Asian J. Exp. Sci., Vol. 32, No. 1, 2018; 23-28

Online available on : www.ajesjournal.com, ISSSN : 0971-5444

Analysis of Food Preference of Molly Fish (*Poecilia sphenops)* with Special Reference Towards Mosquito Larvae

[1]Sunita Gupta,[1]Mahima Tripathi,[2]R.P. Mishra

[1]Dept. of Post Graduate Studies in Zoology, Mata Gujri Mahila Mahavidyalaya, (Auto),

[2]Dept. of Post Graduate Studies & Research in Biological Science RDVV Jabalpur.

Email:sguptakvs@yahoo.com

Received: July 3, 2017; Revised: November 1, 2017; Accepted: November 07, 2017

Abstract : A study on food preference by the fish with special reference to mosquito larvae has been taken up with the aim of its application in aquarium conditions in controlling mosquito population. The brooders of Molly fishes were collected from aqua hut shop near Russel Chowk, Jabalpur. Physicochemical properties of water sample were analysed in laboratory conditions. The fish of different developmental stages (fry, finger lings and adult) were kept in glass aquarium. Daily consumption of mosquito larvae and artificial food was recorded separately for 30 days. Final weight was recorded after the completion of the given period. Results indicate that consumption rate of fish was found higher towards mosquito larvae than artificial food. Blackmolly prefers mosquito larvae than artificial food in all stages. It is able to predate on mosquito larvae in its different life stages; hence this fish can be used effectively to control mosquito larvae of all the species.

Keywords- Molly Fish, Mosquito larvae, Low cost feed and artificial food.

Introduction

Biological control particularly using larvivorous fish has long been important to malaria control programmes in the 20th century, particularly in urban and periurban areas for immediate use in developed and developing countries (Pant *et al*., 1981; Chandra *et al.,* 2008*)*.Using larvivorous fishes in mosquito control programme is the oldest and presently the most popular bio-control method for eliminating or reducing larval population (Gupta and Banerjee, 2009; Jauhari and Devi, 2011) Larvivorous fish are those that feed on immature stages of mosquitoes (Chandra *et al., 2008)*.The black molly, *Poecilia sphenops*is a common larvivorous fish widely occurring in the Indian sub-continent. Molly is a tropical hardy and highly adaptable fish species that comes in many different colors and varieties such as orange, green, black, sail fin, ballon, etc. *Poecilia sphenops* comes under Molly group. 'Poecilia' means "many coloured" and "Sphenops" means wedge appearance (Jeniffer *et al*., 2012).

Poecilia sphenops are small, usually brightly-coloured, viviparous fishes of fresh or brackish warm waters. They may prove to be a good option to replace insecticides in vector control where breeding habitats of malaria vectors are confined. Black mollies are voracious, feeding on mosquito larvae in breeding sites like drains and tanks (Sumithra *et al.,* 2014*)*. The desirable qualities of fishes to serve as bio-control of mosquito larvae are small size to survive in shallow water; surface feeding and carnivorous nature; surviving in the absence of mosquito larvae; easy to rear; withstanding a wide range of temperature and light intensity; hardy and able to withstand transport and handling; insignificant/useless as food for other predators; and having preference for mosquito larvae over other types of food available at the water surface. Biological control is expected to play an increasing role in vector management strategies of the future. In developing countries like India, success of such strategies depends on developing simple technology backed by a campaign of public education (Sumithra *et al.,* 2014). The objective of the present investigation was to evaluate the food preference and growth of Molly fish consumes natural and synthetic feed.

Materials and Methods

Brooders of Black Mollies - Brooders of black mollies were brought from aqua hut shop near Russel Chowk Jabalpur, India. All selected fish identified (Jhingran, 1991;Kashyap and Prasad,2011) and confirmed by the experts of college of Fisheries Science, Jabalpur. The weight of all the selected brooders was recorded.

Food for Fish - Initially a few mosquito larvae were collected from the local stagnant water bodies by a net of small (16cmx14cm) mesh size. Later, they were introduced in a plastic jar with 20litre capacity for culturing mosquito larvae. Potato media with 200gms of cow dung was placed in the plastic jar along. The jar was placed in the corner of the fresh water tank. The media attracted the mosquito to lay eggs and within 5-7 days, large number of mosquitos' larvae were seen in the media (Das, 2012).

