Comparisons of Sediment Test Volumes for Freshwater Solid Phase Sediment Toxicity Tests

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Laboratory tests with benthic macroinvertebrates are commonly used to assess the potential toxicity of contaminated sediments, and detailed standard test procedures have been developed for various species. For freshwater, two benthic organisms, *Hyalella azteca* and *Chironomus dilutus* are most often used for general sediment toxicity testing and for solid phase toxicity identification evaluation (TIE) characterizations (USEPA 2007). At the recommended sediment volumes (100 mL sediment/replicate), solid phase baseline toxicity tests with both species requires 1.6 L of sediment, and the amount of sediment needed for the various TIE manipulations may exceed 6 L for initial and subsequent TIE tests. Reducing the volume of the test chambers and sediment required has significant logistic advantages. In previous work, we compared the toxicity of sediments to *C. dilutus* and *H. azteca* tested using both standard-volume (100 mL of sediment in 300 mL beakers) and reduced-volume tests (30 mL of sediment in 100 mL beakers). Those studies found the observed toxicity was very similar between the two chamber sizes. In the current study, we evaluated the effect of feeding rates and chamber size on the growth of *C. dilutus* in control sediment. Midge performance was evaluated with three feeding rates and different initial numbers of organisms (e.g., 6, 8, 10, and 12) per beaker. Two groups received either 1.5 mL or 2.6 mL of a 4-g/L Tetrafin® suspension/day (days -1 to 9) and the last group received 1.5 mL of same food on test days -1 to 3, 2.0 mL on days 4 to 6, and 2.6 mL on test days 7 to 9. Growth increased with decreasing stocking density in both chamber sizes. For a given feeding rate, growth was generally higher in the smaller beakers, but growth was similar when food additions were normalized to the surface area of the sediment. High levels of feeding created problems with maintaining dissolved oxygen, particularly in the smaller beakers. Taken together with the previous results, we believe the reduced chamber sizes provide comparable data to the standard chamber size, and the 70% reduction is sediment required has significant logistical advantages.

Comment [drm1]:

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