HAZARD APPLICATION OF TWO COMMON INSECTICIDES (LARVIN AND SEVIN) ON THE GROWTH, METABOLIC ACTIVITY AND NITROGEN FIXING CAPACITY OF CYANOBACTERIA.

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Abstract

Two soil cyanobacterial species were used to investigate the factors affecting the toxicity of two common used insecticides, larvin (Dimethyl N,N-thiobis (methyl amino carbonyloxy)-bis-(ethanimidothioate) and sevin (1-Naphthyl N-methylcarbamate) to soil microflora. The heterocystic filamentous Anabaena subtropica Gardner and Anabaena variabilis Kützing ex. Born. et Flah., were exposed to four concentrations (5, 15, 20 and 40 mg L\(^{-1}\)) of larvin and sevin. Differential growth effects were observed among the two cyanobacterial species exposed to all insecticides concentrations. Selected properties of the test cyanobacteria (chl a, dry weight, O\(_2\) evolution, nitrogenase activity, total soluble proteins, total lipids and fatty acid contents of the total lipids) were measured and examined for their relationship to larvin and sevin sensitivity. Strong inhibiting percentages in all measured parameters in both Anabaena species under the different pesticides concentrations of larvin and sevin except the total lipids were recorded, suggesting that these attributes to the potential hazard of these insecticides to soil microflora and subsequently natural ecosystems.

Key words: Anabaena Larvin Sevin Hazard evaluation.

Introduction.

Soil is a dynamic system in which the physical, chemical and biotic components are in a state of equilibrium. Application of insecticides without taking care of the other soil constituents, disturb this equilibrium which adversely affects the productivity of the soil. Maintenance of the soil biota other than the harmful pests help in better crop nutrient management and maintenance of soil health while working in perfect harmony with the nature. Insecticides frequently exert inhibitory or stimulatory effects on the growth or other activities of microorganisms, either in pure culture or in the field. Few works on pesticides distributions, types, toxicity, mechanism of actions, degradations, their tolerance by the organisms and other phytoecological processes were reviewed and summarised. Ramachandran et al., (1980) and Ghosh & Saha (1988) suggesting that some pesticides actually are highly phytotoxic, such as carbaryl. The toxicity of carbaryl was studied also by Peterson et al., (1994) and Fletcher, (1990). Blue-green algae, specially the nitrogen-fixers cyanobacteria represents the major microorganisms which contribute soil fertility. These organisms play an important role in this system by providing a steady input of fixed nitrogen (Roger et al., 1986). Also, cyanobacteria have been assumed to produce growth promoting substances like hormones, vitamins, amino acids or many other components that enhances germination (Singh & Trehan, 1973; Griceo and Desrochers, 1978; de Carle et al., 1997; Rodgers et al., 1979; Venkataraman, 1981; de Mule et al., 1999; Godd et al., 1999 and Omar, 2000). Most of the soil and aquatic microscopic algae are sensitive to insecticides due to the fact that algae are engaged in photosynthesis and that many insecticides interfere with the process. It is of particular
interest to mention that algae participate activity in the binding and neutralizing of xenobiotics (Jampuni, 1989 and Baeza-squiban et al., 1990).

In Egypt, larvin (Thiodicarb) and sevin (Carbaryl) are the major applied insecticides to get rid of bollworms and other cotton pests. Higher concentrations of these pesticides were applied in different types of soil and water bodies. These insecticides had adverse effects on long term soil fertility, soil productivity, environmental quality and aquatic environment.

The present study was conducted to evaluate the hazard presented by these insecticides to the non target organisms specially cyanobacteria which considered as a major component of soil contents. The insecticides tested were selected on the basis of recommendations of Ministry of Agriculture and land Reclamation, for the integrated control of cotton bollworms. The common and trade names, and the prescribed field applications rates are given in Table (1).

Table (1). Details of insecticides used in the experiment.

<table>
<thead>
<tr>
<th>Common name</th>
<th>Trade name</th>
<th>Chemical name</th>
<th>Dosage* (Fidan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbaryl</td>
<td>Sevin</td>
<td>1-Naphthyl N-methylcarbamate.</td>
<td>1500 gm</td>
</tr>
<tr>
<td>Thiodicarb</td>
<td>Larvin</td>
<td>Dimethyl N, N- [thiobis (methyl amino carbonyloxy)]- bis-(ethanimidothioate).</td>
<td>460 gm</td>
</tr>
</tbody>
</table>


Materials and Methods.

