Nanhe mahseer: A micro diet for larval rearing of golden mahseer

The weaning of any fish larvae to an exogenous food is one of the most critical stages of life cycle. Therefore, the development of a nutritionally balanced larval diet is pivotal for any successful hatchery operation.

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Why larval diet for golden mahseer ?

Golden mahseer (Tor putitora) is king of game fish popular throughout the Indian subcontinent. But, unfortunately, the natural stocks of this species showed drastic declines due to anthropogenic activities like introduction of exotics, damming and overfishing, and is therefore assessed as endangered in the IUCN Red List of Threatened Species. Therefore, it is need of the hour to conserve the population of this species through artificial breeding, seed rearing and finally ranching into its natural habitats. But, the major bottleneck in successful seed rearing is unavailability of suitable larval diets. Hence, the Directorate of Coldwater Fisheries Research (ICAR), Bhimtal has taken sincere efforts and has developed and evaluated a nutritionally balanced micro particulate diet for larval rearing of golden mahseer. The Directorate has named this diet as "Nanhe mahseer".

Problems/difficulties associated with live food

Live food organisms have been considered as the most suitable feed for successful rearing of fish in their early larval stages, but there are many problems inherent to it. Some of the issues associated with live food include variable nutrient composition and availability, potential introduction of pathogens into the culture system. and the high costs of labour and infrastructure required for production which ultimately leads to higher cost of production. Also, the live food culture in coldwater region is proven to be a difficult task which requires sophisticated infrastructure that ultimately results in higher production costs.

Alternative to live food

Nutritionally complete, formulated diets are seen as attractive and valuable alternatives to live food. Reasons for difficulties in successful rearing the early stages of fish larvae on artificial diets are not specifically known but several factors are thought to play an important role. The main reason is that the digestive systems of larvae are usually not fully developed and may not possess sufficient digestive enzyme activity necessary for effective digestion of artificial diets.

In this backdrop, DCFR has extensively studied the ontogeny of digestive enzymes during larval development of golden mahseer to understand its digestive physiology. Based on the pattern of digestive enzyme activities during larval development, a suitable micro particulate diet (Nanhe mahseer) has been developed by supplementing exogenous digestive enzymes to substitute live food for larval rearing of golden mahseer.

Formulation of 'Nanhe mahseer'

Ingredients	% inclusion
Fish meal	15.0
Groundnut meal	15.0
Casein	10.0
Gelatin	03.0
Rice starch	08.0
Soy lecithin	03.0
Egg albumin powder	16.0
Wheat flour	12.0
Fish oil	08.0
Vitamin – mineral mix	05.0
Vitamin C	0.1
Betaine hydrochloride	0.25
Choline chloride	0.25
Sodium alginate	04.0
Digestive enzyme mix* (g/Kg)	2.0
Proximate composition (% dry matter basis)	
Moisture	8.47 0.92
Crude protein	40.76 0.71
Ether extract	8.50 0.57
Ash	11.80 0.27
Dry matter	91.53 0.93

Growth performance and survival

The evaluation of micro-particulate diet (MPD) was done in terms of growth performance and survival of golden mahseer larvae under five dietary regimes for two months. Five groups of golden mahseer larvae in the age of 15 days after hatching were fed with Artemia nauplii, macerated goat liver, micro-particulate diet without exogenous enzyme, MPD with 2.0g/kg exogenous enzyme and MPD with 4.0g/kg exogenous enzyme separately. The highest weight gain % (654%) and survival (97%) were observed in Artemia fed group. The comparable parallel weight gain % (550%) and survival (96%) were registered in the group fed with MPD with 2.0g/kg exogenous digestive enzyme mix. While in other groups, weight gain % and survival were significantly low. Hence, the micro-particulate diet supplemented with 2.0g/kg exogenous digestive enzyme mix was further perfected and named as nanhe mahseer.

The micro-particulate diet 'nanhe mahseer' will decrease our dependency on live feed and will help in development of cost-effective, reliable and easy hatchery production of golden mahseer seed. However, future research is still required to develop a suitable weaning diet for complete replacement of live food that is after hatching till 15 day.

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