Unraveling the Speciation of Phosphorus in Runoff Waters

The excessive use of phosphorus fertilizers makes agriculture one of the major sources contributing to phosphorus enrichment of surface waters, with often serious water quality problems such as algal blooms and fisheries decline as a consequence.

To better understand the impact of manure fertilization on eutrophication, previous research quantified the effects of agricultural management practices and the contribution of different transport routes of phosphorus from land to surface waters. The timing of manure fertilizer application was found to play a crucial role, as manure application followed by rainfall within a week appeared to cause an enormous increase in phosphorus concentration in the adjacent surface waters. During such an incidental phosphorus loss, rainfall-induced runoff was found to be the dominant pathway for transport of phosphorus from land to surface waters.

Although the total amount of phosphorus entering surface waters is generally quantified in phosphorus loss studies, the impact of phosphorus losses on eutrophication is not necessarily related to the total phosphorus concentration. Phosphorus in runoff waters can be present in different chemical species that vary strongly in their bioavailability to algae.

Previous studies have tried to address this problem by linking the bioavailability of phosphorus to operationally defined phosphorus fractions. One of these fractions represents dissolved ortho-phosphate, which is readily bioavailable and thus of major concern with respect to eutrophication. Another fraction is the colloidal phosphorus fraction, which is commonly believed to be largely unavailable for biota. Colloidal phosphorus is generally the dominant phosphorus fraction in runoff waters from clay soils.

doi:10.2134/csa2013-58-4-3

Unraveling the Speciation of Phosphorus in Runoff Waters

SPN1 Sunshine Pyranometer

Unique multi-function solar radiation sensor

- Global and diffuse radiation in W.m$^{-2}$
- Sunshine hours to WMO definition
- No moving parts, no routine adjustment