Cash Crop Establishment Into/After Cover Crops

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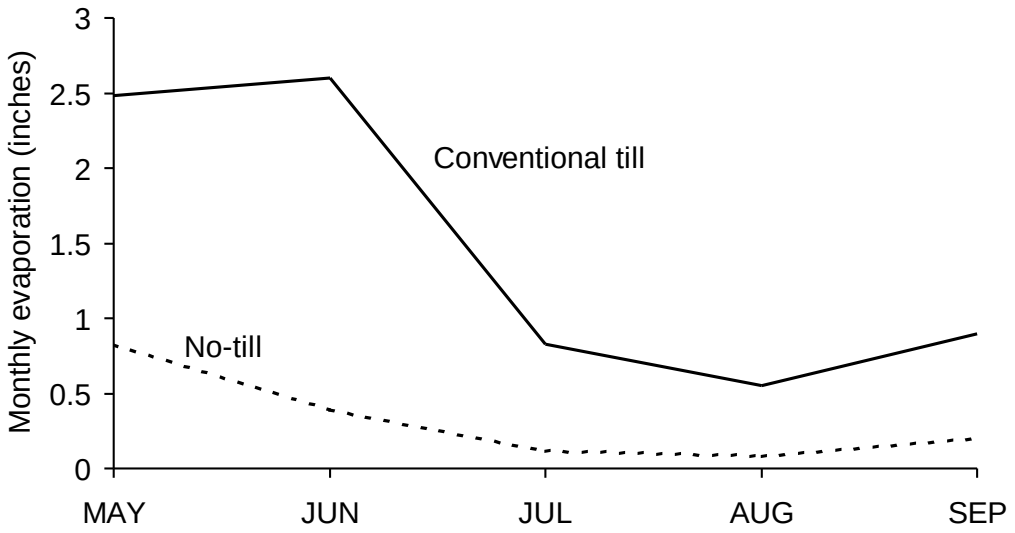
Why No-Till: Reduced Sheet Erosion

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

This soil can become like this

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


Relax! Do no tillage!
Why No-Tillage?
- Labor Savings
Soil tillage is hard work!
07/18/2009

