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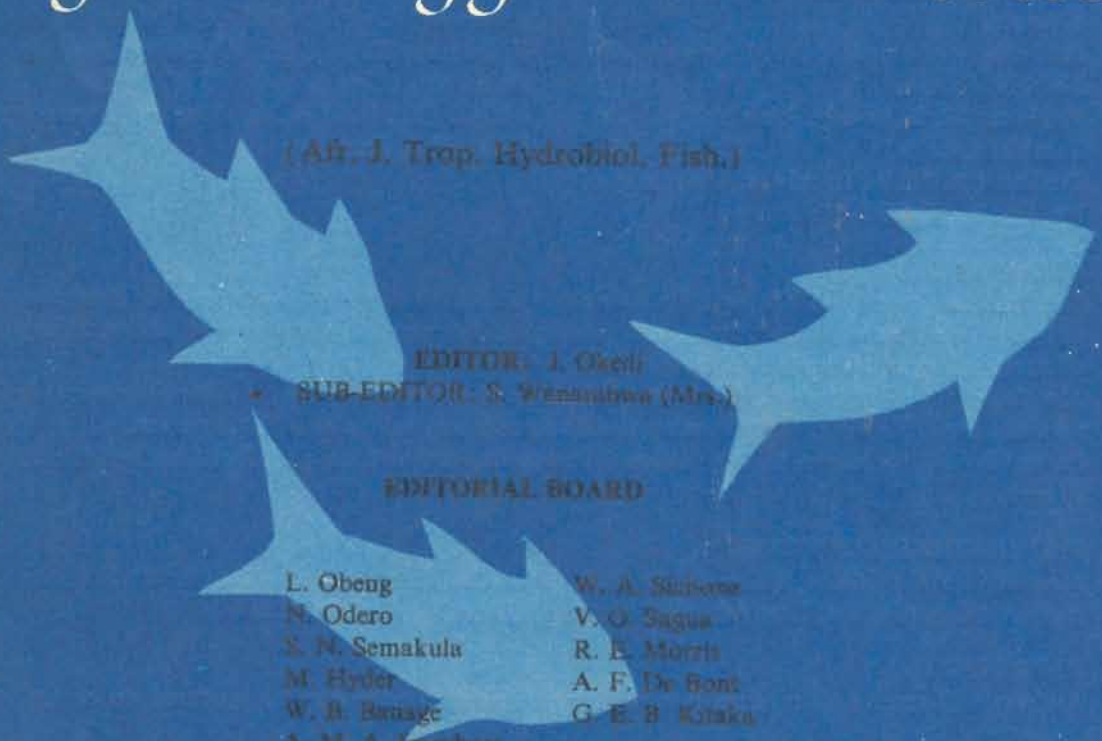

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PRELIMINARY OBSERVATIONS ON CAGE CULTURE OF *TILAPIA ESCULENTA* GRAHAM AND *TILAPIA ZILLII* (GERVAIS) IN LAKE VICTORIA WATERS, AT THE FRESHWATER FISHERIES INSTITUTE, NYEGEZI, TANZANIA

