Rearing of Japanese Sardine from Hatching through Juveniles
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The yield of Japanese sardine Sardinops melanostictus, a major species of clupeids in Japan, is known to show a fluctuation annually.1) The biological knowledge of this species has been accumulated,2) but only a few reports described partly successful rearing of the larvae.1,3,4) Therefore, in this investigation we attempted to rear the Japanese sardine from hatching through the juvenile stage and to obtain some useful information for the propagation of the sardine.

Sardine Ae and Bc stage eggs1) were collected from the Pacific Ocean (31°20′N, 136°00′E), south of Cape Shionomisaki, Kii Peninsula, on February 13, 1990 by Soyo Maru (National Research Institute of Fisheries Science), and about 1500 eggs sorted from plankton samples were transferred to a 700l FRP rectangular indoor tank (1.2×1.2×0.7m) in the Fisheries Laboratory of Kinki University. The eggs and larvae were reared in a still-water system containing Nanochloropsis sp. (10^6 cells/ml of rearing water) with a slight aeration, up to 14 days post-hatching. Thereafter, filtered seawater was supplied at the rate of 3l/min. Water temperature was adjusted at 20°C until the 50th day after hatching and thereafter kept under natural conditions. Rearing water was not intentionally diluted with freshwater and its salinity in the experimental period was 22.7±0.53 (mean±SD). Coexisting L- and S-type rotifer Brachionus plicatilis were given to the larvae as a starter food from the 3rd day after the initial hatching was observed, maintaining the density at 5 ind./ml in rearing water. In turn, brine shrimp Artemia nauplii, red sea bream Pagrus major eggs and larvae, and a commercial artificial diet for red sea bream (prepared by Hayasikane Sangyou Co. Ltd.: moisture, 8.57%; crude protein, 57.2%; crude fat, 12.2%; ash, 9.26%; digestible carbohydrate, 4.37%; diameter, 140–410μm) were successfully given after two weeks post-hatching. Five to twelve fish were randomly sampled and their total length and body weight measured on days 2nd, 15th, 30th, 50th, 70th and 80th after hatching.

Hatching of the eggs was observed on both February 13 and 14. Fig. 1 shows the growth in terms of total length of the fish. The larvae grew linearly and they had transformed from post-larvae to juveniles within 50 days after hatching. The increment of total length fell slightly on day 50, and this might be related to the transformation. After this, the growth recovered and attained 86.8±5.07mm in total length and 4.53±1.54g in body weight (mean±SD, n=10) on day 80 after hatching.

Fig. 1. Changes in total length (mean±SD) of Japanese sardine, water temperature and specific gravity in the rearing period of 80 days after hatching.

This is the first report that demonstrates the successful rearing of the Japanese sardine from hatching through juveniles. Nakai reported that sardine egg and larval survival maintained higher under diluted seawater (1/4 and 1/2) than under natural seawater.1) Matsuoka and Mitani3) also indicated that 17-day-old larvae after hatching attained 9.9mm in the mean total length. In the present experiment, 116 juvenile survived on day 80 after hatching, and the percent survival from the eggs were found to be 7.7% despite the rearing in natural seawater. Moreover, mean total length already reached 16.2mm on day 15. The reasons for obtaining these relatively higher survival and growth were not clear, but the size of rearing tank and rearing temperature seem to have been potential factors: 700l and 20.0°C in the present study, whereas only 1 or 5l beaker and 17.8°C in the previous study.3)

The more extensive prolongation of the rearing span is definitely required in obtaining detailed information on the growth, maturation and reproductive cycle. With this in mind, further rearing to the juvenile sardines is now in progress.

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References

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