Digital Evaluator - An App for Trial Gardens

Tim Rhodus, Professor and
Elaine Eberlin, Systems Specialist
Department of Horticulture & Crop Science, The Ohio State University
Rhodus.1@osu.edu and Eberlin.3@osu.edu
Online at: webgarden.osu.edu/buckeye2015.pdf

This article describes the Ohio State University Cultivar Trials and how an app was created to assist in organizing and managing the evaluation and communication program for the garden.

Initially conceived by Dr. Claudio Pasian in 2002, the Ohio State University Cultivar Trials are conducted each year in order to evaluate ornamental bedding and container plants. The objective of these trials is to observe the performance of new and recently introduced cultivated plant varieties under environmental conditions typical of central Ohio.

According to Dr. Pasian, “Over the years, we have grown and put ourselves on the map of annuals trials in the U.S. Growers from around the country and abroad visit the annuals trial every July during the Cultivate event in Columbus. In August, with the help of the Ohio Nursery and Landscape Association (ONLA) and AmericanHort, we also have an open house geared to landscapers.”

The OSU Cultivar Trials contain four categories of plants: field (ground beds), containers in the sun, containers in the shade, and hanging baskets. During the growing season, all plants are evaluated four times by Master Gardener and Chadwick Arboretum volunteers. These consumer evaluators are asked to rate each plant from 1 – 5 on how well they “like” the plant. Additionally, the Trial Director and Trial Manager do a more in-depth “grower” evaluation. Results and photos of the 2014 trials can be found at: hvp.osu.edu/trials

Moving Towards a Digital Solution

Traditionally, each evaluator was given a clipboard and 20 pages of plant names that needed to be evaluated on four different occasions. Volunteers and Trial Staff picked up their clipboard and walked up and down the beds writing their scores in the appropriate boxes. The same clipboards were picked up a month later and used to enter more results. At the end of the season, a student worker was recruited to enter all the scores in a spreadsheet that was then used to generate overall average ratings. Considering that over 500 entries were evaluated each year by approximately 20 volunteers on four different occasions, this approach to data gathering and information management was not only inefficient, time consuming and expensive but also prone to error (Figure 1).
Dr. Rhodus first approached the Cultivar Trial organizers, Dr. Pasian and Lindsay Pangborn, in May 2014 with his idea for developing a mobile app that could be used to not only record evaluation data but also transmit it to a server. That way, the process of recording, transmitting and sharing evaluation scores could be done without the need for clipboards or student workers. In addition, the new process would help the evaluators do their work quicker, the data could be viewed shortly after each evaluator finished their work and the app would be capable of taking pictures of the plant being evaluated.

Deciding What to Include

During follow-up meetings, Dr. Rhodus learned about the list of plants in the trial and what information needed to be collected during each of the consumer and grower evaluations. However, the biggest challenge was learning where 563 different plants were located in 44 different beds both in front of and behind Howlett Hall.

For Claudio and Lindsay, this had become second nature. However, as newcomers, we needed to see a map that was both accurate and visual, not a hand-drawn representation. So, we used Google Maps, satellite view and zoomed into the appropriate areas north and south of Howlett Hall and took screen captures. Given that an evaluator could start with any category of plant or with any specific bed, the maps had to display all 44 planting beds and serve as the primary linking mechanism to the subset of plants in the database that were to be evaluated at a given location. This was done through the addition of clickable icons on a map, each represented by a colored button indicating category abbreviation and bed number. For
example, F-1 was a white button for Field category bed #1 and C-8 was a red button for Container category bed #8 (Figure 2).

**Figure 2**: Locations of planting beds

**Sun Screen Protection**

A significant factor affecting usability but wasn’t part of app design, involved using iPads or iPhones outside in bright sunlight. It was obvious from the beginning that being able to view a mobile screen or enter data in bright conditions was going to be a problem and if we couldn’t
find a solution, there would be no going forward. Success!!! After researching various screen filters, we decided on NuShield’s product called DayVue™. This film is used widely by pilots, boat owners and even the military. You can select the specific make and model of your mobile device at the following: nushield.com

The Software

The development goal was to create a self-contained app that would work on iPhone or iPad and not require any wifi connection. We wanted a design where evaluators could walk around holding their mobile device and easily enter evaluation data. Lastly, there was less than four weeks to develop the app. In order to meet these goals, we decided to use FileMaker Pro software to create a database that would serve as the foundation for the app. We've used this software for over 20 years of web development projects and have found it to be very powerful and easy to use. FileMaker also offers web server and mobile device products. These three programs are fully compatible with each other and were all used in the project.

We also learned that the planting information was contained in spreadsheet files. This was not a problem, as a spreadsheet file can be easily imported into a FileMaker database.

