THE OHIO STATE UNIVERSITY

EVALUATION OF DATA LAYERS TO OPTIMIZE CORN AND SOYBEAN PLACEMENT WITHIN THE SOIL LANDSCAPE

2018 ASABE Annual International Meeting

August 1, 2018

A.A. Klopfenstein, R. Colley III, S. Khanal, J.P. Fulton, S.A. Shearer

Food, Agricultural and Biological Engineering

vDrive Insecticide

Wave Vision

FurrowJet & SmartFirmer

RTK GPS

Monitor

Data Visualization

vApplyHD

vSet &SpeedTube

vSet Select & mSet

DeltaForce

CleanSweep

Change Monitoring

Now what?

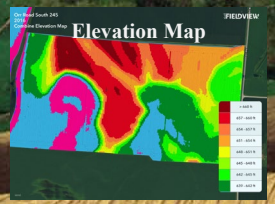
Hybrid prescriptions

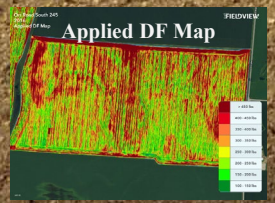
Population prescriptions

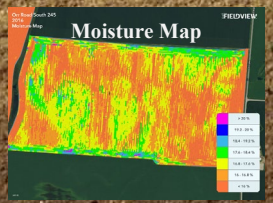
Fertilizer prescriptions

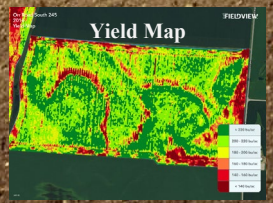
Insecticide prescriptions

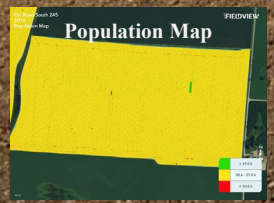
Others?

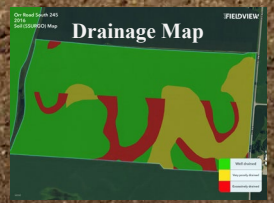


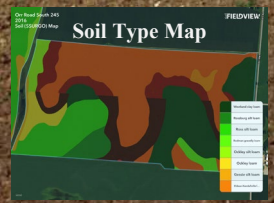


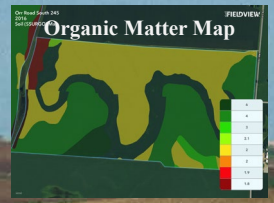


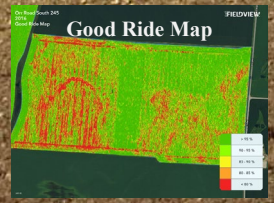


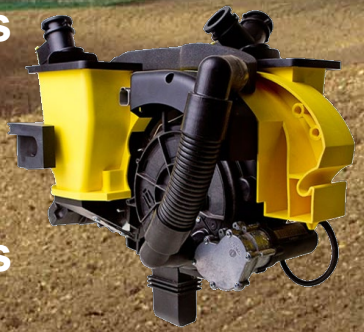












https://upload.wikimedia.org/wikipedia/commons/f/ff/Eroded_soils_in_Iowa.png

Objectives

1. Evaluate challenges of multi-hybrid/variety seeding.
2. Determine the effectiveness of the technology.
3. Consider operational issues, logistics, and benefits to different platforms.
4. Evaluate prescription creation techniques.
5. Consider remote sensing for evaluation of field performance.
6. Evaluate technology with cooperating growers in Ohio.


