2008 PRECISION AGRICULTURAL SERVICES

DEALERSHIP SURVEY RESULTS

by

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Working Paper #08-09

September 2008

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Department of Agricultural Economics
Purdue University

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Abstract

Precision technologies are now well-integrated into the agricultural industry – both at the farm level and at the crop input dealer level. No longer are crop input dealers only using the technologies to bring new services to their customers, they are also utilizing the technology in their own businesses to improve the efficiency and effectiveness of their operations. In early 2008, *Crop Life* magazine and Purdue University's Center for Food and Agricultural Business conducted a survey for the 13th consecutive year to assess the adoption of precision agriculture practices in the U.S. from the perspective of the retail crop input dealer. The questionnaire was mailed to 2500 retail crop input dealerships across the U.S. A total of 298 questionnaires were returned, with 275 being usable providing an effective response rate of 11 percent.

Consistent with previous surveys, dealers were asked questions about the types of precision services they offer and/or use in their businesses, the fees they are charging for precision services, how their customers are adopting precision agriculture practices, and how profitable they are finding precision services to be in their businesses. Key findings include: 1) 61% of the dealers surveyed offered some type of precision service, down from 67% in 2006; 2) locations owned by cooperatives and regional/national organizations were much more likely to offer precision services relative to independent locations; 3) 43% of the respondents believe they make a profit on their precision service offerings, while some 30% believe they breakeven, covering only the fixed and variable costs of offering the services; and 4) dealers continue to expect growth in precision services, and this growth is more substantial in the Midwest relative to other states.

Keywords: precision agriculture, geographic information systems (GIS), crop input dealer, variable rate application, site-specific agriculture, technology adoption.

JEL Codes: Q13, O30, L84.

Table of Contents

List of Figures

2008 Precision Agricultural Services Dealership Survey Results

Introduction

In the spring of 2008, *Crop Life* magazine and Purdue University's Center for Food and Agricultural Business conducted a survey of crop input dealers for the 13th consecutive year. The survey was conducted in February and March 2008. In February, a questionnaire was sent to 2500 *Crop Life* retail crop input dealership readers across the US. (See Appendix I to this report for a copy of the questionnaire.) To get a better distribution of respondents, 500 of the questionnaires were sent specifically to the West with the remaining distribution reflecting *Crop Life* magazine's readership distribution. One change in survey protocol in 2008 was that there was no second mailing like there has been in other years. A total of 298 questionnaires were returned, with 275 being usable. This provided an effective response rate of 11 percent, one of the lowest response rates in the 13 years. (Response rates have ranged from a high of 38 percent in 1996 to a low of 11 percent in 2001 and 2008.)

Consistent with previous surveys, dealerships were asked questions about the types of precision services they offer and/or use in their businesses, how quickly their customers are adopting precision agriculture practices, and how profitable they are finding precision services to be in their businesses. This year additional questions were asked about the current barriers to adoption in terms of customers, dealers and technology, and their view on 'Precision 2.0' services. An additional topic explored this year is retailer-manufacturer roles and the changes expected over the next 2 to 3 years.

Questionnaire and Data Analysis Notes

As in other years, questionnaires were deemed "unusable" for several reasons. Some questionnaires were not filled out completely; others were from wholesalers who did not sell directly to farmers; some respondents sold only seed, while a few were from farmers. This year there were 23 unusable questionnaires among the 298 returned.

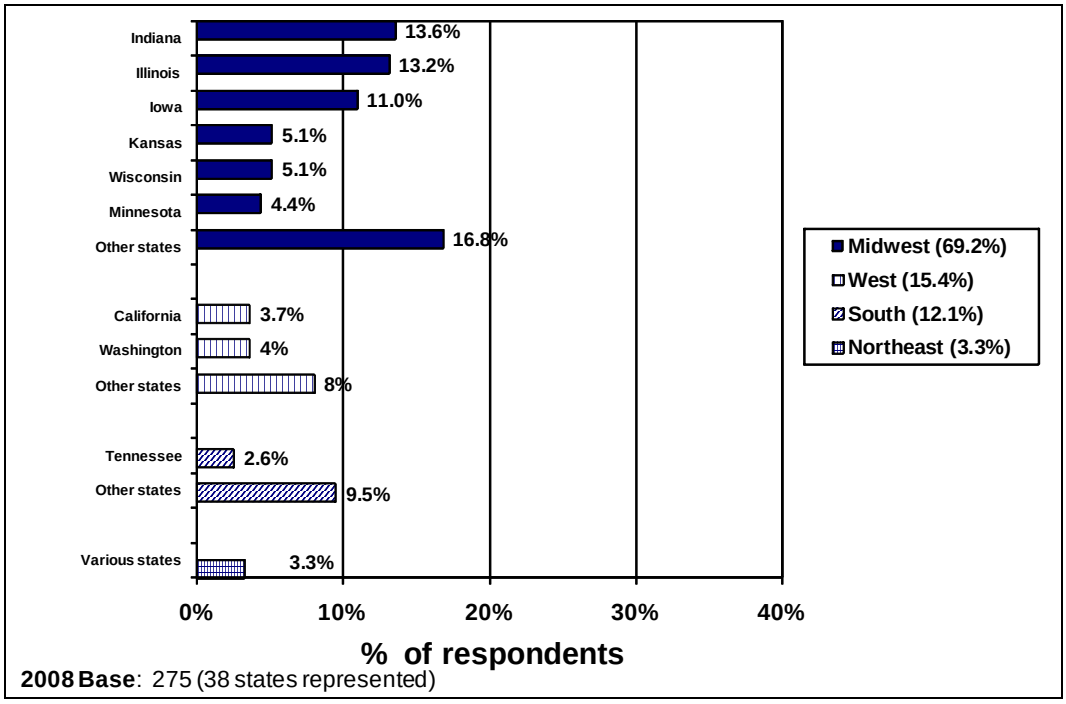
In 2000, 2001, and 2007 the data were statistically weighted to have the same demographics as previous years' demographics in order to make year-to-year comparisons more meaningful. These demographics included the region, organizational type and outlet size in terms of sales. Several procedural changes in the survey process in 2000 and 2001 made this necessary (timing of the survey, survey length, etc.). In 2007, the sample demographics did not compare to other years, resulting in the need to weight by demographics once again. This year the demographic results were similar to previous years and therefore no weighting was necessary.

The data were analyzed to identify statistical differences by region (Midwest versus other states) and differences between organizational types within the Midwest (cooperative, local independent, regional/national). Where charts or data are provided for these breakouts, differences are statistically different at $p < .05$ unless specifically stated otherwise.

The Respondents

The 275 survey respondents came from 38 states and one from Puerto Rico with the highest state representation from Indiana, accounting for 13.6 percent of the respondents, and Illinois with 13.2 percent of the respondents (Figure 1). By region, the Midwest was heavily represented in the sample, with 69 percent of the respondents being from the Midwest states of Indiana, Illinois, Iowa, Kansas, Wisconsin, Minnesota, Michigan, Missouri, Nebraska, North and South Dakota, and Ohio. Fifteen percent of the respondents were from the West, 12 percent were from the South, and 3 percent were from the Northeast.

