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Economics of No-Till and Cover Crops in Texas Rolling Plains Dryland Cotton

Conventional tillage

No-till

No-till with cover crops

Photos courtesy of Paul B. DeLaune

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Introduction

By avoiding tillage practices, no-till farming minimizes soil disturbance, while increasing water infiltration, retention of organic matter, and cycling of nutrients in the soil. Cover crops enhance soil health in terms of fertility, quality, water, and pests, among others (Rodale Institute, 2011). Both no-till and cover crops help reduce soil erosion, increase soil biological fertility, and improve soil resilience. As a result, no-till and cover crops can improve farmland productivity, reduce yield variability, and increase profits (Claassen et al., 2018).

The adoption of cover crops has been promoted by the USDA Natural Resources Conservation Service (NRCS) Soil Health Initiative due to potential economic and agronomic benefits (USDA-NRCS, 2019). Sustainable Agriculture Research & Education (SARE) has also provided support for research and educational programs relating to cover crops (SARE, 2007). Multiple benefits of cover crops have been identified (Fig. 1).

Research has yielded various findings. For instance, using hairy vetch increased the net return of corn production compared to no cover in Tennessee (Robert et al., 1998), while cotton lint revenue and gross margins of no-till rye cover crop were lower than that of conventional tillage in the Texas High Plains (Lewis et al., 2018). Therefore, the process of choosing and adopting cover crops is complex and technical. Factors to consider include the possibility that the production cost may be increased.

When considering adopting no-till practices and cover crops, several major factors need to be considered: selection of cover crops, costs, timing of planting and terminating cover crops, labor availability, investment in additional machinery, cash crop mix, crop rotation, short- vs. long-term returns, environmental and economic benefits, availability of technical information, and Extension services (Midwest Cover Crops Council, 2014; Triplett and Dick, 2008).

To investigate the effects of no-till and cover crops on soil improvement and crop growth, Texas A&M System researchers conducted experiments of no-till and cover crops (DeLaune and Sij, 2012; DeLaune et al., 2015). Data from the experiments demonstrate the calculation of costs and profits to help producers make decisions about no-till and cover crop adoption. The study focused on:

- The estimated costs of adopting no-till and cover crops in dryland cotton systems.
- The impact of no-till and various cover crops on lint and cottonseed yields.
- The impact of no-till and various cover crops on net returns of cotton growers.
- The impact of lint and cottonseed prices on net returns.

