GENERAL INFORMATION

author(s)	De Vos B
year	1998
English title	Chemical element analysis of the forest floor in the macro-invertebrate soil fauna plots
original title	
reference	Report IBW Bb R:98.005
pages	72
type	report
ecosystem service	supporting – soil formation and fertility
keywords	litter layer
taxa	
project	B&G/15/96: Soil classification based on soil fauna (Bosbodemklassifikatie door middel van bodemfauna) B&G/29/98: Identification of forest invertebrates and variables indicating their occurrence (Determinatie en bioindicatie van bosgebonden ongewervelden – Luik A)
supervisor	
institution	Institute for Forestry and Game management (IBW)
document	pdf
data	

MATERIALS & METHODS

study area	5 n (scientific zone) – plot n° 35 and 36
time period	July-August 1997
goal	- determine the concentration range of 16 chemical elements in forest floor layers in a wide range of common forest types in the Flanders region - evaluate the relationships and relative importance of the observed chemical variables - ordinate and rank the 50 forest plots using forest floor chemistry data - to look for differences between the holorganic layers and between the forest floors in different forest types - estimate the forest floor elemental pool in all plots
set-up	50 plots in Flanders (all common soil and forest types): most plots are also part of other networks - 3 sample points on a transect, 4 m between the points, coordinates middle point determined by gps - 50 cm x 50 cm x 10 cm sampling frame
data collection	L F H layers - concentration of N, P, K, Ca, Mg, Na, S, Fe, Al, Mn, Cu, Cr, Pb, Ni, Zn, Cd - fresh weight, moisture content, pH-H_2O, pH-$CaCl_2$
remarks	November-March would be a better period to sample the L layer. Appendix with element concentrations for the 50 plots.

RESULTS

An average forest floor layer sample contains 35–45 % dry matter and 55–65 % water. The F and H layer tend to have a higher moisture content than the L layer. The actual acidity was 3.3–8.1; the potential acidity was 2.9–6.8. The K, Na, Cr, Ni concentrations were very high in the Aelmoeseneie ash stand. Pb

concentration was low in the Aelmoeseneie ash stand. Zn concentration was low in the Aelmoeseneie beech-oak stand. The mull humus type forests had a lower organic layer mass and a higher pH.

	concentration (μg g^{-1})	**pool (g m^{-2})**
N	0.71–2.34 % (mean 1.5)	0.26–245 (median 70)
P	275–2224 (mean 505)	0.01–5.65 (median 2.16)
K	88–10647 (mean 1022)	0.18–18.4 (median 2.18)
Ca	1473–29897 (mean 5968)	0.08–68.9 (median 15.58)
Mg	240–3600 (mean 942)	0.03–13.4 (median 2.97)
S	546–4958 (mean 1587)	0.02–38.0 (median 7.66)
Fe	1138–54578 (mean 7127)	0.06–203 (median 24)
Al	460–11079 (mean 2909)	0.03–58.6 (median 9.36)
Mn	31–3216 (mean 487)	0.004–9.71 (median 0.883)
Na	103–475 (mean 219)	0.006–2.980 (median 0.91)
Cu	10–97 (mean 25)	0.0003–0.982 (median 0.102)
Cr	5–222 (mean 27.4)	0.003–1.239 (median 0.099)
Pb	8–1354 (mean 119)	0.001–9.102 (median 0.423)
Ni	8–126 (mean 26)	0.002–0.566 (median 0.092)
Zn	36–895 (mean 118)	0.001–3.147 (median 0.434)
Cd	0.1–8.6 (mean 1.2)	0.00001–0.089 (median 0.003)

Concentration of elements not bound in structural components (i.e., Na, K, Ca, Mg and Mn) were L>F>H. The concentration of N and P were quite similar for the 3 layers. Pb, Cu, Al, and Fe showed a tendency to accumulate if F and H layer. The forest floor acidified from L to H layer with 1 to 1.5 pH units. The organic layer of coniferous forests had a higher mass, but a lower nutrient content (base cations, Al, Mn).

The variables that explained the highest amount of variation between the plots were acidity and organic layer mass, N, Mn, and Zn content. Three groups of variables: (1) base cations, pH, P and Al (inversely related to organic layer mass); (2) N, organic matter content; (3) heavy metals Mn, Zn, and Cd (reflecting soil properties and pollution impact).

The concentration of K, Ca, and Mg generally decreased from the L to the H layer. Al concentrations increased with depth. Leaching was important for the Ca, Mn, Na, K, and Mg. Al, Fe, Cu, Cr, Pb, and Ni tended to accumulate in the H layer. Zn and Cd concentrations showed no increase with depth in the holorganic layer. There was a tight relationship between organic layer mass, pH, and macronutrient concentrations. Below pH-H_2O = 5, the mass was higher; and the correlation between organic layer mass and most macro-elements (except N) was positive. C content decreased from L to H layer, and N remained constant. The N pool seemed to be a good indicator for discriminating humus types.