Soybean Management for 2023

Laura Lindsey

Corn College/Soybean School Webinar

February 10, 2023

THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

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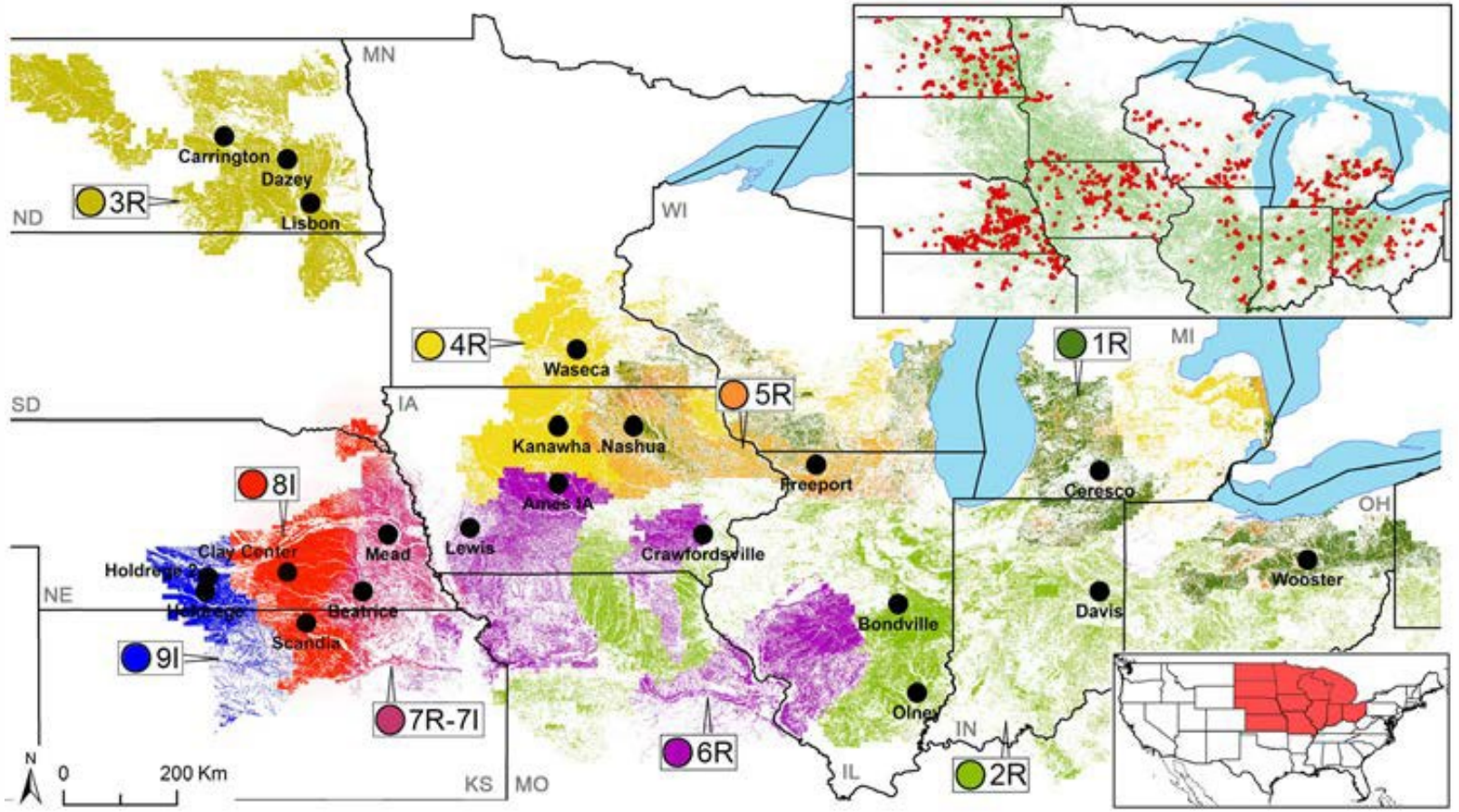
Soybean Planting Date is #1 Management Factor that Influences Yield



Rattalino Edreira et al., 2017

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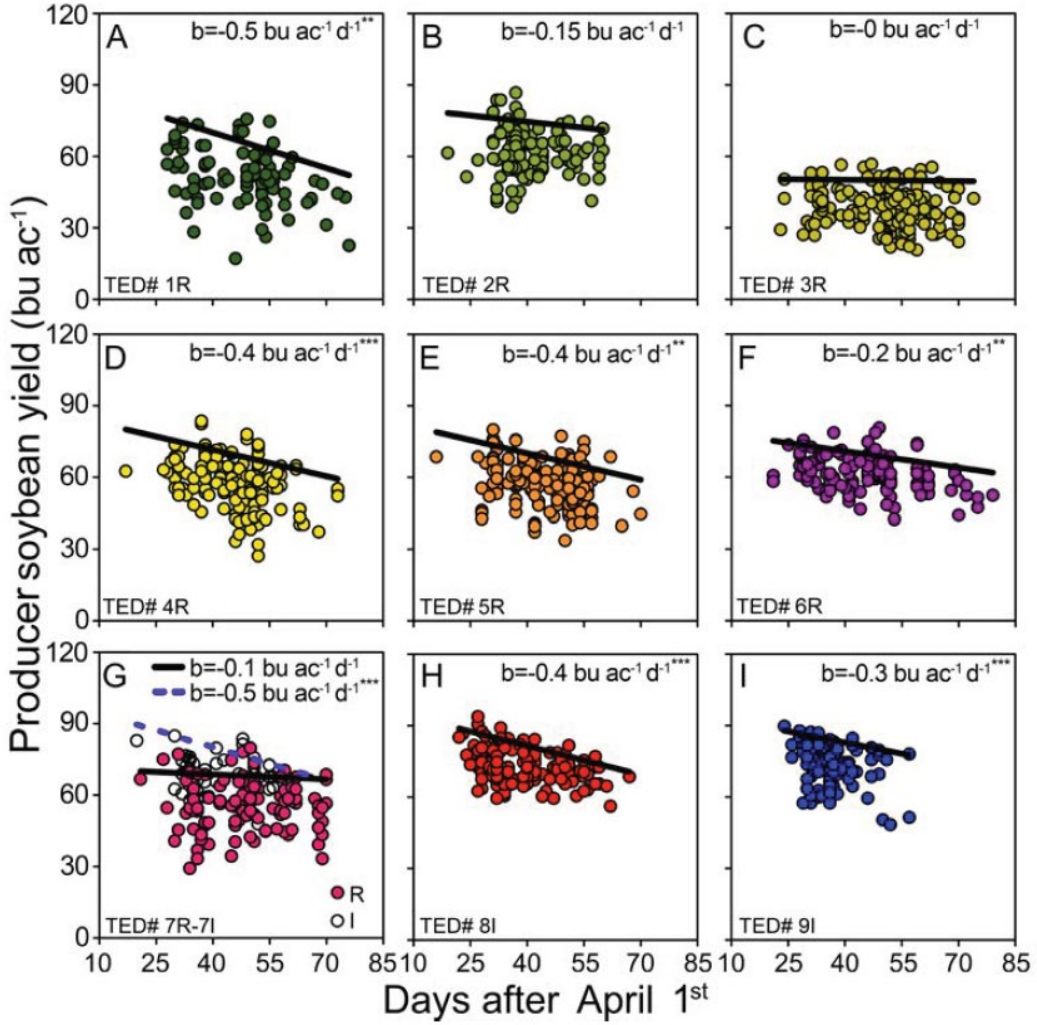
Soybean Planting Date is #1 Management Factor that Influences Yield



Rattalino Edreira et al., 2017

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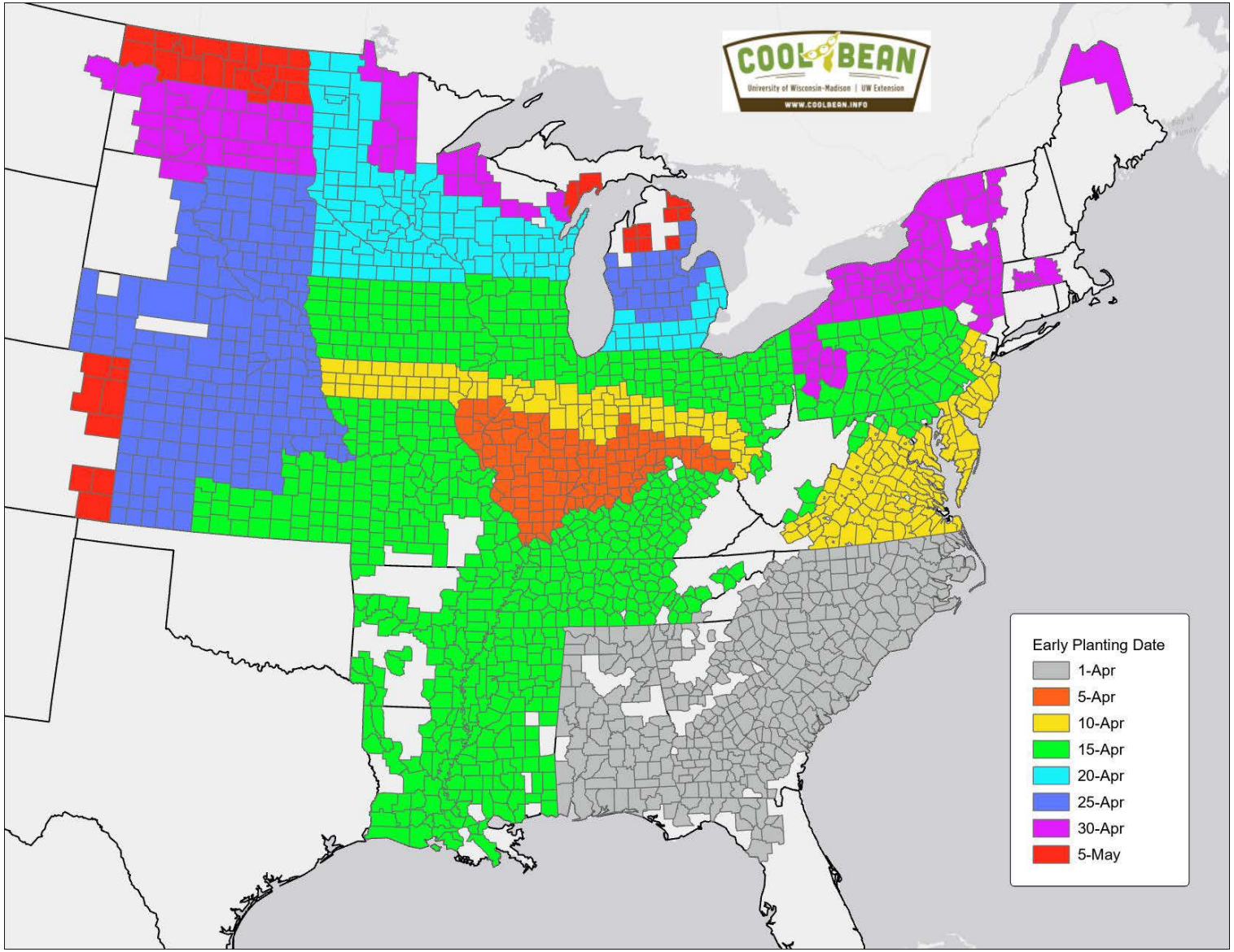
Revised crop insurance dates for early planting!



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Using Data-Driven Knowledge for Profitable Soybean Management Systems

- Develop a new online cropping system optimization decision tool for soybean farmers in the North Central Soybean production zone

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What We Need From You…

- We need data from Ohio to make the tool relevant to Ohio growers.
  - Online or Paper Survey
  - Provide field management and yield information

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How early is too early?

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How early is too early?

…If I wait, will I be planting in June?

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2021 & 2022 Planting Date x Cover Crop Study

- Target planting dates
  - Ultra Early: First week of April
  - Early: Last week of April
  - Normal: Mid-May

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Planting Date x Cover Crop Study

- Cover crop treatments
  - None
  - Rye terminated early (planting into a dead cover crop)
  - Rye terminated late (‘planted green’)

No cover crop present.

Rye cover crop terminated early.

Soybeans planted green into a living rye cover crop.

