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PEARL OYSTER SPAT COLLECTION

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INTRODUCTION

For running a pearl culture industry, a steady supply of pearl oyster seed is a pre-requisite. Collection of pearl oysters from the natural beds is not always dependable, owing to their irregular production. Inspection of pearl oyster beds during the last three decades has proved this. There are three ways to raise pearl oyster spat for pearl culture farms : (1) setting up of artificial spat collectors at subsurface during oyster spawning season (2) collection from the natural beds and (3) hatchery production of seed.

In setting up of artificial spat collectors, the best way is to provide the right type of spat collectors at the most propitious time, especially during the peak spawning season, in the farm area for the spat to attach in large numbers. This will prevent the spat collector from becoming fouled with barnacles and other organisms. There are several practices for spat collection of different species of pelecypod molluscs in different parts of the world. In France lime-coated, semicylindrical ceramic tiles are used to collect spat of *Crassostrea* sp. On the east coast of the United States and along the Gulf of Mexico, the most successful collectors have been strings of scallop shells for the spat of American oyster (Iverson, 1968). In Japan, the materials that are easily available in each region are used as collectors for the spat of edible oyster *e.g.*, bamboo, pine branches, twigs, tiles, shells of oysters and other molluscs, slate, stones, pebbles, earthern pipes, ropes etc. (Imai, 1970). While ropes intertwined with twigs are used in Italy, metal net baskets or triangular wooden frames with empty shells inside are used for edible oyster spat collection (Imai, 1970). In Japan long-line method is widely used in which leaves and twigs were tied to ropes as spat collectors for collecting scallop seed (Imai, 1970). In France, mussel seed are collected by suspending loosely woven ropes in the intertidal region near natural mussel beds (Bardach *et al.*, 1972). In Japan, shells of abalones, oysters and scallops and cedar sprigs are suspended from rafts from just below the surface to about 3 m in depth for collecting the spat of pearl oyster (Alagarswami, 1970). Achari (1980) has described the spat collectors and breeding hapas made of nylon frills used for collecting spat of pearl oysters at Vizhinjam. The present account deals with the results obtained while experimenting with various types of spat collectors, for collecting pearl oyster spat at Veppalodai and Tuticorin Harbour farms from November 1975 to March 1981. A large number of oysters, which were earlier collected from the natural pearl oyster beds are introduced in the farms served as the parent stock.

RESULTS OF SPAT COLLECTION

Pearl oyster shell collectors

Pearl oyster shells were pierced in the centre and strung to a 2 mm diameter polythene twine and the strings were tied to the iron frames in two rows, in

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each of the five sections of the sandwich type frame net measuring 60 × 40 cm. Three such frames were tied one below the other leaving a space of 1 m between the frames and suspended vertically into the water column so that each net is kept in place at surface, middle and bottom waters (Fig. 1, 1). Five sets of such shell collectors were under observation at the farm from November 1975 through October 1976. In April, 15 spat had settled on shells and in iron frames and, in June, 16 spat had settled on shells and frames.

