



Multiple Species Cover Crop growing in standing wheat stubble

What are Cover Crops

Cover crops are grasses, legumes, forbs or other herbaceous plants that are established for seasonal cover and conservation purposes.

Cover crops are typically planted in the late summer or fall around harvest and before spring planting of the following year's crops. Common cover crops used in Minnesota include winter hardy plants such as rye and wheat. Other less common, but also effective cover crops include oats, barley, spring wheat, hairy vetch, red clover, turnips, canola, radishes, and triticale.

Purpose

This practice may be used to reduce wind or water erosion by establishing cover after a low residue crop, to use up excess nutrients in the soil profile, to increase carbon sequestration and improve soil structure, to provide nutrients for the next crop, and for weed suppression.

Where the practice applies

Cover crops may be used on all lands needing vegetative cover for natural resource protection and improvement. They are an excellent tool for helping to improve soil health.

General Cover Crop Benefits

Erosion Control: Cover crops reduce soil erosion in several ways. They protect the soil surface from raindrop impact, increase water infiltration, trap and secure crop residues, improve soil aggregate stability and provide a

network of roots which protect soil from flowing water.

Cover crops can be established to protect the cash crop from wind erosion when the cash crop is at the most vulnerable stage of growth.

Reduce Nitrogen and Phosphorus Loss:

Nitrate lost from Minnesota cropland can find its way to surface waters through surface runoff and tile. Many cover crops are good scavengers of nitrogen and will take up excess nitrogen and store it in plant tissues through the winter and early spring. Most of this nitrogen will be stored in the soil organic matter.

Phosphorus loss from Minnesota fields occurs in both soluble and particulate forms. Cover crops reduce runoff of soluble phosphorus through increased infiltration and plant uptake. Particulate phosphorus loss is reduced by trapping organic residues and reducing soil erosion.

Improving Soil Health: Cover crops have the potential to increase soil organic matter and increase the biodiversity of organisms in the soil. This increase is greater where less tillage is used to establish the cover crop and more growth is allowed prior to spring termination. Increased biodiversity from cover crops can increase populations of beneficial organisms such as earthworms and other soil organisms such as mycorrhizae which greatly increase nutrient cycling, aeration and improved soil structure. Select cover crop species to achieve one or more of the following: a species mix with different maturity dates and or physiology, attract beneficial insects, attract pollinators, increase biological diversity to a crop rotation, serve as a trap crop for damaging insects, and/or provide food and cover for wildlife.



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Seeding

Seedbed Preparation: Prepare a suitable seedbed adequate for the species to be planted and method of planting. This may vary from conventional planting to no till. If seeding the cover crop prior to harvest of the primary crop, broadcast the seed by a method that allows for good coverage of the area and does the least acceptable crop damage to the standing crop. No seedbed preparation is necessary. If seeding after the harvest of the primary crop, the cover crop may be drilled or broadcast into existing residue cover. No-till seeding into standing residue should be considered.

Selection of Seed: Use certified (tested) seed that has been cleaned and is free from noxious weeds. Select a species that is adapted to the desired planting date with ample time to germinate and develop adequate root growth to survive the winter prior to a killing freeze. Select a species or mix which will meet the intended purpose and maximize the desired benefits. Inoculate legume seed with species-specific Rhizobia bacteria before seeding.

Drilled Seeding: Ensure the drill or planter is designed to handle the crop residues and seed being planted (especially important for small seeds or mixtures with varying size and/or density). Set and operate the drill/planter to provide an ideal planting depth--0.25 to 0.5 inches deep for legumes and grasses, and up to 1.5 inches deep for cereal grains.

Broadcast Seeding: Seed may be broadcast using a broadcast seeder if capable of spreading seed in a uniform manner. Pre-mixing the seed with needed fertilizer or pelletized lime and utilizing an airflow applicator can also be effective.

Aerial Seeding: Aerial seeding into the existing crop in August and September can be an effective seeding method to acquire more fall growth. Seed spread on the surface is more rain dependent and generally requires a higher seeding rate. Seeding cover crops just ahead of soybean leaf drop will aid in mulching the seed and conserving moisture. Results of aerial seeding can be quite variable, and are dependent on adequate rainfall.

Fertilizer and Lime: Fertilizer is not recommended (this includes nitrogen) for the establishment of the cover crop, but may be used to increase biomass production on poor or damaged sites. If using cover crop for forage a starter fertilizer may be needed for the cover crop. The cover crop may be used to sequester or trap nutrients from manure or fertilizer applied for the subsequent crop. Lime application in conjunction with a cover crop is advantageous to improve soil quality benefits where pH is less than 6.4. Apply all soil amendments prior to seedbed preparation when possible, or before planting if a no-till drill is used.

