SoildiverAgro project

Adoption of new management practices to increase crop production and quality

THE WHAT AND WHY

Different types of tillage

Soil tillage takes time and changes soil quality. The two extreme ends are zero tillage (low disturbance no-till) and mouldboard ploughing (full inversion deep tillage). However, the range of tillage options is much more nuanced.

The main split of choices is along depth (shallow and deep) and inversion (inverting and non-inverting). Shallow tillage (c.a. 0-80 mm) keeps plant residue near the soil surface and leaves the root zone intact. Deep tillage (80-300 mm) disturbs the root zone but can be used to remove deeper compaction. Both methods can bury residue, or keep it mostly at the surface. This split presents four types of tillage: shallow inverting and non-inverting, and deep inverting and non-inverting.

Shallow, non-inverting tillage is gentlest for the soil (low disturbance sweeps in cultivators, straw harrows, tine harrows, etc.). Plant residue is mixed, evened, and roots may be cut. The soil is covered with mulch. Shallow inversion can be done with disc harrows or rotary hoes (rotavator), as can curved points in cultivators. Inversion makes the following field operations easier but leaves the soil bare and buries surface dwelling organisms.

Deep tillage can be done with heavy cultivators, discs, mouldboard plows or deep looseners (spaders and subsoilers). Heavy cultivators and spaders mix residue through the profile. Mouldboard plows and discs bury most residue and subsoilers leave it to the surface. In some special cases this burial is necessary, but it also influences soil properties considerably.

It is difficult to generalize the effects of different types of tillage. Thinking about ways to keep tillage shallow and keeping residue on the surface also helps in reducing tillage work (time and energy used) and the possible damage to soil.

1. Shallow, non-inverting tillage leaves all the crop residue on top of the soil and provides protection from soil erosion.

KEYWORDS

Tillage, soil degradation, energy consumption, soil management, tilth

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