Performance of 25 m Large Mesh Demersal Trawl off Veraval, North West Coast of India

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Performance of a 25 m large mesh demersal trawl, with 150 mm mesh size in the fore parts of the trawl was evaluated in comparison 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. 8.2 percent increased catch was obtained by 25 m large mesh demersal trawl. The gear is comparatively cheaper, lighter in construction and offered better horizontal spread with significantly lower towing resistance. Commercial suitability of the gear for efficient harvesting of demersal fish resources of the region is discussed.

Since the introduction of commercial trawling on the north west coast, several different designs of trawls suitable for small and medium size trawlers have been developed, evaluated and introduced for improved harvesting of demersal fishery resources (Deshpande & Kartha, 1964; Deshpande *et al.*, 1968, 1970; Kunjipalu *et al.*, 1979a, b; Panicker *et al.*, 1979; Kunjipalu *et al.*, 1984). Use of large meshes in the front trawl sections is a possible means of reducing the towing resistance. Kunjipalu *et al.* (1979 a) has demonstrated the possibility of using 150 mm mesh size in the foreparts of a 32 m demersal trawl without adversely affecting the catching efficiency. This paper reports the findings of comparative fishing trials with 25 m large mesh demersal trawl and a BOBP high opening trawl with 25.6 m head rope length conducted off Veraval, north west coast of India.

Materials and Methods

Design details of 25 m large mesh demersal trawl is given in Fig. 1. One boat high opening trawl of Bay of Bengal Programme (BOBP) with 360 mm meshes of 160 mm mesh size and 25.6 m head rope length described by Pajot & Crocket (1980) was utilized for comparison. Both are two panelled trawls with relatively large meshes in the front trawl sections. General particulars regarding both the trawls are given in Table 1.

Table 1. *General particulars of the trawls*

Particulars	25 m large mesh demersal trawl	25.6 m BOBP high opening trawl
Total no. of meshes	1,13,186	1,74,453
Weight of webbing, kg	29	32
Weight of net, kg	42	51
Cost of net, Rs.	1874	2448
Mesh size (stretched), mm		
Wings	150	200
Body	150, 100, 60 and 40	200, 160 120, 80 and 40
Cod end	30	25
Material of webbing	HDPE (blue) twine 2 mm, 1.5 mm, 10mm dia	
Head rope and foot rope	HDPE rope 18 mm dia	
Reef lines and bolsch line	HDPE rope 6 mm dia	
Floats – 150 mm dia spherical, hard plastic, nos.	13	13
Iron link chain 6 mm dia rod, kg	30	30

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Flat rectangular otter boards of wood and steel construction and 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 a 165 HP engine. Operations were conducted during day time in the depth range of 25–45 m off Veraval during 1984–85. The two gears were operated alternately on each consecutive fishing day maintaining same depth, duration, direction of tow and engine revolution during each set of comparative tows giving equal chances for both the gears. Operational details are furnished in Table 2.

