

Adjusting Management Practices to Account for Variable Soybean Planting Time



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Cropping Systems Agronomy
MICHIGAN STATE UNIVERSITY

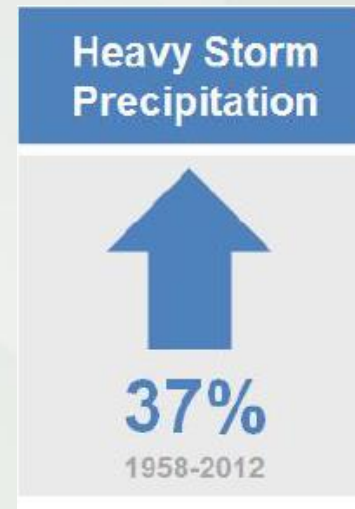
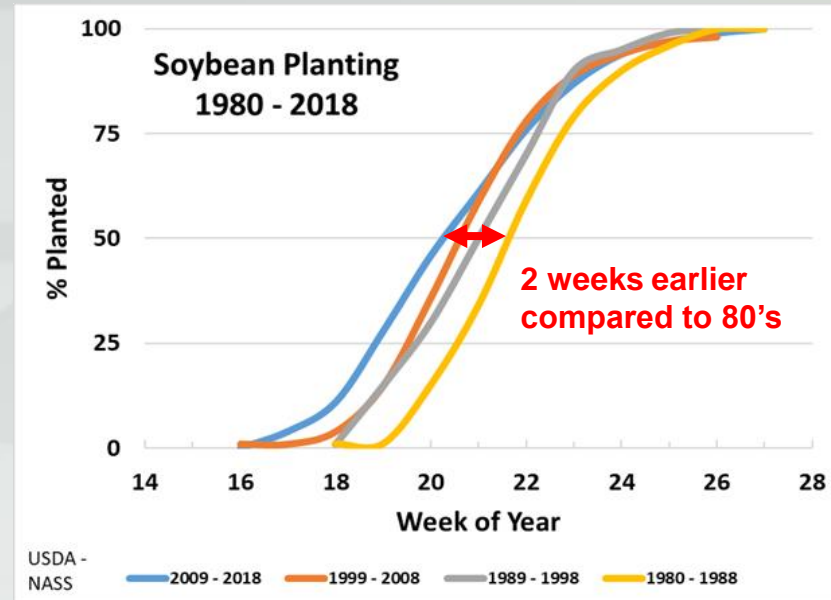


Michigan Soybean
Promotion Committee
www.michigansoybean.org

Background

- Soybean planting date (PD)
 - Influences soybean yield and composition
 - Soybean producers are moving planting time earlier

- Variable planting window
 - Changing climate
 - Perceived risks – soil conditions
 - Equipment availability
 - Lack of research in many regions



Planting Time

Conditions

➤ **Early Season**
(late April – early May)

- Cool, wet soil
- Extended growing season

➤ **Mid Season**
(mid May – early June)

- Typically adequate soil temperature and moisture

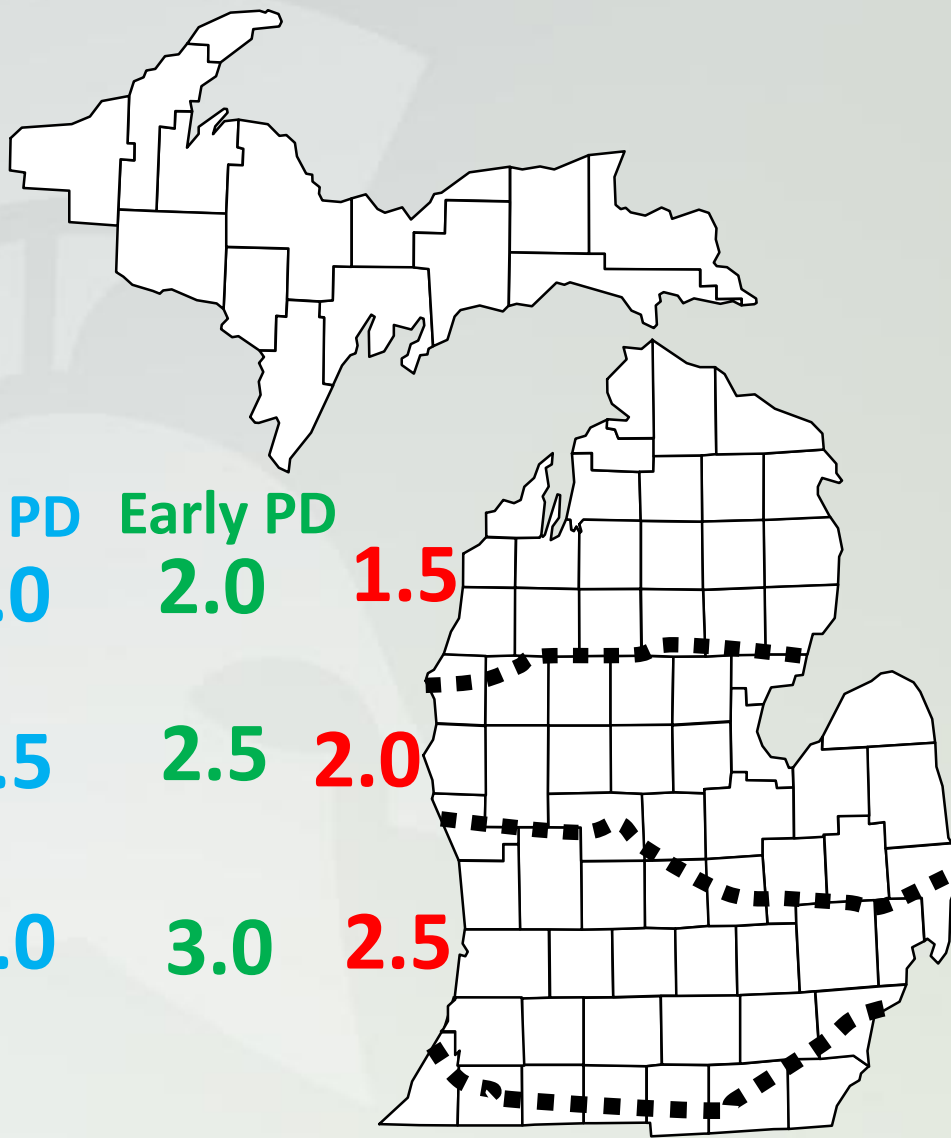
➤ **Late Season**
(mid June – late June)

- Lack of soil moisture
- Growing season is shortened

Research Questions

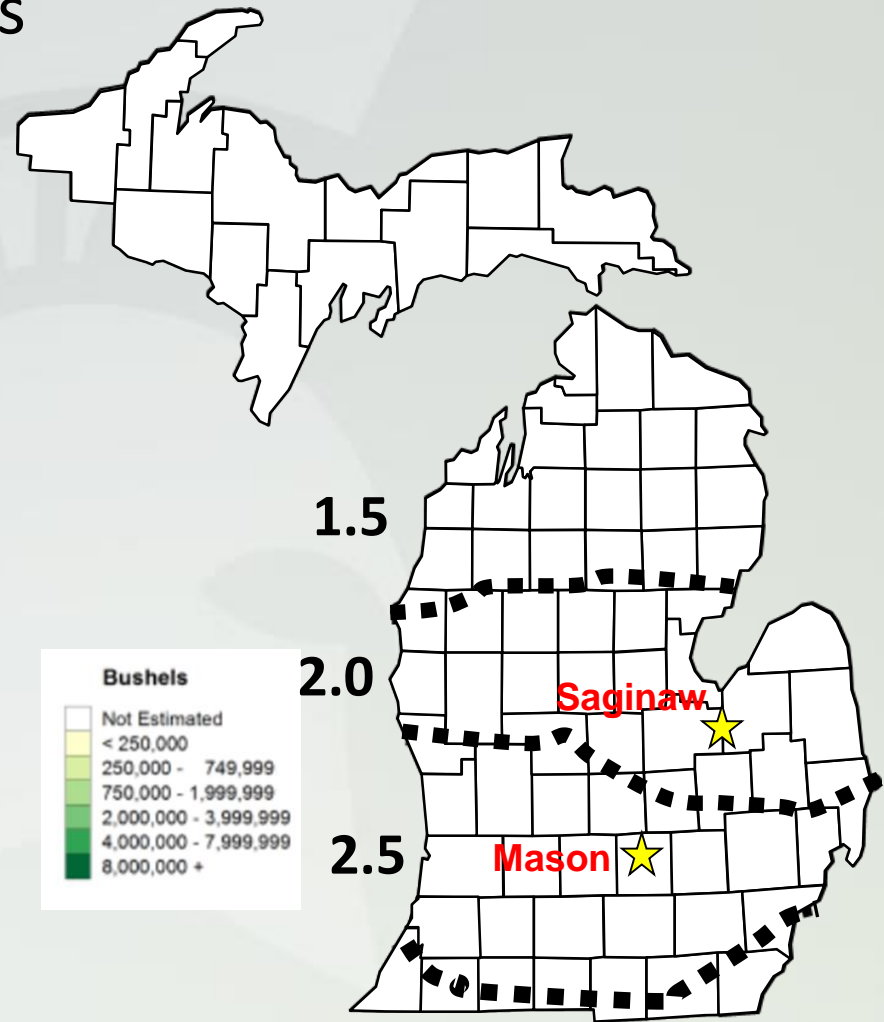
- Adjusting agronomic practices based on time of planting
- Maturity group (MG) selection
 - Later MG when planting early?
 - Early MG when planting late?
- Planting rate
 - Variable based on planting date?
- Seed treatment
 - Are benefits dependent on environment?

