Optimal Maturity Selection in Corn/Soy

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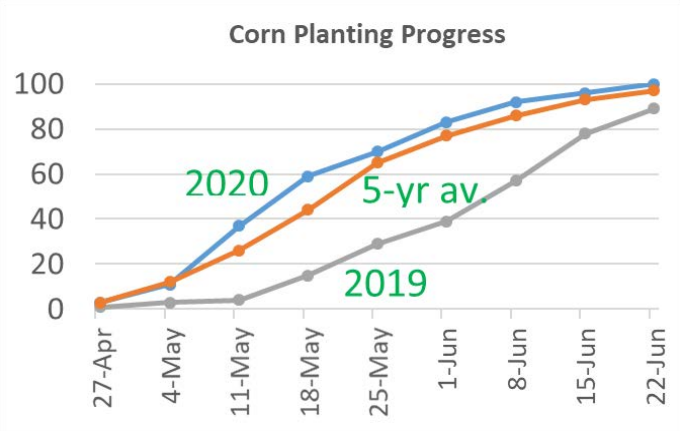
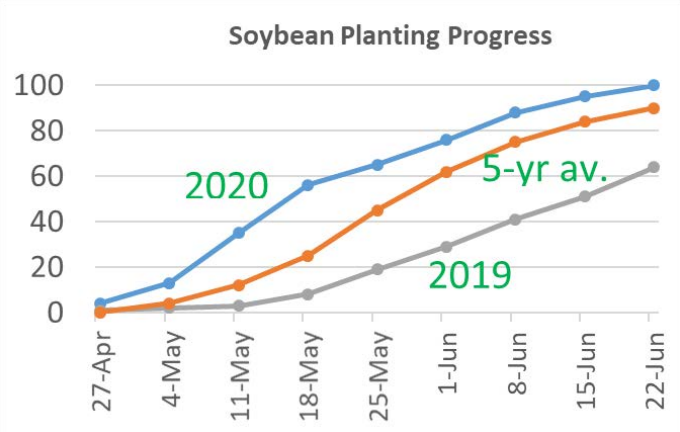
Recent planting seasons…

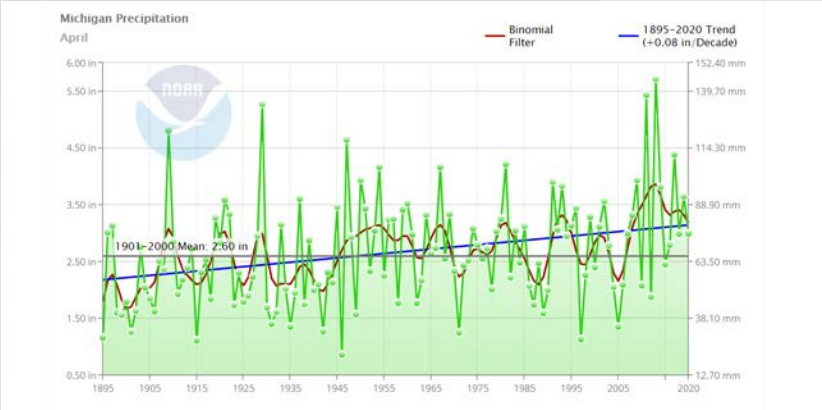




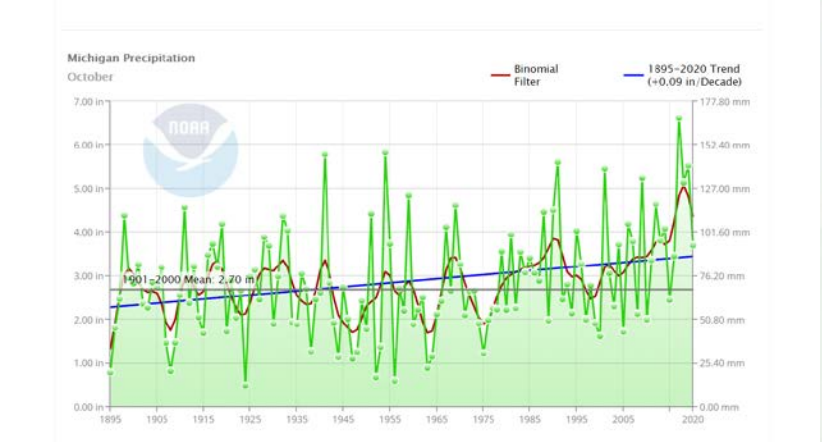
- Variability in planting window
- Extreme weather events- lead to poor field planting conditions
- Need to adjust agronomic practices based on planting time?
- **Optimal hybrid/variety maturity selection** to best utilize the relatively-short growing season

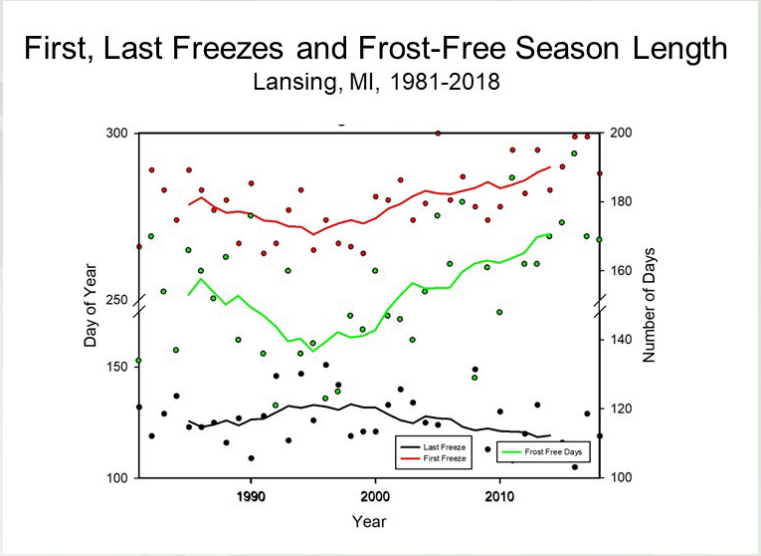
Weather Trends: Wetter and Warmer

Spring



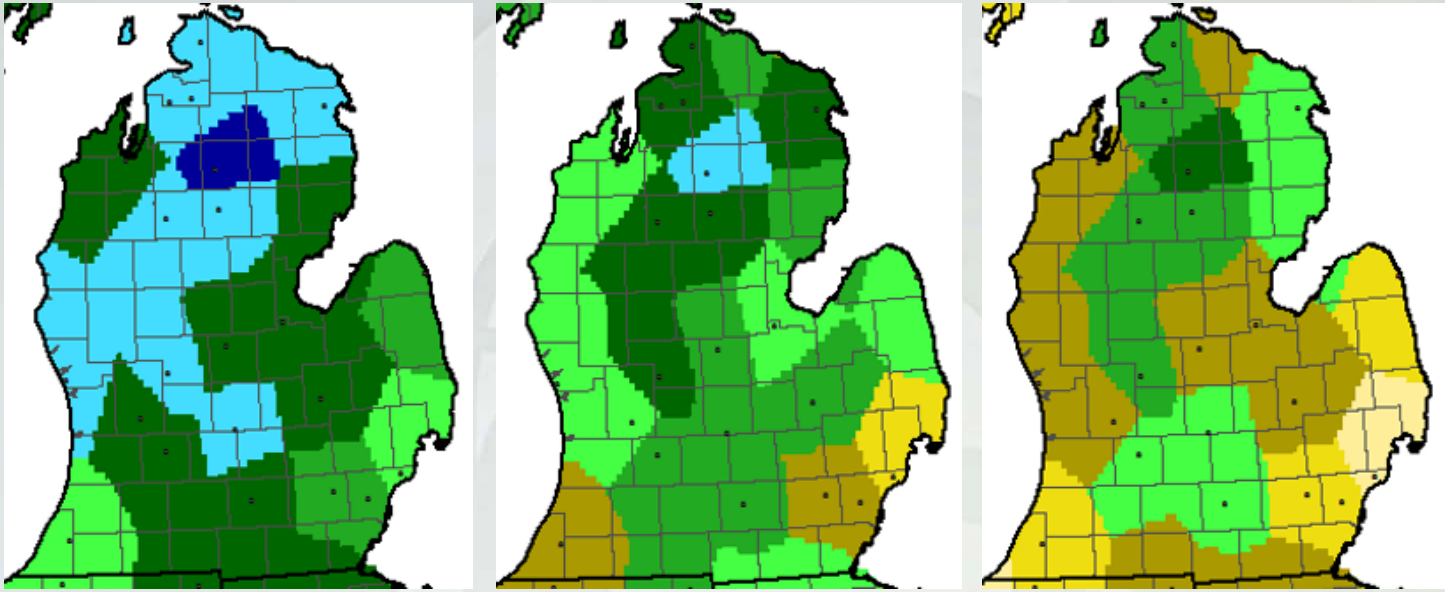
Fall



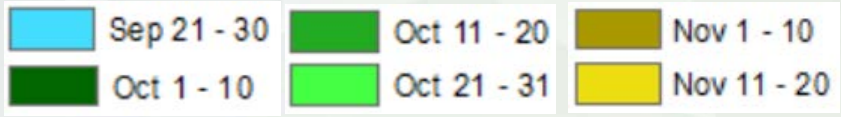


Planting Time	Conditions
➢ **Early Season** (before early-May)	• Cool, wet soil- can lead to uneven stands • **Extended Growing Season** • Use of Late-maturity variety? Late-season pathogens
➢ **Mid Season**	• Typically adequate soil temp. and moisture • **When to switch maturity?** GDD compression? • Timely drydown, harvest, fall operations
➢ **Late Season** (June)	• Lack of soil moisture • **Restricted Growing Season** • Use of Early-maturity variety? Field drydown

