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# OYSTER CULTURE



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by

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The Secretariat

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The present text is a translation of the Malay text entitled, "Pemeliharaan Tiram" by P.S.Choo, published by the Department of Fisheries, Ministry of Agriculture, Malaysia (Bahagian Perikanan, Risalah Perikanan Bil. 9, 1979).

Cover: Oyster (*Ostrea folium*) Culture in Pulau Langkawi, Kedah, Malaysia, using the raft method and polyethylene nets as collectors.

# OYSTER CULTURE

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## INTRODUCTION

Oysters extend over a wide geographic range, and many species are at present farmed throughout the world. These are the flat oysters belonging to the genus *Ostrea* or the cup-shaped oysters of the genus *Crassostrea*. In Malaysia, at least two species of *Crassostrea*, viz. *C. cucullata* and *C. rivularis*, are found.

The methods of culturing oysters vary in different parts of the world. The information provided here gives a summary of the knowledge on the different aspects of oyster culture and is intended to provide basic information on the subject to anyone interested in oyster culture in Malaysia.

## CULTURE OPERATIONS

Oyster culture involves the following two major operational phases:-

- 1) Collection of spat
- 2) Growing for market

## 1) Collection of spat

The collection of spat from nature is still the major source of seed, although artificial breeding in hatcheries is being carried out in certain countries like the United States and the United Kingdom, where pollution of natural oyster beds has been posing a threat to the oyster industry.

### (a) Choosing sites for spat collection

A good site for the collection of spat must first be selected. Normally, this would be an area where a natural population of parent oysters is present, and this area must have enough shelter to prevent storm damage to the collectors (the materials used for collecting spat). The depths at which collectors catch most spat vary from place to place, ranging from the surface to a depth of about eight metres. Very often the best places are discovered through experience.

### (b) Timing

Whatever method of collection is used, the time of putting out the collectors is crucial to the success of oyster culture. The best time of the year for spat collection varies with species, locality and annual fluctuations in temperature, salinity, tide and so on. Although oysters in Malaysia spawn throughout the year, there are peak spawning periods, which are triggered off by the rains. A heavy spatfall normally follows two to three weeks after a sudden and heavy rain, which lasts a few days. The collectors must be put out at a time which coincides with a major spatfall, otherwise these collectors would be fouled by barnacles, slime and silt.

One way of determining spatfall is to examine regular plankton hauls taken with a suitable plankton net. The oyster larvae of about 0.25 to 0.5 mm in length can be distinguished by the skewed umbo (Fig. 1).



*FIG. 1. OYSTER LARVA  
LENGTH 0.25 mm — 0.5 mm.*

To determine spatfall, a few parent oysters can also be checked every few days in the area where spat are to be collected. If a high percentage of these oysters have lost their creamy layers and have a thin, watery appearance it means that they have spawned and collectors can be put out. However, this method is not totally reliable, for occasionally a whole brood of larvae will die or be swept out from that area a few days after spawning.

#### (c) Methods of spat collection

In selecting the kinds of collectors, one has to bear in mind whether the collectors are available in large quantities, are cheap and can be handled easily. The following are some of the methods which could be used to collect spat.

(i) On poles

One of the simplest ways of spat collection and culturing oysters is by driving sun-dried bamboo or wooden (e.g. mangrove or nibong) poles into the substratum. The poles are arranged as closely together as possible, leaving only enough room between rows to permit access by small boats.

(ii) On racks

Rectangular pieces of corrugated roofing tiles (as practised in Sabah) or pieces of tarred wood can also be placed on racks for spat collection. The racks are made by driving two parallel rows of posts into the seabottom (Fig. 2).

