

# Management Practices to Optimize Winter Barley & Wheat Yield and Quality

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April 2, 2021. Grains for Brewing and Distilling  
Virtual Happy Hour



Cropping Systems Agronomy  
MICHIGAN STATE UNIVERSITY



# MSU Agronomy Program

Identify current and emerging issues in cropping systems of Michigan with an overall goal to improve the productivity, profitability, and resiliency of these systems



## Benefits of Small Grains

in crop rotation

- Economic
- Environmental

# Integrated Crop Management: Yield vs Quality

- Crop rotation
- Variety Selection
- Planting Date
- Plant Population
- Row Spacing
- Fertility management
- Pest management
- Harvest timing



**Winter Wheat**



**Winter Barley**

## 2019-20 Growing Season, MSU Mason Farm

- **Variety: Teepee (barley), Whitetail (wheat)**  
**Nitrogen: 30 lbs fall, 75 lbs spring for barley**

### Plant dates (PD):

PD1: Sept 19

PD2: Oct 7

PD3: Oct 18

PD4: Oct 29

PD5: Nov 15

### Seed rates (SR):

SR1: 0.8 m/ac

SR2: 1.2 m/ac

SR3: 1.6 m/ac

SR4: 2.0 m/ac

SR5: 2.4 m/ac



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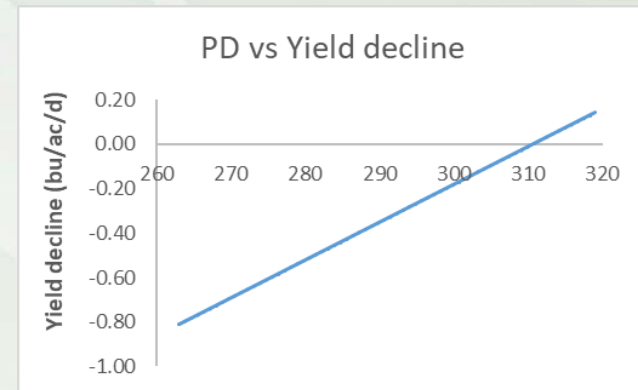
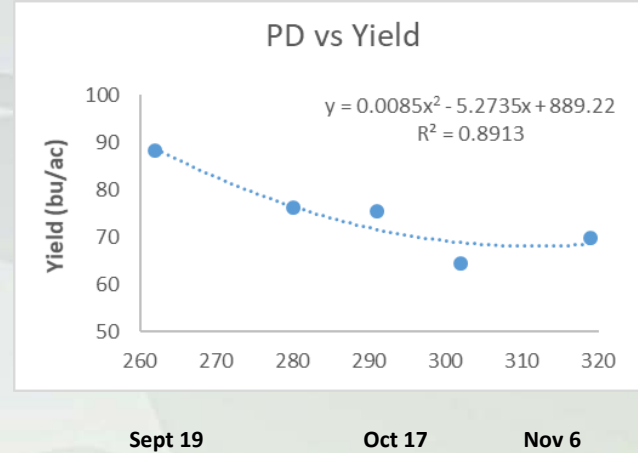
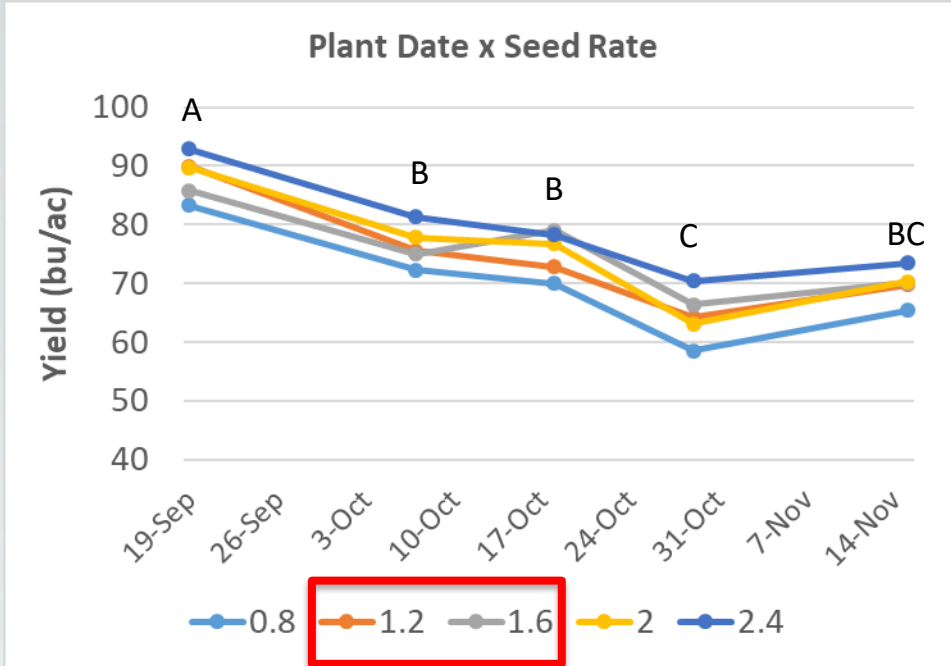
SR3: 1.6 m/ac

