



Statistical Optimization and Partial Characterization of Xylanases Produced by *Streptomyces* sp. S1M3I Using Olive Pomace as a Fermentation Substrate

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Abstract

Xylanase production by *Streptomyces* sp. S1M3I was optimized by response surface methodology (RSM), followed by a partial characterization of these enzymes. Olive pomace was used as a substrate for growing *Streptomyces* sp. S1M3I in submerged fermentation. Effects of incubation time, pH, temperature, carbon source, nitrogen source, and inoculum size on xylanase production were studied, through the one-factor-at-a-time method. Then, a 3³-factorial experimental design with RSM and the Box–Behnken design was investigated for the major influence factors. Maximum xylanase production (11.28 U/mL) was obtained when the strain was grown in mineral medium supplemented with 3% (w/v) of olive pomace powder and 0.3% (w/v) of ammonium sulfate, at a pH 7.4 and an incubation temperature of 40 °C. The xylanases in the supernatant degraded all tested substrates, with higher activity for the low-viscosity wheat arabinoxylan substrate. Two xylanases with close molecular masses were detected by zymogram analysis: Xyl-1 and Xyl-2 with molecular masses of 24.14 kDa and 27 kDa, respectively. The optimization of enzyme production parameters of *Streptomyces* sp. S1M3I and the characterization of these enzymes are prerequisites to enhancing xylanase production yield, which is crucial for further biotechnological processes.

Keywords Actinobacteria · Xylanase · Olive pomace · Optimization · Characterization

Introduction

Actinobacteria are a group of gram-positive bacteria [1]. There are some that form branching filaments that resemble the mycelia of unrelated fungi, among which they were originally classified as the actinomycetes [2]. There are a large number of them found in soil, and they play an important role in decomposing the soil and forming humus [2, 3]. *Streptomyces* is the most important genus in this group, being able to produce a large variety

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