

AGB User Manual

(1/30/18)

AGB Overview

Accrete Genetics & Breeding (AGB) is an open source laboratory information management system with an accompanying multi-user interface for plant genetics & breeding programs. AGB supports the complete workflow for managing genetics and breeding projects (from selecting stocks for a given planting to inventorying seed stocks from a harvest). AGB uses a modular design. A project manager module provides an active memory of the workflow for different projects and allows collaborators to share/transfer responsibility in executing breeding and trialing activities across seasons and locations. Projects and data are preserved as users advance through modules to choose germplasm, create experimental designs, organize and plant genetic/breeding stocks and produce row or plant tags, create data collection files and upload phenotype or weather data, track tissue samples, record mating types and pedigrees when harvesting, inventory seed stocks created, and more. AGB does not handle sequence or genotype data or perform data analysis. There are plans to add a module for users to export datasets in formats for downstream analysis with other tools.

Installation

1. Install AGB databases

- If you don't already have a MySQL community server and MySQL Workbench, download and install from the following links:

MySQL community server: <https://www.mysql.com/downloads/>

MySQL Workbench: <https://www.mysql.com/products/workbench/>

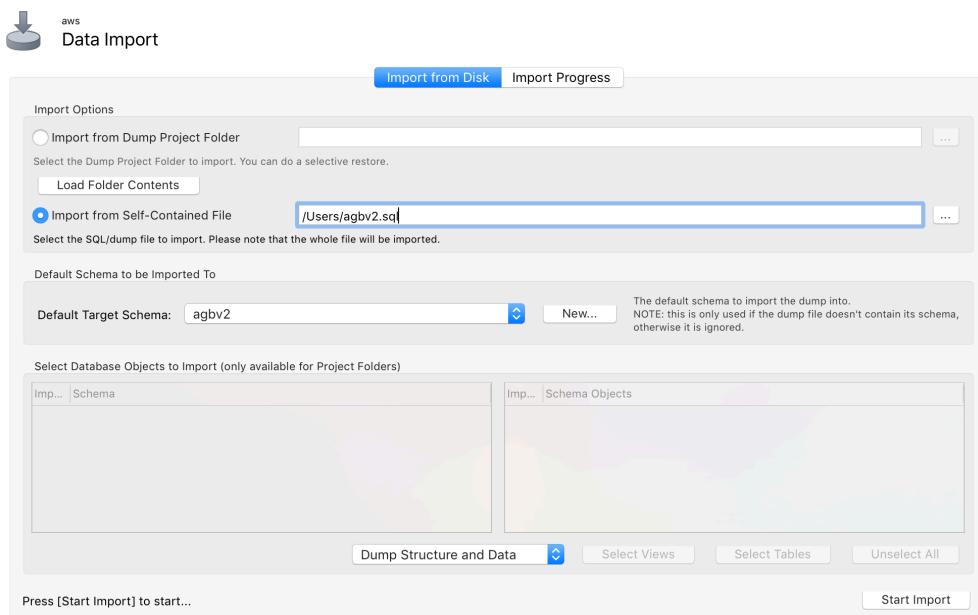
- Setup AGB schemas (agbv2 and projectmanager) using MySQL workbench:

First, open MySQL workbench and connect to the server

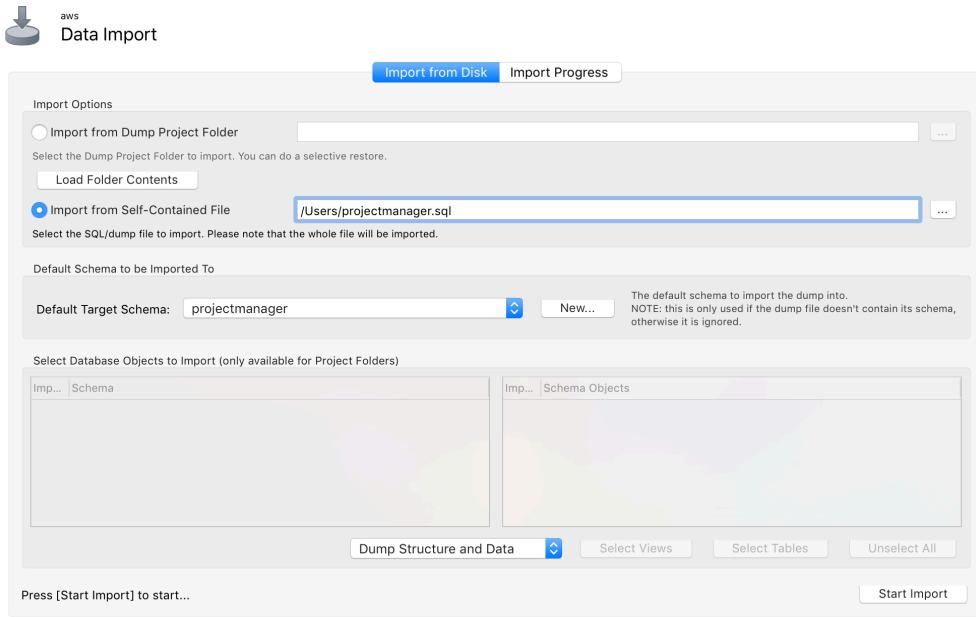
(<https://dev.mysql.com/doc/workbench/en/wb-mysql-connections.html>). This will open a new set of menu options and be

the server on which the databases are installed.

Setup the agbv2 schema: Click 'Server' -> 'Data Import' -> 'Import from Self-Contained File' -> Locate/import the agbv2.sql file -> 'New' -> Name schema as "agbv2" -> 'Start Import'



Setup the projectmanager schema: click 'Server' -> 'Data Import' -> 'Import from Self-Contained File' -> Locate/import the projectmanager.sql file -> 'New' -> Name schema as "projectmanager" -> 'Start Import'



2. Install the Software R (used for Experimental Design)

- Install the software R <https://cran.r-project.org/mirrors.html> from one of the CRAN Mirror Sites.
- Install the following R packages required for AGB functions. Open the R console and input the following commands to install the packages. Note: you may have to type the commands into the R console instead of copy and paste (quotation marks may change).


```
> install.packages("agricolae")
> install.packages("Rserve")
```

3. Install Java Runtime Environment

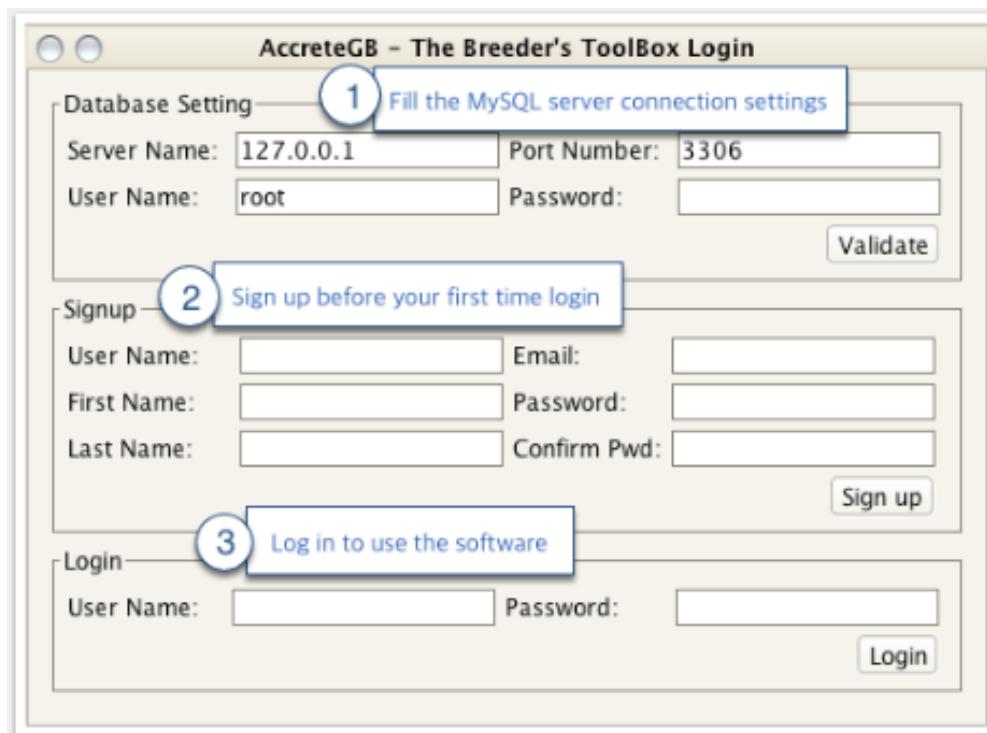
- Install JRE <http://java.com/en/download/>. JRE Version needs to be at least 7.
- Download the software folder. Keep all of the files from the software folder in the same directory on your local machine (i.e. .jar file, mysql and mysqldump)

Using AGB

Launching the Software

To start using AGB, double click the software JAR file, and follow the three steps mentioned in the screenshot to login to the software. If you cannot open the jar by double-clicking it in windows, try to install [Jarfix](#) and try again.

