

## **Efficacy of square mesh cod end in trawlers in reducing the by-catch of juvenile fishes and fuel consumption: An experiment conducted off Munambam coast**

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### **Introduction**

One of the most disastrous adversities affecting the marine fisheries sector of India is the high by-catch of juvenile fishes. Enormous quantities of juvenile fishes are fished out of the marine environment everyday as by catch owing to trawling operations. The frequent removal of juvenile fishes at the present rate would have a devastating effect on marine ecology, which would eventually lead to a collapse of marine fisheries sector in India. The juvenile fishes in by-catch also include high density of juveniles of economically important fishes. These fishes, if allowed to grow to full size, would have fetched huge profits to fishing sector and also would have contributed to the recruitment of next generation of their respective species. Therefore, it can be said that the by-catch of juvenile fishes pose an equal threat to both ecology and economy.

It is high time that fishermen are made aware of the seriousness of the issue and the impact it would have on their own future. However, it needs to be understood that generating awareness alone will not solve the issue. To bring about any

change, the concerned authorities and organisations should come up with effective solutions to reduce by-catch of juvenile fishes without affecting the livelihood of fishers. Considering the need for improving trawl selectivity to reduce by-catch of juvenile fishes and to ensure sustainability in marine fisheries sector of India, NETFISH decided to popularize Square mesh cod ends as an effective measure to reduce the by-catch of juvenile fishes. If the presently used diamond mesh cod ends are replaced by square mesh cod ends, it will go a long way in saving the juveniles and thus ensuring sustainability in marine fisheries sector.

In order to create awareness among the sea going fishermen on the benefits of using square mesh cod ends, a two day onboard demonstration experiment was conducted by NETFISH on a trawler with 10 crew members on 18<sup>th</sup> and 19<sup>th</sup> of March, 2015. Dr. Joice V Thomas, Chief Executive, NETFISH, Mr. Santhosh N K, State Coordinator, Kerala North, Mr. Afsal V V and Mr. Naveen Sathyan, Research Assistants of NETFISH and Mr. Sreekumar O C, Harbour Data Collector,

Munambam Harbour participated in the experiment.

### *The Experiment*

The main aim of conducting the experiment was to compare the catch data of square mesh cod end (of 25 mm mesh size and 16 mm mesh size) and the diamond mesh cod end (of 25 mm mesh size). The fuel consumption during the hauling of different cod ends was also compared. Basically, the experiment was designed to give an onboard demonstration to fishermen on the economic and ecological viability of using 25 mm square mesh cod ends. A set of 5 experiments were conducted to draw effectual conclusion. The experiments were conducted using the following cod ends:

- (a) 25 mm diamond mesh cod end.
- (b) 16 mm square mesh cod end.
- (c) 25 mm square mesh cod end.
- (d) 25 mm square mesh cod end with 25 mm diamond mesh cover.
- (e) 25 mm square mesh cod end with 16 mm diamond mesh cover.

Experiments (a) to (c) were conducted to compare the catch



data and fuel consumption of the three types of cod ends used. Experiments (d) and (e) were conducted to get an idea of fishes which escape from 25 mm square mesh but are caught in 25 mm diamond mesh and 16 mm diamond mesh. All five experiments were conducted off Munambam coast at a depth of 15 fathoms (27.43 m). A uniform hauling time of one hour and a hauling speed of 3.8 to 4 knots/h were maintained for all five experiments. The total wharf length was 170 m.

The total length (TL) of a sample of each species caught was noted down and the mean TL was calculated. Fuel consumption during each experiment was also recorded. The data obtained was analysed and compared to draw inferences.

### Results and Inferences

The catch data of the different cod ends used in experiments (a) to (c) is presented in table 1.

anchovies, seer fish and squid. The mean TL of Anchovies was greater in 25 mm square mesh when compared to 25 mm diamond mesh and 16 mm square mesh. In case of squid also mean TL was greater in 25 mm square mesh in comparison to other two meshes. In case of seer fish the mean TL in 25 mm square mesh was found to be almost 50% more when compared to the mean TL in 25 mm diamond mesh. In case of Mackerel and Moon fish, considerable difference was not observed in the mean TL of fish caught in the three cod ends. Overall, it can be said that the mean TL of fishes caught using 25 mm square mesh cod end was higher in comparison to other two, which means that higher percentage of larger fishes were present in the catch from 25 mm square mesh.

