

GEPHE SUMMARY

Os07g0603400 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase= [^] Os07g0603400 [^] #gephebase-summary-title)	Gephebase Gene	GP00001542	GepheID
Published	Entry Status	Prigent	Main curator

PHENOTYPIC CHANGE

Trait #1	Trait Category
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category= [^] Morphology [^] #gephebase-summary-title)	Trait
Grain size (<a href="https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Grain">https://www.gephebase.org/search-criteria?/and+Trait=[^]Grain size [^] #gephebase-summary-title)	Trait State in Taxon A
Nipponbare japonica (NPB) cultivar	Trait State in Taxon B
Ping13 (P13) indica variety with superior grain length and appearance quality (decreased chalkiness & larger starch granules)	

Trait #2	Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category= [^] Physiology [^] #gephebase-summary-title)	Trait
Grain quality (<a href="https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Grain">https://www.gephebase.org/search-criteria?/and+Trait=[^]Grain quality [^] #gephebase-summary-title)	Trait State in Taxon A
-	Trait State in Taxon B
-	

Taxon A	Ancestral State
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status= [^] Domesticated [^] #gephebase-summary-title)	Taxonomic Status

Taxon A	Taxon B
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	rice
rice; red rice; Oryza sativa L.	rice; red rice; Oryza sativa L.
species	species
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzaceae; Oryzinae; Oryza	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzaceae; Oryzinae; Oryza
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)	Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)	4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)
is Taxon A an Intraspecies?	is Taxon B an Intraspecies?
Yes	Yes
Nipponbare japonica (NPB) cultivar	Ping13 (P13) indica variety with superior grain length and appearance quality (decreased chalkiness & larger starch granules)

Taxon A	Taxon B
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	rice
rice; red rice; Oryza sativa L.	rice; red rice; Oryza sativa L.
species	species
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzaceae; Oryzinae; Oryza	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzaceae; Oryzinae; Oryza
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)	Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)	4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)
is Taxon A an Intraspecies?	is Taxon B an Intraspecies?
Yes	Yes
Nipponbare japonica (NPB) cultivar	Ping13 (P13) indica variety with superior grain length and appearance quality (decreased chalkiness & larger starch granules)

GENOTYPIC CHANGE

Os07g0603400	Generic Gene Name	A3BLY4 (http://www.uniprot.org/uniprot/A3BLY4)	UniProtKB Oryza sativa subsp. japonica
OsJ_25030; OSNPB_070603400	Synonyms	0	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
-	GO - Biological Process		
-	GO - Cellular Component		

Mutation #1

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

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

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

Nonsense SNP Coding Change

first null mutation resulting in a truncated protein of a negative regulator of GL7 in long-grain varieties - GAA>TAA (Fig S15 - the stop codon has not been highlighted) Molecular Details of the Mutation

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

	Taxon A	Taxon B	Position
Codon	GAA	TAA	-
Amino-acid	Glu	STP	-

Copy number variation at the GL7 locus contributes to grain size diversity in rice. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26147619>) Main Reference

Wang Y; Xiong G; Hu J; Jiang L; Yu H; Xu J; Fang Y; Zeng L; Xu E; Xu J; Ye W; Meng X; Liu R; Chen H; Jing Y; Wang Y; Zhu X; Li J; Qian Q Authors

Copy number variants (CNVs) are associated with changes in gene expression levels and contribute to various adaptive traits. Here we show that a CNV at the Grain Length on Chromosome 7 (GL7) locus contributes to grain size diversity in rice (*Oryza sativa* L.). GL7 encodes a protein homologous to *Arabidopsis thaliana* LONGIFOLIA proteins, which regulate longitudinal cell elongation. Tandem duplication of a 17.1-kb segment at the GL7 locus leads to upregulation of GL7 and downregulation of its nearby negative regulator, resulting in an increase in grain length and improvement of grain appearance quality. Sequence analysis indicates that allelic variants of GL7 and its negative regulator are associated with grain size diversity and that the CNV at the GL7 locus was selected for and used in breeding. Our work suggests that pyramiding beneficial alleles of GL7 and other yield- and quality-related genes may improve the breeding of elite rice varieties. Abstract

Additional References

Mutation #2

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

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

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

Nonsense SNP Coding Change

second null mutation resulting in a truncated protein of a negative regulator of GL7 in long-grain varieties - TGG>TAG (Fig S15 - this second stop codon has been highlighted) Molecular Details of the Mutation

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

	Taxon A	Taxon B	Position
Codon	TGG	TAG	-
Amino-acid	Trp	STP	-

Copy number variation at the GL7 locus contributes to grain size diversity in rice. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26147619>) Main Reference

Copy number variants (CNVs) are associated with changes in gene expression levels and contribute to various adaptive traits. Here we show that a CNV at the Grain Length on Chromosome 7 (GL7) locus contributes to grain size diversity in rice (*Oryza sativa* L.). GL7 encodes a protein homologous to *Arabidopsis thaliana* LONGIFOLIA proteins, which regulate longitudinal cell elongation. Tandem duplication of a 17.1-kb segment at the GL7 locus leads to upregulation of GL7 and downregulation of its nearby negative regulator, resulting in an increase in grain length and improvement of grain appearance quality. Sequence analysis indicates that allelic variants of GL7 and its negative regulator are associated with grain size diversity and that the CNV at the GL7 locus was selected for and used in breeding. Our work suggests that pyramiding beneficial alleles of GL7 and other yield- and quality-related genes may improve the breeding of elite rice varieties.

RELATED GEPHE

Related Genes

10 (GL3.1, GS3, GS5, GW2, OsPPKL1/qGL3, qSW5, OsSPL13, GL7, GW7, OsSPL16) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^4530^/and+Trait=Grain size/or+Taxon ID=^4530^/and+Trait=Grain quality/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

same allele found in *Oryza rufipogon* indicating that this natural variation could be an ancient event