The Effects of a Cyanobacterial Crude Extract on Different Aquatic Organisms: Evidence for Cyanobacterial Toxin Modulating Factors

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ABSTRACT: In an aquatic ecosystem, during cyanobacterial bloom lysis, a mixture of toxins and other cyanobacterial and bacterial components will be present in the water, acting on aquatic organisms. Most of the research into toxic effects of cyanobacteria has involved the use of purified toxins. In this study, the "real-life" situation of a cyanobacterial lysis event was investigated. For this purpose, intact cells from a natural cyanobacterial bloom from Lake Müggelsee, Berlin, were taken and the cells were broken by repeated freeze/thaw cycles. This crude extract was used to expose several aquatic organisms ranging from microalgae (*Scenedesmus armatus*), macrophyte (*Ceratophyllum demersum*), invertebrate (*Chaoborus crystallinus*) up to fish eggs (*Danio rerio*) to look at several physiological parameters such as detoxication enzyme activity and, in the case of the microalgae and the macrophyte, also the effect on activity of photosynthesis. In all the tests, the cyanobacterial crude extract caused stronger effects than the pure cyanobacterial toxins used in equivalent concentrations.
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