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

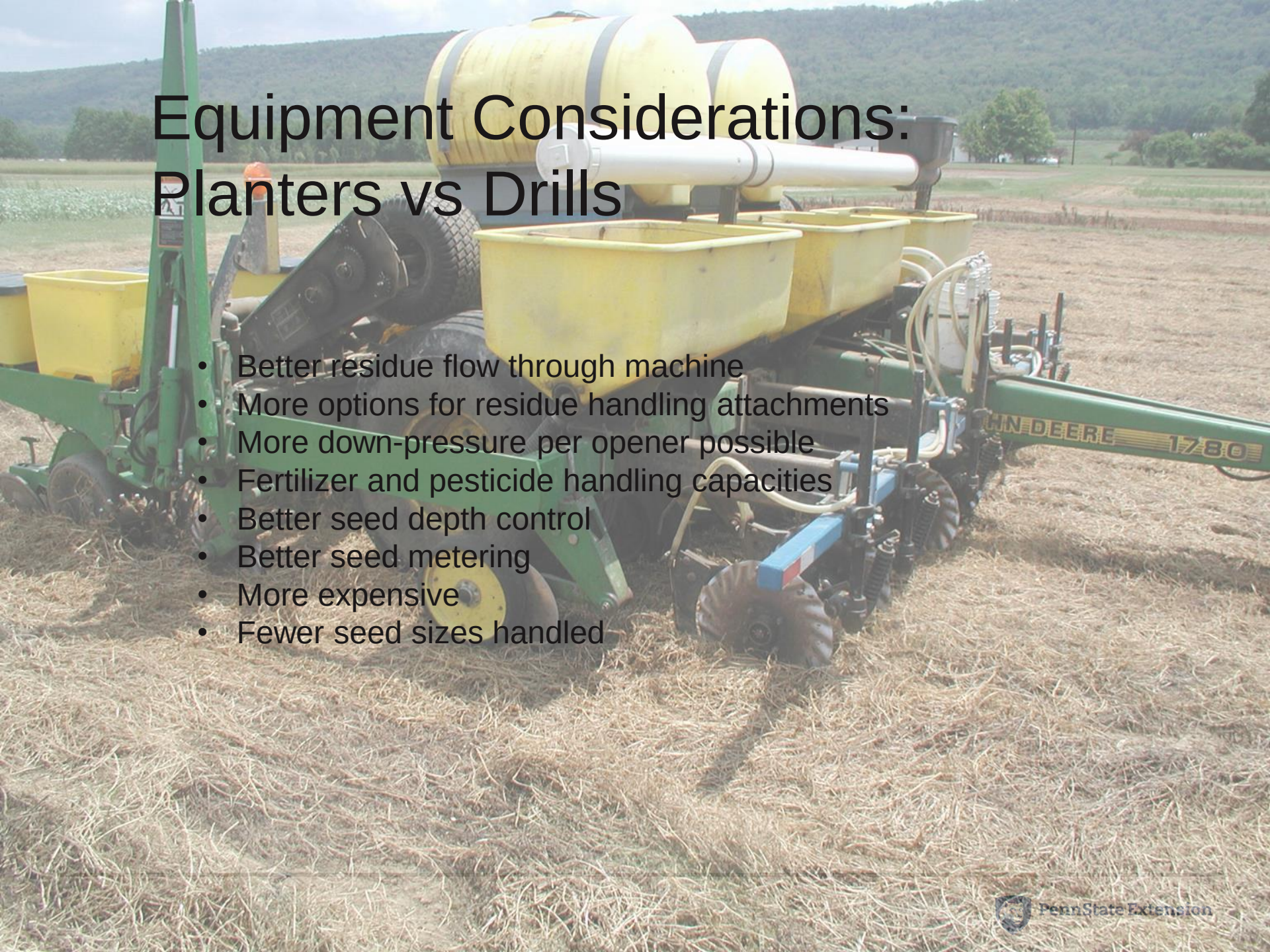

JOHN DEERE
Bats worn


Chaff not spread out


Chaff
Spreader
Straw
Spreader

Straw Residue Effect on NT Sorghum-sudangrass

Equipment Considerations: Planters vs Drills



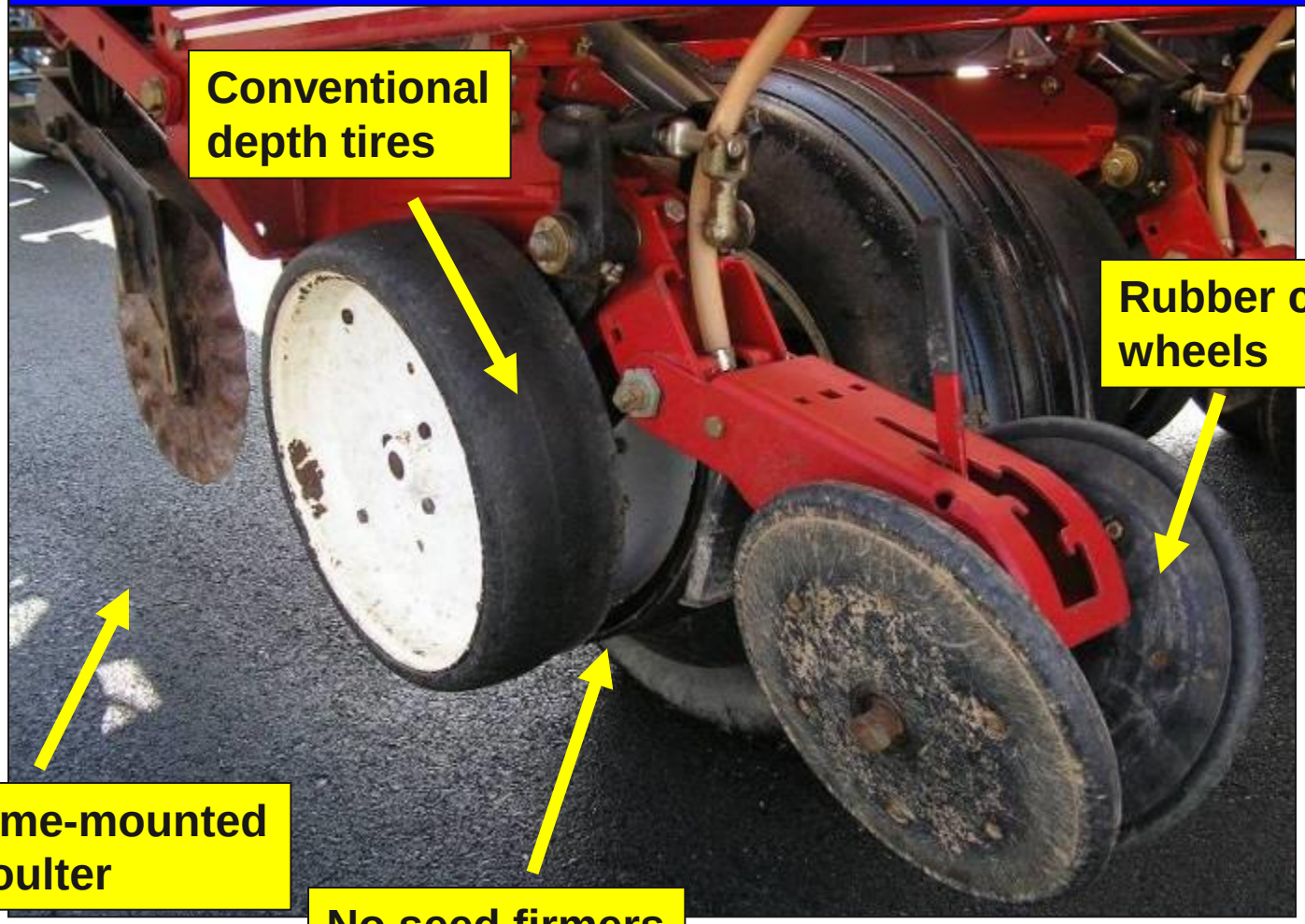
- Better residue flow through machine
- More options for residue handling attachments
- More down-pressure per opener possible
- Fertilizer and pesticide handling capacities
- Better seed depth control
- Better seed metering
- More expensive
- Fewer seed sizes handled

