Joint Adoption of Conservation Agricultural Practices by Row Crop Producers in Alabama

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Abstract

Conservation agricultural production systems for row crops are usually comprised of a number of integrated conservation practices including conservation tillage, cover crops, soil testing, crop rotations, buffers, precision agriculture and integrated pest management. Current incentive structures for promoting the adoption of conservation programs rely on a piece meal approach for adopting conservation systems. That is, the adoption of practices is done one step at a time, which can lengthen the adoption process and potential for adverse economic and environmental consequences. The purpose of this paper is to examine the joint adoption of conservation practices by farmers in Alabama and factors that might impact this type of adoption. A survey of farmers in three watersheds was conducted in 2005 examining the adoption of conservation practices by producers. The survey was used to collect data about the adoption of farming practices, incentives for adopting conservation practices, farm characteristics and demographics of Alabama farmers. Survey data were statistically modeled to derive conditional measures of correlation to examine the impact of different socio-economic factors on the joint adoption of conservation practices. This information can be used to help develop outreach and incentive programs for promoting the adoption of conservation practices and systems by farmers. For example, if farmers have a higher likelihood of using winter cover crops in rotation with conservation tillage practices, then incentives might be developed that promote both practices jointly.

Introduction

A significant change in agri-environmental policy occurred in 2004, with the initial sign-up for the Conservation Security Program (CSP). The CSP is a voluntary conservation program that pays farmers who have met prescribed guidelines established by the USDA Natural Resource Conservation Service (NRCS) concerning the quality of soil, water, air, energy, plant and animal life to maintain and enhance conservation practices on their land. A factor that may limit participation is the eligibility requirements for the CSP. A base conservation management system that includes soil testing, crop rotations, crop nutrient management, integrated pest management, prescribed or rotational grazing and conservation tillage must be in place on-farm for a minimum of two years to qualify. Financial incentives are provided for environmental stewardship on-farm at the time of sign-up and for intensification of the on-farm conservation management system (NRCS 2004a, 2004b).

Conservation programs have historically focused on the adoption of conservation practices (components) instead of systems. That is, while a conservation systems approach is advocated by many conservation programs, most incentives are for individual practices, thereby resulting in a piece-meal approach for the adoption of conservation management systems. The result is a potential delay in economic and environmental benefits for the farmer and society, due to a lengthened adoption process.

The purpose of this paper is to examine the joint adoption of conservation practices by row crop producers in Alabama. Specifically, the joint adoption of conservation tillage, crop rotations and cover crops is examined using a multinomial logistic regression model. Survey data of farmers in three Alabama watersheds conducted in 2005 is used to estimate the model. Conditional measures of association (dependence) and conditional probabilities between conservation practices are examined to provide additional insight into socio-economic factors affecting the adoption of conservation practices and systems.

Materials and Methods

Data

The survey data used in the paper were collected in 2005 in a survey examining the adoption of conservation practices by farmers in three regions of Alabama. A random sample of farm operators included those operations with more than $10,000 gross value of sales and row crop and/or livestock control data. The sampling design for the survey was structured to obtain 300 responses from each of three regions in Alabama, the Wheeler Lake watershed (northern AL), the Upper Alabama watershed (central, AL), and the combined area of the Upper Choctawhatchee \Pea watersheds (southern, AL).

Producers were contacted by mail using a self-administered survey instrument. A second request questionnaire was used to increase the mail response, and a telephone contact was initiated if needed to boost response rate in areas with low response. In total 5935 surveys were mailed to respondents, of which 23 percent responded back. Of those, 1081 responses were usable for data analysis. Given the sample included row crop and livestock producers, the total sample size for this study was 247, the number of row crop producers.

The survey data included variables concerning the adoption of conservation tillage, cover crops, crop rotations, rotational grazing, crop nutrient management and integrated pest management practices for each respondent, as well as demographic, farm, financial and conservation program participation data. Definitions and summary statistics of the explanatory variables used in the empirical model are presented in Table 1.