	Late PD	Early PD	
Later MG when planting early?	1.0	2.0	1.5
Early MG when planting late?	1.5	2.5	2.0
Variable based on planting date?	2.0	3.0	2.5

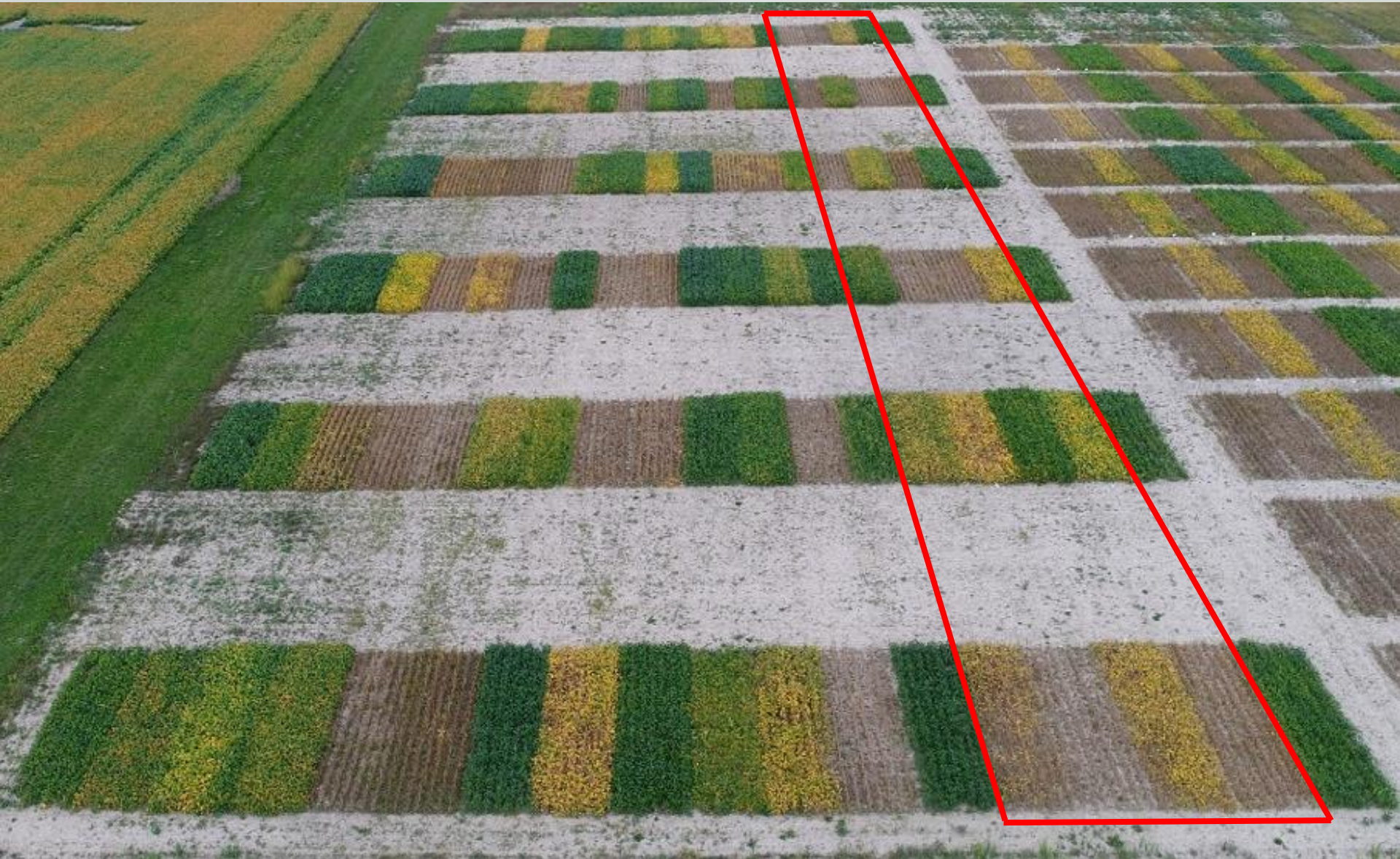


Research Questions

- Two Years and two locations
- Planting Date (4)
 - Early-season (late-April)
 - Mid-season (mid-May)
 - Late-season (early-June)
 - Very Late-season (late-June)
- Maturity Group (6)
 - 1.0 – 3.5 (0.5 intervals)
- Planting Rate (5)
 - 50k – 210k seeds/a
- Seed Treatment (2)
 - Clariva™ Complete seed treatment
 - No seed treatment



U.S. Department of Agriculture, National Agricultural Statistics Service



Planting Time

Management Practices

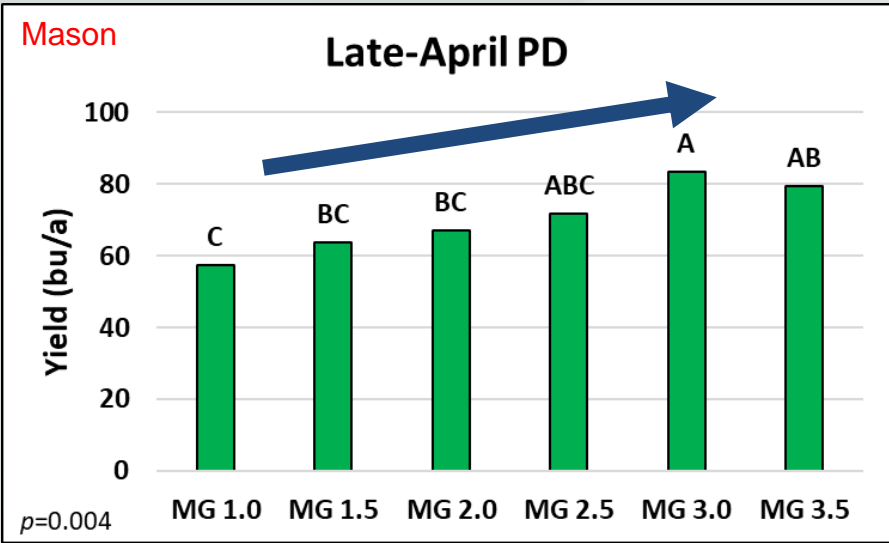
➤ **Early Season**
(late April – early May)

➤ **Mid Season**
(mid May – early June)

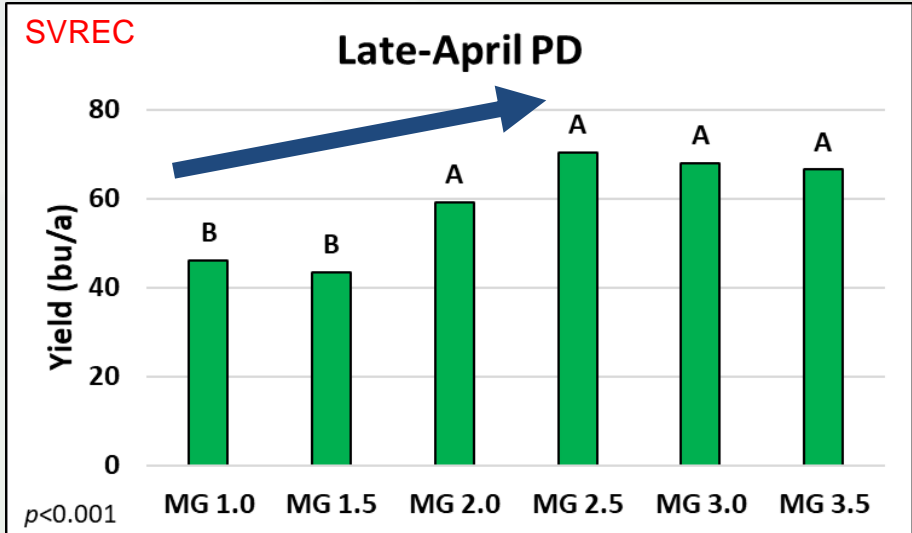
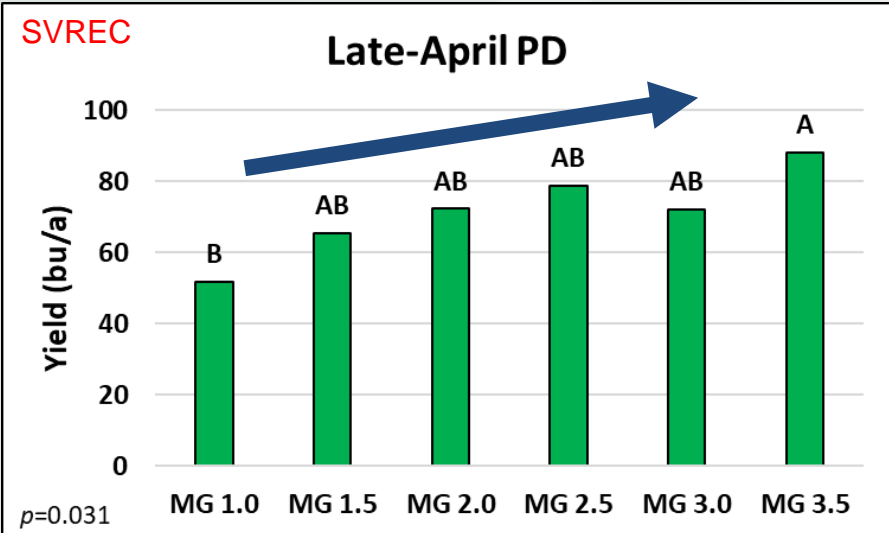
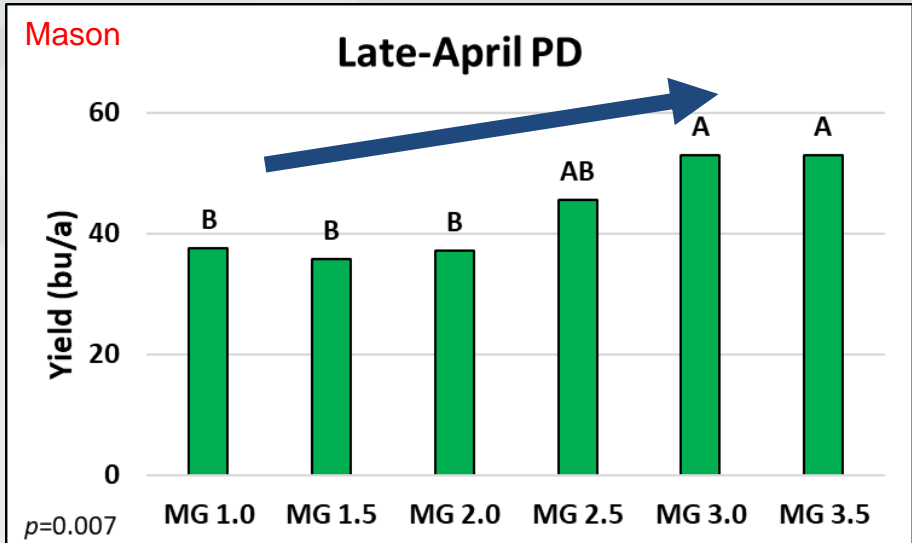
➤ **Late Season**
(mid June – late June)

