

Planting Date and Seeding Rate Impact Ear Rots, Mycotoxins, and Quality in Corn Silage



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Project
GREEN



Cropping Systems Agronomy
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Corn Silage in Diet Ration

- Makes 50% of the forage dry matter
- Constitute the fiber portion of the diet
- Digestibility is an important factor



Producing High Quality Corn Silage

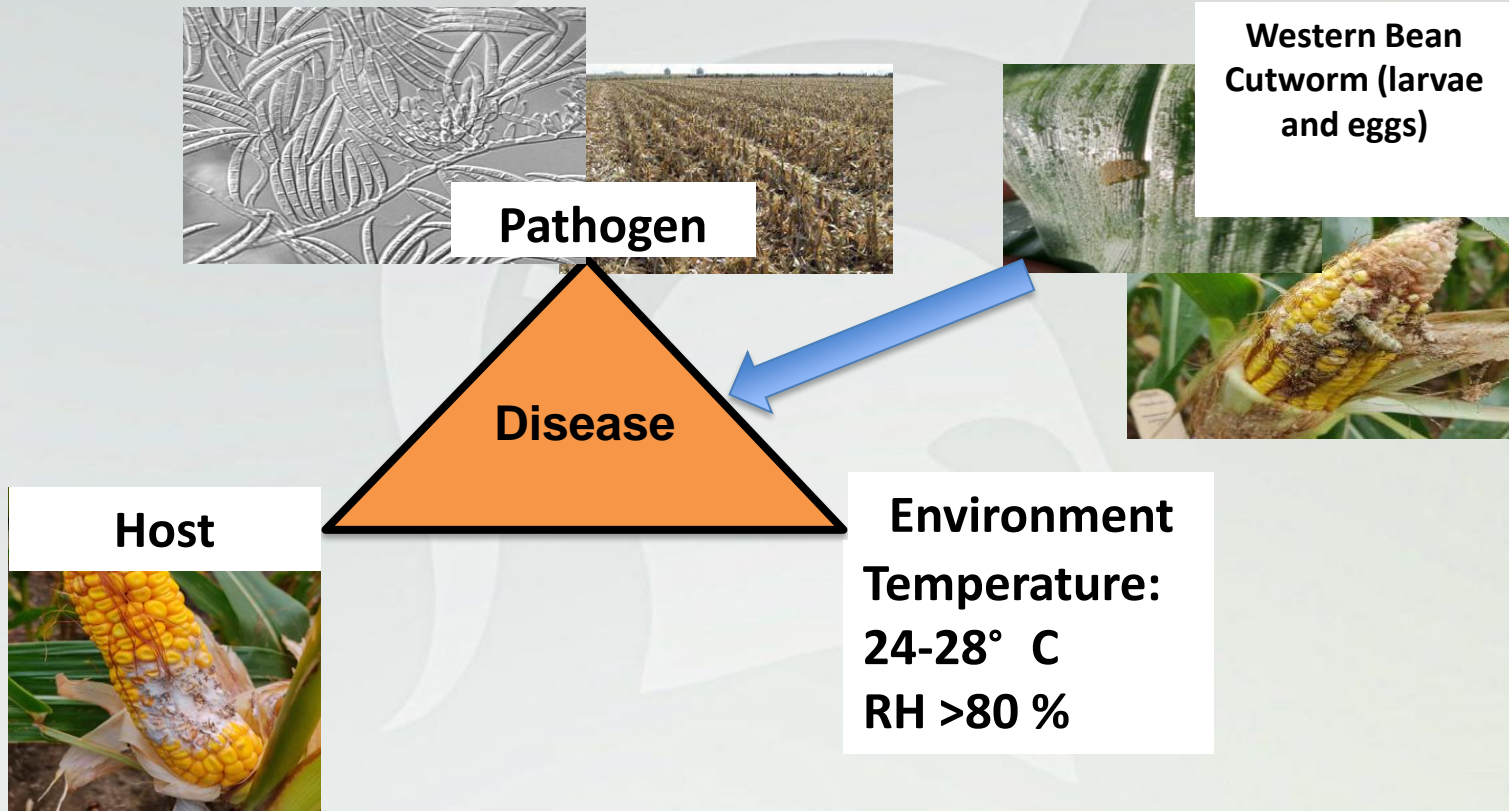
- Hybrid Selection
- Planting Date
- Seeding Rate
- Fertilizer Application
- Irrigation
- Harvest timing and height

