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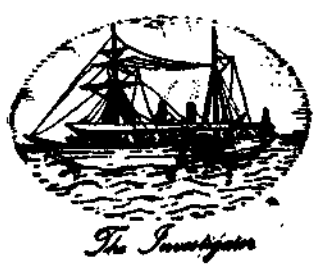

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PRAWN SEED CALENDARS OF COCHIN BACKWATER

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ABSTRACT

The paper presents a consolidated monthly picture of the availability of penaeid prawn seeds in Cochin backwater (between Thoppumpady and Mulavukad) based on the results of routine monitoring studies carried out from 1967 to 1979, using plankton net, try net (miniature trawl) and velon screen drag net. The prawn seed population, comprising postlarval and early juvenile stages, is represented by thirteen species, of which, *Metapenaeus dobsoni*, *M. affinis*, *M. monoceros*, *Penaeus indicus* and *P. semisulcatus* are the most common. While *M. dobsoni* forms the chief constituent in the plankton collections (88%) and try net catches (46%), *P. indicus* predominates in the velon screen drag nets (93%) operated in shallow areas close to the shore. *M. affinis* occurs in greater abundance in the deeper areas as evidenced by its high percentage (45%) in the try net catches.

The environmental conditions of the backwater and the relative abundance and size distribution of the seeds of different species as represented in the three methods of collections are summarised month-wise. Although prawn seeds are available throughout the year, the peak seasons of important species are August-January for *M. dobsoni*, May-July for *M. affinis*, December-April for *M. monoceros*, March-May for *P. indicus* and January-March for *P. semisulcatus*.

INTRODUCTION

AVAILABILITY of adequate quantity of the seeds of desired species at the appropriate time is one of the important factors that determine the success of prawn culture. Estuaries and backwaters are the important sources of prawn seed in nature as most of the cultivable species of prawns spend their juvenile phase in these environments. The Cochin backwater system in Kerala is the largest nursery ground for penaeid prawns in the west coast, where large scale prawn culture is carried out traditionally as well as on modern scientific lines. The fast expansion of culture fisheries now taking place in this region entails greater demand for the seed and the necessity for increased search for them in this ecosystem. For a judicious exploitation of this resource it is essential to have precise information on the distribution and abundance of different species in space and time. The studies so far conducted from this area are mostly of a general nature on the recruitment and biology of some species, with little emphasis on their seed resources (Menon and Raman, 1961 ; George, 1962a, 1962b, 1963 ; Shetty, 1965 ; Mohamed and Rao, 1971 ; Rao and Kathirvel, 1971; Kuttyamma, 1975 ; Kuttyamma and Antony, 1975). Therefore, an attempt is made here to draw up seed calendars for this backwater based on the results of routine monitoring studies carried out from 1967 to 1979, with particular reference to penaeid prawns.

The material for this study was collected by weekly operation of three types of nets namely a half-metre plankton net (1967-'71), a velon screen drag net (1977-'79) and a try net (1969-'77) at different stations in the backwater between

Thoppumpady and Mulavukad (Fig. 1). The sampling with these different types of nets was attempted in order to cover all the areas occupied by the diffrerent developmental stages of the prawns from postlarvae to early juveniles. The plankton net was towed against the current for 10 minutes near the bar mouth in the early time during the high tide and low tide periods of the day alternatively at Thoppumpady and Mulavukad. Data on salinity and temperature of the surface water were also recorded. The samples of seeds were analysed qualitatively and quantitatively and length measurements recorded for those obtained in the drag net and

