

Fish Rearing in Paddy Fields on the Agricultural Research Station, Aduturai, Tanjore District

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There are over a million acres of wet land of very flat nature in the Cauvery delta which are under swamp paddy from June to January. The irrigation source is the Cauvery river and its numerous distributories. Water from the river is conveyed through the main channels from which, branch or field channels take off and deliver the water direct into the paddy fields. With the construction of the Mettur Reservoir, the supply of water has been so well regulated that there is hardly any dearth of supply at any time during the irrigation season. With such assured water supply for 8 months in the year the writer, as Superintendent in charge of the Agricultural Research Station, Aduturai, thought it worth while to start rearing of fish in paddy fields with suitable precautions. The experiment was started in 1933—34 paddy season. As indigenous varieties of fish including many species of carps naturally occur in the river water, artificial rearing of the fry was not attempted, but precautions were taken to see that fish that once entered the block of land selected for the experiment were never allowed to escape, by the provision, at the drainage vents of 'V' shaped bamboo screens which allowed entry of the fish into the paddy fields but not their escape (see fig. 1.) The vent through which irrigation water



Fig. 1. 'V' shaped bamboo screen.

was allowed to enter the block of land was completely screened off by close meshed wire netting. The provision of 'V' shaped screen was made at the drainage vent, purposely to take advantage of the natural tendency of all fish to swim against the current. Streams of fish could be seen for-

cing their way through the narrow slit in the 'V' shaped screen and against the flowing water. The block of land selected was about 12 acres in extent with two parallel rows of fields, 14 in each row, with a long common bund dividing the two rows of plots. The length of this common bund was nearly 1500 feet running west to east. These fields are planted to two crops of paddy during the season of 8 months, the first crop occupying the ground

from June to the end of September and the second crop from October to the end of January or the middle of February. The fish on entering were free to move about in all the fields of the experimental block. But it was soon realised that conditions became unsuitable for fish to thrive when the fields were ploughed or when water went down in depth (below

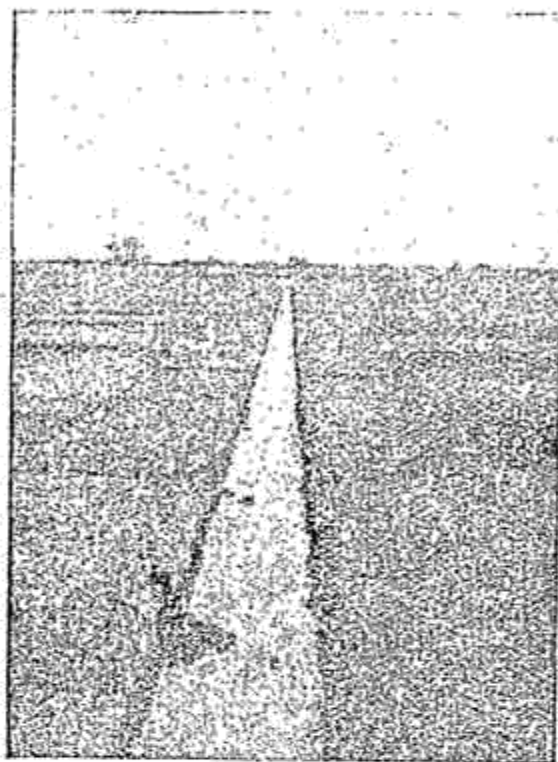


Fig. 2. Central trench connecting the fish pond.

2 inches) in the fields. Young fish, particularly of carps, were also noticed to die in large number when temperature of the water in the experimental fields rose beyond 36°C. Such high temperature prevails on almost all days from June to the middle of September during the hours 12 noon to 3 in the after-noon in the unplanted fields in the delta. Within 20 days after planting a paddy crop, the shade produced by the rapidly tillering paddy plants was sufficient to prevent the rise in temperature of the water in the fields and to protect the young fish from heat stroke. To save the fish from the ill-effects of the above conditions, a central trench 2 feet in width and 2 feet in depth was dug in the place of the central long bund. (See fig. 2.) This trench was in turn connected to a 6 feet wide and 8 feet deep trench of about 26 feet length

at the head of the block of land through which water was let in for irrigating the whole block.

At the end of the paddy season in January, the water supply is cut off from Mettur and in consequence, the rivers, the channels and the paddy fields dry up with the result that the fish either perish or are caught by the people irrespective of their size or weight. A certain number, of course, escape into the numerous village tanks scattered all over the delta but a large proportion of the young and small fish generally perish. The big trench at the head of the experimental block served to give shelter to the fish and carry them over to the next irrigation season through the dry months, February to May. This trench was subsequently widened and deepened into a fish pond occupying about 7 cents in area and 300 to 400 lb. of mature fish are caught and sold annually now, though the long central trench was filled up and the experiment of rearing fish in the paddy fields discontinued after three seasons, in 1936.

The following varieties of fish were found to thrive well in the fish pond of which *Valai* or fresh water shark (*Callichrous bimoculatus*) alone was not found to live in paddy fields. It requires deep water to thrive.

