THE OHIO STATE UNIVERSITY

OPERATIONAL CHALLENGES AND YIELD IMPLICATIONS OF INCREASING CORN PLANTING SPEEDS

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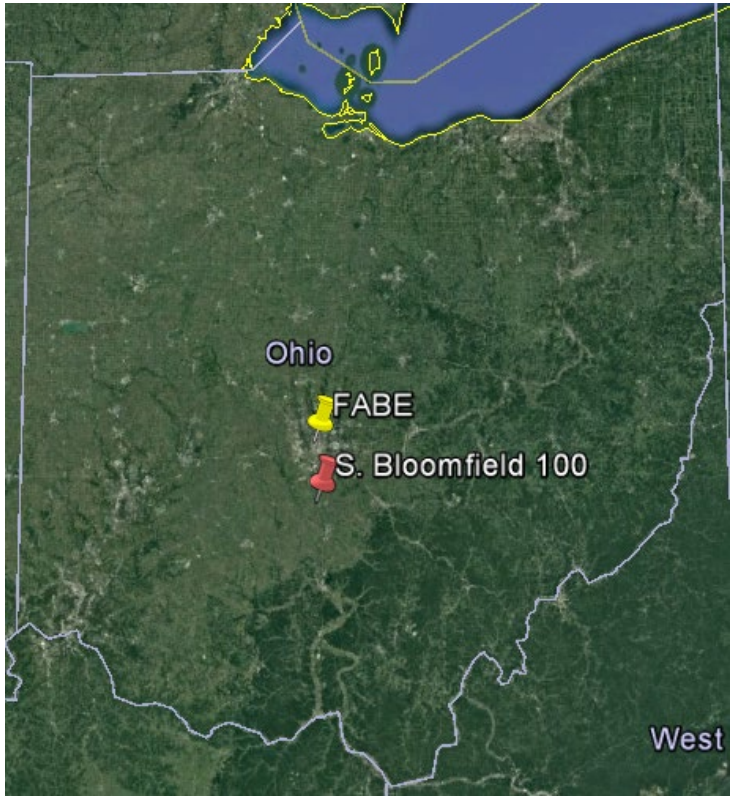
Food, Agricultural and Biological Engineering

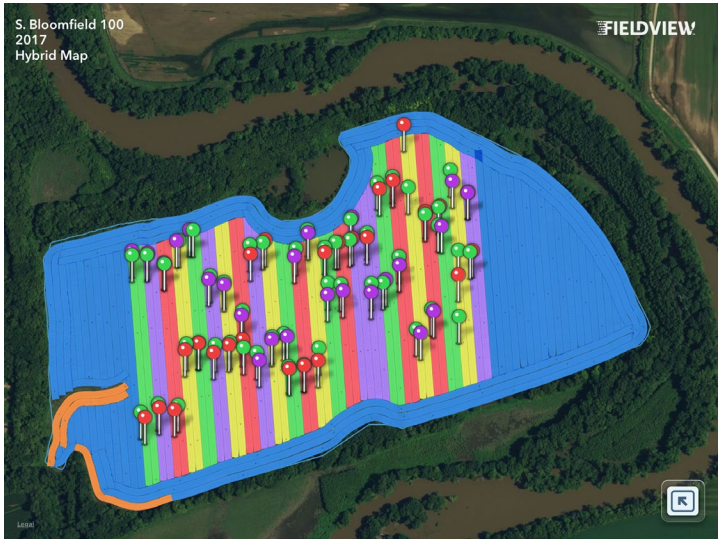
Objectives

1. Layout field investigation conducted to evaluate the effectiveness of high speed planting, operational realities, and yield impact.
2. Evaluate seed spacing and emergence as a function of planting speed.
3. Evaluate crop with aerial imagery performed to assess crop vigor as a function of planting speed.

