

CATCH EFFICIENCY AND SELECTIVE ACTION OF COLOURED GILL NETS

N. A. GEORGE, A. A. KHAN & O. P. PANDEY

Central Institute of Fisheries Technology, Cochin-682011.

Information on the catch efficiency and selective action of coloured gill nets in relation to the reservoir fishes of India are lacking. Authors, in the present studies have attempted to evaluate the comparative catch efficiency of gill nets of four shades viz. yellow, orange, green and blue over the colourless ones, by conducting fishing experiments, in the Govindsagar reservoir. Attempts have also been made to study the preference shown to colours by the four major species of fishes of the reservoir.

INTRODUCTION

Comparative catch efficiency of coloured gill nets and the behaviour of different species of fish towards coloured gear have been studied elsewhere by various authors. Von Brandt and Leipolt (1955) and Andreev (1958) Kanda *et al.* (1958) showed the relative effect of coloured nets over the colourless ones. Nomura (1959 and 1961), while studying the behaviour of fish schools in relation to gill nets, reported higher catch rate in nets with darker shade. Blaxter *et al.* (1964) stated that the response of fish to the gear is influenced by the colour and visibility of the net material used. Muntz and Cronby Dillon (1966) found that gold fish has a preference for blue colour. Koike (1968) was of the view that sea bass, black progy, flat fishes, conger eel, rock trout and trout are attracted by coloured nets. Nambiar *et al.* (1970) studied the avoidance response of the fish in relation to the colour

of the webbing and reported the higher catch of blue and black nets for certain species of fish. In India, efficiency and the selective action of coloured gill nets have not yet been systematically studied. The authors conducted a series of comparative fishing experiments with gill nets of four different colours along with colourless nets, in the Gobindsagar reservoir, and the results are discussed in this communication.

MATERIALS AND METHODS

Simple gill nets of mesh size 50 mm. bar made out of nylon twine 210D/2/3 of shades blue, green, orange and yellow were selected for the fishing experiments. These nets, along with the colourless ones, were regularly operated in the different grounds of the reservoir during the period November 1966 to December 1967. The design specifications of the gear, the details of fishing operations, grounds etc. are described by Khan *et al.* (1974). Number

and weight of each fish of the four major species of fish in the reservoir caught by nets of different shades were collected separately. Fish, other than the four selected species, were grouped as "miscellaneous" and on each day, only the total weights, of such fish caught in the different nets were recorded.

RESULTS AND DISCUSSION

Based on the weight of the total catch landed by each net during the period, the catch per unit area was worked out and presented in Table I.

TABLE I
Catch per 100 sq. m. of webbing of
coloured gill nets (Worked out
based on the total weight)

Colour of net	Catch/100 sq.m. of webbing (kg.)
Yellow	6.45
Orange	5.76
Green	4.91
Blue	4.40
Colourless (white)	3.24

In conformity with the observations of von Brandt and Leipolt *op. cit.* and Andreev (*op. cit.*) coloured nets landed higher catches than the colourless ones.

The data were further statistically tested for the significance. Under the

assumption that the fish were uniformly distributed over the net, the average catch per 100 webbings were worked out for each net. For analysis the catch figures were converted into degrees by using transformation $P = n^2 \phi$. The analysis of variance is given in table II.

The variation between the hauls and nets are significant at 1% level. The significance of variation between the hauls may be due to the day to day variations in the reservoir. But the significance of variation between the nets can be due to the effect of colour of the nets. The critical difference and the mean value of the different coloured nets are calculated:

critical differenc = 0.06860.

White	Blue	Green	Orange	Yellow
0.11065	0.21502	0.22653	0.23087	0.27306

The catches from the white nets, are significantly less than that from the coloured nets.

For efficiency between the coloured nets, the average catch per 100 sq. m. of webbing was worked out for each net in each month as well as for the four months. The efficiency ratio was worked out by dividing the average catch per 100 sq. m. of webbing of coloured nets by that of the control net. These are given in Table III.

