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LOCAL FISH AS BIOLOGICAL CONTRO FOR MOSQUITO LARAE

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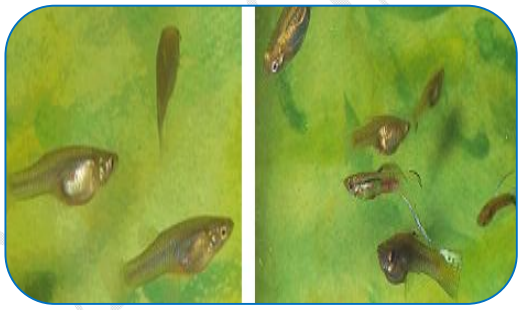
ABSTRACT :



Background & objectives: *Mosquito represent the major arthropod vectors of human disease worldwide transmitting malaria, filariasis and dengue virus and Zika virus. Indigenous larvivorous fishes bear potential for regulating vector mosquitoes through tropic interactions. The mosquito prey preference of four fish indigenous larvivorous fishes in the presence of alternative food items was assessed to highlight their use in mosquito vector management.*

Mathods: *laboratory experiment wer crried out using the larvivorous fish Ambassis nama (chanda nama) , Anabas testudineus, Puntius ticto, Osteobrama cotio and Gambusia affinis as predators and IV th instar Anopheles stephensi, Culex quinquefasciatus and Aedes aegypti larvae as target prey.mosquito prey preference of these fishes in the presence of without food material were used to test their predacious efficacy. . Larval choice & preference of fishes on larvae of An. Stephensi, Culex quinquefasciatus and Aedes aegypti were determined.*

Result: *. These experiments were conducted without fish food, only 4th instar larvae of An. Stephensi were given as feed. Total consumed larvae in 24 hrs duration were noted. the fishes consumed considerable amount of mosquito larvae both in absence and presence of alternative food items. Larvivorous experiments of fishes were performed to observe the ranking of experimental fishes based on their body weight & larvivorous efficiency.*

Conclusion: *The result larvivorous potential of fishes without fish food. This is quite comparable with the results of the some fishes supplied with fish food along with larvae of mosquito. With fish food Anabas consumes larvae and without fish food Anabas consumes larvae of Anopheles stephensi¸ Culex quinquefasciatus and Aedes aegypti using five fishes in one experiment.*

KEYWORDS : *Biological control, larvivorous fishes, Mosquito Anopheles stephensi¸ Culex quinquefasciatus and Aedes aegypti larvae.*

INTRODUCTION :

Use of fish mosquito-control has been well-known for more than 100 years. In India as far back in 1904 larvivorous fishes were used in Mumbai city for the control of malaria vector An. Stephensi. Larvivorous fish's poecilia reticulate (Guppy), a native of South America and Gambusia affinis, a native of Texas were imported in India in 1908 and 1928 respectively for the control of malaria vectors. Different methods of mosquito larvae control are throughout history, and they include both chemical and biological methods. It is a very control methodologyies in which both pesticides and fish or other biotic agents have their own roles. Though use of larvivorous fish is in the urban malaria schemes in india,use of larvivous fish in

control of rural malaria was shown for the first time in India. The most successful method for mosquito control includes the fish.

The biological control is environmental friendly and not hazardous for plnats, bebeficial insects and health for controlling pest some of the biological controlling agents were used such as parasites, parasitoids, microorganism and predators (Sarwar2014). Fresh water fish Gambusia affinis, Oreochromis mossambica, poecilia reticulate was used to control mosquito (Walker, 2002). As biological mosqutio control agents, larvivorous fish (i-e those that feed on immature stages of mosquitoes) are being used extensively all over the world since the early 1900s (Pre DDT era) (Raghavendera *et al*., 2002).

