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Editorial: Biowaste valorization utilizing microbial systems

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Editorial on the Research Topic Biowaste valorization utilizing microbial systems

The demand for energy resources and chemicals is continuously increasing around the globe due to the ever-increasing population and industrialization (Sinha et al., 2021; Kang et al., 2023). The use of microbial cell factories is getting attention to valorize waste into valuable products (biofuel, fertilizers, pigments, enzymes, etc.) due to its eco-friendly nature and ability to generate revenue simultaneously (Bohacz et al., 2020; Vinayak et al., 2021; Paul et al., 2023). Optimization of bioprocesses depending on the organisms' nutritional requirement, cultivation conditions, and involvement of cellular metabolic pathways leads to enhanced production of value-added commodities (Bhatia et al., 2023). Microbes also have the potential to decompose complex organic waste into simpler molecules that can be used as fertilizers to improve plant growth and productivity. This Research Topic is focused on the valorization of waste into valuable products utilizing microbial systems and four articles were published (Figure 1).

The first article discusses the use of “mandi” waste to produce carotenoids from oleaginous red yeast *Rhodospiridium* sp. for cancer treatment. The carotenoid extract was composed of β -carotene, torulene, and torularhodin and demonstrated antioxidant, antimicrobial, and anti-breast cancer activities. *In silico* analysis showed good binding energy toward VEGF receptors. Overall the process is sustainable and eco-friendly for carotenoid production from red yeast having anti-breast cancer activities (Sinha et al.).

The second article studied the growth of *Lupinus albus* using an organic fertilizer matrix (ORGAON[®]) made from horticultural waste, with the addition of two bacterial strains (*Bacillus pretiosus* and *Pseudomonas agronomica*). Results revealed that both bacterial strains added individually to the ORGAON[®] and sterile ORGAON[®] (ORGAON[®]st) organic matrix improved certain plant biometric variables. *B. pretiosus* enhanced root weight, total weight, plant length, and the number of secondary roots, while *P. agronomica* improved root length and the number of secondary roots. Genotaxonomic analysis confirmed the suitability of both strains for improving crop yield in fields. Biosafety tests were conducted and yielded positive results (Mora, Fernández Pastrana, Gutiérrez Oliva et al.). The use of chemical fertilizers pollutes soil and groundwater, while agri-food industry waste endangers the environment and human health. To counteract this, natural biofertilizers are made from agricultural waste via microbiological treatments by breaking down the waste into simple molecules. Biosafety is ensured by metagenomic analysis to exclude pathogens. A

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