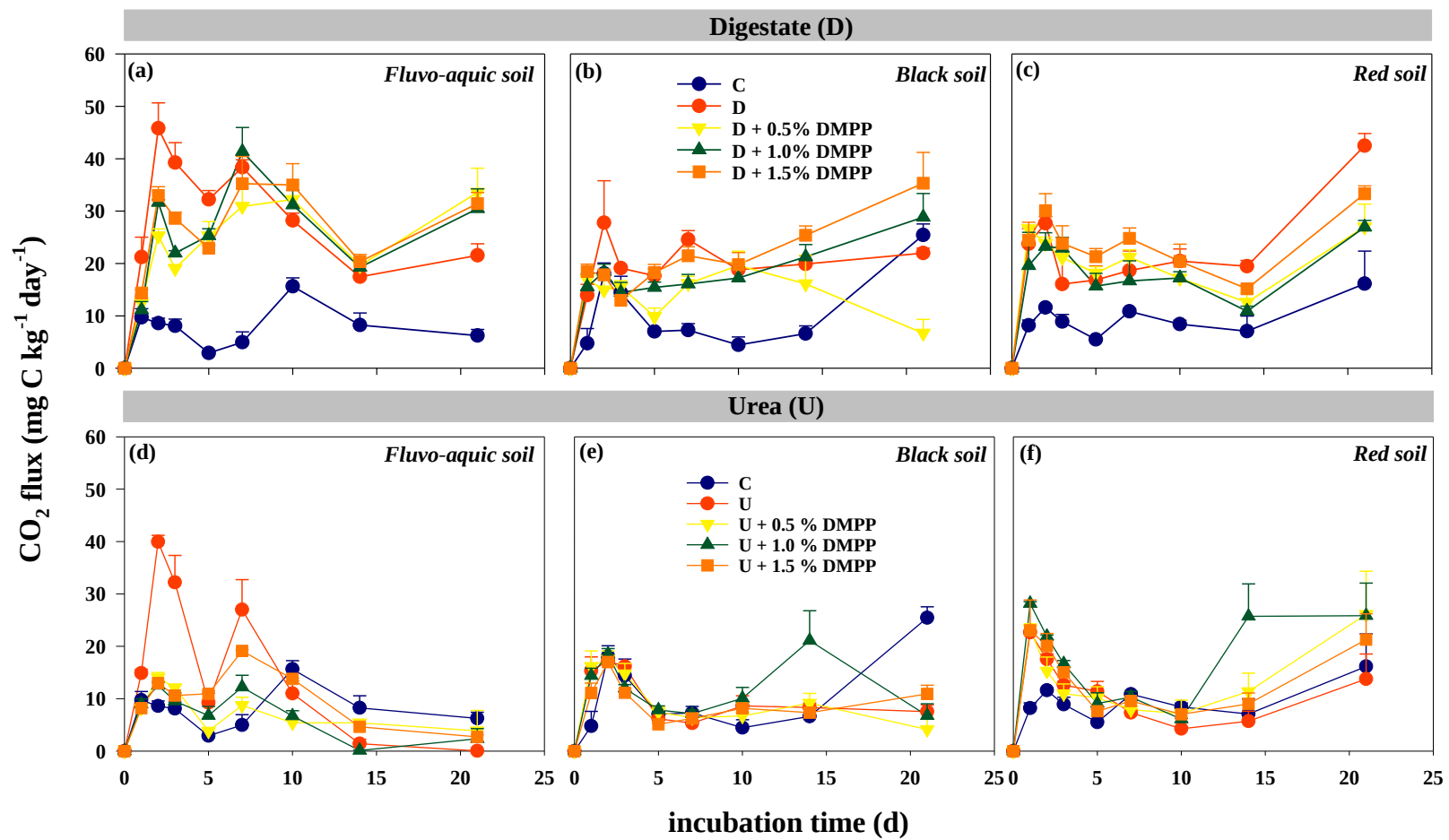


Appendix A

Results of three-way ANOVA analysis for the effects of soil, fertilizer, DMPP concentration (con.) and their interactions on cumulative N₂O emission during the 21-d

incubation period.

