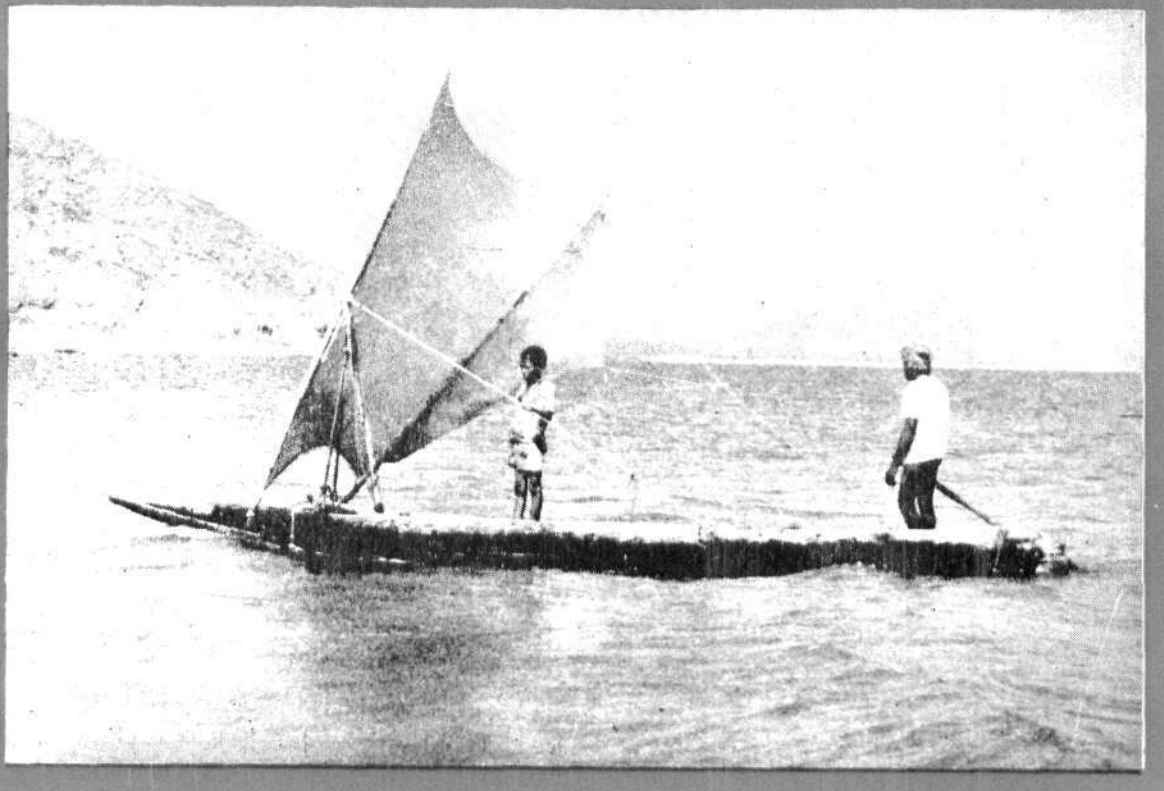
MARINE FISHERIES INFORMATION SERVICE



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CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
COCHIN, INDIA

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THE MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of information on marine and brackish water fishery resources and allied data available with the National Marine Living Resources Data Centre (NMLRDC) and the Research Divisions of the Institute, results of proven researches for transfer of technology to the fish farmers and industry and of other relevant information needed for Research and Development efforts in the marine fisheries sector.

Abbreviation - *Mar. Fish. Infor. Serv., T & E Ser.*, No. **80**: 1988

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Front cover photo:

Catamaran setting out on sail.

Back cover photo:

A view of the Visakhapatnam Fisheries Harbour.

MARINE FISH CALENDAR

2. VISAKHAPATNAM

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Introduction

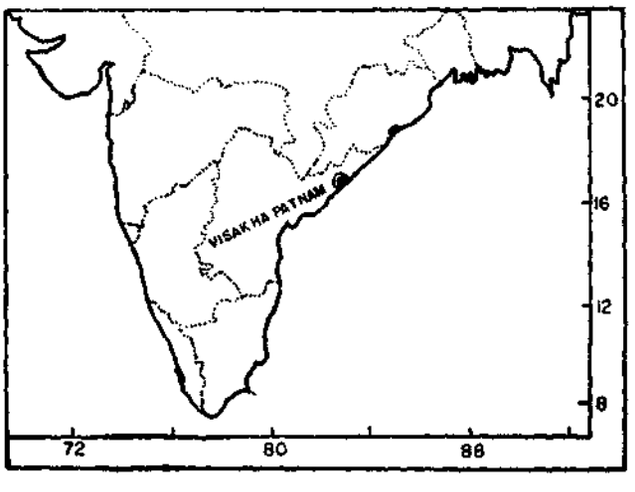
This fish calendar has been prepared to furnish information on the important families (*e.g.* Clupeidae, Scombridae, Sciaenidae, *etc.*), groups (*e.g.* sardines, mackerel, croakers, *etc.*) and species of fishes that are met with in the commercial fish landings of both the artisanal and mechanised sectors, together with such other details as would help those who wish to acquire some knowledge of the general features of the fish and fisheries of the Visakhapatnam area. Details furnished for each group include the vernacular name, popular English name and gearwise annual average landings together with percentage composition in the total landings by the same gear. For the dominant species of a group caught in each gear, their relative composition, local names wherever available, length range, dominant size, depth of capture, size at first maturity and spawning seasons are also given.

Data collected by the Research Centre during recent years (1981–'86) have been used for this purpose. The data of corresponding months of the period have been pooled. Seasonal trends depicted by kite-diagrams, and species composition by bar-diagrams are presented separately for each group of fish landed by the major gears: shrimp trawl, gill net, and all other indigenous gears put together (*e.g.* shore seine, boat seine, hooks and line, *etc.*). Catch per hour of trawling (CPH or C/E) for shrimp trawl, and catch per net per day (C/U) for indigenous gears have been used as indices of abundance for furnishing the monthly trends of fish catches. Figures have been provided for important species of fishes to facilitate their recognition.

Forty-two species of fishes belonging to nineteen groups and sixteen families have been included in this fish calendar, besides sharks, skates and rays which have been presented under a single category – group Elasmobranchs.

A composite picture of the fish and fisheries of the Visakhapatnam area is also given here to enable the reader to make a proper appraisal of the fishery of the groups/species of fishes presented in the calendar and for their effective exploitation and utilization.

The fisheries canvas of Visakhapatnam is a mosaic of artisanal fishing carried out within 8–10 km from shore by a variety of indigenous gears from country crafts, and of mechanized fishing by shrimp trawls carried out in deeper waters by 200 odd small mechanized boats and by about 30 mini and 100 large trawlers. The range of operation of the small mechanised boats extends upto 50 km north-south and 15 km off the coast of Visakhapatnam making fishing trips lasting for 1–3 days each, while the mini and large trawlers fish mostly in the Gopalpur–Sandheads area making longer voyages lasting for 10–30 days. The country



*Consolidated by N. Gopinatha Menon and K. Balachandran, CMFRI, Cochin.

crafts and the small mechanised boats land almost all of their catches whereas the mini and large trawlers land mostly shrimp, discarding the fish at sea. With this multi-faceted fishing activity, supported by a modern fisheries harbour with adequate infrastructure built around it, Visakhapatnam has emerged as the capital of deep sea fishing industry of the country.

Lawson's Bay is the major artisanal fish landing centre of Visakhapatnam. Of late, another area close to the Visakhapatnam fishing harbour is developing into an important artisanal fish landing centre because of the fast developing marketing facilities in its vicinity. The annual average fish landings at these two centres are around 680 and 500 t respectively. Year-round fishing activity is noticeable at these two centres. Fishing effort by the artisanal sector in general is intense during February–April followed by June–July. It is quite low during November–January. Catch rates are better during April–June and December–February. However, bulk of the annual fish catch is obtained during February–August.

Hooks and lines and bottom-set gill nets (silk vala) are the main gears employed by the fishermen operating from the three adjacent fishing villages of the Lawson's Bay landing centre, namely, Jalaripeta, Vasavanipalem and Moolapalem, while gill nets and boat seines are the major gears used by the fishermen operating from the other landing centre Kotha Jalaripeta near fisheries harbour. The average catch per unit (C/U) for the different gears are: hooks and line 10 kg, bottom-set gill net 20 kg, gill net 40 kg and boat seine 50 kg. While shore-seine is operated during October–May, the rest of the gears are operated round the year. However, intensity of their operations is as follows: hooks & lines from December to August, bottom-set gill nets from May to September, gill nets from November to July and boat seines from August to February.

The important groups of fishes met with in the artisanal fish landings are: seer fishes 18%, tunas and bill fishes 13%, mackerel 13%, sardines 11%, cat fishes 9%, jacks 7%, whitebait anchovy 5%, sharks 5%, ribbon fishes 4%, rainbow sardine 2%, silver bellies 2% and bulls eye 1%. The important groups caught in the different gears and their species composition are given in the fish calendar.

Mechanised fishing by small boats is also carried out throughout the year. All the boats go for daily day-fishing trips during March – October. During November–February, about 75-80% of these boats goes for either daily night or stay fishing. In the latter two cases the boats leave in the evening and fish that night, or stay at sea and fish on the following day and night, and return to the base in the morning. During all these trips three hauls each of two hours duration are made during the day, and of three hours duration at night. Thus during the course of a single trip a boat expends about six hours of actual fishing effort in daily day-fishing, nine hours during daily night-fishing, and about 24 hours during stay-fishing.

Over the five year period (1981–'85) monthly trawling effort ranged between 14,117 hrs and 28,622 hrs with the average at 22,886 hrs, monthly fish landings ranged between 361 and 814 t with the average at 525 t and the catch rate ranged between 17 kg/hr and 29 kg/hr with the average at 23 kg/hr. With reference to these average figures, fishing effort was better during July–January, total fish catches during July–October and catch rates during July–September and February–May. Thus both total catches as well as catch rates were better during July–September and this is considered as the best period for the trawl fishery off Visakhapatnam.

Eight groups of fishes form the bulk (68%) of trawler landings. They are threadfin breams 13.5%, prawns 13%, lizard fishes 9.7%, croakers 7.7%, ribbon fishes 7.4%, silver bellies 5.9%, crabs 5.5% and goat fishes 4.9%. Six other groups account for about 17% of the annual catches. They are jacks 3.3%, bulls eye 3.4%, squids and cuttle fishes 3.1%, whitebait and thryssa anchovies 3.0%. The rest of the catch comprises of a variety of small sized fishes.

CARANGIDAE

Popular English Name	:	Jacks/Trevallies/Scads/ Horse mackerels
Vernacular Name (Telugu)	:	'Paralu'
Annual average catch	:	304 t
Gearwise annual average catch	:	Trawl net : 249 t Drift gill net : 25 t Shore seine and hooks & line : 30 t
Fishing methods and their contribution in the gears	:	Drift gill net : 14% Shore seine and hooks & line : 7% Trawl net : 4%

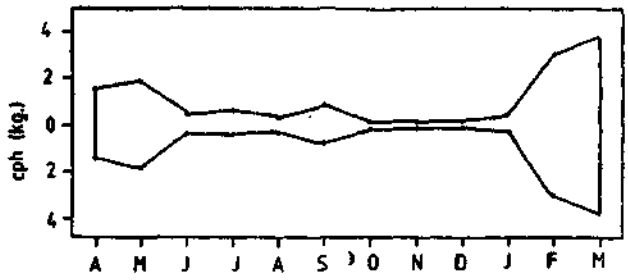


Fig. 1. Seasonal abundance of jacks (gear: shrimp trawl).

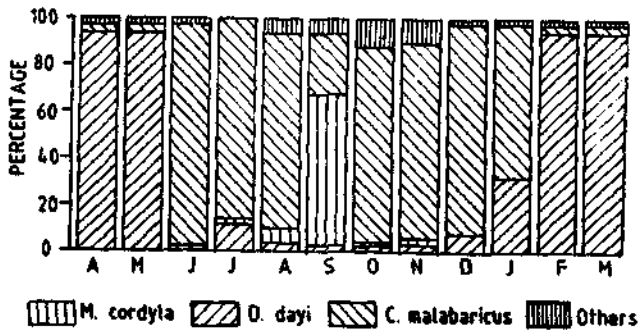


Fig. 2. Monthly species composition of jacks landed by shrimp trawls.

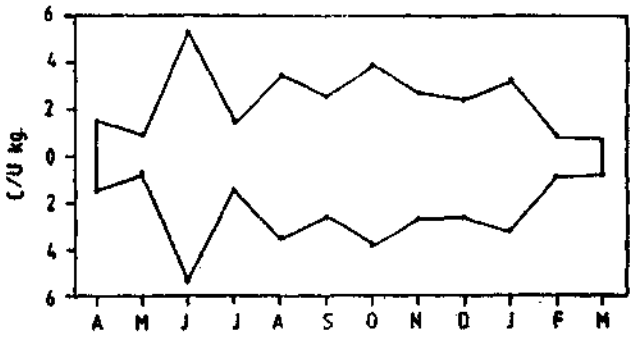


Fig. 3. Seasonal abundance of jacks (gear: gill nets).

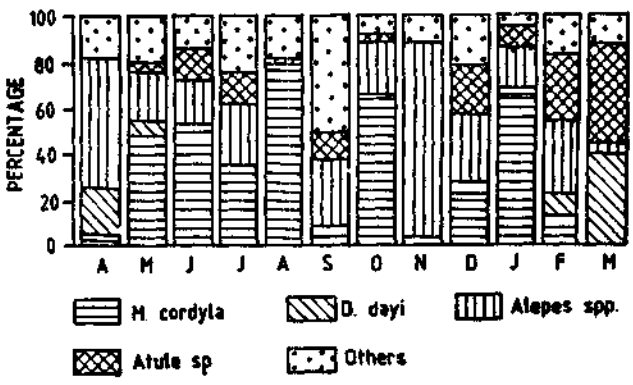


Fig. 4. Monthly species composition of jacks landed by gill nets.

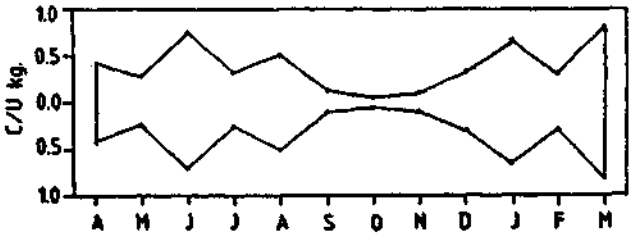


Fig. 5. Seasonal abundance of jacks (gear: other indigenous gears).

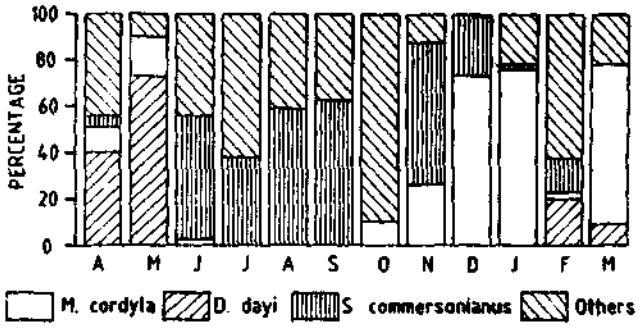


Fig. 6. Monthly abundance of jacks landed by indigenous gears.

