Ear Formation Issues in Corn, an Update

Osler Ortez
PhD. Student in Agronomy

Justin McMechan
Crop Protection and Cropping Systems

Tom Hoegemeyer
Adjunct Professor of Practice

Roger Elmore
Extension Cropping Systems








2020 Wilber Crop Clinic
Friday, February 7

EXTENSION

AGRONOMY AND HORTICULTURE
College of Agricultural Sciences and Natural Resources

Introduction

Reports of ear issues in **Aug. 2016**

Initially thought it was isolated to **Nebraska**

Institute of Agriculture and Natural Resources
CROPWATCH

UNL › IA... › Nebraska Extensi... › CropWat... › Corn Ear Formation Issues Likely Correlated With the Loss of the Primary Ear Node

HOME | WEATHER (GDD & ET) INFO & RESOURCES | CROPS | MANAGEMENT | RELATED TOPICS | ARCHIVES

Corn Ear Formation Issues Likely Correlated With the Loss of the Primary Ear Node

AUGUST 19, 2016

Roger Elmore - Extension Cropping Systems Agronomist | Jenny Rees - Extension Educator | Justin McMechan - Crop Protection and Cropping Systems Specialist | Tamra Jackson-Ziems, Extension Plant Pathologist | Tom Hoegemeyer - Adjunct Professor of Practice

Tweet Email

As of last Sunday, August 14, 76% of Nebraska's corn was rated in good to excellent condition, according to USDA-NASS and crop development was outpacing last year and the previous five-year average. In most cases corn yield forecasts for Nebraska (Aug. 10 UNL Forecasts and Aug. 12 USDA–NASS forecast) and the U.S. are somewhat encouraging. However, critical seed-fill stages remain and as the old saying goes, "The proof in the pudding is in the eating!" Cool

Figure 1. "Normal" length ears with short husks most likely on the

Introduction

Reports of ear issues in **Aug. 2016**

Initially thought it was isolated to **Nebraska**

Well-substantiated reports from:

Texas Panhandle
Eastern Colorado
Iowa
Illinois

Issue Reports in 2016

Introduction

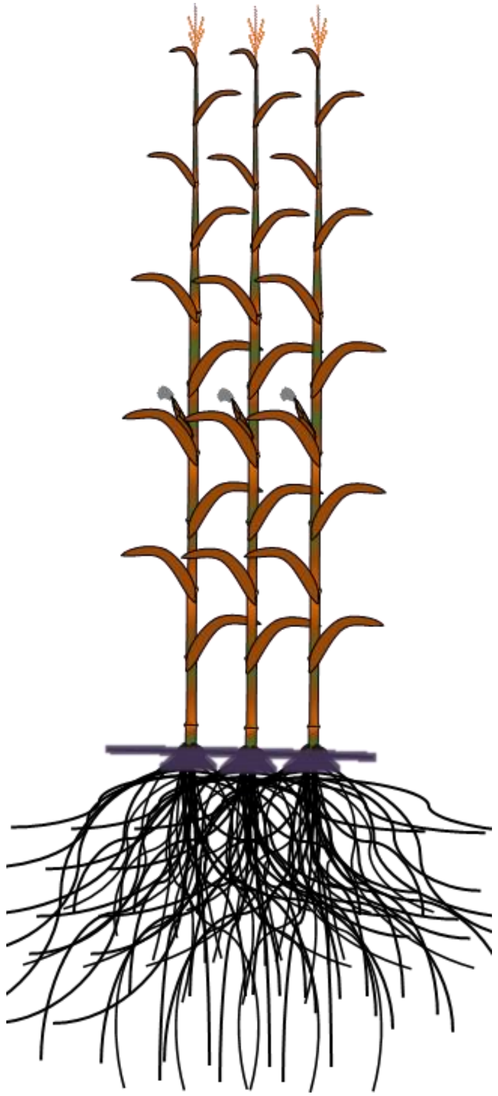
Ear formation issues as result of **interactions** among **G x E x M**:

genetics (G)

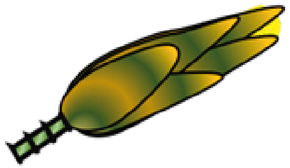
environment (E)

management practices (M)

… but specific causes are still to be found!



Ear's Symptomology / Classification



Normal Ears

Ear's Symptomology / Classification

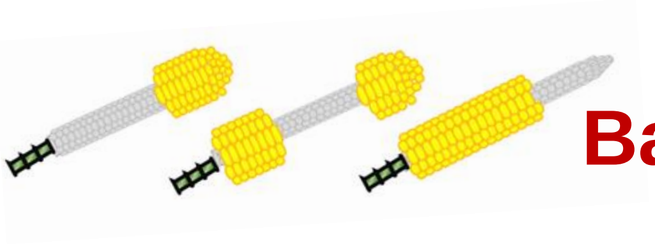
Short Husks

70% short

80% short

90% short

Ear's Symptomology / Classification



Barbell-Ears

Barbell-1: base

Barbell-2: middle

Barbell-3: tip

Ear's Symptomology / Classification

Multi-Ears

Three ears

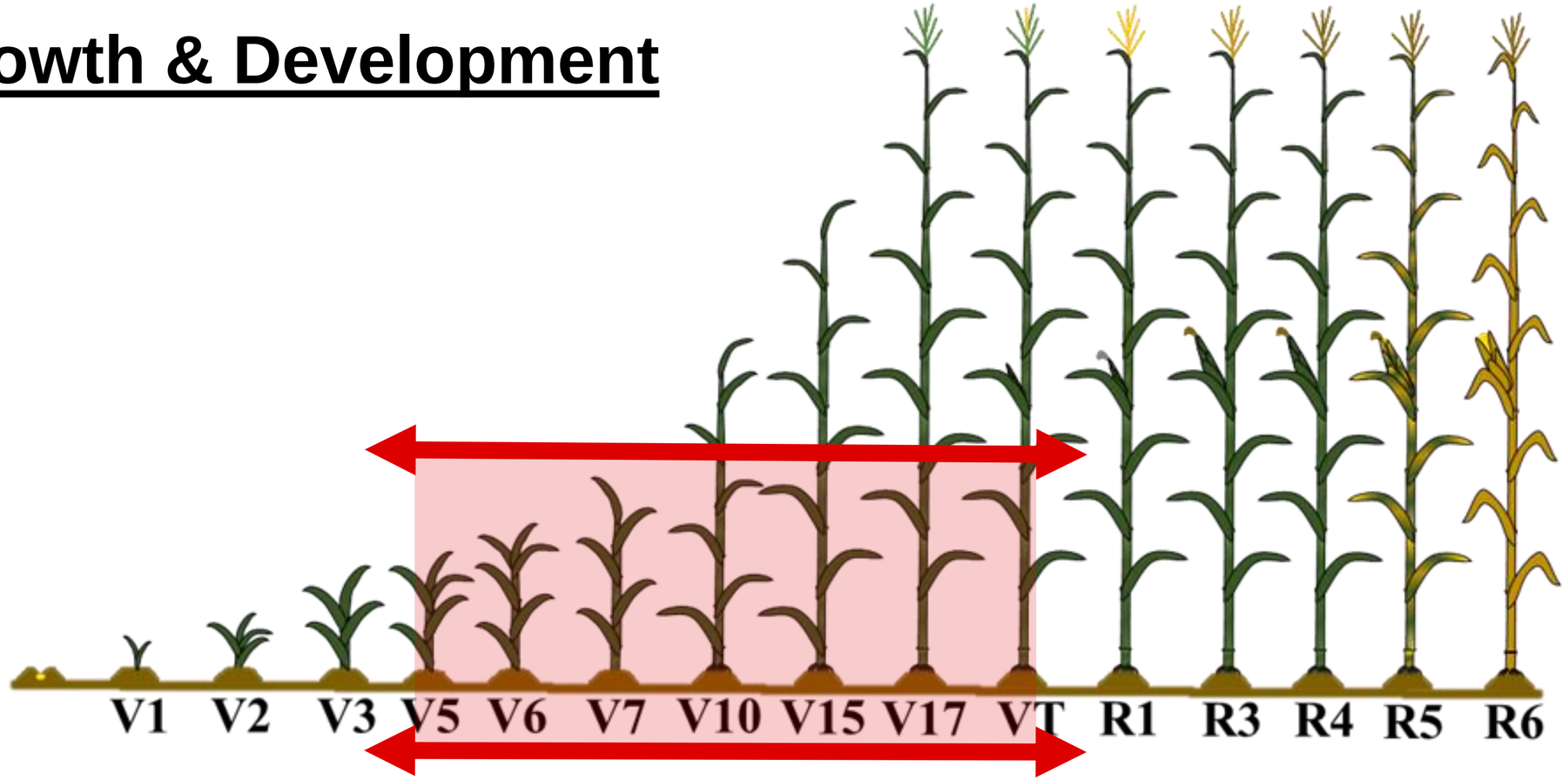
Four ears

Seven ears

Objective

To study **causal agents** of **ear formation issues** and **productivity losses in corn**

