



EFFECT OF THIAMETHOXAM ON THE CHEMICAL COMPONENTS OF *LYNGBYA AERUGINEA-COERULEA*

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Abstract

The nutritional value of a blue-green algae *Lyngbya aeruginea-coerulea* was tested by determining its biochemical content and the rate of protein digestion under the influence of different concentrations of the insecticide Thiamethoxam. The algae were isolated, cheaper, purified and propagated using agricultural (Chu-10) media for biochemical analyzes. The nutritional value of algae was studied by studying the chemical content of proteins, carbohydrates, fats and chlorophyll dye, as well as by knowing the value of protein digestion rate under normal growth conditions and under the influence of different concentrations of the pesticide. The results were shown using insecticide and concentrations ranging from (0-25) mg/L. The highest content of all chemical compounds was recorded at low concentration (0.5) mg / L (compared to other concentrations).

Keywords: Thiamethoxam , *Lyngbya aeruginea-coerulea* , chemical content.

Introduction

Pesticides are chemicals that eliminate unwanted organisms and include many types according to the goal that works to annihilate, most notably Insecticides, which are used in the fight against harmful insects and pesticides are involved in that they interfere to stop vital processes in the organism is unwanted or otherwise so toxic It has a negative effect on the chemical content of the targeted and non-target organisms that are in contact with them (Deneer, 2000). Due to the importance of algae in the food field as one of the important food sources, therefore, the issue of water pollution of various types of pollutants, including pesticides, which has an impact on aquatic organisms, including algae, an important topic of interest to many countries (Miller *et al.*, 2002). Pesticides are the most prominent water pollutants due to lack of awareness and poor discharge in different environments. Since algae are the main base in the food chain in the aquatic ecosystem, being the primary producer of organic substances such as proteins, carbohydrates and others, and being the main provider of oxygen, many studies have been carried out to observe the effect of different types of pesticides on their chemical content or the effect of pesticides. Their physiological processes have importance and influence on the nutritional value of algae. The effect of many pesticides on the formation and accumulation of proteins or on compounds of a protein nature such as DNA in algae. (DeLorenzo *et al.*, 2001) explained in a study of *Chlorella emersonii* that part of its cell division was inhibited when exposed to Sulfonylureas Metsulfuron methyl (SMM) even if it was added at the end of the culture period due to its effect on the final bioaccumulation of proteins. Thymidine polymerase kinase and DNA are not directly affected by the sulfonylureas (SU) (Li, 2010). There are many pesticides inhibited the manufacture of amino acids, most notably the pesticide (SU), which is toxic to most microalgae in low concentrations (Snyder *et al.*, 1974). One of the most prominent effects of inhibition of the manufacture of the enzyme (Acetolactate synthase (ALS, which is the main enzyme for the biological composition of the saturated chain in acids The amino acid caused the toxic accumulation in the manufacture of the chain and it was found that the amino acid valine can protect the algae *Selenastrum* from inhibition

by the pesticide (SMM), while it was observed when the addition of lysine and isoleucine growth inhibition (Ma and Liang, 2001). They noted (Deneer, 2000) Effect of two types of pesticides Deltamethrin and Alphamethrine on accumulation Brolin appeared where an increase in the accumulation when increasing concentrations of pesticides and the cause is the effect of pesticides on biochemical compounds and manufactured. A study conducted by (Seguin, 2002) showed the effect of Irgaral 1051 which is a toxic substance, where its effect on photosynthesis process has been inhibited by inhibiting the transport chain of electrons. They dissolve in cell membranes and affected them. It was also observed that their effect on growth rate and decrease in the amount of carbohydrates inside the cell bodies. (Wightwick and Allinson, 2007) studied the effect of the pesticide (Methyl sulfoxide). To inhibit the process of photosynthesis in many races belonging to the Department of algae, bluish vegetables, etc. Rmthel (*Chlorella* and *Oscillatoria*), which was reflected in the algae content of carbohydrates. In the environment, pesticide pollution is a factor affecting the growth of algae, its chemical content and nutritional value Study the effect of some insecticides (Thiamethoxam) on chemical content and nutritional value of *Lyngbya* algae.

Materials and Methods

Collect samples

The blue-green unicellular *Lyngbya* alga this species have been routinely cultivated in our laboratory under standardized conditions, such as Ch-10 medium, And incubated at a temperature of (25 °C) and lighting (150) micro-Einstein / m / s in the growth cab and lighting system (8:16) Lighting: dark with constant consideration of men samples until the desired growth (Peterson *et al.* 1997).

Pesticide concentrations

The insecticide Thiamethoxam was used as a widespread insecticide with the following concentrations (0, 0.5, 5, 10, 15, 20 and 25) (mg / L), in addition to the control sample to which no concentration of the active ingredient was added. Depending on the concentration of the active substance on the package and for the preparation of the

concentrations mentioned, a series of dilution of the pesticide was prepared and taken certain sizes of it and added to the moss farm with a volume of liters and placed in the cab (Dasilva *et al.* 1975)

Determination of chemical content of studied algae

Estimation of protein concentration

Protein was determined by (Singh *et al.* 2011) by reading the protein concentration at 280 nm wavelength for the highest absorption of proteins and the absorbance reading at 260 nm wavelength for the highest absorption of nucleic acids. The following equation was then applied to calculate protein concentration:

$$\text{protein concentration} = 1.55 * A_{280} - 0.77 * A_{260}$$

Estimate the amount of carbohydrates

The total amount of carbohydrates in algae samples was estimated based on Phenol- Sulphuric acid method, according to (Kalayanova and EI Batawi, 1991).