After you have successfully logged in, database settings and login information are encrypted and stored in the files where the jar resides. You will not need to re-input these again during subsequent logins.



Main Interface Introduction

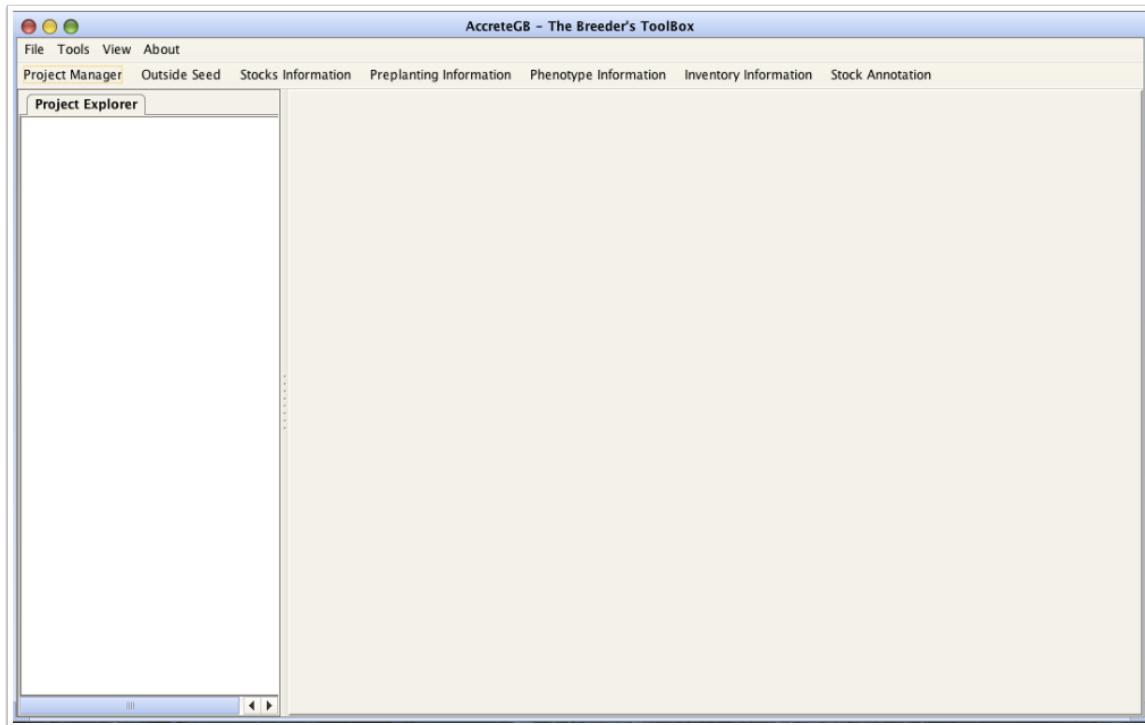
After you logged in, you can see three horizontal sections in this main panel.

The first horizontal section includes four menus: "File", "Tools", "View" and "About." The "View" menu is used to view the AGB execution logs. The "About" menu is used to view details about the AGB project. The "File" and "Tools" menus will be discussed later.

The second horizontal section includes different modules that are independent of projects. The modules include Project Manager, Outside Seed, Stocks Information, Preplanning Information, Phenotype

Information, Inventory Information and Stock Annotation. The details of the modules are discussed later.

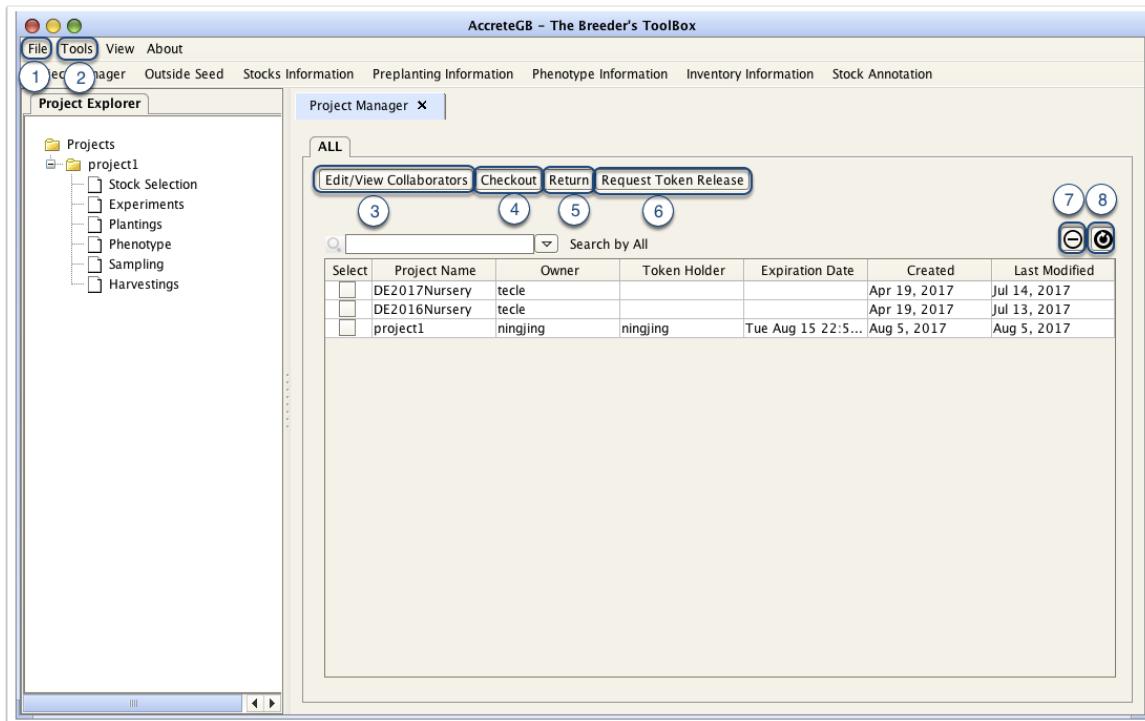
The third horizontal section is used to display projects (Project Explorer) and module interfaces.



Project Creation and Management

You have two ways to create a new project. One way is to click "File" - "New Project". The other way is right-click at any white space on the Project Explorer panel. After you input a project name, you will see the project shows in both Project Explorer and Project Manager module interface.

Project-dependent modules can be accessed under the project name in Project Explorer panel. They are Stock Selection, Planting, Phenotype, Sampling and Harvesting. Initially these are inaccessible. More details on these are explained below with the numeric icons in the screenshot and the corresponding text items.



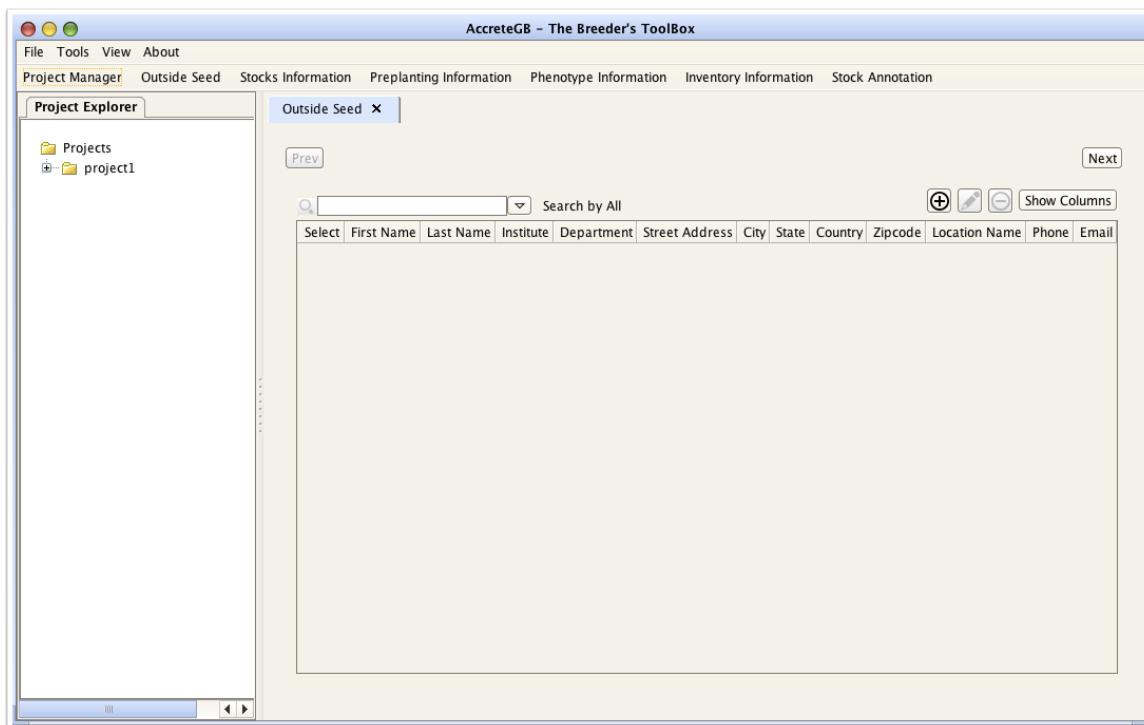
1. There are three submenus under menu "File": create a new project, save an existing project and exit the software. To save a project, click the project name ("project1" in this case) and select the project first.
2. There are three submenus under menu "Tools":
 - Back up the current databases (AGB-data and ProjectManager). This will create two .sql files saved to the specified directory.
 - Restore databases with the .sql files. **This will overwrite the existing databases with the content of the .sql files. ***Use this function with extreme caution, especially when multiple users share the databases.*****
 - Set up a Gmail account. This account is used to send automatic emails. Email addresses and passwords are encoded into an encrypted file that resides in the same directory as the software jar.
3. A project's owner can add/remove collaborators to/from the project. Collaborators need to sign up in order for an owner to add them to a project. **Collaborators can only view who are collaborating on a project.**
4. A token system is used for project collaboration. Users need to checkout a project in order to work on it. A project is available for checkout only when the token holder is empty.

