Planting Green With Corn and Soybean

What we learned in 2015

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Planting green into hairy vetch (Sjoerd Duiker)

Establishing cash crop into green cover crop

2013 Survey of PA No-Till Alliance members

29% of members were planting green already for:

1. Soil conservation and health benefits
2. Reducing soil moisture for better seed placement
3. Slug populations

Penn State Research Station Experiments

CORN

- Cover crop
  - Crimson Clover (20 lb/A)
  - **Rye (120 lb/A)**
  - Crimson Clover + Rye (20 + 120 lb/A)
- **Termination timing**
  - Early
  - Late (planted green)

SOY

- Rye seeding rate
  - 30 lb/A
  - 60 lb/A
  - 120 lb/A
- **Termination timing**
  - Early
  - Late (planted green)
- Rye top-dress N rate
  - 30 lb/A
  - 60 lb/A

Farmer-Cooperator Experiments

- Centre County (soy only)
- Clinton County
- Lancaster County (corn only)

- Termination timing
  - Early
  - Late (planted green)

Data Collected

(multiple collection dates)

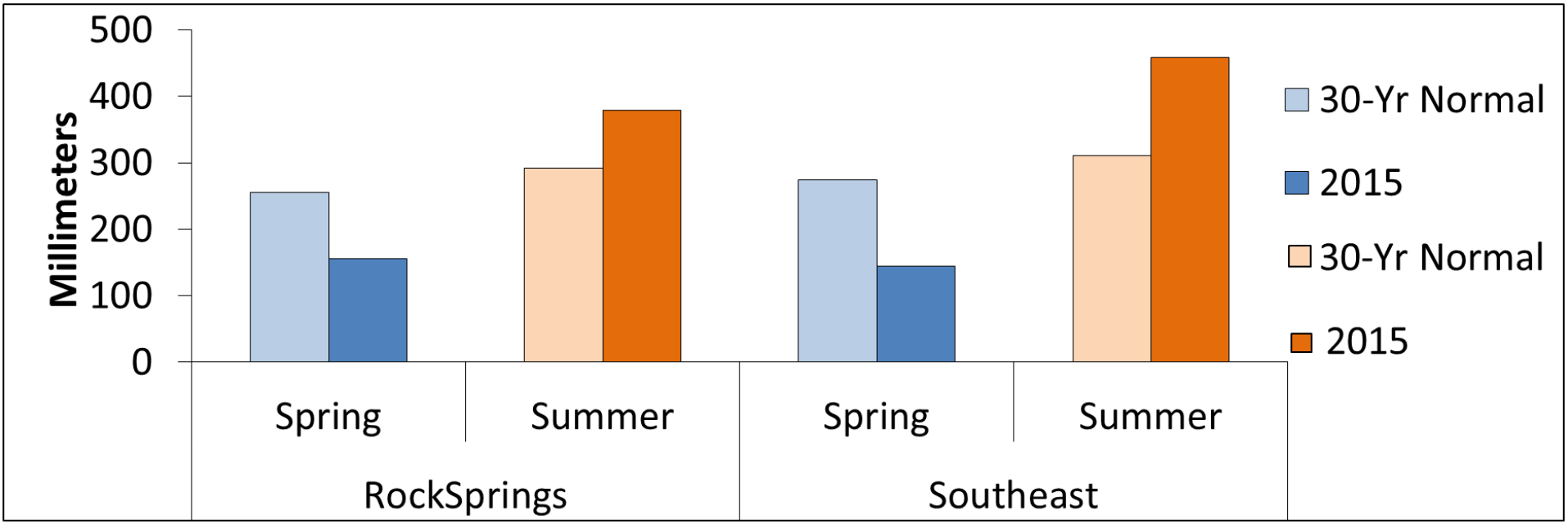
ALL LOCATIONS

- Cover crop biomass
- Cash crop populations
- Soil cover
- Soil temperature
- Soil moisture
- Slug population
- Yield

RESEARCH STATIONS ONLY

- Insect damage
- Weed biomass and community composition
- Beneficial insect population
- Insect predation

2015: Dry spring, wet summer



Corn Experiment: Rye Biomass

Site	Rye Planting Date	Rye Seeding Rate	Early Termination Date	Late Termination Date	Corn Planting Date
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Landisville	30-Sep	120 lb A^{-1}	5-May	29-May	19-May
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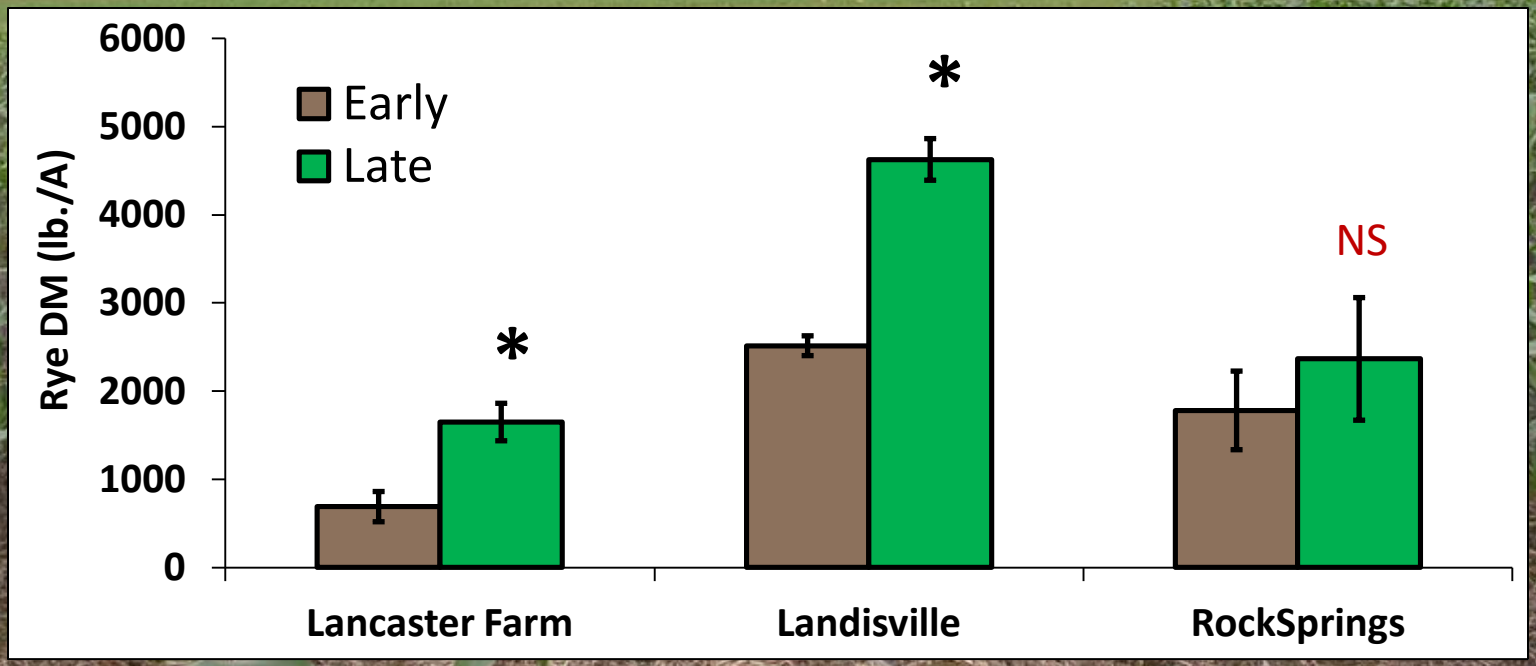
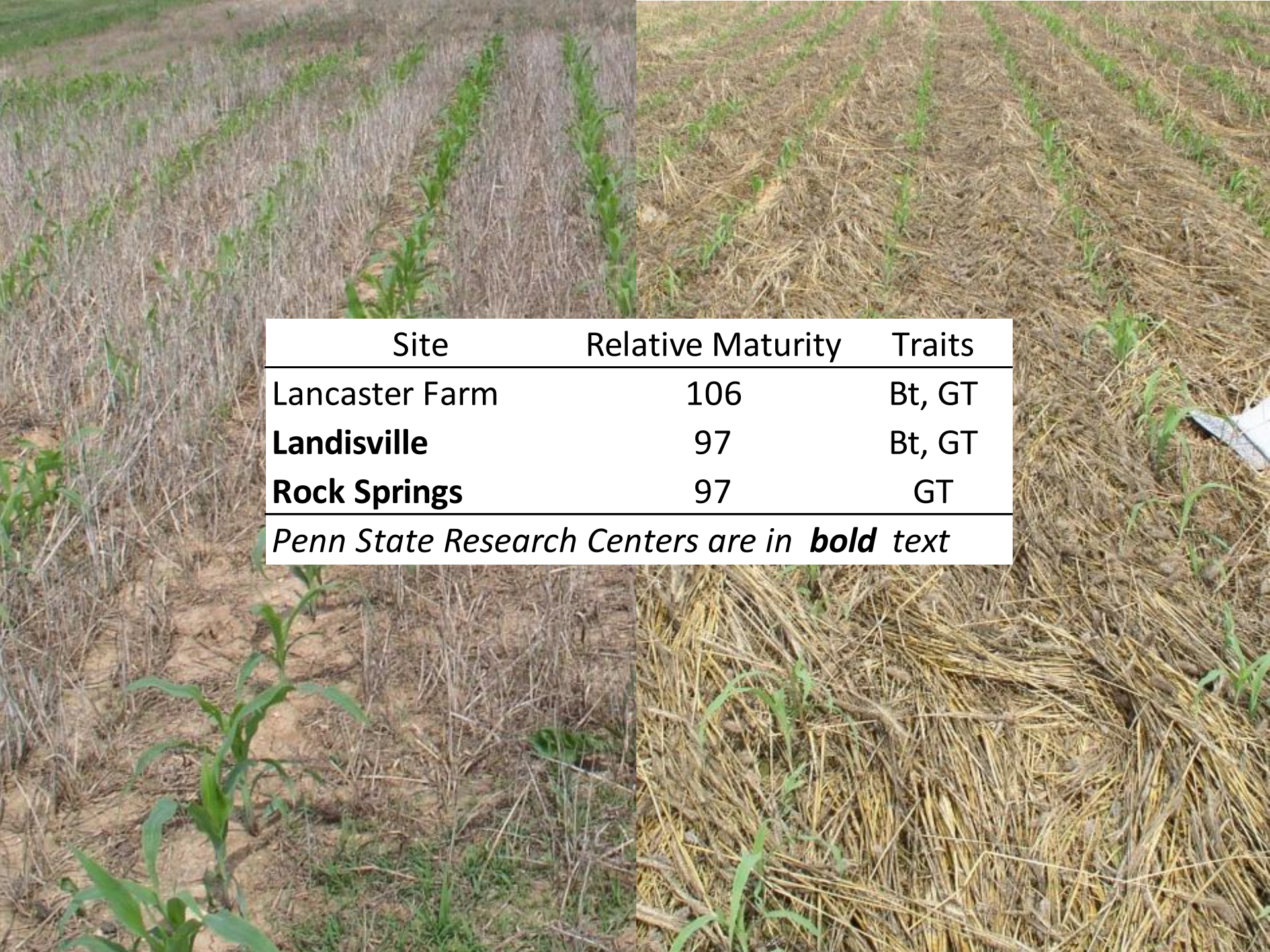
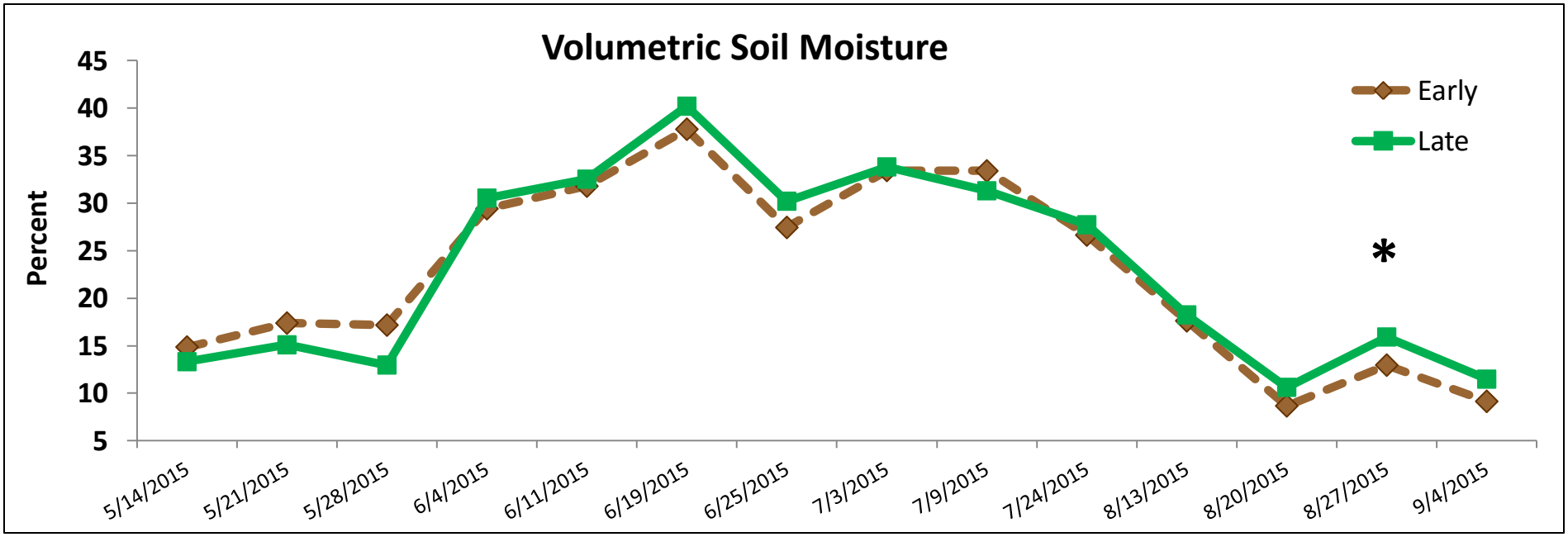




Site	Relative Maturity	Traits
Lancaster Farm	106	Bt, GT
Landisville	97	Bt, GT
Rock Springs	97	GT

