Industrial symbiosis to valorise wastewater derived from rendering plants for different industrial applications

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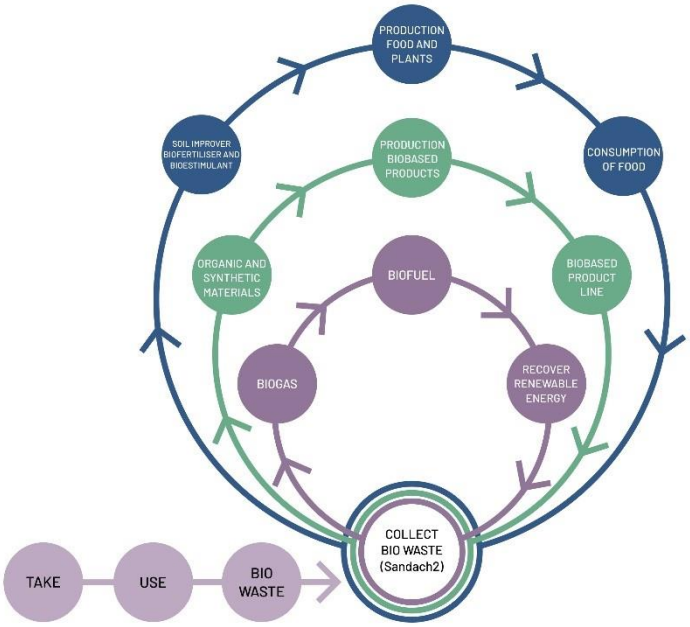

Abstract

High-concentration organic wastewater derived from rendering plants and slaughter-houses plants has a high cost for business and municipalities, mainly because of the high demand of gas, energy and other resources. This is due to the high protein content and the difficulty in treating this type of waste to make it safe for human and animal wellbeing before its discharge.

In this sense, towards a circular bioeconomy, the European LIFE byProtVal project proposes the valorization of this biowaste, specifically the recovery of valuable collagen hydrolysates from high-protein-content processing wastewater that are generated in rendering facilities from category 3 of animal by-products (ABPs).

In addition, as part of an industrial symbiosis, the manager of these wastewaters from category 3 ABP collaborates with a category 2 rendering plant to integrate the recovery of these high-protein waters into its processes to convert these resources and waste streams into value-added products through a biochemical industry that is also part of the project.

For such purpose, this research also focuses on scaling up the process to a TRL-7 project to validate and produce protein recovery for the treatment of by-products and optimise the conditions for validating protein derivatives as biostimulants and biopolymers for leather industry in these demonstration plants with the capacity to recover up to 100 tonnes of protein per year.

In this sense, amino acid free based plant biostimulants have currently raised great interest at European level due to their potential application in sustainable agriculture, as they help to promote plant growth and improve crop productivity, while reducing dependence on chemical and/or inorganic fertilisers and their high environmental impact.

Furthermore, these bio-based products are also a promising approach in reducing the environmental footprint with alternative resources in the chemical industry for leather application enabling the flow of resources between cross-sectoral industries and boosting industrial symbiosis within the valorisation of bio-waste to high-value bio-based products.

The protein recovery is based on a developed enzymatic process that has proved to allow the recovery up to 96% protein present in the wastewater from poultry ABPs category 3 enriching the protein content in the bioproducts obtained and it has shown itself to be a versatile process easily customisable to different kinds of ABPs.

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