Libyan Journal of Ecological & Environmental Sciences and Technology
(LJEEST)

LJEEST
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Identification of Freshwater Algae From Kufrah, Libya

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ARTICLE INFO

Vol. 2 No. 1 June, 2020

Pages (13 - 17)

Article history:
Revised form 20 *March 2020*
Accepted 19 *April 2020*

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Keywords:
freshwater algae, Cyanophyta, Chlorophyta, Bacillariophyta, Euglenophyta.

ABSTRACT

The Libyan freshwater algae remains partially unexplored in term of their distribution. Many reports done on algae in south of Libya, but recently need more new reports. A survey of farms in kufra was undertaken from October 2010 to May 2011. Out of 16 sites of water bodies surveyed from different farms. Among the sampling sites there were algal blooms comprising 24 species following to 24 genera and 5 divisions were recorded. Chlorophyta, Cyanophyta, Bacillariophyta, Euglenophyta and Dinophyta. Chlorophyta was the most dominant, followed by Cyanophyta. They were observed as scums or mat on the surface of water bodies.

الملخص

لا تزال طحالب المياه العذبة الليبية غير مكتشفة جزئيًا من حيث توزيعها. تم عمل العديد من الدراسات حول الطحالب في جنوب ليبيا ، لكنها في الآونة الأخيرة بحاجة إلى المزيد من التقارير الجديدة. أجري مسح للمزارع في الكفرة في الفترة من أكتوبر 2010 إلى مايو 2011. من 16 موقعًا لمسطحات مائية تم مسحها من مزارع مختلفة. من بين مواقع أخذ العينات ، كانت هناك أزدهار للطحالب التي تضم 24 نوعًا تتبع ل 24 جنسًا و 5 أقسام تم تسجيلها. الطحالب الخضراء ، الطحالب الخضراء المزرقة ، الطحالب العصوية ، الطحالب اليوجلينية والنارية. كانت الطحالب الخضراء هي الأكثر سيادة ، يليها الطحالب الخضراء المزرقة. وقد لوحظت على أنها متكثفة على سطح المسطحات المائية.

INTRODUCTION

Algae are very important component of aquatic environment like other aquatic flora and fauna. The algae and Cyanobacteria comprising the phytoplankton are the first link in the aquatic food web as primary producers. Their presence in the water is often unnoticed as they are tiny microscopic organisms. Under favourable environmental conditions such as elevated nutrient concentration, warm temperature, shallow and slow moving water, the algal growth is stimulated in the water bodies that will finally result in the formation of algal blooms (Chen & Liu ,2014). Anthropogenic inputs can alter the algal community such that the health of an ecosystem may be reflected in the algal community and diversity (Glibert *et al.*, 2014). Though algal blooms are natural phenomenon and have occurred throughout the recorded history, recent studies from around the world indicate that they have increased in frequency and geographic distribution over the past few decades (O'neil *et al.*, 2012).

The Libyan freshwater algae remains partially unexplored in term of their distribution. Several researches performed on algae in south of Libya

but they are old, such as reports of (Marchesoni, 1947; Quezel, 1958; Schwabe & Simonsen ,1961; leonard *et al.*, 1969). Recently many researches done in many cities in north of Libya, such as that done by (Nizamuddin & Gerloff, 1982; Compère,1986; Khan, 1989; Khan & Zarmouh, 1989; Khan,1995; Khan, 2010; Issa *et al.*, 2012; Hamida & Hanan, 2018), however, very limited data come from south of Libya. Many areas of south Libya need intensive phycological studies because most studies have concentrated only on general hydrobiology, so this study aimed to survey and identification of kufrah freshwater algae.