Cyanobacterial isolates. Two cyanobacterial species were isolated from cotton fields. *Anabaena subtropica* Gardner and *Anabaena variabilis* Kützing ex. Born. et Flah.

Purification of algal isolates was carried out primarily by repeated culturing and subculturing on Allen’s medium (1968 modification of Hugue’s Gorhan and Zehnder’s, 1958) until they were obtained final on pure unialgal cultures, which were then identified according Prescott (1951,1969 & 1978). The pure isolates of algae were inoculated in 100 ml sterilized liquid Allen’s medium having the same components as solid media contained in 250 ml conical flasks. These cultures were then left to grow under 27±2°C and light intensity of 3000 Lux through light-dark cycle of 16-8 hrs respectively during the growth time, with optimum growth time 10 days.

Chemicals tested. Two common used insecticides, larvin (Dimethyl N,N-[thiobis (methyl amino carbonyloxy)]-bis-(ethanimidothioate) and sevin (1-Naphthyl N-methylcarbamate) (kindly supplied from Agricultural Research center, Ministry of Agriculture, Egypt) were used in this investigation. Both insecticides were prepared in stock solutions and added aseptically to the culture media to the final concentrations indicated for each treatment. The applied insecticides concentrations were 5,15,20 & 40 mg L⁻¹.

Measurement of treated algal growth.

Chlorophyll a estimation. Chlorophyll a was estimated by the method of Strickland and Person (1972).
Dry weight determination. At the end of 10 days (logarithmic growth phase) the culture masses were separated from their media by suction filtration then dried at 90 °C many times till a constant weight was attained.

Oxygen evolution determination. Photosynthetic oxygen evolution was polarographically determined by following the changes in O₂ concentrations in the medium with a calibrated Clark type oxygen electrode (Oono and Murata 1984). Three ml aliquots of cell suspensions, with a mass density of 0.1mg/ml, were placed in temperature controlled cuvette and illuminated with a quantum flux density of 300 μEm²s⁻¹.

The Metabolic analyses.

All the following parameters were estimated at sharp logarithmic phase (10 days old culture)

1. Measurement of Nitrogenase activity (acetylene reduction method). The cultures were grown without nitrogen source for estimation of the nitrogen fixation ability of the two studied cyanobacteria using acetylene reduction technique of Stewart et al. (19971).

2. Total soluble proteins. This was carried out according to the method of Lowery et al., (1951), using bovine serum albumin as a standard protein.

3. Total lipid content. A quantitative determination of total cellular lipids using dichromate reduction method (Kochert’s, 1978) was conducted.

4. Fatty acid content of total lipids. The effect of larvin on the composition and quantity of fatty acids of the total lipids were examined in Anabaena variabilis Kützing ex Born. et Flah. Cells. Replicate samples were harvested from control and treated cultures and separated from the growth medium by centrifugation. Prior to this step, subsamples were taken for cell enumeration and mass measurements. Using a vortex mixer, cells were rinsed three times with 10 mL of fresh growth medium to remove any loose surface material (i.e., gelatinous exogenous material). Extraction and purification of total lipids followed modifications to established procedures (Caux, 1989; Bligh and Dyer, 1959 and Kates, 1972). After the rinse, total lipids were extracted by adding 8.0 mL methanol-chloroform-0.2 M hydrochloric acid solution (2:1:0.8 v/v/v), sonicating for 10 min, and leaving the suspension undisturbed at 22°C for 1 h. The suspension was then centrifuged (700 r.p.m for 10 min). The extraction procedure was repeated once on the debris pellet and the supernatants combined. Water and nonlipid contaminants were removed through a two-phase purification step. Chloroform (2.0 mL) and bidistilled water (2.0mL) were added to the combined supernatants to obtain a methanol to chloroform to water ratio of 1:1:0.9 (v/v/v). The mixture was agitated with a vortex and centrifuged (700 r.p.m for 10 min). The chloroform phase (bottom layer) was carefully removed with a Pasteur pipette and neutralized to pH 7.0 with 0.3 M NH₄OH in methanol. The purified lipids were concentrated under N₂, resuspended in chloroform (2.0 mL) and transferred to teflon-capped glass vials (4.0 mL) and stored under N₂ in the freezer. Total lipids were then transesterified and methylated (Metcalfe et al., 1966) and the fatty acid methyl esters (FAME) were quantified by gas chromatography following an internal standard procedure (Grenier, et al.,1979) using methylheptadecanoate. A Hewlett Packard model 5880 gas chromatograph equipped with a hydrogen flame ionization detector was employed. FAME extracts were injected directly into a 2
mm i.d. glass column packed with Supelco GP SP-2330 on 100/120 Chromosorb WAW. Oven temperature was maintained at 175°C. The injection port and detector temperatures were 210 and 240°C, respectively. Peak areas were determined using a Hewlett Packard digital integrato model 5880A.

