ABSTRACT

Bioplastics are environmentally friendly, biodegradable, biocompatible, and derived from renewable biological resources, often referred to as polyhydroxyalkanaotes (PHAs), which are sustainable substitutes for traditional plastics. Thus, PHAs do not contribute to long-term plastic pollution. The present work focuses on optimizing various physicochemical parameters to maximize the PHA yield using *Bacillus siamensis* and characterizing the extracted biopolymer to understand its physical and chemical properties. In the present work, the maximum PHA productivity was 81.1% (w/w) based on CDW obtained under optimum conditions such as M3 medium, 2.5% glucose as a source of carbon, 1.5% yeast extract as a supply of nitrogen, pH 7, 37°C incubation temperature, 72 hrs. of the incubation period, 1% of sodium gluconate as an additional source of carbon without the presence of sodium chloride (NaCl). Moreover, the successful PHA production and its properties were confirmed through FTIR, TGA, DSC, and SEM. Hence, this study has effectively illustrated the capacity of *Bacillus siamensis* to produce polyhydroxyalkanoates (PHAs) under ideal conditions. Thus, this work has contributed to reducing plastic pollution by creating more effective processes for making biodegradable polymers.