Current Cotton Harvest Research At UGA

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2022 Georgia Cotton Conference
January 25, 2022 Tifton, GA

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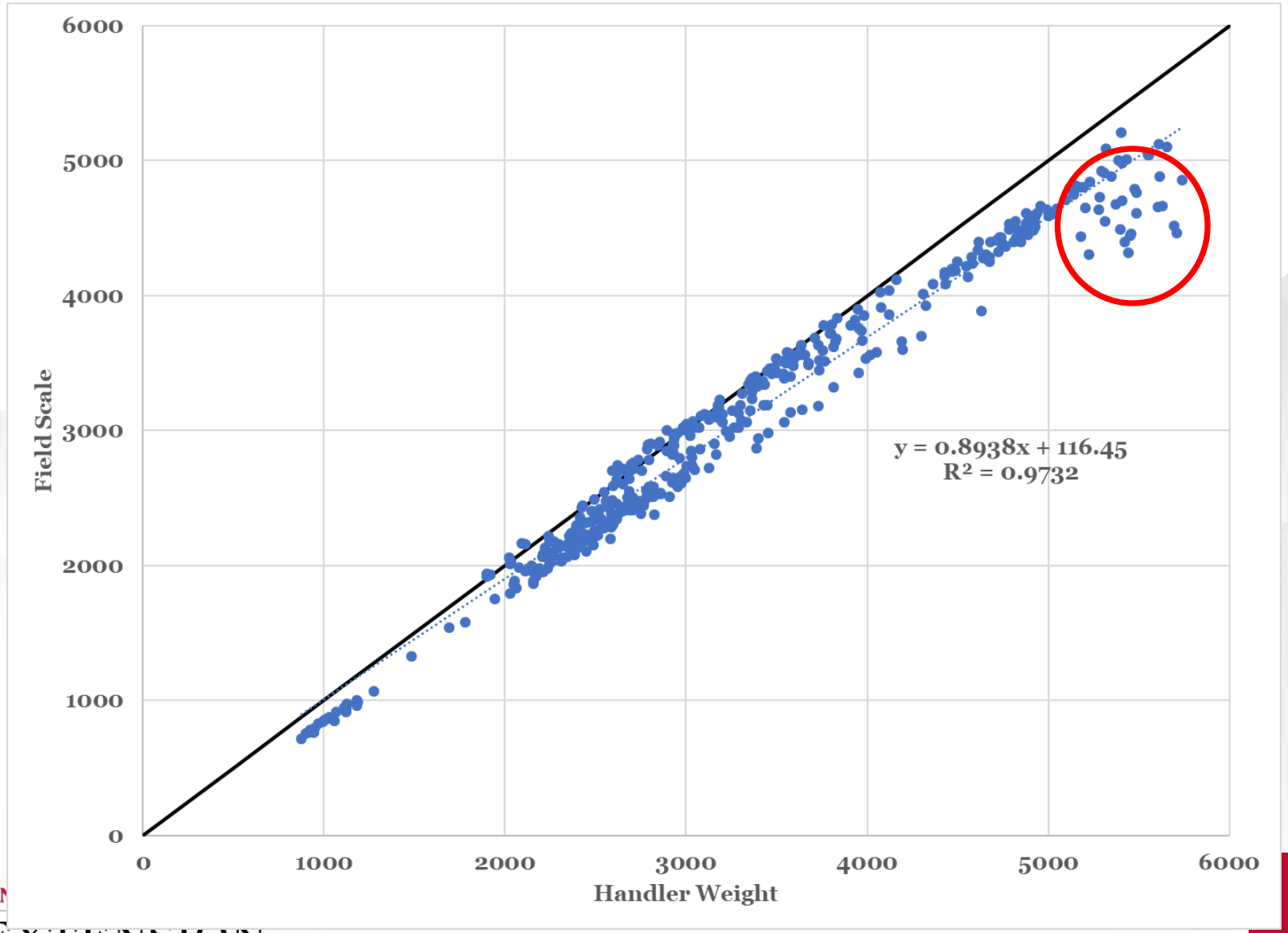
Background

- Typically Extension Specialists and Agents do a considerable amount of on-farm research and need a way to evaluate the results at the end of the year.
- Cotton Modules are currently weighed in the field using large truck style scales or boll buggies.
- However, JD 7760 (CP/CS) and CP/CS 690's have the option to add an on-board module weighing system.

