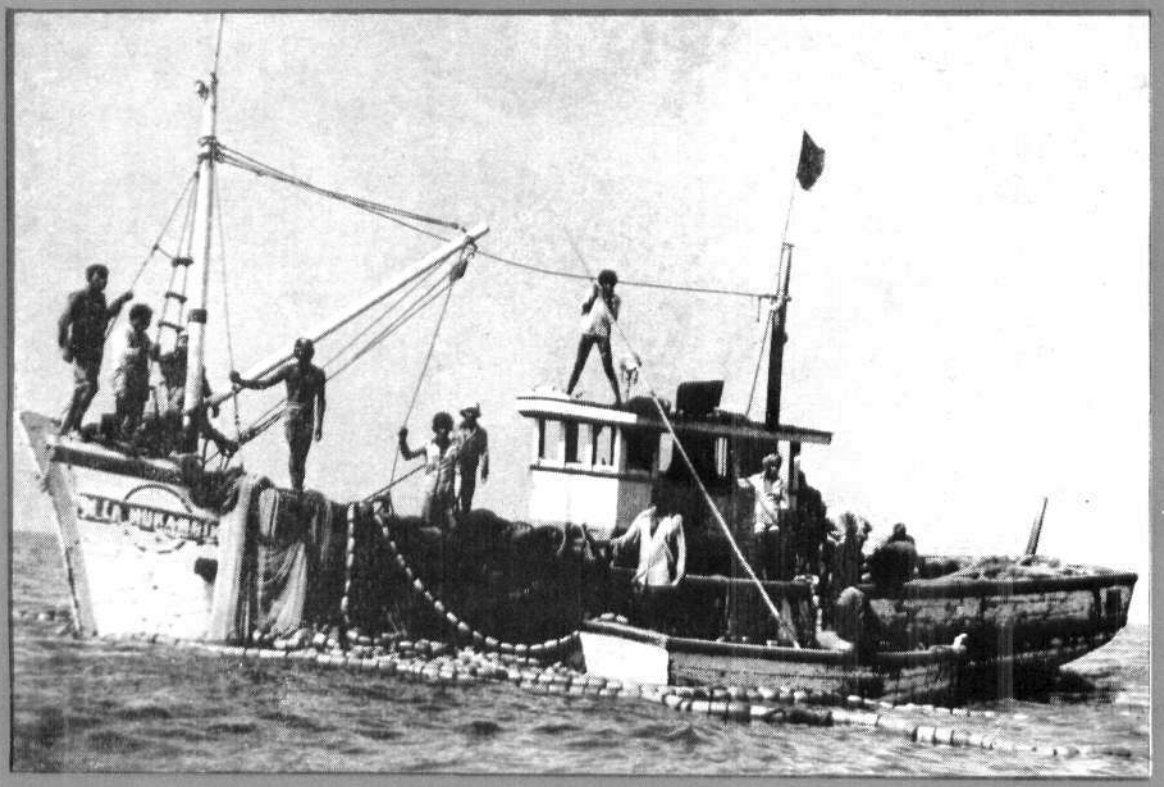
MARINE FISHERIES INFORMATION SERVICE



No. 79
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Technical and Extension Series

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
COCHIN, INDIA

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

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. 79: 1988

CONTENTS

Front cover photo:

A purse seiner fishing off Mangalore.

Back cover photo:

Malpe Fisheries Harbour, Malpe (South Kanara).

PREFACE

Central Marine Fisheries Research Institute, Cochin and its Research Centres at Veraval, Bombay, Karwar, Mangalore, Calicut, Vizhinjam, Tuticorin, Mandapam, Madras, Kakinada, Visakhapatnam and Minicoy conduct short-term and long-term multidisciplinary researches on the marine capture and culture fisheries of the country. This is to provide research support for the rational exploitation, conservation and management of the marine fishery resources and for stepping up fish production from the seas around the country.

Often enquiries are received from industrialists and entrepreneurs regarding the seasonal availability, abundance, size, spawning seasons, vulnerability to various gears *etc.* of many commercially important species of marine fishes. Currently such information are either improperly documented or not readily available to the end users; the fishermen, entrepreneurs and government departments. In order to fill up this lacuna in our knowledge, it is planned to bring out a series of fish calendars which would contain vital fishery information such as annual average catch of each fish group and its percentage in total fish catch, major fishing methods and the percentage contributions of each species in the gears, availability during different season, vulnerability to various gears, length range in the commercial fishery, depth of distribution, size at first maturity, spawning seasons *etc.* of almost all commercially important species of fishes of any given centre. Gear-wise seasonal abundance of families is shown as kite diagrams based on a five year data for the 1981-'85 period and the species composition in each gear is given in histograms.

It is to be noted that all the fish species landed at any identified centre may not find a place in the fish calendars due to lack of full and detailed information, but attempts have been made to include as many commercially important species as possible. The families are not arranged in the taxonomic order. Instead, they are listed in the alphabetic order to make it easy for the end user.

The present issue for the Mangalore Research Centre is the first in the series of fish calendars from the 12 research centres of the Institute. The calendars for the other centres will be published in the forthcoming issues of Marine Fisheries Information Service, Technical and Extension Series.

Several scientists and technical staff of the Institute have put in a lot of effort in the preparation of these calendars. I wish to record here my appreciation to all of them.

P. S. B. R. JAMES
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Central Marine Fisheries
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Cochin - 682 031.

MARINE FISH CALENDAR

1. MANGALORE*

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Mangalore Research Centre of CMFRI, Mangalore

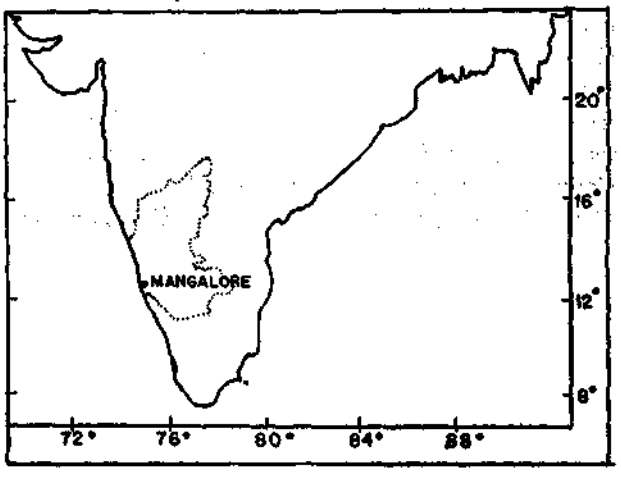
Introduction

Mangalore, one of the major fish landing centres of Karnataka, produces annually 43,559 t of fish forming about 33% of the state's marine fish landings. Prior to early seventies the principal gears employed in the fishery were shrimp trawls and indigenous gears *viz.*, 'Rampani', small shore seines, cast nets and gill nets. In the late seventies, the fishing pattern underwent a major change with the introduction of purse seine, augmenting fleet strength of shrimp trawls and mechanisation of gill net crafts. Of the present average annual production (1981–'85) at Mangalore, the purse seiners account for the bulk of the catch, with 33,850 t which forms 78% of the total all fish catch followed by shrimp trawlers with 9,302 t (21%) and gill netters 407 t (1%).

Fishing operations are carried out within 50 m depth between Kaup in the north (45 km) and Kasaragod in the south (40 km). During the peak season (Sep.–Jan.) fishing by purse seines for major pelagics is conducted around 10–20 m depth with extension upto 35 m depth in other months. The area within 15 km from the shore, forms the trawling ground for demersal fishes and crustaceans. The area between 15 and 45 m depth provides the fishing ground for drift gill netters for larger pelagics.

The fishing season commences in September (at the end of the southwest monsoon) and extends upto the end of May (the beginning of southwest monsoon). The peak period of production by purse seiners is from September–December when about 76% of the annual catch by this gear is obtained. The average monthly catch for the above period is 6,462 t. The peak month is October contributing 8,760 t which is equal to 26% of the annual catch. The catch slides down from December and the average monthly catch during the lean season (January–May) is 1,588 t. For trawlers, best season is during January–April which produces 72% of the annual trawl catch with a monthly average catch of 2,413 t. Maximum production takes place in March forming 30% (2,862 t) of the annual catch. Decline in production starts from May touching the lowest in September–November and an upward trend is seen from December onwards. Drift gill netters have productive period in September–January with an average monthly catch of 76 t. About 93% of the annual drift net catch is realised during this period. The highest landings are in October and November with an estimated catch of 123 and 125 t respectively. The landings decline from February to May; the monthly average catch during this lean season being 7 t. The period from June to August is a closed season when no fishing is done.

By and large, the fish landings in the Mangalore region are dominated by pelagics forming 75%. Demersal varieties contribute 25%. The predominant species/



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

groups among the pelagic component are oil sardine (forming 44.3% of the total marine fish catch), mackerel (10.5%), anchovies (8.4%), carangids (4.0%), tuna (2.3%), lesser sardines (2.0%), cat fishes (5.3%), threadfin breams (2.3%), soles (2.0%), lizard fishes (1.0%) and silver bellies (1.0%) in the demersal component.

For the preparation of this 'Fish Calendar', fish landing data of purse seiners and drift gill netters collected by this Research Centre from 1981 to '85 and trawls from 1986 to '87 have been utilised for gear-wise species composition and seasonal abundance studies. However, in the case of trawls, the annual fish landing data for the Mangalore Centre for the periods 1983–'84 and 1984–'85 have been considered for annual average catch studies of individual species/group.

It should, however, be stressed here that the account on fish calendar outlined here is not exhaustive, and it needs to be updated as and when more information are available especially with regard to demersal fisheries.

CARANGIDAE

Popular English Name	:	Trevallies/Horse mackerels/Scads	
Vernacular Name (Kannada)	:	'Bathi'/'Thakatte'/ 'Kodande'/'Tidema'/ 'Melagu meenu'/ 'Palai meenu'	
Annual average catch	:	1,745.3 t.	
Gear wise annual average catch	:	Purse seine	: 1,210.48 t
		Trawl net	: 529.48 t
		Drift gill net	: 5.32 t
Fishing methods and their contribution in total catch	:	Purse seine	: 3.6%
		Trawl net	: 5.7%
		Drift gill net	: 1.3%

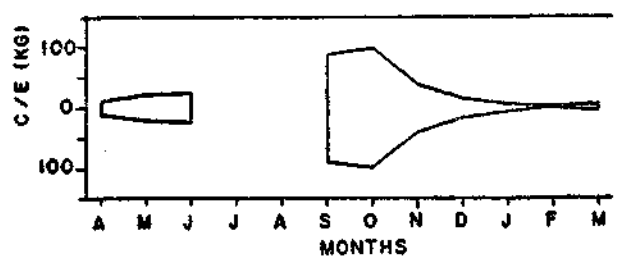


Fig. 1. Seasonal abundance of carangids in the purse seining grounds off Mangalore.

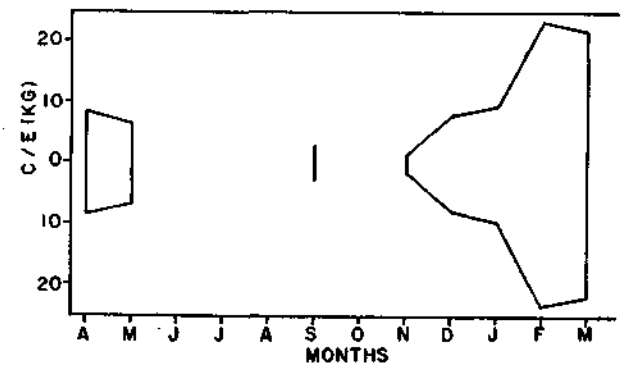


Fig. 2. Seasonal abundance of carangids in the trawling grounds off Mangalore.

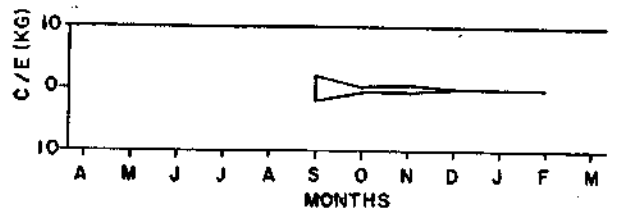


Fig. 3. Seasonal abundance of carangids in the drift gill netting grounds off Mangalore.

Fig. 4. *Caranx kalla.*

Scientific Name	:	*Caranx kalla*
Vernacular Name	:	'Bathi'
Gear	:	Purse seine/Trawl net/Drift gill net
Peak period of occurrence	:	Sep.–Nov./Jan. –Mar.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	90–165 mm
Size at first maturity	:	124 mm
Spawning season	:	Dec.–Jan./May–Jun.

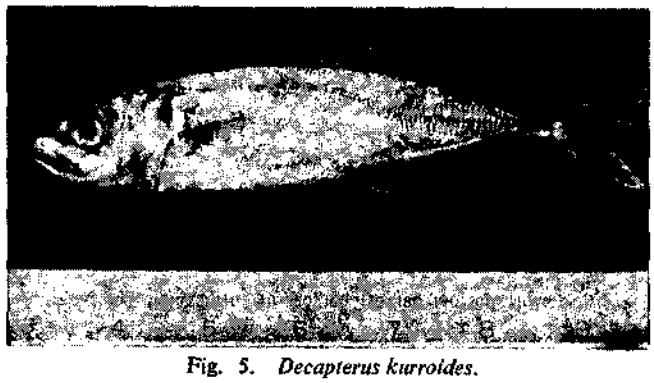


Fig. 5. *Decapterus kurroides.*

Scientific Name	:	*Decapterus kurroides*
Vernacular Name	:	'Tidema'
Gear	:	Purse seine/Trawl net
Peak period of occurrence	:	Sep.–Nov./Jan.–Mar.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

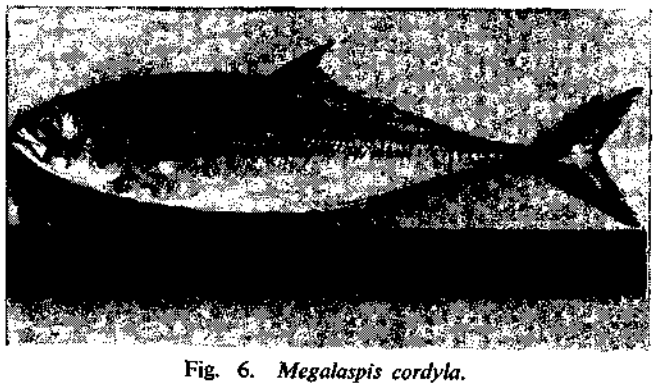


Fig. 6. *Megalaspis cordyla.*

Scientific Name	:	*Megalaspis cordyla*
Vernacular Name	:	'Kodande'
Gear	:	Purse seine/Drift gill net
Peak period of occurrence	:	September–November
Depth of occurrence	:	15–45 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

Scientific Name	:	*Atule mate*
Vernacular Name	:	'Thakatte'
Gear	:	Trawl net
Peak period of occurrence	:	January–March
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—

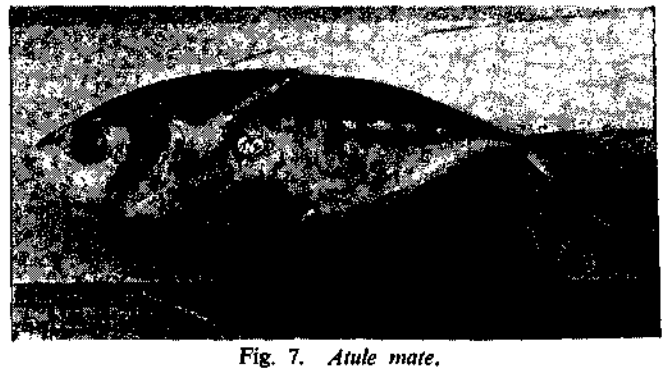


Fig. 7. *Atule mate.*

Size at first maturity	:	—
Spawning season	:	—

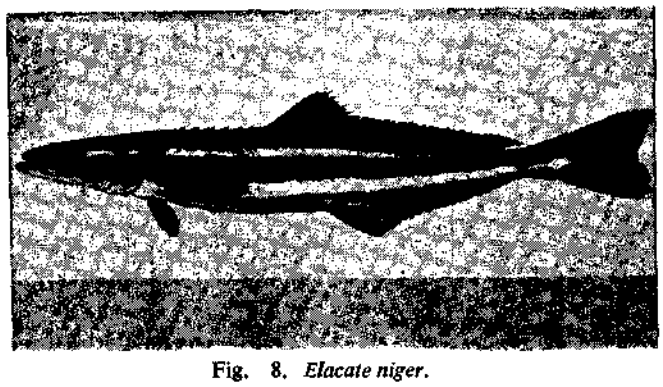


Fig. 8. *Elacate niger.*

Scientific Name	:	*Elacate niger*
Vernacular Name	:	'Melagu meenu'
Gear	:	Drift gill net
Peak period of occurrence	:	October–November
Depth of occurrence	:	18–45 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

