

GEPHE SUMMARY

ZmVPP1 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~ZmVPP1^#gephebase-summary-title)	Gephebase Gene	GP00001567	GepheID
Published	Entry Status	Prigent	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=~Physiology^#gephebase-summary-title)	Trait Category		
Drought tolerance (https://www.gephebase.org/search-criteria?/and+Trait=~Drought+tolerance^#gephebase-summary-title)	Trait		
Drought-sensitive maize	Trait State in Taxon A		
Drought-tolerant maize	Trait State in Taxon B		
Unknown	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Intraspecific^#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
	Latin Name		Latin Name
Zea mays (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title)	Latin Name	Zea mays (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title)	Latin Name
-	Common Name	-	Common Name
	Synonyms		Synonyms
Zea mays var. japonica; maize; Zea mays L.; Zea mays mays	Synonyms	Zea mays var. japonica; maize; Zea mays L.; Zea mays mays	Synonyms
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Tripsacinae; Zea	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Tripsacinae; Zea	Lineage
	Parent		Parent
Zea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575)	Parent	Zea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575)	Parent
4577 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577)	NCBI Taxonomy ID	4577 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577)	NCBI Taxonomy ID
Yes	is Taxon A an Intraspecies?	Yes	is Taxon B an Intraspecies?
B73 (genome) line and other drought-sensitive maize cultivars (GWAS)	Taxon A Description	CIMBL55 line and other drought-tolerant maize cultivars (GWAS)	Taxon B Description

GENOTYPIC CHANGE

GRMZM2G170927	Generic Gene Name	A0A172DSU8 (http://www.uniprot.org/uniprot/A0A172DSU8)	UniProtKB Zea mays subsp. mays
GRMZM2G170927	Synonyms	0	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
GO:0009678 : hydrogen-translocating pyrophosphatase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0009678)	GO - Molecular Function		
GO:0004427 : inorganic diphosphatase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004427)	GO - Molecular Function		
GO:1902600 : proton transmembrane transport (https://www.ebi.ac.uk/QuickGO/term/GO:1902600)	GO - Biological Process		

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

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=`No`#gephebase-summary-title)

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

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

100-999 bp

A 366-bp insertion in the promoter containing 3 MYB cis elements confers drought-inducible expression of ZmVPP1 in drought-tolerant genotypes

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

Genetic variation in ZmVPP1 contributes to drought tolerance in maize seedlings. (2016) (https://pubmed.ncbi.nlm.nih.gov/27526320)

Wang X; Wang H; Liu S; Ferjani A; Li J; Yan J; Yang X; Qin F

Maize production is threatened by drought stress worldwide. Identification of the genetic components underlying drought tolerance in maize is of great importance. Here we report a genome-wide association study (GWAS) of maize drought tolerance at the seedling stage that identified 83 genetic variants, which were resolved to 42 candidate genes. The peak GWAS signal showed that the natural variation in ZmVPP1, encoding a vacuolar-type H(+) pyrophosphatase, contributes most significantly to the trait. Further analysis showed that a 366-bp insertion in the promoter, containing three MYB cis elements, confers drought-inducible expression of ZmVPP1 in drought-tolerant genotypes. Transgenic maize with enhanced ZmVPP1 expression exhibits improved drought tolerance that is most likely due to enhanced photosynthetic efficiency and root development. Taken together, this information provides important genetic insights into the natural variation of maize drought tolerance. The identified loci or genes can serve as direct targets for both genetic engineering and selection for maize trait improvement.

Presumptive Null

Molecular Type

Aberration Type

Insertion Size

Molecular Details of the Mutation

Experimental Evidence

Main Reference

Authors

Abstract

Additional References

RELATED GEPHE

1 (ZmNAC111) (https://www.gephebase.org/search-criteria?/or+Taxon ID=`4577`/and+Trait=Drought tolerance/and+groupHaplotypes=true#gephebase-summary-title)

No matches found.

Related Genes

Related Haplotypes

EXTERNAL LINKS

COMMENTS

Non-null mutation. The associated SNP contributes to 10% (the most significant) of the phenotypic variance