Identification of Host Fishes and Experimental Culture of Juveniles for Selected Freshwater Mussel Species in Virginia

by

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(ABSTRACT)

Host fishes for the state-endangered Tennessee heelsplitter (*Lasmigona holstonia*) and state-threatened black sandshell (*Ligumia recta)* were identified through induced infestations of glochidia on potential hosts. Largemouth bass (*Micropterus salmoides),* yellow perch (*Perca flavescens),* convict cichlid *(Cichlasoma nigrofasciatum),* platy *(Xiphophorus maculatus),* green sunfish (*Lepomis cyanellus),* rock bass *(Ambloplites rupestris),* redbreast sunfish (*Lepomis auritus),* and white perch (*Morone americana)* were identified as suitable hosts for *L. recta*. The banded sculpin *(Cottus carolinae)* and rock bass were identified as hosts for *L. holstonia*; striped shiner (*Luxilus chrysocephalus),* central stoneroller (*Campostoma anomalum),* and warpaint shiner (*Luxilus coccogenis)* were identified as potential hosts. Additionally, rock bass and bluegill (*Lepomis macrochirus)* were identified as potential hosts for the state-endangered spectaclecase *(Cumberlandia monodonta),* with numerous encysted glochidia present at 11 days post-infestation when the fish died.

Recirculating culture systems of different design were tested for suitability in juvenile mussel culture. In one system (high maintenance), juveniles of the wavy-rayed lampmussel, *Lampsilis fasciola,* were kept in culture dishes, and in the other system (low maintenance), the juveniles were kept in culture beds. At the end of the 16-wk culture period, the 31.3% (± 15.4) survival exhibited in the dish culture system was significantly greater than the 3.1%

(± 2.8) survival in the bed culture system ($P < 0.01$, Tukey-Kramer). However, mussels grown in the bed system exhibited significantly greater growth (1.4 ± 0.50 mm height, 1.8 ± 0.76 mm length) than those grown in the dish system (0.86 ± 0.19 mm height, 1.1 ± 0.27 mm length) ($P<0.01$, Tukey-Kramer).

Using the high maintenance dish culture system and juveniles of *L. fasciola*, the influence of high (4.1%) and low (2.5 %) organic content in substrate, and high (250 mg/L $CaCO_3$) and low (50 mg/L $CaCO_3$) water hardness levels were assessed on growth and survival. After 15 wk, juveniles in the high water hardness treatment exhibited significantly greater survival and growth (44.2 ± 9.3% survival, 1.5 ± 0.28 mm height, 2.1 ± 0.41 mm length) than those in the low water hardness treatment (9.0 ± 7.9% survival, 1.3 ± 0.25 mm height, 1.8 ± 0.37 mm length) ($P<0.01$, Tukey- Kramer). Juveniles in the high organic substrate exhibited similar growth (1.41 ± 0.24 mm height, 1.96 ± 0.37 mm length) to those in the low organic substrate (1.39 ± 0.28 mm height, 1.94 ± 0.42 mm length). Juveniles grown in high hardness and high organic substrate had similar survival (27.4 ± 9.2%) to those in low organic substrate (25.8 ± 8.1 %).

For the culture of *L. fasciola* juveniles, I recommend using a culture system that is cleaned regularly (weekly), receives a consistent (daily) supply of algal food, has relatively even flow, and from which juveniles are easily sampled. I recommend culturing them in relatively hard water (≈ 250 mg/L $CaCO_3$), in a substratum with some organic content. These recommmendations may warrant modification for the culture of other freshwater mussel species.