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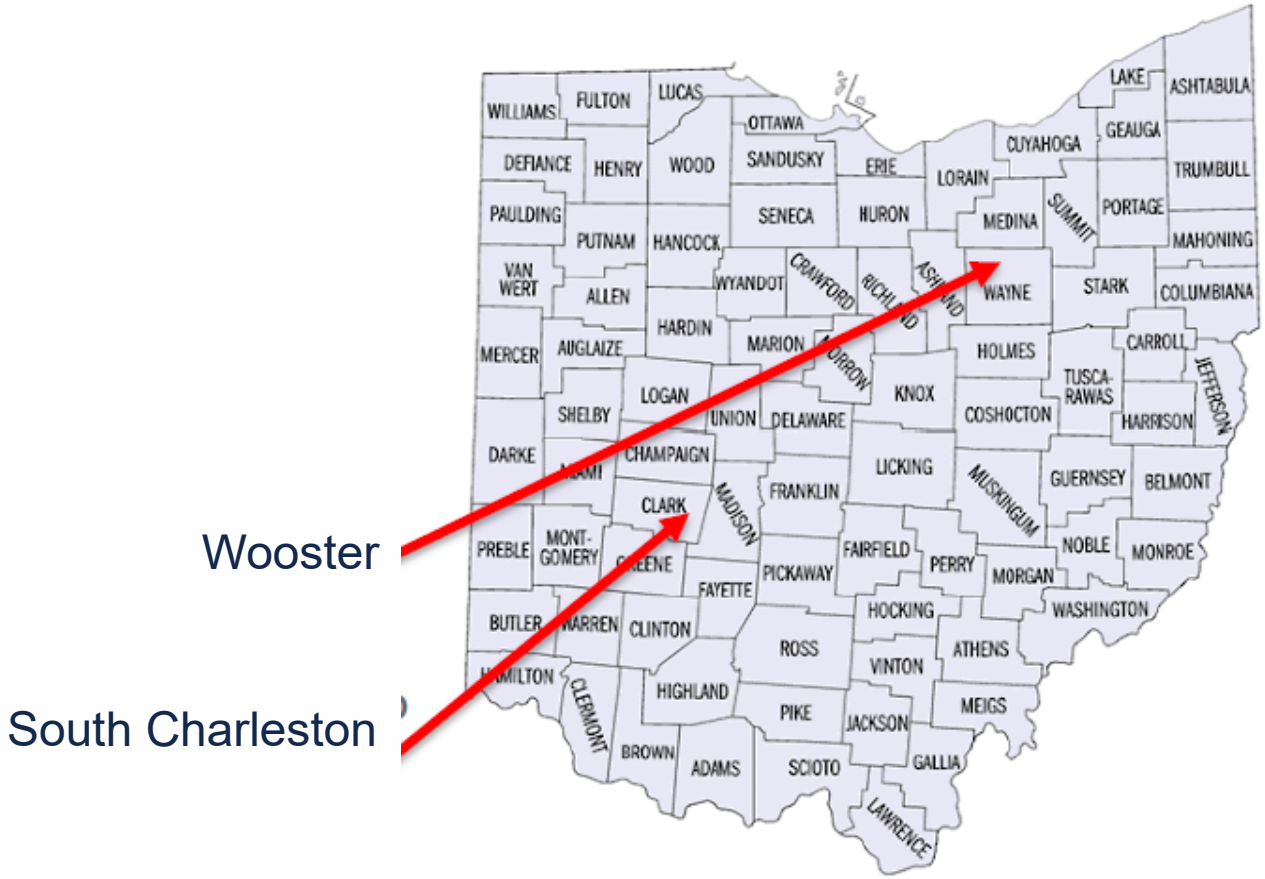
Planting Date x Cover Crop Study



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	2021		2022	
Planting date	Wooster	South Charleston	Wooster	South Charleston
Cover crop	Oct. 14	Oct. 15	Oct. 14	Oct. 14
Ultra early	April 6	April 5	April 5	Mar 30
Early	April 28	April 28	April 30	April 25
Normal	May 26	May 27	May 31	May 31

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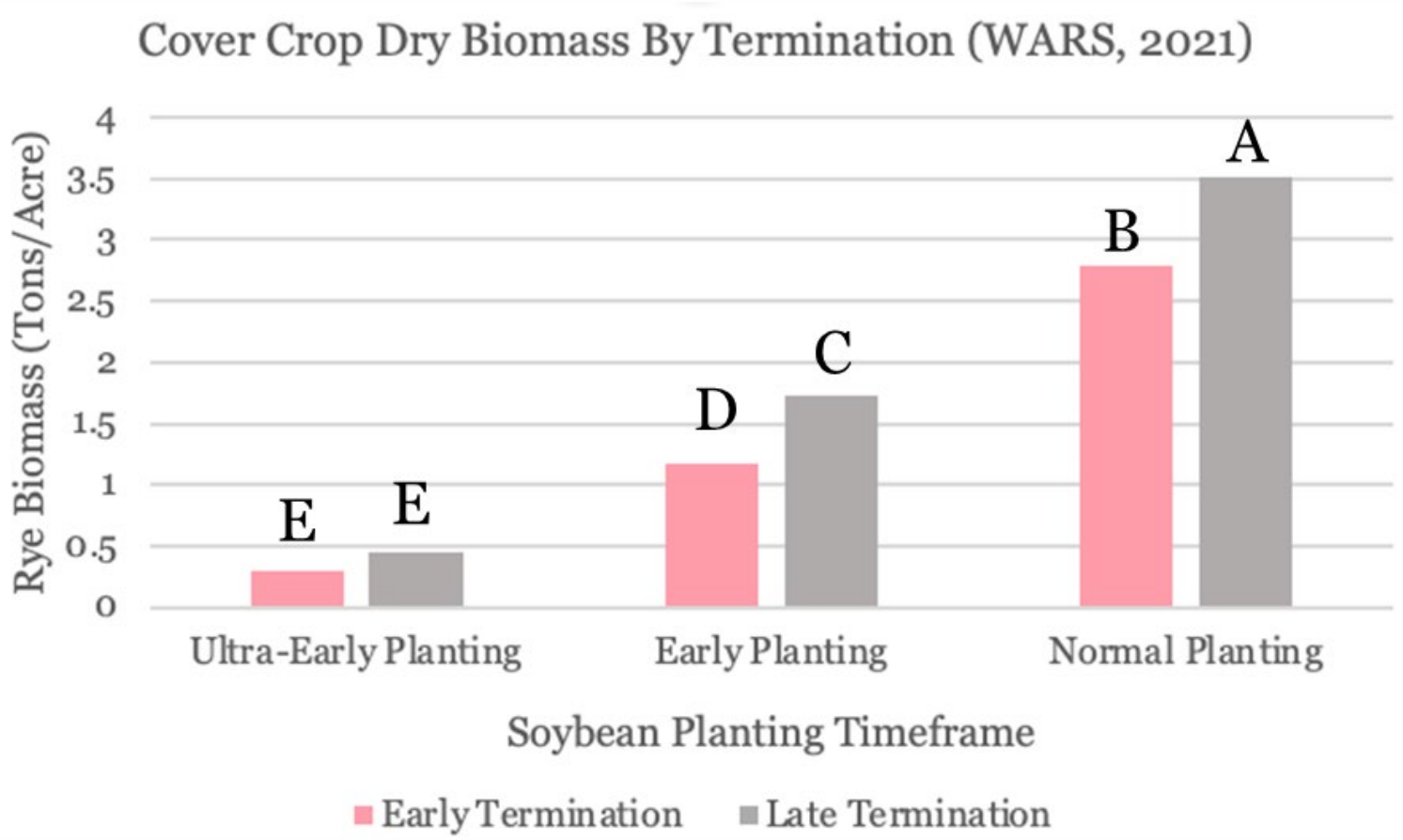
Cover Crop Biomass



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Northeast Ohio Results….

Wooster

South Charleston

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Early-Season Check-In: 2021 Wooster OH

Photo taken on May 13 of soybeans planted on April 6 in Wooster.

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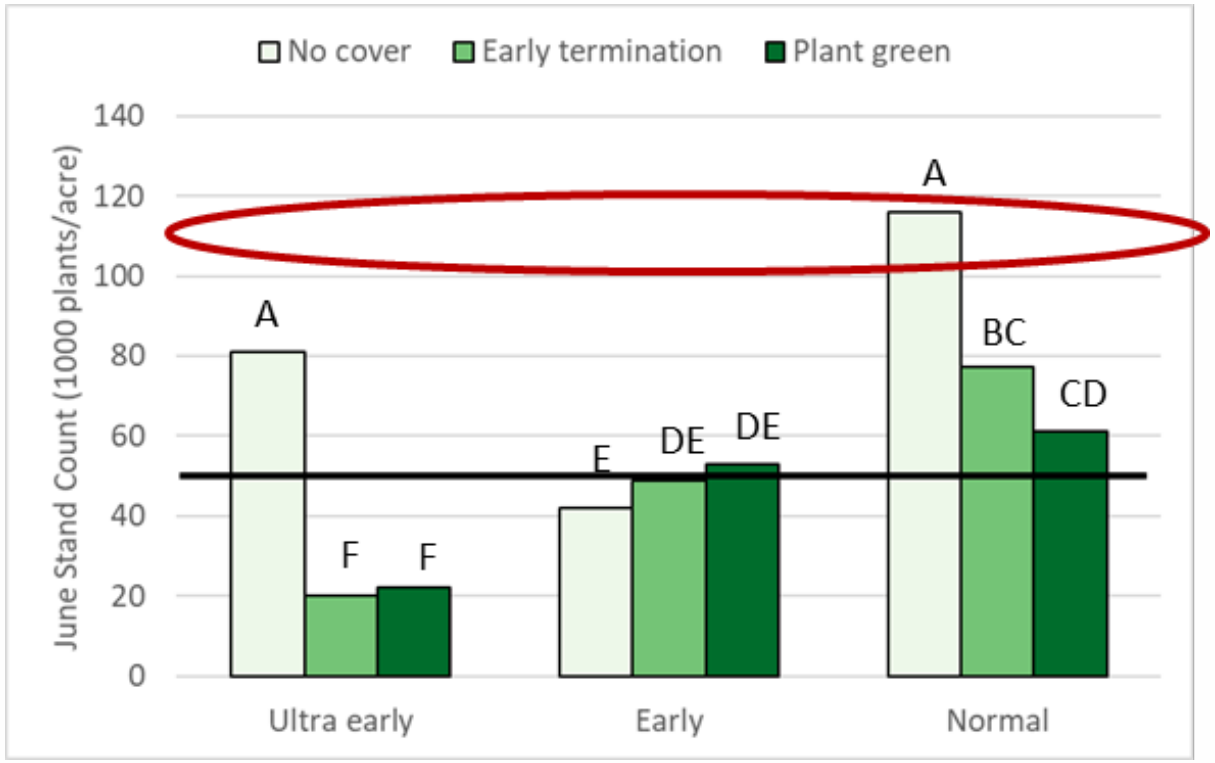
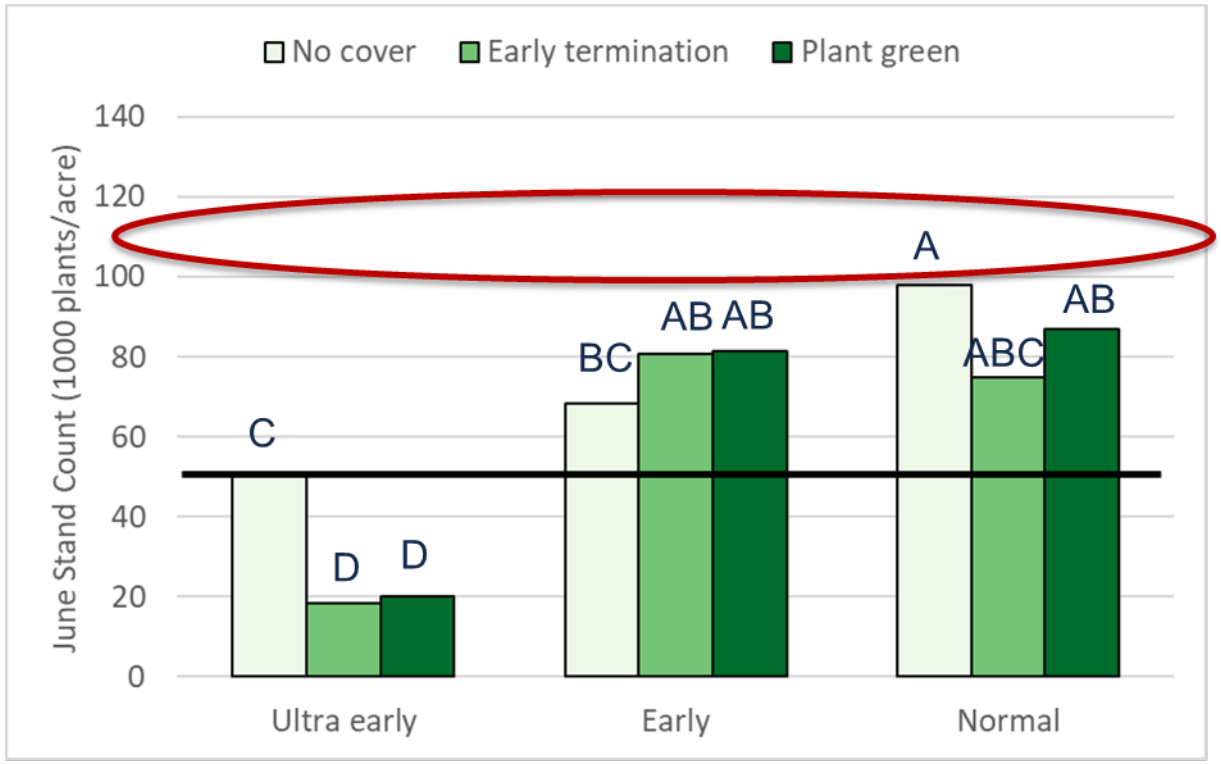
Wooster Stand Counts



