

grow



Organic Substance Through a Mix of Measurements and Biochar

About

This case study focuses on a 30+ farmer near Kassel who is testing innovative soil cultivation methods on a 1-hectare test area. By combining reduced tillage, biochar application, intercropping, and year-round greening, the project aims to increase the soil's organic matter content and promote humus formation. Named "Humuvation", the initiative seeks to develop climate-resistant cultivation methods and improve long-term soil health while monitoring changes over a five-year period.



The Challenge

Key challenges included:

- Biochar quality and quantity:** High-quality biochar is essential, and costs can reach several thousand euros per hectare, exceeding profits from conventional arable farming.
- Mechanization:** Specially modified machines are required to incorporate biochar at a depth of 30 cm without turning the soil—a technology not yet widely available.
- Importance:** Humus formation is crucial for soil fertility, water retention, microbial activity, and long-term CO₂ sequestration, making it a key measure for climate adaptation in agriculture.



THE SOLUTION

The farmer implemented a combined, innovative approach:

- Biochar application:** High-quality biochar (produced in-house or purchased) introduced every 60 cm at 30 cm depth using a specialized machine.
- Complementary measures:** Intercropping, year-round greening, no deep plowing, nutrient balancing, and consistent use of organic fertilizer.
- Integrated approach:** The success relies on the interaction of multiple small steps rather than a single intervention, optimizing soil structure, nitrogen fixation, and microbial activity.

IMPACT AND RESULTS

The project has achieved several key outcomes:

- Soil health:** Improved microbial life, nitrogen fixation, root growth, and soil resilience.
- Water retention:** Increased capacity for soils to store water.
- CO₂ sequestration:** Biochar remains in the soil for centuries, contributing to long-term climate protection.
- Economic perspective:** High upfront costs (~€2,000/ha for three tons of biochar) are offset by long-term soil benefits and funding support (EIP, State of Hessen, private partners).
- Scientific monitoring:** The test field serves as a reference point for the farm's remaining 70 hectares, providing measurable data on humus formation and soil quality.

Humus formation requires a combination of multiple measures, and mechanization remains a challenge due to the need for specialized machinery. The farmer plans to continue implementing and testing measures that positively impact on soil organic matter. With the right technology and funding, this approach can be applied on other farms to enhance long-term soil health and climate resilience.

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