SR4: 2.0 m/ac

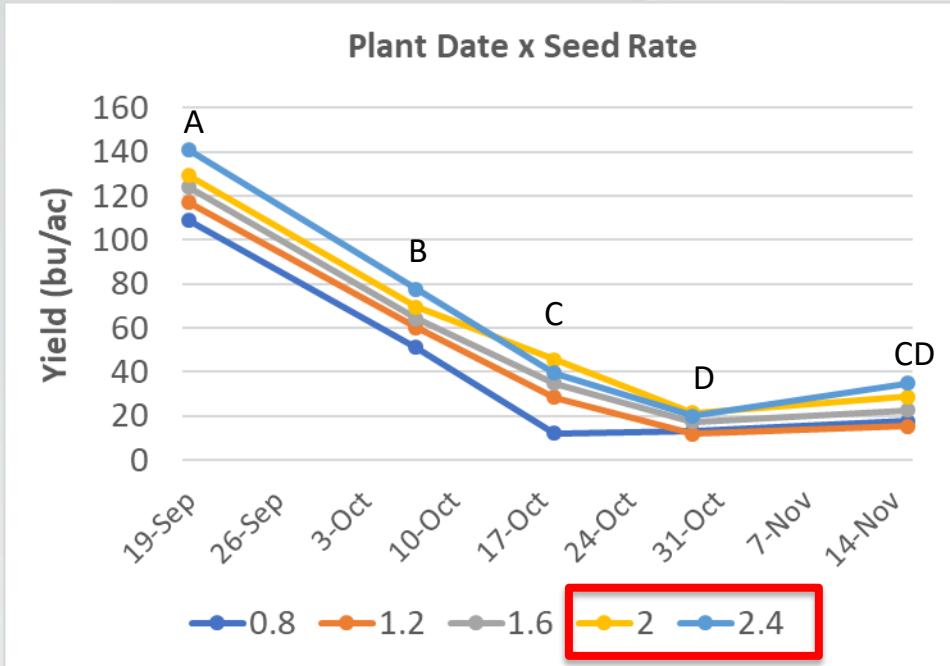
SR5: 2.4 m/ac



# Winter Wheat- 2020 Trial

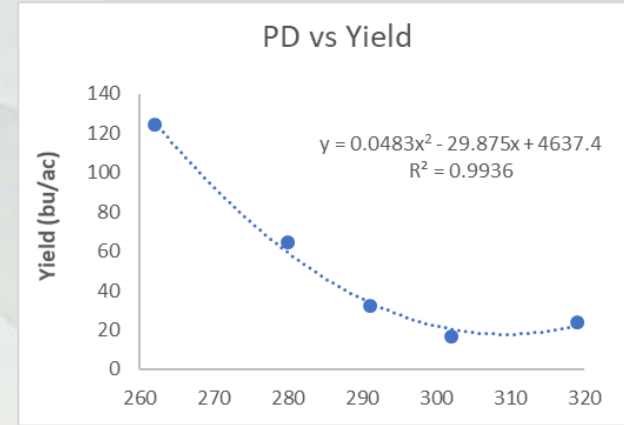


# Winter Malting Barley- 2020 Trial



#### Poor stand:

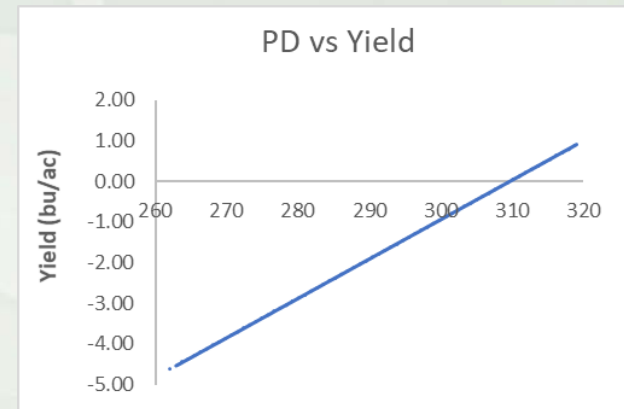
- PD1 >70%, PD2 >50%, PD3 >40%
- PD4, 5 ~30%



Sept 19

Oct 17

Nov 6



# Winter Malting Barley- 2020 Trial

Plant date	Protein (%)	Plump kernels (%)	Thin kernels (%)	Germination (4ml 72 hr GE)
Criteria	≤12%	>90%	<3%	>98%
19-Sep	10.3 C	84.4 C	2.2 A	99.2 A
7-Oct	12.6 B	96.1 A	0.2 B	98.4 AB
18-Oct	14.7 A	95.7 A	0.4 B	93.2 C
29-Oct	16.4 A	90.8 B	1.7 A	95.5 BC
15-Nov	15.6 A	92.4 AB	1.4 A	95.9 BC
P value	<0.001	<0.001	<0.001	<0.001

Data from 3 higher seed rates (1.6, 2.0, 2.4 m seeds/ac)

