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GROWTH, REPRODUCTION AND MORTALITY OF *OPHICEPHALUS STRIATUS* BLOCH IN A PEATY SWAMP OF SRI LANKA

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Abstract

Growth, reproduction and mortality of the snakehead, *Ophicephalus striatus* Bloch, inhabiting the Muthurajawela swamp, a low Ph environment in Sri Lanka, were studied using monthly samples collected by angling and indigenous fish traps. The asymptotic length and growth coefficient were estimated to be 49.5 cm and 0.194 respectively. These figures were smaller than those estimated for this species in other regions of the country. The values estimated for the total and natural mortality coefficients were 3.7 and 1.7 respectively. The exploitation ratio, which was 0.5, indicates that this stock is exploited at the optimum level. The absolute fecundity of the fish ranging from 23.8 cm to 29.5 cm in standard length varied from 3800 eggs to 10800 eggs. These figures are higher than those recorded for *O. striatus* in other regions of Sri Lanka. The relative fecundity ranged from 19 to 38 eggs/g of body weight. The minimum size at maturity for the females and males were 19.5 cm and 24.5 cm respectively. The sex ratio was found to be 1 female : 3.6 males.

Introduction

The snakehead, *Ophicephalus striatus* is one of the most popular freshwater food fishes in Sri Lanka. In the recent past, it has been recorded in significant numbers in the fish catches of minor irrigation reservoirs in the low country (Indrasena 1965).

O. striatus is cultured in many south east Asian countries (Ling 1977) mainly due to the high demand for its palatable white flesh which is claimed to have rejuvenating properties (Wee 1982).

Some research on the use of alternative food sources (De Silva 1989, 1990), food conversion efficiencies in low pH conditions (Wijeyaratne 1989) and feasibility of its aquaculture in swamp conditions (Wijeyaratne 1990) have been carried out in Sri Lanka recently. Kilambi (1986) has studied the age, growth and reproductive strategy of *O. striatus* collected from south western region of Sri Lanka. The nesting habits, parental care and the development of young has been studied by Willey (1910).

O. striatus is capable of tolerating extreme ecological conditions such as low pH (Varma 1979) and is found in significant numbers in the Muthurajawela swamp, which is a low pH, less productive peaty environment extending for about 3000 ha in the west coast of Sri Lanka. A subsistence fishery for this species by angling and using indigenous fish traps exists in this swamp throughout the year.

Recent studies shown that *O. striatus* can be cultured in dug-out ponds in low pH swamp environments (Wijeyaratne, 1990). A knowledge on the biology of this species will be very useful for a successful aquaculture programme (Wee 1982). No work has so far been done on any aspect of biology of *O. striatus* in low pH environments. This paper describes the growth rate, mortality rates, fecundity, the minimum size at maturity and spawning season of *O. striatus* inhabiting the Muthurajawela swamp which is characterized with low pH and less productive aquatic habitats.

Materials and Methods

Random samples of *O. striatus* were obtained every month from fishermen's catch of Muthurajawela swamp from November 1990 to October 1991. Fish were transported alive to the laboratory and were freezed. After measuring the standard length and weight, each fish was dissected open and the sex and gonadal maturity stage according to the maturity classification described by Kilambi (1986) were recorded. Mature ovaries were preserved for 1 week in Gilson's fluid (Bagenal and Braum 1968) and fecundity was estimated. Diameters of eggs of 16 mature ovaries were also measured using a micrometer eye piece.

Using the modal length progression analysis (Sparre *et al* 1989, the asymptotic length and growth coefficient were estimated. The total mortality coefficient was estimated using the Z equation described by Beverton and Holt (1956). For the calculation of natural mortality coefficient using Pauly's (1980) empirical formula, mean environmental temperature was taken as 30°C.

Results

The standard length of the fish used in the present study ranged from 12.0 cm to 35.0 cm. The length frequency distribution for each month together with estimated growth curves are shown in Fig. 1.

The absolute fecundity of fish ranging from 23.8 cm to 29.5 cm in standard length varied from 3800 eggs to 10800 eggs. The relative fecundity ranged from 19 to 38 eggs/g of body weight. The statistical relationships of fecundity with body size are given in Table 1. The absolute fecundity was observed to increase significantly with size ($P<0.05$). The relationship of relative fecundity with standard length and body weight were not statistically significant ($P<0.05$).

The variation of mature fish in each size group is shown in Fig. 2. The minimum size at maturity for the females and males were found to be 19.5 cm and 24.5 cm standard length respectively. The sex ratio was observed to be 1 female :3.6 males.

The frequency distribution of egg diameters is shown in Fig. 3.

The relative abundance of different maturity stages in the samples during the study period is shown in Fig.4. Spent females were observed in the samples from October to December and from March to May.

Asymptotic length and growth coefficient were estimated to be 49.5 cm standard length and 0.194 $year^{-1}$ respectively. The values estimated for total and natural mortality coefficient were 3.7 and 1.7 respectively. The exploitation ratio was found to be 0.52.

Discussion

The values for absolute fecundity observed in the present study are higher than those recorded by Kilambi (1986) for fish collected from south western region of Sri Lanka. This may be an adaptation for extreme ecological conditions of the Muthurajawela swamp to ensure the survival of more offspring. The values observed in the present study are close to those recorded in South India (Alikunhi 1953). Although no significant correlation between fecundity and body size has been recorded for *O. striatus* from south western region of Sri Lanka (Kilambi 1986), the regression equations between absolute fecundity and