



Cover Crops for Soil Health and Pest Management on Limited Acreage



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Benefits and negatives

Timing options

Options for termination

What are Cover Crops?

Plants grown with intention of killing them and stealing their nutrients

When cover crops die, cash crops take advantage of their work



Not for All Locations

Not feasible if you are using all your space for production and growing early spring to late fall.



No-Till Growers

Benefits of Cover Crops

Improved Soil Health

Increased organic matter

Reduced surface and subsoil compaction

Increased water filtration

Legumes add nitrogen

Decreased leaching of nutrients

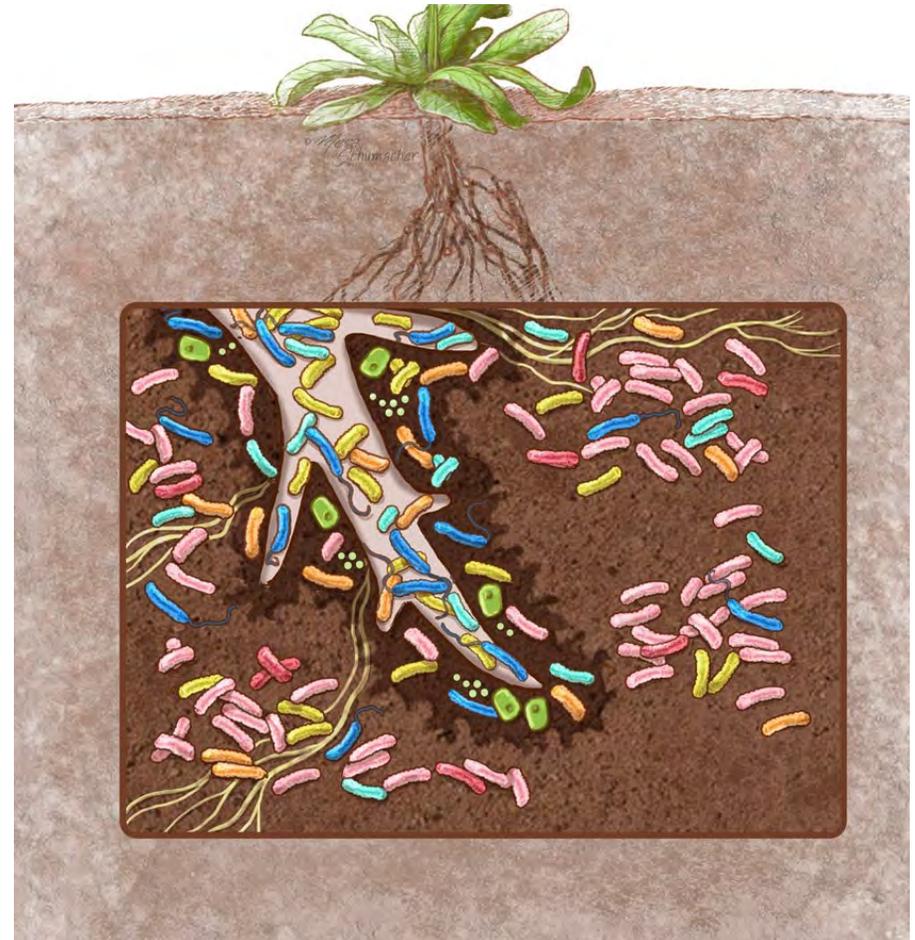


