



Fayoum University  
Faculty of Science  
Botany Department

# **Biodegradation of some pesticides by different microalgal strains**

By

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## **Approval Sheet**

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This thesis for Ph. D. Degree has been

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# Abstract

## Biodegradation of some pesticides by different microalgal strains

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Chlorpyrifos (CPS) is a highly toxic insecticide to aquatic organisms and one of the commonly used organophosphorus (OP) insecticides in Egypt that are implicated in dangerous environmental and human health disturbs. In the present study, three microalgal strains (*Anabaena oryzae*, *Nostoc muscorum* and *Chlorella vulgaris*) were used to remove CPS from contaminated wastewater. Treatment of algal strains with different concentrations of CPS increase chlorophyll (a), total carbohydrate and protein content at lower concentrations (0.2 and 20 ppm) while the higher concentrations (50, 100 and 200 ppm) reduced them. The algal cultures were further subjected to grow under P-limitation in absence and presence of CPS. The growth and phosphorus content under P-limitation registered a very poor level. When the P-restricted medium was supplemented with CPS, the algal growth and phosphorus content of cells were increased significantly. Treatment of the tested strains with various concentrations of CPS gave a remarkable response in osmolytes and antioxidant enzymes where phenols, free proline content, catalase, peroxidase and superoxide dismutase activities were extremely significantly enhanced with increasing the concentration of CPS. Results of GC-MS showed that the examined strains has the

ability to degrade CPS to compounds with lower toxicity and its main toxic metabolites 3, 5, 6-trichloro-2-pyridinol (TCP) and CPS-Oxon (CPO) were not detected in filtrate of all tested algae. Morphological changes such as pigmentations increase in the number of heterocysts and alteration in the size of vegetative cells were observed. The ability to survive at high concentration of CPS and enhanced degradation make this isolates an ideal and effective candidates for its application in such harmful chemicals bioremediation.

**Keywords:** Chlorpyrifos, Microalgal strains, Biodegradation, Phosphorous limitation, Antioxidant enzymes.