

# Challenges and considerations for growing good quality corn silage in Michigan



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# Corn Silage in Diet Ration

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



# Challenges for Corn Silage in Michigan

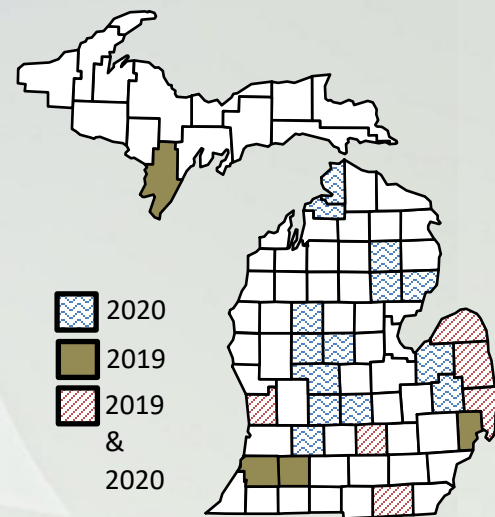
- Shorter growing season
- Ear damaging insect flight
- Fungal Diseases: Ear and stalk infections, Foliar infections
- Quality Concerns: Loss in digestibility and toxin accumulation





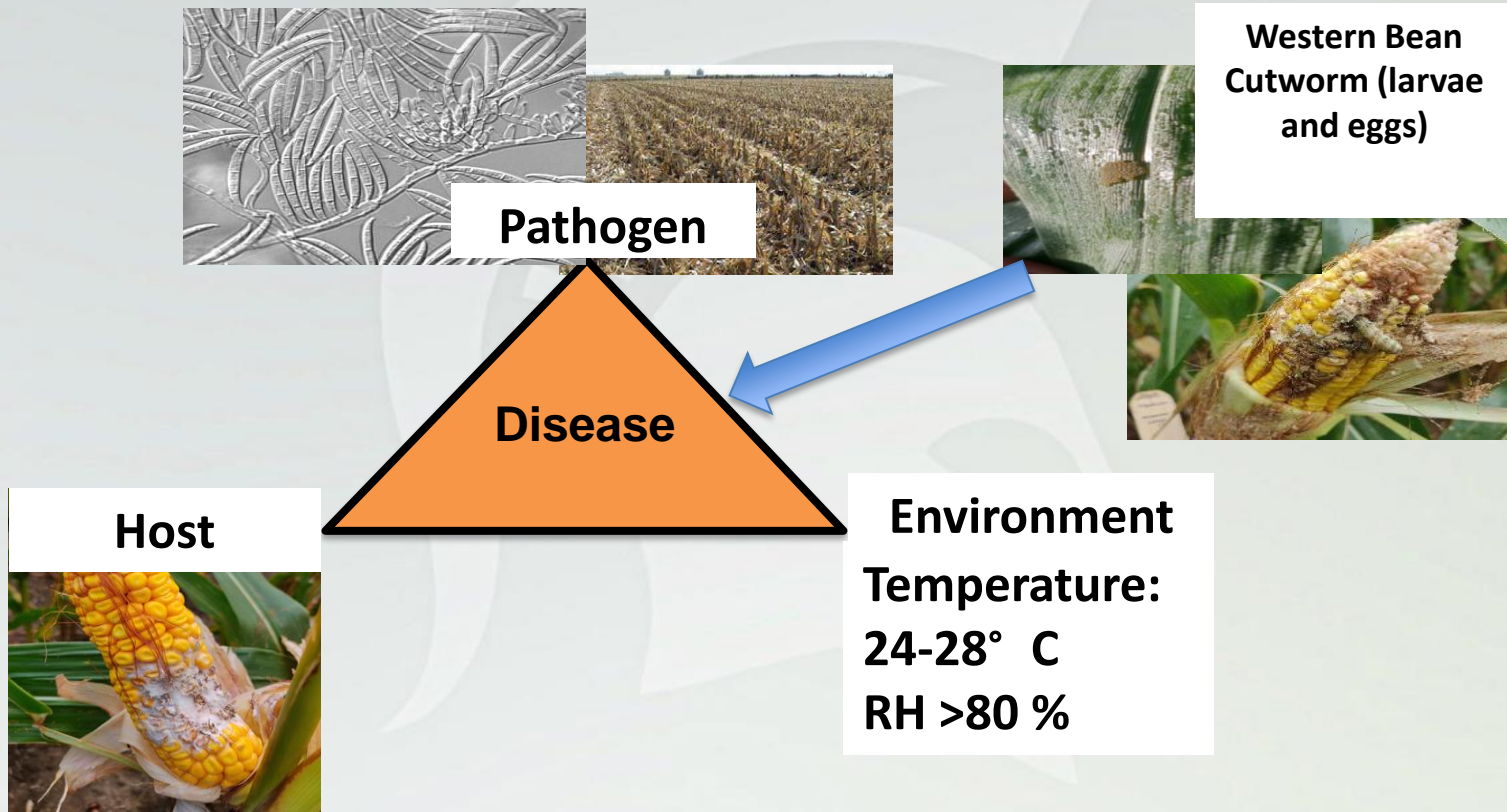
# Mycotoxins in Michigan Corn Silage

- Grower samples for mycotoxin analysis from 10 and 20 Michigan counties in 2019 and 2020 respectively .
- 100 percent of the samples tested positive for at least one mycotoxin.
- 24 out of 26 mycotoxins tested were found positive in at least one of the samples.
- 50% samples had higher mycotoxin levels than threshold for DON (1 ppm), ZON (1ppm) and 5% for fumonisin.



