THE STAKE (PATUSOK) METHOD OF OYSTER FARMING IN THE DAGAT-DAGATAN LAGOON, RIZAL PROVINCE

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WITH THREE PLATES AND ONE TEXT FIGURE

INTRODUCTION

Dagat-dagatan (a Tagalog word for miniature sea) is a brackish-water lagoon of 163.45 hectares on the fringe of Manila Bay about 10 kilometers north of Manila. In official charts this small body of water is labeled as Dagat-dagatan Lagoon. The Navotas–Malabon River and other estuarine tributaries such as the Batasan and Tonsuya on the north, the three rivulets on the east, Maypajo and Marala Creeks on the south, all empty into this lagoon. The municipality of Navotas borders the lagoon on the west (text fig. 1).

The lagoon is on a tidal gradient zone, the highest tide level reaching six feet. The run-offs from the adjoining lowlands, tidal streams and tributaries enrich the water of the lagoon with nutrients that enable the lagoon to support an abundant growth of plankton. Diatoms commonly taken as food by oysters such as *Mastoglora, Pleurosigma, Surilla, Chaetoceros, Biddulphia, Nitzchia, Melosira, Navicula,* and *Coscinodiscus* are found in Dagat-dagatan.

The richness of plankton life, the availability of oyster stocks throughout the year, and the favorable tidal characteristics contribute to make Dagat-dagatan an ideal place for the cultivation of oysters. A fairly large oyster farming industry has, therefore, developed in the lagoon providing employment to small fishermen living in its vicinity. Shucked and unshucked oysters grown in Dagat-dagatan are sold in the towns of Malabon and Navotas, Rizal and in the city of Manila.

Some 64.93 hectares of oyster farms are at present in operation inside Dagat-dagatan Lagoon. Adjacent to the Dagat-dagatan Saltwater Fisheries Experimental Station of the Bureau of Fisheries are 31 oyster lots with a total area of 1.76 hectares

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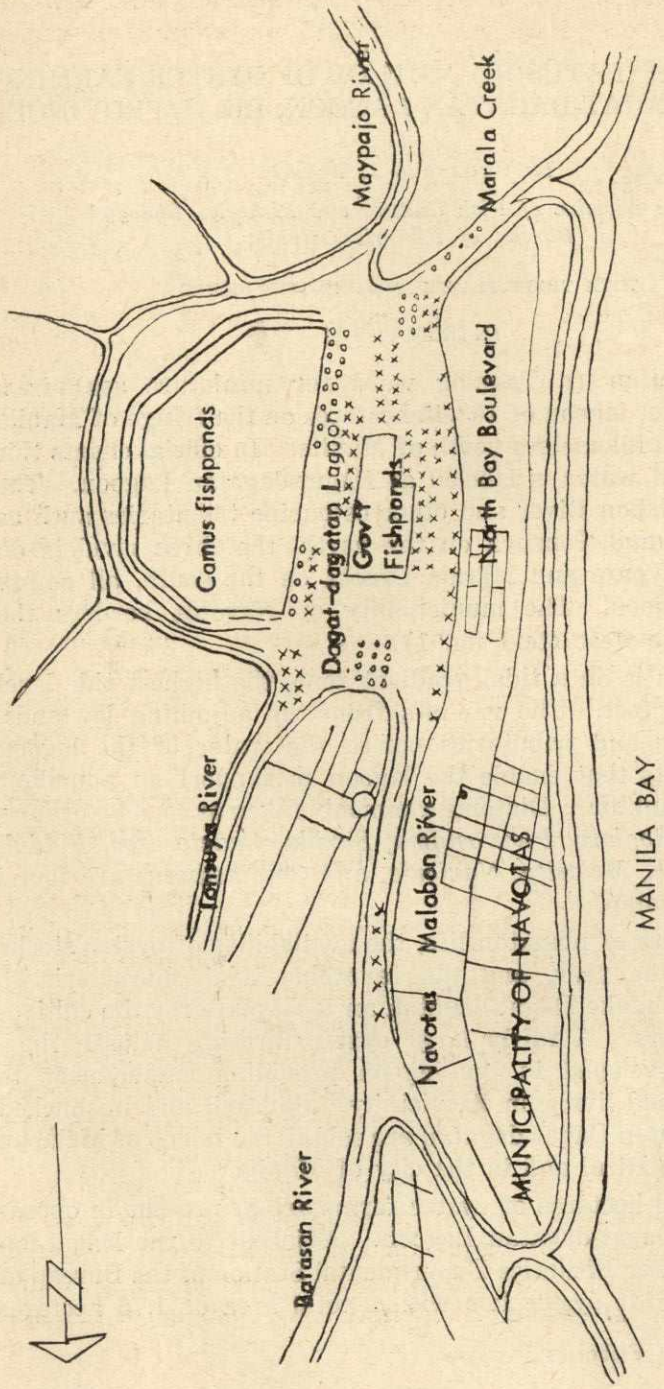

