Cascading Utilization Pathways of Food Processing Residues and Valorization Potentials of Biogas Digestates

Insights into the FFG project „CircularFood“

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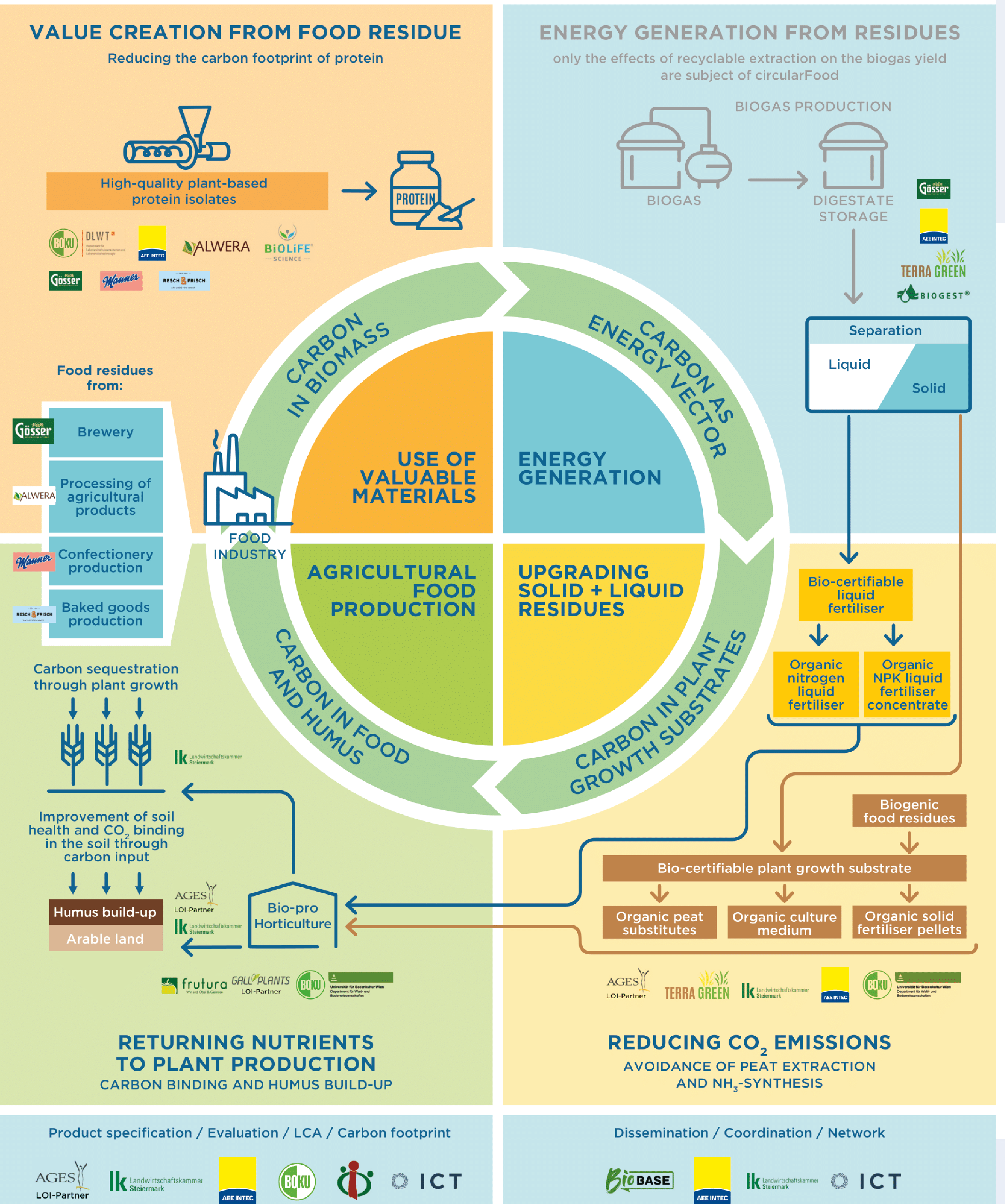
FFG Forschung wirkt.
Kreislaufwirtschaft & Produktionstechnologien im Rahmen von open4innovation
Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie

„CircularFood“
Cascading Utilization Pathways of Food Processing Residues

circularFood

Innovation along the value chain

- New flow reactors for protein hydrolysis for sustainable **protein hydrolysates**
- Optimized **solid/liquid separation** of the fermentation residue
- **Bio-certifiable liquid fertilizer** through the use of membrane distillation
- New **peat substitutes**, organic growing media and organic solid fertilizer pellets through optimal blends
- **Plant tests and practical tests** in agriculture