MATERIALS AND METHOD-

(i) Collection and maintenance fishes-

The four indigenous fishes, *Anbas Testudineus, Ambassis nama* (*Chanda nama*), *Puntis tincto* & *Osteobrama cotio,* widely found in ponds, canals & rivers of Vidisha, Hoshangabad & Betul districts of M.P, were selected for larvivorousperimental purposes of mosquito controlbecause of their larvivorous behavior. These indigenous fishes were collected from water bodies of Vidisha district during different seasons & brought to the laboratory. Collected fishes were identified with the help of Datta & Shrivastava (1988), Talwar & Jhingran (1991) & kept in glass aquarium genera wise for acclimatization for one week under laboratory conditions.

As standard fish *Gambusia affinis* were procured from District Malaria Control Centre, Vidisha & brought to the laboratory & kept in aquarium for acclimatization. Well equipped aquaria for different species were maintained in the laboratory throughout the year. Aerator, bulb & pump were fixed with aquarium to supply oxygen, to maintain temperature & to dispose waste material from aquarium respectively. Dried readymade food & live food were provided to fishes. Temperature & pH of water were recorded regularly. Antifungal solution was dropped once in a week.

(ii) Colonization of Mosquitoes-

To understands the life cycle of mosquitoes, breeding behavior of adult. Larval development and fulfillment of larvae for experimental purpose, a viable insectary was *maintained. Colonization of tree health important mosquito Anopheles stephensi*¸ Culex *quinquefasciatus and Aedes* aegypti were done in the insectary. An insectary of 10 x10 sq.ft.in sizes was maintained in the laboratory equipped with thermostat, head converter, humidifier fluorescent tube light, incandescent lamps with regular dimmer, cooler, exhaust fan, RH meter and minimom-miximom thermometer to maintain the favorable environment for mosquitoes. The insectary was maintained at 27 ±2ºC and RH 75±5%. The photoperiod was maintained at L: D; 14:10.

(iii) Experimental fishes –

Larvivorous potential of experimental fish species were recorded by taking them separately and individually in 1000ml. glass beakers with larvae of an. Stephens. These experimental were conducted without fish food only IV instar larvae of An. Stephensi were given as feed total consumed larvae in 24 Hours duration were noted. The difference between the number of larvae released in the beginning of the experiment and found alive after 24hours was considered as the fish. A control was also maintained by taking 50 larvae of mosquitoes in a beaker without fish.

Observation and result -

Report ranking of Larvivorous potential of experimental fishes based insects indigenous fishes have also shown larvivorous potential. Four fishes *Ambassis nama, Anabas, Puntius ticto,* & *Osteobramacotio* were used to test their predacious efficacy. The results were compared with *Gambusia affinis* a standard larvivorous fish. Larvivorous potential of fishes without fish food.

Table I- Larvivorous potential of fishes in groups without fish food materials

S.No.	Names of Fishes	Number of Fishes	Length of Fishes (in cm.)	Number of 4th instar larvae consumed by fishes		
				Anopheles stephensi	*Culex quinquefasciatus*	*Aedes aegypti*
1.	*Ambassis nama* (Chanda nama)	05	3.3	180.2	186.4	154.0
2.	*Anabas testudineus*	05	5.8	448.0	412.6	395.0
3.	*Puntius ticto*	05	4.2	380.4	458.0	348.0
4.	*Osteobrama cotio*	05	4.2	380.4	458.0	348.0
5.	*Gambusia affinis*	05	3.2	232.0	240.8	228.0

Experiments were conducted in five replicates.
Experiments were observed for 24 hours duration.