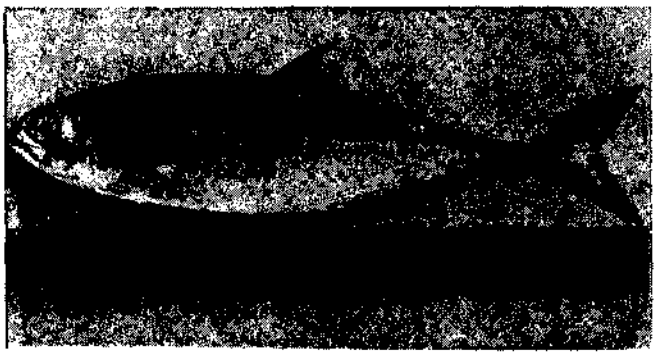


Fig. 7. *Megalaspis cordyla*.

Scientific Name	:	*Megalaspis cordyla*
Vernacular Name	:	'Bokkodugu'
Gear	:	Drift net
Percentage in the catch of the group	:	Drift net : 44
Peak period of occurrence	:	July-January
Depth of occurrence	:	20-40 m
Length range in commercial fishery	:	175-440 mm
Size at first maturity	:	240 mm
Spawning season	:	March–April

Fig. 8. *Decapterus dayi.*

Scientific Name	:	*Decapterus dayi*
Vernacular Name	:	'Pillodugu'
Gear	:	Shore seine/Hooks & line/Trawl net
Percentage in the catch of the group	:	Shore seine and hooks & line : 27 Trawl net : 72
Peak period of occurrence	:	January–May
Depth of occurrence	:	1–60 m
Length range in commercial fishery	:	30 – 234 mm
Size at first maturity	:	120 – 130 mm
Spawning season	:	February – March

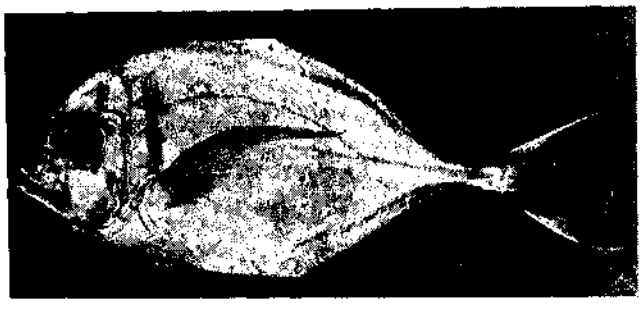


Fig. 9. *Carangoides malabaricus.*

Scientific Name	:	*Carangoides malabaricus*
Vernacular Name	:	'Thalampara'
Gear	:	Trawl net
Percentage in the catch of the group	:	Trawl net : 20
Peak period of occurrence	:	June-January
Depth of occurrence	:	10-60 m
Length range in commercial fishery	:	110 – 270 mm
Size at first maturity	:	150 mm
Spawning season	:	March

CLUPEIDAE

Popular English Name	:	Sardines	
Vernacular Name (Telugu)	:	'Kavvallu'	
Annual average catch	:	283 t	
Gearwise annual average catch	:	Gill net	: 146 t
		Boat seine	: 137 t
Fishing methods and their contribution in the gears	:	Gill net	: 90%
		Boat seine	: 47%

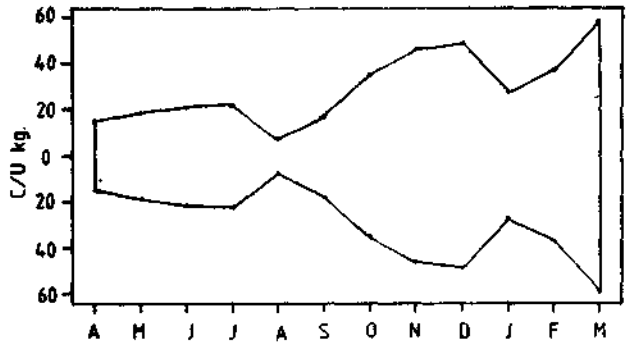


Fig. 10. Seasonal abundance of sardines (gear: gill net).

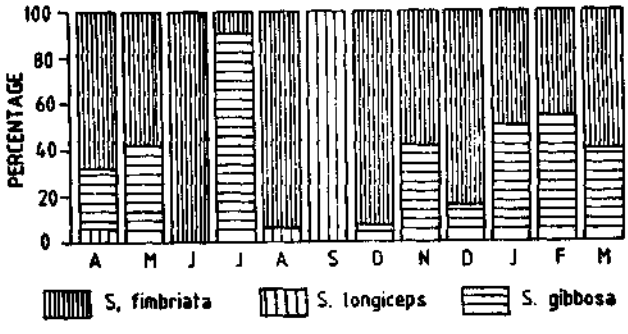


Fig. 11. Monthly species composition of sardines landed by gill nets.

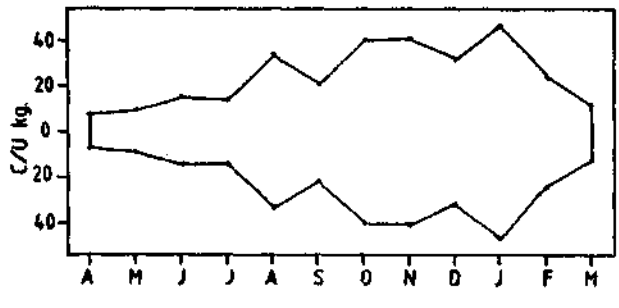


Fig. 12. Seasonal abundance of sardines (gear: other indigenous gears).

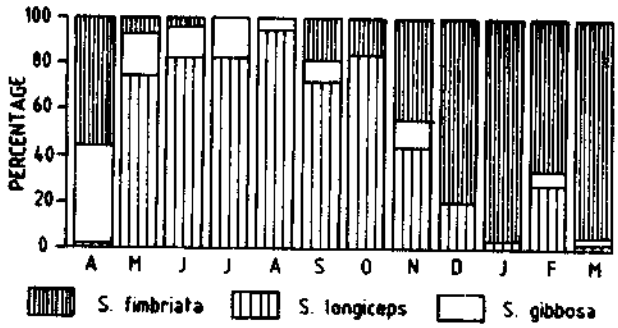


Fig. 13. Monthly species composition of sardines landed by other indigenous gears.

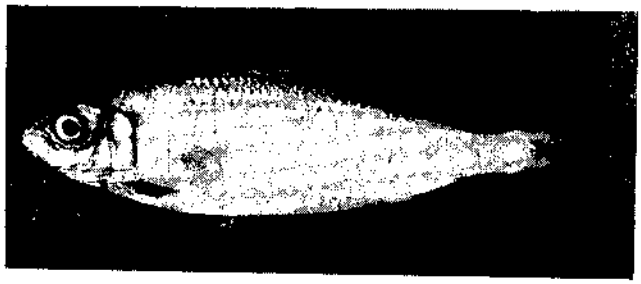


Fig. 14. *Sardinella fimbriata.*

Scientific Name	:	*Sardinella fimbriata*
Vernacular Name	:	'Balla kavvallu'
Gear	:	Gill net/Boat seine
Percentage in the catch of the group	:	Gill net : 66 Boat seine : 46
Peak period of occurrence	:	October–March
Depth of occurrence	:	10 - 20 m
Length range in commercial fishery	:	40 – 195 mm
Size at first maturity	:	—
Spawning season	:	July – August

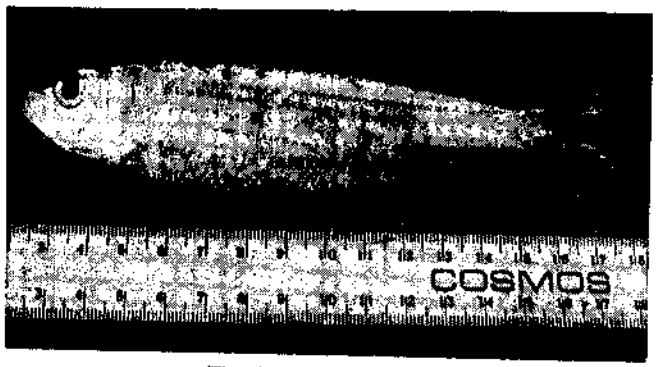


Fig. 15. *Sardinella gibbosa.*

Scientific Name	:	*Sardinella gibbosa*
Vernacular Name	:	'Soodimooti 'kavvallu'
Gear	:	Gill net/Boat seine
Percentage in the catch of the group	:	Gill net : 33 Boat seine : 46
Peak period of occurrence	:	November – March
Depth of occurrence	:	10 - 20 m
Length range in commercial fishery	:	35 - 180 mm
Size at first maturity	:	120 mm
Spawning season	:	January – May

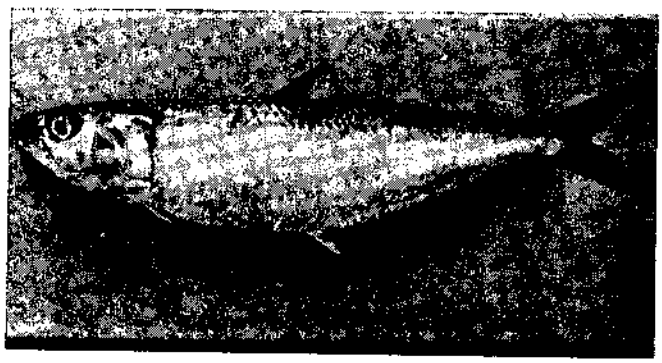


Fig. 16. *Sardinella longiceps.*

Scientific Name	:	*Sardinella longiceps*
Vernacular Name	:	'Noone kavvallu'
Gear	:	Gill net/Boat seine
Percentage in the catch of the group	:	Boat seine : 48 Gill net : 1
Peak period of occurrence	:	August – November
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	40 – 205 mm
Size at first maturity	:	150 mm
Spawning season	:	June – September

ELASMOBRANCHS

Popular English Name	:	Sharks and Skates
Vernacular Name (Telugu)	:	'Sorralu'/'Adalam'/ 'Yalam'
Annual average catch	:	55.7 t
Gearwise annual average catch	:	Hooks & line : 34.9 t Trawl net : 20.8 t
Fishing methods and their contribution in the gears	:	Hooks & line : 10.4% Trawl net : 0.3%

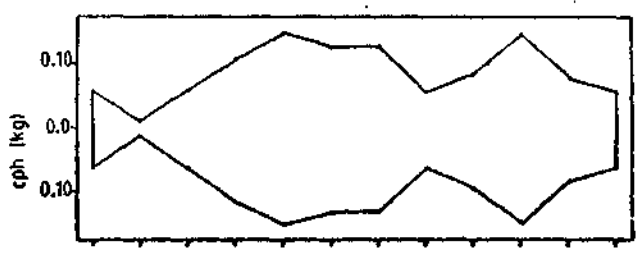


Fig. 17. Seasonal abundance of elasmobranchs (sharks & skates) in trawl nets.

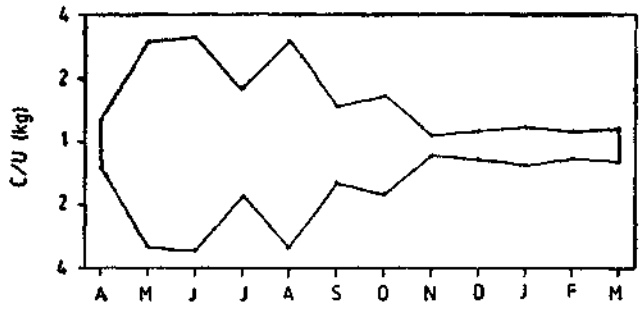


Fig. 18. Seasonal abundance of elasmobranchs (sharks & skates). in hooks and line.

ELASMOBRANCHS

Popular English Name : Rays
Vernacular Name (Telugu) : 'Tekulu'
Annual average catch : 60.8 t
Gearwise annual
average catch : Trawl net : 60.8 t
Fishing methods and their
contribution in the gears : Trawl net : 1%

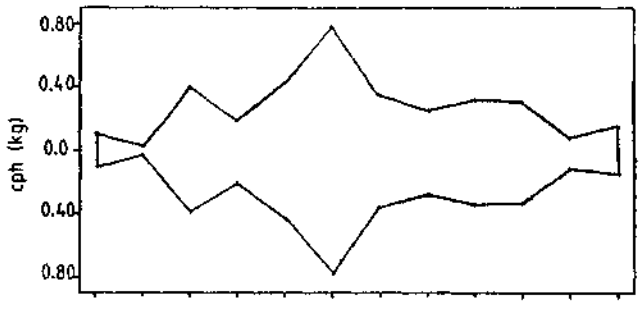


Fig. 19. Seasonal abundance of elasmobranchs (rays) in trawl nets.

ENGRAULIDAE

Popular English Name : Anchovies/Whitebait
Vernacular Name (Telugu) : 'Nethallu'
Annual average catch : 176 t

Gearwise annual
average catch : Trawl net : 132 t
Shore seine : 40 t
Boat seine : 4 t
Fishing methods and their
contribution in the gears : Shore seine : 60%
Boat seine : 3%
Trawl net : 1.9%

Fig. 20. Seasonal abundance of whitebait anchovy (gear: shrimp trawls).

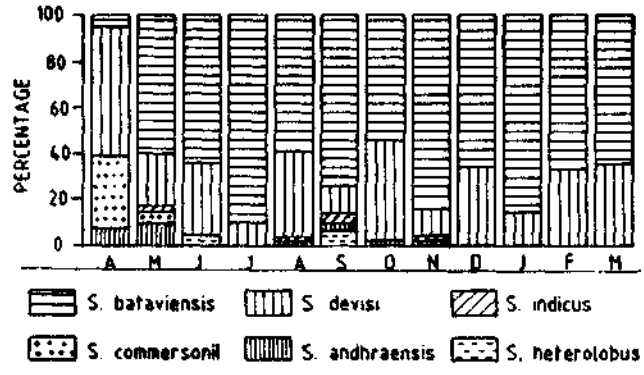


Fig. 21. Monthly species composition of whitebait anchovy landed by shrimp trawls.

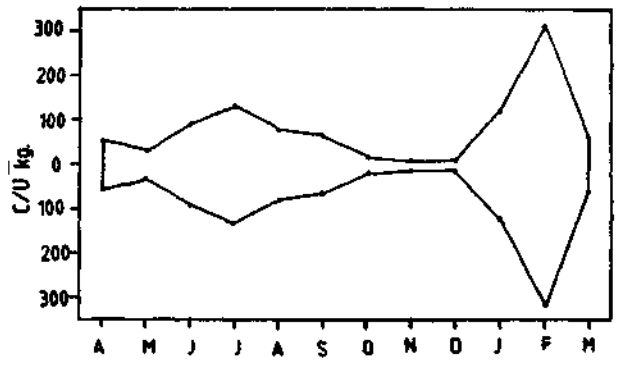


Fig. 22. Seasonal abundance of whitebait anchovy (gear: other indigenous gears).

