

## Forest type effect on throughfall deposition and seepage flux

Jeroen Staelens, An De Schrijver, Guy Geudens & Kris Verheyen.

Laboratory of Forestry, Ghent University, Geraardsbergse steenweg 267, B9090 Gontrode (Melle), Belgium. E-mail: an.deschrijver@ugent.be, jeroen.staelens@ugent.be. Tel: +32 9 264 9031, Fax: +32 9 264 9092

Converting deciduous forests to coniferous plantations and *vice versa* causes environmental changes, but till now insight in the overall effect of conversion is lacking. This review, based on 38 case studies, aims to find out how coniferous and deciduous forests differ in terms of element throughfall (+ stemflow) deposition to the forest floor and seepage flux below the rooting zone. From the comparison of coniferous and deciduous stands at comparable sites, it was inferred that deciduous stands receive lower nitrogen (N) and sulphur (S) throughfall (+ stemflow) deposition than coniferous stands. In regions with a relatively low bulk open-field N deposition ( $<10 \text{ kg N ha}^{-1} \text{ y}^{-1}$ ), lower mean  $\text{NH}_4^+$  throughfall (+ stemflow) deposition was reported under coniferous than deciduous stands, whereas in regions with a higher open-field N deposition ( $>10 \text{ kg N ha}^{-1} \text{ y}^{-1}$ ) the opposite held true. The higher the open-field  $\text{NH}_4^+$  deposition, the higher the difference between the coniferous and deciduous  $\text{NH}_4^+$  throughfall (+ stemflow) deposition. Furthermore, the calculated canopy exchange of  $\text{K}^+$ ,  $\text{Ca}^{2+}$ , and  $\text{Mg}^{2+}$  was on average higher in the deciduous stands. The significant higher deposition of N and S in the coniferous stands was reflected in a higher soil seepage flux of  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , and Al(III). Considering a subset of papers for which all necessary data were available, a close relationship between throughfall (+ stemflow) deposition and seepage flux was found for N, irrespective of the forest type, but not for S. This review shows that the higher N and S deposition input in coniferous stands involves higher seepage fluxes of  $\text{NO}_3^-$  and  $\text{SO}_4^{2-}$  and of accompanying cations such as  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , and Al(III) to the groundwater, which makes coniferous stands more vulnerable to acidification and eutrophication than deciduous stands.

Reference: De Schrijver A., Geudens G., Augusto L., Staelens J., Mertens J., Wuyts K., Gielis L. & Verheyen K. A review of forest type effect on element deposition and seepage flux. *Oecologia*, accepted with revisions.