**Results and discussion**

Growth of *Anabaena subtroica* Gardner and *Anabaena variabilis* Kützing ex. Born. et Flah as monitored by estimation of chl a and dry weight contents was inhibited by addition of larvin and sevin to the cultures. The data recorded in Fig. 1 showed the effect of larvin and sevin on chl. a content of cyanobacterium *Anabaena subtroica* Gardner. It is clear that a progressive inhibition in percentages of chl. a were observed with increasing of larvin & sevin concentrations. Where, the highest inhibition percentages of chl. a (70 & 74 %) of the studied cyanobacterium were recorded at concentration of 40 mg L⁻¹ for both larvin and sevin respectively after 20 days of treatment. Similarly, the data given in Fig (2) indicated that the treatment of *Anabaena variabilis* Kützing ex. Born. et Flah. with low concentration of both larvin and sevin (5mg L⁻¹) caused a moderately depression in its chl. a biosynthesis (20 & 11 %) after 20 days of treatment, respectively. Further increase of larvin concentrations (15 & 20 mg L⁻¹) highly suppressed chl. a values in treated *Anabaena variabilis* Kützing ex. Born. et Flah to 45 & 63 % after 20 days respectively. Also, application of 10 & 20 mg L⁻¹ of sevin in the nutrient medium of *Anabaena variabilis* Kützing ex. Born. et Flah. led to a gradual inhibition in chl. a contents (41 & 49 %) after 20 days, respectively comparable with corresponding control. Furthermore, the inhibition percentages of chl.a linearly increased (75 & 71 %) with increasing of larvin and sevin concentrations (40 mg L⁻¹) respectively. These results are in harmony with findings of Shabana (1991). She found that, growth, dry weight and the total soluble carbohydrates of *Anabaena oryzae* and *Aulosira fertilissima* were significantly decreased by application of Parathion pesticide. Also, similar results were previously recorded by Saugh, et al., (1983). They reported that, Thiocarbamate benthic carb was inhibiting for of growth of *Nostoc linckia*. In addition, they recorded a reduction in heterocyst formation at all studied insecticides concentrations it was found that, the heterocyst differentiation in both studied cyanobacteria is completely ceased.

![Fig.1. Inhibition percentage of chl a contents of Anabaena subtroica Gardner treated by different conc. of Larvin (5-40 mgL⁻¹) (A) and Sevin (5-40 mgL⁻¹) (B).](image-url)
Hazard application of two common insecticides on the growth, metabolic activity and nitrogen fixing capacity of cyanobacteria 

Fig. 2. Inhibition percentage of chl a contents of *Anabaena variabilis* Kützing ex. Born. et Flah treated by different conc. of larvin (5-40 mgL⁻¹) (A) and Sevin (5-40 mgL⁻¹) (B).

Fig. 3. Dry weight contents of *Anabaena subtropica* Gardner treated by different conc. of larvin (5-40 mgL⁻¹) (A) and Sevin (5-40 mgL⁻¹) (B).

Fig. 4. Dry weight contents of *Anabaena variabilis* Kützing ex. Born. et Flah treated by different conc. of larvin (5-40 mgL⁻¹) (A) and Sevin (5-40 mgL⁻¹) (B).