Factor	N ₂ O		
	df	F	<i>P</i> -value
Soil	2	142.277	<0.001
Fertilizer	1	783.861	<0.001
DMPP con.	3	95.376	<0.001
Soil × Fertilizer	2	143.186	<0.001
Soil × DMPP con.	6	17.997	<0.001
Fertilizer × DMPP con.	3	36.920	<0.001
Soil × Fertilizer × DMPP con.	6	19.494	<0.001



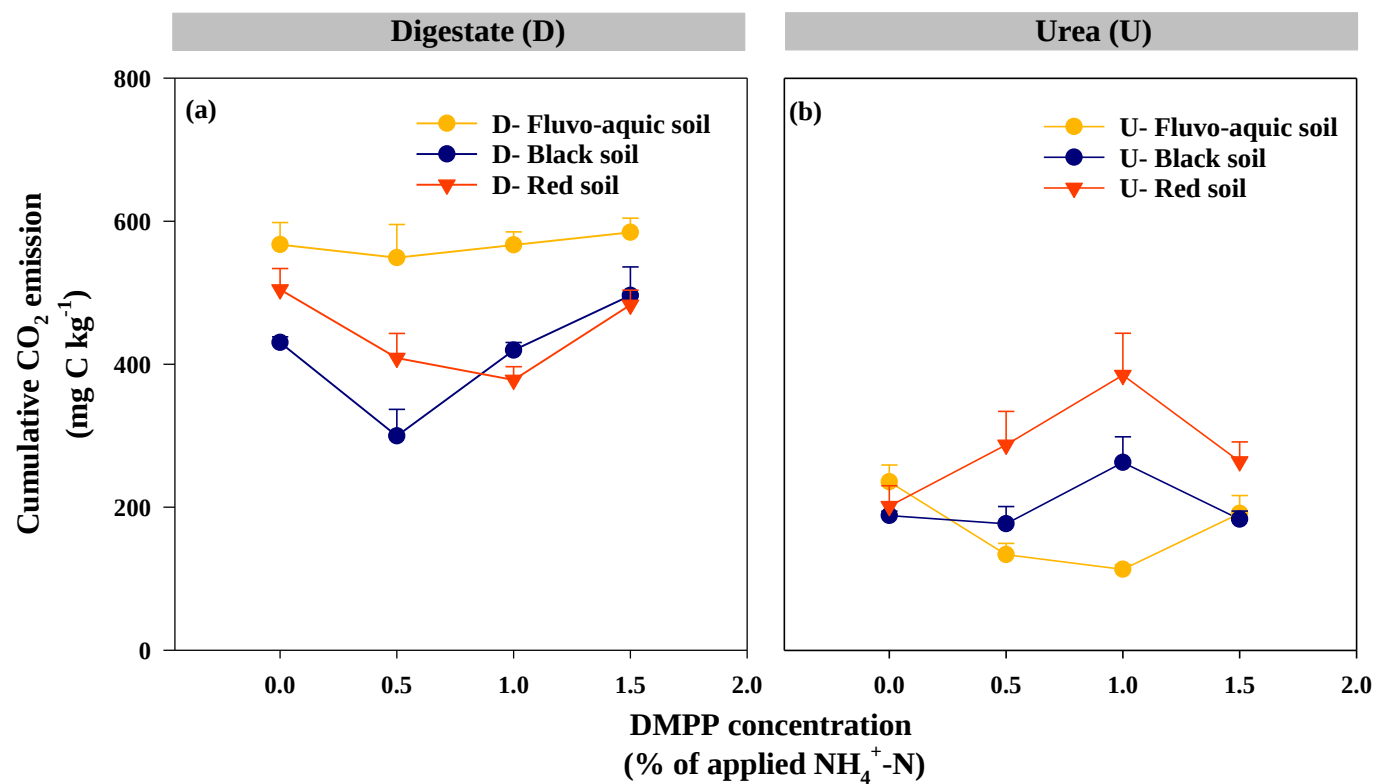
Appendix B CO₂ fluxes from the soils throughout the incubation. The results for soils amended with digestate and urea are shown in panels a-c, and d-f, respectively. The DMPP concentrations are shown in panels. Error bars are the standard error of four replicates.