June 2021



June 2022

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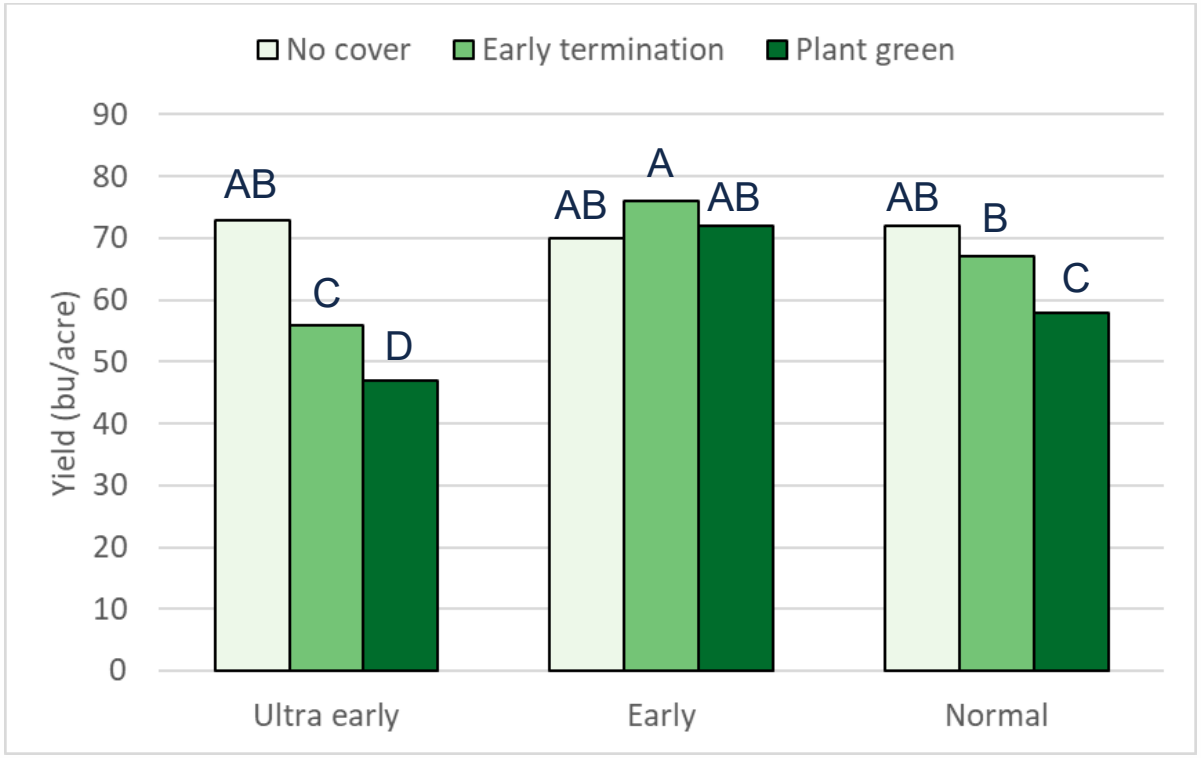
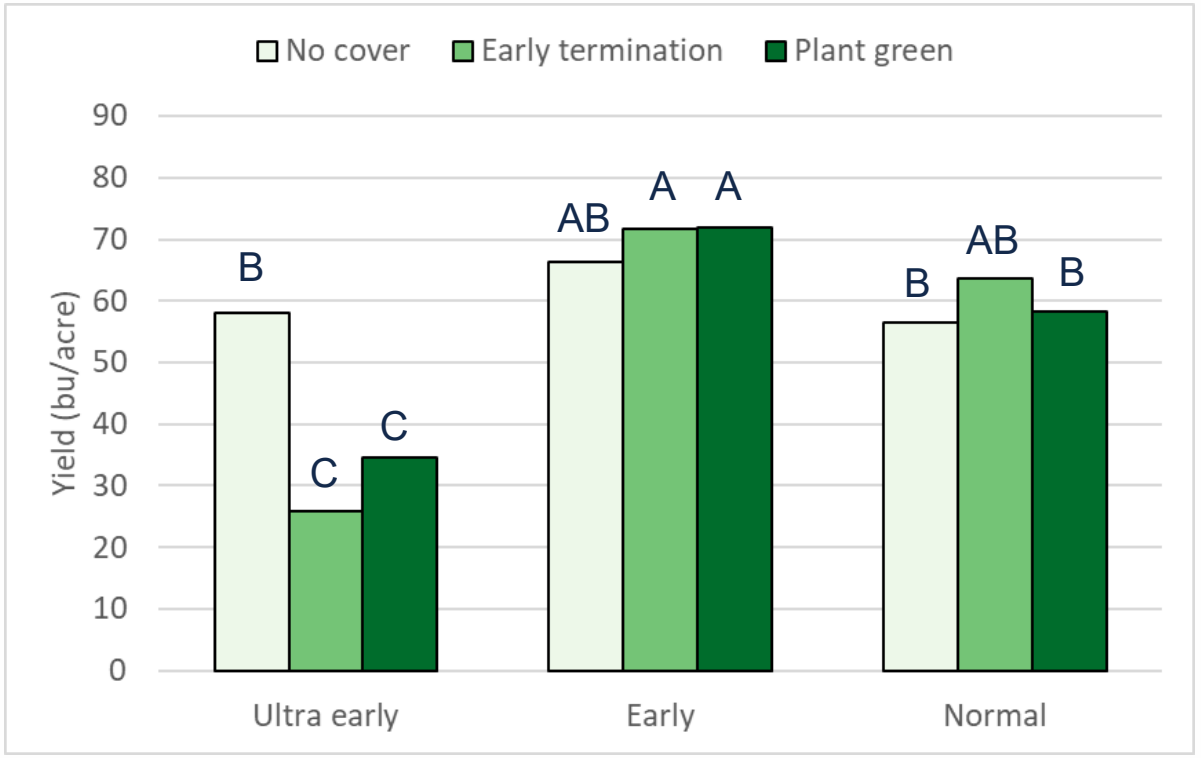
Wooster Yield



2021



2022

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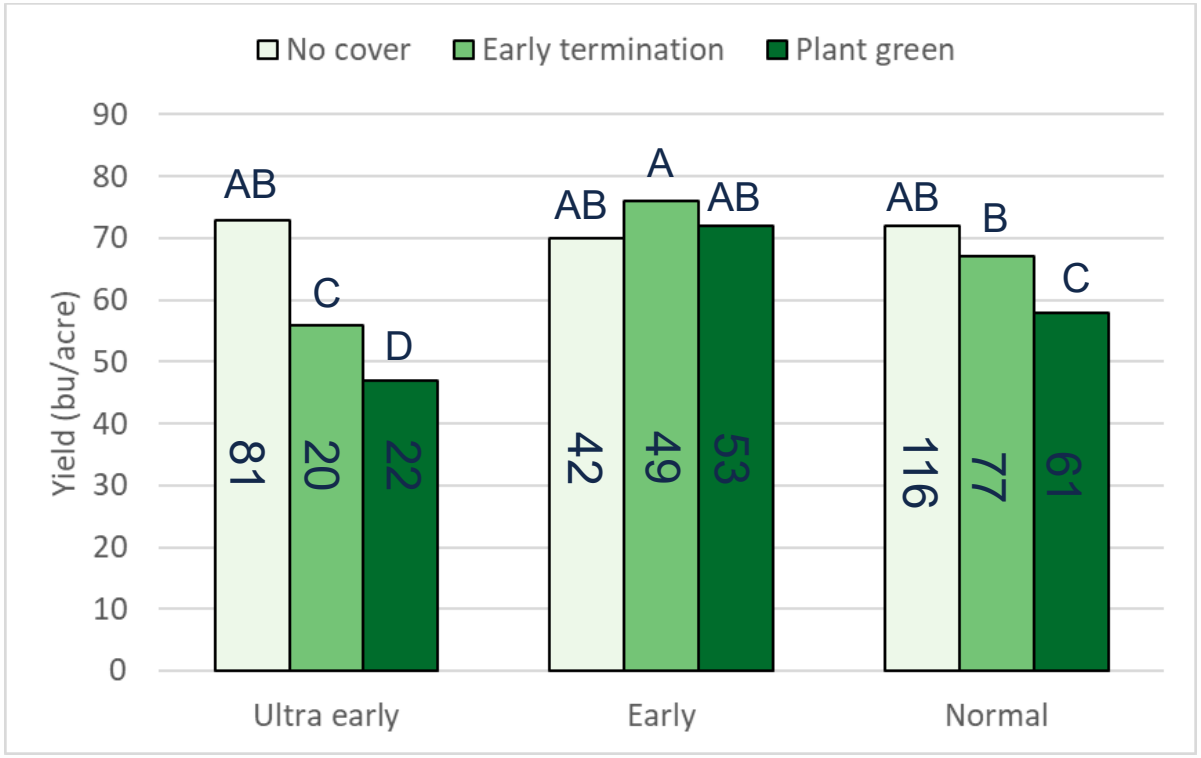
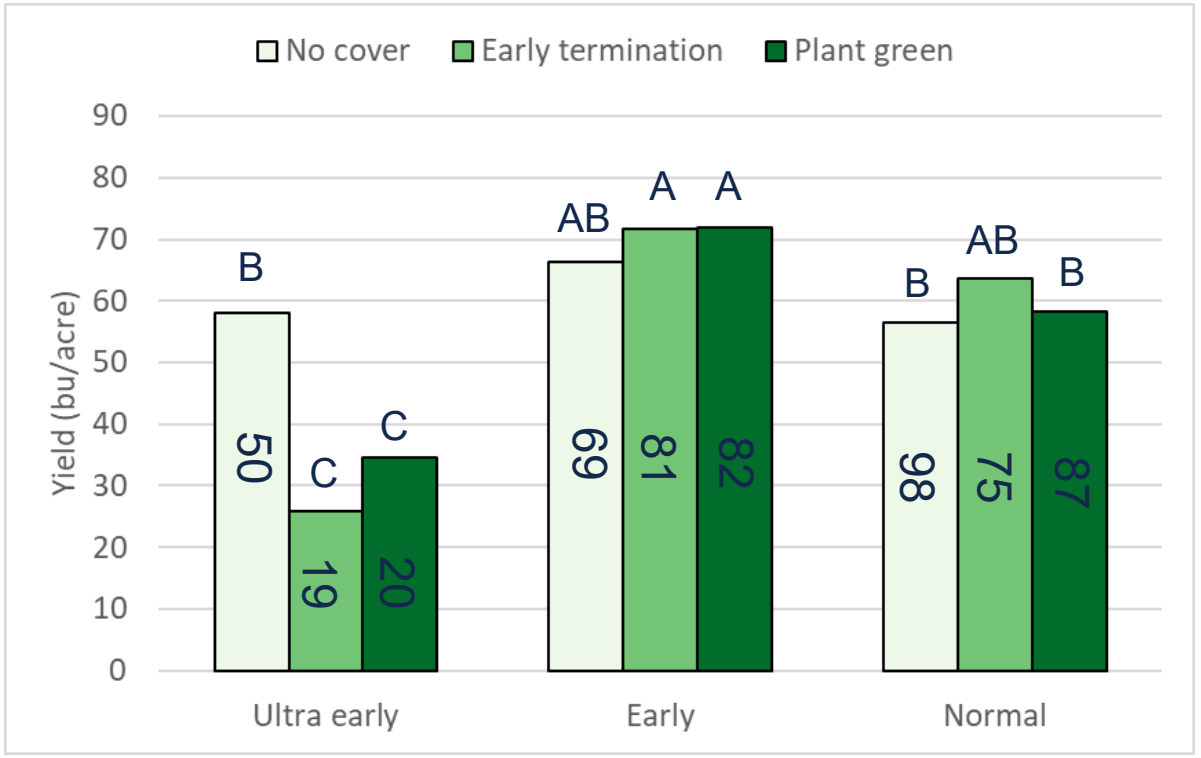
Wooster Yield



2021



2022

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West Central Ohio Results….

