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2014 Nutrient Management Survey-Executive Summary

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2014 Indiana Nutrient Management Survey
Executive Summary

This report summarizes key findings from a mail survey of agricultural landowners and producers in Indiana conducted in early 2014 about awareness of soil and water health and usage of nutrient management practices. We present the methods used to conduct the survey, overall key findings, and key findings by farm size, livestock ownership, land tenure, crop reporting district, and absentee landowners.

Survey Methods

The data presented here comes from a mail survey conducted by the Natural Resources Social Science Lab at Purdue University during the winter of 2014. Questions included on the survey focused on respondents' background, characteristics of the farms they rent out or own, relationships between landowners and tenants, awareness and use of nutrient best management practices (BMPs), awareness of different pollutants, and use of and trust in information sources regarding BMPs. The information was gathered to help agricultural organizations in Indiana develop a statewide, non-regulatory strategy for increasing soil health and nutrient use efficiency.

A Freedom of Information Act (FOIA) request was made to the Farm Service Agency on November 18, 2013, requesting the names and addresses of all owners or renters of Indiana farmland who had received FSA payments in the year 2012. The resulting database contained 78,459 names and addresses. All out-of-state addresses were eliminated and the resulting database was cleaned by removing all duplicates, trusts, non-farm businesses, clubs, churches, estates, organizations, partnerships, and university related addresses. A random number generator was used to create a list of nearly 2,600 landowners and producers in Indiana. The Dillman (2000)[1] Tailored Design Method was used with to contact those on the list up to five times (advance letter, 1st mailing of paper survey, reminder postcard, 2nd mailing of paper survey, 3rd mailing of a paper survey with a reminder postcard) which achieved a response rate of 51.8% (n=1,341). Instructions asked for the survey to be completed by the person in each household who makes the most land management decisions and is at least 18 years old. The survey was structured in such a way that both landowners and producers could complete a portion of it. Skip logic directed those who owned land that they rented to others and those who rented land from others to answer additional questions.

Most of the data presented in this report comes from the survey described above. However, an additional similar survey was also conducted with owners of farmland in Indiana who do not live in Indiana. Using the same FOIA request, all Indiana addresses were eliminated and the resulting list was cleaned by removing all duplicates, trusts, non-farm businesses, clubs, churches, estates, organizations, partnerships, and university-related addresses. This resulted in 5,284 out-of-state addresses. A random number generator was then used to select 925 owners of Indiana farmland residing outside of the state. Again, the Dillman Tailored Design Method was used to contact potential respondents, with instructions asking for the survey to be completed by the person at each address who makes the most land management decisions and is over 18 years old. A total of 246 surveys were returned providing a response rate of 34.0% (n=246). Survey questions included absentee landowners' demographics, characteristics of their farms, relationships with tenants, land management decision-making processes, and attitudes towards and adoption of various conservation practices. The last section of this report contains results from this survey of absentee landowners in Indiana.

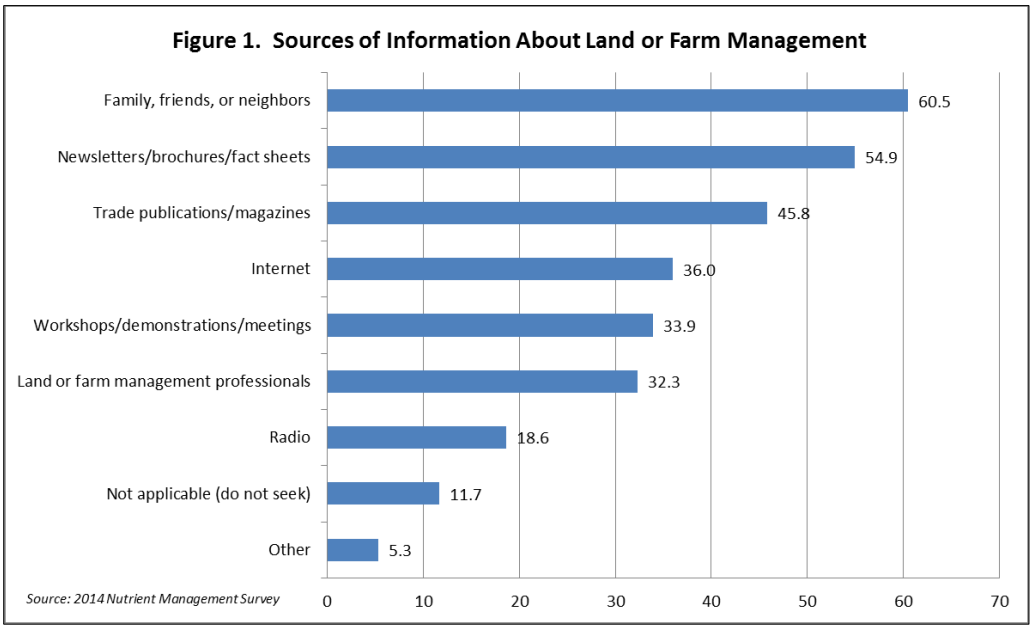
[1] Dillman, D.A., 2000. Mail and Internet Surveys: The Tailored Design Method, 2nd edition. John Wiley Co., New York.

The key findings from the survey are below:

Overall Key Findings[2]

Characteristics of Agricultural Landowners/Producers and their Farms

- A total of 1,341 agricultural landowners and producers responded to the survey ranging in age from 21 to 97 years (average=62).
- 80% of the respondents were male, and 20% were female.
- 31% earned a bachelor's degree or higher, including 13% with post-graduate degrees.
- The average acreage owned by respondents was 331 acres, and ranged from 0 to 16,100 acres.
- The most common source of information for respondents regarding land or farm management was family, friends, or neighbors (61%) (see Figure 1). Many also said they get information from newsletters, brochures, and fact sheets (55%) or from trade publications and magazines (46%). Respondents were the least likely to get information from the radio (19%).
- The greatest number of respondents planted corn and soybeans on the land they managed or had beef cattle as part of their farming operation.
- If respondents were agricultural producers, they had been farming for 32 years on average.
- 65% of agricultural producers managed property that touched a stream, river, lake, or wetland.
- One out of every ten producers had an IDEM CFO approval or a CAFO permit.
- 18% of the agricultural producers were certified as a "distributor and user of fertilizer materials" by the Office of the Indiana State Chemist.
- About half (48%) of the agricultural producers surveyed worked off-farm in the last year.
- 30% of the operators surveyed considered themselves retired or partially retired.