Early Season Planting – MG Selection

2018

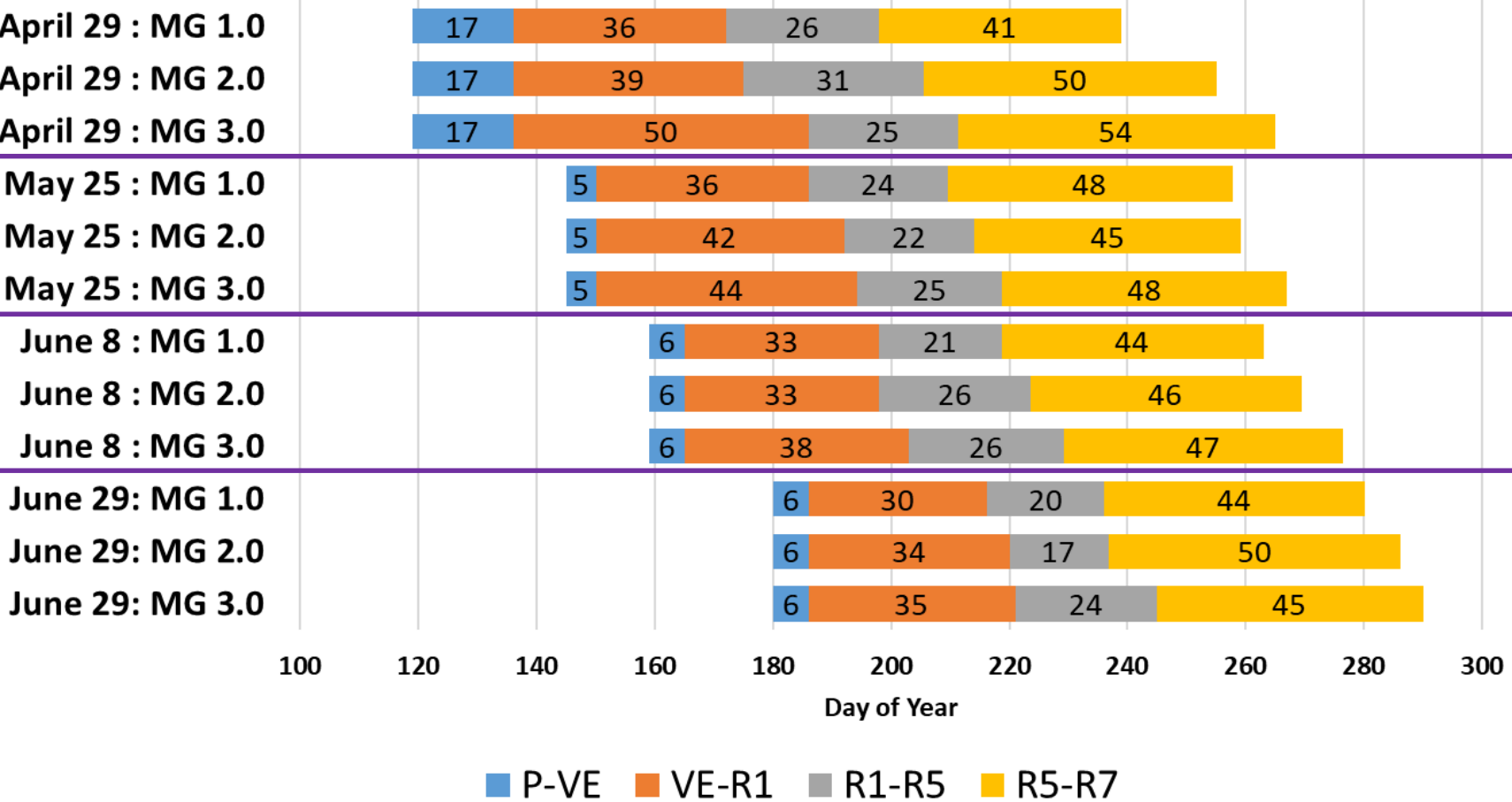


2019



Phenology 2018

R7



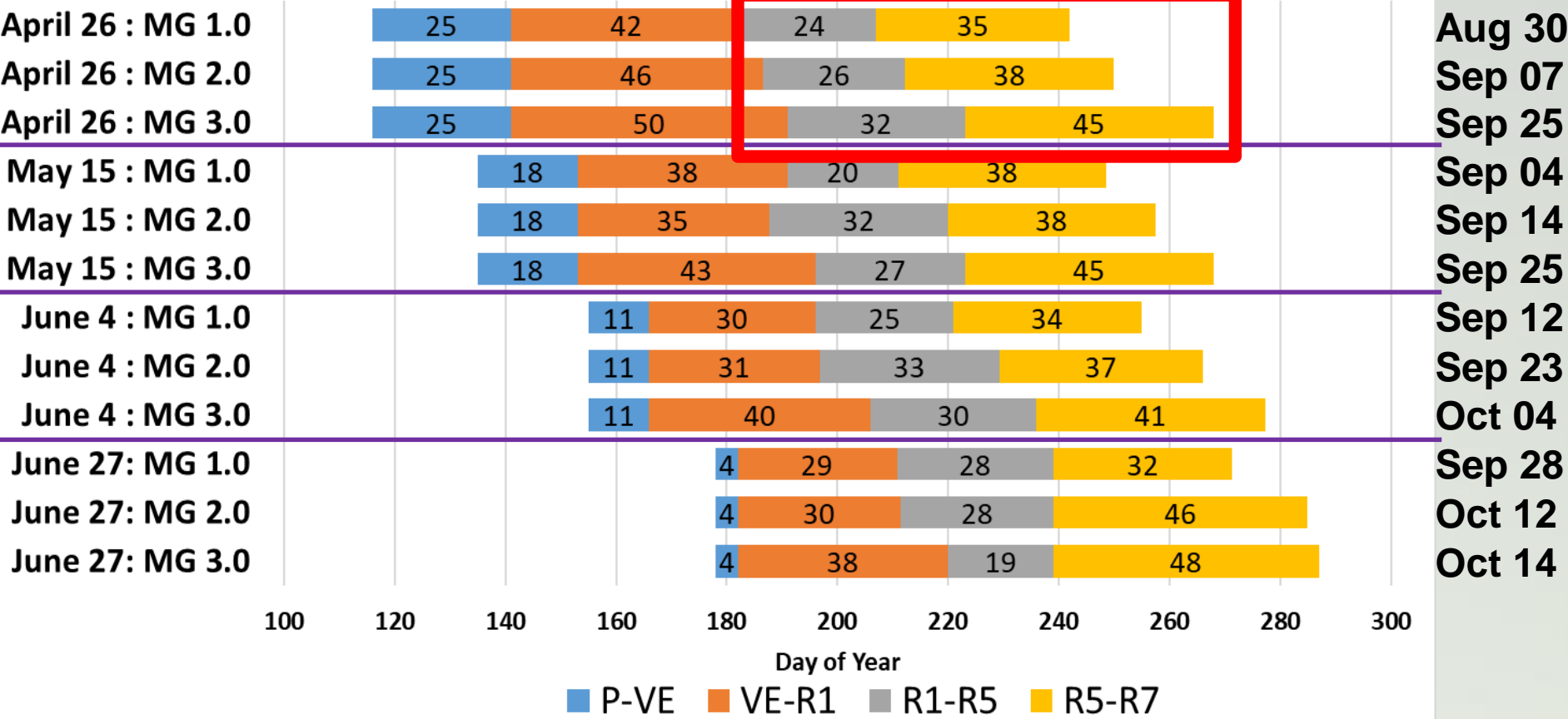
- Aug 27
- Sept 10
- Sept 22
- Sept 14
- Sept 17
- Sept 26
- Sept 26
- Oct 5
- Oct 15
- Oct 15
- Oct 23**
- Oct 26

Longer MG planted late in the season were damaged by frost in 2018

First killing freeze:
Oct. 17

Phenology 2019

R7

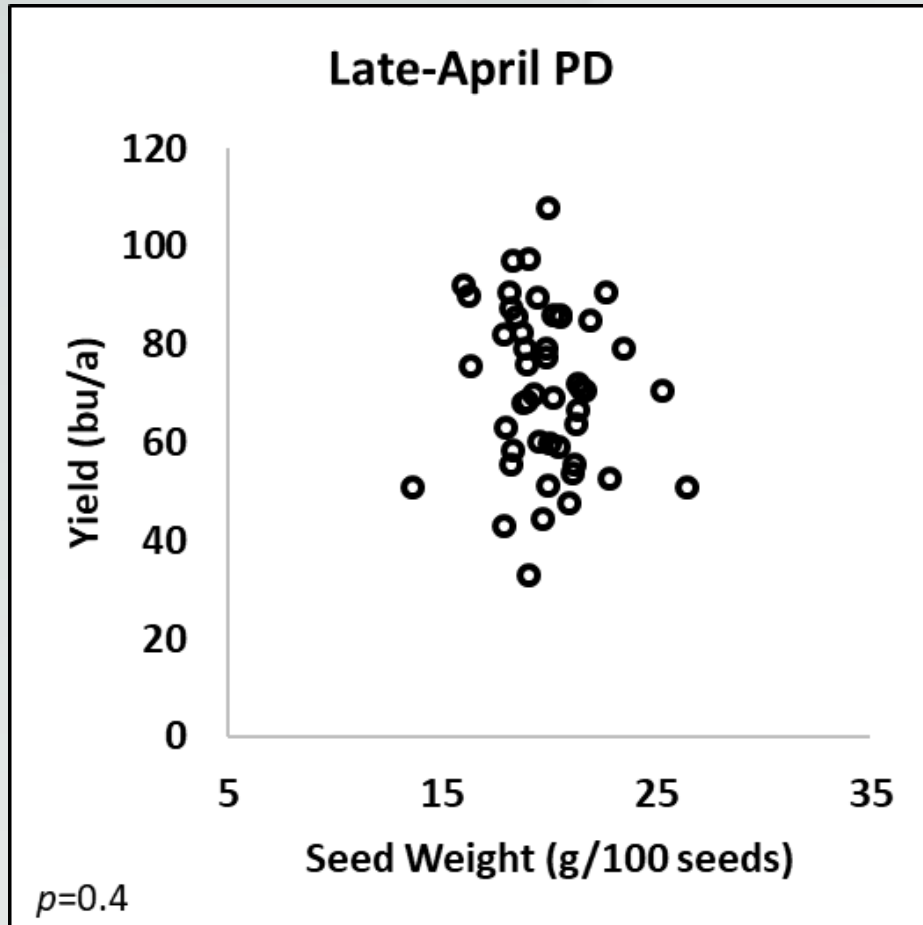


Aug 30
 Sep 07
 Sep 25
 Sep 04
 Sep 14
 Sep 25
 Sep 12
 Sep 23
 Oct 04
 Sep 28
 Oct 12
 Oct 14

