



CONSERVATION ENHANCEMENT ACTIVITY

E340B

CONSERVATION STEWARDSHIP PROGRAM

Intensive cover cropping to increase soil health and soil organic matter content

Conservation Practice 340: Cover Crop

APPLICABLE LAND USE: Crop (Annual & Mixed)

RESOURCE CONCERN: Soil

ENHANCEMENT LIFE SPAN: 1 Year

Enhancement Description

Implementation of cover crop mix to provide soil coverage during ALL non-crop production periods in an annual crop rotation. Cover crop shall not be harvested or burned. Planned crop rotation including cover crops and associated management activities must achieve a soil conditioning index (SCI) of zero or higher. The current NRCS wind and water erosion prediction technologies must be used to document SCI calculations.

Criteria

- Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, fertility requirements, and planting methods will be consistent with applicable local criteria and soil/site conditions **(REFER TO STATE SPECIFIC LISTS)**.
- Determine the method and timing of termination to meet the grower's objective and the current NRCS Cover Crop Termination Guidelines.
- Select species that are compatible with other components of the cropping system.
- Ensure herbicides used with crops are compatible with cover crop selections.

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- Cover crops may be established between successive production crops, or companion-planted or relay-planted into production crops. Select species and planting dates that will not compete with the production crop yield or harvest.
- Do not burn cover crop residue.
- Do not harvest the cover crop.
- If the specific rhizobium bacteria for the selected legume are not present in the soil, treat the seed with the appropriate inoculum at the time of planting.
- Cover crop must provide soil coverage during all non-crop production periods to the maximum extent possible considering the cropping system, climate, and soils in the annual crop rotation. **(STATES SHALL PREPARE GUIDANCE FOR THEIR LOCAL CLIMATES AND CROPPING SYSTEMS.)**
- Minimum 3 species mix will be selected on the basis of producing higher volumes of organic material and root mass to maintain or increase soil organic matter.
- Planned crop rotation including cover crops, biomass produced, and associated management activities must achieve a management soil conditioning index (SCI) of zero or higher and result in a positive trend in the Organic Matter (OM) sub factor value over the life of the rotation.

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Documentation and Implementation Requirements

Participant will:

- Prior to implementation, provide NRCS with the current and planned crop rotation and field operation(s) used for each crop.

Current Management Rotation

Field	Planned Crops/Cover Crop (in sequence)	Planting Date	Harvest/Termination Date

Current Field Operations for each crop

Field	Crop	Field Operation	Timing of Field Operation (month/year)

Planned Management Rotation Including Cover Crop

Field	Planned Crops/Cover Crop (in sequence)	Planting Date	Harvest/Termination Date



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Planned Field Operations for each crop

Field	Crop	Field Operation	Timing of Field Operation (month/year)

Cover Crop Mix and Seeding Rate

Species	Variety	Seed Size	Typical Seeding Depth	Seeding Rate (PLS lbs/acre)	Percent of Mix (%)

Establishment and Management Considerations:

Task	Provide information and details
Seedbed Preparation	
Seeding Date	
Seeding Depth	
Seeding Method	
Fertilizer, as needed	
Weed Management, as needed	
Termination Date (window)	
Termination Method	

- Prior to implementation, read and follow current [NRCS Cover Crop Termination Guidelines](#).



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- During implementation, cover crops must not be burned or harvested.
- During implementation, notify NRCS of any planned changes in crops, crop rotation, or unharvested areas to verify the planned system meets the enhancement criteria.
- After implementation, if changes to the cover crop and crop rotation were made, complete the tables above to document the applied Cover Crop for the contract period and provide to NRCS.

NRCS will:

- As needed, provide technical assistance in selecting cover crop mixes for the crop rotations or substitute species that would meet the criteria of the enhancement.
- As needed, provide additional assistance to the participant as requested.
- Prior to implementation, verify the cover crop mix has a minimum of 3 species.
- Prior to implementation, provide and explain the current [NRCS Cover Crop Termination Guidelines](#).
- Prior to implementation, use the information provided from the participant to calculate the management Soil Conditioning Index (SCI) and Organic Matter (OM) sub factor value over the life of the rotation. Cover crop must increase SCI and OM sub factor from the current/benchmark condition and SCI value must be 0 or greater and have a positive trending OM subfactor over the life of the rotation.

Benchmark Management SCI = _____, Benchmark Management OM sub factor = _____

Planned Management SCI = _____, Planned Management OM sub factor = _____

- During implementation, evaluate planned adjustments in cover crop selected, timing in crop rotation, management, or field operations to verify the new system meets the enhancement criteria.
- After implementation, evaluate the applied crop rotation or management using information provided from the participant, if any variation to planned evaluation, then calculate SCI values to document that the applied rotation met the enhancement criteria.