„CircularFood“ Cascading Utilization Pat of Food Processing Resi

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circularFood

Innovation along the value chain …

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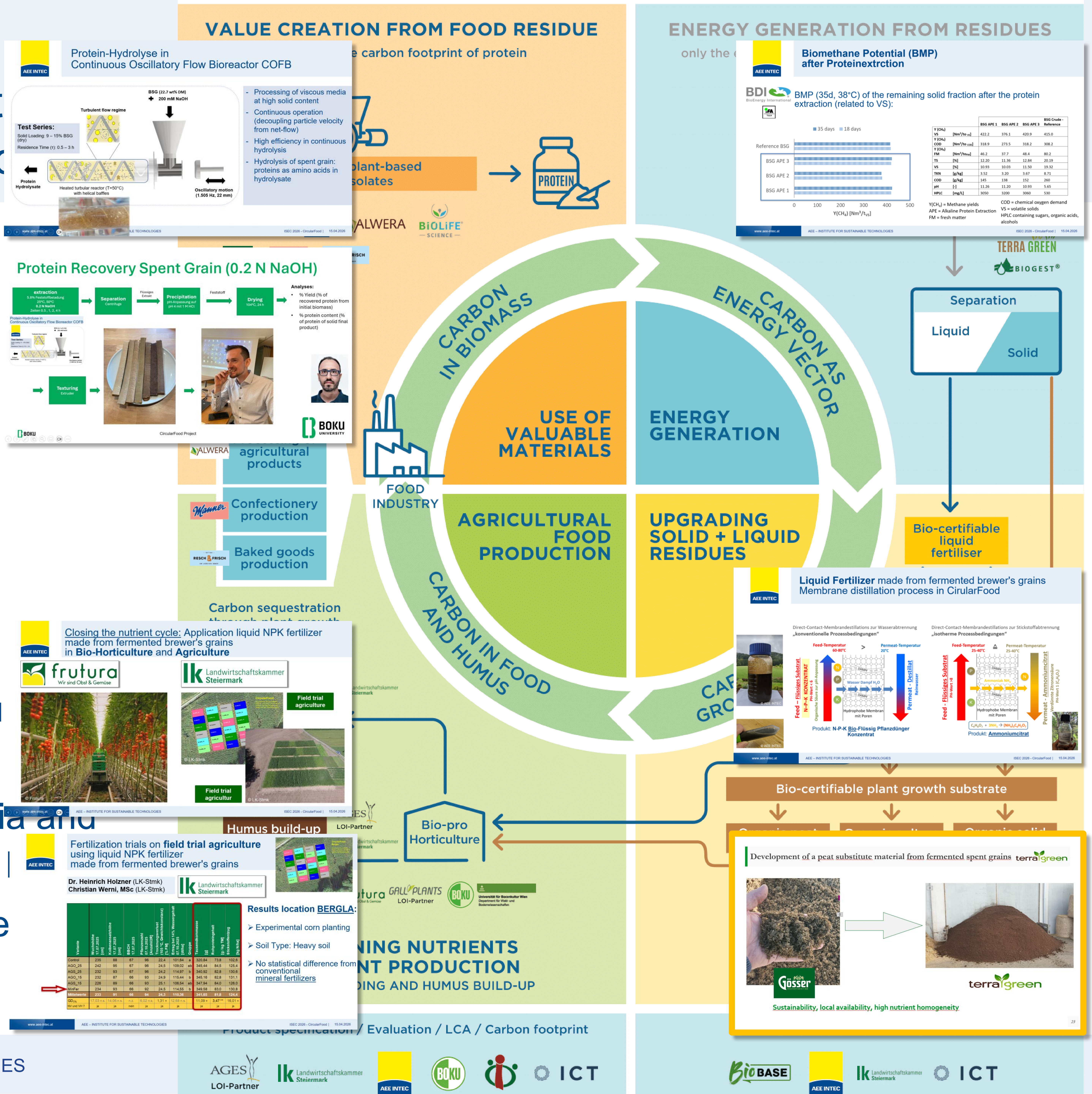

Separation Trial
18. - 19. March 2025

Gösser · terragreen

Liquid Fraction


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Solid Fraction


© Terra Green

- 111 bales a ~ 1 to


© Terra Green

- ~ 50 IBC liquid fraction


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PEAT USE
What is peat actually used for?

- **Main component** of potting soils and **growing media in commercial horticulture**
- Used in **nurseries**, **ornamental plant** and **vegetable cultivation**, and by local Municipality
- Landscaping and restoration projects
- …

Where does peat come from?
Peat is extracted from peat bogs / wetlands


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Peat Extraction

- Peatlands are among Europe’s most endangered habitats and are home to a highly specialized flora and fauna
- Annual growth → 1 mm per year
- **Peat is a fossil fuel!**
  (a precursor to lignite / Braunkohle)


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Problem → Destruction of peatlands and massive CO2 emissions resulting from peat extraction for horticultural purposes

- Peatlands are massive **carbon sinks**. Although they cover only 3% of the Earth's surface, their peat layers store **one-third of terrestrial carbon**—twice as much as the world's forests.
- When peat is extracted, CO_2, methane, and nitrous oxide—a gas that is 300 times more harmful to the climate than CO_2—are released.
- **According to the IPCC, emissions from peat used for horticultural purposes / gardening amount to approximately 7 million tons of CO_2 equivalents for Europe**
- **Globally, the destruction of peatlands is expected to contribute to higher CO_2 emissions than international air travel**

[Quelle: https://science.apa.at/power-search/16090587791456171117]

Peat Use in Austria – The Current Situation

- Import and use of approximately **160.000 tons of peat** per year in Austria [1])
- The volume of imports generates annual greenhouse gas emissions of approximately **308.800 tons of CO_2-equivalents** [2])

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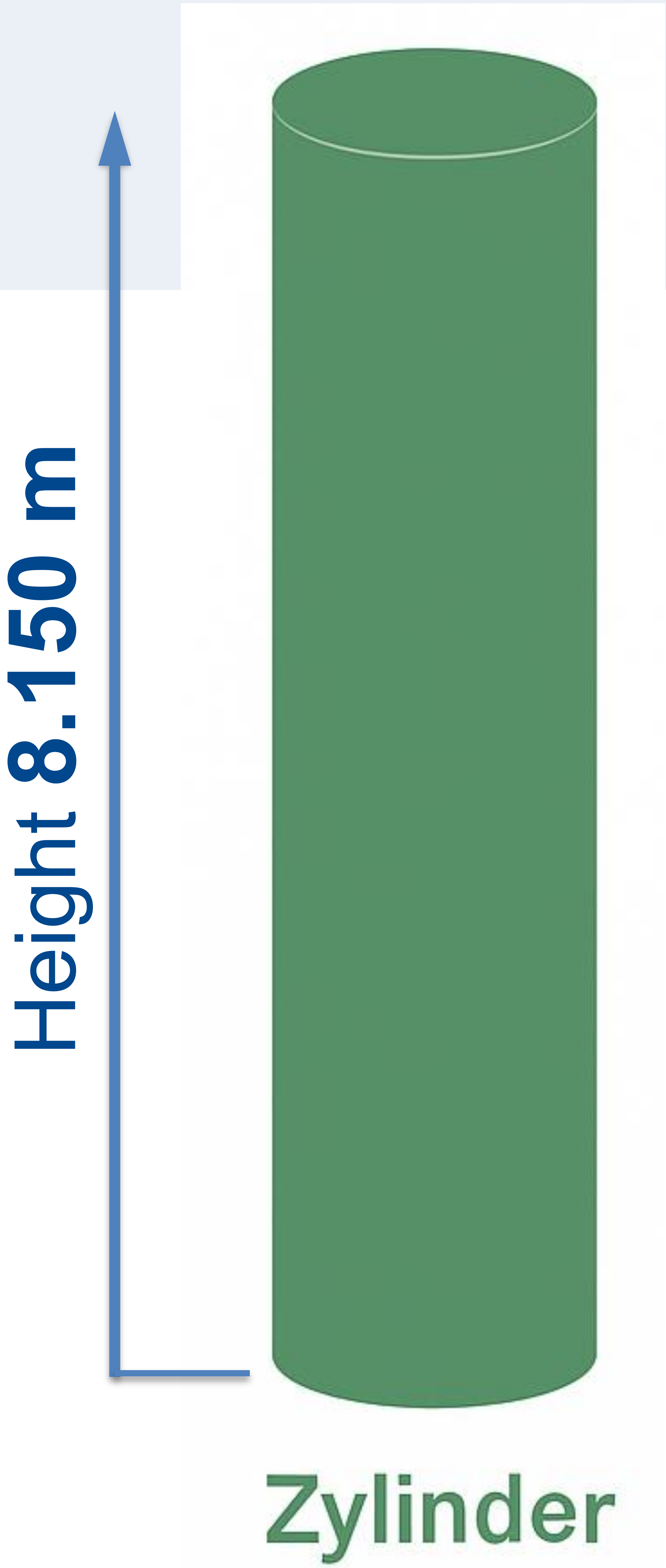
1) Quelle: *https://www.umweltzeichen.at/file/Richtlinie/UZ%2032/Long/UZ32_R8a_Torffreie%20Kultursubstrate_Bodenhilfsstoffe_2024.pdf Ausgabe 1. Jänner 2024*

2) Quelle: *vgl. Stichnothe, H. (2022). Life cycle assessment of peat for growing media and evaluation of the suitability of using the Product Environmental Footprint methodology for peat. The International Journal of Life Cycle Assessment, 27, 1270– 1282. DOI: 10.1007/s11367-022-02106-0*

