

Relative Catch Efficiency of Newer Fishing Gear Materials

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Investigations on the relative catch efficiency of gill nets fabricated with twines of polypropylene(PP) multifilament, and nylon multifilament, nylon monofilament, PE twisted monofilament and PE yarn undertaken in Hirakud reservoir are discussed. Based on the comparative fishing data recorded, the polypropylene is adjudged as the best substitute for nylon.

The superiority of synthetic twine over natural twine fibres has been discussed by Nomura (1959), Mugaas (1959), Molin (1959), Amano (1959), Januz Zaucha (1964), Shimozaki (1964), Carter & West (1964), Sulochanan (1968), Mathai & George (1972). The efficiency and suitability of monofilament as gear material was studied by Molin (1959), Shimozaki (1964), Wigutoff (1951), Einsele (1959), Carrothers (1959), Carter & West (1964), Honda & Osada (1964), Klust (1964), Steinberg (1964). Tran-Van-Tri and Ha-Khac-Chu (1964), Khan *et al.* (1975), Nayar *et al.* (1985) and Mohan Rajan *et al.* (1991). Pajot (1980), Radhalakshmi & Nayar (1985) and Pillai *et al.* (1989) have discussed HDPE twine as a gear material. Results of fishing experiments conducted with gill nets of polypropylene twine, nylon monofilament, PE twine, PE monofilament yarn and nylon multifilament twine in Hirakud reservoir are presented in this communication.

Materials and Methods

Catching efficiency of a fishing gear depends not only on construction but also on the properties of the net materials used (Steinberg, 1964). Comparative fishing was done with frame nets made of PP, nylon monofilament, PE monofilament yarn, PE twine along with nylon twine frame nets already evolved (Geroge *et al.*, 1979) for harvesting the economical size groups of *Catla catla*. Four units of each gear material

having a mounted length and depth of 35 m and 5.25 m respectively were operated as surface set nets. The experiments were carried out from 1987 to 1990 and details

Table 1. Specifications of the Gear

Webbing	Twine material				
	Nylon multi-filament	Nylon mono-filament	PP	PE mono-yarn	PE twine
Type of knot	-	Double	Trawl	Knot	-
Colour	White	White	White	White	Blue
Twine size	0.55 mm	0.32 mm	0.70 mm	0.25 mm	0.35 mm
Mesh size(mm)	90 105	90 105	90 105	90 105	90 105
No of Meshes in length - in 90(mm)	390	390	390	390	390
- in 105 (mm)	334	334	334	334	334
No of Meshes in depth - in 90 (mm)	60	60	60	60	60
- in 105 (mm)	50	50	50	50	50
Hanging coefficient	0.5	0.5	0.5	0.5	0.5

Lines and ropes

Material	monofilament braided rope	
Dia (mm)	4mm	
Floats and sinkers	Floats	Sinkers
Numbers	12	3-5
Material	PVC	Iron ring
Shape	Spindle shape	Circular
Diameter	5 cm	12.7 cm
Buoyancy	45 g	-
Wt. in air	5 g	600-650 g

of the fishing gear employed for the investigation are given in Table 1.

Details of catch landed by nets of each gear material irrespective of mesh size were recorded (Table 2). The materials of different diameter were used due to non-availability of twines of similar diameter.

Results and Discussion

Thirty six valid observations were made for these studies. The catch per unit area (kg/1000 sq. m.), indicates that the PP nets are more effective than nylon monofilament, nylon multifilament, PE monofilament yarn and PE twine as it yielded 1.37, 1.43, 2.84 and 3.86 and 1.15, 1.36, 3.00 and 5.00 times more both by weight and number respectively (Table 2).

The data were analysed statistically by using Anova technique. (Table 3).

Table 2. *Catch details of nets different gear materials*

Gear materials	No. of fish	%	Total weight in kg	%	Catch per 1000 sq.m. of webbing in kg.
Polypropylene	15	31.91	53.00	32.72	2.121
PA.mono filament	13	27.67	38.65	23.86	1.546
PA.multi filament twine	11	23.40	37.00	22.84	1.480
PE Twine	5	10.64	18.65	11.51	0.746
PE Mono-filament yarn	3	6.38	14.70	9.07	0.588

From the analysis it is seen that there is significant difference ($p < 0.05$) between nets. The least significant difference at 5% level was worked out and the means separated. PP, nylon monofilament, nylon multifilament nets had significantly ($p < 0.05$) higher catches by weight compared to PE monofilament yarn and PE twine. Fur-

Table 3. *Statistical analysis (Anova Technique)*

Source	S.S.	d.f.	m.s.	F
Total	14.8064	179	-	-
Nets	1.0678	4	0.2670	3.108*
Days	1.7185	35	0.0491	0.572
Error	12.0201	140	0.0859	

* Indicates significance at 5% level
Least significant difference at 5% level = 0.1382

ther the mean catch in log values in respect of PP, nylon monofilament, nylon multifilament, PE monofilament yarn and PE twine was worked out as 0.2582, 0.2085, 0.1884, 0.0779 and 0.0593 respectively.

