

Supplementary Table 1 The primers for qRT-PCR of *PIN* family genes

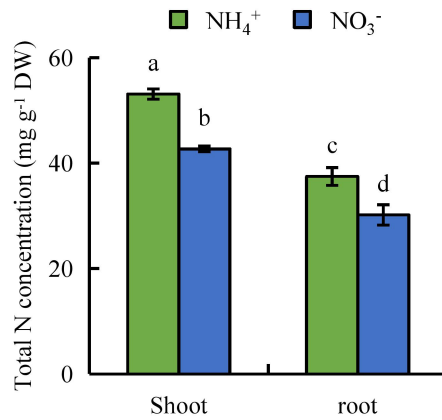
Gene	Primer sequence
<i>OsPIN1a</i>	5'-TCATCTGGTCGCTCGTCTGC-3' 5'-CGAACGTCGCCACCTTGTTTC-3'
<i>OsPIN1b</i>	5'-TGCACCCTAGCATTCTCAGCA-3' 5'-CCCTCCTCCCAAATTCTACTT-3'
<i>OsPIN1c</i>	5'-CCGTCAGGTTCTCGTGGGT-3' 5'-TCACGGCTGTGCTCAGAATG- 3'
<i>OsPIN1d</i>	5'-GATTCCGACGTCGTCTCGCTCG-3' 5'-GTCGGGTTCCGCGACGACTGCA-3'
<i>OsPIN2</i>	5'-CAACACCTACTCCAGCCTC-3' 5'-TGGACCAGTCAAGAACCTC-3'
<i>OsPIN5a</i>	5'-GGGGCTGGTGCTAAAGTTCG-3' 5'-TGAGGTAGGGCTGCCTGTATG-3'
<i>OsPIN5b</i>	5'-GGGCAGCAGGAGAGGGTGATAG-3' 5'-GAATCGGCAGAGAGATCAATGT-3'
<i>OsPIN5c</i>	5'-CTTCACCGCCGACCAGTGCGAC-3' 5'-GTGATGCACCACGAGAACCCGC-3'
<i>OsPIN8</i>	5'-GTTCCACTATATGTAGCTATGATAC-3' 5'-CAGTCAAACCTTCTCTGCACAGC-3'
<i>OsPIN9</i>	5'-GATACAAGATAGCGTCGTTCTC-3' 5'-ATGATGTCTGCGTGGACCT-3'
<i>OsPIN10a</i>	5'-GTTGGATTGAGATAGGCTGAGGAG-3' 5'-ATGGCGACGAAGCGGTTGAT-3'
<i>OsPIN10b</i>	5'-TCCGATGCAGGGTTAGGC-3' 5'-AGGATGGTAGCGTGGAGGTT-3'
<i>OsACTIN</i>	5'-CAACACCCCTGCTATGTACG-3' 5'-CATCACCAGAGTCCAACACAA-3'

Supplementary Table 2 The primers for qRT-PCR of *YUCCA* genes

Gene	Primer sequence
<i>OsYUCCA1</i>	5'-AGGTGTTGGTCGTGGGATGCG-3' 5'-GCGATGCCGAACGTGGATAGA-3'
<i>OsYUCCA2</i>	5'-TATGGATCGGCAACCATTTGA-3' 5'-CGCTGGGAAGACTGTCCTTGT-3'
<i>OsYUCCA3</i>	5'-GGAAGCGTGTTCTCGTTGTTG-3' 5'-ACATTGACAGCCCAAAGGTGG-3'
<i>OsYUCCA4</i>	5'-CCTCGACCTCTGCAACCACAATG-3' 5'-CGACAACAGGAGTACCAGCCAATC-3'
<i>OsYUCCA5</i>	5'-GTCAGCCTCGACCTCTGCAACA-3' 5'-TGGGAAACCACTTGAGAAGGAACAC-3'
<i>OsYUCCA6</i>	5'-GGATACCAAAGCAACGTCCCC-3' 5'-TGAAGCCAACAGAGTAGAGCCCTG-3'
<i>OsYUCCA7</i>	5'-ACCGGCTACCGCAGCAATGTG-3' 5'-CGTACAGCCCCGACTCACCT-3'
<i>OsYUCCA8</i>	5'-GAGATGTGCCTGGACCTCTGC-3' 5'-GTGTCTCCCAGCACCATCCTT-3'

