Title: Farmers, Information, and Nutrient Management in the US Midwest

Abstract: In an age of increasingly available options, which sources of information about nutrient management do farmers use to guide their management decisions and why? Recent work reveals emerging shifts in how farmers access information about technology and practices related to their operation. In this study, we use survey data gathered in 2014 in the US Corn Belt to examine the information sources that farmers use, the likely influence those sources will have on their nitrogen fertilizer decisions, and whether some information sources are held in higher regard than others. We explore the factors shaping whether farmers use multiple information sources as well as their consultation of particular ones. Our empirical analysis reveals that most farmers in our sample use multiple information sources and that the number of sources used varies by farm size. Just over three sources are used on average among the full sample, with large operators (> 1,000 acres of land) using four sources. Farmers' perception of these sources differs in the degree to which they value and perceive their recommendations to influence management practice decisions. Among our sample, fertilizer dealers, crop consultants, seed suppliers, and university extension are greatly valued and influential sources. Finally, education and years in farming shape the selection of multiple information sources or the intensity of information gathering, and how farmers perceive the utility of sources regarding their influence and value.

Keywords: Farmer-Decision-Making; Nitrogen-Fertilizer; Corn Agriculture, Information Sources; Structural-Equation Modeling

Introduction

The agricultural industry faces the dual challenges of increasing production of food, fuel, and fiber products to meet the needs of a growing world population while simultaneously protecting the environmental, social, and economic resource base on which it relies (Davidson et al. 2015). Agricultural producers must meet these goals while operating in an increasingly globalized marketplace, information age, and changing climate (Robertson and Swinton 2005). Both globally and within the US, agricultural production has been linked with large scale and complex environmental challenges, including non-point source pollution of both fresh and coastal water bodies, air pollution, habitat loss, and contributions to climate change (Robertson and Vitousek 2009). Rapid changes in agricultural technology and growth in the agricultural services industry have resulted in a proliferation of tools and practices available to farmers to address these challenges that, if adopted, can help ameliorate agriculture's environmental impacts and increase productivity (Davidson et al. 2012). Structural changes within the traditional institutional arrangements in the US have also resulted in shifts in how farmers access information about technology and practices related to decision-making about their operation. In particular, there is a shift in where farmers seek information about key agricultural issues, moving away from university researchers and extension services to agricultural retailers and certified crop advisors (Edge et al. 2017; Prokopy et al. 2015).

A key example of this emerging trend is how farmers access information about nitrogen management. Nitrogen is a key nutrient for crop growth and additions of nitrogen in the form of synthetic fertilizers constitutes a key input in modern farming systems (Davidson et al. 2012; Robertson and Vitousek 2009). Applications of synthetic nitrogen fertilizer in agriculture have increased significantly since the early 20th century invention of the Haber-Bosch process, which artificially produces industrial quantities of nitrogen. In the US, for instance, between 1920 and 1990 the amount of nitrogen fertilizer applied to US farm fields increased 50-fold (Nelson 1990). Globally, there has been a documented 10-fold increase between 1950 and 2008 (Robertson and Vitousek 2009). Through bolstering soil fertility, the use of synthetic nitrogen fertilizer is responsible for increased agricultural yields, reducing the necessary amount of land for agricultural production, and enabling increased human carrying capacity (Smil 2002). Smil (2002) estimates that food production made possible by nitrogen fertilizer supports approximately 40 percent of the global population. One cost of this extensive use of nitrogen fertilizer is the loss of nitrogen to surrounding surface waters through leaching, where it can cause algal blooms and hypoxic conditions, and to the atmosphere through volatilization, where it can contribute to global climate change (Robertson and Vitousek 2009). In addition, many farmers apply nitrogen fertilizers in ways and amounts that do not fit with best management practices, especially in the US Corn Belt (Ribaudo et al. 2011), which further exacerbates this problem.

Farmers' decisions about nitrogen fertilizer applications related to timing, method, source, and rate are important for food production and environmental conditions alongside farmer income and longevity. As we describe below, farmers' nutrient management strategies are influenced by the information sources they use. As such, information sources function as one of the factors contributing to Midwestern corn farmers' current nitrogen management practices. Others have argued that information sources can be significant in encouraging environmentally focused management decisions among farmers (Mills et al. 2016). Understanding which information sources are most important to farmers can serve as a foundational step in responding to calls for further research on why sub-optimal nitrogen management strategies are practiced in Midwestern corn agriculture (Stuart et al. 2015) and assist in efforts to reach them with up-to-date information about advancements in knowledge or technology.

Prior work has described which information sources farmers use most frequently and how these affect the adoption of different practices (see below). Absent from this literature is investigation beyond which sources of information about nutrient management are used most frequently to why farmers use certain ones, particularly in relation to their perceptions of their likely influence and how much they value their input. In this study, therefore, we explore not just the information sources that farmers use, but how much they value them in terms of the likely influence those sources will have on their nitrogen fertilizer decisions and whether some information sources are held in higher regard than others. We also consider the factors shaping whether farmers use multiple information sources as well as their consultation of particular ones. We focus on the US Midwest, given its prominence in corn (*Zea mays* L.) and soybean (*Glycine max)* production, comprising much of the geographic region known as the 'Corn Belt'. We begin by reviewing the relevant literature on information sources for nutrient management in agriculture, with a focus on nitrogen fertilizer as it informs our study.

Information Sources for Nutrient Management

When making annual decisions related to management strategies, farmers rely on various sources of information for recommendations. Corn and soybean farmers have a multitude of potential information sources that they can use related to annual management decisions, including farm industry suppliers and dealers, such as fertilizer and seed dealers; university extension; private crop consultants; friends, family and neighboring farmers; farm magazines and publications; and farm events or product demonstrations (Luloff et al. 2012; McBride and Daberkow 2003; Stuart et al. 2012).

Previous work examines how farmers' management decisions relate to the particular sources of information they utilize (Daberkow and McBride 1998; McBride and Daberkow 2003; Osmond et al. 2015). This literature generally finds a relation between management practice adoption and information source utilization (see Baumgart-Getz et al. 2012 for a meta-analysis of the conservation practice adoption literature). For instance, Hoag et al. (2012a; 2012b) found that a University Extension Educator was able to increase the adoption rate of nutrient best management practices and related conservation practices by cattle ranchers who applied broiler chicken litter to fields. In a survey of Maryland farmers who made nutrient management plans, fertilizer dealers were more likely than extension agents to recommend an increase in fertilizer application rates (Lawley et al. 2009). However, the same study found that independent crop consultants were even more likely than fertilizer dealers to recommend a fertilizer rate increase. The authors assert that, for many farmers, fear of yield losses heavily influences recommendations from crop consultants.

