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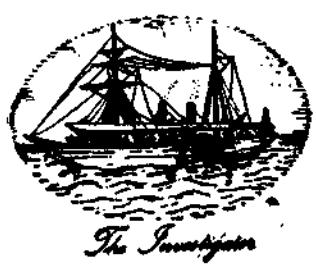

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A SAMPLING DEVICE FOR THE QUANTITATIVE ASSESSMENT OF PRAWN AND FISH SEED RESOURCES IN THE ESTUARINE AREAS

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ABSTRACT

The need for a suitable and efficient sampler for the quantitative assessment of prawn and fish seed resources of the estuarine areas was very much felt during the field surveys. Dragging or pushing a net was beset with several difficulties in the estuaries and backwaters. To overcome these, several devices such as drag nets, trolley type pushing nets, scoops, traps, etc. were tried and finally a simple and at the same time efficient sampler was adopted.

The Quantitative Seed Sampler (QSS) deviced for sampling in the estuaries and backwaters is an aluminium foldable cage of the size of 100 × 100 × 75 cm, open at top and bottom. All the four sides of the cage are covered with nylon netting. Besides this, a square scoop net of 95 × 95 cm which would almost fit into the cage, is used to scoop out the seeds trapped inside the cage. The method of operation is to suddenly place the cage in a water area so as to firmly settle at the bottom ensuring complete prevention of even the fast swimming organisms from the cage. All the prawn and fish seeds once trapped in the cage could conveniently be collected using the scoop net. Fabrication of the sampler, materials required, dimensions, its operation, efficiency studies made, advantages and disadvantages, etc. are discussed in detail in this paper.

INTRODUCTION

FOR SUCCESSFUL Aquaculture practices, one of the factors needed is the knowledge about the availability of natural seed resources of the desired fishes or prawns. Aquaculturists need not always depend upon the laboratory reared seeds and this is not necessary also when the seeds are available in the wild in required quantities. The shallow areas of estuaries and backwaters (right from the water edge) have been found to be an excellent habitat for fish and prawn larvae of cultivable species. Their abundance has been found to vary with areas and seasons. Hence, a quantitative assessment of the natural seed resources in space and time becomes a prerequisite for the successful farming of brackishwater prawn and fishes.

While conducting surveys for the assessment of prawn and fish seed resources of cultivable species in estuaries and backwaters of Kerala, the need for a suitable sampler for the quantitative estimation of the seed resources was felt very much. Several gears such as drag nets, trolley type push nets, scoops, traps, cages, etc. have been experimented. Finally, an entirely new one was selected being the most efficient. The present paper gives the details of the fabrication and operation of this sampler including the materials required, dimensions and its efficiency (Table 1 and 2). A comparative study of the catch efficiency of the present sampler with another type of quantitative sampler was also made (Table 2).

The authors express their sincere thanks to

Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin for his suggestions, constant advices and encouragements during the course of these experiments. They are also indebted to him for critically going through the manuscript and offering many valuable suggestions. They wish to record their thanks to Shri S. Thiagarajan at the Regional Centre of the Central Marine Fisheries Research Institute, Mandapam Camp for placing the drag net designed by him at their disposal for comparative studies.

Methods employed in quantitative seed sampling

Strawn (1954) described a 'one-man push net' used in shallow water flats by Florida bait shrimp fishermen and reported its superiority over a seine for collecting seeds in rooted vegetation. Donald and Anthony (1958) fabricated another kind of one man operated push net, and used it for the quantitative sampling of shrimp in shallow estuaries among vegetations. The net is pushed at a standard pace for a prescribed measured distance. Velon screen (a nylon seine) is employed to estimate the quantitative assessment of prawn seeds present in an area. Two men have to drag the screen for a fixed distance and estimate the number of seeds in terms of No./square area. The same velon screen method is also used to calculate the number of seeds collected per man hour. But this method will not give an insight into the actual quantity of the seed resources present and has only commercial application. One kind of drag net was used by Thiagarajan (Per. comm.) for the quantitative estimation of prawn and fish seeds in shallow sandy areas.

