

COMPARATIVE STUDY OF MONOFILAMENT AND MULTIFILAMENT GILLNETS IN LAKE KAINJI

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ABSTRACT

Comparative studies of monofilament and multifilament gillnets in Lake Kainji was carried out at Monai fishing village of Lake Kainji. A total number of six nets (3 multifilament and 3 monofilament gillnets) each measuring 15meters in length and 3 meter depth were constructed; Kuralon ropes were used as footrope and headrope, synthetic corks as float and lead as weight. The net were set in the evening (between 5:00pm and 6:00pm) and hauled in the morning (between 8am and 9am) there by maintaining a soaked time of about 15hours. The species caught by the two nets were *Lates niloticus*, *Oreochromis niloticus*, *Oreochromis aureus*, *Sarotherodon galileus*, *Tilapia mariae*, *Synodontis nigrita*, *Alestes baromozze*, *Distichodus rostratus*, *Tilapia dageti*. The result obtained from the fish caught show that Monofilament gill net had a better performance than Multifilament gill net; this was attributed to the looseness and flexibility as well as the transparent nature of net which makes it invisible in water. However, from the statistical analysis (variance test) carried out there was no significant ($P > 0.05$) difference in numbers and weight of fish species caught by the two nets.

Keywords: Monofilament, Multifilament, Gill net.

INTRODUCTION

Gillnet is a curtain like netting materials hanging vertically in water, its effectiveness depend on various factors include mesh sizes, exposed net area, mesh shape, hanging ratio, visibility and type of netting materials in relation to stiffness and breaking strength (Brandt, 1984). Gillnet is very popular among artisanal fishermen in Nigeria more than 75% of the fishermen in the inland coastal and waters in Nigeria uses gillnet at one time or another within a fishing season (Reed *et al.* 1967) Knowledge of the efficiency of gillnet is important for estimation of fish population in the stock assessment. The effect of technical innovation by fishermen on the efficiency of gillnet in qualified for proper fisheries management. Netting materials types has been shown to greatly influence catches. The Transparent nature of monofilament netting makes it effective as gillnet in clear water, it is invisible to the fish. Gillnet can be set on the surface, mid water or bottom of water. It is usually set left over night at the fish ground. Gillnet are passive gear, but can be used as an active gear by drifting through water by the aid of a fishing boat. The catchability and selectivity of gillnet depends on the hanging ration used for mounting it. One way of estimating the selectivity of gillnet is by comparing the catch with that of a relatively unselective gear such as trawl net or the purse seine net (Hamely 1975). In monnai fishing village fishermen uses mostly multifilament gillnet without comparing its catch efficiency with that of monofilament gillnet with this in mind this study was carried out. This study aimed to determine the catching efficiency of monofilament and multifilament gillnets in Lake Kainji and the appropriate netting gear that is suitable for the water body

MATERIALS AND METHODS

Study area

Kainji lake is situated in Niger state and Kebbi state in North West Nigeria. Formed in 1968 by damming the River Niger. It lies between latitude $9^{\circ} 30'$ and $10^{\circ} 35'$ and longitude $40^{\circ} 20'$ and $40^{\circ} 40'E$. It has surface area of 1270km (Ita, 1993). The study area covered little part of the Kainji Lake which includes Monai.

Construction materials and fabrication

A total number of six nets (3 multifilament, 3 monofilament gillnet) each measuring 15meters in length and 3 meter depth were constructed at the Federal College of Freshwater Fisheries Technology (FCFFT) Fishing Gear workshop using the following materials white nylon (polyamide PA) multifilament netting of twine size 69 tex and Monofilament netting of twine size 0.16mm in diameter, mesh size of 76mm and mounted at 50% ($E=0.5$) hanging ratio the same head and foot ropes were used for the six net made of kuralon (polyvinyl alcohol PVC) rope of thickness No 12.

Round shaped synthetic cork were used as float for all the net and were spaced at 1meter intervals with spacing interval corresponding to that of float.

The nets were ganged together randomly using randomized numbering techniques to form a fleet of 3 gangs of nets. The net was tied to a grass and pull until it finished and the terminal end was again tied to a stone to allow it sink.

The net were set in the evening (between 5:00pm and 6:00pm) and hauled in the morning (between 8am and 9am) thereby maintaining a soaked time of about 15hours.

The catches were carefully removed as the net were been hauled into the boat. The fish species were separated according to the net type that caught the fish and sorted into their respective species using fish identification keys prepared by Olaosebikan and Raji (2004) as taxonomic guide. At the end of the experiment the data collected were put together and the following analysis were carried out in order to achieve the objectives of the project which include: Type of species of fish caught by each gillnet, number and percentage of various fish species, Biomass of fish caught and Statistical analysis

RESULTS

Eleven different species belong to seven families were caught, (table 1) the species caught by gill nets include; *Lates niloticus*, *Oreochromis aureus*, *Oreochromis niloticus*, *Sarotherodon galilaeus*, *Tilapia mariae*, *Synodontis nigrita*, *Alestes baremoze*, *Distichodus rostratus*, *Tilapia dageti*, *Malapterurus minjiriya* and *Bagrus filamentosus*.

