Title: Who Buys Crop Insurance? Predictors of the Participation Gap Between Organic and Conventional Farms

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Authors: Eric J. Belasco and Kate Binzen Fuller

Affiliations: Eric Belasco is a professor in the Dept. of Agricultural Economics and Economics at Montana State University.

Kate Fuller is an associate professor and extension specialist in the Dept. of Agricultural Economics and Economics at Montana State University.

Correspondence to: eric.belasco@montana.edu

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Who buys crop insurance? Predictors of the participation gap between organic and conventional farms

Organic farmers face a range of unique production and management risks. Certification standards limit the inputs with which producers can respond to pest and disease outbreaks or make short-term adjustments to soil fertility. Organic producers have also historically purchased dramatically less crop insurance than conventional producers (Morris, Belasco, and Schahczenski 2019). This imbalance in coverage is consequential as crop insurance has become the dominant federal safety net program for U.S. agriculture over the last 20 years. As discussed in Miranda (1991), low participation rates in a crop insurance program often coincide with adverse selection and poor actuarial performance. Additionally, a stated objective of the 2000 Agricultural Risk Protection Act (ARPA) was to improve crop insurance products through research and development and to increase participation for products with low participation.

Federal crop insurance expenditures are projected to be $38 billion from 2019—2023 fiscal years and comprises over 35% of the 2018 farm bill non-nutrition program spending (CRS 2019). Careful consideration of insurance policy is also important because of the goals it serves at the farm level. As discussed in Delbridge et al. (2017), crop insurance both provides farmers with a mechanism to manage yield and price risk but is also a major source of income support for commodity growers (also see Sherrick and Schnitkey, 2013).

Since the 2000 Farm Bill (Agricultural Risk Protection Act), federal crop insurance programs for organic and diversified producers have expanded in terms of liability, policies, and coverage. The number of crops that offer organic endorsements increased from four in 2007 to 79 in 2018. As Appendix Figure A1 shows, this expansion coincided with growth in both

liability (from $121 million in in 2007 to $1.20 billion in 2018) and acres insured (from 434,408 to 1.34 million) for organic production (USDA RMA 2019). Whole Farm Revenue Protection (WFRP) policies were also introduced in 2015, partially as a response to organic and diversified producers who did not fit neatly into traditional commodity crop insurance offerings. WFRP allows for all organic and conventional crops and to be insured under a single policy. Since its introduction when 1,128 WFRP policies with a total liability of $1.1 billion were purchased, the program has doubled with 2,224 policies sold in 2019, amounting to a total liability of $2.4 billion. In spite of this growth, participation in crop insurance by organic producers, relative to their conventional counterparts, remains low.

This paper contributes to the existing literature in three ways. First, we address the question of whether, after controlling for confounding factors, organic producers really do purchase less crop insurance than conventional producers. Second, we identify factors influencing the crop insurance participation decision for organic producers to better understand barriers to adoption. We evaluate a wide range of covariates to better understand crop insurance decisions, including financial relationships, farm characteristics, soil quality, and subjective risk. Finally, we use our analysis to discuss and inform crop insurance education programs aimed at increasing participation.

This paper draws on two unique datasets that are used to both reinforce and complement findings. First, we use responses from a national survey (referred to here as the "OREI survey") specifically designed to examine the questions about organic farmers' crop insurance participation. This dataset was collected by utilizing a wide network of organic producers to ask a range of specific questions regarding perceptions regarding risk management and was funded by the USDA Organic Research and Extension Initiative (OREI). Second, we utilize a nationally

representative dataset, the USDA Agricultural Resource Management Survey (ARMS), to assess the representativeness of our survey sample as well as examine linkages between organic status, crop insurance and several covariates outside the scope of the OREI survey. The combination of these two data sources allows for a greater range of relationships to be evaluated and also provides a robustness check on aspects that are evaluated in both surveys.

Challenges for organic crop insurance at the farm and policy design levels

According to USDA (2020), 74% of organic farms did not purchase any crop insurance. The most common stated reasons were that insurance was unwanted or unnecessary (53%), unfamiliarity with products (15%), and that products were too expensive (11%). Better understanding of gaps in utilization of crop insurance for organic producers is a critical step in focusing current education and informing farm policy to increase participation in crop insurance by organic farmers.

While the persistence of the participation gap in crop insurance between organic and conventional producers is well established, the underlying causes are less understood. Morris, Belasco, and Schahczenski (2019) find that lack of familiarity and paperwork burden are two major reasons for lack of adoption of organic polices. Filing for insurance induces greater paperwork and time burdens on those producing a greater diversity of individual commodities, which may be more of an issue for organic producers than conventional. Similar to other crop insurance policies, it may take time before producers gain comfort with these policies and use them to a greater extent.

There are also a few notable challenges when considering crop insurance policies for organic production. First, organic producers utilize supply chains that may differ from

conventional producers. A larger average proportion (7%) of organic sales are made through direct-to-consumer marketing, while the average of U.S. fresh produce direct-to-consumer sales is 1.6% (Greene 2017). Direct-to-consumer sales can also present challenges in classifying organic farmers; producers may use production practices that are considered "organic" and relay these signals to consumers and capture some price premium, without an official USDA organic certification.

While conventional crop insurance policies are typically tied to futures prices, organic commodities are not traded through futures markets. The Risk Management Agency (RMA), which administers the federal crop insurance program, has attempted to incorporate differences between organic and conventional prices by offering organic price premiums and marketing contract price addendums, but prior to 2011, organic pricing was not available in crop insurance contracts (Delbridge et al. 2017). Organic price premiums assign a "typical" premium relative to conventional crop prices, making policies more expensive and providing an additional possible barrier.[1] However, organic prices can move in ways that often diverge from conventional prices (Singerman, et al. 2013), so basing organic prices off of conventional may be problematic and introduce additional basis risk between the price received and the coverage price. More recently, marketing contract price addendums were introduced to provide producers the opportunity to utilize the price guaranteed by their buyer. While these addendums can help organic producers insure their crops, they are unavailable for many crops, practices, and counties. And, crops must fall under one of three practices to qualify—conventional, certified organic, or transitioning. (See https://legacy.rma.usda.gov/news/currentissues/organics/cpa_eligibility.html for details.)

Literature Review

In this paper, we work to explain why organic producers elect crop insurance at lower participation rates than conventional producers. We also try to better understand barriers to- and covariates of- participation and the levers with which policy can influence insurance participation within this group. While to our knowledge, this is the first paper to empirically address drivers of participation for organic producers specifically, it fits into a larger body of work on crop insurance participation, selection, and policy.

Knight and Coble (1997) discuss a range of papers that estimate the participation demand for federal crop insurance to be relatively inelastic with respect to premiums. One notable finding in this literature is that demand in counties with relatively low risk may be more elastic than those than in higher risk counties (Goodwin, 1993). The implication of this finding is that if premiums are too high, then adverse selection issues may be compounded and lead to a higher risk pool where the program may become unsustainable. In contrast, Woodard and Yi (2018) recently found that demand elasticities may be more elastic when accounting for the endogeneity associated with premium rate calculations and participation.[2]

Recently, a resurgence of crop insurance demand papers have focused on the impact of premium subsidies on participation and unintended consequences of those subsidies. Yu et al. (2017) find that subsidies increase both program participation and the acreage of insured (or insurable) crops. In a related paper, Yu and Sumner (2018) find that subsidization can also influence crop choice. However, subsidies alone do not explain insurance participation or selection. Du et al. (2017) find that premium expenditures, rather than expected future net benefits, which are highly correlated with subsidies, are a more important determinant.

For policies available to organic growers, the percent subsidy is generally the same as for conventional. So why is participation so much lower? What is different about organic agriculture

and the risk management quandaries that organic producers face? Flaten et al. (2005) find that organic dairy farmers in Norway perceive themselves to be less risk averse than conventional farmers. However, Smith et al. (2004) found that organic farmers experience similar risk as measured by the variability of net returns. Hansen et al. (2004) explore perceptions of risk among organic producers and find that grain and cotton farmers, who had more experience with insurance than the rest of the group, expressed concern with policies not reflecting the prices accurately. Fruit and vegetable farmers had relatively less knowledge of crop insurance but when given information about available policies, were skeptical of their usefulness. Others reported that the opportunity cost of the premium payment was too high; they could better spend the money on capital that could reduce risk more directly, such as irrigation systems. While polices have changed since that time and several new policies have been introduced to target diversified and organic farms, these concerns may continue to limit organic crop insurance participation.

Data and Methodology

We combine information from two data sources, described in greater detail in what follows. The OREI survey provides stated preference information about crop insurance and covariates from diversified organic and conventional producers including willingness to pay, barriers to adoption, and general perceptions surrounding crop insurance. The ARMS dataset provides revealed preference data in the form of (self-reported) crop insurance purchases and other information.

OREI Survey

The OREI survey was developed in cooperation with organic grower group representatives from across the United States[3] and distributed through these same associations as well as the USDA

Organic Integrity Database, which includes all certified organic producers in the United States. The online survey was conducted through SurveyMonkey and included 46 questions, taking respondents 15-30 minutes to complete. The full survey and responses are available in Appendix A. Appendix Figure A2 shows the distribution of responses by state and compares to NASS statistics on organic acreage and number of farms from the Certified Organic Survey. The survey was open from August 2017 through November 2017 and resulted in 1,032 valid survey responses.[4]

Results from this survey provide direct insights into the makeup of this group of farmers, barriers preventing further increases in crop insurance participation among them, and how those barriers can be overcome. For example, the OREI survey sample includes a large portion of respondents who sell through farmer's markets (48%), and farm stands (27%), which are generally under-researched groups. Further, while 83 percent of the respondents produce some portion of their crops using organic methods, only 31 percent have organic certification from the USDA; the remainder are not represented in the USDA Certified Organic Survey.[5]

[Tables 1 & 2 here]

Table 1 summarizes the differences in mean statistics using the OREI Survey observations between four groups of interest. We split responses by certified organic and conventional/uncertified producers and by crop insurance participation. Table 2 further breaks down some of these metrics by farm type and provides a summary of all observations.

