The formulated feed is sprinkled on the surface of the water in small amounts frequently at every 2-3 h throughout the day. Formulated feed is added in small amounts so that the feed is consumed within 5-10 minutes, as excess feed should not be allowed to accumulate on the bottom of the tank where it will get decomposed and degrade water quality. The size of particulate feed is increased to 400-800 µm from 300-450 DPH. High-quality micro feeds, specifically formulated for marine finfish, should be used and these should be stored in a refrigerator or freezer to maintain their quality. In addition, minced fresh fish meal is fed from 300 DPH.

The larvae metamorphoses after 30-35 days of culture. Regular grading of the larvae is carried out to avoid cannibalism. Juveniles of orange spotted grouper is harvested after 40-45 days of larval rearing and are shifted for nursery rearing. The average survival during the larval rearing is around 12%.

In addition, the pellet feed with 40% protein is also used for the grow out system. However, the acceptance for fish meat is better than pellet feed, and added to this the wastage is also more for pellet feed in cages. Food Conversion Ratio is 11.6 - 11.7 with pellet feed and 16.0 - 17.0 for low value fish. Net exchange is an important aspect for cage culture of fishes, and it is necessary to change the net once in 30-45 days as part of the best management practice in cage culture. However, based on the observation, the time can be decided for net exchange. The fish stocked at 15 g size grows to 250 g, 500 g, 750 g and 1000 g after 4 months, 6 months, 8 months and 12 months, respectively in cages. The cost of production estimated is ₹ 220/kg and the farmgate price realized is ₹ 350/kg.

Growth out culture

The growth potential of orange spotted grouper is studied by culturing the advanced fingerlings of the fish in sea cages. A 6 m dia floating HDPE cage is used for the culture. In general, advanced fingerling of approximately 10 cm (15 g) is an ideal size for stocking either in cage or pond for culture. The stocking density is 30 nos/m² in cages and 2500 nos/acre in ponds. Initially the fishes are stocked in the cage with 1 cm mesh size net and after reaching 100 g size fishes are transferred to cages with 2 cm mesh size nets and finally after reaching 500 g in size they are stocked in cages of 2.5-3.5 cm mesh net till harvest. During the culture in grow out, low value fish (sardine, scad, tilapia, etc) meat is considered as good feed.

Nursery rearing

The nursery rearing of orange spotted grouper is standardized with different feed and culture conditions. Pellet feed with 45% protein and 10% lipid is an ideal feed during the nursery rearing of orange spotted grouper. Fishes are fed 10% of the biomass for 3-4 times in a day. Nursery rearing is carried out in different systems such as RAS, hapa fixed in pond and cement tank. The stocking density is generally 300-1000 nos per m² depending upon the culture system. The RAS is stocked with 1000 nos/m² and the fish grows to a size of 38 g in 2 months with a growth rate of 6.35 g/day. Hapa in pond is stocked at 300-400 nos/m² and the fish grows to a size of 32 g in 2 months with a growth rate of 0.4 g/day. The cement tank is stocked at 100-200 nos/m² and the fish grows to a size of 36 g after 2 months with a growth rate of 0.26 g/day.
The orange-spotted grouper (Epinephelus coioides) is a popular carnivorous food fish with high market demand in many parts of the world such as China, Singapore, Thailand, Gulf countries, etc. It inhabits wide range of habitats including shallow reefs, lagoons, brackish water, over mud and rubble in depths to at least 30 m. Juveniles are commonly found in the shallow waters of estuaries over sand, mud, gravel and among mangroves. The culture of orange-spotted grouper in floating net cage and coastal pond is common in South East Asian countries. The advantages of orange-spotted grouper culture is its fast growth, ability to live in limited space, salinity tolerance and orange-spotted grouper in floating net cage and coastal pond is common in South East Asian countries. The advantages of orange-spotted grouper culture is its fast growth, ability to live in limited space, salinity tolerance and orange-spotted grouper in floating net cage and coastal pond is common in South East Asian countries. The advantages of orange-spotted grouper culture is its fast growth, ability to live in limited space, salinity tolerance and the rate of active filter feeding is very less (145-150 ppm) so they have to be provided with appropriate size of feed. Nannochloropsis sp. and Isochrysis sp. (31) is introduced into the larval-rearing tanks on 2nd day post-hatch (DPH) at algal cell density of 1.5 x 10^5 cells/ml. Copepod nauplii (3-5 nm) and rotifers filtered water is introduced into the larval-rearing tanks on 2nd DPH, after the larval mouth opening has been formed. The rotifer density in the larval-rearing tanks is maintained at 5-10 nos/ml during 2-5th DPH. After 5th DPH, small rotifers (filtered with 150 µm mesh) are introduced at densities of 100-200 nos/ml, which is gradually increased to 20 nos/ml from 11th to 18th DPH. Rotifer density gradually decreases with increase in the rate of rotifer consumption by the larvae and eventually by 30th DPH, the rotifers disappear in larval rearing tank. Freshly hatched out Artemia nauplii are fed at a density of 0.5 individual/ml from 18th DPH and their size increases with advancing rearing period. Adult copepods are fed during last 2-3 DPH in larval rearing. Artificial feed of 100-200 µm size is added in larval rearing tanks from 14th DPH onwards. Weaning of grouper larvae with artificial diet starts from 20th DPH with a particle size of 200-400 µm.

