Title	**Effects of sonication and advanced chemical oxidants on the unicellular green alga Dunaliella tertiolecta and cysts, larvae and adults of the brine shrimp Artemia salina: A prospective treatment to eradicate invasive organisms from ballast water**
Author	Meghana R. Gavand,James B. McClintockand Robert A. Angus etal
Journal	Marine Pollution Bulletin
Abstract	Uptake and release of ship-borne ballast water is a major factor contributing to introductions of aquatic phytoplankton and invasive macroinvertebrates. Some invasive unicellular algae can cause harmful algal blooms and produce toxins that build up in food chains. Moreover, to date, few studies have compared the efficacy of ballast water treatments against different life history phases of aquatic macroinvertebrates. In the present study, the unicellular green alga Dunaliella tertiolecta, and three discrete life history phases of the brine shrimp Artemia salina, were independently used as model organisms to study the efficacy of sonication as well as the advanced oxidants, hydrogen peroxide and ozone, as potential ballast water treatments. Algal cells and brine shrimp cysts, nauplii, and adults were subjected to individual and combined treatments of sonication and advanced oxidants. Combined rather than individual treatments consistently yielded the highest levels of mortality in algal cells (100% over a 2 min exposure) and in brine shrimp (100% and 95% for larvae and adults, respectively, over a 2 min exposure). In contrast, mortality levels in brine shrimp cysts (66% over 2 min; increased to 92% over a 20 min exposure) were moderately high but consistently lower than that detected for larval or adult shrimp. Our results indicate that a combination of sonication and advanced chemical oxidants may be a promising method to eradicate aquatic unicellular algae and macroinvertebrates in ballast water.
Year	2007
Pages	-
keywords	

Title	**Algae and UV irradiation: Effects on ultrastructure and related metabolic functions**
Author	Andreas Holzingerand Cornelius Lütz
Journal	Micron
Abstract	The effects of ultraviolet radiation in the biological relevant wavebands of UV-A (315–400 nm) and UV-B (280–315 nm) on algae have become an important issue as a man-made depletion of the protecting ozone layer has been reported. However, experimental designs to investigate this issue are manifold and the target organisms are extremely diverse. Data are included from the prokaryotic cyanobacteria, haptophytes, diatoms, brown algae to green algae (fresh water, snow algae and marine species) including different habitats from marine littoral and open ocean to freshwater ponds, lakes and snow fields. A broad overview on UV effects on algae is given, with a focus on structurally visible changes. Here we report on destruction in chloroplasts, mitochondria, and the occurrence of structures that are likely to be related to the UV stress. In addition several new data are presented from organisms that have to face naturally high UV irradiation due to their habitats. As no disturbances are reported in these organisms, they obviously have a set of protective

	mechanisms allowing survival in extreme habitats such as snow fields. Physiological changes as a consequence of UV irradiation are included, effects on the DNA level are summarized, and avoidance strategies are discussed. Every effort has been made to summarize the diverse observations and critically evaluate and compare the different experimental strategies to study UV effects in algae.
Year	2006
Pages	190- 207
keywords	

Title	**Reduction of UV-B radiation causes an enhancement of photoinhibition in high light stressed aquatic plants from New Zealand lakes**
Author	Dieter Hanelt, Ian Hawes and Rowena Rae
Journal	Journal of Photochemistry and Photobiology B: Biology
Abstract	Anthropogenic stratospheric ozone depletion causes an increase of UV-B radiation impinging on the earth surface, which is a threat to plants not adapted to higher UV-B irradiances. Investigations were undertaken with aquatic plants from New Zealand, where UV-irradiances are naturally higher due to the southern latitude, to compare with former results of polar species. The experiments reported in this study were undertaken with plants collected from different lakes of the South Island, with different UV transparencies. Photoinhibition was induced under controlled conditions using a sun simulator, which mimicked the natural underwater radiation spectrum. Photosynthetic activity during high light stress, and during recovery in dim light, was determined in vivo by measuring fluorescence changes, using a PAM fluorometer device. A comparison of different species showed that the extent to which UV causes an additional decrease of photosynthetic performance during high light stress varies according to the depth of growth and UV transparency of the water body. This observation fits with previous studies. However, a new finding was that some species were even more strongly inhibited when UV-B was filtered out of the simulated sun spectrum, indicating a supporting effect of the short UVR wavelength range against photoinhibition. These results were also confirmed by field experiments under natural radiation conditions. Thus, UV-B does not solely cause negative effects on photosynthesis, but it may even support recovery processes in aquatic plants adapted to a high UV-radiation environment. The latter is in contrast to earlier studies, in which UV-B radiation was considered causing only harmful effects on photosynthesis of aquatic plants.
Year	2006
Pages	89- 102
keywords	