PURSE-SEINES OFF GOA

K. A SADANANDAN, K K. KUNJIPALU, N. A. GEORGE & T. JOSEPH MATHAI
Central Institute of Fisheries Technology, Panaji, Goa.

The design, construction and operational details of the purse-seines operated from Goa, for sardines and mackerel are reported briefly. The deck equipments and details of vessel along with the fishing season, fishing grounds and catches are briefly accounted. The design has been compared with Japanese purse-seines operated for the same species of fishes. Based on the findings an improved design of purse-seine has been presented.

INTRODUCTION

According to Gokhale (1970) and Elias (1971) except trawling the country has not yet adopted any other modern commercial fishing method for the exploitation of marine wealth. The sardines and mackerel contribute to 35 - 40% of the total marine fish landings in India (Sekharan, 1972). These species are at present exploited with boat seines, beach seines and gill nets (Hornell 1938, Nair and Chidambaram 1950, Hall 1965). As the operations of these gear are limited to the shallow areas they have only a restricted application.

The purse-seine operation for sardines and mackerel on the Indian coast was first attempted by the FAO Experts working on the Malabar-Mangalore coast. These were followed by attempts by the Indo-Norwegian Project (Anon 1963a, Menon *et al.* 1970), Offshore Fishing Station, Cochin and Central Institute of Fisheries Technology (Anon 1963b).

Purse seining was first attempted in Goa in 1957, when the territory was still under Portuguese rule (Anon, 1969). Two Portuguese built purse seiners, of length 13.5 m. (45′) were commissioned that year. Encouraged by the successful operations of these vessels two more purse seiners were added in 1970.

This communication presents the design details of three of the purse seine nets and the deck lay out of one of the seiners. Rigging of the nets, method of operation, catch details, fishing season and fishing grounds have also been described. Based on a technical study of the gear, the authors have suggested an improved design of purse seine.

DESIGN AND CONSTRUCTION OF THE NET

Text Fig. 1 represents the design and other details of one of the purse seine nets. The webbing part of the gear consists of the main webbing of thinner

