

GEPHE SUMMARY

	Gephebase Gene	Gephebase ID
Waxy /GBSS (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Waxy /GBSS^#gephebase-summary-title)	GP00001204	
	Entry Status	Main curator
Published	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	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)
rice	Common Name	Common Name
rice; red rice; Oryza sativa L.	Synonyms	Synonyms
species	Rank	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	Parent
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)	NCBI Taxonomy ID	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
	Yes	Yes
	Oryza sativa japonicus	Taxon B Description

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Setaria italica
waxy		
GBSSI	Synonyms	GenebankID or UniProtKB
-	String	
	Sequence Similarities	
Belongs to the glycosyltransferase 1 family. Bacterial/plant glycogen synthase subfamily.		
GO:0004373 : glycogen (starch) synthase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004373)	GO - Molecular Function	
GO:0019252 : starch biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0019252)	GO - Biological Process	
GO:0009501 : amyloplast (https://www.ebi.ac.uk/QuickGO/term/GO:0009501)	GO - Cellular Component	

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 (Chalks) (<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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