STUDY OF PHYTOPLANKTON ABUNDANCE AND DIVERSITY IN THE SOLAR SALTERN OF SFAX (TUNISIA)

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Abstract
The solar saltern of Sfax sustained an abundant phytoplankton community with higher diversity in the outer than the inner zone in terms of Shannon-Weaver diversity index (H'). Some environmental parameters such as salinity seem to play an important role in determining the phytoplankton community succession and then diversity, favoring or limiting the growth of the different phytoplankton groups.
Keywords: Phytoplankton, Salinity, Biodiversity

Introduction
Several investigations on plankton were conducted in the solar saltern of Sfax [1, 2, 3]. In this ecosystem, phytoplankton was found to tolerate different salinity [1]. That's why, they could be found in the five ponds of our study, but most of them concentrated in the pond of low salinity [3]. In this study, phytoplankton density was described in 2000 and 2003 in five ponds of increasing salinities.

Material and methods
2-1- Sampling
Sampling was carried out in the central part of the five ponds A1, A16, C2-1, M2 and TS in 2000 and 2003.
2-2- Phytoplankton
Water samples (200 ml) were fixed by Lugol's iodine solution and counted under an inverted microscope (× 400) using the Utermöhl method. Phytoplankton identification was made from morphological criteria after consulting various keys.
2-3- Statistical analysis
Mean and standard deviation (SD) were reported when appropriate. The potential relationships between variables were tested by Pearson's correlation coefficient.

Results and discussions
The density of total phytoplankton community marked differences between ponds and years. Phytoplankton density ranged between $0.44 \times 10^6 \pm 0.62 \times 10^6$ cells l^{-1} (pond A1) and $1.23 \times 10^6 \pm 1.87 \times 10^6$ cells l^{-1} (pond M2) during the year 2000 (Table 1).

Tab. 1. Annual Mean ± SD of total phytoplankton density, diversity index and salinity in ponds A1, A16, C21, M2 and TS during the years 2000 and 2003.

Ponds	Years	Total phytoplankton (×10⁶ cells. l⁻¹)	Diversity index (bits. cells⁻¹)	Salinity (p.s.u)
A1	2000	0.44 ± 0.62	1.68	42.6 ± 2.3
	2003	0.64 ± 0.82	1.26	45.2 ± 5.3
A16	2000	0.55 ± 0.91	1.36	74.8 ± 3.0
	2003	0.41 ± 0.28	1.0	78.9 ± 8.2
C21	2000	0.96 ± 1.09	1.19	84.7 ± 5.1
	2003	0.6 ± 0.71	1.14	90.2 ± 11.2
M2	2000	1.23 ± 1.87	1.17	171.9 ± 11.0
	2003	3.34 ± 4.38	1.09	190.1 ± 12.9
TS	2000	0.73 ± 1.05	0.23	393.3 ± 38.4
	2003	1.39 ± 1.39	0.36	423.8 ± 33.1

Throughout the year 2003, phytoplankton density increased in all the ponds. The most important phytoplankton density was recorded in pond M2, at about $3.34 \times 10^6 \pm 4.38 \times 10^6$ cells l^{-1} (Table 1).
The density of total phytoplankton decreased in pond TS. The highest density recorded in pond M2 was due to the high abundance of *Dunaliella salina* (66%) recorded in 2000, and the coexistence of *Dunaliella salina* (51%) and *Chlamydomonas rublifilum* (49%) throughout 2003. The density of the species controlled by salinity was a density-controlling factor [1,2]. Several studies confirmed this result [1,2,3,4]. In consistency with this finding, Elloumi et al. [2]reported that *D. salina* was the major phytoplankton taxon in the Sfax saltern. The majority of these studies mentioned the decrease of aquatic communities' densities with the salinity gradient. The diversity index decreased with the increasing of salinity. This can be explained by the negative correlation recorded between salinity and diversity index ($r = -0.96$; $n = 3$; $p < 0.05$), ($r = -0.94$; $n = 3$; $p < 0.05$) in 2000 and 2003 respectively.

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