

Soil-friendly tillage practices

Soil-friendly tillage practices can help to achieve a better protection of soil resources. The main types are intercropping, subsoiling, and contour farming, each of which is discussed below.

Intercropping

What is intercropping and why is it useful?

Intercropping involves growing two or more crops in alternating rows on adjacent strips of variable width or in different layers (under-sown crops) on the same piece of land, during the same growing season. It thus promotes a favourable interaction between different plant species or varieties.

Benefits

The competition and complementarity between appropriately selected, intercropped plants enhances the overall stability of the system, including a significant resilience against pests, diseases and weeds. This practice has positive effects on soil porosity, soil biodiversity, supports nutrient cycles and results in increased yields. Overall it leads to a better use of available resources

Drawbacks

Combinations of crops in intercrop systems must be carefully chosen. Intercropping may result in reduced yields compared to stand-alone crops if it leads to excessive competition for resources. Costs for the purchase of seeds and seedbed preparation can be rather high.

Success story

Intercropping in the Svratka river basin (Czech Republic)

This area has a high risk of soil degradation. Intercropping (under-sown crops) is one of the main ways of successfully dealing with this risk and is widely used in the area, especially in organic farming. Under-sown crops (like grass or lucerne) are sown while the main crop (e.g. wheat) is still growing. These crops thus have the capacity to prevent soil erosion and nutrient losses after the main crop is harvested, and also to increase above-ground biodiversity. Overall, intercropping mitigates water and wind erosion, organic matter decline, diffuse soil contamination and off-site damage in the area. The practice is supported under agri-environment measures, providing motivation for farmers to apply it.

Source: SoCo case study in the Czech Republic



Intercropping of wheat, maize and flax on sloping land (France) (Source: Solagro, France)

Subsoiling

What is subsoiling and why is it useful?

Long-term ploughing and the continued use of heavy machinery can create deep hardpans and compacted soil layers. These may hinder root growth and infiltration of water and nutrients. Subsoiling aims at restoring the lost soil properties and involves loosening compacted soil layers below the ploughing depth, without inverting them. The working depth of the subsoiler should be decided according to the degree of compaction and the soil moisture content at this depth.

Benefits

Subsoiling leads to improved root growth and water and nutrient infiltration. It thus helps to reduce surface run-off and boost yields.

Drawbacks

Subsoiling requires a high input of energy. This practice is of a remedial character: which means that if the causes of compaction and poor soil structure are not removed, compacted layers may well reappear in the short term. Subsoiling is less effective at reducing shallow surface compaction resulting from inappropriate livestock management on pasture.

Success story

Subsoiling in the village of Belozem (south Bulgaria)

Salinisation is one of the major soil degradation processes in southern Europe. There are more than 35 000 hectares of salt-affected soils in Bulgaria. In Belozem 40 % of the land is affected by salinisation. Periodic subsoiling (up to 40-45 cm) has been proven to remedy compaction and salinisation on heavy soils. It increases water infiltration and decreases the upward capillary movement of underground water with high salt content. It also improves soil drainage and can facilitate the leaching of excess salts from the upper part of the soil. However, the effect of this practice is short-lived unless measures to improve the soil are introduced.

Source: SoCo case study in Bulgaria



Machine for subsoiling (Source: Roger Langohr, Universiteit Gent, Belgium)



Contour farming

What is contour farming and why is it useful?

Contour farming involves carrying out field activities such as ploughing, furrowing and planting along contours (at right angles to the normal flow of run-off, and not up and down the slope). It aims to create water-retention storage within the soil surface horizon and to slow down the run-off rate, giving water the time to infiltrate into the soil.

Benefits

Contour farming increases the soil's infiltration capacity and reduces water loss and erosion due to tillage.

Drawbacks

On slopes steeper than 10 %, contour ploughing should be combined with other measures, such as terracing or strip cropping. The effectiveness of contour farming for water and soil conservation depends on the design of the systems, but also on such factors as soil, climate, slope aspect and land use of the individual fields.

Success story

Contour farming in the Guadalentín basin (Murcia, Spain)

Water erosion has traditionally been considered as the major soil degradation process in this region. Contour tillage, the restriction of row crops on steep slopes and reduced tillage are the main preventative practices adopted. Contour tillage has been widely used since its inclusion in the Code of Good Farming Practices (2001), and has been mandatory for this region under cross compliance since 2005. Contour tillage is highly effective at mitigating water erosion.

Source: SoCo case study in Spain

Further reading

<http://soco.jrc.ec.europa.eu>

<ftp://ftp.fao.org/agl/agll/docs/lw8e.pdf>



This fact sheet is based on the findings of the 'Sustainable agriculture and soil conservation' (SoCo) project. It is part of a package of ten sheets organised around the three main topics of the project. The sheets cover the following topics:

- Introduction:
 - Fact sheet no. 1: Linking soil degradation processes, soil-friendly farming practices and soil-relevant policy measures;
- Soil degradation processes:
 - Fact sheet no. 2: Water erosion and compaction;
 - Fact sheet no. 3: Organic matter decline;
 - Fact sheet no. 4: Salinisation and sodification;
- Soil-friendly farming systems and practices:
 - Fact sheet no. 5: Conservation agriculture;
 - Fact sheet no. 6: Soil-friendly tillage practices;
 - Fact sheet no. 7: Soil-friendly farm infrastructure elements;
- Soil-relevant policies:
 - Fact sheet no. 8: Requirement to keep land in good agricultural and environmental condition (GAEC);
 - Fact sheet no. 9: Agri-environment measures;
 - Fact sheet no. 10: Advisory services.

All SoCo fact sheets and project reports can be downloaded at: <http://soco.jrc.ec.europa.eu>.