Structure and fabrication of the present sampler

The sampler consists of two parts, a cage and a scoop. The frame of the sampler is made of anodised aluminium angles and frames of 3 mm thick and 25 mm width. The materials required for making the sampler are given in Table 1. The size of the cage is 100 × 100 × 75 cm. The cage is made into two foldable pieces. Each piece consists of two sides of the cage, each side being attached by a pair of aluminium hinges. When each piece is folded it will be in the form of a rectangle and this shape facilitates easy carrying of the sampler from place to place in the field. The two pieces of the cage, can easily be assembled together, by means of latches provided at the appropriate places to form a cage. Once the latches are screwed tight there should not be any gap on any side of the sampler. Equidistant holes at 10 cm interval are made on the frames including the corners for passing a 4 mm diameter nylon rope to fastening the velon screen. To prevent undue bulging of the netting while sampling with the scoop, plain aluminium flats are to be fixed horizontally and vertically to each side of the cage. If the net is bulged out it will leave space on sides which may allow the larvae to evade the scoop. The nylon netting for the cage is to be cut into four pieces of 1 × 0.75 m size and to the four edges of each piece the canvas cloth of 10 cm width is to be stitched to strengthen the edges. Each piece of the nylon netting is tied to each side of the frame.

The frame of the scoop is also made in four pieces of aluminium angles each one of 95 cm in length. Equidistant holes are to be made on the frame as in the case of the cages. The net for the scoop frame is made in the form of a shallowscoop by stitching together four triangular pieces of nylon netting. This netting is attached to the frame by means of the nylon rope.

The cage when completed and assembled can cover an area of 1 m^2 or can contain 0.75 m^3 of water. The cage and the scoop will have a total weight of 7.5 kg.

Operation of the Quantitative Seed Sampler

The sampler is assembled into a cage on land and carried by a single man to the sampling

area without making much disturbance. It is suddenly placed in water ensuring that the sampler has settled properly at the bottom without gaps between the bottom frame and the substratum. Now the movement of organisms is restricted within the cage and escape from the cage is prevented. The depth at the sampling area is measured inside the cage at the centre. The scoop is used by two persons to collect the organisms from the sampler. The scooping is repeated until all the organisms trapped in the sampler are removed. Similar sampling is to be repeated at three or four places in a centre to get the correct data on the occurrence of the seeds in that area.

The values obtained from the analysis can be expressed either volumetrically (No. per m^3) or area wise (No. per m^2) and finally this can be used for the estimation of the seed resources of a particular region.

Comparative study of seed sampling efficiency

The Quantitative Seed Sampler described here and another type of drag net fabricated by Thiagarajan (Per. comm.) were tried at Paruthithodu in the Cochin Backwaters to test the efficiency of one over the other. Each net was operated at four separate but adjacent places. The former sampler filtered a total of 1.9 m^3 of water and the latter filtered a total of 19.45 m^3 of water. The results thus obtained are given in Table 2.

Discussion

For an area-wise estimation of the seed resources, the most important factor is to collect all the seeds present in the sampling area. The Florida type push net described by Strawn (1954) operates efficiently in submerged vegetation such as turtle grass. However, a satisfactory index of abundance based on a standardised unit of effort could not be obtained using this type of net. De Silva (1954) used the Florida type push net. But avoidance of the sampler by some species of prawns was noticed by him. A commercial prawn seed collection device for operating from motor boats, piers or platforms has been fabricated by Fontain *et al.* (1972) and found very effective. A system of quantitative estimation of the seed obtained has also been given. But the massiveness and complexity of the equipment minimise the operational ease to a great extent. Donald and Anthony (1958) who designed another type of push net admit that the organisms caught in their net may not be in proportion to their abundance. They have noticed avoidance of the sampler by some species of prawns. Use of a velon screen for the quantitative estimation of seed resources is not a correct method. Tests have proved that use of cast net was inefficient in giving a correct estimate of the seed resources.

