United States Department of Agriculture

NRCS Natural Resources Conservation Service

Residue and Tillage Management No-Till/Strip-Till/Direct Seed

Conservation Practice Job Sheet FL-329-JS

Natural Resources Conservation Service, Florida October 2011

Strip Till Corn

Residue and Tillage Management No-Till/Strip-Till/Direct Seed is defined as the management of the amount, orientation, and distribution of crop and other plant residue on the soil surface year round while limiting soil disturbing activities to those necessary to place nutrients, condition residue, and plant crops. The following are several of the purposes of this practice: Reduction of sheet and rill erosion, reduction of wind erosion, improvement in soil organic matter content, reducing CO_2 losses, reducing energy use, increasing plant-available moisture, and provide food and cover for wildlife. This practice applies to all cropland and other land where crops are grown.

No-till: The residue is left undisturbed from harvest through planting except for the narrow strips that cause minimal soil disturbance, such as injecting anhydrous ammonia. No-till is also referred to as zero-till, slot-till, direct seeding, or slot plant.

Strip-till: The residue is often left undisturbed from harvest through planting except for strips up to a third of the row width to allow for seedbed preparation, planting, and fertilizer placement. These strips are cleaned of residue or tilled for warming and drying purposes either before or during the planting operation. This practice is also referred to as row-till, zone-till, or fall strip-till.

Direct seed: Narrow strips of soil are disturbed by the equipment openers used to place fertilizer and seed in the soil without full width tillage. Residue covers 60 percent of the soil surface. **This operation is not commonly used in Florida.**

Practice specifications are provided to assure the residue management system meets the resource needs and producer's objectives. The specifications are based on the amount, timing, and orientation of crop residue left on the soil surface. These planned requirements are recorded in Table 1. Supporting information is included in Tables 2 and 3 along with Figures 1, 2, and 3.

Residue to be retained on the field needs to be uniformly distributed. Combines or other harvesting machines need to be equipped with spreaders capable of distributing residue over at least 80 percent of the combine header width.

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Residue and Tillage Management No-Till/Strip-Till/ Direct Seed SITE SPECIFIC SHEET

Secondary removal of crop residue by haying or grazing shall be minimized to retain the amount of residue needed to achieve the intended purpose(s). Do not burn or disturb residue by full width tillage operations except for occasional row cultivation for spot treatment of weed escapes or limited use of undercutting operations, such as sweeps or blades used to level ruts or alleviate compaction. Equip planting implements with coulters and/or disk openers designed to cut through surface residue. Do not disturb more than 1/3 of the row width from harvest through planting by nutrient injection, row cleaning, planting, or other operations. Row cleaners may be attached to the planters to move residue out of the row area and help warm and dry the seedbed. Anhydrous injectors, manure injectors, and similar equipment may need to be modified to operate in high residue situations. Weed control techniques must be carefully planned, yet sufficiently flexible, to complement the system.

On sloping ground where water erosion is a problem, the row area formed during the planting operation needs to be level with or above the row middles unless planting is on the contour. Current wind and water erosion technology will be used to establish minimum requirements.

Tillage aerates the soil and increases crop residue decomposition. No-till and strip-till protect the soil from excessive erosion, reduce soil aeration from tillage, allow organic matter to accumulate, and improve the condition of the soil. The required amounts of residue for soil protection are specified in Table 1. Tables 2 and 3 can be used to plan and record the crops, field operations, and management necessary to achieve a positive trend in soil organic matter content based on the NRCS Soil Condition Index (SCI) procedure described in the National Agronomy Manual.

Residue shall be evenly distributed and maintained on the soil surface to retain soil moisture for crop use by enhancing infiltration and reducing evaporation. A minimum of 50 percent surface cover is required to significantly reduce surface evaporation and meet the intent of this practice purpose.

Record planned practice specifications in Table 1. Tables 2 and 3 and figures 1, 2, and 3 are for optional use when more detailed planning or design information is needed.

Evaluate/measure the crop residues cover and orientation for 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.

This practice can be certified by completing the applied column in the site specific sheet and signature in the certification section..

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Residue and Tillage Management No-Till/Strip-Till/Direct Seed
SITE SPECIFIC SHEET

Client:		County:	Date:
Farm #:	Tract #:	Field # (s):	Contract #:

Purpose\Needs (check all that apply)

☐ Reduce sheet/rill erosion	☐ Reduce energy use
☐ Improve soil organic matter content	☐ Increase plant-available moisture
☐ Reduce wind erosion	☐ Other
☐ Improve wildlife habitat (food and cover)	
☐ Reduce CO2 losses	

Table 1 Specifications (and application record)

Acres	Crop to be planted	Type of Equipment (ex.: No-Till Planter/Drill, Strip-Till Planter)	Row width (inches)	Width of tilled area	Percent residue after harvest of the prior crop **(See note below)**	Percent residue cover after planting of planned crop	
						Planned	Applied

Note: If a cover crop is planned after harvest of the previous crop then the percent residue does not need to be measured. An estimate of residue can be calculated using Table 2.

Only measure the percent residue from the cover crop after the planned crop is planted.

Notes: If residue is managed for wildlife benefits describe planned wildlife provisions. Also use this space to describe row direction, grade restrictions, or other site specific requirements.

Soil Conditioning Index (SCI) available and used*	Yes ☐	No ☐	**Calculated SCI value:**

*SCI provides an indication of the soil condition trend based on planned management. Positive values indicate an upward trend. Negative values indicate an downward trend. The values are based on how crops and management affect soil organic matter content. Refer to tables 2 and 3.

