

Partial budgets for cover crops in Midwest row crop farming

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Goal

- To evaluate the changes in annual budgets for corn and soybean production in Midwest farms associated with the use of cover crops.

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Novelty

- First study to calculate partial budgets using field data (instead of experimental plots) from farmers that manage row crop production on acres with cover crops and on acres with no cover crops.
- Our partial budgets are the best available estimates of annual net returns to cover crop users, because the data were collected following a scientific method across the largest number of farms included in any cover crop study available to date.

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Method: Partial Budgets

- For each farm operator, costs and revenues in his or her production system with cover crops are compared against costs and revenues in his or her production system without cover crops.

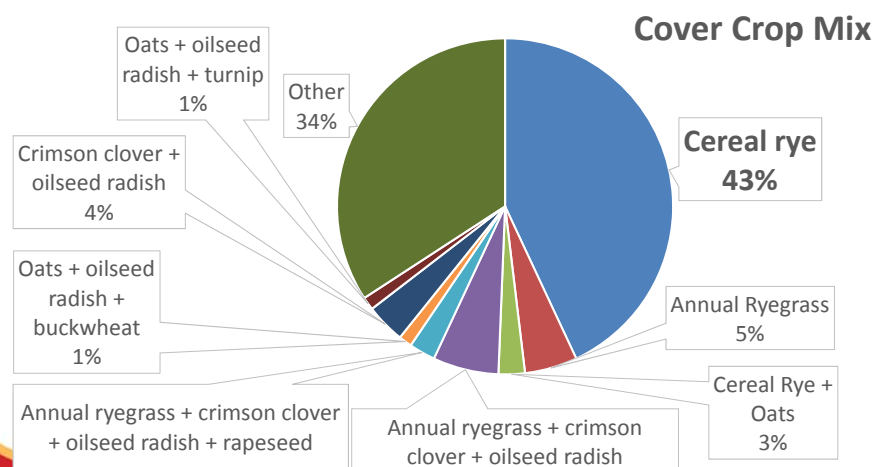
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Data collection: Survey

- Questionnaire design informed by extensive feedback from 16 experienced cover crop farmers in Iowa, Minnesota, and Illinois
- Online survey
- Electronic invitations: +20,000 farmers (PFI, Midwest Cover Crops Council, National Wildlife Federations' Cover Crops Champions Program, American Society of Agronomy, etc.)
- +300 responses; only used 79.

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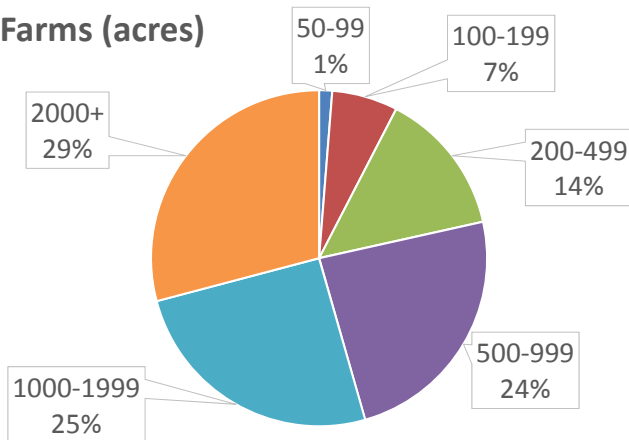
Respondents' characteristics



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Respondents' characteristics

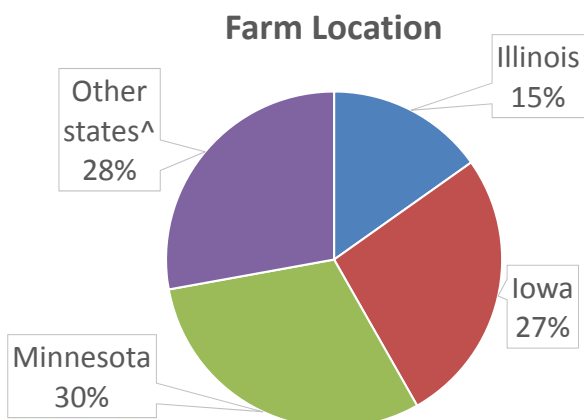
Size of Farms (acres)