Peat Use in Austria – The Current Situation

Import and use of approximately **160.000 tons of peat** per year in Austria

Diameter 10 m
Volume **640.000 m³**
(at bulk density)



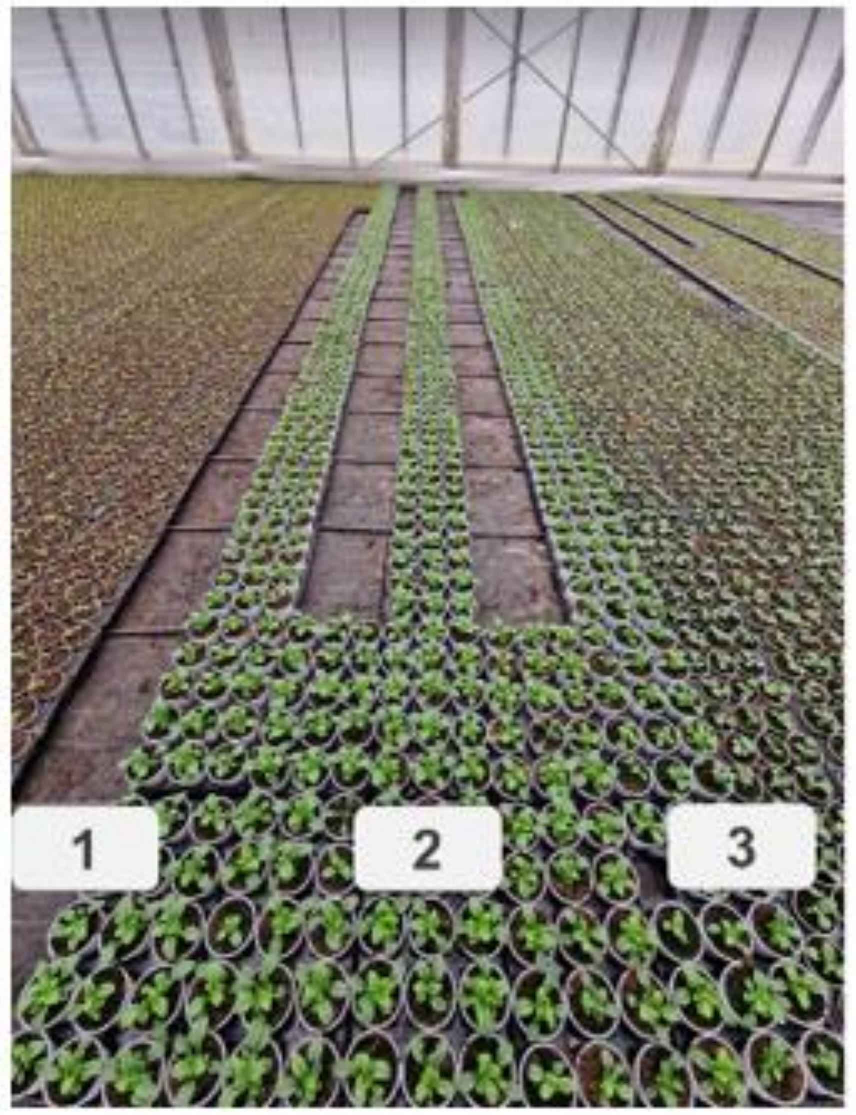
Development of a peat substitute material from fermented spent grains