Estimate the amount of fat

As for fat content, (Nystrom *et al.*, 2002) was used to extract the total fat using Soxhlet and the solvent used was hexane.

Gross energy

The total energy of algae was calculated using the following equation (Larsen *et al.*, 2002).

$$\text{GE (Kcal / kg)} = 5.72 * (\% \text{ protein}) + 9.5 * (\% \text{ lipids}) + 4.03 * (\% \text{ carbohydrate})$$

Estimate the amount of chlorophyll

The concentration of chlorophyll was calculated based on the Lorenzen equation described in (Larsen *et al.*, 2002).

Protein digestion rate

Estimation rate of algae protein digestion in vitro according to the method (Nystrom *et al.*, 2002) described in (Wightwick and Allinson, 2007).

Results and Discussion

It was observed from the present study that the concentration of L. algae of proteins was relatively high at low concentrations of the pesticide (60.15) and with increasing the concentration of the used pesticide there was a significant decrease in the protein content. The reason may be that pesticides contain elements or compounds that have a harmful effect on the cell content of proteins or the process

of manufacture, for example found that pesticides containing elements of cadmium or chlorine and high concentrations, they are associated with peptides and converted to other harmful compounds such as (Metallothionins). This may be due to the effect of pesticides on algae in the exponential growth phase, which caused a decrease in cell division and a decrease in growth generally associated with a lack of organic compounds (Peterson *et al.*, 1997). Due to the correlation of the digestion rate of proteins with the content of proteins, the results showed the highest value at low pesticide concentrations. On the compounds and materials used in the extraction process or the binding of proteins with some pesticide compounds (heavy metals, for example), which complicates the composition or the enzyme-based digestive process. The results of the present study showed a decrease in carbohydrate concentration by increasing the concentrations of the pesticide used. The reason for this decrease may be because these pesticides contain compounds and elements that inhibit or affect the formation of carbohydrates, as it was found that in pesticides containing elemental phosphorus or cadmium, one of these two elements replace the iron, which is linked to cytochromat photosynthesis, which adversely affect the process of photosynthesis. Decrease of carbohydrates (Singh *et al.*, 2011). Or perhaps the reason for the low activity and efficiency of photosynthesis process is the inhibition of the transport chain of electrons by certain pesticides, which leads to a decrease in the activity of this process and then inhibited (Dasilva *et al.*, 1975). The current results indicated that the effect of fats with pesticides was severe. It was noted that there was a significant decrease in the moss content of fats by increasing the concentrations until the disappearance of these compounds at relatively high concentrations. It is possible that the decrease is due to the negative impact of pesticides on the process of fat production, which inhibits the enzymes responsible for the process of building fatty substances, which leads to the decline and disappearance of these compounds with greater concentration, the effect is more severe and faster. It is possible, however, that these pesticides are soluble in fats, which cause them to dissolve in lipid membranes and thus damage these structures and alter the chemical composition of the cell (Franqueira *et al.*, 2000). The results of the present study showed a decrease in chlorophyll content when the insecticide was added and with increasing concentrations. Main operation (Kalayanova and EI Batawi, 1991). Or it may be due to a shortage of magnesium, one of the most important elements necessary to build chlorophyll dye, or it may be harmful to the pesticide degradation of this dye and the tyranny of other dyes.

Table 1 : Effect of different concentrations of insecticide on the chemical components of the studied alga

Pesticide concentrations	Protein content %Dry weight	Rate of digestion of proteins	Carbohydrate content %Dry weight	Fats %Dry weight	Total energy Kg / kg	Chlorophyll content mg / 100 cm ³
0	62.21 ^a	83.62 ^a	16.32 ^a	5.1 ^a	493.86 ^a	1.5 ^a
0.5	60.15 ^a	80.19 ^a	14.68 ^a	3.2 ^b	473.89 ^a	1.2 ^a
5	53.26 ^b	45.23 ^b	10.17 ^b	2.9 ^c	391.56 ^b	0.41 ^b
10	33.19 ^c	23.20 ^c	9.54 ^b	1.5 ^d	259.71 ^c	0.52 ^b
15	20.43 ^d	23.25 ^c	6.17 ^c	-	159.28 ^d	0.47 ^c
20	15.75 ^d	16.39 ^c	5.9 ^c	-	120.12 ^d	0.24 ^c
25	6.54 ^c	16.27 ^c	1.5 ^d	-	67.22 ^e	-

Conclusion

A variety of findings in this study confirm that chemical content measurement is extremely useful in algal toxicity tests to evaluate the potential cellular toxicity of pesticides at different concentrations. Changes in environmental conditions are often easily and quickly identified through the interaction of simple organisms afterwards, and taking into account the results obtained, these results are expected to improve researchers' ability to meet the major environmental challenges facing human societies

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