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Gambusia affinis and *Poecilia reticulata* : THE LARVIVOROUS FISHES AS BREEDING CONTROL OF MOSQUITO

Khanna, D.R. ; Shikha Singhal and R. Bhutiani
Department of Zoology and Environmental Sciences Gurukul Kangri University, Haridwar (U.A.) INDIA

Abstract

Larvivorous (ishes *Gamhitsia affinis* and *I'oecilia reliculala* are the biological control agents . which have been used operational!) in mosquito control programme. These fishes were survived and multiplied in the ponds and effectively controls mosquito breeding . The use offish in mosquito control have definite advantage and it does not contaminate the environment as happened by using insecticide lor breeding control of mosquito, the other advantage is that it doe not harm the non target organism especially the predators in (lie ecosystem. Therefore using larvivorous fishes for mosquito breeding control is the cheapest method . with a long term suppression of mosquito population.

Key Words : *Gamhusia affinis, Poecilia reticulata. Larvivorous , Mosquito , Breeding*

INTRODUCTION

Mosquitoes are the vectors of several diseases and carry parasites of malaria, fllaria, yellow fever, Japanese encephalitis and dengue. They breed in all sorts of stagnant water and shallow weed , infested ponds, swamps ,pits, guttersand and all other kinds of inland water bodies. Different species of mosquitoes prefer different kinds of water for breeding purposes.

Malaria is one of the most devastating ancient diseases known to man. The transmission of malaria by mosquitoes was unraveled by Sir Ronald Ross in India in 1895. The checking of malaria by destruction of intermediate hosts was thought of with all seriousness well towards the end of 19 th century and beginning of late 20 th century. For control of malaria we spray insecticides, vectors are resistant to insecticides and bioaccumulation of DDt/HCh occurs.

Recent emphasis on bioenvironmental malaria control has raised and this has given some hopes of permanent control.

Bioenvironmental control of malaria was conceptualized at the centre and launched for the first time in Gujarat. The study was aimed to know the feasibility of the bioenvironmental control of malaria in endemic rural areas.

Among biological control agents larvivorous fishes and biocides (*Bacillus thuringiensis* var. and *Bacillus sphaericus)* are the two potential which have high potential in management of mosquito population.

.The alternative method for the prevention of malaria and the control of mosquito population is the use of larvivorous fishes. In India here are number of larvivorous fish species indigenous as well as exotic such as *Gambusia affinis (*exotic), *Poecilia reticulata* (exotic). *Carassius carassius* (exotic), *Danio* (indigenous). The *Poecilia reticulata* , a native of South America was introduced in India. *Gambusia affinis* , a native of Texas and widely distributed in the world was imported from the Italy in 1928 by Dr. B.A. Rao.

MATERIALS AND METHODS

For the present study ,two larvivorous fishes i.e *Poecilia reticulata* and *Gambtisia qffinis* were selected on the basis of individual potential and its edible nature. Before study these fishes were studied in laboratory and in the field with different ecological characteristics of the mosquito breeding habitats to test the larvoracity and their ability to survive annd reproduced.Mosquito larvae were cultured in a ware kept reared in the laboratory so as to get the desired age larvae for experimental purpose. Third and Fourth instar *larvae* were used for the study .

The experiment was conducted in three types of water samples i.e Factory effluent tanks, effluent ponds and drains. Besides this survival rate of fishes were also studied in these types of water with regular food, the mortality offish was recorded daily for 30 days to calculate the survival rate.

RESULTS AND DISCUSSION

The results of all experiments are shown in table I-6.The results of the laboratory studies to determine larvivoracity showed that first hour of the fishes was slow in devouring larvae but later on the fishes become very voracious.The results showed that predation was high when no food was supplied to the fishes during the course of experiment. Similar findings has been reported by Mishra and Saxena (2000). Saxena *et a/. (*1995) notified *Mystus cavacious* as maximum predator of mosquito larvae followed by *Rasbora daniconius.* Results showed that without fish food predatory performance was better than with fish food Mishra and Saxena (2000).