Rearing and maintenance of fishes

Brooders Rearing - Male and female brood of selected species kept in a separate aquarium having approximate size of 20" x10" x 12" containing ten litres water. Aquarium equipped with heater, proper aeration and a gentle filter. The physico-chemical parameter of aquarium

water optimized as per the need of brooders (Gupta and Banerjee, 2009). Commercial pelleted food along with mosquito larvae provided to all selected brooders twice a day in the morning (6.00-8.00 am) and the afternoon (1.00-3.00pm) at the rate of 10% of their body weight (Jauhari and Devi, 2011).

Breeding and collection of hatchling- All selected fishes allowed to breed separately in fish aquarium. After liberation of respective gametes the brooders were shifted out to another aquarium. The fertilized eggs were collected carefully and transferred to fish aquarium from hatching hapa. The suitable physico-chemical condition of water maintained during the rearing period.

Fry, Finger lings and adult rearing- Fry, fingerlings and adult of fishes reared in separate aquarium approximately for six months. Mosquito larvae and artificial food provided for nursing the selected species. The selected fries (0.44-0.64g), finger lings (0.65g-0.78g) and adult (1.98g-2.35g) of Black Molly were kept without food to standardize their hunger level. Each of these fishes provided with 100 mosquito larvae (I-IV instars) and artificial food separately at a time. After 1 hour remaining amount of unconsumed mosquito larvae and artificial food counted. This experiment conducted in four replicates. The growth of all selected fish species estimated during the experimental period.

The physico-chemical analysis of water - Parameters such as water temperature, dissolved oxygen (DO), pH and total hardness (calcium and magnesium) were monitored every ten days throughout the experimental period. Water quality parameters were analyzed. The pH was taken by pH meter (ESICOMADEIN 1010) and temperature by Mercury thermometer (accuracy 0.5). While the other parameters such as DO, total hardness analysed in laboratory by using standard method by APHA (1995).

FOR Stage I , II ,& III

Null Hypothesis- There is no significant difference in the intake between live and artificial food by molly fish.

Alternate Hypothesis- There is significant difference in the intake between live and artificial food by molly fish.

FOR STAGE I (molly fish) F Calculated = 582.3177

F tabulated = 4.0130

Here, F calculated> F tabulated

So, null hypothesis is rejected.

FOR STAGE II (molly fish)- F Calculated = 1445.0804

F tabulated = 4.0130

Here, F calculated> F tabulated

So, null hypothesis is rejected.

FOR STAGE III (molly fish)- F Calculated = 2051-2482

F tabulated = 4.0130

Here F calculated> F tabulated

So, null hypothesis is rejected.

Conclusion of ANOVA analysis: The intake between live food and artificial food by molly fish is highly significant. In other words molly fish highly prefer to take live food in comparison with artificial food.

Result

The number of mosquito larvae i.e. live feed and artificial food consumed by molly fish in its different life stages viz. stage-I fry; stage II finger lings and stage III adult are presented in table-1 and figs. 1-3. The fish choose the live feed during its all three developmental stages. The result clearly shows molly fish highly prefer to take live food in comparison with artificial food. The weight increases during the experimental period of fishes in its different life stages is given in tables 2, 3, 4 and Figs. 4-7.The molly fish shows better growth performance after consuming live food. The live food was a better feed as preferred by all developmental stages, fry, finger ling and adult. Finger lings showed the best performance with respect of growth and survival in this study.

Table -1. Record of consumption of live and artificial feed by molly fish in different developmental (fry, fingerlings and adult) stage.

