This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 689229.

DECISIVE

Press Release

The use of digestate as a source of bioproducts through solid-state fermentation

In the last years, it has been reported an increasing interest to go towards an improved waste management. In this context, one of the most abundant waste are the food wastes. Its management can be assessed either in a decentralized or centralized configuration submitting the wastes to an anaerobic digestion process. The sludge generated after this process, namely digestate, can be valorised into value added products with high industrial and commercial interest through the technology of solid state fermentation (SSF).

The DECISIVE project aims to design a new decentralized waste management in order to make a change on the linear paradigm of waste management to a more sustainable and integrative system that promotes the local production and consumption. In this framework, anaerobic digestion is proposed to be the main process for waste valorisation. The obtained digestate can be further valorised by means of solid state fermentation (SSF), a technology that allows the conversion of the digestate into new valuable products To achieve this goal two scenarios have been proposed for the treatment of the digestate obtained from anaerobic digestion (Figure 1): i) *in situ* treatment (SSF decentralized management) of ii) *ex-situ* treatment (SSF centralized management).

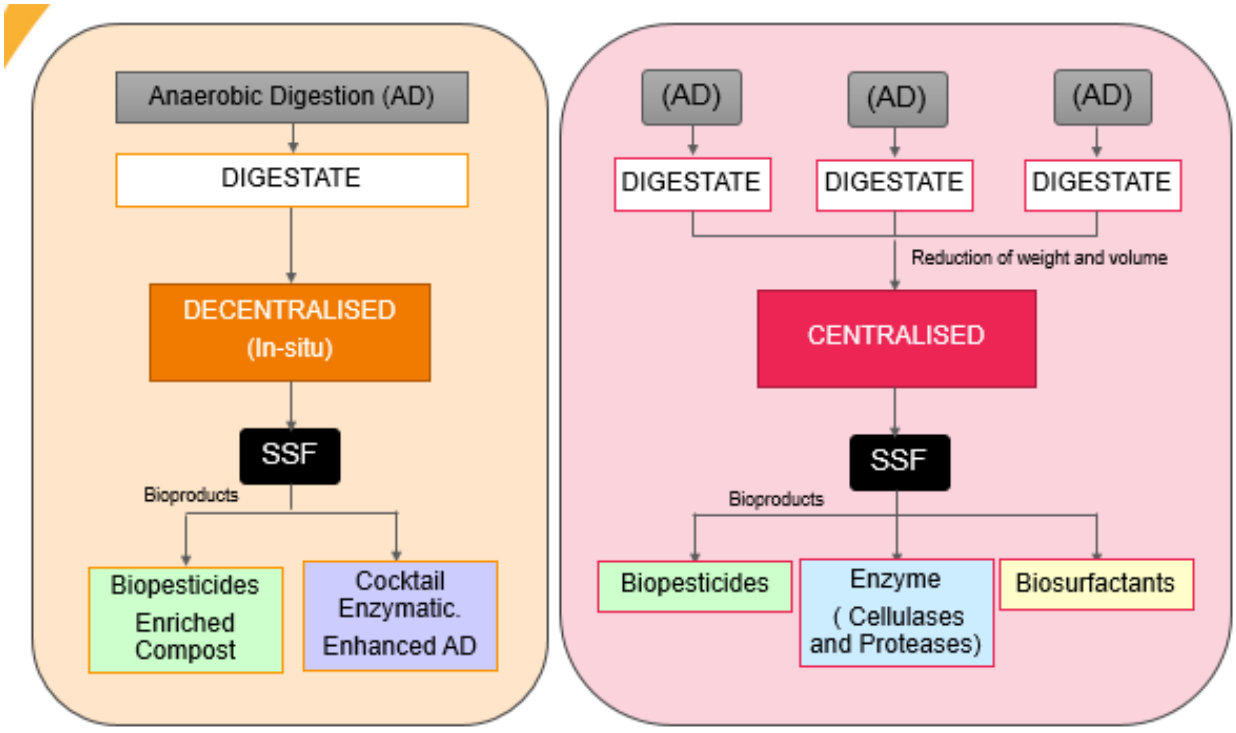

***Figure 1**. Scheme of the possible bioproducts after the anaerobic digestion.*

Depending on the strategy of waste management, the characteristics of the raw material will change, therefore different products could be obtained by SSF. This fermentation process is carried out in

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absence or near absence of free water (Figure 2).