Fig. 1. Sketch of the Dagat-dagatan lagoon with its tributaries indicating the locations of the stick (patusok) and broadcast (sabog) methods of oyster cultivation.

Legend:
Stake (patusok) sites xxxx
Broadcast (sabog) sites oooo

which are leased by the municipalities of Malabon and Navotas to oyster growers at the rate of ₱25.00 for every 500 square meters.

THE STAKE OR PATUSOK METHOD

Oysters are raised in Dagat-dagatan lagoon by either the stake or *patusok,* broadcasting or *sabog,* or the raft or *balsa* method. Oyster lots adjacent to the Bureau of Fisheries Station employ the patusok method exclusively. This method was first introduced in this place in 1949 and was quickly adapted by Dagat-dagatan oyster farmers. At present it has largely replaced the old sabog or broadcast method.

The patusok method consists of hanging oyster shells, empty cans and other objects on bamboo stakes stucked into the oyster bed. This method accomplishes two things, namely, (1) it increases the growing area of the oyster bed by utilizing its vertical gradient, and (2) it reduces the mortality of oysters caused by suffocation from rapid sedimentation by elevating them from the bottom of the bed.

Three types of stake oyster cultches are used in Dagat-dagatan depending upon the materials used for hanging on the stakes. For all the three types, bamboo stakes, two feet long and two inches wide with a pointed end, are uniformly used.

The first type uses six concave oyster shells threaded together as a circular garland. Wire used is GI No. 18. The shell garland is sometimes made into twisted-cross-lock at the center (Plate 1, figs. 1–6). The oyster cultch is hung through its twisted center on the split end of the bamboo stake.

The second type of stake oyster cultch also uses oyster shell garlands as in the first type. With this difference instead of being clipped to the split end of the stake, the garland is secured by passing the threading wire through two holes on the upper section of the bamboo stake. The upper hole is 5 inches below the top end and the lower hole is 6 inches below the upper hole. Three pieces of oyster shells are threaded to the wire on each side of the stake. The ends of the wire are joined to prevent the shells from getting loose (Plate 1, fig. 7).

The third type of stake oyster cultch uses empty milk cans. These are inserted in the split upper part of the stake, alternately one on top of the other (Plate 1, fig. 8).

A one-hectare oyster bed uses about 62,500 pieces of stake oyster cultches placed one foot apart. In Navotas there are

contractors exclusively engaged in making patusok oyster cultches. Their current price is ₱70.00 for 1,000 sets when materials such as bamboos, wire and shells are furnished. The cultches are stored until they are ready for planting during the spatting season which occurs in Dagat-dagatan in May or August.

ADVANTAGES OF THE PATUSOK METHOD

The shift in the oyster-culture practice from the broadcasting method to the stake method in Dagat-dagatan lagoon was brought about by the rapid and heavy sedimentation in the locality. Broadcasted oyster cultch shells easily get covered with sediments and debris especially during the rainy season. However, in places where silting is not heavy the broadcasting method is still practiced. Discarded old bamboo rafts are also utilized as spat collectors where the oysters are left to grow until the oysters are culled for the market.

The stake method of oyster culture has several advantages. The sticks are easily stucked into the oyster bed with one foot of their length exposed above the muddy bottom. By hanging the cultches on these sticks harm from sediments is minimized. Furthermore, bottom dwelling mollusks are partially avoided. Harvesting of marketable oyster is easier than when grown by the broadcasting method. Culling the oyster from the wire loop is also convenient.