Equipment Considerations: Enough Weight on Planter or Drill

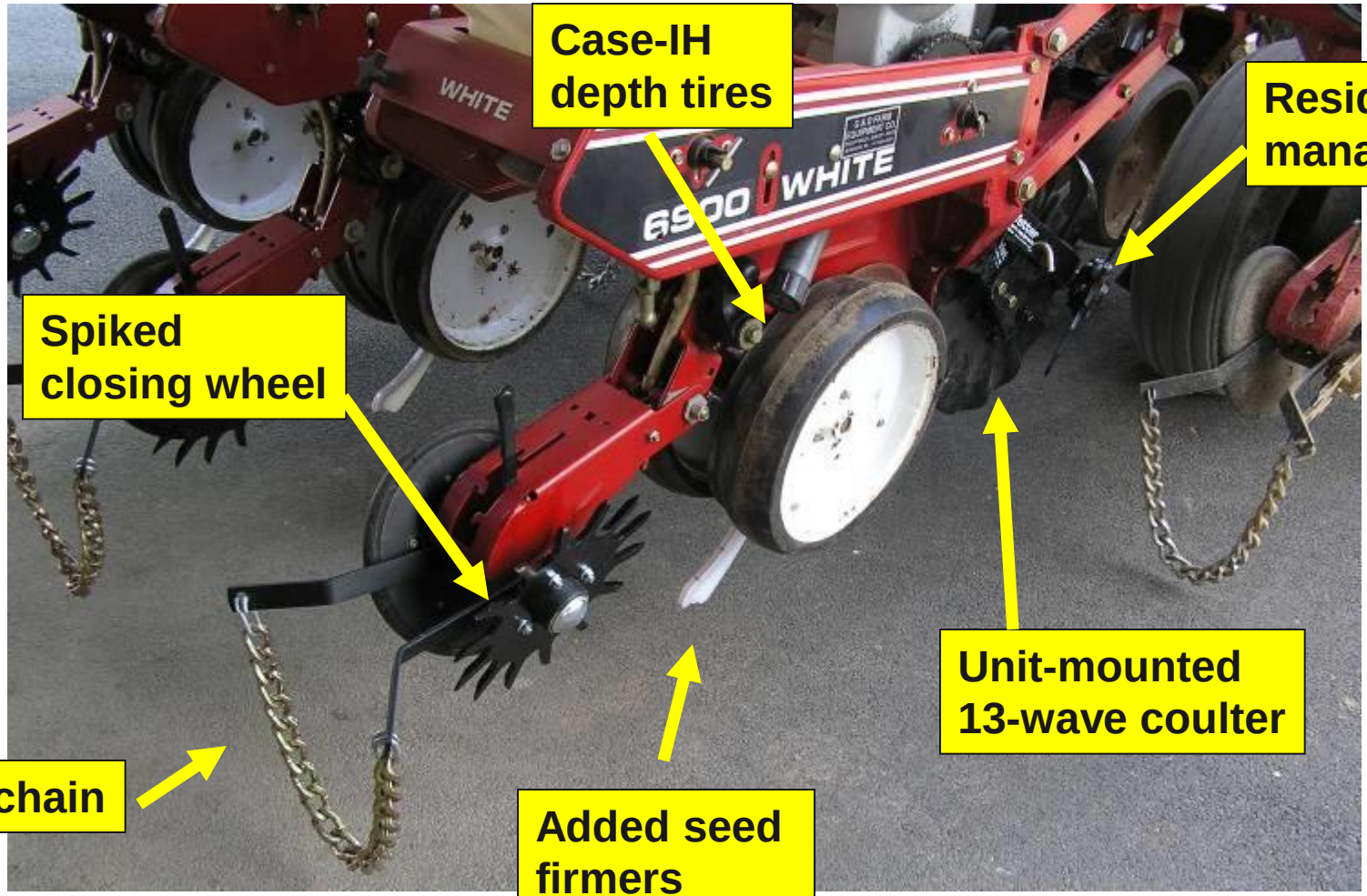
Example of Improved Planter Set-up for No-Till

- 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
6900 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

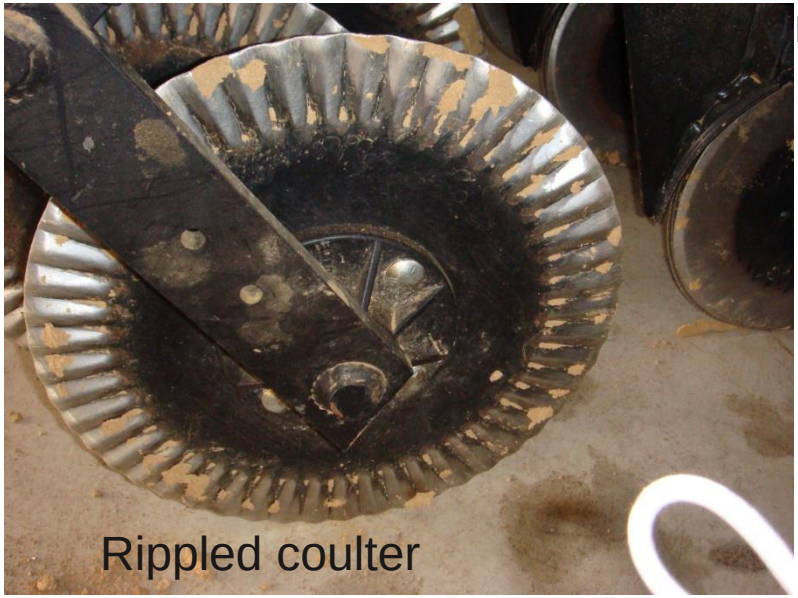
1” waves

16” -20” diameter

8-wave fluted coulter

1 ¼” waves,

14 5/8”-20” diameter



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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