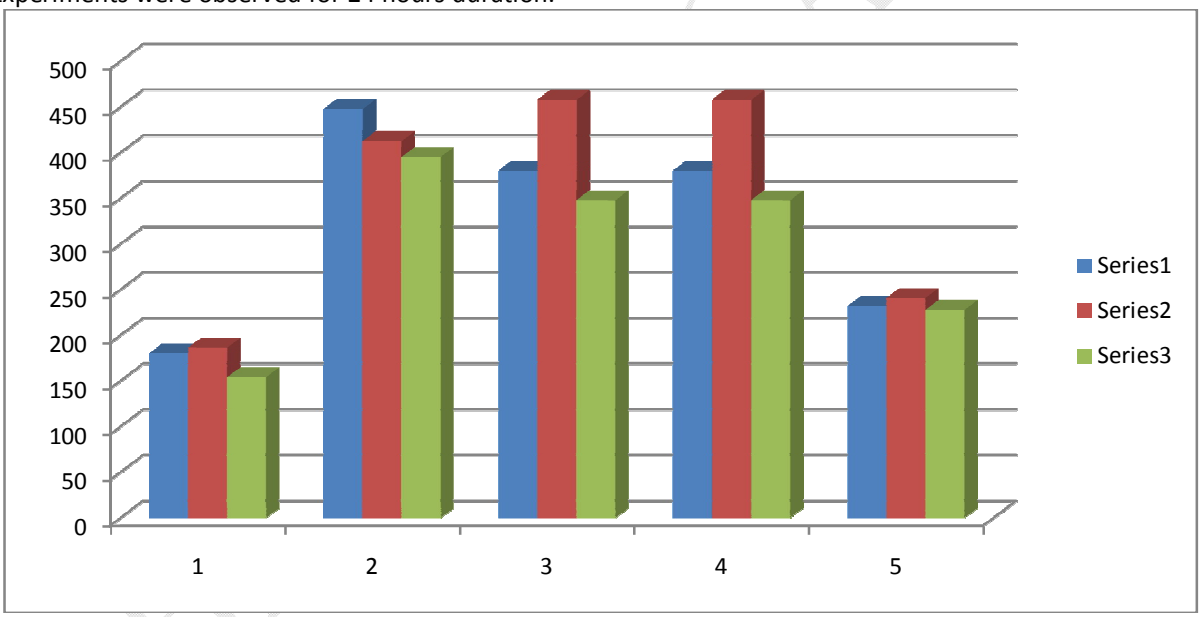


Fig.1: The number of IV instars larvae consumed ratio by the larvivorous fishes in groups without fish food materials.

Table . Larvivorous potential of fishes in groups with fish food materials

S.No.	Names of Fishes	Number of Fishes	Length of Fishes (in cm.)	Other fish food provided (in gm)	Number of 4th instar larvae consumed by fishes		
					Anopheles stephensi	*Culex quinquefasciatus*	*Aedes aegypti*
1.	*Ambassis nama* (Chanda nama)	05	3.3	50 gm	158.6	152.8	142.0
2.	*Anabas testudineus*	05	6.5	50 gm	437.8	418.0	368.2
3.	*Puntius ticto*	05	4.2	50 gm.	358.4	412.0	328.6
4.	*Osteobrama cotio*	05	5.1	50 gm	358.4	412.0	328.6
5.	*Gambusia affinis*	05	3.2	50 gm.	235.0	248.0	244.4

Experiments were conducted in five replicates.
Experiments were observed for 24 hours duration.