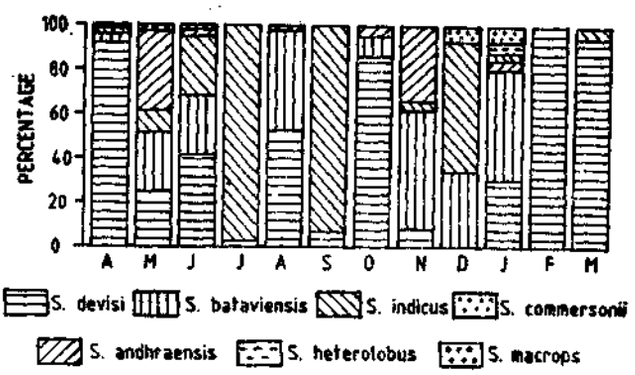


Fig. 23. Monthly species composition of whitebait anchovy landed by other indigenous gears.

Fig. 24. *Stolephorus devisi.*

Scientific Name	:	*Stolephorus devisi*
Vernacular Name	:	'Namala nethallu'
Gear	:	Trawl net/Shore seine/ Boat seine
Percentage in the catch of the group	:	Trawl net : 26 Shore seine : 95 Boat seine : 39
Peak period of occurrence	:	August – May
Depth of occurrence	:	10 – 20 and 40–60 m
Length range in commercial fishery	:	30 – 95 mm
Size at first maturity	:	60 – 64 mm
Spawning season	:	February – March, June – August and October – December

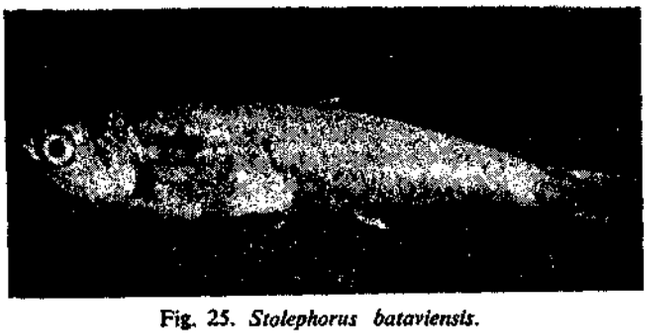


Fig. 25. *Stolephorus bataviensis.*

Scientific Name	:	*Stolephorus bataviensis*
Vernacular Name	:	'Balla nethallu'
Gear	:	Trawl net/Shore seine/ Boat seine
Percentage in the catch of the group	:	Trawl net : 70 Shore seine : 3 Boat seine : 6
Peak period of occurrence	:	September – January
Depth of occurrence	:	10–20 and 40 – 60 m
Length range in commercial fishery	:	35 – 133 mm
Size at first maturity	:	80 – 84 mm
Spawning season	:	February – March, June – July and Dec.

Fig. 26. *Stolephorus indicus.*

Scientific Name	:	*Stolephorus indicus*
Vernacular Name	:	'Nethallu'
Gear	:	Boat seine
Percentage in the catch of the group	:	Boat seine : 22
Peak period of occurrence	:	April – September
Depth of occurrence	:	10 – 20 m
Length range in commercial fishery	:	45 – 160 mm
Size at first maturity	:	—
Spawning season	:	—

ENGRAULIDAE

Popular English Name	:	Thryssa anchovy
Vernacular Name (Telugu)	:	'Poravalu'
Annual average catch	:	71 t
Gearwise annual average catch	:	Trawl net : 71 t
Fishing methods and their contribution in the gears	:	Trawl net : 1%

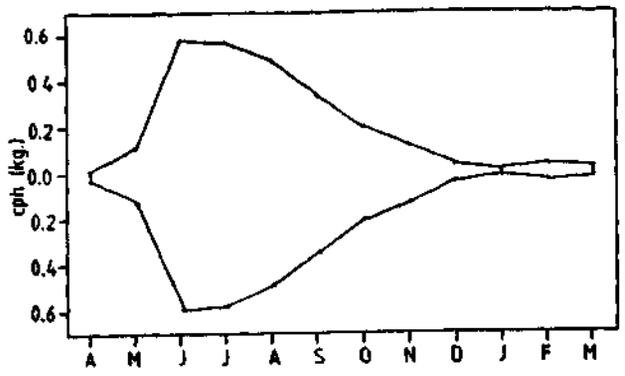


Fig. 27. Seasonal abundance of thryssa anchovy (gear: shrimp trawls).

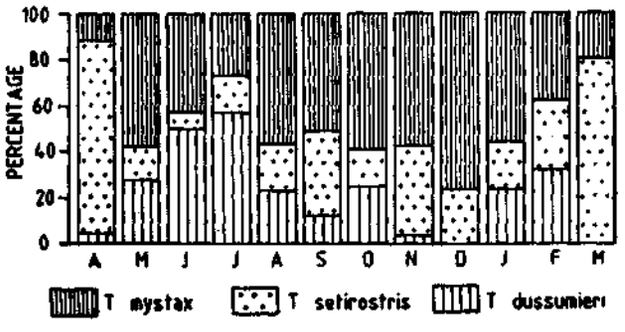


Fig. 28. Monthly species composition of thryssa anchovy landed by shrimp trawls.

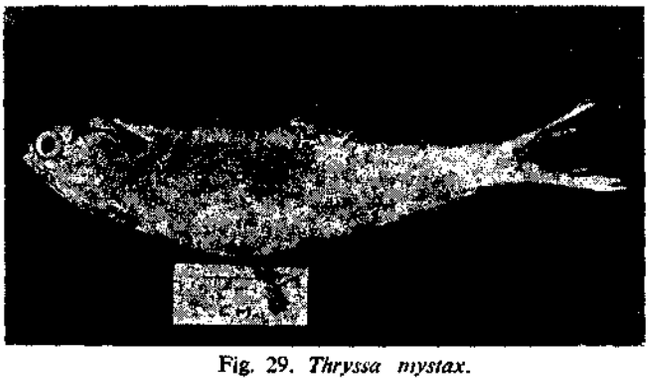


Fig. 29. *Thryssa mystax.*

Scientific Name	:	*Thryssa mystax*
Vernacular Name	:	'Palli porava'/ 'Nedum porava'
Gear	:	Trawl net
Percentage in the catch of the group	:	Trawl net : 46
Peak period of occurrence	:	June – October
Depth of occurrence	:	40 – 60 m
Length range in commercial fishery		65 – 220 mm
Size at first maturity	:	—
Spawning season	:	—

Scientific Name	:	*Thryssa dussumieri*
Vernacular Name	:	'Potta porava'
Gear	:	Trawl net
Percentage in the catch of the group	:	Trawl net : 33
Peak period of occurrence	:	June - August
Depth of occurrence	:	40 – 60 m
Length range in commercial fishery	:	70 – 150 mm
Size at first maturity	:	—
Spawning season	:	—

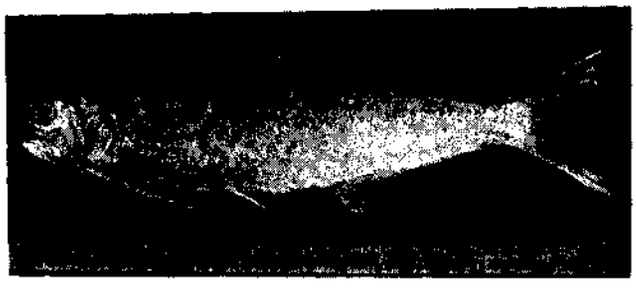


Fig. 30. *Thryssa setirostris.*

Scientific Name	:	*Thryssa setirostris*
Vernacular Name	:	'Geddam porava'/'Yeeka porava'
Gear	:	Trawl net
Percentage in the catch of the group	:	Trawl net : 21
Peak period of occurrence	:	July – September
Depth of occurrence	:	40 – 60 m
Length range in commercial fishery	:	80 – 195 mm
Size at first maturity	:	—
Spawning season	:	—

ISTIOPHORIDAE

Popular English Name	:	Sail fish
Vernacular Name (Telugu)	:	'Kommu konemu'
Annual average catch	:	22.8 t
Gearwise annual average catch	:	Hooks & line : 22.8 t
Fishing methods and their contribution in the gears	:	Hooks & line : 7%

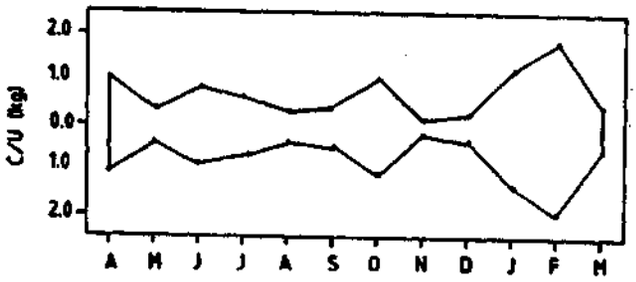


Fig. 31. Seasonal abundance of sail fishes (gear: indigenous gears).

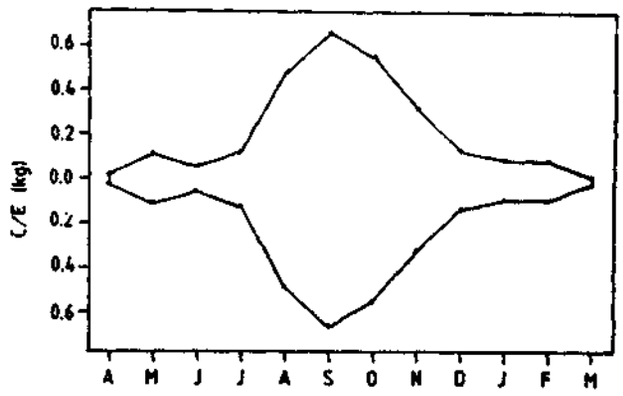


Fig. 33. Seasonal abundance of white fish (gear: indigenous gears).

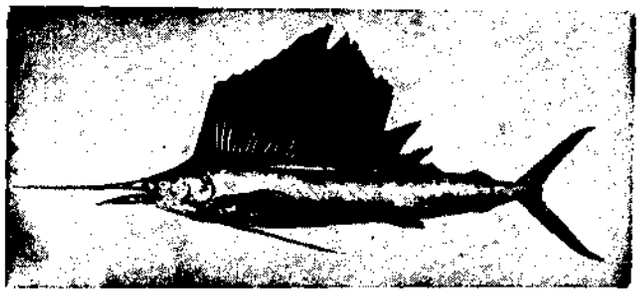


Fig. 32. *Istiophorus platypterus.*

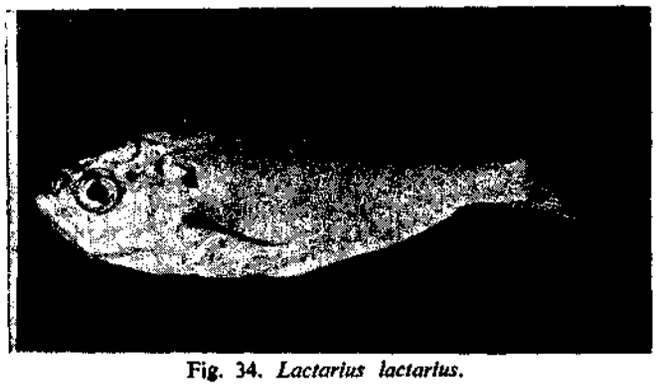


Fig. 34. *Lactarius lactarius.*

Scientific Name	:	*Istiophorus platypterus*
Vernacular Name	:	'Kommu konemu'
Gear	:	Hooks & line
Percentage in the catch of the group	:	Hooks & line : 100
Peak period of occurrence	:	January – April
Depth of occurrence	:	30 – 60 m
Length range in commercial fishery	:	1,500 – 1,700 mm
Size at first maturity	:	—
Spawning season	:	—

LACTARIIDAE

Popular English Name	:	Big jawed jumper/ White fish
Vernacular Name (Telugu)	:	'Sudumulu'
Annual average catch	:	74.5 t
Gearwise annual average catch	:	Trawl net : 74.5 t
Fishing methods and their contribution in the gears	:	Trawl net : 1%

Scientific Name	:	*Lactarius lactarius*
Vernacular Name	:	'Sudumulu'
Percentage in the catch of the group	:	Trawl net : 100
Peak period of occurrence	:	July – December
Depth of occurrence	:	10 – 60 m
Length range in commercial fishery	:	45 – 250 mm
Size at first maturity	:	150 mm
Spawning season	:	March – April

LEIOGNATHIDAE

Popular English Name	:	Silver bellies
Vernacular Name (Telugu)	:	'Karalu'
Annual average catch	:	450 t
Gearwise annual average catch	:	Trawl net : 450 t
Fishing methods and their contribution in the gears	:	Trawl net : 5.7%

Fig. 35. Seasonal abundance of silver bellies (gear: shrimp trawls).

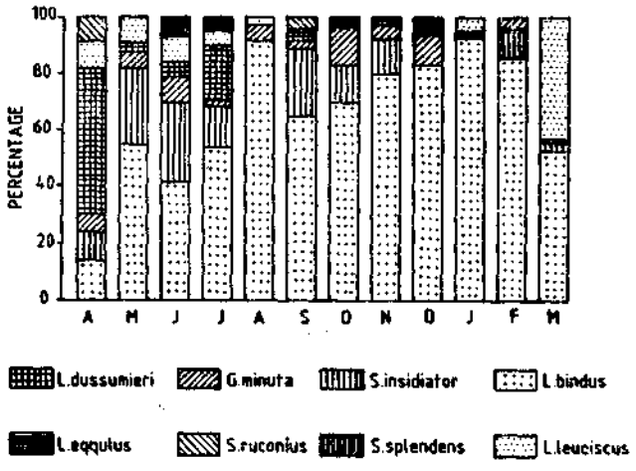


Fig. 36. Monthly species composition of silver bellies landed by shrimp trawls.

