

RESEARCH ARTICLE

# Cryptic effects of biological invasions: Reduction of the aggressive behaviour of a native fish under the influence of an “invasive” biomolecule

Laura Magliozzi<sup>1,2</sup>, Frederico Almada<sup>3</sup>, Joana Robalo<sup>3</sup>, Ernesto Mollo<sup>4</sup>, Gianluca Polese<sup>2</sup>, Emanuel J. Gonçalves<sup>3</sup>, Serena Fellingine<sup>1</sup>, Antonio Terlizzi<sup>5,6</sup>, Biagio D’Aniello<sup>2\*</sup>

**1** Dipartimento di Scienze e Tecnologie Biologiche ed Ambientali, Università del Salento, Lecce, Italy, **2** Dipartimento di Biologia, Università degli Studi di Napoli “Federico II”, Napoli, Italy, **3** MARE – Marine and Environmental Sciences Centre, ISPA – Instituto Universitário, Lisbon, Portugal, **4** Istituto di Chimica Biomolecolare, Consiglio Nazionale delle Ricerche, Pozzuoli, Napoli, Italy, **5** Dipartimento di Scienze della Vita, Università degli Studi di Trieste, CoNISMa, Trieste, Italy, **6** Stazione Zoologica A. Dohrn, Napoli, Italy

\* [biagio.daniello@unina.it](mailto:biagio.daniello@unina.it)



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## Abstract

The invasive green alga *Caulerpa cylindracea* has become an important component of the diet of the Mediterranean white seabream *Diplodus sargus*. As a consequence of this “exotic diet”, the algal bisindolic alkaloid caulerpin accumulates in the fish tissues. Although the compound shows structural similarity to endogenous indolamines that modulate animal behaviour, the potential impact of caulerpin on fish behaviour still remains unexplored. In this report, behavioural experiments both on groups and on single fish responding towards a mirror were performed under different doses of dietary caulerpin. Differences between treated and control groups for each behaviour and for the overall aggressive pattern during the different experimental phases showed that the aggressiveness of *D. sargus* decreased with the administration of caulerpin. These results call the attention to a still unexplored potential ability of bioactive metabolites from marine invasive species, to alter the behaviour on native species, with putative negative effects on patterns of fish growth and population dynamics.

## Introduction

The intentional or accidental introduction of alien species is emerging as one of the most dramatic impacts contributing to changes in biodiversity and ecosystem functioning across the planet [1,2]. Such phenomena, called biological invasions, have deep impacts on the society with both ecological and economic costs [3]. A new and critical theme in invasion biology addresses how bioactive metabolites from invasive pests may impact marine biodiversity, and ecosystem functioning [4,5]. Moving in this research frame, recent studies suggested that secondary metabolites from the invasive green alga *Caulerpa cylindracea* (reported as *Caulerpa racemosa*) may produce complex indirect effects on the Mediterranean marine biodiversity