5. When a user is done editing a project, they can return it, which releases the token. The user will be prompted to choose to save the project or not. Saving will store the current project data in the ProjectManager database (the AGB-data database is not affected; only sync functions alter data in the AGB-data database [more on that later]).
6. Request a collaborator to release the token. An email will be sent to the token holder automatically if the email account is set up correctly.
7. Deleting a project will delete the corresponding project content from the ProjectManager database. The AGB-data database is not affected.
8. Refresh the project panel to ensure current token holdings are displayed.

Outside Seed Management

If your database does not have any stock data yet, you can start with the Outside Seed Management module. This module allows you to convert your current stock data or outside seed data to AGB-data database compatible formatting.

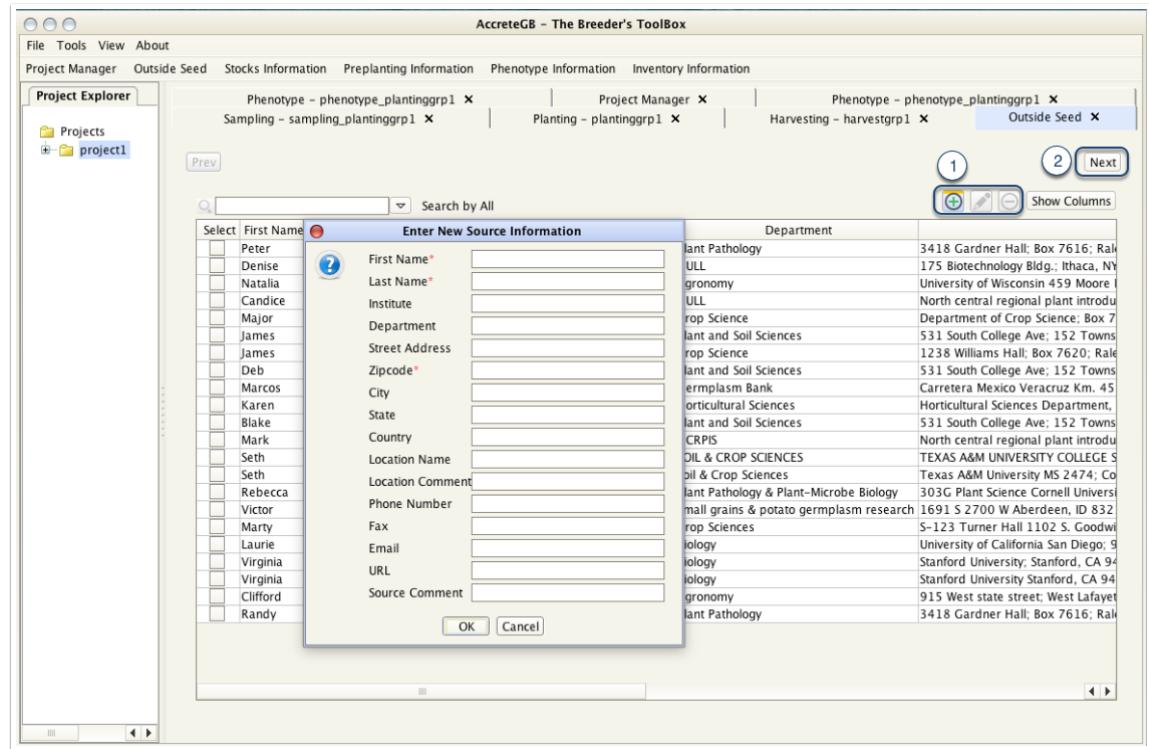
Again, this module is project-independent. It's a starting point if you don't have any stock data in the database.



Outside Seed Management – Record Source Info

To create stocks for the seeds, you need to input the source information of the seeds first. This panel allows you to add/edit/delete a source's contact information.

More details are explained below with the numeric icons in the screenshot and the corresponding text items.



1. The buttons marked by this icon is used to add/edit/delete a row (resource information) of the table.
2. The button marked by this icon is used to proceed to the next page

Outside Seeds Management – Record Seeds Info

This panel allows you to describe details of the outside seeds. There are three tables in this panel. From top to bottom, the first table displays the seeds information. The bottom left table is for displaying, adding, editing or deleting Classification information. The bottom right table is for displaying, adding, editing or deleting Taxonomy info. To start record a seed's information, click “+” button on the top-right corner of the first table to add an empty row, then double click

"Accession" or "Pedigree" cell of the row to input the details. Then you can set "Classification" and "Taxonomy" information for the row. The other way to populate seeds' information to the table is to download the table template first, then fill out the template, and upload the template back.

More details are explained below with the numeric icons in the screenshot and the corresponding text items.

Select	Classification Type
<input checked="" type="checkbox"/>	2102 managed/mutant/fixed
<input type="checkbox"/>	2092 managed /line /fixed
<input type="checkbox"/>	2081 managed/family/seggreg...
<input type="checkbox"/>	2072 managed/hybrid /fixed
<input type="checkbox"/>	2051 managed/synthetic/segre...
<input type="checkbox"/>	2081 managed/family/segregra...

Select	Genus	Species	Subspecies	Subtaxa	Race	Common name	Population	Gto
<input checked="" type="checkbox"/>	Zea	mays	mays	NULL	NULL	maize	NULL	GR_TAX:014546
<input type="checkbox"/>	Zea	mays	mays	NULL	Tuson	maize	Hallauer's Tuson	GR_TAX:014546
<input type="checkbox"/>	Zea	mays	mays	NULL	NULL	maize	Association Panel	GR_TAX:014546
<input type="checkbox"/>	Zea	mays	mays	NULL	NULL	maize	DRIL	GR_TAX:014546
<input type="checkbox"/>	Zea	mays	mays	NULL	NULL	maize	Holland's HIFs	GR_TAX:014546
<input type="checkbox"/>	Zea	mays	mays	NULL	Suwani	maize	Hallauer's Suwan	GR_TAX:014546

1. The buttons marked by this icon is used to set/remove "Classification" information for/from the selected rows in the top table. Use the left button to set the information. Use the right button to remove the setting.
2. The buttons marked by this icon is used to add/edit/delete a "Classification" record
3. The buttons marked by this icon is used to set/remove "Taxonomy" information for/from the selected rows in the top table. Use the left button to set the information. Use the right button to remove the setting
4. The buttons marked by this icon is used to a "Taxonomy" record
5. The buttons marked by this icon is used to proceed to next page to save the outside seed information

Stock Selection

A project starts with stock selection. This Stock Selection module allows you to search stocks from the database by different categories.

There are two major horizontal sections in the Stock Selection Panel. The left part of the first section is used to specify the searching filters, and the right part is a table that is used to display the search results. The second section is used to display the final stock selection.

* For all the tables that allow multiple selection, you have two ways to quickly select multiple consecutive rows: 1) left click one row, drag the mouse and drop the mouse at the last row of the selection, 2) left click one row, hold "shift" key and click the last row of the selection.

More details are explained below with the numeric icons in the screenshot and the corresponding text items.

Select	Stock Name	Accession Name	Pedigree	Generation	Classification Code	Population
<input checked="" type="checkbox"/>	09.1.19716...	B73HTRHM	NA	NULL	2092	Association ...
<input checked="" type="checkbox"/>	010109.27...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	010110.27...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	032212.27...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	050111.27...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	051612.19...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	051614.53...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	061013.92...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	061015.53...	B73	NA	NULL	2092	NULL
<input checked="" type="checkbox"/>	09.1.19716...	B73	NA	NULL	2092	NULL

Select	Stock Name	Accession Name	Pedigree	Generation	Classification Code	Population
<input type="checkbox"/>	010109.27695.PB...	B73HTRHM	NA	NULL	2092	Association Panel
<input type="checkbox"/>	09.1.19716.0004...	B73HTRHM	NA	NULL	2092	Association Panel
<input type="checkbox"/>	010109.27695.PB...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	010109.27695.JH...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	010110.50011.CG...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	032212.27695.PB...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	050111.27695.JH...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	051612.19716.JH...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	051614.53706.N...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	061013.92093.LS...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	061015.53706.N...	B73	NA	NULL	2092	NULL
<input type="checkbox"/>	09.1.19716.0004...	B73	NA	NULL	2092	NULL

1. This icon is used to create a new Stock Selection group. Right-click "Stock Selection" and select "create new"
2. The buttons/fields marked by this icon are used to search stocks with filters
3. The buttons marked by this are used to select /deselect all rows
4. Buttons for further filtering stocks
5. Button for expand the table for better view

6. Buttons for select /deselect columns
7. Buttons for duplicate and confirm stocks selection. Selected stocks will be shown in the bottom table
8. Button for importing stocks from a file instead of selecting stocks from the top table. The file format template is in the attachments.
9. Button for exporting the bottom table to a .csv file

Experimental Design

You can apply some randomization for the stocks selected. This experiment module displays and saves design results generated by R. This module is optional for a project.

