

GEPHE SUMMARY

NRT1.1B (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=NRT1.1B^#gephebase-summary-title)	Gephebase Gene	GP00001375	GephelD
	Entry Status	Prigent	Main curator
Published			

PHENOTYPIC CHANGE

Trait Category			
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=Physiology^#gephebase-summary-title)	Trait		
Nitrogen use (metabolism) (https://www.gephebase.org/search-criteria?/and+Trait=^Nitrogen use (metabolism)^#gephebase-summary-title)	Trait State in Taxon A		
Rice ; O. s. japonica ; Nipponbare ; low nitrate absorption	Trait State in Taxon B		
Rice- O. s. indica ; IR24 ; high nitrate absorption	Ancestral State		
Taxon A	Taxonomic Status		
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=Domesticated^#gephebase-summary-title)			
Taxon A	Latin Name	Taxon B	Latin Name
Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)	Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)	Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)	Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)
rice	Common Name	rice	Common Name
rice; red rice; Oryza sativa L.	Synonyms	rice; red rice; Oryza sativa L.	Synonyms
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza	
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)	Parent	Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)	Parent
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)	NCBI Taxonomy ID	4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)	NCBI Taxonomy ID
is Taxon A an Infraspecies?		is Taxon B an Infraspecies?	
Yes	Taxon A Description	Yes	Taxon B Description
Rice ; O. s. japonica ; Nipponbare ; low nitrate absorption		Rice- O. s. indica ; IR24 ; high nitrate absorption	

GENOTYPIC CHANGE

NPF6.3	Generic Gene Name	UniProtKB Arabidopsis thaliana
	Synonyms	GenebankID or UniProtKB
ARABIDOPSIS THALIANA NITRATE TRANSPORTER 1; AtNPF6.3; ATNRT1; ATNRT1.1; B-1; CHL1; CHL1-1; CHLORATE/NITRATE TRANSPORTER; CHLORINA 1; F12F1.1; F12F1..1; NITRATE TRANSPORTER 1; nitrate transporter 1.1; NITRATE/CHLORATE TRANSPORTER; NPF6.3; NRT1; NRT1/PTR family 6.3; NRT1.1; At1g12110; T28K15..13	Q05085 (http://www.uniprot.org/uniprot/Q05085)	
3702.AT1G12110.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT1G12110.1)	String	0
	Sequence Similarities	
Belongs to the PTR2/POT transporter (TC 2.A.17) family.	GO - Molecular Function	
GO:0015293 : symporter activity (https://www.ebi.ac.uk/QuickGO/term/GO:0015293)		
GO:0015112 : nitrate transmembrane transporter activity		

GO:0009734 : auxin-activated signaling pathway

(<https://www.ebi.ac.uk/QuickGO/term/GO:0009734>)

GO:0009414 : response to water deprivation

(<https://www.ebi.ac.uk/QuickGO/term/GO:0009414>)

GO:0006857 : oligopeptide transport

(<https://www.ebi.ac.uk/QuickGO/term/GO:0006857>)GO:0042128 : nitrate assimilation (<https://www.ebi.ac.uk/QuickGO/term/GO:0042128>)GO:0015706 : nitrate transport (<https://www.ebi.ac.uk/QuickGO/term/GO:0015706>)GO:0009635 : response to herbicide (<https://www.ebi.ac.uk/QuickGO/term/GO:0009635>)GO:0010167 : response to nitrate (<https://www.ebi.ac.uk/QuickGO/term/GO:0010167>)

GO - Cellular Component

GO:0016021 : integral component of membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No^#gephebase-summary-title>)

Molecular Type

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Coding^#gephebase-summary-title>)

Aberration Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=^SNP^#gephebase-summary-title>)

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

c.980C>T p.Met327Thr

Experimental Evidence

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Linkage+Mapping^#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Variation in NRT1.1B contributes to nitrate-use divergence between rice subspecies. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26053497>)

Authors

Hu B; Wang W; Ou S; Tang J; Li H; Che R; Zhang Z; Chai X; Wang H; Wang Y; Liang C; Liu L; Piao Z; Deng Q; Deng K; Xu C; Liang Y; Zhang L; Li L; Chu C

Abstract

Asian cultivated rice (*Oryza sativa* L.) consists of two main subspecies, indica and japonica. Indica has higher nitrate-absorption activity than japonica, but the molecular mechanisms underlying that activity remain elusive. Here we show that variation in a nitrate-transporter gene, NRT1.1B (OsNPF6.5), may contribute to this divergence in nitrate use. Phylogenetic analysis revealed that NRT1.1B diverges between indica and japonica. NRT1.1B-indica variation was associated with enhanced nitrate uptake and root-to-shoot transport and upregulated expression of nitrate-responsive genes. The selection signature of NRT1.1B-indica suggests that nitrate-use divergence occurred during rice domestication. Notably, field tests with near-isogenic and transgenic lines confirmed that the japonica variety carrying the NRT1.1B-indica allele had significantly improved grain yield and nitrogen-use efficiency (NUE) compared to the variety without that allele. Our results show that variation in NRT1.1B largely explains nitrate-use divergence between indica and japonica and that NRT1.1B-indica can potentially improve the NUE of japonica.

Additional References

RELATED GEPHE

Related Genes

1 (DEP1 (DENSE AND ERECT PANICLES 1)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^4530^/and+Trait=Nitrogen+use/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Wild ancestors are *O. rufipogon*-I and *O. rufipogon*-III in which the SNP was polymorphic ; the variant of indica has probably been selected during domestication

