Evaluation of the Sunray Venus Clam *Macrocallista nimbosa* for Aquaculture in Florida

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Florida bivalve aquaculture production: $0.4M in 1987, $18M in 2001, $10M in 2005

Based “solely” on hard clam

Diversifying product line may avoid economic, marketing, and disease problems

Different species have been examined (e.g. angel wing, bay scallops, ark clams)

New species: Sunray Venus
Background

- Attractive large (up to 6”SL) clam distributed from SC to FL
- Targeted species for commercial harvest in 1960s along west coast
- Harvest halted due to spotty distribution, limited fishing grounds
- Natural growth rate experiments suggested fats grower
  - (3”, 40 g in 12 months)

Shell pile at Apalachicola processing plant
Photo courtesy of Florida State Archives
Objective

- Utilize current hard clam methods as a starting point to:
  1) Identify spawning methods
  2) Establish hatchery protocols
  3) Examine nursery culture
  4) Grow a test group
  5) Test market acceptance
Broodstock

130 mm (5”) SL
Broodstock

Wet Shipping

Dry Shipping
Broodstock

1:1 sex ratio

< 10% mortality after 1 week
Spawning

Thermal Shock - (increase 10°C)
Dissected sperm addition
Serotonin injection - (0.4 mL 2mM)
Larvae Culture

- Egg
- 2-cell
- 4-cell
- D-stage
Larval Growth

Survival: 13 Oct: - 13% ??, 10 Nov HBOI – 88%, 10 Nov UF – 85%
Larval Culture

Umbo Pediveliger

30-d 60-d
Post-Set Culture

No Substrate
Aragonite (0.5-1.0 mm)
Sand (<0.5mm)
Post-Set Culture

• First Exp: (n=1)
  Sand: 100%
  Aragonite: 71%
  No Substrate: 49%
  Total: 32,000 juveniles
  63% return

• Second Exp: (n=3)
  Sand: 58%
  No Substrate: 35%
  Total: 454,000 juveniles
  46% return
Feed Experiment

- Triplicate 4-L beakers
- 24 clams/beaker (42±3 mg/clam)
- Fed T-Iso, twice/day (0, 50, 100, 200K cells/mL)
- Salinity ~30 ppt
  Temp 73-84°F
Feed Experiment

Sunray Total Growth Fed
Different Concentrations of Microalgae

Weight (mg)

Time (week)

0  50  100  200

0  1  2  3  4
Feed Experiment

Sunray Total Growth (%) Fed Different Concentrations of Microalgae

Weight Change (%) vs Time (week)

- 0
- 50
- 100
- 200
Land-based Nursery

37/mL at 17,200/m² (1600/ft²)
Land-based Nursery (4 months)

20.4 ± 2.1mm (1.1 ± 0.3g)

12.0 ± 1.3mm (0.3 ± 0.1g)
Land-based Nursery

118,000 seed available for field nursery trials
Field Nursery – Bottom Bags

Nursery bags (3’ by 4’) made of 4 mm polyester mesh material

Stocked at densities of 332 – 554/ft²
Nursery periods of 78 – 128 days
Nursery cages (3’ x 1.5’ x 6” deep) constructed of wire and lined with 4 mm polyester mesh material.

Stocked at densities of 100 – 375/ft²

Nursery periods of 42 – 119 days
# Field Nursery Results

<table>
<thead>
<tr>
<th>Site*</th>
<th>Sieve (mm)</th>
<th>System</th>
<th>Density** (#/ft²)</th>
<th>Survival (%)</th>
<th>Growth (mm/month)</th>
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</tbody>
</table>

* AH – Alligator Harbor, CK – Cedar Key
** Density of 4’ x 4’ nursery bag stocked at 10,000 hard clams = 625/ft²
Field Nursery Results

Approximately 75,000 juveniles (22-28 mm SL) nursed for growout trials during June – December 2007
Growout bags (4’ x 4’) made of 9 mm polyester mesh material

Growout bags (4’ x 4’) made of 9 mm polyester mesh material with internal 1”- and 1 ½”-PVC pipe frames, covered with plastic netting

Several growout systems being evaluated
Growout

Growout cages (3’ x 3’ x 6” deep’) constructed of wire and lined with 9 mm polyester mesh material

Several growout systems being evaluated

Bottom plant (4’ x 8’) covered with 9 mm polyester mesh material and chicken wire
Growout

Evaluating stocking densities* ranging from 38 to 70/ft²

* Hard clams planted at 1200 per 4’ x 4’ bag = 75/ft²
Growout

Measuring at intervals the following parameters:

- Growth – SL, SW, SH, weight, meat weight
- Survival
- Condition Index
- Histology
Summary

• Sunray Venus clams were successfully:
  • Collected and transported broodstock
  • Spawned for first time under controlled conditions in hatchery
  • Cultured through setting, land-based and field nursery
  • Methods similar to hard clam
  • Growout to “marketable-size” proceeding
What’s Next?

- Harvest test plants
- Determine shelf life
- Evaluate “grit” pocket and “degritting” methods
- Test market acceptance
  - Chefs
  - Restaurants
  - Sushi market sector
- Determine salinity and temperature preferences for seed sizes
- Characterize economics
Sunray Venus Clams!
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