**NATURAL RESOURCES CONSERVATION SERVICE**

**CONSTRUCTION SPECIFICATION**

# RESIDUE AND TILLAGE MANAGEMENT, MULCH TILL

## 1. Scope

The work shall consist of performing cultural operations to produce crops or hay in a manner that maintains acceptable yields and provides adequate residues on the soil surface from harvest until after the planting of the next crop. Crop residue to be retained on the soil surface shall be uniformly distributed across the production area and managed through the use of full width tillage implements and/or other cultural practices to meet the producer and resource management objectives. The intent of the practice is to provide surface cover to control soil erosion, conserve soil moisture, and reduce pest competition. Practice design and application will be documented on Cropland Field Management Record in the Revised Universal Soil Loss Equation, Version 2 (RUSLE2). This practice does not apply to tillage systems that fully incorporates or removes the residue from the soil surface during any period of the year.

## 2. Materials

Chemicals used in performing this practice shall be federally, state, and locally registered and shall be applied strictly in accordance with authorized registered uses, directions on the label, and other federal, state, and local policies and requirements.

Chemical containers shall be properly stored and disposed of in a safe manner according to state and local ordinances or procedures.

Seeding and tillage implements will be equipped to operate through plant residue and loose soil conditions without clogging, and to maintain residue on or near the soil surface. Loose residue to be retained on the field shall be uniformly distributed on the soil surface.

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 locally applicable data on residue production by crops and residue reduction by tillage machines. Further adjustments shall be made as needed during the tillage sequence based on field measurements of remaining residue.

Harvesting implements used for small grains will be equipped with devices that will distribute the crop residue over approximately 80 percent of the working width of the header unless partial removal of the residue is intended.

Procedures for estimating amounts of crop residue retained may be found in Kansas Agronomy Technical Notes KS-1, SCS-CRM-01, SCS-CRM-02, and National Agronomy Manual, Part 502.

## 3. Cultural Operations

**Managing for Soil Erosion Control.** In rainfall erosion areas, the tillage and planting system shall provide enough surface cover to accomplish sheet and rill erosion objectives as determined by the current approved sheet and rill erosion prediction method. There will be at least 30 percent coverage of the soil surface with plant residues after planting a crop or at other essential time periods unless otherwise specified on the Cropland Field Management Record in RUSLE2. The soil may be disturbed prior to planting and generally more than half the soil surface will be disturbed using chisels, field cultivators, disks, sweeps or blades. Refer to: RUSLE2 http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm and the Tillage Equipment Pocket Identification Guide at ftp://ftp-fc.sc.egov.usda.gov/IA/intranet/Tillage.pdf.

In wind erosion areas, the tillage and planting system shall maintain the amount of residue to accomplish soil erosion protection objectives as determined by the current approved wind erosion prediction method. At least 1000 pounds per acre of flat, small grain residue equivalent will be present on the soil surface

throughout the critical wind erosion management period unless otherwise specified on the Cropland Field Management Report in RUSLE2. The soil may be disturbed prior to planting and generally more than half the soil surface will be disturbed using tillage tools such as chisels, field cultivators, disks, sweeps, or blades. Refer to: Wind Erosion Equation (WEQ) at http://efotg.nrcs.usda.gov/treemenuFS.aspx?Fips=20169&MenuName=menuKS.zip, Section 1F, Erosion Prediction, Wind Erosion.

Planting shall be performed as nearly as practical across the slope.

Follow fragile residue-producing crops with non-fragile residue-producing crops and follow low residue-producing crops with high-residue producing crops. Do not use fragile, low residue producing crops more than two consecutive years.

**Residue Types**

| Nonfragile | Fragile |
|---|---|
| Alfalfa or legume hay | Canola/Rapeseed |
| Barley * | Dry beans |
| Buckwheat | Dry peas |
| Corn | Fall seeded cover crops |
| Flaxseed | Lentils |
| Forage Silage | Mustard |
| Grass Hay | Potatoes |
| Millet | Safflower |
| Oats * | Soybeans |
| Pasture | Sugar Beets |
| Popcorn | Sunflowers |
| Rye * | Vegetables |
| Sorghum | |
| Triticale * | |
| Wheat * | |

* If a combine is used with a straw chopper or otherwise cuts straw into small pieces in harvesting small grain, then the residue should be considered as being fragile.

**Managing for Available Soil Moisture.** In systems designed to maximize available soil moisture, crop stubble should be left standing during the winter period to increase the potential for snow catch. When shredding of stalks and stubble are included in the system, these practices should be conducted after primary snowfall periods to reduce evapo-transpiration at the soil surface. A minimum of 2000 pounds per acre or 60 percent residue cover shall be maintained on the soil surface throughout the year.
To capture winter snowfall fall tillage, operations should be limited to undercutting tools such as blades, sweeps, or deep tillage implements such as rippers or subsoilers to maintain stubble in a standing condition. Crop stubble shall be maintained at least 10 inches for crops with row spacing less than 15 inches and at least 15 inches in height for crops with a row spacing of 15 inches or greater. These heights will be present over at least 50 percent of the field. Fall tillage operations will be as close to perpendicular as possible to the direction of the prevailing winds during the time that significant snowfall is expected.

**Managing for Pest Reduction.** Weed control shall be accomplished with herbicides, cultivation, cover crops, and crop rotations.

Maintain a diverse crop rotation that will disrupt life cycles and not provide carry over diseases. Manage chemical diversity to reduce the potential of resistance to applied chemicals.

Managing insect populations requires early detection and control to keep populations below an economic loss threshold. Monitor border areas for potential population expansions and control prior to infestations of the cropping area where feasible. Tillage or chemical application operations will be timed with crop rotations to disrupt pest life cycles to prevent population growth beyond the economic thresholds.

**Managing for Soil Organic Matter Content.** Crop rotations will consist of at least 50 percent non-fragile, high residue producing crops.

Conduct a periodic soil test to monitor levels of soil organic matter. Additional organic biomass in the form of livestock waste and/or increasing the intensity of the crop rotation and reduction of tillage operations may be needed to reduce the potential of further soil organic matter degradation.

**Managing for Wildlife Food and Cover.** Residue height, amount, and time period shall be determined using and approved habitat evaluation procedure. Residues shall not be removed unless it is determined by the habitat evaluation procedure that removal would not adversely affect habitat values.

Determine the primary management purpose or objective when planning pest management activities. In a wheat-fallow cropping system it has been determined that eliminating summer post harvest weed control applications may have little or no detrimental effects on available soil moisture, but is very beneficial to pheasant populations.

When managing for migratory waterfowl and/or sandhill cranes maintain residue cover during both the fall and spring migrations.

**4. Other Requirements**

Residue shall not be burned.

Partial removal of residue by means of haying or grazing shall be limited to the amount needed to meet the desired objectives.

Tillage systems often create restrictive or compaction layers that inhibit water infiltration and root penetration. Depth of these layers should be should be assessed to determine type of implement that will penetrate below the restrictive layer during a period when soil moisture is low so that the layer will be temporarily fractured. Attempting to treat a compaction layer when soils above the layer are moist or wet will normally increase the compaction problem.

The owner, operator, contractor, or other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regard to the safety of all persons and property.

**Planning and documentation requirements:**

- Identified problem
- Producers objectives
- Location map – field numbers, map, or sketch of the area planned
- Measured acres
- Cropping sequence and planned residue, kind, amounts, percent surface cover required, and orientation
- Critical time periods to maintain residue
- Documentation of applied residue in pounds or percent by planning unit.

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