

Practice BBF n° 6

STRIPPING-SCRUBBING OF LIQUID FRACTION OF PIG MANURE TO PRODUCE AMMONIUM NITRATE

Introduction

Category: Research Innovation (RI)

Practice identity card

#Bio-based fertilizers, food, GP, Belgium, stripping-scrubbing, ammonium nitrate

#Stripping-scrubbing converts ammonia from pig manure into ammonium nitrate, a liquid biobased fertilizer.

This can be achieved at farm level and reduce farm emissions.

This fertilizer can be applied on the field based on the requirements of the crop.

Short description

- ➔ Stripping-scrubbing of the liquid fraction of pig manure allows for on farm production of biobased fertilizer. It starts with the liquid fraction of pig manure followed by scrubbing for ammonium salt recuperation.
- ➔ The operating principle of stripping-scrubbing is that ammonia (NH₃) is stripped by air, steam or vacuum through the nitrogen rich waste stream in an NH₃ stripping reactor, resulting in NH₃ transfer from the aqueous phase to a gas phase. The released NH₃ is removed in a chemical air scrubber by washing it with a strong acidic solution such as nitric acid (HNO₃), resulting in ammonium nitrate. The efficiency of process can be increased by adjusting the pH and/or temperature by which more of water soluble NH₄-N ion will be converted into the gaseous ammonia.
- ➔ The resulting fertiliser is liquid and can be applied as any other liquid fertilizer through injection or through spraying followed by immediate ploughing. Applications where the fertiliser is brought as close as possible to the roots is ideal. This fertiliser is best applied at the start of the growing season because the nitrogen in the product is present as ammonium and it still needs to be converted to nitrate before the plant can absorb it. This type of fertiliser is useful for any kind of crop, but in case a S containing counter acid is used in the production step the resulting fertiliser can be of particular interest for crops that also have a sulfur need such as cabbage crops, onions, celery, grains, sugar beets etc.
- ➔ As this fertiliser has an acidic character special attention should be paid to the material use when applying this fertiliser. Also, at any time the mixture with animal manure should be avoided as toxic H₂S formation could occur.

Implementation process

Which fertiliser type is considered as the standard in this region? Mineral fertilizer and/or (pig) manure (slurry)

Application process/mode

- **In which form is the BBF applied?** liquid
- **How is the BBF applied on the field?** band placement

Logistics

- **Storage safety risk:** average
- **Logistic aspects to consider:** Corrosion hazard for storage tanks etc + attention for processing acid solutions.
- **Skill/education level required for safe and effective application of the BBF?** rather low
- **Availability of the BBF in this region:** very low
- **Availability of the BBF in the wider EU:** very low

Agronomical traits

- **Is it a 'slow-release' fertiliser?** no
- **N-P-K composition of the BBF:** 15-0-0
- **C:N ratio of the BBF:** 0:15
- **Expected availability of nitrogen (N) in the BBF:** similar
- **Expected availability of phosphorus (P) in the BBF:** lower
- **Expected availability of potassium (K) in the BBF:** lower
- **Can the BBF be applied to a multitude of cultivation techniques, or is the use limited to one or a few techniques?** Multitude, less suitable for foliar application. Advised is band placement with injection, no broadcasting.
- **Targeted crop categories:** food, feed, fibre, oil, industrial, ornamental
- **Influence on soil quality:** Low pH product, so attention is needed for the buffer capacity of the soil, compensation with liming can be needed when the pH is influenced. S dosage must be in line with crop request.
- **Soil types suitable for the BBF:** peaty, sandy, clay, loamy, chalky, silty
- **Expected effect on crop yield:** similar
- **Expected effect on crop yield variation:** similar
- **Expected effect on crop quality:** similar
- **Expected effect on crop quality variation:** similar
- **Which costs may increase upon using the BBF?** equipment, storage
- **Which costs may decrease upon using the BBF?** mineral or other types of fertilisers
- **Expected long-term/indirect benefits of using the BBF:** Total N is present in mineral form and can thus be a good replacement for synthetic fossil-based fertilizers while at the same time excess manure/digestate can be processed and valorised => closing the circle.
- **Is the use as fertiliser the most valuable application of the material at hand?** yes

Administrative context

- **Does the use of the BBF qualify for subsidies?** No
- **Status of the legal framework that regulates the use of the BBF:** existing, however with gaps
- **Are there any policy barriers complicating the use of the BBF?** Currently the use of this product falls under the Nitrates Directive as animal manure (max 170 kg N/ha) and not as mineral N. Most mineral salts do comply with the Renure criteria
- **Does the BBF contain any hazardous substances, and if this is the case, which one(s)?** No
- **Is the use of the BBF compliant with EU organic farming practices?** No, as for the moment the manure/liquid fraction is considered to origin from intensive pig production
- **Is the use of the BBF supported by Eco-schemes?** No
- **Expected effect on the leaching of nutrients?**

The product only contains nitrogen, the product shows similar patterns as compared to classical fertilization

- **Are there any gaseous emissions to be considered upon using the BBF?** No
- **Greenhouse gas (GHG) reduction potential of the BBF:** little or none
- **Effects expected on the time occupation of the farmer upon using the BBF?** moderate increase
- **May the use of the BBF contribute to a better public image of agriculture?** Yes, as it could help in the image of agriculture, by contributing to a more circular economy.
- **Any relevant information or remarks about the above can be added here:** Moderate increase in workload for the farmer as long as there is no RENURE status, after that it can replace the time spent on spreading mineral fertilizer

For now, the focus was on ammonium nitrate but by varying with the counter acid in the washing step also ammonium sulphate can be produced which can be very useful in cultivation of certain crops.

Contact

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Eu member state: Belgium

Find out more

Source of information: H2020 Fertimanure / Interreg Nitroman

Additional info/links:

<https://www.fertimanure.eu/en/news/consult/54>

<https://www.youtube.com/watch?v=zhHmOtXkSOo>