CHAPTER 4

Biosurfactant production by utilizing waste products of the food industry

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4.1 Introduction

Globally, waste generation and by-products have significant effects on the social, economic, and environmental sectors. The generation of waste is becoming worrisome because of the progressive side effects on human health and the environment. Using these generated wastes in producing valuable products has created novel avenues for environmental sustainability. Growing world population and globalization have enhanced the evolution of complex food supply chains. Food products, especially from agricultural products, generate greater quantities of waste and by-products. More than 50% of fruit by-products, including stems, bagasse, trimmings, peels, shells, seeds, and bran, are obtained from fresh fruits; these by-products contain different functional and nutritional contents (Ayala-Zavala et al., 2011). However, diverse food wastes and by-products are not being used and eventually end up in municipal landfills, where they cause unexplainable danger to the environment.

The use of food waste is associated with significant quantities of carbon sources that are viable substitutes in the production of biosurfactants. Biosurfactants are mobile surface molecules comprising both hydrophobic and hydrophilic components that empower them to assemble at the interface between nonpolar and polar phases; thus, they modify the surface and interface effects and improve the solubilities of polar substances in nonpolar substances and otherwise (Aguirre-Ramírez et al., 2021). Biosurfactants are generally produced from bacteria, filamentous fungi, and yeasts. They are categorized into fatty acids and phospholipids, glycolipids, lipopeptides and lipoproteins, particulate surfactants, and polymeric surfactants (Chen et al., 2015). The ability to minimize the surface tension shows the efficiency of a biosurfactant; an adequate biosurfactant can minimize water surface tension from 72 to 35 mN/m (Santos et al., 2016). Another factor in determining a biosurfactant's efficiency is critical micellular concentration value; an effective biosurfactant will have a value between 10 and 40 times lower than synthetic surfactants (Sharma, 2016).

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