The final part of the project was to download and open the finished database in FileMaker Go. This free mobile app enables anyone to design a fully functioning mobile app that supports all the features of a database.

Primary Features of Digital Evaluator

Our finished program was named, Digital Evaluator. Building on our web design experiences, the initial page of this app is referred to as Home. This layout connects a user with the basic administrative and evaluative controls they need to participate in the Cultivar Trials (Figure 3).

Evaluator ID - All evaluators (new and returning) were trained in how to use the app. As part of their training, they were each assigned an ID number. This was selected on Home page and linked to all scores recorded and transferred by that evaluator.

Figure 3: Digital Evaluator app for iPhone
**Category** - The evaluator selects which category of plants they want to evaluate – **Field** (north of Howlett Hall) or **Basket, Container, Shade** (south of Howlett Hall). Tapping the appropriate button links to the detailed navigation map for selecting individual beds.

**Progress Report** - With 563 plants to evaluate, it's easy to miss some. This report shows the evaluator which plants have not been evaluated and allows him/her to return to the appropriate bed and enter a score.

**Export Data** – After completing the evaluation, those people using their own device need to export the data. Step-by-step instructions are contained in a special layout. Evaluators who borrowed a device simply returned it and the export was done by us.

**Evaluation Layout**

A single evaluation layout was developed for use with all plant categories. However, before entering a score, it was critical that evaluators confirm the plant they are looking at is the same as the plant in the database. To assist with this, the app layout was designed to mimic the look of the plant label (Figure 4).

![Digital Evaluator App for iPad 1 – Evaluation screen](image)

Having confirmed they are rating the correct plant, the evaluator tapped the appropriate spot on the evaluation scale to enter their score. Custom notes could be entered in the text box. The evaluator walked to the next plant in the bed and tapped the Next button on the app. After completing a given bed of plants, the evaluator would tap one of the Category buttons to return
to the primary navigation map and select another bed. Many of the returning volunteers indicated the app helped them rate the plants in less time than using the old pencil and paper approach.

A **grower** version of the app was developed to provide Claudio and Lindsay with evaluation options that were essential to them as grower professionals but too in-depth for the consumer version. An added benefit of the grower version was the ability to take pictures while using the app, for both the iPhone and iPad versions. With this approach, we didn’t experience the usual problem of trying to match photos taken with a digital camera to an exact plant in the database.

**Training**

To introduce the app, we set up training sessions for all new and returning evaluators. A tri-fold training brochure was developed to describe the trials and depict the various features of the app. In total, we trained 54 volunteers in all aspects of using the app and reviewing the progress report. For many of the volunteers, this was their first experience using an iPad.

Some of the volunteers preferred to use their own iPhone or iPad device. For them, an extended training session was held to assist these volunteers with downloading and installing the Digital Evaluator App on their devices and making sure they were familiar with the app, how to adjust settings, how to export their results and how to update the app.

**Website Development**

The website - [2014 Ohio State Cultivar Trials](http://hyp.osu.edu/trials) showcased the data being collected throughout the season. Using the app, volunteer evaluations were collected over the course of one week, on four different occasions. Data was transferred from each device and emailed to Dr. Rhodus, who then checked for completeness and uploaded it to FileMaker server. When the evaluation window was closed, the average score for each plant, across all evaluators, was compiled and saved in the database. This way, the database server program does not have to recalculate average scores for all 563 plants every time someone looks at the website.

Another feature of our website is the ease with which one might search/sort results by: Category, Crop, Series, Cultivar, Company or Rating (Figure 5). Filtering of results for any of these attributes is immediate. Compare this to other trial gardens where results are provided as a spreadsheet file in “pdf” or “doc” format that requires downloading and opening in a separate program - not very immediate and definitely not very flexible.

For those who are more visual, pictures taken with the app are also served on the website. The Gallery not only shows the plants, but provides all of the important identifying information, too, including Category, Bed, Location, Crop/Series/Cultivar, Company, and Overall Rating (Figure 6).
InVirtual Perspective Technology Team...

The OSU inVirtual Perspective Technology Team consists of Dr. Tim Rhodus, Professor; Bud Witney, Systems Manager, and Elaine Eberlin, Systems Specialist. The team is responsible for the design and maintenance of the systems, databases, and much of the content contained in the numerous web sites positioned within Horticulture in Virtual Perspective, OSU PlantFacts, and American Society for Horticultural Science. Online access to this document is available at: [hvp.osu.edu/buckeye2015.pdf](http://hvp.osu.edu/buckeye2015.pdf)

**Figure 5:** Filter evaluation results for Coleus
Figure 6: OSU Cultivar Trials Website