providing a ready planting bed. Oats, peas, buckwheat and sorghum Sudan grass are some examples of cover crops that will winter-kill. They are also easy to seed, germinate well, and grow with little care. These covers are the best choice for beds that you will want to plant in early spring. In the case of main crops that you will not plant until late spring or early summer, you may choose a cover crop that is winter-hardy. Hairy vetch, clover, and rye are all examples of cover crops that will survive winter and continue to grow in the spring. When choosing one of these cover crops, it is very important to know how you will kill the crop when you are ready to plant. Rye and clover can be difficult to kill with hand tools, but are fairly easy to kill with tarps. Hairy vetch is not difficult to kill by any means and is a good choice when first trying winter-hardy cover crops.

How to plant a cover crop

After clearing the bed, loosen the soil with a fork or shovel. Measure out the right amount of seed for your bed (see below) and spread the seed evenly over the bed. Use a fork or hand rake to cover the seed with soil and firm it into the bed. Keep the bed moist until the seeds germinate. Row cover can help keep the soil warm and moist, thus facilitating quick germination.

When to terminate a cover crop

To get the most benefit out of a cover crop, terminate it when in full flower and before setting seed. Mature seed that drops in the garden can create weed problems. Any cover crop may also be killed before it flowers, according to your timeline and needs, and will still provide significant benefit.

Termination options

1. Winter will kill tender covers like oats, peas, buckwheat, and sorghum Sudan grass. Just leave these cover crops standing in the garden when you put it to bed in the fall – be sure they have not set seed. In the spring these covers will be dead and their residue will leave a mulch layer on the bed. When seeding into those beds, it will be a good idea to move the residue aside in the planting rows. Transplants can go right into the mulch without having to move it aside.
2. Any cover crop can be killed by cutting it down and incorporating it into the soil. In general, if you are going to incorporate a cover crop it is best to do so about two weeks before seeding a vegetable crop. If transplanting into an incorporated cover crop, you may be able to reduce that time to one week. That wait time will allow the soil to digest the cover crop residue and create a favorable planting bed. If you cut down and remove the cover crop for use as mulch, you should be able to work up the roots and plant seeds or transplants right away.
3. Any cover crop can also be terminated by occultation under black landscape fabric or a 6 ml black plastic tarp. Just place the tarp over the cover crop for at least two and up to three weeks to get a good kill. Use 8” landscape fabric staples, sand bags, or bricks to hold the tarp down. Be sure no light can get in through the edges or through holes. When the tarp is removed, the cover crop will be dead and the residue will leave a light mulch layer on the soil. Transplants can go directly in to that residue with no further work. If seeding a vegetable crop, the soil may need to be lightly turned before seeding.

How to make a cover cropped bed ready for planting vegetables or flowers

Fall-planted winter-sensitive cover crops will all die over the winter and leave a mulch layer on the bed for the spring.

Winter-hardy cover crops as well as those planted in spring or summer will need to be killed before planting vegetables. No matter how the cover crop is terminated, there are a few choices in how to proceed. Here are some specific examples:

- For cover crops that are winter-killed or tarp-killed before transplants: Use a trowel to create planting holes at the appropriate spacing in the bed. Seedlings can go right into those holes without working up the soil first. This cover crop based reduced tillage approach is not only good for the soil, it also leaves weed seeds buried making it less likely they will germinate. The cover crop residue is unlikely to prevent weeds all season, so additional mulch should be added after planting for long-term weed prevention.
- For cover crops that are winter-killed before direct seeding: Pull the cover crop residue aside to create cleared seeding rows in the bed. Lightly work the seeding rows and leave the residue as mulch in between. Seeds can be sown directly into the cleared and lightly worked seeding rows.
- For cover crops that are cut and incorporated before transplants: The cut cover crop residue should be stacked to the side for use as mulch or transport to the compost pile. Lightly work up the cover crop roots to kill them and transplant into the bed as usual. Place the cut residue around the plants as mulch. Some additional mulch will be needed to prevent weeds all season. (This system is not a good choice for rye or clover. Tarp-killing rye and clover is easier and more effective.)

Variety Specifics

Buckwheat is winter-sensitive, frost-sensitive, and grows best in summer. It is fast, and will generally flower and need to be killed within 35 to 50 days. The flowers attract beneficial insects and the roots pull phosphorus to the surface from deeper in the soil. Buckwheat can be sown after the last frost up until late August. Take it down when it is at full flower (or somewhat before) to prevent it from going to seed in your garden and becoming a weed. Buckwheat plants are very succulent and are easy to kill and incorporate by hand. They do not make good mulch because they decompose quickly. Seed 4 oz. per 100 ft².