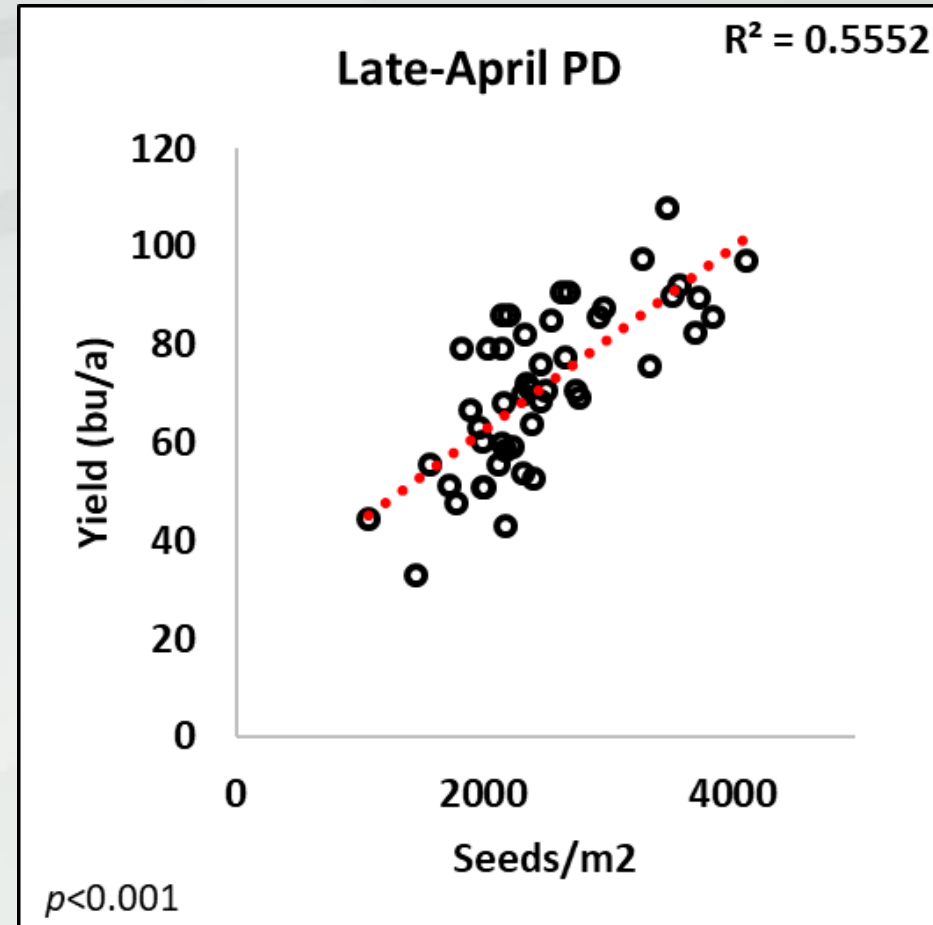
- No frost damage in 2019
- Is yield increase coming from longer time spent in seed fill stage?

First killing freeze:
Oct. 26

Yield Components

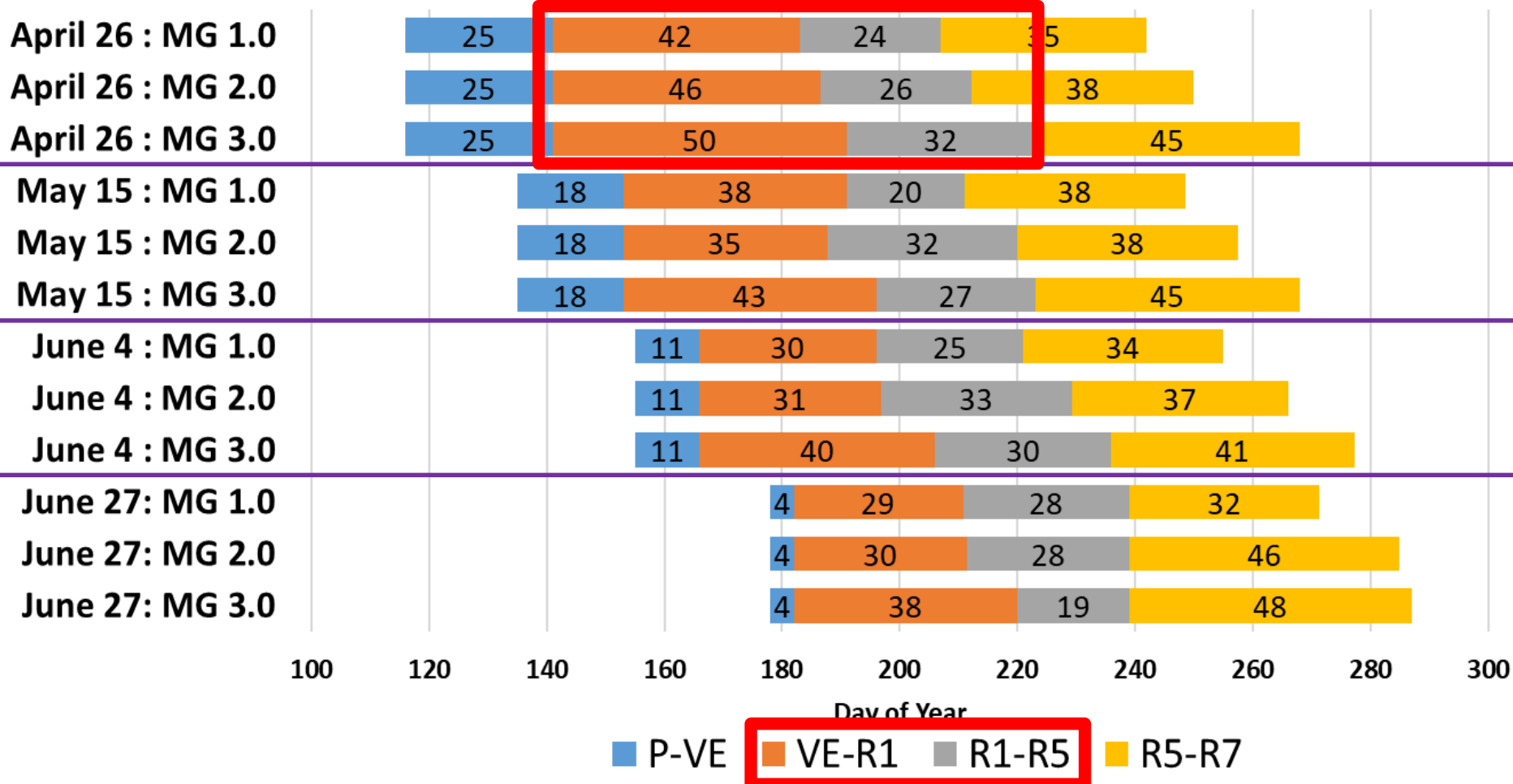


No relationship between seed weight and yield



Positive relationship between seed number and yield

Phenology 2019

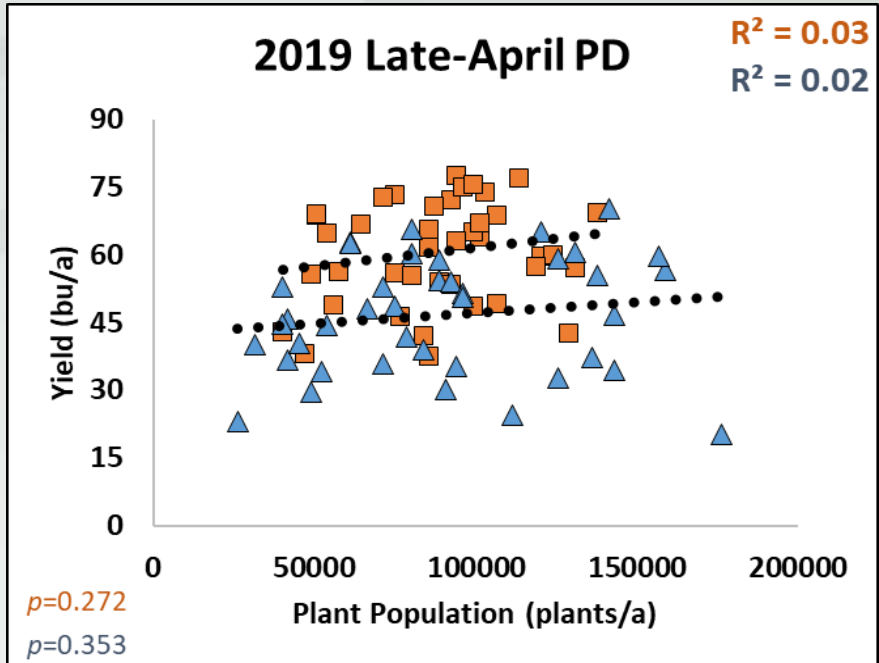
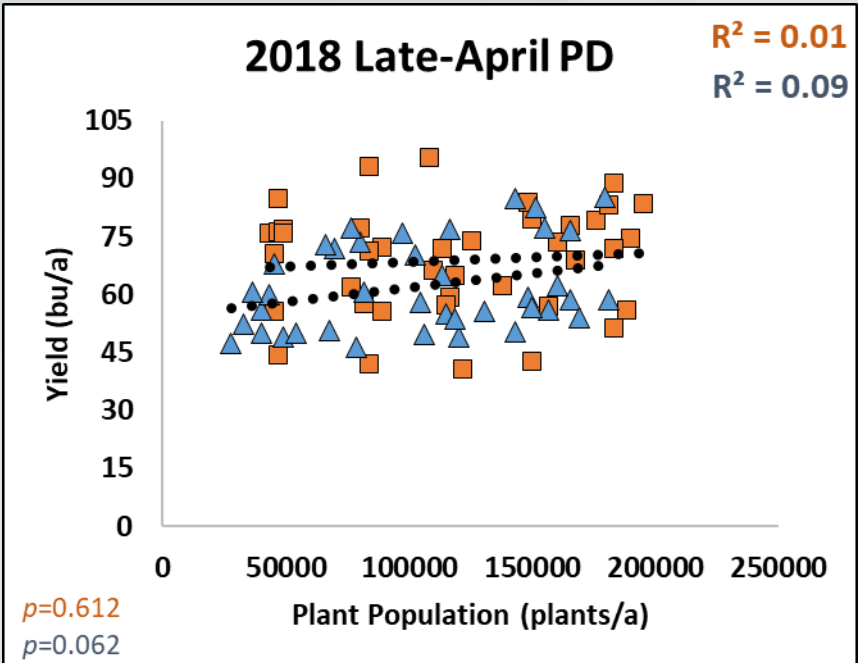




Yield increase most likely coming from longer duration spent in vegetative and seed set stage.



