CMFRI

Course Manual

Winter School on

Recent Advances in Breeding and Larviculture of Marine Finfish and Shellfish

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BROODSTOCK DEVELOPMENT, BREEDING AND LARVAL REARING OF SIGANUS CANALICULATUS

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Introduction

Rabbitfishes belong to the family Siganidae include a group of potentially important aquaculture species occurring in the indo pacific, Indian Ocean, Red sea and Eastern Mediterranean regions and are subtropical euryhaline herbivorous fishes. There are 27 species of siganids. In nature, they found in reefs among seagrass, mangroves and in shallow lagoons and algae form a major part of their food. *Siganus canaliculatus*, an important candidate for aquaculture, has been found to tolerate wide range of salinity (17- 37ppt) in its natural habitat. Though siganids are primarily herbivorous, under captivity the juveniles and adults show omnivorous feeding habits and will accept a variety of foodstuffs viz. vegetable and animal origin as well as pellet feed.

Fishes of this family are considered of economic importance for the fishery production in several countries and also in the Indo- pacific and Middle East region. Though culture is presently limited to a fewer areas, rabbitfishes attracted the attention of aquculturists in many countries mainly because their excellence as food fish, herbivores feeding habit, ability to feed on a variety of foods, availability of fry in large numbers in coastal waters during seasons, ability to tolerate changes in salinity and temperature, ability to adapt well in captivity and rapid growth on a diet of natural foods and artificial pellet feeds.

Broodstock management

Adult fishes were collected from wild and brought to hatchery for broodstock. The broodstock development and reared in round fibre glass tanks of 5 m^3 with in-situ biological filters. The salinity was maintained at 30-35 ppt and temperature ranged from 26 – 32^oC. The tank water was exchanged @ 20% on every two weeks with filtered seawater of same salinity and provided constant aeration. Feeding was done twice a day with minced fish and prawn meat, pellet feed fortified with HUFA rich fish oils and occasionally with seaweeds. *Ad libitum* Feeding was done for these fishes.

The natural spawning of brood fishes was observed in the average size of 150-250gms. As they are not year round spawners, the spawning is confined to a particular season in a year. Spawning at CMFRI hatchery was observed during November – February when the environmental temperature was low. Spawning always took place a few days before or after full/new moon. Apart from the natural spawning, induced spawning of these fishes using HCG and other inducing agents were also reported form other parts of the world.

Sex determination of these fishes is possible in mature spawners only. The males is said to have a slightly more elongated body than females. During the breeding season, the sexes can be easily distinguished as the males are generally smaller than females whereas the abdominal region of the females is more distinctly plump and enlarged than that of the male on account of the ripening ovary. The genital aperture of the female is more enlarged than that of the male for the free passage of the ripe eggs. When slight pressure is applied on the vent region, ripe, orange-colored eggs come out from the female and white milt from the male and the female is less active than male because of the weight of the ripe eggs.

Eggs are always found in the morning. In general, ripe eggs of siganids are transparent, colourless, spherical, demersal and adhesive and contain oil globules. They found attached to the sides and the bottom of the spawning tanks. The size of fertilized eggs was 630 – 700 microns in diameter. Because of the demersal and adhesive nature of eggs, it is difficult to collect the egg for incubation and also to estimate the egg fertilization and hatchability rate.

Larval rearing

The green water technique was employed for the larval rearing of these fishes. The hatched out larvae were collected from the tanks and reared in 1 t larval rearing tanks under roofing at a stocking density of 5 nos/L in greenwater system using *Nanochloropsis* sp. The length of newly hatched out larvae is 1.80mm and have relatively large yolk sac and float passively. After day 2, as the yolk sac deceases they become more mobile. The algal density in the rearing tanks is 2-5 $x10^5$ cells/ml. Larvae were fed with enriched rotifers from Day 1 onwards. The rotifer density in the larval rearing was maintained @ 5-10/ml. Everyday morning the bottom of the tank was siphoned out and 5-10% water was replaced with fresh seawater. The rotifer density was adjusted by adding fresh rotifers every day. *Nanochloropsis* sp. was added to the tanks everyday morning and evening at the required densities, to provide green water to the larvae and also as feed to rotifers.

The size of the larvae on day 2 was 2.87mm. The mouth size of the larvae at this time was 100-125µ. On 4^{th} day a slight reduction in the number of larvae was observed in all tanks. On 6^{th} day the larvae had grown to a size of 3.25mm and mouth size was increased to 150- 175µ. The gut content analysis of larvae revealed the presence of rotifers along with algae in the gut of the larvae. There was a gradual reduction in the number of larvae in the succeeding days. The surviving larvae were healthy and grown to bigger size. Large reduction in the number of larvae was observed during day 12 – 15. At this time larvae grown to size of 5-6 mm and were actively feeding on rotifers. On day 16, freshly hatched artemia were added to the tanks as feed to the larvae. On day 20-25 the larvae metamorphosed to juvenile fishes. In an experiment, copepods collected from wild were used as feed for larvae. Everyday live copepods were collected from mangrove areas using a 100µ mesh scoop nets and the collected copepods after washing were added to larval rearing tanks through a bigger sized mesh. The larvae reared under this method also showed good survival and compared to rotifer feeding, the survival was more (2%).

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