Iowa Learning Farm – 2005 Year End Report

05IFLM006
January 25, 2006

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Introduction:

The Iowa Learning Farm is a model for learning and exchanging ideas among producers, government agencies, scientists, agribusinesses, and the general public. It will demonstrates and promotes conservation management systems with emphasis on conservation tillage systems, cropping systems, and nutrient management across Iowa, while tailoring educational activities to support state and federal soil conservation and water quality programs, such as Iowa's non-point source pollution issues and the USDA Conservation Security Program. Ultimately this project will help producers recognize resource problems and implement conservation systems leading to improved soil and water quality.

Adoption of conservation systems is one of many potential solutions to water quality challenges in Iowa. However, the implementation of conservation systems is a critical component that includes a suite of management practices, including pest and nutrient management and other agriculture practices, which can be considered in the overall picture of water quality improvement, soil quality improvement, and wildlife habitat enhancement. In addition, the increased adoption of conservation tillage systems, such as no-tillage, ridge-tillage, strip-tillage, and other residue management systems, along with different crop rotations and nutrient management in a systems approach will help producers prepare and qualify for the Conservation Security Program.

Vision:

The Iowa Learning Farm vision is the integration of agronomic, economic, and community aspects in evaluating and promoting the effectiveness of conservation systems coupled with an extensive educational program. The Iowa Learning Farm brings a new dimension for developing and transferring emerging technologies and fine-tuning old technologies that are community based, economically feasible, and environmentally responsible.

Objectives:

The specific objectives of this project are:

- Develop and promote regional conservation systems across the state that are suitable to each landscape and ecosystem for improvement to soil and water quality.
- Conduct an awareness and educational program with leadership and involvement of state and local communities and agricultural professional.
- Evaluate the agronomic and economic benefits of conservation systems.
- Assess the social obstacles of conservation systems and lack of adoption through surveys and focus groups.

Agronomic:

As part of the Iowa Learning Farm, on-farm demonstrations have been established to compare the effectiveness of conservation practices with other conservation practices or in comparison with conventional practices. The on-farm demonstrations are used to validate agronomic and soil quality improvements.

Demonstration site:
Six to ten producers in each of five geographic areas, totaling 30-50 producers statewide, will be identified to establish on-farm demonstrations of different conservation tillage systems (Fig. 1). On these sites, NRCS will work with cooperators on the development and implementation of conservation plans addressing resource concerns identified in the NRCS Field Office Technical Guide Quality Criteria. The implemented system will be compared to conventional practices either on the same field or on another adjacent field of the same soil association in their region. Sites are being selected based on their suitability to model and monitor the outcomes of conservation practices vs. conventional practices effects on soil and water quality.

Data collection parameters:
Field measurements were determined to evaluate conservation practices utilizing a limited set of indicators for soil quality, water quality, and agronomic productivity. The indicators are utilized to evaluate the performance of conservation practices. The following data was collected in each region:

- Soil and water quality: Bulk density, soil carbon, total nitrogen, and pH were collected at all on-farm demonstrations. Water infiltrations, aggregate stability, and soil compaction were determined on a subset of the on-farm demonstrations.
- Agronomic: Seeding rate, surface residue estimation, seedling emergence, final plant population, and grain yield were collected at all on-farm demonstrations.
- Nutrient utilization: Late spring soil nitrate and fall stalk nitrate were collected at all on-farm demonstrations. Grain nitrogen and phosphorus uptake will be analyzed on a limited basis.

Preliminary results and summary:
Preliminary results are presented in Tables 1 through 5 based on the identified Iowa Learning Farm regions. Within each region similar treatments have been averaged for regional comparison. Results from each individual on-farm demonstration are presented in Appendix A.
Residue Estimation: Average residue cover across the state ranged from 13% to 100% depending on the tillage and cropping system. Residue cover for no-tillage averaged 65% compared to only 26% for convention tillage. Residue cover is highly related to tillage intensities and cropping system.
Final Plant Population: The final plant populations across the state averaged 28,831 and 91,083 plants per acre for corn and soybean, respectively. Differences due to tillage, cropping system, or region were not evident.
Bulk Density: Regionally, the Northeast Iowan Surface had higher bulk densities (1.4 g/cm^3) than the other regions. In the Southern Iowa Drift Plain the bulk density from a hay field (1.1 g/cm^3) was lower than the no-tillage row crop field and pasture (1.3 and 1.5 g/cm^3, respectively). A lower bulk density for a hay field is due to finer roots, less soil disturbance, and a more overall

stable environment. The pasture likely had a higher bulk density to a six inch depth due to grazing intensity.

Organic Matter: The average soil organic matter across the state was 4.2%. Organic matter was highest in the Des Moines Lobe (5.1%) and lowest in the Southern Iowa Drift Plain and Loess Hills (3.5% and 3.0%, respectively).

Carbon to Nitrogen Ratio: The average soil carbon to nitrogen ratio across the state was 12.1. There are no evident differences regionally or due to tillage or cropping system. A typical agricultural soil has a carbon to nitrogen ratio of approximately 10:1. Materials that have ratio less than 20:1 favor nitrogen mineralization. A ratio of greater than 30:1 favors nitrogen immobilization. In the 20:1 to 30:1 range mineralization and immobilization are in balance for no net change.

pH: The average soil pH across the state was 6.3. The Loess Hills region had the lowest pH (5.6) compared to the other regions, while the Northwest Iowa Plains region had the highest pH (6.7).

Late Spring Soil Nitrate: The average late spring soil nitrate across the state was 24 ppm. In the Northeast Iowan Surface region anhydrous ammonia had a significantly lower soil nitrate compared to manure as the nitrogen source (20 and 61 ppm, respectively). Conversely, in the Loess Hills there was no difference between the no-tillage with and without starter fertilizer (16 and 15 ppm, respectively).

Fall Stalk Nitrate: The average fall stalk nitrate across the state was 2,084 ppm. In the Des Moines Lobe where a low and high nitrogen rate of side-dressing was compared, there was no significant difference (2,177 and 1,573 ppm, respectively). This indicates that nitrogen leaching occurred particularly from the high nitrogen rate. In the Northeast Iowan Surface region anhydrous ammonia had a significantly lower soil nitrate compared to manure as the nitrogen source (3,653 and 7,960 ppm, respectively). However, both treatments were in the excessive range (greater than 2,000 ppm) meaning there was more nitrogen available than needed for maximum yield.

