

Effects of shade cloth on survival, moult, respiratory metabolism and nitrogen metabolism of Chinese mitten crab (*Eriocheir sinensis*)

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Abstract:

Light intensity and water temperature affect the growth and metabolism of *Eriocheir sinensis* during the culture process. In this study, a preliminary study was conducted on the survival, growth and oxygen and nitrogen metabolism of *E. sinensis* under different levels of shade cloth during laboratory farming. The aim of this study was to study the survival and moult rates of crabs by means of no shade cloth (NS), one layer of shade cloth (AS) and two layers of shade cloth (TS) for 28 days. Respiration, nitrogen metabolism levels and oxygen to nitrogen ratio were then studied in three groups of crabs using the static respiration method. The results showed that: 1) the shade cloth made the underwater light intensity of the AS and TS groups significantly lower than that of the NS group ($p < 0.05$), however, there was no significant difference in underwater light intensity between the AS and TS groups; 2) the shade cloth made the water temperature of the TS group significantly lower than that of the AS group ($p < 0.05$), and the water temperature of the AS and TS groups significantly lower than that of the NS group ($p < 0.05$); 3) the 28-day survival rate of the NS group was 95.8% higher than that of the AS group (87.5%), and both were higher than that of the TS group at 62.5%; 4) No molting was found in the NS and AS groups within 28 days, while the molting rate of the TS group reached 8.33%; 5) There was no significant difference in the oxygen consumption rate and ammonia excretion rate among the three groups ($p > 0.05$); (6) The oxygen to nitrogen ratio of the NS group (47.24 ± 21.05) was significantly lower than that of the AS group (112.19 ± 32.09) ($p < 0.05$), while the oxygen to nitrogen ratio of the TS group (165.30 ± 29.50) was significantly higher than the other two groups ($p < 0.05$). In conclusion, it is recommended that when using shade cloth for Chinese mitten crab culture, the use of two layers of shade cloth is more beneficial to the moult of the crab.

Materials and Research Methods

Seventy-two Chinese mitten crabs were divided into three groups. No shade cloth group (NS), one layer shade cloth group (AS), and two layer shade cloth group (TS), and the experimental culture was conducted from the evening of April 12 to May 11. The light intensity and water temperature at the bottom of each box were measured on sunny days from 10:00 to 15:00 on day 9 (early), day 18 (mid) and day 27 (late) of the experiment. The number of dead and molted crabs in each group was recorded daily during the experiment, and the daily survival rate and the final molting rate of each group were statistically analyzed at the end of the experiment; at the end of the experiment, the oxygen consumption rate, ammonia discharge rate and oxygen to nitrogen ratio of each group of Chinese mitten crabs were measured by the hydrostatic confinement method.

