

Growth Observation of Four Indigenous Fishes Fed with Mosquito Larva and Fish Meal

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Abstract

An experiment was conducted on *Esomus danricus*, *Colisa fasciata*, *Puntius sophore* and *Colisa lalia* to observe the effect of different diets on growth along with their future utility, supplying mosquito larva and fish meal as test diets. Specific growth rate and condition factor were calculated for each of the species fed with both the diets. It was observed that *Esomus danricus* show high efficiency of mosquito larvae feeding followed by *Colisa fasciata*, *Colisa lalia* and *Puntius sophore*. Growth attained by all the fishes was also maximum in mosquito larvae feeding.

Key words : Growth, Indigenous fish, Mosquito larva, Fish meal, Efficiency.

Growth has been one of the most important aspects of fish biology as it determines the health condition of the individual and the population. Growth of an organism can be defined as a change in its size (length and weight) over a period of time. The growth rate in fishes is highly variable and depends upon many environmental factors. quality of food and its availability is one of the important factor influences growth rate of fishes (1). Many indigenous fishes are reported feed mosquito larvae which is responsible for the transmission of the pathogens causing some of the most life threatening and debilitating diseases of man, like malaria, yellow fever, dengue fever, chikungunya, filariasis, encephalitis (2). It is also reported that these fishes easily accept artificial diet like fish meal in captive environment. These fishes are capable of getting about easily in shallow waters among thick weeds where mosquitoes find suitable breeding grounds. Many investigations were done by various scientists about the larvicidal activity of fishes (2, 3). However, little information is available on the growth rate of these larvicidal fishes. Therefore, attempts were made in the laboratory to evaluate the effect of different diets on growth of four indigenous fish species along with their probable usefulness, supplying mosquito larva and fish meal as test diets.

Methods

Healthy specimens of four fishes were collected

from the Urpod beel of Goalpara district, Assam on 8 January, 2009, early in the morning to the laboratory of Department of Zoology, Goalpara College. They were first treated with 0.5% KMnO₄ solution for two minutes then transferred to four aquariums of same size (95.2 cm × 45.8 cm × 40.5 cm) for acclimatization to laboratory condition using tap water for two weeks. The fish species taken for the investigation were as follows : *Esomus danricus* (4.1—4.1 cm), *Colisa fasciata* (7.2—7.5 cm), *Puntius sophore* (6.2—6.8 cm) and *Colisa lalia* (3.2—3.6 cm). All these fishes were selected after the preliminary experiments on its feeding efficiency to both fish meal and mosquito larvae (larval stage only). Two sets were arranged, each set containing four glass aquarium. Each aquarium of the first set was provided with mosquito larva while another set with fish meal as test food. Mosquito larva (*Anopheles* sp.) was collected freshly and fish meal was given after binding with cloth having small pores to prevent heavy loss of food during feeding hours. In each aquarium of both the sets 10 fishes of a species were released. Before starting the experiments total length and weight of each fish was recorded. For both the trials maximum requirement of diet was given to the fishes and they were allowed to eat for 24 hours. Left-over diet, if any, was collected after 24 hours of feeding, air dried and weighted. Total number of larva and weight of fish meal fed by each fish species were also recorded daily to know the feeding

Table 1. Major water quality parameters managed during experiments.

Parameter	Values
Water temperature (C)	29 ± 1.12
pH	7.8 ± 0.21
Dissolved Oxygen (mg/l)	9.4 ± 2.18
Free CO ₂ (mg/l)	2.3 ± 0.45
Alkalinity (mg/l)	60 ± 3.50
Hardness (mg/l)	52 ± 3.24

efficiency. Both the experiments were continued for 30 days and repeated for three times. After completion of experiments with each of the test food; weight of all fishes were measured and growth was calculated accordingly. During the investigation, efficiency of each species to mosquito larva and fish meal was observed along with their feeding behavior.

Growth in terms of length and weight for each species fed with mosquito larva and fish meal were estimated separately. Specific growth rate (SGR) and condition factor (K) was calculated by following the methods of Rounsefell and Everhart (4). For maintaining better water quality physico-chemical parameters of each of the aquarium were monitored daily between 07.00 and 08.00 hour. They were estimated by following standard methods (5). In all cases the average length and weight of 10 fishes were taken. After 30 days of rearing, fishes were harvested by hand net. The fishes were weighed and measured individually followed by calculation of mean value.

