

PLANKTON-BENTHOS CYCLE OF *SCRIPPSIELLA ACUMINATA* (THORACOSPHAERACEAE, DINOPHYCEAE) IN THE MAR PICCOLO OF TARANTO (SE ITALY)

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Abstract

The resting stage encystment-germination cycle has been investigated for the dinoflagellate *Scrippsiella acuminata* in the confined coastal basin of the Mar Piccolo of Taranto (South East Italy). The selected species is one of the most abundant in the basin, and, in the study period, it co-existed with other 46 phytoplankton *taxa* (mainly dinoflagellates) in the water column, and 76 resting stages (morphotypes) in the sediment. Two functional types of resting stages have been recognized, to remain in such a variable and crowded system.

Keywords: *Plankton, Dinoflagellates, Sediments, Ionian Sea, Mediterranean Sea*

Introduction

Resting stage production by planktonic organisms represents an adaptation to fluctuations of the environment on seasonal and/or pluriannual scales. In the muddy bottoms of confined marine areas, where conditions are more variable, high densities of plankton resting stages are present as an insurance against unforeseen events. Coastal systems are sometimes crowded by different species, but only few of them are active at each time. The competition for the exploitation of resources in the water column is resolved with the possibility to rest, waiting for a more favourable situation. The deriving network of interactions of biotic and abiotic environment with resting stages has been indicated under the term of Resurrection Ecology [1], and it is understandable only through an integrated approach of sampling and analysis both of pelagic (active plankton) and benthic (resting plankton) communities [2]. The Mar Piccolo of Taranto, a confined coastal basin in Apulia (South East Italy), is one of the most studied environments in the field of resting stage ecology. It hosts a well structured resting stage community, reaching densities of millions of cysts m⁻² of bottom, with more than 180 morphotypes, representing dinoflagellates, ciliates, rotifers and copepods. The basin is being studied since more than 15 years about the presence and distribution of resting stages and their ecological role in plankton dynamics. Recently a research program has been launched to ascertain the diversity of life cycles of the most important species. Here is presented the first investigation, on a single *taxon*.

Materials and Methods

A study of the pelagos-benthos exchanges in the plankton of the Mar Piccolo has been planned at a single pilot station. Four collection methods have been contemporaneously executed (in brackets the sampled items): Niskin bottles and plankton nets (active stages in the water column); sediment traps (cyst production rate from the water column); sediment cores (cyst accumulation in the sediment); inverted traps, Niskin bottles very close to the sediment (cyst germination from the sediment). The study was carried out in two times: autumn 2010, and spring-summer 2011 to observe the cyst production/germination cycles and their consequences on the abundance of active populations. Data here presented refer only to *Scrippsiella acuminata* complex (Ehrenb.) Kretschmann, Elbr., Zinssmeister, S. Soehner, Kirsch, Kusber & Gottschling, one of the most abundant and common dinoflagellate *taxon* of the basin.

Results and Discussion

Only for phytoplanktonic *taxa*, a total of 76 resting stages morphotypes, and 47 active stages species have been found in the whole sampling set. *S. acuminata* was collected by all the sampling devices. The species presence in the water column (active stages) diminished from 140 x 10³ to 5 x 10³ cells L⁻¹ in autumn (September – December 2010), and grew in spring up to a pike of 145 x 10³ cells L⁻¹ in July 2011 (Fig. 1). The production of resting stages (cysts) and their sink to the bottom was strictly dependent by the active cell abundance in the water column, and showed a pike of 63±32 x 10³ cysts m⁻² d⁻¹ in summer 2011 (July). The abundance of resting stages in the sediment, however, was relatively constant during autumn 2010, notwithstanding the production from the water column. Such a sinking flow determined a significant maximum of presence in the sediment, during spring 2011 (June) with 419±83 cysts g⁻¹ dw. The inverted traps showed a certain activity of germination during autumn 2010.

In fact, cells identified as *Scrippsiella* sp. were continuously detected from September to November 2010, but planomeiocytes of *S. acuminata* were observed only in July 2011. This explains the constancy of cyst concentration in the sediment during autumn, and its decrease, starting from June 2011, in correspondence of a growth of the active population in the water column. From these findings, it can be concluded that *S. acuminata* is a species complex, with a high intraspecific diversity [3]. In fact, it seems that at least two types of cysts are produced. One has a short time of rest and is responsible of the fast encystment-excystment cycle observed during autumn, while a second type has a longer mandatory resting period, ensuring the constancy of the cyst reservoir in the sediments, and it is subjected to a mass germination at the end of spring, that triggers the summer population bloom.

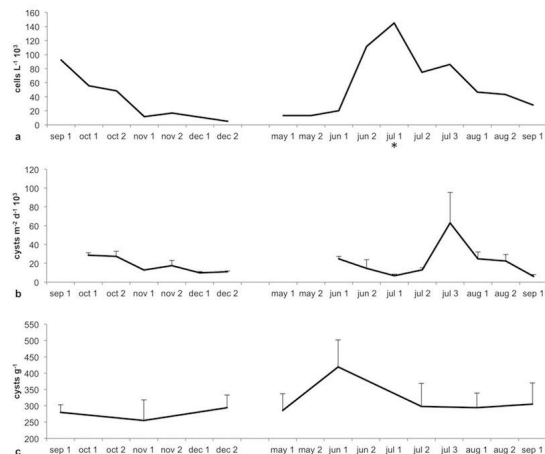


Fig. 1. The pelagos-benthos exchanges of the dinoflagellate *Scrippsiella acuminata* in the Mar Piccolo of Taranto (September 2010 - September 2011) a) active stages in the water column; b) resting stage production rates; c) resting stage dynamics in the sediment

References

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