

GEPHE SUMMARY

Gephebase Gene

B2

Entry Status

Published

GepheID

GP00002058

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

Morphology

Trait

Coloration (bulb)

Trait State in Taxon A

yellow bulb

Trait State in Taxon B

white bulb - recessive allele

Ancestral State

Taxon A

Taxonomic Status

Domesticated

Taxon A

Latin Name

Allium cepa

Common Name

onion

Synonyms

onion; *Allium cepa* L.

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; Asparagales; Amaryllidaceae; Allioideae; Allieae; Allium

Parent

Allium () - (Rank: genus)

NCBI Taxonomy ID

4679

is Taxon A an Intraspecies?

No

Taxon B

Latin Name

Allium cepa

Common Name

onion

Synonyms

onion; *Allium cepa* L.

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; Asparagales; Amaryllidaceae; Allioideae; Allieae; Allium

Parent

Allium () - (Rank: genus)

NCBI Taxonomy ID

4679

is Taxon B an Intraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

-

Synonyms

-

String

-

Sequence Similarities

-

GO - Molecular Function

-

GO - Biological Process

-

GO - Cellular Component

-

Presumptive Null

Yes

Molecular Type

Cis-regulatory

UniProtKB

GenebankID or UniProtKB

AUG71567

Aberration Type

Insertion

Insertion Size

100-999 bp

Molecular Details of the Mutation

577-bp insertion of a transposable element named AcWHITE in the 5' upstream region of the white allele of B2. A 8-bp target site duplication (GTTATA AC) and a 7-bp terminal inverted repeat (CAAGGTT) were identified at both ends of this insertion - no SNP detected in the coding region

Experimental Evidence

Linkage Mapping

Main Reference

Transposition of a non-autonomous DNA transposon in the gene coding for a bHLH transcription factor results in a white bulb color of onions (*Allium cepa* L.). (2019)

Authors

Jo C; Kim S

Abstract

A DNA transposon was found in the gene encoding a bHLH transcription factor. Genotypes of the marker tagging this DNA transposon perfectly co-segregated with color phenotypes in large F populations. A combined approach of bulked segregant analysis and RNA-Seq was used to isolate causal gene for C locus controlling white bulb color in onions (*Allium cepa* L.). A total of 114 contigs containing homozygous single nucleotide polymorphisms (SNPs) between white and yellow bulked RNAs were identified. Four of them showed high homologies with loci clustered in the middle of chromosome 5. SNPs in 34 contigs were confirmed by sequencing of PCR products. One of these contigs showed perfect linkage to the C locus in F populations consisting of 2491 individuals. However, genotypes of molecular marker tagging this contig were inconsistent with color phenotypes of diverse breeding lines. A total of 146 contigs showed differential expression between yellow and white bulks. Among them, transcription levels of B2 gene encoding a bHLH transcription factor were significantly reduced in white RNA bulk and F individuals, although there was no SNP in the coding region. Phylogenetic analysis showed that onion B2 was orthologous to bHLH-coding genes regulating anthocyanin biosynthesis pathway in other plant species. Promoter regions of B2 gene were obtained by genome walking and a 577-bp non-autonomous DNA transposon designated as AcWHITE was found in the white allele. Molecular marker tagging AcWHITE showed perfect linkage with the C locus. Marker genotypes of the white allele were detected in some white accessions. However, none of tested red or yellow onions contained AcWHITE insertion, implying that B2 gene was likely to be a causal gene for the C locus.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

COMMENTS

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