Species Compsition and Seasonal Variation of epiphytic diatoms on Typha domtoms on Typha domingensis and Phragmits australis from Southern Iraqi Marshes

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Abstract:
Submerged stem of Typha domingensis and Phragmites australis were chosen from two stations within southern marshes of Iraq. A total of 76 species of epiphytic diatoms were recorded. Most of the indentified diatoms belong to biraphid pennates. The existing difference in Physical and chemical parameters between the two stations were reflected in diatom species, dominancy and standing crop.

INTRODUCTION:

Most of the phyla of algae are represented in the epiphyte community, though diatoms are often predominant (1). More than 80% of the known epiphyton population in southern Iraq were represented by diatoms (2,3). Data available from Iraqi waters are very few and the details on species composition, seasonal variation and the dominant periphytic species did not exist still. Maulood and Hinton (4); Kassim (2); Hadi and Al-Saboonchi (3) have revealed some aspects of such studies in their publications.

The seasonal variations in the epiphytic diatoms attached on the main two aquatic plants in southern marshes were discussed.

Study Area:

The extensive march region of Iraq, occupy an area of more than 35000 km^2 of the lower Mesopotamian region, 9000 km^2 as permanent marsh and the rest as seasonal due to the flood. It lies between 30 ° 35°-32° 45 N and 46° 13 –48°E, with a length of about 210 Km and a maximum width of 170 km.

The epiphyton diatoms were investigated at two stations located in the southern marshes near Qurna city, where the two rivers Tigris and Euphrates Join to form the Shatt al-Arab estuary (Fig. 1). Station 1, was located west to Dair (10 km South of Qurna) and characterized by closed area feature due to the presence of artificial dams. Station 2 was located north Madaina (5 km west of Qurna) and characterized by open marsh area.

Materials and Methods:

The present study conducted during the period from July 1983 to June 1984. Submerged stems of two host plants, Typha domingensis; Phragmites australis of about 500gm were randomely collected from each station and kept in sample water in wide mouth plastic bottles. All samples were cut to pieces of about 1 cm in the laboratory and 4 gm fresh weight was kept in 50 ml of distilled water. The removal of algae was carried out by using shaking and sonication technique (5). Triplicate drops of 0.05 ml from the concentrated sample cleared in nitric acid, mounted in naphrax. The modified microtransect method(6) was used for counting and results expressed as cells per one gram fresh weight host plant. Unconcentrated portion of sample remained, cleared in chromic acid and used for identification of diatom frustules according to (7,8,9).

Results and discussion

A total of 76 species of diatoms were recorded during the study period (Table 1). All species recorded belong to pennate diatoms, most of which were biraphid from which constitute more than 80% of the total number. About 47% of the identified species were found to becommon between the two stations, this may be related to the existing difference between the stations in respect to physical and chemical parameters (Table 2) (10,11,12).

Achananthes minutissima was found to have an almost universal distribution in fresh water (13) and was found in a wide variety of lakes (11). This species was found to be common at both stations during this investigation although Maulood and Hinton (4) and Kassim (2) have refered to its presence in southern marshes. Three species of Amphora were found attached to both plants at station 1 while it was not recorded at station 2.

Amphora angustata var. typica (Greg) Cl. L :22.7-39.7 μ, W: 4.9-5.6 μ, Striae :16-17 in 10 μ) is a new record to Iraqi flora according to the known check list (14). Round (15) described the habitat of Amphora as brackish or marine whereas Hutchinson (12) refered to its presence in mineralized lakes..

Anomoeneis costata (Exilis) and Cymbella spp. were dominant at station 1 where they were rare, where as higher percentage of *Navicula* and *Nitzschia* was found at station 1. Occurrence of many other species in the study area may also be related to water chemistry and its effect on periphyton diatoms. Presence of the genera *Amphipleura*, *Epithemia*, *Eunotia*, *Gomponema* and *Rhopalodia* at station 2 may be related to poor nutrient character of the water in this area in contrast to *Amphora*, *Mastogloia* and *Synedra* at station 1 which are indicators of alkaline, Euryhaline and eutrophic waters (15, 16, 17, 18).

Total number of algae found on both plants (standing crop) were different between the two stations. The maximum, minimum and monthly mean number at station 1 were found to be more than double of that at station 2(Table 3).

