

**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 and diesel 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.

**CRITERIA**

**General Criteria Applicable to All Purposes**

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.

This practice 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.

All residues shall be uniformly distributed over the entire field.

Residue shall not be burned.

The number, sequence and timing of tillage and planting operations and the selection of ground-engaging components, shall be managed to achieve the planned amount, distribution and orientation of residue after planting or at other essential time periods. Acceptable alternative tillage sequences shall be initially determined by a residue budget using RUSLE2 or locally applicable data on residue reduction by tillage machines. Further adjustments shall be made as needed during the tillage sequence based on field measurements of remaining residue.

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) and the STIR shall be no greater than 60. Additionally, Crop residue levels following planting must be at least 30 percent or greater.

**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 approved water erosion prediction technology (currently RUSLE2). Calculations shall account for the effects of other practices in the management system (e.g. grazing or baling).

### **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 approved wind erosion prediction technology (currently WEQ). Calculations shall account for the effects of other practices in the conservation management system.

### **Additional Criteria to Reduce Soil and Diesel 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 approved wind erosion prediction technology. Calculations shall account for the effects of other practices in the conservation management system.

Soil-disturbing activities in the cropping system shall be limited to low STIR values and the timing of the tillage must be done at sufficient soil moisture conditions to reduce soil particulate emissions.

Combine multiple activities (e.g. tillage, fertilizer placement, herbicide application and seeding) into a single or reduced number of passes to reduce diesel particulate emissions.

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

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**

A minimum of 2000 pounds per acre or 60 percent surface residue cover shall be maintained throughout the year to reduce evaporation from the soil surface..

### **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 will be provided for the target wildlife species. Crop residues shall remain undisturbed between harvest and planting to

maximize food and cover unless it is determined by the Kentucky Habitat Evaluation Procedure that residue removal would not reduce the habitat index to less than a 0.5.

### **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. Selection of acceptable tillage methods for specific site conditions may be aided by an approved Soil Tillage Suitability Rating.

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 CO<sub>2</sub> 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.

CO<sub>2</sub> 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 tillage 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.

**Increasing Plant-available Moisture** – 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.

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

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

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.

Crop stubble height during the time significant snowfall is expected to occur shall be (these heights shall be present over at least 50% of the field):

- 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

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.

**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 specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

## OPERATION AND MAINTENANCE

Crops grown in the planned cropping sequence will yield adequate residue cover amounts as stated in the conservation plan for the farming operation.

## REFERENCES

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