Spawning, Larval Rearing and Growth of the Silver Sillago in Abu Dhabi

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Silver sillago *Sillago sihama* (Fig. 1), a member of the family Sillaginidae, is distributed throughout the Indo-West Pacific Ocean, occurring from southern Africa to Australia, the Arabian Gulf, the Red Sea and Mediterranean Sea. It is found along shallow sandy and muddy inshore waters and mangrove creeks. It is a planktonivore that preys predominantly on diatoms, blue-green algae, dinoflagellates, polychaetes, a variety of crustaceans, mollusks and, to a lesser extent, echinoderms and fish. It burrows in the sand and mud in search of food and to escape from potential predators. In the United Arab Emirates (UAE), the fish is known as *hasoom* and it is a common species in local fish markets.

The fish is a gonochoristic species, reaching sexual maturity at 13-16 cm in length, corresponding to about 1 to ≥ 2 years of age. It has a protracted breeding season from June to February, with peaks of spawning activity from December to February. Females release several hundred thousand eggs, which are small spherical, pelagic and transparent. The onset of gametogenesis occurs during October and November (Mckay 1992, Carpenter 1997, MAF 2003, Khan *et al*. 2013, 2014).

FIGURE 1. *The silver sillago* Sillago *sihama, known locally in Abu Dhabi as hasoom.*

FIGURE 2. *Stocking silver sillago broodfish in a 40-m³ tank.*

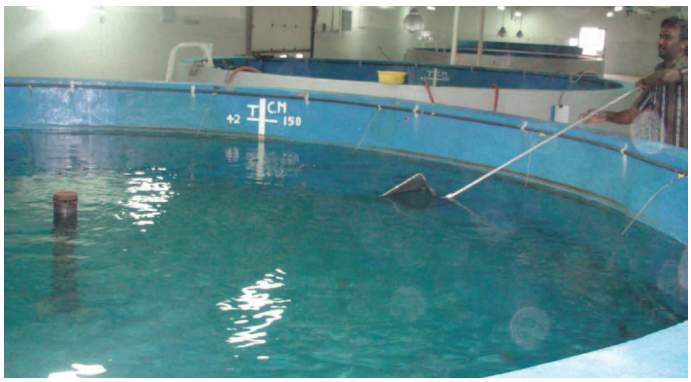

FIGURE 3. *Skimming floating eggs of silver sillago.*

The results of the first spawning, larval rearing and growing of this species in the UAE at the Aquaculture and Marine Studies Center (AMSC), Abu Al Abyad Island, Abu Dhabi are presented in this article.

Broodstock Management

Silver sillago breeders with an average length of 15 cm and average weight of 25 g were collected from the Al Hanyoorah area, northeast of Abu Dhabi and brought to the AMSC where they were dipped in freshwater for 2 min to control external parasites and then stocked in a 40-m³ concrete circular tank with 45 ppt seawater (Fig. 2). Fish were fed a diet of squid, sardines, shrimps and pelleted feed (52 percent crude protein).

Spawning, Incubation and Hatching

Natural spawning was first observed in January 2013. Subsequent to the first spawn, four more spawns were obtained until the end of February 2013. The total number of eggs was 192,000, of which 94 percent were fertilized. Eggs were small and spherical, averaging 714 µm (690-750 μm) in diameter. Fertilized eggs were buoyant and thus skimmed from the water surface with a 100-µm mesh dip net (Fig. 3), rinsed with fresh seawater, separated and counted with a graduated cylinder. The volumetric density of eggs was estimated at 2,400 eggs/mL. Fertilized eggs were transferred to 600-μm mesh incubation baskets at 4-5 eggs/mL. During incubation, water temperature ranged from 22-23 C. Eggs hatched within 26 h and the hatching rate was 56 percent (Fig. 4).

Larval Rearing and Grow-out

Newly hatched larvae, measuring 1.64 ± 0.16 mm, were transferred to 4-m³ larval rearing tanks (LRTs) at 25 larvae/L. In the first two days post-hatch (ph), larvae in all LRTs were held in

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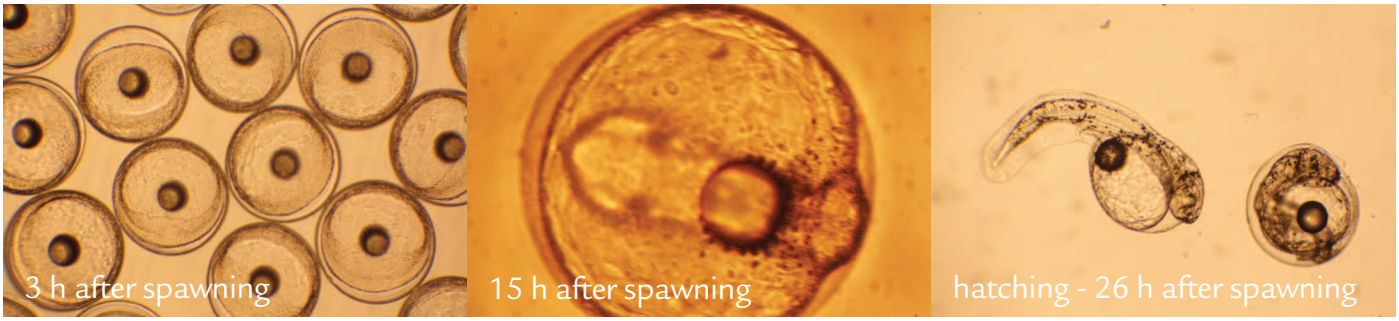