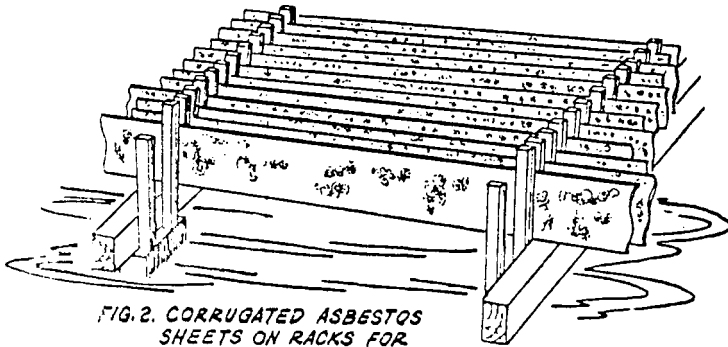


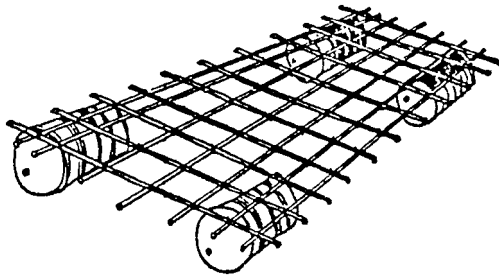
FIG. 2. CORRUGATED ASBESTOS SHEETS ON RACKS FOR CATCHING SPAT.



- (iii) Suspended from fixed frames  
or from floating structures

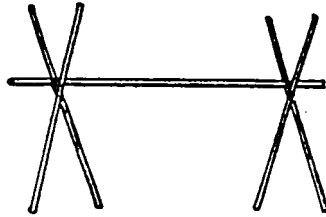
Collection can also be carried out with collectors suspended from:-

- a. floating structures such as rafts, which are of any convenient dimension and are built of wood or bamboo, or mangrove poles with plastic cans or oil drums coated with coal tar as floats (Fig. 3); or



*FIG.3. A RAFT WITH TARRED DRUMS OR PLASTIC CANS AS FLOATS.*

- b. fixed frames such as bamboo or wooden poles driven into the substratum to form an "X" support with other poles fixed horizontally between the "Xs" (Fig. 4).



*FIG.4. "X" SUPPORT FOR SUSPENDING COLLECTORS.*

The collectors used include:-

- i. corrugated roofing tiles
- ii. asbestos sheet
- iii. pieces of wood and bamboo
- iv. egg-crate fillers

To allow for easy detachment of seed oysters, the collectors are coated with a cement-sand-lime mixture. This mixture also gives the egg-crate fillers added strength, and prevents them from disintegrating in the water easily. The cement-sand-lime mixture is prepared as follows:-

2 volumes of sand previously sieved (with standard copper sieve No. 16, mesh aperture 1.003 mm), washed and dried

2 volumes of cement

1 volume of quicklime

The components are mixed with water to give a soupy consistency, and the collectors dipped into the mixture and allowed to dry slowly in the shade. The coated egg-crate fillers (any convenient number) are formed into a bundle by means of a fishing net (Fig. 5), which is then suspended from the raft or the "X" supports at different depths to avoid overcrowding and to catch spat at different levels.

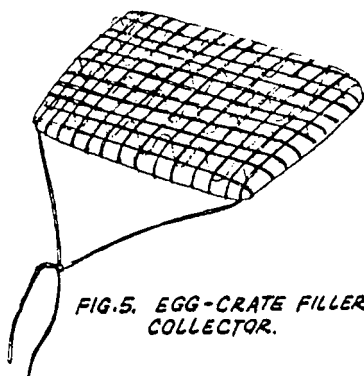


FIG. 5. EGG-CRATE FILLER COLLECTOR.

Wood, bamboo, asbestos sheet and corrugated roofing tiles can be cut into suitable rectangular sizes and fastened to ropes made of sisal, coconut husks or nylon (Fig. 6).



*FIG. 6. COLLECTORS HELD IN A ROW WITH SISAL ROPE.*

## 2) Growing for market

When the seed oysters are about 20 mm or bigger they are detached from the collectors and transferred elsewhere where they are grown for the market. The following are some of the methods that can be used to grow oysters for the market.

### (a) Pole culture

In the pole culture method used normally in shallow waters, oyster spat cling to the bamboo or wooden poles. As the oysters grow to mature size, some of them are periodically

removed to avoid overcrowding.

