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DOM in stream water and soil solution in two small, bordering catchments in central Sweden

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Seasonal variations in dissolved organic matter (DOM) and the influence of wood ash application on DOM were studied in two first order streams draining two small, bordering forested catchments. The catchments, 40 and 50 h respectively, were situated in Bispgården (63°07N, 16°70E), central Sweden with forest consisting of mainly 50 to 80 year-old Norway spruce (Picea abies) and Scots pine (Pinus sylvestris). Seasonal variations in the stream water were measured during 2003-2007, and wood ash was applied in one of the catchments in the fall of 2004. In addition to stream water samples, sampling of soil solution in the riparian zone was made in one of the catchments during 2003-2006.

The quantity of DOM differed between the streams, but the seasonal patterns for the two streams were correlated during 2003 and 2004. After wood ash treatment, dissolved organic carbon (DOC) increased significantly in the stream draining the treated catchment. 17 different low molecular mass organic acids (LMMOAs) were measured in the stream water during the whole study period. The most abundant LMMOAs were oxalic- and lactic acid, of which peak concentrations of oxalic acid coincided with those of DOC, while no such relation between the concentrations of DOC and lactic acid could be seen in either of the streams. Some of the most common acids in the soil solution, shikimic acid, citric acid and malic acid were rarely found in the stream water and only then in very low concentrations, thus appearing not to have made the transition from soil to stream water in the same manner as oxalic acid.

The wood ash application did not affect the total LMMOA concentration and there was no difference during the investigated period. Of the 17 analysed LMMOAs, only malonic acid appeared affected by wood ash application, with a significant increase during both 2005 and 2006.