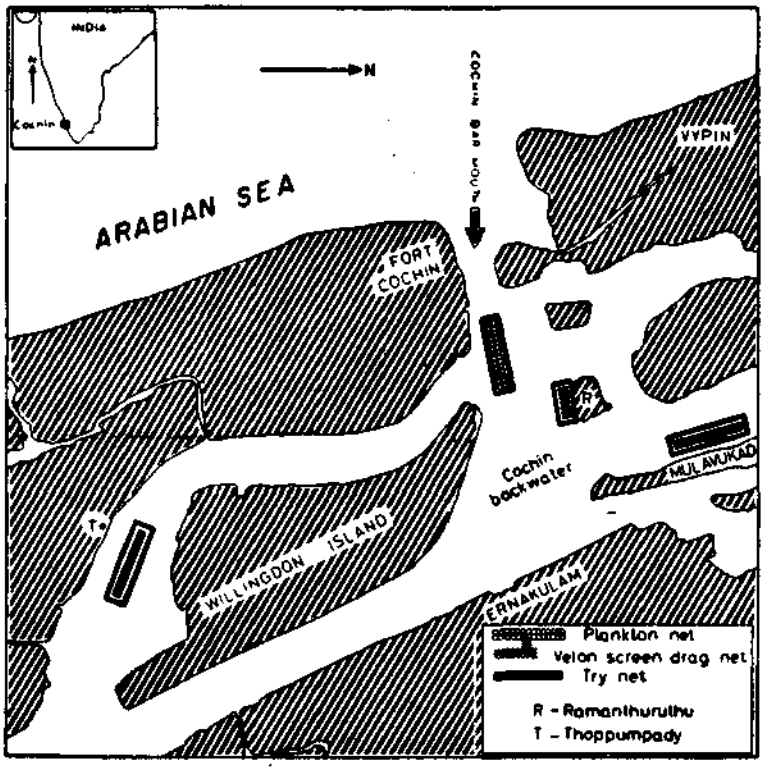

Fig. 1. Map showing the sampling stations.

hours of the day. The velon screen drag net, measuring 2 m long and 1 m wide, was dragged parallel to the shore for 2 minutes in the shallow near shore areas at Ramanthuruth in the morning. The try net, a miniature trawl specially designed for collecting prawn samples from deeper areas of the backwater measuring 4 m in overall length (5.4 m head rope and 5.4 m foot rope, with mesh size of 8 mm throughout), was operated for 15 minutes each try net. The size of the seed was measured from the tip of rostrum to the tip of the telson.

The data thus collected were analysed in detail and monthly abundance of the seed of different species was worked out in terms of number/haul for each type of the net. The average number of seeds/haul of important species caught by the different types of nets have been tabulated month-wise and presented in Table 1.

TABLE 1. *Monthly abundance of prawn seeds in different types of nets*

Species	Net	Average number of seeds/haul											
		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
P. indicus	PN	1	1	2	2	21	..	..	..	1	1	2	1
	VN	177	240	1,432	1,870	10,025	96	1	..	762	766	74	532
	TN	1	1	1	1	1	4	2	..	..	1	1	..
P. semisulcatus	PN	..	..	..	..	..	..	..	..	..	..	..	..
	VN	5	8	2	2	1	..	..	..	..	..	..	1
	TN	2	3	4	4	3	3	..	..	..	..	..	1
P. canaliculatus	PN	..	..	..	..	..	..	..	..	..	..	..	..
	VN	1	1	2	18	4	..	..	..	..	..	..	..
	TN	..	..	..	1	..	..	..	..	..	..	..	..
P. monodon	PN	..	..	..	..	..	..	..	..	..	..	1	..
	VN	..	..	..	..	1	..	..	..	1	..	..	..
	TN	..	..	3	3	..	..	..	..	..	..	..	..
M. dobsoni	PN	101	21	12	9	9	1	2	3	10	5	141	72
	VN	104	17	64	52	71	45	22	79	154	91	18	62
	TN	5	2	2	2	2	18	8	2	97	20	24	5
M. affinis	PN	2	1	..	2	1	1	..	..	..	..	1	1
	VN	..	..	..	2	3	..	..	..	..	..	..	..
	TN	7	6	6	8	16	44	85	4	2	1	2	3
M. monoceros	PN	1	1	1	..	..	..	..	..	..	1	5	1
	VN	15	15	26	34	2	5	1	1	..	3	..	25
	TN	..	..	1	1	1	5	10	1	1	1	..	..
P. stylifera	PN	..	..	..	..	..	..	..	..	..	..	..	..
	VN	..	..	..	..	..	..	..	..	..	..	..	..
	TN	3	2	3	3	..	..	..	..	..	..	2	8

