

## Summary

This current study included the isolation, identification, purification and cultivation of three species of blue-green algae from the soil of Basra and Maysan Governorate /Southern Iraq, represented by *Aphanothece clathrata*, *Microcystis flos-aque*, and *Oscillatoria pseudogeminata*. The study was the first of its kind in isolation, purification and cultivation of blue-green algae from the soil and measuring their susceptibility to the production of microcystins. The growth curve of the three isolated and purified species was measured after their cultivation in the liquid medium (BG-11). The growth constant (k), which measured 0.211, 0.175, and 0.144 and generation time (G), which reached 1.425, 1.718 and 2.09 day for algal species respectively.

Hepatotoxins (Microcystins) were purified from the three algal species isolated and purified during the current study and diagnosed quantitatively and qualitatively by Enzyme Linked Immuno Sorbent Assay (ELISA). The filamentous alga *O. pseudogeminata* showed higher susceptibility to produce hepatotoxins (microcystins) produce of 1.47  $\mu\text{g} / \text{L}$  per 50 mg of weight of alga, then *Microcystis flos-aque* of 0.734  $\mu\text{g} / \text{L}$  ,While *A. clathrata* was found to be the lowest production of microcystins reach 0.324  $\mu\text{g} / \text{L} / 50$  mg dry weight compared with the previous two species. And the diagnosis and ability of this species to produce this toxin is considered the first of its kind locally and globally.

The present study was concerned with the effect purified microcystins on the seeds germination of the tomato plant *Lycopersicon esculentum* at different concentrations, in addition to the effect of these toxins on some of the morphological and physiological characteristics of the plant after two month of cultivation and growing in laboratory.

Tomato seeds were treated with different concentrations of purified MCs from *O. pseudogeminata* for seven days, with concentrations of 0.5, 3 and 6  $\mu\text{g} / \text{L}$ , in addition to the control group treated with distilled water. The germination percentage was 0% on the first and second day under highest concentration of 3 and 6  $\mu\text{g} / \text{L}$  compared to control group and concentration 0.5  $\mu\text{g} / \text{L}$  of 26.6%,While on the third day of exposure to hepatotoxicity, germination percentage decreased to 3.3% at 6  $\mu\text{g} / \text{L}$  compared to the control group which

reached germination where 83.3% .Then the increasing period of exposure to purified hepatotoxins MCs increase the germination percentage starting Where germination percentage reach 100% for all treatments, except the seeds which exposed to 6 µg/L / of purified microcystins which was 86.6%. The results showed a significant decrease  $p \leq 0.05$  in the rate of germination speed, the rate of length of the root and the feather and their weight wet and dry with increased concentration of purified microcystins.

The two-month-old tomato plant was treated with different concentrations of purified microcystins for 24 days. The concentrations of 0.5, 3 and 6 µg / L were extracted from the *O.pseudogeminata* . It was found that the highest concentration and accumulation of these toxins was found in the group plants treated with 6 µg /L (12.27 µ/L) in all plant body (Whole plant).With a daily accumulation rate of 0.511 µg/L The highest rate of accumulation of toxins was observed in the parts of the plants of the treated group at a concentration of 6 µg/L was as follow : the highest concentrations found in the roots (an average 4.818 µ/L)followed by the stem with a concentration of 4.091 µg/L , Finally le leaves (with a concentration 3.369 µg/L. In the plants group treated with 3 µg/L, the whole plant concentration of toxins was 3.856 µg/L with daily accumulation rate of 0.16 µg/L. The accumulation of microcystins was reached 1.717 µg/Lin the root, 1.499 µg / L in the stem and 0.640 µg / L in the leaves. While the lowest concentrations of accumulated microcystins were found in the plant group treated with 0.5 µg / L. A total of 1.670 µg / L and with the daily accumulation rate of microcystins was 0.0.69 µg / L ,Where the highest concentrations of microcystins 0.687 µg / L in the root, followed by the stem at a concentration of 0.558 µg / L and then the leaves at a concentration of 0.425 µg / L. Where the plant increases its ability to accumulate those toxins in the tissues when compared to the control group and the roots and stems are the most accumulated of hepatic toxins from the leaves in all groups exposed to those toxins.

The results showed that the treatment of the tomato plant with the above concentrations of purified microcystins was cause a decrease significant changes  $p \leq 0.05$  in the vegetative growth indicators were the decrease in the rate of height of tomato plant , length of stems ,diameter and root length , surface area of leaves and wet and dry weights, which appeared clearly in tomato plant at when exposed to purified microcystins , which was inversely proportional to the concentration of

these toxins in addition to some morphological changes, as the color of pale green Chlorosis on the leaves of tomato plant, which was exposed to increased concentrations of microcystins, and the results of the study showed significant decrease  $p \leq 0.05$  in total chlorophyll and total carbohydrate concentration by increasing exposure to increased concentration of purified hepatotoxins (MCs).



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**Evaluation of some Blue-green alga species isolated  
from soil - Southern Iraq to produce hepatotoxins  
(Microcystins) and effects of alga *Oscillatoria  
pseudogeminata* on growth of tomato plant  
*Lycoperscon esculentum* Mill**

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