# Cash Crop Establishment Into/After Cover Crops

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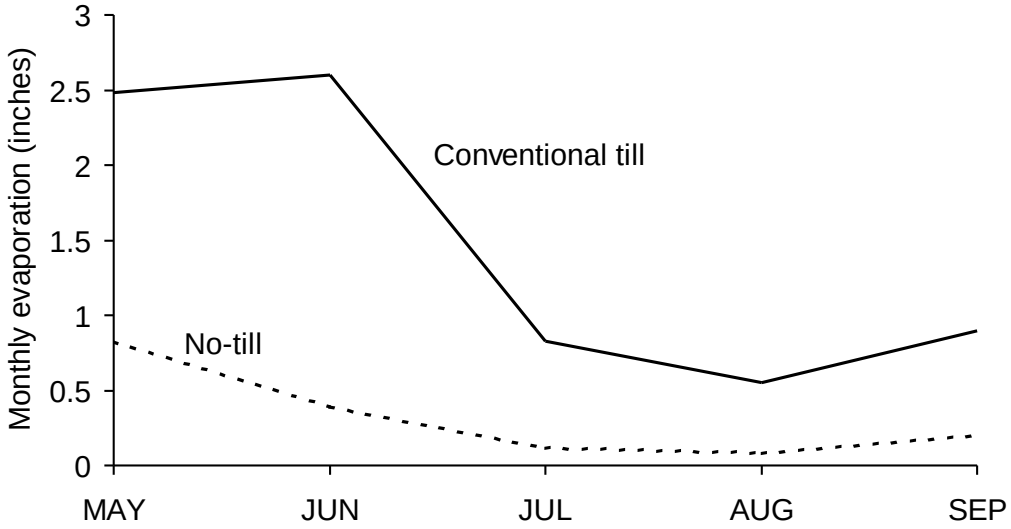
# Why No-Till: Reduced Sheet Erosion

# Why No-Till: Reduced Gully Erosion

# Why No-Till: Water Conservation

Reduced evaporation



# Why No-Till:
# Greater Surface Organic Matter Content

# Why No-Till: Soil Structure Improvement

# Why No-Till: Great Biological Activity

| # Earthworms/A | No-Till | Plow |
|---|---|---|
| Cont.Corn | 75,000 | 40,000 |
| Cont. Soybean | 500,000 | 230,000 |
| Clover/Ryegrass | 2,000,000 | |
| Pasture+manure | 5,000,000 | |

Data from Indiana
Crop and management systems continuous for at least 10 years

# Why No-Tillage?
## - Labor Savings

# No-Till for Faster Cover Crop Establishment

# Why No-Till : to let cover crops develop more growth in Spring

# Equipment Considerations: No-Till Starts at Harvest

**Effects of uneven residue distribution**

Uneven residue distribution

JOHN DEERE
Bats worn

Chaff not spread out

Chaff
Spreader
Straw
Spreader

# Straw Residue Effect on NT Sorghum-sudangrass

# Equipment Considerations: Planters vs Drills

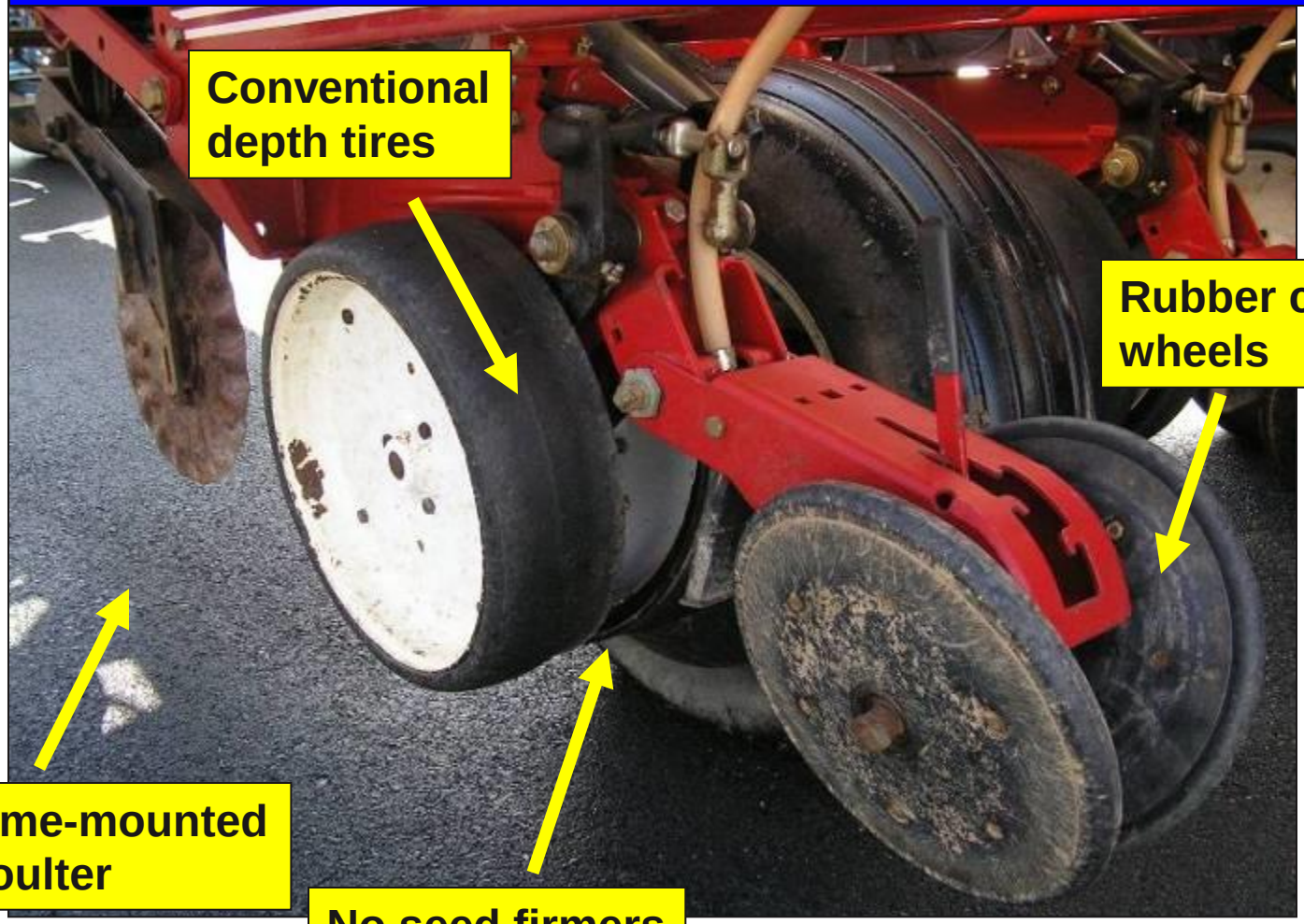
- Better residue flow through machine
- More options for residue handling attachments
- More down-pressure per opener possible
- Fertilizer and pesticide handling capacities
- Better seed depth control
- Better seed metering
- More expensive
- Fewer seed sizes handled

