

High Throughput Data Collection

Jeremy L. Machacek, Matthew C. Vann, & Joseph A. Cheek
Department of Crop & Soil Sciences
North Carolina State University

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Introduction

Barcoding

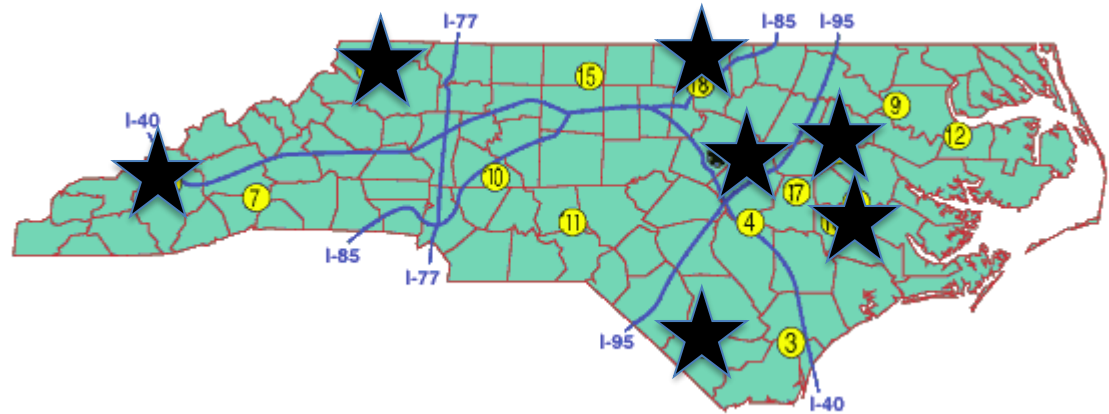
Electronic
Data
Collection

Digitized
Field notes

Technology:
Smarter &
Faster

Uses

- Farm
- Private Industry
- Research
 - $\approx 21,000$ samples weighed and graded per year



Creating an ID

- 2023 KINSTON OFFICIAL VARIETY TRIAL 101A
- **OVTKN-23-101A**



QR Code



Tips and Tricks



A	B	C	D	E	F	G
1	Trial	Location	Rep	Plot	Trt	Variety
2	OVT	KN-23	1	101	1	NC 989
3	OVT	KN-23	1	102	2	RJREX608
4	OVT	KN-23	1	103	3	GL 386 (GF315)
5	OVT	KN-23	1	104	4	PVH 2310 (PXH07)



A	B	C	D	E	F	G
Barcode	Trial	Location	Rep	Plot	Trt	Variety
OVTKN-23-101	OVT	KN-23	1	101	1	NC 989
	OVT	KN-23	1	102	2	RJREX608
	OVT	KN-23	1	103	3	GL 386 (GF315)
	OVT	KN-23	1	104	4	PVH 2310 (PXH07)



A	B	C	D	E	F	G
Barcode	Trial	Location	Rep	Plot	Trt	Variety
OVTKN-23-101	OVT	KN-23	1	101	1	NC 989
OVTKN-23-102	OVT	KN-23	1	102	2	RJREX608
OVTKN-23-103	OVT	KN-23	1	103	3	GL 386 (GF315)
OVTKN-23-104	OVT	KN-23	1	104	4	PVH 2310 (PXH07)



ADD QR OR BARCODE
HELP ✕

CHOOSE SPREADSHEET
CHOOSE FIELDS
CREATE BARCODES

Imported Data

Barcode ↕

Trial ↕

Location ↕

Rep ↕

Plot ↕

Trt ↕

Entry ↕

Drag & Drop ➡

Industry Standard Format QRCode ▼

Code Type Text ▼

Enter barcode text Barcode ✕

Preview: Update Preview

Print a sample barcode page


BACK
FINISH

Barcode	Trial	Location	Rep	Plot	Trt	Variety
OVTKN-23-101	OVT	KN-23	1	101	1	NC 989
OVTKN-23-102	OVT	KN-23	1	102	2	RJREX608
OVTKN-23-103	OVT	KN-23	1	103	3	GL 386 (GF315)
OVTKN-23-104	OVT	KN-23	1	104	4	PVH 2310 (PXH07)