For US corn and soybean farmers specifically, studies reveal a relationship between information source use and management practice adoption. For example, using 1996 *Agriculture Resource Management Survey* (ARMS) data from 16 states, Daberkow and McBride (1998) find that corn farmers who used crop consultants for information on precision agriculture (16% of the sample) were more likely to adopt precision agriculture techniques. Using 1998 ARMS data with a sample of approximately 3,000 corn farmers from across the country, McBride and Daberkow (2003) showed that corn farmers using crop consultants, input suppliers and extension educators were more likely than those using the mass-media as an information source to adopt precision farming techniques. Receiving information from crop consultants had the largest impact on the probability of adopting precision farming techniques (28% increase in the probability of adopting compared to those using mass media). Weber and McCann (2015) analyze the 2012 ARMS data on US corn farmers to explore farmer adoption of nitrogen management practices. Their analysis reveals that farmers not using any source of recommendations were less likely to adopt N soil testing and plant tissue sampling as well as nitrification inhibitors (which prevent volatilization and leaching of nitrogen fertilizer) than those using fertilizer dealers' information. They also found that compared to those using crop consultants, farmers who used fertilizer dealers' recommendations were significantly less likely to use the two above mentioned practices. This effect is generally argued to be a result of fertilizer dealers' interest in maximizing sales and thus recommending more, not less fertilizer use (Lawley et al. 2009; Stuart et al. 2012; 2014; Weber and McCann 2015).

These results suggest the link between the source of information a farmer uses and their on-farm management decisions. While there is a diverse set of actors from which farmers can seek information, current evidence suggests that farmers do not necessarily use these sources equally. Farmers appear to rely heavily on farm input suppliers and dealers for information about management practices. Using ARMS data from 16 states, Daberkow and McBride (1998) found most corn farmers utilized farm suppliers and dealers (57%) as information sources regarding precision farming techniques, followed by farm-publications (37%); university extension (22%), crop consultants (16%) and an equipment event/demonstration (6%). McBride and Daberkow (2003), using the 1998 ARMS data, similarly examined what corn farmers' major sources of information were for precision agriculture. Most farmers[1] (47%) had heard about the technique primarily through the “mass media,” including farm publications, the internet, and television ads. Farm input suppliers were the second most prevalent source (25%), followed by university extension (12%). McBride and Daberkow (2003) argue that while most farmers had heard of precision application via the mass media, this source was passively utilized and not influential in decisions. They highlight the role of input suppliers as a source that corn and soybean farmers actively sought out for up to date information. While farmers appear to be increasingly relying on private sector sources of information, farmers use different information sources for different types of decisions: Mase et al. (2015) demonstrate that sources like university extension and government agencies are more trusted than others for information on soil and water conservation.

For nitrogen management, prior work demonstrates that many farmers use fertilizer dealer recommendations. In a survey of Michigan corn farmers, Stuart et al. (2012) found that fertilizer dealers were the most prevalent source of information related to nitrogen fertilizer application and were considered the most important source influencing farmers’ fertilizer decisions. Nearly 70 percent of farmers in their study received information from fertilizer dealers, and approximately 37 percent of farmers found their information to be the most important source, followed by seed company agronomists as the most important source for around 18 percent of the surveyed farmers. Only 15.8 percent of farmers reported university recommendations as their most important source of information. In a recent study using 2012 ARMS data, Weber and McCann (2015) found that a slight majority of US corn farmers (52%) did not receive outside recommendations related to their nitrogen fertilizer management strategies. However, many farmers did use outside information sources for recommendations. In

[1] McBride and Daberkow (2003) excluded farmers who had not heard of precision application techniques from their analyses.

particular, fertilizer dealers (27%) were the most utilized outside source of information related to nitrogen-use, followed by crop consultants (16%) and university extension (4%). A 2012 survey of farmers in Iowa indicated that farmers in that state overwhelmingly use fertilizer or agricultural chemical dealers for information and recommendations on nitrogen management and fertilizer rates (Arbuckle and Rosman 2014).

As we have described, previous research has investigated how information sources may affect farmer nutrient application behavior, but little work has empirically explored the factors shaping the selection of information sources (see Luloff et al. 2012 as an exception). Although many farmers appear to be relying primarily on fertilizer dealers' recommendations for nitrogen management, it is not clear what determines farmer choices of information sources or indeed the number of information sources used. To be specific, this work leaves at least three important areas under examined: 1) the intensity of use of information sources across farmers, 2) why a particular source is used and how farmers perceive that source, and 3) how farmer and farm characteristics influence use of particular information sources. Empirical exploration of these areas contributes to the growing literature examining information sources through a more nuanced explanation of reasons for a particular information sources use. In this paper, we use data from a survey of corn growers in the US Corn Belt to investigate 1) what information sources farmers are utilizing for nitrogen management decisions, 2) how farmers view these information sources, and 3) what individual factors (including perceptions of farming and environmental quality, experience in farming, education, age, and farm size) may determine which sources of information farmers are using given their perceived influence and value or utility.

Materials and Methods

We conducted a survey of commercial corn producers in three Midwestern U.S. states (Indiana, Iowa, and Michigan) to gather information about the use of nitrogen fertilizers and associated management practices. We selected these three states to represent the range of physiographic and socioeconomic settings within the Corn Belt, the geographic region of the U.S. growing the majority of corn and soybean (Arbuckle et al. 2013). Thirty-seven percent of the region's total land area was planted in one of these two crops in 2015 (NASS 2015), ranging from twelve percent in Michigan to sixty-five percent in Iowa. In 2015, the Midwest grew nearly sixty percent of the US's 13.6 billion bushels of corn and fifty-five percent of the U.S.'s 3.9 billion bushels of soybeans (NASS 2015).

Our survey sample was drawn from the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) Census of Agriculture sample frame in consultation with the NASS Regional Office in Michigan. Given our population of interest of larger-scale corn farmers, the sample frame consisted of non-organic corn growers with more than 100 acres of cropland in 2012, the most recent Census of Agriculture year (USDA 2014). We stratified our sample into three categories by farm size to ensure adequate representation of large farms: under 500 acres, 500-999 acres, and greater than 1000 acres of cropland.

We followed a four-wave mailing process using a modified Tailored Design Method that included a survey-survey-postcard-survey protocol (Dillman et al. 2014). The farmers in our sample frame were mailed a survey questionnaire in March and early April 2014 with Michigan State University letterhead and NASS return addresses. In the first contact, farmers were mailed a survey questionnaire with a cover letter explaining the purpose of the study. The second contact, approximately 2 weeks later, included a second copy of the questionnaire. The third and fourth contacts consisted of a color reminder postcard and a third copy of the questionnaire, respectively, and were mailed seven days following previous contacts.

Our overall response rate of 20% (n=260) approximates recent surveys using similar designs (Arbuckle et al. 2013; Reimer and Prokopy 2014; Rejesus et al. 2013; Stuart et al. 2012).[2] We compared the characteristics of our sample with Census data since our multi-state stratified sampling approach was designed to include larger farms. This strategy was appropriate for our study design that sought to include a greater proportion of operators with large numbers of acres in corn production.[3] We use survey weights in our analyses.