# Equipment Considerations: Enough Weight on Planter or Drill

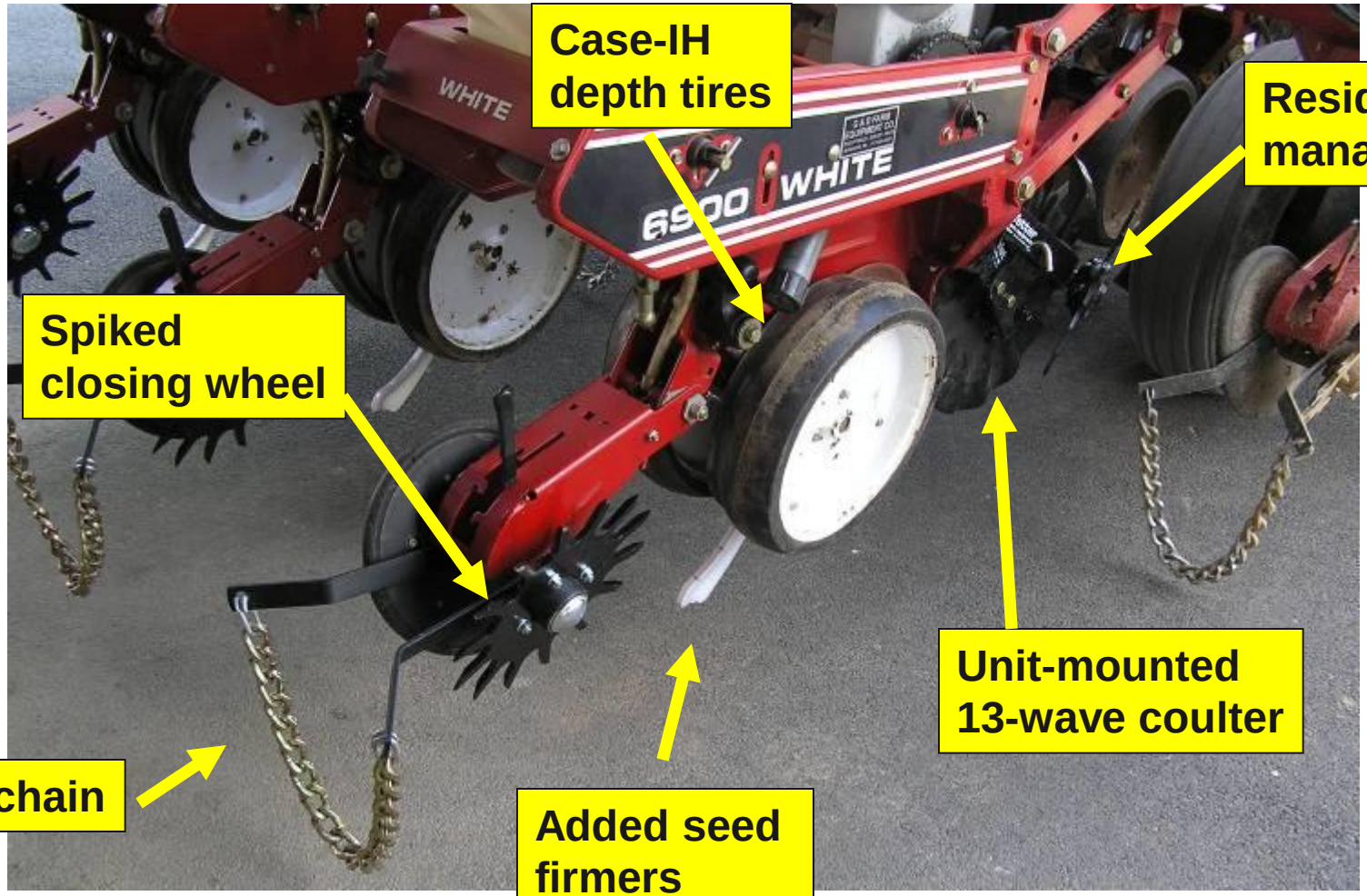
# Example of Improved Planter Set-up for No-Till

- 4-row White 6100 pull-type corn planter
- 7 rows for soybeans with splitters
- Liquid side-dress at 2+2
- Converted for no-till in 2006

# previous setup



# new setup


Case-IH
depth tires
Residue
manager
Spiked
closing wheel
Unit-mounted
13-wave coulter
Drag chain
Added seed
firmers
WHITE
6500 WHITE

# Equipment Considerations: Drills

- Seeding Rate – calibrate
- Depth Control
- Press wheels for seed to soil contact
- Read the Manual
  - Note all references are for new equipment

# Drills

- Seeding depth more critical than rate
- Single disk openers
  - Better residue handling capacity
  - Better depth control
- Double disk openers
  - Better for small seeded crops
- Shoe type
  - Limited residue handling ability
  - Depth control limited
  - Not very common

# Drills

- Shoe type

# Coulters

- Purpose – cut through residue
- Narrow design –
  - Less soil disturbance
  - Work better under wide soil conditions
- Close to seed openers
- Run at planting depth
- The more iron to push into the soil – the more weight required on drill

Bubbled coulter

Turbo coulter

13-wave fluted coulter

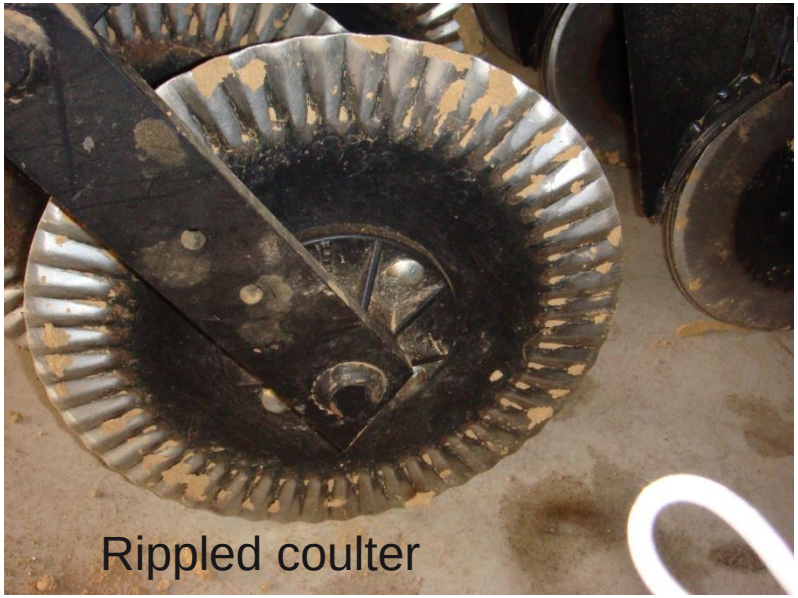
1” waves

16” -20” diameter

8-wave fluted coulter

1 ¼” waves,

14 5/8”-20” diameter



Rippled coulter

# Coulters for no-tillage and zone-tillage

# Depth Control

- Depth gauge wheel  or press wheel

# Press Wheels

- Purpose –
  - Seed-to-soil contact
  - Control seeding depth
- 2 inch or V shaped preferred
- 1 inch – poor depth control
- >2 inch poor closing action

# ‘Planting Green’

**What**: Planting main crops in actively growing cover crops

**Why**:

- To allow the cover crops to put on more biomass
- To improve soil
- To avoid hair-pinning problems
- To improve weed control
- To save water in summer
- To increase natural enemies of insect pests attacking main crop

# ‘Planting Green’ – attachment

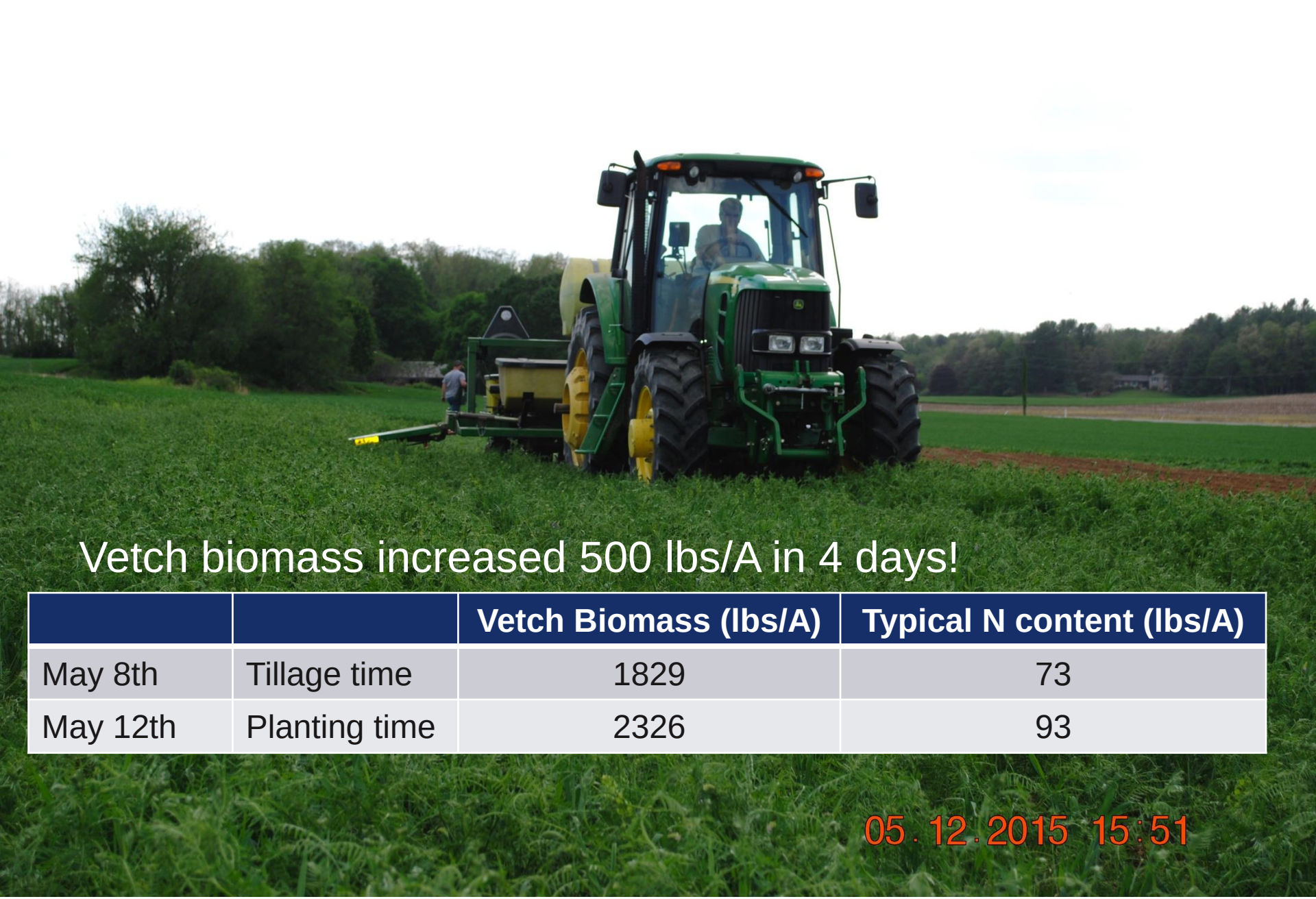
Designed and developed by farmer and engineer, Charles Martin, Perry County, Pennsylvania

Cover crop partially dead – difficult to cut by coulter, ‘hairpinning’

# Partially killed cover crop problems

# Some 2015 Planting Green Experiences

Planting corn into hairy vetch in a 3-year corn-soybean-wheat/vetch rotation




# Vetch biomass increased 500 lbs/A in 4 days!

| | | Vetch Biomass (lbs/A) | Typical N content (lbs/A) |
|---|---|---|---|
| May 8th | Tillage time | 1829 | 73 |
| May 12th | Planting time | 2326 | 93 |

Planting Green – corn into 1 ton hairy vetch DM
Herbides: glyphosate, Lexar, 2,4-D May 18th

Visual soil improvement with hairy vetch

# Vetch plowed in with moldboard plow

# Vetch plowed in with chisel plow

# After plowing you also need to disk harrow

# And harrow some more

# Field cultivator presents some challenges in heavy cover crop

Moldboard/disk/harrow
Planted green
06.12.2015 14:15

# Soil after MB/disk/harrow

# Soil after Planting Green

# After Moldboard/disk/harrow – harvest time

fter Planting Green – harvest time

# Corn Yields 2015

| | Yield (bu/a) |
|---|---|
| Moldboard/disk/harrow | 187 a |
| Chisel/disk/harrow | 211 b |
| Planted Green | 203 b |