<p>50,000 Seeds/A</p>	<p>90,000 Seeds/A</p>	<p>130,000 Seeds/A</p>	<p>170,000 Seeds/A</p>	<p>210,000 Seeds/A</p>
<p>3.9 Branches</p>	<p>3.3 Branches</p>	<p>2.3 Branches</p>	<p>2.0 Branches</p>	<p>1.6 Branches</p>
<p>Low pod: 3.0"</p>	<p>Low pod: 3.2"</p>	<p>Low pod: 3.8"</p>	<p>Low pod: 4.2"</p>	<p>Low pod: 4.3"</p>

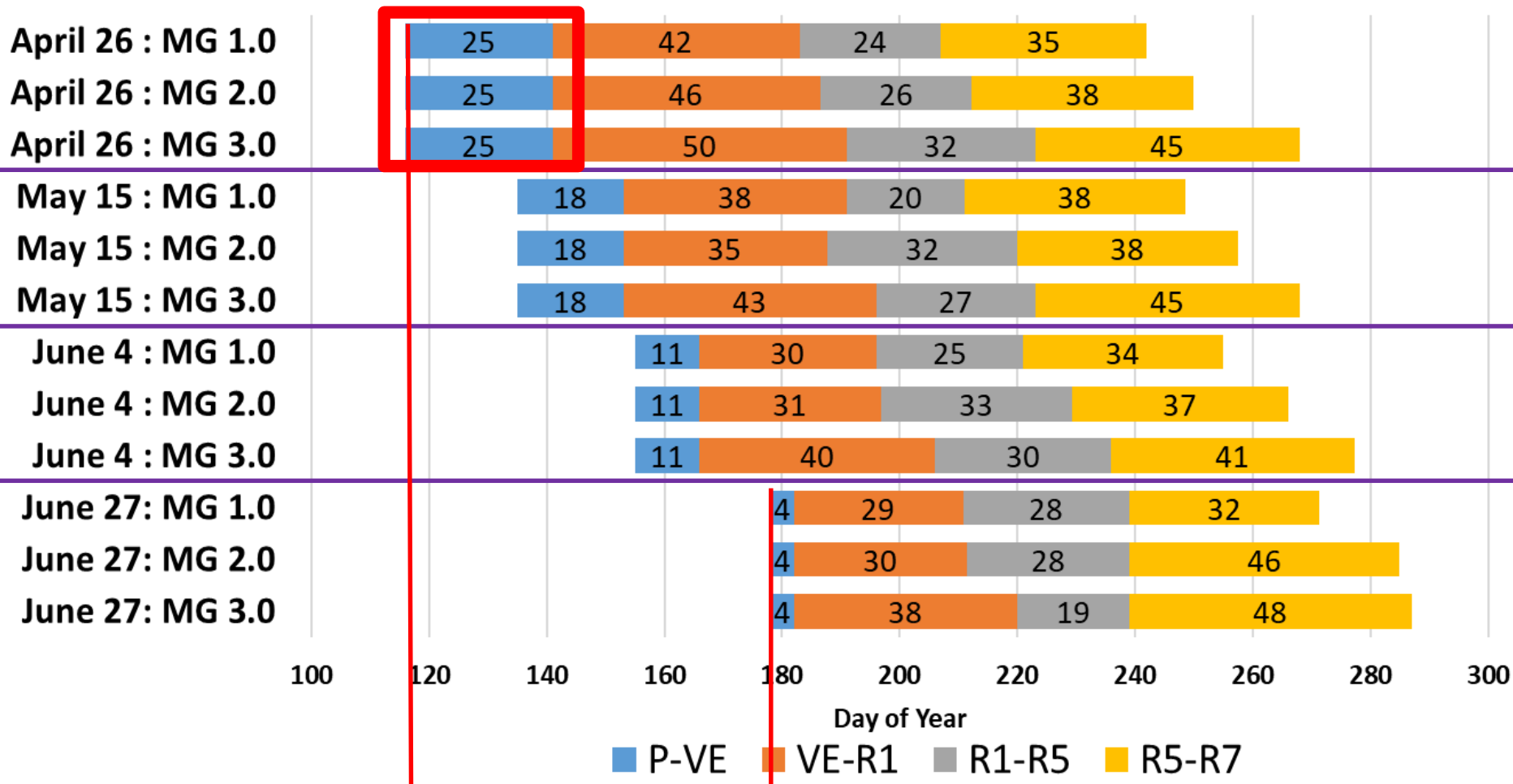
Early Season Planting – Planting Rate



-  SVREC
-  Mason

No relationship between plant stand and yield

Early Season Planting – Seed Treatment



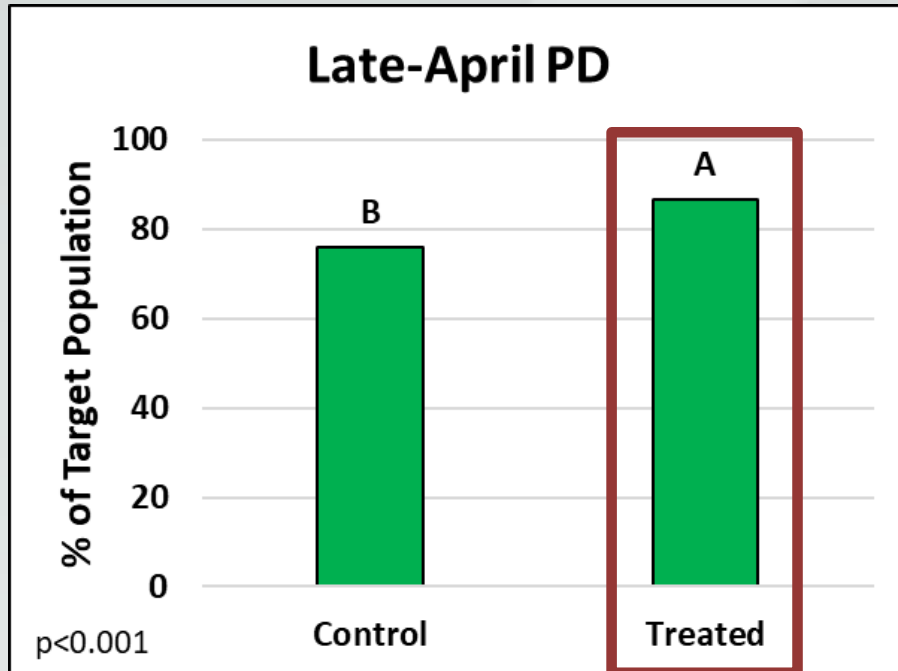
Soil Temp @
Planting

48°

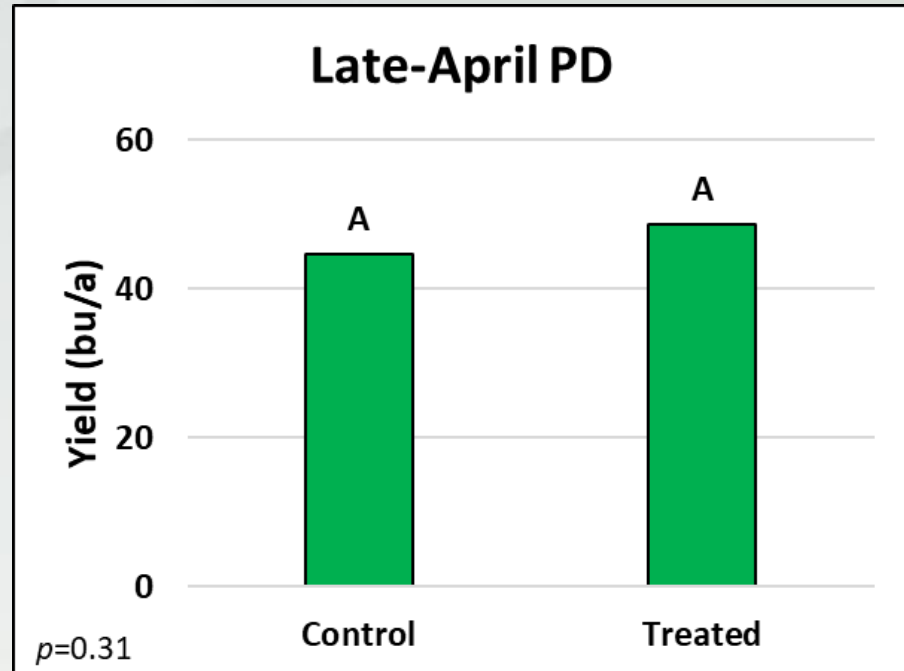
81°

Early Season Planting – Seed Treatment

Plant Stand



Yield



- Improved stand in 2018
- No differences in 2019

No impact on yield

Planting Time

Management Practices

➤ **Early Season**
(late April – early May)

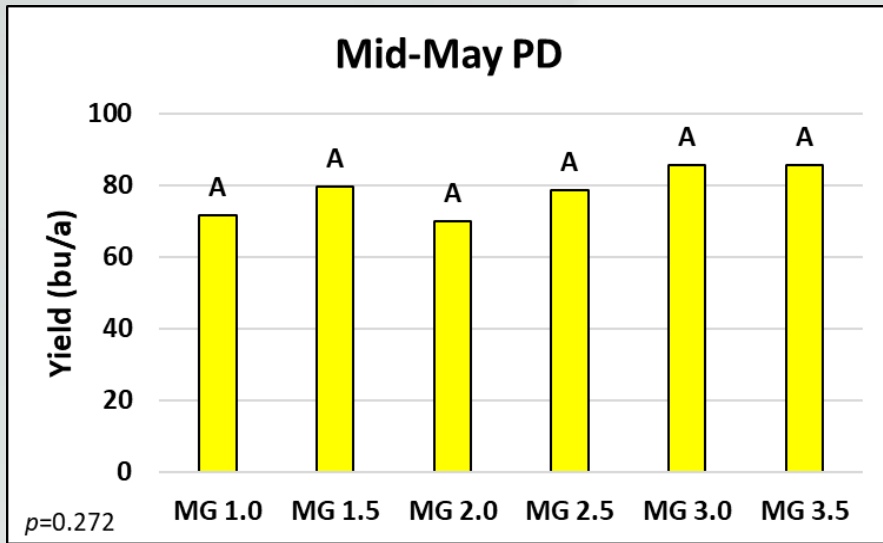
- **Longer maturity group can improve yield**
- **No benefit from increasing planting population**
- **Seed treatment- environment dependent**

➤ **Mid Season**
(mid May – early June)