The number and percentage of various fish species caught in lake Kainji by gillnets are shown in Table 2. The total numbers of fish caught were 59 of which *Oreochromis niloticus*, *Sarotherodon galileaus*, *Lates niloticus* had the highest number of 18, 13 and 11 with percentages of 31.04%, 22.03% and 18.79% respectively the relative percentages recorded by monofilament multifilament gillnets were 70.69% and 29.31%. While the dominant species in the catch of the two type of nets were recorded starting with monofilament gillnet *Sarotherodon galileaus* were 13 in number and a percentage of 31.71% followed by *Oreochromis niloticu* 12 in number and a percentage of 29.27% *Lates niloticus*, 8 in number and a percentage of 19.51%, the least catch was *Synodontis nigrita* with 1 fish and a percentage of 2.44%. The dominant catch for Multifilament gillnet was *Oreochromis niloticus* with 6 fish and percentage of 35.02% the least catch were *Oreochromis auerus*, *Distichodus rostratus* and *Alestes baremoze* with 1 fish each and percentage of 5.55%.

The biomass of various fish caught using the two types of gillnet are shown in Table 3. A total weight of 6.17g was caught of which *Oreochromis niloticus*, *Sarotherodon galileaus*, *Lates niloticus* has the highest biomass, accounted for 30.14%, 16.85%, 19.44%, respectively of the weight of all the fish caught with the two nets. The weight of the fish caught by monofilament net was 3.92kg of which *Oreochromis niloticus*, *Sarotherodons galileaus* and *Lates niloticus* accounted for 30.87%, 26.63%, 22.50%, respectively. The weight of fish caught by multifilament net was 2.25kg which *oreochromis niloticus*, *oreochromis aurenus* and *lates niloticus* accounted for 28.89%, 14.22%, 14.22%, respectively.

Statistical analysis

Variance test (T test) was used to determine the significant difference for the number as well as the biomass of the fish caught by the two different gill nets. The T calculated for the number of fish caught by two nets was 1.73 and T table value was 1.78; for the biomass, the T calculated was 1.37 and T table value was 1.78.

Table 2: Number and percentage of various fish species caught in Lake Kainji by each nets

Fish species	Monofilament		Multifilament		Overall Total	
	No	%	No	%	No	%
<i>Oreochromis niloticus</i>	12	29.27	6	35.02	18	31.04
<i>Sarotherodon galileaus</i>	13	31.71			13	22.03
<i>Oreochromis auerus</i>	1	2.44	1	5.55	2	3.38
<i>Tilapia mariae</i>	3				3	5.17
<i>Distichodus rostratus</i>			1	5.55	1	1.72
<i>Alestes naremoze</i>			1	5.55	1	1.73
<i>Lates niloticus</i>	8	19.51	3	17.05	11	18.79
<i>Bagrus flamentosus</i>			3	16.05	3	5.17
<i>Tilapia dageti</i>			3	16.05	3	5.17
<i>Malapterus minjiriya</i>	3	7.31			3	5.17
<i>Synodontis nigrita</i>	1	2.44			1	1.72
Total	41	100	18		59	100
Relative percentage	70.69		29.31			

Table 3: biomass of fish caught by each gillnets in Lake Kainji

Fish species	Monofilament		Multifilament		Overall total	
	g	%	g	%	g	%
<i>Oreochromis niloticus</i>	1210	30.87	650	28.89	1860	30.14
<i>Sarotherodon galileus</i>	1040	26.53			1040	16.85
<i>Oreochromis aeneus</i>	120	3.10	320	14.22	440	7.15
<i>Tilapia mariae</i>	250	6.38			250	4.07
<i>Distichodus rostratus</i>			160	7.11	160	2.59
<i>Alestes naremoze</i>			100	4.44	100	1.61
<i>Lates niloticus</i>	880	22.50	320	14.22	1200	19.44
<i>Bagrus flamentosus</i>			350	15.55	350	5.67
<i>Tilapia dageti</i>			350	15.55	350	5.68
<i>Malapterus minjiroya</i>	320	8.16			320	5.18
<i>Synodonis nigrita</i>	100	2.55			100	1.63
Total	3920	100	2250	100	6170	100
Relative percentage	61.91		38.08			

DISCUSSION

The results obtained from the experimental study showed that the two types of gillnet used are capable of catching different species of fish. (Table1). This might be due to looseness and flexibility of the netting materials used in construction, this agreed with Garner (1986) who stated that the netting material for gillnet construction must be as soft, fine and flexible as possible to allow proper entangling and gilling.

Analysis of fish caught by the gillnet shows that monofilament gillnet perform better than multifilament gillnet, this might be due to the invisibility of the gillnet in water. The transparent nature of monofilament net allows it to blend easily with the color of the water thereby reducing the visibility of the fish to detect the net in water (Brandt, 1984). Also the high performance of monofilament over multifilament might be due to high elongation ratio and moderately dense fibre (Garner, 1986). However, since T calculated was less than T table value, it showed that there was no significant ($P>0.05$) difference between the number as well as the biomass of fish caught by the different nets.

CONCLUSION AND RECOMMENDATIONS

This experiment was carried out in order to know the catching efficiency of monofilament and multifilament gillnets in Lake Kainji. The result obtained showed that the monofilament gillnet was more efficient than multifilament gillnet because of the transparent nature of net in water.

Based on result obtained from the experimental work, Monofilament gillnet could be recommended to the fishermen for profitable fishing and proper fisheries management in the Lake.

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