

## Practice BBF n° 9

# SOLID FRACTION OF A DIGESTATE FROM PLANT MATERIAL

## Introduction

**Category:** Good Practice (GP)

### Practice identity card

*#Bio-based fertilizers, food, GP, The Netherlands, digestates, methanization*

*#Digestates, a by-product of methanization, are rich in organic and mineral nutrients for fertilization.*

*Spreading digestates improves nutrient efficiency and reduces methane emissions from manure storage.*

*Local anaerobic digestion supports renewable energy generation and sustainable fertilization practices.*

### Short description

➔ Digestates are the majority by-product of methanization. They are rich in organic and mineral elements, giving them a high organic fertilizer potential. The spreading of digestates, particularly of agricultural origin, is the most commonly carried out practice in order to valorize this product. Physicochemical and agronomic indicators are used in order to quantify their characteristics and qualities. The characteristics of digestates are very variable and depend on several factors such as inputs, operating conditions of methanizers and post-treatments. Here we propose the solid fraction of a digestate, mainly from plant matter, and supplemented with non-ruminant slurry and ruminant slurry.

## Implementation process

**Which fertiliser type is considered as the standard in this region?** Green waste compost

**What was the on-farm issue/challenge/opportunity that led to the implementation of the practice?** The methanization sector has been developing rapidly in France for about ten years. This sector meets the needs of waste treatment, increased energy autonomy and energy decarbonization. But it also provides positive externalities, digestate. For the agricultural world, digestate is now considered a real product. It provides farmers who use it with a real technical and economic benefit. It also represents considerable potential for savings on synthetic nitrogen fertilizers.

**How long did it take to implement the practice and which are the measures needed to monitor:** In order to optimally use digestates, the first step is to know the products that will be spread. Indeed, digestates

vary greatly depending on the method of methanization (dry or wet), the inputs and the post-treatments applied. The principle of fertilization balance, applicable to all fertilizers, also applies to digestates. The objective is to ensure that the crop's needs are covered by the soil and by digestates. With this in mind, calculation methods exist and are accessible for example on the site <https://fertiliser-avec-des-digestats.fr/>

## Application process/mode

- **In which form is the BBF applied?** solid
- **How is the BBF applied on the field?** broadcasting

## Logistics

- **Storage safety risk:** substantial
- **Logistic aspects to consider:** Emissions during digestate storage depend on the type of inputs, the residence time of the material in digestion and the storage temperature. Good practices must therefore be implemented to limit GHG emissions during digestate storage, such as covering digestate storage structures with a gas-tight cover, and recovering the residual biogas, which can be recovered. Or, to limit N<sub>2</sub>O and NH<sub>3</sub> emissions, install a crust, a natural floating layer, or a non-watertight cover (in accordance with the ICPE 2021 rules, covers are not mandatory in the case of lagoons if a residence time of 80 days of digestion upstream can be justified).
- **Skill/education level required for safe and effective application of the BBF?** rather low
- **Availability of the BBF in this region:** abundantly available
- **Availability of the BBF in the wider EU:** sufficiently available

## Agronomical traits

- **Is it a 'slow-release' fertiliser?** yes
- **N-P-K composition of the BBF:** "N tot =8-17 kg/tMB - P<sub>2</sub>O<sub>5</sub> = 21-32 kg/tMB - K<sub>2</sub>O= 8-13 kg/t MB"
- **C:N ratio of the BBF:** 11-17
- **Expected availability of nitrogen (N) in the BBF:** similar
- **Expected availability of phosphorus (P) in the BBF:** higher
- **Expected availability of potassium (K) in the BBF:** higher
- **All materials present in the BBF:** digestate
- **Can the BBF be applied to a multitude of cultivation techniques, or is the use limited to one or a few techniques?**
- **Targeted crop categories:** food, feed, fibre, oil, industrial
- **Influence on soil quality:** Depending on their dry matter content and the form of the carbon they contain, digestates modify, like all other organic fertilizers, in comparison with a control without fertilization or with mineral fertilization: the stable organic matter content of the soil, which, due to its lower density than the mineral phase of the soil, contributes by dilution to reduce the apparent density of the soil and therefore the compaction of the soil, and to increase the porosity of the soil; the activity of earthworm communities (as well as the composition of these communities) which, by modifying the clay-humic complex, but also by creating galleries and producing worm castings, contribute to an improvement in the infiltration of water into the soil and structural stability; the activity of microorganisms which, by consuming the labile carbon in

the digestate, produce a variety of molecules (microbial metabolites) which either increase the cohesion between particles and aggregates (this is the case of polysaccharides) or reduce the wettability of aggregates (this is the case of hydrophobic molecules), and consequently improve the structural stability of the soil. However, the reduction in the wettability of aggregates can lead to a reduction in the water retention capacity of the soil; this can be detrimental, particularly in the case of sandy soils.

- **Soil types suitable for the BBF:** 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?** storage, equipment
- **Which costs may decrease upon using the BBF?** mineral or other types of fertilisers
- **Expected long-term/indirect benefits of using the BBF:** Most of the benefits of digestate application concern soil fertility.
- **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:** well-developed
- **Are there any policy barriers complicating the use of the BBF?** If the methanization unit integrates urban sewage sludge, the spreading must also comply with additional constraints specified in the decree of January 8, 1998 (three-year rotation of spreading, thresholds to be respected for the contributions of trace metal elements per hectare and cumulative flows of trace metal elements over 10 years).
- **Does the BBF contain any hazardous substances, and if this is the case, which one(s)?** Digestates may contain metallic trace elements on the inputs used in the composition of the digestate and their proportion (B, Cd, Cu, Mo, Zn, even Ag and Hg for digestates based on inputs such as urban sludge and household waste). It should be noted that in France, concentrations in spread products are subject to regulations.
- **Is the use of the BBF compliant with EU organic farming practices?** Methanation digestates can be used in Organic Agriculture (AB) unless the incoming materials consist of sewage treatment plant sludge and/or from the agri-food industries. The regulations govern this specific agronomic valorization. Bibliographic data and field feedback show that digestates play an interesting role for farms run in organic agriculture showing synergies between methanization and AB.
- **Is the use of the BBF supported by Eco-schemes?** No
- **Expected effect on the leaching of nutrients?**

Risks of nitrate loss through leaching are possible if digestates are used inappropriately. The choice of application period depends on the nitrogen requirements of the crops, the nitrogen content of the product to be applied and the technical possibilities for spreading. Excessive inputs are likely to be lost through leaching during the autumn-winter period. For the same input dose of crude, the “Solid fraction - majority non-ruminant manure” digestates, as well as “Crude or liquid fraction - other situations including majority vegetable” and “Crude or liquid fraction - majority non-ruminant manure” stand out slightly from all digestates, with a slightly larger pool of volatilizable nitrogen.

- **Are there any gaseous emissions to be considered upon using the BBF?** yes: nitrous oxide, yes:

ammonia

- **Greenhouse gas (GHG) reduction potential of the BBF:** little or none
- **All features of the BBF which may hinder its social acceptance:** odor
- **Effects expected on the time occupation of the farmer upon using the BBF?** none
- **May the use of the BBF contribute to a better public image of agriculture?** Methanization currently has a rather negative image in France, which may call into question the use of digestates. The main issue is competition between food crops and energy crops.

## Contact

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**Eu member state:** France

## Find out more

**Source of information:** A range of information on digestates is available on the FertiDig project website (<https://fertiliser-avec-des-digestats.fr/>).