
Improving Pearl Quality by Grafting Technologies and Husbandry Methods for Development of a Hatchery- Based Black Pearl Industry in Pohnpei, the Federated States of Micronesia, Year 1

General Information

<i>Reporting Period</i>	July 1, 2007–September 30, 2007
<i>Funding Level</i>	\$47,100
<i>Participants</i>	Masahiro Ito , Director and Chief Scientist Aquaculture Development, College of Micronesia Land Grant Program Fumio Ike, Master Grafting Technician

Objectives

The overall goal of this project is to find a simple and economical way of improving pearl quality and husbandry methods, always considered crucial issues for commercial pearl farming. The proposed project aims to conduct experiments based on simple designs so that the results could be applied immediately for research as well as ongoing farming activities in Micronesia and other countries.

1. Improve roundness rate by grafting techniques. (Year 1)
2. Reduce flaws by grafting techniques and husbandry methods. (Years 1 and 2)
3. Improve host survivorship by husbandry methods. (Years 1 and 2)
4. Transfer pearl aquaculture technology immediately to Micronesia and other regions. (Years 1 and 2)

Anticipated Benefits

The proposed Year 1 work goes toward understanding the mechanisms of flaw formation, particularly the so-called “circle” and/or “spot” marks, which are commonly found in a significantly large proportion (i.e., 60–95%) of total pearl production in black pearl farming. Pearl production has depended heavily on the performance of a grafting technician who decides, for example, which oysters to re-graft for “seconds.” To date, so many oysters used in a first grafting typically have been wasted without further pearl production. Some 40–50% oysters do not produce a pearl after their first grafting. An additional 50–70% of oysters from a first grafting are usually discarded before a re-grafting attempt, as they produced pearls with flaws, particularly “circles” or “spots”, and irregular shapes. This inefficiency has been a bottleneck for farm profitability.

Thus, this project’s experiments on pearl quality assessment conducted through new grafting and re-grafting operations will directly benefit the existing pearl industry by providing a scientific basis to farm management practices. These experiments are called the “circle test” and “FNC test,” with FNC standing for fibronectine-coated nuclei.

Furthermore, there is a paucity of information on significant quality improvements, such as increases in roundness and flaw reduction, made by on-farm experimental approaches. This project’s experiments are based on simple designs, so that existing industry can immediately adopt discoveries and improve their techniques, skill, and performance regarding pre-grafting preparation (conditioning), post-grafting nuclei retention rate, and survival rate of hosts, as well as pearl production success rates.

Work Progress and Principal Accomplishments

Objective 1. Improve roundness rate by grafting techniques.

Mr. Fumio Ike, a master grafting technician, arrived in Pohnpei on July 9, 2007, and completed his work on August 16, 2007.

1. Approximately 3,000 oysters previously grafted in 2005 and 2006 were harvested, which included 260 oysters for re-grafting for “circle test” in 2006.

2. New grafting experiments were conducted in August 2007 for FNC test and involved both fibronectine-coated nuclei and “non-FNC” or nuclei that were not chemically coated. A total of 1,200 each of S7 and S10 groups were used for these experiments, or 300 oysters each with duplicate. S7 used nucleus size 2.3 (FNC and non-FNC) and S10 used size 2.0 (FNC and non-FNC). Data collection of the post-grafting survivorship is ongoing bimonthly after the grafting operation at Pakin Atoll.

Objective 2. Reduce flaws by grafting techniques and husbandry methods.

1. To collect preliminary data on the circle test, 260 oysters were harvested, and an additional 240 oysters regrafted for “irregular test” in 2006 were also harvested.
2. Among oysters that produced “circled pearls,” a total of 600 oysters were used for the circle test regrafting experiments. The nuclei used for the experiment ranged from size 2.7-Bu (8.18 mm in diameter) to 4.3-Bu (13.03 mm in diameter). The size of nuclei was selected randomly, but size suitability was based on the master grafting technician’s on-site decisions. Regrafted oysters were divided randomly into two 300-oyster groups, making two replicates.
3. New grafting was conducted to examine the effect of host age on pearl quality, using 1,200 oysters each of S7 and S10, and the nucleus size 2.0-Bu (6.06 mm) and size 2.3-Bu (6.96 mm). The host age of S7 and S10 was 42 months and 33 months, respectively. S13 (20-month-old) oysters were not used for this year’s work (non-FNC with size 2.0 nucleus) because of the master technician’s on-site decision. The S13 oysters were not well developed in the soft body area for nucleus implantation. Accordingly, the experiments were carried out with S7 and S10 groups, including 1,200 S7 instead of the proposed 600 oysters and 1,200 S10 instead of the 1,800 planned in the proposed schedule. The S13 group will be used for the Year 2 experiments.
4. Two different types of nuclei (FNC and non-FNC) with two different sizes (6.06 mm and 6.96 mm) nuclei were used for FNC tests. The size 2.3 nuclei were implanted in the S7 groups and the size 2.0 nuclei were used with the S10 groups. For each size, two groups of 300 oysters, two replicates, were used for these experiments.

Objective 3. Improve host survivorship by husbandry methods.

Bimonthly data collection and farm maintenance work began in mid-October and the experiments are ongoing.

Objective 4. Transfer pearl aquaculture technology immediately to the Micronesian and other regions.

Data collection for and analysis of experiments has just begun.

Work Planned

1. Preliminary results of circle test obtained during the July 2007 harvest will be analyzed and disseminated through the *CTSA Regional Notes* newsletter.
2. Bimonthly data collection of post-husbandry survivorship and farm maintenance work will continue and, therefore, the results will be obtained during the 2008 harvest and grafting operations.
3. Results of circle test and FNC tests from Year 1 experiments will be obtained during the Year 2 harvest and grafting operations.
4. Pre-grafting conditioning will commence from two months before the proposed Year 2 experiments, probably in May 2008.
5. Year 2 experiments are scheduled to begin in July 2008, including harvesting and regrafting operations.

Impacts

As of September 30, 2007, the Year 1 experiments are still in progress, and we are in the process of our analysis of the data collected in July 2007 from preliminary circle test in 2006–2007. Although the full impact of the proposed project is yet to be described, the preliminary circle test” in 2006–2007 is showing that some oysters that produced “circled pearls” can produce “round pearls” or “pearls with reduced circle marks.” A quality assessment of those pearls has yet to be conducted.

Publications in Print, Manuscripts, and Papers Presented

No publication as of September 30, 2007.