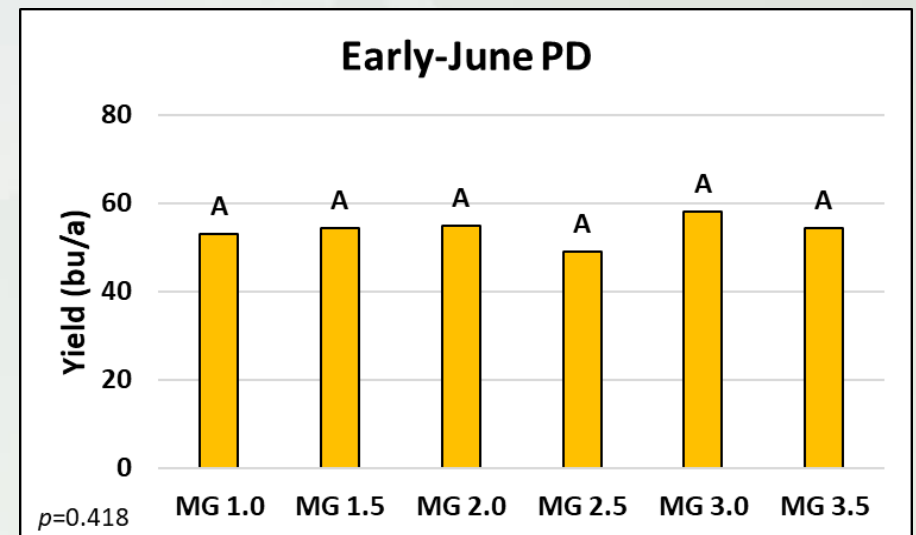
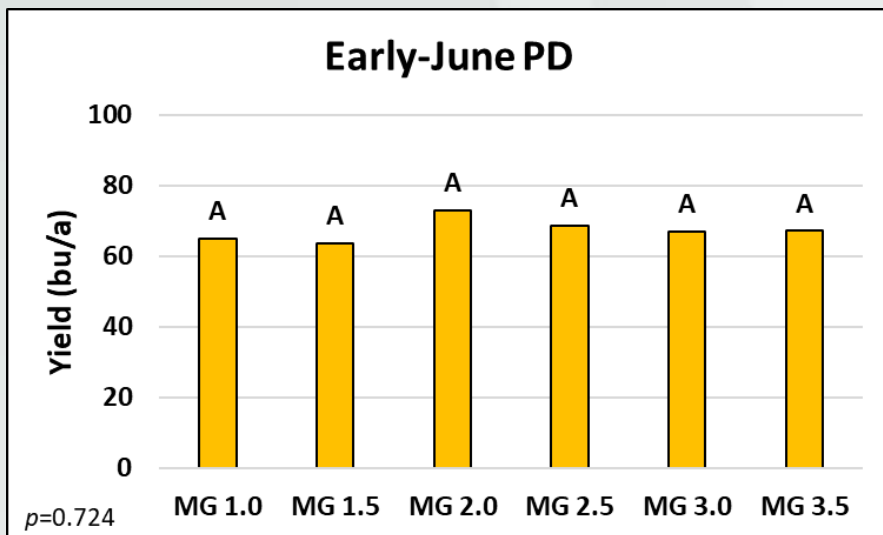
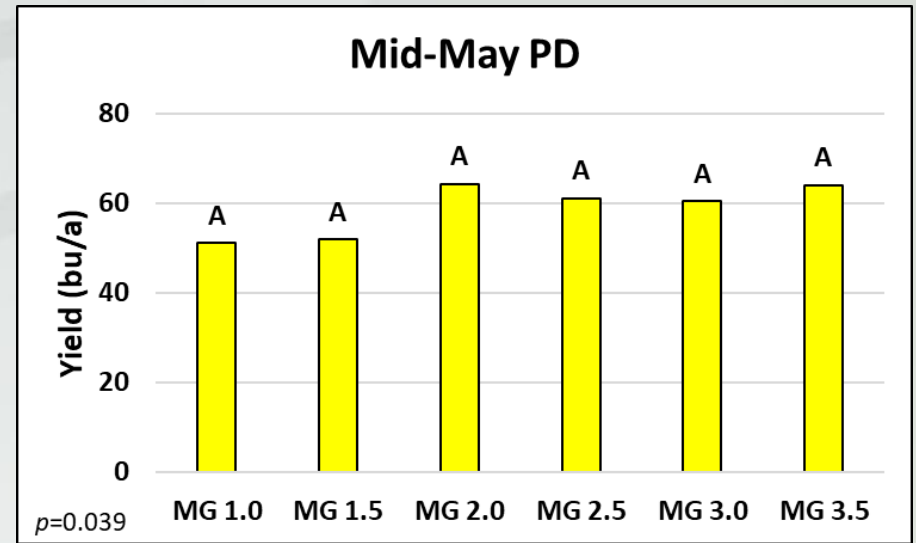
➤ **Late Season**
(mid June – late June)

Mid Season Planting – Planting Rate

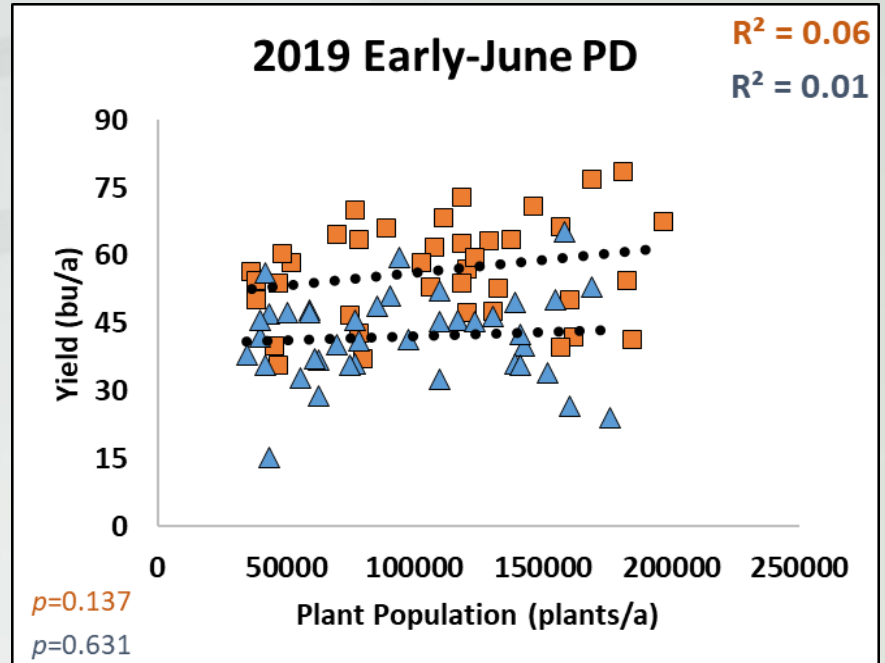
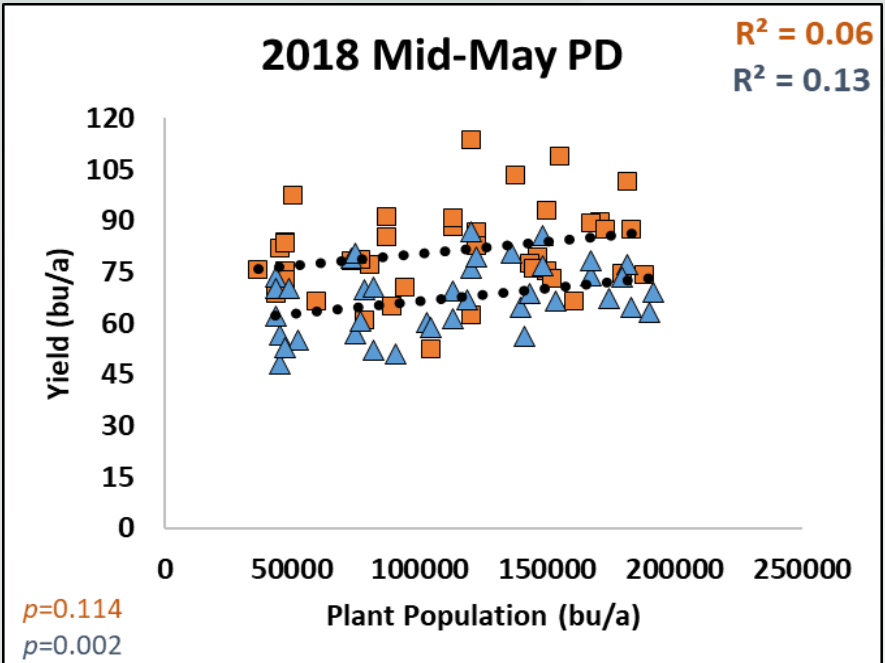
2018 SVREC





2019 SVREC



Mid Season Planting – Planting Rate

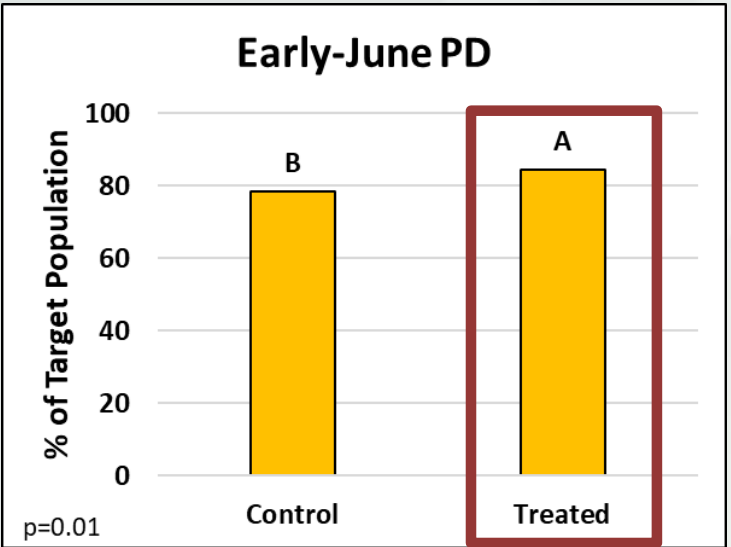
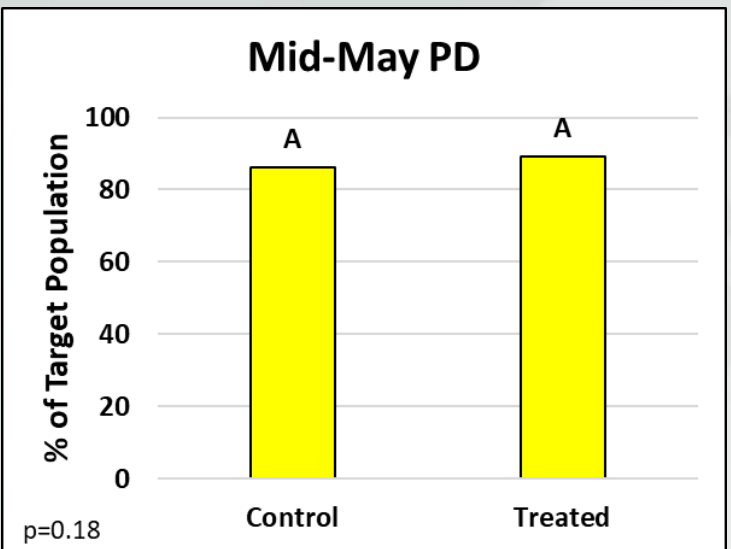