During the field collections it was experienced that efficient seed procurement from this backwater depends to a great extent on favourable environmental conditions. Very often the operation of nets and sorting of seeds were rendered difficult on account of the interference of weeds (*Salvenia* and *Eichornia*) which have become a menace to this ecosystem in recent years. Similarly the physicochemical conditions such as flood, turbidity, movement of water, salinity, temperature etc. were also found to influence the occurrence of prawn seed. While preparing the calendars all these aspects have been considered and brief mention of the conditions prevailing in each of the months made along with details of seed abundance.

We are greatly indebted to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute for his keen interest and encouragement in this work. We are also thankful to Mr. K. H. Mohamed and Dr. P. Vedavyasa Rao for their constant guidance during the course of this study and to Dr. M. J. George for critically going through the manuscript and suggesting improvements.

Species of Prawns and Their General Composition

The seed collections made during this investigation included several species of prawns chiefly belonging to the families Penaeidae, Atyidae and Palaemonidae. Among the penaeid prawns a total number of 13 species were recorded and they are listed below:

While all these species were encountered in the deeper portion of the backwater only few of them occurred in the surface plankton and nearshore areas. Out of the thirteen species listed above five species namely *Penaeus indicus*, *P. semisulcatus*, *Metapenaeus dobsoni*, *M. affinis* and *M. monoceros* were the most common. The composition of these species showed considerable variation in the different types of nets. Fig. 2 shows the overall species composition. It can be seen that *M. dobsoni* forms the major component of the tow net and try net

Name of species	Net in which it was caught
Penaeus indicus H. Milne-Edwards	PN, VN, TN
P. monodon Fabricius	PN, VN, TN
P. semisulcatus de Haan	VN, TN
P. latisulcatus Kishinouye	TN
P. canaliculatus (Olivier)	VN, TN
P. penicillatus Alcock	TN
Metapenaeus monoceros (Fabricius)	PN, VN, TN
M. affinis (H. Milne-Edwards)	PN, VN, TN
M. dobsoni (Miers)	PN. VN, TN
M. burkenroadi Kubo	TN
Metapenaeopsis hilarula (de Man)	TN
Parapenaeopsis stylifera (H. Milne-Edwards)	TN
P. acclivirostris Alcock	TN

PN—Plankton net ; VN—Velon screen drag net ; TN—Try net.