K. H. IBRAHIM, T. NOZAWA and R. LEMA
Freshwater Fisheries Institute Nyegezi, Tanzania

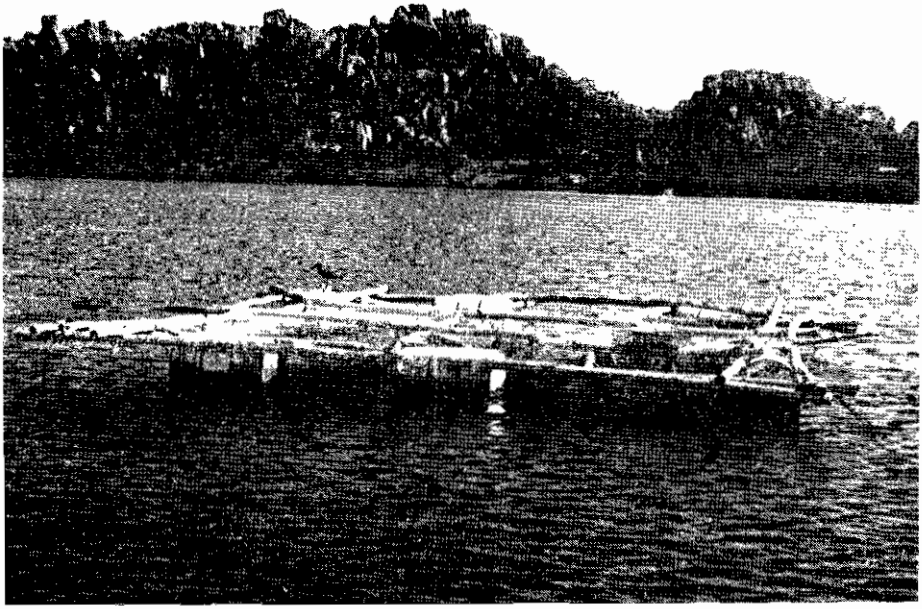
INTRODUCTION

One of the most spectacular developments in aquaculture in recent times is the rearing of fishes in confined areas, enclosures and cages. In Japan, one of the well established techniques in intensive fishculture is the use of floating cage nets in protected bays for culture of Yellow tail (*Seriola quinqueradiata*) and in Lakes and reservoirs for rearing common carp (FAO 1969). Cage fish culture has been practised, since olden days, in Cambodia, particularly for rearing *Pangasius suchi* (LAFONT & DOM SAUEUN, 1951) and in Indonesia for rearing carps (VAAS & SACHLAN, 1956). HICKLING (1962) and BARDACH *et al.* (1972) mention the widespread use of floating cages for rearing of both freshwater and marine fishes in Japan and other Far East countries. According to the latter authors when fishes are crowded into small spaces, they burn few calories and hence food conversion is more efficient. The General Fisheries Council for Mediterranean (GFCM) and its working party established in 1967, having recognized the potentialities of this line of aquaculture proposed to investigate in detail intensive culture of fin fishes in ponds, cages, pens and other enclosures (FAO, 1970a). Raising of Channel cat fish in cages in Illinois (FAO, 1970b) has been found to be feasible on commercial scale; the size of cage preferred being 1.8 × 0.9 × 1.2 metres.

One of the advantages of this type of fish culture is that since cages are fixed in running waters or in larger water bodies, a very high rate of stocking can be adopted. In addition to this, since this is being conducted in already existing water areas there is no fresh demand on land.

MATERIAL AND METHOD

The presence of the large expanse of shallow waters of Lake Victoria near the Freshwater Fisheries Institute, Nyegezi was considered ideal to initiate work on Cage culture of *Tilapia esculenta* and *T. zillii*. This was part of a comprehensive project on investigations on fish culture development techniques being carried out at the Freshwater Fisheries Institute, Nyegezi (IBRAHIM & LEMA, 1974a, 1974b). A 3.5 × 3.5 × 3.5 metre cage with bamboo frame, empty drums as floats and nylon fish net material (8 mm mesh) constituting the hanging part, was fabricated and fixed in the shallow waters



Photograph 1 Photograph of a Fish rearing cage fixed in Lake Victoria waters near the freshwater Fisheries Institute, Nyegezi, Tanzania.

of Lake Victoria, about fifty metres from the shore (PHOTO 1 and FIG. 1). The cage was kept stationary and stretched with the help of sinkers. A covering was provided for the cage with larger meshed net as a precaution against any possible fish escape or predators entering the cage. On 13th March, 1972 a total of about 3,538 *T. zillii* fry of initial size range of 37.0 to 72.0 mm and an average size of 53.0 mm/2.56 g were stocked in the cage. The fry were obtained from the Freshwater Fisheries Institute ponds at Nyegezi.