The survey questionnaire, developed by a multidisciplinary[4] team of scientists, included more than 35 questions covering a range of topics including farm operation characteristics, fertilizer management decisions, use of application technologies, participation in government farm conservation programs, environmental perceptions, views of farming, and grower characteristics including demographics and socio-economics. This paper presents findings from questions related to information sources about nitrogen fertilizer application and seeks to explain what affects the use and evaluation of key information sources. In this section, we describe the measurement of all variables and the methodological approach, structural equation modeling (SEMLV) with latent variables using maximum likelihood estimation (Bollen 1989; Hoyle 2012). We use SAS 9.3 and AMOS 24 for our analyses.

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[2] For instance, both Rejesus et al. (2013) and Arbuckle et al. (2013) used NASS to conduct surveys in four and eleven states, respectively, with response rates of 23% and 20%. In a single county survey fielded in Indiana, Reimer and Prokopy (2014) report a survey response rate of 22%. Further, Stuart et al. (2012) report a response rate of 27% for a survey of farmers conducted using NASS services in 6 southwest Michigan counties.

[3] 75% of our sample farms less than 500 acres, which is smaller than the three-state average of 86% of farms that grow corn for grain.

[4] The interdisciplinary team included social scientists (economist, sociologists) and natural scientists (geologist and biogeochemist with extensive agronomic experience).

Dependent Variables: Information Sources, Perceptions of Influence and Value

We have three dependent variables in our empirical models. Our first dependent variable summarizes the number of information sources from which survey respondents reported having received information about nitrogen management. Questions related to information sources on nitrogen fertilizer application comprised a complete page of the questionnaire. Respondents were asked first about whether they receive information from seventeen different sources (e.g. relatives; friends, neighbors and other farmers; county extension; commodity group; crop consultant; fertilizer consultant; the Farm Service Agency; the Natural Resources Conservation Service; the Farm Bureau) and instructed to check all that apply. We combined the top seven information sources—fertilizer supplier, other farmers, friends, and neighbors, county extension/university specialist, independent crop consultant, farm magazines/media, seed suppliers, and online calculators—into a summary measure to make our first dependent variable. This additive scale ranges from 0 to 7, with higher values indicating that respondents receive materials and information from more of these information sources.

The second and third dependent variables are constructed from two follow-up questions on the survey that asked respondents for further details about each information source they had reported using related to 1) the likelihood of the source influencing their decisions about nitrogen application and 2) how much value they place on that source's views. The response scales for both questions ranged from 1=low influence or value to 5=high influence or value. We added the individual source scores together and averaged them, so higher scores reveal greater perceived influence and value in the seven information sources.

Independent Variables

Given expectations from previous research, we use measures of basic farming values (after Greiner et al. 2009), environmental views, and perceived local environmental water quality as latent constructs, and observed demographic characteristics as independent variables. Our model includes four latent constructs proposed to affect information sources used, including two measures of farming values—economic and stewardship ethics—as well as perceived local environmental water quality and the appropriateness of agrichemical use. A latent construct, also called a latent variable, is an unobserved variable that underlies the relationship between the multiple observed variables that are being used to measure it (Bollen 1989, 2002). To evaluate the fit of these latent constructs, we tested each of the four latent variables independently of one another using confirmatory factor analysis (CFA) or measurement models, a technique in SEMLV. CFA results provide fit statistics for each measure included in the latent variable and the overall fit or quality of the latent construct, both of which need to be examined to comprehensively assess the fit of the latent constructs and evaluate their appropriateness to use in the analysis.

'*Economic Values*' is a latent construct that includes six variables from survey items capturing the important motivations of being a farmer and managing their operation including (1) being among the best in the industry, (2) building up land and (3) wealth assets, (4) earnings, (5) finances, and (6) profit maximization. Fit statistics from the CFA indicate excellent fit of this latent construct (West et al. 2012). These empirical checks provide information regarding the validity and reliability of the individual measures (e.g. standardized factor loadings ranging from 0.72 to 0.93 and unstandardized loadings from 0.69 to 1.00, all significant). Overall model fit statistics are very good—the chi-square value is non-significant and values for the Incremental Fit Index (IFI), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) are 1.00. Values above 0.95 suggest very good to excellent fit for these measures (West et al. 2012). The Root Mean Square Error of Approximation (RMSEA) is 0.04 (CI=0.00, 0.09). For the RMSEA, values closer to zero are desirable and below 0.05 suggest very good fit.

The latent construct '*stewardship values*' includes four variables gauging values related to how important the items were to being a farmer and managing their operation. These survey items included (1) looking after the environment, (2) passing on the land in good condition, (3) minimizing environmental impacts, and (4) improving the condition of the land. As with economic values, CFA results and fit statistics indicate a very good fit of the latent construct *stewardship values*.[5]

A third latent construct, '*perceived appropriate use of agrichemicals*' includes three variables expressing farmers' opinions regarding a list of statements about intensive practices in modern farming and the use of chemical inputs (Arbuckle and Rosman 2014). Indicators include survey items on beliefs about the (1) over application of and (2) over dependence on fertilizer and (3) pesticides/agrichemicals in modern farming. Higher values reveal great disagreement with the individual items.[6]

'*Perceived local environmental water quality*' is a latent construct that includes four variables that ask survey respondents about how much of a problem they perceive each of these issues to be locally. The four survey items include nutrients in (1) surface waters and (2) groundwater, (3) hypoxia (dead zones) in surface waters, and (4) algal blooms in surface waters.

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[5] The standardized factor loadings for '*stewardship values*' range from 0.68 to 0.92 and unstandardized loadings from 0.83 to 1.00; all are significant. Overall model fit statistics are excellent—the chi-square value is non-significant, values for the IFI, CFI, and TLI are 1.00, and the RMSEA is 0.00 (CI=0.00, 0.14).

[6] The fit of this variable is good. For '*perceived appropriate use of agrichemicals*', the standardized factor loadings range from 0.67 to 0.95 and unstandardized loadings from 0.74 to 1.00; all are significant.

Higher values suggest greater concern with how these issues shape local water quality. As with the previous latent variables, CFA results and fit statistics indicate very good fit of the latent construct *perceived environmental quality*.[7]

In accordance with previous studies of farmer decision making, the models include measures of education, farming experience, age categories, and controls for farm size (see Baumgart-getz et al. 2012 for a review). Education is a dichotomous measure of whether farmers have an associate's, bachelor's degree or graduate degree (college=1). Farming experience is the number of years the respondent reported having been in farming. We created four age categories: 49 years and younger (reference), between 50 and 59 years, between 60 and 69 years of age, and 70 years or older. Farm size includes three categories: 499 acres or less (reference), 500 to 999 acres, and 1000 acres or more. Table 1 shows weighted descriptive statistics for the variables used in the SEMLV analyses. With regard to farm and farmer characteristics, the majority of respondents (61%) operate less than 500 acres. Our sample of respondents has been engaged in farming for an average of approximately 35 years. Two-thirds (66%) of our sample is between 50 and 69 years of age. Forty percent of our sample has attended college or has a college degree.

