United States Department of Agriculture
Natural Resources Conservation Service

NRCS Natural Resources Conservation Service

Delaware

SOIL CONDITIONIING INDEX/SOIL COMPACTION CONTROL ENHANCEMENT (CSP Enhancements) January 2005

Delaware Enhancement Activity Job Sheet SCI-1

Name:

Soil Conditioning Index

Payment as follows:

Soil Conditioning Index (SCI) score of at least 0.1.	$1.16	Per Acre
Soil Conditioning Index (SCI) score of at least 0.2.	$2.32	Per Acre
Soil Conditioning Index (SCI) score of at least 0.3.	$3.48	Per Acre
Soil Conditioning Index (SCI) score of at least 0.4.	$4.64	Per Acre
Soil Conditioning Index (SCI) score of at least 0.5.	$5.80	Per Acre
Soil Conditioning Index (SCI) score of at least 0.6.	$6.96	Per Acre
Soil Conditioning Index (SCI) score of at least 0.7.	$8.12	Per Acre
Soil Conditioning Index (SCI) score of at least 0.8.	$9.28	Per Acre
Soil Conditioning Index (SCI) score of at least 0.9.	$10.44	Per Acre
Soil Conditioning Index (SCI) score of at least 1.0.	$11.60	Per Acre
Soil Conditioning Index (SCI) score of at least 1.1.	$12.76	Per Acre
Soil Conditioning Index (SCI) score of at least 1.2.	$13.92	Per Acre
Soil Conditioning Index (SCI) score of at least 1.3.	$15.08	Per Acre
Soil Conditioning Index (SCI) score of at least 1.4.	$16.24	Per Acre
Soil Conditioning Index (SCI) score of at least 1.5.	$17.40	Per Acre
Soil Conditioning Index (SCI) score of at least 1.6.	$18.56	Per Acre
Soil Conditioning Index (SCI) score of at least 1.7.	$19.72	Per Acre
Soil Conditioning Index (SCI) score of at least 1.8.	$20.88	Per Acre
Soil Conditioning Index (SCI) score of at least 1.9.	$1.16	Per Acre
Soil Conditioning Index (SCI) score of at least 2.0.	$23.20	Per Acre
Soil Conditioning Index (SCI) score of at least 2.1.	$24.36	Per Acre
Soil Conditioning Index (SCI) score of at least 2.2.	$25.52	Per Acre
Soil Conditioning Index (SCI) score of at least 2.3.	$26.68	Per Acre
Soil Conditioning Index (SCI) score of at least 2.4.	$27.84	Per Acre
Soil Conditioning Index (SCI) score of at least 2.5 or greater.	$29.00	Per Acre

Enhancement - Soil Management	Reduce soil compaction by controlling areas of traffic that result in a Soil Tillage Intensity Rating (STIR) between 31 and 60	Acre	0.5
Enhancement - Soil Management	Reduce soil compaction by controlling areas of traffic that result in a Soil Tillage Intensity Rating (STIR) between 16 and 30	Acre	1
Enhancement - Soil Management	Reduce soil compaction by controlling areas of traffic that result in a Soil Tillage Intensity Rating (STIR) of 15 or less	Acre	2
Enhancement - Soil Management	Using GPS or other similar guided measure technology, reduce soil compaction by controlling areas of traffic that result in a Soil Tillage Intensity Rating (STIR) between 31 and 60	Acre	1
Enhancement - Soil Management	Using GPS or other similar guided measure technology, reduce soil compaction by controlling areas of traffic that result in a Soil Tillage Intensity Rating (STIR) between 16 and 30	Acre	2
Enhancement - Soil Management	Using GPS or other similar guided measure technology, reduce soil compaction by controlling areas of traffic that result in a Soil Tillage Intensity Rating (STIR) of 15 or	Acre	4

less

The Soil Conditioning Index (SCI) is a tool that can predict the consequences of cropping systems and tillage practices on the trend of soil organic matter. Organic matter is a primary indicator of soil quality and an important factor in carbon sequestration and global climate change.

The Soil Conditioning Index has three main components: 1) the amount of organic material returned to or removed from the soil; 2) the effects of tillage and field operations on organic matter decomposition; and 3) the effect of predicted soil erosion associated with the management system. The SCI gives an overall rating based on these components. If the rating is a negative value, the system is predicted to have declining soil organic matter. If the rating is a positive value, the system is predicted to have increasing soil organic matter.

