Spatiotemporal variations and community structure of microzooplankton along the Hooghly Estuary, West Bengal with special reference to tintinnids (Ciliata: Protozoa)

Abstract

The spatiotemporal distribution and community structure of the microzooplankton tintinnid with special reference to tintinnids was studied in the context of environmental variables from nine sampling sites (n=252) along the Hooghly Estuary, West Bengal during March 2012 to August 2014. A total of 32 tintinnid species (3 core, 16 occasional species and 12 seasonal) were recorded, where the agglomerated genera *Tintinnopsis* sp., contributed the dominant part (~62 %) followed by *Tintinnidium* (2 sp), *Leptotintinnus* (2 sp), *Codonellopsis, Stenosomella, Holocotylomella, Favella, Eutintinnus, Metacyclus, Dadayiella* and *Wangiella* (each comprising single species). A wide range of seasonal variations in tintinnid abundance was observed with maximum value (~1995 ind. 1⁻¹) during postmonsoon in mouth of the estuary (Gangasagar) and minimum (~52 ind. 1⁻¹) during monsoon in brackish water site (Diamond Harbour). The biomass and daily production rate of tintinnid ranged from 0.004-2.764 µg C 1⁻¹ and 0.04-3.54 µg C 1⁻¹day⁻¹ respectively. An overall dominance and diversity of the small-sized tintinnid (lorica length <76µm) belonging to the genera *Tintinnopsis* sp., *Tintinnidium* sp., *Codonellopsis* sp., *Wangiella* sp., *Eutintinnus* sp., *Metacyclus* sp. and *Holocotylomella* sp. was pronounced, accounting ~66% of the total tintinnid abundance. A significant variation between species abundance and months (P= 2.21; P≤ 0.041) was revealed from ANOVA results. K-dominance curves were plotted against log rank k, showed species dominance over the investigated sites. Principal Component Analysis (PCA) map showed clustering of core species with chl a and nitrate and could be considered as the crucial factors controlling the distribution and seasonal patterns of tintinnids. Results of biota-environment (BIOENV) analyses reveal that chl a and nitrate were the significant causative factors, suggesting that tintinnids may be used as a bioindicator for discriminating water quality status in this estuarine system. Case studies related to Human-induced and natural stresses on tintinnid community were also pronounced, disrupting the productivity in pelagic organisms and fishery potentialities. The study provided exhaustive information of microzooplankton which enhances our understanding of their interactions in a tropical estuarine system and of immense importance in the context of maintaining its ecological and economic stability.

Keywords: Spatiotemporal, tintinnid, Hooghly Estuary, biomass, lorica, species assemblages

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