First records of alien toxic algae *Heterosigma akashiwo* (Raphidophyceae) from the Mediterranean Coast of Syria

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K E Y W O R D S

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Introduction

The raphydophyte *Heterosigma akashiwo* is widely distributed in coastal ecosystems at different latitudes where it may cause fish mortality and shellfish damage (Taylor and Haigh, 1993; Connell *et al.*, 1997) and inhibition of microzooplankton growth (Kamiyama, 1995; Kamiyama *et al.*, 2000).

Many researcher have investigated the ecological characteristics of *H. akashiwo* like appearance, growth, nutrition, and cysts (Honjo and Tabata, 1985; Yamochi, 1989; Imai and Itakura, 1991).

Though the classification of *H. akashiwo* and *Olisthodiscus luteus* has been confused, Hara and Chihara (1987) reported that *O. luteus*, which had been identified as a red tide species in North America and Europe, was actually the same organism as *H. akashiwo*.

In spite of , *H. akashiwo* has been recorded in many coasts around the world, it was recorded in two regions only , the first in the Bay of Izmir a , (Koray, T., 1984) and the second was Alexandria Coast (Labib W.,2010) on the Mediterranean sea .

There are many alien species were reported for the first time on Syrian coast, since the end of the previous century to present (Durgham, 2002;2009,2011), so, the main purpose of this study was to report on the occurrence of *H. akashiwo* in the Mediterranean coast of Syria (Levantine basin).

Material and Methods

Studying area is located in the eastern Mediterranean, in the coastal waters of Syria and exists in Lattakia Port. This region is exposed to various contamination resources (urban sewerage, residue, and ships ballast water).

ABSTRACT

The raphydophyte Heterosigma akashiwo is widely distributed in coastal ecosystems at different latitudes where it cause red tide. In spite of It has been identified in many coasts around the world, this species are recorded first time from the Syrian coast of the eastern Mediterranean in 2010. Heterosigma akashiwo was isolated from samples which are collected from the coast of Lattakia port. Surface temperature, chlorophyll -a -b -c, Pheophytin, and nutrients concentrations were measured.

The samples collected from Lattakia Port ($35^{\circ}32'20.63"N$, $35^{\circ}46'2.79"$ E) in May 2010. The location of the studying area and sampling station are shown in Figure 1. Phytoplankton Samples were taken by WP2 plankton net (56cm diameter, 20µm mesh). The samples bottle are held on ice, and protected from light and taken quickly for further investigation (Isolation and culturing this species moreover to Taxonomic study) in the plankton Lap. in High Institute of Marine Research (HIMR). Water Samples were taken by Hydro-Bios-DBG Germany HB (capacity 5L). Temperature and salinity profiles were obtained with a WTW Multiline P4.

Phosphates, ammonia, nitrates and nitrites was determined as described by (Murphy& Riley 1962; Koroleff, 1969; Wood *et al.*, 1967; Bendschneider & Robinson, 1952) respectively. Chlorophyll a, b and c was determined as described by (Unesco, 1980). Taxonomy were carried out according to (Koray, 1984; Tomas, 1997)

Results

Heterosigma akashiwo (Chromophyta: Raphidophyceae) (fig 2,3) have two flagella, one of which is used for swimming, Cells contain many yellow green chloroplasts, and the Length of cells ranged between 12-18 μ m.

Heterosigma akashiwo was observed near the urban discharge, where high values of nutrients was recorded. Ammonia, Nitrites, Nitrates and Phosphate concentration was (14.3, 0.16, 4 & 2.1 μ mol/L) respectively. Highest Chlorophyll a , b and c concentration (98.9, 56.4 & 41 mg m3, respectively) were observed due to rising nutrient concentration. The values of temperature (23°c) was recorded in the same period to occurrence *H. akashiwo* are agree with (Kamiyama,1995), whereas the salinity was 38 ‰ . A very low density of *H. akashiwo* was recorded (150.4 cells/l) in compare with other regions (Clarke, 1999; Kamiyama,1995).



Figure (1) Location of sampling station from Latakia port (Lattakia-SYRIA).



Fig (2) Live cell of *Heterosigma akashiwo* collected from Lattakia port in may 2010.



Fig (3) live cells of *Heterosigma akashiwo* after addition of formaldehyde solution from aquaculture of Plankton Lap., (HIMR).

Discussion

The significance of alien species in marine ecosystems worldwide has been highlighted in recent years. International organizations and the scientific community have addressed the issue through articles, review papers, databases and directories.

The introduction of non-indigenous species is a dynamic nonstop process with new species reported each year.

On the other hand, The number of alien biota in the Mediterranean appears to be underestimated. Some hot spot areas for possible species introductions such as the coast of the Levantine basin are not well studied.

The introduction of marine non-indigenous species across the red sea (Lessepsian migrants) is similar to marine invasions in other parts of the world. Transportation via the Suez Canal and shipping appear to be the major vectors of introduction (Streftaris et al., 2005). Studying area (Lattakia port) is more polluted than other in Syrian coast (Durgham, 2004). The untreated waste waters originating together with substantial industrial development and intensive harbor activities, give rise to considerable pollution loads. Therefore, significant nutrient enrichments have been observed in this Region . The rise in pollution and increased the concentrations of nutrient in this region may be a major cause in the emergence of *H.akashiwo*.

The appearance *H. akashiwo* indicate a large probability of occurrence of red tides, and what have of a potential to cause a toxic and/or harmful bloom, in this region in the future.

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