[TABLE 1: DESCRIPTIVE STATISTICS FOR VARIABLES USED IN SEMLV ANALYSES]

Results and Discussion

Results

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[7] The standardized and unstandardized factor loadings for '*perceived environmental quality*' range from 0.58 to 0.87 and from 0.73 to 1.00; all are significant. Overall fit statistics are very good—non-significant chi-square and values for the IFI, CFI, and TLI are 0.99, with an RMSEA of 0.06 (CI=0.00, 0.20).

Farmers receive information about nitrogen application from a number of sources. Figure 1 provides the weighted percentages of our sample reporting having used various information sources for nitrogen application rates for seven of the seventeen groups queried in our survey for 1) the full sample in the dark gray bars and 2) for large farms (i.e. those with more than 1000 acres). For the full sample, the most frequently reported nitrogen application information source were fertilizer suppliers, which were utilized by slightly more than two-thirds of our sample of respondents (70%). Following fertilizer suppliers were county extension/university specialist and independent crop consultants (both with 50%), other farmers, friends and neighbors (45%), farm magazines/media (43%), seed suppliers (37%), and online calculators (35%) to round out the top seven most used information sources. Farmers in our sample also reported having received information from farm cooperatives, contract applicators, and commodity groups (by 28%, 22%, and 20% respectively). Fewer than 2 in 10 survey respondents reported having received information from the other seven groups included in the survey questionnaire (E.g. relatives, Natural Resource Conservation Service, Farm Service Agency, Farm Bureau, landlords, lenders, and equipment dealers).

[FIGURE 1: INFORMATION SOURCES USED]

Most farmers receive information about nitrogen application from more than one source, as indicated by an average of 5.64 sources taking into account all seventeen sources (not shown) and 3.24 sources for the seven most frequently used information sources as noted in Table 1. This is consistent with prior work (Arbuckle and Rosman 2014) where the average Iowa corn farmer used 2.8 sources.

The lighter grey bars in Figure 1 provide parallel information for large farms, displaying the percentage of our sample operating more than 1,000 acres that reported using various information sources for nitrogen application rates, again showing the top seven of the seventeen sources. Consistent with the full sample, the most frequently reported information source was fertilizer suppliers at 75% of large operators. The patterning of information sources differed, however, for the next most frequently used sources. Following fertilizer consultants were independent crop consultants (64%), extension/university specialists (61%), online calculators (49%), farm magazines (46%), other farmers, friends and neighbors (45%), and seed suppliers (30%), to round out the top seven information sources, respectively. Farmers with large operations in our sample also reported having received information from the Natural Resource Conservation Service, farm cooperatives, commodity groups, contract applicators, the Farm Bureau, and relatives (by 26%, 25%, 24%, 23%, 21%, and 21% of survey respondents, respectively). Fewer than 2 in 10 survey respondents with large farms reported having received information from the other sources included in the survey questionnaire (e.g. Farm Service Agency, lenders, and equipment dealers). Most farmers in our sample with operations greater than 1,000 acres receive information about nitrogen application from more than one source, as indicated by averages of 6.11 sources and 3.71 sources for all seventeen and the seven most frequently used information sources, respectively. Compared with the full sample of survey respondents, farmers with large operations consult a greater number of information sources.

Given the complexity of nitrogen decision-making and that farmers report using multiple sources of information, we examine the top seven most consulted information sources regarding nitrogen fertilizer application in more detail, as they were reported by more than one-third of the survey respondents. Beyond the simple receipt of information, what perceptions do farmers have of these different information sources? Figure 2 provides detail regarding two questions about each information source that ask about 1) how likely the source is to influence survey respondents' decisions about application rates, and 2) how much value they place on that information source's views. The figure shows the percentage of respondents who reported using it indicating that the information source has a high influence on them in the first dark gray bar and that they highly value it in the second light gray bar, both defined as two responses (4&5 where 5=high influence or high value) on the influence and value scale respectively. Many farmers in our sample report having used sources that they both perceived as influential *and* that they valued.

Of the seven sources, four in particular stand out in terms of how survey respondents perceive the source's influence and value to guiding their nitrogen management. More than 50% of survey respondents indicated that fertilizer suppliers, county extension/university specialists, independent crop consultants, and seed suppliers are information sources that are both highly likely to influence their decision and are groups whose views they highly value. In other words, these are trusted information sources held in high regard. Online calculators were highly values sources, but did not have similar percentages of respondents indicating they would have a high likelihood of influencing their fertilizer management decisions. Farm magazines and media had similar percentages of respondents reporting high influence and value in shaping fertilizer decision-making. Rounding out the top seven, other farmers, friends, and neighbors were valued information sources with lower percentages of respondents indicating they would have a high likelihood of influencing their fertilizer management decisions.

[FIGURE 2: INFORMATION SOURCES PERCEIVED INFLUENCE & VALUE]

We next investigate what factors affect information source selection. Given expectations from previous research (Baumgart-get et al. 2012; Reimer et al. 2012), we examine the role of perceptions of farming and environmental quality, experience in farming, and education, and include relevant controls for age groups and farm size.

Table 2 shows the results of our first model that predicts the number of information sources used. Having a college education led to an increase in the number of sources used by 0.416 units on the seven point scale. For each additional year in farming, farmers used fewer information sources. Our model explains about 5 percent of the variation in the number of information sources consulted by farmers in our sample.

[TABLE 2: RESULTS OF SEMLV ANALYSES FOR INFORMATION SOURCES]

Table 3 shows the results of SEMLV analyses of the likely influence of the seven information sources in the columns to the left and the valuing of the set of seven information sources used on the right. Regarding whether the source is likely to influence their nutrient management, results reveal two variables with significant effects: having a college education and years of experience in farming. For the degree of influence, results reveal that having some college (including a degree) increases the perceived influence of the sources used by 0.250 units. For each additional year of farming experience, there is a 0.019 unit decrease on the influence of information sources. A farmer with average farming experience (i.e. 34.86 years) will be influenced by the information sources he/she uses 0.662 units less than a farmer with no years of experience. For how much a farmer values information sources, we find that having a college education increases the value of the sources used by 0.363 units. As farmers gain experience as farmers, there is a 0.014 unit decrease on the influence of information sources for each additional year of farming experience. Our models explain 15 and 13 percent of the variation in the likely influence of and value placed on information from the seven most frequently used information sources reported by farmers in our sample.

