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BIOLOGICAL CONTROL OF *ORYZIAS MELASTIGMA* (McCLELLAND) IN LESS SALINE PONDS OF BAKKHALI BY *MEGALOPS CYPRINOIDES* (BROUSSONET)

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ABSTRACT

In the rain-fed ponds of Bakkhali containing very low saline water (0.16 - 1.28 ppt), when large populations of *Oryzias melastigma* got established, such populations could effectively be checked through introduction of a few numbers of *Megalops cyprinoides*. The feeding intensity of the predators at different sizes on *O. melastigma* and the growth obtained thereof were discussed together with a description of the habitat.

INTRODUCTION

Oryzias melastigma (McClelland), a small-sized cyprinodontid fish, is highly euryhaline. It is found in freshwaters through estuaries and even in hypersaline lakes with a water salinity of 70 ppt. This species is a prolific breeder and lays eggs which are attached to some substratum and which hatch out in 8-15 days (Raj, 1916; Jones, 1937). When ideal conditions for breeding are encountered in fertilized ponds, an explosive population is formed within a short time (10-15 days), leading to an acute competition with the cultivable species for food and space.

On the basis of data collected during May-November 1975, the role of *Megalops cyprinoides* as a predator in controlling the population of *Oryzias melastigma* is discussed in the present communication.

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BIONOMICS OF THE PREDATOR

M. cyprinoides is a minor predator feeding on small fish and insects in the adult stage, while as fry and fingerling it feeds on insects and fish fry (Alikunhi, 1957). At postlarval stage this species gets easily acclimatised to freshwater in just two stages – 50% brackish-water and 50% freshwater and 25% brackish-water and 75% freshwater (Ganapati and Alikunhi, 1952). In freshwater ponds it grows to a length of 38.7 cm in nine and a half months time (Alikunhi and Rao, 1951) and 57 cm in its second year (Menon *et al.*, 1959). From observations on the larval incursions of this species from the Bay of Bangal into the Pulicat Lake, the breeding season was found to be very prolonged, extending from April to October and again during December-January (Rao and Gopalakrishnan, 1975).

DESCRIPTION OF THE HABITAT

The present observations were carried out at the pilot fish farm of the Central Inland Fisheries Research Institute of Henry's Island in the Sunderbans region of West Bengal. When a series of rain-fed ponds was constructed in 1968 on the elevated saline soils of this island, the initial salinity in the soil and water

phases was 29.5 and 20.12 ppt respectively, which declined rapidly over a period of three years paving the way for successful polyculture of Indian major carps, mullets and prawns (Jhingran *et al.*, 1973). With a further lowering of water salinity to a range of 1.28 - 3.15 ppt in the subsequent years, two exotic carps viz., *Hypophthalmichthys molitrix* and *Cyprinus carpio* var *communis* were also cultured along with the above species.

During 1973-75, when the salinity was further lowered (water salinity 0.18 to 1.47 ppt and soil salinity 0.041 to 0.24 ppt), a persistent turbidity (160 to 516 ppm of SiO_2) was observed for a long time. During experimentation to find out a solution to the problem of turbidity, it was observed that when estuarine water was pumped into the pond from the surrounding borrow-pits, raising the salinity sharply by 1.5 to 2.0 ppt, the turbidity disappeared, perhaps due to removal of exchangeable sodium ions, and the pond water remained clear for a considerable length of time.

Along with the estuarine water which was pumped into the pond from the borrow-pits, a few specimens of *Oryzias melastigma* gained entry into the pond. Due to abundant growth of marginal grasses which formed a very good substratum for the eggs of *O. melastigma* and diatoms in the plankton, the species bred prolifically, requiring biological control.

Feeding Intensity and Growth of the Predator

Thirty specimens of *M. cyprinoides* in the length range of 250 to 265 mm were introduced in the pond in May, 1975. Eight out of the ten fishes examined in the length range of 255 mm to 395 mm on different occasions during the period May to November, 1975 had stomachs full and the gut contents included invariably whole specimens and remains of *O. melastigma*. On one occasion two fishes had half-full stomachs, with the remains of the above species in an advanced stage of digestion. The number of specimens of the forage species in the guts of the predator

Table 1. *Predator-prey relationship in* Megalops cyprinoides

Date of observation	Length range of predator (mm)	Number of specimens examined	Condition of gut	Gut contents analysis: Composition of diet	Gut contents analysis: No. of whole specimens of *O. melastigma* in each gut	Size range of prey (mm)
16.5.1975	255	1	Full	Fish remains 80% Mysids 20%	12	12–18
21.6.1975	300–310	2	Full	Fish remains 100%	18 & 20	16–23
10.7.1975	330–335	2	½ Full	–do–	Nil	Nil
20.8.1975	355–370	2	Full	–do–	22 & 30	20–28
26.9.1975	385	1	Full	–do–	25	25–30
22.10.1975	390–395	2	Full	–do–	26 & 34	25–31

ranged from 12 to 34 per gut depending upon the size of the predator. Further, it was also observed that with increase in the size of the predator, there was increase in the size of the prey (Table 1).

Data on the growth of the predator are presented in Table 2. It can be seen that fishes of an average size of 256 mm/140 g grew to a mean size of 396 mm/590 g in six months.

TABLE 2. *Growth of* M. cyprinoides *during May-November* 1975 *in a less saline pond at Bakkhali*

Month	Mean length (mm)	(g)	Growth In length (mm)	In weight (g)
May	256	140	49	120
June	305	260	28	60
July	333	320	27	90
August	360	410	22	70
September	382	480	9	70
October	391	550	5	40
November	396	590		

From Table 2 it can be further noticed that the increase in body weight was maximum during May-June apparently due to higher temperatures of the water prevailing in the season (27.6 to 28.9°C) and least during the colder months of October-November. The growth rate observed by the authors compares favourably with that reported by Alikunhi and Rao (1951).

EFFICACY IN CONTROL OF PREY

Before the introduction of the predator, the density of the prey population was found to be higher — the average number of fish per haul of a fry drag net of 4 mm mesh size was 8,409. In November 1975, when similar netting was done, their concentration, indicated by the above parameter, was only 3,947. It may therefore be mentioned that *Megalops cyprinoides* can function as an effective biological control against *Oryzias melastigma*.

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