DIPARTIMENTO DI SCIENZE CHIMICHE

UNIVERSITÀ DEGLI STUDI DI PADOVA

Valuable Chemicals from Biomass Using Green Chemistry Approaches

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Globally, one third of food produced for human consumption is categorised as lost or waste, which equates to 1.3 billion tonnes per annum. Food is considered lost when it is not transferred from the producer to market due to pest infestations or issues during harvesting and food is considered waste when it is removed from the supply chain due to not meeting quality or size specifications based on appearance. Fruits and vegetables have the highest loss and wastage rates at 40-50% of that grown, followed by cereals and fish at approximately 30-35% each and then dairy and meat at 20%. With the loss or waste of food there is also the inefficient use of inputs including water, energy and labour and the production of greenhouse gas emissions. Apart from food, vast quantities of other biomass from agricultural production are often underutilised and provide the feedstocks for biorefineries of the future. It is essential that biomass feedstocks are used to their fullest extent for circular economy efficiencies.

Our approach in finding value in the food and other agricultural waste is to conduct a detailed analysis of what is present in the material. This includes quantifying and extracting the lipids, hemicellulose, cellulose, protein, lignin and dietary fibre. Depending on the substrate, investigation continues into the more highly valued compounds such as pectin, polyphenols, oils and other extractives from biomass components such as the peels and seeds. This presentation will cover a number of examples of recovering such valuable components. In all cases, Green Chemistry principles are applied to develop innovative extraction methods. For some waste streams that are rich in plant essential nutrients, application of the waste back into the agricultural systems is a necessary option to consider.

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