

COMPARATIVE FISHING EXPERIMENTS WITH TWO TRAWL DESIGNS USED IN THE INSHORE WATERS OFF KAKINADA. (ANDHRA PRADESH)

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INTRODUCTION

The importance of small trawlers for the economic exploitation of the inshore demersal fisheries is well recognised and accordingly mechanised boats of sizes 30' and 32' fitted with engines of h. p. ranging from 30 to 45 came into existence particularly at Kakinada. The need to work out the most suitable trawling gear for these classes of boats becomes imperative and as an appurtenance to this, comparative fishing experiments were attempted with different trawls. In the present communication certain observations made on the relative catch efficiency of two different trawl nets used in combination with two different shaped otter boards are given.

BOAT & GEAR

The boat used for these studies was a small decked boat, "Fish Tech No. I", of overall length 9.15 m (30') and powered with 36 H. P. engine. A mechanical winch and warp guide rollers were provided in the boat.

The two nets A and B experimented with were both of the two seam type and having head rope length of 12.96 m (Satya-

narayana & Nair 1963) and 11.89 m (Narayanappa 1968) respectively. The nets were used with an oval otter board and a horizontal curved board described by Mukundan *et al* (1967). The particulars of the nets, the otter boards and the rigging are shown in Table I.

FISHING GROUND AND PERIOD

The experiments were conducted in the inshore waters off Kakinada in the areas between 16° 55' to 17° 10' North Latitude and 82° 20' to 82° 30' East Longitude in the depth ranges of 10 to 35 m. The bottom was mostly muddy. The experiments were undertaken in three series in different periods as shown in Table II.

EXPERIMENTAL PROCEDURE

The shooting and hauling were done following the conventional methods. Horizontal spread between otter boards was calculated by the method described by Deshpande (1960). The towing tension on the warps was measured using the tension meter of Satyanarayana & Nair (1965). The trawling was done at the same engine out-put in each series though it varied in the different series of experi-

TABLE I PARTICULARS OF NETS,
OTTER BOARDS AND FISHING RIG

Nets	A	B
Head rope	12.96 m (42.5')	11.89 m (39.0')
Foot rope	16.00 "	17.38 "
Side lines	13.42 ,,	15.25 "
Legs	7.32 ,,	7.32 "
Material of webbing	Cotton	Cotton
Floats	13 Nos of 5" dia. Aluminium alloy.	15 Nos. of 5" dia. Aluminium alloy.
Sinkers	13.2 kg of lead.	16.0 kg of lead.
Otter boards	Oval	Horizontal curved
Length	100 cm	101 cm
Breadth	60 "	50.50 "
Weight	35 kg	35 kg
Angle of bridle attachment	42°	30°
<i>Fishing rig</i> (for both nets)		
Danleno	Butterfly type-Iron	
Sweep wire	15 m - 20 m	
Bridles	1.83 m.	

TABLE II DETAILS OF PERIOD OF
EXPERIMENTATION

Series	Nets	Otter boards	Period of experimentation
I	A & B	Oval	July '64 to February, '65
II	-do-	Horizontal curved	October, '64 to November, '65.
III	A	Horizontal curved	November, '65 to May, '66
	B	Oval	

ments. The depth warp ratio adopted in the course of the experiments was 1:4 to

1:5 depending on the day's prevailing conditions of depth and area of operation.

In each series, comparative fishing was done each day operating the two gears alternatively. To counteract the possible effect of current and tides, hauls with each gear were made along and against the current. The fishing ground was not changed during each day's operation and the strictly comparable hauls only were taken for analysis of results.

RESULTS

The catch particulars and frequency weight ranges for each series of experiments are given in Tables III and IV respectively.

The particulars showing average percentage horizontal spread, warp tension and towing speed through water at constant engine out-put are furnished in table V.

DISCUSSION

Preliminary observations by Sebastian *et al* (1965) and subsequent studies showed that there exists fairly good stocks of prawns and fish in the inshore waters off Kakinada. Among the various designs of four seam and two seam types in both nylon and cotton studied, two nets of 12.96m (42.5') and 11.89m (39.0') two seam cotton, were found more effective and hence comparative fishing was done with the above gear in combination with oval and horizontal curved otter boards.

