

GEPHE SUMMARY

Gephebase Gene		GepheID
mucilage-modified 2 (mum2) (<a +mucilage-modified+2+(mum2)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+mucilage-modified+2+(mum2)+"#gephebase-summary-title)		GP00001277
Entry Status		Arnoult
Published		
Main curator		

PHENOTYPIC CHANGE

Trait Category			
Physiology (<a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title)			
Trait			
Mucilage (seeds) (<a +mucilage+(seeds)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Mucilage+(seeds)+"#gephebase-summary-title)			
Trait State in Taxon A			
Arabidopsis thaliana- Col-0 and other lines			
Trait State in Taxon B			
Arabidopsis thaliana- Had-3-1			
Ancestral State			
Data not curated			
Taxonomic Status			
Intraspecific (<a +intraspecific+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific+"#gephebase-summary-title)			
Taxon A		Taxon B	
Latin Name		Latin Name	
Arabidopsis thaliana (<a +arabidopsis+thaliana+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Arabidopsis+thaliana+"#gephebase-summary-title)		Arabidopsis thaliana (<a +arabidopsis+thaliana+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Arabidopsis+thaliana+"#gephebase-summary-title)	
Common Name		Common Name	
thale cress		thale cress	
Synonyms		Synonyms	
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress		thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	
Rank		Rank	
species		species	
Lineage		Lineage	
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis	
Parent		Parent	
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)		Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)	
NCBI Taxonomy ID		NCBI Taxonomy ID	
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)		3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
Yes		Yes	
Taxon A Description		Taxon B Description	
Arabidopsis thaliana- Col-0 and other lines		Arabidopsis thaliana- Had-3-1	

GENOTYPIC CHANGE

Generic Gene Name		UniProtKB Arabidopsis thaliana
BGAL6		Q9FFN4 (http://www.uniprot.org/uniprot/Q9FFN4)
Synonyms		GenebankID or UniProtKB
beta-galactosidase 6; BGAL6; MBK5.28; MBK5_28; MUCILAGE-MODIFIED 2; At5g63800		836500 (https://www.ncbi.nlm.nih.gov/nuccore/836500)
String		
3702.AT5G63800.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT5G63800.1)		
Sequence Similarities		
Belongs to the glycosyl hydrolase 35 family.		
GO - Molecular Function		
GO:0004565 : beta-galactosidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004565)		
GO - Biological Process		

GO:0005975 : carbohydrate metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005975>)
GO:0048354 : mucilage biosynthetic process involved in seed coat development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048354>)
GO:0009827 : plant-type cell wall modification
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009827>)

GO - Cellular Component

GO:0005773 : vacuole (<https://www.ebi.ac.uk/QuickGO/term/GO:0005773>)
GO:0048046 : apoplast (<https://www.ebi.ac.uk/QuickGO/term/GO:0048046>)
GO:0005618 : cell wall (<https://www.ebi.ac.uk/QuickGO/term/GO:0005618>)

	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
Insertion (https://www.gephebase.org/search-criteria?/and+Aberration+Type=~Insertion~#gephebase-summary-title)	
	Insertion Size
1-9 bp	
	Molecular Details of the Mutation
TACA insertion @position 4906 causing frame shift + Stop	
	Experimental Evidence
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=~Candidate+Gene~#gephebase-summary-title)	
	Main Reference
Local evolution of seed flotation in Arabidopsis. (2014) (https://pubmed.ncbi.nlm.nih.gov/24625826)	
	Authors
Saez-Aguayo S; Rondeau-Mouro C; Macquet A; Kronholm I; Ralet MC; Berger A; Sall�� C; Poulain D; Granier F; Botran L; Loudet O; de Meaux J; Marion-Poll A; North HM	
	Abstract
Arabidopsis seeds rapidly release hydrophilic polysaccharides from the seed coat on imbibition. These form a heavy mucilage layer around the seed that makes it sink in water. Fourteen natural Arabidopsis variants from central Asia and Scandinavia were identified with seeds that have modified mucilage release and float. Four of these have a novel mucilage phenotype with almost none of the released mucilage adhering to the seed and the absence of cellulose microfibrils. Mucilage release was modified in the variants by ten independent causal mutations in four different loci. Seven distinct mutations affected one locus, coding the MUM2 Î²-D-galactosidase, and represent a striking example of allelic heterogeneity. The modification of mucilage release has thus evolved a number of times independently in two restricted geographical zones. All the natural mutants identified still accumulated mucilage polysaccharides in seed coat epidermal cells. Using nuclear magnetic resonance (NMR) relaxometry their production and retention was shown to reduce water mobility into internal seed tissues during imbibition, which would help to maintain seed buoyancy. Surprisingly, despite released mucilage being an excellent hydrogel it did not increase the rate of water uptake by internal seed tissues and is more likely to play a role in retaining water around the seed.	
	Additional References

RELATED GEPHE

	Related Genes
2 (PER36, PME16) (https://www.gephebase.org/search-criteria?/or+Taxon+ID=~3702~/and+Trait=Mucilage/and+groupHaplotypes=true#gephebase-summary-title)	
	Related Haplotypes
4 (https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~mucilage-modified+2+(mum2)~/and+Taxon+ID=~3702~/or+Gene+Gephebase=~mucilage-modified+2+(mum2)~/and+Taxon+ID=~3702~#gephebase-summary-title)	

EXTERNAL LINKS

COMMENTS

Another null allele of MUM2 already found in 18165330