

MULCHING

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Description

The soil surface is covered with material, either organic such as straw and leaves or non-organic products such as black plastic. The term is mulching usually also used for no-tillage, since straw is left on the soil surface using this practice. Originally, mulching meant importing straw from outside the field, a practice commonly used in horticulture in many parts of Europe.

Rationale, mechanism of action

Adding a soil surface cover can increase soil moisture retention and water storage capacity, resulting in more uniform water infiltration into the topsoil. Additionally, the effect of raindrops on loosening of soil particles is reduced. Simultaneously, mulching helps to reduce soil drying and to maintain more moisture for crop use.

Applicability

Used as an erosion control, mulching should be adapted to local soil and climate conditions. Under dry conditions, the mulch prevents evaporation of water, which may be beneficial in dry climates. In the Nordic climate problems arise since it is usually necessary to remove crop residues in order to get the soil sufficiently warm in spring. Straw residues on the soil surface are considered to be a problem when reduced tillage system is used. In Norway, straw has shown a positive effect on yields under no-till [1]. Additionally, under no-till, erosion was reduced by 30-40% when straw was left on the field compared to removing straw [2].

Effectiveness, including certainty

Nitrogen: Application of plant residues have different effect depending on the C/N-ratio in the residues. Mineralisation or immobilisation is the resulting effect. There may be an immobilisation first, followed by mineralisation.

Phosphorus: In trials in the USA, leaving harvest residues on the soil surface and omitting soil tillage after harvest was estimated to decrease erosion losses by 30-90% depending on the crop, which also markedly decreased P losses [3]. For each ton of soil particles prevented from leaving the field with runoff, P losses can be reduced by at least 50 g [3].

Time frame

The effect of mulching on erosion risk can be expected in short term. However, the effects of mulching on soil structure and improved infiltration may take some more time.

Environmental side-effects

Plant residues left on the soil surface can act as a P source and increase the losses of dissolved reactive P [4,5]. Another negative consequence is that leaving harvest residues on the field increases the risk of fungal diseases. Large weeds cannot be smothered, and if the mulch contains weed seeds, these may germinate.

Relevance, potential for targeting

Relevant and targeted primarily in a warm climate.

Costs: Investment, labour

The costs of mulching highly depend on whether the mulch material is bought from other farms or can be produced on-site.

References

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