-  SVREC
-  Mason

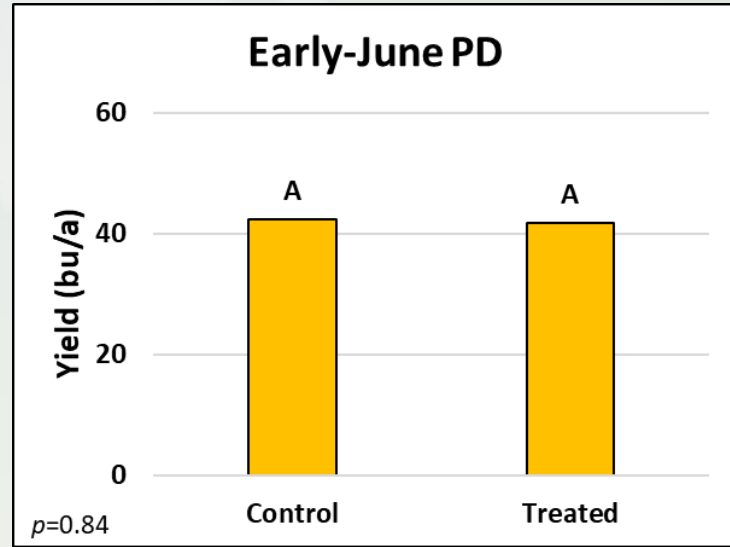
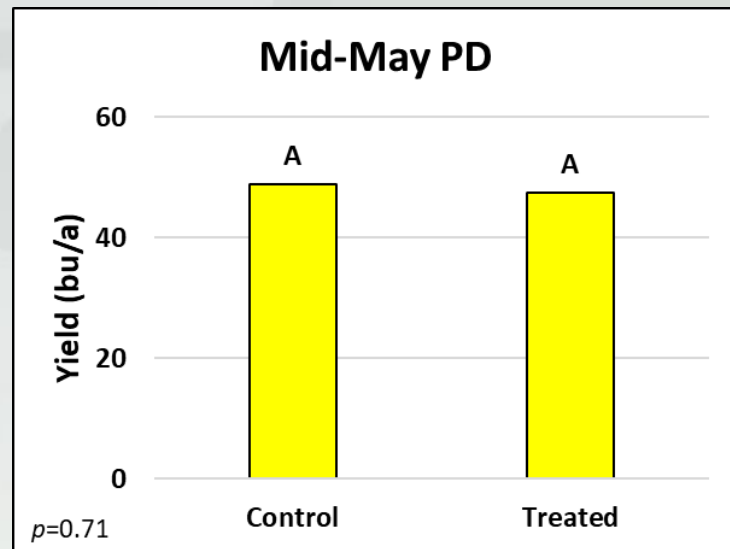
No relationship between plant stand and yield

Mid Season Planting – Seed Treatment

Plant Stand



Yield



Planting Time

Management Practices

➤ **Early Season**
(late April – early May)

- Longer maturity group can improve yield
- No benefit from increasing planting population
- Seed treatment – environment dependent

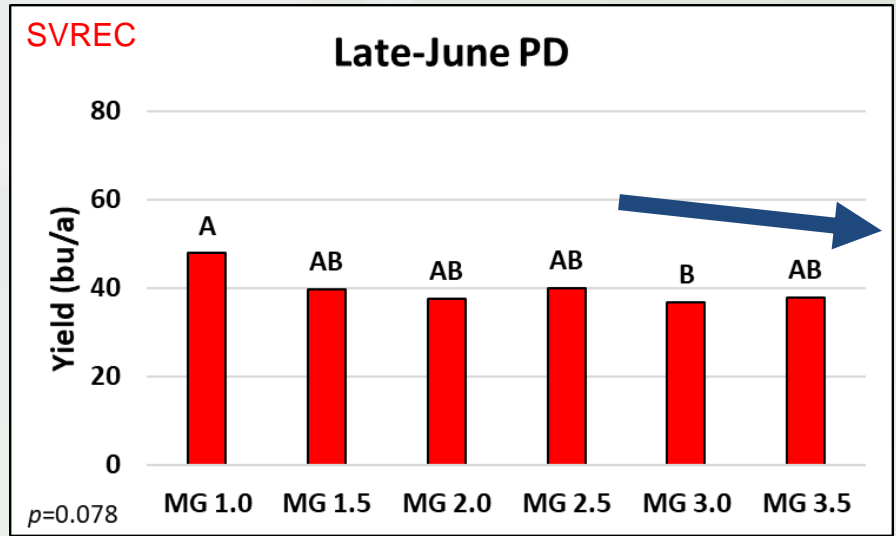
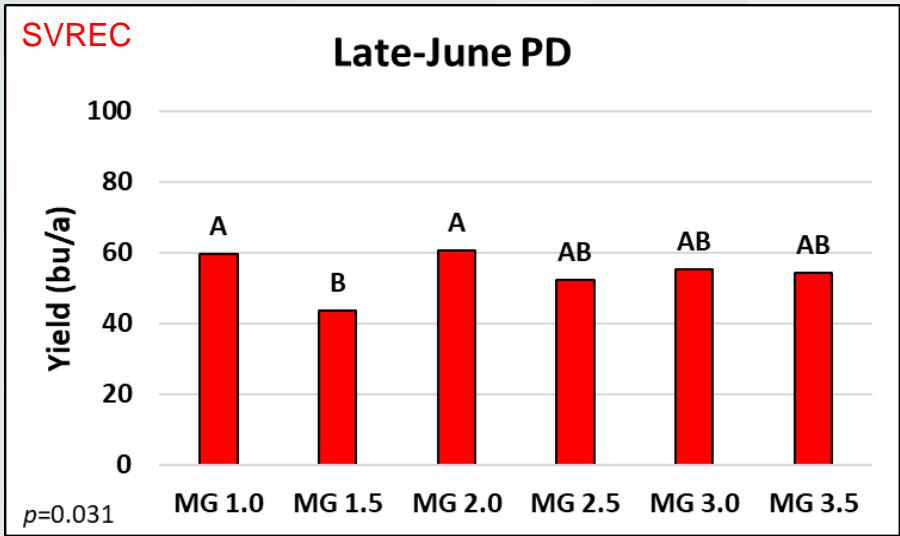
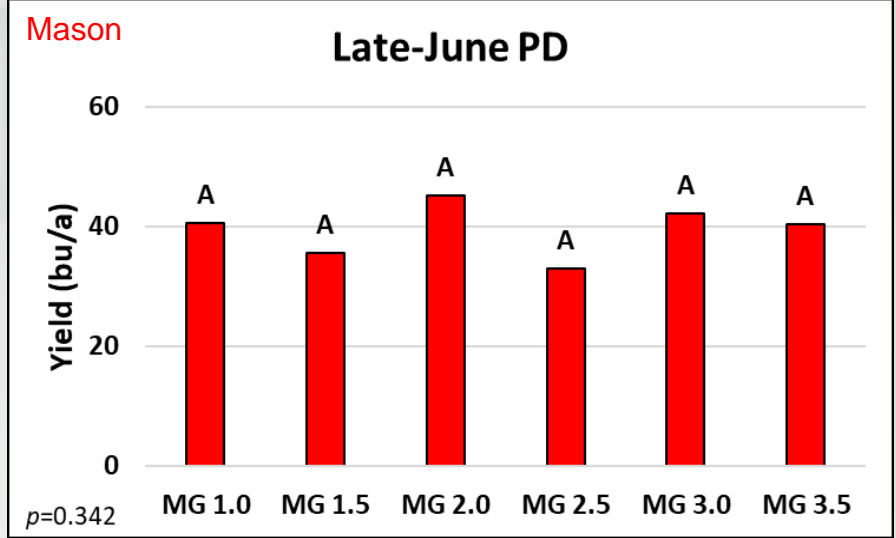
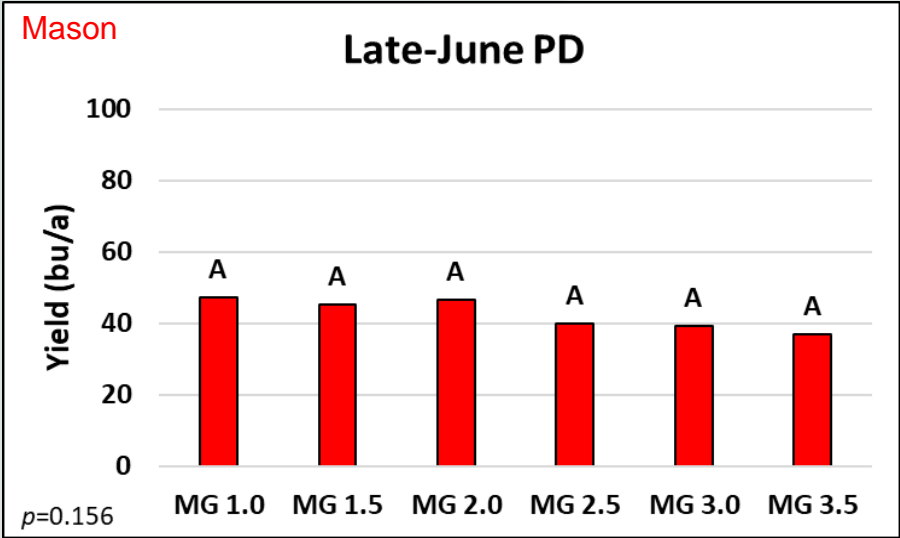
➤ **Mid Season**
(mid May – early June)

- **Limited impact from changing maturity groups**
- **No benefit from increasing planting population**
- **Seed treatment – environment dependent**

