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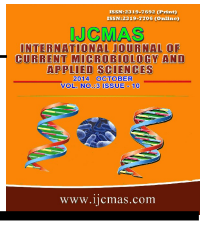

Original Research Article

Effect of medicinal plants on the diversity of rhizosphere blue greens, growth and some metabolites of *Cyanosarcina fontana*

Mustafa A. Fawzy[1]*, Awatief F. Hifney[1], Ahmed A. Issa[2], Mahmoud S. Adam[1] and Gamal, Gareib[1]

[1]Botany & Microbiology Department, Faculty of Science, Assiut University, Assiut 71516, Egypt
[2]Biology Department, Faculty of Science, Taif University, Taif, KSA
**Corresponding author*

A B S T R A C T

The present study investigate the effect of six medicinal rhizosphere blue greens and their aqueous root extract on the growth of plants extract have slight inhibitory effect on the growth of *Cyanosarcina* significantly decreased by increasing the concentrations of the root extract of all *Cyanosarcina fontana* that was very sensitive and completely disappearance around the root zone from all tested plants. Qualititative analysis of some phytochemical investigated plants extract contained alkaloids, proteins, carbohydrates, and plants, *Verbesina encelioides*, *Glinus lotoides*, *Helotropium supinum*, constituents of these medicinal plant roots are taken into our consideration. All investigated plants extract contained alkaloids, proteins, carbohydrates, and terpenoides. While tannins were recorded only in aqueous extract of *Mentha microphylla*. Results indicated that, the total number of blue greens was *Mentha microphylla*, *Juncus subulatus* and *Pulicaria undulate* on the diversity of plants, greatly reduced around these plant roots. Addition of 1% and 3% of all aqueous root *fontana*. In general, the total carbohydrates, total proteins, and total lipids were tested plants.

Keywords

Medicinal plants, rhizosphere blue greens, metabolites, *Cyanosarcina fontana*.

Introduction

It is known that weeds are important sources of medicines for indigenous people (Steppand Moremen, 2001).Some works concern its toxicity (Eichholzer et al., 1982), allelopathy (Hifney et al., 2013), Triterpenoides and pharmaceutical evaluation for antimicrobial, antiviral, and tumer (Jain et al., 2007).Many plants including medicinal plants were reported to interact chemically with other plant species. Such chemical interaction is known as allelopathy, which is formulated as any process involving secondary metabolites produced by plants, algae, bacteria and fungi that influence the growth and development of agricultural and biological systems (Anonymous, 1996).Medicinal plants are able to produce and release bioactive compounds that are secondary metabolites into the environment and are capable of suppressing the growth of other plants.Such chemicals include tannins, phenolic acids, lignins, alkaloids, flavonoids, coumarins and terpenoids. They are present in all plant

tissues including leaves, stems, roots, rhizomes, flowers, fruits and seeds, and even in pollen grains (Ahmad et al., 2011).Under certain conditions, these compounds are released into the environment, either as exudates from living tissues or by decomposition of plant residues in sufficient quantities to affect neighboring or successional plants (Einhelling, 1996; Ashrafi et al., 2007).

There are different stages in plants growth such that each stage has been different chemical compounds (secondary metabolites) that result in varying effects on other organisms or plants (Fujii et al., 1991). Sometimes a single chemical produced by one organism or plant is harmful to another but beneficial to a third organism or plant (Rizviand Rizvi, 1992). Some plants have an important effect on soil microbiology, due releasing different nutrients and organic compounds into the soil. Several investigators studied the effects of plant extracts on growth of several organisms such as Bacteria and Animals (Al-Ani et al., 1996). Others (Mohammed et al., 1999; Gross, 1999) studied the effect of medicinal plants containing chemical compounds having the potentials to modify physiological activities of other organisms at different concentrations of its extract. No attempt had been made in Upper Egypt to study the soil and rhizosphere blue greens with relation to medicinal plants and its phytochemical components. As well as the studies on the effect of aqueous root extract for the medicinal plantson the growth performance of algae especially *Cyanosarcina fontana* is scare. Therefore, the purpose of this research is to examine the phytochemical components of six medicinal plants and their allelopathic effect on the diversity of rhizosphere blue greens, as well as to evaluate the effect of aqueous root extract of these plants on the growth and some metabolites of *Cyanosarcina fontana.*