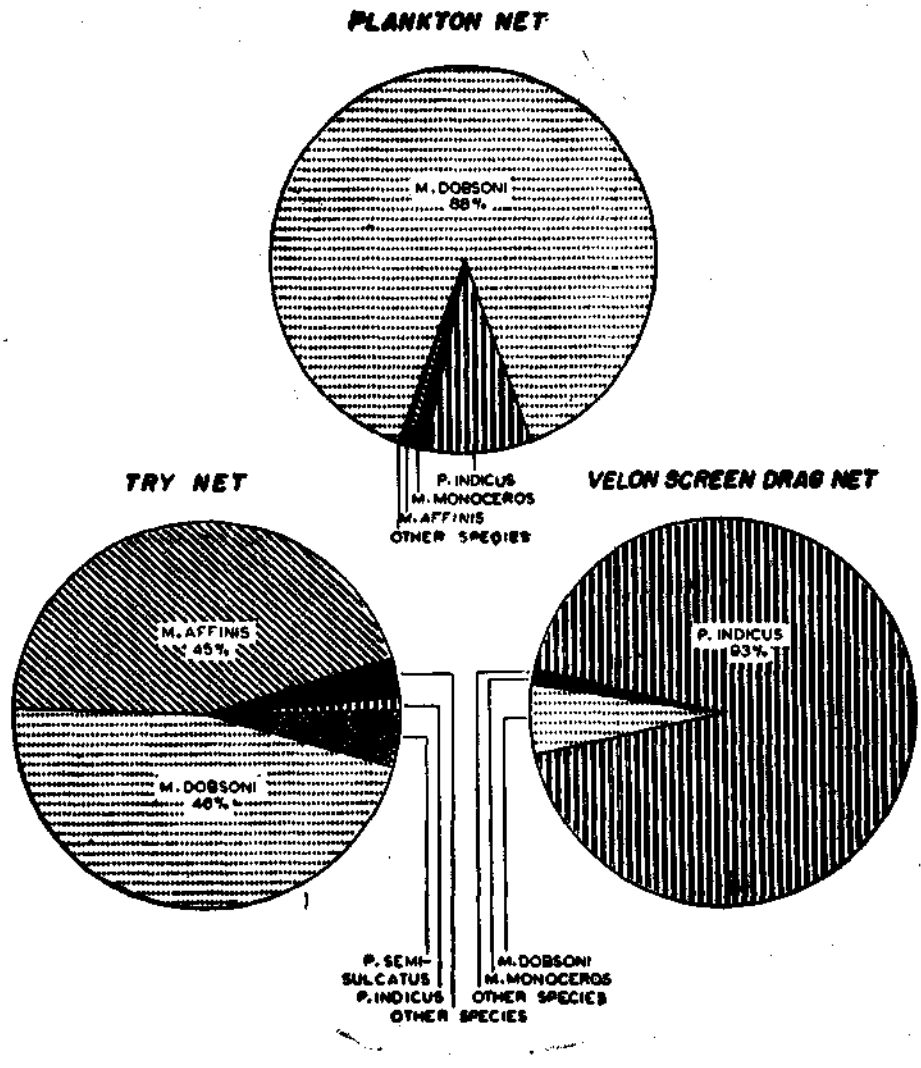

Fig. 2. Species composition of seeds in the different types of nets.

collections, contributing to 88% and 46% respectively. In the velon screen drag net, on the other hand, *P. indicus* is the predominant species forming as much as 93%. *M. affinis* and *P. semisulcatus* are only rarely encountered here, while they constitute a sizeable portion in the try net catches (45% and 4% respectively) from deeper areas.

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Seed Size

The seed sizes considered here comprise postlarval stages and early juveniles upto 35 mm size in the case of species belonging to genus *Metapenaeus* and upto 50 mm size for others. In the plankton collections the seeds are predominantly represented by postlarval stages

