

Soil Erosion Enhancement Activity – SOE05 – Intensive no-till (ORGANIC or Non-organic systems)



Enhancement Description

This enhancement is for using an intensive no-till, strip till, or direct seeding method of planting throughout the planned rotation. A C:N ratio that builds soil health is maintained by including high residue and low residue crops in the rotation, and/or by using cover crops where needed. Termination of all cover crops is accomplished using chemical methods or non-chemical methods, such as flail mowing, roller crimper, and frost kill; not tillage.

Land Use Applicability

Crop

Benefits

Use of intensive no-till, strip till, or direct seeding leaves high levels of crop residue that can improve soil health and reduce erosion by wind and water up to 100%. The result is increased soil organic matter and added weed control as compared to heavily tilled soils with no surface residue. This will in turn, enhance and protect water quality and biotic communities that depend on clean water. Mechanically terminating cover crops using a flail mower or roller crimper can eliminate the use of herbicides, thereby reducing potential offsite water quality problems while leaving the soil undisturbed.

Conditions Where Enhancement Applies

This enhancement applies to all acres of annually planted cropland. The acres can be organic, transitioning to organic or non-organic.

Criteria

Implementation of this enhancement **requires** the use of no-till, strip till, or direct seeding of all crops in the planned rotation. The no-till, strip till, or direct seeding system must include the following activities:

1. For each crop in the planned rotation, calculate an estimated post harvest residue amount.
2. Compare the estimated post harvest residue amount to a state and locally defined critical residue amount, as determined by the NRCS State Agronomist, to determine high and low residue-producing crops.

Note: The “defined critical residue amount” is based on maintaining a positive Soil Conditioning Index (SCI).

3. For crops in the rotation where the difference between the estimated and critical residue amount are positive:



- a. No cover crop is required if a Soil Tillage Intensity Rating (STIR) ≤ 10 is maintained for the rotation.
 - b. Otherwise, cover crops should be:
 - i. A single grass species or a multiple species mixture that includes at least 50% grass or legume adapted for the local area, including the season, and
 - ii. Must be planted using a no-till system.
 - c. Residue removal is prohibited (Exception: residue removal is allowed for optimal crop production where SCI can be maintained greater than zero and the criterion of 5(c) is still met).
4. For crops in the rotation where the difference between the estimated and critical residue amount are neutral or negative:
- a. Cover crops must be used
 - b. Plant cover crops using a no-till system
 - c. Cover crops can be a single grass species or a multiple species mixture that includes at least 50% grass or legume adapted for local use, including the season.
 - d. Maintain a minimum Soil Tillage Intensity Rating (STIR) ≤ 10 for each crop in the planned rotation
 - e. Residue removal is prohibited
5. Additional Criteria
- a. All residues must be uniformly distributed over the entire field
 - b. No full-width tillage is permitted regardless of the depth of the tillage operation
 - c. Field(s) must have a soil loss at or below the soil tolerance (T) level for wind and/or water erosion for the crop rotation and a Soil Tillage Intensity Rating (STIR) of ≤ 10 for each crop in the planned rotation
 - d. If applicable (i.e., organic systems), no synthetic herbicides may be used for weed control. Weed control materials allowed on the National Organic Program's National List of Allowed and Prohibited Substances, such as corn gluten, vinegar, and certain plant-derived essential oils, may be used.
 - e. If applicable, termination of all cover crops is accomplished using non-chemical methods, such as flail mowing, roller crimper and frost kill.

Adoption Requirements

This enhancement is considered adopted when the STIR criteria, residue and/or cover crops listed above have been implemented on the land use acreage.

Documentation Requirements

Documentation for each field where this enhancement is applied:

1. Planned crop rotation showing cover crops that will be used after low residue crops,
2. Planting method used for each crop in the rotation (no-till, strip till, direct seeding),
3. List of all other potential ground disturbing farming operations,
4. Method of cover crop termination, e.g. chemical, flail mowing, roller crimper, or combination,
5. Dates for farming operations,
6. Map showing fields and acreage, and
7. Photographs of planted crops.



References

- Bolton, R. 2003. Impact of the surface residue layer on decomposition, soil water properties and nitrogen dynamics. M.S. thesis. Univ. of Saskatchewan, Saskatoon, Saskatchewan, CA.
- Mutch, D. and T. Martin. 2010. Website: Roller/Crimper Research. Michigan State University. <http://www.covercrops.msu.edu/crimper/works.html>
- Reicosky, D.C., M.J. Lindstrom, T.E. Schumacher, D.E. Lobb and D.D. Malo. 2005. Tillage-induced CO₂ loss across an eroded landscape. *Soil Tillage Res.* 81:183-194.
- Reicosky, D.C. 2004. Tillage-induced soil properties and chamber mixing effects on gas exchange. Proc. 16th Triennial Conf., Int. Soil Till. Org. (ISTRO).
- Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators. 1997. Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook No. 703.
- Shaffer, M.J., and W.E. Larson (ed.). 1987. Tillage and surface-residue sensitive potential evaporation submodel. *In* NTRM, a soil-crop simulation model for nitrogen, tillage and crop residue management. USDA Conserv. Res. Rep. 34-1. USDA-ARS.
- Skidmore, E.L. and N.P. Woodruff. 1968. Wind erosion forces in the United States and their use in predicting soil loss. U.S. Department of Agriculture. Agriculture Handbook No. 346.
- USDA-NRCS. 2011. National Agronomy Manual. 190-V. 4th ed.

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For Criteria #1-4; RUSLE2 will be used to determine and document the Soil Condition Index (SCI). To determine which Criteria applies (i.e. Criteria 3 or Criteria 4); a neutral or negative SCI as identified in RUSLE2 shall require a cover crop to be established (i.e. implement criteria 4). If the SCI value is positive, then no cover crop is required (i.e. follow criteria 3).

See Wisconsin Agronomic Technical Note 7 for cover crop recommendations:

<ftp://ftp-fc.sc.egov.usda.gov/WI/technotes/agronomy-tn7.pdf>

This is a 'System' type enhancement. This enhancement shall be performed on the areas (i.e. fields) identified in the Conservation Stewardship Plan each year when appropriate to do so.