

Welcome to the Webinar!

- This webinar will start at the top of the hour and it will be recorded. Please find a handout of the slides in the “handouts” section of your webinar control panel.
- Find the other 2 webinars in this series on the Plant Breeding and Genomics YouTube channel at <https://www.youtube.com/user/plantbreedgenomics/videos>



Getting Started with Barcode-based Digital Data Collection for Vegetable Breeding Programs
Part 3 of 3: Planting to Field Observations

Michael Mazourek
 Calvin Knoyes Keeney Associate Professor
 of Vegetable Breeding
 Cornell University



workflow photographs by Emily Rodekohr

Genomic And Phenomic Tools To Support
 Vegetable Cultivar Development:
 Winter Squash As An Initial Target
 USDA-AFRI 2013-67013-21232



United States Department of Agriculture National Institute of Food and Agriculture

Our Goals

- 1. Efficiency and accuracy**
 - No transcription or transcription errors
 - No funded downtime in the winter to “type it up”
- 2. Security and availability**
 - No risk of losing only copy or pages
 - Viewable by whole team anywhere, anytime
- 3. Understand progress during the season**
 - Plot your data as it comes in

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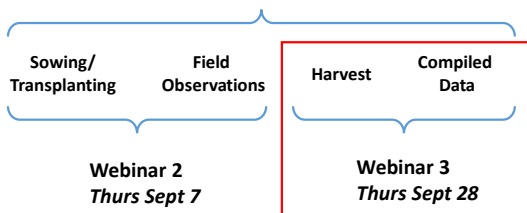
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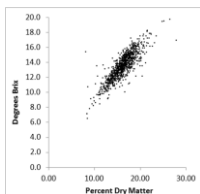
Three Part Webinar Series

Webinar 1: Overview



Specific examples of workflow and how we implement

Harvest to Spreadsheets



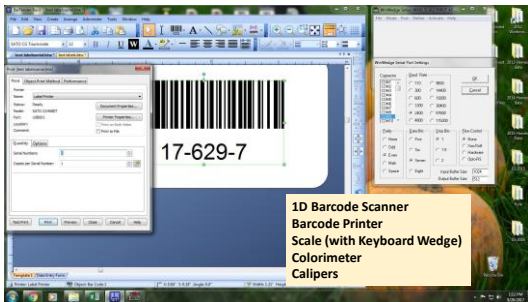
Labels Field to Fruit



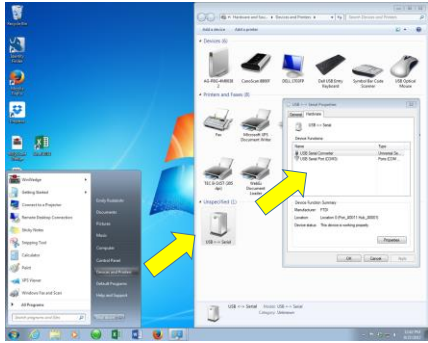
Station 1: USB Connectedness



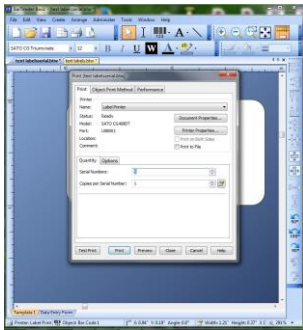
Station 1: USB Connectedness



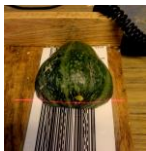
Station 1: USB Connectedness



Station 1: Serialize Labels



Station 1: Morphometric



Station 2: Imaging



- Worklights with 5,000K CFL bulbs
- Tripod
- DSLR camera
- Grey linoleum
- White milkboard
- Ruler for scale
- Sponge & bucket

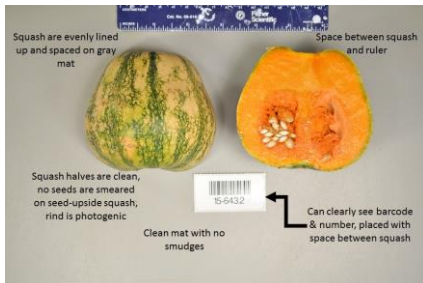


Station 2: Imaging

- Adjust height and zoom to get desired area in view
 - Tape lens
- Set white balance
 - WB mode 
 - Custom
 - Snap photo of pure white object
- Set exposure
 - Aperture priority mode "A"
 - Set F stop to higher number (small opening and large depth of field)
 - Grey card with your exact zoom and light settings to fill viewfinder or use spot metering
 - Depress shutter halfway and note shutter speed
 - Switch to manual mode and enter Fstop and shutter speed
 - Tape dials



Station 2: Imaging



Station 3: Brix Process



Station 4: Dry Matter Process



How Many Barcode Stickers?