Wooster

South Charleston

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South Charleston July Check-In- 2021

	No Cover Crop	Early Termination	Planted Green
Ultra-Early Planting (April 7th)			

Mid-Season Check In (July 8th, 2021)

Normal Planting (May 27th)			

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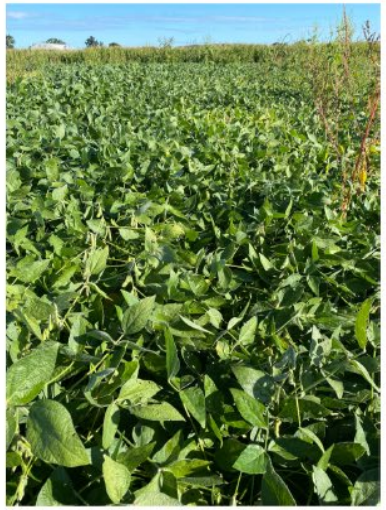
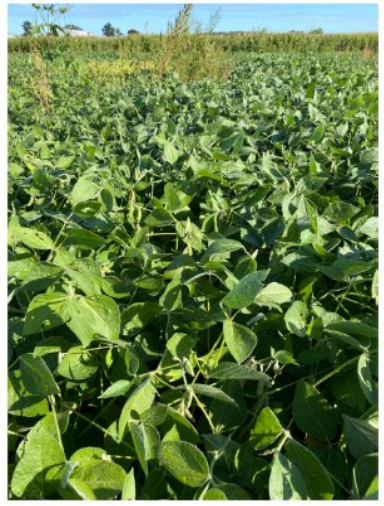
South Charleston September Check-In- 2021

	No Cover Crop	Early Termination	Planted Green
Ultra-Early Planting (April 7th)			
Normal Planting (May 27th)			

Prior to Harvest (September 9th, 2021)

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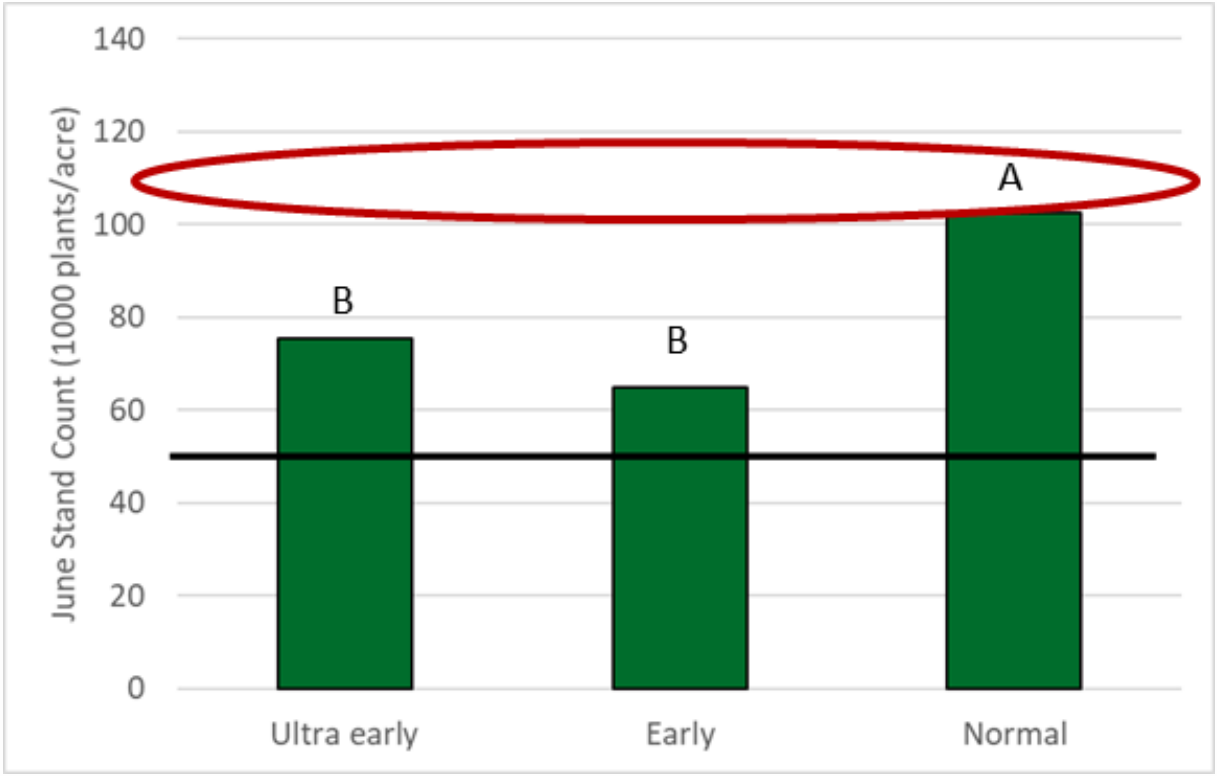
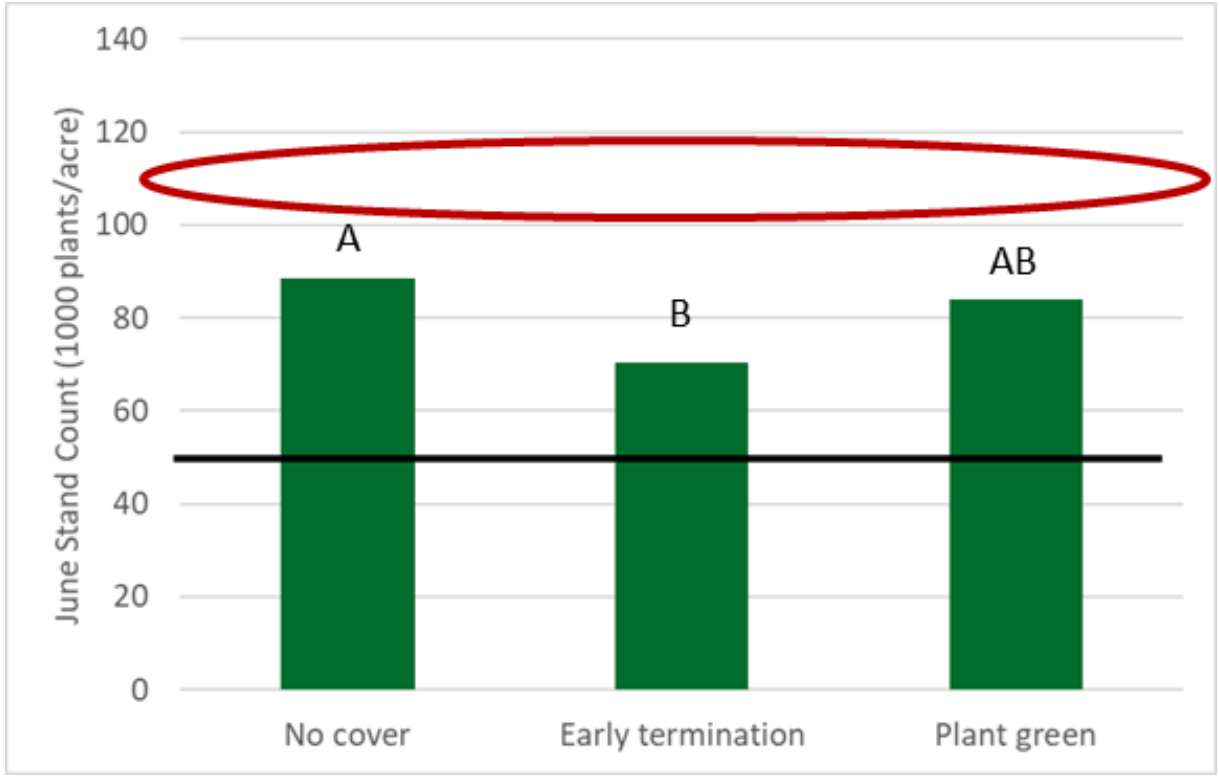
South Charleston Stand Counts- 2021





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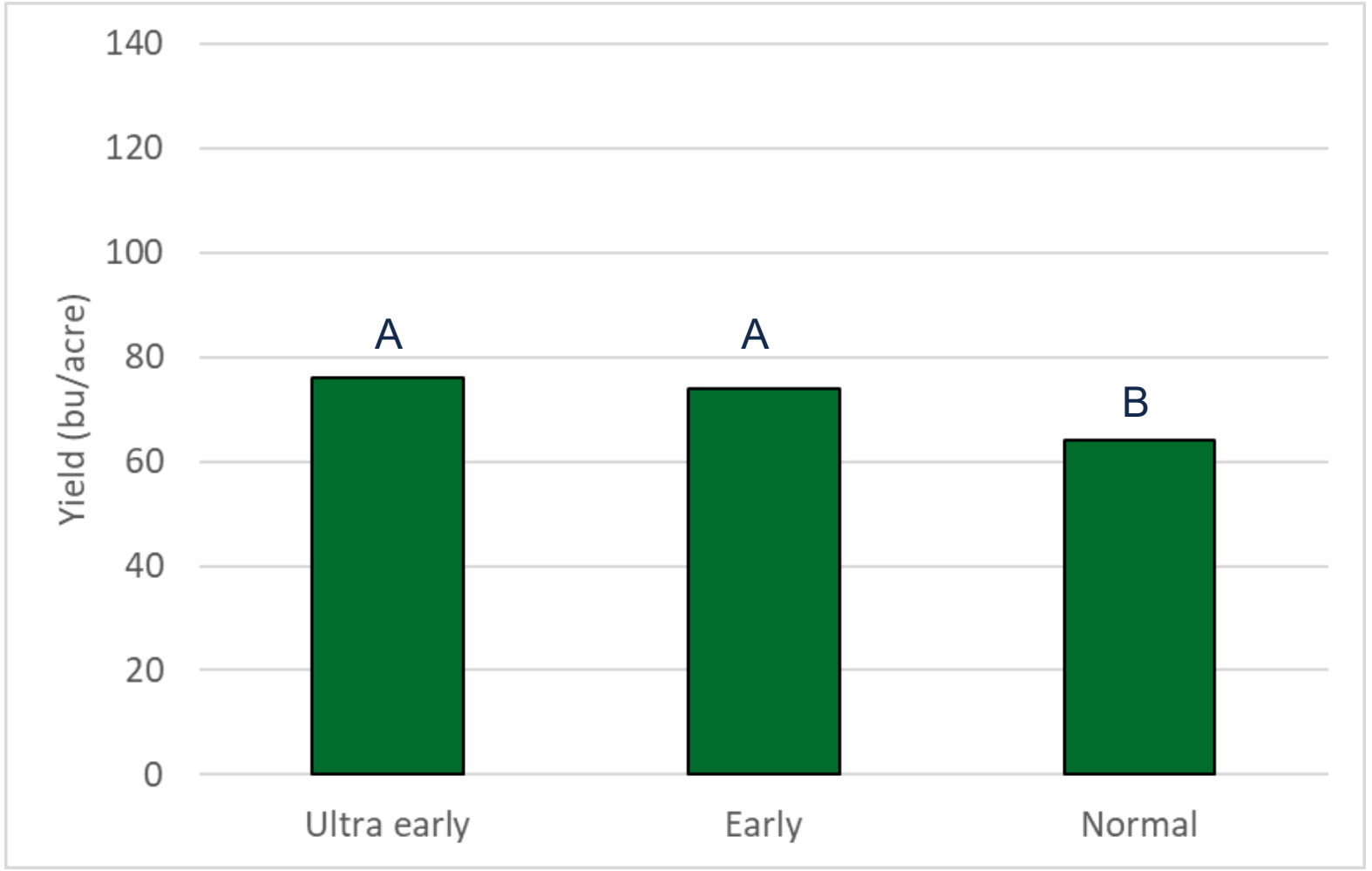
Yield in South Charleston- Planting Date Effect- 2021



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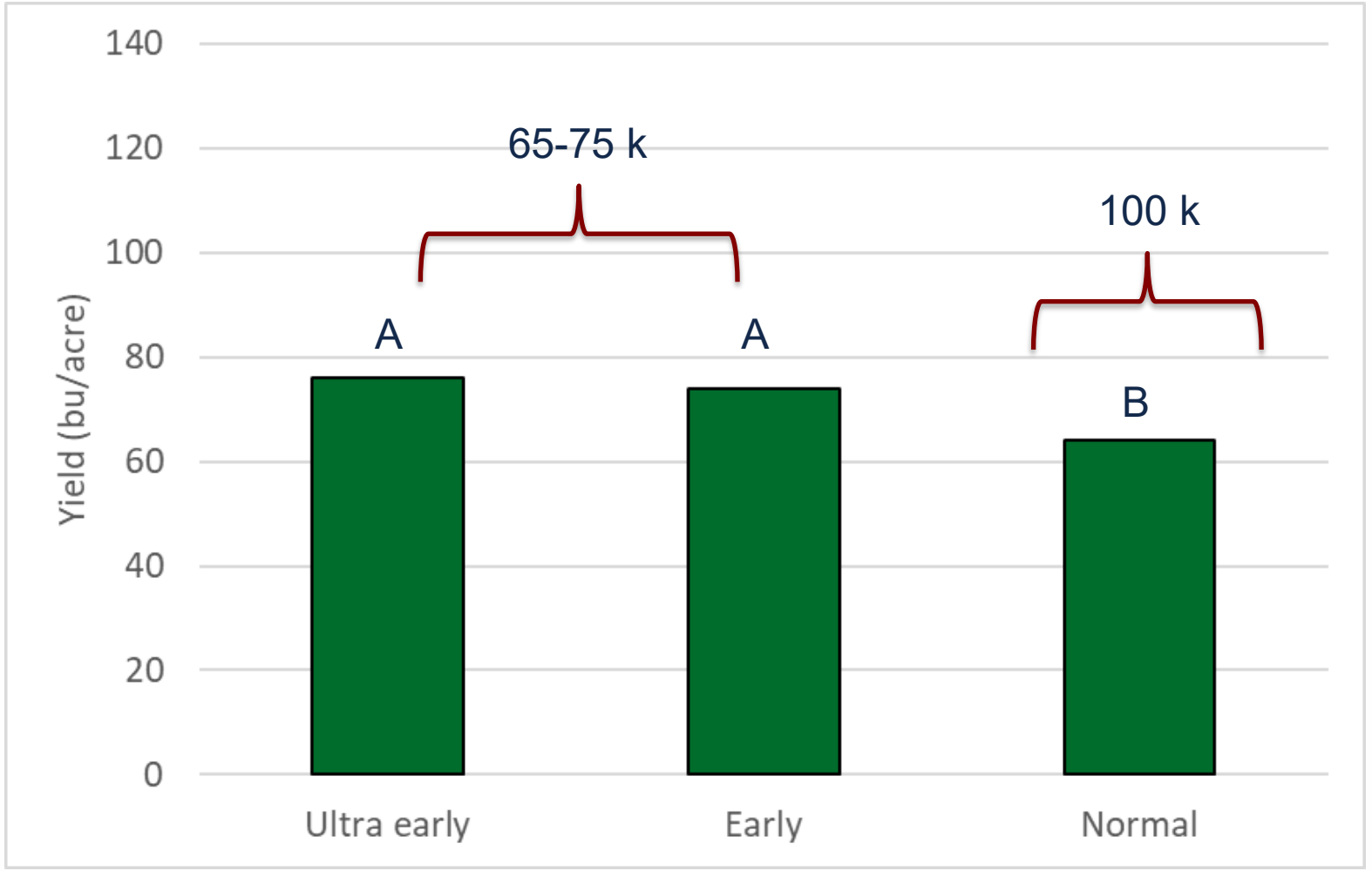
Yield in South Charleston- Planting Date Effect- 2021