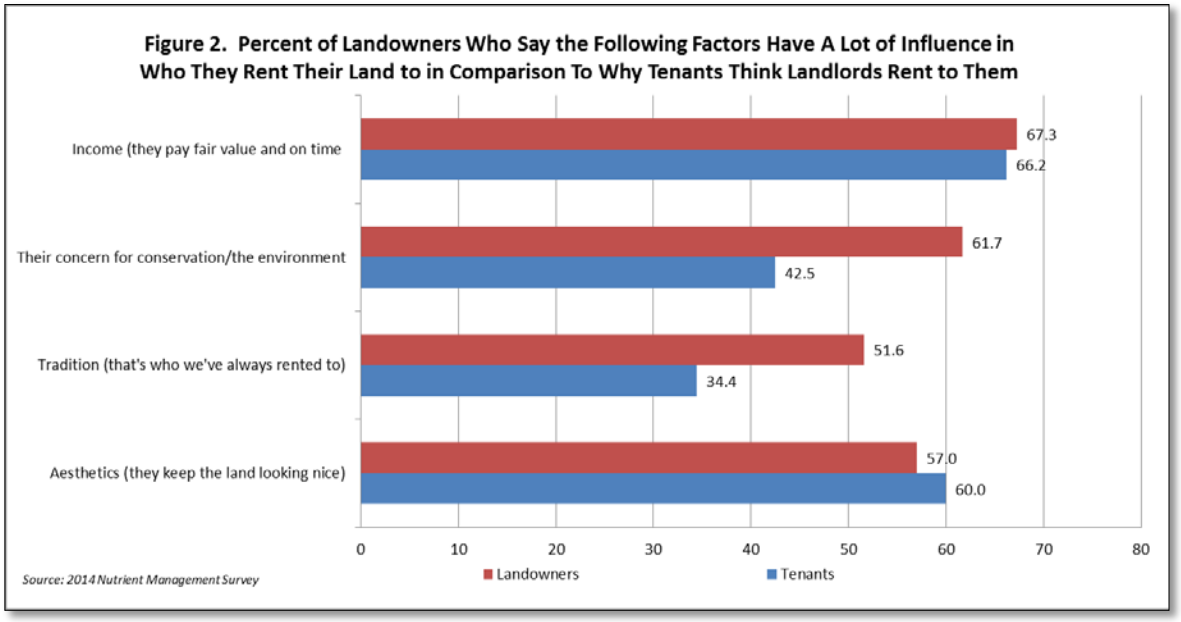


Land Ownership and Tenure

- About half (45%) of respondents own land that they rent to others, with 169 acres being the average amount of land rented out.

[2] See Appendix I for a report of responses to all questions from all survey respondents.

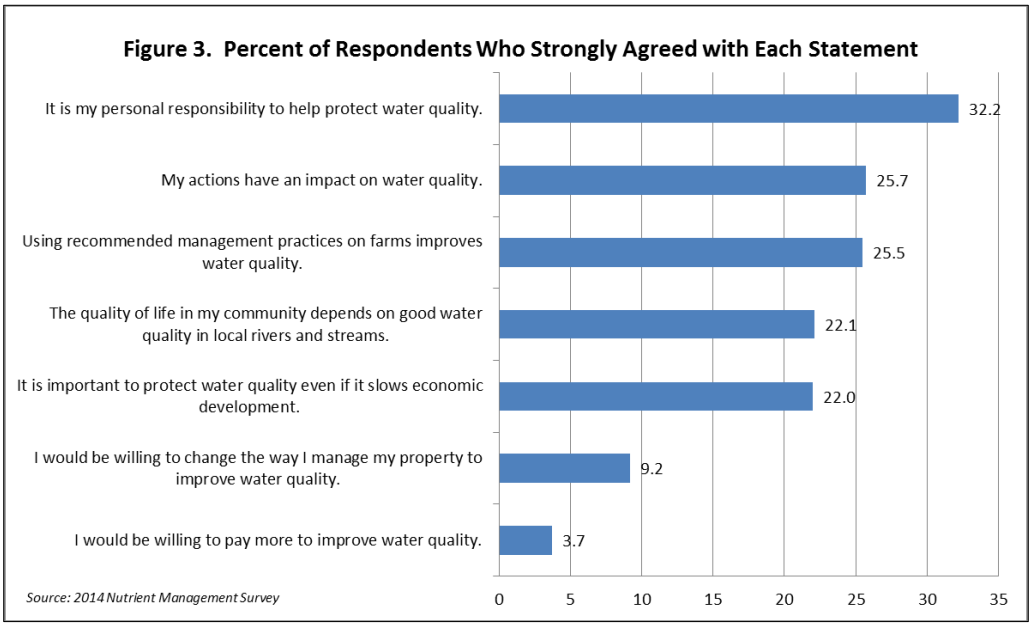
- The most important factor influencing who landowners rented to was income (e.g., they pay a fair value and on time), while the least important factor was tradition (e.g., who they have always rented to (see Figure 2).
- The majority (62%) earned 20% or less of their income from renting land. Only 4% of respondents had greater than 80% of their income from renting land.
- In terms of decision-making on the land that they rent out, landowners said that tenants generally are the primary decision makers about the agricultural practices they used, with the exception of the installation of structures, where landowners and tenants most often share responsibility in decision making.
- About half of the respondents also rented farmland from someone else (52%). The average amount of acres rented out is 818 from an average of 7 landlords.
- Most tenants were renting their largest pieces of farmland from former farmers (32%) or inheritors of farmland (29%) to whom they were often related (31%). The average length of tenancy is 15 years.
- Tenants also agree that they make the majority of decisions about practices on the land they rent, however, they see themselves as having more responsibility than owners.
- Like landowners, tenants thought income was the most important factor in their landlord's decision to rent to them and tradition the least (see Figure 2). Tenants were less likely to say that they thought their concern for the environment and tradition were important than landowners.
- A majority (70%) of tenants had written or verbal cash rent agreements with their landowners, while 23% had crop share agreements.



Views on Water Quality and Impairments

- While 32% of respondents strongly agreed that it is their responsibility to help protect water quality, only 4% strongly agreed that they would be willing to pay more and only 9% said they would be willing to change the water they managed their property to improve water quality (see Figure 3).
- Many respondents *did not* see specific water pollutants as problems in the areas where they rent or own farmland. 45% did not see bacteria (e.g., E. coli), 34% did not see phosphorus, 31% did not see nitrates, and 31% did not see sedimentation/silt as problems in their area.

- A high percentage also said they *didn't know* whether certain pollutants are problems in their area. 14-25% didn't know if bacteria (e.g., E. coli), phosphorus, nitrates, or sedimentation/silt are problems where they rent or own farmland.
- In a list of sources of water pollution across the country, the highest percentage of respondents saw littering or the illegal dumping of trash (12%) and urban stormwater runoff (9%) as severe problems where they lived. Respondents were much less likely to see agricultural-related sources of pollution as severe problems. Less than 3% saw fertilizers or manure used for crop production, pesticides or herbicides used for crop production, animal feeding operations, and manure from farm animals as severe problems in the area that they rent or own farmland.