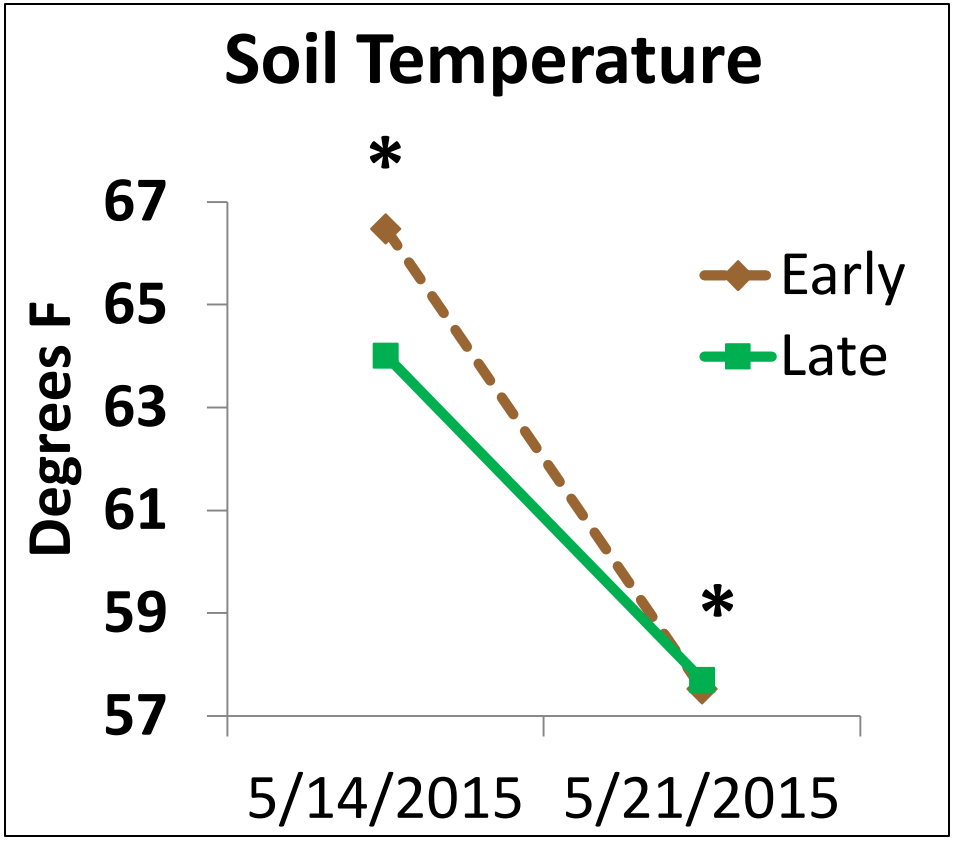
*Penn State Research Centers are in **bold** text*

- Very dry conditions at planting
- No difference in soil moisture between treatments for most of growing season

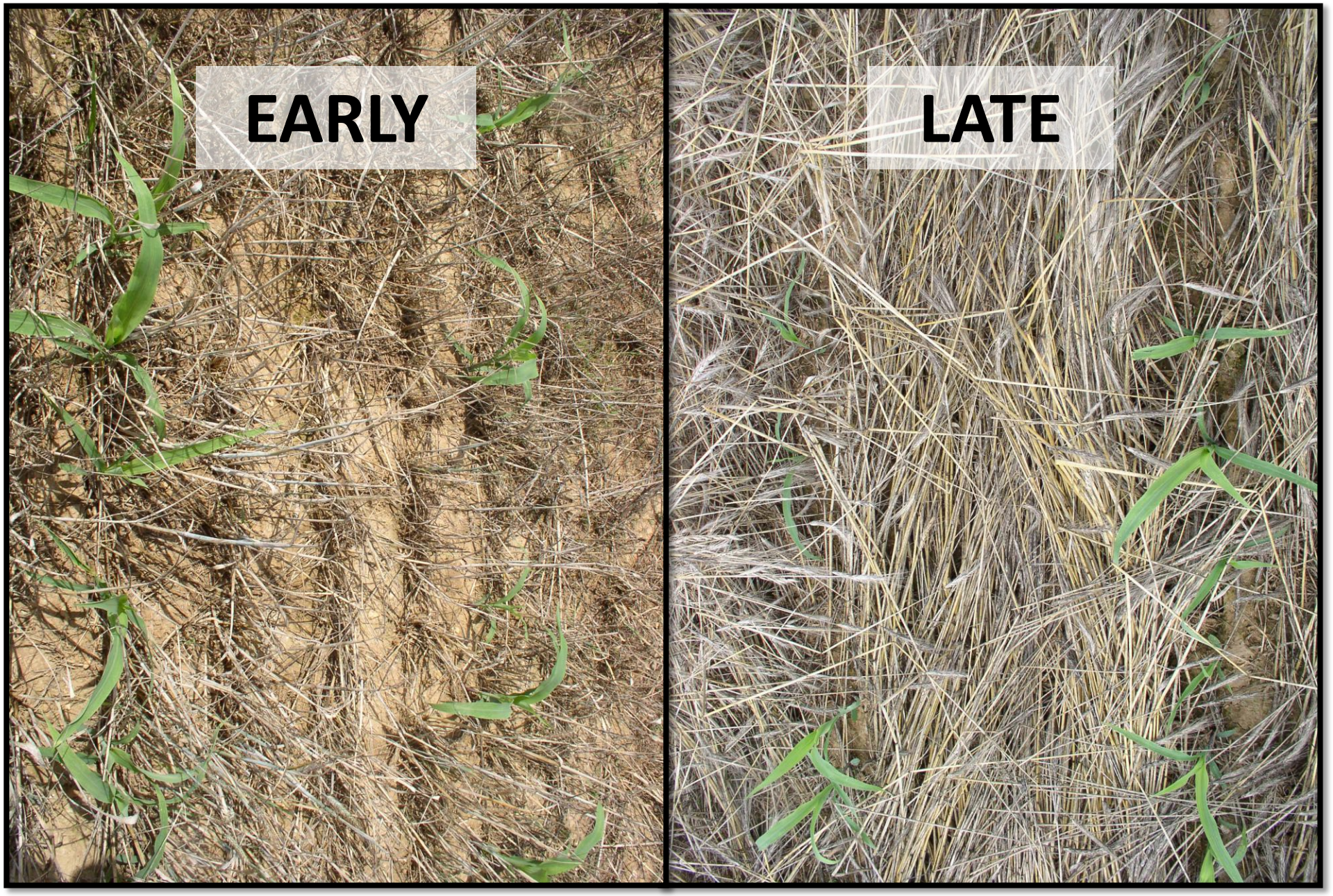


Rock Springs

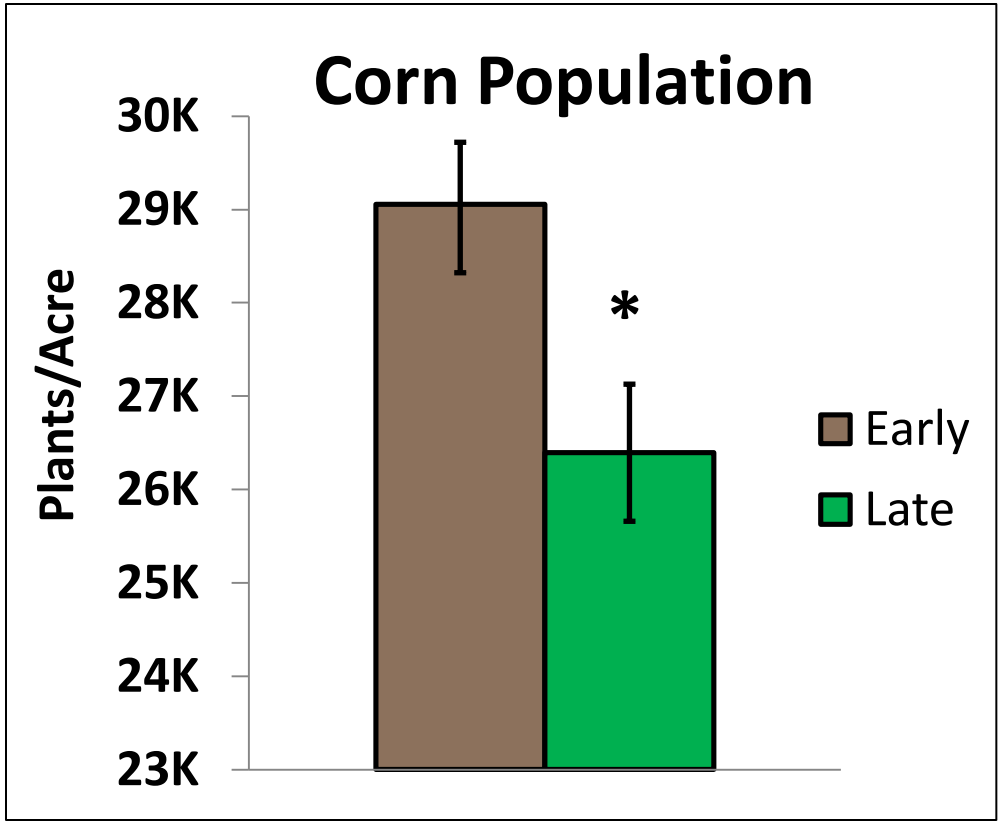
- Planted green treatment was cooler at corn planting
- Difference between treatment diminished after 2 weeks



Rock Springs

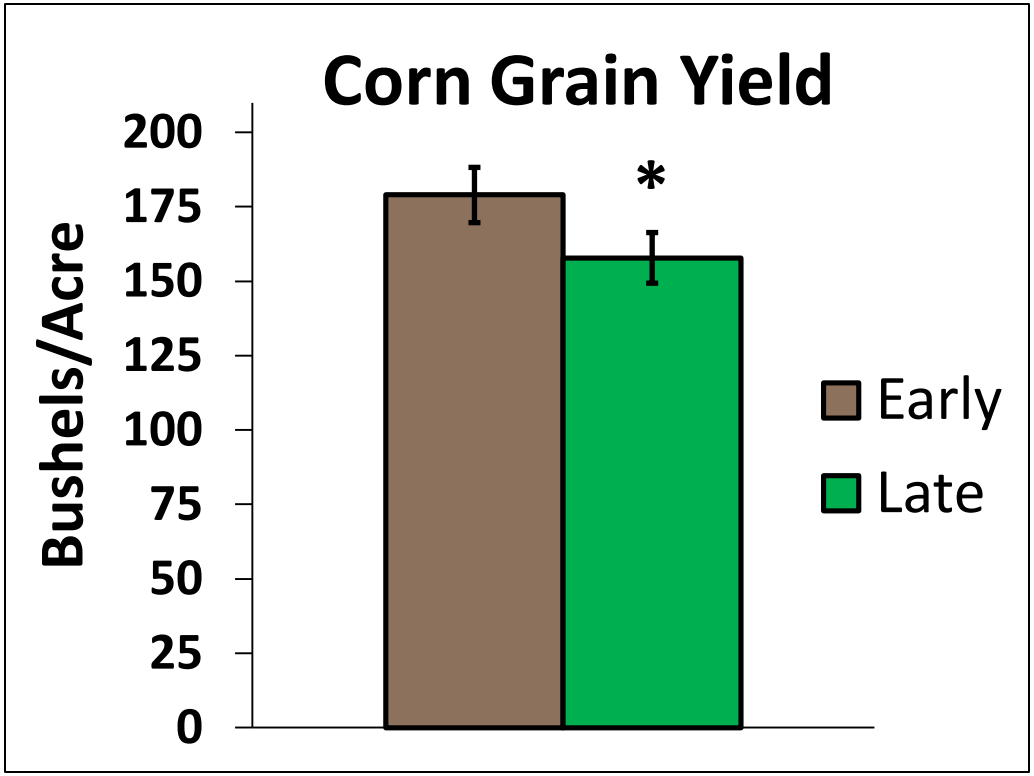

EARLY
LATE

- 9% population reduction in planted green treatment



Rock Springs

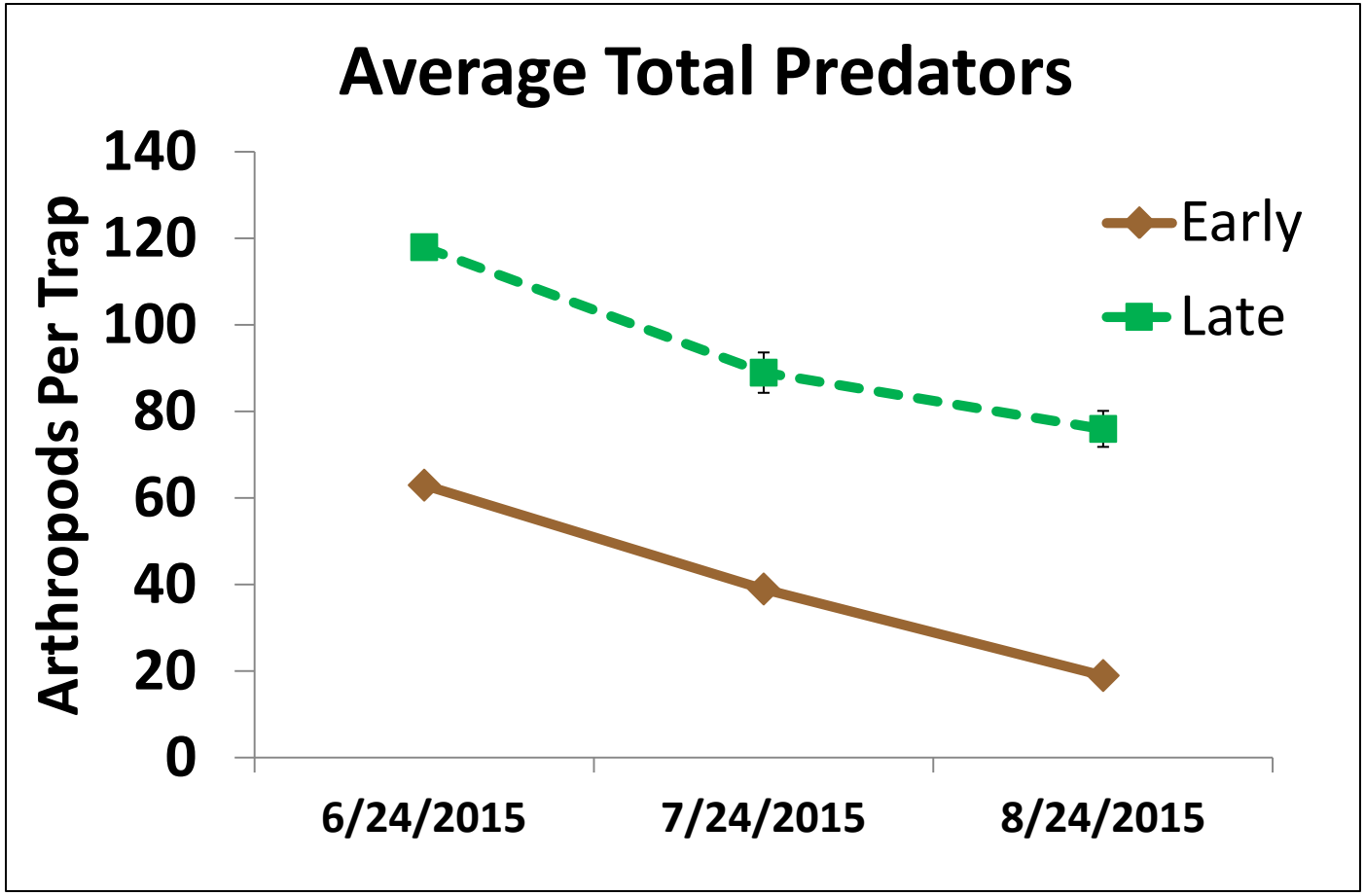
- 20 bushel (11%) yield reduction in planted green treatment