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Respondents' characteristics

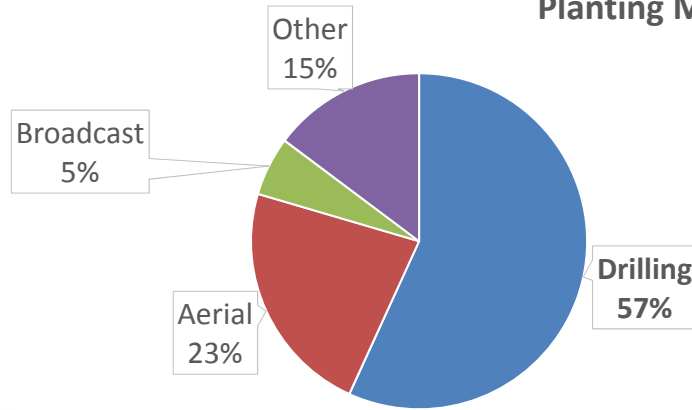
Farm Location



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Respondents' characteristics

Planting Methods



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Respondents' characteristics

Farmers' experience with cover crops

	Mean	StDev	Median	Min	Max
Number of years planting cover crops	3.94	2.64	4	0.2	15
Cumulative cover crop acreage	1,483	3,783	540	5	30,000

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Structure of Partial Budgets

A. Changes in revenue

B. Changes in costs

1. Cover crop planting
2. Herbicide expenses (weighted average of a,b)
 - a. For farmers that did not apply herbicides before planting cash crop in baseline
 - b. For farmers that applied herbicides before planting cash crop in baseline
3. Other Costs (cash crop, rent, management, ...)

C. Net change in profit ($C=A-B$)

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Partial budget for cover crops
terminated with herbicides
followed by corn for grain

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Part A. Changes in Revenues

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
A. Changes in revenue:					
1. Corn Yield (valued @ \$3.35/bushel)	-9.18	-33.50	0.00	18.36	21
2. Cost-share program	25.33	17.00	25.00	25.00	6
Subtotal	16.16	-16.50	25.00	43.36	

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Part B. Changes in Costs

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
B. Changes in costs:					
1. Cover crop planting	31.84	39.86	29.88	23.05	
a. Seeds	16.33	21.00	14.00	12.00	21
b. Planting (excluding seeds) (weighted average of i-ii)	15.51	18.86	15.88	11.05	
i. Custom work	17.50	19.00	16.00	15.00	8
ii. Non-Custom	14.44	18.78	15.82	8.95	15

Part B. Changes in Costs (cont.)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
2. Herbicide expenses (weighted average of a-b)	4.05	7.38	0.72	0.72	
a. For farmers that did not apply herbicides before planting corn in baseline	15.06	15.06	15.06	15.06	1
i. Herbicide cost to terminate cover crops	9.00	9.00	9.00	9.00	1
ii. Application (Non-custom)	6.06	6.06	6.06	6.06	1

Part B. Changes in Costs (cont.)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
b. For farmers that applied herbicides before planting corn in baseline	3.50	7.00	0.00	0.00	20
i. Additional herbicide costs on top of regular weed control program*	3.50	7.00	0.00	0.00	20
ii. Labor costs to apply herbicides on top of regular weed control program*					0

Part B. Changes in Costs (cont.)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
3. Other Costs (sum of a-k)	1.02	1.41	0.30	0.00	
a. Corn seed costs	0.00	0.00	0.00	0.00	21
b. Corn planting costs (excluding seeds)	0.71	0.00	0.00	0.00	21
c. Nitrogen costs	0.26	0.00	0.00	0.00	21
d. P & K costs	0.00	0.00	0.00	0.00	21
e. Manure costs	0.00	0.00	0.00	0.00	21
f. Insecticide costs	0.90	0.00	0.00	0.00	21
g. Fungicide costs	0.00	0.00	0.00	0.00	21

Part B. Changes in Costs (cont.)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
h. Soil testing costs	0.00	0.00	0.00	0.00	21
i. Management (\$15 per hour)	1.24	1.41	0.30	0.00	15
j. Cash rent	-1.43	0.00	0.00	0.00	14
k. Soil erosion repairs	-0.67	0.00	0.00	0.00	21
Subtotal B. Changes in Costs	36.91	48.65	30.90	23.77	

