Impact of salinity changes on growth, oxygen consumption and expression pattern of selected candidate genes in the orange mud crab (Scylla olivacea)

ABSTRACT

Change in environmental salinity level is a major limiting factor for the aquaculture productivity because it imposes severe stress on organisms that in turn retards growth. The orange mud crab (Scylla olivacea) is an important coastal aquaculture species (farming is practised in 10‰–20‰ salinity levels) in Bangladesh. The present study was conducted to investigate the changes in growth, O2 consumption and mRNA expression levels of five selected genes in the orange mud crab (S. olivacea) exposed to three different experimental salinity levels (0‰, 10‰ and 20‰) for three months. Crabs reared at 10‰ and 20‰, showed significantly higher ($p < .05$) growth performance and expression of growth regulatory genes (Actin and α-amylase). The highest levels ($p < .05$) of O2 consumption and expression of ion regulatory genes (Na+-K+-ATPase, V-type H+-ATPase and Diuretic Hormone) were obtained at 0‰. Moderate levels of growth and expression of selected candidate genes were observed at 10‰ treatment while the highest levels of growth and gene expression were obtained at 20‰ (control salinity). Strong interactions were observed between growth performance and expression of growth genes ($R2 = 0.81–0.91$), and rate of O2 consumption and expression of ion regulatory genes ($R2 = 0.83–0.93$), implying that the selected genes are important candidates for growth and ionic balance in S. olivacea. Growth performance was found to be very low at 0‰ initially, after 30 days crabs showed better growth performance at this salinity level. It is thus inferred that orange mud crab individuals might require 3–5 days for acclimation to salinity stress but it can take at least 30 days for acclimation to regular growth. Results indicate that with proper acclimation, the orange mud crab (Scylla olivacea) can be farmed at low salinity conditions and possibly in freshwater condition.