

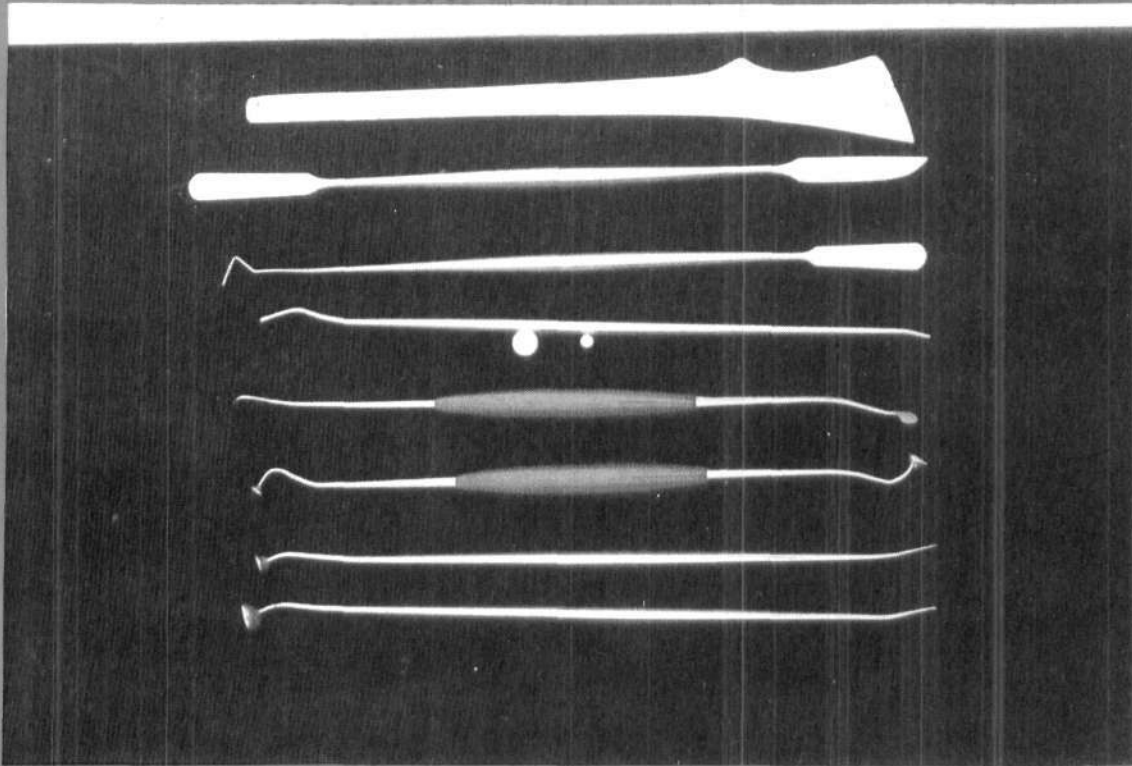


# समुद्री मात्स्यकी सूचना सेवा

## MARINE FISHERIES INFORMATION SERVICE

No. 112

JUNE 1991



तकनीकी एवं TECHNICAL AND  
विस्तार अंकावली EXTENSION SERIES

केन्द्रीय समुद्री मात्स्यकी CENTRAL MARINE FISHERIES  
अनुसंधान संस्थान RESEARCH INSTITUTE  
कोचिन, भारत COCHIN, INDIA

भारतीय कृषि अनुसंधान परिषद  
INDIAN COUNCIL OF AGRICULTURAL RESEARCH

## **A REPORT ON THE OFF-FLAVOURED OIL SARDINE, *SARDINELLA LONGICEPS*, CAUGHT OFF MANGALORE COAST IN MAY, 1991\***

The oil sardine, *Sardinella longiceps* is one of the principal species caught by the purse seiners operating from Mangalore. As the 1990-'91 fishing season witnessed a sharp decline in the catches of this species as compared to the fishery of 1989-'90, there was good demand for the fish in local markets. On 3- 5- 1991, it was reported that the oil sardines landed by the purse seiners at Mangalore had a peculiar flavour described differently by the consumers as that of tender mango, diesel oil or mushy taste. Consequently, the dishes prepared from the fish were discarded unconsumed. A perusal of the literature shows that such a phenomenon of off-flavour in the oil sardine caught from the Indian coast has not been reported earlier.

