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Production of Extracellular Hydrolytic Enzymes by an Obligate Thermophile – *Thermoactinomyces vulgaris*

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Enzymes from thermophiles are thermostable and thus can survive under adverse conditions, hence they are industrially important. The benefits of using thermostable enzymes include faster rate of hydrolysis and reducing risk of contamination. *Thermoactinomyces vulgaris*, being an important obligately thermophilic bacterium, growing optimally at 50-52°C could serve as ideal system for the production of hydrolytic enzymes. Different strains of *T. vulgaris* have been screened for their ability to produce industrially important extracellular hydrolases such as amylase, protease, lipase, xylanase, tannase and pectinase through plate culture assays. The tests for amylase, protease and lipase were found to be positive in the wild-type (1227) and mutant strains (1261 and 1286). Pectinase, tannase and xylanase were found to be absent in all the three strains of *T. vulgaris* tested. Ca^{2+} enhanced the extracellular secretion of amylase in this obligate thermophile.

Keywords: Extracellular enzymes, hydrolases, obligate thermophile, *Thermoactinomyces vulgaris*

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INTRODUCTION

Thermophilic microorganisms grow at high temperature and can be exploited widely in industry. The thermoactinomycetes is monogenic with *Thermoactinomyces vulgaris* as the only species isolated for the first time by Tsilinsky in 1899 from decaying straw and manure. It is a Gram-positive aerobic spore forming obligate thermophile; growing well at 50-52°C by producing flat colonies with entire or filamentous margins resistant to lysozyme.

Thermophiles represent an obvious source of thermostable enzymes thus assuming thermostable proteins as their product (Antranikian 2007, Rasooli 2008). In recent years there has been a great demand for thermostable enzymes in industries. Thermostable enzymes are alternate catalyst which can withstand the often relatively harsh conditions of industrial processing. Thermostable enzymes facilitate faster rate of hydrolysis, higher stability, higher process yield, increased resistance towards organic solvents, a decrease of viscosity of the solution and reducing risk of contamination (Asgher *et al* 2007, Arikan 2008).

The industrial enzymes of microbial origin are in good demand owing to their applications in a wide variety of processes. The majority (~65%) of industrial enzymes are hydrolytic in action and are widely used in the textile, starch, pulp and paper, leather, personal care and detergent industries, the remainder are primarily used in food processing (~25%) or in animal feed supplements (~10%) (Cherry and Fidantsef, 2003).

Thermoactinomyces vulgaris could serve as an ideal model system for the production of hydrolytic enzymes. The present investigation was conducted to screen this thermophile for its ability to produce industrially important enzymes such as amylase, protease, lipase, pectinase, tannase and xylanase through plate culture assays; and to study the effect of Ca^{2+} on the production of a most important extracellular hydrolase (amylase), as this divalent cation has been reported to exhibit growth promontory effect in *T. vulgaris* (Singh and Sinha 1982).

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