

**Name:**

Soil tillage index

**Definition:**

This indicator refers to the grade of aggressiveness that machinery, used on the farm, provides to the soil. It refers to the number of passes, the implementation depth and the type of used agricultural implement.

**Method of calculation:**

The value of this indicator is estimated using the STIR (soil tillage intensity rating) proposed by the Natural Resources Conservation Service of the USDA and adapted by Giulio Ferruzzi. The equation of RUSLE2 is used in its calculation. Lower values indicate less soil disturbance. By definition the direct seeding management has a STIR value below 15. The values range from 0 to 20.

$$\text{Indicator} = \sum A_i * STIR_i / A_T$$

$S_i$ : Area of each plot (ha).

$STIR_i$ : calculated value of STIR in each plot.

$S_T$ : Total area considered (ha)

The value of the STIR reflects the class and severity of soil disturbance caused by tillage. It includes

- Speed of operation of the tilling equipment
- Tillage type
- Tillage depth
- Percentage of the soil area

$$STIR = (0,5 * S) * 3.25 * T * D * A$$

- $S$ =Speed of operation (mph) = Speed (km/h) / 1.60934
- $T$ =Tillage type modifier

Tillage type	Equipment	Modifier
Inversion	Moldboard plough	1
Mixing	Rototiller, Harrow, Subsoiler row	0.7
Mixing and some inversion	Chisel, Cultivator, Disk, Drills, Planters	0.8
Lifting / Fracturing	Subsoiler/Ripper, Hoe drills, Fertilizer applicators, Manure injectors, Sweep plough	0.4
Compression	Graze operations, Manure spreaders, Rollers	0.15

- $D$ =Tillage depth (inches) = Tillage depth (cm) / 2.54
- $A$ =Area disturbed (0 - 1)

**Interpretation:**

The application of best soil management practices decreases the value of this indicator due to that less tillage is used and its intensity is lower.

**Information source:**

The data are obtained in a farmers survey through the operations carried out on the plots.

**Bibliography and references:**

United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). Soil Tillage Intensity Rating (STIR).

[https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs143\\_014811.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_014811.pdf)

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(<http://www.conservationwebinars.net/webinars/farming-implements-in-action/>)