

FURTHER OBSERVATIONS ON LUNAR PERIODICITY IN RELATION TO THE PRAWN ABUNDANCE IN THE GODAVARI ESTUARINE SYSTEMS

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INTRODUCTION

It is generally believed that the fluctuations in the prawn landings are closely associated with the phases of the moon in the inland tidal systems (Racek, 1959; Subrahmanyam, 1965, 1966). Racek (*loc. cit.*), however, felt that the correct interpretation of the fluctuations within a lunar month is somewhat confusing and suggested that a comprehensive study of the interrelation of factors controlling the lunar periodicity would be desirable in view of the importance of such findings to the prawn fisheries. While working in the Godavari estuarine systems the author observed that the total prawn catch and the migratory pattern of the commercial prawns were closely linked with the lunar phases (Subrahmanyam, 1965). The total prawn catch was relatively rich during the new moon period and this was found to be the result of the intensity of migration of the dominant commercial species at the mouth of the estuary. Similar studies conducted on the abundance of two commercially important prawns in the Chilka Lake proved that *Penaeus monodon* was relatively richer during the new moon fortnight while *Penaeus indicus* showed a greater abundance during the full moon fortnight (Subrahmanyam, 1966).

It is the object of this paper to project another observation made on the lunar periodicity in the abundance of prawns in the Godavari estuarine systems. A part of the data was presented in a previous paper dealing with the fluctuations in the landings of *P. monodon* (Subrahmanyam, 1964). The details gathered on size distribution and catch of *P. monodon* during the full moon and new moon phases are presented here. The data relate to the period from November 1961 to June 1962.

SPECIES COMPOSITION

Although several species enter the catch only six species contribute to the commercial fishery viz. *Metapenaeus monoceros*, *Pendaeus indicus*, *P. monodon*, *M. dobsonii*, *M. affinis* and *M. brevicornis*. *M. monoceros* is the dominant species forming about 43% in the total catch. These prawns occur all round the year but their numbers are very poor during the flood period, July-October. They appear in appreciable quantities from November till June but the peak season lasts from October or November to January only.

LUNAR PERIODICITY IN RELATION TO PRAWN ABUNDANCE

Total prawn catch : The catch-unit effort data collected during the new moon and full moon phases showed that the catch made during the new moon phase was

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heavier than the catch made during the full moon phase in each month (Fig. 1). The maximum and minimum values of the figure of the catch-per-unit effort for both the moon phases were recorded in December and February respectively.

