



# Occurrence and abundance of juvenile Penaeid shrimps in Gosthani backwaters of Bheemunipatnam with respect to an emphasis towards Entrepreneurship

Sudharani P., Assistant Professor, Dept. of Biotechnology, GITAM (Deemed to be University), Visakhapatnam-530045, India.

Kishan K.P.C., Professor, Dept. of Entrepreneurship, GITAM (Deemed to be University), Visakhapatnam-530045, India.

Ramamohanrao M., Professor, Dept. of Entrepreneurship, GITAM (Deemed to be University), Visakhapatnam-530045, India.

Manjulatha C. Professor & Head, Dept. of Zoology, Andhra University, Visakhapatnam-530003, India.

## Abstract:

Sea food is a highly traded food commodity among which, farmed tropical marine penaeid shrimps contribute a significant proportion. The present study has been undertaken to investigate the seasonal occurrence and abundance of juvenile penaeids in Gosthani estuary, Bheemunipatnam coast; in order to know the opportunities to get wild stock for aqua farmers. For the study, random samples of juvenile shrimps from the fishery of the estuary, were collected fortnightly between September 2020 to August 2021 and analysed. The results revealed the presence of six species of juvenile penaeid shrimps inhabiting the estuary during the study period.

*Metapenaeus monoceros* and *Penaeus indicus* were more commonly found in catches and constituted 78.78% of the population. These two species sustained their occurrence throughout the study period, whereas *P. semisulcatus* constituted 15.83% of the population followed by *P. monodon* (4.21%). Another juvenile species, *M. dobsoni* shared a very little percentage of the population (0.8%), whereas small individuals (6mm-14mm) of the genera *Metapenaeus* constituting 0.38% of the total population, could not be identified to species level. Seasonal abundance of the population is also observed, which can be utilized as irrelevance seed resource for penaeid shrimp aquaculture.

**Key words:** Juvenile penaeid shrimp, Gosthani estuary, occurrence and abundance, species.

## I. Introduction:

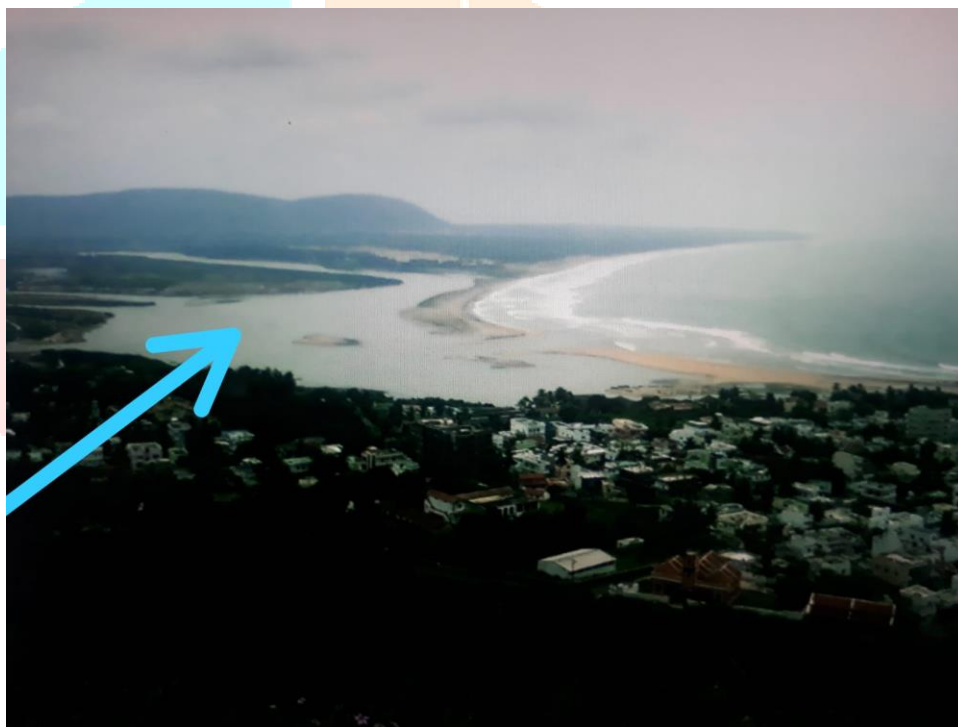
The developmental cycle of penaeid shrimps is completed in two phases: first is an oceanic phase, when they spawn and pass through a series of larval stages to attain Mysis and post larva; second is the estuarine phase in which the post larvae move inshore to estuarine backwaters and become demersal juveniles<sup>4</sup>. Estuaries are nursery areas for juveniles of many penaeid shrimp species<sup>(8,10)</sup> and therefore play an important role in the life cycle of those species. The estuarine water ways are highly rich in nutrients, provides favourable habitats, serve as nurseries and feeding grounds for juvenile penaeid prawns. These shallow estuarine backwaters enhance the survival and growth of the young shrimps to adolescence. Then they move to offshore waters for spawning on being mature.