MATERIALS AND METHODS

The Study area:

Kufrah is a basin in south east of Libya "53.43´11°24N 23° 17´09.20" E, It is located in a particularly isolated area, not only because it is in the middle of the Sahara desert but also because it is surrounded on three sides by depressions. Kufrah's location in Libya's southeast places with total area 483,510 km2 (186,680 sq mi). It is on the country's border with Egypt, Sudan and Chad. Nationally, it borders Murzuq in west, Jufra in northwest and Al Wahat in north. Kufrah is a part of Cyrenacian geographical subdivision, the largest region in Libya and which is mostly semi-arid in nature. Around 91 % of the land is covered by desert, with only 8.8 % agricultural land, with only 1% arable lands and 0.1 % of forests. It is desert climate in all other parts of the region. Dust storms lasting four to eight days is fairly common during Spring.

Sample collection and identification

Samples were collected from different farms at random; brought to the laboratory, fixed immediately in 4% formaldehyde. The algal were observed and identified till species level based on the existing literature (Desikachary, 1959; Guiry, 2013), and photographs were taken.

Figure 1: Map of Libya and the study area

RESULTS AND DISCUSSION

Though almost all classes of algae were encountered, 24 species following to 24 genera and 5 divisions were recorded (Table 1& Figure1). The most diverse group was Chlorophyta (46%), followed by Cyanophyta (25%), Bacillarophyta (17%), Euglenophyta (8%) and Dinophyta (4%). Chlorophyta were found to be more widely and frequently distributed throughout the study period. Agricultural discharges may contain fertilizers that stimulated the growth of algae as they are rich by nutrients. Chlorophytes can live in wide range of nutrients and physical environments. Dinophyta species was only appeared as one species since they prefer oligotrophic water. Euglenophyta species preferred more organic ecosystems conditions and they indicate to the trophic states of freshwater lakes (Omar *et al*, 2016).

Cyanophytes inhabit environments with diverse trophic states and wide distribution in eutrophic water bodies (Naqqiuddin *et al.*, 2017; Omar *et al.*, 2016). They used as a critical indicator for water quality because of their toxicity and their probable risk to human health. Progression of Cyanophytes increased with increasing temperature and organic contents in freshwaters bodies.

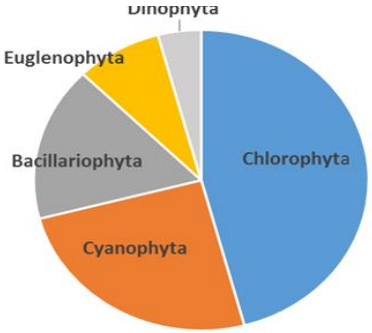

Figure 2: Algae composition in kufrah

Presence of certain species of algae could define various zones of degradation in a freshwater body. Palmer (1969) published a composite rating of algal species that could be used to indicate clean and polluted waters. More intensive surveys fore freshwater algae are recommended in future studies with physico-chemical parameters study. Study done by (Saad & Alsanbany, 2019) in Fezzan (south of Libya) reported that Cyanophyta was the most dominant group followed by Bacillariophyta then chlorophyte, these result are not agreeing with the current study, may because of the sampling water type. Since their sampling was from water tanks, which have no pollution.

Table.1: List of algae species categorized from kufrah

Chlorophyta
Chlamydomonas reinhardtii P.A. Dangeard
Chlorella vulgaris Beyerinck (Beijerinck)
Cosmarium undulatum Corda ex Ralfs
Oedogonium braunii Kützing ex Hirn
Oocystis borgei J.W. Snow
Pandorina morum Bory
Pediastrum simplex Meyen
Scenedesmus acuminatus Chodat
Spirogyra varians (Hassall) Kützing
Staurastrum margaritaceum Meneghini ex Ralfs
Zygnema stellinum (O.F.Müller) C.Agardh
Cyanophyta
Chroococcus turgidus Nägeli
Microcystis aeruginosa Kützing
Merismopedia punctata Meyen
Nostoc commune Vaucher ex Bornet & Flahault
Oscillatoria princeps Vaucher ex Gomont
Arthrospira platensis Gomont
Bacillarophyta
Cyclotella meneghiniana Kützing
Cymbella lanceolata Kirchner
Navicula rhynchocephalia
Nitzschia amphibia Grunow
Euglenophyta
Euglena viridis Ehrenberg
Trachelomonas hispida F.Stein
Dinophyta
Gymnodinium helveticum Penard