Dragging or pushing a net or using a cast net, velon screen, etc. in muddy estuarine areas is extremely difficult and estimation of the seeds based on such collections may be biased because of the following reasons. (1) Speed at which the sampler is dragged cannot be maintained, (2) complete removal of seeds present in the sampling area is not possible, (3) there will be more tendency for the larvae and juveniles to avoid the samplers and (4) in the case of drag net, since two persons have to walk in front of the net the disturbances caused due to this may result in the escape of larvae from the sampling area.

The Quantitative Seed Sampler described in this paper overcomes almost all the drawbacks mentioned above. Since the sampler is used at a fixed place, the problems connected with speed maintenance do not come into the picture. Secondly, the sampler is placed suddenly at an undisturbed area so that the entire seeds are trapped. Once the sampler is placed,

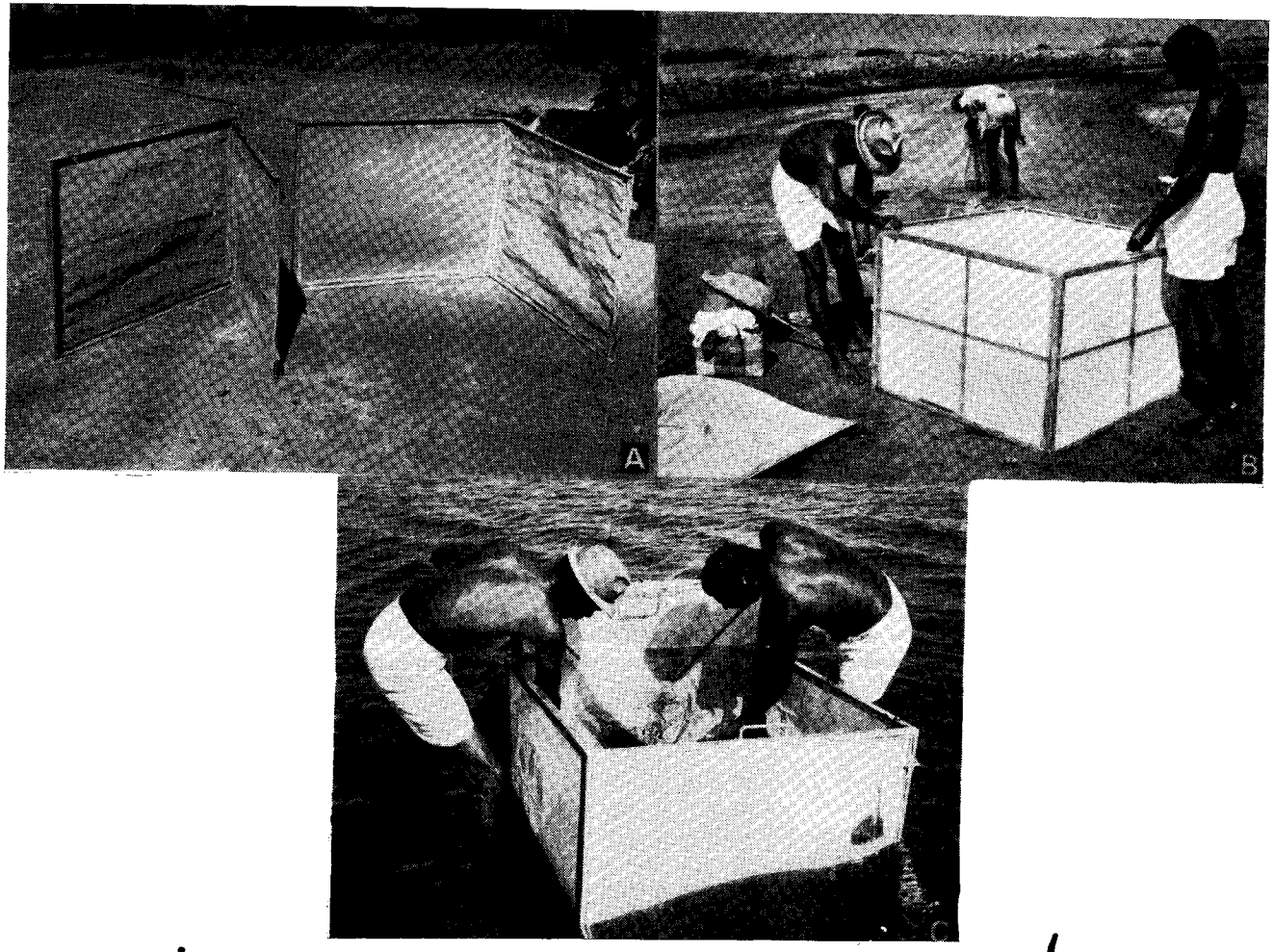

PLATE I A - C. The Quantitative Seed Sampler (QSS), its assembly and operation. A. the cage in pre-assembling condition, B. the cage in assembled condition and C. the sampler is in use and the seeds are being scooped out.

TABLE 1. *Requirements of different materials for the fabrication of Quantitative Seed Sampler*

Part of the sampler	Aluminium angles		Aluminium flats		Nylon netting		Canvass 10 cm width (m)	4 mm thick Nylon rope (m)	Hinges (No.)	Latches (No.)	Handles (No.)
	Length of each piece (m)	No. of each piece	Length of each piece (m)	No. of each piece (m)	Size & shape	No. of pieces					
Cage	1.00 0.75	8 8	1.00 0.75	4 4	1× 0.75 rectangular	4	14	15	8	4	2
Scoop	0.95	4	—	—	triangular piece each side having 95 cm length	4	8	5	—	—	2
Total		20		8	8	8	22	20	8	4	4

TABLE 2. *Results of comparative study of efficiency of two Quantitative Seed Samplers*

