Flow field control via aeration adjustment for the enhancement of larval survival of the kelp grouper Epinephelus bruneus (Perciformes:Serranidae)

Abstract

Flow field control via aeration adjustment for the enhancement of larval survival of the kelp grouper Epinephelus bruneus was examined. Aeration rate of 300 mL min $^{-1}$ was introduced during daylight (07:00-19:00 hours) and adjusted to 0, 300 and 900 mL min $^{-1}$ at night (19:00-07:00 hours). Larval sinking velocity±SD increased from 0.08 ± 0.05 to 0.26 ± 0.24 cm sec $^{-1}$ from 4 to 12 days after hatching (DAH), indicating their susceptibility to sink. Larvae reared in 300 mLmin $^{-1}$ attained the highest survival rate at 24.9 ± 3.4%, but remained significantly smaller in growth: 4.54 ± 0.56 mm compared with 4.82 ± 0.53 mm in 900 mL min $^{-1}$. The flow field in 300 and 900 mL min $^{-1}$ was at 10-20 and 15-25 cm above the bottom of the tank and 8.0 and 1.0 cm beneath the water surface. A favourable rearing condition was observed in 300 mL min $^{-1}$ as larvae were away from the bottom and surface areas, thus preventing them from dying due to sinking and surface tension-related death (STRD). Although sinking death was decreased with an increasing aeration rate, the stronger flow had increased larval susceptibility to STRD. Our findings suggest that aeration at 300 mL min $^{-1}$ could enhance larval survival by reducing both sinking death and STRD.