



DESIGN AND TECHNICAL ASPECTS OF DISCO TRAWL NET (68 M) OF RATNAGIRI, MAHARASHTRA (INDIA)

Nilesh N. Sawant*, Dr. Ashish S. Mohite
& Makarand T. Sharangdhara*****

Department of Fisheries Engineering, College of Fisheries, Shirgaon, Ratnagiri,
Maharashtra

Abstract:

Trawling is one of the popular fishing methods along the west coast of India. However, there are regional variations in trawl net design, construction and operation. The present study deals with the design and technical aspects of fish trawl (68 m) locally known as '42 Angli Disco Dol' operated along the Ratnagiri coast of Maharashtra. The material used for the fish trawl is HDPE (High Density Polyethylene) and the knot type used for construction is a single trawl knot. Blue colour netting twine material is normally used having twine diameter of 1.25 mm for construction of netting of wing and belly; while 1.0 mm twine is used for cod end. The mesh size of the wing and square section was 800 mm and gradually reduced to 18 mm for cod end section. The '42 Angli Disco Dol' was used to catch Ribbonfish, Squids, Croaker, Pomfrets etc.

Keywords: Trawling, Fish trawl & *Disco Dol*

Introduction:

Trawling, though an efficient method of fishing is known to be one of the most non-selective methods of fish capture. Trawl is an important marine fishing gear; nearly 20 per cent of marine fish landed in the world is caught by this gear (Sreekrishna and Shenoy, 2001). The major factors influencing on the fish catch is the vertical opening of the net (Takayama and Koyam, 1959 and Parrish 1959). In a known fishing ground the quantity of fish caught by trawl gear has direct bearing on the volume of water filtered during a certain period of operation and depends on both the horizontal and vertical opening of the net while in operation (Deshpande, 1960).

The trawl nets are operated from Ratnagiri as per the prevailing local practices largely based on the individual fishing experience (Mohite, 1999). The nets are fabricated as per the requirement of individual fisherman and local tradition. Thus variations in design pattern and rigging practices of trawl nets are observed. Therefore, the present study is an attempt to document the observation with respect to the design, net specifications, material used, mesh size, mode of operation, etc of the fish trawl (68 m) operated along the Ratnagiri coast of Maharashtra.

Materials and Methods:

The detailed information regarding the technical specifications, construction and operation of 42 *Angli Disco Dol* / fish trawl (68 m) operated along the Ratnagiri coast of Maharashtra was collected by physically sampling the units in operation. Structured interview schedule comprising of two major sections was formulated to collect data required for the present study. The first section dealt with the particulars of the trawl owners / trawlers and second for the detail specifications of the trawl net operated. The collected data was recorded according to Sreekrishna & Shenoy (2001) and Akerman (1986) and statistically analyzed as required (Snedecor and Cochran, 1967). The designs of the gear were documented according to Nedelec (1975).

Results and Discussion:

The fish trawl (68 m) operated along the Ratnagiri coast of Maharashtra is commonly known as *Disco Dol* (42 *Angli*). The number of *Angli* locally refers to the

width of the mesh size equivalent of that many numbers of fingers. Different sections are fabricated separately and then assembled as per the specifications. *Disco Dol* (42 *Angli*) was a two seam high opening bottom trawl net operated along the coast of Ratnagiri specifically to catch Ribbonfish, Squid, Croaker, Pomfret etc. It was mainly made up of two panels i.e. upper and lower panel, side panel was absent in this type of trawl net. The average total length of the 42 *Angli Disco Dol* was found to be 68 m. Technical Specification of the 42 *Angli Disco Dol* net are presented in the Table 1 and its design depicted in Fig. 1.

There were two wings present in the *Disco Dol* comprising of upper panel and lower panel on each wing. Wing section was braided with HDPE blue colour netting twine of 1.25 mm diameter with the help of single trawl knot. The mesh size of wing section in the 42 *Angli Disco Dol* was 800 mm. The number of meshes observed in A and A₁ sections of wing for upper and lower panel were same; i.e. 1 and 40 numbers respectively. Depth meshes for this section was also found same; i.e. 20. While the baiting rate observed in A and A₁ was same; i.e. 1:1. The hanging coefficient for A and A₁ observed was 0.46 and 0.48, respectively. The number of meshes observed in wing section for upper and lower panel was same; i.e. 40 numbers. Meshes in depth were 20 and 25 in upper and lower wing respectively. The hanging coefficient observed in upper wing and lower wing was 0.46 and 0.48, respectively. The wing length observed of upper and lower panel was 40.23 and 49.37 m, respectively.

