The Amazing 2018 Soybean Season: Lessons for 2019

ISA Webinar

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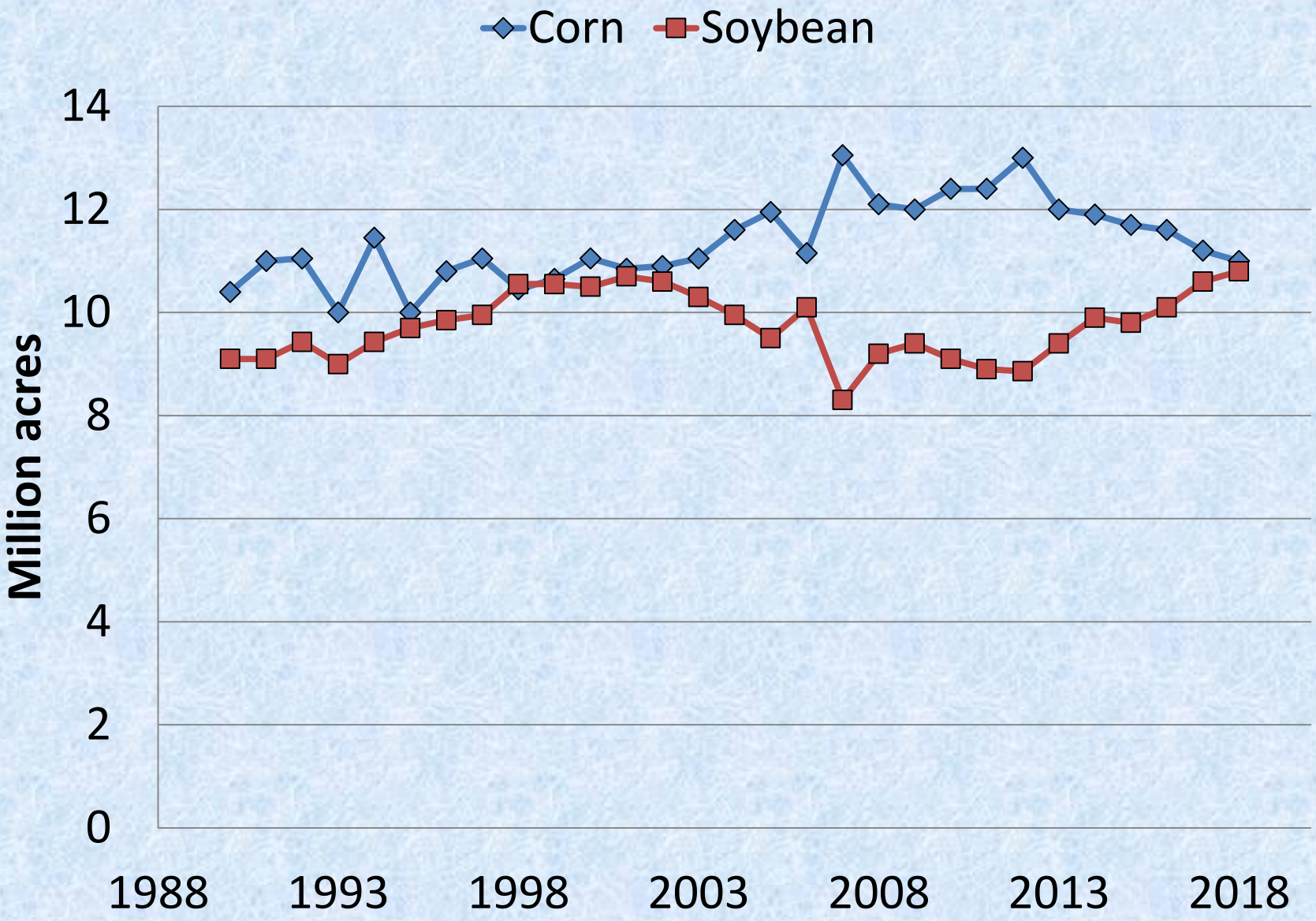
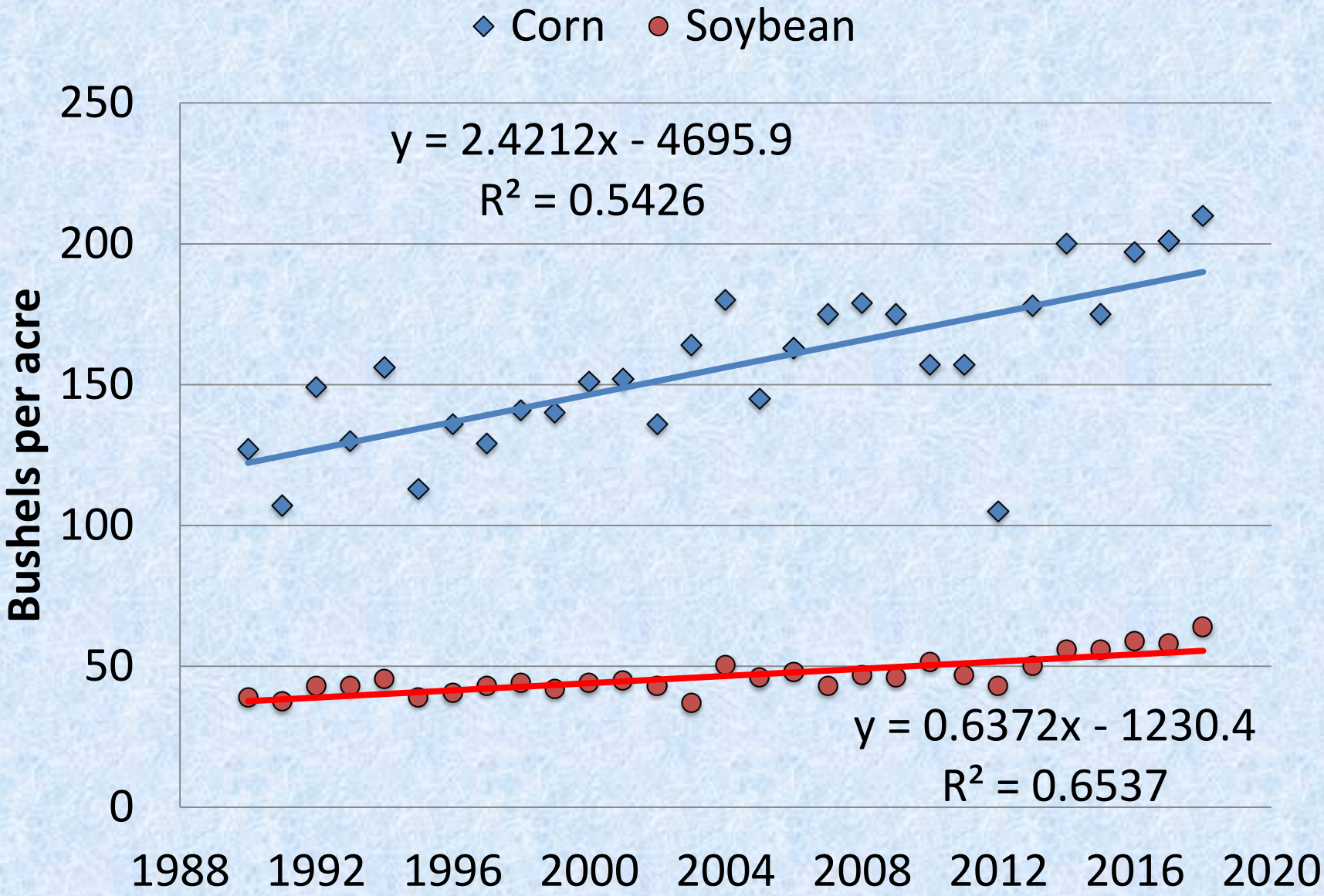
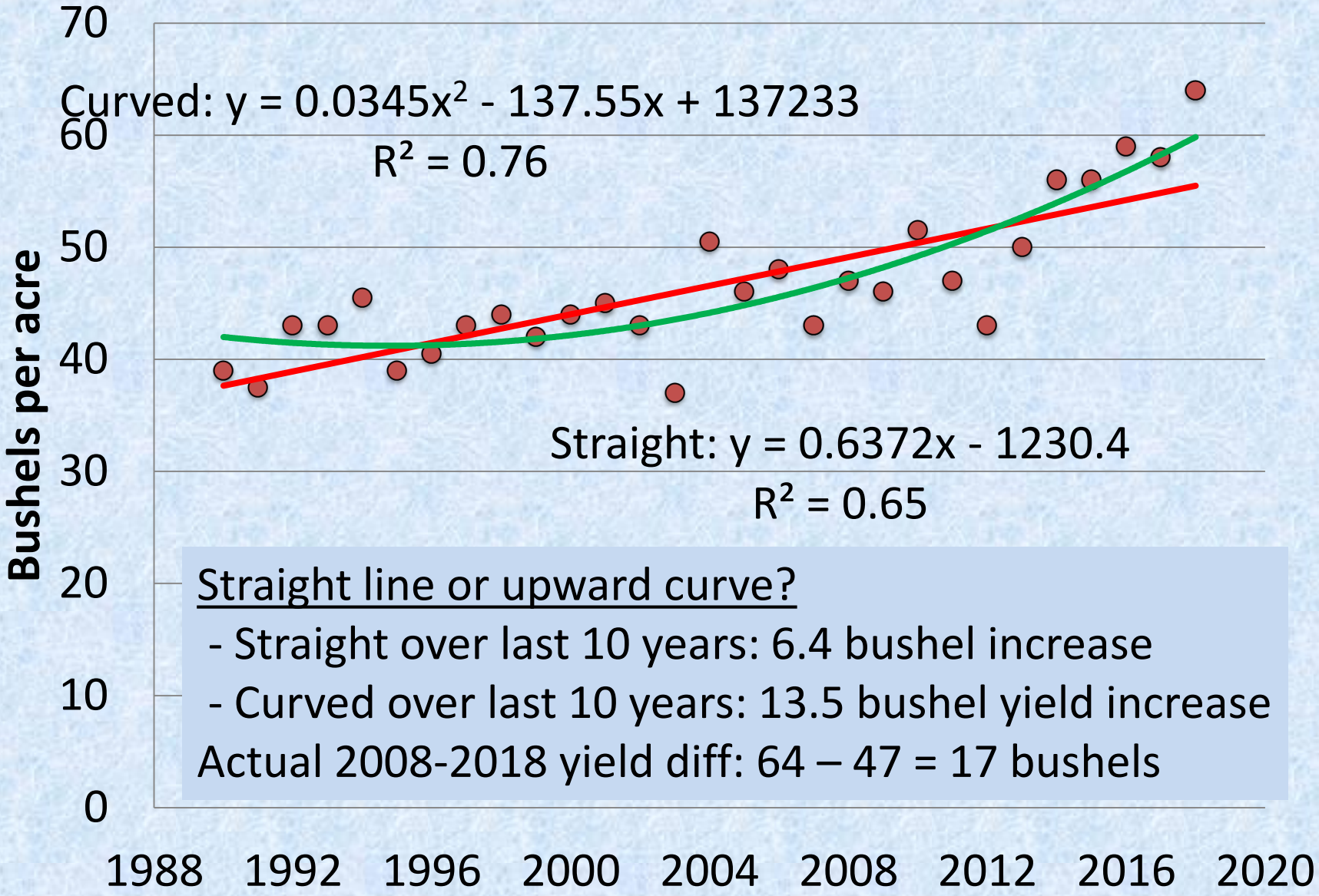
Illinois corn and soybean acreage, 1990-2018



Illinois yields, 1990-2018



Illinois soybean yields, 1990-2018

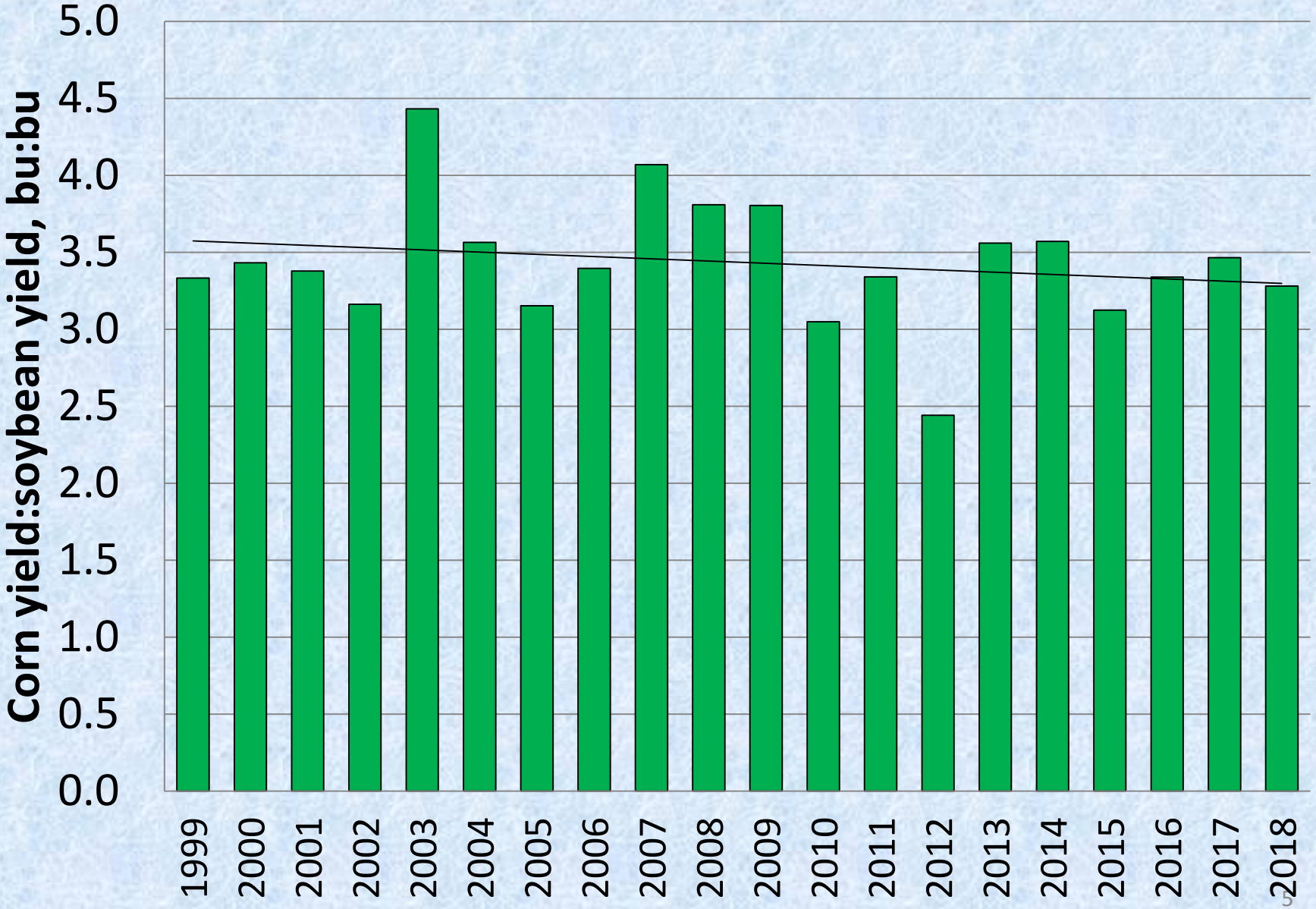


Straight line or upward curve?

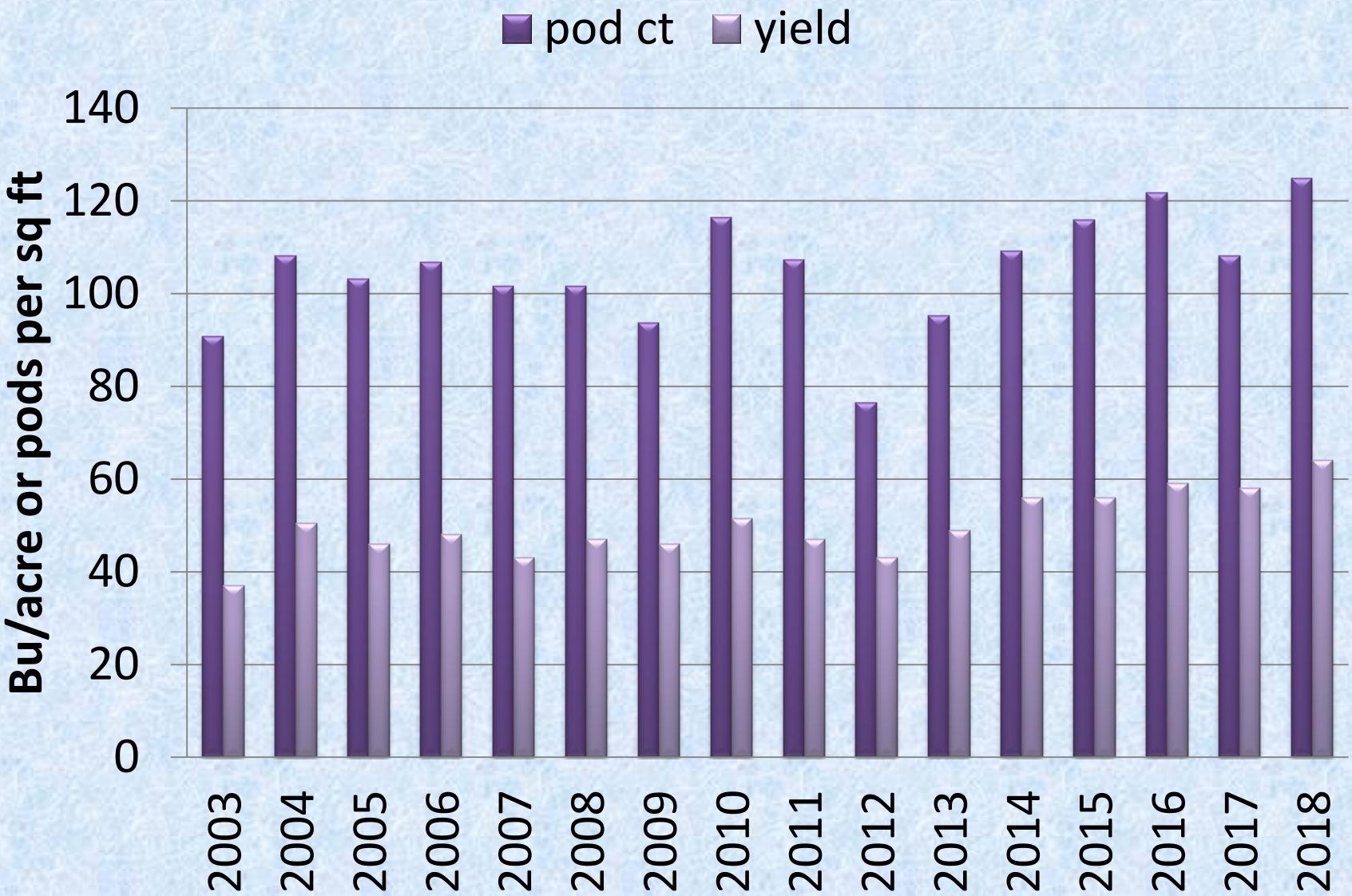
- Straight over last 10 years: 6.4 bushel increase
- Curved over last 10 years: 13.5 bushel yield increase