Termination

For most cropping systems, it is not desirable to allow the cover crop to produce seed. Harvest for grain is not a purpose of this practice standard. When applicable, ensure cover crops are managed and are compatible with crop insurance and/or USDA program criteria. Do not burn cover crop residue. For additional information see NRCS Cover Crop Termination Guidelines—Non-Irrigated Cropland.

Use of Herbicides: If the cover crop is to be terminated with herbicides, assure that timing and selection of herbicides achieve a complete kill. Make sure herbicides are compatible with the following crop. Translocated herbicides will normally perform better under conditions that are ideal for active growth. Follow all federal, state, and local guidelines as well as the manufacturer's label rates and guidelines when applying herbicides. Always apply herbicides according to labeled directions. For additional information on herbicide controls, contact your local agronomist, or Minnesota Extension Specialist.

Mechanical: Cereal grains can be terminated by mowing, crimping, and tillage, but this does not always result in complete removal.

Operation and Maintenance

Cover crops should be terminated as late as feasible to maximize plant growth and soil protection, but there is some risk in waiting too long, because a vigorously growing cover crop can deplete soil moisture, negatively affecting the following crop. A period of 7-14 days between termination and planting is usually sufficient if there is rainfall to replenish the seed zone and hasten decomposition of the cover crop residue.

The cover crop should be integrated as part of a conservation cropping system with practices such as: Residue Management No-till/Strip-till (329), Nutrient Management (590), Pest Management (595), and Conservation Crop Rotation (328).

When utilizing either grazing or mechanical harvest on cover crops a residual stubble height may be needed. Contact your area grazing specialist and refer to Table A for minimum stubble heights.

Table A

Recommended Harvest Management Strategies for Cover Crops*				
Primary Objective**	Common Cover Crop Type	Fall Grazing Recommendations	Spring Grazing Recommendations	Mechanical Harvest Recommendations
Mulch for Subsequent Crop	Small grain	2" residual	6" residual***	6" residual***
Break up Compaction Layer	Brassica	No residual	No residual	N/A
Weed Suppression	Small grain	2" residual	8" residual***	N/A
Feed Soil	Cocktail mix	2" residual	No residual	N/A
Reduce Erosion	Small grain	2" residual	2" residual	2" residual
Nitrogen Fixation	Legume	No grazing	No residual	2" residual
*This table is meant to provide harvest recommendations for cover crops. Typically cover crops are used to accomplish multiple objectives. Benefits may still be achieved if these strategies are not followed. Specific requirements should be laid out in the Individual Cover Crop Plan.				
**Other objectives exist that are not shown above, and may require alternative harvest management strategies. Refer to MN Practice Standard 340 for additional considerations.				
***Stubble heights higher than 3" may restrict no-till planting equipment and may reduce effectiveness of herbicides.				

Landowner _____

Tract/Field number(s) _____

Purpose (check all that apply)	
<input type="checkbox"/> Reduce wind or water erosion	<input type="checkbox"/> Increase biodiversity
<input type="checkbox"/> Increase soil organic matter	<input type="checkbox"/> Weed suppression
<input type="checkbox"/> Capture/recycle nutrients in the soil profile	<input type="checkbox"/> Soil moisture management
<input type="checkbox"/> Promote biological nitrogen fixation	<input type="checkbox"/> Minimize and reduce soil compaction
<input type="checkbox"/> Protect growing crops from damage by wind-borne soil particles	<input type="checkbox"/> Improve soil structure
<input type="checkbox"/> Provide Supplemental forage	<input type="checkbox"/> Other _____

Cover Crop

Field	Species or Seed Mixture	Seedbed Preparation	Seeding Rate	Acres	Total Seed Needed (Rate x Acres)	Seeding Date

Cover Crop – Job Sheet

Other relevant information, complementary practices and measures, and additional specifications may be included.

Additional Specifications and Notes:

References

-Managing Cover Crops Profitably – USDA Sustainable Agriculture Research and Education Program
<http://www.sare.org/Learning-Center/Books/Managing-Cover-Crops-Profitably-3rd-Edition>

-Midwest Cover Crops Council- <http://www.mccc.msu.edu/states/minnesota.html>

-Midwest Cover Crops Council Decision Tool <http://mcccdev.anr.msu.edu/VertIndex.php>

-Indiana NRCS <http://www.in.nrcs.usda.gov/>

-Iowa NRCS <http://www.ia.nrcs.usda.gov/>

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