Net Change in Profits (\$/acre)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)
A. Changes in revenue	16.16	-16.50	25.00	43.36
B. Changes in Costs	36.91	48.65	30.90	23.77
C. Net change in profit (A-B)	-20.76	-65.15	-5.90	19.59
Net change in profit without Cost-Share:	-46.09	-82.15	-30.90	-5.41

Partial budget for cover crops terminated with herbicides followed by soybeans

Part A. Changes in Revenues

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
A. Changes in revenue:					
1. Soybean Yield (valued @ \$9.95/bushel)	31.74	0.00	4.78	57.30	34
2. Cost-share program	28.07	20.00	25.00	30.00	14
Subtotal	59.81	20.00	29.78	87.30	

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Part B. Changes in Costs

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
B. Changes in costs:					
1. Cover crop planting	31.14	35.95	29.77	24.82	
a. Seeds	15.11	17.00	13.50	11.00	34
b. Planting (excluding seeds) (weighted average of i-ii)	16.02	18.95	16.27	13.82	
i. Custom work	13.61	15.00	14.50	11.50	14
ii. Non-Custom	17.44	21.25	17.31	15.17	24

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
2. Herbicide expenses (weighted average of a-b)	3.82	5.50	4.05	2.33	
a. For farmers that did not apply herbicides before planting soy in baseline	16.85	23.38	17.23	9.91	8
i. Herbicide cost to terminate cover crops	11.25	16.50	11.00	6.00	8
ii. Application (weighted average a-b)	5.60	6.88	6.23	3.91	8
(a) Custom work	6.17	7.00	6.50	5.00	3
(b) Non-Custom	5.26	6.81	6.06	3.25	5

Part B. Changes in Costs (cont.)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
b. For farmers that applied herbicides before planting soy in baseline	-0.19	0.00	0.00	0.00	26
i. Additional herbicide costs on top of regular weed control program*	-0.19	0.00	0.00	0.00	26
ii. Labor costs to apply herbicides on top of regular weed control program*					0

Part B. Changes in Costs (cont.)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
3. Other Costs (sum of a-k)	-0.27	1.41	0.27	0.00	
a. Corn seed costs	0.21	0.00	0.00	0.00	34
b. Corn planting costs (excluding seeds)	1.18	0.00	0.00	0.00	34
c. Nitrogen costs	0.00	0.00	0.00	0.00	34
d. P & K costs	0.00	0.00	0.00	0.00	34
e. Manure costs	0.53	0.00	0.00	0.00	34
f. Insecticide costs	-0.21	0.00	0.00	0.00	34
g. Fungicide costs	-0.38	0.00	0.00	0.00	34

Part B. Changes in Costs (cont.)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)	N
h. Soil testing costs	0.00	0.00	0.00	0.00	34
i. Management (\$15 per hour)	0.97	1.41	0.27	0.00	24
j. Cash rent	-2.50	0.00	0.00	0.00	20
k. Soil erosion repairs	-0.06	0.00	0.00	0.00	34
Subtotal B. Changes in Costs	34.69	42.86	34.09	27.15	

Net Change in Profits (\$/acre)

Sources of changes in net profits	Mean (\$/acre)	1 st Quartile (\$/acre)	Median (\$/acre)	3rd Quartile (\$/acre)
A. Changes in revenue	59.81	20.00	29.78	87.30
B. Changes in Costs	34.69	42.86	34.09	27.15
C. Net change in profit (A-B):	25.13	-22.86	-4.31	60.15
Net change in profit without Cost-Share:	-2.95	-42.86	-29.31	30.15

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Concluding remarks

- The average net return to cover crops terminated with herbicides followed by corn was **negative**,
- but the average net return to cover crops terminated with herbicides followed by soybeans was **positive**.

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Concluding remarks (cont.)

- Substantial variability in net returns, driven by:
 - the difference in yields obtained in fields with and without cover crops,
 - planting costs, and
 - cost-share program payments.

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Concluding remarks (cont.)

- For most farmers, cost-share payments are insufficient to cover all private costs associated with cover crop use,
- but are a critical incentive to support this practice.

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Thank you for your attention!

Questions?

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