Results and Discussion

Physico-chemical parameter analysis data dur-

ing the experiments are presented in Table 1. All the parameters were found within the acceptable range for fish culture (6). Details growth performance of each test fishes fed with mosquito larva and fish meal are shown in the Tables 2 and 3 respectively. It was observed that except *Puntius sophore* other fishes show high feeding efficiency to mosquito larva comparing to fish meal. It might be due to column feeding habit of *Puntius sophore* which feed on mosquito larvae when chance permits. Therefore, the condition factor (K) of *Puntius sophore* was found to be less (0.83) in larva feeding. Among four fishes *Esomus danricus* showed high efficiency of mosquito larva feeding (K 1.39) followed by *Colisa fasciata* (K 1.24), *Colisa lalia* (K 0.97) and *Puntius sophore* (K 0.83). Condition factor (K) gives information when comparing two populations living in certain feeding, density, climate, and other conditions, when determining the period of gonadal maturation; and when following up the degree of feeding activity of a species to verify whether it is making good use of its feeding source (7). Thus we can conclude that the condition factor (K) of four species in this study shows their different feeding activity.

Esomus danricus was found highest feeding of fish meal than other three fish species but not more than larvae feeding. Considering both the test food the growth attained by all the fishes was maximum in mosquito larvae feeding. Arrangement of fishes in terms of larva feeding efficiency can be made as *Esomus danricus* > *Colisa fasciata* > *Colisa lalia* > *Puntius sophore* and while fed with fish meal it

Table 2. Growth performance of each test fishes fed with mosquito larvae.

Treatments (fishes)	Observation	IL (cm)	Mean	FL (cm)	Mean	IW (g)	Mean	FW (G)	Mean	WG (g)	LG (cm)	K	(SGR) (% / day)
<i>Esomus danricus</i>	a	4.2	4.23	5.6	5.63	0.532	0.534	0.575	0.572	0.038	1.4	1.39	0.00126
	b	4.4		5.5		0.537		0.572					
	c	4.1		5.8		0.533		0.57					
<i>Colisa fasciata</i>	a	7.3	7.33	8.4	8.43	8.452	8.473	8.488	8.490	0.017	1.11	1.24	0.00056
	b	7.5		8.3		8.467		8.490					
	c	7.2		8.6		8.501		8.492					
<i>Puntius sophore</i>	a	6.8	6.47	7.9	8.2	5.38	5.373	5.406	5.416	0.043	1.73	0.83	0.00143
	b	6.4		8.4		5.368		5.412					
	c	6.2		8.3		5.372		5.429					
<i>Colisa lalia</i>	a	3.4	3.4	4.3	4.53	0.94	0.935	0.954	0.949	0.014	1.13	0.97	0.00046
	b	3.2		4.4		0.931		0.949					
	c	3.6		4.9		0.935		0.943					

Table 3. Growth performance of each test fishes fed with fish meal. IL—Initial length, FL—Final length, IW — Initial weight, FW—Final weight, WG—Weight gain, LG—Length gain, SGR—Specific growth rate, K—Condition factor.

Treatments (fishes)	Observation	IL (cm)	Mean	FL (cm)	Mean	IW (g)	Mean	FW (G)	Mean	WG (g)	LG (cm)	K	(SGR) (% / day)
<i>Esomus danricus</i>	a	5.6	5.63	6.3	6.3	0.575	0.572	0.579	0.576	0.004	0.67	1.33	0.00013
	b	5.5		6.5		0.572		0.576					
	c	5.8		6.1		0.57		0.573					
<i>Colisa fasciata</i>	a	8.4	8.47	9.4	9.17	8.49	8.494	8.501	8.497	0.003	0.7	0.87	0.00010
	b	8.3		9.2		8.493		8.492					
	c	8.7		8.9		8.498		8.497					
<i>Puntius sophore</i>	a	7.9	8.2	8.6	9.03	5.406	5.416	5.422	5.422	0.006	0.83	1.05	0.00020
	b	8.4		9.2		5.412		5.424					
	c	8.3		9.3		5.429		5.42					
<i>Colisa lalia</i>	a	4.3	4.53	5.3	5.17	0.954	0.949	0.947	0.951	0.002	0.64	0.76	0.00006
	b	4.4		5.2		0.949		0.951					
	c	4.9		5		0.943		0.955					

will be *Esomus danricus*>*Puntius sophore*>*Colisa fasciata*>*Colisa lalia*. It was observed that all the fishes have more or less mosquitocidal behavior. Sheikh et al. (3) also reported high feeding efficiency of these fishes to mosquito larvae. Specific growth rate (SGR) indicated the higher growth percentage per day for all the fishes fed with mosquito larva than that of fish meal.

Thus, the fishes like *Esomus danricus*, *Colisa fasciata* and *Colisa lalia* showed high potentiality for the biological control of mosquitoes as they showed high growth in mosquito larvae feeding. These fishes should be released to the drainage system and in the shallow water areas particularly in the urban and semi-urban regions to control mosquito population. As these fishes are mostly available comparing to other exotic mosquitocidal fishes like *Gambusia affinis*, *Poecilia (Lebistes) reticulata*, the cost of use of these fishes will be low. This is also

useful for conservation of such important indigenous fish species.

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