Actual 2008-2018 yield diff: 64 – 47 = 17 bushels

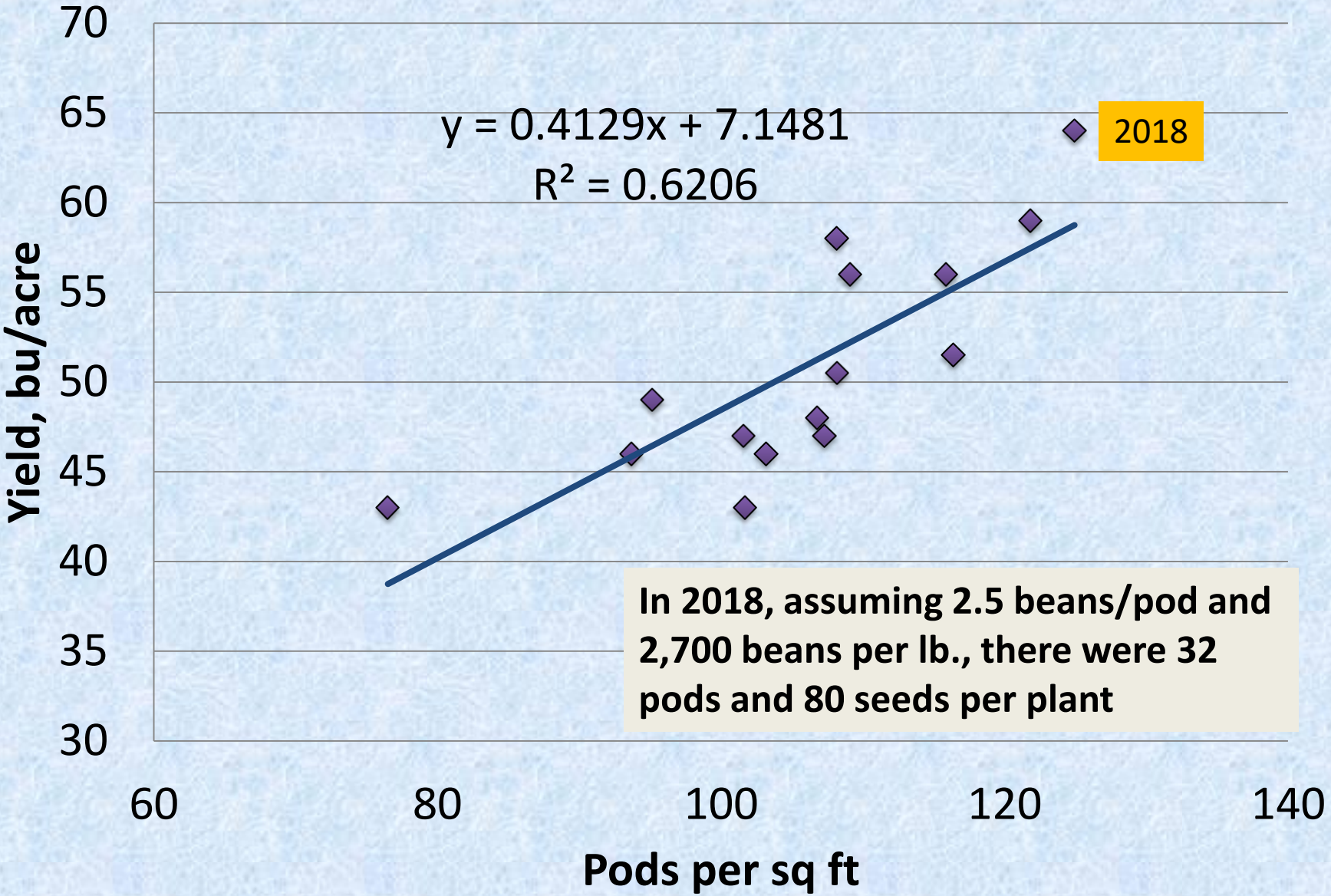
Corn:Soy Yield Ratio, Illinois, 1999-2018



Illinois Soy Pod Count & Yield

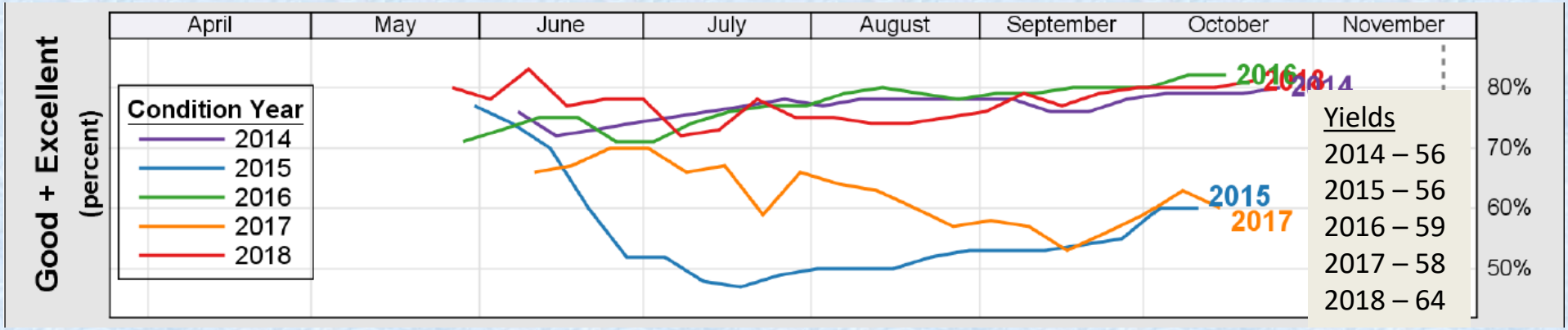


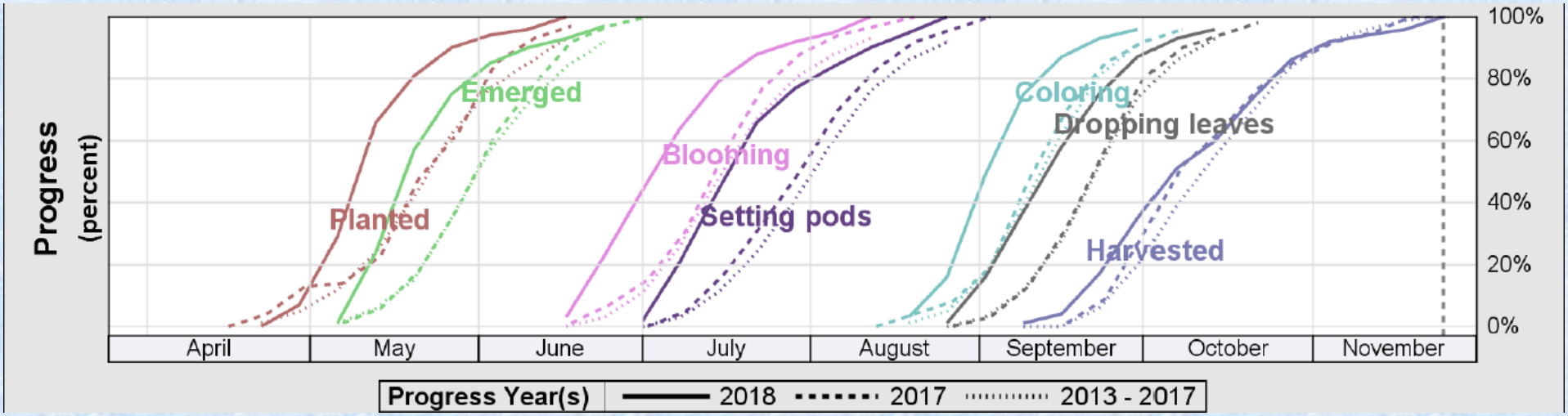
Illinois soybeans, 2004-2018



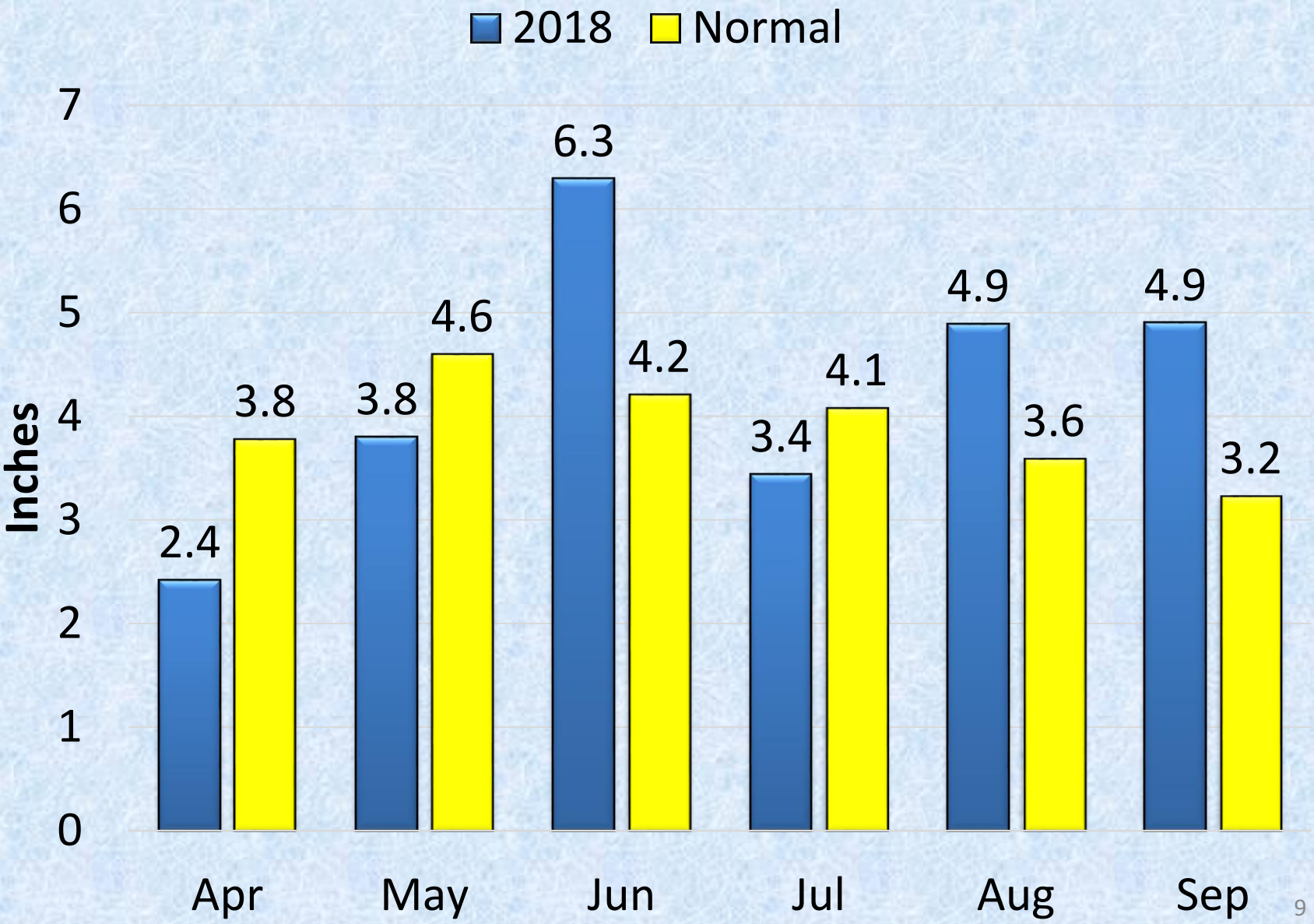
In 2018, assuming 2.5 beans/pod and 2,700 beans per lb., there were 32 pods and 80 seeds per plant

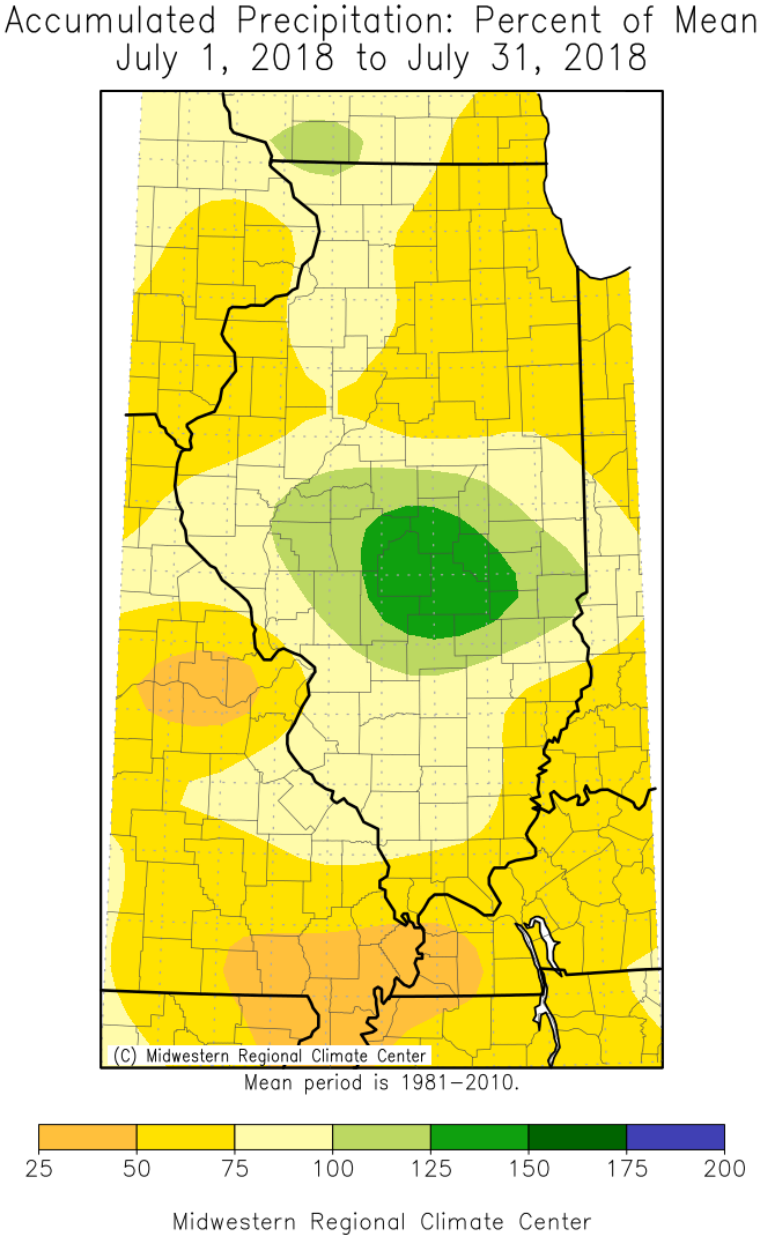
USDA Crop Progress and Condition: Soybeans in Illinois , 2018 NASS