Applied Management SCI = _____, Applied Management OM sub factor = _____

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NRCS Documentation Review:

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

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Participant Name: _____ Contract Number: _____

Total Acres Applied: _____ Fiscal Year Completed: _____

NRCS Technical Adequacy Signature

Date



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SOUTH DAKOTA (SD) SUPPLEMENT TO CONSERVATION ENHANCEMENT ACTIVITY

CONSERVATION STEWARDSHIP PROGRAM

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Additional Criteria for SD

In addition to the criteria specified in the national job sheet E340B, the following additional criteria apply in SD:

- Ninety percent (90%) of mix will be rated Good (G) or Fair (F) for Increase Soil Organic Matter or have a rating of Medium (M) or High (H) for Mycorrhizal Fungi Association on the attached Cover Crop Table 1.

SD guidance to maximize soil coverage during non-crop production periods:

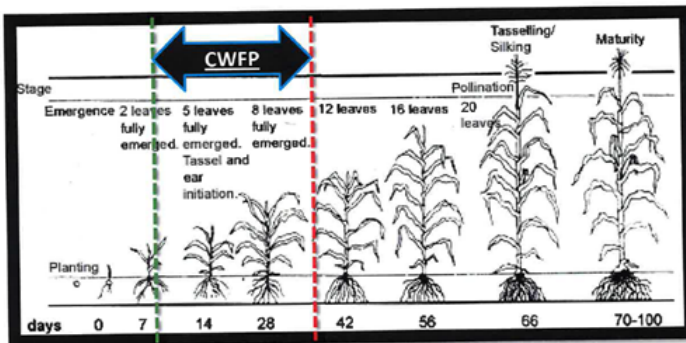
Guidelines for aerial applying cover crops into standing corn:

- Aerial apply cover crops when corn plant is dried approximately to the ear and when 50% of the sunlight can reach the ground between the rows.
- A forecasted rain event within two-three days of cover crop seeding improves germination success.



Guidelines for interseeding cover crops into corn:

- Critical Weed Free Period (CWFP): The period in the corn growth cycle which weeds must be controlled to prevent yield losses (Mahmoodi, S. And Rahimi, A. 2009).



Corn CWFP: 3rd to 8th leaf (34 days after planting (DAP))(Ontario 2010).

Source: <https://www.ag.ndsu.edu/carringtonrec/cover-crops-forum/Possible%20Advantages%20of%20Cover%20Crops%20Interseeded%20at%20V5-V6%20Corn%20in%20SD%20No-Till%20Production%20Systems%20A.%20Bich.pdf>

Guidelines for aerial applying cover crops into standing soybeans:

- Start aerial application of cover crops when the soybean plant is showing 25 - 50% yellowing of leaves and 40 - 50% of the sunlight can reach the ground between rows.





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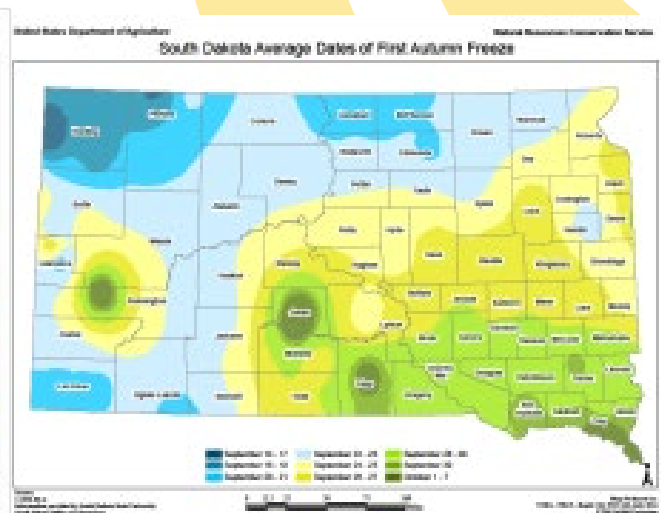
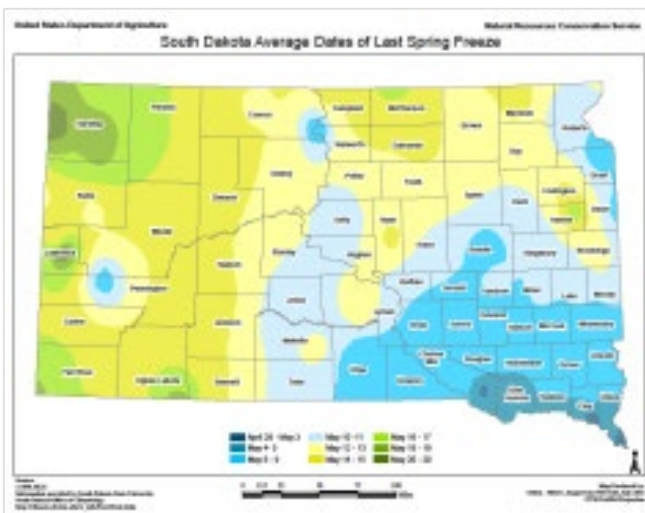
Guidelines for seeding cover crops into small grains:

- Grain harvest through August 5 – warm-season species.
- Grain harvest through August 20 - cool-season winter-kill species.
- August 1 through Winter – species that do not winter kill.