[TABLE 3: RESULTS OF SEMLV ANALYSES FOR PERCEIVED INFLUENCE AND VALUE]

Discussion

Farmers are consulting multiple sources of information for on-farm nutrient management decisions. Like prior work, our results reveal that farmers commonly use multiple information sources about nitrogen fertilizer application (Arbuckle and Rosman 2014). Our exploratory analyses reveal that farmers with a college education use more information sources and those with more farming experience use fewer sources. The significance of using more sources of information has not been widely studied. The effect of education could suggest that relying on more information sources reflects a higher level of information seeking propensity instilled during college. Farmers who receive information from multiple sources may also be more likely to innovate or try new practices than farmers who rely on fewer information sources; the goal of this innovation (conservation or production) may depend on the number of sources from a particular sector (e.g. private vs. public) (Mase et al. 2015). Using multiple sources of information may also be a way for farmers to confirm or check recommendations against each other to determine what might work best in their operation. Many biophysical and climatic variables influence nitrogen cycling within farming systems (Robertson and Vitousek 2009) and recommendations may not always offer information that fits their particular farm setting, opening a pathway for farmer's personal experience to fill a critical gap and provide an important baseline for decision making. Additional years of experience farming the same land can build a vital knowledge base with the potential to inform future management choices in a cumulative fashion. In an increasingly information-rich environment, farmers must be selective, yet intensive information consumers. Future studies should explore the potential effects of using multiple information sources on nitrogen management behavior in greater depth.

How farmers perceive different information sources and whether this shapes their choices about fertilizer application rate, timing, method, and product (i.e. the 4Rs) is an area to be explored in future studies. For instance, although our analyses reveal a large difference between the influence and value of seed suppliers, online nitrogen calculators, and other farmers as information sources, precisely why this is the case is unclear from the survey data. We do find that information sources are perceived as less important or influential the more experience a farmer has to draw on, suggesting that over time farmers may replace outside information sources with their own experiences when making nitrogen fertilizer decisions. This is in line with prior work, as Arbuckle and Rosman (2014) also found that a majority (58%) of Iowa farmers relied at least in part on their own experiences when determining application rates. The positive influence of college education on the perceived influence and valuing of information sources may suggest that these farmers are more able to recognize and appreciate the knowledge of others, specifically the value and applicability of their information, even if they choose not to act on it.

Farm size and farmer age appear to have little influence on this aspect of decision making, while education and experience do influence how farmers seek out and use information from various channels. However, farmer attitudes and values were not revealed to affect information use, in contrast with prior work where stewardship values and attitudes have been positively linked with farmer conservation behavior in a number of studies (Baumgart-Getz et al. 2012; Reimer et al. 2012). Greiner et al. (2009) found a link between stewardship values and risk perceptions of various conservation practices, indicating that farmers with higher levels of stewardship attitudes view conservation practices as assisting in on-farm risk management. Whether farmers with high stewardship attitudes specifically seek out information from extension services on conservation aspects of nitrogen management, as extension is one of the most trusted sources for such information (Mase et al. 2015), remains a topic ripe for future study.

Recent literature suggests that in the context of increasingly available choices regarding information, trust is increasingly recognized as an important component of how people select information sources (Luloff et al. 2012; Mase et al. 2015). Our included variables gauging farmers' perceptions of the influence and value of seven information sources may approximate farmers' trust in these sources. Some information sources, like other farmers, seed suppliers and online nitrogen calculators, were perceived by farmers as having a low influence on their fertilizer application rates but their views were highly valued. Although lower on both measures, farmers in our sample had similar perceptions of other farmers as an information source, having low influence on application rates but highly valued views. High perceived influence *and* value could equate to or be a result of 'trusting' a source, though future work should specifically examine the role trust plays in information source selection and actual influence on practices.

Our exploratory models explain some of the variation in farmer choice of information sources, up to 15 percent of perceived influence of seven information sources, so gaps in our understanding of what affects information use remain. At the farm scale, additional variables to examine include resources like available equipment, recent equipment purchases with technological enhancements, and whether they hire outside assistance (e.g. consultants or contractors) for fertilizer recommendations or application. Further, although our list of seventeen sources was extensive, it was not exhaustive and did not consider geographic variation in information availability. As an example, our category of extension can be further broken into county or regional extension educators and university campus-based extension faculty. Also, it may be the case that not all counties in the Corn Belt are serviced by the same set or number of agricultural input retailers, thus suggesting differences in potential sources individual farmers have available to readily consult. The agricultural retail industry is diverse, ranging from small, independent service providers to national corporate retailers. Some provide crop consultancy or retail services only, while others provide a wide range of services and product sales. Retailers and service providers also often employ people in different roles, from sales to services that include personalized fertilizer recommendations.

Given this diversity and complexity of information sources and service providers, researchers should craft survey questions that clearly distinguish between different types of information sources, including public and private, differentiating crop consultants into independent and corporate affiliates, and based on their tenure of influence in nutrient management decision-making. Categorizing information sources in two groups—public and private—and examining the intensity and perception of them is important for future work. Public sector information sources include university researchers and extension services, while private sector sources include fertilizer dealers and other agricultural retailers as well as certified crop advisors (Prokopy et al. 2015). Precision in identifying information sources is important, though it may be difficult to achieve. As an example, our survey included both “my independent crop consultant” and “my fertilizer consultant/supplier” as potential sources of information. It is possible that respondents could conflate independent and corporate crop consultants, the latter of which work for an integrated agricultural retailer. In addition, while many retailers offer both fertilizer sales and recommendation services, they are often provided by different employees with different professional backgrounds and certifications. One recommendation for future research in this area is to disentangle fertilizer consultants—both corporate and independent—from fertilizer sales dealers and to be as specific as possible when crafting survey questionnaires.

Summary and Conclusions

A growing body of scholarship describes the information sources farmers use to shape on-farm decisions. Our study contributes to this literature by exploring the information sources farmers used for nitrogen management decisions, their perceptions of these information sources, and the role of individual factors that affect which sources farmers used to inform their management decisions. Our analyses offer three suggestions for future study. First, most farmers in our sample use multiple information sources—more than three different sources (of the top seven) for the full sample, and farmers with large operations using more sources. Second, farmer education positively affected the number of sources used while farming experience had an inverse relation with consulting information sources. However, farmers do differ in their perception of these different sources, holding some in higher regard than others with respect to their likelihood of shaping nutrient management decisions. Third, three sources in particular—fertilizer dealers, seed suppliers, and extension/university specialists—stand out in the degree to which farmers both value their recommendations and find them to be influential in making their management decisions. Our empirical analyses suggest that education and years of experience in farming are key factors that shape the use of multiple information sources, the intensity of information gathering, and the perception of the influence and value of information sources.