Investigations on the occurrence and species composition of shrimp post larvae<sup>(9,2,5,14,11,1,3,13)</sup>; water quality and abundance of phytoplankton for juvenile penaeids at Gosthani estuary<sup>15</sup>, feeding habits of *Parapenaeopsis stylifera* of Gosthani estuary<sup>12</sup> were done by different researchers. The present study is another attempt to overview the seasonal occurrence and abundance of this commercially important juvenile resource in Gosthani estuary opening into Bay of Bengal, on account of taking a note of emphasis towards employment generation through Entrepreneurship.

## II. Material and Methods:

Random samples of juvenile shrimps from the fishery of Gosthani estuary (lat. 17° 53' - 17°56' N: long. 83° 26' - 83° 28' E) Bheemunipatnam coast, Visakhapatnam District, A.P., India (Map 1, Plate 1) were collected fortnightly for a period of twelve months between September 2020 and August 2021. A drag net consisting of 5 pieces (5.0 × 2.7 in each) with a stretch mesh varying from 0.9- 2.5 cm was operated in the estuary between 06.30 and 08.30 hrs. in depths of 0.5 – 2.5 m. for juvenile shrimps. Temperature, salinity and pH of water were recorded. Collected samples were packed in iced polythene bags, brought to the laboratory, washed with tap water, wiped gently and were identified<sup>(6,7)</sup> up to their species level.

Data on catch per day was enquired from fisher folks working in daily trip boats. That data was made up to total number of boats involved in fishing in the particular fishing day and the resultant data was calculated for one month and tabulated (Table 1). SPSS 16.0 version is used for statistical analysis. Bar graph and line graphs were plotted to explain species composition, seasonal occurrence and abundance of the community.



**Map 1: Gosthani river (sample collection point, indicated by arrow)  
opening into Bay of Bengal.**



**Plate 1: Gosthani estuary, sample collection site, Bheemunipatnam, Visakhapatnam District, A.P. India.**

### III. Results:

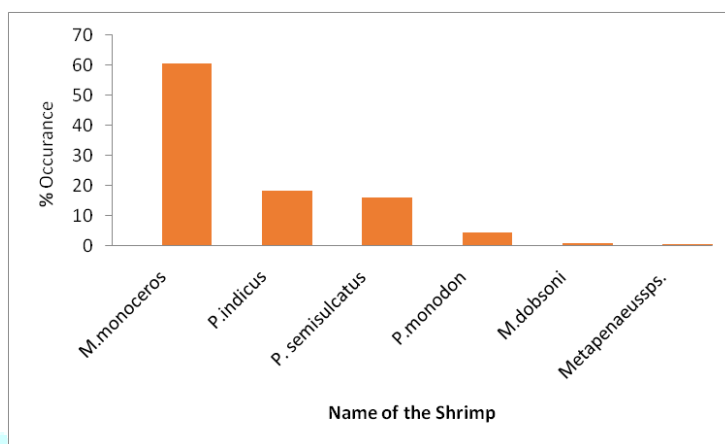
Analysis of the collected samples revealed the presence of six species: Juveniles of *Metapenaeus monoceros*, *Penaeus indicus*, *P. semisulcatus*, *P. monodon*, *M. dobsoni* and *Metapenaeus* sps. The smaller (6mm-14mm length) specimens of the genera *Metapenaeus* could not be identified to species level.

**Table 1: Mean catch (kgs) composition of juvenile penaeid shrimps from Gosthani estuary during September 2020- August 2021.**

Name/ Month	<i>M.</i> <i>monoceros</i>	<i>P.</i> <i>indicus</i>	<i>P.</i> <i>semisulcatus</i>	<i>P.</i> <i>monodon</i>	<i>M.</i> <i>dobsoni</i>	<i>Metapenaeus</i> sps.	Total
Sep.	110	45	12	9	0	2	178
Oct.	129	44	13	6	2	0	194
Nov.	132	49	15	8	2	1	207
Dec.	140	50	11	10	0	0	211
Jan.	126	38	12	8	3	1	188
Feb.	128	30	10	6	0	1	175
Mar.	119	42	10	7	2	0	180
Apr.	130	30	14	7	3	0	184
May	72	13	61	8	2	1	157
June	66	11	50	6	0	0	133
July	59	18	49	8	0	2	136
Aug.	74	12	78	6	3	0	173
<b>Total</b>	<b>1285</b>	<b>382</b>	<b>335</b>	<b>89</b>	<b>17</b>	<b>8</b>	<b>2116</b>
<b>%</b>	<b>60.73</b>	<b>18.05</b>	<b>15.83</b>	<b>4.21</b>	<b>0.8</b>	<b>0.38</b>	<b>100</b>

As presented in Table 1 and Fig.1, the total mean catch of juvenile penaeid shrimps from Gosthani estuary during the study period is 2116 kgs. They belong to the family Penaeidae with juveniles of *M. monoceros* (60.73%) as predominant among the population followed by *P. indicus* (18.05%), *P. semisulcatus* (15.83%), *P. monodon* (4.21%), *M. dobsoni* (0.8%) and unidentified *Metapenaeus* sps. (0.38%). Maximum number (211) of juveniles were available for collection in the month of December, where *M. monoceros* was the most dominant (140) species followed by *P. indicus* (50), *P. semisulcatus* (11) and *P. monodon* (10); constituting 66.35%, 23.7%, 5.21% and 4.74% respectively of the total population in December. The same pattern of composition is followed from September through April.