Days	Mean of food consumption						
	Live Food			**Artificial food) (100 small granules**			
	Fries	Fingerlings	Adults	**Days**	Fries	Fingerlings	Adults
1	9.875	13.625	17	**1**	2.375	4.625	5.375
2	10.25	13.875	16.25	**2**	2.375	4.25	5.25
3	10	13.625	14.375	**3**	2.25	4	4.75
4	9.375	12.375	16.625	**4**	2.125	4.75	4.75
5	10.5	13	15.375	**5**	2.25	4.5	4.625
6	8.5	12.5	13.5	**6**	2.75	4.625	4.875
7	7.125	13.375	14.125	**7**	2.25	4.75	4.5
8	8.25	12.625	14.125	**8**	2	4.25	5
9	8.5	12	13.375	**9**	2.25	4.125	5.25
10	9.125	10.75	17	**10**	2.125	3.75	5.125
11	10.625	14.125	14.5	**11**	1.875	4.25	4.875
12	10.75	13.75	16	**12**	2.5	4.25	4.375
13	10.125	13.375	16.375	**13**	2.25	5.375	5.375
14	9.875	13.375	14.125	**14**	2.125	4.25	5.25
15	9.25	14.25	14.5	**15**	2.75	3.75	5
16	8.125	12.75	14.875	**16**	1.875	3.75	5.125
17	7.125	17.125	17.125	**17**	2.25	3.5	5.375
18	7.375	13.625	13.625	**18**	1.875	3.625	5.125
19	6.5	16.75	16.75	**19**	2.375	3.875	5.125
20	6.75	15.625	15.625	**20**	1.875	3.75	5.125
21	9	13.5	13.5	**21**	2.75	5.25	4.625
22	10.75	13.75	13.75	**22**	2	4.75	4.75
23	10.875	15.5	15.5	**23**	2.625	4.375	4.875
24	8.75	14.625	14.625	**24**	2.625	4.125	5.125
25	8.625	13.5	13.5	**25**	2.375	4.125	4.5
26	7.75	15.5	15.5	**26**	2.625	4.25	4.875
27	7.125	15.625	15.625	**27**	2.375	3.75	5.25
28	7.75	14.125	14.125	**28**	2.5	3.875	5.125
29	6.5	15.125	15.125	**29**	2.25	3.625	5
30	7.375	15.625	15.625	**30**	2	3.5	5.5

Table -2. Observation of weight of fry, fingerling and adult fish fed on live feed for evaluation of growth performance.

Month& Stage	Mean Weight (g) Gain			
	Molly -1	Molly -2	Molly -3	Molly-4
Fry	0.44	0.45	0.46	0.48
Fingerlings	0.65	0.75	0.7 2	0.78
Adult	1.98	2.23	1.98	2.01

Table -3. Observation of weightof fry, fingerling and adult fish fed on artificial feed.

Month & Stage	**Mean Weight (g) Gain**			
	Molly-5	Molly -6	Molly-7	Molly-8
Fry	0.44	0.45	0.46	0.48
Fingerlings	0.54	0.56	0.61	0.62
Adult	1.53	1.63	1.32	1.5

(i) Mean weight gain (g) = Mean final weight – Mean initial weight

(ii) Percent weight gain (%) = [(Mean final weight – Mean initial weight)/Mean initial weight]×100%

Table-4. Weight gain by molly fish after consumption of live and artificial food.

parameter	**After taken live food**	**After taken artificial food**
Mean initial weight (g)	**0.45±.016**	0.45±.016
Mean final weight (g)	2.05±0.104	1.49±0.11
Mean Weight gain (g)	1.6±0.104	1.04±0.110
Percentage weight gain%	355.55±550	231±1000

Weight gain of molly fish after live food > Weight gain of molly fish after artificial food.

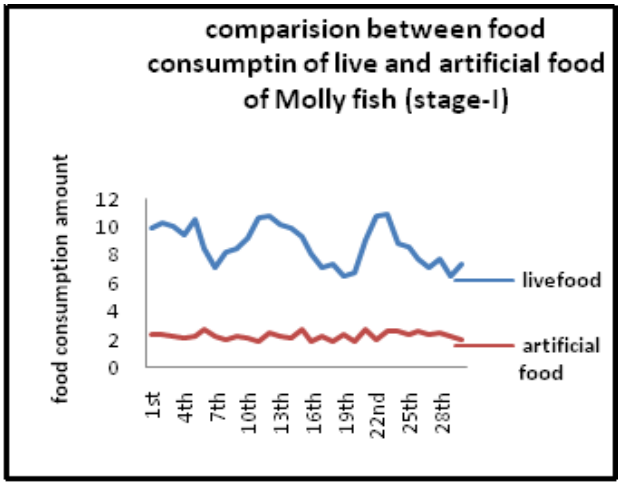

Fig.1 - Food consumption of molly fish (stage –I)

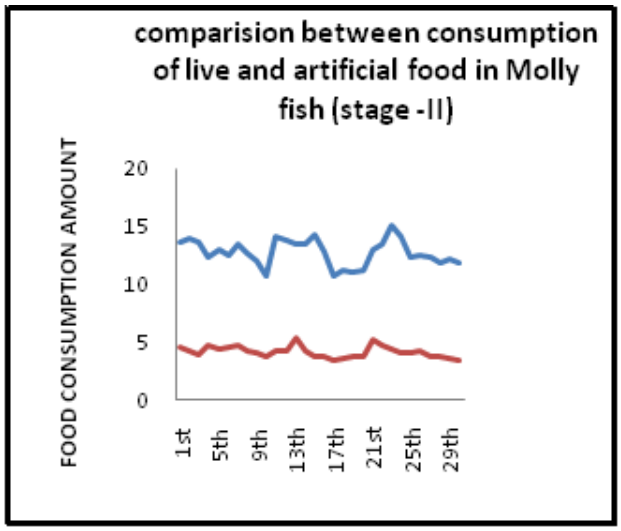

Fig.2 - Food consumption of molly fish (stage –II)