The fishes were fed daily with the locally made Brewery Waste—Fish meal mixture (10:1) at 15% weight of the total weight of fish for one month and thereafter increased to 30%. After the first fifteen days the fishes were also fed with green vegetable leaves and more commonly with the common weed *Comalina* sp. at 50% weight of the total weight of fish. Under cage conditions the fishes readily adjusted to supplementary feeding and consumed both items of food voraciously.

RESULTS

In two months time the fishes attained a size range of 64.0 to 96.0 mm and an average size of 77.26 mm/10.0 g. By the third month the fishes reached a size range of 65.0 mm to 128.0 mm and an average size of 91.35 mm/15.6 g. By now there was a large scale infection of *Saprolignia* and hence the fishes were all removed for treatment. A total of 2,407 specimens were removed, having a total weight of 38.5 kg. Among these only a few had attained sizes of over 100.0 mm and hence most of them were not of table size. The net was lifted up, thoroughly scraped, treated with lime, washed well and allowed to dry out for some time.

On 1st August 1972, 963 specimens of a mixed stock of *T. esculenta* and *T. zillii*, ranging in size from 60.0–118.0 mm and an average size of 90.0 mm/16.3g were stocked in the cage. The fishes in addition to the regular feeding schedule were also subjected to a weekly spray of lime solution in and around

