

STUDIES ON SOME ASPECTS OF REPRODUCTION OF  
MUD CRAB, *SCYLLA SERRATA* ( FORSKAL )

TRAN NGOC HAI

MASTER OF SCIENCE  
UNIVERSITI PUTRA MALAYSIA

1997

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**By**

**TRAN NGOC HAI**

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C6	Crab Stage
C7	Crab Stage
CL	Carapace Length
CW	Carapace Width
D	Deck
L	Leg
M	Megastoma Stage
Z1	Zoea Stage
Z2	Zoea Stage
Z3	Zoea Stage
Z4	Zoea Stage
Z5	Zoea Stage



Abstract of thesis submitted to the Senate of Universiti Putra Malaysia in fulfillment of requirements for the degree of Master of Science

## LIST OF ABBREVIATIONS

### STUDIES ON SOME ASPECTS OF REPRODUCTION OF MUD CRAB, *SCYLLA SERIATA* (FORSKAL)

BL:	Body Length
BW:	Body Weight
C1:	Crab <sub>1</sub> Stage
C2:	Crab <sub>2</sub> Stage
C3:	Crab <sub>3</sub> Stage
C4:	Crab <sub>4</sub> Stage
C5:	Crab <sub>5</sub> Stage
C6:	Crab <sub>6</sub> Stage
C7:	Crab <sub>7</sub> Stage
CL:	Carapace Length
CW:	Carapace Width
D:	Dark
L:	Light
M:	Megalopa Stage
Z1:	Zoea <sub>1</sub> Stage
Z2:	Zoea <sub>2</sub> Stage
Z3:	Zoea <sub>3</sub> Stage
Z4:	Zoea <sub>4</sub> Stage
Z5:	Zoea <sub>5</sub> Stage

Abstract of thesis submitted to the Senate of Universiti Putra Malaysia in fulfillment of requirements for the degree of Master of Science .

**STUDIES ON SOME ASPECTS OF REPRODUCTION OF  
MUD CRAB, *SCYLLA SERRATA* (FORSKAL)**

**By**

**Tran Ngoc Hai**

**December 1997**

**Chairman: Dr. Anuar B. Hassan**

**Faculty: Faculty of Applied Science and Technology**

Some aspects on reproduction of mud crab, *Scylla serrata*, in captive conditions were studied. By ablation of bilateral eyestalks of the female, 14 batches of eggs were spawned after 5 days of culture in fiberglass tanks. Spawning occurred at any time of day, month and year. Majority of crabs spawned without undergoing molting and mating under culture condition. Crab spawners were mainly in size of 201-300 g. Average fecundity was  $1479992.12 \pm 17.03$  eggs / crab. However, many eggs could not adhere to the pleopods of the female but fell on the bottom of the tanks. Regression between body weight of female and fecundity was significant ( $p < 0.05$ ). In addition, the second spawning of the crabs under captivity was also observed.

Incubation period of eggs lasted for 9.71 days (9-12 days) and hatching process took 27.71 hours (8-60 hours) in conditions of water temperature of 25-31°C, salinity of 27.5-30 ppt, DO of 6.2-6.8 ppm, and ammonia of 0.02 ppm. Duration for incubation and hatching was significantly related to water temperature ( $p < 0.05$ ). In salinity range of 0-40 ppt, crab eggs could hatch in salinity of 20-40 ppt but the optimal was 30 ppt. In addition, artificial incubation of eggs with incubating density increasing from 762.4 to 48793.6 egg/liter gave hatching rate decreasing from  $65.77 \pm 6.52\%$  to  $16.66 \pm 1.31\%$ .

In rearing larvae of mud crabs, under photoperiods of 24 hr L : 0 hr D, 18 hr L : 6 hr D, 12 hr L : 12 hr D, 6 hr L : 18 hr D and 0 hr L : 24 hr D, metamorphosis, growth and survival of crab larvae were significantly effected. Metamorphosis of larvae was significantly delayed under photoperiods of 6 hr L : 18 hr D and especially 0 hr L : 24 hr D in comparison with larvae under the other photoperiod conditions ( $P < 0.05$ ). There was no significant difference in body length of larvae between the treatments with exception of that in Zoea5. Larvae under photoperiods of 0 hr L : 24 hr D and 6 hr L : 18 hr D all died at Zoea2 and Megalope stage, respectively. Meanwhile, under 24 hr L : 0 hr D, 18 hr L : 6 hr D and 12 hr L : 12 hr D, survival rate of larvae was rather high until Zoea5 but extremely dropped thereafter. Photoperiods of 24 hr L : 0 hr D, 18 hr L : 6 hr D and 12 hr L : 12 hr D were recommended for mud crab larval rearing.