2015
Magnum 240 and 1255 16-row planter


2016
Magnum 380 and 1245 16/31-row planter

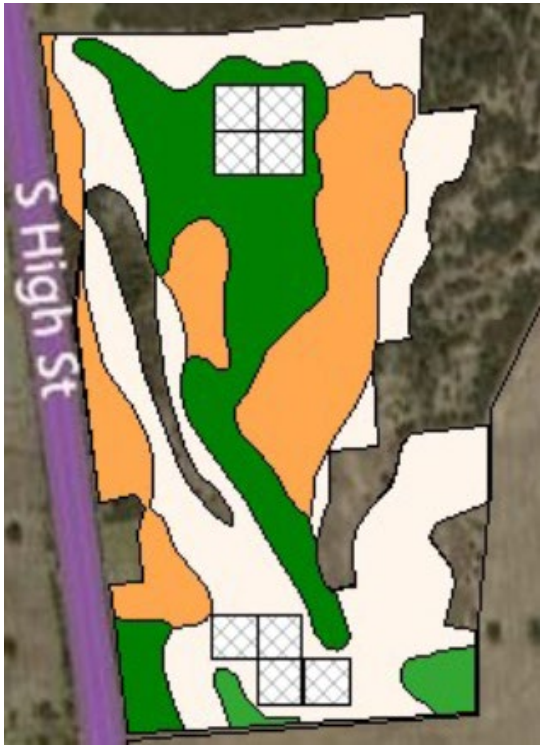

2017
Magnum 380 and 1245 16/31-row planter


2018
Magnum 340 and 1245 16/31-row planter

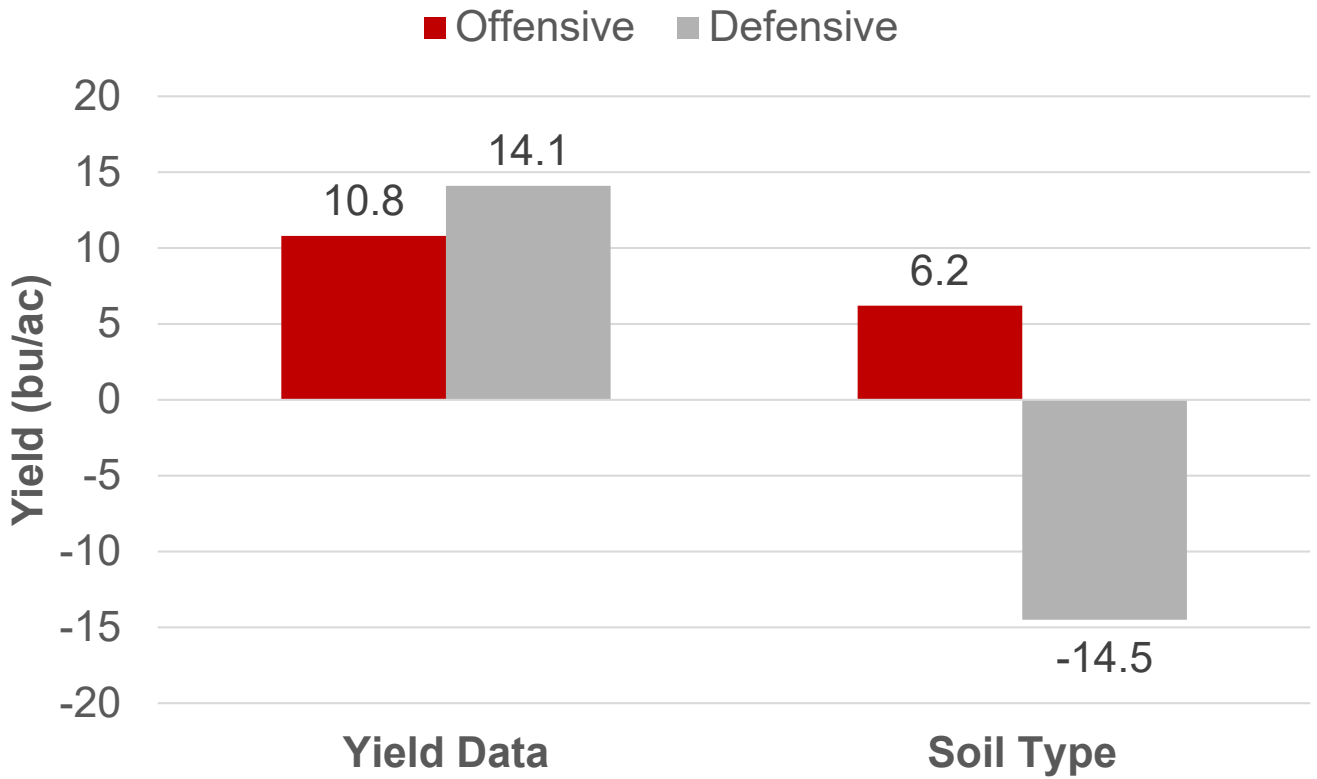
Test Blocks vs Test Strips

2015 Test Blocks

- Corn
- 0.25 to 0.5 acre blocks
- Treatments
  - Defensive hybrid: Low, medium, high population
  - Offensive hybrid: Low, medium, high population
- No replications



Yield Data vs. Soil Type



Test Blocks vs Test Strips

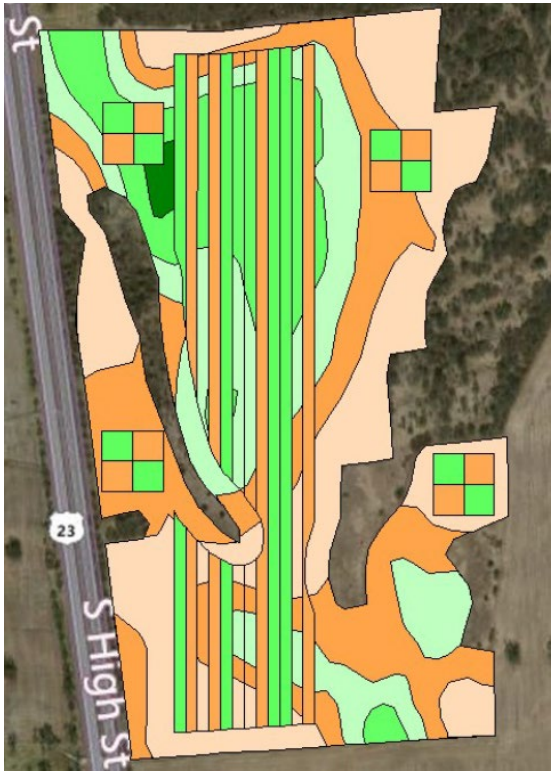
2016 Test Strips

- Corn and Soybeans
- Treatments
  - Solid seed defensive hybrid at low population
  - Solid seed defensive hybrid at high population
  - Solid seed offensive hybrid at low population
  - Solid seed offensive hybrid at high population
  - Inverse of prescription
- Replicated 3 times

Test Blocks vs Test Strips

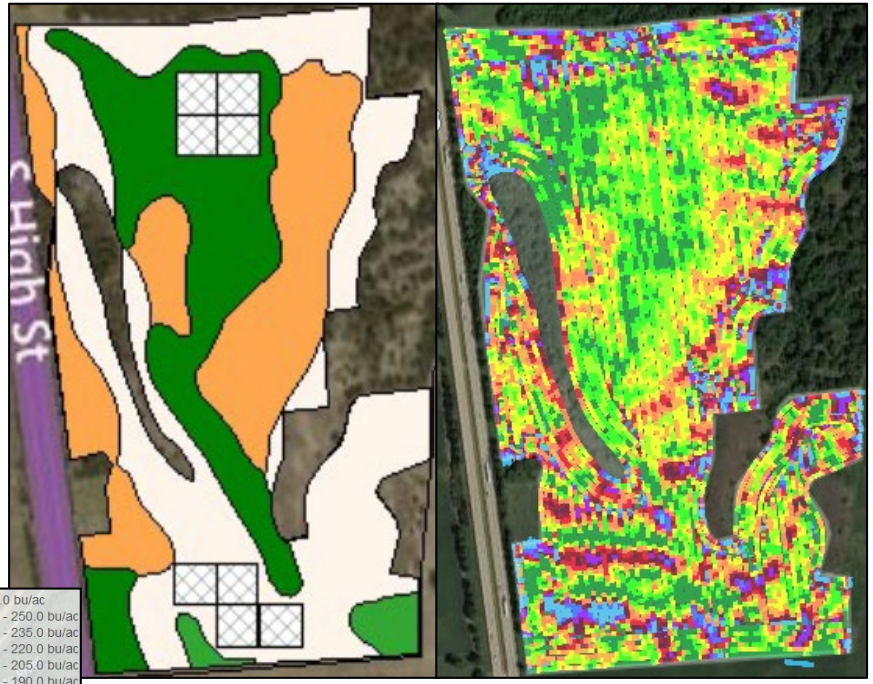
2017 Protocol

- Corn and soybeans
- 0.25 to 0.5 acre blocks
- Treatments
  - Defensive and offensive hybrid
  - One mid population for comparison
  - Rest of comparisons are already in Rx
- Minimum of 3 replications