Appendix C

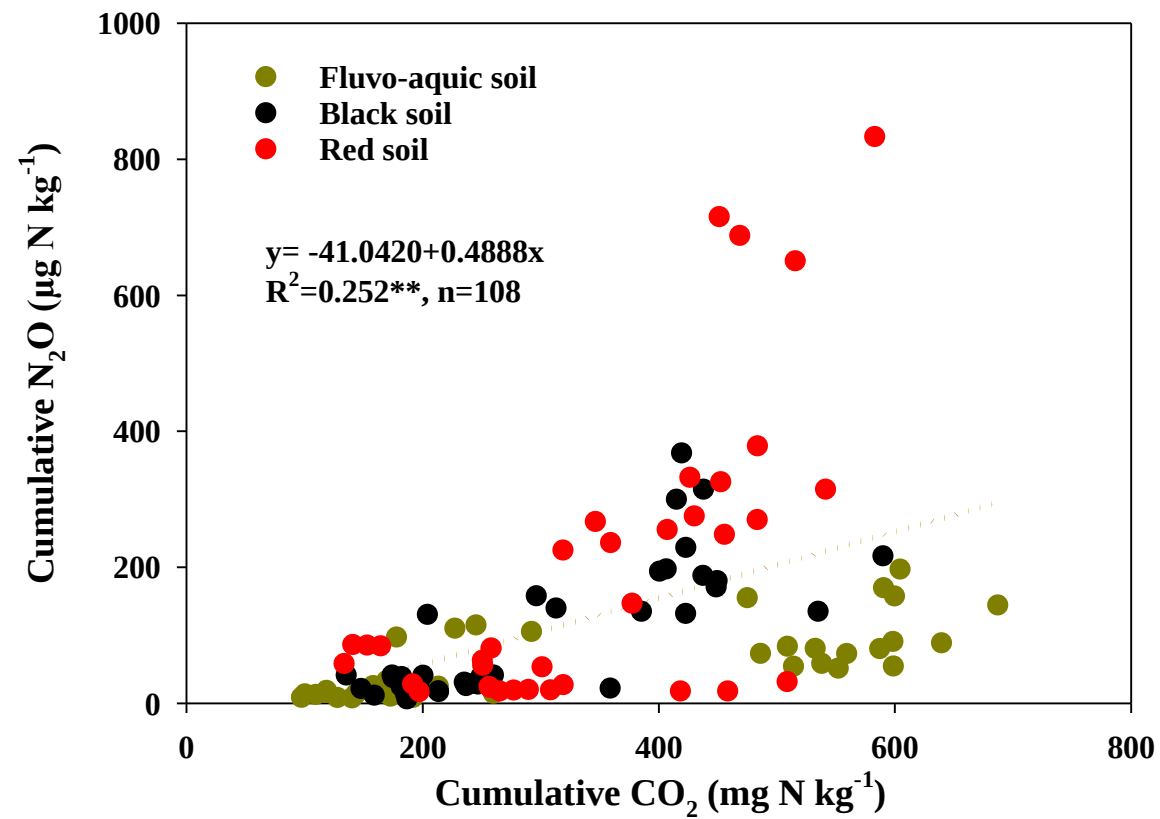
Cumulative N₂O, CO₂ emissions (mean ± standard error) and inhibitory effects of DMPP on N₂O emissions (%) during the incubation period. Different lowercase letters in the same column indicate significant differences ($P < 0.05$).

Treatments	Fluvo-aquic soil			Black soil			Red soil		
	N ₂ O (µg N kg ⁻¹)	Inhibition ^a (%)	CO ₂ (mg C kg ⁻¹)	N ₂ O (µg N kg ⁻¹)	Inhibition (%)	CO ₂ (mg C kg ⁻¹)	N ₂ O (µg N kg ⁻¹)	Inhibition (%)	CO ₂ (mg C kg ⁻¹)
C	24.77 ± 3.69 c	-	180.39 ± 11.90 bc	28.53 ± 4.45 d	-	233.54 ± 7.55 cd	69.64 ± 8.03 d	-	211.30 ± 40.52 d
D	169.91 ± 9.65 a	-	567.32 ± 30.95 a	290.57 ± 39.61 a	-	430.40 ± 8.02 a	721.92 ± 39.44 a	-	504.52 ± 29.43 a
D + DMPP 0.5%	89.00 ± 19.46 b	48%	549.04 ± 46.40 a	140.84 ± 5.95 c	52%	299.49 ± 37.25 b	297.65 ± 35.07 b	59%	408.90 ± 34.16 abc
D + DMPP 1.0%	71.08 ± 8.65 b	58%	566.90 ± 18.29 a	197.82 ± 11.93 b	32%	419.60 ± 10.77 a	231.34 ± 29.42 c	68%	378.16 ± 18.47 bc
D + DMPP 1.5%	73.41 ± 8.01 b	57%	584.42 ± 19.82 a	167.94 ± 20.68 bc	42%	496.24 ± 39.91 a	289.56 ± 18.32 bc	60%	483.16 ± 20.58 ab
U	106.94 ± 3.80 b	-	235.53 ± 23.61 b	35.70 ± 3.61 d	-	188.41 ± 6.01 cd	72.37 ± 7.64 d	-	201.54 ± 28.73 d
U + DMPP 0.5%	13.44 ± 1.14 c	87%	133.83 ± 15.72 c	29.18 ± 4.33 d	18%	176.89 ± 24.15 d	19.35 ± 1.38 d	73%	287.24 ± 46.89 cd
U + DMPP 1.0%	12.08 ± 2.45 c	89%	113.22 ± 6.49 c	26.35 ± 5.85 d	26%	262.68 ± 35.90 bc	21.76 ± 3.34 d	70%	385.09 ± 58.45 bc
U + DMPP 1.5%	14.66 ± 4.73 c	86%	191.28 ± 25.25 c	19.09 ± 7.73 d	47%	183.16 ± 11.52 d	25.10 ± 1.83 d	65%	263.97 ± 27.37 d