End Point? Frost (28 ºF) Dates

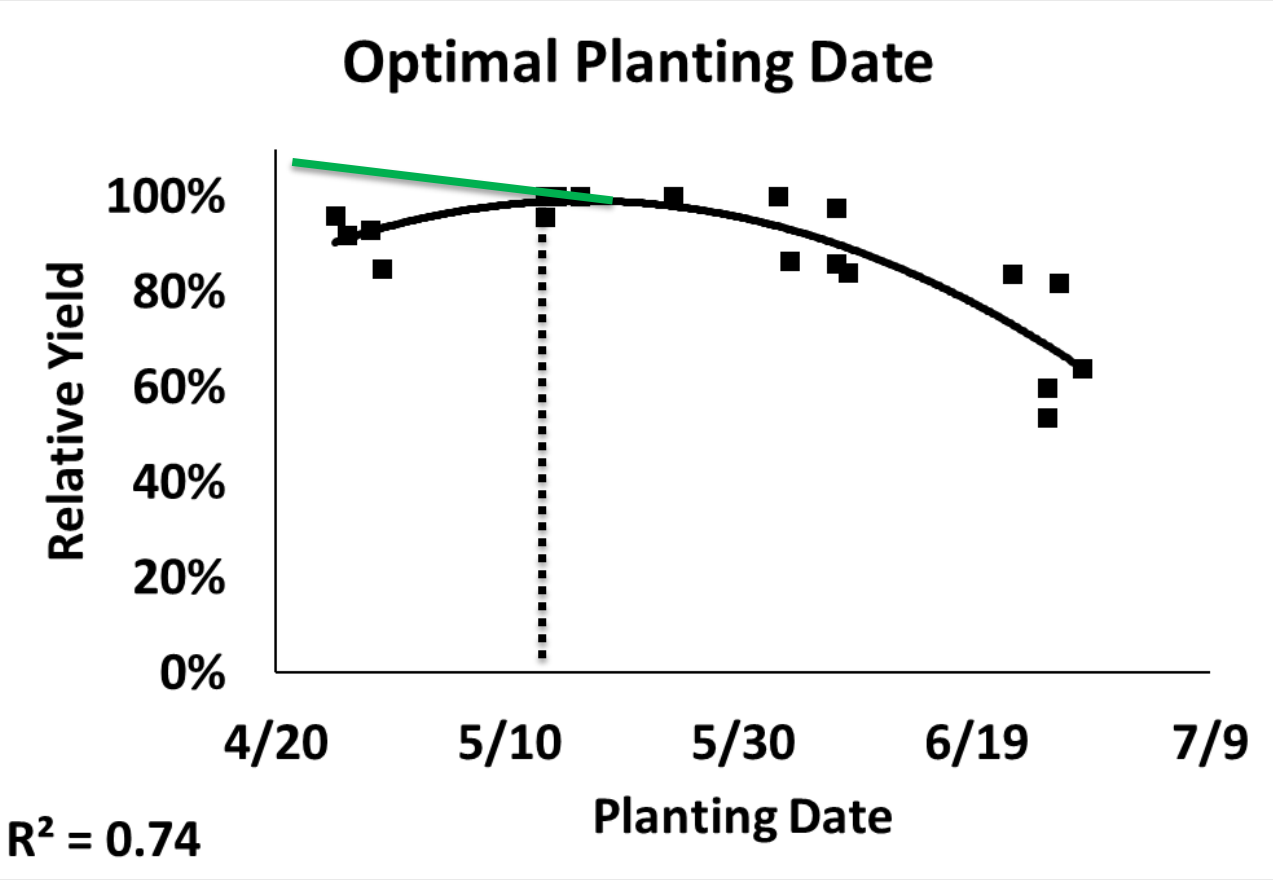


Early First Frost **Median First Frost** **Late First Frost**

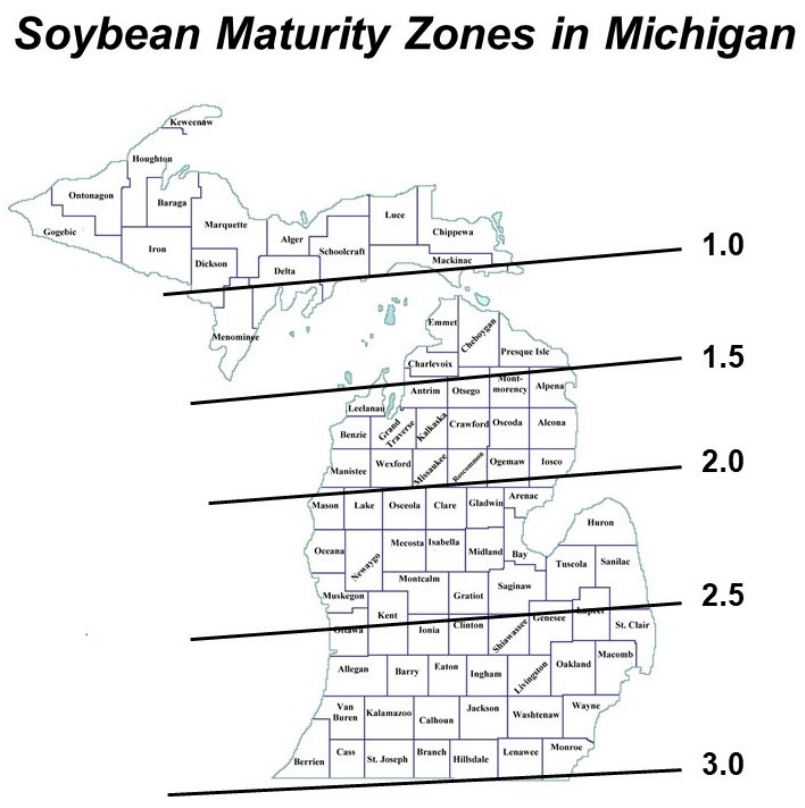


Source: https://mrcc.illinois.edu/VIP/frz_maps/freeze_maps.html

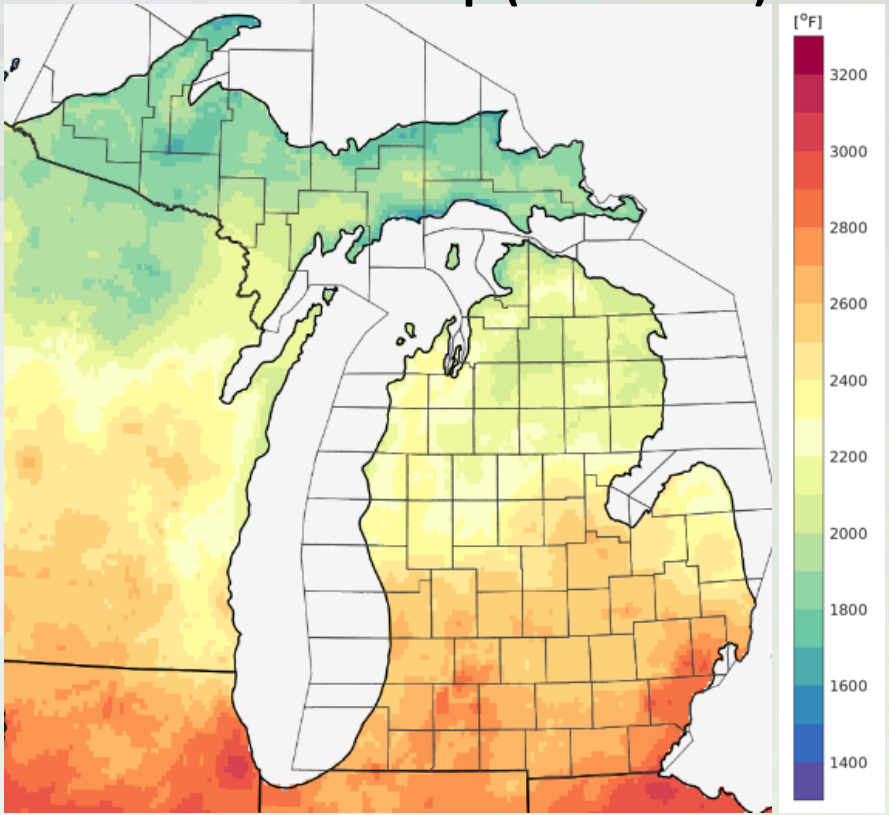
Soybean Planting Date (2018-20 data)