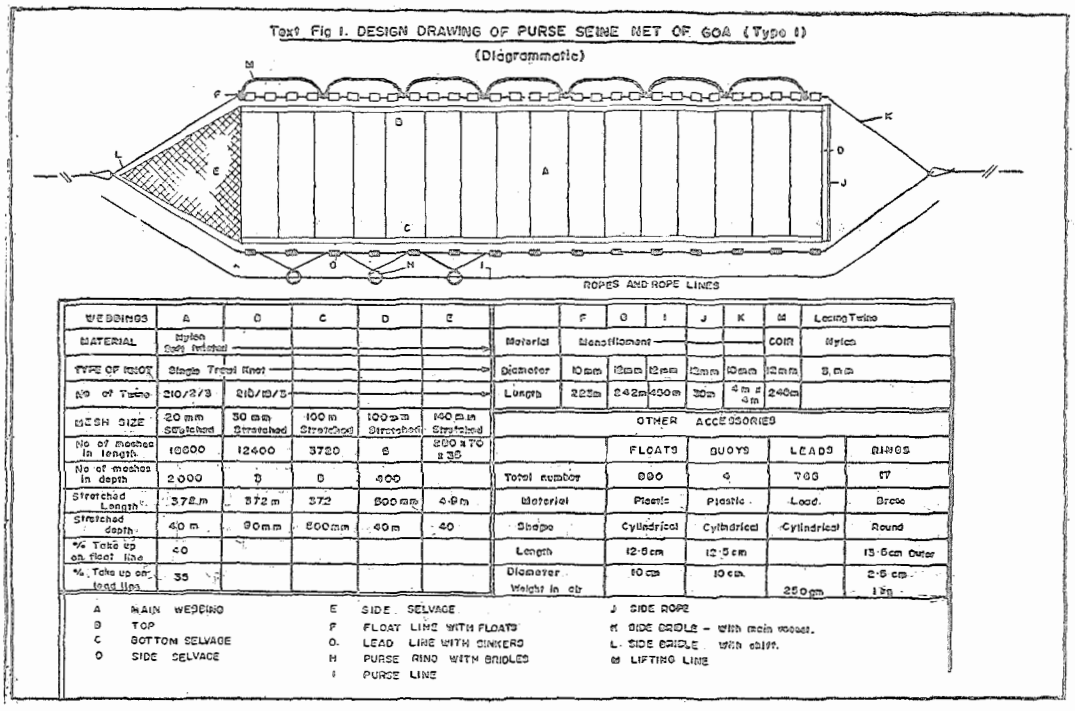


Fig. I

twines and smaller mesh, and the selvage of thicker twine and bigger mesh. The stretched length and depth of the main webbing, which is formed by joining 16 nos. of rectangular pieces, are 372 m. and 40 m. respectively. The selvage part consists of four pieces and each piece is peculiar in its construction, as shown in Text Fig. 1. The selvage pieces are laced to the respective sides of the main webbing by polyamide twine of size 210/18/3. After lacing the selvage pieces to the main webbing, the side meshes are loosely hung on hanging lines, at a fixed ratio. These hanging lines are afterwards mounted on float line and on lead line. The hanging coefficients given on float and lead lines are 0.6 and 0.65 respectively. A total of 890 nos. of plastic floats and 765 nos. of lead sinkers are evenly distributed on the respective ropes. In order to prevent loose movement of the floats, a lifting line is also fixed on the float line. The remaining components of the gear are the side bridles, purse rings, pursing bridles and purse line. The details of the rigging of these parts are shown in Text Fig. 3. The design, drawing and details of the other purse seine is illustrated in Text Fig. 2.

Boat, Deck Equipments etc.

The overall length and the power of the engine of the vessels, from which purse seining is conducted, range from 12.19m. to 16.5m. and 67 BHP to 100BHP respectively. The deck fittings and their general lay out are shown in Text Fig. 4.

Method of Operation

Single boat type purse seining for mackerel and sardines with the aid of a skiff is practised off Goa. As is characteristic of Portuguese type seiners the shooting and hauling operations are done over the port side of the vessel with

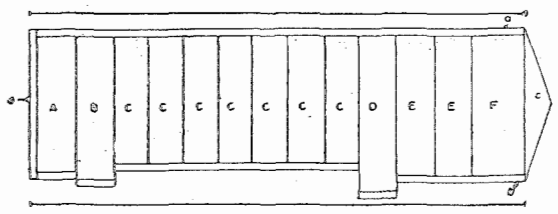
float line, while shooting on the aft and lead line on fore deck (Text Fig. 5). After the location of the shoal, which is mainly by visual aid, the end of the net where bridle and buoys are provided, along with one end of the purse seine is given to the skiff. In this process, the purse line, which is coiled on the winch drum is also released. After the shoal is completely encircled, the purse line end which was with the skiff is taken back to the main vessel. The two ends of the pursed line are then pulled fast with the help of the winch. After pursing the bottom the gallow is reversed on the deck, the purse rings are arranged, the engine stopped and the net is hauled in by pulling the lead line, float line and webbing at the same time. As soon as the ropes and major portion of the webbing are hauled inside, the fishes collected at the bunt end, are brailed in by scoop net. The time required for setting, pursing, hauling and brailing varies from one to one and half hours.

Fishing Season & Catch

The season for sardines and mackerel commences by the middle of October and lasts up to the end of December. However, in the year 1970-71 the season continued upto March. The operation of purse seiners are generally limited to grounds below 20m. of fishing depth.