Those who purchase crop insurance tend to have larger operations, higher adjusted gross revenue (AGR), more experience, and fewer distinct products than those who do not buy insurance. They also tend to have a slightly higher perceived likelihood of downside income events and a substantially higher interest in learning more about crop insurance. When asked

"*the maximum amount the respondent would be willing to pay for an insurance policy that protected gross income from falling below 75 percent of its average level*", those who state they 'never' or 'occasionally' purchase insurance have a higher reported willingness to pay, both on a per acre basis and, to a much lesser extent, as a percent of AGR. This seemingly counterintuitive discrepancy between groups could result from a lack of insurance products that fit the needs of producers currently not purchasing insurance. However, the difference is not statistically significant.

A second basis for comparison is that between organic certified and non-certified/conventional producers. Stated willingness to pay for crop insurance is higher for organic producers. On a per acre basis, certified organic producers state they are willing to pay at least four times more for crop insurance. As a percentage of adjusted gross revenue, willingness to pay is nearly twice as high as conventional producers. Organic producers also grow a higher number of products, which is consistent with diversified organic production methods.

Respondents were also asked about their crop insurance purchase history, with four potential responses, which we collapsed into *Doesn't Typically Purchase Crop Insurance*, and *Typically Purchases Crop Insurance*. Of the farmers with a positive percentage of acreage that is certified, 36 percent typically purchase crop insurance.

Table 1 also illustrates some important differences between those organic producers who typically purchase crop insurance versus those who do not. First, larger farms tend to purchase crop insurance.[6] Farms that purchase crop insurance, on average, have more than four times as many acres and more than double the AGR, relative those that do not. Respondents with more experience are also more likely to purchase crop insurance. Finally, as noted earlier, those who already purchase crop insurance also are more interested in learning more about crop insurance.

There are also a couple of surprising similarities between these groups. First, those who purchase crop insurance value crop insurance similarly to those who do not. Insurance purchasers report being willing to pay 6.5% of their AGR compared to 7.5% for those who do not. Second, the two groups appear to view their revenue variance similarly. The insured group estimates their revenue falls below 75% of normal an average of 23.4% of the time, compared to 21.4% for the group not purchasing insurance.

Table 2 splits summary statistics by crop. One unique feature of the OREI Survey is that respondents were able to select multiple crop/livestock categories that characterize their operation. This distinction is important because there are notable differences in insurance participation between commodities. For example, the participation rate for cattle, dairy, grains, and other field crops, all sit above 25 percent. In contrast, other commodities, such as high value/specialty crops, hogs, sheep, and poultry, which tend to participate less in crop insurance are shown as such in this survey. Stated willingness to pay for crop insurance is notably higher for those producing field crops other than grains and legumes, at 12.9 percent of AGR, which is more than twice as high as for all other commodities.

USDA ARMS

The OREI survey provides novel detail into organic producers' crop insurance participation decisions. However, the data generated may be subject to bias common amongst data gathered through online surveys. While online surveys offer relatively inexpensive and fast access to a large group of potential respondents, they also can introduce selection bias. Recruitment of participating respondents is often the result of self-selection. To a lesser extent as technology advances, certain groups may be underrepresented because they don't have easy access to the

internet (Bethlehem 2010). Additionally, the OREI survey is by design a survey focusing on organic producers, both certified and non-certified.

To address potential disparities between the distribution of farms in the OREI survey sample and that of the population of U.S. farms, as well as to compare organic and conventional farms, we also draw from the USDA ARMS. The ARMS is the only nationally representative annual survey of farm financial and production information and includes approximately 20,000 agricultural operations annually. The ARMS sampling and weighting procedures are specifically designed such that the data are nationally and regionally representative with respect to the distribution of farm size and commodities produced (USDA ERS 2017).

An additional benefit is that the ARMS asks the same questions for both organic and conventional operations. The bulk of other large-scale data on organic farming includes data on organic farms only, making comparisons with conventional operations challenging or impossible. Using the ARMS, we are also able to observe the proportion of farmland that is organic within a given farm. Many farms with some organic acreage have a combination of both conventional and organic acres. We are therefore able to explore associated differences in our variables of interest over marginal changes in the proportion of organic to total land.

We also incorporate data from several other sources at the county level into the ARMS analysis. We include soil quality data from then Natural Resource Conservation Service Soil Survey Geographic (SSURGO) Database (USDA NRCS 2017). SSURGO contains data on soil characteristics, including summary measures of soil quality known as the National Commodity Crop Productivity Indexes (NCCPI). These indexes measure county acre-weighted averages of overall soil productivity ranging from 0.01 (low productivity) to 0.99 (high productivity). From the 2002 Census of Agriculture, we include the proportion of

irrigated cropland and number of organic farms in the county. We also use information on urbanization using the 2003 Rural-Urban Continuum codes. These codes classify counties on a 1-9 scale (with "1" being the most urban) based on metropolitan population, degree of urbanization, and proximity to other urban areas (USDA ERS 2019).

Lastly, we calculate a measure of crop diversity using a version of the "Gini coefficient," often applied to income inequality. Ours is based on harvested acres by crop, and summarizes crop diversity for each farm in terms of number of crops grown and the share allocated to each of 20 crops or crop categories recorded in the ARMS. A farm that grows only one of these crops would have a crop acreage Gini coefficient of one. A farm that equally allocates acres across all of these categories would have a Gini coefficient of zero.

Fuller, Janzen and Boldbaatar (2021) contains an overview of organic economic information in the ARMS. One limitation is that the years for which we observe organic acreage with precision do not extend to the present. We are able to draw from 66,572 observations over 2003-2011, the years in which the ARMS asked the question "Of the total acres in this operation, how many acres were used to harvest certified organic crops?" (USDA ERS 2018). That sample is made up of 64,542 conventional and 2,050 organic farms. Table 3 shows summary statistics from the ARMS comparison data, by organic and insurance status.[7]

[Table 3 here]

Across the years we examine, organic farms were much less likely to purchase crop insurance than conventional farms; conventional farms had a mean of 53% insured acres, compared with 31% for organic acreage. Approximately 60% of all farms purchased some form of insurance on some acres/crops, in contrast to 40% of organic farms. See Appendix Figure A3 for more detail on the distribution of the proportion of insured acres by organic status.

In Table 3, we present summary statistics by insured and organic status. We observe many more conventional, insured farms than conventional, uninsured farms, and many more conventional farms than organic farms. Organic farms are split fairly equally into farms with some insurance and farms with none. We present medians along with means because of the degree of variation and the potential role of outliers in dominating mean statistics. In general, the medians are much lower than the means.

Across both organic and conventional farms, farms that purchase insurance are more likely to receive subsidy payments. In general, farms purchasing insurance receive much less off-farm income and tend to be larger in terms of cropland and total operated acres. Insured farms tend to have greater debt-to-asset ratios. For farms with any insurance, the mean proportion insured is over 80% of acres and the median is 100%; farms that do insure tend to fully insure. Across insurance status, organic farms tend to have lower soil quality, higher costs and returns, and greater off-farm income. They also tend to be smaller, both in cropland and total acres.

OREI vs. ARMS Comparison

While the ARMS data are more dated and lack much of the detail of the questions asked by the OREI survey, we can compare across several relevant categories. The proportion of organic farms purchasing crop insurance is roughly the same in the ARMS as in the OREI Survey (40% versus 36%). Total farm size differs, but not in a way that is statistically meaningful; the mean farm size in the OREI sample is 489 acres, while the mean cropland acres for organic farms in the ARMS is 536 acres. (The average for conventional farms is 617 acres.) Data from both sources suggest that farms purchasing crop insurance are, on average, larger in terms of acreage. Reported AGR for the OREI sample is approximately $176,000 annually. While the ARMS does

not report AGR, average revenue was approximately $316,000 for organic farms and $245,000 for conventional.

Empirical Findings

This study focuses on two main empirical questions. The first question is the importance of key farm-level financial and production indicators to crop insurance participation. To our knowledge, this is the first study to evaluate the impact of key farm characteristics on the demand for crop insurance by organic producers.

The second key empirical question this paper addresses is the extent to which education can be utilized to overcome gaps in crop insurance participation. Specifically, we evaluate the gap between the stated interest of the respondent to learning more about crop insurance and whether a respondent has actually used crop insurance in the past.

Model and Regression Analysis: OREI Survey Data

While correlations discussed in the previous section provide meaningful insights, we also wish to measure the marginal impact of these covariates on participation. We use a binary choice model to evaluate the impact of outside variables on decisions regarding crop insurance participation:

$$y_i^* = \beta X_i + e_i \tag{1}$$

where y_i^* is the expected utility for individual i, associated with their utility maximizing crop insurance participation decision; X_i includes a matrix of important covariates for all individuals; and e_i includes a random error term with mean zero and constant variance. While the distribution of y^* is unobserved, we are able to observe the discrete variable, y, such that

$$y_i = \begin{cases} 1 & if\ y_i^* > 0 \\ 0 & Otherwise \end{cases} \tag{2}$$

In this model, the observable dependent variable takes the value of 1 when crop insurance is selected and 0 otherwise. We employ a probit model, which assumes $\Pr(y = 1|X) = \Phi(\beta X)$, where Φ is a normal CDF.This allows for an evaluation into the impact of covariates on the probability of expected crop insurance participation.[8]

The results from this regression are shown in table 4. Estimated coefficients can be transformed to the marginal mean effect on the probability of a farm participating in crop insurance as follows:

$$\frac{d\Pr(y = 1|X)}{dX} = \frac{d\Phi(\beta X)}{dX} = \phi(\beta X)\beta \quad (3)$$

where X is evaluated at the mean levels, $\bar{X}$ and ϕ indicates the normal PDF.