Results

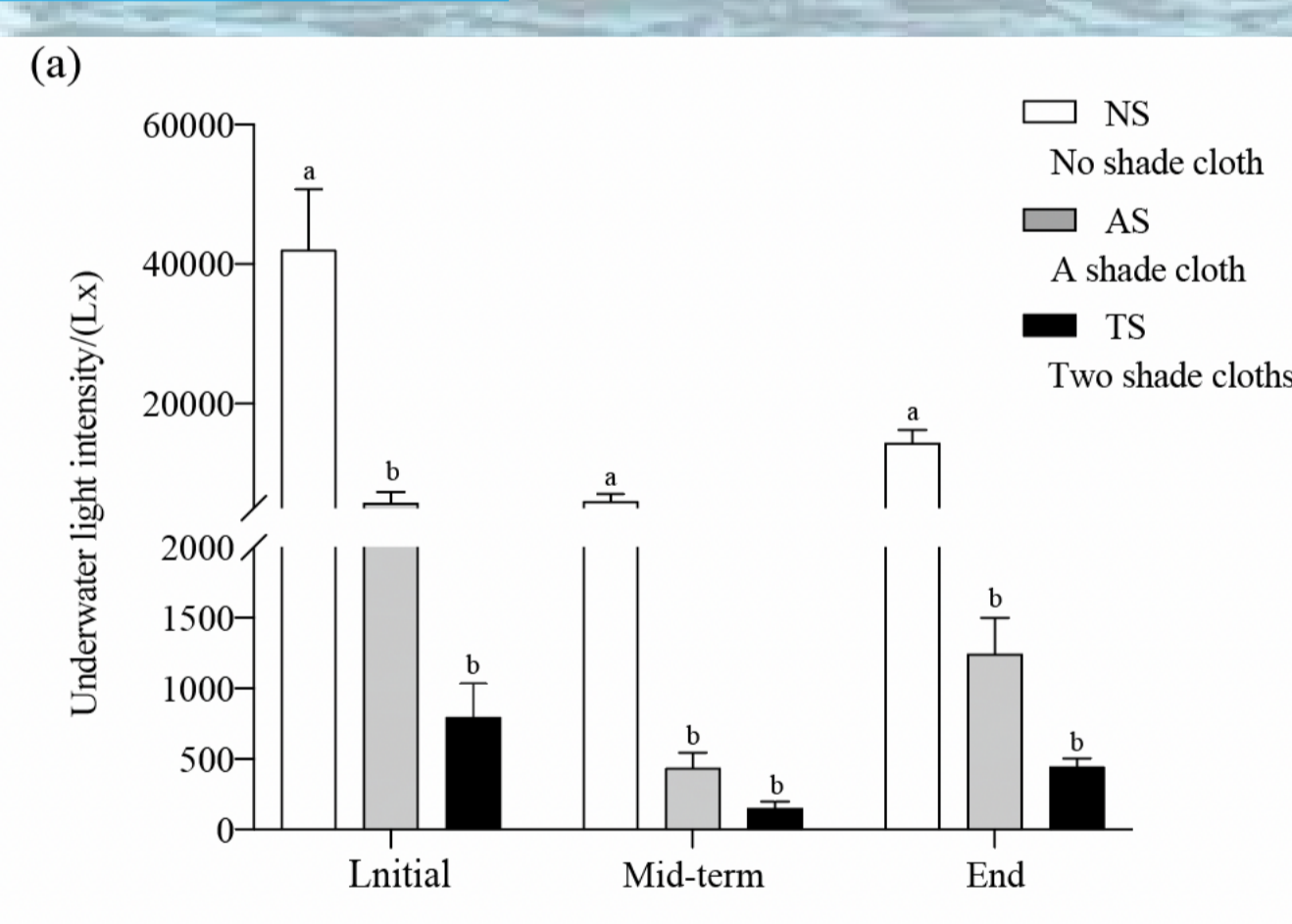


Fig.1 (a) Effect of different layers of shade cloth on the intensity of underwater light.

