

## Biology and culture techniques of bocourti catfish, *Pangasius bocourti* Sauvage, 1880 in Thailand

ชีววิทยา และเทคนิคการเพาะเลี้ยงปลาเผาะ *Pangasius bocourti* Sauvage, 1880 ในประเทศไทย

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### Abstract

Bocourti catfish, *Pangasius bocourti* is an economic fish in Indo-China. The fish is omnivorous and bottom feeder. In nature, the fish migrate upstream into spawning area on April – June. The larva migrates to the flood area, after flood season juvenile fish migrate into downstream. In farming, the fish is all year spawning. The optimal weights of broodstock begin in 1 kg. Buserelin with Domperidone, carp pituitary gland and HCG are the successful hormones for artificial breeding of the fish. The larva nursed in tank with flow the water in every time. Before one month old, the larva must feed on high protein food and after one month old, the larva can be feed on 25 – 30 % protein of float pellets feed. In Thailand, the culture time range is about 1 – 1.5 years and average weight is about 0.4 – 1 kg.

**Keyword:** biology, culture techniques, bocourti catfish, *Pangasius bocourti*

### บทคัดย่อ

ปลาเผาะ *Pangasius bocourti* เป็นปลาเศรษฐกิจในภูมิภาคอินโดจีน ปลาเผาะเป็นปลาที่กินทั้งพืชและสัตว์ และหากินในบริเวณพื้นที่ตื้นน้ำ ในธรรมชาติปลาเผาะจะอพยพขึ้นไปวางไข่ยังบริเวณต้นน้ำระหว่างเดือนเมษายน – มิถุนายน ลูกปลาวัยอ่อนจะอพยพไปยังพื้นที่น้ำหลาก และหลังฤดูน้ำหลากลูกปลาวัยรุ่นจะอพยพไปยังลำน้ำตอนล่าง ในระบบฟาร์มปลาเผาะสามารถสืบพันธุ์ได้ตลอดทั้งปี น้ำหนักของพ่อแม่พันธุ์ที่มีความเหมาะสมเริ่มตั้งแต่ 1 กิโลกรัม การใช้ฮอร์โมน Buserelin เสริมด้วย Domperidone, ต่อมใต้สมองปลาไน และ HCG เป็นฮอร์โมนที่ประสบความสำเร็จในการผสมเทียมปลาเผาะ ลูกปลาวัยอ่อนจะได้รับการอนุบาลในภาชนะที่มีน้ำหมุนเวียนตลอดเวลา ก่อนอายุหนึ่งเดือนลูกปลาวัยอ่อนจะต้องการอาหารที่มีโปรตีนสูง และหลังอายุหนึ่งเดือนลูกปลาจะสามารถกินอาหารเม็ดที่มีระดับโปรตีน 25

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- 30 % ในประเทศไทยระยะเวลาการเลี้ยงปลาเพาะจะอยู่ที่ 1 – 1.5 ปี และมีน้ำหนักเฉลี่ยประมาณ 0.4 – 1 กิโลกรัม

**คำสำคัญ:** ชีววิทยา เทคนิคการเพาะเลี้ยง ปลาเพาะ *Pangasius bocourti*

## Introduction

Fishes in family Pangasiidae are the group of catfish with migration behavior in Southeast Asia. The fish migrate for feeding and full of life cycle (Hogan et al., 2007). Pangasiidae has four genera namely *Helicophagus*, *Pseudolais*, *Pangasianodon* and *Pangasius* (Nam and Baran, 2008). The fish is widely distribution in mainstream and large tributary (Poulsen et al., 2004). The pangasiid catfish is a high fishery value in Southeast Asia (Roberts and Vidthayanon, 1991). Bocourti catfish, *Pangasius bocourti* is indigenous fish in Mekong-Chaophaya Basin (Poulsen et al., 2004; Kottelat, 2001; Rainboth, 1996; Roberts, 1993; Roberts and Vidthayanon, 1991). The fish is an economic resource in Thailand and fillet is exported to the foreign countries such as Europe, USA and Malaysia (Preecha and Thapanand-Chaidee, 2009; Sirikul and Prarom, 1995). This paper is a review of essential biology data and culture techniques for aquaculture of bocourti catfish in Thailand.

