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## Design and technical specifications of pomfret gill nets of Ratnagiri, Maharashtra

T.G. KAZI, A.S. MOHITE AND R.R. JADHAV

### ABSTRACT

The present investigation deals with the design and general characteristics of pomfret gill nets operated from Ratnagiri, Maharashtra. Webbing of the nets were found to be fabricated with polyamide (PA) monofilament of diameter 0.23 to 0.32 mm and the mesh size ranged between 100 to 130 mm with the hanging coefficient of 0.41 to 0.56. Nets were used with the hung length and hung depth of 47.25 to 108.57 m and 4.41 to 11.92 m, respectively. Pomfret gill nets in Ratnagiri had a total fleet length of 182 to 915 m and depth of operation varied between 10 to 55 m. Head rope and foot rope of polypropylene (PP) of 3 to 4 mm diameter was used without mounting rope. Five to twenty numbers of units were joined end to end to form a netting fleet. The pomfret gillnets are locally known as *Papletchi jali*.

**Key words :** Design, Technial specifications, Pomfret, Monofilament, Polyamide, Gill net

### INTRODUCTION

Maharashtra state, having a coast line of about 720 km spread over the maritime districts viz., Thane, Mumbai, Raigad, Ratnagiri and Sindhudurg. The fishing fleet operating along the Maharashtra coast during the year 2006-07 comprised of 11,798 mechanized boats and 10,895 non mechanized boats. In Ratnagiri a total of 588 gill netters are in operation (Anonymous, 2007).

Design characteristics of marine gill nets of Kerala have been discussed by Thomas and Hridayanathan (2006) and Vijayan *et al.* (1993), gill nets of Gujarat by Pravin *et al.* (1998), of Andhra Pradesh by Ramarao *et al.* (2002).

Various aspects related to the pomfret gill nets of India were studied by Banerjee and Chakrabarthy (1972), Panicker *et al.* (1978), Sitarama Rao *et al.* (1980), Kunjipalu *et al.* (1984), Mohan Rajan and Mathai (1988), Thomas *et al.* (2005) and Meenakumari *et al.* (2009).

Detailed information on fishing gear system is essential for their improvement in terms of efficiency, cost-effectiveness and for efficient management of any fishery. Many changes have taken place in the gill nets with respect to the material used, net dimensions, mesh size, mode of operation (Vijayan *et al.*, 1993). The present day gill nets are mostly resource specific. The present study was undertaken with the objective of documenting the design and technical specifications of the pomfret gill nets operated

from Ratnagiri.

### MATERIALS AND METHODS

The present investigation was undertaken during the period August, 2009 to May, 2010 to study the design and technical specifications of pomfret gill nets operated from Ratnagiri, Maharashtra. Ten important fish landing centres were selected for the present study comprising of Mirkarwada, Sakhartar, Kasarveli, Mirya Bandar, Bhagwati Bandar, Bhatkarwada, Rajiwada, Karla, Bhatye and Phansop. Structured data collection schedule formulated for the present study comprised of two major sections. The first section dealt with the particulars of gill net owner and the fishing vessel used for the pomfret gill net operation. The second section dealt with the technical specifications, design aspects, rigging and the mode of operation of the pomfret gill nets used by the fisherman of Ratnagiri. The information included in the first section was recorded according to Sreekrishna and Shenoy (2001) whereas, the information in the second section was physically collected and recorded according to Thomas and Hridayanathan (2006). The net designs of the pomfret gill nets were presented according to Nedelec (1975).

### RESULTS AND ANALYSIS

Technical specification and design of the typical

pomfret gill net operated from Ratnagiri is mentioned in the Table 1 and the design is shown in the Fig. 1. In Ratnagiri, the gear was operated from mechanized, motorized or traditional non-mechanized fishing vessels. Pomfret gill nets were of drifting type operated either in the surface or column water according to the movement of the target species. In 1991, pomfret gill nets were operated as bottom set gill nets mostly from motorized fishing vessels (Vijayan *et al.*, 1993). Pomfret gill nets were used as surface drift, column drift and bottom drift in Gujarat either from the non-motorized as well as inboard or outboard motor craft (Pravin *et al.*, 1998), similar observation were recorded during present study.