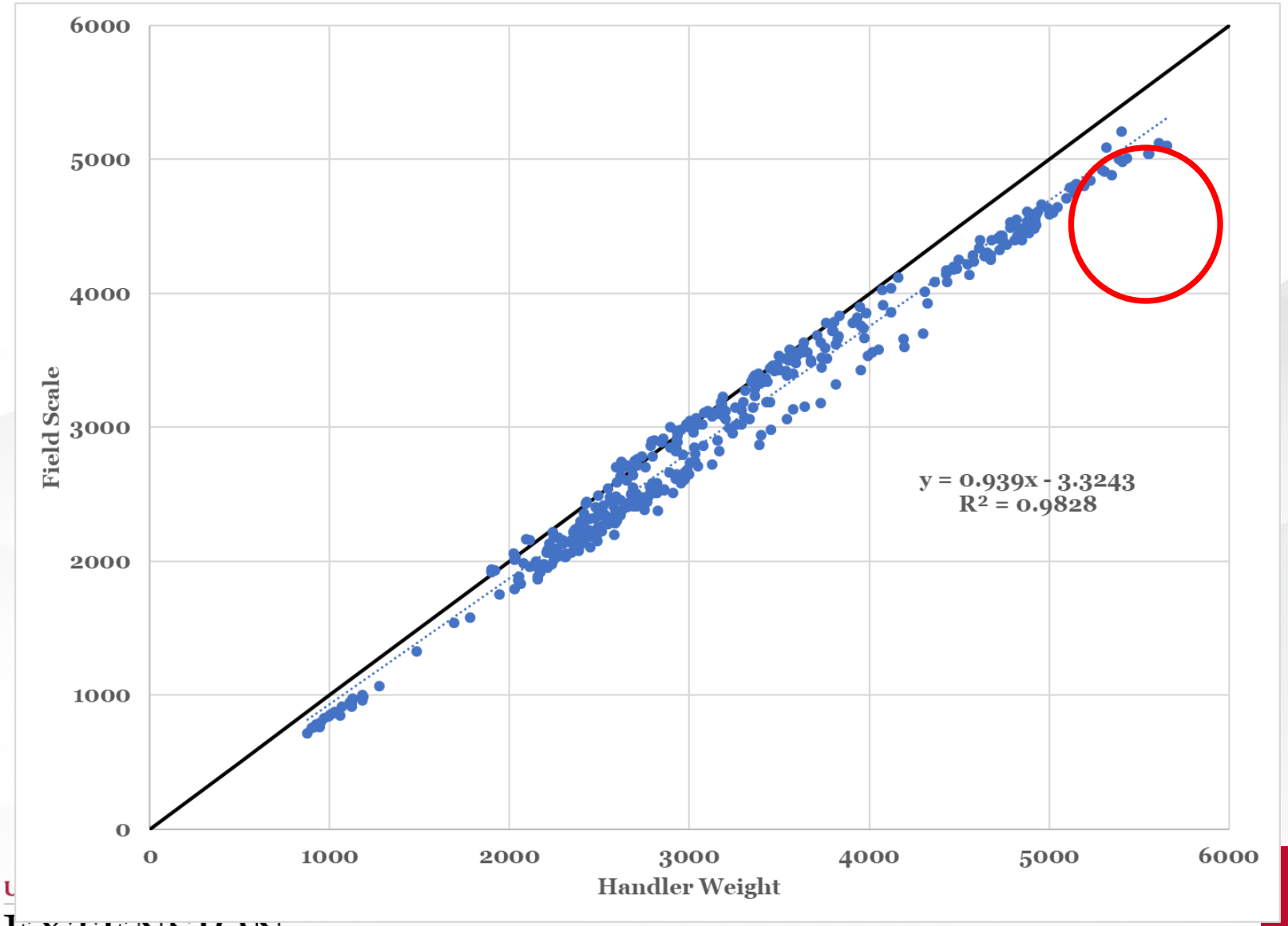
National Data Collected

- 2020:
  - Arizona, Georgia, North Carolina, Oklahoma
    - Total of 414 observations compiled.
- 2021:
  - Arizona, Georgia, North Carolina, Oklahoma
    - Total of 272 observations compiled.

2020 AZ, GA, MS,NC, OK, Pooled Data



2020 AZ, GA, MS,NC, OK, Pooled Data



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Results: Multiple Sites

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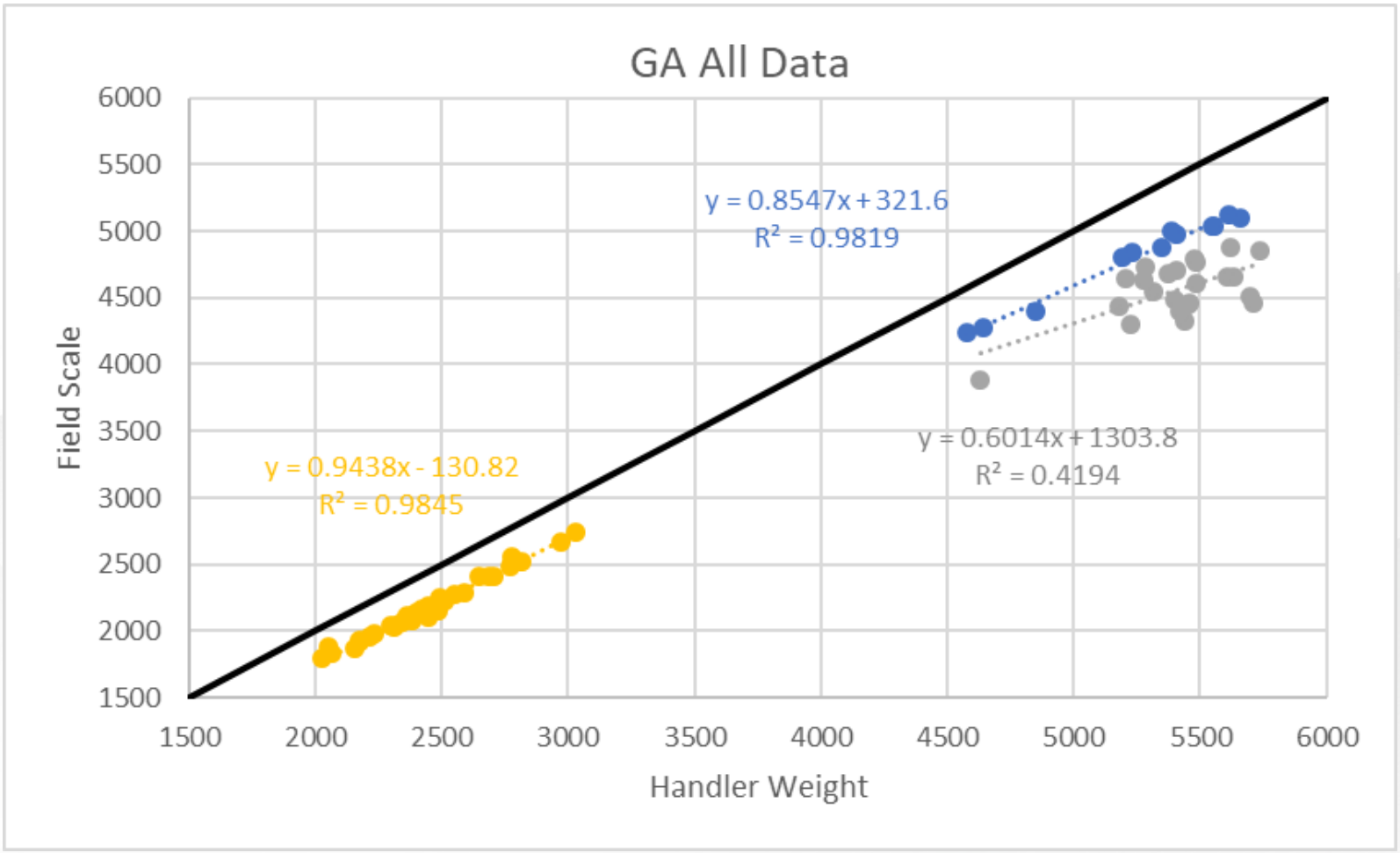
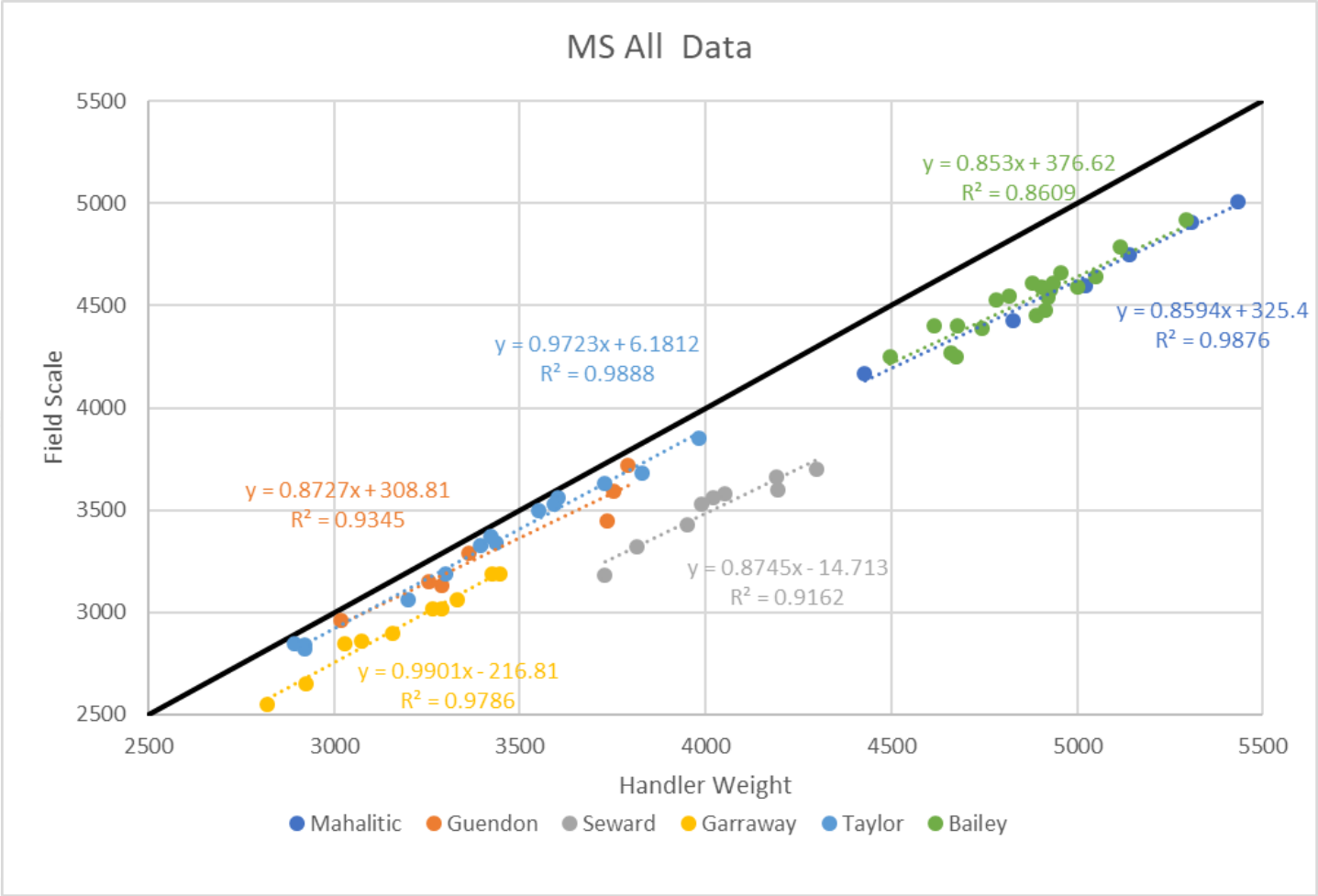