Yield: The average yield across the state was 189 and 62 bu/acre for corn and soybean, respectively, and 20 ton/acre for corn silage. Generally there was no significant difference regionally due to tillage or cropping systems.

Economic:

The economic component of this project has been working on two different approaches. We have been gathering and summarizing the data from the field cooperators. We are in the process of finalizing data and working closely with the cooperators to establish a database that can be utilized for economic analysis. We are in contact with the cooperators and are nearing the completion of the full database for the cooperators from last year.

A second component for this past fall has been to look at the energy use in related studies. Specifically we have begun examining the tillage studies conducted around the state on the ISU Experiment Station farms. This data will provide a good comparison set for the farmer cooperator data. The tillage project is in the initial start-up years but it is providing good insights to the comparisons between alternative tillage systems.

Community Assessment:

Baseline Documentation on Conservation Systems and Perspectives Among Iowa Producers Farming 200 or More Acres of Cropland

Evaluation of the Iowa Learning Farm project began with a statewide baseline documentation of conservation practices, conservation ethics, and water quality perspectives among Iowa producers farming 200 or more acres of cropland. The purpose of the baseline study was threefold: 1) to gain a better understanding of the extent to which producers recognize resource problems relating to soil and water quality; 2) to understand the social variables influencing conservation decisions and 3) to offer the Iowa Learning Farm team insights into developing more effective conservation education and outreach activities. The statewide survey among active farm operators and a series of discussion groups across the state among conservation-minded stakeholders were designed to meet these goals. This year-end report presents the descriptive percentage distribution for the statewide survey unweighted sample and the regional samples. Additionally, it presents a summary of the major themes to emerge from the regional discussion groups.

Methodological Overview – Statewide Questionnaire:

During May and June of 2005, an eight-page questionnaire on conservation tillage practices, water quality management issues, conservation ethic perspectives as well as priorities of the Conservation Security Program (CSP) by the United States Department of Agriculture (USDA) National Resources Conservation Services (NRCS) as determined in their self-assessment workbook was developed. The National Agricultural Statistic Services (NASS) drew a representative sample, mailed, and received the questionnaires. There were two specific methodological goals of the questionnaire: 1) to have representative samples from the five geographical regions as established by the project team (Fig. 1), and 2) to target producers with 200+ acres of land. Using the 2002 Census of agriculture, NASS estimated that 36,261 or 40% of farmers in Iowa operate 200+ acres of cropland. Table 6 shows how the overall and 200+ acre cropland farmers are distributed within the five geographical regions.

Preliminary Results – Statewide Questionnaire:

The questionnaire was mailed by NASS late July with a follow-up second mailing in early August. From the original 4,000 sample, 1,077 questionnaires were completed and returned for a response rate of 27%. After closer analysis, 99 questionnaires were removed because the respondent's acres were in CRP, the respondent was no longer farming, or the respondent did not have 200 or more acres in cropland. The statewide sample is 978. Table 7 shows the number of usable questionnaires in each of the Iowa Learning Farm regions as compared to the targeted sample number. Statewide results of the survey are presented in Appendix B.

Methodological Overview – Discussion Groups:

Additionally from June through August, discussion groups were conducted in each of the five geographical regions. Iowa State University County Extension Education Directors supplied lists of conservation-minded individuals to potentially participate in the discussion groups. Host counties were chosen on following two criteria: 1) an Iowa Learning Farm field day was held in the county, and 2) there was an Iowa Learning Farm cooperator in the county. Three of the five counties chosen had field days. Jacqueline Comito attended all the field days to observe

demonstrations and to recruit individuals for the discussion groups. Each discussion group was held as a luncheon and the discussions (except for the Loess Hills region) were audio taped. Overall, there were 41 participants who represented a variety of community stakeholders including producers, educators, and bankers (Table 8). The goal was to have 8 to 12 participants at each group. Two of the groups fell short of the goal due to uncontrollable circumstances (i.e. funeral of a prominent community member).

Preliminary Results – Discussion Groups:

General ideas to come out of all five groups are presented in Appendix C. The themes expressed the general ideas emerged and were discussed to some level by all the groups. The following paragraphs are a characterization of each individual Iowa Learning Farm region.

Northwest Iowa Plains, Region 1: July 20, 2005 – 14 participants – A group of mainly farmers. General discussion was very clear that farmers would not implement conservation practices if there was no financial incentive.

Des Moines Lobe, Region 2: August 8, 2005 – 6 participants – This group was a little more unique than the others because there were only two farmers and the others were conservation activist concerned about water quality issues. What came out strongly in this group is the link between grade school education and conservation. Because of government programs, students are no longer taught about the connection between Iowa's rivers and lakes and farming practices. If our young people are not taught the importance of conservation, how can we maintain it as a value in the state?

Northeast Iowan Surface, Region 3: August 3, 2005 – 8 participants – The group consisted of a couple of crop consultants along with the farmers. What came out strongly here was that conservation practices have been backsliding a bit in the last couple of years. Landlords are a big concern in this area; many landlords are not interested in investing in conservation practices. The statement was made that farmers need to use many strategies to deal with erosion. It is not just about tillage. Too many farmers seem to think you can do one thing and it will solve the problems often resulting in taking the fast, simple solutions. It was discussed the influences of agribusiness (particularly winter meetings) on many farmers operations often do not necessarily support conservation practices.

Southern Iowa Drift Plain, Region 4: July 27, 2005 – 9 participants – The group consisted of mainly farmers with one gentleman who worked for a seed company. There were strong "no-till" farmer in the group along with a few that were more pragmatic so it led to some strong (but reasonable) exchanges. Several farmers in the group felt they would move toward "no-till" if they did not get so much rain in their area in the spring. The feeling was that it is a moisture issue and not the issue of soil type that is the biggest barrier to conservation practices. Participants were also very pleased that Iowa State University was holding these discussions and they thanked us strongly for coming down to listen to them.