It is evident from Table III, that when the two nets were tried with oval otter boards, 11.89 m net obtained 1.2 times more catch than 12.96 m net; but when the same nets were operated with curved otter boards, the reverse was the case. Horizontal spread between otter boards, warp tension and towing speed in each of the two series did not show much difference, but on comparison between two series, it was found that curved otter

TABLE III CATCH PARTICULARS

Details of fishing	I Series		II Series		III Series	
	Oval O. B.		Horizontal	Curved O. B.	Horizontal	Oval
	A	B	A	B	Curved O. B.	O. B.
1. Comparable hauls	49	49	75	75	51	51
2. Trawling time in Hrs. and Mins	43-00	41.50	67-35	67-20	48-10	47-50
3. Total catch in Kg.	1,921	2,239	6,104	5,234	1,848	1,964
4. Catch per hour in kg.	44.67	55.32	90.32	77.73	38.37	41.06
5. Composition (per trawling hour)						
Prawns : Kg.	16.42	21.01	15.66	13.15	9.56	11.61
Sciaenids: "	6.31	8.51	20.59	15.91	8.41	8.99
Lactarius: "	7.05	5.93	11.57	13.27	3.72	3.34
Silver bellies: "	4.10	4.12	8.12	6.20	1.82	2.04
Ribbon fish: "	2.40	3.00	2.26	3.34	0.28	1.27
Elasmobranches: "	1.71	4.94	7.13	5.08	5.05	4.63
Caranx: "	1.15	1.12	0.47	0.48	0.32	0.18
Perches: "	0.64	0.14	1.36	0.42	0.22	0.21
Upeneoides: "	0.05	-	6.90	6.75	2.24	1.44
Soles: "	0.30	0.66	5.84	4.35	3.27	3.03
Miscellaneous: "	4.54	4.09	10.42	8.78	3.48	4.32

TABLE IV FREQUENCY WEIGHT RANGES

Weight ranges in Kg.	Frequency					
	I Series		II Series		III Series	
	Oval O. B.		Horizontal	Curved O. B.	Horizontal	Oval
	A	B	A	B	Curved O. B.	O. B.
0-35	17	10	12	20	28	24
36-70	24	28	28	20	20	20
71-105	8	8	14	13	2	6
106-140	-	2	12	11	1	1
141-175	-	1	1	4	-	-
176-210	-	-	1	4	-	-
211-245	-	-	2	2	-	-
246-280	-	-	2	1	-	-
281-315	-	-	1	-	-	-
316-350	-	-	-	-	-	-
351-385	-	-	1	-	-	-
386-420	-	-	-	-	-	-
421-455	-	-	1	-	-	-

TABLE V HORIZONTAL SPREAD, WARP TENSION AND TOWING SPEED THROUGH WATER AT CONSTANT ENGINE OUTPUT

Details	I Series		II Series		III Series	
	Oval	O. B.	Horizontal curved O. B.		Horizontal curved O. B.	Oval O. B.
	A	B	A	B	A	B
Average Horizontal spread between otter boards (%)	25.55	24.21	29.25	29.82	28.04	22.28
Average warp tension (Kg.)	300.00	302.00	309.00	310.00	318.00	315.00
Average towing speed through water (Knots)	2.10	2.08	2.14	2.12	2.20	2.27

TABLE VI STUDENTS T - TEST

Series	No. of observations n.	Σd	$d = \frac{\Sigma d}{n}$	$\Sigma (d-d)^2$	$S = \frac{\Sigma (d-d)^2}{n-1}$	$t = \frac{d}{s} \sqrt{n}$	Table value of t at corresponding degrees of freedom and at 5% level of significance
I Series	49	490.0	10	45,206.25	30.69	2.281	2.013
II Series	75	911.0	12.15	1,92,811.08	51.04	2.061	1.995
III Series	51	127.0	2.5	23,742.75	52.92	0.337	0.850

boards recorded more horizontal opening between otter boards with consequent high tension. The above results led to the presumption that 12.96 m net is relatively more efficient with curved otter boards while 11.89 m net is efficient with oval otter boards. With this presumption, when these two combinations were experimented later on, it is found that there exists no significant difference, though 11.89 m net obtained a little higher catch rate and got less percentage horizontal spread.

The significance between two nets in each of the three series was statistically tested by employing student's, 't' test as presented in Table VI.

This supports the significant difference

between the two nets with each of the otter boards in the first two series, while no significant difference is seen between the two combinations in the third series.

