

## SABALO SPAWNING

by

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### Introduction

Artificial spawning and reproduction of Chanos chanos or sabalo (sexually mature bangos) would be the greatest contribution to the bangos farming industry that science could offer at this point in time. Bangos are cultured almost exclusively in Taiwan, Indonesia and the Philippines. These three countries collectively produce about 200,000 metric tons per year which is by far the greatest production of any single species of fish or shellfish raised in brackishwater ponds in the world. However, until now the industry has depended entirely on natural spawning to provide fry for raising in ponds. Unfortunately, supply of bangos fry from nature is not meeting the demand in any of the bangos farming countries (Chen, 1971 and 1973, personal communication; <sup>1</sup>/Djajadiredja and Suhardi, 1972). In 1974, the Philippines needed an estimated 875 million bangos fry, but only 115 million or 13% of the demand were collected.

This paper is a brief presentation on the status of natural and artificial reproduction of bangos and a recommendation on general approaches researchers may take in solving fry needs while working toward bangos domestication. As with all other aspects of bangos biology and life history, science has surprisingly very little knowledge about spawning and reproduction. Essentially, no new information has been generated since Schuster's (1960) synopsis.

### Status of Sabalo Reproduction in Nature

The following is condensed from Schuster, 1960 with additional information from the unpublished Philippine Inland Fisheries Project Technical Report No. 5 (IFP TR #5, 1974):

1. No external observable characters are known to distinguish sabalo males and females.
2. Sexual maturity is attained at an estimated age of four years when male and female sabalo weigh approximately 4.3 kg and 4.9 kg,

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respectively. (Schuster, 1960).

3. The fecundity of sabalo is estimated to be between 3 million and 7.3 million eggs per spawn, and a fecundity second only to the cod fish among vertebrate animals.

4. Sabalo are polygamous; schools of sabalo, in pre-spawning behaviour or in the act of mating, have been observed during several spawning seasons in water from 4 to 5-m depth.

5. Individual female sabalo spawn only one time per year which may be anytime during the season of up to several months. Male sabalo are capable of spawning over a long period within a season and probably mate with more than one female.

6. The pelagic eggs are fertilized while they float in the surface layers after spawning.

7. Spawning takes place in the evening from "8 to 10 hours" and the eggs develop in about 24 hours.

8. Spawning takes place in quiet, shallow sandy bays where the water is clear and the bottom consists of sand and corals.

9. Spawning seasons vary between and within geographic locations.

10. Bangos raised in ponds or have voluntarily entered fresh or brackishwater lakes remain sexually undeveloped and sterile as long as they are landlocked.

#### Status of Artificial Reproduction of Sabalo

Numerous unpublished reports exist on various attempts to artificially reproduce sabalo in the Philippines, Taiwan and Indonesia. Some of the most informative work has been done by Liao (1971) in Taiwan and the Inland Fisheries Project (IFP TR #5, 1974) in the Philippines. The following is a summary of conclusions reported in IFP TR #5, 1974:

1. Almost all sabalo males capture during spawning seasons have had ripe sperm and are strippable while females have been in various stages of gonadal development from first stages of development to post spawning. However, none has been captured with ripe, strippable eggs or ova.