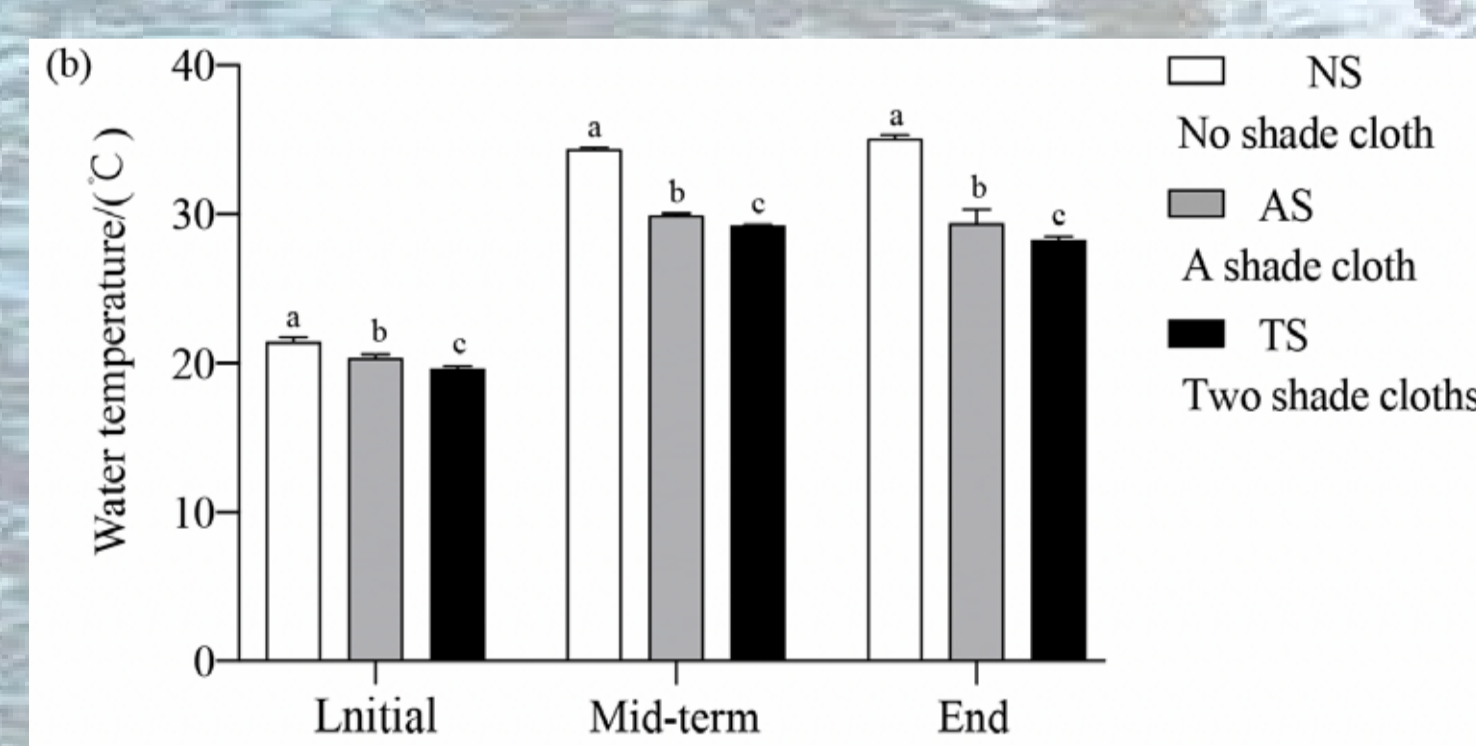


Fig.2 (b) Effect of different layers of shade cloth on water temperature.

