Characterization of novel amylase enzyme from mango (Mangifera indica cv. Chokanan) peel

ABSTRACT

Amylase is one of the important industrial enzymes used in different types of industries such as food, detergent, pharmaceutical, pulp and paper. Mango peel could be a potential source of amylase, which has been extracted and purified from mango (Mangifera indica cv. Chokanan) peel using alcohol/salt, aqueous two phase system. In this study, the effect of temperature, pH, metal ions, inhibitors and surfactant agents on amylase activity and stability were investigated. In addition, purity and molecular weight of amylase was determined using sodium dodecyl sulphate gel electrophoresis. Amylase showed the highest activity and stability at 50°C for 20 min after enzyme incubation at different temperatures (20 to 90°C) in interval time. Amylase from mango peel is thermostable because more than 85% of enzyme activity was retained at temperatures of 20-55°C for 20 min. The amylase was incubated at pH 3-10 and the highest enzyme activity was obtained at pH 7.0. The enzyme activity was significantly decreased at pH 3.0 and 10 because of protein denaturation. Molecular weight of amylase from Mangifera indica L. cv. Chokanan was 42 kDa. Activity of amylase was significantly ($p < 0.05$) increased in presence of Ca^{2+} but Zn^{2+} and Cu^{2+} reduced the enzyme activity due to replacing of calcium cation from the binding site of amylase. In addition, the effect on amylase activity was investigated at a concentration of 5 mM. The enzyme was completely deactivated in presence of carbodimine and p-chloromercuribenzoic acid whereas iodoacetamide did not show any significant ($p < 0.05$) effect on amylase activity. Thus, amylase from mango peel with this unique characteristic has potential application in various kind of industries such as food, detergent, pharmaceutical and biotechnological applications.

Keyword: Amylase; Inhibitors; Mango peel; Metal ions; Molecular weight; Optimum pH; Optimum temperature; pH stability; Protein concentration; Temperature stability