A gradual inhibitions of dry weight of *Anabaena subtropica* Gardner were observed with increasing of the two studied insecticides (Fig. 3). Accordingly, increasing larvin and sevin concentrations to 5, 10 & 20 mg L⁻¹ caused high reduction in (70, 84 &
92 %) and (70, 84 & 90 %), respectively comparable with the control. In addition, the results given in Fig. 4 revealed that 40 mg L⁻¹ of both larvin & sevin caused high inhibition of dry weight of the treated Anabaena variabilis Kützing ex. Born. et Flah. to 93 & 92.7 %, respectively, after 20 days comparing with controls. Successive concentrations of larvin & sevin (5, 10 & 20 mg L⁻¹) recorded a drastic inhibition ratios (61.6, 80.6 & 80 %) and (44, 71 & 90.3 %) in dry weights of the cyanobacterium Anabaena variabilis Kützing ex. Born. et Flah. Respectively. (Fig 4). In this respect, Ramachandran et al., (1980) reported that, the growth of the marine diatom, Coscinodiscus concentricus was inhibited by 46% when exposed to only 0.05 mg L⁻¹ carbaryl. They suggested that carbaryl may actually be highly phytotoxic to certain plants (Ghosh & Saha, 1988).

The interference of larvin and sevin with growth and chl a was further clarified by testing the insecticides effects at different concentrations on the photosynthetic electron flow (Fig. 5). The photosynthetic activity in both Anabaena species measured as O₂-evolution showed marked inhibition at all insecticides concentrations used (5, 10, 20 & 40 mg L⁻¹).

![Graphs showing inhibition in O₂-evolution](image)

**Fig 5.** The rate of photosynthetic O₂-evolution in *Anabaena subtroupsica* Gardner (—+) and *Anabaena variabilis Kützing* ex. Born. et Flah. (—A-) treated by different conc. of larvin (5–40 mgL⁻¹) (A) and sevin (5–40 mgL⁻¹) (B).

The reduction in O₂ evolution rate reached approximately 60 and 65% in *Anabaena subtroupsica* Gardner and *Anabaena variabilis Kützing* ex. Born. et Flah at 10 mg L⁻¹ of larvin and 58 and 75% in *Anabaena subtroupsica* Gardner and *Anabaena variabilis Kützing* ex. Born. et Flah at 10 mg L⁻¹ of sevin, respectively. Where the inhibition percentages were progressively increased with increasing of insecticides concentration in all treatments.

The results showed more or less similar pattern of change in a photosynthetic response to O₂ evolution as in growth in response to insecticides treatment. Singh et al., (1983) showed that low concentrations of benthiocarb induced a reduction in oxygen evolution in *Nostoc linckia*.

Nitrogen fixation by cyanobacteria, is an important source of nitrogen input in the nitrogen cycle of cultivated soils and could limit pollution problems by lowering the demand for chemical fertilizers (Quesada et al., 1997). Nitrogenase activities in both experimental cyanobacteria were found to be affected by both larvin and sevin. These insecticides inhibit the enzyme action, not only at higher doses, but also on the lower doses (Fig. 6 A and B). A gradual suppression in nitrogenase activity by increasing of larvin concentration could be observed. The obtained results indicated that increasing of
sevin concentration (5, 10 & 20 mg L\(^{-1}\)) led to significant inhibitions of nitrogenase activity values of *Anabaena subtropica* Gardner (Fig. 6-A) and of *Anabaena variabilis* Kützing ex. Born. et Flah. (Fig. 6-B).

![Graph A](image)

![Graph B](image)

Fig. 6. Nitrogenase activity of *Anabaena subtropica* Gardner, and *Anabaena variabilis* Kützing ex. Born. et Flah. affected by larva (A) and sevin (B) treatments. (Data were recorded at sharp logarithmic phase).

The nitrogen fixation process depends mainly on an equilibrium between CO\(_2\) & O\(_2\) gases. This ratio is specific but generally under high O\(_2\) – tension inhibition of acetylene reduction occurred (Stewart & Pearson, 1970). These ratios of CO\(_2\) / O\(_2\) are controlled by respiration and photosynthesis processes (Léx *et al.*, 1972). The dependence of nitrogen fixation process on photosynthesis comprises also, the carbon skeleton, ATP.
and hydrogen donor (Wolk, 1968). It may be suggested that the inhibition of Nitrogenase-activity by larvin and sevin application in the tested blue green species, as well as, the instability for sometimes in the patterns of aerobic & anaerobic inhibitions, may be attributed to the effect of larvin and sevin on the size of the pool of reduction, which the photosynthetic products provide. It may alter the ratios between CO₂ & O₂ during photosynthesis and photorespiration. The rate of inhibition and its severity depends on the organisms under test and concentration of the pesticides.

