Seasonal variations in the sensitivity of Lake Geneva phytoplankton community structure to atrazine

Annette Bérand¹, Thomas Pelte² and Jean-Claude Druart¹

Institut National de Recherche Agronomique, Station d’Hydrobiologie Lacustre

With 5 figures and 3 tables

Abstract: Natural phytoplankton assemblages from Lake Geneva were cultivated in outdoor microcosms contaminated with 10 µg/l of the PS II inhibitor herbicide, atrazine. The 12 experiments were performed in the spring and early and late summer. Physico-chemical parameters and the changes in the densities of algal species were followed. The algae in the phytoplankton community were inhibited, stimulated, or apparently unaffected by the herbicide. The growth of 3 species (Fragilaria crotonensis KITTON, Nitzschia sp. and Oscillatoria limnetica LEMMERMANN) was stimulated by atrazine contamination in microcosms, but showed no such response in monoculture, whereas Chlorella vulgaris BEIJER, which was inhibited in the outdoor microcosm experiments, was also inhibited by the herbicide in laboratory monoculture. Atrazine influenced the interspecies interactions, which could explain the greater development of some phytoplanktonic species in the contaminated microcosms. Hence, the herbicide may act as a supplementary factor disturbing algal succession in lakes. The effect of atrazine on species development and community structure varied. The algal communities were most sensitive to restructuring by the PS II inhibitor herbicide in the clear water phase, whereas the robust spring algal communities were the least sensitive. Seasonal changes in environmental parameters, species composition and interactions may affect the response of algal communities to the toxicant. These interactions between herbicides and seasonal successions may reduce or increase the consequences of pollution in aquatic systems. This may be ecologically important, especially when the herbicide contamination from runoff also varies seasonally.

Authors’ addresses: INRA, Station d’Hydrobiologie Lacustre, B.P. 511, 74203 Thonon Cedex – France. E-mail: berard@thonon.inra.fr
2 Agence de l’Eau Adour-Garonne, 90 rue du Féretra 31078, Toulouse Cédex 4. France

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