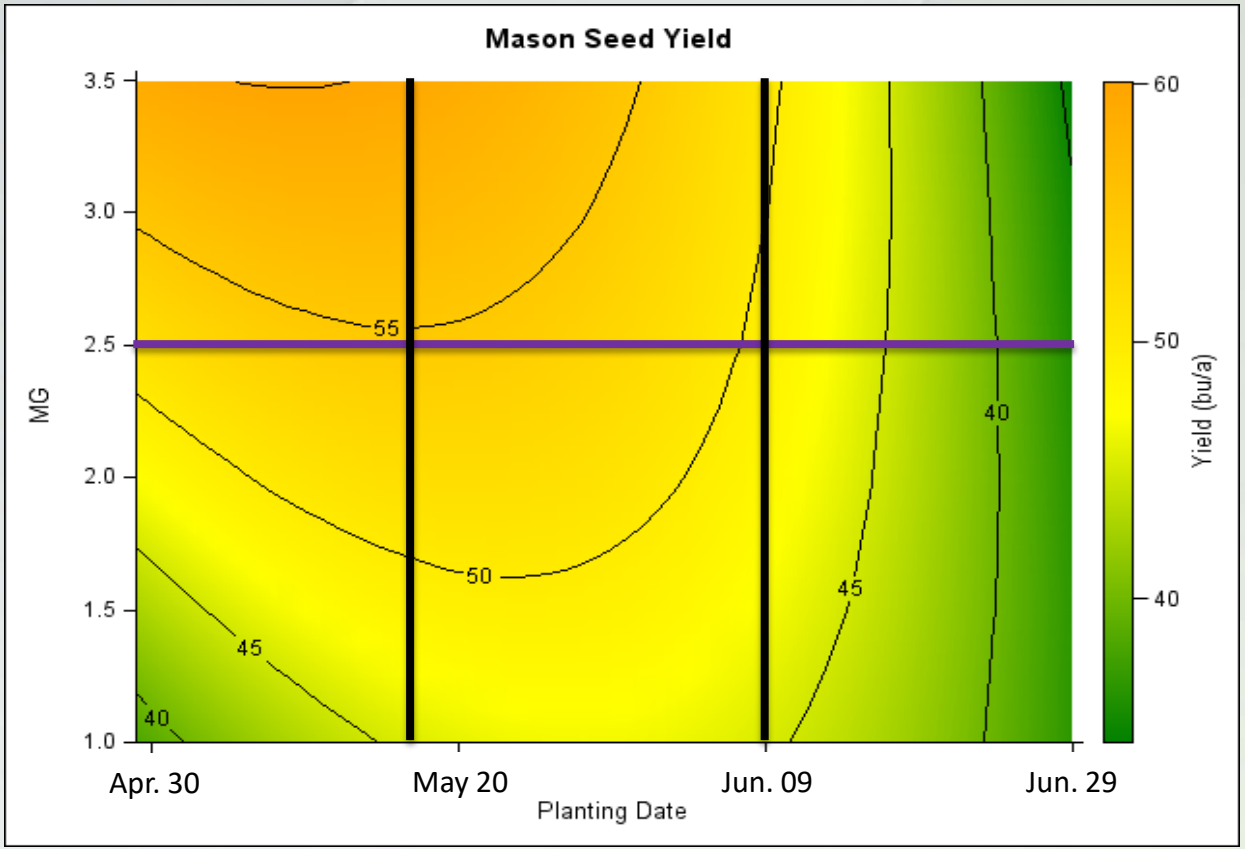
Optimal Maturity Selection: Role of planting date



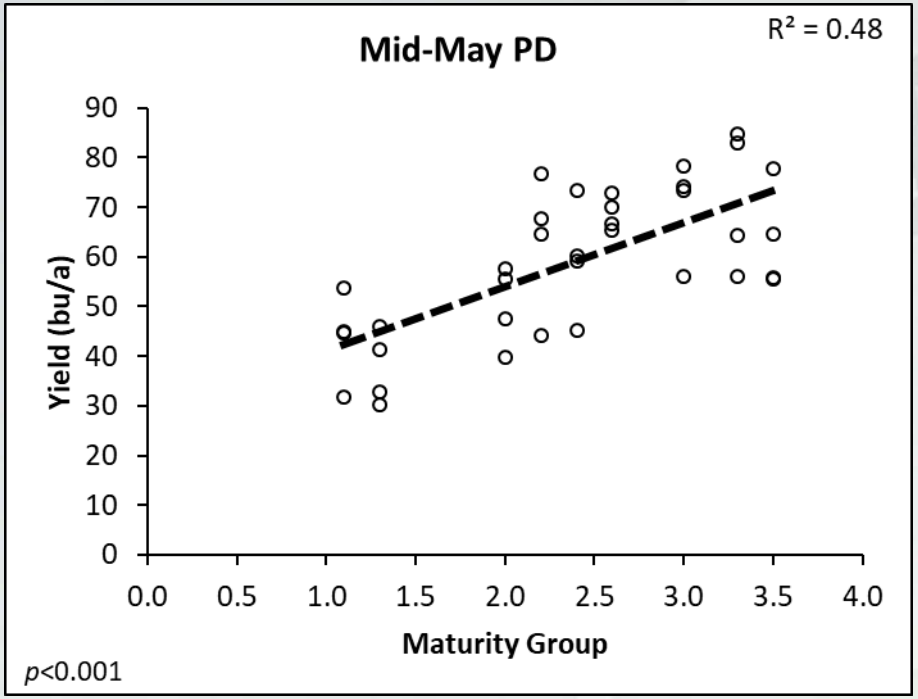
Corn GDD Map (2010-2019)

