

Cover Crops as Garden Tools

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Cover Crops

- Definition: Plants that are grown to maintain or improve soil health
- Widely used in commercial production but also great way to increase home garden productivity



Photo credit: Washington State Univ. Extension

Crop Rotation

- Breaks disease cycle through use of non-host crop
 - Reduces disease inoculum in the soil
 - Know the disease cycle (how long will it persist in soil, how does it spread, etc.)
 - Make sure that rotation crops are not also hosts
- Helps balance soil nutrient availability
- Helps weed management
- Improves soil health
- Use cover crops as part of overall crop rotation plan

Introduction to Cover Crops

- Excellent method for long-term building of productive, healthy soil
- Use of cover crops has been shown to increase yield of other cash (main) crops
- Increase resilience of farms and gardens to erratic climatic conditions



Cover Crop Introduction

- Any crop can serve as a cover crop, but ideally they should be quick growing, provide a benefit to your soil & other crops, and - for annual crops - be easy to kill
- Chile Pepper Institute Teaching Garden
-Marigold and broccoli cover crops used to maintain healthy soil for chile pepper plots



Marigolds (French, *T. patula* and Mexican, *T. minuta*)

- Repels many harmful insects including whiteflies
- Roots of French Marigolds exude chemicals that kill root knot nematodes
- Mexican Marigolds may have herbicidal effect on weeds, including bindweed
- May inhibit growth of beans and cabbage



Cover Crop Chart

GROWTH CYCLE

A = Annual
B = Biennial
P = Perennial

RELATIVE WATER USE

☾ = Low
💧 = Medium
💧 = High

PLANT ARCHITECTURE

☪ = Upright
* = Upright-Spreading
≡ = Prostrate

-----Cool Season----- Warm Season-----

---Grass---		-----Broadleaf-----								---Grass---	
A <u>Barley</u>										A <u>Pearl millet</u>	
A <u>Oat</u>	A <u>Phacelia</u>									A <u>Amaranth</u>	A <u>Foxtail millet</u>
A/P <u>Ryegrass</u>	A <u>Flax</u>									A <u>Buckwheat</u>	A <u>Proso millet</u>
-----Legumes-----											
A <u>Wheat</u>	A <u>Spinach</u>	B <u>Turnip</u>	A <u>Field pea</u>	A <u>Berseem clover</u>	A/P <u>Medic</u>	A <u>Chickpea</u>	A <u>Sunflower</u>	A <u>Sudan grass</u>			
A <u>Cereal rye</u>	A <u>Kale</u>	A <u>Radish</u>	A <u>Lentil</u>	B/P <u>Red clover</u>	P <u>Birdsfoot trefoil</u>	A <u>Cowpea</u>	A <u>Safflower</u>	A <u>Teff</u>			
A <u>Triticale</u>	A/B <u>Canola</u>	B <u>Beet</u>	A <u>Lupin</u>	P <u>White clover</u>	P <u>Sainfoin</u>	A <u>Soybean</u>	A <u>Squash</u>	A <u>Grain sorghum</u>			
A <u>Annual fescue</u>	A/P <u>Mustard</u>	A/B <u>Carrot</u>	A/B <u>Vetch</u>	A/B <u>Sweetclover</u>	P <u>Alfalfa</u>	A <u>Mung bean</u>	P <u>Chicory</u>	A <u>Corn</u>			

Introduction to Cover Crops

- For maximum benefit, cover crops are not harvested
- Grown to serve as a living ground cover/mulch or to improve soil in rotation with the main harvested crop



Disadvantages of Cover Crops

- Cost of seed and other inputs \$\$\$
- Field space not available for other crops
- Must be watered and maintained like a crop being harvested for profit or consumption (main crop)
- May contribute to weed problem if not terminated before setting seed

Benefits of Cover Crops May Include:

- Optimum soil health if plants are actively growing throughout the year
- Reduce soil erosion
- Aids water retention
- Weed management
- Prevent loss of nutrients
- Help maintain active soil microflora
- Break disease or pest cycles
- Increases soil organic matter
- Increase soil nitrogen (legumes)

Cover Crop Selection

- **Select cover crop based on your needs:**
 - Compacted soil
 - Nitrogen (N) deficient
 - Excessive N
 - Weeds
 - Low soil organic matter
 - Maintaining soil moisture
 - Pest and diseases

Cover Crop Selection

- Legume vs. Non-legume
- Warm Season vs. Cool Season Annuals
- Brassicas vs. Non-brassica
- Annual, Biennial or Perennial

Annual Grass Cover Crops

- Includes: Rye, Wheat, Barley, Oats
- Tolerant to freezing temps
- Rapid growth to outcompete weeds
- Fibrous roots prevent soil erosion
- Scavenge residual nutrients in the soil
- Great for adding organic matter to soil
- Great rotation crop to break pest and disease cycles for many vegetable crops



Winter Rye at Jose Fernandez Garden

- Winter annual cover crop
- Cold tolerant
- Rapid growth to outcompete weeds



Sorghum-Sudan Grass

- Summer annual cover crop
- Sensitive to freezing temps
- Rapid growth for great biomass, weed suppression
- Extensive root system
- Drought tolerant



Photo credit: johnnyseeds.com

Broadleaf cover crops

- Includes: Buckwheat, Brassicas (Mustard, Radish, Broccoli)

Buckwheat

- Summer annual cover crop
- Rapid growth for weed suppression
- Good performance in poor soil; great for soil building
- Killed by freezing temps
- Quick break down after termination to release nutrients
- Great pollinator plants if allowed to flower



Biofumigation

- Brassicas: Broccoli, cabbage, cauliflower, Brussels sprouts, kale, canola, radish and mustard
- Produce **glucosinilates**, compounds shown to reduce soil pathogens when breaking down in soil
- Different varieties have different amounts of glucosinilate