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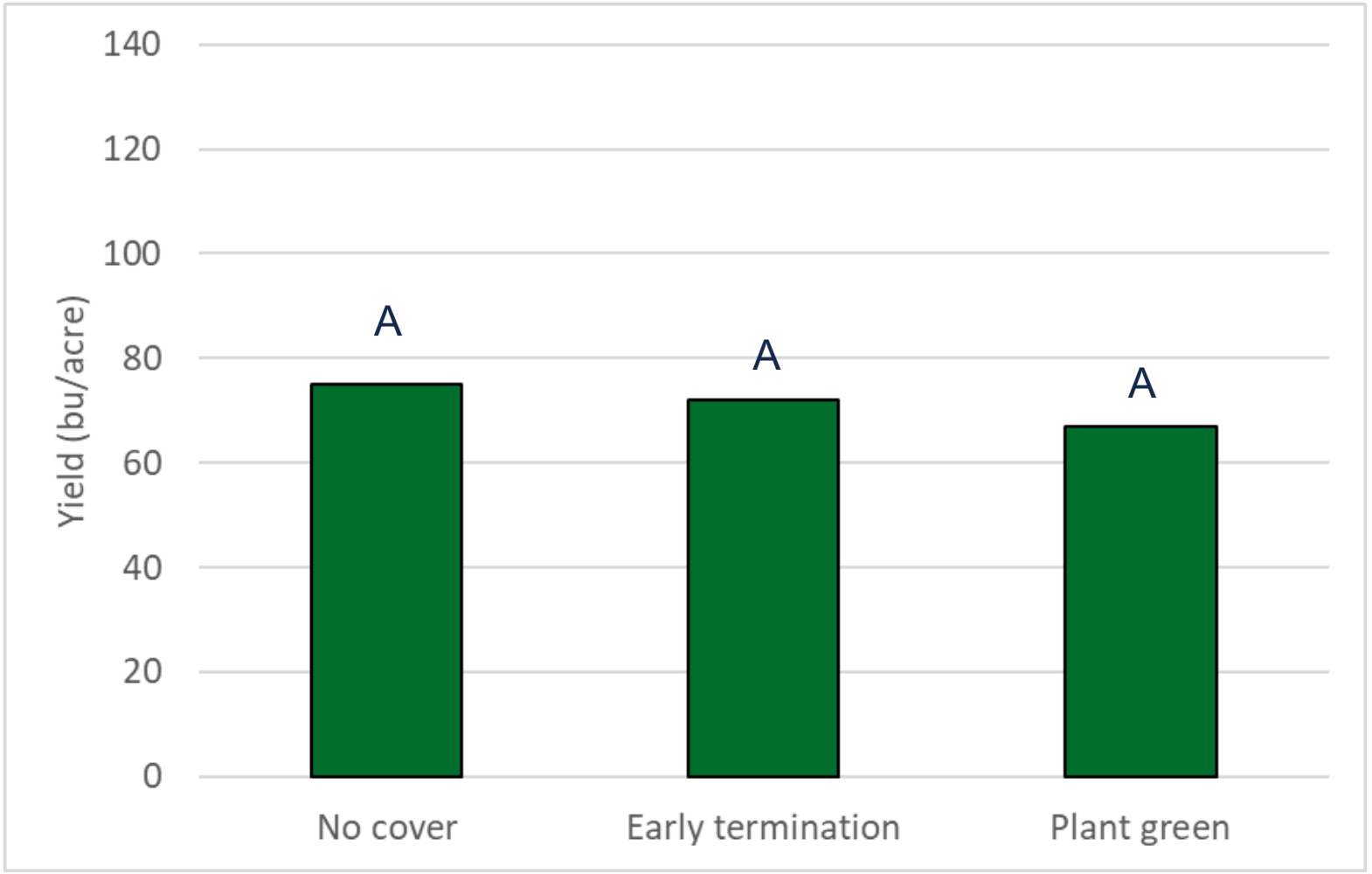
Yield in South Charleston- Cover Crop Effect- 2021



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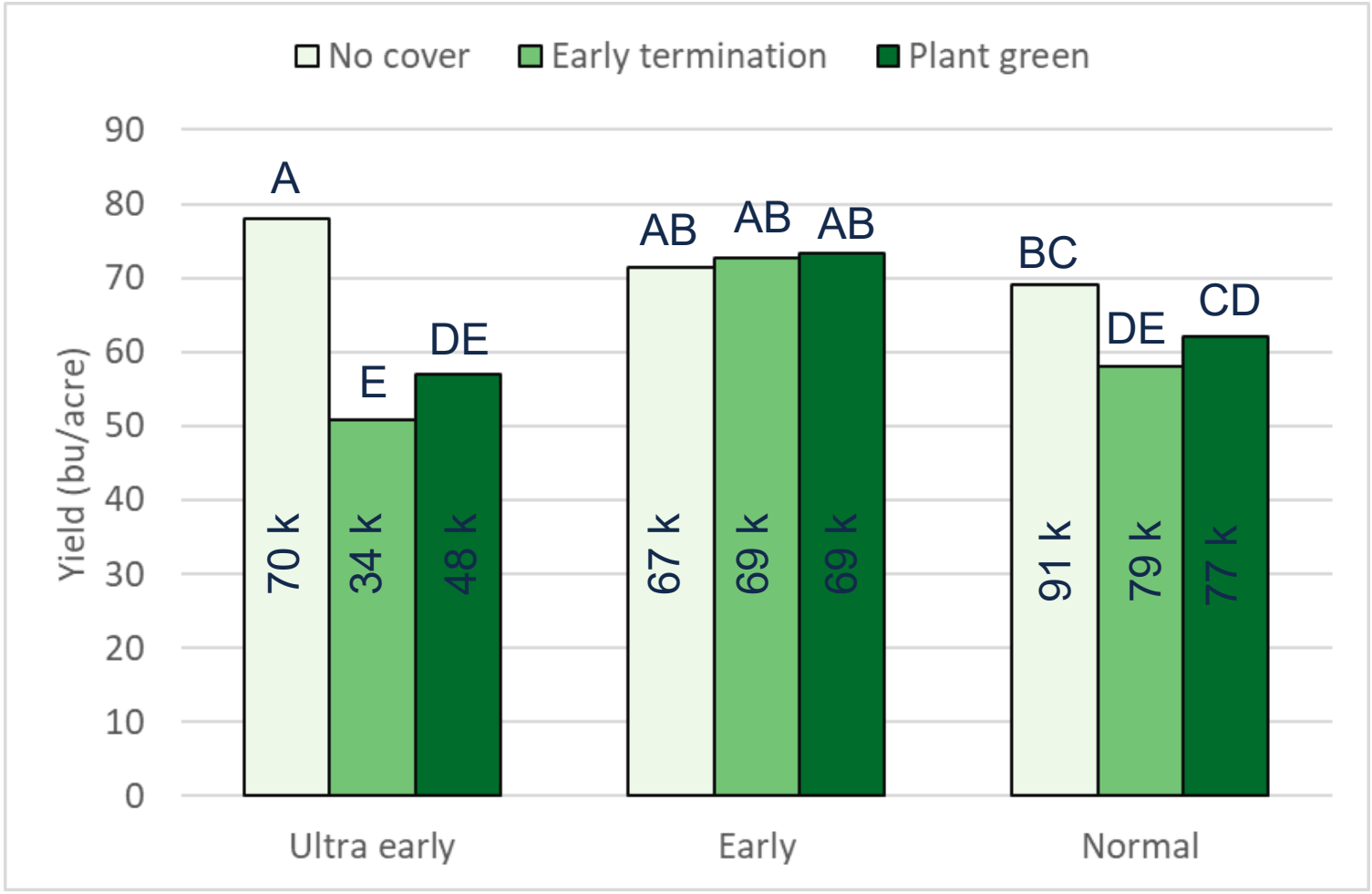
Yield in South Charleston- 2022



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Key Take-Aways…

Soybean stand will likely be lower for ultra early planting, especially with a cover crop.

- 50-70 k without cover crop
- 20-48 k with cover crop

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Key Take-Aways…

Northern Ohio

- Least risky planting date to maximize yield = end of April

West Central Ohio

- Early April (with no cover crop) or late April ok

Key Take-Aways…

Soybean plants are very good at compensating for low plant population.

Soybean plant with many branches at low plant population in Wooster.

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Graduate Student: Seth Kannberg

OHIO SOYBEAN COUNCIL

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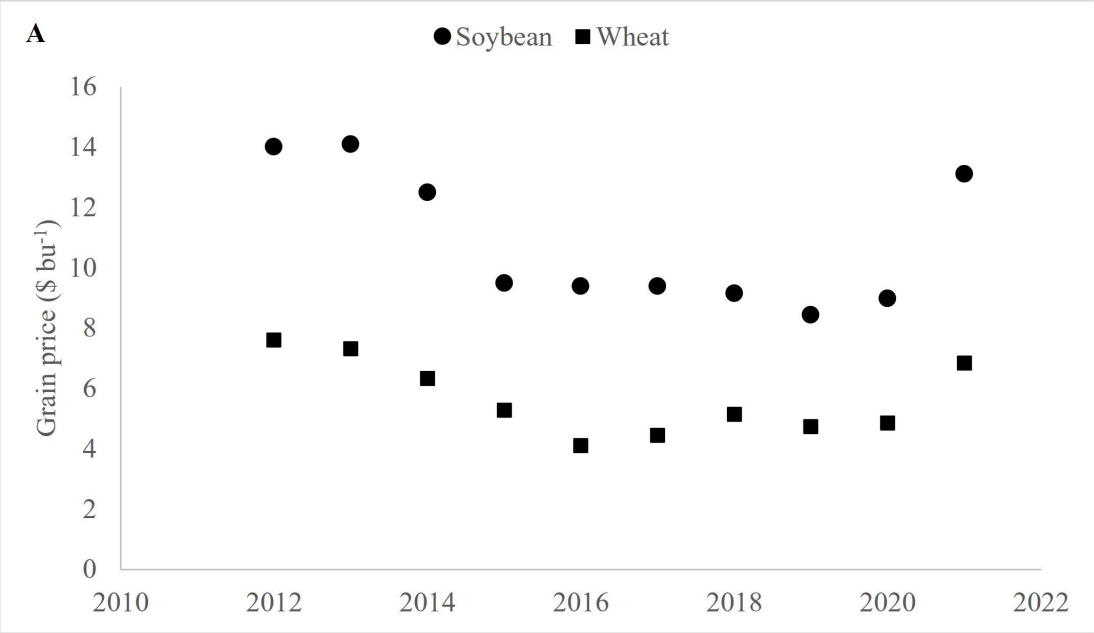
High Soybean & Small Grain Prices



