

**Supplementary Table S1.** Soil characteristics determined from the nutrient addition trials at Ukulinga Farm, KwaZulu-Natal. Values represent mean  $\pm$  SE, based on n = 4. Significant differences ( $p < 0.05$ ) among treatments are denoted by different superscript letters.

Parameter	Treatment trials					
	N1	N2	N3	N1+P	N2+P	N3+P
<b>Soil macronutrients</b>						
( $\mu\text{mol g}^{-1}$ )						
Leco N concentration	0.27 $\pm$ 0.01 <sup>a</sup>	0.32 $\pm$ 0.01 <sup>c</sup>	0.31 $\pm$ 0.00 <sup>bc</sup>	0.31 $\pm$ 0.01 <sup>bc</sup>	0.28 $\pm$ 0.01 <sup>ab</sup>	0.29 $\pm$ 0.01 <sup>ac</sup>
P concentration	0.07 $\pm$ 0.013 <sup>a</sup>	0.16 $\pm$ 0.05 <sup>bc</sup>	0.10 $\pm$ 0.01 <sup>ab</sup>	0.21 $\pm$ 0.01 <sup>c</sup>	0.20 $\pm$ 0.04 <sup>c</sup>	0.22 $\pm$ 0.04 <sup>c</sup>
K concentration	3.81 $\pm$ 0.58 <sup>b</sup>	3.07 $\pm$ 0.58 <sup>ab</sup>	4.29 $\pm$ 0.81 <sup>b</sup>	3.14 $\pm$ 0.27 <sup>ab</sup>	1.74 $\pm$ 1.45 <sup>a</sup>	1.45 $\pm$ 0.14 <sup>a</sup>
<b>Relative acidity</b>						
Exchangeable acidity	0.22 $\pm$ 0.06 <sup>a</sup>	0.75 $\pm$ 0.30 <sup>b</sup>	1.57 $\pm$ 0.23 <sup>c</sup>	0.13 $\pm$ 0.01 <sup>a</sup>	0.23 $\pm$ 0.05 <sup>a</sup>	1.02 $\pm$ 0.23 <sup>bc</sup>
( $\text{cmmol L}^{-1}$ )						
Moisture factor (g/g)	1.07 $\pm$ 0.03 <sup>a</sup>	1.08 $\pm$ 0.00 <sup>b</sup>	1.08 $\pm$ 0.00 <sup>b</sup>	1.08 $\pm$ 0.00 <sup>b</sup>	1.08 $\pm$ 0.00 <sup>ab</sup>	1.08 $\pm$ 0.00 <sup>ab</sup>
pH (KCl)	4.67 $\pm$ 0.07 <sup>bc</sup>	4.46 $\pm$ 0.09 <sup>ab</sup>	4.12 $\pm$ 0.04 <sup>a</sup>	4.77 $\pm$ 0.04 <sup>bc</sup>	5.01 $\pm$ 0.37 <sup>c</sup>	4.18 $\pm$ 0.04 <sup>ab</sup>
pH (H <sub>2</sub> O)	5.63 $\pm$ 0.07 <sup>c</sup>	5.45 $\pm$ 0.10 <sup>bc</sup>	4.61 $\pm$ 0.14 <sup>a</sup>	5.72 $\pm$ 0.06 <sup>c</sup>	5.86 $\pm$ 0.27 <sup>c</sup>	4.91 $\pm$ 0.12 <sup>ab</sup>

**Supplementary Table S2.** The molecular identification of soil and plant isolated nitrogen-fixing bacteria.

Nitrogen-fixing bacteria			Treatment (s)
Strains	Accession No.	Similarity (%)	

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<b>Soil isolated nitrogen-fixing bacteria</b>					
<i>Caulobacter</i> IMCC34905	<i>rhizosphaerae</i>	strain	MK 138628	97.38	N1, N2, N3, N1 + P, N2 + P, and N3 + P
<i>Sphingomonas</i> sp.	N-9		LC 101917	97.82	N1, N2, N3
<i>Burkholderia</i> J8A6SARS	<i>contaminans</i>	strain	MT 409575	99.01	N1 + P, N2 +P, and N3 + P
<b>Plant root nodule isolated nitrogen- fixing bacteria</b>					
<i>Mesorhizobium</i> sp.	BwIS3– 11		KX 959579	98.01	N2 + P
<i>Mesorhizobium</i> sp.	strain BwIS3-17		KX 959577	98.00	N3 + P

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