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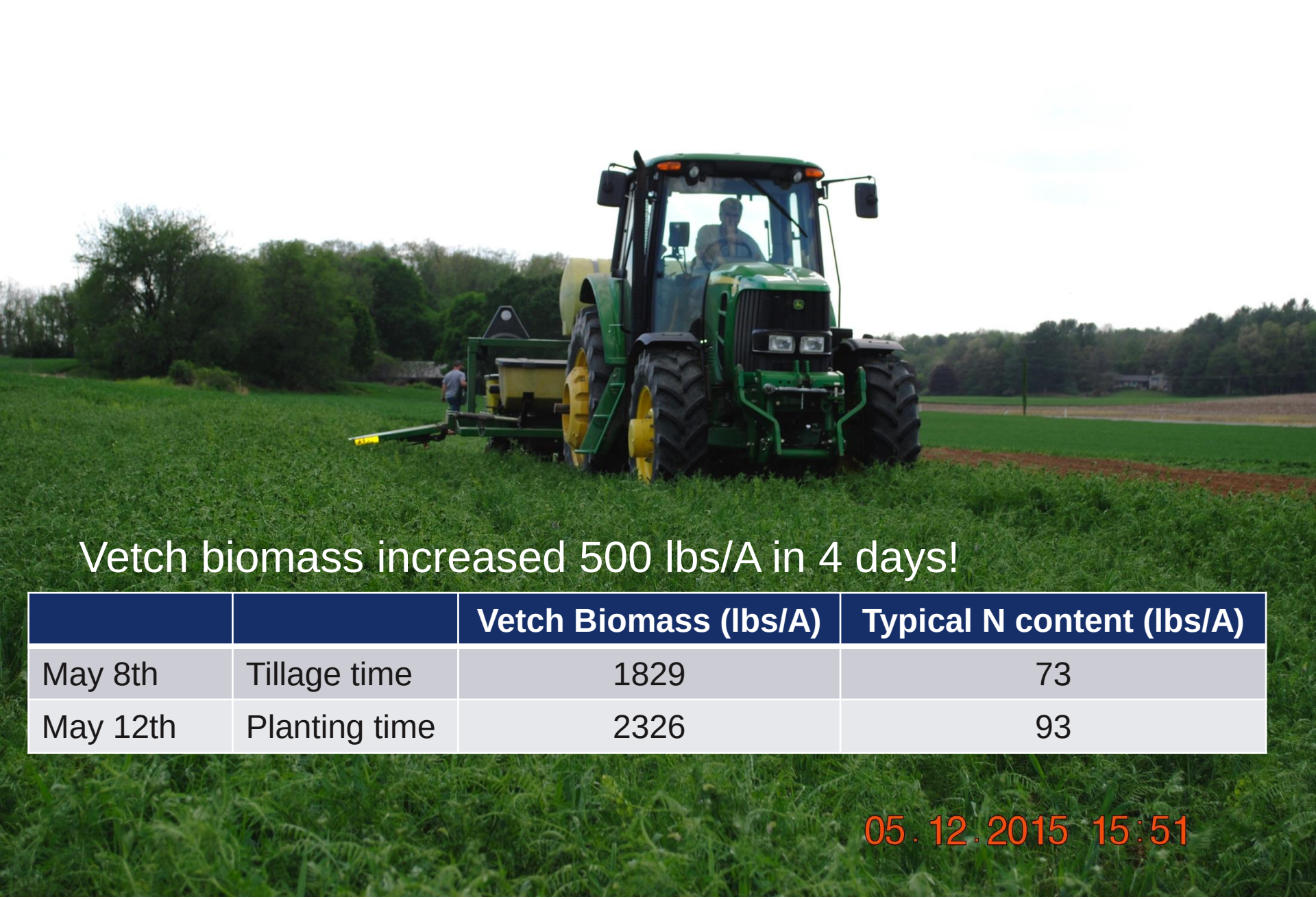
Cover crop partially dead – difficult to cut by coulter, ‘hairpinning’

