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Health & Welfare

Larviculture of the West Indian pointed venus

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Studies of culture densities relevant to restocking efforts and aquaculture development

The West Indian pointed venus (*Anomalocardia brasiliana*), is an important seafood resource in northeastern Brazil and elsewhere in its geographic distribution.

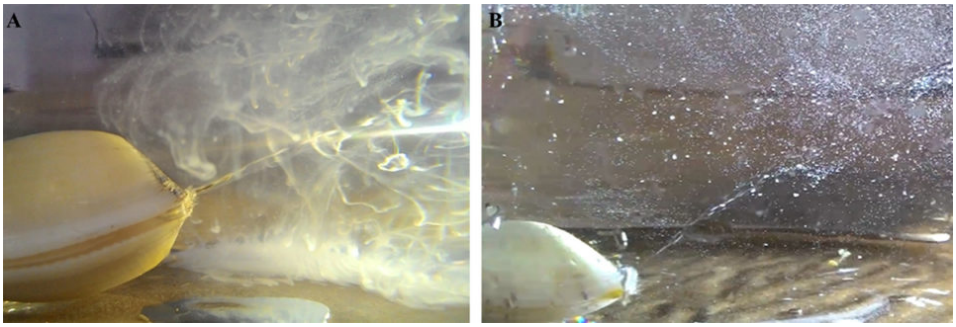
The farming of mollusks is an important component of aquaculture around the world, but the viable culture of many valuable species still faces various obstacles, including the lack of proper methodologies for domesticating native species.

The West Indian pointed venus (*Anomalocardia brasiliana*) is a fishing resource of great importance for Brazilian fisheries. This bivalve mollusk occurs naturally in shallow waters, particularly in mangrove lagoons, and is found in the intertidal zone down to a depth of 1.5 meters, where it buries in muddy bottoms. Adults typically settle in with fine or coarse sand areas where environmental conditions are harsher during low tides.

The fisheries of *A. brasiliana* are based on extraction in natural banks by inhabitants of coastal communities, and uncontrolled exploitation and environmental degradation can compromise its populations. In the state of Pernambuco in northeast Brazil, the traditional communities that capture the species have reported a reduction in the size of individuals harvested, even though there are no recent data on production or fishing in the state.

Such declines in the natural bank populations of bivalve molluscs throughout the world have provided the incentive for studies on their larviculture, because the production of juveniles in hatcheries and laboratories is an alternative to mitigate and supply seedstock to help support the extractive demand on natural stocks and for the development of mariculture operations.

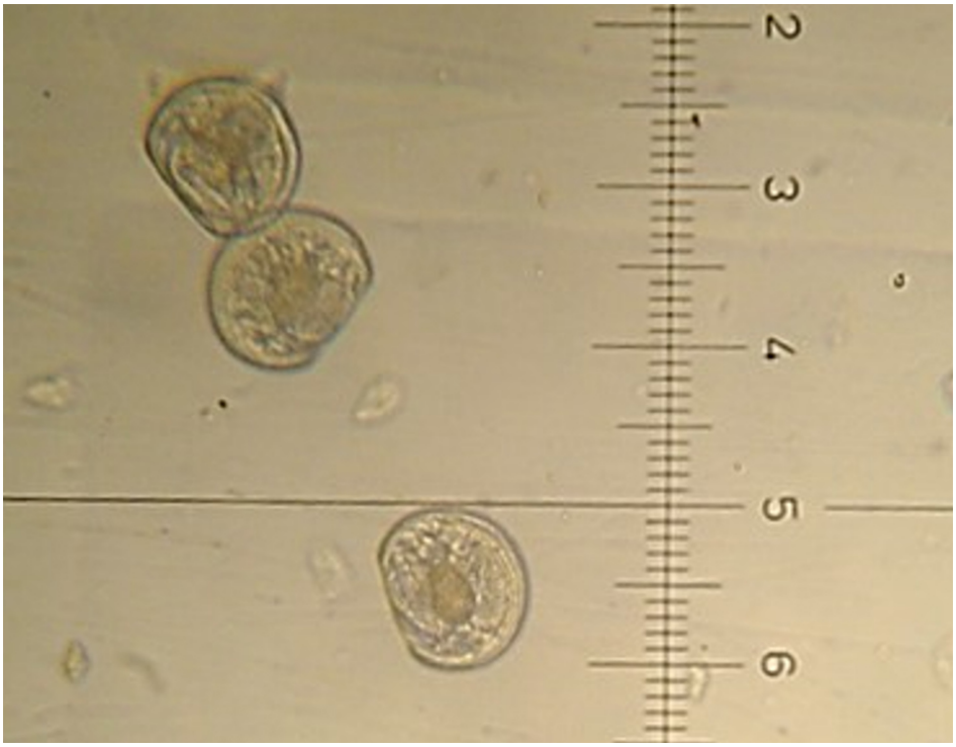
We are studying the reproductive development of *A. brasiliana* in closed systems at the Sustainable Mariculture Laboratory of the Fisheries and Aquaculture Department, Federal Rural University of Pernambuco in northeastern Brazil, and here report on some of our results developing larviculture methods for this species.



Spawning of *A. brasiliana* males (A) and females (B) after induction for gametes release by addition of microalgae (200,000 cells/mL) and temperature manipulation.

