

Activities

- Develop and implement the microfiltration and subsurface drip irrigation.
- Test and evaluate the efficiency and nutrients balance of the solid-liquid separation followed by microfiltration treatment. Moreover, the work evaluates from the agronomical point of view the possibility of using digestate in place of chemical fertilizer, reducing environmental impacts.
- Dissemination, training courses, exchanges knowledge and field visits.

Further details

- € **Total budget:** € 372.047,32
Total financed: € 330.042,59
Main funding source: Rural development 2014-2020 for Operational Groups
Rural Development Programme: 2014IT06RDRP003 Italy - Rural Development Programme (Regional) - Emilia-Romagna
- 🕒 **Ended, 2020 - 2023**
- 📍 **Emilia-Romagna, Italy**
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SOS_AQUAE

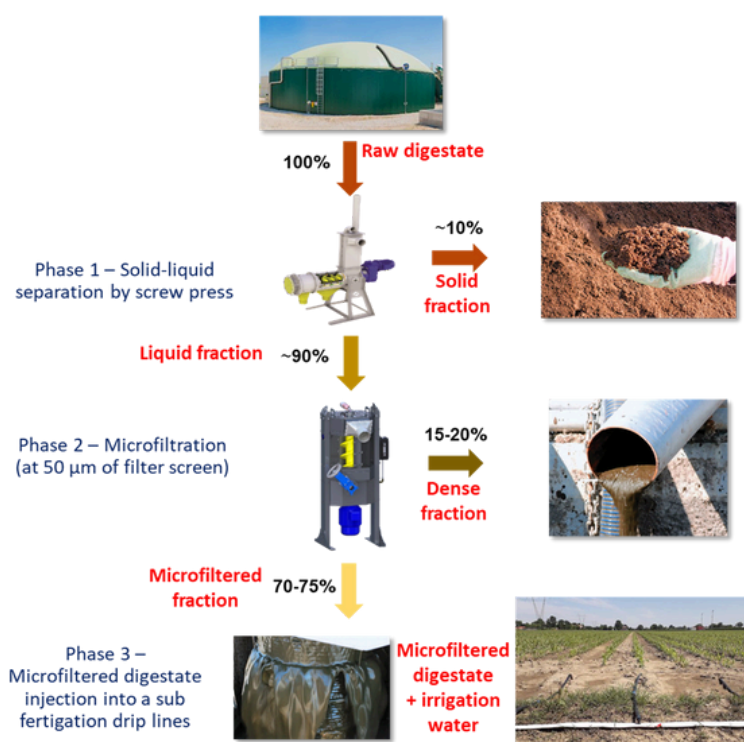
Microfiltered Digestate treatment to Fertigation, an integrated system to improve nutrient upcycling



Objectives

To develop an innovative system to valorize the digestate liquid fraction (the most present and most problematic fraction to be valorised), for maximizing the efficient reuse of nutrients and reducing the use of mineral fertilizers through digestate microfiltration linked to microfiltered digestate injection into a fertigation plant with driplines in sub-irrigation.

Process layout



Results

The digestate undergoes common solid-liquid separation, resulting in a solid fraction and a clarified liquid fraction. The clarified fraction is then microfiltered at 50 µm, thereby producing microfiltered digestate. This is then transferred to the field, mixed with water and injected into a subsurface drip lines irrigation system. The microfiltered fraction does not show particles with a granulometry greater than 100 microns and a solids content by 30% lower than the clarified digestate, while maintaining an excellent supply of nutrients.

The microfiltration avoids the clogging and fouling of the nozzles of the fertigation line.

The application of the digestate through fertigation significantly reduces ammonia, odour emissions and nitrate losses from the soil to the water.

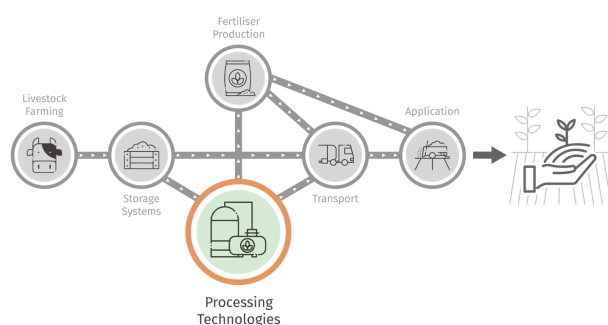
The efficiency of nutrient is significantly increased compared to normal spreading practices and these applications of the digestate on growing crops can reduce the use of mineral fertilizers. Fertigation with drip lines reduces the use of water and energy.

Context

Slurry and digestates are very useful fertilizing materials for agricultural crops as they contain nitrogen, phosphorus, potassium and numerous micronutrients.

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Location in the Nutri-Know value chain



Effective and affordable solutions for manure and digestate recycling, to increase the nutrient use efficiency and reduce the environmental impacts (ammonia and GHG emissions, nitrates leaching from soil to water), are becoming more and more necessary and widespread. This approach contributes to improve sustainability of the farming systems in the frame of circular economy.

The fertigation with digestate from biogas plants, a practice that significantly enhances nutrient use efficiency, is not yet widespread because of chemical-physical characteristics of digestate, even if clarified, that are such as to cause problems of clogging of the nozzles of the fertigation line.

The digestate, if properly filtered, can be used as a fertilizer resource mixed with irrigation water by two techniques: the first, in sub-fertigation with drip lines buried at a depth of 30 cm, the second in fertigation with rangers.



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