Malays. Appl. Biol. (2021) 50(3): 57–67

MODELLING THE ENVIRONMENTAL AND BIOLOGICAL CUES FOR THE BLOOM OF SERGESTID SHRIMP *Acetes* (DECAPODA: SERGESTIDAE) IN COASTAL WATER OF MIRI, SARAWAK, MALAYSIAN BORNEO

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Accepted 14 July 2021, Published online 31 December 2021

ABSTRACT

The sergestid shrimp (*Acetes* spp.) shows the annual peak season from February to April. This krill-like shrimp, locally known as 'bubok', is one of the commercially important fisheries in Miri, Sarawak, Malaysian Borneo. Previous researchers had reported patchy data on the environmental factors and Acetes distribution in Miri-Bintulu adjacent areas. Moreover, insufficient analysis has led to the inability to conduct sustainable management strategies for *Acetes* fisheries. Therefore, this study is designed to explore the mathematical model usage to understand the interaction between selected water quality parameters and zooplankton assemblages with the *Acetes* population in the coastal water of Miri. Selected temporal biotic and abiotic data were collected using standard methods and later subjected to mathematical time series analysis called the Granger causality test. The results show bi-directional Granger causality between the abundance of *Acetes* and dissolved oxygen (DO). Interaction between other water quality parameters (temperature, salinity, turbidity, pH, TSS and *Chlorophyll a*) with the abundance of *Acetes* has also emerged. The number of zooplankton in the water column, namely *Centropages*, *Euterpina*, *Oithona rigida*, and *Oncaea* shows a significant causality towards the abundance of *Acetes*. The findings imply that complex interaction between biotic and abiotic factors exists during the bloom of *Acetes* in Miri; thus, relevant agencies should step up measures to ensure sustainable management of the coastal areas where *Acetes* bloom occurs.

Key words: Granger causality, sergestid shrimp, water quality, zooplankton

INTRODUCTION

Coastal water is defined as a zone where land and water interact with each other (Moksness *et al*., 2013), serves as an important settlement area for human and home for various species of fishes, molluscs, prawns and crabs, providing natural foods for human as well as daily income for the locals (Srinivasan *et al*., 2013; Obatitor, 2014). Miri is a coastal city, located in the northwest part of Sarawak, Malaysia, which has an open coastline type facing the South China Sea, ranging from the mouth of Baram River until Tanjong Lobang beach (Ee & Zae, 2010). Miri coastal water is made up of coral reef, seagrass, beach forest and mangrove, provides important fisheries such as skipjack tuna, Spanish mackerel, grouper and sergestid shrimp known as *Acetes* (Amin *et al*., 2010). *Acetes* spp. (local name: 'bubok') show peak season from February to April and this krill-like shrimp is commercially important in Miri (Anandkumar *et al*., 2017). Shrimp and its product could be sold as high as 12 USD per kilogram (Hassan & Othman, 2021). The by-products of *Acetes* include 'belacan', a fermented shrimp paste and a pickle 'cincalok', are Malaysian local cooking ingredients. The fresh *Acetes* shrimps could be sold at approximately 0.8

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