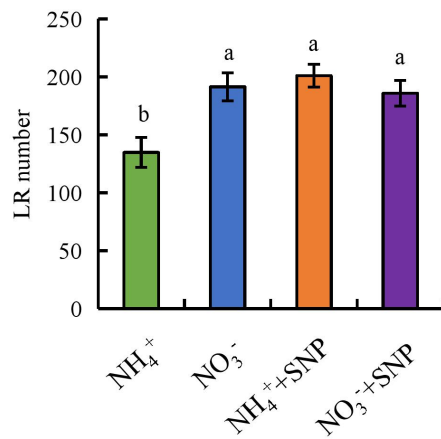
Supplementary Table 3 The primers for qRT-PCR of *NOA*, *NIA1*, *NIA2*, *CYCB1;1* genes

Gene	Primer sequence
<i>OsNOA</i>	5'-TGCTTCTGTGGTTGGGAC-3' 5'-TCTAAGGGCACGGTGTTT-3'
<i>OsNIA1</i>	5'-CCAATTCTTTCATCGTGTTCT-3' 5'-CATGCAGCATTTCGTTTCT-3'
<i>OsNIA2</i>	5'-ACTGGTGCTGGTGCTTCTGG-3' 5'-CGGCTGGGTGTTGAGGGACT-3'
<i>OsCYCB1;1</i>	5'-CACGTCGACTATAGACTAAGCCATTGAGGCGTAT -3' 5'-AAAGGTACCAGAGCTGATCTCGATGACATGCTCGG-3'

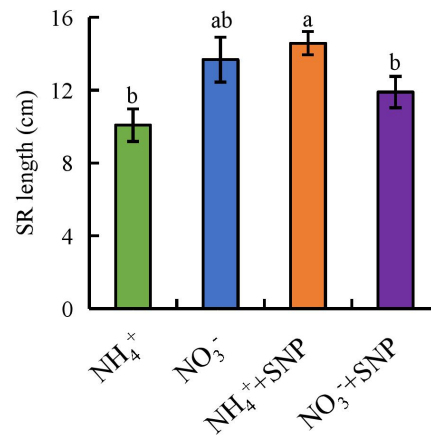


Supplementary FIGURE 1 Effect of NH₄⁺ and NO₃⁻ availability on total nitrogen (N) concentrations in the shoot and root of wild-type (Nipponbare) rice plants. Seedlings were grown in a hydroponic media containing NH₄⁺ and NO₃⁻. Data are means ± SE and bars with different letters indicate significant difference at P < 0.05 tested with ANOVA.

(A)

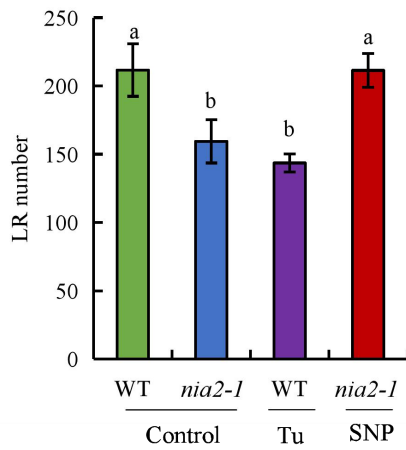


(B)

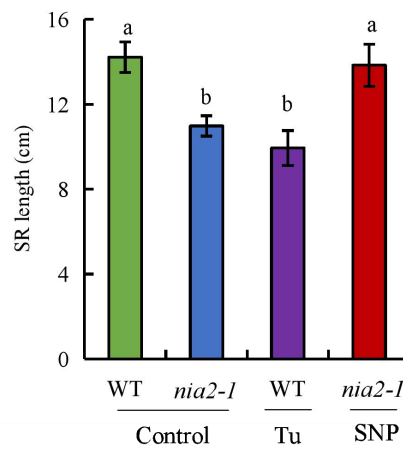


Supplementary FIGURE 2 Lateral root (LR) number and seminal root (SR) length in wild-type (Nipponbare) rice seedlings. Seedlings were grown in hydroponic medium containing NH₄⁺ and NO₃⁻ in addition to SNP (10 μM) for 14 days. (A), Lateral root (LR) number; (B), Seminal root (SR) length. Bar=1mm. Data are means ± SE and bars with different letters indicate significant difference at P < 0.05 tested with ANOVA.

