



STUDYING THE CHANGES IN CHLOROPHYLL (A) CONCENTRATIONS RELATED TO SOME HYDROLOGICAL FACTORS IN NORTH COASTAL WATERS OF LATTAKIA CITY (EASTERN MEDITERRANEAN)

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

This research aimed to study chlorophyll (a) concentrations related to some hydrological properties (temperature -pH -salinity) and to determine the qualitative composition of phytoplankton in different environmental stations exposed to a different pollution sources (sewage -human activities). Six cruises were carried out during summer and autumn. Results showed that no differences in temperature and salinity. The highest concentration of chlorophyll (a) was found on autumn (7.09 mg/m^3). The most dominant group in summer was Diatoms (*Chaetoceros curvisetus*, *Leptocylindrus danicus*, *Guinardia striata*) most Dinoflagellata dominated in autumn with high abundance of two species (*Ceratium furca*, *Ceratium macroceros*).

Keywords: Phytoplankton; hydrological factors; chlorophyll (a); Eastern Mediterranean.

1. INTRODUCTION

The eastern Mediterranean is one of the most impoverished (oligotrophic) seas in the world in terms of nutrient concentrations and productivity. However, some parts of the eastern Mediterranean are more productive because of local enrichment by run-off from the land [1].

Phytoplankton communities play an important role in aquatic ecosystems as they produce food and oxygen, which supports all other life forms. Knowledge on their abundance and community composition

provided further understanding of ecological interactions in aquatic ecosystems. The seasonal dynamics of phytoplankton have been investigated worldwide [2].

There are many local studies on phytoplankton communities, including information regarding their spatial and temporal variations along the eastern Mediterranean coastline.

The aim of this studied area was to investigate in qualitative composition and chlorophyll a concentrations with hydrological factors, and to understand the present situation of the studied area

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which can be a base line for further studies in this region.

2. MATERIALS AND METHODS

2.1 Description of Sampling Stations

The studied area: the north coast of Lattakia city, Eastern Mediterranean (between lat. 35°41'8.15" N, long. 35°47'48.58" E). Samples were collected from six different stations, located in an area ranging from coast line to (500m- 1km) of sea (Fig. 1). These stations are under the influence of different pollution sources due to the human activities, sewage, estuarine.

2.2 Sampling Methods & Laboratory Analyses

Sampling was performed six times: (June 2020, November 2020). Water samples for analyses phytoplankton, chlorophyll a were collected from surface waters at all stations and in all periods. Phytoplankton was identified using light microscopy (LISS MICROSCOPE FACTORY), and species were determined based on international taxonomic references [3,4,5]. Water temperature and salinity were measured immediately in situ using a pH / Cond340i.

3. RESULTS AND DISCUSSION

3.1 Environmental Parameters

The highest and lowest surface water temperatures throughout the sampling period were found 31.4°C in September and 24.9°C in November. Whereas, salinity ranged from 34.9‰ to 38.1‰ and the highest and lowest salinity values were found in June and September, respectively (Fig. 2). Generally there were significant variations of temperature and salinity values between months.

Temporal differences were found among months in term of chlorophyll a values (Fig. 3) in the present study; the difference among stations was statistically significant, whereas the difference among the results in terms of months was significant. chlorophyll a reached the highest value of chlorophyll (a) was determined in September (4.2 mg/m³) and June (5.8-6.6 mg/m³) and the lowest value was in November (0.0 mg/m³), usually phytoplankton shown two main peaks, the first one in spring and the second in autumn. Also, chlorophyll a concentrations in this study showed similarity with earlier findings for different areas of east Mediterranean [6] and to other studies in Syrian coastal water.