The three conservation practices (dependent variables) jointly examined in this study are conservation tillage, crop rotation, and use of cover crops. All three variables are binary, taking a value of ‘1’ if the conservation practice was used by the farmer being surveyed, and ‘0’ otherwise. Of the respondents, 72 percent used conservation tillage, 54 percent use crop rotations at least every two years, and 51 percent used cover crops on same portion of their land. Given that we are examining these practices jointly, seven different conservation management systems could be devised, each used to represent the probability of adopting different combinations of the conservation practices being examined. Each of these potential management systems is presented in Table 1, along with the number of respondents who adopted each system.

Table 1: Variables and Descriptive Statistics

Variable	Mean	Standard Deviation[a]	Definition
Explanatory Variables			
Wheeler Lake[a]	0.55	---	Reside in Wheeler Lake Watershed. (1 = yes, 0 = no)
Upper Choc-tawhatchee[a]	0.38	---	Reside in Upper Choctawhatchee/Pea Waterhsed. (1 = yes, 0 = no)
Conservation Plan	0.77	0.42	Have a conservation plan on farm. (1 = yes, 0 = no)
EQIP	0.31	0.46	Participate in EQIP. (1 = yes, 0 = no)
CRP	0.26	0.44	Participate in CRP. (1 = yes, 0 = no)
NRCS Contact	0.61	0.49	Contact with NRCS in last 12 months (1 = yes, 0 = no)
Cotton	0.43	0.49	Grow cotton. (1 = yes, 0 = no)
Corn	0.77	0.42	Grow corn. (1 = yes, 0 = no)
Peanut	0.37	0.48	Grow peanuts. (1 = yes, 0 = no)
Farm Size	618	829	Size of farm in acres.
Row Crop Land	0.43	0.52	Percent of land used for row crop production.
Row Crop Sales	0.42	0.34	Percent of gross farm sales from row crop production.
Low Income	0.55	0.50	Gross farm sales less than $50,000. (1 = yes, 0 = no)
Debt	0.38	0.49	Have medium to high amount of debt. (1 = yes, 0 = no)
Farm Age	29	15	Number of years of farm experience.
Education	0.57	0.49	College education. (1 = yes, 0 = no)

Dependent Variables

Management System[b]	Conservation Practices: Conservation Tillage	Conservation Practices: Crop Rotation	Conservation Practices: Cover Crop	Percent Adoption by Respondents
None	---	---	---	0.09
T	X	---	---	0.14
R	---	X	---	0.09
C	---	---	X	0.10
TR	X	X	---	0.17
TC	X	---	X	0.13
RC	---	X	X	0.08
TRC	X	X	X	0.20

[a] The standard deviation of all binary variables is calculated as: $\sqrt{p(1-p)}$, where p is the mean of the binary variable. Wheeler Lake and Upper Choctawhatchee Pea Watershed Variables are included in the model as fixed effects.

[b] T = Conservation Tillage, R = Crop Rotation, C = Cover Crops

The Model

Suppose a farmer has the option of adopting J different management practices. These practices can be combined to form a set of $M = 2^J$ conservation management systems, representing different combinations of conservation practices from those available. Denote a specific management system as d_m, $m = 1,...,M$, where d is a $(J \times 1)$ vector of indicator variables equal to 1 if the j^{th} practice is part of plan m, making the set of conservation plans $C = \{d_m, m = 1,...,M\}$. A farmer will adopt d_m, if:

$$u_{i,m}^E = h_m(\mathbf{z}_i; g_m) + v_{i,m} = \max(u_{i,1}^E,...,u_{i,M}^E), \qquad (1)$$

where $u_{i,m}^E$ is the expected utility of choosing d_m, $h_m(.,.)$ is the systematic component of the farmer's expected utility function, $\mathbf{z}_i$ is a $(K \times 1)$ vector of explanatory variables (i.e. a set of physical and socioeconomic characteristics of the farmer and operation), g_m is a vector of parameters, and $v_{i,m}$ is the non-systematic (or random) component of expected utility. If the residuals, $v_{i,m}$, $m = 1,...,M$ are independently distributed with extreme value distribution, then the probability of a farmer choosing d_m can be represented as:

$$\mathbf{P}(I = m) = \frac{\exp(h_m(\mathbf{z}_i; g_m))}{\sum_{s=1}^{M} \exp(h_s(\mathbf{z}_i; g_s))}, \text{ for } m = 1,...,M \qquad (2)$$

where I is a polychotomous index denoting the choice of conservation management system by the farmer. Equation (2) gives rise to a traditional multinomial logistic regression model (Train, 2003; Wu and Babcock, 1998). It is assumed that, $h_m(\mathbf{z}_i, g_m) = g_m' \mathbf{z}_i$ for $m = 1,...,M$ (i.e. linear). The model given by equation (2) is estimated with the conservation management systems and explanatory variables (socio-economic factors) indicated in Table 1. The Wheeler Lake and Upper Choctawhatchee variables represent fixed effects in the model to take account of heterogeneity across watersheds.[1]

Marginal Effects, Conditional Probabilities and Measures of Association

The marginal effects of each explanatory variable (e.g. $z_{i,k}$, $k = 1,...,K$) on the probability of adopting a particular management plan can be determined by differentiating equation (2) with respect to the $z_{i,k}$ of interest (Greene, 2000).

Measures of association provide a way to assess the dependence between adopting alternative conservation practices that make up a system. A type of conditional correlation (or

[1] The Upper Alabama Watershed is represented by the intercept term.

concentration) coefficient between two (binary) nominal variables $Y_{i,j}$ and $Y_{i,r}$ given $\mathbf{Z}_i = \mathbf{z}_i$ can be derived using Goodman and Kruskal's tau, as:

$$t_{j,r} = \frac{\sum_{p_j=0,1}\sum_{p_r=0,1} \frac{\left(\sum_{m\in\{d_m:Y_{i,j}=p_j \text{ and } Y_{i,r}=p_r\}} g_m(\mathbf{z}_i;g)\right)^2}{\sum_{m\in\{d_m:Y_{i,r}=p_r\}} g_m(\mathbf{z}_i;a)} - \sum_{p_j=0,1}\left(\sum_{m\in\{d_m:Y_j=p_j\}} g_m(\mathbf{z}_i;g)\right)^2}{1-\sum_{p_j=0,1}\left(\sum_{m\in\{d_m:Y_{i,j}=p_j\}} g_m(\mathbf{z}_i;g)\right)^2}, \qquad (3)$$

where $t_{j,r} \in [0,1]$ and $g_m(\mathbf{z}_i;g)$ is given by equation (2) and $g = (g_1,...,g_M)'$ (Spanos, 1999). When $t_{j,r} = 0$ the j^{th} and r^{th} practices are statistically independent. This measure can be used to generate a type of conditional correlation matrix between the adoption of conservation practices being examined (Bergtold, 2005; Spanos, 1999).

The conditional probability of adopting a particular management plan can be determined using Bayes Theorem. Of interest here is the conditional probability that cover crops are adopted given conservation tillage has been adopted. To consider this, let C, T and R represent binary variables for the adoption of cover crops, conservation tillage and crop rotations respectfully. Then the conditional probability is given by:

$$P(C=1|T=1) = \frac{P(T=1,C=1)}{P(T=1)} = \frac{P(I=TC)+P(I=TRC)}{P(I=T)+P(I=TR)+P(I=TC)+P(I=TRC)}, \qquad (4)$$

where the probabilities in the last equality are given by equation (2). Marginal effects for the conditional probability given by equation (4) can be obtained by differentiating it with respect to each $z_{i,k}$.

Standard errors for marginal effects, conditional probabilities and measures of association were obtained using a Monte Carlo method. The estimated parameters, g_m, $m = 1,...,M$, are assumed to be asymptotically multivariate normal with the mean being the estimated parameters and covariance matrix being the estimated covariance matrix of the parameters from the multinomial model. Based on these assumptions, 10,000 sets of parameters are randomly generated and used to compute each statistic and stored. The standard errors represent the sample standard error of the 10,000 stored values for the statistic of interest.

Results and Discussion

The multinomial model given by equation (2) and specified in the previous section was estimated using MATLAB (2007). Estimation results are provided in Table 2. The fixed effects tell us there exists significant differences in adoption rates among the three Alabama watershed areas examined in the survey. The remainder of the coefficients in Table 2 are not readily interpretable, given all coefficients appear in equation (2) for all the conservation management plans. Thus, the m^{th} coefficient on the k^{th} explanatory variable cannot be directly related to the m^{th} outcome. An alternative is to examine the marginal effects of the explanatory variables on the probability of adopting a particular conservation management system.

The estimated marginal effects for the estimated multinomial joint adoption model are provided in Table 3. The marginal effects provide the change in probability of adopting one of the conservation management systems given a one unit change of an explanatory

Table 2: Estimation Results and Fit Statistics for the Joint Adoption Model

Variable	**Conservation Management System**[a]						
	T	**R**	**C**	**TR**	**TC**	**RC**	**TRC**
Intercept	-4.20**	-2.63	-2.57	-2.97*	-7.62**	0.23	-4.49**
	(1.91)	(2.13)	(2.01)	(1.77)	(2.35)	(2.10)	(1.78)
Wheeler Lake[b]	0.61	-0.22	-0.80	2.12**	1.51	-0.58	2.06**
	(0.86)	(1.00)	(1.33)	(0.87)	(1.22)	(1.43)	(0.96)
Upper Choc-	-1.02	0.29	0.88	0.03	2.86**	-0.11	1.64*
tawhatchee[b]	(0.96)	(0.96)	(0.90)	(0.92)	(1.28)	(1.15)	(0.94)
Conservation	1.74**	-0.96	-0.06	0.32	2.33**	0.69	1.34*
Plan	(0.74)	(0.76)	(0.72)	(0.67)	(1.05)	(0.86)	(0.71)
EQIP	-0.67	1.35	0.99	-0.11	1.65*	-0.40	0.77
	(0.99)	(1.06)	(0.93)	(0.90)	(0.92)	(1.04)	(0.86)
CRP	-0.63	-0.83	-1.16	-0.28	-2.17**	-1.54*	-0.83
	(0.70)	(0.86)	(0.80)	(0.68)	(0.85)	(0.91)	(0.67)
NRCS Contact	-0.14	-0.97	0.95	0.39	0.61	0.69	0.69
	(0.72)	(0.84)	(0.77)	(0.69)	(0.83)	(0.83)	(0.69)
Cotton	0.22	-1.59	-0.24	-0.38	-0.85	-1.38	0.04
	(0.91)	(1.10)	(1.06)	(0.88)	(1.01)	(1.05)	(0.88)
Corn	1.75**	2.23**	2.31**	2.46**	0.64	1.34	1.95**
	(0.81)	(0.98)	(0.96)	(0.80)	(0.85)	(0.93)	(0.76)
Peanut	0.95	1.60	1.99*	2.25**	0.53	3.12**	2.00**
	(1.14)	(1.16)	(1.09)	(1.05)	(1.20)	(1.17)	(1.00)
Farm Size	0.001	-0.001	-0.002	0.000	0.001	-0.002	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Row Crop Land	-0.67	0.68	-1.85	-0.61	0.61	0.23	-3.63**
	(1.03)	(0.94)	(1.54)	(1.03)	(0.93)	(1.09)	(1.25)
Row Crop Sales	1.94	2.21	0.93	1.83	2.09	-0.45	3.48**
	(1.45)	(1.52)	(1.68)	(1.39)	(1.63)	(1.66)	(1.44)
Low Income	0.85	-0.27	-0.40	-0.47	-0.66	-2.90**	-0.31
	(1.00)	(1.12)	(1.04)	(0.94)	(1.01)	(1.10)	(0.91)
Debt	1.61**	2.17**	1.26	0.89	2.18**	0.77	1.30*
	(0.83)	(0.90)	(0.87)	(0.81)	(0.89)	(0.92)	(0.80)
Farm Age	0.02	0.02	0.01	-0.01	0.05*	-0.01	0.01
	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.02)
Education	-0.04	0.28	0.28	0.05	-0.09	0.33	0.03
	(0.65)	(0.73)	(0.70)	(0.63)	(0.70)	(0.77)	(0.62)
Predicted Probabilities	0.14	0.09	0.10	0.17	0.13	0.08	0.20
Other Statistics							
Likelihood Ratio							-370.67
McFadden Pseudo R^2							0.26

Percent Correct Predictions	43.72

Note: T = Conservation Tillage, R = Crop Rotation, C = Cover Crops. Standard errors are in parentheses. * and ** indicate statistical significance at the 10% and 5% level, respectively.

variable. For example, the presence of a conservation management plan increases the probability of adopting a conservation management system with conservation tillage, crop rotations and cover crops by 10 percent. The results in Table 3 are mixed. The marginal effects are not consistent across management plans for a given explanatory variable. For example, participation in the Environmental Quality Incentives Program (EQIP) decreases the probability of only adopting conservation tillage by 10 percent, but increases the probability of adopting both conservation tillage and cover crops by 12 percent. This phenomenon is likely due to the fact that we are looking at management systems and not individual practices. The probability of adopting conservation tillage is not the same as the probability of adopting the management system with only conservation tillage (see equation (4)). When considering the adoption of all three conservation practices being examined, the presence of a conservation plan, growing cotton and

Table 3: Estimated Marginal Effects for Conservation Management Plans

Variable	**Conservation Management System**							
	None	**T**	**R**	**C**	**TR**	**TC**	**RC**	**TRC**
Conservation	-0.06*	0.12**	-0.14**	-0.06*	-0.07*	0.11**	0.01	0.10**
Plan	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)
EQIP	-0.03	-0.10**	0.07*	0.04	-0.07*	0.12**	-0.06**	0.04
	(0.05)	(0.04)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)
CRP	0.07*	0.00	-0.00	-0.02	0.08*	-0.10**	-0.04	0.01
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)
NRCS Contact	-0.02	-0.05	-0.10**	0.05*	0.02	0.02	0.02	0.05
	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)
Cotton	0.03	0.06	-0.07**	0.01	-0.01	-0.04	-0.06*	0.07*
	(0.06)	(0.05)	(0.04)	(0.06)	(0.05)	(0.05)	(0.04)	(0.06)
Corn	-0.18**	0.02	0.05	0.06*	0.11**	-0.10**	-0.01	0.06
	(0.06)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Peanut	-0.10**	-0.07	-0.01	0.02	0.10*	-0.10**	0.10**	0.06
	(0.04)	(0.06)	(0.05)	(0.05)	(0.07)	(0.06)	(0.06)	(0.07)
Farm Size	0.00	0.00**	-0.00	-0.00**	0.00**	0.00**	-0.00*	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Row Crop	0.07	0.02	0.11**	-0.07	0.06	0.16**	0.08**	-0.44**
Land	(0.06)	(0.07)	(0.04)	(0.10)	(0.08)	(0.05)	(0.05)	(0.11)
Row Crop	-0.14*	0.02	0.05	-0.07	-0.00	0.01	-0.15**	0.28**
Sales	(0.09)	(0.08)	(0.07)	(0.09)	(0.09)	(0.08)	(0.07)	(0.10)
Low Income	0.04	0.13**	0.02	0.02	-0.02	-0.02	-0.20**	0.03
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)
Debt	-0.09**	0.04	0.07**	-0.00	-0.06*	0.08**	-0.04	-0.01
	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
Farm Age	-0.00	0.00	0.00	-0.00	-0.00**	0.00**	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Education	-0.01	-0.01	0.01	0.01	-0.00	-0.02	0.01	-0.01
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)

Note: T = Conservation Tillage, R = Crop Rotation, C = Cover Crops. Standard errors are in parentheses. * and ** indicate statistical significance at the 10% and 5% level, respectively.

having higher row crop gross sales increases the probability of adopting all three practices simultaneously by 10, 7 and 28 percent respectively. In contrast, a farmer with the majority of their land under row crop production decreases this probability by 44 percent, possibly due to a perceived increase in production risk from adopting these practices.

Table 4 provides estimates of a conditional form of Goodman and Kruskal's tau to examine the association between adopting the different conservation practices being examined. Although all the statistics in table 3 are significantly different from zero, these results indicate there is not a strong association between adopting any of the conservation practices. That is, knowing a farmer has adopted one conservation practice, such as conservation tillage, does not allow us to strongly predict that he/she will adopt another, such as cover crops. The lack of association may be due to the historical component rather than systems focus of outreach and research efforts toward farmers, and the monetary incentives for conservation practices provided by federal and state level conservation programs.