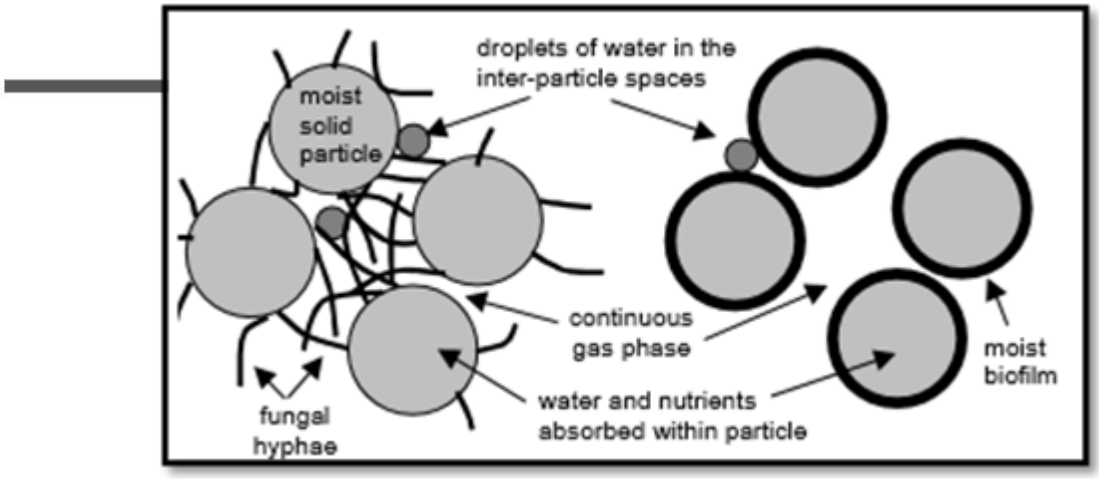

***Figure 2**.SSF Process. A case of a filamentous fungus (left side) and a unicellular microorganism (right side) are shown. Source: Mitchell et al., 2006.*

The SSF process has been extensively studied by the GICOM research group from the Universitat Autònoma de Barcelona for the production of value-added products with high industrial interest. In this project, the products to be explored are biopesticides, hydrolytic enzymes (single component or an enzymatic cocktail) and biosurfactants. These bioproducts can be potentially used in the agriculture or in a near urban sector and have a wide application in different sectors of the industry, especially the agriculture and the energy sectors.

The pesticide production has been studied by incorporating to the digestate a common biopesticide producer*: Bacillus thuringiensis (Bt)*. These trials were successful due to the bacteria was able to grow in the solid hence providing the material biopesticide properties. The latest will be confirmed in further experiments with the application of this compost-like material in a real agricultural soil.

The researchers also assessed the potential of using the digestate as a source for cellulase production in an innovative configuration that allows the continuous production of this enzyme. In this case, digestate can be considered as a suitable substrate for cellulase production despite further optimization of the process is required.

Finally, the results obtained for sophorolipids production showed a low productivity in comparison with the previous results obtained by our group using different substrates. This is likely associated to the composition of the digestate, which includes a low content of fats and sugar.

This first approach to the potential of the digestate as a source of bioproducts has been successfully carried out, achieving acceptable levels of production in all cases. The following steps for study are the optimization of all processes which may include the addition of a co-substrate to improve sophorolipids and cellulase production, the incorporation of overproducing strains to enhance cellulase production and the assessment of these processes at a larger scale, in order to validate the results obtained at lab scale.