Sustainability, local availability, high nutrient homogeneity

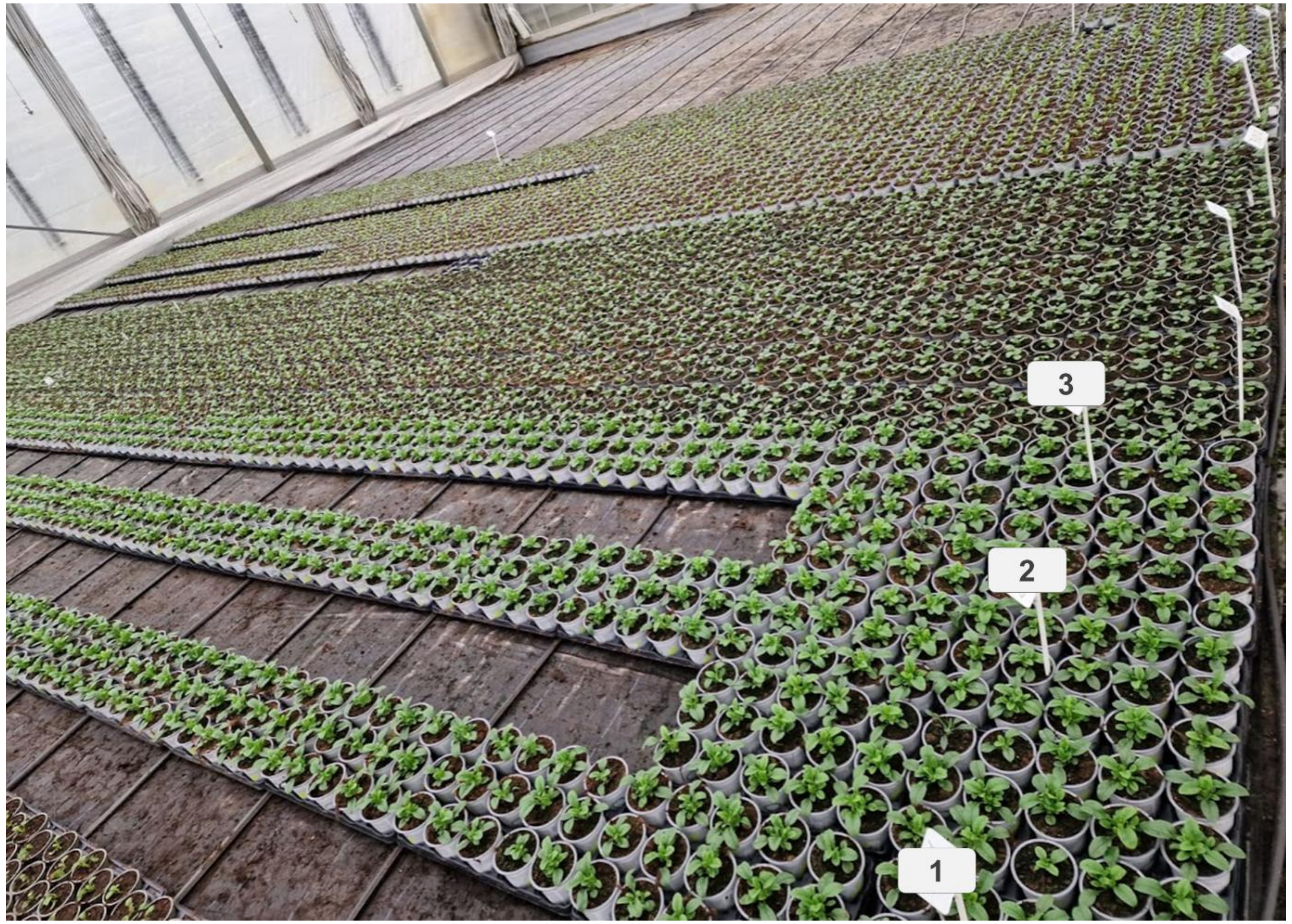
Peat subsitute from fermented spent grains
Various mixtures tested in commercial gardening

terragreen

- Testing efficient solid/liquid separation methods
- Substrate stabilisation
- Processing the susbtrate as peat substitute material (mixing with other substrates)