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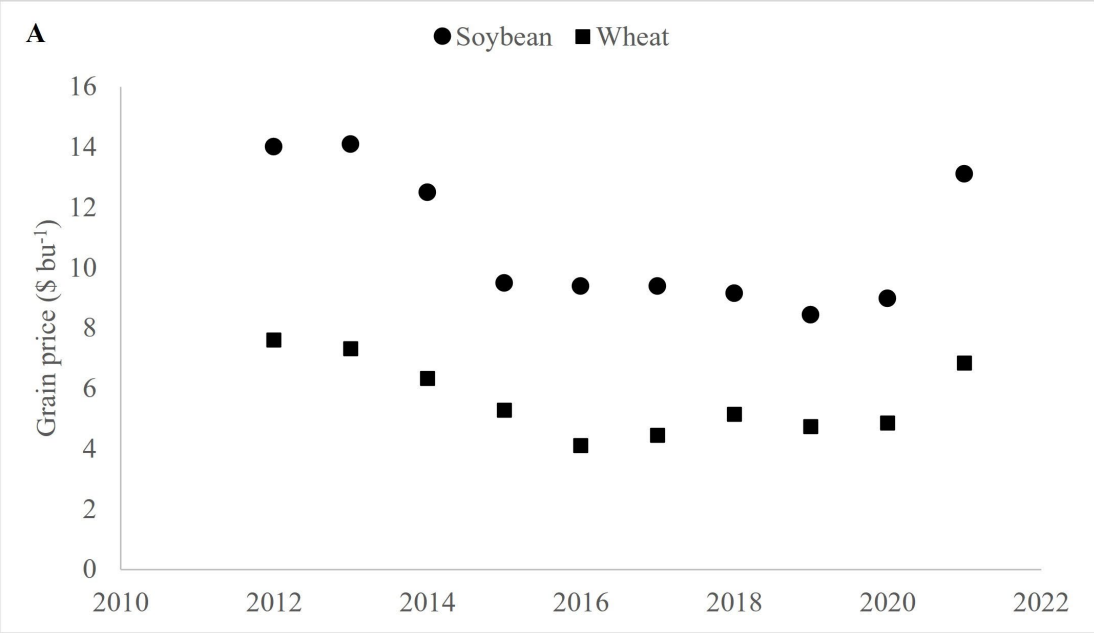
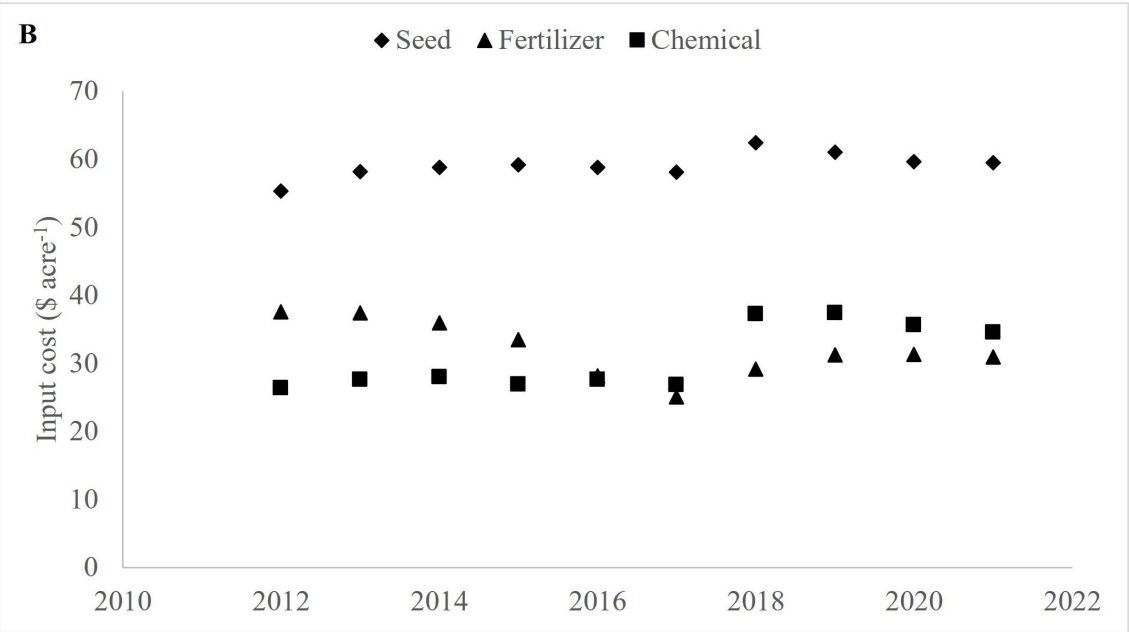
High Soybean & Small Grain Prices





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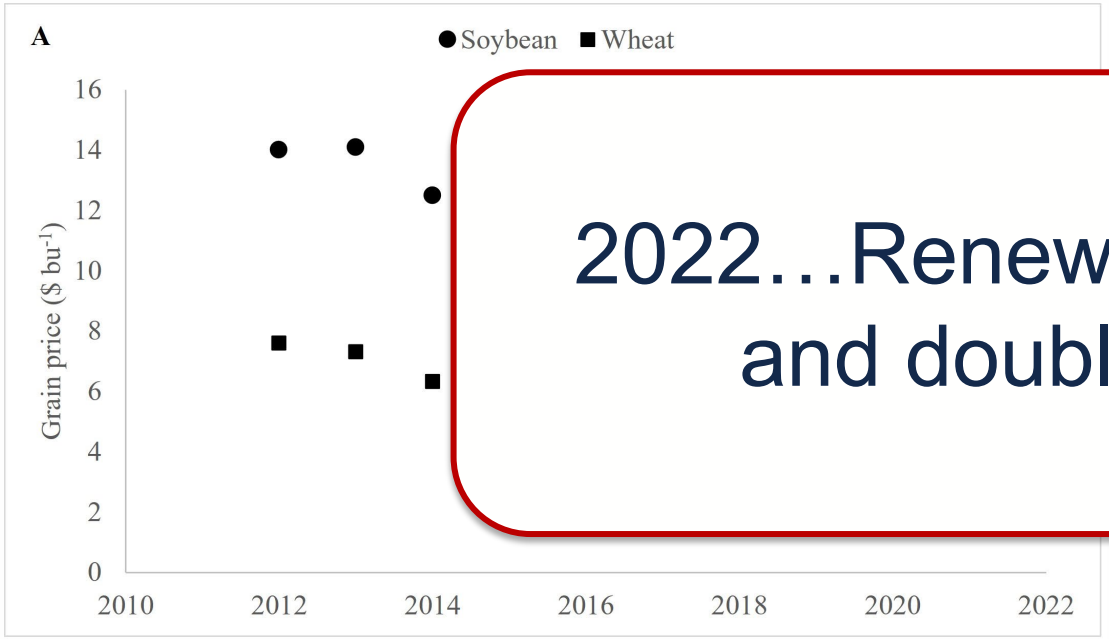
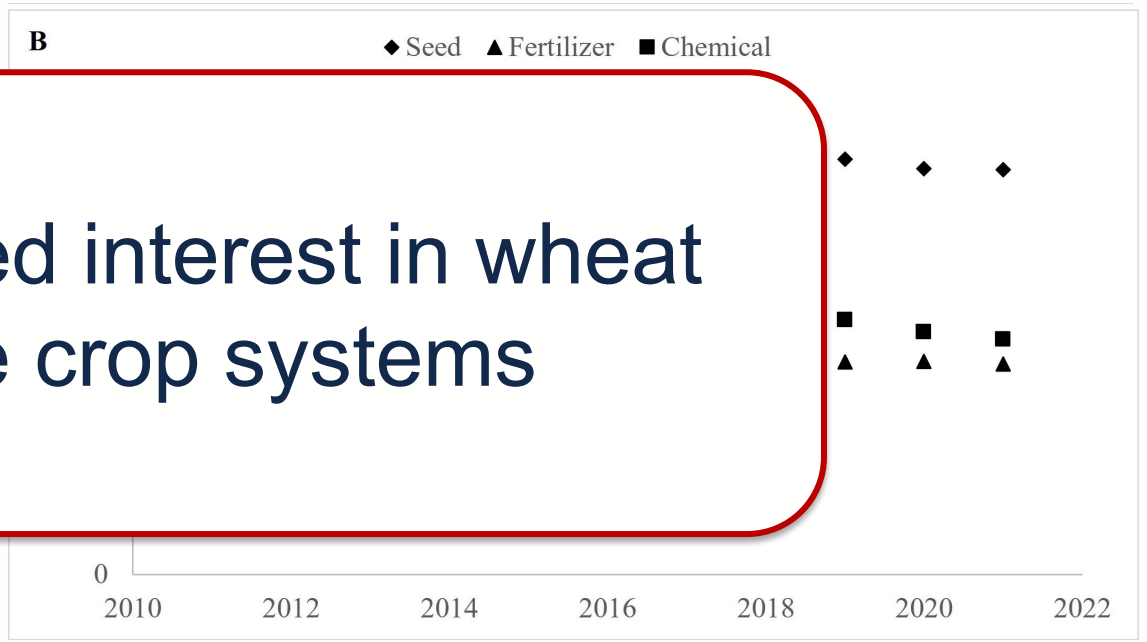
High Soybean & Small Grain Prices





2022…Renewed interest in wheat and double crop systems

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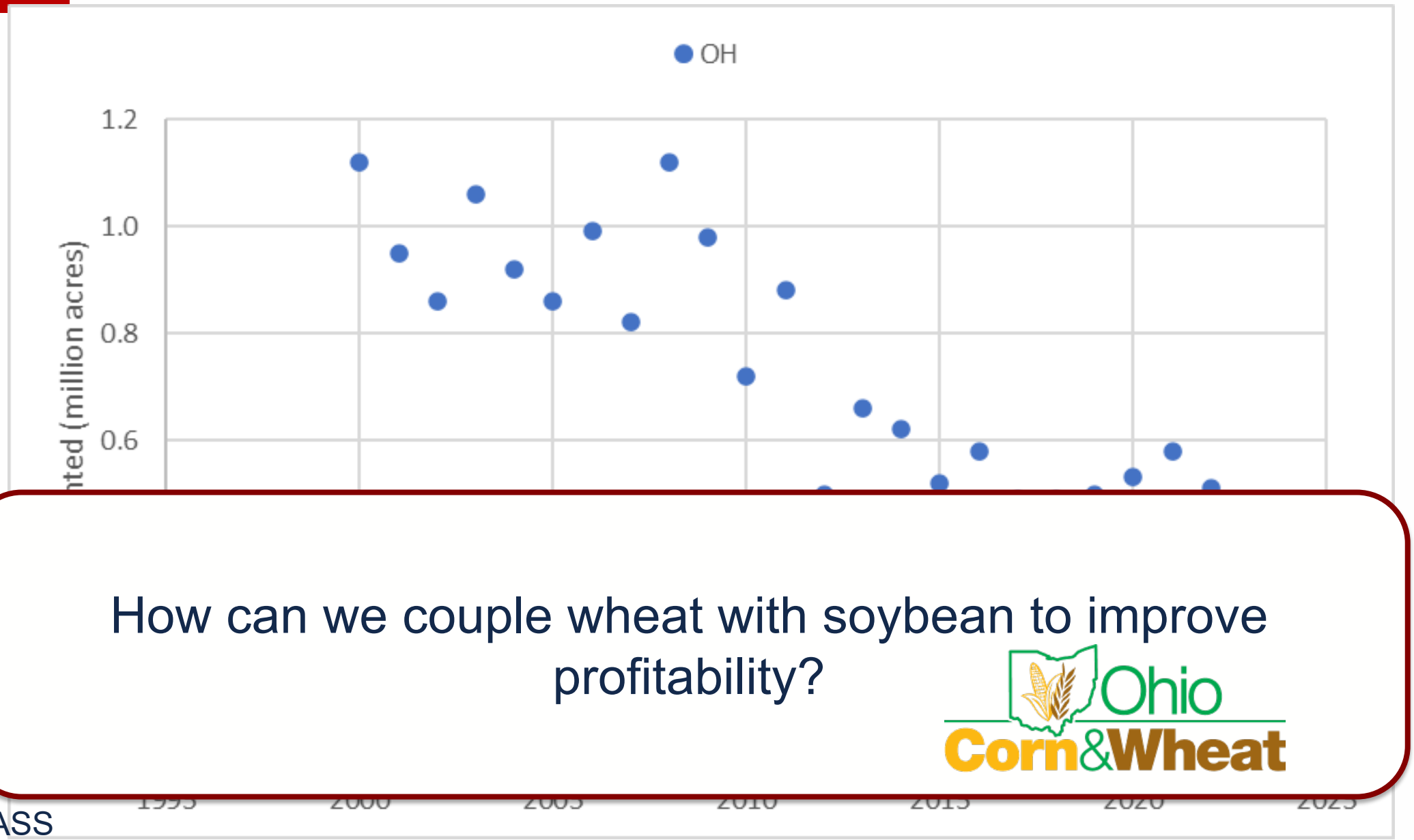
Value of Small Grains in Rotation

- Diversify cropping systems
- Lower disease/pest pressure
- Reduce soil erosion (fall cover)
- ~+4 bpa increase in soybean yield when wheat in rotation



How can we couple wheat with soybean to improve profitability?

