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Mass culture of fairy shrimp *Branchinecta orientalis* (G. O. Sars 1901) (Crustacea: Anostraca) using effluent of rainbow trout *Oncorhynchus mykiss* (Walbaum 1792) ponds

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Abstract

The variable quality and high price of *Artemia* (Leach 1819) cyst products, used worldwide as live food, motivate aquaculturists to find an appropriate alternative, especially for fresh/brackish water organisms. In this study, *Branchinecta orientalis* (G. O. Sars 1901), a common fairy shrimp in north-western Iran, was reared for 15 days using effluent from trout ponds enriched with effluent filtrate as sole feed, or co-fed with microalgae (*Scenedesmus* sp.). The effluent filtrate was replaced by algae at different ratios (25% and 50%), and feeding experiments were designed at densities of 100, 200 and 400 individuals/L in 3-L containers and at 100 individuals/L in 20-L containers. The results indicated that, at a certain density, the final length and survival were not significantly affected by different feeding regimes ($p > .05$). In 3-L containers, the highest length and survival were observed at the lowest density. *B. orientalis* contained the highest amounts of proteins, carbohydrates and lipids, though, when co-fed algae, although the differences with the treatment fed solely effluent filtrate were often limited. Inclusion of algae in the diet also resulted in higher levels of a number of PUFAs. Our study proves that *B. orientalis* can be mass-cultured successfully using trout effluent as culture medium without additional microalgae. Fish pond effluent is massively available as a cheap food source. Recycling aquaculture effluent for this type of live food production contributes to lowering the use of natural resources and to less discharge of nutrient loads into natural water bodies.

KEYWORDS

Anostraca, *Branchinecta orientalis* (G. O. Sars 1901), fairy shrimp, fish effluent, mass culture

1 | INTRODUCTION

Many studies have shown the use of the brine shrimp *Artemia* (Leach 1819) as an excellent larval diet in aquaculture (Agh, Noori, Irani, Van Stappen & Sorgeloos, 2013; Simhachalam, Kumar & Rao, 2015). However, the use of *Artemia* in freshwater aquaculture is hampered by the organism's osmoregulatory adaptation to its natural environment (saline habitats). In freshwater, *Artemia* nauplii have a short lifetime, and consequently settle at the bottom of freshwater aquaculture containers, thus being out of reach for most fish larvae. Decomposition of the dead nauplii deteriorates water quality. Moreover, the need for seawater to hatch *Artemia* cysts, the high and fluctuating price and varying quality of commercial cyst product on the market have urged the aquaculturists to look for alternative fresh/brackish water species as live feed.

Fairy shrimps, as non-selective filter feeders of plankton and suspended material (Beladjal, Peiren, Dierckens & Mertens, 1997), usually inhabit freshwater wetlands which periodically dry, especially