The SCI is a quick way to characterize the organic matter dynamics of a farming system. Organic matter is a critical component of soil function for several reasons. Surface residue protects soil from the impact of rain and wind. As residue decays, it feeds microbes that improve soil structure and infiltration, and thus reduces runoff. Soil organic matter contributes to nutrient and water holding capacities. Regular inputs of organic material foster a diverse microbial community that supports plant health and productivity.

Documentation Requirement; Attach a copy of calculated SCI and/or Soil Tillage Intensity Rating (STIR from RUSLE 2.

Certification

I certify that I have installed/performed the enhancement/practices on the SCI calculation listed in the attached document.

Name: _____ Date: _____

REDUCING SOIL COMPACTION BY CONTROLLING AREAS OF TRAFFIC

Soil that is excessively compacted is limited in its ability to function. Soil compaction occurs when moist or wet soil particles are pressed together and the pore spaces between them are reduced. Adequate pore space is essential for the movement of water, air, and soil fauna through the soil. The mechanical strength and poor oxygen supply of compacted soil restricts root penetration. Soil moisture is unavailable if layers of compacted soil restrict root growth.

Compaction restricts infiltration, resulting in excessive runoff, erosion, nutrient loss, and potential water-quality problems. Soil compaction can restrict nutrient cycling, resulting in reduced yields.

Compaction is caused primarily by wheel traffic, but it also can be caused by animal traffic or natural processes. Soil is especially susceptible to compaction when it is at field capacity or wetter, has a low content of organic matter, or has poor aggregate stability. Saturated soils lack adequate strength to resist the deformation caused by traffic. Moldboard plowing and excessive tillage break down soil aggregates. After the aggregates are broken down and the soil surface is bare, the soil is more likely compacted by the excessive vehicle passes common in conventional tillage systems.

A controlled traffic system separates traffic zones from cropping zones within a field. Yields normally improve when traffic is restricted to controlled zones between the rows because the soil directly beneath the rows can retain a loosened structure. A controlled traffic system works well with row crops. If drilled crops are grown, a skip row is required. One component of controlled traffic systems is ensuring that all equipment covers the same width or multiples of the same width. A second component is minimizing the number of traffic lanes. Table 2 provides examples of traffic patterns. In the first scenario in table 2, the tractor tire spacing is 60” and the combine tire spacing is 120”. Thus, each set of six rows will have four tire paths and 44 percent of the ground will be trafficked. By increasing the tractor tire spacing to match the combine tire spacing (as in the second row of the table), the number of paths and area trafficked are cut in half.

Permanent high-residue cropping systems, otherwise known as conservation tillage systems, generally work well with controlled traffic systems because previous crop rows are not tilled and thus traffic rows remain visible. Controlled traffic can be an integral part of ridge-till systems and no-till systems with permanent beds.

Table 2.—Examples of traffic patterns for controlled traffic systems.

Number of rows	Tractor (in)	Combine (in)	Number of paths	% Trafficked
----------30" row spacing----------				
6	60	120	4	44
6	120	120	2	22
8	120	120	2	17
8	60 & 120	120 & 180	6	50
12	60 & 120	120 (6-row)	4	22
16	60 & 120	120 & 180 (8-row)	8	33
24	60 & 120	120& 180 (12-row)	12	33
----------36" row spacing----------				
6	72	144	4	37
8	72	144	4	28
12	72	144	4	18

Certification

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Name: _____ Date: _____

USING GPS OR OTHER SIMILAR GUIDED MEASURE TECHNOLOGY, TO REDUCE SOIL COMPACTION BY CONTROLLING AREAS OF TRAFFIC

Mulch tillage systems (systems with tillage across the entire field) require autosteer technology (Sandusky, 2003) using guidance from a Global Positioning System (GPS) to locate traffic lanes year after year. Auto-steer technology keeps all field operations in the same traffic lanes. Some systems are even capable of 1-inch accuracy. This technology allows controlled traffic with standard agricultural equipment and full-width tillage. Automatic steering and controlled traffic reduce compaction beneath the row, thereby increasing infiltration and reducing the hazard of erosion and the need for sub-soiling.

Documentation Required: A description of the system of control traffic, including fields being applied to and equipment being used. Soil Tillage Intensity Rating (STIR) provided by NRCS.

Certification

I certify that I have installed/performed the enhancement/practices on the SCI calculation listed in the attached document.

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