## Food and feeding habit

The specimens of bocourti catfish in Thailand showed that the stomach of the fish is a U-shape. The inner wall of stomach is white color. Ratio of total length and intestinal length is 0.93:1. The fish is highly feeding activity in the morning during 06.00 – 09.00 am and the evening during 06.00 – 09.00 pm (Kunlapapuk and Thapanand-Chaidee, 2009). The food items in this stomach can be divided in to 9 groups namely plants, oligochaete, shrimps, crabs, insects, mollusks, fishes, detritus and unidentified (Kunlapapuk and Thapanand-Chaidee, 2009; Sirikul and Prarom, 1995). Invertebrates are main food items of the juvenile and small fish and plants are main food item of the adult fish (Roberts and Vidthayanon, 1991; Kulabtong and Wudtisin, 2012). In wet season, plants are main food items of the fish, but dry season fishes, invertebrates and algae are main food items of the fish (Baird et al., 2004; Poulsen et al., 2004). In Vietnam, fishes are main food items of bocourti catfish (Nam et al., 2006) and in farming, artemia and chironomid is an optimal live feed in nursing of the fish larva (Hung et al., 1999). In cage

culture at Mekong Delta, rice bran and vegetable leftovers are main raw materials of feed production (Hung et al., 2003). The all data indicated that, the fish is bottom feeder. According to the stomach content data, the fish can be considered as omnivorous (Kunlapapuk and Thapanand-Chaidee, 2009; Sirikul and Prarom, 1995).

### **Reproductive biology**

Bocourti catfish has a secondary sexual characteristic. Sexual checking must use flexible catheter (Udumkarn and singsee, 2004; Sirikul and Prarom, 1995). In nature, sex ratio of male and female fish is 1:2 (Imsilp and Sirichaiphan, 2007). Length at 50% maturity of the fish in Mekong River is 9 cm (Preecha et al., 2011). The fish migrate upstream into spawning area of Mekong River and large tributary of Thailand on April - June (Sirikul and Prarom, 1995). According to report of Poulsen and others, they reported that bocourti catfish laid eggs in Mekong mainstream and the fish larva followed the tide into the downstream flood area (Poulsen et al., 2004). This area is a best nursery ground of the larva (Baird, 2007). After flood season, the juvenile fish migrated to downstream of Mekong River and this area is a habitat of the fish in dry season (Poulsen et al., 2004). Turbid water is a main factor to spawning behavior and the larva occurs in June (Imsilp and Sirichaiphan, 2007). But in farming data shows that the fish is all year spawning (Uppakarat et al., 2010; Chaiyao and Totanapoca, 2008). The egg of bocourti catfish is yellow round-shaped, the average egg's diameter is 1.28 mm. The type of egg is demersal with sticky (Ngoichansri et al., 2010; Sirikul and Prarom, 1995). Some researchers reported number of the fecundity of bocourti catfish such as Uppakarat et al. (2010) reported that 6,980 – 9563 eggs/kgBW, Ngoichansri et al. (2010) reported that 21,139 eggs/kgBW and Sirikul and Prarom (1995) reported that spawner female, which weight 5.2 – 12.2 kgBW have average fecundity about 157,040 egg.

### **Rearing broodstock**

Adult bocourti catfish that weight 4.42 – 9.0 kgBW is checked for sexual separation with flexible catheter. The fish with sexual separation take to 3 m x 5 m concrete tank and water depth is 0.7 m. The optimal stock density of female is 2.5 m<sup>2</sup>/fish and male is 3 m<sup>2</sup>/fish. The broodstocks were fed by 1.5 % of spawner's body weight with 30 % protein of float pellets feed (2 times per day). Changing rate of the

water is 100 % in every week. The fish is all year spawning. During in this time, breeder must check the maturation of broodstock every month, but high maturation rate was found in February – August (Uppakarat et al., 2010; Chaiyao and Totanapoca, 2008).

Ngoichansri et al. (2010) reported that broodstock of bocourti catfish can be reared in cage (2 m x 2 m x 1.8 m). Average size of a broodstock is 50 cm in total length and 1 kg in body weight. The optimal stock density of the broodstock is 50 fish/cage. The broodstocks were fed by 2 % of spawner's body weight with 30 % protein of float pellets feed (1 time in 08.00 pm). After one year, average growth rate of the broodstock is 0.13 % per day in length and 2.67 g per day. The survival rate of broodstock is 100 %. The maturation rate of male and female broodstocks were 81.6 % and 31.4 % respectively. The broodstock were induced spawning successfully in 15 hours after injection with hormone.

### Artificial breeding

All three types of hormone; (1) 20 µg/kg Buserelin (BUS) in combination with 10 mg/kg Domperidone (DOM), (2) 2 dose carp pituitary gland and (3) 2,000 IU/kg Human Chorionic Ganadotropic (HCG) are the successful for artificial breeding of bocourti catfish, but BUS with DOM is the lowest cost. All hormones caused high fertilization rate (70 - 95 %), high hatching rate (average 80 %) and high survival rate of larva (average 85 %) (Udumkarn and Singsee, 2004).