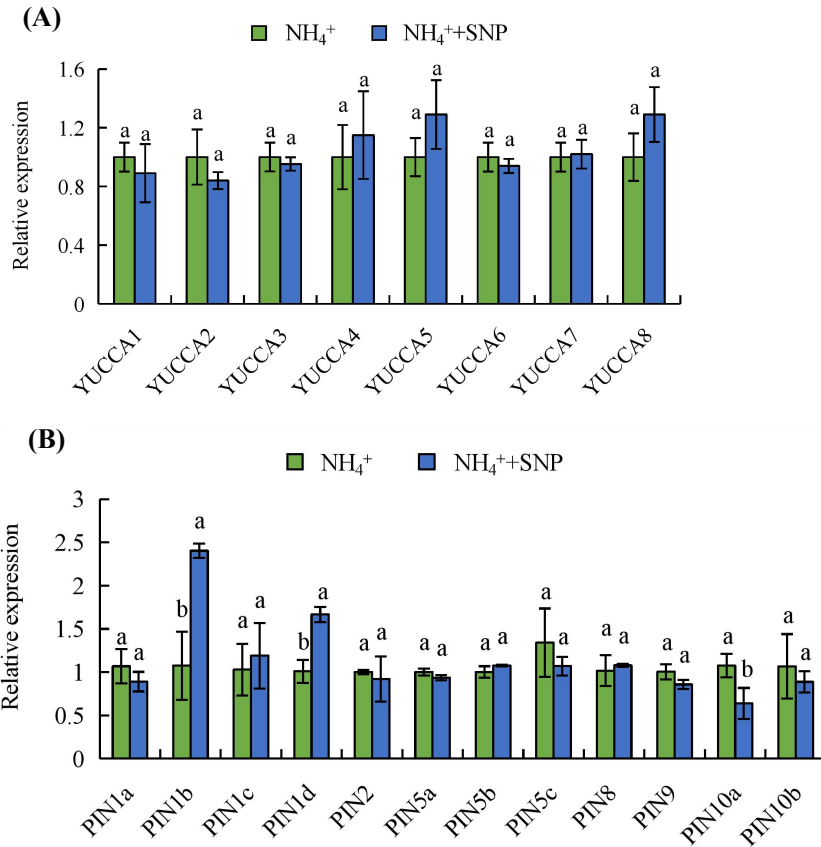
(A)



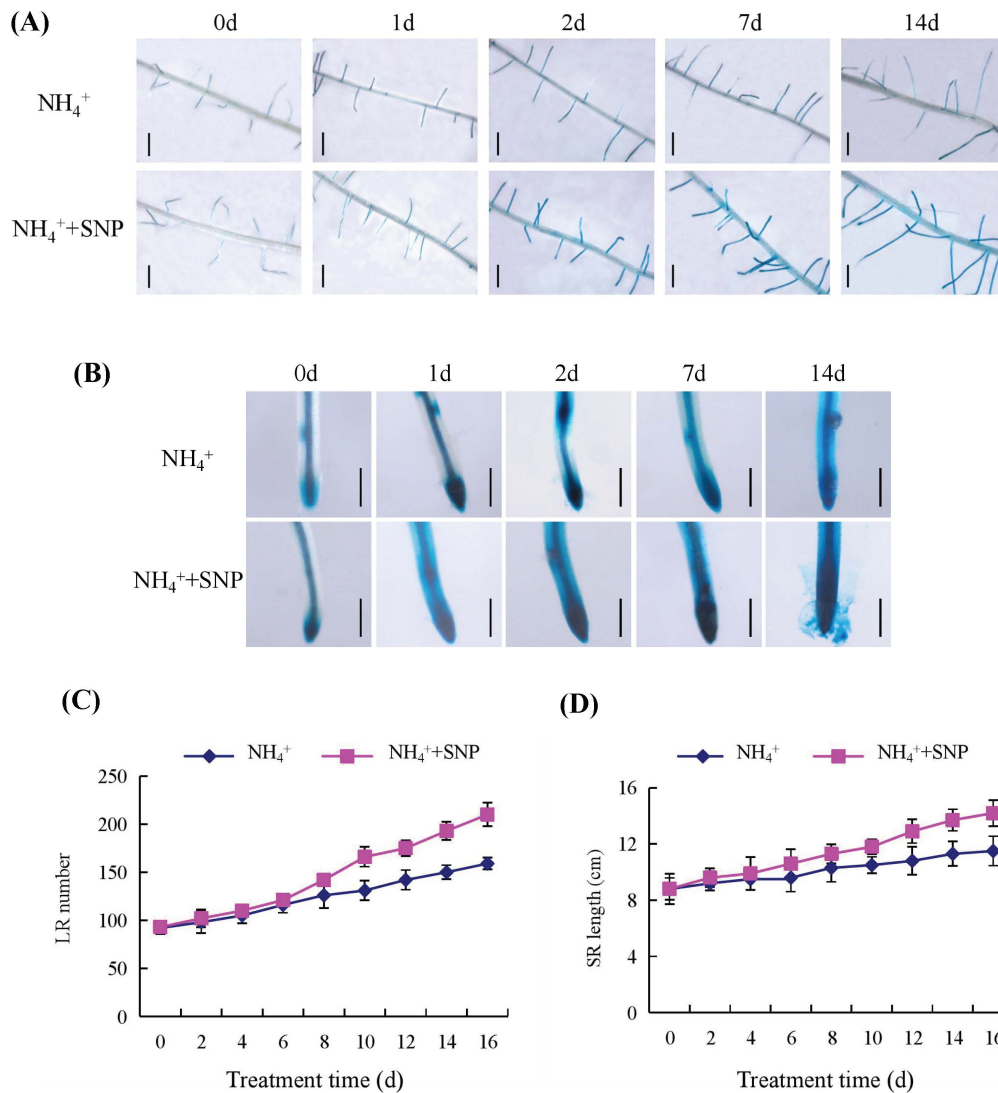
(B)