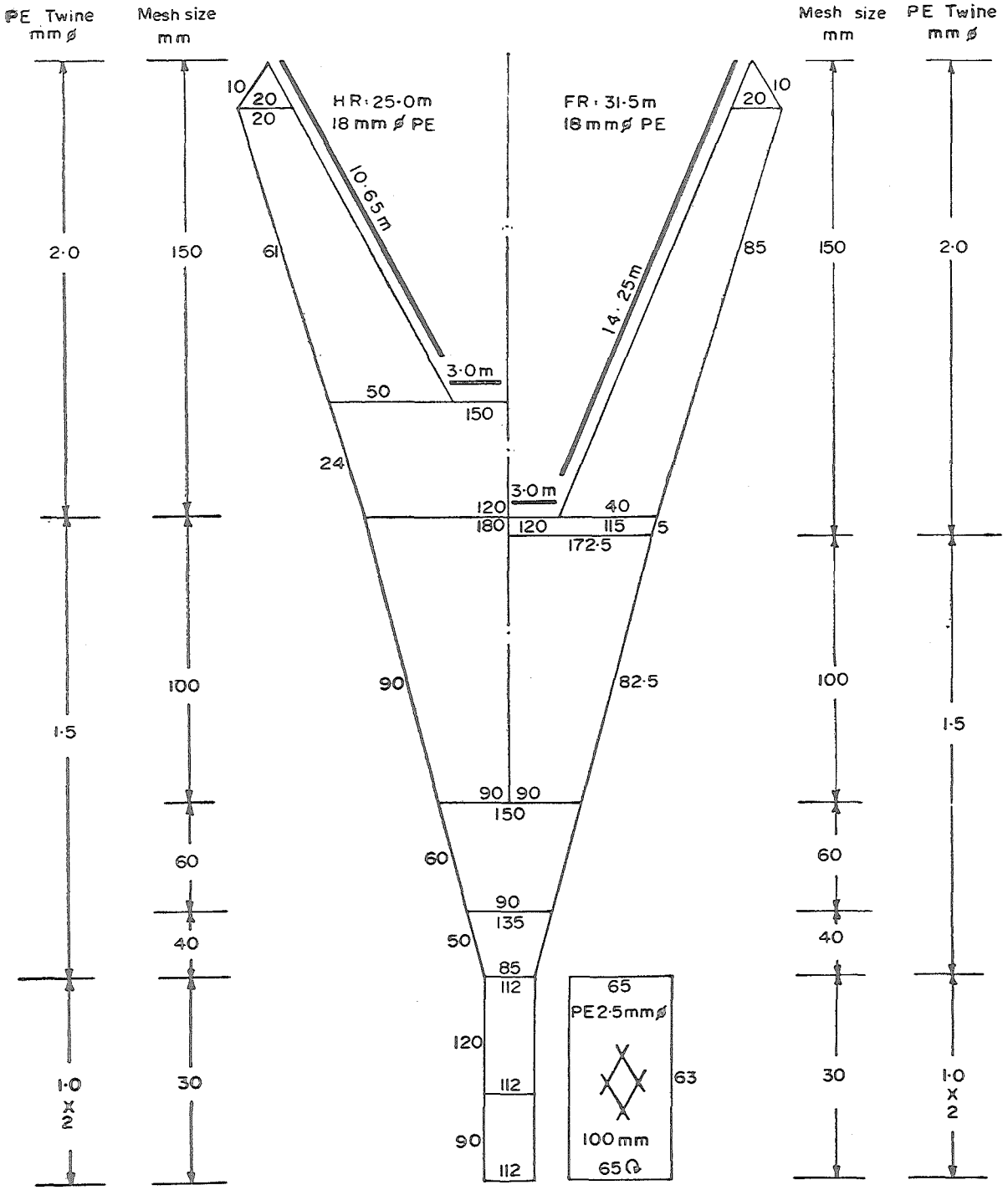

Fig. 1. 25 m large mesh demersal trawl

Table 2. *Results of comparative fishing operations*

	25 m large mesh demersal trawl	25.6 m BOBP high opening trawl
Number of hauls	19	19
Towing time, h	28¼	28½
Depth range, m	25–45	25–45
Horizontal opening between otter boards, m		
Average	19.1	17.7
Range	16.24	14.4–24.0
Warp tension, kg		
Average	619.4	651.7
Range	581–674	582–710
Catch, kg	1906	1762
CPUE, kg/h	66.88	61.83

Results and Discussion

Details of catch and its composition are presented in Table 3. Results of statistical analysis using Wilcoxon matched pairs signed rank test for total catch, catch components, horizontal opening and warp tension are furnished in Table 4.

Average catch (CPUE) during the period of comparative hauls was 8.2% more for 25m large mesh demersal trawl when compared to 25.6 m BOBP trawl. Catch of 25 m large mesh demersal trawl consisted of 17.2% cephalopods, 14.9% *Lactarius* sp., 8.1% quality fish, 0.7% prawns and lobsters and 59.1% miscellaneous fish including ribbon fish, sciaenids, elasmobranchs etc. Quality fish contributed 12.3%, cephalopods 11.6%, *Lactarius* sp. 4.6% and miscellaneous fish 71% of the catch of BOBP trawl with negligible quantities of prawns and lobsters.

