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13. ABSTRACT (Maximum 200 words)

Phytoplankton bioassays have been used as biological tools in assessing environmental contamination. In our laboratory, a simple bioassay has been developed which measures the light output from bioluminescence dinoflagellates for assessment of toxic effects when exposed to a single toxicant or mixture. Successful use of this type of bioassay has provided data on the acute response and has demonstrated the chronic efefcts, from hours up to 11 days, on dinoflagellate cells of *Pyrocystis lunula* and *Gonyaulax polyedra* upon exposure to several metals and storm drain effluent.

Dinoflagellate cells were exposed to various concentrations of tributyltin chloride (TBTCl), copper (II) sulfate ($CuSO_4$), zinc sulfate ($ZnSO_4$), or storm drain effluent. Stimulable bioluminescence was measured at each test period (3 or 4 h, 24 h, 4° h, 72 h, etc.) following setup for all assays. Cells were kept in the dark for 3 or 4 h prior to testing. Stirring the cells within the chamber stimulated maximum bioluminescence from the dinoflagellates. An IC_{50} (an estimated concentration that is likely to cause a 50% reduction in light output) was estimated for all assays.

The trend of light reduction as a response to increasing dose level of test article was observed in all assays. A reduction in light output was measured from cells exposed to 1.6, 4.2, and 12.8 ug/L TBTCl. The IC_{50} decreased from 8.5 ug/L at 120 h to 3.0 ug/L at 264 h. The cells exposed to 6.25%, 12.5%, and 25.0% storm drain effluent exhibited a statistically significant ($p=0.05$) reduction in light output in as little as 3 h exposure. Almost complete light reduction was measured 4 h after assay setup at concentrations of 1 to 20 mg/L $CuSO_4$. Cells exposed to 0.100 mg/L produced 30% of the control light output at 4 h, and continued to decay to approximately 14% of control values at 72 h. A statistically significant ($p=0.05$) decrease in light output was measured at 5 and 10 mg/ L $ZnSO_4$. A 3 h and 48 h IC_{50} of 7 mg/L was calculated.

Light output seems to be inversely related to the toxicity of the test article. The results of these assays indicate that these organisms may be as, or more, sensitive than many of the traditional bioassay organisms.

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THE USE OF STIMULABLE BIOLUMINESCENCE FROM DINOFLAGELLATES AS A MEANS OF DETECTING TOXICITY IN THE MARINE ENVIRONMENT.

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