- RVA (for PHS): <120 only for PD 5
- DON (vomitoxin) <0.15 ppm for all samples



# 2021 Trials

PD 1 : Sept 17



PD 3 : Oct 14



## Plant dates (PD):

PD1: Sept 17

 PD2: Sept 29

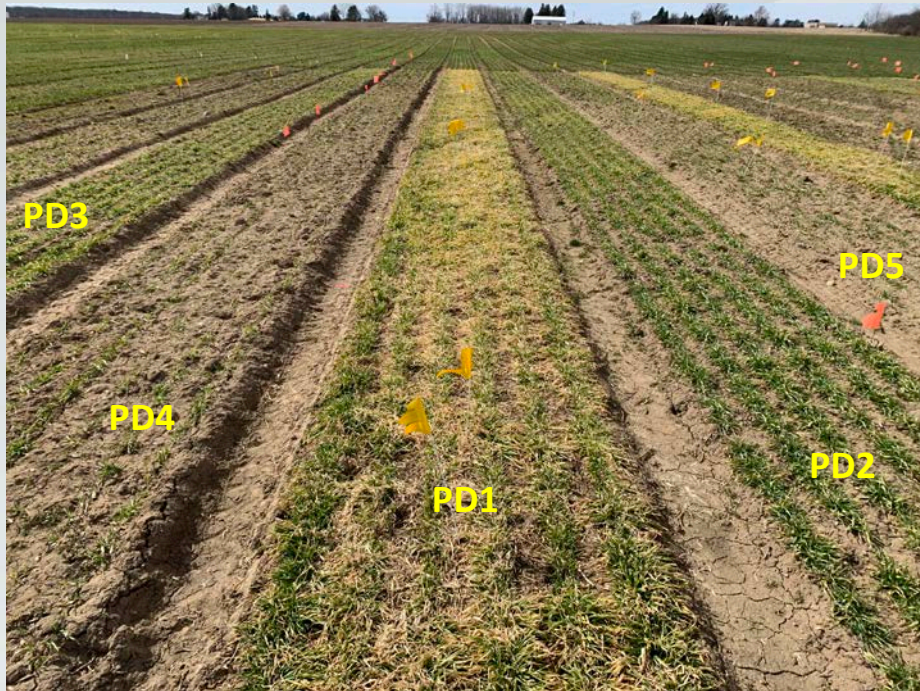
PD3: Oct 14

PD4: Oct 29

PD5: Nov 12

 Pictures taken on Nov 20, 2020

# 2021 Trials



Winter Barley



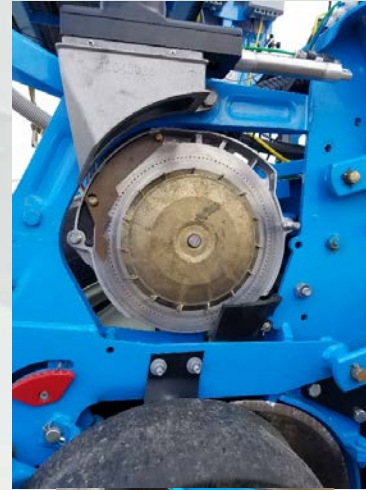
Winter Wheat

Pictures taken on March 14, 2021

# Seed Placement in Small Grains

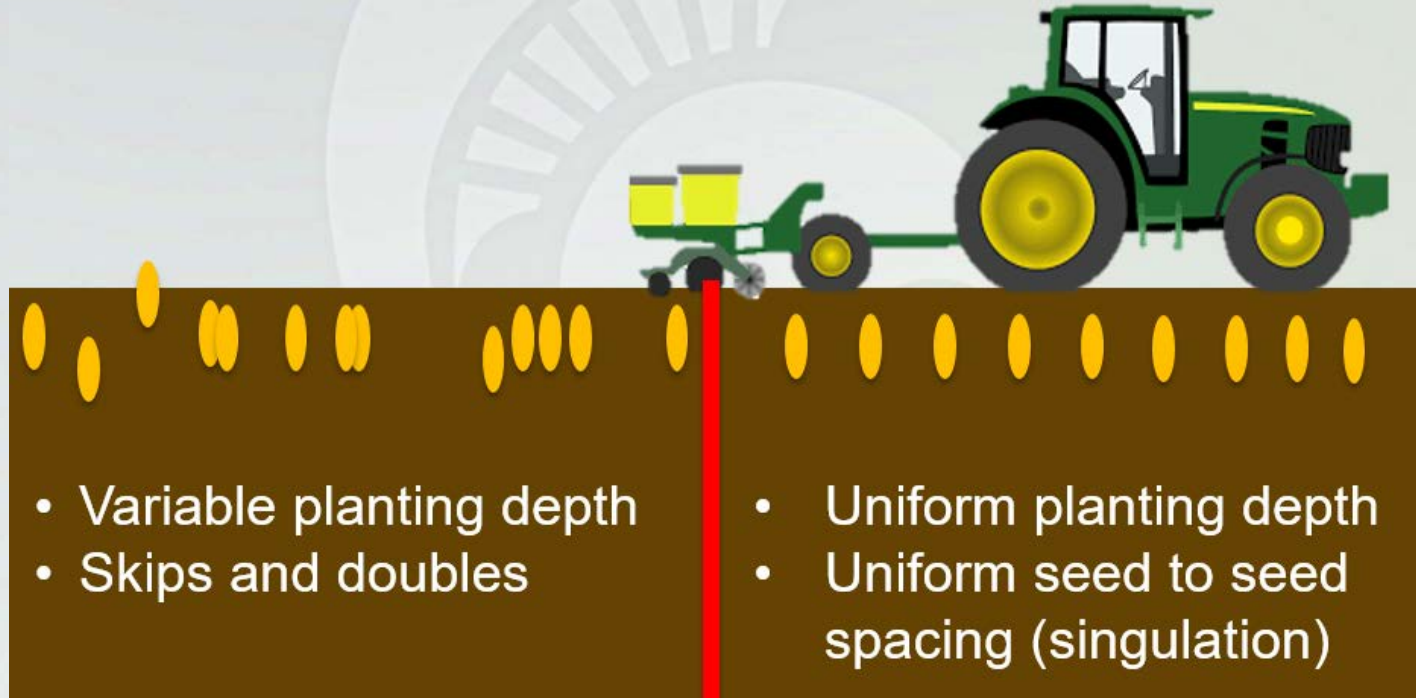


