



Short Communication

Revival of bleached *Zoanthus sociatus* (Ellis & Solander, 1786) in the intertidal waters of Thikkodi, Malabar coast, Kerala

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Abstract

Revival of SST induced bleached anthozoan; *Zoanthus sociatus* in the intertidal zone of Thikkodi, Calicut was investigated for a period of 67 days from May to July 2010. Regaining of chlorophyll pigments of symbiotic zooxanthellae in the bleached *Zoanthus* colonies was correlated with reduction in SST indicating a temperature linked bleaching.

Keywords: *Zoanthus*, bleaching, revival, SST, Malabar coast

Introduction

Unicellular zooxanthellae occur as symbionts in all hermatypic corals. They are also present in many other reef cnidarians such as hydrozoans, scyphozoans and anthozoans. Anthozoans are soft bodied marine animals commonly known as green sea mat or button polyp found usually in shallow reef zones of tropical marine waters. The importance of zooxanthellae as primary producers and their productivity was reported for the first time from Minicoy lagoon of Laccadive Archipelago (Kaladharan, 2000). Although a wide variety of environmental stresses, ranging from high irradiance, UV levels to runoff and pollution have been shown to induce symbiont bleaching in a variety of host species (Salih *et al.*, 1998), the main cause of bleaching is attributed to high sea surface temperatures (Glynn, 1996). Vivekanandan *et al.* (2009) projected a coral vulnerability in the Indian seas with reference to SST.

Material and Methods

Samples of *Zoanthus sociatus* found attached in the laterite rocks were collected from the intertidal area of Thikkodi, Calicut (11° 28.2' 49.03" N lat.; 75° 37.2' 38.33" E long.). The geo-location was recorded by using portable GPS (Garmin 12) for subsequent observations. The sea surface temperature (SST) was recorded using a bucket

thermometer. Chlorophyll pigments (*a* and *b*) were estimated from oral disc dissected from the bleached as well as normal polyps. The oral disc (one g) containing zooxanthellae were immersed in 10 ml acetone (90% v/v) overnight. The acetone extracts thus saved were measured for chlorophyll *a* and *b* in UV-VIS Spectrophotometer (Hitachi) following the method of Arnon (1949).

Results and Discussion

Zoanthus sociatus populations inhabiting the laterite rocks at an area of 0.25 sq km in the intertidal regions of Thikkodi were found bleached extensively, the polyps appeared regressed and were devoid of green colour (Fig. 1) during the third week of May 2010. Very few colonies usually not subjected to emersion even during the lowest tide appeared green and remained healthy. The surface temperature at the intertidal area during this period ranged from 30° to 34°C in the day time. Hence the reason for bleaching was believed to be the rise in SST. Zoanthids are known to expel their zooxanthellae when the polyps are placed under stress conditions such as salinities slightly higher than 35 ppt, temperatures above 30°C or under starvation (Amada, 1971).

The chlorophyll concentration in the bleached colonies of *Zoanthus* was 86.5 % lesser than that of the normal polyps (Table 1). Subsequent observation on 3 July 2010 at the same spot showed gradual



Fig. 1. Bleached *Zoanthus* at Thikkodi intertidal region on 21 May 2010



Fig. 2. Partial revival of *Zoanthus* colonies on 3 July 2010 (after 42 days)

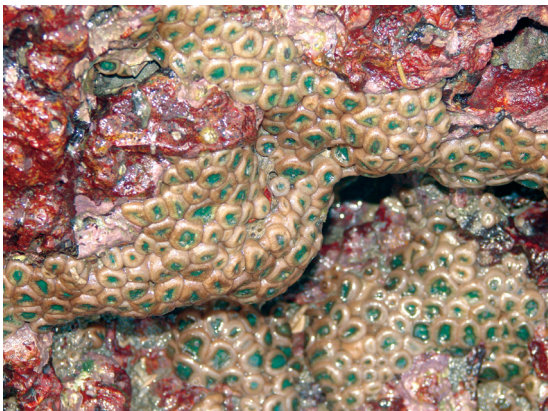


Fig. 3. Revival of *Zoanthus* colonies on 27 August 2010 (after 67 days)

revival of bleached colonies of *Zoanthus*. The polyps were still partially regressed but looked slightly green (Fig. 2). The chlorophyll concentration from these reviving *Zoanthus* colonies was 0.0322 mg/g wt of the tissue which was 122 % higher than the

completely bleached polyps and 70 % lesser than the normal polyps (Table 1). The surface temperature was 28.5° - 30° C. According to the Indian Meteorological Department, 2010 was the warmest year since their record keeping, which began in 1901. The mean atmospheric temperature for March and April was also the highest till date, measuring 26.3° C (2° C above normal) for March and 29.1° 2C (2° C above normal) for April.

On 27 August 2010 (after 67 days), we observed that the bleached colonies of *Zoanthus sociatus* were still alive and their oral disc had become darker than the previous observation (Fig. 3). The chlorophyll content showed increase over the previous observation (Table 1). Reimer *et al.* (2007) observed seasonal changes in the morphology of symbiotic *Symbiodinium* spp. in *Zoanthus sansibaricum* from southern Japan. They found that significant decrease in percentage of normal zooxanthellae was consistently correlated with higher seawater

Table 1. Chlorophyll content in healthy, bleached and reviving populations of *Zoanthus sociatus* in the intertidal region of Thikkodi

Sampling date	Sea surface temperature (°C)	Anthozoan samples	Total Chl. (mg/g)	Chl. a/b ratio
21-5-2010	30-34	Normal	0.107	2.57
21-5-2010	30-34	Bleached	0.015	3.14
03-7-2010	28.5-30	Reviving	0.032	3.72
16-7-2010	28.0-29.5	Reviving	0.037	2.79
27-8-2010	24.0-26.5	Reviving	0.074	2.65

temperatures (18.5° - 28.5° C) for two weeks. It is reported that the aposymbiotic polyps may die under starvation (Amada, 1971).

The present observation shows the rejuvenation capability of zooxanthellae in the bleached *Zoanthus* colonies with the restoration (reduction) of surface temperature to the normal levels.

Acknowledgements

We are grateful to the Director, CMFRI and the Scientist-in-Charge, Calicut Research Centre of CMFRI for encouragements and facilities.

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Received : 04/09/10

Accepted : 28/02/11

Published : 15/06/11