Perhaps surprisingly, the presence of some certified organic acreage also increases the likelihood of participating in crop insurance—by 11.60 percent, although the percentage of certified acres had an insignificant impact on insurance decisions.[9] Variables related to the commercialization of a farm, including adjusted gross income, farming experience, and the use of an operating loan, are all positive and statistically significant in this regression. Common utilization of an operating loan increases the likelihood of participating in crop insurance by 13.55 percent. This relationship may be driven by lenders requiring a crop insurance policy to give producers with high debt levels additional lines of credit (Ifft, Kuethe, and Morehart 2013). The relationship between the number of commodities produced and insurance participation is negative. As the number of commodities produced increases by one commodity, the likelihood of insurance participation decreases by 0.30 percent. The type of commodity produced is also correlated with crop insurance participation; high value and specialty crops, as well as hogs, are negatively related to crop insurance participation. In summary, farms that have the lowest likelihood of participating in crop insurance tend to have lower adjusted gross income, a higher

number of commodities produced, less farming experience, and do not commonly use an operating loan.

[Table 4 here]

Organic Crop Insurance Participation: USDA ARMS Data

To explore the robustness of our findings from the OREI Survey data, we conduct a similar analysis using the ARMS. While the ARMS lacks several variables in the OREI Survey, others are observed in greater detail. For example, both the proportion of insured to total acres and the proportion of certified organic to total acres are identified as continuous variables in the ARMS.[10] For this reason, we employ a fractional logistic regression, which is useful to identify models with fractional or proportional outcome variables that fall between 0 and 1 (Papke and Wooldridge 1996). The model itself is similar to a binary choice logit model, but allows for variation in insured proportions and organic status. This flexibility is important since many farms have variation in the combination of insured and uninsured, as well as organic and conventional acreage.

Table 5 reports regression results using the ARMS data that relate important covariates to the proportion of insured acres per farm.[11] In general, we find contrasting results to the OREI survey; after controlling for our covariates, we find that organic farms are less likely to purchase crop insurance. The marginal estimate of -0.101 for the organic variable can be interpreted to mean that a 10% percentage point increase in the proportion of organic acres would correspond with a roughly 1% percentage point decline in the average proportion of insured acres. There are number of reasons why this finding could be different from the OREI survey. The two surveys cover different time periods and insurance options for organic production have expanded since

the time the ARMS data covers. The OREI survey also targeted organic groups specifically, so the difference it evaluates could be more certified organic versus farms that use organic practices but lack certification.

The largest coefficient in magnitude is that of the crop diversity Gini index; farms with a higher Gini (less crop diversity), less likely to purchase crop insurance. This finding is surprising, and also contrasts the OREI result. However, within the ARMS, there is both much less variation in crop diversity and generally less crop diversity than that of the OREI sample; while the effect appears strong, the estimate might not hold if farms with many more crops were included. The average OREI organic farm that does not purchase crop insurance grew 22 crops, which is more than double both organic and conventional farms that do purchase crop insurance, and may provide a barrier to crop insurance in terms of record keeping. In the ARMS survey, organic farmers who purchased insurance grew an average of 20% more crops than those who did not. But, the mean number of crops grown by farms in the ARMS is dramatically less than that of the OREI survey. ARMS farms average 2.2 crops in total; the average for farms with organic acreage in the ARMS is 1.9 crops. Another correlating factor may be that producers are required to ensure all of a given crop under a certain practice within a county. In the extreme, for a farm with only one crop/practice, insuring is a possibly large binary decision that may be undesirable or financially infeasible. (A similar argument could be made against WFRP, which insures at the farm level.) Lastly, soil productivity is another relatively strong (positive) predictor of insurance participation in the ARMS dataset.

[Table 5 here]

Implications for Risk Management Education Programs

Widespread participation in the crop insurance program has been a policy goal in efforts to avoid a "downward spiral of adverse selection," where only those who are more likely to receive an indemnity payment enroll in a program (Miranda 1991). Glauber (2004) argues that the desired avoidance of an adverse selection problem was the main rationale behind increasing of subsidy rates to their relatively high current level. Research and education programs have more recently been the RMA's main tool in increasing participation rates, mainly through the Risk Management Education Partnership Program, a funding program that has historically matched RMA groups with private, nonprofit, or academic institutions to provide risk management trainings[12]. The 2017 Risk Management Education Partnership program provided $4 million in funding for 52 separate projects across the country that focused on different aspects of risk management education.[13] Of those funded projects, 19 projects (37% of all funded projects) listed "organic" in main project description, while 15 (29% of all funded projects) focused on insurance targeted toward diversified producers by listing "Whole Farm Revenue Protection" or "WFRP" in the main project description. This emphasis in training could be driven by lack of participation in such programs, which is illustrated in the OREI survey where only 45 respondents (4.2%) stated that they had purchased WFRP and the large majority stated that they "know nothing" (60.5%) or "know a little" (24.4%) about WFRP (see Appendix A Q30, Q31)

The OREI survey attempts to help focus these efforts towards groups that may benefit from purchasing crop insurance but lack understanding of how doing so could benefit their business. In this sample, 89% of respondents reported that they were at least slightly motivated to learn more about crop insurance products, while 65% reported that they had never purchased crop insurance. This indicates a demand for knowledge that could translate into higher participation rates. These groups that demand more information and might be future crop

insurance customers can be identified in this survey, in terms of region, crops, scale, as well as other factors. Future research will investigate the multivariate response between the decision to participate and an interest in future participation.

Figure 1 demonstrates that the frequency of purchasing an operating loan has a positive relationship with both an interest and history of crop insurance purchases. However, the gap between the two measures also shrinks as the frequency of an operating loan increases. Those who never take out operating loans may comprise a group where an education gap persists, though it doesn't necessarily indicate that these farmers will actually purchase crop insurance with more education. It also indicates a potential linkage between the record keeping associated with applying for operating loans and crop insurance, where loans and crop insurance can be viewed as complementary risk management products (Ifft, Kuethe, and Morehart 2015). Second, given that greater interest in learning about crop insurance seems to be with those who have the highest participation rate, educating farmers on new products could expand crop insurance purchases, but would do little to improve participation rates on the extensive margin.

[Figure 1 here]

Conclusions

The relatively low crop insurance participation for organic producers could limit the long-run viability and continued expansion of the organic industry. Without desirable options for organic and diversified producers, questions can be raised about the equitability of the crop insurance program across production types. In the OREI Survey (see Appendix, Q6), we find the top two reasons that farmers rarely or never purchase crop insurance are the following: (1) "My farm is too small" and (2) "My farm is too diversified." These responses suggest plenty of space for an

insurance product that provides small, diversified farm with crop insurance that limits record-keeping requirements and focuses on simplicity. Low participation in the crop insurance program by organic producers can also harm those who do select into the program by reducing the accuracy of the insurance ratings, reinforcing low participation. These combined factors may inhibit future growth in the organic industry.

There are many possible ways to provide risk management support to organic producers. Crop insurance is likely the most straightforward pathway to provide that support, given the role it plays in the U.S. as a major agricultural policy lever. Research and education programs have been the RMA's main tools in increasing crop insurance participation. This paper discusses ways in which those programs may be better utilized to increase participation.

Another potential solution to the participation gap between organic and conventional producers resides in the expansion of Whole Farm Revenue Protection (WFRP). The ability to insure a range of commodities, and especially those not traditionally or currently served with single-commodity policies, is one of the strengths in WFRP. However, the inherent complexity and paperwork necessary is challenging, especially for new and beginning farmers. To overcome these challenges, it is critical to either pair future crop insurance education programs with more advanced accounting and sufficient record-keeping components or to find ways to reduce the paperwork burdens of products targeted to small and diversified farms.

If crop insurance paperwork were combined with operating loan or organic certification paperwork, participation in all three programs could be incentivized. However, while our data show significant correlation between crop insurance participation and organic certification and operating loan use, we lack the detail needed to establish causation and leave this question for future research. An additional method of improving organic crop insurance is by incorporating

more accurate organic price information. The data gathering process implied, however, is substantial since organic prices are not captured by futures markets that provide price estimates for many conventional policies. We leave this question to future research as well.

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Figure 1. Survey responses regarding crop insurance purchase history and interest in learning more, grouped by frequency of operating loan.