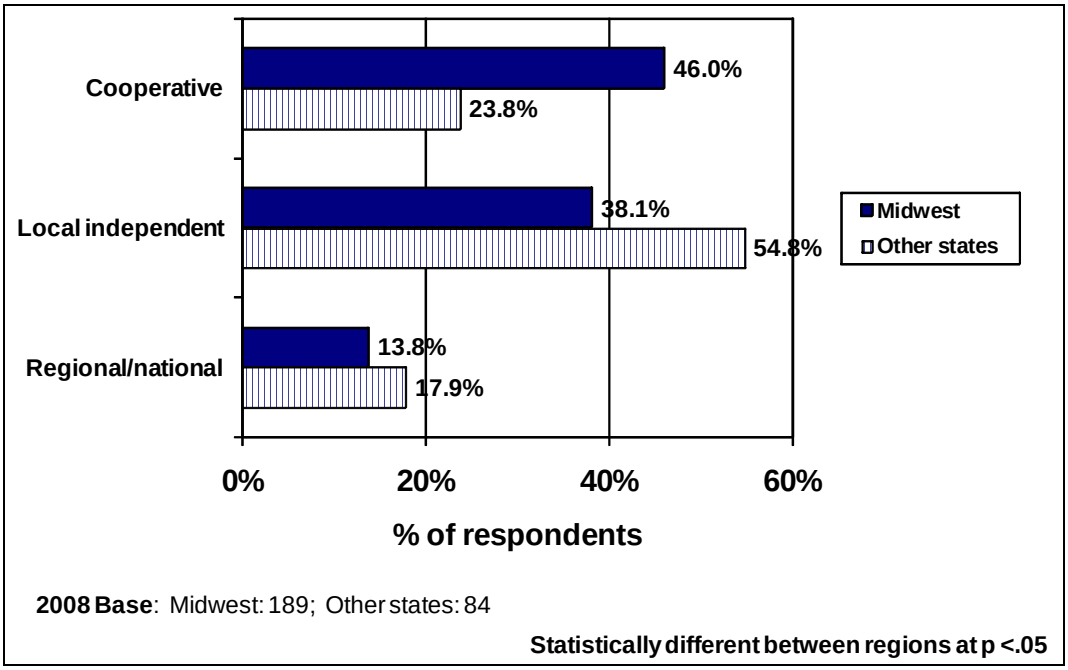
Figure 1. States Represented



Responding dealerships represented a variety of organizational types with 4 out of 10 of the sample respondents being cooperatives (39 percent), 43 percent representing local independents, and 15 percent being part of a national or regional chain of dealerships.

Figure 2 shows the organizational types for the Midwest and non-Midwestern respondents. Cooperatives accounted for approximately half of the Midwest sample while local independents accounted for approximately 40 percent of the Midwest sample. In non-Midwestern states, local independents accounted for 55 percent of the sample this year.

Figure 2. Organization Types by Region



The size of the responding dealerships ranged from one outlet (39 percent of the respondents) to more than 25 outlets (18 percent of the respondents) (Figure 3). When the number of retail outlets was broken out by region (Figure 4), respondents with only one retail outlet were the most common in both regions (36 percent of the Midwestern respondents and 45 percent of the respondents from other states). In both regions, respondents from firms with 2 to 15 outlets were next most common (23 percent in the Midwest and 21 percent of the respondents from non-Midwestern states).

There were significantly more respondents from Midwestern states representing firms with more than 25 outlets than respondents from the non-Midwest. In the Midwest, local independents were significantly more likely to have only one retail outlet (71 percent compared to 15 percent of the cooperatives and 8 percent of the regional/nationals) while the most common size for cooperatives was 2 to 15 outlets (64 percent) and the majority of the regional/national organizations had over 25 outlets (65 percent of these respondents).