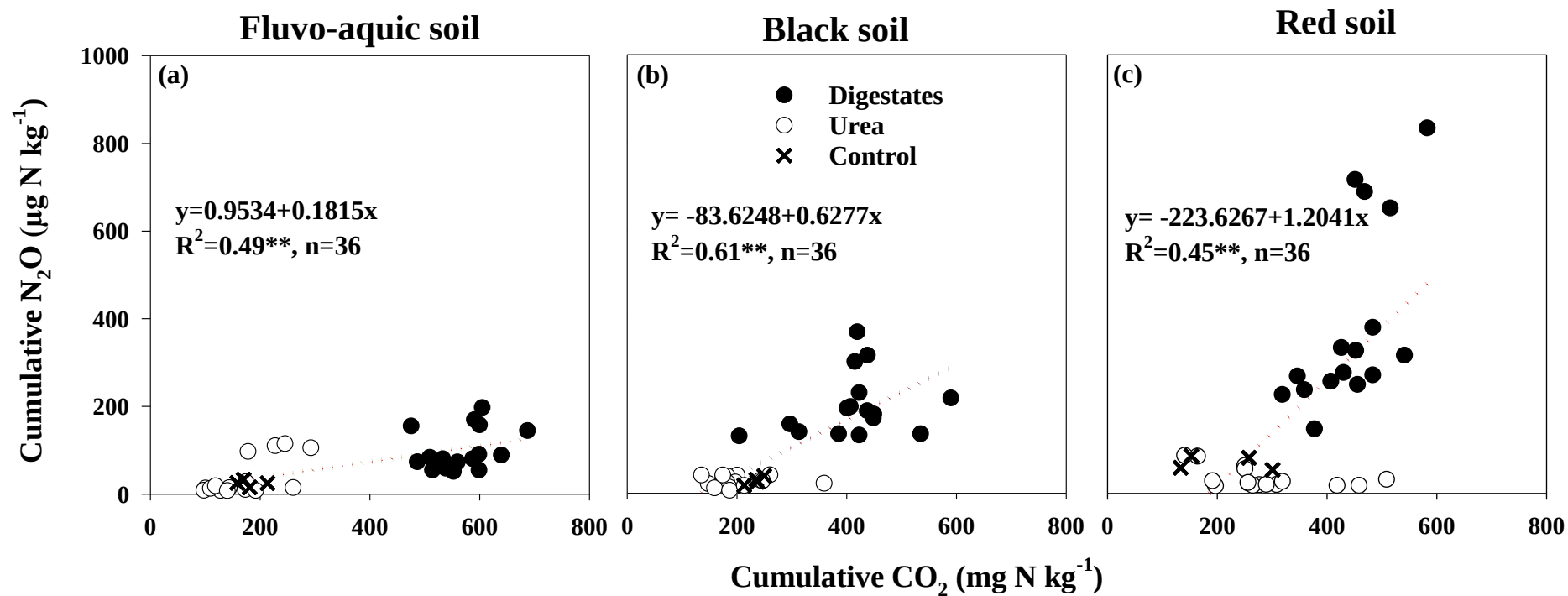
$$\text{Inhibition}^a(\%) = \frac{\text{Cumulative N}_2\text{O emission produced in D or U soil} - \text{Cumulative N}_2\text{O emission produced in DMPPtreated soil}}{\text{Cumulative N}_2\text{O emission in D or U soil}}$$



Appendix D Cumulative CO₂ emissions in response to DMPP application rates in the studied soils during the incubation period. The results for soils amended with digestate and urea are shown in panels a, and b, respectively. Error bars are the standard error of four replicates.



Appendix E The relationship between cumulative N_2O emissions and cumulative CO_2 emissions in all studied soils during the incubation period. The equation is the linear regression of data in all three soils ($P < 0.05$).



Appendix F The relationship between cumulative N₂O emissions and cumulative CO₂ emissions in each soil during the incubation period. The equation is the linear regression of data from all treatments in each soil ($P < 0.05$).

