

Table S1. Results of Fisher's Least Significant Difference (LSD) test of pH in the different treatments at the same sampling period (0-10d).

Treatments	Incubation time (days)						
	0	1	2	3	5	7	10
C vs. P	0.0007	<0.0001	0.0002	<0.0001	0.0015	<0.0001	0.0002
Urea vs. Urea+P	0.1101	0.4283	0.6426	0.8543	0.5247	0.5730	0.7371

The data in Fig1A were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no urea and P addition; Urea, urea amendment rate at 0.20 g N kg⁻¹ soil; P, monopotassium phosphate amendment rate at 0.087 g P kg⁻¹ soil.

Table S2. Results of Fisher's Least Significant Difference (LSD) test of available P in the different treatments at the same sampling period (0-10d).

Treatments	Incubation time (days)						
	0	1	2	3	5	7	10
C vs. P	0.0010	0.0002	0.0013	0.0001	0.0002	0.0008	<0.0001
Urea vs. Urea+P	0.0005	<0.0001	0.0006	<0.0001	0.0011	0.0003	0.0095

The data in Fig. 1B were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no urea and P addition; Urea, urea amendment rate at 0.20 g N kg⁻¹ soil; P, monopotassium phosphate amendment rate at 0.087 g P kg⁻¹ soil.

Table S3. Results of Fisher's Least Significant Difference (LDS) test of $\text{NH}_4^+\text{-N}$ in the different treatments at the same sampling period (0-10d).

Treatments	Incubation time (days)						
	0	1	2	3	5	7	10
C vs. P	0.0873	0.3038	0.0046	0.0007	0.0591	0.0168	0.9551
Urea vs. Urea+P	0.9758	0.0147	0.0061	0.6615	0.0054	0.0328	0.2733

The data in Fig. 2A were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no N and P addition; Urea, urea amendment rate at 0.20 g N kg^{-1} soil; P, monopotassium phosphate amendment rate at $0.087 \text{ g P kg}^{-1}$ soil.

Table S4. Results of Fisher's Least Significant Difference (LDS) test of $\text{NO}_3^-\text{-N}$ in the different treatments at the same sampling period (0-10d).

Treatments	Incubation time (days)						
	0	1	2	3	5	7	10
C vs. P	0.7196	0.2616	0.2475	0.0224	0.1130	0.0038	0.2020
Urea vs. Urea+P	0.0404	0.0411	0.0005	0.0009	0.0004	0.8460	0.4644

The data in Fig. 2B were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no N and P addition; Urea, urea amendment rate at 0.20 g N kg^{-1} soil; P, monopotassium phosphate amendment rate at $0.087 \text{ g P kg}^{-1}$ soil.

Table S5. Results of Fisher's Least Significant Difference (LDS) test of net nitrification rate in the different treatments at the same sampling period (0-10d).

Treatments	Incubation time (days)					
	1	2	3	5	7	10
C vs. P	0.4495	0.3430	0.0176	0.0966	0.0047	0.1838
Urea vs. Urea+P	0.3308	0.0010	0.0012	0.0006	0.9084	0.7023

The data in Table 1 were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no N and P addition; Urea, urea amendment rate at 0.20 g N kg⁻¹ soil; P, monopotassium phosphate amendment rate at 0.087 g P kg⁻¹ soil.

Table S6. Results of Fisher's Least Significant Difference (LDS) test of ratio of NH₄⁺-N/AP in the different treatments at the same sampling period (0-10d).

Treatments	Incubation time (days)						
	0	1	2	3	5	7	10
C vs. P	0.0056	0.0006	0.0437	0.0132	0.7953	0.0006	0.2746
Urea vs. Urea+P	0.0242	0.0021	0.0011	<0.0001	0.0104	0.1042	0.4079

The data in Fig. 1B and 2A were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no N and P addition; Urea, urea amendment rate at 0.20 g N kg⁻¹ soil; P, monopotassium phosphate amendment rate at 0.087 g P kg⁻¹ soil. AP, available phosphorus.

Table S7. Results of Fisher's Least Significant Difference (LDS) test of ratio of NO_3^- -N/AP in the different treatments at the same sampling period (0-10d).

Treatments	Incubation time (days)						
	0	1	2	3	5	7	10
C vs. P	0.0037	<0.0001	0.0054	0.0045	0.0126	0.0005	0.0035
Urea vs. Urea+P	0.0005	<0.0001	0.0001	0.0003	0.0022	0.0046	0.0059

The data in Fig. 1B and 2B were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no N and P addition; Urea, urea amendment rate at 0.20 g N kg⁻¹ soil; P, monopotassium phosphate amendment rate at 0.087 g P kg⁻¹ soil. AP, available phosphorus.

Table S8. Results of Fisher's Least Significant Difference (LDS) test of *amoA* gene abundance of AOB, AOA and ratio of AOB to AOA between in the different treatments at the same sampling period (0, 3 and 7d).

Treatments	AOB			AOA			AOB/AOA		
	0	3	7	0	3	7	0	3	7
C vs. P	0.0350	0.0055	0.0013	0.1802	0.0428	0.1844	0.1812	0.3694	0.0020
Urea vs. Urea+P	0.0024	<0.0001	0.3133	0.0059	0.0003	0.7620	0.0366	0.0014	0.5773

The data in Fig. 3 were used for the statistical analysis. *P* values of Fisher's LSD tests ($P \leq 0.05$) were reported. Numbers in bold indicate a statistical difference between the control (C) and the phosphorus (P) treatments, the urea and the combined application of urea and phosphorus (Urea+P) treatments at the same sampling period. C, no N and P addition; Urea, urea amendment rate at 0.20 g N kg⁻¹ soil; P, monopotassium phosphate amendment rate at 0.087 g P kg⁻¹ soil. AOB, ammonia oxidizing bacteria; AOA, ammonia oxidizing archaea.