

Study of the biodegradation of the insecticide thiamethoxam by *Streptomyces* from wastewater treatment plants in Algeria

Boufercha Oumeima ^(1, 2, 3), ***Irina Sousa Moreira*** ⁽⁴⁾, ***Paula Maria Lima Castro*** ⁽⁴⁾,

Boudemagh Allaoueddine ⁽³⁾

⁽¹⁾ *Laboratory of Microbiological Engineering and Application, Department of Microbiology. Faculty of Natural and Life Sciences. University Mentouri Brothers, Constantine- Algeria.*

boufercha.oumeima@yahoo.com

⁽²⁾ *Laboratory of molecular and cellular biology. Department of Microbiology. Faculty of Natural and Life Sciences. University Mentouri Brothers, Constantine- Algeria.*

⁽³⁾ *Department of Microbiology. Faculty of Natural and Life Sciences. University Mentouri Brothers, Constantine- Algeria. boudemgh.allaoueddine@yahoo.fr*

⁽⁴⁾ *Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia. ismoreira@porto.ucp.pt/plcastro@porto.ucp.pt*

Abstract

Thiamethoxam is a neonicotinoid insecticide used to control a wide range of pests in a broad variety of agricultural fields. Thiamethoxam may pose some risk to the environment and the health of living organisms. The objective of this study is to isolate actinomycetes strains able to degrade thiamethoxam. In the present study, three thiamethoxam-degrading actinomycetes, were isolated from the activated sludge of Oued El Athmania wastewater treatment plant (Algeria). On the basis of morphological, physiological and biochemical characteristics, combined with phylogenetic analysis of the 16S rRNA gene, these actinomycetes were affiliated to the genus *Streptomyces*. Evaluation of the degradation of 35 mg/L of thiamethoxam was accomplished in liquid medium. The monitoring of the biodegradation was done by HPLC. The results show that *Streptomyces* sp. OV was able to degrade 84% of thiamethoxam in the presence of 10 mM glucose, while the strains *Streptomyces* sp. OB and *Streptomyces* sp. OH could degrade 78% and 69% of thiamethoxam, respectively, in the presence of 5.9 mM sodium acetate, during 18 days of incubation. Experiments were performed at 30°C, pH 7 and under agitation of 130 rpm. The isolated *Streptomyces* strains are potential candidates to be used for the developed of biotechnological solutions to eliminate this insecticide from contaminated sites.

Keywords: biodegradation, activated sludge, *Streptomyces*, thiamethoxam.

Acknowledgements: This work was supported by National Funds from FCT – Fundação para a Ciência e a Tecnologia through the project UIDB/50016/2020.