SB 100



- South Bloomfield, OH
- Cooperator Beck's Hybrids
- 31.24 inches of rain during 2016



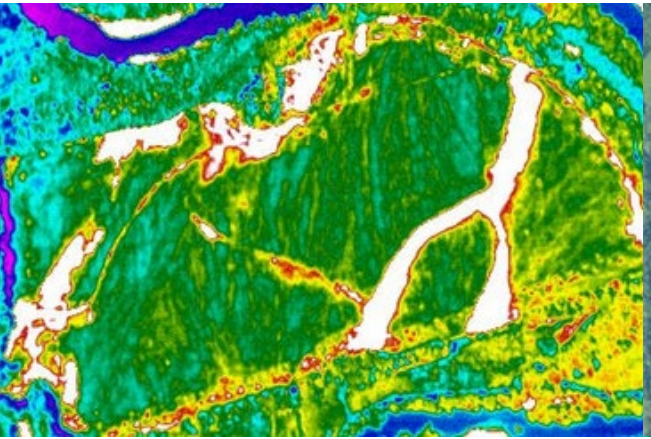
South Bloomfield 100 – Speed Plots

4 Speeds

- 5 mph
- 7.5 mph
- 10 mph
- 12.5 mph

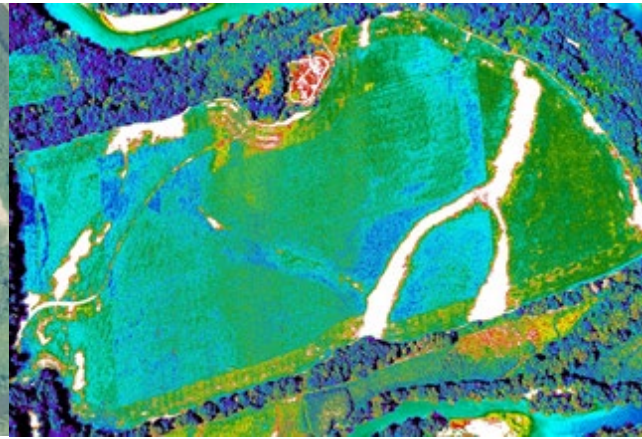
Imagery - Airscout 7-27-2016

Thermal



RGB

ADVI



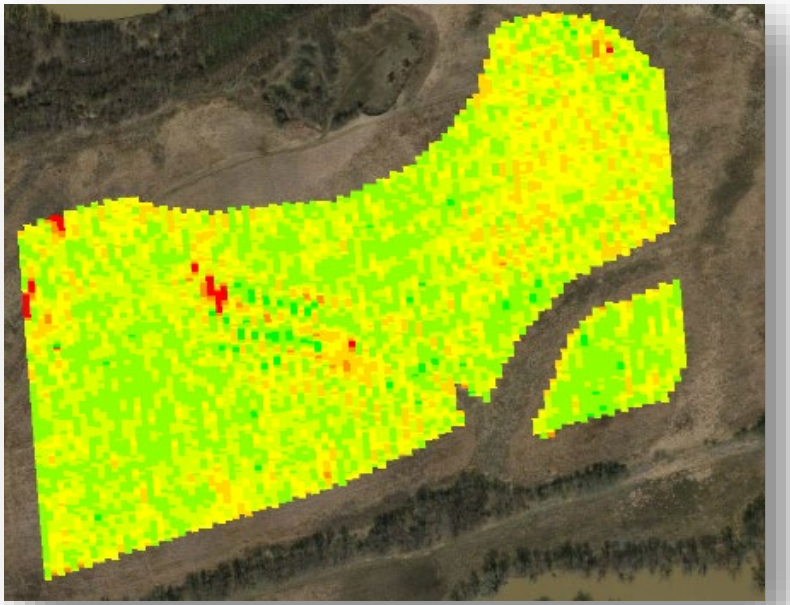
South Bloomfield 100 – Results

SMS Planting Data				
Actual Speed (MPH)	Planted Population	Singulation %	Nominal Spacing	Average Spacing Variation (%)
5.3	32,110	98.8	6.5	14.8
7.8	32,120	99.0	6.5	14.8
10.3	32,110	99.2	6.5	14.9
12.5	32,010	99.3	6.5	14.8

POGO Planting Data				
Planted Population	Singulation %	Nominal Spacing	Standard Deviation	CV (%)
32,911	97.1	6.1	2.0	**32.8**
33,194	96.9	6.1	2.0	**33.7**
33,010	96.5	6.0	2.2	**36.0**
32,724	96.7	6.2	2.0	**32.2**

