Distribution of phytoplankton community in relation to environmental parameters in cage culture area of Sepanggar Bay, Sabah, Malaysia

Abstract

This paper covers spatial and temporal variation in phytoplankton communities and physico-chemical water properties in the cage culture area of Sepanggar Bay, Sabah, Malaysia based on field measurement conducted during July 2005 to January 2006 to study the spatial and temporal variation in phytoplankton communities and physico-chemical water properties of the bay. Phytoplankton samples and water parameters data were collected from five different stations located inside the bay during Southwest, Interseasonal and Northeast monsoons. Forty phytoplankton genera, representatives of 23 families, were found in the study area with a mean abundance of $1.55 \pm 1.19 \times 106$ cells L-1. Most of these genera belong to diatoms (82.17%), Dinoflagellates (17.55%) and cyanobacteria (0.29%). Three genera were found to be dominant (>10%) in phytoplankton abundance and these were Coscinodiscus spp. (36.38%), Chaetoceros spp (17.65%) and Bacteriastrum spp. (10.98%). The most dominant genus was Coscinodiscus spp. which showed high abundance during all monsoons and stations (except Station 3). Among the seven environmental parameters tested in this study, water temperature, pH and suspended sediment concentration were found to be significantly different between monsoons. On the other hand, no significant differences were found between stations for the studied physico-chemical parameters. A clear differences in phytoplankton densities were observed between monsoons and stations with higher mean abundances during interseasonal monsoon ($2.40 \pm 1.37 \times 106$ cells L-1) and at station five ($2.05 \pm 0.74 \times 106$ cells L-1), respectively. Conversely, the diversity indices, both Shannon-Wiener (H') and Pielou (J'), showed no significant difference throughout stations and monsoons (except (H') for monsoons). Analysis of similarity (ANOSIM) results demonstrated temporal differences in phytoplankton community structure with highly diverse phytoplankton assemblage. Through cluster analysis five groups of phytoplankton were attained (at 40% similarity level) though no

marked separation of the taxonomic classes pointed towards the constant pattern of the phytoplankton assemblage in the studied area.