

Effect of Tidal and Lunar Phases on the Penaeid Prawn Seed Abundance

Most penaeid prawns utilize estuaries as their nursery areas, where postlarvae and juveniles grow under sheltered and protected conditions (Idyll, 1957). Many factors are known to affect the abundance of prawn seed in this environment (Staples & Vance, 1979). These factors include state of tide, time of day, tidal and lunar phases, season, schooling behaviour and the distribution of seed with respect to water depth.

In the present work, to study tidal and lunar influences on penaeid prawn seed abundance, collections of water and seed samples were made on 21 August, 1986 (full moon), 5 September, 1986 (New Moon) and 12 September, 1986 (half moon) in the Kali estuary, Karwar where tides are of semi-diurnal type. In each lunar phase, collections were made every three hour intervals commencing from 06.00 to 18.00 h covering four tidal phases: high, receding, low and rising tides. The water samples were analysed for recording temperature, salinity and dissolved oxygen following standard methods (Strickland & Parsons, 1972). Seed samples were collected at shallow waters (at knee depth) with a standard velon screen drag net (mesh size 2 mm) of length 2 m and width 1 m by covering an area of 10 m². Height of the tide (water level) was recorded at the time of each collection by a graduated pole fixed below the low tide mark. The state of the tide was decided by referring to the Indian Tide Table (1986).

Variation in temperature was maximum (26.0 - 31.0°C) on September 12 and minimum (28.0 - 29.5°C) on September 5. The salinity fluctuation was comparatively high around full moon (1.46 - 22.99%) and new moon (2.90 - 28.87%) days.

Higher salinity values were recorded during high and receding tides, whereas low values during low and rising tides. The range of variation of dissolved oxygen was 4.264 - 5.401, 3.681 - 4.832 and 3.666 - 5.075 ml/l on August 21, September 5, and September 12 respectively. In general, the concentration of dissolved oxygen was high during the low and rising tides and low during the high and receding tides.

The seeds of two species of penaeid prawns were present in the collection. They were *Penaeus merguensis* (4.04%) and *Metapenaeus dobsoni* (95.96%) with the former ranging from 7-12 mm and the latter 4-32 mm in total length. The distribution of seed appeared to be influenced by tidal and lunar phases (Table 1). The peak abundance of seed was recorded during low tide whereas high tide registered the lowest. Out of 445 seeds recorded, 132 (29.66%), 297 (66.74%) and 16 (3.60%) occurred on full moon, new moon and half moon days respectively. Species abundance also showed more or less similar pattern of variation.

No direct relationship could be established between the hydrological parameters and abundance of seed. The gradual fall in water level with the onset of low tide results in the subsequent exposure of the submerged area and thus the area available for the settlement of prawn seeds gets reduced. This reduction in the area for distribution might have resulted in the maximum occurrence of seeds at the time of low tide. Better catch rate during low tide periods in the present study is in conformity with the works of Staples & Vance (1979). From the study it was also observed that new moon collection,

Table 1. *Hydrological parameters, tidal periodicities and availability of penaeid prawn seeds*

Lunar phase	Tide height cm & State	Time h	Temperature °C	Salinity ‰	Dissolved oxygen ml/l	Species, numbers/10m ²	
						<i>P. merguensis</i>	<i>M. dobsoni</i>
Full noon (31 - 8 - 86)	0, low	0600	26.9	1.46	4.548	4	76
	93, rising	0900	28.5	2.18	5.401	-	3
	150, high	1200	30.0	20.90	5.401	-	-
	110, receding	1500	28.0	22.99	4.264	-	3
	40, low	1800	28.0	3.40	4.833	-	46
New noon (5-9-86)	10, low	0600	28.0	2.90	4.832	4	143
	80, rising	0900	29.5	3.61	4.832	-	-
	148, high	1200	29.0	22.64	4.548	-	-
	105, receding	1500	28.0	28.87	3.681	4	-
	55, low	1800	29.0	8.95	4.512	6	140
Half noon (12-9-86)	125, high	0600	26.0	15.31	3.666	-	-
	100, receding	0900	27.5	14.95	5.075	-	5
	70, low	1200	29.5	5.75	5.075	-	11
	95, rising	1500	31.0	8.60	5.075	-	-

showed numerical superiority over those of full moon and half moon collections. The spring tides coincide with full and new moons rendering it difficult to separate the effects of moon phases from tidal heights. Numerical superiority of new moon catches over full moon collections, inspite of similar influence of tidal height and hydrological parameters on seed catchability in both the cases, clearly indicate that moon phase affected the abundance of penaeid prawn seeds.

The authors are thankful to Shri Suresh Harakantra, Field Assistant, Department of Marine Biology, Karwar for his help during the course of the investigation.

Department of Marine Biology,
Karnatak University'
Kodibag, Karwar-581303

References

- Idyll, C. P. (1957) *National Geographic Magazine*, **111**, 699
- Indian Tide Table (1986) *Indian Tide Table, Indian and Selected Foreign Ports*. Printing Group of Survey of India, Dehra Dun.
- Staples, D. J. & Vance, D. J. (1979) *Aust. J. Mar. Freshw. Res.* **30**, 511
- Strickland, J. D. H. & Parsons, T. R. (1972) *Bull. Fish. Res. Board Can.* **167**, 1

VISHNUDAS GUNAGA,
KUSUMA NEELAKANTAN AND
B. NEELAKANTAN