Results: Multiple Sites



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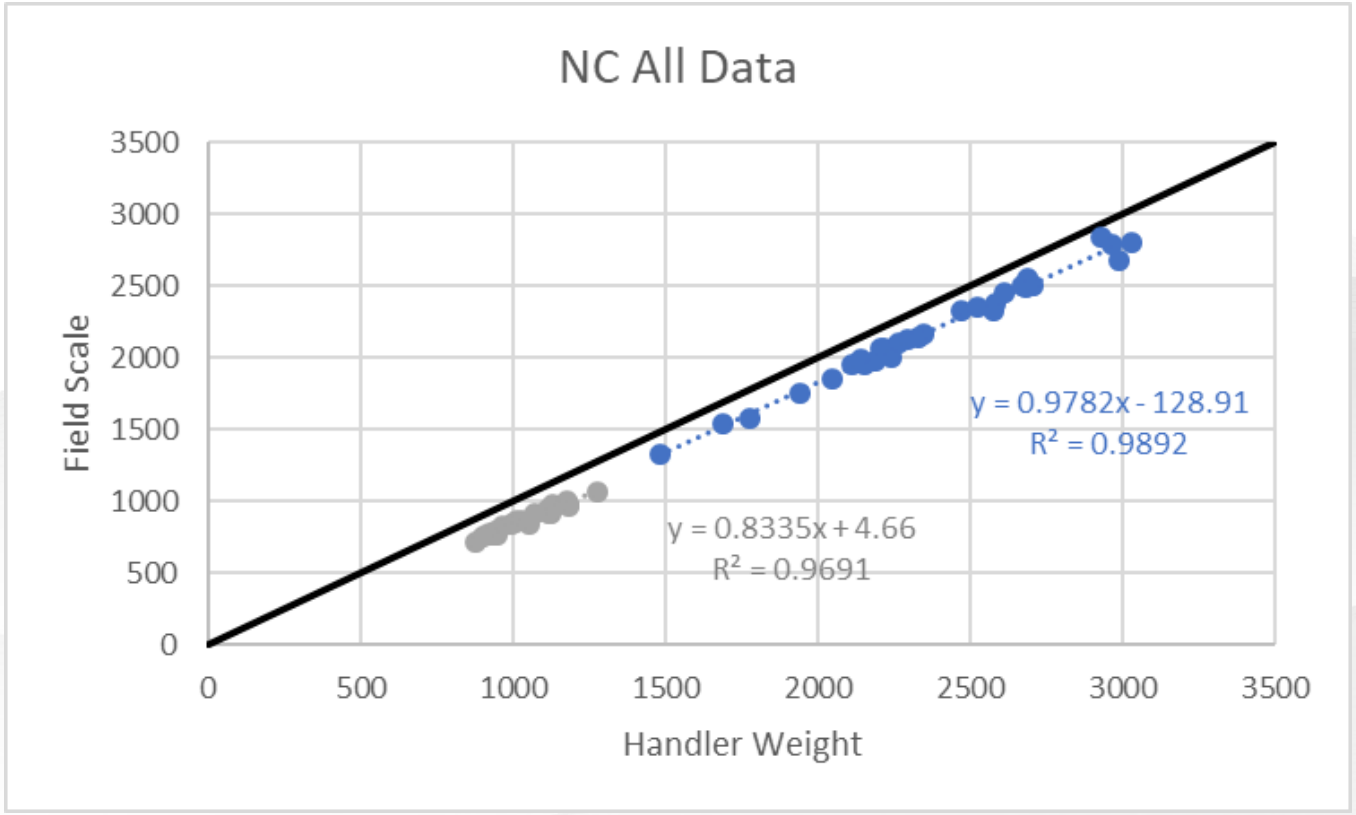
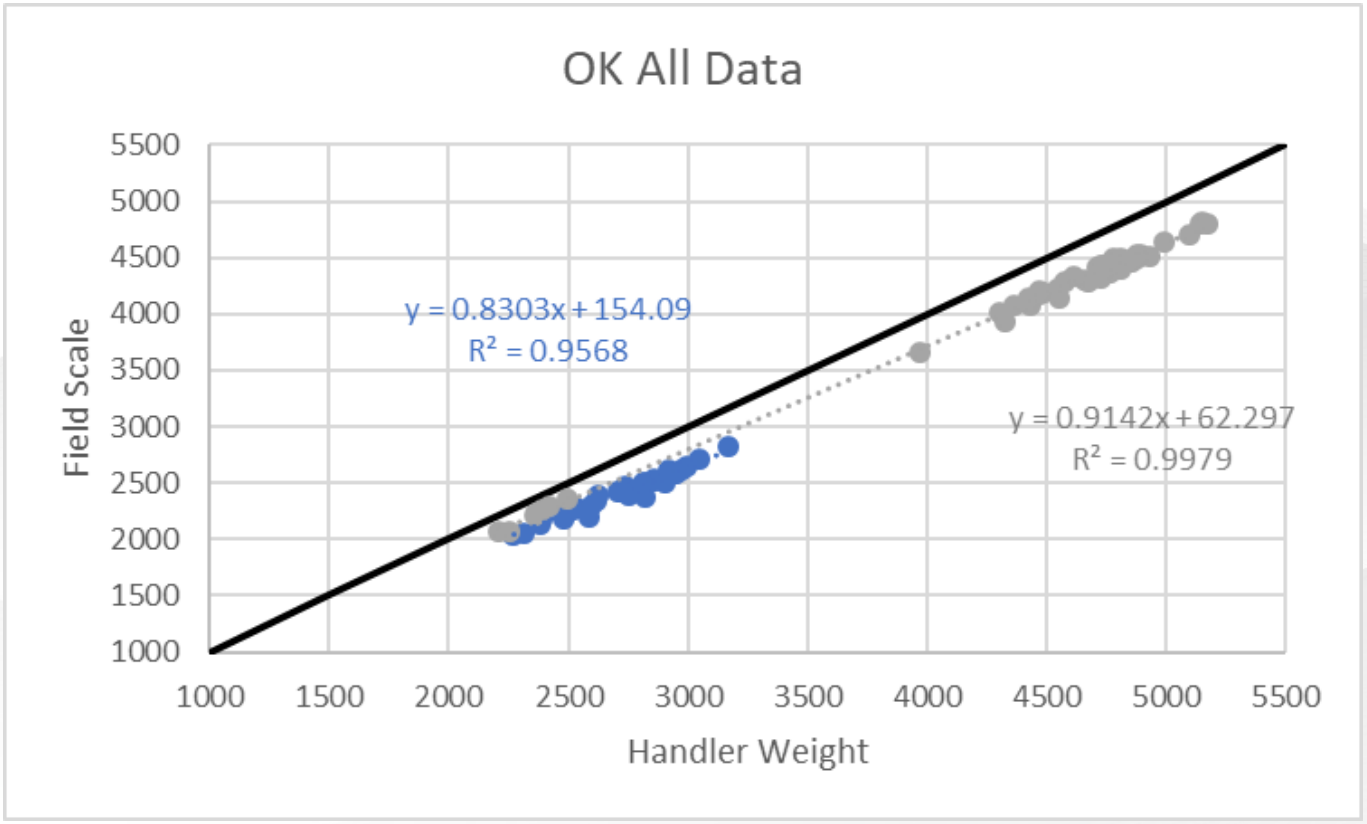
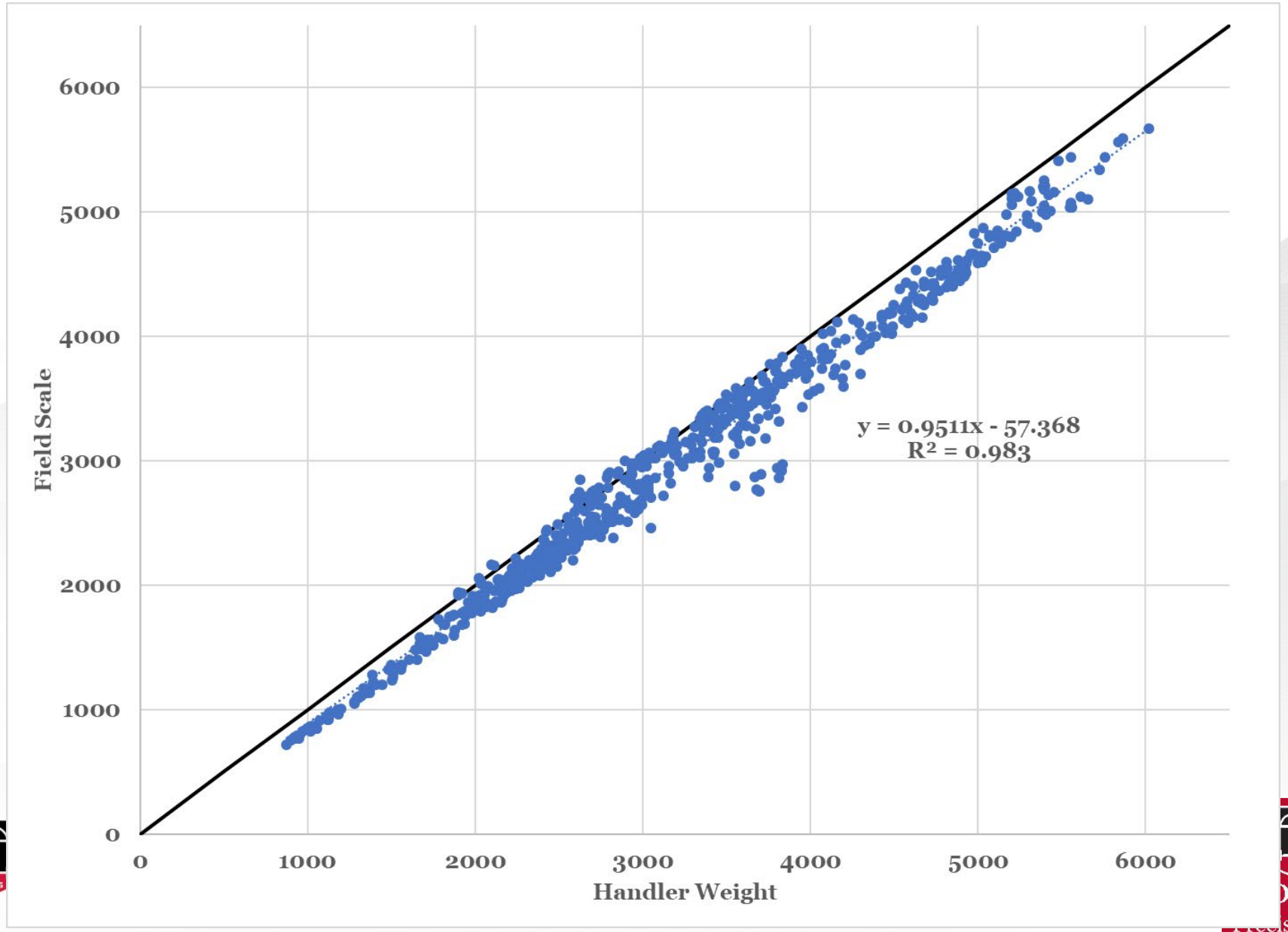
Results: Multiple Sites