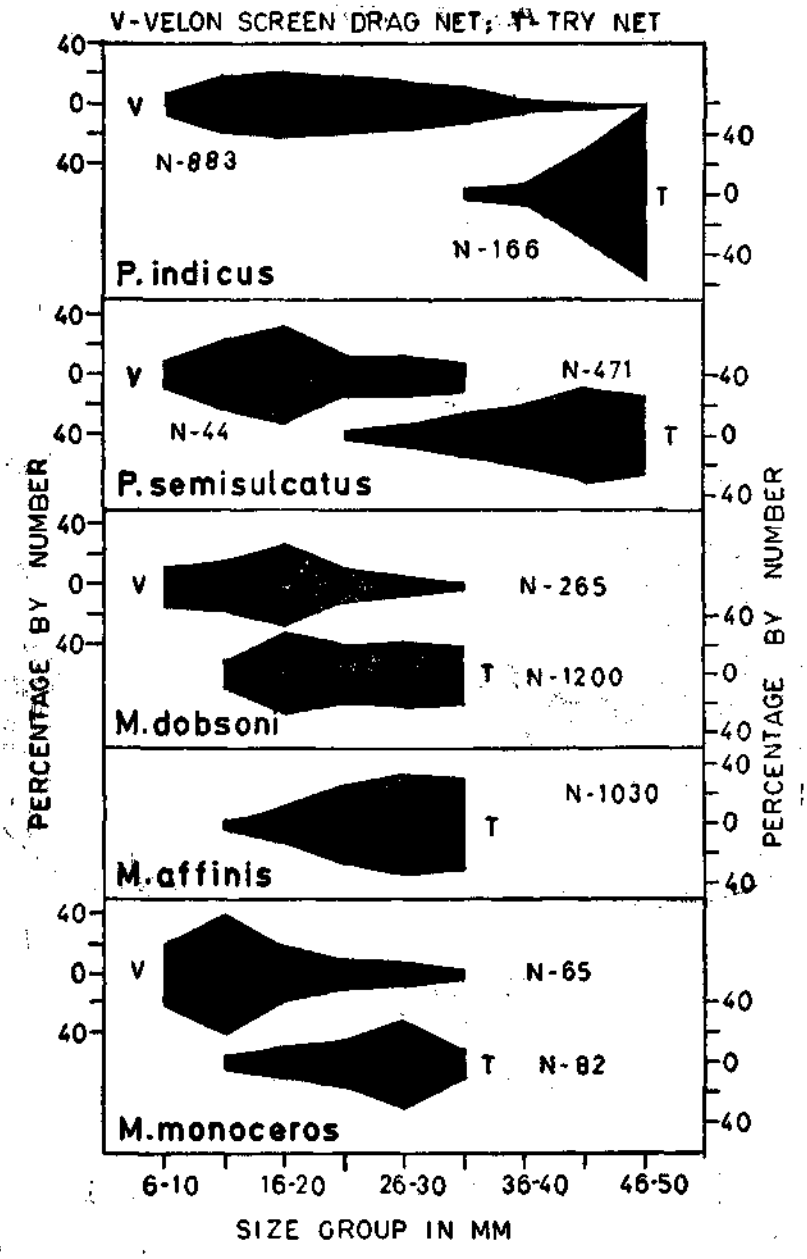

Fig. 3. Size distribution of important species.

I to IV. Sometimes late-mysis stages are also encountered in few numbers. The seeds collected from the shallow nearshore areas are generally smaller in size than those obtained from deeper grounds and include both advanced postlarvae as well as early juveniles. The postlarval stages mostly belong to species of the genus *Penaeus* measuring 8 mm to 17 mm in total length. The overall size distribution of the seeds of important species caught by velon screen drag net and try net are depicted separately in Fig. 3. It can be seen that the important sizes of seed collected by velon screen drag net is 11-35 mm for *P. indicus*, 11-20 mm for *P. semisulcatus* and *M. dobsoni* and 6-20 mm for *M. monoceros*. In the try net collections the seed is mainly represented by the size group 41-50 mm for *P. indicus*, 36-50 mm for *P. semisulcatus*, 16-35 mm for *M. dobsoni*, 21-35 mm for *M. affinis* and 21-30 mm for *M. monoceros*.

SEED CALENDARS

January

1. *Physical conditions of the backwater*—Clear water; stray patches of decaying weeds here and there over the surface and nearshore areas but do not pose problems for seed collection.

2. *Salinity*—Ranges from 28.82 to 34.39‰; average, 32.85‰.

3. *Temperature*—Ranges from 27.0 to 29.0°C; average, 28.5° C.

4. *Prawn seeds*—Moderately present. *P. indicus* and *M. dobsoni* are the dominant species; *P. indicus* can be collected in greater numbers by velon screen drag net and *M. dobsoni* by both velon screen drag net and tow net; try net collects relatively poor.

February

1. *Physical conditions of the backwater*—Clear water; surface devoid of weeds but shore and bottom areas harbour plenty of decayed weeds.