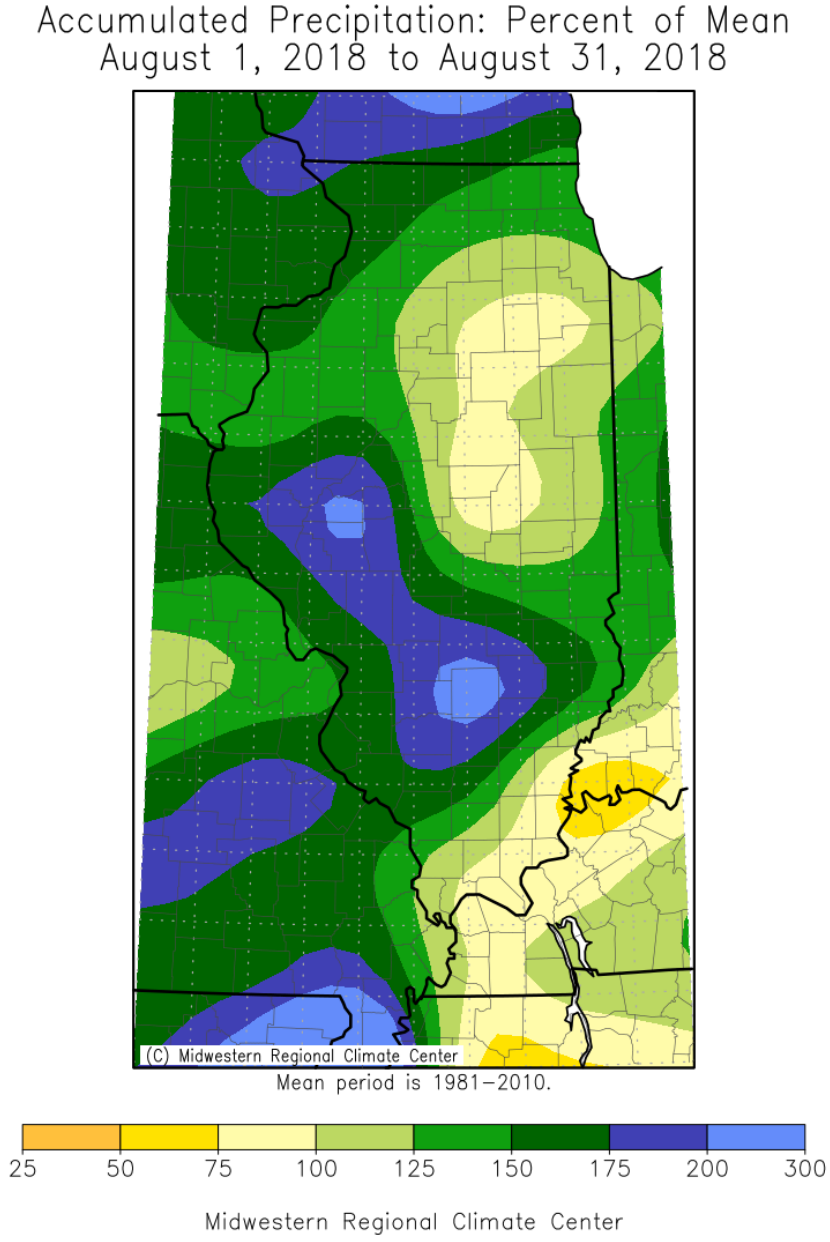


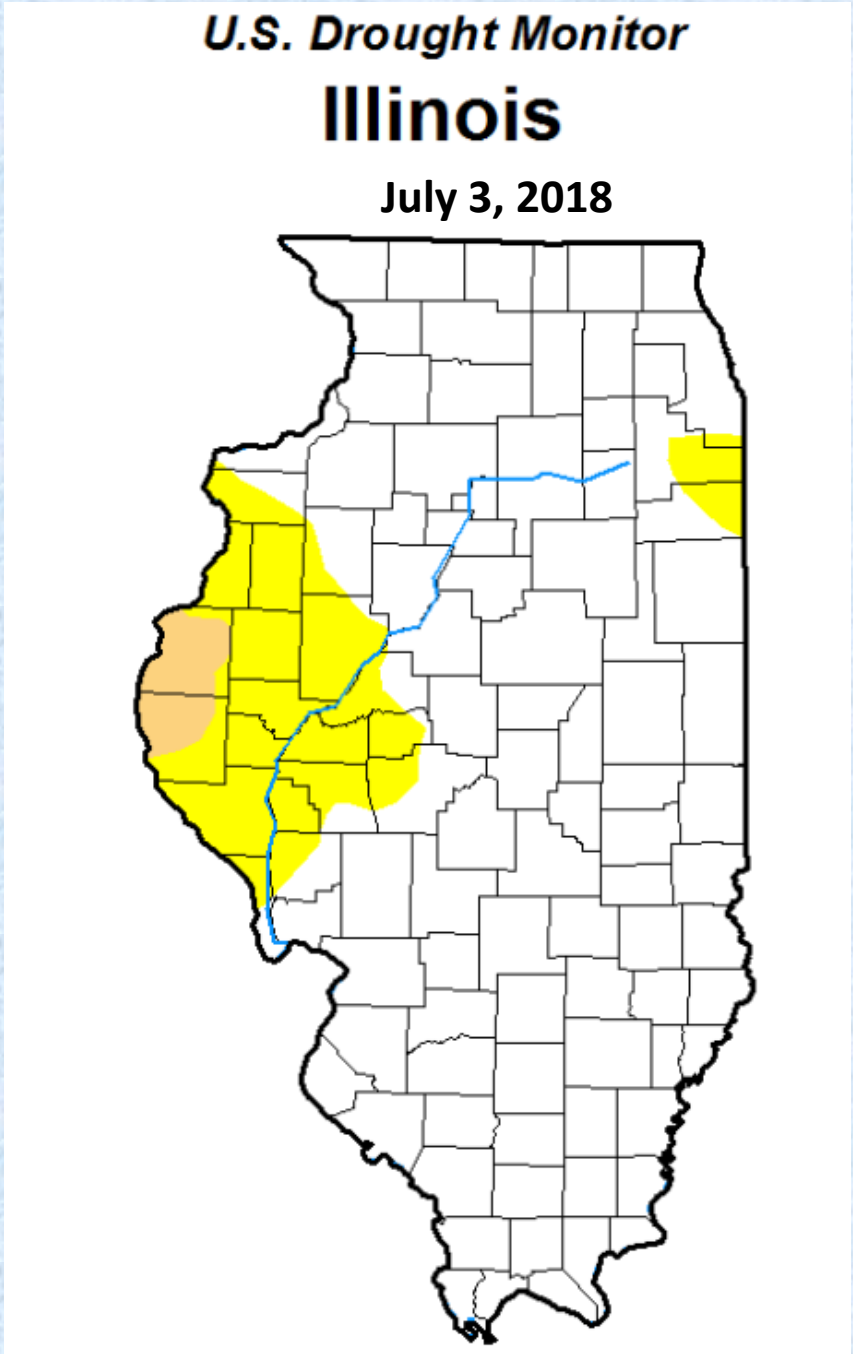


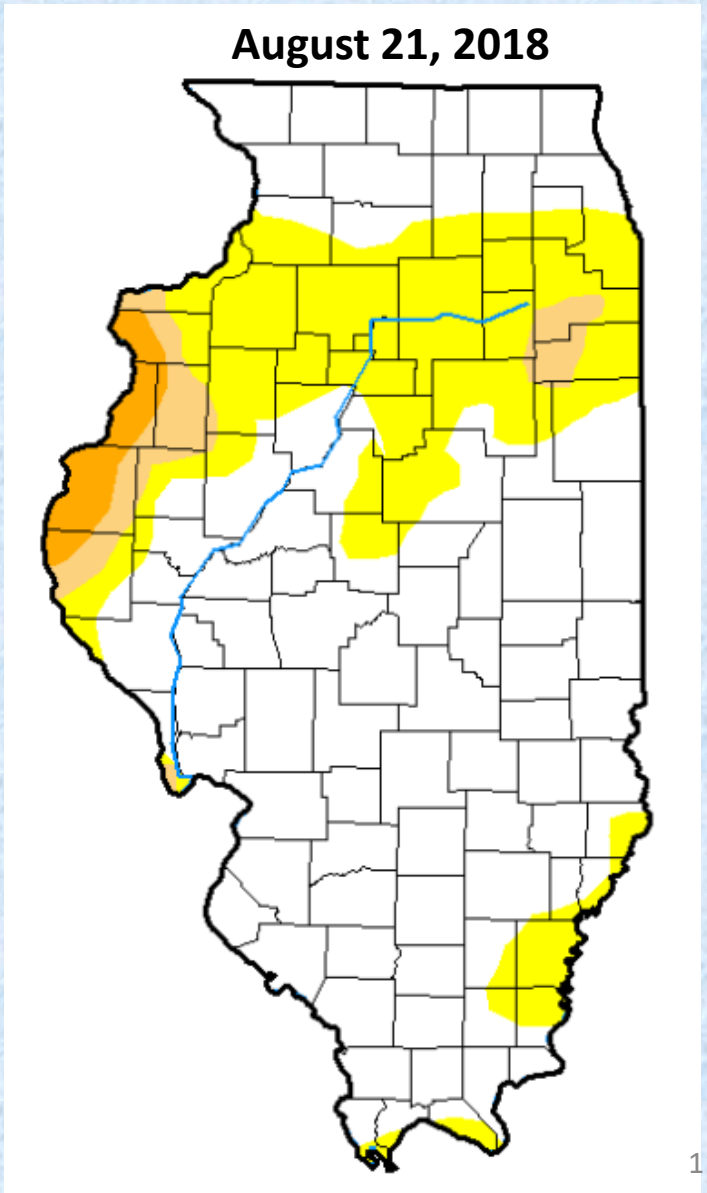
Illinois rainfall

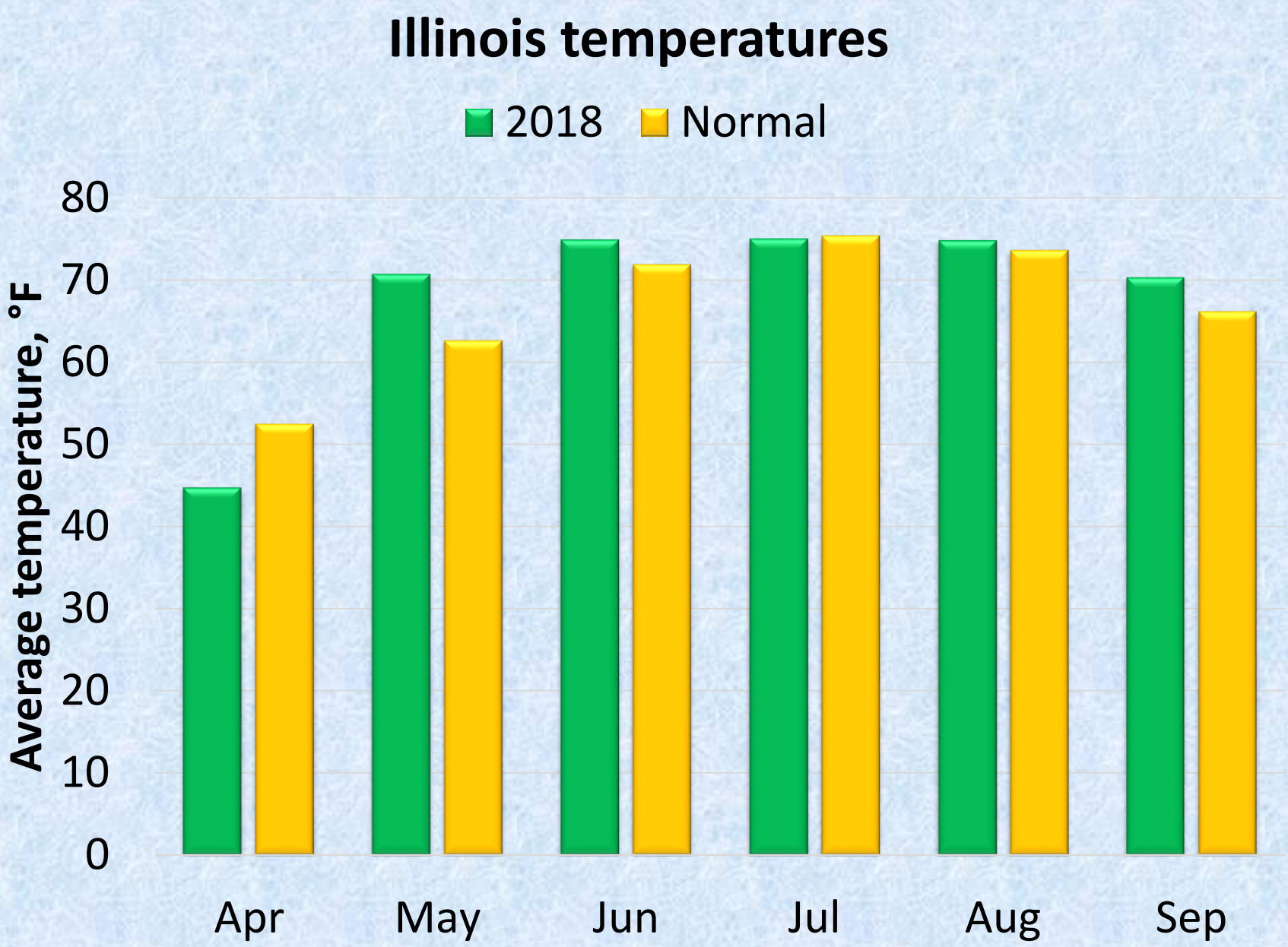



Accumulated Precipitation: Percent of Mean
July 1, 2018 to July 31, 2018
(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
25
50
75
100
125
150
175
200
Midwestern Regional Climate Center

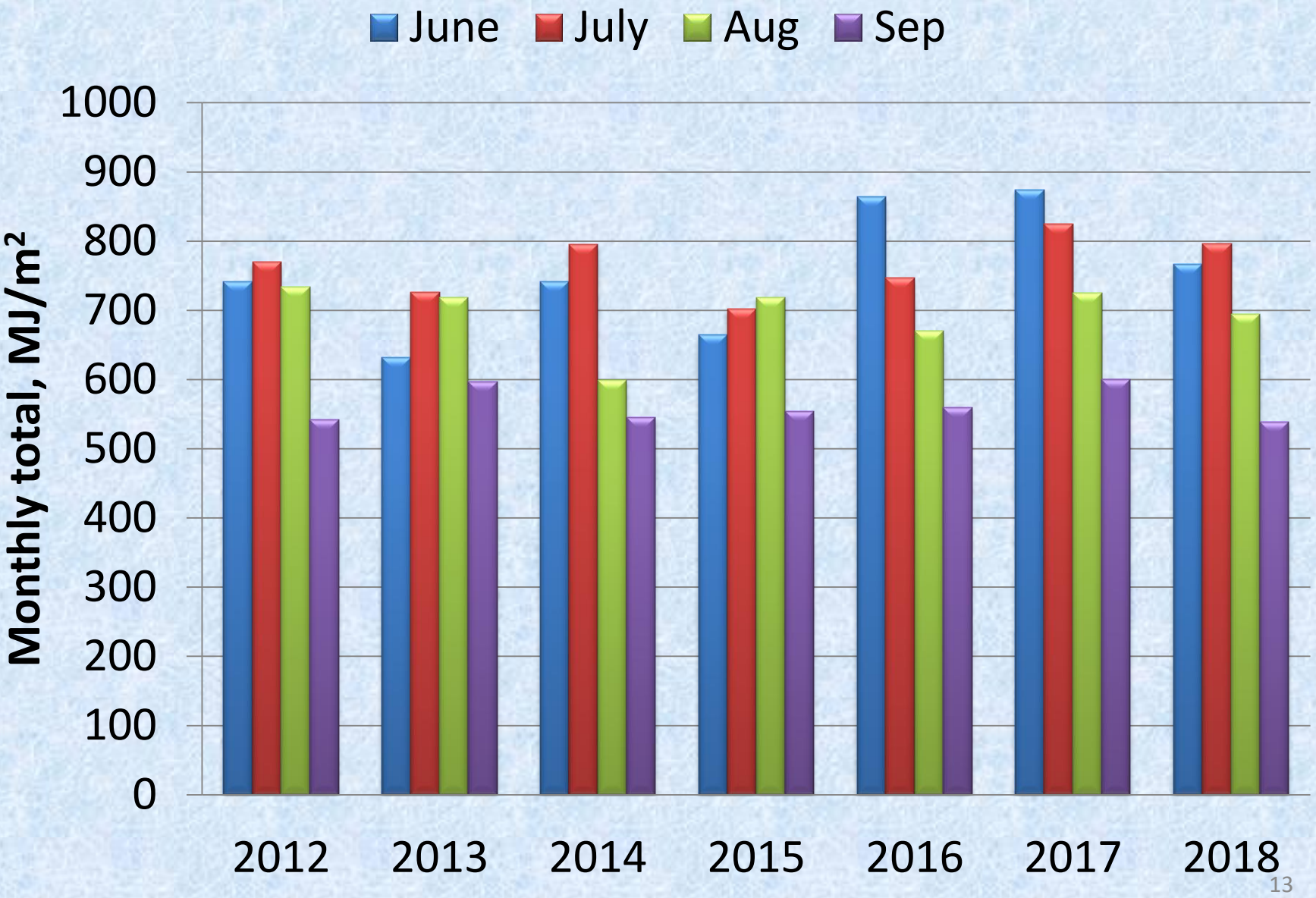

Accumulated Precipitation: Percent of Mean
August 1, 2018 to August 31, 2018
(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
25
50
75
100
125
150
175
200
300
Midwestern Regional Climate Center


U.S. Drought Monitor
Illinois
July 3, 2018


August 21, 2018


Illinois temperatures
2018
Normal
Average temperature, °F
80
70
60
50
40
30
20
10
0
Apr
May
Jun
Jul
Aug
Sep

Sunlight at Bondville, Champaign Co.



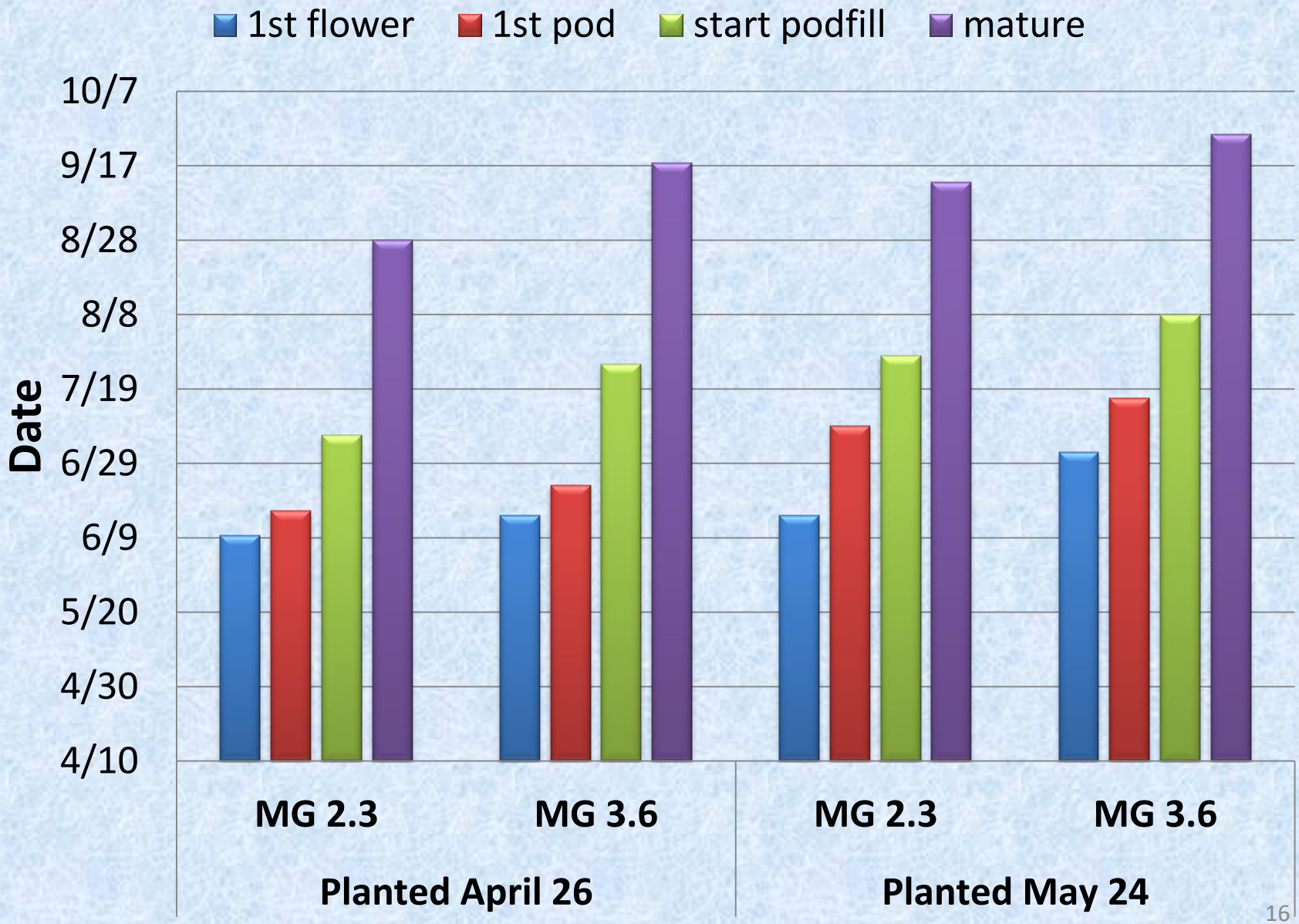
So why the high soybean yields (again) in 2018?

- **Weather:**
  - Very cool April, very warm May, with normal rainfall
  - June a little warmer and wetter than normal (most places)
  - July and August temps normal, rainfall mixed: above- to below-normal
  - Sunshine amounts high in May, a little above normal June-August
- **Crop:**
  - Planting began a little late, finished earlier than normal
  - Excellent emergence and early growth; high crop ratings from the start
  - Flowering **much** ahead of normal; >40% of the crop flowering by July 1
  - Excellent canopy color throughout podsetting and seedfilling
  - Podsetting and maturity about 2 weeks ahead of normal
- **Results:**
  - Projected yield of 64, beating previous Illinois record of 59 (2016)
  - Yields some to well above normal in most areas, limited by dryness/drought in NE western IL, and by high rainfall in parts of NW IL
- **2018 was for the soybean crop probably the most stress-free year ever across most of Illinois.**

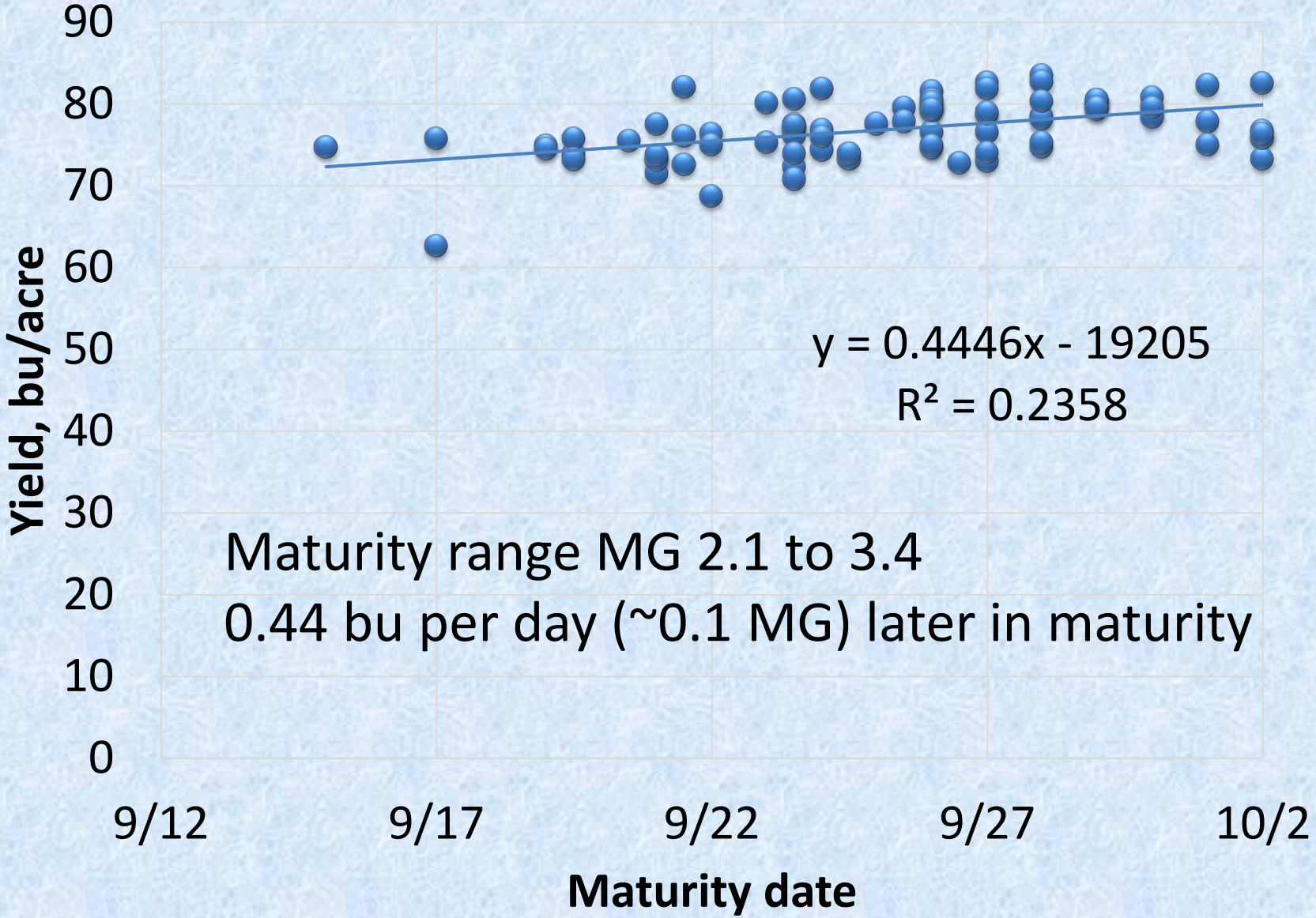
But don't soybeans need "short days" to flower?

- Yes: nights need to be long enough (it's the night length that counts) to trigger plants of a given maturity to flower
  - Later-maturing varieties need a longer night/shorter day than early ones, so flower later
- **But** if a variety normally gets a long enough night on July 10 (20 days after the longest day/shortest night), that same night length also occurs 20 days BEFORE the longest day, or on June 10
- If plants have reached V3 stage by the time they get the signal to flower, they will flower even if it's before June 20
- Night temperature is a major factor: shorter but warmer nights (as in 2018) will trigger flowering

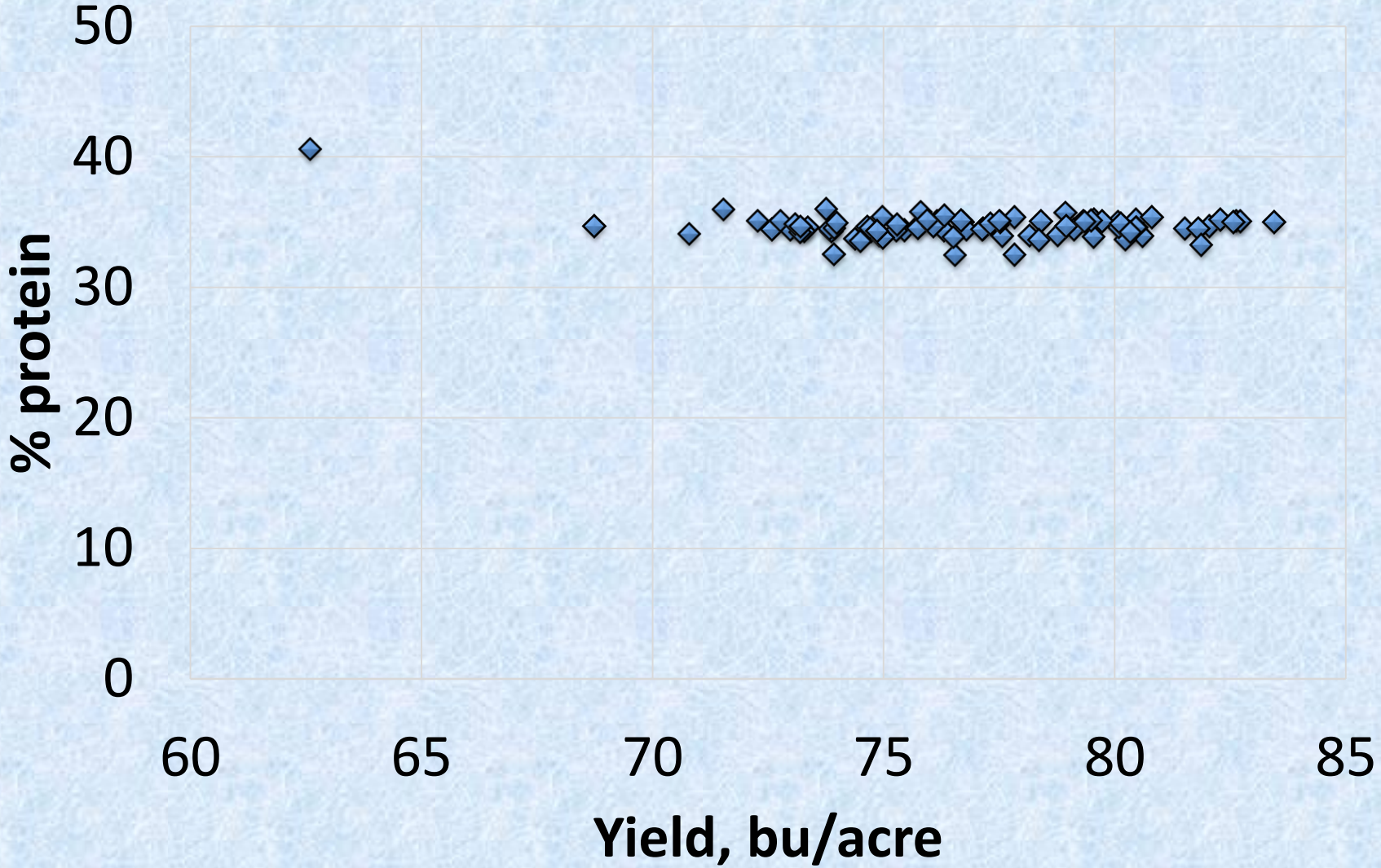
Soybean maturity x planting date, Urbana, 2018



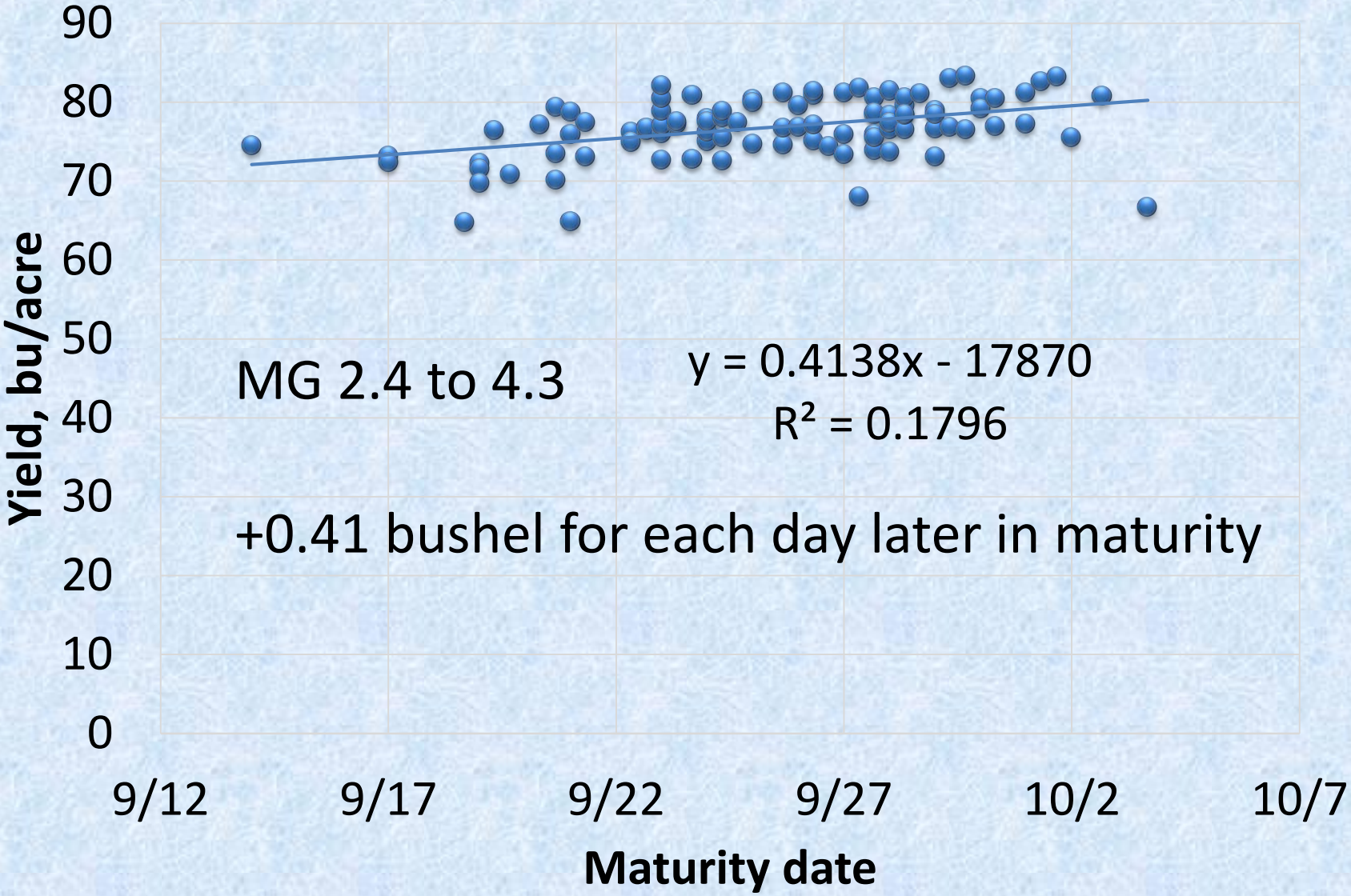
UI Variety Trials, Region 1 (N)