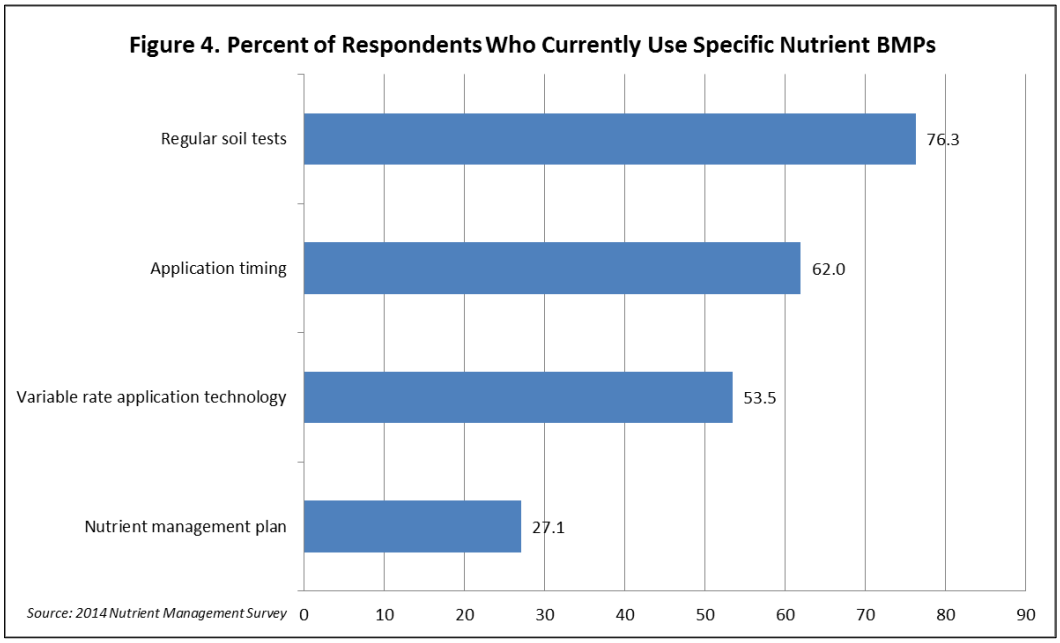
Usage of Best Management Practices (BMPs)

- With regards to those who grow crops or hay, the highest percentage currently used conservation crop rotations (75%), while the lowest percentage used cover crops (42%). More than half used the remaining BMPs including limited or targeted fertilizer application, conservation tillage, and vegetated buffers.
- Most respondents had heard of the practices. The highest percentage of respondents had "never heard of" the Indiana State Chemist fertilizer applicator licensing (16%) and the 4R Nutrient Stewardship model (11%).
- Most were familiar with the BMPs of conservation tillage, crop rotations, and cover crops.
- In terms of those with livestock, the highest percentage had considered location and soil characteristics as a method to minimize leaching or runoff of manure (66%), while only 26% had constructed a waste storage facility to address manure issues. From 36% to 48% had used other BMPs such as timed application of manure, precision manure application, diversion of surface water from feedlots, or composting manure before application. Again, most respondents had heard of the practices.

Nutrient Management

- In terms of specific nutrient management practices, the highest percentage of survey respondents currently used regular soil tests (76%), while fewer used application timing (62%), variable rate application technology (54%), or nutrient management plans (27%) (see Figure 4).

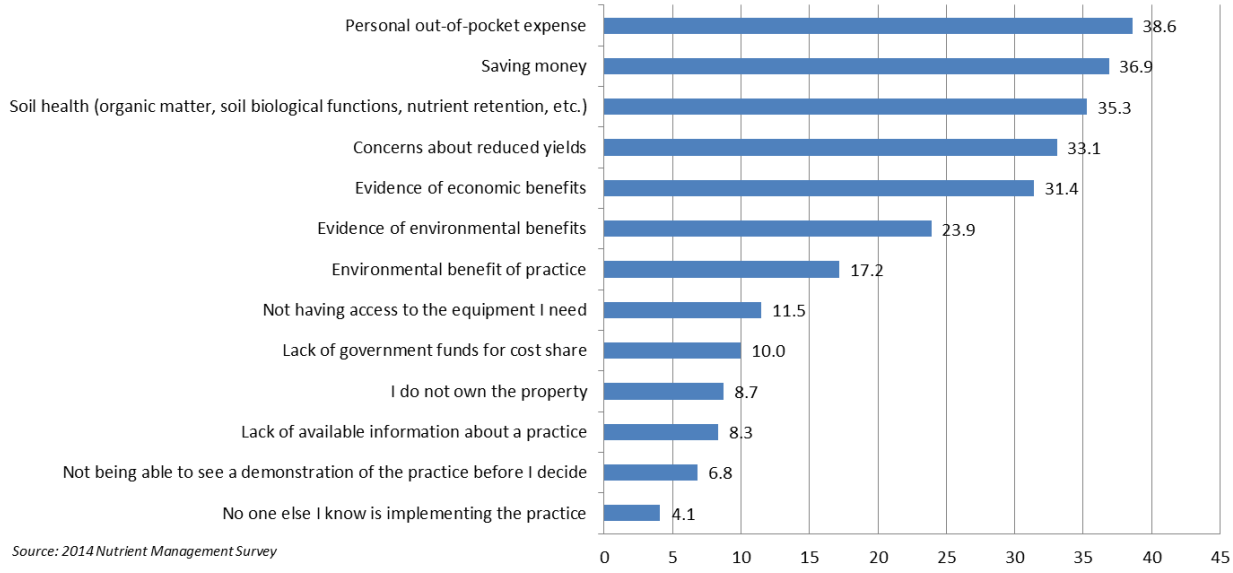
- Many of those not using these specific nutrient management practices said that they might be willing to try them, including those who had never heard of them, had heard of them, and had used them in the past (14% regular soil tests; 36% variable rate application; 29% application timing; and 22% nutrient management plans).
- Most respondents used application timing, variable rate application technology, and regular soil tests on the majority of their land, but about 10% use them on 1% to 50% of their land, indicating that although many use these practices, not all are using them on all of the farmland they manage.
- The most common soil tests agricultural producers and landowners used were agricultural lime (98%), followed by potassium fertilizer (95%), phosphorus fertilizer (95%), nitrogen fertilizer (80%), manure (26%), and other tests (5%).
- A little over half (57%) of respondents had access to the equipment that they needed for variable rate application.
- The highest percentage received assistance in developing their nutrient management plan from a private sector agronomist or crop consultant (70%), while the fewest used university extension (9%).
- Most (74%) used commercial nutrients in their nutrient management plans while the fewest used industrial sludge (0%).
- Not all respondents followed the guidelines set forth by their nutrient management plans. 86% agreed or strongly agree that they did, while the remainder were neutral or disagreed.