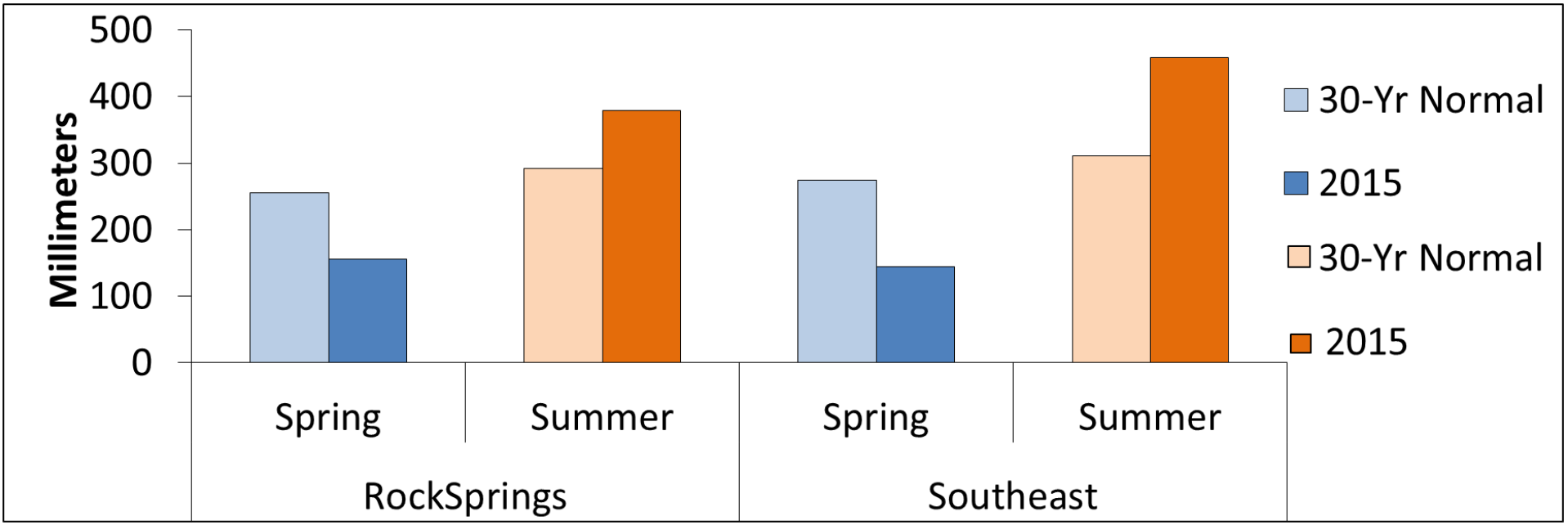
Used 90 lbs/A Nitrogen fertilizer

# Farmer-Cooperator Experiments

- Centre County (soybeans only)
- Clinton County (corn + soybean)
- Lancaster County (corn only)

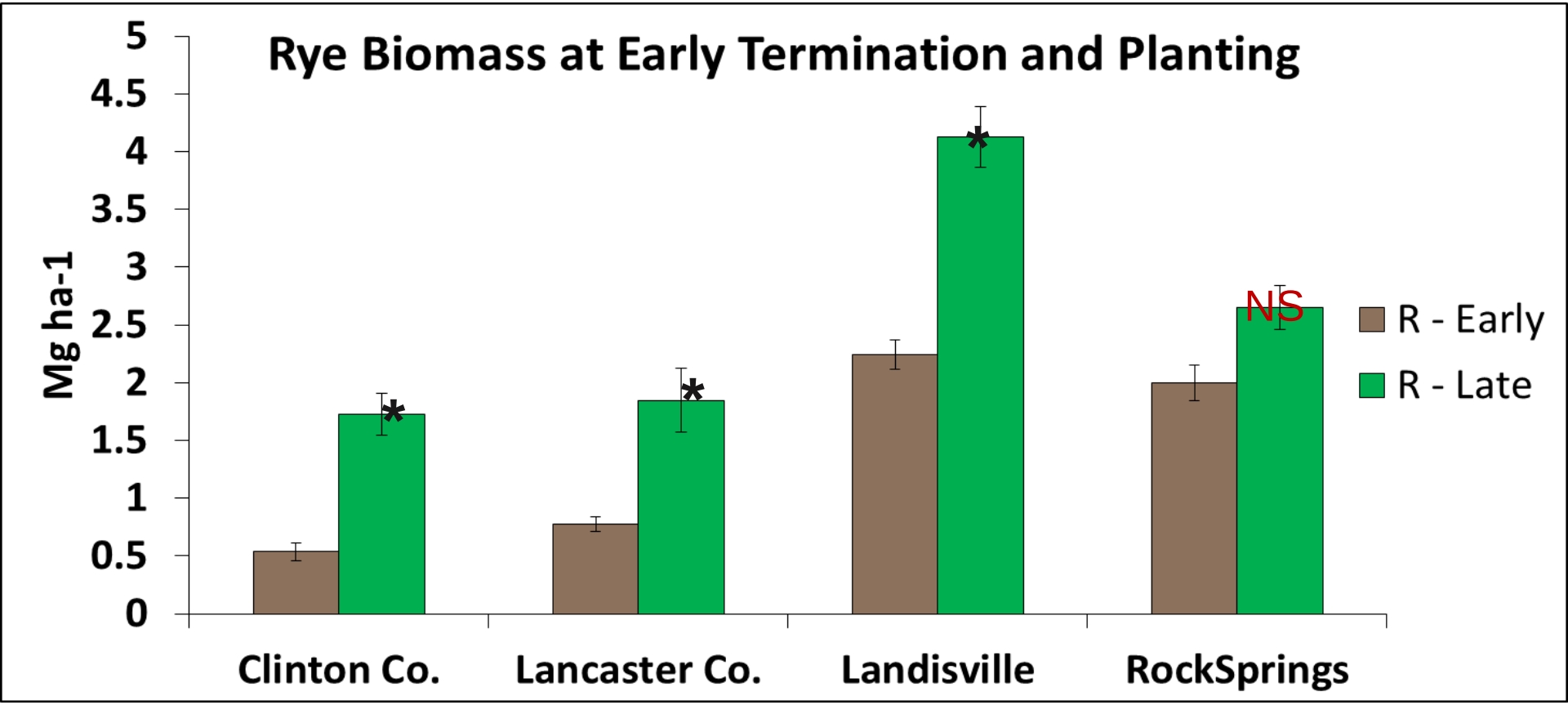
- Termination timing
  - Early
  - Late (planted green)