Polyamide (PA) monofilament of diameter 0.23 to 0.32 mm was used as a material for pomfret gill nets operating from Ratnagiri. PA monofilament of 0.23 mm diameter was in use as a material for pomfrets gill nets in 1991 along Kerala coast (Vijayan *et al.*, 1993). In Gujarat for catching pomfret, gill nets made of PA monofilament of 0.16 to 0.32 mm twine diameter and for catching big black pomfrets, gill nets made up of PA monofilament of 0.23 to 0.32 mm twine and PA multifilament twine of 210d×1×3 to 210d×3×3 were used (Pravin *et al.*, 1998). Ramarao *et al.* (2002) reported that the pomfret gill nets of Andhra Pradesh were made of PA monofilament of 0.23 to 0.32 mm diameter twine and PA multifilament gill nets of 210d×10×3 to 210d×12×3 twine. Thomas *et al.* (2005) recorded the use of pomfret gill nets in Karnataka with material specification of 210d×9×3 and in Andaman Island with 210d×2×3. PA monofilament of 0.20 and 0.23 mm diameter was exclusively used as the material for the pomfret gill nets in Kerala (Thomas and Hridayanathan, 2006). Results of the present study indicated that the gear material used for pomfret gill net was quite similar as that of the gear material used along Indian coast except PA multifilament which was not observed during present study for pomfret fishing.

For catching pomfret, gill nets of mesh size ranging in between 100 to 130 mm were commonly operated from Ratnagiri. Banerjee and Chakrabarty (1972) studied the drift gill netting in Lower Sundarbans, West Bengal and observed that 101 mm mesh size was most effective for *Pampus argenteus*. Panikkar *et al.* (1978) worked out 126 mm as the optimum mesh size for the capture of *P. argenteus*. Vijayan *et al.* (1993) recorded that the mesh size of 100 to 120 mm was used for catching pomfrets in Kerala. Pravin *et al.* (1998) reported the pomfret gill net of mesh size 80 to 120 mm and big black pomfret gill nets of mesh size 140 to 200 mm from Gujarat. Pomfret gill nets of mesh size 120 to 150 mm were observed in Andhra Pradesh by Ramarao *et al.* (2002). Thomas *et al.* (2005)

recorded the pomfret drift gill nets with mesh size of 120 to 180 mm in Gujarat, 110 to 115 mm in Karnataka, 100 to 118 mm in Kerala, 60 to 130 mm in Andhra Pradesh and 76 mm in Andaman Islands. Thomas and Hridayanathan (2006) reported the range of mesh size, 100 to 118 mm for pomfret gill nets from the Kerala coast. Meenakumari *et al.* (2009) has recommended optimum mesh size for silver pomfret gill nets of 126 mm with common mesh size of 110 to 130 mm. Mesh sizes recorded for the pomfret gill net operated from Ratnagiri were of similar magnitude as compared to the mesh size reported by other studies along the Indian coast (Banerjee and Chakrabarty, 1972; Panikkar *et al.*, 1978; Vijayan *et al.*, 1993; Thomas and Hridayanathan, 2006 and Meenakumari *et al.*, 2009) except for the upper range exceeding to 150 mm in Andhra Pradesh (Ramarao *et al.*, 2002), 140 to 200 mm in Gujarat (Pravin *et al.*, 1998) and lower range of 60 mm in Andhra Pradesh and 76 mm in Andaman Islands (Thomas *et al.*, 2005).

Pomfret gill nets with the hanging coefficient of 0.41 to 0.56 were recorded from Ratnagiri. Hanging coefficient of 0.60 was recommended by Panikkar *et al.* (1978) for commercial exploitation of *P. argenteus*, which was higher than the observed hanging coefficient during the present study. Hanging coefficient of 0.50 to 0.65 was reported by Ramarao *et al.* (2002) in Andhra Pradesh for pomfret gill nets. Thomas and Hridayanathan (2006) reported that the hanging coefficient ranged from 0.45 to 0.62 for pomfret gill nets in Kerala. Result of the present study regarding observation on hanging coefficient was within the range of observation recorded by Ramarao *et al.* (2002) and Thomas and Hridayanathan (2006).

