COTTON RESEARCH VERIFICATION SUSTAINABLITY PROGRAM: ECONOMICS REPORT

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Abstract

The University of Arkansas System Division of Agriculture's Cotton Research Verification Sustainability Program (CRVSP) works with producers to grow cotton more efficiently with the objective of improving profitability. The average return to total specified costs in 2020 was $122.17/ac. The verification field low was -$53.08/ac in the Desha South field, and the high was $288.44/ac in the Clay FS/NC field. Total operating expenses averaged $0.42/lb lint, and total expenses averaged $0.53/lb lint. For cotton to continue being a viable commodity, profitability must be improved.

Introduction

The University of Arkansas System Division of Agriculture has been conducting the Cotton Research Verification Program (CRVP) since 1980. This is an interdisciplinary effort in which best recommendation practices and production technologies are applied in a timely manner to a specific farm field. Since the inception of the CRVP in 1980, there have been 331 irrigated fields entered into the program. The success of the cotton program spawned verification programs in rice, soybean, wheat, and corn in Arkansas and similar programs in other mid-South states. In 2014, the CRVP became known as the Cotton Research Verification Sustainability Program (CRVSP). The CRVSP expands beyond that of the traditional verification programs by measuring the producers' environmental footprint for each field and evaluating the connection between profitability and sustainability.

Materials and Methods

The 2020 CRVSP was composed of 12 fields in four locations, Desha County (6), Clay County (2), St. Francis County (2), and the Agricenter (2). Each field was entered into the Field to Market Fieldprint Calculator (www.fieldtomarket.org). Two fields in Desha County, Shop and Weaver, entered the sixth year, Clay County, Desha County, and St. Francis County each had one field that entered the second year, and the Agricenter field entered the first year of a modified no till with cover crop production system (Table 1). Increasing both efficiency and profitability will continue to be a main part of the program. The CRVSP has worked along with the University of Arkansas System Division of Agriculture's Discovery Farms Program in Southeast Arkansas in 4 of the 12 fields for the last 6 years. Discovery Farms' focus is to monitor edge-of-field water quality. Fields were watered in two sets on Discovery Farm Fields. The split-field arrangement provides the opportunity to compare two production strategies. The farmer standard tillage was compared to a no-till system with cereal rye cover crop. The fields at St. Francis and Clay counties were not watered in two sets to allow for that unique comparison, and the Agricenter fields were dryland. In the fall of 2019, all no-till cover fields were broadcast seeded with 'Elbon' cereal rye at a target seeding rate of 56 lb/ac with the exception of the U.S. Cotton Trust Protocol/Better Cotton Initiative (USTP/BCI) field. The USTP/BCI no-till cover field is the only one within the study that had a cover crop blend which consisted of 25 lb/ac cereal rye, 25 lb/ac black oats, and 2 lb/ac hairy vetch. Irrigated fields were either furrow or pivot irrigated. The diversity of the fields in the program reflects cotton production in Arkansas. Field records were maintained, and economic analysis was conducted at the end of the season to determine net return/ac for each field in the program

Results and Discussion

The majority of cotton in Arkansas was planted in May. Tarnished plant bug (TPB) numbers slightly decreased this year in the CRVSP fields, which were treated an average of 3.33 times compared to 3.57 times in 2019. TPB pressure was similar across all fields, which were sprayed 3 to 5 times during the growing season (except the BCI Trust Protocol field, which received no plant bug treatments). Each field had an average of 1.58 burndowns and 1.83 herbicide applications for the 2020 season. The average number of treatments for moth/worms was 0.83. The average costs for

