

Effects of Cu²⁺, Ni²⁺, Pb²⁺, Zn²⁺ and pentachlorophenol on photosynthesis and motility in *Chlamydomonas reinhardtii* in short-term exposure experiments

ABSTRACT

Copper and pentachlorophenol turned out to be especially toxic for PE in *C. reinhardtii*. Zinc has been concluded to be moderately toxic while nickel and lead had stimulatory effects on the PE. Because of high variance, motility was not considered a reliable physiological parameter when assessing toxicity of the substances using *C. reinhardtii*.

INTRODUCTION

Background Heavy metals, especially copper, nickel, lead and zinc, have adverse effects on terrestrial and in aquatic environments. However, their impact can vary depending of the nature of organisms. Taking into account the ability of heavy metals to accumulate in sediments, extended knowledge of their effects on aquatic biota is needed. In this context the use of model organisms, which allow for rapid assessment of pollutants in freshwater, can be of advantage. *Chlamydomonas reinhardtii* has been shown to be one of those especially suited organisms for different kinds of studies. Previous investigations showed *C. reinhardtii* to be sensitive to copper, nickel and zinc. Although, most studies concentrated on the impacts on growth rates and ultrastructure. The photosynthetic apparatus in *C. reinhardtii* was shown to be highly vulnerable to toxic substances thus making it a suitable parameter for toxicity estimation. Motility has been shown to be one of the possible physiological markers for toxicity assessment using *Euglena gracilis*. The aim of this study was to carry out comprehensive experiments in order to investigate effects of different concentrations of copper, nickel, lead and zinc on the photosynthetic efficiency and motility of *C. reinhardtii*. As an additional test substance pentachlorophenol was used to its previous use as a bleaching agent at pulp and paper factories in Sweden thus making it to a spread contaminant in some areas.

CONCLUSION

Conclusions Copper and pentachlorophenol turned out to be especially toxic for PE in *C. reinhardtii*. Zinc has been concluded to be moderately toxic while nickel and lead had stimulatory effects on the PE. Because of high variance, motility was not considered a reliable physiological parameter when assessing toxicity of the substances using *C. reinhardtii*.