Aquaculture of the Asian Catfish Pangasius hypopthalmus in Puerto Rico

Michael V. McGee PhD
Christopher R. Mace MS
Caribe Fisheries Inc.
Lajas, Puerto Rico

Introduction

The basa catfish is a member of the Order Siliformes which includes all catfish. The family Pangasidae includes 21 species distributed throughout South East Asia. Of these P. hypopthalmus and P. bocorti are the most important as aquaculture species in the region.

P. hypopthalmus is native to the Mekong River drainage in Vietnam, Cambodia and Thailand but has been introduced in other Asian countries for aquaculture as a food and ornamental fish. It is commonly known as tra in Vietnam and basa catfish, pangas or Pangasius on the world market. When sold at small size for the aquarium trade it is marketed as the iridescent shark or mystic shark.

Pangasius have been cultured in S.E. Asia for many years. Prior to the mid 1990’s fingerlings were collected seasonally from the river and supply was limited. In 1995 the development of hormone spawning and fry rearing techniques greatly increased fingerling supply and permitted rapid expansion of the commercial production to export markets.

From 1999 – 2002 frozen basa catfish filets exported to the United States increased to over 18,000 mt. This affected the United States catfish farming industry and resulted in import restrictions and higher tariffs on the imported pangasius catfish.

The Vietnamese have continued to open new markets and develop new products for Pangasius. Current production is over 300,000 mt per year with a goal of 1,000,000 mt annually by 2010. Pangasius from Vietnam are currently marketed in over 40 countries around the world as frozen filets and over 80 different value-added products.

Aquaculture

P. hypopthalmus is a tropical warm water catfish which grows to a maximum size of 8kg. Under intensive aquaculture conditions the species will reach harvest size of 1kg in approx. 6-9 months. The fish are highly resistant to crowding and low oxygen and efficiently convert low protein feeds. In Vietnam much of the production is done in large floating cages suspended in rivers, or in earthen ponds. Cage production ranges from 35 to 65 kg/m3 while pond production can exceed 35mt/ha.
Reproduction

Pangasius hypopthalmus becomes sexually mature after 2 years of age. Females grow larger than males and can produce up to 50,000 eggs / kg. Mature eggs are approx. 1mm in diameter and are strongly adhesive after spawning. Individual females may be spawned more than once during spawning season.

In Puerto Rico Pangasius may be spawned from late May through September when water temperatures remain above 24C. Ripe females are selected by sampling of the ovaries using a small diameter catheter. Ripe males release milt when gentle pressure is applied to the lower abdomen.

Selected fish are placed in holding tanks. Hormone injections to induce ovulation are given twice to the female at 8h intervals. Fish may be spawned using HCG at dosages of 500 IU/kg for the first injection and 2,000 IU/kg at the second. Oviprim can be used at a dosage of 0.3 ml/kg followed by a second injection of the females at 0.6 ml/kg. Release of eggs normally occurs 8 to 10 hours after the second injection. Males are injected once at the time of the first injection of the female.

Upon ovulation eggs are stripped from the female. Milt from the male is added and mixed. Water is added and mixing is continued for 1 minute while fertilization occurs.

Eggs are scattered over spawning mats placed in aerated hatching tanks. Hatching occurs 24 hours later. Larvae are approx. 3mm and free swimming upon hatching. Larvae begin to feed on newly hatched artemia approx. 48 hours after hatching. Cannibalism may occur during the larval and fry rearing stages if adequate artemia or similar live food is not provided at regular intervals.

After 3 to 7 days fry may be stocked into rearing ponds with established zooplankton blooms and fed with a suitable prepared diet. Fry grow rapidly to 4-7 cm in approx. 45 days. After this time they are harvested and size graded, and can be sold as fingerlings or stocked into larger grow out ponds.

Pond Production in Puerto Rico

Pangasius were grown to harvest size to evaluate production potential in a 0.05ha pond during 2003-2004. 1,700 50 gm fingerlings were stocked Nov. 2003.

Fish were fed a 28% protein sinking pellet at approx. 2.5 % body weight adjusted bi-weekly. Lack of feed and concern for water quality restricted feeding during some periods of the trial.

Pangasius averaged 0.33 kg by May 2004.
In August 2005 harvest was begun to remove fish of approx 1 kg

Harvests were continued from Aug – Nov. 2004

Total fish harvest from the pond was over 1,700 kg or kg/ha

Although the trial was not considered a scientific evaluation the results indicate that Pangasius can be cultured successfully at high density in earthen ponds in Puerto Rico and demonstrates the potential for aquaculture of this species in other tropical areas of the Western Hemisphere.

Processing and Product Quality

Pangasius are normally processed as a filet or steaked although the Vietnamese have developed over 80 value added products to date. Flesh of the fish ranges in color from creamy white to orange with a mild flavor and a medium firm texture. No evidence of off-flavor has been encountered with pond raised fish in Puerto Rico.

Summary

Development of hormone spawning techniques for Pangasius hypophthalmus has resulted in a rapid and dramatic increase in production of the species in Asia. The fish is currently marketed in 40 countries around the world and production from Vietnam is projected to reach 1,000,000 mt by 2010.

The United States has enacted laws and tariffs to limit imports of the fish from Vietnam to protect the domestic catfish farming industry. Import tariffs currently only apply to Vietnam.

Pangasius tolerate highly intensive culture conditions in floating cages or in ponds and quickly reach harvest size of 1 kg or larger. Fish grow well on less expensive, lower protein feeds.

Pangasius reach sexual maturity at 2 years of age, are highly fecund and can be reproduced using standard hormone spawning and larval rearing techniques.

Pangasius were successfully reproduced and cultured in Puerto Rico with results similar to those achieved in Asia.

Significant potential and opportunity exists for the introduction and development of Pangasius culture in tropical areas of Central and South America as a new aquaculture species for the region.

It is anticipated that in the next 5 years worldwide aquaculture production of Pangasius could be similar to that achieved with Tilapia and Salmon.