Recovery of amylase from mango (Mangifera indica L. cv. Chokanan) waste using organic solvent/salt aqueous two-phase system: a potential low cost source of enzyme and purification method

ABSTRACT

Amylases, which constitute approximately 25-33% of the world enzyme market, are in second place after protease enzymes and have great significance due to their extensive biotechnological applications in food, detergent, pharmaceutical, textile and paper industries. Currently, conventional methods of purification, such as precipitation, chromatography and electrophoresis, are employed to isolate and purify the amylase. These methods are multistep, discontinuous, time and labour consuming. Aqueous two-phase system by integrating of concentration, clarification and initial purification has become a desirable method for the recovery of many biological products. Therefore, in this study, amylase as valuable components for the first time was recovered from mango (Mangifera indica cv. Chokanan) waste using organic solvent aqueous two-phase system. The effectiveness of different parameters, such as type and concentration of alcohol (1-propanol, 2-propanol and ethanol), type of salt (sodium phosphate and ammonium sulphate, sodium citrate), pH and NaCl on the partitioning behaviour of amylase were investigated. The selectivity (S), purification factor (P) and yield (Y%) were investigated in this study as important parameters for the evaluation of the enzyme recovery. The highest partition coefficient (101.2) and selectivity (303.4) for amylase purification value were achieved in an ATPS of 19% (w/w) ethanol, 25% (w/w) sodium phosphate and 5% (w/v) NaCl at pH 7.0. It was demonstrated that amylase from mango peel could be recovered with a yield of 88.4% and a purification factor of 13.3. Therefore, this study proves that alcohol salt aqueous two-phase system can be an inexpensive and effective method for recovery of amylase from plant source.

Keyword: Purification; Amylase; Aqueous two-phase system; Mango; Waste; Yield; Organic solvent; Selectivity; Phosphate; Propanol