# 2015: Dry spring, wet summer



# Corn Experiment

| Site | Rye Planting Date | Rye Seeding Rate | Early Termination Date | Late Termination Date | Cash Crop Planting Date |
|---|---|---|---|---|---|
| Clinton Co. | 31-Oct | 54 kg ha $^{-1}$ | 18-May | 7-Jun | 27-May |
| Lancaster Co. | 20-Oct | 41 kg ha$^{-1}$ | 2-May | 13-May | 11-May |
| **Landisville** | 30-Sep | 54 kg ha$^{-1}$ | 5-May | 29-May*, 21-May | 19-May |
| **Rock Springs** | 30-Sep | 54 kg ha$^{-1}$ | 8-May | 18-May | 14-May |

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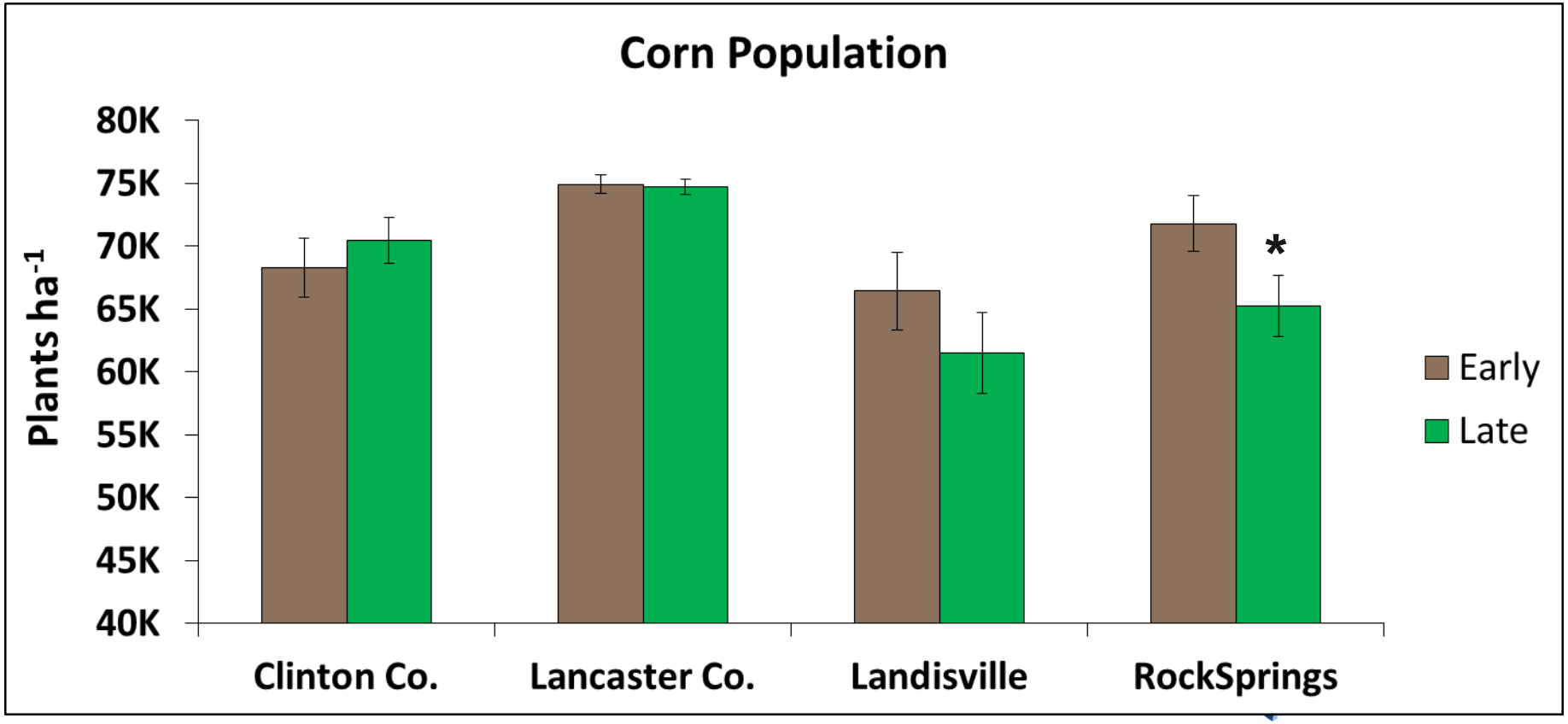
EARLY

LATE

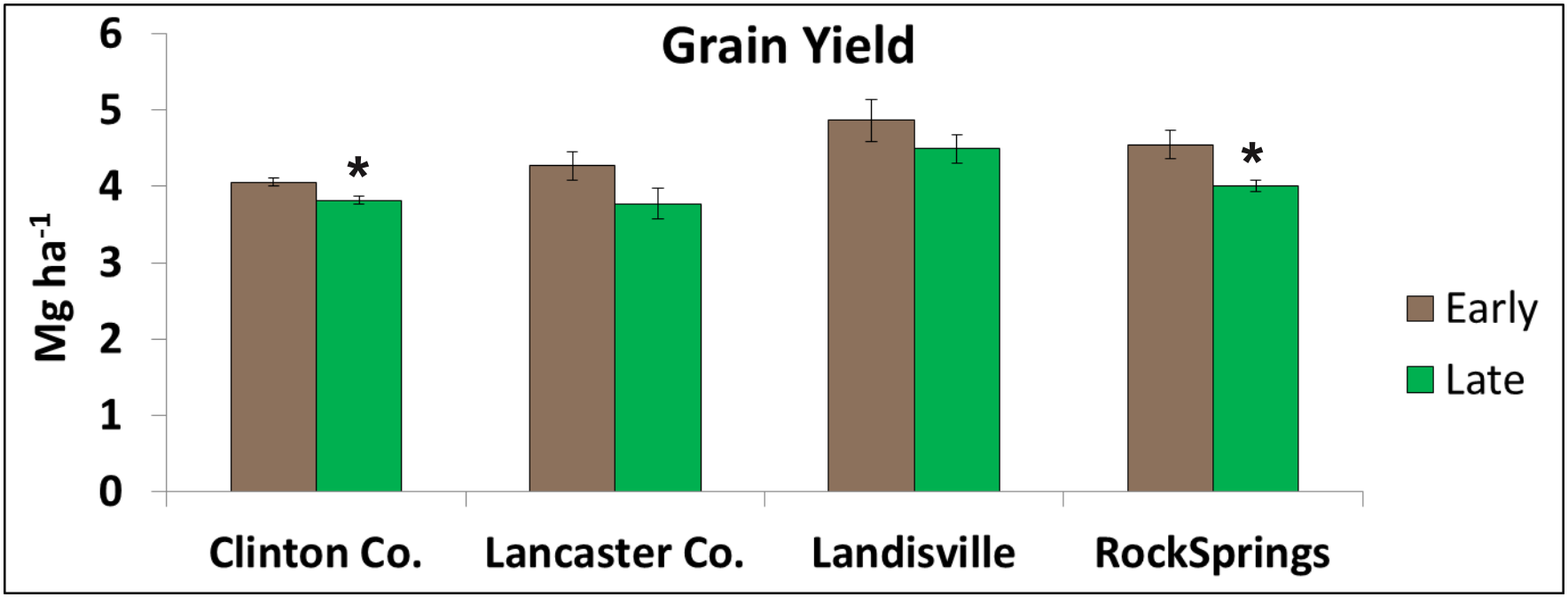
# Corn Experiment

- Corn populations were no different between treatments at ¾ study sites. At Rock Springs, population was reduced by 9%