Insect and
Disease
Levels

Mycotoxins

Forage
Quality

Conditions Favoring Ear Rots and Mycotoxins



Objectives

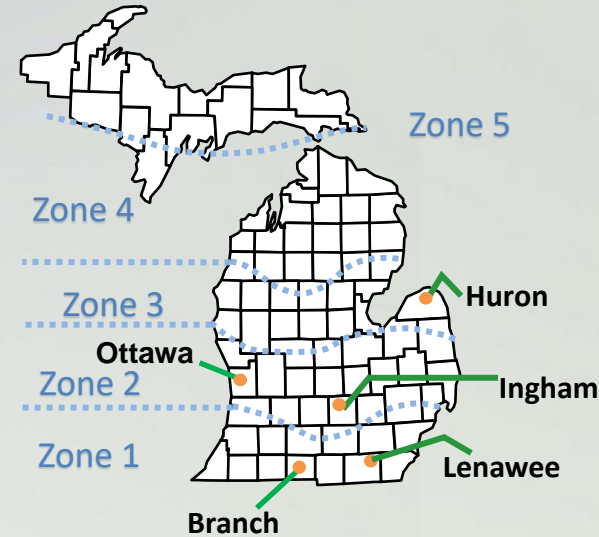
- To evaluate impact of planting date and seeding rate on insect (western bean cutworm), disease (ear rot), mycotoxin accumulation, quality, and yield in corn silage.

Hypothesis: Planting corn silage late April to early May in Michigan will help escape the highest insect and disease pressure for the most susceptible growth stage (silking) .

- To quantify optimum seeding rate across wide environmental conditions.

Hypothesis: Optimum seeding rate will differ with change in surrounding environment due to variable insect and disease pressure.

Design and Method of Work



Objective 1:

- Field trials in Split plot design with 4 reps at Ingham county location.
- Treatments: Planting Date and Seeding Rate
 - Planting Date: Early, Mid and Late
 - Seeding Rate: 69,160; 83,890; 98,800; 113,69 seeds per hectare

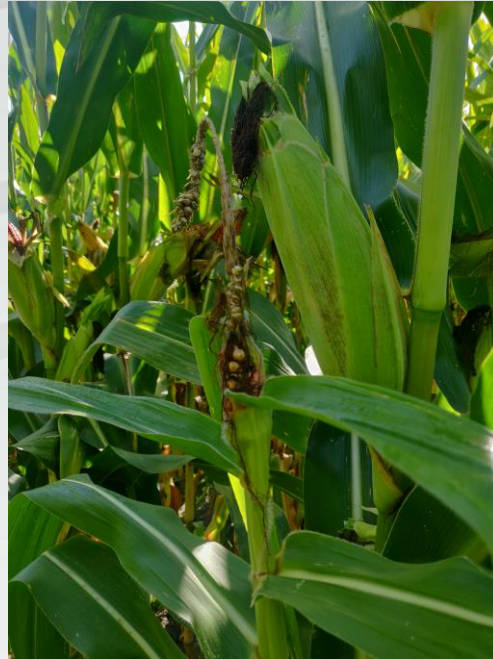
Objective 2:

- Multi-location seeding rate trials in Randomized Complete Block Design with 4 reps

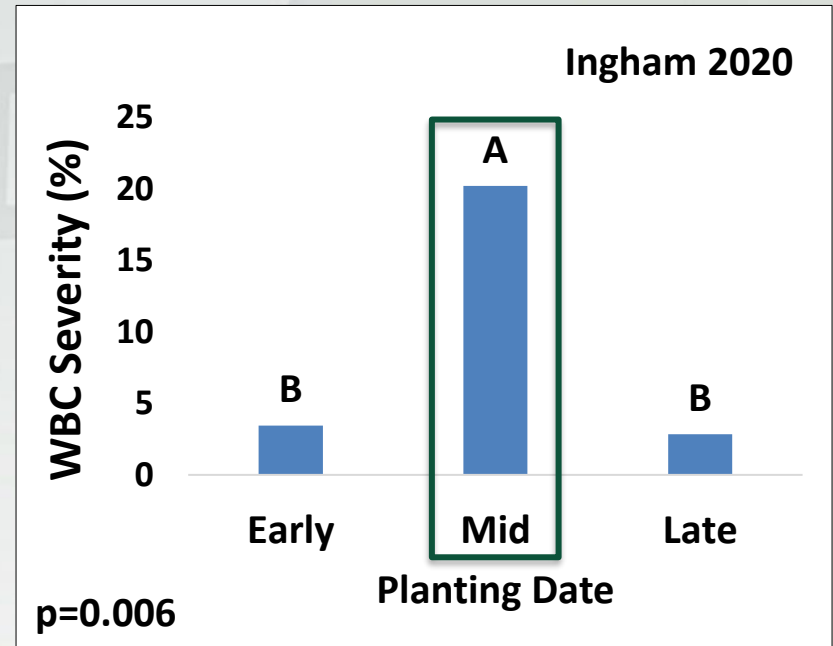
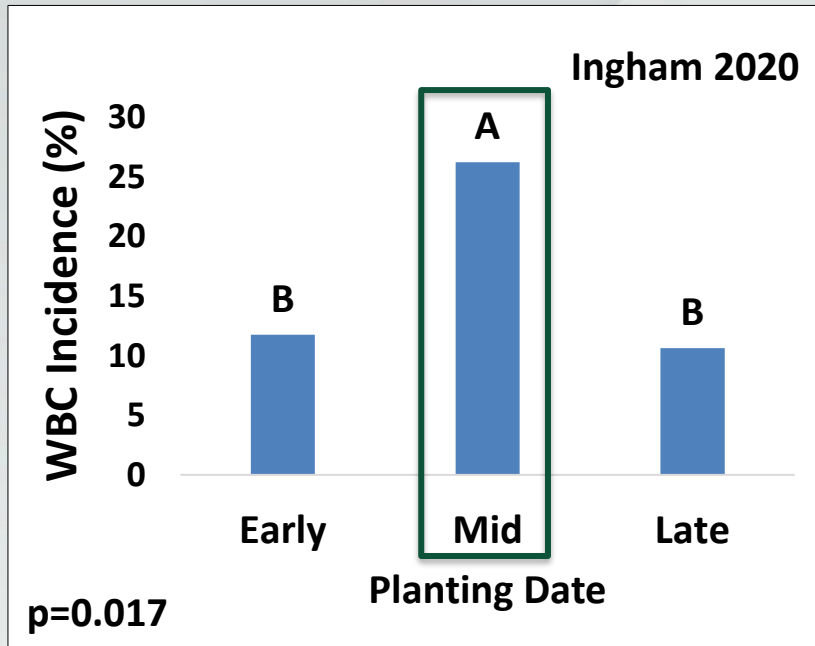
Planting Time	Planting Window
Early	Late April-Early May
Mid	Third –fourth week of May
Late	Early second week of June

Data Collection

- Insect Damage Ratings
 - Western Bean Cutworm Incidence
 - Western Bean Cutworm Severity
- Ear Damage Ratings
 - Ear Rot Incidence
 - Ear Rot Severity
 - Ear Rot Index
- Mycotoxin Concentrations
(Deoxynivalenol, DON;
Zearalenone, ZON)
- Quality and Yield parameters

