AUTHORS

with assistants:

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Evaluating the Co-Culture of Oysters and Urchins in Maine Aquaculture



This project explores the potential benefits of co-culturing green sea urchins (Strongylocentrotus droebachiensis) with oysters (Crassostrea virginica) as a strategy to improve farm productivity through biofouling mitigation.



01. Introduction

Urchins are natural grazers of biofouling organisms, which significantly impact oyster farm labor and gear maintenance. By integrating urchins into oyster grow-out systems, farmers may reduce biofouling, enhance oyster growth, and cultivate urchins as a secondary market crop. The study investigates survivorship and growth under varying environmental conditions (temperature, salinity, gear type), aiming to identify whether polyculture can improve outcomes for both species while promoting a more resilient, diversified aquaculture model.

02. Objective

To evaluate whether coculturing oysters and green sea urchins improves growth, survival, and biofouling control under varying environmental conditions and gear types.



03. Methodology

- Two farm sites were used differing in temperature and salinity.
- Two gear types were tested at each site: surface cages and bottom cages
- Each site trialed 36 mesh grow-out bags (9mm), stocked with: ~2 liters of 1.5–2" oysters and 2 green sea urchins (~1.5" wide)
- Growth period ran from July 12 to November 18; winter survival was assessed the following April.
- Weekly sampling recorded oyster and urchin growth, environmental conditions (temperature and salinity) using HOBO loggers and handheld tools.
- Biofouling was photographed and assessed at final harvest. Bags were categorized by oyster mortality and condition.
- Overwintering was performed by sinking cages; spring recovery included survival assessment and further observations.

04. Results/Findings

- Co-culturing did not negatively impact survival, indicating biological compatibility between oysters and urchins.
- Oysters grown without urchins (and regularly flipped) outperformed co-cultured oysters in growth, suggesting that traditional biofouling control methods remain more effective.
- Urchins were unable to keep up with the level of biofouling, especially during a season with high sea squirt abundance.
- Gear maintenance limitations (no sun-drying with urchins present) reduced farming efficiency and increased labor.
- Urchins did not grow significantly, likely due to limited available food in grow-out bags.
- Environmental factors such as warmer, shallower waters (inner site) supported slightly better oyster growth, aligning with known optimal conditions.
- Overall, co-culture is biologically feasible but not yet practical without redesigning gear or adjusting management practices.

Urchin Survival

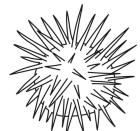
Urchins survived a range of conditions at the two locations tested: LGRA316 and CIPL. With no additional food source, they grew an average of 1" in 9mm mesh bags stocked with 1.5-2" oysters. At the end of the season, they were overwintered on bottom from Dec.-April. and were recovered with very low mortality rates in spring.

Temperature

ht 63.4 F

Gear Type

bottom & surface



Salinity
28-44 ppt
Overwintering
5 months

06. Conclusion

While oysters and urchins can successfully be cocultured with high survival rates, urchins did not significantly reduce biofouling or improve oyster growth in surface or bottom gear containing 9mm bags. Future trials should explore alternative gear configurations or bottom-only culture to enhance practical viability.