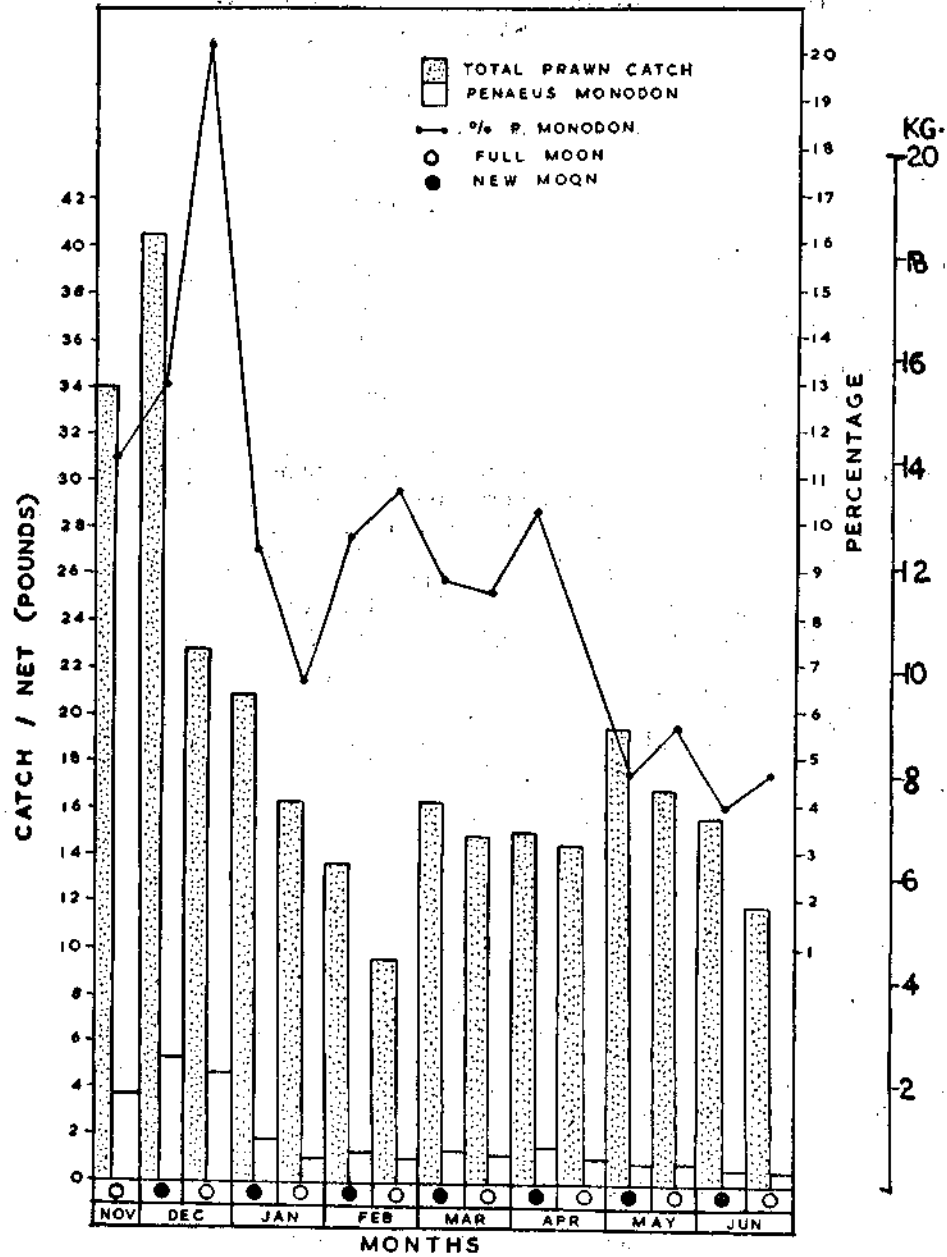


FIG. 1. Prawn catch in relation to lunar periodicity.

Penaeus monodon catch: The new moon catch was heavier than the full moon

catch in all the months except May. The catch-per-unit effort was maximum in December and minimum in June during both the moon phases (Fig. 1).

LUNAR PERIODICITY IN RELATION TO SIZE DISTRIBUTION IN *PENAEUS MONODON*

While analysing the size-frequency data of *P. monodon* collected both during the full moon and new moon phases, it was observed that the count per pound (whole prawns) was lower during the new moon phase, ranging from 28 to 57 whole prawns per pound, than during the full moon phase when the range was observed between 36 and 124 whole prawns per pound. The average for the whole period was 37 whole prawns per pound during the new moon phase and 60 whole prawns per pound during the full moon phase. This would mean that comparatively larger size-groups are available during the new moon phase than during the full moon phase.

