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Wood ash application reduced global warming potential over the five years after application in two drained peatland forests in Sweden

Ulf Sikström[1], Robert G. Björk[2], Leif Klemedtsson[2]
[1)] The Forestry Research Inst of Sweden [2)] University of Gothenburg, Sweden

Self-hardened crushed wood ash (3.3 or 6.6 tonnes dry weight ha^{-1}) was used to fertilize two drained and forested peatland sites in southern Sweden, a Pinus sylvestris L. stand at an ombrotrophic peat site and a Picea abies (L.) Karst. stand at a minerotrophic site. The fluxes of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) from the forest floor were monitored during the first, second and fourth and/or fifth year after application of ash. The gases were measured using static chambers (snow-free periods) and a snow concentration gradient method (periods with snow). No significant effects of wood ash application on greenhouse gas exchange were detected at the ombrothrophic site. At the minerotrophic site, the emission of CO_2 and N_2O from the soil was significantly reduced by both doses during the first two years after application, but not during the fourth and fifth year. Over the first eight years after fertilization, the mean annual tree-stem volume increment was significantly larger at both ash doses in the pine stand. In the spruce stand, there was a tendency to increased increment over the five-year effect period. In conclusion, application of 3–6 tonnes d.w. self-hardened crushed wood ash ha-1 rendered in reduced Global Warming Potential (GWP) over the first five years at both sites.