Counties submitting silage samples for analysis over years

# Conditions Favoring Ear Rots and Mycotoxins



# Producing High Quality Corn Silage

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

Insect and  
Disease  
Levels

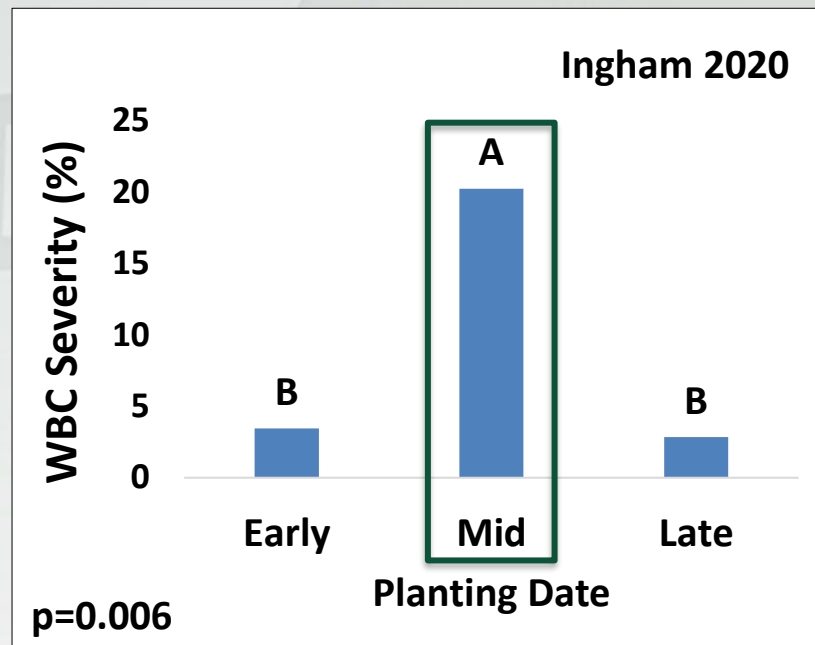
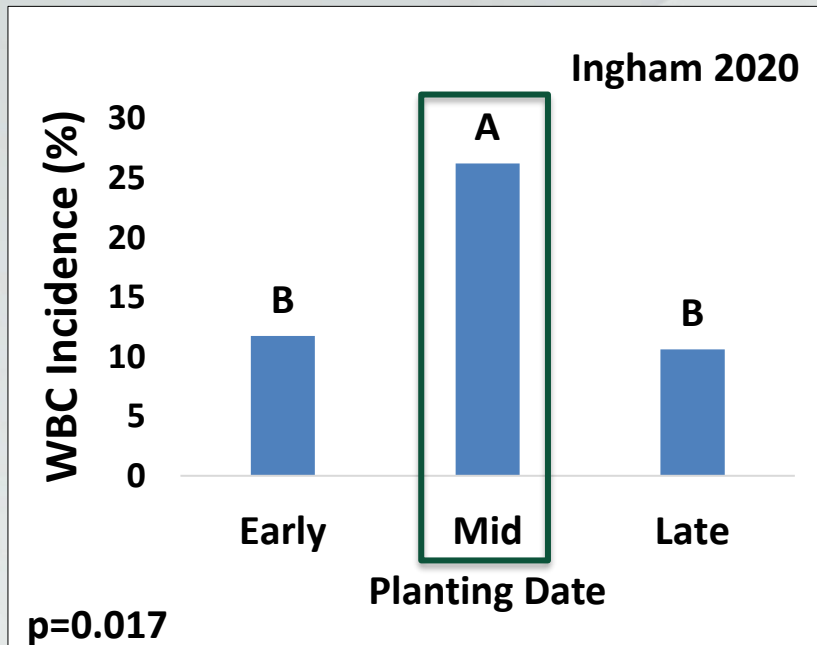
Mycotoxins

Forage  
Quality

# Planting Date

- Planted between early May to Mid June.
- Planting date may determine the environmental conditions at a particular stage.
- Determines exposure of a plant stage to a pathogen.
- Influences harvest time, yield and eventually forage quality.

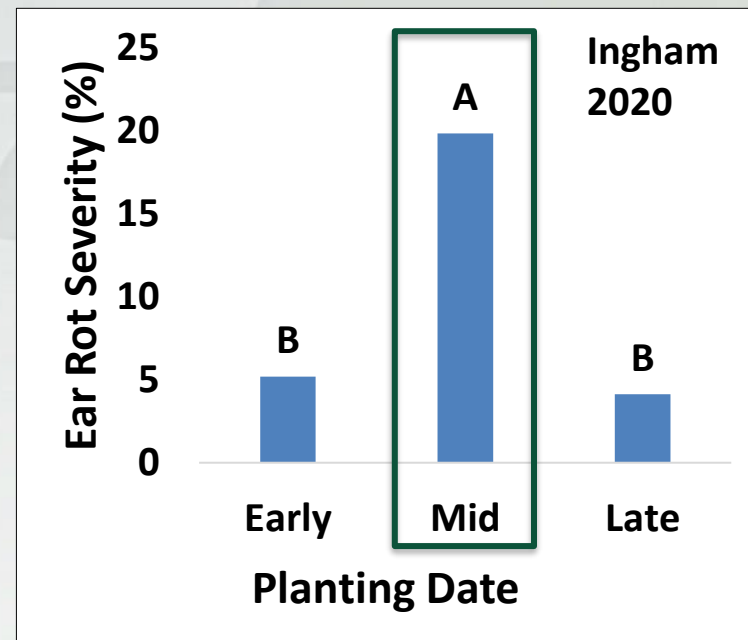
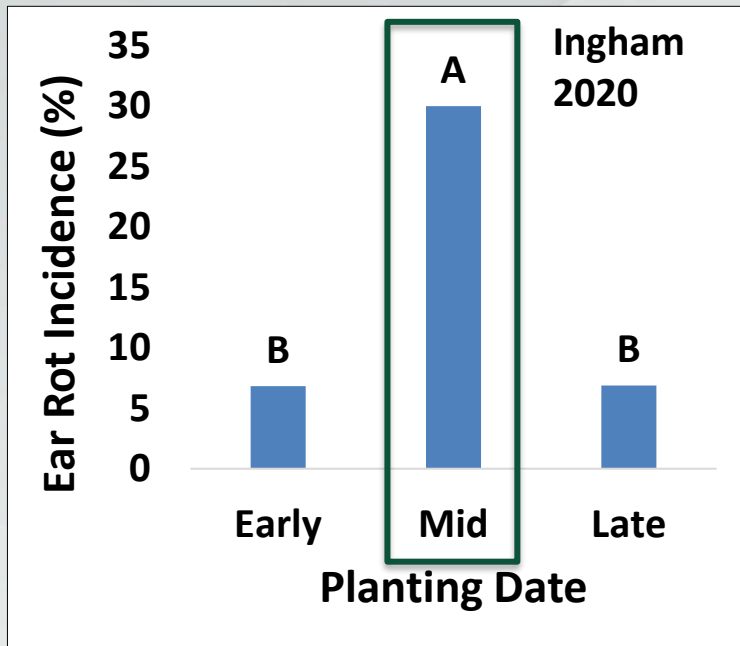
# Planting Date – Insect Damage