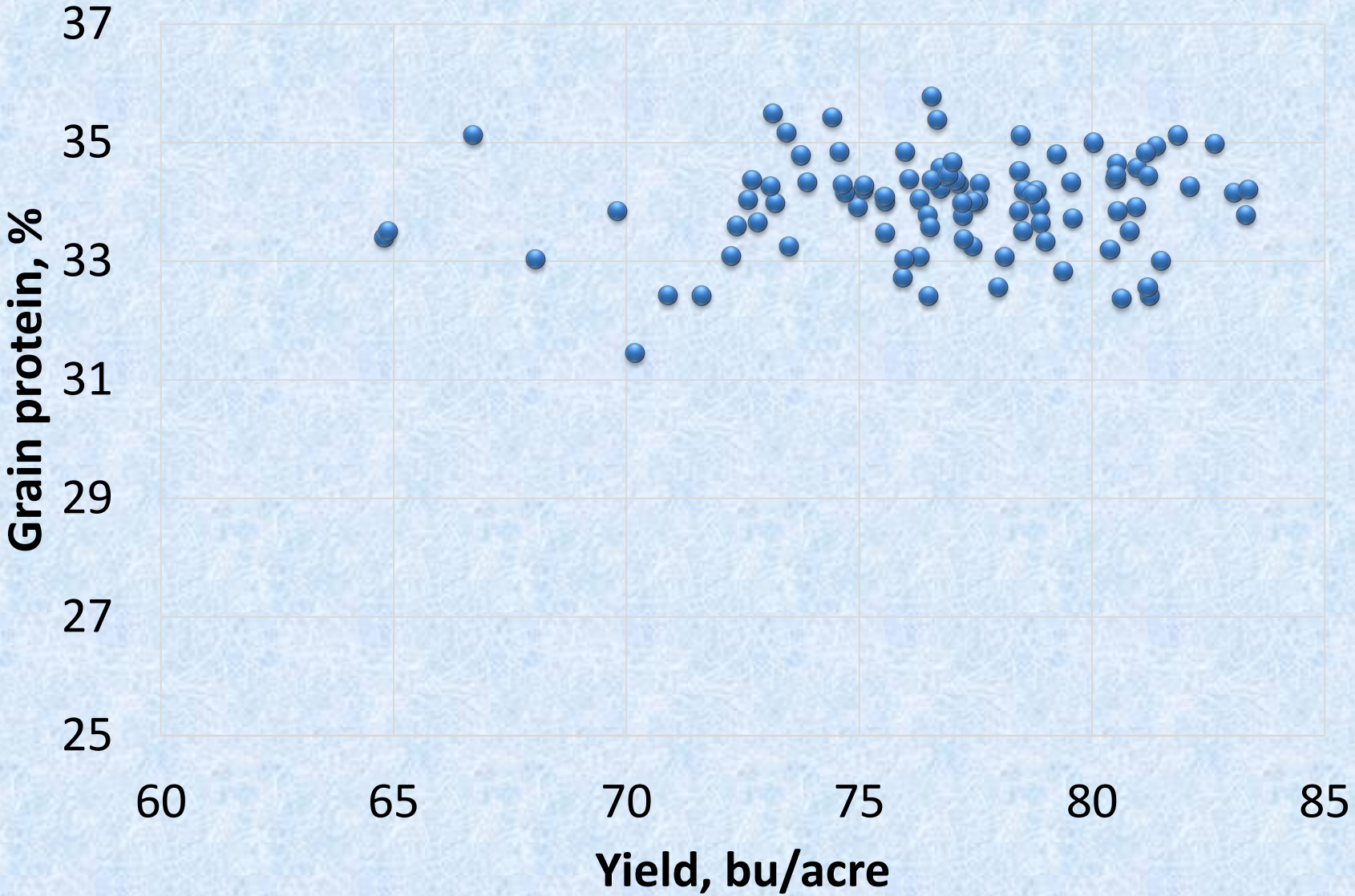
UI Variety Trials Region 1, 2018



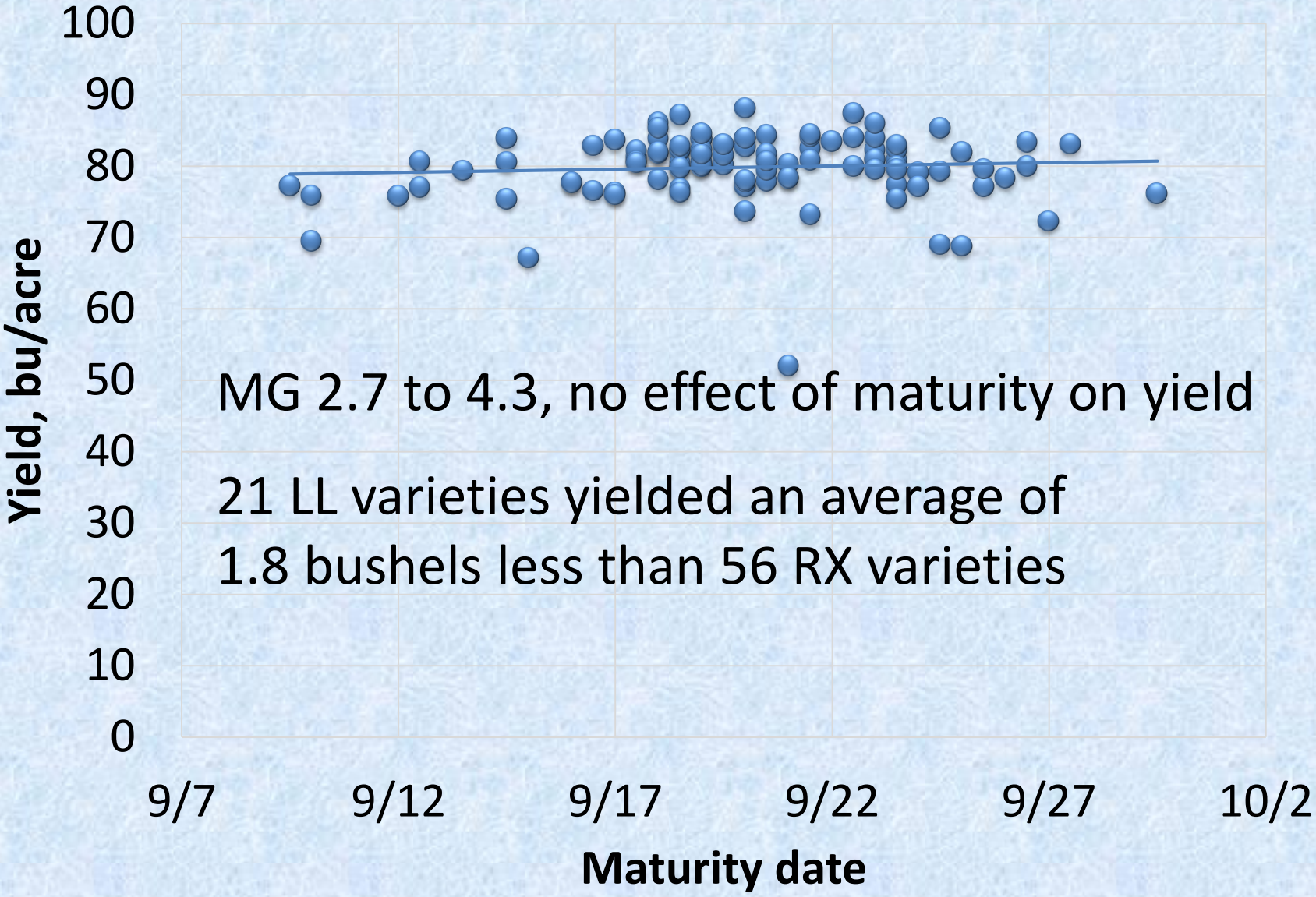
UI Variety Trial Region 2 (NC) 2018



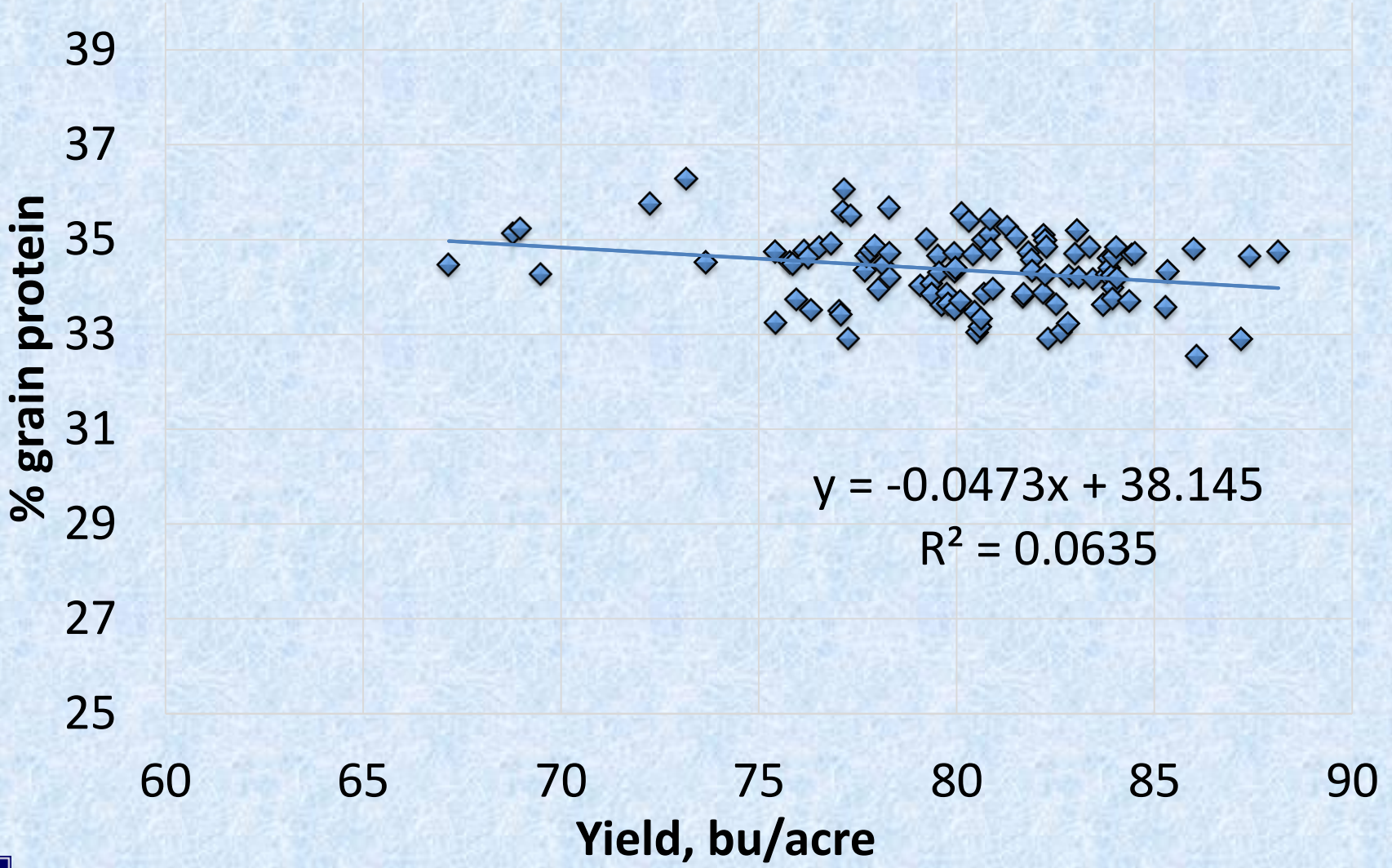
Variety Trial Region 2, 2018



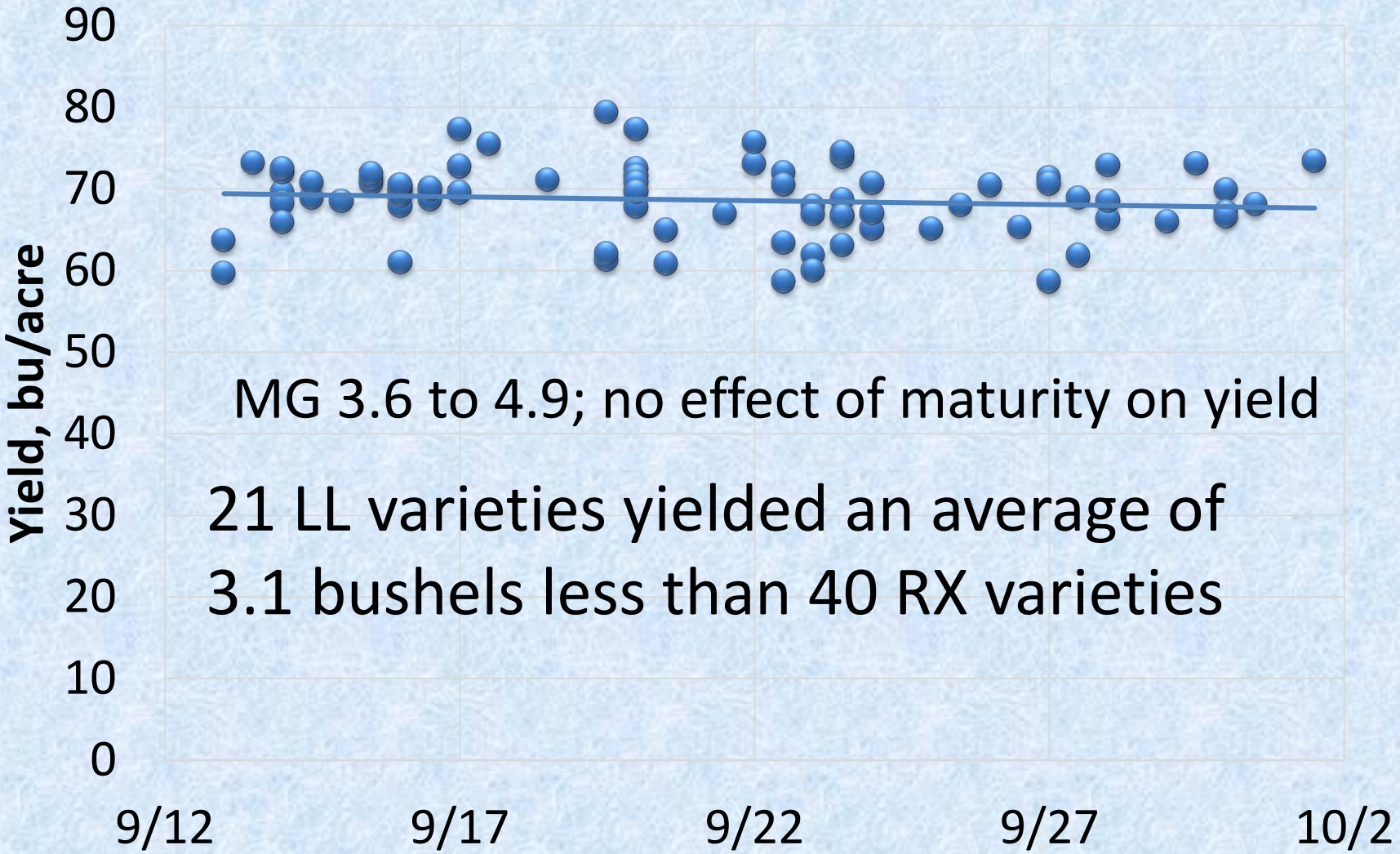
UI Variety Trials Region 3 (C), 2018



UI Variety Trial Region 3, 2018



UI Variety Trial Region 5 (S) 2018



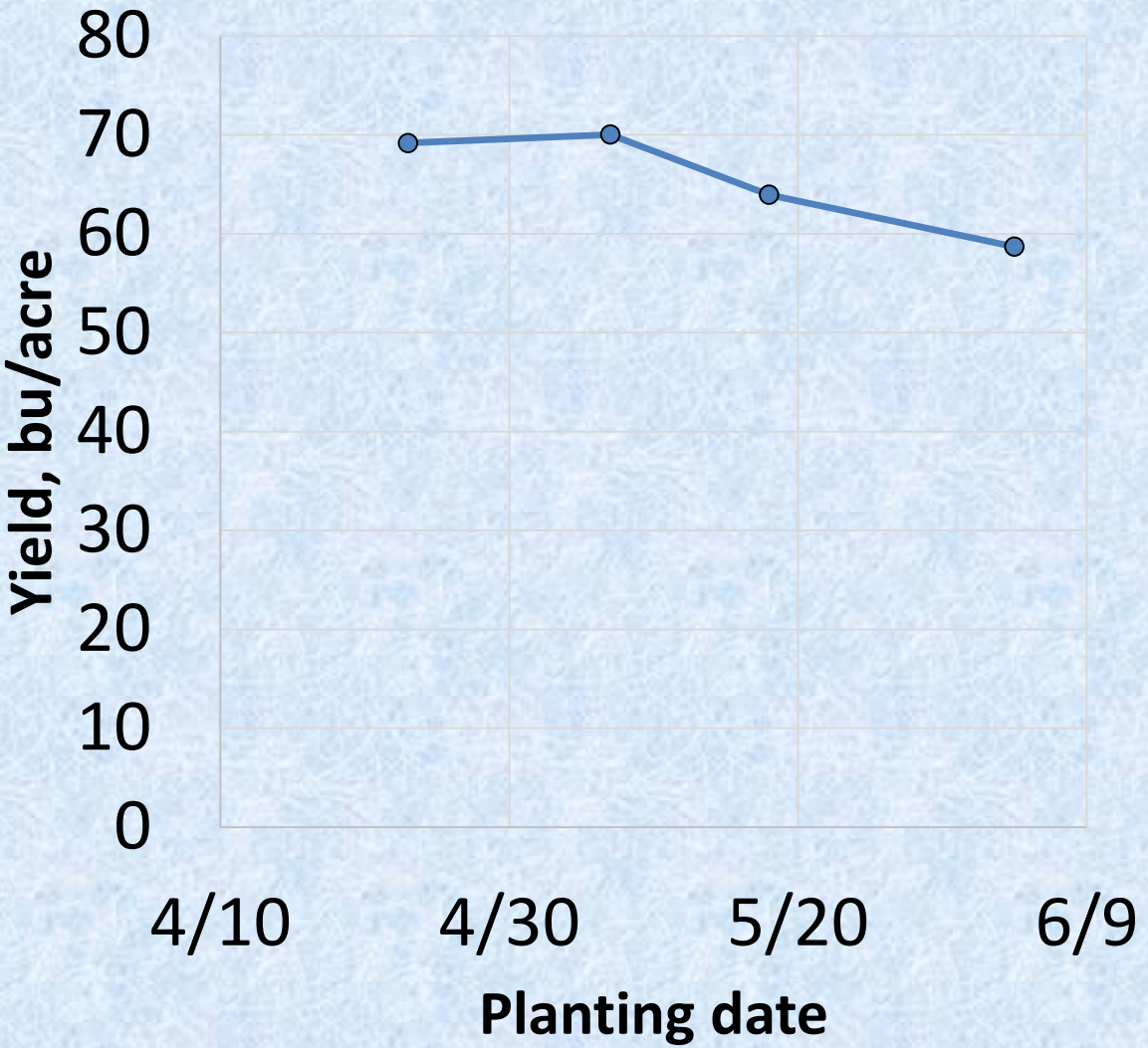
MG 3.6 to 4.9; no effect of maturity on yield

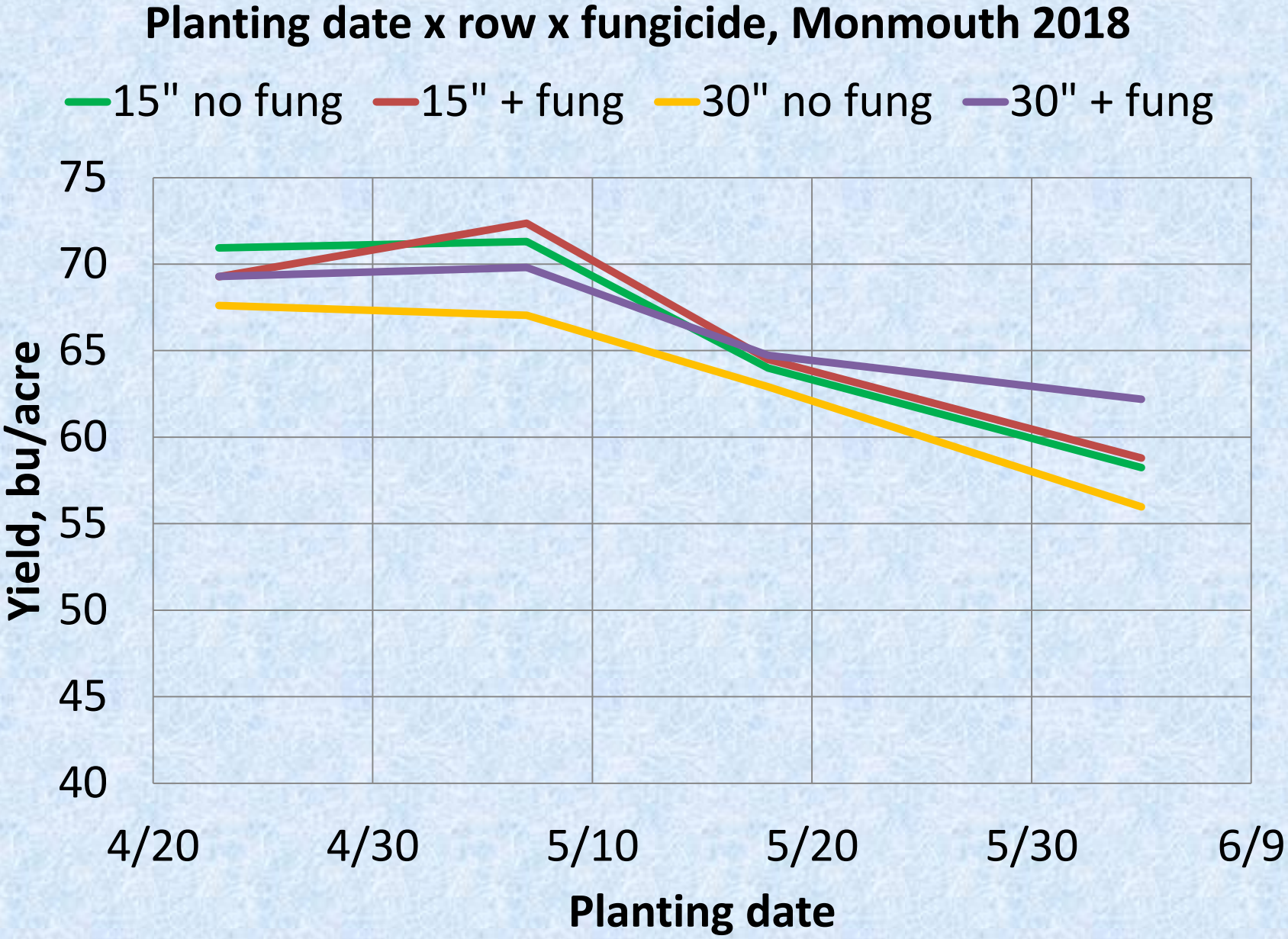
21 LL varieties yielded an average of 3.1 bushels less than 40 RX varieties

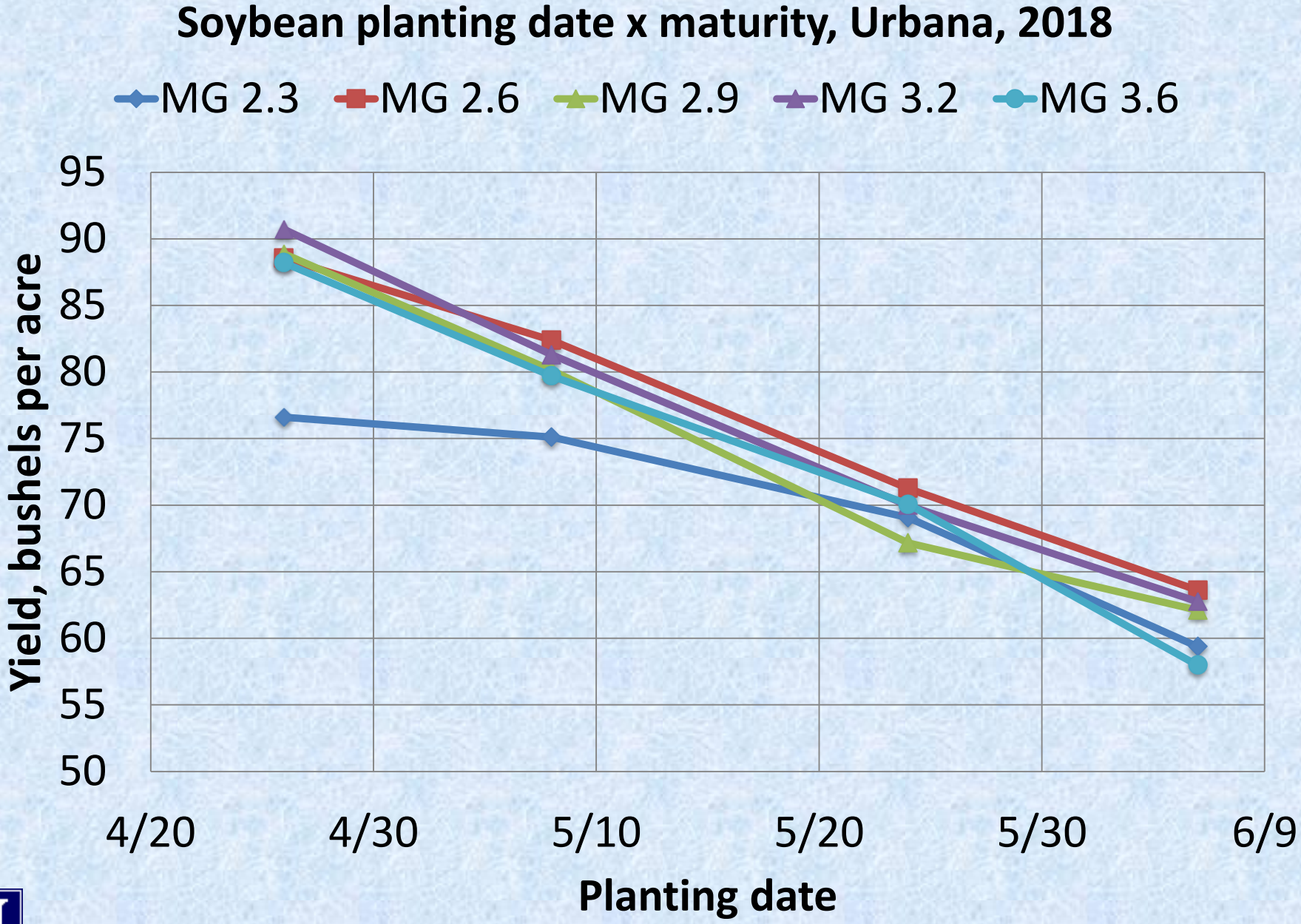
Lessons on varieties, 2018 for 2019

- Yields, like those in farm fields, were high at most sites; one site (Goodfield) averaged 89.3, a new VT record.
- Effect of maturity on yield varied by region, but in 2018 ranged from positive (4+ bu/MG) to flat
- RR2Xtend® (RX) varieties increased again as a percentage of entered varieties, mostly at the expense of RR varieties
  - Some regional differences, but yields of the two groups of varieties (at least those entered in the trials) differed more within group than between groups
- Selecting varieties based on protein content does not (at this point) appear to be a path to higher profits

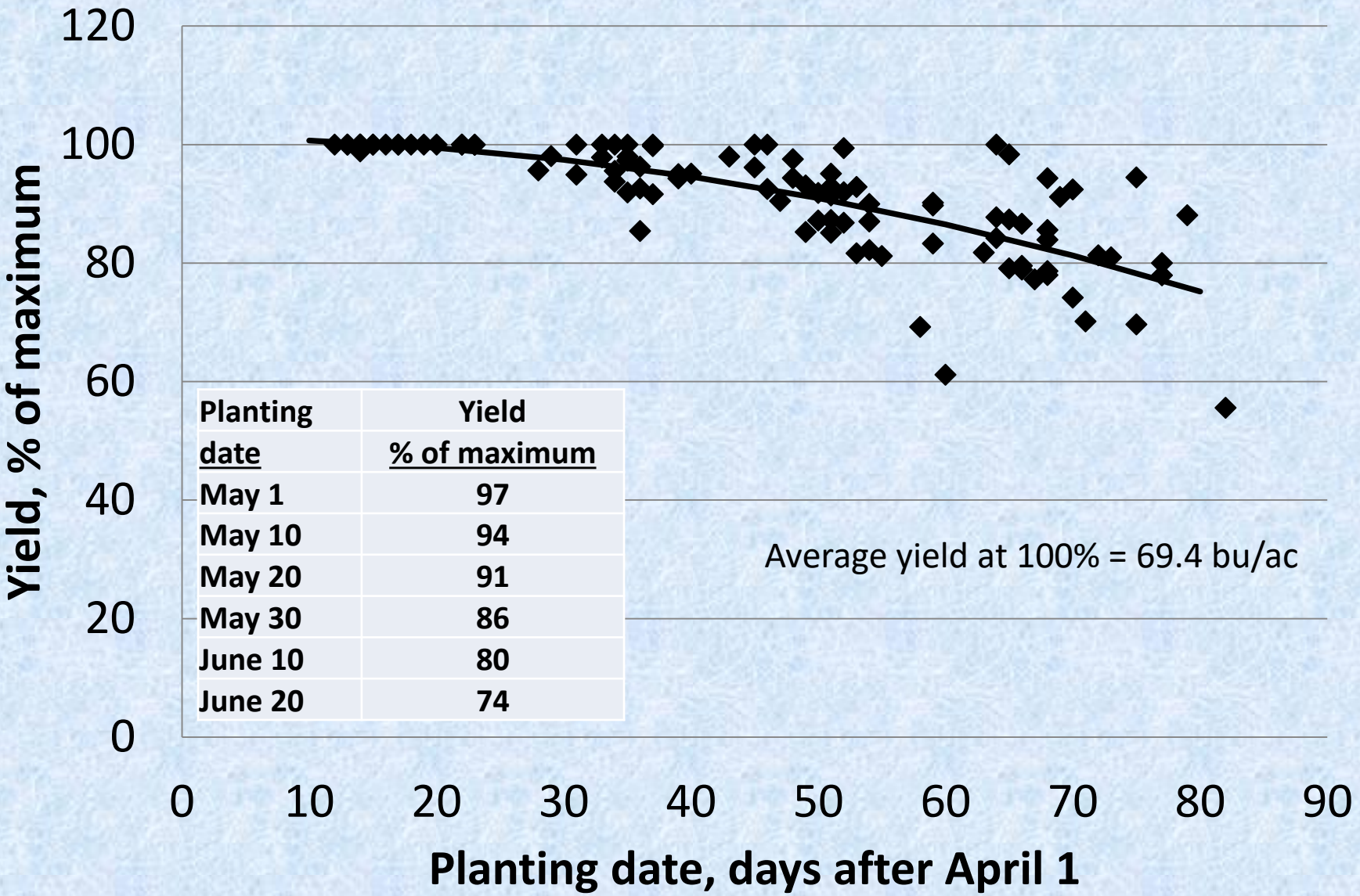
Few soybeans were planted very early (mid-April) and few were planted very late (June) in 2018