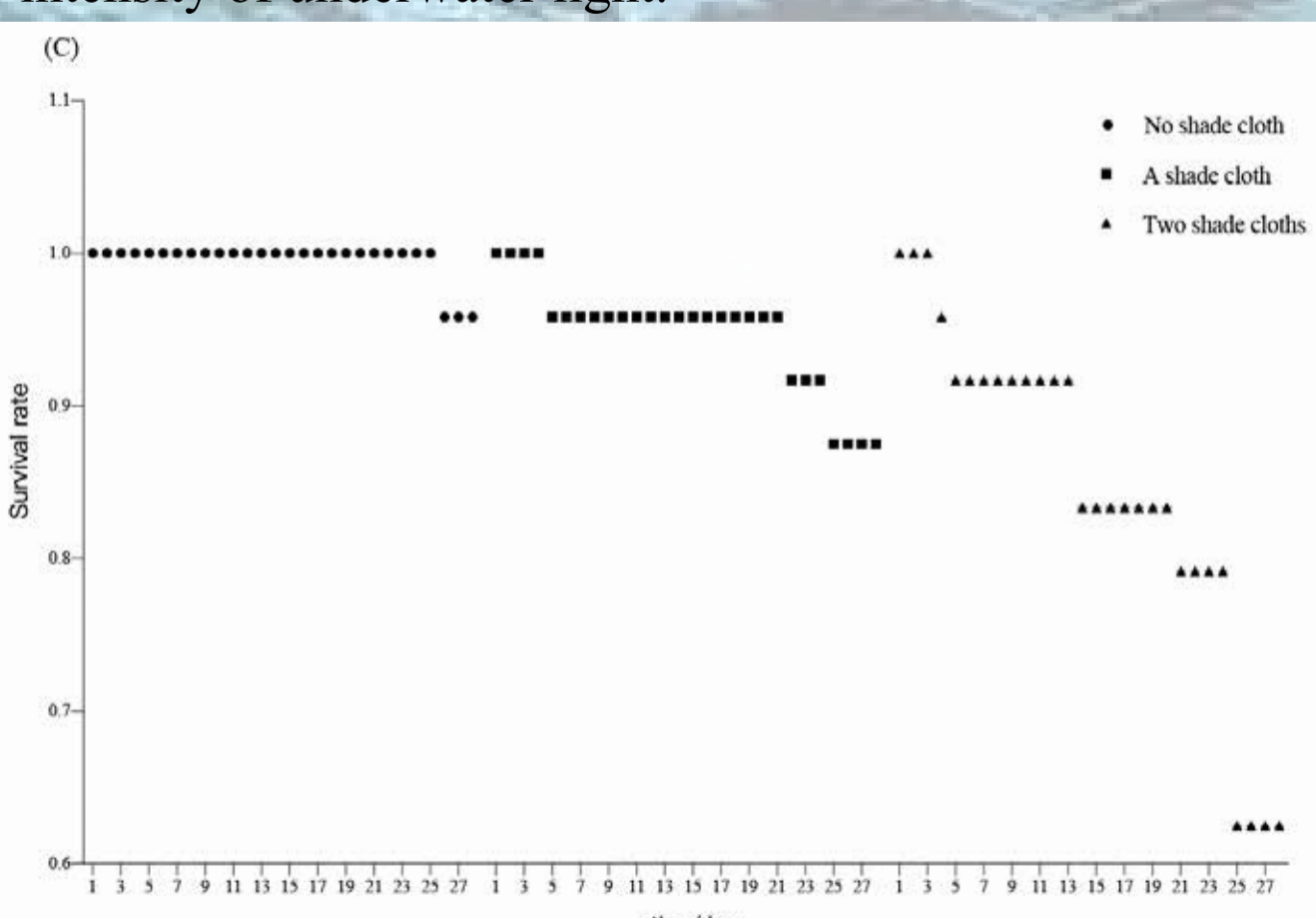


Fig.3 (c) Effect of different layers of shade cloth on the survival rate of Chinese mitten crab.

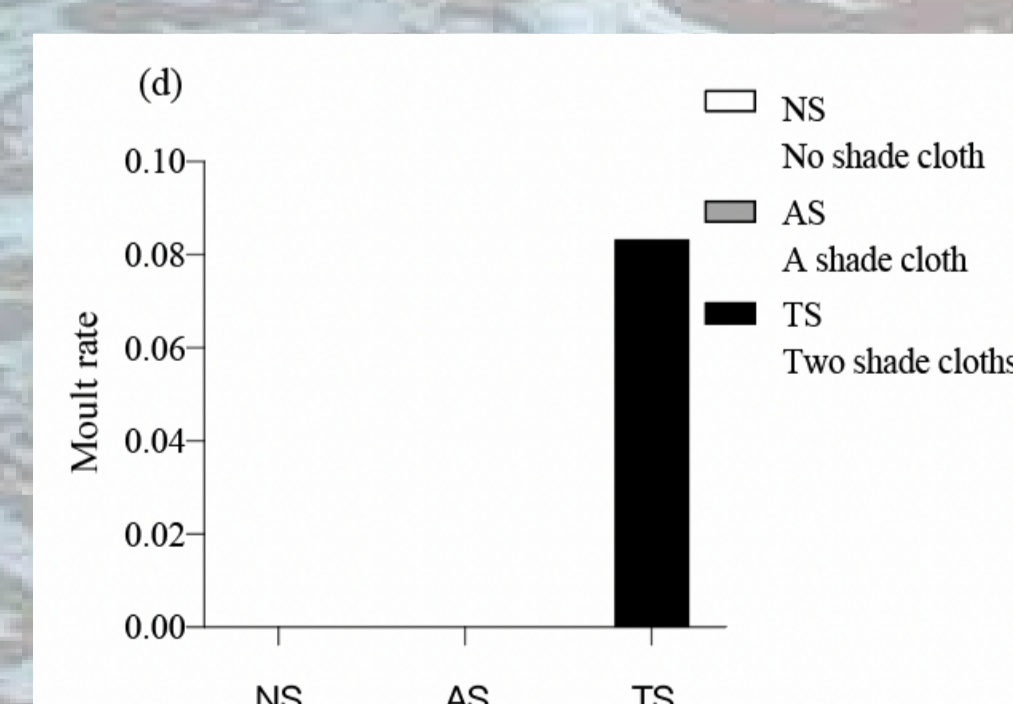


Fig.4 (d) Effect of different layers of shade cloth on the molting rate of Chinese mitten crab.