TPWKN-21-101

Interval: 2 DAT
Sample: Foliar





Devices

- Midco Accufast P4
 - Multi-media printer
 - Barcode writing technology



Wedge Software



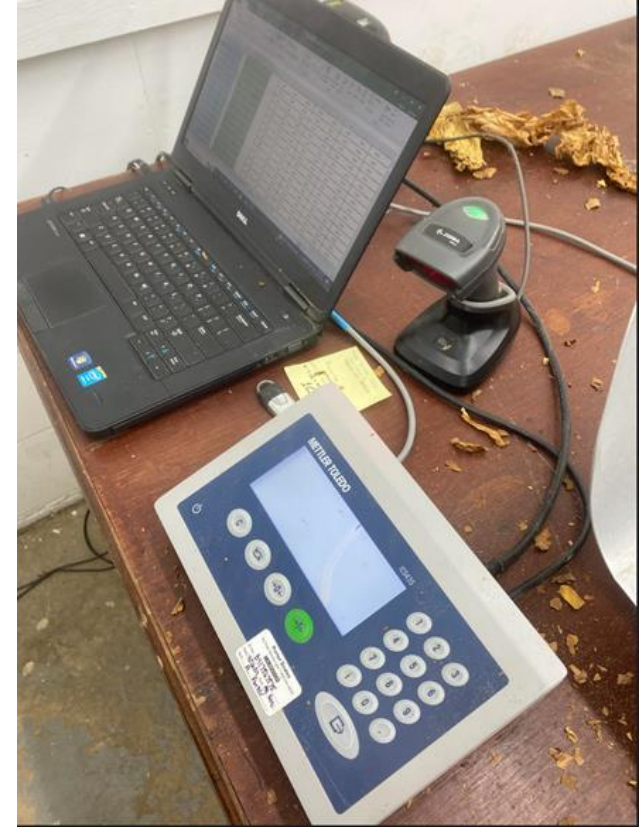
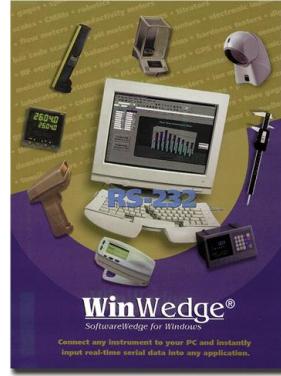
WinWedge®

Serial Device [Data Collection Software](#)

- WinWedge (**\$299 for single PC**)
 - WinWedge easily collects data from balances, gages, meters, sensors, micrometers, barcode scanners, GPS, PLCs, analyzers and other measuring devices and laboratory instruments



- WinWedge
- Laptop
- Barcode Scanner
- Digital gram scale





Oxford Tobacco Research Station, Oxford, NC

Cost or Benefit

- QR Code Scanner (7) @ \$150/unit = \$1,050
 - Digital gram scales (5) @ \$2,100 = \$10,500
 - WinWedge Software Group License for 12 users = \$1,521.50
 - **Grand Total = \$13,071*** (estimated grand total)
-
- 5,228 individual plots
 - Harvested four times for a total of 20,912 bundles of tobacco
 - Weight quantification, grading assignment, and then sub-sampling for chemistry samples

Cost or Benefit

- Analog Notes

- 3 minutes per bundle
- Transcribing to excel
- 1045 hours @ \$15
- \$15,675
 - 26 days to complete harvest data

- Digital Notes

- 30 seconds per bundle
- Pre-populated excel
- 174 hours @ \$15
- \$2,610
 - 5 days to complete harvest data

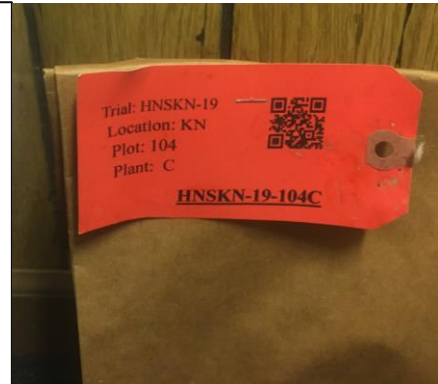
\$13,065

- Beginning to End -



Grades of Leaf

B1L		B1F		B1FR			
B2L		B2F		B2FR			
B3L		B3F		B3FR		B3K	
B4L		B4F		B4FR		B4K	
B5L		B5F		B5FR		B5K	
						B6K	



Lab ID: 1900463

Technology saved the day



TOBACCO DATA

Exp. No. COVKN-19 Nature of Exp. Cover Crop
 Location KINSTON Date 9/24/19 Leader _____
 Remarks Stand Count 2 ROW PLOTS

Plot No.									
101	18	201	15	301	20	401	16		
102	24	202	19	302	19	402	20		
103	18	203	20	303	19	403	19		
104	20	204	22	304	23	404	19		
105	19	205	19	305	16	405	18		
106	13	206	18	306	16	406	22		
107	22	207	22	307	19	407	22		
108	15	208	16	308	21	408	21		
109	22	209	19	309	20	409	22		
110	20	210	19	310	22	410	18		
111	18	211	18	311	22	411	17		
112	19	212	17	312	20	412	21		



SAMSUNG Galaxy
 Tab A7 Lite (2021,...

