PACIFIC OYSTER SEED PRODUCTION (CRASSOSTREA GIGAS)

D. B. Quayle

Fisheries Research Board of Canada, Biological Station
Nanaimo, British Columbia

Abstract

Procurement of seed oysters (Crassostrea gigas) needed to sustain the Pacific oyster industry in the Pacific northwest is described. The two main sources together with the type of seed and cultch from each are compared.

Utilization of Oyster Seed

Supply of seed for the Pacific oyster industry has not been a very serious problem in the past. The increasing cost of seed, materials and labour relative to the unchanging price of market oysters requires a serious review of supply and utilization of seed oysters.

In discussions of seed oysters one significant point is often overlooked, and this is compatibility of the seed and the culture for which it is intended.

There is an almost infinite number of types of oyster culture although it is an exaggeration to apply the term "culture" to many current methods of growing oysters. In some cases the culture is adapted to the type of seed; in others, the seed is adapted to the type of culture. Contrasted to variations possible in seed, ecological factors that characterize a given oyster bottom are relatively fixed. Seed is more easily adapted to the method of culture than the reverse. The type of cultch, and therefore seed, may be varied to fit the culture.

Pacific-Oyster Seed

Japanese Seed. Pacific-oyster breeding in the Pacific Northwest was originally quite erratic. Consequently the industry came to rely on annual imports of Japanese seed that was collected especially for this export trade. The spat were of quite uniform size and age. This permitted individual year classes to be grown as a unit, so at harvest the oysters were relatively uniform in size and quality. Separate growing and breeding areas on the West Coast assist in developing this type of uniformity.

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Except for the war years, the relatively stable supply of Japanese seed and continued low cost created little incentive to develop alternatives, although dependence of the industry on a single source is hazardous. In addition, Japanese producers have been willing to change the type of seed according to the wishes of U. S. growers.

Scallop shells were used initially but found to be unsatisfactory. Subsequently whole oyster shell ("unbroken") became the standard cultch, then broken oyster shell, which gave both a greater number of spat and of cultch pieces per case. Increased spat count, in addition to the concept that smaller clusters would not require separation, has made broken oyster shell a very popular form of seed. The industry failed to appreciate that smaller pieces of cultch led to increased mortality from silting and that there were just as many clusters requiring separation. On the average, the industry received little advantage from the more costly broken seed, with standard methods of culture. Broken seed would have had definite advantages and benefits if the culture had been adapted to the new form of seed by placing it on ground to which it was suited. Instead, a very considerable part of each year's seed was literally buried in the bottom.

The most recent change has been the development of high-count seed, where spat count per case was tripled over unbroken seed and nearly doubled over broken. High-count seed may be obtained only by making the pieces of mother shell smaller or by increasing the spat count, the former being the most important method. The result of this move was a further increase in silting mortality, again because cultural techniques were not adapted to the new type of seed. On the basis of experiments on seed with quite high counts (50-100 thousand per case), mortality was about 90% between planting and marketing, although absolute survival was greater than with standard broken seed under slightly better than average bottom conditions. Only because of the unique price structure of Japanese seed has it been profitable to use high-count seed.

Local Seed. The alternative to the Japanese supply is locally-produced seed. Several factors have militated against its greater use in the past. These are the relatively low cost (up to now) of Japanese seed, inconsistency of local supply, and type of shell cultch. The cost of Japanese seed is rising rapidly and is almost certain to increase much faster than the cost of local seed. Consistency of supply by local breeding has improved in recent years. The probability of receiving commercial sets in Dabob Bay (Washington) on floating cultch is at least 75% certain (Quilcene Lab. Report, 1954). In Willapa Harbour between 1936 and 1958 there have been only 7 years when setting has been non-commercial (less than 3 per shell) (Sayce 1957). In Pendrell Sound, B. C., spatfall has fallen below an average of 10 per shell only in one year during the period 1949-1958 (Quayle 1955, 1957). It is unlikely that all areas will fail in any given year, so the possibility of a reasonably consistent supply of local

seed exists. On the other hand, shell is still the basic cultch for local seed and its deficiencies are many and obvious. Heavy shell is considered by industry to be a very serious drawback.

For collecting local seed there are three basic plans, all of them based on spatfall prediction. The first is bottom-spread shell cultch. This is an inefficient method and its deficiencies stem from two main factors:

1. If the shelling operation is to be on a large scale, spreading must begin the moment occurrence of a larval brood is reported. If this fails to survive, and frequently there may be only one significant brood per season, the shell is lost.

2. Even with excellent spatfalls, low efficiency of bottom-spread cultch renders its use doubtful, both practically and economically, in comparison to results obtained from prepared collectors such as shell strings or shell bags. The low efficiency is mainly due to fouling. In Table I is given spatfall-per-shell frequency for the 1957 spatfall in Willapa Harbour, Washington, when strings hung from intertidal racks caught well over an average of 100 spat per shell. This table shows that 40% of the loose shell held no spat, and another 13% held between one and three spat per shell. These counts were made in September on approximately 11,000 shells.

The second basic plan is to use intertidal racks from which shell strings or shell bags are hung. This is much more efficient than bottom-spread cultch. Preparations may be made well in advance and exposure may be delayed until the probability of a set has become high. In event of a set failure the cultch may be recovered. Growth rate of spat is high and mortality is relatively low. With low larval production rack cultch will collect a significantly greater spatfall than bottom cultch.

In the third plan, rafts are used to suspend either shell strings or bags. While generally more costly than the other two methods, efficiency is greater and commercial sets may be obtained when little or no spatfall is obtained by the other methods. Growth rate is also higher and some labor problems might be solved for little attention need be given to tidal conditions. Oil drums or log rafts may be used. Creosoted plywood pontoons, while initially expensive, would be highly efficient for they could be used for other purposes or stored ashore, and would last indefinitely.

Cultch

No discussion of seed oysters would be complete without mention of cultch problems. The most serious drawback in oyster seed production today is the cultching medium. As a specific cultch, shell has many deficiencies which include great weight and strength, which with heavy spatfalls create large clusters whose separation is difficult, although not impossible. The chief attributes of shell are

availability and low cost. Many alternatives have been proposed, but all have failed to approach even closely the requisites of an ideal cultch. One of the most significant forward steps possible in oyster culture today would be development of a satisfactory cultch.

Summary

The future trend of oyster seed production on the Pacific Coast will lie in greater use of local seed. This is inevitable because of increasing cost of Japanese seed and realization that dependence on a single seed source over which industry has little or no control is not good business. The trend would be hastened considerably by development of a suitable cultch.

Table I. Spatfall of Crassostrea gigas on loose shell, Willapa Harbour, Washington, September, 1957.

Spatfall per shell	Percentage occurrence			
	Coon Rock	South Dock	Naselle Bay	Average
0	43	41	37	40
1-3	10	16	13	13
4-6	7	9	10	9
7-9	5	7	8	7
10-12	5	5	6	6
13-15	3	5	4	4
16-18	3	3	3	3
19-21	2	2	3	3
22-24	1	1	2	2
25-27	4	4	2	3
28-30	2	1	2	1
31-33	2	1	1	1
34-36	1	1	1	1
37-39	1	1	1	1
40-42	1	1	1	1
43-45	1	1	1	1
46-48	1	0	0	1
49-51	5	1	2	2

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