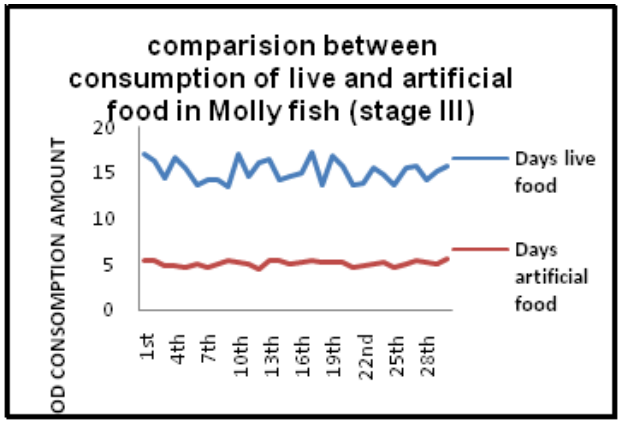

Fig.3 -Food consumption of molly fish (stage –III)

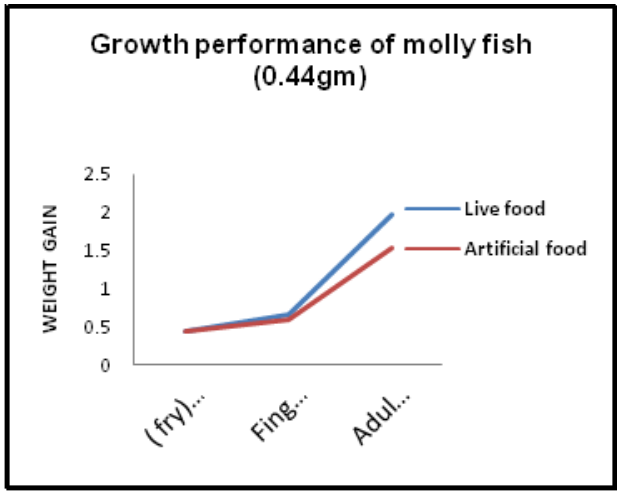

Fig.4 - Growth permormance (molly fish-1)

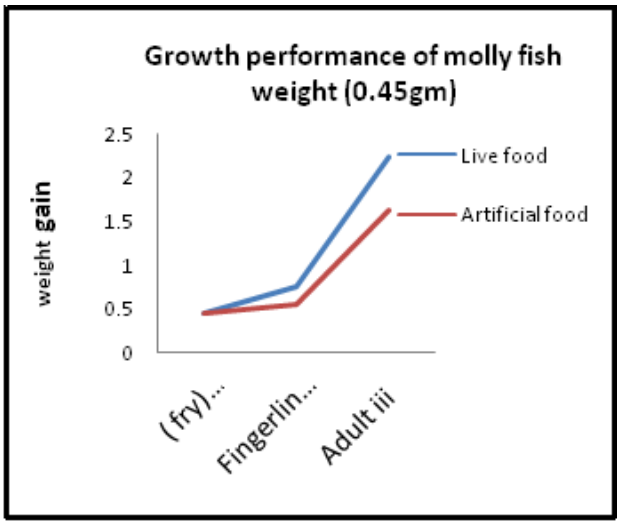

Fig.5 - Growth permormance (molly fish-2)

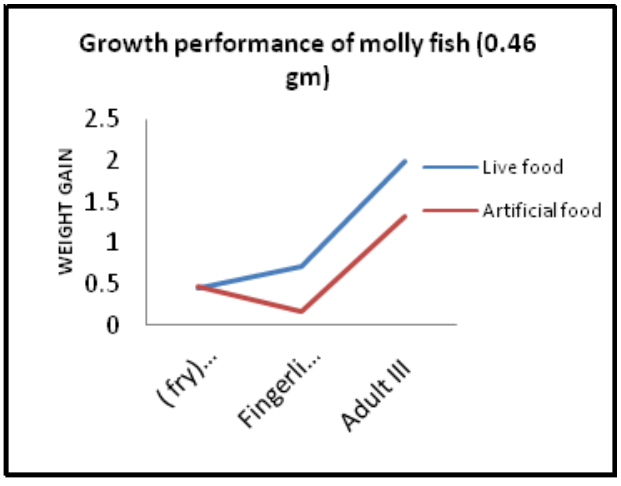

Fig.6 - Growth permormance (molly fish-3)