There are two major horizontal sections in the Experiment Design Panel. The left part of the first section is used to specify the parameters for a design method required by R. The middle part of the first section is used to specify treatments information. The right part of the first section is used to add experiment comment. The second horizontal section is a table used to display the result fetched from R.

More details are explained below with the numeric icons in the screenshot and the corresponding text items.

The screenshot shows the AccreteGB software interface with the following numbered callouts:

- 1**: Points to the 'Stock Selection' node in the Project Explorer under 'Experiments'.
- 2**: Points to the 'Design Selection' panel which includes dropdowns for 'Randomized Complete Block' and 'Randomized Complete Block Design', and input fields for 'Replications' (2), 'Seed' (1), and 'Method' (Wichmann-Hill).
- 3**: Points to the 'Treatments' panel which includes a dropdown for 'Treatment 1: stock' and input fields for 'Stocks', 'Description', and 'Comment'.
- 4**: Points to the 'Experiment Comment' panel, which is currently empty.
- 5**: Points to the 'Show Columns' button and the column headers in the table.
- 6**: Points to the 'Export' button at the bottom right of the table.

Select	Plot	Replication	Stock Name	Accession N...	Pedigree	Generation	Cycle	Classification...	Population
	101	1	09.1.1971...	B73HTRHM	NA	NULL	NULL	2092	Association ...
	102	1	061015.53...	B73	NA	NULL	NULL	2092	NULL
	103	1	051614.53...	B73	NA	NULL	NULL	2092	NULL
	104	1	010109.27...	B73	NA	NULL	NULL	2092	NULL
	105	1	050111.27...	B73	NA	NULL	NULL	2092	NULL
	106	1	032212.27...	B73	NA	NULL	NULL	2092	NULL
	107	1	061013.92...	B73	NA	NULL	NULL	2092	NULL
	108	1	010109.27...	B73	NA	NULL	NULL	2092	NULL
	109	1	051612.19...	B73	NA	NULL	NULL	2092	NULL
	110	1	09.1.1971...	B73	NA	NULL	NULL	2092	NULL
	111	1	010110.50...	B73	NA	NULL	NULL	2092	NULL
	112	1	010109.27...	B73HTRHM	NA	NULL	NULL	2092	Association ...
	201	2	010109.27...	B73HTRHM	NA	NULL	NULL	2092	Association ...
	202	2	010110.50...	B73	NA	NULL	NULL	2092	NULL
	203	2	050111.27...	B73	NA	NULL	NULL	2092	NULL
	204	2	032212.27...	B73	NA	NULL	NULL	2092	NULL
	205	2	010109.27...	B73	NA	NULL	NULL	2092	NULL

1. Right-click a Stock Selection group to create a new Experimental Design group
2. The buttons marked by this are used to select a design type, fill out the parameters and start randomization (*note: seed is for random number generator*)
3. The buttons marked by this are used to fill out treatment info. Use "Stocks" button to add/remove stocks
4. The table marked by this icon is used to display experimental design result generated by R
5. Button for syncing the table with database, and then table background turns yellow.

Planting Events - Field Selection

To start planning plantings, you need to push the stocks from Stock Selection group and/or experiments to this plantings module.

The first panel of Planting module is "Field Selection", where you can select/edit/add planting field information.

More details are explained below with the numeric icons in the screenshot and the corresponding text items.

Select	Field id	Field Number	Field Name	Latitude	Longitude	City	Zipcode	State	Country
<input checked="" type="checkbox"/>	1	15	AGRONOMY	39.669800...	-75.74939...	Newark	19716	Delaware	USA
<input type="checkbox"/>	2	4-7	PC	39.670099...	-75.75079...	Newark	19716	Delaware	USA
<input type="checkbox"/>	3			25.504799...	-80.50440...	Homestead	33031	Florida	USA
<input type="checkbox"/>	4	1-2	PC	39.669800...	-75.75209...	Newark	19716	Delaware	USA
<input type="checkbox"/>	5		COMPOUND	39.668399...	-75.74679...	Newark	19716	Delaware	USA
<input type="checkbox"/>	6			17.958300...	-66.39249...	Santa Isabel	757	Puerto Rico	USA
<input type="checkbox"/>	7			35.4011	-78.49259...	Clayton	27520	NC	USA
<input type="checkbox"/>	8			35.669800...	-78.49259...	Clayton	27520	NC	USA
<input type="checkbox"/>	9			42.0289	-93.64799...	Ames	50011	IA	USA
<input type="checkbox"/>	10			43.054018...	-89.52951...	West Madison	53706	WI	USA
<input type="checkbox"/>	11			30.546444...	-96.43323...	College Station	77843	TX	USA
<input type="checkbox"/>	12			30.546399...	-96.43323...	College Station	77843	TX	USA
<input type="checkbox"/>	13			33.691885...	-101.8236...	Lubbock	79403	TX	USA
<input type="checkbox"/>	14			33.691899...	-101.8237	Lubbock	79403	TX	USA
<input type="checkbox"/>	15			17.573	-66.23210...	Santa Isabel	757	Puerto Rico	USA
<input type="checkbox"/>	16			17.572399...	-66.23350...	Santa Isabel	757	Puerto Rico	USA

1. Use 'ctrl' or 'command' to select multiple groups from Stock Selection and/or Experimental Design, then right-click to create a new planting group. You can also add the stocks to an existing planting group.
2. Buttons for adding/editing/deleting a location

Planting Events - Table View

After you selected a field, click "Table View" tab to specify plants related information. Each row of the table represents a plot/row in a field.

The tag names (Tags column) are composed by year + "." + planting group index of the year + "." + zip code + "." + plot/row number + "." + plant number.

More details are explained below with the numeric icons in the screenshot and the corresponding text items.

Row Num	Type	Row	Plant	x	y	Tag	Stock Name	Accession Name	Pedigree	Gene
16	Row	00016	0000000	-1	-17.6.19716.00016.0000000	032212.27695.PBALI.00184	B73	NA	NULL	
17	Row	00017	0000000	-1	-17.6.19716.00017.0000000	010109.27695.JHOLL.00001	B73	NA	NULL	
18	Row	00018	0000000	-1	-17.6.19716.00018.0000000	051614.53706.NDELE.00008	B73	NA	NULL	
19	Row	00019	0000000	-1	-17.6.19716.00019.0000000	09.1.19716.00040.00000	B73	NA	NULL	
20	Row	00020	0000000	-1	-17.6.19716.00020.0000000	051612.19716.JHAWK.00001	B73	NA	NULL	
21	Row	00021	0000000	-1	-17.6.19716.00021.0000000	061013.92093.LSMIT.00001	B73	NA	NULL	
22	Row	00022	0000000	-1	-17.6.19716.00022.0000000	061015.53706.NDELE.00031	B73	NA	NULL	
23	Row	00023	0000000	-1	-17.6.19716.00023.0000000	010109.27695.PBALI.00038	B73	NA	NULL	
24	Row	00024	0000000	-1	-17.6.19716.00024.0000000	09.1.19716.00041.00000	B73HTRHM	NA	NULL	
25	Row	00025	0000000	-1	-17.6.19716.0002	061010.27695.PBALI.00039	B73HTRHM	NA	NULL	
26	Row	00026	0000000	-1	-17.6.19716.00026.0000000	09.1.19716.00041.00000	B73HTRHM	NA	NULL	
27	Row	00027	0000000	-1	-17.6.19716.00027.0000000	010109.27695.PBALI.00038	B73	NA	NULL	
28	Row	00028	0000000	-1	-17.6.19716.00028.0000000	010109.27695.JHOLL.00001	B73	NA	NULL	
29	Row	00029	0000000	-1	-17.6.19716.00029.0000000	010110.50011.CGARD.00001	B73	NA	NULL	
30	Row	00030	0000000	-1	-17.6.19716.00030.0000000	032212.27695.PBALI.00184	B73	NA	NULL	
31	Row	00031	0000000	-1	-17.6.19716.00031.0000000	050111.27695.JHOLL.00001	B73	NA	NULL	
32	Row	00032	0000000	-1	-17.6.19716.00032.0000000	051612.19716.NDELE.00001	B73	NA	NULL	
33	Row	00033	0000000	-1	-17.6.19716.00033.0000000	051614.53706.NDELE.00008	B73	NA	NULL	
34	Row	00034	0000000	-1	-17.6.19716.00034.0000000	061013.92093.LSMIT.00001	B73	NA	NULL	
35	Row	00035	0000000	-1	-17.6.19716.00035.0000000	061015.53706.NDELE.00031	B73	NA	NULL	
36	Row	00036	0000000	-1	-17.6.19716.00036.0000000	09.1.19716.00040.00000	B73	NA	NULL	