Ohio Corn&Wheat

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Full-Season, Relay-Intercrop & Double Crop Systems

- Full season soybean
- Relay-intercrop
- Double crop

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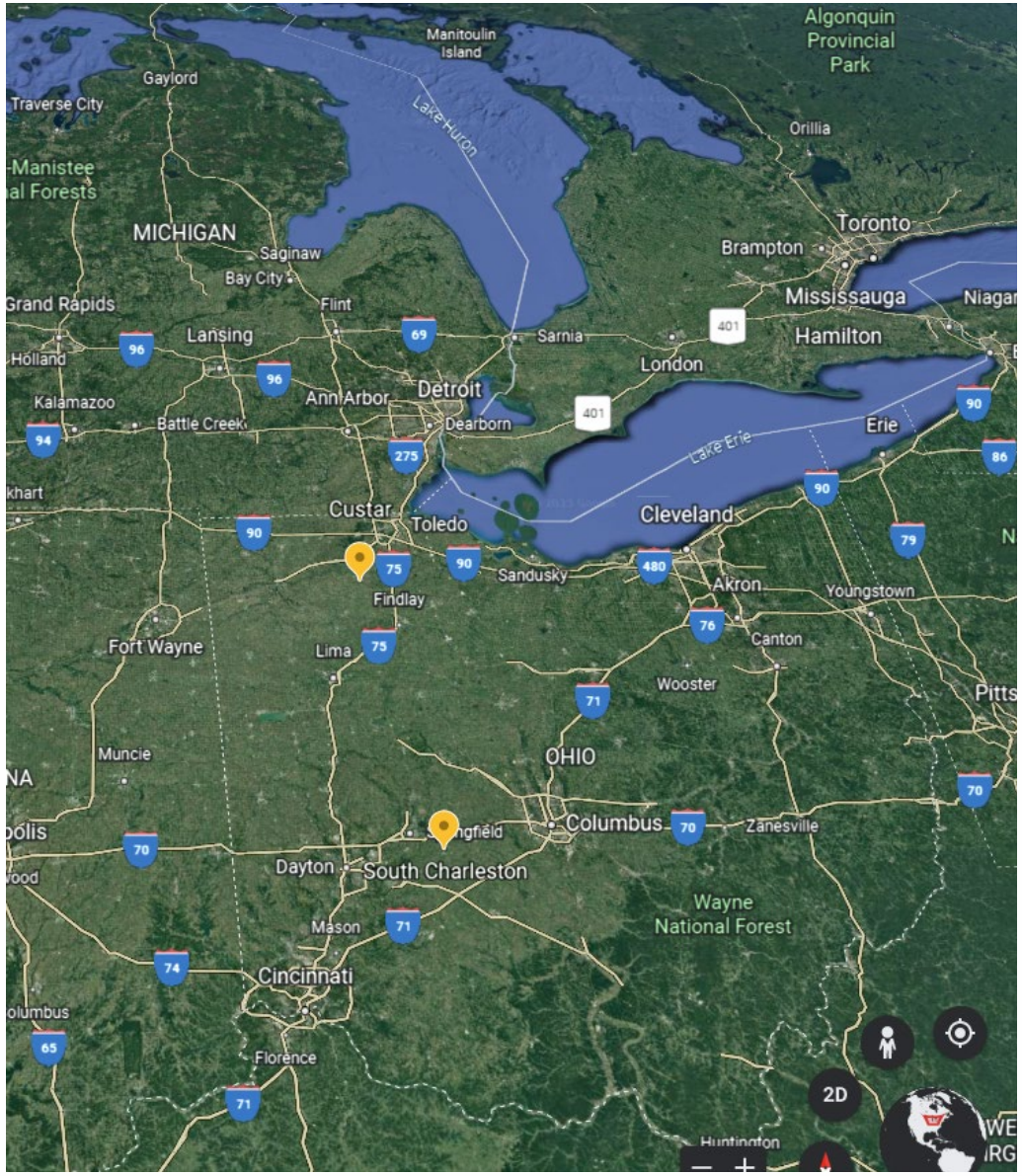
Algonquin Provincial Park
Manitoulin Island
Gaylord
Traverse City
Lake Huron
Orillia
Manistee
al Forests
MICHIGAN
Saginaw
Bay City
Toronto
Brampton
Grand Rapids
Flint
Mississauga
Niagar
Lansing
Sarnia
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Hamilton
Holland
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London
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Ann Arbor
Detroit
Kalamazoo
Battle Creek
Dearborn
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Erie
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Cleveland
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90
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Sandusky
Akron
Youngstown
Findlay
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Fort Wayne
Lima
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Canton
Wooster
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Pitts
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Zanesville
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Dayton
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Wayne
National Forest
Mason
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74
Cincinnati
olumbus
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Florence
71
2D
Huntington

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‘Standard’ Practice in NW OH

- Wheat only
  - 7.5-inch row width
  - 1.5-1.7 million seeds/acre

- Full season soybean
  - Plant mid to late May
  - 15-inch row width
  - 3.1 RM
  - 150,000 seeds/acre

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Relay-Intercrop 'Standard' Practice in NW OH

- Relay-Intercrop Wheat
  - 15-inch row width
  - Seeding rate ~870,000 seeds/acre
- Relay-Intercrop Soybean
  - Plant last week of May/early June (~wheat heading/flowering)
  - 15-inch row width
  - 3.1 RM

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Double Crop 'Standard' Practice in NW OH

- Wheat
  - 7.5-inch row width
- Double Crop Soybean
  - Plant first week of July
  - 7.5 or 15-inch row width
  - 3.1 RM
  - 200,000 seeds/acre

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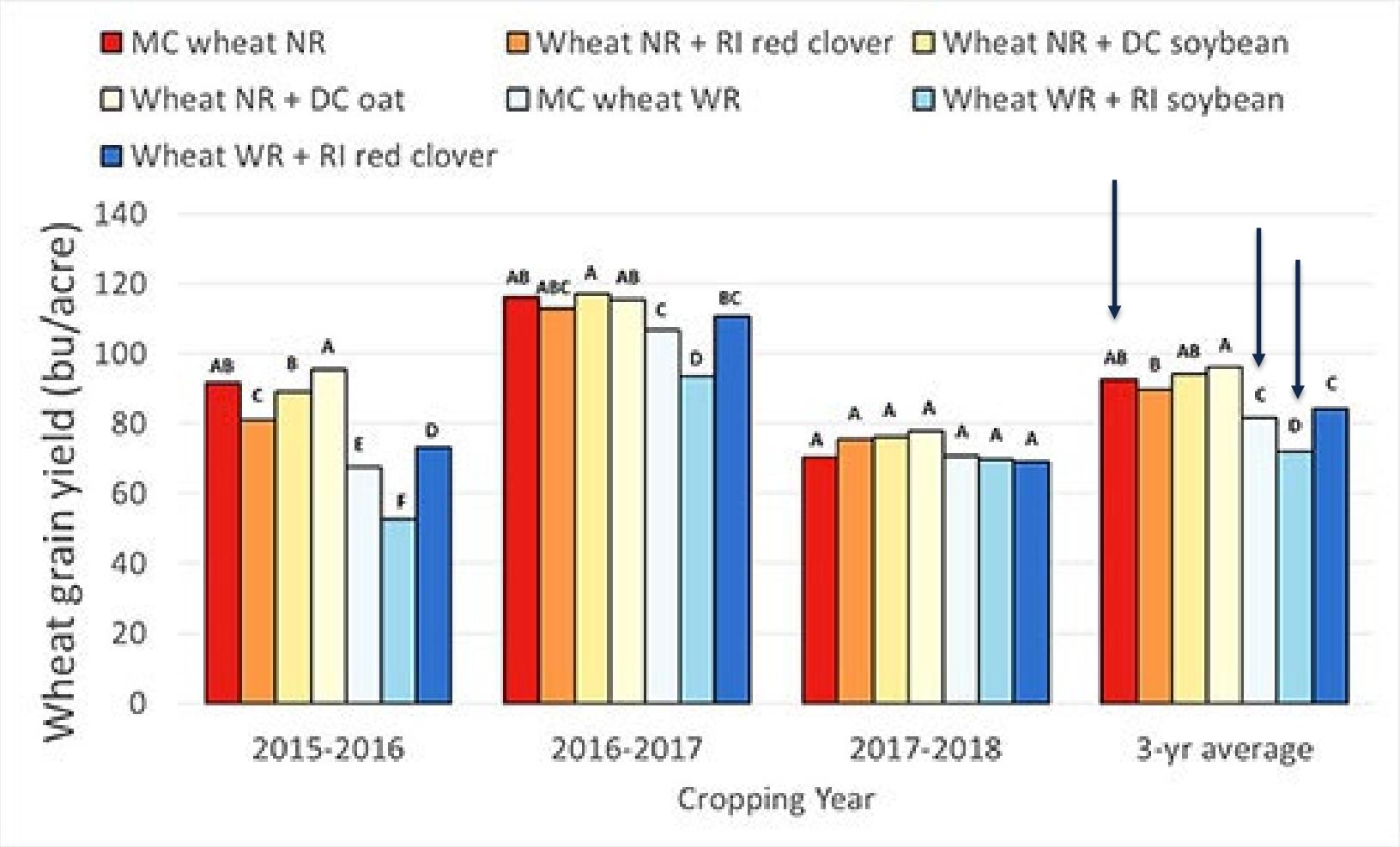
Wheat Yield



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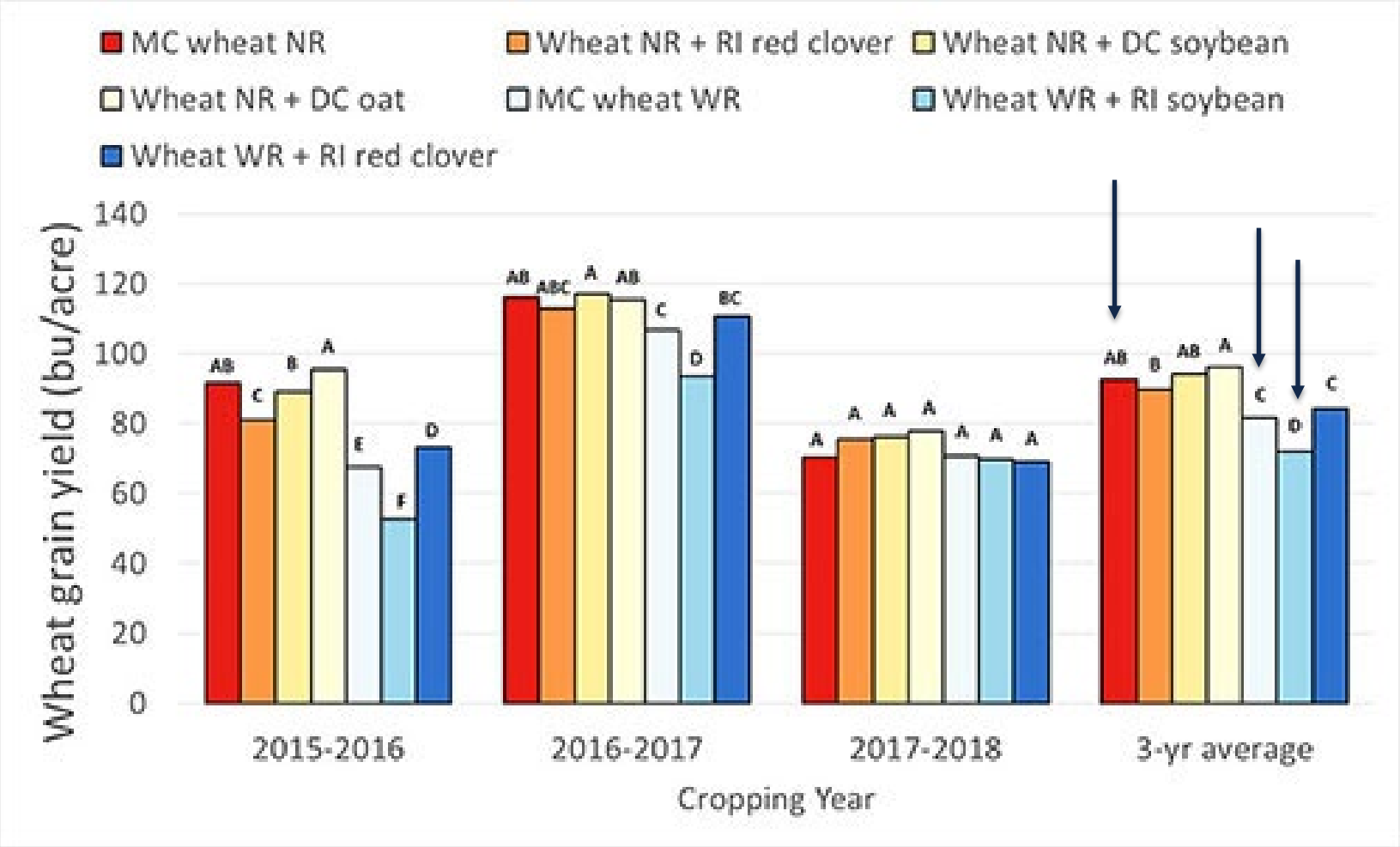
Wheat Yield