Corn Growth & Development



Yield Components

Plant Population

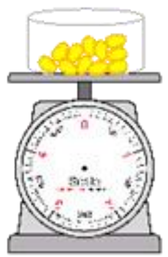
Ears / Plant

Kernel Rows / Ear

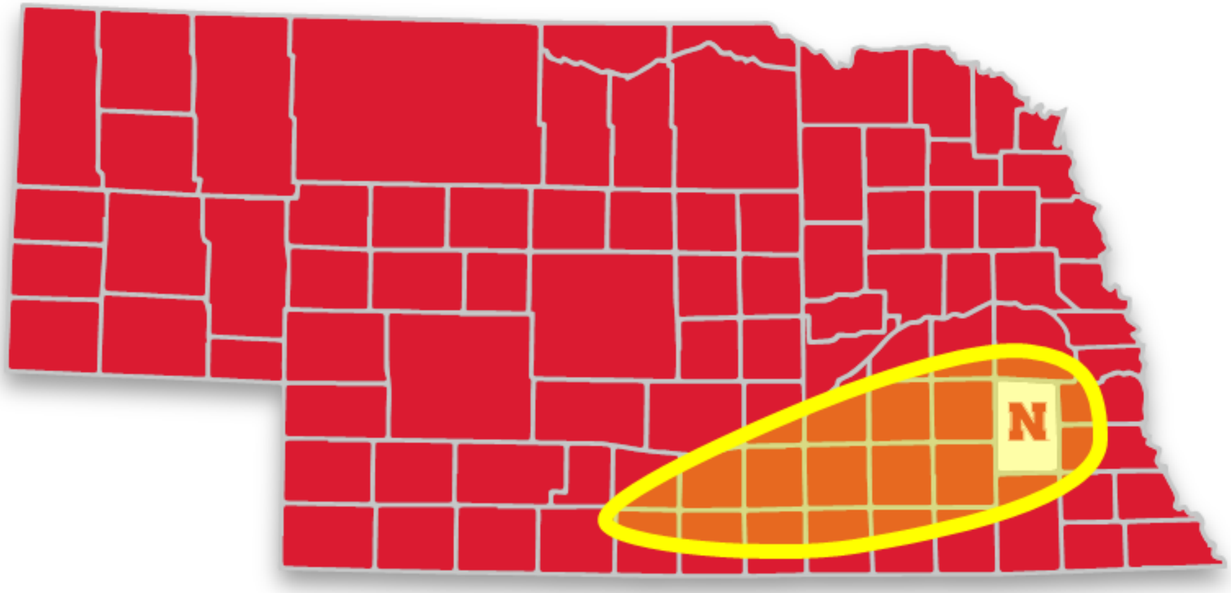
Potential Kernels / Row

Harvestable

Kernel Weight



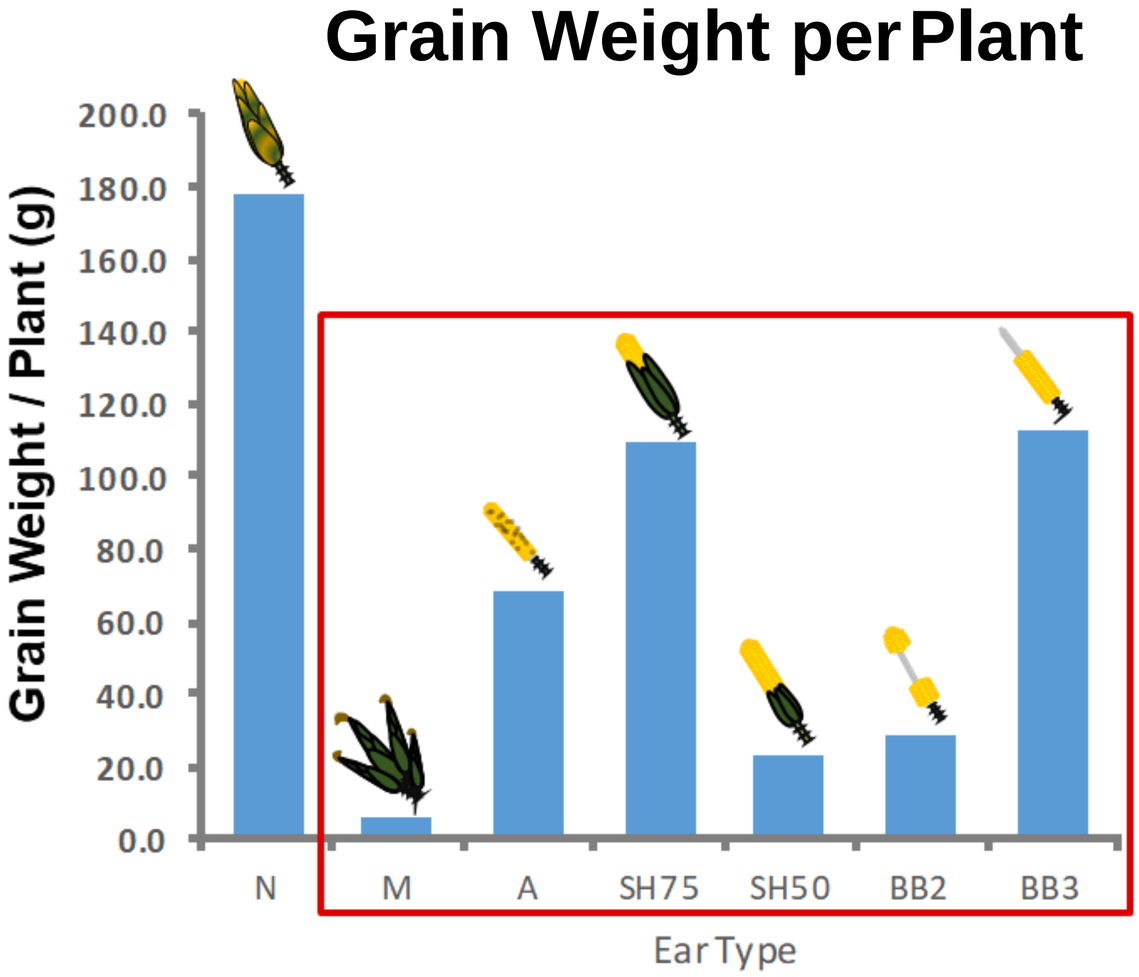
Field Surveys, 2016-2017



Ear Issues: 2016 and 2017

- 16 Nebraska Fields
- Multiple Hybrids
- 50-100 plants/location
- Up to 60% issues for some fields

Field Surveys, 2016-2017



Summary

- **Ear height** and average **ear node** were lower for ear issues
- Significant **yield impact** under ear issues

Research Questions

2016-2017:

Primary ear loss?

•Sheath constriction?

•Internode length?

2018-2019:

•Primary ear loss?

•Sheath constriction?

•Internode length?

•Hybrid specific?

•Heat/drought/wind stress?

•Ethylene concentration?

•Seeding rates?

•Planting dates?

•Delayed emergence?

