GEPHE SUMMARY

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

GepheID
GP00001204

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
Amylose content (glutinous rice) (https://www.gephebase.org/search-criteria?/and+Trait=^Amylose content (glutinous rice)^#gephebase-summary-title)

Trait State in Taxon A
Oryza sativa

Trait State in Taxon B
Oryza sativa japonicus

Ancestral State
Data not curated

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?
Yes

Taxon B Description
Oryza sativa japonicus

GENOTYPIC CHANGE

Generic Gene Name
waxy

Synonyms
GBSSI

String
-

Sequence Similarities
Belongs to the glycosyltransferase 1 family. Bacterial/plant glycogen synthase subfamily.

GO - Molecular Function
GO:0004373 : glycogen (starch) synthase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004373)

GO - Biological Process
GO:0019252 : starch biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0019252)

GO - Cellular Component
GO:0009501 : amyloplast (https://www.ebi.ac.uk/QuickGO/term/GO:0009501)

UniProtKB Setaria italica
Q8L699 (http://www.uniprot.org/uniprot/Q8L699)

GenebankID or UniProtKB
ABC17717 (https://www.ncbi.nlm.nih.gov/nuccore/ABC17717)

GO:0009507 : chloroplast (https://www.ebi.ac.uk/QuickGO/term/GO:0009507)

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

-

Molecular Details of the Mutation

substitution G->T in the 5′ splice site of intron 1

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

The amylose content in rice endosperm is related to the post-transcriptional regulation of the waxy gene. (1995) (https://pubmed.ncbi.nlm.nih.gov/7742858)

Authors

Wang ZY; Zheng FQ; Shen GZ; Gao JP; Snustad DP; Li MG; Zhang JL; Hong MM

Abstract

The waxy (Wx) gene of rice encodes a granule-bound starch synthase (GBSS = waxy protein) required for the synthesis of amylose in endosperm. An analysis of Wx transcripts, Wx protein, and amylose content of 31 rice cultivars revealed that endosperm amylose and Wx protein contents are correlated with the ability of the cultivar to excise intron I from the leader sequence of the Wx transcript. Cultivars with high endosperm amylose content (group I) contain high levels of amylose, Wx protein, and the mature 2.3 kb Wx mRNA. Cultivars with intermediate amylose content (group II) produce substantial amounts of a large 3.3 kb Wx pre-mRNA, with intron I still present, in addition to the mature Wx mRNA, and intermediate levels of Wx protein. Glutinous rice (group III cultivars) contains no amylose, no Wx protein, and no mature Wx mRNA; only the incompletely spliced 3.3 kb Wx pre-mRNA is present in group III cultivars. Based on these results, it is hypothesized that the amylose content of rice endosperm is regulated at the level of Wx transcript processing, and, more specifically, at the stage of intron I excision from the Wx pre-mRNA.

Additional References

A single base change altered the regulation of the Waxy gene at the posttranscriptional level during the domestication of rice. (1998) (https://pubmed.ncbi.nlm.nih.gov/9718725)
Use of alternate splice sites in granule-bound starch synthase mRNA from low-amylose rice varieties. (1998) (https://pubmed.ncbi.nlm.nih.gov/9747848)
Selection under domestication: evidence for a sweep in the rice waxy genomic region. (2006) (https://pubmed.ncbi.nlm.nih.gov/16547098)

RELATED GEPHE

Related Genes

1 (Chalk5) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^4530^/and+Trait=Amylose content/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

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

EXTERNAL LINKS

COMMENTS

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