World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:18, No:07, 2024

Valorisation of Food Waste Residue into Sustainable Bioproducts

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Abstract : Globally, more than one-third of all food produced is lost or wasted, equating to 1.3 billion tonnes per year. Around 31.2 million tonnes of food waste are generated across the production, supply, and consumption chain in Australia. Generally, the food waste management processes adopt environmental-friendly and more sustainable approaches such as composting, anerobic digestion and energy implemented technologies. However, unavoidable, and non-recyclable food waste ends up as landfilling and incineration that involve many undesirable impacts and challenges on the environment. A biorefinery approach contributes to a waste-minimising circular economy by converting food and other organic biomass waste into valuable outputs, including feeds, nutrition, fertilisers, and biomaterials. As a solution, Green Eco Technologies has developed a food waste treatment process using WasteMaster system. The system uses charged oxygen and moderate temperatures to convert food waste, without bacteria, additives, or water, into a virtually odour-free, much reduced quantity of reusable residual material. In the context of a biorefinery, the WasteMaster dries and mills food waste into a form suitable for storage or downstream extraction/separation/concentration to create products. The focus of the study is to determine the nutritional composition of WasteMaster processed residue to potential develop aquafeed ingredients. The global aquafeed industry is projected to reach a high value market in future, which has shown high demand for the aquafeed products. Therefore, food waste can be utilized for aquaculture feed development by reducing landfill. This framework will lessen the requirement of raw crops cultivation for aquafeed development and reduce the aquaculture footprint. In the present study, the nutritional elements of processed residue are consistent with the input food waste type, which has shown that the WasteMaster is not affecting the expected nutritional distribution. The macronutrient retention values of protein, lipid, and nitrogen free extract (NFE) are detected >85%, >80%, and >95% respectively. The sensitive food components including omega 3 and omega 6 fatty acids, amino acids, and phenolic compounds have been found intact in each residue material. Preliminary analysis suggests a price comparability with current aquafeed ingredient cost making the economic feasibility. The results suggest high potentiality of aquafeed development as 5 to 10% of the ingredients to replace/partially substitute other less sustainable ingredients across biorefinery setting. Our aim is to improve the sustainability of aquaculture and reduce the environmental impacts of food waste.

Keywords : biorefinery, ffood waste residue, input, wasteMaster
Conference Title : ICFWRTIT 2024 : International Conference on Food Waste Recovery Technologies and Industrial Techniques
Conference Location : Rome, Italy
Conference Dates : July 22-23, 2024