In Ratnagiri, for pomfret gill nets colorless or light green colour gill nets were used. Sitarama Rao *et al.* (1980) studied the effect of white, green, blue and yellow colored drift gill nets on the catch efficiency with respect to seer, pomfret, tuna and sharks along the Andhra coast. They observed that colored gill nets caught more *P. niger*. Experimental fishing conducted using white, yellow, orange, blue, brown and green gill nets by Kunjipalu *et al.* (1984) to study the effect of colour of webbing on the efficiency of gill nets for hilsa and pomfret off Veraval; yellow and white were recommended for hilsa and pomfret fishing. Mohan Rajan and Mathai (1988) carried out study on operation of coloured gill nets off Saurashtra coast and inferred that, yellow and white coloured gill nets were observed to be more effective for both hilsa and pomfret. The preference of Ratnagiri fishermen for colourless or white coloured gill nets for pomfret was in concurrence with the observation recorded by Kunjipalu *et al.* (1984) and Mohan Rajan and Mathai (1988). Light green colour

**Table 1 : Technical specification of pomfret drift gill net operated from Ratnagiri**

Station	Ratnagiri
Local name	<i>Papletchi jali</i>
Main webbing mesh size (mm)	100-130
Mean main webbing mesh size (mm)	114.71 $\pm$ 2.35
Twine type	PA monofilament
Twine specification/ diameter (mm)	0.23-0.32
Mean twine specification/ diameter (mm)	0.27
No. of meshes in depth	50-100
Mean no. of meshes in depth	88.88 $\pm$ 4.43
Horizontal hanging coefficient (E)	0.41-0.56
Mean horizontal hanging coefficient (E)	0.47
Vertical hanging coefficient (1-E2)	0.82-0.91
Mean vertical hanging coefficient (1-E2)	0.87
No. of meshes per unit	960-1880
Mean no. of meshes per unit	1378.96 $\pm$ 49.02
Hung length (m)	47.25-108.57
Mean hung length (m)	78.61 $\pm$ 3.40
Hung depth (m)	4.25-11.70
Colour of webbing	Colourless-light green
Selvedge twine type	PA mono/ PA multi
Selvedge specification/ diameter (mm)	0.40-0.50/ 210 $\times$ 2 $\times$ 3
Selvedge mesh size (mm)	100-130
No. of selvedge meshes in depth	1
Selvedge hung depth (m)	0.16-0.22
Total hung depth (m)	4.41-11.92
Mean total hung depth (m)	9.95 $\pm$ 0.55
Head rope material	PP
Head rope diameter (mm)	3-4
Float material	PVC
Float dimensions (mm)	70 $\times$ 20/130 $\times$ 15/140 $\times$ 15
No. of floats per unit-during surface operation	5-8
Mean no. of floats per unit	6.30 $\pm$ 0.28
No. of floats per unit during column operation (A)	5-8
Mean no. of floats	6 $\pm$ 0.23
No. of floats per unit during column operation (B)	10-15
Mean no. of floats	11.85 $\pm$ 0.51
Foot rope material	PP
Foot rope diameter (mm)	3-4
Sinker material	Concrete
Sinker dimension	60 $\times$ 20/ 90 $\times$ 10/ 130 $\times$ 15 /140 $\times$ 15
Sinker weight (g)	350-500
No. of sinkers per unit during surface operation	5-8
Mean no. of sinkers	6.30 $\pm$ 0.28
No. of sinkers per unit during surface operation (A)	10-15

Contd... Table 1

Table 1 contd....

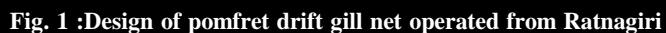
Mean no. of sinkers	12.09 $\pm$ 0.51
No. of sinkers per unit during surface operation (B)	5-8
Mean no. of sinkers	5.85 $\pm$ 0.22
Total fleet length (m)	182-915
Mean total fleet length (m)	524.77 $\pm$ 32.21
Depth of operation (m)	10-55
Craft	Dug-out canoe, FRP, wooden boat with outrigger, FRP, wooden mechanized and motorized vessel
Craft-HP	Nil – 50

gill nets for pomfret were also preferred by Ratnagiri fishermen as observed by Sitarama Rao *et al.* (1980) along Andhra coast.

