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856 INFLUENCE OF SEASONALITY AND LUNAR PERIODICITY ON THE MATURITY PATTERN OF *PINCTADA FUCATA* FOR NUCLEUS IMPLANTATION IN PEARL CULTURE

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In India, the Central Marine Fisheries Research Institute, succeeded in developing a viable technology for pearl culture using *Pinctada fucata* in 1973 and since then research is continuing to improve the technology. Further, the successful development of hatchery technology for the production of pearl oyster spat during 1981 led to production of pearl oyster seed overcoming the problem of non-availability of seed from the wild for pearl culture industry. These developments resulted in the establishment of the Tamil Nadu Pearls (Pvt.) Limited at Mandapam and the firm is carrying out pearl culture since 1983. James (*Bull. CMFRI*, 39:120-122, 1987) has indicated some of the research and development requirements on pearl culture such as the production of shell bead nuclei indigenously and to improve gross production and quality of cultured pearls.

In the commercial operations at Mandapam a large number of mother oysters were found not suitable for nucleus implantation due to the ripe and developing condition of their gonads. An average of 49 % were only suitable for implantation of nuclei and in some days only 2 % were suitable. This problem caused unnecessary stress to oysters. Therefore it was decided to examine the influence of seasonal and lunar periodicity on maturation of the oyster in relation to nuclei implantation.

The study was based on the samples brought from the mother oyster farm at Krusadai Island. When the oysters attained suitable size for nucleus implantation operation, they were transported to Tamil Nadu Pearls Implantation Centre at Mandapam. Preconditioning of mother oyster for surgery was done by keeping the oysters in running filtered sea water during the previous night of the surgery date.

On every nucleus implantation day, 100 oysters were taken at random for surgery. The visceral mass was found occupied largely by gonad which takes the major nucleus load. The oysters were opened and those found in the inactive or 'condition' (other than the ripe and developing) stage, were suitable for implantation of nuclei. The ripe and developing stage oystersh were returned along with other discarded oysters to the oyster farm. Between September '85 and August '86 a total of 21,800 mother oysters were examined in 218 nucleus implantation days.

The data on preconditioned oysters for implanation were pooled monthwise and the number in the three gonadial classification viz. the ripe, the developing and the inactive are given in Table 1. The monthwise percentage of ripe, developing and inactive oysters are shown in Fig.1. During October, November and March 1985 and July-August 1986, the inactive oysters constituted more than 50 % of the population.

The monthly percentage of ripe oysters ranged from 21 to 61 % and the mean monthly percentage was 36 %. During September, January, February, April and May, the ripe oysters formed 55, 46, 50, 52 and 61 % respectively. During November, March, July and August, the ripe oysters formed 21-24 % which is well below the average of 36 %.

TABLE 1. *Monthwise number of oysters in different gonadial conditions viz. ripe, developing and inactive*

Month	Sample No.	Ripe	Developing	Inactive
Sept '85	300	166	39	95
Oct.	2,400	661	464	1,275
Nov.	2,300	480	326	1,494
Dec.	2,500	935	320	1,245
Jan '86	2,500	1,146	368	986
Feb.	2,300	1,140	291	869
Mar.	1,100	244	186	670
Apr.	1,300	681	437	182
May	1,600	981	160	459
Jun.	1,200	450	151	599
Jul.	2,700	647	364	1,689
Aug.	1,600	344	231	1,025
Total	21,800	7,875	3,337	10,588
%	100.0	36.1	15.3	48.6

The monthly mean gonad developing stage was 15 % and was less than the mean during September, November-February and May-August. The developing stage oysters were more during October, March and April and formed 19, 17 and 34 % respectively.

