



**Natural Resources Conservation Service**  
**CONSERVATION PRACTICE STANDARD**  
**RESIDUE AND TILLAGE MANAGEMENT, NO TILL**

**CODE 329**

**(ac)**

**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 is used to accomplish one or more of the following purposes:

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

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all cropland.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Residue shall not be burned.

No haying or grazing of crop residue is allowed.

Distribute all residues uniformly over the entire field. Removing residue from directly within the seeding or transplanting area prior to or as part of the planting operation is acceptable.

This practice **only** involves an in-row soil disturbance operation during strip tillage, the planting operation, and a seed row/furrow closing device. There is **no full-width soil disturbance performed** from the time immediately following harvest or termination of one cash crop through harvest or termination of the next cash crop in the rotation 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 and termination of the previous cash crop and harvest or termination of the current cash crop (includes fallow periods). The crop interval STIR value shall be no greater than 20.

This practice includes planting methods commonly referred to as no till, never till, zero till, slot plant, zone till, strip till, or direct seed. Approved implements are: no till and strip till planters, certain drills and air seeders, strip-type fertilizer and manure injectors and applicators, and similar implements that only disturb narrow strips and slots.

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Grazeout small grains or forage sorghums (i.e., not harvested for grain) will only be applied once within a crop rotation and at a rate of no more than one in three years. The grazed out crop shall maintain 60% ground cover of living biomass and will be immediately followed by the planting of a high residue producing warm season crop or cover crop to supply crop residue which is lost during the grazing operation.

When ruts created from normal field operations (harvest, irrigation, etc.) become a concern, leveling shall be limited to implements that minimize residue burial (ex. Sweeps, chisels, etc.) whenever possible. Tillage will only be used on the area(s) of the field needing to be leveled. Soil disturbance shall be limited to no more than 10% of the field acres. Avoid tillage when soil is wet.

#### **Additional Criteria to Reduce Sheet, Rill and Wind Erosion, Reduce Excessive Sediment in Surface Waters, and Reduce Tillage-Induced Particulate Emissions**

Use the current approved water and wind erosion prediction technology to determine if the field operations planned provide the following:

- Amount of randomly distributed surface residue needed.
- Time of year residue needs to be present in the field.
- Amount of surface soil disturbance allowed to reduce erosion to the desired level.
- Calculations shall account for the effects of other practices in the management system.

#### **Additional Criteria to Maintain or Increase Soil Health and Organic Matter Content**

Ensure the soil condition index (SCI) for the cropping system results in a positive rating. The SCI results have to be a positive value.

#### **Additional Criteria to Increase Plant-Available Moisture**

Maintain all residue cover on the soil surface throughout the year.

Crop stubble height during 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.

#### **Additional Criteria to Reduce Energy Use**

Reduce the total energy consumption associated with field operations by at least 25 percent compared to the benchmark condition. Use the current approved NRCS tool for determining energy use to document energy use reductions.

#### **Additional Criteria to Provide Food and Escape 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**

These activities should not be performed without full evaluation of impacts on soil, water, animal, plant, and air resources. Effects on soil erosion and soil conditioning index (SCI) will be evaluated with the current approved erosion prediction technology.

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

When providing technical assistance to organic producers, ensure residue and tillage management, activities are consistent with the USDA Agricultural Marketing Service National Organic Program regulations.

Residue should not be shredded after harvest. Shredding residue makes it more susceptible to movement by wind or water, and areas where residue accumulates may interfere with planting the next crop.

Using wider spacing on drills will disturb less soil and leave more standing residue thus more protection against wind and water erosion.

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 and improved aggregate stability.
- 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.

#### **Considerations to Increase Soil Health and Organic Matter Content**

Carbon loss is directly related to the volume of soil disturbed, intensity of the disturbance and soil moisture content and soil temperature at the time the disturbance occurs. To make this practice more effective—

- 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 or slot opener no-till drill will release less CO<sub>2</sub> and oxidize less organic matter than planting with a wide-point hoe/chisel opener seeder drill.
- Soil disturbance that occurs when soil temperatures are below 50 °F will oxidize less organic matter and release less CO<sub>2</sub> than operations done when the soil is warmer.
- Maximizing year-round coverage of the soil with living vegetation (e.g., cover crops) and crop residues, if applicable, builds organic matter and reduces soil temperature, thereby slowing organic matter oxidation.
- Use a diverse crop rotation, incorporating multiple crop types (cool-season grass, cool-season legume/forb, warm-season grass, warm-season legume/forb) into the crop rotation.
- Plant a cover crop after every cash crop in the rotation. Multispecies cover crop mixes provide greater benefits than single-specie cover crops.

#### **Considerations to Increase Plant-Available Moisture**

Leaving stubble taller than the 10-inch minimum will trap more snow.

Cover crop residue will help retain soil moisture and is another effective agronomic management tool.

Soil-disturbing operations performed when the soil surface is moist will result in greater moisture loss than operations done when the top two or 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.

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 (e.g., no shredding or baling) to maximize the cover and food source benefits for wildlife. Avoid disturbing standing stubble or heavy residue during the nesting season for ground nesting species.

Conservation buffers, planting corners to wildlife and pollinator seed mixes would benefit wildlife, beneficial insects, and insect pollinator species. Timing of pesticide applications and turning off pesticide applicator booms in these areas will help protect beneficial insects and pollinators.

### **PLANS AND SPECIFICATIONS**

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit. Record the specifications using the practice implementation requirements document. The specifications shall identify, as appropriate—

- Purpose for applying the practice or resource concern to be treated.
- Planned crops.
- Amount of residue produced by each crop.
- All field operations or activities that affect the—
  - Residue orientation including height (where applicable).
  - Surface disturbance.
  - Amount of residue (pounds/acre or percent surface cover) required to accomplish the purpose, and the time of year it must be present.
- Planned soil tillage intensity rating STIR value, soil condition index value, and erosion rate.
- Grazing Plan if applicable.
- Target species of wildlife, if applicable.
- Benchmark and planned fuel consumption, if applicable.

Record the specifications using the Texas Code 329 Practice Implementation Requirements document located in eFOTG Section IV – Conservation practices – Residue and Tillage Management – No Till (329 Code) folder. Locate the folder from the below link:

[eFOTG-Document Locator](#)

### **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 equipment, and if applicable, the harvesting equipment.

Limited tillage is allowed to close or level ruts from harvesting equipment. No more than 10 percent of the field may be tilled for this purpose.

If there are areas of heavy residue accumulation (because of movement by water or wind) in the field, spread the residue prior to planting so it does not interfere with planter operation.

## REFERENCES

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