Of the three types of patusok method the third type, which uses empty cans, is inferior to the first two types especially for catching oyster spats. After catching a few spats, the cans usually rust within a period of five to six months resulting in the loss of some oysters that have attached to the cans. In such cases the fallen oysters are recovered and sold to oyster farmers who want to produce a seven- to eight-month-old crop of oysters. For this purpose this type of oyster cultch is very appropriate. The stake oyster cultch with wire-loop, on the other hand, is suitable for growing twelve- to fourteen-month crops. The wire used for threading the oyster cultch does not rust as readily as the empty cans.

YIELD BY PATUSOK METHOD

With reference to production per unit area the results obtained by the patusok method are very encouraging. From actual observations, it was shown that a significant increase in production could be obtained in a limited area under favorable conditions. An oyster bed of 5,000 square meters in area,

when planted with 31,250 stakes of oyster cultch, will produce marketable oysters after eight to ten months. On the basis of 30 stakes with clusters of full-grown oysters to fill a *kaeng* (basket container of marketable oyster yielding approximately 1.5 gallons of shucked oyster), this area may be expected to produce about 1,512.5 kaengs of oyster which at ₱2.00 per kaeng would be valued at ₱2,083.40.

SPAWNING OF OYSTERS GROWN IN STAKE OYSTER CULTCH

There are several species of oysters indigenous to Dagat-dagatan lagoon, but the most commonly cultivated are *Ostrea malabonensis* (*kukong kabayo*), *O. iredalei* (*talabang chinelas*), and *O. cucullata* (*pulid-pulid*) (Plate 2, figs. 1–9).

The Philippine commercial species of oysters usually spawn in bayous, coves, and tidal estuaries in May, June, July, and August at a temperature ranging from 18° to 20°C. The spat at the time of attachment are minute, about one millimeter in diameter. In Dagat-dagatan, oysters set in May grow faster than those attached in August. This is due to the abundance of freshets from the surrounding lowlands, lowering the salinity of the water and bringing in nutrients for the growth of the plankton food of oysters. The August spats have to go through a growing period extending from November or December to March or April when freshets are less and the salinity of the water is high. The August oyster spats are harvested for the market in March or April after a growth period of 8 or 9 months. In the case of *O. malabonensis* and *O. iredalei* they grow up to 90 millimeters in 12 months.

FACTORS AFFECTING THE GROWTH OF PATUSOK BROWN OYSTERS

There are several serious drawbacks in the use of estuarine lagoons like Dagat-dagatan for the cultivation of oysters, among which are the prevalence of silting, pollutants, algae, and sponges. Sediments accumulating on oyster beds endanger oysters being raised by the sabog method. Pollution due to industrial wastes coming from Marala Creek decimate spats resulting in the low production of oysters. Algae attach themselves on the growing oysters especially during the period from November to February and suffocate them.

Domantay (1948) describes a supposedly new species of skeletal sponge locally called *taing kalabao* (*Oscarella malabonensis*) which is very destructive to oysters grown in the vicinity of Dagat-dagatan Saltwater Fishery Experimental Station. The

pest was later identified and rectified as a spongiomorphic mass composed of tube-dwelling *Corophium* sp., amphiphods, and secretions of planarian flatworms. This spongiomorphic mass occurs abundantly during the dry season when the salinity of the lagoon water is high. At low tides during the dry season, the exposed oyster beds may be seen to be thickly encrusted with taing kalabao. The encrustation results in high mortality to the sabog-grown oysters due to their inability to feed and take sufficient oxygen. The spongiomorphic mass disappears during the rainy season when the salinity of the water is low. In 1951 the oyster farmers at Dagat-dagatan suffered losses due to the abundance of the spongiomorphic mass in the lagoon oyster beds.

In the patusok method, the unfavorable effect of the spongiomorphic mass is minimized when the spat takes place before encrustation. Oyster spats will not set on spongiomorphic mass covered cultch.

Except for their natural extermination during the rainy season, there is so far no method to control the growth of taing kalabao during the dry season.

