

PROTECTIVE RESPONSE OF *CAULERPA TAXIFOLIA* UNDER INTENSE HERBIVORE PRESSURE

Antoni Sureda ¹ *, Antonio Box ², Salud Deudero ² and Antoni Pons ¹

¹ ¹Departament de Biologia Fonamental i Ciències de la Salut, Universitat de les Illes Balears, Crtra. Valldemossa Km 7.5.

E-07122-Palma de Mallorca, Illes Balears, Spain - tosugo@hotmail.com

² Laboratorio de Biología Marina. Departamento de Biología & Instituto Mediterraneo de Estudios Avanzados (UIB/CSIC), Universidad Islas Baleares, Mallorca, Spain

Abstract

Our aim was to determine the caulerpenyne production and the antioxidant enzyme activities in *Caulerpa taxifolia* in response to *Bittium reticulatum* feeding. Caulerpenyne production, as well as CAT, SOD and GR activities significantly increased in presence of *Bittium*. *Caulerpa taxifolia* responded to intense herbivorism reducing their palatability and increasing their antioxidant system.

Keywords : *Algae, Balear Islands, Bio-indicators, Gastropods.*

Introduction

The seaweed of tropical origin algae *Caulerpa taxifolia* (Vahl) was introduced in the Mediterranean Sea in 1984, covering the infralittoral zone and competing with autochthonous flora [1]. Caulerpenyne is the main secondary metabolite synthesized by Caulerpales, playing a major role in its chemical defense [2]. Cells contain a complex network of antioxidant defence that scavenge or prevent the generation of ROS, and repair or remove the damaged molecules. Small marine herbivores often feed on macroalgae chemically defended against fishes or sea-urchins. In this work, we studied in a controlled environment the antioxidant enzyme response and caulerpenyne production by *Caulerpa taxifolia* under severe herbivorism .

Materials and Methods

Caulerpa taxifolia samples were collected and maintained in two separated aquariums at 24°C. *Bittium reticulatum* were introduced in one aquarium during three days, whereas the other aquarium was considered as negative control. Caulerpenyne contents were measured by HPLC in fronds of *Caulerpa taxifolia* from both aquariums at the end of the experiment [3]. Antioxidant enzyme activities -CAT, GP, SOD and GR were determined in alga homogenates [3].

Results and Discussion

In a previous study performed during 2003 and 2004 in the Balearic Islands, we evidenced that *Bittium reticulatum* is one of the most abundant species living in *Caulerpa* meadows. The abundance reached 33 ind/m² in *Caulerpa taxifolia*, 133 ind/m² in *Caulerpa racemosa* and 208 ind/m² in *Caulerpa prolifera*. Herbivorism of *Bittium reticulatum* over *Caulerpa* species was evidenced in the aquarium.

The levels of caulerpenyne were significantly higher in *Caulerpa taxifolia* fronds at the end of the experiment after herbivore exposure compared to the initial values ($p < 0.05$). CAT, SOD and GR activities significantly increased after three days in presence of *Bittium reticulatum* ($p < 0.05$), whereas GP maintained the initial values.

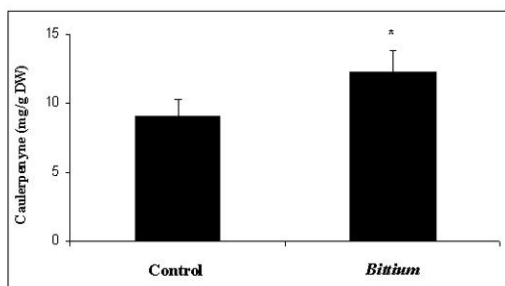


Fig. 1. Caulerpenyne concentration with and without exposure of *Caulerpa taxifolia* to *Bittium reticulatum*.

The presence of *Bittium reticulatum* in the aquarium induces a protective adaptation in *Caulerpa taxifolia* in order to reduce the damage produced by herbivores. The alga responded with an increase in caulerpenyne production in order to protect the algae from herbivorous pressure reducing their palatability. The tissue damage generated by herbivores induces an antioxidant enzyme adaptation, increasing their activities.

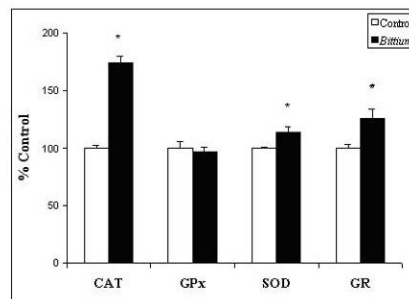


Fig. 2. Antioxidant enzyme activities in *Caulerpa taxifolia* with and without exposure to *Bittium reticulatum*.

References

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