greenbeanconnection.wordpress.com

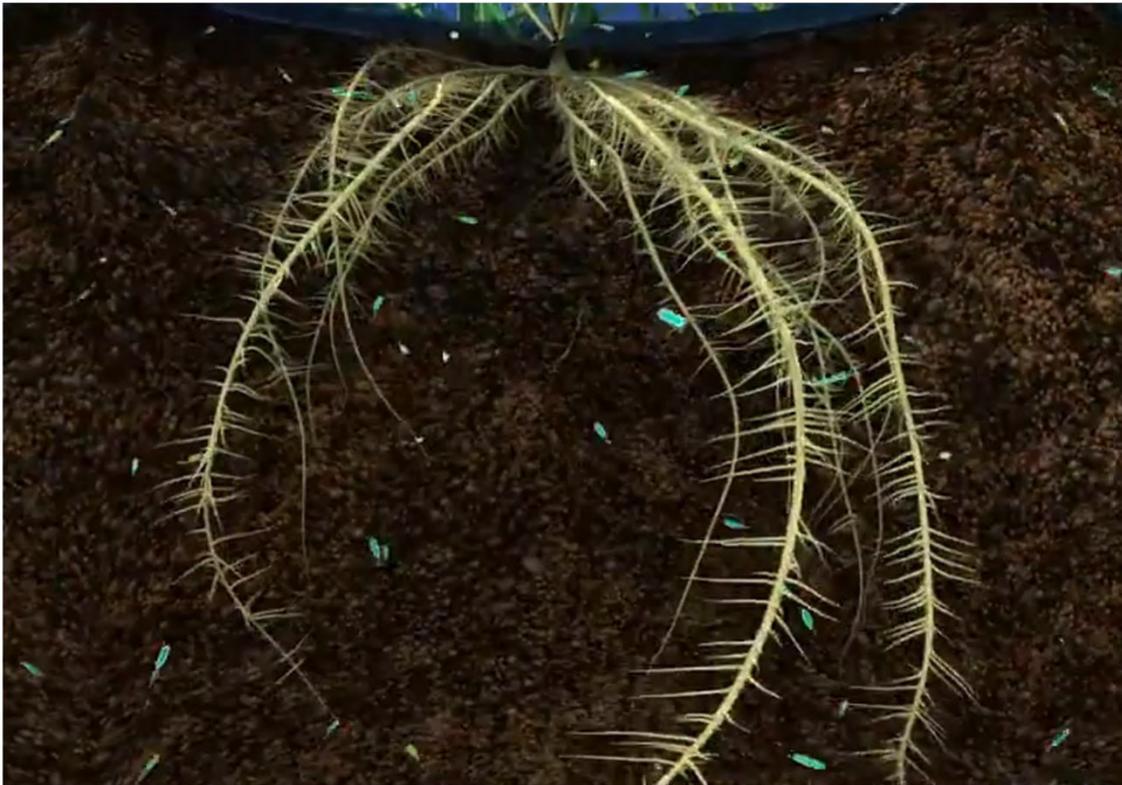
Increased Soil Microbial Biomass, Activity, and Diversity

Roots are substrates and habitat for bacteria and fungi = **rhizosphere**

Less disruption of roots increases **soil microbiome**



Suppression of Soilborne Diseases - Biological

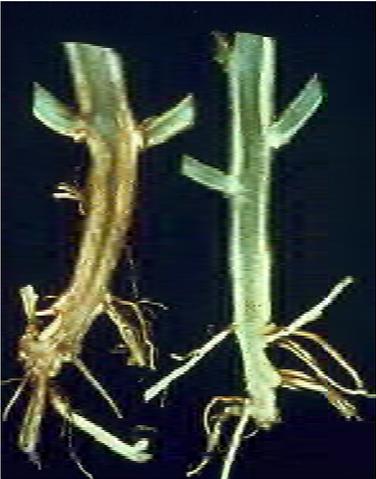


**Greater
biological
= suppression of
soilborne
diseases**

Suppression of Soilborne Diseases



**Fusarium,
Verticillium
Wilts**



**Phytophthora
Root or
Crown Rot**



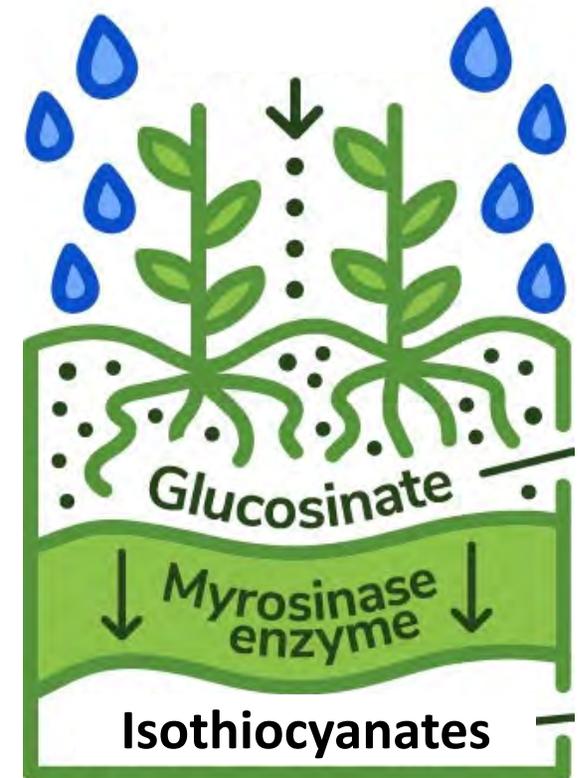
Suppression of Soilborne Diseases – Biofumigation

Brassicas contain toxins to kill pathogens in soil = biofumigation

Leaf tissues contain glucosinolates

Break down to isothiocyanates (ITCs)

