Comparison of *Puntius conchonius* and *Gambusia affinis* for feeding rate of mosquito larvae

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ABSTRACT:

Aim: Mosquito are a major problem in almost all tropical and subtropical countries, as they are responsible for the transmission of pathogens which causes different diseases.
Study design: The present study deals with the Comparison of *Puntius conchonius* and *Gambusia affinis* for feeding rate of mosquito larvae.
Place and Duration of work: The mosquito larvae collected from badapur, Tal. Yeola Dist. Nashik between 2010 -2011.
Methodology: Fishes introduced into experimental jar individually and acclimatized for 1 hrs. Then 200 to 500 larvae introduced into jar for each fish. Readings were taken after 10 min, 20 min, 30 min initially and then after 1 hr, 3 hr, 6 hr, 9 hr, 12 hr and 24 hours, respectively. It determines feeding rate, food consumption and larvivorous potential of fishes.
Result: The comparative account of the feeding rate of two different species which came as *Puntius conchonius* > *Gambisia affinis*. Whereas, when the food consumption pattern was different i.e. *Gambisia affinis* > *Puntius conchonius*.
Conclusion: The length and weight increases, the feeding rate also increases. It was found that the larvivorous activity of the ornamental fishes was greater than the well-known *Gambusia affinis*.

Keywords: Puntius conchonius, Gambisia affinis

1. INTRODUCTION

Mosquito borne diseases continue to be a major problem in almost all tropical and subtropical countries. They are responsible for the transmission of pathogens causing some of the life threatening and debilitating diseases of man, like malaria, yellow fever, dengue fever, chikungunya, filariasis, encephalitis, etc. (2). Of this malaria, dengue and Japanese encephalitis has already caused deaths of millions of people all over the world.
These diseases have neccesitized the application of mosquito control measures, which can be achieved mainly by four ways.

- Chemical
- Environmental
- Biological
- Genetic

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Biological control measures include using a living organism for the distraction of another living organism. Introducing larvivorous fishes (Gambusia, Topminnows, Poecelia and ornamental fishes) in to tanks, wells, aquaria, and ponds; bacteria (*Thurigensis* and *Bacillous spharicus*) in water collections and tiny water creatures in water collection will kill the larval stages of mosquito.

Environmental protection agencies have banned or placed sever restriction on the use of many pesticides, which were formerly used in mosquito control programmes, and there are now fewer adulticides available than there have been for the last 20 years, further, manufactures themselves have withdrawn some insecticide due to the high cost of carrying out the additional tests now as per the government norms in addition to the fact that the production of crop pesticide for the agricultural market is much more lucrative. The harmful effect of chemicals in mosquitoes as well as on non - target populations and development of resistance to these chemicals in mosquitoes and genetic control measures being expensive, tedious and inaccessible to remote rural areas along with recent resurgence of different mosquito borne diseases (5).

During mid-1980's national institute of malaria research demonstrated the use of larvivorous fish as part of an integrated vector strategy. Though use of larvivorous fish is an important component of vector control in the urban malaria scheme in India, use of larvivorous fish in control of rural malaria was shown for the first time in India. (*Gambisia affinis, Poecilia reticulata*) It is local measure which is effective, simple and inexpensive as shown by some of the examples in integrated vector control in an urban setting.

The present study deals with ornamental fishes, which shows dual nature. They can be introduced in to ornamental tank in garden, fountains, and many decorative areas. Ornamental fishes decorate or beauty the environment as well as control the mosquito larvae. The ornamental fishes feed on the mosquito larvae, thereby inhibiting the increase in their population which helps in controlling the disease like malaria.

2. MATERIAL AND METHODS

2.1 Collection of fishes

- Fish species were collected from the fisherman – Yogesh Bhavsar .'fish home Mastyalaya ' Shop No.-3, new cidco , Nashik-422009 and Yogesh Patil . 'home Aquaria,' collage road.
- The collected species of fish were identified with the help of exotic aquarium book of William, internet site fishman.com, Encyclopedia Britannica, inc. William Benton and many Research papers.
- The collected fishes were transferred carefully in to plastic bags with oxygen and water at about two third levels.

