A058 AGSC

Collection and Conversion of Food Waste for Value-added Bioproducts

Abstract

Each year 2.86 trillion pounds of food is wasted globally. The U.S. alone wastes approximately 200 billion pounds which accounts for $240 billion in revenue loss, 30-40% in supply loss, and

3.3 gigatons of greenhouse gas emissions (GHGs). Most of this wasted food is thrown out by consumers and ends up in landfills which is considered the most (GHG)-intensive option, emitting nearly 400 kg CO2e per tonne of organic waste. A small portion of food waste is recycled through composting and repurposed as animal feed, but with strict regulations of animal feed and minimal benefits of composting, these alternatives are impractical for processing large amounts of waste. Currently, one of the most promising routes for converting food waste into value-added products is through microbial fermentation. However, there are several issues with using food waste as a viable feedstock. Food waste is highly heterogeneous with fluctuating compositions and therefore must be analyzed to determine its potential in sustaining industrial bacterial strains to produce valuable bioproducts. One of these industrial strains, Bacillus licheniformis YNP5-TSU, can produce yields of up to 82% the theoretical maximum of 2,3- butanediol (2,3-BDO) from raw food waste without sterilization. 2,3-BDO is a valuable bioproduct that can be used to create methyl ethyl ketone, diacetyl, polyurethane, or 1,3- butadiene and even potentially a drop-in fuel. In this study, food waste collected from TSU was examined for moisture, ash, protein, fat, fiber, starch, soluble sugars (sucrose, glucose, fructose), and other solids. Results are currently being assessed to determine the potential of this food waste as a feedstock to produce 2,3-BDO.