Rock Springs

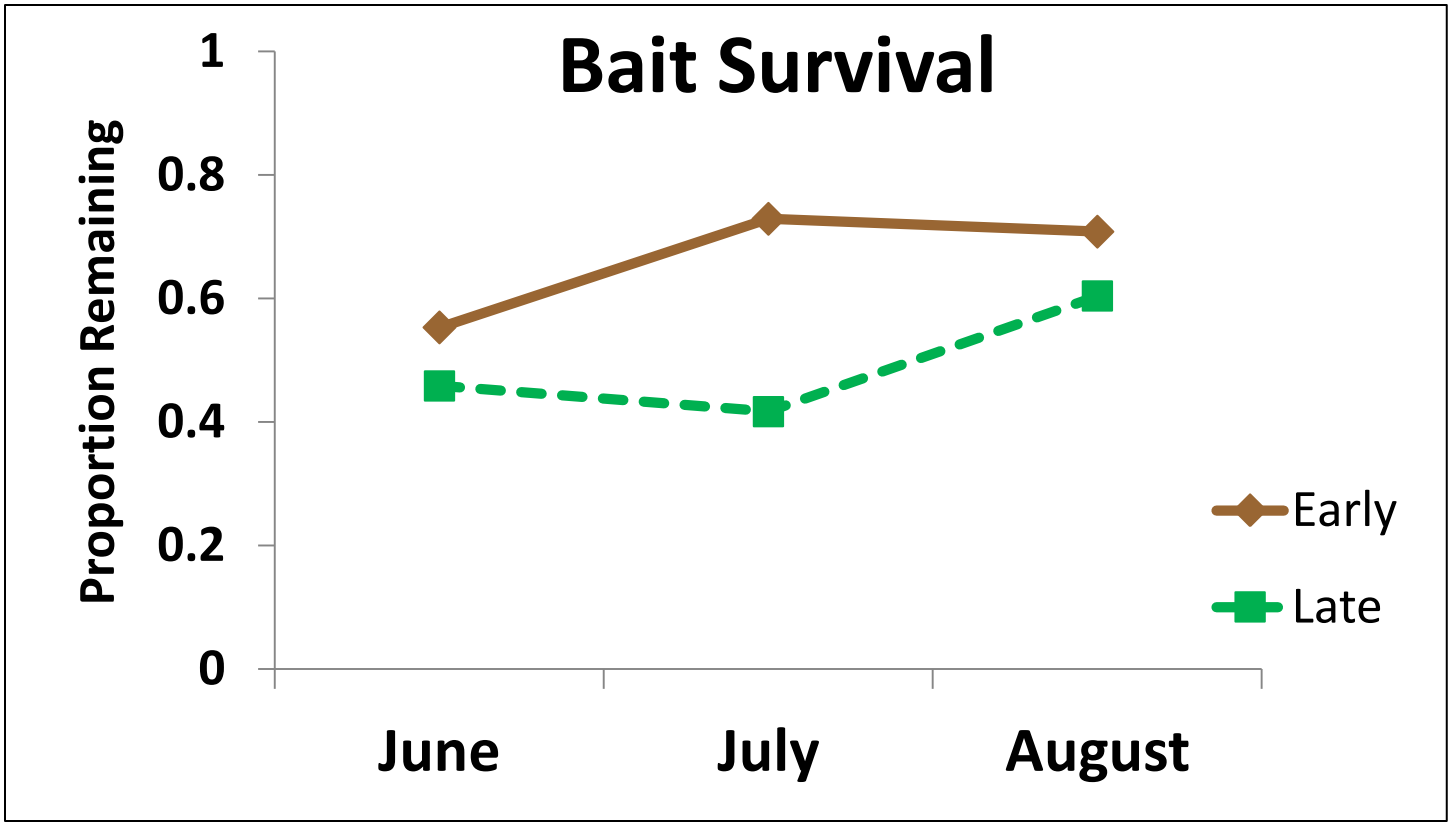
Example of delayed maturity due to planting green. Plots were planted on the same day (Landisville, PA)

- More beneficial insects were found in the planted green treatment



Rock Springs

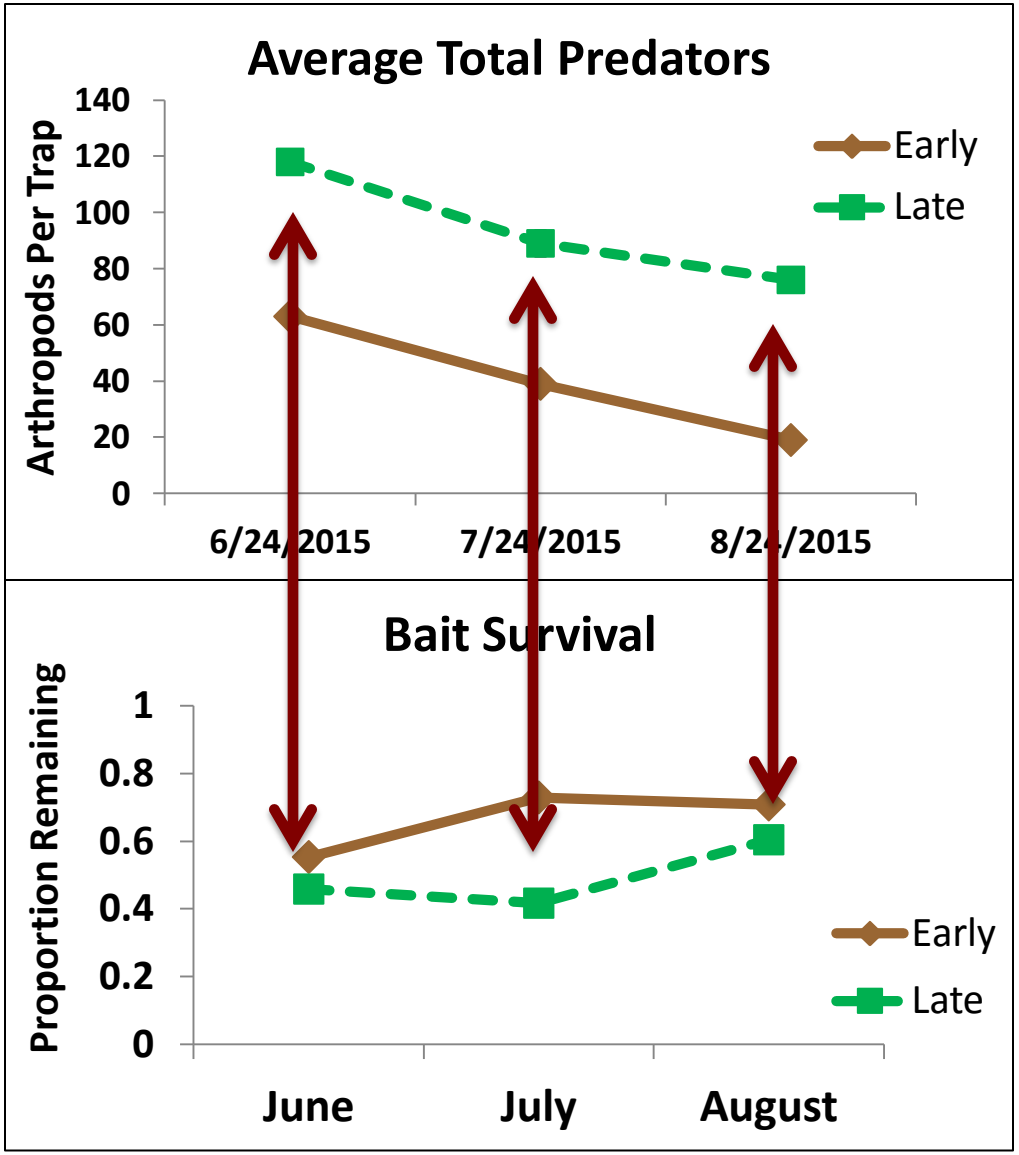
- Fewer bait worms survived in planted green treatment

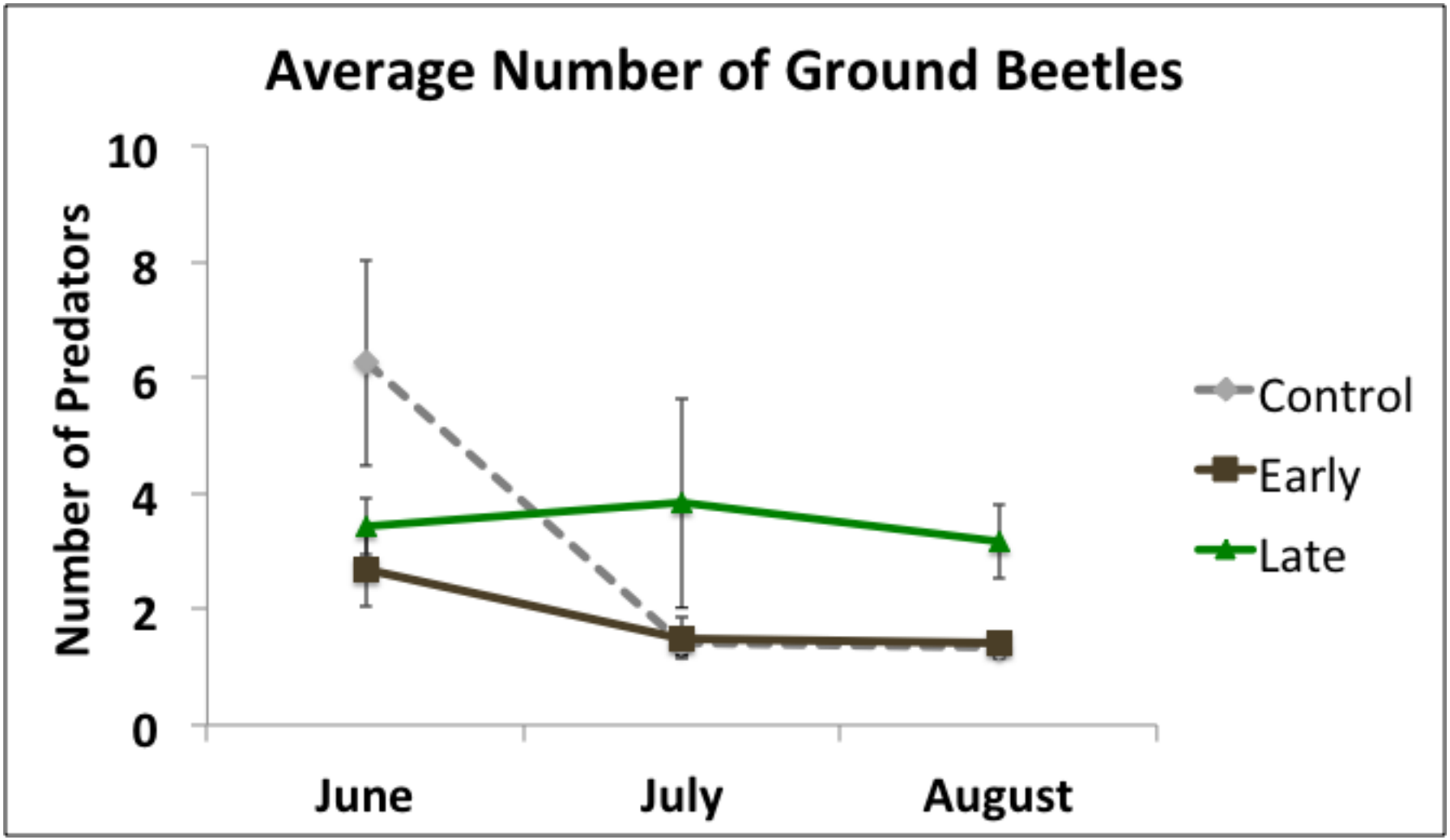


*Bait worms represent soft –bodied pests like slugs and black cutworm

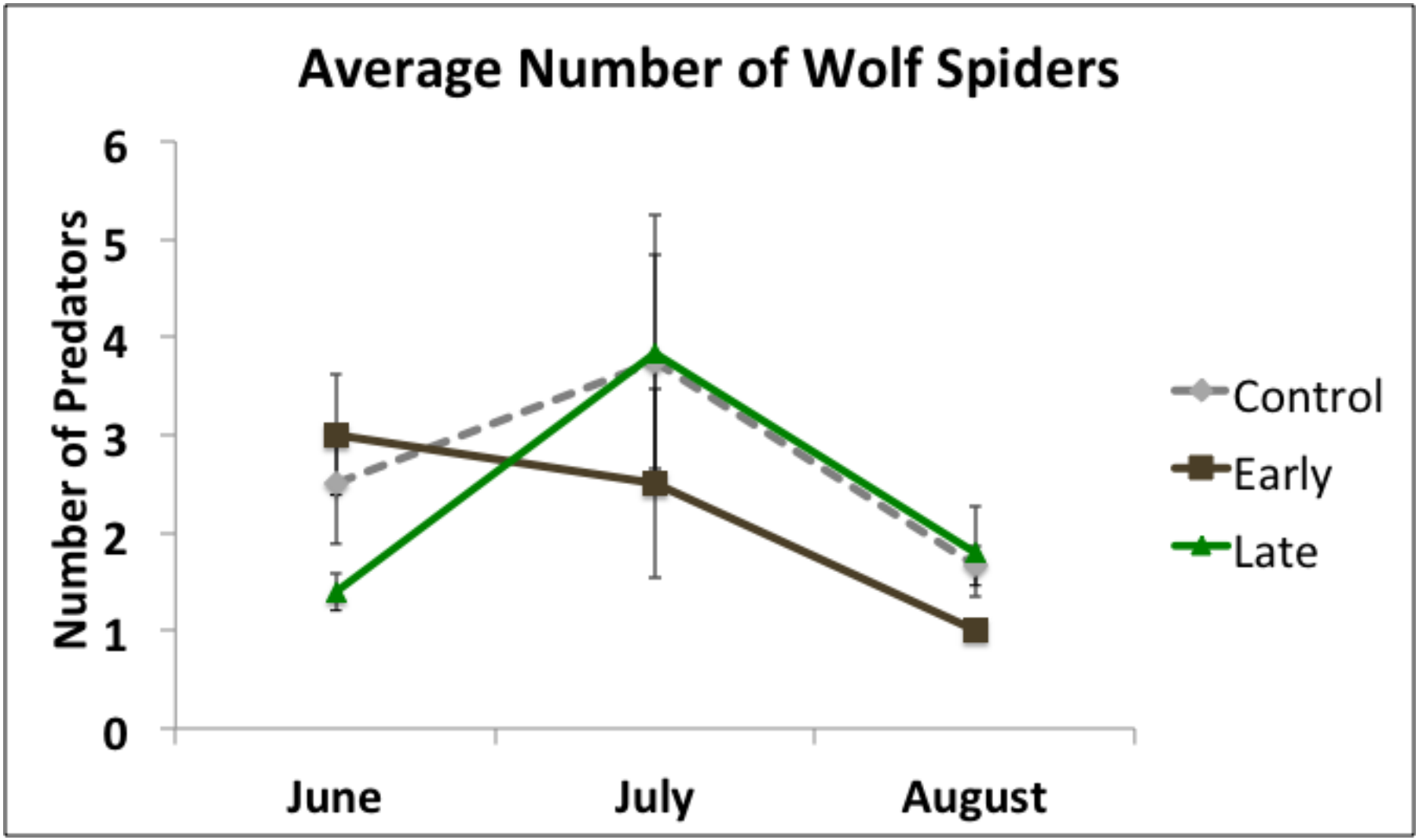
Rock Springs

- More predators corresponded with the decreased survival of bait

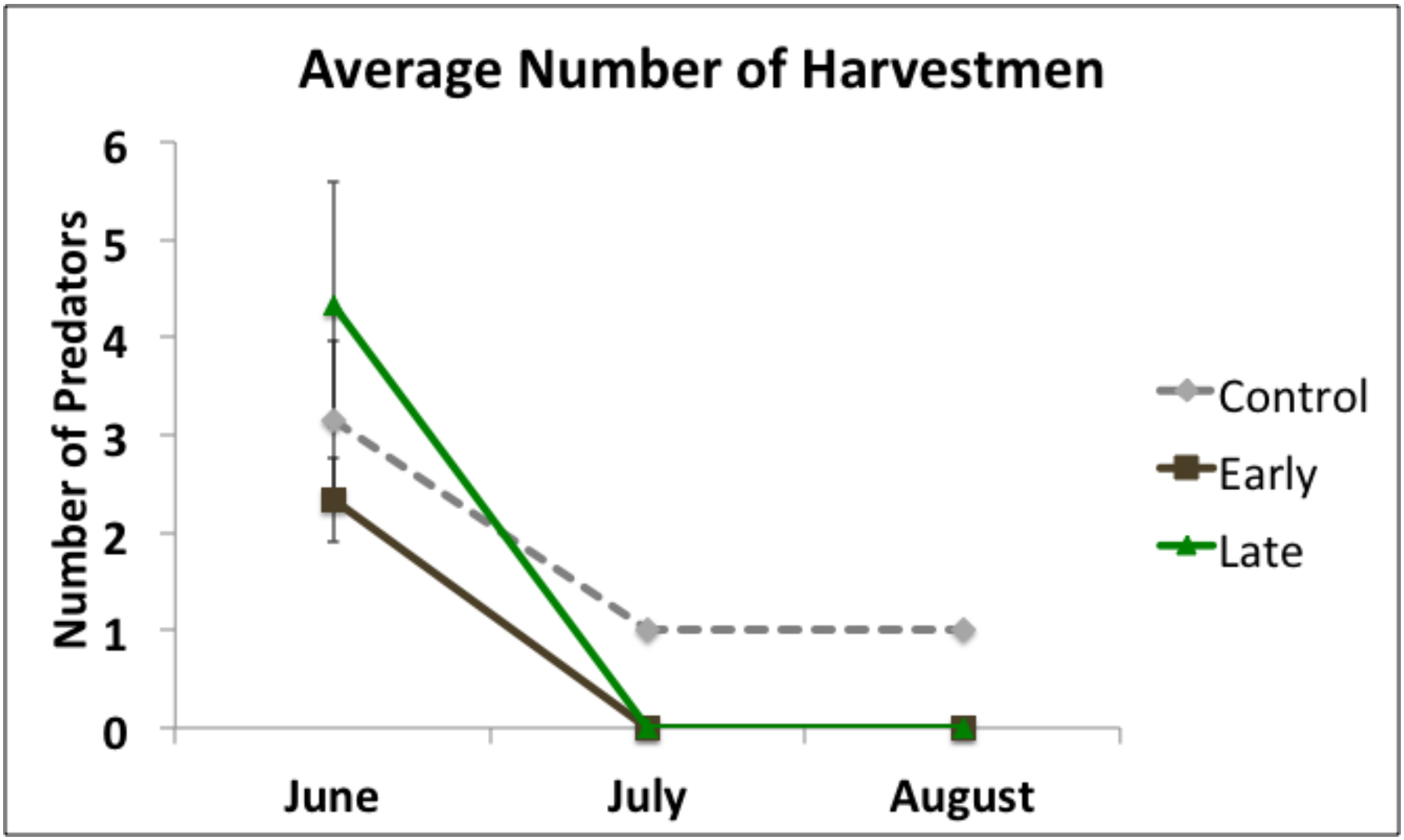




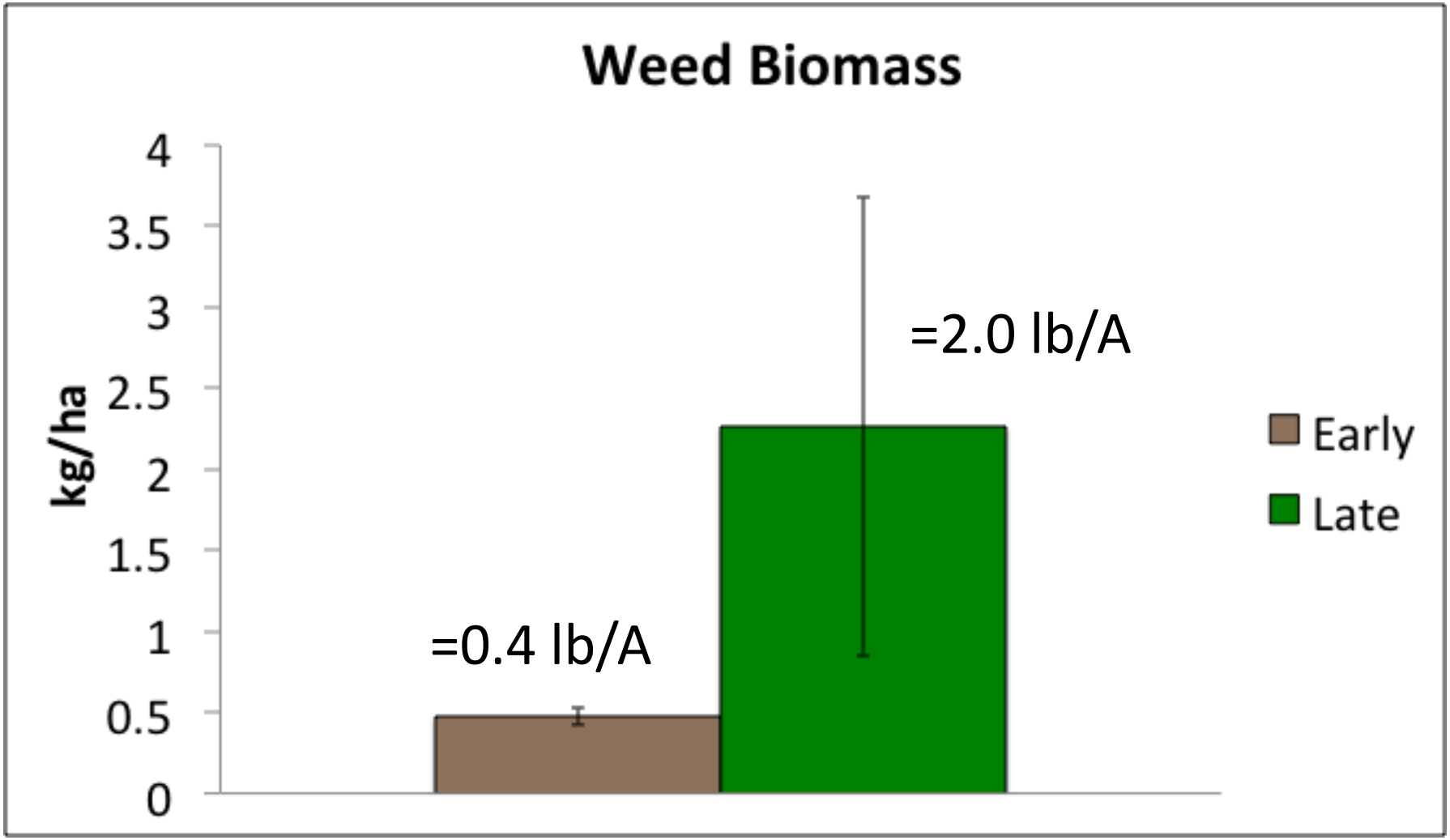
Rock Springs



Rock Springs

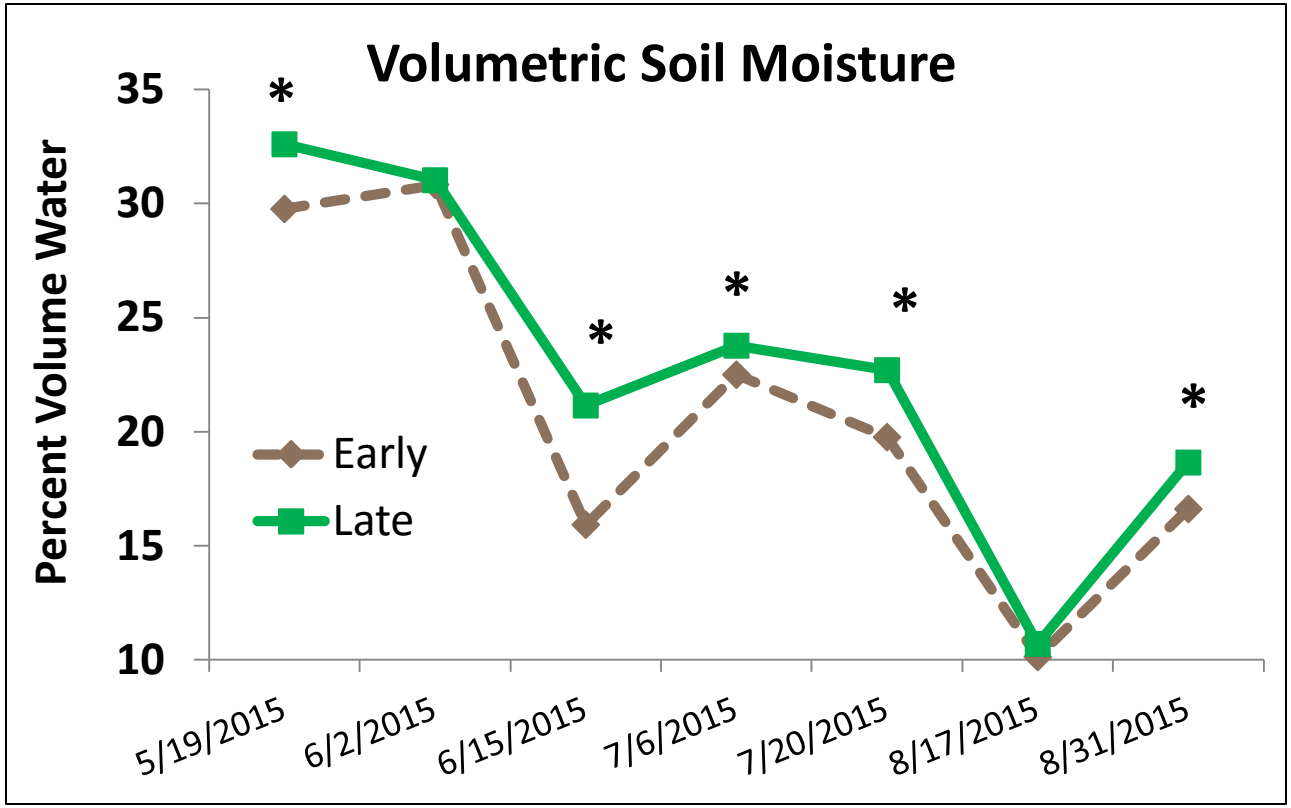


Rock Springs



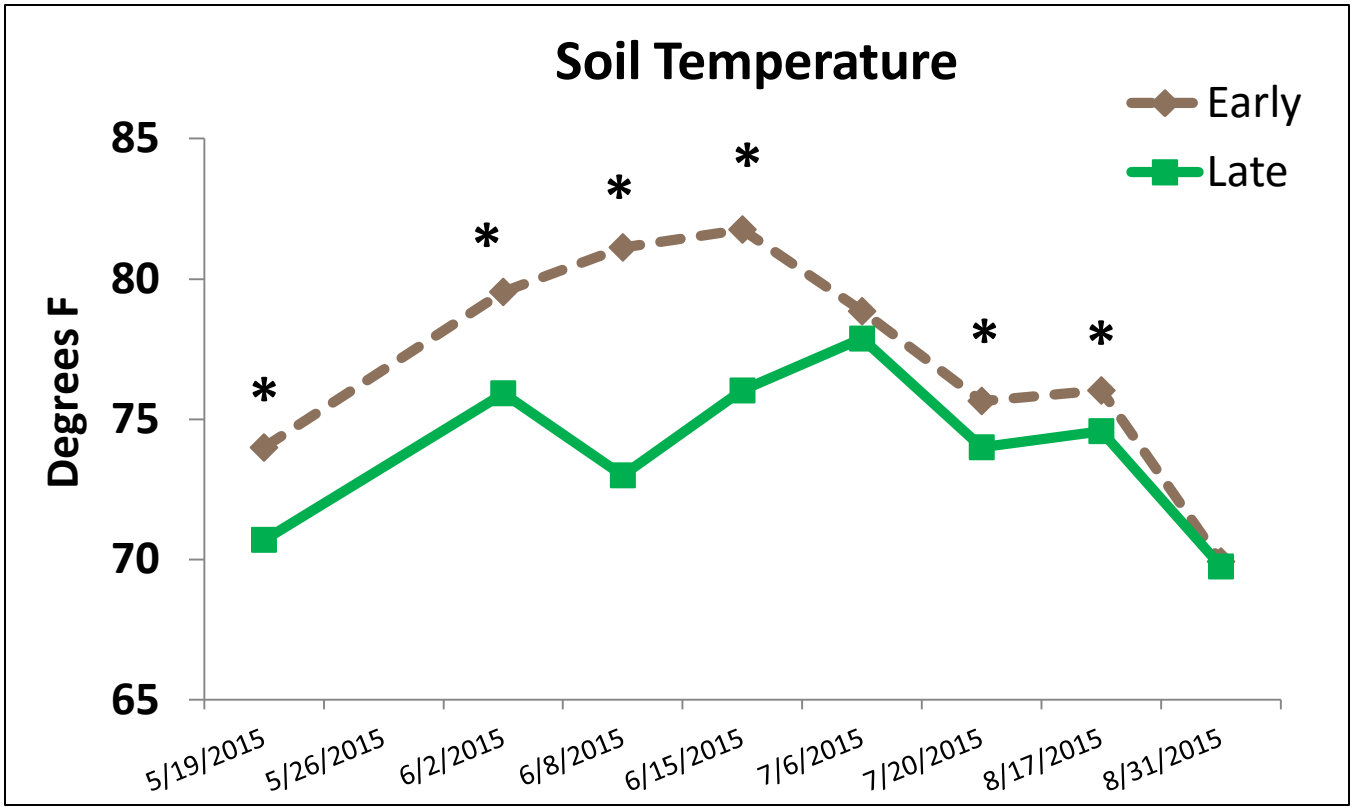
Rock Springs

- With sufficient rainfall, planted green plots actually had higher soil moisture than early-terminated plots for much of the growing season



