FINAL PROJECT REPORT

Project Title: Improve electronic data collection/public access to USDA pear genebank

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Total Project Request: **$2500**

Other funding sources:
Agency Name: North American Raspberry & Blackberry Association (NARBA)
Amount awarded: $1000
Notes: Funding received for supplies to expand QR code labeling to include USDA Rubus collection.

Budget History:

Item	2014
Wages	$1100
Equipment	$ 900
Supplies	$ 500
Total	$2500

Objectives:

- Add the capacity at NCGR to generate weather-proof labels using a thermal-transfer printer, and to collect field data using a tablet computer and barcode reader.
- Improve the durability and information content on Pyrus field labels at the USDA germplasm collection in Corvallis, Oregon.
- Provide field access to online germplasm data by adding QR (quick response) codes to field tags.

Procedure:

1. High density polyethylene sheets (1/8" Polymax) were purchased, and we manufactured 4" x 6" HDPE tree tags with an expected 25 year lifespan.
2. Tree labels were generated on a laser printer using Avery 5524 weatherproof address labels.
3. Labels were affixed to HDPE tags and fastened to orchard pear trees with 2" stainless steel screws and 1" nylon spacers.
4. We worked with Westmark Industries, Inc. (Lake Oswego, OR) to obtain 1.25" square, weather-proof labels, and adapt barcode labeling software (BarTender, Seagull Scientific) to be used with a recently purchased thermal-transfer printer to generate quick response (QR) codes for each pear tree accession.
5. QR codes were designed to encode a custom URL for each tree accession that links to the specific accession record in the USDA Germplasm database (GRIN).
6. A tablet computer and barcode reader were purchased for field use.

Introduction

The USDA National Clonal Germplasm Repository (NCGR) in Corvallis, Oregon houses a globally diverse living collection of pear cultivars and *Pyrus* wild relatives as 13 acres of orchard trees with a single tree per accession. The collection includes about 2200 clonal accessions representing 36 Pyrus taxa from 56 countries. Included in the collection are:

913 European Cultivars	171 Rootstock Selections
177 Asian Cultivars	25 Perry (cider) Cultivars
115 Hybrid Cultivars	946 Pear Wild Relative Trees

Pear accessions are evaluated for phenotypic and genotypic traits which are documented in the national GRIN germplasm database, and scions are freely distributed to researchers worldwide.

Long-lasting, high quality tags are commercially available for forestry, botanic garden, and museum applications with costs ranging from $3.00 to more than $10.00 each. These costs are prohibitive for labeling the thousands of long-lived woody tree and shrub accessions conserved in the USDA field genebank collections. We have developed a durable, attractive and functional high density polyethylene (HDPE) tag that can be easily manufactured for direct mounting onto a tree trunk for a total cost of less than $0.70 each (including 4" x 6" HDPE tag, stainless steel fastener, nylon spacer, printed 3 ⅓" x 4" weather-proof label). For small trees a 3 ft. mounting stake is used until trees are large enough to relocate tags directly onto lower trunk.

Significant Findings, Results & Discussion

A developmentally disabled young adult had been helping with labeling tasks at NCGR through a school district training program. We were able to use part of the tree fruit industry funds hire him for

the summer to manufacture and install HDPE tags on more than 2000 pear tree accessions. After custom QR coded labels were developed, they were printed using a thermal transfer printer and affixed to each field tag.

Thanks in part to Tree Fruit Research Commission funding, the entire clonal pear germplasm collection is now labeled with durable, long-life tags. The weather-proof labels on each tree include cultivar, taxonomy and origin information. Barcoded inventory numbers incorporated in the labels allow electronic data collection. Custom QR codes added to each tag allows public access to each plant's database information directly from the field using any smart phone or tablet computer equipped with a free QR reader app. The QR code generates a URL using the germplasm accession number and links to the USDA GRIN germplasm database. The link displays all public information in GRIN for the accession including plant origin, pedigree, source history, as well as voucher images and evaluation results.

Executive Summary

1. More than 2000 pear germplasm accessions were labeled with durable, attractive and functional high density polyethylene (HDPE) tags.
2. The weather-proof labels on each tree tag include cultivar, taxonomy and origin information.
3. Barcoded inventory numbers incorporated in the labels allow electronic data collection to expedite germplasm evaluation efforts.
4. Custom QR codes added to each tag provides public access to plant origin, pedigree, taxonomy, source history, voucher images and evaluation results directly from the field using a smart phone.

HDPE Tags with Tree and QR Labels

John attaches tag to pear tree.

Tree Tag without QR Label

Namrata adds QR Labels