A CASE STUDY

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Disco fish trawl (137 m) of Ratnagiri, Maharashtra

■ **N.N. SAWANT AND ASHISH S. MOHITE**

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See end of the Paper for authors' affiliation

Correspondence to :

ASHISH S. MOHITE
Department of Fisheries Engineering, College of Fisheries (Dr. B.S.K.K.V.), Shirgaon, RATNAGIRI (M.S.), INDIA
Email : ashishmohite@yahoo.com

■ **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 general characteristics and specifications of fish trawl (137 m) 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 1.50 mm for construction of netting of wing and belly; while 1.0 mm twine is used for cod end. The mesh size of the cod end section was 18 mm while the upper and lower edge of cod end had 100 meshes in width and 150 meshes in depth.

■ **KEY WORDS :** Trawling, Fish trawl, *Disco Dol*

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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 was an attempt to document the observation with respect to net specifications, material used, mesh size, mode of operation, etc. of the fish trawl (137 m) operated along the Ratnagiri coast of Maharashtra.

■ METHODOLOGY

The detailed information regarding the specifications and construction of fish trawl (137 m) operated along the Ratnagiri coast of Maharashtra was collected by physically sampling the units in operation. The data were recorded according to Sreekrishna and Shenoy (2001) and Akerman (1986).

■ RESULTS AND DISCUSSION

The fish trawl (137 m) operated along the Ratnagiri coast of Maharashtra is commonly known as *Disco Dol* (125 *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*

(125 *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 125 *Angli Disco Dol* was found to be 137 m. Specification of the 125 *Angli Disco Dol* net are presented in the Table 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 1.50 mm diameter with the help of single trawl knot. The mesh size of wing section in 125 *Angli Disco Dol* was 2500 mm. The number of meshes observed in wing section was 20 and 25 for upper edge and lower edge, respectively. Meshes in depth were 30 in upper and 35 in lower wing. The length of the upper panel and lower panel was 73.15 and 82.29 m, respectively. The hanging co-efficient observed in upper wing was 0.88 and lower wing was 0.89.

The square section of *Disco Dol* was made up of HDPE and was braided with blue colour netting twine of 1.50 mm diameter with the help of single trawl knot having a mesh size of 2500 mm. The numbers of meshes in upper and lower edge were same; *i.e.* 150 mesh. Meshes in depth were 5 in number. The hanging co-efficient observed was 0.88.

The Belly portion comprised of 16 different sections starting from lower edge of the square portion up to the upper edge of codend portion. Belly section was braided with blue colour HDPE netting twine ranging between 1.00 to 1.50 mm in diameter with the help of single trawl knot and the mesh size ranging from 2500 to 25 mm, with gradual reduction in mesh size. Two wings, square and first section of belly was constructed using 1.50 mm twine and mesh size of 2500 mm. Second to eight sections were made from 1.25 mm diameter twine, while the mesh size observed in these sections were 2000, 1600, 1500, 1200, 1000, 800, 600 mm. Nine to sixteenth sections were made from 1.00 mm twine and having mesh size 320, 200, 120, 80, 60, 40, 30, 25 mm. The observed numbers of meshes in upper and lower edge of first eight sections were same; *i.e.* 150 mesh. The next four sections comprised 180 meshes in both upper and lower edge. The thirteenth section was observed with 250 meshes in upper edge while 200 mesh in lower edge in both the panels. Fourteenth section comprised of 200 meshes in upper edge while 100 meshes in the lower edge. Last two sections had same number of meshes in upper edge and lower edge; *i.e.* 100 mesh. Depth meshes in first six sections were 5 in number. Seventh and eight sections had 6 numbers of meshes in depth. While ninth, tenth, and eleventh sections were found with 8, 12 and 25 meshes in depth, respectively. Meshes in depths observed in twelfth and thirteenth sections was 50, fourteenth section 100, whereas for fifteenth and sixteenth section number of meshes in depth were 150. The baiting rate observed in thirteenth and fourteenth section of the belly was 2:1 each.

Cod end of 125 *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 (137 m) and foot rope (146 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 increases 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 90-165 BHP (Brake Horse Power), a pair of stern gallows 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

Table 1: Specifications of 137 m fish trawl (*Disco Dol 125 Angli*)

Local name of the gear: *Disco Dol 125 Angli*	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	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
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		1.50					1.25									1			
Mesh size, mm	2500	2500	2500	2000	1600	1500	1200	1000	800	600	320	200	120	80	60	40	30	25	18
Upper edge, m	20	20	150	150	150	150	150	150	150	150	180	180	180	180	250	200	100	100	100
Lower edge, m	25	25	150	150	150	150	150	150	150	150	180	180	180	180	200	100	100	100	100
Depth, meshes	30	35	10	5	5	5	5	5	6	6	8	12	25	50	50	100	150	150	150
Baiting / creasing rate	-														2:1	2:1		-	
Hanging co-efficient	0.9		0.8	0.0								-							

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		137 (64+9+64)		146 (68.5+9+68.5)	18.5 x 2	90 x 2

Particulars of other gear accessories

	Floats	Sinkers	Otter boards
Diameter, mm	152, 203,254,305	6-8	
Number/quantity	5-7	500-600	2
Material	PVC	Iron	Wooden planks fitted with iron plates and iron shoe
Shape	Round	Ellipse ring	Flat Rectangular
Indicator float	-	-	1524 x 1067 x 31.75 at top & 63.5 at bottom (Length x Breadth x Width)
Style of attachment	2+1+2	Each loop consists of 17 ellipse rings. Each loop is attached with a gap of 4-5 feet interval	
Dimension, mm	3+1+3		
Weight in air, kg	0.250, 0.500, 1.5,2	30-35	75
Remarks	In the wing portion hanging co-efficient was 0.9 in the upper section and 0.8 in the lower section, while in the square section zero hanging co-efficient was observed. Larger mesh size in the mouth portion of net helps to reduce the drag and low hanging co-efficient with very close stapling of meshes to the head rope in square section helps to prevent escape of fishes from the larger meshes and to guide them towards the cod end portion.					

trawling operation carried out for 12–18 hrs per day. The stern based trawling is generally of 3-4 hours per haul with the trawler speed being maintained at 4-6 knots.

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 *Disco Dol* a two seam fish trawl net without side panel 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.

The documented information on the technical specifications and operation of fish trawl (137 m) or *Disco Dol* (125 *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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Authors' affiliations:

N.N. SAWANT, Department of Fisheries Engineering, College of Fisheries (Dr. B.S.K.K.V.), Shirgaon, RATNAGIRI (M.S.) INDIA

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