GEPHE SUMMARY

Gephebase Gene

CYP81F2 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CYP81F2^#gephebase-summary-title)

GepheID

GP00000212

Entry Status

Published

Main curator

Martin

PHENOTYPIC CHANGE

Trait #1

Trait Category

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

Trait

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

Trait State in Taxon A

Arabidopsis thaliana- Da(1)-12

Trait State in Taxon B

Arabidopsis thaliana- Ei-2

Trait #2

Trait Category

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

Trait

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

Trait State in Taxon A

-

Trait State in Taxon B

-

Ancestral State

Data not curated

Taxonomic Status

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

Taxon A

Latin Name

Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name

thale cress

Synonyms

thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent

Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID

3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon A an Infraspecies?

Yes

Taxon A Description

Arabidopsis thaliana- Da(1)-12

Taxon B

Latin Name

Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name

thale cress

Synonyms

thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent

Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID

3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon B an Infraspecies?

Yes

Taxon B Description

Arabidopsis thaliana- Ei-2

GENOTYPIC CHANGE

Generic Gene Name

CYP81F2

Synonyms

''cytochrome P450; cytochrome P450; family 81; MJB24.3; MJB24_3; polypeptide 2; polypeptide 2''; subfamily F; IGM1; At5g57220

String

3702.AT5G57220.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT5G57220.1)

Sequence Similarities

Belongs to the cytochrome P450 family.

GO - Molecular Function

GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)
GO:0016709 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen, NAD(P)H as one donor, and incorporation of one atom of oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016709)

GO - Biological Process

GO:0009617 : response to bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0009617)
GO:0042742 : defense response to bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0042742)
GO:0071456 : cellular response to hypoxia (https://www.ebi.ac.uk/QuickGO/term/GO:0071456)
GO:0052544 : defense response by callose deposition in cell wall (https://www.ebi.ac.uk/QuickGO/term/GO:0052544)
GO:0050832 : defense response to fungus (https://www.ebi.ac.uk/QuickGO/term/GO:0050832)
GO:0002213 : defense response to insect (https://www.ebi.ac.uk/QuickGO/term/GO:0002213)
GO:0019760 : glucosinolate metabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0019760)
GO:0009759 : indole glucosinolate biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0009759)
GO:0042343 : indole glucosinolate metabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0042343)
GO:0009682 : induced systemic resistance (https://www.ebi.ac.uk/QuickGO/term/GO:0009682)

GO - Cellular Component

GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0016020 : membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016020)

UniProtKB Arabidopsis thaliana

Q9LVD6 (http://www.uniprot.org/uniprot/Q9LVD6)

GenebankID or UniProtKB

FM208179 (https://www.ncbi.nlm.nih.gov/nuccore/FM208179)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

unknown

Experimental Evidence

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

Main Reference

The gene controlling the indole glucosinolate modifier1 quantitative trait locus alters indole glucosinolate structures and aphid resistance in Arabidopsis. (2009) (https://pubmed.ncbi.nlm.nih.gov/19293369)

Authors

Pfalz M; Vogel H; Kroymann J

Abstract

Glucosinolates are defensive secondary compounds that display large structural diversity in Arabidopsis thaliana and related plants. Much attention has been paid to variation in the biosynthesis of Met-derived aliphatic glucosinolates and its ecological consequences, but little is known about the genes that cause qualitative and quantitative differences in Trp-derived indole glucosinolates. We use a combination of quantitative trait locus (QTL) fine-mapping and microarray-based transcript profiling to identify CYP81F2 (At5g57220), encoding a cytochrome P450 monooxygenase, as the gene underlying Indole Glucosinolate Modifier1 (IGM1), a metabolic QTL for the accumulation of two modified indole glucosinolates, 4-hydroxy-indole-3-yl-methyl and 4-methoxy-indole-3-yl-methyl glucosinolate. We verify CYP81F2 function with two SALK T-DNA insertion lines and show that CYP81F2 catalyzes the conversion of indole-3-yl-methyl to 4-hydroxy-indole-3-yl-methyl glucosinolate. We further show that the IGM1 QTL is largely caused by differences in CYP81F2 expression, which results from a combination of cis- and trans-acting expression QTL different from known regulators of indole glucosinolate biosynthesis. Finally, we elucidate a potential function of CYP81F2 in plant-insect interactions and find that CYP81F2 contributes to defense against the green peach aphid (Myzus persicae) but not to resistance against herbivory by larvae from four lepidopteran species.

Additional References

RELATED GEPHE

Related Genes

5 (ACD6 = ACCELERATED CELL DEATH 6, AOP2, AOP3, MAM1, Epithiospecifier protein (ESP)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Glucosinolate content/or+Taxon ID=^3702^/and+Trait=Herbivore resistance/and+groupHaplotypes=true#gephebase-summary-title)

No matches found.

EXTERNAL LINKS

COMMENTS