

Studies on the Suitability of HDPE Materials for Gill Nets

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The suitability of HDPE yarn and HDPE twine in place of nylon for gill nets has been studied. As regards total catch nylon gill net is found to be better than HDPE nets. However, statistical analysis of the catch in respect of quality fishes shows that HDPE yarn nets are equally efficient as nylon nets.

Gill net fishing for hilsa, pomfrets etc. is one of the popular fishing activities in the Saurashtra region. Panicker *et al.* (1978) studied the selectivity of gill nets with reference to twine size, mesh size and ratio of take up for hilsa and pomfrets. Again Kunjipalu *et al.* (1984) studied the effectiveness of coloured webbing on the catch of hilsa and pomfrets. All these years nylon twine (polyamide) of different specifications has been exclusively used for the gill net fabrication. The HDPE materials, which was introduced to fishing industry during early 60's made very little impact on the gill net fishery till the end of 70's. The increased cost of polyamide materials makes the operation of the gill net fleet more and more expensive. This necessitated the need for introducing a cheaper material like HDPE in place of nylon for gill net fabrication in recent years. Pajot (1980) and Radhalakshmi *et al.* (1985) attempted to study the effectiveness of HDPE twine and tape twisted twines, for large meshed gill nets and mackerel gill nets respectively. The present investigation was initiated to study the suitability of HDPE yarn and thinner HDPE twine for gill nets.

Materials and Methods

Nylon multifilament twine (210/2/3), HDPE yarn (single) and HDPE twine (multiple yarn) were selected for experimental net (Table 1) as these materials were predominantly used for fabrication of local gill nets. The variation in the diameter of the three materials has not been taken into considera-

tion. The detailed specifications of the gill nets are given in Table 1. The properties of each material used for the above gill nets are given in Table 2.

Experimental fishing was carried out during 1985 and 1986 seasons from the departmental vessel. All the three types of nets namely, HDPE yarn, twine and the control nylon were operated as bottom drift on each day during day time at the depth range of 25 to 35 m off Veraval. The fish catch in number and weight in respect of each type of the net was recorded.

Results and Discussion

Thirtythree viable observations were made for these studies. The details of catch in respect of each type of net are given in Table 3. The data were analysed statistically using the 't' test in two comparison, one between the HDPE yarn versus control nylon nets and another between HDPE twine versus the control nylon nets, in respect of quality fishes and total catch separately in order to critically evaluate the new material. The details of the analysis are given in Table 4.

The catch rate as per Table 3 shows that the general performance of nylon gill net are found to be better than the other two materials. But the statistical analysis of the data in respect of the quality fishes comprising hilsa, pomfret, seer, silver bar and razor edge shows that there is no significant difference in the performance between the nylon nets and HDPE yarn nets. In other words the HDPE yarn gill nets are equally efficient in the catching rate when compared

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Table 1. Details of the gill nets

Material	Nylon	HDPE yarn	HDPE twine
Specification	216/2/3	Single yarn	1 x 3 multiple yarn
Mesh size	120 mm	120 mm	120 mm
Unit size	500 x 50 meshes	500 x 50 meshes	500 x 50 meshes
Hanging coefficient	0.50	0.50	0.50
Head rope } Foot rope }	6 mm dia HDPE rope		
Floats	Foam plast 150 x 20 mm size 5 to 6/unit		
Sinkers	Cement sinker of 500 g each 4 to 5/unit		
Average area of net operated per fishing day (m ²)	1602	1645	1428

Table 2. Properties of the materials used for the gill net fabrication

	HDPE yarn	HDPE twine	Nylon
Dia, mm	0.270	0.410	0.620
Wt/m, g	0.059	0.110	0.155
Runnage m/kg	17,000	9,090	6,450
Strength kg	1.6	2.10	8.75
Stretch %	36.00	50.00	26.60

to control nylon nets. But in the case of HDPE twines there is significant difference with the nylon net at a probability of 0.05, hence found to be unsuitable. The analysis of the total catch including miscellaneous fishes shows that there is significant difference in the catching rate between nylon and HDPE yarn nets and nylon and HDPE twine at a

probability of 0.05 and 0.01 respectively. But generally the catch of miscellaneous fishes in gill nets is not given much importance due to its lesser value whereas the catch of high cost quality fish is taken into account to evaluate its efficiency. Accordingly the findings indicate that HDPE yarn is a suitable substitute for the costly nylon.

Eventhough Table 3 shows a high preference of hilsa catch in nylon net and pomfret catch in HDPE yarn net, it has no relevance statistically. While considering the cost of the two materials, the HDPE yarn costs 35% less than nylon and hence the use of this material for gill nets fabrication will substantially reduce the total investment for a gill net fleet and thereby makes fishing more profitable. Considering all these factors the authors are of the opinion that

Table 3. Total catch of each variety of fish in each type of net calculated on the basis for 1000 m² area for each type of net

Fish caught	Nylon net kg	HDPE yarn net kg	HDPE twine net kg
A. Quality fish			
Hilsa spp.	10.721	1.972	2.464
Pomfret (<i>Pampus</i> spp., <i>Parastromateus</i> spp.)	4.876	14.991	4.015
Seer (<i>Scomberomorus</i> spp.)	2.874	1.050	1.332
Silver bar (<i>Chirocentrus dorab</i>)	2.587	2.813	2.494
Razor edge (<i>Pellona</i> spp.)	2.641	2.136	1.357
Total	23.679	22.962	11.662
B. Other fishes	30.741	21.918	14.248
Grand Total	54.440	44.880	25.910

Table 4. Details of statistical analysis

	Mean log-transferred value			
	Nylon	HDPE yarn/twine	Difference	Calculated t
A. HDPE yarn with nylon as control				
Total catch	0.3870	0.2828	0.1042	2.0865*
Quality fish	0.1887	0.1499	0.0388	0.8435
B. HDPE twine with nylon as control				
Total catch	0.3870	0.2455	0.1415	3.7703***
Quality fish	0.1887	0.114	0.073	2.1930*

* Significant at the probability of 0.05

*** Significant at the probability of 0.01

HDPE yarns can be successfully introduced in the gill net fishing industry.

The authors are thankful to Shri M.R. Nair, Director, Central Institute of Fisheries Technology, Cochin for permission to publish this paper and to Shri P.A. Panicker, Scientist S-3, CIFT for critically going through the manuscript and suggesting necessary modifications. Thanks are also due to S/Shri J. B. Paradua and K.V. Dholia, Technical Assistants for their active participation during the field trials.

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