Mustard (*Brassica juncea*, *Sinapis alba*, & others)

- Brassicas with high glucosinolate content
- Cold weather tolerant
- **Advantages:**
 - High biofumigant activity
 - Root knot nematode reduction
 - Reduces weed seed germination
- Many cultivars are drought tolerant
- Easy to terminate by crimping or tilling



Photo credit: <https://hearneseed.com/pacific-gold-mustard/>

Mustard Cover Crop

- **Disadvantages:**

- Slower growing; needs 5-6 weeks to establish

- Must be killed at least 3 weeks before planting the main crop

- Soil must be irrigated after terminating for break down, biofumigation effect

- Flowering mustards are great pollinators, but may create a weed issue if allowed to go to seed



Daikon Radish

(*Raphanus sativus* var. *longipinnatus*)

- Daikon = Japanese for 'big root'
- Brassica, biofumigant
- Also known as Long White Radish
- Rapidly growing, long penetrating tap root opens up compacted soil
- Left in ground to decompose creates biofumigant benefit



Photo credit: www.diseaseproof.com/archives/healthy-food-strange-veggies-daikon.html

Legumes

- Produce nitrogen (N) in symbiosis with *Rhizobium* bacteria
- Seed may need to be inoculated
- Bacteria contained in nodules on the roots
- Won't work if abundant N already in soil, or if N is added





Legume Cover Crops

- Includes: Clovers, Vetch, Peas, Beans
- Adds nitrogen (N) to soil
 - be sure to inoculate seed if needed
 - best N provided if crop is ended before pollination and seed set
 - however, flowering legumes are excellent for pollinating insects

LabLab

- Summer annual cover crop
- Legume – can contribute soil N
- Spreading vines; good soil coverage to outcompete weeds
- Killed by freezing temperature



Hairy Vetch

- Winter annual cover crop
- Legume – can contribute soil N
- Cold-tolerant - will overwinter
- Tolerant of drought, alkaline soil
- Somewhat shade tolerant
- Susceptible to salinity
- Host to Root Knot Nematodes



Photo credit: CoverCrop.com

Cowpea

- Summer annual cover crop
- Legume – can contribute soil N (up to 150 lbs/ac)
- Killed by freezing temperatures
- Thrives in heat
- Drought tolerant
- Rapid growth with minimal irrigation



Photo credit: NC State Univ. IPM Program

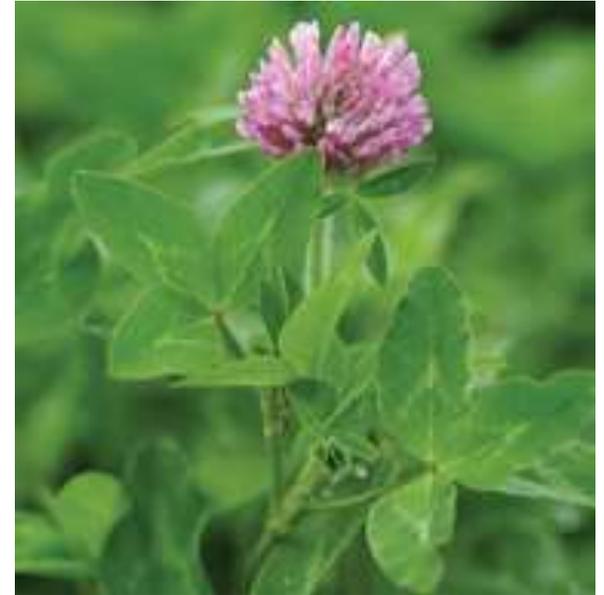
Sesbania

- Legume – can contribute soil N
- Warm season annual
- Rapid upright growth
- Upright growth to 12’;
lots of biomass



Red Clover

- Legume; nitrogen fixation
- Perennial cover crop
- Cold tolerant, less productive in warmer parts of NM
- Good companion to grape vines
- Flowers attracts beneficial insects



Cover Crop Mixtures

- Mixture of different cover crop species
- Provides multiple benefits (soil N + weed suppression)
- Seed mixtures tend to be more expensive
- Some types may outcompete others in local growing conditions



Photo credit: Natural Resources Conservation Service (NRCS) - USDA

Termination of Cover Crops

- Ideally annual cover crops should be easy to kill
- Prevents competition with main crop
- Prevents development of cover crop weed issue

Methods to End Cover Crops

- Herbicides
- Tilling
- Crimping
- Crimping & Covering
- Mowing & Double Mowing
- Mowing, Double Mowing & Covering
- Winter Kill



Crimping

- Crush cover crop with a crimper
- Crush with boards or any other method available



Photo credit: sare.org, quora.com

Mowing and Tarping

- Mow cover crop close to ground
- Cover with tarp



Photo credit: Cornell Univ. Small Farms Program

Solarization

- Non-chemical method to manage soilborne diseases, pests, and weeds
- Best results during summer months, 4-6 weeks duration
- Cover area with solid, clear plastic and seal edges with soil
- Also a great way to terminate most cover crops



Summary

- Identify primary garden challenges or needs and select cover crops accordingly
- Consider crop rotation best practices; example: don't use Brassica cover crop if you plan a Brassica main crop
- Consider cover crop mixes to obtain multiple benefits
- Timing: plant at correct time depending on cool vs. warm season cover crop
- Terminate cover crops before they set seed

Cover Crop Resources

Principles of Cover Cropping for Arid and Semi-arid Farming Systems

https://aces.nmsu.edu/pubs/_a/A150/welcome.html

Managing Cover Crops Profitably

<https://www.sare.org/wp-content/uploads/Managing-Cover-Crops-Profitably.pdf>

Thank You! Questions?

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