

# DIETARY ACCUMULATION IN WHITE SEABREAM TISSUES OF A SECONDARY METABOLITE FROM CAULERPA RACEMOSA (FORSSKÅL) J. AGARDH

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## Abstract

Our recent observations made on gut contents of *Diplodus sargus*, have highlighted that the algal pest *Caulerpa racemosa* represents an important component of the fish diet along the coast of the Salento Peninsula (SE Italy). Here, we demonstrated that one of *C. racemosa* secondary metabolites, caulerpin, enters in trophic chains and accumulates in fish tissues. Providing a new perspective in the understanding of the effects of biological invasions, the present study represents the starting point for future investigations aimed at evaluating both the potential hazard for long-term effects on the fish, and risks for human health deriving from *D. sargus* consumption.

**Keywords:** *Alien species, Bio-Accumulation, Fishes, Food Webs*

## Introduction

Secondary metabolites of *Caulerpa* species have been previously investigated to evaluate their ecological role both in chemical defence against herbivores [1] and as allelochemicals in interspecific competition [2]. Our recent observations made on gut contents of *Diplodus sargus*, have highlighted *C. racemosa* as a very important component of the fish diet along the coast of the Salento Peninsula (SE Italy). This study aimed at measuring whether and to what extent the presence of an invasive species in the diet of an endemic fish species can determine accumulation of the algal secondary metabolites in the fish tissues.

## Material and Methods

This study is based on a collection of 18 specimens speared in June-September 2008, a period of the year when the abundance of *C. racemosa* reaches its maximum. Each individual was dissected and white and red muscle, liver, skin and the gastrointestinal tract separated. Stomach contents were observed under magnification to assess the abundance of *C. racemosa*. Animal tissues were lyophilized and then exhaustively extracted first with acetone then with ethyl acetate. RP-HPLC-MS analyses were carried out on organic extracts to quantify the accumulation of algal metabolites in fish tissues.

## Results and Discussion

The only algal metabolite we were able to detect in *D. sargus* tissues was caulerpin which is the main component of the *C. racemosa* lipophilic extract. The concentrations range between: 0-5.4 µg/g (white muscle), 0-38.2 µg/g (red muscle), 0-14.4 µg/g (skin) and 0-16.3 µg/g (liver). Even though we still do not know if the accumulation of caulerpin is responsible of toxic effects and/or other physiological alterations in the fish, it is reasonable to hypothesize harmful effects on non-adapted fish populations, such as those typical of the invaded systems. This study has represented a baseline on which we have designed an *ad-hoc* experiment, which is based on an integration of chemical, physiological and ecological approaches. Forty-five specimens of *D. sargus* (15 individuals for each of the three locations considered along the Apulian Coasts) have been speared in September-October 2009. Analysis of wide battery of molecular and cellular biomarkers, namely Cat, GPx, TOSC assay, Na<sup>+</sup>-K<sup>+</sup>-ATPase, VTG, Micronucleus and Comet assay, are currently evaluating the health status of these fishes and their reproductive potential. At the same time, chemical investigations on fish tissues are in progress to value algal metabolites accumulation and to correlate these data with fishes physiological responses. Therefore, through the analyses in progress, we should provide a better understanding of how the *C. racemosa* spreading in the Mediterranean Sea can affect the population dynamics of a single species. Also, we should provide essential information for an effective evaluation of possible risks for human health, deriving from *D. sargus* consumption.

## References

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