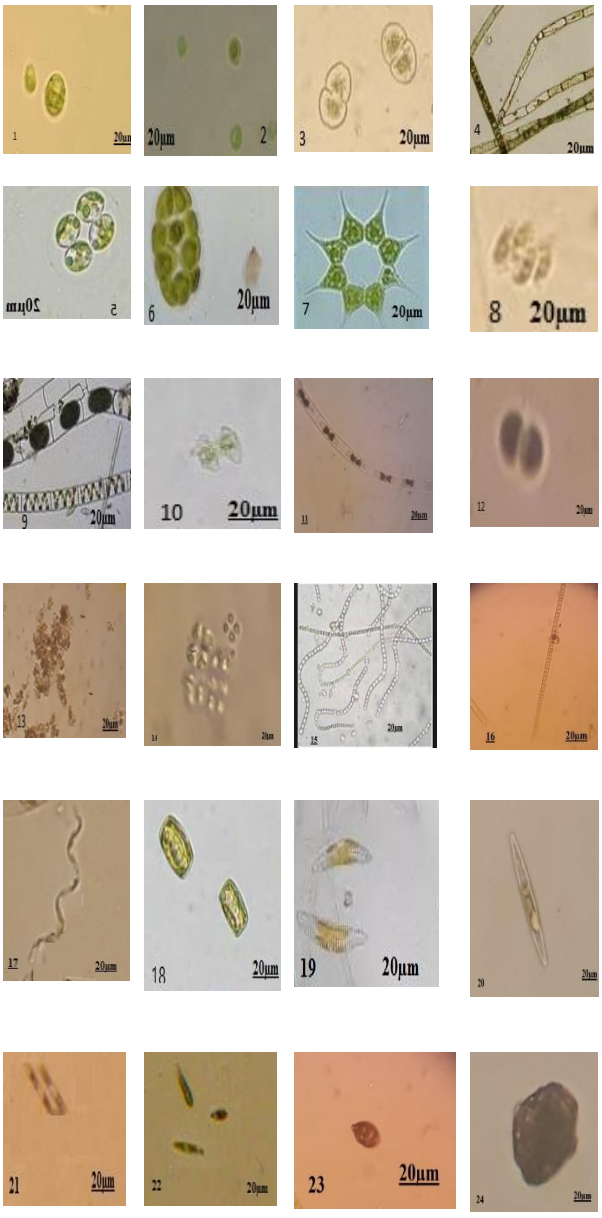

Figure 2: Photos of algae collected from different sites from kufrah.

(1): Chlamydomonas reinhardtii, (2): Chlorella vulgaris, (3): Cosmarium undulatum, (4): Oedogonium braunii, (5):*Oocystis borgei*,(6): *Pandorina morum*, (7): *Pediastrum simplex*, (8):*Scenedesmus acuminatus*, (9): *Spirogyra varians*, (10): *Staurastrum margaritaceum*, (11): *Zygnema stellinum* (12): *Chroococcus turgidus*, (13): *Microcystis aeruginosa*, (14): *Merismopedia punctate*, (15): *Nostoc commune*, (16):

Oscillatoria princeps, (17): *Arthrospira platensis*, (18): *Cyclotella meneghiniana*, (19): *Cymbella lanceolate*, (20): *Navicula rhynchocephalia* (21): *Nitzschia amphibia*, (22): *Euglena viridis*, (23): *Trachelomonas hispida*, (24): *Gymnodinium helveticum*.

REFERENCES

Chen, Y. Y., & Liu, Q. Q. (2014). On the horizontal distribution of algal-bloom in Chaohu Lake and its formation process. Acta Mechanica Sinica, 30(5), 656-666.

Compère, P. (1986). Algues récoltées par J. Léonard dans le désert de Libye. Bulletin du Jardin botanique national de Belgique/Bulletin van de Nationale Plantentuin van Belgie, 9-50.

Desikachary, T. V. (1959). Cyanophyta, Monograph on blue green algae. ICAR, New Delhi, India, 1-689.