- Brix – inside freezer baggie
- Dry matter – with weighboat (scanned twice)
- Photo – internal label, reused
- Seed – through dryer to packet (inside and outside)
- Taste test

5 stickers consumed, replaces 6 handwritten labels

Merging with VLOOKUP

| Fruit ID | Weight | Length | Width | Brix |
|-------------|--------|---------|---------|------|
| 17-205-EA.1 | 0.8014 | 11.0 cm | 14.0 cm | 8.2 |
| 17-208-EA.1 | 1.2030 | 12.0 cm | 13.0 cm | 4.8 |
| 17-209-EA.1 | 0.4878 | 9.0 cm | 11.0 cm | 8.3 |
| 17-214-EA.1 | 2.3620 | 22.0 cm | 16.0 cm | 8.7 |
| 17-214-EA.2 | 2.4079 | 21.0 cm | 17.0 cm | 10.4 |
| 17-214-EA.3 | 2.0176 | 22.0 cm | 15.0 cm | 7.9 |
| 17-214-EA.4 | 1.3480 | 15.0 cm | 13.0 cm | 7.9 |
| 17-202-EA.1 | 0.9302 | 13.0 cm | 14.0 cm | 9.4 |
| 17-202-EA.2 | 0.6405 | 13.0 cm | 13.0 cm | 8.2 |
| 17-208-EA.2 | 0.9701 | 11.0 cm | 14.0 cm | 6.9 |
| 17-208-EA.3 | 1.2090 | 12.0 cm | 13.0 cm | 7.4 |
| 17-208-EA.4 | 0.8840 | 10.0 cm | 14.0 cm | 6.9 |
| 17-207-EA.1 | 0.8024 | 11.0 cm | 13.0 cm | 5.9 |
| 17-207-EA.2 | 0.7242 | 11.0 cm | 12.0 cm | 9.9 |
| 17-208-EA.5 | 2.3707 | 15.0 cm | 19.0 cm | 5.6 |
| 17-208-EA.6 | 2.7815 | 14.0 cm | 20.0 cm | 7.5 |
| 17-208-EA.7 | 0.3877 | 12.0 cm | 12.0 cm | 3.8 |
| 17-205-EA.1 | 0.4880 | 10.0 cm | 12.0 cm | 6.9 |
| 17-205-EA.2 | 0.6736 | 10.0 cm | 12.0 cm | 7.7 |
| 17-219-EA.2 | 0.4601 | 9.0 cm | 12.0 cm | 4.7 |
| 17-219-EA.3 | 0.4406 | 9.0 cm | 12.0 cm | 4.7 |



Merging with VLOOKUP

=VLOOKUP(A2, Sheet2!\$A\$2:\$B\$23, 2, FALSE)

Fill down
-autoincrements
-use "\$" to avoid



Merging with VLOOKUP

Missing data
-combine like-data before Vlookup
-sort and Vlookup missing data progressively

Copy fruit ID and save as .txt file etc
Import into excel and choose delimiters
17 | 265 | A | 2

Now ready for stats software with year, plot, rep and repeated measures



Summary

- Adopting barcode labels allows you to streamline many aspects of your data collection
- Initial upfront cost pays for itself within one season if you record many observations
- Requires planning ahead and developing systems otherwise it will be slower initially
- Don't be deterred by stories of not being able to see screens outdoors etc
- See webinars 1 & 2 for background information and look for additional resources later this fall

Acknowledgements

- Lindsay Wyatt
 - Sara Shapleigh
 - Emily Rodekohr
 - Buckler group
 - Alice Formiga
- Genomic And Phenomic Tools To Support Vegetable Cultivar Development:
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Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.



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- Please fill out our follow up survey that you'll receive by email
- Thank you for coming!