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***RESEARCH ARTICLE***

# Design and technical aspects of bottom fish trawl (64 m) of Ratnagiri, Maharashtra

■ **NILESH N. SAWANT,** ASHISH S. MOHITE **AND** MAKARAND T. SHARANGDHAR

**ABSTRACT**

The present study deals with the design and technical aspects of bottom fish trawl (64 m) locally know as 32 *Angali 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 multifilament netting twine was normally used, having twine diameter of 1.25 mm for construction of netting of wing and square section while 1.00 mm twine was used for the belly, lengthener and cod end section. The mesh size of the wing and square section was 600 mm and gradually reduced down to the cod end section (18 mm). The net was specifically used to catch Ribbonfish, Squid, Croaker, Pomfret etc.

**KEY WORDS :** Trawling, Bottom fish trawl, 32 *Angali disco dol*

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## INTRODUCTION

Though trawling is one of the popular fishing methods along the west coast of India, there are regional variations in trawl net design, construction and operation. The trawl nets operated from Ratnagiri are as per the prevailing local practices largely based on the individual fishing experience (Mohite, 1999). 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 net design and technical specifications, material used, mesh size, etc of the bottom fish trawl (64 m) operated along the Ratnagiri coast of Maharashtra.

## EXPERIMENTAL PROCEDURE

The detailed information regarding the technical specifications of bottom fish trawl (64 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 and 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).

**Table 1 : Technical specifications of (64 m) bottom fish trawl (32 *Angali disco dol*)**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Local 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 |
| 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 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 400 | 320 | 240 | 200 | 160 | 120 | 80 | 60 | 40 | 30 | 25 | 18 |
| Upper edge, m | 1 | 1 | 45 | 1 | 1 | 45 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 250 | 200 | 100 | 100 | 100 |
| Lower edge, m | 45 | 45 | 45 | 45 | 45 | 45 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 250 | 200 | 100 | 100 | 100 |
| Depth, meshes | 22 | 22 | 23/30 | 22 | 22 | 23/30 | 10/5 | 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 co-efficient | 0.59 | 1.08 | 0.59/1.08 | 1.08 | 0.59 | 0.59/1.08 | 0.59/1.08 | | | | | | | - | | | | | |
| **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 | | | 64 | | | | | | 68 | | | | 22 | | | 57x2 | | | |
| **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 | - | | | | | | | | | | | | | | | | | | |
| Style of attachment/ | 2+1+2 | | | | | | Each loop consists of 17 ellipse rings. Each loop is | | | | | | 1372 x 838 x 32 at top and 64 at bottom | | | | | | |
| dimension, mm | 3+1+3 | | | | | | attached with a gap of 4-5 feet interval | | | | | | (Length x breadth x width) | | | | | | |
| Weight in air, kg | 0.250, 0.500, 1.5,2 | | | | | | 30-35 | | | | | | 65 - 70 | | | | | | |

## EXPERIMENTAL FINDINGS AND ANALYSIS

The bottom fish trawl (64 m) operated along the Ratnagiri coast of Maharashtra is commonly known as *Disco dol* (32 *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* (32 *Angli*) was a two seam high opening bottom trawl net operated along the coast of Ratnagiri specifically used to catch Ribbonfish, Squid, Croaker, Pomfret etc. It had two panels *i.e.* upper and lower panel, while the side panels were absent. The average total length of the 32 *Angli disco dol* was found to be 64 m and the belly portion had mesh size of 600 mm. The detailed technical specifications of 32 *Angli disco dol* net are presented in the Table 1. The relationship between various parts of the trawl are presented in Table 2, 3 and 4. The design of the net is depicted in Fig. 1.

