

Breeding and Seed Production of the Mangrove Red Snapper

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In recent years, mangrove red snapper (*Lutjanus argentimaculatus*) aquaculture has become popular in Southeast Asia and Australia. As an important food fish, it commands a relatively high market price. Supply of seeds to farms, however, is still dependent on fry collected from the wild, which is limited, seasonal, and unpredictable and therefore, limits the sustainability of its aquaculture. Thus, a reliable breeding and seed production protocol must be developed to ensure consistent and good quality seed supply to support snapper aquaculture. We will outline research highlights on snapper breeding and seed production at the Southeast Asian Fisheries Development Center's Aquaculture Department.

Using standardized indices of female maturity (based on mean oocyte diameter of > 0.40 mm), time of injection (1000 – 1130), and sex ratio (1 female to 2 males), a single injection of 100 mg/kg body weight (BW) of luteinizing hormone-releasing hormone analogue (LHRHa) successfully induced spawning. Out of 16 trials, 62.50% had egg production and 43.75% had hatched larvae. Spawning was not observed at 50 mg/kg BW LHRHa. Similarly, spawning was also not observed at 500 IU/kg BW of human chorionic gonadotropin (hCG). However, doses of 1,000 and 1,500 IU/kg BW of hCG induced spawning. Higher success rates of egg (77.27 and 80.00%, respectively) and larval (72.73 and 60.00%,

respectively) production were obtained for 1,000 and 1,500 IU/kg BW hCG than LHRHa. Furthermore, 1,000 IU/kg BW hCG had a higher percentage (76.47%) of spawns with egg collection per spawn in excess of 1 million than those of 1,500 IU/kg BW hCG (41.67%) and 100 mg/kg BW LHRHa (30.00%).

When left undisturbed in concrete tanks (150-ton capacity) and floating cages (10-m diameter by 3 m deep), mangrove red snapper, spawned naturally from March-April to November-December in Central Philippines. About 0.05 – 6.35 million eggs were collected per spawn. Total egg collection in tanks (68 million) and cages (75 million) for 2 years was similar. Each tank or cage was stocked with 10-15 females and males. The percentage of egg viability (those with developing embryo 12 hours after spawning) from natural spawns (75%) was not different from induced spawns (64%) but natural spawns had higher hatching rates (69%) and percentage of normal larvae (69%) than those of induced spawns (45 and 40%, respectively). On the average, for every spawn, about 35% normal larvae can be produced from natural spawns compared to only 16% from induced spawns. Natural spawning followed a lunar periodicity. Most spawns were observed about three days before or after the last quarter and new moon.

Broodstock were given a practical diet (39% protein, 9% lipid) had higher total egg collection (82 million from 69 spawns) and mean number of eggs per spawn (1.21 million) than those fed raw fish (77 million from 66 spawns; 1.18 million eggs/spawn). Broodstock fed the practical diet had higher percentage of spawns (49%) with egg collection in excess of 1 million per spawn than that of broodstock fed raw fish (41%). Rates of egg viability, hatching and normal larvae of spawns from broodstock given formulated diet were similar to spawns of broodstock fed raw fish. However, survival activity index (4.08) of



Above: The mangrove red snapper

broodstock given formulated diet was higher than that of broodstock fed raw fish (2.97). This indicates that larvae of broodstock fed formulated diet survived longer under starvation than larvae of broodstock fed raw fish.

In the hatchery, wastes in the rearing tanks were siphoned every other day. Water exchange was 20-30% on day 2 to day 20, 50-70% on day 21 to day 35. The tanks were supplied with flow-through water from day 35 until harvest. Green water using *Chlorella* was provided to the tanks from day 2 to 35. Larvae were fed rotifers at 20 individuals/ml (day 2 to 20) and 10 individual/ml (day 21 to day 28), brine shrimp nauplii (day 21 to day 50), and minced raw fish (day 38 to day 55). Larvae were harvested on Day 55 but over-all survival rate is still below 1%.

Newly-hatched larvae reared in 3-ton tanks had higher survival rate (13%) after 21 days when stocked at 15,000 than at 30,000 (4%) or 45,000 (5%) per ton. Older larvae fed a mixed diet (50:50) of brine shrimp nauplii and artificial diet had best growth and survival than those fed brine shrimp nauplii alone or weaned to the larval diet at 10% reduction in brine shrimp nauplii. The results suggest that the formulated diet can replace brine shrimp nauplii for snapper larviculture. The formulated diet will be tested on earlier larvae to determine its suitability.



Gonadal biopsy of mangrove red snapper broodstock to check for sexual maturity prior to induced spawning



Mangrove red snapper broodstock in cage lined with fine mesh net to retain eggs. The net is lifted every morning to allow water exchange. Eggs are collected with a sweeper (right)