Wheat only = 90 bpa

Wheat 15-inch row width = 80 bpa

Wheat 15-inch row width + RI soybean = 70 bpa

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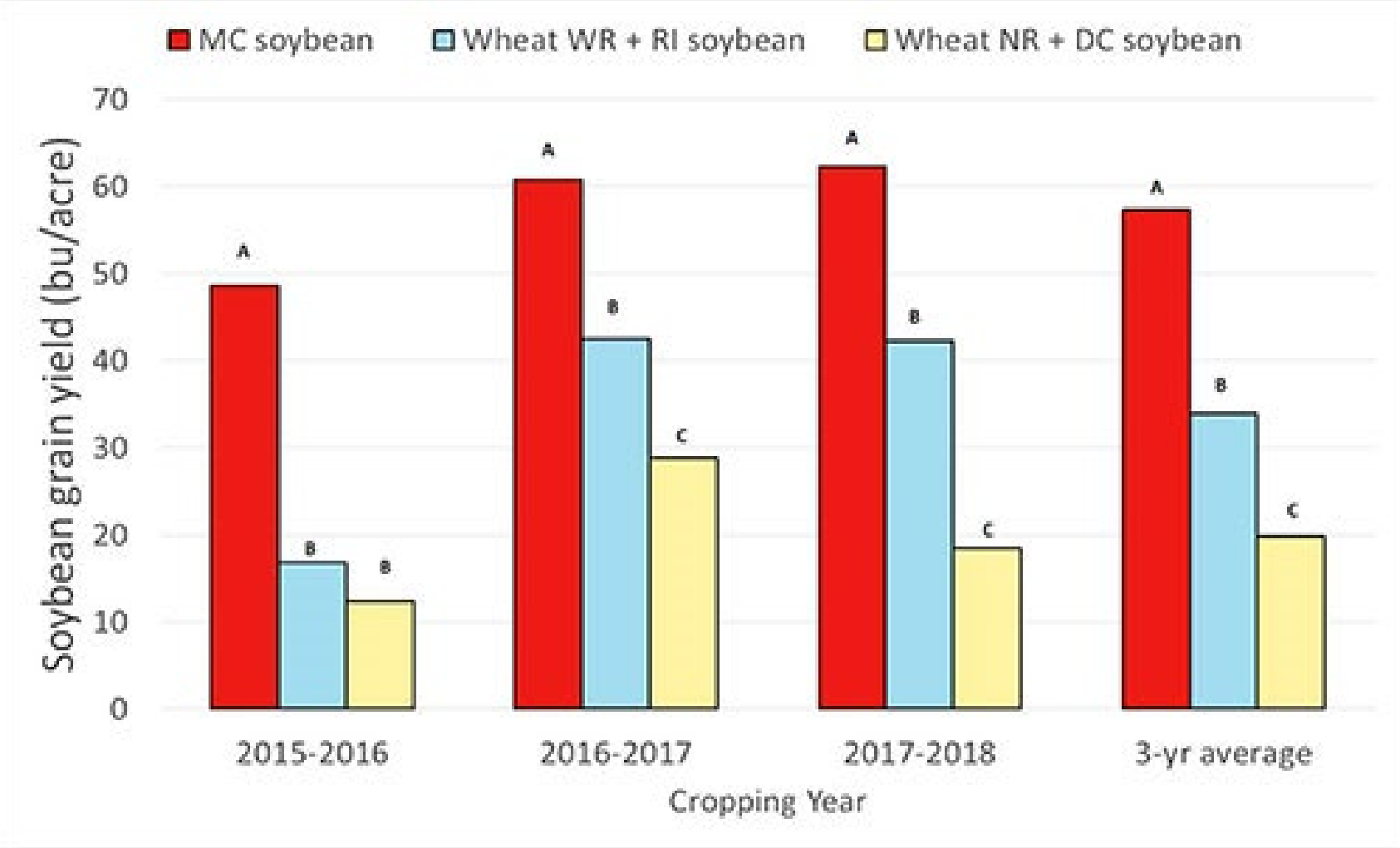
Soybean Yield



Full-season- May 25, May 6, May 24

RI- May 25, June 6, May 29

Double crop- July 1, July 6, July 5

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Profitability Calculator- stepupsoy.osu.edu

Crop Price	Default Value	Your Value
Wheat ($/bu)	8.59	7.99
Wheat straw ($/ton)	133.00	133.00
Soybean ($/bu)	15.43	13.50

Management Practices	Default Value	Your Value
Wheat seeding rate (7.5-inch) (seeds/acre)	1,800,000	1,800,000
Wheat seeding rate (15-inch) (seeds/acre)	900,000	900,000
Wheat N application rate (lb N/acre)	120	150
Soybean seeding rate (seeds/acre) for full season or intercrop sc	140,000	150,000
Soybean seeding rate (seeds/acre) for double crop soy	200,000	200,000

Input Costs	Default Value	Your Value
Wheat seed costs ($/1000 seeds)	0.03	0.03
Wheat herbicide ($/acre)	13.18	15.00
Soybean seed cost ($/1000 seeds) for full season or intercrop	0.41	0.43
Soybean seed cost ($/1000 seeds) for double crop soy	0.21	0.21
Soybean herbicide ($/acre) for full season crop	78.07	71.64
Soybean herbicide ($/acre) for intercrop or double crop	50.00	50.00

Fertilizer Costs as lb N, P_2O_5, and K_2O*	Default Value	Your Value
Nitrogen ($/lb N)	1.07	1.16
Phosphorus ($/lb P_2O_5)	0.83	0.83
Potassium ($/lb K_2O)	0.60	0.60

*Use columns F-H to convert from $/ton of UAN, MAP, and Potash.

Field Operation Costs ($/acre)	Default Value	Your Value
Planting (wheat/no-till drill)	19.70	17.60
Fertilizer application (wheat only/liquid spray)	8.40	7.60
Herbicide application (wheat/self-propelled)	8.20	7.70
Combine (wheat)	32.10	28.40
Wheat straw harvest	13.30	13.30
Planting (soybean/no-till/30 or 15-inch spacing)	23.40	20.10
Herbicide application (soybean/liquid spray)	8.20	8.00
Combine (soybean)	32.20	27.80

Expected Yield (bu/acre)	Default Value	Your Value
Wheat only (7.5-inch row width)	93	87
Wheat (15-inch row width & intercropped with soy)	72	78
Wheat straw (ton/acre)	2.0	2.0
Full season soybean	57	85
Relay-intercrop soybean	34	60
Double crop soybean	20	30

Fertilizer Product Costs	Default Value	Your Value
UAN (28-0-0) ($/ton)	600	650
MAP (11-52-0) ($/ton)	865	865
Potash (0-0-60) ($/ton)	715	715

Fertilizer Costs as lb N, P2O5, and K_2O	Default Value	Your Value
UAN (28-0-0) ($/ton)	1.07	1.16
MAP (11-52-0) ($/ton)	0.83	0.83
Potash (0-0-60) ($/ton)	0.60	0.60

1. START HERE | 2. Partial Return | 3. Nutrient Removal | 4. Partial return - removal

Ready   Accessibility: Investigate

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DEFAULT VALUES

		Gross Return	Costs per acre	Partial Return
1	**Wheat only (7.5-inch row width)**	$799	$264	$535
2	**Wheat only (7.5-inch row width) + straw**	$1,065	$277	$787
3	**Full season soybean**	$880	$199	$680
4	**Wheat (15-inch row width) with soy intercropped**	$1,143	$408	$735
5	**Wheat (7.5-inch row width) with soy double crop**	$1,107	$420	$688
6	**Wheat (7.5-inch row width) with soy double crop + straw**	$1,373	$433	$940

YOUR VALUES

		Gross Return	Costs per acre	Partial Return
1	**Wheat only (7.5-inch row width)**	$695	$266	$429
2	**Wheat only (7.5-inch row width) + straw**	$961	$279	$682
3	**Full season soybean**	$1,148	$192	$956
4	**Wheat (15-inch row width) with soy intercropped**	$1,433	$409	$1,024
5	**Wheat (7.5-inch row width) with soy double crop**	$1,100	$413	$687
6	**Wheat (7.5-inch row width) with soy double crop + straw**	$1,366	$427	$939

Calculated From Tab 1

Per Acre Costs (calculated as $/acre)	Default Value	Your Value
Wheat seed (7.5-inch)	54.00	54.00
Wheat seed (15-inch)	27.00	27.00
Wheat N	128.52	128.52
Wheat herbicide ($/acre)	13.18	21.98
Soybean seed (full season or intercrop)	57.40	64.50
Soybean seed (double crop)	42.00	42.00
Soybean herbicide for full season crop ($/acre)	78.07	71.64
Soybean herbicide ($/acre) intercrop or double crop	50.00	50.00

FIeld Operation Costs ($/acre)	Default Value	Your Value
Planting (wheat/no-till drill)	19.70	17.60
Fertilizer application (wheat only/liquid spray)	8.40	7.60
Herbicide application (wheat/self-propelled)	8.20	7.70
Combine (wheat)	32.10	28.40
Wheat straw harvest	13.30	13.30
Planting (soybean/no-till/15- or 30-inch)	23.40	20.10
Herbicide application (soybean)	8.20	7.70
Combine (soybean)	32.20	27.80

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	A	B	C	D
1	**Costs ($/lb)**	**Default Value**	**Your Value**	
2	P_2O_5	0.83	0.83	
3	K_2O	0.60	0.60	
4				
5	**Nutrient Removal Rates**	**P_2O_5**	**K_2O**	Note: Nutrient removal rates are from the Tri-State
6	Wheat grain (lb/bu)	0.50	0.25	Fertilizer Recommendations for Corn, Soybeans,
7	Wheat straw (lb/ton)	3.70	29.00	Wheat, and Alfalfa (OSU Bulletin 974).
8	Soybean (lb/bu)	0.80	1.15	
9				

	F	G	H	I	J	K
1			**Phosphorus removed (lb P_2O_5/acre)**		**Potassium removed (K_2O/acre)**	
2		**Estimated Nutrient Removal**	**Default Value**	**Your Value**	**Default Value**	**Your Value**
3	**1**	**Wheat only (7.5-inch row width)**	47	44	23	22
4	**2**	**Wheat only (7.5-inch row width) + straw**	54	51	81	80
5	**3**	**Full season soybean**	46	46	66	98
6	**4**	**Wheat (15-inch row width) with soy intercropped**	63	87	57	89
7	**5**	**Wheat (7.5-inch row width) with soy double crop**	63	68	46	56
8	**6**	**Wheat (7.5-inch row width) with soy double crop + straw**	70	67	104	114
9						
10			**P_2O_5 value (per acre)**		**K_2O value (per acre)**	
11		**Estimated Nutrient Removal**	**Default Value**	**Your Value**	**Default Value**	**Your Value**
12	**1**	**Wheat only (7.5-inch row width)**	$38	$36	$14	$13
13	**2**	**Wheat only (7.5-inch row width) + straw**	$45	$42	$49	$48
14	**3**	**Full season soybean**	$38	$38	$39	$58
15	**4**	**Wheat (15-inch row width) with soy intercropped**	$52	$72	$34	$53
16	**5**	**Wheat (7.5-inch row width) with soy double crop**	$52	$56	$28	$34
17	**6**	**Wheat (7.5-inch row width) with soy double crop + straw**	$58	$56	$63	$68
18						
19			**Total P_2O_5 and K_2O value (per acre)**			
20		**Estimated Nutrient Removal**	**Default Value**	**Your Value**		
21	**1**	**Wheat only (7.5-inch row width)**	$52	$49		
22	**2**	**Wheat only (7.5-inch row width) + straw**	$93	$90		
23	**3**	**Full season soybean**	$77	$96		
24	**4**	**Wheat (15-inch row width) with soy intercropped**	$87	$125		
25	**5**	**Wheat (7.5-inch row width) with soy double crop**	$79	$90		
26	**6**	**Wheat (7.5-inch row width) with soy double crop + straw**	$120	$124		
27						
28						

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		From Tab 2. Partial Return			From Tab 3. Nutrient Removal	Final Calculation
DEFAULT VALUES		Gross Return	Costs per acre	Partial Return	Total P_2O_5 and K_2O value per acre	Partial Return - Nutrient Removal per acre
1	Wheat only (7.5-inch row width)	$799	$264	$535	$52	$482
2	Wheat only (7.5-inch row width) + straw	$1,065	$277	$787	$93	$694
3	Full season soybean	$880	$199	$680	$77	$603
4	Wheat (15-inch row width) with soy intercropped	$1,143	$408	$735	$87	$648
5	Wheat (7.5-inch row width) with soy double crop	$1,107	$420	$688	$79	$608
6	Wheat (7.5-inch row width) with soy double crop + straw	$1,373	$433	$940	$120	$820

		From Tab 2. Partial Return			From Tab 3. Nutrient Removal	Final Calculation
YOUR VALUES		Gross Return	Costs per acre	Partial Return	Total P_2O_5 and K_2O value per acre	Partial Return - Nutrient Removal per acre
1	Wheat only (7.5-inch row width)	$695	$266	$429	$49	$380
2	Wheat only (7.5-inch row width) + straw	$961	$279	$682	$90	$592
3	Full season soybean	$1,148	$192	$956	$96	$860
4	Wheat (15-inch row width) with soy intercropped	$1,433	$409	$1,024	$125	$899
5	Wheat (7.5-inch row width) with soy double crop	$1,100	$413	$687	$90	$597
6	Wheat (7.5-inch row width) with soy double crop + straw	$1,366	$427	$939	$124	$816

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Thanks to….