Results: Multiple Sites



Results: 2020-2021



Conclusions

- With over 686 different loads collected from multiple states, harvesters and harvester types (CP vs. CS) the John Deere On-Board weighing system had a strong correlation to a calibrated platform scale system (R^2 = 0.983).
  - Additionally the On-board system was able to accurately determine significant differences between treatments even if it's weight predictions were not the same as the platform scale.

Conclusions

- Based on these observations the John Deere On-Board module weighing system can be used as a viable option for determining treatment differences for On-Farm trials.
- However, if the system has not been calibrated and the data require high accuracy, a field scale is suggested.
- The system accuracy can be increased via applying a calibration equation because it has a strong enough correlation to a calibrated platform scale that it can be utilized for accurate weight predictions.
  - https://www.planthealthexchange.org/cotton/Pages/GROW-COT-10-20-271.aspx

In Field Cotton Fiber Quality Mapping Using John Deere's HID System

- Similar to most crops, cotton production is not only reliant on yield but also fiber quality.
  - Staple length
  - Length Uniformity Index
  - Strength
  - Micronaire
  - Color
  - Color Grade
  - HVI Trash
- These values are reported by the bale and/or module back to the producer.

Cotton Fiber Quality

- Premiums and discounts can be incurred by good or poor fiber quality ratings respectively.
- Some fiber quality parameters can be effected by harvest timing, machine settings, variety selection, while others the natural environment may have more of an effect and can be out of the producers control.

Harvest Identification

- Technology developed by John Deere exists that has the ability to track the development of individual round cotton modules as they are created in the field.
- This is the John Deere Harvest Identification (HID) system.
  - Can be utilized on both cotton pickers and strippers
    - CP/CS 7760 and CP/CS 690
  - Utilizes RFID Technology
    - Each module is assigned a unique serial number
    - 18 Data points are created per module
      - I.e.: Lat/Long, weight, time stamp etc.

