International Journal of Biology Research
www.biologyjournal.in
ISSN: 2455-6548
Received: 02-06-2026, Accepted: 02-07-2026, Published: 17-07-2026
Volume 11, Issue 3, 2026, Page No. 17-21

Evaluation of live feeds and rearing strategy on growth and survival of *Horabagrus brachysoma* Larvae, a near threatened catfish in captivity

Sangram Ketan Sahoo*, Shajahan Ferosekhan, Ajit Keshav Chaudhari, Satya Narayan Sahoo, Shiba Shankar Giri
ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, Odisha, India
Corresponding Author: Sangram Ketan Sahoo
DOI: https://doi.org/10.66856/ijbr.2026.11.3.11041

Abstract
Horabagrus brachysoma, a threatened catfish was induced bred in captivity for the stocking material. A comparative study by feeding three live feeds (mixed zooplankton, artimia and tubifex) to larvae was undertaken during larval rearing. The rearing performance of larvae in normal day light vs complete dark condition was also studied. Both the experiments were carried out in triplicate glass aquaria for a period of 21 days. The water quality parameters were within the acceptable range in the rearing tanks of both the experiments. All the three live feeds were accepted well by larvae. The results showed that the growth in terms of final weight of larvae fed on mixed zooplankton was significantly highest ($p<0.05$) compared to the larvae fed on artimia or tubifex. The parameters like weight gain, SGR and yield were lowest ($p<0.05$) in artimia fed larvae. The survival rate of larvae fed on mixed zooplankton, artimia and tubifex did not vary to each other. The growth and survival of larvae reared under natural day light and complete darkness did not also vary ($p<0.05$) to each other. Therefore, the study recommends to rear this valued larva with live zooplankton in normal condition for the captive hatchery production. The live feed like artimia or tubifex may be an alternative when a shortage of zooplankton is experienced.

Keywords: *Horabagrus brachysoma*, larvae, live feed, growth, survival, dark condition

Introduction

Horabagrus brachysoma or the sun catfish is endemic to rivers in the Western Ghats of India. The gradual degradation of its natural habitat and overfishing are the causes of their lowering population in the natural water. Hence it is considered as a vulnerable catfish species by IUCN. It is considered as a high value fish and also having ornamental value during its early stage (Ali *et al*., 2007) [1]. The market price ranges from ₹300 to 400 kg^{-1} (approx. 3.0 to 4.0 US$ kg^{-1}). The maximum growth upto 45cm size was reported (Talwar & Jhingran, 1991) [24] and we also observed its growth upto 200-250g during pond culture in two years. The work on its biology has been reported extensively (Raghavan *et al*., 2016) [16] compared to captive production (Padmakumar *et al*., 2010; Sahoo *et al*., 2010a, 2010b, 2011, 2014) [13, 17, 18, 19, 14]. Inspite of its potentiality, the catfish could not come up for easy availability in the market. It is probably due to lack of easy seed availability to take up its aquaculture. Always early mortality of larvae remains a primary factor during seed production of any catfish due to lack of suitable management and feed. Suitable feed at the early life is considered crucial, which are readily consumed, efficiently digested and that provide the required nutrients to support good growth and health (Giri *et al*., 2002) [6]. Generally, the larvae depend on live food due to substantial availability of protein and other essential nutrients during their first feeding. The efficacy of using different live feeds for rearing of several catfish larvae was reported (Misiska 1981; Kerdchuen & Legendre, 1994; Hung *et al*., 2002; Sahoo *et al*., 2004: Sahoo *et al*., 2010a) [17, 12, 10, 9, 22]. Several researchers have also tried dry feed formulae as possible substitutes of live food for optimal larval growth with limited results (Hecht & Viljoen, 1982; Dabrowski, 1984; Prinsloo & Schoonbee, 1986) [7, 4, 15]. The artificial diets may perform poorly due to poor digestibility (Lauff & Hofer, 1984) [11], deficiency of growth factors (Higgs *et al*., 1985) [8] and insufficient stimulation of feeding behaviour (Dave, 1989) [5], indicating the limitation of using manufactured diets replacing live feed during initial feeding of larvae. The feeding of mixed zooplankton or artimia or tubifex during captive larval rearing is usually seen in different catfishes as referred earlier. There is no comparative growth data due to feeding these three live feeds for this valued catfish larva. Hence the present article communicates the rearing performance of *H. brachysoma* larvae by feeding mixed zooplankton, artimia and tubifex during captive rearing. Further the result of the experiment recommends the best live feed for the catfish larvae during their initial feeding. The possibility of rearing the larvae in dark environment was also observed as it was beneficial for some catfishes (Appelbaum & Kamler, 2000; Paramanik *et al*., 2014) [3, 14]. The successful rearing of the larvae is not only ensuring the seed for aquaculture diversification, but also ensures its conservation.