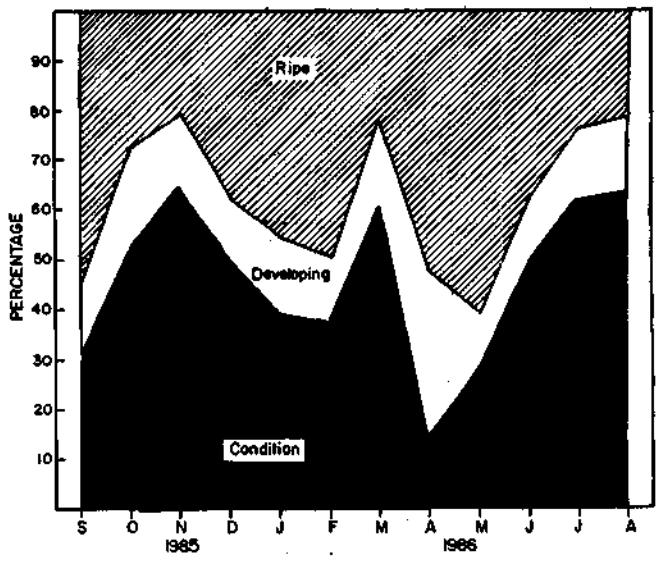

Fig. 1 Monthwise percentage of ripe, developing and inactive oysters at Krusadai Island pearl oyster farm.

The pearl oysters in Tuticorin harbour farm also showed the inactive, maturing and mature gonads and these stages were represented almost in all the months during 1980-'81 (Chellam, *Bull. CMFRI*, 39 : 13-20, 1987). The percentage of resting/inactive gonad was less during March-May and September-October 1980 among Tuticorin harbour farm oysters. In Krusadai farm oyster, during April-May and September, the inactive oysters were less (14-32 %) than the monthly mean percentage (49 %).

The daily percentage of occurrence of inactive oysters was plotted against the date of operation and the full moon and new moon days are marked in Fig.2.

In addition to the day of full moon and new moon, 3 days before and after the full moon and the new moon days were taken as lunar periods. The rest of the period between the full moon and new moon was taken as interlunar period. The number of sampling days during the lunar periods and interlunar periods, the date of full moon and new moon and the percentage of occurrence of inactive, developing and ripe oysters are given in Table 2. A closer examination of the mean values of inactive oysters between interlunar and lunar periods (Fig. 2) showed slight increase as well as slight decrease in the percentage. To know whether there is a relationship of percentage occurrence of inactive oysters during lunar and interlunar periods and to know whether there is a general increase or decrease in the percentage of inactive oysters between the two lunar periods, regression analysis was performed and was found that the mean value of inactive oysters percentage (51) was more during lunar period than the percentage during interlunar period (45) and this showed an increase of inactiveoysters during lunar period.

From the above analysis of the data for the effect of lunar periods on the daily occurrence of ripe, developing and inactive oysters it was evident that there was not much difference in the