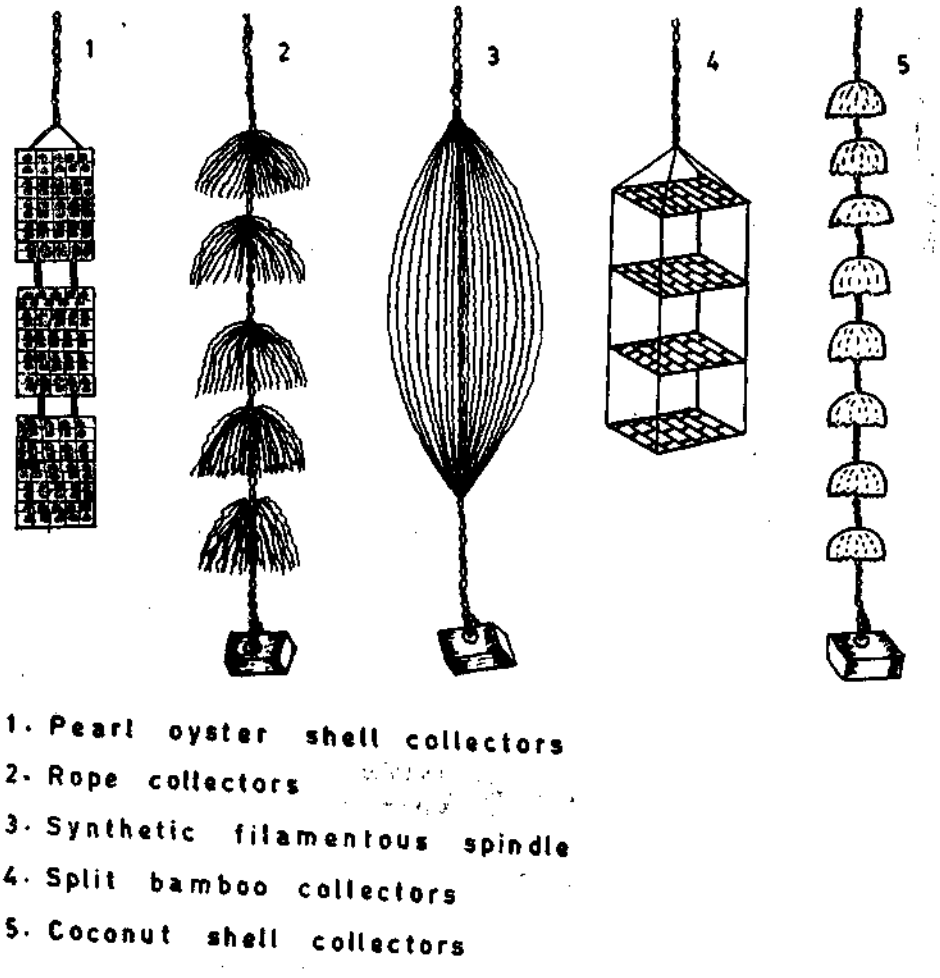

FIG. 1. Different types of experimental spat collectors used for pearl oysters.

Rope collectors

The rope collector consisted of a 9 m main rope made of synthetic material in which bunches of untwisted nylon filaments were inserted at intervals of 25 cm. One end of the main rope was firmly tied on the wooden pole of the raft and the other end was tied to a granite stone weighing around 5 kg. When the rope was suspended from the raft the filaments from the bunch spread in the entire water column from surface to bottom (Fig. 1, 2). The synthetic ropes and filamentous bunches were of three colours *viz.* blue, green and yellow. At the Tuticorin Harbour farm several such rope collectors were suspended from the raft and were examined at fortnightly intervals from January 1976 through April 1977. Periodically the collectors were removed from the raft and sundried for a day or two before being put into use. By this method the silt and the fouling organisms were removed. During the entire period of observation, only one spat was found settled on the blue coloured collector in July 1976.

Synthetic filamentous spindle

Bunches of synthetic monofilaments of 6 m length secured at both ends in the form of a spindle was suspended vertically into the water column. The spindle

was supported by a main rope in the middle, one end was tied on the wooden pole of the raft and the other end on a 5 kg granite stone. A good spread of monofilament was noticed in the entire water column commencing from surface to bottom (Fig. 1, 3). In all a total of six such collectors were suspended from the raft in February 1976 and were examined regularly at fortnightly intervals till the end of April 1977. Nine spat had settled on the collector in July 1976. In June 1976, 10 spat had settled on the main rope and anchor.

Split bamboo collectors

Split bamboo reapers of 1.25 m length were arranged vertically with either ends tied to two horizontally placed wooden reapers leaving an interspace of 2 cm so as to form a platform of 1.25 X 1.25 m. Four such platforms were arranged at 2 m intervals and tied, securely on 4 casurina poles *i.e.* one pole at each corner and suspended from the raft. The bamboo platforms after suspension occupied the surface, middle and bottom water (Fig. 1, 4). There was no settlement of pearl oysters on this collector.

Coconut shell collectors

Holes were made in the centre of half coconut shells and the shells strung on a 5 mm diameter polythene rope of 8 m length at intervals of about 1.5-2.3 cm with plastic spacers between the shells (Fig. 1, 5). Six such shell strings were hung vertically in the water from the raft in June 1976 and were examined at monthly intervals till February 1977. No spat had settled on these collectors.

Apart from the above mentioned spat collectors, several experiments were conducted on selection of materials for effective collection of spat. Granite stones, old fishing nets, lime coated tiles, black polythene sheets and coir ropes were placed in book type frame nets and suspended in sea water at depths 2 m, 4 m and 6m. None proved successful.

Spat settlement along the slopes of the breakwater

As spat are found to settle on granite stones along the slopes of the breakwater of the wharf wall, 12 sets of spat collectors made of untwisted nylon ropes spread and tied with bamboo frames were kept on the slopes in December 1980. The spat collectors were examined at monthly intervals. The settlement of spat was totally absent on all the collectors. However, dense settlement of pearl oyster spat was noticed on the culturing units such as baskets, frame nets and live oysters.