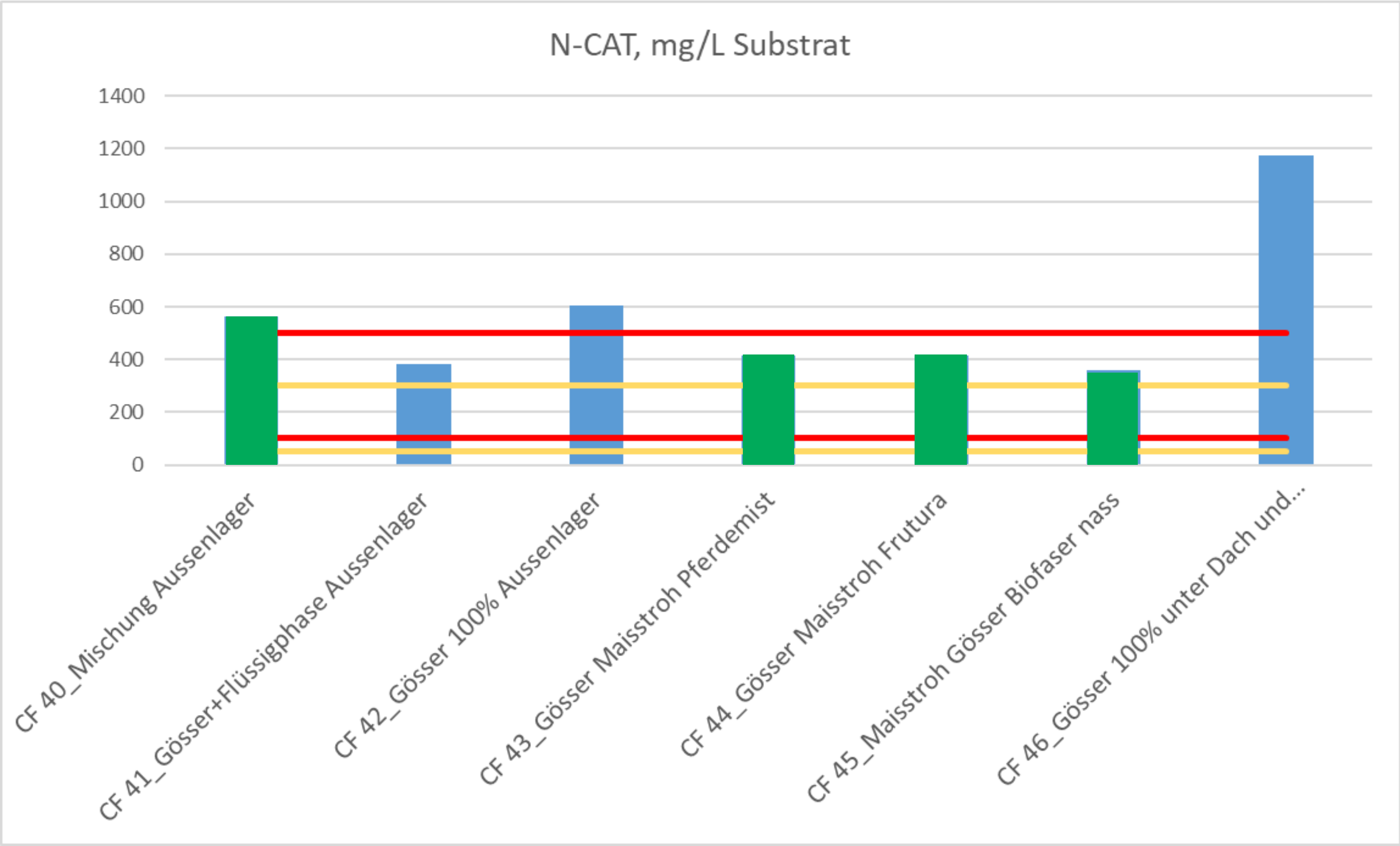
Results and Successes



- A total of more than 22,000 plants were transplanted using the substrate mixtures, in Austria in cooperation with Gall Plants from Markt Allhau and in Germany in cooperation with the company Compaqpeat SIA
- Results of the planting test – The root mass was significantly more developed in the mixtures containing fermented beer spent grain (samples 1, 2, 3) than in those without added fermentation residue (sample 0%)

Outlook: BOKU – Mixtures of Brewer Spent Grain and agricultural byproducts Analyses Result Testing Phase 2025

