Stresses and recovery process of blood cockle *Tegillarca granosa* in hyposaline and turbid water

Albert Manuel[1*], Kazumasa Hashimoto[1], Takeo Kurihara[1]

[1]Fisheries Technology Institute, Japan Fisheries Research & Education Agency, Nagasaki 851-2213

Introduction

Blood cockle *Tegillarca granosa* is a popular shellfish fishery resource and cultured in the Asia region, but not in Japan, even though found in the bay of Ariake, Japan. This species inhabits shallow mudflats and is thought to have a high tolerance level against different types of stressors. However, with on-going changes to coastal marine environmental factors due to anthropogenic changes, climate change, etc., this particular species tolerance level to prolonged low salinity and high turbidity levels which occur during the rainy season is unknown. Therefore, this study focused on exposing individuals to low salinity and high turbidity conditions for a certain period and then examining if they recover after a recovery period.

Akira Yamaguchi

Original

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Images of *Tegillarca granosa* & Experimental Set-Up.

Materials & Methods

A 2 x 2 experimental design with six replicate tanks were set up at water temperature at 20 ± 1° C. During the exposure period of 2-weeks, salinity (10, 30 psu) and turbidity levels (0, 900 mg L^{-1}) were prepared and stocked with 2 individuals' $tank^{-1}$. After the exposure period, exposed individuals were then introduced to a 1-week recovery period where salinity and turbidity levels were restored to normal conditions of 30 psu and 0 mg L^{-1}, respectively. As physiological health indicators, gaping behaviour, clearance rate (CR), survival rate and glycogen content measurements were recorded.

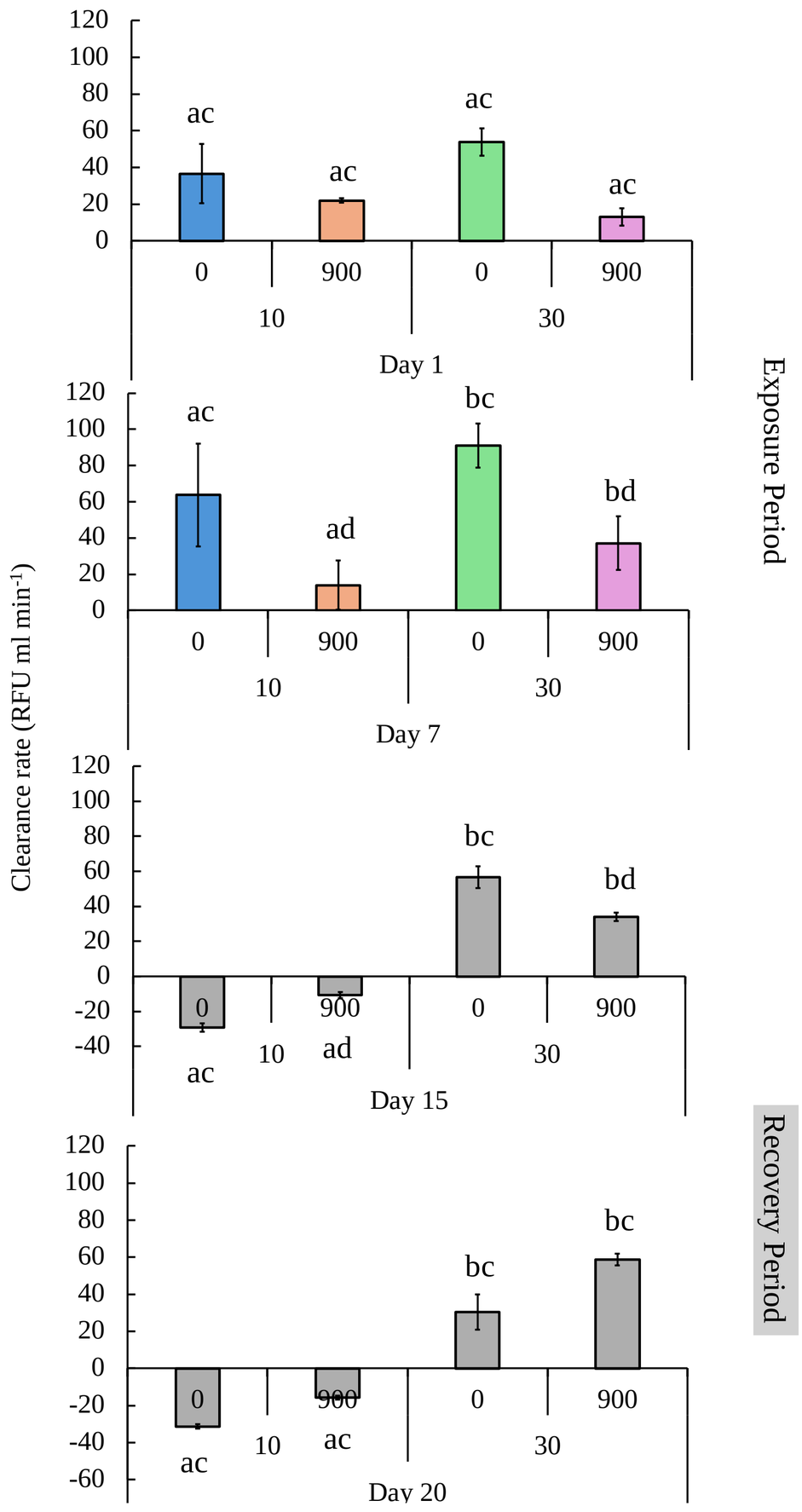

Fig. 2 Clearance rate of *T. granosa* individuals recorded on Day 1, 7 (exposure period) and Day 15, 20 (recovery period) during the experimental period.