From May through August, the populations of juvenile *M. monoceros* and *P. indicus* have declined, but that of *P. semisulcatus* was increased. Yet, *M. monoceros* has maintained the highest peak, *P. semisulcatus* has attained second higher peak and juvenile *P. indicus* became the third higher peak in abundance. Among all the study months, only in August, juvenile *M. monoceros* abundance was slightly lesser, which may not be taken into consideration. The population of juvenile *P. monodon* was stable during the entire study period. *M. dobsoni* and unidentified *Metapenaeus* sps. appeared occasionally in the samples throughout the study period.



**Fig.1: Mean % occurrence of juvenile penaeid shrimps in Gosthani estuary during September 2020 – August 2021.**



**Fig.2: Mean abundance (kgs) of juvenile penaeid shrimps in Gosthani estuary during September 2020 to August 2021.**

The temperature, salinity and pH ranges of estuarine water during the study period are 18°C- 34°C, 29-45‰ and 7.8-8.2 respectively.

#### IV. Discussion:

The present investigation indicated a pronounced variation in the composition (Table 1, Fig.1) and abundance (Fig.2) of juvenile Penaeid shrimps in the study area. Juveniles of *M. monoceros* (60.73%) was found to be abundant in all the samples followed by *P. indicus*, *P. semisulcatus*, *P. monodon*, *M. dobsoni* and unidentified *Metapenaeus* sps. This is in tune with the investigations in the same study area, where four species of Penaeid juveniles were reported<sup>13</sup>, of which *M. monoceros* population was predominated followed by *P. indicus*, *P. semisulcatus* and *P. monodon*. Apart from these four species, *M. dobsoni* and another *Metapenaeus* species were also sampled in the present probe. But, the current confer is not in agreement with the presence of *Parapenaeopsis stylifera* in the same study area<sup>12</sup>. The absence of *P. stylifera* during the occurring time may be due to different spacial distribution of the species in different periods.

In view of species abundancy, the research carried out in the mangroves of Sandspit, Karachi<sup>14</sup> is in support of the present investigation that, the population of juvenile *M. monoceros* was reported as first abundant species in both the studies. *M. stebbingi*, *P. merguensis* and *penicillatus* complex were second abundant; *P. indicus*, *P. monodon* and *M. affinis* also occurred in small numbers, of the seven species reported in the study<sup>14</sup>. Another research conducted in the same mangrove swamps of Sandspit in Karachi<sup>3</sup> was not in agreement with the previous study<sup>14</sup> conducted in the same area and the present study in Gosthani estuary as well, that *M. affinis* is the first dominant species and population of *M. monoceros* is designated as the second dominant juvenile followed by *M. stebbingi*, *P. indicus*, *P. monodon*, *P. semisulcatus* and unidentified *Metapenaeus* and *Penaeus* sps., of the eight juveniles reported<sup>3</sup>.

The present study also furnished interesting results that coincide with the work done on seasonal occurrence of juvenile species at the same study area<sup>11</sup>, where *P. indicus*, *P. monodon* and *M. monoceros* have peak availability in December (Table 1). Reason may be, during both the study periods, water parameters of the estuary or availability of food for the growing juveniles might have been favourable to survive more. Reports from Indus delta revealed the presence of juvenile *M. affinis* and *P. indicus* in the delta waters<sup>(2,5)</sup>, however these two studies were limited to only three months samples.

Moreover, the peak abundance of *M. monoceros* in majority of the studies including the present investigation may be due to positive correlation of the species with increasing salinity. This fact was proved in habitats of mangrove fringed Bay on Inhaca island, Mozambique<sup>1</sup> while the researchers are working on spatial distribution of juvenile penaeid shrimps. Furthermore, it was observed that the size of the catch (Table 1) at the study area during the present study period is very limited when compared with previous research<sup>13</sup> because the fisher folk are unable to perform fishing operations to their efforts, as the precautionary protocol due to Covid19 pandemic is in force.

#### V. Conclusion:

Penaeid shrimp aquaculture has expanded significantly over the past three decades. The results of the current research indicate that the respective sample area can be considered as a probable nursery ground for shrimps. Penaeid juveniles inhabit salinity and were dominant in Gosthani estuary, which may be due to the occurrence of favourable environmental conditions of the habitat. It may be considered that; a fair number of seed is available in Gosthani backwaters to meet the requirement of shrimp culture operations. Further studies on the fishery details of the estuary will be helpful to confirm the location as a potential collection ground for juveniles of commercially important species, that can be a seed resource for aqua farmers and can create Entrepreneurs, intern employment, which adds to produce economy and reduce poverty.

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