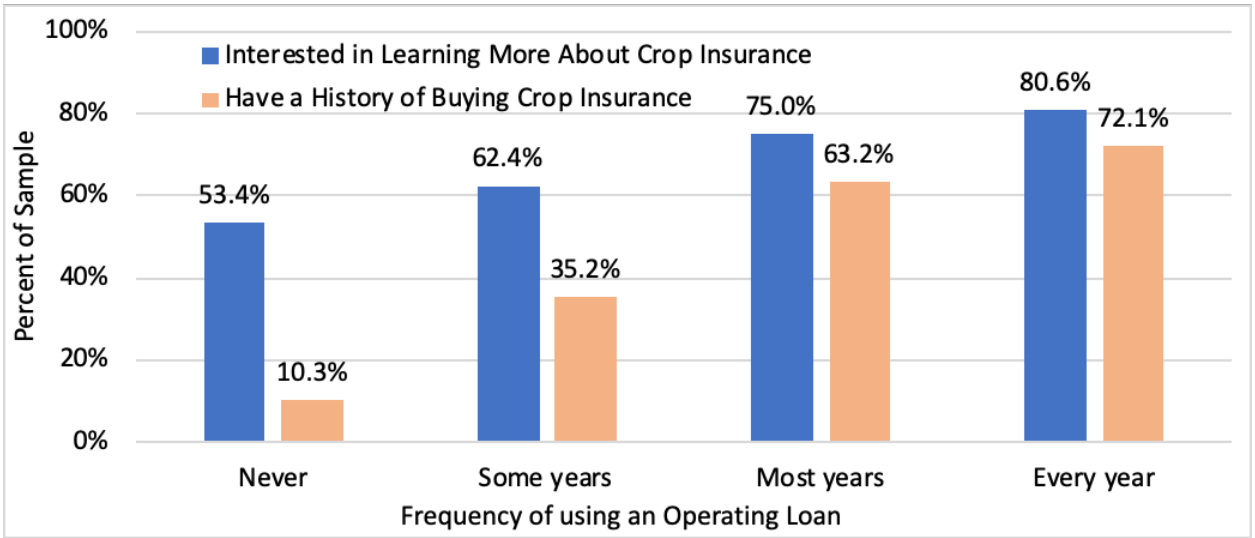

100%
80%
60%
40%
20%
0%
Percent of Sample
Interested in Learning More About Crop Insurance
Have a History of Buying Crop Insurance
53.4%
10.3%
62.4%
35.2%
75.0%
63.2%
80.6%
72.1%
Never
Some years
Most years
Every year
Frequency of using an Operating Loan

Table 1. Mean and standard deviation OREI survey statistics, by organic certification and insurance participation categories.

	Certified Organic		Conventional		
Variable	Typically purchases Insurance	Doesn't typically purchase insurance	Typically purchases Insurance	Doesn't typically purchase insurance	All
Acres	1,504.96	345.20	1,378.08	140.69	489.19
	(2,504.65)	(1,342.89)	(2,267.92)	(516.55)	(1,441.93)
Experience	23.69	14.30	22.56	11.49	14.96
	(15.20)	(11.80)	(15.57)	(12.24)	(13.86)
Stated WTP Per Acre ($ Per Acre)	72.18	373.03	18.47	52.74	117.40
	(353.32)	(3,729.69)	(71.42)	(113.18)	(1,713.67)
Stated WTP Per AGR (Percent)	6.54	7.49	3.59	2.03	4.02
	(39.00)	(43.83)	(10.19)	(4.60)	(25.30)
Perceived likelihood that income will fall below 75% of average	23.39	21.44	27.44	20.97	22.47
	(13.43)	(15.99)	(16.39)	(15.97)	(15.84)
Percent with stated interest to learn more about crop insurance	91.87	45.87	84.17	51.24	59.90
	(27.44)	(49.94)	(36.63)	(50.03)	(49.03)
Adjusted Gross Revenue (in $1,000s)	449.73	173.90	304.31	74.64	176.47
	(415.62)	(264.77)	(393.15)	(162.85)	(299.85)
Number of different products grown or raised on farm	9.41	22.12	6.82	14.22	14.06
	(13.87)	(21.99)	(9.96)	(17.02)	(17.45)
Observations	123	218	139	607	1,087

Note: WTP is the willingness to pay for insurance; AGR is adjusted gross income.
Standard deviations are presented in parenthesis.

Table 2. OREI Survey Summary Variables, by crop.

Variable	Willingness to pay for crop insurance (Percent of AGR)	Percentage who typically purchase crop insurance	Percent of Production that is certified organic	Acres	Experience (in Years)	N
Grains Legumes	2.76	62.96	33.30	1,395.12	22.76	270
	(7.67)	(48.38)	(42.89)	(2,256.37)	(15.50)	
Other Field Crops	12.92	36.93	28.03	983.86	19.27	176
	(62.17)	(48.40)	(40.74)	(2,107.52)	(14.83)	
High Value/Specialty Crop	3.46	15.38	25.75	172.03	12.58	754
	(20.48)	(36.10)	(41.88)	(765.82)	(12.69)	
Cattle	4.43	32.56	22.46	1,005.23	18.75	258
	(28.82)	(46.95)	(38.02)	(2,047.61)	(14.21)	
Hogs	2.29	18.90	18.38	374.07	14.50	127
	(9.03)	(39.30)	(35.65)	(1,198.72)	(13.69)	
Dairy	1.64	48.08	39.44	1,105.63	21.80	52
	(2.25)	(50.45)	(43.62)	(2,494.99)	(14.30)	
Sheep	3.22	13.93	18.38	291.54	14.63	122
	(11.37)	(34.77)	(35.15)	(606.31)	(13.15)	
Poultry / Eggs	2.48	11.32	16.31	254.70	10.90	265
	(8.47)	(31.74)	(34.76)	(988.02)	(11.38)	

Note: Standard deviations are presented in parenthesis.

Table 3: ARMS Summary Statistics, by Organic and Insured Status

	No insurance, no organic cert.			Insured acres>0, no organic cert.		
Variable	Mean	SD	Median	Mean	SD	Median
Proportion Insured	0.00	0.00	0.00	0.89	0.21	1.00
Proportion Organic	0.00	0.00	0.00	0.00	0.00	0.00
# Crops	1.85	1.08	2.00	2.47	1.12	2.00
Crop Diversity Gini	0.93	0.03	0.95	0.91	0.03	0.91
Soil Productivity Index	0.48	0.22	0.52	0.54	0.21	0.58
Revenue/Acre	1,056.11	1,960.16	397.19	620.13	1,186.39	378.62
Var Cost/Acre	728.57	1,411.71	239.16	376.41	760.21	202.75
Crop Insurance Indemnity/Acre	0.92	9.42	0.00	10.44	28.55	0.00
Subsidy/Acre	10.12	19.29	0.00	18.72	20.21	14.77
Off-Farm Income/Acre	1,778.75	3,130.20	480.18	399.49	1,273.68	67.93
# Organic Farms/County (2002)	9.24	19.86	3.00	4.64	11.34	2.00
Proportion Irrigated Acres/County	0.24	0.36	0.02	0.15	0.28	0.00
Operator Age	57.32	13.89	57.00	54.61	13.13	55.00
Total Cropland Acres/Farm	244.45	510.00	85.00	833.38	1,073.12	470.00
Total Acres Operated/Farm	316.65	641.47	126.00	997.08	1,322.16	555.00
Total Revenue/Farm ($1,000)	153.54	499.50	33.88	338.27	575.09	159.94
Debt: Asset Ratio	0.09	0.27	0.00	0.15	0.34	0.06
Rented: Total Acres	0.29	0.40	0.00	0.53	0.42	0.58
N		20,403			44,119	
	No insurance, cert. organic acres>0			Insured acres>0, cert. organic acres>0		
Proportion Insured	0.00	0.00	0.00	0.80	0.26	1.00
Proportion Organic	0.73	0.36	1.00	0.58	0.38	0.56
# Crops	1.77	1.25	1.00	2.29	1.32	2.00
Crop Diversity Gini	0.93	0.03	0.95	0.91	0.04	0.92
Soil Productivity Index	0.38	0.20	0.35	0.41	0.24	0.37
Revenue/Acre	3,390.66	3,856.56	1,857.75	1,360.80	2,187.78	437.16
Var Cost/Acre	2,529.87	2,821.14	1,201.71	1,175.25	1,910.53	272.88
Crop Insurance Indemnity/Acre	0.21	4.22	0.00	20.08	46.72	0.00
Subsidy/Acre	4.35	17.96	0.00	15.08	25.41	6.02
Off-Farm Income/Acre	3,553.65	4,646.93	867.15	963.89	2,479.00	89.45
# Organic Farms/County (2002)	3.91	38.18	10.00	16.39	28.61	5.00
Proportion Irrigated Acres/County	0.37	0.41	0.10	0.35	0.39	0.13
Operator Age	52.77	13.54	54.00	54.57	12.78	55.00
Total Cropland Acres/Farm	196.97	661.65	30.00	884.78	1,477.00	289.00
Total Acres Operated/Farm	269.35	832.92	50.00	1,099.80	1,809.09	400.00
Total Revenue/Farm ($1,000)	289.78	936.08	42.43	550.02	1,255.03	125.79
Debt: Asset Ratio	0.11	0.25	0.01	0.16	0.23	0.07
Rented: Total Acres	0.23	0.38	0.00	0.38	0.41	0.22
N		1,000			1,050	

Note: See notes on Table 5.

Table 4. Probit Model Regression Results (Dependent Variable: Crop Insurance Participation)

Variable	Estimate	Marginal Mean Effect	Standard Error	
Any Certified Organic Acres	0.598	11.60	0.277	*
Percentage of Certified Acres	-0.001	-0.03	0.003	
Adjusted Gross Income (in $10,000s)	0.009	0.17	0.003	***
Acres (in 1,000 Acres)	0.039	0.75	0.051	
Different Number of Products Produced	-0.015	-0.30	0.004	***
Organic Experience (in years)	-0.022	-0.42	0.008	**
Farming Experience (in years)	0.024	0.47	0.006	***
Is an Operating Loan Commonly Used?	0.698	13.55	0.144	***
High Value or Specialty Crops	-0.265	-5.14	0.157	*
Hogs	-0.436	-8.47	0.238	*
Pseudo R-squared	0.641			

Note: Other variables include an intercept, other crop types. Grains/Legumes are excluded crop. *, **, and *** indicates statistically significant at the 0.10, 0.05, and 0.01 levels. Pseudo R-squared was computed as 1 - LL/LL_0, where LL is the log likelihood value from the unrestricted model (-250.802) and LL_0 is using only an intercept (-698.1945).