Partially killed cover crop problems

Cover crop ‘bales’ created by row cleaners

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
05.12.2015 15:52


Visual soil
improvement
with hairy vetch
05.12.2015 16:12

Vetch plowed in with moldboard plow

Vetch plowed in with chisel plow


After plowing you also need to disk harrow
05.11.2015 10:03

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
06.12.2015 14:15


Soil after Planting Green
06 12 2015 14 16

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

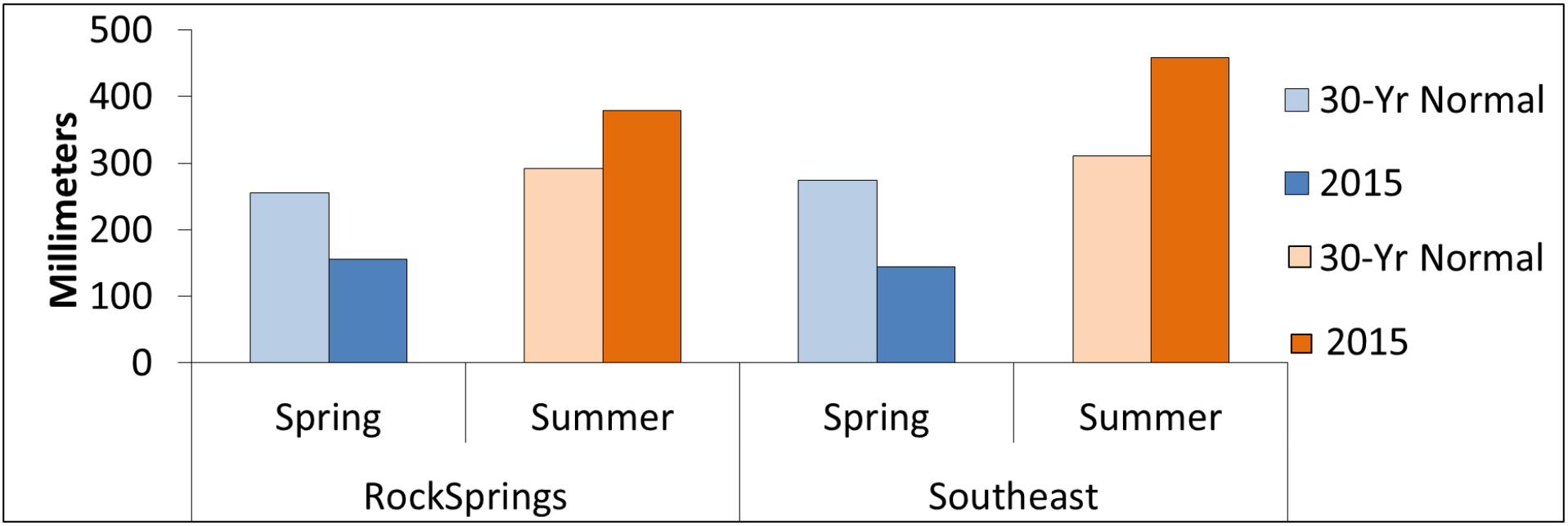
05:12:2015 16:16

Farmer-Cooperator Experiments

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

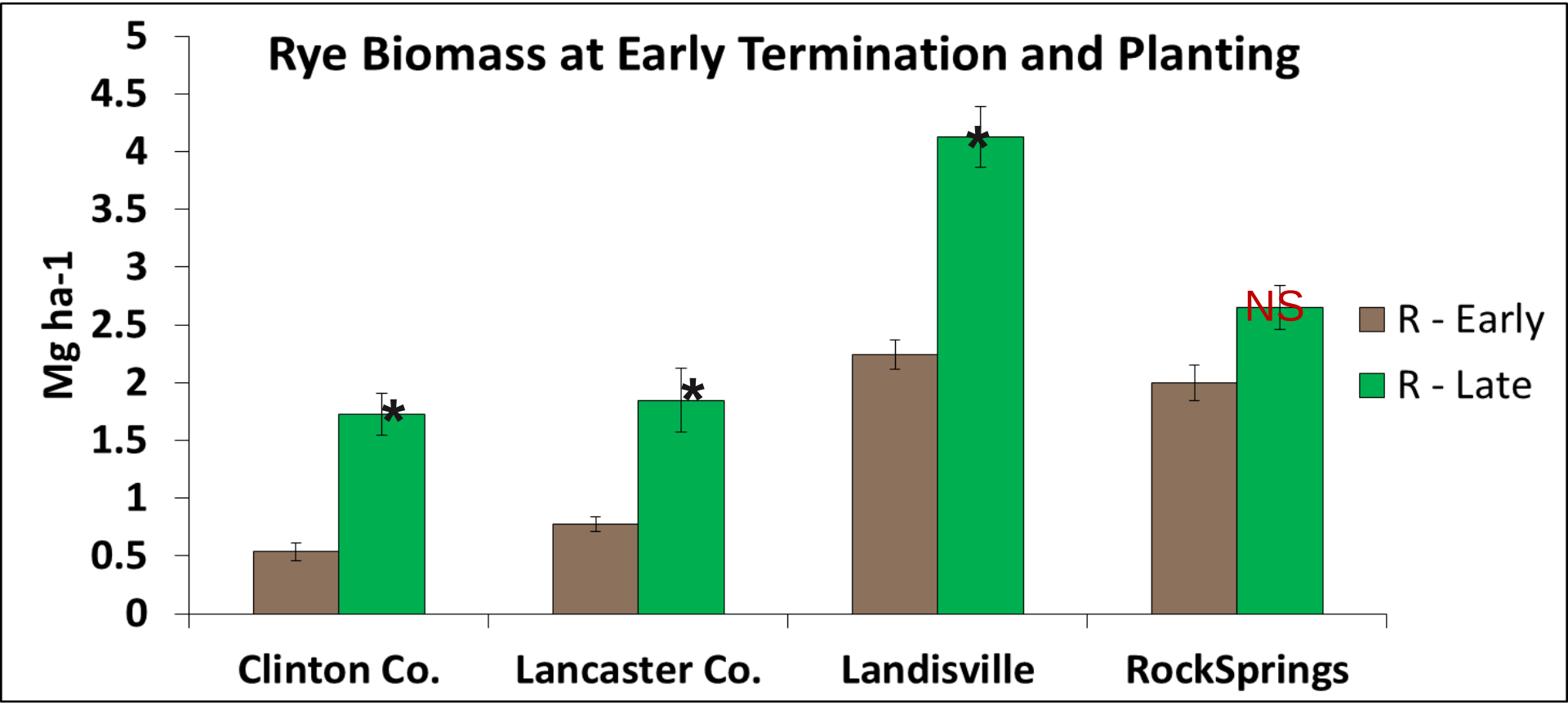
- Termination timing
  - Early
  - Late (planted green)

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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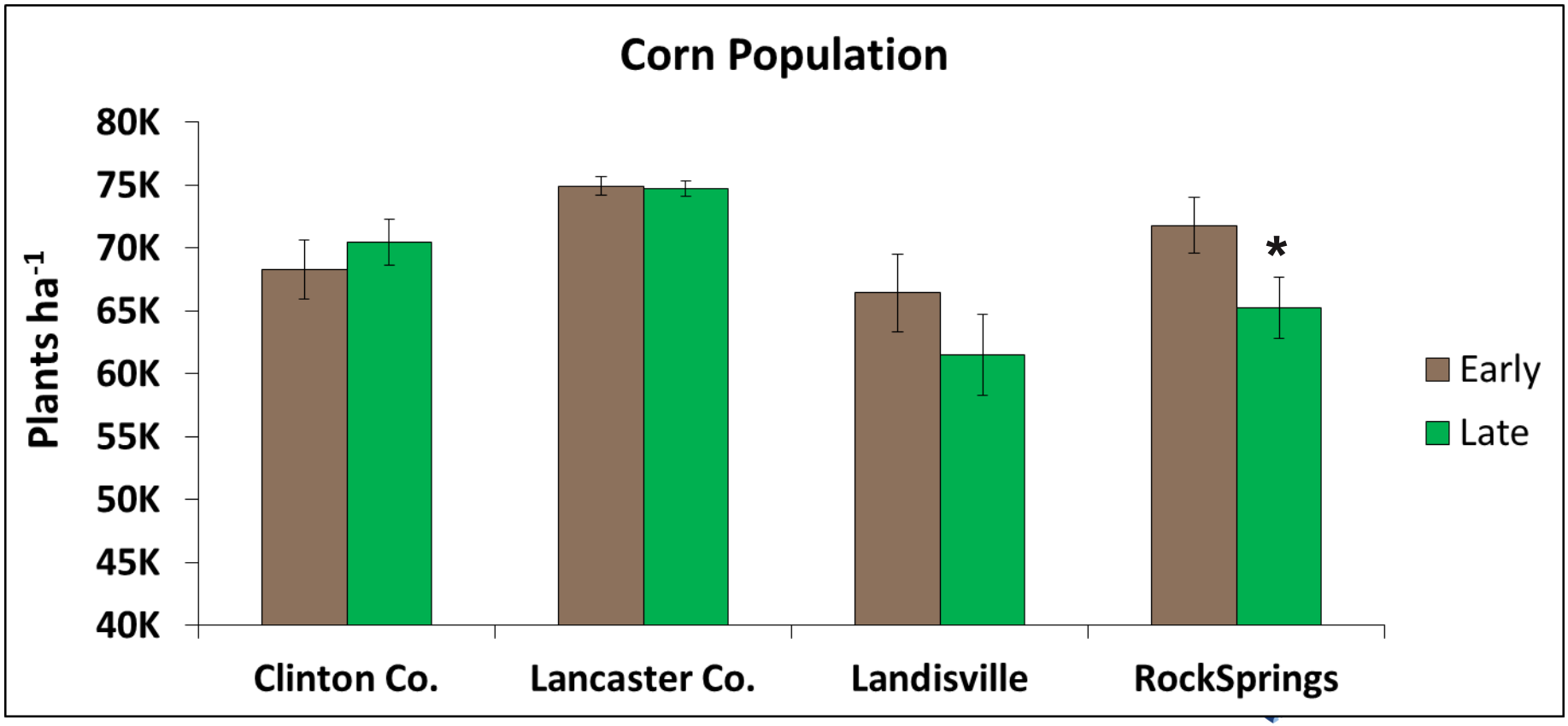
EARLY
LATE