TABLE 1.—*Prospectus for a one-hectare oyster farm using patusok method.*

A. 1. Capital expenses			₱712.00
Equipment—			
One banca	₱80.00		
One hammer	2.50		
One cross cut saw	7.50		
One bolo	2.00		
One hatchet	5.00		
One Auger bit (balbiki)	15.00		
Operating capital	600.00		
2. Operating expenses			620.00
Materials and supplies—			
300 pieces of full-length bamboos at ₱1.70	510.00		
2 rolls of G.I. wire #18 at ₱25.00	50.00		
100 baskets (kaeng) old oyster shells at ₱0.60	60.00		
Labor			1,897.00
One caretaker-laborer at ₱120.00 per month	1,440.00		
Five contract (labor for the preparation of 62,500 pcs. patusok oyster cultch at ₱0.07)	457.00		
Fixed charges			383.70
Depreciation and interest on capital, 10 per cent	71.20		
Sales charges, at 5 per cent	208.33		
Miscellaneous expenses and bad debts, at 2.5 per cent of sales	104.17		
Total operating expenses			2,900.70
B. 1. Gross income			
Sale of 2,083.3 kaeng of oysters at ₱2.00 per kaeng			4,166.60
Net profit			1,265.90

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ILLUSTRATIONS

PLATE 1

FIGS. 1–8. Types of oyster cultch (stake patusok). *1*, Piece of bamboo butt, 2 feet long; *2*, bamboo stick, 2 feet long, 2 inches wide, with a top split and a pointed end; *3*, piece of wire No. 18, 2 feet long; *4*, oyster valves with a 2 feet No. 18 wire; *5*, a cultch wire loop of threaded 6 oyster shell; *6*, stick-wire loop oyster cultch; *7*, another type of stake (patusok) oyster cultch; *8*, clipped 3 empty milk cans in a piece of bamboo stick.

PLATE 2

FIGS. 1–3. *Ostrea iredalei* (*talabang chinelas*) with left and right valves.
4–6. *O. malabonensis* (*kukong kabayo*) with left and right valves.
7–9. *O. cucullata* (*pulid-pulid*) with left and right valves.
10–13. Stake (patusok) oyster garland cultch showing how threaded oyster shells are clustered with oysters.

PLATE 3

View of oyster lot grown with oyster by the stake (patusok) methods, sitio Bangkulasi, Navotas, Rizal Province.

TEXT FIGURE

FIG. 1. Sketch map of the Dagat-dagatan lagoon with its tributaries indicating the locations of the stake (patusok) and broadcast (sabog) methods of oyster cultivation.