Loess Hills, Region 5: June 29, 2005 – 4 participants – The uniqueness of this group was that three of the four were bankers as well as farmers or landowners. It was stressed how investors seem to be coming from outside their region and buying up large chunks of land. A thousand acre farm is considered small and it is difficult to buy the equipment needed. Also discussed urban sprawl and its impact on soil erosion and conservation practices.

Educational Outreach:

Newsletter:
In 2005, two issues of the Iowa Learning Farm newsletter was disseminated to cooperating producers, Soil and Water Conservation District commissioners, state legislators, and partnering agency staff in a combination of electronic and hard copy. Each issue of the newsletter features a Producer Profile and timely conservation information.

Conservation Minutes:
These public service announcements were developed to highlight conservation technology and opportunities to rural communities and the agriculture industry as well as landowners living off the farm. In 2005, 27 one-minute Conservation Minutes were broadcast on 90 plus potential radio stations across Iowa.

Web page:
A Web page, http://www.extension.iastate.edu/ilf, has been developed to convey timely conservation information to facilitate a need for additional information on conservation practices. It includes the Iowa Learning Farm newsletters, Conservation Minutes, Conservation Leaders, education material, publications, and conservation links.

Field days:
Seven field days with 227 persons attending were utilized to promote the Iowa Learning Farm and begin discussing conservation systems. Five of those field days were sponsored and put on by the Iowa Learning Farm utilizing current cooperators.

Field signs:
Field demonstration signs were erected to identify Iowa Learning Farm on-farm demonstration across the state. These signs were located on 11 highly visible locations.

Conservation Leaders:
Conservation Leaders are conservation minded community leaders and are being identified to increase conservation awareness at the local level. These Conservation Leaders, include Soil and Water Conservation District commissioners as well as outstanding conservation producers. Conservation Leaders are profiled in the Iowa Learning Farm newsletter.

Presentation and posters:
Presentations and posters have been given at over 25 conferences and meetings across the state with over 2300 individuals attending. Audiences have included agencies, conservation boards, producers, and agribusiness personnel.

Expected Benefits:

There are many expected benefits from the Iowa Learning Farm. In this first year the main purpose was to become visible and begin to develop tools to increase the awareness and promote conservation systems. The visibility of the project was established in a strong campaign including press releases, presentations at conferences, area staff meetings, and producer

gatherings. Additionally, visibility was increased through on-farm demonstration signage, field days, a Web site, and newsletters. Local community involvement has increased through activities such as focus groups, field days, on-farm demonstrations, and local workshops. The Iowa Learning Farm activities continue to build on and strengthen already existing multi-agency and community working groups to engage in solving water quality challenges by focusing on conservation systems. Because the Iowa Learning Farm engages all involved groups to empower local communities to address local natural resource challenges and to communicate a strong and united conservation ethic.

Beginning with this past year several project outcomes are expected: 1) increased awareness of on-going conservation efforts; 2) development of a broad understanding of the inter-connectivity of water quality, agricultural production, and conservation systems; 3) extensive outreach information transfer mechanism to producers and agribusinesses due to established educational opportunities and development of a variety of educational materials; and 4) greater understanding integrating conservation systems with energy consumption and community awareness.

Partners:

Conservation Districts of Iowa
Iowa Department of Natural Resources
Iowa Farm Bureau Federation
Iowa Natural Resources Conservation Service
Iowa State University Extension

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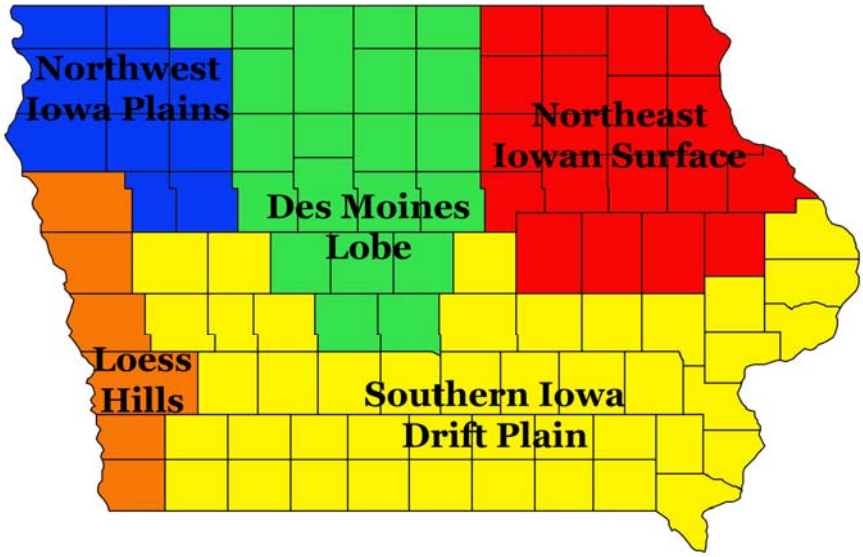

Figure 1. Iowa Learning Farm regions based on topography and soil association.

Table 1. Northwest Iowa Plains (region 1) comparisons of on-farm demonstration results. Yields are for corn grain unless noted.

Comparison Type	Treatment	Residue Estimation	Final Plant Population	Bulk Density	Organic Matter	C:N Ratio	pH	Late Spring Soil Nitrate	Fall Stalk Nitrate	Yield
		%	plants / acre	g / cm^3	%			ppm	ppm	bu / acre
Tillage	No-tillage	59	28,667	1.1	3.4	13.1	6.9	30	3,476	203
	Strip-tillage	49	30,750	0.8	3.5	14.4	5.5	28	1,305	205
	Reduced tillage	13	25,667	1.3	3.3	11.7	7.5	31	4,167	197
Cropping System†	Open pollinated corn	29	27,833	1.1	5.5	11.4	6.7	35	n/a	17 ‡
	Hybrid seed corn	20	30,500	1.2	6.1	11.3	6.9	45	n/a	26 ‡

† In 2006 this comparison will be cover crop versus no cover crop.

‡ This is corn silage yield in tons/acre.

Table 2. Des Moines Lobe (region 2) comparisons of on-farm demonstration results. Yields are for corn grain unless noted.

