

Supplementary Table S1. Experimental coefficients of variation (CV) for the variables shown in Figures 3–7.

Variable	Units	Grand mean	CV (%)
Figure 3 — N₂O emission flux			
N ₂ O	μmol m ⁻² s ⁻¹	3.9 × 10 ⁻⁴	n.a.†
Figure 4 — Water and soil physicochemical properties			
DO	mg L ⁻¹	6.61	19.3
pH	—	7.18	5.8
WTC	mg L ⁻¹	4.79	5.8
WOC	mg L ⁻¹	2.00	7.1
W-NH ₄ ⁺	mg L ⁻¹	0.0167	39.5
W-NO ₃ ⁻	mg L ⁻¹	0.263	33.9
SOC	g kg ⁻¹	22.0	12.7
STN	g kg ⁻¹	1.99	10.1
S-NH ₄ ⁺	mg kg ⁻¹	23.5	29.4
S-NO ₃ ⁻	mg kg ⁻¹	16.7	21.1
Figure 5 — Denitrification pathway gene relative abundances			
<i>nosZ</i>	%	0.0869	10.2
<i>napA</i>	%	0.0387	16.9
<i>narG</i>	%	0.375	9.5
<i>nirK</i>	%	0.0520	17.2
<i>nirS</i>	%	0.0537	17.7
<i>norB</i>	%	0.0527	14.0
Figure 6 — DNRA, nitrification, nitrogen-fixation and ammonium-assimilation gene relative abundances			
<i>nrfA</i>	%	0.0220	17.4
<i>amoA</i>	%	0.0171	30.8
<i>glnA</i>	%	0.485	4.4
<i>nifH</i>	%	0.0543	21.0
Figure 7 — Functional gene ratios related to the N₂O production–consumption balance			
<i>nosZ</i> /(<i>nirK</i> + <i>nirS</i>)	—	0.829	13.6
(<i>nirK</i> + <i>nirS</i> + <i>norB</i>)/ <i>nosZ</i>	—	1.87	11.0
<i>nirK</i> / <i>nirS</i>	—	1.01	25.8
<i>nrfA</i> /(<i>nirK</i> + <i>nirS</i>)	—	0.212	22.8

CV(%) = ($\sqrt{\text{MSE}} / \text{grand mean}$) × 100, where MSE is the residual (within-cell) mean square of a two-way analysis of variance with treatment, growth stage and their interaction as factors ($n = 54$; 3 treatments × 3 growth stages × 6 replicate plots; residual $df = 45$), and the grand mean is the overall mean of the variable across all 54 samples. The two-way ANOVA was used solely to estimate the pooled experimental error for computing the CV; treatment effects were tested as described in Section 2.7 (Statistical analysis).

† Not applicable. N₂O flux means are near zero and include negative values, so the CV (which divides by the mean) is undefined and uninterpretable.

Supplementary Table S2. Two-way mixed-model (split-plot-in-time) analysis of variance for the variables in Figures 3–7.

Variable	Treatment	Growth stage	Treatment × stage
Figure 3 — N₂O emission flux			
N ₂ O	$F = 0.22, p = 0.804$	$F = 5.59, p = 0.009$	$F = 1.33, p = 0.283$
Figure 4 — Water and soil physicochemical properties			
DO	$F = 8.09, p = 0.004$	$F = 13.98, p < 0.001$	$F = 1.31, p = 0.289$
pH	$F = 2.26, p = 0.138$	$F = 16.51, p < 0.001$	$F = 4.03, p = 0.010$
WTC	$F = 23.70, p < 0.001$	$F = 89.81, p < 0.001$	$F = 4.98, p = 0.003$
WOC	$F = 5.97, p = 0.012$	$F = 645.63, p < 0.001$	$F = 2.58, p = 0.057$
W-NH ₄ ⁺	$F = 14.96, p < 0.001$	$F = 4.92, p = 0.014$	$F = 2.48, p = 0.065$
W-NO ₃ ⁻	$F = 7.33, p = 0.006$	$F = 9.96, p < 0.001$	$F = 0.78, p = 0.549$
SOC	$F = 1.66, p = 0.223$	$F = 14.34, p < 0.001$	$F = 2.12, p = 0.103$
STN	$F = 3.34, p = 0.063$	$F = 7.53, p = 0.002$	$F = 2.80, p = 0.044$
S-NH ₄ ⁺	$F = 2.25, p = 0.140$	$F = 4.51, p = 0.019$	$F = 4.51, p = 0.006$
S-NO ₃ ⁻	$F = 0.15, p = 0.866$	$F = 7.65, p = 0.002$	$F = 1.32, p = 0.286$
Figure 5 — Denitrification pathway genes			
<i>nosZ</i>	$F = 28.34, p < 0.001$	$F = 16.63, p < 0.001$	$F = 0.91, p = 0.471$
<i>napA</i>	$F = 12.39, p < 0.001$	$F = 11.23, p < 0.001$	$F = 5.71, p = 0.002$
<i>narG</i>	$F = 4.59, p = 0.028$	$F = 44.84, p < 0.001$	$F = 0.90, p = 0.476$
<i>nirK</i>	$F = 0.32, p = 0.728$	$F = 1.18, p = 0.322$	$F = 4.46, p = 0.006$
<i>nirS</i>	$F = 4.60, p = 0.028$	$F = 3.15, p = 0.057$	$F = 0.34, p = 0.847$
<i>norB</i>	$F = 2.53, p = 0.113$	$F = 11.24, p < 0.001$	$F = 2.06, p = 0.111$
Figure 6 — DNRA, nitrification, N₂ fixation and NH₄⁺ assimilation genes			
<i>nrfA</i>	$F = 6.43, p = 0.010$	$F = 19.54, p < 0.001$	$F = 7.89, p < 0.001$
<i>amoA</i>	$F = 1.24, p = 0.319$	$F = 67.37, p < 0.001$	$F = 5.86, p = 0.001$
<i>glnA</i>	$F = 11.86, p < 0.001$	$F = 8.84, p < 0.001$	$F = 4.12, p = 0.009$
<i>nifH</i>	$F = 2.29, p = 0.136$	$F = 27.61, p < 0.001$	$F = 2.42, p = 0.070$
Figure 7 — Functional gene ratios			
<i>nosZ</i> / <i>(nirK+nirS)</i>	$F = 7.78, p = 0.005$	$F = 7.80, p = 0.002$	$F = 3.19, p = 0.027$
<i>(nirK+nirS+norB)/nosZ</i>	$F = 16.63, p < 0.001$	$F = 8.62, p = 0.001$	$F = 3.60, p = 0.016$
<i>nirK/nirS</i>	$F = 3.54, p = 0.055$	$F = 0.05, p = 0.953$	$F = 2.51, p = 0.063$
<i>nrfA/(nirK+nirS)</i>	$F = 6.81, p = 0.008$	$F = 14.43, p < 0.001$	$F = 3.10, p = 0.030$

Two-way mixed-model analysis of variance with treatment as a between-plot factor and growth stage as a within-plot (repeated-measures) factor, and plot identity as the experimental unit ($n = 54$; 18 plots × 3 stages).