- Early: End April to Early May; Mid: Third-fourth week of May; Late: Second-third week of June.
- Corn planted around last week of May had highest insect damage.

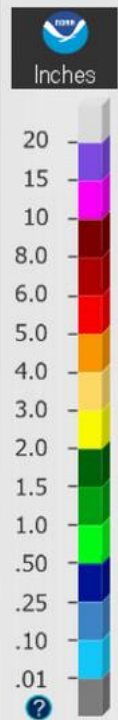
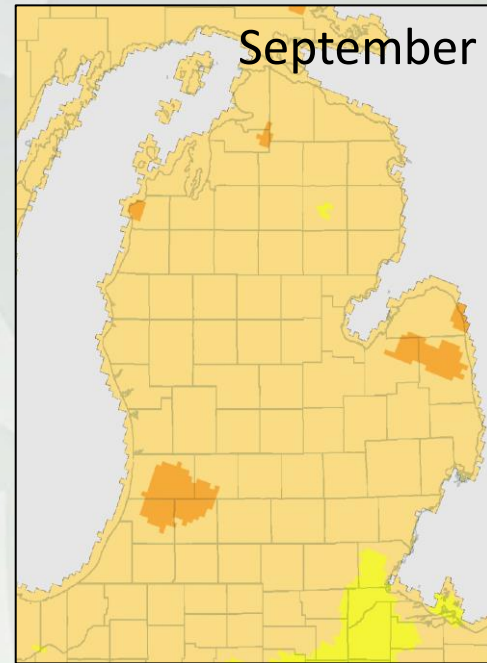
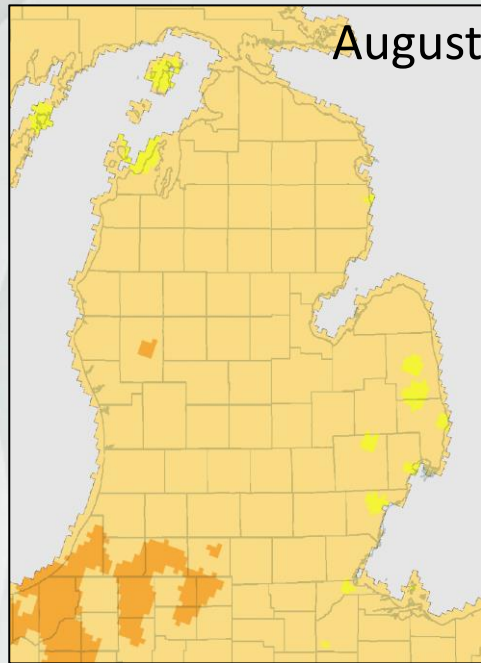
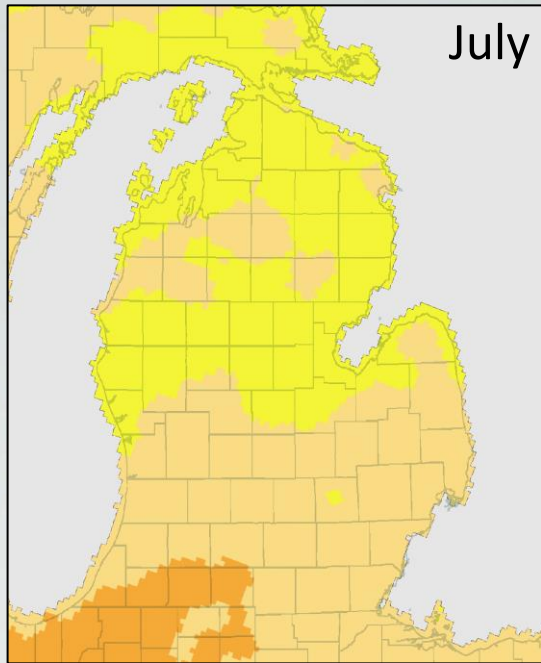


# Planting Date – Disease Damage



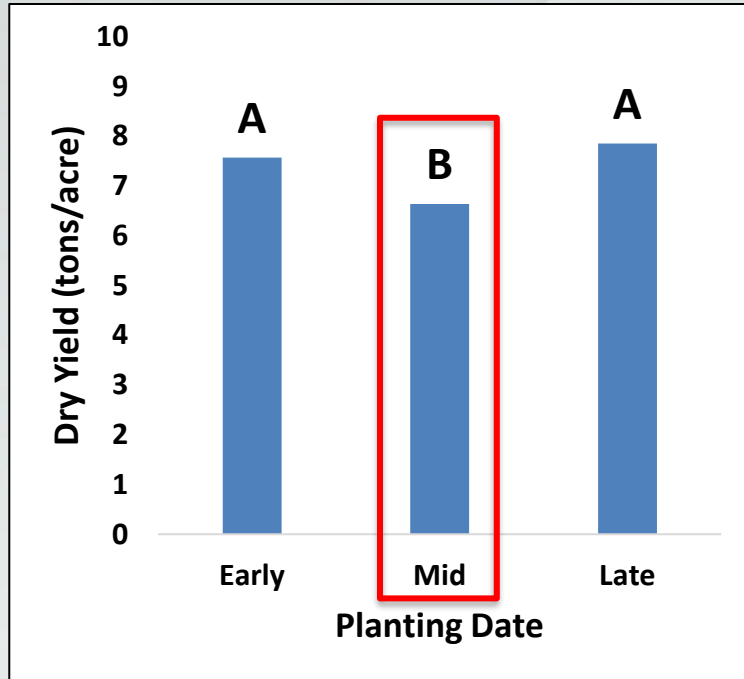
- Highest disease damage was seen in mid planted crops at Ingham 2020.
- Disease damage was similar across seeding rates in both 2019 and 2021.

