

# Improving resilience with efficient refined digestate

## Authors

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## Implications

Development of an efficient nitrogen fertilizer from biogas digestate will offer a better possibility for organic and conventional farmers to utilize nutrient resources from organic matter in a resource efficient and environmentally healthy way, in accordance with the organic principles of Health and Ecology.

## Background and objectives

Organic plant production relies on nutrient recycling, where organic fertilizers play an important role. The traditional handling of slurry and other organic fertilizers often impose big nitrogen losses to the environment especially when the losses are substituted with mineral fertilizers. Although no mineral fertilizers are used in organic farming nitrogen losses should still be addressed.

The global change to quit fossil fuels means a rising need for other carbon sources to produce plastic and other synthetic substances. Agriculture can supply society with a useful carbon source as methane from biogas production besides powering with energy and provide agriculture with recycled nutrients. With most animal manure going to biogas production in the future organic farming will be more dependent on digestate, and therefore it is important to treat the digestate to ensure lower losses of nitrogen and smaller emissions of direct and indirect nitrous oxide. It is though imperative to investigate if the new digestate fertilizers can be used in accordance with the organic principles.

## Key results and discussion

In the project "Efficient degassed nitrogen fertilizer" (Opti-BioN) (2026-2029) the liquid fraction of separated digestate is aerated with oxygen in tanks to facilitate a biological nitrification. Lime is used to balance the pH in the process. The result is a liquid fertilizer rich in nitrate that can be applied very accurate to the crops, in small doses, to ensure high nitrogen utilization and less losses. Application with spraying equipment in the field will also be gentler to soil compaction than with heavy slurry transporters.

Nitrogen balance and GHG emissions from the manufacturing process are measured and the nitrogen efficiency, and NH<sub>3</sub> and N<sub>2</sub>O emissions are measured in lab scale, field scale, and greenhouse cropping trials. The environmental and economic implications of a widespread use of the new fertilizer are estimated and the alignment of the new fertilizer with the regulation of organic farming is investigated.

Converting raw digestate containing organic carbon into a liquid nitrate fertilizer looks like a violation of the organic tradition not to use readily available nutrients in accordance with the organic principles.

However, to ensure that organic farming is a relevant answer to the environmental and climate challenges in agriculture, other considerations must be handled too. Lack of nitrogen is often the cause of low yields in organic farming and nitrogen losses and greenhouse gas emissions to the environment are directly in contradiction to the organic principles.

The organic principle of Care prescribes that new technologies must be scientifically tested before the introduction into organic farming practices.

The Opti-BioN project will deliver such an investigation.

## References

Description of the project: [Opti-BioN](#)