Results and Discussion

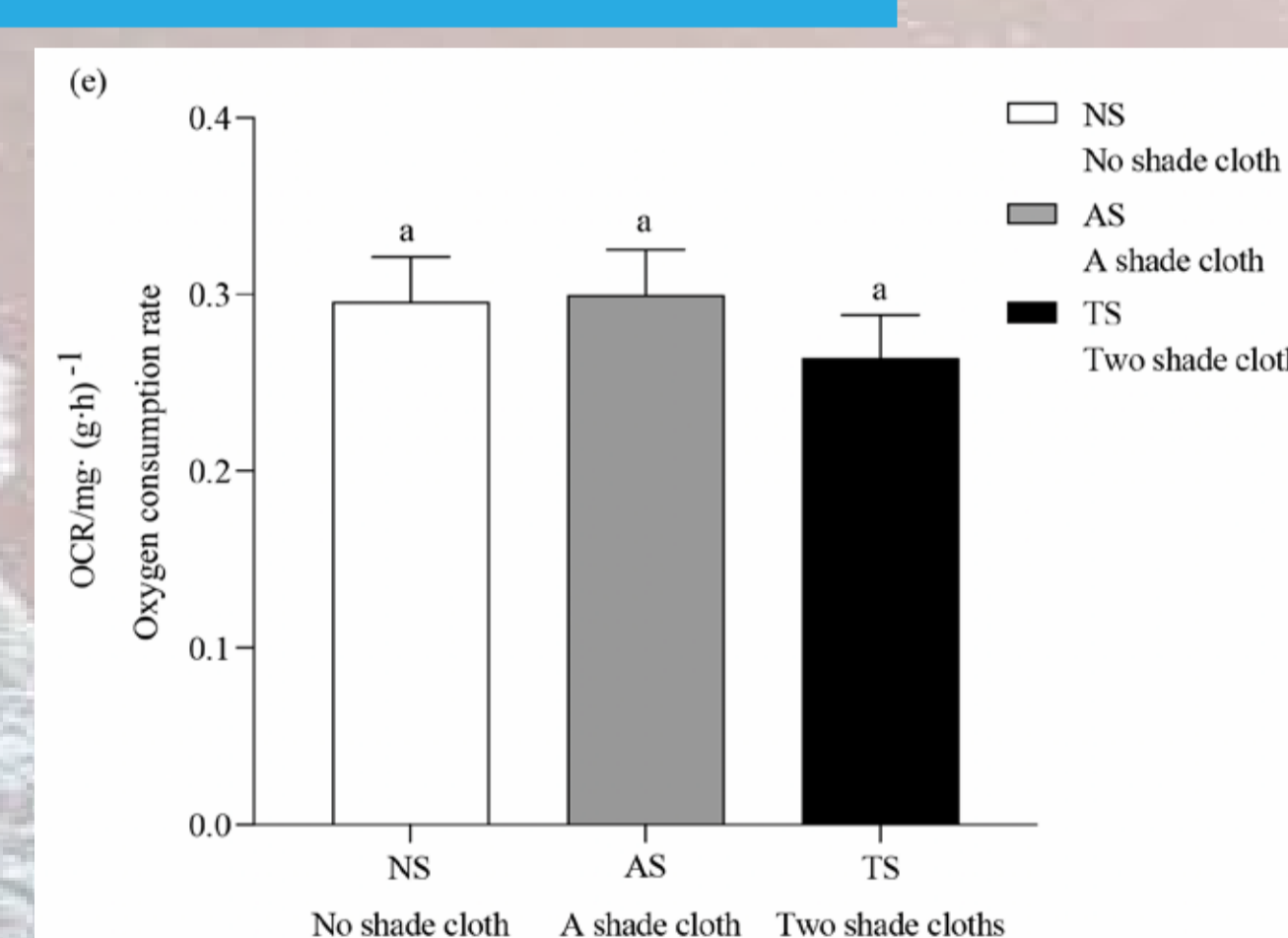


Fig.5 (e) Effect of different layers of shade cloth on the oxygen consumption rate of Chinese mitten crab.

