

Cover Crops for Vegetable Growers:

Use cover crops to feed and improve the soil, smother weeds, and prevent soil erosion. Select cover crops to use opportunities year round. Fit cover crops into the schedule of vegetable production.

©Pam Dawling 2016 author of *Sustainable Market Farming* pam@twinoaks.org
www.sustainablemarketfarming.com www.facebook.com/SustainableMarketFarming

Benefits of using cover crops

- Smother weeds, prevent germination, seeding
- Add organic matter and nutrients to the soil
- Increase the biological activity in the soil
- Reduce erosion
- Improve the tilth of the soil and the sub-soil structure
- Improve soil drainage
- Improve the soil's ability to absorb and store water
- Salvage leftover nutrients from a previous crop
- Fix nitrogen to feed the next crop
- Attract beneficial insects
- Bio-fumigation for pest or weed control
- Kill nematodes

Five steps of cover crop planning

1. Identify your opportunities for cover crops (When, how long, how warm, crops before and after)
2. Clarify your cover crop goals for each opportunity (check list of benefits above)
3. Shortlist suitable cover crops for each situation (consult books and charts)
4. Make a decision from among the options to match your main goals and some secondary goals
5. Record your decisions and results, and review for possible changes next year.

Step 4 - Fit your cover crop with the season (fall)

- Work back from your farm's first frost date, to see what options you have.
- 80-120 days before frost - buckwheat, soy, cowpeas, Japanese millet, sorghum-sudangrass, or a fast vegetable crop.
- 60-80 days before frost - buckwheat, soy, cowpeas, Miami peas, Japanese millet, sorghum-sudangrass to winter-kill; or oats with Austrian winter peas, crimson clover, or red clover to grow into winter.
- 40-60 days before frost - oats with soy beans or Miami peas to winter-kill; winter barley or winter wheat with Austrian winter peas, crimson clover, hairy vetch, red clover, fava beans to survive the winter.
- 20-40 days before frost, winter rye, winter wheat, or winter barley, with crimson clover, Austrian winter peas, red clover or (40 days before frost) hairy vetch. Too late to usefully sow crops that are not frost-hardy.
- Up to 10 days past the frost date - winter rye or winter wheat with Austrian winter peas.
- Up to a month past your average frost date, still possible to sow winter rye.

Fit your cover crop with the season (summer)

- If you have only 28 days until the patch is needed for a food crop, you can grow mustards or buckwheat. Or weeds, if you're careful not to let them seed!
- If you have at least 45 days, you can grow soy or Japanese millet.
- If you have 50-60 days, Browntop millet is possible. In the right climate, sunn hemp can mature in 60 days.
- With 60-70 days, German foxtail millet, pearl millet and some cowpeas will mature.
- In high-moisture years, grow the most weed-suppressing crops, e.g., alfalfa.

Reliable cover crops at Twin Oaks

Winter cover crops.

Grasses:

- Spring Oats
- Winter Wheat
- Winter Rye

Legumes:

- Hairy Vetch
- Crimson Clover
- Austrian Winter Peas

Summer cover crops

Grasses:

- Sorghum-sudangrass
- Japanese millet

Legumes:

- Soy

Broadleaved crops:

- Buckwheat

Clover fallow recipe: 1 oz crimson clover, 1 oz Ladino white clover, 2 oz medium red clover / 100 sq ft.

Fall cover crops

Only include legumes with if there will be time in spring for them to flower

September cover crops:

- ❖ Before 9/15, oats.
- ❖ 9/1-9/30: winter rye, winter wheat, winter barley, hairy vetch, crimson or red clover, Austrian winter peas.

October cover crops:

- ❖ Before 10/14, winter wheat with crimson clover or red clover.
- ❖ After 10/15, winter wheat or winter rye with Austrian winter peas

November cover crops:

- ❖ Before 11/8, winter wheat or winter rye, Austrian winter peas
- ❖ From 11/9 to 11/15 (a month past our average frost date) winter rye alone
- ❖ It's only worth sowing cover crops in November if they will have time to make some growth in spring.
- ❖ Otherwise, don't till, leave weeds to hold the soil together, or lightly spread some crop debris, straw, hay.

Spring cover crops at Twin Oaks

- ❖ **In February or March** we sow **oats**, where we have winter weeds, no cover crop, and will not be planting a food crop for 8 weeks. That is sufficient time for growth to out-compete weeds and add to the organic matter in the soil. Minimum soil temperature for germination is 38F (3C)
- ❖ **March 31** here is **too late** in spring **for oats** (they will quickly head up after making very little growth)
- ❖ In **late March or April**, we can sow **winter rye**, which "languishes" here once it gets hot. One year when our spring potatoes got flooded we transplanted potatoes to the drier end of the patch and sowed rye in the lower end, once the floods had subsided. This was easy to deal with in July at harvest.
- ❖ In **early April**, too late for oats, but too soon to sow frost-tender cover crops, we might till and make stale seed beds (till 2 or more weeks ahead of time, prepare beds, hoe once a week to kill weeds)
- ❖ In **late April** (close to our average last frost), we sow frost-tender cover crops like **buckwheat** or **soy, mixed with a grain** such as **winter rye** or **wheat** for insurance and some shielding from harsh weather.
- ❖ After our corn planting date, if a food crop fails, or we "discover" some space, we grow **sorghum-sudangrass** for the remainder of the warm season.