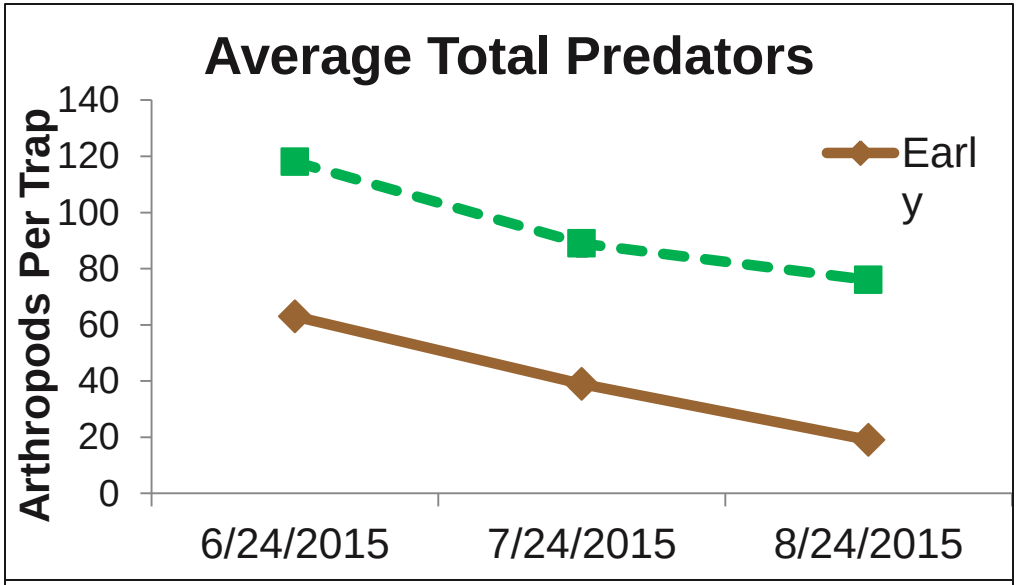
# Corn Experiment

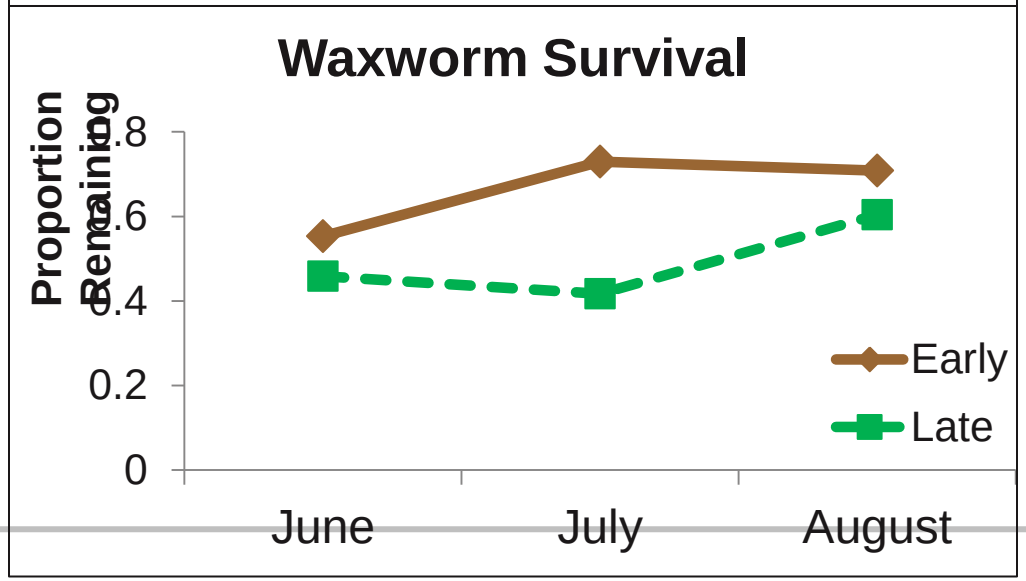
- Corn grain yield was significantly lower (9%) at half of the study sites. Yield was numerically lower at all four sites.



