

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

T4-P4

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## 1-Introduction

Alpha-cypermethrin is widely used against a broad range of insects especially *Lepidoptera*, *Coleoptera*, and *Hemiptera* (1).

Alpha-Cypermethrin is degraded by photochemical and biological processes. Various cypermethrin-degrading microorganisms such as *Pseudomonas* sp. *Micrococcus* sp. CPN1, *Serratia* sp. and *Ochrobactrum lupini* DG-S-01 have been reported (2).

This study focuses on the isolation of indigenous *Actinobacteria* capable of degrading alpha-cypermethrin.

## 2- Methodology

### 1. Isolation of *Actinobacteria*

Activated sludge

Isolation media: Czapeck, Olson

Incubation at 30°C for 21 days

### 2. Selection of tolerant *Actinobacteria*

*Actinobacteria* isolates

MMA+ alpha-cypermethrin (50, 200, 500ppm).

Incubation at 30°C for 21 days.

### 3. Identification of the performing isolate

#### Morphological

Aerial and substrate mycelium, spore, diffusible pigment

#### Molecular

Analysis of the rRNA16S gene

## 3- Analysis & results

### 1. Isolation of *Actinobacteria*

**Table 1:** Number of *Actinobacteria* isolated in each medium.

Medium	Czapeck-dox	Olson
Number of isolates	3	5

### 2. Selection of tolerant *Actinobacteria*

**Table 2:** Actinobacterial isolates able to use alpha-cypermethrin

Actinobacteria strains	MMA+ 50 ppm AC	MMA+ 200 ppm AC	MMA+ 500 ppm AC	MMA	MMA+glucose
5 isolates	-	-	-	-	+
AG	+	+	-	-	+
ML	+/+	-	-	-	+
OF	+	-	-	-	+

**Table 3:** Morphological characterization of isolates

Isolate	Aerial	Substrate	Spore	Pigment
AG	Cream	Dark reddish brown	Yellow	Dark reddish Brown
ML	Greyish to light grey	Brownish to brown	Grey	Dark brown
OF	White brown leathery	Cream to brown	Yellow	Brown

**Table 4:** Molecular identification of the isolates.

Isolate	The closest organisme	Similarity %
AG	<i>Streptomyces gougerotii</i> souche NBRC 13043	100%
ML	<i>Streptomyces collinus</i> strain NBRC 12759	99%
OF	<i>Streptomyces sampsonii</i> strain ATCC 25495	99%

## 6- Conclusion.

-This study showed that *Streptomyces* sp. AG, ML and OF recovered from activated sludge could use 50 ppm of alpha-cypermethrin as sole carbon source.  
 -*Streptomyces* sp.OF showed good tolerance for concentrations 200mg/l .  
 -The use of these strains in the bioremediation of contaminated environments with alpha-cypermethrin seems a very promising ecological alternative and can contribute to minimize the pollution caused by alpha-cypermethrin.

## 7- References

- (1) Diao J, Xu P, Liu D, Lu Y, Zhou Z (2011). Enantiomer-specific toxicity and bioaccumulation of alpha-cypermethrin to earthworm *Eisenia fetida*. *J Hazard Mater* 192: 1072–1078  
 (2) GÜR O, ÖZDAL M, ALGUR O F (2014). Biodegradation of the synthetic pyrethroid insecticide  $\alpha$ -cypermethrin by *Stenotrophomonas maltophilia* OG2. *Turkish Journal of Biology*.

## 8-Acknowledgments and contact

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