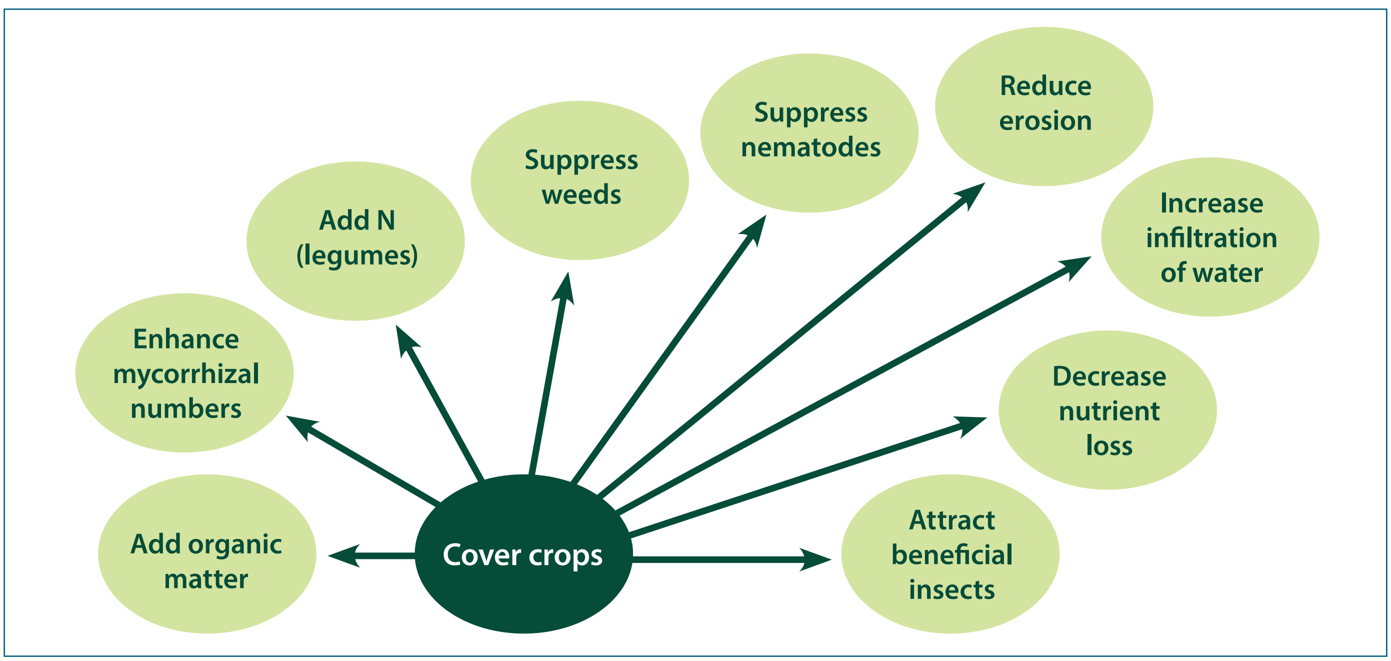

Figure 1. Cover crops have multiple benefits. *Source: Adapted from Magdoff and van Es (2009).*

Appropriate cover crops must be suited to each farm and may vary depending on the subsequent cash crop, soil fertility, purposes of adding cover crops, availability of labor during planting, and termination time period for the specific cover crop. Cotton growers can refer to this publication for the associated costs and benefits of no-till and cover crop practices.

Estimated Annual Operating Expenses

Experimental design and management scenarios

A field experiment was conducted at the Texas A&M AgriLife Research Station at Chillicothe, Texas from 2013 to 2016. The soil type was Grandfield fine sandy loam soil (Adhikari et al., 2017). No-till and cover crop practices were used for continuous dryland cotton production. Regionally well-adapted commercial cotton cultivars were used over the duration of this study, including DP1219 (2013) and NG1511 (2014, 2015, 2016). Four replicates were used for each tillage and cover crop combination. Cover crops had been planted in October or November of the previous year and were chemically terminated in April. Cotton was planted in June and harvested in October or November. This was repeated every season (Table A1, Appendix A). Average values for the whole tillage-cover, cotton production cycle are reported in this study in terms of costs, yields, and net returns. Appendix A provides additional information relating to input prices used to estimate variable costs, overhead costs, fixed costs, and the cost values for each year.

For the dryland cotton production in this research, we studied the costs and benefits of six no-till and cover crop combinations compared to commonly used conventional tillage methods in the Texas Rolling Plains (DeLaune et al., 2015):

1. CT_Fallow — conventional tillage (without cover crops);
2. NT_Fallow — no-till (without cover crops);
3. NT_Wheat — no-till with winter wheat (30 lb./ac);
4. NT_Clover — no-till with crimson clover (20 lb./ac);
5. NT_Pea — no-till with Austrian winter pea (35 lb./ac);
6. NT_Vetch — no-till with hairy vetch (20 lb./ac);
7. NT_Mix — no-till with mixed cover crop species (species and their ratios vary each year—see Table A2, Appendix A).

Table 1. Average direct and indirect costs for cotton production (2013-2016) ($/ac).

Cost component	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
A. Direct costs							
A1. Production costs[1]							
Seed (cover crops and cotton)	50.78	50.78	58.88	73.43	70.73	83.63	77.13
Chemical	19.27	19.27	26.88	26.88	26.88	26.88	26.88
Labor[2]	5.08	1.87	3.53	3.53	3.53	3.53	3.53
Fuel	11.78	3.82	7.27	7.27	7.27	7.27	7.27
Lubrication and repairs	6.91	6.35	7.24	7.24	7.24	7.24	7.24
Custom chemical application	27.00	27.00	32.50	32.50	32.50	32.50	32.50
Interest	2.76	2.41	3.60	4.54	4.36	5.20	4.78
A2. Harvest costs							
Custom operation/application	130.77	130.12	126.66	124.92	136.31	138.56	133.92
Labor/fuel/lube/repairs/chemical	17.91	17.91	17.91	17.91	17.91	17.91	17.91
Total direct costs	272.24	259.52	284.46	298.21	306.72	322.71	311.15
B. Indirect cost							
Depreciation	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Other[3]	—	—	—	—	—	—	—
Total indirect costs	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Total direct and indirect costs (A+B)	289.82	278.41	304.88	318.63	327.14	343.13	331.57

[1] No fertilizer is applied in these fields.
[2] Custom tillage operation is for conventional tillage only, and the associated labor, fuel, lube, etc. are considered together with these for cover crops and cotton production.
[3] Insurance, taxes, and cash rent are not considered in the fixed costs.