(b) Tray method

The culture trays for the growth of oysters can be made of galvanised wire netting of 12.7 mm mesh, with tarred (to prevent boring by shipworms, e.g. *Teredo*) wood as the supporting frame (Fig. 7). This method is usually used in shallow waters with sandy bottom.

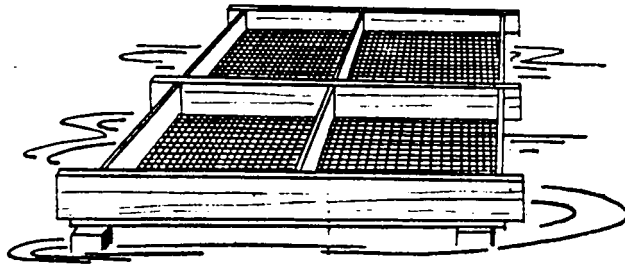


FIG. 7. TRAY METHOD OF GROWING OYSTERS FOR MARKET.

(c) Raft method

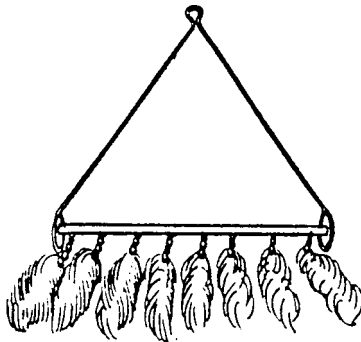
In waters which are at least 5 metres in depth during low water spring tides, raft culture can be used. The farming area for raft culture must be sheltered against violent winds and waves. The seed oysters can be transferred into fishing net cages and plastic trays, which are then suspended from the raft which is built in the same way as the raft for the collection of spat (see Fig. 3 on p. 5)

## ENEMIES OF OYSTERS

Some of the predators of oysters are starfish, certain species of crabs, various gastropods, fishes and birds, and two of the main competitors of oysters are mussels and barnacles.

### 1) Starfish

Starfish can be controlled either by removing or poisoning them. They can be removed during low tide with a rod which has a barb attached to one end. On deeper rearing grounds they can be removed by mopping. Starfish mops (Fig. 8) are made by knotting clumps of soft and snarly cotton on to wires about two feet long. The starfish mop must be towed very slowly over the bottom and hoisted frequently (at ten minutes interval) to remove and kill the starfish.



**FIG. 8. STARFISH MOPS ATTACHED  
TO THEIR TOWING FRAME.**

Starfish can be killed in boiling water or a strong brine solution. If they are very abundant they can be killed by spreading quicklime at the sea-bottom at 500 lbs/acre.

2) Oyster drills

Several species of snails, e.g. *Thais* sp. (Fig. 9), are able to bore small holes through the shells of oysters and kill them. The simplest way to avoid trouble is to select culture grounds that are free of drills.

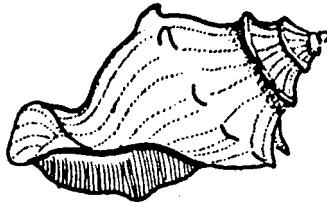


FIG. 9. OYSTER DRILL - Thais sp.

3) Blister worm

The mud blister worm, *Polydora* sp., which lives on the inside of the shells of oysters causes the formation of unsightly dark coloured blisters on the inner surface of the shells. The blister worm can be controlled by brining the oysters in saturated salt solution.

4) Mussels

Mussels (*Perna viridis*) are one of the oysters' chief competitors for food and space. They are a common cause of poor quality oysters and may even kill the oysters. Before oyster spat are planted out mussel spat should be removed.

5) Barnacles .

Barnacles (*Balanus* sp.), apart from smothering the shells of market oysters, also compete with oysters for food and space, and seriously interfere with the efficient laying of cultch for oyster spat collection.

The fouling of collectors by barnacles can be overcome to a certain extent by examining the oyster larvae in plankton samples, and thus predicting spatfall. If collectors are laid only a few days too soon they are almost certain to become smothered by barnacles. It might also be possible to locate the sites for oyster culture in localities where barnacles are not found in abundance.

