NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

RESIDUE AND TILLAGE MANAGEMENT,

REDUCED 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 and harvest crops in systems where the field surface is tilled prior to planting.

PURPOSE

This practice is applied as a part of a conservation management system to support one or more of the following purposes:

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

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland.

This practice includes tillage methods commonly referred to as mulch tillage or conservation tillage where the entire soil surface is disturbed by tillage operations such as chisel plowing, field cultivating, tandem disking, or vertical tillage. It also includes tillage/planting systems with few tillage operations (e.g. ridge till) but which do not meet the STIR criteria for Residue and Tillage Management - No Till (code 329).

CRITERIA

General Criteria Applicable to All Purposes

Uniformly distribute residues over the entire field. Removing residue from the row area prior to or as part of the planting operation is acceptable.

Do not burn residues.

The Soil Tillage Intensity Rating (STIR) value shall include all field operations that are performed during the crop interval between harvest of the previous cash crop and harvest or termination of the current cash crop (includes fallow periods). The STIR value rating shall be no greater than 80, and no primary inversion tillage implements (e.g. moldboard plow) shall be used.

All residues shall be uniformly distributed over the entire field.

Additional Criteria to Reduce Sheet and Rill Erosion and Reduce Wind Erosion

To reduce erosion, use high residue producing crops as often as possible. The amount of randomly distributed surface residue needed, the time of year the residue needs to be present in the field, and the amount of surface soil disturbance allowed to reduce erosion to the tolerable soil loss value (T) shall be determined using the current approved erosion prediction technology.

Minimum residue requirements for this practice will be reflected by leaving all crop residues from row crops on the field following harvest. When residues such as corn stalks or soybean residue are removed, a cover crop will be used to supplement cover lost from residue removal. Calculations shall account for the effects of other practices in the management system.

Additional Criteria to Reduce Tillage-Induced Particulate Emissions

Reduce or modify tillage operations that create dust, especially during critical air quality periods.

Adopt tillage practices that reduce particulate emissions.

Additional Criteria to Maintain or Improve Soil Quality and Organic Matter

Ensure that an evaluation of the cropping system using the current approved soil conditioning index (SCI) procedure results in zero or higher.

Additional Criteria to Increase Plant-Available Moisture

To reduce evaporation from the soil surface, a minimum of 2,000 pounds per acre, or 60 percent surface residue cover, shall be maintained throughout the year.

Additional Criteria to Reduce Energy Use

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

Additional Criteria to Provide Food and Escape Cover for Wildlife

An approved habitat evaluation procedure shall be used to assess 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.

Avoid tillage and other soil and residue/stubble disturbing operations during the nesting season and brood-rearing period for ground-nesting species.

Note: Specific cost-sharing programs or other funding sources may impose criteria in addition to, or more restrictive than, those specified in this standard.

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.

Reduced 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 the use of an approved Soil Tillage Intensity Rating (STIR).

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.

When providing technical assistance to organic producers, residue management, and tillage activities should be consistent with the USDA-Agricultural Marketing Service National Organic Program standard.

Considerations for improving Soil Organic Matter Content

Carbon loss is directly related to the volume of soil disturbed, the intensity of the disturbance, 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.

Considerations for Improving Soil Health/Quality

Producers can achieve major improvements in soil health by using the following activities/practices:

- 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. Multi-species cover crop mixes provide greater benefits than single-species cover crops.
- Using undercutting tools rather than burying tools will enhance accumulation of organic material in the surface layer.
- Conducting any soil-disturbing field operation when soil moisture is optimal, neither excessive nor too dry, will help maintain soil tilth, and reduce the need for additional tillage in the future.

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.

Providing Food and Escape Cover for Wildlife

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 for operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance (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

An operation and maintenance (O&M) plan shall be prepared for this practice. Appropriate job sheets may be used to serve as the management plan as well as supporting documentation, and shall be provided to the land user.

The producer/client is responsible for the operation and maintenance of the practice. Operation and maintenance activities address the crop rotation for each field, minimum percent residue to be maintained for each crop, and type of tillage implements to be used.

SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

- Identify resource concern(s) to be treated (see the "purposes" section of this standard);
- Identify the field location and extent of practice in acres, and complete the assistance notes. Assistance notes shall include dates of site inspections, name or initials of the person who made the inspections, specifics as to what was inspected, alternatives discussed, decisions made, and by whom;
- Ensure that field number, acreage, crop rotation, SCI, STIR, and percent residue needed to address identified resource concern(s), and type(s) of tillage implements used are recorded in the conservation plan or on an applicable job sheet;
- Operation and Maintenance plan or job sheet that includes the crop rotation, tillage implements, and minimum percent residue needed to address identified resource concern(s);
- Soil loss calculations.

REFERENCES

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