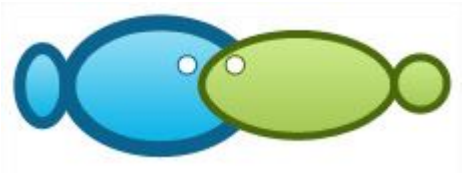

Effects of water temperature, dissolved oxygen and total suspended solids on juvenile *Barbonymus schwanenfeldii* (Bleeker, 1854) and *Oreochromis niloticus* (Linnaeus, 1758)

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Abstract. The aim of the present study was to investigate the effects of water temperature, dissolved oxygen (DO), and total suspended solids (TSS) in water on an indigenous fish species, *Barbonymus schwanenfeldii* (Bleeker, 1854), and an exotic fish species, *Oreochromis niloticus* (Linnaeus, 1758) in Malaysia. The survival rate, growth performance, and feed conversion ratio (FCR) of juvenile fish were tested in different water quality conditions for 30 days. The water temperature of 30°C, DO value of less than 4 mg L^{-1}, and TSS content of 1000 mg L^{-1} are believed to be harmful to fish life. The result indicates that the *O. niloticus* juveniles are relatively tolerant of high water temperature and TSS in term of survivorship, whereas the *B. schwanenfeldii* juveniles are more vulnerable to the two parameters. Reduced DO value had influenced the survival rate of both fish species in a similar way where 100% mortality of both fish species occurred at DO value less than 2 mg L^{-1}. The growth performance of juvenile *B. schwanenfeldii* was less susceptible to the changes of water temperature and DO whereas the growth performance of juvenile *O. niloticus* was influenced by the two parameters. The results show that the FCR of both fish increased with high water temperature and TSS. The juvenile *B. schwanenfeldii* was able to sustain its growth by consuming additional food in high water temperature. Increased DO value significantly improved the FCR of *O. niloticus* juvenile but not of *B. schwanenfeldii* juvenile.
Key Words: turbidity, hypoxia, survival rate, growth performance, feed conversion ratio, exotic species, native species.

Introduction. Anthropogenic activities resulting in degradation of aquatic habitats are increasing in Sarawak (Ling et al 2013; Gandaseca et al 2014; Nagarajan et al 2015; Ling et al 2016; Soo et al 2016). Most anthropogenic activities generally raise the temperature of receiving waters, cause sedimentation and eutrophication which leads to the turbid environment and depletion of dissolved oxygen (DO) content in water column (Moehansyah et al 2002; Moore et al 2005; Cooke et al 2011). Those physicochemical water quality parameters determine the distribution and abundance of fish and affect the survival and growth of fish (Freund & Petty 2007; Bilotta & Brazier 2008; Ice 2008; Gupta et al 2012; Flint et al 2015; Kjelland et al 2015; Jeppesen et al 2018). The effects of water temperature upon life of fish which is a poikilotherm are profound (Durham et al 2006; Bartolini et al 2014). DO in water is also considered one of the most revealing factors in water quality where hypoxia is a common cause of fish kills around the world (Flint et al 2015; Jeppesen et al 2018). High suspended solids in water can cause physical damage to gill structure of fish and clogging which leads to respiratory failure (Au et al 2004). The turbid condition also decreases anti predator behavior, foraging efficiency, and hatching rate of fish (Gray et al 2012; Li et al 2013; Kimbell & Morrell 2015).