Figure 3. Number of Retail Outlets Owned or Managed

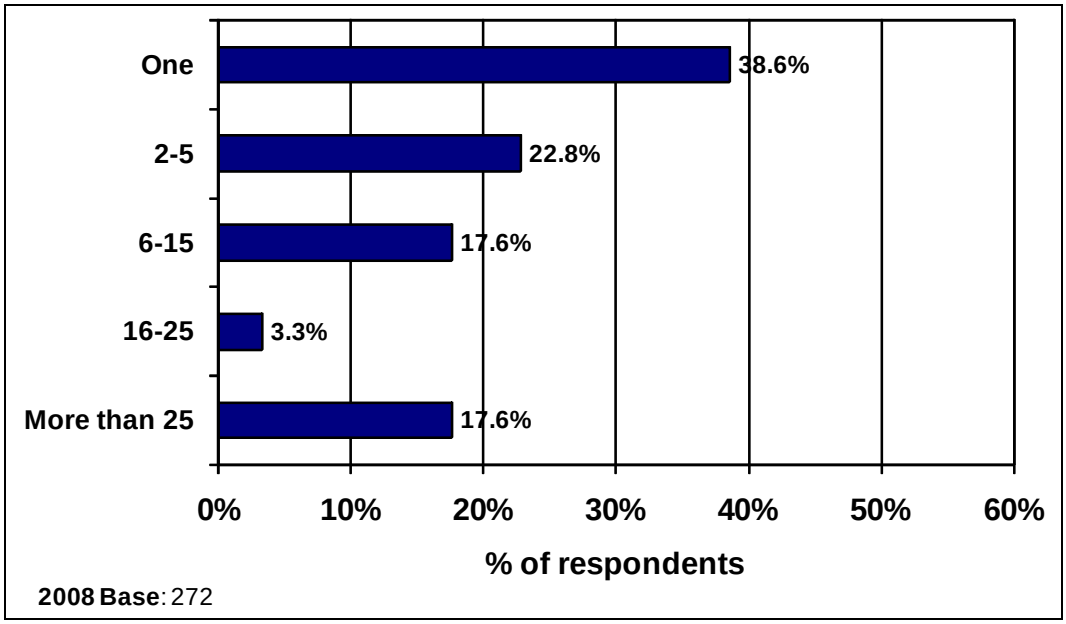
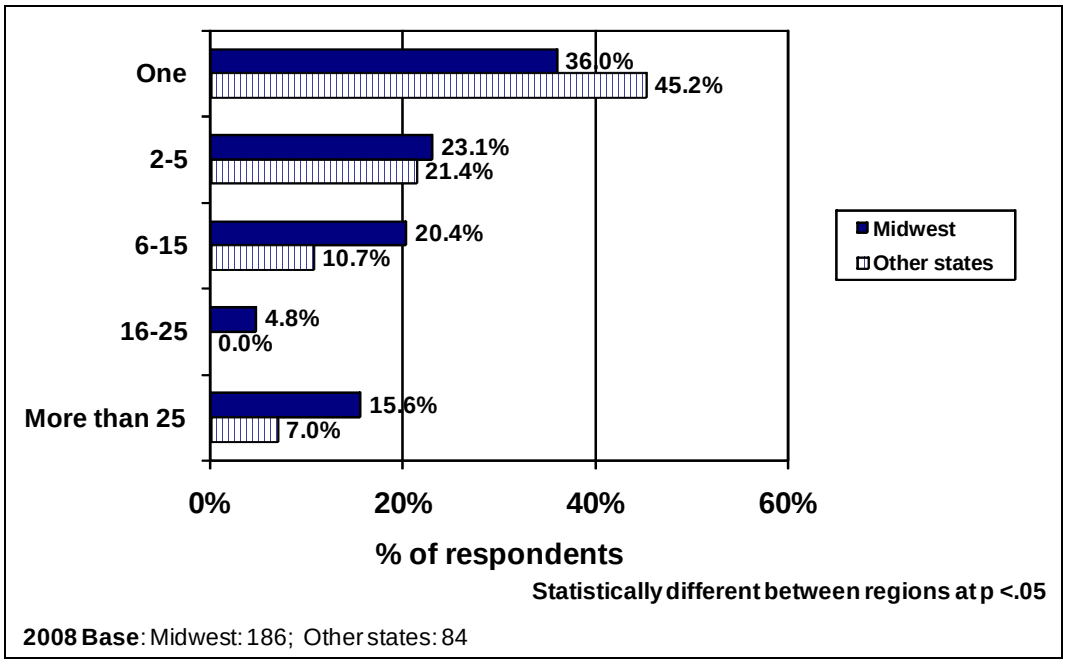


Figure 4. Number of Retail Outlets Owned or Managed by Region



Respondents also represented a range of outlet sizes. Fourteen percent of this year's respondents had annual crop input sales of less than $1 million at their location, similar to last year, while 38 percent had $5 million or more in annual agronomy sales (Figure 5). There were no significant differences in outlet size across regions (Figure 6).