Table 3: Standing crops (x 10^5) cell g^{-1} epiphytic diatoms and their monthly mean during the study period.
(T: *Typha*; Ph : *Phragmites*)

	Station 1		Station 2	
	T	Ph	T	Ph
Minimum	14.8	20.7	3.0	4.2
Maximum	60.4	61.8	32.0	29.9
Monthly mean	36.5	38.1	14.2	18.6

The seasonal variations in the total standing crops were largely the outcome of the seasonal variations attained by the dominant species found (Figs. 2,3). Station 1 characterized by the bimodel distribution pattern. First peak extended from October-December, although it continued also to January on Phragmites. Numbers reached the maxima (61.7 x10^5 cells g^{-1}) during October reached the maxima (61.7x 10^5 cells g^{-1}) during October on Phyagmites and (60.4 x10^5 cell g^{-1}) during December on Typha. Second peak was less in its time period, where the maxima (61.8 x10 5 cell g-1) on Phragmites and the maxima (58.5 x10^5 cells g^{-1}) on Typha were recorded in May. Low numbers were in May June, and late March . Thus , High numbers were during autumn, winter and late spring months, and low numbers during summer months on both plants.

Dominant species comprised a total percentage, at the first maxima of about (94%) during October on *Phragmites* and (80.2%) during December on *Typha*. At the second maxima they comprised (87%) in late May on *Phragmites* and (71.0%) in early May on *Typha*. Thus, species diversity was low in species interaction or competition for the diminishing substrate area (19).

At station 2, first peak was also extended from October –December, although numbers remained high in January on *Typha*. The maxima was (29.9 x10 5 cells g-1) in October on Phragmites and (32.0 $x10^5$ cells g^{-1}) in November on *Typha*. Second peak was unclear on both plants, since diatom number began to fluctuate on *Phragmites* and never raised again on *Typha*. Thus, the seasonal variations in the total epiphyton standing crops at this station characterized by relatively constant high numbers during Autumn- Winter months only. The lack of late spring maxima was questionable at this station.

Dominant species, at the first maxima comprised a total percentage of (61.6%) in October on Phragmites and (71.8%) in November on Typha. The general seasonal variations pattern of the total epiphyton standing crop at both stations, characterized largely by, autumn – winter and spring months maxima and summer minima. Similar patterns of seasonal variations are given for the epiphyton attached on various aquatic macrophytes from southern marshes(2) and from Shatt al-Arab (3).

The entrance feature arised from this study was the lack of host specificity, I,e both plants from the same station or locality posses the same dominant species, and nearly equal cell densities, since the differences in the total cell counts of diatoms attached on both plants from the same station were statistically not significant, t-test value=0.473, $P<0.05$; $t=1.070$, $P<0.05$, in station 1 and station 2 respectively. Thus, the role of external environment appeared to be more important than the host type at the study stations. Several investigators indicated similar observations (12,21,10, 22,23,24) although, Eminson and Moss(25) stated that, the influence of host type in determining periphyton community was greater in infertile lakes, but that in progressively more fertile water, internal environmental factors become more important.

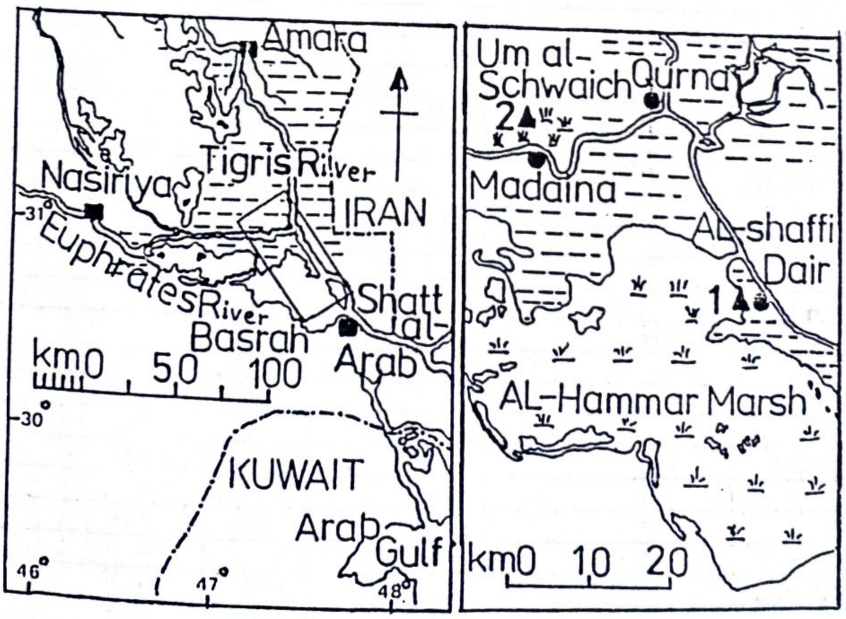

Fig.(1). Map of marsh area showing the two stations.

