Comparison of Microtox and Xenoassay light as a near real time river monitoring assay for heavy metals

ABSTRACT

Luminescence-based assays for toxicants such as Microtox, ToxAlert, and Biotox have been used extensively worldwide. However, the use of these assays in near real time conditions is limited due to nonoptimal assay temperature for the tropical climate. An isolate that exhibits a high luminescence activity in a broad range of temperatures was successfully isolated from the mackerel, Rastrelliger kanagurta. This isolate was tentatively identified as Photobacterium sp. strain MIE, based on partial 16S rDNA molecular phylogeny. Optimum conditions that support high bioluminescence activity occurred between 24 and 30°C, with pH 5.5 to 7.5, 10 to 20 g/L of sodium chloride, 30 to 50 g/L of tryptone, and 4 g/L of glycerol as the carbon source. Assessment of near real time capability of this bacterial system, Xenoassay light to monitor heavy metals from a contaminated river running through the Juru River Basin shows near real time capability with assaying time of less than 30 minutes per samples. Samples returned to the lab were tested with a standard Microtox assay using Vibrio fishceri. Similar results were obtained to Xenoassay light that show temporal variation of copper concentration. Thus, this strain is suitable for near real time river monitoring of toxicants especially in the tropics.

Keyword: Luminescence-based assays; Bioluminescence; Isolated bioluminescent bacterium; Luminescence