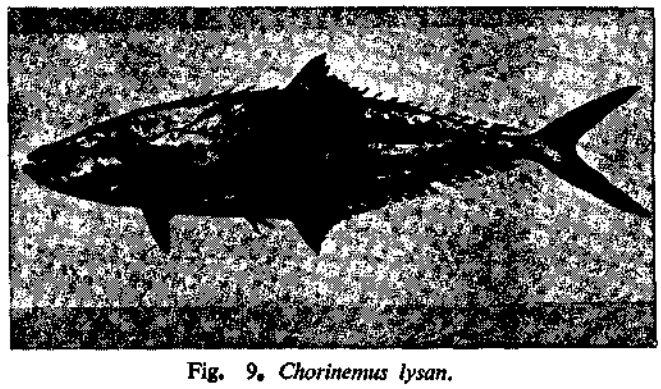


Fig. 9. *Chorinemus lysan.*

Scientific Name	:	*Chorinemus lysan*
Vernacular Name	:	'Palai meenu'
Gear	:	Drift gill net
Peak period of occurrence	:	October–November
Depth of occurrence	:	18–45 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

Carcharhinidae and Sphyrnidae

Popular English Name	:	Sharks and Hammer-head sharks		
Vernacular Name (Kannada)	:	'Thate'/'Kebi thate'		
Annual average catch	:	119.5 t		
Gear wise annual average catch	:	Purse seine	:	1.88 t
		Trawl net	:	48.79 t
		Drift gill net	:	68.84 t
Fishing methods and their contribution in total catch	:	Drift gill net	:	16.9%
		Trawl net	:	0.5%
		Purse seine	:	0.1%

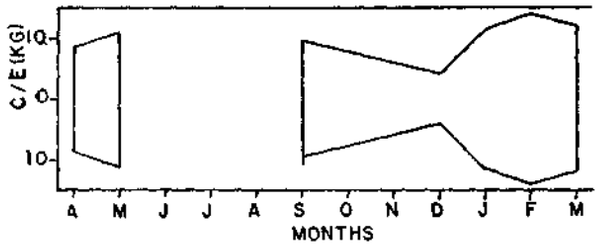


Fig. 10. Seasonal abundance of sharks in the drift gill netting grounds off Mangalore.

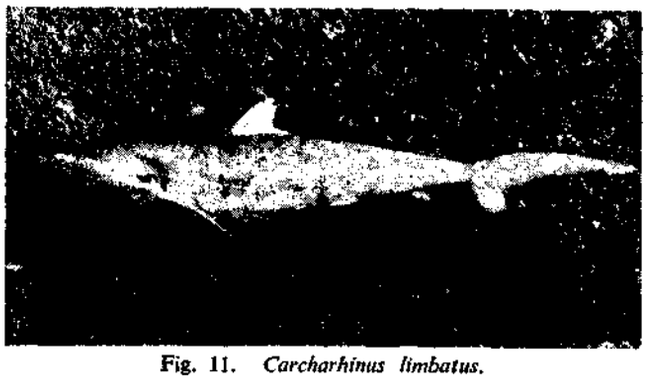


Fig. 11. *Carcharhinus limbatus.*

Scientific Name	:	*Carcharhinus limbatus*
Vernacular Name	:	'Kappukedi'/'Thate'
Gear	:	Purse seine/Drift gill net
Peak period of occurrence	:	September-February
Depth of occurrence	:	15-35 m
Length range in commercial fishery	:	420–600 mm
Size at first maturity	:	610 mm
Spawning season	:	—

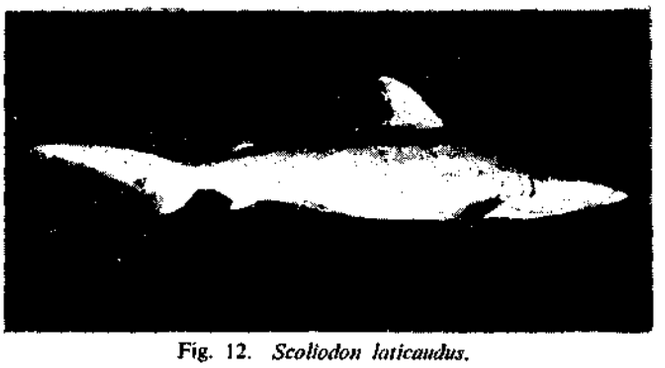


Fig. 12. *Scoliodon laticaudus.*

Scientific Name	:	*Scoliodon laticaudus*
Vernacular Name	:	'Thate'
Gear	:	Trawl net/Drift gill net
Peak period of occurrence	:	October–March
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	260–320 mm
Size at first maturity	:	310 mm
Spawning season	:	Mar. and Sep.-Dec.

Fig. 13. *Rhizoprionodon oligolinx.*

Scientific Name	:	*Rhizoprionodon oligolinx*
Vernacular Name	:	'Thate'
Gear	:	Drift gill net/Trawl net
Peak period of occurrence	:	October–March
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	240–450 mm
Size at first maturity	:	—
Spawning season	:	—

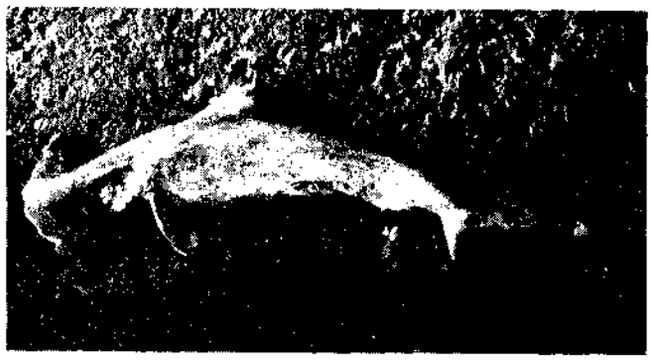


Fig. 14. *Sphyrna lewini.*

Scientific Name	:	*Sphyrna lewini*
Vernacular Name	:	'Kebi thate'
Gear	:	Drift gill net
Peak period of occurrence	:	October–February
Depth of occurrence	:	18–35 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

CHIROCENTRIDAE

Popular English Name	:	Wolf herrings	
Vernacular Name (Kannada)	:	'Karli'	
Annual average catch	:	14.8 t	
Gear wise annual average catch	:	Trawl net	: 5.80 t
		Drift gill net	: 6.02 t
Fishing methods and their contribution in total catch	:	Drift gill net	: 1.5%
		Trawl net	: 0.1%

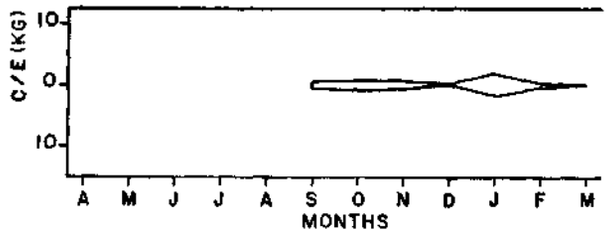


Fig. 15. Seasonal abundance of Wolf-herrings in the drift gill netting grounds off Mangalore.

Scientific Name	:	*Chirocentrus nudus*
Vernacular Name	:	'Karli'
Gear	:	Drift net/Trawl net
Peak period of occurrence	:	Jan.–Feb. and Oct.–Nov.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

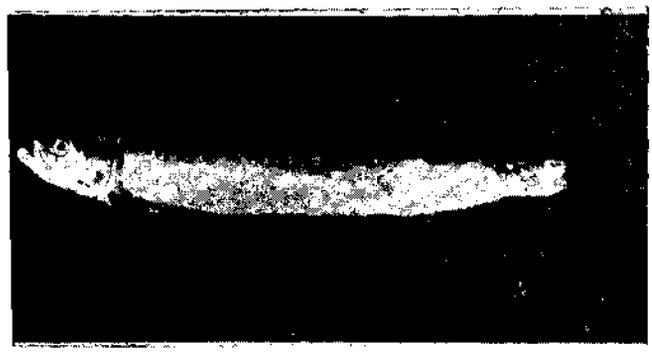


Fig. 16. *Chirocentrus nudus.*

CLUPEIDAE

Popular English Name	:	Sardines/Shads	
Vernacular Name (Kannada)	:	'Buthai'/'Erabai'/ 'Seriande'/'Swadi'	
Annual average catch	:	20,385.0 t	
Gear wise annual average catch	:	Purse seine	: 20,337.64 t
		Trawl net	: 47.36 t
Fishing methods and their contribution in total catch	:	Purse seine	: 60.1%
		Trawl net	: 0.5%

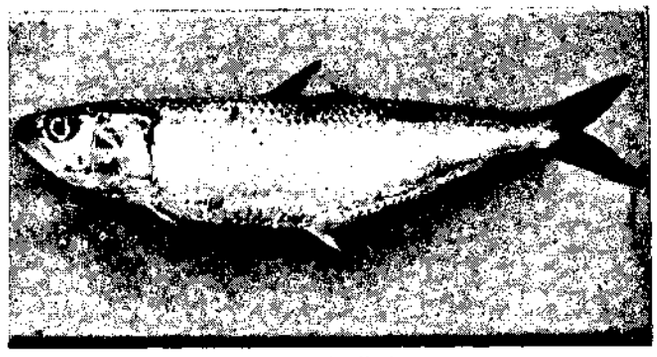


Fig. 17. *Sardinella longiceps.*

Scientific Name	:	*Sardinella longiceps*
Vernacular Name	:	'Buthai'
Gear	:	Purse seine
Peak period of occurrence	:	September–February
Depth of occurrence	:	20–35 m
Length range in commercial fishery	:	100–160 mm
Size at first maturity	:	150 mm
Spawning season	:	June–August

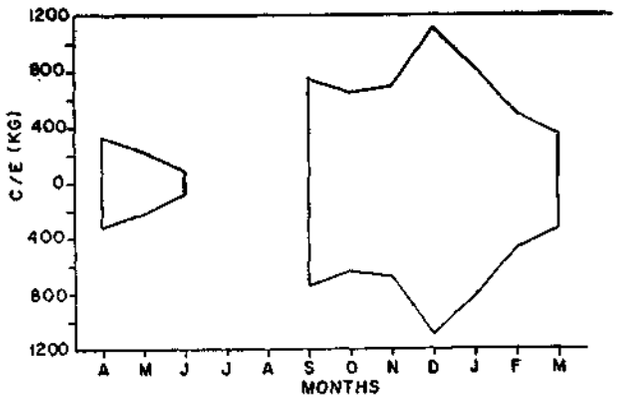


Fig. 18. Seasonal abundance of oil sardine in the purse seining grounds off Mangalore.

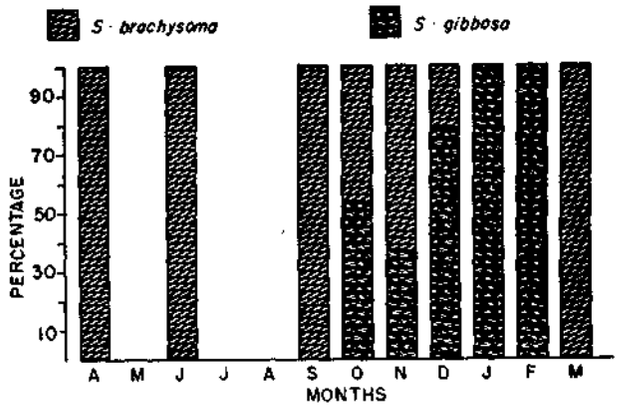


Fig. 21. Month-wise species composition of lesser sardines landed by purse seiners.

Fig. 19. *Sardinella gibbosa.*

Fig. 22. *Dussumieria acuta.*

Scientific Name	:	*Sardinella gibbosa*
Vernacular Name	:	'Erabai'
Gear	:	Purse seine
Peak period of occurrence	:	October–March
Depth of occurrence	:	20–35 m
Length range in commercial fishery	:	145–170 mm
Size at first maturity	:	150 mm
Spawning season	:	October–March

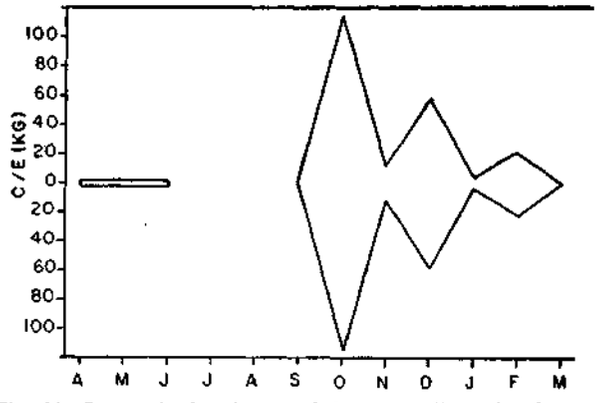


Fig. 20. Seasonal abundance of lesser sardines in the purse seining grounds off Mangalore.

Scientific Name	:	*Dussumieria acuta*
Vernacular Name	:	'Seriande'
Gear	:	Purse seine
Peak period of occurrence	:	September–December
Depth of occurrence	:	20–35 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

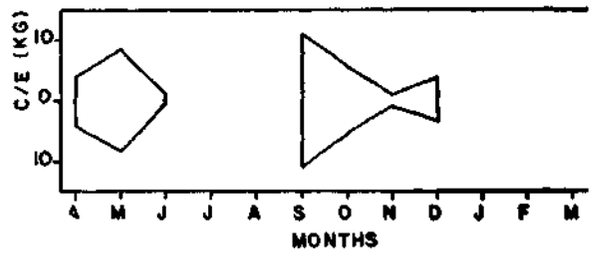


Fig. 23. Seasonal abundance of rainbow sardines in the purse seining grounds off Mangalore.