Table 1: List of Diatom species recorded in the study stations and their average percentages of the total population during the study period. (*: dominant (5% or more); T: *Typha*; Ph *Phragmites*; --:not recorded)

Taxa	Station 1		Station 2	
	T	Ph	T	Ph
Achnanthes lanceolata var. rostata	--	--	--	0.04
* *A. minutissima*	1.31	0.91	19.79	19.37
Amphipleura pellucida	--	--	0.71	1.68
Amphoro angustata var. typica	8.68	21.63	--	--
A. coffeaeformis	11.66	12.71	--	--
A. ovalis var. lypica	--	0.08	--	--
**Anomoeoneis costata*	0.73	0.40	7.65	9.46
Bacillaria paradoxa	0.35	0.30	0.27	0.43
Campylodiscus clypeus var. bicostata	0.77	0.82	0.05	--
Cocconeis placentula var. euglypta	2.61	3.53	1.59	2.62
Cymbella affinis	--	0.08	--	--
**C. cistula*	--	--	7.02	7.90
C. Cymbiformis	--	--	2.75	3.26
**C. microcephala*	--	0.53	5.69	5.62
C. turgida	--	--	--	0.22
Diploneis ovalis	1.54	1.58	0.56	0.84
Epithemia zebra	--	0.32	1.18	1.42
E. Zebra var. porcellus	--	--	1.01	0.80
E. Sorex	0.08	0.04	--	--
E. turgida	0.04	--	1.33	--
Eunotia lunaris	--	--	0.11	--
E. pectinalis var. undulata	--	--	--	0.17
Fragilaria brevistriata var. inflata	0.47	0.25	0.96	0.50
F. construens	1.01	--	0.05	--
F. pinnata	--	--	0.71	--
Gomphonema augar	--	--	0.05	--
G. constrictum var. capitata	--	--	--	0.04
G. gracile	--	--	--	0.64
G. intricatum var. lunata	0.13	0.12	1.11	0.27
G. lanceolatum fo. turris	--	--	0.05	0.09
G. montanum	--	--	0.22	--
G.parvulum	--	--	0.82	0.32
Mastogloia braunii	7.54	3.09	1.10	0.67
M. elliptica var. dansei	--	--	3.16	2.89
M. smithii var. amphicephala	0.51	0.04	2.37	3.87
**M. smithii var. lacustris*	5.64	1.65	24.18	16.93
Navicula buccella	2.15	--	--	2.00
N. cryptocephala fo. Minuta	0.64	0.37	1.49	--
N.graciloides	--	0.12	--	--
N. halophila var. robusta fo. subcapitata	--	--	--	0.34
N. inflata	1.13	0.56	0.16	0.23
* *N. parva*	6.61	3.93	0.27	3.88
N. pupula var. capitata	--	--	0.11	--
N.pupula var. rectangularis	--	--	0.11	0.04
N.pygmaea	0.27	--	--	--
N.radiosa	--	0.08	0.28	0.31
N.radiosa var. tenella	--	--	--	0.24
N.rhynchocephala	--	0.37	--	0.04
N. spicula	2.41	0.41	1.04	0.04
N.tenera	0.09	--	--	--
N.viridula var. rostellata	1.84	1.33	0.62	0.09
Nitzschia amphibia	1.94	0.68	1.12	1.20
N. apiculata	1.14	0.70	0.11	0.09
N.dissipata	0.46	0.12	--	--
N.filiformis	0.22	0.25	0.11	--
N.fonticola	2.76	2.37	0.11	--
N.gracilis	0.27	0.65	0.49	2.66
N. granulata	0.98	0.62	--	--

