Natural Resources Conservation Service

Supplement to Conservation Practice Standard
Residue and Tillage Management No Till/Strip Till/ Direct Seed
(Acre)
Code 329

This supplement contains clarification of criteria for planning and certifying residue and tillage management no till/strip till/direct seed.

1. Definition in the standard reads: Managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year round while limiting soil disturbing activities to only those necessary to place nutrients, condition residue, and plant crops.

    - This definition means that the practice standard is for a year round system of residue management, not just a residue management for major crop or cash crop. Thus, all crops, including cover crops, in the rotation for a whole year need to be considered. An example of this crop rotation would be a cover crop of rye planted in November followed by cotton planted in April and harvest in early November. The cropping system then repeats when a cover crop of rye planted in November again.
    - This standard doesn't cover any other soil disturbing activities than those listed as necessary to place nutrients, condition residue, and plant crops. If any other soil disturbing activity is performed, then the practice isn't, by definition, No-Till or Strip-Till. It may be another practice such as Mulch Till if covered in that practice standard.

2. Conditions where this practice applies: This practice includes planting methods commonly referred to as no-till, strip-till, direct seed, zero till, slot till, or zone till. Approved implements are: no-till and strip-till planters; certain drills and air seeders; strip-type fertilizer and manure injectors and applicators; in-row chisels; and similar implements that only disturb strips and slots. All other implements are considered to be full-width or capable of full disturbance and therefore not compatible.

    - Simply put, if an implement is not on the approved list of implements that can be used for no-till or strip-till, then the implement and its activity cannot be used under this practice standard. Thus, moldboard plows, disks, chisels, harrows, and field cultivators produce a full width disturbance, obviously aren’t listed in the approved list of strip or slot implements.

- Soil disturbance, as used in RUSLE2, occurs when an operation fractures and loosens the soil, displaces soil, mixes soil and surface residue so that the interface between the residue and the surface soil is no longer distinct, and disrupts a high organic matter layer at the soil surface.

3. Criteria: General criteria applicable to all purposes. Do not perform any full-width tillage regardless of the depth of the tillage operation.

    - Interpretation: If any full-width tillage operation is used in the rotation, then it is a Mulch-Till system not a No-Till or Strip-Till system.

4. General Criteria: Base the annual Soil Tillage Intensity Rating (STIR) value on 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). The STIR value shall be no greater than 30.

    - The STIR rating is a measure of how much soil disturbance is done by an implement as it moves through the soil. The factors that are evaluated in STIR are recommended operating speed, tillage type, recommended tillage depth, and surface area disturbed. Crop interval is defined as the time interval from harvest to harvest of the main crops in the rotation. Another definition of crop interval is that it begins with the first pass across the field after harvest of the previous crop. Anything that manages residue distribution or orientation, controls weeds, manages moisture, applies nutrients or pesticides, does tillage, planting, and harvesting is part of the tillage system for that crop and, therefore, is included in that crop's crop interval. Cover crops are not harvested, so are included on the front end of a harvested crop.

    - Cover crops function and are considered in much the same way as a fallow time supports the next small grain crop to be grown and harvested. A cover crop supports the next crop by providing cover, biomass, sequestering surplus nutrients, and possibly manages moisture. Plant type does not determine if it is a cover crop component of the cropping system or not. The same small grain plant may be grown for different reason such as a cover crop, as forage that is grazed or is harvested as hay or silage, or grown and harvested for grain. Because of this, people need to clearly distinguish how a small grain is used when calculating STIR. If the small grain cover crop is harvested for grain, forage, silage, hay, or biomass for a cellulosic ethanol plant then it is considered to be a separate crop and has its own crop interval, tillage system, and STIR. Use of a cover crop does not always mitigate the disturbance effect of all mechanical operations associated with producing that crop. For example, the STIR rating for a peanut crop cycle with a small grain cover crop is over 30. This occurs because, while the other crops in the rotation are harvested without digging and are well below the 30 threshold, but the peanut digger is rated at 27.3 and when you add a planter to that it is over 30. The disturbance of digging a root crop has to be included in the tillage system for

that crop because these crops can't be harvested without digging them up. It might be possible to credit that disturbance to the next crop interval if you were harvesting the small grain and, thus, it had its own crop interval. But, if you grow continuous peanuts, you have no option but to charge the disturbance to the crop interval for peanuts.

- Examples of these crop intervals: Rye planted for a cover crop in November with a no-till drill and sprayed in March has a STIR value of 2.59. Peanuts planted in April into the killed rye cover crop with a strip-till planter and harvested with a peanut digger in September have a STIR value of 33.3. Because the cropping interval for peanuts includes the rye cover crop, the STIR values of the two crops are combined for a value of 35.9. If the rye was harvested for grain, then there would be two separate STIR values. STIR values for other crops can be calculated using RUSLE2.

5. A minimum of 30 percent of the soil surface shall be covered by plant residue immediately following the planting of the crop.

- Interpretation: After the major crop is planted then 30 percent of the soil surface must be covered by plant residue. This amount of residue has been determined to be the minimum amount necessary to protect the soil from water and wind erosion until the crop has enough time to cover the soil surface with its canopy. This percentage needs to be measured in the field as outlined in the guidance document for this practice. The plant residue after the major crop is harvested should also be measured to determine if a cover crop is necessary to ensure that when the next major crop is planted then there will be 30 percent cover.
- An example of this would be corn, which at time of crop harvest, had a residue that measured 80 percent. This level of residue immediately post harvest should be adequate to provide the 30 percent needed at the time of planting of the next major crop. But if the crop is peanuts, which had a residue measured after harvest of 40 percent, it is unlikely there would be enough cover to have the 30 percent required at planting. This is in part to the fact that only 40 percent residue was present post harvest and peanut residue is considered fragile and will rapidly decompose. In this case, a cover crop would be needed.
- Another consideration is if there will be any soil disturbing operations that may occur after the harvest of a major crop and the planting of the next crop In the jobsheet for this practice, Figure 2 Machinery Table, gives percentages of residue left after an operation has occurred and by type of residue, either fragile (like peanuts) or non-fragile (like corn). An additional document from Purdue, Estimating Corn and Soybean Residue Cover (http://www.agry.purdue.edu/ext/pubs/AY-269-W.pdf), shows percentages that result after several different operations. The amount of residue that the cover crop will provide also depends on if the cover crop is grazed and when

it is grazed during its growth cycle. Grazing at the beginning of the growing period for a limited amount of time has less effect on residue amount than if a cover crop is grazed at the end of the growing period. Also, if the cover crop is harvested for grain and the straw baled after the combining, then the amount of residue left on the field will be greatly reduced.

When planning and certifying the Residue and Tillage Management No Till/Strip Till/Direct Seed Practice Standard (Code 329) all of the following criteria must be met:

1. Disturb no more than one-third of the row width.
2. Do not perform any full-width tillage regardless of the depth of the tillage operation. Use only implements that disturb strips and slots. Follow this for every crop in the year-round rotation: if one of the crops uses full-width tillage, then it is no longer No-till or Strip-till and it is Mulch Till.
3. Calculate the annual Soil Tillage Intensity Rating (STIR) using RUSLE2 on all field operations that are performed during the crop interval. This value cannot be greater than 30.
4. A minimum of 30 percent of the soil surface needs to be covered by plant residue immediately following the planting of the crop.