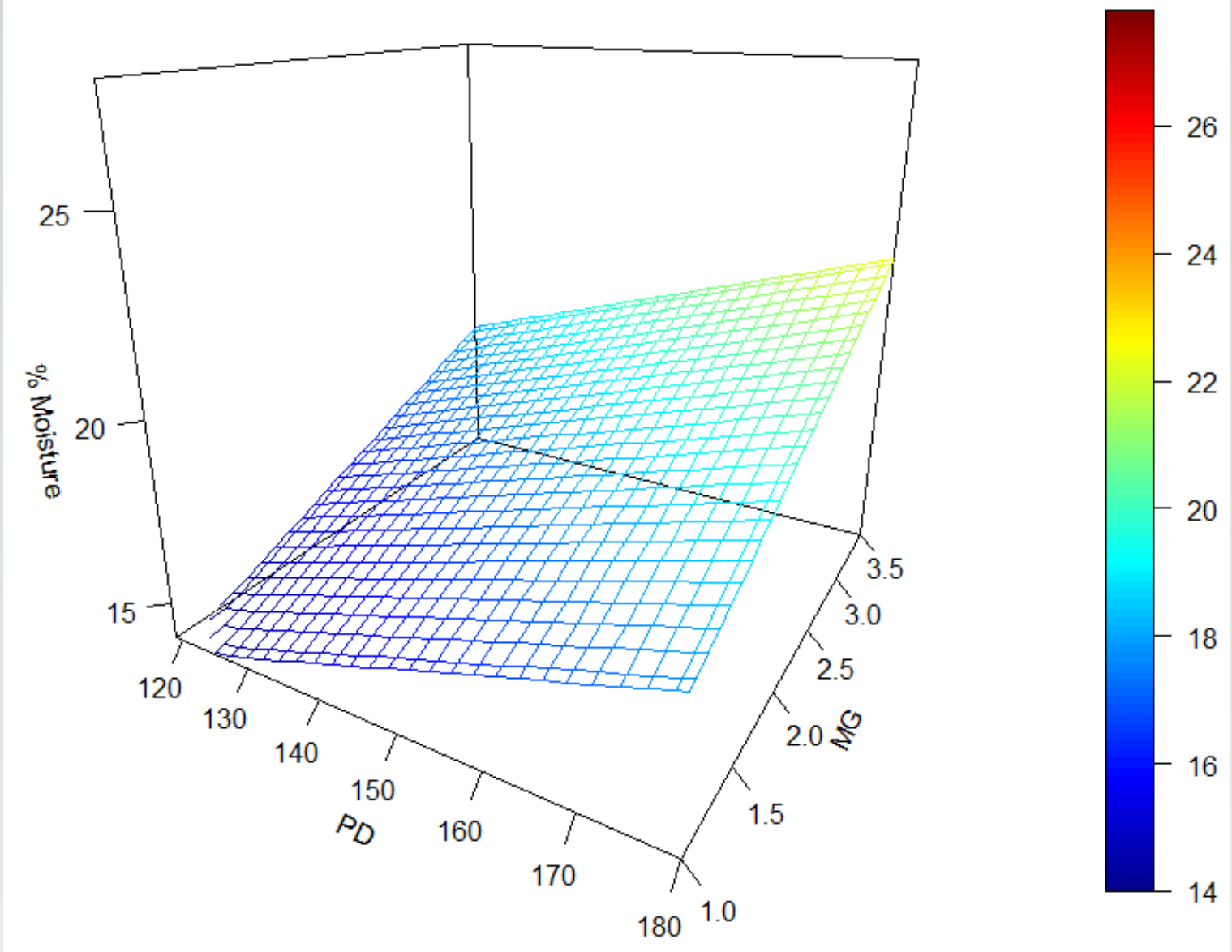
➤ **Late Season**
(mid June – late June)

Late Season Planting – MG Selection

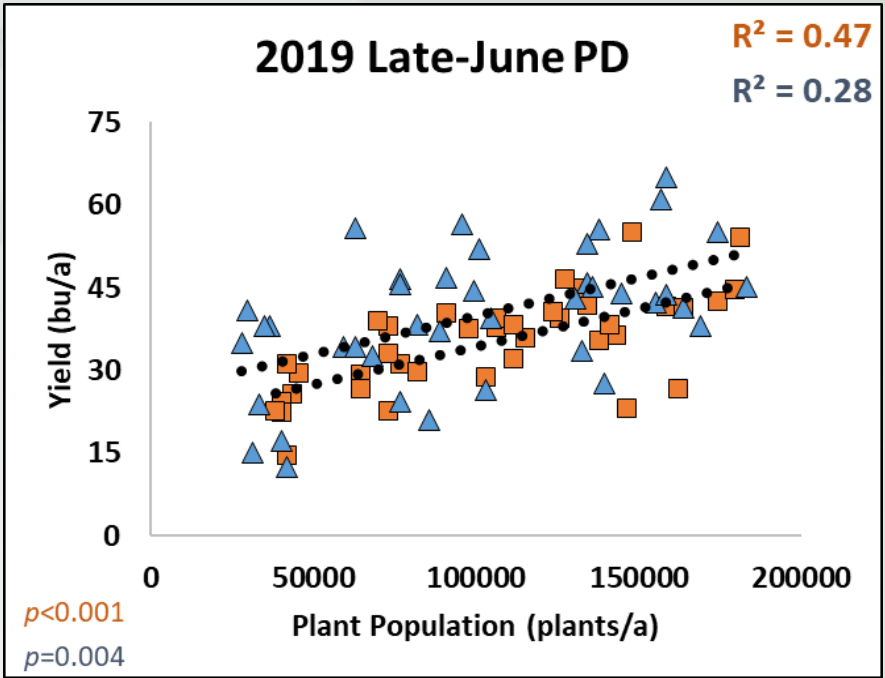
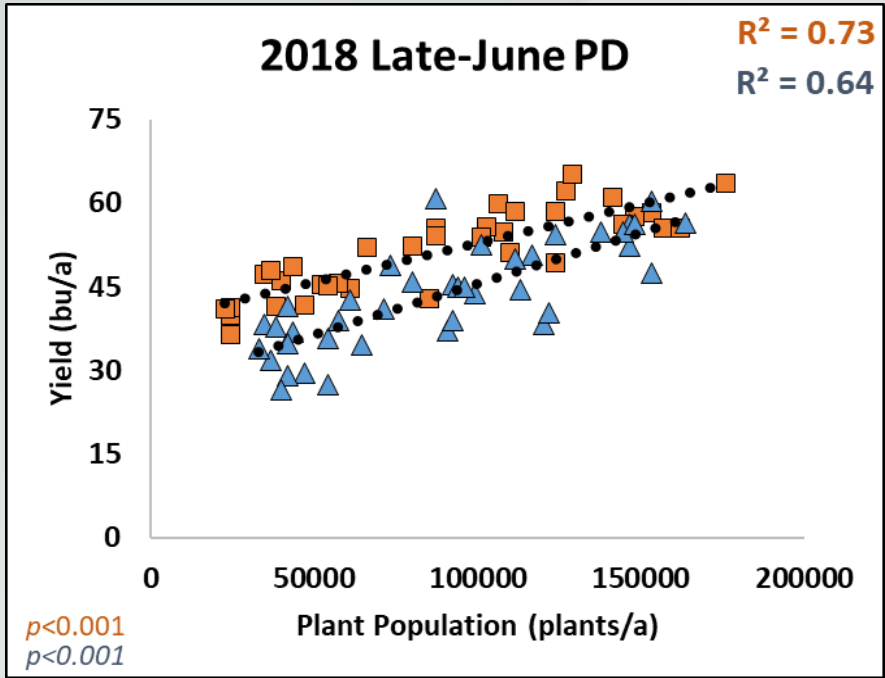
2018





Late Season Planting – Harvest Moisture



Late Season Planting – Planting Rate

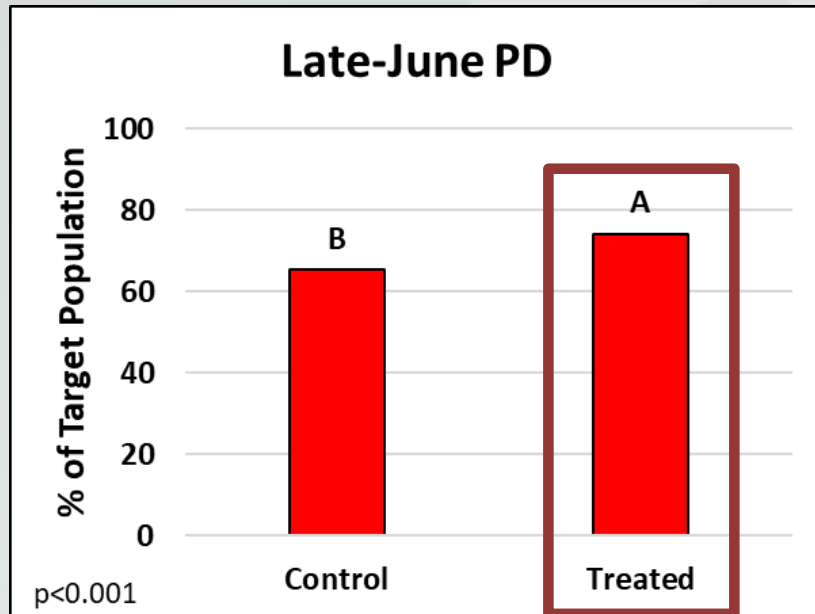


-  SVREC
-  Mason

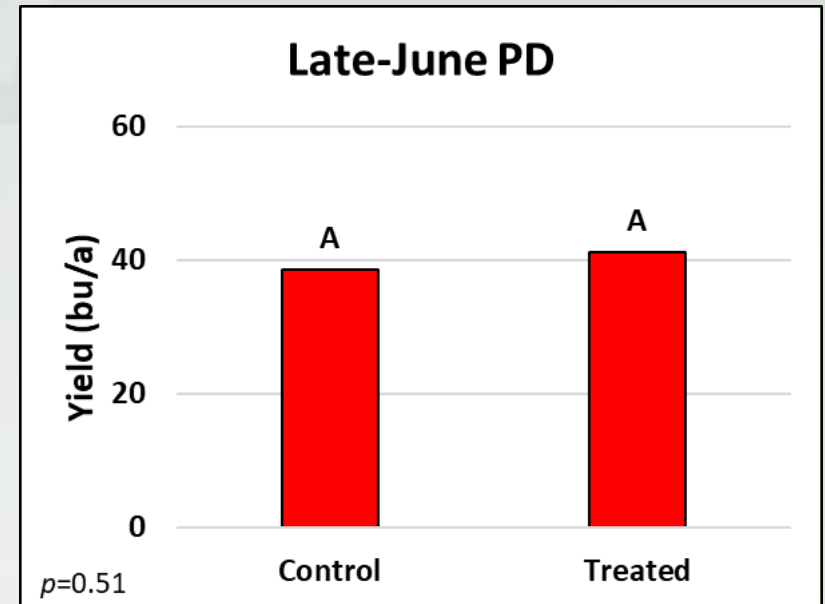
Positive relationship between plant stand and yield

Late Season Planting – Seed Treatment

Plant Stand



Yield



- Improved stand in 2018
- No differences in 2019

No impact on yield

Planting Time

Management Practices

➤ **Early Season**
(late April – early May)

- Longer maturity group can improve yield
- No benefit from increasing planting population
- Seed treatment - environment dependent

➤ **Mid Season**
(mid May – early June)

- Limited impact from changing maturity groups
- No benefit from increasing planting population
- Seed treatment – environment dependent

➤ **Late Season**
(mid June – late June)

- **Shorter maturity group can be used to avoid poor seed quality**
- **Increasing planting population can improve yield**
- **Seed treatment – environment dependent**

Planting Time

Management Practices

➤ **Early Season**
(late April – early May)

- **Longer maturity group can improve yield**
- No benefit from increasing planting population
- Seed treatment – environment dependent

➤ **Mid Season**
(mid May – early June)

- Limited impact from changing maturity groups
- No benefit from increasing planting population (**potential for reducing rate**)
- Seed treatment – environment dependent

➤ **Late Season**
(mid June – late June)

- **Shorter maturity group can be used to avoid poor seed quality**
- **Increasing planting population can improve yield**
- Seed treatment – environment dependent

Acknowledgments

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- Calvin Canfield
- Harkirat Kaur
- Kyle Imwalle
- Lucas Para
- All current and past undergraduate students

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Michigan Soybean
Promotion Committee

The Soybean Checkoff



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