

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**RESIDUE AND TILLAGE MANAGEMENT  
NO TILL**

(Ac.)

**CODE 329**

**DEFINITION**

Limiting soil disturbance to manage the amount, orientation and distribution of crop and plant residue on the soil surface year around.

**PURPOSE**

This practice supports one or more of the following purposes:

- Reduce sheet, rill and wind erosion.
- Reduce tillage-induced particulate emissions.
- Maintain or increase soil organic matter content.
- Reduce energy use.
- Increase plant-available moisture.
- Provide food and escape cover for wildlife.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all cropland.

This practice only involves an in-row soil tillage operation during the planting operation and a seed row/furrow closing device. There is no full-width tillage performed before or after the planting operation regardless of the depth of the tillage operation.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Residue shall not be burned.

All residues shall be uniformly distributed over the entire field except for removing residue from the row area prior to or during planting.

No full-width tillage shall be performed regardless of the depth of the tillage operation.

The Soil Tillage Intensity Rating (STIR) value shall include all field operations that are performed during the crop interval between harvest of the previous crop and harvest or termination of the current crop (includes fallow periods). The STIR value shall be no greater than 20.

**Additional Criteria to Reduce Sheet/Rill Erosion; Reduce Wind Erosion and Tillage Induced Particulate Matter.**

The amount of randomly distributed surface residue needed and the amount of surface soil disturbance allowed to reduce erosion to the planned soil loss objective shall be determined using the

current approved water and/or wind erosion prediction technology. Calculations shall account for the effects of other practices in the management system.

**Additional Criteria to Improve Soil Organic Matter Content**

An evaluation of the cropping system using the current approved soil conditioning index procedure shall result in a positive trend.

**Additional Criteria to Increase Plant-available Moisture and Reduce Evaporation from the Soil Surface.**

Maintain a minimum of 2000 pounds per acre or 60 percent residue cover on the soil surface throughout the year.

Crop stubble height during the time of expected evaporation losses shall be:

- at least 10 inches for crops with a row spacing of less than 15 inches;
- at least 15 inches for crops with a row spacing of 15 inches or greater.

These stubble heights shall be present on at least 60% of the field.

**Trapping Snow.** Crop stubble height during the time significant snowfall is expected to occur shall be:

- at least 10 inches for crops with a row spacing of less than 15 inches;
- at least 15 inches for crops with a row spacing of 15 inches or greater.

These heights shall be present over at least 50% of the field.

**Additional Criteria to Provide Food and Cover for Wildlife**

Use an approved habitat evaluation procedure to determine when residue needs to be present, and the amount, orientation, and stubble height needed to provide adequate food and cover for target species.

**CONSIDERATIONS**

**General Considerations** - Removing of crop residue, such as by baling or grazing, can have a negative impact on resources. These activities should not be performed without full evaluation of impacts on soil, water, animal, plant, and air resources.

Production of adequate crop residues to achieve the purpose of this practice can be enhanced through the use of high residue crops and crop varieties, the use of cover crops, and adjustment of plant populations through seeding rates and row spacing.

Using Residue Management - No Till for all crops in the rotation or cropping system can enhance the positive effects of this practice by:

- increasing the rate of soil organic matter accumulation.
- keeping soil in a consolidated condition, which provides additional resistance to the erosive forces of water and wind.
- sequestering additional carbon in the soil.
- further reducing the amount of particulate matter generated by field operations.
- reduce energy inputs to establish crops.
- forming root channels and other near-surface voids that increase infiltration.

A field border planted to permanent vegetation can:

- allow unobstructed turning for equipment
- eliminate unproductive end rows

- provide food and escape cover for wildlife
- provide travel lanes for farming operations.

**Considerations for Improving Soil Organic Matter Content** - Carbon loss is directly related to the volume of soil disturbed, the intensity of the disturbance and the soil moisture content and soil temperature at the time the disturbance occurs. The following guidelines can make this practice more effective:

- Shallow soil disturbance (1-3 inches) releases less CO<sub>2</sub> than deeper operations.
- When deep soil disturbance is performed, such as by subsoiling or fertilizer injection, make sure the vertical slot created by these implements is closed at the surface.
- Planting with a single disk opener no-till drill will release less CO<sub>2</sub> than planting with a wide-point hoe/chisel opener air seeder drill.
- Soil disturbance that occurs when soil temperatures are below 50° F will release less CO<sub>2</sub> than operations done when the soil is warmer.

**Considerations for Managing Soil Moisture** The type, timing and depth of soil-disturbing activities all influence moisture loss. Shallow operations (1-2 inches) or operations that do not invert the soil will reduce moisture loss compared to deeper operations or those that invert and mix the soil.

Soil-disturbing operations performed when the soil surface is moist will result in greater moisture loss than operations done when the top two to three inches of soil have dried.

Leaving stubble taller than the minimum required will increase the relative humidity close to the soil surface, which reduces the rate of evaporative loss from the soil.

Leaving stubble taller than the 10-inch minimum will trap more snow and provide better protection to plants from freezing or desiccation.

Variable-height stubble patterns may be created to further increase snow storage.

Performing all field operations on the contour will slow overland flow and allow more opportunity for infiltration.

**Considerations for Wildlife Food and Cover** - Leaving rows of unharvested crop standing at intervals across the field or adjacent to permanent cover will enhance the value of residues for wildlife food and cover. Leaving unharvested crop rows for two growing seasons will further enhance the value of these areas for wildlife.

Leave crop residues undisturbed after harvest (do not shred or bale) to maximize their cover and food source benefits.

Avoid disturbing standing stubble or heavy residue during the nesting season for ground-nesting species.

## PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit. The specifications shall identify, as appropriate:

- The resource concern to be treated or the purpose for applying the practice
- Planned crop(s)
- The amount of residue produced by each crop.
- All field operations or activities that affect:
  - Residue cover
  - Residue orientation
  - Surface disturbance

- The amount of residue (pounds/acre or percent surface cover) required to accomplish the purpose, and the time of year it must be present
- The maximum STIR value allowed to accomplish the purpose, and the time of year that soil disturbance is allowed
- The minimum soil conditioning index value required to accomplish the purpose

Record the specifications using the Practice Implementation Requirements sheets.

### **OPERATION AND MAINTENANCE**

Evaluate/measure the crop residues cover and orientation after each crop to ensure the planned amounts and orientation are being achieved. Adjust management as needed to either plan a new residue amount and orientation or adjust the planting and/or harvesting equipment.

### **REFERENCES**

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- 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.
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- 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.
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**APPROVAL AND CERTIFICATION**

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(Ac.)

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**PRACTICE SPECIFICATIONS APPROVED:**

          /s/ William H. Durham          

State Agronomist

  10/01/2014  

Date

          /s/ Alfonso Leal          

State Resource Conservationist (Acting)

  10/01/2014  

Date