Though the gear is designed and operated for sardines and mackerel, other

Text Fig. 2 DESIGN DRAWING OF A PURSE SEINE NET OF GOA (Type II)



ROPES AND LINES

	A	B	C	D	C	F	a	b	c	d
MATERIAL	Nylon									
TYPE OF KNOT	Single troof knot		Knot-less	Single Trawl			Single Trawl			
NO OF TWINE	210/2/3		210/3	210/3/3			210/18/3			
MESH SIZE mm STRETCHED	20	20	18	20			50	110	150	110
No of meshes in length	1200	1200	1300	1200	1200	1000	7400	3085	2800	3
No of meshes in depth	2200	2500	2700	2500	2280	2280	3	5	–	360
Stretched length	24m	24m	22m	24m	24m	23m	222m	337 cm		55 cm
Stretched depth	44m	48m	48·5	50m	45m	45m	90m	55 cm		210 cm
% Take up on float line	43·8									
% Take up on lead line	50·5									

	a	b	Purse line	Bridle	Ring bridle	Hanging twine	Lacing twine
MATERIAL	Mono filament	Manila	Monofilament	Manila	Nylon		
DIAMETER	10 mm	12mm	12 mm		12 mm	210/18	210/10/3
LENGTH	176m	18·3	250m				

OTHER ACCESSORIES

	FLOATS	BUOYS	LEADS	RINGS
TOTAL NUMBER	1487	2	324	10
MATERIAL	Foam plastic	Plastic	Lead	Brass
SHAPE	Cylindrical	Cylindrical	Barrel	Round
LENGTH	12 cm	12 cm	–	–
DIAMETER	9·5 cm	9·5cm	–	–
WEIGHT IN AIR			225 gm	1·8 kg each

Fig. 2

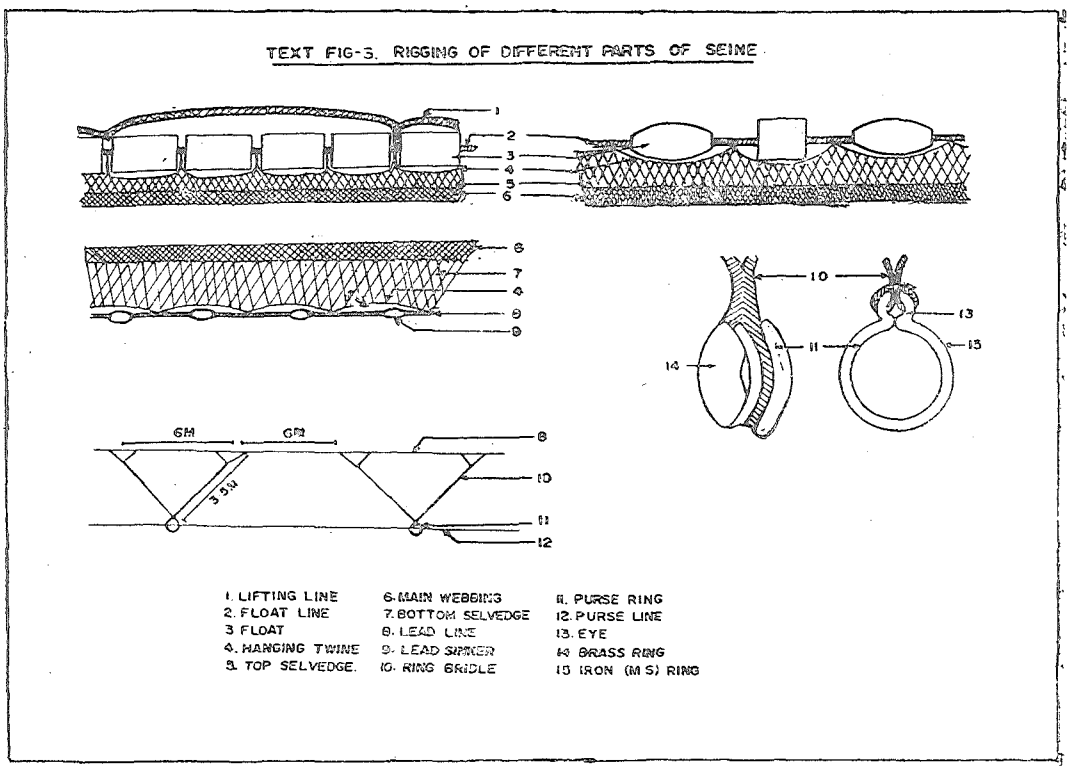

TEXT FIG-3. RIGGING OF DIFFERENT PARTS OF SEINE
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
6M
6M
3.5M
1. LIFTING LINE
2. FLOAT LINE
3. FLOAT
4. HANGING TWINE
5. TOP SELVEDGE.
6. MAIN WEBBING
7. BOTTOM SELVEDGE
8. LEAD LINE
9. LEAD SINKER
10. RING BRIDLE
11. PURSE RING
12. PURSE LINE
13. EYE
14 BRASS RING
15 IRON (M S) RING

Fig. 3

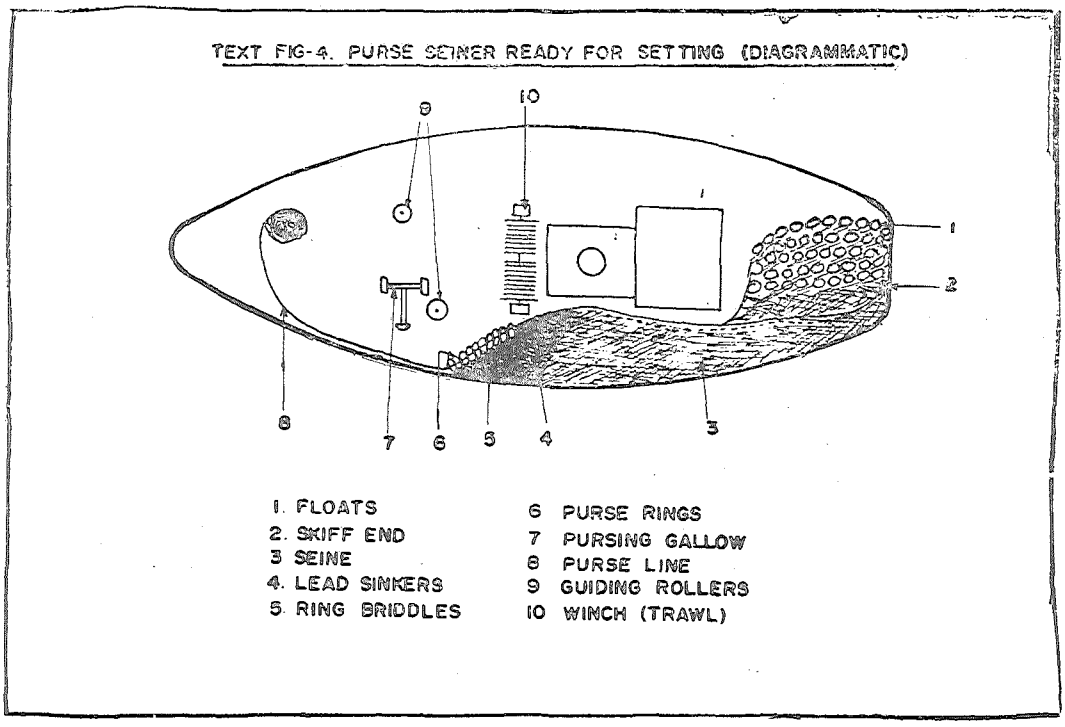

TEXT FIG-4. PURSE SEINER READY FOR SETTING (DIAGRAMMATIC)
9
10
1
2
8
7
6
5
4
3
1. FLOATS
2. SKIFF END
3 SEINE
4. LEAD SINKERS
5. RING BRIDDLES
6 PURSE RINGS
7 PURSING GALLOW
8 PURSE LINE
9 GUIDING ROLLERS
10 WINCH (TRAWL)

Fig. 4

fishes such as *Pseudosciaena dicanthus* (ghol), prawns, pomfrets etc. are also often caught by the net. During September and Obtober, 1971 there was a regular landing of ghol and prawns by purse seiners. However, the main catch remains to be mackerel and on an average the vessel landed 2 tons of mackerel per fishing day. The maximum catch per day's voyage was 6 tons of mackerel.