6) Encrusting worm

This worm (*Pomatoceros* sp.) forms white limy tubes on suitable settling surfaces, thus competing with oyster spat. It also settles on the shells of market oysters and presents a problem to culturists wishing to send clean-shelled oysters to market.



## HARVESTING

A growth period of about 12 to 18 months (from the time of spat collection) is needed for the oysters to reach the marketable size of about 100 mm. They should be harvested when their meat contents are creamy-white in colour, i.e. when they are very rich in glycogen. If oysters are to be stored for some time they keep best at a temperature of 1°C or 34°F.

## PUBLIC HEALTH

A possible health hazard in the eating of oysters is bacteria contamination. Bacteria contamination is not peculiar to oysters but is commonly found also in other molluscs that are filter feeders and may pick up the pathogenic bacteria from sewage polluted waters. The bacteria in the oysters can be killed by boiling the oysters for 2 to 3 minutes. If polluted oysters are to be marketed live, the bacteria could be destroyed by keeping the oysters in bacteriologically clean water for 2 to 4 days. Oysters can also be purified in bacteria-free water treated with ultraviolet light, chlorine or ozone.

## STATUS OF OYSTER CULTURE IN MALAYSIA

The culture of oysters on an experimental scale has been carried out in both Peninsular and East Malaysia.

In Peninsular Malaysia, a Colombo Plan oyster culture expert, Mr. H. Okada, conducted experiments from 1960 to 1963, and indicated the possibility and potential of culturing oysters in Peninsular Malaysia. He mentioned that oyster culture by the raft method appeared to be the most suitable method for application in Peninsular Malaysia. He recommended that spat collection be carried out in Pangkor Island, Langkawi Island, Butterworth and Kuala Linggi in Malacca, and identified suitable areas of culture in Lumut, Pulau Langkawi, Johore Bahru and Penang Island. The Fisheries Research Institute, Penang, is currently carrying out small-scale experimental oyster culture by the raft method.

In Sarawak, oyster culture experiments started in 1967, and this led to the introduction of the oyster culture subsidy scheme in 1973. In Sabah, oyster culture research started in 1970, and the rack and raft method of culture has been found to be very successful.

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PRESENT STATUS OF OYSTER CULTURE  
IN MALAYSIA

In Peninsular Malaysia, the Fisheries Research Institute, Penang is still carrying out experimental culture of oysters by the raft method. Its efforts are mainly concentrated on the culture of the flat oyster, *Ostrea folium* in Pulau Langkawi, Kedah, using polyethylene nets and ropes as collectors. Oysters (*Crassostrea belcheri*) are also propagated on a part-time basis in the Muar River, Johore, by fishermen using on-bottom culture method with oyster shells as collectors. The oysters are collected by the fishermen during low tides when they dive into the sea to bring up the oysters.

Some of the problems affecting oyster culture in Peninsular Malaysia are siltation, fouling by other organisms, and predation by crabs and starfish.

In Sarawak, experimental oyster culture is carried out by the Department of Fisheries. The culture methods used are:-

- (i) Raft method
- (ii) Pole-and-rack method
- (iii) Combination of the pole-and-rack method with the raft method.

The main problems affecting oyster culture in Sarawak are:-

- (i) limited supply of desirable oyster seed
- (ii) difficulties in locating suitable culture sites.

Only *Crassostrea cucullata*, which attains an average size of 45 mm in one year, and which are considered to be too small for culture, are found in abundance. Although Sarawak has extensive mangrove swamps and a long coastline, extensive sheltered areas suitable for the culture of oysters have not been identified. The high tidal range (5.5 m) in Sarawak is also considered a disadvantage to oyster culture.

In Sabah, the basic technique of oyster culture using the rack-and-raft-with-tray method has been established, but it now needs to be introduced to the public sector. The high cost of production is one of the main drawbacks to this method of culture; and presently research is being carried out to lower the production cost so as to make the culture more profitable.

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