Performance of High Opening Trawls off Veraval, North West Coast of India

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Results of performance evaluation of a 25 m six panelled high opening trawl are presented. Comparative field trials with one boat high opening trawl of the Bay of Bengal Programme (BOBP) with 360 meshes of 160 mm mesh size and 25.6 m head rope length have indicated an overall efficiency of 9.2% for the six panelled high opening trawl over BOBP high opening trawl. The six panelled high opening trawl showed a very high efficiency of 80% in the catch of quality fishes over BOBP trawl. It has also shown an increase over BOBP trawl in the catch of other fin fishes and shell fishes except *Lactarius* sp. and sciaenids. Suitability of the gear for improved harvesting of bottom and off bottom resources on the north west coast of India are discussed.

Bottom trawls designed to attain relatively high vertical opening are increasingly popular for harvesting bottom and off bottom fishes. An eight panelled high opening trawl tested by Kunjipalu *et al.* (1984) was found to be highly successful for exploitation of off bottom resources on the north west coast. Pajot and Crocket (1980) have reported efficient performance of high opening trawls along the south east coast of India.

In the present study, performance of a 25 m six panelled high opening trawl developed at Veraval Research Centre of Central Institute of Fisheries Technology is evaluated through comparative field trials along with a BOBP high opening trawl off Veraval, north west coast of India.

Materials and Methods

Design details of 25 m six panelled high opening trawl with large meshes of 150 mm size in the foreparts, is given in Fig. 1. A two panelled high opening trawl of the BOBP design with 25.6 m head rope length described by Pajot & Crocket (1980) was operated for comparative observations. General particulars of both the trawls are given in Table 1.

Flat rectangular otter boards of wood and steel construction of size 1524 x 762 mm weighing 100 kg each described by Kuriyan *et al.* (1964) were used in combination with 5 m double bridles. Field trials were conducted from the research vessel Fish Tech No. 8 of 15.2 m OAL fitted with 165 HP engine. Observations were conducted in the depth range of 28 to 44 m off Veraval, during day time in 1984–'85. The two trawls were operated alternately on each fishing day so as to give equal chances by maintaining same depth, duration, direction of tow and engine revolutions during each set of comparative hauls. Horizontal spread between the otter boards was estimated using the method suggested by Ben-yami (1959) and Deshpande (1960) and towing tension on the warps was measured by a mechanical tension meter described by Satyanarayana & Nair (1965). Operational details are given in Table 2.

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Table 1. *General particulars of the gear*

Particulars	25 m high opening trawl	25.6 m BOBP high opening trawl
Total number of meshes	1,66,400	1,74,453
Weight of webbing, kg	32	32
Weight of net, kg	52	51
Cost of net, Rs.	2450	2448
Mesh size (stretched) mm		
Wings	150	200
Body	150,100, 75, 60 40 & 30	200, 160, 120, 80 & 40
Cod end	30	25
Material and webbing	HDPE twine (blue) 2 mm, 1.5 mm, 1.0 m dia	
Head rope and foot rope	HDPE rope of 18 mm dia	
Reef lines and bolsch lines	HDPE rope of 6 mm dia	
Hard plastic floats 150 mm dia, nos.	15	13
Iron link chain 6 mm rod, kg	30	30

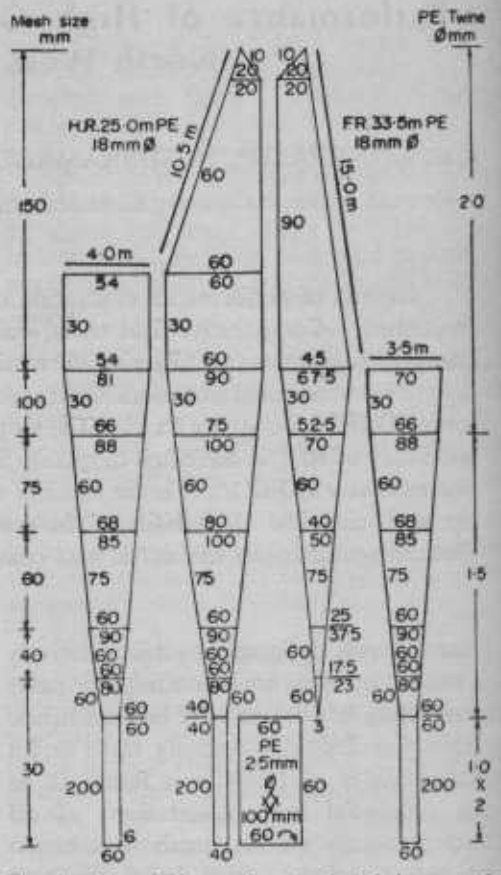

Fig. 1. 25 m high opening trawl with large meshes

Results and Discussion

Catch details and composition of catch are presented in Table 3. Results of statistical analysis using Wilcoxon matched pairs signed rank test for total catch, component groups horizontal opening between otter boards and warp tension are given in Table 4.