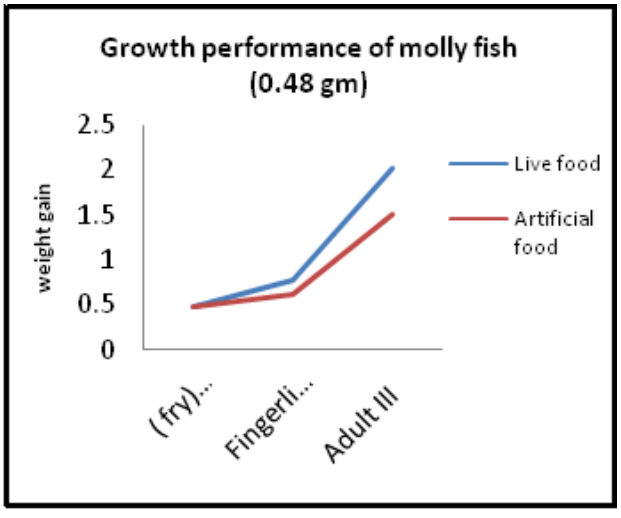

Fig.7 - Growth permormance (molly fish-4)

Acknowledgment

Authors are thankful to Dr. Renu Sharma Deptt. of Mathematics, Mata Gujri Mahavidyalaya (Auto.), Jabalpur, M.P. India.

References

APHA (1995): Standard analytical procedures for water and waste water, 19th APHA, AWWA, WEF.

Chandra G., Bhattacharjee I., ChatterjeeS.N. and Ghosh A. (2008):Mosquito control by larvivorous fish. *Indian J. Med Res.,* 127, 13–27.

Brahman L. and Chandra R. (2014): A Comparative Study on Survival and Growth of Larvivorous Fish, *Rasboradaniconius*, *Puntiusticto,* and Puntius Conchonius, International J. of Biological, Veterinary, Agricultural and Food Engineering., 2(8)180-183.

Chatterjee S.N. and Chandra G. (1997) Laboratory trials on the Feeding pattern of *Anopheles subpictus*, *Culex uinquefasciatus* and *Armigeres subalbatus* larvae by *Gambusia affinis*. *Science and Culture.,*63 : 51-52.

Das, S.K. (2012): A Preliminary Note on Assessment of a Few Indigenous Ornamental Fishes of Northeast India as Potential Predators of Mosquito Larvae., Indian Journal of Hill Farming*., 25*(1):*63-65.*

Gupta S. and Banerjee S. (2009): Food preference of gold fish *(Carrassius auratus)* (LINNAEUS, 1758) and its potential in mosquito control. Electronic J. of Ichthyology., Vol.2: 47 – 58.

Jauhari R.K. and Devi, N.P. (2011):Food preference of *Aplocheilus panchax* (Cyprinidontiformes : Aplocheilidae) with special reference towards mosquito larvae, 3(6): 55-59.

Jeniffer P., Kumar M. and Kumar K.L. (2012): The effects of photoperiod on the Growth rate of Black Molly *Pocellia sphenops* (Valenciennes, 1846) from larvae to adult in mass culture, International J. of Advanced Life Sciences (IJALS), 5(2), 133-136.

Jhingran V.G. (1991):Fish and Fisheries of India. 3rd ed. Hindustan Pub. Corp.(India).

Kashyap V. and Prasad S.N. (2011):*A text book of Vertebrate Zoology* 13th ed. : New age international Publication, New Delhi .

Manna B, Aditya G. and Banerjee S. (2008): Vulnerability of the mosquito larvae to the guppies (*Poecilia reticulata*) in the presence of alternative preys. J.Vect. Borne Dis., 45: 200-206.

Pant C., Rishikesh N., BangY.H. and Smith A. (1981): Progress in malaria vector control. Bull WHO.; 59: 325- 333.

Patra A.K. (2010): Laboratory trials on the feeding pattern of mosquito larvae by ornamental fishes (Mollies and

Sword tails) in domestic well water. Uttar Pradesh J Zool. 30(1): 47-52.

Sumithra V., Janakiraman A. and Altaff K. (2014): Influence of Different Type of Feeds on Growth Performance in Black Molly, *Poecilia sphenops* International J. of Fisheries and Aquatic Studies. 1(6): 24-26.