Decision Making Regarding Nutrient Management

- The most important factors for agricultural producers and landowners in Indiana in their decisions regarding nutrient management are financial (see Figure 5). 39% cited that personal out-of-pocket expense, 37% saving money, 33% reduced yields, and 31% the lack of evidence of economic benefits were very important concerns to them. Soil health was also a key concern with 35% saying it was very important.
- Factors such as knowing others implementing nutrient management practices (4%), not being able to see demonstrations of the practice (7%), and not having enough information (8%) were the least likely to be very important in their decisions.

Figure 5. Percent of Respondents Who Say the Following Factors are Very Important in their Decisions About Nutrient Management

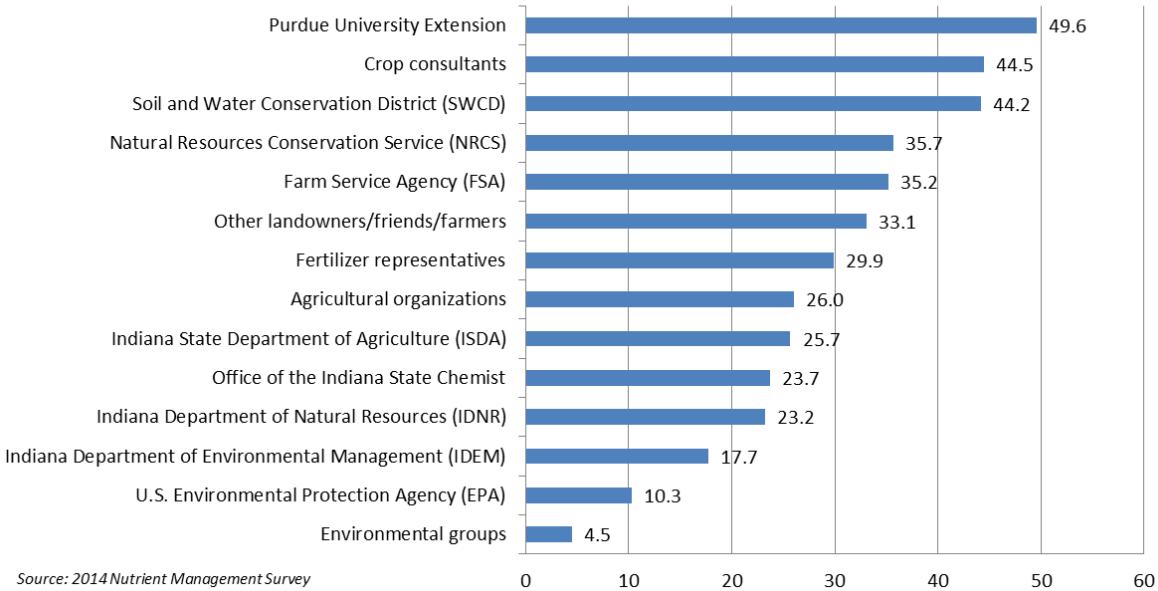


Source: 2014 Nutrient Management Survey

Information Sources about Nutrient Management

- The most highly trusted source for information about nutrient management was Purdue University Extension (50% trust very much), followed closely by crop consultants (45%) and Soil and Water Conservation Districts (44%) (see Figure 6).
- Agricultural producers and landowners in Indiana trusted environmental groups the least, with only 5% saying they trusted environmental groups in general very much, 10% the EPA, and 18% the Indiana Department of Environmental Management.

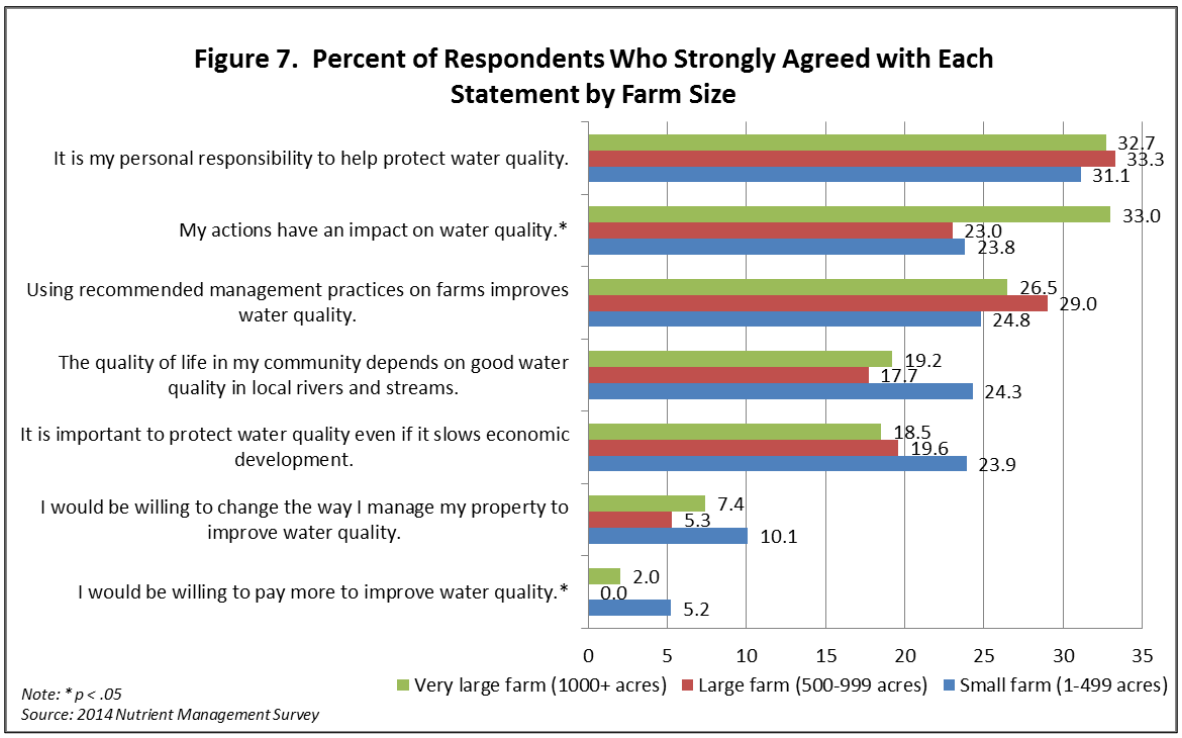
Figure 6. Sources of Information About Nutrient Management that Respondents Trust Very Much



Source: 2014 Nutrient Management Survey

Key Findings by Farm Size[3]

- 62% of survey respondents operated what the Economic Research Service (ERS) classifies as small farms (1-499 acres), 14% were large farms (500-999 acres), and 25% were very large farms (1000+ acres).[4]
- Smaller farms were significantly[5] more likely to be managed by females and those who were older (e.g., 70+).
- Larger farms were more likely to use newsletters/brochures/fact sheets, the internet, the radio, workshops/demonstrations/meetings, land or farm management professionals, and trade publications/magazines than smaller farms.
- Those who manage larger farms were less likely to rent farmland to others, but more likely to be renting land from others, and more likely to be renting land from non-relatives. They were also more likely to have written (as opposed to verbal) and cash rent (as opposed to crop share) agreements with their tenants.
- Very large farms were more likely to say that they believed their actions have an impact on water quality, but were less likely to say they would be willing to pay more to improve water quality than small farms (see Figure 7).