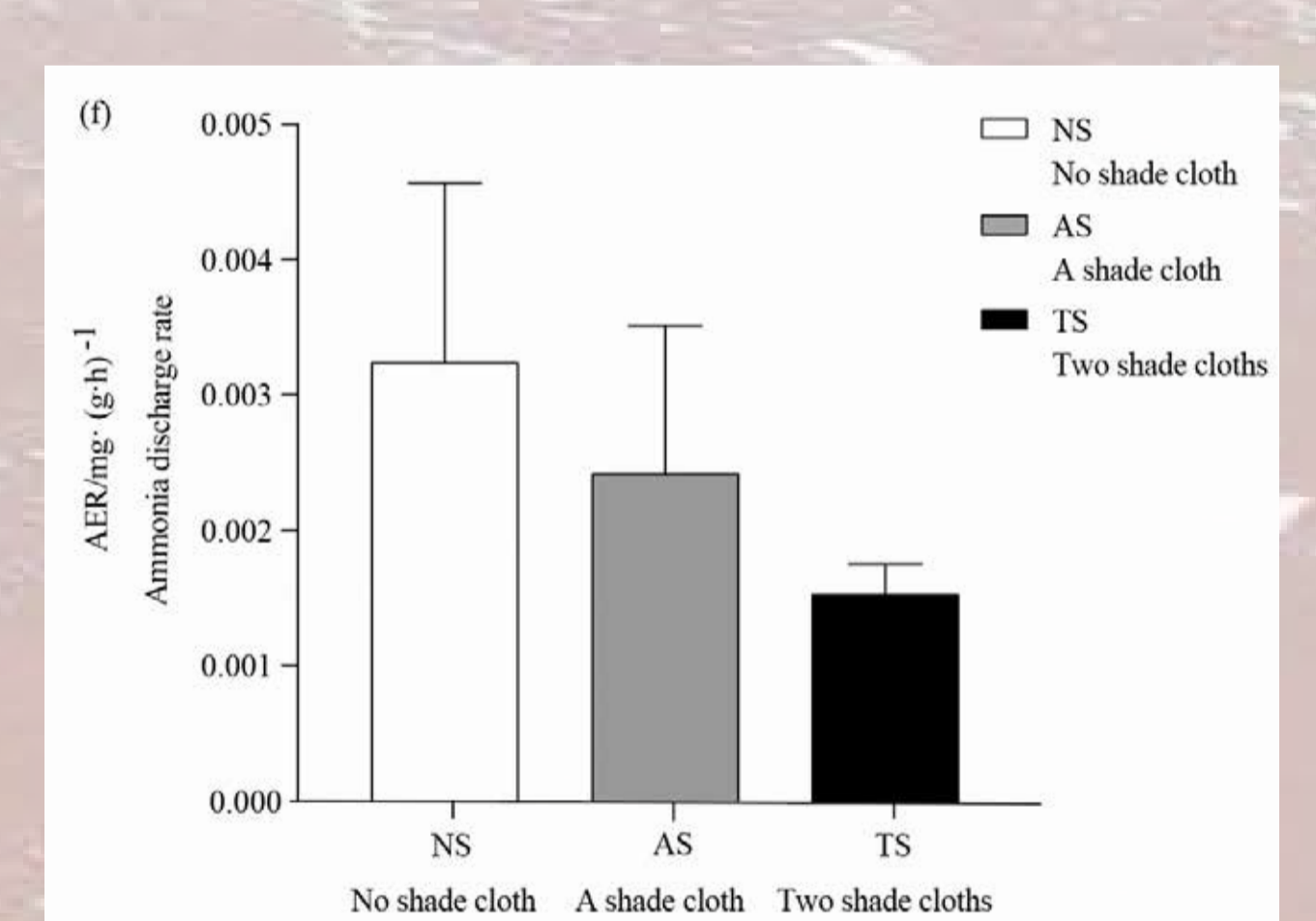


Fig.6 (f) Effect of different layers of shade cloth on ammonia discharge rate of *Eriocheir sinensis*.