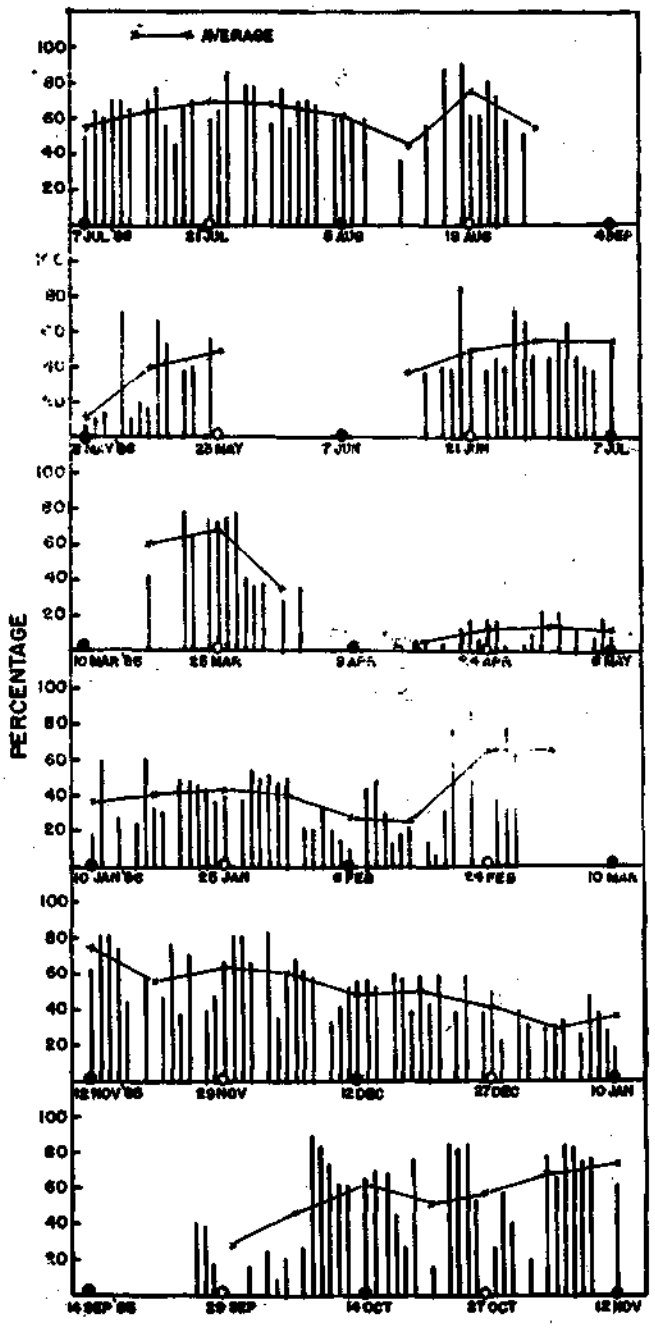

Fig. 2. Daily percentage occurrence of inactive oysters and the mean values during full moon, new moon and semi-lunar periods during September ' 85 to August '86.

structure of the population periods. Contrary to the general belief, the ripe oysters were slightly less during the lunar period and the inactive oysters were slightly more than in the interlunar period. The variation in the percentage occurrence of inactive oysters was mainly due to the season. It will be advantageous to make use of the season of inactive oysters to the maximum for pearl culture operations.

TABLE 2. *The number of sampling days durtng the full moon (F), semi lunar (S) and new moon (N) periods and the percentage of inactive, developing and ripe oysters*

Date of Full and New Moon	Lunar phase	Number of sampling days	Oyster gonad condition		
			Inactive	Developing	ripe
1	2	3	4	5	6
29.09.'85	F	4	28	22	50
	S	7	47	22	31
14.10.'85	N	6	63	22	15
	S	4	52	13	35
27.10.'85	F	6	58	13	29
	S	6	68	15	17
12.11.'85	N	5	74	10	16
	S	6	56	16	28
27.11.'85	F	6	64	15	21
	S	6	61	12	27
12.12.'85	N	6	48	12	40
	S	7	50	11	39
27.12.'85	F	5	41	19	40
	S	5	29	7	64
10.01.'86	N	6	36	12	52
	S	6	41	17	42
25.01.'86	F	6	43	19	38
	S	6	41	18	41
08.02.'86	N	6	28	15	57
	S	8	26	11	63
24.02.'86	F	5	66	9	25
	S	2	66	14	20
10.03.'86	N	–	–	–	–
	S	2	60	27	13
25.03.'86	F	6	68	16	16
	S	4	35	12	53
09.04.'86	N	–	–	–	–
	S	2	4	53	43
24.04.'86	F	6	12	34	54
	S	5	14	27	59
08.05.'86	N	5	12	12	76
	S	7	39	8	53
23.05.'86	F	2	48	6	46
	S	–	–	–	–
07.06.'86	N	–	–	–	–
	S	6	37	20	43
21.07.'86	F	6	69	17	14
	S	7	68	12	20
05.08.'86	N	5	61	15	24
	S	2	45	23	32
19.08.'86	F	6	76	10	14
	S	2	55	21	24
21.06.'86	F	6	49	16	35
	S	8	54	10	36
07.07.'86	N	6	54	11	35
	S	6	64	13	23