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Allelopathic Effects of *Microcystis* sp. (Blue Green Algae) on *Scenedesmus* sp. (Green Algae)

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Abstract

Microcystis is well known bloom-forming toxic algae indicating eutrophication in freshwater ecosystems. As consequence, a reduction of light penetration through the water column, depletion of oxygen in water, and disruptions of the ecological integrity of lentic freshwater ecosystems have been observed. However, research on the allelopathic effects of *Microcystis* on other species in phytoplankton communities is still scarce. The objective of the present research was to study the allelopathic effects of *Microcystis* sp. (blue-green algae) on *Scenedesmus* sp. (green algae) under laboratory conditions with reference to variations in cell density and morphology. Monoculture series of *Microcystis* and *Scenedesmus* were prepared and maintained under controlled light (12 hours day and 12 hours dark) and temperature (26°C) in the laboratory. Two algae cultures (initial cell density: *Scenedesmus* - 9.34×10^6 cells mL^{-1}, *Microcystis* - 12.66×10^6 cells mL^{-1}) were mixed under different ratios of *Scenedesmus*: *Microcystis* as 1:0, 3:1, 1:1 and 1:3. *Microcystis* was added to *Scenedesmus* cultures in two different forms: live cell cultures and extract of *Microcystis*. Cell density and morphological variations were observed to determine the allelopathic interactions. A reduction of *Scenedesmus* cell density was observed when increasing the cell density of *Microcystis* in the live mixed cultures for 10 days. Similarly, a reduction of cell density of *Scenedesmus* was observed when using the cell extract of *Microcystis* in different volume ratios. The *Scenedesmus* colonies with regular four cells were changed to irregular shape colonies with 32-50 cells when increasing the live *Microcystis* cell density in cultures. The ability to perform allelopathic effects on other prominent phytoplankton species in lentic freshwater ecosystems, such as green alga, may lead to preserving the superiority of *Microcystis* blooms. Understanding such species interactions and underlying mechanisms related to algal blooms are necessary to manage the ecological conditions of freshwater ecosystems under continuous anthropogenic pressure.

Keywords: *Algal Blooms, Allelopathy, Eutrophication, Microcystis sp., Species İnteractions.*

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