Abstract

During June and July 2015 we sampled three acid headwater streams (Henstep, Little Weikert and Coral Run) that flow down the north slope of Penns Creek Mountain (Bald Eagle State Forest, western Union/Snyder counties), each in a separate cut along the ridgetop. The dominant producers in each stream are mosses (Fontinalis), leafy liverworts (Porella) and complex filamentous algae (Nitella and Batrachospermum). We investigated diatom periphyton communities associated with nonvascular plants in each of the streams to determine the similarity of those communities on the same substrate in different streams. Our preliminary results suggest that there is not a moss periphyton diatom community. The metrics differed from stream to stream though each periphyton community had 26-39 species in a count of 300 valves using a JEOL 6010LV SEM. The most surprising results had to do with the dominant taxa in the periphyton community of each stream. Eolima minima was the dominant taxon in Henstep periphyton while Fragilaria forma minima dominated in periphyton of Little Weikert. Both of these streams had similar features including levels of discharge. Coral Run, a smaller stream had Eunotia minor as the dominant species in the periphyton. In comparing communities that developed on plants versus stones and sediment at each site, all communities were moderately similar (mean = 47% similar). Thus, the diatom periphyton communities are made up of different dominant taxa that appear to be undetermined and stochastic in occurrence.

Methods

• Field collections of active biofilms were made at the marked sites (see Figure 1).
• Mosses (Fontinalis), leafy liverworts (Porella) and multicellular algae (Batrachospermum and Nitella) were collected and placed in plastic bags.
• Samples were returned to the lab and cleaned using the following procedures:
  • Soaked in 5% acetic acid
  • Heating and ultrasonication
  • Concentrated Potassium Permanganate
  • Concentrated Hydrochloric Acid
  • Concentrated (30%) Hydrogen Peroxide
• Diatom ID confirmed by JEOL JSM 6010LV SEM, Kraemer and Lange-Bertalot (1986) and other monographs on freshwater diatoms.
• Counts performed using the JEOL JSM 6010LV, 1 plug, each of 300 valves.
• Bray-Curtis Proportional Similarity (BCI) comparisons generated according to Bloom (1981).

Results

Table 1. A composite list of the 82 species of diatoms found on mosses at the headwater streams: Henstep, Little Weikert Run, and Coral Run (see Figure 1). The following table compares the relative abundance of taxa at each study site from counts of at least 300 valves. Note that relative abundance is color-coded according to three categories: dominant (>10%), common (1-10%) and rare (<1%). See key at right.

Figure 1. Map of the collection sites on the headwater streams.

Conclusions

• Diatom periphyton communities, though moderately diverse (Table 1), do not appear to be defined on multicellular nonvascular plants nor do they differ from those of other substrates within the stream such as stones or sediment (Table 2).
• While the periphyton communities are similar to those of stone and sediment, each most substrate seemed to support one dominant taxon, especially in Little Weikert (Table 1 & Figure 2).
• Diatom communities on Fontinalis, though highly similar within the same stream, show very low similarity between Coral Run and Little Weikert Run (Tables 1 & 3).

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