Comparison Type	Treatment	Residue Estimation	Final Plant Population	Bulk Density	Organic Matter	C:N Ratio	pH	Late Spring Soil Nitrate	Fall Stalk Nitrate	Yield
		%	plants / acre	g / cm^3	%			ppm	ppm	bu / acre
Tillage	No-tillage, C-s	66	26,500	1.2	5.1	13.1	6.9	13	2,817	160
	No-tillage, C-c	71	27,167	1.2	5.0	13.7	6.6	12	2,117	169
	Strip-tillage, C-s	58	29,667	1.2	4.7	12.3	5.5	24	1,490	189
	Minimum tillage, C-s	60	30,750	1.2	5.2	13.6	6.6	24	545	n/a
	Reduced tillage, C-s	57	28,959	1.2	5.0	26.9	6.1	15	1,203	170
	Conventional tillage, C-s	36	30,833	1.2	4.5	12.2	6.0	20	750	194
	Conventional tillage, C-c	13	26,667	1.2	5.4	13.5	7.4	8	631	170
Nutrient Management †	150 lb N side-dressed, C-c	61	26,000	1.4	5.6	14.1	6.6	10	2,177	177
	300 lb N side-dressed, C-c	59	25,000	1.6	5.6	13.5	6.4	7	1,573	180

† This comparison was an accidental comparison due to problems with the side-dressing applicator. Intent was to have a 150 and 170 lb N side-dress rates.

Table 3. Northeast Iowan Surface (region 3) comparisons of on-farm demonstration results. Yields are for corn grain unless noted.

Comparison Type	Treatment	Residue Estimation	Final Plant Population	Bulk Density	Organic Matter	C:N Ratio	pH	Late Spring Soil Nitrate	Fall Stalk Nitrate	Yield
		%	plants / acre	g / cm^3	%			ppm	ppm	bu / acre
Tillage	No-tillage, C-s	65	29,833	1.4	4.0	13.3	5.4	27	1,255	170
	Ridge tillage, C-s	62	30,000	1.4	3.1	13.5	5.4	26	1,022	170
	Strip-tillage, C-s	38	33,833	1.4	4.8	11.7	6.4	26	5,673	218
	No-tillage, S-c	75	94,833	1.5	3.9	13.4	6.5	n/a	n/a	61 ‡
	Ridge tillage, S-c	74	87,333	1.5	3.8	13.1	6.6	n/a	n/a	62 ‡
Cropping System[1]	Cover crop following corn silage	20	27,833	1.4	4.4	10.1	5.2	30	n/a	18 §
	No cover crop following corn silage	20	28,000	1.4	4.2	10.9	5.5	28	n/a	18 §
Nutrient Management	Conventional tillage with NH_3	30	33,333	1.2	4.9	11.3	6.6	20	3,653	219
	Conventional tillage with manure N	30	32,167	1.2	6.4	11.5	6.4	61	7,960	212
Residue Management †	Baled corn stalks	46	30,000	1.4	4.1	12.1	6.9	34	2,840	214
	No baled corn stalks	48	28,667	1.5	4.4	12.6	6.9	35	1,147	200

† This comparison was established in the fall of 2005 with the 2005 growing season being a baseline year with no true comparison.
‡ This is soybean yield in bushels/acre.
§ This is corn silage yield in tons/acre.

Table 4 Southern Iowa Drift Plain (region 4) comparisons of on-farm demonstration results. Yields are for corn grain unless noted.

Comparison Type	Treatment	Residue Estimation	Final Plant Population	Bulk Density	Organic Matter	C:N Ratio	pH	Late Spring Soil Nitrate	Fall Stalk Nitrate	Yield
		%	plants / acre	g / cm^3	%			ppm	ppm	bu / acre
Tillage	Minimum tillage	61	27,500	1.2	3.2	11.0	5.9	28	1,620	171
	Reduced tillage	28	27,500	1.2	3.0	10.8	6.1	32	1,183	168
Cropping System	Row crop, no-tillage, C-S	57	26,167	1.3	3.8	11.7	6.1	18	368	n/a
	Alfalfa	100	n/a	1.1	3.7	11.0	6.9	n/a	n/a	n/a
	Pasture	100	n/a	1.5	3.6	10.4	6.4	n/a	n/a	n/a

Table 5 Loess Hills (region 5) comparisons of on-farm demonstration results.

Comparison Type	Treatment	Residue Estimation	Final Plant Population	Bulk Density	Organic Matter	C:N Ratio	pH	Late Spring Soil Nitrate	Fall Stalk Nitrate	Yield
		%	plants / acre	g / cm^3	%			ppm	ppm	bu / acre
Tillage	Minimum tillage	71.5	31,000	1.4	3.1	9.5	5.4	13	2,120	223
	Minimum tillage with row cleaners	65.5	30,000	1.3	2.6	10.0	5.5	19	1,777	221
	Reduced tillage	51.7	31,167	1.2	3.4	11.0	5.9	9	3,180	215
Nutrient Management	No-tillage	69.2	27,667	1.2	3.0	10.3	5.5	16	831	193
	No-tillage with starter fertilizer	70.8	26,833	1.2	2.9	9.8	5.5	15	233	178

Table 6. Percentage of Iowa farmers and Iowa farmers with 200+ acres of cropland in each of the Iowa Learning Farm regions.

Region	Overall Producers	200+ Acre Producers
1 - Northwest Iowa Plains	10.4%	13.3%
2 - Des Moines Lobe	18.1%	21.6%
3 - Northeast Iowan Surface	23.6%	21.8%
4 - Southern Iowa Drift Plain	42.5%	37.1%
5 - Loess Hills	5.4%	6.2%
Total Producers	90,652	36,261

Table 7. Sample number per Iowa Learning Farm region.

Region	Targeted Sample #	Actual Sample #
1 - Northwest Iowa Plains	200	183
2 - Des Moines Lobe	203	190
3 - Northeast Iowan Surface	203	196
4 - Southern Iowa Drift Plain	205	228
5 - Loess Hills	191	191

Table 8. Iowa Learning Farm discussion group participation per region.

