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# What is the Primary Purpose of the Cover Crop

# COVER CROPS

Many Ag producers have discovered the economic benefits of incorporating cover crops into their operation.

A cover crop is a crop generally grown at times of the year when cash crops are not actively growing. Covers are planted primarily to improve soil fertility and soil health, control weeds, improve water infiltration, break up pest and disease cycles, and reduce soil erosion. Cover crops are also used to manage excess water, improve water quality, provide wildlife habitat, and extend the grazing season. **The range of cover species available and array of characteristics those species possess, allows farmers to target a broad spectrum of resource concerns.**



**Schoenrock Farm, Hanson County**  
Justin Schoenrock drilled this rye after corn harvest in 2015 for the purpose of efficiently using the next spring's moisture all while managing saline spots; building organic matter, structure, infiltration, and tilth; and cycling nutrients. On some of his fields he utilized the rye for additional livestock forage. Weed control was very good and the soil temps were much lower than the neighboring fields that were black!



**Cronin Farm, Potter County**  
Our cattle grazed a 12-way full season cover crop with biomass production at 8,200 lbs., and dry matter with 11% protein. We grazed this in January of 2017 with average temperature of 11° and with 34 inches of snow on the ground. Our goal was to leave 33% biomass which we were able to do. This field was set up with 5 paddocks grazed for 40 days contributing \$1.26 on the feed cost per day for 675 cows. If we would have had a normal winter this cover would have been our cattle's full feed.



**Smith Farm, Davison County**  
This cover crop mix included barley, dwarf essex rape, soybeans, flax, oats, and radishes. It was a Prevent Plant field that was seeded to cover crops on 7/25/16. The cover crop had excellent growth into the fall and was grazed over winter and into late March. After grazing, the remaining 1 ton of residue helped with the salinity issue.



**Arnoldy Farm, Lyman County**  
Mike Arnoldy planted flax, Indian head lentil, and rapeseed into wheat that was harvested with a stripper head. The goal of the cover crop cocktail was to increase microbial activity while maintaining the majority of the stripper head wheat residue for ease of planting the next no-till crop, snow catch, and increasing soil organic matter.



**Jorgensen Land & Cattle Partnership, Tripp County**  
In 2014, the Jorgensens installed 26 miles of new fence around their cropland acres. "We have seen a savings of \$1.50 head/day (or a 70% reduction) in feed cost alone when grazing instead of confining and feeding. Take that over roughly 1,000 head per year (so effectively around 3,000 head) for 60 days per animal, and we have gotten about \$250,000 in saved feed costs since the fence was put in (2014).



**Rausch Farm, Potter County**  
Rausch farms use cover crops to eliminate platy soil structure in their silt loam dominated soils. Fibrous root cover crops such as oats address the adverse effects of platiness. Platiness isn't necessarily compaction, but the soil may have similar symptoms such as reduced root growth.



**Stehly Farm, Davison County**  
This field had winter rye flown on 9/5/2016 for the purpose of efficiently using the next spring's moisture all while managing saline spots; building OM, structure, infiltration, and tilth; and cycling nutrients. An added bonus is better management of next years weed growth.