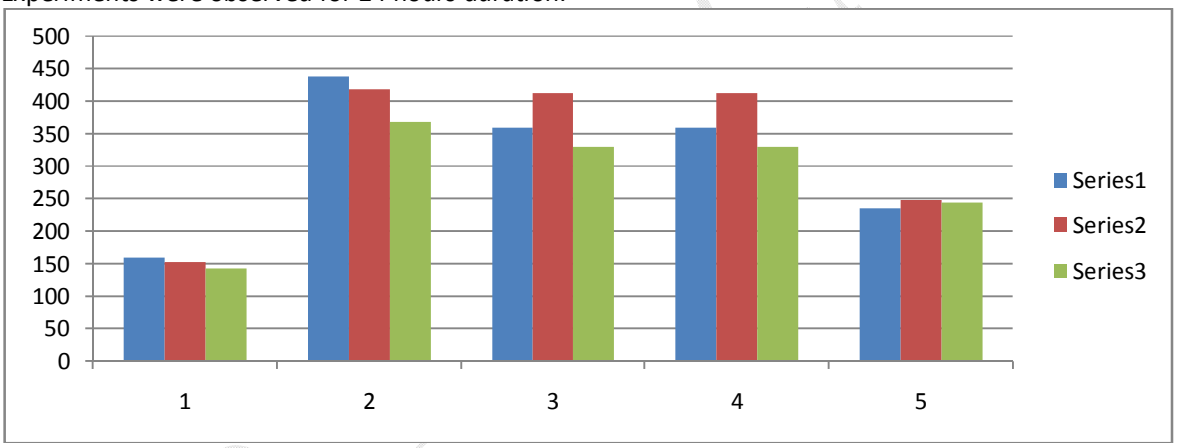


Fig.2:The number of IV instars larvae consumed ratio by the larvivorous fishes Other fish food provided (in gm)

Table-I

The result in table I showed the larval performance of fishes. This is quite comparable with the results of the some fishes supplied with fish food along with larvae of mosquito. It was recorded for *Anabas testudineus* was in the highest consumed 448.0, 412.6 and 395.0 Fourth instar larvae/ gm.body weight/24hours of Anophelsstephensi, Culex *quinquefasciatus* and Aedes aegypti respectively. Puntius ticto and Osteobrama cortio was in the second which consumed 380.4, 458.0 and 348.0 fourth instar larvae per gram body wieght per 24 hours for Anophles *stiphensi*, Culex *quinquefasciatus* and Aedes aegypti respectively. . Ambassis *nama* (Chanda nama) was in the third which consumed 180.2, 186.4 and 154.0fourth instar larvae/ gm. Body weight / 24 hours of Anopheles stephensi, Culex quinquefasciatus and Aedes aegypti respectively.

Table-II

The result in table II showed the larval performance of fishes.The larvivorous potential of fishes in a group of five each with fish food. *Anabas* seems to be much voracious feeder of *Aedes aegypti* larvae. It equally prefers *Anopheles* and *Culex* larvae also. The rate of predation of this fish is much more than the *Gambusia affinis.*

DISCUSSION-

As alternative to the chemical control of vector species was worked out in the present study so as to minimize environmental pollution and to provide sustainable development. The present paper reported the biological control of vector species by *brvaevorous* fishes which are quite suitable according to the environmental condition and different eco ones, the study which was carried out at government college khargone reports the larviovorous potential of 3 indigenous fishes collected form Vidisha, Hoshangabad & Betul districts of M.P. the maximum number of larval consumption was noted in *Punctius ticto*. Similar result was reported by Soni *et. al.* 2006 and Arora 1992 but as regards the larvivorous potential as well as edible value and commercial potential Anabas testudineus was found to be of great commercial value. Due have also reported the larvivorous potential of poecilia reticulate and observed a great larvivorous potential. Krishan *et. al.* 2008 have also expressed the similar views of bioenvironmental control of vector Mosquito by predatory fishes and insect.

CONCLUSION –

The present paper report the larviovorous potential of three speices of indigenous fishes as an alternative to the chemical pesticide to minimize the human health hazards due to chemical pesticides and to save the ecosystem. Degradation due to chemical pesticides among the three species *Punctius ticto* was found to be highly efficacious as for as its predatory behavior is concerned but as far as commercial value is concerned Anabas *testudineus* is superior than others. The results showed that the fishes generally proffered in 3rd &4th Instar larvae may be due to the presence of lycofuchin in their cuticle. For the bioenvironmental control using predatory fishes the following are pre exquisite to undertake the experimental protocol.

i) The fishes must be easily label around that particular area.

ii) They should be cultured by the farmers in small reservoirs.

iii) The fishes must have high edible value.

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