Glibert, P. M., Icarus Allen, J., Artioli, Y., Beusen, A., Bouwman, L., Harle, J., ... & Holt, J. (2014). Vulnerability of coastal ecosystems to changes in harmful algal bloom distribution in response to climate change: projections based on model analysis. Global change biology, 20 (12), 3845-3858.

Guiry, M.D. (2013). Algae Base. World-wide electronic publication, National University of Ireland, Galway.

Hamida. EL. & Hanan. M. A. (2018). Collection and definition of freshwater algae in City of Shahat, Libya. Journal of Environmental Science, Toxicology and Food Technology, (12)12: 37-41

Issa, A. A., Attitalla, I. H., & El-Mesmary, H. M. 2012. A first Report of Fresh Water Algae at Suluq lake, Libya. Topclass Journal of Microbiolog, 1(1) :18-24

Khan MA. (1995). Floristic studies of Diatom communities and habitat characteristics of some inland waters in Libya. Arab Gulf J. Sci. Res., 13: 133-149.

Khan, M. A. (1989). Studies on limnobiotic conditions in a thermal spring at Tajura,(Tripoli), Libya. Acta hydrochimica et hydrobiologica, 17(4), 401-405.

Khan, M. A. (2010). Limnological research in Libya. International Journal of Ecology and Environmental Sciences, 36(1), 59-66.

Khan, M. A. (2010). Limnological research in Libya. International Journal of Ecology and Environmental Sciences, 36(1), 59-66.

Khan, M. A., & Zarmouh, M. M. (1989). Phyto- and Zooplankton Composition and Some Ecological Observations on a Man-made Lake in Wadi el Majanin, Libya. Acta hydrochimica et hydrobiologica, 17(5), 525-532.

Léonard, J., Misonne, X., Klerkx, J., De Heinzelin, J., Haesaerts, P., Van Noten, F., & Petiniot, R. (1969). Expédition scientifique belge dans le désert de Libye. Africa Tervuren, 15 (4):101-134.

Marchesoni, V. (1947). Flora algologica del Fezzan e della regione di Gat. *Mém. Ist. Ital. Idrobiol.* 3, 431-461.

Naqqiuddin, M. A., Kader, M. A. O. A., Muhamad, N., Nor, N. O., Shohaimi, S., & Zulkifly, S. (2017). Comparison of phytoplankton diversity and succession between two small man-made lakes in Serdang, Selangor. Tropical Ecology, 58(3), 485-496.

Nizamuddin, M., & Gerloff, J. (1982). Freshwater algae from Libya. Nova Hedwigia: Zeitschrift fur Kryptogamenkunde.

O'neil, J. M., Davis, T. W., Burford, M. A., & Gobler, C. J. (2012). The rise of harmful cyanobacteria blooms: the potential roles of eutrophication and climate change. Harmful algae, 14, 313-334.

Omar, M. A., Naqqiuddin, M. A., Shohaimi, S., Omar, H., & Ismail, A. (2016). Phytoplankton diversity in relation to different weather conditions in two urban made lakes. Sustainability, Agri, Food and Environmental Research, 4(1).

Omar, M. A., Azmai, M. N. A., Omar, H.,& Ismail, A. (2016). Water quality, primary productivity and carbon capture potential of microalgae in two urban manmade lakes, Selangor, Malaysia.Advances in Environmental Biology, 10(3), 10-22.

Quézel, P. (1958). Mission botanique au Tibesti. *Mem,inst. Rech.sahar*.4:357.

Saad, S. M. & Alsanbany M. M. (2019). Diagnosis of algae present in the concrete basins and their relationship to saturation food for some farm area Fezzan (south of Libya). Journal of Pure & Applied Sciences, 18 (3): 43- 50.

Schwabe, G. H., & Simonsen, R. (1961). Cyanophyceen und Diatomeen aus der Krateroase Wau en-Namus (Fezzan, zentrale Sahara). Internationale Revue der gesamten Hydrobiologie und Hydrographie, 46(2), 255-268.