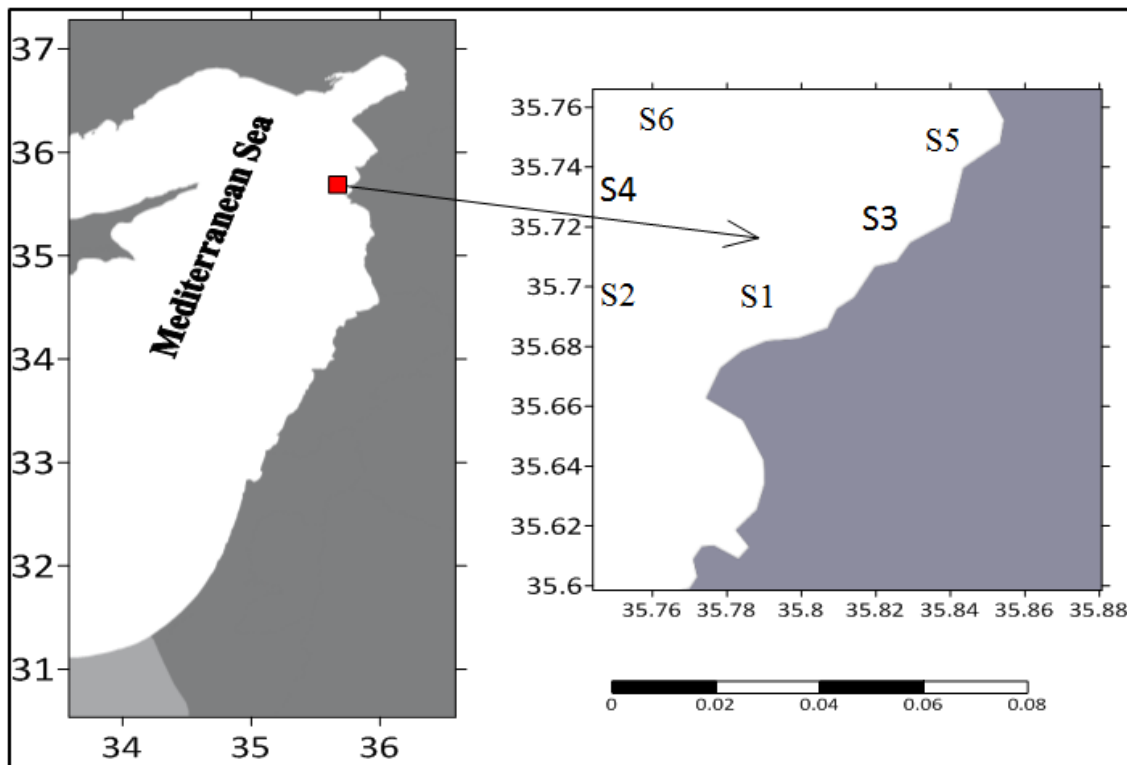


Fig. 1. Locations of the studied stations in Lattakia city coastal waters

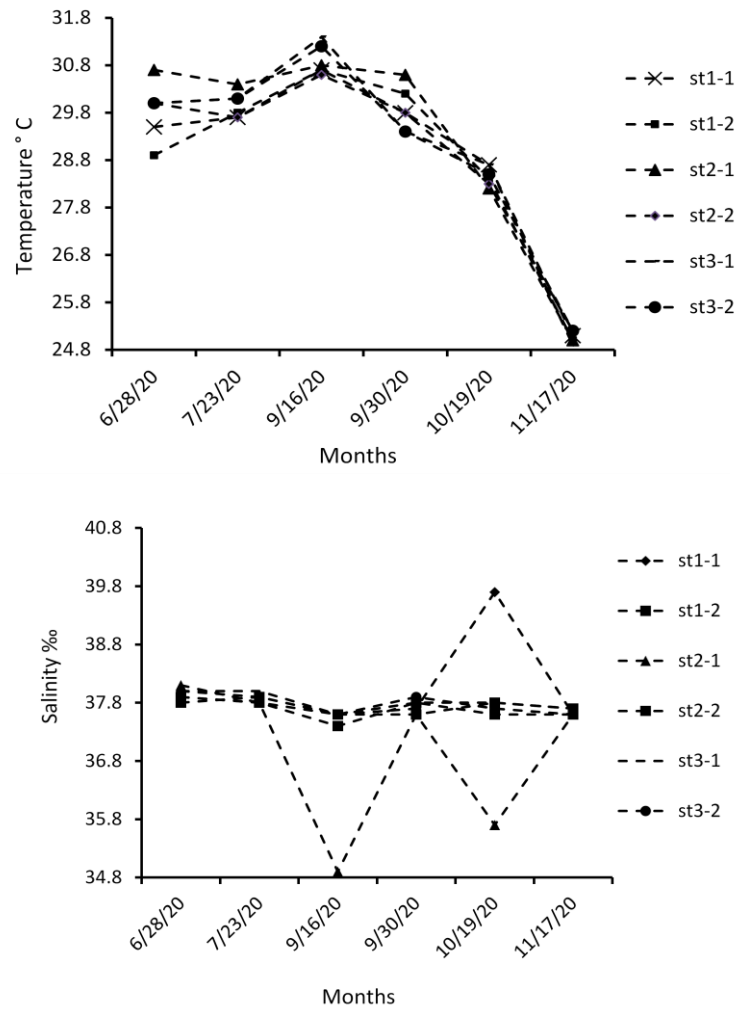


Fig. 2. Spatial and temporal variations of temperature and salinity in the coastal waters of Lattakia city