It was recorded in Ratnagiri, that the pomfret gill net were used with the hung length varying from 47.25 to 108.57 m for each unit. On the contrary in Andhra Pradesh pomfret gill net units with the hung length of 27 to 1260 m were observed by Ramarao *et al.* (2002). In Kerala, Thomas and Hridayanathan (2006) reported the pomfret gill net units with average hung length of 160 m. The range of hung length observed for pomfret gill net during the present study was within the range observed by Ramarao *et al.* (2002) and Thomas and Hridayanathan (2006).

Hung depth for pomfret gill nets varied from 4.41 to 11.92 m operated from Ratnagiri. Vijayan *et al.* (1993) recorded that the pomfret gill nets with hung depth of 6.5 to 9.5 m were in operation during 1991 along Kerala coast. Ramarao *et al.* (2002) recorded the hung depth of pomfret gill nets in the range of 5.5 to 10 m in Andhra Pradesh. Pomfret gill nets from Kerala with the total average hung depth of 8.83 m were reported by Thomas and Hridayanathan (2006). The observations of the hung depth recorded for pomfret gill net by the authors (Vijayan *et al.*, 1993; Ramarao *et al.*, 2002 and Thomas and Hridayanathan, 2006) along the India coast were within the range of the hung depth (4.41 to 11.92 m) recorded for pomfret gill net during the present study in Ratnagiri. It was calculated that for pomfret gill nets, mounted height was 87% of total stretched height (Graph 1).

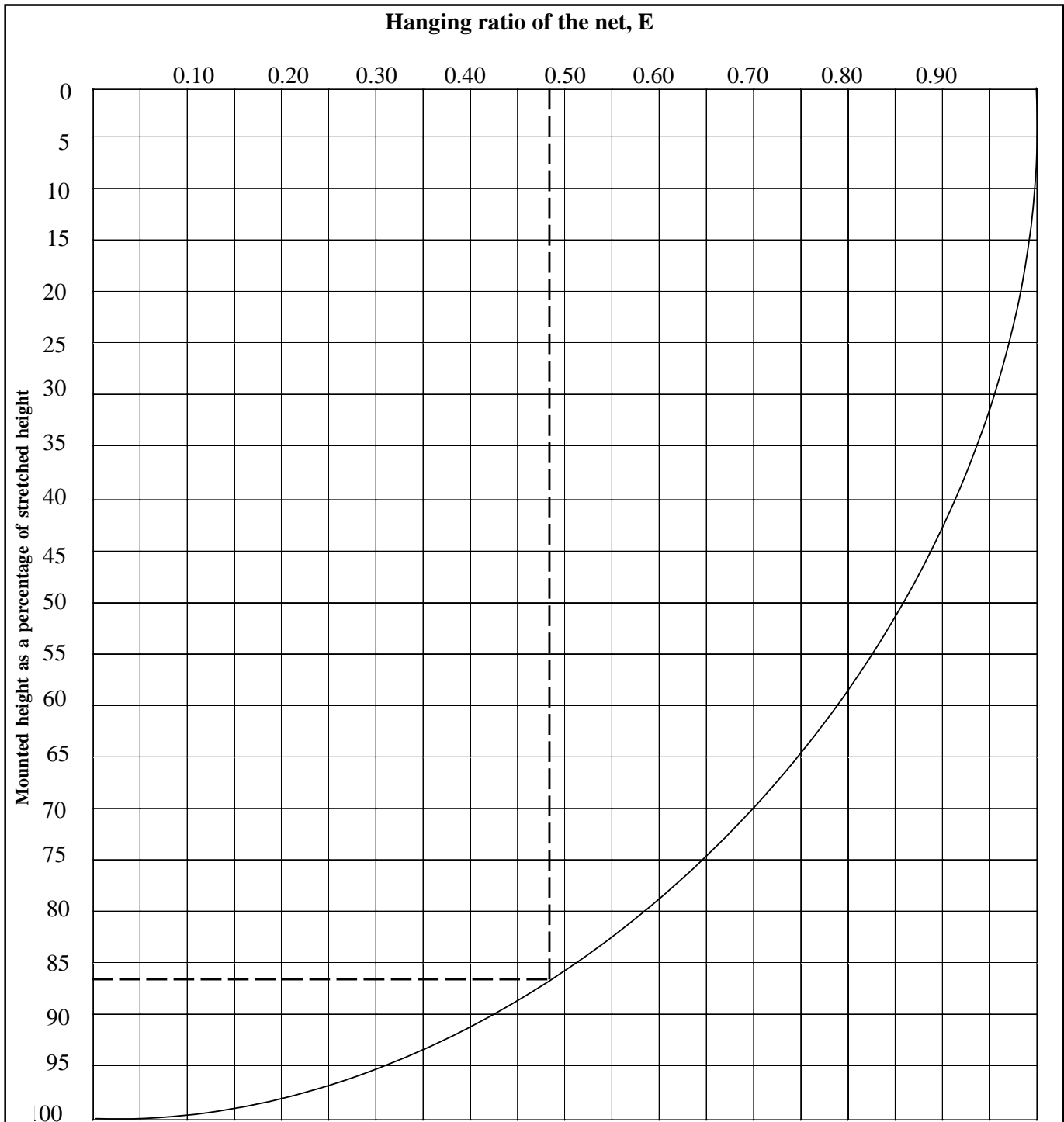
In Ratnagiri, the total fleet length of pomfret gill net varied from 182 to 915 m and depth of operation varied in between 10 to 55 m. Vijayan *et al.* (1993) had reported that, during 1991 pomfret gill nets with total fleet length of 600 to 750 m were operated with depth of operation ranging in between 15 to 25 m. Average total fleet length for pomfret gill net along the coast of Kerala was observed