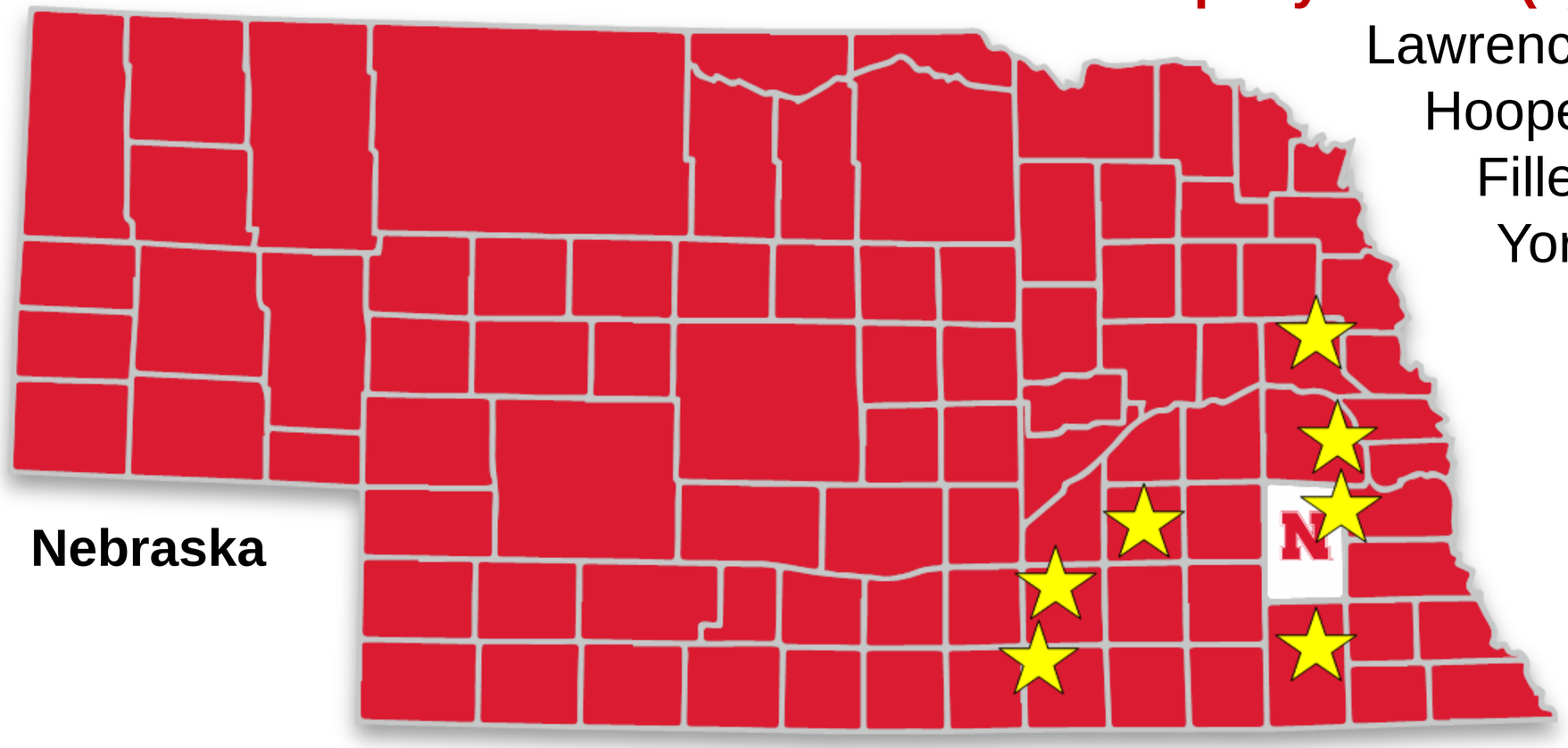
•Ear placement/height?

•Solar radiation limitation

Field Experiments, 2018-2019

UNL Farms (3):
HAVELOCK, Lincoln
SCAL, Clay Center
ENREC, Mead

Company Farms (4):
Lawrence
Hooper
Filley
York



Nebraska

Eight Hybrids

Four Planting Dates

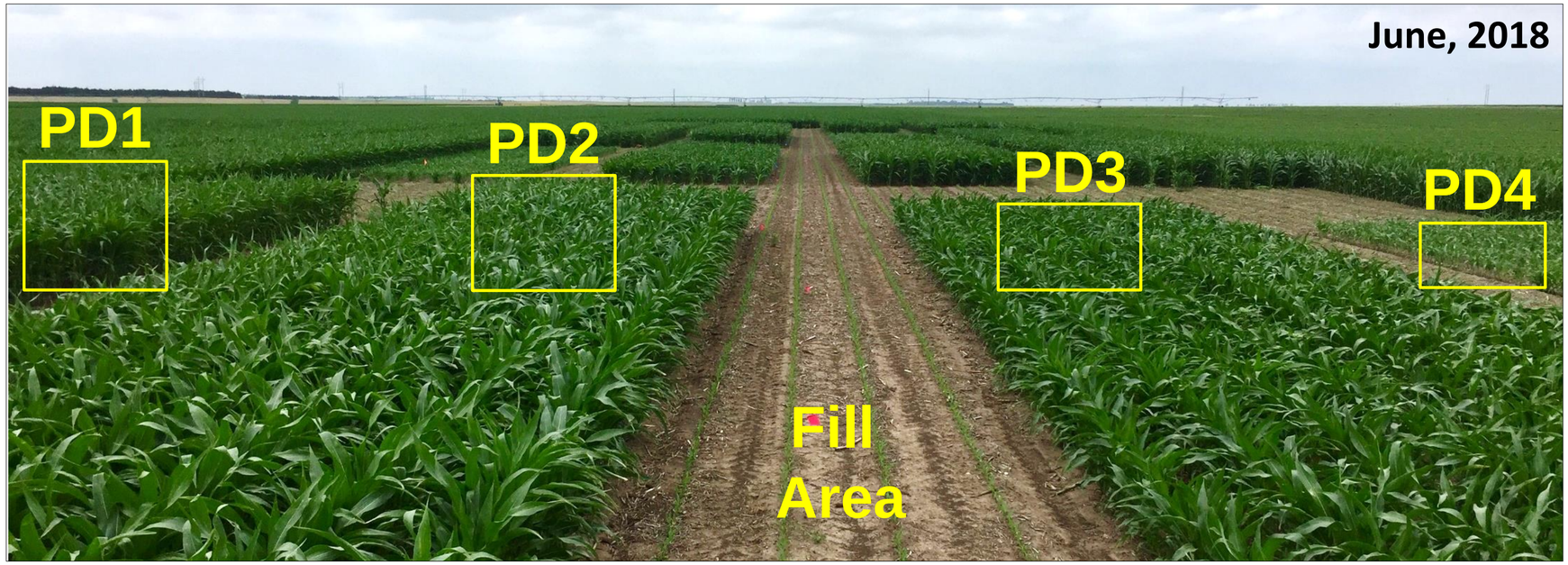
Five Seeding Rates

Seven Hourly Plantings

Field Experiments, 2018-2019

South Central Agricultural Lab, Clay Center, NE
Eastern Nebraska Research & Extension, Mead, NE

Planting Dates (4):
Mid/Late April
Early May
Mid May
Late May



Hybrids (6):
Three Susceptible (racehorses) = yield varies
Three Checks (workhorses) = stable yields

Field Experiments, 2018-2019

Lawrence, NE
Hooper, NE
Filley, NE
York, NE

Seeding rates (5):

18,000 seeds/Ac^{-1}
26,000 seeds/Ac^{-1}
34,000 seeds/Ac^{-1}
42,000 seeds/Ac^{-1}
50,000 seeds/Ac^{-1}

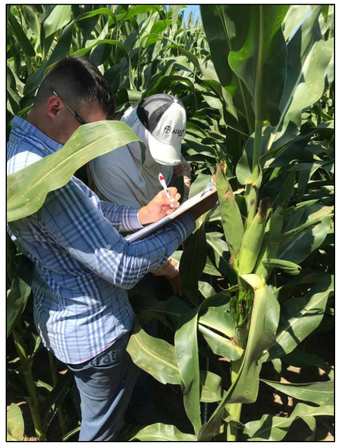
Hybrids (8):

