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Using bio-inspired methods control predator contaminants in microalgal cultures

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Large-scale cultures of microalgae are often contaminated by predators such as rotifers, ciliates and algivorous flagellates. These predators achieve very high growth and predation rates and can cause large losses in productivity, often within a matter of days. The aim of this study was to explore bio-inspired technologies to control predator contamination in microalgal cultures. It is known that some species of marine microalgae accumulate or produce specific secondary metabolites as a chemical defence against predators. We explored whether these metabolites can be used to eradicate ciliate and rotifer predators from contaminated microalgal cultures and restore microalgal productivity. Two chemicals produced by marine microalgae were tested, DMSO and the unsaturated aldehyde decadienal, and were found to be capable of controlling predator contaminants in microalgal cultures. Several analogues of these chemicals were tested as well and were found to be equally or more effective. All chemicals tested, however, also had a negative impact on microalgae when applied in higher doses. A second approach that was explored was the use of biocontrol. In natural ecosystems, copepods are important predators of rotifers and ciliates. We isolated and cultured a freshwater copepod species (*Acanthocyclops robustus*) and introduced it into microalgal cultures to control predator contaminants. Modest numbers of adult copepods were capable of clearing contaminated microalgal cultures of ciliate and rotifer predators, without impacting microalgal productivity. These chemical and biological control methods offer two approaches that might be applied to control predator contamination in large-scale microalgal cultures.

Keywords: contamination, predator, biocontrol, chemical control