Landisville

- Soil temperature was several degrees cooler in the planted green treatment for most of the growing season



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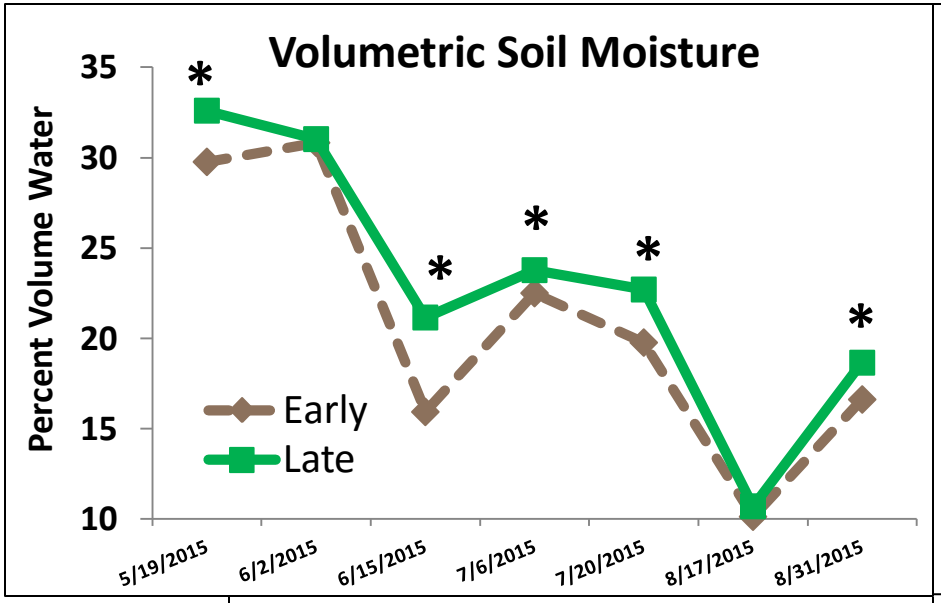
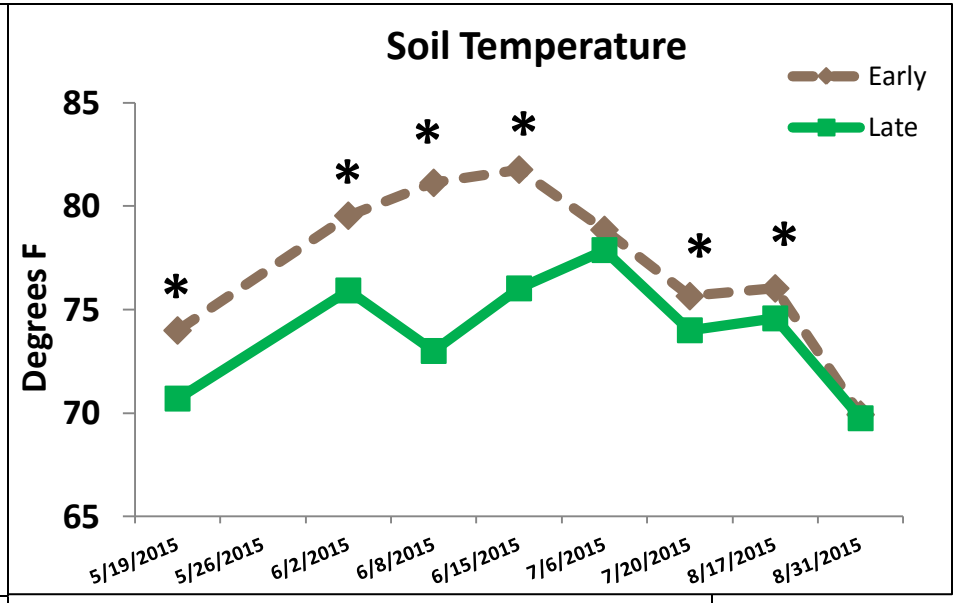
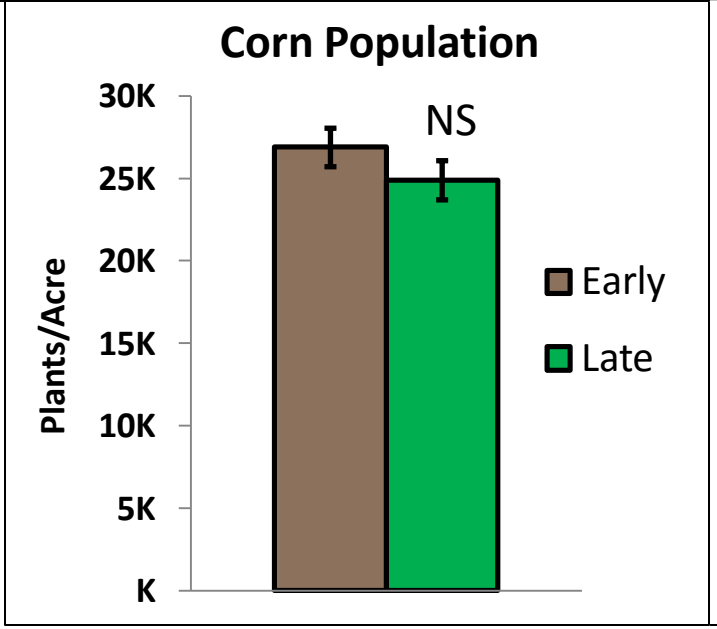
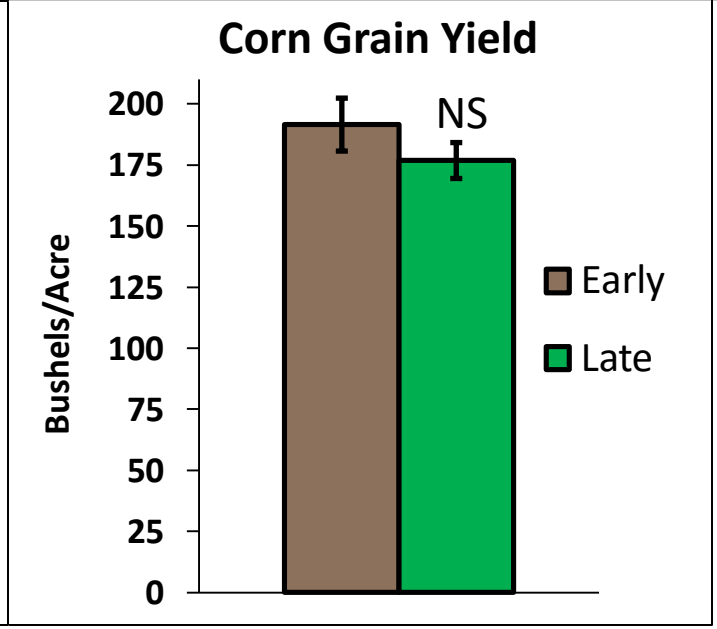