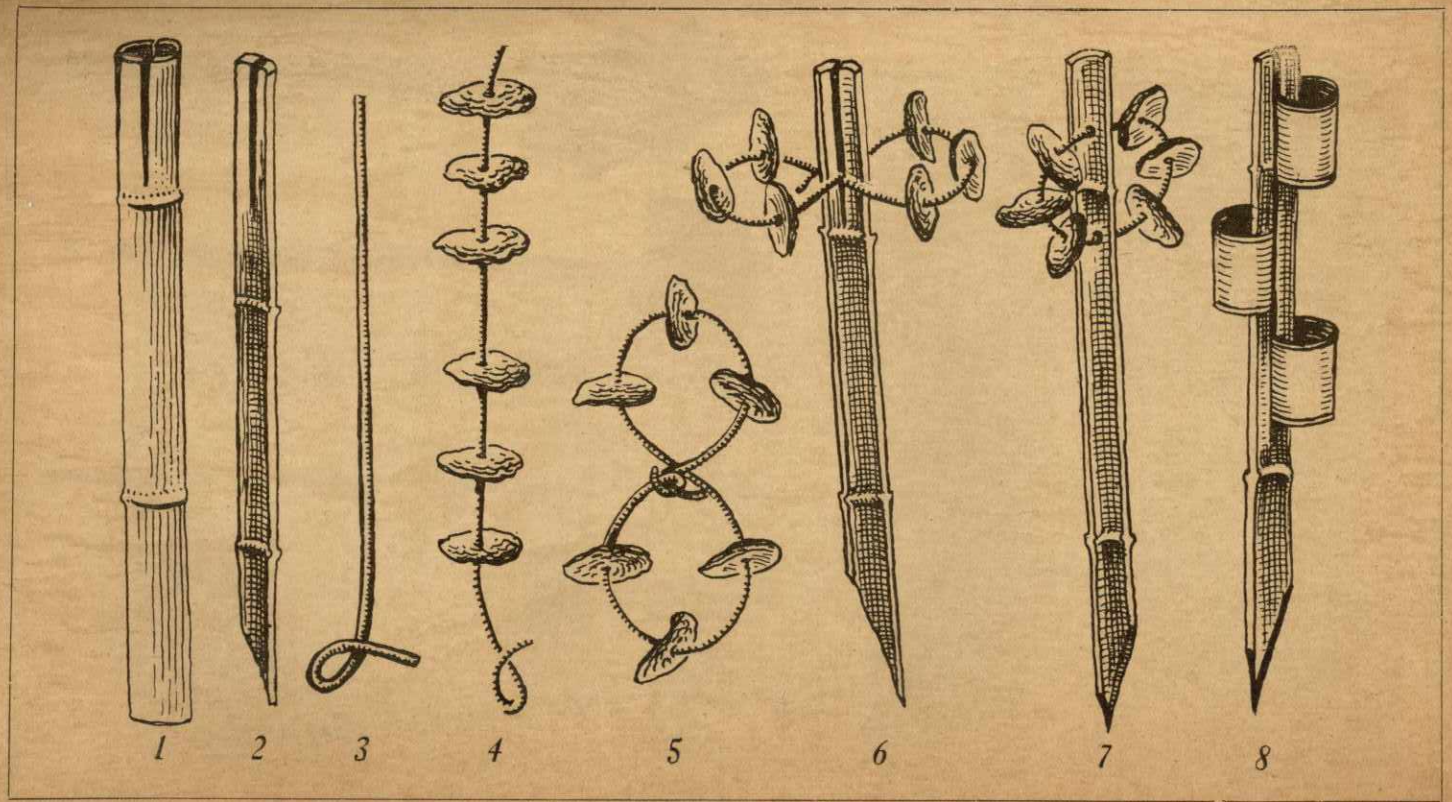
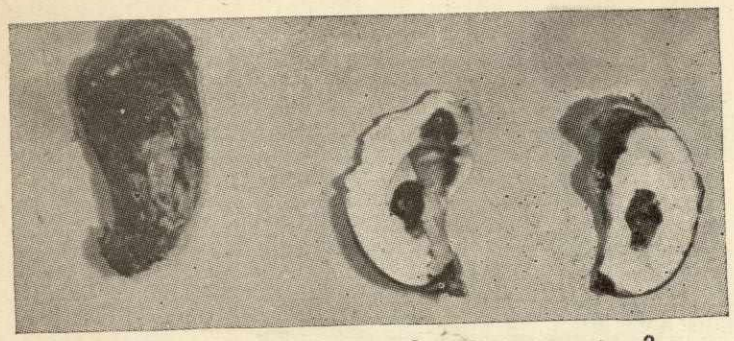


PLATE 1



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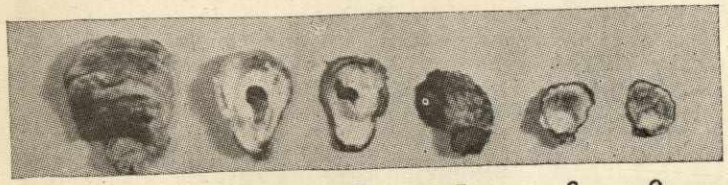