Annual operating expenses

Annual operating expenses, including both direct and indirect costs, were estimated for each tillage and cover crop combination (Table 1).

The direct costs include costs relating to production and harvest. For the cover crop treatments, the increased costs are related to cover crop seeds, chemicals and their application to terminate the cover crops, related fuel use, and other operating costs. A detailed comparison of the increased costs on cover crops is presented later on the next page.

The indirect costs were higher with cover crops primarily due to additional equipment such as no-till drill planters. For example, the depreciation value for cover crop treatments is $20.42 per acre and $17.58 per acre for conventional tillage treatment.

Seed costs of cover crops

Table 2 shows the seed prices of cover crops. The seed prices of crimson clover, Austrian winter pea, and hairy vetch are $23, $20, and $33 per acre, respectively. All of these are higher than wheat at $8 per acre. The slight year-to-year variation of seed costs is due to price changes in this region. The price of the mixed species averages $26 per acre, including mixing and re-bagging fees.

Table 2. Cover crop seed costs ($/ac).

Year	Wheat	Clover	Pea	Vetch	Mix*
2013	8	25	19	32	31
2014	8	24	20	32	24
2015	8	18	20	32	25
2016	8	24	20	36	25
Average	8	23	20	33	26

*Please refer to Table A2 for the mixed species and their ratios in each year.

Total costs of cotton production using no-till and cover crops

Table 3 shows the total production costs for cotton and preceding tillage and use of cover crops. The total costs are slightly higher when using cover crop practices—which are $305, $319, $327, $343, and $332 per acre for winter wheat, crimson clover, Austrian winter pea, hairy vetch, and mixed species cover crops, respectively—compared with the $290 per acre for the production of conventionally tilled cotton. The total costs for no-till, without cover crops, is $278 per acre on average.

Table 3. Total costs ($/ac) for combinations of tillage systems (CT: conventional, NT: no-till) and cover crop species.

Year	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
2013	247	226	276	296	250	272	265
2014	312	300	310	347	358	405	382
2015	294	274	302	307	331	333	324
2016	306	314	331	324	369	362	355
Average	290	278	305	319	327	343	332

Relative costs

The relative costs of no-till and cover crop practices compared to conventional tillage without cover crops are calculated below. In Table 4, no-till and cover crop practices increase the production cost—by $15, $29, $37, $53, and $42 per acre for winter wheat, crimson clover, Austrian winter pea, hairy vetch, and mixed cover crops, respectively. No-till practices without cover crops save farmers $11 compared to conventional tillage. The savings are primarily due to the reduced labor, machinery, and fuel use.

Table 4. Relative costs ($/ac) compared to CT_Fallow.

Year	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
2013	0	-21	29	49	3	25	18
2014	0	-13	-2	35	46	93	70
2015	0	-20	9	14	37	40	31
2016	0	8	25	18	63	56	49
Average	0	-11	15	29	37	53	42

The relative cost compared to no-till practices without cover crops include seed cost and applications (labor, machinery, and fuel use for planting and terminating cover crops). These calculations also reflect the total cost of cover crop seeds and application costs. Table 5 shows that wheat has the lowest cost of all cover crops at $26 per acre. Crimson clover, Austrian winter pea,

Table 5. Relative costs ($/ac) of no-till (NT) with cover crops compared to no-till with winter fallow.

Year	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
2013	0	50	70	24	46	39
2014	0	10	47	58	105	82
2015	0	28	33	57	60	50
2016	0	18	10	56	48	41
Average	0	26	40	49	65	53

and mixed species have a moderate cost—$40, $49, and $53 per acre, respectively. Hairy vetch has the highest cost at $65 per acre. Legume cover crops are preferred by growers because they create and promote nitrogen and help save fertilizer cost.