Except in December, in all the other months the efficiency ratio of yellow net is

TABLE II
Analysis of variance

Source	SS	DF	MS	F
Total	1.25884	79		
Hauls	0.41387	15	0.02759	2.704**
Coloured nets	0.23316	4	0.05829	5.71*
Error	0.61181	60	0.01020	—

TABLE III
Efficiency ratio of coloured nets to control net.

Nets	Blue	Green	Orange	Yellow
November	2.70	3.08	2.87	4.09
December	1.47	1.75	2.18	1.59
January	1.41	1.57	2.21	2.82
February	1.71	2.65	3.60	5.10
Total	1.50	1.80	2.32	2.61

higher than that of orange, green and blue nets. If total for all the months is taken into consideration yellow comes first followed by orange, green and blue in that order.

The data were further studied for colour preference of the four major species of fishes viz. *Mystus seenghala*, *Barbus tor*, *Labeo bata*, and *Labeo diplostoma*. The number of each species of fish, caught by each net, during the period was noted and from this, the percentage of appearance was worked out and is tabulated in Table IV.

All the four major species of the reservoir have preferred coloured nets over the colourless ones. It can be further seen that *Labeo diplostoma* and *Barbus tor* have shown preferences almost in the same degree for orange and yellow colours followed by blue and green. *Labeo bata* was attracted equally by green, orange and blue nets while *Mystus seenghala* preferred blue and orange shades.

It is also observed that although no single species of fish has shown any first preference for the yellow colour, the nets of that shade landed catches at a higher rate, and this is because, the efficiency rate was worked out on the total weight of all species of fishes of the reservoir including that of the fishes classified as "miscellaneous." On the other hand, preference rate of specific species of fish was worked out based on the number of that particular group caught by each net.

ACKNOWLEDGEMENTS

The authors wish to express their thanks to the Director, Central Institute of Fisheries Technology for the permission granted to publish this paper. They are also grateful to Shri. G. K. Kuriyan Senior Fishery Scientist cum Head of Division, Craft and Gear, Central Institute of Fisheries Technology, for critically going through the manuscript and for the suggestions offered. Finally they wish to record their appreciation to Shri. K. A. Sadanandan, Junior

TABLE IV
Percentage of different species of fishes caught by net of different colours. (Based on number of fishes)

Colour of net	Percentage of different species of fishes caught			
	<i>Labio diplostoma</i>	<i>Barbus tor</i>	<i>Labio bata</i>	<i>Mystus seenghala</i>
Yellow	26.53	23.46	17	17.40
Orange	26.72	24.07	24	21.73
Green	16.61	17.90	25	15.22
Blue	17.47	19.14	23	30.43
Colourless (white)	12.67	15.43	11	15.22

Fishery Scientist (Craft & Gear) for helpful suggestions and to Shri. H. Krishna Iyer, Asst. Statistician, Central Institute of Fisheries Technology for the statistical analysis.

REFERENCES

- Andreev, N. N. 1992. *Hand book of fishing gear and its rigging.*, Pischepromizdat Moskva. Translated from Russian TT 66-51046 United States Department of Interior and Natural Science Foundation, Washington D.C.
- Blaxter, J. H. S., B. B. Parrish and W. Dickson. 1964. *Modern Fishing Gear of the World*; 2:529. Fishing News (Books), London.
- Von Brandt, Prof. Dr. A and R. Leipolt. 1955. *Oesterreichs Fischerei*; 8: 9/10: 93.
- *Kanka, K., A. Koike and M. Ogura, 1958. *Bull. of the Jap. Soc. of Sci. Fish*; 23: 612.
- Koike, Atsushi. 1968. *Bull. of the Jap. Soc. of Sci. Fish*; 34, 3: 177.
- Muntz, W. R. A. and J. R. Cronly Dillon. 1966. *Anim. Behav*; 14: 351.
- Nambiar, K. P. P., Yoshio Hiyama and Takaya Kusaka. 1970. *Bull. of the Jap. Soci. of Sci. Fish*; 36, 5: 469.
- Somura, M. 1959. *Modern Fishing Gear of the World*; 2: 550. Fishing News (Books), London.
- Nomura, M. 1961. *Bull. of Tokai. Reg. Fish. Res. Lab*; 30: 9.
- *Not consulted in original.