

## 1 Supporting information

2 Appendix C1: (a) The soil pools of nitrate ( $\text{NO}_3^-$ ), ammonium ( $\text{NH}_4^+$ ) and (b) microbial biomass  
 3 N in the upper 10 cm of each land use type prior to inoculation. (c) Plant nitrogen (N) and (d)  
 4 plant biomass. Data from four 200-cm<sup>2</sup> areas per fields were amalgamated to give mean values of  
 5 three fields per land use  $\pm$  1SE. Different letters within groups represent  $p < 0.05$ .

	Terraced		Unterraced	
	Mown	Unmown	Mown	Unmown
a) Soil N pools				
N- $\text{NO}_3^-$ ( $\mu\text{g N.g}^{-1}$ soil)	$3.7 \pm 1.3^{\text{B}}$	$8.3 \pm 0.9^{\text{A}}$	$0.2 \pm 0.01^{\text{C}}$	$1.1 \pm 0.3^{\text{BC}}$
N- $\text{NO}_3^-$ ( $\text{mg N.m}^{-2}$ area)	$458.1 \pm 161.3^{\text{B}}$	$1073.8 \pm 125.8^{\text{A}}$	$24.1 \pm 5.9^{\text{C}}$	$121.8 \pm 33.8^{\text{BC}}$
N- $\text{NH}_4^+$ ( $\mu\text{g N.g}^{-1}$ soil)	$21.7 \pm 2.1^{\text{A}}$	$15.7 \pm 1.7^{\text{A}}$	$12.9 \pm 2.1^{\text{A}}$	$22.1 \pm 4.8^{\text{A}}$
N- $\text{NH}_4^+$ ( $\text{mg N.m}^{-2}$ area)	$2646.3 \pm 261.6^{\text{A}}$	$2595.1 \pm 227.3^{\text{AB}}$	$1382.1 \pm 214.8^{\text{B}}$	$2595.1 \pm 563.7^{\text{A}}$
N- $\text{NH}_4^+$ / N- $\text{NO}_3^-$ ratio	$8.5 \pm 3.9^{\text{B}}$	$1.9 \pm 0.3^{\text{C}}$	$59.3 \pm 2.3^{\text{A}}$	$25.4 \pm 7.8^{\text{A}}$
b) Microbial N pools				
Microbial biomass N ( $\mu\text{g N.g}^{-1}$ soil)	$150.4 \pm 16.9^{\text{A}}$	$117.7 \pm 29.8^{\text{A}}$	$137.5 \pm 27.7^{\text{A}}$	$164.1 \pm 17.1^{\text{A}}$
Microbial biomass N ( $\text{g N.m}^{-2}$ area)	$18.3 \pm 2.1^{\text{A}}$	$15.1 \pm 3.8^{\text{A}}$	$14.6 \pm 2.9^{\text{A}}$	$19.2 \pm 2.0^{\text{A}}$
Microbial C : N ratio	$6.4 \pm 0.2^{\text{A}}$	$7.2 \pm 0.2^{\text{A}}$	$5.1 \pm 0.1^{\text{B}}$	$4.8 \pm 0.2^{\text{B}}$
c) Plant N pools				
Above-ground plant ( $\text{mg N.g}^{-1}$ biomass)	$20.1 \pm 1.8^{\text{A}}$	$20.8 \pm 2.5^{\text{A}}$	$21.6 \pm 1.5^{\text{A}}$	$24.2 \pm 1.2^{\text{A}}$
Above-ground plant ( $\text{g N.m}^{-2}$ area)	$3.9 \pm 0.8^{\text{C}}$	$4.5 \pm 0.8^{\text{BC}}$	$7.2 \pm 0.6^{\text{AB}}$	$10.0 \pm 1.3^{\text{A}}$
Root ( $\text{mg N.g}^{-1}$ biomass)	$11.9 \pm 1.1^{\text{AB}}$	$12.8 \pm 0.8^{\text{A}}$	$8.4 \pm 1.0^{\text{BC}}$	$6.3 \pm 1.2^{\text{C}}$
Root ( $\text{g N.m}^{-2}$ area)	$9.3 \pm 1.1^{\text{A}}$	$5.6 \pm 0.2^{\text{A}}$	$9.4 \pm 1.9^{\text{A}}$	$8.1 \pm 1.1^{\text{A}}$
d) Plant Biomass				
Above-ground plant biomass ( $\text{g.m}^{-2}$ area)	$193.9 \pm 32.7^{\text{B}}$	$230.4 \pm 67.6^{\text{B}}$	$338.9 \pm 28.5^{\text{AB}}$	$413.2 \pm 54.4^{\text{A}}$
Relative growth rate ( $\text{mg.g}^{-1}.\text{d}^{-1}$ )	$82.5 \pm 18.7^{\text{A}}$	$94.5 \pm 29.6^{\text{A}}$	$36.5 \pm 7.0^{\text{B}}$	$24.5 \pm 3.3^{\text{B}}$
Root biomass ( $\text{g.m}^{-2}$ area)	$784.7 \pm 47.7^{\text{B}}$	$446.5 \pm 46.2^{\text{C}}$	$1102.6 \pm 91.0^{\text{A}}$	$1311.0 \pm 115.5^{\text{A}}$

