

AUSTRIA

Carbon conservation & sequestration

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Wien

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2014 – 2020

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Measure
M16 - Cooperation

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Project promoter
Bio Forschung Austria

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www.bioforschung.at/projects/kreislaeufe-schliessen/

Developing and testing practical solutions to close material cycles in farms through better use of agricultural residues.

Summary

The farming sector in Austria is changing fast. Farmers are abandoning many traditional practices, such as extensive livestock farming, especially in eastern Austria. As they become more specialised, farms increasingly rely on external inputs and very few of them still have closed nutrient cycles.



This OG worked on the development and testing of practical ways to improve nutrient and humus efficiency through better use of agricultural residues. The project organised experimental actions focused on straw-manure cooperation between farms (e.g. between arable farms and livestock farms); biomass transfer within a farm; composting of unused residues and subsequent utilisation; and innovative methods of using clay and biomass from nature conservation areas as digestate.

Results

The -now tried and tested practices- will enable Austrian farmers to develop their own nutrient cycles and reduce their production costs through the circular use of waste and byproducts.

Thanks to the experimental actions, the OG has calculated their first nutrient balances of farm cooperation, digestate exchange, cut and carry, and composting actions, including an evaluation of their economic performance and CO₂ emissions.

Lessons & Recommendations

- ❑ Farmers are not well informed about the quantities of hidden nutrients in residues on and around their farms, or how these can be reused. Valorisation of these residues can reduce the costs of using external inputs such as fertilisers.
- ❑ Austrian farms are diverse and this made the evaluation of test practices complicated. Objective evaluation criteria, or flexible evaluation models were necessary to ensure that recommendations could be produced for individual farms.

Context

The importance of closed nutrient cycles is emphasised in the UN Sustainable Development Goals (2016), the Circular Economy Package of the EU (2015) and is incorporated in the Austrian rural development programme 2014-2020. Therefore, it is a critical issue for Austrian farmers. However, the farming sector in Austria is changing fast and as it becomes more commercial and specialised, farmers rely increasingly heavily on external inputs and very few of them still operate closed nutrient cycles. This does not only increase the farms' production costs, but it also has a negative environmental impact.

Objective

The main objective of the EIP Operational Group (OG) is to close operational material cycles in farms by improving nutrient and humus efficiency, thus, contributing to a more sustainable and circular management of natural resources in agriculture.

Activities

The main steps in this OG's research work included:

Recording material flows (e.g., quantity, nutrient, and carbon content) by sampling biomass such as alfalfa clover grass, compost, soil, manure, digestate, and slurry at the participant farms.

Establishing experimental actions in cut and carry (mulch transfer), composting with coal, microbial carbonisation, digestate and dilution of slurry to optimise the circular economy on the participant farms.

Conducting laboratory analyses of samples to assess their content in plant nutrients. Data processing and evaluation of field surveys and laboratory results.

Calculating nutrient balances and nutrient efficiency in the investigated actions to close nutrient cycles.

Calculating the humus balances on the farms and tested actions. Comparison of the results of the laboratory analyses and the balancing with the figures researched from existing literature.

Evaluating the tested practices regarding the use of residual materials and the closing of operational and regional cycles together with the partners.

Developing catalogues of tested practices and decision

trees that enable the results to be transferred to other farms.

Preparing a brochure on the project results and practices.

Main results

The tested practices will enable Austrian farmers to develop their own nutrient cycles and reduce their production costs through the circular use of waste and byproducts.

Some field trials have been completed. The operational group presented the interim results of the compost, cut and carry, digestate and manure trials to farmers at field days in Lower Austria, Burgenland, and Upper Austria. Here, farmers discussed their experiences and ideas concerning the tested practices. Many of them were participating in the trials, while other are already implementing the new practices on their farms.

The first nutrient balances for farm cooperation, digestate exchange, cut and carry and composting actions have been drawn up, and their economic performance and CO₂ emissions have been evaluated.

Further events to disseminate the project findings will follow in winter 2021/2022.

Key lessons

Farmers are not well informed about the quantities of hidden nutrients in residues on and around their farms, or how these can be reused.

Austrian farms are diverse, and this made the evaluation of test practices complicated.

Recording the weight of the materials studied, e.g. clover grass, requires considerable time and specific machinery. It was necessary that the farmers in the project put in a great deal of effort into providing this data.

Microbial carbonisation (mC) is difficult for farmers to implement since in practice, the exact "recipe" of mC compost varies depending on the materials (residues) available on site.

Communication without personal contact due to the COVID-19 restrictions is challenging. However, thanks to a well-functioning partnership between farmers, advisors, and researchers, it was possible to successfully implement the project even during the pandemic.

Additional sources of information

n/a