ตารางที่ 4.2-5 บทความวิจัยหรือบทความวิชาการที่ตีพิมพ์ในวารสารวิชาการระดับนานาชาติที่ปรากฏในฐานข้อมูลระดับนานาชาติ และได้รับการรับรองในรูปแบบอื่นๆ (ค่าน้ำหนัก 1.0)

ลำดับที่	บทความวิจัยที่ตีพิมพ์ในวารสารวิชาการระดับนานาชาติที่อยู่บนฐานข้อมูล ISI	ชื่อเจ้าของผลงานและผู้ร่วม	ชื่อบทความวิจัยหรือบทความวิชาการที่ตีพิมพ์ในวารสารวิชาการระดับนานาชาติที่ปรากฏในฐานข้อมูลระดับนานาชาติตามประกาศ ก.พ.อ./ วัน-เดือน-ปี สถานที่/จังหวัด/ประเทศที่จัด/เลขหน้า	โปรดระบุฐาน (เช่น Scopus ISI Science Direct	หลักฐาน/ ตารางประกอบ
กลุ่มวิทยาศาสตร์และเทคโนโลยี					
1	Evalauation of flocculated concentrates from intensive shrimp pond water as a substitute for microalgal concentrates in the nursery culture of juvenile oyster (*Crassostrea belcher* i)	Suwat Tanyaros Woraporn Tarangkoon Tossaporn Klomkleing	International Aquatic Research Volume 8, Issue 2, April, 2016 Page 149-160 SJR คลอไทล์ที่ 3 (Q3) Doi 10.1007/s40071-016-0130-5	SJR Q3	
2	Baker's yeast as a substitute for microalgae in the hatchery rearing of larval and juvenile tropical oyster (Crassostrea belcheri, Sowery 1871)	Suwat Tanyaros Chutinut Sujarit Namtima Jansri Woraporn Tarangkoon	Journal of applied aquaculture Volume 28, No.1, 27 April, 2016 Page 35-46 http://dx.doi.org/10.1080/10454438.2016.1163312 SJR คลอไทล์ที่ 4 (Q4)	SJR Q4	

ลำดับที่	บทความวิจัยที่ตีพิมพ์ในวารสารวิชาการระดับนานาชาติที่อยู่บนฐานข้อมูล ISI	ชื่อเจ้าของผลงานและผู้ร่วม	ชื่อบทความวิจัยหรือบทความวิชาการที่ตีพิมพ์ในวารสารวิชาการระดับนานาชาติที่ปรากฏในฐานข้อมูลระดับนานาชาติตามประกาศ ก.พ.อ./ วัน-เดือน-ปี สถานที่/จังหวัด/ประเทศที่จัด/เลขหน้า	โปรดระบุฐาน (เช่น Scopus ISI Science Direct	หลักฐาน/ ตาราง ประกอบ
3	Variability in larval period, post-setting growth and survival of the oyster *Crassostrea belcheri* produced by gamete stripping method	Suwat Tanyaros Woraporn Tarangkoon	Agriculture and Natural Resources Volume 50, Issue 4, July,2016 Page 295-298 SJR คลอไทล์ที่ 3 (Q3) Accepte 10 April 2016 Available online 8 October 2016	SJR Q3	
4	แกงไตปลาแห้ง : คุณภาพและความปลอดภัยของผลิตภัณฑ์	สุแพรวพันธ์ โลหะลักษณาเดช	เมษายน 2559	ตำรา	
5	ระเบียบวิธีการวิจัยทางการเพาะเลี้ยงสัตว์น้ำ	วรวุฒิ เกิดปราง	2559	ตำรา	
	รวมจำนวนบทความทั้งหมด			.....5..... เรื่อง	

เรื่องที่ 1

Int Aquat Res (2016) 8:149–160
DOI 10.1007/s40071-016-0130-5

ORIGINAL RESEARCH

Evaluation of flocculated concentrates from intensive shrimp pond water as a substitute for microalgal concentrates in the nursery culture of juvenile oyster (*Crassostrea belcheri*)

