The Effects of Gypsy Moth Defoliation on Soil Water Chemistry[1]

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Abstract: Twenty-eight plots were established in oak stands along the leading edge of gypsy moth migration into north-central West Virginia. Plots were arranged in a 3-chain square grid pattern in areas of varying aspect, percent slope, elevation, site index and species composition. Soil water, gypsy moth frass and leaf fragments generated by larval feeding were collected weekly from May 14 until July 30, 1992. Frass and leaf fragments were sorted and weighed. Water and frass samples were analyzed to determine concentrations of sodium, potassium, magnesium, calcium, hydrogen, phosphate and nitrate. Estimates of average defoliation were also made for each plot on a weekly basis.

The objectives of this study are;

* To determine the effects of gypsy moth defoliation on soil water chemistry.
* To correlate frass deposition and litter fall with changes in soil water chemistry.
* To create a baseline of data from which inferences or predictions can be made about the effects of gypsy moth defoliation on stream water chemistry.

To date, only preliminary analyses have been performed. Element concentrations for the water samples were weighted by the volume of water collected. Frass and leaf fragment weights were converted to per acre values. Data from all twenty-eight plots were combined and weekly means were calculated.

Element concentrations over time show possible trends. The deposition of frass and leaf fragments was greatest during the seventh week (June 25) of the twelve week sample period. The concentration of phosphate in the water samples also peaked during this week. Potassium, nitrate and calcium all showed similar trends. Their concentrations initially decreased until the fourth or fifth week (June 4 and 11) then increased until reaching a maximum at or near the eighth week (July 2). Unlike phosphate, potassium and nitrate concentrations were greatest during the eighth week rather than the seventh week when gypsy moth feeding seemed to be at its greatest. This may be attributed to a lag effect. Concentrations of sodium and magnesium showed a steady decrease throughout the defoliation period with only minor increases during peak frass and leaf fragment deposition. Levels of pH showed very little variation throughout the sample period.

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