ANALYSIS OF FOOD WEB IN EELGRASS BED OF MITSUKUCHI BAY, SETO INLAND SEA, JAPAN, BY CARBON AND NITROGEN STABLE ISOTOPE RATIOS

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Eelgrass beds support highly productive ecosystems in shallow coastal waters. Due to the great diversity and abundances of organisms present, their structures and functions are extremely complex. In this study, we have measured carbon and nitrogen stable isotope ratios($\delta^{13}C$, $\delta^{15}N$) of the organisms in the eelgrass bed of Mitsukuchi Bay, Seto Inland Sea, in attempt to better understand the food web structure and the carbon flow in the eelgrass bed. $\delta^{13}C$ values of small crustaceans were distributed from –17.5 to –14.3‰ for those collected outside the eelgrass bed and from –14.1 to –10.3‰ for most of those collected inside the eelgrass bed. These values were clearly more enriched than that of the particulate organic matter (POM)(-20.9±1.0‰). The $\delta^{13}C$ values of small crustaceans outside the eelgrass bed was similar to that of epilithic organic matter (EOM)(-16.7‰), and those inside the eelgrass beds had even more enriched $\delta^{13}C$ values, which implies the contribution of epiphytes (-12.1‰) or eelgrass(-11.7‰) as a food source for these crustaceans inside the eelgrass bed. Similarly, the $\delta^{13}C$ values of the fish collected inside the eelgrass bed (-15.6 to –11.4‰) were more enriched than those of fish collected outside the eelgrass bed (-16.1 to –14.3‰) and in nearby water, Hiroshima Bay (about -18.0 to –14.0‰). These results suggest that the fish inside the eelgrass beds which feed on the crustaceans with enriched in $\delta^{13}C$ utilize epiphytes or eelgrass as important food sources. The contributions of epiphytes and eelgrass as food sources for organisms in eelgrass are likely to be much greater than previously considered. On the other hand, $\delta^{15}N$ values showed that there are four main trophic levels present in the eelgrass bed of Mitsukuchi Bay; POM, EOM, epiphytes and eelgrass being primary producers (5.5 to 7‰), small crustaceans being primary consumers (7 to 12‰), most fish being secondary consumers (13 to 16‰), and piscivores fish being tertiary consumers(17.0‰).