GEPHE SUMMARY

Gephebase Gene
DTH2 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^DTH2^#gephebase-summary-title)

GepheID
GP00000239

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Flowering time (https://www.gephebase.org/search-criteria?/and+Trait=^Flowering time^#gephebase-summary-title)

Trait State in Taxon A
Oryza sativa - IR24 (indica)

Trait State in Taxon B
Oryza sativa - Asominori (Aso; japonica) ; adapted to Northern China latitude

Ancestral State
Taxon A

Taxonomic Status
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name
Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)

Common Name
rice

Synonyms
rice; red rice; Oryza sativa L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza

Parent
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)

NCBI Taxonomy ID
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Oryza sativa - IR24 (indica)

Taxon B

Latin Name
Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)

Common Name
rice

Synonyms
rice; red rice; Oryza sativa L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza

Parent
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)

NCBI Taxonomy ID
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Oryza sativa - Asominori (Aso; japonica) ; adapted to Northern China latitude

GENOTYPIC CHANGE

Generic Gene Name
DTH2

Synonyms
DTH2; Os02g0724000; OSNPB_020724000; P0685G12.25

String
39947.LOC_Os02g49230.2 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=39947.LOC_Os02g49230.2)

Sequence Similarities
-

GO - Molecular Function
GO:0008270 : zinc ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0008270)

GO - Biological Process
-

GO - Cellular Component
GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)

UniProtKB Oryza sativa subsp. japonica
O82118 (http://www.uniprot.org/uniprot/O82118)

GenebankID or UniProtKB
()

Mutation #1

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

Arg9Gly (A/G)

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	Arg	Gly	9

Main Reference

Association of functional nucleotide polymorphisms at DTH2 with the northward expansion of rice cultivation in Asia. (2013) (https://pubmed.ncbi.nlm.nih.gov/23388640)

Authors

Wu W; Zheng XM; Lu G; Zhong Z; Gao H; Chen L; Wu C; Wang HJ; Wang Q; Zhou K; Wang JL; Wu F; Zhang X; Guo X; Cheng Z; Lei C; Lin Q; Jiang L; Wang H; Ge S; Wan J

Abstract

Flowering time (i.e., heading date in crops) is an important ecological trait that determines growing seasons and regional adaptability of plants to specific natural environments. Rice (Oryza sativa L.) is a short-day plant that originated in the tropics. Increasing evidence suggests that the northward expansion of cultivated rice was accompanied by human selection of the heading date under noninductive long-day (LD) conditions. We report here the molecular cloning and characterization of DTH2 (for Days to heading on chromosome 2), a minor-effect quantitative trait locus that promotes heading under LD conditions. We show that DTH2 encodes a CONSTANS-like protein that promotes heading by inducing the florigen genes Heading date 3a and RICE FLOWERING LOCUS T 1, and it acts independently of the known floral integrators Heading date 1 and Early heading date 1. Moreover, association analysis and transgenic experiments identified two functional nucleotide polymorphisms in DTH2 that correlated with early heading and increased reproductive fitness under natural LD conditions in northern Asia. Our combined population genetics and network analyses suggest that DTH2 likely represents a target of human selection for adaptation to LD conditions during rice domestication and/or improvement, demonstrating an important role of minor-effect quantitative trait loci in crop adaptation and breeding.

Additional References

Mutation #2

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

Tyr319Asp (T/G)

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	Tyr	Asp	319

Main Reference

Association of functional nucleotide polymorphisms at DTH2 with the northward expansion of rice cultivation in Asia. (2013) (https://pubmed.ncbi.nlm.nih.gov/23388640)

Authors

Wu W; Zheng XM; Lu G; Zhong Z; Gao H; Chen L; Wu C; Wang HJ; Wang Q; Zhou K; Wang JL; Wu F; Zhang X; Guo X; Cheng Z; Lei C; Lin Q; Jiang L; Wang H; Ge S; Wan J

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Additional References

RELATED GEPHE

Related Genes

9 (EARLY FLOWERING 3/Hd17, Hd1, Hd6a, PRR37 pseudoresponse regulator protein 37, se5, Early flowering1 (EL1), HEADING DATE 1, Ehd1 (Response regulator), Ghd7)
(https://www.gephebase.org/search-criteria?/or+Taxon ID=^4530^/and+Trait=Flowering time/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@SeveralMutationsWithEffect