

# 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---

---Grass---

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

# 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](http://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](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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