	
Gambusia affinis	***Puntius conchonius***

2.1 Maintenance

Acclimatization

Before proceding the experiment the fishes has to be acclimatized for 3 days to the laboratory conditions.

Acclimatization was done in 3 steps

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- These fishes were acclimatized first in the water in which they were brought. So that they get acclimatized comfortably to the laboratory condition.
- Fishes were transferred to the aquarium with laboratory tap water in which the experiment has to be done, so that they can acclimatize to tap water.
- 6 fishes of *Puntius conchonius* were introduced into a glass jar with 3 lit of water and these were allowed to acclimatized. This was repeated for control *Gambisia affinis*.
- All possible precautionary measures were taken to maintain experimental fishes in the fish tank. Commercially available food pellet were given to the fishes as a food source.
- The aquarium water was well aerated and changed every alternate day.

2.2 Site of mosquito larvae collection:

The mosquito larvae were collected from stagnant waters of yeola and badapur areas.

2.3 Method of mosquito larvae collection:

Mosquito larvae were collected with the help of sieve or stainer and beaker.The collected larvae transferred carefully in to bottles with tiny hole on the lid.

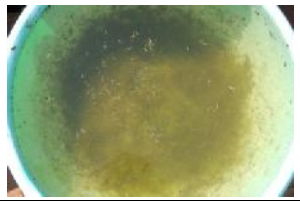
2.4 Identification of mosquito larvae collection:

The morphological and behavioural characteristics of the collected larvae were observed in laboratory. Different species of mosquito: *Culex, Anopheles* and *Aedes*

2.5 Methodology of Experiment:

Fishes starved for 24 hrs before utilizing them for the experiment. Fishes introduced into experimental jar individually and acclimatized for 1 hrs. Then 200 to 500 larvae introduced into jar for each fish.

Readings were taken after 10 min, 20 min, 30 min initially and then after 1 hr, 3 hr, 6 hr, 9 hr, 12 hr and 24 hours, respectively.

		
Plate No. 1: Showing collection of mosquito larvae from Badapur area.	**Plate No.2:** Showing the larvae collected directly from the site into the tub.	**Plate No. 3:** showing the *Culex* (left) and *Anopheles* (right) larvae in two different beakers.
		
Plate No. 4: Showing the II, III, and IV stage of *Anopheles* larvae in the beaker.	**Plate No. 5**: Showing the experimental design, during the ancessment of no. of larvae consumed by *Gambusia affinis*.	**Plate No. 6**: Showing the experimental design, during the ancessment of no. of larvae consumed by *Puntius cochonius*

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3. RESULTS AND DISCUSSION

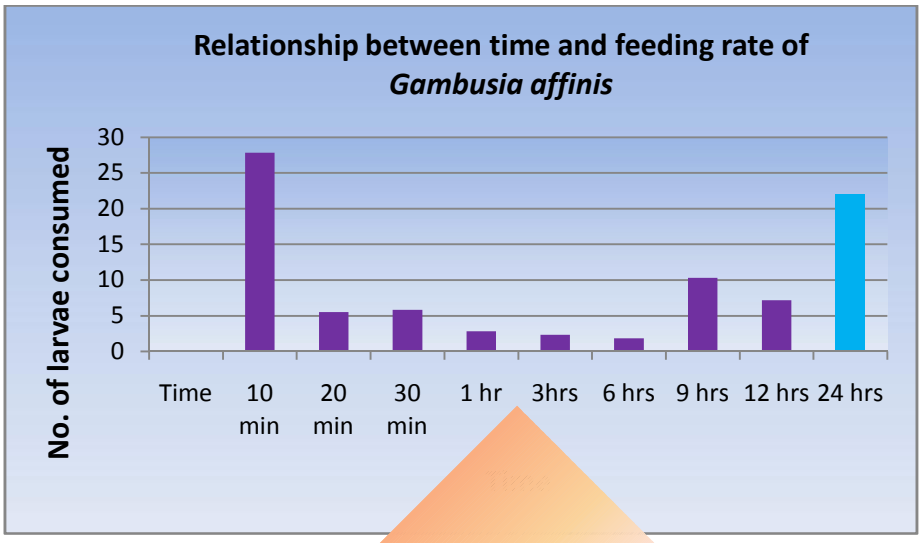

Fig. 1. This fig. shows pred[illegible] *affinis* on the III and IV instar mosquito larvae in 24 hr f[illegible] mption at that interval of time.

