Development of an Efficient Trap for Lobster Fishing

K. V. MOHAN RAJAN*, B. MEENAKUMARI and A. K. KESAVAN NAIR
Central Institute of Fisheries Technology, Cochin - 682 029

A modified trap was developed for fishing spiny lobsters. Experimental fishing was conducted using this trap along with traditional trap (as control) to assess the comparative efficiency. Design details and comparative efficiency of the modified trap is reported in this paper. From the analysis of variance, the difference in average catches between the modified trap and the control is found to be highly significant establishing the high efficiency of new trap.

Trap is the conventional fishing gear extensively employed for both large scale and small scale exploitation of spiny lobsters all over the world (Pease, 1965). Mohan Rajan *et al.* (1981) has reviewed the various fishing methods for the exploitation of spiny lobsters. The traditional traps used along the south west coast of India for fishing spiny lobsters are called 'Colachal traps' described by Miyamoto & Shariff (1961) which are made of palmyra leaf stalk fibres. They also reported about anchor hooks, scoop nets, and bottom set gill nets for fishing spiny lobsters. Balasubramanyan *et al.* (1961) have assessed the lobster fishing grounds of the south west coast with bottom set gill nets. The most popular 'Colachal traps' being made of biodegradable materials, last only a few days in the sea water. Moreover these traditional traps have remained restricted in popularity to certain pockets of Indian coastline since their fabrication techniques and mode of operation are known only to a few fishermen.

Prospects for upgrading fishing gear exist in several fields and trap is one of them. Spiny lobsters lend themselves for easy exploitation as they live in shallow waters and can be attracted into pots which do not require constant tending. Catching lobsters therefore, is a low capital enterprise with high returns on the investment. Trap fishing amounts to diversification of fishing effort by evolving appropriate technology (Anon, 1981).

*Present address: Research Centre of Central Institute of Fisheries Technology, Veraval - 362 265.

In the present communication the authors introduce a modified design of lobster trap developed basing on extensive studies with three different designs of traps (Mohan Rajan & Meenakumari, 1982) and incorporating the observations of the studies on trap materials (Meenakumari & Mohan Rajan, 1985). Experimental fishings were conducted with this trap using a traditional trap as control. The design details and comparative efficiency of the modified trap are reported in this paper.

Materials and Methods

The trap is semicylindrical in appearance and measures 700 x 550 x 400 mm and is a modified version of Australian pot with a frame of rectangular base and semicircular ribs made of 10 mm dia MS rod. MS welded mesh (25 x 25 mm square mesh, 2.11 mm thick) is used as covering material on the skeletal frame work. The trap is a single entry type with a trunk shaped funnel of 350 mm located at one end. Funnel is designed and attached in such a way that lobsters are guided by a gradual inclination to the internal opening through which they fall into the floor of the trap. The anterior end of the trap as such tapers into a circular ring of 200 mm dia located 100 mm inside the trap and held in position by 6 mm rods attached to the corners. The funnel extends to 250 mm inside the trap. The internal opening is formed of an elliptical ring of 180 mm in length and 120 mm in breadth attached at an inclination of 30° being 130 mm below the roof of the trap and 270 mm above the floor. Hexagonal

meshed chicken wire netting (125 mm mesh, 0.89 mm thick) is used to cover the funnel. An escape gap of 150 x 35 mm of 120 x 120 mm is also provided on the upper middle portion of the trap with suitable hinge arrangement for baiting and removal of the catch. No separate holding compartment is necessary since the whole trap holds the catch. The completed trap (Fig. 3) is given a plastic coating (Meenakumari & Mohan Rajan, 1985) to prevent corrosion in sea water.

The traps were serially numbered and the trap nos. 20, 21 and 23 which were in the modified design were used to conduct experimental fishing. They were put to extensive field trials along with traditional trap using live tender mussels *(Perna* sp.*)* as bait at Kadiapatnam (77°11′E, 18°8′N) and Enayam (77°11′E, 18°13′N). The fishing craft employed for the operation of the gear was four logged boat catamaran