Discussion

Iitaka (1970) while studying the purse seine designs of Japan has illustrated certain essential requirements for an efficient design. He is of the openion that netting materials should have a faster sinking speed, and the webbing, where extra load is expected, should be made of thicker twine and of reef knots. On the depth of the net, for deep swimming fishes like sardines and mackerel he suggested to have a deeper net as deep as 30 to 50% of the total net length. He further states that in order to avoid entagling the bottom of the seine, a smaller ratio of hanging of webbing to the lead line is preferred. On the weight requirements to the lead line, he is of the openion that it should be 1 to 2.5 kg. per metre, and at the ends the weight should be still more.

However, the technological features of the design of the nets, under discussion and in operation in Indian waters, are different from their counter parts in Japan. The twines selected for fabrication of the main webbing are of soft twist and it often results in slow sinking speed and in frequent repairs. The webbing is fabricated by single trawl knots. The specifications of the netting materials are the same throughout and the parts of the net where catches are accumulated are not strong enough to withstand the load. This also results in frequent repairs to

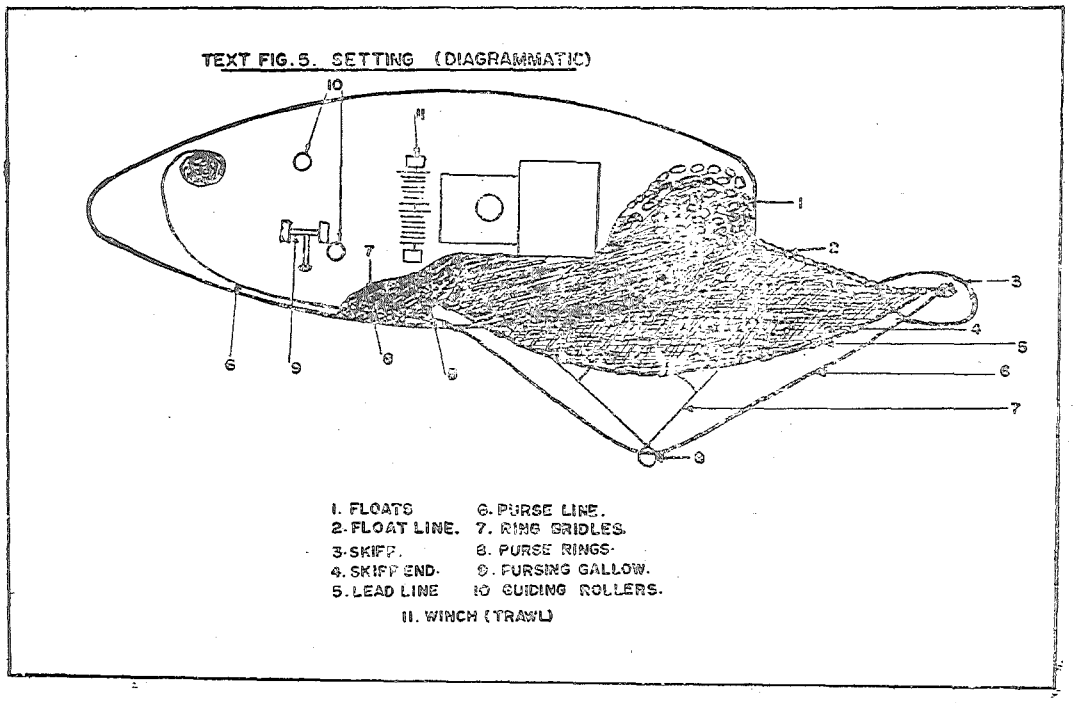
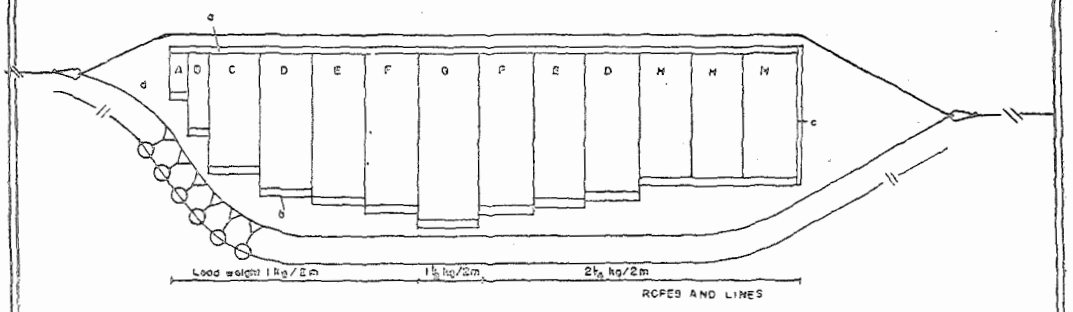


