GEPHE SUMMARY

Gephebase Gene
GmHs1-1 (Glyma02g43700.1) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^GmHs1-1 (Glyma02g43700.1)^#gephebase-summary-title)

GepheID
GP00001543

Entry Status
Published

Main curator
Prigent

PHENOTYPIC CHANGE

Trait #1

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Seed hardness (https://www.gephebase.org/search-criteria?/and+Trait=^Seed hardness^#gephebase-summary-title)

Trait State in Taxon A
Wild soybean hard-seeded (PI 468916 & PI 479752)

Trait State in Taxon B
Soybean cultivar Williams 82 with permeable seeds

Trait #2

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Seed coat permeability (https://www.gephebase.org/search-criteria?/and+Trait=^Seed coat permeability^#gephebase-summary-title)

Trait State in Taxon A
-

Trait State in Taxon B
-

Ancestral State
Taxon A

Taxonomic Status
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name
Glycine soja (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Glycine soja^#gephebase-summary-title)

Common Name
-

Synonyms
wild soybean; Glycine soja Siebold & Zucc.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Fabales; Fabaceae; Papilionoideae; 50 kb inversion clade; NPAAA clade; indigoferoid/millettioid clade; Phaseoleae; Glycine; Soja

Parent
Soja () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 1462606)

NCBI Taxonomy ID
3848 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3848)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Wild soybean hard-seeded (PI 468916 & PI 479752)

Taxon B

Latin Name
Glycine max (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Glycine max^#gephebase-summary-title)

Common Name
soybean

Synonyms
soybean; soybeans; Glycine max (L.) Merr.; Glycine max; cv. Wye

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Fabales; Fabaceae; Papilionoideae; 50 kb inversion clade; NPAAA clade; indigoferoid/millettioid clade; Phaseoleae; Glycine; Soja

Parent
Soja () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 1462606)

NCBI Taxonomy ID
3847 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3847)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Soybean cultivar Williams 82 with permeable seeds

GENOTYPIC CHANGE

Generic Gene Name

Hs1

Synonyms

GmHs1-1; 100801460; WBb98N11.1; GLYMA_02G269500

String

3847.GLYMA02G43700.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3847.GLYMA02G43700.1)

Sequence Similarities

-

GO - Molecular Function

GO:0004035 : alkaline phosphatase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004035)

GO - Biological Process

-

GO - Cellular Component

GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)

UniProtKB Glycine max

I1JIK2 (http://www.uniprot.org/uniprot/I1JIK2)

GenebankID or UniProtKB

()

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

Nonsynonymous

Molecular Details of the Mutation

C>T p.Thr>Met predicted to affect the alpha-helix of the protein

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

GmHs1-1, encoding a calcineurin-like protein, controls hard-seededness in soybean. (2015) (https://pubmed.ncbi.nlm.nih.gov/26098868)

Authors

Sun L; Miao Z; Cai C; Zhang D; Zhao M; Wu Y; Zhang X; Swarm SA; Zhou L; Zhang ZJ; Nelson RL; Ma J

Abstract

Loss of seed-coat impermeability was essential in the domestication of many leguminous crops to promote the production of their highly nutritious seeds. Here we show that seed-coat impermeability in wild soybean is controlled by a single gene, GmHs1-1, which encodes a calcineurin-like metallophosphoesterase transmembrane protein. GmHs1-1 is primarily expressed in the Malpighian layer of the seed coat and is associated with calcium content. The transition from impermeability to permeability in domesticated soybean was caused by artificial selection of a point mutation in GmHs1-1. Interestingly, a number of soybean landraces evaded selection for permeability because of an alternative selection for seed-coat cracking that also enables seed imbibition. Despite the single origin of the mutant allele Gmhs1-1, the distribution pattern of allelic variants in the context of soybean population structure and the detected signature of genomic introgression between wild and cultivated soybeans suggest that Gmhs1-1 may have experienced reselection for seed-coat permeability.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Introgression - Hard-seeded is dominant