On 3- 5- '91, 4 purse seine boats which operated off Panambur, Hejmadi and Kaup (located north of Mangalore) at a depth of 10-15 m landed an estimated 20 tonnes of oil sardine. The fish was as usual sold for Rs. 5/kg by auctioning to the local merchants. As there was good demand for the fish, most of the catch was sold locally and only a small quantity was transported to Karwar and Kerala. On 4- 5- '91, there was only stray landings of oil sardine, but on 5- 5- '91, the fishes caught from the same area and those caught off Kumbala, about 35 km south of Mangalore, on 9- 5- 91, had the same characteristic taste. Consequent to this the price fell from

Rs. 5 to Rs. 2.50/kg and in the local markets there were only few buyers for the fish. During the period (3- 5- '91 to 10- 5- '91) about 50 tonnes of affected oil sardine was estimated to have landed.

The fresh fish did not show any sign of external spoilage or change in texture. However, on cooking, the peculiar taste was reported. There was also no report of any after effects on their consumption. The fishes were discarded mainly due to their non-acceptable taste.

The occurrence of off-taste in oil sardine was first reported on 3- 5- '91 from the areas north of Mangalore and subsequently from the southern region. The entire phenomenon lasted for about 8 days. The fishes caught on 11- 5- '91 were normal in taste.

The biological observation of the affected fish sample showed that the size range of the fish was 145-199 mm total length. The size group 170-174 mm was predominant on 4- 5- '91 and 5- 5- '91 and 180-184 mm on 6- 5- '91 and 7- 5- '91. Female fishes were more abundant on all the days. More than 80% of the males were in maturity stage II and the rest were in stage III. Among females, fishes of maturity stage II were predominant followed by spent recovery and stage III fishes. No external lesions or parasites were observed in the affected fish.

\* Prepared by P. U. Zacharia, K. Sunilkumar Mohamed, G. S. Bhat, D. Nagaraja, C. Purandara and Uma, S. Bhat, Mangalore Research Centre of CMFRI, Mangalore - 575 001.

The gut content analysis of the fishes collected on 4- 5- '91 and 5- 5- '91 showed full stomach condition. The diatom *Coscinodiscus* spp. (60-180  $\mu$ ) was the dominant food item (98%) in the stomach content. The other phytoplankters present in very few numbers were *Ceratium*, *Rhizosolenia*, *Planktoniella*, *Pleurosigma* and *Navicula*. Copepods and decapod larvae were also present in very small numbers. Strangely, large amounts of free oil was seen inside the stomach. The analysis of the stomach contents of the fish obtained on 6- 5- '91 and 7- 5- '91 indicated empty stomachs. The total lipid content of the muscle tissues of Sardines was analysed from samples obtained four hours after its capture using the Chloroform-methanol method. The analysis showed very high lipid content in the muscle tissue ( $25.3 \pm 12.1$  mg /100 mg dry weight).

The surface and bottom seawater samples and surface plankton samples were collected on 5- 5- '91 and 6- 5- '91 from off Panambur (one of the areas from where the affected fish was reported) at 10 m depth to study the environ-

TABLE 1. Hydrographic parameters of the inshore waters off Panambur (Mangalore) and percentage composition of plankton collected from 10 m depth on 5- 5- '91 and 6- 5- '91

