ABSTRACT

The current research deals with the isolation and screening of indigenous bacteria for production, and characterization of polyhydroxybutyrate (PHB) using inexpensive carbon sources. Fifty six bacterial species were isolated from the solid and liquid samples collected from the local area using standard procedure. Different bacterial colonies were collected and then qualitatively screened by Sudan black and Nile blue staining for the detection of PHB. The positive isolates forboth the staining procedure were subjected to biopolymer extraction. Twenty-six bacterial isolateswere subjected to a quantitative screen for PHB synthesis, and the results indicated that G3 hadthe highest yield by utilizing sugarcane bagasse substrate. Out of 56 isolates, the best was the G3strain, which was determined using a combination of morphological, molecular, and biochemical analysis. The analysis revealed that the strain shared 99% of its genetic material with *Bacillus siamensis*. The production of PHB was improved by adjusting a number of physicochemical factors in order to get optimal results. *Bacillus siamensis* showed the maximum PHB production of 56.31% (w/w) on CDW basis under optimum physico-chemical conditions such as M1 medium,pH 6.5, 30ºC, 24 h inoculum age, 2ml inoculum size, 5% sugarcane bagasse substrate, 72h incubation period under absence of nitrogen source. The extraction procedure using sodiumhypochlorite and chloroform was the most efficient. The FTIR spectroscopy adsorption peaks
showed that the recovered biopolymer was PHB. The results of the TGA analysis demonstrated that the PHB polymer that had been isolated was stable at temperatures lower than 246° C. SEM analysis showed the surface features and porosity of extracted PHB. It was determined that agricultural waste might serve as a low-cost carbon source, leading some to believe that it could be used as a substrate in PHB manufacturing. PHB that has been recovered can be used as a suitable
replacement for plastics that are derived from petrochemicals due to the fact that it is both biocompatible and biodegradable.