

Study of the biodegradation of the insecticide alpha-cypermethrin by indigenous *Actinobacteria* isolated from activated sludge

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.*

⁽⁴⁾ *Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia.*

Abstract

Synthetic pyrethroids such as the insecticide alpha-cypermethrin have been widely used in agriculture to protect fruits and vegetables from various pests. Alpha-cypermethrin has beneficial effects but at the same time is toxic to aquatic life and highly carcinogenic to humans. This product is stable to hydrolysis at neutral pH, is very low soluble in water. It is therefore very likely to accumulate in aquatic ecosystems. Various methods are available to remove alpha-cypermethrin from the environment, but these methods are costly and time consuming. This study focuses on the isolation of indigenous *Actinobacteria* capable of degrading alpha-cypermethrin. The use of microorganisms has received considerable attention as a natural and eco- friendly method. In this study, eight *Actinobacteria* were isolated from the activated sludge sample using two selective isolation media: Olson and Czapeck dox modified. All these isolates were tested for their ability to degrade the target compound on solid media supplemented with 50 mg/l of alpha-cypermethrin. The results obtained indicate three *Actinobacteria* isolates were able to grow on the plates containing alpha-cypermethrin as the only source of carbon at a temperature of 30°C during 7 days of incubation. This is a strong indication on the ability of isolated bacteria for the degradation of the target compound. The molecular identification of these isolates allowed to assign them to the genus *Streptomyces*. This study showed that *Actinobacteria* recovered from activated sludge could be used in the bioremediation of aquatic environments contaminated by this type of pesticides.

Keywords: *Actinobacteria*, alpha-cypermethrin, biodegradation, activated sludge.

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