

The physico-chemical parameters of larval rearing tank water for temperature, pH, total alkalinity and dissolved oxygen were found in the range of $25 \pm 2^\circ\text{C}$, 6.8 – 7.4, 126 – 130 mg L⁻¹ and 6.4 - 7.9 mgL⁻¹, respectively during the entire rearing period.

Table 1: Hybridization performance of African Catfish, *Clarias gariepinus x Heterobranchus longifilis* induced bred with Ovaprim hormone.

Male Avg. Weight (g)	Female Avg. Weight (g)	Latency period (hr)	Total number of Eggs stripped out	Fertilized eggs	Fertilization (%)	Number of Hatchlings	Hatching(%)	Survival %
120 ± 0.75	180 ± 0.5	10 ± 1	1265 ±1.6	1105±2.2	87.35 ±1	1021 ± 2.1	92.40	80 ± 7

The data are based on the means (± SE) of pools in each group.

Table 2. Formulation and proximate composition of the test diets (% dry matter basis)

DIETS				
INGREDIENTS	DIET 1	DIET 11	DIET 111	*STANDARD/CONTROL
Fish meal	15.00	27.0	20.0	
Baker's yeast	-	20	20	
Powdered milk	20.	-	-	
Boiled chicken egg yolk	15	20	-	
Whole egg (albumin + yolk)	-	-	35	
Wheat flour	10	15	12	
Cod liver oil	2	1	1	
Vitamin premix	3	2	1.5	
Mineral premix	2	1	2	

Vitamin and Mineral Composition (Per 100 g): Manufacturer: Sunder Chemical. Ltd., Chennai, India. Vitamin A, 70000 IU; D₃, 7000 IU; E, 25mg; Nicotinamide, 100 mg; Cobalt, 15 mg; Copper, 120 mg; Iodine, 32.5 mg; Iron, 150 mg; Magnesium, 600 mg; Manganese, 150 mg; Potassium, 10 mg;

Selenium, 1 mg; Sodium, 0.59 mg; Sulphur, 0.72%; Zinc, 960 mg; Calcium, 25.50%, Phosphorus 12.75%) , from Glaxo SmithKline Pharmaceuticals Ltd

*Standard/Control Feed: Live feed - *Artemia nauplii* was used.

Table 3. Various growth parameters and survival rate of hybrid larvae fed with three different artificial diets for 21 days experimental period.

Treatments/ parameters	Diet 1	Diet 11	Diet 111	Control
Initial length (mm)	5.47c ± 0.12	5.47c ± 0.12	5.47c ± 0.12	5.47c ± 0.12
Initial weight (mg)	3.16b ± 0.1	3.16b ± 0.1	3.16b ± 0.1	3.16b ± 0.1
Final length (mm)	8.73b	10.55 a	10.73 a	11.23 a
Final weight (mg)	40.76 b	48.54 a	49.32a	50.20a
Length gain (mm)	3.26	5.08	5.26	5.76
Weight gain (mg)	37.60	45.38	46.16	47.04
Specific growth rate (SGR)	179.05	216.10	219.81	224.00
Percentage Survival (%)	80	75	83.33	76.66
Condition factor	1.56	1.53	1.53	1,49