Table 5: Fractional Response Logit Regression Results using ARMS Data (Dependent Variable: Proportion Insured Acres)

Variable	Estimate	Standard Error	Margin	
Proportion Organic	-0.603	0.184	-0.101	***
Crop Diversity Gini	-2.036	0.684	-0.343	***
Soil Productivity Index	0.801	0.266	0.135	***
# Organic Farms/County	0.006	0.002	0.001	***
Proportion Irrigated Acres/County	0.135	0.133	0.023	
Operator Age	-0.002	0.002	-0.000	
Total Cropland Acres/Farm	0.000	0.000	0.000	***
Var Cost/Acre	0.000	0.000	0.000	*
Revenue/Acre	0.000	0.000	0.000	***
Subsidy/Acre	0.014	0.001	0.002	***
Off-Farm Income/Acre	0.000	0.000	0.000	***
Debt: Asset Ratio	0.379	0.095	0.064	***
Rented: Total Acres	0.727	0.057	0.122	***
Constant	-0.607	0.774		***
Farm Type	x			
Year	x			
Statistical District	x			
Urban-Rural	x			
Observations	66,572			
Pseudo-R2	0.2732			

Notes: *, **, and *** indicates statistically significant at the 0.10, 0.05, and 0.01 levels, respectively. See data source description in USDA ARMS subsection of the Data and Methodology section. Financial variables are inflated to $2011. We drop observations with crop production less than $5,000, as this is the threshold at which organic certification can occur, farms with zero crop acres, farms from which the largest proportion of sales is derived from woody trees, livestock, and nursery crops, and farms with debt:asset ratios over 20. We drop crop reporting districts (CRDs) without any organic acreage. We replace observations with proportion insured greater than one with one. We winsorize the top 1% of per acre financial variables, land in crops, and total land. All summary statistics are computed with ARMS probability weights, and all regressions are weighted as such as well. An “x” in the Estimates column signifies a set of indicator variables was included in the regression (but coefficients are suppressed in the interest of space.)

Endnotes

[1] Organic premiums are assigned by RMA after gathering data from several sources, often including USDA NASS and AMS, and private sources. They are updated each year with available data (Not Afraid 2019).

[2] The endogeneity associated with premium rates arises from and ignoring those who do not purchase crop insurance. Goodwin (1993) included Iowa farmers who who purchased and did not purchase crop insurance.

[3] The development of this survey included participants representing the following associations: Florida Certified Organic Growers and Consumers; Kansas Rural Center; Montana Organic Association; Michael Fields Agricultural Institute; Midwest Organic & Sustainable Education Service; National Center for Appropriate Technology; National Sustainable Agriculture Coalition; New England Farmer's Union; Oregon Tilth; and Rural Advancement Foundation International.

[4] Incomplete responses (277 observations) and duplicates (12 observations) were excluded from the final sample.

[5] In this paper, we define organic producers as those with some amount of certified organic acreage, since many products are sold as conventional, although they are grown using some organic production methods (see Appendix A, Q21 for a breakdown of these methods).

[6] As a reviewer pointed out, the larger average size of insured farms may reflect agents' efforts in search of higher commissions, rather than characteristics of the farms themselves.

[7] Our supplemental "ARMS Summary Stats" appendix includes summary statistics for several alternative slices of the data—by region, farm type, and organic status.

[8] While ordinary least squares (OLS) is appropriate in some instances, it comes with notable limitations relevant to this application. First, OLS assumes relationships between covariates and unobservable dependent variables are linear across the span of outcomes. Second, OLS can result in unrealistic probabilities outside of the [0,1] space.

[9] Note that farms using organic practices but not certification are ineligible for organic crop insurance.

[10]The ARMS does not collect information on farms that use organic farming methods but are not certified organic.

[11] Our supplemental "ARMS Regressions" appendix includes results from several alternative specifications, including a hurdle model a Tobit model. Results are similar.

[12] The Risk Management Education Partnership Program was administered through RMA through 2018.

[13]See https://www.rma.usda.gov/en/About-RMA/Jobs-and-Opportunities/Partnerships-and-Cooperative-Agreements/Agreements-Archive

Appendix A. Complete list of survey questions and summary results

Q1 Are you farming or ranching commercially in the United States?

Yes	83.6%	1319
No	16.4%	258
TOTAL		**1577**

Q2 How LIKELY are you to buy crop insurance in the COMING YEAR?

Zero chance	36.8%	459
Slight chance	30.3%	378
Likely	15.1%	188
Definitely buying	17.8%	222
TOTAL		**1247**

Q3 For the long-term success and survival of your farm or ranch, how IMPORTANT is it for you to have crop insurance?

Not at all important	20.7%	258
Slightly important	32.3%	403
Moderately Important	24.4%	304
Extremely important or essential	22.6%	282
TOTAL		**1247**

Q4 How MOTIVATED are you to study and learn about new crop insurance options that might apply to your situation?

Not at all motivated	10.5%	131
Slightly motivated	29.6%	369
Moderately motivated	34.5%	430
Extremely motivated	25.4%	317
TOTAL		**1247**

Q5 Have you EVER bought crop insurance?

Never	64.9%	809
Occasionally	10.3%	129
Often	7.3%	91
Every year	17.5%	218
TOTAL		**1247**

Q6 WHY do you rarely or never buy crop insurance? (Check up to 4 biggest reasons.)

My farm is too small. Not worth the trouble.	52.7%	472
My farm is too diversified; not feasible to insure all these crops.	38.7%	347
I don't know anything about it.	31.8%	285
Too expensive.	27.3%	245
Few if any policies are available for the crops that I grow.	25.3%	227
I've never really looked into it but doubt that it would be worthwhile.	22.9%	205

I rarely experience major crop losses.	20.3%	182
Requires too much paperwork.	18.4%	165
Rules are too complicated. I don't understand how it works.	14.7%	132
Other (please specify)	11.6%	104
I'm not comfortable accepting federal subsidies.	8.8%	79
Coverage levels are too low for my situation.	8.0%	72
I've never bought crop insurance and see no reason to start now.	7.5%	67
I don't trust that claims would be paid.	7.4%	66
People that I trust have told me not to bother with it.	5.6%	50
I want to keep my financial records confidential.	4.7%	42
Would harm my image with customers.	0.7%	6
	TOTAL	**896**

Q7 Do you feel that a lack of crop insurance has limited your ACCESS TO LOANS?

Never	50.3%	451
Occasionally (every 5 years or more)	6.6%	59
Often (every 1-4 years)	2.3%	21
Constantly (all the time)	1.7%	15
Don't know	39.1%	350
TOTAL		**896**

Q8 Do you feel that a lack of crop insurance has limited your ABILITY TO EXPAND your operation?

Never	50.1%	449
Occasionally (every 5 years or more)	13.2%	118
Often (every 1-4 years)	4.9%	44
Constantly (all the time)	2.6%	23
Don't know	29.2%	262
TOTAL		**896**

Q9 How many YEARS have you been farming or ranching?

0 - 5	32.2%	370
6 - 10	23.0%	265
11 - 15	10.0%	115
16 - 20	6.8%	78
21 - 30	9.3%	107
31 - 40	9.7%	112
Over 40	9.0%	104
TOTAL		**1151**

Q10 How many ACRES do you farm or ranch?

Less than 5	24.9%	286
5 - 10	14.3%	164
10 - 50	21.0%	242
50 - 200	15.5%	178

200 - 1,000	16.2%	186
1,000 - 5,000	6.3%	73
5,000 - 10,000	1.2%	14
Over 10,000	0.7%	8
	TOTAL	**1151**

Q11 Do you farm FULL-TIME or PART-TIME?

Full-time	55.9%	643
Part-time	44.1%	508
	TOTAL	**1151**

Q12 Do you OWN or LEASE the land that you farm or ranch?

Own	58.1%	669
Lease/rent	17.7%	204
Own some and lease/rent some	24.2%	278
	TOTAL	**1151**

Q13 In what STATE(S) are you currently farming or ranching? (Check all that apply.)

Alabama	0.7%	8
Alaska	0.5%	6
Arizona	0.4%	5
Arkansas	4.3%	50
California	7.0%	80
Colorado	1.7%	19
Connecticut	0.4%	4
Delaware	0.2%	2
Florida	3.3%	38
Georgia	2.0%	23
Hawaii	1.0%	11
Idaho	0.5%	6
Illinois	2.9%	33
Indiana	2.5%	29
Iowa	3.2%	37
Kansas	4.8%	55
Kentucky	1.5%	17
Louisiana	0.9%	10
Maine	0.8%	9
Maryland	0.7%	8
Massachusetts	1.0%	12
Michigan	3.9%	45
Minnesota	2.7%	31
Mississippi	1.0%	11
Missouri	1.5%	17

Montana	7.2%	83
Nebraska	2.0%	23
Nevada	0.2%	2
New Hampshire	1.5%	17
New Jersey	0.4%	4
New Mexico	0.7%	8
New York	3.0%	35
North Carolina	5.5%	63
North Dakota	0.4%	5
Ohio	1.9%	22
Oklahoma	1.0%	12
Oregon	2.7%	31
Pennsylvania	1.1%	13
Puerto Rico	0.1%	1
Rhode Island	0.1%	1
South Carolina	0.9%	10
South Dakota	1.2%	14
Tennessee	1.7%	20
Texas	9.3%	107
Utah	0.2%	2
Vermont	0.8%	9
Virginia	1.8%	21
Washington	4.2%	48
West Virginia	0.9%	10
Wisconsin	5.7%	65
Wyoming	0.2%	2
	TOTAL	**1151**

Q14 What's the 5-DIGIT ZIP CODE of your primary farming or ranching operation? (OK to leave blank if you don't know or prefer not to provide this info.)

