



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
RESIDUE AND TILLAGE MANAGEMENT, REDUCED TILL

CODE 345

(ac)

DEFINITION

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

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
- Improve soil health and maintain or increase organic matter content
- Reduce energy use

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland.

CRITERIA

General Criteria Applicable to All Purposes

This practice includes tillage methods commonly referred to as mulch tillage or conservation tillage where the entire soil surface may be 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 that do not meet the soil tillage intensity rating (STIR) criteria for the Maryland conservation practice Residue and Tillage Management, No Till (Code 329).

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 residue.

The STIR value shall include all soil disturbance field operations that are performed during the crop interval (i.e., from the time immediately following harvest or termination of one cash crop through harvest or termination of the next cash crop in the rotation, including fallow periods). The crop interval STIR value rating shall be no greater than 80, and no primary inversion tillage implements (e.g., moldboard plow) shall be used.

Additional Criteria to Reduce Sheet, Rill and Wind Erosion, and Excessive Sediment in Surface Waters

Use the current approved water and wind erosion prediction technology to determine if the field operations planned will provide the amount of randomly distributed surface residue needed, time of year residue

needs to be present in the field, and the planned field operations allowed to reduce erosion to the desired level. Calculations shall account for the effects of other practices in the management system.

In ridge-till systems, plan ridge height and ridge orientation to manage runoff and minimize erosion, with a maximum row grade not to exceed 4%.

Additional Criteria to Reduce Tillage-Induced Particulate Emissions

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

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

Ensure the soil condition index (SCI) for the cropping system results in a positive rating (greater than zero).

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.

Note: Specific programs may dictate criteria in addition to, or more restrictive than, those specified in this standard.

CONSIDERATIONS

General Considerations Applicable to All Purposes

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 the 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.

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, ensure residue and tillage management activities are consistent with the USDA Agricultural Marketing Service National Organic Program regulations.

Additional Considerations for Maintaining or Improving Soil Organic Matter Content and Soil Health

Carbon loss is directly related to the volume of soil disturbed, intensity of the disturbance, soil moisture content, and soil temperature at the time the disturbance occurs. Soil disturbance that occurs when soil temperatures are below 50° F will oxidize less organic matter and release less CO₂ than operations done when the soil is warmer. To make reduced till more effective, consider using the following practices:

- Maximizing year-round coverage of the soil with living vegetation and/or crop residues builds organic matter and reduces soil temperature, thereby slowing organic matter oxidation;
- Using a diverse crop rotation with multiple crop types (cool-season grass, cool-season legume/forb, warm-season grass, warm-season legume/forb) in the crop rotation;
- Planting a cover crop after every cash crop in the rotation. Multi-species cover crop mixes provide greater benefits than single-species cover crops;
- 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 opener no till drill will release less CO₂ and oxidize less organic matter than planting with a wide-point hoe/chisel opener seeder drill;
- 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 will help maintain soil tilth and reduce the need for additional tillage in the future.

Additional Considerations for Providing Food and Escape Cover for Wildlife

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

Leave crop residues undisturbed after harvest (e.g., no shredding or baling) to maximize the cover and food source benefits for wildlife.

Leave rows of unharvested crops standing at intervals across the field or adjacent to permanent cover to 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

Plans and specifications for this practice shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail to ensure successful implementation of this practice and may be recorded in narrative form, on Implementation Requirements (IR) sheets, or other approved forms.

The completed 345 IR sheet and appropriate fact sheet(s) can serve as the plan and specifications for implementing this practice.

The following items shall be addressed, as appropriate:

- Purpose of the reduced till practice (identified resource concerns);
- For each field, the cropping sequence and acceptable implements to be used, minimum Soil Conditioning Index (SCI) and Soil Tillage Intensity Rating (STIR) values to be maintained, and minimum percent residue needed to address the identified resource concern(s);
- Benchmark and planned fuel consumption, if applicable.

Supporting Data and Documentation

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

- Location of the practice on the conservation plan map;
- Assistance notes. The notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom;
- If applicable, soil loss calculations (using the current approved NRCS erosion prediction tool);
- SCI and STIR calculations;
- Completed IR sheet, and copy of the appropriate fact sheet(s) or other specifications and management plans.

OPERATION AND MAINTENANCE

An Operation and Management (O&M) plan shall be prepared and is the responsibility of the client to implement. The IR sheet and appropriate fact sheet(s) may serve as the management plan, as well as supporting documentation, and shall be reviewed with and provided to the client.

At a minimum, the following components shall be addressed in the O&M plan, as applicable:

- Follow the specified crop rotation and implements to be used for each field. Contact NRCS before changing the cropping sequence and/or tillage methods, especially on HEL fields or when receiving financial assistance for this practice;
- Evaluate/measure crop residue 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 and/or harvesting equipment;
- A Soil Tillage Intensity Rating (STIR) value of 80 or less must be maintained in order to be considered reduced-till;
- If there are areas of heavy residue accumulation in the field because of movement of water or wind, spread the residue prior to planting so that it does not interfere with planter operation.

REFERENCES

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