Materials and methods

The *H. brachysoma* brood fish were reared in the earthen pond (0.04 ha) at Catfish Unit, ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, India. They were fed with a formulated diet containing 32 % crude protein and 8 % lipid at the rate of 2 % of the body weight daily prior to three months of breeding season. Perspective male and female brood fish were identified by seeing the free flow of milt and soft belly respectively. Male and female brood of 150–200 g were selected for induced breeding operation. The females were injected with the synthetic hormone, Ovatide (Hemmo Pharma Pvt. Ltd., Mumbai, India) at the rate of 1.0 mL per kg body weight as it is an effective inducing agent for other catfish (Sahoo *et al*., 2005). The female fish is stripped after 13-14 h of post injection and fertilised with the milt stripped from the male brood. The fertilised eggs were incubated for egg hatching. The hatched larvae were collected and released in rearing tanks.

Experiment 1- Effects of feeding live feeds on rearing performance of *H. brachysoma* larvae

The six days old larvae were utilised for experimental purpose. The initial length and weight of larvae used for the experiment were 6.7 ± 0.03 mm and 2.9 ± 0.02 mg, respectively. The larvae were subjected to three feeding regimes, which were mixed zooplankton, *artimia* nauplii and tubifex worm. Triplicate glass aquaria were filled with twenty litre of water for each live feed and stocked with 3 larvae per litre of water for experimental purpose. The tanks were provided with mild aeration. The tanks were cleaned during morning hour and two third water was renewed daily. The larvae were stocked in morning hour and feeding started after 3 h post-stocking.

Artemia cysts (OSI Red Ring, USA) were hatched in saltwater (30 ppt) under vigorous aeration in hatchery and the freshly hatched *Artemia* nauplii were used for feeding purpose. Similarly mixed zooplankton was collected daily for feeding purpose from the pond and sieved 2-3 times before feeding the larvae. The tubifex was purchased and kept under flowing water in hatchery for feeding purpose. The tubifex bunch was chopped well before feeding the larvae. These three live feeds were fed *ad libitum* to the larvae in their respective tanks throughout the experimental period during morning hour. The uneaten excess feed and excreta were removed daily before feeding the larvae. The experiment was continued for 21 days under the natural photoperiod.

At the end of the experiment, 20 larvae were collected from each treatment tank and measured for the final total length and body weight through measuring board and electronic balance respectively. The growth parameters and survival rate were calculated as per the standard formula described below.

Weight gain (%) = [Final weight (mg)−Initial weight (mg)]/Initial weight (mg) ×100

Specific growth rate (% day^{-1}) = [Ln (Final weight (mg)) − Ln (Initial weight (mg))]/Duration of rearing period (days) ×100

Yield (mg L^{-1}) = Total biomass (mg)/Total volume of water (L)

Survival rate (%)= Number of survived larvae/Number of larvae stocked ×100

The water from each tank was collected before cleaning the water for analysis of water quality parameters. The water like water temperature, dissolved oxygen, carbon-di-oxide, pH total alkalinity, total ammonia and nitrites were measured once in seven days, following the standard procedure (APHA, 2005) [5].