Cotton Yield and Net Return

Yield

Lint and cottonseed yields calculated below show productivity using different tillage methods along with various cover crops. There are no statistical differences in lint and seed yields in these variablestreatments.

Table 6 shows conventional tillage and no-till winter fallow have similar cotton lint yields, averaging 594 and 591 lbs. per acre. For cover crops, winter wheat and crimson clover show a slightly lower lint yield—576 and 568 lbs. per acre, respectively. However, lint yield was increased by using Austrian winter pea, hairy vetch, and mixed cover crops—yielding 620, 630, and 609 lbs. per acre, respectively.

Regarding the cottonseed yield (Table 7), compared to conventional tillage with fallow (841 lbs. per acre), no-till practices with fallow and winter wheat decreased the seed yield—784 and 812 lbs. per acre, respectively. Crimson clover, Austrian winter pea, and mixed cover crops showed a similar seed yield—841, 836, and 833 lbs. per acre, respectively. Hairy vetch increased the seed yield, producing 929 lbs. per acre.

Net return

Net returns under different tillage methods and various cover crops are calculated with cost-benefit analysis for each year and an average over four years (Table 8). Cost-benefit analysis compared the total costs of both variable and fixed inputs to total farm revenue. Historical prices of lint and cottonseed prices were used for these calculations. No statistical difference was found among the treatments. Net returns of conventional tillage ($179/ac) and no-till with winter fallow ($182/ac) were similar, and net returns for all cover crops ($136-153/ac) were less than the conventional tillage system

Table 6. Lint yield (lb./ac) for combinations of tillage systems (CT: conventional, NT: no-till) and cover crop species

Year	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
2013	471	417	507	518	336	373	346
2014	628	613	538	629	698	855	787
2015	603	556	541	517	614	570	558
2016	676	779	717	607	831	721	744
Average	594	591	576	568	620	630	609

Table 7. Cottonseed yield (lb./ac) for combinations of tillage systems (CT: conventional, NT: no-till) and cover crop species.

Year	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
2013	665	589	716	732	475	527	489
2014	886	866	759	888	985	1208	1111
2015	851	785	764	730	866	805	788
2016	963	897	1010	1012	1017	1177	944
Average	841	784	812	841	836	929	833

Table 8. Net returns ($/ac) for combinations of tillage systems (CT: conventional, NT: no-till) and cover crop species.

Year	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
2013	202	172	207	198	69	81	63
2014	138	140	75	104	142	209	183
2015	147	132	93	70	117	82	83
2016	231	284	237	172	274	225	225
Average	179	182	153	136	150	149	138

($179/ac). Similar net return levels were found for wheat, Austrian winter pea, and hairy vetch—$153, $150, and $149 per acre, respectively. Crimson clover and mixed cover crops had a relatively lower net return of $136 and $138 per acre, respectively.

Sensitivity Analysis

Impact of price change

Net returns are calculated at varying prices based on the average lint and cottonseed prices between 2013 and 2016. Table 9 shows the net returns calculated using the average lint price at $0.65/lb. and average cottonseed price at $0.10/lb. These values are very close to those calculated with the historical prices of each year (Table 8). Net returns are also calculated by increasing or decreasing the prices by 10, 20, 30, and 40 percent. The results show that higher lint and seed prices make cover crop practices more profitable while the differences across different tillage and cover crop scenarios are negligible. Decreasing the prices by 30 percent—that is, at lint price $0.46/lb. and seed price $0.07/lb.—makes the cotton production using cover crops almost break even.

Additional analyses were conducted for varying fuel prices, labor payments, fertilizer, and chemical uses, and discount rates among other factors. However, given their relatively small magnitude, the impacts of a positive or negative 10 percent change on net return range from a quarter to a couple of dollars. Therefore, the specific values are not presented in this report.