1. The buttons/fields marked by this icon are used to set planting information for selected plots.
2. The buttons/fields marked by this icon are used to set plot start number for this planting group. Auto Set will set the number to be (1 + max Row/Plot number) based on the tag names in the

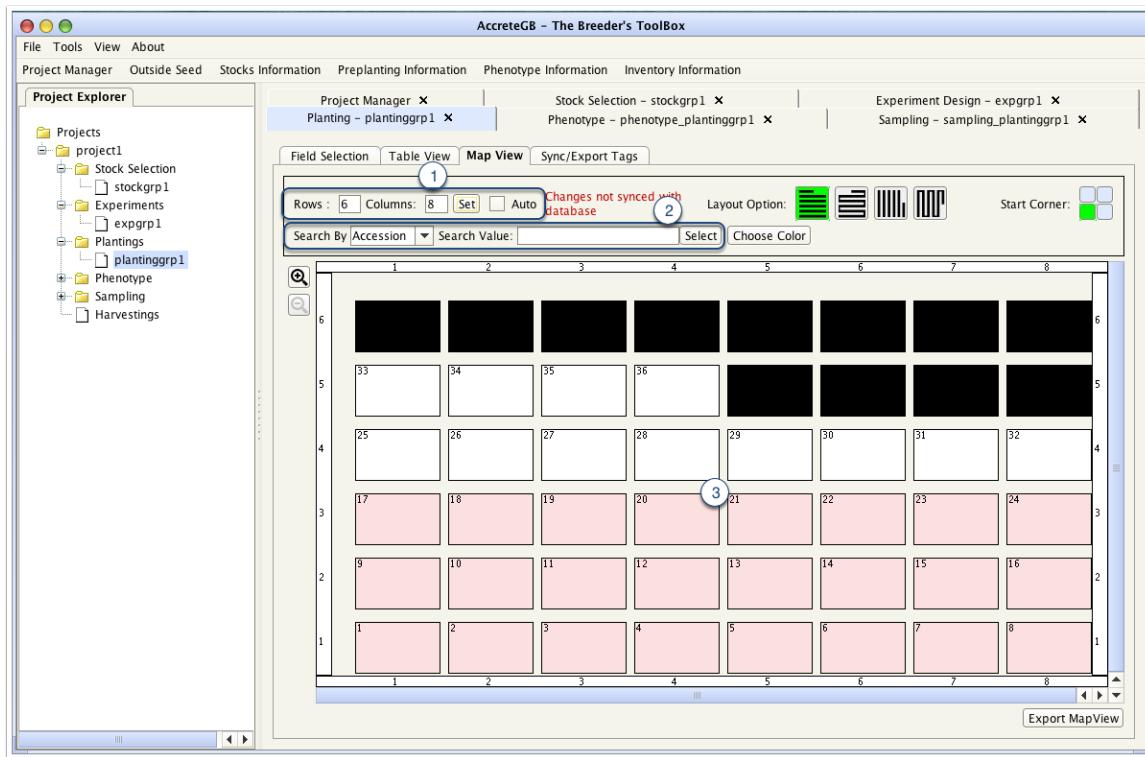
database. For example, 17.6.19716.00090.0000000 belongs to the 6th planting group of year 2017 at the field with zip code 19711. If 90 are the maximum Row/Plot number of this group, then next Row/Plot number of this group set by Auto Set is 91.

3. The buttons/fields marked by this icon are used to set planting group index. All plants in a same planting group share same planting group index. If you plan to have two planting groups in 2017, you need to create a planting group for 17.1.19716.xxxxx.xxxxxxx plantings and a planting group for 17.2.19716.xxxxx.xxxxxxx plantings.
4. Button for setting the number of plants in each selected plots.
5. Button for setting mating method for selected plots.
6. Table rows with red background are from Experimental Design group. Others are from Stock Selection group.
7. Buttons for adding a plot or deleting multiple plots.
8. Buttons for moving up and down selected plots in the table.
9. Button for exporting the table to a .csv file.
10. Button for importing the .csv file exported (Not normally used)

Planting Events - Map View

"Map View" panel is used to design the layout of the plots in the field. "Layout Option" sets and shows how plots are connected – you could tell the difference by looking at the plot number in the top left corner of each rectangle plot. "Start Corner" sets and shows the position of (0,0) coordinates.

More details are explained below with the numeric icons in the screenshot and the corresponding text items.



1. Buttons/fields for setting the number of rows and columns in the map. Numbers on the Y-axis represent the row. Numbers on the X-axis represent the column. Select "Auto", either "Rows" or "Columns" can be set automatically based on the plot size when one is set manually.
2. Buttons/fields for Highlighting plots with filters.
3. Plots with red background represent stocks from Experiment group; plots with white background represent stocks from Stock Selection group; plots with black background are empty plots. Plots with white background can be moved to anywhere. Plots with red background are moved as groups marked by replications.

Planting Events - Sync/Export Tags

After the field layout is finalized, click "Sync/Export Tags" tab to sync the data with database and/or export the data to a .csv file. The table in the panel contains the data that will be saved to the database. After sync, you will not be able to change the plant prefix of this planting group, e.g. 17.3.19716 (year + "." + group index + "." + "zip code")

There are two scenarios that can happen after you click the "sync" button:

1. Everything went through.
2. The software detects the tag names already exist in the database. Follow the following instruction to proceed:
 - Your Tag id column is completely empty. This means another planting group, or another project created and saved the tag names after you created the tags but before you save your tags. You have to follow the pop-up message to re-create the tags.
 - Your Tag id column is not completely empty. This means you have saved the table data to the database and tag ids were created. If you did some modification to the tags, but not the tag names, you can select "Continue" to update the data. If you did modifications to the tag names, you may want to re-create the tag names since proceeding would mean there would be duplicate tag names in the database.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

The screenshot shows the AcreteGB software interface. The top menu bar includes File, Tools, View, About, Project Manager, Outside Seed, Stocks Information, Preplanting Information, Phenotype Information, and Inventory Information. The Project Explorer on the left shows a tree structure with Projects, project1, Stock Selection, Experiments, expgrp1, Plantings, plantinggrp1, Phenotype, Sampling, and Harvestings. The main central area has tabs for Project Manager, Planting - plantinggrp1, and Phenotype - phenotype_plantinggrp1. Below these tabs is a table titled 'Sync/Export Tags'. The table has columns: Select, Tag Id, Type, Row, Plant, x, y, Tag, Stock Name, Accession Name, Pedigree, and Class. The table contains numerous rows of data. At the bottom of the table, it says 'The current number of rows in this table: 36'. To the right of the table are several buttons: '1' (Sync/Export Tags), '2' (Export), 'Get Stocks', 'Plant Tags', and 'Plot Tags'.

1. Button for syncing the data with database AGB-data
2. Buttons for exporting the table data with different columns.
 - Export: export whole table as a .csv file
 - Get Stocks: export tags and related data with inventory information as a .csv file
 - Plant Tags: export plant tags and related data as a csv file

- Plot Tags: export row tags and related data

Phenotype - Export

Phenotype groups are created automatically with planting group creation. "Export" Panel allows you to export a template file to record phenotype data. You can choose information to be included in the template file from "Descriptors" and "Parameter Names" list panel.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

Select	Type	Row	Plant	x	y	Tag	Stock Name	Accession Name	Pedigree	Generation	Cycle	Clas
		00001	0000000	1	17.6.19716.00001.000000	09.1.19716.00041.00000	B73HTRHM	NA	NULL	NULL	209;	
		Row	00002	0000000	2	17.6.19716.00002.000000	061015.53706.NDELE.00031	B73	NA	NULL	NULL	209;
		Row	00003	0000000	3	17.6.19716.00003.000000	051614.53706.NDELE.00008	B73	NA	NULL	NULL	209;
		Row	00004	0000000	4	17.6.19716.00004.000000	010109.27695.PBAL010038	B73	NA	NULL	NULL	209;
		Row	00005	0000000	5	17.6.19716.00005.000000	050111.27695.JHOLL.00001	B73	NA	NULL	NULL	209;
		Row	00006	0000000	6	17.6.19716.00006.000000	032212.27695.PBAL010184	B73	NA	NULL	NULL	209;
		Row	00007	0000000	7	17.6.19716.00007.000000	061013.92093.LSMIT.00001	B73	NA	NULL	NULL	209;
		Row	00008	0000000	8	17.6.19716.00008.000000	010109.27695.JHOLL.00001	B73	NA	NULL	NULL	209;
		Row	00009	0000000	1	17.6.19716.00009.000000	051612.19716.IHAWK.00001	B73	NA	NULL	NULL	209;
		Row	00010	0000000	2	17.6.19716.00010.000000	01.1.19716.00040.00000	R73	NA	NULL	NULL	209;

1. Table shows plants related information. Same as the table data in Planting - "Sync/Export Tags"
2. Buttons/fields for selecting stocks to create Subsets and providing comments
3. List panel for selecting plants related information to export. Use "+" "-" to adjust selected descriptors.
4. List panel for adjusting the order by drag and drop a item to a position.
5. Double-click an item to edit. Right click an item to delete it.

