Glutamic acid independent production of bioflocculants by Bacillus subtilis UPMB13

ABSTRACT

Bacillus subtilis UPMB13 was found to be an L-glutamic acid independent producer of extracellular polymeric substances (EPS) with bioflocculation properties. Optimum production of the bioflocculant was found to be at the early stage of cell propagation of 24–72 h of fermentation. At a limited nutrient input of 100 mL tryptic soy broth, the flocculating activities were found to be negatively correlated ($p < 0.01$) with growth as it continued to decline after 72 h, while cell growth proliferated further. Ample nutrient supply may prolong bioflocculant production with flocculating activities of 90 % and higher, while excess oxygen supply may promote rapid growth that can lead to poor flocculation due to the re-use of the bioflocculant as a substitute for food during starvation. Bioflocculant production occurred at best at 25-30 °C incubation temperature and at the initial pH medium of 7 to 8. The bioflocculant was proven to be extracellularly produced as the broth and the supernatant possessed the ability to flocculate the suspended kaolin particles. Bioflocculant productions by UPMB13 were hereditarily stable among succeeding progenies, hence, proving genetic competency. About 0.90 g of purified bioflocculant were collected from 1 L culture broth of UPMB13 under the optimized fermentation conditions.

Keyword: Extracellular polymeric substance (EPS); Biopolymer; γ-PGA; De-novo; Kaolin assay