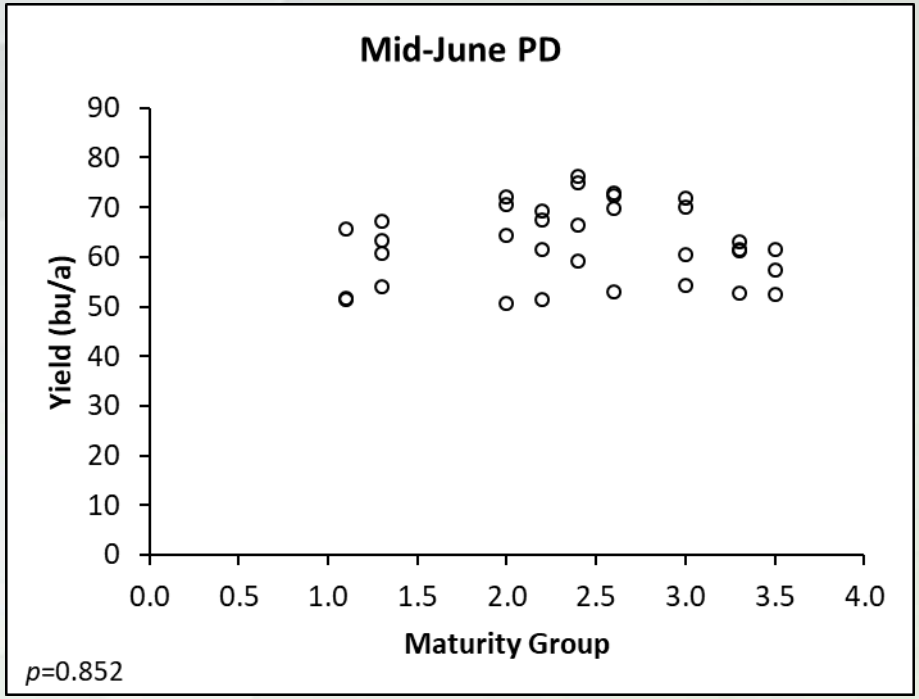


Soybean Maturity Selection



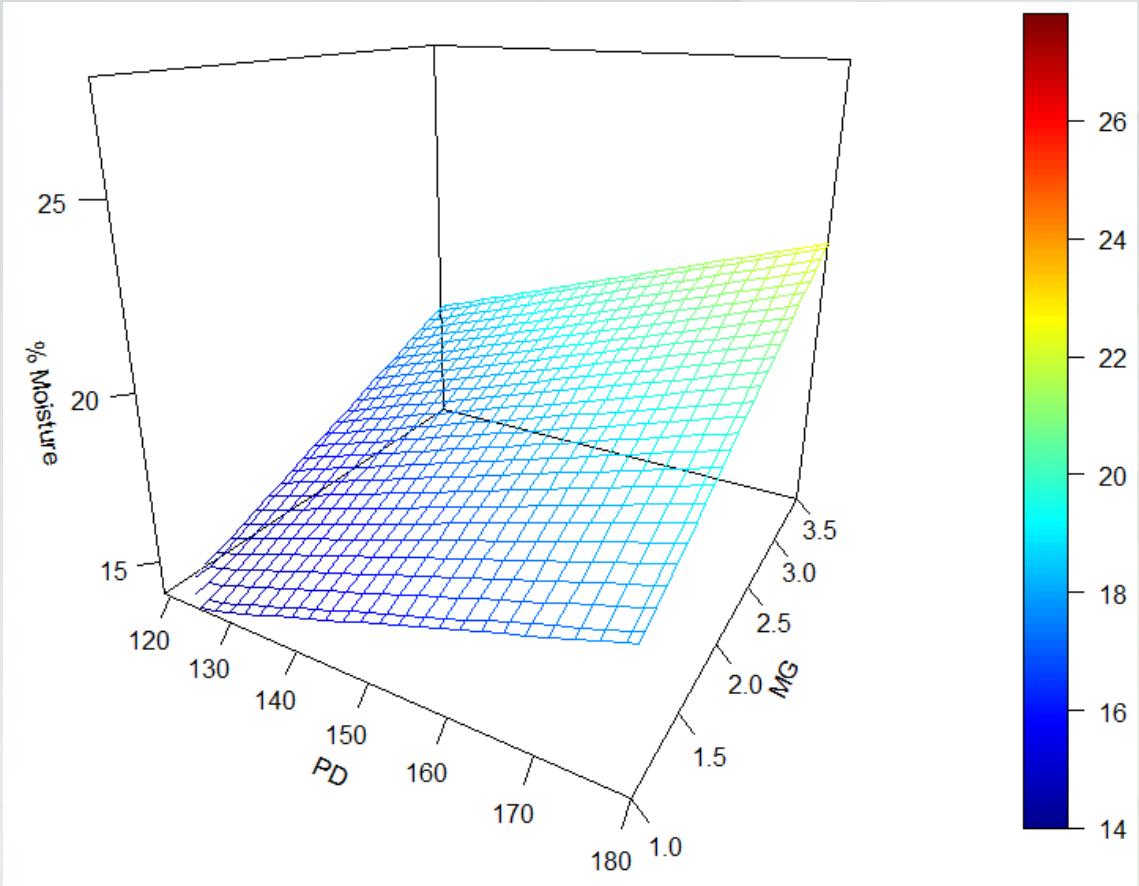
2020 Results





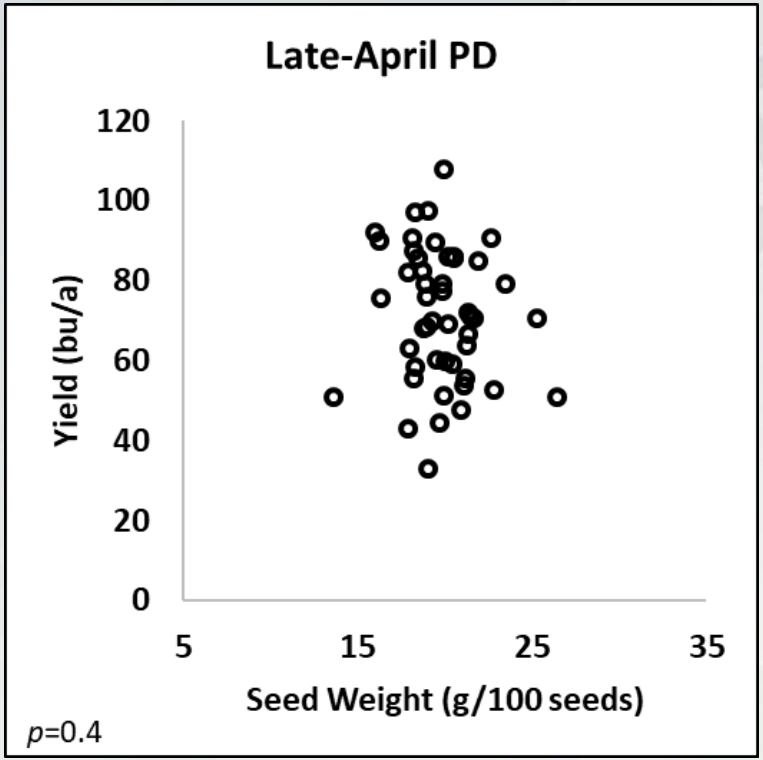
- Increase in Yield by using late-maturity variety ONLY in Early Planting