Clover: Dutch White or Medium Red are winter-hardy and grow best in cool weather. They are legumes that will fix nitrogen. The seeds are small and can be more difficult to germinate than the other legumes on this list. They can also be difficult to kill and will continue to grow unless well incorporated. Plant with the appropriate inoculant as soon as the soil can be worked through early September. Seed .5 to 1 oz. per 100 ft².

Cow Peas are winter-sensitive, frost-sensitive, and grow best in summer. Also known as black-eyed pea, these nitrogen-fixing legumes can be planted on their own or with Sorghum Sudan grass, which they will climb. Sow after the last frost through July, with the appropriate inoculant. Seed 3 oz. per 100 ft².

Oats are winter-sensitive, frost-hardy and grow best in spring and fall. They can be planted with peas or on their own. They germinate easily and their fibrous roots do a great job of holding the soil in place over winter. Plant as soon as the soil can be worked up through May, and again in August through early September. When spring planted the above ground growth can be removed for use as mulch. Seed 6 oz. per 100 ft².

Peas are winter-sensitive, frost-hardy, and grow best in spring and fall. They are a legume that will fix nitrogen and can be planted on their own or mixed with oats as support of the pea vines. Plant with the appropriate pea/vetch inoculant as soon as the soil can be worked up through May, and again in August through early September. For seeding alone, use 8 oz. per 100 ft². Plant a 3/1 mix of peas and oats at 8 oz. of mix per 100 ft².

Radishes: Daikon, Tillage, or Ground Hog are winter-sensitive, frost-hardy, and grow best in the fall. While these have been popular on some farms, they are not a good choice for gardens where other brassicas are grown. They are susceptible to all the pests and diseases that cause problems for other brassicas and can actually bring those pests and diseases to the garden. In the right setting, they will produce large taproots that can both alleviate soil compaction and bring up nutrients from deep in the soil. As the roots rot, they can also increase soil biological activity and leave channels for water infiltration and increased soil penetration by subsequent crops. Plant in mid to late August. Seed 2 oz. per 100 ft².

Rye, Winter is winter-hardy and grows best in the fall and spring. This grass is very strong and fibrous. It also exudes allelopathic chemicals that inhibit germination of other seeds in the soil, including weed and vegetable seeds. It is best used where weeds are a main concern, but should be used with caution in the home garden because it can be difficult to kill with the cut and incorporate method. When using the cut and incorporate method, allow at least two weeks for rye to decompose before planting other crops. Plant in August through late October. Seed 4 or 5 oz. per 100 ft².

Sorghum Sudan Grass is winter-sensitive, frost-sensitive, and grows best in summer. It is a relative of corn and will grow very tall and produce a great deal of biomass. It is a great choice for suppressing weeds and easy to kill over winter. It is best planted in late June through July and left in place until the following spring. Seed 4 oz. per 100 ft².

Sunn Hemp is a winter-sensitive, frost-sensitive, and grows best in summer. This nitrogen-fixing legume can be planted on its own or with a summer grass like Sorghum Sudan grass. Be aware that it is very attractive to Japanese beetles which can not only damage this crop but also other crops in the garden. Plant after the last frost through July. Seed 1.5 oz per 100 ft².

Vetch, Hairy is winter-hardy and grows best in the fall and spring. It is a legume that fixes nitrogen and should not be confused with crown vetch. It can be planted on its own or with rye and is easy to seed and germinate. When on its own, it can be killed easily in the spring by cutting it down and removing the foliage for use as a nitrogen-rich mulch. Work up the roots before planting a vegetable crop. Plant in August through late September. Seed 1 oz. to 1.5 oz. per 100 ft².

Where to Find Seed

- High Mowing – highmowingseeds.com – all organic seed, large or small amounts
- Fedco Seeds – fedcoseeds.com – large or small amounts, good prices, some organic seed
- Green Cover Seed - greencoverseed.com – good prices on small or large volumes, wide selection of conventional seed
- Johnny's Selected Seeds – johnnyseeds.com – great catalog with detailed cultural information, large or small amounts
- Welters Seed & Honey Co. - welterseed.com – great prices, larger volumes, wide selection of organic and conventional seed