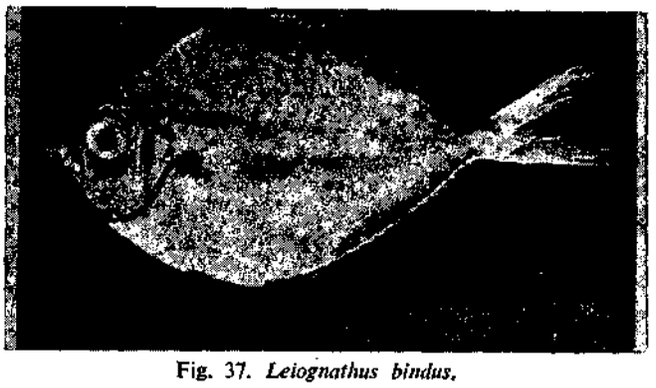


Fig. 37. *Leiognathus bindus.*

Scientific Name	:	*Leiognathus bindus*
Vernacular Name	:	'Karalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	69
Peak period of occurrence	:	May - September
Depth of occurrence	:	10 - 50 m
Length range in commercial fishery	:	20 - 129 mm
Size at first maturity	:	80 mm
Spawning season	:	December - February

MULLIDAE

Popular English Name	:	Goat fishes
Vernacular Name (Telugu)	:	'Gulivindalu'
Annual average catch	:	441 t
Gearwise annual average catch	:	Trawl net : 441 t
Fishing methods and their contribution in the gear	:	Trawl net : 7%

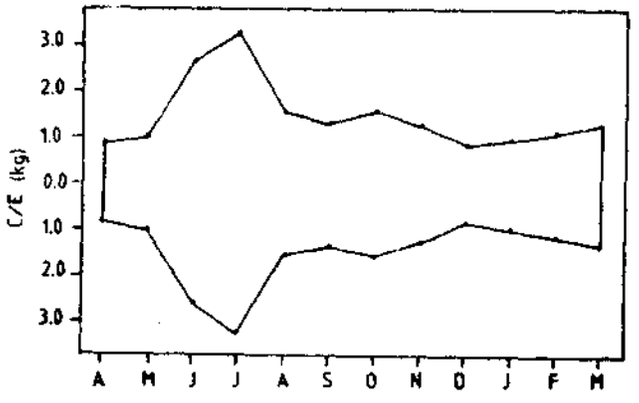


Fig. 38. Seasonal abundance of goat fishes (gear: shrimp trawls)

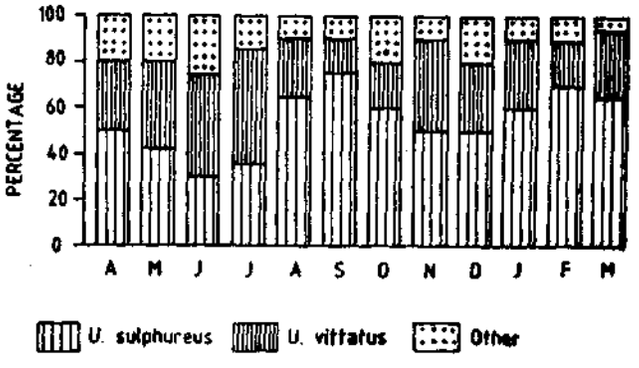


Fig. 39. Monthly species composition of goat fishes landed by shrimp trawls.

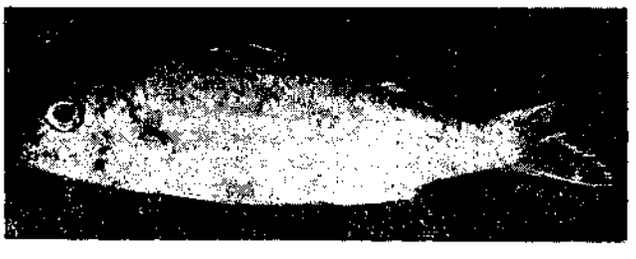


Fig. 40. *Upeneus sulphureus.*

Scientific Name	:	*Upeneus sulphureus*
Vernacular Name	:	'Pasupu gulivindu'
Gear	:	Trawl net
Percentage in the catch of the group	:	52
Peak period of occurrence	:	August - March
Depth of occurrence	:	10 - 60 m
Length range in commercial fishery	:	65 - 235 mm
Size at first maturity	:	130 mm
Spawning season	:	February - March

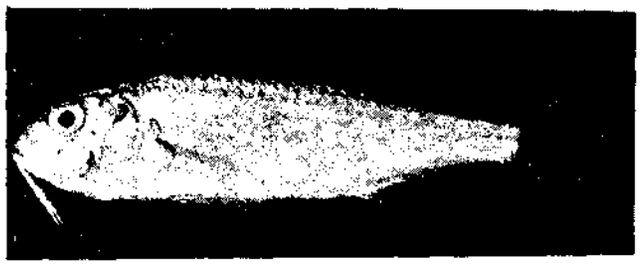


Fig. 41. *Upeneus vittatus.*

Scientific Name	:	*Upeneus vittatus*
Vernacular Name	:	'Chara gulivindu'
Gear	:	Trawl net
Percentage in the catch of the group	:	33
Peak period of occurrence	:	April - July
Depth of occurrence	:	10 - 60 m
Length range in commercial fishery	:	100 - 180 mm
Size at first maturity	:	125 mm
Spawning season	:	February - March

NEMIPTERIDAE

Popular English Name	:	*Threadfin breams*
Vernacular Name (Telugu)	:	'Gulivindalu'
Annual average catch	:	830 t
Gearwise annual average catch	:	Trawl net : 830 t
Fishing methods and their contribution in the gear	:	Trawl net : 13.1%

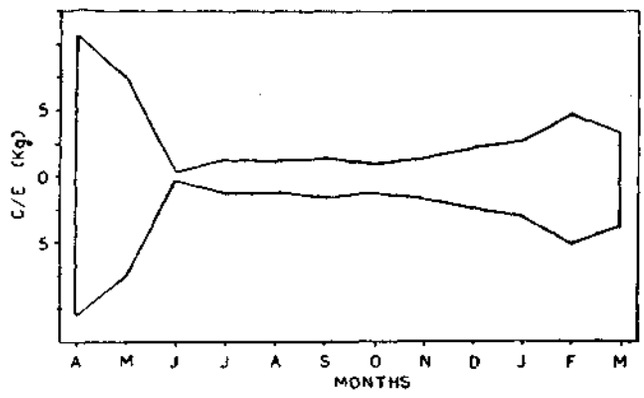


Fig. 42. Seasonal abundance of threadfin breams (gear: shrimp trawls).

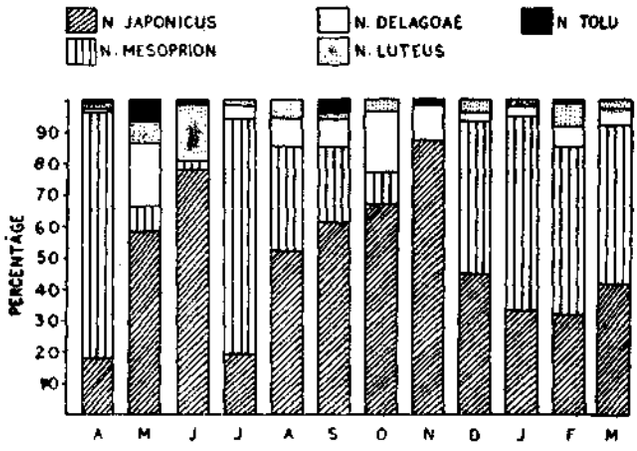


Fig. 43. Monthly species composition of threadfin breams landed by shrimp trawls.

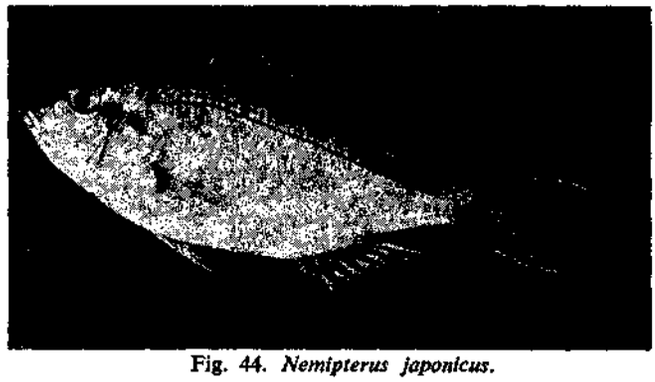


Fig. 44. *Nemipterus japonicus.*

Scientific Name	:	*Nemipterus japonicus*
Vernacular Name	:	'Bandi gulivindalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	38
Peak period of occurrence	:	August - January and May - June

Depth of occurrence	:	30 - 70 m
Length range in commercial fishery	:	50 - 280 mm
Size at first maturity	:	148 mm
Spawning season	:	December - February and June - July

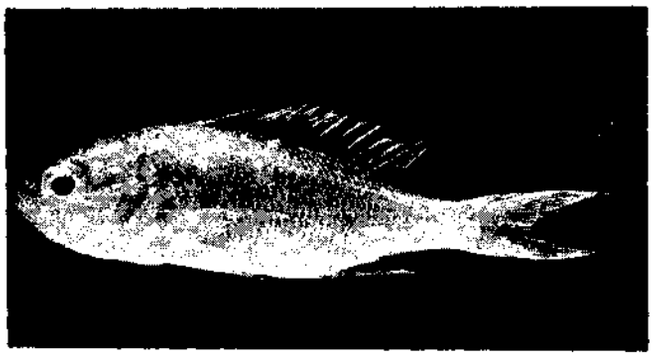


Fig. 45. *Nemipterus mesoprion.*

Scientific Name	:	*Nemipterus mesoprion*
Vernacular Name	:	'Bandi gulivindalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	51.8
Peak period of occurrence	:	December - April and July - August
Depth of occurrence	:	30 - 70 m
Length range in commercial fishery	:	80 - 210 mm
Size at first maturity	:	147 mm
Spawning season	:	January - April

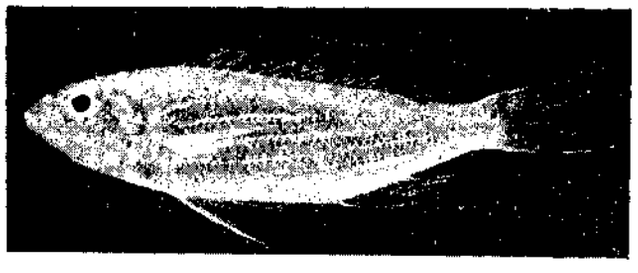


Fig. 46. *Nemipterus delagoae.*

Scientific Name	:	*Nemipterus delagoae*
Vernacular Name	:	'Gulivindalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	6
Peak period of occurrence	:	May - June and October - November
Depth of occurrence	:	30 - 70 m
Length range in commercial fishery	:	100 - 200 mm
Size at first maturity	:	—
Spawning season	:	—

NOMEIDAE

Popular English Name	:	Drift fish
Vernacular Name (Telugu)	:	'Methapara'
Annual average catch	:	123 t
Gearwise annual average catch	:	Trawl net : 123 t
Fishing methods and their contribution in the gears	:	Trawl net : 2%

Fig. 47. Seasonal abundance of Indian drift fishes (gear: shrimp trawls).

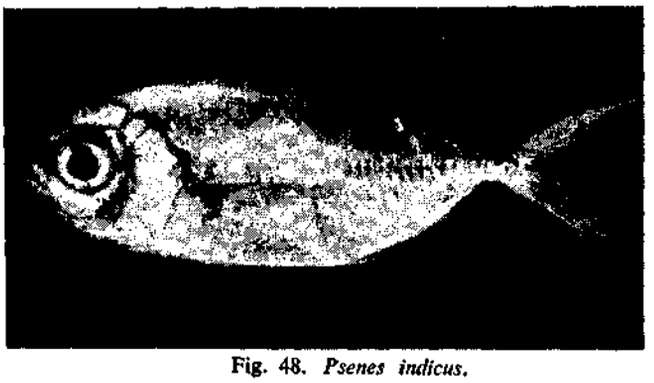


Fig. 48. *Psenes indicus.*

Scientific Name	:	*Psenes indicus*
Vernacular Name	:	'Methapara'
Gear	:	Trawl net
Percentage in the catch of the group	:	100
Peak period of occurrence	:	February - July
Depth of occurrence	:	10 - 60 m
Length range in commercial fishery	:	60 - 275 mm
Size at first maturity	:	160 mm
Spawning season	:	February - June

POLYNEMIDAE

Popular English Name : Threadfins
Vernacular Name (Telugu) : 'Magalu'
Annual average catch : 53 t
Gearwise annual
average catch : Trawl net : 53 t
Fishing methods and their
contribution in the gears : Trawl net : 1%

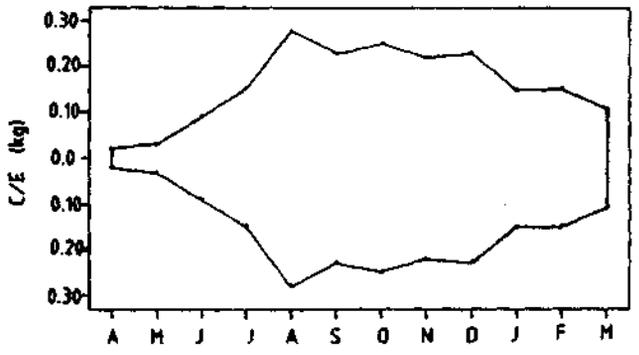


Fig. 49. Seasonal abundance of black spot threadfins (gear: shrimp trawls).

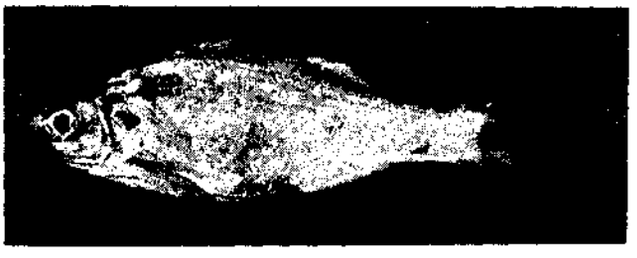


Fig. 50. *Polynemus sextarius*.

Scientific Name : *Polynemus sextarius*
Vernacular Name : 'Maga'
Gear : Trawl net
Percentage in the
catch of the group : 100
Peak period of occurrence : August – December
Depth of occurrence : 10 - 60 m
Length range in
commercial fishery : 100 - 210 mm
Size at first maturity : 170 mm
Spawning season : January - May

PRIACANTHIDAE

Popular English Name : Bulls eye/Big eye
Vernacular Name (Telugu) : 'Bochulu'
Annual average catch : 219 t
Gearwise annual
average catch : Trawl net : 219 t
Fishing methods and their
contribution in the gears : Trawl net : 3.4%

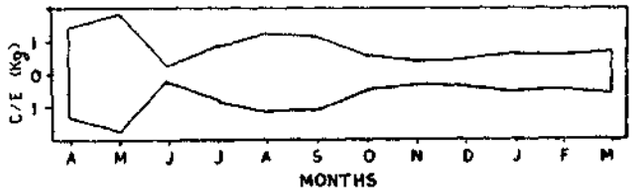


Fig. 51. Seasonal abundance of bulls eye (gear: shrimp trawl).

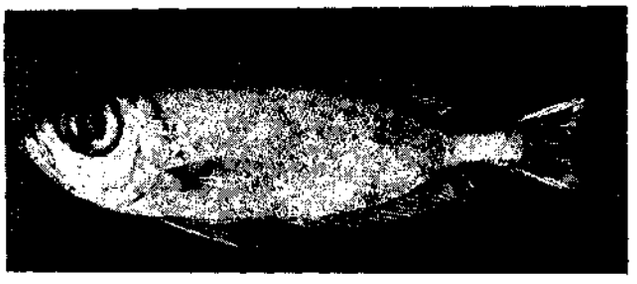


Fig. 52. *Priacanthus macrocanthus*.