6 Appendix C2: (a) Soil nitrogen (N) flux per day, calculated using the  $^{15}\text{N}$  pool dilutions for 48 h after inoculation from the isotope  
7 dilution equations of Kirkham & Bartholomew. (b) Microbial N uptake, and (c, d) plant N uptake per day, calculated for the same  
8 period using the  $^{15}\text{N}$  pool dilution equations of described in Stark (2010). Data from four 200-cm<sup>2</sup> areas per fields were amalgamated  
9 to give mean values of three fields per land use  $\pm$  1SE. Different letters within groups represent  $p < 0.05$ .

	Terraced		Unterraced	
	Mown	Unmown	Mown	Unmown
a) Soil N flux				
Gross N-NO <sub>3</sub> <sup>-</sup> consumption rate ( $\mu\text{g N.g}^{-1}$ soil.day <sup>-1</sup> )	28.3 $\pm$ 6.7 <sup>A</sup>	16.8 $\pm$ 6.3 <sup>A</sup>	17.25 $\pm$ 4.5 <sup>A</sup>	19.0 $\pm$ 4.9 <sup>A</sup>
Gross N-NO <sub>3</sub> <sup>-</sup> consumption rate (mg N.m <sup>-2</sup> .day <sup>-1</sup> )	3448 $\pm$ 818 <sup>A</sup>	2162 $\pm$ 816 <sup>A</sup>	1835 $\pm$ 480 <sup>A</sup>	2232 $\pm$ 586 <sup>A</sup>
Gross N-NH <sub>4</sub> <sup>+</sup> consumption rate ( $\mu\text{g N.g}^{-1}$ soil.day <sup>-1</sup> )	22.3 $\pm$ 4.2 <sup>A</sup>	16.7 $\pm$ 3.1 <sup>AB</sup>	8.6 $\pm$ 1.1 <sup>B</sup>	9.9 $\pm$ 2.1 <sup>B</sup>
Gross N-NH <sub>4</sub> <sup>+</sup> consumption rate (mg N.m <sup>-2</sup> .day <sup>-1</sup> )	2719 $\pm$ 519 <sup>A</sup>	2158 $\pm$ 405 <sup>AB</sup>	917 $\pm$ 116 <sup>B</sup>	1165 $\pm$ 242 <sup>B</sup>
b) Microbial N uptake				
Specific N uptake rate per g soil ( $\mu\text{g N.g}^{-1}$ biomass.day <sup>-1</sup> )	66.7 $\pm$ 6.9 <sup>A</sup>	58.7 $\pm$ 4.9 <sup>A</sup>	48.76 $\pm$ 13.1 <sup>A</sup>	55.8 $\pm$ 8.1 <sup>A</sup>
Gross N uptake rate per field area (mg N.m <sup>-2</sup> area)	2144.5 $\pm$ 624.9 <sup>A</sup>	956.5 $\pm$ 153.9 <sup>A</sup>	1109.5 $\pm$ 198.1 <sup>A</sup>	1202.6 $\pm$ 372.5 <sup>A</sup>
c) Plant N translocation to above-ground biomass				
Specific N uptake rate (mg N.g <sup>-1</sup> biomass. day <sup>-1</sup> )	19.2 $\pm$ 0.9 <sup>AB</sup>	28.7 $\pm$ 3.6 <sup>A</sup>	26.5 $\pm$ 13.4 <sup>A</sup>	14.9 $\pm$ 1.5 <sup>B</sup>
N uptake rate per field area (mg N.m <sup>-2</sup> . day <sup>-1</sup> )	2401.7 $\pm$ 1103.7 <sup>AB</sup>	3812.2 $\pm$ 438.3 <sup>A</sup>	1545.3 $\pm$ 87.5 <sup>B</sup>	1550.5 $\pm$ 437.9 <sup>B</sup>
d) Plant root N uptake				
Specific N uptake rate (mg N.g <sup>-1</sup> biomass. day <sup>-1</sup> )	1.8 $\pm$ 0.5 <sup>BC</sup>	4.3 $\pm$ 0.3 <sup>A</sup>	2.8 $\pm$ 0.5 <sup>B</sup>	1.0 $\pm$ 0.3 <sup>C</sup>
N uptake rate per field area (g N.m <sup>-2</sup> . day <sup>-1</sup> )	456.3 $\pm$ 183.3 <sup>AB</sup>	718.2 $\pm$ 115.2 <sup>A</sup>	443.8 $\pm$ 27.2 <sup>AB</sup>	240.8 $\pm$ 43.2 <sup>B</sup>

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