Experiment 2 – Effect of rearing condition on growth and survival of *H. brachysoma* larvae

The *H. brachysoma* is nocturnal and shy in nature, which hides in natural water and remain active in night time. Hence, apprehending the beneficial effect on growth, the rearing of larvae was undertaken under the natural day condition and also in complete dark environment. Triplicate glass aquaria were used for both the condition. The dark condition is created by covering the entire aquaria with black polythene. Provision of aeration was kept to get rid from the oxygen depletion. The aquaria were filled with 20 l of water and the larvae of six days old were stocked @ 3 larvae/L. The initial length and weight were 6.25 ± 0.13 mm and 2.55 ± 0.04 mg respectively. Live zooplankton was used as feed due to good survival observed in previous experiment. The cleaning and refilling of water were followed as described for other experiment. The experiment was also continued for 21 days. The final weight and survival rate were recorded as done for the first experiment.

Stastical analysis

The growth parameters and survival rate were analysed for statistical differences by One-Way ANOVA and Duncan's multiple range post hoc test (SPSS 26.0, USA). The values were considered significant at $p<0.05$.

Results and discussion

The water quality parameters of different tanks used for rearing *H. brachysoma* larvae in both the experiments are summarised in Table 1 and 2. These water quality parameters were within the permissible levels as also observed during rearing of different catfish larvae in experimental condition (Sahoo *et al*., 2004; 2012) [20, 22]. This could be due to the combined effect of continuous aeration in aquaria as well as cleaning and replacing of water daily during the rearing period. The larvae reared in glass aquaria fed actively after the supply of different live feeds. The larvae fed actively at the bottom of the tank, which was clearly observed from their browsing at the bottom. The growth of larvae in terms of length and weight increment was superior in mixed-zooplankton fed larvae compared to tubifex and artimia fed larvae. The final weight of larvae was the highest ($p<0.05$) while feeding mixed-zooplankton followed by tubifex and artimia fed larvae. All the three live feeds were given in sufficient quantity till they refuse, which was also observed from outside. The tubifex and artimia were provided to larvae once till satiation during the day. But the uneaten zooplankton remains live in aquaria water till renewal in next day. Hence the larvae reared under zooplankton received food at their need every time, which might be the possible cause of their higher growth compared to other two feeds fed larvae. Live zooplankton remains helpful as initial feed during rearing of different catfish larvae also (Kerdchuen & Legendre, 1994; Hung *et al*., 2002; Sahoo *et al*., 2010a) [10, 9, 18]. The parameters like weight gain, SGR and yield followed the similar trend like final weight in the larvae while feeding zooplankton. These parameters were significantly lowest ($p<0.05$) in artimia fed larvae compared to other two live feed treatments. This lower value of these parameters during artimia feeding, could be due to lower final weight of larvae. The survival rate among the treatments were 75-95%, which did not vary ($p<0.05$) to each other. The balanced nutritional content in these three live feeds might have played major role for reducing the mortality of larvae during their rearing. Similar non-variance of survival rate in *Pangasius bocourti* larvae fed on zooplankton, tubifex and artimia, was reported in a comparative feeding trial (Hung *et al*., 2002) [9]. The comparative rearing trial of *H. brachysoma* larvae under normal day light and complete dark condition did not show any significant ($p<0.05$) variation in final weight and survival rate. However, a positive growth and survival were reported in early life of *Clarias gariepinus* and *C. batrachus* while rearing in dark condition (Appelbaum & Kamler, 2000; Paramanik *et al*., 2014) [3, 14]. However, this positive factor on growth could not be observed at larval stage of *H. brachysoma* in the present study, which might be related to difference in species. Hence the larval rearing of this catfish can be undertaken in normal condition unlike *C. gariepinus*. However, the effect of darkness during rearing of different life stages of this catfish is needed as the adult prefers darkness in the wild waters, which may be an information for the hatchery managers during seed rearing.

Table 1: Water quality parameters of *H. brachysoma* larval rearing tanks used during the feeding of different live feeds for a period of 21 days.

