# CottonGen 2023: New Data and New Functionality to enable Cotton Research Discovery and Crop Improvement

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## ABSTRACT

CottonGen is the long-established cotton community's genomics, genetics, and breeding database resource. It provides a comprehensive collection of integrated data, analysis tools, a Breeding Information Management System, and links to external resources of interest to cotton researchers. CottonGen hosts 72 whole genome assembly and annotation datasets obtained from 7 tetraploid species (AD1-AD7) and 23 diploid species (A, B, C, D, E, F, G, K, and kirkii); Other data include 3,138,642 genes/transcripts, 118 genetic maps; 691,693 markers; 11,904 QTL/GWAS; 20,455 germplasm; 31 million SNP and 14,284 SSR genotype measurements; 566,599 phenotype measurements (mainly from RBTN and NCGC projects), 45,155 images (mainly of NCGC); and synteny data for 72 genomes with links to genes, mRNA, orthologs and function. Analysis and visualization tools in CottonGen include the genome browser JBrowse, Synteny Viewer, MapViewer, Gene Expression Heatmap, CottonCyc, BLAST+, BIMS (the Breeding Information Management System) and MegaSearch, a powerful search engine with recently added new features and functions. All the data are integrated within CottonGen and can easily be queried through various CottonGen search features.

## NEW GWAS DATA & SEARCHES

### GWAS Search

GWAS search interface allows user to find traits and their locations on the whole genome.

**780 records were returned**

| # | QTL/GWAS Label | Trait Name | GWAS Marker | Gene ▲ | Type | P value | Genome | Standardized chromosome | Location |
|---|---|---|---|---|---|---|---|---|---|
| 1 | GWAS0002128 | fiber elongation | AD1-NBI_SNP_A01_95581482 | Gh_A01G1690 | GWAS | 2.73E-5 | Gossypium hirsutum (AD1) 'TM-1' genome NAU-NBI_v1.1 | AD_ch01_At.01 | A01:95581482..95581482 |
| 2 | GWAS0002157 | fiber elongation | AD1-NBI_SNP_A06_101132589 | Gh_A06G1619 | GWAS | 8.79E-5 | Gossypium hirsutum (AD1) 'TM-1' genome NAU-NBI_v1.1 | AD_ch06_At.06 | A06:101132589..101132589 |

### GWAS Page

**GWAS0003136**

- GWAS Overview
- Genome Location
- Properties
- Publications
- Terms

**GWAS Overview**

| | |
|---|---|
| GWAS Label | GWAS0003136 [ MapViewer ] |
| Published Symbol | ELO |
| Trait Name | fiber elongation |
| Trait Alias | N/A |
| GWAS Marker | AD1-NBI_SNP_D04_46699823 |
| GWAS Study | AD1-NBI_quality_USDANO-Thyssen-2019_GWAS |
| Genome Assembly | Gossypium hirsutum (AD1) 'TM-1' genome NAU-NBI_v1.1 |
| Statistical Method | N/A |
| Experimental Model | N/A |
| GWAS Panel | N/A |
| LOD | N/A |
| P Value | 9.8E-6 |
| R2 | N/A |
| Unique key | 3792-AD1-NBI_MAGIC-20805|ELO|FLO-MSU-STV|AD1-NBI_SNP_D04_46699823 |
| MAF | 0.316 |
| Allele | C/T |
| LgP | 5.0087739243075 |

### MapViewer

## NEW GENE EXPRESSION DATA & DISPLAY

### Gene Expression & HeatMap

Expression Heatmap

**Heatmap Options**

Organism: Any Organism

Search Features

Expression Datasets

| Expression Analysis | Aligned to | BioProject | Publication |
|---|---|---|---|
| Root system development study in G. hirsutum | AD1-TM1_NAU-NBI_v1.1 | PRJNA316280 | Cui et al 2022 Theoretical and applied genet... |
| Root-knot nematode resistance in G. hirsutum | AD1-TM1_UTX_v2.1 | PRJNA787300 | Ojeda-Rivera et al 2022 Frontiers in plant sci... |
| G. raimondii plant tissues used as references in V. dahliae resistance study | D5_JGI_v2_a2.1 | PRJNA607768 | Dong et al. 2019 Genes. |

**Heatmap Results**

Expression: Root-Knot Nematode resistance...

### MapViewer

Correspondence matrix between maps & genome

**Correspondence Matrix**

Correspondence between the genetic map and the genome on a specific chromosome

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