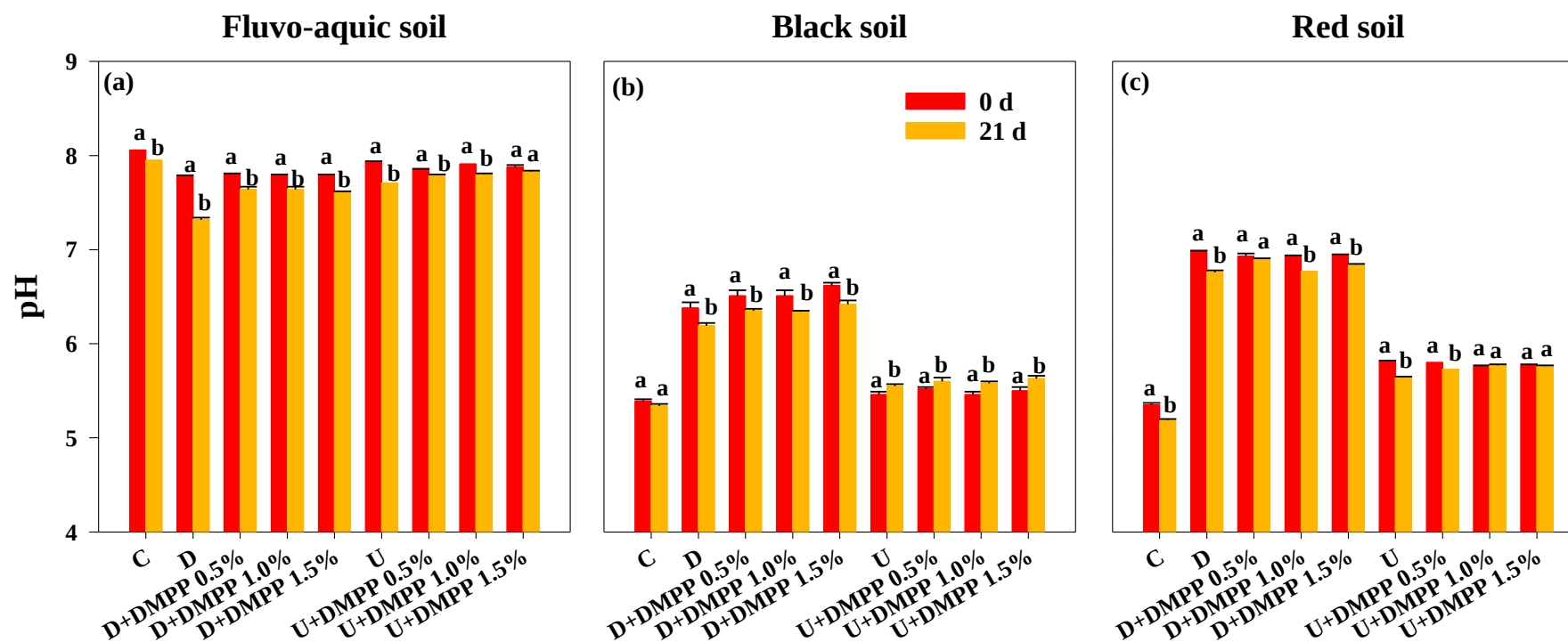
Appendix G

Mineral N concentration at the beginning and end of the incubation and mineral-N balance.

