PRACTICE ABSTRACT

Mulch sowing in organic agriculture

Problem

Ploughing provides many advantages, such as weed control and enhanced mineralization of nutrients, but can also cause negative effects, especially when water or nutrients are restricted. Specifically, ploughing destroys the soil aggregate and capillary structure, increases the mineralisation of soil organic matter and causes soil compaction, all impacting soil health and functions. It also decreases load bearing capacity and may negatively influence water, gas and nutrient cycles.

Solution

Mulch sowing is a method of reduced soil tillage, based on sowing a main crop into the crop residues of the previous crop or catch crop. The soil is loosened, but not turned, and only an upper, shallow layer is mixed thoroughly.

Benefits

The organic material remaining on the soil surface protects the soil from crusting/sealing and erosion. The decomposing organic matter in the upper soil layer enriches the soil with humus. The lack of soil in-version preserves the soil structure, improving soil environment and thus the bearing capacity and water retention of the soil, as well as increasing the earthworm population. Reduced-tillage methods also usually reduce costs, including those related to fossil fuel consumption, compared to ploughing.

Applicability box

Theme
Reduced soil tillage, mulch sowing with less harvest residues

Agronomic conditions
Temperate climate, Switzerland

Application time
Whole year

Required time
No additional time acquired

Period of impact
Following crop

Equipment
Cultivator, disc harrow, seed drill

Best in
After potatoes, maize and cereals

Fig. 1: Cultivator (H.Dierauer, FiBL)

Practical recommendation

- Supporting measures:
  - Selection of suitable crops (see below) that are less susceptible to weeds as well as high-growth, nitrogen-efficient varieties.
  - Ensure constant soil cover to suppress weeds.
  - Under-sowing to prevent late weed infestation (e.g. white or small red clover varieties or mixtures).
- Start with simple procedures, such as:
  - Winter grain legumes, cereals or oilseed rape after cereals, potatoes or other root vegetables.
  - Green manure/intermediate crop for forage after silage maize, potatoes or cereals. (e.g. vetch- oats-peas mixture, mustard, cereal-grain legumes mixtures).
- Equipment/Machinery Considerations:
  - Examples of suitable machines for reduced tillage are a cultivator with wing-shares (Fig.1) or overlapping swing shares (i.e. disc harrow) (Fig.2) and, for heavy clay soils, a stubble plough.
  - Working depth: at least 10cm deep to eliminate thistles and docks. Adjust machines to shallow working depth; a depth guidance may be needed.
  - Seed drill: if organic matter or soil surface is well decomposed or not too abundant (after potatoes, cereals, or silage maize) use normal sowing machinery. If more abundant, rather use a disc drill.

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- Preparing the seedbed:
  - After silage maize and potatoes, preparing the seedbed and sowing can take place immediately.
  - After cereals, wait until volunteer grains have germinated.
  - After green manure and corn, wait 10-14 days until organic matter has decomposed (or apply manure before tillage).
  - Use suitable tools, e.g., spring toothed harrow. Rotary or star disc harrow work under most conditions and do not tend to clog

Fig.2: Reduced tillage for mulch sowing, Disc harrow (FiBL, 2014)

- Make sure to produce enough soft soil for the seedbed with the primary soil tillage.
- Rolling the field after sowing facilitates germination and minimizes water evaporation.
- Reduced tillage after grassland is risky and only recommended for experienced farmers.

Use the comment section on the SolACE discussion forum to share your experiences with other farmers, advisors and scientists! If you have any questions concerning the method, please contact the first author of the practice abstract by e-mail.

Further information

Videos

- Regulierung von Wurzelunkräutern bei der Stoppelbearbeitung mit Schälpflug oder Grubber (English sub.)
- Direkt- und Streifenfrässaat beim Biomais (German)
- Stickstoffnachlieferung aus Untersaaten und Beisaaten (German)
- Reduzierte Bodenbearbeitung mit Schälpflug - Maschinenvorführung August 2013 (English sub.)

Further reading

- Dierauer H., Gelencser T. 2019. Practice abstract "Undersowing in cereals". FiBL.
- Dierauer H. et al. 2014. "Reduzierte Bodenbearbeitung – Umsetzung im Biologischen Landbau", FiBL.
- Berner A. et al. 2016. Basic guide "The Basics of Soil fertility". FiBL & Organic Research Centre.

Weblinks

- Soil tillage in bioaktuell.ch (German/French)
- Reduced tillage on Ökologieundlandbau.de (German)

About this practice abstract and SolACE

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SolACE: The project is running from May 2017 to April 2022**.** The goal of SolACE (Solutions for improving Agroecosystem and Crop Efficiency for water and nutrient use) is to help European agriculture face major challenges, notably increased rainfall variability and reduced use of N and P fertilizers

Project website: www.solace-eu.net

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