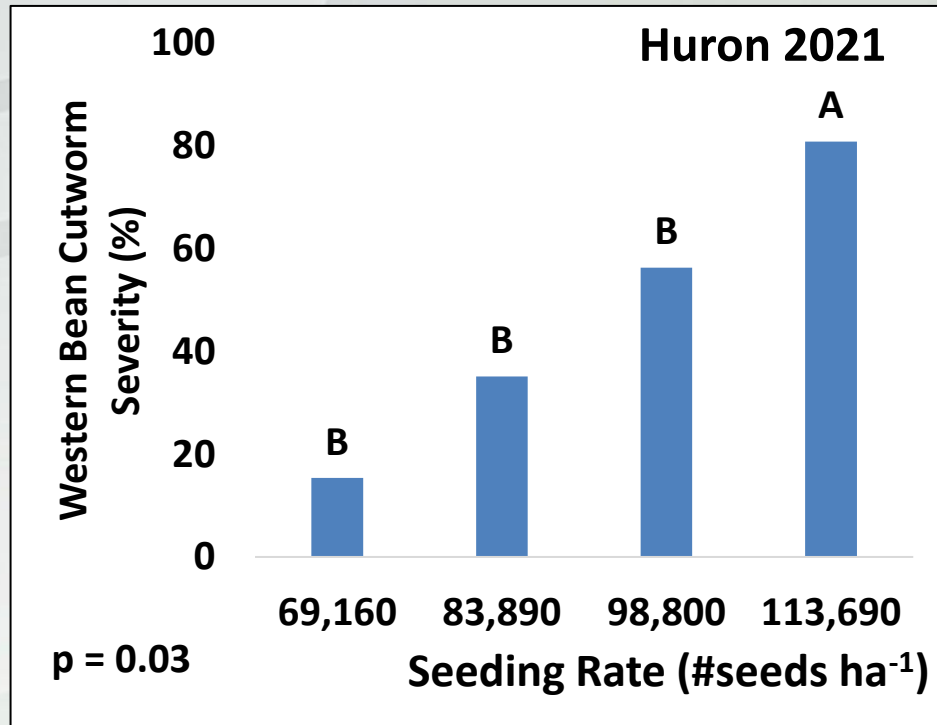
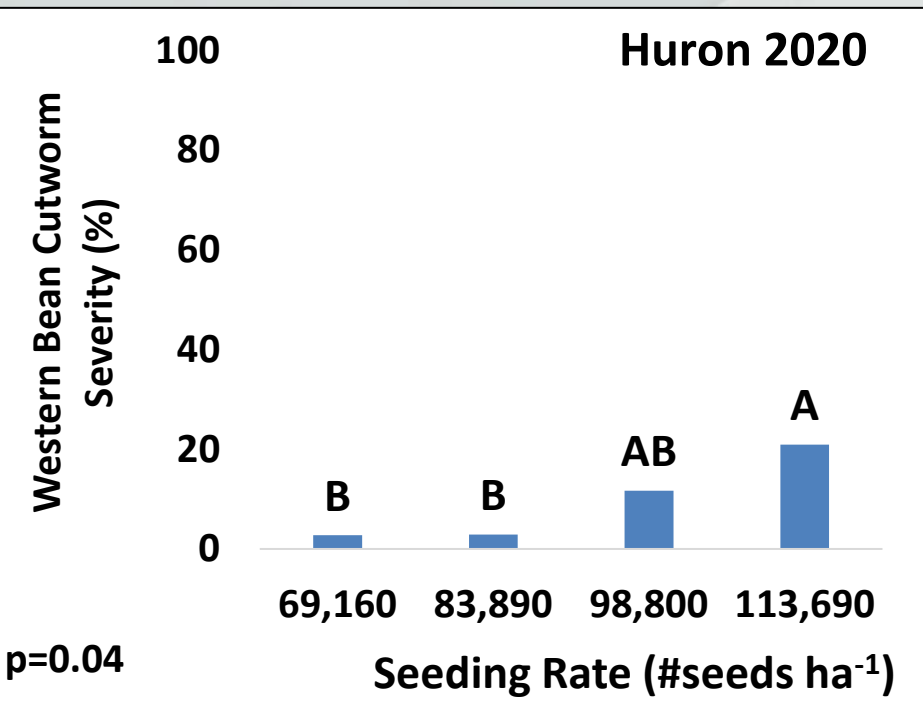