Breakeven price

The breakeven prices for all tillage and cover crop scenarios are presented in Table 10. Historical data (2013 to 2016) show that cottonseed prices are relatively stable ($0.095 to $0.11/lb.) compared to lint prices ($0.57 to $0.746/lb.). Given an average cottonseed price of $0.10/lb., we calculated the breakeven prices of lint for multiple scenarios. The type of tillage and cover crops utilized did not significantly affect breakeven prices, mainly due to the limited yield responses in each practice (Table 6). Overall, it is beneficial to practice no-till without cover crops for its lower breakeven price of lint at $0.36/lb., compared to $0.39/lb. for conventional tillage. The breakeven prices for cover crop scenarios range from $0.41/lb. for wheat to $0.47/lb. for mixed species. Thus, low-cost cover crops, like wheat, pea, and crimson clover, should be preferred from a breakeven price perspective. However, crimson clover was not a good biomass producer in our experiment.

Table 9. Net returns at varying prices based on average lint and cottonseed prices in 2013-2016 ($/ac).

	Price change scenarios								
	−40%	−30%	−20%	−10%	P_1=0.65, P_2=0.10	+10%	+20%	+30%	+40%
CT_Fallow	-8	40	87	134	181	228	275	322	369
NT_Fallow	-1	46	92	138	184	231	277	323	370
NT_Wheat	-32	14	59	105	151	196	242	287	333
NT_Clover	-47	-1	44	89	134	180	225	270	316
NT_Pea	-35	13	62	111	159	208	256	305	354
NT_Vetch	-42	8	59	109	159	209	260	310	360
NT_Mix	-44	4	52	99	147	195	243	291	339

Notes: P1 refers to lint price; P2 refers to cottonseed price.

Table 10. Breakeven lint prices ($/lb.), given an average cottonseed price of $0.10/lb.

Year	CT_None	NT_None	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
2013	0.39	0.41	0.42	0.44	0.61	0.68	0.67
2014	0.48	0.40	0.46	0.41	0.40	0.34	0.39
2015	0.35	0.35	0.42	0.46	0.41	0.45	0.44
2016	0.36	0.29	0.34	0.37	0.32	0.35	0.37
Average	0.39	0.36	0.41	0.42	0.44	0.46	0.47

Study limitations

We evaluated the combinations of no-till and cover crop practices as compared to the conventional tillage system and observed their economic impacts on dryland cotton production in the Texas Rolling Plains. We did not discuss some additional benefits in the study due to limitations in the field experiment.

There may be potential benefits from environmental improvement through no-till and cover crop practices. Though crop yield can be increased due to enhanced soil health, the environmental or soil benefits cannot be fully enjoyed by producers. Examples include improved water quality in nearby lakes and reduction of nitrogen loss due to decreased soil erosion. Thus, it is difficult to accurately quantify these environmental benefits in values. Additional benefits can also be obtained if producers practice crop rotation. The impact of cover crops can be amplified with the interaction of cover crops and cash crop rotation. Future field experiment and economic analysis will be warranted.

In addition, there may be many concerns for farmers considering the inclusion of cover crop practices in farming operations. Workshops, education programs, cost-share programs, subsidies, and policy support may help address these concerns and promote the adoption of cover crops for better soil health and improved agricultural productivity.

Summary

The process of adopting cover crops in no-till cropping systems is complex and technical. Many factors need to be evaluated, including a selection of cover crops, termination time, labor availability, technical support, and financial assistance. Though improving soil health is a key motivator, additional costs may make producers hesitate in cover crop adoption.

By evaluating the economic benefits of different tillage and cover crops farmers can make informed, sustainable production decisions (Cotton Incorporated, 2018). This study investigated the economic feasibility of seven practices utilized in dryland cotton production in the Texas Rolling Plains: conventional tillage, no-till with winter fallow, and no-till with various cover crops including winter wheat, crimson clover, Austrian winter pea, hairy vetch, and mixed species.

The study found that:

- The total production cost when using no-till and winter cover crops is higher than practicing conventional tillage. The seed costs for legume cover crops range from $23 to $33 per acre and are $8 per acre for winter wheat cover. Compared to conventional tillage, the average costs of adding cover crops (including seed costs and operation) to a no-till system are $15 to $42 higher—even with $11 saved for no-till operation. The cost increase may be a significant barrier for producers.
- With moderate variations across scenarios, lint yields are increased by adding legume cover crops to no-till production. This study found an increase of 3 to 7 percent for Austrian winter pea, hairy vetch, and mixed species.
- Net returns of dryland cotton are not significantly reduced after adopting no-till and cover crops.
- Higher lint and cottonseed prices will make adopting cover crops more profitable.
- No-till is preferred over conventional tillage considering saved cost, lint yield, net returns, and different lint prices. While crimson clover may not produce good biomass, low-cost cover crops—like wheat and pea—should be preferred when considering break-even pricing.
- While crimson clover may not produce good biomass, local cotton growers can maintain a sustainable cropping system with technical and financial assistance, including Extension services and cost-share programs.