Harvest Identification

- Unfortunately current adoption of HID systems is very low.
  - In Georgia as of the end of 2021 there were only four producers with the HID subscription:
    - Bluffton, GA
    - Colquitt, GA
    - Iron City, GA
    - Rome, GA
  - We have worked with the first 3 producers to collect data.

Data Collection

- Trimble Nomad w/ RFID Reader attachment
- My JD account with shared grower data
- Calibrated field scale for yield monitor calibration
- Android tablet with RFID module scan application

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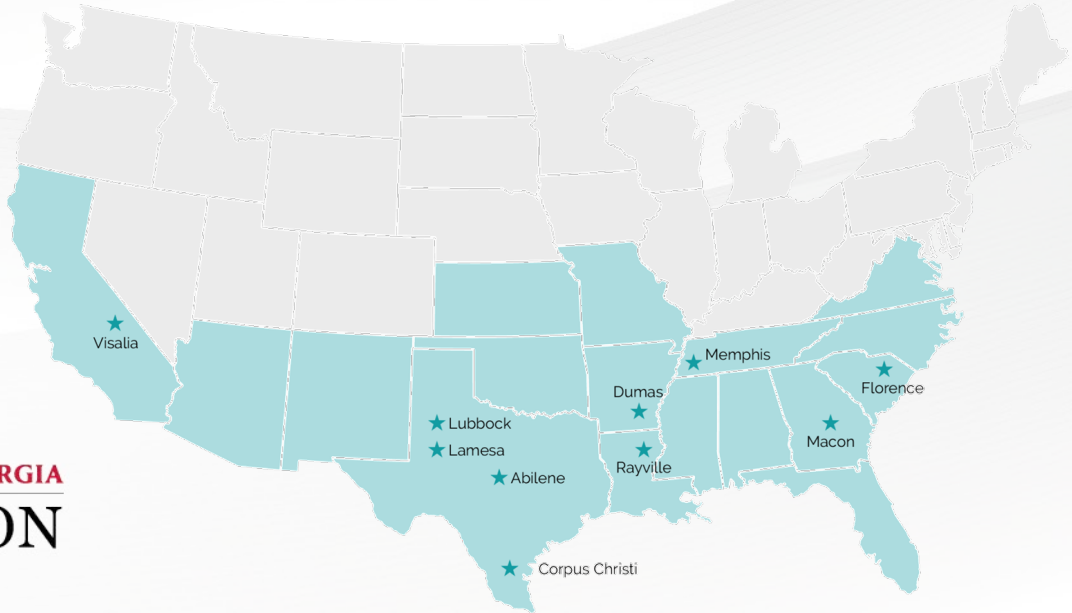
Data Collection

- Each harvester was calibrated to ensure accurate yield data.
- Each module created was labeled by the machine then scanned w/ the RFID reader and module scan application.
- Match gin label w/ module ID numbers.
- Track modules through ginning to identify bale numbers for AMS classification data.

Data Collection

- As the modules are ginned approximately 4 to 5 bales (~480 lbs. each) are created.
  - Each bale has a fiber quality sample collected and sent to the nearest classing office for analysis.
    - Some Gins send individual bale results back and some do module averaging
  - Results are returned to the gin and producer, notating the current premiums and discounts.



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Data Collection

- After fiber quality data is returned via the Gin, the grades from each bale are assigned back to their original module and averaged.
- Using the MyJD account the HID file can be exported and converted into a .CSV file.

Module ID	Module SN	Lat	Lon	GMT Date	GMT Time	Tag Count	Diameter	Weight (k	Drop Lat	Drop Lon	Field Total	Increment	Local Date	Comment
3500B98806110904 48EE3C3E	18403441726	31.198067	-84.760861	11/29/2019	21:46:39	3	239	0	31.19807	-84.7615	1	0	########	
3500B98806110804 48EE3C3D	18403441725	31.197976	-84.762561	11/29/2019	21:57:22	3	239	2521	31.19762	-84.7668	2	0	########	
3500B98806110704 48EE3C3C	18403441724	31.198404	-84.758629	11/29/2019	22:06:05	3	239	2479	31.19792	-84.7656	3	0	########	
3500B98806110604 48EE3C3B	18403441723	31.197782	-84.767042	11/29/2019	22:14:11	3	237	2524	31.19798	-84.7661	4	0	########	
3500B98806110504 48EE3C3A	18403441722	31.198352	-84.758689	11/29/2019	22:22:32	3	239	2497	31.19768	-84.7666	5	0	########	
3500B98806110404 48EE3C39	18403441721	31.198	-84.764012	11/29/2019	22:30:14	3	237	2494	31.19841	-84.7604	6	0	########	
3500B98806110304 48EE3C38	18403441720	31.198398	-84.760492	11/29/2019	22:37:26	3	238	2544	31.19788	-84.7666	7	0	########	
3500B98806110204 48EE3C37	18403441719	31.19848	-84.761282	11/29/2019	23:17:20	3	236	2534	31.19835	-84.764	8	0	########	
3500B98806110104 48EE3C36	18403441718	31.198274	-84.764911	11/29/2019	23:25:52	2	238	2589	31.19814	-84.7666	9	0	########	
3500B98806111804 48CFE45F	18401453151	31.198909	-84.757973	11/29/2019	23:40:50	3	239	0	31.1982	-84.7664	10	0	########	
3500B98806111704 48CFE45E	18401453150	31.198332	-84.763626	11/29/2019	23:49:30	3	237	0	31.19848	-84.7619	11	0	########	
3500B98806111604 48CFE45D	18401453149	31.198388	-84.761817	11/29/2019	23:59:02	3	237	0	31.198	-84.7664	12	0	########	
3500B98806111504 48CFE45C	18401453148	31.198975	-84.75893	11/30/2019	0:08:33	3	239	0	31.19845	-84.7664	13	0	########	
3500B98806111404 48CFE45B	18401453147	31.198405	-84.76692	11/30/2019	0:17:15	3	239	0	31.19858	-84.766	14	0	########	
3500B98806111304 48CFE45A	18401453146	31.199012	-84.759128	11/30/2019	0:25:58	3	236	0	31.19839	-84.7665	15	0	########	
3500B98806111204 48CFE459	18401453145	31.198549	-84.763401	11/30/2019	0:34:09	3	237	0	31.19883	-84.7624	16	0	########	
3500B98806111104 48CFE458	18401453144	31.198842	-84.76231	11/30/2019	0:42:29	3	238	2631	31.19849	-84.7665	17	0	########	
3500B98806111004 48CFE457	18401453143	31.19928	-84.758857	11/30/2019	0:51:36	3	239	0	31.19909	-84.7624	18	0	########	
3500B98806110F04 48CFE456	18401453142	31.198971	-84.764871	11/30/2019	1:01:07	2	237	0	31.19907	-84.7619	19	0	########	

