
Cover Cropping and its Benefits
Seth Shaffer MSFS
Red Clay Farm

Questions about cover cropping

I have a small raised bed, do I still need cover crops?

What benefits do cover crops give me?

Do I really need to add more to my workload by planting cover crops?

Where do I get seeds for cover crops?

Cover crops don’t make me any money, why plant them?

If soil needs to be covered why not let weeds or mulch be the barrier?

Farm/garden with nature

Nature never hurries

Everything in nature self heals given enough time

Build it and they will come

Focus on the soil and your plants will thrive

Cover crops are the mouth of the soil

IT’S NOT ABOUT THE EQUIPMENT, IT’S ABOUT THE UNDERSTANDING

Soil Health

There are 4 basic principles for good soil health:

- Keep the soil covered as much as possible
- Disturb the soil as little as possible
- Keep plants growing throughout the year to feed the soil
- Diversify crop rotations as much as possible, including cover crops

Know your Baseline

Before you do anything with the soil, amendments, cover crops etc

Take a soil test, you can use university labs, or soil labs

There are a number of different type of soil tests, on average I do a basic test

I use Water's Agricultural lab in KY, GA, NC, MISS

Why use Cover Crops?

- Cut fertilizer costs
- Reduce needs for herbicides
- Improve yields OVER TIME
- Prevent erosion
- Conserve soil moisture
- Protect water quality

What is cover cropping?

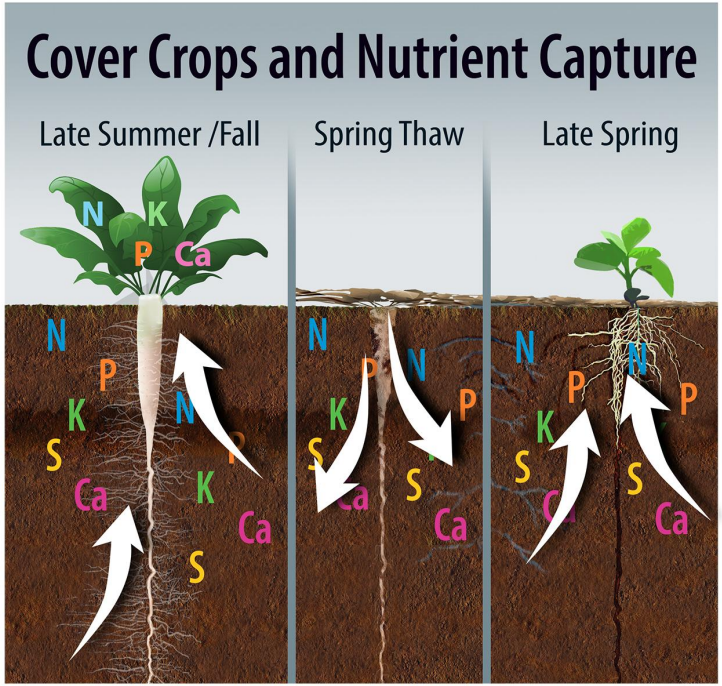
Cover crops are a non-cash crop whose purpose is to replenish, cover and improve soil health

Cover crops by themselves do not add nutrients to the soil

They work by gathering and storing nutrients until the nutrients are released when they are terminated

3 types, **Legumes, Brassicas and Grains**

Cover Crops and Nutrient Capture



Cover crops can increase the amount of nutrients available for the next crop by taking up nutrients that remain in the soil and holding them in plant tissue until they are released the next spring, when they can be used by the following crops. *Courtesy: Cover Crop Solutions*