**Conventional drill** with rotating gear that “spills” seed into the drop tube.

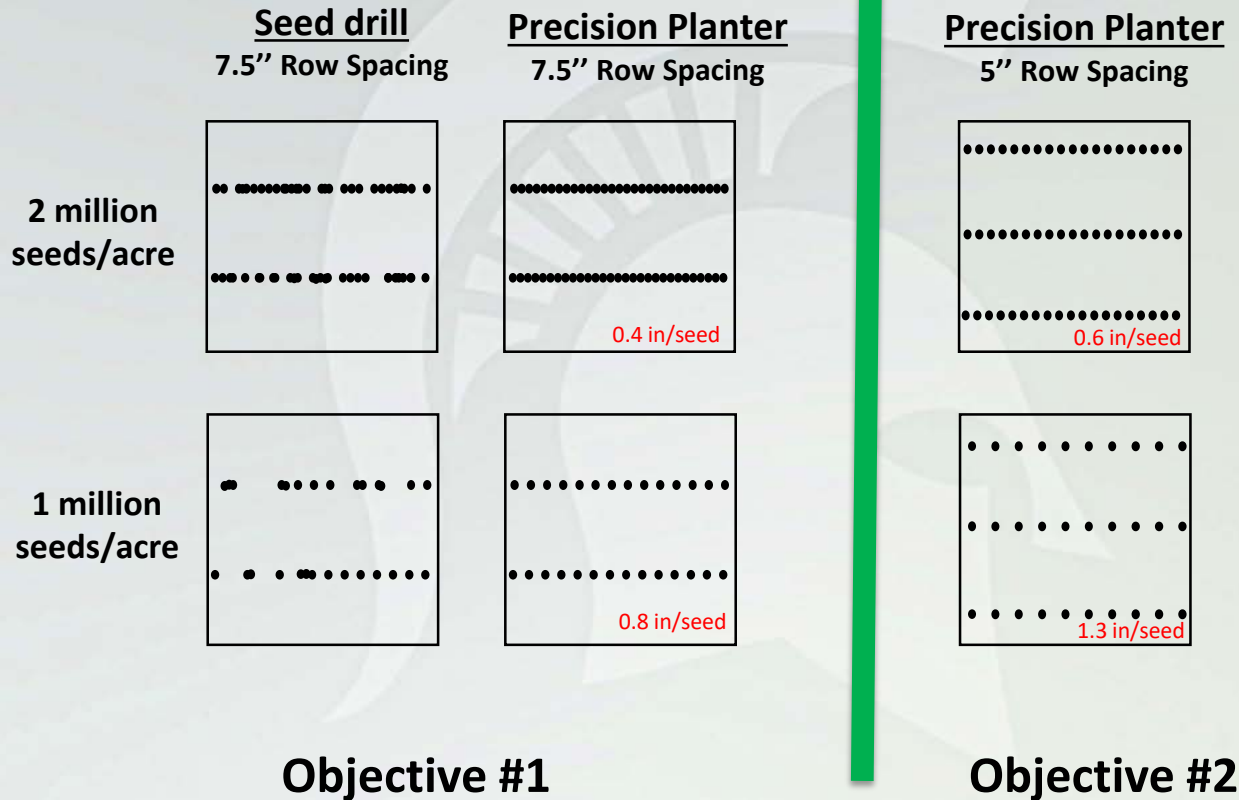


**Precision planter** with vacuum that picks up individual seeds and drops one seed at a time down the drop tube.

# Uniform Seed Placement



# Research Objectives

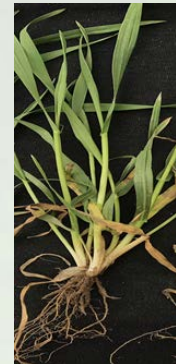


# Variability in Seed Placement

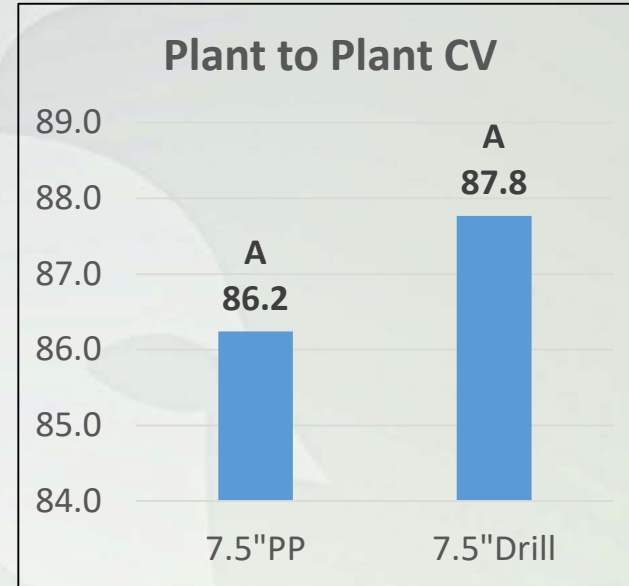
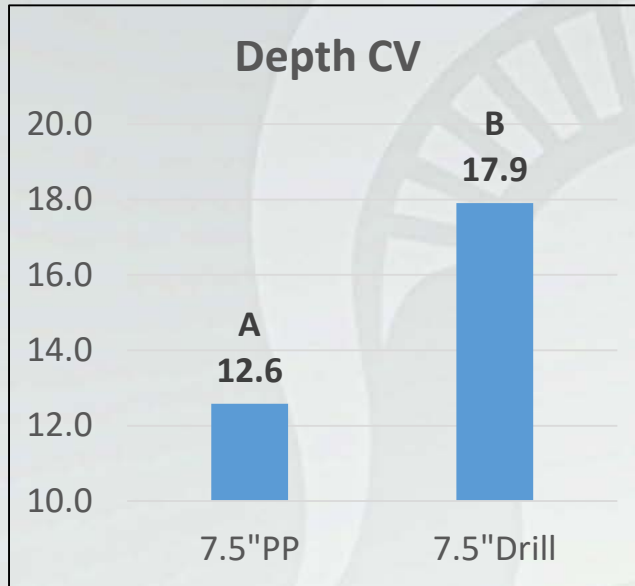
DRILL



