



Supplement of

Organic-matter-mediated leaching of alkalinity in limed acid soils is affected by dissolved organic carbon adsorption and soil structure

Hannah Van Ryckel et al.

Correspondence to: Hannah Van Ryckel (hannah.vanryckel@kuleuven.be)

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Supplementary information

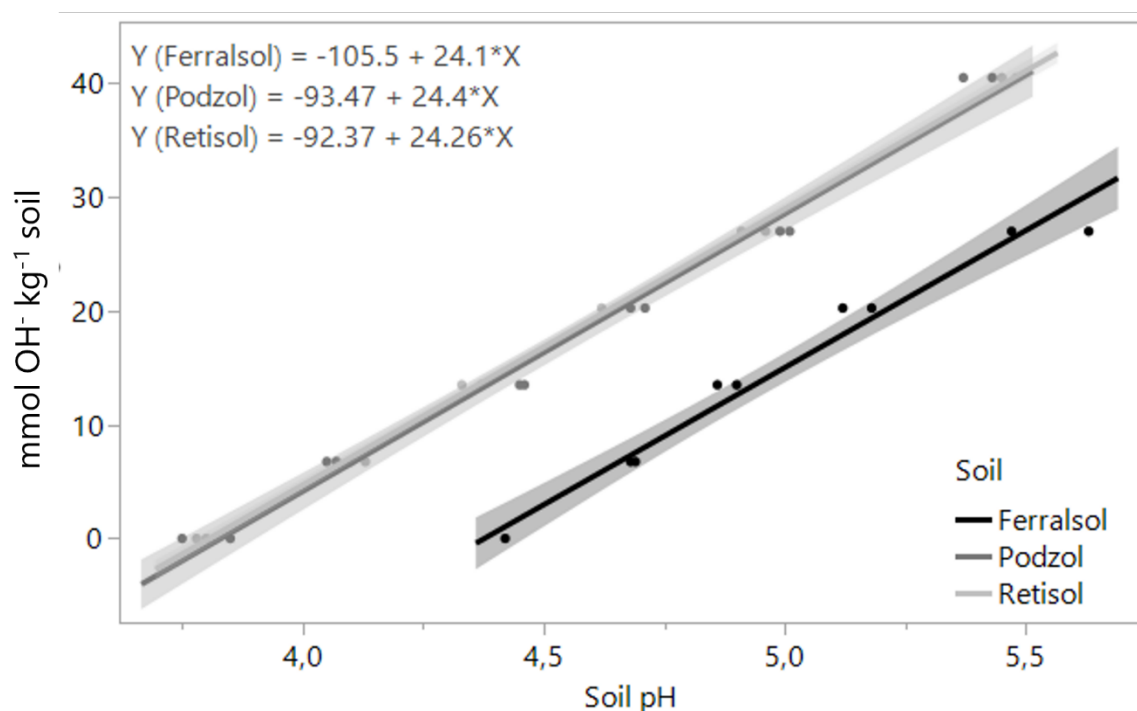


Figure S1: Determination of pH buffer capacities of Podzol, Ferralsol and Retisol as the slope of the curve plotting the amount of base added (mmol OH⁻ kg⁻¹ soil) as a function of the resulting soil pH determined in 10⁻³ M CaCl₂, at 1:5 solid-liquid ratio.