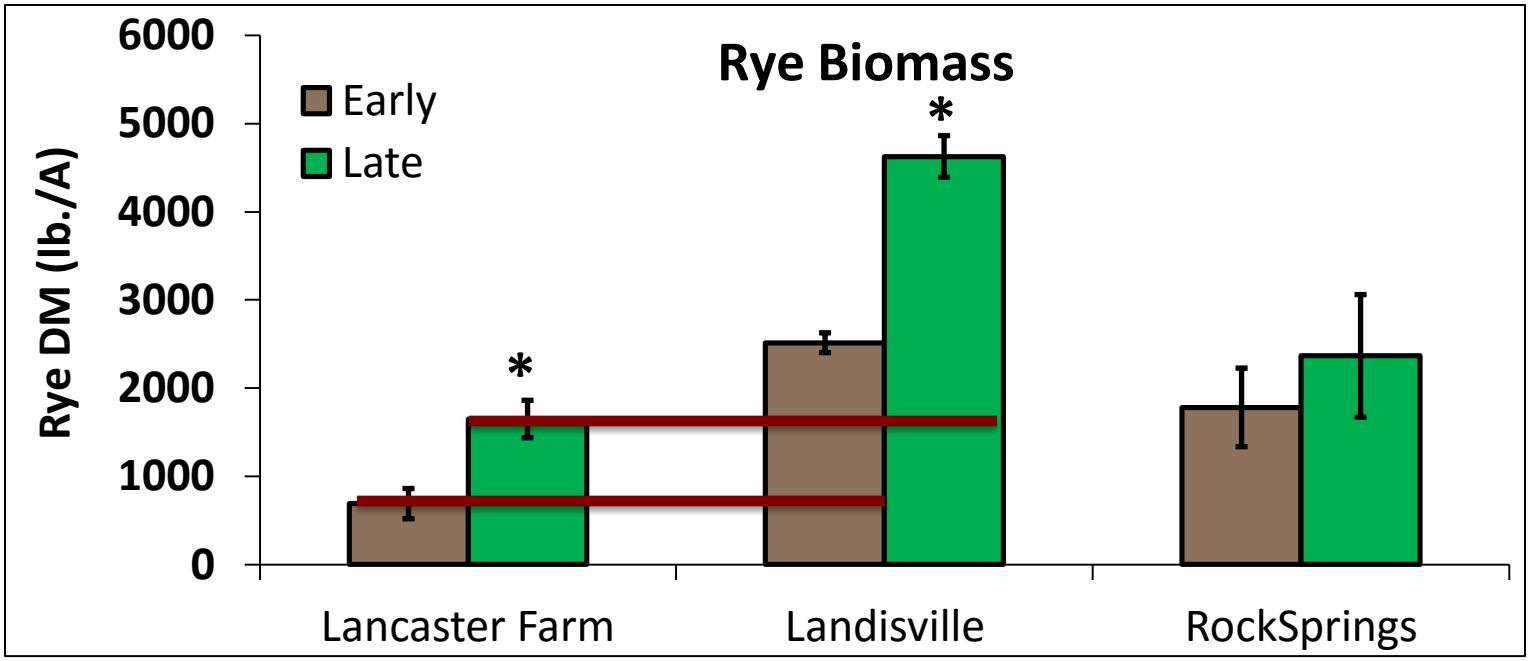


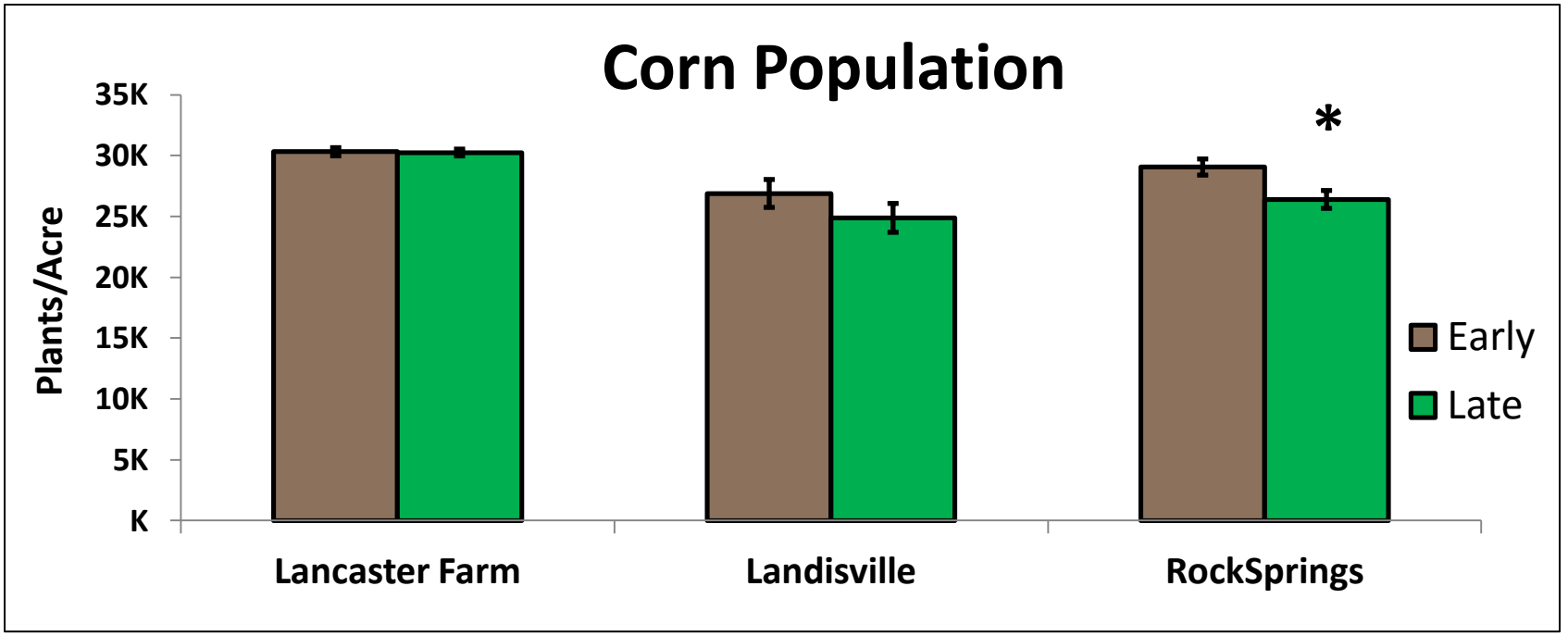


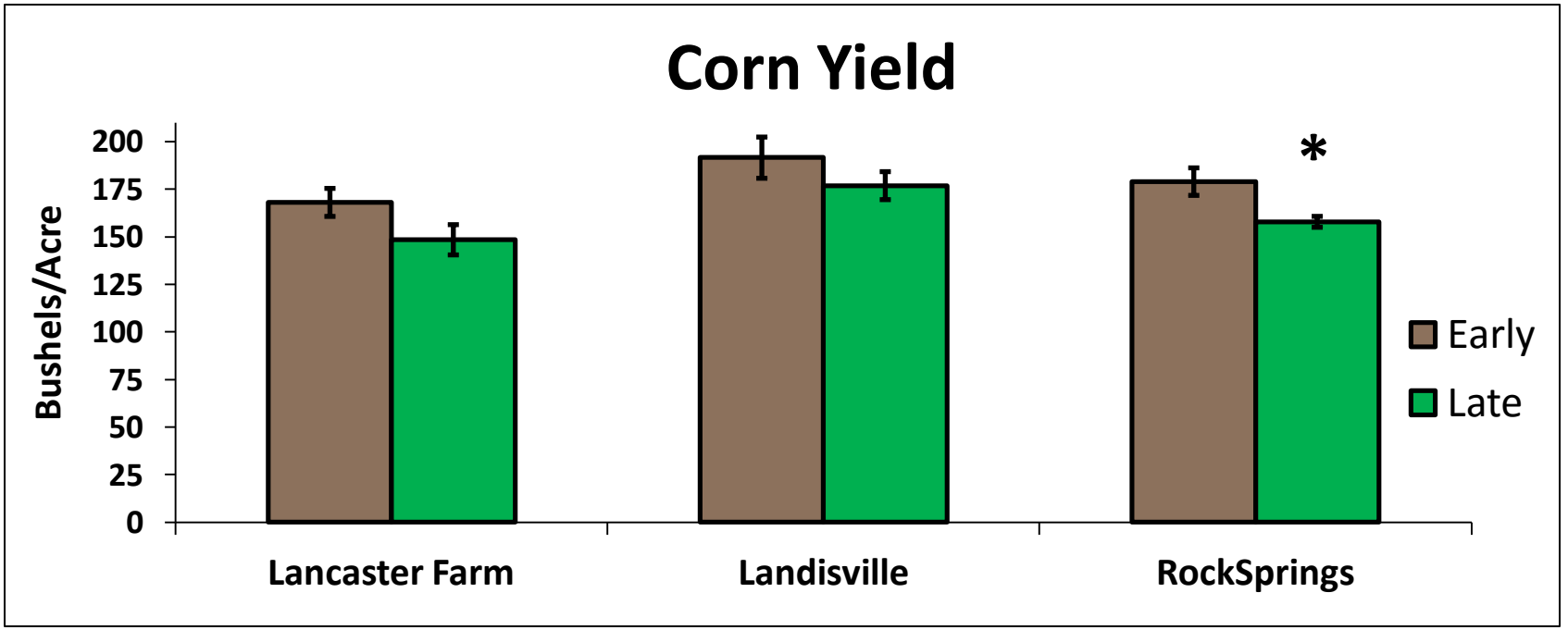


- Soil moisture and temperature influences depended on amount of rye biomass present

→higher biomass = greater effect




Corn Population
35K
30K
25K
20K
15K
10K
5K
K
Plants/Acre
*
Early
Late
Lancaster Farm
Landisville
RockSprings


Corn Yield
200
175
150
125
100
75
50
25
0
Bushels/Acre
*
Early
Late
Lancaster Farm
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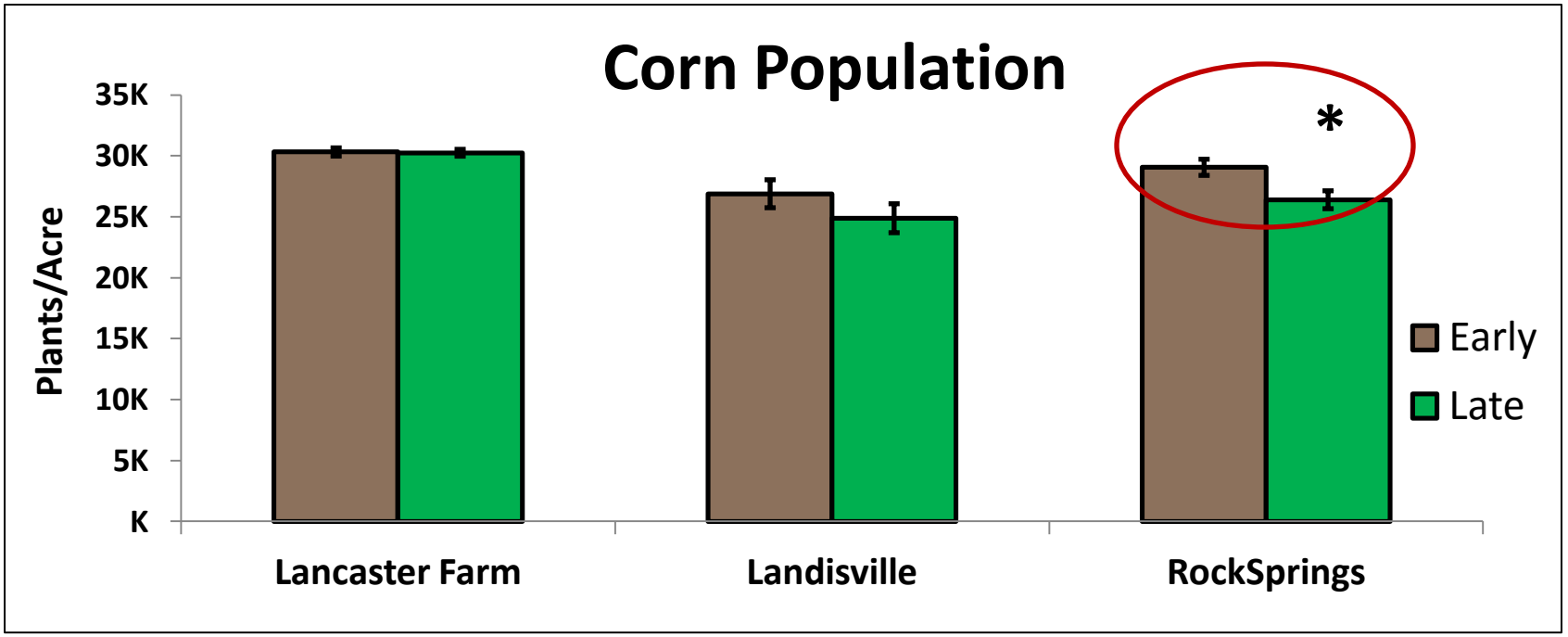
RockSprings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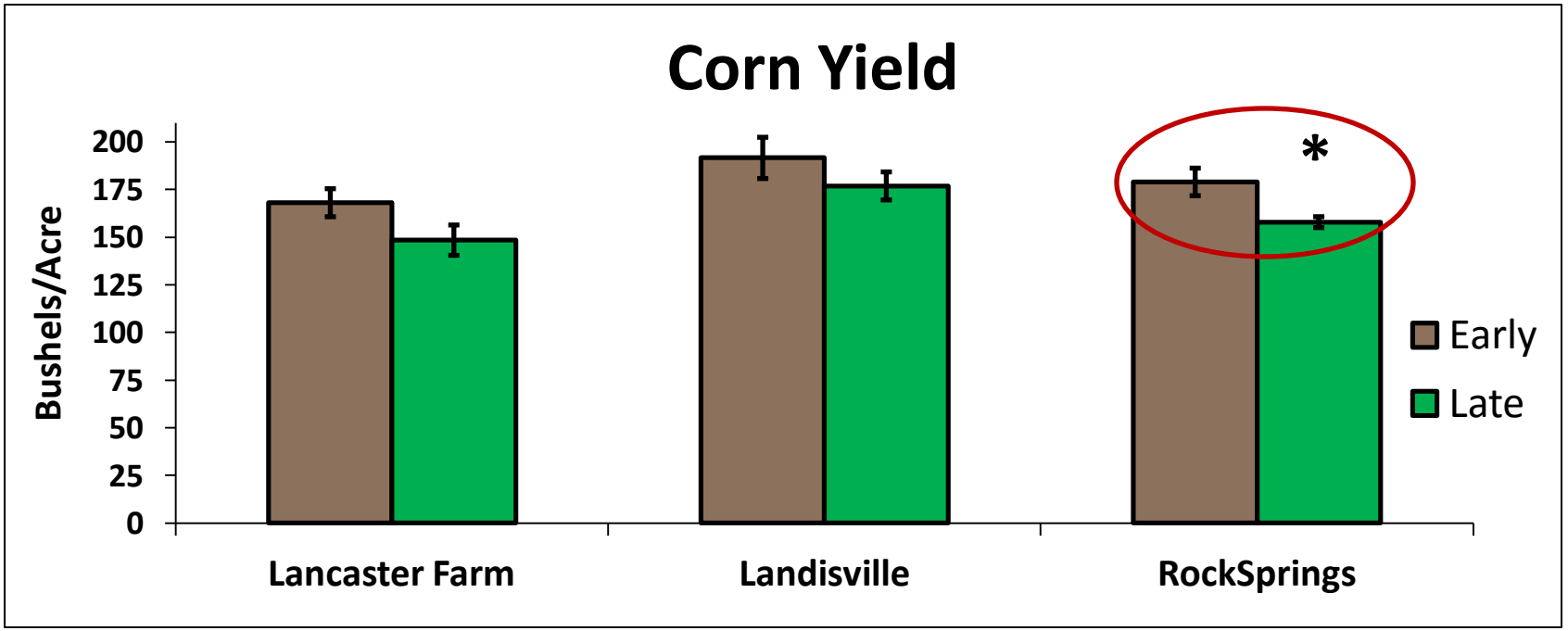
Corn Yield
Bushels/Acre
200
175
150
125
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75
50
25
0
*
Early
Late
Lancaster Farm
Landisville
RockSprings

Planting Green with Corn—Takeaways

Great potential…..

- Conserved soil moisture late in growing season
- Increased residue cover early in growing season
- Increased beneficial insect populations
- Can attain comparable yields to early-terminated

…But Use Caution

- Dry spring → kill cover early
- Plant deep enough
- Delayed emergence and maturity lag
- Nitrogen may be limited; management can be critical

Soy Experiment: Rye Biomass

Site	Rye Planting Date	Rye Seeding Rate	Early Termination Date	Late Termination Date	Soy Planting Date
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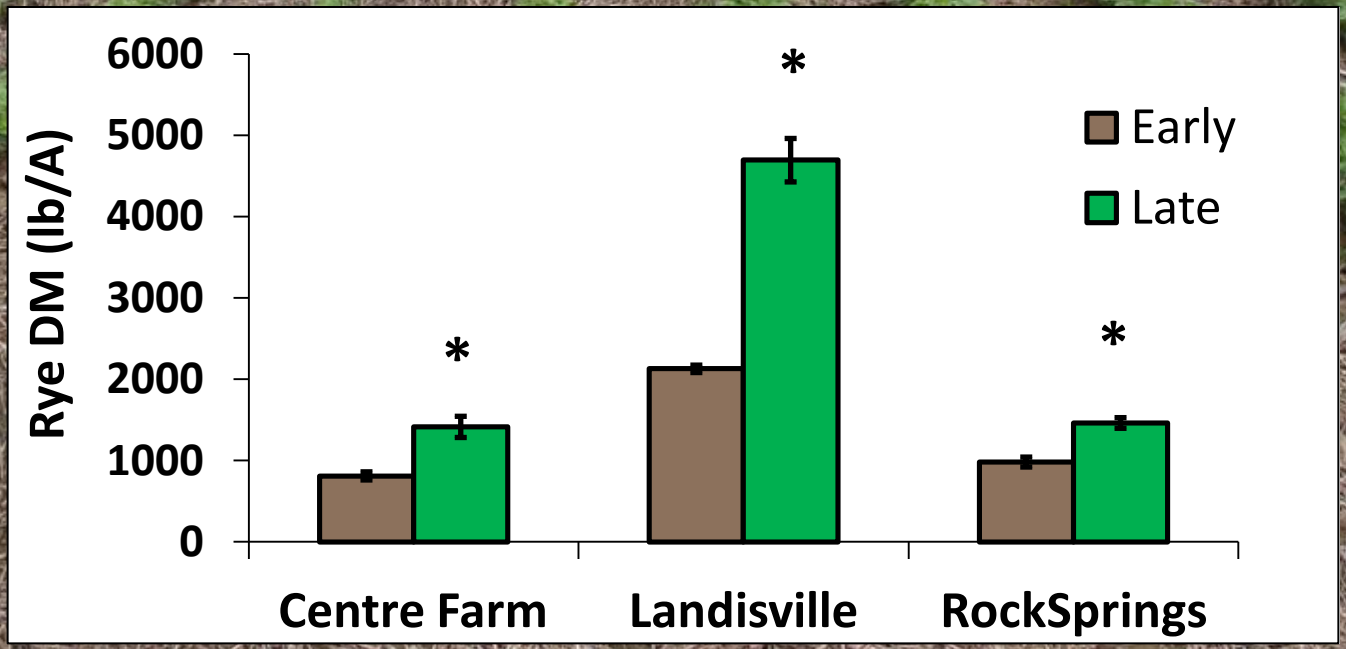
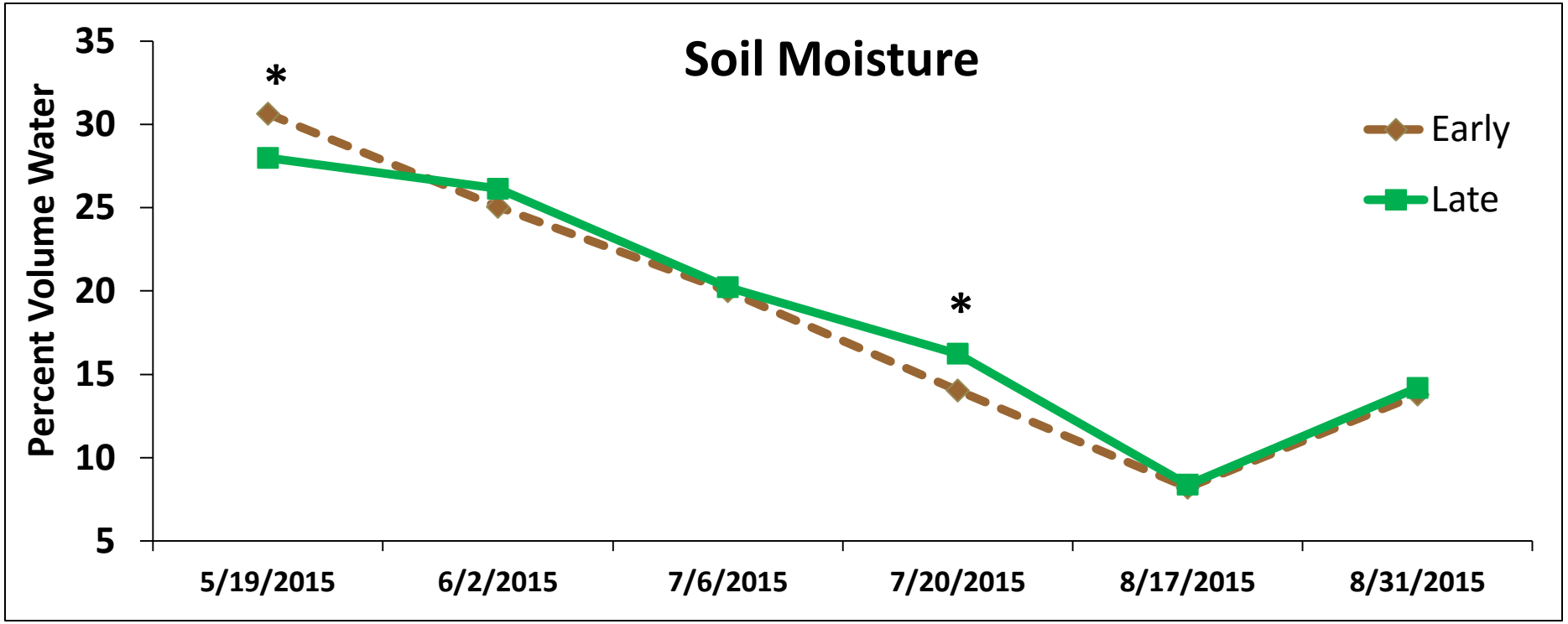