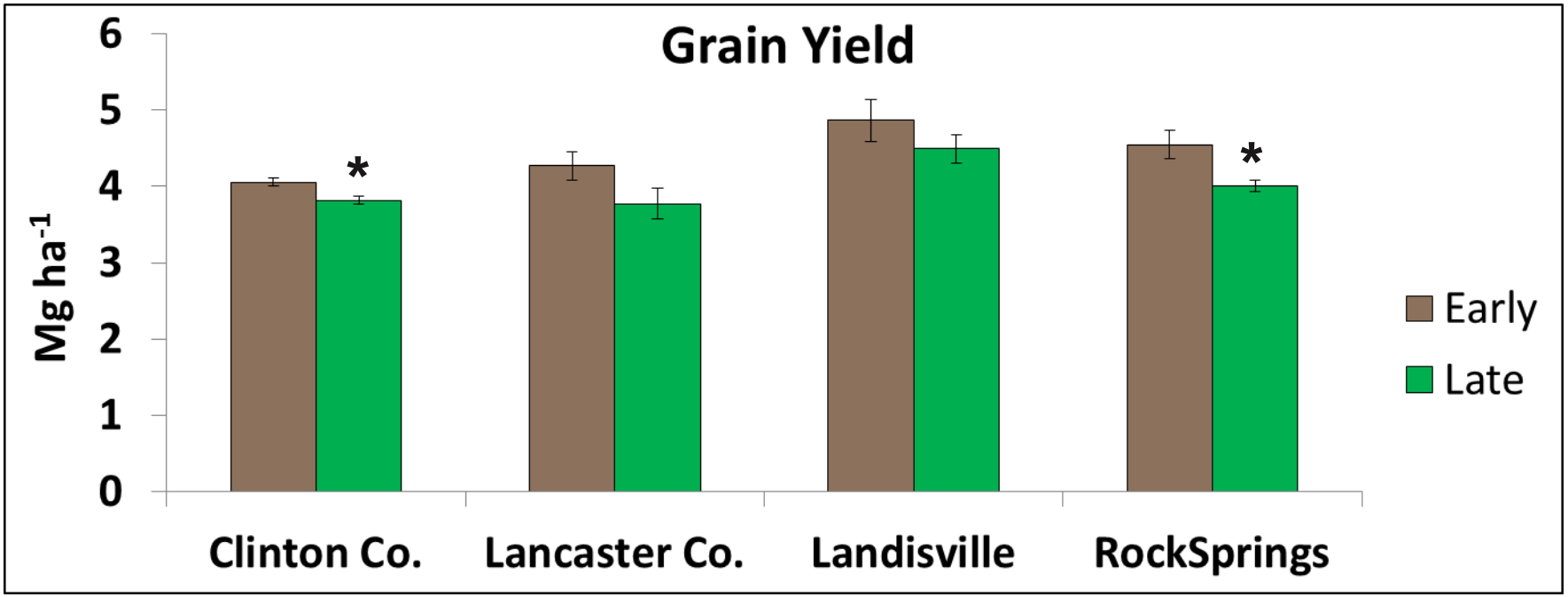
Corn Experiment

- 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.