Cover Crops in Organic Vegetables

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Crop	Planting	Seeding rate*		Characteristics and Management	Termination
		#/1000ft ²	#/acre		
Field Peas	Spring: as soon as soil can be worked through May. Fall: August through early September	4 to 8	50 to 200	Frost-hardy and winter-sensitive, grows best in spring and fall, good N fixer (most N fixed before flowering), annual. Use pea/vetch inoculant. Drill seed or broadcast and harrow or till to plant. For maximum biomass, N, and weed suppression, seed heavily. Plan to terminate at full flower or before. Peas mix well with oats or barley.	Spring plantings can be mowed and disked or tilled to incorporate. Fall plantings will winter kill and leave a spring residue mat.
Oats	Spring: as soon as soil can be worked through May. Fall: August through early September	3 to 4	100 to 140 (1-2 bushels) if mixed; up to 4 bushels if seeded alone.	Frost-hardy and winter-sensitive, grows best in spring and fall, annual. Extensive, fibrous roots hold soil and produce biomass. Tolerant of wet soils and low pH. If allowed to mature, oats will reseed. Drill or broadcast and harrow/till. To produce mulch, mow when needed. Oat straw decomposes rapidly. Oats are a good trap crop; late summer plantings will hold N from manure applications. Oats provide good winter erosion control. Oats are excellent for mixing with legumes. Versatile, available and cheap.	Spring plantings can be mowed and disked or tilled to incorporate. Fall plantings will winter kill and leave a spring residue mat.
Buckwheat	After the last spring frost through August	2 to 3	50 to 100	Frost- and winter-sensitive, grows best in summer, annual. Fast-growing, matures in 40-50 days. Drill or broadcast and harrow. Fast growth enables buckwheat to smother weeds. Several sequential plantings to be made in one season. Once mowed, residue decomposes rapidly and soil is friable; little tillage is necessary for next crop. Will reseed itself and can become a weed if flowers mature to seed. Buckwheat residue can be a good winter cover if late plantings are thick and growth is adequate.	Terminate at or before full flower by mowing and incorporate with a disk or tiller. Late summer planting will kill with a frost.
Sorghum-Sudangrass	Late spring through July	2 to 3	15 to 40	Frost- and winter-sensitive, fast-growing, drought-tolerant, annual. Will grow to over 6' if left uncut. Grows on most soils but needs fertile soils for best results. Drill or broadcast and harrow. A good N trap crop and excellent smother crop that produces tremendous biomass (more than any other cover crop) even when mowed regularly. Decomposes slowly; allow at least 2 weeks before planting next crop. Best used in areas where it can be left in place through the winter.	Winterkills. Will be easier to incorporate in the spring if mowed short in the fall.

Seeding rate*

Crop	Planting	#/1000ft²	#/acre	Characteristics and Management	Termination
Hairy Vetch	August through September	1 to 2	25 to 50	Winter-hardy. Excellent N fixer (100 lbs/acre). Needs pH of 6 or 7 for best results. Tolerates most soils but will not survive flooding. Drought tolerant once established. Tolerant of mowing but intolerant of shade. Use pea/vetch inoculant. Drill or broadcast and harrow. Can be used alone or in combination with a small grain like winter rye.	Mow and till in the spring to incorporate. Or cover with a black tarp for 2 to 3 weeks and plant directly into the dead residue.
Winter Rye	August through October	2 to 5	50 if mixed with legume. 60-200 if seeded alone.	Winter-hardy small grain. Grows longer in fall than other grains and resumes growth earlier in spring. Grows on most soils. Extremely efficient nutrient scavenger. Dense, fibrous roots help build organic matter and make soil more friable. Can be drilled or broadcast and tilled. Often sown with hairy vetch. Rye shows weed suppressing (allelopathic) abilities and is useful to help clean weedy areas. Tremendous biomass production can create challenges for incorporation and problems with planting and germinating small seeded vegetables. Main challenge is having time for adequate incorporation between spring rains.	Wait for it to flower in late May, then mow and till. Or cover with a black tarp for 3 weeks and transplant directly into the dead residue.
Clover (red and white)	As soon as soil can be worked in the spring through August	1/2 to 1	Red: 8 to 15 White: 5 to 15	Red (Medium, Mammoth, Alsike) and white (Dutch, New Zealand, Ladino) clovers are slow growing legumes and short-lived perennials. Whites are shorter and longer lasting. Use alfalfa/clover inoculant. Clovers grow slowly in the seeding year but rapidly the second year. Mow as needed to control weeds. Reds are the better N fixers, as is the New Zealand white. Clovers mixed with oats or annual ryegrass produce large amounts of biomass for soil improvement. Seed at lower rates if sown with grasses. White and red clovers can also be mixed, and both can work for living aisles.	Can be difficult to kill. Mow and till or tarp for 3 weeks.

*Use lower rate listed for drilling, and higher rates for broadcasting.

adapted from : Cover Crops on the Intensive Market Farm

<https://www.cias.wisc.edu/wp-content/uploads/2019/06/covercropmarketgrower2019web.pdf>