\$118.99
 Amazon.com

Electronic Field notes

- First developed in 2012
- Android
- Open-Source

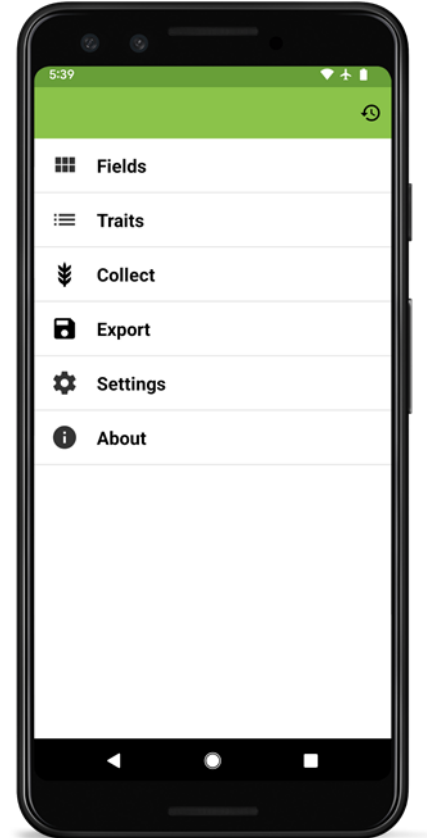


Field Book v5.4:

Rife, Trevor & Poland, Jesse. (2014). Field Book: An Open-Source Application for Field Data Collection on Android. *Crop Science*. 54. 10.2135/cropsci2013.08.0579.

Field Book Outline

- Fields
- Traits
- Collect
- Export



Design your field

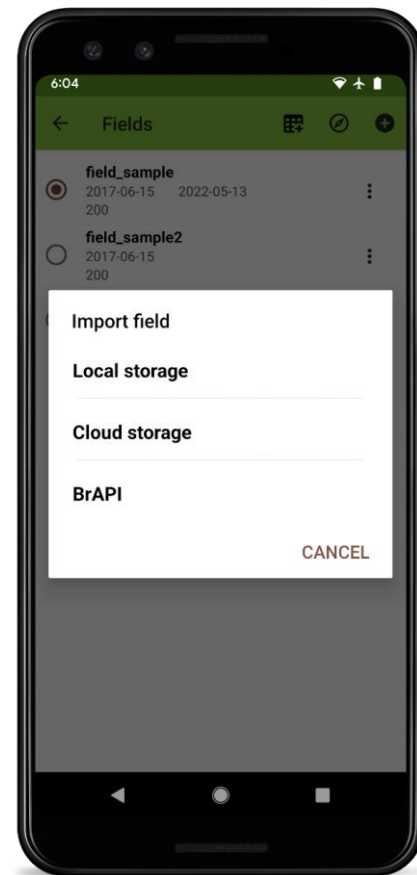
- Barcode
- CSV file

Import field

A	B	C	D	E	F	G	H
Barcode	Trial	Location	Rep	Plot	Trt	entry	Plant
EFTKN-23-101-1	EFT	KN-23	1	101	1	1. Non-tre	1
EFTKN-23-101-2	EFT	KN-23	1	101	1	1. Non-tre	2
EFTKN-23-101-3	EFT	KN-23	1	101	1	1. Non-tre	3
EFTKN-23-101-4	EFT	KN-23	1	101	1	1. Non-tre	4
EFTKN-23-101-5	EFT	KN-23	1	101	1	1. Non-tre	5