Cover Crop	Purpose	Erosion Reduction	Increase soil organic matter	Capture, recycle, redistribute nutrients in soil	Promote biological nitrogen fixation	Salinity tolerance	C:N Ratio	Attract Beneficial Insects	Mycorrhizal fungi association	Weed suppression	Provide supplemental hay	Provide supplemental grazing	Rooting Depth / Plant Water Use 1/	Minimize / reduce soil compaction	Seed size (Large or Fine)	Crop Type and Seeding Dates 2/3	Full Seeding rate, lbs/acre 4	Seeding depth, inches
<b>Cool Season Broadleaf</b>																		
Alfalfa	G	G	G	Y	P	L	Y	M	G	F	F	DH	G	F	CB	6.5	.25-.75	
Alsike clover	G	F	G	Y	P	L	Y	M	G	F	F	SL	P	F	CB	3	.25-.75	
Brassica hybrids	F	F	G	N	G	L	Y	N	G	F	F	MM	G	F	CB	7	.25-.5	
Canola	F	F	G	N	G	L	Y	N	P-G**	F	F	MM	G	F	CB	5	.25-.75	
Chickling vetch	G	F	G	Y	P	L	Y	M	F	F	F	SL	F	L	CB	50	.5-1.5	
Common vetch	G	F	F	Y	P	L	Y	M	P	F	F	SM	F	L	CB	25	.5-1.5	
Crimson clover	G	F	G	Y	P	L	Y	M	G	G	G	SM	F	F	CB	15	.25-.75	
Ethiopian cabbage	F	F	G	N	G	L	Y	N	F	F	F	MM	G	F	CB	5	.25-.75	
Flax	F	F	F	N	F	H	Y	H	P	P	P	SM	P	F	CB	30	.25-.75	
Hairy vetch	G	F	F	Y	P	L	Y	M	P	F	F	SM	F	L	CB	15	.5-1.5	
Kale	F	F	G	N	G	L	Y	N	G	F	F	MM	G	F	CB	4	.25-.5	
Lentils	P	P	F	Y	P	L	Y	M	P	F	F	SL	P	F	CB	30	1-1.5	
Mustard, oriental or brown	F	F	F	N	P	M	Y	N	G	F	F	MH	F	F	CB	6	.25-.75	
Mustard, tame yellow	F	F	F	N	P	L	Y	N	G	F	F	MH	F	F	CB	12	.25-.75	
Peas	P	P	P	Y	P	L	Y	M	F	G	F	SL	P	L	CB	70	1.5-3	
Radishes	P	P	G	N	P	L	Y	N	G	P	G	DH	G	F	CB	8	.25-.75	
Rapeseed	F	F	G	N	G	L	Y	N	F	F	G	MM	G	F	CB	5	.25-.75	
Red clover	G	F	G	Y	P	L	Y	M	G	F	F	SL	P	F	CB	5	.25-.75	
Sugar beets	P	P	G	N	G	L	N	N	F	P	G	DH	G	F	CB	4	.25-.5	
Sweet clover	G	F	F	Y	F	L	Y	M	F	P	F	MM	F	F	CB	4	.25-1	
Turnips	P	P	G	N	P	L	Y	N	G	P	G	DH	G	F	CB	4	.25-5	
White clover	G	F	G	Y	P	L	Y	M	G	F	F	SL	P	F	CB	1.5	.25-.75	
Winter camelina	F	F	G	N	P	L	Y	N	F	P	P	ML	G	F	CB	3	.25-.5	
<b>Cool Season Grass</b>																		
Annual Oregon ryegrass	F	G	G	N	F	M	Y	L	F	G	G	MM	P	F	CG	15	.5-1.5	
Barley	G	G	F	N	G	M	Y	M	G	F	F	MM	F	L	CG	50	.75-2	
Oats	G	G	F	N	F	M	N	M	F	G	F	MM	F	L	CG	70	.5-1.5	
Spring wheat	G	G	G	N	F	M	Y	M	G	F	F	MH	F	L	CG	60	.5-1.5	
Tall wheatgrass	G	G	G	N	G	H	N	M	G	G	G	DH	F	L	CG	13	.25-1	
Triticale	G	G	G	N	G	M	Y	M	G	F	F	MH	F	L	CG	60	.5-1.5	
Winter wheat or rye	G	G	G	N	G	M	Y	M	G	F	F	MH	F	L	CG	60	.75-2	
<b>Warm Season Broadleaf</b>																		
Buckwheat	G	F	G	N	P	L	Y	N	G	P	P	SL	P	F	WB	50	.5-1.5	
Cowpeas	P	P	F	Y	P	L	Y	M	G	F	F	SL	F	L	WB	30	1-1.5	
Dry beans	P	P	F	Y	P	L	Y	M	G	F	F	SL	F	L	WB	30	1-1.5	
Safflowers	F	F	G	N	F	M	Y	M	F	P	P	DM	F	L	WB	30	.5-1	
Soybeans	P	P	F	Y	P	L	Y	M	P-G**	F	F	SM	P	L	WB	35	1-1.5	
Sunflowers	F	F	G	N	F	M	Y	M	F	P	G	DM	F	L	WB	7	.5-1	
Sunn hemp	F	F	F	Y	P	L	Y	Y	G	P	P	DM	F	L	WB	15	1.5-2	
<b>Warm Season Grass</b>																		
Corn	G	G	G	N	P	H	N	H	P-G**	F	F	DH	G	L	WG	12	1-1.5	
Forg. Sorghum/sudan hybrids	G	G	G	N	F	M	Y	H	G	G	F	MM	G	L	WG	15	.5-1.5	
Grain sorghum	G	G	G	N	F	M	Y	H	G	G	F	MM	G	L	WG	5	.5-1.5	
Millet	G	G	F	N	P	M	N	H	G	G	F	SL	F	F	WG	25	.25-.75	
Sudangrass	G	G	G	N	F	M	Y	H	G	G	G	MM	G	L	WG	20	.5-1.5	
Teff grass	F	G	F	N	P	M	N	N/A	F	G	F	SM	P	F	WG	5	.13-.25	

