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Functional expression of raw starch degrading enzyme from laceyella sacchari LP175 in escherichia coli and its application for hydrolysis of dried cassava chips

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The application of raw starch degrading enzyme (RSDE) is currently of interest in various starch processing industries since RSDE could hydrolyse raw starch granules at below gelatinization temperature without the heating process.This could reduces the energy consumption and also reduces the cost of operations. In this work, RSDE produced by Laceyella sacchari LP175, was purified with a 14.7 purification fold and 40.5% yield. The first 15 N-terminal amino acids were sequenced and showed a 100% homology with α-amylase from Laceyella sp. DS3 and Thermoactinomyces vulgaris. The RSDE gene was fuctional annotated with the L. sacchari strain GS1-1 available genome which showed the presence of a putative gene of 1362 bp encoding 453 amino acids. The RSDE gene was amplified from L. sacchari LP175 genomic DNA and cloned for expression in Escherichia coli which showed the highest activity on raw cassava starch at pH 6.5 and a temperature at 50°C. The recombinant LsA175 could hydrolyze raw cassava chips at below gelatinization temperature and showed higher efficiency for hydrolysis of raw cassava chip than commercial α-amylase (Termamyl) at 50°C. These results suggested that the raw starch degrading gene from L. sacchari LP175 could be expressed in E.coli BL21 (DE3), thus providing an alternative choice for enzyme production at an industrial level in terms of reduce the energy consumption, operation cost and also reduce the global environmental problems.

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