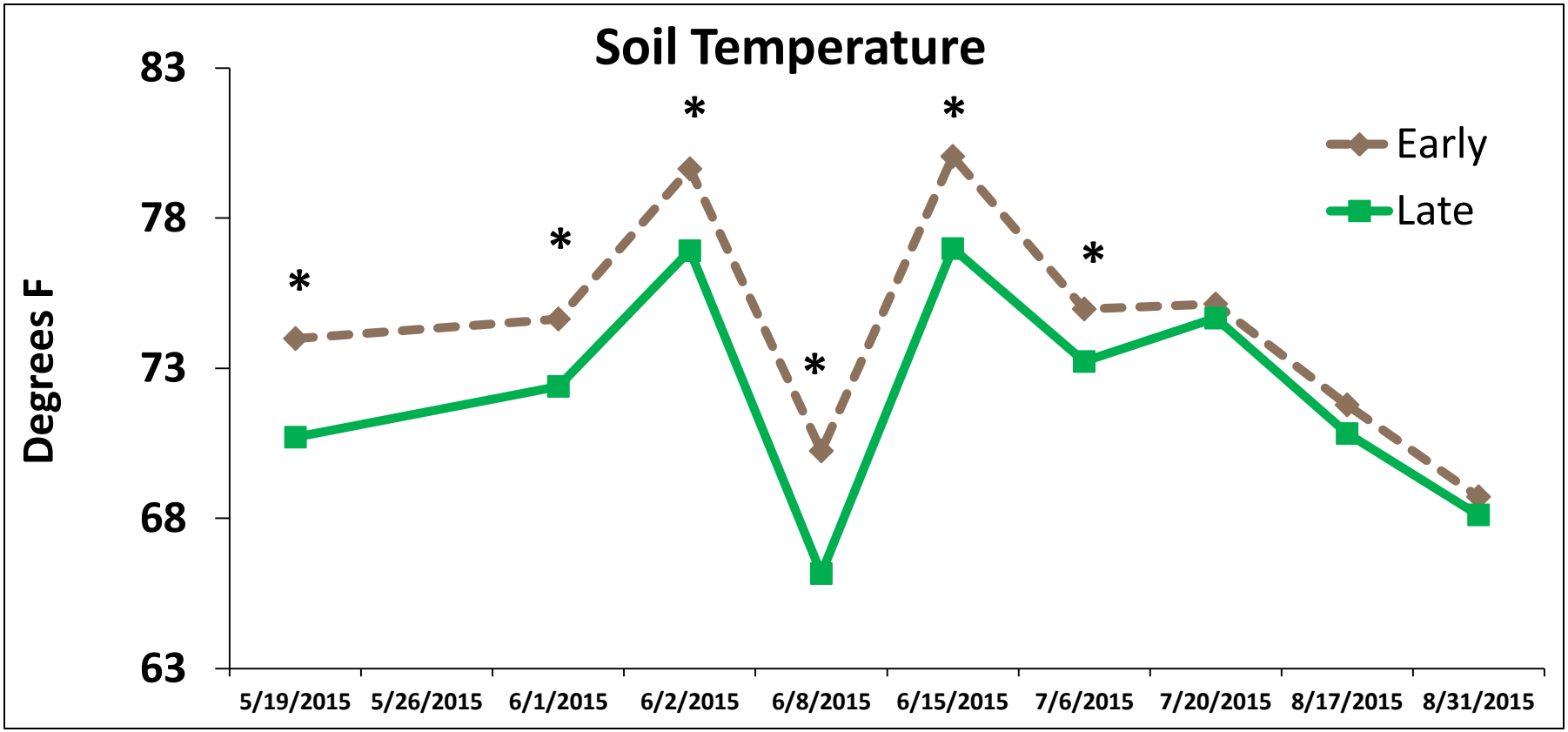

Group: 2.8
Traits: GT, STS
No seed insecticide

- Soil was drier in the late-terminated treatment at planting, but not different for most of the growing season



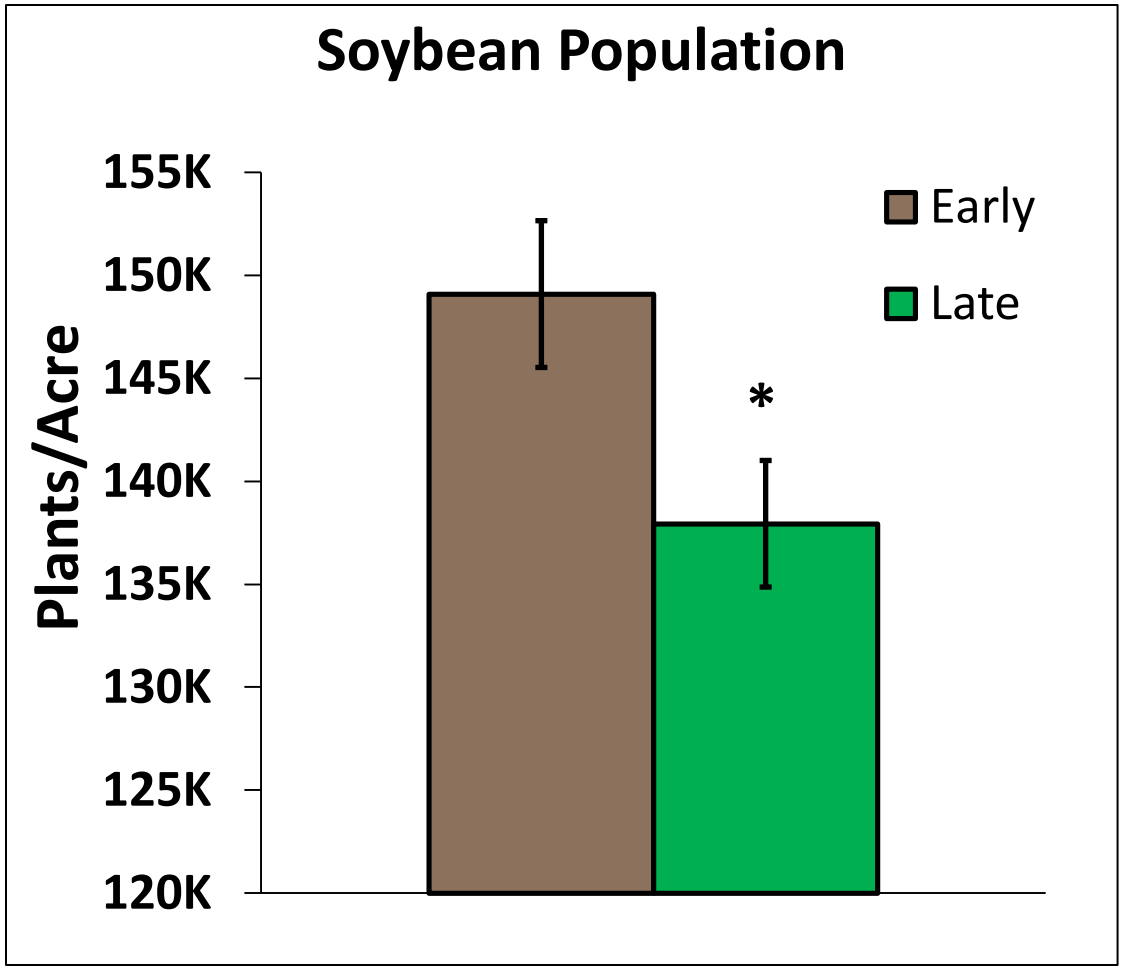
Landisville

- Soil was cooler in the late-terminated treatment for most of the growing season



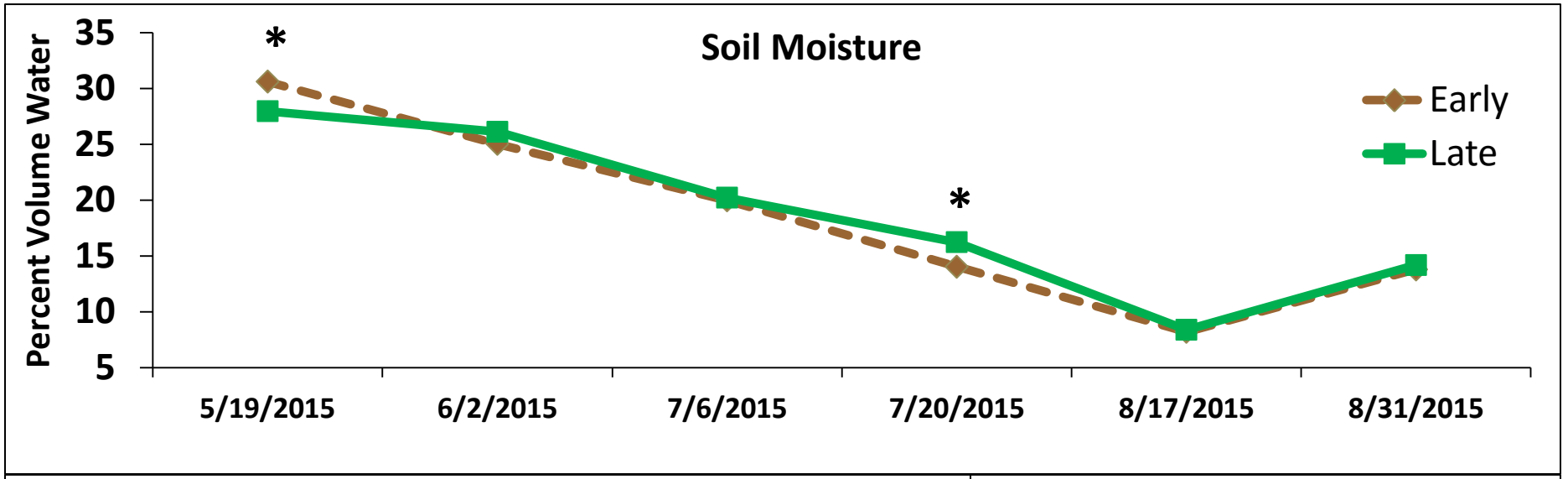
Landisville

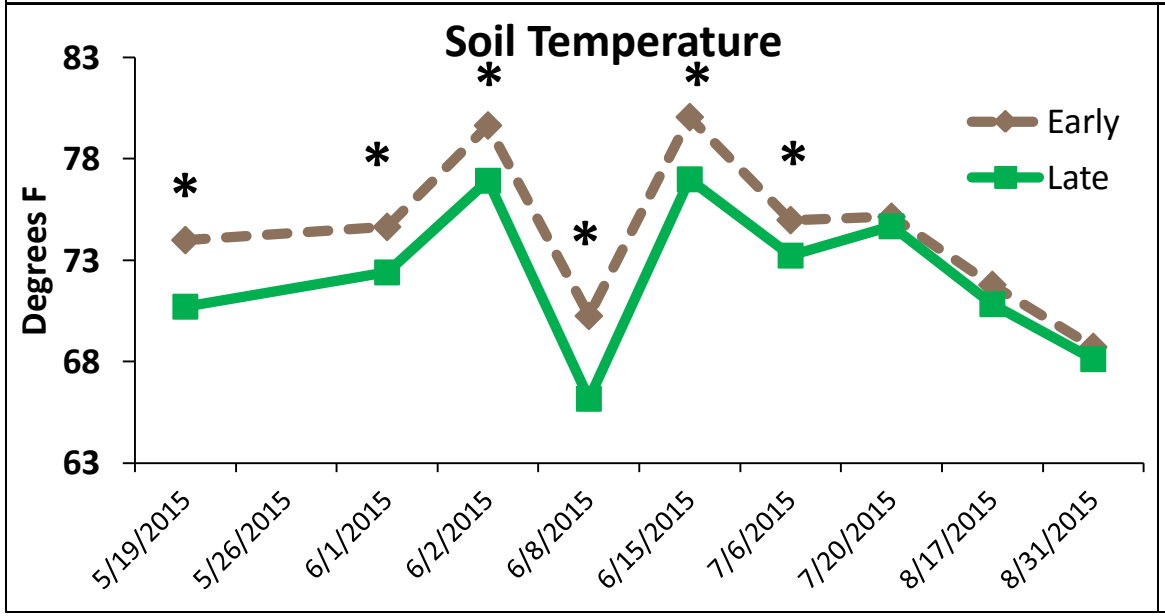
- Soybean population was reduced by 6% in the planting green treatment

