

# Bioconversion of Olive Pomace by Submerged Cultivation of *Streptomyces* sp. S1M3I

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Received: 11 August 2016/Revised: 10 April 2017/Accepted: 18 May 2017  
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**Abstract** Olive pomace is an abundant low-cost agro-industrial residue in Mediterranean countries, including Algeria. The aim of the present study was the biotreatment of olive pomace in submerged culture with *Streptomyces* sp. S1M3I in order to produce lignocellulolytic enzymes and to upgrade the nutritional value of olive pomace for incorporating in the livestock feed. The selected strain was cultured on submerged medium

**Significance statement** Olive pomace is a low cost agro-industrial residue. It was used as fermentation substrate for Actinobacteria, in order to produce lignocellulolytic enzymes for industrial applications and also improve its nutritional values, through the production of protein and biodegradation of cell wall constituents, for use in the feeding of livestock.

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based olive pomace at 40 °C for 30 days, and subsequently, the lignocellulolytic activities, the viability of the microorganism and the chemical composition of the resulting substrate, were determined. *Streptomyces* sp. S1M3I exhibited activities, of  $11.2 \pm 0.12$  U/mL for xylanase,  $1.44 \pm 0.02$  U/mL for cellulase and  $1.21 \times 10^{-2}$  U/mL for laccase. A significant ( $p < 0.05$ ) decrease in the hemicellulose, cellulose and lignin content was registered. Maximum of viability ( $2.71 \times 10^9$  cfu/mL) of *Streptomyces* sp. S1M3I was registered on the 7th day, followed by a decline caused by polyphenol release into the culture medium ( $4.37 \pm 0.04\%$ ). However, the total phenolic content in dry matter (DM) during the incubation period remained significantly ( $p < 0.05$ ) stable. An increase in crude protein content with 34.18% and a decrease in total lipid content with 82.23% were registered. The quantities of  $98.03 \pm 4.85$  and  $123 \pm 3.6$  mg/g DM have been obtained, for reducing sugar and total sugar, respectively, after 30 days of incubation. Olive pomace can be valorized by submerged culture of Actinobacteria strains; this can be an interesting alternative for biotechnological processes.

**Keywords** Olive pomace · *Streptomyces* · Lignocellulolytic enzymes · Bioconversion

## Introduction

Cultivation of olive is an important agricultural activity in Algeria. According to the National Agency of Development of Investment (NADI, Algeria), 87,500 tons of olive pomace are produced each year, released directly to the environment. The problem for these industries is the management of these residues because of their pollution in some cases and the costs associated with the treatment necessary for their proper disposal