Transfer field files to tablet

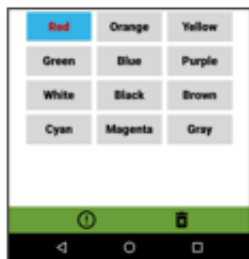
- Local import
- Google Drive import



Numeric



Categorical



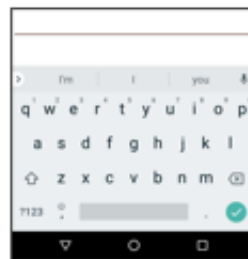
Percent



Date



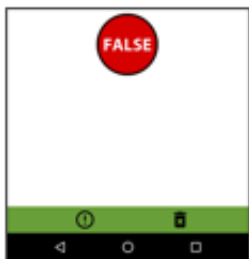
Text



Multicat



Boolean



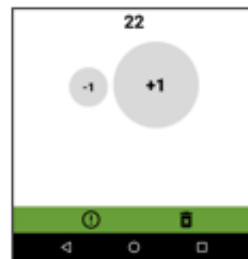
Disease Rating



Location



Counter



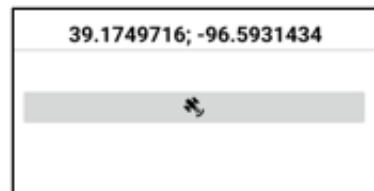
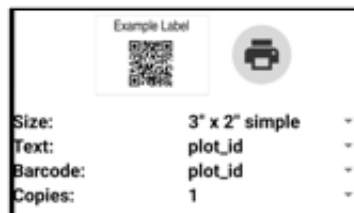
Photo



Audio



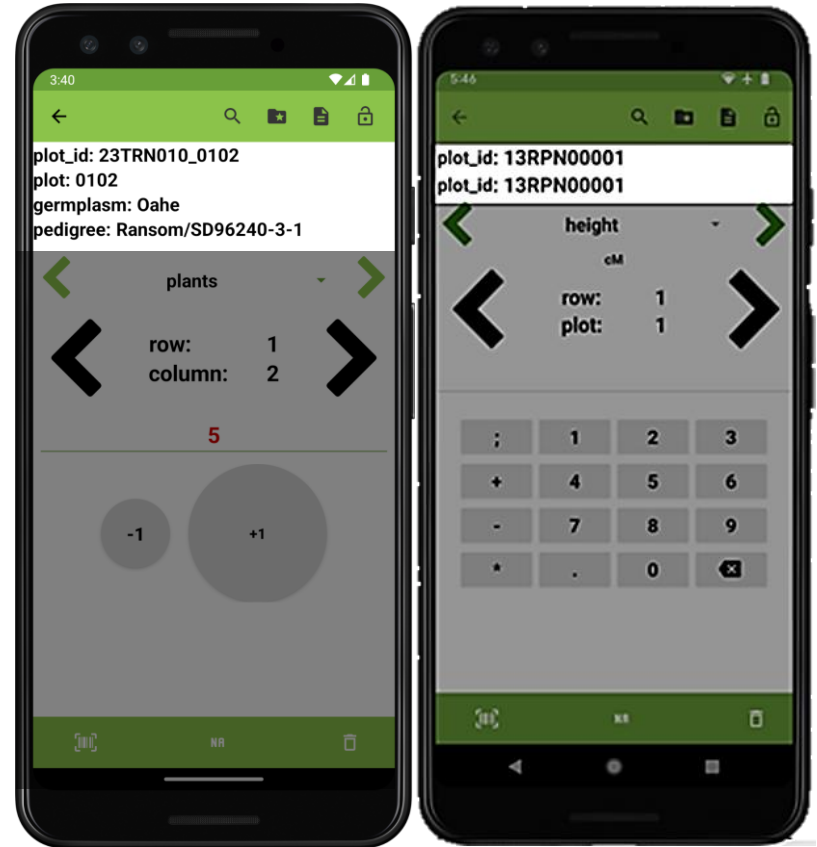
Zebra Label Print



GNSS

Data Collection

- Plot Information
- Customize using imported data



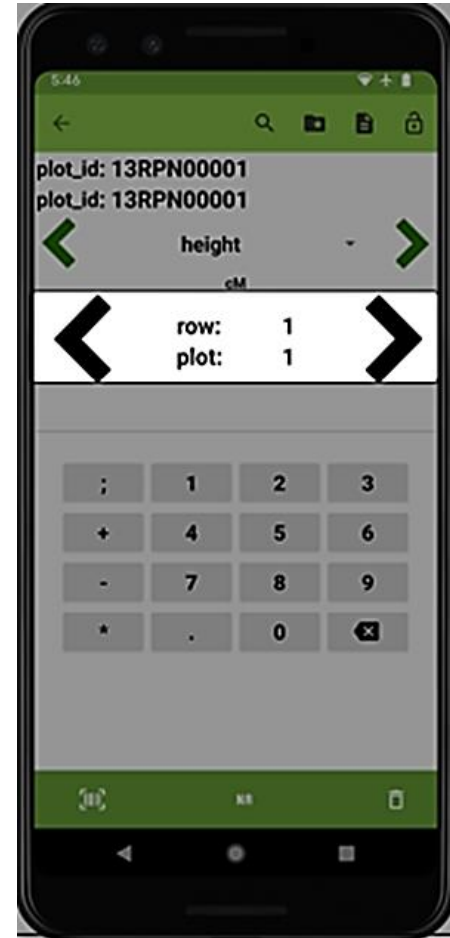
Data Collection

- Trait selection
 - Green arrows



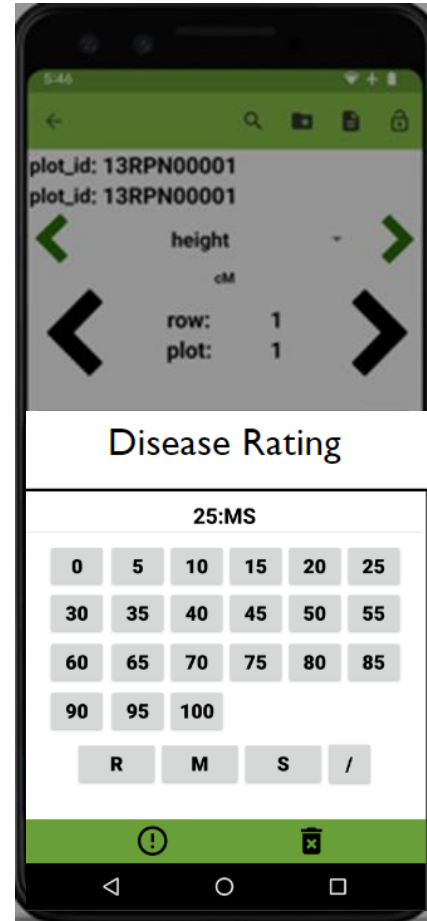
Data Collection

- Plot selection
 - Black arrows
 - Customize primary and secondary order



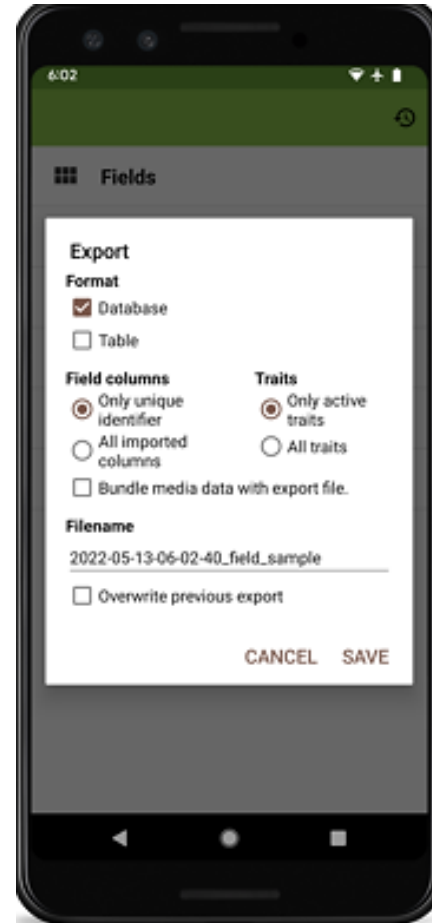
Data Collection

- Entering Data
 - Layout trait specific



Exporting Data

- CSV file format
 - Local storage
 - Shared storage options



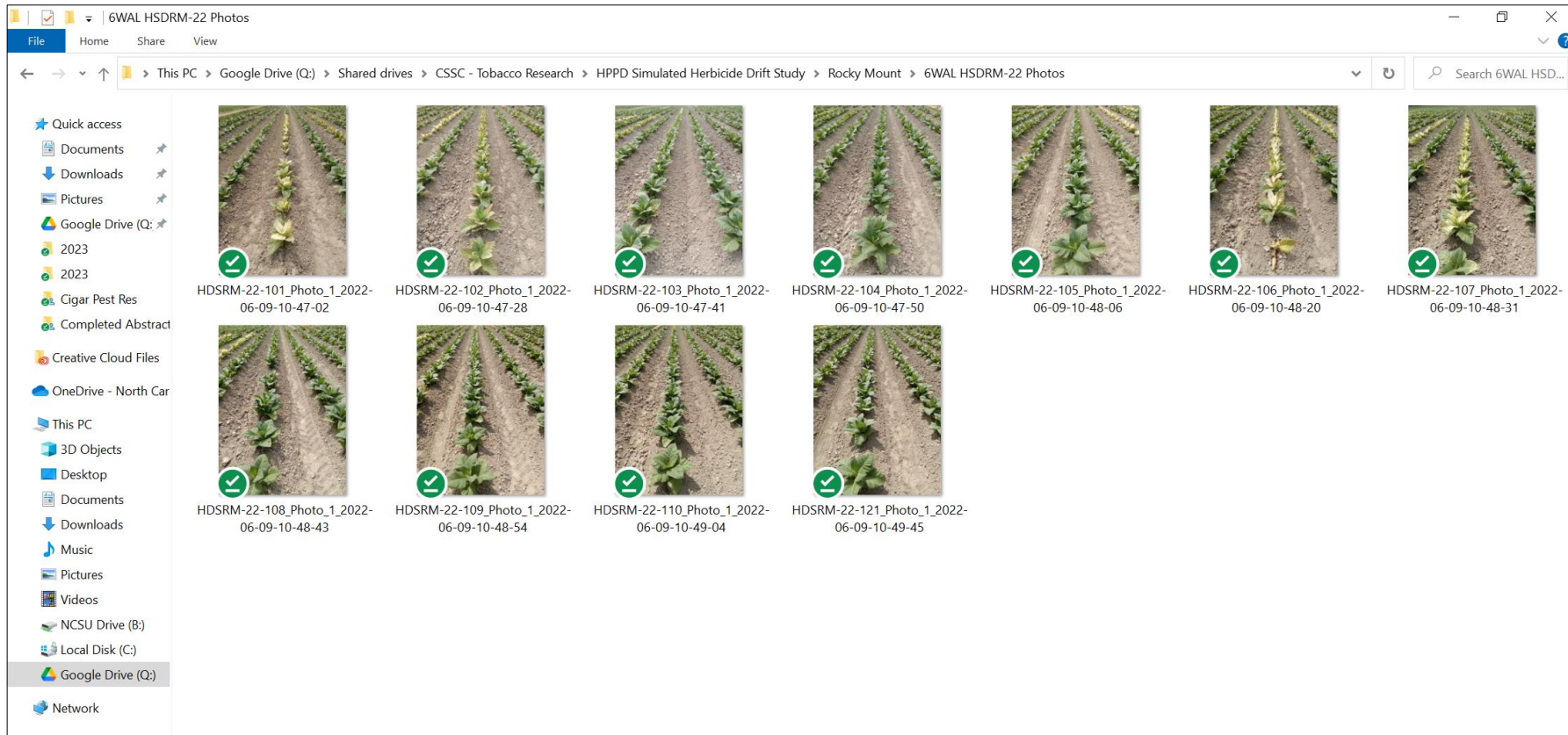
Exported File

A	B	C	D	E	F	G	H	I	J	K	L	M
Barcode	Trial	Location	Rep	Plot	Trt	entry	Plant	Lower Sta	Middle Sta	Upper Stalk	Disease	Percent Per Leaf
EFTKN-23-101-1	EFT	KN-23	1	101	1	1. Non-tre		1 15;10;8	0	0		
EFTKN-23-101-2	EFT	KN-23	1	101	1	1. Non-tre		2 15;5;1;0	1;0;	0;0		
EFTKN-23-101-3	EFT	KN-23	1	101	1	1. Non-tre		3 25;8;20;5;3	0	0		
EFTKN-23-101-4	EFT	KN-23	1	101	1	1. Non-tre		4 10;5;20;2;1	0	0		
EFTKN-23-101-5	EFT	KN-23	1	101	1	1. Non-tre		5 20;25;0;3;5	0	0		

Database

plot_id	trait	value	timestamp	person	location	number
13RPN00001	height	75	2023-05-22 11:25:57.304-04:00	Trevor Rife	35.9750949;-78.9786926	1
13RPN00001	color	Blue	2023-05-22 11:26:04.936-04:00	Trevor Rife	35.9750949;-78.9786926	1
13RPN00001	lodging	27	2023-05-22 11:26:11.278-04:00	Trevor Rife	35.9750949;-78.9786926	1
13RPN00002	height	45	2023-05-22 11:26:18.414-04:00	Trevor Rife	35.9739981;-78.9765391	1
13RPN00002	color	Yellow	2023-05-22 11:26:21.666-04:00	Trevor Rife	35.9739981;-78.9765391	1

Features



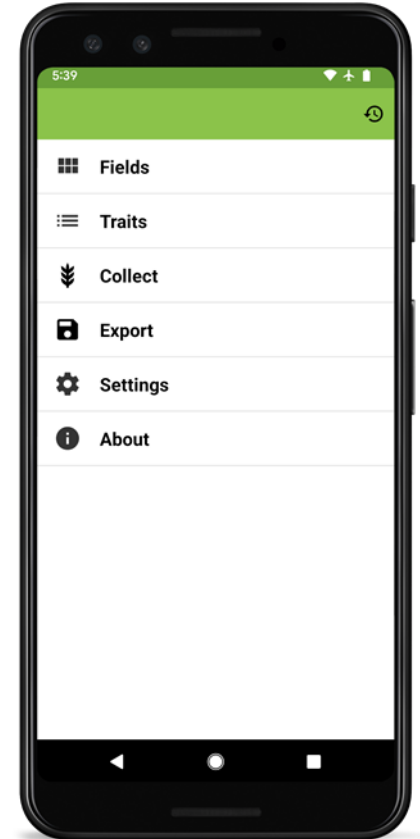
Field Tested

- Data saves automatically
- Summer heat is no problem
- Good camera also for scanner function
- Battery life is no problem
 - Extra battery



Smarter & Faster

- Reduce human error
- No data transcription
- Saves time
 - 3 to >30 hours for each field trial
- Reduce chances of lost data
 - Upload to Google Drive



Hotspot

- Hotspot and data plan @\$29 and \$40/month



Verizon Orbic Speed Mobile Hotspot Prepaid

- Nearly instant report
 - Farm trial view results in minutes
 - Export to Excel in usable format, insert pivot table and done



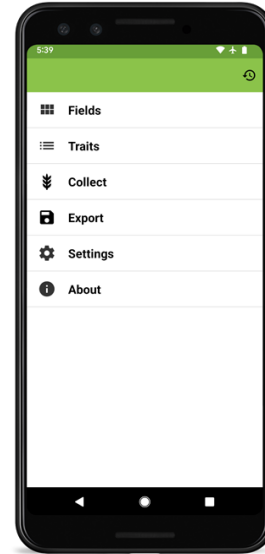
entry	Values		
	Average of Avg Lower Disease Percent	Average of Avg Middle Disease Percent	Average of Avg Upper Disease Percent
1. Non-treated control (no spraying)	7.3	1.5	2.0
2. Excalia @ 2 fl oz/a	4.4	1.9	3.0
3. Excalia @ 4 fl oz/a	3.7	1.4	1.0
4. Excalia @ 10 fl oz/a	3.7	1.6	1.0
5. Quadris F @ 8 fl oz/a fb. 9 fl oz/a fb. 9 fl oz/a	4.5	1.1	1.0
6. Manzate ProStick @ 2 lbs/a	6.0	1.1	1.0
Grand Total	5.0	1.4	1.3