Total catch of 25 m six panelled high opening trawl was 9.2% more than that of BOBP high opening trawl. The catch of different component groups, namely, ribbon fish, cephalopods, prawns and lobsters and small miscellaneous fish were more by 37.8%, 14.6%, 44.4% and 10.7% respectively over BOBP trawl. Quality fishes, comprising pomfret, seer fish, *Chirocentrus dorab, Pellona* spp. and other high value fish were 80% more in 25 m six panelled high opening trawl when compared to BOBP trawl and the difference was found to be statistically significant at 0.01 probability level. In the case of *Lactarius* sp. and sciaenids respectively 69.4% and 81.3% more catch were obtained with BOBP trawl over 25 m six panelled high opening trawl. However the difference in total catch and in the catch components was not statistically significant except in the case of quality fishes.

Mean horizontal opening between otter boards was 3% more and tension on the warps was 1.8% more in the case of BOBP trawl. But the difference was not found to be statistically significant.

Table 2. *Details of comparative fishing operation*

Particulars	25 m high opening trawl	25.6 m BOBP high opening trawl
Number of hauls	20	20
Towing time, h	30	30
Towing speed, knot	2.5 at 1250 rpm engine output	
Horizontal spread between otter boards, m		
Average	16.8	17.3
Range	14.9–20.9	12.5–24.0
Warp tension, kg		
Average	635.7	647.3
Range	570–701	581–696
Catch, kg		
Total	2890.0	2645
CPUE, kg/h	96.2	88.2

Suitability of an eight panelled high opening trawl with 75 mm mesh size in the front sections, for improved harvesting of bottom and off bottom resources, normally beyond the fishing height of conventional low-rise bottom trawls, has been reported by Kunjipalu *et al.* (1984). It is well known that many species of fish can be effectively herded by large meshes in the fore parts of the trawl. How large the mesh size can be increased, depends on the species, their reactions to the gear and fishing conditions. Based on field trials using a 32 m large mesh demersal trawl Kunjipalu *et al.* (1979) has found that effective exploitation of demersal fish resources on the north west coast is possible with mesh size as large as 150 mm in the foreparts of the trawl.

In the present design of high opening trawl, the number of panels has been brought down to six, the mesh size in the foreparts of the trawl has been increased to 150 mm for ease of construction and economy. The gear effectively combines the advantages of a high rise multi panelled bottom trawl and large mesh trawl.

The difference in fabrication costs between the two trawls tested, is negligible. 25 m six panelled high opening trawl scores over 25.6 m BOBP high opening trawl in relative

Table 3. *Composition of catch*

	25 m high opening trawl		25.6 m BOBP high opening trawl	
	kg	Catch % in each gear	kg	Catch % in each gear
Quality fish	366.3	64.3	203.3	35.7
Ribbon fish	197.0	57.9	143.0	42.1
Lactarius sp.	160.0	37.1	271.0	62.9
Sciaenids	67.0	35.5	121.5	64.5
Cephalopods	164.2	53.4	143.3	46.6
Prawns and lobsters	15.5	59.2	10.7	40.8
Small miscellaneous catch and elasmobranchs	1,920.0	52.3	1,752.0	47.7
Total	2,890.0	52.2	2,645.0	47.8

Table 4. *Results of statistical analysis using Wilcoxon matched pairs signed rank test*

Variables	n	μ	σ	T	$Z=\frac{\lvert \mu-T \rvert -\frac{1}{2}}{\sigma}$	Remarks
Total catch	20	105	26.7864	54	1.885	Not significant at 5% level
Catch components						
Quality fish	19	76.5	21.12	19	2.699	Significant at 1% level
Ribbon fish	15	—	—	51.5	—	Not significant at 5% level
Lactarius sp.	9	—	—	22	—	,,
Sciaenids	15	—	—	46	—	,,
Cephalopods	16	—	—	65	—	,,
Prawns and lobsters	15	—	—	31	—	,,
Small miscellaneous fish	20	105	26.7862	60.5	1.643	,,
Operational parameters						
Horizontal spread	14	—	—	36	—	,,
Warp tension	19	85	23.5053	56	1.212	,,

Note: where n > 16, the significance was tested using Z statistic

catch rates of total catch and most of the catch components contributing to the bulk of total landings. Besides, significantly high catch of quality fishes suggests the suitability for its introduction on the north west coast for improved harvesting of bottom and off bottom resources.

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