Figure 5. 2007 Annual Agronomy Sales at Location

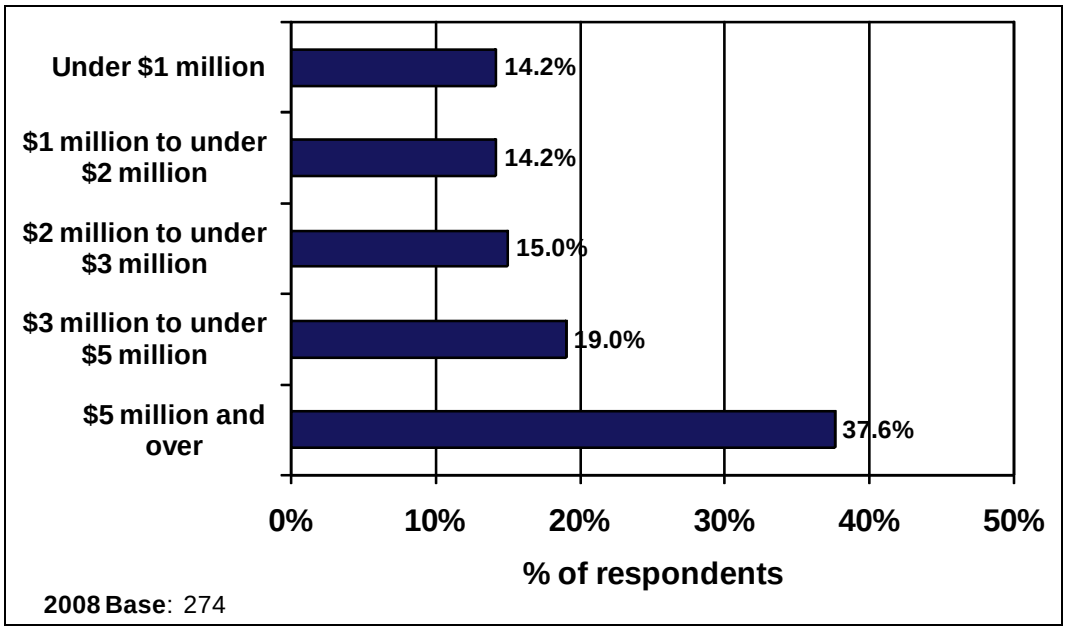
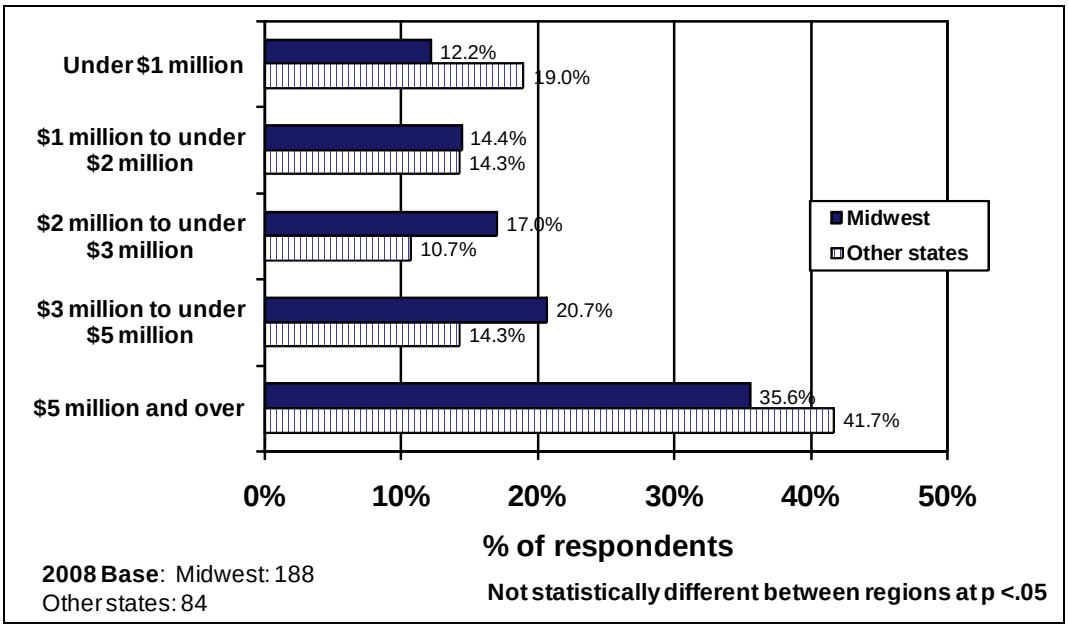
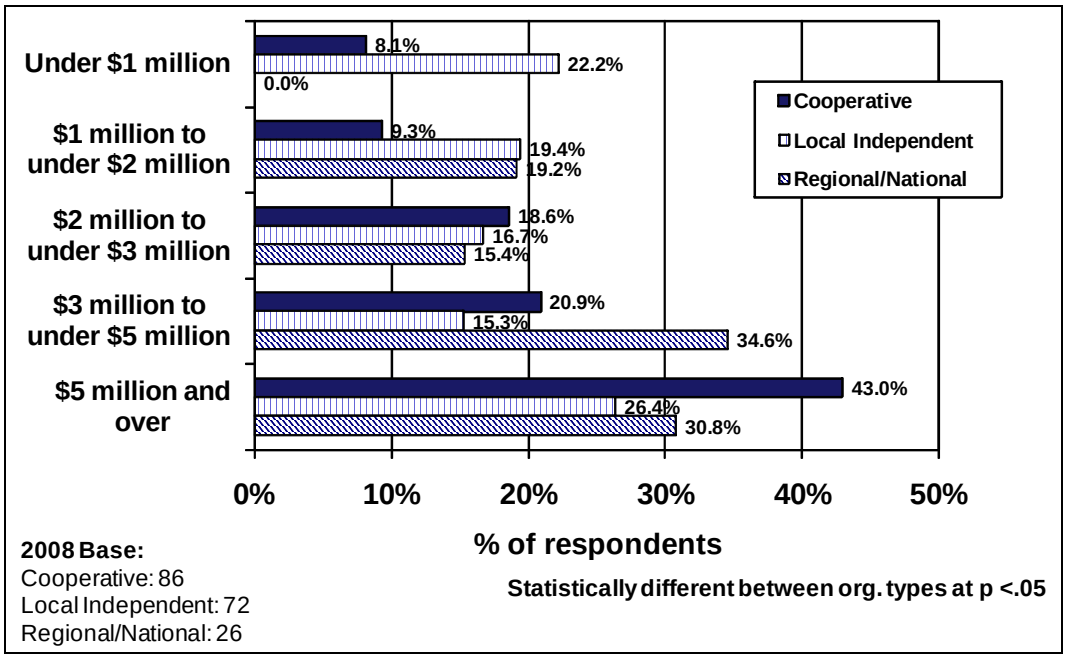