# What's happening in Mid Planting?



- Thirty years average rainfall data in Michigan in July, August and September.

# Planting Date – Dry Yield

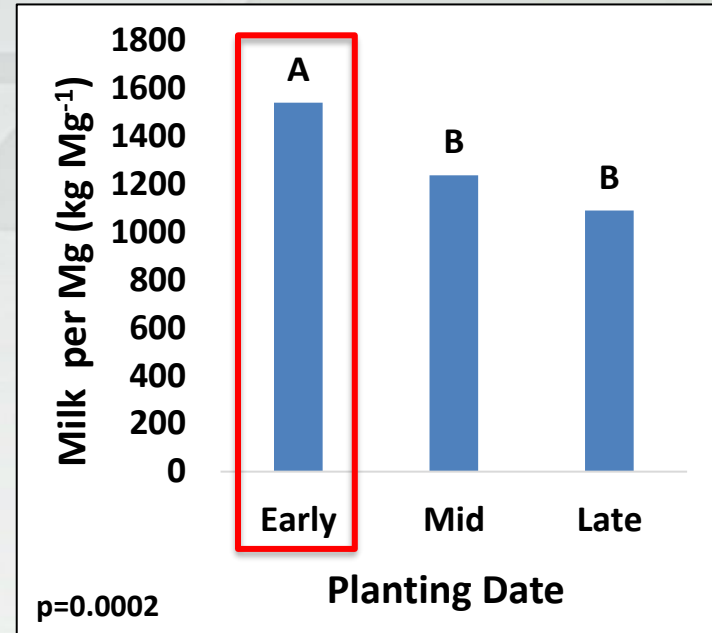
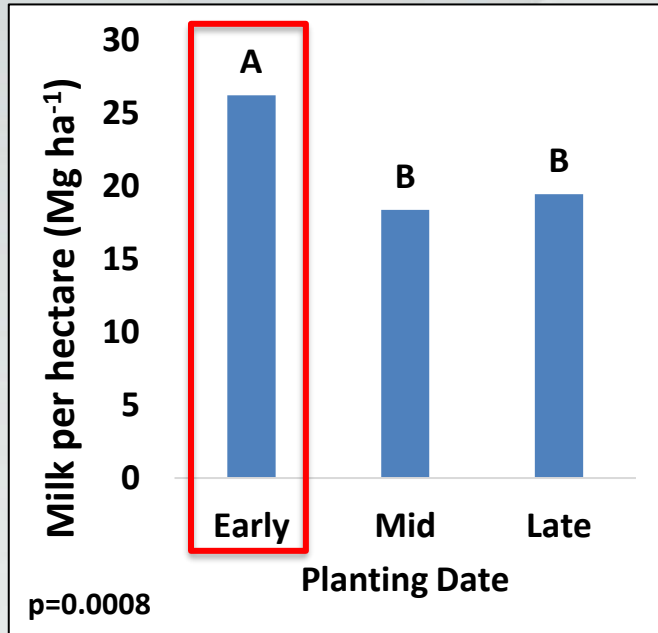


➤ Planting date impacted yield only at Ingham 2020

# How does the quality look?

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

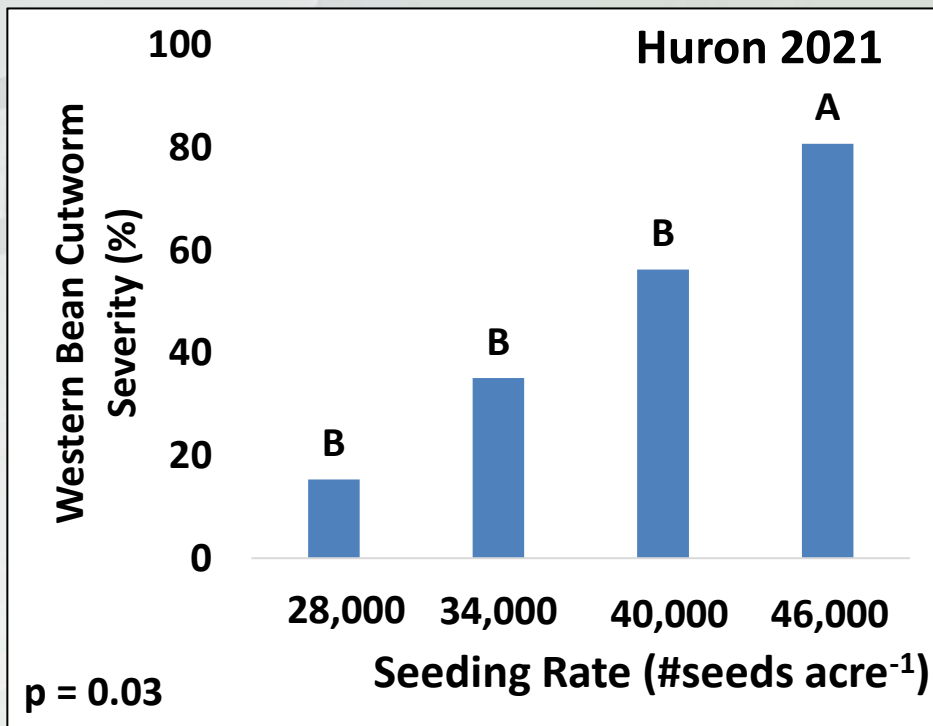
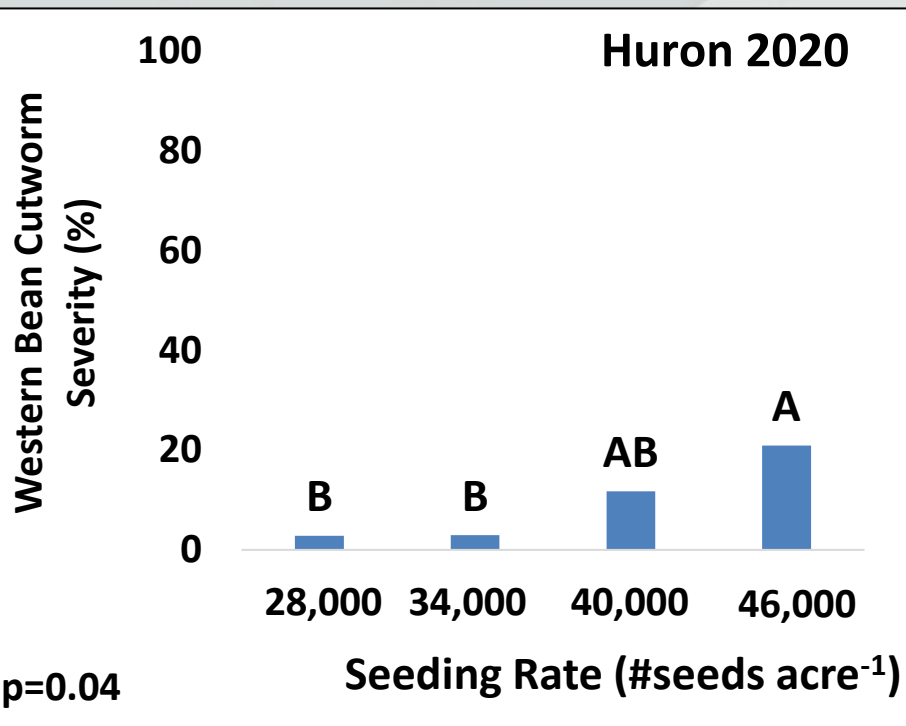
# Planting Date – Milk Yields



