

# Effects of Deposit Feeder *Stichopus Japonicus* on Algal Flourish and Organic Matter Contents on Bottom of Enclosed Sea

Kitano, Michio.<sup>1</sup>, Kurata, Kengo.<sup>1</sup>, Kozuki, Yasunori.<sup>1</sup>, Murakami, Hitoshi.<sup>1</sup> Yamasaki, Takayuki., Yoshida, Hideaki.<sup>1</sup>, Sasayama, Hiroshi.<sup>2</sup>

1. Graduate School of Engineering, The University of Tokushima, Japan
2. Port and Airport Technical Investigation Office, The Shikoku Regional Development Bureau, Ministry of Land, Infrastructure and Transport, Japan

## 1. INTRODUCTION

It has been reported that dead algae and attached organisms are deposited on the bottom and turned to sediments with rich organic matter in artificial lagoon and enclosed sea. Algae growing in the enclosed sea may inhibit eutrophication because they absorb nutrients in water. However, dead algae often cause deoxygenated and anaerobic condition in sediments after they are deposited on the bottom. We then focused the ecology of deposit feeder *Stichopus japonicus* inhabiting inner bays around Japan, and found that *S. japonicus* inhibited the anaerobic process in the sediment with decreasing amount of sulfide. The present study investigates whether *S. japonicus* inhibits the algal flourish and influences the sediment properties such as organic matter contents.

## 2. METHODS

Aquarium experiments were performed at the Komatsushima port of Tokushima, western Japan. The aquaria used in the experiments were supplied with water directly from the adjacent sea (6 L/min), laid with the sand of 10 cm depths, and lighted at intervals of 12 hours. Six aquaria containing with a sea cucumber from Komatsushima port and six aquaria without it were used in the experiments. Sediment samples down to a depth of 1.5 cm were taken using syringe samplers biweekly. Sediment samples were measured for chlorophyll *a* and pheophytin *a* from surface to 0.5 cm, and for TOC (total organic carbon) and TN (total nitrogen) contents from surface to 0.5 cm and from 1.0 to 1.5 cm. Suspended solids flowed into aquaria were gathered and analyzed for TOC, TN, Chl. *a* and Pheo. *a*.

## 3. RESULTS

Water temperature ranged between 9 and 15°C during December 2000 and April 2001. Salinity ranged between 32 and 34‰. Algae began to cover the bottom of the aquaria without *S. japonicus* after 2 weeks, whereas they did not show the growth in the aquaria containing sea cucumbers. Chl. *a* concentration in the surface sediments of the aquaria with *S. japonicus* ( $6.1 \pm 3.6 \mu\text{g/g}$ , the mean value  $\pm$  the standard deviation) was significantly lower than that without it ( $60 \pm 17 \mu\text{g/g}$ , U-test,  $p < 0.05$ ). Pheo. *a* concentration in the surface sediments of the aquaria with *S. japonicus* ( $0.9 \pm 0.09 \mu\text{g/g}$ ) was significantly lower than that without it ( $4.5 \pm 1.0 \mu\text{g/g}$ , U-test,  $p < 0.05$ ). TOC concentration in the surface sediments of the aquaria with *S. japonicus* ( $2.6 \pm 1.3 \mu\text{g/g}$ ) was slightly lower than that without it ( $4.0 \pm 1.2 \mu\text{g/g}$ ). These results showed that algal biomass and organic matter concentration at the bottom were decreased in the presence of *S. japonicus*. Therefore, the ecology of *S. japonicus* proved to inhibit algal flourish and decrease the concentration of organic matter deposited on the bottom in enclosed sea areas.