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The Indian Mackerel

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The Indian mackerel *Rastrelliger kanagurta* (Cuvier), forms one of the two commercially important pelagic fisheries of the west coast of India, the other being the oil sardine. On an average 65,342 tonnes of this fish were landed annually during 1958-65 period and in the years 1958 and 1960 the total catch exceeded one lakh tonnes. This fish is widely distributed in the Indo-Pacific areas extending from the African coast north of Durban to the Polynesian group of Islands. Therefore, the problems facing the mackerel fishery are being tackled on an international basis as recommended by the Indo-Pacific Fisheries council.

Valuable knowledge on the fishery and biology of the Indian mackerel have been obtained as a result of the Investigations carried out by the Central Marine Fisheries Research Institute on the west and east coasts of India. Some of the aspects on which information have been obtained relate to annual fluctuations in the fishery, age and rate of growth, spawning habits and environmental conditions. Further investigations along these lines are being continued.

The mackerel fishery along the Indian coast comprises of a single species viz., *Rastrelliger kanagurta* (Cuvier), while one more species, a deep-bodied form *R. brachysoma* (Bleeker), occurs in the Andaman waters. The Indian mackerel is mostly caught on the west coast which accounts for as much as 9% of the total catch. It is fished from Ratnagiri to Cape Comorin on the west coast, but the bulk of the fishery is concentrated between Ratnagiri and Quilon. It appears rather erratically in some parts of the east coast forming local fisheries near Madras, Kakinada, Visakhapatnam and some places off Orissa. In the Mandapam area, the fishing season extends from December to March and the best catches are obtained in January-February.

Even in the region of the main fishery along the west coast, variations are noticed in the total catch landed. The largest catches are usually recorded in the region between Ratnagiri (in Bombay State) and Ponnani (in Kerala State), while only moderate to poor catches are obtained south of Ponnani up to the Cape. The fishery as a whole is in vogue from August to March. While in the Mangalore-Ponnani region the fishery starts early (August-September) and lasts longer (terminating in March-April), in Mangalore-Ratnagiri region it is of shorter duration commencing later (October-November) and terminating earlier (February-March). In the Karwar and S. Kanara coast two peaks are noticed, one at the beginning and the other at the end of the fishing season.

The most common net used in the capture of mackerel along Southern Bombay and Mysore coasts is known as the *Ranpani*. It is a shore seine consisting 400 to 600 pieces

made of hemp or cotton yarn, joined together and operated by about 80 men with the help of five outrigger boats. In very few other shore seines in the world such large quantities of fish are caught as in the *Rampani* net and in a good fishing season it is not unusual to get in one operation alone over two million fish. One advantage in operating this net is that surplus mackerel can be impounded and kept alive for about a week, so that they can be sold later at favourable prices. Gillnets known locally as *Pattabola* are also used. The nets commonly employed along the Malabar coast (North Kerala) are boat seines such as *Pattenkulli*, *Ayila kulli*, and *Paithu vala* and the gillnet, *Ayila chalarala*; both operated from dugout canoes. Further south, boat seines are used from dugout canoes.

It is the juvenile mackerel of size 18 to 22 cm. that contribute most to the commercial catches in the post South West Monsoon months. But during the monsoon months irregular catches of both juvenile and adult mackerel of size range 7 to 24 cm usually occur. Towards the close of the season the fishery is mostly supported by large ones of length 21 - 22 cm.

Mackerel are normally surface feeders feeding both on phyto and zoo-plankton. Correlations between the food of the mackerel and the plankton organisms found in the environment have been noticed and it is felt that one of the causes for the movement of mackerel in dense shoals during the post monsoon months in inshore waters is the availability of plankton in the highest densities during that period. The intensity of feeding varies depending upon the state of maturity of the fish. There seems to be some selectivity in the feeding and some plankters such as *Sagitta*, stomatopods and spionid larvae are avoided. Though some workers have found no difference between the food of the adults and juveniles, some others have observed carnivorous habits in the juveniles.