**Plots were planted on the same day.**
**(Landisville, PA)**

# Planting green increased beneficial insect populations and predation in the rye treatment

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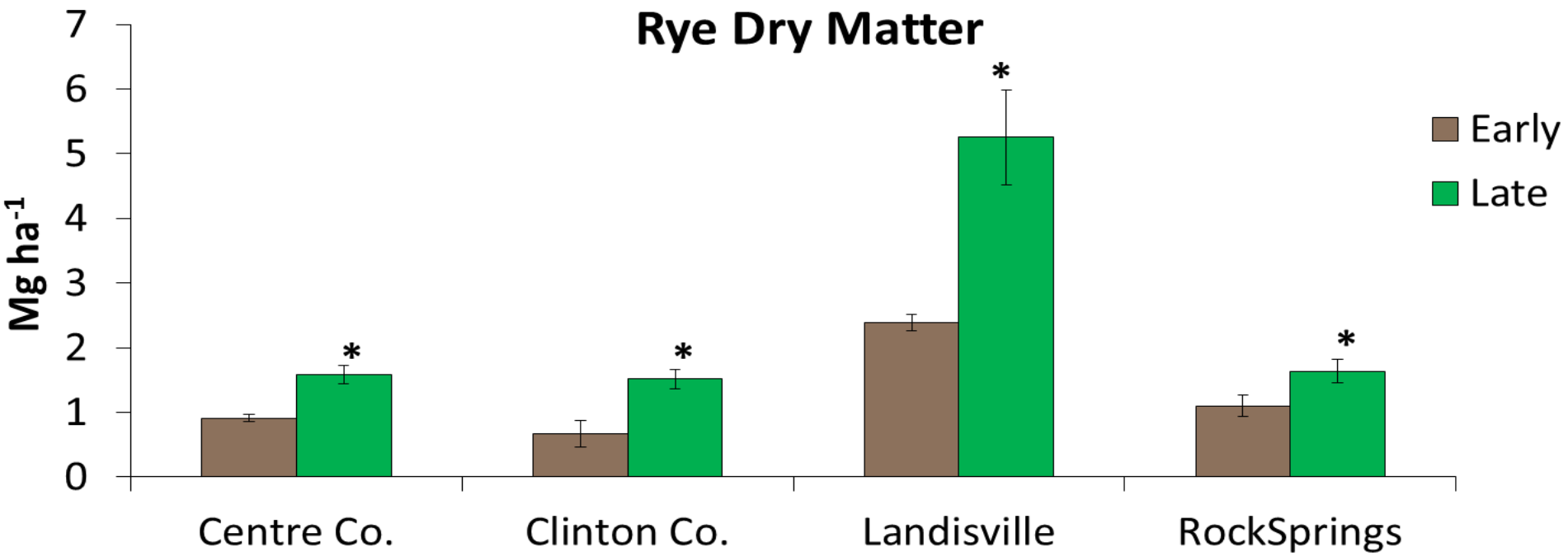
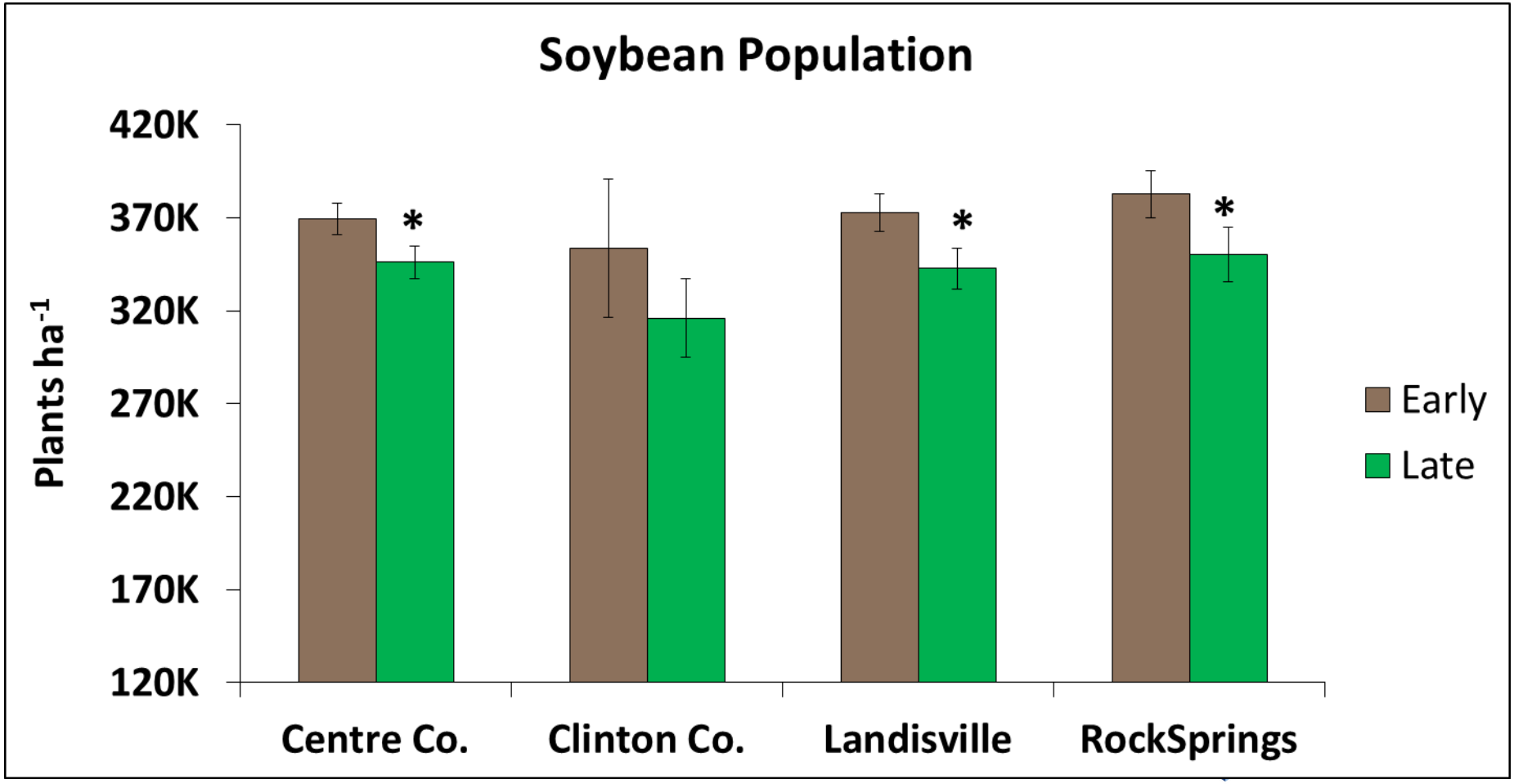
# Soybean Experiment

| Site | Rye Planting Date | Rye Seeding Rate | Early Termination Date | Late Termination Date | Soybean Planting Date |
|---|---|---|---|---|---|
| Centre Co. | 28-Oct | 41 kg ha $A^{-1}$ | 4-May | 9-May | 9-May |
| Clinton Co. | 31-Oct | 54 kg $ha^{-1}$ | 18-May | 23-Jun | 22-May |
| **Landisville** | 30-Sep | 24, 41, or 54 kg $ha^{-1}$ | 5-May | 21-May | 19-May |
| **Rock Springs** | 30-Sep | 24, 41, or 54 kg $ha^{-1}$ | 8-May | 18-May | 14-May |