6. List panel for adjusting the order by drag and drop a item to a position.
7. Export the template to record data. You can review the format before export.

Phenotype - Import

"Import" Panel allows you to import the file that was created by export panel. This is normally done after you have filled the template file with phenotype data. You also can edit the data before sync with database.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

The screenshot shows the AcreteGB software interface with the following details:

- Project Explorer:** On the left, it shows a project named "project1" with sub-folders like Stock Selection, Experiments, Plantings, and Phenotype. Under Phenotype, there is a folder named "phenotype_plantinggrp1".
- Toolbar:** At the top right, there are tabs for "Export" and "Import". The "Import" tab is active, indicated by a blue background. There are five numbered callouts pointing to specific elements:
 - Callout 1:** Points to the "Add New Parameter" button.
 - Callout 2:** Points to the "Import File" button.
 - Callout 3:** Points to a timestamp input field set to "00:00:00".
 - Callout 4:** Points to a red-highlighted cell in the table, indicating an out-of-range value.
 - Callout 5:** Points to a "Show Columns" button.
- Table View:** The main area displays a table of data with the following columns (from left to right):
 - observa...
 - tagname
 - stock_n...
 - coordin...
 - coordin...
 - plot
 - row
 - planting...
 - p1h
 - tom_plh
 - height
 - tom_hel...
 - measur...
 The table contains approximately 30 rows of data, each with numerical values for the columns.

1. Button for adding a new parameter if the parameter was not the output from Export panel.
2. Button for importing the file created by Export panel
3. Buttons/fields for setting timestamp. You need to select tom_ cells or a tom_ column first.
4. A cell with out-of-range value (range specified by a Parameter) have red background
5. Button for syncing the table data with database AGB-data

Sampling - Sample Selection

Sampling groups are also created automatically with Planting groups. "Sample Selection" panel is used to make groups of samples. A group of samples is a subset of the table rows.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

Select	Type	Row	Plant	x	y	Tag	Stock Name	Accession Name	Pedigree	Generation
Row 00001	0000000	1	117.6.19716.00001.0000000	09.1.19716.00041.00000		B73HTRHM	NA	NULL		
Row 00002	0000000	2	117.6.19716.00002.0000000	061015.53706.NDELE.00031		B73	NA	NULL		
Row 00003	0000000	3	117.6.19716.00003.0000000	051614.53706.NDELE.00008		B73	NA	NULL		
Row 00004	0000000	4	117.6.19716.00004.0000000	010109.27695.PBALI.00038		B73	NA	NULL		
Row 00005	0000000	5	117.6.19716.00005.0000000	050111.27695.JHOLL.00001		B73	NA	NULL		
Row 00006	0000000	6	117.6.19716.00006.0000000	032212.27695.PBALI.00184		B73	NA	NULL		
Row 00007	0000000	7	117.6.19716.00007.0000000	061013.92093.LSMIT.00001		B73	NA	NULL		
Row 00008	0000000	8	117.6.19716.00008.0000000	010109.27695.JHOLL.00001		B73	NA	NULL		
Row 00009	0000000	1	217.6.19716.00009.0000000	051612.19716.JHAWK.00001		B73	NA	NULL		
Row 00010	0000000	2	217.6.19716.00010.0000000	09.1.19716.00040.00000		B73	NA	NULL		
Row 00011	0000000	3	217.6.19716.00011.0000000	010110.50011.CGARD.00001		B73	NA	NULL		
Row 00012	0000000	4	217.6.19716.00012.0000000	010109.27695.PBALI.00039		B73HTRHM	NA	NULL		
Row 00013	0000000	5	217.6.19716.00013.0000000	010109.27695.PBALI.00039		B73HTRHM	NA	NULL		
Row 00014	0000000	6	217.6.19716.00014.0000000	010110.50011.CGARD.00001		B73	NA	NULL		
Row 00015	0000000	7	217.6.19716.00015.0000000	050111.27695.JHOLL.00001		B73	NA	NULL		
Row 00016	0000000	8	217.6.19716.00016.0000000	032212.27695.PBALI.00184		B73	NA	NULL		
Row 00017	0000000	1	317.6.19716.00017.0000000	010109.27695.JHOLL.00001		B73	NA	NULL		
Row 00018	0000000	2	317.6.19716.00018.0000000	051614.53706.NDELE.00008		B73	NA	NULL		
Row 00019	0000000	3	317.6.19716.00019.0000000	09.1.19716.00040.00000		B73	NA	NULL		
Row 00020	0000000	4	317.6.19716.00020.0000000	051612.19716.JHAWK.00001		B73	NA	NULL		
Row 00021	0000000	5	317.6.19716.00021.0000000	061013.92093.LSMIT.00001		B73	NA	NULL		
Row 00022	0000000	6	317.6.19716.00022.0000000	061015.53706.NDELE.00031		B73	NA	NULL		
Row 00023	0000000	7	317.6.19716.00023.0000000	010109.27695.PBALI.00038		B73	NA	NULL		
Row 00024	0000000	8	317.6.19716.00024.0000000	09.1.19716.00041.00000		B73HTRHM	NA	NULL		
Row 00025	0000000	1	417.6.19716.00025.0000000	010109.27695.PBALI.00039		B73HTRHM	NA	NULL		

1. Select multiple table rows and make subsets. These subsets are synced with the subsets in Phenotype - "Export" panel.

Sampling - Sample Settings

"Settings" panel is used to set information for the groups of samples.

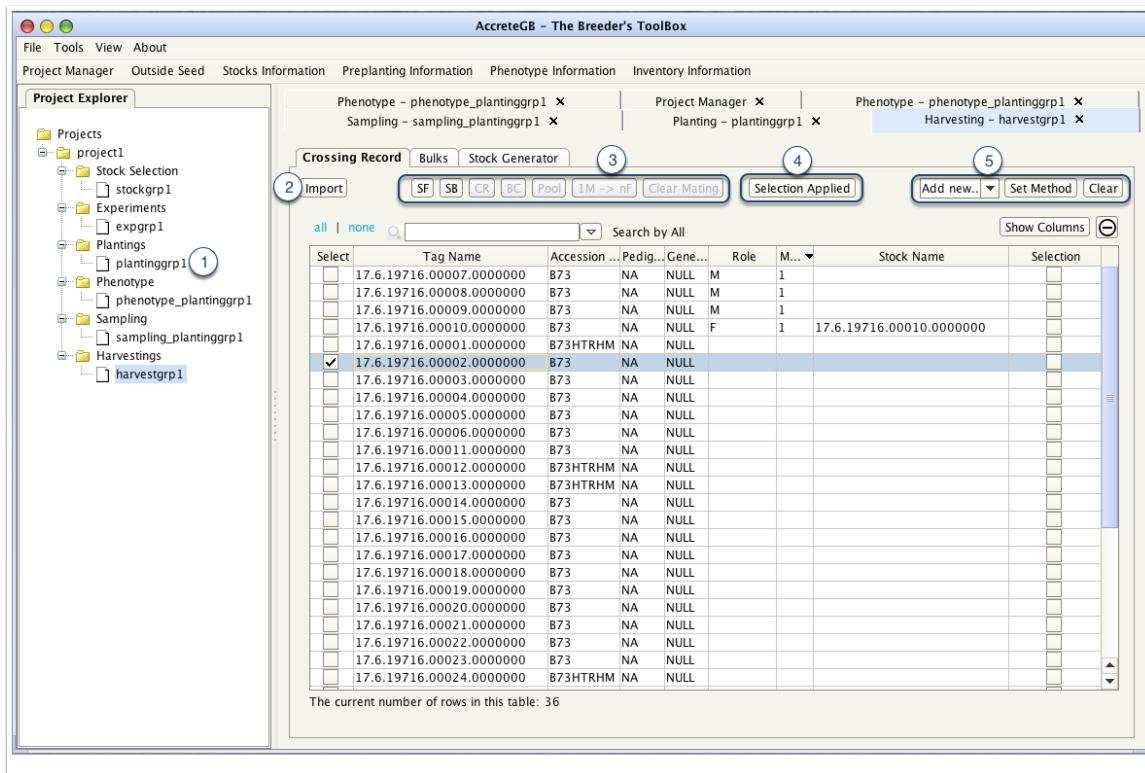
More details are explained below with the numeric icons in the screenshot and the corresponding text items:

1. Button for importing pre-existing tags as samples.
2. Button/fields for setting the prefix for current subset.
3. Button/fields for setting collection date for selected rows.
4. Button/fields for setting collector for selected rows.
5. Button/fields for syncing the table data with database AGB-data.
6. Button/fields for exporting the table data with different columns

Harvesting Events - Crossing Record

Push the data from planting group to harvest group to create stocks. “Crossing Record” Panel allows you to edit the information of actual mating process done in the field. You can specify mating type and mating type by clicking the buttons or importing a file. The file format is attached at the end of this manual.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