Scientific Name : *Priacanthus macrocanthus*
Vernacular Name : 'Bochulu'
Gear : Trawl net
Percentage in the catch
of the group : 90
Peak period of occurrence : August – March
Depth of occurrence : 30 – 70 m
Length range in
commercial fishery : 100 - 230 mm
Size at first maturity : 170 mm
Spawning season : November – May

SCIAENIDAE

Popular English Name : Croakers/Jew fish
Vernacular Name (Telugu) : 'Gorasalu'
Annual average catch : 502 t
Gearwise annual
average catch : Trawl net : 503 t
Fishing methods and their
contribution in the gears : Trawl net : 7.9%

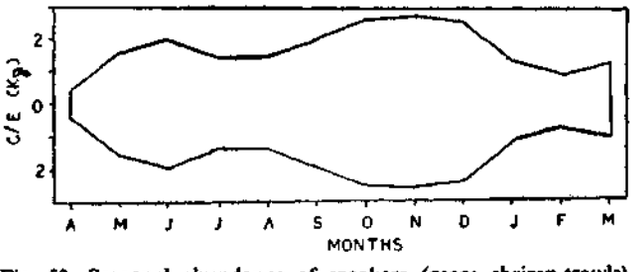


Fig. 53. Seasonal abundance of croakers (gear: shrimp trawls).

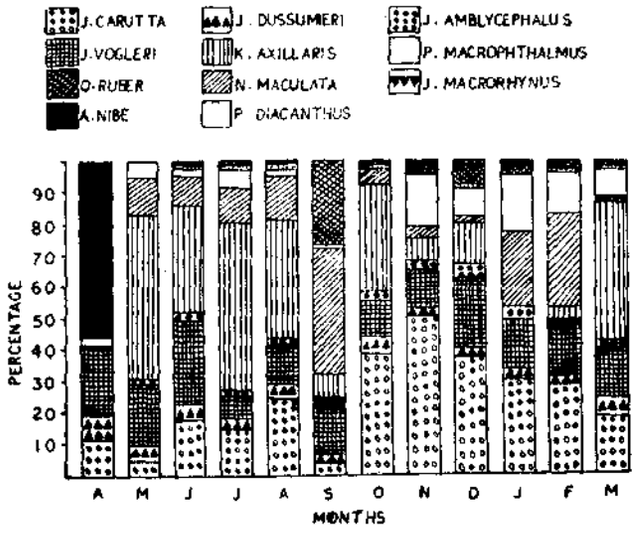


Fig. 54. Monthly species composition of croakers landed by shrimp trawls.

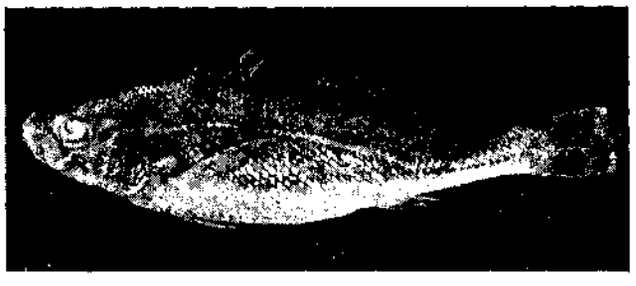


Fig. 55. *Johnius carutta.*

Scientific Name	:	*Johnius carutta*
Vernacular Name	:	'Nalla gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	26
Peak period of occurrence	:	October – February
Depth of occurrence	:	20 - 70 m
Length range in commercial fishery	:	40 - 240 mm
Size at first maturity	:	170 mm
Spawning season	:	January – March

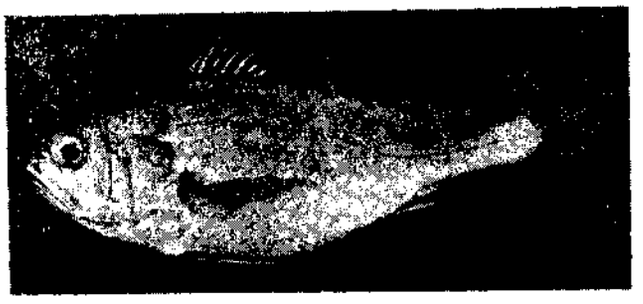


Fig. 56. *Kathala axillaris.*

Scientific Name	:	*Kathala axillaris*
Vernacular Name	:	'Gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	25.3
Peak period of occurrence	:	July - August and October
Depth of occurrence	:	30 – 70 m
Length range in commercial fishery	:	50 – 150 mm
Size at first maturity	:	155 mm
Spawning season	:	—

Fig. 57. *Nibea maculata.*

Scientific Name	:	*Nibea maculata*
Vernacular Name	:	'Macha gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	12.6
Peak period of occurrence	:	May – September and January – February
Depth of occurrence	:	30 – 70 m
Length range in commercial fishery	:	70 – 240 mm
Size at first maturity	:	160 mm
Spawning season	:	—

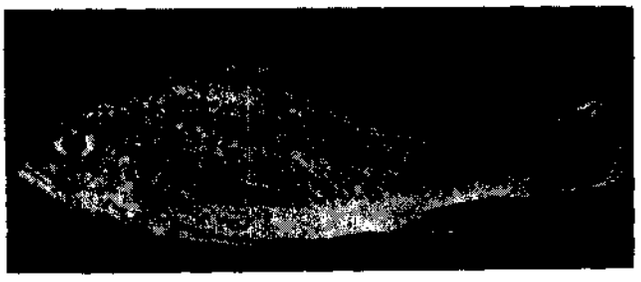


Fig. 58. *Pennahia macrophthalmus.*

Scientific Name	:	*Pennahia macrophthalmus*
Vernacular Name	:	'Gorasalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	5.7
Peak period of occurrence	:	November - February
Depth of occurrence	:	20 - 70 m
Length range in commercial fishery	:	100 - 240 mm
Size at first maturity	:	172 mm
Spawning season	:	December - March

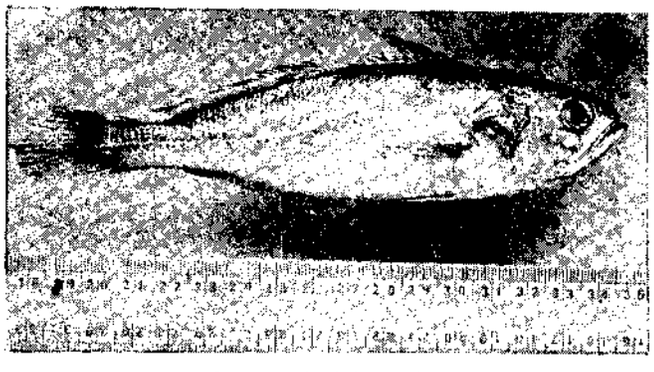


Fig. 59. *Otolithes ruber.*

Scientific Name	:	*Otolithes ruber*
Vernacular Name	:	'Villi gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	5.6
Peak period of occurrence	:	September
Depth of occurrence	:	30 - 70 m
Length range in commercial fishery	:	150 - 300 mm
Size at first maturity	:	—
Spawning season	:	—

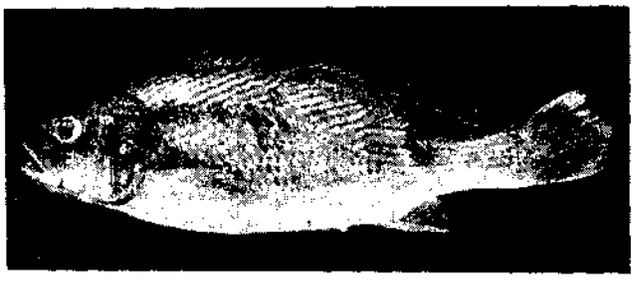


Fig. 60. *Johnieops vogleri.*

Scientific Name	:	*Johnieops vogleri*
Vernacular Name	:	'Gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	16
Peak period of occurrence	:	March - June and Dec.
Depth of occurrence	:	30 - 70 m
Length range in commercial fishery	:	100 - 235 mm
Size at first maturity	:	152 mm
Spawning season	:	February - April

Fig. 61. *Johnieops dussumieri.*

Scientific Name	:	*Johnieops dussumieri*
Vernacular Name	:	'Gorasa'
Gear	:	Trawl net
Percentage in the catch of the group	:	4.3
Peak period of occurrence	:	February
Depth of occurrence	:	30 - 70 m
Length range in commercial fishery	:	100 - 180 mm
Size at first maturity	:	—
Spawning season	:	—

Fig. 62. *Protonibea diacanthus.*

Scientific Name	:	*Protonibea diacanthus*
Vernacular Name	:	'Ghol'
Gear	:	Trawl net
Percentage in the catch of the group	:	1
Peak period of occurrence	:	September
Depth of occurrence	:	30 - 70 m
Length range in commercial fishery	:	150 - 750 mm
Size at first maturity	:	—
Spawning season	:	—

SCOMBRIDAE

TUNAS

Popular English Name	:	Tuna
Vernacular Name (Telugu)	:	'Soora'
Annual average catch	:	47.7 t
Gearwise annual average catch	:	Hooks & line : 47.7 t
Fishing methods and their contribution in the gears	:	Hooks & line : 15.1%

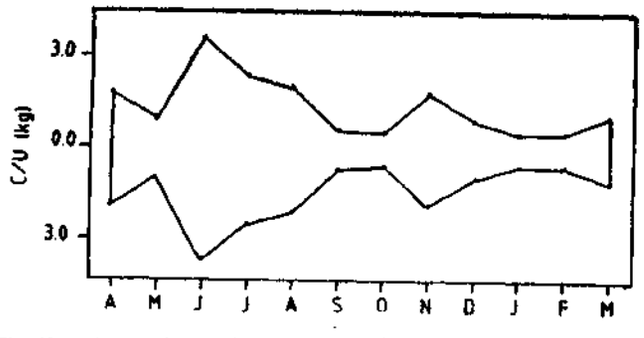


Fig. 63. Seasonal abundance of tunas (gear : indigenous gears).

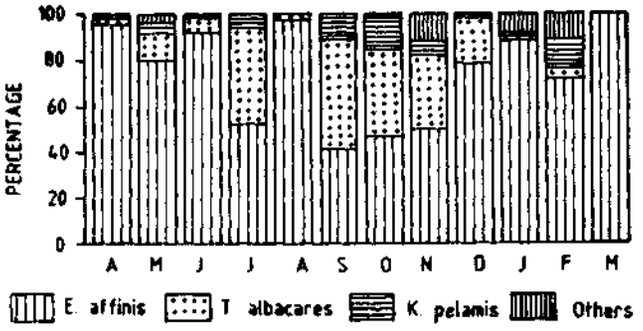


Fig. 64. Monthly species composition of tunas landed by indigenous gears.

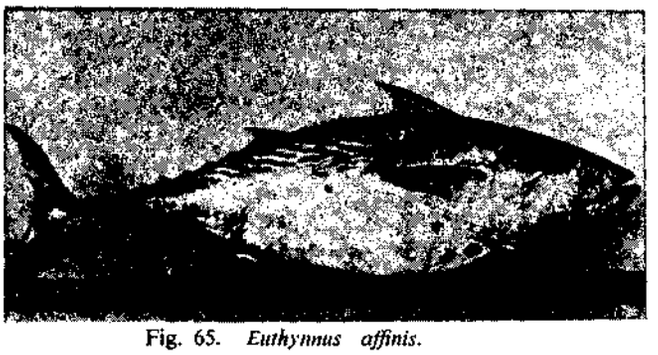


Fig. 65. *Euthynnus affinis.*

Scientific Name	:	*Euthynnus affinis*
Vernacular Name	:	'Pala soora'
Gear	:	Hooks & line
Percentage in the catch of the group	:	79.9
Peak period of occurrence	:	June - August
Depth of occurrence	:	30 - 60 m
Length range in commercial fishery	:	45 - 55 mm
Size at first maturity	:	—
Spawning season	:	—

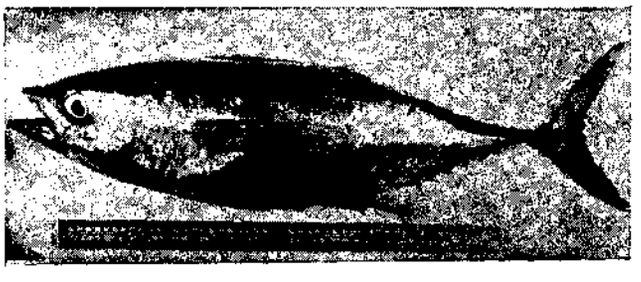


Fig. 66. *Thunnus albacares.*

Scientific Name	:	*Thunnus albacares*
Vernacular Name	:	'Racca soora'
Gear	:	Hooks & line

Percentage in the catch of the group	:	15.2
Peak period of occurrence	:	June - July and November
Depth of occurrence	:	30 - 60 m
Length range in commercial fishery	:	55 - 70 mm
Size at first maturity	:	—
Spawning season	:	—

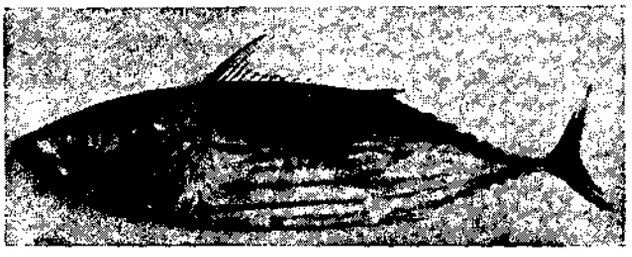


Fig. 67. *Katsuwonus pelamis.*

Scientific Name	:	*Katsuwonus pelamis*
Vernacular Name	:	'Namala soora'
Gear	:	Hooks & line
Percentage in the catch of the group	:	2.2
Peak period of occurrence	:	October - November
Depth of occurrence	:	30 - 60 m
Length range in commercial fishery	:	50 - 70 mm
Size at first maturity	:	—
Spawning season	:	—

SEER FISHES

Popular English Name	:	Seer fishes
Vernacular Name (Telugu)	:	'Vanjaram'/'Konemu'
Annual average catch	:	120 t
Gearwise annual average catch	:	Hooks & line : 105 t Bottom set gill net : 15 t
Fishing methods and their contribution in the gears	:	Hooks & line : 33% Bottom set gill net : 9%

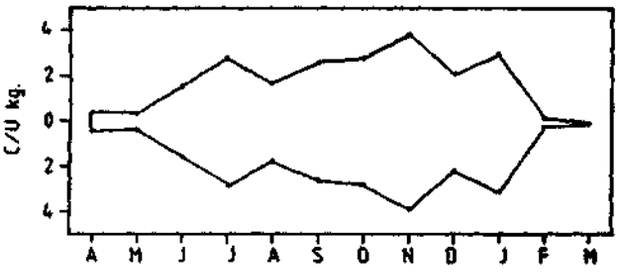


Fig. 68. Seasonal abundance of seer fishes (gear: gill nets).