Q15 What DESCRIPTION best fits your operation? (OK to choose more than one.)

High-value or specialty crops (e.g. fruits, vegetables, melons, tree nuts, greenhouse, nursery crops, horticultural specialties)	65.51%	754
Grains & legumes (e.g. corn, soybeans, wheat, oats, barley, sorghum, dry edible beans, rice)	23.46%	270
Poultry & eggs	23.02%	265
Cattle	22.42%	258
Other field crops (e.g. cotton, peanuts, potatoes, sunflowers, sugar beets, seed crops, hay, silage, forage, tobacco)	15.29%	176
Other (please specify)	14.51%	167
Hogs	11.03%	127
Sheep	10.60%	122
Dairy	4.52%	52
	TOTAL	**1151**

Q16 How many DIFFERENT PRODUCTS (crops and/or livestock) do you typically grow and sell per year?

Just one	11.0%	126
2	10.5%	121
3	11.8%	132
4 - 6	19.9%	229
7 - 10	13.1%	151
11 - 20	11.9%	137
21 - 40	11.4%	131
40 - 60	5.7%	65
Over 60	5.1%	59
	TOTAL	**1151**

Q17 How do you MARKET your farm products? (Check all that apply.)

Farmer’s market	47.20%	543
Restaurants	32.80%	378
Farm stand	27.40%	315
Community-supported agriculture (CSA)	24.90%	286
Internet sales	22.90%	263
Grocery stores	21.70%	250
Growers' cooperative or aggregator	15.90%	183
Livestock sale barn or buying station	15.80%	182
Processor (e.g. grain mill, meat processing facility)	12.30%	141
Distributor	12.20%	140
Broker	10.30%	119
Elevator	9.80%	113
Schools, hospitals, or other institutions	7.80%	90
Produce packing house	3.50%	40
Produce terminal market	1.40%	16
Other (please specify)	15.00%	173
	TOTAL	**1151**

Q18 What's your average ANNUAL GROSS REVENUE from sales of agricultural products?

New farmer: little or no revenue yet	13.0%	150
$1 - $10,000	20.1%	231
$10,000 to $50,000	23.3%	268
$50,000 to $100,000	14.9%	171
$100,000 to $500,000	14.7%	169
$500,000 to $1 million	4.3%	49
Over $1 million	3.8%	44
I'd rather not provide this information	6.0%	69
	TOTAL	**1151**

Q19 Have you ever had an OPERATING LOAN for your farm or ranch?

Never	64.4%	741
Some years	18.5%	213
Most years	5.9%	68
Every year	11.2%	129
TOTAL		**1151**

Q20 Do you use ORGANIC FARMING METHODS? (By this we mean alternatives to chemical fertilizers and pesticides--methods such as biological pest control, reduced-tillage, cover crops, and green or animal manure.)

No, I don't use organic farming methods.	17.5%	201
Yes, on 1 - 25% of acreage.	8.4%	97
Yes, on 26 - 50% of acreage.	5.1%	59
Yes, on 50 - 75% of acreage.	4.6%	53
Yes, on 75 - 99% of acreage.	7.6%	87
Yes, on all acreage.	56.8%	654
TOTAL		**1151**

Q21 Which of the following ORGANIC FARMING METHODS have you used? (Check all that apply.)

Crop rotation	75.1%	674
Compost	72.8%	653
Cover crops	72.8%	653
Animal manure	62.5%	561
Maintain beneficial insect habitat	62.4%	560
Mulching	60.7%	544
Mechanical cultivation for weed control	57.9%	519
Green manures	53.1%	476
Biological pest control	51.2%	459
Highly diversified crops	47.1%	422
Companion planting	46.6%	418
Rotational (multi-paddock) grazing	36.0%	323
Integrate animals and crops on the same acreage	31.2%	280
Compost tea	27.8%	249
Trap crops	19.3%	173
Other (please specify)	6.5%	58
TOTAL		**897**

Q22 HOW MANY YEARS have you been farming with organic methods?

0 to 5	39.4%	353
6 - 10	24.9%	223
11 - 15	13.4%	120
16 - 20	7.1%	64
21 - 30	8.1%	73
31 - 40	4.4%	39
Over 40	2.8%	25

TOTAL	**897**	

Q23 What's the average SOIL ORGANIC MATTER level on your farm or ranch? (OK to estimate.)

Less than 2%	9.5%	85
About 3%	24.4%	219
About 4%	15.7%	141
5% or more	21.1%	189
Don't know	29.3%	263
TOTAL	**897**	

Q24 How would you rate the BENEFICIAL INSECT POPULATIONS on your farm or ranch?

Poor	2.5%	22
Fair	22.2%	199
Good	47.6%	427
Outstanding	17.8%	160
Don't know	9.9%	89
TOTAL	**897**	

Q25 WHY DO YOU CHOOSE to use organic methods? RANK each item in the following list, with 1 being most important to you and 6 being least important.

	1	2	3	4	5	6	Avg Score
For reasons of land stewardship and ecological sustainability	39.0%	22.6%	15.7%	7.6%	9.5%	5.6%	4.6
To produce higher quality and more nutritious products	20.2%	23.8%	29.1%	12.5%	9.4%	5.1%	4.2
To reduce pesticide exposure for health & safety of family & workers	16.6%	28.9%	22.3%	12.5%	10.4%	9.4%	4
To tap into growing consumer demand for organic products	6.7%	10.3%	12.5%	27.2%	29.9%	13.5%	3
To get higher prices for my products	10.9%	7.7%	10.4%	17.4%	24.2%	29.4%	2.8
To reduce input costs	6.6%	6.8%	10.0%	22.9%	16.7%	37.0%	2.5
TOTAL 1087							

Q26 What percentage of the acreage that you currently farm is USDA CERTIFIED ORGANIC?

None of it	68.6%	746
1 - 25%	3.4%	37
26 - 50%	3.5%	38
50 - 75%	2.1%	23
75 - 99%	3.1%	34
All of it	19.2%	209
TOTAL	**1087**	

Q27 HOW MANY YEARS have you had USDA certified organic acreage?

1 - 5	14.4%	156
6 - 10	8.0%	87

11 - 15	5.2%	57
16 - 20	5.8%	63
I don't have any certified organic acreage.	66.6%	724
	TOTAL	**1087**

Q28 What best describes your STATUS with USDA ORGANIC CERTIFICATION? (Choose one.)

I've NEVER had USDA certified organic land and am SOMEWHAT INTERESTED in getting some.	27%	293
I've NEVER had USDA certified organic land and am NOT INTERESTED in getting any.	26%	278
I've NEVER had USDA certified organic land and am EXTREMELY INTERESTED in getting some.	12%	127
I HAVE USDA certified organic land and am EXTREMELY INTERESTED in getting more.	11%	122
I HAVE USDA certified organic land and am SOMEWHAT INTERESTED in getting more.	9%	93
I HAVE USDA certified organic land and am NOT INTERESTED in getting more.	8%	84
I ONCE HAD USDA certified organic land but NO LONGER DO.	5%	50
I've NEVER had USDA certified organic land and am CURRENTLY GETTING some land certified.	2%	25
I HAVE USDA certified organic land but I'm THINKING ABOUT DROPPING my certification.	1%	15
	TOTAL	**1087**

Q29 Would you be MORE INTERESTED in getting land certified organic--or increasing your organic acreage--if you knew that there was AFFORDABLE CROP INSURANCE that would cover your losses and reduce your risks during the transition period?

Would make no difference	29.3%	318
I'd be SLIGHTLY more interested	27.8%	302
I'd be QUITE A BIT more interested	15.4%	167
I'd be A LOT more interested	12.9%	140
Don't know	9.0%	98
Comment	5.7%	62
	TOTAL	**1087**

Q30 How would you rate YOUR UNDERSTANDING of the following?

	I know nothing.	I know a little.	I know a fair amount.	I know a lot.	Avg score (1-3)
The CROPS for which insurance is available in your county	39.8%	35.4%	17.4%	7.3%	1.9
The crop insurance POLICIES or PRODUCTS available to you	37.4%	39.3%	17.1%	6.2%	1.9
The USDA RISK MANAGEMENT AGENCY and what it does	56.9%	29.2%	10.3%	3.6%	1.6
WHOLE-FARM REVENUE PROTECTION insurance	60.5%	24.4%	9.9%	5.2%	1.6
The NONINSURED CROP DISASTER ASSISTANCE PROGRAM (NAP) of the Farm Service Agency	58.8%	27.0%	9.8%	4.4%	1.6
Insurance products designed specifically for ORGANIC CROPS, using premium prices	72.6%	18.8%	5.9%	2.6%	1.4
The option of using a SALES CONTRACT to establish the covered price in crop insurance	74.9%	16.1%	6.3%	2.7%	1.4
				Answered	**1078**

Q31 What type(s) of crop insurance have you BOUGHT within the PAST FIVE YEARS? (Check all that apply.)