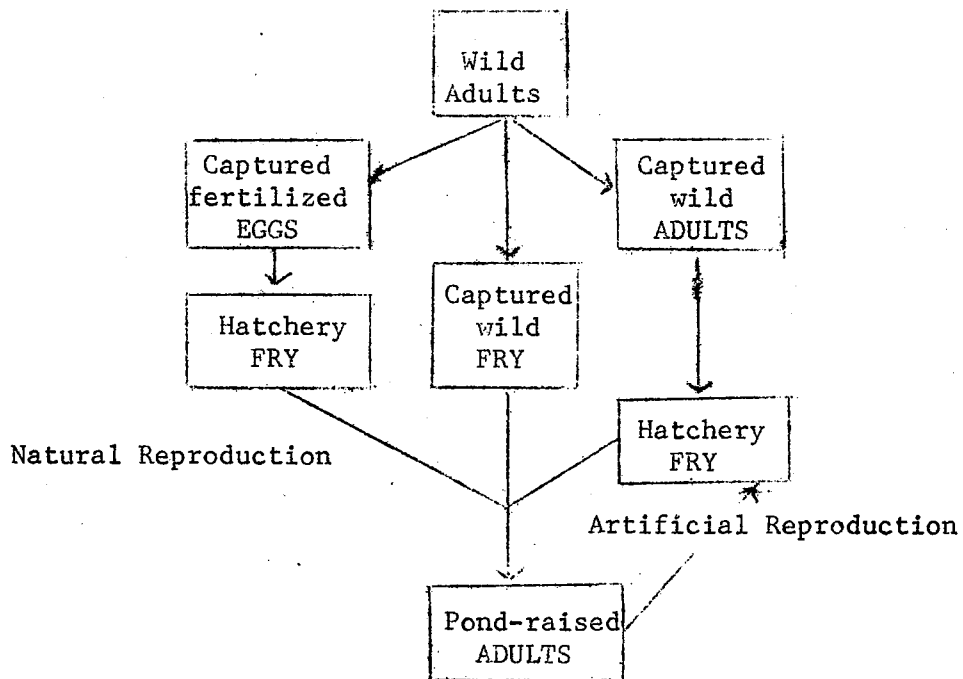
2. Artificial spawning by stripping is possible for both males and females.

3. Wild adults sabalo are highly excitable, and extremely difficult to capture and handle without causing stress and shock which result in death within a few minutes to a few hours depending on severity of stress. Techniques to capture, handle and indefinitely hold sabalo without severe stress must be developed before artificial reproduction of wild adult sabalo can be highly efficient.

Recommended Strategy in Pursuing Research on Sabalo Reproduction

It is essential to the growth and perhaps even the survival of the bangos farming industry that the species be artificially reproduced as quickly as possible. Ultimately, it will be essential that we achieve control over the complete life cycle of bangos. In the interim, while researchers are developing knowledge on artificial reproduction and control of the life cycle of the bangos, we must learn better ways to utilize natural reproduction.

The figure below diagrammatically illustrates alternatives or avenues that different researchers and research institutions may take to collectively achieve, through coordinated cooperative effort, better utilization of natural sabalo reproduction while simultaneously working toward artificial reproduction and, eventually, control over the bangos life cycle. The four alternatives (A, B, C, and D) are discussed following the figure.



Alternative A - Research could be initiated immediately using captured wild fry to learn the requirements for raising fry to sexually mature adults, a feat that has never been accomplished, but an essential setup in achieving control over bangos life cycle.

Alternative B - Research may be centered on locating specific spawning grounds of sabalo which will open other avenues of research such as:

1) studying both ecological conditions where sabalo spawn in nature and spawning-mating behavior of sabalo.

2) developing hatchery techniques for incubating eggs and raising the sacfry to normal capture size of 10 to 13 cm.

3) developing new techniques for mass collection of wild eggs and fry on and near the spawning grounds.

Alternative C - Research may be centered on spawning and reproducing sexually mature sabalo captured directly from the sea and/or adult sabalo captured from the sea and held in captivity until gonadal maturity. Knowledge developed in Alternative A and B would be utilized after fertilization of the eggs.

Alternative D - Little, if any, meaningful research can be done on developing control over the life cycle of bangos outside of research in Alternatives A, B and C until developments have been achieved in those areas. Once control of the life cycle has been obtained, much research will be required to improve handling techniques, increase survival, improve selected characters through genetic improvement and many others.

Organizations known to be doing research on natural and/or artificial sabalo reproduction are listed below with names and address of contact personnel:

BUREAU OF FISHERIES AND AQUATIC RESOURCES  
Mr. Thomas Reyes  
Intramuros, Manila, Philippines

UNIVERSITY OF THE PHILIPPINES  
COLLEGE OF FISHERIES  
Dean R. O. Juliano  
Diliman, Quezon City, Philippines

SEAFDEC AQUACULTURE DEPARTMENT  
Mr. Porfirio R. Manacop, Sr.  
Tigbauan, Iloilo, Philippines

TAIWAN FISHERIES RESEARCH INSTITUTE  
Dr. I-Chiu Liao  
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OCEANIC INSTITUTE  
Dr. Colin E. Nash  
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