UNIVERSITI PUTRA MALAYSIA

EFFECTS OF DIFFERENT FEED TYPES AND LIGHT INTENSITY LEVELS ON THE GROWTH AND REPRODUCTION OF CLAM SHRIMP, Cyclestheria hislopi (Baird, 1859)

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This project report is submitted in partial fulfillment of the requirements for the degree of Bachelor of Agriculture (Aquaculture)

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CERTIFICATION OF APPROVAL

DEPARTMENT OF AQUACULTURE

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This is to certify that i have examined the final project report and all corrections have been made as recommended by the panel of examiners. This report complies with the recommended format stipulated in the AKU4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia.

Signature and official stamp of supervisor:

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ABSTRACT

Clam shrimp (a Phyllopod order conchostraca) is a freshwater crustacean belonging to the subclass of Branchiopoda. It possesses a bivalve carapace, inhabit mainly the benthos but can swim freely in water column. *Cyclestheria hislopi* is the only species that has been reported to be found in permanent water body. The objective of this study was to determine the effects of different types of feed and different levels of light intensity on the growth and reproduction of *Cyclestheria hislopi*. Three types of feed (artificial fined powdered diet, microalgae *Scenedesmus* sp. and microalgae *Chlorella* sp.) were used for the feeding experiment. Five levels of light intensity (0, 15, 30, 45, and 60 μmol m^{-2} s^{-1}) were used for the light intensity experiment. *Cyclestheria hislopi* showed the best growth and reproduction when fed with *Chlorella* sp. and when were kept under the lowest light intensity. This study illustrated that *Cyclestheria hislopi* prefered small sized microalgae as its food and tend to live in subdued light condition. It is important to understand the optimum condition for clam shrimp to grow and reproduce so that culturing of this species for use in aquaculture can be successful.

ABSTRAK

‘Clam shrimp’ (sejenis Filopod order Konkostraka), merupakan sejenis krustasea air tawar di bawah subkelas Branchiopoda. Ia mempunyai cangkerang berlokan, biasanya mendiami dasar kolam tetapi boleh berenang bebas dalam kolum air. *Cyclestheria hislopi* merupakan satu-satunya species yang telah dikenalpasti boleh didapati dalam badan air kekal. Objektif kajian ini adalah untuk mengenalpasti kesan jenis pemakanan dan tahap intensiti cahaya yang berbeza ke atas pertumbuhan dan pembiakan *Cyclestheria hislopi*. Tiga jenis makanan (diet tiruan, mikroalga *Scenedesmus* sp. dan mikroalga *Chlorella* sp. telah digunakan dalam kajian jenis pemakanan yang berbeza. Lima tahap intensiti cahaya (0, 15, 30, 45, and 60 μmol m^{-2} s^{-1}) digunakan untuk kajian tahap intensiti cahaya yang berbeza. *Cyclestheria hislopi* menunjukkan tahap pertumbuhan dan pembiakan yang paling memuaskan apabila diberi makan *Chlorella* sp. dan dibela bawah intensiti cahaya yang paling rendah. Kajian ini menunjukkan *Cyclestheria hislopi* lebih suka mikroalga yang bersaiz kecil sebagai makanan dan cenderung untuk hidup di dalam keadaan cahaya yang lemah. Ianya adalah penting untuk memahami keadaan optimum bagi tumbersaran dan pembiakan “clam shrimp” supaya penternakan species ini untuk tujuan penggunaan dalam akuakultur boleh berjaya.

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LIST OF ABBREVIATIONS AND SYMBOLS

ml	milliliter
m	meter
cm	centimeter
nm	nanometer
µmol m^{-2} s^{-1}	micromole per square meter per second
THz	terahertz
℃	degree Celcius
PSU	practical salinity unit
mS/cm	millisiemens per centimeter
mg/l	milligram per liter

CHAPTER 1

INTRODUCTION

Clam shrimp (a Phyllopod order conchostraca), is a freshwater crustacean belonging to the subclass of Branchiopoda. It is called clam shrimp because it possesses a bivalve carapace that resembles the shape of a clam's shell which completely encloses its body and limb. The clam shrimps can be found in small, temporary ponds or rainwater pool with aquatic vegetation (Bishop, 1967). *Cyclestheria hislopi*, the sole member in family Cyclestheriidae, is the only species that has been reported to be found in permanent water body from many countries especially in Southeast Asia (Padhye *et al*., 2011; Martin *et al*., 2003).

Utilization of clam shrimp and their benefits in aquaculture are not significant yet, most probably due to the poor information on this crustacean as compared to the other orders in Branchiopoda like brine shrimp (Anostracans) and water fleas (Cladocerans). Although there are papers which discuss the morphology (King, 1863-1866; Olesen *et al*., 1997), evolution of unisexuality (Sassaman, 1995), and reproductive biology (Tinti & Scanabissi, 1996; Weeks *et al*., 2005) of Conchostraca, study on the other aspects of this crustacean is still lacking. Furthermore, most of the information on clam shrimp was derived from field observations rather than experimentation (Frank, 1988).

Therefore, study is necessary to understand clam shrimp better. One of the interesting topics to be studied will be the optimum conditions for clam shrimps to grow and reproduce, so that rearing and mass production of clam shrimp is possible. This information will further aid future research to test on the potential benefits of the clam shrimp in aquaculture or other related industries.

Clam shrimp often inhabit the benthos, but they can actively swim in the water column upon disturbance. They are generally acknowledged as non-selective filter feeders that feed mainly on detritus and other minute organic materials (Nair, 1968; Nayar, 1968). In contrast, Royan (1976) reported that clam shrimp are selective omnivorous bottom feeder. They can feed on algae, zooplankton, detritus and suspended particles stirred up from the bottom. Therefore, it is also important to know the feeding habits and food preferences of clam shrimp in order to culture them. This study was designed to determine the best food type for *C. hislopi*.

Based on our preliminary field and laboratory observation, it was observed that clam shrimp preferred to dig and hide into mud or layer of organic matter at the bottom of pool, or attached themselves under thick layer of aquatic plants where there was no direct penetration of sunlight. Therefore, light could probably be a factor that controls the growth and reproduction of clam shrimp. Thus this study was undertaken to examine the effects of different light intensity levels on the growth of clam shrimp.

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