
The role of micro-algal toxin in allelopathy

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Abstract

Marine coastal areas are facing increasing occurrence of toxic micro-algae blooms all over the world. The toxins produced by these photosynthetic organisms can cause severe afflictions not only to marine organisms but also to humans. In particular, the tropical benthic dinoflagellate *Ostreopsis cf. ovata* known to produce several analogs of the potent palytoxin has now spread over the Mediterranean Sea. So far, the ecological role and the mode of action of those toxins have been little studied, although some results point out their role as allelochemicals.

Allelopathic interactions between *Ostreopsis cf. ovata* and co-occurring benthic micro-algae were investigated using bioassays along with co-cultures. The physiological state of the micro-algae was monitored measuring their photochemistry (active chlorophyll-a fluorescence) and their exo-metabolome (extra cellular content) was simultaneously investigated. A targeted metabolomic approach was first used to analyze the toxic content followed by an untargeted analysis by UHPLC-HRMS to detect other metabolites eventually involved as allelochemicals. The bioassays reveal a non-uniform toxicity of *Ostreopsis* exo-metabolome on its competitors and was particularly harmful against the benthic diatom *Licmophora paradoxa*. A co-culture without contact between the two species further showed no effects of this exo-metabolome on *L. paradoxa*, suggesting that the mode of action of the toxins is by contact rather than distant allelopathy.

Keywords: toxic dinoflagellate, marine, bioessay, allelopathy

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