PLANTER



# Precision Planter (PP) vs Drill: Seed Placement Accuracy



CV is a measure of how variable the planting depth or spacing is. Lower number represents lower variability (increased consistency) in planting depth.

# Precision Planter (PP) vs Drill: Yield

	Yield (bu/a)	Stand/acre	Heads/ft <sup>2</sup>	Seeds/head	TKW	DON*
7.5"PP	101.1A	732,744B	76.1A	29.7A	29.1A	1.8A
7.5"Drill	96.7B	852,822A	72.5A	28.9A	28.8A	2.8B

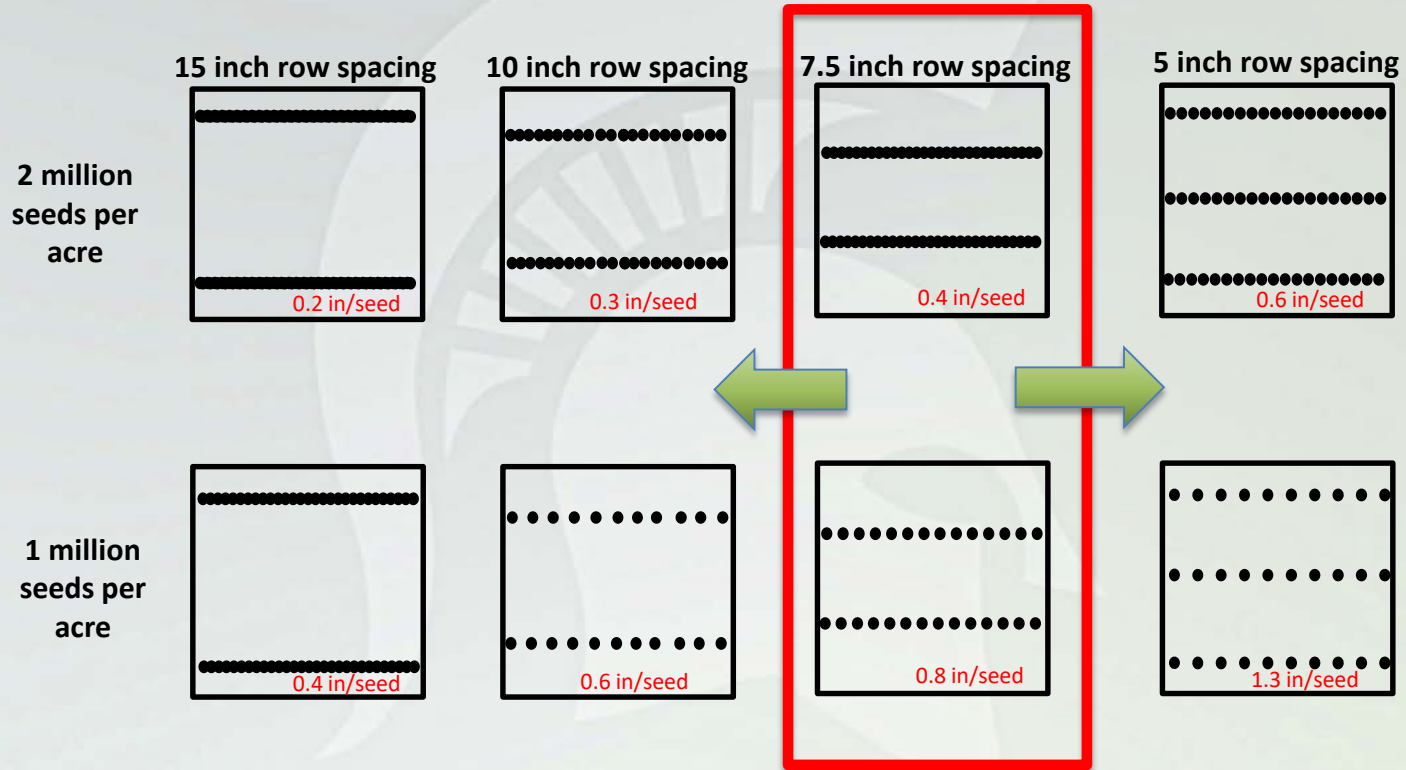
Yield response was significant in 2019 (>10 bu difference) but not in 2020

Data from 4 site years, except DON (Mason 2019 only)

