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Indian edible oyster *Crassostrea madrasensis* (Preston), a promising bivalve for aquaculture amidst the challenges of global warming and climate change as revealed through thermo tolerance studies

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Temperature tolerance of a species is an indicator which determines its potential to persist or become extinct in response to climate change and the related environmental challenges. Identifying the winner species which can withstand the increasing biotic and abiotic challenges is essential for sustainable culture practices and thereby to ensure food for future. Aquaculture of the Indian edible oyster (*Crassostrea madrasensis*) is becoming more popular along the Indian coasts. Hence, knowledge on the level of thermo tolerance, its enhancement through thermal induction and the molecular mechanism behind it shall be of immense use for the scientific management of the system to ensure sustainable production. The oysters with size ranging from 70-80 mm collected from the oyster farm were acclimated in aerated sea water with salinity 22 ppt, temperature 280o C to 300o C and fed with micro algae nannochloropsis and isochrysis. The maximum temperature at which the oysters show tolerance and survive without mortality and the temperature at which almost all animals succumbed to death are referred as sub lethal temperature (SLT) and lethal temperature (LT) respectively. SLT and LT were determined as 44 0o C and 470o C respectively by exposing the acclimated oysters to temperatures ranging from 370o C to 470o C for one hour and monitoring the survival in normal acclimation temperature (280o C) for one week. Transcriptomic analysis of oysters recovering from SLT has shown a statistically significant up regulation of genes coding for heat shock protein 70 (Hsp70) and super oxide dismutase (Cu/Zn SOD). The oysters recovering from sub lethal shock (SLT) at 440o C were found to be resistant to the subsequent lethal temperature (LT) shock (470oC) while the control animals lacking previous exposure to SLT succumbed to death. The phenomenon of induced tolerance was evident and the oysters recovering from SLT were able to survive LT up to 26 days which stands as record duration ever reported. As reported earlier, the oysters surviving high temperatures would also survive the parasitic and microbial infection through the phenomenon of cross tolerance. The study has revealed the special potential of Indian edible oyster (*Crassostrea madrasensis*) in thermo tolerance and induced enhanced thermo tolerance over its European and western counter parts such as Crassostrea gigas and Crassostrea virginica. Thus, the Indian edible oyster (*Crassostrea madrasensis*) could be projected as a winner species with the ability to survive the challenges posed by climate change and related issues.

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