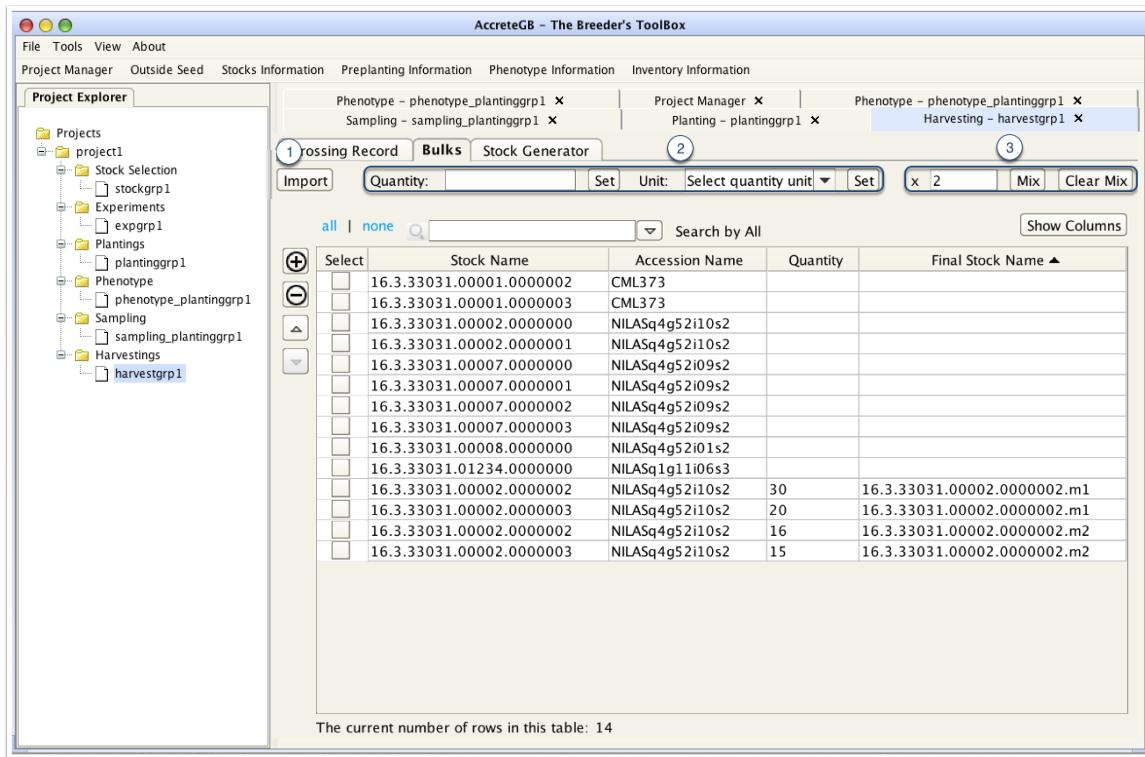


1. Right-click a Planting group to create a Harvesting group.
2. Button for importing a file that specifies the mating process for multiple plantings. Example file is attached at the end of this manual.
3. Button for setting mating type for selected rows. SF = SELF, SB = SIBLING, CR = CROSS, BC = BACK CROSS, PP = POOL
4. Button for setting a flag that will be used in automatic creation of stock generation.
5. Buttons for setting mating method for selected rows.

Harvesting Events - Bulks

"Bulks" Panel allows you to create new stocks that are mixed by previous season's seeds or/and newly harvested stocks crossing Record panel.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

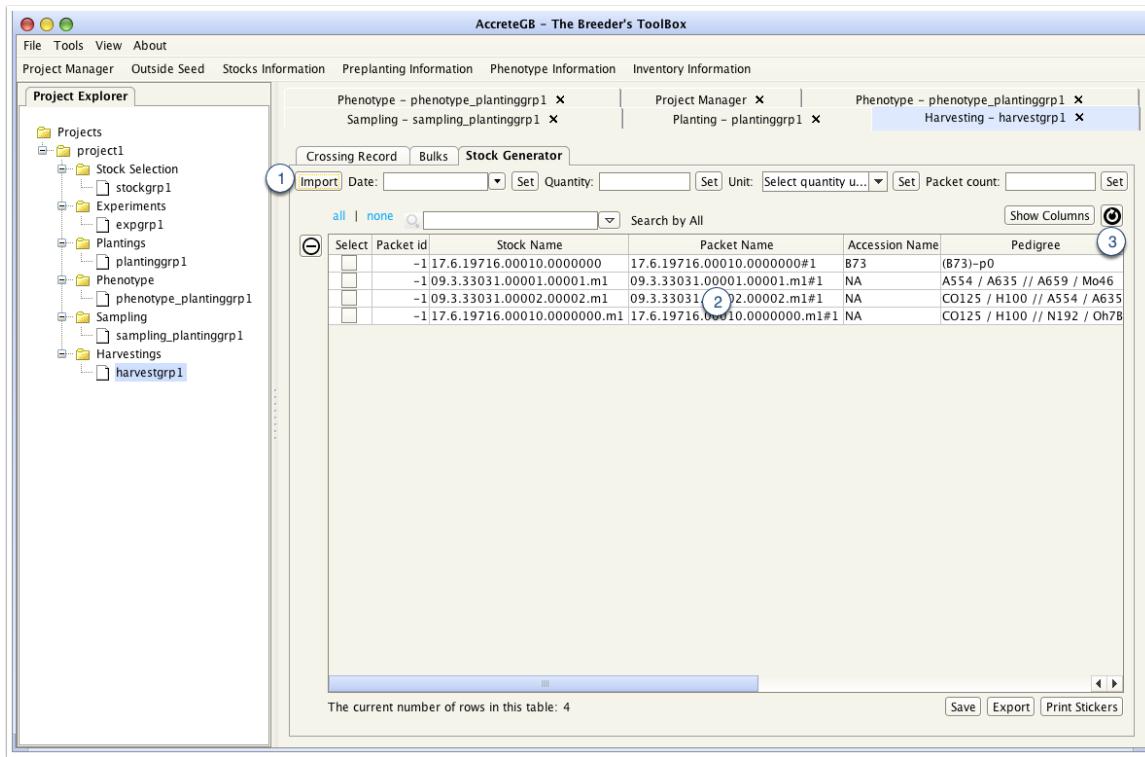


1. Button for importing stocks from previous stocks or/and newly harvested stocks using a popup window
2. Buttons for setting quantity of the stocks and setting unit for the quantity.
3. The buttons are for mix/un-mix the selected stocks. The field let you create multiple mixes from same stocks combination.

Harvesting Events - Stock Generator

"Stock Generator" Panel allows you to create packets for newly created stocks from Crossing Record panel and Bulks panel. You can double click the cells in the following columns to manually edit information: Accession, Pedigree, Quantity, Packet Number and Comments.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

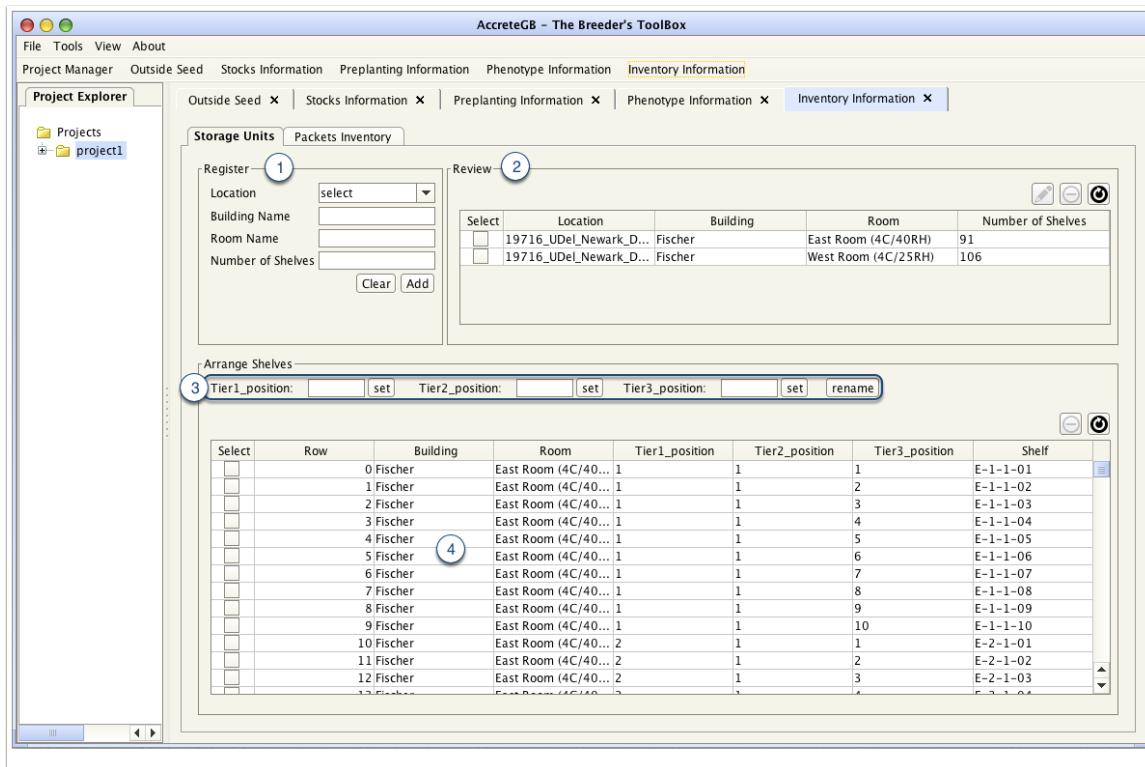


1. Button for importing stocks from Crossing Record or/and Bulks from a popup window
2. Table to review stocks information. Double click a row to review stock composition information (How was it generated by mating/bulk mixing).
3. Button for syncing the table with the database AGB-data.

