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Patterns of periphyton biomass distribution in headwater streams

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Human influences, patterns of precipitation and channel modifications are important factors which affect the ecosystem processing of headwater streams in S. Korea. Since the periphyton community often reflects the degree of these disturbances within catchment, we decided to determine factors affecting the patterns of periphyton biomass and community structure. First, we studied the patch structure of epilithon (optimum sampling size). Second, in order to see the correlation between the periphyton biomass and enviornmental variables, we studied physical (slope, bankfull, active channel width, light penetration, and temperature) and chemical factors (conductivity, alkalinity, pH, turbidity, TN, NH_4-N, NO_3-N, TP, and SRP) of 26 sites in 9 stream systems. The optimum sampling size for the determination of the epilithon biomass was at least 8 or 9 and no relationship between the algal biomass and the different size class of the substratum was found. All study sites showed softwater nature (pH : 5.7-7.9, alkalinity : 4-32 mg $CaCO_3$/l, n=26) with various concentration of nutrients and conductivity (20-345μ mhos/cm, n=26). The algal biomass in undisturbed streams was generally low. However, due to the different nature of disturbances and physical setting, wide range of epilithon biomass (Chl. a: 0.4-38.3mg/m^2) were observed. Active channel width, conductivity, TN, and TP were positively correlated with all biomass distribution, whereas channel slope was negative. Among many physico-chemical variables, conductivity seems to be the most useful parameter for the prediction of algal biomass distribution in a single stream system.

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The litter decomposition and patterns of shredder distribution in the headwater streams.

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The rate of litter processing and the macroinvertebrate fauna associated with leaf packs in headwater streams was determined. During winter 1992 and spring 1993, experiments were conducted on two different species of leaves(oak:*Quercus* sp., tulip:*Liriodendron* sp.) using two different types of bags to compare rates of decomposition by shredder and/or microbiota. Litter bags(10x30cm with 5g of dry leaves) were retrieved biweekly or monthly from a relatively undisturbed 2nd order stream. Invertebrate fauna was analyzed from 122 leaf packs at 11 streams(1st through 3rd order) during winter(Feb. and Apr.). Regardless of leaf type, leaves in open bags decomposed slightly faster. Decomposition of oak leaves was much slower than tulip leaves(after 138days, oak closed; 0.006% loss day^{-1}, open; 0.008, tulip closed; 0.021, open; 0,023). A diverse invertebrate fauna was associated with leaf packs (about 30 families, shredder; 58.5%, collector; 30%, scraper; 8.3%, predator; 3.2%). Among many physico-chemical variables that were studied, stream channel width was important factor that affects the distribution of *Gammarus* spp. and *Tipula* spp.($r=-0.2985$; $0.02<P<0.05$, $r=0.6774$; $P<0.001$, respectively). Condsidering the factor that oak and pine dominate riparian vegetation in S. Korea, patterns of litter processing and shredder distribution shown in this study may well represent characteristics of headwater streams in S. Korea