Region	# Participants	Participants
1 - Northwest Iowa Plains	14	Producers, business owners, local government
2 - Des Moines Lobe	6	Producers, educators
3 - Northeast Iowan Surface	8	Producers, crop consultants
4 - Southern Iowa Drift Plain	9	Producers, agribusiness employees
5 - Loess Hills	4	Producers, banker, local government

Appendix A. Data collection results for all on-farm demonstrations. Yields are for corn grain unless noted.

Region	County	Comparison	Residue Estimation	Final Plant Population	Bulk Density	Organic Matter	C:N Ratio	pH	Late Spring Soil Nitrate	Fall Stalk Nitrate	Yield
			%	plants / acre	g / cm^3	%			ppm	ppm	bu / acre
1	Clay	No-tillage	63	31,500	0.8	3.4	13.3	6.2	23	3,805	203
		Strip-tillage	49	30,750	0.8	3.5	14.4	5.5	28	1,305	205
1	Plymouth	No-tillage	56	25,833	1.4	3.4	12.8	7.5	37	3,147	204
		Reduced tillage	13	25,667	1.3	3.3	11.7	7.5	31	4,167	197
1	Plymouth	Open pollinated corn	29	27,833	1.1	5.5	11.4	6.7	35	n/a	17‡
		Hybrid corn	20	30,500	1.2	6.1	11.3	6.9	45	n/a	26‡
2	Dallas	Reduced tillage	43	n/a	1.2	4.4	12.3	6.3	6	n/a	n/a
		Conventional tillage	40	n/a	1.2	3.8	11.7	6.2	7	n/a	n/a
2	Hamilton	Minimum tillage	60	30,750	1.2	5.2	13.6	6.6	24	545	n/a
		Reduced tillage	45	28,750	1.2	5.1	14.2	6.4	26	428	n/a
2	Palo Alto	150 lb N side-dressed	61	26,000	1.4	5.6	14.1	6.6	10	2,177	177
		300 lb N side-dressed	59	25,000	1.6	5.6	13.5	6.4	7	1,573	180
2	Pocahontas	Strip-tillage	58	29,667	1.2	4.7	12.3	5.5	24	1,490	189
		Conventional tillage	32	30,833	1.3	5.1	12.6	5.7	33	750	194
2	Webster	No-tillage, C-s	66	26,500	1.2	5.1	13.1	6.9	13	2,817	160.4
		Reduce tillage, C-s	69	29,167	1.2	5.1	13.7	5.8	13	1,977	170.3
		No-tillage, C-c	71	27,167	1.2	5.0	13.7	6.6	12	2,117	169.1
		Conventional tillage, C-c	13	26,667	1.2	5.4	13.5	7.4	8	631	169.5

† This comparison was established in the fall of 2005 with the 2005 growing season being a baseline year with no true comparison.
‡ This is corn silage yield in tons/acre.
§ This is soybean yield in bushels/acre.

Appendix A. Data collection results for all on-farm demonstrations. Yields are for corn grain unless noted. (continued)

3	Butler [†]	Cover crop following corn silage	20	27,833	1.4	4.4	10.1	5.2	30	n/a	18[‡]
		No cover crop following corn silage	20	28,000	1.4	4.2	10.9	5.5	28	n/a	18[‡]
3	Delaware	Strip-tillage	38	33,833	1.4	4.8	11.7	6.4	26	5,673	218
		Conventional tillage with NH_3	30	33,333	1.4	4.9	11.3	6.6	20	3,653	219
		Conventional tillage with manure N	30	32,167	1.3	6.4	11.5	6.4	61	7,960	212
3	Howard – 1	No-tillage, C-s	65	29,833	1.4	4.0	13.3	5.4	27	1,255	170
		Ridge tillage, C-s	62	30,000	1.4	3.1	13.5	5.4	26	1,022	170
		No-tillage, S-c	75	94,833	1.5	3.9	13.4	6.5	n/a	n/a	61 [§]
		Ridge tillage, S-c	74	87,333	1.5	3.8	13.1	6.6	n/a	n/a	62 [§]
3	Howard – 2 [†]	Baled corn stalks	46	30,000	1.4	4.1	12.1	6.9	34	2,840	214
		No baled corn stalks	48	28,667	1.5	4.4	12.6	6.9	35	1,147	200
4	Adair	Minimum tillage	63	28,500	1.3	3.5	10.0	5.7	17	3,087	196
		Reduced tillage	24	27,500	1.3	3.2	9.7	6.2	18	2,220	200
4	Keokuk	Minimum tillage	58	26,500	1.1	2.9	12.0	6.0	38	152	129
		Reduced tillage	31	27,500	1.1	2.8	11.8	6.0	45	145	136
4	Page	Row crop, no-tillage, C-S	57	26,167	1.3	3.8	11.7	6.1	18	368	n/a
		Alfalfa	100	n/a	1.1	3.7	11.0	6.9	n/a	n/a	n/a
		Pasture	100	n/a	1.5	3.6	10.4	6.4	n/a	n/a	n/a
5	Fremont	No-tillage	69.2	27,667	1.2	3.0	10.3	5.5	16	831	193
		No-tillage with starter fertilizer	70.8	26,833	1.2	2.9	9.8	5.5	15	233	178
5	Pottawattamie	Minimum tillage	71.5	31,000	1.4	3.1	9.5	5.4	13	2,120	223
		Minimum tillage with row cleaners	65.5	30,000	1.3	2.6	10.0	5.5	19	1,777	221
		Reduced tillage	51.7	31,167	1.2	3.4	11.0	5.9	9	3,180	215

Appendix C. Statewide Iowa Learning Farm survey results; percentage distribution (n=978); July 2005