Broodstock development and spawning

Adult fishes (2-3 kg) collected from commercial catches are stocked in a circular tank of 125 m³ capacity fitted with a Re-circulating Aquaculture system (RAS). The tank is connected with different components of RAS such as rapid sand filter to remove suspended solids, protein skimmer to eliminate dissolved solids and biological filter to reduce biochemical waste. The whole tank water is getting recirculated around 100% per day, and the water is added at the rate of 3% to top up the loss happening due to protein skimmer and backwash of rapid sand filter. The newly hatched larvae are collected from the water surface of hatching tank and stocked in larval rearing tanks at 10 nos/l. Water depth of the larval rearing tanks is maintained at a minimum of 80 cm. Squid oil is added on the water surface of the larval rearing tank for initial 4.5 days at 0.2 ml/l. Longer duration of light (1000 lux) is provided during the initial period of larval rearing i.e. 2nd to 10th day and afterwards natural light regime is followed. The grouper larvae are aboral type larvae, which hatch out with undeveloped organs and structures and exhibit a more complicated development pattern. The yolk sac (endogenous source) continues as the sole source of nutrients for the developing larva immediately after hatching and up to 2-3 days. Then, the exogenous feeding starts when the mouth opens after 48-56 h depending upon temperature. Larval initial mouth gape is very less (145-150 µm) so they have to be provided with appropriate size of feed. Nannochloropsis sp. and Isochrysis sp. (31) is introduced into the larval-rearing tanks on 2nd day post-hatch (DPH) at algal cell density of 1.5 x 10^5 cells/ml. Copepod nauplii (2.3 nos/ml) and rotifers filtered with 150 µm mesh is introduced into the larval-rearing tanks on 2nd DPH, after the larval mouth opening has been formed. The rotifer density in the larval-rearing tanks is maintained at 5-10 nos/ml during 2-5th DPH. After 5th DPH, small rotifers (filtered with 150 µm mesh) are introduced at densities of 100-200 nos/ml, which is gradually increased to 20 nos/ml from 11th to 18th DPH. Rotifer density gradually decreases with increase in the rate of rotifer consumption by the larvae and eventually by 30th DPH, the rotifers disappear in larval rearing tank. Freshly hatched out Artemia nauplii are fed at a density of 0.5 individual/ml from 18th DPH and their size increases with advancing rearing period. Adult copepods are fed during last 2-3 DPH in larval rearing. Artificial feed of 100-200 µm size is added in larval rearing tanks from 14th DPH onwards. Weaning of grouper larvae with artificial diet starts from 20th DPH with a particle size of 200-400 µm.

Larviculture

The fishes are fed on fresh squid fortified with squid oil, vitamin - mineral pre-mix in a day till satiation. Passive integrated transponder (PTT) tagging is used for identification of individual brooder. Fifty percent of fishes are selected and implanted with 17 a methyl testosterone and letrozole at the rate of 5 mg and 0.2 mg/kg body weight,