Scientific Name	:	*Ilisha melastoma*
Vernacular Name	:	'Swadi maikannu'
Gear	:	Trawl net
Peak period of occurrence	:	February–March

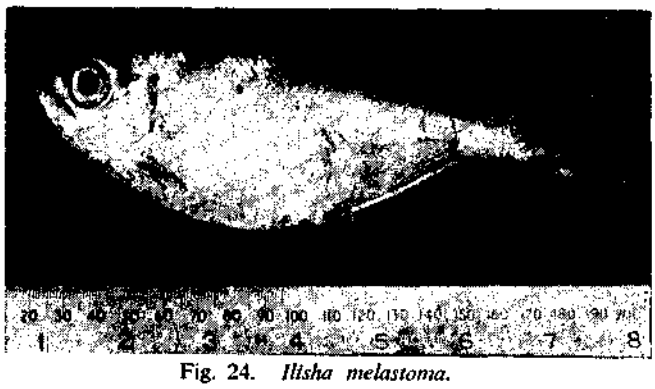


Fig. 24. *Ilisha melastoma.*

Depth of occurrence	:	4-50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

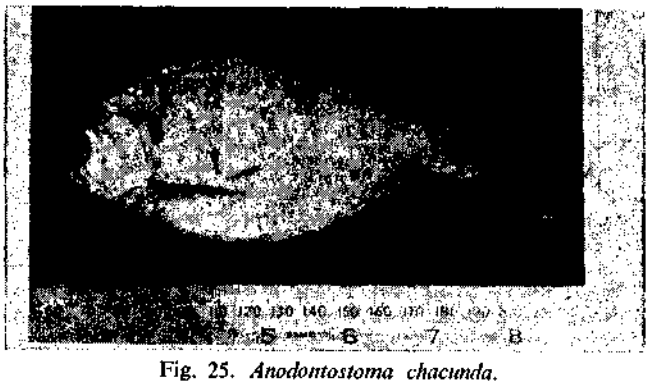


Fig. 25. *Anodontostoma chacunda.*

Scientific Name	:	*Anodontostoma chacunda*
Vernacular Name	:	'Kurandodi swadi'
Gear	:	Trawl net
Peak period of occurrence	:	February-March
Depth of occurrence	:	4-50 m
Length range in commercial fishery	:	145-179 mm
Size at first maturity	:	—
Spawning season	:	November-March

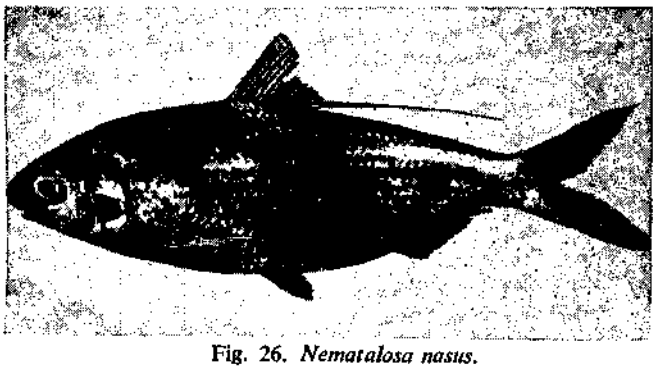


Fig. 26. *Nematalosa nasus.*

Scientific Name	:	*Nematalosa nasus*
Vernacular Name	:	'Hole swadi'
Gear	:	Trawl net
Peak period of occurrence	:	February-March
Depth of occurrence	:	4-50 m
Length range in commercial fishery	:	103-320 mm
Size at first maturity	:	—
Spawning season	:	October-November

CYNOGLOSSIDAE

Popular English Name	:	Tongue soles	
Vernacular Name (Kannada)	:	'Nangu'	
Annual average catch	:	839 t	
Gear wise annual average catch	:	Purse seine :	8.20 t
		Trawl net :	830.84 t
Fishing methods and their contribution in total catch	:	Trawl net :	8.9%
		Purse seine :	0.1%

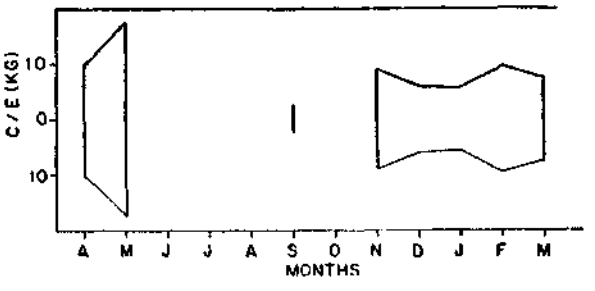


Fig. 27. Seasonal abundance of tongue soles in the trawling grounds off Mangalore.

Fig. 28. *Cynoglossus bilineatus.*

Scientific Name	:	*Cynoglossus bilineatus*
Vernacular Name	:	'Nangu'
Gear	:	Purse seine
Peak period of occurrence	:	September

Depth of occurrence : 15–35 m
Length range in commercial fishery : —
Size at first maturity : —
Spawning season : —

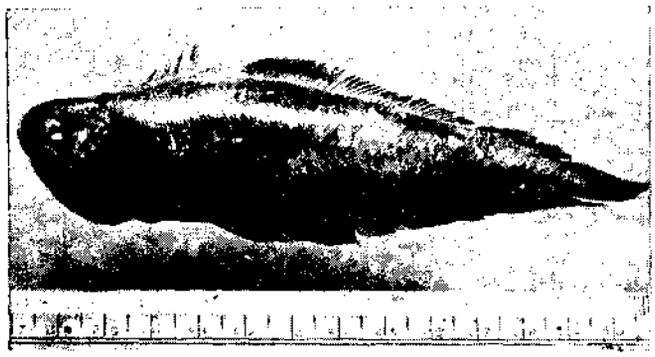


Fig. 29. *Cynoglossus macrostomus.*

Scientific Name : *Cynoglossus macrostomus*
Vernacular Name : 'Nangu'
Gear : Trawl net/Purse seine
Peak period of occurrence : August–September
Depth of occurrence : 4–50 m
Length range in commercial fishery : 100–130 mm
Size at first maturity : 110 mm
Spawning season : October–January

ENGRAULIDAE

Popular English Name : Anchovies
Vernacular Name (Kannada) : 'Kollatharu'/'Manangu'
Annual average catch : 3,792.7 t
Gear wise annual average catch : Purse seine: 3,661.96 t
Trawl net : 130.87 t
Fishing methods and their contribution in total catch : Purse seine : 10.8%
Trawl net : 1.4%

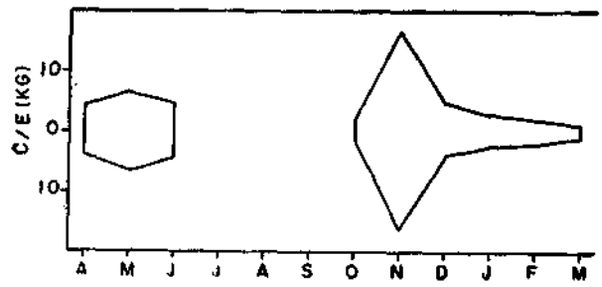


Fig. 30. Seasonal abundance of anchovies in the trawling grounds off Mangalore.

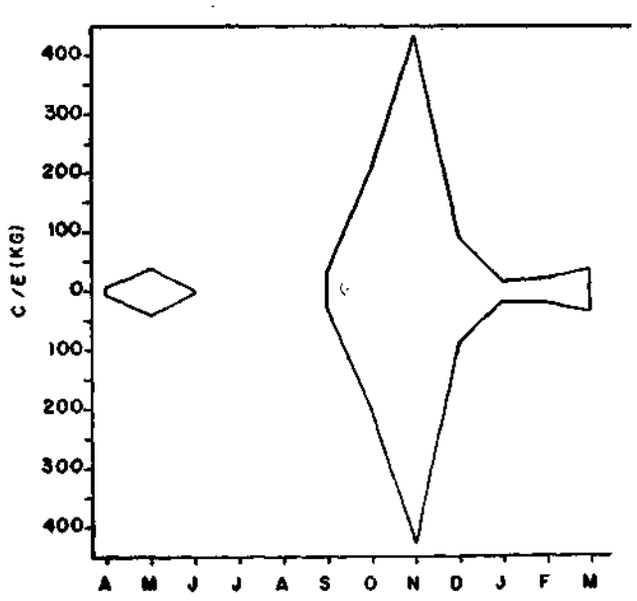


Fig. 31. Seasonal abundance of anchovies in the purse seining grounds off Mangalore.

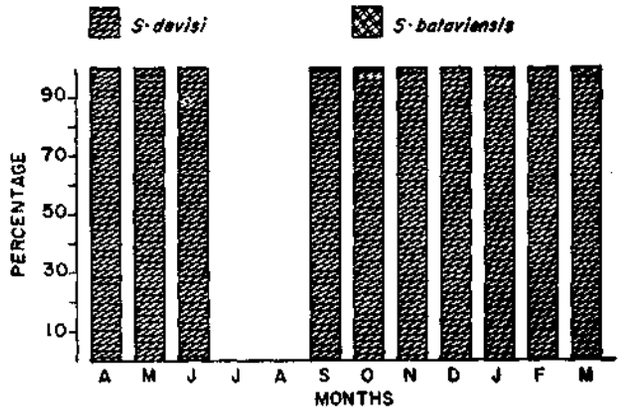


Fig. 32. Month-wise species composition of anchovies landed by purse seiners.

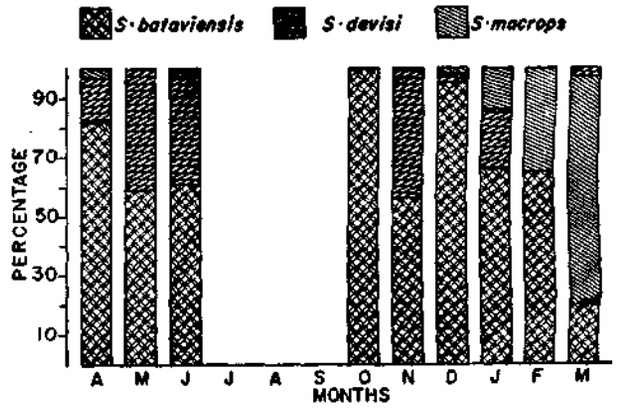


Fig. 33. Month-wise species composition of anchovies landed by shrimp trawlers.

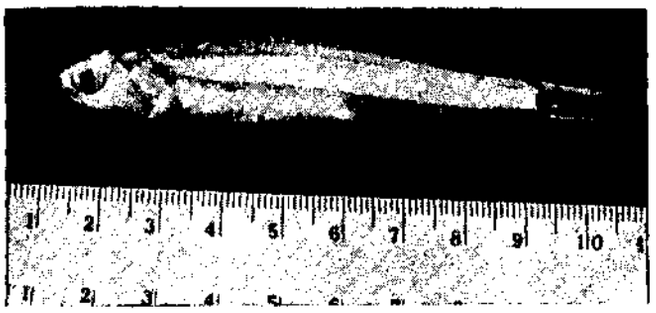


Fig. 34. *Stolephorus devisi.*

Scientific Name	:	*Stolephorus devisi*
Vernacular Name	:	'Kollatharu'
Gear	:	Purse seine/Trawl net
Peak period of occurrence	:	Oct.–Dec. and Apr.–May
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	70–94 mm
Size at first maturity	:	75 mm
Spawning season	:	Apr.–May and Oct.–Dec.

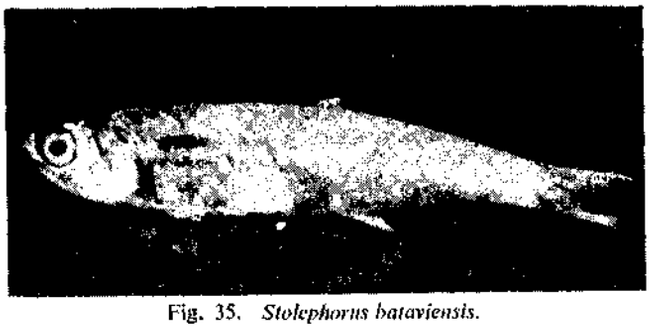


Fig. 35. *Stolephorus bataviensis.*

Scientific Name	:	*Stolephorus bataviensis*
Vernacular Name	:	'Kollatharu'
Gear	:	Purse seine/Trawl net
Peak period of occurrence	:	November–December
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	79–95 mm
Size at first maturity	:	85 mm
Spawning season	:	Apr.–May and Oct.–Dec.

Fig. 36. *Stolephorus macrops.*

Scientific Name	:	*Stolephorus macrops*
Vernacular Name	:	'Kollatharu'
Gear	:	Purse seine/Trawl net
Peak period of occurrence	:	Feb.–Mar. and Nov.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	65–74 mm
Size at first maturity	:	70 mm
Spawning season	:	—

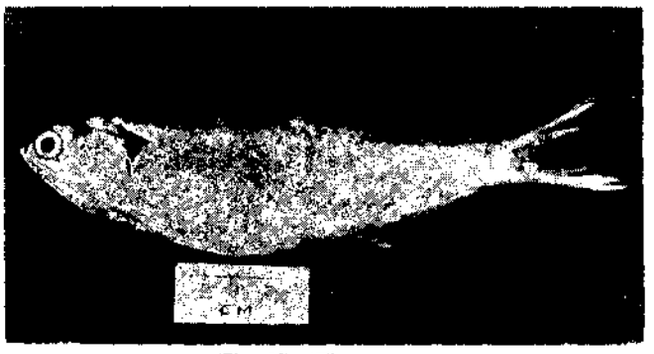


Fig. 37. *Thryssa mystax.*

Scientific Name	:	*Thryssa mystax*
Vernacular Name	:	'Manangu'
Gear	:	Purse seine/Trawl net
Peak period of occurrence	:	Sept.–Oct. and Jan. Mar.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—
Size at first maturity	:	140 mm
Spawning season	:	Jan.–Mar. and Jun.–Jul.

LACTARIIDAE

Popular English Name	:	Big-jawed jumper
Vernacular Name (Kannada)	:	'Ade meenu'
Annual average catch	:	157.8 t
Gear wise annual average catch	:	Trawl net : 157.8 t
Fishing methods and their contribution in total catch	:	Trawl net : 1.7%

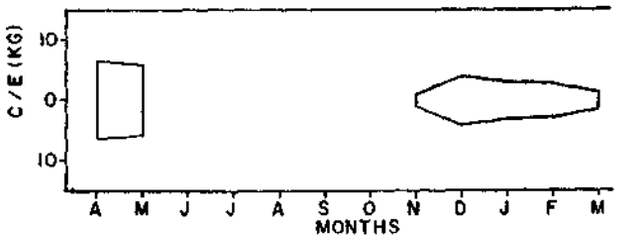


Fig. 38. Seasonal abundance of big-jawed jumper in the trawling grounds off Mangalore.

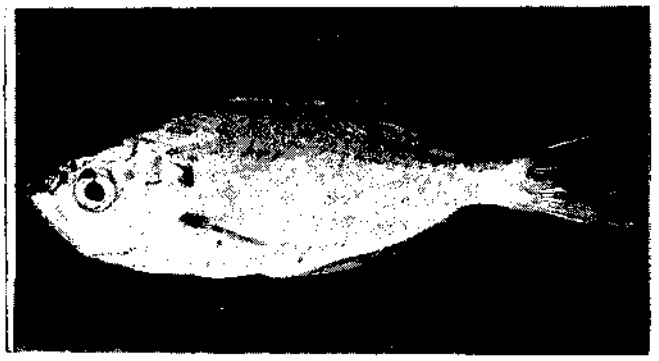


Fig. 39. *Lactarius lactarius.*

Scientific Name	:	*Lactarius lactarius*
Vernacular Name	:	'Ade meenu'
Gear	:	Trawl net
Peak period of occurrence	:	January-May
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—
Size at first maturity	:	167 mm
Spawning season	:	February–April

LEIOGNATHIDAE

Popular English Name	:	Silver bellies	
Vernacular Name (Kannada)	:	'Kurchi'	
Annual average catch	:	442.8 t	
Gear wise annual average catch	:	Purse seine	: 322.82 t
		Trawl net	: 120.01 t
Fishing methods and their contribution in total catch	:	Purse seine	: 1.0%
		Trawl net	: 1.3%

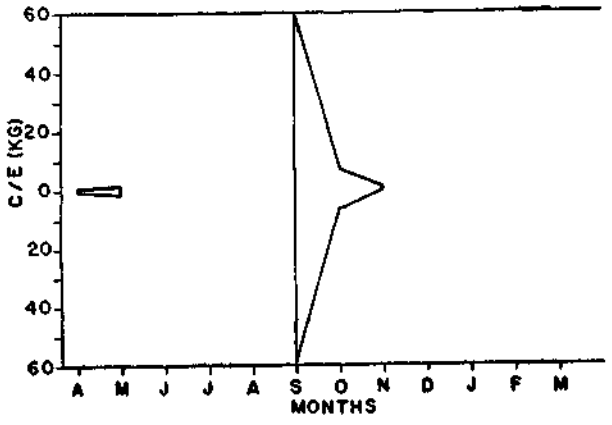


Fig. 40. Seasonal abundance of silver bellies in the purse seining grounds off Mangalore.

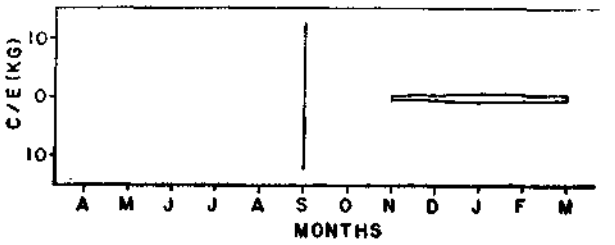


Fig. 41. Seasonal abundance of silver bellies in the trawling grounds off Mangalore.

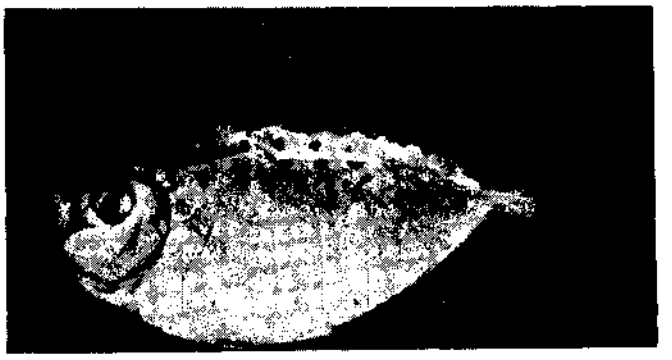


Fig. 42. *Secutor insidiator.*

Scientific Name	:	*Secutor insidiator*
Vernacular Name	:	'Kurchi'
Gear	:	Purse seine
Peak period of occurrence	:	September
Depth of occurrence	:	15–35 m
Length range in commercial fishery	:	—
Size at first maturity	:	81 mm
Spawning season	:	Jul.–Nov. and Mar. –Apr.

