



Effect of ultraviolet radiation on alkaline phosphatase activity and planktonic phosphorus acquisition in Canadian boreal shield lakes

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ABSTRACT: We examined how ultraviolet radiation (UVR) affects the activity of alkaline phosphatase (APase), a common extracellular enzyme. APase activity declined up to 57% under UVR exposure and decreased more often under ultraviolet A than ultraviolet B exposure, indicating that most of the observed decrease did not occur through direct enzyme inactivation. Enzyme activity in the particulate fraction ($>0.22 \mu\text{m}$) was less susceptible to UVR than activity in the total or dissolved fractions, suggesting that attachment to the cell surface may convey some protection against UVR-induced inactivation. Samples that were $0.22\text{-}\mu\text{m}$ filtered before being subjected to radiation treatments often showed increased enzyme activity, especially in the photosynthetically active radiation-only treatment, indicating reactivation of APase in the absence of de novo production of the enzyme. Decreases in APase can be severe near the lake surface, suggesting that UVR-induced variations in APase activity might contribute to microscale variations in nutrient availability and community composition.

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