

Stable isotope ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) analysis as a tool to quantify the food web structure in seagrass area of Pulai River estuary, Johor, Peninsular Malaysia

ABSTRACT

Diversity of seagrass bed areas is high, but little has been done to demonstrate the complexity of its food web structure. Hence, the present study developed a preliminary food web structure in a seagrass area at the Sungai Pulai estuary, Johor, Peninsular Malaysia. Bulk stable isotope analysis was employed to determine $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ stable isotope ratios in tissues of various biotas collected from within the designated seagrass area via Isotope Ratio Mass Spectrometry (IRMS). The results showed that the $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ ratios from the collected samples ranged between -21.0 and -8.0‰, as well as 18.0 and 2.0‰, respectively. The smooth sea cucumber was applied as the reference baseline to calculate the trophic level of other organisms. Meanwhile, the width range of $\delta^{13}\text{C}$ values within the primary producer revealed three different food sources on the seagrass bed in the construct of the food web structure. The producers were phytoplankton, *Ulva* sp., *Enhalus acoroides*, *Halophila ovalis* and *Halophila spinulosa*. As a result, consumers in trophic level (TL) 2 was discovered to range between 2.2 and 2.9, suggesting herbivorous species, whereas the organisms in TL 3 and TL 4 had values that ranged from 3.4 to 3.9 and from 4.0 to 4.9, which indicated omnivorous and carnivorous species, respectively. Apart from that, the majority (70%) of the benthic organisms were above the group of reference baseline between TL 2.2 and 5.2.

Keyword: Stable isotopes; Food web; Pulai river estuary