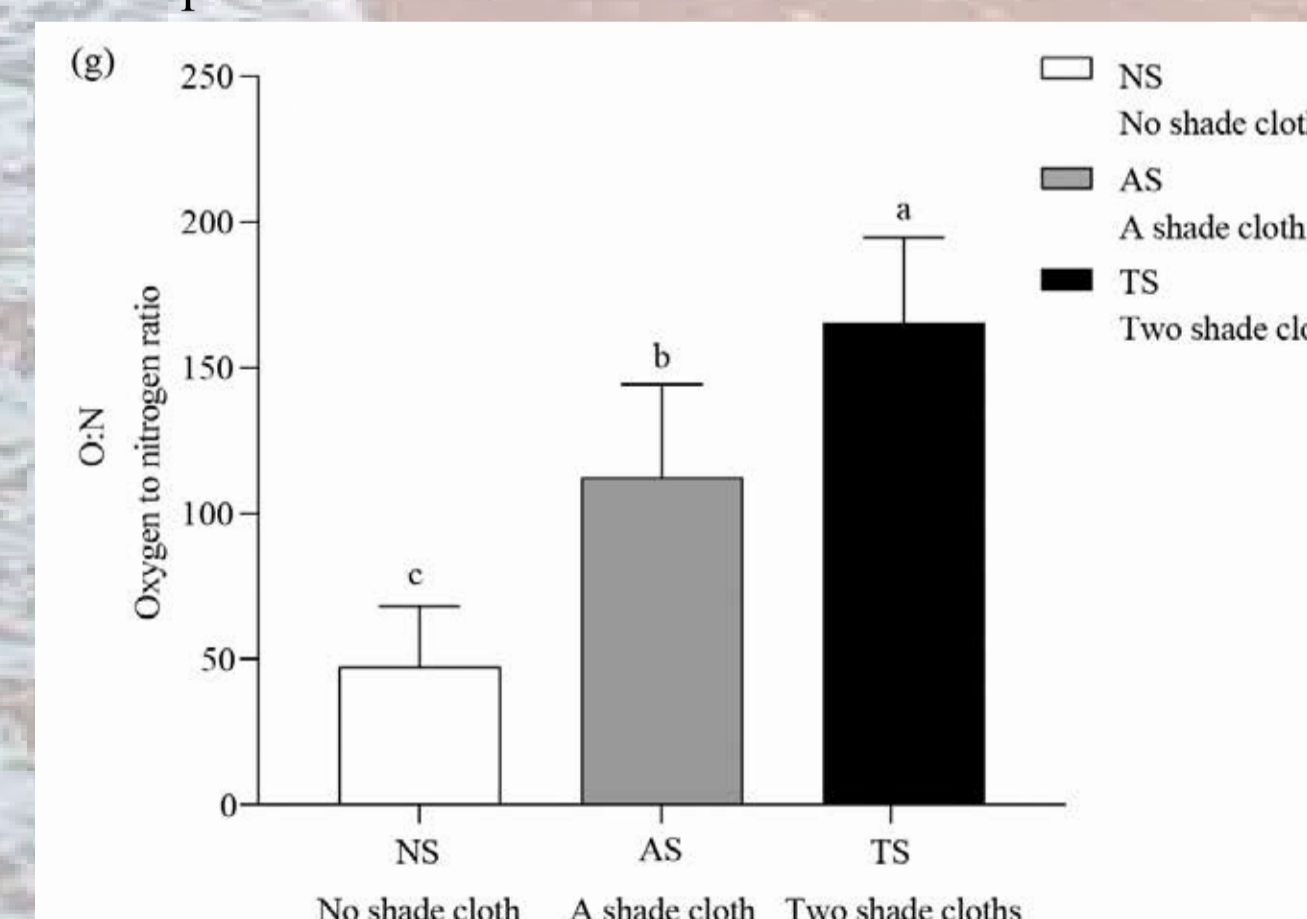


Fig.7 (g) Effect of different layers of shade cloth on the oxygen to nitrogen ratio of Chinese mitten crab.



References

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- [2] ZHOU Shuang-Nan, CHEN Qi-Cheng, JIANG Mao-Wang, et al. Effects of light intensity on growth, survival, metabolism and related enzyme activities of the tiger squid, *Squidia tigris*[J]. Journal of Applied Ecology, 2019, 30(06): 2072-2078.