Results – Insect Damage



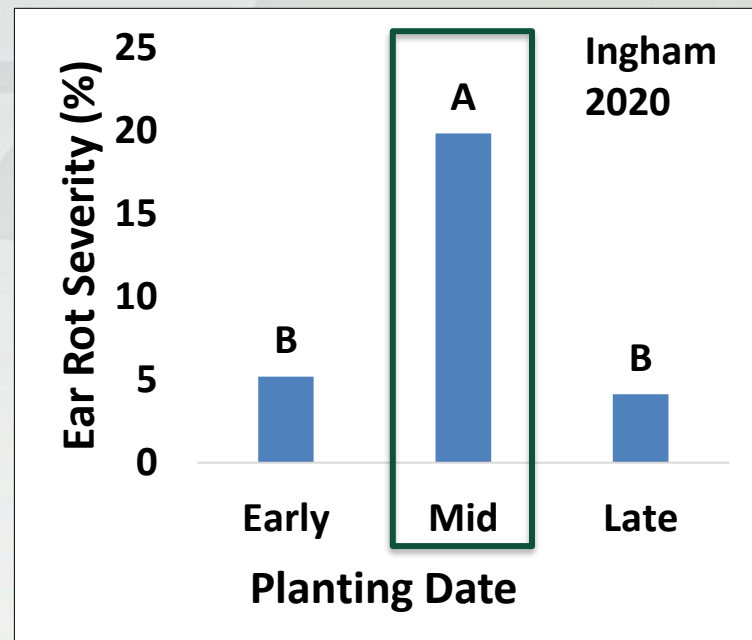
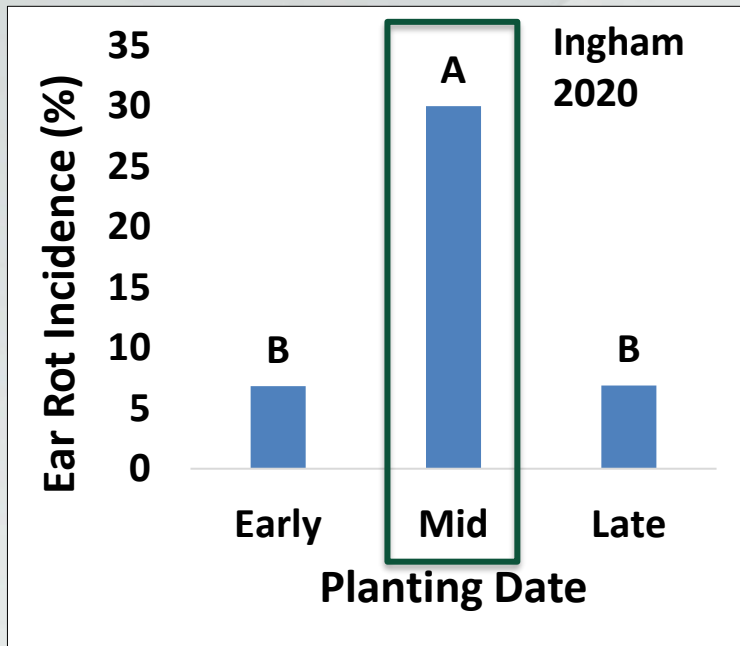
- Insect damage did not differ significantly in 2019 and 2021.
- Corn planted around last week of May had highest insect damage.

Results – Insect Damage



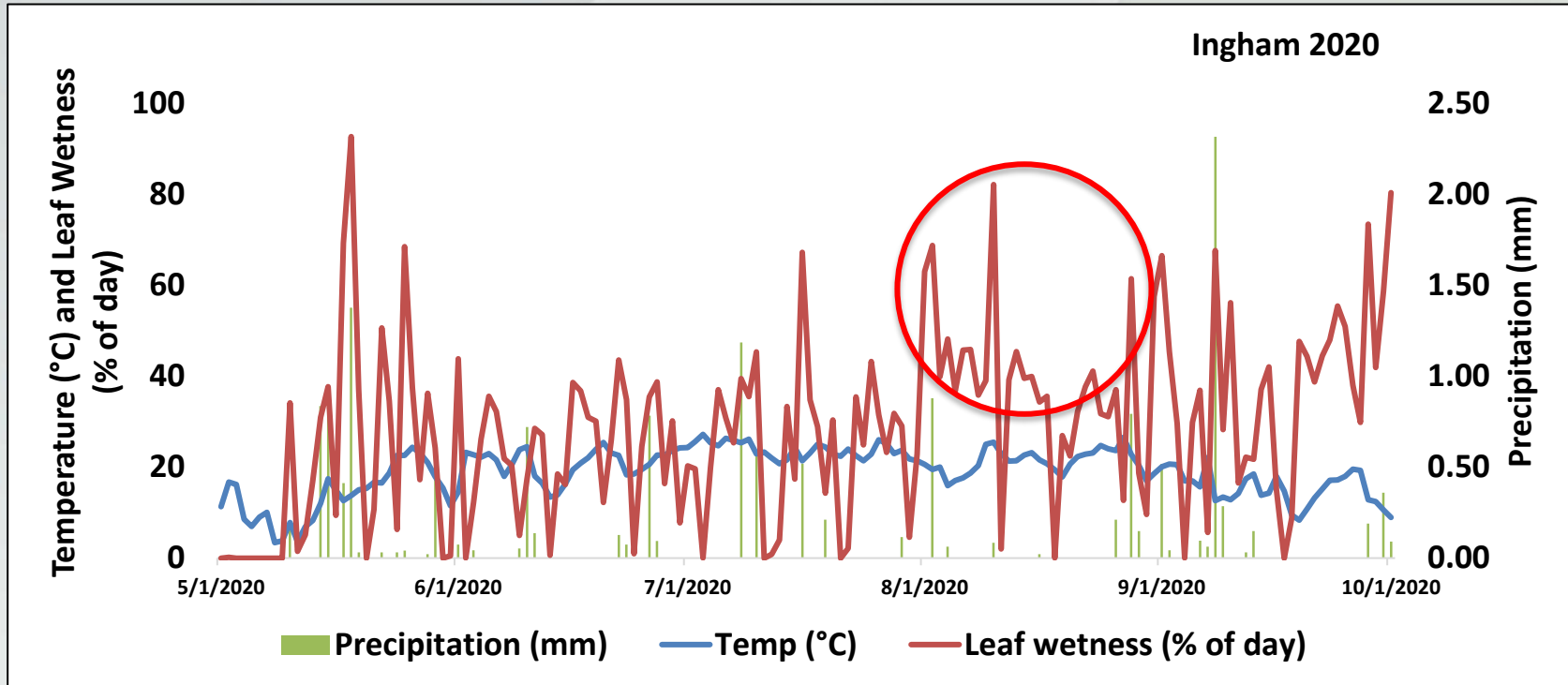
- Insect damage varied across the seeding rate only at Huron.
- WBC Severity was higher for higher seeding rates.