Parameters	Surface		Bottom
	5-5-'91	6-5-'91	6-5-'91
Air temperature °C	NA	37.60	NA
Water temp °C	NA	34.80	33.60
Dissolved Oxygen	NA	4.09	3.59
Salinity ml/l (ppt)	36.34	35.35	35.53
pH	8.15	8.07	8.10
Transparency (extinction coeff.)	NA	0.60	-
Phosphate $\mu\text{g-at/l}$	1.02	0.78	0.48
Nitrate $\mu\text{g-at/l}$	1.80	0.96	1.20
Nitrite $\mu\text{g-at/l}$	0.04	0.02	0.03
Silicate $\mu\text{g-at/l}$	8.0	11.00	8.00
<b>Plankton :</b>			
Diapalceiment volume			2.5 cc
Total numbers/10 min haul			17,010
Copepods			13.23%
Chaetognaths			4.23%
Decapod larvae			9.52%
Lucifer			2.12%
Medusae			0.53%
Appendicularia			4.23%
<i>Coscinodiscus</i>			66.14%
Other diatoms			Insignificant

mental conditions (Table 1). The surface and bottom water temperature (34.8 and 33.6° C respectively), salinity (36.34 and 35.53 ppt), dissolved oxygen (4.09 and 3.59 ml/l), pH (8.07 and 8.15) and other parameters such as phosphate, nitrate and nitrite did not show any deviation from the normal for the season. However, the content of silicate was significantly below the normal. The transparency of the water was also high (0.6 extinction coefficient). Plankton analysis showed that the diatom *Coscinodiscus* spp. was the major component of the plankton forming 66%. Interestingly most of the *Coscinodiscus* cells showed absence of aereolas and presence of yellowish chromatophores pointing to the fact that these might be dead cells.

Although large scale mortality of oil sardine between Mangalore and Mulky along the Dakshina Kannada coast due to contaminated foul discharge from the estuaries of the rivers draining into the sea south of Mangalore is on the record (Hornell, *Madras Fish. Bull.*, 4 : 71 - 126, 1910), the off-flavour phenomenon as observed at present is not so far reported from this coast. While the exact reason for the present phenomenon could not be assigned from the data at hand, the presence of appreciable number of *Coscinodiscus* spp. in the plankton samples, the predominance of this diatom in the gut content and the relatively low silicate content and high transparency of the water would indicate the possibility of formation of a bloom of *Coscinodiscus* in the region just prior to the report of this phenomenon. The occurrence of such a bloom in the area is not unusual (Mathew *et al.*, *Mar. Fish. Infor. Serv., T & E Ser.*, 84 : 1988) and a *Coscinodiscus* bloom occurred last in the area during April-May, 1989. Further, it is interesting to note that *Coscinodiscus* being a disc shaped diatom has large number of oil filled vacuoles, which is an adaptation for its floatation. Feeding of such a lipid laden diatom could bring about changes in the chemical composition of fish flesh. Earlier studies on the seasonal lipid composition of oil Sardine muscle tissues have indicated only 5-8% lipid during the months of April and May (Sen and Chaluria, *Patindia*, 18 (4) : 39 - 41). However, in the present case, significantly higher content of lipid was observed in the muscle tissues. It is reported that high levels of lipid (above 25%) as observed presently would impart an oily flavour and give rise to a soft mushy taste (Howgate and Hume, *World Conference on Aquaculture Reviews, Venice*, 1981, 40 - 43). Whether such a condition might be the

reason for the present off-flavour in the oil sardine needs further investigation. Moreover, most of the fish examined after 6-5-'91 had empty stomachs indicating the active avoidance of this food. Such active avoidance of blooms by oil sardines has also been reported earlier (Raja, *Bull. CMFRI*, **16**, 1969).

Howgate and Hume (*op. cit.*) have reported that flavourous compounds in the water can be readily absorbed to the flesh causing taints. Taints can be caused from oil spills or phenols from industrial waste. It is interesting to note that the characteristic mango flavour/aroma could be caused by a phenolic compound. Although the Mangalore Chemicals and Fertilizer (MCF) factory

discharges its effluents, mainly composed of urea and ammonia, into the near shore open sea, a few kilometers north of Mangalore, there is no report of the presence of any phenolic compounds in the effluent. Similarly, most of the local people believe that the peculiar taste in the fish could have been caused by the presence of oil contamination. However, none of the information gathered at present point to this. Moreover, none of the other pelagic fishes caught from the region during the period showed this off-taste.

The authors are grateful to Dr. P. V. Rao, Officer-in-charge, MRC of CMFRI, Mangalore for providing facilities and for correcting the manuscript.