Experiments on 'Hapa'

A breeding *hapa* of 1 m^3 was fabricated with velon screen of 1 mm mesh size and it was kept inside another frame which was encircled fully with coir ropes. Two ripe male and three ripe female oysters were kept inside the hapa and suspended from the raft at the surface water during June 1978. Various spat collection materials such as black polythene sheets, synthetic filaments and oyster shells were kept in the outer margin of the *hapa*. This was under observation at monthly intervals till March 1979. 33 spat settled on coir ropes in August, 11 in November and 1 in December 1978. However, no spat settlement was observed on the other spat collectors suspended adjacent to the *hapa*. The oysters inside the *hapa* had spawned and entered the post-spawning phase.

Spat settlement on culture units

Even though collection of spat on cultch materials did not prove successful, good settlement of pearl oyster spat had been observed on the frames and meshes of nets and on the cultivated oysters both at Harbour and Veppalodai during the years 1973-1979 (Table 1) Two peaks of spatfall were observed in the farm, one in May-July and the other in October-February. However, a small number of spat was observed in all the months.

TABLE 1. *Showing settlement of pearl oyster spat in the farms at Veppalodai and Tuticorin Harbour during* 1973—79*

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Veppalodai farm												
1973	..	..	..	..	173	128	163	..	7	1	4	12
1974	10	..	..	..	..	146	..	..	..	..	1	3
1975	163	..	..	17	53	276	17	1	..	6	25	12
1976	15	4	..	3	342	..	..	..	..	..	..	24
Tuticorin Harbour farm												
1975	..	..	..	..	..	..	..	..	4	15	..	565
1976	68	..	..	53	165	1444	47	..	..	..	..	4
1977	135	330	..	176	184	..	..	..	..	..	..	..
1978	..	..	..	..	..	..	..	..	..	141	15	1
1979	97	40	392	190	113	..	..	..	..	..	..	..

**Note :* Farming had been suspended in the harbour from June 1977 to August 1978.

Discussion

In Japan spat collection is done by lowering different types of objects into the sea during spawning season. Shirai (1970) has reported that good settlement of pearl oyster spat took place on various types of cultch materials namely bunches of cedar branches, strings of common oyster and abalone shells and old fishnets when lowered to a depth of 1-3 m into the sea. Cahn (1949) has described an early experimental type of spat collector used in Japan. It consisted of a small cage 84 x 54 x 20 cm formed by covering a heavy wire frame with a 2 cm wire mesh. The spat per cage varied from 1,000 to 16,000 but the usual average was from 7,000 to 10,000. In Papua New Guinea, Lock (1982) reported about the success achieved in the collection of the spat of the black lip oyster using plain nylon rope. In French Polynesia, spat collectors made of polythene sheets protected against predators by plastic net bags gave best results for *P. margaritifera*. The collection period was from November to January and the average yield was 50 spat per collector (AQUACOP, 1982).

At Vizhinjam, roof tiles, strings of coconut shells split bamboo, frilled nylon ropes, iron *hapa* covered with nylon netting and fish cages were tried as spat collectors. Of these, the frilled nylon ropes, *hapa* or fish cages covered with nylon screen and nylon netting were useful as spat collectors. The profuse settlement of other fouling organisms affected pearl oyster settlement (Appukuttan, personal communication).

Mahadevan and Nayar (1976) reported that the settlement of pearl oyster spat on the paars was irregular and subject to quantitative fluctuations. Alagarswami (1977) observed good spat settling in the inshore areas and also resurgent population of species other than *P. fucata* in the natural beds off Tuticorin in the Gulf of Mannar, which he attributed to larval drift.

Recent studies indicate that the settlement of edible oyster spat *Crassostrea* sp. on cultch materials is influenced by various exogenous factors especially temperature, salinity, light, angle of surface, colour and texture of surface as well as cleanliness (Quayle, 1980). The depth at which the collectors are placed is very important with respect to both getting the maximum number of spat and avoiding the settlement of fouling organisms. The proper time for laying the spat collectors can be determined by examining the gonadal condition of the oyster or by sampling the farm area with plankton net to locate the drifting larvae.

Nayar *et al.* (1978) observed that stray settlement of pearl oyster spat on the heavily fouled surface of iron piles of pier, underside of steel drums used as floats for long time, channel buoys, keels and gunwales of permanently anchored launches. They have also experimented spat settlement on different spat collectors such as pearl oyster shell strings, oyster growing frame nets and cages, nylon twine, meshed iron ring, perforated and slotted plastic baskets, polypropylene and coir ropes and found that nylon twine meshes of circular and square cages appeared to be the best substratum for spat settlement. The present results reveal that the oyster growing baskets and cages appeared to be best spat collectors as compared with the other spat collectors.

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