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Data Collection

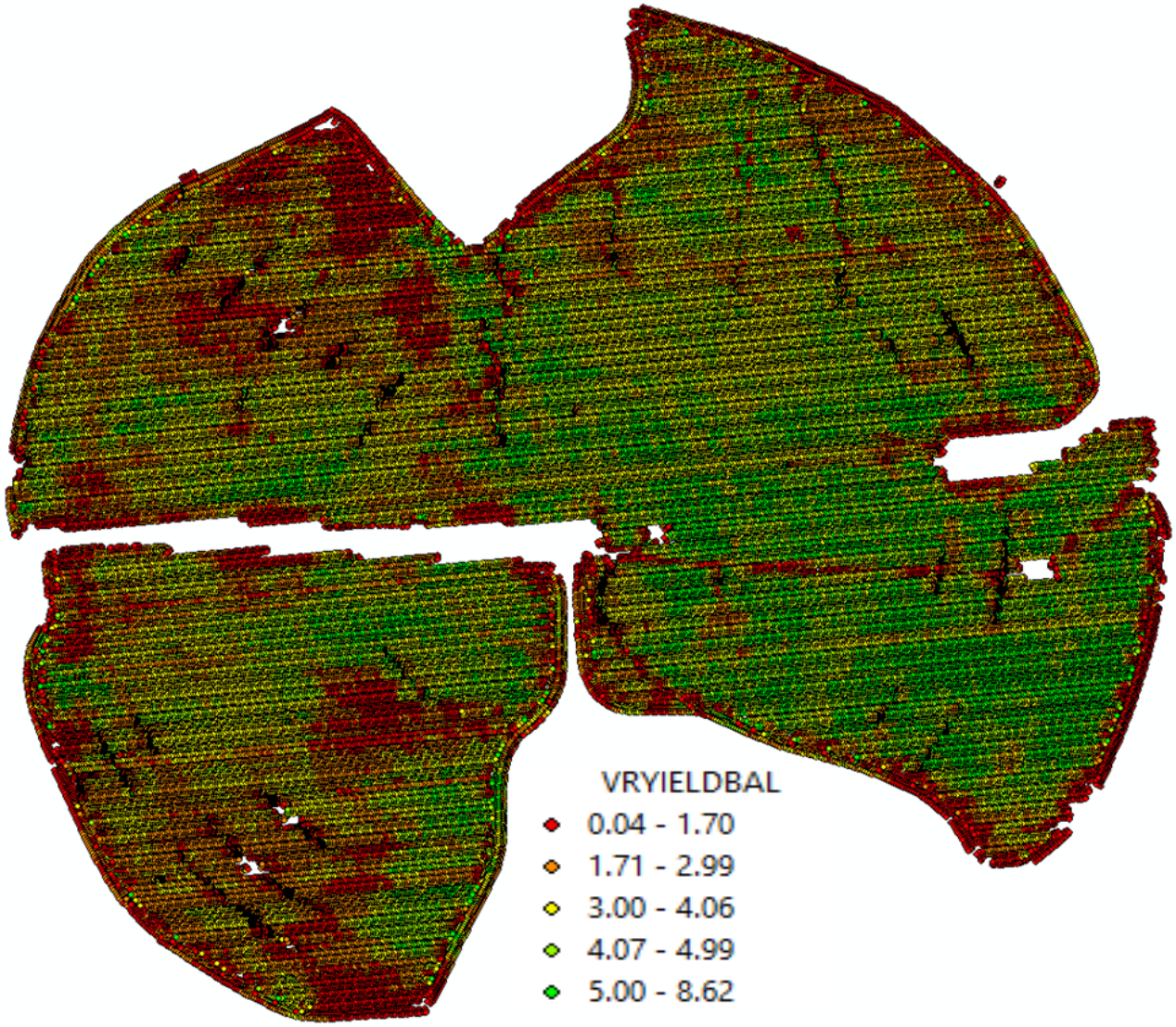
- The yield file is also exported from the MyJD account.
  - The time stamp from the both the HID and yield files are used to determine the harvested area for each module.
    - I.e. if module 1 was created at 16:07 and module 2 at 16:34, we know that all yield points between 16:08-16:34 correspond to module 2.

FID	DISTANCE	SWATHWIDTH	VRYIELDBAL	SECTIONID	WetMass	Time	Heading	Elevation	IsoTime
0	4.29326105	5.99956256	0.40452202	616	462.313881	21:34	347.9218	178.8218	2019-11-29T21:34:32.000Z
1	4.29326105	5.99956256	0.40452202	617	462.313881	21:34	347.9218	178.8218	2019-11-29T21:34:32.000Z
2	4.29326105	5.99956256	0.40452202	618	462.313881	21:34	347.9218	178.8218	2019-11-29T21:34:32.000Z
3	5.8352558	5.99956256	0.22483636	616	256.9376282	21:34	346.5818	178.9694	2019-11-29T21:34:33.004Z
4	5.8352558	5.99956256	0.22483636	617	256.9376282	21:34	346.5818	178.9694	2019-11-29T21:34:33.004Z
5	5.8352558	5.99956256	0.22483636	618	256.9376282	21:34	346.5818	178.9694	2019-11-29T21:34:33.004Z
6	7.31163375	5.99956256	0.47634715	616	544.3844211	21:34	347.2518	179.0908	2019-11-29T21:34:33.998Z
7	7.31163375	5.99956256	0.47634715	617	544.3844211	21:34	347.2518	179.0908	2019-11-29T21:34:33.998Z
8	7.31163375	5.99956256	0.47634715	618	544.3844211	21:34	347.2518	179.0908	2019-11-29T21:34:33.998Z
9	7.83656814	5.99956256	1.32738722	616	1516.947541	21:34	345.6718	179.0679	2019-11-29T21:34:35.001Z
10	7.83656814	5.99956256	1.32738722	617	1516.947541	21:34	345.6718	179.0679	2019-11-29T21:34:35.001Z
11	7.83656814	5.99956256	1.32738722	618	1516.947541	21:34	345.6718	179.0679	2019-11-29T21:34:35.001Z
12	7.73814294	5.99956256	1.85525711	616	2120.262646	21:34	344.9818	178.8087	2019-11-29T21:34:35.996Z
13	7.73814294	5.99956256	1.85525711	617	2120.262646	21:34	344.9818	178.8087	2019-11-29T21:34:35.996Z
14	7.73814294	5.99956256	1.85525711	618	2120.262646	21:34	344.9818	178.8087	2019-11-29T21:34:35.996Z
15	7.70533454	5.99956256	2.00854931	616	2295.478997	21:34	346.5818	178.6742	2019-11-29T21:34:36.996Z
16	7.70533454	5.99956256	2.00854931	617	2295.478997	21:34	346.5818	178.6742	2019-11-29T21:34:36.996Z
17	7.70533454	5.99956256	2.00854931	618	2295.478997	21:34	346.5818	178.6742	2019-11-29T21:34:36.996Z

Data Collection

- Next the module averaged fiber quality data is assigned to each of the yield points for each module.
- This file can now be imported into a GIS software.
  - The two files can now be joined using the FID column as the joining feature.
- If data can be converted into polygons by module creation location this reduces the number of data points and makes the software easier to run and the data easier to display and analyze.