The square section of *Disco Dol* was made up of HDPE blue colour netting twine of 1.25 mm diameter with the help of single trawl knot with the mesh size of 800 mm. The observed numbers of meshes in upper and lower edge were same; i.e. 180 mesh. Depth meshes were 6 in number. The hanging coefficient observed in square section was 0.46.

The Belly portion comprised of 13 different sections starting from lower edge of the square portion up to the upper edge of codend portion. Different mesh sizes were observed ranging from 800 to 25 mm and the twine diameter ranged from 1.25 to 1.00 mm. First section of belly was constructed using 1.25 mm twine and mesh size of 800 mm. The twine diameter from second to thirteenth sections were made from 1.00 mm twine, while the mesh size observed in these sections were 800, 600, 400, 320, 240, 200, 160, 120, 80, 60, 40, 30 and 25 mm. The observed numbers of meshes in upper and lower edge of first to ninth section were same; i.e. 180 mesh. Tenth section comprised 250 meshes in upper edge and 200 meshes in lower edge. The eleventh section was observed with 200 meshes in upper edge while 100 mesh in lower edge in both the panels. Last two sections had same number of meshes in upper edge and lower edge; i.e. 100 mesh. Depth meshes in first three sections were 6 in number. Fourth section had 8 numbers of meshes. While fifth and sixth section had 12 meshes each. Seventh and eighth sections were found with 25 depth meshes each. Ninth and tenth sections comprised of 50 depth meshes each. Eleventh section had 100 mesh depths while 150 depth meshes were found in twelfth and thirteenth sections each. The baiting rate observed in tenth and eleventh section of the belly was 2:1 each.

Cod end of 42 *Angli Disco Dol* was also made up of HDPE blue colour netting twine of 1.00 mm diameter with the help of single trawl knot having a mesh size of 18 mm. The observed numbers of meshes in upper and lower edge were same; i.e. 100 mesh. Meshes in depth in the codend section were 150 in number.

In the *Disco Dol*, head rope (68 m) and foot rope (73 m) of 10 mm diameter made up of HDPE was used. Hollow spherical shaped HDPE floats were used along the headline to maintain vertical opening and fishing height in the water column. *Disco Dol*

was rigged with 5-7 numbers of float having 152 mm, 203 mm, and 254 mm or 305 mm diameter. Weight of floats ranged between 0.250–2.0 kg. Chain was used as sinking material which was in tandem with the floats to maintain vertical opening and to increase the sinking speed. Total weight of the chain used for the fish trawl net was observed to be 30-35 kg.

The *Disco Dol* is operated on the trawlers having overall length (OAL) from 12.19 to 15.24 m., breadth from 4.5 to 5.4 m and depth from 1.9 to 2.4 m, with their tonnage varying from 5 to 50 tonnes. Generally, their wheel house is situated at amidships and masts with their boom and derrick arrangement at aft. They are fitted with 6 cylinder water cooled diesel engines of 90-100 BHP (Brake Horse Power), a pair of stern galleys provided with towing blocks, a horizontal stowing bar for arranging the net behind the cabin and a four drum power take off winch. Commercial and Palghar type winches which are perpendicular type of winches, are fitted on front side of cabin having two net drums and warping heads are used.

The crew members in each fishing vessel for trawling operation ranges from 5 to 8. Trip duration ranges from single day operations to multiday; with actual trawling operation carried out for 12–18 hrs per day. The stern based trawling is generally of 3-4 hours per haul.

On the comparative efficiency of conventional and bulged belly fish trawls was studied by Varghese *et al.*, (1968). In their study, they made net with bulged belly and compared with a conventional design under actual fishing conditions. Design aspects of 12.77 m two seam improved trawl was described by Vijayan *et al.*, (1990) in Valappu area of Vypeen Island. Advantage of large meshes in 10.3 m mid water trawl was studied by Vijayan *et al.*, (1992) by representing its design and specification. Comparative study on design and fishing efficiency of large meshed four seam trawl and high opening bottom two seam trawl off Mangalore was conducted by Nayak and Sheshappa, (1993). In Ratnagiri it was seen that for catching fish with *Disco Dol* a two seam fish trawl net without side panels was commonly used.

Rao and Narayanappa, (1994) studied performance of 25 m rope trawl in inshore waters off Kakinada, Andhra Pradesh and design detail was described. The design and construction aspect of the *Disco Dol* was studied during this research work. Similarly design features of fish trawls of Thoothukkudi coast was studied by Neethiselvan and Brucelee, (2003). The design details, rigging and functional characteristics of semi-pelagic trawl were studied by Vijayan *et al.*, (2003). Design and operational efficiency of mini trawl net for capturing demersal fishes and prawns in Netravati-Gurpur estuary at Manglore has been described by Sheshappa, (1978), in Kasargod district by Remesan and Ramachandran, (2005) and off Cochin by Boopendranath and Hameed, (2013). Design and technical specifications of demersal trawl used in the Turkish coast of the Aegean Sea was presented by Tosunoglu and Aydin, (2007).

Disco Dol net costs around Rs. 20,000/- to 30,000/-. The nets are generally fabricated by local net braiders. No standard designs or specifications are followed while fabricating them, which largely depend on individual experience, local practices, and demands of owner coupled with new trends or designs in vogue etc.

Conclusion:

The documented information on the technical specifications and operation of fish trawl (68 m) or *Disco Dol* (42 *Angali*) net of Ratnagiri, would serve as a base line information for the technological modifications the net may undergo to increase its efficiency in the coming years.

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Table 1: Technical Specifications of Fish Trawl (68 m) / '42 Angli Disco Dol'

Name of the gear : Disco Dol		Main species caught : Ribbonfish, Squid, Croaker, Pomfret etc.						Operation : Day			Trawling speed : 10-12 RPM					Vessel: OAL : 40-50					
Locality : Ratnagiri, Maharashtra India.								Trawling period : 4 Hrs			Water depth to warp ratio : 1:25					H.P : 90- 100					
PARTICULARS OF WEBBING																					
Webbing	A	A ₁	A ₂	B	B ₁	B ₂	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
Sections/ Local name	Wing/ Paay						Square/Pat		Belly/ Ghanpat											Codend/ Khola	
Material/Preservation	High Density Polyethylene (HDPE)/ Nil																				
Knot type/ colour	Single Trawl Knot/ Blue/ Green																				
Twine Ø mm	1.25							1													
Mesh size, mm	800	800	800	800	800	800	800	600	400	320	240	200	160	120	80	60	40	30	25	18	
Upper edge, m	1	1	40	1	1	40	180	180	180	180	180	180	180	180	180	250	200	100	100	100	
Lower edge, m	40	40	40	40	40	40	180	180	180	180	180	180	180	180	180	200	100	100	100	100	
Depth, meshes	20	20	20/25	20	20	20/25	12/6	6	6	8	12	12	25	25	50	50	100	150	150	150	
Baiting /Creasing rate	1:1	1:1		1:1	1:1			-								2:1	2:1	-			
Hanging Coefficient	0.4 6	0.48	0.46/ 0.48	0.48	0.46	0.46/0.48	0.46/0.48														
PARTICULARS OF LINES AND ROPES																					
	Top wing section						Bottom wing section					Wing end section			Lateral sides						
	Bolsh rope			Head rope			Bolsh rope		Foot rope			Wing line		Side rope							
Material	NA			HDPE			NA		HDPE			HDPE		HDPE							
Number				1					1			2, One on either end		2, One on either side							
Diameter, mm				10					10			5		4							
Length, m				68					73			22		60 x 2							
PARTICULARS OF OTHER GEAR ACCESSORIES																					
	Floats						Sinkers					Otter boards									
Diameter, mm	152, 203, 254, 305						6-8					2									
Number/quantity	5-7						500-600					Wooden planks fitted with iron plates and iron shoe									
Material	PVC						Iron					Flat Rectangular									
Shape	Round						Ellipse ring					-									
Indicator float	-																				
Style of attachment/ Dimension, mm	2+1+2 3+1+2						Each loop consists of 17 ellipse rings. Each loop is attached with a gap of 4-5 feet interval					1372 x 838 x 32 at top & 64 at bottom (Length x Breadth x width)									
Weight in air, kg	0.250, 0.500, 1.5, 2						25 - 30					65 - 70									