Summer cover crops at Twin Oaks

- ❖ When **summer gaps** occur between the end of one vegetable crop and the planting of the next, we sow a short-term cover crop (see earlier). Consider buckwheat, soy, cowpeas, millets, Brassicas (perhaps).

Cover crop mixes

- A mix of several cover crops species will provide more resilience in the face of extreme weathers
- Extension.org recommend first selecting 1-3 cover crop species that serve your major goals, then identifying "missing services" and choosing 1 or 2 cover crops that provide this service to add to the mix.
- Mixes can generally be sown at a depth of 1" (2.5 cm), regardless of seed size. Up to 3" deep will be OK.
- When legumes and grasses are mixed, sow in the date range for the grass.
- When 2 grasses are mixed, the seeding rate of each is reduced by a third (not a half),
- Do not reduce the seeding rate of legumes by much in mixtures. Use at the same rate as a pure stand, or reduce the legume seeding rate by a maximum of 25%.
- In mixes with oats, reduce the amount of oats to as little as 30#/ac (34 kg/ha) so that the highly competitive oats don't out-compete the other crops.
- We sometimes use a mix of rye, crimson clover and AWP if the date is borderline for crimson clover and the weather uncertain, especially if we have the seed on hand and don't want to use it the next year when the germination rate and seedling vigor will be less good.
- Most mixes include some crops that attract beneficial insects and some legumes to add N.

Spring mixes

- Main ingredients could be oats and peas, 3 oats:7 peas

- Minor ingredients could include hairy vetch, radish, turnips and red clover.

Summer mixes

- Major ingredients could include soy, cowpeas, red clover and buckwheat.
- Lesser ingredients could include pearl millet, proso millet, radish, turnips, sunflowers and sunn hemp.

Using manual seeders (Earthway-type) for small-scale production

See the VABF Infosheet **Seeders: Using Manually-operated Seeders for Precision Cover Crop Plantings.**

Make rows about 6" apart

- For crimson clover use the #5 (beet) EW plate.
- For other clovers use the #8 (light carrot) plate
- Austrian winter peas need the #14 (pea) plate,
- For winter rye, oats, soybeans, cowpeas and hairy vetch, use the #22 (beets, okra) plate.

7 steps in creating a permanent rotation for vegetables and cover crops

1. Figure out how much area is needed for each major crop (the ones needing the largest amount of space).
2. Measure and map the land available
3. Divide into equal plots big enough for the major crops
4. Group compatible crops together to fill each plot
5. Determine a good sequence
6. Include cover crops
7. Try it for one year, then make improvements

RESOURCES

General

- ❑ ATTRA attra.ncat.org Many helpful publications
- ❑ SARE sare.org -A searchable database of research findings
- ❑ SARE *Managing Cover Crops Profitably*. Buy the book or download the free pdf from their website sare.org/Learning-Center/Books/Managing-Cover-Crops-Profitably-3rd-Edition
- ❑ SARE Cover Crop Topic Room: sare.org/Learning-Center/Topic-Rooms/Cover-Crops/Cover-Crops-No-Till
- ❑ SARE *Crop Rotations on Organic Farms, A Planning Manual*, Charles Mohler and Sue Ellen Johnson, editors. sare.org/Learning-Center/Books/Crop-Rotation-on-Organic-Farms Buy or download
- ❑ articles.extension.org/organic_production The organic agriculture community with eXtension. Publications, webinars, videos and trainings.
- ❑ *Growing Small Farms*: growingsmallfarms.ces.ncsu.edu click Farmer Resources. Debbie Roos keeps this site up to the minute. Click Farm Planning and Recordkeeping to download Joel Gruver's spreadsheets.

Slideshows

- ❑ Many of my presentations are available at www.Slideshare.net. Search for Pam Dawling: *Cold-hardy Winter Vegetables; Crop Planning for Sustainable Vegetable Production; Crop Rotations for Vegetables and Cover Crops; Fall Vegetable Production; Feed the Soil; Fall and Winter Hoophouses; Spring and Summer Hoophouses; Succession Planting for Continuous Vegetable Harvests; Sustainable Farming Practices for New Growers*
- ❑ *Planning the Planting of Cover Crops and Cash Crops*, Daniel Parson www.slideshare.net/parsonproduce/southern-sawg
- ❑ *Cover Crop Innovation* by Joel B Gruver www.Slideshare.net
- ❑ *Cover crops for vegetable cropping systems*, Joel Gruver
- ❑ www.slideshare.net/jbgruver/cover-crops-for-vegetable-crops
- ❑ *Finding the best fit: cover crops in organic farming systems*. Joel Gruver, Some overlap with previous slideshow. www.slideshare.net/jbgruver/cover-crops-decatur
- ❑ <http://vabf.files.wordpress.com/2013/02/tom-peterson-farm-planning-for-a-full-market-season.pdf> Tom Peterson *Farm Planning for a Full Market Season*
- ❑ Conservation Systems Research, USDA-ARS Auburn University, Cover Crops for the Southeast slideshow <https://www.ars.usda.gov/ARSUserFiles/60100500/SlideSets/SS01.pdf>