<p><b>1/1 Rooting Depth/Water Use</b></p> <p>SL= Shallow rooted/Low water use  SM= Shallow rooted/Medium water use  SH= Shallow rooted/High water use  ML= Medium rooted/Low water use  MM= Medium rooted/Medium water use  MH= Medium rooted/High water use  DL= Deep rooted/Low water use  DM= Deep rooted/Medium water use  DH= Deep rooted/High water use</p>	<p><b>1/2 Crop types</b></p> <p>CG= cool season grass  CB= cool season broadleaf  WB= warm season broadleaf  WG= warm season grass</p> <p>Shallow 6 - 18 inches  Medium 18 - 24 inches  Deep 24 + inches</p>	<p><b>Ratings</b></p> <p>L= Low G= Good  M= Medium F= Fair  H= High P= Poor  Y= Yes  N= No or None  N/A= Not Available</p>
<p><b>1/3 Seeding Dates</b></p> <p>November 1 through May 15 - predominantly cool-season species  May 15 through August 1 - predominantly warm-season species  August 1 through October 1 - predominantly cool-season species  Seeding dates fluctuate annually. The dates listed above are averages that maybe 10 days in either direction depending on current climatic conditions.</p>	<p><b>1/4 Full Seeding rates</b></p> <p>Multiply by the percent desired if mixtures are used.</p>	<p><b>1/5 Buckwheat contamination</b></p> <p>To reduce chances of buckwheat contamination in wheat do not rotate to wheat for grain for 2 years.</p>

Source: USDA Natural Resources Conservation Service South Dakota, Field Office Technical Guide, Agronomy, Cover Crops, Table 1.

## Considerations when using cover crops:

- What is the primary purpose of the cover crop? Refer to the USDA NRCs SD Cover Crops Table 1.
- What crop type will the following cash crop be? The majority of the cover crop mix should be an alternate crop type.
- Do you include warm season species or not? If planting later than about August 10, do not include warm seasons.
- Would you like any species to overwinter? Cereal grains most consistently overwinter i.e. rye, winter wheat, triticale, etc.
- Benefits to using cover crops include: Graze, Build Organic Matter, or Reduce Compaction, etc.
- Review the "half life" of previously applied herbicides. Herbicides break down by microbes, sunlight, OM level, pH, etc.
- For overwinter cover crops, refer to NRCs Cover Crop Termination Guidelines Termination Zone Map, Considerations, and Definitions.
- Seeding Timing Options  
Drilling after small grain/silage/corn/soybeans; aerial interseeding; or full season.
- See the Seed Supplier List on the SD No Till Association website: [www.sdnottill.com](http://www.sdnottill.com).

# South Dakota Cover Crop Common Species and Benefits



## Dwarf Essex Rapeseed

(*Brassica campestris/Brassica napus*)

Cool Season, broadleaf

- Good for grazing
- Good cold tolerance for late season grazing
- Large taproot
- pH tolerance 5.5–8.3
- Occasionally overwinter with mild winter conditions
- Flood tolerance Low, especially during establishment
- High Drought tolerance
- The minimum soil temperature for planting is 45°F
- Fits well into rotations with non-brassica crops



## Common Vetch

(*Vicia sp.*)

Cool Season, broadleaf

- Annual or biennial
- Good for grazing
- Legume (N fixation)
- Prostrate plant architecture (vine)
- Common Vetch is different than Hairy Vetch or Chickling Vetch
- Poor salinity tolerance
- Seeding depth: 1 ½ – 2 ½ inches
- Crude protein: 13-20%
- Low C:N ratio
- Forms arbuscular mycorrhizal associations
- Attracts pollinators