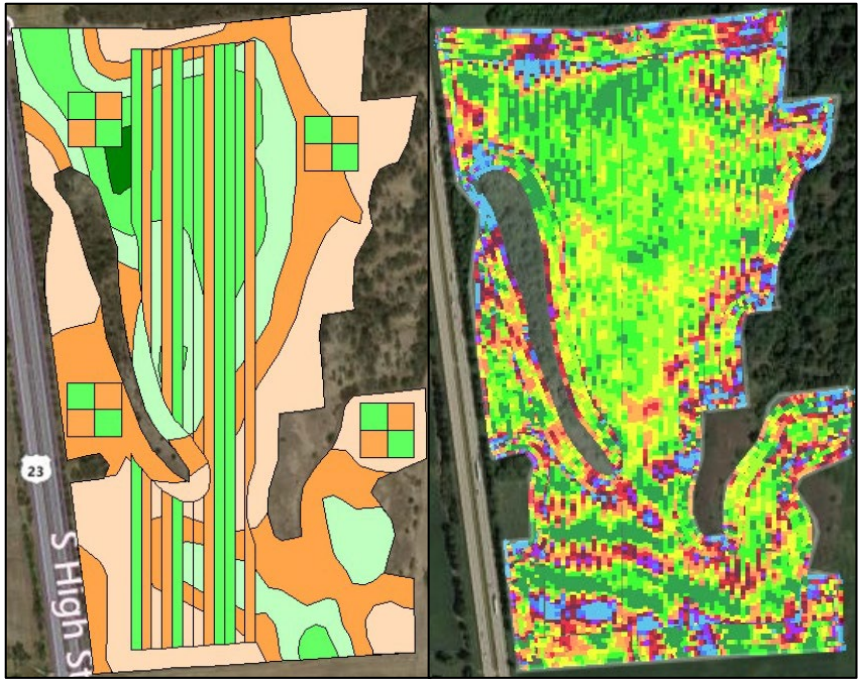


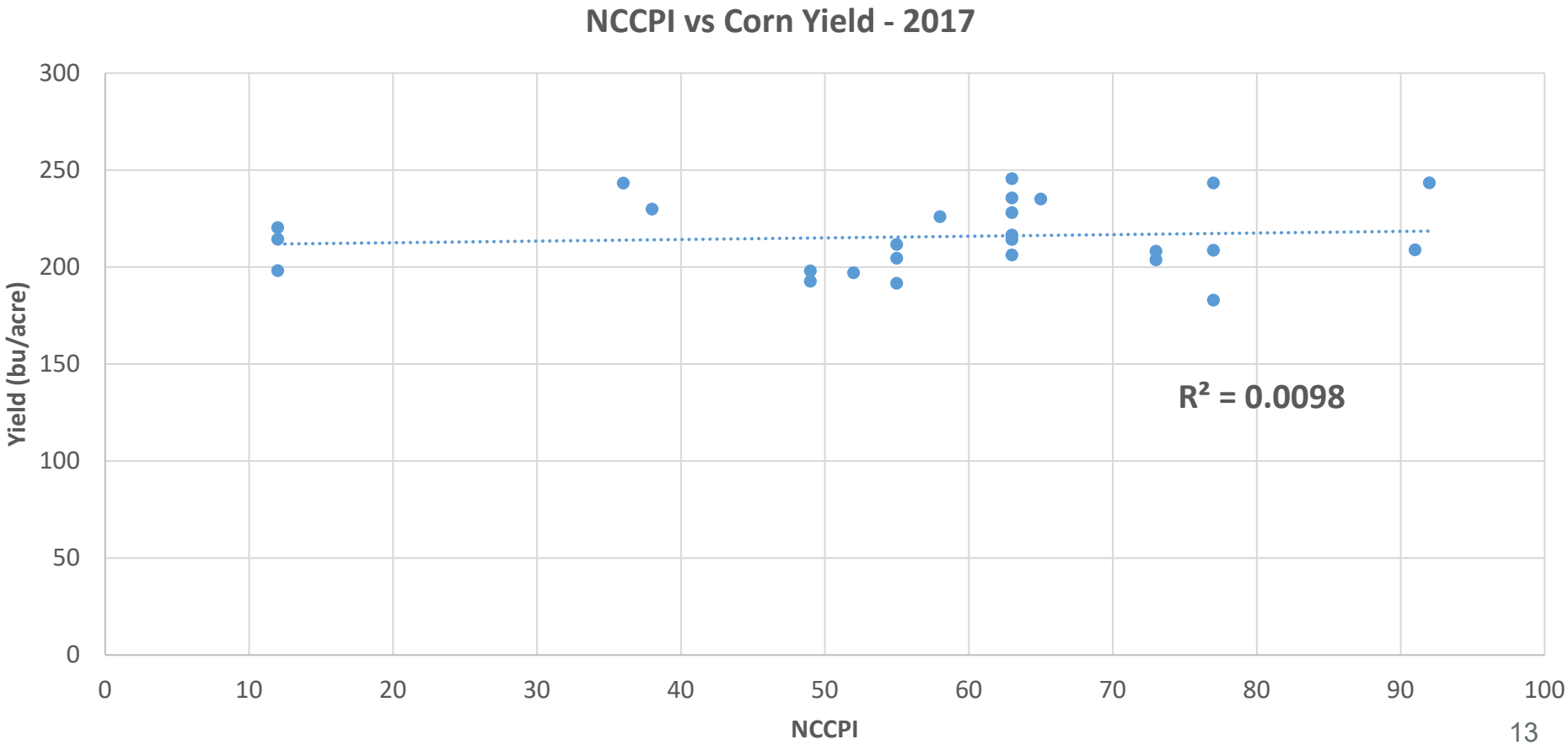
Comparing Corn Yield Maps

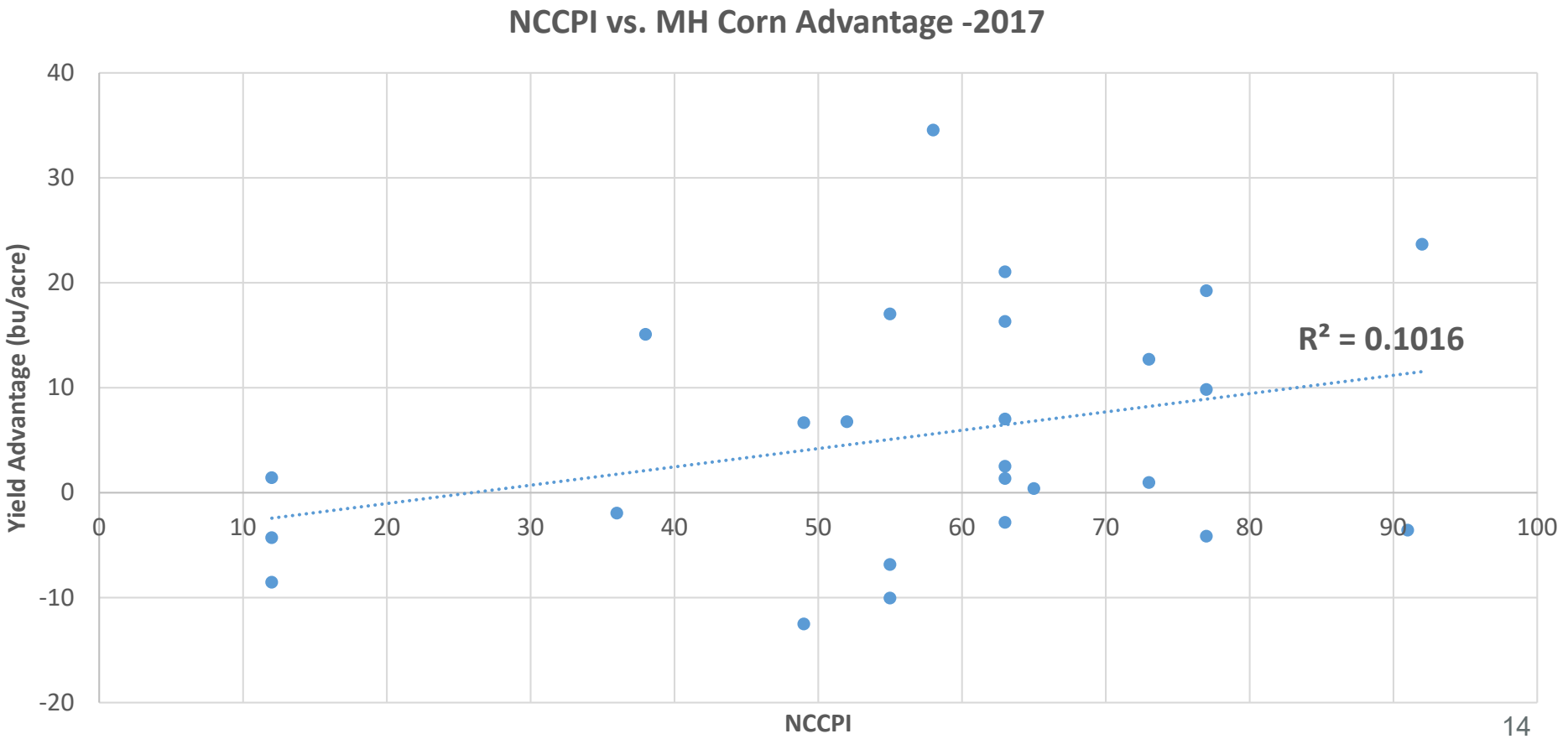
2015

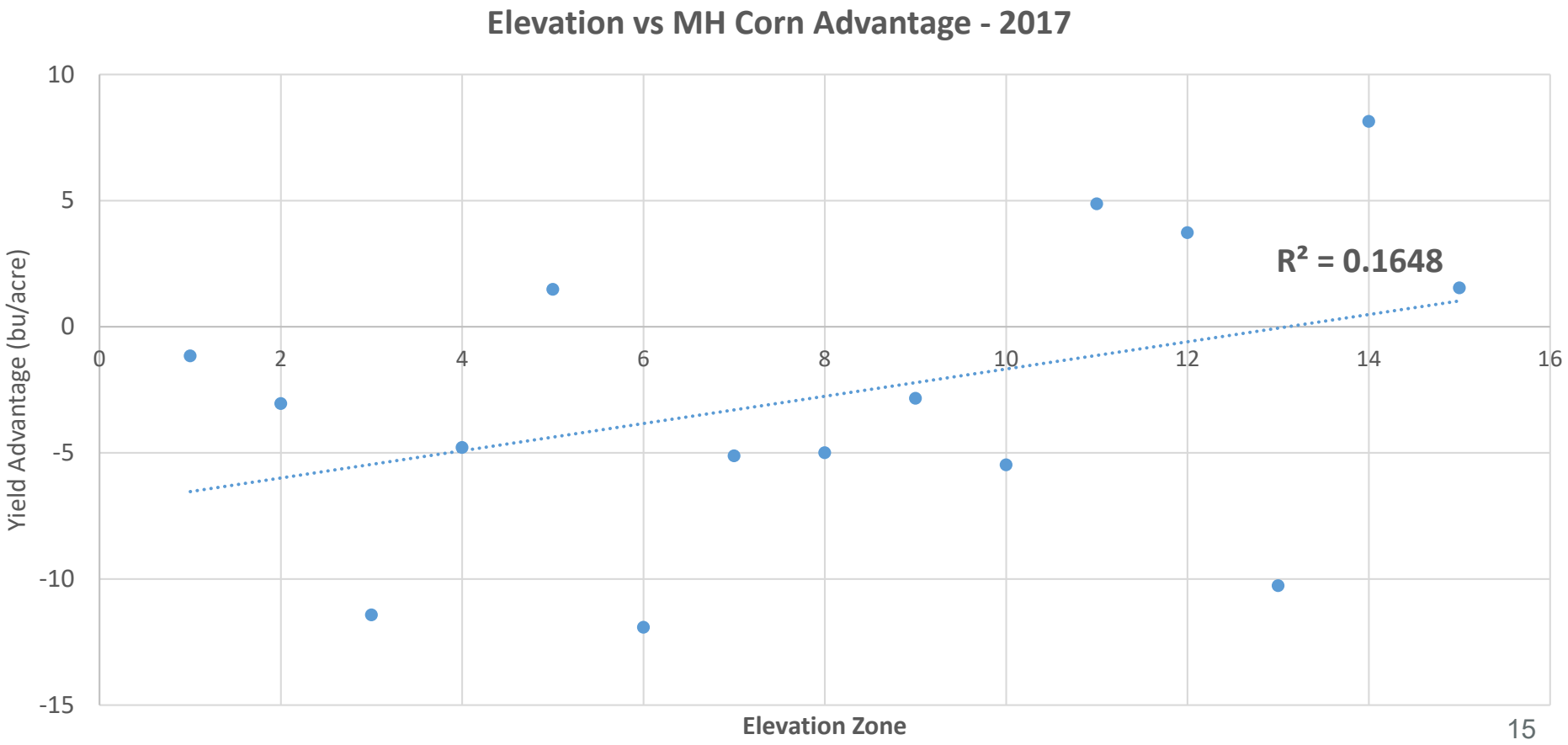


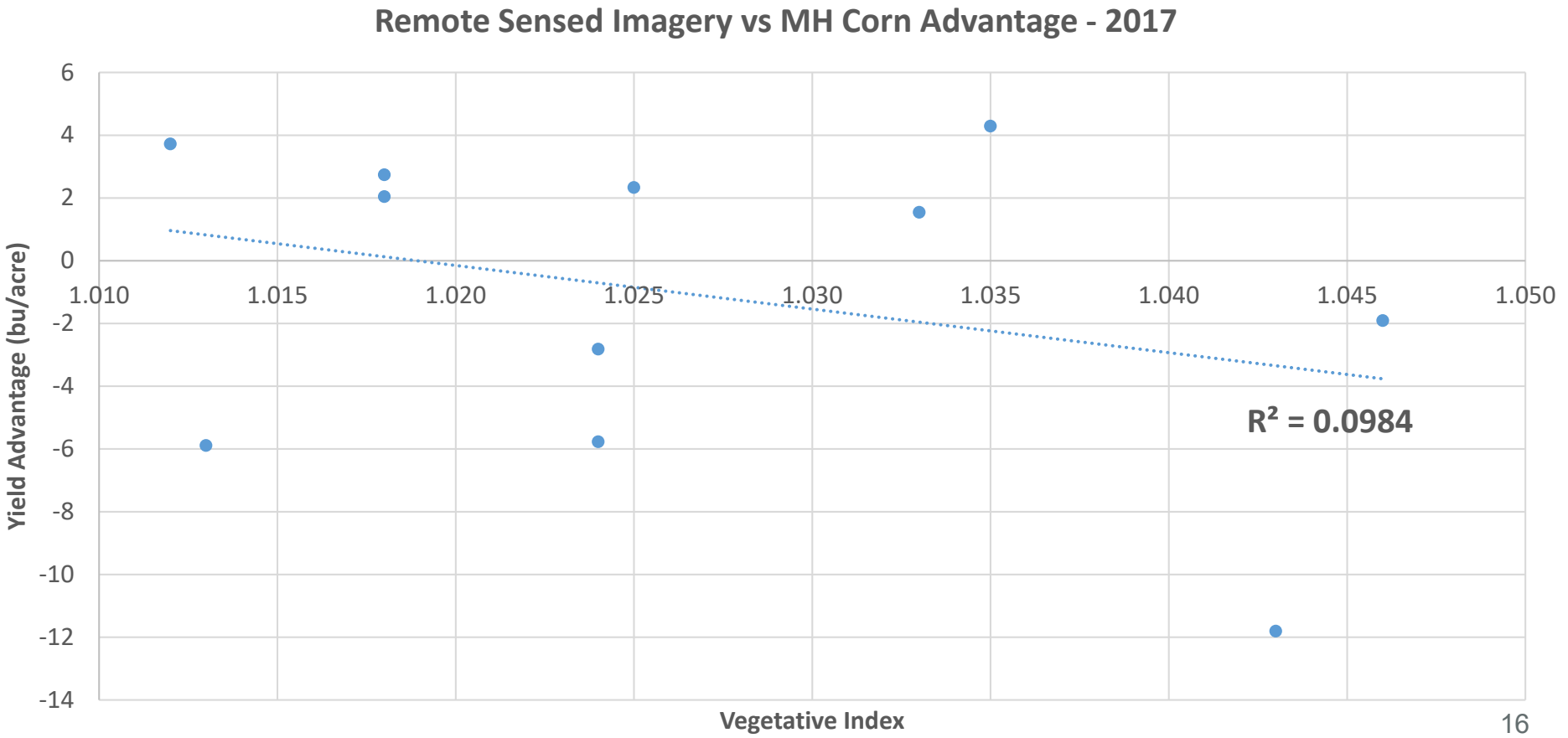