To assess what could be done to move toward a systems focus (i.e. increase these measures of association), the conditional probability of adopting a conservation practice, given the adoption of another conservation practice is examined. Specifically, the adoption of cover crops given the adoption of conservation tillage is examined in detail (i.e. equation (4)). Estimated conditional probabilities and marginal effects are provided in Table 5. The estimated probability of adopting cover crops once conservation tillage has been adopted is 51 percent. Findings suggest that the presence of a conservation plan, participation in EQIP, higher row crop gross sales, and each year of on-farm experience significantly increases the probability of adopting cover crops if a farmer is already doing conservation tillage by 12, 26, 21 and 0.5 percent. All these factors potentially decrease the risk of adopting cover crops by reducing uncertainty with experience and a conservation plan, as well as, helping to cover potential production costs with financial incentives and higher revenues. In contrast, participation in CRP, growing of corn, and having a high percentage of your land under row crop production significantly decreases the probability of adopting cover crops even though conservation tillage has already been adopted by 13, 15 and 27 percent, respectively. Participation in CRP pays to take land out of production providing a potential disincentive to adopting working land conservation practices. Farmers may perceive corn residue as being sufficient to meeting the conservation tillage requirement of 30% surface cover and therefore have obtained their perceived maximum benefit. A higher percentage of land under row crop production may increase the perceived risk faced by a farmer, potentially due to less diversification in the farming operation, limiting income streams.

Table 4: Goodman and Kruskal's Tau Coefficients for Conservation Practices

	Conservation Tillage	Crop Rotation	Cover Crops
Conservation Tillage	---	0.1049**	0.0574**

		(0.0274)	(0.0226)
Crop Rotation	---	---	0.0858**
			(0.0239)
Cover Crops	---	---	---

Note: Standard errors are in parentheses. * and ** indicate statistical significance at the 10% and 5% level, respectively.

Table 5: Conditional Probability of Adopting Cover Crops Given Adoption of Conservation Tillage and Associated Marginal Effects.

Estimated Conditional Probability	0.51**
	(0.03)
Variable	**Marginal Effect**
Conservation Plan	0.12*
	(0.08)
EQIP	0.26**
	(0.08)
CRP	-0.13**
	(0.08)
NRCS Contact	0.08
	(0.08)
Cotton	-0.02
	(0.09)
Corn	-0.15**
	(0.08)
Peanut	-0.05
	(0.11)
Farm Size	0.00
	(0.00)
Row Crop Land	-0.27**
	(0.14)
Row Crop Sales	0.21*
	(0.15)
Low Income	-0.08
	(0.09)
Debt	0.07
	(0.08)
Farm Age	0.00**
	(0.00)
Education	-0.01
	(0.07)

Note: Standard errors are in parentheses. * and ** indicate statistical significance at the 10% and 5% level, respectively.

Conclusion

Historically, conservation policy has promoted the adoption of conservation practices rather than systems via its incentive mechanisms. While a systems approach is the desired result, the actual outcome is an outreach system that promotes conservation components and practices. This result is partially supported by the low dependence exhibited between the adoption of conservation tillage, crop rotations and cover crops by Alabama farmers. The likelihood of adopting cover crops once conservation tillage has been adopted is examined to assess what socio-economic factors might help to increase the association between adoptions of conservation practices, thereby moving toward a systems approach. Findings suggest if a farmer: (i) has a well developed conservation plan established, (ii) receives financial incentives from conservation programs such as EQIP (that are coupled with other conservation practices, such as conservation tillage and cover crops), (iii) possess information showing the potential profitability of conservation system components (in a system context), (iv) and has access to mentors (other farmers) that can help guide integration of conservation components, then likelihood of cover crops being adopted once the initial decision to adopt conservation tillage has been made. Such an approach may increase the success of conservation programs like the CSP, which are based upon a systems focus, by increasing eligibility and focusing incentive structures on conservation system intensification.

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