Materials and Methods

Collection of plant materials

Fresh parts of six medicinal plants *Verbesina enceliodes, Glinus lotoides, Helotropium supinum*, *Juncus subulatus*, *Mentha microphylla* and *Pulicaria undulate* were collected from different regions of El-Kharga oasis (New-Valley Egypt). The plant materials were taxonomically identified and authenticated by Assiut University Herbarium, Botany and microbiology Department, Faculty of science, Assiut University. The plant materials are properly washed in tap water and rinsed with distilled water. The rinsed plants were dried in air for 15 days. The dried plant is pulverized using a mortar and pestle, to obtain a powdered form. The powdered form was stored in airtight glass containers, protected from sunlight until using for analysis.

Preparation of aqueousplant extracts

The aqueous root extract of each plant sample is prepared by soaking 1g of powdered sample in 50 ml of distilled water for 20h. The extracts were filtered; the filtrate was kept in refrigerator until used for the phytochemical analysis.

Qualitative phytochemical analysis

The aqueous root extract was tested for the presence of bioactive compounds by using following standard methods.

Test for alkaloids (Evans, 1997)

About 50 mg of solvent free extract was stirred with 3 ml of dilute hydrochloric acid and then filtered thoroughly. The filtrate was tested carefully with various alkaloid reagents as follows: few drops of Wagner's reagent are added to 1 ml of filtrate at the side of the test tube. The color change was

observed. A reddish-brown precipitates confirms positive results (Wagner, 1993).

Test for carbohydrates

One ml of plant extract was added to 1 ml of Barfoed's reagent and heated on a boiling water bath for 2 minutes. The color change was noted and recorded. A red precipitates indicated presence of sugar or at least change sample color.

Test for glycosides

Three ml of chloroform and ammonia solution (10%) were added to 2ml plant extract. Formation of pink color indicated the presence of glycosides.

Test for saponins

Two ml distilled water was added of each plant extracts and shaken in a graduated cylinder for 15 minutes lengthwise. Formation of 1cm foam indicates the presence of saponins.

Test forphenols

Three ml of 10% lead acetate solution was added to five ml of plant extract. A bulky white precipitates indicated the presence of phenols.

Test for tannins

Few drops of neutral 5% ferric chloride solution were added to five ml of plant extract. The formation of blue green color indicated the presence of tannins (Mace Gorbach, 1963).

Test for flavonoids

An aqueous solution of the extract was treated with ammonium hydroxide solution. The yellow fluorescence indicated the presence of flavonoids.

Test for proteins

An aliquot of 2 ml of filtrate was treated with drop of 2% copper sulphate solution. To this, 1 ml of ethanol (95%) was added, followed by excess of potassium hydroxide pellets. The pink color in ethanol layer indicated presences of proteins (Gahan, 1984).

Test for terpenoids

Two ml of chloroform and concentrated sulphuric acid was added carefully to 0.5 ml of extract. Formation of red brown color at the interface indicated the presence of terpenoids.

Allelopathic effects of the medicinal plants on the diversity of rhizosphere blue greens

The soil samples around the root zone of the investigated medicinal plantswere cultivated in Rippka and Herdman (1993) modified mediumfor isolation of blue-green algae. Petri-dishes were incubated at 30ºC, the algal colonies were examined, and species identified according to the following references, Prescott (1982), Boney (1983), Komarek andFott (1983), Pentecost (1984).

Impact of themedicinal plants extract on the growth and some metabolites of *Cyanosarcina fontana*

The aqueous root extract of six chosen medicinal plant (*Verbesina encelioides*, *Glinus lotoides*, *Helotropium supinum*, *Juncus subulatus*, *Mentha microphylla* and *Pulicaria undulate*) is prepared by soaking 100g of powdered sample in 200 ml of distilled water for 20hfor three days. Rippka and Herdman (1993) modified medium was used for the growth of *Cyanosarcina fontana* at pH 7.8 and incubated at 28-30˚C

under continuous light intensity of 48 $\mu mol.m^{-2}s^{-1}$for 7 days. The medium was treated with low (1%) and high (3%) concentrations of previous aqueous root extract of each plant. Twenty milliliters of exponential cultures, standardized at an optical density at 680 nm of 0.1, were inoculated into 150 ml of the medium in 250 ml conical flasks in triplicate. The cultures were gassed with dry sterilized air, which contained about 3% CO_2.The growth of tested alga was also monitored daily by chlorophyll-*a*. They were estimated spectrophotometrically, extracted in acetone (90%) overnight, and determined according to Metzner (1965).The growth rate (μ) was determined using the following formula:

$\mu\ (h^{-1}) = (LnN_2\text{-}LnN_1)/\ (t_2\text{-}t_1)$, where N_2 and N_1 represent the chlorophyll *a* concentrations at times t_1 (day 0) and t_2(day 7), respectively. For the determination of the total carbohydrates, the anthrone sulfuric acid method was used (Badour 1959). Total proteins were determined according to Lowry *et al*. (1951). Total lipid contents were determined by the sulfophosphovanilin method (SPV) according to Drevon and Schmitt (1964).

Statistical analysis

Univariate data obtained were subjected to one-way analysis of variance (ANOVA), using the SPSS v17 statistical package. For comparison of the means, the Duncan's multiple range tests ($p < 0.05$) were used.

Results and Discussion

Qualitative analysis of phytochemical constituents for the plants

Phytochemical analysis conducted on the plant extracts revealed the presence of constituents which are known to exhibit medicinal as well as physiological activities (Sofowra,1993).Qualitative screening of phytochemical components such as alkaloids, glycosides, saponins, tannins, flavonoids and terpenoids in roots of six medicinal plants were shown in Table (1).Tentative identification of active chemical compounds in the extracts confirmed that, all studied plants (*Verbesina enceliodes*, *Glinus lotoides*, *Helotropium supinum*, *Juncus subulatus*, *Mentha microphylla* and *Pulicaria undulate*) contained alkaloids, carbohydrates, proteins and terpenoides. With exception of *Mentha microphyll* tannins were present in all rest medicinal plants. Glycosides were present in the root of *Verbesina enceliodes*as well as *Juncus subulatus* and completely absent in the rest of plants. Ervin and Wetzel (1997) found that, *Juncus* contains numerous chemical compounds that may allow this species to employ allelochemical interference. Phenolic compounds such as p-coumaric and vanilic acids (Dong-Zhe et al.,1996), cycloartane, triterpenoides, cycloartane and glucosides (Corsaro et al., 1994; Della Greca et al., 1994,1995) have been reported from *Juncus*. Rameshwari et al.(2013) found that Chloroform extract of *Glinus lotoides* showed the presence of alkaloids, sterols, glycosides, flavanoids, phenols and triterpenoids. On the other hand, saponins were only absent from the roots of *Glinus lotoides* and *Heliotropium supinum*. Phenols were absent in the roots of *Pulicaria undulate*, *Heliotropium supinum*, *Juncus subulatus* and *Glinus lotoides*. Flavonoids were only absent in the roots of *Heliotropium supinum*, whereas they were present in the rest of the tested plants as shown in table (1). The composition of steam-distilled oil of the fresh aerial parts of *P. undulate* is rich in phenolic compounds and monoterpene hydrocarbons and comparatively low in sesquiterpene hydrocarbons(Mossa et al., 1987).

Allelopathic effects of the medicinal plants on the diversity of rhizosphere blue greens

