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# TECHNOLOGY OF EDIBLE OYSTER CULTURE

K. NAGAPPAN NAYAR

## CULTURE METHODS

In oyster culture there are two important major aspects (1) production of seed and (2) growing the seeds to marketable size. This paper deals only with the latter aspect of oyster culture.

In order to grow oysters five different culture methods are generally followed with slight modifications from country to country. They are (1) raft culture (2) rack culture (3) long-line culture (4) stake culture and (5) on-bottom culture.

### Raft culture

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Rafts can be made any convenient size. Most of the rafts used in Japan are of the standard size of 16 x 25 m and each carries a total number of 500 to 600 wire rens. The rafts are constructed by using 75-100 cm diameter bamboo or cedar poles lashed together with wires in 2 layers at right angles to each other and with the poles 0.3 to 0.7 m apart. The rafts are buoyed up by hollow concrete drums, tarred wooden barrels or styrofoam cylinders. Depending on the increase in weight due to growth of oysters, additional floats are added. Rafts are laid at 1.6 to 3 m apart, tied together with ropes with two anchors at each end. 10 or more rafts are tied by this method. Although different materials are used for making rafts, it has been observed that the log rafts are more suitable than light floating materials such as pontoons or styrofoam since they tend to bounce considerably with the slightest wave action. This causes the strings to weaken and break.

### Rack culture

Rack culture is possible only in shallow, and calm seas of 1 to 4 m in depth. Two rows of posts, are planted vertically in the sea bottom and a rack is prepared by fixing horizontal posts on them at a convenient height from the bottom so that the platform thus

erected remains always submerged in water. Where the depth is more than  $2\frac{1}{2}$  m, strings of oysters are suspended from the platform in such a way that they do not touch the bottom. In areas where the depth is less than  $1\frac{1}{2}$  m, oysters can be kept on suitable trays over the constructed platform. At Tuticorin, the rack and tray culture method is being followed, and Crassostrea madrasensis is grown. The platform is so constructed that it can carry two rows of 10 trays each. The trays fabricated for this purpose are rectangular and 90 x 60 x 15 cm in dimension. The frame of the tray is of 6 mm welded steel and is coated with lacoloid black paint as an anticorrosive measure. To the said frame 2 mm nylon twine netting of 20 mm mesh size is knitted at the sides and bottom. The nylon meshed trays are strong enough to bear the weight of the oysters, at the same time permits free water flow along with nutrients and feed organisms. The spat when they are scraped are graded and transferred to suitable meshed cages (15 mm or 25 mm mesh size) and suspended from the platform of the racks. The growth of young oysters is very good during the initial period and it shows an average of about 12-15 mm per month and reaches a size of 40 mm within a period of 3 to  $3\frac{1}{2}$  months. At this size they are transferred to the usual rectangular trays and kept over the platform for further growth. Majority of the oysters attain a size of 90 mm in 12 month period when they are ready for marketing. By following the rack and tray culture method it has been possible to produce 120-150 tons of oysters per hectare which will give a total meat weight of at least 12 tons.

#### Long-line culture

The long-line culture method developed in Japan is a modification of the raft technique. The basic longline unit consists of a series of wooden barrels under which two parallel longlines of 6 centimetre rope are tied. The floats are spaced at a distance of 7 metres apart and the rens are suspended from the rope. The length of the ren is usually 7.5 to 10 m, depending on the depth of the water column. Rens should not be allowed to touch the bottom at any time. The long-lines are so variable in length and depth that no

generalization can be made concerning their yield. It has been reported that a 60 m long longline in Japan consisting of 11 tarred wooden floats with 300 m rens produces 1.2 tons of shucked meat in 18 months growing season. In one ha. 44 such longlines could be accommodated which would give a potential yield of 53 tons of oyster meat. Long lines operated in still deeper waters with 15 m long rens may give a higher yield per ha. In addition to the low initial expense and maintenance costs, longlines possess the advantages of withstanding winds, waves, and currents better than rafts. This method has made it possible to grow oysters in unprotected areas in the open sea where raft culture is not possible and thus appear to be a step forward in oyster culture procedures. The gradual increase in Japanese oyster production over the past decades is due to the utilisation of such areas.

#### Stake culture

This is also an old method and has many disadvantages since the growing oysters are not protected from crawling predators. In this method the seed oysters are attached to wooden stakes driven into the bottom in the intertidal zone. This method is becoming unpopular because of the lack of suitable areas in shallow regions in most of the major oyster growing countries.

#### On-bottom culture or sowing method

This is a primitive method wherein the oyster spats are placed directly on the bottom, and allowed to grow with periodical monitoring till they are harvested. As the production rate is very low, in most of the places, this method has been discontinued making way for raft culture system in deeper waters as in the case of Japan where the production rate is much higher. In U.S.A. which is one of the leading oyster producing countries of the world, the traditional on-bottom culture method is still followed because of economic considerations.

ESTABLISHMENT OF AN OYSTER FARM

Before establishing an oyster farm the following points will have to be satisfied:

1. Site selection and environmental conditions: The area should be fairly well protected from strong winds and waves and should have sufficient depth too. The quality of the water should be very good and it should not be an area polluted by domestic or industrial waste. During rainy seasons the salinity should not be too low since the oysters may not be able to tolerate it. Water samples should be taken and analysed to find out the availability of nutrients to support growth of those species of algae which are utilized by the oysters. Although food levels can be estimated from examination of plankton, test planting of oysters are necessary to determine the adequacy of natural food supplies. Prior study for the prevalence of 'red tide' organisms would also be useful.

2. Availability of seed oysters: Natural setting of oysters varies with location and season. In some places oysters may grow well, but natural setting may not take place always. If natural method of spat collection is not possible then the possibility of introducing seeds from nearby spat collection areas will have to be explored and the economics of collection and transport also should be worked out. It is always better to get the seed from the oyster hatchery, if that is possible and economical, since they try to produce increased disease-resistant seeds and also better quality strains. As a general principle, native species should be used wherever possible to avoid the transfer of predators, parasites and diseases or the introduction of species which will replace more desirable local forms. In some places it may be necessary to introduce exotic species where there are no oysters or where the native species are not suitable for commercial culture. In such cases it is always better to transplant hatchery produced seed oysters.

### CONTROL OF DISEASES, PREDATORS AND FOULING

Mass mortalities of oysters, often due to unexplained causes, are known to occur wherever oysters are grown and only in a few cases the causative organism has been identified. Predators such as boring gastropods, starfishes, crabs and skates may cause extensive damage to the cultured oysters. Hence suitable control methods will have to be followed. In some cases fouling organisms such as barnacles, sponges, various species of algae and other organisms settle on the oysters and affect the growth of oysters. Suitable control methods both chemical as well as physical will have to be followed.

### SCOPE FOR OYSTER CULTURE

Suitable methods of harvesting also will have to be thought of depending on the type of culture method adopted. The economics of oyster culture also will have to be properly studied before starting a big commercial venture. Extension work has to be taken up to popularise the oyster meat at least in some of the selected places so as to create a good demand. As some of the oyster growing countries are not able to produce sufficient quantities of oysters to meet the local demand, they have resorted to import of oysters (mainly canned) from other countries. For instance Korea was not an oyster producing country till 1958. Because of the government policy to develop oyster culture and also due to the availability of suitable extensive shallow bays protected from storms by surrounding hills, the oyster culture was taken up on scientific lines and today the Republic of Korea is one of the leading oyster producing countries in the world.