Results – Disease Damage

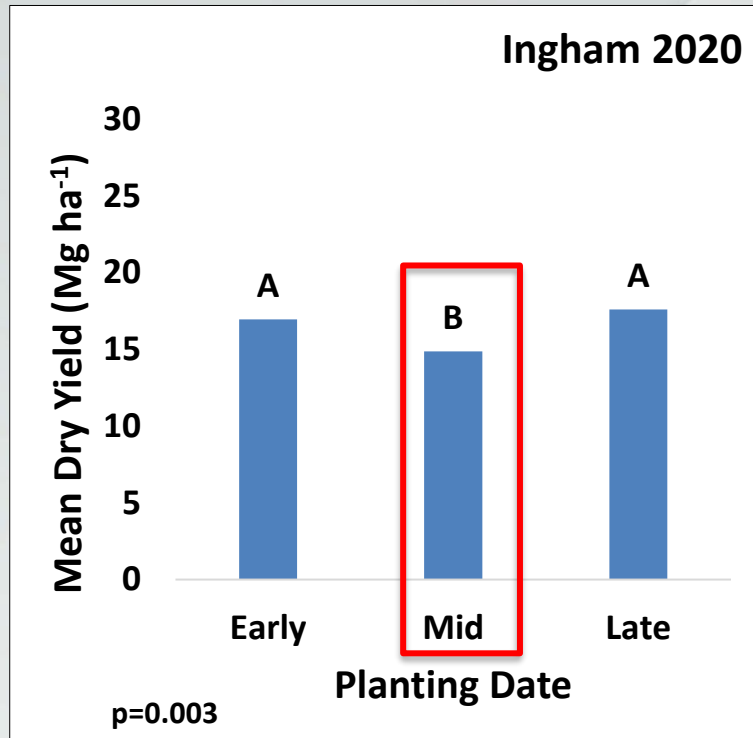


- Highest disease damage was seen in mid planted crops at Ingham 2020.
- Disease damage was similar across seeding rates in both 2019 and 2021.