Average Frost Dates for SD:

Maps identifying SD Average Dates of First Autumn Freeze and Last Spring Freeze are located in the Field Office Tech Guide (FOTG) under Section I/Maps/1. General/SD Average Dates of First Autumn Freeze and SD Dates of Last Spring Freeze.





Climatic Data by county can also be obtained from the Agricultural Applied Climate Information System. This link can be accessed through the FOTG under Section II/Climatic Data/AgACIS.

- Step 1. Product - Select Frost/freeze dates.
- Step 2. Choose location.
- Step 3. Variable - select Minimum temperature <=32oF.
- Step 4. Year – select 1981-2010.
- Step 5. Select Go.

Example:

Climate Data for Beadle County, South Dakota

1. Product	2. Location	3. Variable	4. Year	5. View
<input type="radio"/> Daily data for a month	HURON RGNL AP	Min temp <= 36° F	<input type="radio"/> This year	<input type="button" value="Go"/>
<input type="radio"/> Daily almanac	HURON	Min temp <= 32° F	<input type="radio"/> Last year	
<input type="radio"/> Monthly avgs/totals	WESSINGTON 2SE	Min temp <= 28° F	<input type="radio"/> 1971-2000	
<input type="radio"/> Monthly occurrences		Min temp <= 24° F	<input checked="" type="radio"/> 1981-2010	
<input type="radio"/> Monthly extremes		Min temp <= 20° F	<input type="radio"/> Other range:	
<input type="radio"/> Daily extremes		Min temp <= 16° F	Start:	
<input type="radio"/> Daily/monthly normals			2016	
<input type="radio"/> Record extremes			End:	
<input checked="" type="radio"/> Frost/freeze dates			2016	
<input type="radio"/> TAPS				
<input type="radio"/> FROST				
<input type="radio"/> GROWTH				
<input type="radio"/> WETS				
<input type="radio"/> DAYS				

Product Description:
FROST/FREEZE DATES - finds the last spring and first fall occurrence of minimum temperatures below the selected threshold. This product is available for the current year, the previous year, an average of the normal periods, or any other range of years in the period of record. Additional

[Questions, comments](#)