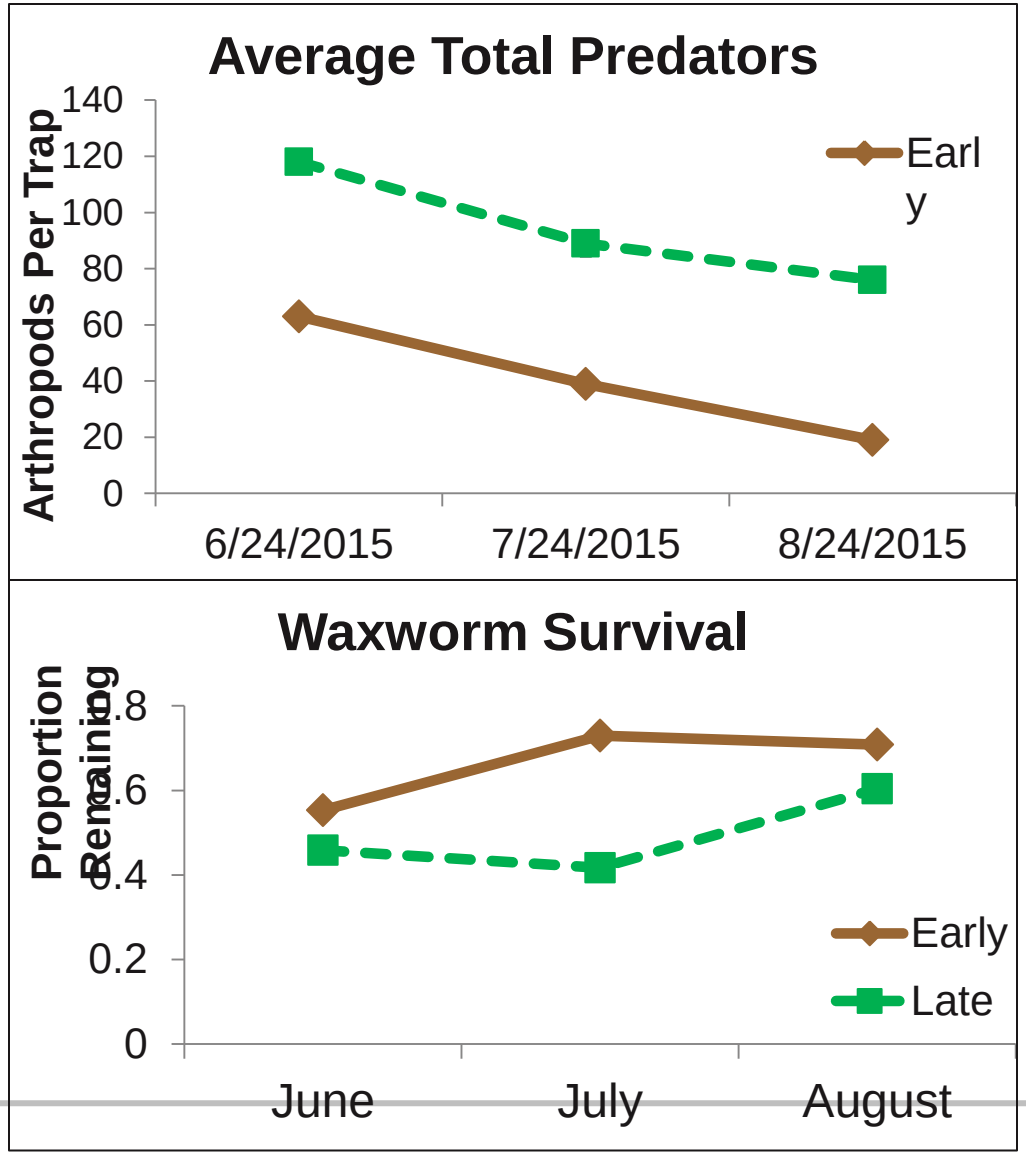


Plots were planted on the same day.
(Landisville, PA)