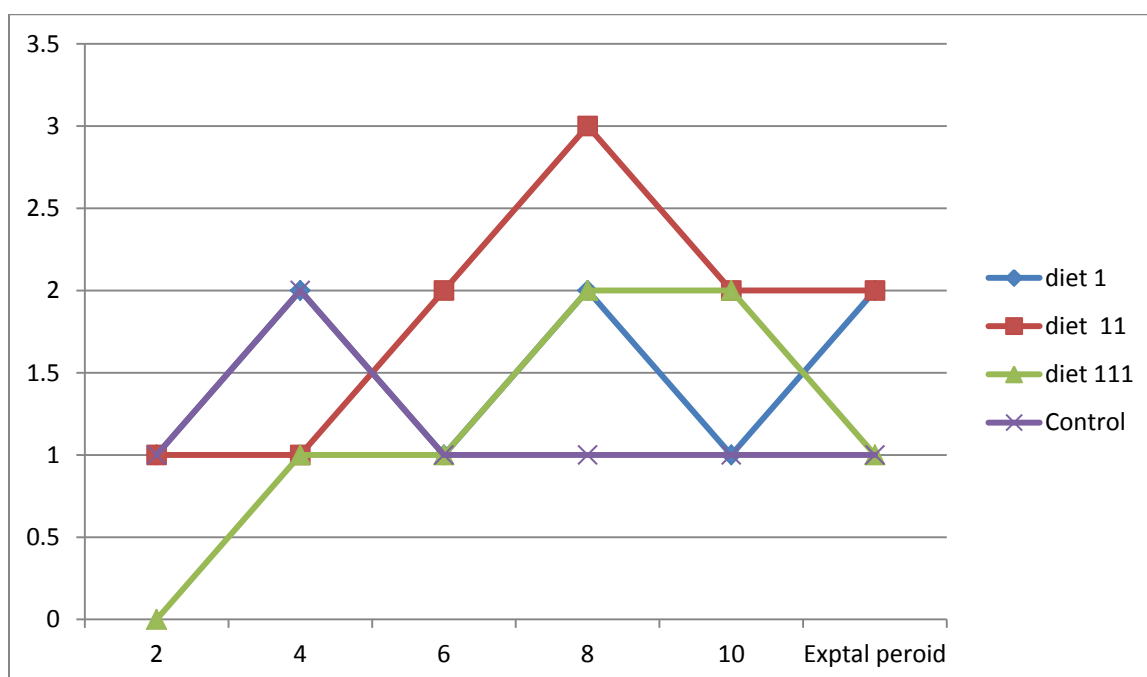


Fig. 1. Mortality of larvae during 21 days feeding trial of hybrid larvae fed on different formulated diets.

Discussion

The feasibility and suitability of laboratory formulated feed for rearing of hybrid larvae was investigated in the present study. Three diets were tested during the period of 21 days feeding trial. At the end of the feeding trial, it was observed that the larvae fed with diet I11 showed better growth and survival rate followed by the larvae fed with diet II. The larvae fed diet I11 showed an average weight gain of 46.16 mg after 21 days feeding trial, followed by larvae fed diet II with weight gain of 45.38mg. These figures were comparable to 47.04mg obtained from larvae fed standard /control diets.

The specific growth rates *SGR* of the larvae fed diets II and III which showed 216.10 and 219. 81 respectively were also comparable to the larvae fed standard /control diets with 224.00. Higher survival rate which portray the feed acceptance and assimilation by larvae was obtained from larvae fed diet III followed by diet I. The larvae fed diet III and diet I showed survival rate of 83.33% and 80.00 % respectively. This was in agreement with the findings of Dabrowski *et. al.*, (1984), who successfully uses dry and live feed to rear larvae.

Ovaprim has been optimally employed for inducing spawning of fish used in a number of commercially important food as well as ornamental and threatened species (Lakra *et.al.*, 1996; Pandey *et. al.*, 1999). The hormone has been reported to be an efficient inducing agent for oocyte maturation and ovulation in *Clarias spp.* In the present study, the latency period of 10-15 hours after the injection of Ovaprim, dose 0.5 ml/100 g⁻¹ body weight to female fish was shown to be suitable for the maturation and ovulation of this species. Similar findings were also reported by Sahoo *et al.*, (2005), in the same species while using gonadotrophin releasing hormone *GnRH* in combination with *domperidone* (14 to 23 hours). However, according to Sahoo *et al.* (2005), the suitable latency period for final maturation of ova is also dose dependent when using *GnRH* and *domperidone* combinations on spawning performances. Thus our findings on spawning and larval production are in support with the reports of Sahoo *et al.* (2005) in case of *Clarias spp.*

Many authors have attested to the fact that suitable feed is the basic requirement for growth and survival of fish larvae (Srivastava *et al.*, 2012, Mollah *et al.* 1987 & Mollah and Nurullah, 1988).

Furthermore, most fish larvae are known to feed best on zoo planktons or live feeds, before the later stage of their life which needs nutritionally balanced feed. This is well demonstrated in the present findings of 21-day feeding trials with *artemia nauplii* as standard feed compared to other 3 different formulated diets. Here, group of hybrid larvae fed with *Artemia nauplii* showed high performance in all parameters including percentage survival (76.00%) and SGR (224) in comparison to other formulated diets (see table 3). This could be attributed to the nutritive richness of *artemia nauplii* as live feed. Secondly, larvae being small in size needed such minute live agent (*Artemia nauplii*) in contrast to the formulated diet. This study outcome is also in line with Mollah et al. (1987) & Mollah and Nurullah (1988) who have reported high percentage survival of 97.6 -99.6% while feeding tubifid worms to *C. batrachus* fry (size 88.1mg). Our findings of improved length size, weight increment also find support with the study of Thakur, (1976), who reported that *Clarias* fry attained 3-7 cm size within 20-25 days feeding trials..

Therefore, the present study demonstrated that the hybrid larvae of *heteroclarias* can be reared with formulated artificial diets for 21-days as with live feed of *artemia nauplii* for enhanced growth as well as high survival performance of larvae. Principally, these laboratory formulated diets can be use as alternative to *artemia nauplii* thereby reducing cost of production in term of foreign exchange reduction, since *artemia* live feed is an imported feed.

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