N. Hustediana	--	0.04	0.06	0.04
N. hungarica	0.29	--	--	--
**N. kuetzingiana*	10.91	5.26	1.40	3.48
N.longissima	0.21	0.16	--	--
N. lorenziana	0.04	0.08	--	--
N. obtusa	--	--	0.05	0.18
N.paleacea	--	--	--	0.18
N. scalaris	--	0.04	--	--
N.sigma	0.04	--	--	--
Pinnularia appendiculate	0.09	0.53	0.05	--
Pleurosigma delicatulum	0.12	--	0.05	0.9
Rhopalodia gibba	0.21	0.86	4.31	2.56
R. musculus	0.17	0.04	0.11	--
Synedra acus var. radians	--	0.61	--	--
S. capitata	--	--	0.16	--
** S.fasciculata*	13.45	18.77	0.11	0.47
**S. ulna*	7.83	11.94	1.49	1.49
S.pulchella	--	--	--	0.09

Table 2: Some physico –chemical parameters of the study stations (Al-zubaidi, 1985).

		Total depth (cm)	Air temeprature °(c)	Water temperature °(c)	PH	Salinity (%)	Total alkalinity (mg. l^{-1})as CaCo$_3$	Total hardness (mg. l^{-1}) as CaCo$_3$	% Saturation of oxygen	Silicate (Mg-at. SiO$_3$-Si.l^{-1})	N:p
Station I	Min.	30	18.0	14.0	7.99	3.4	53.0	875	23.2	36.3	1.06:1
	Max.	145	40.0	32.0	9.16	21.5	355.0	13765	112.3	306.4	19.29:1
	Mean	86.6	31.0	24.2	8.43	8.8	221.0	3826	80.5	143.6	4.16:1
Sataion 2	Min.	85	15.0	12.0	7.39	0.6	162.0	158	42.4	18.5	0.67:1
	Max.	150	37.0	32.0	8.04	2.2	231.0	417	81.9	325.0	6.00:1
	Mean	105	28.6	22.3	7.82	1.0	209.4	325	65.0	122.2	2.80:1

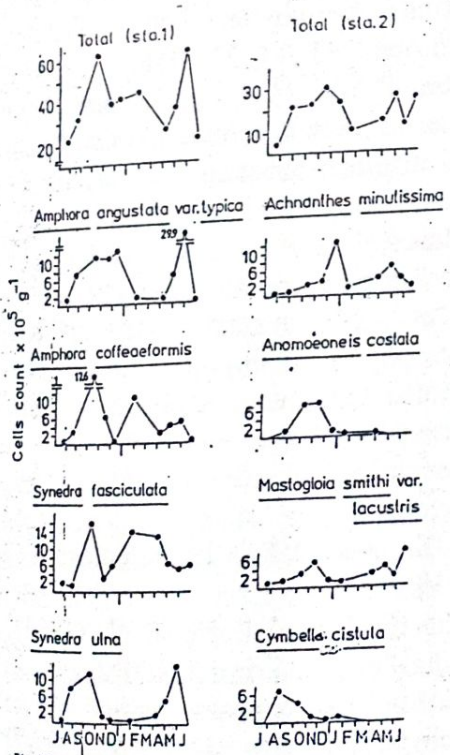

Fig.(3) Seasonal variation of some epiphytic algae on Phragmites australis.

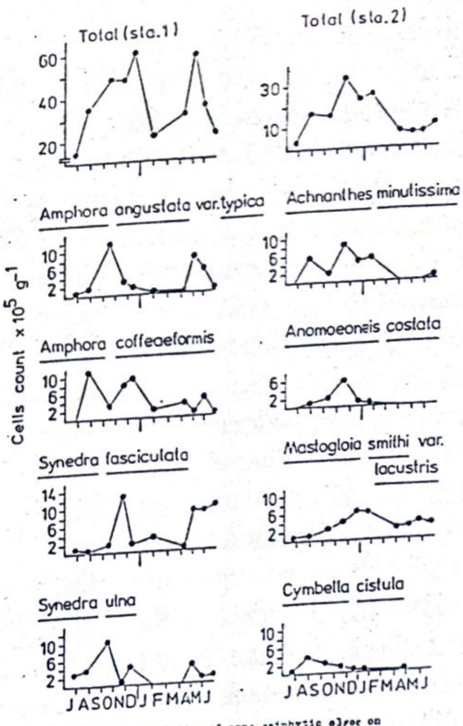

Fig.(2). Seasonal variation of some epiphytic algae on Typha dominangensis.

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