Experiments (d) and (e) were conducted to assess the size of fishes which escape the 25 mm

the fishes which escaped the 25 mm square mesh but which held in 25 mm diamond mesh include squids of size less than 5 cm (66% less than 3 cm), Mackerel of size less than 7 cm and anchovies of size range 4 to 6 cm. Similarly, fishes which escaped 25 mm square mesh but got caught in 16 mm diamond mesh included squids of size less than 5 cm (more than 84% had size less than 3 cm) and anchovies of size less than 7 cm. In all cases juveniles of economically important fishes with no market value were found to escape from 25 mm mesh size cod end. Only anchovies of size less than 7 cm escaped the 25 mm square mesh which can be considered as a loss, but larger anchovies were found to be retained by net. However, if they are going for a three hour hauling, these smaller anchovies will get crushed.

### Fuel efficiency

Fuel efficiency was calculated in terms of litres of diesel consumed during one hour hauling of each of the three cod ends, viz., 25 mm diamond mesh, 16 mm square mesh and 25 mm square mesh. When using 25 mm diamond mesh cod end, a fuel consumption of 40 litres per hour was recorded. Maximum fuel consumption was recorded for 16 mm square mesh cod end (42 litres/h) and minimum was recorded for 25 mm square mesh cod end (38 litres/h). Fishermen are currently using 25 mm diamond mesh cod ends. Their each fishing haul is of 3 hours and in a day they conduct 4 fishing

**Table.1.** Comparison of mean total length (TL) of fishes caught using different cod ends.

Sl. No.	Fish Caught	Square Mesh 25 mm		Diamond Mesh 25 mm		Square Mesh 16 mm	
		Mean	St Dev	Mean	St Dev	Mean	St Dev
1	Anchovies	9.91	0.63	7.71	2.16	7.69	0.74
2	Seer Fish	33.6	4.2	22.75	7.3	Nil	Nil
3	Mackerel	16.5	0.8	17.05	1.12	Nil	Nil
4	Moon Fish	11.0	0.6	11.04	0.63	10.91	0.66
5	Squid	13.96	3.83	12.11	2.71	8.73	2.71

From table 1 it is quite evident that considerable difference exists in the mean of total length (TL) of fishes caught in the three different cod ends, especially in case of

square mesh, but get caught in 25 mm diamond mesh and 16 mm diamond mesh cod ends. In experiment (d) where 25 mm diamond mesh was used as cover,



hauls, 2 in the morning and 2 in evening. Therefore, it is estimated that in a day they conduct hauling operations for around 12 h. In case, they use 25 mm square mesh for hauling, fishermen can save 2 litres of fuel in an hour amounting to 24 litres of fuel per day. For 100 days of active fishing it is estimated that 2400 litres of fuel amounting to Rs 1,32,000/- (2400 x Rs 55=1,32,000) can be saved by using 25 mm square mesh cod end.

### Conclusion

The experiment was conducted

to demonstrate the efficiency of 25 mm square mesh to sea going fishermen and other crew members of fishing vessel. It was found that 25 mm cod end mesh size would allow the escape of juvenile fishes without causing much loss to fishermen. Also the fuel consumption was found to be less during hauling of nets with 25 mm square mesh cod ends. The fishes caught in 25 mm square mesh were easy to sort and were much cleaner. The fishermen who participated in the programme were

much satisfied by the results and expressed their interest in using 25 mm square mesh cod ends. After the experiment, NETFISH is expecting that 25 mm square mesh will get huge recognition by mouth to mouth publicity in Munambam. The success of the experiment has prompted NETFISH to further carry out such demonstration experiments and to come up with other programmes to popularize the use of 25 mm square mesh cod ends in all coastal states of India.