Supplementary FIGURE 3 Lateral root (LR) number and seminal root (SR) length in *nia2* mutant and wild-type (DJ) rice seedlings. Seedlings were grown in a hydroponic media containing NH_4^+ and NO_3^- in addition to SNP (10 μM) and Tu (25 μM) for 14 days. (A), Lateral root (LR) number; (B), Seminal root (SR) length. Data are means \pm SE and bars with different letters indicate significant difference at $P < 0.05$ tested with ANOVA.

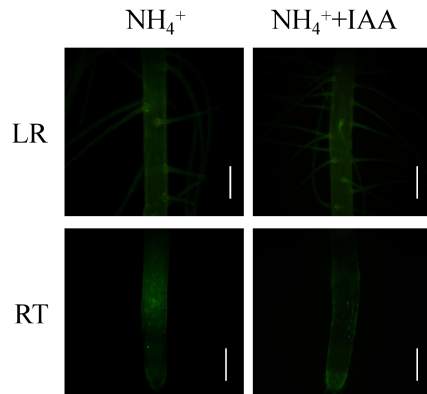


Supplementary FIGURE 4 qRT-PCR analysis of *YUCCA* and *PIN* family genes in rice seedlings. Rice seedlings were grown in hydroponic media containing NH₄⁺ and NO₃⁻ in addition to SNP (10 μM) for 14 days. (A), The expression of *OsYUCCA* genes in the first leaf. (B), The expression of *OsPIN* genes in roots. Relative mRNA levels were normalized for individual gene relative to *OsACT*. Data are means ± SE and bars with different letters in the same gene indicate significant difference at P < 0.05 tested with ANOVA.

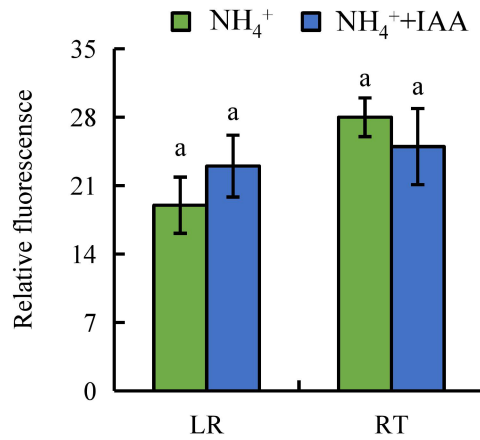


Supplementary FIGURE 5 Histochemical localization of *DR5::GUS* activity and Lateral root (LR) number and seminal root (SR) length in rice seedlings. Rice seedlings were grown in hydroponic media containing NH_4^+ in addition to SNP (10 μM) for 16 days. (A), *DR5::GUS*, a specific reporter that contains seven repeats of a highly active synthetic auxin response element and can reflect the in vivo auxin level. Roots were stained for GUS activity for 2h at 37°C. (A), Lateral root region. Bar=2mm. (B), Root tip. Bar=1mm. (C), Lateral root (LR) number. (D), Seminal root (SR) length. Data are means \pm SE and bars with different letters indicate significant difference at $P < 0.05$ tested with ANOVA. d=days.

(A)



(B)



Supplementary FIGURE 6 Accumulation of nitric oxide (NO) in wild-type (Nipponbare) the rice seedlings. Seedlings were grown in hydroponic medium containing NH_4^+ with or without IAA (100 nM) for 14 days. (A), Photographs of NO production shown as green fluorescence in the lateral root (LR) and root tip (RT). (B), NO production expressed as fluorescence intensity relative to LR and RT. Bar=1mm. Data are means \pm SE and bars with different letters indicate significant difference at $P < 0.05$ tested with ANOVA.