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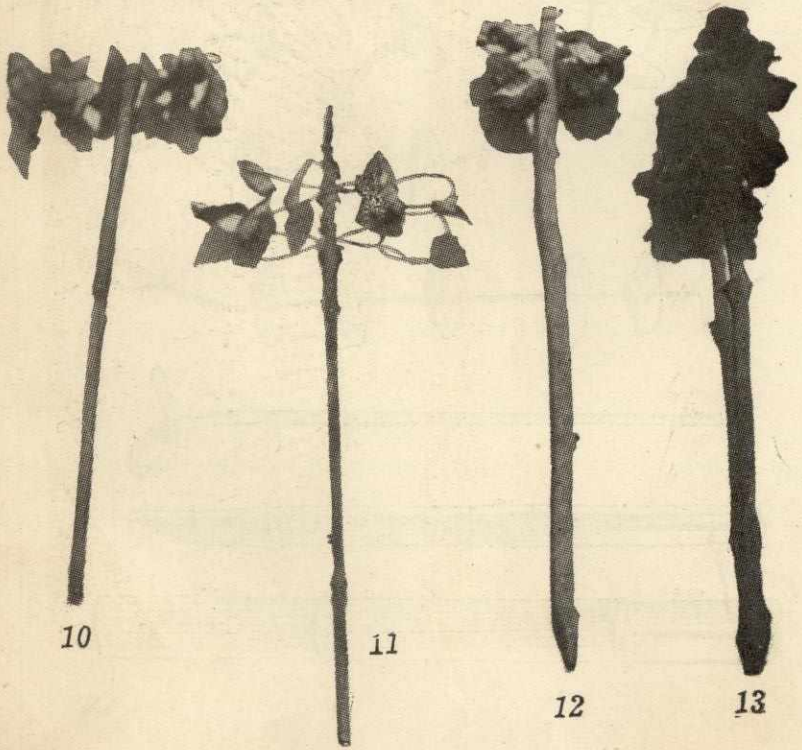

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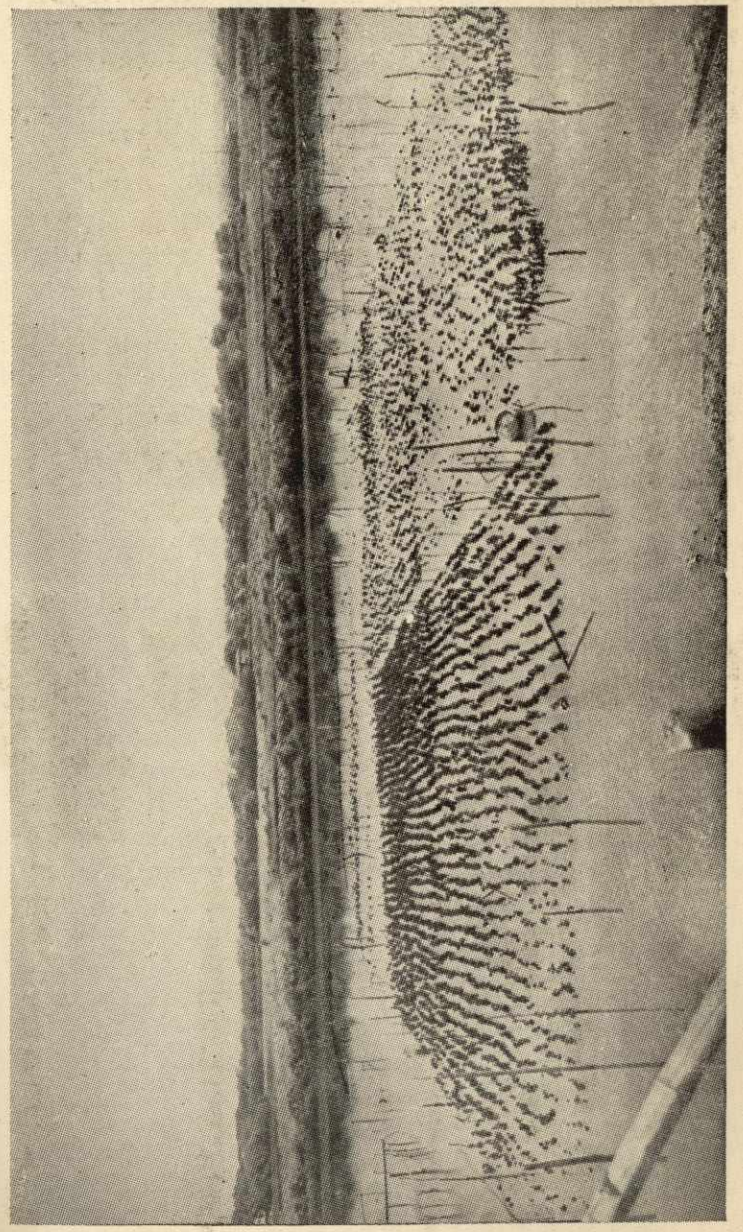

PLATE 3