Maps: Yield (bale/ac)



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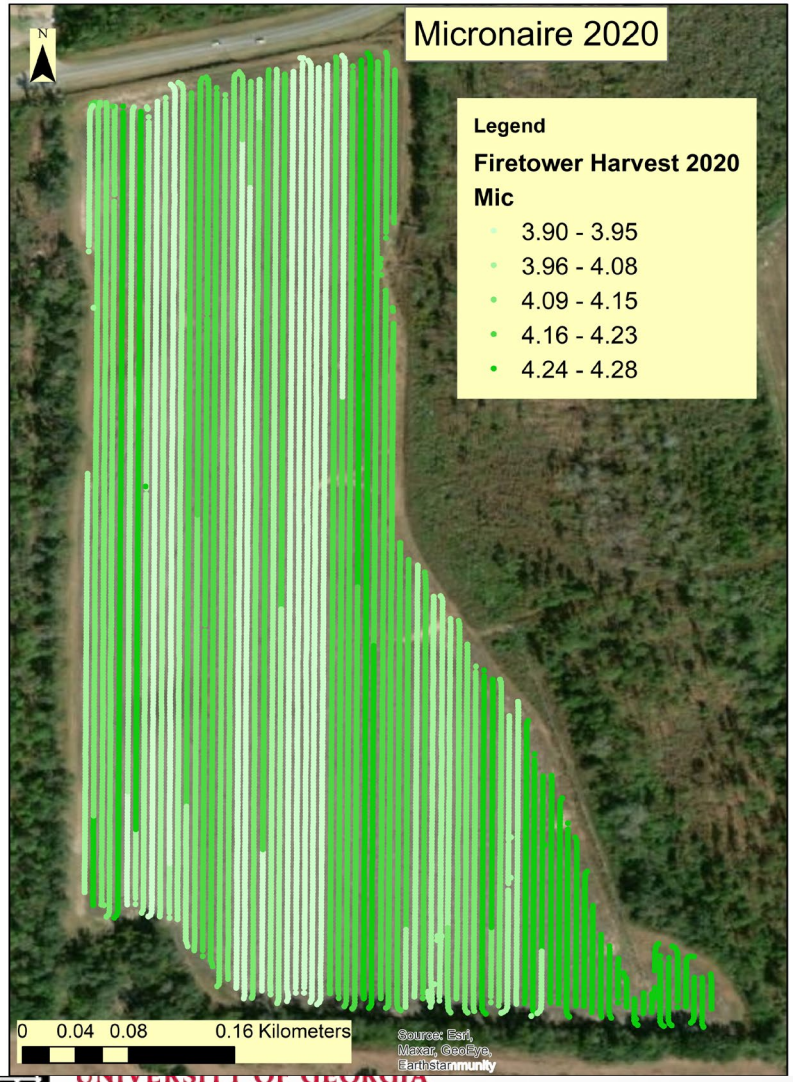
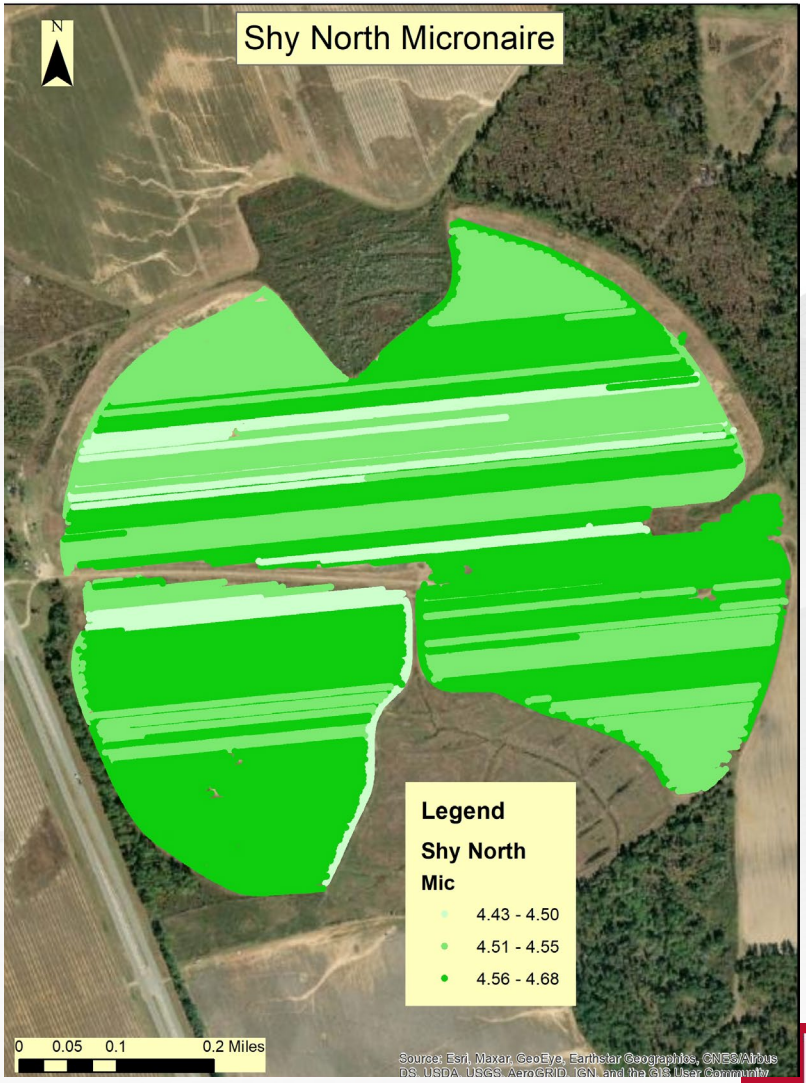
Maps: Micronaire





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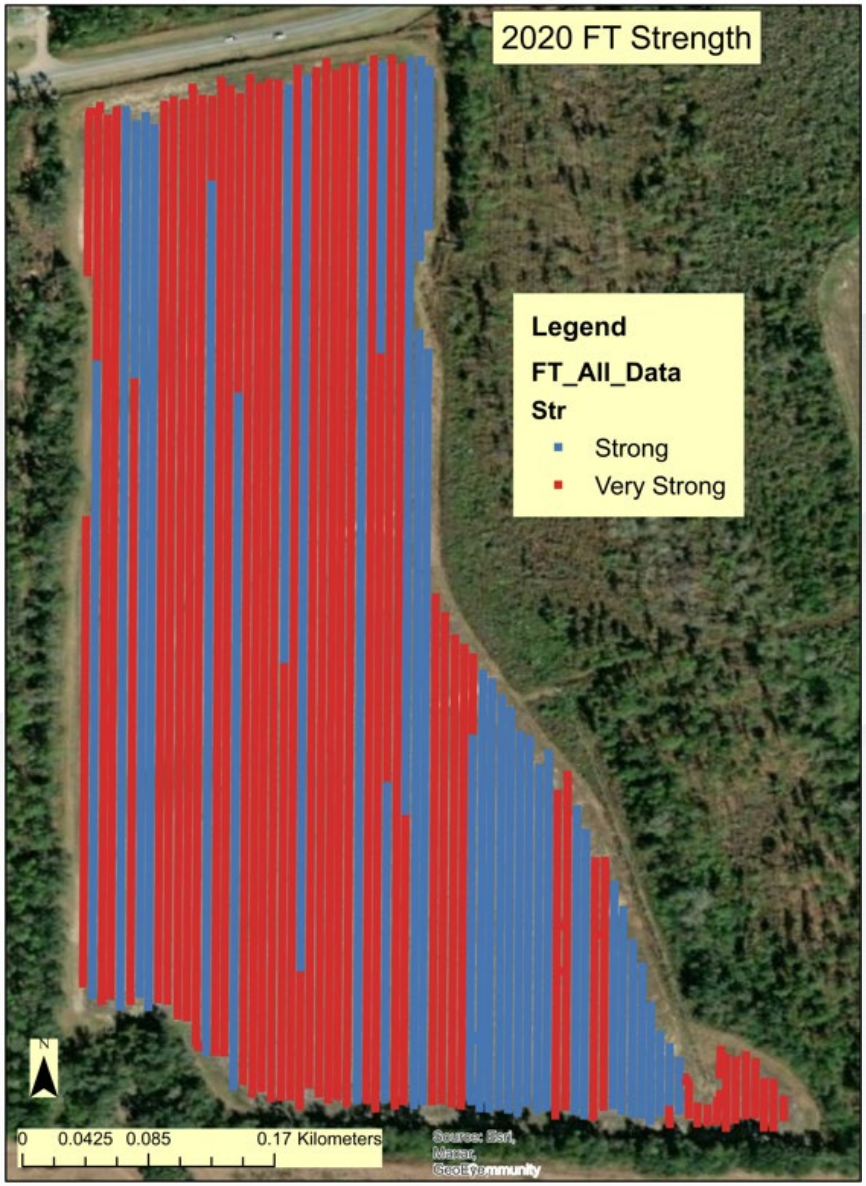
Maps: Strength