2017




NCCPI vs Corn Yield - 2017
Yield (bu/acre)
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
NCCPI
R² = 0.0098

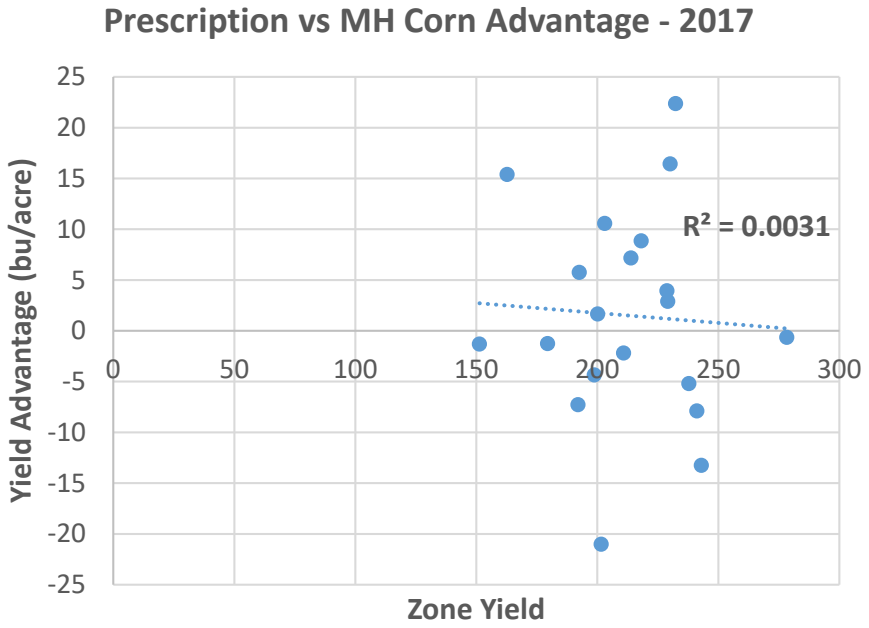

NCCPI vs. MH Corn Advantage -2017
Yield Advantage (bu/acre)