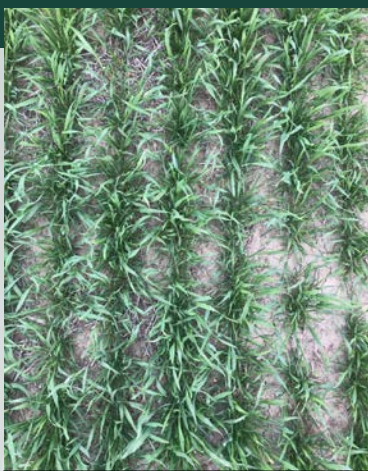
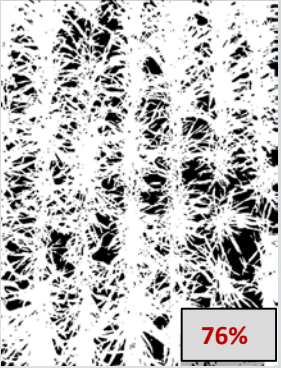
- Max yield ~1.0 m seeds/ac, lower in planter vs drill



# Planter Configuration: row spacing



May 8, 2020



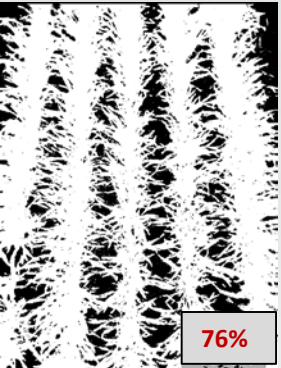
7.5" spacing



5" spacing



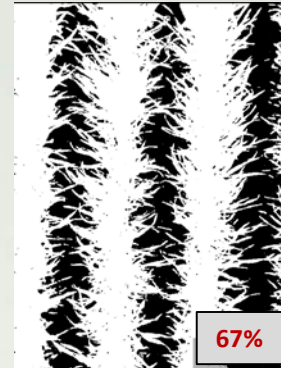
92%



10" spacing

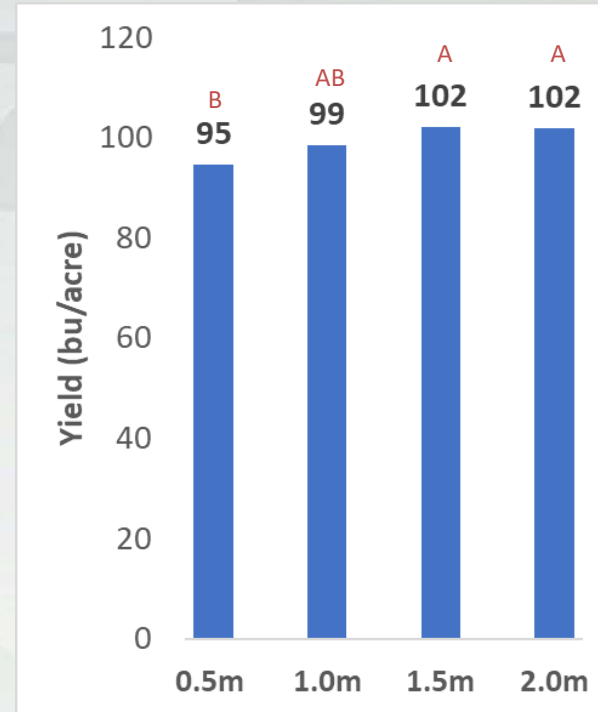
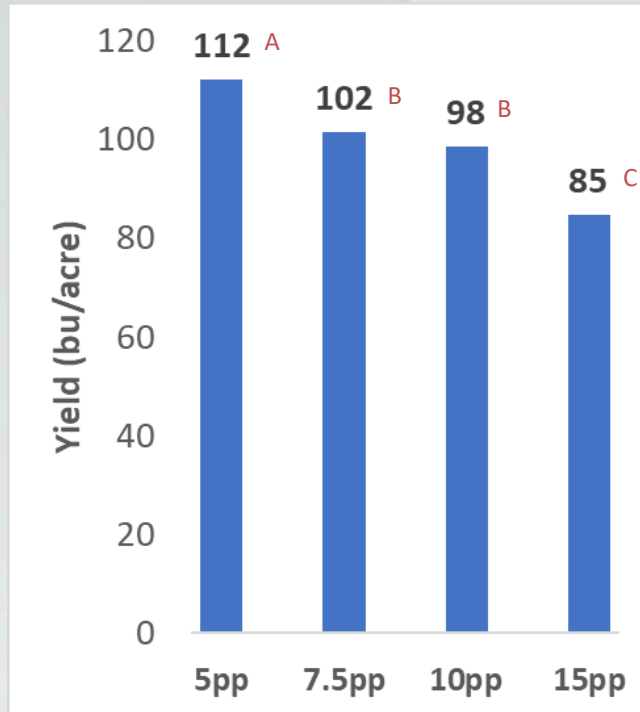