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Residue and Tillage Management No-Till/Strip-Till/Direct Seed SITE SPECIFIC SHEET

Planner/Technical Service Provider:

_____ _____

Designed by Date

_____ _____

Approved by Date

Certification

This practice(s) as applied **meets** Florida NRCS standards and specifications for Residue and Tillage Mgt. No-Till/Strip-Till/Direct Seed, Code 329.

_____ _____

Planner/Technical Service Provider Date

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Residue and Tillage Management No-Till/Strip-Till/Direct Seed SITE SPECIFIC SHEET

Table 2 Design Worksheet for estimating crop residue produced (for planned rotation)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Crop	**Harvest units**	**lb/unit**	**Yield**	**Residue/yield ratio**	**Est. lb residue/ac**	**Estimated percent ground cover**	**Instructions to estimate values for column 6 & 7**
							Multiply columns 3x4x5 to estimate total pounds of residue available after harvest. Figure 1 can be used to convert pounds of residue (column 6) to percent ground cover (column 7). Figure 3 can be used for values for column 3 and 5.

Notes:

Information in column 7 is used in table 3 and an estimate of beginning ground cover for each crop in the rotation.

Table 3 Design worksheet for residue budget

Crop	Previous Crop	Beginning Residue	Operation	Date	Percent retained*	Percent residue left

Notes:

*Residue retention values are recorded on figure 2.

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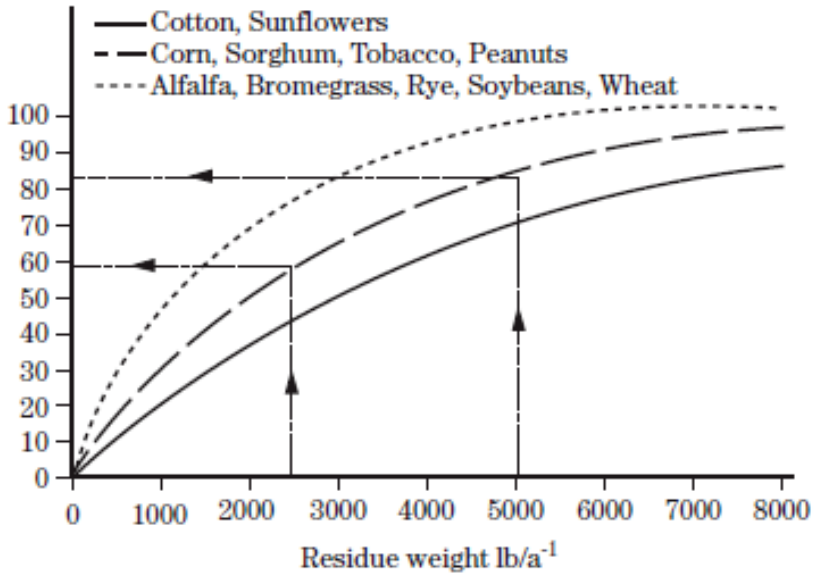
Residue and Tillage Management No-Till/Strip-Till/Direct Seed
SITE SPECIFIC SHEET

Figure 1 Residue lb/percent cover conversion

Percent cover	Corn	Soybeans	Cotton	Grain sorghum	Small grains
10%	250	250	400	300	250
20%	600	400	1,000	650	400
30%	950	600	1,600	1,050	600
40%	1,400	850	2,300	1,550	850
50%	1,850	1,200	3,200	2,100	1,200
60%	2,400	1,600	4,150	2,700	1,550
70%	3,300	2,100	5,300	3,600	2,100
80%	4,400	2,800	6,900	4,800	2,750
90%	6,050	3,900		6,750	3,850

Adapted from table D-4 and Figure 5-4, ARS Ag Handbook 703 , and Figure 503-45 National Agronomy Handbook

Figure 503–45 Relationship of residue weight to percent residue cover for various crops



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Residue and Tillage Management No-Till/Strip-Till/Direct Seed SITE SPECIFIC SHEET

Figure 2 Machinery table

Implement Values represent percent of ground cover **left after operation**	**Percent for fragile residue (like peanuts)**	**Percent for non-fragile residue (like corn)**
Over winter weathering following summer harvest	65 – 85	70 - 90
Over winter weathering following winter harvest	70 – 80	80 - 95
Paraplow / Paratill	65 – 75	80 – 90
V ripper/subsoiler	60 – 70	70 – 90
Drill w/ single disk opener	75 – 85	85 - 100
Row planter: no-till planter w/ smooth coulters	75 – 90	85 – 95
Row planter: no-till planter w/ ripple coulters	70 – 85	75 - 90
Row planter: no-till planter w/ fluted coulters	55 – 80	65 - 85
Row planter: strip-till planter w/ 2 or 3 fluted coulters	50 – 75	60 - 80
Row planter: strip-till planter w/ row cleaning devices	50 – 60	60 - 80
Notes: See Purdue Agronomy Guide AY-280 Table 1 for other residue amounts of tillage and planting implements at http://www.agry.purdue.edu/ext/pubs/AY-280-W.pdf For pictures of Tillage Implements go to: ftp://ftp-fc.sc.egov.usda.gov/IA/technical/TillageGuide.pdf		

Figure 3 Residue/yield ratio and Lb/unit

Crop	**Residue/yield ratio**	**Lb/unit**
Corn	1.00	56.0
Cotton	4.50	1.0
Millet	1.43	56.0
Oats	2.00	32.0
Peanuts	1.30	1.0
Rye	1.00	56.0
Sorghum	.20	56.0
Soybeans	2.00	60.0
Wheat	1.70	60.0