South Bloomfield 100 – Results

Summary (MPH)	Acres	Moisture (%)	AVG Yield (bu/acre)
5	11.2	19.1%	204.9
7.5	10.6	19.2%	205.5
10	11.1	19.2%	205.1
12.5	11.14	19.3%	204.7

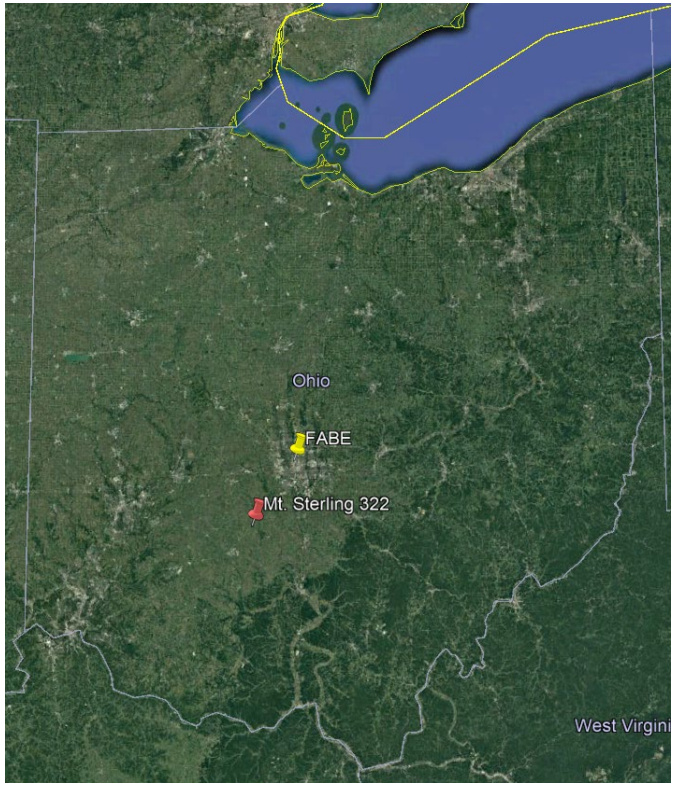


High Speed Planting

2016
- 5 mph
- 7.5 mph
- 10 mph
- 12.5 mph

2017
- 5 mph
- 7.5 mph
- 10 mph
- 12.5 mph
- 15-18 mph

Mt. Sterling 322

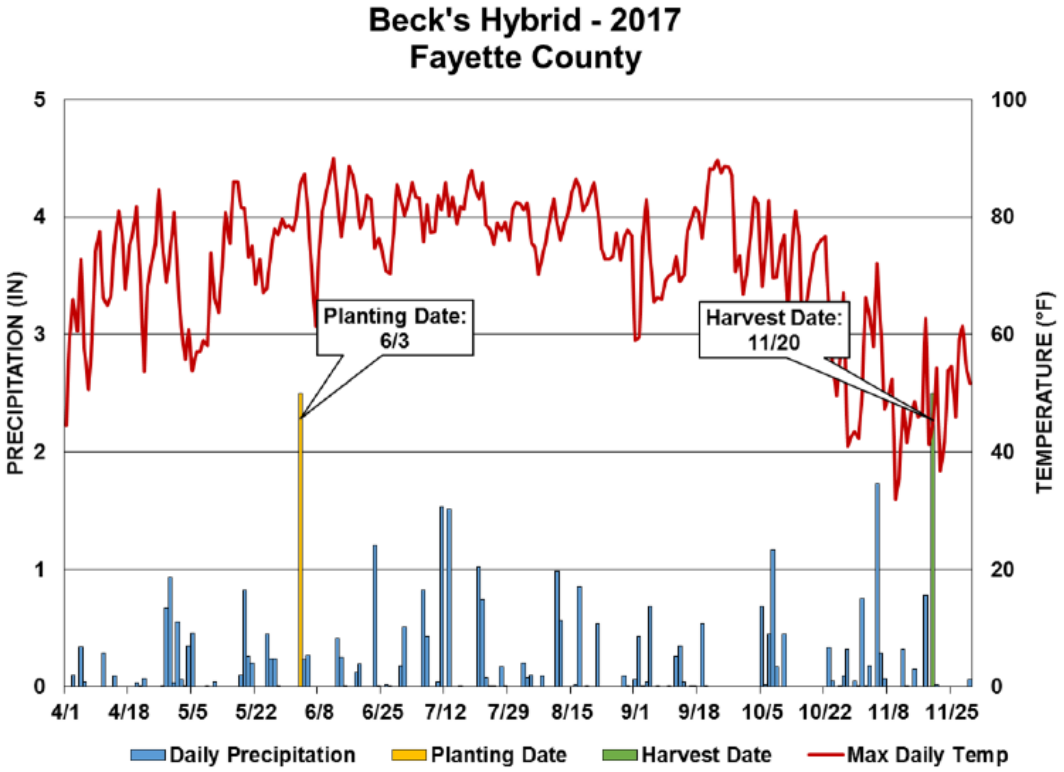


- Mount Sterling, OH
- Cooperator Beck's Hybrids
- 23.27 inches of rain during 2017

Soil Type

Fayette County, Ohio (OH047)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Bs	Brookston silty clay loam, fine texture, 0 to 2 percent slopes	7.3	10.30%
CeB	Celina silt loam, 2 to 6 percent slopes	16.6	23.40%
CrA	Crosby silt loam, Southern Ohio Till Plain, 0 to 2 percent slopes	36.5	51.40%
MIB2	Miamian silt loam, 2 to 6 percent slopes, eroded	3.6	5.00%
MmC3	Miamian clay loam, shallow to dense till substratum, 6 to 12 percent slopes, severely eroded	4.3	6.10%
MmD3	Miamian clay loam, shallow to dense till substratum, 12 to 18 percent slopes, severely eroded	2.6	3.70%
Totals for Area of Interest		**70.9**	**100.00%**

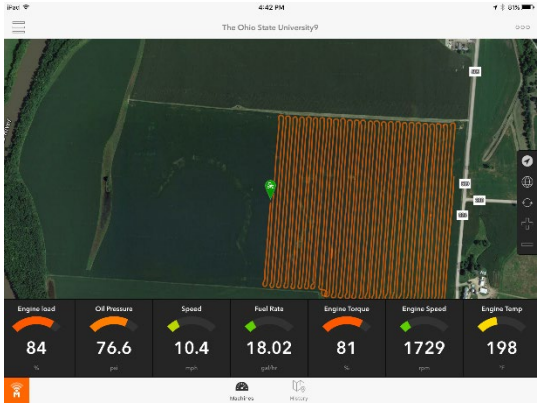