Twenty genera (59 species) of blue green algae were recorded and identified from soil sample collected around the root zone of six tested plants. It is worthy to mention that, the number of Cyanophycean species recorded around the roots of the investigated plants were less than that of the control, whereas the highest no. of species were recorded around *Heliotropium supinum* while, the lowest no. of species were recorded around *Mentha microphylla*. *Anabaena viguierii* was represented as a highly occurrence, while *Nostoc carneum*, *Oscllatoria sancta* and *Schizothrix vaginata* was represented as a moderately occurrence. On the other hand, there are more species were recorded as low and rare species such as *Anabaena flos-aquae, Aphanothece castagnei, Arthrospira maxima, Calothrix braunii, Chroococcus submarines*, *C.turgidus, Cyanosarcina fontana*, *Gloeocapsopsis magma, Lyngbya biebliana*, *L.martensiana, Nodularia spumigena, Nostoc muscorum* and *N. pruniforme* (Table 2). Hifneyet al (2004) recorded that, there is a direct relationship between root growth of some plants and the diversity of algae. In this respect, Morris et al(2003) cleared that, are lease of chemical compounds by plants inhibit algal growth. Plant species had strong influence on soil microbial organism and their activity. The input of nutrient by the roots into surrounding soil as well as the mineral nutrients levels in the soil are of considerable importance (Bertin et al., 2003).The reduction in the algal species may be due to the presence of many naturally chemical compounds in the extract like saponin, glycoside and alkaloids that had an inhibitory effect on algae (Shaheed et al., 1996).Root exudates play a key role in the selective stimulation of microorganisms. Plants have an important effect on soil microbiology by releasing different nutrients and organic compounds into the soil. The rhizosphere microorganisms can both mobilize and immobilize plant nutrients (C, N and S) and can produce growth promoting substances, such as phytohormones, as well as phytotoxins (Abd El-Ghani and Fawzy, 2006).Most soil microorganisms do not interact with plantroots, possibly due to the constant and diverse secretion of antimicrobial root exudates. It contains root-specific metabolites that have critical ecological impacts on soil macro and microbiota as well as on the whole plant itself(Bertin et al., 2003).

Our results suggested that most of blue greens carpet that present in the soil and develops during inundation were highly affected with the plants which has negative effect on the blue green algal community. Since *Cyanosarcina fontana* was one from the highly sensitive and completely absent species around the root zone of all plants under testing; so it has been intensively studied in this investigation to light spots on the influence of aqueous root extract of the six plants on the growth and some metabolites of *C. fontana*.

Impact of aqueous root extracts of the medicinal plants on the growth and metabolites of *Cyanosarcina fontana*

The influence of various concentrations of aqueousroot extract concentration (low (1%) and high (3%))of *Verbesina encelioides, Glinus lotoides, Helotropium supinum*, *Juncus subulatus, Mentha microphylla* and *Pulicaria undulata* on the growth and some metabolites of *Cyanosarcina fontana* was shown in Figs. (1, 2) and Table (3).It could be observed that, addition of 1% and 3% of all aqueous root extracts have slight inhibitory effect on the growth of

*Cyanosarcina fontana*as compared with the control. It was mentioned that, high concentration of root extract form *Verbesina encelioides* and *Pulicaria undulate* stimulated the growth at 4 days of incubation, then the growth were retard and decreased. Rameshwari et al. (2013) found that, Chloroform extract of *Glinus lotoides* possesses antibacterial activity; the best activity was against *Bacillus subtilus* and *Staphylococcus aureus*. Methanol, cold water and hot water extracts from fresh roots of *V. encelioides*, a plant, have antimicrobial activities against select microorganisms (Bacteria: *Bacillus subtilus***,** *Enterobacter aerogenes***,** *Escherichia coli***,** *Pseudomonas aeruginosa* and Fungi: *Aspergillus niger***,** *Candida albicans, Penicillium crysogenum* and *Tricophyton rubrum*). The reduction in growth parameters of *Cyanosarcina fontana* treated with *Mentha microphylla, Juncus subulatus, Heliotricum supinum* and *Glinus lotoides* extract may be due to the presence of many naturally chemical compound in these extract like alkaloids, terpenoides and saponins as shown in Table(1). These resultsare in agreement with Shaheed et al. (1996) who found that,the reduction in growth parameters (total cell number, growth rate and multiplication time) of *Microcystis aeruginosa* with the use of licorice extract may be due to the presence of many naturally chemical compounds in this extract like saponin glycoside (glycyrrhizin) which had an inhibitory effect on algae.

Table.1 Qualitative analysis of some phytochemical constituents of the root of medicinal plants

Terpenoids	Proteins	Flavonoids	Tannins	Phenols	Saponins	Glycosoides	Carbohydrats	AlKaloids	Parameters / Plants
+	+	+		+	+	+	+	+	***Verbesina encelioides***
+	+	+					+	+	***Glinus lotoides***
+	+						+	+	***Helotropium supinum***
+	+	+	+	+	+		+	+	***Mentha microphylla***
+	+	+			+	+	+	+	***Juncus subulatus***
+	+	+			+		+	+	***Pulicaria undulate***