	Tamil Name	Scientific Name	Remarks
1.	Valai	<i>Callichrous bimaculatus</i> (Bloch)	
2.	Viral	<i>Ophiocephalus striatus</i> (Bloch)	
3.	Sani Kandai	<i>Barbuis pennauratus</i> Day	Carp
4.	Sel Kandai	<i>Lebec fimbriatus</i> (Bloch)	Carp
5.	Venkandai	<i>Cirhinus cirrhosus</i> (Bloch)	Carp
3.	Kilathi	<i>Aoria Vittala</i> (Bloch)	
7.	Uluvai	<i>Glossogobius ginis</i> (H. B.)	
8.	Theli	<i>Heteropneustes fossilis</i> (Bloch)	
9.	Arai—(Fe.)	<i>Rhyncobdella oculiata</i> (Bloch)	
10.	Pana-Eychi Kandai	<i>Anabas testudineus</i> (Bloch)	Carp
11.	Rattu—(Prawn)	<i>Palaemon</i>	
12.	Koravai	<i>Ophiocephalus punctatus</i> (Bloch)	

It would be seen from the list that not only carp but other fish mostly predacious in nature also get into the paddy fields and finally into the fish pond when fish are allowed free entry into the fields from rivers and channels. If carp alone are to be reared, artificial rearing of the carp fry will have to be undertaken for liberation into the paddy fields during the irrigation season, to the exclusion of all other kind.

The writer has not noted any one of the carps breeding in still water in the paddy fields but large numbers of their young fry are seen in the channel and river water, thereby showing that breeding of these carps takes place only in running water. *Ophiocephalus striatus* and *Ophiocephalus punctatus*, were found to breed freely in paddy fields from the months of September to November. About 10,000 eggs are laid on a circular raft made by sticking together cut leaves of paddy and grasses. The young of *Ophiocephalus striatus* are blood red in colour and when the young fry move in water the trail looks bloody; 3000 to 4000 young ones are noted in one brood. Of the carps, *Labeo fimbriatus* attains the biggest size. A full grown specimen would weigh a pound while others vary in weight from 3 to 8 ounces when full grown. None of these carps attain their full size within the 8 months of the paddy season as none of them weighed more than 4 oz. during the time. So it is essential that the immature fish should be carried over through the summer to the second season in a fish pond if the maximum size or weight of the fish is to be obtained.

A fresh fish pond was dug on the station and stocked with *Gourami* fingerlings in April, 1940. These were fed on groundnut cake and when specimens were caught at the end of two years, many of them had attained 5 lb. in weight. These fish have spawned freely in the pond which is 8 feet in depth and more than 500 young fry are now available. It is proposed to liberate 100 fingerlings of this famous fresh water carp in the paddy fields next paddy season taking suitable precautions to note what size they attain within 8 months of the irrigation season in comparison with the growth of the indigenous carps mentioned above.

There is no doubt that it is practicable to rear fish in the paddy fields of the Cauvery delta provided the cultivators take care to provide small fish

ponds of, say, 5 cents in area in 10 acre blocks of paddy fields to carry immature fish through the summer from one paddy season to the next so that fish could attain their maximum size and weight. Carp fry alone should be encouraged to grow in the paddy fields by excluding all the predacious fish. If exotic varieties of carp, like *Osphronienus gourami*, are able to thrive in paddy fields, the yield of fish in paddy fields could be greatly increased. An average catch of 50 lb. of fish from an acre will indeed, represent a great addition to the supply of food in the country, particularly so when it is a first class source of animal protein.

Dehydrated Banana Products and Their Food Value

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Introduction According to a recent estimate by the Provincial Marketing Officer, Madras, bananas are grown in the province on an area of nearly 140,000 acres. The estimated annual production of fresh banana fruits is of the order of 1,133,000 tons. Of these, *Poovan* accounts for more than half with an annual production of 741,000 tons. *Monthan*, *Nendran*, *Kunnan*, *Mauritius*, *Rasthali*, *Pachanadan*, Hill bananas and *Chakerakeli* follow next in order of importance, the first two claiming a production of nearly 90,000 tons each per year.

The pre-war exports outside the producing districts were over 910,000 railway maunds, of which the district of Trichinopoly claimed roughly 529,000 maunds, East Godavari, West Godavari and Madura 100,000 maunds each, and the districts of Salem and South Arcot about 70,000 maunds each. The exports by rail outside the province ranged from 80,000 to 90,000 railway maunds, mainly from the Cauvery area to the Mysore State and from 60,000 to 120,000 railway maunds from the Godavari area to the Nizam's Dominions and North India. In effect, the pre-war exports of 140,000 to 210,000 railway maunds may be taken to represent the annual surplus of fresh banana fruits in the province.

Provided the transportation facilities are improved and the demand for Madras bananas is fostered within and outside the province, there is much scope for extending the banana cultivation particularly in the heavy rainfall tracts of Malabar and on the hills of the Madura District where the crop can be raised under rainfed conditions. Such an extension seems desirable as the yield of bananas per acre surpasses that of the staple food crops, and the fresh ripe banana is recognized to be a very valuable and delicious food.

Restrictions in transportation facilities during the war may hinder the course of development of banana-growing industry in certain producing areas, and consequently, gluts in some producing regions and scarcity in others may become the features during the present emergency period. Dehydration of banana suggests itself as a means to tide over such temporary difficulties. The dehydrated bananas can, moreover, be transported