Mt. Sterling 322 – Timeline



Specifications

Speed (mph)	Theoretical Field Capacity[1] (ac/hr)	Adjusted Field Capacity[2] (ac/hr)
5	24	19
7.5	36	29
10	48	38
12.5	60	48
17.0	82	58

1) Assumes no stops or downtime.
2) Accounts for turning, re-loading, etc.



2017 Results

Treatments	Observed Singulation	Spacing Standard Deviation	Spacing CV	Yield (bu/ac)	Yield Diff (bu/ac)
5.0 mph	96.6	1.8	0.29	**210.7**[a]	**-**
7.5 mph	96.2	1.9	0.31	**210.5**[a]	**-0.2**
10.0 mph	95.6	2.0	0.33	**210.3**[a]	**-0.4**
12.5 mph	95.8	2.0	0.32	**207.3**[a]	**-3.4**
17.0 mph	94.1	2.3	0.37	**208.7**[a]	**-2.0**

Conclusions

- No statistical difference in emergence for different speeds
- No statistical difference in yield for different speeds
- Operators will vary speed based on ground conditions
- Field preparation makes a difference on row unit ride as well as soil conditions
- Hydraulic downforce settings need to be higher to maintain quality ride at high speeds
- Fertilizer rates vary widely from 5 to 12.5 mph and must account for this during planting and orifice selection

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