Water Quality Parameters	**Feeding treatments**		
	Plankton fed tank	**Artemia fed tank**	**Tubifex fed tank**
Temperature	27.20±0.21	27.01±0.30	27.10±0.26
Dissolved Oxygen	5.83±0.20	6.17±0.20	6.00±0.12
Carbon-di-oxide	1.96±0.03	2.03±0.04	2.00±0.01
pH	7.63±0.09	7.60±0.20	7.46±0.28
Total Alkalinity (Caco3)	122.33±2.60	125.00±2.08	128.00±1.54
Total ammonia	0.04±0.01	0.04±0.01	0.03±0.01
Total nitrites	0.04±0.01	0.04±0.01	0.03±0.01

The water quality parameters are expressed in mean±SE

Table 2: The variation of growth parameters and survival rate of *H. brachysoma* larvae fed with different live feeds during 21 days rearing in hatchery.

Observations	**Feeding Treatments**		
	Plankton	**Artemia**	**Tubifex**
Initial Length (mm)	6.7 ±0.03	6.7 ±0.03	6.7 ±0.03
Final Length (mm)	19.03 ± 0.1^{b}	15.87 ± 0.14^{a}	19.9 ± 0.03^{c}
Initial Weight (mg)	2.9±0.02	2.9±0.02	2.9±0.02
Final Weight (mg)	75.68 ± 1.04^{c}	33.97 ± 0.59^{a}	59.59 ± 2.48^{b}
Wight Gain %	2509.46 ± 35.55^{c}	1071.31 ± 20.14^{a}	1954.83 ± 85.61^{b}
SGR %	21.75 ± 0.1^{c}	16.41 ± 0.12^{a}	20.15 ± 0.28^{b}
Yield (mg L^{-1})	231.73 ± 22.07^{b}	129.16 ± 6.75^{a}	228.18 ± 3.56^{b}
Survival %	76.5 ± 8.5^{ab}	95 ± 3^{b}	95.5 ± 2.5^{b}

The value (mean ± SE) bearing different superscripts in the row differs significantly ($p<0.05$)

Table 3: Water quality parameters of *H. brachysoma* larval rearing tanks used during the feeding of different live feeds for a period of 21 days.

Treatments	**Temperature**	**Dissolved Oxygen**	**Carbon-di-oxide**	**pH**	**Total Alkalinity (Caco3)**	**Total ammonia**	**Total nitrites**
Normal Photoperiod	27.23±0.22	6.00±0.11	1.96±0.03	7.53±0.18	126.33±1.20	0.04±0.01	0.04±0.01
Complete Dark	27.43±0.12	6.03±0.12	1.96±0.03	7.67±0.13	127.00±0.58	0.03±0.01	0.04±0.01