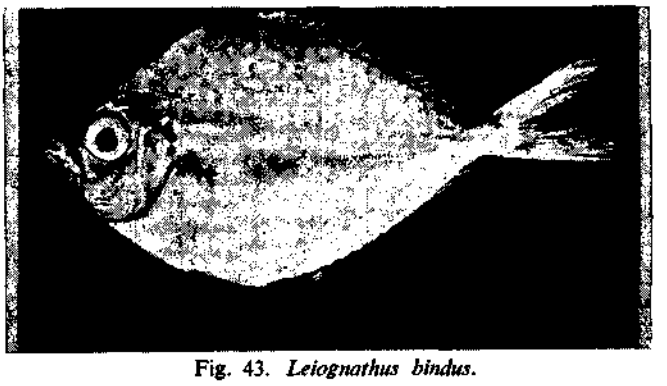


Fig. 43. *Leiognathus bindus.*

Scientific Name	:	*Leiognathus bindus*
Vernacular Name	:	'Kurchi'
Gear	:	Purse seine
Peak period of occurrence	:	September
Depth of occurrence	:	15–35 m
Length range in commercial fishery	:	—

Size at first maturity : 85 mm
Spawning season : December–February

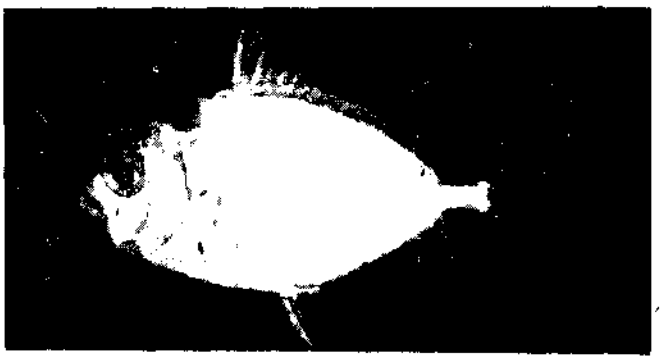


Fig. 44. *Leiognathus brevirostris.*

Scientific Name : *Leiognathus brevirostris*
Vernacular Name : 'Kurchi'
Gear : Purse seine
Peak period of occurrence : September
Depth of occurrence : 15–35 m
Length range in commercial fishery : —
Size at first maturity : —
Spawning season : —

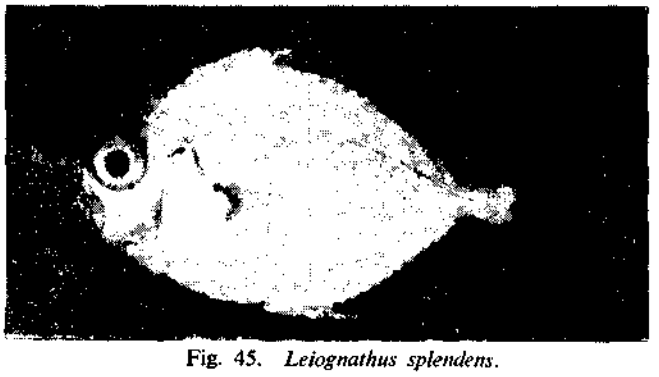


Fig. 45. *Leiognathus splendens.*

Scientific Name : *Leiognathus splendens*
Vernacular Name : 'Kurchi'
Gear : Purse seine
Peak period of occurrence : September
Depth of occurrence : 15-35 m
Length range in commercial fishery : —
Size at first maturity : —
Spawning season : —

Fig. 46. *Leiognathus equulus.*

Scientific Name : *Leiognathus equulus*
Vernacular Name : 'Kurchi'
Gear : Trawl net
Peak period of occurrence : Sep. and Jan.–Feb.
Depth of occurrence : 4–50 m
Length range in commercial fishery : —
Size at first maturity : —
Spawning season : —

MULLIDAE

Popular English Name : Goat fishes
Vernacular Name (Kannada) : 'Purli'
Annual average catch : 23.7 t
Gear wise annual average catch : Trawl net : 23.72 t
Fishing methods and their contribution in total catch : Trawl net : 0.3%

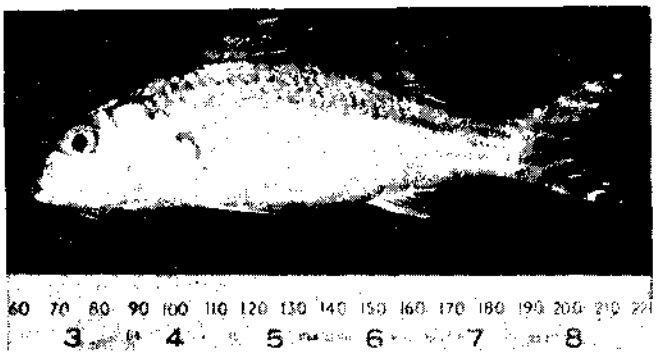


Fig. 47. *Upeneus taeniopterus.*

Scientific Name : *Upeneus taeniopterus*
Vernacular Name : 'Purli'
Gear : Trawl net
Peak period of occurrence : February–March
Depth of occurrence : 4–50 m
Length range in commercial fishery : —

Size at first maturity : —
Spawning season : —

NEMIPTERIDAE

Popular English Name : Threadfin breams
Vernacular Name (Kannada) : 'Madumagalu meenu'
Annual average catch : 999.1 t
Gear wise annual average catch : Trawl net : 999.1 t
Fishing methods and their contribution in total catch : Trawl net : 10.7%

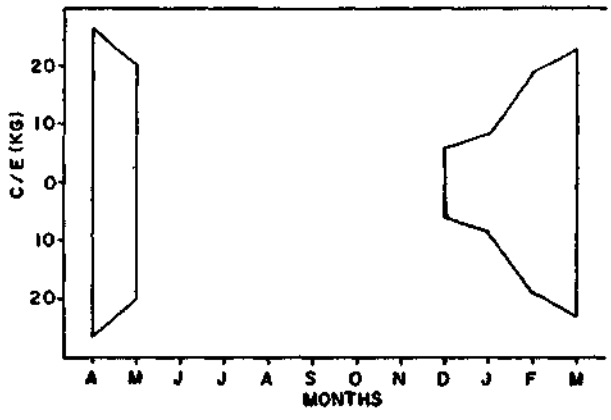


Fig. 48. Seasonal abundance of threadfin breams in the trawling grounds off Mangalore.

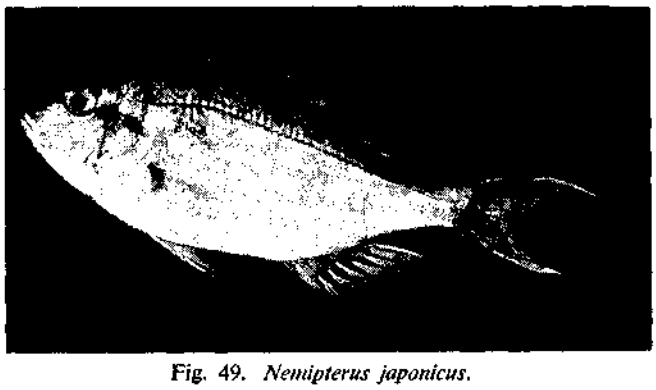


Fig. 49. *Nemipterus japonicus.*

Scientific Name : *Nemipterus japonicus*
Vernacular Name : 'Madumagalu meenu'
Gear : Trawl net
Peak period of occurrence : January–May
Depth of occurrence : 4–50 m
Length range in commercial fishery : —
Size at first maturity : —
Spawning season : —

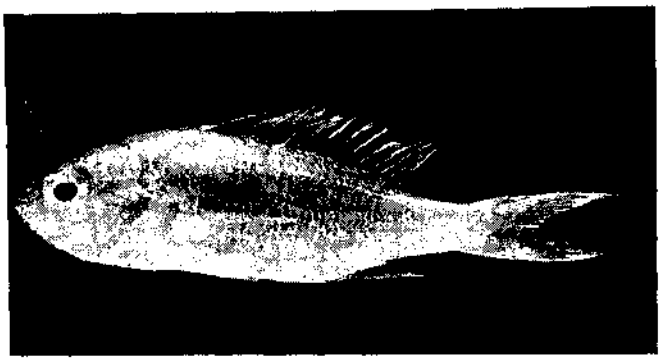


Fig. 50. *Nemipterus mesoprion.*

Scientific Name : *Nemipterus mesoprion*
Vernacular Name : 'Madumagalu meenu'
Gear : Trawl net
Peak period of occurrence : January–May
Depth of occurrence : 4–50 m
Length range in commercial fishery : —
Size at first maturity : 100 mm
Spawning season : December–April

NOMEIDAE

Popular English Name : Drift fishes
Vernacular Name (Kannada) : 'Pupper mangi'
Annual average catch : 40.3 t
Gear wise annual average catch : Trawl net : 40.31 t
Fishing methods and their contribution in total catch : Trawl net : 0.4%

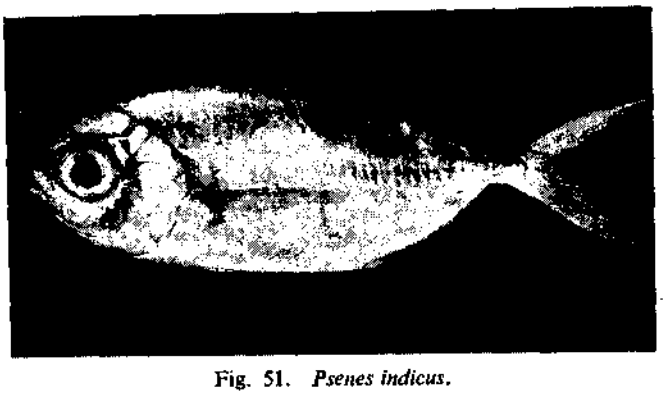


Fig. 51. *Psenes indicus.*

Scientific Name : *Psenes indicus*
Vernacular Name : 'Pupper mangi'
Gear : Trawl net
Peak period of occurrence : January–March
Depth of occurrence : 4–50 m
Length range in commercial fishery : —

Size at first maturity : 135 mm
Spawning season : —

PLATYCEPHALIDAE

Popular English Name : Spiny flat heads
Vernacular Name (Kannada) : 'Balchett'
Annual average catch : 181.9 t
Gear wise annual average catch : Trawl net : 181.86 t
Fishing methods and their contribution in total catch : Trawl net : 2.0%

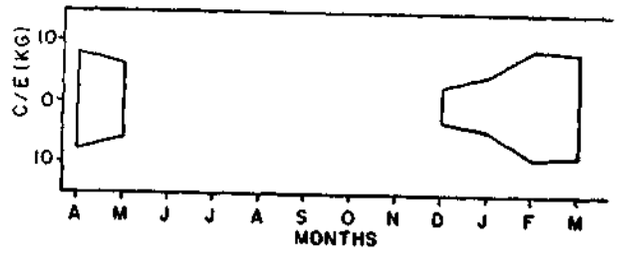


Fig. 52. Seasonal abundance of spiny flatheads in the trawling grounds off Mangalore.

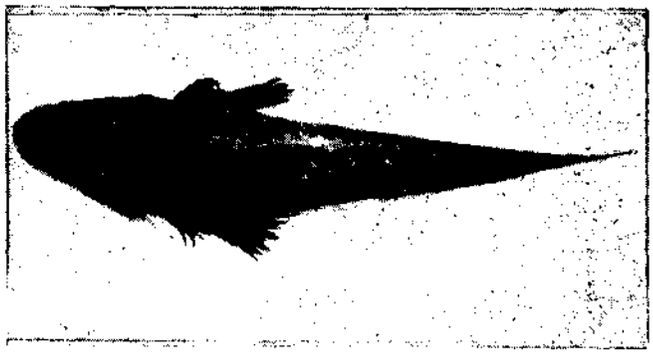


Fig. 53. *Platycephalus scaber.*

Scientific Name : *Platycephalus scaber*
Vernacular Name : 'Balchett'
Gear : Trawl net
Peak period of occurrence : January–March
Depth of occurrence : 4–50 m
Length range in commercial fishery : —
Size at first maturity : —
Spawning season : —

PRIACANTHIDAE

Popular English Name : Big eye/Bulls eye
Vernacular Name (Kannada) : 'Disco meenu'
Annual average catch : 93.3 t
Gear wise annual average catch : Trawl net : 93.23
Drift gill net : 0.03t
Fishing methods and their contribution in total catch : Trawl net : 1.0%
Drift gill net : 0.1%

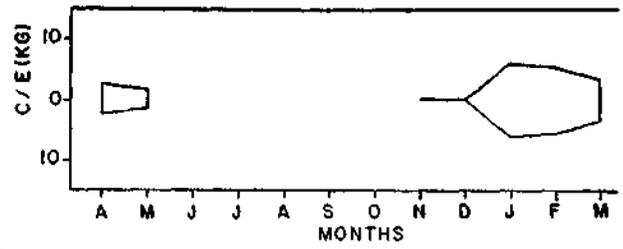


Fig. 54. Seasonal abundance of big eye in the trawling grounds off Mangalore.

Fig. 55. *Priacanthus hamrur.*

Scientific Name : *Priacanthus hamrur*
Vernacular Name : 'Disco meenu'
Gear : Trawl net/Drift gill net
Peak period of occurrence : Jan.–Apr. and Nov.
Depth of occurrence : 4–50 m
Length range in commercial fishery : —
Size at first maturity : —
Spawning season : —

SCIAENIDAE

Popular English Name : Croackers
Vernacular Name (Kannada) : 'Kalluru'/'Koran'
Annual average catch : 399.8 t
Gear wise annual average catch : Trawl net : 341.16 t
Purse seine : 58.02 t
Drift gill net : 0.67 t
Fishing methods and their contribution in total catch : Trawl net : 3.7%
Purse seine : 0.2%
Drift gill net : 0.2%

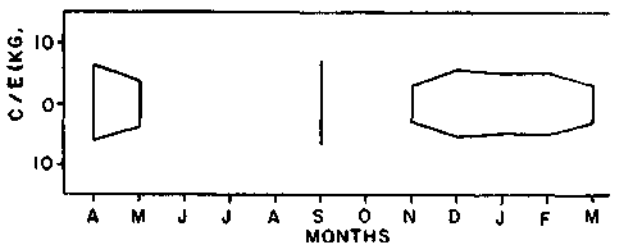


Fig. 56. Seasonal abundance of sciaenids (croackers) in the trawling grounds off Mangalore.