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



# Seeding Rate – Insect Damage



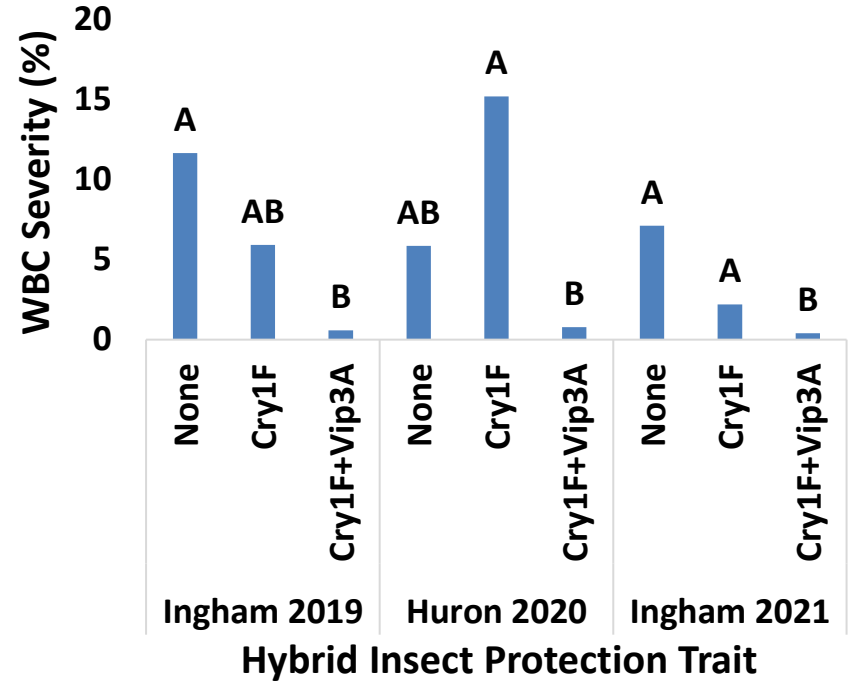
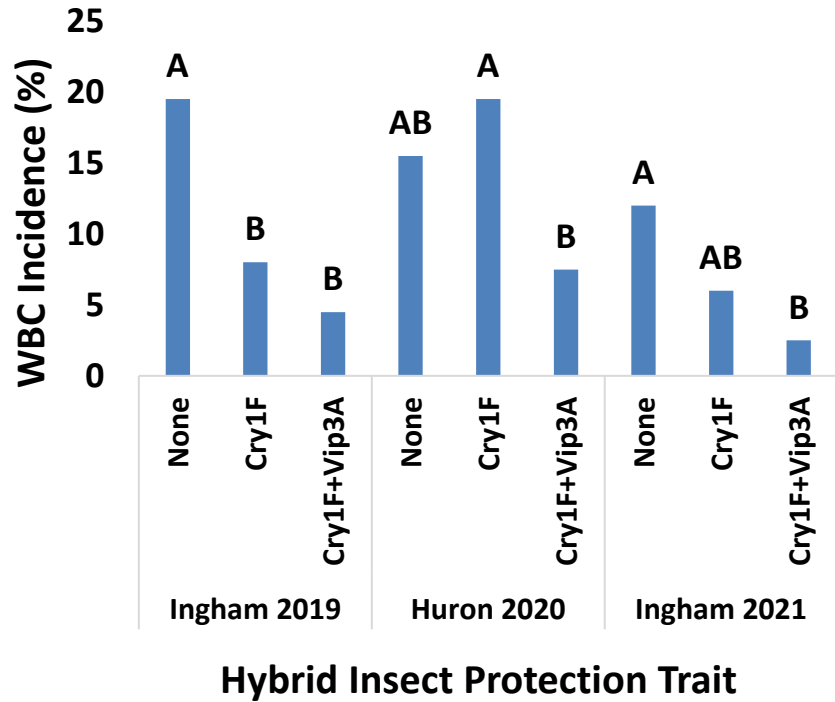
- Western bean cutworm severity increases linearly with increasing seed rate.