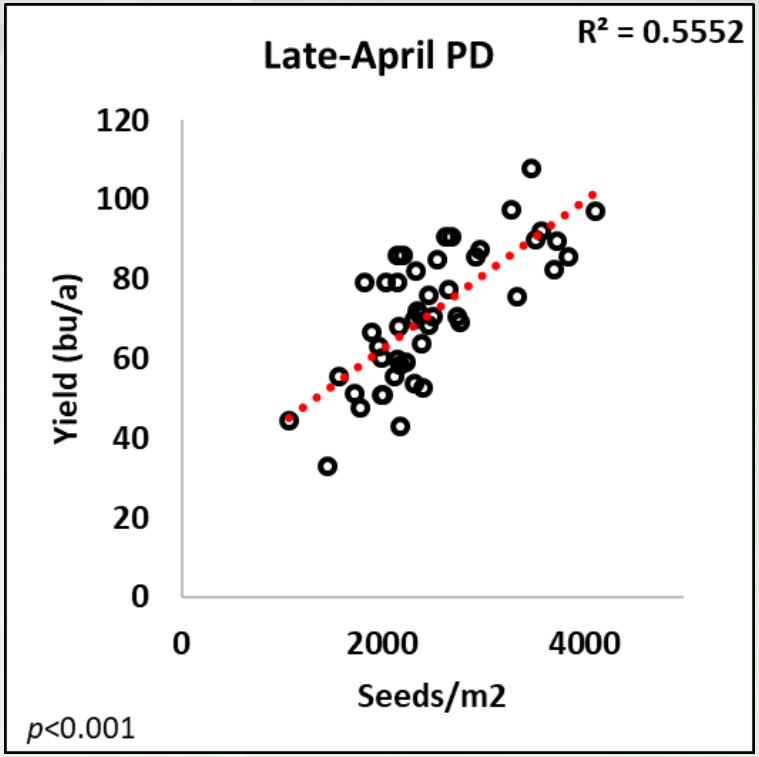
Late Season Planting: Harvest Moisture



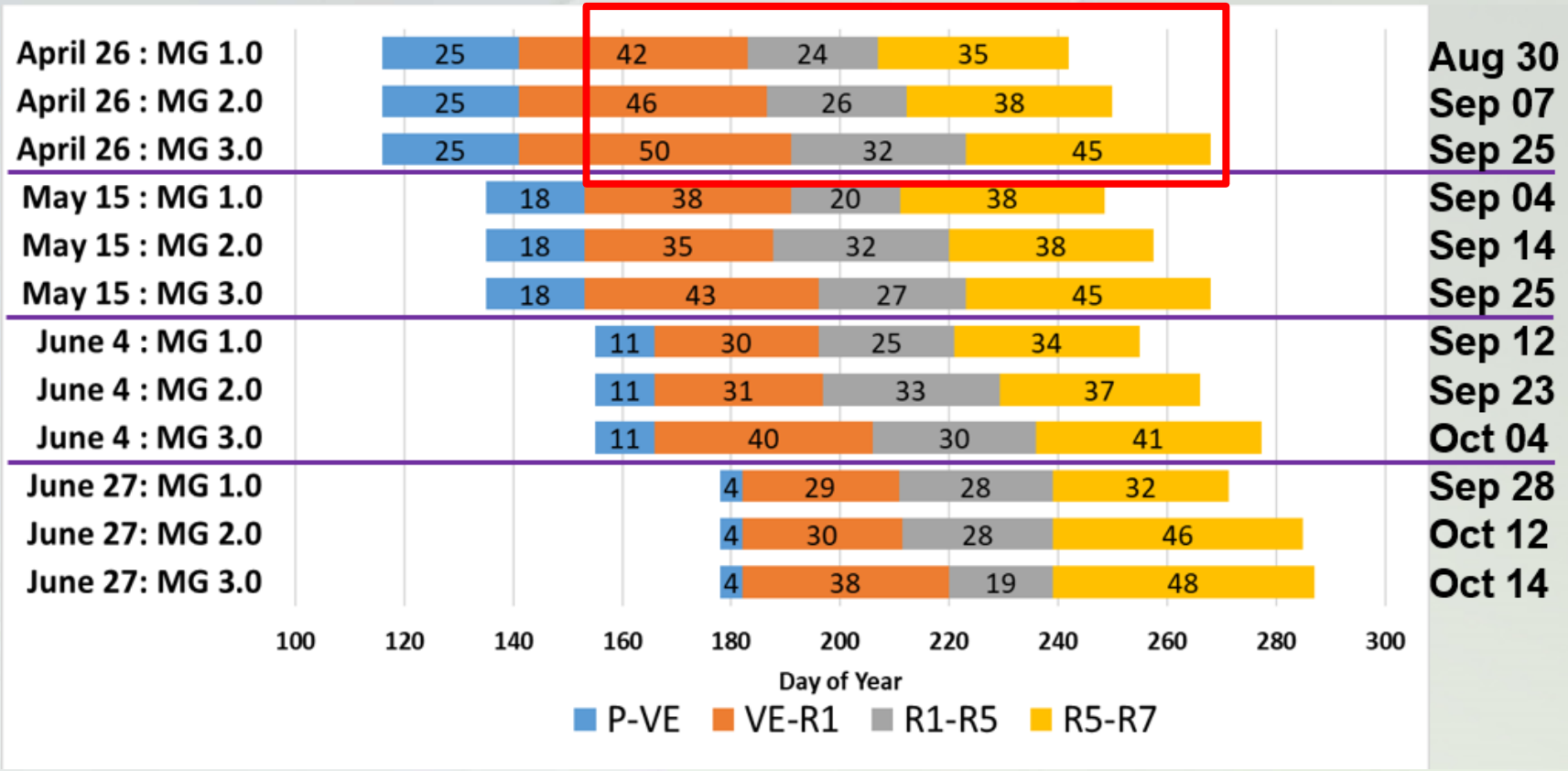
Frost on Oct 16 on MG >3.0

Yield Components

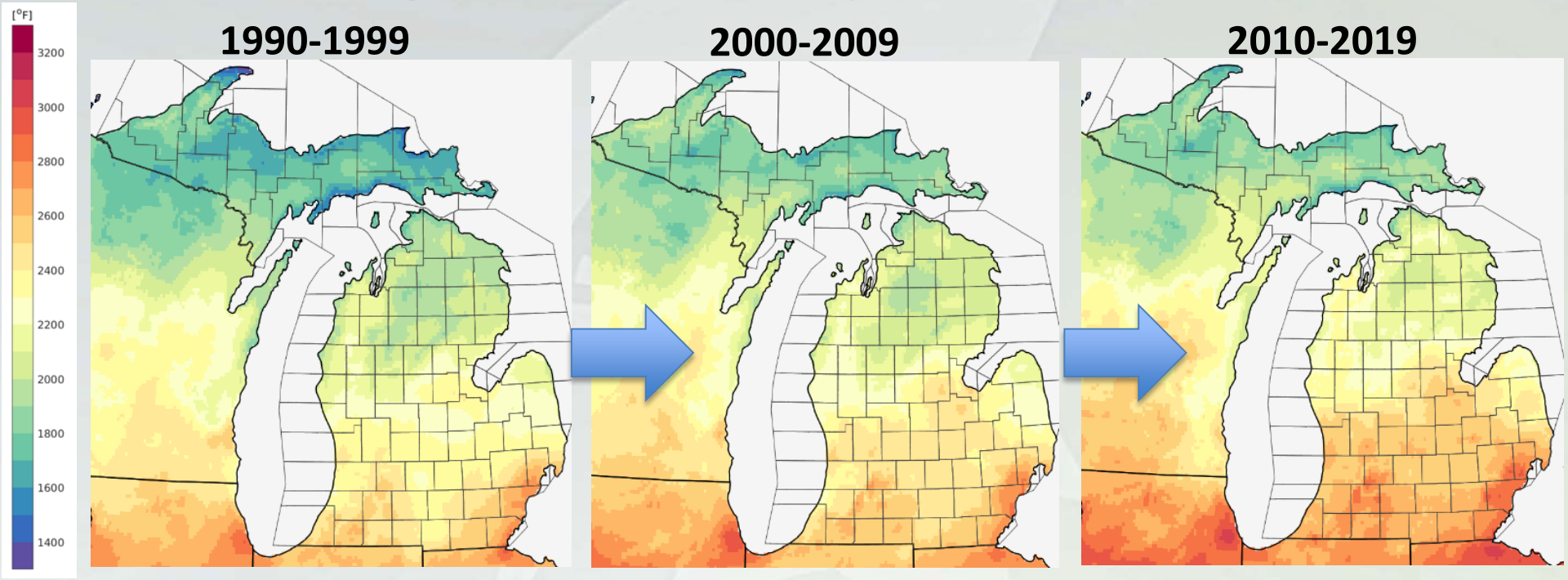




Phenology


R7 date
April 26 : MG 1.0
25
42
24
35
Aug 30
April 26 : MG 2.0
25
46
26
38
Sep 07
April 26 : MG 3.0
25
50
32
45
Sep 25
May 15 : MG 1.0
18
38
20
38
Sep 04
May 15 : MG 2.0
18
35
32
38
Sep 14
May 15 : MG 3.0
18
43
27
45
Sep 25
June 4 : MG 1.0
11
30
25
34
Sep 12
June 4 : MG 2.0
11
31
33
37
Sep 23
June 4 : MG 3.0
11
40
30
41
Oct 04
June 27: MG 1.0
4
29
28
32
Sep 28
June 27: MG 2.0
4
30
28
46
Oct 12
June 27: MG 3.0
4
38
19
48
Oct 14
100
120
140
160
180
200
220
240
260
280
300
Day of Year
P-VE
VE-R1
R1-R5
R5-R7

Corn Development Driven by **GDD Accumulation**



May 1- Sept 30 (86/50 method)

- **Seasonal GDD totals are increasing with time. Use <u>GDD ratings for hybrid selection</u> vs relative maturity '<u>days</u>"?**

GDD Compression with **Late planting** or **Replant?**

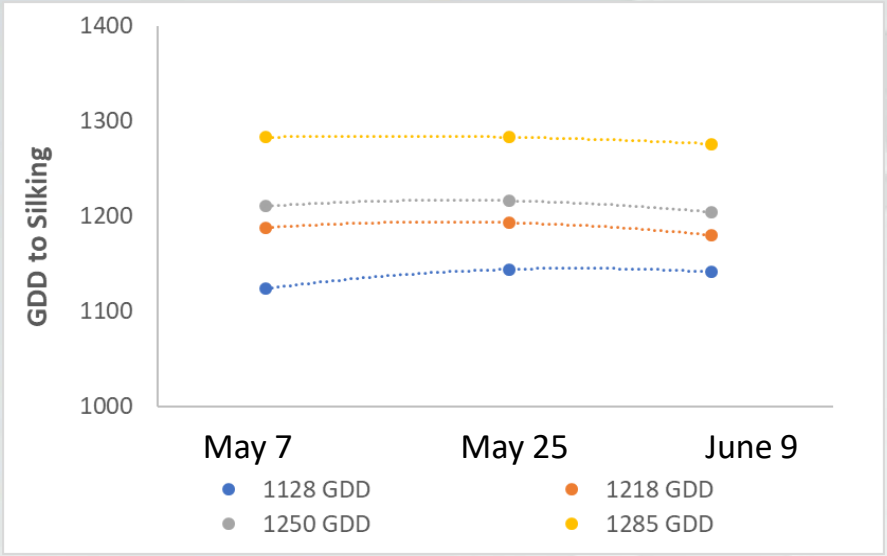
- **GDD Compression**: Decrease in hybrid GDD requirements with delayed planting
- **6.8 fewer GDDs** for every day of delay beyond May 1 (Nielsen et al., 2002)
  - Example: May 31 vs May 1 planting (30 days delay x 6.8 = 204 less GDDs needed)
- Need Michigan data on new hybrids to verify **compression and yield** impacts
- Implications of late-season pathogens (e.g. tar spot)?

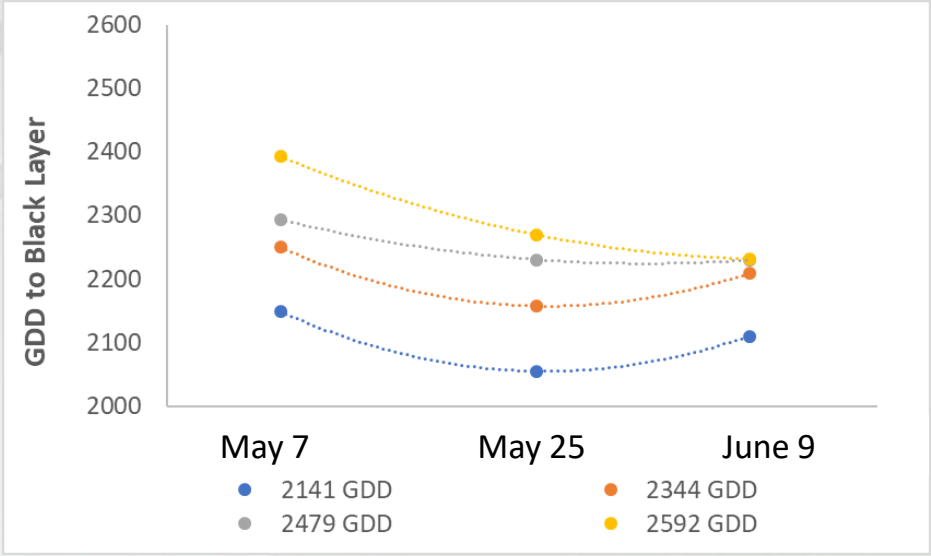
2020 Field Research

- Planting times: 3
  - Early (May 7)
  - Mid (May 25)
  - Late (June 9)