Fig. 57. *Johnieops osseus.*

Scientific Name	:	*Johnieops osseus*
Vernacular Name	:	'Kalluru'
Gear	:	Trawl net/Purse seine
Peak period of occurrence	:	Oct. and Dec.–Apr.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	130–150 mm
Size at first maturity	:	120 mm
Spawning season	:	Throughout the year

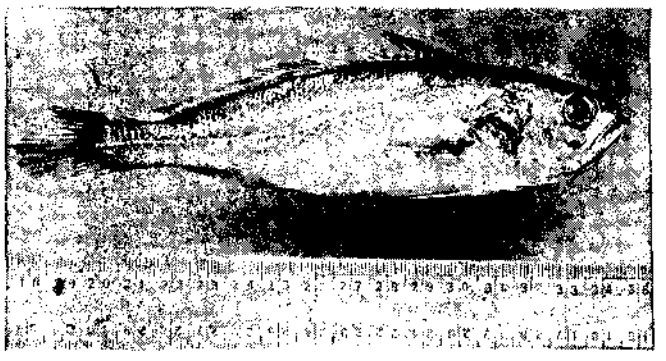


Fig. 58. *Otolithes ruber.*

Scientific Name	:	*Otolithes ruber*
Vernacular Name	:	'Kalluru'
Gear	:	Trawl net
Peak period of occurrence	:	December–April
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	110–200 mm
Size at first maturity	:	140 mm
Spawning season	:	October-January

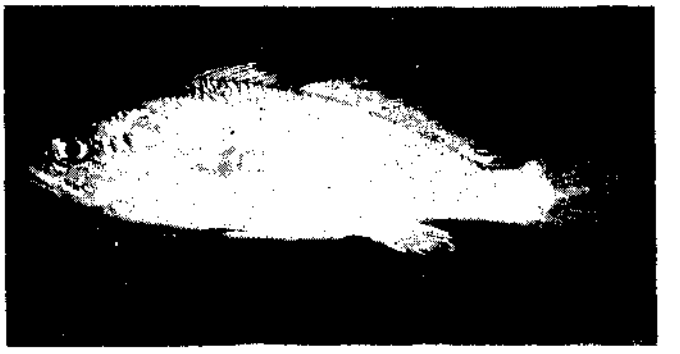


Fig. 59. *Otolithes cuvieri.*

Scientific Name	:	*Otolithes cuvieri*
Vernacular Name	:	'Kalluru'
Gear	:	Trawl net
Peak period of occurrence	:	December-April
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	150-250 mm
Size at first maturity	:	—
Spawning season	:	—

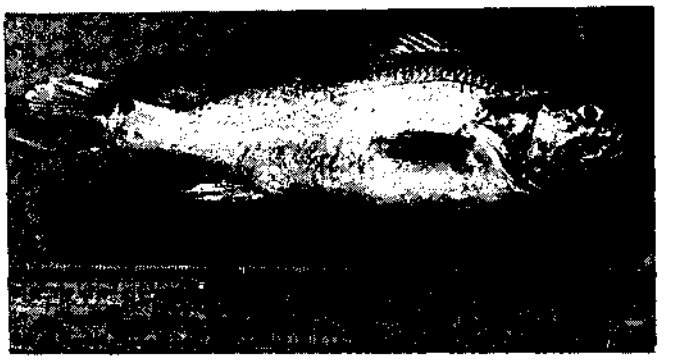


Fig. 60. *Johnieops dussumieri.*

Scientific Name	:	*Johnieops dussumieri*
Vernacular Name	:	'Kalluru'
Gear	:	Trawl net
Peak period of occurrence	:	December-April
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	130–150 mm
Size at first maturity	:	—
Spawning season	:	—

Fig. 61. *Protonibea diacanthus.*

Scientific Name	:	*Protonibea diacanthus*
Vernacular Name	:	'Koran'
Gear	:	Drift gill net
Peak period of occurrence	:	February
Depth of occurrence	:	18–45 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

SCOMBRIDAE

Popular English Name	:	Mackerel/Tunas/Seer fishes	
Vernacular Name (Kannada)	:	'Banguda'/'Kedar'/'Anjal'	
Annual average catch	:	5,773.3 t	
Gear wise annual average catch	:	Purse seine	5,532.64 t
		Drift gill net	240.97 t
		Trawl net	3.70 t
Fishing methods and their contribution in total catch	:	Drift gill net	59.1%
		Purse seine	16.3%
		Trawl net	0.1%

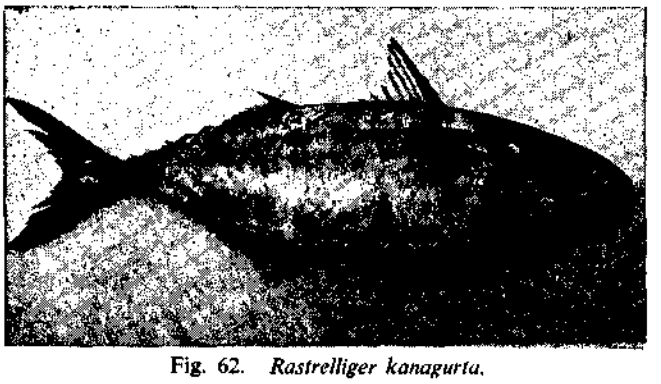


Fig. 62. *Rastrelliger kanagurta.*

Scientific Name	:	*Rastrelliger kanagurta*
Vernacular Name	:	'Banguda'
Gear	:	Purse seine/Drift gill net/ Trawl net
Peak period of occurrence	:	Sep.–Nov. and Mar.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	165–439 mm
Size at first maturity	:	217 mm
Spawning season	:	June–August

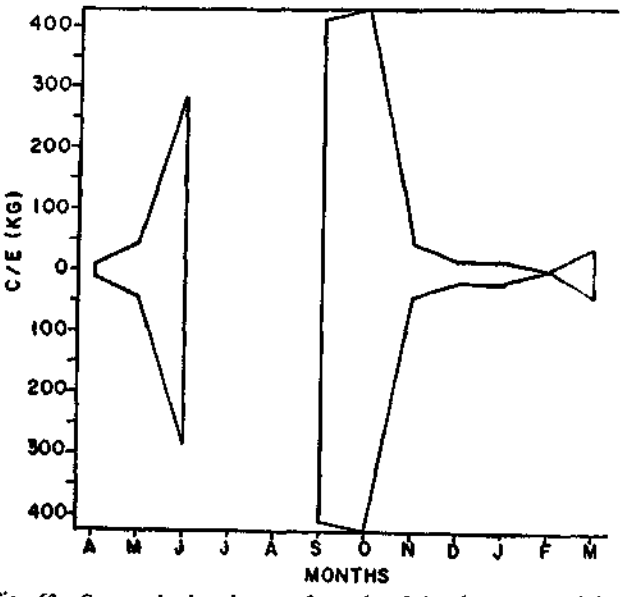


Fig. 63. Seasonal abundance of mackerel in the purse seining grounds off Mangalore.

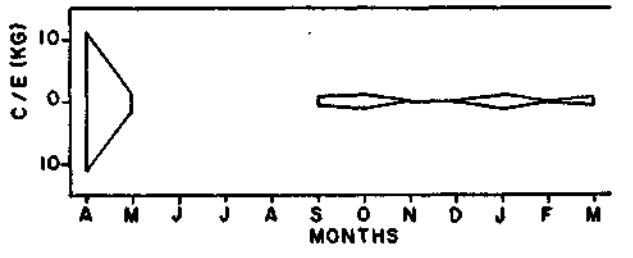


Fig. 64. Seasonal abundance of mackerel in the drift gill netting grounds off Mangalore.

TUNAS

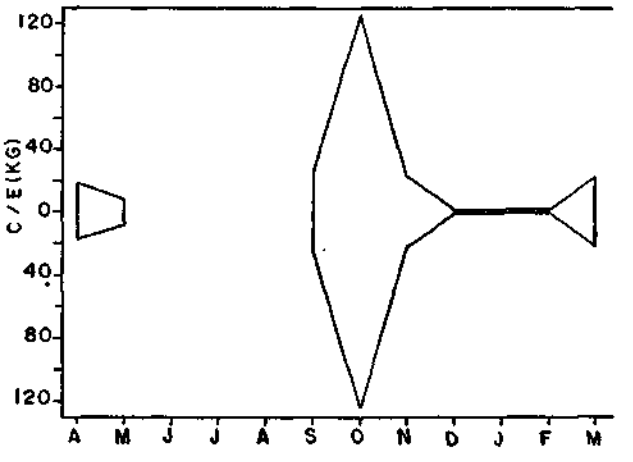


Fig. 65. Seasonal abundance of tunas in the purse seining grounds off Mangalore.

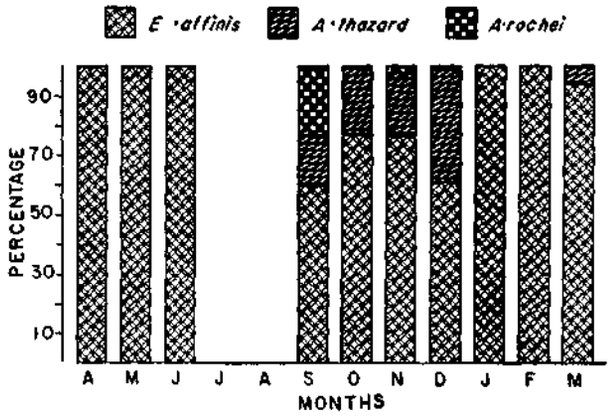


Fig. 66. Month-wise species composition of tunas landed by purse seiners.

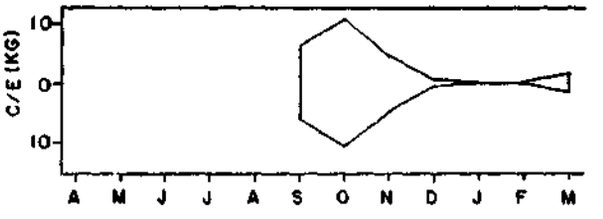


Fig. 67. Seasonal abundance of tunas and bill fishes in the drift gill netting grounds off Mangalore.

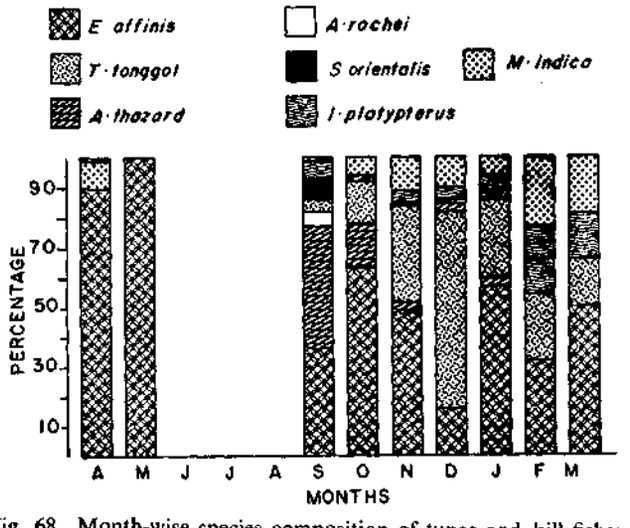


Fig. 68. Month-wise species composition of tunas and bill fishes landed by drift gill netters.

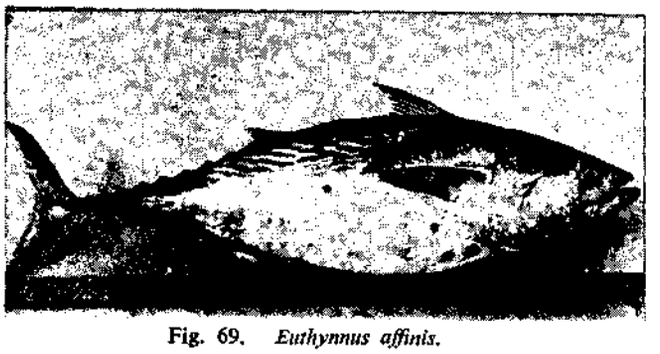


Fig. 69. *Euthynnus affinis.*

Scientific Name	:	*Euthynnus affinis*
Vernacular Name	:	'Peepa kedar'
Gear	:	Purse seine/Drift gill net
Peak period of occurrence	:	September–November
Depth of occurrence	:	15–45 m
Length range in commercial fishery	:	340–499 mm
Size at first maturity	:	430 mm
Spawning season	:	September–October

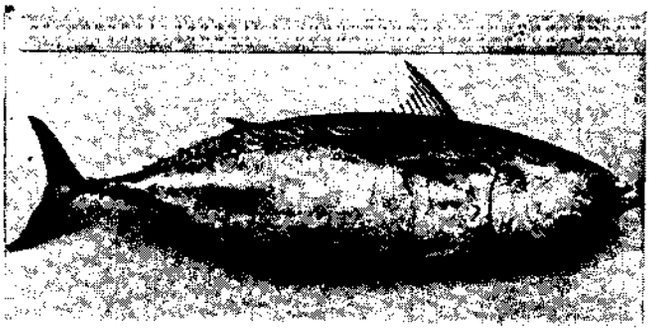


Fig. 70. *Auxis thazard.*

Scientific Name	:	*Auxis thazard*
Vernacular Name	:	'Baremeenu'/'Kedar'
Gear	:	Purse seine/Drift gill net
Peak period of occurrence	:	September–December
Depth of occurrence	:	15–45 m
Length range in commercial fishery	:	260–439 mm
Size at first maturity	:	305 mm
Spawning season	:	October–November

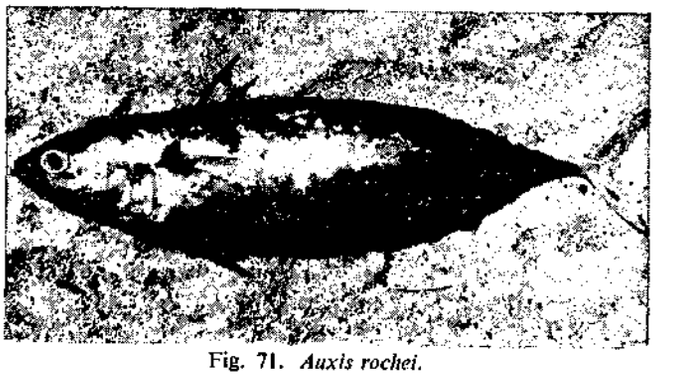


Fig. 71. *Auxis rochei.*

Scientific Name	:	*Auxis rochei*
Vernacular Name	:	'Sheerad kedar'
Gear	:	Drift gill net
Peak period of occurrence	:	September–December
Depth of occurrence	:	15–35 m
Length range in commercial fishery	:	200–300 mm
Size at first maturity	:	238 mm
Spawning season	:	September

SEER FISHES

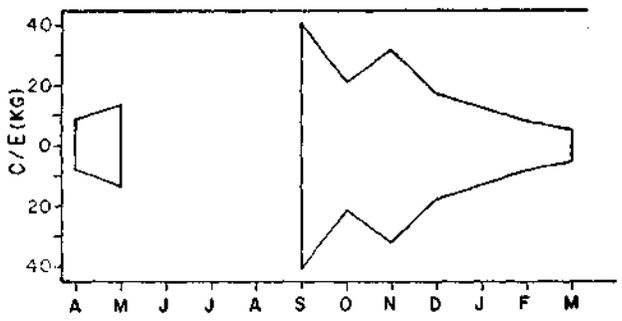


Fig. 72. Seasonal abundance of seer fishes in the drift gill netting grounds off Mangalore.

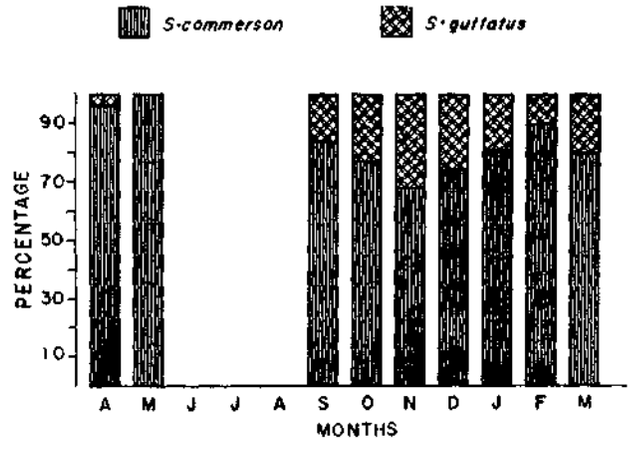


Fig. 73. Month-wise species composition of seer fishes landed by drift gill netters.