Suwat Tanyaros · Woraporn Tarangkoon · Tossaporn Klomkleing

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Abstract Intensive shrimp pond water typically contains high densities of microalgae and may have a great potential as a substitute for microalgae in the nursery culture of juvenile oysters as this stage needs large amount of microalgae. Two experiments with different phytoplankton composition in flocculated concentrates from shrimp pond water were investigated to compare the effect on preservation and use of flocculated concentrates from intensive shrimp pond as a partial substitute for microalgae concentrates for the nursery culture of juvenile oysters (*Crassostrea belcheri*) was evaluated. The results show that total crude protein content in flocculated concentrates mostly contain unidentified nanocyanobacteria preserved in refrigerator at 4 °C gradually decreased from the first week in experiment 1, while a slight decrease in crude protein content appeared after the third week in flocculated concentrates dominated by the Bacillariophyceae and unidentified nanocyanobacteria groups in experiment 2. The pheophytin *a*:chlorophyll *a* ratio suddenly increased during the third week of storage and most of the fatty acid composition was absent after four weeks of storage in both experiments. Substituting 75 % of microalgal concentrates in feed with flocculated concentrates from shrimp pond water showed no significant differences in growth performance in experiment 1, but higher growth performance in experiment 2 in comparison with control treatment (100 % microalgal concentrates). Our findings indicate that a partial substitution of flocculated concentrates of up to 75 % from shrimp pond water for microalgal concentrates would lead to better growth in juvenile oysters.

Keywords Flocculated concentrates · Intensive shrimp pond · Daily growth rate · *Crassostrea belcheri*

Introduction

Highly nutritional microalgae are normally used to feed the larval and adult stages of bivalves in hatcheries. However, microalgae production requires a high level of investment and is very costly. Production of live microalgae has been seen as a major hatchery operating costs, accounting for 20–50 % of the total bivalve seed production costs (Coutteau and Sorgeloos 1992). Hatchery-reared oysters in the nursery with a low mortality rate in the sea should be bigger than 5 mm in length (Tanyaros and Tarangkoon 2014), but feeding

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เรื่องที่ 2

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Baker's yeast as a substitute for microalgae in the hatchery rearing of larval and juvenile tropical oyster (*Crassostrea belcheri*, Sowerby 1871)

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ABSTRACT

In this study, baker's yeast, *Saccharomyces cerevisiae*, was used as a partial substitute for microalgae in the hatchery rearing of larval and juvenile tropical oyster (*Crassostrea belcheri*). Dietary microalgae were replaced with graded levels (0%, 25%, 75%, and 100%) of untreated and treated yeast in the feed of oysters from the early umbo (6 days postfertilization) to the eyed larval stage (18 days postfertilization); then the same diets were formulated with untreated barker's yeast and fed juvenile oysters for 3 weeks. The results showed that a partial substitution of microalgae with untreated or treated baker's yeast is unsuitable for feeding oyster larvae up to the eyed stage. With juvenile oysters, there were nonsignificant differences ($P > 0.05$) in mean shell width and length during the study period. The replacement of 25% microalgae with baker's yeast showed mean daily growth rates (DGR) as high as that obtained with 100% microalgae, while the other treatments showed lower DGR ($P > 0.05$). Nonsignificant differences were found among the treatments in terms of mean percentages of survival at the end of the experiment ($P > 0.05$). The percentage of juvenile oysters larger than 0.75 cm was highest ($P < 0.05$) when 25% microalgae was replaced with baker's yeast, while the highest percentage of juvenile oysters smaller than 0.32 cm was observed with diet where 75% microalgae was replaced with baker's yeast ($P < 0.05$). From the experiments, it was concluded that a partial substitution of microalgae with untreated or treated baker's yeast was unsuitable for feeding oyster larvae, while a 25% substitution with untreated yeast could be used for rearing juvenile oysters.