I have not bought crop insurance in the past 5 years.	70.4%	759
Actual Production History (APH)	10.7%	115
Noninsured Crop Disaster Assistance Program (NAP)	7.2%	78
Revenue Protection	7.1%	76
I'm not sure what it's called.	6.8%	73
Yield Protection	5.8%	63
Whole-Farm Revenue Protection (WFRP)	4.2%	45
Livestock Policy	3.5%	38
Actual Revenue History (ARH)	3.1%	33
Area Risk Protection Insurance (ARPI)	2.0%	22
Rainfall Index (RI)	1.7%	18
Contract Price Addendum (CPA)	1.6%	17
Group Risk Plan (GRP)	1.0%	11
Group Risk Income Protection (GRIP)	0.7%	7
Commodity Exchange Price Provisions (CEPP)	0.6%	6
Vegetation Index (VI)	0.5%	5
Dollar Plan	0.1%	1
	Answered	**1078**

Q32 HOW OFTEN have you filed a SUCCESSFUL crop insurance claim?

Never	77.6%	836
Occasionally	17.2%	185
Fairly often	3.8%	41
Frequently	1.5%	16
	TOTAL	**1078**

Q33 HOW OFTEN have you had a crop insurance claim DENIED?

Never	89.8%	968
Occasionally	5.0%	54
Fairly often	1.0%	11
Frequently	0.6%	6
Optional: Why was/were your claim(s) denied?	3.6%	39
	TOTAL	**1078**

Q34 Among the FARMING PEERS that you talk to regularly, how many buy crop insurance?

None of them	22.3%	240
A few	25.6%	276
Quite a few	12.1%	130
Nearly all of them	13.0%	140
Don't know	27.1%	292
	TOTAL	**1078**

Q35 What commodities have you GROWN and/or INSURED within the PAST 5 YEARS? Check all that apply. (This list includes essentially all commodities for which specific crop insurance policies are available.)

	Grew it but DID NOT insure it	Grew it AND bought crop insurance for it	Total
Cucumbers	321	19	340
Peppers	307	20	327
Tomatoes - Fresh Market	288	21	309
Onions	287	16	303
Cabbage	263	17	280
Potatoes	252	20	272
Tomatoes	248	24	272
Corn	159	108	267
Beans - Fresh market	244	11	255
Pumpkins	210	19	229
Peas - Green	207	11	218
Cattle	171	29	200
Peppers - Chile	187	5	192
Pasture, Rangeland, Forage	161	19	180
Apples	157	17	174
Strawberries	155	19	174
Sweet Potatoes	163	10	173
Forage Production	129	30	159
Apiculture (Beekeeping)	147	4	151
Annual Forage	138	12	150
Mint	145	2	147
Sweet Corn - Fresh Market	130	14	144
Sweet Corn	128	13	141
Sunflowers	135	4	139
Wheat	57	77	134
Blueberries	117	15	132
Soybeans	41	84	125
Beans - Dry	99	22	121
Oats	91	23	114
Pears	100	4	104
Mustard	95	6	101
Peaches	88	11	99
Swine	91	8	99
Lamb	92	1	93
Figs	87	1	88
Grapes	73	12	85
Nursery - Field Grown & Container	78	6	84
Buckwheat	77	6	83
Barley	43	29	72
Cherries	63	9	72
Plums	66	3	69
Rye	63	4	67
Alfalfa Seed	50	10	60
Peas - Dry	43	16	59
Popcorn	50	5	55
Cattle - Dairy	40	11	51

Millet	34	9	43
Apricots - Fresh	36	6	42
Forage Seeding	37	4	41
Peaches - Freestone, Fresh	36	4	40
Avocados	27	12	39
Pecans	34	2	36
Sorghum - Grain	25	11	36
Lemons	29	4	33
Table Grapes	31	2	33
Clary Sage	29	2	31
Walnuts	25	5	30
Sorghum - Silage	27	2	29
Sugar Beets	29	0	29
Oranges	23	5	28
Avocado Trees	23	3	26
Banana Trees	24	2	26
Lime Trees	23	2	25
Peanuts	23	2	25
Canola	15	8	23
Papaya	22	1	23
Banana	18	3	21
Beans - Processing	12	9	21
Grapefruit	15	4	19
Nectarines	12	7	19
Tobacco	13	6	19
Cotton	10	8	18
Grapefruit Trees	15	3	18
Grass Seed	15	3	18
Olives	16	2	18
Orange Trees	13	5	18
Mandarins/Tangerines	16	1	17
Mango Trees	13	4	17
Corn Seed - Hybrid	8	7	15
Flax	10	5	15
Almonds	7	7	14
Carambola Trees	12	2	14
Cranberries	10	4	14
Apricots - Processing	9	4	13
Camelina	9	4	13
Coffee	12	1	13
Peaches - Cling, Processing	8	4	12
Sugarcane	11	1	12
Papaya Trees	10	1	11
Safflower	6	5	11
Macadamia Nuts	10	0	10
Peaches - Freestone, Processing	7	3	10
Sweet Corn Seed - Hybrid	8	2	10
Prunes	5	3	8
Rice	6	2	8
Sorghum Seed - Hybrid	7	1	8
Coffee Trees	5	2	7
Sesame	6	1	7
Tangelos	7	0	7
Clams	5	0	5

Macadamia Trees	3	2	5
Raisins	3	2	5
Tangerine Trees	4	1	5
Oysters	3	1	4
Rice Seed - Hybrid	2	2	4
Wild Rice - Cultivated	4	0	4
Pistachios	1	2	3
Tangors	3	0	3
None of the above	174	8	182
		ANSWERED	**1056**

Q36 What OTHER PRODUCTS (not on the list above) have you raised in the past 5 years? Check all that apply. (Specific crop insurance policies are generally NOT available for these products.)

Squashes (any kind)	438
Lettuce (any kind)	425
Brassicas/leafy greens (e.g. broccoli, collards, kale...)	409
Culinary herbs & spices (e.g. basil, dill, sage, fennel...)	398
Other root vegetables (e.g. beets, parsnips, turnips...)	387
Chickens (for eggs)	321
Watermelons	294
Flowers	287
Berries not listed above (e.g. blackberries, raspberries...)	286
Other melons (e.g. canteloupes, honeydews)	263
Asparagus	215
Chickens (for meat)	182
Medicinal plants (e.g. echinacea, ginseng, nettle...)	161
Other poultry (e.g. ducks, turkeys...)	133
Sheep	126
Goats	116
Other tree fruits (e.g. pomegranates, persimmons...)	110
Mushrooms	89
Other tree nuts (e.g. chestnuts, hazelnuts...)	64
Rabbits	58
Fish or shellfish (e.g. tilapia, catfish, crawfish, shrimp...)	12
Bison	3
None of the above	249
Other	109
ANSWERED	**1056**

Q37 HOW OFTEN do the following cause SERIOUS FINANCIAL LOSS on your farm?

	Never	Occasionally	Fairly often	Frequently	Weighted Average
Drought or insufficient rain	30.7%	49.6%	14.9%	4.8%	1.9
Insects, rodents, or other pests	29.2%	51.9%	14.3%	4.6%	1.9
Excessive rain and flooding	34.4%	52.1%	10.1%	3.5%	1.8
Freezes or frost	33.1%	54.7%	10.3%	1.9%	1.8
Diseases	34.1%	55.2%	8.1%	2.6%	1.8
Unexpected decline in market prices	49.0%	33.9%	12.7%	4.3%	1.7
Wind damage	37.6%	54.5%	6.2%	1.6%	1.7
Hail	53.5%	41.8%	3.9%	0.8%	1.5
				Answered	**1044**

Q38 How would you describe your PAST EXPERIENCE with the performance of crop insurance COMPANIES?

Excellent	4.1%	43
Good	11.7%	122
Fair	8.0%	83
Poor	5.4%	56
I have little or no experience.	70.9%	740
	TOTAL	**1044**

Q39 How would you describe your PAST EXPERIENCE with the performance of crop insurance AGENTS?

Excellent	6.7%	70
Good	13.0%	136
Fair	6.7%	70
Poor	4.6%	48
I have little or no experience.	69.0%	720
	TOTAL	**1044**

Q40 HOW SATISFIED are you with the following?

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied	Don't Know
The crop insurance PRODUCTS & POLICIES currently available to you	10.3%	7.8%	13.4%	6.0%	62.5%
The PREMIUM COST of crop insurance policies & products currently available to you	9.8%	10.3%	13.1%	3.9%	62.9%
				TOTAL	**1044**

Q41 About how often does your gross income fall below 75% of its average level? (OK to estimate.)

1 year in 10 or less	21.6%	225
1-2 years out of 10	15.5%	162
2-3 years out of 10	11.5%	120
3-4 years out of 10	7.9%	82
4-5 years out of 10	4.5%	47
More than 5 years out of 10	3.0%	31
Don't know	36.1%	377
	TOTAL	**1044**

Q42 What's the most you'd be WILLING TO PAY (in ANNUAL PREMIUM COST) for an insurance policy that protected your gross income from falling below 75% of its average level?[Example: Your average gross income is $100,000 and falls to $60,000 in a given year. Insurance pays $15,000, giving you $75,000 or 75% of your average gross income.]

$0 - Not interested	14.2%	148
$1 - $100	14.8%	154
$100 - $500	21.8%	228
$500 - $1,000	10.3%	107
$1,000 - $2,500	7.1%	74
$2,500 - $5,000	3.2%	33

$5,000 - $10,000	1.5%	16
$10,000 - $25,000	1.4%	15
$25,000 - $50,000	0.9%	9
$50,000 - $100,000	0.3%	3
More than $100,000	0.6%	6
Don't know	24.0%	251
	TOTAL	**1044**

Q43 How do you DESCRIBE yourself? (OK to check more than one.)