# Hybrid Selection: Insect Protection Trait

- Important tool for protection against insect pest.
- Use of Bt proteins in hybrids can play a crucial role.

<b>Hybrid Class</b>	<b>Protein</b>	<b>Insect Targets</b>
Conventional	None	--
Bt	Cry1F	ECB
Bt	Cry1F+Vip3A	ECB & WBC

# Insect Protection Traits - WBC

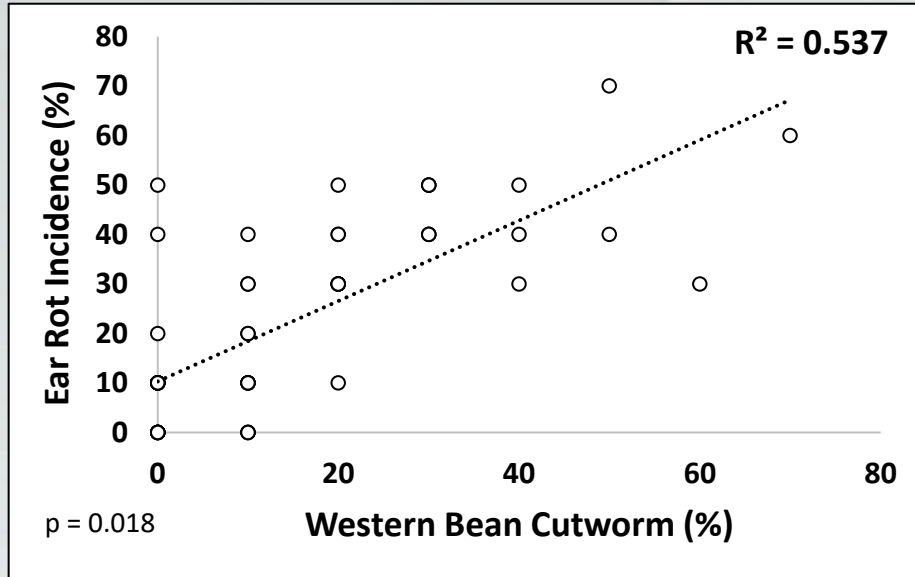


➤ Presence of two insect protection proteins help control insect damage.

# Insect Protection Traits – Ear Rots

Ear Damage		Insect Protection	Site Year			
			Ingham 2019	Ingham 2020	Huron 2020	Wood 2020
Ear Rot	Incidence	None	18.0 a	26.0 a	25.0 a	14.5 a
		Cry1F	11.0 a	20.0 a	23.0 a	4.5 b
		Cry1F+Vip3A	12.5 a	18.0 a	17.0 a	4.3 b
	Severity	None	17.1 a	21.1 a	15.8 a	5.8 a
		Cry1F	4.7 b	15.7 a	15.5 a	0.6 b
		Cry1F+Vip3A	0.1 b	1.3 b	3.9 b	2.8 b

# Ear Rot and Western Bean Cutworm

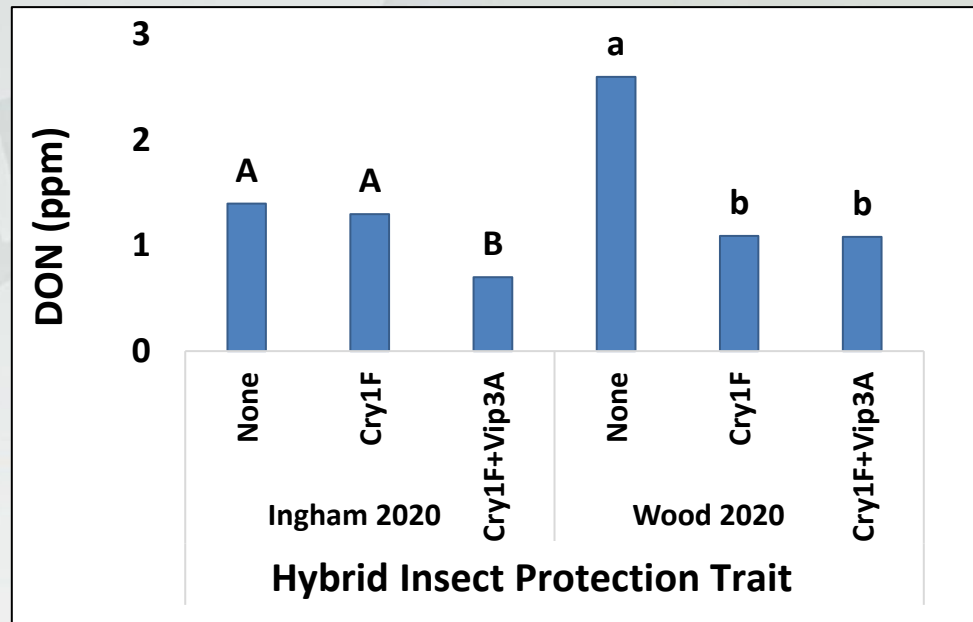
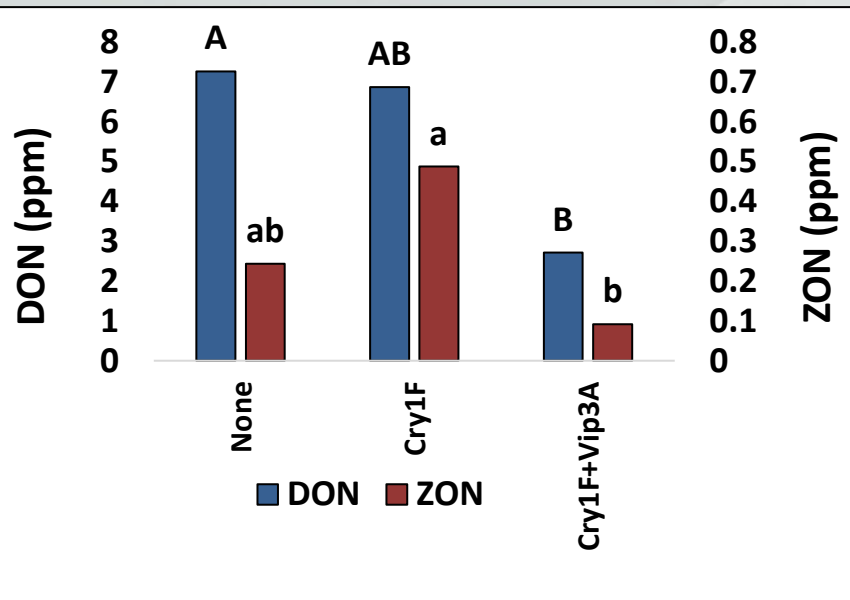