Planting date x row x fungicide, Monmouth 2018
15" no fung
15" + fung
30" no fung
30" + fung
75
70
65
60
55
50
45
40
Yield, bu/acre
4/20
4/30
5/10
5/20
5/30
6/9
Planting date


Soybean planting date x maturity, Urbana, 2018
MG 2.3
MG 2.6
MG 2.9
MG 3.2
MG 3.6
Yield, bushels per acre
95
90
85
80
75
70
65
60
55
50
4/20
4/30
5/10
5/20
5/30
6/9
Planting date

Soybean, N & C Illinois, 2010-2016

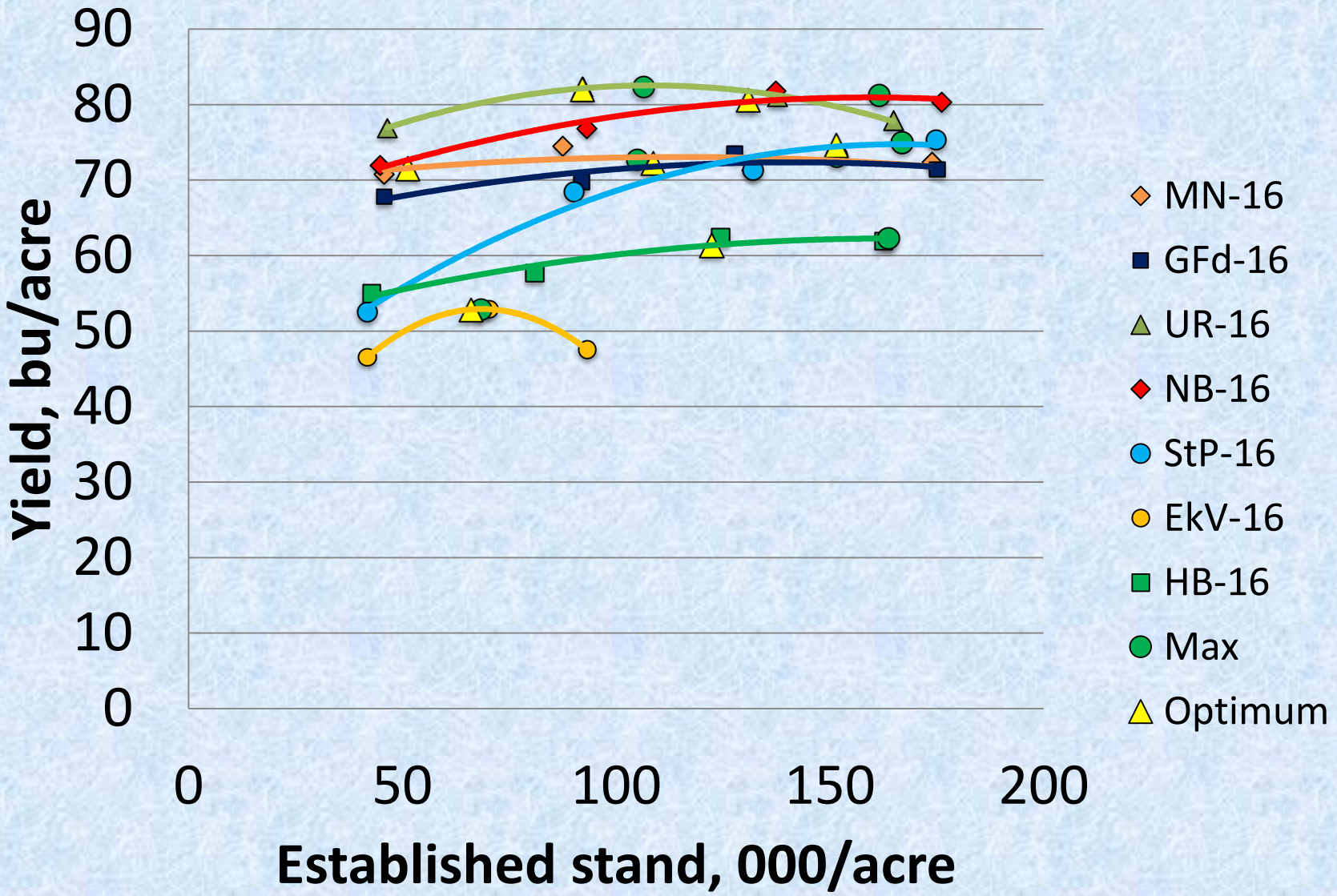


Planting date	Yield % of maximum
May 1	97
May 10	94
May 20	91
May 30	86
June 10	80
June 20	74

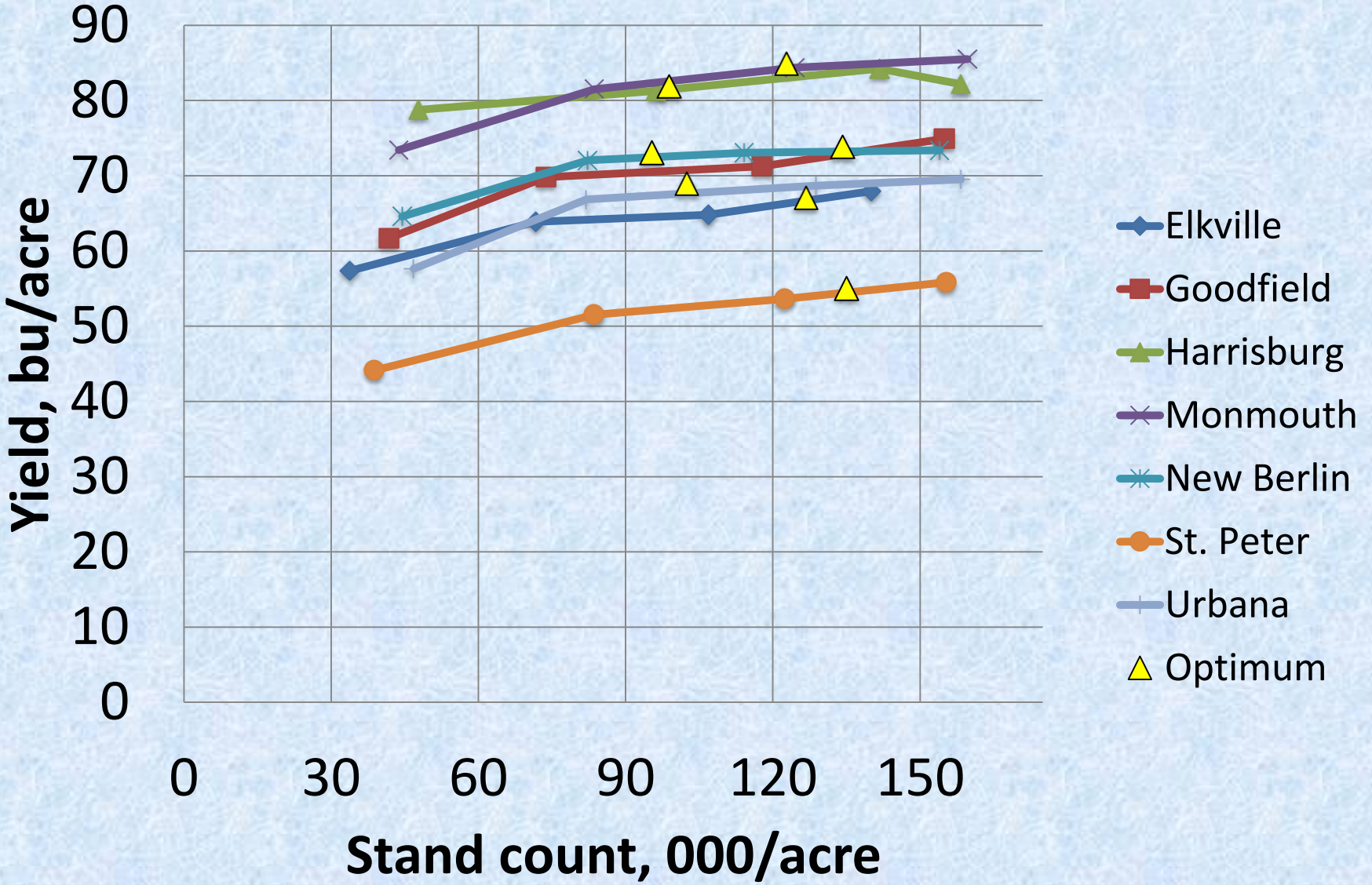
Planting date

- Delayed planting was a “non-issue” in most areas in 2018
  - Doublecrop soybean yields were good, following mediocre wheat yields but early harvest
- With growing conditions uniformly good in most areas through July and August, there was little to threaten yields, but early planting still set the stage for higher yields
- Once again there as some “super-early” (in March in 2018) planting: much of this had to be replanted, and it’s certain that none yielded more than late April or early May planting

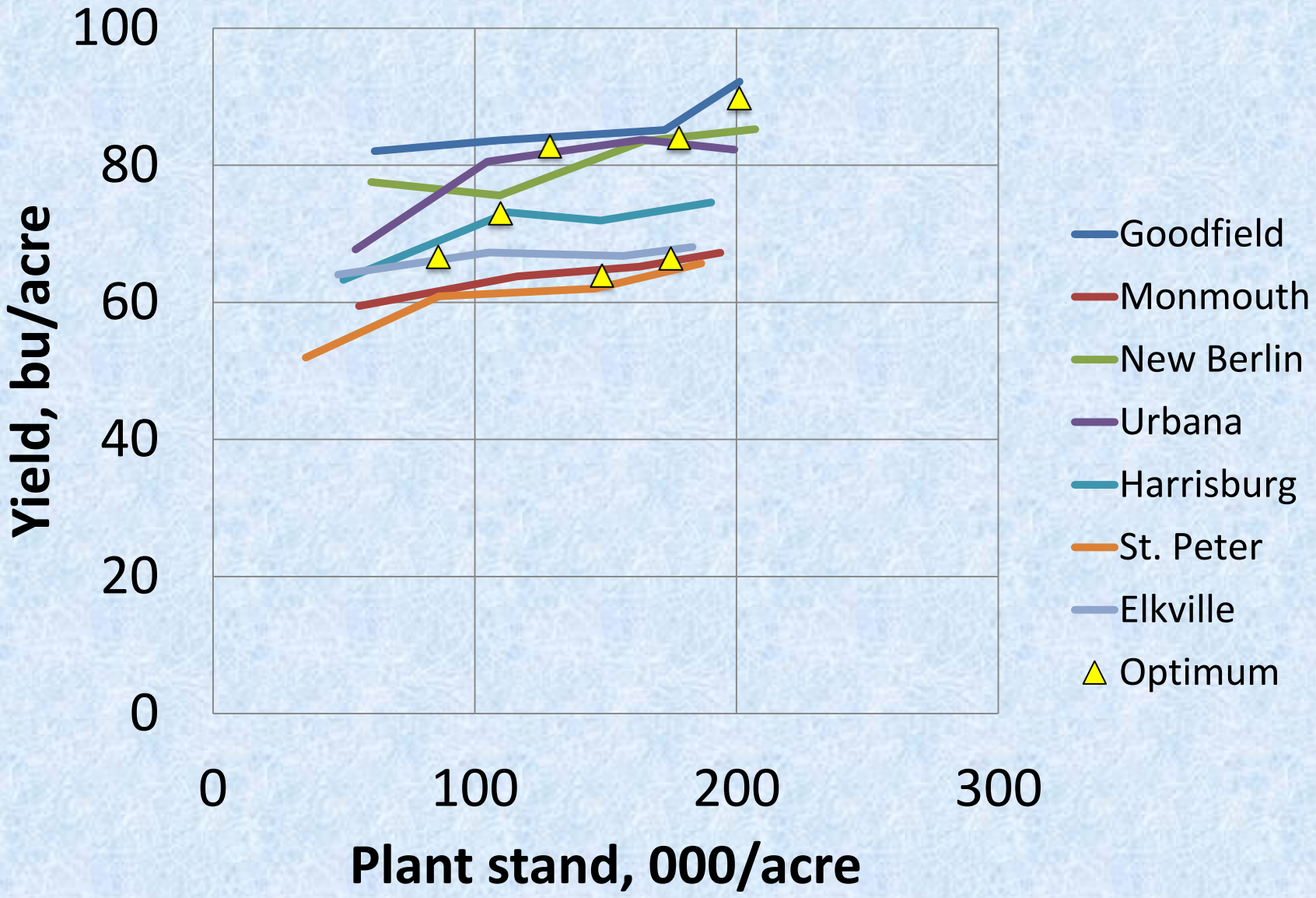
Soybean seeding rate 2016



Seeding rate trials 2017

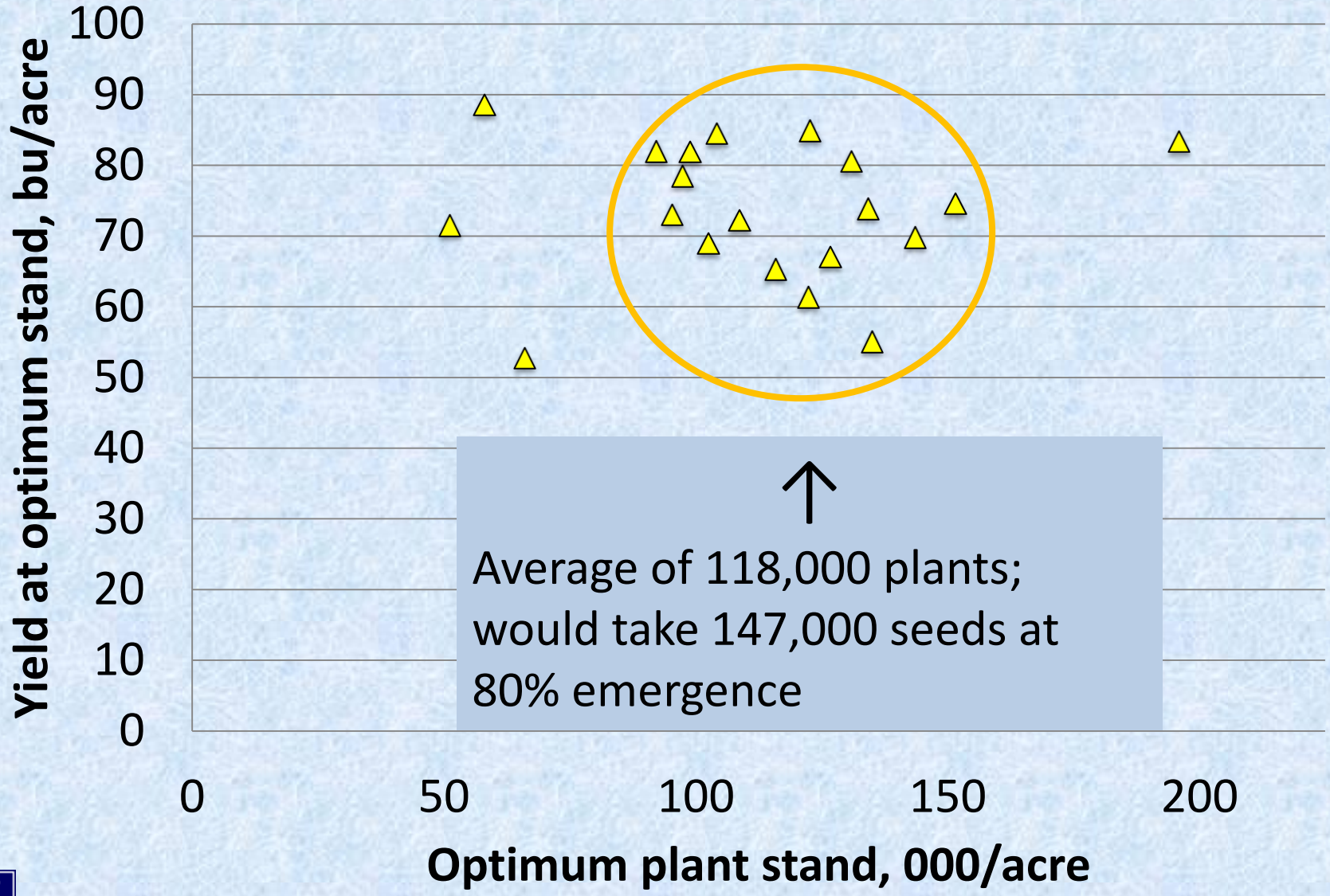


Soybean seeding rate trials 2018

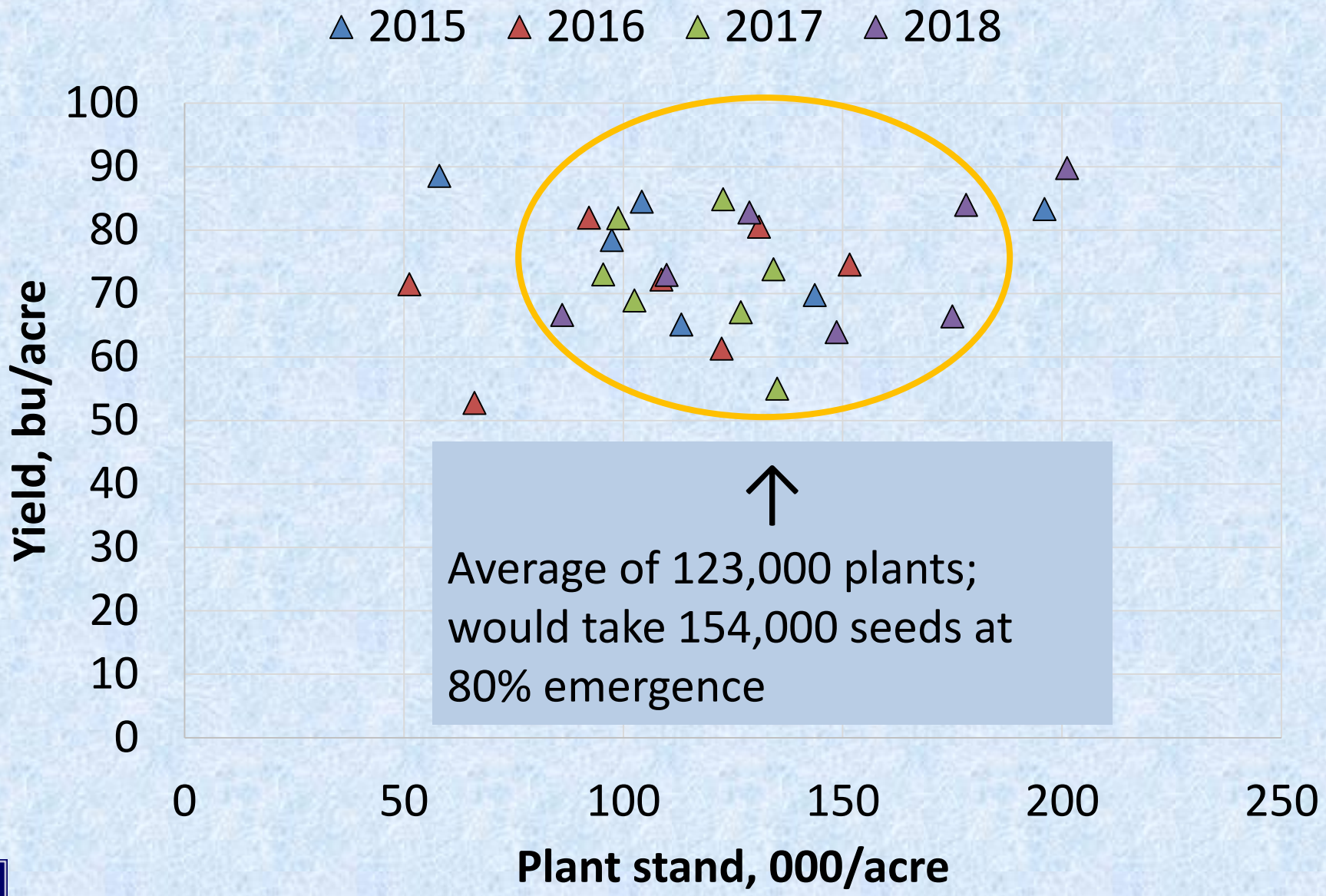


Then:

20 Illinois Seeding Rate Trials, 2015-17



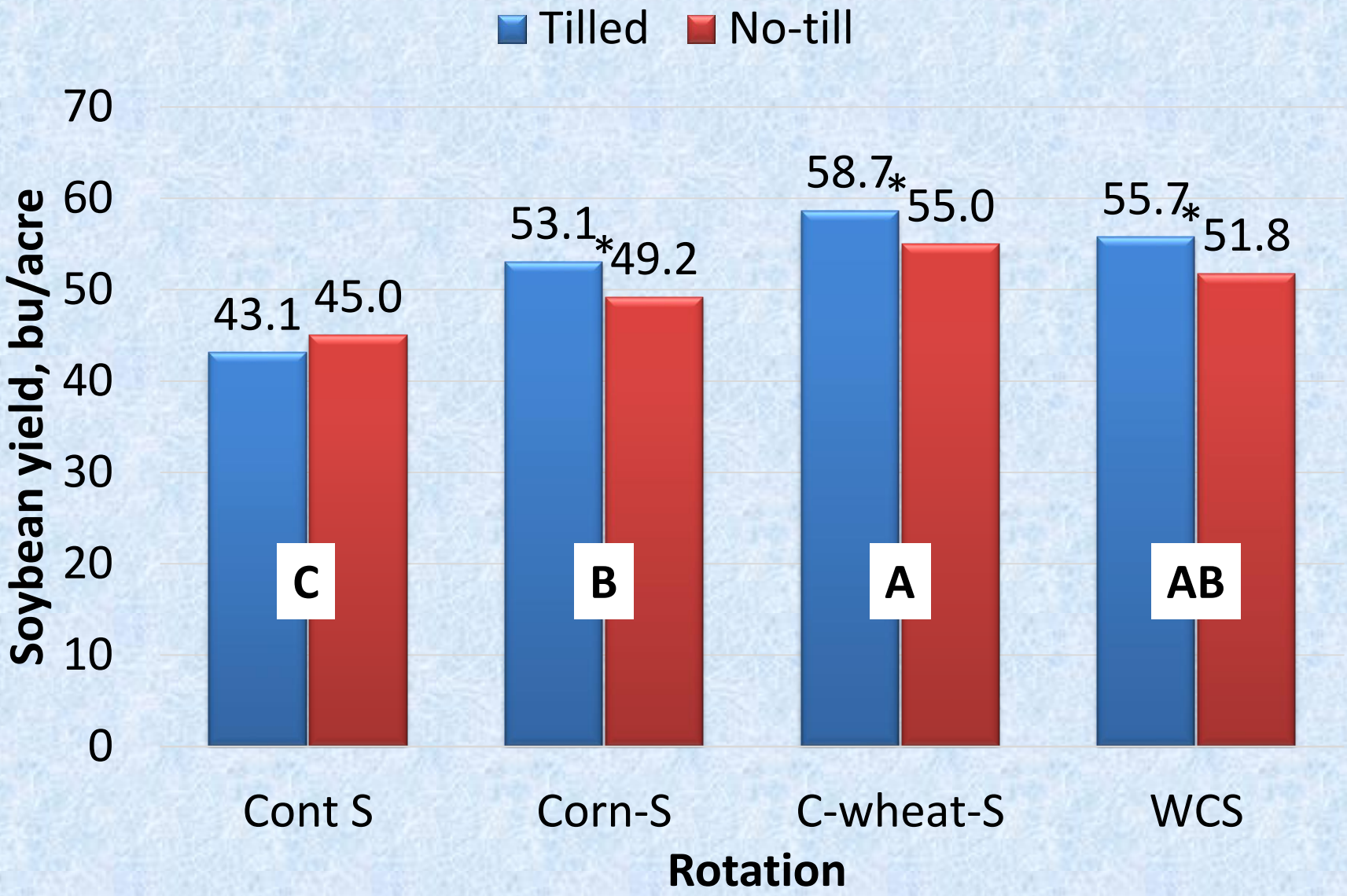
Now: 27 soybean seeding rate trials, 2015-2018

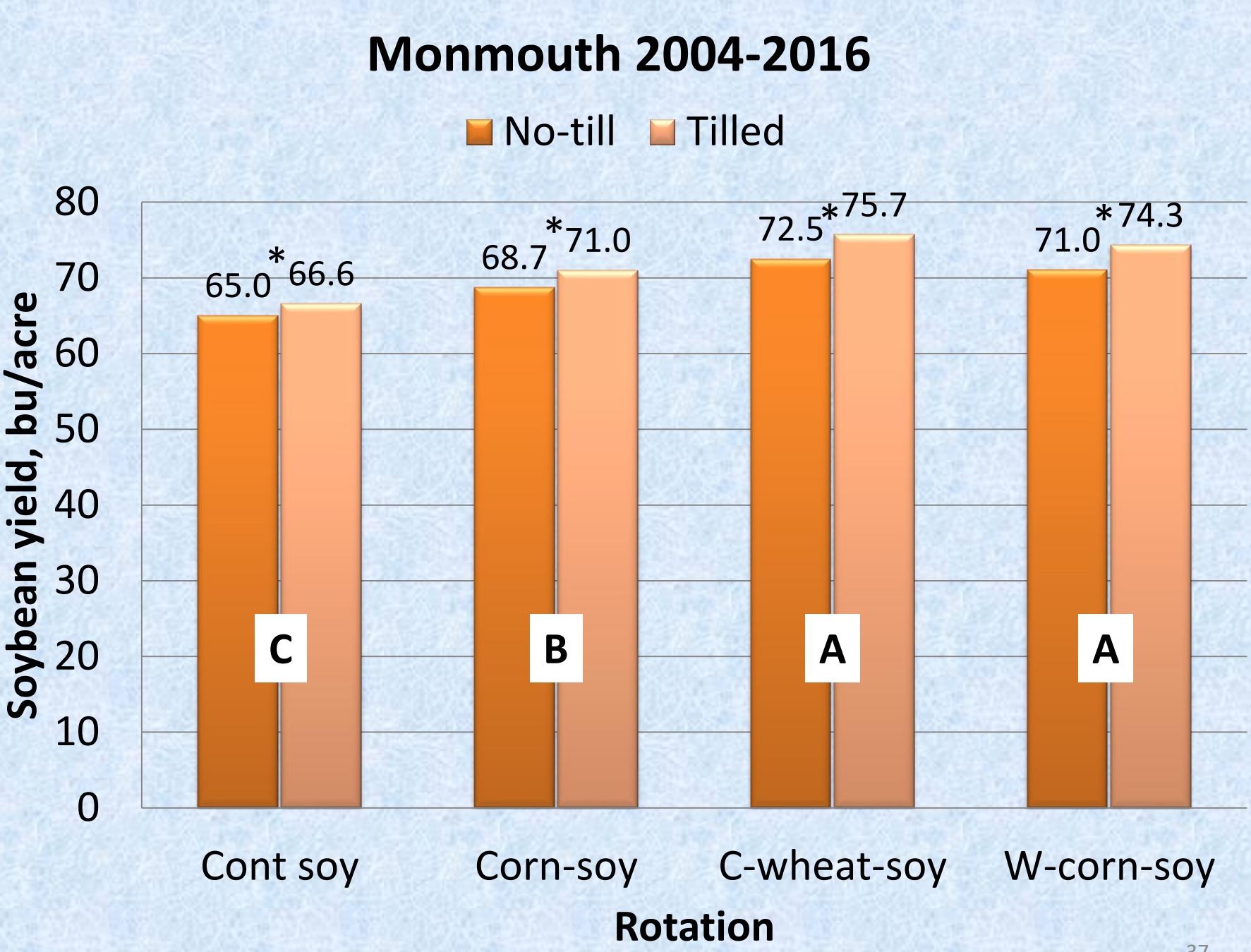


Seeding rate 2018

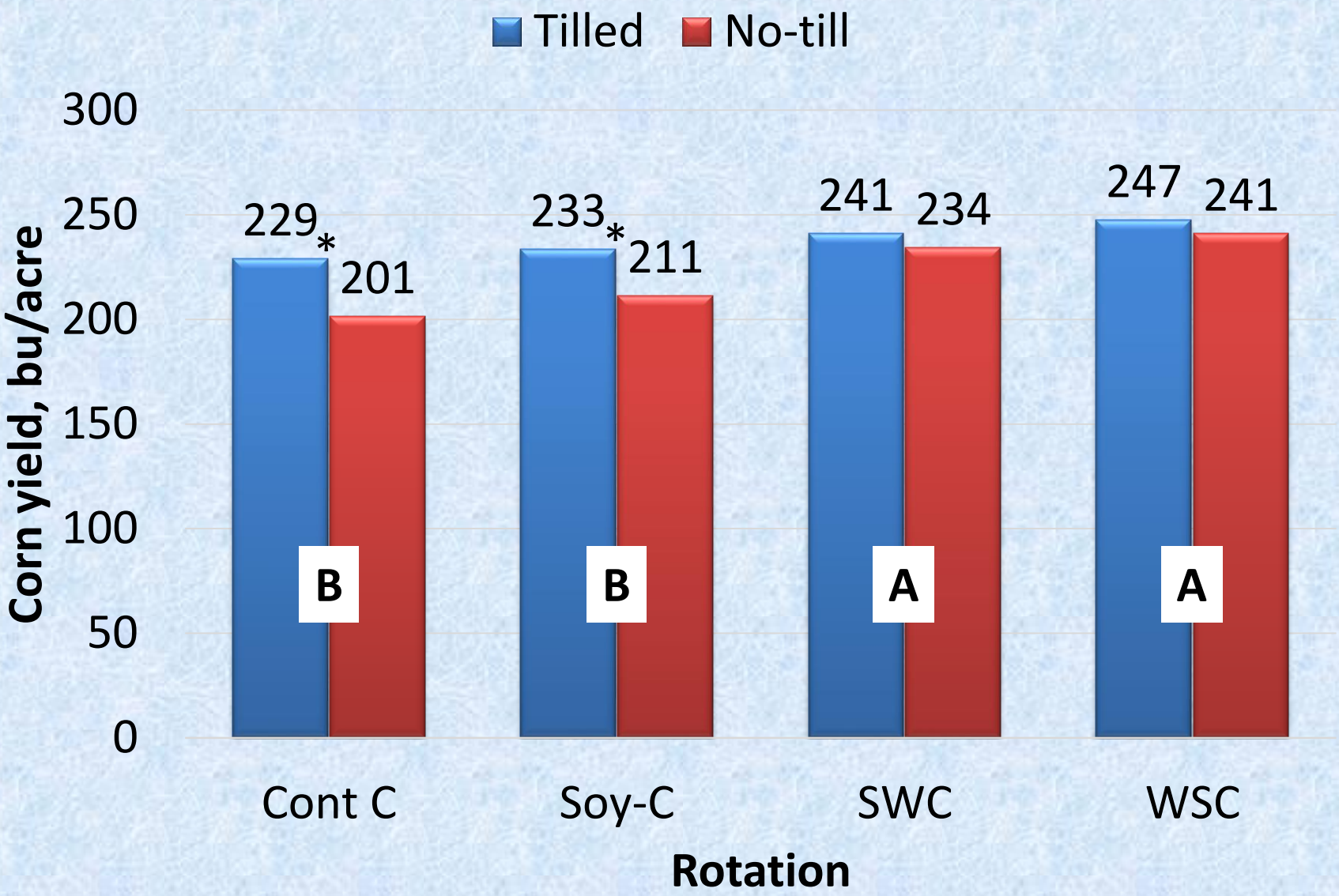
- Stand consistency was good, with an average in trials (and probably most fields) of >90% stand
- The range of plant stands needed to optimize yield was wider in 2018 than in previous years, ranging from 86K to 201K among sites, with modest correlation between yield and stand
- A “safe” seeding rate in the 140,000 to 150,000 range is still supported when including 2018 results, but risk of being too low to maximize returns to seed may be higher than that of being too high

Rotation study, Monmouth 2018 (year 20)

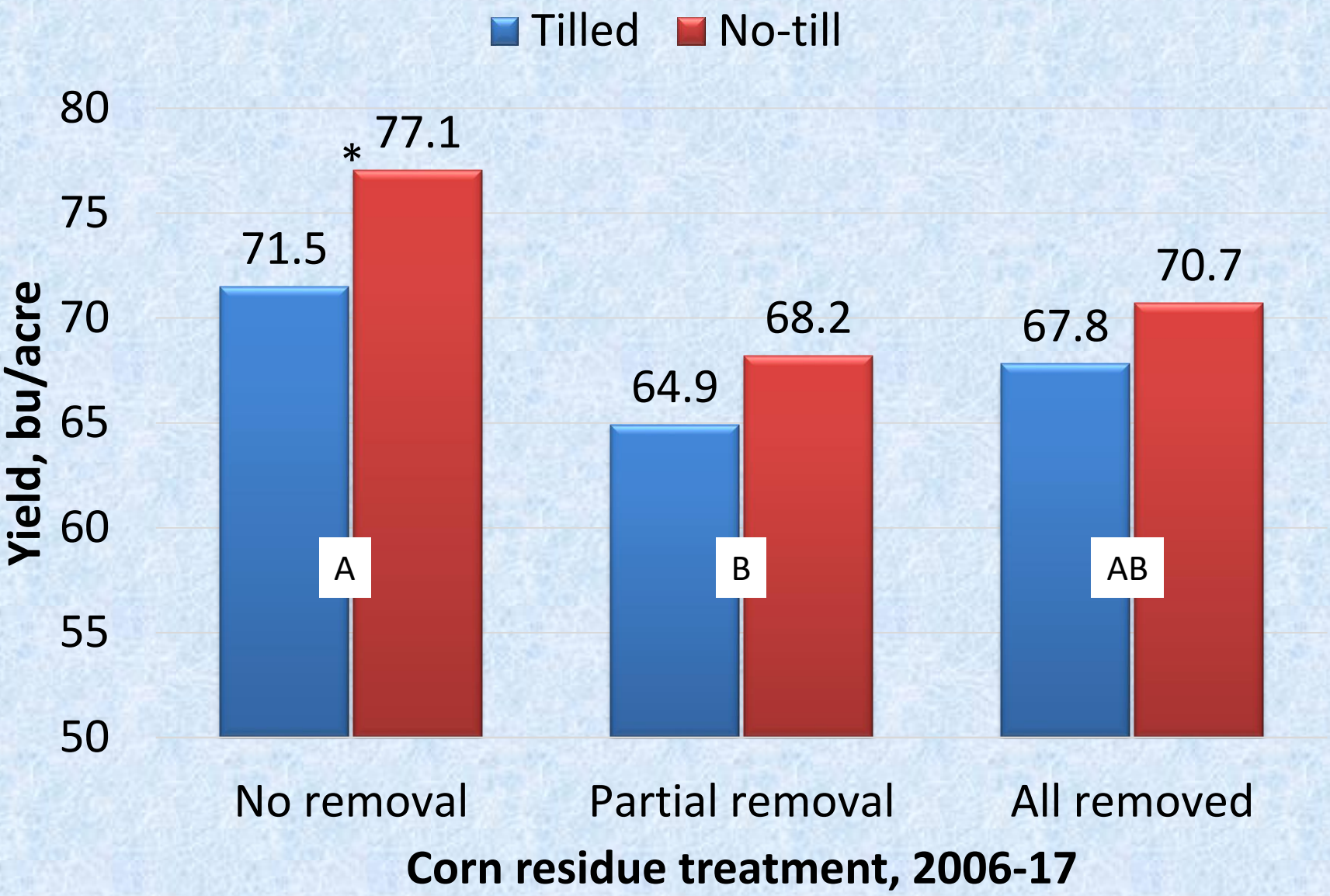



Monmouth 2004-2016
No-till
Tilled
Soybean yield, bu/acre
80
70
60
50
40
30
20
10
0
65.0
*66.6
68.7
*71.0
72.5
*75.7
71.0
*74.3
C
B
A
A
Cont soy
Corn-soy
C-wheat-soy
W-corn-soy
Rotation