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Appendix A

Table A1. Dates and cotton cultivars.

	Cover crops		Cotton				
Year	Planting	Termination	Planting	Harvesting	Cultivar	Planting density (seeds/ft)	Seed price ($/ac)
2013	Oct. 26, 2012	Apr. 24	June 12	Oct. 25	DP1219	3	40.15
2014	Oct. 28, 2013	Apr. 25	June 13	Oct. 28	NG1511	3	56.00
2015	Oct. 30, 2014	Apr. 20	June 2	Nov. 24	NG1511	3	56.04
2016	Nov. 24, 2015	Apr. 25	June 10	Nov. 17	NG1511	3	50.91

Table A2. Cover crop species used in the mix treatment (lb./ac).

Species	2012	2013	2014	2015
Cereal rye	10	5	5	6
Wheat	10	9.5	9	9
Turnip	2	0.5	0.5	—
Crimson clover	3	2.5	2.5	—
Austrian winter field pea	10	8	8	12
Radish	—	0.5	1	—
Hairy vetch	5	4	4	3
Mix total	40	30	30	30

Table A3. Prices and component values used in the study.

Price/component	Value
Fuel price ($/gal)	2.59
Lube (% of fuel use)	10.00
Labor ($/hr)	10.00
Interest rate (%)	6.25
Custom chemical applications ($/ac)	5.50
Custom harvest operations ($/lb.)	
Custom stripping	0.10
Ginning	0.12

Table A4. Assumptions on preharvest operations.

Preharvest operations	Acres/hour	Fuel/hour
Shred stalks	50	7
Plant cover crops	6	8
Bedded (Conventional only)	7	10
Beds reshaped (Conventional only)	7	10
Cultivator (Conventional only)	7	9
Plant cotton	6	8

Table A5. Assumptions on equipment uses.

Equipment	Purchase price ($)	Salvage value (%)	Annual repair costs ($)	Useful life (yr)	Percent used in the crop (%)
Tillage equipment (Conventional)	45,000	30	1,125	15	10
Cotton planter (Conventional)	80,000	30	2,000	10	10
Cotton planter (No-till)	85,000	30	2,125	10	10
Box planter (Cover crops)	35,000	30	875	10	10
Sprayer (No-till)	55,000	30	1,375	10	10
Shredder	15,000	30	375	20	10

Table A6. Direct and indirect costs of cotton production in 2013 ($/ac).

Cost component	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
A. Direct costs							
***A1. Production costs*[1]**							
Seed (cover crops and cotton)	50.78	50.78	58.88	73.43	70.73	83.63	77.13
Chemical	19.27	19.27	26.88	26.88	26.88	26.88	26.88
Labor[2]	5.08	1.87	3.53	3.53	3.53	3.53	3.53
Fuel	11.78	3.82	7.27	7.27	7.27	7.27	7.27
Lubrication and repairs	6.91	6.35	7.24	7.24	7.24	7.24	7.24
Custom chemical application	27.00	27.00	32.50	32.50	32.50	32.50	32.50
Interest	2.76	2.41	3.60	4.54	4.36	5.20	4.78
A2. Harvest costs							
Custom operation/application	130.77	130.12	126.66	124.92	136.31	138.56	133.92
Labor/fuel/lube/repairs/chemical	17.91	17.91	17.91	17.91	17.91	17.91	17.91
Total direct costs	272.24	259.52	284.46	298.21	306.72	322.71	311.15
B. Indirect cost							
Depreciation	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Other[3]	—	—	—	—	—	—	—
Total indirect costs	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Total direct and indirect costs (A+B)	289.82	278.41	304.88	318.63	327.14	343.13	331.57

[1]No fertilizer is applied in these fields.
[2]Custom tillage operation is for conventional tillage only, and the associated labor, fuel, lube, etc. are considered together with these for cover crops and cotton production.
[3]Insurance, taxes, and cash rent are not considered in the fixed costs.
Above assumptions are the same for costs estimation of the following years.

