

Acidic deposition, critical loads and the BC/Al ratio in soil solution on Swiss forest research plots

PETER WALDNER¹, ELISABETH PANNATIER¹, MARIA SCHMITT¹, ANNE THIMONIER¹, BEAT RIHM²

¹ WSL, Swiss Federal Research Institute for Forest, Snow and Landscape Research, Zürcherstrasse 111, CH-8903 Birmensdorf, Switzerland; peter.waldner@wsl.ch

² Meteotest, Fabrikstrasse 14, CH-3012 Bern, Switzerland; rihm@meteotest.ch

Keywords: acidification, inferential, throughfall, soil solution, aluminum toxicity.

Air pollutants affecting forest health include increased atmospheric deposition of acidic compounds of nitrogen and sulfur. In the frame of the 1985 Convention on Long Range Transboundary Air Pollution (LRTAP) a network to monitor air pollution impacts has been established in Europe which includes 12 continuously monitored forests ecosystem research (LWF) plots in Switzerland. Research efforts have been undertaken to define critical values for acidic deposition and soil acidification.

We determined the present acidic loads with the throughfall method (Thimonier et al., in press). The present loads did not exceed the critical loads for acidity calculated with a mass balance on the assumption of a steady state on any plot (Fig. 1). Some parameters for were estimated based on

physical soil examinations. Considering the uncertainties of the determination exceedance of critical loads cannot completely be excluded for some plots. The BC/Al ratio in the soil water, that is widely used as an indicator for aluminum toxicity stress for plants is above but on some plots close to the critical value of 1. We determined this ratio with up to three years of soil water sampling or based on chemical analyses of the soil matrix (Pannatier et al., 2004).

So, the exceedances of critical loads and the acidification state of the soil were consistent. However, it will be necessary to include chemical characteristics of the soil profile and to use a dynamic model to reconstruct past and predict future development of the ecosystem acidification status on the LWF-plots.

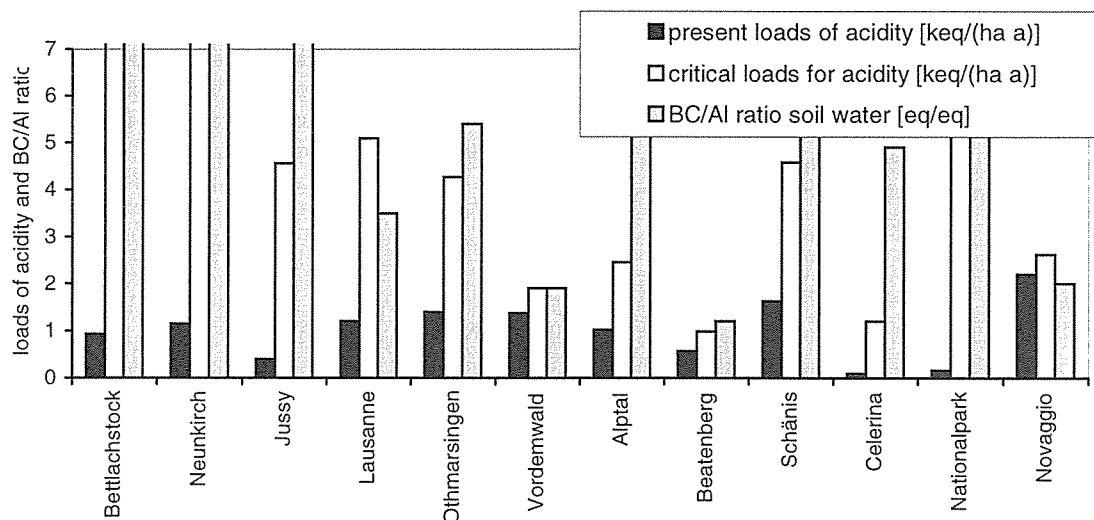


Fig. 1 Present and critical loads of acidic compounds and the critical BC/Al ratio in soil water on Swiss long-term forest ecosystem research plots. Some of the loads and ratios are $\gg 7$

References

- Pannatier, E. G., Walthert, L. & Blaser, P. 2004. Solution chemistry in acid forest soils: are the BC: Al ratios as critical as expected in Switzerland? *Journal of Plant Nutrition and Soil Science - Zeitschrift Für Pflanzenernahrung und Bodenkunde*, 167: 160-168.
- Thimonier, A., Schmitt, M., Waldner, P. & Rihm, B. in press. Atmospheric deposition on Swiss Long-term Forest Ecosystem Research (LWF) plots. *Environmental Monitoring and Assessment*.