International Council for the Exploration of the Sea C.M. 1975/ E:4
Fisheries Improvement Committee

Oyster culture with Crassostrea gigas relaid in containers in German coastal waters

by

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About a hundred years ago the German North Sea coast yielded up to 600 tons annually of European oystern Ostrea edulis. After this peak production throughout the years 1859 - 1873 oyster harvest decreased. Wild stocks had disappeared almost completely by 1925, however, by relaying and fattening of imported oysters a small production was kept going in the Sylt area until about 1939. The German Baltic coast had no oyster stocks since the Neolithic. Various attempts have been made to increase the harvest by relaying European or Portuguese oysters on beds along our North Sea coast. A small consignment of American oysters from New Brunswick/Canada had been transplanted in 1884 into the Western Blatic. In 1959 introduction of oysters from grounds abroad was stopped. The main reason for this was the possible danger of the oysters carrying pests and diseases. An additional reason was that transplanted oysters very often suffered high losses during icy winters.

Progress made by British hatcheries in producing seed oysters of Crassostrea gigas, which is a hard fast growing oyster, encouraged a first trial introduction in 1971. Together with these seed oysters a certificate must be supplied stating the absence of known pests and diseases . Promising results from the very beginning, reportet to the ICES-Shellfish and Benthos Committee

in 1972 and 1973, gave occasion to repeat such experimental introduction (1971: 500 specimens; 1972 : 22 500; 1973 : 135 000; 1974: 310 000; 1975 : 390 000). At present some hundred thousand Pacific oysters grow on the North Sea coast as well as in the Flensburger Förde, a fjordlike coastal water of the Western Baltic.

In order to increase the yield of marketable oysters the Institut für Küsten- und Binnenfischerei Hamburg is cooperating with fishermen in five places along our coasts. The backbone of this program is a specially designed gear, the so-called "Container". Such a container consists of a steel frame (length 210 cm, width 130 cm, height incl. legs 110 cm) which holds 80 plastic trays (60 x 40 x 7 cm) and is fitted with a marking buoy and a hauling device. It offers 20 m^2 of oyster growing space and can be stocked by 11 500 yearlings.

It was found that in our waters the use of these containers offered the following advantages:

(1) According to our fishermen the container is easy to handle by using a winch on, e.g., a shrimp boat or on a mussel kutter in the coastal region of the North Sea or just on a pontoon in the sheltered waters of the Flensburger Förde.

(2) The oyster container combines the advantages of rack culture and tray culture with an increased flexibility of handling.

(3) The container gives the opportunity to cultivate Pacific oysters in a submersed condition. In our waters, where a considerable growth of oysters can only take place throughout less than 2/3 of a year, no time should be wasted, e.g., by exposure to tides.

(4) Like oysters on trays fixed to the ground or suspended from rafts, oysters in containers are well protected from their predators.

(5) Oyster containers submerged deep enough down in the coastal waters of the North Sea and the Baltic are safe from ice, which presents an extreme risk during severe winters.

(6) Fishermen feel that the containers, lowered to the ground, give their oysters much more shelter from theft than, e.g., suspension of trays from rafts.

(7) In areas covered by soft sediment, where ground culture of oysters is usually impossible, long-legged containers are most useful. In the Flensburger Förde (W. Baltic) where we, as mentioned before, cultivate oysters in containers, we make use of a former sand dredging pit. In this pit muddy sediment and occasional deficiency of oxygen in the bottom layer would result in great losses and slow growth if oysters were cultivated on the ground.

At present we are aiming at a two-year cycle of oyster production. A scheme, which serves more or less as guideline to our fishermen, is represented on Table 1 and Table 2.

Table 1: Hatchery reared seed Crassostrea gigas relaid in trays, suspended from rafts in the Flensburger Förde, W. Baltic (Phase I)

months of 1st year	II	IV	VI	VIII	X	XII	remarks
weight per specimen (g)	-	0.01	0.5	1.0	5.0	8.0	reduction in number by thinning out, mortality, selection of slowest growing specimens
seed number per m^2	-	5000	2500	2000	700	650	

Table 2: Yearling oysters Crassostrea gigas from rafts are grown on in containers at various places of the German coasts (Phase II)

months of 2nd year	II	IV	VI	VIII	X	XII	remarks
weight per specimen (g)	8.5	10.0	15.0	30.0	50.0	60.0	reduction in number by thinning out, mortality, selection, harvesting
number per m^2	625	575	450	250	175	125	

We think it would be advisable from an economic point of view to concentrate the production of yearlings from seed in one or two places of our coasts. Sheltered places and little sedimentation inside the trays as well as good growth conditions in early spring are potential seed oyster growing factors. There are two areas, one in the Flensburger Förde (W. Baltic), the other off the Island of Sylt (North Sea) where Phase I of our scheme works well. There exist, however many other sites, where growing of hatchery reared seed-oysters would be hindered but where yearling oysters in containers grow on well. These are the potential sites for planting yearlings in containers for production of marketable size (Phase II).

Hatchery reared seed Crassostrea gigas averaging 0.01 g (5 mm) per specimen is stocked on trays with a density of 5 000 /m^2 in April. These trays are suspended from rafts or put into containers. The density is reduced throughout the following time by natural mortality, by thinning out and by elimination of slow-growing specimens. The yearlings averaging 8.5 g (4.5 cm) are then transferred to other areas for production of marketable oysters. The trays on which they are stocked with a density of 625/m^2 are put into containers. Density is once again reduced by natural mortality, by thinning out, by selection and from October onwards also by harvesting.

Our scheme takes into account a total loss of 50 % from the seed to the marketable size (60 g). The total loss is very variable. A 27 % total loss in two years (13 % dead or missing oysters plus 14 % of eliminated slow-growing oysters) of a small consignment of some hundred seed oysters, which had been checked continuously, we considered an exceptionally good result.

SUMMARY

Some hundred thousand hatchery-reared Pacific oysters grow on in containers in German coastal waters. A container consists of a steel frame (length 210 cm, width 130 cm, height incl. legs 110 cm) which holds 80 plastic trays and offers 20 m^2 of space for 11 500 yearlings. A two-year production cycle is aimed at using trays suspended from rafts throughout the first year of growth, and trays arranged in containers, throughout the second year of growth of oysters up to commercial size.

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