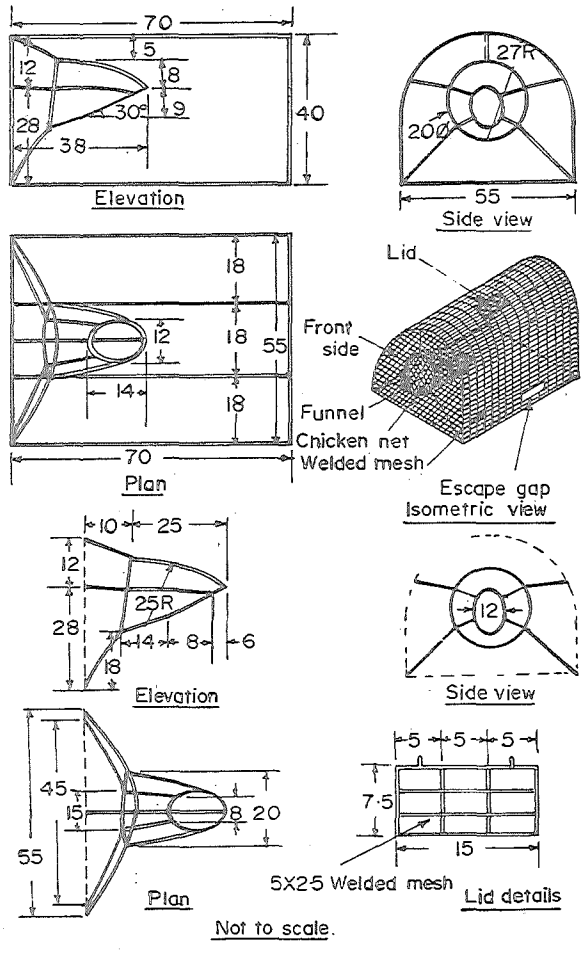

Fig. 1. Design details of modified lobster trap

and the fishing ground was 8 to 20 m in depth. The traps were set and retrieved by resorting to skin diving. 3.5 kg of granite stones were put as ballast inside the trap. The technique of analysis of variance (ANOVA) as presented by Snedecor and Cochran (1968) was employed to compare statistically the modified and control traps with regard to their performances.

Results and Discussion

Fig. 1 shows the design aspects of the modified trap. A semicylindrical structure is found more suitable for the trap (Mohan Rajan & Meenakumari, 1982) since it imparts greater bottom stability and reduces

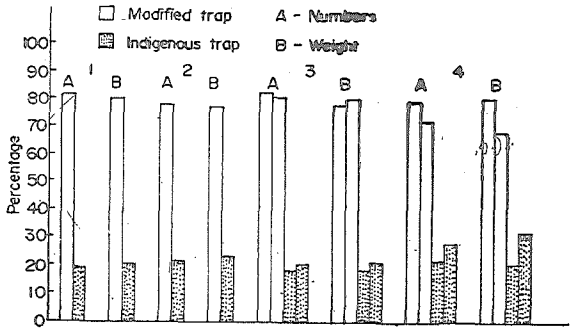

Fig. 2. 1) Overall efficiency Kadiapatnam
2) Overall efficiency Enayam
3) Seasonwise efficiency Kadiapatnam (1980 – '81 and 1981 – '82)
4) Seasonwise efficiency Enayam (1980 – '81 and 1981 – '82)

the effects of under water currents. A side entrance is given for the trap since the tests undertaken in Scotland (Temple, 1964) and at the institute (Mohan Rajan & Meenakumari, 1982) showed that side entrance pot gave higher catch rates than top entrance types. In designing the opening of the funnel the typical behaviour of the lobsters are taken into consideration. Spiny lobsters being typically crawling organisms (Suborder: Reptantia) move about only in the floor of traps looking for ways of escape, unlike fishes which rise immediately to the top when, entrapped. So the opening of the funnel in the trap is located high at the side so that the organisms are not able to locate it. As seen in Fig. 1 an escape gap is provided for the possible escape of under sized and juveniles as a measure of conservation.

The size of the escape gap will be finalised after detailed studies with vents of different sizes and taking morphometric features like carapace height into consideration, the details of which will be reported later.

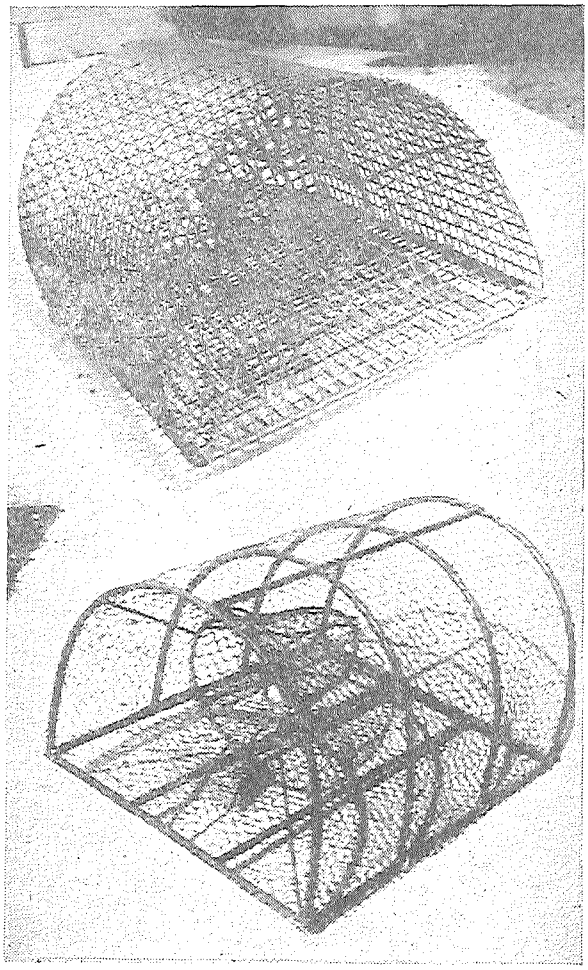

Fig. 3. Completed modified lobster trap in welded mesh (above) and chicken wire netting (below)