Table A7. Direct and indirect costs of cotton production in 2014 ($/ac).

Cost component	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
A. Direct costs							
A1. Production costs							
Seed (cover crops and cotton)	56.00	56.00	64.10	80.00	76.30	87.60	80.43
Chemical	20.88	20.88	25.56	25.56	25.56	25.56	25.56
Labor	4.72	1.87	3.53	3.53	3.53	3.53	3.53
Fuel	10.85	3.82	7.27	7.27	7.27	7.27	7.27
Lubrication and repairs	6.82	6.35	7.24	7.24	7.24	7.24	7.24
Custom chemical application	32.00	32.00	37.50	37.50	37.50	37.50	37.50
Interest	2.77	2.43	3.47	4.47	4.24	4.94	4.50
A2. Harvest costs							
Custom operation/application	138.05	134.91	118.29	138.38	153.47	188.14	173.04
Labor/fuel/lube/repairs/chemical	22.78	22.78	22.78	22.78	22.78	22.78	22.78
Total direct costs	294.87	281.04	289.74	326.73	337.89	384.56	361.85
B. Indirect cost							
Depreciation	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Other	—	—	—	—	—	—	—
Total indirect costs	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Total direct and indirect costs (A+B)	312.45	299.93	310.16	347.15	358.31	404.98	382.27

Table A8. Direct and indirect costs of cotton production in 2015 ($/ac).

Cost component	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
A. Direct costs							
A1. Production costs							
Seed (cover crops and cotton)	56.04	56.04	64.14	74.04	76.34	87.64	81.43
Chemical	26.75	26.75	35.70	35.70	35.70	35.70	35.70
Labor	4.72	1.87	3.53	3.53	3.53	3.53	3.53
Fuel	10.85	3.82	7.27	7.27	7.27	7.27	7.27
Lubrication and repairs	6.82	6.35	7.24	7.24	7.24	7.24	7.24
Custom chemical application	22.00	22.00	27.50	27.50	27.50	27.50	27.50
Interest	3.30	2.97	4.28	4.94	5.09	5.85	5.43
A2. Harvest costs							
Custom operation/application	132.62	122.33	119.10	113.82	135.00	125.44	122.76
Labor/fuel/lube/repairs/chemical	12.83	12.83	12.83	12.83	12.83	12.83	12.83
Total direct costs	275.93	254.96	281.59	286.87	310.50	313.00	303.69
B. Indirect cost							
Depreciation	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Other	—	—	—	—	—	—	—
Total indirect costs	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Total direct and indirect costs (A+B)	293.51	273.85	302.01	307.29	330.92	333.42	324.11

Table A9. Direct and indirect costs of cotton production in 2016 ($/ac).

Cost component	CT_Fallow	NT_Fallow	NT_Wheat	NT_Clover	NT_Pea	NT_Vetch	NT_Mix
A. Direct costs							
A1. Production costs							
Seed (cover crops and cotton)	50.91	50.91	59.01	74.91	71.21	86.91	75.45
Chemical	15.66	15.66	24.47	24.47	24.47	24.47	24.47
Labor	6.15	1.87	3.53	3.53	3.53	3.53	3.53
Fuel	14.55	3.82	7.27	7.27	7.27	7.27	7.27
Lubrication and repairs	7.19	6.35	7.24	7.24	7.24	7.24	7.24
Custom chemical application	27.00	27.00	32.50	32.50	32.50	32.50	32.50
Interest	2.98	2.54	3.80	4.86	4.61	5.66	4.90
A2. Harvest costs							
Custom operation/application	148.79	171.40	157.75	133.48	182.73	158.60	163.68
Labor/fuel/lube/repairs/chemical	15.22	15.22	15.22	15.22	15.22	15.22	15.22
Total direct costs	288.45	294.77	310.79	303.48	348.78	341.40	334.26
B. Indirect cost							
Depreciation	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Other	—	—	—	—	—	—	—
Total indirect costs	17.58	18.89	20.42	20.42	20.42	20.42	20.42
Total direct and indirect costs (A+B)	306.03	313.66	331.21	323.90	369.20	361.82	354.68

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