## Cereal Rye

(*Secale cereale*)

Cool Season, grass

- Winter annual
- Very good rating to increase Organic Matter
- High water use
- Good salinity tolerance
- Seeding depth: ¼ – 2 inches
- Crude protein: straw 4%, grain 14%
- Medium C:N ratio
- Forms arbuscular mycorrhizal associations
- Assists in weed control for subsequent crops
- Rated 'very good' at scavenging nitrogen from the soil



## Flax

(*Linum usitatissimum*)

Cool Season, broadleaf

- Annual
- High C:N ratio
- Medium water use
- Fair salinity tolerance
- Seeding depth: ½ – 1 ½ inch
- Benefits from arbuscular mycorrhizal associations
- Flowers attract pollinators



## Cowpea

(*Vigna unguiculata*)

Warm Season, broadleaf

- Annual
- Legume (N-fixation)
- Resembles or looks like soybean
- Good for grazing
- Low water use/shallow rooted
- Fair salinity tolerance
- Seeding depth: ¾ – 1 inch
- Crude protein: grain and leaves 19-30% – stems 13-17%
- Low C:N ratio
- Forms arbuscular mycorrhizal associations
- Attracts pollinators



## Oats

(*Avena sativa*)

Cool Season, grass

- Annual
- Good at increasing Organic Matter
- Fair salinity tolerance
- Seeding depth: .5 – 1.5 inches
- Crude protein: hay 9-15%, grain 13-18%
- Forms arbuscular mycorrhizal associations
- Self pollinator (wind)
- Rated 'very good' at scavenging nitrogen from the soil



## Radish

(*Raphanus sativus*)

Cool Season, broadleaf

- Annual
- Good for grazing
- High water use
- Poor salinity tolerance
- Seeding depth: ¼ – ½ inch
- Crude protein: 26-30%
- C:N ratio: low 19 – 20
- Does not form arbuscular mycorrhizal associations
- Rated 'very good' at scavenging nitrogen from the soil
- Flowers attract pollinators



## Field Pea

(*Pisum sativum arvense*)

Cool Season, broadleaf

- Annual
- Legume (N fixation)
- Good for grazing
- Low water use
- Poor salinity tolerance
- Seeding depth: 1 – 3 inches
- Crude protein: hay 14%, grain 24%, silage 15%
- Low C:N ratio
- Forms arbuscular mycorrhizal associations
- Flowers attract pollinators



## Pearl Millet

(*Pennisetum glaucum*)

Warm Season, grass

- Annual
- Excellent for increasing Organic Matter
- Good for grazing
- Poor salinity tolerance
- Seeding depth: ½ – 1 inch
- Crude protein: hay 13%
- Forms arbuscular mycorrhizal associations
- Potential for accumulating toxic levels of nitrate, especially on the lower 6" of the stalks



## Turnip

(*Brassica rapa L. var. rapa*)

Cool Season, broadleaf

- Good Cold Tolerance
- Good for grazing
- Poor salinity tolerance
- Seeding depth: ¼ – ½ inch
- Crude protein: tops 16%, root 12-14%
- Low C:N ratio
- Does not form arbuscular mycorrhizal associations
- Rated 'good' at scavenging nitrogen from the soil
- Flowers attract pollinators



## Annual Ryegrass

(*Lolium multiflorum*)

Cool Season, grass

- Good at increasing Organic Matter
- Seeding rate is much less than cereal rye
- Deep rooted - Good at scavenging nutrients from the soil profile
- Desirable for grazing but often less biomass than other grasses
- Has been used in aerial seeding into a standing crop
- Can overwinter with spring control difficult
- Cross-pollinate freely, and many different types have developed
- It does not withstand hot, dry weather or severe winter



## Sorghum-Sudangrass

(*Sorghum bicolor*)

Warm Season, grass

- Annual
- Good for silage, grazing or hayed
- Excellent for increasing Organic Matter
- High tonnage potential
- Fair salinity tolerance
- Seeding depth: 1 inch
- Crude protein: hay 7-11%, silage 6-17%
- Medium C:N ratio
- Forms arbuscular mycorrhizal associations
- Rated 'Excellent' at nutrient scavenging
- Stress conditions that limit growth (e.g., drought, frost) can contribute to prussic acid accumulation in leaves