Flexible catheter, the tool for searching maturity spawner, sucks an egg of spawner female and measures the egg's diameter. The diameter length of mature female's egg is during 1.8 – 2.2 mm (Tuan, 1999). The mature male will release semen after being pressed softly at stomach area. The spawners were intramuscularly injected below the dorsal fin with: 20 µg/kg BUS in combination with 10 mg/kg DOM (Udumkarn and Singsee, 2004; Sahatnarepaipong et al., 2004; De Silva et al., 2004). After injection, the spawners were separated in to broodstock ponds (cement tank size 2m x 2m x 0.5m). Eight hours later, spawners could be artificial breeding with dry method (Udumkarn and Singsee, 2004). In 2010, Ngoichansri and others modified the breeding method, they reported that the spawner female with 1.9 – 2.2 mm in egg's diameter was injected with resolving 2 times between 6 hours; the 1st injection was HCG 500 IU/kgBW and the 2<sup>nd</sup> injection was 25 µg/kg BUS in combination with 10 mg/kg DOM (Ngoichansri et al., 2010). The spawner male was injected only 1 time with 10 µg/kg BUS

in combination with 10 mg/kg DOM. Eleven hours later, breeders checked spawning of spawner females and softly press at stomach area of spawner males for collecting semen to mix with saline solution (0.9 % NaCl) in ratio 1:1 . Artificial breeding is modified dry method. After breeding, the eggs were mixed with fine mud solution (fine mud 1 kg per water 0.5 L) and were cleaned before being moved to hatching cone with water flow at all time.

### Nursing

Bocourti catfish larva, which age 2 – 3 days is nursed in 2 m diameter cement tank and water depth is 0.4 m. The rate of water flow is 2.8 L/minute. The larva was fed with fine yolk of boil egg and *Moina* sp. 6 times per day (Chaiyao and Totanapoca, 2008; Sema and Teekha, 2008). The 8 days old larva is nursed in 70 m<sup>2</sup> cement tank and water depth is 0.5 m. The rate of water flow is 10 L/minute. The larva was fed with *Moina* sp. and dust of pellet feed with 40 % protein. Fourteen days old, the size of larva is about 6 cm. In this time, the fish can be fed with 30 % protein of float pellet feed 3 times per day (Chaiyao and Totanapoca, 2008). After one month, the fish can be fed with 25 - 30 % protein pellets 2 - 3 times per day (Uppakarat et al., 2010; Sema and Teekha, 2008).

### Pond and cage culture

The dry 200 m<sup>2</sup> earth pond will be eradicated the fish enemies (others fish, insects or invertebrates) and added the lime about 60 kg/1,600 m<sup>2</sup>. The pond will be exposed to the sunlight for 7 days. The water will be filled to the pond passing nylon filter No. 18 about 1 m in depth. The fish larva, which age 20 - 30 days old is an optimal age range to start rearing in earth pond (Sema and Teekha, 2008). The larvae feed on the 30 % protein pellets feed 3 times per day (Uppakarat et al., 2010). The fish larva at 90 days old was fed with 25 % protein pellets feed on 2 - 3 times per day (Uppakarat et al., 2010; Sema and Teekha, 2008). At this time, the larva is about 25 – 30 g in weight and optimal stock density is 3 fish per square metre. After one year, the average weight of fish was 465 g and the average growth rate was 1.17 g per day. The specific growth rate is 0.33 % per day and the survival rate is more than 90 % (Sema and Teekha, 2008). The water qualities requirement in earth pond is shown in Table 1.

**Table 1.** Water qualities requirement in earth pond at 03.00 pm (Sema and Teekha, 2008)

Water quality	Parameter
Water temperature (°c)	25.0 – 32.5
Air temperature (°c)	26.0 – 36.5
Dissolved oxygen (mg/L)	2.5 – 7.5
pH	5.5 – 8.7
Hardness (mg/L)	15.3 – 35.5
Alkaline (mg/L)	15.0 – 25.7
Transparency (cm)	10.0 – 25.0

Imsilp and Sirichaiphon (2007) reported that the optimal larva weight in cage culture is 10 g and stock density of fish is 120 fish per cubic metre. In Thailand, popular cage size is 1 m x 2 m x 1.8 m and maze size is 0.8 cm. The cages drown in about 1.5 m. The fish feed on the 30 % protein pellets feed 1 time per day (about 05.00 pm). After one year and five month, the fish is about 900 g in weight and the average growth rate is 1.8 g per day. The specific growth rate is 0.89 % per day and the survival rate is more than 90 %.

### Conclusion

In farming, the bocourti catfish is omnivorous and all year spawning. The optimal weight of broodstock is about 1 kg. Buserelin with Domperidone, carp pituitary gland and HCG are the successful hormones for artificial breeding of the fish but, BUS with DOM is a lowest cost. All hormones are high fertilization rate (70 - 95 %), high hatching rate (average 80 %) and high survival rate of larva (average 85 %). The larva is nursed in a tank with water flow at all time. The larva, which 8 days old is nurse in 70 m<sup>2</sup> cement tank and the larva, which 90 days old can be cultured in pond. In Thailand, the culture time range is about 1 – 1.5 years and average weight is about 0.4 – 1 kg.

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