Kobbia and EL-Sharony (1985) reported that, Nitrogenase activity was inhibited in three blue-green algae by treatment with 2,4-D herbicide. In addition, the reduction in nitrogenase activity could be attributed to inhibition in protein synthesis by applied insecticides (Singh, et al., 1983).

Data presented in Table 2 indicated that total soluble proteins were gradually inhibited by increasing larvin and sevin doses. At low dose (5 mg L⁻¹) of larvin and sevin, the total soluble proteins of Anabaena subtropaica Gardner were reduced by 45.2 and 33 %, respectively as compared with control. Increasing the doses to 10 and 20 mg L⁻¹ of larvin and sevin lead to high inhibitory levels in total soluble proteins of Anabaena subtropaica Gardner to 81.3 & 93.7 % for larvin and 75.4 & 86.2 % for sevin. Moreover, at the highest dose (40 mg L⁻¹) of both larvin and sevin, the total soluble proteins were ceased (97.7 & 91.8%) respectively, comparing with the control.

Table 2. Effect of larvin and sevin treatments on total soluble protein contents (mg g⁻¹ dry algae) of Anabaena subtilica Gardner & Anabaena variabilis Kützing ex. Born. et Flah. (Data were recorded at sharp logarithmic phase).

<table>
<thead>
<tr>
<th>Insecticide concentration (mgL⁻¹)</th>
<th>Total soluble proteins (mg g⁻¹ dry algae).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anabaena subtilica Gardner</td>
</tr>
<tr>
<td></td>
<td>Anabaena variabilis Kützing ex. Born. et Flah</td>
</tr>
<tr>
<td>Control</td>
<td>99.20 ± 3.0</td>
</tr>
<tr>
<td>Larvin</td>
<td>54.30 ± 3.5</td>
</tr>
<tr>
<td>10</td>
<td>18.50 ± 2.0</td>
</tr>
<tr>
<td>20</td>
<td>06.21 ± 0.5</td>
</tr>
<tr>
<td>40</td>
<td>02.30 ± 0.6</td>
</tr>
<tr>
<td>Sevin</td>
<td>66.50 ± 3.0</td>
</tr>
<tr>
<td>10</td>
<td>24.37 ± 2.2</td>
</tr>
<tr>
<td>20</td>
<td>13.60 ± 1.3</td>
</tr>
<tr>
<td>40</td>
<td>08.12 ± 1.1</td>
</tr>
</tbody>
</table>

Values, expressed on a dry mass basis, and presented as the mean ±SD of three replicates.

Similarly, estimation of the total soluble proteins of Anabaena variabilis Kützing ex. Born. et Flah, after treatments by larvin and sevin (40 mg L⁻¹) showed a pronounced declines representing percentages of 93.6 and 86.7 % (Table 2). Protein synthesis was progressively inhibited by insecticides treatments, a phenomenon which was correlated with the inhibition of nitrogen fixation process (Awad, 1978, Bottomley and Stewart, 1977). These results in agreement with Flectcher, (1990), Ramachandran et al., (1980) and Peterson et al., (1994) who found that, the inhibition in growth of cyanobacteria at low concentrations of some pesticides may be due to their toxic effects or their degradation products on the algal cells. This suggestion was in
agreement with Singh et al., (1983) & Pipe (1992) who classified carbamates as protein synthesis inhibitors and Fletcher (1990) who found that, carbamates have inhibitory effects on the basic metabolic processes common throughout the plant kingdom. Several studies were applied in this respect to estimate the hazard effects of these chemicals on non target microorganisms.

The all measured parameters were coincided except the total lipids which exhibit stimulating effects with increasing of the studied insecticides concentrations. Data in Table 3 revealed that the total lipid content of Anabaena subtropona Gardner were slightly inhibited at low concentrations (5 mg L⁻¹) of the two studied insecticides. However by increasing larvin and sevin concentrations (10, 20 & 40 mg L⁻¹) exhibited a stimulatory effect on total lipid contents of Anabaena subtropona Gardner. It reached 36, 77.7, & 77.5 % with treatment by larvin and 19.8, 59 & 61 % with treatment by sevin respectively.