Inventory Events - Storage Unit

Inventory module is a project-independent module. You can set up storage unit data and store inventory data via this module. "Storage Units" Panel allows you to add/edit/delete your storage unit information.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:

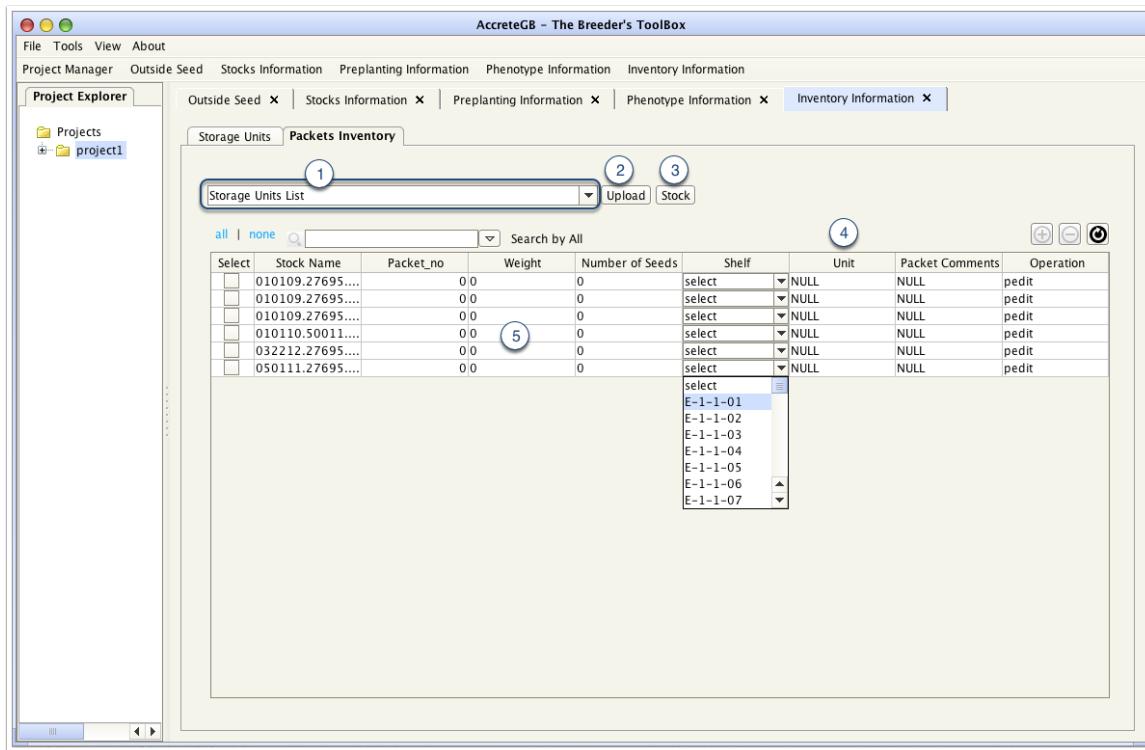


1. Panel for adding storage units information
2. Panel for reviewing storage unit's information. Sync with database to view/edit shelves' detail in "Arrange Shelves" table. Shelf's name is automatically generated to be in the form of (initial of the "Room Name")_(sequential number): R_1, R_2...
3. Buttons for renaming shelf's name to be (initial of the room)_tier1_tier2 (optional)_tier3 (optional)
4. Table for reviewing the storage units setting. Use the sync button to save the settings if any edit was done.

Inventory Events - Packets Inventory

"Packets Inventory" panel allows you to add/edit packets' inventory information or add/edit/remove storage units on the shelves via uploading a file with certain format. This module is project-independent.

More details are explained below with the numeric icons in the screenshot and the corresponding text items:



1. A dropdown list for showing current storage units
2. Button for import data by uploading a file with certain format (attached at the end of the manual)
3. Button for searching stocks to edit packets' inventory information
4. A column that shows Shelf storage unit label
5. A table to review packets information. The cells under the following columns are editable by double-clicking the cells: "Weight", "Number of Seeds", "Unit", "Packet Comment".

Pre-planting Information Review

Pre-planting module is project-independent. This panel allows you to search and review pre-planting information. Select date range and field info, and click "search".

The screenshot shows the AcreteGB software interface with the title bar "AcreteGB – The Breeder's ToolBox". The menu bar includes File, View, About, Project Manager, Outside Seed, Stocks Information, Preplanting Information, Phenotype Information, and Inventory Information. The "Preplanting Information" tab is selected.

The left sidebar shows a "Project Explorer" with a folder named "Project_16Spring".

The main area displays a search form with fields for Start Date (set to Fri 01/01/2016), End Date (set to Tue 03/29/2016), Plot (from) (empty), Plot (to) (empty), and a checked checkbox for "Individual plants information too".

A search bar with the placeholder "Search by All" and a "Show Columns" button is present above a grid table.

The grid table has columns: Select, Field ID, Field Name, Field Number, Altitude, City, State, Country, and Zipcode. It lists several entries, with the second row (Field ID 2) being highlighted. The second row contains values: PC, 4-7, 33.5 m, Newark, Delaware, USA, 19716.

Below the grid is a progress bar showing "Progress : 100 %".

A detailed table below the progress bar lists individual plant records with columns: Plot, Parent Stock Name, Accession N..., Pedigree, TagName, Plant, Planting ..., Delay, Harvest ..., and Purpose. The first few rows show entries like "11 010109.19716.JHAWK.00001 LH132 NA 16.4.19716.00011.0000000 0000000 Feb 22, ... NULL NULL NULL" and "8 010109.19716.JHAWK.00002 Genter purple NA 16.4.19716.00008.0000000 0000000 Feb 22, ... NULL NULL NULL".

Buttons for "Search", "Export", and navigation arrows are located at the bottom right of the table area.

Phenotype Information Review

Phenotype Information module is project-independent. This panel allows you to search and review phenotype information. Use dates range, tagname, traits information, phenotype sets created in checked-out project or field info to filter the plants. This module is project-independent.

The screenshot shows the AccreteGB software interface with the following details:

- Menu Bar:** File, Tools, View, About.
- Toolbar:** Project Manager, Outside Seed, Stocks Information, Preplanting Information, Phenotype Information, Inventory Information, Stock Annotation.
- Project Explorer:** Shows a single project named "DE2017Nursery".
- Phenotype Information Tab:** Active tab.
- Search Bar:** Search by All.
- Filter Options:** Start Date, End Date, Tag Name, Phenotype Subsets (set to "DE2017Nursery-ph..."), Traits (set to "select").
- Data Grid:** A table showing phenotype data with columns: Select, Field ID, Field Name, Field Number, Altitude, City, State, Country, ZipCode. The data includes entries for fields 1 through 12 across various locations like Newark, Homestead, Santa Isabel, Clayton, Ames, West Madison, College Station, and Puerto Rico.
- Progress Bar:** Progress : 100 %.
- Parameter Grid:** A table showing parameter measurements with columns: Tag Name, Parameter Name, Value, Unit, Measurement Type, Date Measured. Examples include Ear height (102 cm), Number cupules in row (43), and Plant height (207 cm).
- Buttons:** Export, Search.

Stock Annotation Events

This module is used to add “Classification” and “Taxonomy” information for existing stocks. You can load stocks to the table by searching stocks or importing from harvesting groups. The bottom two tables are same as the ones in outside seed modules.

The screenshot shows the AccreteGB software interface with the title bar "AccreteGB - The Breeder's ToolBox". The menu bar includes File, Tools, View, About, Project Manager, Outside Seed, Stocks Information, Preplanting Information, Phenotype Information, Inventory Information, and Stock Annotation. The "Stock Annotation" tab is selected. On the left, a "Project Explorer" pane shows a tree structure with "Projects", "project1", and "DE2016Nursery". The main area has tabs for "Project Manager" and "Stock Annotation". The "Stock Annotation" tab is active, displaying a table with columns: Select, Stock Name, Accession Name, Pedigree, Generation, Classification ..., and Population. Below this is another table with columns: Select, Classification Code, Classification Type. To the right, there are two smaller tables: one for Genus, Species, Subspecies, Subtaxa, Race, and Comm; and another for Zea mays entries. There are also various toolbar icons for operations like search, import, and export.