Study of veliger stage development

In the first experiment, the effect of stocking densities (2, 6 and 10 larvae/mL) on veliger larvae was evaluated. The animals were fed microalgae – *Chaetoceros calcitrans* and *Isochrysis galbana* – at a 1:1 ratio and concentrations of 30,000 cells/mL. The larvae used in the first experiment had an initial length of (88.76 ± 3.75 mm; see image below), and were cultured for seven days, when the morphological differentiations of metamorphosis begin.

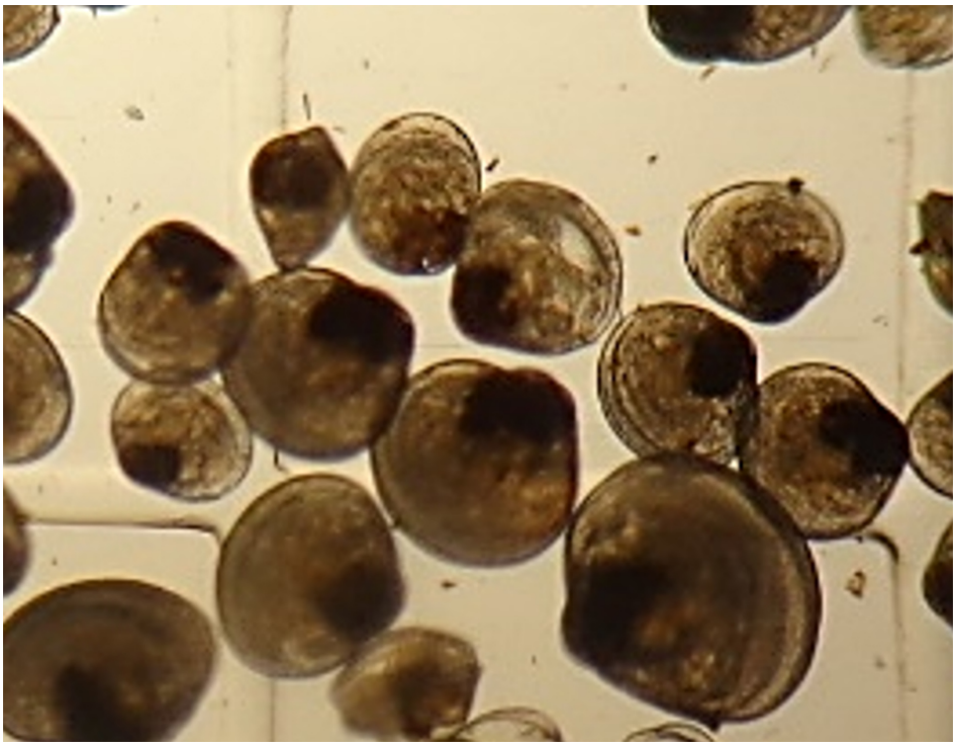


A. brasiliana D-larvae cultured in the first test for seven days at different stocking densities.

Study of post-larvae development

We evaluated the effect of stocking density on the growth and survival of *A. brasiliana* post-larvae (at 15 days of age; see image below). Three densities were evaluated: 40, 80 and 160 post-larvae per cubic centimeter. The specimens (307.89 ± 50.92 mm in average length) were fed two microalgae – *C. calcitrans* and *Palvova lutheri* –at a 1:1 ratio and a different algal concentration in each larval stage. This experiment lasted 28 days.

In both experiments, proper management ensured that the water quality parameters were within optimal ranges.



A. brasiliana post-larvae after 15 days of culture during the second test at different stocking densities.

Results

In the first test, the survival of *A. brasiliana* veliger larvae was higher using the densities 2 and 6 larvae/mL (Fig. 1). At the end of the experiment, the treatments with 2 and 6 larvae/mL had the best results of survival and growth, 55.91 percent and 166.80 µm, and 65.55 percent and 155.95 µm, respectively. They differed significantly from the treatment with 10 larvae/mL, both in survival and in growth. After seven days, the animals cultured at the densities of 2 and 6 larvae/mL grew from 88.76 mm to about 160 mm of length.

Fig. 1: Larval survival ratio – with mean and standard deviation – after seven days at different stocking densities.

In the second experiment, post-larvae at densities of 40 and 80 animals per cubic centimetershowed similar survivals, about 53 percent (Fig. 2). However, post-larvae cultured at a density of 40 animals per cubic centimeter had a significantly larger length (1249.77 ± 27.08 µm). Post-larvae cultured at the highest stocking density (160 post-larvae per cubic centimeter) had lower average lengths of 791.21 µm ($p < 0.05$) by day 28 of the experiment.

Fig. 2: Larval survival of A. brasiliana after 28 days of culture and at different stocking densities. Means with different characters differ significantly ($p < 0.05$).

Because no differences in length were observed during the first 21 days of culture at the three densities tested, we suggest the use of the highest density (160 post-larvae per cubic centimeter) up to 21 days, and then reducing the culture density to 40 post-larvae per cubic centimeter until animals reach the desirable length.

Research supporting the restocking of natural populations as well as the development of mariculture of the West Indian pointed venus is an important initiative.

Perspectives

Our results show that density interferes in the development of larvae and post-larvae of *A. brasiliana* grown in a static system. We can conclude that the density for veliger larvae should be 6 larvae/mL and 160 post-larvae per cubic centimeter after settlement. This density can be used until the

post-larvae reach 600 µm in length, then they should be in density of 40 post-larvae per cubic centimeter.

These results are very relevant to restocking efforts to support the extractive fisheries from natural banks and also for the development of aquaculture of *A. brasiliana.*

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