Similarly, the total lipid contents of Anabaena variabilis Kützing ex. Born et Flah increased with increasing of larvin & sevin concentrations (Table 3). It reached 30.4, 85.5 & 81.3 % with treatment by 10, 20 & 40 mg L⁻¹ of larvin and 29, 51.4 & 49.5 % with treatment by 10, 20 & 40 mg L⁻¹ of sevin, respectively.

A similar patterns were observed for the total lipid contents of both organisms. treated with larvin and sevin, so, the fatty acids contents of only one of the two studied cyanobacteria (Anabaena variabilis Kützing ex. Born. et Flah.) was determined as the fatty acids of total lipids.

**Table 3. Effect of larvin and sevin treatments on total lipids contents (μg mg⁻¹ algae) of Anabaena subtropona Gardner & Anabaena variabilis Kützing ex. Born. et Flah. (Data were recorded at sharp logarithmic phase).**

<table>
<thead>
<tr>
<th>Insecticide concentration (mgL⁻¹)</th>
<th>Total lipid (μg mg⁻¹ algae)</th>
<th>Anabaena subtropona Gardner</th>
<th>Anabaena variabilis Kützing ex. Born. et Flah</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>41.4 ± 1.7</td>
<td>30.5 ± 3.3</td>
<td></td>
</tr>
<tr>
<td>Larvin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>40.6 ± 2.3</td>
<td>30.5 ± 3.6</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>56.4 ± 4.1</td>
<td>39.8 ± 3.2</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>73.6 ± 5.3</td>
<td>56.6 ± 4.3</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>73.5 ± 4.5</td>
<td>55.3 ± 5.1</td>
<td></td>
</tr>
<tr>
<td>Sevin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>41.3 ± 2.1</td>
<td>31.60 ± 1.2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>40.6 ± 3.0</td>
<td>39.45 ± 2.9</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>65.9 ± 4.2</td>
<td>46.20 ± 5.7</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>66.8 ± 2.0</td>
<td>45.61 ± 4.6</td>
<td></td>
</tr>
</tbody>
</table>

Values, expressed on a dry mass basis, and presented as the mean ±SD of three replicates.

Table 4 indicated that increasing in larvin concentrations exhibited an inhibitory effects on estimated fatty acids. The highest reduction values were observed at the high concentrations of larvin (40 mgL⁻¹). Table 4 indicated that the saturated palmitic acid (16:0) slightly affected by larvin treatment (18 mol %) comparing with its control (20.3 mol %). Furthermore, the unsaturated C16 fatty acids which estimated as palmitoleic acid
(16:1) showed a remarkable inhibition (6.67 mol %) less than corresponding control (11.07 mol %).

Table 4. Effect of larvin treatment on fatty acids contents (mol %) of total lipids of the studied cyanobacterium (Anabaena variabilis Kützing ex. Born. et Flah) cells. (Data were recorded at sharp logarithmic phase).

<table>
<thead>
<tr>
<th>Fatty acids</th>
<th>Control</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:0 Palmitic mol %</td>
<td>20.33</td>
<td>20.92</td>
<td>22.02</td>
<td>20.33</td>
<td>18.17</td>
</tr>
<tr>
<td>16:1 Palmitoleic mol %</td>
<td>11.07</td>
<td>11.6</td>
<td>9.90</td>
<td>8.05</td>
<td>6.67</td>
</tr>
<tr>
<td>18:0 Stearic mol %</td>
<td>12.52</td>
<td>12.30</td>
<td>7.00</td>
<td>7.55</td>
<td>5.43</td>
</tr>
<tr>
<td>18:1 Oleic mol %</td>
<td>20.73</td>
<td>20.00</td>
<td>22.07</td>
<td>19.33</td>
<td>16.41</td>
</tr>
<tr>
<td>18:2 Linoleic mol %</td>
<td>5.70</td>
<td>5.03</td>
<td>0.66</td>
<td>3.30</td>
<td>3.00</td>
</tr>
<tr>
<td>18:3 Linolenic mol %</td>
<td>30.82</td>
<td>33.63</td>
<td>28.70</td>
<td>27.01</td>
<td>26.23</td>
</tr>
</tbody>
</table>

