

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

Cropland

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, 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.
 - 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, only herbicides approved for organic production systems are allowable for weed control
 - 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.



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2013 Ranking Period 1

References

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- 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.
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IDAHO ADDENDUM 2013
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(Organic or Non-organic Systems)

Additional guidance for intensive no till:

An intensive no-till rotation in Idaho will likely involve small grains only. All equipment used during the entire crop rotation will be identified and verified in RUSLE2 or WEPS for the STIR value, as documented in the operations files. In order to maintain a STIR value less than 10 for the rotation, hoe-type drills and some anhydrous fertilizer shank operations may not fit this enhancement. Drills identified as “no-till” or “one-pass” may not meet the requirements of this enhancement.

YOU MUST REVIEW THIS ENHANCEMENT WITH THE STATE AGRONOMIST BEFORE USING THIS ENHANCEMENT.

Table 1. High residue producing crops in Idaho with estimated post harvest residue levels greater than the “critical” amount.

Crop	Lbs. Residue per Bushel
Barley	65
Corn (sweet)	55
Corn (grain)	55
Flax	80
Oats	60
Rye	80
Sorghum (grain)	70
Milo	80
Millet	80
Teff	6 lbs residue per lb seed
Triticale	100
Wheat winter	90

Table 2. Legume cover crop species with associated agronomic data.

Cover Crop Species	Life Cycle	Potential Fixed Nitrogen (lbs/A)	Seeding Rate (lbs/A)	Seeding Depth (inches)	% Nitrogen Content ¹	Rhizobium Inoculant Type
Legumes						
Annual medic*	SA	40-100	10-40	1/4 to 1/2	1.5	A
Berseem clover*	SA	60-90	9-20	1/4 to 1/2	2.6	R
Crimson clover*	SA	50-60	12-20	1/4 to 1/2	2.7	R
Austrian peas	SA / WA	30-100	70-150	1 to 2	2.2	C
Hairy vetch	WA	60-180	25-40	1/4 to 1/2	3.7	C
Mammoth red clover	B	60-70	8-15	1/4 to 1/2	2.9	B
Sweetclover (yellow)	B	70-90	8-15	1/4 to 1/2	3.1	A
Alfalfa	P	50-150	9-25	1/4 to 1/2	3.3	A
White clover	P	60-100	5-7	1/4 to 1/2	3.9	B
Medium red clover	P	60-70	10-15	1/4 to 1/2	2.9	B
Alsike clover	P	60-70	4-10	1/4 to 1/2	2.9	B

*Cover crops not commonly used in Idaho

¹ Dry weight basis, data from USDA Plant data base and UC SAREP online Cover crop database (<http://www.sarep.ucdavis.edu/ccrop/>)

Table 3. Non Legume cover crop species with associated agronomic data.

Species	Life Cycle	% Nitrogen Content ¹	Seeding Rate (lbs/A)	Seeding Depth (inches)
Buckwheat*	SA	1.25	35-60	1/4 to 1/2
Forage turnips	SA	3.3	3-5	1/4 to 1/2
Forage radish	SA		10-15	1/4 to 1/2
Oilseed radish	SA	3.8 tops 2.5 roots	25	1/4 to 1/2
Mustards (White)	SA	3.5	15	1/4 to 1/2
Mustards (Oriental)	SA	3.5	10	1/4 to 1/2
Canola / Rape	SA/WA	3.5	15	1/4 to 1/2
Annual ryegrass	SA	1.3	15-25	1/4 to 1/2
Barley	SA / WA	2.2	50-100	1 to 2
Rye	SA / WA	2.8	50-100	1 to 2
Triticale	SA / WA	2.0	50-100	1 to 2
Wheat	SA / WA	2.3	50-100	1 to 2
Oats	SA	2.1	35-70	1 to 2
Sudangrass	SA	1.3	20-60	1 to 2

*Cover crops not commonly used in Idaho

¹ Data from USDA Plant data base and UC SAREP online Cover crop database (<http://www.sarep.ucdavis.edu/ccrop/>)

Notes:

Life cycles: P = perennial, WA = winter annual, SA = summer annual, B = biennial

Nitrogen values vary depending on cover crop densities (biomass produced) and date of planting

Use of any of the non-legume cover crop species to scavenge nitrogen left in the soil, refer to CSP enhancement WQL10.

**This activity may NOT be used with the following enhancements:
ANM12, ANM21, ENR01, SQL10, WQL17**

Potential Duplicate Practices:

**329 - Residue & Tillage Management - No Till/Strip Till/Direct Seed,
328 - Conservation Crop Rotation, 340 - Cover Crop**