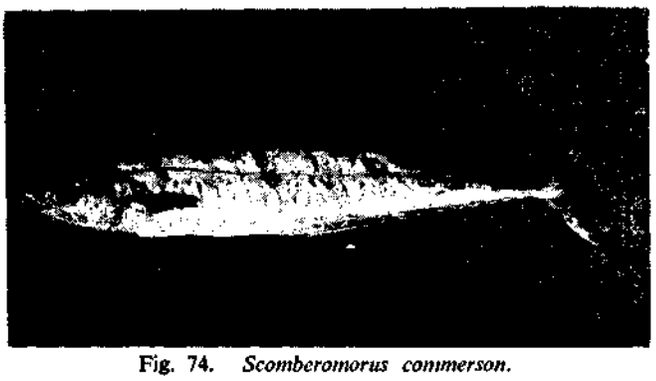


Fig. 74. *Scomberomorus commerson.*

Scientific Name	:	*Scomberomorus commerson*
Vernacular Name	:	'Anjal'
Gear	:	Drift gill net/Trawl net
Peak period of occurrence	:	Sep.–Dec. and Mar.
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	460–900 mm
Size at first maturity	:	740 mm
Spawning season	:	January–September

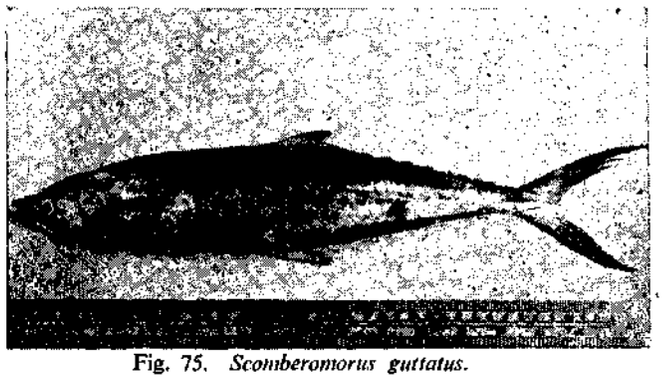


Fig. 75. *Scomberomorus guttatus.*

Scientific Name	:	*Scomberomorus guttatus*
Vernacular Name	:	'Anjal'
Gear	:	Drift gill net
Peak period of occurrence	:	October–December
Depth of occurrence	:	18–45 m
Length range in commercial fishery	:	360–460 mm
Size at first maturity	:	365 mm
Spawning season	:	April–July

Fig. 76. *Scomberomorus lineolatus.*

Scientific Name	:	*Scomberomorus lineolatus*
Vernacular Name	:	'Anjal'
Gear	:	Drift gill net
Peak period of occurrence	:	November–January
Depth of occurrence	:	18–45 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

SPHYRAENIDAE

Popular English Name	:	Barracudas
Vernacular Name (Kannada)	:	'Surula kandai'
Annual average catch	:	17.2 t
Gear wise annual average catch	:	Trawl net : 15.97 t Drift gill net : 1.25 t

Fishing methods and their contribution in total catch : Drift gill net : 0.3%
Trawl net : 0.2%

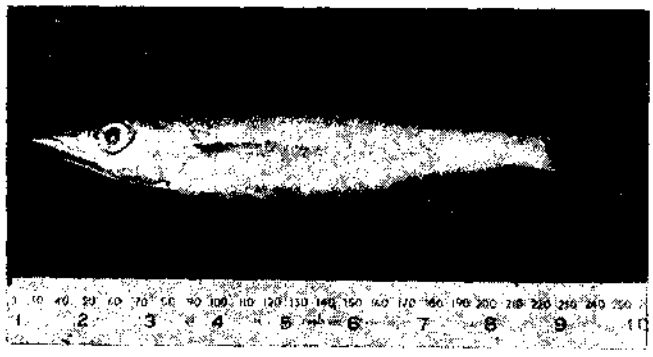


Fig. 77. *Sphyraena obtusata.*

Scientific Name	:	*Sphyraena obtusata*
Vernacular Name	:	'Surula kandai'
Gear	:	Trawl net
Peak period of occurrence	:	March
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

Fig. 78. *Sphyraena barracuda.*

Scientific Name	:	*Sphyraena barracuda*
Vernacular Name	:	'Surula kandai'
Gear	:	Drift gill net
Peak period of occurrence	:	November
Depth of occurrence	:	18–45 m
Length range in commercial fishery	:	—
Size at first maturity	:	—
Spawning season	:	—

STROMATEIDAE

Popular English Name	:	Pomfrets
Vernacular Name (Kannada)	:	'Manji'

Annual average catch : 113.7 t
Gear wise annual average catch : Trawl net : 43.93 t
Purse seine : 38.28 t
Drift gill net : 31.51 t

Fishing methods and their contribution in total catch : Drift gill net : 7.7%
Trawl net : 0.5%
Purse seine : 0.1%

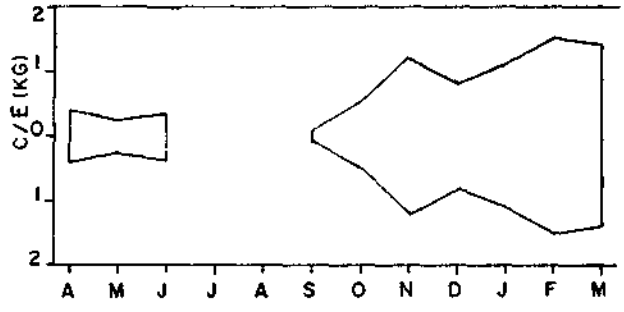


Fig. 79. Seasonal abundance of pomfrets in the trawling grounds off Mangalore.

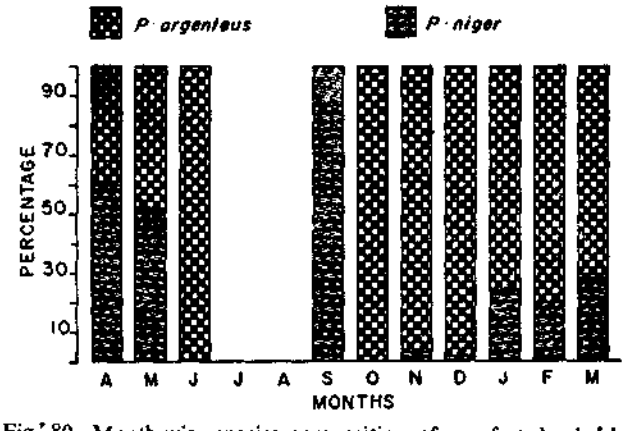


Fig. 80. Month-wise species composition of pomfrets landed by shrimp trawlers.

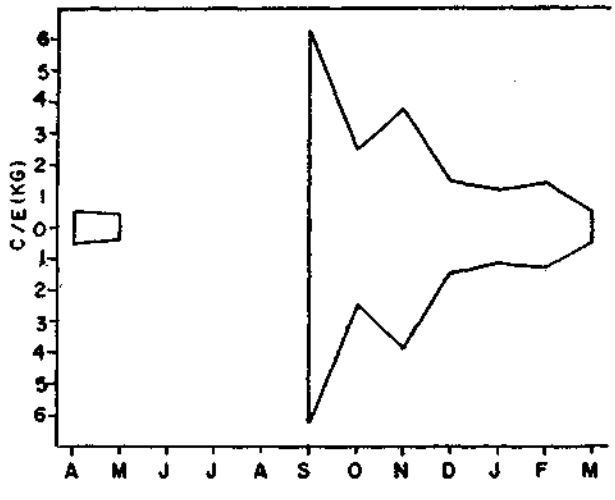


Fig. 81. Seasonal abundance of pomfrets in the drift gill netting grounds off Mangalore.

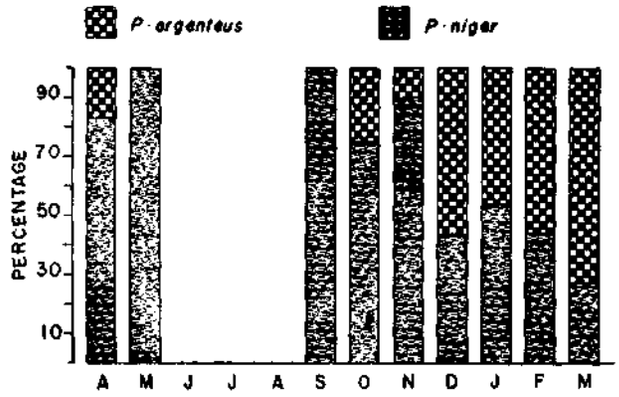


Fig. 82. Month-wise species composition of pomfrets landed by drift gill netters.

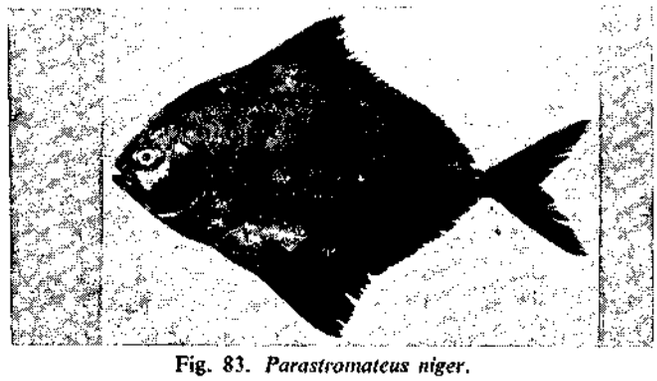


Fig. 83. *Parastromateus niger.*

Scientific Name	:	*Parastromateus niger*
Vernacular Name	:	'Kappu manji'
Gear	:	Drift gill net/Trawl net/ Purse seine
Peak period of occurrence	:	September–April
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	140–320 mm
Size at first maturity	:	290 mm
Spawning season	:	October–December

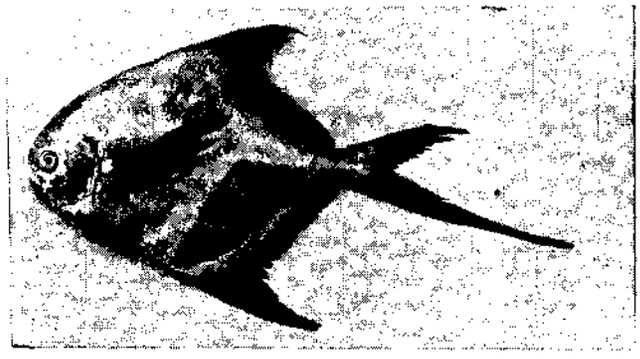


Fig. 84. *Pampus argenteus.*

Scientific Name	:	*Pampus argenteus*
Vernacular Name	:	'Boldhu manji'
Gear	:	Drift gill net/Trawl net
Peak period of occurrence	:	October–April
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	50–240 mm
Size at first maturity	:	180 mm
Spawning season	:	April–June

SYNODONTIDAE

Popular English Name	:	Lizard fishes
Vernacular Name (Kannada)	:	'Arane meenu'
Annual average catch	:	443.5 t
Gear wise annual average catch	:	Trawl net : 443.48 t
Fishing methods and their contribution in total catch	:	Trawl net : 4.8%

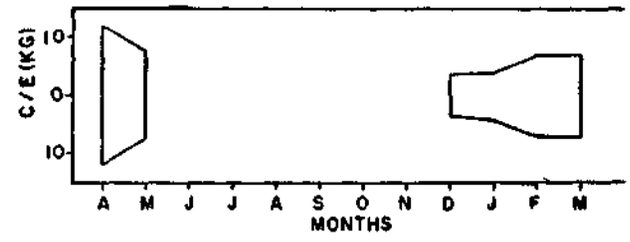


Fig. 85. Seasonal abundance of lizard fishes in the trawling grounds off Mangalore.

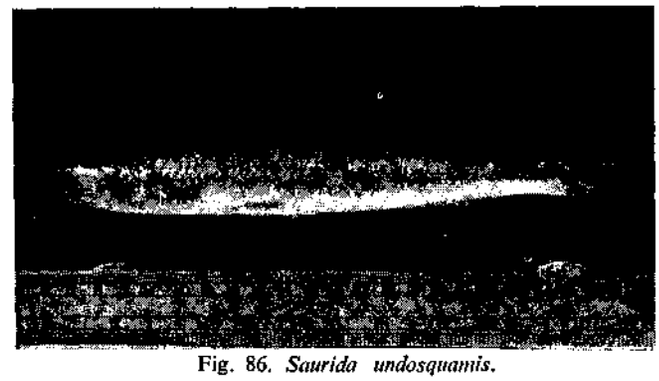


Fig. 86. *Saurida undosquamis.*

Scientific Name	:	*Saurida undosquamis*
Vernacular Name	:	'Arane meenu'
Gear	:	Trawl net
Peak period of occurrence	:	January–May
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—
Size at first maturity	:	240 mm
Spawning season	:	October–March

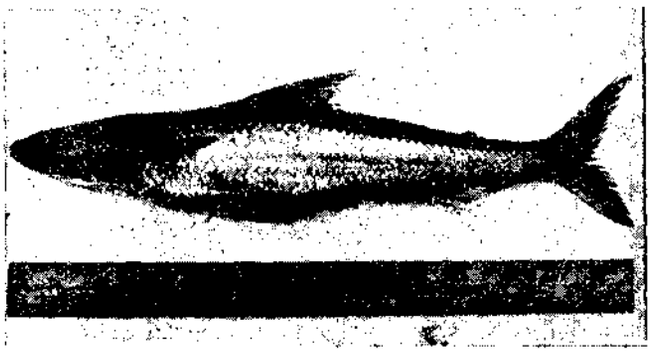


Fig. 87. *Saurida tumbil.*

Scientific Name	:	*Saurida tumbil*
Vernacular Name	:	'Arane meenu'
Gear	:	Trawl net
Peak period of occurrence	:	January–May
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	113–404 mm
Size at first maturity	:	260 mm
Spawning season	:	October–January

TACHYSURIDAE

Popular English Name	:	Cat fishes	
Vernacular Name (Kannada)	:	'Thede'/'Shede'	
Annual average catch	:	2,325.3 t	
Gear wise annual average catch	:	Purse seine	: 2,072.08 t
		Trawl net	: 209.80 t
		Drift gill net	: 43.40 t
Fishing methods and their contribution in total catch:		Drift gill net	: 10.7%
		Purse seine	: 6.1%
		Trawl net	: 2.3%

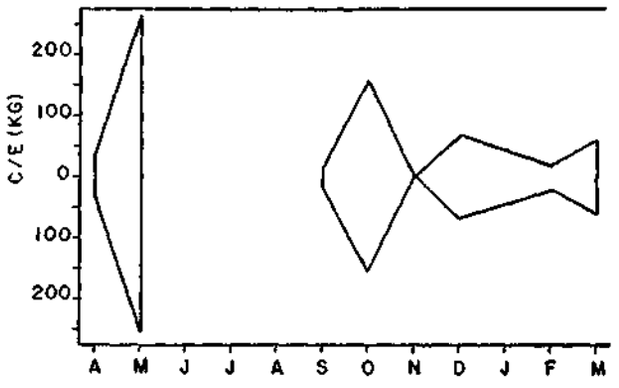


Fig. 88. Seasonal abundance of cat fishes in the purse seining grounds off Mangalore.

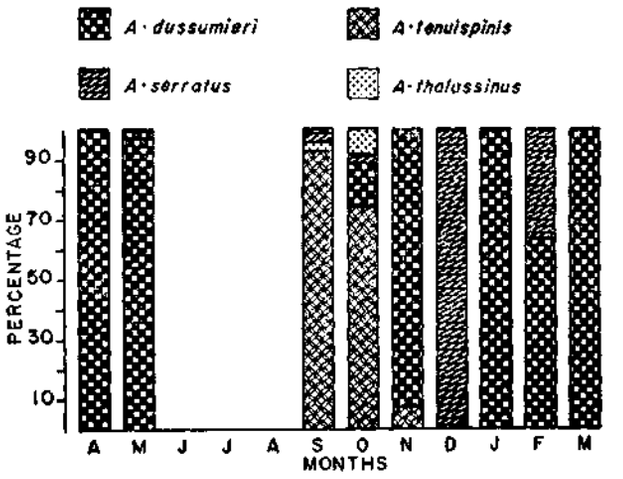


Fig. 89. Month-wise species composition of cat fishes landed by purse seiners.

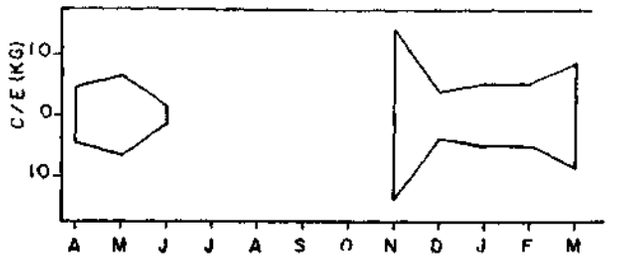


Fig. 90. Seasonal abundance of cat fishes in the trawling grounds off Mangalore.

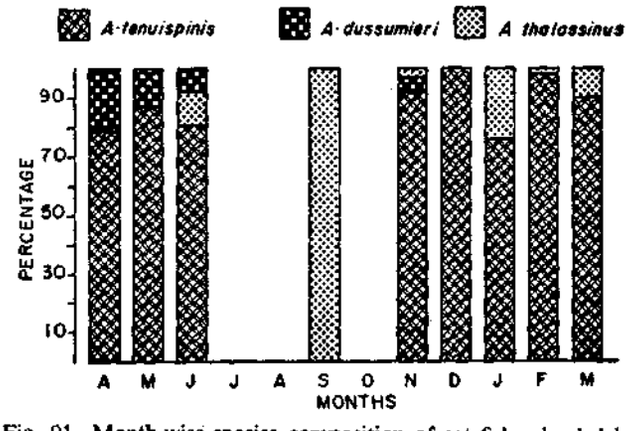


Fig. 91. Month-wise species composition of cat fishes landed by shrimp trawlers.