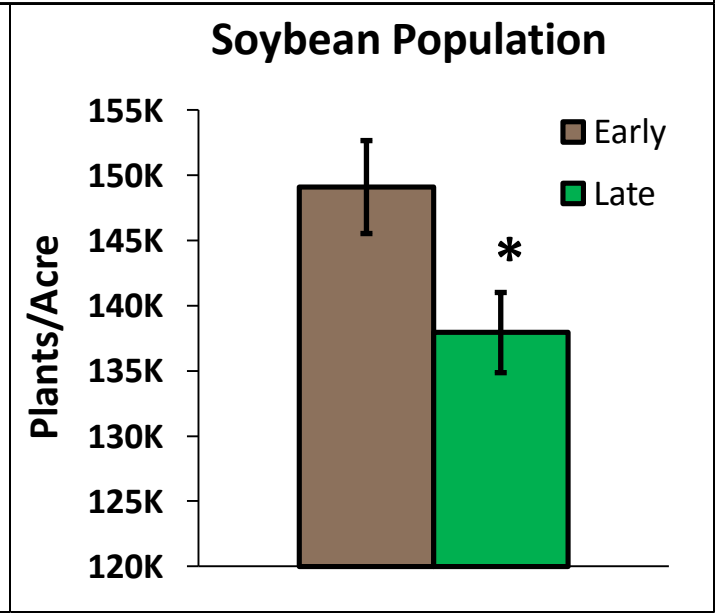


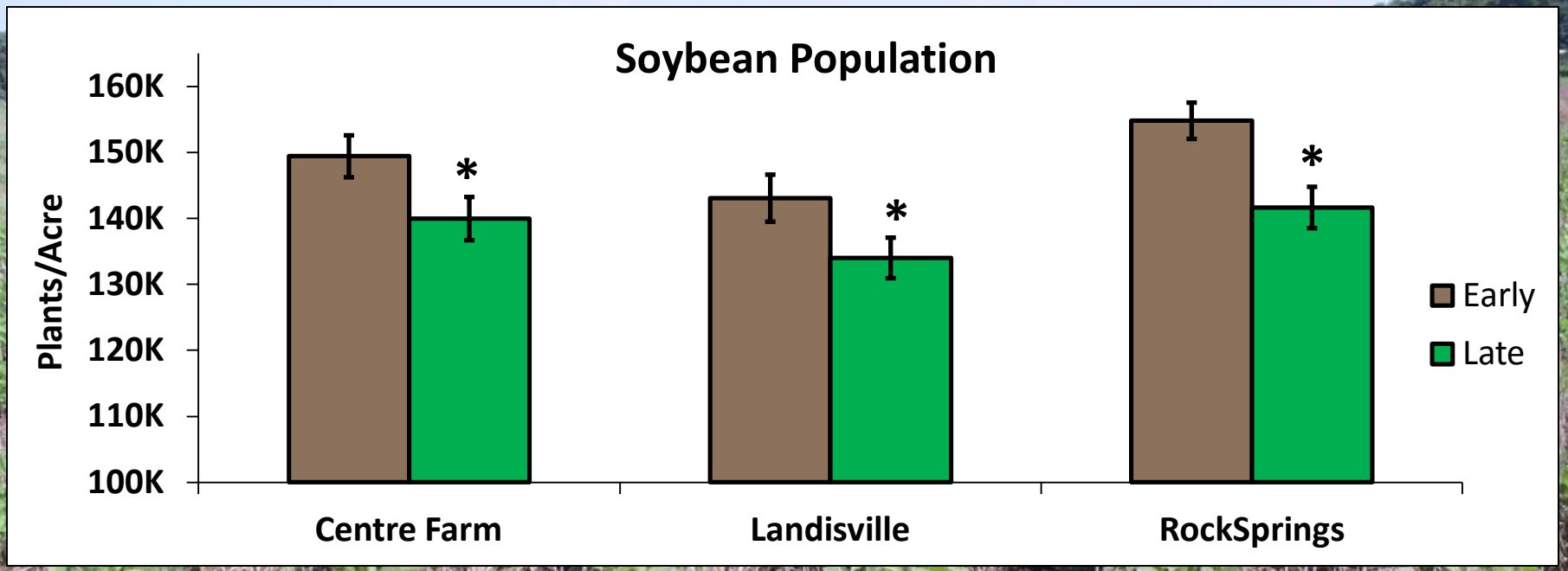
Landisville

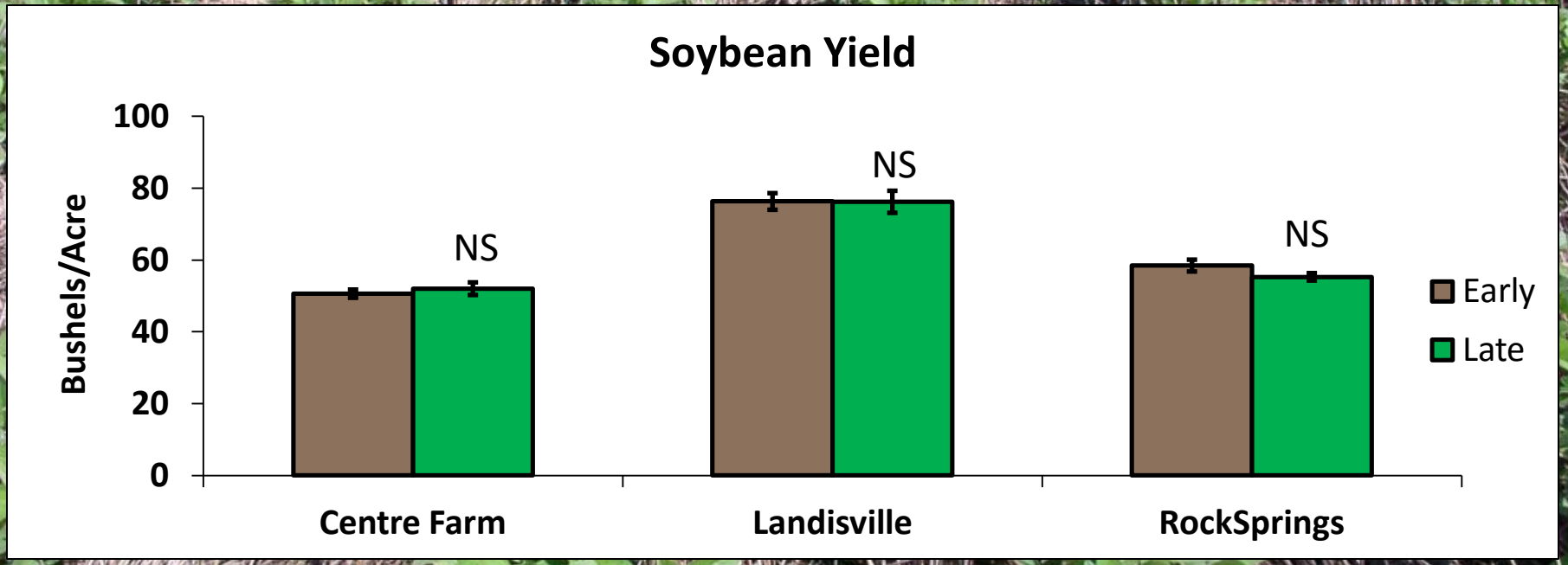
Landisville



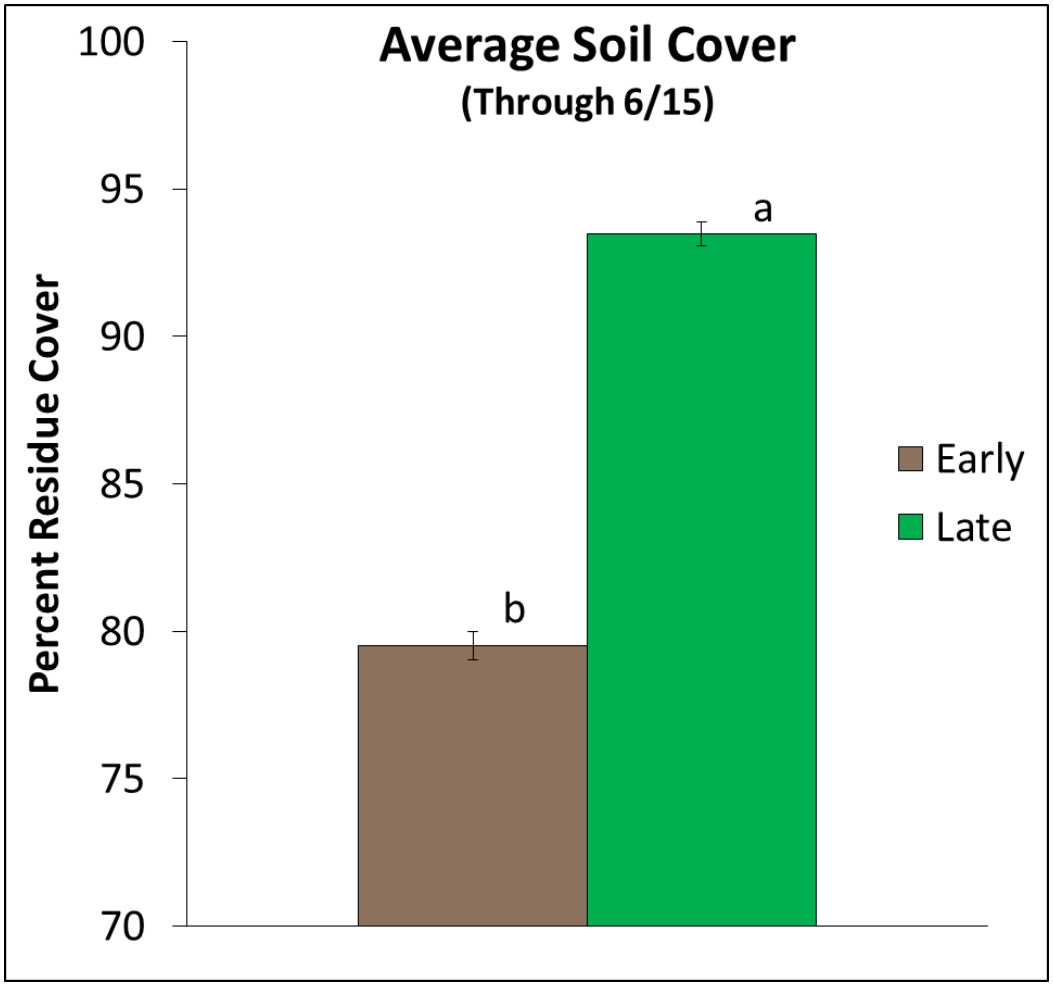




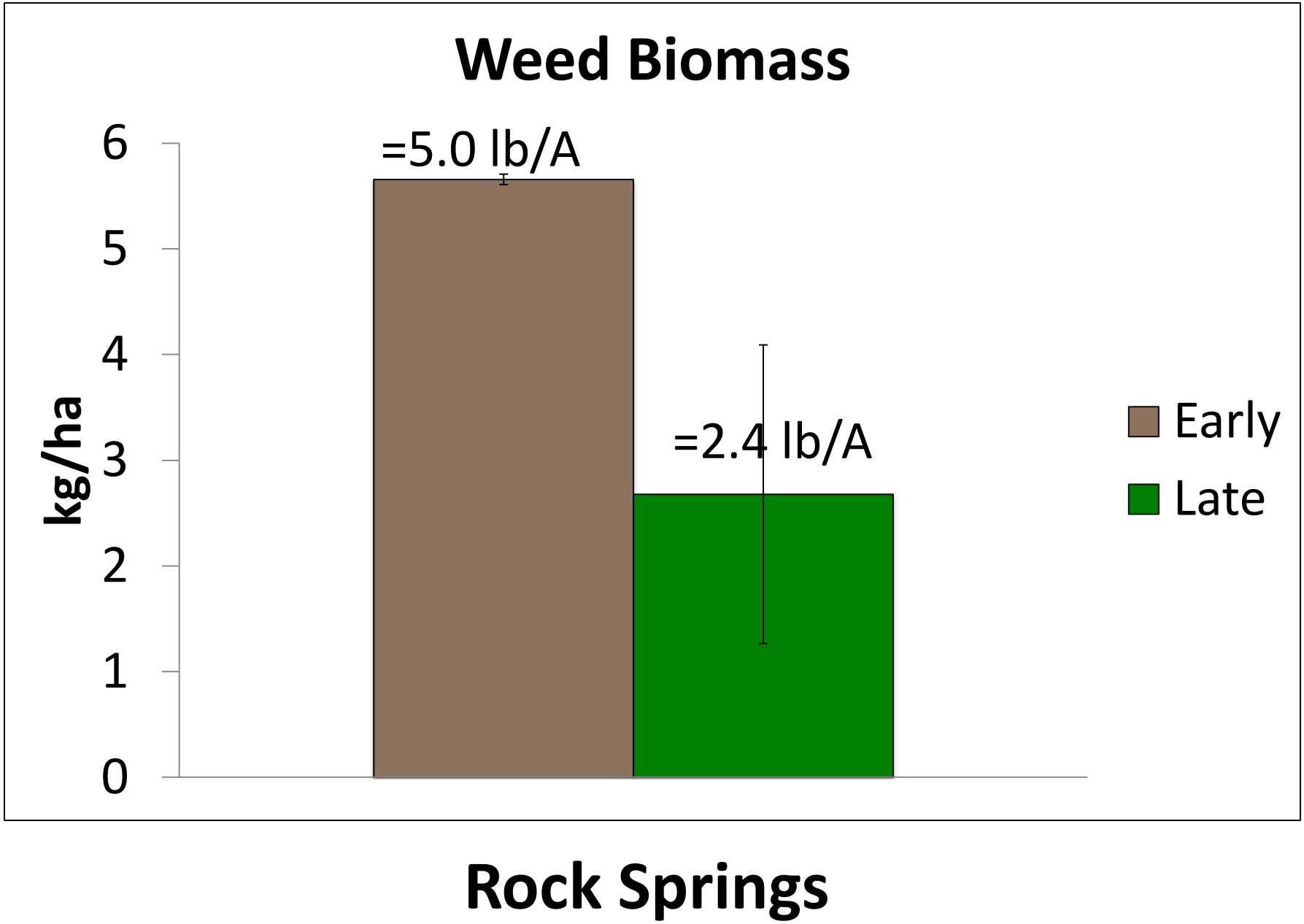

Soybean Population
160K
150K
140K
130K
120K
110K
100K
Plants/Acre
*
*
*
Early
Late
Centre Farm
Landisville
RockSprings


Soybean Yield
100
80
60
40
20
0
Bushels/Acre
NS
NS
NS
Early
Late
Centre Farm
Landisville
RockSprings

Planting green increased soil cover by almost 15% in all treatments



Landisville Soy


Weed Biomass
6
5
4
3
2
1
0
kg/ha
=5.0 lb/A
=2.4 lb/A
Early
Late
Rock Springs

Planting Green with Soybeans—Takeaways

Excellent potential…..

- Took up soil moisture around planting, conserved later in season
- Increased residue cover early in growing season
- Soybeans compensate for reduced populations
- Achieved same yields as typical no-till practice
- Few N-management implications

…But Use Caution

- Plant deep enough
- Delayed emergence and maturity lag
- Groundhogs

2015 Summary

- Planting depth is vital (too shallow is not good)
- Planting green dried out soil early, conserved moisture later*
- Planting green cooled soil temperatures*
- Delayed emergence and a 1-week maturity lag
- Nitrogen immobilization was a real concern– N management critical
- Soybean appeared more adaptable to planting green
- Planting green should be weather dependent; if dry terminate ASAP

With the dry spring in 2015….

…Slug populations were insufficient to draw strong conclusions. Study will be repeated for 2 more years…stay tuned!

Please contact me with any questions!

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- 717-283-7084

- THANKS!!!