Table S1: Other characteristics of soils used in the column leaching experiments

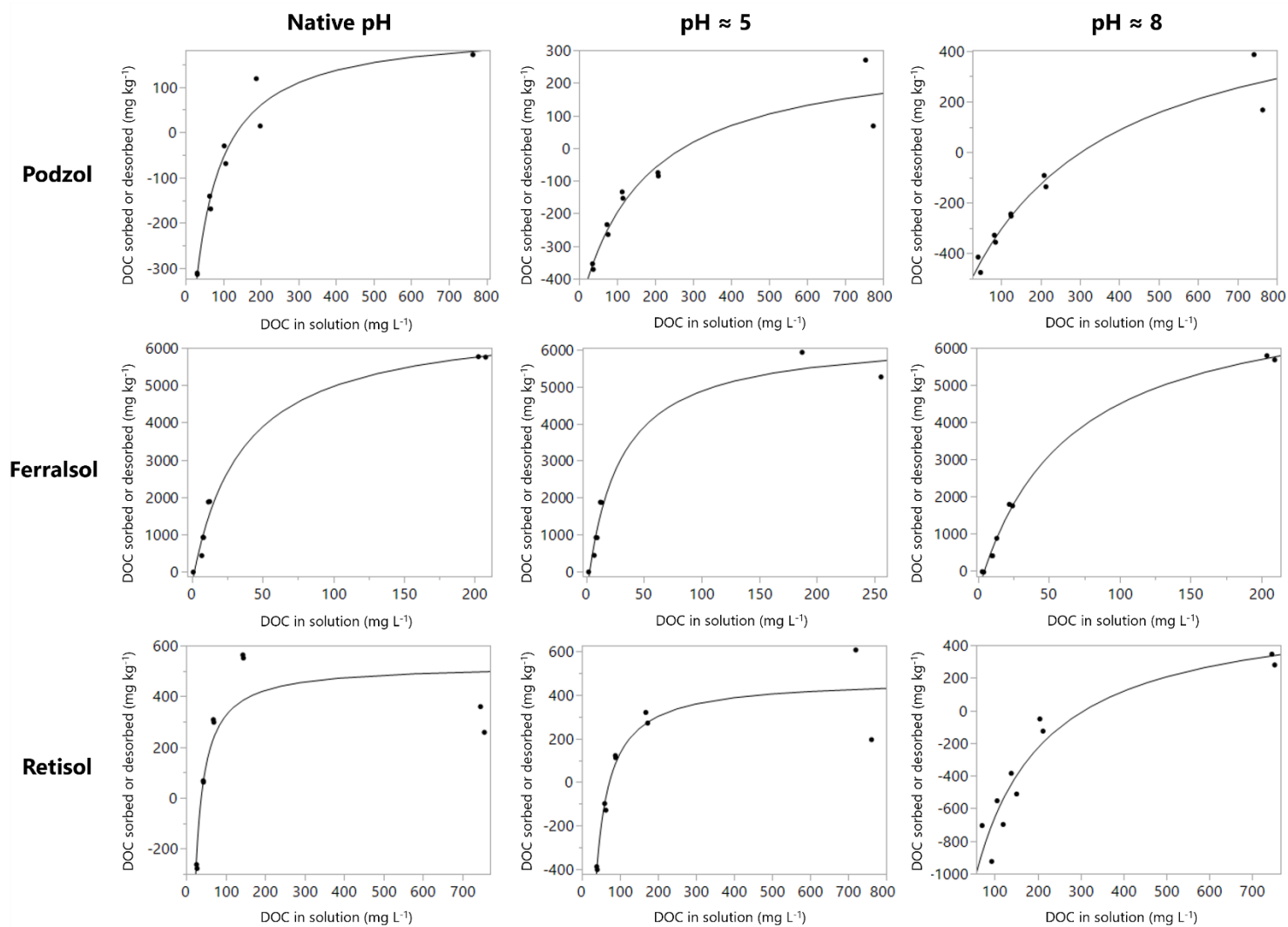
Characteristics		Podzol	Ferralsol	Retisol
Clay ^a	(%)	2.2	34.2	8.3
Silt ^a	(%)	10.5	65.8	91.7
Sand ^a	(%)	87.3	0.0	0.0
Total N ^b	(%)	0.05	0.07	0.08
Fe _{ox} ^c	(g kg ⁻¹ soil)	0.63	0.60	2.82
P _{ox} ^c	(g kg ⁻¹ soil)	0.31	0.02	0.12
Al _{ox} ^c	(g kg ⁻¹ soil)	0.96	1.30	0.85