- Weak or no correlation was seen between ear rot and WBC damage at other site years.



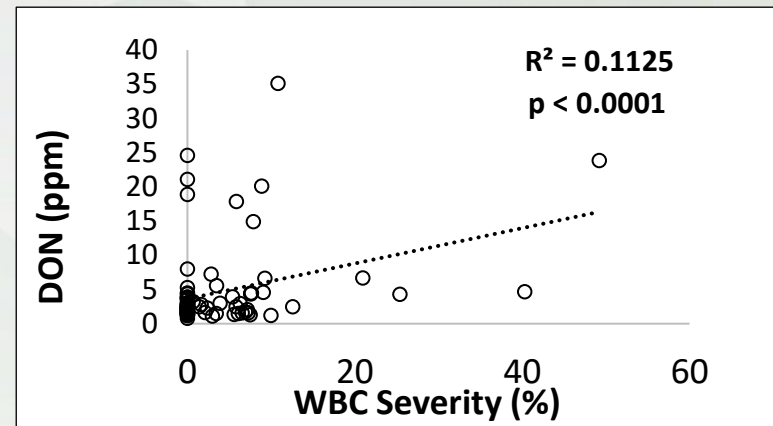
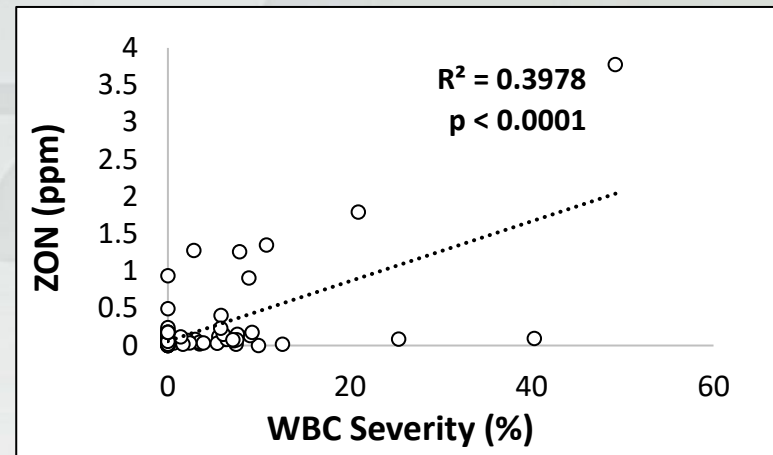
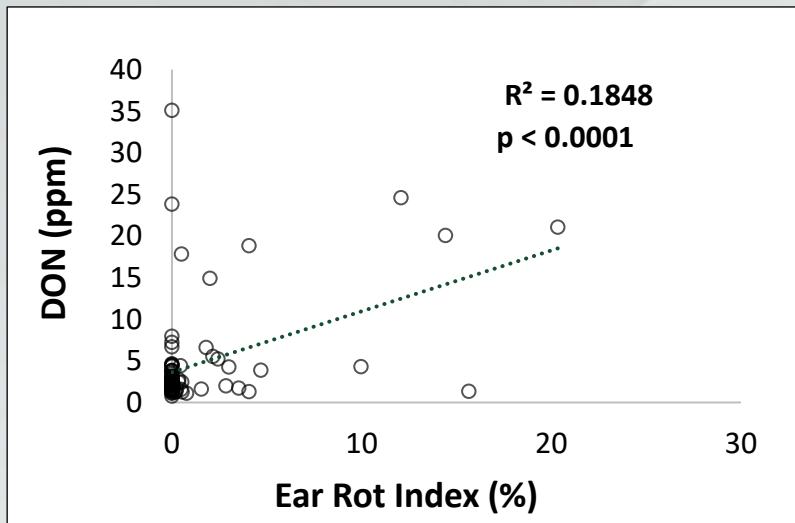


# Insect Protection Trait - Toxins



- Mycotoxin concentration was low except in inoculated plots.
- Lower mycotoxin levels were detected in hybrids with insect protection traits for both ECB and WBC.

# Mycotoxins and Ear Damage



- Weak Correlations observed.
- Ear Rot Index = (Ear Rot Incidence x Ear Rot Severity)/100

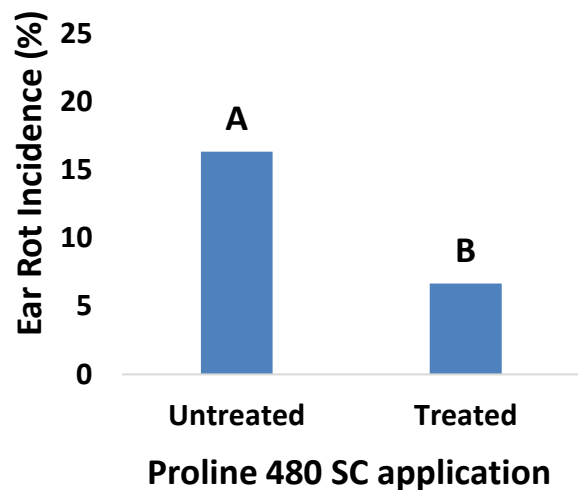
# Fungicide Application

- Usually applied at silking (single vs multiple).
- Chemistry of the fungicide and mode of action.
- Pest resistance.

