

the fish. These channels are connected with a small pond near the field to provide shelter to the fish against heat. Inlet and outlet of the field are provided with screens.

The natural food of fish fry and fingerlings in paddy fields consists of minute crustaceans and insects. The quantity of manure applied to the paddy is increased by 50-100%. Use of night soil, compost, stable manure, increases fish food and brings about rapid growth. Fish culture is beneficial to the paddy also to some extent. Fish perform tillage, destroy weed and insects that cause damage to the paddy plants, thus increasing paddy production.

In India, experiments conducted on fish culture in paddy fields in W. Bengal have shown that the survival rate of *Labeo*, *Catla* and *Mrigala* ranges from 34-40%, and the species show more rapid growth in paddy fields than in ponds. Experiments conducted on culture of *Channa striatus* in paddy fields, have shown 7-13% increase in the yield of paddy, and an average production of 112 kg/ha of fish. Experiments conducted with *Tilapia* and *Cyprinus carpio* have also provided encouraging results.

During the recent years, however, high yielding varieties of paddy are being cultivated. These require use of insecticides, pesticides, weedicides etc., which are harmful to the fish. Under such conditions, fish culture along with paddy is not possible. However, where common varieties of paddy are cultivated, fish culture is practised. Fields that are left flooded for a long or short period after harvesting, can be easily utilised for fish culture.

It is, therefore, essential to make a well planned survey of prevailing conditions, before attempting fish culture in paddy fields on large scale.

FISH FARMING IN DAMS AND RESERVOIRS :

A large number of dams and reservoirs have been constructed during the recent years to provide water for irrigation and power generation. It is estimated that these man made lakes provide about two million hectares of water, and this would continue to increase. These bodies of water offer immense scope for fish culture.

For successful fish farming in dams and reservoirs, it is essential to make a detailed hydrological study of the water body. Suitable species that are stocked in dams are the major carps such as *Catla catla*, *Cirrhinus mrigala* and *Labeo calbasu*. These are capable of adjusting successfully to ecological conditions of the reservoir. The reservoirs, in their initial stages are very rich in microscopic organisms, which start dwindling after 5 or 6 years. It is, therefore, necessary that new reservoirs are stocked on a large scale with fry of Gangetic carps, so that they are able to establish themselves, and provide sustained fisheries during later years. In the absence of large scale stocking of major carps, weed fishes and carp minnows establish themselves in the reservoirs. Some of these like *Ambassis nama*, *A. ranga*, *Osteobrama cotio*, and *Gadusia chapra*, compete with *Catla* for food and reduce the latter's productivity. Carp minnows compete with *Cirrhinus mrigala* and *Labeo calbasu*.

FISH CULTURE IN PADDY FIELDS AND RESERVOIRS

CULTURE IN PADDY FIELDS :

In certain areas, paddy fields remain flooded with water for a period of 3-8 months in a year, during which some growth of fish is easily possible. Hence, fish is cultured in paddy fields to give substantial additional supply to the farmer. This practice is common in Italy, Japan, Malaysia, several African countries and to some extent in India. Fish culture practices in paddy fields are of three categories :

1. The simplest method is to retain the wild stock that enter the fields during floods, by erecting barriers across the drains and channels. There is no regular stocking of fish in the fields. The fish that enter the field along with water are not allowed to escape.
2. The paddy fields are used as temporary ponds after harvesting. Fish and paddy are not cultivated together, but the fields used for paddy, are later used for fish culture. Fish seed of suitable species are stocked, and this serves as an off season occupation for the farmer.
3. The fish are stocked in flooded fields, and there is a simultaneous culture of paddy and fish in the same water.

Various techniques are employed for fish culture in paddy fields depending upon the climate, local conditions, species of fish available and the variety of paddy cultivated. Actually, every paddy field produces some quantity of wild fish that enter as fry. The cultivation of paddy is the primary purpose of the farmer, hence fish culture is to be adapted to the schedule of paddy cultivation. Species that are suitable for culture in paddy fields must be able to thrive in shallow water. They should be able to tolerate relatively higher temperature and turbidity. Certain carps, murrels, and tilapia are suitable for culture in paddy fields.

Paddy fields to be used for fish culture are provided with strong barrier wall to prevent leakage of water, and to convert the field into pond of desired depth. The field is also provided with trenches or ditches for