- Hybrid maturities: 4
  - 2100-2600 GDD (1100-1300 silk GDD)
  - 85 - 103 CRM (Comparative Relative Maturity)

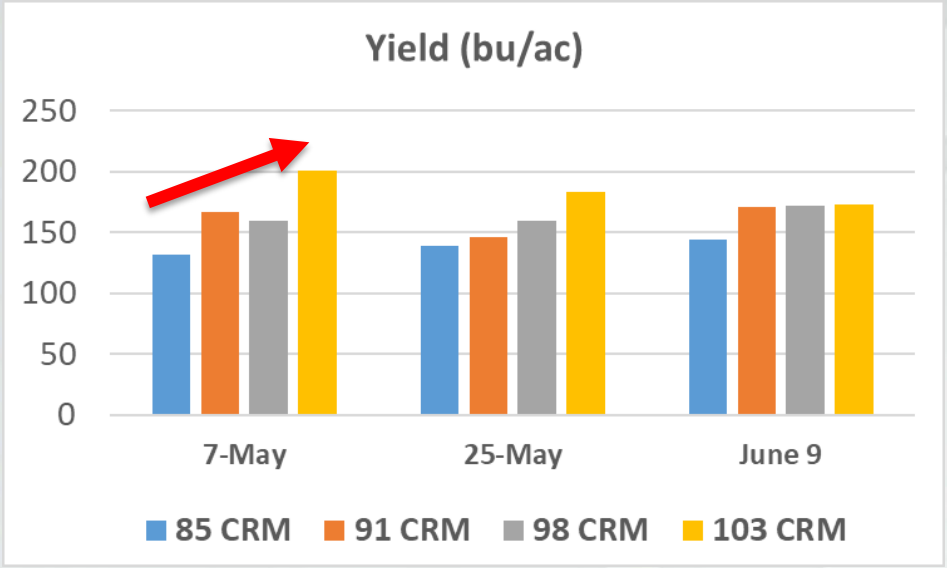
Silking and Black Layer

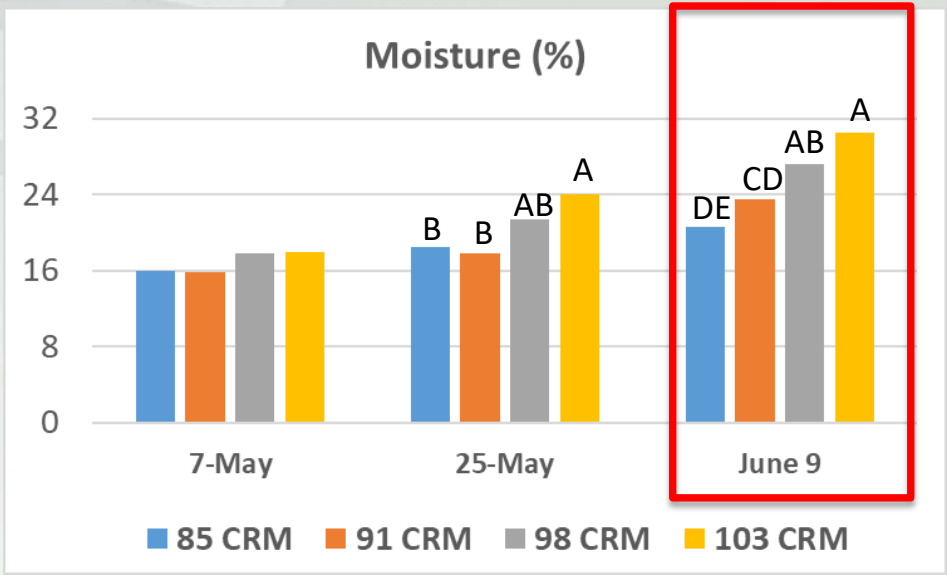




- No GDD compression observed for silking time
- Late-maturity hybrids showed GDD compression to Black Layer

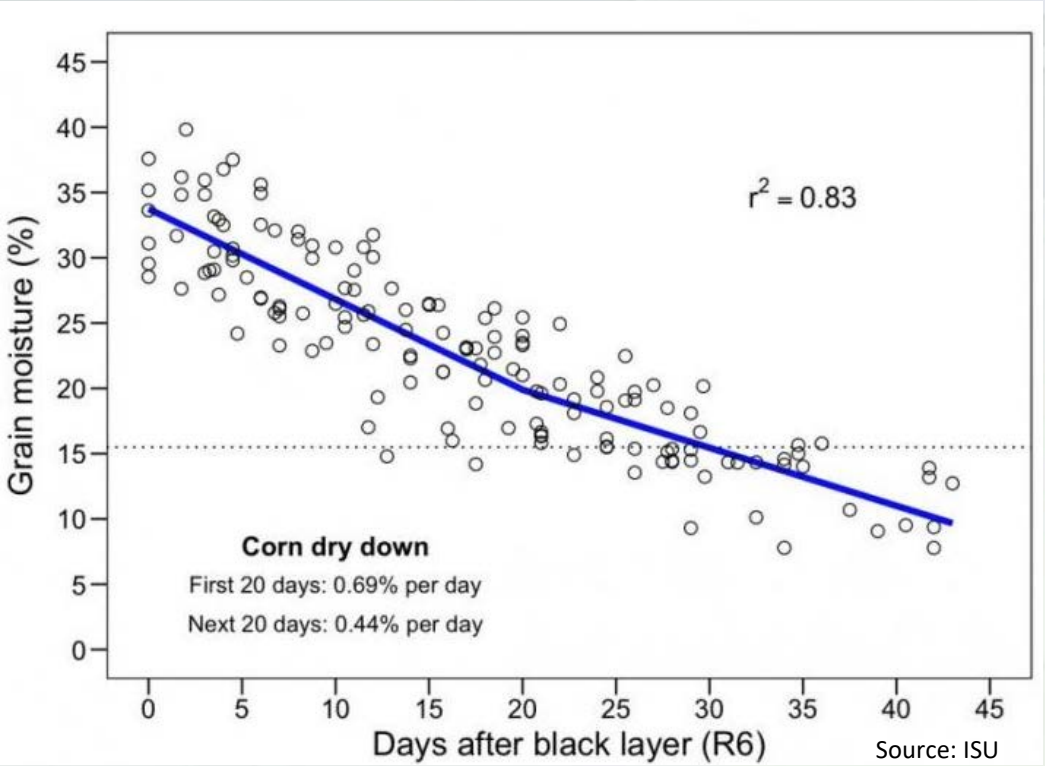
Yield and Moisture

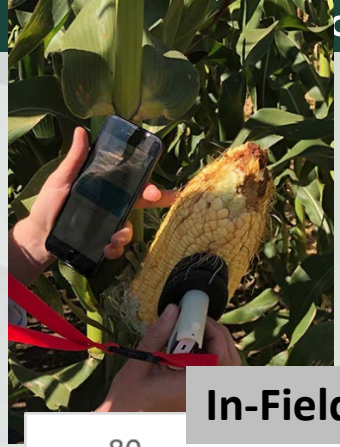




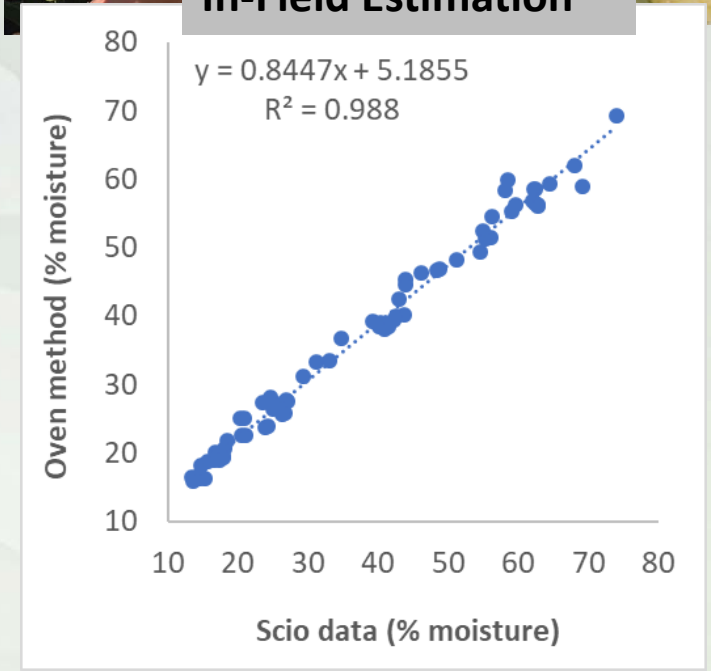
- Trend towards Increase in Yield by using late-maturity hybrid in early planting
- Greater Moisture by using late-maturity hybrid in late planting

