

Larvivoros Fish in Mosquito Control

There are several indigenous fish like *Danio rerio*, *Esomus danricus*, *Badis badis*, *Chanda nama*, *Puntius ticto*, *Rasbora daniconius*, *Colisa fasciata*, etc. which are commonly encountered in Indian fresh waters. In almost all the field stations of the Centre larvivoros potential of these fish was evaluated. These fish were found to be effective in controlling mosquitoes. However, these fish either can not be mass produced or they are not hard enough to withstand transportation, variation of water quality, turbidity and temperature. Also these fish produce smaller broods than the exotic fish.



Danio rerio

Rasbora daniconius

During laboratory trials in Rourkela, Orissa, *Danio rerio* and *Oryzias melastigma* showed a high predatory efficacy against the mosquito larvae. A single tiny *Danio* fish (2.7–3.0 cm) consumed on an average 52 IV instar anopheline larvae per day, whereas *Oryzias* sp. (2.5 cm) consumed 98 larvae per day. The results obtained during the trials in rice field quadrates showed that both the fish are highly effective in reducing the density of mosquito immatures in rice fields. The reduction in the density of III and IV instars and pupae became evident right from the beginning. On Day 6 *Danio* and *Oryzias* lowered the densities by 86.8 and 76.2% respectively.



Esomus danricus

Puntius sp.

Colisa fasciata

The two well-known larvivoros fish used extensively by the Centre are exotic. The guppy, a native of south America, was introduced in India in 1908 and *Gambusia affinis*, a native of Texas and widely distributed in the world, was imported from Italy in 1928. Guppy (*Poecilia reticulata*) and *Gambusia affinis* have been used in vector control programmes for 5 to 6 decades and could be found widely

*Poecilia reticulata* (guppy)*Gambusia affinis*Mass production of *Gambusia affinis*

occurring in nature almost all over the country. Stocks of these fish were collected, mass produced and introduced in mosquito breeding places in all the project sites.

Mass Production of *Gambusia affinis* and *Poecilia reticulata*

Mass production of *Poecilia reticulata* and *Gambusia affinis* was undertaken for mosquito control programme as part of the bioenvironmental control of malaria at many places in India. Some innovative methods have been developed to reduce the cost of mass production and distribution of fish. A number of hatcheries for mass production were established and fish were transported to the villages where they were stocked and introduced in the mosquito breeding places from time to time.

Mass production of *Gambusia affinis* was undertaken in District Nainital in Uttaranchal and District Shahjahanpur and Allahabad in Uttar Pradesh. Big ponds were converted into fish hatcheries as well as new hatcheries were made. *Gambusia affinis* were introduced into these ponds for multiplication. *G. affinis* breed thrice in a year and within a year all the field stations had good stocks of *Gambusia affinis*. Similarly, large stocks of *Poecilia reticulata* (Guppy) were established at Naidad, Gujarat and BHEL, Hardwar. The fish from these stocks were used for mosquito control in various breeding sites like drains and under ground tanks. Regular introduction and monitoring was undertaken.

Composite Fish Culture

Improvement of village economy by promoting local raw materials and natural resources was an important component of the programme. Carps are grown by

the farmers all over and the adjoining areas of Haldwani, Distt. Nainital, Uttaranchal. As a result of health education and personal discussion with fish farmers, it was possible to culture *Gambusia* along with carps. The tendency of *G. affinis* to remain near margins convinced farmers that this fish does not compete with edible fish for space and food. It was amply clear to the farmers that it eats mosquito larvae at the margins while carp fish is mainly herbivorous. Gradually farmers came forward to culture the *Gambusia* sp. with their edible fish. The fish were cultured together for two years and there was no adverse impact of *Gambusia* on edible fish. In fact, mosquito nuisance in the areas where *Gambusia* culture was practiced went down to such low levels that it encouraged other farmers to produce *Gambusia* in their ponds. As a result, *Gambusia* fish stocks were available all over the district in large numbers.

In Nadiad more than 50% ponds were infested with water hyacinth and this important resource was not being used for fish production. In these ponds guppy fish were cultured along with carps, and this had no adverse effect on carp production. Guppies were extensively used for the control of mosquito breeding in Kheda district.

Composite fish culture along with *Gambusia*