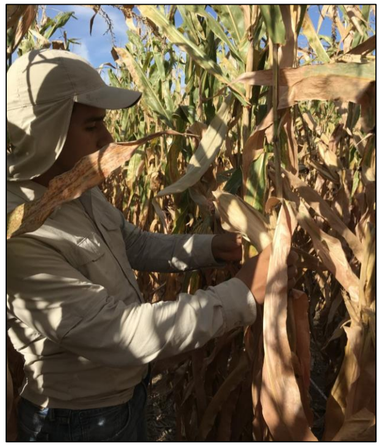
Four Susceptible (racehorse)
Four Checks (workhorse)

Data Collection, 2018-2019

Ear Issues Assessment

- **1,440 plots total**
- **62,640 linear feet**
- **~110,600 assesed plants**

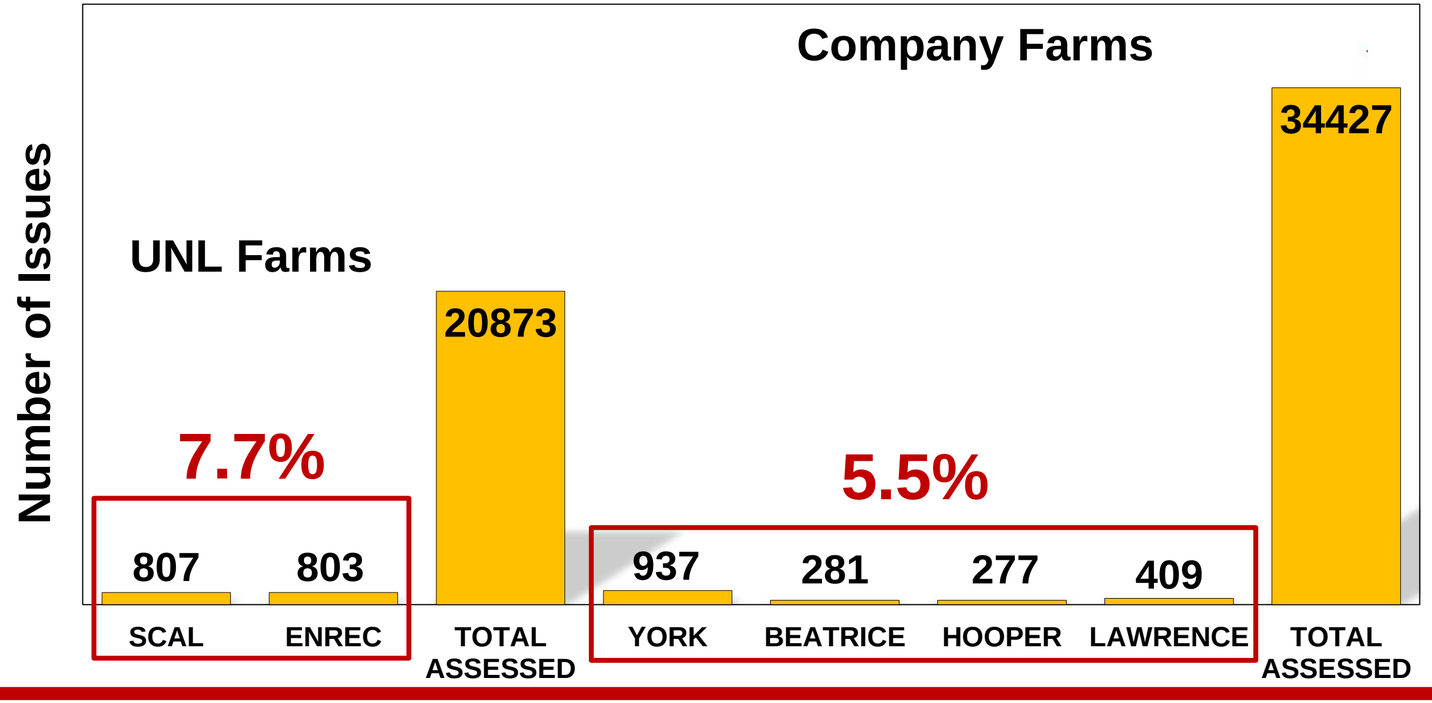




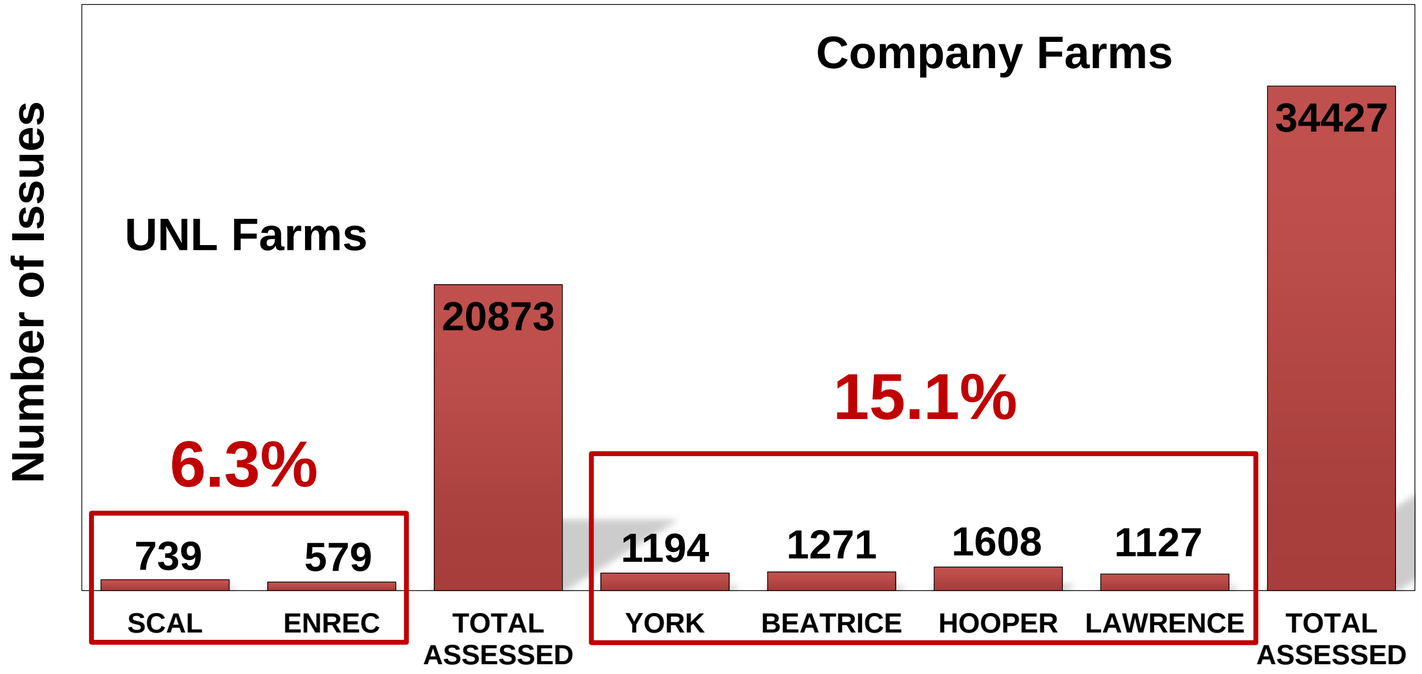
#	Location:	Stage:	Date:	PD	Plot	Row	Location (ft)	Reference	Ear Type	Ear Height (inch)	Additional Notes
1	ENREC	R5	8/6/2018	1	101	3	5.2	1 aft 15	SH5	45	Overall 45 inch ear height; commom 5% SH
2	ENREC	R5	8/6/2018	1	101	3	6.1	2 aft 15	SH10	39	Overall 45 inch ear height; commom 5% SH
3	ENREC	R5	8/6/2018	1	101	3	7.2	2 aft 24	SH5	45	Overall 45 inch ear height; commom 5% SH
4	ENREC	R5	8/6/2018	1	101	3	9.5	4 aft 0	SH10	40	Overall 45 inch ear height; commom 5% SH
5	ENREC	R5	8/6/2018	1	101	3	10.7	3 aft 9	SH15/ME2	42	Overall 45 inch ear height; commom 5% SH
6	ENREC	R5	8/6/2018	1	101	3	13.1	3 aft 12	SE	26	Overall 45 inch ear height; commom 5% SH
7	ENREC	R5	8/6/2018	1	101	3	14.8	5 aft 12	SH15/ME2	41	Overall 45 inch ear height; commom 5% SH
8	ENREC	R5	8/6/2018	1	101	3	15.3	1 aft 15	SH15/ME2	39	Overall 45 inch ear height; commom 5% SH
9	ENREC	R5	8/6/2018	1	101	3	15.7	2 aft 15	SH15/ME2	49	Overall 45 inch ear height; commom 5% SH
10	ENREC	R5	8/6/2018	1	101	3	17.6	1 bef 18	SH15	43	Overall 45 inch ear height; commom 5% SH
11	ENREC	R5	8/6/2018	1	101	3	18.6	2 aft 18	SE	47	Overall 45 inch ear height; commom 5% SH
12	ENREC	R5	8/6/2018	1	101	3	23.2	5 aft 21	ME2/SH5	42	Overall 45 inch ear height; commom 5% SH
13	ENREC	R5	8/6/2018	1	101	3	23.6	1 bef 24	SE	43	Overall 45 inch ear height; commom 5% SH
14	ENREC	R5	8/6/2018	1	101	3	25.1	3 aft 24	SH10	43	Overall 45 inch ear height; commom 5% SH
15	ENREC	R5	8/6/2018	1	101	3	26.2	5 aft 24	SE	43	Overall 45 inch ear height; commom 5% SH
16	ENREC	R5	8/6/2018	1	101	3	28.6	4 aft 27	SE	44	Overall 45 inch ear height; commom 5% SH

