



COTTONGEN
COTTON DATABASE RESOURCES

A Breeders Perspective on using the Breeding Information Management System for Cotton Breeding

Todd Campbell, Taein Lee, Sook Jung, Jing Yu, Don Jones
and Dorrie Main

Vision of BIMs

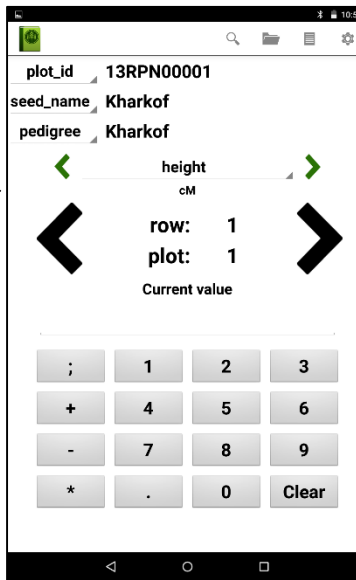
- To **aid new cultivar development** by providing individual breeders with a secure and comprehensive online breeding information management system which will allow them to:
 - Store, manage, archive and analyze their private breeding program data
 - Fully integrate their data with publicly available genomic, genetic and breeding data
 - Manage data from the Field Book App, an android app for efficient collection of phenotype data in the field and laboratory

BIMS Workflow

Create Input File/Plot Plan

Unique_ID	Plot	Range	Row	Rep	Genotype
17STRNS_FLO_1	101	1	1	1	DP-393
17STRNS_FLO_2	102	1	2	1	PD 05069
17STRNS_FLO_3	103	1	3	1	Phytogen 72
17STRNS_FLO_4	104	1	4	1	PD 99053
17STRNS_FLO_5	105	1	5	1	PD 98066

Load Input File on Tablet



Collect Data on Tablet



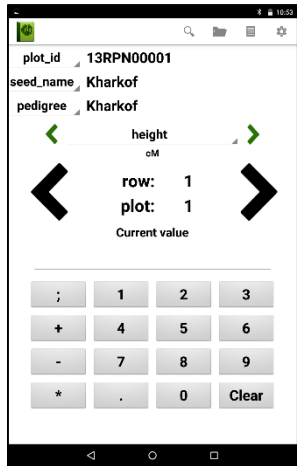
Import Data to BIMS Database



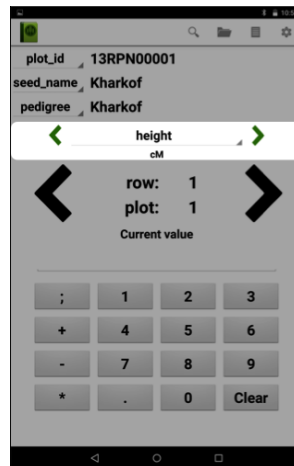
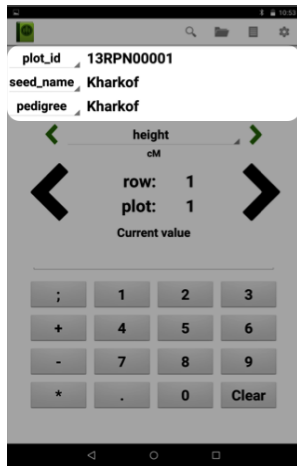
Export Data from Tablet to PC

Unique_ID	Plot	Genotype	Stand	Maturity
17STRNS_FLO_1	101	DP-393	10	Sept 1
17STRNS_FLO_2	102	PD 05069	8	Sept 4
17STRNS_FLO_3	103	Phytogen 72	7	Sept 5
17STRNS_FLO_4	104	PD 99053	10	Sept 10
17STRNS_FLO_5	105	PD 98066	9	Sept 8