FIGURE 4. *Stocking silver sillago broodfish in a 40-m³ tank.*

FIGURE 5. *Collection of silver sillago fry.*

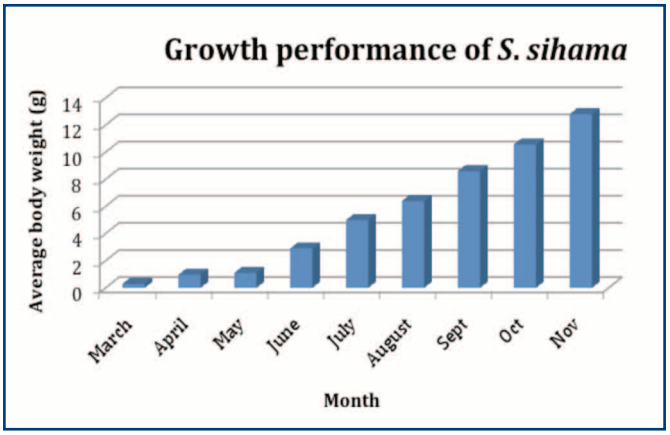

FIGURE 6. *Growth performance of silver sillago over 32 weeks.*

complete darkness by covering the tanks with green mesh sheets. On day 3 ph, the cover sheets were removed. In addition to the natural photoperiod, overhead fluorescent lighting was provided for 16 hours.

Algae (*Tetraselmis* and *Chlorella* spp.) were added daily until day 25 ph at 10 percent of each LRT water volume to maintain a density of 50,000-100,000 cells/mL. From day 2 to day 8 ph, copepod nauplii, collected from shrimp ponds with 150-µm filter mesh were provided to silver sillago larvae at ≤1 individual/ml. From day 2 to day 25 ph, rotifers *Brachionus rotundiformis* (66-150 µm) were added twice daily to maintain a density of 10-15 individuals/ml in the LRTs. Rotifers were enriched prior to feeding for 6-8 h with super HUFA (>45 percent ω3 fatty acids, >16 percent EPA, >30 percent DHA, >2.0 percent ARA). Because of the very small mouth opening, larvae were unable to consume rotifers and copepod nauplii at the onset of feeding and only algae cells were detected in the stomachs of larval silver sillago.

During rotifer feeding, water exchange was done only at night at 30-50 percent of LRT volume. From day 18 to day 40 ph, enriched *Artemia* nauplii with super HUFA were added to LRTs at 0.50-0.75 nauplii/mL. The addition of artificial feed (Love Larva) started on day 20 ph with the small feed size of 198 µm (57.4 percent crude protein, 12.4 percent fat) until day 30 ph. From day 28 until day 35 ph, artificial feed of medium size (308-476 µm; 58.4 percent crude protein, 14.0 percent fat) was added and, from day 32 to day 40 ph, the larger size artificial feed (680-1058 µm; 56.2 percent crude protein, 3.5 percent fat) was provided. From day 35 to day 50 ph, trash fish paste was served to larvae. After weaning, fry were collected through the drain pipe, counted, weighed and measured to the nearest mm (Fig. 5).

Overall larval survival was low (only 1.0 percent), mainly attributable to initial mortalities during the first week, probably due to lack of the proper size of prey for the silver sillago larvae to feed upon. In addition, one LRT was severely infected on day 38 ph with a parasitic protozoan *Cryptocaryon irritans*, resulting in a very low survival in that tank. The average body weight recorded was 180 ± 190 mg and the average body length was 2.60 ± 0.35 mm.

Collected fry were transferred immediately to a 40-m³ growing tank and grown further for 32 weeks. During this period, fish were fed with 0.3-0.9 mm feed (52 percent crude protein) at 5 percent body weight per day and fresh whole sardines placed at the bottom of the tank.

THE RESULTS OF THE PRESENT PRELIMINARY TRIAL CLEARLY INDICATE THAT SILVER SILLAGO COULD BE SUCCESSFULLY SPAWNED NATURALLY IN CAPTIVITY.

At harvest, the fish average body length was 13.6 cm and the average body weight was 12.8 g with an average daily body weight gain of 56.3 mg/d. (Fig. 6). The survival rate recorded at this phase was 87 percent.

Conclusion

The results of the present preliminary trial clearly indicate that silver sillago could be successfully spawned naturally in captivity. However, survival during larval rearing was very poor; therefore, future efforts to improve larviculture techniques are required. The grow-out results were not impressive and the fish required a long time to reach 12.8 g and hence their commercial viability as an aquaculture species is not promising. Nevertheless, the hatchery production of this species could serve to support restocking the depleted coastal areas around the Emirate of Abu Dhabi.

Notes

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