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学位論文要旨

専攻名　生物圏生命科学

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題　目　Impact of temporal change of salinity stress in marine shellfish

(海洋性貝類に対する一時的塩分変化ストレスの影響)

Scientific consensus confirmed that coastal marine system is being threatened by anthropogenic global climate change. Several drivers of climate change including water bodies warming, sea level rise, ocean acidification and weather pattern change are directed to the coastal system. Aside from those drivers, increasing evens of low salinity due to extreme heavy rains events and freshwater runoff may also be affecting marine organisms. It has been well documented that the increasing precipitation was linked with climate change and there is potential of lowering salinity during periods of rainfall and runoff rivers or estuaries in coastal water.

In the present study, the effect of temporary hyposalinity stress on three kinds of high commercially values of marine shellfish were conducted. In the first experiment, growth, survival and lysozyme activity of adult Manila clam, *Ruditapes philippinarum* were investigated. In the second experiment, adult Akoya pearl oyster, *Pinctada fucata* were studied for its growth, survival, lysozyme and phenoloxidase activity. In the last experiment, growth, survival, lysozyme and phenoxidase activity were checked on adult giant abalone, *Haliotis gigantea*; and time required for hacthing and hatching succesful rate were checked on eggs stage of giant abalone.

In general, tested animals were exposed to 3h per day for 30 days of hyposaline stress, followed by recovery period mimic conditions typical for culture site at bays or estuaries experiencing heavy freshwater input, with a quick return to initial salinity (34 psu). As for giant abalone's eggs, hyposalinity exposure started after 5 h post fertilization, and carried out after 24h recovery period until two days after the first egg hatched.

One-way ANOVA showed that clams exposed to temporary salinity stress of 14 psu had a lower lysozyme activity compare to control (34 psu) and 24 psu temporary salinity ($P < 0.05$). On the oyster, mean values of lysozyme and phenoloxidase activity of oyster exposed to temporary hyposalinity 14 psu were lower than control (34 psu). However, lysozyme and phenoloxidase activity on adult stage of abalone kept at 20 psu temporary salinity had a lower values than control (34 psu). Investigation on the eggs stage, 100% of eggs exposed to 20 psu salinity for 3 h did not hatch. Moreover, temporary hyposaline stress postponed the time required to hatch and reduced hatching succesful rate of giant abalone eggs. In addition, there were no significant different on growth and survival between treatments for adult stage of three marine shellfish investigated in this studies.

External stress factor such as salinity is known can affect the immune parameters of marine bivalve species. Under the scheme of environmental factors alteration due to climate changes, our result showed that the immune parameter of three tested marine shellfish were affected by the temporary hyposalinity due to low lysozyme activity and low phenoloxidase activity. Considering the importance of marine shellfish in ecosystems and aquacultures, this result will be a valuable information to develop the adaptation and mitigation program in the future under climatic change scenarios.