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
NCCPI
R² = 0.1016

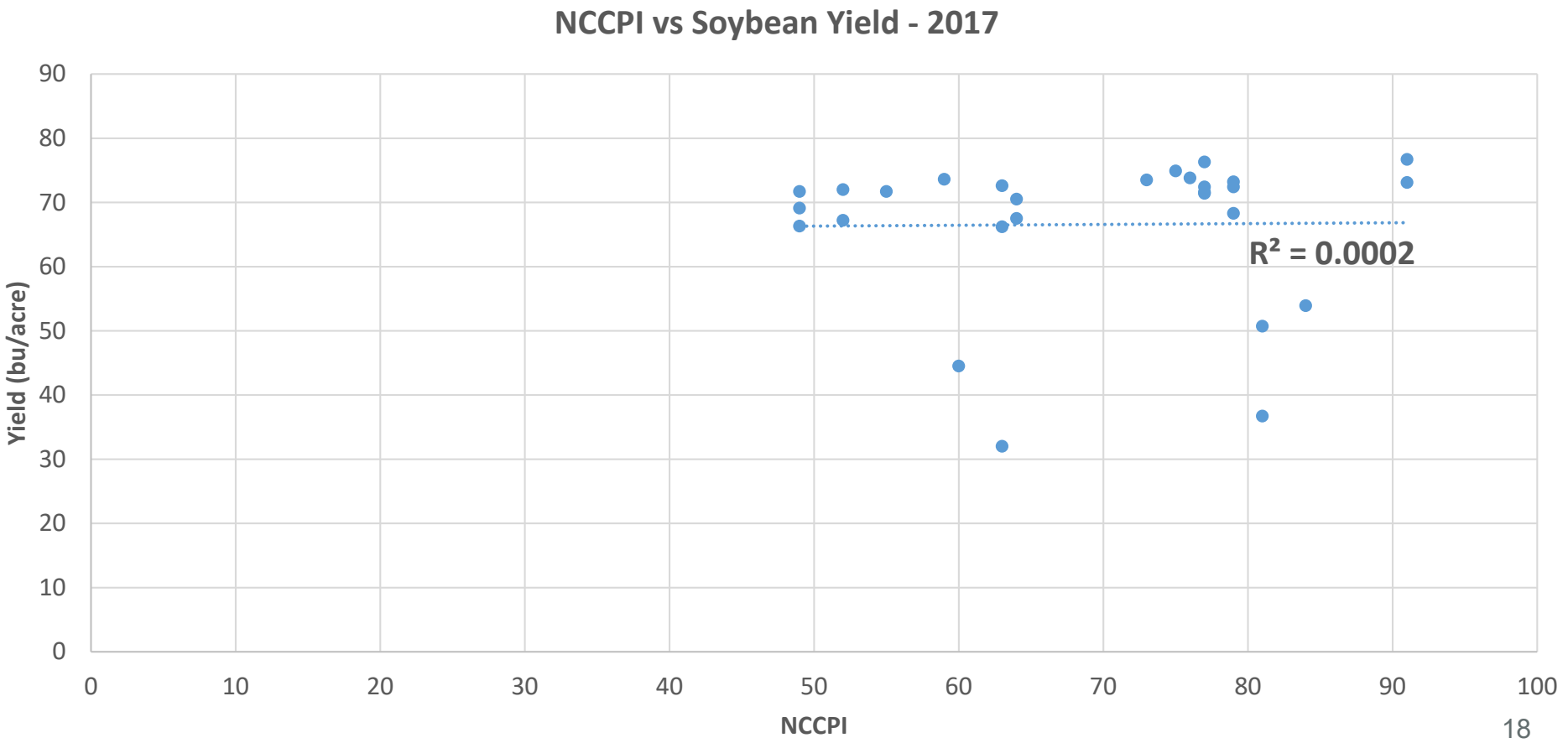

Elevation vs MH Corn Advantage - 2017
10
5
0
-5
-10
-15
0
2
4
6
8
10
12
14
16
Yield Advantage (bu/acre)
Elevation Zone
R² = 0.1648