The spawning season of mackerel along the west coast is a prolonged one, extending from April to September. Observations on the spawning habits of this fish made at Vizhingam near Trivandrum indicated the possibility of two spawning periods, one in November-March and another in May-August. Off the Madras coast, this fish breeds during or after the North-East Monsoon as evidenced by the occurrence of young mackerel in March-April. About the same time this fish is presumed to breed off the Vizag coast also where there are indications that it spawns twice in the spawning season.

Sex differentiation takes place when it is about 12cm and the minimum size at which mackerel matures is 21-22 cm. The ova are released in batches. Observations made at Porto Novo suggest that the spawning takes place at night. Mackerel are believed to spawn in slightly deeper waters outside the usual range of our fishermen, but not far off from the coast. There appears to be good spawning grounds of this fish off Vizhingam and Madras coasts as judged by the occurrence of post larvae and young ones in these two areas.

In regard to age of mackerel, it has been deduced from length frequency studies that the normal modal size of one year old mackerel is 12 to 15 cm and it reaches a length of 21-23 cm at the end of the second year of its life. The determination of the age of mackerel by length frequency analysis is rendered difficult due to the prolonged spawning

and recruitment of mackerel broods in batches into the fishery. A view is held that the mackerel grows much faster (2-3 cm per month) while it is young and 10-14 cm fish may actually belong to 0 year class and the fish attains 21-22 cm at the end of first year of its life. Growth checks or rings have been observed in the scales of mackerel of over 23 cm (in some between 22 to 23 cm also) and they have been interpreted as spawning marks. But if the latter view is accepted, these may even be considered as age rings.

Mackerel move in shoals and each shoal comprises of individuals of uniform size. They approach the near shore waters at a time when the salinity and temperature show a rising trend after the minimum values. Though mackerels are pelagic fishes, the possibility of a dispersed and demersal phase in their life history is not ruled out as they have been caught in trawl nets and bottom set gill nets. Observations made on the west coast show that the bigger size groups show high tolerance towards the increase in the temperature and salinity in contrast to the smaller size groups which usually occur in good numbers only at a certain time (June-September) when the salinity values and temperature are low.

The highly fluctuating nature of the mackerel fishery may be seen from the following table wherein figures of annual mackerel landings from 1958-'65 are given.

TABLE
Landings of mackerel during 1958-'65 (in metric tons)

Year	Mackerel	Percentage of Mackerel to total catch
1958	1,23,282	16.31
1959	62,198	10.65
1960	1,33,655	15.22
1961	34,485	5.04
1962	29,103	4.52
1963	76,980	11.74
1964	23,863	2.78
1965	39,169	4.80
Average	65,342	8.90

During this period the mackerel on an average constituted 8.90% of the total marine fish catch. The highest catch was in 1960 and the lowest in 1964. An interesting feature noticed during the period was that whenever there was a good mackerel fishery there was correspondingly a good oil sardine fishery. However, a steep rise in the oil sardine catches was noticed during the years when the mackerel fishery failed. Though the reasons for such marked fluctuations cannot be adequately given, some of the factors generally attributed to poor catches are spawning failure resulting in the poor recruitment to the fishery, lack of food and adverse environmental conditions.

During the time of glut due to lack of transport and cold storage facilities, only small part of mackerel catch is consumed in fresh state, the rest being cured either by dry or wet process or pickled according to Colombo method. In the wet process, the required quantity of salt is split up and applied on the fish for three successive days. The cured product is not sun dried, but left moist and soft. Pickling is done by thrusting salt and a small piece of tamarind (called "Gorukapuli" in Malayalam) into the abdomen and the pickled mackerel is mostly exported to Ceylon. Unsold mackerel are beach dried and then converted into manure for use in Cocoanut, Coffee and Tea plantations. Parts like viscera, guts and gills left over from the cleaning of the fish are at times used in the preparation of fishmeal which forms good protein food to cattle and poultry.

A tagging programme has been initiated on the west coast at various Substations and Units of the Central Marine Fisheries Research Institute in order to study the rate of growth, movements and migratory habits of the mackerel. It is hoped that as a result of the investigations that are being carried out, additional knowledge will be gained on the different aspects of the biology and fishery of mackerel which will ultimately lead to a rational exploitation of the fishery.