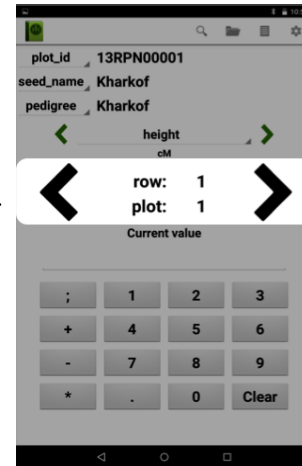
Collecting Data with the FieldBook



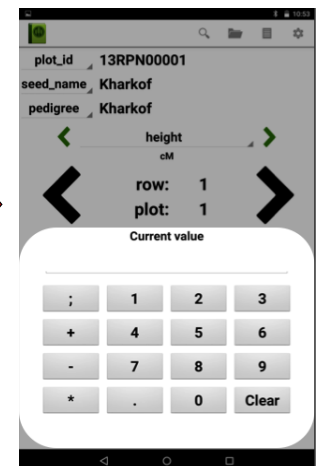
Plot Description



Trait Selection



Plot Selection



Entering Data

Components of BIMS

- Archive
- Manage Breeding
- Data Import, Edit and Download
- Search and Compare
- Field Book App Management
- Data Analysis Tools
- Breeding Decision Tools

BIMS Home

Todd Campbell Breeding Program Program Hello todd.campbell | Site Home | Log out

Archive

Manage Breeding

- Program**
- List
- Trait
- Location
- Cross
- Gemplasm
- Trial
 - Trial Tree
 - Cross Tree
 - Breeding Line Tree

Data Import

Data Edit

Search

Download

Manage Program

Instructions

Program Admin Menu

Program Selection

- Cotton Public Data
- Todd Campbell Breeding Program**

Program Details

Name	Todd Campbell Breeding Program
Owner	todd.campbell
Description	<input type="text"/>
Members	<input type="button" value="Manage Members"/>

Login from CottonGEN home page accesses the breeders private BIMS

Manage Breeding – Manage Program

Todd Campbell Breeding Program Program Hello todd.campbell | Site Home | Log out

Archive

Manage Breeding

- **Program**
- List
- Trait
- Location
- Cross
- Germplasm
- Trial
 - Trial Tree
 - Cross Tree
 - Breeding Line Tree

Data Import

Data Edit

Search

Download

Field Book Management

Data Analysis

Breeding Decision Tools

Manage Program Members x

Instructions

Current members

Current members

Remove Member

Add Members

Non-member

Permission

- READ ONLY
- EDIT

Add Member

Add members and give them privilege to read or read/write

Manage Breeding – Manage Lists

Archive

Manage Breeding

- Program
- **List**
- Trait
- Location
- Cross
- Germplasm
- Trial
 - Trial Tree
 - Cross Tree
 - Breeding Line Tree

Data Import

Data Edit

Search

Download

Field Book Management

Manage List

Instructions

List Admin Menu

Action	Description
<input type="button" value="Create"/>	Create a new list.
<input type="button" value="Delete"/>	Delete the list.

Your Lists

No lists associated with the current program.

List Details

Please choose a list from the lists.

Create lists of genotypes and traits to make phenotypic data collection sheets, download phenotypic or genotypic data in 'Download' or any other future BIMS tools.

Manage Breeding – Manage Traits

Todd Campbell Breeding Program Program Hello todd.campbell | Site Home | Log

Archive

Manage Breeding

- Program
- List
- **Trait**
- Location
- Cross
- Germplasm
- Trial
 - Trial Tree
 - Cross Tree
 - Breeding Line Tree

Data Import

Data Edit

Search

Download

Manage Trait

Instructions

Trait Admin Menu

Traits

- AREA %
- +b
- bollm2
- bollwt
- CGRD
- ELO
- GIN1
- GIN2
- harv_no
- height
- length
- LINT YLD
- lyld_kg
- maturity
- MIC

Trait Details

Name	maturity
Alias	N/A
Format	numeric
Definition	day when 50% of bolls are open

- View existing traits and trait details
- Add/edit/delete traits in admin menu

Manage Breeding – Manage Trials

Todd Campbell Breeding Program Program Hello todd.campbell | Site Home | L

Archive

Manage Breeding

- Program
- List
- Trait
- Location
- Cross
- Germplasm
- **Trial**
 - Trial Tree
 - Cross Tree
 - Breeding Line Tree