*Changing the cod ends of trawl nets*



*Shooting the trawl net*



*Pulling the nets onboard after hauling*



*Onboard sorting of fishes*





Weighing 1 kg of fish for estimating size class



Size variation of squid caught in 25 mm diamond mesh



Mackerel which escaped 25 mm square mesh but got caught in 25 mm diamond mesh



Squid which escaped 25 m square mesh but got caught in 25 mm and 16 mm diamond mesh

## NETFISH move welcomed by the boat operators of Munambam harbour

NETFISH introduced square mesh cod end net at Munambam harbour in a function conducted to observe the World Ocean Day. NETFISH convened an awareness programme to boat operators and associated people on 8<sup>th</sup> June 2015 and announced the results of the fishing experiments conducted by NETFISH using square and diamond mesh net cod ends on March 18<sup>th</sup> and 19<sup>th</sup> March 2015, off Munambam coast by using a commercial bottom trawler. The experiments were conducted to test the feasibility and advantages

of square mesh cod end over the conventional diamond cod end in a commercial trawler. In these experiments, 25 mm square mesh cod end, 25 mm diamond and 16 mm diamond cod ends were tested in the trawl net with a view to analyze the difference in the catch pattern as well as fuel consumption. In the square mesh, fuel saving of 2 litre per hour was noticed and this indicates that around 2400 litre of diesel can be saved in a 100 day of fishing days per year per boat and that will eventually save around Rs. 1.32

lakh on fuel cost. In addition to this economic benefit, it was also found that juvenile fishes, squid, cuttle fish etc also got escaped from the square mesh cod end net which will eventually help in maintaining the sustainability of these fish stocks. The catch in the square mesh cod end recorded with very little by- catch thereby the sorting time was very less. While using 25 mm square mesh, squids were recorded with a size above 9 cm whereas in 25 mm diamond and 16 mm diamond cod ends above 50 % of squids were caught with



a size of below 5 cm which fetch no market value but considered as waste in fishing. The results of the experiments were announced by Dr. Joice V Thomas, Chief Executive, NETFISH in the function.

During the programme, 25mm squarecodendnetsweredistributed

to three trawl boats such as *Leader, Kilukkam* and *Kireedam* at Munambam. Mr. P P Girish (Chairman, Fishing boat Owner's & Operator's Coordination Committee), Mr. S B Kasim (President, Deep Sea Fishing Boat Operator's association), Mr. K K Velayudhan (President, Trawl Net

Boat Operator's Association) and Mr. K K Pushkaran (President, Fishing Boat Operator's Welfare Association) felicitated the occasion. They all welcomed this move by NETFISH and offered their support against juvenile fishing.



Dr. Joice V Thomas, CEO, NETFISH distributing square mesh cod end net to fisherman at Munambam



Dr. Joice V Thomas, CEO NETFISH announcing the results of the fishing experiments conducted by NETFISH using the square mesh net cod end

## MPEDA participates in 'KRISHI VIKAS-2015' exhibition at Indore, Madhya Pradesh

Madhya Pradesh (MP), the second largest state of India, has a vast knowledge pool of agriculture and herbal sectors, owing to its biodiversity that facilitates the production of various types of crops. Its agricultural land is considered among the most fertile lands in Asia. The state has an agrarian economy and the major crops of Madhya Pradesh are wheat, soybean, gram, sugarcane, rice, maize, cotton, rapeseed, mustard and pigeon pea. Fisheries, Horticulture and Poultry industries are also growing well within the state and contribute to the state

GDP.

Confederation of Indian Industry (CII) along with the Madhya Pradesh state government organized the 3<sup>rd</sup> edition of agricultural event 'Krishi Vikas-2015' a state level agricultural event from 25<sup>th</sup> to 27<sup>th</sup> May, 2015 at Dassahra Maidan, Annpurna Road, Indore, Madhya Pradesh. The exhibition was organized along with 'Krishi Mahotsav', an initiative of state government to train and aware farmers to latest techniques and technology to boost farm produce. Shri Shivraj Singh, Hon'ble Chief Minister, Govt. of Madhya Pradesh

inaugurated the programme.

The Marine Products Export Development Authority (MPEDA), Ornamental Fish Division participated in the event. Mr. Sreejith P.T., Assistant Director, Regional Office - Mumbai and Mr. Mohammed Arif Ansari, Programme Manager, Ornamental Fish Division, Bhopal represented MPEDA in the event by putting up a 36 sq m. stall. Ornamental Fish Varieties viz. Angel Fish, Koi carp, Kohaku, Oranda Gold Fishes, Golden Carps, Livebearers, Milky Carps