



Natural Resources Conservation Service  
WASHINGTON

## SOE05 – Intensive no-till (ORGANIC or Non-organic systems)

CSP Enhancement Washington State Supplement

Land Use Applicability: Cropland

January 2014

Client/Operating Unit:

Tract Number:

Farm/Ranch Location:

Farm Number:

Specifications Date:

Field Number(s):

Planned Installation Date:

Proposed Treatment Acres:

### Enhancement Description:

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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.

### 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 for intensive no-till (Organic or Non-organic systems)

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 each crop in 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.
  - 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, vinger, 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.

#### **Layout Sketch & Drawing (Provide sketch, drawings, maps, and/or aerial photographs.)**

- Geo-referenced field map with all delineated treatment areas where CSP Enhancement SOE05 is to be applied.

#### **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 CO<sub>2</sub> 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.

### Field Office Technical Guide:

[eFOTG, http://www.nrcs.usda.gov/technical/efotg/](http://www.nrcs.usda.gov/technical/efotg/)

\* **Some online documents may take several minutes to download.**

## State Supplemental Information

### States need to define high residue, low residue crops.

For WA purpose annual planted crops will also include small grain – fallow. For a perennial crop rotation, the enhancement criteria must be implemented at least twice during the contract life. RUSLE2 and/or WEPS will be completed as verification for soil loss, implements used, crops to be grown, STIR and SCI. A run will be needed for the benchmark and another for the planned. For criteria 1 & 2, high residue crops will be considered corn, small grains and canola. H crops will be considered to have a positive SCI. All other crops will be considered low residue. If the planner has a question about a possible high residue crop not listed, contact your area or state agronomist. Criteria #3, if a planned crop rotation includes all high residue crops it will be considered a positive difference between estimated and critical residue amounts. Criteria #4, if the planned rotation includes a mix of high and low residue crops or all low residue crops, then it will be considered a neutral or negative difference between the estimated and critical residue amounts. Criteria #5 is self-explanatory; remember any harrow or roller is considering full width tillage as well as other implements.

### High Residue Crops

High residue producing crops in rotation , High residue crops are defined as:

All annual cool season small grain and grass crops where residue following harvest is not removed. This includes cool season spring and winter varieties of Wheat, Triticale, Rye, Barley, Oats.

**AND:**

All annual warm season grass crops where residue following harvest is not removed. This includes millet, sorghum, sudan, field corn, and sweet corn.

**AND:**

All Cover crops in the rotation where residue following termination is not removed. Residue is left on the soil surface after termination of the cover crop.

Continuous No till is defined as Criteria for Practice Standard 329 is met for all crop intervals during the entire rotation. This is when the true benefits of a No till system can be realized.

### Low Residue Crops

Low residue producing crops in rotation , Low residue crops are defined as:

All annual vegetable and root crops where residue following harvest is low. This includes potatoes, beets, onions, peas, beans and bulbed flowers.

**AND:**

All high residue crops that have excessive residue removed by grazing or baling that does not maintain at least 50% ground cover or required stubble height.

**AND:**

All Cover crops in the rotation where residue following termination is removed. Residue is removed from the surface or tilled after termination of the cover crop.

Examples of Low Residue Crops include:

Buckwheat	Edible beans (all types)	Root crops
Chickpea/Garbonzo	Flax	Safflower
Corn or Sorghum silage/green chop	Millet, hay	Sunflowers
Corn, sweet corn	Mustard	Vegetable crops