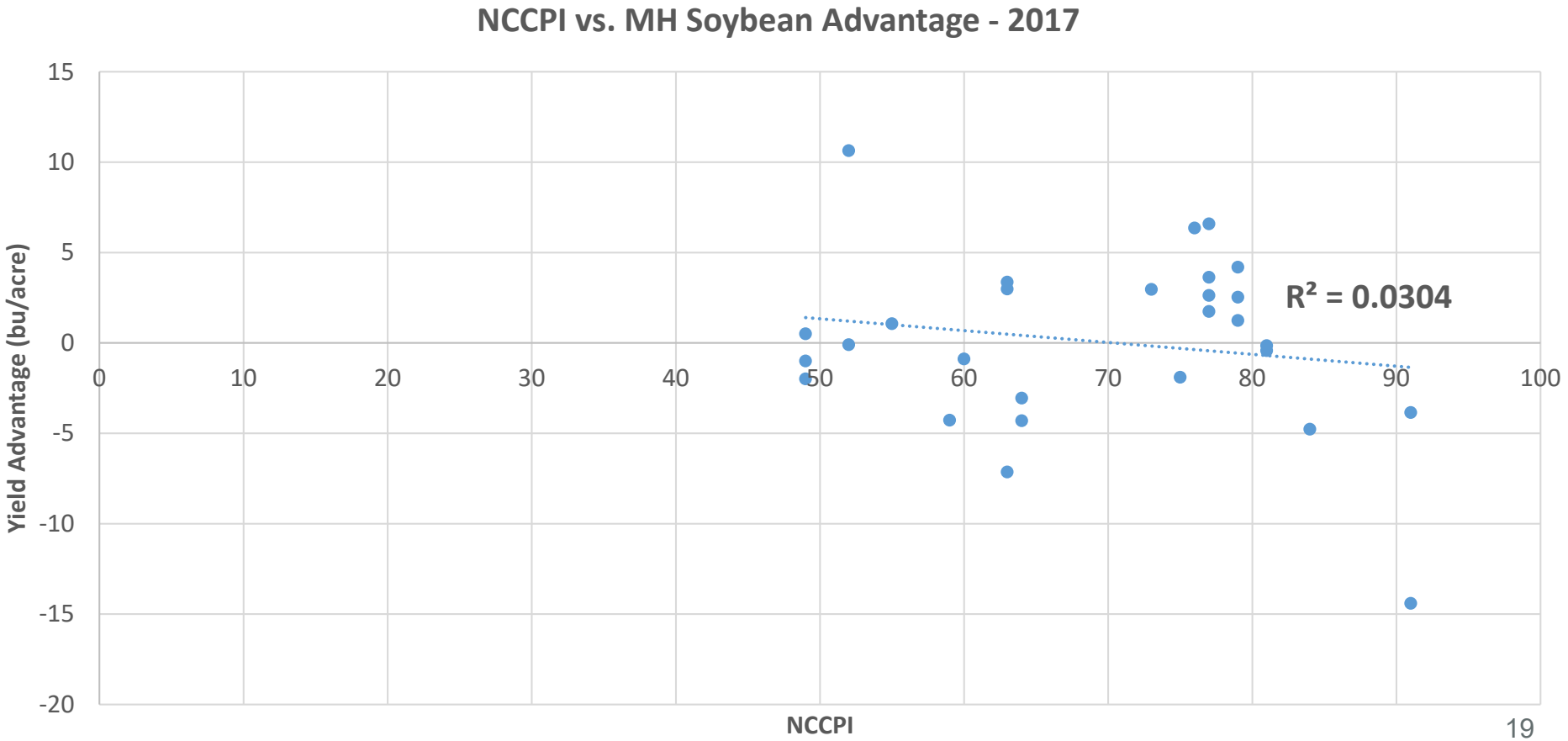

Remote Sensed Imagery vs MH Corn Advantage - 2017
Yield Advantage (bu/acre)
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
1.010
1.015
1.020
1.025
1.030
1.035
1.040
1.045
1.050
Vegetative Index
R² = 0.0984