Catch rates of *Lactarius* sp. and cephalopods were respectively 226% and 60.8% higher in 25 m large mesh demersal trawl. BOBP trawl caught 40.3% more quality fish and miscellaneous fish increased by 11%. The difference in total catch and relative catch rates of *Lactarius* sp., cephalopods, quality fish, ribbon fish, sciaenids and miscellaneous fish were however, not statistically significant. Although percent contribution in landings was low, there was more than threefold increase in the catchability of prawns and lobsters with 25 m large mesh demersal trawl. The difference is statistically significant at the probability of 0.05.

Tension on the warps was 5% less with 25 m large mesh demersal trawl and the difference was statistically significant at 0.01 probability level. Improved horizontal opening between otter boards was obtained by 25 m large mesh demersal trawl which was on the average 7.9% more than 25.6 m BOBP trawl. The difference was statistically significant at the probability of 0.05.

The drag of the netting is clearly the dominant single drag component of trawling gear (Wileman, 1984). Use of large meshes in the front trawl sections will lead to substantial reduction in towing resistance. It is well

Table 3. *Composition of catch*

	25 m large mesh demersal trawl catch		25.6 m BOBP high opening trawl catch	
	kg	% in each gear	kg	% in each gear
Quality fishes	154.0	41.6	216.1	58.4
Ribbon fish	38.1	52.1	35.0	47.9
Lactarius sp.	284.0	76.5	87.0	23.5
Sciaenids	67.0	55.4	54.0	44.6
Cephalopods	328.0	61.7	204.0	38.3
Prawns & lobsters	12.9	76.8	3.9	23.1
Small miscellaneous fish and elasmobranchs	1022.0	46.8	1162.0	53.2
Total	1906.0	52.0	1762.0	48.0

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

Variables	n	μ		T	Z	Remarks
Total catch	19	95	24.850	79	0.624	Not significant at 5% level
Catch components						
Quality fishes	19	95	24.850	46	1.950	,,
Ribbon fish	13	—	—	36	—	,,
Lactarius sp.	8	—	—	5	—	,,
Sciaenids	14	—	—	41	—	,,
Cephalopods	18	85.5	22.96	42.5	1.85	,,
Prawns & lobsters	10	—	—	2.5	—	Significant at 5M level
Small miscellaneous fish	19	95	24.85	62.5	1.23	Not significant at 5% level
Operational parameters						
Horizontal opening between boards	16	68	19.339	19	2.508	Significant at 5% level
Warp tension	16	68	19.339	14	2.766	Significant at 1% level

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

known that many fish species are effectively herded by large meshes. Maximum size of mesh that can be used without loss in fishing efficiency depends on the fish species, their reactions to the gear and fishing conditions. In Palk Bay, off Tamil Nadu, Pajot & Crocket (1980) demonstrated through field trials of 25.6 m BOBP trawl, having 200 mm mesh size in the forepart, that it is not necessary to use small meshes to obtain large catches of fish. Kunjipalu *et al.*, (1979 a) has reported that the use of 150 mm mesh size in the forepart of the trawl is more effective for harvesting of demersal fish on the north west coast. The present design of 25 m is a scaled down version of the successful 32 m design retaining similarly large meshes in the front trawl sections.

It is evident from Table 1, that 25 m large mesh demersal trawl is 17.7% lighter in construction, 23.5% cheaper in cost and has 35% less number of meshes. These advantageous features together with catch trends, significantly lower towing resistance and better horizontal spread, highlight the suitability of 25 m large mesh demersal trawl for improved harvesting of demersal fish in the region. Lower drag makes it especially suitable for trawlers with low towing power. The gear suitably meets the current needs of the commercial trawling industry which is giving increased importance to harvesting of fish at a time when catch of prawns per boat is declining and operating costs are rising due to escalating oil prices.

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