Under different conditions of light intensity ; 0 lux (completely darkness), 300-350 lux, 1500-2000 lux, 4500-6000 lux and under transparent roof, metamorphosis were significantly delayed for larvae under completely darkness and 300-350 lux. There were no significant difference in body length of larvae under different lighting intensity. However, from Zoea5 onwards, body

length of larvae under 4500-6000 lux and under transparent roof were significantly longer than that of larvae under other treatments. Larvae under completely darkness and 300-350 lux all died at Zoea<sub>1</sub> and Megalope stage, respectively. Survival rate of larvae under 4500-6000 lux and transparent roof were found significantly higher than one under other treatments. Lighting intensity of 4500-6000 lux and under transparent roof were thus suitable for larval rearing of mud crabs.

With different feeding regimes for the larvae, the results showed that larvae fed with green water only or fed with green water plus artificial plankton and prepared feed was not significantly different from the control (no feeding) and that all died at Zoea<sub>1</sub> after 3 days of culture. Larvae fed with green water, rotifer and *Artemia* nauplii or fed with green water, rotifer, artificial plankton, prepared feed and *Artemia* nauplii were similar to larvae fed with green water and *Artemia* nauplii in terms of metamorphosis and growth, but the first achieved survival rate of Zoea better than the later, and the later gave survival rate of Crab<sub>1</sub> stage better than the first. Green water and *Artemia* nauplii thus could be used satisfactory for larval culture.

In rearing crab seeds from Crab<sub>1</sub> to Crab<sub>7</sub> with different salinity from 30 ppt to 0 ppt at intervals of 6 ppt, salinity of 18-30 ppt was found better for crabs in terms of molting, growth and survival rate than other salinity. Crabs could not tolerate freshwater (salinity of 0 ppt) over a period of 2 days.

In culture of crab seed from Crab<sub>1</sub> to Crab<sub>6</sub> fed with trash fish and pellets, crabs fed with pellets gave results comparable with that of crabs fed with trash fish in terms of molting, growth and survival rate.

Abstrak tesis dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi syarat untuk mendapatkan Ijazah Master Sains.

**KAJIAN KE ATAS BEBERAPA ASPEK PEMBIAKAN  
KETAM NIPAH, *SCYLLA SERRATA* (FORSKAL)**

Oleh

**Tran Ngoc Hai**

**Disember 1997**

**Pengerusi: Dr. Anuar B. Hassan**

**Fakulti: Fakulti Sains Gunaan dan Teknologi**

Kajian ke atas beberapa aspek pembiakan ketam nipah (*Scylla serrata*) telah dijalankan di pusat penetasan. Dengan cara pemotongan kedua-dua mata induk betina, sebanyak 14 kali pembiakan telah berlaku yang menghasilkan telur selepas 5 hari ditenak di tangki serabut glas ("fibreglass"). Pembiakan berlaku pada bila-bila masa samada mengikut hari, bulan atau tahun. Majoriti ketam-ketam ini membiak tanpa melalui proses persalinan kulit (cengkerang) atau tanpa berpasangan dalam suasana ternakan. Kebanyakan ketam yang membiak adalah pada saiz 201-300 gram. Purata fekunditi ialah  $1479992.12 \pm 17.03$  telur/ketam. Walau bagaimanapun telur tidak melekat pada kaki renang jantan sebaliknya jatuh di dasar tangki. Regressi di antara berat badan ketam dan fekunditi adalah signifikan ( $p < 0.05$ ). Selain daripada itu, pembiakan kali kedua bagi ketam yang dikultur di dalam tangki juga diperhatikan.

Jangkamasa pengeraman telur ialah 9.71 hari (9-12 hari) dan proses penetasan telah mengambil masa selama 27.71 jam (8-60 jam) dalam keadaan suhu air 25-31 °C, saliniti 27.5-30 ppt, oksigen terlarut 6.2-6.8 ppm dan Ammonia 0.02 ppm. Tempoh untuk pengeraman dan penetasan mempunyai hubungan yang signifikan dengan suhu air ( $p < 0.05$ ). Dalam ujian ke atas saliniti air yang berjulat 0-40 ppt, telur-telur ketam boleh menetas dalam saliniti 20-40 ppt tetapi saliniti yang optimal ialah 30ppt. Manakala pengeraman buatan terhadap telur-telur ketam dengan pertambahan kepadatan daripada 762.4 hingga 48793.6 telur per liter memberikan keputusan kadar penetasan yang menurun daripada  $65.77 \pm 6.52\%$  hingga  $16.66 \pm 1.31\%$ .