Results, 2018-2019

- About 7% of ear issues documented across fields

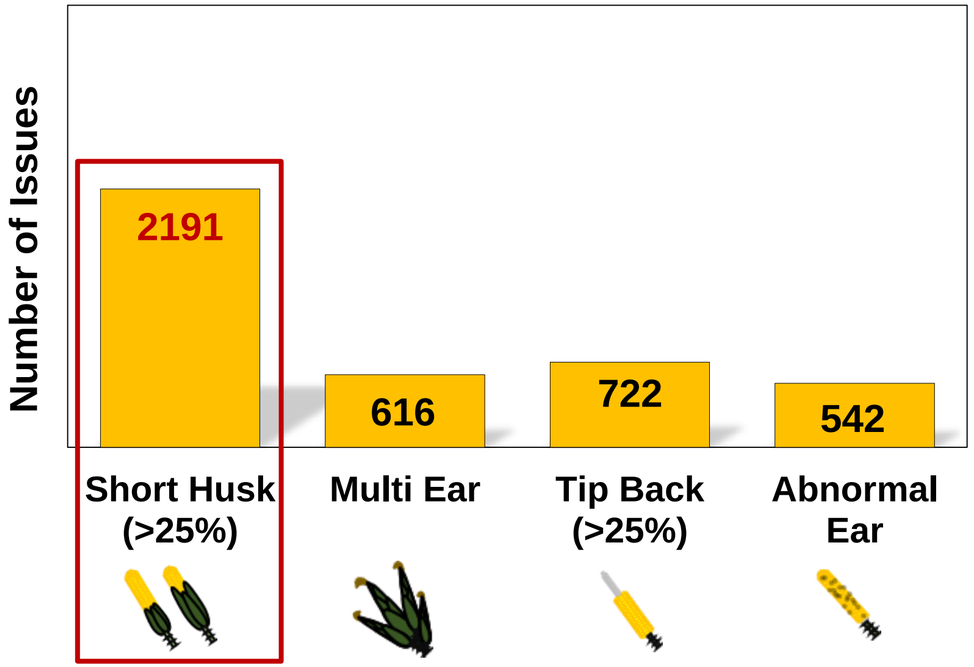


- About 12% of ear issues documented across fields
- Comparable for UNL Farms
- More for Company Farms



Results, 2018-2019

- **Short husks** accounted for **54%** of the issues

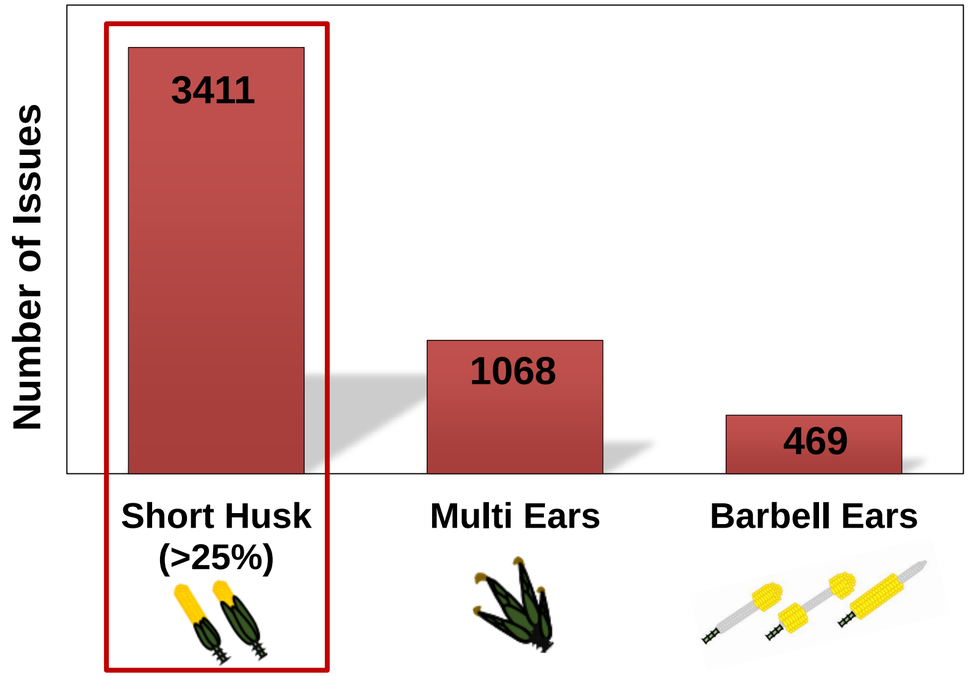


2018

- **Short husks** accounted for **69%** of the issues

- **Multi Ears** increased by about **73%**

- **Barbell Ears** observed in 2019

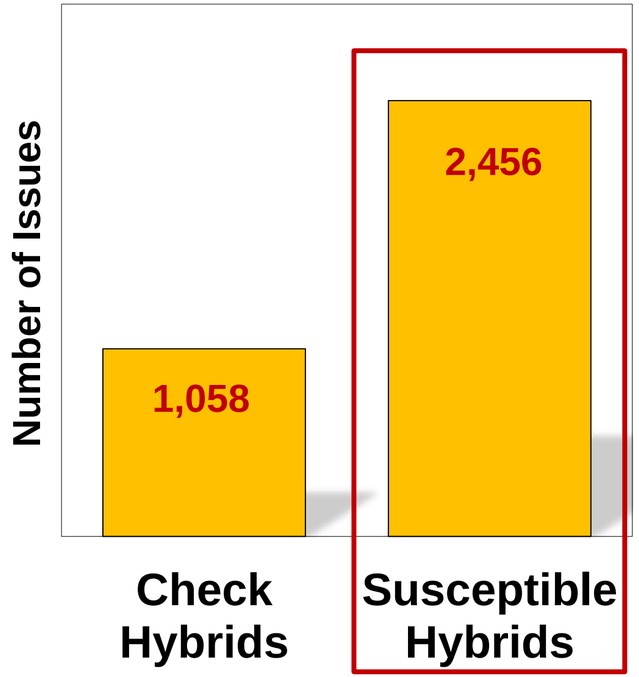


2019

Results, 2018-2019

2018

More issues with **susceptible hybrids, ~70%**



Hybrids (8):

Four Susceptible
(racehorse = yield varies)

Four Checks
(workhorse = stable yields)

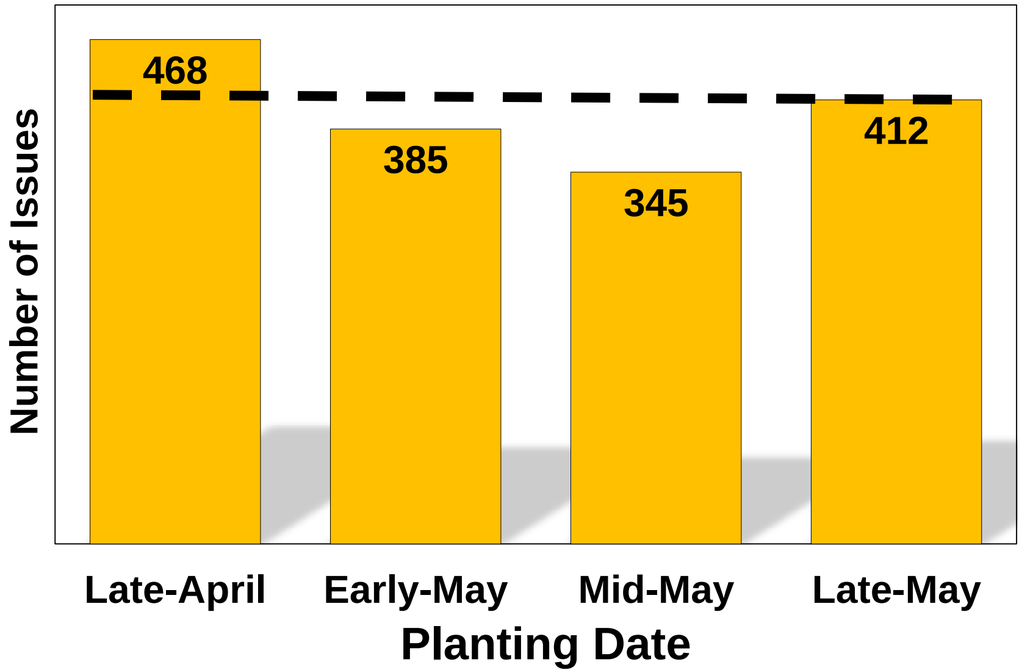
2019

To be added,

Hybrid-influenced results

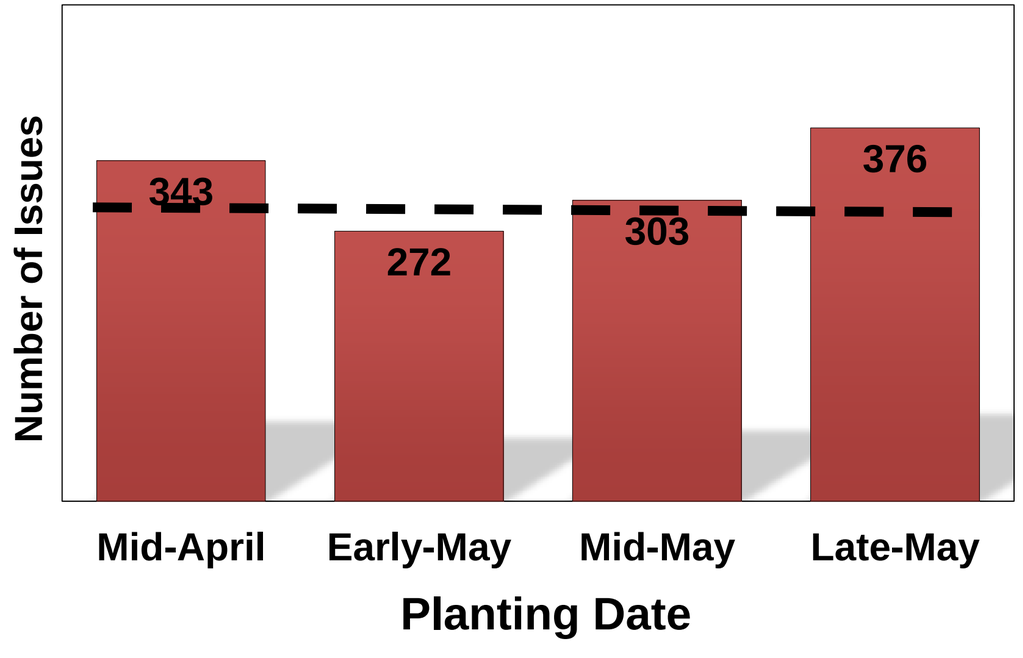
Results, 2018-2019

No major influence due to planting dates, similar number of issues among all



2018

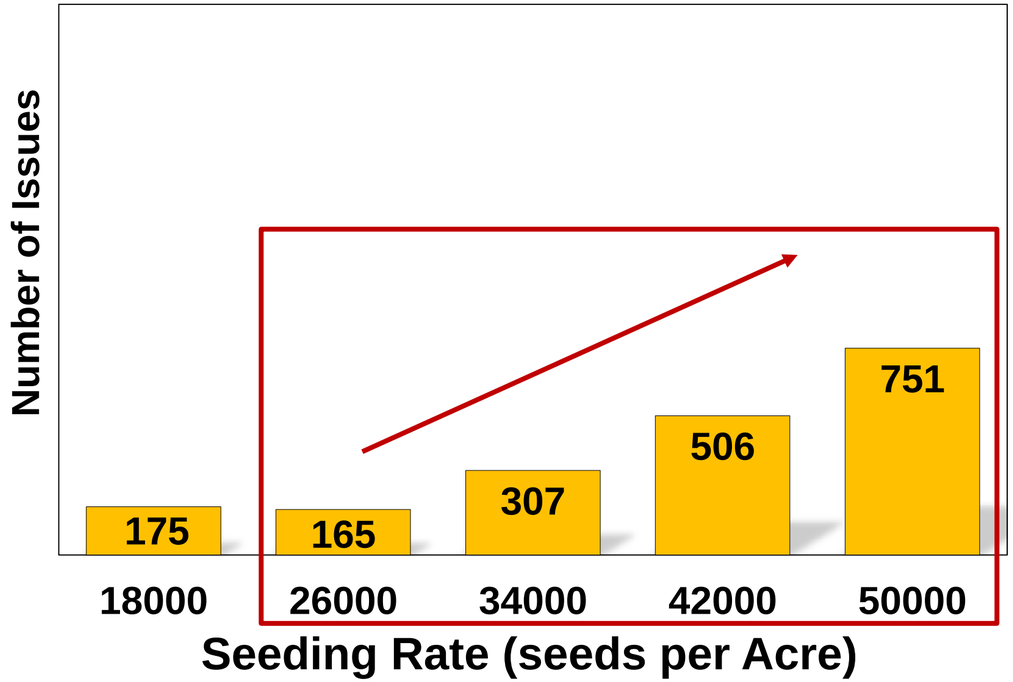
No major influence due to planting dates, similar number of issues across



2019

Results, 2018-2019

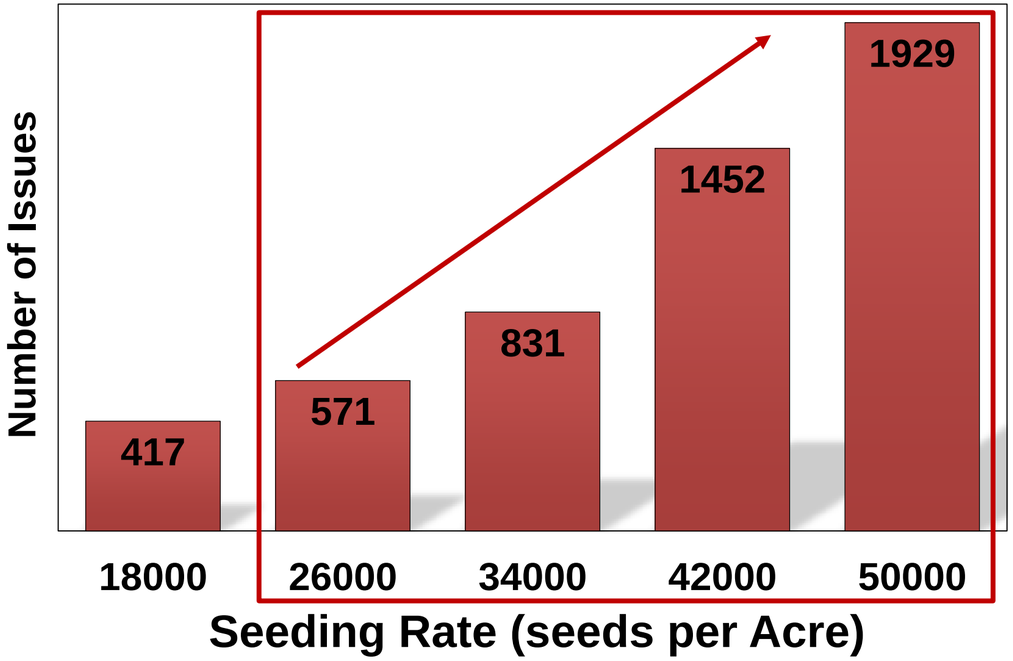
- **More ear issues** under higher seeding rates (for both, absolute and relative terms)