Data Import

Data Edit

Search

Download

Manage Trial

Instructions

Trial Admin Menu

View all trials. Clicking on a trial name, populates the trial description

Trials

- 04-AYT
- 04-E-AYT
- 04-eyt
- 04-f4rev
- 04-PD-NR
- 04-PYT-1
- 04-PYT-2
- 04-PYT-3
- 04-PYT-4
- 04-PYT-5
- 05-AYT-FL
- 05-E-AYT-BLACKVILLE
- 05-E-AYT-FLORENCE

Trial Details

Name	04-AYT
Access	Private
# data points	2208
Statistics / Data	<input type="button" value="Views"/>

Manage Breeding – Manage Trials

The screenshot displays a software interface for managing breeding trials. The top bar shows "Todd Campbell Breeding Program" and "Program". The left sidebar has a "Manage Breeding" section with a tree view where "Breeding Line Tree" is highlighted with a red box. The main panel shows a "Breeding Line" tree view with a folder "Todd Campbell Breeding Program" containing a list of trial IDs: 04F4-1, 04F4-10, 04F4-100, 04F4-101, 04F4-102, 04-f4rev, 04F4-103, 04F4-104, 04F4-105, 04F4-106, 04F4-107, 04F4-108, 04F4-109, 04F4-11, 04F4-110, 04F4-111, 04F4-112, 04F4-113, and 04F4-114.

The Breeding Line Tree shows all the progeny and breeding lines that have been tested. Clicking on a breeding line shows all the trials where the breeding line was phenotyped, Clicking any trial name will access the same phenotype page with the statistical information and the entire phenotype data.

Search Germplasm – by properties

The screenshot shows a web application interface for searching germplasm. On the left is a sidebar with navigation options: Archive, Manage Breeding, Data Import, Data Edit, Search, and Download. The 'Search' option is highlighted. The main area is titled 'By Property' and contains an 'Instructions' section. Below this are two panels: 'Choose property' and 'Set filter'. The 'Choose property' panel has a dropdown menu with 'Trial' selected. The 'Set filter' panel has a list of trials, with '04-PYT-1' through '04-PYT-5' highlighted in blue. Below the list is an 'Add' button, which is pointed to by a red arrow. To the right is a 'Search results' section with a table showing the results for the 'Trial' property.

Property	# stocks	Actions
Trial	82	remove view

Search germplasm that has been tested in these trials. If you click 'Add' it shows the number of germplasm.

Search Germplasm – by trait

Todd Campbell Breeding Program Program Hello todd.campbell | Site Home | Log out

Archive
Manage Breeding
Data Import
Data Edit
Search

- By Property
- By Trait
- By Genotype

By Trait

Instructions

Choose trait

Traits

- AREA %
- GIN2
- selection
- SFC%

Set filter

Name	selection
Format	categorical
# of data	724

categories

- Y
- N

Add

Search results

Trait	# stocks	Actions
SFC%	1372	remove view
AREA %	549	remove view

Search germplasm by any number and combination of trait values

Data Import - Templates

Archive

Manage Breeding

Data Import

Excel Data Templates

- [Template List](#)
- [Upload data](#)

Data Edit

Search

Download

Field Book Management

Data Templates

Instructions

Data templates

The table lists the templates used in BIMS. The template name is corresponding to the name of Excel worksheet and it is not case-sensitive. You can download an individual template in Excel format from a "download" link in the table. The templates can be combined into one Excel file to upload to the database.

Template name	Details	Download	Description
Sample_prop	view	download	Sample properties
Dataset	view	download	Trials of your program
Descriptor	view	download	Traits used in phenotyping data of your program
Stock	view	download	Stock
Cross	view	download	Cross
Progeny	view	download	Progeny
Phenotype	view	download	Evaluation data (Phen

In data import, templates for each type of data are available for download in template list page.