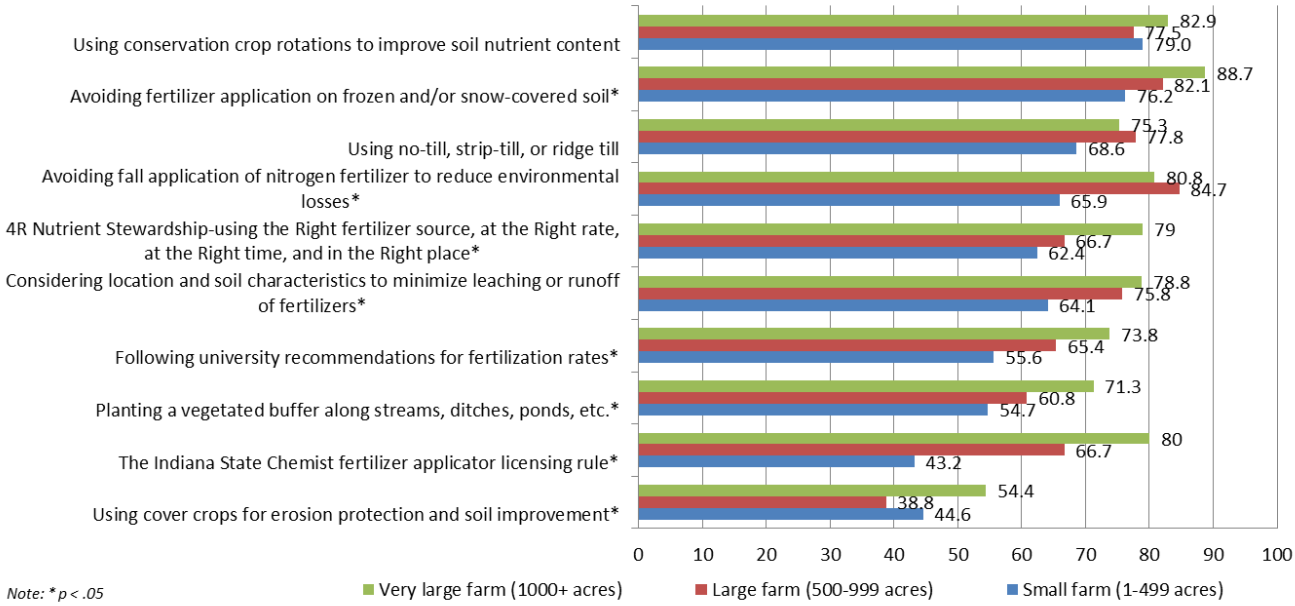


- Small farms were more likely to say sedimentation/silt was not a water pollutant problem in their area.

[3] See Appendix II (a, b, and c) for a report of responses to all questions broken down by farm size managed.
[4] Here we examine only differences by responses to the question about acres managed, as opposed to acres owned.
[5] Throughout the key findings "significant" indicates that differences are statistically significant (meaning that they are unlikely to have occurred by chance) at the p<.05 level. All differences noted throughout are "significant" even if the word significant is not used.

- Small farms were more likely to say discharges from sewage treatment plants, lawn fertilizers/pesticides, fertilizers or manure used for crop production, improperly maintained septic systems, manure from farm animals, littering/illegal dumping of trash, and urban stormwater runoff were not problems in their area.
- Large and very large farms that grew crops or pasture were significantly more likely to have used nearly all of the best management practices listed than small farms (see Figure 8). Very large farms were more likely to avoid using fertilizer application on frozen and/or snow-covered soil, avoid fall application of nitrogen fertilizer, use 4R Nutrient Stewardship, consider the location and soil characteristics to minimize leaching or runoff of fertilizers, follow university recommendations for fertilization rates, plant vegetated buffers, follow the Indiana State Chemist fertilizer applicator licensing rule, and use cover crops than small farms.

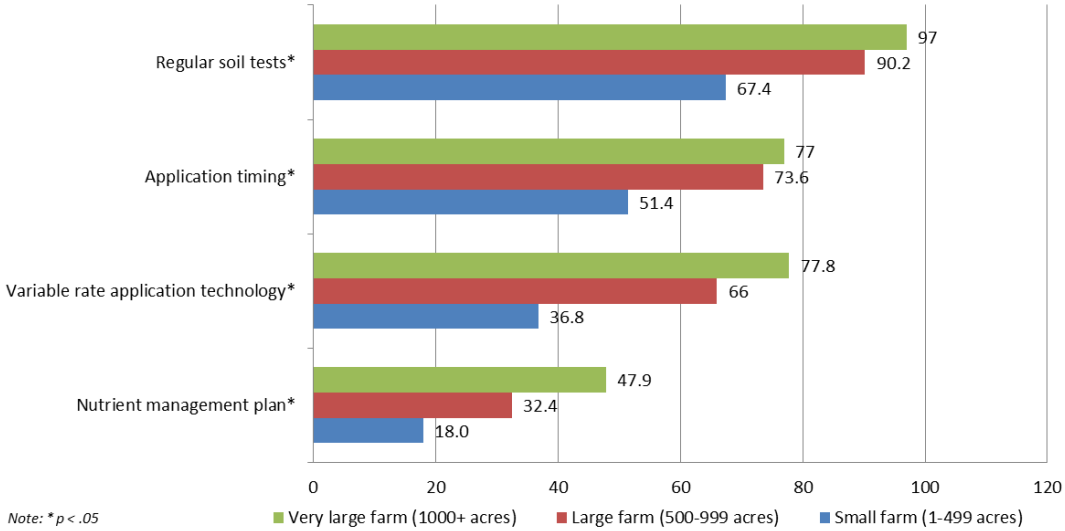
Figure 8. Percent of Crop Farmers Who Use the Following Practices by Farm Size



*Note: * $p < .05$*
Source: 2014 Nutrient Management Survey

- Livestock owners who managed large or very large farms were more likely to apply manure at agronomic rates and construct waste storage facilities than small farms.
- Very large farms were significantly more likely than small farms to use all of the specific nutrient management practices that were inquired about (see Figure 9), including regular soil tests, application timing, variable rate application technology, and nutrient management plans.