Results

- Gaping activity data showed that 10 psu individuals, irrespective of turbidity, started opening their valves around Day 4 which was quite early compared to our previous experiment.
- During the exposure period, salinity and turbidity independent effect on CR were detected only on Day 7 ($P < 0.05$).
- There were no significant differences in glycogen content of foot during the exposure and recovery period except for turbidity independent effect on the recovery individual.
- Even though there were signs of weakening, 100% survival rate was obtained across all treatments.

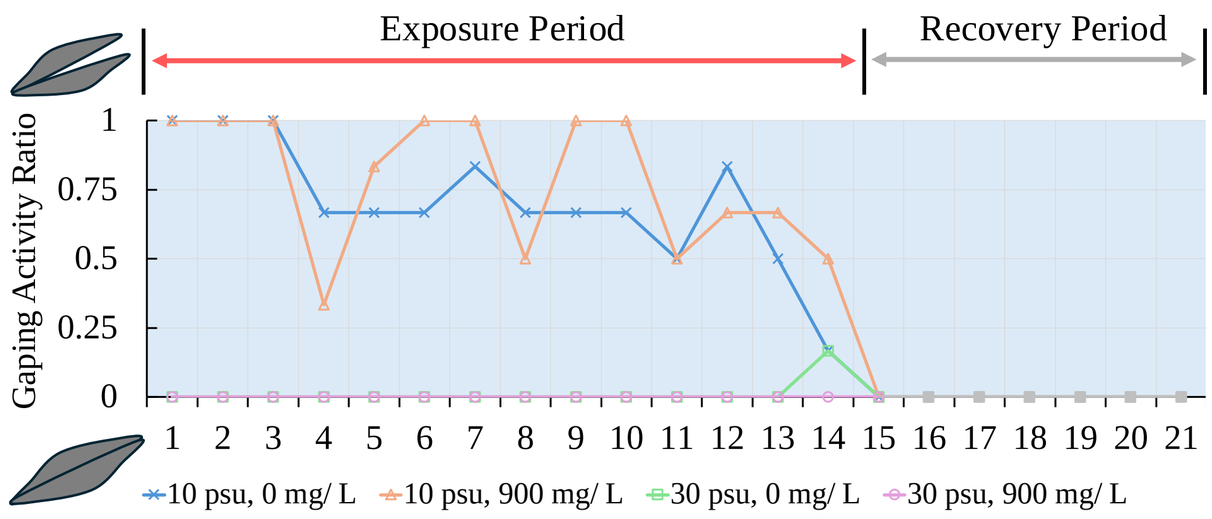

Fig. 1 Gaping activity of *T. granosa* individuals exposed to salinity levels (10, 30 psu) and turbidity levels (0, 900 mg L^{-1}) throughout the 2-week exposure and 1-week recovery period. Zero (0) on the vertical axis represents valve open and one (1) represents valves closed.

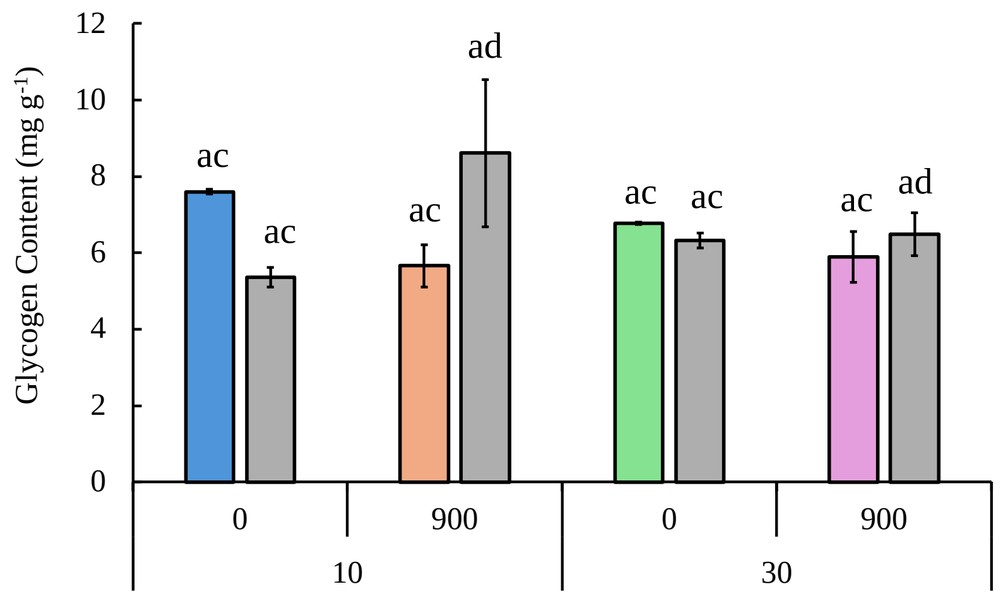

Fig. 3 Glycogen content of *T.granosa* foot of individuals exposed to salinity levels (10, 30 psu) and turbidity levels (0, 900 mg L^{-1}) after 2-week exposure and 1-week recovery.

Conclusion

- Exposed individuals experienced stress to some level of extent (evident in gaping activity and CR data).
- Nevertheless, stress was not terminal (100% survival rate).
- There is a need for future studies to investigate exposing individuals in the lab and returning them to the field for recovery.