Data Import – Upload data from Templates

Todd Campbell Breeding Program Program

Archive
Manage Breeding
Data Import
Excel Data Templates

- Template List
- Upload data

Data Edit
Search
Download
Field Book Management
Data Analysis
Breeding Decision Tools

Upload Excel Data

Instructions

Uploaded files

- Todd-03-campbell-2012-2014-TL-03-29-2017-Final.xlsx
- Todd-02-campbell-2009-2011-TL-03-29-2017-Final.xlsx
- Todd-01-campbell-2004-2008-TL-03-29-2017-Final.xlsx

Filename	Todd-03-campbell-2012-2014-TL-03-29-2017-Final.xlsx
File Size	813.28 KB
Submit Date	2017-09-12 21:20:01
Description	Breeding data 3 of 3 by Sushan
Status	Completed

Upload data by a file

Data File
Choose File No file chosen Upload

File Description

Please add a description of your file

Upload File

In data upload, files can be uploaded. The status of the upload is shown. The history of files uploaded is being added with submission details.

Download – By Trial or list

Todd Campbell Breeding Program Program Hello todd.campbell | Site Home | Log

- Archive
- Manage Breeding
- Data Import
- Data Edit
- Search
- Download**
 - By Trial
 - By List

Manage Trial

Instructions

Trial Admin Menu

Trials

- 04-AYT
- 04-E-AYT**
- 04-eyt
- 04-f4rev
- 04-PD-NR
- 04-PYT-1
- 04-PYT-2
- 04-PYT-3
- 04-PYT-4
- 04-PYT-5
- 05-AYT-FL
- 05-E-AYT-BLACKVILLE
- 05-E-AYT-FLORENCE

Trial Details

Name	04-E-AYT
Access	Private
# data points	1380
Statistics / Data	<input type="button" value="Views"/>

Download all the phenotype data or summary information by trial or list.

Field Book App Management – configure your metadata

Archive

Manage Breeding

Data Import

Data Edit

Search

Download

Field Book Management

- Configure Field Book
 - Configuration
- Generate input file
 - Trait
 - Field
- Upload exported file
 - Upload trait file
 - Upload filed file

** The format of an exported field file can be table or database*

Data Analysis

Breeding Decision Tools

Configuration

Field Book required columns

Field Book input file requires 3 columns (*Unique Identifier, Primary and Secondary orders*). Please type the default names of these columns.

1. Unique Identifier

Field ID

2. Primary order

Plot

Starting *Please enter the starting number*

Repeat *Please enter the number of repeat*

Increment *Please enter the increment*

3. Secondary order

Row

Starting *Please enter the starting number*

Increment *Please enter the increment*

Save

Configure the three columns required for Field Book App

Field Book App Management – upload data in FB output file

- Archive
- Manage Breeding
- Data Import
- Data Edit
- Search
- Download
- Field Book Management**
 - Configure Field Book
 - Configuration
 - Generate input file
 - Trait
 - Field
 - Upload exported file
 - Upload trait file
 - Upload filed file
- Data Analysis
- Breeding Decision Tools

Upload Field Data

Uploaded files

No upload field file found

Filename	--
File Size	--
Submit Date	--

Description

Actions

Inspect an exported field file

Upload an exported field file

Field Book other columns

There are unknown columns in your filed file. Please check the columns you want to store as sample properties.

- num
- tray_row
- tray_id
- seed_id
- pedigree
- person
- location
- number

Locations

Do not specify

Trials

Test_Trial_2017

Upload trait evaluation data collected with the Field Book App to BIMS

Timeline for Development

- V2.0 by September 2017
 - Load complete breeding program data (peach and cotton) and tested by breeder
 - Excel template and Field Book App data loading available
 - List generator function available
 - Search germplasm by name, parentage, trait, and genotype available
- V3.0 by March 2018
 - Downloading raw phenotypic data, summary page and stats from list available
 - Generating input file for ongoing trial (a way of syncing data from multiple devices) available

Acknowledgements

- Direct Funding Sources



- The CottonGen Steering Committee
- The Cotton Community
- The Tripal Developers Community
- The Bioinformatics Community

Plus leveraged funding from

