

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

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<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.

Indiana CSP Enhancement Supplemental Information

SOE05- Intensive No-till (Organic or Non-organic systems):

Indiana Examples for meeting national criteria:

1. **Maintain high level of residue cover after no-till planting all crops in the rotation.**
 - a. A continuous No-till/Strip-till cropping system that meets IN-FOTG-329 with >50% of the crops in the rotation being high residue crops from the list below. Examples: Corn-Corn-Soybean, Corn-Wheat/Double crop Soybeans, or Corn- Soybean-Wheat

2. **Use high residue cover crops to provide adequate residue for no-till planting after or between low residue crops in rotation.**
 - a. A continuous No-till/Strip-till cropping system that meets IN-FOTG-329 with a cover crop seeded after low residue crops such as soybeans, tomatoes, corn silage, melons.
Examples:
 - i. Corn-soybean w/ cover crop after soybean,
 - ii. Corn silage w/ cover crop- Soybean w/ Cover crop, Corn-Tomato w/ cover crop.

3. **Low disturbance no-till planting and moderate level of residue cover after or between low residue crops in rotation**
 - a. A continuous No-till/Strip-till cropping system that meets IN-FOTG-329 and/or the “modified no-till” criteria of IN-FOTG 345 Standard following a low residue crop that precedes a high residue crop.
Examples:
 - i. Corn-Soybean rotation with both crops being no-tilled or strip-tilled,
 - ii. Corn-Soybean rotation with a rotary harrow being run once in the spring prior to planting corn and soybeans being no-tilled.

The **STIR** value is the **Soil Tillage Intensity Rating**. The RUSLE 2 software program utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation.

Indiana CSP Enhancement Supplemental Information

Residue Cover Types

Perennial Cover <u>1/</u>	High Residue Producing Crops <u>2/</u>	Cover Crops <u>3/</u>
Alfalfa	Barley	Radish, forage, oilseed
Alsike Clover	Corn (grain)	Alsike Clover
Birdsfoot Trefoil	Millet	Annual Ryegrass
Kentucky Bluegrass	Milo	Barley
Lespedeza, Korean, common	Oats	Buckwheat
Orchardgrass	Popcorn	Canola/rape
Perennial Ryegrass	Rye	Cowpeas
Red Clover	Sorghum	Crabgrass (red river)
Redtop	Sorghum-Sudangrass Hybrids	Crimson Clover
Smooth Brome	Triticale	Field Peas/winter peas
Tall Fescue	Wheat	Hairy Vetch
Timothy	<p>Footnotes:</p> <p><u>1/</u> Cover must be grown for two years or more.</p> <p><u>2/</u> Full-season crops managed to leave 50 percent or more residue cover. Not harvested for silage or biomass.</p> <p><u>3/</u> Cover to be established early enough in growing season to provide adequate cover.</p>	Oats
White Clover		Red Clover
Wildrye, Canada, Riverbank, Virginia		Rye
Big Bluestem		Sorghum-Sudangrass Hybrids
Prairie Dropseed		Sweetclover
Eastern Gamagrass		Triticale
Indiangrass		turnips
Little Bluestem		Wheat
Sideoats Grama		Woollypod Vetch
Switchgrass		
Native Forbs and Legumes		