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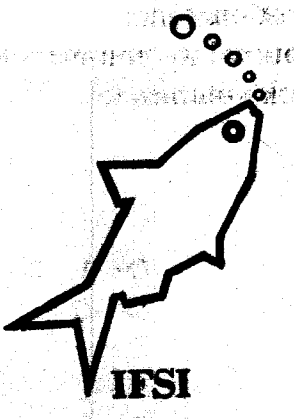

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A NOTE ON CLIPPING EXPERIMENTS TO ESTIMATE FISH PRODUCTION IN CULTURE OPERATIONS

Methods of marking fish for future recognition for studies on population parameters such as migrations, age and growth, and behaviour, etc. have been of concern to fishery biologists for some time. Clipping of fins has been recognised as one of the methods by many workers and has become more popular as a group marking method as it is much quicker and cheaper than tagging and has a less traumatic effect on the fish.

In culture operations, periodic netting of ponds is done to evaluate the growth and calculate the standing crop of fiish. Once an estimate of the number of fish present in the pond is made, the amount and intensity of poaching can be estimated in the light of known natural mortality. The present study was undertaken in an experimental pond of the All India Co-ordinated Research Project on Composite Fish Culture and Fish Seed Production at Kalyani to study the possibilities of using clipping as a means for estimating the poaching intensity and also to study the effect of clipping on the growth of fishes.

The study was conducted in a 0.23 ha pond which was stocked with 5 species *viz.*, *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*, *Hypophthalmichthys molitrix* and *Cyprinus carpio*. For these studies, catla *C. catla*, which is a surface feeder and easy to net, was selected. Of the 241 catla present in the pond, left pelvic fin of 60 catla (average length 216.6 mm and average weight 145.8 g) was clipped at the base of the fin and released back into the pond on 31.5.75. On 23.6.75, the pond was netted and 185 catla were caught of which 45 where observed to be the clipped ones. The average length and weight of unclipped catla was observed to be 240.8 mm and 206.0 g respectively, whereas the clipped ones had an average length and weight of 231.1 mm and 176.7 g respectively. Again on 22.9.75, the fishes were examined. Out of 162 fish caught, 38 were found to be clipped with an average length of 287.5 mm and an average weight of 335.5 g. The unclipped ones had an average length of 299.0 mm and an average weight of 346.4 g. Within this three months' period, it was noticed that the clipped fins had completely regenerated and only a trained eye could distinguish the clipped ones from the rest. Further observations could not be made as it was not possible to distinguish the clipped ones from the unclipped ones.

The number of catla available in the pond on 23.6.75 was estimated to be 247. Similar estimate made on 22.9.75 showed that 256 catla were present in the pond. From these two estimates, it may be concluded that there was neither natural mortality nor mortality due to poaching during this period of observation.

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TABLE I

Analysis of variance

Set	Variations due to	d. f.	S. S.	M. S.	F.
First set on 23.6.75	Between groups	1	2,023.5	2,023.4	5.28 *
	Within groups	85	32,572.0	383.2	
	Total	86	34,595.4		
Second set on 22.9.75	Between groups	1	2,145.3	2,145.3	8.31 **
	Within groups	64	16,528.5	258.3	
	Total	65	18,673.8		

* and ** indicates significance at 5% and 1% levels respectively.

Data on length measurements of clipped and unclipped ones were analysed using analysis of variance (Table I). The difference in lengths was found to be significantly different at 5% level on 23.6.75 and at 1% level on 22.9.75, indicating better growth for unclipped ones. However, it may be mentioned that this difference in growth is not much to affect the production substantially.

Since the differences in growth were found to be statistically significant, production was estimated for clipped and unclipped ones separately as follows :—

In the normal notation, production during the interval (t_1, t_2) is expressed as $P(t_1, t_2)$ where

$$P(t_1, t_2) = \int_{t_1}^{t_2} N_t \, d\bar{w}_t \qquad (1)$$

where N_t and $\bar{w}_t$ are the number of fishes available and their average weight respectively at time 't' in (t_1, t_2). Since N_t in this case remains the same

$$P(t_1, t_2) = N \int_{t_1}^{t_2} d\bar{w}_t$$

$$= N \left[\bar{w}_{t_2} - \bar{w}_{t_1} \right] \qquad (2)$$

Using (2) the production for 181 unclipped and 60 clipped fishes was found to be 36.5 and 11.4 kg. respectively, totalling to 47.9 kg. Had there been no clipping, the total production during this period of observation would have been 48.6 kg.

Of all the fins, generally the pelvic fins are selected for clipping since clipping of other fins will affect the mobility of the fish. The present study has revealed that clipping of pelvic fin can be used for short term studies only, since the fin regenerated completely within three months' time. In general it has been observed that regeneration is more rapid

among young fish as compared to the older ones. van Someran and Whitehead[1] have observed that though the pelvic fin in *Tilapia* regenerated in as short a period as 30 days, they could recognise the marked fish since regenerated fish showed altered pattern of branching. But such a phenomenon was not observed in the present study in the regenerated fins of catla. Hence some other mode of marking should be used for estimating the intensity of poaching in pond culture operations.

Shetter[2] observed that trout whose left pectoral fin had been clipped had a lower survival rate. Nelson[3] did not find any effect on the growth or survival of brook or rainbow trout when both the pelvic fins were removed. Ricker[4] found that yearling black bass with one pectoral, both pelvics or one pectoral plus both pelvic fins clipped had a greatly reduced survival rate. Clipping of left pectoral fin in the present studies had no effect on their survival. However, their growth was affected due to clipping.

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