herbicides and insecticides were $71.97 and $63.23, respectively. Pest control represents a big expense and can impact yields greatly. Records of field operations on each field provided the basis for estimating expenses. Production data from the 12 fields were applied to determine costs and returns above operating costs, as well as total specified costs. Operating costs and total costs/lb lint indicate the commodity price needed to meet each cost type. Costs in this report do not include land costs, management, or other expenses and fees not associated with production. Budget summaries for cotton are presented in Table 1. The price received for cotton of $0.62/ lb is the estimated Arkansas annual average for the 2020 production year. The average cotton yield for these verification fields was 1302 lb/ac lint, 102 lb/ac lint greater than the state average. The average operating cost for cotton in these fields was $537.46/ac (Table 2). Chemical costs averaged $183.27/ac and were 34% of operating expenses. Seed and associated technology fees averaged $117.34/ac, or 22% of operating expenses, and included five fields with a cover crop. Fertilizer and nutrient costs averaged 15% of operating expenses and were $82.36/ac. The average yield in the verification fields was 1302 lb/ ac lint, which was a 102 lb/ac lint increase when compared to both the 2020 enterprise budget and the statewide average yield. Average operating costs were $0.42/lb lint compared to the yearly enterprise budget operating costs of $0.53 lb/ lint. Operating costs ranged from a low of $376.23 in the USTP/BCI Farmer Standard No Cover (FS/NC) field to a high of $726.30 in the Desha North field. Returns to operating averaged $269.87/ac across verification fields which was an increase of $161.71/ac over the enterprise budget. The range was from a low of $113.10/ac in the Desha South field to a high of $450.75/ac in the Clay FS/NC field. Average fixed costs were $147.70/ac which led to average total costs of $685.17/ac. The average return to total specified costs was $122.17/ac, compared to -$68.77/ac on the enterprise budget. The verification field low was -$53.08 in the Desha South field, and the high was $288.44 in the Clay FS/NC field. Total operating expense averaged $0.42/lb lint, compared to $0.53/lb lint in the enterprise budget. Total expenses averaged $0.53/lb lint, compared to $0.68/lb lint in the enterprise budget. While the enterprise budget slightly over-estimated expenses and slightly under-estimated revenue, it still serves as a valuable planning tool for producers. For cotton to continue being a viable commodity, profitability must be improved.

Table 1. Field location, field name, years in program, tillage type with or without cover crop, and irrigation method for 2020 verification fields.

Location	Field name	Years in Program	No-till Cover Crop	Farmer Standard till with No Cover	Irrigation Method
Clay	Clay NTC	2	x		Furrow
Clay	Clay FSNC	2		x	Furrow
Desha	Weaver NTC	6	x		Furrow
Desha	Weaver FSNC	6		x	Furrow
Desha	Shop NTC	6	x		Furrow
Desha	Shop FSNC	6		x	Furrow
St. Francis	St. Francis NTC	2	x		Pivot
St. Francis	St. Francis FSNC	2		x	Pivot
Agricenter	USTP/BCI NTC	1	x		Dryland
Agricenter	USTP/BCI FSNC	1		x	Dryland
Desha	Desha North	2		x	Furrow
Desha	Desha South	2		x	Furrow

Table 2. Summary of revenue and Expenses per acre for 12 fields in the 2020 Cotton Research Verification Sustainability Program compared to the online 2020 enterprise budget