These findings points to at least four promising avenues for future work seeking to understand farmers' on-farm decisions in greater depth related to nutrient management. First, how can we develop a deeper understanding of how farmers decide which information sources to consult for fertilizer recommendations? As we noted above, trust is increasingly considered an important factor in information source selection. Specific exploration of trust in information source use—how it is gained, what is means to farmers, and its influence in farmers' actual likelihood in following provided recommendations—may prove fruitful in efforts to understand information source selection and utilization in decisions. Qualitative analyses like interviews or focus groups would allow for such probing questions that are not able to be incorporated into a survey like the one used in this study. Second, what role does the selection of multiple information sources play in shaping farmers' rate or frequency of nitrogen fertilizer application? How frequently do farmers receive information about nutrient management? Third, does the selection of information from a certain set of sources—e.g. public over private or vice versa—affect the likelihood of farmers developing policy preferences related to nutrient best management practices (e.g. attitudes towards the Iowa Nutrient Reduction Strategy)? Finally, how should researchers account for geographic variability in information availability and source selection, and how does this spatial component shape farmers' decisions about nutrient management? As information sources may motivate or discourage farmers from adopting nitrogen best management practices, a greater understanding of how and why they are used by farmers may provide insights important to outreach efforts encouraging efficient nitrogen fertilizer use. Future research should continue to delve into these relations to provide a richer description of the complexities farmers face as they make nutrient management decisions.

Ethical approval: "All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standard

References

Arbuckle, J.G., and H. Rosman. 2014. Iowa farmers' nitrogen management practices and perspectives. Iowa State University Extension and Outreach. Extension Report PM3066.

Arbuckle, J.G., L.S. Prokopy, J. Hobbs, T. Knoot, C. Knutson, and A. Loy 2013. Climate change beliefs, concerns, and attitudes toward adaptation and mitigation among farmers in the Midwestern United States. Climatic change 117:943-950.

Baumgart-Getz, A., L. S. Prokopy, and K. Floress. 2012. Why farmers adopt best management practice in the United States: a meta-analysis of the adoption literature. Journal of environmental management, 96(1):17-25.

Bollen, K. 1989. Structural equations with latent variables. Wiley, New York, New York, USA.

Bollen, K. A. 2002. Latent variables in psychology and the social sciences. Annual Review of Psychology 53: 605–34.

Daberkow, Stan G., and William D. McBride. 1998. Socioeconomic profiles of early adopters of precision agriculture technologies. Journal of Agribusiness 16:151-168.

Davidson E.A., M.B. David, J.N. Galloway, C.L. Goodale, R. Haeuber, J.A. Harrison, R.W. Howarth, D.B. Jaynes, R.R. Lowrance, and B.T. Nolan. 2012. Excess nitrogen in the U.S. environment: trends, risks, and solutions. ESA Issues Ecology 15:1–16.

Davidson, E.A., E.C. Suddick, C.W. Rice, and L.S. Prokopy. 2015. More food, low pollution (Mo Fo Lo Po): A grand challenge for the 21st century. Journal of Environmental Quality 44(2):305-311.

Dillman, D. A., Smyth, J.D., and Christian, L.M. 2014. Internet, mail and mixed-mode surveys: The tailored design method, 4th Edition. John Wiley, Hoboken, NJ.

Edge, B., M. Velandia, D. Lambert, et al. 2017. Changes in the use of precision farming information sources among cotton farmers and implications for Extension. Journal of Extension 55. Available at: https://www.joe.org/joe/2017april/rb2.php

Greiner, R., L. Patterson, and O. Miller. 2009. Motivations, risk perceptions and adoption of conservation practices by farmers. Agricultural Systems 99:86-104.

Haigh, T., L.W. Morton, M.C. Lemos, C. Knutson, L.S. Prokopy, Y.J. Lo, and J. Angel. 2015. Agricultural advisors as climate information intermediaries: exploring differences in capacity to communicate climate. Weather, Climate, and Society 7(1):83-93.

Hoag, D.L.K., I. Chaubey J. Popp M. Gitau L. Chiang J. Pennington G. Rodriguez E. Gbur M. Nelson, and A.N. Sharpley. 2012a. Lincoln Lake Watershed, Arkansas: National Institute of Food and Agriculture–Conservation Effects Assessment Project. In: How to build better agricultural conservation programs to protect water quality: The National Institute of Food and Agriculture-Conservation Effects Assessment Project experience, ed. Osmond et al., 171–186. Soil and Water Conservation Society, Ankeny, IA.

Hoag, D., A. Luloff, and D. Osmond. 2012b. Socioeconomic analysis: National Institute of Food and Agriculture–Conservation Effects Assessment Project. In: How to build better agricultural conservation programs to protect water quality: The National Institute of Food and Agriculture-Conservation Effects Assessment Project experience, ed. Osmond et al., 120–137. Soil and Water Conservation Society, Ankeny, IA.

[IFA] International Fertilizer Industry Association. 2009. The global "4R" nutrient stewardship framework: developing fertilizer best management practices for delivering economic, social and environmental benefits. Drafted by the IFA Task Force on Fertilizer Best Management Practices, Paris, France.

Johnston, A.M. and T.W. Bruulsema. 2014. 4R nutrient stewardship for improved nutrient use efficiency. Procedia Engineering 83:365-370.

Lawley, C., E. Lichenberg, and D. Parker. 2009. Biases in nutrient management planning. Land economics 85(1):186-200.

Luloff, A.E., D.L.K. Hoag, D.L. Osmond, B.R. Woods, J.S. Gordon, J. Gruver, K. Roka C.M. Raboanarielina, C. Longmire, M. Ward, and J.L. Weigle. 2012. Key informant survey to understand what farmers, agency personnel, and stakeholders think: National Institute of Food and Agriculture–Conservation Effects Assessment Project. In: How to build better agricultural conservation programs to protect water quality: The National Institute of Food and Agriculture-Conservation Effects Assessment Project experience, ed. Osmond et al., 12–35. Soil and Water Conservation Society, Ankeny, IA.

Mase, A.S., N.L. Babin, L.S. Prokopy, and K.D. Genskow. 2015. Trust in sources of soil and water quality information: implications for environmental outreach and education. Journal of the American Water Resources Association 51(6):1656-1666.

McBride, W.D., and S.G. Daberkow. 2003. Information and the adoption of precision farming technologies. Journal of Agribusiness 21:21-38.

Mills, J., P. Gaskell, J. Ingram, J. Dwyer, M. Reed, and C. Short. 2016. Engaging farmers in environmental management through a better understanding of behaviour. Agriculture and Human Values 34:283–299.

[NASS] United States Department of Agriculture National Agricultural Statistics Service (2015) Agricultural Statistics 2015. United States Government Printing Office: Washington. Retrieved at: https://www.nass.usda.gov/Publications/Ag_Statistics/2015/Ag_Stats_2015_complete%20publication.pdf

Nelson, L. B. 1990. History of the US fertilizer industry. Tennessee Valley Authority.

Osmond, D.L., D.L.K. Hoag, A.E. Lulo , D.W. Meals, and K. Neas. 2015. Farmers' use of nutrient management: Lessons from watershed case studies. Journal of Environmental Quality 44:382–390.

Prokopy, L.S., J.S. Carlton, J.G. Arbuckle Jr., T. Haigh, M.C. Lemos, A.S. Mase, N. Babin, M. Dunn, J. Andresen, J. Angel, C. Hart, and R. Power. 2015. Extension's role in disseminating information about climate change to agricultural stakeholders. Climatic Change 130(2): 261-272.