Table.2 List of rhizosphere blue greens recorded around all investigated weeds

Plant Weeds / Algal taxa	O. R.	*Glinus lotoides* L.	*Heliotropium supinum*L.	*Juncus subulatus* Forsak	*Pulicaria undulate*(L.)Kostel	*Mentha microphylla* K.Koch	*verbesina encelioides*Boiss.&	Control
Anabaena aequalis Borge	L	+			+			+
A.flos-aquae G.S.West	R							+
A. viguierii Denis & Frémy	H	+	+	+	+	+	+	+
Aphanothece castagnei(Bréb.)Rabenhorst	R							+
Arthrospira jenneri (Kütz.) Stizenberger	L		+	+				+
A.maxima Setchell & Gardner	R							+
Borziaperiklei Anagnostidis	L		+					+
Calothrix atricha Frémy	L					+		+
C. braunii Bornet & Flahault	R							+
Chroococcus submarines (Hansgirg) Kovácik	R							+
C.turgidus (Kützing)Nägeli	R							+
Cyanosarcina fontana Kováčik	R							+
Gloeocapsopsis magma (Brébisson) Komárekand Anagnostidis	R							+
Limnothrix pseudominima (Skuja) I.Umezaki and M.Watanabe	L		+					+
Lyngbya epiphytica Hieronymus	L				+			+
L.biebliana Claus	R							+
L.martensiana Meneghini	R							+
Nodularia spumigena Mertens	R							+
Nostoc carneum C.Agardh ex Bornet & Flahault	M	+			+	+	+	+
Nostoc microscopicum Carmichael	L					+	+	+
*N. muscorum*C. Agardh	R							+
N. piscinale Kützing	L	+					+	+
N. pruniforme C.Agardh	R							+
N. Sp.	R							+
Oscillatoria irrigua Kützing ex Gomont	L			+				+
O. sancta Kützing ex Gomont	M	+	+	+				+
*O. subbrevis*Schmidle	L			+	+			+
*O. tenuis*C.Agardh ex Gomont	R							+
Phormidium acuminatum (Gomont) Anagnostidis and Komárek	R							+

Table 2.continue.

Plant Weeds **Algal taxa**	**O. R.**	***Glinus lotoides* L.**	***Heliotropium supinum*L.**	***Juncus subulatus*Forsak**	***Pulicaria undulate*(L.)Kostel**	***Mentha microphylla*K.Koch**	***Verbesina encelioide* sBoiss.&Noe**	**Control**
Phormidium animale(C.Agardh ex Gomont) Anagnostidis and Komárek	L		+	+				+
Ph. breve(Kützing ex Gomont) Anagnostidis and Komárek	R							+
Ph. californicum Drouet	R							+
Ph.formosum (Bory de Saint-Vincent ex Gomont) Anagnostidis Komárek	R							+
Ph.incrustatum (Nägeli) Gomont ex Gomont	R							+
Ph. inundatum Kützing ex Gomont	R							+
Ph.janthiphorum (Fiorini- Mazzanti ex Gomont)*Elenkin*	R							+
*Ph. pachydermaticum*Frémy	L						+	+
Ph. papyraceum (C.Agardh) Kützing ex Gomont	R							+
Ph. paulsenianum J.B.Petersen	R							+
Ph. regelii (Skuja) Anagnostidis and Komárek	L				+			+
Ph. richardsii Drouet	R							+
Ph. tergestinum (Rabenhorst ex Gomont) Anagnostidis and Komárek	R							+
Pseudanabaenaba latonica Scherffel & Kol	L				+			+
P. frigida(F.E.Fritsch) Anagnostidis	R							+
*P. galeata*Böcher	R							+
P. papillaterminata (Kiselev) Kukk	L			+		+		+
P. starmachii Anagnostidis	R							+
*Schizothrix fragilis (*Kützing) Gomont	R							+
S. gomontii Weber van Bosse	L		+					+
S. radiussolis M.Watanabe and Komárek	L				+		+	+
S. semiglobosa Geilter	L						+	+
S. vaginata Gomont	M	+	+	+				+
Scytonemacoactile Montagne	R							+
*Spirulinanodosa*Schiller	R							+
S. platensis(Gomont) Geitler	R							+
Stigonemao cellatum (Dillw.) Thur.	L	+	+					+
Stigonema turfaceum Cooke ex Bornet&Flahault	R							+
Wolleasaccata(Wolle) Bornet&Flahult	R							+
Total no. of species		**7**	**10**	**8**	**8**	**5**	**7**	**59**