	Field													
Revenue/Expenses	Clay NT/C	Clay FS/NC	Weaver NT/C	Weaver FS/NC	Shop NT/C	Shop FS/NC	St. Francis NT/C	St. Francis FS/NC	USTP/ BCI NT/C	USTP/ BCI FS/NC	Desha North	Desha South	12 Field Verification Average	2020 Enterprise Budget
Revenue														
Yield (lb)	1542	1547	1288	1328	1266	1441	1438	1172	962	905	1384	1353	1302.16	1200
Price ($/lb)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Tot. Crop Rev.	**956.04**	**959.14**	**798.56**	**823.36**	**784.92**	**893.42**	**891.70**	**726.42**	**596.44**	**561.10**	**858.08**	**838.86**	**807.34**	**744.00**
Cottonseed Value	**230.53**	**231.28**	**192.56**	**198.54**	**189.27**	**215.43**	**215.01**	**175.16**	**143.82**	**135.30**	**206.91**	**202.27**	**194.67**	**179.88**
Expenses														
Seed	138.96	118.80	114.96	94.80	114.96	94.80	133.35	113.19	155.40	132.00	98.40	98.40	117.34	114.00
Fertilizer & Nutrients	81.69	81.69	77.20	77.20	77.20	77.20	97.97	97.97	66.77	66.77	93.31	93.31	82.36	85.06
Herbicides	34.27	34.27	42.10	102.69	42.10	102.69	77.35	77.35	66.16	66.16	109.25	109.25	71.97	112.72
Insecticides	99.47	99.47	69.34	62.64	69.34	62.64	54.12	54.12	0.00	0.00	93.79	93.79	63.23	100.93
Other Chemicals	30.37	30.37	22.33	22.33	22.33	22.33	29.82	29.82	22.42	22.42	161.17	161.17	48.07	25.72
Custom Applications	0.00	0.00	48.00	56.00	48.00	56.00	54.00	46.50	0.00	0.00	31.00	31.00	30.88	16.00
Other Inputs	29.57	29.65	25.34	26.00	24.97	27.89	23.96	19.52	10.68	10.05	26.94	26.42	23.42	10.51
Diesel Fuel	17.03	17.17	15.94	16.35	15.94	16.35	13.37	13.37	15.30	15.44	16.87	16.87	15.83	46.08
Irrigation Energy Costs	24.54	24.54	16.83	15.50	17.07	16.83	9.00	7.50	0.00	0.00	17.72	17.72	13.94	35.43
Input Costs	**455.90**	**435.96**	**432.04**	**473.51**	**431.91**	**476.73**	**492.94**	**459.34**	**336.73**	**312.84**	**648.45**	**647.93**	**467.02**	**546.45**
Fee's	21.41	21.41	21.41	21.41	21.41	21.41	21.41	21.41	21.41	21.41	21.41	21.41	21.41	21.41
Repairs and Maintenance[1]	29.01	28.94	26.50	26.16	26.52	26.27	27.21	26.78	25.70	25.63	28.71	28.71	27.18	31.39
Labor, Field Act.	8.62	8.49	8.12	8.08	8.12	8.10	5.44	5.37	6.41	6.28	8.29	8.29	7.47	20.23
Production Exp.	**514.94**	**494.80**	**488.07**	**529.16**	**487.96**	**532.51**	**547.00**	**512.90**	**390.25**	**366.16**	**706.86**	**706.34**	**523.08**	**619.48**
Interest	14.16	13.61	13.42	14.55	13.42	14.64	15.04	14.10	10.73	10.07	19.44	19.42	14.38	16.36
Post Harvest Exp.	230.53	231.28	192.56	198.54	189.27	215.43	215.01	175.17	143.82	135.30	206.91	202.27	194.67	179.88
Operating Exp.	**529.10**	**508.41**	**501.49**	**543.71**	**501.38**	**547.15**	**562.04**	**527.00**	**400.98**	**376.23**	**726.30**	**725.76**	**537.46**	**635.84**
Returns to Op. Exp.	**426.94**	**450.75**	**297.07**	**279.65**	**283.54**	**346.27**	**329.66**	**199.42**	**195.46**	**184.87**	**131.78**	**113.10**	**269.87**	**108.16**
Cap. Recovery and Fixed Costs	161.11	162.31	135.47	134.07	135.57	134.62	154.28	150.90	135.27	136.47	166.18	166.18	147.70	176.93
Tot. Specified exp.[2]	**690.20**	**670.70**	**636.96**	**677.79**	**636.95**	**681.77**	**716.33**	**677.91**	**536.27**	**512.70**	**892.48**	**891.94**	**685.17**	**812.77**
Returns to Spec. Exp.	**265.84**	**288.44**	**161.60**	**145.57**	**147.97**	**211.65**	**175.37**	**48.51**	**60.17**	**48.40**	**-34.40**	**-53.08**	**122.17**	**-68.77**
Operating Exp./lb	0.34	0.33	0.39	0.41	0.40	0.38	0.39	0.45	0.42	0.42	0.52	0.54	0.42	.53
Total Expenses/lb	0.45	0.43	0.49	0.51	0.50	0.47	0.50	0.58	0.56	0.57	0.64	0.66	0.53	.68

[1] Includes employee labor allocated to repairs and maintenance.
[2] Does not include land costs, management, or other expenses and fees not associated with production.
[3] Abbreviations: C = Cover; NC = No Cover; USTP/BCI = U.S. Cotton Trust Protocol/ Better Cotton Initiative; FS/NC = Farmer Standard No Cover.

Summary

The CRVSP has become a vital tool in the educational efforts of the University of Arkansas System Division of Agriculture. It continues to serve a broad base of clientele, including cotton growers, consultants, researchers, and county extension agents. The program strives to meet its goals and provide timely information to the Arkansas Cotton Community.

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