

SoildiverAgro project

Adoption of new management practices to increase crop production and quality



THE WHAT AND WHY

Stratification of soil carbon and phosphorous

Avoiding soil inversion from tillage results in the accumulation of plant residue on the soil surface. This results in many benefits for soil health and farming, but also to two things which can be considered problems: the stratification of carbon (C) and phosphorus (P).

When soil is ploughed or tilled deeply with mixing tillage, the carbon from plant residues is distributed evenly throughout the topsoil profile. With shallow or no-tillage, the residues remain mostly in the top 80 mm. This creates a mulch layer, which is gradually decomposed to soil organic matter. The microbial activity results in good soil aggregation and protects the soil from erosion.

From the viewpoint of carbon sequestration, the accumulation of C to soil surface can be a problem. After several years, the soil surface may become saturated with C, preventing the stabilization of further C onto soil mineral surfaces. Earthworms

and biological mixing can mitigate this problem.

One technical solution to the stratification is mixing the soil every few years certain intervals. Deep ploughing is not the only option, even scratching the soil with narrow cultivator spikes can introduce new C and P poor soil to the surface.

The same stratification can happen also to P. Accumulation to soil surface saturates the mineral surfaces to an extent, where more P ends up in water soluble form. In the worst case, this can end up in the waterbodies through surface runoff or through earthworm channels and drainage.

The stratification of C and P also results in more nutrient availability for plants. In order to avoid problems from P accumulation, the fertilization practices should be adjusted to match this increased availability.



1. With shallow tillage, nutrients and plant residue accumulate to the soil surface.

KEYWORDS

Soil layers, tillage, nutrient availability, aggregate stability

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