More interplant **competition**

2018

- **More ear issues** under higher seeding rates
- **More ear issues** in 2019 as compared to 2018



More interplant **competition**

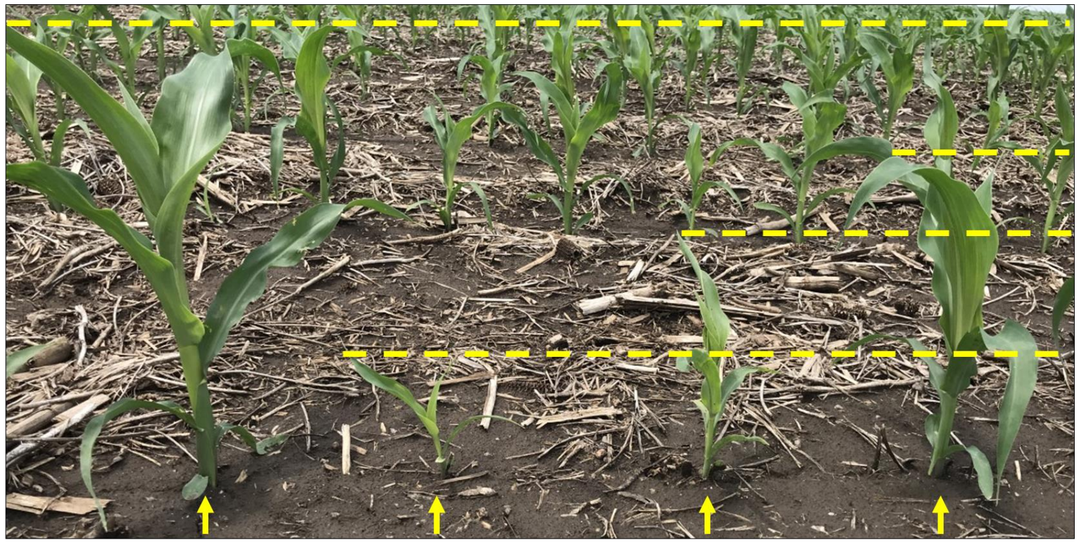
2019

Field Experiments, 2018-2019

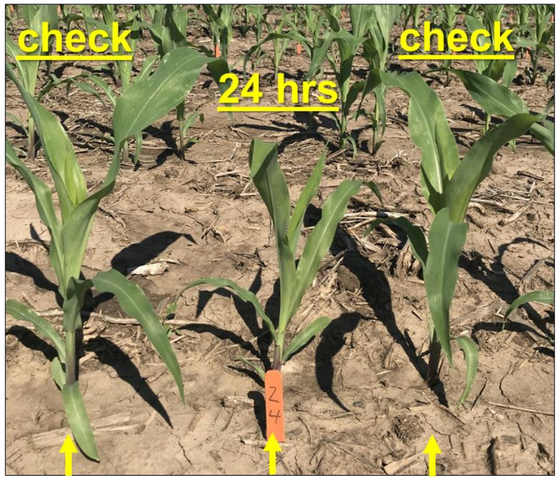
Havelock, Lincoln, NE

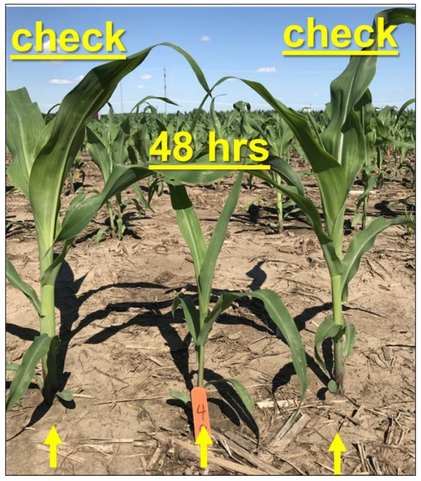
Delayed Hand-Planting (6):
0-hour (control)
6-hours after
12-hours after
24-hours after
48-hours after
96-hours after
270-hours after

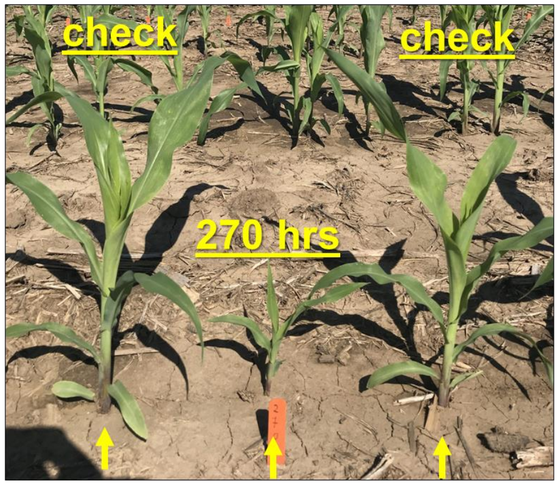
Hybrids (2):
Susceptible (racehorse)
Checks (workhorse)



Field Emergence Variability? soil moist, soil temp, seed depth, insect feeding, soil crusting, herbicide injury