The maximum sizes of both males and females recorded during the new moon phase were larger than the sizes recorded during the full moon phase. The maximum sizes of the male and female forms recorded from commercial catch during the full moon phase were 176 mm. and 184 mm. respectively while those recorded during the new moon phase were 204 mm. and 225 mm. respectively. The sizes over 135 mm. comprised 14.70% by number in case of males and 18.91% by number in case of females in the catches made during the new moon phase while these larger sizes formed only 11.13% by number in case of males and 15.44% in case of females in the catches made during the full moon phase. On the contrary, the smaller sizes (less than 75 mm.) were more in numbers in the catches made during the full moon phase (9.78%) while the same were only 2.50% in the catches made during the new moon phase. The mean size of the individuals was slightly higher during the new moon phase in all the months except in May and June. The average mean size of the individuals during the new moon phase was 101.6 mm. in case of males and 112.43 mm. in case of females while the same was 100.91 mm. in case of males and 104.32 mm. in case of females during the full moon phase for the period covered. This disparity in the mean sizes is clear from the dominance of the larger sizes over 135 mm. in the catches made during the new moon phase except in May and June (Table I). The majority of the larger sizes recorded during both the moon phases were females; however, they were slightly more in numbers during the new moon phase.

The variation in the abundance of *P. monodon* during the two moon phases also reflected on the value of the catches. The estimated cost of each pound during the period under study was higher during the full moon phase than during the new moon phase, a result of low catch and heavy demand during the former period.

DISCUSSION

The present observation on the lunar periodicity in the abundance of *Penaeus monodon* conforms well with a similar observation made at a later period in the Chilka Lake (Subrahmanyam, 1966). The only peculiarity, however, is the size-distribution during the two moon phases. It would appear from the present study that the activity of the larger size groups is considerably reduced on bright moon nights.

TABLE I

Penaeus monodon : Lunar periodicity in relation to size distribution

Month	Moon phase	MALES			FEMALES		
		Number	Size-range (mm.)	Mean size (mm.)	Number	Size-range (mm.)	Mean size (mm.)
November	New moon	114	70-175	109.06	135	65-205	129.75
	Full moon	260	37-166	110.03	248	44-184	114.55
December	New moon	122	73-166	104.31	177	33-167	103.54
	Full moon	71	49-155	96.17	67	40-154	97.33
January	New moon	56	83-204	118.91	47	56-214	110.34
	Full moon	48	76-176	97.91	58	64-183	99.74
February	New moon	30	78-184	139.57	27	81-192	124.30
	Full moon	31	90-144	114.19	47	70-153	111.32
March	New moon	38	90-166	123.76	40	32-201	121.95
	Full moon	126	22-140	71.99	153	21-157	79.29
April	New moon	156	63-178	98.44	163	62-225	97.96
	Full moon	76	31-145	93.16	95	24-166	99.85
May	New moon	75	42-186	107.71	83	74-205	104.01
	Full moon	70	77-162	109.90	71	68-183	113.52
June	New moon	69	74-156	107.75	63	70-161	107.57
	Full moon	46	64-164	113.93	38	52-162	118.95

In the Godavari estuarine system, *Metapenaeus monoceros* is the dominant species in the commercial prawn catch while *Penaeus indicus* is the dominant species in the commercial catch from the Chilka Lake (Subrahmanyam, 1966). It is believed that *M. monoceros* behaves the same way as *P. monodon* showing abundance during the new moon period. The seaward migration of *M. monoceros* was also intensive during the new moon period (Subrahmanyam, 1965).

In the size frequency distribution of prawns from the estuary the number of individuals decrease over a size of about 135 mm. or 140 mm. The relatively higher number of large size individuals (over 135 mm.) occurring in the commercial catches only during the new moon phase reflects on their behaviour during the two moon phases.

Though the present study confirms the earlier observations made on the lunar periodicity in relation to prawn abundance, the relationship between the moon phases and the size-distribution needs further detailed study for an extended period to advance any explanation for the disparity in the size distribution during the two moon phases.

SUMMARY

The relationship between the total prawn catch and the landings of *Penaeus monodon* and the lunar phases was studied. It was observed that the landings during the new moon phase were heavier than the landings during the full moon phase. The catch-per-unit effort (catch-per-net-per-day) is taken as an index.

The size frequency distribution during the two moon phases were not identical. Generally the larger size-groups were available in more numbers during the new moon period than the full moon period. The mean size of the individuals was higher during the new moon phase than during the full moon phase.

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