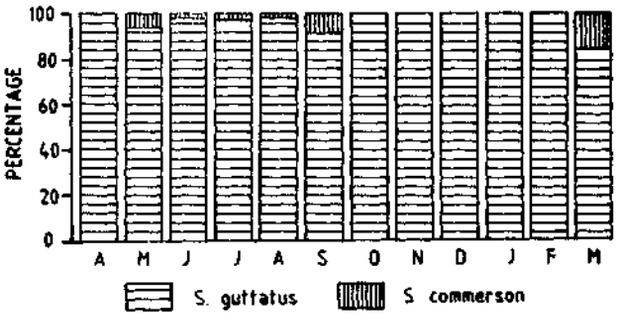


Fig. 69. Monthly abundance of seer fishes landed by gill nets.

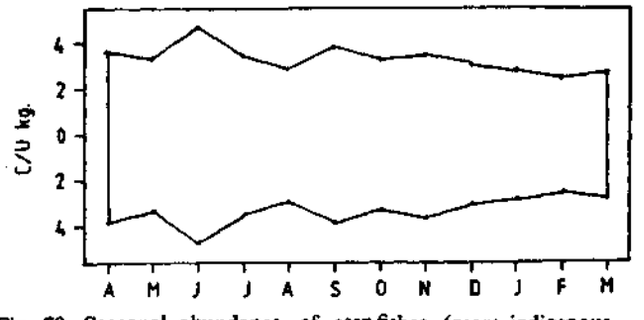


Fig. 70. Seasonal abundance of seer fishes (gear: indigenous gears).

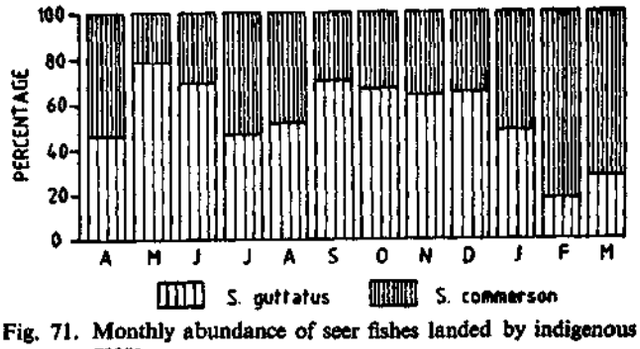


Fig. 71. Monthly abundance of seer fishes landed by indigenous gears.

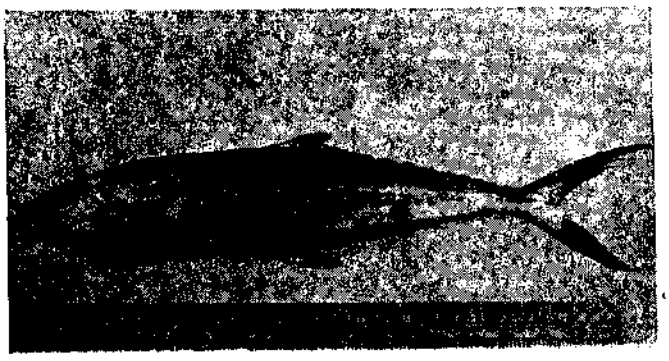


Fig. 72. *Scomberomorus guttatus.*

Scientific Name	:	*Scomberomorus guttatus*
Vernacular Name	:	'Vanjaram'
Gear	:	Hooks & line/ Bottom set gill net
Percentage in the catch of the group	:	Hooks & line : 55 Bottom set gill net : 98
Peak period of occurrence	:	May - July / September-October and January
Depth of occurrence	:	20 - 100 m
Length range in commercial fishery	:	300 - 800 mm
Size at first maturity	:	300 mm
Spawning season	:	February - March and July

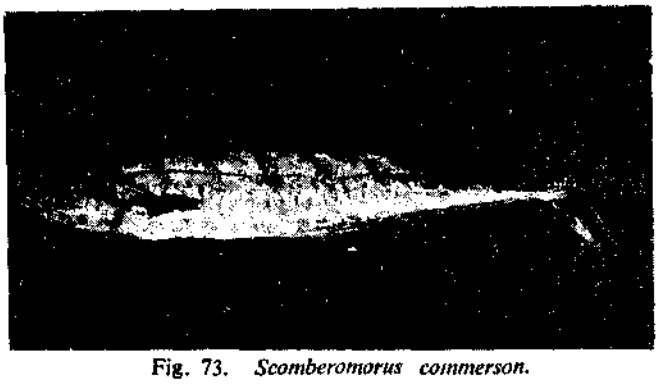


Fig. 73. *Scomberomorus commerson.*

Scientific Name	:	*Scomberomorus commerson*
Vernacular Name	:	'Konemu'
Gear	:	Hooks & line/Bottom set gill net
Percentage in the catch of the group	:	Hooks & line : 45 Bottom set gill net : 2
Peak period of occurrence	:	February - April and July
Depth of occurrence	:	50 - 100 m
Length range in commercial fishery	:	400 - 1000 mm
Size at first maturity	:	—
Spawning season	:	—

MACKEREL

Popular English Name	:	Indian Mackerel
Vernacular Name (Telugu)	:	'Kanagurta'
Annual average catch	:	134 t
Gearwise annual average catch	:	Drift gill net : 94 t Trawl net : 32 t Shore seine & boat seine : 8 t
Fishing methods and their contribution in the gear	:	Drift gill net : 67% Shore seine & boat seine : 3% Trawl net : 0.5%

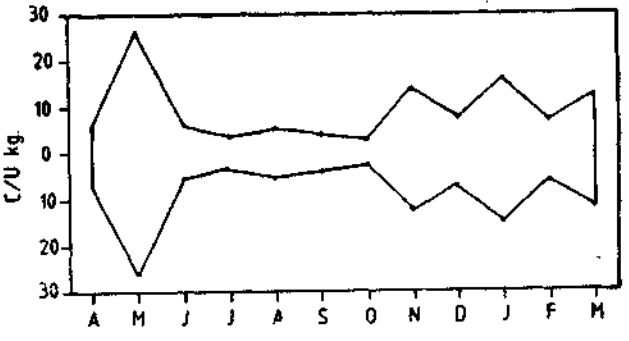


Fig. 74. Seasonal abundance of mackerel in gill nets.

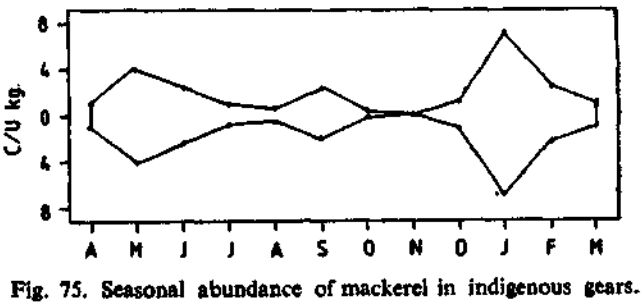


Fig. 75. Seasonal abundance of mackerel in indigenous gears.

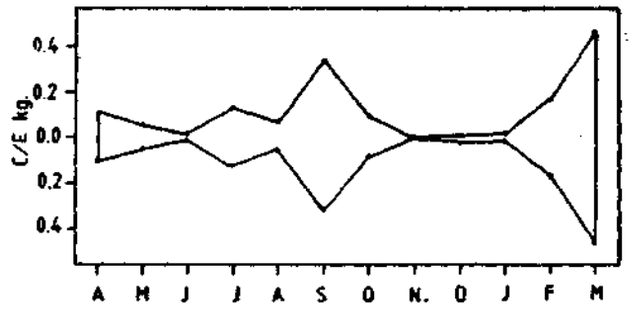


Fig. 76. Seasonal abundance of mackerel in trawl nets.

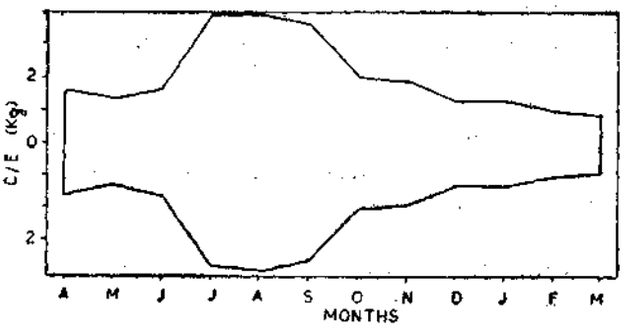


Fig. 78. Seasonal abundance of lizard fishes (gear: shrimp trawl)

Fig. 77. *Rastrelliger kanagurta.*

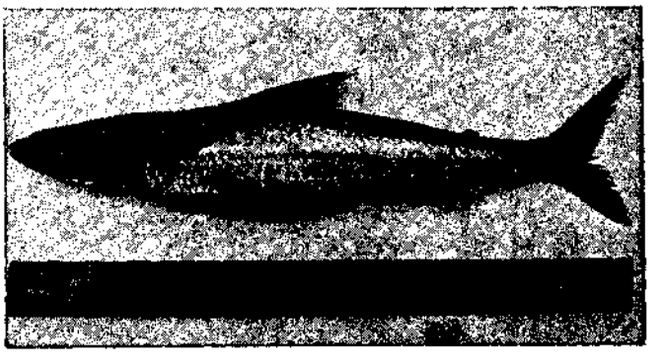


Fig. 79. *Saurida tumbil.*

Scientific Name	:	*Rastrelliger kanagurta*
Vernacular Name	:	'Kanagurta'
Gear	:	Drift gill net/Trawl net/ Boat seine/Shore seine
Percentage composition in the gear	:	Drift gill net : 98 Shore seine & boat seine : 100 Trawl net : 100
Peak period of occurrence	:	January – May
Depth of occurrence	:	1 – 60 m
Length range in commercial fishery	:	40 – 270 mm
Size at first maturity	:	185 mm
Spawning season	:	October – April

SYNODONTIDAE

Popular English Name	:	Lizard fishes
Vernacular Name (Telugu)	:	'Bademattalu'
Annual average catch	:	625 t
Gearwise annual average catch	:	Trawl net : 625 t
Fishing methods and their contribution in the gears	:	Trawl net : 9.8%

Scientific Name	:	*Saurida tumbil*
Vernacular Name	:	'Bademattalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	Trawl net : 60
Peak period of occurrence	:	July – September
Depth of occurrence	:	30 – 70 m
Length range in commercial fishery	:	40 – 320 mm
Size at first maturity	:	—
Spawning season	:	October - March

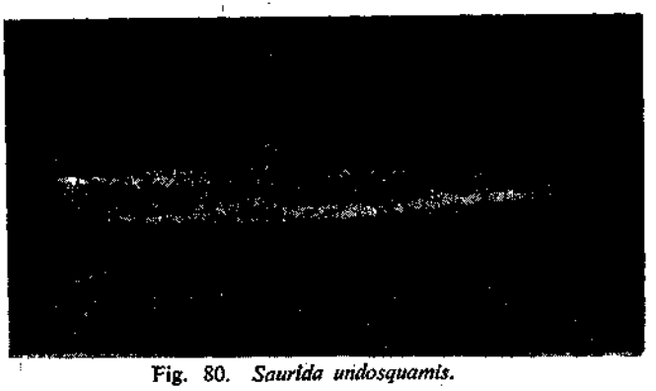


Fig. 80. *Saurida undosquamis.*

Scientific Name	:	*Saurida undosquamis*
Vernacular Name	:	'Bademattalu'
Gear	:	Trawl net
Percentage in the catch of the group	:	Trawl net : 35
Peak period of occurrence	:	July – September
Depth of occurrence	:	30 – 70 m
Length range in commercial fishery	:	50 – 210 mm
Size at first maturity	:	—
Spawning season	:	—

TACHYSURIDAE

Popular English Name	:	Cat fish
Vernacular Name (Telugu)	:	'Jellalu'
Annual average catch	:	179.1 t
Gearwise annual average catch	:	Trawl net : 124.4 t Hooks & line : 54.7 t
Fishing methods and their contribution in the gears	:	Hooks & line : 15.5% Trawl net : 1.7%

Fig. 81. Seasonal abundance of cat fish (gear: shrimp trawl)

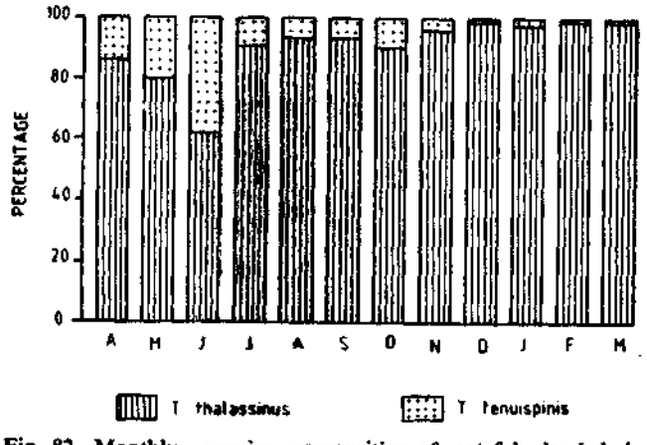


Fig. 82. Monthly species composition of cat fish landed by shrimp trawls.

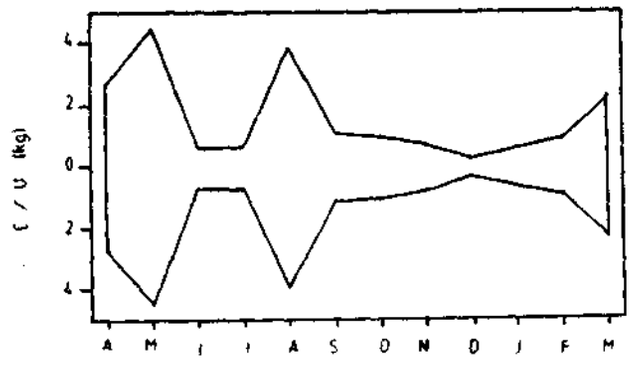


Fig. 83. Seasonal abundance of cat fish (gear: other indigenous gears).

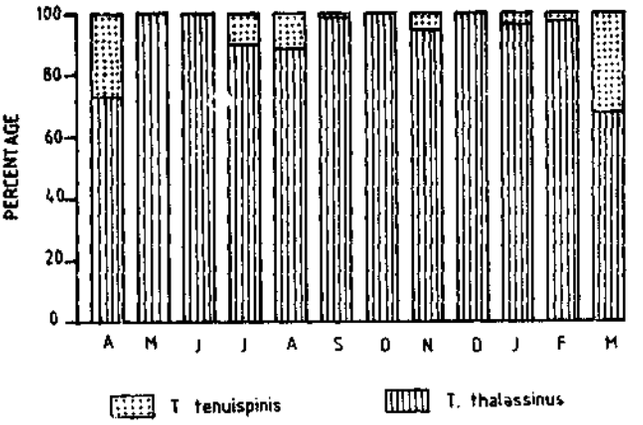


Fig. 84. Monthly species composition of cat fish landed by other indigenous gears.