O. R. = Occurrence remark, Rare (R): 1-24 %, Low (L): 25-49 %, Medium (M): 50-74 %, High (H): 75-100

Table.3 Effect of aqueous roots extract on the growth and some metabolites of *Cyanosarcina fontana*

Plants	Treatments	μ_{max} (h^{-1})	G(h^{-1})	Chl. *a* (µg/ml)	Total Lipids	Total Proteins	Total Carbohydrates
					(mg/mg chl.*a*)		
Verbesina encelioides	**C.**	0.017	39.9	0.23±0.001^{b}	9.41±0.12$_{b}$	77.95±15.99^{a}	25.78±0.64^{a}
	L	0.015	45.9	0.18±0.002^{a}	6.80±0.07^{a}	68.30±4.69^{a}	24.35±0.88^{a}
	H	0.017	41.5	0.17±0.003^{a}	6.42±0.22^{a}	63.33±0.28^{a}	23.83±0.64^{a}
Mentha microphylla	**C.**	0.017	39.9	0.23±0.001^{c}	9.41±0.12^{c}	77.95±15.99^{a}	25.78±0.64^{c}
	L	0.007	95.6	0.16±0.003^{b}	4.39±0.15$_{b}$	18.87±0.99^{b}	6.88±0.33^{b}
	H	0.009	81.2	0.15±0.003^{a}	3.57±0.16^{a}	14.81±0.7^{b}	4.35±0.55^{a}
Juncus subulatus	**C.**	0.017	39.9	0.23±0.001^{b}	9.41±0.12^{c}	77.95±15.99^{a}	25.78±0.64^{b}
	L	0.008	84.5	0.18±0.01^{a}	5.23±0.07$_{b}$	57.35±0.13^{a}	17.26±0.32^{a}
	H	0.009	76.1	0.17±1.01^{a}	4.28±0.29^{a}	49.85±1.94^{a}	16.22±0.19^{a}
Heliotropium supinum	**C.**	0.017	39.9	0.23±0.001^{b}	9.41±0.12^{c}	77.95±15.99^{a}	25.78±0.64^{c}
	L	0.005	131.9	0.15±0.002^{a}	6.79±0.16$_{b}$	40.35±0.60^{b}	23.00±0.86^{b}
	H	0.007	95.2	0.15±0.007^{a}	5.57±0.16^{a}	36.19±0.088^{b}	20.15±0.36^{a}
Pulicaria undulata	**C.**	0.017	39.9	0.23±0.001^{b}	9.41±0.12^{c}	77.95±15.99^{a}	25.78±0.64^{c}
	L	0.013	52.6	0.16±0.009^{a}	5.42±0.08$_{b}$	36.77±1.16^{b}	23.85±0.34^{b}
	H	0.022	32.1	0.14±0.01^{a}	4.70±0.17^{a}	31.64±1.77^{b}	21.34±0.39^{a}
Glinus lotoides	**C.**	0.017	39.9	0.23±0.001^{b}	9.41±0.12$_{b}$	77.95±15.99^{a}	25.78±0.64^{b}
	L	0.017	39.9	0.21±0.02^{b}	9.13±0.23$_{b}$	21.63±0.00^{b}	25.66±1.39^{b}
	H	0.095	7.3	0.15±0.006^{a}	4.75±0.16^{a}	31.39±1.22^{b}	11.98±1.24^{a}

C.= Control, L= Low, H= High, μ_{max}= maximum growth rate, G= generation time. The data are given as averages of three replicates ± standard error. Values followed by the different letters are significantly different at $p < 0.05$.