2. *Salinity*—Ranges from 32.25 to 33.62‰; average 32.92‰.

3. *Temperature*—Ranges from 29.0 to 30.0° C; average 29.4°C.

4. *Prawn seeds*—Slight improvement in general abundance along the nearshore areas, but remain poor in the plankton as well as deeper waters. *P. indicus* is the dominant species in the velon screen drag net collections.

March

1. *Physical conditions of the backwater*—Clear water; surface and shore completely free of weeds; one of the best months for seed collection by velon screen drag net.

2. *Salinity*—Remains at its peak ranging from 31.11 to 34.80‰; average 33.69‰.

3. *Temperature*—Ranges from 29.8 to 31.0°C, average 30.4°C.

4. *Prawn seeds*—Quite abundant in the nearshore waters but remain poor in other areas as in the previous month. Most of the species represented, dominant being *P. indicus*, *M. dobsoni* and *M. monoceros*; *P. indicus* and *M. monoceros* relatively more abundant in velon screen drag net and *M. dobsoni* in tow net. *P. semisulcatus* occurs commonly in try net.

April

1. *Physical conditions of the backwater*—Clear water ; seed collection can be made effectively from all possible parts of the ecosystem.
2. *Salinity*—Ranges from 29.90 to 33.58‰ ; average 31.08‰.
3. *Temperature*—Ranges from 30.1 to 31.88°C ; average 30.7°C.
4. *Prawn seeds*—High abundance continues near the shore, dominant species being *P. indicus, M. dobsoni* and *M. monoceros ; M. affinis* common in try net collections.

May

1. *Physical conditions of the backwater*—Clear water ; best season for seed collection like the previous two months.
2. *Salinity*—Ranges from 29.11 to 33.90‰ ; average 30.63‰.
3. *Temperature*—Ranges from 29.6 to 30.3°C ; average 30.0°C.
4. *Prawn seeds*—Peak of general abundance. Dominant species are *P. indicus* and *M. dobsoni. P. indicus,* mostly fresh recruits of P_4 to P_{12}, can be collected in enormous numbers by velon screen drag net.

June

1. *Physical conditions of the backwater*—Clear water in the beginning of the month, but becomes turbid afterwards since the freshwater influx begins as a result of monsoon rains.
2. *Salinity*—Ranges from 0.59 to 31.8‰ ; average 13.01‰ ; widely fluctuates due to the monsoon rains and flood.
3. *Temperature*—Ranges from 27.1 to 29.5°C ; average 28.3°C.
4. *Prawn seeds*—Declines considerably. Important species *P. indicus, M. dobsoni* and *M. affinis* ; abundance unsteady for most of the species ; *M. affinis* occurs in relatively good numbers in the try net collections.

July

1. *Physical conditions of the backwater*—Turbid water due to constant freshwater influx ; strong water current ; fresh green weeds start infesting the entire ecosystem ; not a proper season for seed collection by tow net and velon screen drag net. Try net collections contain enormous quantities of African weed rendering seed sorting laborious.
2. *Salinity*—Remains nearly freshwater ranging from 0.16 to 1.28‰ ; average 0.38‰.
3. *Temperature*—Ranges from 26.0 to 28.5° C ; average 27.0° C.
4. *Prawn seeds*—Generally scarce. Important species *M. affinis* and *M. dobson. M. affinis* occurs in peak abundance in try net. Species of the genus *Penaeus* are extremely rare.

August

1. *Physical conditions of the backwater*—Flooded situation and turbidity prevails, but occasionally the water becomes clear. Floating weeds on the surface and nearshore areas and the settled weeds at the bottom make seed collection difficult.

2. *Salinity*—Continues to be very low ranging from 0.16 to 2.71‰ ; average 0.83‰.

3. *Temperature*—Ranges from 27.3 to 28.8°C ; average 28.0°C.