**Table 2 : Relationship between size of the trawl and length of head rope**

| Sr. No. | Type of trawl net | Size of trawl net (Avg.) | Length of head rope recorded | Estimated trawl size head rope relationship (Sreekrishna and Shenoy, 2001) |
|---|---|---|---|---|
| 1. | *Disco dol* 32 *Angli* | 69.49 | 64 | 1 : 0.92 |

**Table 3 : Relationship of stretched length of upper edge of belly with the length along various parts of trawl (Sreekrishna and Shenoy, 2001)**

| Sr. No. | Type of trawl | Stretched length of upper edge of belly (m) | Length of webbing for bosum (m) | Height of webbing for jibs (m) | Width of webbing for jibs (m) | Depth of webbing for belly (m) | Width of lower part of belly (m) | Length of cod end (m) |
|---|---|---|---|---|---|---|---|---|
| 1. | *Disco dol* 32 *Angli* | 108 | 36 | 36 | 18 | 81 | 27 | 37.8 to 48.6 |

**Table 4: Relationship between maximum belly width and head rope length**

| Sr. No. | Type of trawl net | Length of head rope recorded | Mesh size of belly (mm) | Maximum no. of meshes in belly | Stretched belly width (m) | Estimated stretched belly width (Kartha *et al.*, 1990) |
|---|---|---|---|---|---|---|
| 1. | *Disco Dol* 32 *Angli* | 64 | 600 | 180 | 108 | 46.3288 |

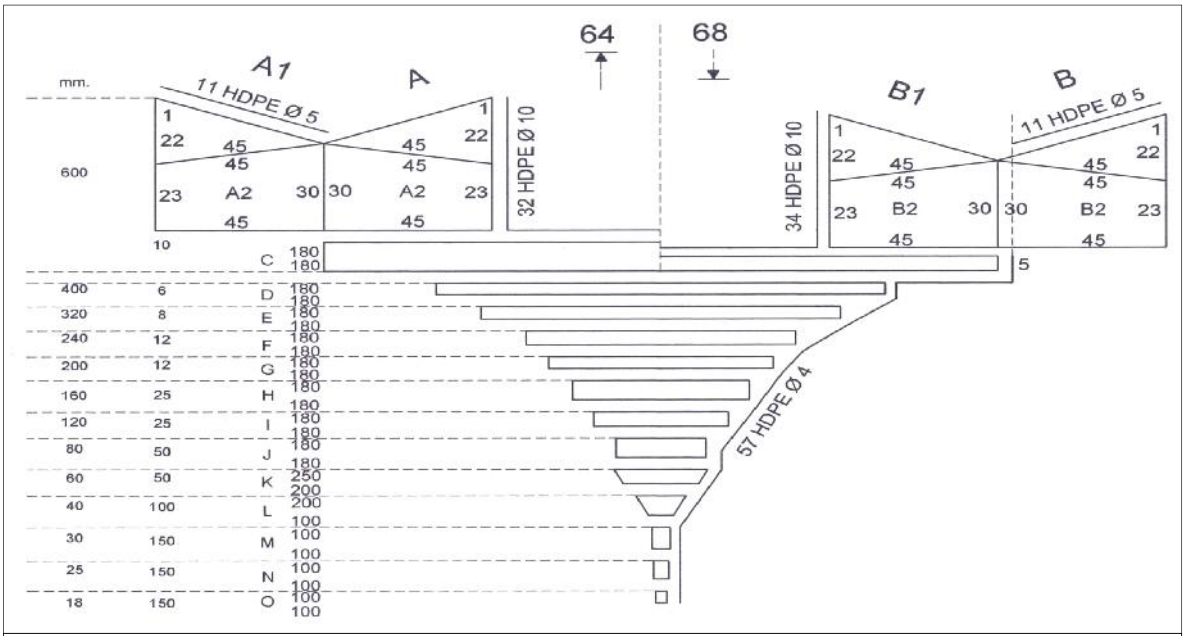


**Fig. 1 : Design of (64 M) bottom fish trawl (32 *Angali disco dol*)**

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 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.* (1990) 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 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 high opening fish trawl (64 m) or *Disco Dol* (32 *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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**MEMBERS OF RESEARCH FORUM**

**AUTHOR FOR CORRESPONDENCE :**

**Nilesh N. Sawant**
Department of Fisheries Engineering, College of Fisheries, Shirgaon, RATNAGIRI (M.S.) INDIA
Email: niel792008@gmail.com

**CO-OPTED AUTHORS :**

**Ashish S. Mohite and Makarand T. Sharangdhar,** Department of Fisheries Engineering, College of Fisheries, Shirgaon, RATNAGIRI (M.S.) INDIA
Email: ashishmohite@yahoo.com; makarand.sharangdher@gmail.com