

Agrifood waste valorisation for bioplastic composites and high-value chemicals

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Abstract

Linear production is no longer possible in a logic of sustainability and circular economy. An important and emerging alternative is based on Circular Economy and the 4R principles (reduce, reuse, recover and recycle) that should be applied during the entire cycle of production, consumption and return of resources, involving the entire supply chain from production to disposal. In this context we will report recent results achieved within various successful case studies reporting the recovery, recycling, and valorization of biomass to produce high value chemicals (Visco et al., 2022). In particular:

1. From Brewery to Bioplastics: The EU Brewing Industry produces over 39.5 MioL of beer yearly, generating over 6.4 Miot/year of Beer spent grain (BSG), main side-stream of the brewing process. In EU, 20% of BSG is landfilled (1.28 Miot/year). LIFE RESTART is a close to market project which will reuse BSG to substitute Fossil based Plastics for food and non-food packaging, giving adequate answer to some of the most pressing environmental issues related to BSG disposal and non-biodegradable, persistent FbP packaging, tackling relevant social issues (Visco et al. 2022).

2. Production of green biopolymers for leather tanning: a novel class of bio-based polymers is being developed within the recently financed LIFE I'M-TAN project with low chemical hazard, sustainable costs, reduced waste and improved circularity (recycle/re-use of waste) compared to conventional processes. An innovative ultrafiltration/nanofiltration purification process (UF/NF) will be scaled up to separate concentrate purified natural tannins (CPNT) from non-tanning LMWS. The CPNT will then be chemically modified according to green chemistry principles to produce tanning

agents while LMWS will be used as animal feed.

Keywords: Agrifood waste valorization, biopolymer composites, fine chemicals, circular economy, green chemistry

References

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