GEPHE SUMMARY

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

GepheID
GP00000215

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

Trait State in Taxon A
-

Trait State in Taxon B
-

Trait #2

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

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

Trait State in Taxon A
shallow rooting

Trait State in Taxon B
deep rooting

Ancestral State
Taxon A

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

Taxon A

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

Common Name
rice

Synonyms
rice; red rice; Oryza sativa L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza

Parent
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)

NCBI Taxonomy ID
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
rice

Synonyms
rice; red rice; Oryza sativa L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza

Parent
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)

NCBI Taxonomy ID
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name

Dro1

UniProtKB Oryza sativa subsp. japonica

Q69P88 (http://www.uniprot.org/uniprot/Q69P88)

Synonyms

Os09g0439800; OJ1344_B01.21; OSNPB_090439800

GenebankID or UniProtKB

()

String

39947.LOC_Os09g26840.1
(http://string-db.org/newstring_cgi/show_network_section.pl?identifier=39947.LOC_Os09g26840.1)

Sequence Similarities

-

GO - Molecular Function

-

GO - Biological Process

-

GO - Cellular Component

-

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

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

1bp deletion within exon 4

Experimental Evidence

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

Main Reference

Control of root system architecture by DEEPER ROOTING 1 increases rice yield under drought conditions. (2013) (https://pubmed.ncbi.nlm.nih.gov/23913002)

Authors

Uga Y; Sugimoto K; Ogawa S; Rane J; Ishitani M; Hara N; Kitomi Y; Inukai Y; Ono K; Kanno N; Inoue H; Takehisa H; Motoyama R; Nagamura Y; Wu J; Matsumoto T; Takai T; Okuno K; Yano M

Abstract

The genetic improvement of drought resistance is essential for stable and adequate crop production in drought-prone areas. Here we demonstrate that alteration of root system architecture improves drought avoidance through the cloning and characterization of DEEPER ROOTING 1 (DRO1), a rice quantitative trait locus controlling root growth angle. DRO1 is negatively regulated by auxin and is involved in cell elongation in the root tip that causes asymmetric root growth and downward bending of the root in response to gravity. Higher expression of DRO1 increases the root growth angle, whereby roots grow in a more downward direction. Introducing DRO1 into a shallow-rooting rice cultivar by backcrossing enabled the resulting line to avoid drought by increasing deep rooting, which maintained high yield performance under drought conditions relative to the recipient cultivar. Our experiments suggest that control of root system architecture will contribute to drought avoidance in crops.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS