**NATURAL RESOURCES CONSERVATION SERVICE**

**CONSERVATION PRACTICE STANDARD**

# RESIDUE AND TILLAGE MANAGEMENT MULCH TILL

**(Ac.)**

**CODE 345**

## DEFINITION

Managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow crops in systems where the entire field surface is tilled prior to planting.

## PURPOSE

- Reduce sheet and rill erosion.
- Reduce wind erosion.
- Reduce soil particulate emissions
- Maintain or improve soil condition.
- Increase plant-available moisture.
- Provide food and escape cover for wildlife.

## CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland and other land where crops are planted.

This practice includes tillage methods commonly referred to as mulch tillage or chiseling and disking. It applies to stubble mulching on summer-fallowed land, to tillage for annually planted crops and to tillage for planting perennial crops.

It also includes some planting operations, such as hoe drills, air seeders and “no-till” drills that disturb a large percentage of the soil surface during the planting operation.

## CRITERIA

### General Criteria Applicable to All Purposes

Residue shall not be burned.

Loose harvested residues retained on the field shall be uniformly distributed over the soil surface.

Crop rotations will have a minimum of 30% flat residue cover on the soil surface at planting or an annual Soil Tillage Intensity Rating (STIR) of 60 or less. The “Surface residue cover values” for crop rotations in RUSLE2 will be used to determine flat residue cover percentages at planting.

### Additional Criteria to Reduce Sheet and Rill Erosion

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 NRCS approved water erosion prediction technology. Calculations shall account for the effects of other practices in the management system.

### Additional Criteria to Reduce Wind Erosion

The amount and orientation of 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 NRCS approved wind erosion prediction technology. Calculations shall account for the effects of other practices in the conservation management system.

### Additional Criteria to Reduce Soil Particulate Emissions

The amount and orientation of residue needed and the amount of surface soil disturbance allowed to reduce wind erosion to the tolerable soil loss value (T) shall be determined using

the current NRCS approved wind erosion prediction technology. Calculations shall account for the effects of other practices in the conservation management system.

**Additional Criteria to Maintain or Improve Soil Condition**

An evaluation of the cropping system using the current NRCS approved Soil Conditioning Index (SCI) procedure shall result in a positive trend (>0).

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

**Reducing Evaporation from the Soil Surface.** A minimum of 2000 pounds per acre or 60 percent surface residue cover shall be maintained throughout the year. The "Surface residue cover values" for crop rotations in RUSLE2 will be used to determine residue cover percentages.

**Trapping Snow.** Any fall tillage operation shall leave the crop stubble in an upright position.

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.

Fall tillage operations shall be done as close to perpendicular as possible to the direction of prevailing winds during the time that significant snowfall is expected to occur.

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

The time that residue is present, the amount and orientation of residue and the height of stubble needed to provide adequate food and cover for the target species shall be determined using the Oklahoma NRCS Upland Wildlife Habitat Management (645) standard and appropriate wildlife management guide.

**CONSIDERATIONS**

***General*** - Removal 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.

Mulch till may be practiced continuously throughout the crop sequence, or may be managed as part of a residue management system that includes other tillage methods such as no till.

Production of adequate amounts of crop residue necessary for the proper functioning of this practice can be enhanced by selection of high residue producing crops and crop varieties in the rotation, use of cover crops and adjustment of plant populations and row spacing. Refer to the Oklahoma NRCS Nutrient Management (590), Pest Management (595), and Cover Crop (340) standards for additional guidance.

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.

Refer to the Oklahoma NRCS Field Border (386) standard for guidance.

***Increasing Soil Organic Matter Level and Reducing $CO_2$ Loss from the Soil*** – Where improving soil tilth is a concern, use of undercutting tools, such as sweeps, will enhance accumulation of organic material in the surface layer.

$CO_2$ 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 $CO_2$ than deeper operations.
- When deep soil disturbance is performed, such as by subsoiling or fertilizer injection, make sure the vertical tillage slot created

by these implements is closed at the surface.

- Planting with a single-disk opener no-till drill will release less $CO_2$ 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 $CO_2$ than operations done when the soil is warmer.

***Increasing Plant-available Moisture*** – The effectiveness of stubble to trap snow increases with stubble height. Increasing the stubble height beyond the minimum required will increase the amount of snow trapped.

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

Tillage and planting operations done on the contour will help slow overland flow and increase infiltration, thus increasing the potential for increased water storage in the root zone.

***Providing Food and Escape Cover for Wildlife -*** Avoid disturbing standing stubble or heavy residue during the nesting season for ground-nesting species. Nesting season generally occurs from May1 through June 30.

Forgoing fall shredding or tillage operations will maximize the amount of wildlife food and cover during critical winter months.

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.

## PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria and Considerations described in this standard. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

## OPERATION AND MAINTENANCE

No operation and maintenance requirements, national in scope, have been identified for this practice.

## REFERENCES

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