Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

RESIDUE AND TILLAGE MANAGEMENT, NO TILL

CODE 329

(ac)

DEFINITION

Limiting soil disturbance to manage the amount, orientation, and distribution of crop and plant residue on the soil surface year around.

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
- Maintain or increase soil health and organic matter content
- Increase plant-available moisture
- Reduce energy use
- Provide food and escape cover for wildlife

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland.

CRITERIA

General Criteria Applicable to All Purposes

Do not burn residue.

Distribute all residues uniformly over the entire field. Removing residue from directly within the seeding or transplanting area prior to, or as part of the planting operation, is acceptable.

This practice only involves an in-row soil disturbance operation during strip tillage, the planting operation, and a seed row/furrow closing device. There is no full-width soil disturbance performed from the time immediately following harvest or termination of one cash crop through harvest or termination of the next cash crop in the rotation regardless of the depth of the tillage operation. Soil that is “splashed” with exposed soil from tillage onto otherwise undisturbed ground is considered part of the zone of soil disturbance. Include all field operations performed during the crop interval period between harvest termination of the previous main crop (including fallow periods) and harvest termination of the current main crop for the Soil Tillage Intensity Rating (STIR) calculation. The crop interval STIR value shall be no greater than 20.

Additional Criteria to Reduce Sheet, Rill and Wind Erosion, Reduce Excessive Sediment in Surface Waters, and Reduce Tillage-Induced Particulate Emissions

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

residue needs to be present in the field, and amount of surface soil disturbance allowed to reduce erosion to the desired level. Calculations shall account for the effects of other practices in the management system.

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

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

Additional Criteria to Increase Plant-Available Moisture

Maintain a minimum of 60 percent residue cover on the soil surface throughout the year.

Trapping Snow

Provide the following minimum crop stubble height during expected significant snowfall times:

- 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.

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.

Additional Criteria to Provide Food and Escape Cover for Wildlife

Use an approved habitat evaluation procedure to determine when residue needs to be present, and the amount, orientation, and stubble height needed to provide adequate food and cover for target species.

CONSIDERATIONS

General Considerations

Removal of crop residue, such as by baling or grazing, can have a negative impact on resources. Fully evaluate the impact on soil, water, animal, plant, and air resources before planning the removal of crop residue.

Enhance the positive effects of this practice by producing adequate crop residues using high residue crops and crop varieties, cover crops, double cropping, and adjustment of plant populations through seeding rates 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.

To prevent the movement and uneven accumulation of residue that may interfere with the planting of the next crop, avoid shredding residue,

Using Residue and Tillage Management, No-Till for all crops in the rotation or cropping system can enhance the positive effects of this practice by:

- Increasing the rate of soil organic matter accumulation.
- Keeping soil in a consolidated condition and improved aggregate stability.
- Sequestering additional carbon in the soil.
- Further reducing the amount of particulate matter generated by field operations.
- Reducing energy inputs to establish crops.
- Forming root channels and other near-surface voids that increase infiltration.

Considerations to Increase Soil Health and Organic Matter Content

The volume of soil disturbed, intensity of the soil disturbance, soil moisture content, and soil temperature at the time the disturbance effect carbon loss from the soil. To make this practice more effective:

- When deep soil disturbance is performed, such as by subsoiling or fertilizer/manure injection, make sure the vertical slot created by these implements is closed at the surface.
- Planting with a single disk or slot opener no-till drill will release less CO2 and oxidize less organic matter than planting with a wide-point hoe/chisel opener seeder drill.
- 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.
- Maximizing year-round coverage of the soil with living vegetation (e.g., cover crops) and/or crop residues builds organic matter and reduces soil temperature, thereby slowing organic matter oxidation.
- 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/maintain a cover crop after every harvested annual crop in the rotation. Multi-species cover crop mixes provide greater benefits than single-species cover crops.

Considerations to Increase Plant-Available Moisture

- Leave stubble taller than the 10-inch minimum to trap more snow.
- Create variable-height stubble patterns to increase snow storage.
- Perform all field operations on the contour to slow overland flow and allow more opportunity for infiltration.

Considerations for Wildlife Food and Cover

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

PLANS AND SPECIFICATIONS

Prepare specifications for establishment and operation of this practice for each field or treatment unit. Record the specifications using the practice Implementation Requirements (IR) document. Identify the following specifications as appropriate:

- Purpose for applying the practice.
- Planned crop(s) and crop interval.
- Amount of residue produced by each crop.
- All field operations or activities that affect—
  - Residue orientation including height (where applicable).
  - Surface disturbance.
  - The amount of residue (pounds/acre or percent surface cover) required to accomplish the purpose, and the time of year it must be present.
- Benchmark and planned Soil Tillage Intensity Rating (STIR) value, Soil Conditioning Index (SCI) value, and erosion rate using current approved erosion prediction technology.
- Target species of wildlife, with appropriate benchmark and planned habitat index if applicable.
- Benchmark and planned fuel consumption, if applicable.
- Benchmark and planned tillage induced particulate emissions if applicable.

OPERATION AND MAINTENANCE

Evaluate and measure the crop residue cover and orientation after each operation through the crop year to ensure planned target residue amounts and orientation will be achieved for the critical time periods specified in the plan. Adjust management and/or planting and harvesting equipment as needed to meet residue objectives for the purpose(s) planned. Adjust the planned residue amounts and orientation in the plan as needed to meet planned practice purpose(s).

Use minor tillage In order to close or level ruts from harvesting equipment. Till no more than 10 percent of the field for this purpose.

If there are areas of heavy residue accumulation (because of movement by water or wind) in the field, spread the residue prior to planting so it does not interfere with planter operation.

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