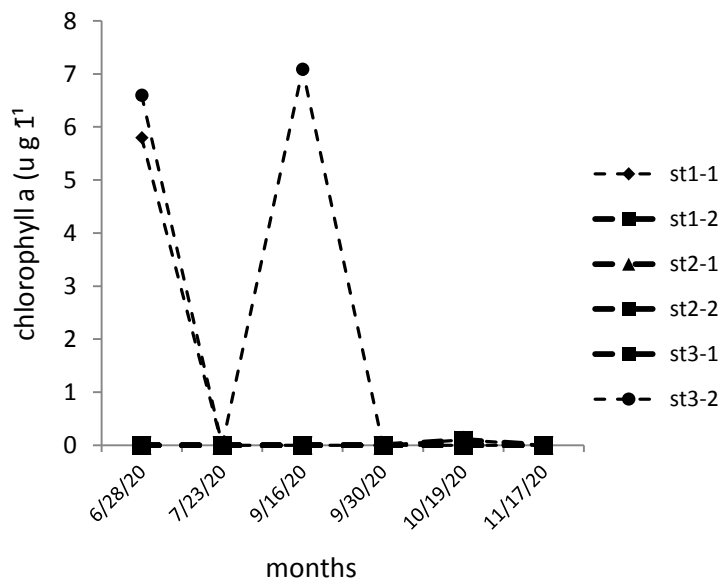


Fig. 3. Spatial and temporal variations of chlorophyll a in the coastal water of Lattakia city

In this study, 22 taxa from Diatoms, 11 from Dinoflagellates were identified (Table 1). The diatoms were the most dominated group, Forming about 85 % of the total counts of phytoplankton, followed by dinoflagellates that represented about 15 % of the total abundance.

Diatoms were dominant in summer and the most abundant species were *Chaetoceros lasinioides*,

Chaetoceroscurvisetus, *Chaetoceros brevis*, *Chaetoceros socialis*, *Leptocylindrus danicus* and *Rhizosolenia fragilissima* and *Guinardia flaccid*, Dinoflagellates were dominant in autumn and the most abundant species were *Ceratium tripos*, *Ceratium longipes*, *Ceratium trichoceros*, *Ceratium macroceros* and *Dinophysis caudate*.

Table 1. Phytoplankton taxa recorded in the study area

Species/Diatoms	Stations					
	St1	St2	St3	St4	St5	St6
<i>Biddulphia aurita</i>	-	-	-	*	*	*
<i>Chaetoceros lasinioides</i>	*	*	*	c	c	c
<i>Chaetoceros curvisetus</i>	*	*	*	c	c	c
<i>Chaetoceros compressus</i>	c	c	c	c	c	c
<i>Chaetoceros brevis</i>	A	A	A	A	A	A
<i>Chaetoceros didymus</i>	A	A	c	c	c	c
<i>Fragellaria crotonensis</i>	-	-	-	*	*	c
<i>Guinardia flaccid</i>	c	c	c	c	c	c
<i>Hemiaulus haukii</i>	*	*	*	*	*	*
<i>Lauderia annulate</i>	*	*	*	*	*	*
<i>Leptocylindrus minimus</i>	c	c	c	c	c	c
<i>Licmophora abbreviate</i>	-	-	-	*	-	*
<i>Navicula cryptocephala</i>	*	-	-	*	*	*
<i>Nitzschia draveillensis</i>	*	*	*	*	*	*
<i>Pseudonitzschia delicatissima</i>	*	*	*	*	*	*
<i>Rhizosolenia alata</i>	c	c	c	c	c	c
<i>Rhizosolenia calcar- avis</i>	c	c	c	c	c	c
<i>Rhizosolenia setigera</i>	*	c	c	c	*	*
<i>Thalassionema nitzschioides</i>	c	c	c	c	c	c
Species/ Dinoflagellates	Stations					
	St1	St2	St3	St4	St5	St6
<i>Ceratium furca</i>	c	c	A	A	A	c
<i>Ceratium fusus</i>	c	c	A	A	A	c
<i>Ceratium lineatum</i>	A	A	c	c	c	c
<i>Ceratium tripos</i>	c	c	c	c	c	c
<i>Ceratium longipes</i>	c	c	c	A	A	A

4. CONCLUSION

According to the different anthropogenic resources in the studied area, many toxic phytoplankton species were found in all stations during summer and autumn and some of these species belong to *Dinophysiscaudate*, *Protoperidiniumdepressum*, *Ceratiumfurca*, *Ceratium fusus*, *Ceratium lineatum*, and *Chaetoceros similis*. These species were dominant during the spring and autumn of phytoplankton blooms period, and were registered for the first time in the coastal water of studied area and this is agreed with the different studies at the studied area and different coastal water at the eastern part of Mediterranean [7].

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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