^a Clay, silt and sand fractions determined with LS 13 320 Laser Diffraction Particle Size Analyser by Beckman Coulter, ^b Total N measurement is based on the principle of oxidative digestion with controlled oxygen supply, ^c Oxalate extractable Fe, P and Al (Schwertmann, 1964)

13 Table S2: Selected characteristics of the OAs screened for the column experiments

Type	Sampling location	pH ^a	DOC (mg C L ⁻¹) ^b	Aromaticity (%) ^c
Green compost	ILVO Merelbeke, Belgium	8.8	1034	30
Green compost + pig manure	ILVO Merelbeke, Belgium	8.5	656	32
Pig manure	ILVO Merelbeke, Belgium	6.8	132	25
Farmyard manure	Antananarivo, Madagaskar	5.7	77	35
Farmyard manure	Behenjy, Madagaskar	6.7	101	36
Garden compost	Herent, Belgium	7.6	344	30
Green compost	Herent, Belgium	7.8	325	29

14 ^a pH (1:5) determined in 0.01 M CaCl₂, ^b determined with the combustion catalytic oxidation method (Shimadzu
15 TOC-L CPH) after extraction with 0.001 M CaCl₂ (1:10) ^c determined using the Specific UV Absorbance (SUVA),
16 as detailed in Amery et al. (2010)



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18 Figure S2: Modified Langmuir DOC adsorption isotherms (Eq. 2) of the Podzol, Ferralsol and Retisol, each at three different soil pH levels: native pH, pH $\approx$ 5 and pH $\approx$ 8.

Table S3: Soil pH values (0.01 M CaCl₂, 1:5) measured in soil slices after the dismantling of column experiment 1. The red line represents the border of the treated layer. Values in bold represent significantly higher ΔpH values (Dunnett, p < 0.05) than the ΔpH value of the 5-6 cm soil layer of the same column.

pH	PODZOL				FERRALSOL			
Depth (cm)	Control	OA	Lime	Lime + OA	Control	OA	Lime	Lime + OA
0-1	3.67	4.45	7.08	7.04	4.24	4.53	7.14	7.31
1-2	3.63	4.17	6.99	7.00	4.22	4.26	6.87	7.14
2-3	3.60	3.72	4.19	5.19	4.22	4.22	4.44	4.52
3-4	3.62	3.64	3.64	3.73	4.22	4.22	4.25	4.25
4-5	3.62	3.62	3.62	3.70	4.21	4.23	4.23	4.25
5-6	3.61	3.60	3.60	3.67	4.22	4.23	4.23	4.24

Table S4: Soil pH values (0.01 M CaCl₂, 1:5) measured in soil slices after the dismantling of column experiment 2. The red line represents the border of the treated layer. Values in bold represent ΔpH values that are significantly higher (Dunnett, p < 0.05) than the ΔpH value of the 5-6 cm soil layer of the same column.

pH	INTACT RETISOL				SIEVED RETISOL			
Depth (cm)	Control	OA	Lime	Lime + OA	Control	OA	Lime	Lime + OA
0-1	3.58	3.97	6.47	6.60	3.56	4.05	6.18	6.45
1-2	3.54	3.71	6.42	6.30	3.56	3.86	6.28	6.20
2-3	3.40	3.51	3.96	4.26	3.53	3.69	5.63	4.88
3-4	3.37	3.44	3.39	3.51	3.53	3.64	4.24	3.74
4-5	3.38	3.43	3.29	3.41	3.51	3.55	3.64	3.55
5-6	3.42	3.42	3.28	3.37	3.51	3.55	3.57	3.54