Kernel Moisture Drydown

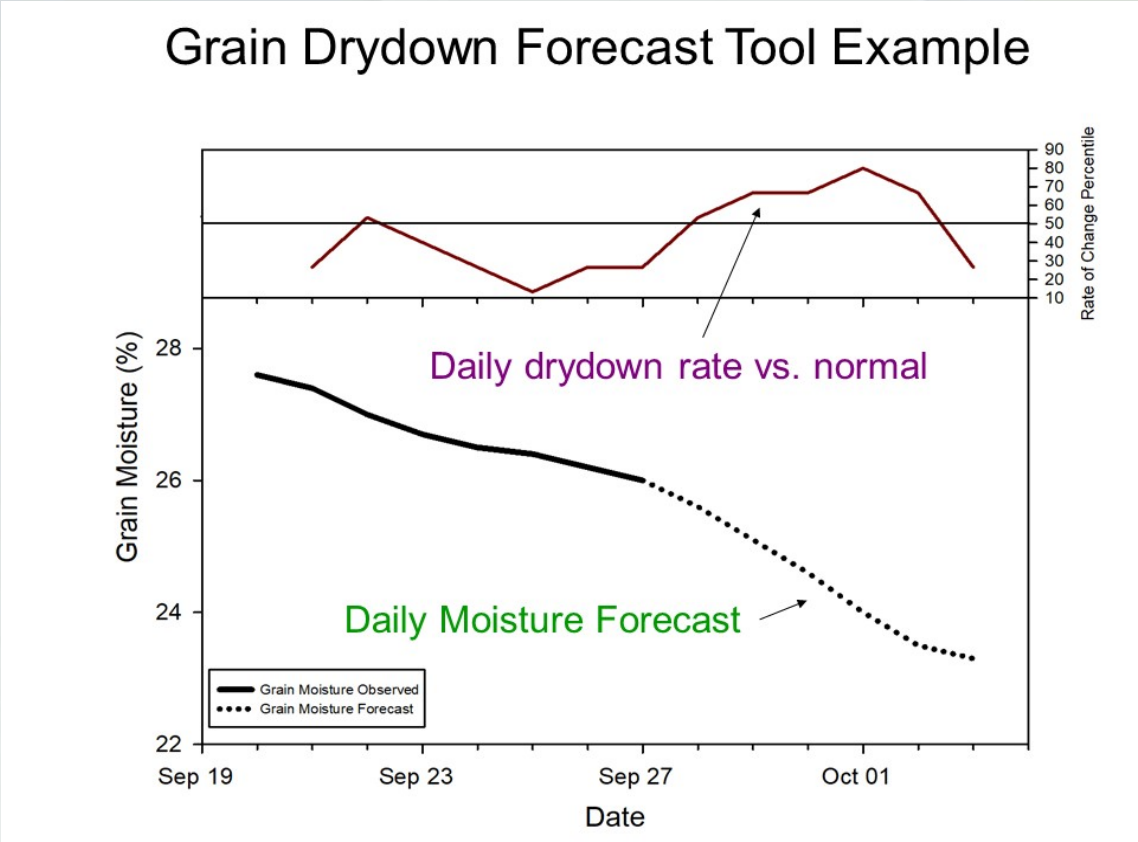




In-Field Estimation



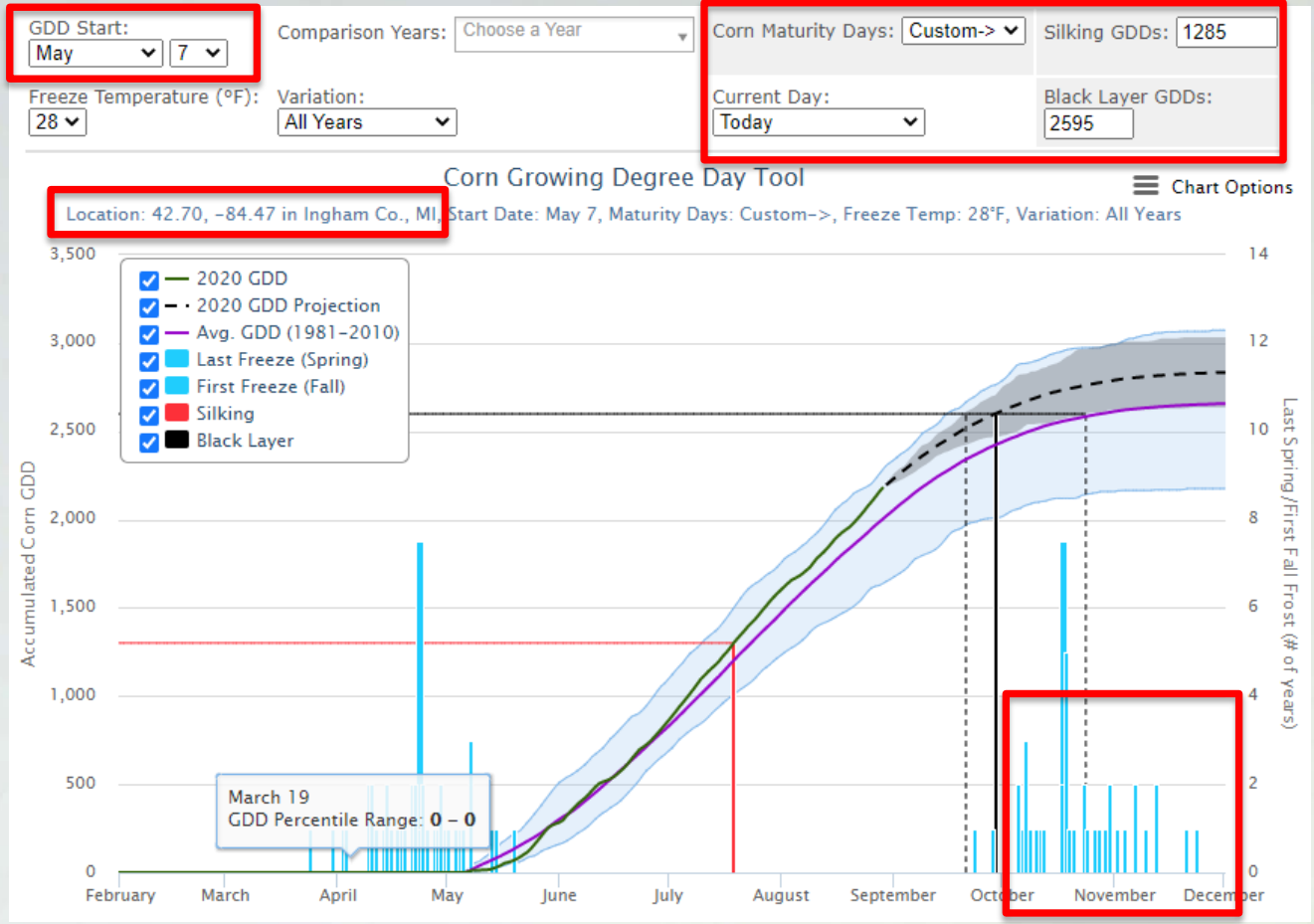
Kernel Moisture Drydown Forecast



Source: Jeff Andresen, MSU

Useful 2 Usable Tool (U2U)