The water quality parameters are expressed in mean±SE

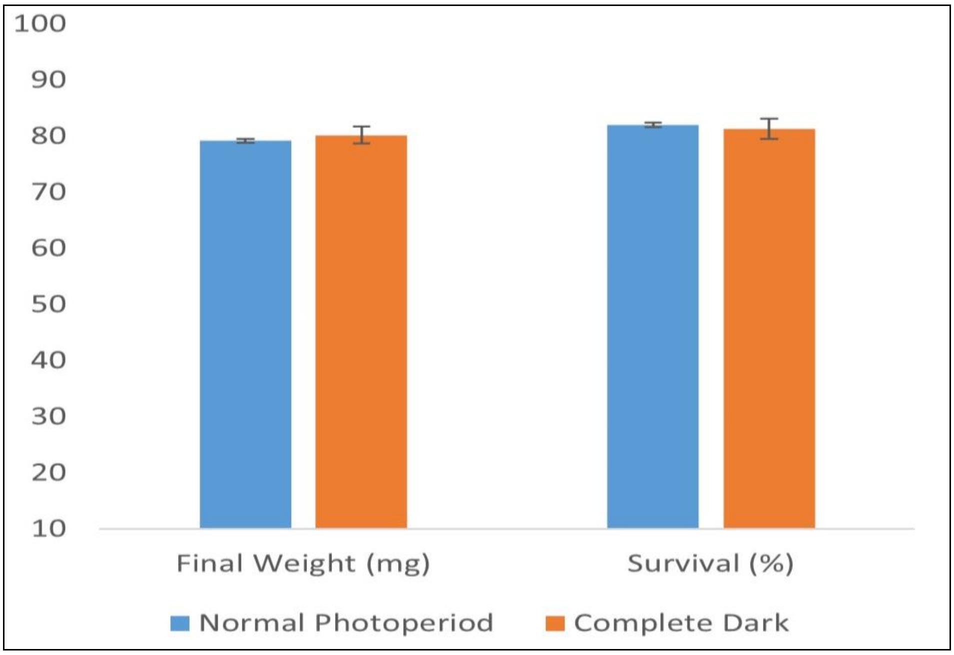

Fig 1: Effect of rearing condition on the comparative growth and survival of *H. brachysoma* larvae during a 21 days hatchery rearing. The value (Mean ± SE) of growth and survival did not vary significantly ($p<.05$).

Conclusion

All the live feeds were fed actively by *H. brachysoma* larvae during their feeding trials. Live zooplankton is considered suitable live feeds as cost is not involved unlike other two live feeds. These larvae can be reared in normal condition with zooplankton as fast food. The possibility of using Artimia or tubifex as feed can be accepted as alternative feed during larval rearing also. Further, blood worm may be an alternative live feed of tubifex, which must be verified before recommending. The optimal light intensity and wavelength may be verified in different life stage of this catfish to extract the beneficial effect on growth and survival as the adult fish is having nocturnal habit.

Acknowledgement

We are thankful to Director, ICAR-Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar, India for the support necessary for this study. Also the research was supported by the Indian Council of Agricultural Research, Department of Agricultural Research and Education, Government of India.