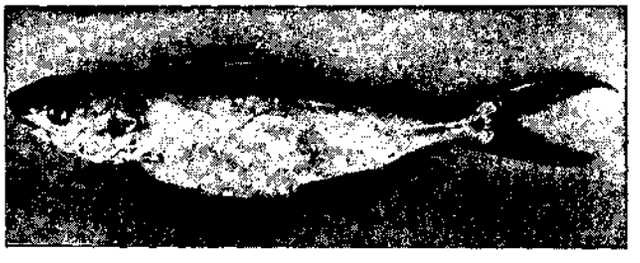


Fig. 85. *Tachysurus thalassinus.*

Scientific Name	:	*Tachysurus thalassinus*
Vernacular Name	:	'Thella jalla'
Gear	:	Trawl net/Hooks & line
Percentage in the catch of the group	:	Trawl net : 1.7 Hooks & line : 15.6
Peak period of occurrence	:	March – December
Depth of occurrence	:	10 – 80 m
Length range in commercial fishery	:	80 – 660 mm
Size at first maturity	:	360 mm
Spawning season	:	May - July

TRICHIURIDAE

Popular English Name : Ribbon fishes
Vernacular Name (Telugu) : 'Savallu'
Annual average catch : 574.4 t
Gearwise annual
average catch : Trawl net : 574.4 t
Fishing methods and their
contribution in the gears : Trawl net : 8%

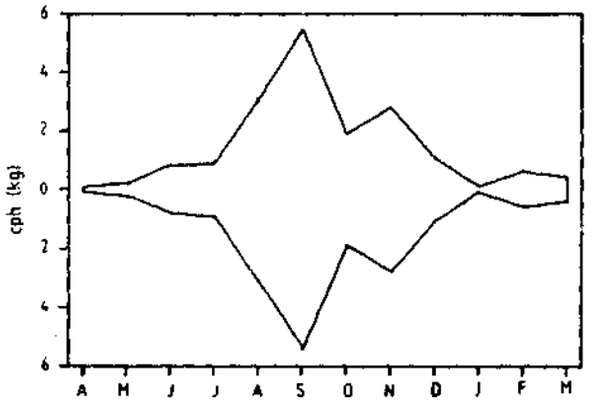


Fig. 86. Seasonal abundance of ribbon fishes (gear: shrimp trawls).

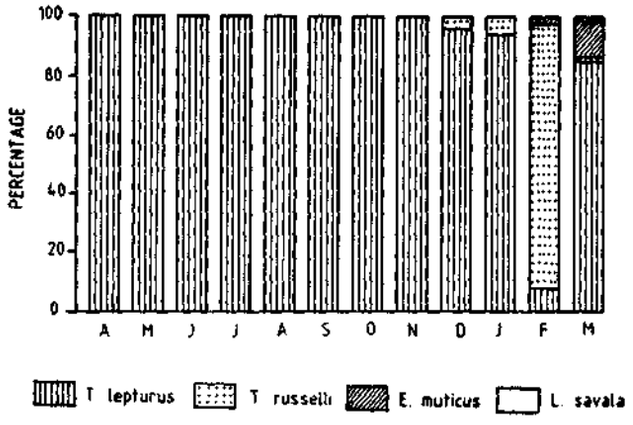


Fig. 87. Monthly species composition of ribbon fishes landed by shrimp trawls.

Fig. 88. *Trichiurus lepturus.*

Scientific Name : *Trichiurus lepturus*
Vernacular Name : 'Savallu'
Gear : Trawl net
Percentage in the catch
of the group : 96.4
Peak period of occurrence : July - November
Depth of occurrence : 10 - 80 m
Length range in
commercial fishery : 150 - 1000 mm
Size at first maturity : 525 mm
Spawning season : February - June

SOME OBSERVATIONS ON THE FOOD CONSUMPTION PATTERN AND NUTRITIONAL STATUS OF A MARINE FISHERMEN COMMUNITY

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Central Marine Fisheries Research Institute, Cochin

Introduction

Nutritional status is an indicator of socio-economic well being of a community. Extensive diet surveys carried out in the country have shown that a good proportion of the population which belongs to low income group is not able to fulfil the requirements of nutrients including the major ones like calories and protein. To understand the food consumption pattern and nutrient intake of artisanal fishermen community, an investigation was carried out in Vypeenkara, Cochin during 1982–'83 and the findings are reported here.

Methodology

A survey was conducted selecting 150 households to find out the weekly food consumption pattern. The total quantity of food bought every week and the frequency of consumption by the surveyed households were recorded through personal interviews with housewives, with the help of an interview schedule. To study the nutritional status of pre-school children, weight of 100 children were collected from the school health records and compared with the UNICEF standard used in Integrated Child Development Scheme (ICDS). Personal discussions were held with the school teachers, extension officer for women and child welfare at the local C.D. Block and the medical officer in charge of the primary health centre of the area to find out the general pattern of nutrition and nutritional disorders.

Occupation, income, educational status and family size

Among the households selected for the study, 57% was engaged in marine fishing as labourers, 38.5 % using own fishing equipment and the rest engaged in other fishery related activities like trading and post harvest operations. The household income ranged from Rs. 5–10 in the case of fishing labourers, Rs. 10–25 in the case of fishermen owning craft/gear and Rs. 25–30 in the case of traders (Table 1). The educational status of the heads of household is given in Table 2. The percentage of men, women and children in the sample was 37.5, 36.0 and 26.5 respectively with the average family size of 5.6.

Food consumption pattern

Table 3 gives the food consumption pattern in the selected households. It is seen that the diets consist mainly of rice and fish which meet only 75% of the calories and 50% of the protein needs. The quantity and frequency of consumption of other protein foods such as egg, meat and milk are considerably less. The foods like vegetables which form the major source of vitamin and iron are rarely included in the diet. Hence these have not been taken into account for computing nutrient in-take. Table 4 gives the average nutrient intake of the fishermen households. The average intake of 'CU' (consumption unit) for calories has been worked out at the rate of 2,400 for adult, though it is felt that an active sea-going fisherman requires the allowance of 3,900 calories, the type of activity being heavy work with considerable environmental stress.

Table 1. *Estimated percentage of occupation and income range of the marine fishermen community*

Occupation	% Families engaged	Income (Rs./day)
Fishing labour	57.0	5–10
Fishing using own craft/gear	38.5	10–25
Fish trading	4.5	20–30

Table 2. *Educational status of heads of households of marine fishermen community*

Education	% Individuals
< Primary	46
Primary	39
Secondary	14
> Secondary	1

Table 3. *Average per capita intake of food stuff by marine fishermen community*

Food	Quantity	Frequency of consumption (days/week)	Recommended daily allowance	Average in take for rural Kerala*
Cereals	260	7	475	369
Pulses	10	2–3	6–5	23
Vegetables	50	2–3	75	56
Leafy vegetables	100	1	125	7
Fruits	50	1	30	25
Roots and tubers	200	1	100	80
Fish	100	7	30	54
Other flesh food	30	1	30	12
Milk & buttermilk	50	1	200	79
Sugar	15	7	40	22
Fats & oils	10	7	40	6

* ICMR, 1982

Table 4. *Nutrient intake of fishermen community*

Nutrient	Average intake	Average intake for low income groups in Kerala*	Recommended daily allowance**
Calories	1,827	1,688	2,400–2,800
Protein (g)	27.35	34.58	55
Calcium (mg)	417.3	413.6	400–500
Iron (mg)	11.75	16.68	24.00
Riboflavin (mg)	0.54	0.642	1.4
Thiamine (mg)	0.28	0.588	1.2
Niacin (mg)	318	8.96	755
Vitamin C (mg)	—	75.2	4.0

*Rajammal, 1978.
**ICMR 1981, *Recommended dietary intake for Indians.*

Food habits and meal pattern

A balanced meal is rare in most of the households excepting during peak season in fishery. Breakfast is seldom prepared and food prepared in the previous night, if left over, is used in the morning. Difficulty in providing breakfast was identified as a reason for children dropping out from schools.

In households which own fishing crafts and where men leave for fishing in the early hours, breakfast is prepared, usually consisting of *ada* and *unda* made of rice flour/wheat flour, plantain and jaggery and black tea. In such households it is customary to serve breakfast for other crew men who accompany the craft owners. Of late sea shore tea shops coming up in increasing numbers have taken up the job and fishermen consume breakfast from these shops before or after fishing trips. *Puttu* made of rice flour and coconut, Bengal gram curry, *pakora* made of bread and Bengal gram flour, *aval* (rice flakes) and banana fry are the items of breakfast generally served in these shops. A Rs. 2 worth breakfast could provide 150 g *puttu* and 100 g Bengal gram curry and 1 cup tea with milk and sugar. The advantage for fishermen with these tea shops is that they can eat food on credit and pay when they get money. Fishermen prefer to carry rice-cooked plain or in the form of *kanji* (gruel) and *chammandi* (chutny) on their fishing trips as they think that such diet prevents them from getting thirsty and reduces the demand on water which is to be carried with them. During longer fishing trips food is often cooked onboard.

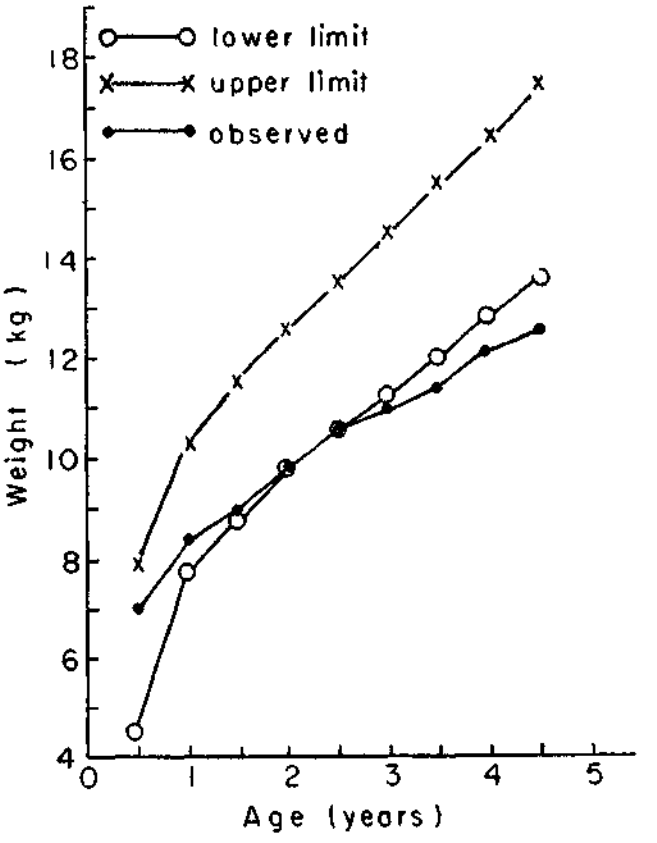


Fig. 1. Graph showing weight of school children plotted against the standard UNICEF curve.

Fig. 2. Food being prepared in a fisherman's hut.

Fig. 4. Fishermen taking food from sea shore tea shop.

The lunch mainly consists of rice, fish curry and fish fry made of oil sardine and other fish. Vegetables and buttermilk find a place in the diet rarely. Milk is not included in the diet excepting in the case of pre-school children. Meat is cooked once a month or during festivals. Men make it a point to bring a portion of the daily catch of fish for the family. The first cereal to be introduced in the diets of infants is usually ragi. By the time the child completes first year it is introduced to all foods consumed by the family.

Food is scarce during lean fishing season. Women bear the consequence of food scarcity which occurs four or five times a year. Even during such hard times neighbours extend mutual help and exchange small quantities of rice so that some *kanji* can be prepared. The welfare programmes of government include free ration for fishermen during adversities but no information was collected on the utilization of the same. The assets including ration cards are pledged during lean season to buy food and medicine. Another difficulty faced by them is buying of weekly ration by paying ready cash. Hence there is a tendency to buy food at higher price from open market on credit. Firewood and coconut husk and shell are used for cooking which have to be bought on price.

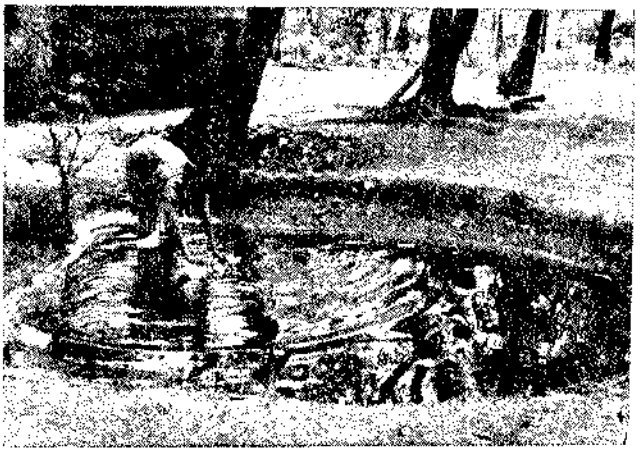


Fig. 3. A woman collecting rain water from a stagnant pool during rainy season.

The houses, generally small huts have some space set apart for preparation of food and is kept clean. Earthern and aluminium wares are used for cooking. A few stainless steel and glass wares are kept aside for the use of guests. The women are in the habit of listening women's programmes over the radio and try to understand the importance of nutrition but it is difficult for them to practice the knowledge because of low income. The local C. D. Block has been encouraging kitchen gardening through free supply of vegetable seed. There are also programmes for goat keeping and poultry. But it is difficult to grow vegetables in the coastal areas especially during summer due to high soil salinity and scarcity of fresh water. Coconut and seasonal paddy called 'pokkali' are the major crops in the island. Among vegetables cowpea is the most commonly cultivated one along the bunds of prawn fields. Corporation taps on the main road are the major source of drinking water and women have to spend a good portion of their time in fetching potable water. Water in small pools stagnated in the homesteads is used for washing during monsoon.

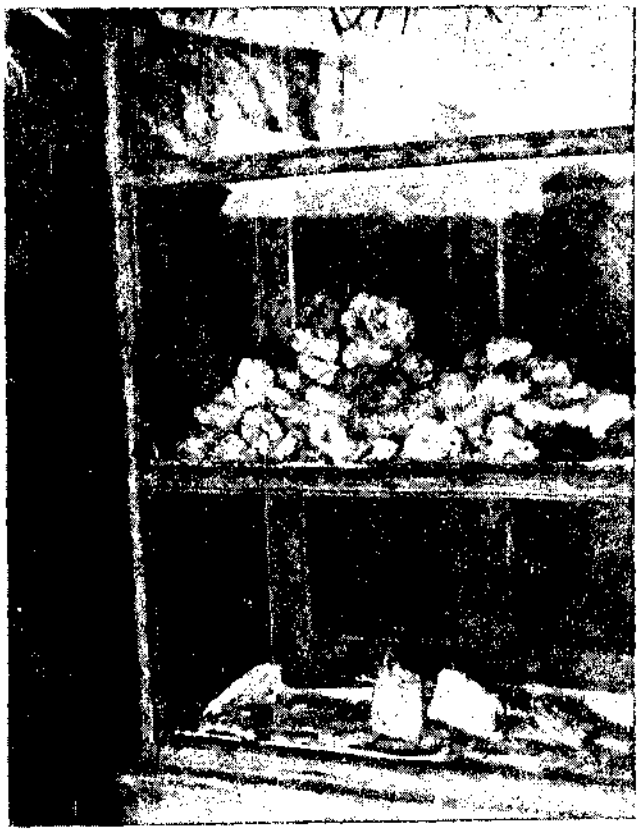


Fig. 5. 'Savala vada' and bread 'pakora' in a sea shore tea shop.