1. Iowa county that holds the majority of your crop acres (n=956).

1%	Adair (001)	<1%	Jefferson (101)
<1%	Adams (003)	1%	Johnson (103)
1%	Allamakee (005)	1%	Jones (105)
1%	Appanoose (007)	1%	Keokuk (107)
<1%	Audubon (009)	2%	Kossuth (109)
1%	Benton (011)	1%	Lee (111)
<1%	Black Hawk (013)	1%	Linn (113)
1%	Boone (015)	1%	Louisa (115)
1%	Bremer (017)	1%	Lucas (117)
2%	Buchanan (019)	2%	Lyon (119)
2%	Buena Vista (021)	<1%	Madison (121)
2%	Butler (023)	<1%	Mahaska (123)
1%	Calhoun (025)	<1%	Marion (125)
1%	Carroll (027)	1%	Marshall (127)
<1%	Cass (029)	2%	Mills (129)
1%	Cedar (031)	1%	Mitchell (131)
1%	Cerro Gordo (033)	2%	Monona (133)
2%	Cherokee (035)	1%	Monroe (135)
1%	Chickasaw (037)	1%	Montgomery (137)
<1%	Clarke (039)	<1%	Muscatine (139)
1%	Clay (041)	2%	O'Brien (141)
1%	Clayton (043)	1%	Osceola (143)
1%	Clinton (045)	1%	Page (145)
1%	Crawford (047)	1%	Palo Alto (147)
1%	Dallas (049)	2%	Plymouth (149)
<1%	Davis (051)	1%	Pocahontas (151)
<1%	Decatur (053)	<1%	Polk (153)
1%	Delaware (055)	5%	Pottawattamie (155)
<1%	Des Moines (057)	1%	Poweshiek (157)
1%	Dickinson (059)	<1%	Ringgold (159)
1%	Dubuque (061)	2%	Sac (161)
1%	Emmet (063)	<1%	Scott (163)
2%	Fayette (065)	1%	Shelby (165)
1%	Floyd (067)	3%	Sioux (167)
1%	Franklin (069)	1%	Story (169)
2%	Fremont (071)	1%	Tama (171)
1%	Greene (073)	<1%	Taylor (173)
2%	Grundy (075)	1%	Union (175)
<1%	Guthrie (077)	<1%	Van Buren (177)
1%	Hamilton (079)	<1%	Wapello (179)
1%	Hancock (081)	<1%	Warren (181)
1%	Hardin (083)	2%	Washington (183)
2%	Harrison (085)	1%	Wayne (185)
<1%	Henry (087)	1%	Webster (187)
1%	Howard (089)	1%	Winnebago (189)
1%	Humboldt (091)	1%	Winneshiek (191)
1%	Ida (093)	4%	Woodbury (193)
1%	Iowa (095)	1%	Worth (195)
1%	Jackson (097)	1%	Wright (197)
1%	Jasper (099)		

2. Total acres in farming operation (n=978)**;**
Range = 200-18,000; Median = 600
$\bar{x}$ = 837; SD = 1,011

Total row crop acres (n=944);
Range = 0-17,000; Median = 500
$\bar{x}$ = 741; SD = 967

Acres owned (n=967);
Range = 0-5,500; Median = 240
$\bar{x}$ = 331; SD = 436

Acres rented from others (n=935);
Range = 0-11,500; Median = 340
$\bar{x}$ = 481; SD = 780

In general, do you manage your rented acres similarly or differently from your owned acres? (n=741)
Similarly – 98%
Differently – 2% Explain (n=16)
Comment – 94%
No Comment – 6%

3. What enterprises are part of your farming operation? *(Check all that apply)* (n=978)

% ✓'ed	
97	Row crops
43	Pastureland/hay and forage
19	Hogs
38	Cattle
2	Poultry
1	Vegetable/horticulture

4. Do you have detailed management plans for the following aspects of your farming operation? (n=180)

	Check if Have Plan	Year Plan Updated	If no plan, do you plan to develop one in next 1-3 years? Yes	No
Row crops	59%	(n=334) Range = 1976-2006 Mode = 2005 (54%)	(n=302) 19%	81%
Tillage	52%	(n=291) Range = 1980-2006 Mode = 2005 (50%)	(n=284) 17%	83%
Commercial fertilizers	51%	(n=288) Range = 1976-2006 Mode = 2005 (56%)	(n=287) 21%	79%
Manure management	24%	(n=146) Range = 1990-2005 Mode = 2005 (57%)	(n=322) 11%	89%
Pesticide practices	41%	(n=230) Range = 1990-2006 Mode = 2005 (64%)	(n=311) 17%	83%

5. Who (if anyone) helped you design your cropland management plans. *(Check all that apply)* (n=971)

% ✓'ed	
47	Designed primarily by myself
11	Farming partner
25	Coop/supply dealer
8	Private agronomist/crop consultant
15	USDA agency
3	ISU Extension staff
3	Other *(specify)* (n=28) Comments, 96% No comment, 4%
25	Not applicable, have not developed cropland mangement plans

6. In the last four years did you perform soil tests on any land you operate? *(Circle response)* (n=878)

Yes – 90%
No – 10%

If Yes:

a. What percentage of cropland was tested? (n=878)

1.) 100%	46%
2.) 75% to 99%	17%
3.) 50% to 74%	25%
4.) less than 50%	12%

b. How was the sampling done? *(Check all that apply)* (n=889)

% ✓'ed	
42	By using a grid
46	By random selection, non-grid
26	By soil type method
2	Other *(Specify)* (n=14) Comment, 100% No comment, 0%
3	Don't know

c. Who did the sampling? *Check all that apply)* (n=889)

% ✓'ed	
73	By fertilizer supplier
14	By self
18	By independent consultant
1	Other *(Specify)* (n=8) Comment, 88% No comment, 12%

7. Are you currently using the NRCS Soil Condition Index to help manage your soil quality? (n=856)

Yes	18%
No	42%
Not familiar with the Soil Condition Index	40%

8. Do you have written field-by-field records? (n=931)
Yes – 71%
No – 29%

If yes: (n=704)
a. Are records kept on the … *(Check all that apply)*

% ✓'ed	
90	Crop varieties planted
76	Soil test results
52	Field operations (tillage, planting)
19	Pest scouting reports and levels of infestation
64	Pesticide application by field
88	Planting dates
81	Fertilizer application rates
75	Yields

b. Who maintains or updates the records *(Check all that apply)*(n=704)

% ✓'ed			
88	On farm (self or spouse)		
5	Consultant		
20	Dealer		
3	Other *(Specify)* (n=24)	Comment, 100%	No comment, 0%

9. Which of the following factors do you use in determining your nutrient application rates? *Check all that apply)* (n=977)