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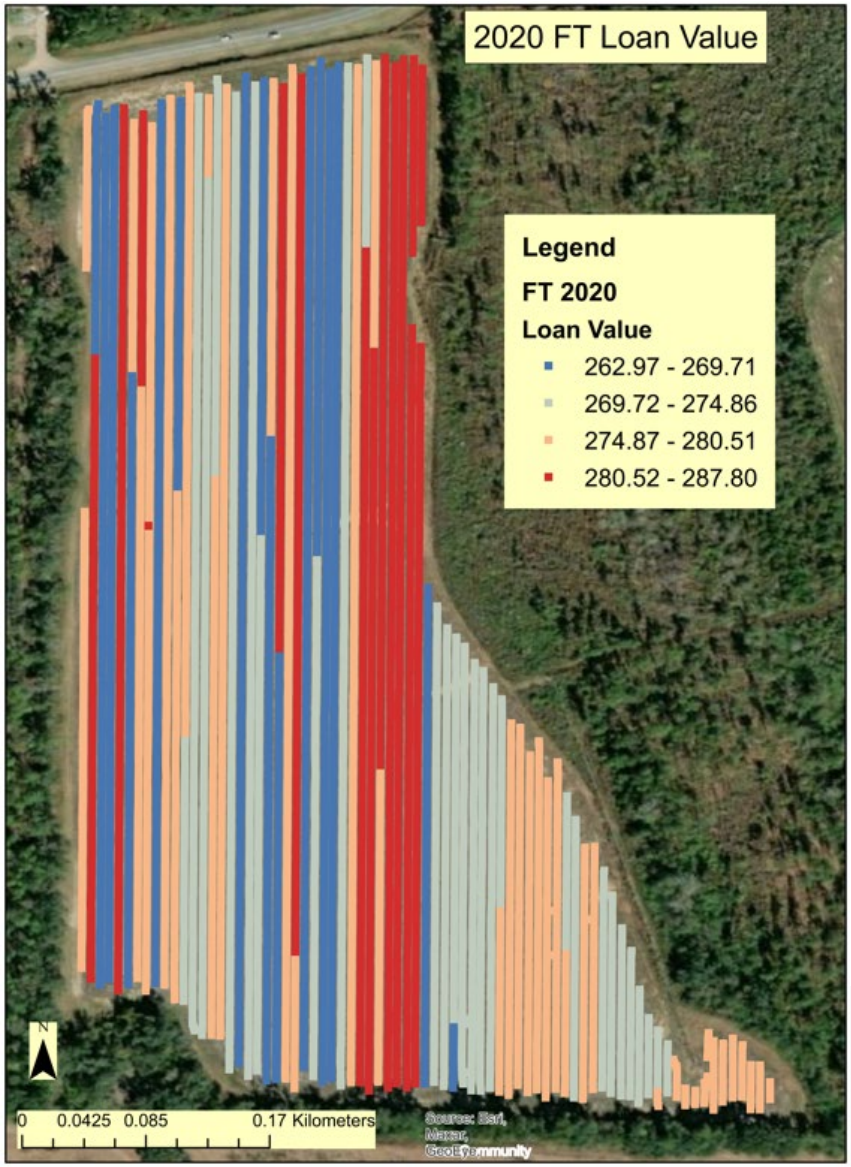
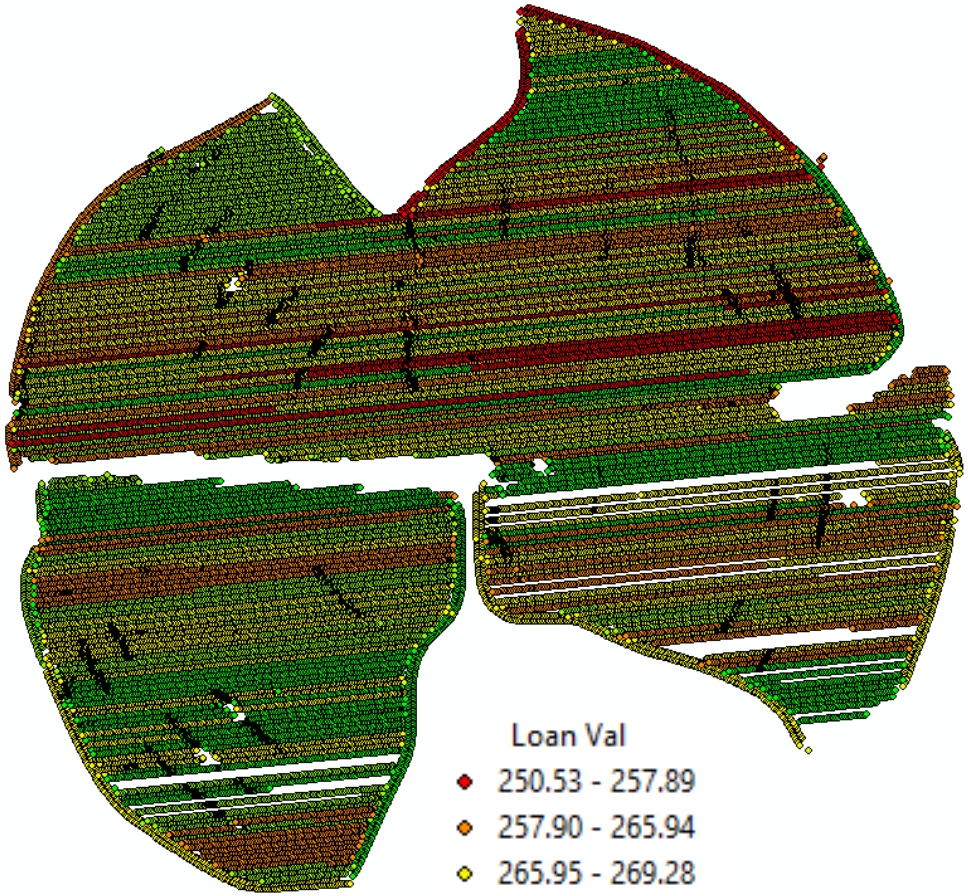
Maps: Loan Value ($/bale)





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QUESTIONS?

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