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# ***Chattonella marina* blooms and its impact on the coastal fishery resources along north Kerala coast**

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In north Kerala region, a widespread and high density bloom of *Chattonella marina* occurred in the first week of September 2002. The bloom showed a discontinuous distribution and extended over a distance of about 50 kilometers along the coast, from

Konadu near Calicut to Mahe near Thalassery. The muddy green coloured bloom was very noticeable at Kappad, where it extended from the shoreline to about a distance of about 3 kilometers towards the sea. It was visible as streaks and patches in other areas.

Analysis of phytoplankton in the bloom region showed a very high density of *C. marina*,  $28 \times 10^7$  cells  $l^{-1}$  at Kappad on the first day of the bloom. High densities of few other phytoplankton were also observed and these included *Coscinodiscus asteromphalus* at a density of  $8 \times 10^4$  cells  $l^{-1}$ , *Pleurosigma normanii* at  $2 \times 10^4$  cells  $l^{-1}$  and *Noctiluca sigma* at a density of  $4 \times 10^4$  cells  $l^{-1}$ . By eighth day, density of *C.marina* had decreased considerably to 4234 cells  $l^{-1}$ . *C.asteromphalus* (1312 cells  $l^{-1}$ ), *P.normani* (22 cells  $l^{-1}$ ) and *N. sigma* (552 cells  $l^{-1}$ ) were the other species of phytoplankton present. The density of the harmful algae had reduced to 2200 cells  $l^{-1}$  after three weeks, while the density of *C.asteromphalus* had increased to 38,400 cells  $l^{-1}$ , *P.normanii* to 164 cells  $l^{-1}$  and *Noctiluca sigma* to 235 cells  $l^{-1}$ .

The density of *C. marina* was very low at Konadu when compared to that of Kappad. On the first day *C.marina* was present at a density of 40,000 cells  $l^{-1}$  along with the diatom *C.asteromphalus* at a density of 8100 cells  $l^{-1}$  and *N.sigma* at 120 cells  $l^{-1}$ . By the eighth day the density of harmful algae had decreased sharply to 2815 cells  $l^{-1}$ , while the diatom *C.asteromphalus* increased to a density of 13,200 cells  $l^{-1}$ . *P.normani* at a density of 1350 cells  $l^{-1}$  and *N.sigma* at 5500 cells  $l^{-1}$  were the other diatoms present. On the 22<sup>nd</sup> day *C.marina* was present at very low densities of 480 cells  $l^{-1}$ . The density of *C.asteromphalus* had increased to 45600 cells  $l^{-1}$ , *P.normani* to 1730 cells  $l^{-1}$  and *N.sigma* to 12,500 cells  $l^{-1}$ .

*C. marina* was not present at Chombala during the first week. By the second week *C.marina* bloom was noticed at this site and phytoplankton analysis showed that it was present at a high density of 1,70,000 cells  $l^{-1}$ . The harmful alga *Noctiluca scintillans* was also detected at a density of 100 cells  $l^{-1}$ . *C.asteromphalus* at a density of 24700 cells  $l^{-1}$ , *P.normani* at a density of 2300 cells  $l^{-1}$  and *N.sigma* at a density of 8100 cells  $l^{-1}$  were the other algae present. Sampling on the 14<sup>th</sup> day showed that the concentration of the harmful algae had decreased to 2990 cells  $l^{-1}$ , *N.scintillans* to 60 cells  $l^{-1}$  and that of *C.asteromphalus* to 2800 cells  $l^{-1}$  at the site. *P.normanii* and *N.sigma* were also present in the sample, but at very low densities. In September 2003 the bloom was severe with maximum cell density of  $135 \times 10^5$  cells  $l^{-1}$

<sup>1</sup> but was for a short period of 5 days.

A very low dissolved oxygen value of 0.22 mg  $l^{-1}$  was recorded on the 1<sup>st</sup> day at Kappad which slightly increased to 1.66 and 1.86 mg  $l^{-1}$  on the 8<sup>th</sup> and 22<sup>nd</sup> day. The dissolved oxygen content at Chombala during the bloom period was low, of 1.92 mg  $l^{-1}$  which increased to 3.52 mg.

The catch from the fishing crafts operating in the Calicut region are landed in the two major harbours namely Chombala and Puthiyappa and in the 3 major landing centers ( Koyilandy, Thikkodi and Kuriyadi) and 12 minor landing centers (Kappad, Edakkadavu, Kavalad, Koloth, Moodadi, Muthaya Kadappuram, Valavil Kadappuram, Payyoli, Kolavi, Badagara, Madappaly and Mahe). The landing from all these sites using gears viz. outboard trawl net (hand trawl) (OBTN), outboard drift net (OBDN), outboard ring seine (OBRS), outboard gill net (OBGN), and country craft gill net (CCGN) were used for the study. These gears generally operate within a distance of 55 km from the shore.

Fishery was found to be affected during the blooming of *C. marina* along the Calicut coast. Reduction in catch from all the gears was observed. During the prolonged bloom of *C. marina* along the Calicut coast, a shift in the community structure with a dominance of fishes belonging to higher trophic levels was observed. Species which were mainly zooplankton feeders were entirely absent and these included *Stolephorus* spp, *Thryssa* and *Leiognathus* which in turn resulted in the reduction in catch of the groups which mainly fed on these zooplankton feeders such as *Caranx* spp. and *Johnius* spp. A significant change in fishery was an increase in catch of the predatory fishes mainly, *Euthynnus*, *Trichurus*, *Carcharinus*, *Saurida*, *Scoliodon*, *Scomberomorus*, and *Sepia* spp which occupies the topmost trophic level. The catch per unit per day for *Cynoglossus*, *Johnius*, *Thryssa* and *P. stylifera* in the outboard trawl net showed significant variation ( $P < 0.05$ ), whereas *M.dobsoni*, *Penaues indicus* did not show any significant variation ( $P > 0.05$ ). The landing of *Euthynnus* spp. in outboard drift net was high during the bloom period from that of the nonbloom period and the variation in CPUE was significant ( $P < 0.05$ ). Demersal fishes *Arius*, *Muraenosox*, *Priacanthus*, *Pristipomoides* spp and the ray *Himantura* spp occurred in the fishery only during the bloom period.

The clupeid *Albula vulpes* and the sailfish *Istiophorus* occurred in the period prior to the bloom, the former during the first instance of *Chattonella marina* bloom and the latter during both the blooms.

Taxonomic diversity studies indicated a change in the community structure of commercial finfishes, crustaceans and molluscs due to the bloom of *C.marina*. Though the species numbers did not vary between the bloom and the non bloom period, the taxonomic distinctness differed indicating a change in the community structure. Funnel plots indicated the deviation in taxonomic distinctness during the bloom period from the theoretical mean for the region. Significant variations were observed in the bloom month of September 02 and more in the post bloom

month of October 02. The effect of the bloom on the fishery appeared to be temporary reviving soon after the subsidence of the bloom. However, the economic losses were high in the year in which the bloom was prolonged since the fishermen abstained from fishing due to the absence of fish shoals and low fish abundance.

Subsequent to this, mass mortality of green mussels of the region was also observed. Besides fishes and mussels, the mole crab *Emerita* sp. was also found to be severely affected and these were found washed ashore all along the Kappad beach on 4/9/02. At Chombala, the shells of the bivalve *Mactra violacea* with decayed meat was found washed ashore in large numbers on 13/9/02.