Figure 6. 2007 Annual Agronomy Sales at Location by Region



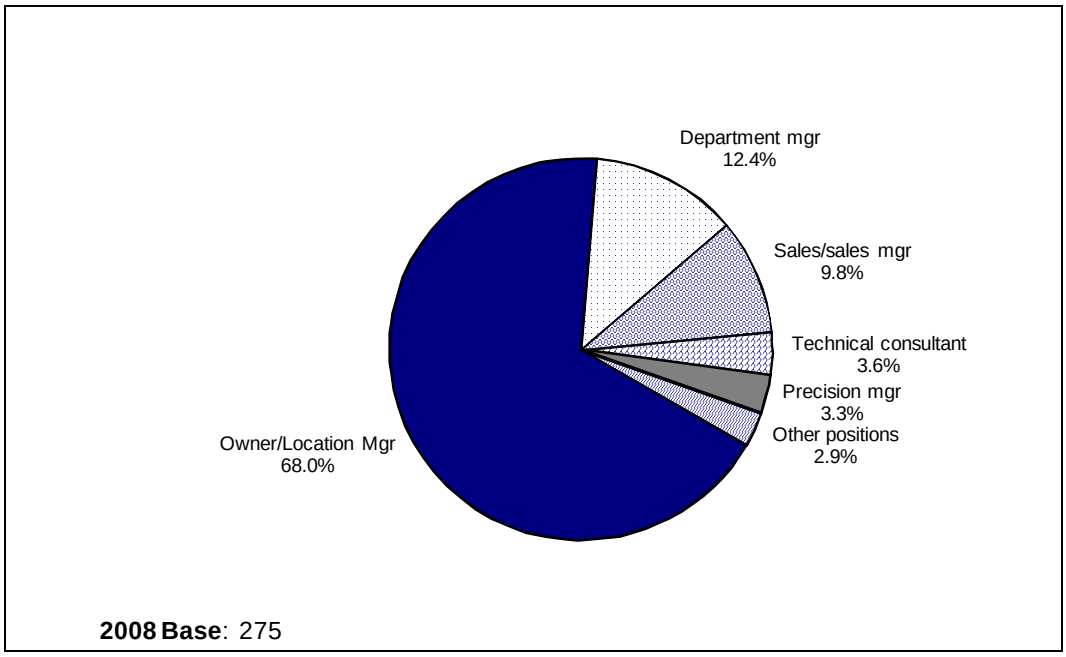
Within the Midwest, there were significant differences in annual crop input sales by organizational type. Local independents were not only smaller in terms of the number of outlets in their businesses, but their outlets were also significantly smaller in terms of crop input sales dollars per outlet (Figure 7) while cooperatives were most likely to have over $5 million in sales at their location. This is similar to previous years.