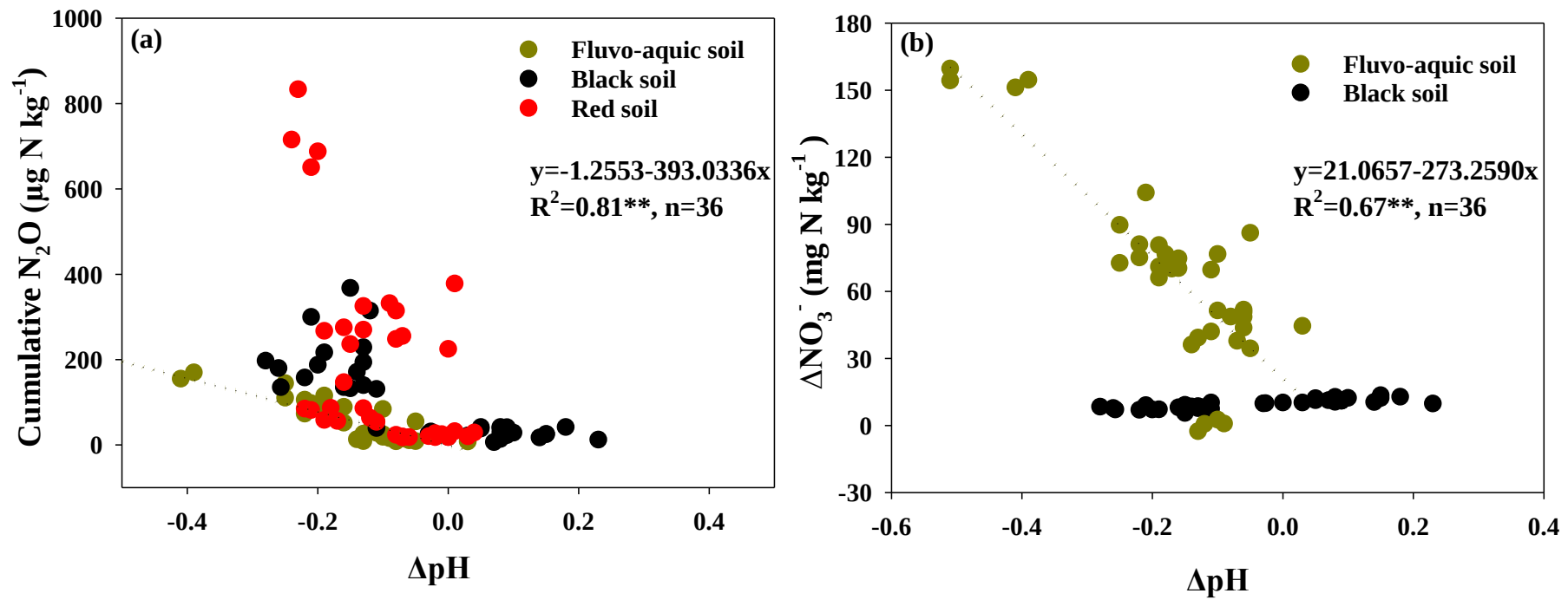
Soil type	Treatments	The beginning of the incubation (mg N kg ⁻¹)			The end of the incubation (mg N kg ⁻¹)			mineral-N balance ^a (mg N kg ⁻¹)
		NH ₄ ⁺	NO ₂ ⁻	NO ₃ ⁻	NH ₄ ⁺	NO ₂ ⁻	NO ₃ ⁻	
Fluvo-aquic soil	C	8.40±0.67	0.05±0.01	24.50±0.31	1.74±0.36	0.00±0.00	24.82±1.03	-6.39
	D	153.91±15.95	1.10±0.02	24.75±0.32	5.31±0.90	0.01±0.01	179.74±1.64	5.30
	D + DMPP 0.5%	141.31±5.28	0.30±0.01	23.66±0.27	114.23±2.31	0.03±0.02	96.84±1.20	45.83
	D + DMPP 1.0%	135.80±5.84	0.34±0.01	23.58±0.40	112.81±0.40	0.02±0.01	99.62±3.44	52.72
	D + DMPP 1.5%	152.07±16.14	0.28±0.00	24.11±0.36	112.15±0.85	0.01±0.00	95.74±2.46	31.44
	U	78.43±1.30	0.68±0.02	26.05±0.78	5.18±1.76	0.02±0.01	114.98±5.73	15.02
	U + DMPP 0.5%	69.18±0.97	0.16±0.01	24.22±0.43	50.16±0.31	0.00±0.00	72.94±1.73	29.54
	U + DMPP 1.0%	66.47±1.24	0.13±0.02	24.63±0.43	49.91±1.67	0.00±0.00	68.52±3.95	27.20
	U + DMPP 1.5%	57.87±2.27	0.07±0.01	24.86±0.40	42.69±3.58	0.00±0.00	64.61±2.24	24.50
Black soil	C	12.06±0.57	0.01±0.00	9.20±0.12	2.23±0.07	0.00±0.00	19.28±0.10	0.24
	D	140.87±1.99	0.03±0.00	11.47±0.16	107.35±3.19	0.13±0.00	19.87±0.39	-25.02
	D + DMPP 0.5%	131.24±6.17	0.05±0.00	11.45±0.17	126.91±3.44	0.12±0.02	18.87±0.19	3.16
	D + DMPP 1.0%	138.28±1.47	0.05±0.00	11.07±0.12	128.15±1.66	0.00±0.00	19.03±0.57	-2.85
	D + DMPP 1.5%	140.64±2.34	0.05±0.00	12.33±0.20	132.58±0.99	0.00±0.00	19.14±0.22	-1.30
	U	23.84±1.39	0.03±0.00	8.35±0.38	82.08±4.39	0.00±0.00	20.75±0.22	70.61
	U + DMPP 0.5%	20.95±2.68	0.03±0.00	7.60±0.49	85.83±4.11	0.00±0.00	18.96±0.45	76.21
	U + DMPP 1.0%	21.72±1.08	0.03±0.00	7.47±0.40	84.70±1.14	0.00±0.00	19.28±0.20	74.76
	U + DMPP 1.5%	24.52±2.59	0.03±0.00	8.41±0.13	82.48±4.48	0.00±0.00	18.96±0.28	68.48