Tempoh pendedahan cahaya dalam pemeliharaan larva ketam nipah mengikut kadar 24 jam cahaya (L) : 0 jam gelap (D), 18 jam L : 6 jam D, 12 jam L : 12 jam D, 6 jam L : 18 jam D dan 0 jam L : 24 jam D memberikan kesan yang signifikan ke atas metamorfosis, tumbesaran dan kemandirian larva. Proses metamorfosis larva tertangguh secara signifikan di bawah pendedahan cahaya selama 6 jam L : 18 jam D dan terutamanya 0 jam L : 24 jam D dibandingkan dengan larva-larva di bawah lain-lain jangkamasa pendedahan cahaya ( $p < 0.05$ ). Tiada perbezaan yang signifikan dalam panjang larva di antara ujian pendedahan cahaya dengan pengecualian ke atas Zoea5. Larve di bawah pendedahan cahaya 0 jam L : 24 jam D dan 6 jam L : 18 jam D kesemuanya mati masing-masing pada peringkat Zoea2 dan peringkat Megalop. Sementara itu, di bawah 24 jam L : 0 jam D, 18 jam L : 6 jam D dan 12 jam L : 12 jam D, kadar kemandirian larva adalah lebih tinggi hingga peringkat Zoea5 tetapi menurun secara mendadak selepas itu. Pendedahan cahaya 24 jam L : 0 jam D, 18 jam L 6 jam D dan 12 jam L : 12 jam D disarankan sebagai sesuai untuk pemeliharaan larva ketam.

Di bawah keadaan intensiti cahaya yang berbeza iaitu 0 lux (gelap sepenuhnya), 300-350 lux, 1500-2000 lux, 4500-6000 lux dan di bawah bumbung lutcahaya, proses metamorfosis adalah tertangguh secara signifikan di bawah kadar gelap sepenuhnya dan pada 300-350 lux. Tiada perbezaan yang signifikan dalam panjang badan larva di bawah intensiti cahaya yang berbeza. Walau bagaimanapun dari peringkat Zoea<sub>5</sub> ke atas, panjang badan larva di bawah keamatan cahaya 4500-6000 lux dan di bawah bumbung lutcahaya adalah signifikan dibandingkan dengan larva di bawah lain-lain keadaan cahaya. Larva di bawah keadaan gelap sepenuhnya dan 300-350 lux kesemuanya mati pada masing-masing peringkat Zoea<sub>1</sub> dan peringkat Megalop. Kadar kemandirian larva didapati lebih tinggi di bawah 4500 – 6000 lux dan bumbung lutcahaya dibandingkan dengan lain-lain intensiti. Jadi, intensiti cahaya 4500-6000 lux dan di bawah bumbung lutcahaya adalah sesuai untuk pemeliharaan larva.

Dengan sistem pemberian makanan yang berbeza dilakukan ke atas larva, keputusan menunjukkan larva yang hanya diberikan air hijau bercampur plankton tiruan dan makanan persediaan adalah tidak mempunyai perbezaan yang signifikan dengan larva dalam ujian kawalan (tanpa pemberian makanan) yang mana kesemua larva mati pada peringkat Zoea<sub>1</sub> selepas 3 hari ternakan. Larva yang diberikan makanan dengan air hijau, rotifer dan naupli Artemia atau dengan air hijau, rotifer, plankton tiruan, makanan persediaan dan naupli Artemia adalah sama dengan larva yang diberikan makanan air hijau dan naupli artemia dari segi proses Metamorfosis dan tumbesaran, tetapi pencapaian kadar kemandirian pada peringkat Zoea lebi baik daripada larva yang diberikan air hijau dan naupli Artemia sahaja, namun keadaan sebaliknya akan berlaku pada peringkat Crab<sub>1</sub>. Air hijau dan naupli Artemia didapati sesuai digunakan untuk ternakan larva.

Dalam kultur benih-benih larva daripada Crab<sub>1</sub> ke Crab<sub>7</sub> dengan saliniti yang berbeza iaitu dari 30 ppt ke 0 ppt dengan jarak 6 ppt, saliniti 18-30ppt didapati lebih baik untuk ketam-ketam dari segi penyalinan cengkerang, tumbesaran dan kadar kemandirian jika dibandingkan dengan lain-lain nilai saliniti. Katam-ketam tidak dapat menyesuaikan diri dalam air tawar (saliniti 0 ppt) selepas tempoh 2 hari.

Dalam kultur benih ketam dari Crab<sub>1</sub> hingga Crab<sub>6</sub> dengan pemberian ikan baja dan palet sebagai makanan menunjukkan ketam-ketam yang diberikan palet sebagai makanan memberikan keputusan yang masih boleh diterima dibandingkan dengan ketam-ketam yang diberikan ikan baja dari segi penyalinan cengkerang, tumbesaran dan kadar kemandirian.