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Rapid Decomposition of Summer-input Leaves in a Northern Michigan Stream

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ABSTRACT—Processing of leaves of five riparian plant species [sugar maple (*Acer saccharum*), speckled alder (*Alnus rugosa*), eastern hemlock (*Tsuga canadensis*), red-stem dogwood (*Cornus sericea*) and sweet gale (*Myrica gale*)] was studied during the summer in a northern Michigan stream. In June 1992, dried green leaves (~5 g) of each species were placed into coarse-mesh bags and tethered in a riffle. Mass loss and macroinvertebrate colonization were measured after 2, 14, 28 and 42 days. In general, decay rates were fast ($k = 0.017 - 0.134$), with most species losing >80% of mass within 28 days. The order of decomposition (in declining rate) was: maple = dogwood > alder > sweet gale = hemlock. Macroinvertebrate numbers in the leaf packs were highest at 14 days, but densities per unit remaining mass increased steadily during the experiment. Midge larvae (Diptera: Chironomidae) and net-spinning caddisflies (Trichoptera: Hydropsychidae) comprised 54% and 44%, respectively, of the macroinvertebrates, which generally lacked typical shredder taxa. Of several measurements of leaf chemistry, toughness and morphology, leaf surface area per unit mass was the best predictor of processing rate. Hemlock and sweet gale may contain secondary compounds that inhibit decomposition. Leaf processing rates were among the highest observed for any North American stream, which may be related to high microbial activity at summer water temperatures, good nutritional status of fresh leaves, and abundant macroinvertebrates. Summer inputs of leaves to woodland streams are transient but possibly important energy resources for some stream organisms.