GEPHE SUMMARY

Gephebase Gene
Hd1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Hd1^#gephebase-summary-title)

GepheID
GP00001723

Entry Status
Published

Main curator
Courtier

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 - many cultivars

Trait State in Taxon B
Oryza sativa - many cultivars

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?
No

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?
No

GENOTYPIC CHANGE

Generic Gene Name
HD1

Synonyms
Hd1; SE1; OsHd1; Os06g0275000; LOC_Os06g16370; P0038C05.23; P0676F10.34

String
39947.LOC_Os06g16370.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=39947.LOC_Os06g16370.1)

Sequence Similarities
Belongs to the CONSTANS family.

GO - Molecular Function
GO:0003700 : DNA-binding transcription factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003700)
GO:0008270 : zinc ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0008270)
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)

GO - Biological Process
GO:0030154 : cell differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030154)
GO:0045892 : negative regulation of transcription, DNA-templated

UniProtKB Oryza sativa subsp. japonica
Q9FDX8 (http://www.uniprot.org/uniprot/Q9FDX8)

GenebankID or UniProtKB
BAB17628 (https://www.ncbi.nlm.nih.gov/nuccore/BAB17628)

(https://www.ebi.ac.uk/QuickGO/term/GO:0045892)
GO:0009908 : flower development (https://www.ebi.ac.uk/QuickGO/term/GO:0009908)
GO:0009909 : regulation of flower development
(https://www.ebi.ac.uk/QuickGO/term/GO:0009909)
GO:0048579 : negative regulation of long-day photoperiodism, flowering
(https://www.ebi.ac.uk/QuickGO/term/GO:0048579)
GO:0048571 : long-day photoperiodism
(https://www.ebi.ac.uk/QuickGO/term/GO:0048571)
GO:0048576 : positive regulation of short-day photoperiodism, flowering
(https://www.ebi.ac.uk/QuickGO/term/GO:0048576)
GO:0048572 : short-day photoperiodism
(https://www.ebi.ac.uk/QuickGO/term/GO:0048572)

GO - Cellular Component

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

Presumptive Null

Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

1bp deletion at position 321Â ; presumptive protein truncated

Experimental Evidence

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

Main Reference

Variations in Hd1 proteins, Hd3a promoters, and Ehd1 expression levels contribute to diversity of flowering time in cultivated rice. (2009) (https://pubmed.ncbi.nlm.nih.gov/19246394)

Authors

Takahashi Y; Teshima KM; Yokoi S; Innan H; Shimamoto K

Abstract

Rice is a facultative short-day plant, and molecular genetic studies have identified the major genes involved in short-day flowering. However, the molecular mechanisms promoting the diversity of flowering time in cultivated rice are not known. We used a core collection of 64 rice cultivars that represent the genetic diversity of 332 accessions from around the world and studied the expression levels and polymorphisms of 6 genes in the short-day flowering pathway. The RNA levels of Heading date 3a (Hd3a), encoding a floral activator, are highly correlated with flowering time, and there is a high degree of polymorphism in the Heading date 1 (Hd1) protein, which is a major regulator of Hd3a expression. Functional and nonfunctional alleles of Hd1 are associated with early and late flowering, respectively, suggesting that Hd1 is a major determinant of variation in flowering time of cultivated rice. We also found that the type of Hd3a promoter and the level of Ehd1 expression contribute to the diversity in flowering time and Hd3a expression level. We evaluated the contributions of these 3 factors by a statistical analysis using a simple linear model, and the results supported our experimental observations.

Additional References

RELATED GEPHE

Related Genes

9 (DTH2, EARLY FLOWERING 3/Hd17, 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

5 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Hd1^/and+Taxon ID=^4530^/or+Gene Gephebase=^Hd1^/and+Taxon ID=^4530^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS