

*2023 Beltwide Cotton Conferences
New Orleans, LA*

Should Cotton Yield Mapping Accuracy be Improved Using On-The-Go Calibration?



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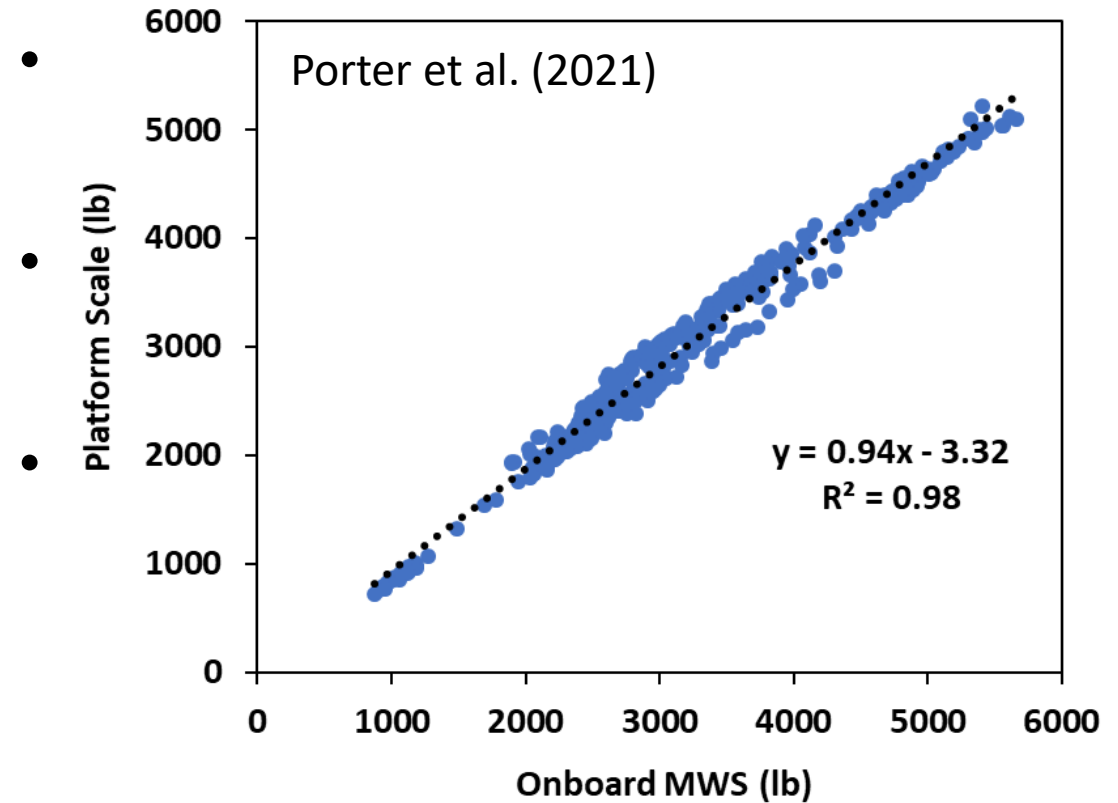
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Yield Monitoring

- ❑ Cotton yield monitor is a valuable technology that can help in evaluate different management decisions (yield maps).
- ❑ Yield monitoring is prone to errors due to many factors (operational and change in field or crop conditions).
- ❑ Calibration is important to collect quality yield data but continuous calibration during harvest is impractical.



New Technology and Yield Map Accuracy



Is there a value in improving cotton yield mapping accuracy in real-time?

Methods

Year: 2021 & 2022

Location: 8 to 10 fields (South Georgia)

Equipment: John Deere CP690

On-Farm Trials: Seeding rate, fungicide evaluation, variety evaluation, etc.



Data Collection

- Yield data was recorded three different ways:

Yield monitor



Onboard module weighing system



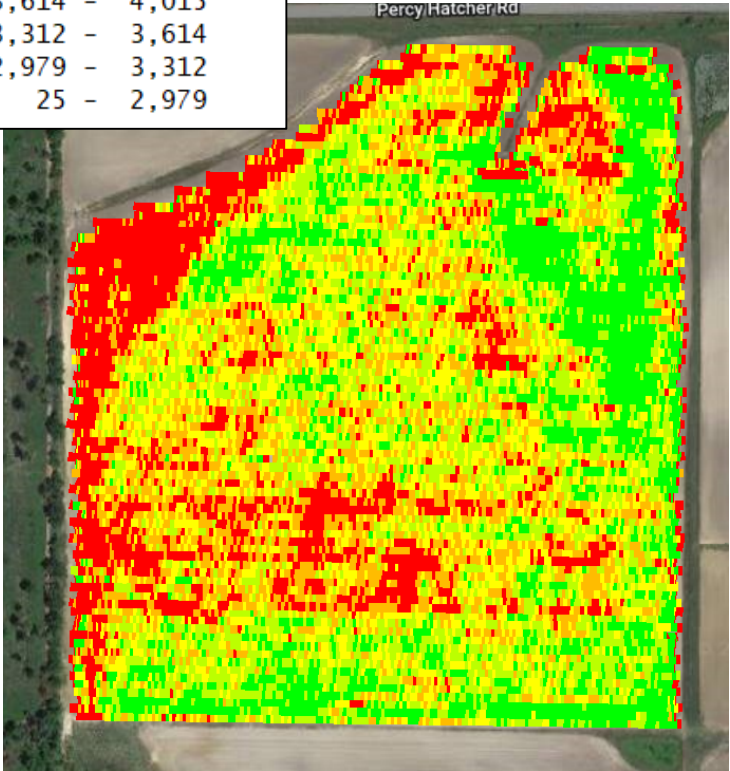
Calibrated platform scale



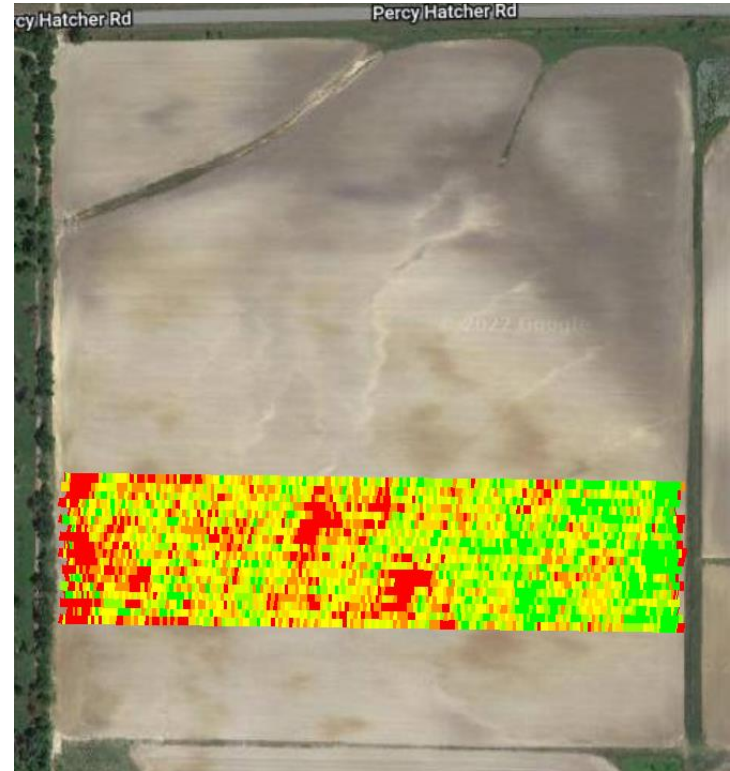
Data Analysis

Yield data was analyzed using AgLeader SMS Advanced and ArcGIS.

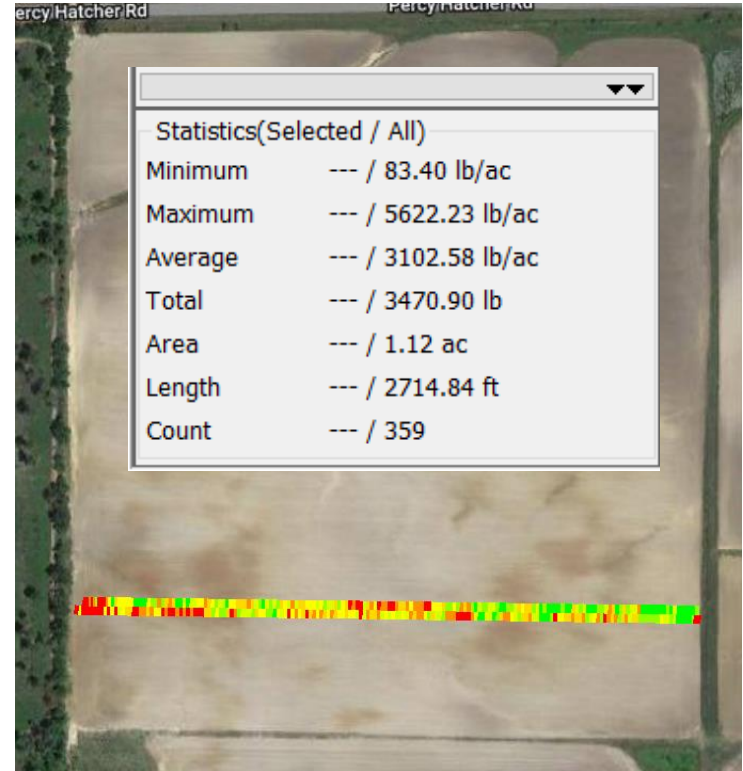
Cotton Mass Yield (lb/ac)	
4,015 - 9,859	Green
3,614 - 4,015	Light Green
3,312 - 3,614	Yellow
2,979 - 3,312	Orange
25 - 2,979	Red



Yield Map (field)



Yield Map (trial)

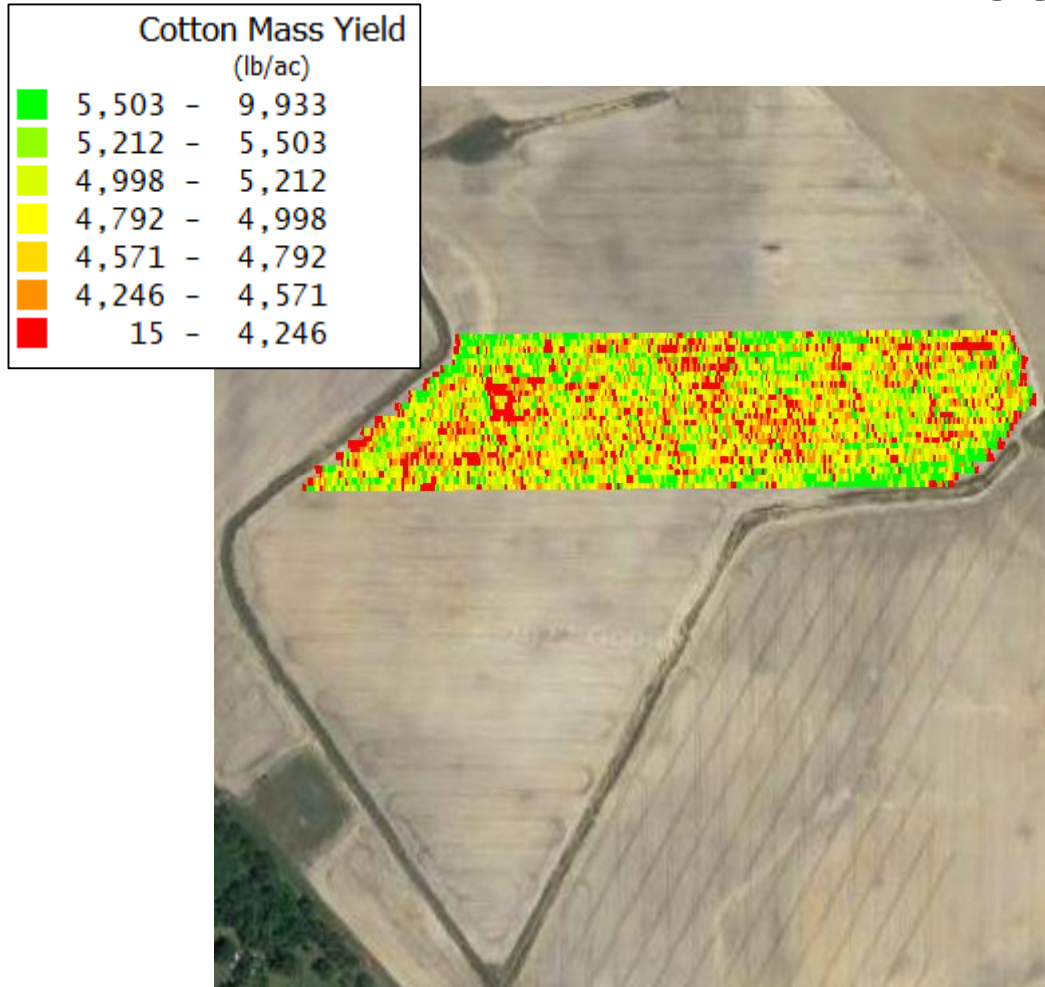


Yield Data (treatment)

Statistics(Selected / All)	
Minimum	--- / 83.40 lb/ac
Maximum	--- / 5622.23 lb/ac
Average	--- / 3102.58 lb/ac
Total	--- / 3470.90 lb
Area	--- / 1.12 ac
Length	--- / 2714.84 ft
Count	--- / 359

Results

Field 1 - 2021



Pass#	Yield Map (lbs)	Picker OWS (lbs)	Cal. Scale (lbs)
Pass1	4634	3550	3728
Pass2	4585	3670	3829
Pass3	4612	3640	3799
Pass4	5242	3835	4087
Pass5	4765	3705	3821
Pass6	5260	3830	4094
Pass7	4845	3680	3867
Pass8	5044	3695	3990
Pass9	5277	3810	4081

Field 1 - 2021

Pass#	Area (ac)	Lint (%)	Cal. Scale (lb/ac)	Picker OWS (lb/ac)	Error (%)	Yield Map (lb/ac)	Error (%)
Pass1	1.27	0.40	1174	1118	-4.8	1930	24.3
Pass2	1.28	0.40	1197	1147	-4.2	2025	19.7
Pass3	1.29	0.40	1178	1129	-4.2	1973	21.4
Pass4	1.29	0.40	1267	1189	-6.2	2023	28.3
Pass5	1.28	0.40	1194	1158	-3.0	1958	24.7
Pass6	1.31	0.40	1250	1169	-6.4	1993	28.5
Pass7	1.33	0.40	1163	1107	-4.8	1899	25.3
Pass8	1.34	0.40	1191	1103	-7.4	1929	26.4
Pass9	1.33	0.40	1227	1146	-6.6	1943	29.3

-5.3%

25.3%

Field 2 - 2022



Pass#	Yield Map (lbs)	Picker OWS (lbs)	Cal. Scale (lbs)
Pass1	3471	3245	3185
Pass2	3706	3470	3445
Pass3	3647	3331	3340
Pass4	3347	3183	3105
Pass5	3230	3309	3320
Pass6	3714	3545	3470
Pass7	3363	3201	3115
Pass8	3336	3364	3400
Pass9	3864	3501	3455

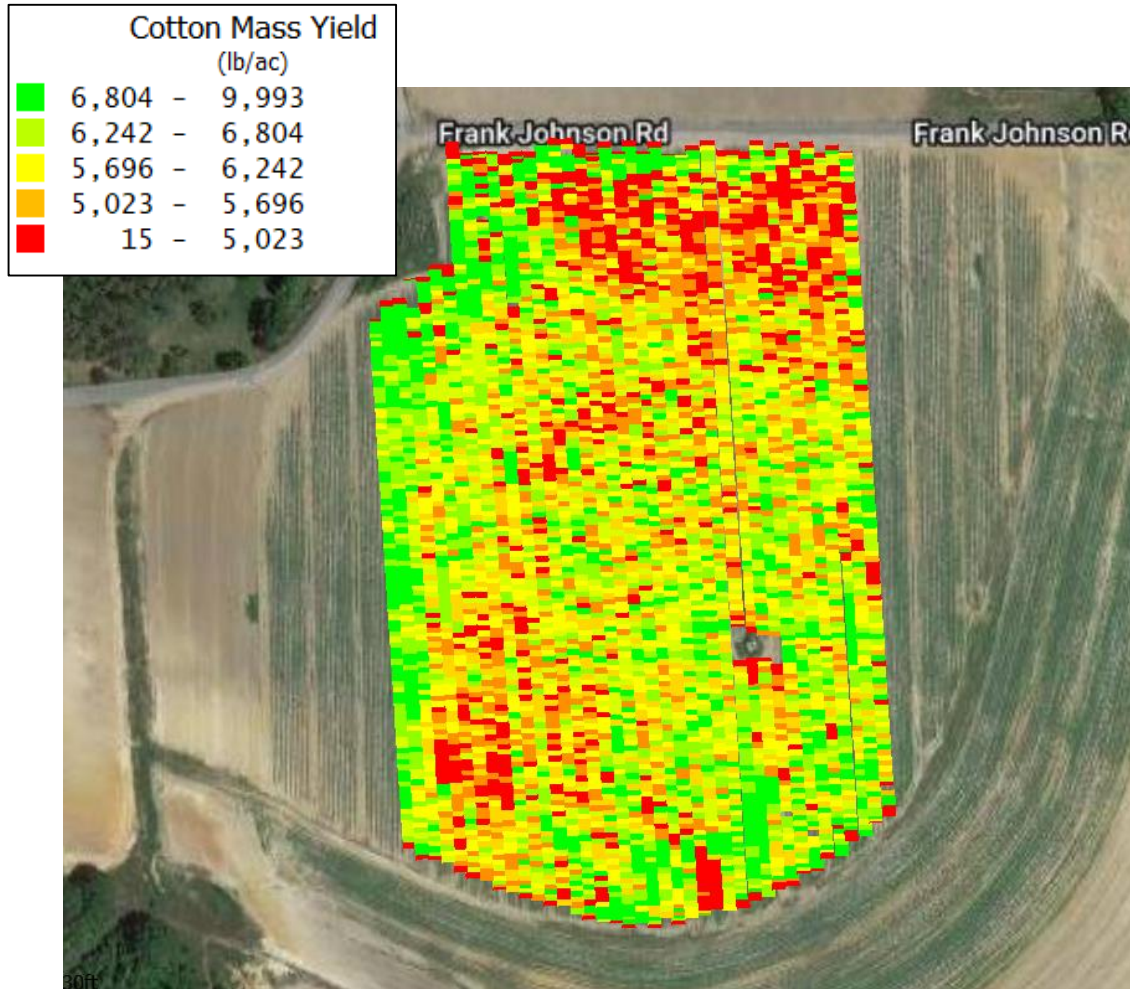
Field 2 - 2022

Pass#	Area (ac)	Lint (%)	Cal. Scale (lb/ac)	Picker OWS (lb/ac)	Error (%)	Yield Map (lb/ac)	Error (%)
Pass1	1.12	0.40	1240	1138	1.9	1159	9.0
Pass2	1.11	0.40	1335	1241	0.7	1250	7.6
Pass3	1.11	0.40	1314	1204	-0.3	1200	9.2
Pass4	1.10	0.40	1217	1129	2.5	1157	7.8
Pass5	1.12	0.40	1153	1186	-0.3	1182	-2.7
Pass6	1.11	0.40	1338	1250	2.2	1277	7.0
Pass7	1.11	0.40	1212	1123	2.8	1154	8.0
Pass8	1.10	0.40	1213	1236	-1.1	1223	-1.9
Pass9	1.12	0.40	1380	1234	1.3	1250	11.8

1.4%

7.2%

Field 3 - 2022



Variety	Yield Map (lbs)	Picker OWS (lbs)	Cal. Scale (lbs)
V1	8161	5168	5050
V2	8058	5013	4925
V3	7705	5113	4985
V4	7022	5075	4965
V5	7088	5198	5040
V6	7710	5324	5140
V7	6576	5408	5215
V8	7169	5097	5075
V9	6904	5201	4955
V10	6586	5057	4925
V11	7317	4974	4885
V12	7717	5170	4985

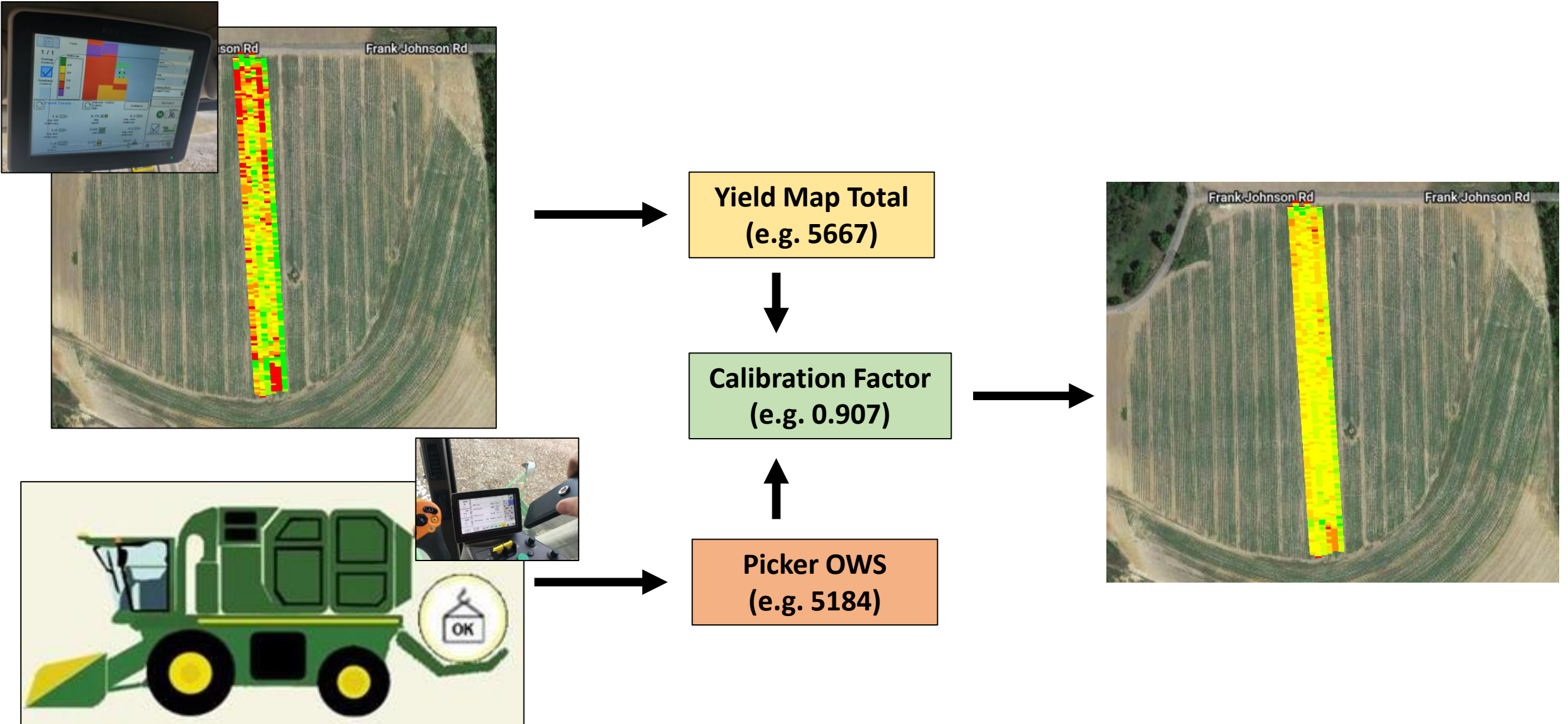
Field 3 - 2022

Variety	Acre (ac)	Lint (%)	Cal. Scale (lb/ac)	Picker OWS (lb/ac)	Error (%)	Yield Map (lb/ac)	Error (%)
V1	1.26	0.40	1566	1602	2.3	2531	58.3
V2	1.16	0.40	1504	1531	1.8	2460	44.4
V3	1.21	0.40	1522	1561	2.6	2353	50.0
V4	1.30	0.40	1528	1562	2.2	2161	31.4
V5	1.32	0.40	1527	1575	3.1	2148	24.0
V6	1.31	0.40	1569	1626	3.6	2354	45.7
V7	1.32	0.40	1580	1639	3.7	1993	23.7
V8	1.32	0.40	1538	1545	0.4	2172	37.7
V9	1.23	0.40	1611	1691	5.0	2245	34.4
V10	1.23	0.40	1602	1645	2.7	2142	29.5
V11	1.24	0.40	1576	1605	1.8	2360	43.2
V12	1.22	0.40	1634	1695	3.7	2530	54.8

2.7%

39.8%

Should the yield map accuracy be improved? **Most definitely.**



Uncalibrated Yield Map

Lint Mass Yield (lb/ac)		
2,160 - 3,298	(2.80 ac)	
1,920 - 2,160	(4.53 ac)	
1,680 - 1,920	(4.78 ac)	
1,440 - 1,680	(2.32 ac)	
1,200 - 1,440	(0.68 ac)	
960 - 1,200	(0.09 ac)	
13 - 960	(0.17 ac)	



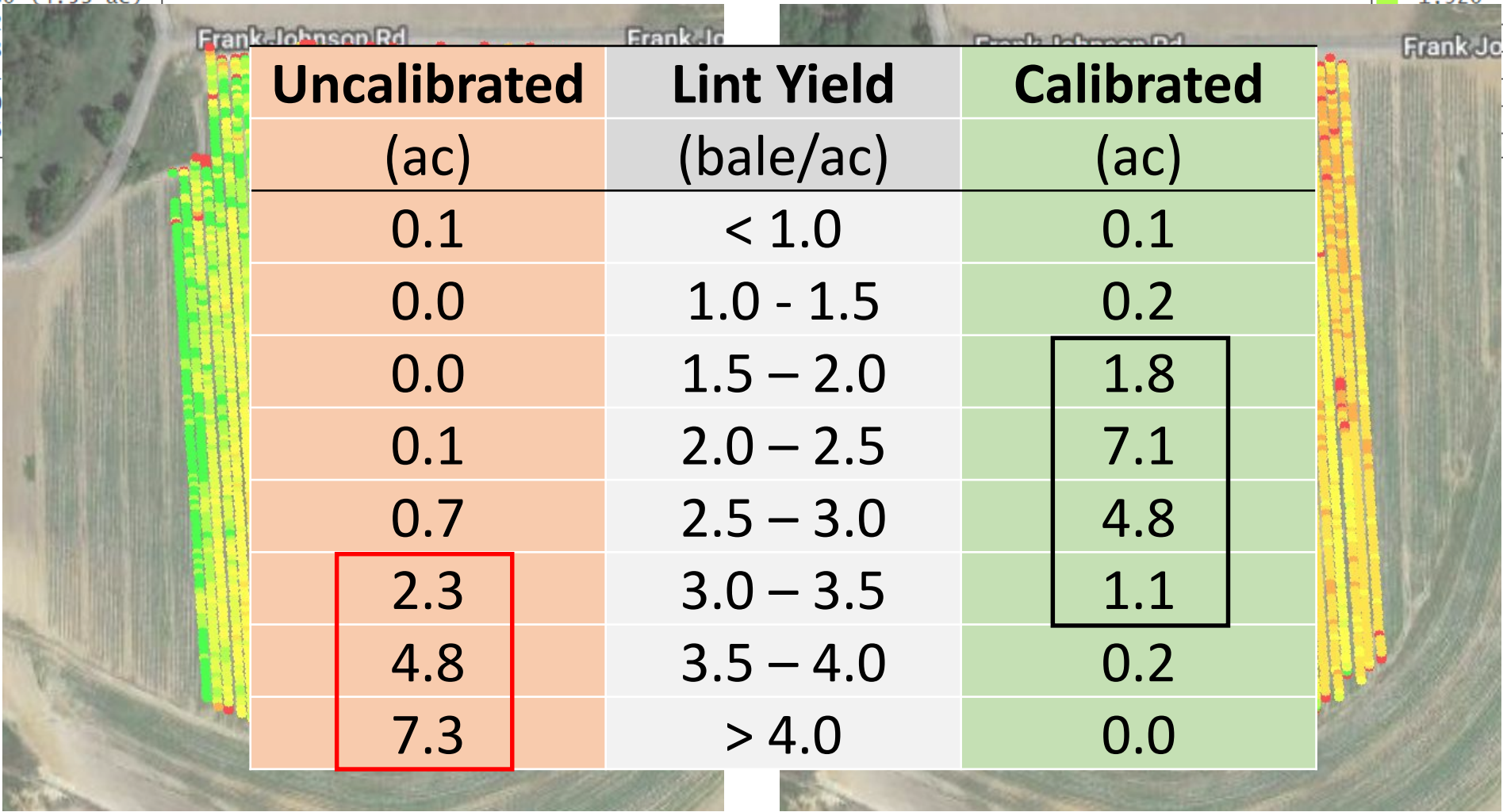
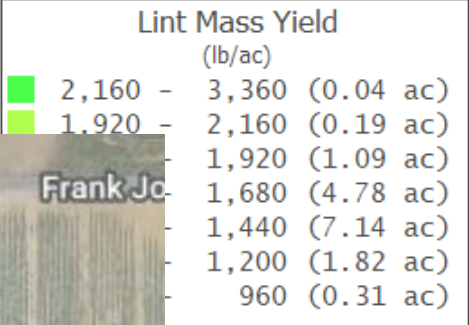
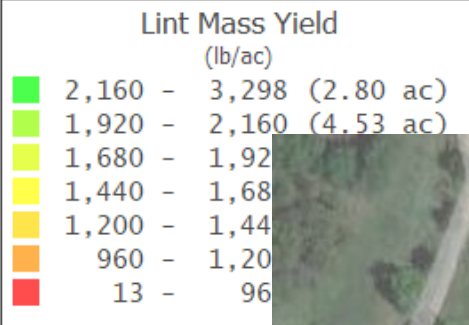
Calibrated Yield Map

Lint Mass Yield (lb/ac)		
2,160 - 3,360	(0.04 ac)	
1,920 - 2,160	(0.19 ac)	
1,680 - 1,920	(1.09 ac)	
1,440 - 1,680	(4.78 ac)	
1,200 - 1,440	(7.14 ac)	
960 - 1,200	(1.82 ac)	
9 - 960	(0.31 ac)	



Module	Cal. Factor
1	0.65
2	0.70
3	0.68
4	0.78
5	0.83
6	0.91
7	0.84
8	0.73
9	0.78
10	0.79
11	0.71
12	0.67

Uncalibrated vs Calibrated Map



Uncalibrated (ac)	Lint Yield (bale/ac)	Calibrated (ac)
0.1	< 1.0	0.1
0.0	1.0 - 1.5	0.2
0.0	1.5 - 2.0	1.8
0.1	2.0 - 2.5	7.1
0.7	2.5 - 3.0	4.8
2.3	3.0 - 3.5	1.1
4.8	3.5 - 4.0	0.2
7.3	> 4.0	0.0

Summary

- Yield monitoring errors can significantly reduce accuracy of yield maps (can also make them totally unreliable in some cases).
- The onboard weighing module system consistently showed higher accuracy than yield estimates from the yield map.
- On-the-go yield monitor calibration using onboard weighing module system can greatly increase yield map accuracy (need to work with industry to incorporate and test this functionality).

Thanks!

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