Survival tests indicate 36% mortality *of Poecilia reticulata* in polluted waters of factory effluent tanks as against only 12% in the case of *Gamhusia qffinis* in the same water. .Mortality of both the fishes in drain water was virtually low and almost identical.

The result of water analysis of three habitats i.e factory effluents tanks, effluent ponds and drains, showed that water in factory effluent tanks contains less dissolve oxygen with high values of chlorides, total hardness and turbidity as compared to ponds and drains, which implies that water in effluent tanks was highly polluted. Observations suggested that Gambusia is not suitable for introduction in polluted water , whereas the Poecilia could be used for mosquito control in polluted /sewage water. Jayshree and Panicker (1992) investigated 34 indigenous fishes for larvivorous potential and found that Mystus cupanus has highest potential. Therefore indigenous fishes could be used as better tool for biological control of mosquitoes as also stated by Prasad and Sharma (1994).

SUGGESTIONS

1. It is essential to generate mass awareness against the danger of mosquito borne diseases and involve the rural community in vector control operation using larvivorous fish.

2. Mass campaigning shopuld be started for using larvivorous fish as a tool for diseases, disease control and sufficient number of seeds

Table I: Predatory capacity of first fish with artificial food

Fish Name	Number of Fishes	Predation of instar larvae	Larvae fed/day
P. reticulata	1	IIlrd	85
		IV th	62
P. reticulata	2	IIlrd	105
		IV th	95
P. reticulata	3	III rd	145
		IV th	130
P. reticulata	4	IIlrd	195
		IV th	165
P. reticulata	5	IIlrd	235
		IV th	210

Table 2: Predatory capacity of first fish with out artificial food

Fish Name	Number of Fishes	Predation of instar larvae	Larvae fed/day
P. reticulata	1	IIlrd	110
		IVth	75
P. reticulata	2	IIlrd	255
		IVth	225
P. reticulata	3	IIlrd	310
		IVth	285
P. reticulata	4	IIlrd	385
		IVth	335
P. reticulata	5	III rd	425
			405

Table 3: Predatory capacity of second fish with artificial food

Fish Name	Number of Fishes	Predation of instar larvae	Larvae fed/day
G *affinis*	1	IIlrd	65
		IVth	55
G. affinis	2	IIlrd	95
		IVth	75
G. affinis	3	IIlrd	125
		IVth	105
G. affinis	4	III rd	155
		IVth	128
G. affinis	5	IIlrd	190
		IVth	165

Table 4: Predatory capacity of second fish without artificial food

Fish Name	Numberof Fishes	Predation of instar larvae	Larvae fed/day
G. affinis	1	IIIrd IV th	95 75
G. affinis	2	IIIrd IV th	115 105
G. affinis	3	IIIrd IV th	155 125
G. affinis	4	IIIrd IV th	205 185
G. affinis	5	IIIrd IV th	275 155

Table 5: Survival test of both the fishes in different types of water

Name of Fish	Percentage(Mortality)		
	Factory effluent tanks	Effluent Ponds	Drains
P. reticulata	36%	25%	20%
G. affinis	12%	28%	23%

Table 6: Physico-chemical analysis of water

Parameters	Types of water		
	Factory effluent tanks	Effluent Ponds	Drains
D.O	2.50	3.50	4.00
B.O.D	15.00	10.00	8.00
Acidity	75.00	50.00	45.00
Alkalinity	210.00	225.00	250.00
Hardness	310.00	325.00	295.00
Chlorides	25.00	35.00	45.00
Turbidity	400.00	290.00	210.00
pH	8.50	7.80	7.20

of these fishes should be distributed amongst villagers to stock their ponds, marshy wetlands.

3. Culture technique should be developed for different sps. under different agro climatic condition.

4. Transportation techniques for different larvivorous fishes should be developed and standardised.

5. Concerted efforts should be made to educate the rural people about the primary aspects of maintenance of larvivorous fishes and their biology.

6. Collaborative projects on larvivorous fishes should be taken up to study the inter and intra sps. interactions feeding rate , food and feeding habits and re productive biology of indigenous fish sps.

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