



Performance Evaluation of Multi-seam Trawl in Inshore Waters of Visakhapatnam, North East-coast of India

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Abstract

Bottom Trawling is a very popular fishing method along the east coast of India. Ever since the shrimp catch has considerably reduced, trawl fishermen have started targeting fish by modifying the trawl design. Majority of the fish trawls used in the fishing industry of Visakhapatnam are two seam trawls. It is a fact that increasing the number of seams increase the area of filtration of the gear. Fishing experiments were undertaken to study the performance of multi seam trawl compared with a two seam trawl gear in terms of the CPUE and catch composition. The experimental trawl net showed a CPUE rate of 40 kg h^{-1} against 23 kg h^{-1} from 2 seam trawl. The composition of catch is also compared in the paper.

Keywords: Multi seam trawl, catch composition, semi pelagic fish

Introduction

Mechanisation of fishing craft in the east coast of India started with the introduction of powered gillnetters during the late fifties. Large mechanised trawlers were introduced in late seventies along the East coast of India (Satyanarayana, 1972). Currently about 579 mechanised trawlers are being operated from Visakhapatnam base (CMFRI, 2010). Bottom trawling provides a major portion of marine fish and is known to be a very effective method for harvesting shrimps and demersal fishes. Shrimp trawls have undergone several changes in course of time such as increase in the number of seams, mesh size and also changes in other dimensions of the net. The fish trawls in the commercial trawlers are two

seam. In fish trawls, mesh sizes in the front part of the net are increased in order to reduce the drag. However, increasing the number of seams to increase the vertical height are not common in fish trawls (Rajeswari et al., 2012). Different designs of trawl nets in the east coast have been described by Satyanarayana & Nair (1962), Satyanarayana et al. (1962) & Narayanappa (1968a). Hamuro (1966) evaluated four seam trawl and found them to be more efficient than two seam trawl. The efficiency of six seam otter trawl was reported by Deshpande et al. (1970). The substitution of netting in the front parts of the trawl by ropes to reduce the drag is reported by Rao & Narayanappa, (1994). Satyanarayana et al., (1972) have reported that the multi seams can rectify the deficiencies of two seam trawls in terms of vertical height. In the present study, performance of the multi-seam net was evaluated and compared with the conventional two-seam trawl.

Material and Methods

Fishing operations were conducted off Visakhapatnam from CIFTECH 1, 15.5m L_{OA} with 122 HP engine, during 2008-2011. V-form otter boards of 137 x 82 cm weighing 70 kg each were used in combination with 15 m double sweep lines, for fishing operations. Alternative hauls were made with the multi seam trawl and two seam trawl in the depth range of 25-45 m, maintaining a tow duration at 1 h and towing speed of 2.3-2.5 kn. Data pertaining to 179 comparative hauls for each net were taken.

The design drawing and detailed specification of the 14 seam trawl and 2 seam trawl are given in Fig 6 and Fig 7. The head rope and foot rope length of multiseam was 26 m and 30 m respectively. The head rope and foot rope length of 2 seam trawl were 28 m and 32 m respectively.

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Results and Discussions

The total catch and the Catch Per Unit Effort (CPUE) obtained from the multi-seam trawl and the two-seam trawls are presented in Table 1 and the catch composition is given in Fig. 1. The percentage composition of fish landed by the two trawls are shown in Fig. 2 and Fig. 3. The CPUE of multi seam trawland two seam trawl is represented in Fig. 4.

Table 1. Details of fishing operations

	Multi seam trawl	Two seam trawl
No of hauls	179	179
Total towing duration (hours)	179	179
Total catch (Kg)	7091	4181
CPUE, kg h ⁻¹	39.6	23.3

The total catch landed by the multi seam trawl in 179 h of operation was 7 091 kg of fish at an average of CPUE 39.6 kgh⁻¹. The two seam trawl yielded a total catch of 4 181 kgh⁻¹ in 179 h with a CPUE of 23.3 kgh⁻¹. The catch obtained from both the nets was analysed to study the composition. The percentage of each species contributing to the catch was compared. The catch of multi seam trawl composed of ribbon fish (30%), goat fish (24%), silver bellies (23%), sciaenids (11%), nemipterids (5%) and others. The catch composition of two seam trawl comprised of silver bellies (45%), goatfish (10%), ribbon fish (10%), sciaenids (9%), nemipterids (7%), sardines and cuttle fish (5% each) and other miscellaneous. The total catch and the catch per unit effort from multi seam trawl was significantly higher ($p < 0.05$) when compared to 2 seam trawl.