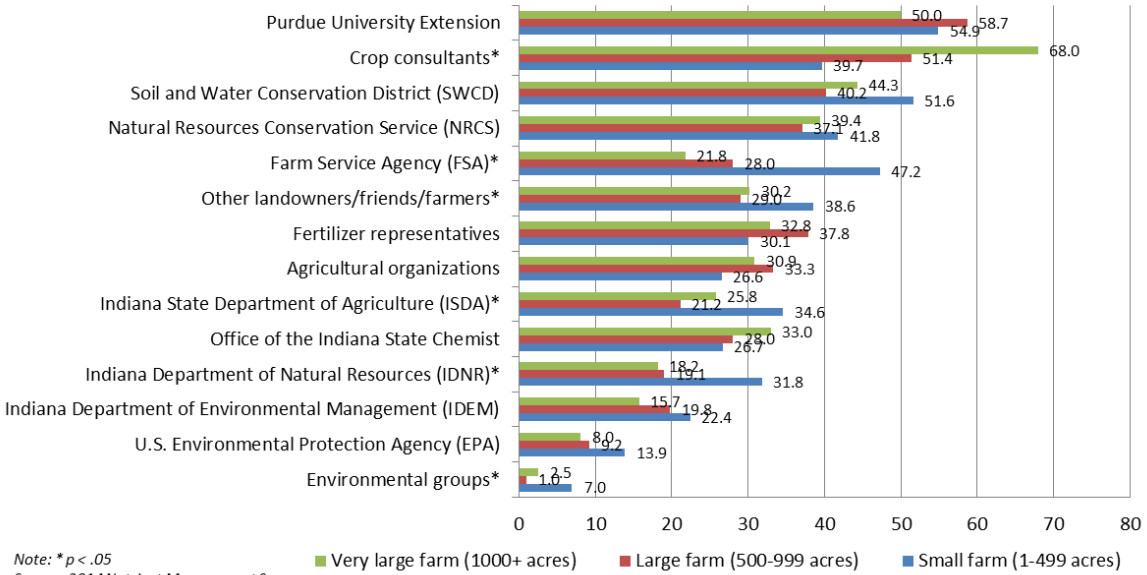
Figure 9. Percent of Respondents Who Currently Use Specific Nutrient BMPs by Farm Size



*Note: * p < .05*
Source: 2014 Nutrient Management Survey

- Larger farms were significantly more likely to say that soil health, concerns about reduced yields, and evidence of the economic and environmental benefits played a role in their decisions about nutrient management than smaller farms. On the other hand, smaller farms were more likely to say that the lack of government funds for cost share played a role in their decisions.
- Larger farms were more likely to trust crop consultants than smaller farms, while smaller farms were more likely to trust the Farm Service Agency, other landowners, friends, or farmers, the Indiana State Department of Agriculture, the Indiana Department of Natural Resources, and environmental groups (see Figure 10).

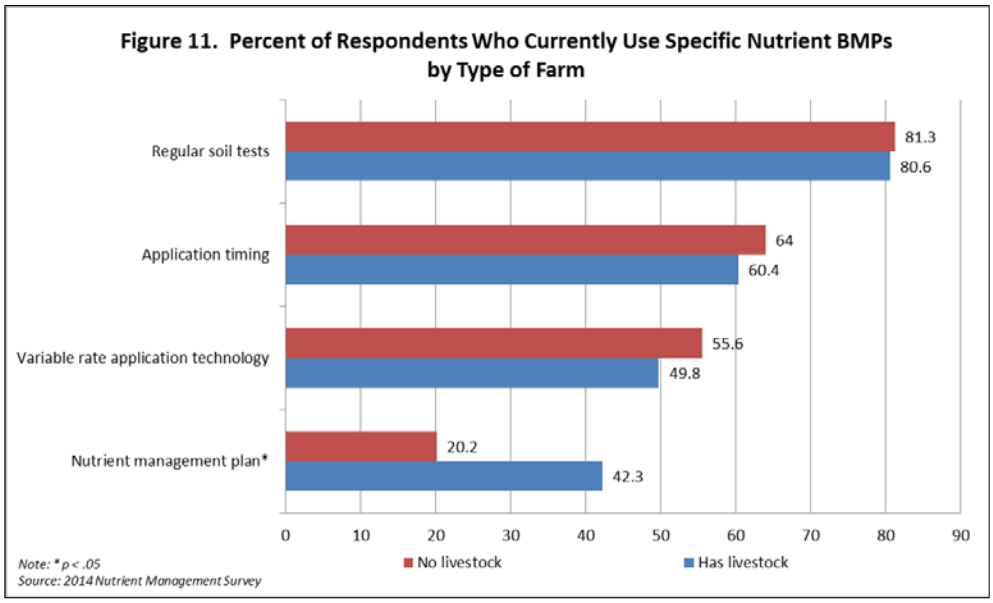
Figure 10. Sources of Information About Nutrient Management that Respondents Trust Very Much by Farm Size



*Note: * p < .05*
Source: 2014 Nutrient Management Survey

Key Findings by Livestock Ownership[6]

- 42% of agricultural producers who responded to the survey had livestock (e.g., just livestock or crops and livestock) and 58% had no livestock (e.g., crop farmer only).
- Those with livestock were significantly more likely to be male, without a college degree and younger that those without livestock.
- Those without livestock were more likely to rent land to others.
- Livestock owners were more likely to say that sedimentation/silt, nitrates, and phosphorus are not water pollution problems in their area.
- Those owning livestock were more likely to say that manure from farm animals and animal feeding operations were not problems in their area. On the other hand, those without livestock were more likely to say that littering/illegal dumping of trash were not a problem where their land is.
- Livestock owners were significantly more likely to use cover crops for erosion protection and soil improvement than those with no livestock.
- Livestock owners were more likely to use nutrient management plans than those who didn't own livestock (see Figure 11), otherwise there was no significant difference in use of nutrient best management practices.



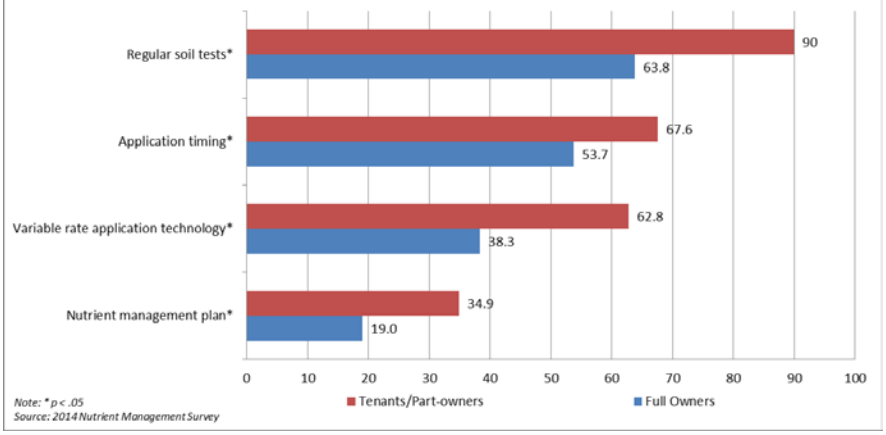
- Those with livestock were more likely to say that the lack of access to the equipment that they need and the lack of government funds for cost share were very important in their decisions about nutrient management.
- With regards to trusting various sources of information regarding nutrient management, the only significant difference between livestock and non-livestock owners was in their trust of the Indiana Department of Environmental Management. Livestock owners were more likely to trust them very much.