Weather Conditions

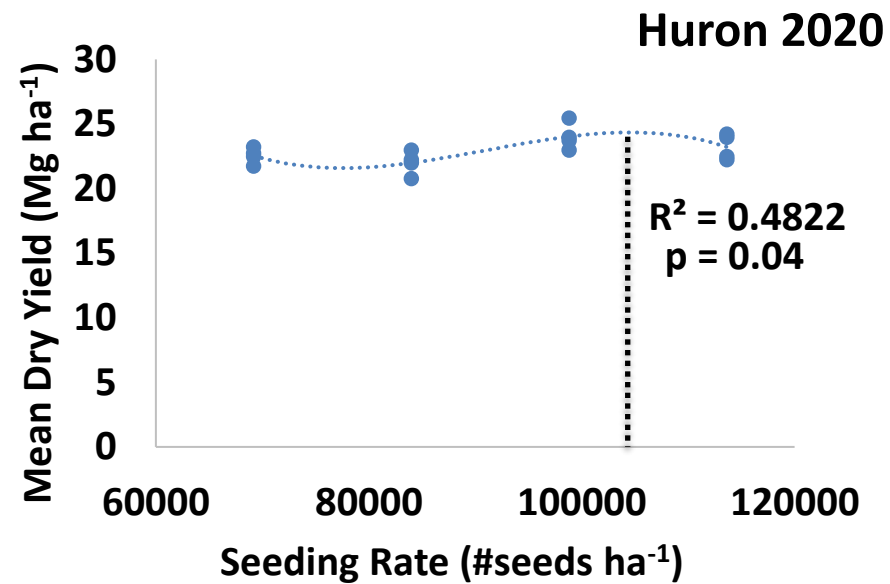
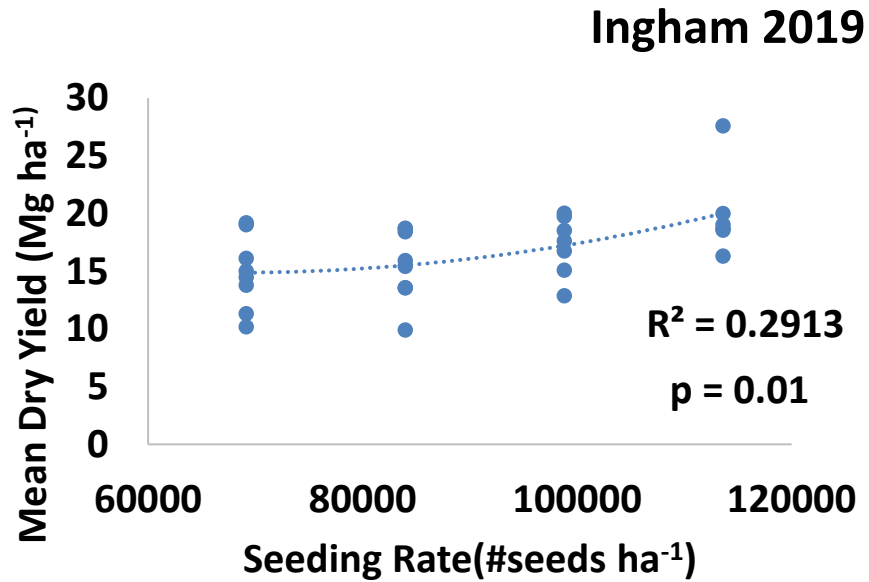


Results – Dry Yield



- Planting date impacted yield only at Ingham 2020
- Mid planted corn suffered a yield penalty due to higher insect and disease damage.

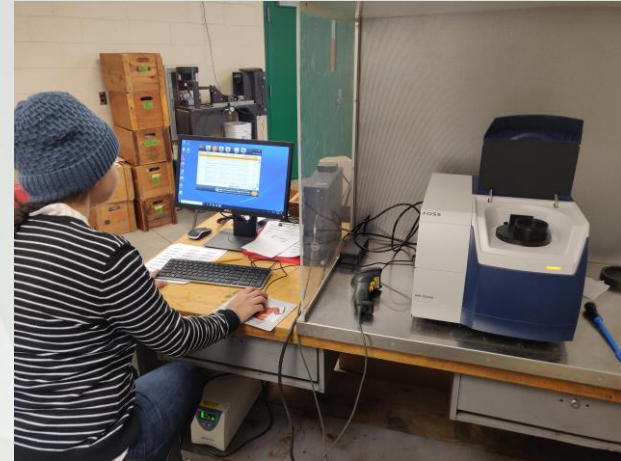
Results – Dry Yield



- Planting date impacted yield only at Ingham 2020
- Seed rate trials at Ingham 2019 showed a linear relationship but at Huron and Allegan 2020 it followed a quadratic regression curve.