Nutritional status of pre-school children

The weight of 100 school children collected from two *balawadis* plotted against the standard UNICEF curve for Indian children is presented (Fig. 1). Nearly upto the age of three years the weights are found to be within the standards and then show a decline. Allergic bronchitis, asthma due to coastal climate, worm infestation, anaemia and dental caries are the health disorders commonly found among children. The coastal villages fall victim to gastro-enterites during monsoon due to lack of adequate sanitation.

Remarks

One of the major problems encountered in the development of fishermen community has been their low nutrient intake. Rajammal and Nirmala (*Proc. Seminar on Small-scale Fish. and Coastal Aquacul. in Inte. Rural Development*, CMFRI, 63–68, 1978) observed that there was conspicous gap in the vital data about the nutritional status of the fishing community. However, the information available on district averages show that the nutritional intake of low income groups in coastal Kerala and the anthrapometric measurements of fishermen children are found to be below the required standards. The present study on food consumption pattern and nutritional status of artisanal fishermen community in Vypeen also confirms the above findings.

The average nutrient intake for coastal Kerala (Rajammal and Nirmala, 1978 *(op. cit.)* and the rural Kerala (National Nutrition Monitoring Bureau, ICMR, Hyderabad, 1984) has indicated adequate intake of calcium and vitamin C coming from food stuffs like millets and vegetables. But in the present study the intake of vitamin C is found to be low since vegetables and fruits are almost absent in the diets of fishermen in this area. The high incidence of malnutrition of this particular community can mainly be attributed to two factors namely low purchasing power and non-availability of protective foods like leafy and other vegetables in the coastal areas. Lack of alternative sources of protein mainly results from low purchasing power. The major reason contributing to low purchasing power is uneven distribution of income over the year due to high seasonality of occupation. The fishermen are caught in a vicious circle of borrowing and paying back money which results in low savings and heavy debts. The most important step in the upliftment of the community is to increase the purchasing power by increasing the income from fisheries and introducing supplementary occupations, so that at least the requirements for protein and calories are met.

Another step in mitigating malnutrition will be increasing the production of animal protein and pro-

Fig. 6. Mobile tea shops managed by women are popular in the sea shore. Tea and snacks are served here.

tective foods in the coastal villages which will help in adding variety to the daily diets. Efforts may be intensified to find out suitable varieties of vegetables, especially leafy and also encourage poultry, piggery, duckery and dairy farming. Integrating these systems of farming with prawn and fish culture and utilization of the products and by-products will help the population to produce and consume more. An open question put to the women of the area showed that they in general had favourable attitude towards small family norm and some measure or other is being followed by them to limit the family size. Efforts may also be intensified to educate the fishermen on these lines so that doubts and superstitions prevalent among them are cleared.

UNUSUAL FISHERY FOR OIL SARDINES ALONG THE WEST SAURASHTRA COAST*

Introduction

The Indian oil sardine *Sardinella longiceps* Valenciennes is the most important pelagic fishery wealth of the southwest coast of India and occasionally contributes as much as quarter of our marine fish landings. Normally the landings fluctuate between 10–18% of the total marine fish catches. In the past several decades, the oil sardine fishery has shown remarkable fluctuations both spatially and seasonally. Since 1981-'82 oil sardine fishery has been showing a declining trend.

Year		Oil sardine landings
1981–'82	...	2,55,644 tonnes
1982–'83	...	2,01,625 „
1983–'84	...	1,80,081 „
1984–'85	...	1,65,537 „

Oil sardines though formed one of the major pelagic resources on the west coast, have never formed a fishery along the Saurashtra coast. They have been only once reported from east coast at Pondicherry during October to December, 1983. (Srinivasarengan and Chidambaram, *Mar. Fish. Infor. Serv. T & E Ser.*, **61**, 1985). Part of west Saurashtra coast (from Lat. 21°08′ N, Long. 70°14′E to Lat. 22°14′N, Long. 60°01′E) observed heavy landings of oil sardines for the first time during winter months of 1986–87, and the present report gives brief account of its fishery and biology.

*Prepared by R. K. Fotedar and Y. D. Savaria, Veraval Research Centre of CMFRI, Veraval.

Fishery

An estimated 352 tonnes of oil sardine were landed during mid November to February end. Peak landings were observed during 16th December to 31st January. Total period for oil sardine fishery can be conveniently divided into three distinct phases.

Phase 1. — 15th Nov. '86 to 15 Dec. '86
Phase 2. — 16th Dec. '86 to 31st Jan. '87
Phase 3. — 1st February '87 to 28th Feb. 87.

Only stray catches of oil sardine were landed during the first phase and therefore didn't contribute much to its fishery. Second phase marked the period of bumper catches particularly at Miani, Porbandar and Navibandar landing centres and also at Madhavpur to a certain extent. At Navibandar and Miani it formed more than 90% of fish landing during this phase. An estimated total of 332 tonnes of oil sardine were landed with a CPUE of 277.21 kg/boat. Third phase marked the declining of fishery and only 20 tonnes of oil sardines were reported with CPUE of 80–100 kg/boat from all the three major landing centres.

The oil sardine shoals were caught by cast nets at depths of 6 to 8 m and within 800 m range from the shore. During January, dense shoals, close to the shore were seen frequently by fishermen at Navibandar. These shoals were so dense that they changed the colour of water near the bank. The shoals were caught from

Fig. 5. 'Savala vada' and bread 'pakora' in a sea shore tea shop.

Nutritional status of pre-school children

The weight of 100 school children collected from two *balawadis* plotted against the standard UNICEF curve for Indian children is presented (Fig. 1). Nearly upto the age of three years the weights are found to be within the standards and then show a decline. Allergic bronchitis, asthma due to coastal climate, worm infestation, anaemia and dental caries are the health disorders commonly found among children. The coastal villages fall victim to gastro-enterites during monsoon due to lack of adequate sanitation.

Remarks

One of the major problems encountered in the development of fishermen community has been their low nutrient intake. Rajammal and Nirmala (*Proc. Seminar on Small-scale Fish. and Coastal Aquacul. in Inte. Rural Development*, CMFRI, 63-68, 1978) observed that there was conspicous gap in the vital data about the nutritional status of the fishing community. However, the information available on district averages show that the nutritional intake of low income groups in coastal Kerala and the anthrapometric measurements of fishermen children are found to be below the required standards. The present study on food consumption pattern and nutritional status of artisanal fishermen community in Vypeen also confirms the above findings.

The average nutrient intake for coastal Kerala (Rajammal and Nirmala, 1978 *(op. cit.)* and the rural Kerala (National Nutrition Monitoring Bureau, ICMR, Hyderabad, 1984) has indicated adequate intake of calcium and vitamin C coming from food stuffs like millets and vegetables. But in the present study the intake of vitamin C is found to be low since vegetables and fruits are almost absent in the diets of fishermen in this area. The high incidence of malnutrition of this particular community can mainly be attributed to two factors namely low purchasing power and non-availability of protective foods like leafy and other vegetables in the coastal areas. Lack of alternative sources of protein mainly results from low purchasing power. The major reason contributing to low purchasing power is uneven distribution of income over the year due to high seasonality of occupation. The fishermen are caught in a vicious circle of borrowing and paying back money which results in low savings and heavy debts. The most important step in the upliftment of the community is to increase the purchasing power by increasing the income from fisheries and introducing supplementary occupations, so that at least the requirements for protein and calories are met.

Another step in mitigating malnutrition will be increasing the production of animal protein and pro-

Fig. 6. Mobile tea shops managed by women are popular in the sea shore. Tea and snacks are served here.

Fig. 1. Harvested *Sardinella longiceps* at Navibandar.

Fig. 2. Salt curing in progress at Porbandar.

dugout canoes and fibre glass boats using cast nets of mesh size 21–27 mm.

Price of oil sardine fluctuated from 40 paise to Re. 1 per kg. They were dried in the sun after salting. After drying the price was fixed at Rs. 80–90 per 20 kg.

Biological observations

A total of 125 randomly selected specimens were studied for length-weight relationship, sex, maturity stages, feeding condition *etc.*. The fish caught by cast net ranged from 123 to 163 mm in total length with a modal length of 138 mm and average length of 137.6 mm. As the dominant size was around 138 mm, it can be presumed that the shoals belonged to 1 year class. The females constituted 96% of the total oil sardine population. All females studied were in immature stage. 98% of stomachs studied were empty and the rest were partially filled. Food items mainly consisted of green algae and diatoms indicating its surface feeding planktivorous nature. The length-weight relationship followed regression equation as

$$W = -30.8796 + 0.41699\,L$$

Where W and L are the weight and length of the fish respectively.

Discussion

Enquiries from local fishermen revealed that oil sardines were of frequent occurrence during winter months and were caught along with miscellaneous catch since last 8–10 years. In the past, oil sardines could not attract fishermen's attention because of their failure to fetch good price in the local market.

Probably, economic stress in the absence of other fishery during this winter season would have led the fishermen to catch this fish. They seem to be ignorant about the utility of oil sardines in oil industries. Their ignorance resulted in the use of oil sardine as poultry feed and fish meal.

According to fishermen oil sardines do show their presence during winter months every year along the west Saurashtra coast. These shoals can either be migrating from southwest coast of India or from the offshore. Several oceanographic as well as biological factors are responsible for oil sardine migrations. The wind driven surface currents of the west coast may be one of the main factors which influence the pelagic shoals of oil sardines (Murty, *Jour. mar. biol. Ass. India*, **16** (2): 520-522, 1974). The sea water temperature and salinity also appear to significantly influence the oil sardine migrations (Suresh & Reddy, *Indian J. Fish.*, **27** (1 & 2): 1-9, 1980). To understand the proper causes and course of migration, a well planned study along the Saurashtra coast is required.

ACETES SHRIMP FISHERY OF BOMBAY COAST*

Introduction

Acetes indicus a sergestid shrimp is estimated to contribute about 20% of the marine prawn landing along the Maharashtra coast and constitutes seasonal fishery. A closer examination of these organisms have shown that three other species namely, *A. johni*, *A. sibogae* and *A. japonicus* are involved in the fishery. *A. sibogae* was observed to form a fishery only in estuaries.

During 1985 and 1986, weekly visits were made to three fish landing centres namely Versova, Sassoon Dock and Trombay for collection of catch data and samples for biological studies. The number of specimens examined for stomach contents were 1,215 for *A. indicus*, 1,115 for *A. johni*, 1,125 for *A. sibogae* and 212 for *A. japonicus*.

Fig. 1. 'Machardani' a gear used at Thane creek for catching *Acetes*.

The fishery

The fishery for *Acetes* is almost exclusively by bag nets ('Dol' and 'Bokshi'). 'Dol' operations are upto a depth of 40 m while 'Bokshi' nets are employed in shallower regions, mostly in creeks. A special net called 'Machardani' (Fig. 1) of mosquito net is employed for the capture of *A. sibogae* along the Thane Creek zone at 3–5 m depth. *Acetes* spp. are also caught in small quantities in the trawlers having very small cod-end mesh of about 2 cm. The fishery for *Acetes* is throughout the year at Sassoon Dock. At Versova 'Dol' operations are suspended during monsoon months. At Trombay 'Machardani' nets are not employed during this period. The average monthly landings at different centres are given in Table 1.

Table 1. *Average monthly landings of* Acetes *spp. at Versova, Sassoon Dock and Trombay* 1985–'86

Months	Place & catch (in t.)		
	Versova	S. Dock	Trombay
January	88	8	19
February	62	12	20
March	112	24	12
April	180	20	18
May	220	15	25
June	—	6	—
July	—	10	—
August	—	14	20
September	400	10	20
October	302	20	18
November	205	30	18
December	93	18	22

Table 2. *Percentage composition of* Acetes *spp. at the three centres*

Species	Versova	S. Dock	Trombay
A. indicus	49	55	2
A. johni	49	43	—
A. japonicus	2	2	3
A. sibogae	—	—	95
Total	100	100	100

It can be seen from Table 1 that landings of *Acetes* show an increasing trend just after the monsoon months at all the three centres. Another peak season is observed to be prior to the start of the monsoons. The major species that contributed to the fishery showed considerable variations in percentage. *A. sibogae* was not represented either at Versova or at Sassoon Dock. Similarly *A. johni* was not present in the 'Machardani' landings at Trombay. The predominance of *A. sibogae* at Trombay may be due to the fact that this species prefers an estuarine environment and sheltered area

*Prepared by M. Aravindakshan and J. P. Karbhari, Bombay Research Centre of CMFRI, Bombay.

of the creek (Omori, *Bull. Tokyo Res. Inst.*, 7: 1-87, 1975). *A. johni* was not noticed in Trombay landings indicating its preference for a marine habitat.

The percentage composition of all the four species is given in Table 2. It can be seen from the Table that *A. indicus* and *A. johni* have similar percentage composition, though the percentage is a little less at Sassoon Dock. At Trombay *A. sibogae* is the dominant species, the contribution of the other species being very small.

Biological studies

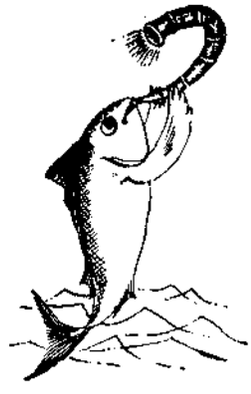
A. indicus measured 13–40 mm, *A. johni* 15–28 mm, *A. japonicus* 12–25 mm and *A. sibogae* 9–33 mm. *A. sibogae* at Trombay was of smaller size, ranging from 9–22 mm mostly, though the species is known to grow upto 35 mm. This may be due to very small size of the mesh used in the fishery.

In all the four species, common items of food comprising copepods and appendages of decapod crustaceans (60%), foraminiferan and molluscan shells and shell fragments (10%), sand grains (10%) and debris (20%) were found.

Maturing females of *A. indicus* were noticed at Versova in January and of *A. johni* in March. Females of *A. sibogae* with maturing ovaries were observed in April–May indicating possible breeding during the monsoon months. In all the three species a minimum size of 13 mm was recorded for females with ripening ovary.

General considerations

According to Omori (1975) (*op. cit.*) the total landings of *Acetes* spp. in the world amounts to 1,30,000 tonnes on an average. This figure is considered to be the minimum by the authors as many countries do not have landing figures for *Acetes*. In India the average catch is estimated at 14,500 tonnes, constituting 11.2% of total world *Acetes* production. Major countries where a fishery for *Acetes* exists are China, India, South Korea and Thailand with China ranking first. The average life span of *Acetes* is less than six months and adult dies soon after spawning. In India only a small portion of the catch is consumed in fresh condition and the rest is mostly sun-dried. There is good demand for fresh *Acetes* in Japan where it can easily fetch a price of 300-800 Yen/kg. Considering the vast resource potential available in India, it is possible to earn considerable foreign exchange through export to countries like Japan in fresh condition.



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