

TRIPLOID INDUCTION IN BANANA SHRIMP, *Fenneropenaeus merguensis* (de Man, 1888) BY USING COLD SHOCK TREATMENT

NORHIDAYAH BINTI ABDUL MANAN

**MASTER OF SCIENCE AQUACULTURE
UNIVERSITI MALAYSIA TERENGGANU**

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DEDICATION

*I dedicate this thesis to my beloved father and mother for all their supports and encouragement throughout my studies and also to all my beloved friends for all of their helps and support.
Thank you.*

ABSTRACT

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu
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Chairperson : Associate Professor Aizam Zainal Abidin

**Members : Safiah Binti Jasmani, PhD
Professor Siti Shapor Siraj, PhD**

Faculty : Institute Aquaculture Tropika

A study was done to determine the optimum parameter to produce monosex culture of postlarvae in banana shrimp, *Fenneropenaeus merguensis* by producing triploid larvae using cold shock treatment. In addition also to identify the effect of triploidy in reproductive performance, survival rate, growth performance and sex ratio in *F. merguensis* compared to it diploid (control) besides identifying the sex external characteristic of the postlarvae. Cold shocks (10°C, 15°C and 20°C) with control (28°C) and three different time of exposures (10, 15 and 20 min) were introduced to each treatments. One gravid female shrimp at stage 4 was used for triploidy induction. The fertilization rate was found significantly different ($P < 0.05$) among treatments, however the hatching rate showed no significantly different ($P > 0.05$). Larvae reared until mysis stage produced poor survival rate and no significantly different ($P > 0.05$) among treatments which is a bit higher in control than in 15°C 10mins treatments (n=160). Chromosome numbers found were analyzed using Video Karyo Test software version

3.1. Triploidy were identified in 15°C treatment for all time of exposures (10, 15 and 20 min) with the metaphase chromosome number ranged between 118 -154 with mode 132 chromosome and other treatments produced diploid. 15°C treatment and control larvae were reared until PL50, the survival rate showed significantly different ($P < 0.05$) among them. For the sex ratio, it was significantly higher ($P < 0.05$) in 15°C treatment which produced 94% males compared to control that produced 85% females. For growth performance, total length (TL) and body weight (BW), was significantly higher ($P < 0.05$) among treatments which 15°C treatment showed faster growth towards the treated larvae compared to control. For the relationships of TL and BW, it was significant different at 0.01(2-tailed) between control and triploid treatments, even though have a quite similar proportional for each treatments. The specific growth rate (SGR) was identified significantly different ($P < 0.05$) between control and the 15°C treatment. Male PL shrimp were differentiated by present of petasma and female by appearance of sharp ridges in thelycum (srt). Consequently, the findings of this present study indicate that current methods of triploidy induction using cold shock treatment at optimum temperatures of 15°C appear suitable for viable triploid shrimp production. It is concluded that triploidy by inducing cold shock treatment produced monosex culture of males with fastest growth even though have a low survival rate due to chromosomal abnormality to survive.

ABSTRAK

Abstract thesis yang dikemukakan kepada Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk ijazah Master Sains Akuakultur

ARUHAN TRIPLOID DALAM UDANG PISANG, *Fenneropenaeus merguensis* (de Man, 1888) MENGUNAKAN RAWATAN SUHU SEJUK

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**Members : Safiah Binti Jasmani, PhD
Professor Siti Shapor Siraj, PhD**

Faculty : Institut Aquaculture Tropika

Satu kajian telah dilakukan untuk mengenal pasti parameter optima bagi menghasilkan kultur satu jantina bagi udang Pisang, *Fenneropenaeus merguensis* dengan menghasilkan triploid menggunakan rawatan suhu sejuk. Seterusnya sebagai tambahan bagi mengenalpasti kesan triploid pada pembiakan, kadar hidup, pembesaran dan nisbah jantina di bandingkan dengan adik- beradik diploid *F. merguensis* disamping mengenalpasti ciri organ seks luaran bagi rega udang. Kejukan menggunakan suhu sejuk pada (10°C, 15°C dan 20°C) dan kontrol (28°C) berserta 3 kadar waktu didedahkan (10, 15 and 20 min) dijalankan pada setiap rawatan. Satu udang betina matang pada peringkat 4 kematangan dipilih untuk dijalankan triploid induksi keatasnya. Di dapati, kadar persenyawaan adalah berbeza di antara tiap rawatan ($P < 0.05$) dan didapati kadar penetasan terhasil adalah tidak berbeza antara rawatan ($P > 0.05$). Rega udang yang ditenak hingga ke peringkat mysis mengalami kadar hidup yang sangat rendah dan cuma sedikit tinggi pada kontrol dan pada rawatan 15°C10minit serta tiada perbezaan wujud antara rawatan ($P > 0.05$) (n=160). Jumlah kromosom yang diperolehi telah

dianalisa menggunakan Video Karyo Test versi 3.1. Triploid telah dikenal pasti terhasil menggunakan rawatan 15°C bagi semua kadar waktu didedahkan (10, 15 and 20 min) dengan nombor kromosom metaphasa diantara 118 – 154 dengan kekerapan 132 kromosom, manakala rawatan lain dikenalpasti menghasilkan diploid nombor kromosom. Rega udang bagi control dan rawatan 15°C telah diternak hingga ke PL50 dan diperhatikan kadar hidup bagi control dan rawatan 15°C adalah berbeza ($P < 0.05$) bagi keduanya. Bagi nisbah jantina, terdapat perbezaan ketara bagi control dan rawatan 15°C dimana bagi rawatan 15°C telah menghasilkan 94% udang jantan dibandingkan dengan control yang menghasilkan 85% udang betina. Bagi pembesaran panjang total (TL) dan berat badan (BW) pula terdapat perbezaan ketara ($P < 0.05$) dimana rawatan 15°C didapati memberikan kadar pembesaran yang cepat bagi rega udang dibandingkan dengan kontrol. Bagi hubungan antara TL dan BW terdapat perbezaan pada 0.01 (2-tailed) antara control dan rawatan 15°C walaupun keduanya mempunyai perkadaran yang agak sama antara kedua rawatan. Bagi kadar pertumbuhan spesifik (SGR) pula, terdapat perbezaan diperhatikan ($P < 0.05$) antara control dan rawatan 15°C. Secara morfologi, udang jantan dibezakan dengan kehadiran Petasma (P) dan udang betina dibezakan dengan kehadiran bubungan tajam pada thelycum (srt). Oleh itu, penemuan dari kajian ini mendapati kaedah kejutan menggunakan suhu sejuk pada suhu optima 15°C adalah sesuai bagi pengeluaran udang triploid dan dapat disimpulkan triploid terhasil dari rawatan kejutan menggunakan suhu sejuk dapat menghasilkan kultur satu jantina bagi penghasilan udang jantan dengan kadar pertumbuhan yang pantas walaupun mengalami kadar hidup yang rendah disebabkan ketidaknormalan rega untuk terus hidup.