Red soil	C	32.20±2.72	0.16±0.00	23.99±0.43	36.48±1.79	0.00±0.00	23.92±0.38	4.05
	D	188.59±3.37	0.35±0.01	23.30±0.29	140.74±2.96	0.12±0.02	21.68±0.49	-49.70
	D + DMPP 0.5%	189.09±4.32	0.31±0.02	23.47±0.20	162.37±15.92	0.05±0.00	20.80±0.15	-29.65
	D + DMPP 1.0%	209.29±3.65	0.39±0.02	23.39±0.06	168.09±13.14	0.04±0.00	20.20±0.98	-44.74
	D + DMPP 1.5%	201.41±2.49	0.32±0.00	21.07±1.62	155.29±2.09	0.04±0.01	20.50±0.26	-46.97
	U	73.67±1.75	0.24±0.01	26.36±0.26	112.74±3.06	0.01±0.01	24.97±1.84	37.45
	U + DMPP 0.5%	74.09±3.32	0.20±0.00	26.90±0.34	120.14±6.55	0.00±0.00	22.42±0.34	41.37
	U + DMPP 1.0%	69.95±0.87	0.18±0.01	26.87±0.28	129.12±4.64	0.00±0.00	21.31±0.26	53.43
	U + DMPP 1.5%	67.69±1.76	0.20±0.02	27.14±0.49	126.72±1.71	0.01±0.01	21.69±0.43	53.39

^a mineral-N balance=N(end)-N(beginning); N(beginning)=(NH₄⁺+ NO₂⁻+ NO₃⁻)-N; N(end) = (NH₄⁺+ NO₂⁻+ NO₃⁻)-N.



Appendix H Soil pH at the beginning and end of the incubation period. Different lowercase letters indicate significant differences ($P < 0.05$) between the two time points within the same treatment.



Appendix I Correlations of cumulated N₂O emissions and the changes in nitrate with the changes in soil pH. Panel a shows the cumulated N₂O for individual vials (end point values), plotted against the measured change in soil pH ($\Delta \text{pH} = \text{pH}_{\text{end}} - \text{pH}_{\text{beginning}}$) for all soils. Panel b shows the changes in nitrate ($\Delta \text{NO}_3^- = \text{NO}_3^-_{\text{end}} - \text{NO}_3^-_{\text{beginning}}$) plotted against the change in soil pH for the fluvo-aquic and the black soil (red soil not included since nitrification was below detection in this soil). The equations in a and b are both derived from the linear regression in the fluvo-aquic soil ($P < 0.05$).