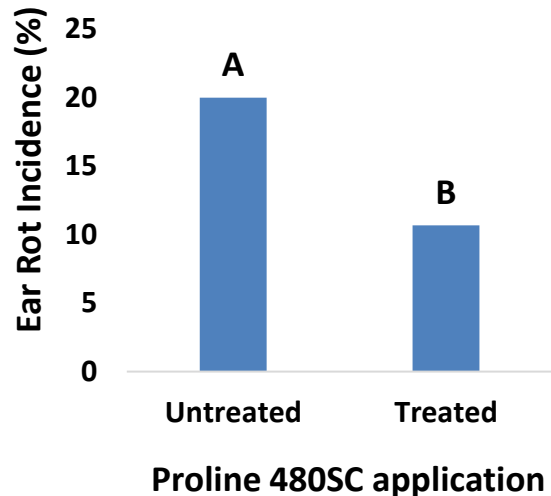


# Fungicide Response

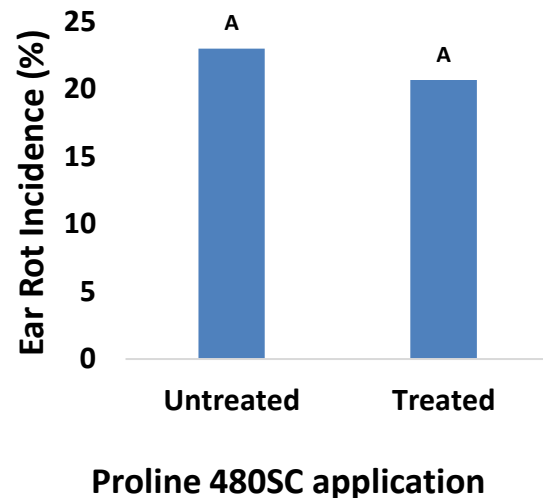
Allegan 2020



Lenawee 2020

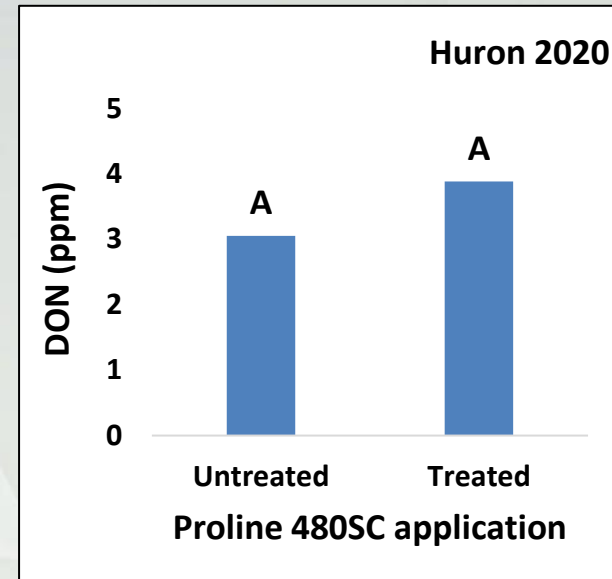
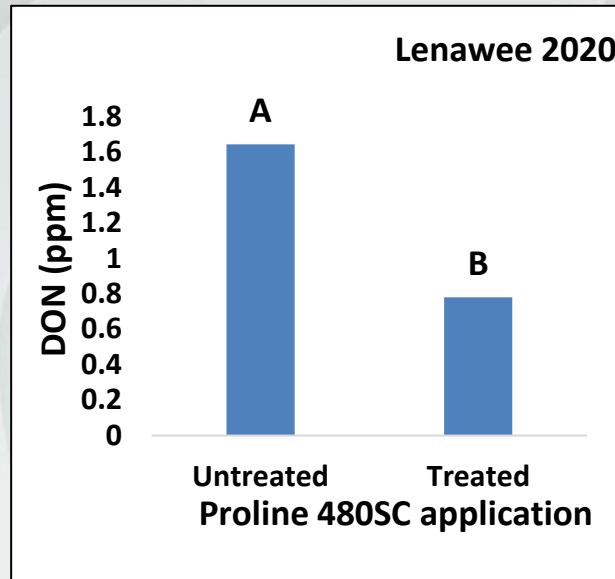
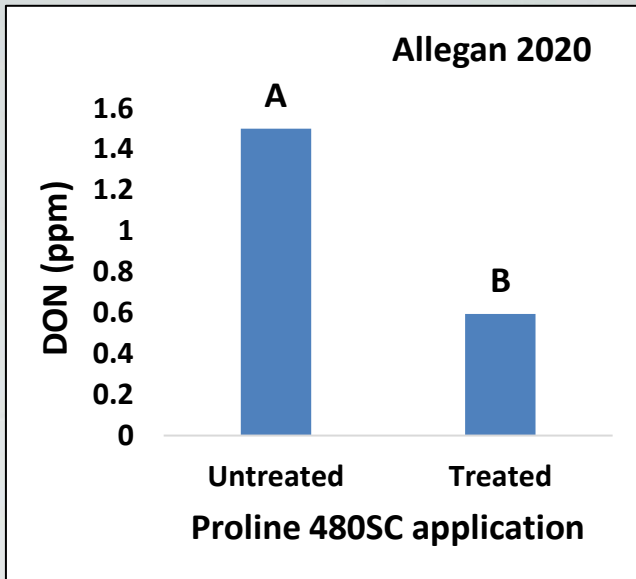


Huron 2020



- Fungicide application lowered ear rot incidence only under low disease pressure.

# Fungicide Response



- Fungicide application lowered DON levels only under low disease pressure.



# Take homes

- Field History.
- Reducing plant stress by altering planting date and seeding rate
- Planting date is crucial for silage quality especially digestibility.
- Hybrid selection is the key.
- Fungicide application (timing, chemistry)
- Harvest high risk fields first

# Acknowledgments

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# Thanks!!

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Project  
**GREEN**