Name of the Seed Sampler	Sampling Number	Time (hrs.)	Depth of water at the collection site (cm)	Nature of the bottom	Quantity of water filtered (m^3)	Organisms found in the sample: *Penaeus indicus*	*Metapenaeus dobsoni*	*Macrobrachium idella*	Caridian prawns	*Scylla serrata*	*Etroplus maculatus*	*Glassogobius* spp.	*Syngnathus* sp.	*Aplocheilus* sp.	*Tetrodon* sp.	*Solea* sp.	Estimated number * of organisms per m^3
Quantitative Seed Sampler	1	1030	15	Sandy & muddy	0.15	8	145	—	—	2	—	—	1	—	—	—	1040
	2	1100	60	Sandy & muddy	0.60	—	14	—	—	—	2	2	—	3	—	—	35
	3	1215	55	Sandy	0.55	1	24	—	—	—	—	3	—	2	—	—	55
	4	1230	60	Sandy	0.60	2	3	—	—	—	—	1	—	3	—	—	15
					1.90	11	186	—	—	2	2	6	1	8	—	—	114
Drag Net	1	1130	60	Sandy & muddy	7.80	1	44	—	1	—	1	3	—	—	2	1	7
	2	1145	25	Sandy & muddy	3.25	32	41	—	—	—	—	—	—	10	—	1	26
	3	1300	30	Muddy	4.20	14	—	3	22	—	—	—	—	—	—	—	9
	4	1330	30	Muddy	4.20	5	21	1	16	2	1	—	—	—	—	—	11
					19.45	52	106	4	39	2	2	3	—	10	2	2	11

* Estimated number of organisms per m^3 has been rounded of to the nearest full number.

the seeds trapped in can be conveniently taken out with the aid of the scoop net.

As far as the trapping efficiency of the present equipment is concerned the comparative results obtained from the two types of samplers tested in the field weigh in its favour. From Table 2 it is clear that the Quantitative Seed Sampler described here is more efficient over the drag net. It is true that three additional species were collected in the drag net, but this could be attributed to the extra coverage of area by the drag net.

The only drawback of the present sampler is that it can be used only in shallow areas where water depth is less than 75 cm, but again this is not a major problem because the seeds especially of prawns are mainly confined to the shallower areas of the estuaries and back-waters. Moreover, for culture purposes seed collection is done at very shallow waters having less than one metre depth.

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