15" spacing



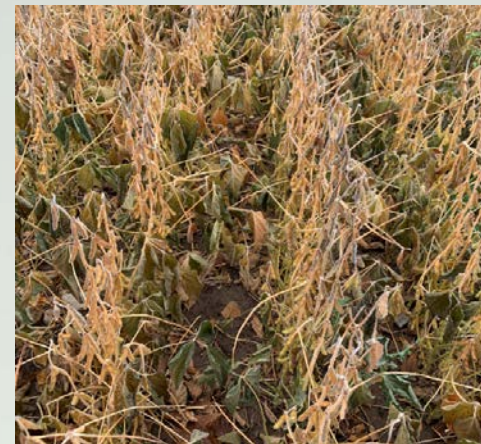
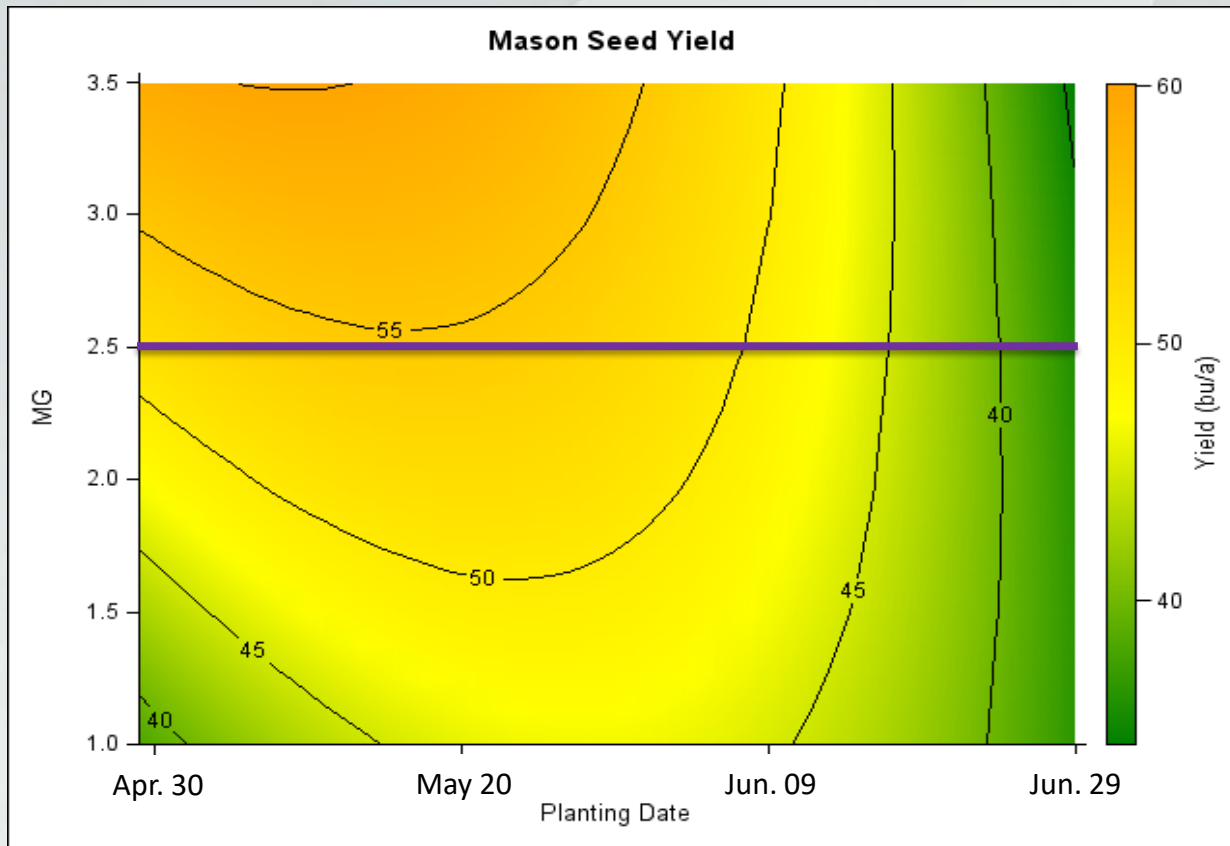
67%

