Cover Crops

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What is a Cover Crop?

Short definition: Living Groundcovers

Attributes of cover crops:
- Cool Season
- Warm Season
- Planted alone
- Mixed with other species
- Interplanted with cash crop
- Fix nitrogen
- Trap nitrogen
- Fast-growing
- Dense; Create lots of biomass
- Deep-rooted
- Big-rooted
- Used for grazing
- Attract pollinators
- Reduce pests and diseases
Why would I use them?

- Protect soil from erosion and nutrient runoff
- Enhance soil structure
- Increase nutrient potential in soil
- Store nutrients for later use
- Pest Control (weeds, insect, and disease)
- Increase biological activity in soil
- Habitat for beneficial insects and pollinators

Protect your investments of time, labor, and money spent on amendments!
Reducing Erosion and Nutrient Runoff

- Cover Crops dissipate energy from rain and wind, allowing soil particles to stay in place
- Roots hold soils together
- Faster infiltration prevents sheet runoff and erosion
- Using covers as “trap crops” can tie up nutrients so that they can be used later for cash crop
Cover Crops improve soil structure through:

- Creating space for air and water in root channels
- Add organic matter to soil, improving tilth
- Reduce compaction and increase “sponginess” of soil, making it more resilient to compacting forces.
Cover Crops and Nutrients

- Cover crops do not “create” nutrients in soil, but can recycle and release; except legumes can add N
- Trap nutrients that would otherwise “leak out” during fallow periods
  - leaching through soil
  - losses as eroded soil or runoff
- Release nutrients later—ideally at the time needed by the next crop
- Fix N from atmosphere (legumes)
- Translocate nutrients from deeper in subsoil, to near surface after cover crop death
- Increase soil biological activity in topsoil, potentially releasing nutrients from soil minerals
Weed Suppression

- “Smothering” effect reduces weeds and seedbank
- Residue and leaf canopy inhibits weed germination and lowers soil temperature
- Some allelopathy (can be pro and con!)
- Reduce the need for herbicides and weeding

UT Extension - Rutherford County
Weed Suppression

Time it right and you can get months of weed prevention!

Left to Right:

1. Daikon radishes sown in August quickly covered soil

2. Next spring, there were very few winter annuals in beds with radish, even though radish had winter killed

3. Other beds sown with cover crops that were slower to cover soil had more chickweed and other winter annuals.

Virginia Association for Biological Farming.
Cover Crops and Disease Control

- No till methods encourage beneficial soil microorganisms and have been shown to outcompete pathogens.
- Interplanted cover crops can reduce soil splash.
- Many brassicas and cereal grains actually have effects against both pathogenic nematodes and fungi.
Increase Soil Biota

- Microorganisms are most abundant near roots.
- Increase populations of soil organisms (fungi, bacteria, protozoans, earthworms, nematodes, insects, etc.).
  - More air
  - More roots
  - They maintain activity for longer in heat and drought due to increased air and moisture.
  - Soil is buffered from freeze by covers.
  - Further improve soil texture and nutrient availability.

Figure 3.1 Soil organisms and their role in decomposing residues. Modified from D.L. Dindal, 1978.
Beneficial insects and pollinators alike are needed in the garden.

Cover Crops can be used for early flowering plants in spring, predator-attractants in summer, and a late season pollen source for bees.

Clovers, peas, buckwheat, and brassicas are especially attractive and can be interplanted with cash crops.
Pollinator Habitat 

Enhance Soil Structure 

Increased Soil Organic Matter 

Environmental Quality 

Cover Crops 

Increase Soil Biota 

Increased Nutrient Cycling 

Increased pH buffering 

Improved Aeration 

Improved Aggregation 

Improved Infiltration 

Improve Pest Management 

Weed Suppression 

Pathogen Suppression 

Nematode Suppression 

Reduced N-leaching 

Reduced Erosion 

Reduced Run-off 

Pollinator Habitat
Cover Crop Examples

Warm Season Legumes
- Sunn Hemp
- Cowpeas, soybeans

Warm Season Non-Legumes
- Buckwheat
- Sorghum Sudan Hybrid (Sudex)
- Millet

Cool Season Legumes
- Vetch
- Austrian Winter Peas
- Clovers (ladino, red, crimson)

Cool Season Non-Legumes
- Cereal grains (wheat, cereal rye, barley, oats, *barley*, etc.)
- Tillage radish
- Turnips, mustard
Basic Characteristics

Features of Non-Legumes
- Reduce Erosion
- Large amounts of residue
- Add organic matter
- Scavenge nutrients
- May immobilize nitrogen
- May have allelopathic effects
- Suppress weeds

Features of Legumes
- Reduce Erosion
- Small amounts of residue
- Small amount of organic matter
- Fix nitrogen from atmosphere
- More likely to attract beneficial insects
Cover Crops Drawbacks

- More time and management
- Weed potential
- May harbor pests
- Allelopathic effects
- Use of soil moisture
- Deciding how and when to kill
- To till or not to till... For another day!
Warm Season Covers