Powered by NOAA Regional Climate Centers



Table 1: Cover Crop - Common Species and Properties

Cover Crop	Full seeding rate lbs/acre/4	Seeding depth inches	Reduce erosion	Increase soil organic matter	S cavenge nutrients	Biological N fixation	Suppress weeds	Provide supplemental hay	Provide supplemental grazing	Rooting depth / Plant water use /1	Minimize / Reduce surface soil compaction	Minimize/ Reduce subsoil compaction	Seed size (Large or Fine)	Crop type and seeding dates /2 /3	Winter Survival	Salinity Tolerance	CN Ratio	Mycorrhizal fungi association	Seeds/lb	Shade Tolerance
Alfalfa	6.5	.25 - .75	G	G	G	Y	G	G	F	DH	G	G	F	CB	Y	P	L	M	210,000	F
Barley	50	.75 - 2.0	G	G	G	N	G	G	G	MM	G	F	L	CG	N	G	M	M	14,000	F
Brassica hybrids	7	.25 - .5	F	F	G	N	G	F	G	MM	G	G	F	CB	N	G	L	N	180,000	P
Buckwheat /5	50	.5 - 1.5	P	P	F	N	F	P	P	SL	F	P	L	WB	N	P	L	N	19,000	G
Cabbage, African	5	.25 - .75	F	F	G	N	F	F	F	MM	G	G	F	CB	N	G	L	N	180,000	F
Camelina, Winter	3	.25 - .5	F	F	F	N	P	P	P	ML	P	F	F	CB	S	P	L	N	400,000	P
Canola	5	.25 - .75	F	F	G	N	G	F	F	MM	G	G	F	CB	S	G	L	N	140,000	F
Clover, Balansa	5	.25 - .75	F	P	F	Y	P	P	F	SL	P	P	F	CB	N	P	L	M	500,000	F
Clover, Crimson	15	.25 - .75	F	F	F	Y	P	F	F	SM	P	P	F	CB	S	P	L	M	150,000	F
Clover, Red	5	.25 - .75	G	F	F	Y	F	F	F	SL	F	F	F	CB	Y	P	L	M	275,000	G
Clover, Sweet	4	.25 - 1.0	G	G	F	Y	G	F	F	MM	G	G	F	CB	Y	F	L	M	260,000	G
Collards or Kale	5	.25 - .5	F	F	G	N	G	F	G	MM	G	G	F	CB	N	G	L	N	175,000	F
Corn	12	1 - 1.5	G	G	G	N	G	F	G	DH	G	G	L	WG	N	P	H	H	2,500	F
Cowpeas or Dry Beans	30	1 - 1.5	P	F	F	Y	P	P	F	SL	F	F	L	WB	N	P	L	M	4,000	F
Fava beans	75	1 - 1.5	F	F	F	Y	F	G	G	DM	F	F	L	CB	N	F	L	P	2,500	P
Flax	30	.25 - .75	F	F	F	N	P	P	P	SM	F	P	F	CB	N	P	H	H	80,000	P
Lentils	30	1 - 1.5	P	P	P	Y	P	P	P	SL	P	P	F	CB	N	P	L	M	20,000	P
Millet, hay	15	.5 - 1.0	G	G	G	N	G	G	G	SL	G	F	F	WG	N	P	M	H	180,000	P
Millet, proso	25	.5 - 1.0	G	G	G	N	G	G	G	SL	G	F	F	WG	N	P	M	H	80,000	P
Mustard	6	.25 - .75	F	F	F	N	G	F	P	MH	G	F	F	CB	N	P	L	N	140,000	P
Oats	70	.5 - 1.5	G	G	G	N	G	G	G	MM	G	F	L	CG	N	F	M	H	16,000	F
Peas	70	1.5 - 3.0	F	P	P	Y	F	G	G	SL	F	F	L	CB	N	P	L	M	3,500	F
Phacelia	4	.25 - .5	F	F	F	N	P	P	P	DH	F	P	F	CB	N	P	L	M	225,000	F
Radishes	8	.25 - .75	F	F	G	N	G	P	G	DH	G	G	F	CB	N	P	L	N	25,000	P
Rapeseed	5	.25 - .75	F	F	G	N	G	F	G	MM	G	G	F	CB	Y	G	L	N	140,000	F
Rye, Cereal	60	.75 - 2.0	G	G	G	N	G	G	G	MH	G	G	L	CG	Y	G	H	M	18,000	G
Ryegrass, Annual	15	.5 - 1.5	G	G	G	N	F	G	G	MM	G	F	F	CG	S	F	M	M	190,000	G
Safflowers	30	.5 - 1.0	F	F	G	N	F	P	P	DM	F	G	L	WB	N	F	M	M	15,000	P
Sorghum, Forage and Sudan Hybrids	15	.5 - 1.5	G	G	G	N	G	G	G	MM	G	G	L	WG	N	F	M	H	17,000	P
Sorghum, Grain	5	.5 - 1.5	G	G	G	N	G	G	G	MM	G	G	L	WG	N	F	M	H	17,000	P
Soybeans	35	1 - 1.5	F	P	F	Y	F	F	F	SM	F	F	L	WB	N	P	L	M	3,000	F
Sudangrass	20	.5 - 1.5	G	G	G	N	G	G	G	MM	G	G	L	WG	N	F	M	H	25,000	P
Sugar beets	4	.25 - .5	F	P	G	N	F	P	G	DH	G	G	F	CB	N	G	L	N	22,000	P
Sunflowers	7	.5 - 1.0	F	F	G	N	F	P	G	DM	F	G	L	WB	N	F	M	M	8,000	P
Sunn hemp	15	1.5 - 2.0	F	F	F	Y	F	P	F	DM	F	F	L	WB	N	P	L	M	15,000	P
Teff grass	5	.13 - .25	G	G	F	N	F	G	G	SM	G	F	F	WG	N	P	M	H	1M	N
Triticale	60	.5 - 1.5	G	G	G	N	G	G	G	MH	G	F	L	CG	Y	G	M	M	15,000	F
Turnips	4	.25 - .5	F	P	G	N	G	P	G	DH	G	G	F	CB	S	P	L	N	175,000	P
Vetch, Chickling	50	.5 - 1.5	F	F	F	Y	F	F	P	SL	F	F	L	CB	N	P	L	M	2,500	F
Vetch, Common	25	.5 - 1.5	F	F	F	Y	F	F	G	SM	F	F	L	CB	N	P	L	M	8,000	F
Vetch, Hairy	15	.5 - 1.5	G	F	F	Y	F	F	F	SM	G	F	L	CB	Y	P	L	M	14,000	G
Wheat, Spring	60	.5 - 1.5	G	G	G	N	G	G	G	MH	G	F	L	CG	N	G	M	M	15,000	F
Wheat, Winter	60	.75 - 2.0	G	G	G	N	G	G	G	MH	G	F	L	CG	Y	G	M	M	15,000	F