Plant Breeding Data Management

Appropriate Technologies and Innovative Approaches for Agriculture Knowledge Sharing

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International Crops Research Institute for the Semi-Arid Tropics
Integrated Breeding Platform

• IBP - a one-stop-shop where breeders can access:
  – Databases (germplasm, pedigree, phenotypic, genotypic and environmental)
  – A configurable workflow system (CWS)
    • Logistics and data management tools
    • Breeding planning and management tools
    • Analytical tools
    • Breeding decision support tools
http://www.integratedbreeding.net
The Integrated Breeding Workflow System provides a unified workbench with all the informatics tools to run an entire crop breeding project. The IBWS utilizes databases that are specific to each crop, and manages the seamless transfer of data between the different applications. This 3-step process downloads and installs everything you need to start using the system. Users can also obtain the IBWS on DVD.

**Step One: Infrastructure Files**

Click download to install the infrastructure files needed to run the application. Files include Tomcat, Apache Server and MySQL. Size XX MB.

**Step Two: Application & Documentation**

Download and install the IBWS application.

Download and install IBWS documentation.

Below are centralised crop databases containing publicly available pedigree, phenotypic and genotypic data for some crops. You can download these databases for use in your own breeding project. However, the IBWS application comes with an inbuilt blank database that follows the same structure as these databases, which you can use to collect your project data as it is generated. For the heavier databases, you can use Download Manager to help with the process.
GETTING STARTED
REGISTERING USERS

Register User Account Form

First Name*  Middle Name  Last Name*
Arllet       [ ]        Portugal

Email Address*  
a.portugal@cgiar.org

Username*  
aportugal

Password*  
[ ]

Re-type Password*  
[ ]

Security Question*  
What is your first pet's name?

Answer to Security Question*  
Cat

Save  Cancel
# THE PROJECT DASHBOARD

## DASHBOARD

<table>
<thead>
<tr>
<th>START DATE</th>
<th>PROJECT</th>
<th>Breeding Workflows (Click to open workflow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-09-23</td>
<td>Test 1 soybean</td>
<td>Markers assisted recurrent selection (MARS)</td>
</tr>
<tr>
<td>2013-09-24</td>
<td>Test 2 maize</td>
<td>Access all tools with a menu interface (MENU)</td>
</tr>
<tr>
<td>2013-09-25</td>
<td>Test 3 rice</td>
<td></td>
</tr>
<tr>
<td>2013-09-26</td>
<td>Test 4 Strawberries</td>
<td></td>
</tr>
</tbody>
</table>

## ACTIVITIES [2]

<table>
<thead>
<tr>
<th>DATE</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-09-26 02:55:59</td>
<td>Imported a Germplasm List</td>
<td>Imported list from file IEBP2013EX01a.xls</td>
</tr>
<tr>
<td>2013-09-26 02:38:33</td>
<td>Imported a Germplasm List</td>
<td>Imported list from file Example List Import (1).xls</td>
</tr>
</tbody>
</table>
1. Select your crop
2. Choose a workflow
3. Specify project members
MARS Workflow

**Project Planning**
- Plan MARS Timelines (3)
- Browse Germplasm Information
- Browse Studies and Datasets
- Browse Germplasm Lists
- Browse Genotyping Data

**Phenotypic Analysis**
- Single-Site Analysis for Local Datasets
- Multi-Site Analysis
- Breeding View Standalone (All Analyses)

**QTL Selection**

**Population Development**
- Import Germplasm Lists (1)
- Manage Germplasm Lists (2)
- Make Crosses
- Manage Nurseries

**QTL Analysis**
- Breeding View Standalone (All Analyses)

**Recombination Cycle**
- Manage Recombination Cycles (4)
- Make Crosses
- Manage Nurseries

**Field Trial Management**
- Create Fieldbooks

**Genotyping**
- Manage Genotyping Data

**Final Breeding Decision**
- Head-to-Head Query *(coming soon)*

1. Link invokes the Fieldbook with the Nursery Manager view showing; link to import germplasm list is the first entry in the menu.
2. Link leads to the List Browser tool in the Workbench
3. Link launches the freestanding Breeding Planner application
4. Launches OptiMAS
**Conventional Breeding Workflow**

### Project Planning
- Browse Germplasm Information
- Browse Studies and Datasets
- Browse Germplasm Lists
- Browse Genotyping Data

### Population Development
- Import Germplasm Lists (1)
- Manage Germplasm Lists (2)
- Make Crosses
- Manage Nurseries

### Field Trial Management
- Create Fieldbooks

### Statistical Analysis
- Single-Site Analysis for Local Datasets
- Multi-Site Analysis
- Breeding View Standalone (All Analyses)

### Breeding Decision
- Head-to-Head Query *(coming soon)*

1. Link invokes the Fieldbook with the Nursery Manager view showing; link to import germplasm list is the first entry in the menu.
2. Link leads to the List Browser tool in the Workbench
MAS Workflow

Project Planning
Browse Germplasm Information
Browse Studies and Datasets
Browse Germplasm Lists
Browse Genotyping Data

Population Development
Import Germplasm Lists (1)
Manage Germplasm Lists (2)
Make Crosses
Manage Nurseries

Field Trial Management
Create Fieldbooks

Statistical Analysis
Single-Site Analysis for Local Datasets
Multi-Site Analysis
Breeding View Standalone (All Analyses)

Breeding Decision
Head-to-Head Query (coming soon)