Different workers expressed different opinions regarding the comparative fishing. Dickson (1964) compared with a series of foot-ball matches and Holt (1959) expressed that it can give certain comparable measurements, but cannot tell the reasons due to complex problems involved in fishing. Benyami (1959) while assessing the relative value of fishery gear also admitted the difficulties in determining the actual value of differences. Perumal & Sriram (1962) in their studies of comparative catch efficiency between the two seam net with oval otter boards and four seam net

with rectangular otter boards, found no significant difference in catch rate between them, even though the former recorded low towing tension. In the present experiments the relative catching efficiency of nets is found varying with the combination of different otter boards. The same observation has been made by Narayanappa (1968) while studying the relative catch efficiency of different shaped otter boards. The reasons may perhaps be the difference in the designs and constructional aspects of the nets. The most striking difference between the two nets experimented is in the structure of the wings as indicated in Fig 1.

The salient features of 12.96 m net are that baitings are put at the rate of 1 mesh in 1 mesh in the lower parts of upper wings on head rope side while the upper part of upper wings and lower wings are baited in the ratio of 1 mesh in $2\frac{1}{2}$ meshes and 4 meshes respectively. There are no

creasings at the lastrich side. The percentage take-up on head and foot ropes is ranged between 4.0 to 18.6. Perhaps the opening of net is not optimum with oval otter boards but might have achieved in combination of horizontal curved otter boards resulting in better catch efficiency.

The constructional details of wings in 11.89 m net are different from the above. Here the fly meshes having baiting rate of 1 mesh in 1 mesh are maintained throughout the length of both head and foot rope sides of wings and to compensate for the quick loss of meshes a number of creasings are put on last-rich side. Bosum is rather wide and take-up is not provided. By this arrangement, the wings give a steep curve and may help to obtain optimum width with oval otter boards, but the relative catch efficiency declined when used with oval curved otter boards, which might have caused distortion at mouth.

Considering the above, it appears reasonable to assume that 12.96 m net in combination with horizontal curved boards and 11.89 m net in combination with oval otter boards are equally effective at the respective optimum spreads.

It is possible that both combinations are covering equal trawling ground in a unit time as there was no significant difference in the catch of the two nets in the last series of experiments. This presumption is supported by the fact that the catch rate of the bottom fish like sciaenids which dominated the better combination in the first two series is equal in the last series. Further confirmation available from Table IV where more dominant weight range frequency of 36-70 kg positively correlated with better combination in first two series, is equal in the last series.

ACKNOWLEDGEMENTS

The author wishes to express his sincere gratitude to Shri. A. V. V. Satya-

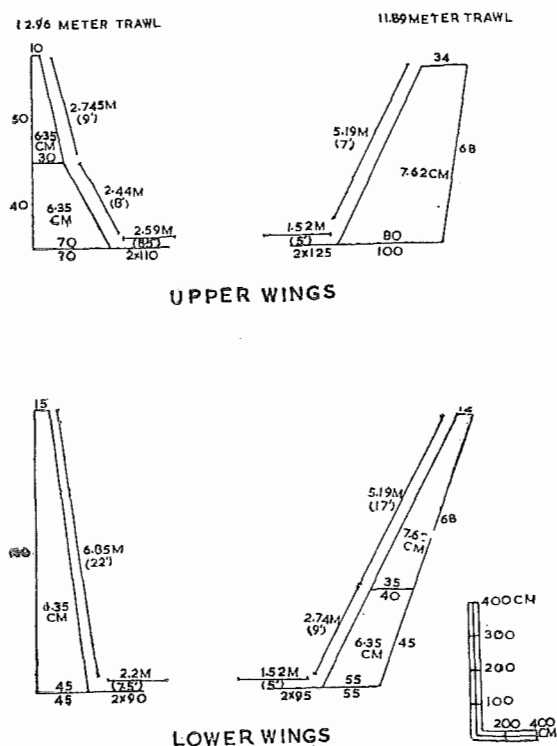


Fig 1. Structural differences in the wings of experimental gear.

narayana, Junior Fishery Scientist, and Shri. G. K. Kuriyan, Fishery Scientist for going through the manuscript and offering valuable suggestions. The author is greatly indebted to Shri. S. Nagaraja Rao, former Research Officer of the Sub-Station and Shri. K. A. Sadanandan, Junior Fishery Scientist for their valuable suggestions in the course of these investigations.

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