# Precision Planter- row spacing, seeding rate



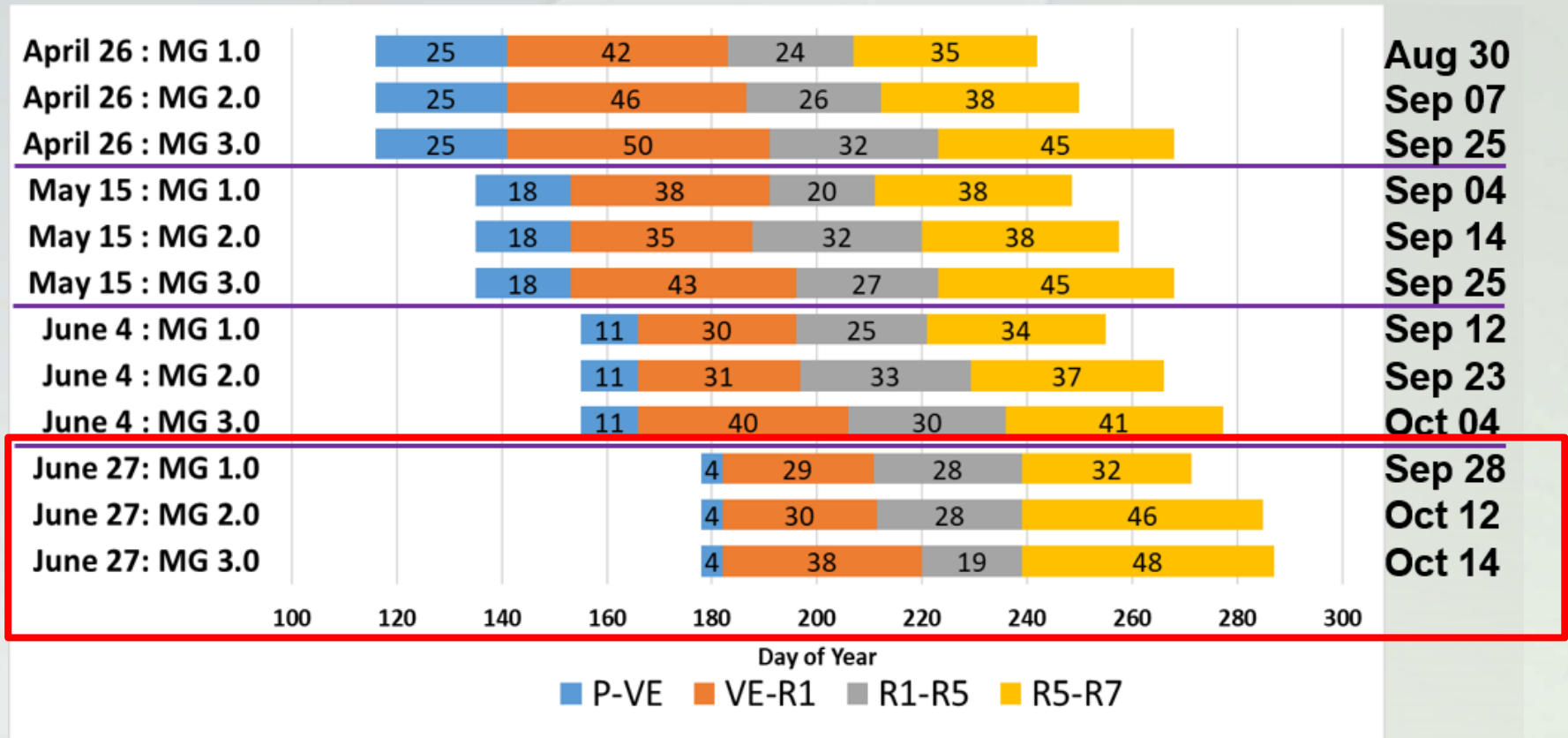
Data from 4 site years

# DC Soybeans- Maturity Selection



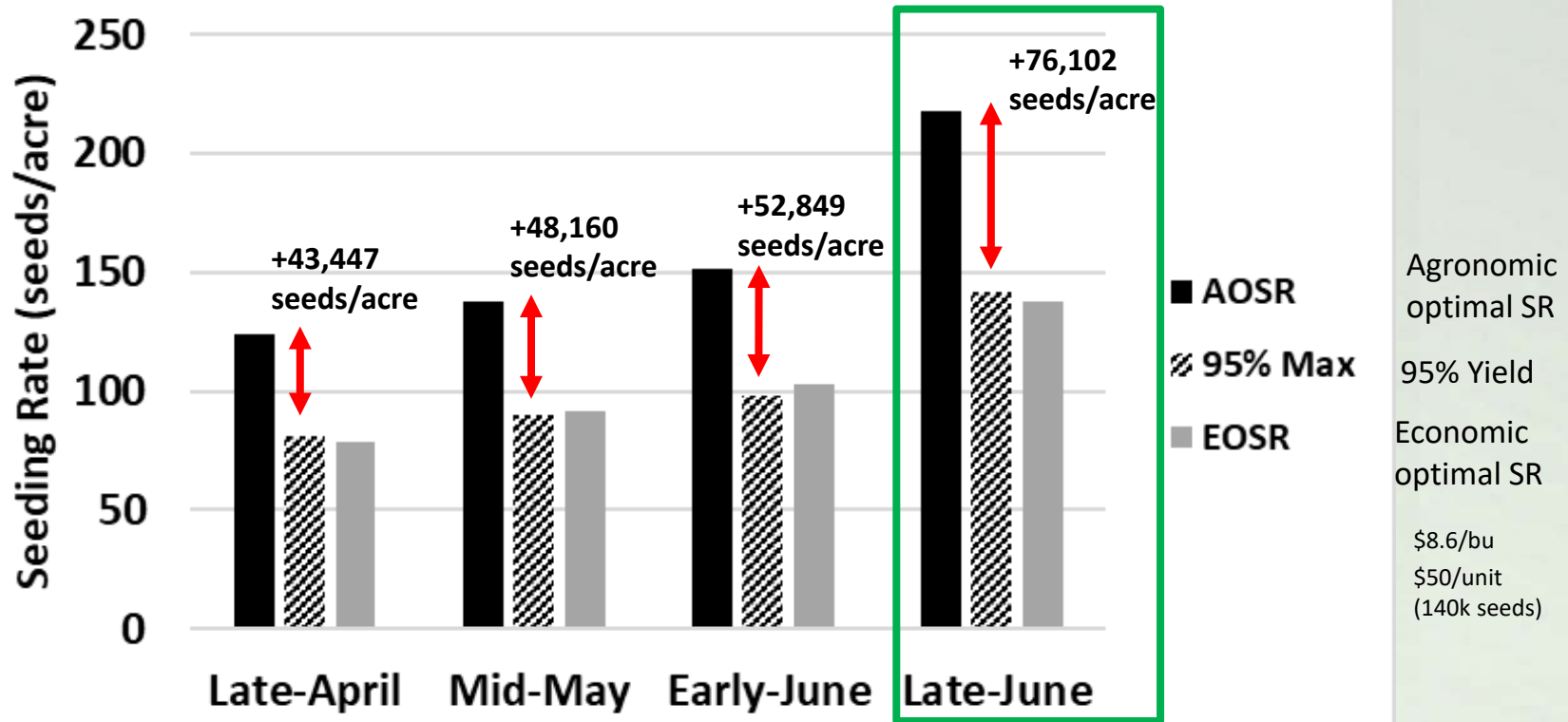
# DC Soybeans- Phenology

R7 date



# DC Soybeans- Seeding Rate

## Optimal Seeding Rate



- **Kalvin Canfield**
- **Dennis Pennington**
- Sam Martin
- Tom Siler
- Eric Olson
- Kelly Ish
- Madeline Yaek
- Lucas Para
- Brook Wilke
- Chris Kapp

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**Thanks!**

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Project  
**GREEN**



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