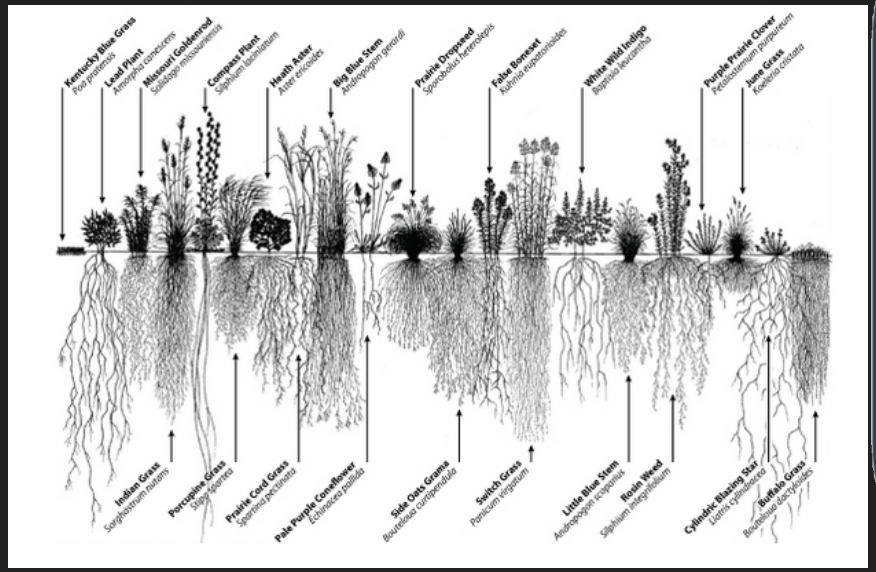
- **Plant materials that are succulent and rich** in proteins and sugars (**tillage radishes**) will release nutrients rapidly but leave behind little long-term organic matter.
- **Plant materials that are woodier or more fibrous (Rye, clovers)** will release nutrients slower, but will promote more stable organic matter, or humus, leading to better soil physical conditions, increased nutrient-holding capacity and higher cation exchange capacity.
- By focusing on biology we help the physical and chemical sections of the soil.

Cover crops also benefit the soil by sending out deep roots

This helps break up compaction, and allows water infiltration, air flow and nutrients to flow better

Cover crops keep soil covered during the offseason and planting season

This coverage helps to keep the soil temperature lower in the summer and warmer in the winter


Kentucky Blue Grass
Poa pratensis
Lead Plant
Amorpha canescens
Missouri Goldenrod
Solidago missouriensis
Compass Plant
Silphium laciniatum
Heath Aster
Aster ericoides
Big Blue Stem
Andropogon gerardi
Prairie Dropseed
Sporobolus heterolepis
False Boneset
Kuhnia eupatorioides
White Wild Indigo
Baptisia leucantha
Purple Prairie Clover
Petalostemum purpureum
June Grass
Koeleria cristata
Indian Grass
Sorghastrum nutans
Porcupine Grass
Stipa spartea
Prairie Cord Grass
Spartina pectinata
Pale Purple Coneflower
Echinacea pallida
Side Oats Grama
Bouteloua curtipendula
Switch Grass
Panicum virgatum
Little Blue Stem
Andropogon scoparius
Rosin Weed
Silphium integrifolium
Cylindric Blazing Star
Liatris cylindracea
Buffalo Grass
Bouteloua dactyloides


COVERS&CO.

The Stress: Gradient Hypothesis holds that as stress increases in an ecosystem, mutually supportive interactions become more significant and negative interactions, such as competition, become less so.

The idea has been hotly debated but is now backed by a review of hundreds of studies co authored in Ecology Letters by Mark Bertness, professor of biology at Brown

Cover crops are beneficial to insects

Providing protection, food and shelter

Soil temperature is very important, microbes and plants will stop growing if the soil temps get too warm or cold, below 50 degrees F and above 85 degrees F

Think of it like being outside in the summer and standing in the shade vs direct sun

Image description: Image 1 shows a thermometer taking soil temperature of 33.1 degrees in tilled soil. Image 2 shows a thermometer taking soil temperature of 36 degrees in covered soil.

How do I know what cover crops to plant?

Remember your soil test? What does it tell you?

If I am low in Nitrogen plant legumes to gather N from the atmosphere and the soil

If you need OM (Organic matter) planting crops like rye, sun hemp will build up the biomass in the soil, providing green manure when it’s terminated

If I have compaction, tillage radishes, turnips, rye are my go to covers

Allelopathic plants produce toxic compounds that can affect their neighbors. These compounds can be released into the soil or air, and can inhibit growth or even kill neighboring plants

Cover crops with allelopathic qualities include: oats, barley, wheat, triticale, buckwheat, clovers, hairy vetch, sunflowers, and fescues

The opposite of compaction is loose soil, nothing holding it together

Cover crops help to build soil and bind it together with glomalin and organic matter

When do I plant cover crops?

Cover crops, traditionally have been used after cash crops or sowed towards the end of the cash crop to be established by fall/winter

Covers can be used before, during and after cash crops

If you have a bed or row that is empty for the next month, plant a fast growing cover.

Buckwheat, cow peas, radishes, turnips, clover

When planting cover crops make sure you start them early enough to maximize growing

Nothing grows during the winter, so for the Southern US, August/ September

Northern states July/August is your target window

I want a dense stand of them come winter

Interplanting of cover crops

Cover crops work well with cash crops

Corn and rye, or clover

Brassicas and clover

Taters with peas

Winter squash with cool season mix

Planting covers should be done after the cash crop is established 3/4th grown

A lot of times interseeding depends on the type of crop and timing

You don’t want your cover crop to get taller or more vigorous than the cash crop

You also want the cover crop to be getting established and be ready to take over after the cash crop is done. (No bare soil)

Garlic and onions are two crops that don’t like competition so don’t interplant with them

How do I plant cover crops?