[6] See Appendix III (a and b) for a report which includes responses to all survey questions broken down by livestock ownership.

Key Findings by Land Tenure[7]

- 64% of survey respondents were agricultural producers (e.g., crops, livestock, or both), as opposed to non-operating landlords. Of these, 48% owned all of the land (e.g., full owners) that they farmed and 52% owned part or none of the land (e.g., tenants/part-owners).
- Full owners were more likely to be female and elderly (70+) than tenants/part-owners.
- Full owners were more likely to say they strongly agree that they would be willing to pay more to improve water quality, would be willing to change the way they manage their property to improve water quality, and that the quality of life in their community depends on good water quality.
- Full owners were more likely to say that discharges from sewage treatment plants, the littering or illegal dumping of trash, and urban stormwater runoff were not problems where they live.
- Tenants and part-owners were significantly more likely to say that they currently follow university recommendations for fertilization rates, avoid fall application of nitrogen fertilizer, use no-till, strip-till, or ridge till, consider the location and soil characteristics to minimize leaching or runoff of fertilizers, use conservation crop rotation, and follow the Indiana State Chemist fertilizer applicator licensing rule than full owners.
- Tenants and part-owners were more likely to conduct regular soil tests, variable rate application technology, application timing, and a nutrient management plan on the land they farm than full owners (see Figure 12).

Figure 12. Percent of Respondents Who Currently Use Specific Nutrient BMPs by Land Tenure



- Personal out-of-pocket expense, concerns about reduced yields, soil health, evidence of the economic benefits, and evidence of the environmental benefits were more likely to be a very important factor in how tenants' and part-owners' made decisions than full owners.
- Full owners were much more likely to have very high levels of trust in information about nutrient management from the Farm Service Agency, the Indiana State Department of Agriculture, the Indiana Department of Natural Resources, the Indiana Department of Environmental Management, environmental groups, and the Environmental Protection Agency. On the other hand, tenants/part-owners were more likely to put high levels of trust in fertilizer representatives and crop consultants.

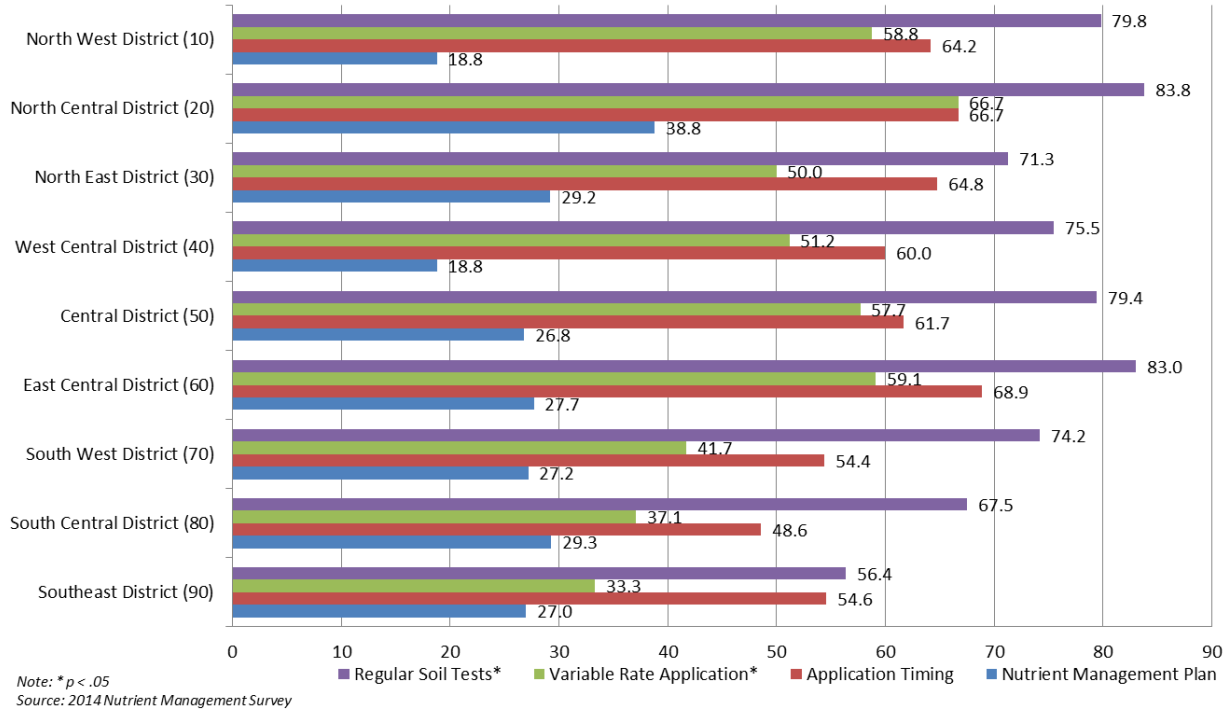
[7] See Appendix IV (a and b) for a report which includes responses to all survey questions broken down by land tenure.

Key Findings by Crop Reporting Districts[8]

- While there were survey respondents from each crop reporting district in Indiana, the highest percentage (21%) were from the Central district (50) while the smallest percentage (4%) were from the South East district (90).
- The West Central district (40) had the highest percentage of respondents with bachelor's degrees or higher (43%), while the South West district (70) had the lowest (23%).
- Respondents in the West Central district (40) were the most likely to be renting land to someone else (59%), while those in the South East district (90) were the least likely (26%).
- Respondents living in the South West district (70) were the most likely to say that improperly maintained septic systems and animal feeding operations were not problems in the area where they rent or own farmland (57% and 70%, respectively), while those in the North Central district (20) were the least (31% and 50%, respectively).
- Those living in the West Central district (40) were the most likely to say that urban stormwater runoff was not a problem in their area (56%), while those in the North East (30) were the least likely to say this was the case (35%).
- Respondents from crop reporting district 80 (South Central) were the most likely to say they used no-till, strip-till or ridge till (91%), while those from district 60 (East Central) were the least likely to currently use this practice (61%).
- Cover crops were the most widespread in district 80 (South Central) with 77% of respondents using them. They were the least used in district 20 (North Central) with only 34% of respondents currently using them.
- In the South East district (90) 58% of respondents with livestock had constructed a waste storage facility, the highest in the state. This is in comparison to only 25% in district 40 (West Central), which was the lowest in the state.
- In district 60 (East Central) 87% of livestock owners diverted their surface water away from feedlots. In comparison, only 47% said they did the same in district 50 (Central).
- 75% of those with livestock in district 90 (South East) avoid fall application of manure to reduce environmental losses in comparison to only 37% in district 30 (North East).
- Respondents with livestock in district 80 (South Central) were the most likely to avoid using manure application on frozen and/or snow-covered soil (89%), while those from district 20 (North Central) were the least likely to use this practice (38%).
- Respondents in the North Central district (20) were the most likely to be currently conducting regular soil tests and using variable rate application technology (84% and 67%, respectively) (see Figure 13). Those in the South East district (90) were the least (56% and 33%, respectively).