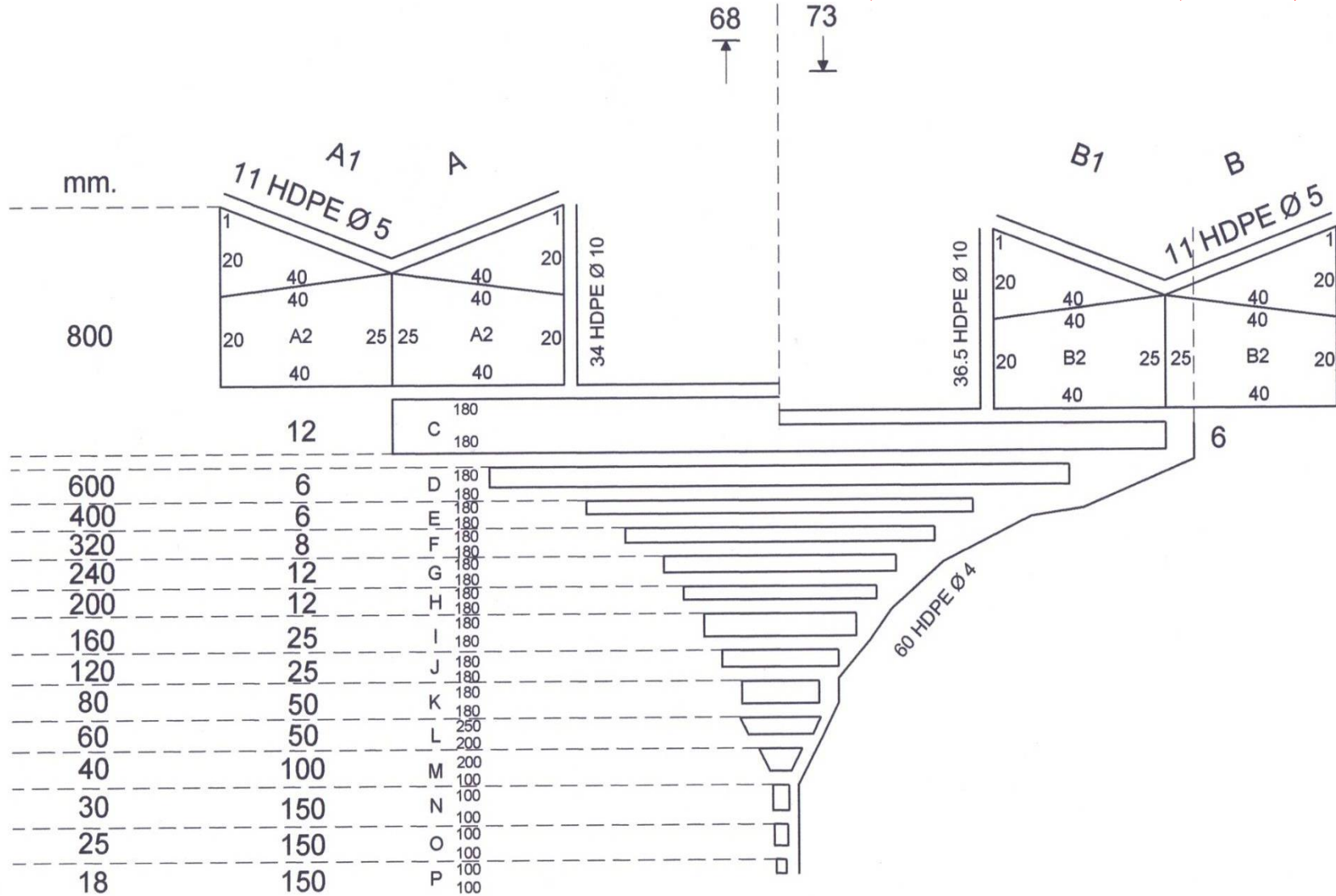


Figure 1: Design of Fish Trawl (68 m)/'42 Angli Disco Dol'