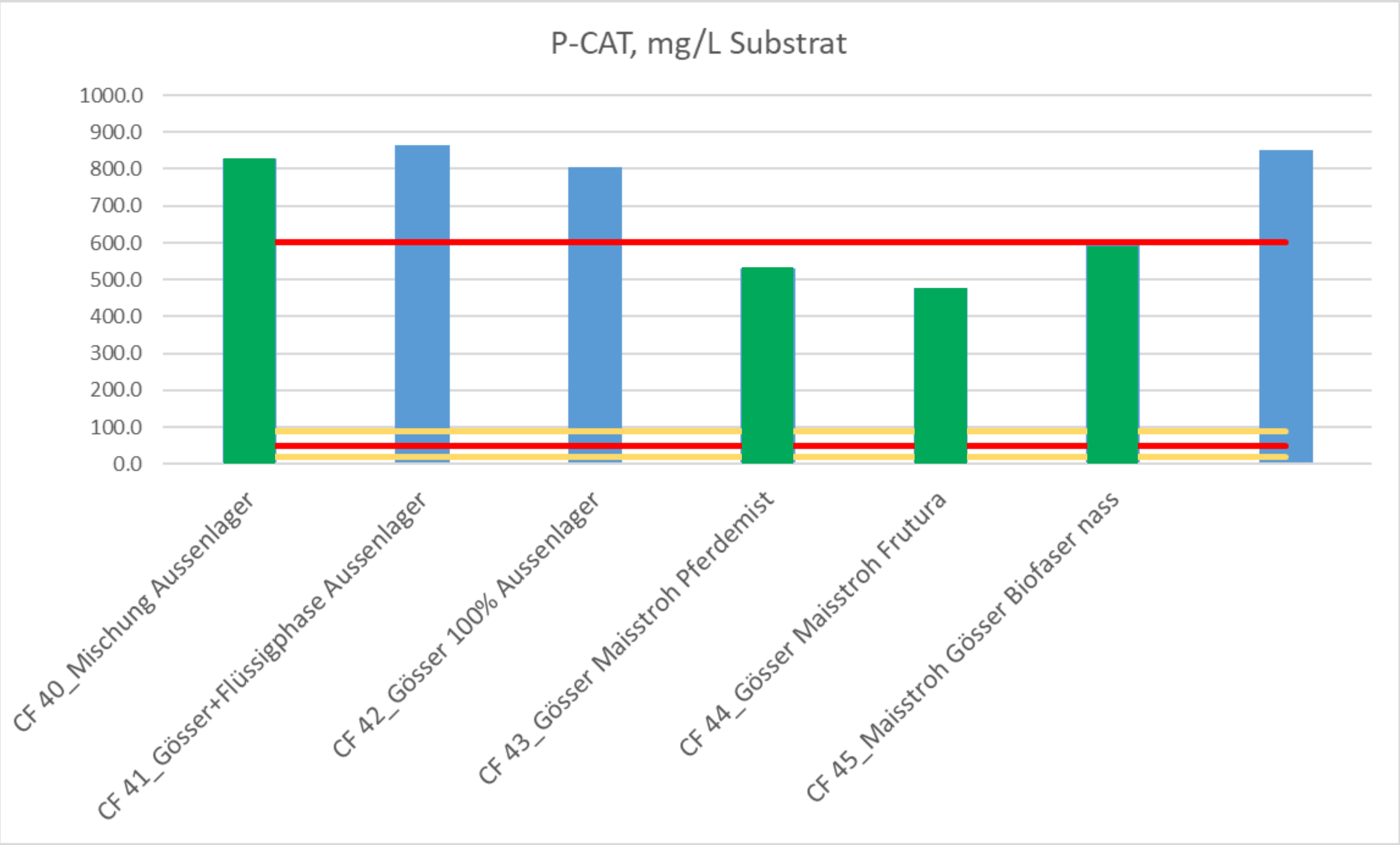
CAT-soluble N, P, K, salt content

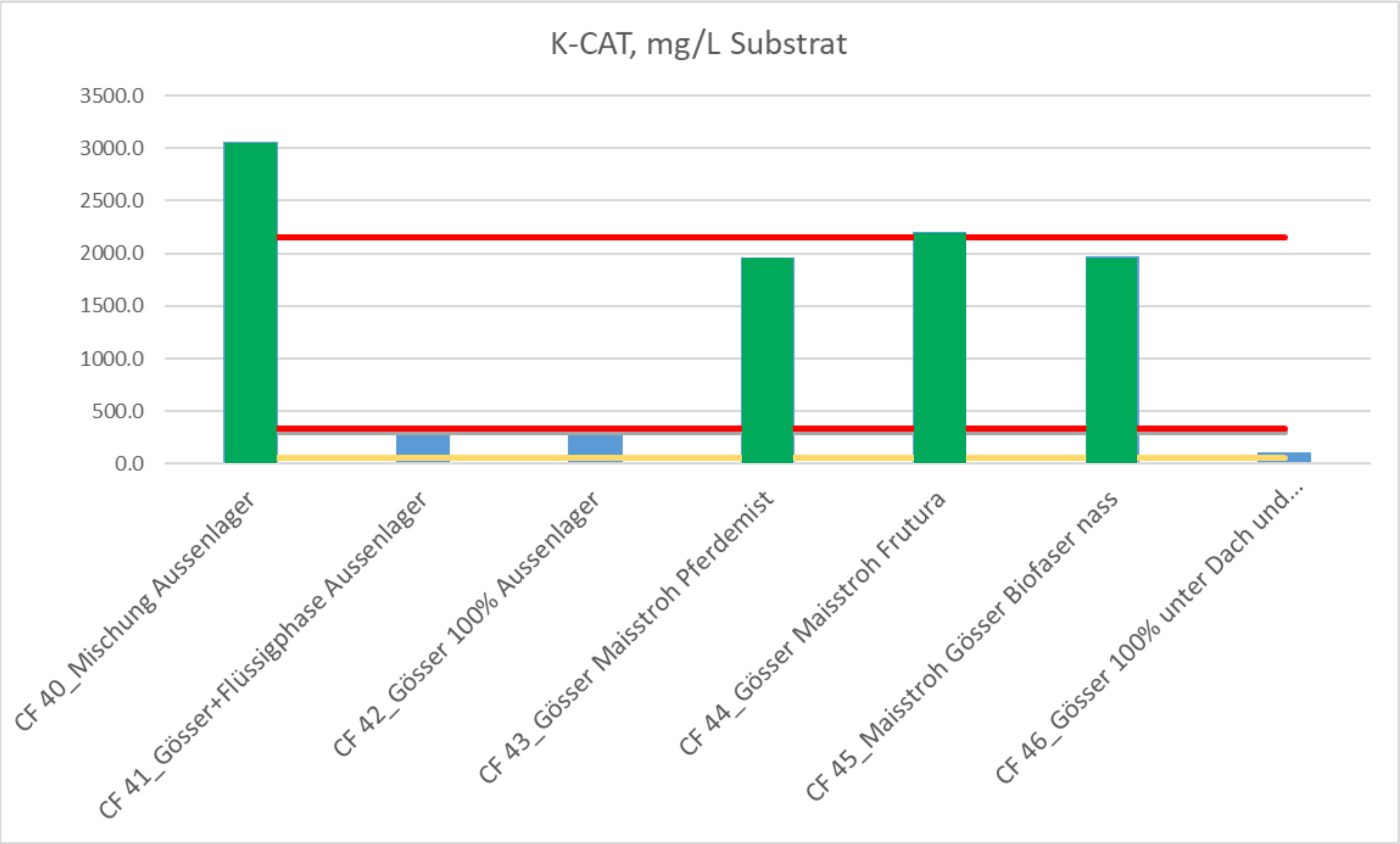


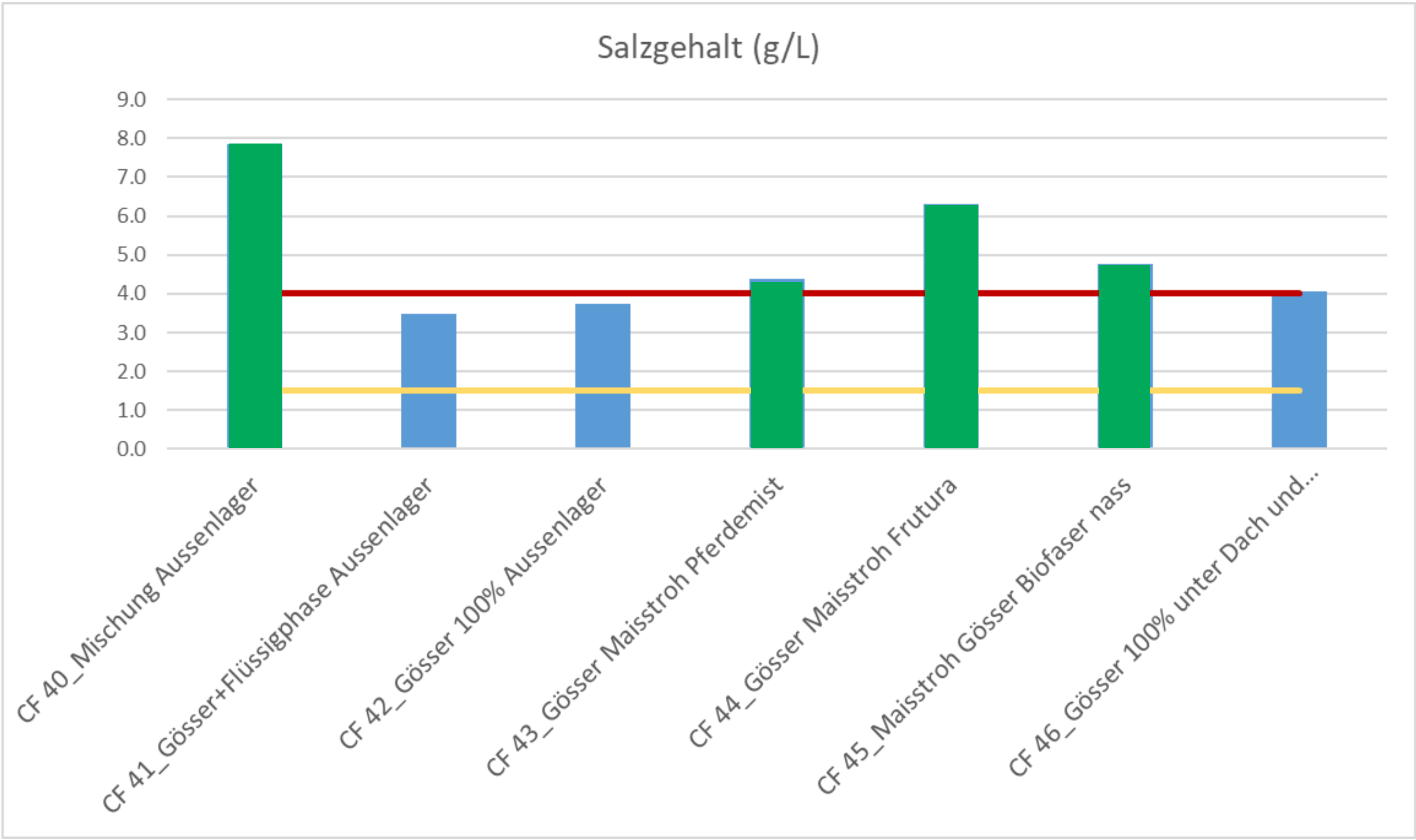
Ausgangsmaterial gehäckseltes Maisstroh
Quelle: Terra Green GmbH

Monokompostiertes Maisstroh (ungesiebt, unzerkleinert)
Quelle: BOKU

Monokompostiertes Maisstroh (fein zerkleinert)
Quelle: BOKU







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