- ❑ Impacts of plastic and cover crop mulches http://www.slideshare.net/greenjeans76/weaver-fieldday-ziegler20120810?from_search=1
- ❑ Mark Cain *Planning for Your CSA*: www.Slideshare.net (search for Crop Planning)

Cover crops

- ❑ CEFS Organic Production: *Cover Crops for Organic Farms*, <https://cefs.ncsu.edu/wp-content/uploads/covercropsfinaljan2009.pdf?3106e7>
- ❑ eOrganic *Cover Cropping in Organic Systems* <http://www.extension.org/pages/59454/cover-cropping-in-organic-farming-systems#.Uk7Z7CRJOv8>. (many useful documents.)
- ❑ Extension.org, in the eOrganic section, <http://articles.extension.org/pages/72973/making-the-most-of-mixtures:-considerations-for-winter-cover-crops-in-temperate-climates> *Making the Most of Mixtures: Considerations for Winter Cover Crops in Temperate Climates*
- ❑ USDA/ARS *Cover Crop Chart*, download at ars.usda.gov/main/docs.htm?docid=20323 The crop "tiles" can be clicked to access more information about 46 cover crops
- ❑ USDA project *Multifunctional Cover Crop Cocktails for Organic Systems*. <http://agsci.psu.edu/organic/research-and-extension/cover-crop-cocktails>
- ❑ Sequester soil organic C <http://news.aces.illinois.edu/news/cover-crops-can-sequester-soil-organic-carbon>
- ❑ Mark Schonbeck <http://www.carolinafarmstewards.org/wp-content/uploads/2012/12/1-Schonbeck-Principles-of-Sustainable-Weed-Management-in-Organic-Cropping-Systems.pdf>
- ❑ VABF www.vabf.org/information-sheets *Seeders: Using Manually-operated Seeders for Precision Cover Crop Plantings* by Mark Schonbeck/RonMorse
- ❑ See plans by Greg Bowman for a roll-kill roller at <http://www.croproller.com/> or build your own <http://www.newfarm.org/depts/notill/features/2006/0506/drawings.shtml>
- ❑ <http://www.extension.org/pages/18526/what-is-organic-no-till-and-is-it-practical#.Uk7a1iRJOv8> A Sub-surface Tiller-Transplanter designed by Ron Morse.
- ❑ asi.ucdavis.edu/programs/sarep/research-initiatives/are/nutrient-mgmt/cover-crops-database1 University of California Davis, *Cover Crops Database*
- ❑ Cornell University, *Cover Crops for Vegetable Growers*, covercrops.cals.cornell.edu nysaes.cornell.edu/hort/faculty/bjorkman/covercrops
- ❑ USDA-ARS Auburn University, *Cover Crops for the Southeast* (also see Slideshows) ars.usda.gov/southeast-area/auburn-al/soil-dynamics-research/docs/fact-sheets/
- ❑ Rodale *Organic No-till roller-crimper* <http://rodaleinstitute.org/our-work/organic-no-till/>
- ❑ NCSU Department of Horticultural Sciences Horticulture Information Leaflet 37, *Summer Cover Crops*, ces.ncsu.edu/depts/hort/hil/pdf/hil-37.pdf
- ❑ *Northeast Cover Crops Handbook* Marianne Sarrantino
- ❑ Jeff Moyer *Organic No-till Farming* <http://rodaleinstitute.org/shop/organic-no-till-farming/>
- ❑ *Sustainable Production of Fresh-Market Tomatoes and Other Vegetables with Cover Crop Mulches*, Aref Abdul-Baki, John Teasdale on rye with hairy vetch and crimson clover <https://www.ars.usda.gov/ARSUserFiles/oc/np/SustainableTomatoes2007/TomatoPub.pdf>
- ❑ Cornell *Buckwheat Cover Crop Handbook* hort.cornell.edu/bjorkman/lab/buck/handbook/main.php
- ❑ *Buckwheat for Cover Cropping in Organic Farming* – eOrganic Agricultural Resource Area of the eXtension website. extension.org/pages/18572/buckwheat-for-cover-cropping-in-organic-farming
- ❑ tranq3.tranquility.net/~jefferson/Cover%20Crop%20Guides/Buckwheat%20Guide%20Sheet.pdf *Buckwheat Cover Crop Guide* – Jefferson Institute
- ❑ *How to De-hull Buckwheat with the Country Living Mill* <http://countrylivinggrainmills.com/grainmill3.html>
- ❑ Sources for seed: Seven Springs Farm, Floyd, VA, 7springsfarm.com; Lancaster Ag products, PA, lancasterag.com; Adams Briscoe Seed Co, Jackson, GA, (770) 775-7826