Trichodesmium Bloom and the Failure of Oil Sardine Fishery

by

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The occurrence of *Trichodesmium* blooms off Mangalore from the latter half of February to early March in 1968 and its adverse effect on the oil sardine fishery have been reported in this account. Some of the environmental factors such as temperature, salinity, oxygen content and wind velocity and direction associated with the blooming have also been discussed.

The oil sardine fishery constituting over 20% of the marine fish landings along the Mysore coast with the season extending from August to April, appeared to have suffered an abrupt set back during February — March 1968. In the course of experimental fishing operations in the 12 and 25m. areas off Mangalore, extensive blooms of *Trichodesmium* spp., comprised mainly of *T. erythraeum* were observed from the latter half of February to early March.

Blooming of this blue-green alga has been noticed in March along this coast (Prabhu *et al*, 1965), but the commencement of the present one was a little earlier, in late February, when the blooms were so dense that the surface appeared to have been covered with light brownish scum, emanating a pungent smell all over the area. Even a 5-minute surface haul with a half-metre plankton net was sufficient to clog the net. The plankton was composed of these algae almost to the exclusion of other plankters as was observed earlier. Since the blooming of the alga coincided with the sudden disappearance of oil sardine shoals, the data in respect of this fishery and the occurrence of *Trichodesmium* for the years 1966 to 1968 were examined in order to study the relationship, if any, between them (Table I).

Table I

Temperature, salinity, *Trichodesmium* occurrence and sardine landings.

Year	Oil sardine (Kg.)		*Trichodesmium* (Nos./c. c.)		Temperature (°C)		Salinity (‰)	
	Feb.	Mar.	Feb.	Mar.	Feb.	Mar.	Feb.	Mar.
1966	1,31,942	31,226	2,140	680	29.0	29.8	33.28	33.85
1967	4,06,443	2,37,482	Nil	280	28.1	29.3	33.01	34.15
1968	Nil	72	6,30,000	5,60,000	28.2	29.5	35.01	37.00

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It is evident from the table that the oil sardine landings were the best during February — March 1967 and poorest in 1968. Comparing the fishery and the *Trichodesmium* bloom, the latter appeared to have profoundly affected the fishery in an adverse manner, as evident from a clear inverse relationship existing between them. *Trichodesmium* counts (filaments) per c.c. of a standardised volume during February—March were as high as 6,30,000 in 1968, whereas they were 2,140 in 1966 and practically negligible in 1967, corresponding to the total oil sardine landings of 72; 1,63,168 and 6,43,925 kg. respectively. Such a deleterious effect of the algal bloom on the tuna fishery in the region around Minicoy Island has also been reported (Nagabhushanam, 1957). In a recent account (Qasim, 1971) on some characteristics of a *Trichodesmium* bloom in the Laccadives in April 1968, the author has given a gist of the views expressed earlier by various workers on the probable inhibitory effect or otherwise of *Trichodesmium* bloom on marine fisheries. The author has also stated that no dead fish or any other animal were seen during the bloom either in the sea or around the island and coral reef. However, although instances of fish mortality have also been associated with the blooming of *Trichodesmium* spp. (Panikkar, 1967), no such incidence was noticed during the present study probably because the fishes had avoided this area. Due to death and decay of these algae, the oxygen content is likely to get depleted in the environment resulting in asphyxiation. It was observed that the oxygen values prior to and after the blooming varied from 3.84 to 4.37ml/L and 3.36 to 4.99 ml/L respectively, whereas during the bloom period it was as low as 2.50 ml/L Further, the emanation of pungent odour is suggestive of the liberation of chlorine. Perhaps due to these factors the fish forsake such areas. With a view to study the effect of the environmental factors, namely temperature and salinity on the fishery, the data pertaining to these have also been analysed. The surface temperature was lowest in 1967 coinciding with the best landings of oil sardine. Although the temperature in 1968 was also low as in 1967, the fishery turned out to be a failure perhaps because of the *Trichodesmium* blooms. Except in 1968, when the salinity values and *Trichodesmium* counts were high and the oil sardine catch very poor, no inter-relationships among these factors were discernible during the other years.

Interpolating the data on wind velocity and direction, it was observed that during the bloom period the wind velocity was moderate (00 to 18 mph) and the direction predominantly east--north-east or north-north-east, whereas during the pre-and post-bloom periods the velocity ranged from 00 to 18 mph, and 00 to 30 mph., respectively, the wind direction being mainly east or east-south-east during both the periods. From the pattern of coastal circulation, a reversal of current from anticlockwise to clockwise direction is known to take place during February (Subramanyan 1959). This change of circulation of current and the predominantly east--north-east and north-north-east winds coincided with the blooming of *Trichodesmium.*

Although a revival of the oil sardine fishery was noticed following the disappearance of the *Trichodesmium* blooms in 1964 (Prabhu, 1965), no such instance of improvement of the fishery was noticed in 1968, when the blooming was more intensive and of a longer duration. It was also of interest to

note that the blooms which were restricted to the 25m. region in February 1968 had shifted towards the 12m. area in March which might be due to the increase in wind velocity. This suggests that they might be occurring farther in the offshore regions also which would act as a barrier for the movement of pelagic shoals into the inshore area. The detection of such blooms in the offshore waters, in time, would therefore be useful as an indicator of a poor oil sardine fishery in the inshore region.

References

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