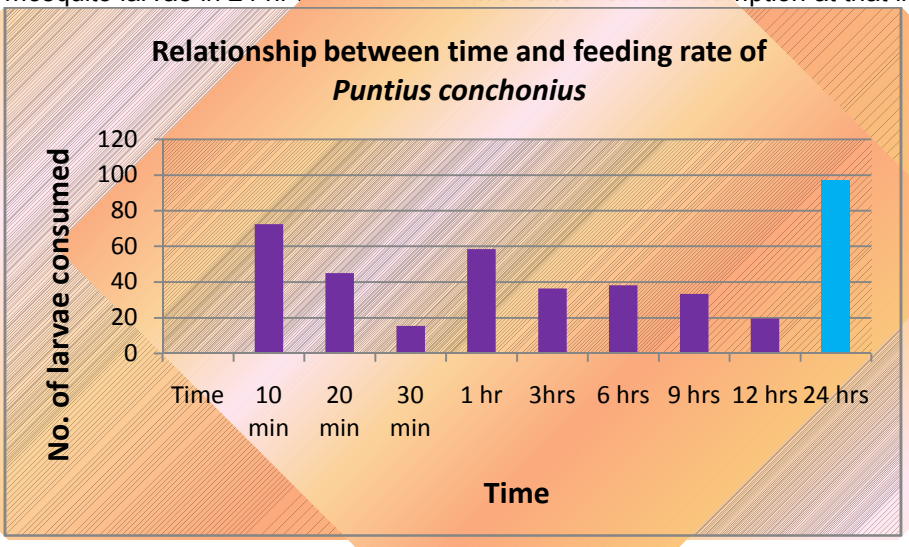

Fig. 2. This graph shows predat[illegible] *us conchonius* on the III and IV instar mosquito larvae in a 24 hr feeding. E[illegible] mean consumption at that interval of time.

Fish Species	Length	Weight	Feeding rate	Food Consumption	Larvivorous potential
Gambusia affinis	**2.733**	**0.3135**	85.66	18.97	3.54
Puntius conchonius	5.4	2.572	415	11.29	17.29

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Table no. 1 This table shows the length, weight, feeding rate, food consumption and larvivorous potential of 4 different species.

The above result observed that the Puntius conchonius has feeding rate 415, food consumption 11.29 and larvivorous potential 17.29. The Gambusia affinis has feeding rate 85.66 food consumption 18.97 and larvivorous potential 3.54 (table no. 01). The comparative account of the feeding rate and larvivorous potential of *Puntius conchonius* > *Gambisia affinis* (Fig. 1 and fig. 2). Whereas, when the food consumtion pattern was different i.e. *Gambisia affinis* > *Puntius conchonius.*The relationship between feeding rate, length, of two different species came out as the length and weight increases, the feeding rate also increases. Chatterjee and Chandra reported the Gambusia affinis consumed per day 48, 51, and 31 larvae of *An. subpictus, Cx. Quinquefasciatus* and *Ar.subalbatus* respectively (3). O. melastigma consumed 98 IV instar larvae of Anopheles per day (2). Several such studies have been done on different species of fishes.

The fish *Gambusia affinis* has been extensively used as an effective predator of mosquito larvae and it is observed to be an active visual feeder [8, 9, 10]. The fish consumed more number of larvae during the day time feeding when compared to night, where the feeding rate was less. The occurrence and success of aquatic predators is pronounced to be largely dependent on physicochemical factors operative in natural waters. The physicochemical complex of fresh water bodies where mosquitoes breed are known to fluctuate from time to time [11, 12], observed that the feeding behavior of *Gambusia affinis* was a direct response to the water temperature.

4. CONCLUSION

Mosquitoes are and will be the major concerns to come. Biological control is expected to play an increasing role in vector management strategies of the future.

Larvivorous fishes are an excellent option in controlling the breeding of malaria and dengue vectors in a variety of mosquito breeding habitats.

This experiment was successful in detecting the larvivorous activity of *Puntius conchonius* and it was found that the larvivorous activity of the ornamental fishes was greater than the well-known *Gambusia affinis*.

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