**Buckwheat**

**Sow:** Mid Spring through summer

**Frost Sensitive?** Yes

**Growth Rate:** Very Fast

**Good for Pollinators & Beneficial Insects?** Yes

**Other Attributes & Notes:** smother crop, use between crops, sets seed easily

**Seeding Rates:** 60 (drilled) to 90# (broadcast)/acre or 2oz./100 sqft.
**Sorghum Sudangrass Hybrids**

*(Su dex)*

**Sow:** Late spring/early summer

**Frost Sensitive?** Yes

**Growth Rate:** Fast

**Attracts Pollinators & Beneficial Insects?** No

**Other Attributes and Notes:** soil builder, weed and nematode suppression, deep roots, LOTS of organic matter. Should mow 1-2x/season to avoid getting too woody; Good planted with climbing legume.

**Seeding Rates:** 35 (drilled) to 50# (broadcast)/acre or 2oz./100 sqft.

_Rutgers_
Warm Season Covers

**PEARL MILLET**

**Sow:** Late Spring/Early Summer

**Frost Sensitive?** Yes

**Growth Rate:** Fast

**Attracts Pollinators & Beneficial Insects?** Yes

**Other Attributes and Notes:** Quick cover, weed suppression, wildlife food

**Seeding Rates:** 25 (drilled) to 40# (broadcast)/acre or ¾ oz./100 sq.ft.

University of Georgia
SUNN HEMP

Sow: Mid Spring through summer

Frost Sensitive? Yes

Growth Rate: Medium

Attracts Pollinators & Beneficial Insects? No

Other Attributes & Notes: fixes nitrogen, lots of biomass

Seeding Rates: 60 (drilled) to 90# (broadcast)/acre or 2-3oz./100 sqft.
Warm Season Covers

**Cow Pea**

**Sow:** Mid Spring through summer

**Frost Sensitive?** Yes

**Growth Rate:** Fast

**Attracts Pollinators & Beneficial Insects?** No

**Other Attributes & Notes:** fixes nitrogen, chokes weeds, good for short windows, kills easily, commonly used in deer food plots

**Seeding Rates:** 60 (drilled) to 90# (broadcast)/acre or 5oz./100 sqft.
Cool Season Covers

**Winter Wheat**

**Sow:** Late summer/fall  
**Frost Sensitive?** No  
**Growth Rate:** Fast  
**Attracts Pollinators & Beneficial Insects?** No  

**Other Attributes and Notes:** Prevents erosion, suppresses fall weeds, scavenges excess nutrients, high biomass. Best killed **before** fruit stem grows (high N use)

**Seeding Rates:** 60 (drilled) to 90# (broadcast)/acre or 4-6oz./100 sqft.

Mississippi State University
Cool Season Covers

OATS (BORDERLINE COOL/WARM)

Sow: September or early spring
Frost Sensitive? Zone 8
Growth Rate: Fast
Attracts Pollinators & Beneficial Insects? No
Other Attributes and Notes: Lots of biomass, quick to germinate, reduce fall/early winter weeds. Good mulch for early spring transplants. Expect winter kill, allelopathic effects can slow germination after tillage. Seeding Rates: 90 (drilled) to 110# (broadcast)/acre or 4-6oz./100 sqft.
Cool Season Covers

AUSTRIAN WINTER PEA

**Sow:** mid August – early October

**Frost Sensitive?** Zone 7 - mixed plantings with grass will buffer kill

**Growth Rate:** Medium  
**Attracts Pollinators & Beneficial Insects?** Yes

**Other Attributes and Notes:** fixes nitrogen, good mixed with grass. Can be slow to establish

**Seeding Rates:** 50 (drilled) to 100# (broadcast)/acre or 4oz./100 sqft.
Hairy Vetch

Sow: mid August - early October

Frost Sensitive? No

Growth Rate: Slow to medium

Attracts Pollinators & Beneficial Insects? Yes

Other Attributes and Notes: fixes nitrogen, once established provides excellent weed suppression, does well in wide range of soil types, great soil builder. Can be quite weedy if allowed to mature

Seeding Rates: 25 (drilled) to 40# (broadcast)/acre or 2oz./100 sqft.
Cool Season Covers

**Daikon Radish**

(aka Forage Radish, Tillage Radish)

**Sow:** mid August - early September

**Frost Sensitive?** Kill likely at 25°F; needs 60 frost-free days to establish

**Growth Rate:** Fast - Can be trying to establish

**Attracts Pollinators & Beneficial Insects?** No

**Other Attributes and Notes:** reduce compaction & avoid deep tillage, trap nitrogen, suppress early spring weeds, Early release of nitrogen in late winter/early spring. Will not tolerate wet soils. “Oilseed radish” more hardy, but not as deeply rooted.

**Seeding Rates:** 10 (drilled) to 20# (broadcast)/acre or 1oz./100 sq ft.
I think that Covers it!

But not really... Check out our onsite Cover Crop Demonstrations to see a variety of cover crop options in action and stay tuned for updates on soil changes through time.

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