



Cover Crops and Soil Health: Options and Opportunities

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Why Cover Crops?

- Cover crops are a “tool” to advance or improve soil health.
- Cover crops are not a “silver bullet”
- Cover crops work best when used in combination with other soil health management practices.

What is Soil Health?

Soil health = Soil function

Soil function =

Ability to capture and store precipitation

Ability to cycle nutrients

How do we improve soil function?

Promote diverse soil microbe community

- How: **Cover crops**

- Continuous living root
- Provide soil armor most of the year
- Diversify crop rotation

Minimize tillage

Integrate livestock on cropland

Results

- Increase glomulin and humus
- Increased soil aggregate structure



Soil Health Benefits

- Increase water holding capacity
- Increase fertility
- Reduced need for inputs
 - Drain tile and irrigation
- Reduced erosion
- Less vulnerable to drought events
- Less leaching and runoff

Diverse Crop Rotations

- Include at least one representative of each major crop type.
- In general: greater the diversity, greater the soil health benefits.
- Cover crops can be a means of increasing diversity in the rotation.

Major Crop Types

- Cool season grasses
 - Oats, barley, triticale, cereal rye, wheat
- Cool season broadleaves
 - Clovers, brassicas, field pea, vetch
- Warm season grasses
 - Corn, millets, sorghum, sudangrass
- Warm season broadleaves
 - Soybean, sunflower, cowpea, buckwheat

Why integrate livestock?

- Ruminant livestock = walking “vat of microbes”.
- “We cannot replicate in a jug or bag what comes out of the back end of a cow.”
- Reduced manure handling costs
- Most cost effective means of recouping cover crop costs in establishment year.
- Creates more management options
- Dr. Beck, Dakota Lakes Experiment Station

When to integrate cover crops?

Diverse crop rotation creates the greatest opportunities.

- After small grain or field peas.
- Full season cover crop
- Prevent plant acres
- With silage corn
- With grain corn, sunflowers or soybeans

Cover Crop Establishment Options

- No-till post grain harvest
 - Fill drill box 1/3 full or split by seed size between multiple box drills
- Broadcast or drop-tube seed at V-6
 - Homemade drop-tube seeder
- Aerial or “high boy” seed corn, beans
- Companion planting with main crop

Creative ways to integrate cover crops



Inter-seed into standing crop.



Livestock Glean Crop Field



“Companion Crop”



“Double Cropping”



Complex Cover Crop Mix Example

- Pearl millet
- Sorghum x sudangrass
- Cowpea
- Rapeseed
- Forage radish
- Purple top turnip
- Austrian winter pea
- Sunflower
- Buckwheat
- Sunn hemp
- Red clover



Full Season Cover Crop



Complex Cover Crop Mix Example

- Sorghum x sudangrass
- Pearl millet
- Corn
- Sunflower
- Cowpea
- Red clover
- Winfred hybrid turnip
- Purple top turnip
- Forage radish



Summer Graze Cover Crops



Complex Cover Crop Blends

- To address one or more soil resource issues on a specific field.
- Generally consist of 8 or more annuals in the blend
- No “one size fits all” or “recipe”

Resource Issues

- Diversify crop rotation
- Provide soil surface armor or cover
- Build soil aggregates
- Improve water cycle
- Integrated pest management
- Build soil organic matter
- Promote nutrient cycling
- Enhance pollinators
- Adjust carbon : nitrogen ratio
- Provide food and shelter for wildlife
- Integrate livestock

Addressing Resource Issues



Addressing Resource Issues



Power of Diversity!

Brown's Ranch, Bismarck, ND, 8/20/13



~30 cover crop species, planted 6/26, 0.5" rain, picture taken 8/20, 1PM, 100 degrees F

Brown's Ranch 2012 Corn Crop

- Followed complex cover crop
- No commercial fertilizer
- No herbicide
- Drought year
- Planting = no-tilled into cover crop residue
- Yield: 31% > than 10 year county average
- Utilized OP corn variety
- Production cost \$1.44/bushel

Thank You!