% ✓'ed			
72	Soil needs		
74	Crop needs		
68	Yield goals		
52	Fertilizer dealer recommendations		
13	On farm side-by-side comparisons		
40	Overall past experiences		
13	ISU Extension recommendations		
4	Landlord recommendations / stipulation		
18	Environmental impacts		
3	Other *(Specify)* (n=33)	Comment, 97%	No comment, 3%

10. Which of the following pest mangement practices do you use? *(Check all that apply)* (n=977)

% ✓'ed	
49	Follow local reports on presence of pests (Extension publications and reports/crop consultant info)
59	Follow local reports on presence of pests from crop consultant or input suppliers
34	Avoid varieties with historical pest problems
32	Spot treat on individual field basis for pest management
11	Adjust planting/harvesting dates to avoid pests
26	Predetermined and scheduled timing for scouting weeds and insects
9	Systematic sampling when scouting (i.e. a set patter is used in field)
58	Economic threshold formula to determine appropriate actions

11. Tell us about your dominate tillage systems by indicating the tillage implements you use and the "label" or "name" you use to describe them. (Use the column boxes to answer separately for each rotation listed.)

Tillage System (n=976)	Corn Following Corn (n=506) 48% ✓ not applicable	Corn Following Soybean (n=890) 9% ✓ not applicable	Soybean Following Corn (n=873) 11% ✓ not applicable	Corn Following Sod (n=243) 75% ✓ not applicable
	% ✓'ed	% ✓'ed	% ✓'ed	% ✓'ed
Tillage implements				
Moldboard plowing	8	1	2	39
Chisel plowing	33	10	22	18
Disking	40	21	34	31
Field cultivation	42	55	38	27
Row cultivating	7	9	6	6
Disk ripping	26	6	18	5
System description				
No-tillage planting	14	32	36	29
Ridge tillage	2	2	2	1
Reduced tillage	21	21	20	7
Mulch tillage	8	3	4	2
Minimum tillage	26	30	23	14
Conventional tillage	21	16	16	28
Strip tillage	2	2	<1	1
Percentage of cropland in this rotation in 2005	(n=430) Range 0-100% Median = 22% $\overline{x}$ = 35; SD = 32	(n=795) Range 0-100% Median = 50% $\overline{x}$ = 57; SD = 25	(n=776) Range 0-120% Median = 50% $\overline{x}$ = 56; SD = 26	(n=170) Range 0-100% Median = 10% $\overline{x}$ = 20; SD = 31

One objective of the Iowa Learning Farm project is to provide information to assist farmers in better conservation practices. The following questions ask about your perceptions and experiences.

12. How well do you believe your current tillage systems…

	Not Very Well	**Adequate**	**Very Good**	**Excellent**
a. Provide good seed bed for plant development (n=936)	3%	20%	47%	30%
b. Control for weeds and insects (n=929)	4%	27%	47%	23%
c. Control for erosion (n=932)	3%	25%	44%	28%

13. In the next 3-4 years, what plans, if any, do you have to change tillage systems? (n=174)

No plans 54%
Minor refinement only 43%
Significant changes 4% *(Please describe your plans)* (n=441)
Comment, 39% No comment, 61%

14. On cropland in your immediate vicinity (2-4 mile radius of your residence) which statement best describes…

a. Sheet, rill and wind erosion (n=946)

% ✓'ed	
4	Soil loss rates are not controlled and soil loss rates are above the soil loss tolerance level.
8	Soil loss rates are above the soil loss tolerance but at alternate conservation system level.
42	Soil loss rates are at tolerance levels.
30	Soil loss rates are below tolerance levels and are enhancing the soil resource.
15	Do not know.

b. Gully erosion (n=937)

% ✓'ed	
3	Gully erosion is not controlled.
12	Gully erosion is minimal, controlled and often control methods fail.
56	Gully erosion sites are controlled but sometimes control methods fail.
19	All gully erosion sites are controlled with no gullies present.
11	Do not know.

c. Streambank erosion (n=942)

% ✓'ed	
1	Heavy streambank erosion occuring along most of stream bank, no buffer strip in place.
9	Erosion is occuring along most of the streambank, with little or no buffer strip in place.
43	There is slight streambank erosion occuring in limited places, a buffer strip is in place.
22	There is no streambank erosion occuring or not present.
16	Do not know.
9	Not applicable, no stream within 5 miles of residence.

15. What is the source of your family's drinking water? *(Check all that apply)* (n=975)

% ✓'ed		
9	Bottled water	
34	Rural/municipal →	**Do you filter your water?** (n=557)
73	Well water ↓	Yes – 36% No – 64%

How effectively is your well protected? *(Check all that apply)* (n=711)

% ✓'ed	
59	Tight casing
65	Casing extended above ground
49	Well head sealed
66	Surface runoff does not reach area surrounding well

16. Do you know the name of the watershed where the majority of your crop acres are located? If so, name the watershed. (n=349)

Cedar	6%	Nishnabotna	3%
Des Moines	5%	Raccoon	12%
Floyd	1%	Skunk	3%
Iowa	3%	Turkey	3%
Little Sioux	5%	Wapsipinicon	6%
Maquoketa	3%	Other	52%

17. Is this watershed on the government list of "impaired" watershed? (n=825)

Yes	10%
No	14%
Don't know	76%

18. Is there an organized water quality management program in your area or watershed for you? (n=928)

Yes	22%
No	16%
Don't know	62%

19. Below is a series of statements about agriculture, farming and natural resources. Your views are important to us. Please circle the response that best indicates the level of your agreement or disagreement with each statement.

		Strongly Disagree		Mildly Disagree	Mildly Agree		Strongly Agree
		Percentage					
a)	I view my farm first and foremost as a business enterprise and secondly as a way of life (n=938)	4	4	11	28	24	29
b)	The lifestyle of farming is very important to me (n=948)	1	1	2	16	32	50
c)	Farming communities are great places to live (n=953)	1	1	1	10	26	62
d)	In my community farmers who regularly make conservation improvements to their land are more respected than those who do not (n=942)	2	3	13	38	25	18
e)	I feel it is important to leave my land in better shape for the next generation than I found it (n=952)	<1	<1	1	8	29	61
f)	Managing environmental impacts on my farm is a very high priority even if it means slightly less profitability (n=950)	1	1	5	31	35	28
g)	Lack of information about best production and conservation practices is a significant limitation to better land management (n=937)	7	11	22	31	19	10
h)	My farm's profitability must also increase when I undertake new conservation work (n=937)	2	4	14	37	26	17
i)	Planting areas around my farm with native trees and shrubs is important as it encourages native birds and animals (n=937)	7	9	19	34	17	16
j)	Conservation work improves the value of my property (n=944)	1	2	9	29	32	28
k)	Government incentives to farmers to undertake conservation practices is more a public investment than a reward to individual farm operators (n=943)	3	5	13	29	29	20
l)	Government conservation programs such as CRP and WRP remove too much land out of production (n=942)	24	20	30	14	7	5
m)	Improved conservation practices already undertaken by farmers are often not recognized by the general public (n=945)	1	3	6	25	37	28

20. Have you seen the Learning Farm logo in a field in your area? (n=931)

Yes	8%
No	81%
Not sure	12%

21. As a matter of public policy, which statement better reflects your views? *(Circle response.)* (n=878)

Providing green payments for being good stewards	51%
Providing commodity payments to ensure food production	42%
Both	4%
Neither	2%

22. What are the sources of information you use when making tillage and soil conservation decisions? From the list below, indicate the sources you use and the usefulness of these sources.

Information Source	Never Used %	Not Useful %	Of Some Use %	Very Useful %
Print Media				
Daily newspaper (n=885)	36	25	33	6
Weekly community newspaper (n=876)	33	32	30	4
Weekly farm newspaper (n=884)	14	8	60	19
Farm magazines (n=914)	5	4	64	27
Fact sheet/brochures from commercial businesses and farm suppliers (n=894)	12	14	61	13
Fact sheet/brochures from ISU, USDA, and state agencies (n=899)	8	6	57	30
Fact sheet/brochures from other organizations (n=855)	14	19	59	8
Electronic Media				
Commercial television (n=883)	31	37	28	4
Public television (n=889)	26	25	40	8
Commercial radio (n=879)	22	26	44	8
Public radio (WOI/WSUI) (n=872)	33	23	35	8
Internet websites (n=865)	34	16	38	11
Public Meetings Events				
Extension or agricultural agency sponsored meetings (n=903)	10	8	55	27
Farm supplier sponsored meetings (n=896)	6	6	63	25
Field day or farm demonstration (n=905)	5	5	57	33
Individual Conversations				
Private sector agronomist/ consultants (n=882)	14	8	52	26
ISU/Extension/USDA agency staff (n=892)	9	7	56	29
Other farmers (n=989)	4	5	59	32

23. When you seek information from other farmers whose advice do you find most helpful? *(Check all that apply.)* (n=975)

% ✓'ed	
52	Farmers who attend field days and other education events
52	Neighbors/friends at informal gatherings
19	Farmers who are in organizations/associations that I belong to
22	Farmers who work for agribusiness
67	Farmers who are especially progressive and successful

24. Finally, we would like information to help us describe the representativeness of our sample.

a. Year of birth: (n=961) Range = 1915-1983; Median = 1950; $\bar{x}$ = 1949; SD = 13

b. Sex: (n=951)

Female – 4% Male – 96%

c. What is your highest level of education? *(Circle response)* (n=959)

Some high school	4%
High school diploma or GED	36%
Some college/community college/technical training	35%
Bachelor degree (and higher)	25%

d. Please indicate the shortest distance between your residence and the closest land you farm. *(Circle response)* (n=958)

Adjacent or less than one mile	81%
One to two miles	6%
More than two miles	12%

e. Who (if anyone) is a partner in your operations? *(Circle response)* (n=924)

Sole proprietorship/no partner (other than spouse)	70%	Partner other relative	9%
Partner (parent/son/daughter)	19%	Partner non-relative	2%

f. What percentage of your total household income is from the farm? *(Circle response.)* (n=924)

Less than 10%	4%	51% to 75%	9%
11% to 30%	9%	76% to 100%	26%
31% to 50%	17%		

g. In next 5–10 years, which statement best describes your farming plans? *(Circle response.)* (n=974)

	% ✓'ed	
Continue farming in similar farming operation	55%	
Significantly expand cropland	15%	
Significantly expand livestock operation	4%	
Scale back crop acres	4%	
Scale back livestock numbers	55%	
Exit or retire	55%	➔ **What will likely happen to your farmland?** (n=529)

Farm taken over by partner/relative	49%
Sell to another farmer	1%
Sell to highest bidder	6%
Other	11%
Don't know	33%

25. Comments you would like to share about the ISU Extension Learning Farms or ISU Agriculture and Natural Resources programs, in general. (n=978)

Comment	12%
No comment	88%

Thank you for completing this questionnaire. Fold, seal in business reply envelope and place in mail.

Appendix C. Themes from the discussion groups from all regions.

- **"Losing ground" in soil conservation efforts in the last couple of years**.
  - It can be more cost-effective to rent land rather than put it in CRP.
  - Most farmers won't implement soil conservation systems without government incentives.
  - When government funds run out, some farmers will rip out buffer strips and farm all available land.
  - Visible reduction of "no-till" in area
  - Soil conservation ethic has diminished
  - The influence of agribusiness on farming practices
- **Government role in conservation**
  - Regulations have no "teeth" - an "honors" system which doesn't work
  - Government does not get enough feedback from farmers when developing programs.
  - Send mixed messages - Creates good programs and doesn't fund them
  - Government crop payments versus green payments
    - Majority in discussion groups favor green payments
    - Government listens to Agribusiness who are primarily concerned with keeping an inexpensive supply of corn and soybeans
    - Most like the idea that those who are doing the conservation are rewarded as in new CSP
- **Soil Types matter as well as rainfall issues when it comes to using no-till**
- **Land Ownership**
  - Ever increasing farm size which leads to "bottom-line" farming
  - Absentee landlords – just interested in collecting a rent check, the closer the landlord lives to the land the more likely will be interested in conservation
  - If you are connected to land, you will take care of land
  - Many worry about future of their farm – concerns that their children won't be interested or can't earn a living at it.
- **Education of non-rural Iowans and children**
  - Urban dwellers need more education especially concerning sediment movement and water quality
  - Very little conservation is taught in schools