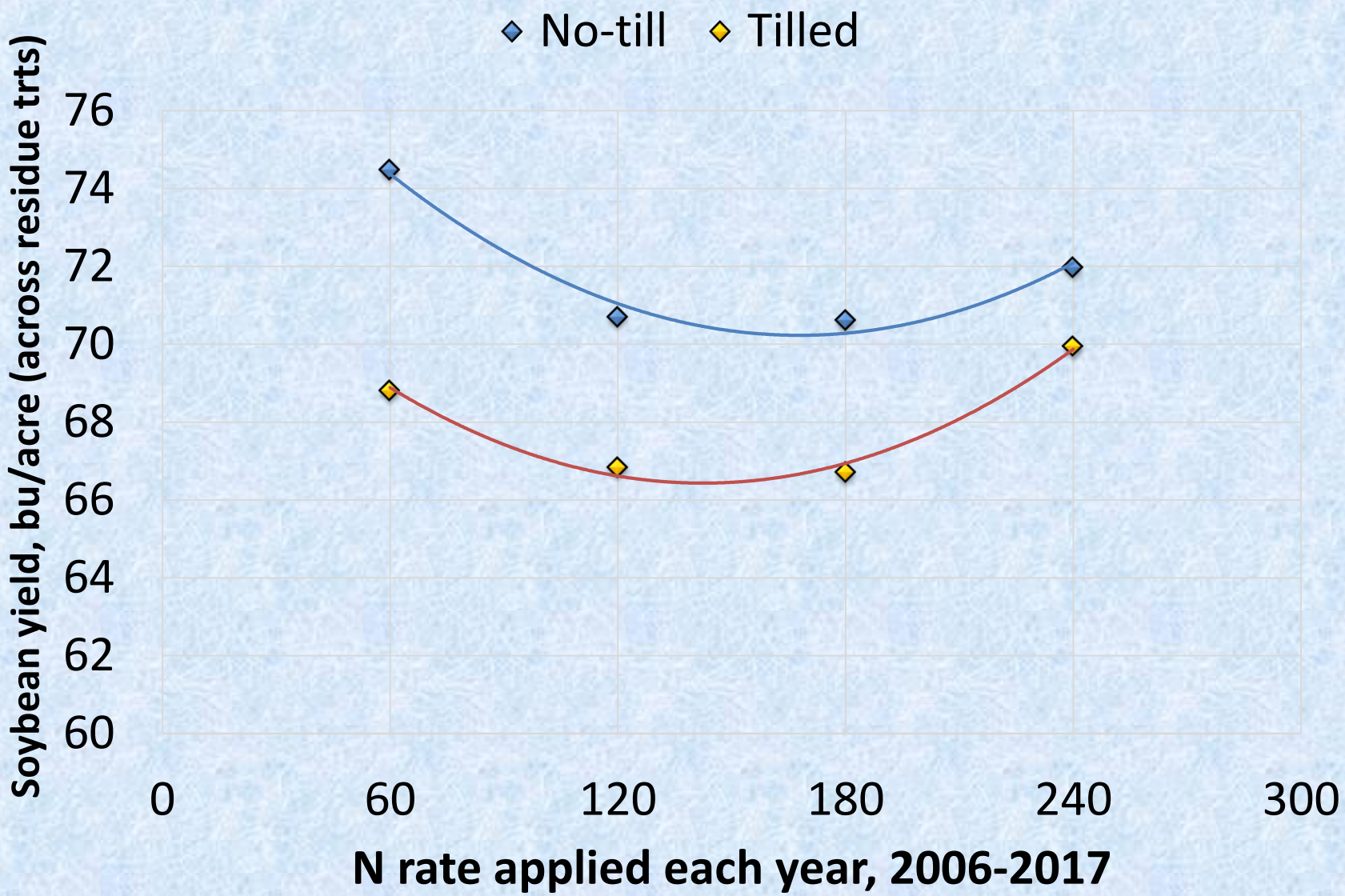
Monmouth Rotation x Tillage, 2018



Soybean after 12 years cont. corn, 2018



After 12 years cont. corn, Urbana



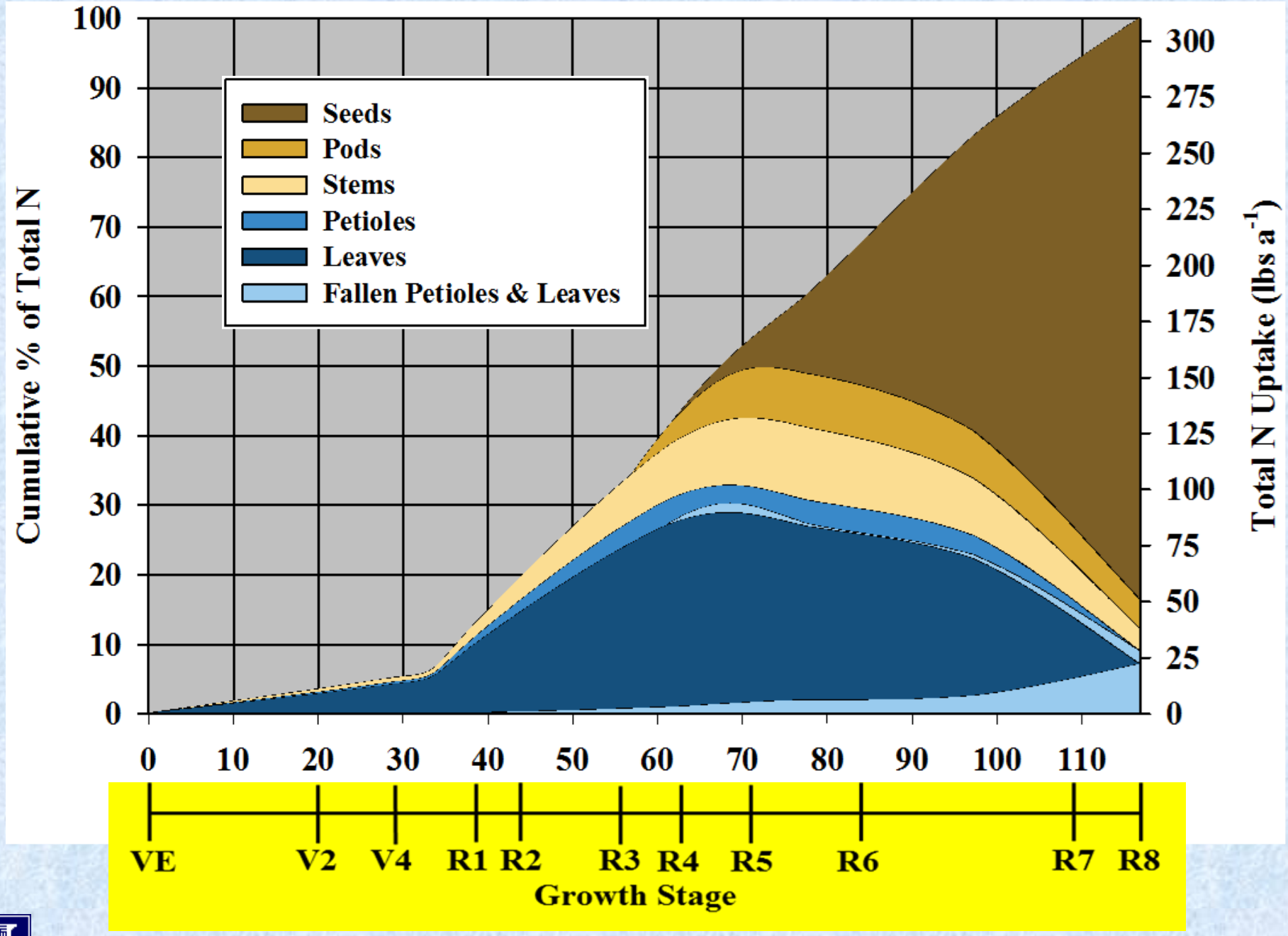
Rotation, tillage, and soybean

- The penalty to continuous soybean compared to corn-soy was unusually high (again) in 2018: continuous soybean yielded 14% less than corn-soy at Monmouth
- In the same study, soybean following wheat (that followed corn) yielded 11% more than corn-soy, and soybean that followed corn (that followed wheat) yielded 5% more than corn-soybean
- At this site, tillage increased soybean in all of the rotations except continuous soybean.
- For 2019, mostly “business as usual”:
  - Expect a 5 to 8% (could be more, depending on?) lower yield for soybeans following soybeans compared to CS
  - Tillage? Generally little effect on yield, and where tillage boosts yield it’s often not enough to pay the tillage cost. Getting good seed placement and keeping soil in place are priorities.

Nitrogen on soybeans?

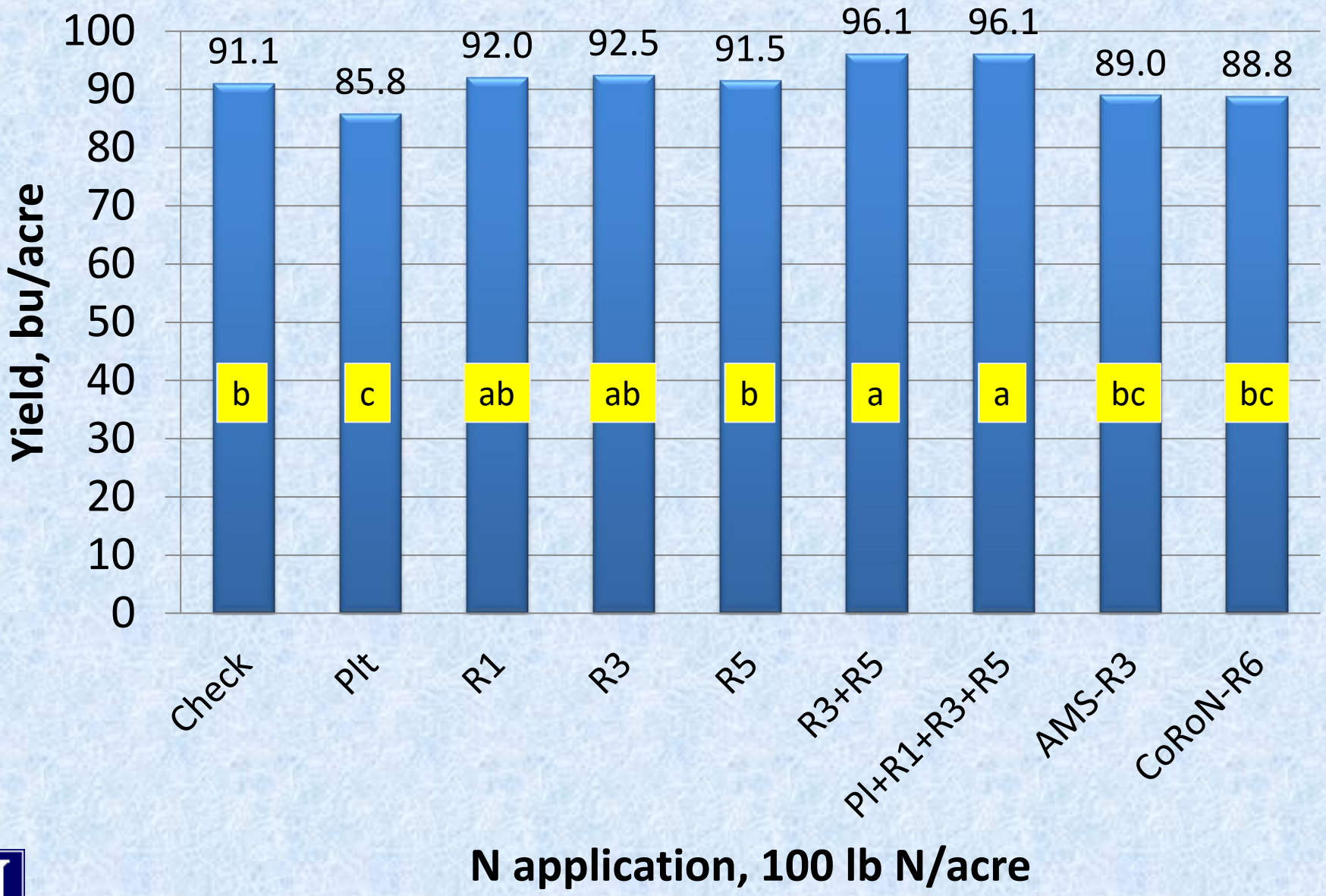
When the canopy is dark green by early August, the crop is unlikely to yield more if N fertilizer is used. It was VERY dark green by Aug. 1 in 2018.

Chillicothe, IL Sep. 2, 2015 – photo by Joshua Vonk

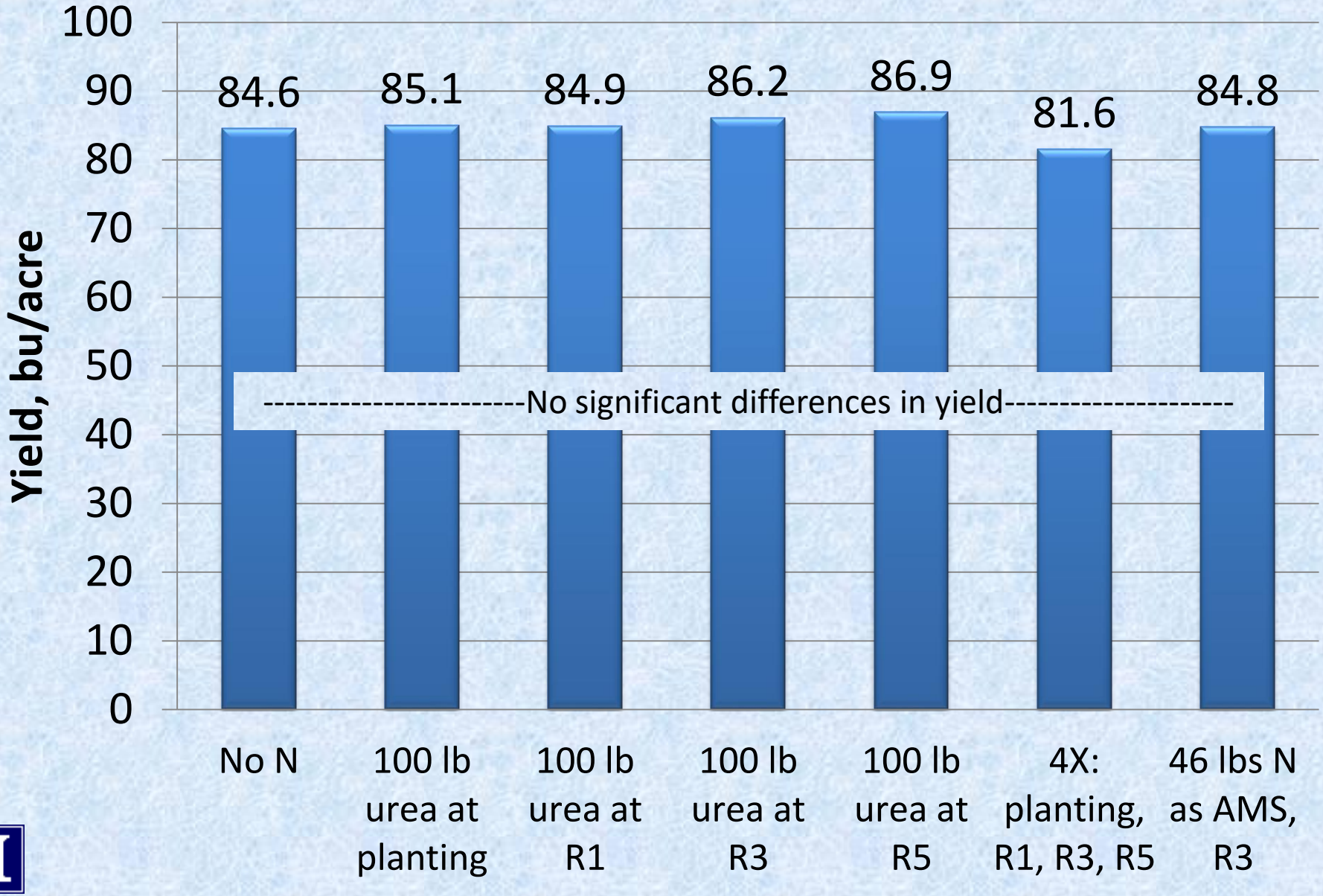


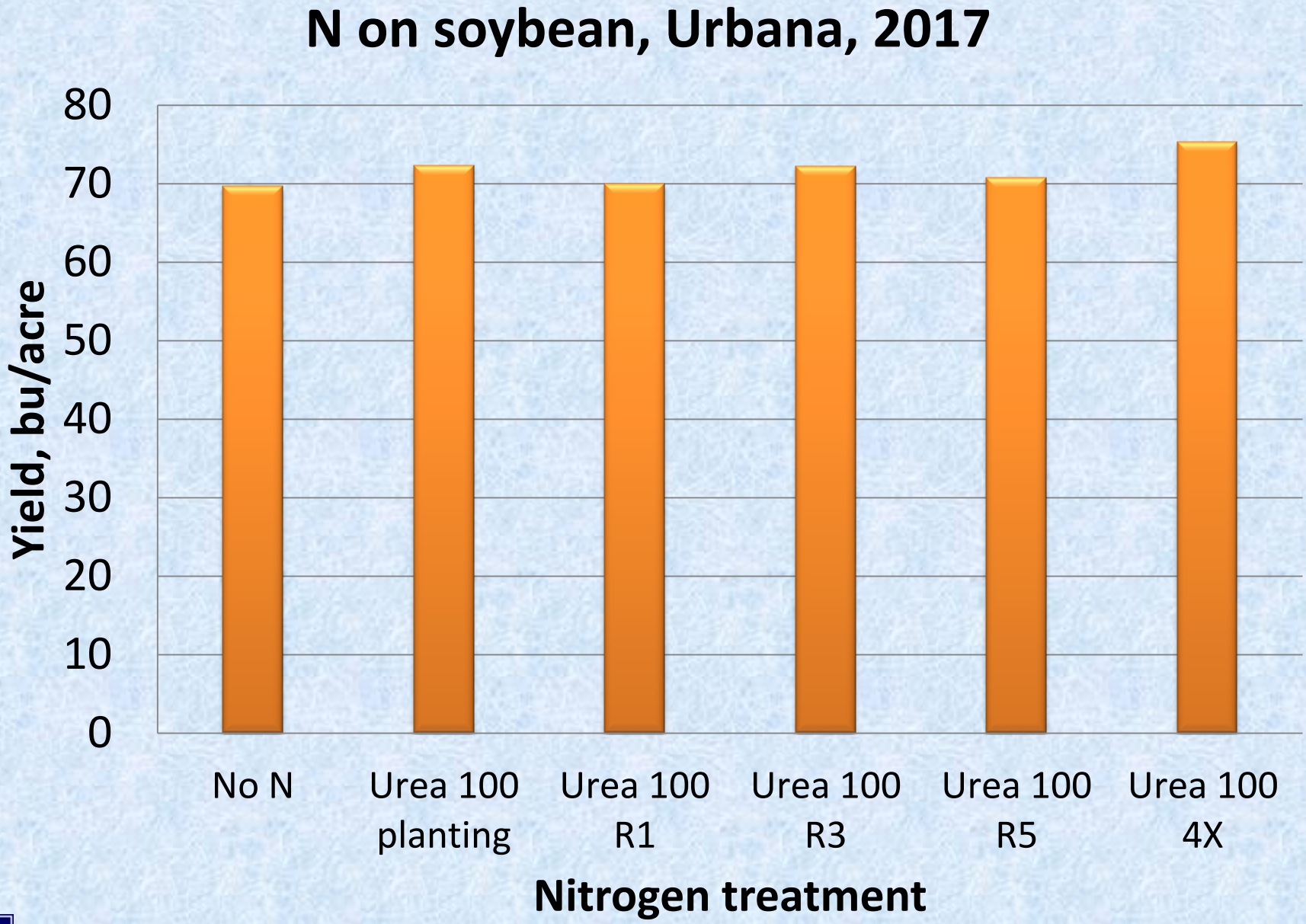
From A. Gaspar and S. Conley, University of Wisconsin

N on soybeans, Urbana 2015



N on soybean at Urbana, 2016




N on soybean, Urbana, 2017
Yield, bu/acre
80
70
60
50
40
30
20
10
0
No N
Urea 100 planting
Urea 100 R1
Urea 100 R3
Urea 100 R5
Urea 100 4X
Nitrogen treatment

Recap: Lessons from 2018 going into 2019

- The less stress soybeans encounter, the more they tend to yield…don't create stress on purpose
- Variety maturity is not strongly correlated to yield potential, but choosing from among "not early" varieties is probably best
- Planting "early" – from mid-April (not mid-March) into mid-May – produces highest yields
- For reasons not altogether clear, we tended to need more plants to maximize return to seed in 2018; planting 140 to 150K is still safe, but don't skimp
- Most fields with high and higher yields in 2018 did not receive fertilizer N; that will also be true in 2019
- Still little consistent benefit to fungicide or insecticide when diseases and insects aren't present


Thanks