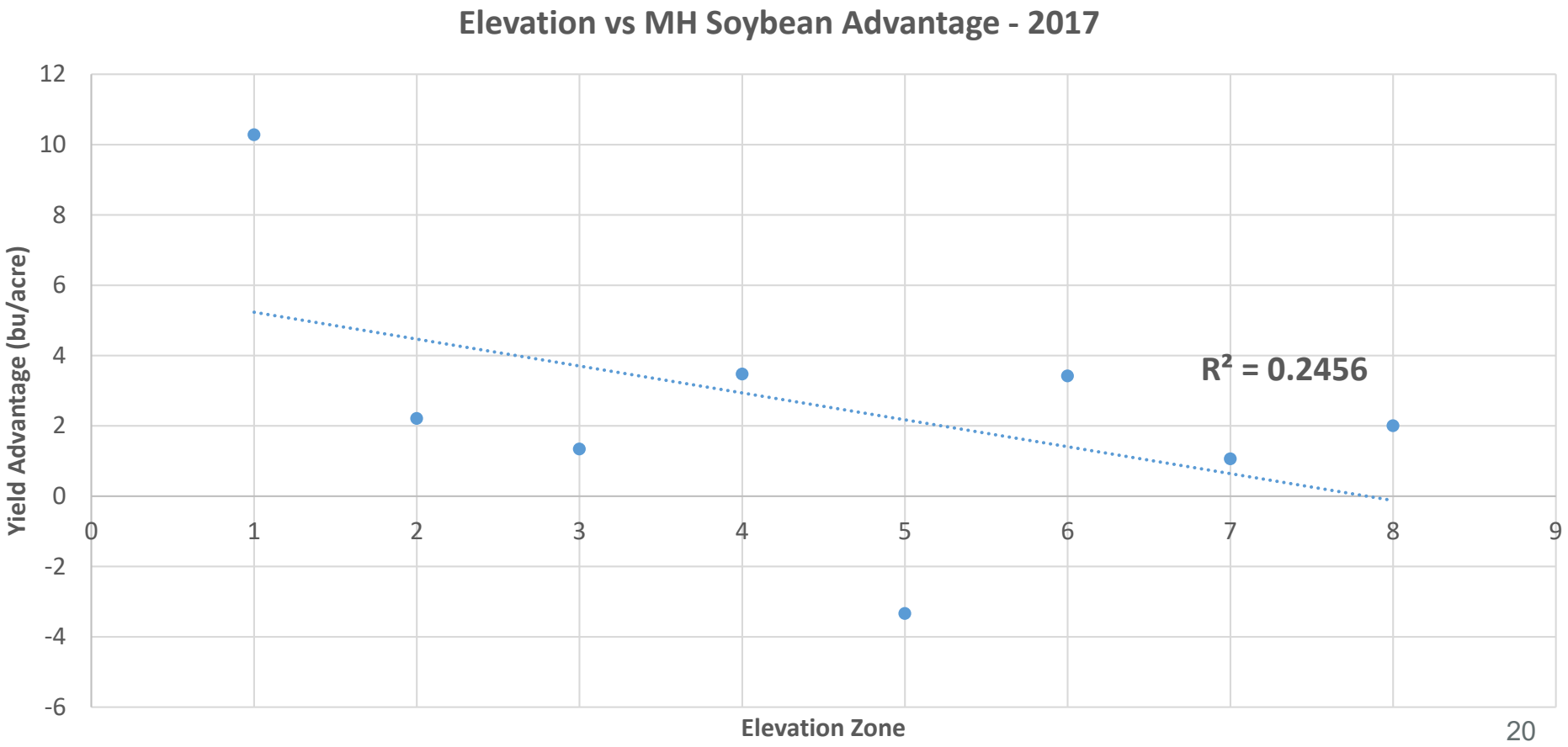
2017 Corn Conclusions

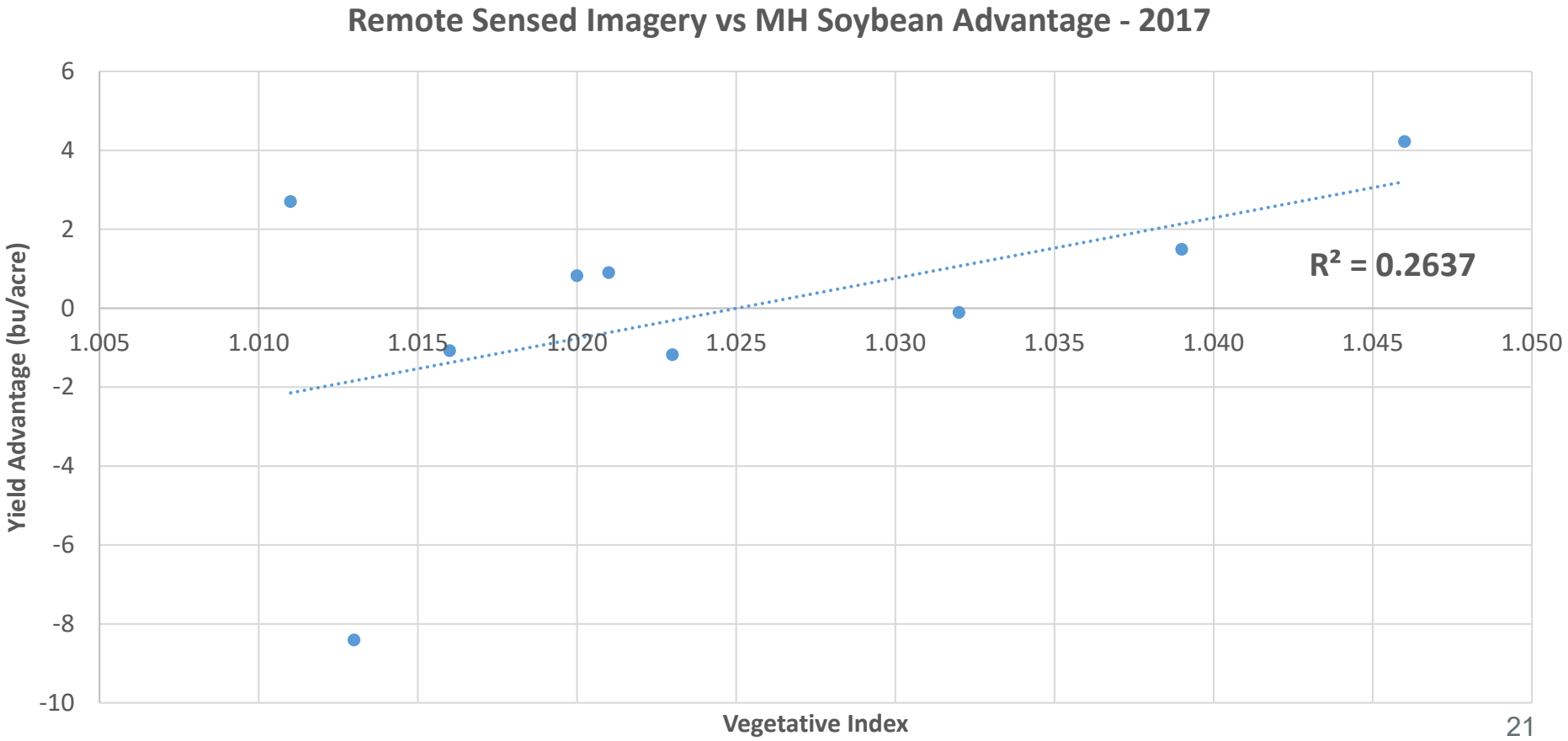
Field	Zone	Zone Yield	Defensive	Offensive	Advantage
N Rathmell West	L	151.3	176.1	174.8	-1.3
SE Off SR 23 70 ac	L	162.8	134.5	149.8	15.4
N Rathmell South	L	179.5	173.1	171.8	-1.3
N Rathmell North	ML	192.0	193.7	186.4	-7.3
N Rathmell West	ML	192.6	202.6	208.4	5.7
N Rathmell West	MH	198.8	240.8	236.4	-4.4
N Rathmell North	M	200.1	215.6	217.2	1.6
SE Off SR 23 70 ac	ML	201.6	213.7	192.7	-21.0
Crist	VL	203.1	221.9	232.4	10.6
N Rathmell West	M	210.9	222.9	220.7	-2.2
N Rathmell South	ML	213.9	198.5	205.7	7.2
Crist	M	218.2	245.5	254.3	8.8
N Rathmell South	M	228.8	223.6	227.5	3.9
SE Off SR 23 70 ac	M	229.2	229.9	232.8	2.9
Crist	L	230.1	219.3	235.7	16.4
Crist	H	232.4	251.0	273.4	22.4
N Rathmell South	MH	237.8	247.6	242.4	-5.2
SE Off SR 23 70 ac	MH	241.1	241.6	233.7	-7.9
N Rathmell North	MH	243.0	264.0	250.8	-13.3
N Rathmell North	H	278.3	288.3	287.7	-0.7