References

1. Ali PHA, Raghavan R, Prasad G. Threatened fishes of the world: *Horabagrus brachysoma* (Gunther,1864) (Bagridae). Environment Biology of Fishes,2007:8:221-221. https://doi.org/10.1007/s10641-006-0022-4
2. APHA. Standard methods for the examination of water and wastewater. American Water Works Association/American Public Works Association/Water Environment Federation, Washington DC, 2005.
3. Appelbaum S, Kamler E. Survival, growth, metabolism and behaviour of *Clarias gariepinus* (Burchell 1822) early stages under different light conditions. Aquaculture Engineering,2000:22:269-287. https://doi.org/10.1016/s0144-8609(00)00054-6
4. Dabrowski K. Influence of initial weight during the change from live to compound feed on the survival and growth of four cyprinids. Aquaculture,1984:148:105-113. https://doi.org/10.1016/0044-8486(84)90213-8
5. Dave G. Experiences with waste water cultured *Daphnia* in the start feeding of rainbow trout (*Salmo gairdnerii*). Aquaculture,1989:79:337-343. https://doi.org/10.1016/0044-8486(89)90475-4
6. Giri SS, Sahoo SK, Sahu BB, Sahu AK, Mohanty SN, Mukhopadhyay PK, *et al*. Larval survival and growth in *Wallago attu* (Bloch and Schneider): effects of light, photoperiod and feeding regimes. Aquaculture,2002:213:151-161. https://doi.org/10.1016/S0044-8486(02)00012-1
7. Hecht Y, Viljoen H. Observation on the suitability of various dry feeds for the commercial rearing of carp, *Cyprinus carpio* larvae in South Africa. Water SA,1982:8:58-65.
8. Higgs DA, Markert JR, Plonikoff MDJ, McBridge R, Dosanjh M. Development of nutritional and environmental strategies for maximizing the growth and survival of juvenile pink salmon (*Oncorhynchus gorbuscha*). Aquaculture,1985:47:113-130. https://doi.org/10.1016/0044-8486(85)90058-4
9. Hung LT, Tuan NA, Cacot P, Lazard J. Larval rearing of the Asian catfish, *Pangasius bocourti* (Siluroidei, Pangasiidae): alternative feeds and weaning time. Aquaculture,2002:212:115-127. https://doi.org/10.1016/S0044-8486(01)00737-2
10. Kerdchuen N, Legendre M. Larval rearing of an African catfish, *Heterobranchus longifilis* (Teleostei, Clariidae): a comparison between natural and artificial diet. Aquatic Living Resources,1994:7:247-253. https://doi.org/10.1051/alr:1994027
11. Lauff M, Hofer R. Proteolytic enzymes in fish development and the importance of dietary enzymes. Aquaculture,1984:37:335-346. https://doi.org/10.1016/0044-8486(84)90298-9
12. Msiska OV. Rearing of the fry of the African catfish *Clarias lazera* (C & V) using live and artificial feed stuffs. Bamidgeh,1981:33:122-127.
13. Padmakumar KG, Bindu L, Manu PS. In situ conservation and stock enhancement of endemic fish resources through captive breeding and artificial sanctuaries. Indian Journal of Animal Science,2010:80:63-70.
14. Paramanik M, Ferosekhan S, Sahoo SK. Does the dark condition enhance growth and survival of *Clarias batrachus* larvae at higher stocking density? International Journal of Fisheries and Aquatic Studies,2014:2:142-144.
15. Prinsloo JF, Schoonbee JH. Comparison of the early larval growth rates of the Chinese silver carp *Hypophthalmichthys nobilis* using live and artificial feed. Water SA,1986:12:229-234.
16. Raghavan R, Philip S, Ali A, Katwate U, Dahanukar N. Fishery, biology, aquaculture and conservation of the threatened Asian sun catfish. Review in Fish Biology and Fisheries,2016:26:169-180. https://doi.org/10.1007/s11160-016-9418-1
17. Sahoo SK, Giri SS, Chandra S, Paramanik M. Management in seed production of an endangered catfish, *Horabagrus brachysoma* during its hatchery phase. Aquaculture Asia,2011:16:26-29.
18. Sahoo SK, Giri SS, Chandra S, Sahu AK. Stocking density-dependent growth and survival of Asian sun catfish, *Horabagrus brachysoma* (Gunther 1861) larvae. Journal of Applied Ichthyology,2010a:26:609-611. https://doi.org/10.1111/j.1439-0426.2010.01473.x
19. Sahoo SK, Giri SS, Chandra S, Sahu AK. Stocking density-dependent growth and survival of Asian sun catfish, *Horabagrus brachysoma* (Gunther 1864) fry during hatchery rearing. Journal of Applied Aquaculture,2010b:22:86-91. https://doi.org/10.1080/10454431003600563
20. Sahoo SK, Giri SS, Gupta SD, Sahu AK. Effect of animal origin feeds and frequency of feeding on growth, survival and cannibalism in *Wallago attu* (Bloch & Schneider) larvae during hatchery rearing. Asian Fisheries Science,2012:25:66-74. https://doi.org/10.33997/j.afs.2012.25.1.006
21. Sahoo SK, Giri SS, Paramanik M, Ferosekhan S. Preliminary observation on the induced breeding and hatchery rearing of an endangered catfish, *Horabagrus brachysoma* (Gunther). International Journal of Fisheries and Aquatic Studies,2014:1:117-120.
22. Sahoo SK, Giri S, Sahu AK. Effect of stocking density on growth and survival of *Clarias batrachus* (Linn.) larvae and fry during hatchery rearing. Journal of Applied Ichthyology,2004:20:302-305. https://doi.org/10.1111/j.1439-0426.2004.00534.x

23. Sahoo SK, Giri SS, Sahu AK. Effect on breeding performance and egg quality of *Clarias batrachus* (Linn.) at various doses of Ovatide during spawning induction. Asian Fisheries Science,2005:18:77-83. https://doi.org/10.33997/j.afs.2005.18.1.009
24. Talwar PK, Jhingran AG. Inland Fishes of India and Adjacent Countries. vol. 2, A.A. Balkema, Rotterdam, 1991.