Cover crops can be established easily by two methods

Broadcasting seeds or drilling seeds

Broadcasting is the simplest, till, spread seed, till again or rake to cover seeds

Drilling is if you have a large field and you fill the drill with seeds and plant the cover crop

Where do I source cover crop seed?

CO-OP

Tractor Supply

Online

Trueleaf

Johnny’s

Seedway

To mix or not to mix?

Anytime you cover crop it's great for the soil

Clover by itself does wonders, however a legume and a grain together do even better

Monocrops are a human invention, we want life in our soils, diversity above ground = diversity below ground

Clover, radishes, turnips, chicory, rye grass, peas

Nutrient Tie Up?

- Are you sure the nutrients are there to begin with? How do you know there is deficiency?
- Wait a few weeks after incorporating the cover so the carbon in the cover crop can be broken down and the nutrients will become available to the following crop.
- Supply another source of fertilizer preferably in liquid form as a foliar application.

If the nutrients are not there the cover crop can not help that much, sometimes you need to add compost, manure, or synthetic fertilizers to begin building your fertility levels in your soil.

Use all your tools

What we want to do is add **biology** to the soil, we want to make sure that we have living roots and soil that is well aggregated so that our crops can access the nutrients. Between the mycorrhizal fungi and other macro organisms in the soil they will help break down the organic matter and make sure that nutrients are available for the crops over time.

Cover crops and livestock

Cover crops are excellent for livestock

Livestock eat the covers, and return nutrients both solid and liquid back to the soil

Done for the season, or rotating fields or pastures? Plant cover crops

Let your livestock spend the winter or part of the winter helping build your soil

Cool Season cover crops

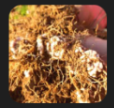
Cover crops can provide food for livestock, including winter food. Some common cover crops for livestock include:

- **Annual ryegrass**: A popular choice for grazing, it grows quickly in the spring and can be grazed repeatedly.
- **Cereal rye**: A cool-season cereal that's often used in spring and fall.
- **Oats**: A cool-season cereal that's often used in spring and fall.
- **Sudan grass**: A warm-season plant that's a popular summer choice.
- **Pearl millet**: A warm-season plant that's a popular summer choice.

Common cover crops

From sources across the web


Hairy vetch


Field peas

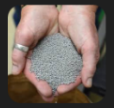

Daikon


Buckwheat


White Clover


Sunn hemp


Crimson clover


Berseem clover


Rye


Forage turnip


Annual ryegrass


Sweet clovers


Oats


Austrian Winter pea


Triticale


Mustard


Red Clover


Turnips

Summer cover crops

Clover, cow peas, soy beans, sunflowers, sun hemp, buckwheat, vetch

Plant these as early as you can, and as often as you can, in between plantings

Summer covers will winter kill

Turnips, radishes work well as early season covers (Spring)

Rye and Wheat work well for late summer interseeded covers

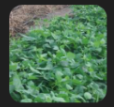
Summer cover crops

From sources across the web

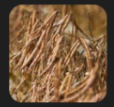

Buckwheat


Soybeans


Crimson clover


Southern peas


Sorghum × drummondii


Bush bean


Sorghum


Sorghum sudangrass


Sunn hemp


Japanese millet


Annual ryegrass


White Clover


Cover crop planning

Velvetbean


Cowpea


Pearl millet


Oats


Hairy vetch


Berseem clover


Phacelia

Systems Thinking

A System is a collection of different elements that together produce results not obtainable by the elements alone

Dr. Russell Ackoff

Ray Archuleta has this acronym: FIST, think of this before doing anything in the soil

Frequency

Intensity

Scale

Timing

Why is diversity Important?