Appendix J

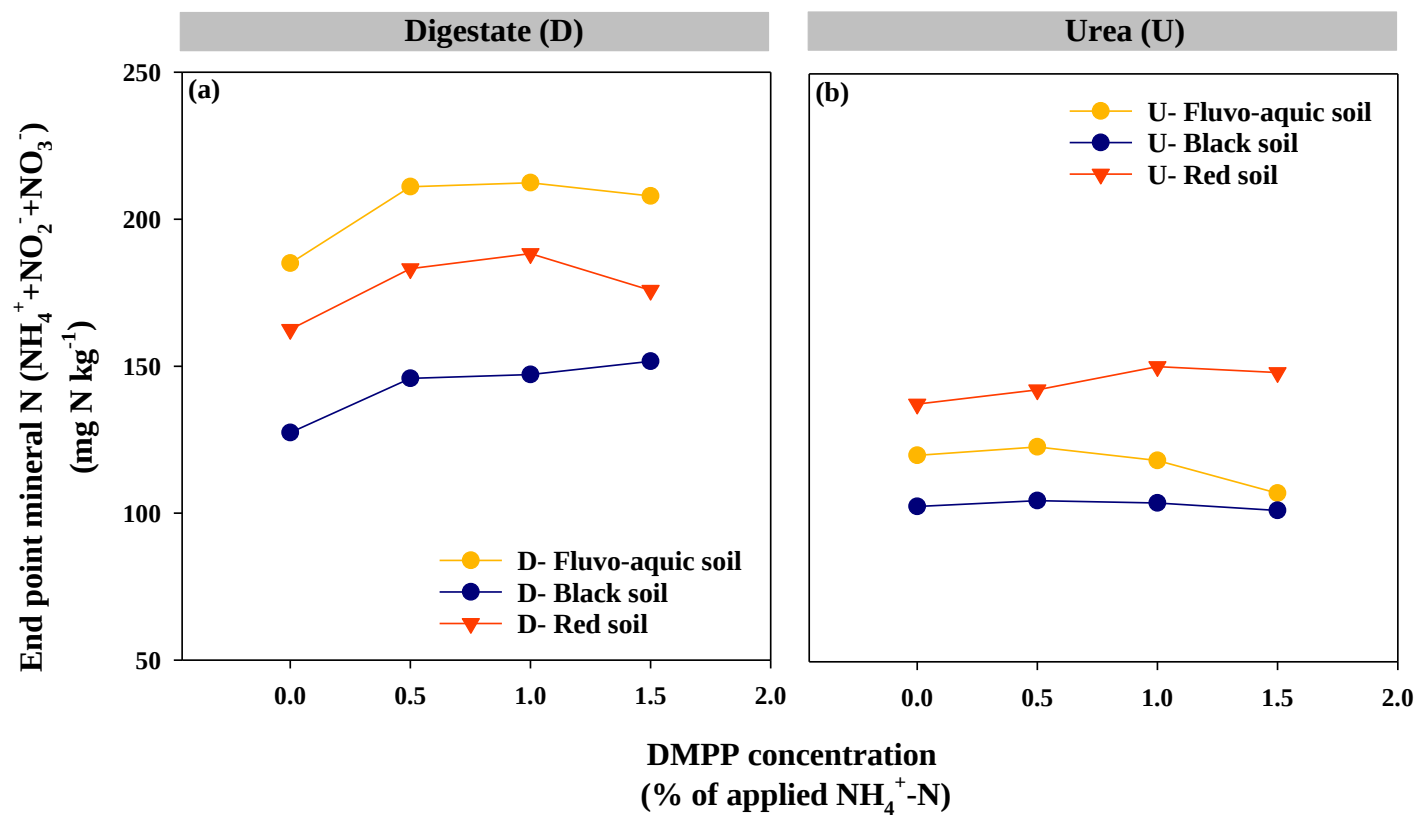
Nitrification rates in studied soils during different incubation periods. Data of nitrification rates in the red soil were not detected. Rates are expressed as mean values ±

Incubation period	Soil type	Nitrification rate (mg N kg ⁻¹ day ⁻¹)								
		C	D	D + DMPP	D + DMPP	D + DMPP	U	U + DMPP	U + DMPP	U + DMPP
				0.5%	1.0%	1.5%		0.5%	1.0%	1.5%
0 2 4	Fluvo-aquic soil	nd ^a	39.73 ± 0.68	18.96 ± 0.26	18.54 ± 0.16	15.58 ± 1.02	27.51 ± 2.38	13.43 ± 0.77	12.00 ± 0.18	11.51 ± 0.43

standard errors.

	Black soil	1.10 ± 0.08	1.57 ± 0.12	1.75 ± 0.21	1.59 ± 0.24	1.46 ± 0.31	1.77 ± 0.24	2.17 ± 0.25	2.14 ± 0.18	1.76 ± 0.13
3-7 d	Fluvo-aquic soil	nd	7.03 ± 0.47	3.57 ± 0.10	3.34 ± 0.08	3.41 ± 0.80	3.01 ± 1.76	1.14 ± 0.61	2.29 ± 0.38	2.24 ± 0.36
	Black soil	0.81 ± 0.08	0.48 ± 0.05	0.22 ± 0.12	0.43 ± 0.16	0.26 ± 0.16	0.41 ± 0.16	0.17 ± 0.10	0.28 ± 0.11	0.48 ± 0.07
7-21 d	Fluvo-aquic soil	0.39 ± 0.19	0.55 ± 0.13	0.14 ± 0.12	0.51 ± 0.24	0.80 ± 0.18	nd	0.62 ± 0.41	nd	nd
	Black soil	0.25 ± 0.02	0.13 ± 0.02	0.13 ± 0.03	0.14 ± 0.03	0.12 ± 0.02	0.38 ± 0.03	0.32 ± 0.04	0.30 ± 0.03	0.23 ± 0.02

nd^a means not detected



Appendix K End point mineral N (NH₄⁺+NO₂⁻+NO₃⁻) in digestate- and urea- amended soil.