CloneSelector: A new tool for Accelerated Analysis of Sweetpotato Breeding Trials

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Introduction

CloneSelector is an Excel based tool developed to help plant breeders, working with clonally propagated crops, carry out field trials, analyze the results and make accurate selection decisions. In version 3.x you can elaborate a list of germplasm to test, select an appropriate statistical design and the corresponding fieldbook , enter experimental data as well as information about the experiment, calculate derived variables and produce some statistical results. All this can be done while using the popular Excel interface only.

Adapted from the Maize Fieldbook developed by CIMMYT, CloneSelector has been built around the widely used Excel workbook and the open source R statistical package. Development of the tool is an ongoing activity by the International Potato Center under the Sweetpotato Action for Security and Health in Africa (SASHA) project.

Objectives

CloneSelector helps a sweetpotato plant breeder to:
1. Elaborate a list of germplasm to test
2. Design field trials with one or more experiments
3. Generate a fieldbook for each experiment
4. Generate plot identification labels
5. Register metadata for each experiment
6. Data collection in field and post-harvest for each entry
7. Enter collected data into electronic Fieldbook
8. Calculate derived variables (e.g yield/ha)

Key Features

Data Management Tool and Planting Labels: Breeding programs produce a lot of data per season. The trial data and various meta data is stored in customized Excel templates, all in a single Excel workbook. Once a breeder types in their germplasm list, uniform worksheets are generated for the various records. Over a period of time, you will have all your data in uniform Excel workbooks. This makes it easy for you to go back to trials you did long time ago with ease, and provides an easy way to share your data with colleagues.

Three statistical designs: These are Randomized Block Complete Design (RCBD), Augmented Block Design and Alpha (0,1) Design. CloneSelector can analyze data for each of the three designs. Knowledge of R is not required as all these is done in Excel.

Multi-Location Trial analysis: CloneSelector enables a user to create a consolidated master sheet from different trials through the Excel interface and performs up to15 different analyses of a single trait. It also gives summary results, and generates a selection index with ranking based on breeding objectives. This analysis can be done across different years. This too is done entirely in Excel.

Data Portability: CloneSelector has a functionality to import data from an external application for analysis. This includes quality data on traits collected using near infrared spectrometry (NIRS), such as beta-carotene and protein contents. Data created using CloneSelector can easily be transferred to an external statistical analysis software since it's a typical Excel workbook.

CloneSelector is a **license free** software. Its available for download together with the source code on the Sweetpotato Knowledge Portal http://www.sweetpotatoknowledge.org.

CloneSelector is based on the open source R (http://www.R-project.org/) statistical software. You do not need to know how to use R to use CloneSelector, enabling users to take advantage of the statistical capabilities of R.

Some CloneSelector interfaces and results

1. Elaborate new list and print planting labels

2. Create Design

3. Fieldbook for data collection
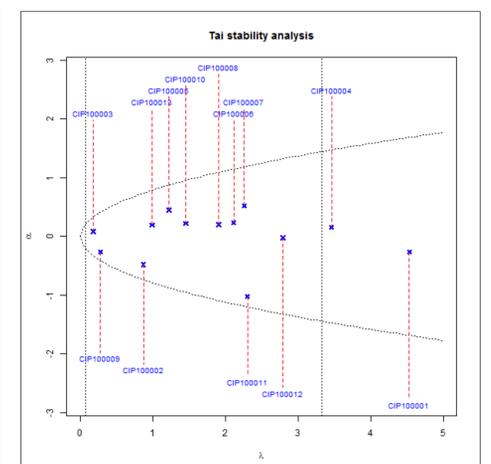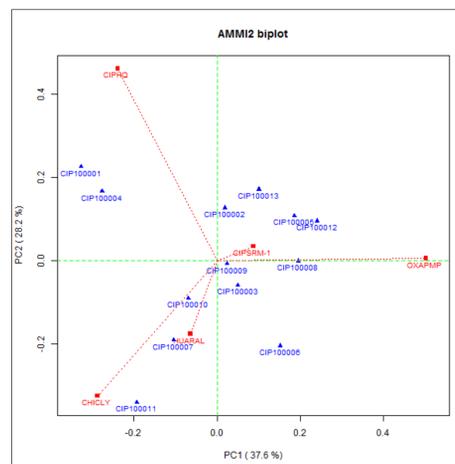
4. Results and graphs

CIP sweetpotato breeders have used CloneSelector to carry out over 200 breeding trials in Africa. Several national sweetpotato breeding programs are also using the software on a regular basis e.g. Ghana, Mozambique, Uganda and Zambia. In Africa alone, CloneSelector installation and training has been delivered to over 100 scientists. By putting the power of R behind the easy to use Excel interface, sweetpotato breeders in Africa have a license free breeding data management and analysis powerhouse.