4. *Prawn seeds*—Continue to be very poor. *M. dobsoni* is the commonly occurring species. Species of the genus *Penaeus* are totally absent. Generally not a good month for seed collection.

September

1. *Physical conditions of the backwater*—Flood continues in lesser intensity ; water getting clear and turbidity low ; African weeds continue to dictate the ecosystem.

2. *Salinity*—Ranges from 0.92 to 9.15‰ ; average 2.44‰.

3. *Temperature*—Ranges from 27.4 to 28.8°C ; average 28.2° C.

4. *Prawn seeds*—Recolonisation takes place and the system is replenished by a new wave of younger seeds particularly of species of the genus *Penaeus*. *P. indicus* begins to appear in large numbers in the velon screen drag net collections. *M. dobsoni* occurs in peak abundance in both velon screen drag net and try netcatches. Seed collection can be initiated during this month after the monsoon break.

October

1. *Physical conditions of the backwater*—Clear water; the problem of African weed continues.

2. *Salinity*—Gradually rises but unsteady and shows wide fluctuations ranging from 1.19 to 26.76‰ ; average 15.9‰.

3. *Temperature*—Ranges from 28.4 to 29.0°C ; average 28.8°C.

4. *Prawn seeds*—Steadily increases along the nearshore areas, the dominant species being *P. indicus* and *M. dobsoni*. *P. indicus* abundant in velon screen drag net.

November

1. *Physical conditions of the backwater*—Clear water ; the floating weeds start decaying ; partly decayed weeds get accumulated near the shore and at the bottom hampering the operation of velon screen drag net and try net.

2. *Salinity*—Ranges from 9.86 to 28.28‰ ; average 20.57‰.

3. *Temperature*—Ranges from 28.0 to 29.4° C ; average 28.9°C.

4. *Prawn seeds*—*P. indicus* less abundant than in the previous month ; *M. dobsoni* occurs in maximum numbers in the plankton.

December

1. *Physical conditions of the backwater*—Clear water ; decayed weeds settle at the bottom and get entangled in try net in large quantities.

2. *Salinity*—Ranges from 24.27 to 29.62‰ ; average 28.18‰.

3. *Temperature*—Ranges from 27.5 to 29.0°C ; average 28.3°C.

4. *Prawn seeds*—General abundance near the shore picks up again with *P. indicus* as dominant species. *M. dobsoni* is fairly common in tow net and velon screen drag net.

Remarks

A perusal of the seed calendar would indicate that although prawn seed is available throughout the year, most of the species have peak seasons of abundance. *M. dobsoni*, the most common species of this backwater, occurs in maximum abundance from August to January, while *M. affinis* and *M. monoceros* have peaks during May-July and December-April respectively. In the case of *P. indicus* the peak occurrence is noticed during the summer period March-May. The seeds of *P. semisulcatus* are relatively more common during January-March and their occurrence coincides with periods of increasing salinity as in the case of *Parapenaeopsis stylifera*.

The information furnished here would be useful in proper seed collection for culture operations. When considering the fast development of intensive shrimp farming around this area, mainly based on the seeds collected from this backwater, a word of caution seems appropriate. Since the juvenile population of penaeid prawns abounding in estuaries and backwaters form the basic stock for replenishing the population in the adjoining inshore waters, their indiscriminate exploitation at the early stages from this nursery area might adversely affect the capture fisheries. Therefore a rational approach is necessary in tapping this valuable resource. For continued progress of prawn culture in this region it is also essential that efforts are intensified for large scale production of quality seeds by artificial propagation. In this context the recent advances made in perfecting techniques of spawning and mass culturing of penaeid prawns under controlled conditions at the Narakkal Prawn Culture Laboratory (Silas and Muthu, 1977) are significant and the efficient methods evolved here will go a long way in establishing hatcheries for large-scale production of seeds to meet the ever increasing demand and thereby reduce the dependence on wild stock.

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