Reimer, A.P., and L.S. Prokopy. 2014. Farmer participation in US Farm Bill conservation programs. Environmental management 53(2):318-332.

Reimer, A.P., A.W. Thompson, and L.S. Prokopy. 2012. The multi-dimensional nature of environmental attitudes among farmers in Indiana: Implications for conservation adoption. Agriculture and human values, 29(1), 29-40.

Rejesus, R.M., M.M. Hensley, l.D. Mitchell, K.H. Coble, and T.O. Knight. 2013. U.S. agricultural producer perceptions of climate change. Journal of Agricultural and Applied Economics 45(4):701-718.

Ribaudo M., J.A. Delgado, L. Hansen, M. Livingston, R. Mosheim, and J. Williamson. 2011. Nitrogen in agricultural systems: implications for conservation policy. U.S. Department of Agriculture, Economic Research Service. Washington, D.C., USA.

Robertson, G.P., and P.M. Vitousek. 2009. Nitrogen in agriculture: balancing the cost of an essential resource. Annual Review of Environment and Resources 34:97-125.

Robertson, G.P., and S.M. Swinton. 2005. Reconciling agricultural productivity and environmental integrity: a grand challenge for agriculture. Frontiers in Ecology and Environment 3(1):38-46.

Siegrist, M., and G. Cvetkovich. 2000. Perception of hazards: The role of social trust and knowledge. Risk Analysis 20(5):713-720.

Smil, V. 2002. Nitrogen and food production: Proteins for human diets. Ambio 31:126-131.

Stuart D., R.L. Schewe, and M. McDermott. 2012. Responding to climate change: barriers to reflexive modernization in US agriculture. Organization and Environment 25:308-327.

Stuart, D., R.L. Schewe, and M. McDermott. 2014. Reducing nitrogen fertilizer application as a climate change mitigation strategy: understanding farmer decision-making and potential barriers to change in the US. Land Use Policy 36:210 –218.

[USDA] United State Department of Agriculture National Agricultural Statistics Service. 2014. 2012 Census of Agriculture. Retrieved at http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf

Vollmer-Sanders, C., A. Allman, D. Busdeker, L.B. Moody, and W.G. Stanley. 2016. Building partnerships to scale up conservation: 4R nutrient stewardship certification program in the Lake Erie watershed. Journal of Great Lakes Research 42(6):1395-1402.

Weber, C., and L. McCann. 2015. Adoption of nitrogen-efficient technologies by US corn farmers. Journal of Environmental Quality 44:391-401.

West, S., A. Taylor, and W. Wu. 2012. Model fit and model selection in structural equation modeling. In Handbook of Structural Equation Modeling, ed. Rick H. Hoyle, 209-231. New York, NY: Guilford Press.

TABLES AND FIGURES:

Figure 1
Percentage of Information Sources used for nitrogen fertilizer application by full sample of farmers (Data Source: Authors' Survey 2014)

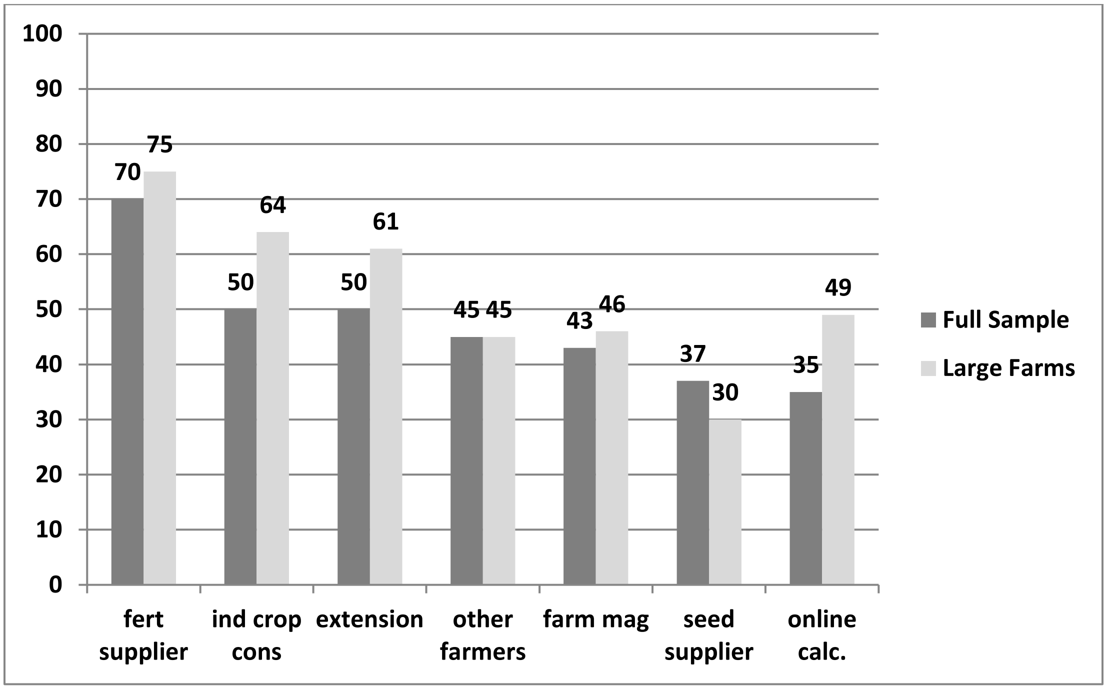

Figure 2
Perceptions of Influence and Value in Seven Information Sources Used for Nitrogen Fertilizer Application (Data Source: Authors' Survey 2014)

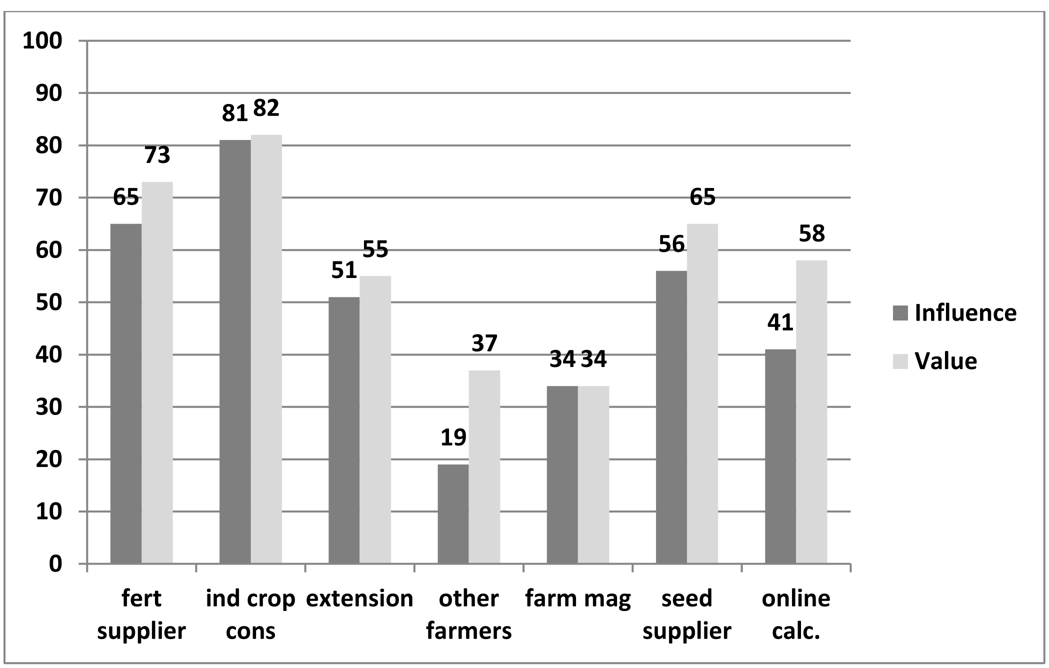

Table 1

Descriptive Statistics for Variables in Model (n=260)