In Kerala, Thomas and Hridayanathan (2006) studied the pomfret gill nets and reported that, mostly 4 mm diameter polypropylene (PP) head rope were used along with the polyvinyl chloride (PVC) floats of average 33.33

number and 3 mm diameter PP foot rope were used along with concrete sinkers of 250 g. Similar observations were recorded in Ratnagiri, where head rope and foot rope of PP of 3 to 4 mm diameter was used for this type of net. Mounting rope was not mostly used. For surface net operation, in Ratnagiri 5 to 8 number of floats as well as sinkers were used and for column net operation two

methods of float and sinker arrangement were used. In the first method 5 to 8 number of floats and sinkers of 10 to 15 number were used. In the second method, 10 to 15 number of floats and sinkers of 5 to 8 number were used. It was observed that, the floats were spaced at a average distance of 53.71% of the total hung depth. In Ratnagiri, 5 to 20 number of units were joined end to end to form a



**Graph 1 : Mounted height for pomfret drift gill net operated from Ratnagiri**

netting fleet during the pomfret gill net operation. On the contrary in Andhra Pradesh, Ramarao *et al.* (2002) recorded that, 2 to 35 units were operated from each fishing craft during the operation.

In Ratnagiri, the gear was operated from mechanized, motorized or traditional non-mechanized fishing vessels. Pomfret gill nets were drifting type operated either in the surface or column water according to the movement of the target species. During the operation of pomfret drift gill nets after shooting, one end of the net was tide to the vessel and vessel was allowed to drift along with the net. Both day and night gill net operations were carried out from Ratnagiri. For indication of gill nets during the night hours the indicator flag poles were attached with solar energy operated flash lamps and tied to the net at both the ends. More than two flag poles were used when the longer nets were in operation.

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### Address for correspondence :

**A.S. MOHITE**  
Department of Fisheries Engineering,  
College of Fisheries (Dr. B.S.K.K.V.),  
Shirgaon, RATNAGIRI (M.S.) INDIA  
E.mail : ashishmohite@gmail.com

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### Authors' affiliations :

**T.G. KAZI AND R.R. JADHAV**  
College of Fisheries (Dr. B.S.K.K.V.),  
Shirgaon, RATNAGIRI (M.S.) INDIA

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