A gradual inhibitions of saturated stearic acid (18:0) were observed with increasing of larvin concentrations. Accordingly, increasing larvin concentration to 40 mgL-1 highly reduced stearic acid (18:0) content to 5.43 mol % comparable with the control (12.5 mol %). Furthermore, larvin inhibited unsaturated oleic acid (18:1) especially at higher concentrations, except at concentration of 10 mgL-1 which caused slight increase (22.07 mol %) comparing with the corresponding control (2.02 mol %). Increasing of larvin concentration (40 mgL-1) led to high inhibition in oleic acid content (16.4 mol %).

Also, 40 mgL-1 of larvin was highly effective inhibitor in di-unsaturated linoleic (18:2) and polyunsaturated linolenic (18:3) acids, it showed high suppression ratios accounted for 3 & 26.2 mol % comparing with the control (5.7 & 30.8 mol %) respectively. In this respect, the obtained data are in agreement with the findings of Reynolds, (1984), and Kent & Currie, (1995) who found that, many phytoplankton species typically store photosynthetic energy reserves as lipids.

Also stimulation effect of lipid may be due to defense mechanism of the organism to balance this toxic effect (Fisher, 1977). Also, associated fatty acids may influence an algal cells ability to tolerate xenobiotics (Shifrin and Chisholm, 1981).

Conclusion.

The shifts in phytoplankton species profiles may be predicated to the contamination which produced from using chemical insecticides (Gaggi, et al., 1995). The recorded results indicated that, both insecticides (larvin and sevin) were applied in Egypt in a high concentrations which considered as a lethal concentrations for the majority of microorganisms such as non target microorganisms and/or the natural predators. The hazard effects of these insecticides not only on this biota but it extend on the crops or
vegetables, which cultivated after cotton harvesting. So, assessment the effects of the studied insecticides on natural ecosystems may requires additional tools that consider environmental factors and/or increase ecological realism. These approaches are still being developed and represent future challenges in ecotoxicology.

References.


Hazard application of two common insecticides on the growth, metabolitic activity and nitrogen fixing capacity of cyanobacteria iron


الاضرار الناتجة من استخدام المبيدات الحشرية (لازيفين، سفين) على النمو والنشاط الأرضي للطحالب الخضر المزرعة وعدد كفاءتها في تثبيت النيتروجين.

إبراهيم مرسي محمد إبراهيم

قسم الفيزياء - كلية العلوم - جامعة القاهرة - نبلي - مصر.

تم في هذا البحث دراسة مدى الخطر البيئي الناتج من استخدام النيتروجين العالي من أثاث من المبيدات الحشرية التي تستخدم في الفيما المصرية بنية entendة وذلك على نمو كفاءة الطحالب الخضر المزرعة (المعروفة من نفس النوبة التي يستخدم فيها هذه المبيدات) وعدد كفاءة الحيوية في تثبيت النيتروجين للنتر، وكذلك تأثير هذه المبيدات على النباتات الحيوية دخل خاصا.

أدت الإحصائيات الناتجة أن النيتروجين المستخدم في هذا الحج لهذن المبيدات (5-100 ملجم لكل طن ماء) والتي أقل بكثير من النيتروجين المستخدم في الحول المصرية (100 ملجم لكل طن) تأثير ضار على كفاءة الطحالب المزرعة لتم تثبيت النيتروجين للنتر، حيث أدت النيتروجين المستخدم إلى تثبيت النتر بشكل طبيعي في الماء، وذلك على النباتات الحيوية في المحيط، وكذلك تأثير هذه النيتروجين على أنواع الهيدروكينون النيتروجين للنتر، وذلك على النباتات الحيوية في المحيط، وكذلك تأثير هذه النيتروجين على أنواع الهيدروكينون النيتروجين للنتر، وذلك على النباتات الحيوية.

appeared زائد ملاحظة عند معظم المبيدات المستخدمة.

من خلال هذه النتائج يمكن أنveys استخدام المبيدات الحشرية من هذين المبيدات، وذلك دراسة الخطر الناجم من استخدام المبيدات الحشرية على أثاث النباتات الحيوية، حيث أن هذين النيتروجين ضارين بيئة مختارة.

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