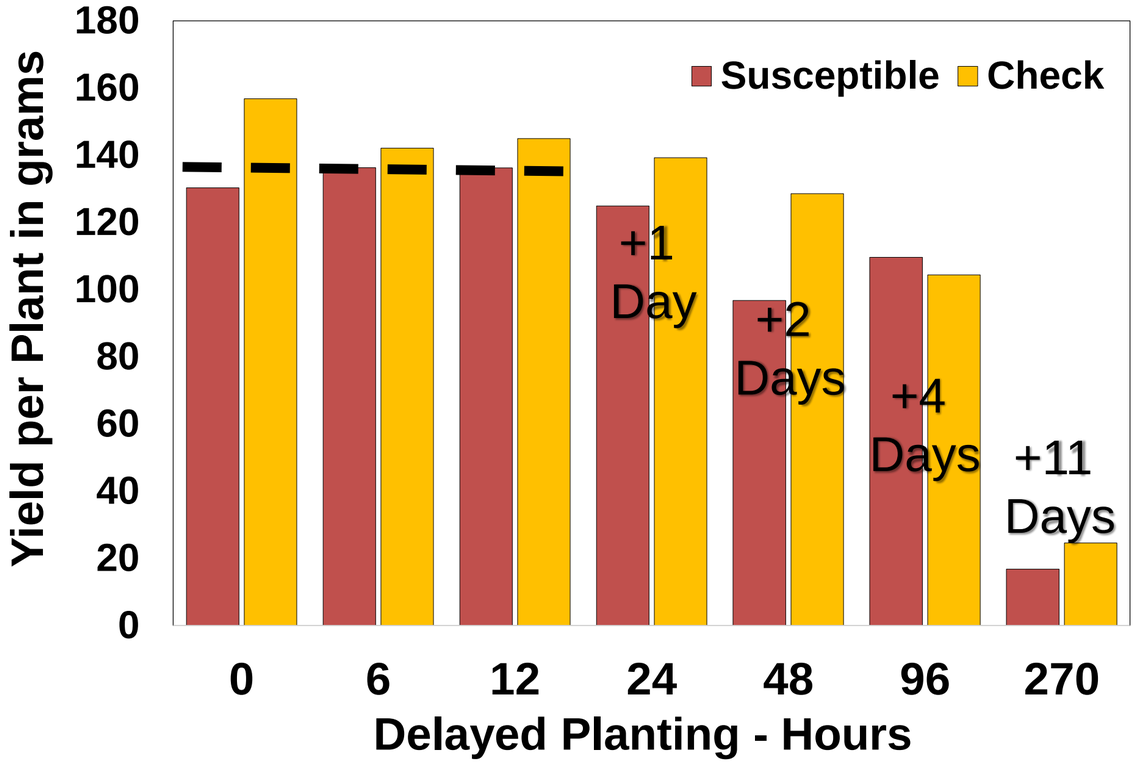






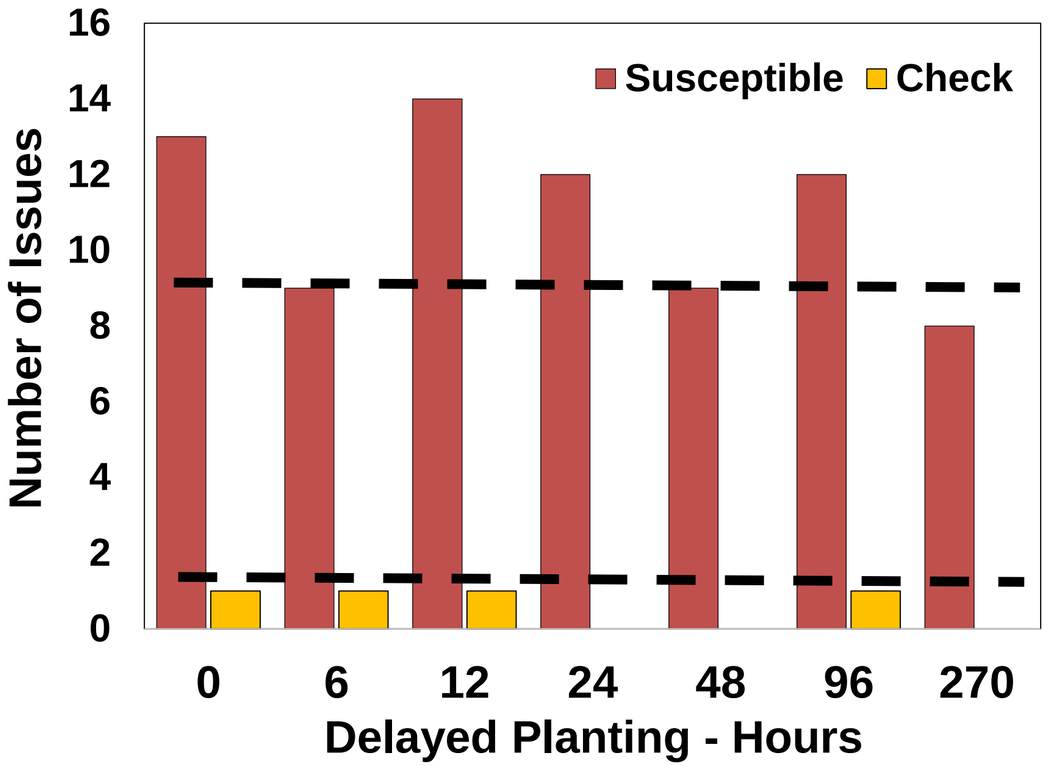
Results, 2019

YIELDS



- **Later plantings** resulted in **lower yields**
- **Susceptible hybrid** resulted in **lower yields**

EAR ISSUES



- **Not much trend** due to **planting times**
- **Susceptible hybrid** resulted in **more issues (20X)**

Summary, 2018-2019

Ear issues decreased **grain yield** (field surveys **2016 & 2017**)

Ear issues found across **sites & conditions 2018 & 2019**:

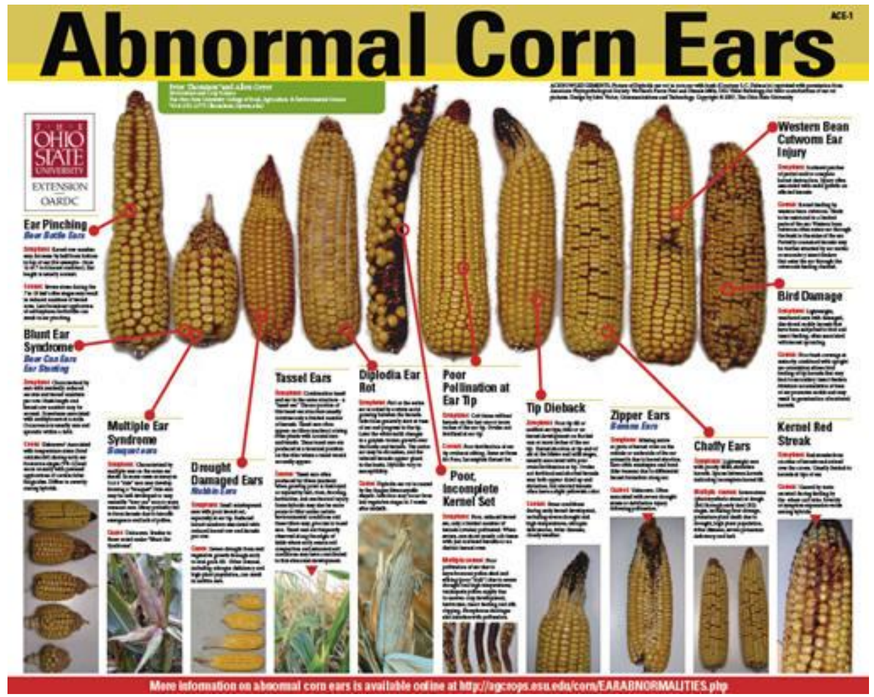
- **More issues** in 2019 **(12% vs. 7%)**
- **Short-husks** led the count **(54% & 69%)**
- No major effect due to **planting dates**
- More issues at **higher seeding rates** and **susceptible hybrids**

Delayed planting study reduced yield and **showed ear issues**

Repeating **field** experiments and adding **greenhouse trial** in **2020**

Take-Home Message

"We can think that 70+ years of basic understanding of corn, it would be understood completely…



Source (2014): http://corn.agronomy.wisc.edu/Management/L018.aspx

…Not true!!! Ear issues affronted in 2016 still plague some farmers, reducing productivity and causing us to continue pondering the causes"

Thank you

Questions?

AGRONOMY AND HORTICULTURE

Water for Food
DAUGHERTY GLOBAL INSTITUTE
at the University of Nebraska

Institute of Agriculture and Natural Resources
DEPARTMENT OF ENTOMOLOGY








Help us by reporting ear issues

Osler Ortez
Ph.D. Student, Agronomy
osler.ortez@huskers.unl.edu
Phone: (785) 370-9369

Justin McMechan
Crop Protection and Crop Systems
justin.mcmechan@unl.edu
Phone: (402) 624-8041

EXTENSION

AGRONOMY AND HORTICULTURE
College of Agricultural Sciences and Natural Resources

Nebraska, 2019: Non-Ionic Surfactant

Research suggests to **avoid use of NIS spray additives with foliar** applications during growth stages **V10 to VT**

Staging is strictly **important:**

- **Dig/split plants** inside field
- **Count nodes** (last collared leaf)
- **Ensure application** is on label

Nebraska, 2019: Non-Ionic Surfactant

Research suggests to **avoid use of NIS spray additives with foliar** applications during growth stages **V10 to VT**

Staging is strictly **important:**

- **Dig/split plants** inside field
- **Count nodes** (last collared leaf)
- **Ensure application** is on label

What Growth Stage is this plant?

Is this a safe stage to add NIS?

Answer: Yes.

***I stopped counting nodes at last collared/fully developed leaf

Nebraska, 2019: Non-Ionic Surfactant

Research suggests to **avoid use of NIS spray additives with foliar** applications during growth stages **V10 to VT**

Staging is strictly **important:**

- **Dig/split plants** inside field
- **Count nodes** (last collared leaf)
- **Ensure application** is on label

What Growth Stage is this plant?

Is this a safe stage to add NIS?

Answer: Yes.

***I stopped counting nodes at last collared/fully developed leaf