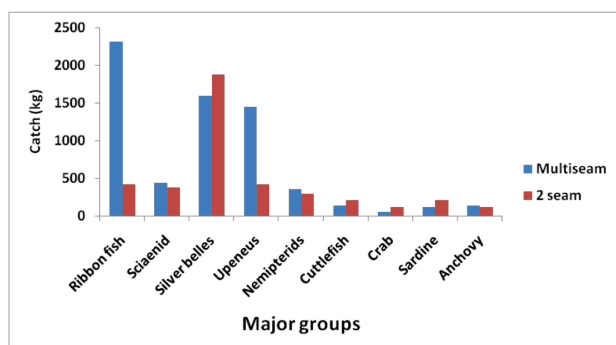


Fig. 1. Catch composition of multi seam and two seam trawls (2008-2011)

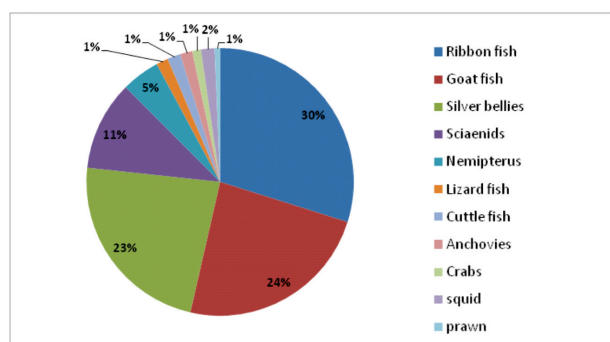


Fig. 2. Catch composition of multi seam trawl

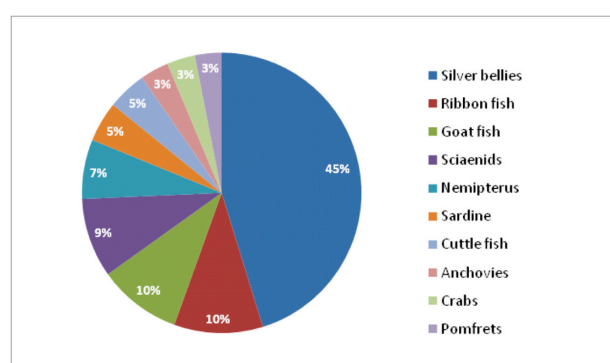


Fig. 3. Catch composition of two seam trawl

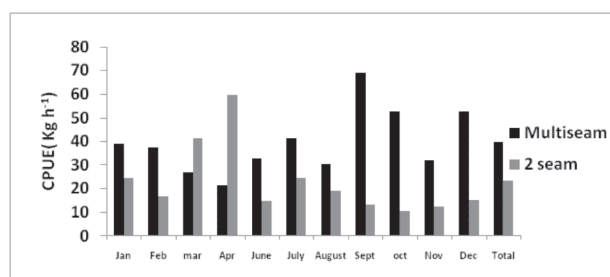


Fig. 4. Comparative CPUE of multi seam and two seam trawls

There is no significant difference between seasons ($p > 0.05$). Off bottom fishes namely ribbon fish, and squid catches were significantly higher ($p < 0.05$) in multi seam trawl. This may be attributed to the higher expected vertical opening of the multiseam trawl when compared to the 2 seam trawl. The quantity of catch and CPUE of multi seam and two seam trawls for each month is given in Fig. 4. Highest catch recorded in multiseam trawl was in the month of September. There is a striking difference between the multi seam and two seam trawl in catch composition and in CPUE. The

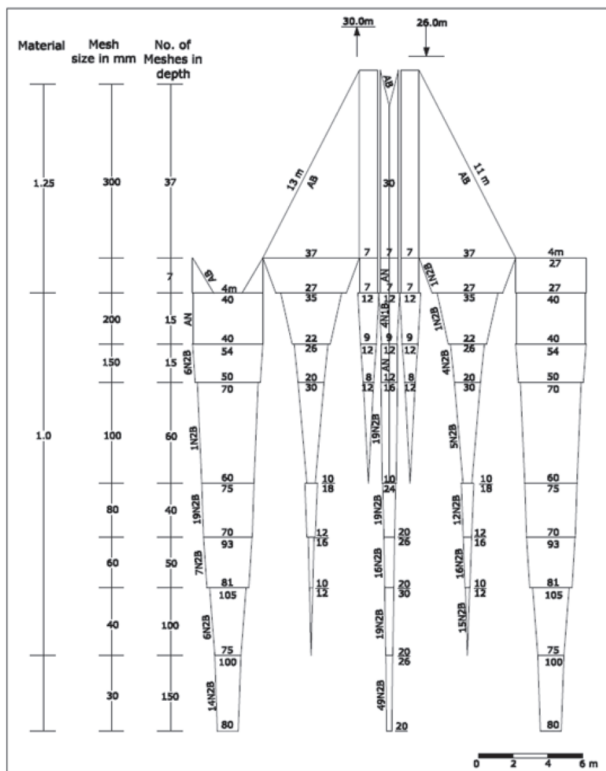


Fig. 5. Design drawing of multiseam trawl

composition of off-bottom fish was high in multi seam trawl.

