Purification and characterisation of thermo-alkaline pectinase enzyme from Hylocereus polyrhizus

ABSTRACT

The thermo-alkaline pectinase enzyme from Hylocereus polyrhizus was purified 232.3-fold with a 73.3 % recovery through ammonium sulphate precipitation, gel filtration, and ion exchange chromatography. Ion exchange chromatography combined with sodium dodecyl sulphate gel electrophoresis (SDS-PAGE) revealed that the enzyme was monomeric with a molecular weight of 34.2 kDa. The pectinase exhibited broad specificity towards polygalacturonic acid, arabinan, oat spelt xylan, and pNP-Ŭ-glucopyranoside. The optimum pH and temperature were 8.0 and 75 °C, respectively. This enzyme was stable over a wide pH range (3.0ï 11.0) and at relatively high temperature (85 °C for 1 h). The Km and Vmax values of pectinase towards polygalacturonic acid were 2.7 mg/ml and 34.30 U/mg proteins, respectively. In addition, the enzyme activity was inhibited by Ni2+, Al3+, and Fe2+ and was increased in the presence of Ca2+ and Mg2+ by 120 and 112 %, respectively. The purified pectinase demonstrated robust stability in response to surfactants and oxidising agents. EDTA, which is a powerful chelating agent, did not exert any significant effect on the enzyme stability. Thus, enzymes with these unique properties may be widely used in different types of industries and biotechnological applications.

Keyword: Hylocereus polyrhizus; Thermo-alkaline pectinase; Purification; Characterisation; Stability; Yield