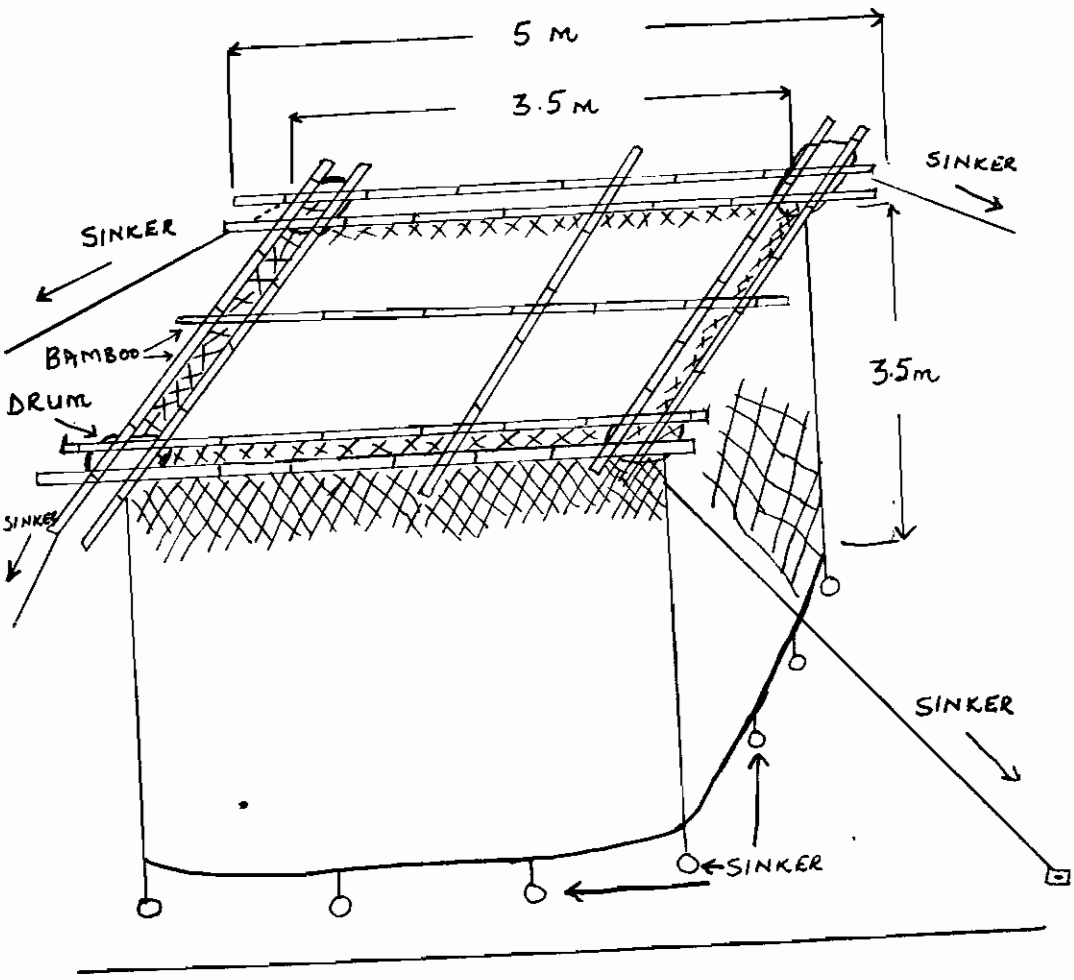


Fig. 1. Sketch of a cage indicating the measurements and other details.

the cage, as a precaution against any possible future *Saprolignia* infection. In about two and a half months time the fishes attained a size range of 77.0 to 157.0 mm and an average size of 120.5 mm/36.5 g. In four months and twenty-two days' time, during sampling both *T. zillii* and *T. esculenta* were segregated and measured separately, and the fishes had attained a size range of: *T. zillii* 108.0 mm to 208.0 mm and an average size of 153.03 mm/83.12 g and *T. esculenta* a size range of 136.0 mm to 193.0 mm and an average size of 162.20 mm/82.2 g. The rearing experiments could not be completed since some persons illegally removed the fish from the cage.

A fresh cage of 5 × 5 × 5 metres (20 mm mesh) was fabricated in April 1973 and by 4th May 1973 under similar conditions of the previous experiments, 2,362 *T. esculenta* fingerlings were stocked in the cage. The initial average size of the fry was 98.0 mm/19.0 g. Fishes were fed with Brewery Waste—fish meal mixture only. In about three and a half months time the fishes attained an average size 116.83 mm/26.68 g. In less than six months' time the fishes reached a size range of 112.0 mm to 193.0 mm and an average size of 141.6 mm/46.6 g. By now the experiment had to be discontinued due to some unexpected happenings which were beyond our control.

Breeding

Both species of *Tilapia* attained maturity under cage conditions. But in the absence of a bottom substratum the specimens could not effectively breed in cages. Thus the problem of prolific breeding and thereby overcrowding very often met with in *Tilapia* culture, was not met with in cage culture. However, an interesting case of *T. zillii* depositing the eggs on the sides of the feeding tray was recorded once. But this need not be taken up seriously since *T. zillii* is not a mouth brooder and hence the hatchlings that come out will automatically fall to the bottom; that is the lake bed.

DISCUSSIONS

Cage culture of *Tilapia* is not suggested as a substitute for any known techniques in fish culture, but as one of the various techniques of obtaining more fish under controlled conditions. This fact has been very well accepted in various countries. Whererever facilities exist, this line of fish culture should be vigorously explored as a possible avenue in increasing fish production. High density stocking, management under controlled conditions, easy technique of fabricating the cage at relatively low cost, having no demand on land area, absence of prolific and effective breeding and easy availability of fish when a person needs it are a few of the attractions of the technique. The studies indicate that it is desirable to have different meshes for the cages, such as, small meshed cages for rearing fry to fingerlings stages, and larger meshed cages for rearing fingerlings to table sized fishes. If the meshes are small, the resistance will be more and less water will pass through.

While feeding with powdered food material, because of brisk activity of feeding fish, a part of the feed appeared wasted. This can be easily overcome if we would resort to feeding fish with cheap pelleted feeds which will no doubt reduce wastage.

Precaution has to be taken against damage of the net and thereby loss of fish and against poaching by unauthorised persons. In the present attempt has been demonstrated the possibility of utilizing locally available species of *Tilapia* for cage culture and obtaining moderately satisfactory growth rates.

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