

GEPHE SUMMARY

| | | |
|--|----------------|--------------|
| | Gephebase Gene | GephelD |
| Waxy /GBSS (https://www.gephebase.org/search-criteria/?and+Gene Gephebase=%Waxy%2FGBSS%#gephebase-summary-title) | GP00001201 | Main curator |
| Published | Entry Status | Martin |
| | | |

PHENOTYPIC CHANGE

| | Trait Category | | |
|---|-----------------------------|---|-----------------------------|
| Physiology (https://www.gephebase.org/search-criteria/?and+Trait+Category=%Physiology%#gephebase-summary-title) | Trait | | |
| Amylose content (https://www.gephebase.org/search-criteria/?and+Trait=%Amylose+content%#gephebase-summary-title) | Trait State in Taxon A | | |
| Setaria italica ssp. Viridis (wild) | Trait State in Taxon B | | |
| Setaria italica waxy landraces | Ancestral State | | |
| Taxon A | Taxonomic Status | | |
| Domesticated (https://www.gephebase.org/search-criteria/?and+Taxonomic+Status=%Domesticated%#gephebase-summary-title) | | | |
| Taxon A | Latin Name | Taxon B | Latin Name |
| Setaria italica (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=%Setaria+italica%#gephebase-summary-title) | | Setaria italica (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=%Setaria+italica%#gephebase-summary-title) | |
| foxtail millet | Common Name | foxtail millet | Common Name |
| Chaetochloa italicica; Panicum italicum; Setaria viridis subsp. italicica; foxtail millet; Chaetochloa italicica (L.) Scribn.; Panicum italicum L.; Setaria italica (L.) P.Beauv.; Setaria viridis subsp. italicica (L.) Briq. | Synonyms | Chaetochloa italicica; Panicum italicum; Setaria viridis subsp. italicica; foxtail millet; Chaetochloa italicica (L.) Scribn.; Panicum italicum L.; Setaria italica (L.) P.Beauv.; Setaria viridis subsp. italicica (L.) Briq. | Synonyms |
| species | Rank | species | Rank |
| cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Panicodae; Paniceae; Cenchrinae; Setaria | Lineage | cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Panicodae; Paniceae; Cenchrinae; Setaria | Lineage |
| Setaria () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4554) | Parent | Setaria () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4554) | Parent |
| 4555 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4555) | NCBI Taxonomy ID | 4555 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4555) | NCBI Taxonomy ID |
| Yes | is Taxon A an Infraspecies? | Yes | is Taxon B an Infraspecies? |
| Setaria italica ssp. Viridis (wild) | Taxon A Description | Setaria italica waxy landraces | Taxon B Description |

GENOTYPIC CHANGE

| | | |
|---|-------------------------|---------------------------|
| waxy | Generic Gene Name | UniProtKB Setaria italica |
| GBSSI | Synonyms | GenebankID or UniProtKB |
| - | String | |
| | Sequence Similarities | |
| Belongs to the glycosyltransferase 1 family. Bacterial/plant glycogen synthase subfamily. | | |
| GO:0004373 : glycogen (starch) synthase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004373) | GO - Molecular Function | |
| GO:0019252 : starch biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0019252) | GO - Biological Process | |

GO - Cellular Component

GO:0009501 : amyloplast (<https://www.ebi.ac.uk/QuickGO/term/GO:0009501>)
 GO:0009507 : chloroplast (<https://www.ebi.ac.uk/QuickGO/term/GO:0009507>)

Presumptive Null

Yes ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=%27Yes%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive%20Null=%27Yes%27#gephebase-summary-title))

Molecular Type

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type=%27Coding%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular%20Type=%27Coding%27#gephebase-summary-title))

Aberration Type

Insertion ([https://www.gephebase.org/search-criteria?/and+Aberration Type=%27Insertion%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration%20Type=%27Insertion%27#gephebase-summary-title))

Insertion Size

1-10 kb

Molecular Details of the Mutation

Transposon insertion TS1-7 (Exon 3)

Experimental Evidence

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence=%27Candidate Gene%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental%20Evidence=%27Candidate%20Gene%27#gephebase-summary-title))

Main Reference

Diverse origins of waxy foxtail millet crops in East and Southeast Asia mediated by multiple transposable element insertions. (2005) (<https://pubmed.ncbi.nlm.nih.gov/16133169>)

Authors

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Abstract

The naturally occurring waxy and low-amyllose variants of foxtail millet and other cereals, like rice and barley, originated in East and Southeast Asia under human selection for sticky foods. Mutations in the GBSS1 gene for granule-bound starch synthase 1 are known to be associated with these traits. We have analyzed the gene in foxtail millet, and found that, in this species, these traits were originated by multiple independent insertions of transposable elements and by subsequent secondary insertions into these elements or deletion of parts of the elements. The structural analysis of transposable elements inserted in the GBSS1 gene revealed that the non-waxy was converted to the low-amyllose phenotype once, while shifts from non-waxy to waxy occurred three times, from low amylose to waxy once and from waxy to low amylose once. The present results, and the geographical distribution of different waxy molecular types, strongly suggest that these types originated independently and were dispersed into their current distribution areas. The patterns of GBSS1 variation revealed here suggest that foxtail millet may serve as a key to solving the mystery of the origin of waxy-type cereals in Asia. The GBSS1 gene in foxtail millet provides a new example of the evolution of a gene involved in the processes of domestication and its post-domestication fate under the influence of human selection.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

5 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=%27Waxy /GBSS%27/and+Taxon ID=%274555%27/or+Gene Gephebase=%27Waxy /GBSS%27/and+Taxon ID=%274555%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene%20Gephebase=%27Waxy%2fGBSS%27/and+Taxon%20ID=%274555%27/or+Gene%20Gephebase=%27Waxy%2fGBSS%27/and+Taxon%20ID=%274555%27#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

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