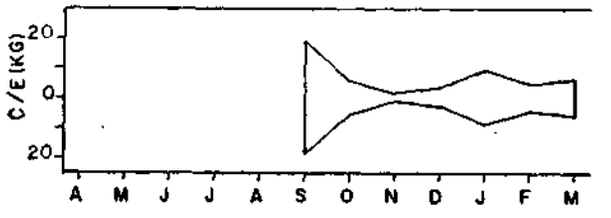


Fig. 92. Seasonal abundance of cat fishes in the drift gill netting grounds off Mangalore.

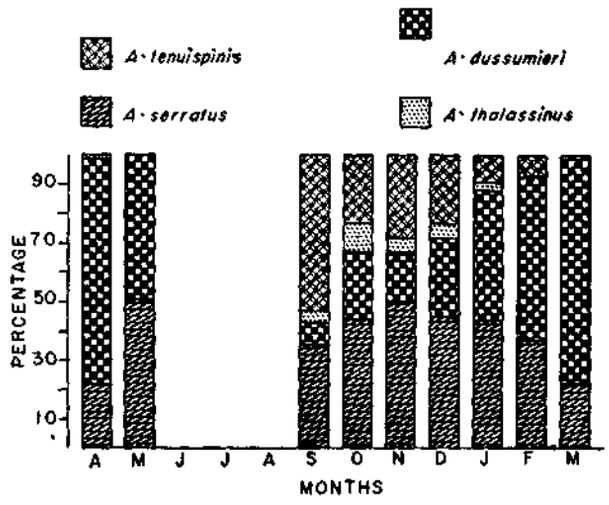


Fig. 93. Month-wise species composition of cat fishes landed by drift gill netters.

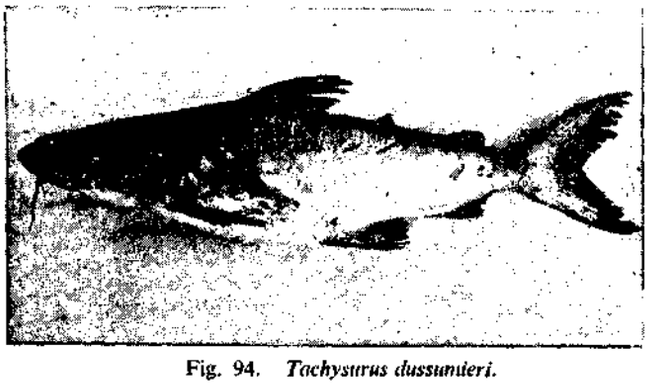


Fig. 94. *Tachysurus dussumieri.*

Scientific Name	:	*Tachysurus dussumieri*
Vernacular Name	:	'Thede' / 'Shede'
Gear	:	Purse seine/Drift gill net
Peak period of occurrence	:	October–May
Depth of occurrence	:	15–45 m
Length range in commercial fishery	:	580–779 mm
Size at first maturity	:	545 mm
Spawning season	:	February–March

Fig. 95. *Tachysurus tenuispinis.*

Scientific Name	:	*Tachysurus tenuispinis*
Vernacular Name	:	'Thede'/'Shede'
Gear	:	Purse seine/Trawl net/ Drift gill net
Peak period of occurrence	:	September–May
Depth of occurrence	:	10–45 m
Length range in commercial fishery	:	160–459 mm
Size at first maturity	:	275 mm
Spawning season	:	Sept.–Oct. and Dec.

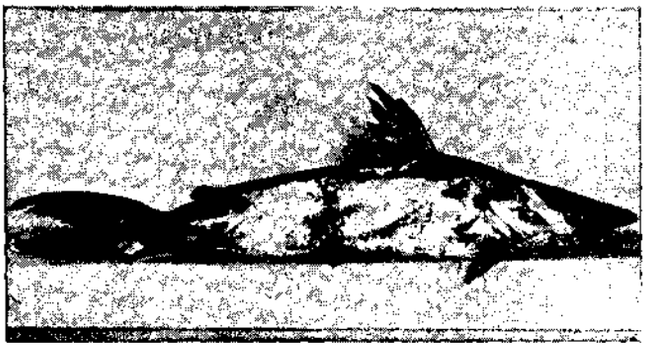


Fig. 96. *Tachysurus serratus.*

Scientific Name	:	*Tachysurus serratus*
Vernacular Name	:	'Thede'/'Shede'
Gear	:	Drift gill net
Peak period of occurrence	:	September-January
Depth of occurrence	:	18–45 m
Length range in commercial fishery	:	800–1,050 mm
Size at first maturity	:	—
Spawning season	:	—

TRICHIURIDAE

Popular English Name	:	Ribbon fishes	
Vernacular Name (Kannada)	:	'Pambol'	
Annual average catch	:	444.8 t	
Gear wise annual average catch	:	Trawl net	: 444.22 t
		Drift gill net	: 0.54 t
Fishing method and their contribution in total catch	:	Trawl net	: 4.8%
		Drift gill net	: 0.1%

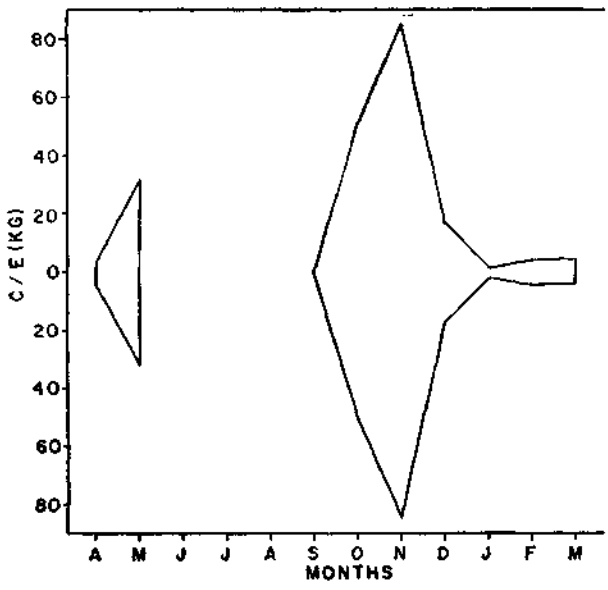


Fig. 97. Seasonal abundance of ribbon fishes in the trawling grounds off Mangalore.

Fig. 98. *Trichiurus lepturus.*

Scientific Name	:	*Trichiurus lepturus*
Vernacular Name	:	'Pambol'
Gear	:	Trawl net/Drift gill net
Peak period of occurrence	:	Oct.–Dec. and May
Depth of occurrence	:	4–50 m
Length range in commercial fishery	:	—
Size at first maturity	:	431 mm (S.L)
Spawning season	:	Throughout the year

GROWTH OF LARVAE AND SPAT OF THE GREEN MUSSEL *PERNA VIRIDIS* (LINNAEUS) IN HATCHERY*

Fertilised eggs and larvae of the green mussel *Perna viridis* (Linnaeus) obtained from the spawning of mussels in confinement were reared in the Kovalam Field Laboratory of the Central Marine Fisheries Research Institute and over 20,000 mussel spat have been produced successfully. The mussels in maturing stage were collected on 15-5-'87, kept in 50 l fibreglass tanks and conditioned for maturation by feeding them with phytoplankters like *Chaetoceros, Skeletonema etc.* They became mature and spawned on 22-5-'87 without any inducement, except for daily change of water. The water temperature at the time of spawning was 30.1°C and salinity 38 ‰.

On the completion of spawning, the mussels were removed and the spawn was kept undisturbed for 1 hr. Fertilized eggs, measuring 0.040–0.064 mm, were observed to sink to the bottom at first and after gastrulation

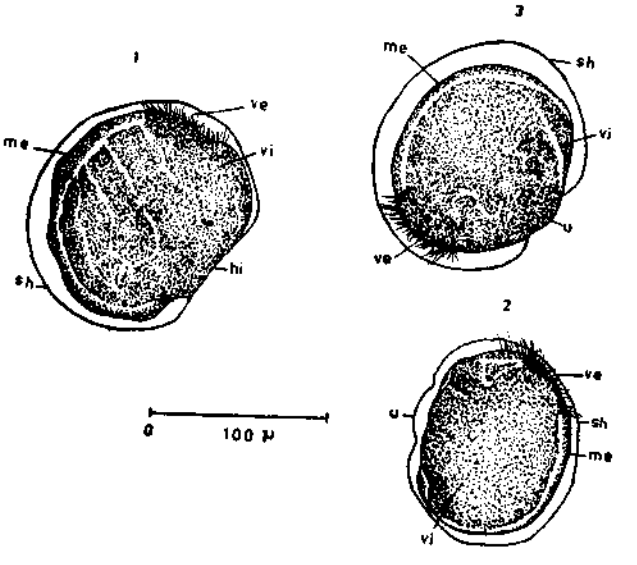


Fig. 1. 1 D-shaped veliger (4 days old)
2 Early umbo stage veliger (6 days old)
3 Umbo stage veliger (7 days old)

*Prepared by P. V. Sreenivasan, K. Satyanarayana Rao, P. Poovannan and R. Thangavelu, Madras Research Centre of CMFRI, Madras.

Table 1. *Growth of the larvae and spat of* **P.** viridis *in the laboratory*

Day after fertilization	Length (mm) Range	Mean	Breadth (mm) Range	Mean	Height (mm) Range	Mean	Stage
4th	0.048–0.096	0.065	0.048–0.112	0.096	—	—	D-shaped
7th	0.064–0.112	0.090	0.080–0.128	0.098	—	—	D-shaped & early umbo
11th	0.080–0.192	0.109	0.096–0.224	0.119	—	—	Umbo
15th	0.112–0.272	0.176	0.128–0.272	0.196	—	—	Pediveliger & eyed
19th	0.176–0.384	0.264	0.176–0.352	0.264	—	—	Plantigrade
23rd	0.224–0.498	0.298	0.224–0.432	0.306	—	—	Plantigrade
27th	0.256–0.720	0.449	0.272–0.640	0.429	—	—	Spat
31st	0.480–2.000	0.959	0.400–1.600	0.775	—	—	Spat
33rd	0.720–1.840	1.155	0.600–1.440	0.853	—	—	Spat
37th	0.880–4.000	1.753	0.600–2.440	1.195	—	—	Spat
40th	1.400–2.520	1.940	0.800–1.920	1.393	—	—	Spat
44th	1.700–5.000	3.500	0.900–2.500	1.700	0.200–1.200	0.700	Spat
48th	1.400–6.200	3.600	0.700–3.200	1.800	0.100–1.300	0.700	Spat
52nd	1.400–6.200	4.000	0.500–4.000	1.900	0.200–2.000	0.800	Spat
56th	2.500–8.300	4.500	1.400–4.700	2.800	0.800–2.900	1.600	Spat
60th	3.600–9.600	5.900	2.000–5.400	3.500	0.700–3.300	2.100	Spat

and appearance of cilia, they moved towards the surface. The water was then filtered through 40 μ filter to retain only healthy embryos. Further rearing was done in three 50 l fibreglass tanks.

Trochophore stage was attained 6–8 hours after spawning and the D-shaped veliger by 20–24 hours. The umbo-stage was reached by 7–9 days and the foot was formed between 10 and 14 days after spawning. With the formation of foot and disappearance of ciliated velum, the larvae tended to settle and at this stage, known as plantigrade, was observed on the 19th day.

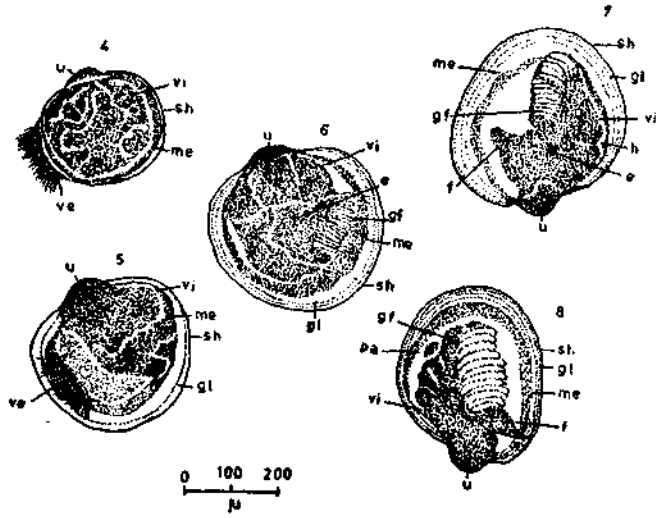


Fig. 2. 4 Umbo stage veliger (10 days old)
5 Pedi-veliger stage (12 days old)
6 Eyed-stage (15 days old)
7 Plantigrade (19 days old)
8 Spat (27 days old)

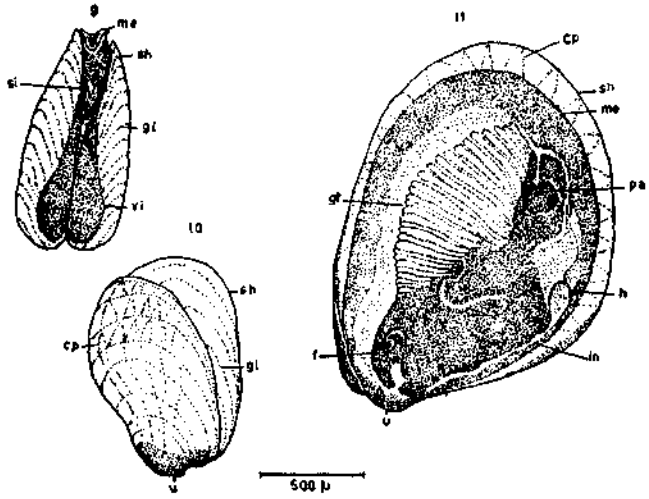


Fig. 3. 9 Anterior view of 33 days old spat
10 Empty shell of 37 days old spat
11 45 days old spat

Settlement of the spat was noticed from 23rd day onwards and continued till the 27th day. Active growth of the spat was noticed after settlement and they grew to 5.9 mm in length by 60th day. The different stages of development are shown in Figs. 1–7.

The larvae were fed with the culture of *Isochrysis galbana* from the 2nd day onwards. The strength of the culture used for food was 2,000 cells/larvae in the earlier stages and gradually raised to 3,000 cells/larvae later. After 45 days, the spat were fed with mixed culture of *Chaetoceros, Coscinodiscus* and *Skeletonema*. Water was changed completely on every alternate day. Aeration was given only after the settlement of spat.

Details of the growth of larvae in length (measured from hinge/umbo to the edge of the shell), breadth (maximum measurement perpendicular to hinge/umbo) and height (maximum thickness of the shell) are given in Table 1.

A total of 20,500 spat of *Perna viridis* were obtained from the experiment. The production could be increased substantially by improvement of water quality and reducing the density of the larvae. The work shows that there are good possibilities for production of green mussel seed through hatchery techniques. Large scale production of spat of this economically important species will be of immense help in conducting mussel farming.

Abbreviation used

Cp	:	chromatophore pigments
e	:	eye
f	:	foot
gf	:	gill filaments
gl	:	growth lines
h	:	heart
hi	:	hinge
in	:	intestine
me	:	mantle edge
pa	:	posterior adductor muscle
sh	:	shell
si	:	siphon
ve	:	velum
vi	:	visceral mass
u	:	umbo

EXPERIMENTAL MOLLUSCAN SEED TRANSPORT*

Introduction

A priority area of attention under the R & D efforts of the Institute is the mass production of seed of cultivable marine fish and shellfishes and to make available the required quantity to the farmers and for 'ranching'. Investigations carried out during 1980–'86 in the shellfish hatchery at Tuticorin enabled mass production of the spat of pearl oyster *(Pinctada fucata)* and edible oyster *(Crassostrea madrasensis)* and also the standardization of technique for such mass production. Trials were conducted during 1985–'87 to evolve safe methods of seed transport, avoiding mortality in transit. The present communication outlines some of the procedures found effective in handling the seeds before, during and after subjecting them to long distant transport by road, sea or air.

*Prepared by A. Chellam, S. Dharmaraj, T. S. Velayudhan and P. Muthiah, Tuticorin Research Centre of CMFRI, Tuticorin.

I. Transportation of seed of pearl oysters

The pearl oyster spat are known to be highly susceptible to oxygen deficiency, and variations in temperature and salinity in the sea water. While planning the experimental transport, the following criteria were adopted.

a) Selection of the spat of the same batch
b) Conditioning of spat for 24 hrs in filtered sea water before packing
c) Ensuring constant sea water drip or bathing to keep the spat free from adverse effects arising out of variation in water temperature
d) Relieving stress that may result due to oxygen deficiency by adequate oxygenation
e) Refreshing the spat with fresh sea water in one or two stages during transport and on reaching the destination and
f) Devising easy methods of packing the spat.

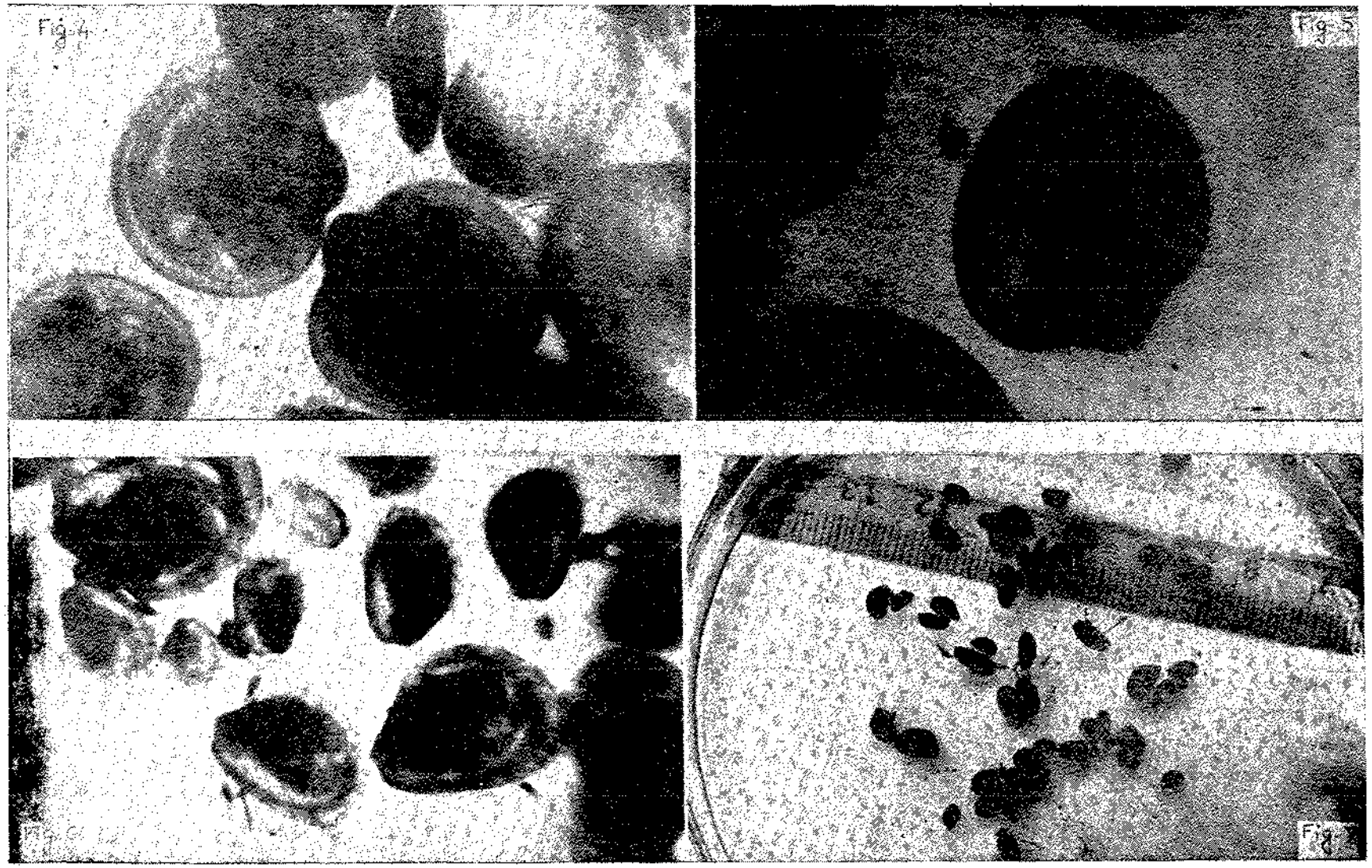


Fig. 4. Umbo stage larva. Fig. 5. 27 days old spat. Fig. 6. 33 days old spat. Fig. 7. 45 days old spat.

Transport by sea

In December, 1985, 50,000 spat of the size 8.3 mm (35,000) and 24 mm (15,000) were taken by sea to the oyster farm at Krusadai, managed by Tamil Nadu Pearls Ltd. The distance covered was 80 nautical miles in 9 hrs.

The spat were uniformly spread in closely knit nylon meshed cages. The cages were arranged under shade on the deck of a mechanised boat. Care was taken to keep the spat always wet by sea water shower during the journey. The entire consignment reached the destination without any mortality. Subsequent monitoring of the survival and growth in the farm at Krusadai showed normal behaviour.

Transport by road and sea

In October 1986, 10,000 spat of size 3.7 mm (2,500) and 13.7 mm (7,500) were sent to Agatti in Lakshadweep. The distance covered was 400 km by road and 250 nautical miles by sea.

The spat were packed in leak-proof polythene bags, each bag containing 750 spat in 3,000 ml of filtered sea water. The bags were filled with oxygen and mouth tightly sealed. The bags were encased in tin containers. After 12 hrs of road journey, the spat were transferred into plastic basins with fresh sea water and aerated adequately. The basins with spat were transported by sea from Cochin. The basins were kept in shade maintaining constant change of sea water. There was no report of spat mortality during this attempt.

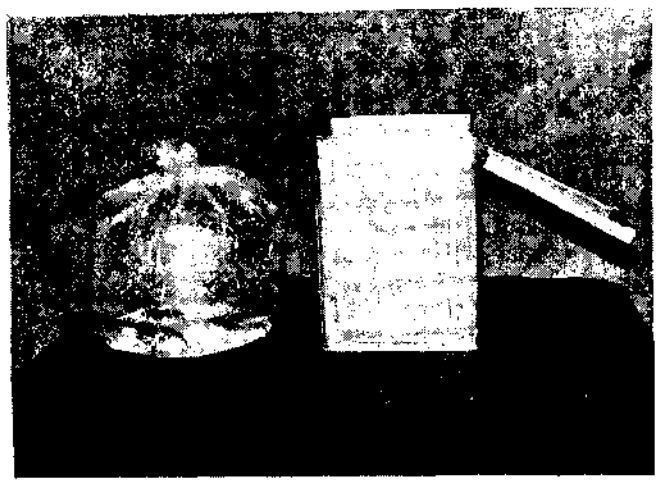


Fig. 1. Pearl oyster seed for road transport - in oxygen-filled polythene bag.

Transport by road and air

In May, 1987, 5,800 spat of size 10 mm (5,500) and 23 mm (300) were sent to Sikka in Gujarat. The first leg of the transport was by road upto Trivandrum covering a distance of 180 km and from there to Jamnagar *via* Bombay by air involving a distance of about 1,700 km. The total time involved in the transport was 33 hrs.

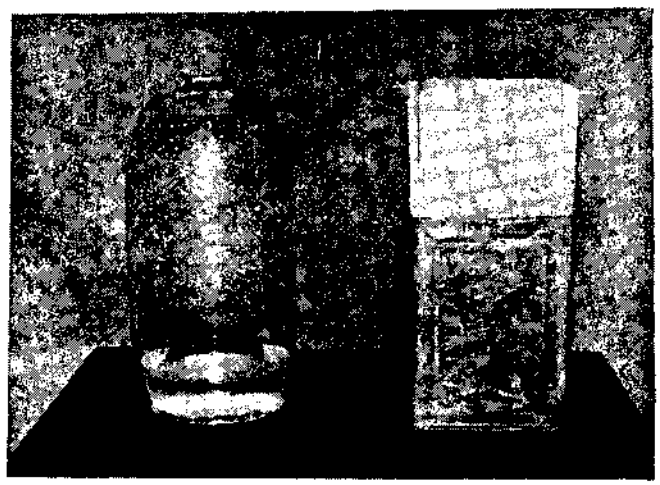


Fig. 2. Pearl oyster seed for air transport - in oxygen-filled heavy-duty fish transport bag.

The spat were transported by road in wet condition. At Trivandrum, they were kept in basins containing fresh sea water and aerated overnight. Heavy-duty polythene fish seed transport bags were used to carry the spat by air. Five hundred spat were put in each bag containing 4,000 ml of filtered sea water. Oxygen was filled to capacity and mouth tightly closed. The bags were wrapped with wet cotton wool and lowered into retrievable polythene bags. These bags were put in tin containers with sides lined with thermocol. Each tin had a lid also. These extra measures were taken because the transport of the spat was done during the peak summer month when atmospheric temperature had exceeded 36°C and water temperature 33°C. A mortality of 14.5% was reported at the end of the transport of spat at Sikka.

II. Transportation of seed of edible oysters

Lot of useful information are available on the transportation of seed of edible oysters from countries

like Japan and United States. These seed are known to be more hardy and if subjected to 'hardening' prior to transport, they are known to survive the transit period very well. Hence, while planning the transport of edible oyster seed from Tuticorin the above fact was given due importance. Where the process of hardening was not adhered to, the percentage of mortality of spat after reaching destination was found to be fairly high. Wet packing of the seed was found to be economical as well as efficient while transporting. Packed in this way the oyster seeds were kept alive even upto 90 hrs. The following experiments were conducted during 1981–'87 to find out the satisfactory transport method.

Transport by road

250 oyster seed of size 30–40 mm were sent to Madras by road. Hardening was done for 10 days prior to transportation. The seeds were wrapped in gunny sheet soaked in sea water and put in a box type cage 40 x 40 x 10 cm size with nylon meshes. After 17 hrs of road journey covering a distance of 650 km, the consignment reached Madras, and the percentage of mortality of the seed was 0.4 only.

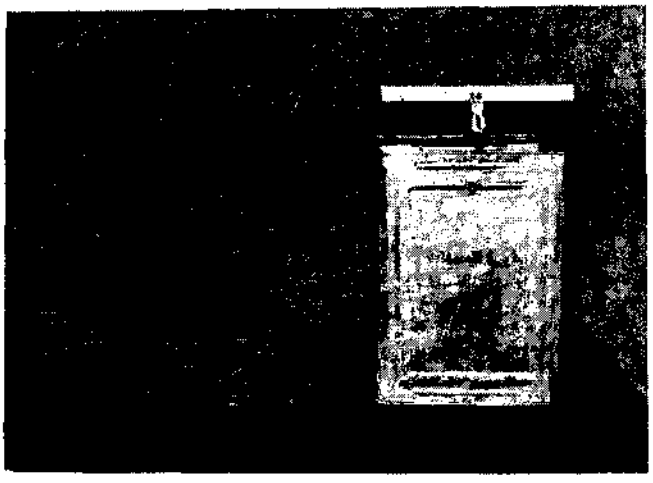


Fig. 3. Hardened edible oyster seed wrapped in wet gunny sheet ready for transportation.

In another experiment 2,000 spat of size 15–20 mm were transported to Narakkal by road, covering a distance of 470 km in 15 hrs following identical procedure. No mortality was observed during transportation.

Transport by road and air

In 1987, 5,800 spat of size 10–20 mm were sent to Sikka in Gujarat State, involving road transport initially for a period of 6 hrs from Tuticorin to Trivandrum followed by air lift to Jamnagar *via* Bombay, involving a duration of 33 hrs.

The oyster seed wrapped by gunny sheet soaked in sea water were kept in tin containers (9 nos). This was to facilitate easy handling of the consignment at the time of loading in the plane. At the end of the road transport period, the seed were emptied into plastic basins containing fresh sea water prior to repacking them as before. This process was followed so that it would enable the seed to remain fresh during the aerial transport period.. Very little mortality occurred during the transit.

Acknowledgements

It would not have been possible for us to carry out the above experiments but for the co-operation extended by the Director, Department of Fisheries, Gujarat; the Director, Department of Fisheries, Union Territory of Lakshadweep and the Managing Director, Tamil Nadu Pearls Ltd. In this context the assistance and help rendered by Shri C. G. Koya, Department of Fisheries, Lakshadweep and Shri K. A. Pota, Department of Fisheries, Gujarat are gratefully acknowledged.

A RECORD CATCH OF 'GHOL' *PROTONIBEA DIACANTHUS* (LACEPEDE) OFF SATPATI, BOMBAY COAST*

Protonibea diacanthus (Lacepede), called 'ghol' in Bombay, is a commercially very important sciaenid forming 5 to 8 per cent of the trawler landings from the Bombay and Saurashtra waters. Being demersal in habitat 'ghol' is usually landed by trawlers, bagnetters and gillnetters. The 'ghol' fishery was considered to

*Reported by J. P. Karbhari, J. R. Dias and M. Aravindakshan, Bombay Research Centre of CMFRI, Bombay.

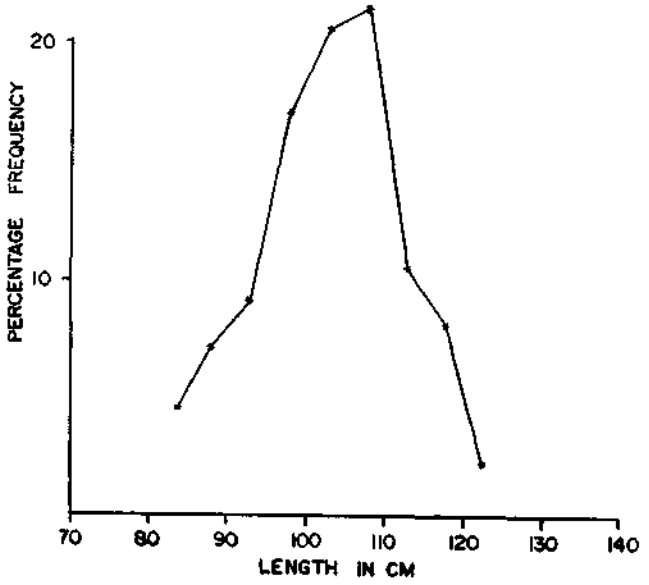


Fig. 1. Length frequency polygon of *P. diacanthus*.

be highly lucrative in the Bombay region until early Seventies. The fishery has been found sharply declining from mid-seventies in the area. In the present note the details of a record catch of 'ghol' consisting of 3,218 specimens, weighing approximately 39.52 tonnes, caught in a single haul of 'dol' net laid in 30 m depth off Satpati (Bombay coast) are presented.

In the early morning on 14th November, 1986 a 32-footer mechanised 'dolnetter' (locally called 'dolkar') steamed out for fishing. On locating its 'Sus' or 'Kav' ('dol' net operating stand) two 'dol' nets were laid at about 1300 hrs in 30 m depth off Satpati. On encountering great difficulties by twelve crew members of the boat in hauling in the nets at about 1730 hrs, assistance of two other boats, fishing nearby, was sought and the prized catch of 'ghol' was brought ashore in two boats. The entire catch was then transported to the wholesale fish market (Shivaji Market) at Bombay, where it was auctioned for a lucrative price of Rs. 2.5 lakhs. The fish was filleted and processed for local and export markets.

A sample of 88 specimens was measured at the Shivaji Market and the size was found to range from 85 to 121 cm. The average length of the fish was found

Fig. 2. A view of the bulk of 'Ghol' catch auctioned at fish market at Bombay.

Fig. 3. 'Ghol' being filleted at fish market at Bombay.

to be 99.80 cm and the average weight 12.28 kg. The dominant mode was at 108 cm. The length-frequency distribution of the various size groups in the catch is presented graphically (Fig. 1).

An analysis of the stomach contents of 35 specimens at the market revealed semi-digested remnants of Horse mackerel *(Megalaspis cordyla)*, Golden anchovy *(Coilia dussumieri)*, Malabar sole *(Cynoglossus macrostomus)* and croakers *(Sciaena* spp.*)*. Most of the specimens had extroverted stomachs (70%) a characteristic feature of 'ghol'.

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