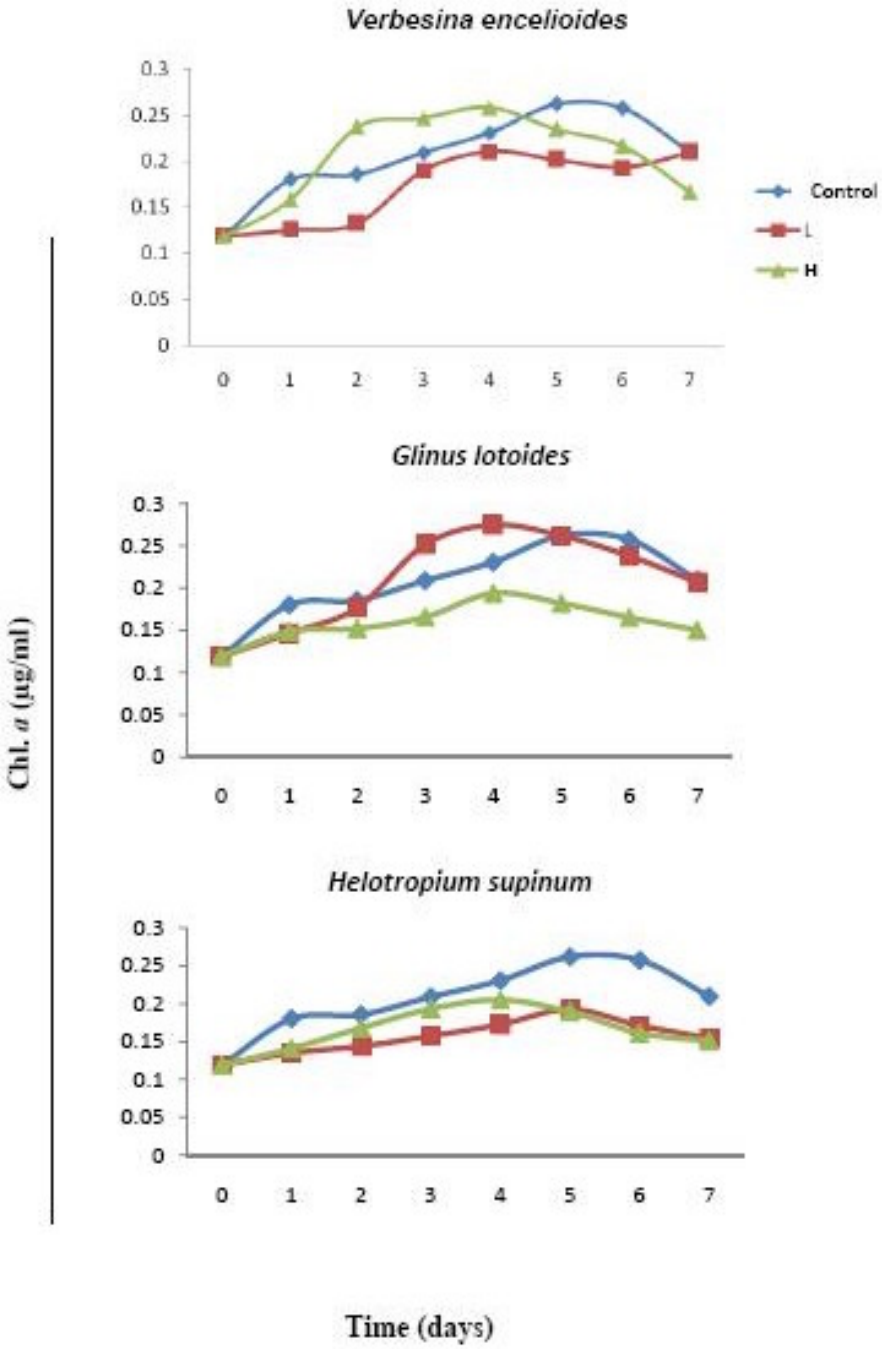

Fig. 1. Growth curves of *Cyanosarcina fontana* with different treatments of various aqueous root extracts of *Verbesina*, *Glinus* and *Helotropium*.