https://mrcc.illinois.edu/U2U/gdd/

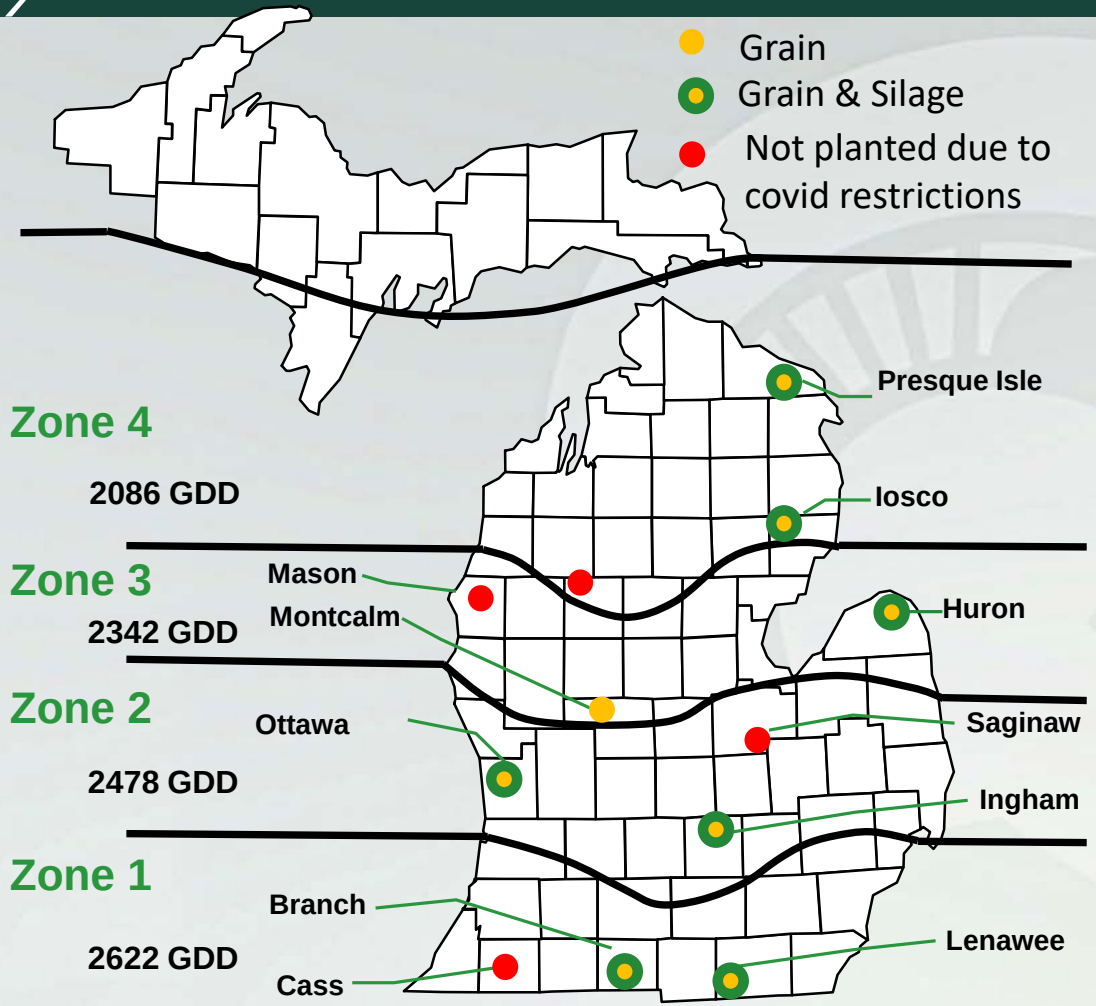


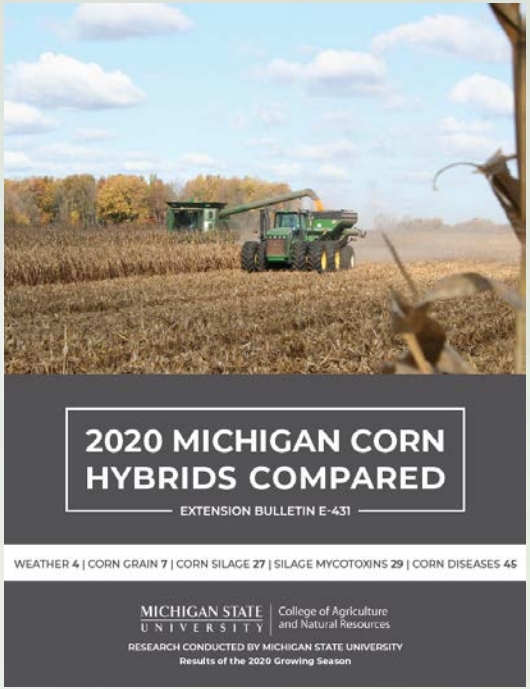
Does NOT account for GDD compression.

Goal: Update tool with new data. Develop NEW tool for estimating maturity dates, and dry down rates

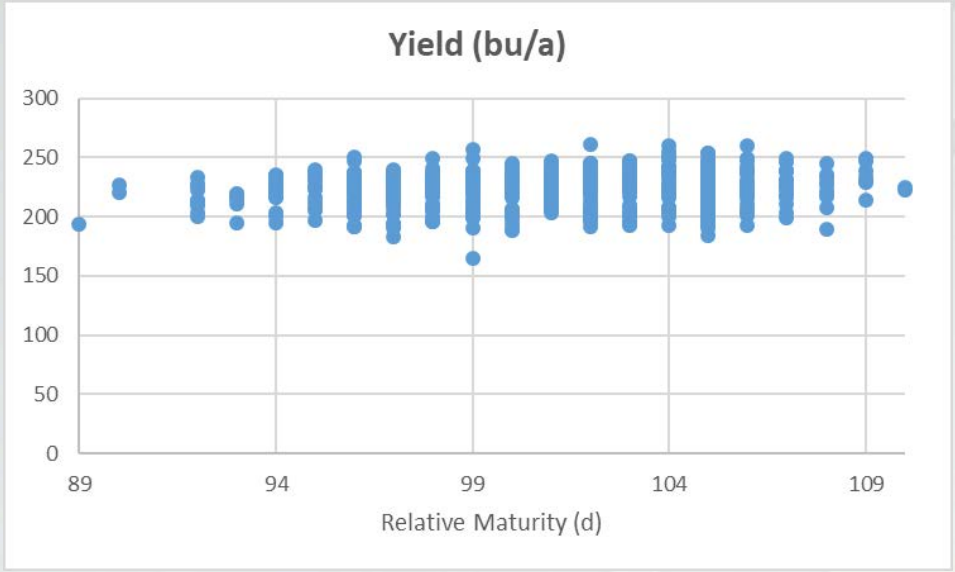
2020 Corn Hybrid Testing Locations

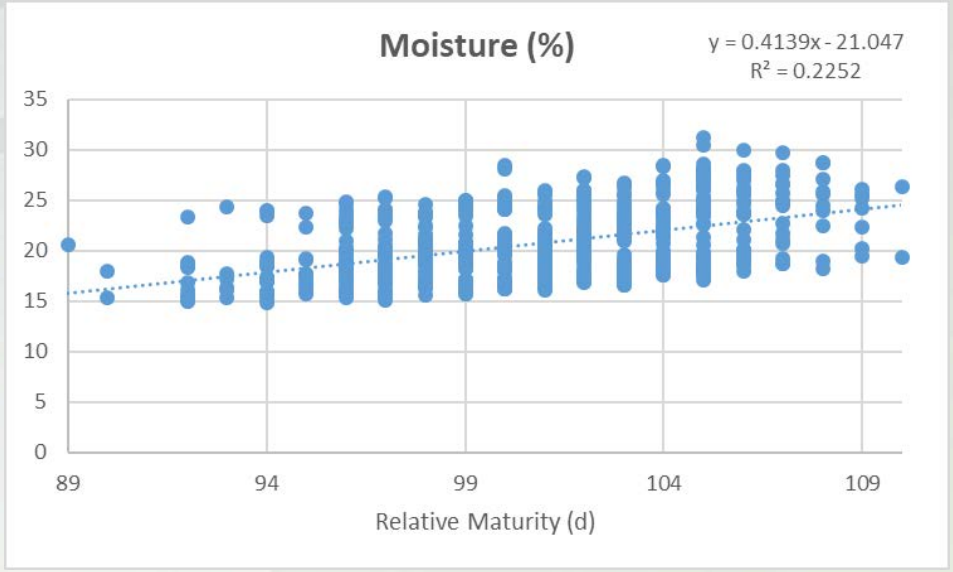
https://varietytrials.msu.edu/corn





Relative Maturity Vs Yield & Moisture





One Planting date (mid-season)

Data from MCPT Trials at one planting time (Zone 2, 2013 onwards)

Relative Maturity Vs Economic Returns

Difference b/w: Late- Early

Zone	Drying cost ($ bu^{-1} point^{-1})	Corn grain price ($ bu^{-1})		
		2.5	3.5	4.5
1	0.03	-11*	-8*	-5
	0.04	-17*	-14*	-11*
	0.05	-23*	-20*	-17*
2	0.03	-1	4	10*
	0.04	-6*	-1	5
	0.05	-11*	-6	0
3	0.03	-19*	-21*	-22*
	0.04	-25*	-26*	-27*
	0.05	-30*	-31*	32*

Mid-season planting

7 year data

Summary

- Optimal maturity varies with time of planting
- For mid-season planting, mid- and early- maturity varieties have competitive yield, and low moisture
- Benefits of early-season planting can be expanded upon with the use of late-maturity hybrid
- Select early-maturity variety to minimize yield loss/ moisture issues in delayed/replant situations
- **Portfolio approach** in maturity selection, accounting for planting time (early vs late), GDD compression, and drying capacity
  - Plant late-maturity hybrids first (30-40% acres)
  - Plant mid- and early-maturity hybrids in sequence to “stack” pollination
  - Plant ~20-30% acres to each of mid- and early-maturity hybrids

- Bill Widdicombe
- Tom Siler
- Katlin Fusilier
- Kalvin Canfield
- Harkirat Kaur
- Maddi Yaek
- Garrett Zuver
- Mike Particka
- Paul Horny
- Charles Scovill (Syngenta)
- **Undergrad students**
- **Farmer cooperators**

- Dr. Laura Lindsey (OSU)
- Dr. Chris Difonzo
- Dr. Dechun Wang
- Dr. Marty Chilvers
- Dr. Erin Burns
- Dr. Christy Sprague
- Dr. I. Ciampitti (KSU)
- Dr. Shawn Conley (UW)
- Mike Staton

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Thanks!

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Michigan Soybean Promotion Committee www.michigansoybean.org

CORN MARKETING PROGRAM CMPM OF MICHIGAN www.micorn.org

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