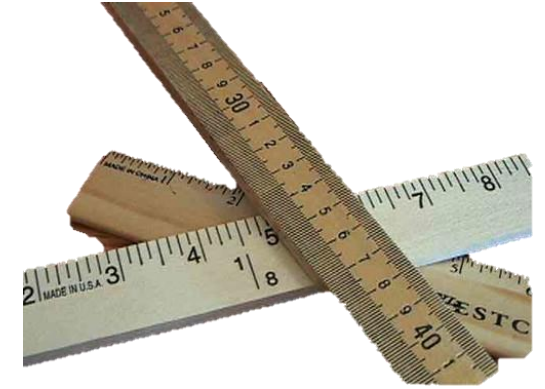


QR Code

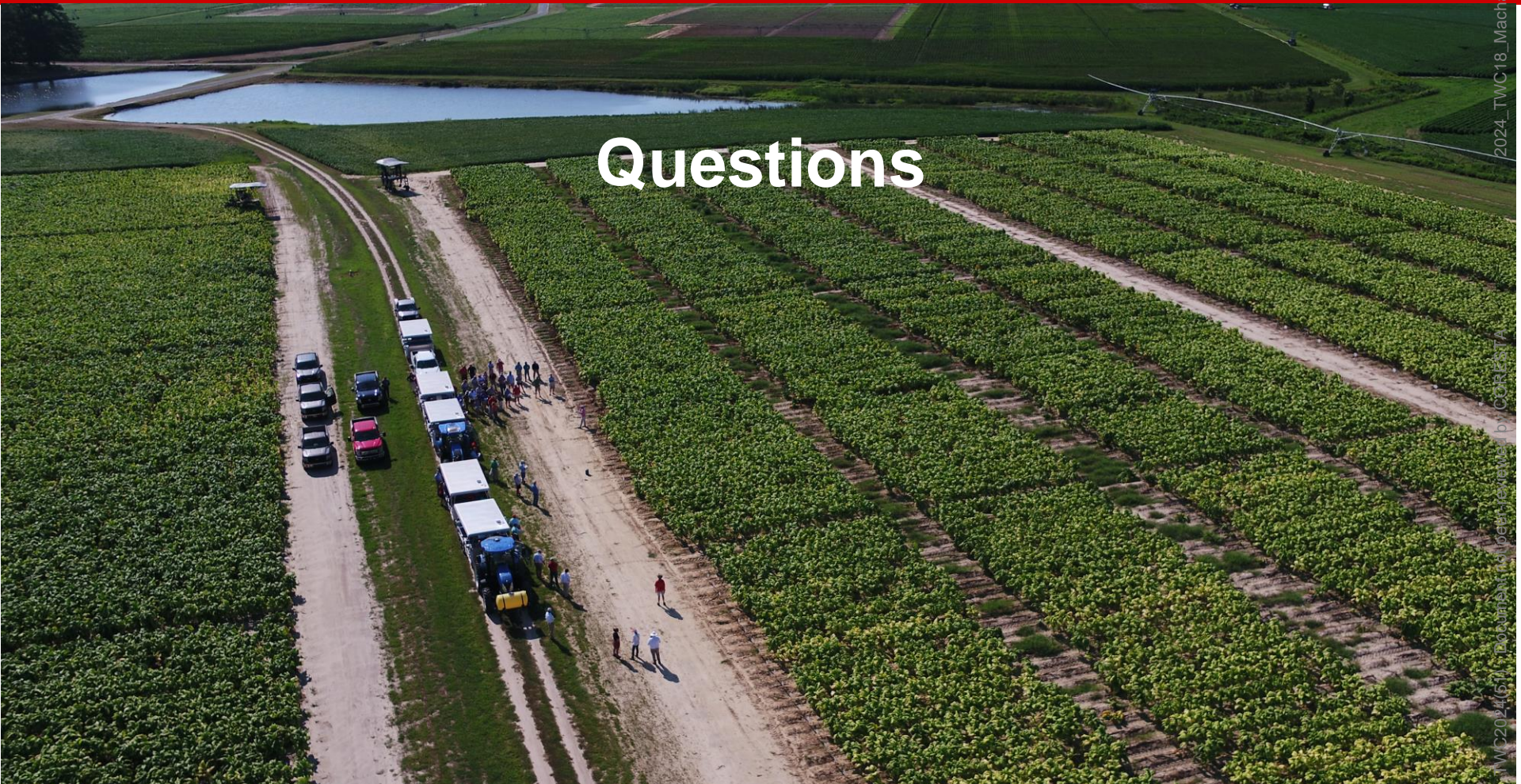
ID	Weight	Grade
OVTOX-19-101A	496	

**Fully Digital in
3 Years**





Questions



Field Book Resources

Docs: <https://docs.fieldbook.phenoapps.org/en/latest/>

Github: <https://github.com/PhenoApps/Field-Book>

Phenoapps Site: <https://www.phenoapps.org/apps/>

Citations

- Ellerbrock, 2023, slides 21, 23-29, 33 and 36
- <https://www.avery.com>, Avery Labels and Barcode Website
- <https://www.dji.com>, DJI Inspire 2
- <https://www.taltech.com>, WinWedge Software
- MIDCO Global, 12825 Flushing Meadows Drive, Suite 170,
Town & Country, MO 63131