Genotyping
Manage Genotyping Data

1. Link invokes the Fieldbook with the Nursery Manager view showing; link to import germplasm list is the first entry in the menu.
2. Link leads to the List Browser tool in the Workbench
**MABC Workflow**

**Project Planning**
- Plan MABC Timelines (3)
- Browse Germplasm Information
- Browse Studies and Datasets
- Import Germplasm Lists (1)
- Manage Germplasm Lists (2)
- Browse Germplasm Lists
- Browse Genotyping Data

**Backcrossing**
- Manage MABC Data
- Make Crosses
- Manage Nurseries

**Field Trial Management**
- Create Fieldbooks

**Statistical Analysis**
- Single-Site Analysis for Local Datasets
- Multi-Site Analysis
- Breeding View Standalone (All Analyses)

**Breeding Decision**
- Head-to-Head Query *(coming soon)*

**Genotyping**
- Manage Genotyping Data

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1. Link invokes the Fieldbook with the Nursery Manager view showing; link to import germplasm list is the first entry in the menu.
2. Link leads to the List Browser tool in the Workbench
3. Link launches the freestanding Breeding Planner application
1. Link invokes the Fieldbook with the Nursery Manager view showing; link to import germplasm list is the first entry in the menu. Future item is to develop a management tool for other templates also.
2. Link leads to the List Browser tool in the Workbench
3. Link launches the freestanding Breeding Planner application
4. Leads to the Nursery File Template portion of the Crossing Manager
## GERMLASM BROWSER: 1.1.3.0

**Search for**
- **GID**
- **Names**

**Germplasm Search Result: 37**

<table>
<thead>
<tr>
<th>GID</th>
<th>NAMES</th>
<th>METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>IT 86 D-612</td>
<td></td>
</tr>
<tr>
<td>19073</td>
<td>TVU 15841, IT 86 D-612</td>
<td></td>
</tr>
<tr>
<td>19074</td>
<td>IT 86 D-622</td>
<td></td>
</tr>
<tr>
<td>19075</td>
<td>TVU 15741, IT 86 D-622</td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>IT 86 D-627</td>
<td></td>
</tr>
<tr>
<td>19076</td>
<td>TVU 15674, IT 86 D-627</td>
<td></td>
</tr>
<tr>
<td>19077</td>
<td>IT 86 D-633</td>
<td></td>
</tr>
<tr>
<td>870</td>
<td>IT 86 D-633</td>
<td></td>
</tr>
<tr>
<td>19078</td>
<td>TVU 15858, IT 86 D-633</td>
<td></td>
</tr>
<tr>
<td>19079</td>
<td>TVU 16470 IT 86 D-633</td>
<td></td>
</tr>
</tbody>
</table>

**Pedigree Tree**

- IT 86 D-612(200)
  - IT 83 D-320-10(87)
    - IT 82 E-32(77)
    - IFE BROWN(329)
  - IT 82 E-18(73)
    - TKX 43-06 E-2(338)
    - TVU 2616(380)

**Save to List**

**Close All Tabs**
POPULATION DEVELOPMENT

- Import Germplasm Lists
- Manage Germplasm Lists
- Make Crosses
- Manage Nurseries
GERMPLSM IMPORT

Simplified import template
Wizard Process

1. Open the template
2. Specify germplasm details
3. Save the list
The Crossing Manager

WORKFLOW SYSTEM 1.1.4.19 : TEST 1 - COWPEA

CROSSING MANAGER: MAKE CROSSES 1.1.1.

Select Nursery Template

- Manually specify parent lists and crosses.
- Use a template file to specify parents and (optionally) crosses.

Select nursery template file

Browse... Upload
**Female Parents**

- 1 -> UCX 1070-075-F9
- 2 -> UCX 1070-076-F10
- 3 -> UCX 1070-014-F9
- 4 -> UCX 1070-175-F8
- 5 -> UCX 1070-125
- 6 -> UCX 1070-125-F8
- 7 -> UCX 1070-010-F9
- 8 -> UCX 1070-087-F9
- 9 -> UCX 1070-024-F8
- 10 -> UCX 1070-126-A

- Select List

- cross each selected female with each selected male
- cross matched pairs of selected female and male lines in top to bottom order
- also make reciprocal crosses

**Male Parents**

- 1 -> CB 46
- 2 -> IT 84 S-2246
- 3 -> IT 93 K-503-1
- 4 -> MOURIDE
- 5 -> UCX 05066-001
- 6 -> UCX 05066-002
- 7 -> UCX 05066-003
- 8 -> UCX 05066-004
- 9 -> UCX 05066-005
- 10 -> UCX 05066-008

- Select List

**Crosses Made**

<table>
<thead>
<tr>
<th>Parentage</th>
<th>Female Parent</th>
<th>Male Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCX 1070-076-F10/CB 46</td>
<td>UCX 1070-076-F10</td>
<td>CB 46</td>
</tr>
<tr>
<td>UCX 1070-076-F10/MOURIDE</td>
<td>UCX 1070-076-F10</td>
<td>MOURIDE</td>
</tr>
<tr>
<td>UCX 1070-175-F8/CB 46</td>
<td>UCX 1070-175-F8</td>
<td>CB 46</td>
</tr>
<tr>
<td>UCX 1070-175-F8/MOURIDE</td>
<td>UCX 1070-175-F8</td>
<td>MOURIDE</td>
</tr>
</tbody>
</table>
IMPROVED LABEL PRINTING AND INVENTORY MANAGEMENT

Nursery Manager
The IB Fieldbook

MULTI-FACTORIAL TREATMENT STRUCTURES SUPPORTED
Thanks...