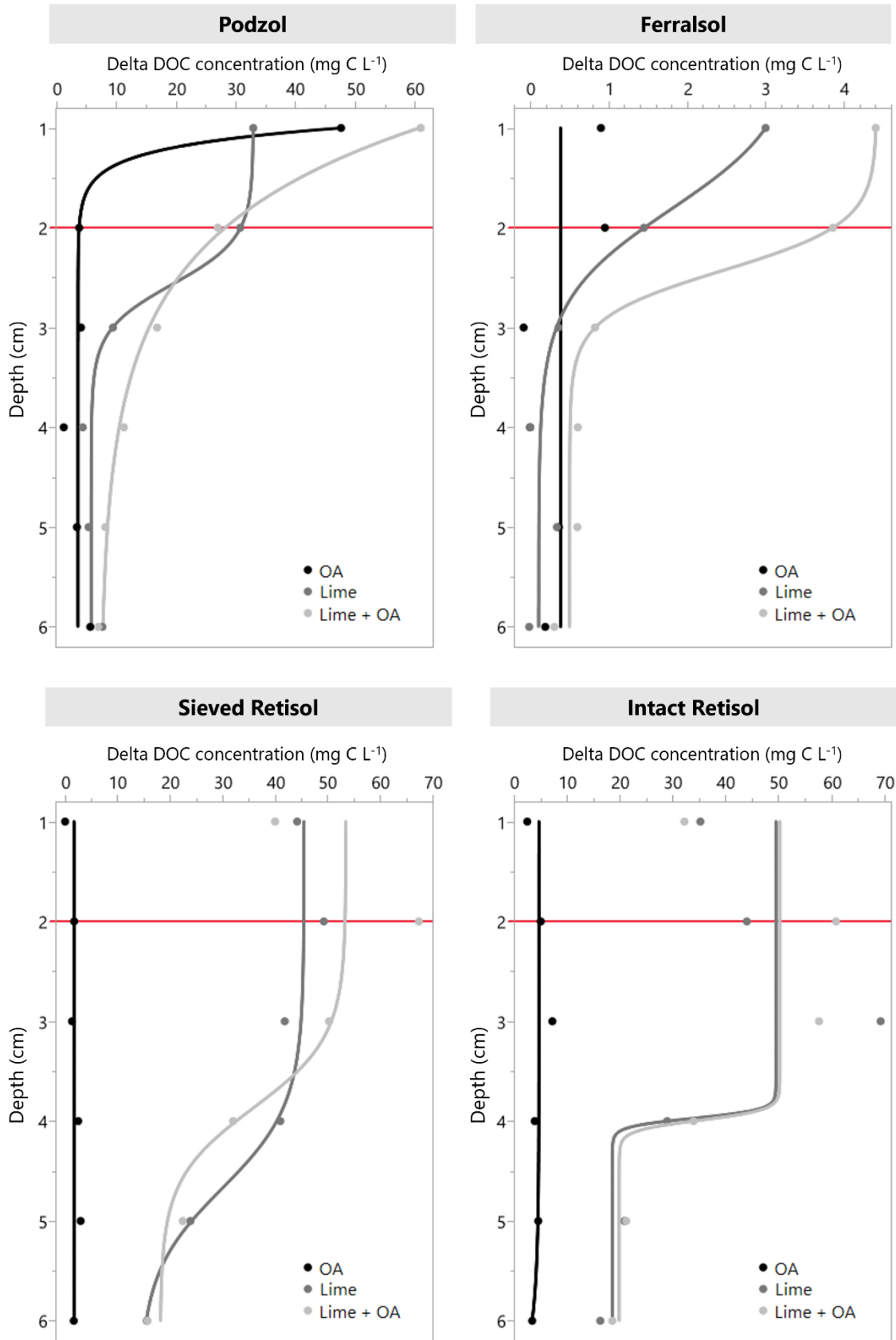


Figure S3: Data points and sigmoidal fits (Eq. 2) of the depth profiles of Δ DOC concentrations (mg C L⁻¹) (difference between DOC concentration in specific soil layer and the DOC concentration of the control treatment in the corresponding soil layer) values in soil slices after dismantling of the columns. The red horizontal lines represent the border of the treated layer.