A total of 52 experimental fishing operartions were conducted at Kadiapatnam for the two seasons (1980 – 81 and 1981–82) and 44 at Enayam landing a total of 692 lobsters weighing 133.435 kg with 3 modified traps and 59 lobsters weighing 13.005 kg with one control trap. The details of the fishing operations are given in the Table 1, which give a clear indication of the superiority of the modified trap over traditional one.

The efficiency of the modified gear in respect of centre and season is presented in Fig. 2 and it indicates that the efficiency of the modified gear is almost same irrespective of season and the fishing ground. The average catches in terms of the number of lobster caught by the modified and control traps for the two centres are presented in Table 2.

From the analysis of variance (ANOVA) (Table 3) the difference in average catches between modified trap and control trap is found to be highly significant establishing a high efficiency of the new traps at both the centres. The tendency for a slight difference among the new traps at Kadiapatnam as indicated by an F-value which is just significant at 5% level is not of any consequence, as the difference between 'modified vs control' is very highly significant.

Table 1. *Details of lobster trap fishing operations during* 1980 – 81 *and* 1981 – 82 *fishing seasons at Kadiapatnam and Enayam*

Fishing area and seasons	Details of modified trap operation					Details of traditional trap operation			
	No. of fishing days	No. of trap/ day	Total No.	catch weight kg	Average weight of lobster g	No. of trap/ day	Total No.	catch weight kg	Average weight of lobster g
Kadiapatnam									
1980–1981	31	3	283	51.40	181.63	1	21	4.47	212.85
1981–1982	21	3	228	30.10	132.03	1	18	2.405	133.11
Total	52	—	511	81.50	159.49	—	39	6.875	172.98
Enayam									
1980–1981	22	3	94	35.15	373.94	1	8	2.805	350.62
1981–1982	22	3	87	21.775	250.29	1	11	3.325	302.27
Total	44	—	181	56.925	314.50	—	19	6.130	326.45
Grand total	96	—	692	138.425	200.04	—	28	13.005	249.71

Table 2. *Average catch (number of lobsters)*

Centre	Modified trap	Control
1. Seasons combined for centres		
Kadiapatnam	4.0	0.7
Enayam	1.6	0.5
2. Centres, season-wise		
Kadiapatnam		
1980–81	2.1	0.3
1981–82	1.9	0.4
Enayam		
1980–81	0.8	0.2
1981–82	0.7	0.3

The lobster trap developed is efficient and remunerative. Studies on economic viability of lobster traps in this design has further confirmed this (Mohan Rajan *et al.*, 1984). The initial higher expenditure is more than offset by way of increased catch and lesser recurring expenditure and extended service life.

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Table 3. *Analysis of variance of lobster catch*

A) Kadiapatnam

Source of variation	Degrees of freedom	Sum of squares	Mean square	F value
Standard vs control	1	325.0548	325.0548	17.7**
Among standard traps	2	139.4912	69.7456	3.8*
Residuals	111	2034.7039	18.3307	
B) Enayam				
Standard vs control	1	33.3867	33.3867	15.0**
Among standard traps	2	7.5043	3.7521	1.7
Residuals	114	253.3590	2.2224	

* Significant at 5% level
** Highly significant

References

Anon (1981) *Proceedings of the Seminar on Role of Small Scale Fisheries and Coastal Aquaculture in Integrated Rural Development*. CMFRI Bulletin 30-A, p. 1

Balasubramanyan, R., Satyanarayana A.V.V. & Sadanandan, K. A. (1961) *Indian J. Fish.* **8**, 269

Meenakumari, B. & Mohan Rajan, K. V. (1985) *Fish. Res.* **8**, 309

Miyamoto, H. & Shariff, A. T. (1961) *Indian J. Fish.* **8**, 252

Mohan Rajan, K. V., Meenakumari, B. & Balasubramanyan, R. (1981) *Fish. Technol.* **18**, 1

Mohan Rajan, K. V. & Meenakumari, B. (1982) *Fish. Technol,* **19**, 83

Mohan Rajan, K. V., Meenakumari, B., Kandoran, M. K. & Balasubramanyan, R. (1984) *Fish. Technol. Newsletter.* **11**, 12

Pease, N. L. (1965) *Comm. Fish. Rev.* **27**, 1

Snedecor, G. W. & Cochran, W. G. (1968) *Statistical Methods* 6th edn., Oxford and IBH Publishing Company, New Delhi

Temple, Alan (1964) *Aust. Fish. Newsletter* **23** (7), 17