Similar to a fumigant pesticide



mightymustard.com

Suppression of Other Diseases - Mechanical

Breaks the life cycle
of pathogens

Powdery mildew



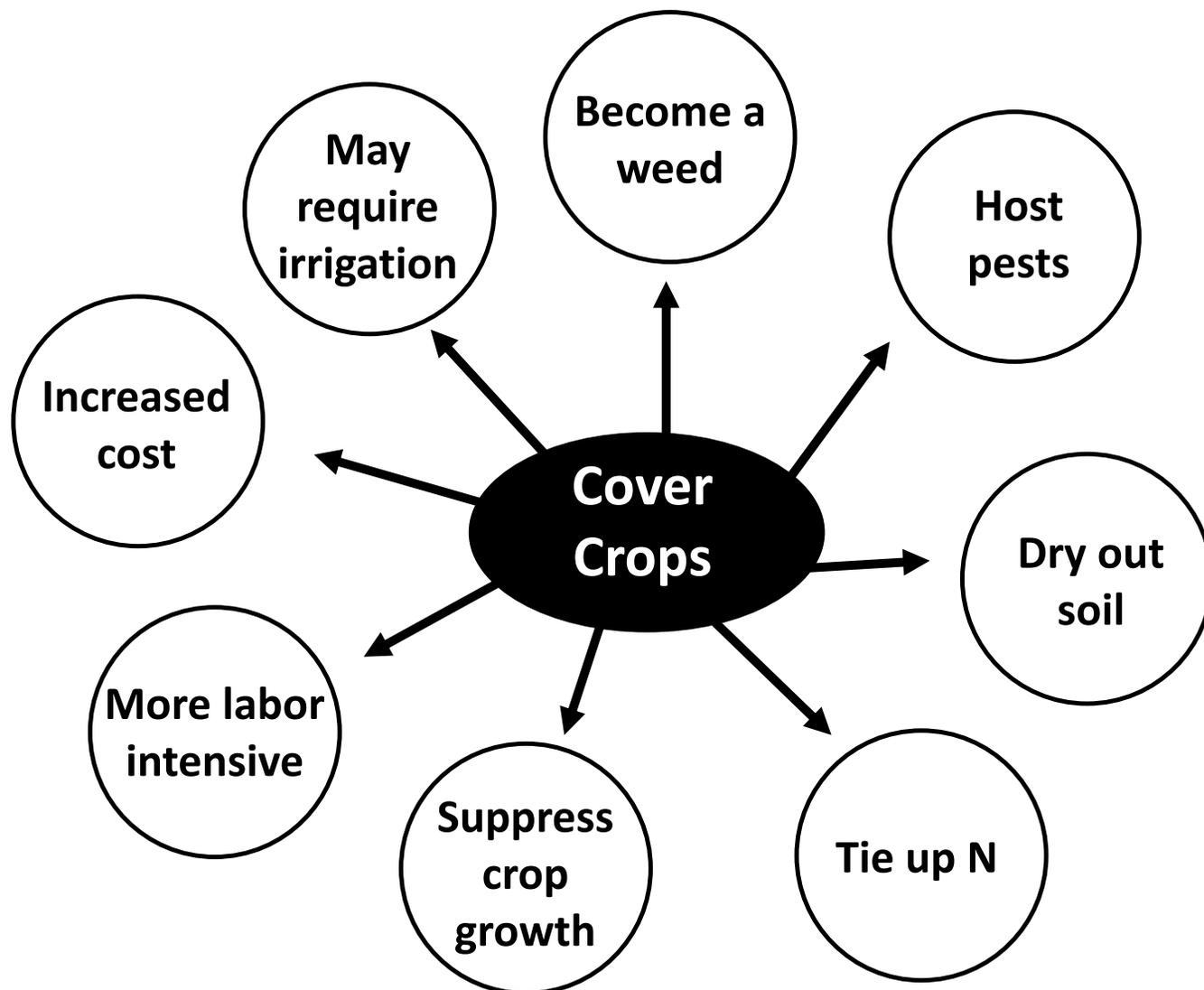
Attract Beneficial Insects

Food sources:
pollen, nectar, prey

Habitat – soil, plants



Negatives



Ways to Use Cover Crops

Cover Crop Season-long



Cover Crop that is Winter-killed

Easiest option

Sow seeds in mid or late summer to early fall to allow maximum fall growth

Crop is killed in winter

Oats, field peas, forage radish, mustard

Tadiello, T., *et al.* Growth, weed control, and nitrogen uptake of winter-killed cover crops, and their effects on maize in conservation agriculture. *Agron. Sustain. Dev.*



Cover Crop that Re-grows in Spring

Plant in early fall; (4-8 weeks before a killing frost)

