Caracterization of organic matter (C, N and P) content of biodeposit derived from marine aquaculture bivalves: a meta-analysis approach.

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Bivalve aquaculture is one of the world’ s most important food sources for humans. However, an increase in biodeposits along with the expansion of aquaculture has led to the deterioration of the seabed. To date, there has been no consensus on the organic content and elemental ratio regarding the quality of a biodeposit. Therefore, in this study, we compiled data on the elemental content and ratio of biodeposits for the first time. Furthermore, we determined (1) the relationship between the carbon (C) contents of biodeposits and food conditions, and (2) the representative value of the stoichiometric ratio of biodeposits with reference to Redfield ratio, (3) a comparison between the taxonomic groups, such as Venerida, Pectinida, Ostreida and Mytilida of carbon/nitrogen ratio (C/N).
Nonlinear regression was performed for total particulate matter (TPM), chlorophyll *a* (Chl-*a*), and particulate organic carbon (POC) concentration, which are food concentration indicators. In addition, linear regression was performed to determine the C (%) of TPM, which is related to food quality. The response of C content of biodeposits to TPM showed a quadratic function type response, whereas that to Chl-*a* and POC concentration showed the Michaelis–Menten equation response. The C content of biodeposits was reduced to approximately 14% of the C (%) of TPM due to linear regression between C content of biodeposit and TPM. Biodeposit stoichiometry was estimated to be C:N:P = 141 (112–173): 13.2 (10.5–15.8): 1, which significantly differed from Redfield ratio. There was also a significant difference observed in the C/N between taxonomic groups, indicating that Pectinida is higher than Ostreida and Mytilida.
We, for the first time, showed several knowledge gaps, such as C content of a biodeposit related to a wide range of foods, the P content of a biodeposit, and data of biodeposits other than mussels with environmental variables. Using these data, we can estimate the C content of a biodeposit by using monitoring data (i.e., TPM and Chl-a) and obtain a more accurate stoichiometric ratio of a biodeposit. In the future, the influence of the differences in the elemental ratios among taxa on ecosystems should be elucidated.

Keywords: bivalve, bio-element, biodeposition, stoichiometry

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