	Mean	Std dev	Range Min	Range Max
Key N Information Sources	3.29	2.14	0	7
Perceived Influence of Key N Information Sources	1.39	0.91	0	3.71
Perceived Value of Key N Information Sources	1.37	1.01	0	3.86
<u>*Importance of Economic Values*</u>	7.74	2.02	1	10
Build up the land and property assets.	8.37	1.95	1	10
Build up wealth and family assets.	7.39	2.26	1	10
Be among the best in the industry.	7.27	2.59	1	10
Earn a high income.	7.39	2.25	1	10
Have lots of money to spend.	5.92	2.62	1	10
Maximize farm/company profit.	8.35	1.96	1	10
<u>*Importance of Stewardship Values*</u>	8.52	1.42	1	10
Minimize environmental impacts.	8.33	1.57	1	10
Improve resource/land condition.	8.59	1.63	1	10
Pass on land in good condition.	8.91	1.63	1	10
Look after the environment.	8.50	1.54	1	10
Perceived Appropriate Use of Agrichemicals	2.62	0.77	1	5
Modern farming relies too heavily upon fertilizers.	3.53	1.26	1	5
Modern farming relies too heavily upon insecticides,…	3.47	1.31	1	5
Farmers often apply too much fertilizer.	3.45	1.34	1	5
<u>*Perceived Local Water Environmental Quality*</u>	1.80	0.81	1	5
Nutrients in surface waters.	2.60	1.12	1	5
Nutrients in groundwater.	2.40	1.22	1	5
Algal blooms in surface waters.	2.24	1.23	1	5
Hypoxia (dead zones) in surface waters.	1.85	1.23	1	5
<u>*Individual Characteristics*</u>				
Years in farming	34.86	12.11	2	69
Education (college degree or some college)	0.40	0.62	0	1
Age Category 1: less than 49 years (reference)	0.21	0.43	0	1
Age Category 2: 50 to 59 years	0.29	0.54	0	1
Age Category 3: 60 to 69 years	0.37	0.65	0	1
Age Category 4: 70 or more years	0.13	0.32	0	1
Farm Size 1-499 acres (reference)	0.61	0.34	0	1
Farm Size 500-999 acres	0.09	0.40	0	1
Farm Size 1000 or more acres	0.30	0.74	0	1

† For all variables included in the analyses, n=260. For the variables included in the latent measures of economic and stewardship values, the responses range from 1=not at all important to 10=extremely important. For the three variables in views of agricultural practices, response scales ranged from 1= strongly disagree to 5=strongly agree; items are rescaled so higher responses show greater *disagreement* with each statement. For the four variables included in perceived local environmental quality, the scale ranges from 1=not a problem to 5=critical problem.

Table 2
Predicting Number of Information Sources Used: Maximum Likelihood Coefficients from SEMLV (n=260)

	Unstd coeffs (std errors)	Std coeffs
Farming Values		
Economic Identity	-0.008	-0.019
	(0.113)	
Land Ethic/Stewardship Identity	0.136	0.326
	(0.160)	
Environmental Perceptions		
Perceived Appropriate Use of Agrichemicals	0.043	0.049
	(0.153)	
Perceived Local Water Quality	0.043	0.032
	(0.158)	
Individual Characteristics		
College Education	0.528*	0.149
	(0.271)	
Years in Farming	-0.031*	-0.359
	(0.017)	
Age Category 1 (ref.)	…	…
	…	
Age Category 2	0.079	0.019
	(0.422)	
Age Category 3	0.069	0.020
	(0.505)	
Age Category 4	0.345	0.050
	(0.703)	
Farm Size Controls		
Farm Size 499 acres and below (ref.)	…	…
	…	
Farm Size between 500 and 999 acres	-0.108	-0.020
	(0.564)	
Farm Size 1000 acres and greater	-0.091	-0.019
	(0.535)	
Adjusted R-Squared	0.06	
Chi-square	720.94	
p	0.00	
RMSEA	0.09	
IFI &CFI	0.95	

Notes: Table includes unstandardized coefficients and standard errors in parentheses.
*p < .10, **p < .05 (two-tailed)

Table 3
Likely Influence of and Valuing 7 Information Sources: Maximum Likelihood Coefficients from SEMLV (n=260)

	Influence of Information Sources		*Valuing Information Sources*	
	Unstd coeffs (std errors)	Std coeffs	Unstd coeffs (std errors)	Std coeffs
Farming Values				
Economic Identity	0.058 (0.044)	0.335	0.061 (0.049)	0.318
Land Ethic/Stewardship Identity	0.029 (0.063)	0.169	0.034 (0.070)	0.178
Environmental Perceptions				
Perceived Appropriate Use of Agrichemicals	0.070 (0.060)	0.195	0.048 (0.067)	0.123
Perceived Local Water Quality	0.008 (0.062)	0.015	0.013 (0.069)	0.021
Individual Characteristics				
College Education	0.267** (0.106)	0.182	0.363** (0.118)	0.224
Years in Farming	-0.019** (0.007)	-0.524	-0.014* (0.008)	-0.363
Age Category 1 (ref.)	… …	…	… …	…
Age Category 2	0.166 (0.1166	0.098	-0.011 (0.184)	-0.006
Age Category 3	0.165 (0.198)	0.118	-0.083 (0.221)	-0.053
Age Category 4	-0.037 (0.276)	-0.013	-0.148 (0.308)	-0.047
Farm Size Controls				
Farm Size 499 acres and below (ref.)	… …	…	… …	…
Farm Size between 500 and 999 acres	-0.066 (0.221)	-0.029	-0.048 (0.246)	-0.019
Farm Size 1000 acres and greater	-0.290 (0.210)	-0.234	-0.306 (0.234)	-0.224
Adjusted R Squared	0.15		0.13	
Chi-square	728.91		720.93	
p	0.00		0.00	
RMSEA	0.09		0.09	
IFI &CFI	0.95		0.95	

Notes: Table includes unstandardized coefficients and standard errors in parentheses.

*p < .10, **p < .05 (two-tailed)