There has been a rapid expansion of mechanized fleet over the past four decades and around 1 341 trawlers are operating along Andhra Pradesh coast of which 579 trawlers operate from Visakhapatnam base (CMFRI, 2010). On the comparative fishing experiments with four seam and two seam trawls in Wadge Bank, Hamuro (1966) obtained better performance with four seam trawl than conventional two seam. Satyanarayana & Narayanappa, (1972) studied the effectiveness of four seam trawl and reported an average catch rate of 105.5 kg h⁻¹ against 98.93 kg h⁻¹ of trawling by two seam trawl. In the present study, the net with more number of seams showed significantly higher catch rates of off bottom fishes. No significant difference in the catch rate was reported except catch composition between two seam and four seam trawls by Satyanarayana & Narayanappa (1976). In the present study, the total catch and the catch per unit effort from multi seam trawl was significantly higher when compared to 2 seam trawl. There is no significant difference between seasons. Off bottom fishes namely ribbon fish, and squid catches were significantly higher in

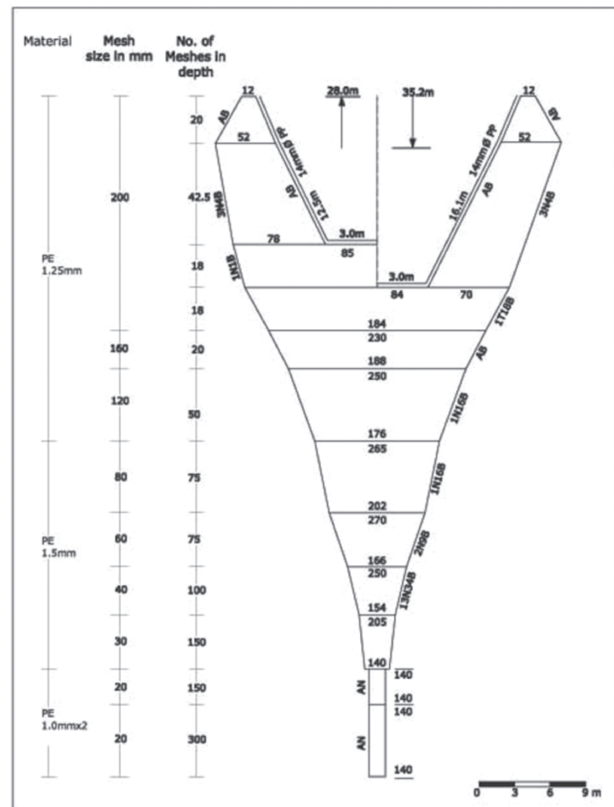


Fig. 6. Design drawing of 2 seam trawl

multi seam trawl. Two seam fish trawls dominated the fishing industry until 1950s. During the next two decades few trawlers adopted four seam trawls but the industry was dominated by two seam nets along the east-coast (Satyanarayana et al., 1972). This trend is still continuing in east-coast of India. In Japan trawl nets with more than four seams are fairly popular (Garner, 1978). The performance of 15.8 m six seam trawl of Veraval coast yielded 31 kg h⁻¹ of prawn and 210 kg h⁻¹ of fish (Deshpande et al., 1970). Three panel double trawl net was found effective in targeting bottom as well as off bottom fishes simultaneously (Satyanarayana & Narayanappa, 1976). In the present study, multi seam trawl yielded an average catch rate of 39.6 kg h⁻¹ of trawling as against 23.3 kg h⁻¹ of trawling by two seam trawl.

The present study reveals the effectiveness of multiseam net for catching off-bottom fish along with bottom fish. Keeping in view the dwindling demersal fish and prawn catch, there is a need to diversify from present fishing method of targeting demersal resources to off bottom resources. Since the multi seam trawl had a relatively higher CPUE than the

conventional two seam net and effective in targeting off bottom fishes, this trawl design can be very useful for the commercial trawlers, along the east coast of India. This net can be used for exploring new grounds and also help in reducing the pressure on bottom resources for sustainability of fishery resources.

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