planted into early terminated rye

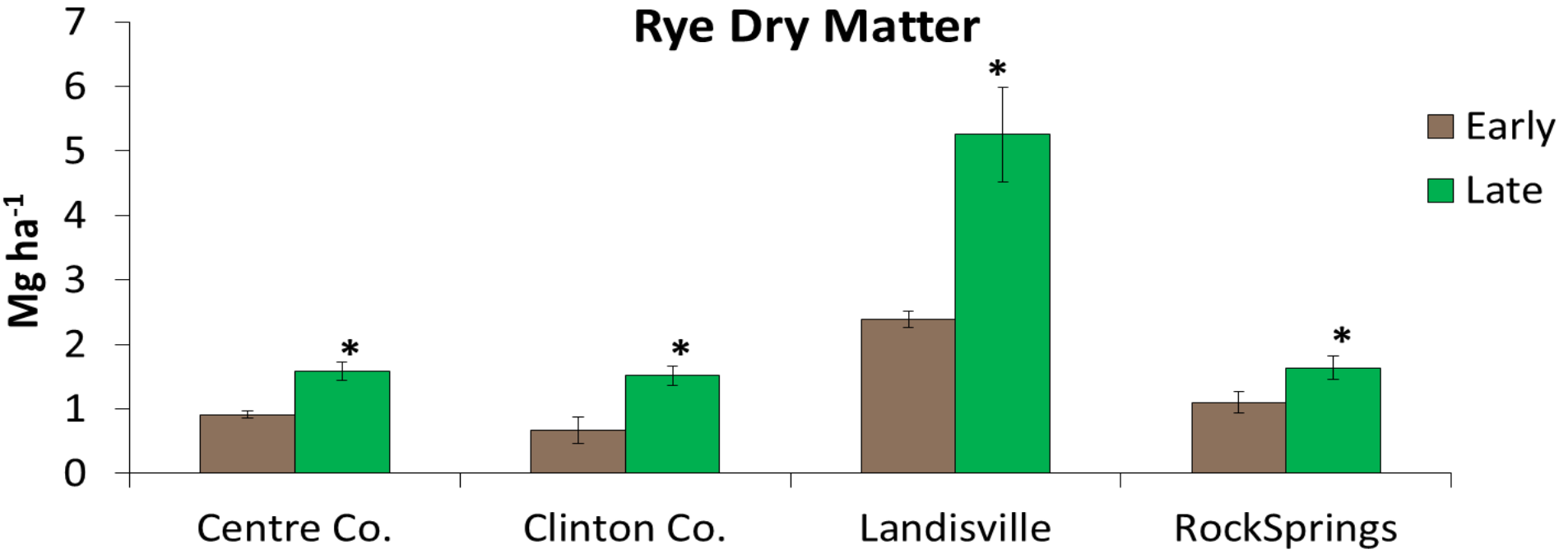
Planted Green into

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



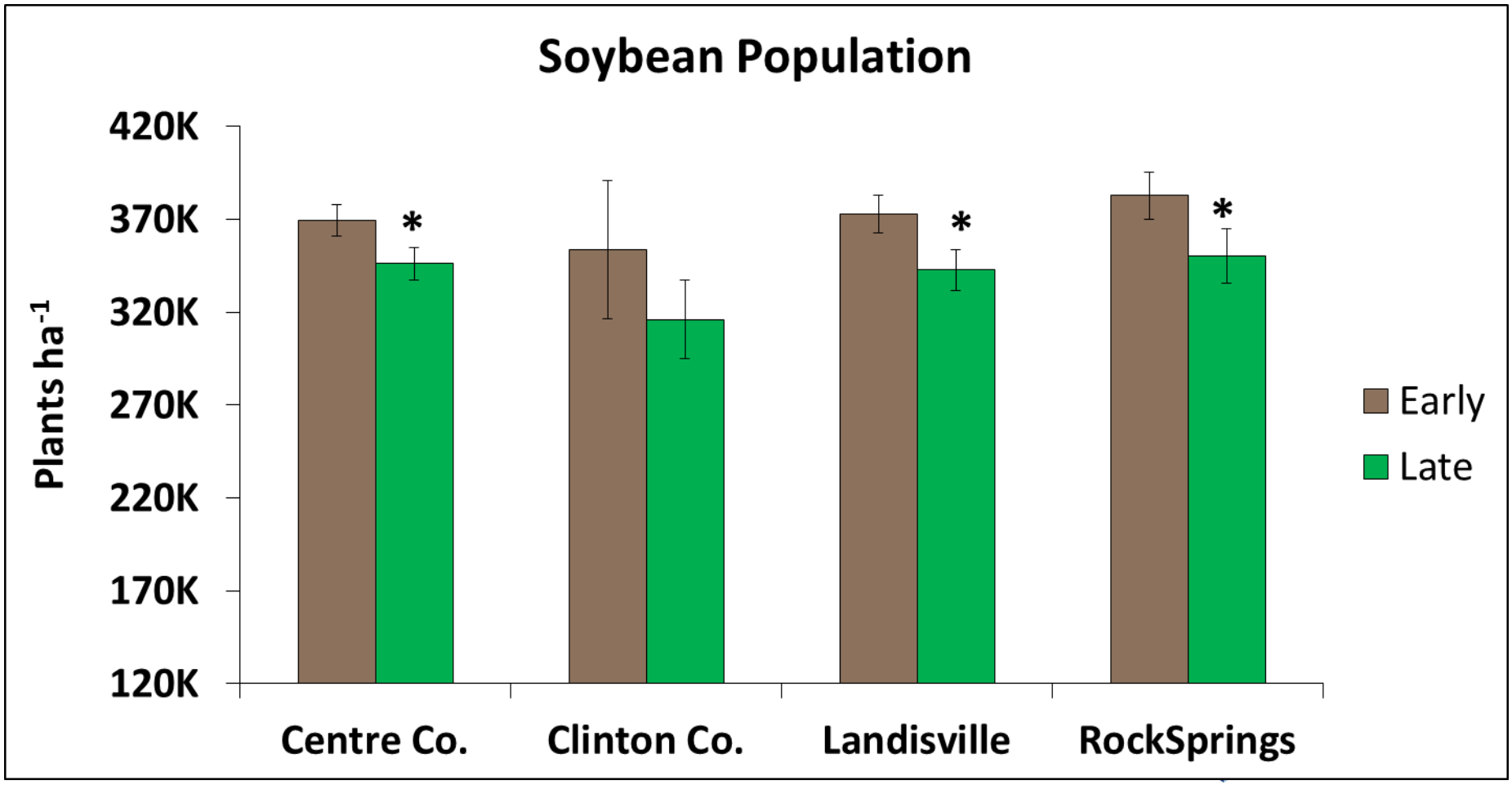
Soybean Experiment

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

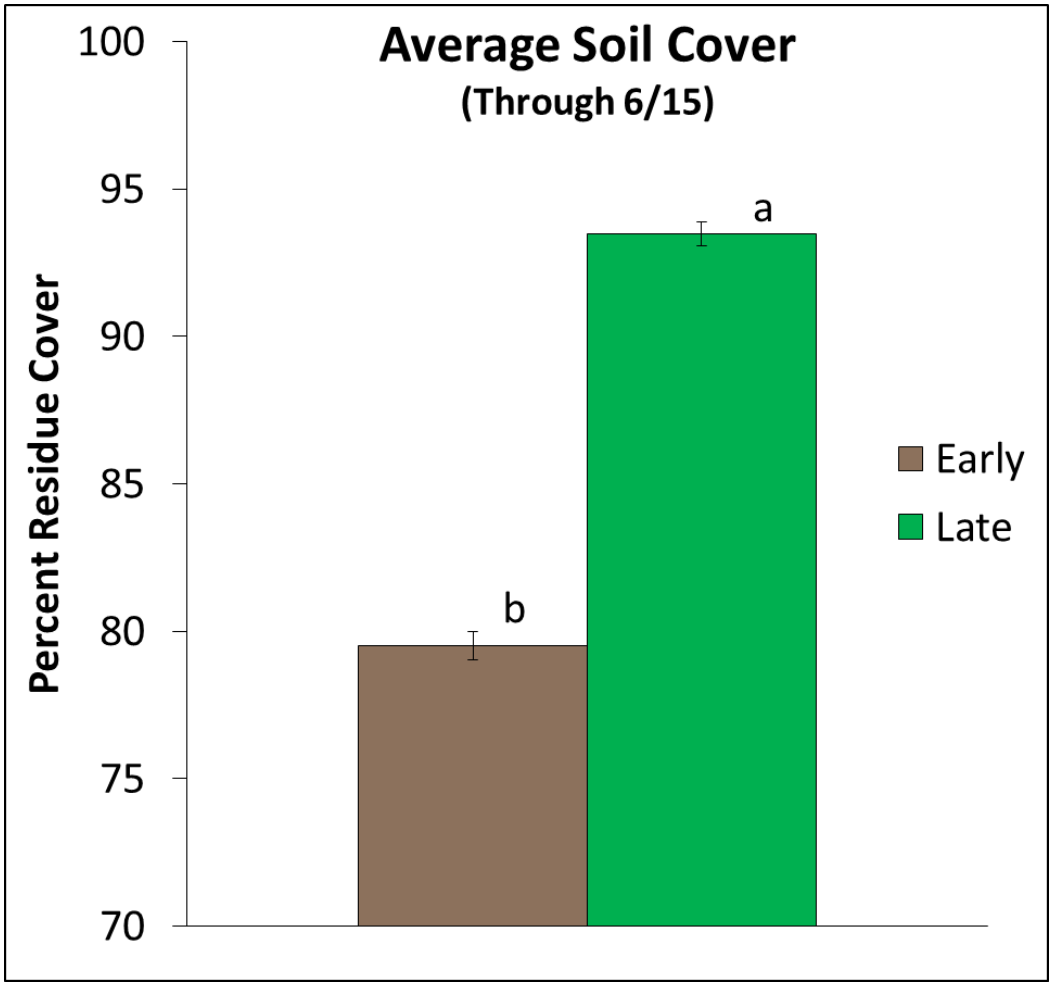
- Soybean populations were reduced by an average of 7% in late-terminated plots in 3 of 4 locations.



Early terminated
Landisville

Planted Green
Landisville

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



Landisville Soy

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Soybean Experiment

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