

**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, sweep-plowing, 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. Most of the surface of the soil is disturbed, but not inverted.

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**

All residues shall be uniformly distributed over the entire field. Chaff spreaders may be needed.

Residue shall not be burned.

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 Revised Universal Soil Loss Equation 2 (RUSLE 2). Most soil loss rates are low, general less than 1 ton/ac). 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 Wind Erosion Equation (WEQ) (management period method) WEQ shall be used to set roughness, ridging, timing, and residue levels. 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 WEQ. Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria to Maintain or Improve Soil Condition

RUSLE 2 will be used to evaluate the cropping system to establish a soil conditioning index. The index will be 0 or greater.

Additional Criteria to Increase Plant-Available Moisture

Reducing Evaporation from the Soil Surface. A minimum 60 percent surface residue cover shall be

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maintained throughout the year.

Residue required for Reducing Evaporation (60% surface cover)	
Type	Lbs/ac
Corn	2650
Small Grain	1650
Cotton	3950

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 an approved habitat evaluation procedure.

Harvest or tillage operations that disturb or cover the entire field shall not be performed during the nesting and brood-rearing period of the target species. Nesting time is from April through June.

CONSIDERATIONS

General - Removal of crop residue, such as by baling or grazing, can have a negative impact on resources. Removal in many cases will make the soil conditioning index be negative. 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. Selection of acceptable tillage methods for specific site conditions may be aided by use of the Soil Tillage Intensity Rating in RUSLE 2.

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.

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.

Increasing Soil Organic Matter Level and Reducing CO₂ Loss from the Soil – Where improving soil tilth is a concern, use of undercutting tools will enhance accumulation of organic material in the surface layer.

CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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.

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, Considerations and O&M described in this standard. Specifications shall be recorded using approved the, job sheet and narrative statement in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Mulch-tillage is best done on a crop rotation basis. The first tillage after harvest usually set the stage for the rest of the residue management. Measuring the surface residue using the line point method is a good way to meet residue goals.

REFERENCES

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