For comparison of number of fish caught in each net experimented, Chi-square test was employed. Chi-square calculated was 11.403 with 4 degrees of freedom which is significant at 5% level. Number of fishes caught in PP, nylon monofilament, and nylon multifilament nets were significantly ($p < 0.05$) higher than that in PE monofilament yarn and PE twine nets indicating the superiority of the first three nets.

Eventhough, the first three nets landed significantly higher catch, among them PP was found to have a slight edge over the other two namely, nylon monofilament and nylon multifilament inspite of having maximum dia among the material tested which agree with the view of Carter & West (1964) that the performance of PP is atleast as good or better than that of nylon.

In view of its catching power PP can be recommended as a suitable substitute for nylon being cheaper and having all other properties required for a gear material (Thomas, 1967; Carrothers, 1962; Honda & Osada 1964, Klust, 1964 and Cecily & Radhalakshmi, 1985).

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References

- Amano, M. (1959) in *Modern Fishing Gear of the World*. (Kristjonsson, H.Ed.) p.150, Fishing News (Books) Ltd., London
- Carrothers, P.J.G. (1959) in *Modern Fishing Gear of the World*. (Kristjonsson, H.Ed.) p.69, Fishing News (Books) Ltd., London
- Carrothers, P.J.G.(1962) Fisheries Research Board of Canada, Circular No.66
- Carter, C.L.B. & West, K.(1964) in *Modern Fishing Gear of the World*. 2. p.57, Fishing News (Books) Ltd., London
- Einsele, W. (1959) in *Modern Fishing Gear of the World*. (Kristjonsson, H.Ed.) p.96, Fishing News (Books) Ltd., London
- George, V.C., Khan, A.A. & Varghese, M.D. (1979) *Fish. Technol.* 16, 87
- Honda, K.& Osada, S. (1964) in *Modern Fishing Gear of the World*., 2, p.55, Fishing News (Books) Ltd., London
- Januz Zaucha (1964) in *Modern Fishing Gear of the World*. 2, p.73, Fishing News (Books) Ltd., London
- Khan, A.A., George, N.A. & Pandey, O.P. (1975) *Fish. Technol.* 12, 60
- Klust, G. (1964) in *Modern Fishing Gear of the World*. 2 p.50, Fishing News (Books) Ltd., London
- Mathai, T.J. & George, N.A. (1972) *Fish. Technol* 9, 81
- Molin, G. (1959) in *Fishing Gear of the World*. (Kristjonsson, H.Ed.) p.156, Fishing News (Books) Ltd., London
- Mohan Rajan, K.V., George Mathai, Manohardoss, R.S. & Puthra Pravin (1991) *Fish. Technol.* 28, 1
- Mugaas, N. (1959) in *Modern Fishing Gear of the World*.(Kristjonsson, H.Ed.) p.159, Fishing News (Books) Ltd., London
- Nomura, M. (1959) in *Modern Fishing Gear of the World*. (Kristjonsson H.Ed.) p.550, Fishing News (Books) Ltd., London
- Nayar, S.G., Radhalakshmi, K.& Meenakumari, B.(1985) in *Harvest and Post-harvest Technology of Fish*, (Ravindran et al., Eds) p.269 *Society of Fisheries Technologists (India), Cochin*
- Pajot, G.(1980) *Bay of Bengal Programme working paper*, 5
- Pillai, N.S., Boopendranath, M.R. & Kunjipalu, K.K. (1989) *Fish. Technol.* 26, 1
- Radhalakshmi, K. & Gopalan Nayar, S. (1985) in *Harvest and Post-harvest Technology of Fish*, (Ravindran et al., Eds) p.262, *Society of Fisheries Technologists (India), Cochin*
- Shimozaki, Y. (1964) in *Modern Fishing Gear of the World*. 2 p.66, Fishing News (Books) Ltd., London
- Steinberg, R. (1964) in *Modern Fishing Gear of the World*. 2 p.111, Fishing News (Books) Ltd., London
- Sulochanan, P., George, V.C. & Naidu, R.M. (1968) *Fish. Technol.* 5, 81
- Thomas, D. (1967) Report to the Govt. of Nigeria on Improved Fishing Gear and Methods for Lake Chad. UNDP No.T.A.2271
- Tran-Van-Tri & Ha-Khac-Chu (1964) in *Modern Fishing Gear of the World*. 2 p.108, Fishing News (Books), Ltd., London
- Wigutoff, N.B. (1951) Fishery Leaflet 386, Fish and Wild Life Service, Washington