Lots of different plants=Lots of different insects and wildlife

Diversity = Life

Mimic nature, whatever nature is doing we need to do, not what the neighbor is doing

Nature is self healing and self regulating

Weeds: Nature's first responders

See what nature is telling you

As soon as you plant covers, nature starts healing

COMPACTED SOIL	OVER GRAZED LAND	WET OR FLOODED SOIL	LOW FERTILITY SOIL	DEFICIENCY
Low Oxygen soils: Platy layers in soil, high bulk density (poor infiltration, increased runoff)	**Lack of cover:** effects similar to compacted land – High weed population	**Low Oxygen soils:** Pore spaces become saturated or not present negatively affecting soil structure, decomposition, and chemical and biological processes	**Unbalanced Fertility:** pH below 5.1 (frequent) or above 7.3 (high pH is uncommon in TN). Often Phosphorous is limiting factor. Potassium is typically limiting on hay land	**Severe deficiency of a nutrient or pH is low and infrequently too high in TN**
Prostrate knotweed: *Polygonum arenastrum or aviculare*	**Horsenettle:** *Solanum carolinense*	**Sedges:** *Carex spp.* **Sedges have edges, triangular stem**	**Rabbit tobacco:** *Pseudognaphalium obtusifolium*	Effects Of Soil pH On Nutrient Availability
Rushes: *Juncus spp.*	**Bitter sneezeweed:** *Helenium amarum*	**Rushes:** *Juncus* spp. Segmented hollow stem	**Red sorrel:** *Rumex acetosella*	**Nitrogen**
Goosegrass: *Eleusine indica*	**Spiny amaranth:** *Amaranthus spinosus*	**Spikerush:** *Eleocharis spp.*	**Poor Joe:** *Diodia virginiana*	Phosphorus
Bitter sneezeweed: *Helenium amarum*	**Bermudagrass:** *Cynodon dactylon*	**Flatsedge:** *Cyperus spp.*	**Broomsedge:** *Andropogon virginicus*	Potassium
Dog fennel: *Eupatorium capillifolium*	**Annual bluegrass:** *Poa annua*	**Bulrush:** *Scirpus spp.*	**Sweet vernalgrass:** *Anthoxanthum odoratum*	Calcium
Buttercup: *Ranunculus*	**Kentucky bluegrass:** *Poa pratensis*	**Virginia buttonweed:** *Diodaia Virginiana*	**Oxeye Daisy:** *Leucanthemum vulgare*	Magnesium
Curly dock: *Rumex crispus*	**Crabgrass:** *Digitaria ischaemum*	**Smartweed:** *Persicaria spp.*	**Panicums:** *Panicum spp.*	Iron
Chicory: *Cichorium spp.*	**Ironweed:** *Vernonia gigantea*	**Reed canarygrass:** *Phalaris arundinacea*	**Yarrow:** *Achillea millefolium*	Zinc

Benefits of covers

Think of cover crops like you would fertilizers or other inputs to your fields

The more covers you put in especially multispecies blends the better your soil and future crops will be

The average farm captures 110 days of sun, we need to be capturing 365 days of sun

Diversity = resilience without living plants all we have is rock and ice, plants bring life and rain

- Cover crops reduce nitrate leaching in two ways:
- They soak up available nitrate for their own needs
- They also use some soil moisture, reducing the amount of water available to leach nutrients.
- For much of the continental U.S., cereal rye is the best choice for catching nutrients after a summer crop.

USDA-NRCS SOIL HEALTH INFOGRAPHIC SERIES #002

unlock the SECRETS IN THE SOIL

what's underneath

Cover Crop Termination

Cover crop termination

Terminating cover crops can be done in a variety of ways.

Crimping, mowing, chemical, burning, tillage, tarping etc

For any cover crop, kill it before it goes to seed

For cereal grains the best time is in the milky doe stage of the grain

For other crops this could happen in winter, winter kill

When the covers reach the stage that you have the ability to kill them

Remember, cover crops have a lot of nutrients that are readily accessible by the soil, until they flower

The nutrients turn from sugar to starch

If you don’t have the ability to turn under your covers, cut them low and put in compost pile

Allow 2-4 weeks between termination and planting




Resources

Dirt to Soil Gabe Brown

Weeds and what they tell us Ehrenfried E. Pfeiffer

https://youtu.be/t-doli5yse0?si=rj24dfu0aliN4lNM Gabe Brown Cover Crops

https://youtu.be/ZOuJ2bUGcTc?si=_sa1MnS8OMCSw2gC Dave Brant Mimicking Nature

https://youtu.be/-QpUmxEQAuE?si=78RHoOPs8vno8xuB Fall Cover Cropping Simplified, No Till Growers

https://youtu.be/0xvp8sWY6Fk?si=t0QrASwpDBhyHNNO Summer Cover Cropping Guide, No Till Growers

https://youtu.be/nNMdWnfjs8s?si=4wGxZtVShMyDGGvV Ray **Archuleta**

https://www.canr.msu.edu/news/cover-crop-considerations-for-vegetables

Cover Crops for Sustainable Crop Rotations
SARE Outreach