Fig. 5

Text Fig. 6. AN IMPROVED DESIGN OF PURSE SEINE FOR MACKERELS AND SARDINES



	A	B	C	D	E	F	G	H	a	b	c	d
MATERIAL	Nylon - Hard twisted →											
TYPE OF KNOT	Reef	Reef	Single Trawl →									
No of Twine	210/9/3	210/6/3	210/3/3						← 210/18/3 →			
Mesh size mm stretched	←			15					30	100	100	120
No of meshes in length	1000	1000	2000	2000	2000	2000	2000	2000	1992	657	0	100+50=150
No of meshes in depth	800	1000	1000	1000	1000	800	800	1000	3	3	90	
Stretched length	15 m	10 m	30 m	30 m	30 m	30 m	27 m	20 m	20 m	20 m	90 cm	
Stretched depth	9 m	10 m	10 m	12 m	12 m	12 m	12 m	12 m	9 cms	60 cms	3 m	
% Take up float line	40											
% Take up lead line	37											

	float line	lead line	side ropes	lifting line	hanging line	lacing twine	purse line	bridle	purse ring bridle
MATERIAL	Monofilament →					Nylon	← Monofilament →		
Diameter	10mm	12 mm	10mm	10cm	5 mm	210/18/3	12 mm	10mm	10 mm
Length	330·5m	370·5 m	9 m	363·5 m	600 mm	3 kg	450	5 + 5 m	8 x 3 5 x 5 m

OTHER ACCESSORIES

	FLOATS	BUOYS	LEADS	RINGS
TOTAL NUMBER	1400	2	1260	17
MATERIAL	Plastic	Plastic	Lead	Brass
SHAPE	Cylindrical	Egg	Barrel	Round
LENGTH	12·5cm	12·5cm	5 cm	15·0 cm outer
DIAMETER	10 cm	10 cm	1·9 cm	2·0 cm
WEIGHT IN AIR			250 gm each	1 kg each

Fig. 6

the net. The distribution of weights on the lead line is uniform, which adds to the cause of fouling the gear, while pursing. As the operation of the net is limited to the shallow grounds, the depth of the net is not in proportion to the net length as studied by Iitaka *(op. cit.)* and is rather in proportion to the fishing depth. When once the shoal is encircled, the chances of escape of fish through the bottom rope even before pursing are meagre as the bottom rope always touches the ground. The net almost rectangular, ithw taperings towards the sides, characteristic shape in purse seines, is conspicuous by its absence. The profile of the gear is almost similar to that of an encircling gill net, described by Satyanarayana and Sadanandan (1962), the only difference being that the net under study has provision to close the bottom after encircling the shoal.

Based on the observations, certain improvements in the design and rigging have been suggested. The details of this improved design are shown in Text Fig. 6.

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