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Short communication

Using hanging plastic trays for three-dimensional collection of antique mactra (*Mactra antiquata*) spat

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Abstract

This paper describes the first case of using hanging plastic tray for three-dimensional collection of the spat in the hatchery production of antique mactra. Different numbers of clusters (72, 90, 108) of plastic trays loaded with fine sand were hung in three tanks for three-dimensional collection of antique mactra, while the other two tanks without hanging plastic trays were controls. There was a higher survival rate in the tanks with hanging plastic trays than the controls and there was significantly increasing the survival rate of the spat as the numbers of clusters of plastic trays increased. At the end of the experiment, in the tank with most numbers of clusters of hanging plastic trays the survival spats was almost 2.6 times of that in the controls. In the early stage of the experiment there was significantly faster growth of the spat in the tank with hanging plastic trays than the controls. However, at the end of the experiment, there was significantly shorter shell length of the spat in the tank with most numbers of clusters of hanging plastic trays, and there was no significant difference in the shell length of the spat among the others tank.

Keywords: Three-dimensional; Collection; Hanging; Plastic tray; Antique mactra; *Mactra antiquata*

1. Introduction

Antique mactra (*Mactra antiquata* Spengler or *Coelomactra antiquata* Spengler) is mainly distributed in Indochina, China, Japan and Korea (Yang et al., 1990). Antique mactra, which inhabit in sand bed is one of the most important economic bivalve. A preliminary research on hatchery production for the antique mactra was started in 1959 in China (Chen et al., 1966). In the hatchery production, it used to use fine sand as settlement substratum for antique mactra pediveligers (Wu et al., 2003). Unlike the other settlement substrata such as shell, plastic board or rope could be easy to be hung for three-dimensional collection of the other bivalve, the sand used to be laid on the bottom of settling tank, so the area which accommodated to the pediveligers to settle was only the base area of the settling tank. This collection way was not fully used the capacity of rearing water for the deep rearing tank, therefore the yield of seed of per water volume was reversely lower. For increasing the settling area to increase yield of antique mactra spat, it needs to research on three-dimensional collection of the antique mactra.

In China, in the first case of research on three-dimensional collection of antique mactra spat, the hanging plastic board generally used for settlement substratum of pearl oyster was chosen to be the collector (Chen et al., 1999). Although the quantity of the spat collection was higher, the plastic board was not suitable

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settlement substratum for the spats which shell-length was over 500 μm (Chen et al., 1999). Liu researched on three-dimensional collection of antique mactra by plastic trays in 2000. Different plastic trays loaded with fine sand, coarse sand, ooze or nothing was put on different shelves to distribute in three water layers in one tank for collection the spat (Liu et al., 2002a). The survival rate of the spat on the plastic trays loaded with fine sand was the highest and the survival rate of the spat on the plastic trays loaded with nothing was the lowest. It was proved that plastic tray loaded with fine sand was suitable substratum for the spat.

This study was conducted to determine three-dimensional collection of antique mactra spat by using hanging plastic trays loaded with sand. It is expected that the result would assist three-dimensional collection of antique mactra in a commercial scale and the way of spat collection could be applied to the collection of bivalve that inhabit in sand or mud.

2. Materials and methods

The experiment was carried out in Huilai Zishen Hatchery, Jieyang City, Guangdong Province, from May to July 2003 and the repeat of experiment was carried out from June to August 2004. During the experiment, sand-filtered seawater was used. Experiment water conditions were temperature 25.0–27.2 °C, salinity 31.8–34.6 and pH 8.1–8.4. Water level in the rearing tanks was maintained at a depth of 1.6 m and constant weak aeration was adopted.

The experiment was carried out with a line of 5 concrete rearing tanks (No. 1 to No. 5) that were the same size. Each is 6 m long, 4 m wide and a depth of 1.8 m. On the top of the tanks and along the width of the tanks, nine parallel steel cables which had the same interval (60 cm) were set for hanging clusters of plastic tray. Per cluster of plastic trays was composed of three plastic trays. The size of the plastic tray is 40 cm long, 30 cm wide and 2 cm deep. Each plastic tray was drilled four holes at tray rim of four corners. To form a cluster of plastic trays, three plastic trays were connected by four plastic cords through four holes of each tray and made each tray interval 25 cm by tying the cord. The four plastic cords were divided into two groups in the top and two cords of each group were tied and connected a sling dog. The distance between the sling dog and the upper plastic tray was 95 cm. A cluster of plastic trays could be stably hung in the tank through two sling dogs hooking the steel cable (Fig. 1). The seashore sand as settlement substrates was sieved with a 120 μm mesh, washed with fresh water and exposed to sunlight for more than 5 days. Before the experiment, the sand was disinfected with 5 $mg \cdot l^{-1}$ $KMnO_4$ and washed with sand-filtered seawater.

Larvae of antique mactra were obtained by inducing the ripe broodstock to spawn after 5 h exposure to air. The newly hatched straight hinge larvae were raised at a density of 2–3 larvae/ml. After 9 days of rearing, most larvae shell length were around 247 μm and showed a rod-shaped podium for settlement. These larvae were ready for the experiment.

The bottoms of the five experimental tanks were covered by a layer of sand before the larvae were transferred into the tanks. The larvae of each tank were raised at a same density of 0.1 larva/ml at the beginning of the experiment.

Different numbers of clusters of plastic trays loaded with sand were hung in tank 1, tank 2, and tank 3 while

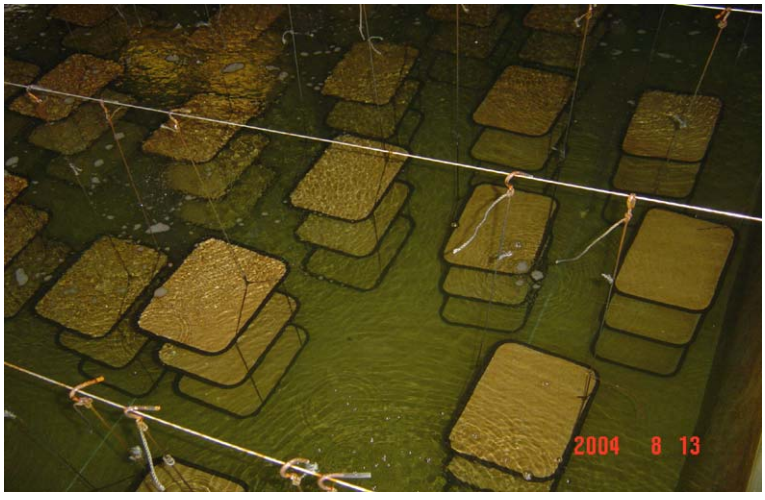

Fig. 1. Hanging plastic trays loaded with fine sand for three-dimensional collection of antique mactra.