White/Caucasian	86.37%	900
Multiracial	4.89%	51
Hispanic/Latino	4.32%	45
African American	3.93%	41
Native American	3.07%	32
Asian/Pacific Islander	1.15%	12
Other (please specify)	2.30%	24
	Answered	**1042**

Q44 What's your GENDER?

Male	58.4%	608
Female	41.7%	434
	TOTAL	**1042**

Q45 What's your AGE?

Under 20	0.5%	5
21 - 30	8.0%	83
31 - 40	23.8%	248
41 - 50	17.6%	183
51 - 60	24.9%	259
61 - 70	19.9%	207
Over 70	5.5%	57
	TOTAL	**1042**

Q46 What's your highest level of EDUCATION?

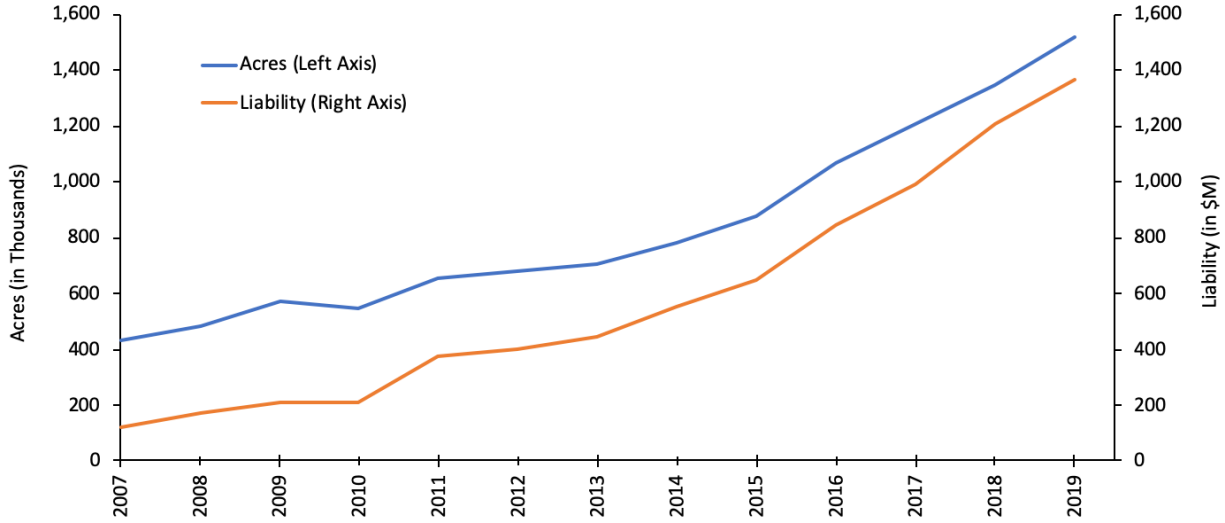
No high school	0.4%	4
Some high school	0.6%	6
Completed high school	4.3%	45
Some college or technical school	16.9%	176
Completed junior college or technical school	8.4%	87
Completed bachelor’s degree	31.4%	327
Some graduate work	10.3%	107
Completed graduate degree	27.8%	290
	TOTAL	**1042**

Q47 Do you want to receive an honorarium of $20 by mail, for completing this survey? (Requires providing your name and mailing address.)

Yes please.	83.7%	868
No thank you.	16.3%	169
	TOTAL	**1037**

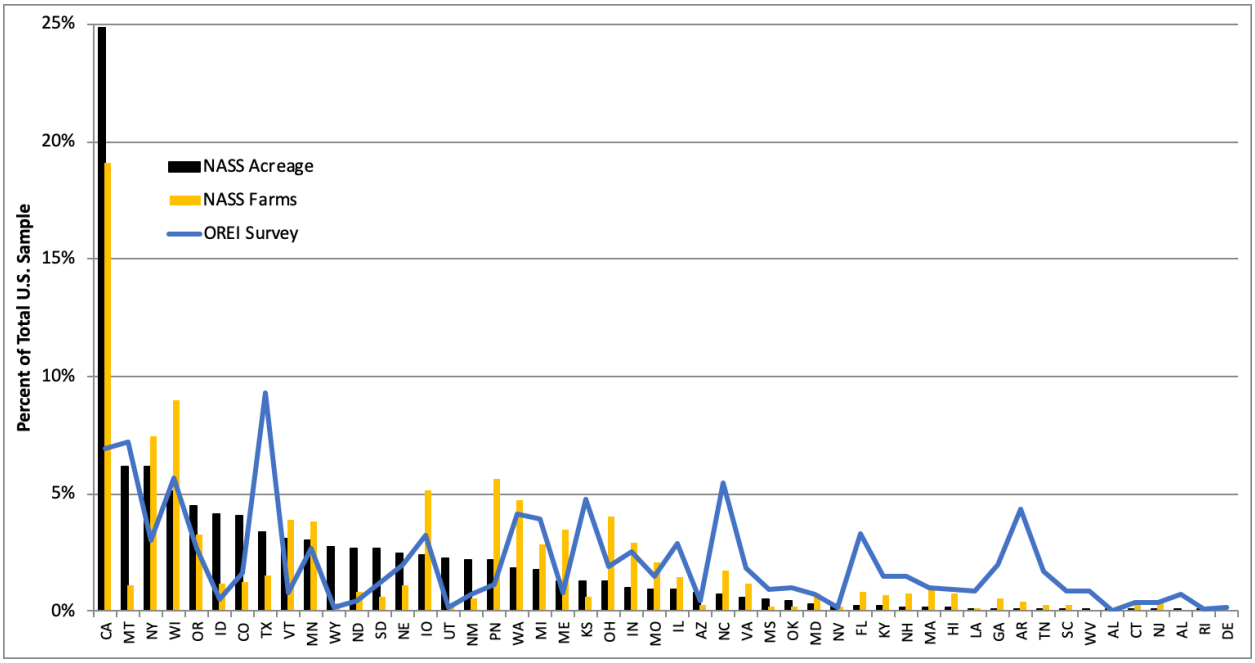
Appendix Figures:

Figure A1. Acreage and nominal liability of organic crop insurance policies, 2007-2019.



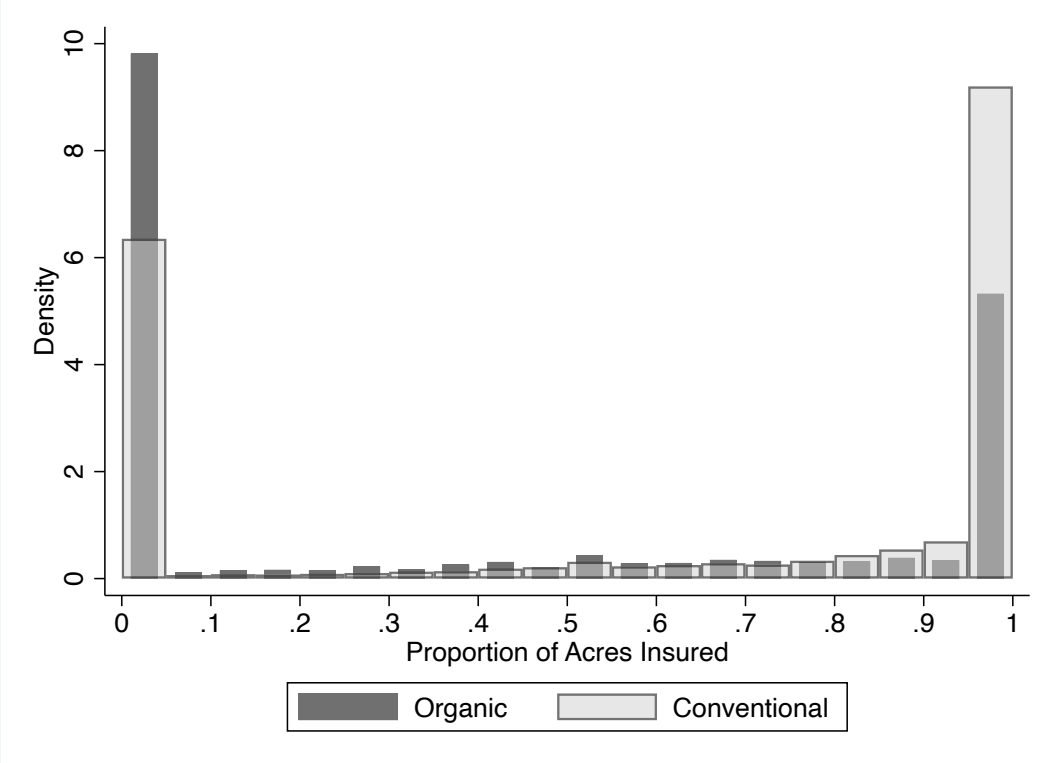
Source: Risk Management Agency, Summary of Business for Organic Production.

Figure A2. Distribution of OREI survey responses, by state.



Note: NASS Organic Acreage and Farms are from the 2016 Certified Organic Survey, available online at https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Organic_Production/. OREI Survey results are from the data conducted under the OREI grant used in this paper.

Figure A3: Proportion of Acres Insured



Data source: USDA ARMS, 2003-2011. Note that this figure reports density (rather than frequency) to show relative concentration of insurance coverage for organic and conventional farms. There are in fact many more conventional farms in this dataset than organic, which is not evident here.