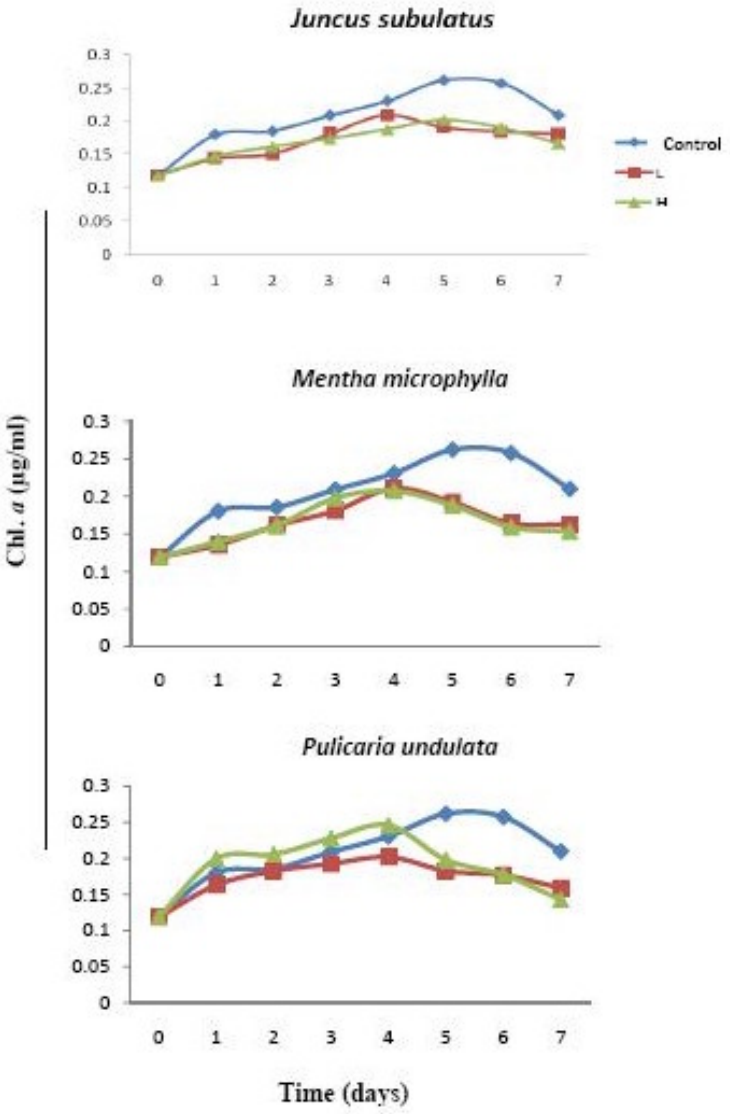

Fig. 2. Growth curves of *Cyanosarcina fontana* with different treatments of various aqueous root extracts of *Juncus*, *Mentha* and *Pulicaria*.

Allelopathic compounds have various modes of action, from inhibition of photosynthesis to oxidative stress or cellular paralysis (Josephine and Hage, 2007).Al-Joubori(1998) stated that, akaloidic compounds presence in licorice could suppress many physiological activities in plant cell. In the current study, tannins were recorded only in *Mentha microphylla* extract and these compounds may be the causal reason for noticeable and extremely growth reduction of *Cyanosarcina fontana* compared to control and other extracts. On the other hand, tannic compounds, which had been detected in this plant previously (Al-Ani, 1998), had strong inhibitory proprieties on algae. Many mechanisms proposed to explain tannins effect, it may be acting on cell wall proteins leading to form complexes and for this reason, we can elucidate highly inhibitory proprieties for tannins (Gross and surfeld, 1994).Another mechanism was inhibit alkaline phosphate enzyme (AP) which play a great role in phosphate uptake on algae, where it help algae to consume $PO_4$from organic phosphorus compounds in surrounding environment (Wetzel, 1992).

In general, chlorophyll*a*was decreased with increasing the concentration of root extracts for all tested plants. In this respect, Ervin and Wetzel (1997) reported that, chlorophyll *a* content was reduced by 2% in *Eleocharis* seedlings treated with *Juncus leachates* as compared to control. The maximum growth rate of *Cyanosarcina Fontana* was ($0.022h^{-1}$) and ($0.095h^{-1}$) that recorded at the treatment with3% of root extract of *Pulicaria undulate* and *Glinus lotoides*, as well as the generation time was ($32.07h^{-1}$) and ($7.3h^{-1}$), respectively. Generally, the total carbohydrates, total proteins, and total lipids were significantly decreased by increasing the concentrations of the root extract of all tested plants at $P>0.05$, (Table 3).Medicinal plant containing chemical compounds having the potentials to modify physiological activities of other organisms at different concentrations of its extract (Shaheedet al.,1996; Mohammed et al., 1999;Gross,1999).

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