NCCPI vs Soybean Yield - 2017
Yield (bu/acre)
NCCPI
R² = 0.0002
0
10
20
30
40
50
60
70
80
90
100

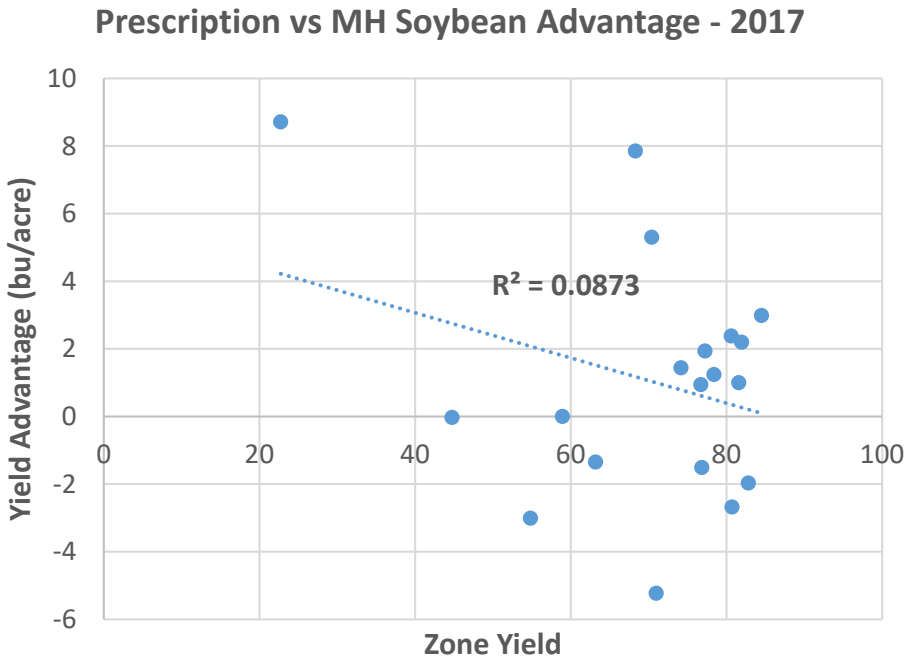

NCCPI vs. MH Soybean Advantage - 2017
Yield Advantage (bu/acre)
15
10
5
0
-5
-10
-15
-20
0
10
20
30
40
50
60
70
80
90
100
NCCPI
R² = 0.0304


Elevation vs MH Soybean Advantage - 2017
Yield Advantage (bu/acre)
12
10
8
6
4
2
0
-2
-4
-6
0
1
2
3
4
5
6
7
8
9
R² = 0.2456
Elevation Zone


Remote Sensed Imagery vs MH Soybean Advantage - 2017
Yield Advantage (bu/acre)
6
4
2
0
-2
-4
-6
-8
-10
1.005
1.010
1.015
1.020
1.025
1.030
1.035
1.040
1.045
1.050
Vegetative Index
R² = 0.2637

2017 Soybean Conclusions

Field	Zone	Zone Yield	Defensive	Offensive	Advantage
South Bloomfield	L	22.7	23.3	32.0	8.7
South Bloomfield	ML	44.8	39.4	39.4	0.0
South Bloomfield	M	54.8	53.3	50.3	-3.0
South Bloomfield	MH	58.9	54.1	54.1	0.0
South Bloomfield	H	63.2	60.7	59.4	-1.4
SW Off SR23 114 ac	L	68.3	60.6	68.5	7.9
South of Rathmell	L	70.4	67.9	73.2	5.3
SE Off SR 23 209 ac	L	71.0	66.3	61.1	-5.2
SE Off SR 23 209 ac	ML	74.2	66.3	67.8	1.4
SW Off SR23 114 ac	M	76.7	70.0	70.9	0.9
SW Off SR23 114 ac	ML	76.8	70.0	68.5	-1.5
South of Rathmell	ML	77.2	72.0	73.9	1.9
SE Off SR 23 209 ac	M	78.4	67.6	68.8	1.2
South of Rathmell	M	80.6	74.5	76.9	2.4
SW Off SR23 114 ac	MH	80.7	76.8	74.2	-2.7
SE Off SR 23 209 ac	MH	81.6	74.0	75.0	1.0
South of Rathmell	MH	82.0	77.6	79.8	2.2
SW Off SR23 114 ac	H	82.8	78.16	76.19	-2.0
South of Rathmell	H	84.5	78.0	80.9	3.0



Return on Investment (Beck's Hybrids 2012-2017)

Multi-hybrid Cost
16 row: $31,200 or $1950/Row

Beck's Multi-Year Data		
Corn (7/17/2018, $3.46 per bushel)	+6.1 bu/ac	$21.11/acre
Soybeans (7/17/2018, $8.35 per bushel)	+1.9 bu/ac	$15.87/acre

Break-Even Acreage

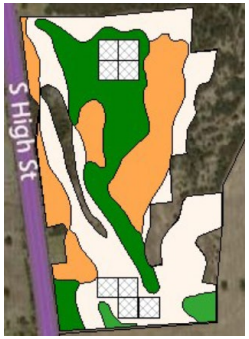
Corn ~ 1477 acres
or
Soybeans ~1965 acres

Grower Conclusions

- Numerous challenges using multi-hybrid technology not just plug and play
- If grower has not ever used variable rate seeding do not use multi hybrid
- Growers must be ready for seed logistics more than ever before
- Switching hybrids could be yield swings of 50 plus bushels per acre
- Planter calibration and setup is critical or will cause gaps and offsets in field critical transition areas
- Mechanically meters have little to no issues
- Growers do not understand their data or the quality of their data
- Growers do not know which data to use and when to use it
- Agronomists do not have all the tools to make sound decisions for seed placement
- Be prepared to make more planter adjustments
- ROI is going to change with introduction of mSet
- ALWAYS DIG BEHIND PLANTER!

Research Conclusions

- Must have test block/strips replicated to double check placement but **which method?**
- Remote sensed imagery will be key for creating prescriptions for growers with little yield history
- **Need a standard protocol for testing zones in fields (Harvest, Planting, Rx generation, Reporting, etc.)**
- Average duration of marketing a hybrid is 18 months
- No true defensive hybrids on market, current we are overloaded with hybrids that are both and stay in the middle of genetics
- With correct data and grower management multi-hybrid will show benefit
- Seed companies are behind the learning curve compared to the equipment companies
- Be ready to fail and get hybrid placement wrong
- Water and growing season affects results considerably



Acknowledgments

CASE IH

Precision Planting

Mike Hannewald - Beck's Hybrids
Craig Rodgers - Beck's Hybrids
Radcliff Farms

BECK'S

airSCOUT®

Digital Agriculture

Providing solutions to meet world demand

Andrew Klopfenstein
Klopfenstein.34@osu.edu

Ohio State Precision Ag Program

www.OhioStatePrecisionAg.com

Twitter: **@OhioStatePA**

Facebook: **Ohio State Precision Ag**

Precision Ag