

## GEPHE SUMMARY

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

## PHENOTYPIC CHANGE

Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=~Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=~Physiology^#gephebase-summary-title</a> )	Trait Category		
Drought tolerance ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=~Drought+tolerance^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=~Drought+tolerance^#gephebase-summary-title</a> )	Trait		
Drought-sensitive maize	Trait State in Taxon A		
Drought-tolerant maize	Trait State in Taxon B		
Unknown	Ancestral State		
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Intraspecific^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Intraspecific^#gephebase-summary-title</a> )	Taxonomic Status		
	Taxon A		Taxon B
	Latin Name		Latin Name
Zea mays ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title</a> )	Latin Name	Zea mays ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title</a> )	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) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575</a> )	Parent	Zea () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575</a> )	Parent
4577 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577</a> )	NCBI Taxonomy ID	4577 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577</a> )	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	UniProtKB Zea mays subsp. mays
GRMZM2G170927	Synonyms	A0A172DSU8 ( <a href="http://www.uniprot.org/uniprot/A0A172DSU8">http://www.uniprot.org/uniprot/A0A172DSU8</a> )
-	String	0
-	Sequence Similarities	
GO:0009678 : hydrogen-translocating pyrophosphatase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0009678">https://www.ebi.ac.uk/QuickGO/term/GO:0009678</a> )	GO - Molecular Function	
GO:0004427 : inorganic diphosphatase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004427">https://www.ebi.ac.uk/QuickGO/term/GO:0004427</a> )	GO - Molecular Function	
GO:1902600 : proton transmembrane transport ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:1902600">https://www.ebi.ac.uk/QuickGO/term/GO:1902600</a> )	GO - Biological Process	

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

No ( <a href="https://www.gephebase.org/search-criteria?/and+Presumptive Null=`No`#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Presumptive Null=`No`#gephebase-summary-title</a> )	Presumptive Null
Cis-regulatory ( <a href="https://www.gephebase.org/search-criteria?/and+Molecular Type=`Cis-regulatory`#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Molecular Type=`Cis-regulatory`#gephebase-summary-title</a> )	Molecular Type
Insertion ( <a href="https://www.gephebase.org/search-criteria?/and+Aberration Type=`Insertion`#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Aberration Type=`Insertion`#gephebase-summary-title</a> )	Aberration Type
100-999 bp	Insertion Size
A 366-bp insertion in the promoter containing 3 MYB cis elements confers drought-inducible expression of ZmVPP1 in drought-tolerant genotypes	Molecular Details of the Mutation
Association Mapping ( <a href="https://www.gephebase.org/search-criteria?/and+Experimental Evidence=`Association Mapping`#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Experimental Evidence=`Association Mapping`#gephebase-summary-title</a> )	Experimental Evidence
Genetic variation in ZmVPP1 contributes to drought tolerance in maize seedlings. (2016) ( <a href="https://pubmed.ncbi.nlm.nih.gov/27526320">https://pubmed.ncbi.nlm.nih.gov/27526320</a> )	Main Reference
Wang X; Wang H; Liu S; Ferjani A; Li J; Yan J; Yang X; Qin F	Authors
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.	Abstract
	Additional References

## RELATED GEPHE

1 (ZmNAC111) ( <a href="https://www.gephebase.org/search-criteria?/or+Taxon ID=`4577`/and+Trait=Drought tolerance/and+groupHaplotypes=true#gephebase-summary-title">https://www.gephebase.org/search-criteria?/or+Taxon ID=`4577`/and+Trait=Drought tolerance/and+groupHaplotypes=true#gephebase-summary-title</a> )	Related Genes
No matches found.	Related Haplotypes

## EXTERNAL LINKS

## COMMENTS

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