Quantification of Silage Quality

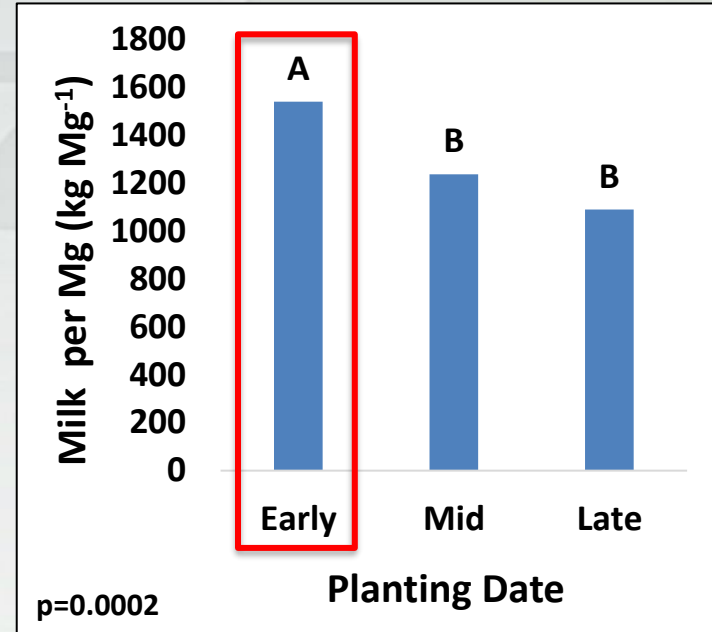
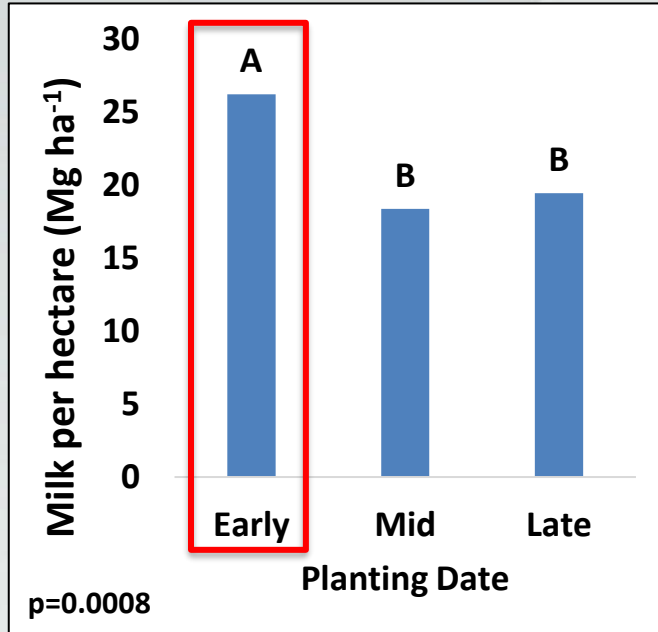
- **Neutral Detergent Fiber (low value desirable)**
- Acidic Detergent Fiber (low value desirable)
- In Vitro Digestibility (higher value desirable)
- **Neutral Detergent Fiber Digestibility (higher value desirable)**
- Crude Protein (higher value desirable)
- Starch (higher value desirable)
- **Milk yields (Milk per hectare and milk per Mg)**



Results- Silage Quality

Quality Parameters	Ingham 2020		
	Early	Mid	Late
NDF	20.03 a	20.99 a	21.73 a
ADF	15.31 b	19.82 a	19.58 b
IVD	88.09 a	84.36 b	84.31 b
NDFD	40.52 a	25.24 b	28.09 b
CP	7.67 a	7.05 b	7.54 a
Starch	46.34 a	40.94 b	35.65 c

Results – Milk Yields



- Milk yield per unit area and per unit dry matter, highest in early May planted crop.

Conclusion and going forward

- Corn planted in late May was more prone to western bean cutworm infestation and ear rot infection.
- Yield was lowest in late May crop, whereas the highest yield was observed in early May crop.
- Overall quality parameters and milk yields were improved for early planted corn.
- Seed rate impact on insect, disease, yield, or quality of silage was location specific.
- Explore additional factors that impact the disease, yield, and quality.

Acknowledgments

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