Allow to re-grow in early spring

Terminate the crop

Plant cash crop 4 weeks later

Crimson clover,
winter rye



Cover Crop in Summer

Plant cover crop in early spring

Terminate mid-summer then
plant cool-season crops for fall

Garden peas, sorghum, barley,
buckwheat, oats



FOOD CROP

COVER CROP

BED 1

Spring to late summer vegetables

Late summer-planted annual that is winter-killed



Winter cover crop - dies over winter

BED 2

Warm season vegetables: peppers, tomatoes, squash, corn, melon

Fall-planted cold-hardy legume that resumes growth in spring and then terminated



BED 3

Late-season planting: Broccoli, beets, kale, collard, lettuce, peas, radishes

Spring-planted annual that is terminated mid-summer



Cover Crop with Strip Cropping

Plant cover crop in early spring
Till out strip for crop and sow crop



www.farmprogress.com

When cash crop is established, till cover crop under



www.farmprogress.com

Cover Crop as Intercrop



Planting

As soon as any crop has finished, rake the soil and remove any weeds, plants, or other debris

Broadcast seeds to make a **dense** planting

- Furrow larger seeds
- Scatter smaller seeds
- Check rate on package

Lightly rake over the seeds, tamp, and irrigate

If available, cover with straw to keep moisture in and weeds down



Legume Seeds

Seed requires inoculation with *Rhizobium* bacteria

- may be pre-inoculated

Comes as dry powder mixed with finely ground peat moss

Shake appropriate amount (on label) with seeds in a container; sow immediately



plantcovercrops.com



Cover Crop Termination

The act of ending the cycle of the cover crop to maximize benefits

Greatest benefit is at greatest biomass

- Balance this with ability to work in the residue



When to Terminate

In general, terminate 3 to 4 weeks before planting vegetable crops

Ideally, at flowering and before seeds form

- Earlier than this is OK

Cutting too early can result in cover crop regrowth

Terminate no later than anthesis (flowering) of grains where pollen sacs are visible or late bloom



Cover Crop Termination For Small Farms and Gardens, USDA NRCS

How to Terminate

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

—MARION COUNTY—
SOIL AND WATER
—CONSERVATION DISTRICT—

Cover Crop Termination For Small Farms and Gardens



Termination Methods – Winter-kill



Oats in fall



Oats in early spring



Oilseed radishes in fall



Oilseed radishes in early spring

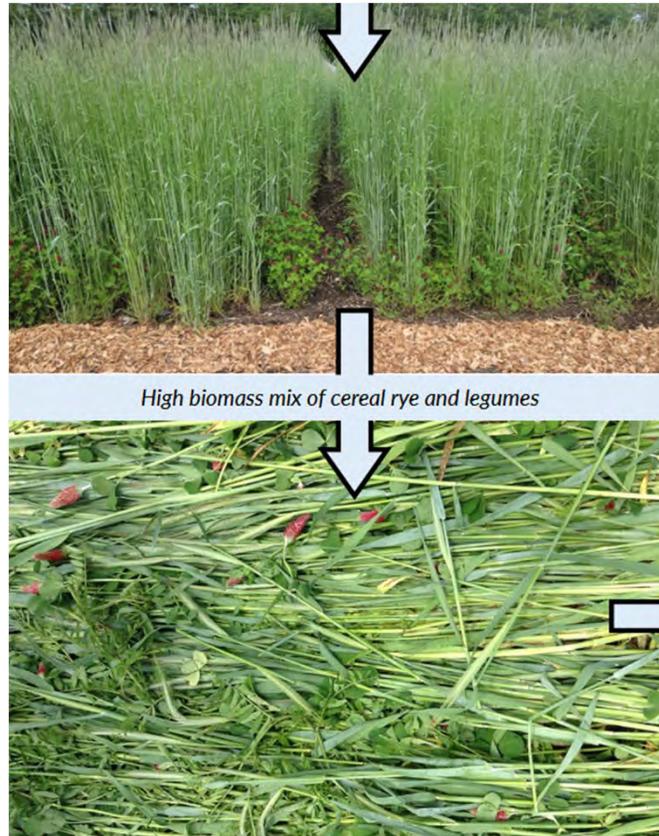
Cover Crop Termination
For Small Farms and
Gardens, USDA NRCS

Termination Methods – Crimping

Pinch stems to prohibit water flow

Works best for cereal rye and similar grasses

- If crimped prior to anthesis, rye may continue to grow



High biomass mix of cereal rye and legumes



Prepping for Other Termination Methods – Crimping



www.theseasonalhomestead.com/how-to-use-cover-crops

Prepping for Other Termination Methods – Mow or Weed-whack



Termination Methods – Till or Shovel Under

Weed-whack or mow first

Breaks up root systems

Avoid deep-tillage

Leave debris in place

Plant 2 to 4 weeks later



Termination: Tarping

Weed-whack, mow, or crimp first

Black plastic

Root systems die but are left in place

Leave on for 2-3 weeks

No need to till

Plant cash crop



Terminating - Chickens