KEYWORDS

Baker's yeast; *Crassostrea belcheri*; juvenile oyster; microalgae; *Saccharomyces cerevisiae*

Introduction

Bivalve culture in Thailand has been practiced for several decades along the coasts. The oyster *Crassostrea belcheri* is one of the most commercially important bivalves. The majority of spats for growout farms are collected from natural sources, but the amount of oyster seed available in nature is

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Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/wjaa.

เรื่องที่ 3

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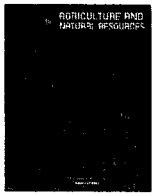

Original Article

Variability in larval period, post-setting growth and survival of the oyster *Crassostrea belcheri* produced by gamete stripping method

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ABSTRACT

Gamete stripping is the most practical method in oyster production because the time of fertilization can be precisely controlled. However, it was found that there was much greater variability in the speed of egg development compared with natural spawning. In this study, three groups of larvae (aged 21, 27 and 29 d) were successively separated from fertilization to the pediveliger stage among all the larvae produced by the stripping method. No differences in the spat growth rate were found among the larval periods at 15 d of the experiment ($p \geq 0.05$), but spat growth and survival rates of juvenile oysters in the larval periods of 21 and 27 d were significantly higher than those for 29 d at the end of the experiment (30 d). The positive correlation between larval growth rates and the spat daily yield at 30 d was significant. These results indicated that the gamete stripping method produced high variations in the larval period and post-setting growth and survival in the oyster, *Crassostrea belcheri*.

Introduction

From the first reported *in vitro* oyster fertilization in 1879 to the appearance of modern production hatcheries, hatchery practices have seen more than one hundred years of development (Helm et al., 2004). Today, knowledge about oyster reproduction and rearing techniques has improved greatly. Hatcheries successfully achieve controlled development of spat from fertilization to post-larvae for many oyster species. Induced spawning and gamete striping or sacrification are commonly used for obtaining gametes in oyster hatcheries as using stripped gametes is the most practical method for producing triploid oysters because the time of fertilization can be easily controlled (Allen Jr. and Bushek, 1992). Although "strip" spawning is the recommended method for obtaining gametes, it was found that there was much greater variability in the speed of egg development in "stripped" eggs than in those obtained from natural spawning (Allen Jr. and Bushek, 1992). This technique is an alternative practice in fully mature oysters in cases where induced spawning is ineffective.

The white-scar oyster, *Crassostrea belcheri* (Sowerby, 1871), is one of the most common commercial bivalves in Thailand, and many studies have been done on its biology and culture over many years (Department of Fisheries, 1994). Oyster seed production from hatcheries has been continuously developed and is a subject of great interest in Thailand (Tanyaros et al., 2000, 2008, 2012). Larvae production under hatchery conditions for this oyster species has been obtained by induced spawning (Sahavacharin et al., 1984; Nugranard et al., 1987) and gamete stripping (Tanyaros and Kitt, 2011, 2012; Tanyaros et al., 2012). However, larval rearing in hatcheries using both techniques results in variability in size within the same batch. The variability in larval period, post-setting growth and survival of the oyster *C. belcheri* produced using the gamete stripping method has not been previously investigated. Smaller grades must take into account the time and cost for nursing them to reach the pediveliger stage at which they are ready to set. The question arises as to whether small grade larvae produced using the stripping method will grow at the same rate as large grade larvae after setting. The objective of the current study was to determine the variability of the larval period and the growth performance of juvenile *C. belcheri* oysters produced by the stripping method.

Materials and methods

Experimental larvae

Mature *C. belcheri* broodstocks (mean shell length 14 ± 1.5 cm) were collected from the wild during the spawning season from

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เรื่องที่ 4

โอเดียนสโตร์

แกงไตปลาแห้ง :

คุณภาพและความปลอดภัยของผลิตภัณฑ์

ผู้ช่วยศาสตราจารย์สุแพรวพันธ์ โลหะลักษณาเดช

เรื่องที่ 5

ไอเดียนสโตร์

ระเบียบวิธีการวิจัยทางการเพาะเลี้ยงสัตว์น้ำ

Research Methodology in Aquaculture

ผู้ช่วยศาสตราจารย์ ดร. วรวุฒิ เกิดปราง