[8] Unlike for other breakdowns, a detailed summary report is not included for the various crop reporting districts.

Figure 13. Current Usage of Nutrient Management Practices by Crop Reporting District



*Note: * p < .05*
Source: 2014 Nutrient Management Survey

- Personal out-of-pocket expense was seen as a very important factor in decisions about nutrient management for the highest percentage (53%) of respondents in district 40 (West Central), and for the fewest (31%) in district 30 (North East).
- Respondents from district 80 (South Central) were the most likely to say they trusted the Soil and Water Conservation District for information about nutrient management (68%), while those from district 10 (North West) were the least (38%).

Key Findings among Out-of-State Absentee Landowners[9]

Characteristics of Absentee Landowners and the Land They Own

- A total of 246 absentee owners of Indiana farmland responded to the survey for a 34% response rate.
- 60% of the respondents were male, and 40% were female.
- 74% earned a bachelor's degree or higher.
- The average amount of land owned in Indiana by out-of-state landowners was 217 acres.
- Most absentee landowners do not get the majority of their income from renting out agricultural land. Most (72%) derive 1-20% of their income from renting their land.
- The average distance landowners live from their land is 806 miles.
- About three-fourths of survey respondents inherited their property while about one-fourth purchased it.
- Nearly half (46%) own their property with other family members, while about 43% own it alone or with their spouse.
- About half visit their land once a year or less. Most visit several times a year (37%).

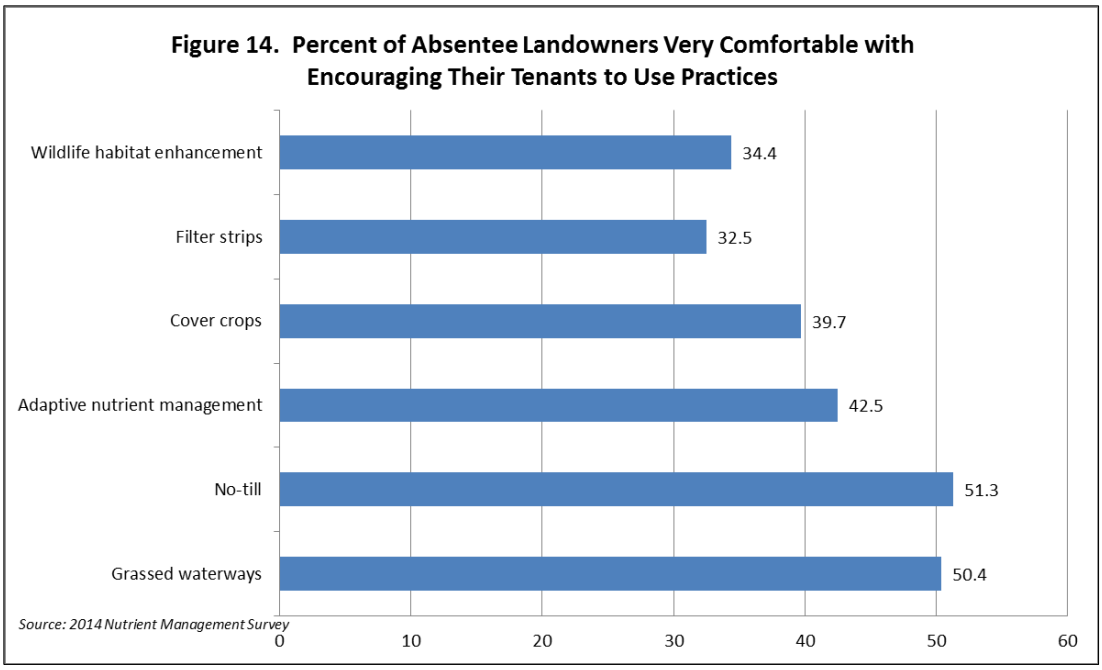
Relationships with Tenants

- Most rent to people they are not related to (31%), followed by relatives (20%), friends (18%), and business associates (17%).
- The average length of rental to a tenant was 16 years.
- Most (45%) have a verbal crop share agreement with their tenants, followed by 23% with a written cash share agreement.
- Income (e.g., they pay fair value and on time) is the most important factor to landlords when they are decide who they rent to, while aesthetics (e.g., they keep the land looking nice) is the least important.

Agricultural Practices on Their Land

- Landlords say that tenants are primarily responsible for deciding which crops are grown and how they are rotated, tillage practices, fertilizer application, and manure management. They are more likely to share responsibility for the installation of structures.
- Landlords would be most comfortable encouraging their tenants to use no-till, followed closely by grassed waterways (see Figure 14). They are the least comfortable with encouraging their tenants to use filter strips or wildlife habitat enhancement.

[9] See Appendix V for a report which includes responses from the survey of owners of Indiana farmland who do not live in Indiana.



- Many (39%) are unsure whether their land is enrolled in a conservation program or not. Of those who do know, the most say their land is enrolled in the Conservation Reserve Program (24%) or nothing (27%).
- Landlords perceived economic factors to be significantly limiting their ability to promote soil and water conservation practices on the land they rent out. Many were concerned with out-of-pocket expense (23%), tenants' out-of-pocket expense (28%), and lack of government funds for cost-share (24%). A high percentage also said that their need to learn more about practices was a significantly limiting factor (21%). Many were also concerned about requirements or restrictions of government programs (22%) and the lack of flexibility with government programs (25%).
- The highest percentage of landlords did not see their own physical abilities, disapproval of their neighbors, the resale value of their farmland, and not wanting to participate in government programs as limiting factors to the adoption of conservation practices on the land they rent out.
- Landlords were highly uncertain about whether or not they would want to include provisions in their leases that would require tenants to prepare and comply with a Conservation Plan under the guidance of USDA Natural Resources Conservation Service personnel, soil erosion control practices, or targeted practices. They were most likely to say they would require tenants implement soil erosion control practices (43%) and least likely to say they would require a Conservation Plan (19%).