# Soybean Experiment

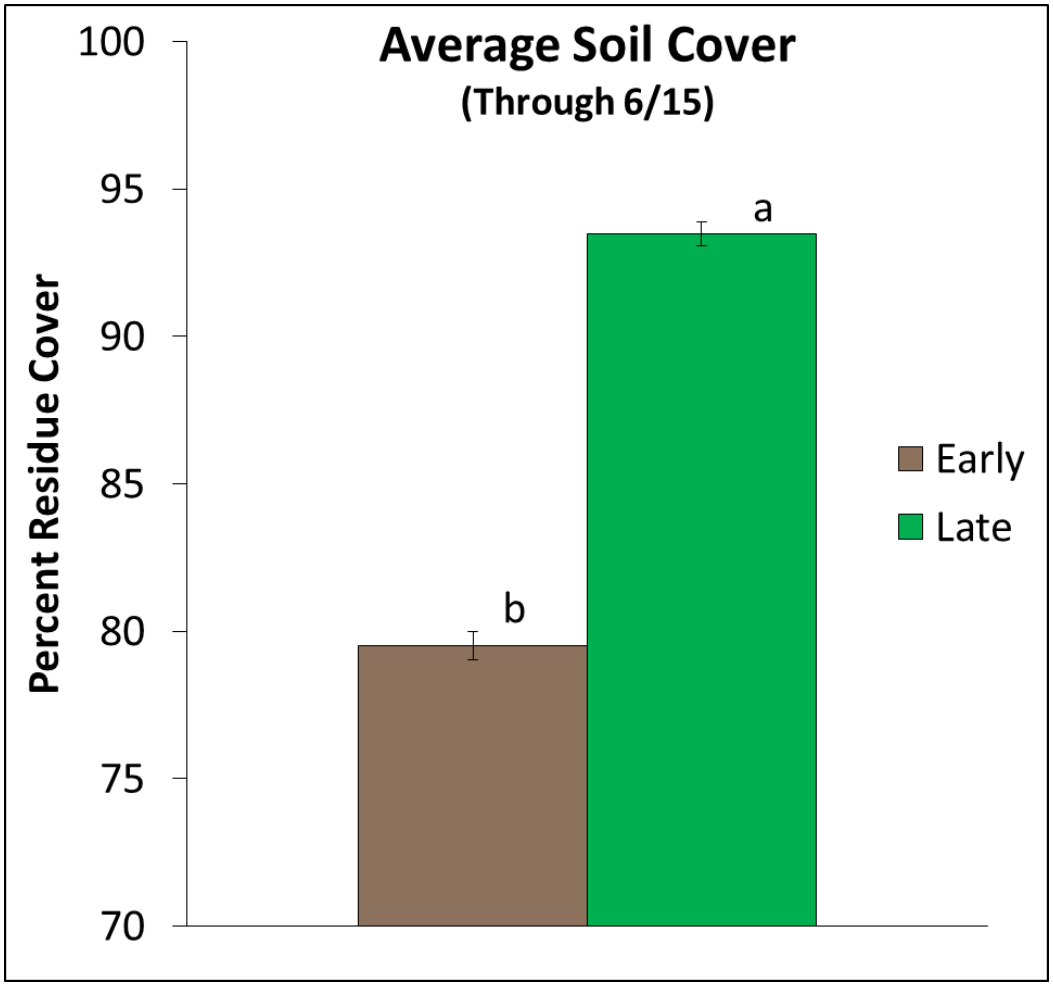
- Soybean populations were reduced by an average of 7% in late-terminated plots in 3 of 4 locations.

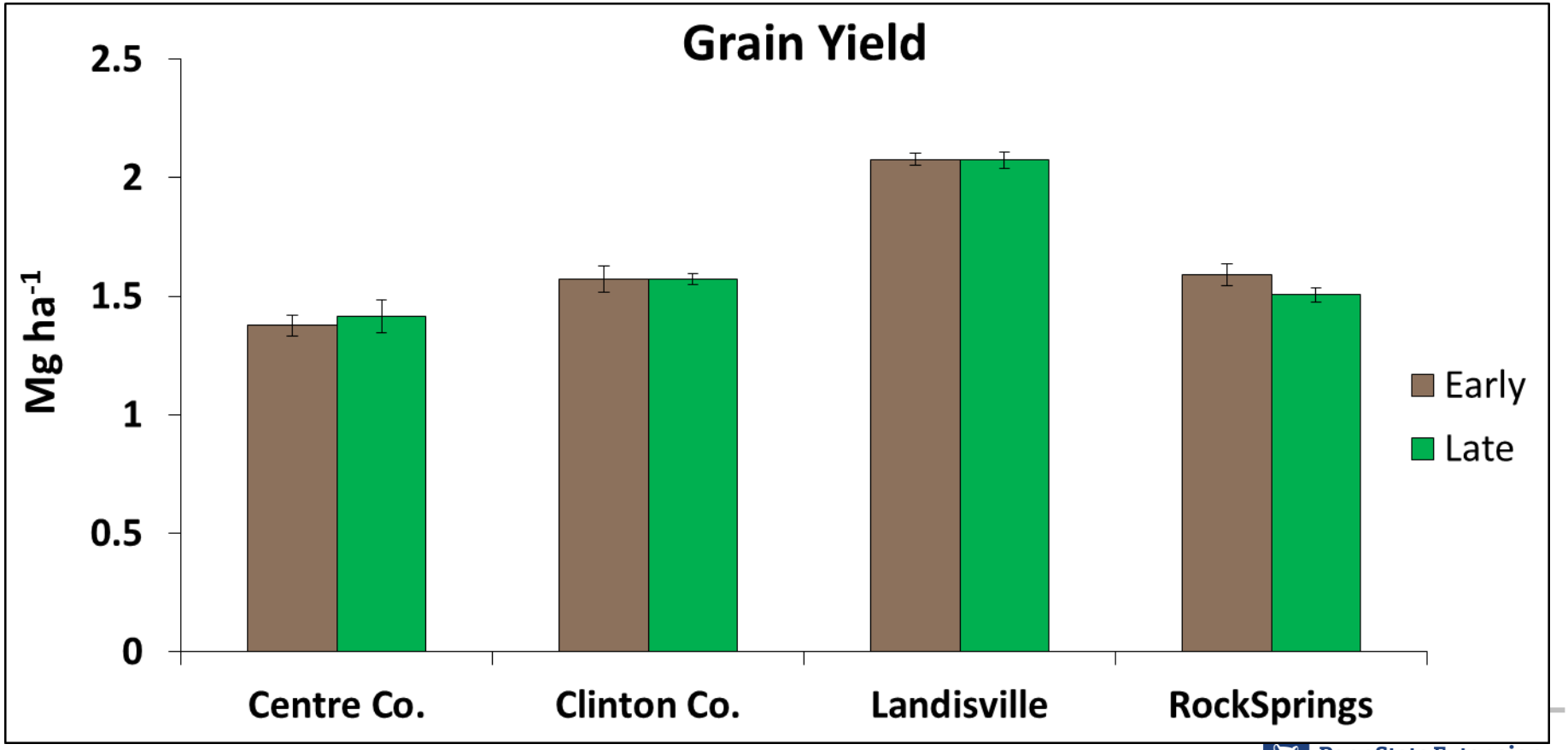


Early terminated
Landisville

Planted Green
Landisville

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



# Soybean Experiment

- Soybean yield was not affected by rye termination time at any of the 4 locations.