

AN EXPERIMENTAL STUDY ON THE CULTURE OF CHANNA STRIATA USING A POPULATION OF PUNTIUS VITTATUS AS FOOD

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Abstract

An experimental study was carried out in a pond dug in the Muthurajawela swamp to evaluate the feasibility of culture of the snakehead Channa striata using a population of Puntius vittatus as food. The swamp was characterized by water of low pH, low amounts of dissolved oxygen and low primary productivity. The gross primary productivity of the pond was artificially increased using cow and poultry manure to support the establishment of a reasonable population of stocked P. vittatus. Fry of C. striata measuring 10 cm in total length were stocked at a density of 9,000 individuals/ha when the population of forage fish was well established. Abundance of phytoplankton, gross primary productivity (GPP) and abundance of forage fish were monitored continuously throughout the study period. The GPP was maintained above 0.6 gC/m²/day by adding extra fertilizer if necessary. The zooplankton density varied from 64 to 341 individuals/l. The density of forage fish of different sizes during the study period was estimated to be around 115 individuals/m³. Average growth rate of C. striata was estimated to be 0.83 g/day with an average weight achieved per individual of about 262 g at the end of 10 months. This study indicated that C. striata could perhaps be successfully cultured in this swamp using P. vittatus as a forage fish species.

Introduction

The snakehead C. striata (Ophicephalus striatus) commonly found in freshwater systems of tropical Asia (Smith 1965; Nelson 1984) has long been considered as a valuable species of food fish in the East (Willey 1910). This species is one of the most popular freshwater food fish and it makes a significant contribution to the fisheries of minor irrigation reservoirs of Sri Lanka (Indrasena 1965).

Snakehead has only been used for aquaculture recently, mainly because of its carnivorous, especially piscivorous, feeding habit (Wee 1982). However, since it fetches a high market price due to its palatable and practically boneless firm flesh, snakehead is now cultured in many southeast Asian countries (Ling 1977). Monoculture of C. striata in ponds and cages is carried out in Thailand, Vietnam and Kampuchea (Wee 1982). It is also used in polyculture with

milkfish and with Nile tilapia to control the numbers of the young tilapias (Cruz and Laudencia 1980). However, in Sri Lanka, aquaculture of C. striata is still not practised in a well-defined system.

Since C. striata is capable of tolerating a wide range of pH from 3.1 to 9.1 (Varma 1979), the present study was carried out to investigate the feasibility of its culture in Muthurajawela swamp, an unutilized swamp in the Western Province of Sri Lanka. This low-lying coastal area which consists of peaty deposits, occupies about 3,300 ha. A layer of muck is present over the peat and sandy clay (Costa and Keembiahetty 1987). Due to the peaty nature and decomposition of organic substances, high acidity, low amounts of dissolved oxygen and low primary productivity resulted in this environment. Some studies on the culture of Oreochromis mossambicus in this swamp were carried out recently (Costa and Keembiahetty 1987). However, no work has so far been done in Sri Lanka on the culture of C. striata in low pH environments. The objectives of the present study were to determine the rate of growth and to estimate the optimum stocking density and production of C. striata when cultured in the low pH environment of Muthurajawela swamp with ad libitum feeding on a population of forage fish, Puntius vittatus.

Materials and Methods

These studies were carried out in a dug-out pond measuring 30 m x 7 m x 1 m in the Muthurajawela swamp. The pond was fertilized at the beginning of the experiment using cow and poultry manure applied at a rate of 1 kg/m² at fresh weight basis. A sample of phytoplankton from highly eutrophic Colombo Lake was then added to the pond to promote algal growth. Three weeks later, about 20,000 individuals of Puntius vittatus measuring 1.0-3.7 cm in total length were collected from the swamp using indigenous fish traps and were introduced into the pond to give an initial stocking density of about 95 fish/m³. Four weeks after the introduction of forage fish, fry of C. striata measuring 9-10 cm in total length were stocked at a density of 9,000 individuals/ha. Dissolved oxygen content, water temperature, pH and gross and net primary productivities were determined at fortnightly intervals at 1000-1200 hrs. Amount of dissolved oxygen was measured by HACH glass electrode oxygen meter and gross and net primary productivities were determined by light and dark bottle technique (Sreenivasan 1964). The pH