Figure 7. 2007 Annual Agronomy Sales at Location by Organizational Type in the Midwest



Two-thirds of the questionnaires were completed by the owner or manager of the outlet (68 percent), while 12 percent of the respondents were departmental managers (Figure 8). Technical consultants and precision managers together accounted for 7 percent of the respondents. There were no significant differences between regions as far as who answered the questionnaire. In the Midwest, the owner/manager was again the most common position for respondents from all three types of organizations. Eight out of 10 (83 percent) of the respondents representing local independents owned or managed the location, while 69 percent of those representing regional/national organizations were owners/managers and 53 percent of the respondents representing cooperatives were the manager.

Figure 8. Responsibility of Survey Respondent



Custom Application

Custom application was offered by 88 percent of the respondents. (Custom application here is defined as dealership application of fertilizer, pesticides, and/or custom seeding.) Over half of the respondents custom applied more than 25,000 acres per year (59 percent) (Figure 9). Across the U.S., however, custom application was most common in the Midwest where 91 percent of the respondents offered custom application services compared to 81 percent of the respondents from other states (

Figure 10).

Figure 9. Acres Custom Applied

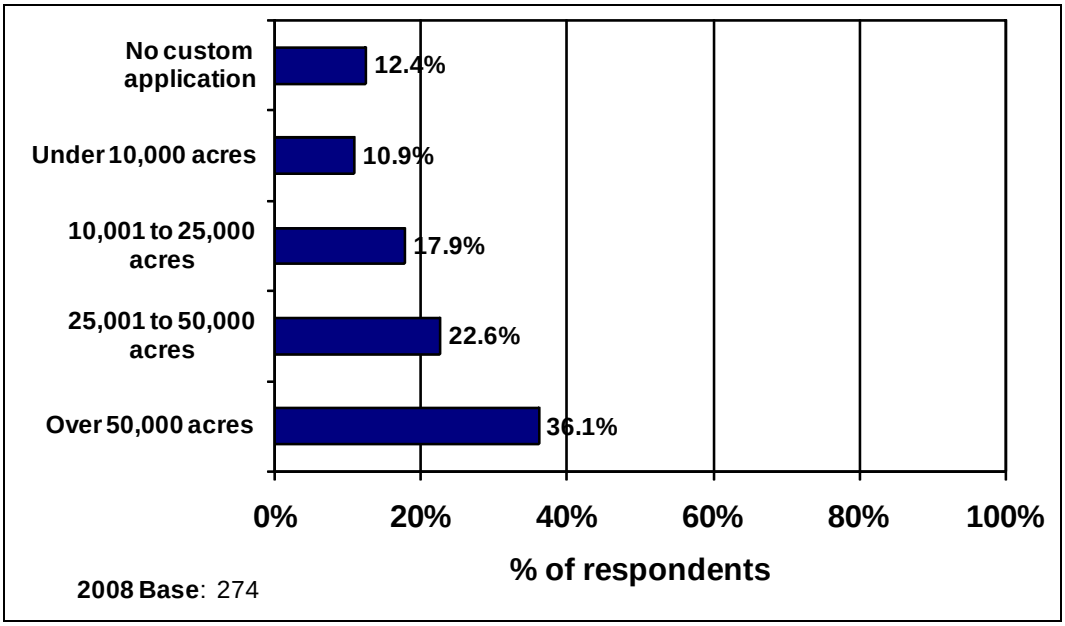
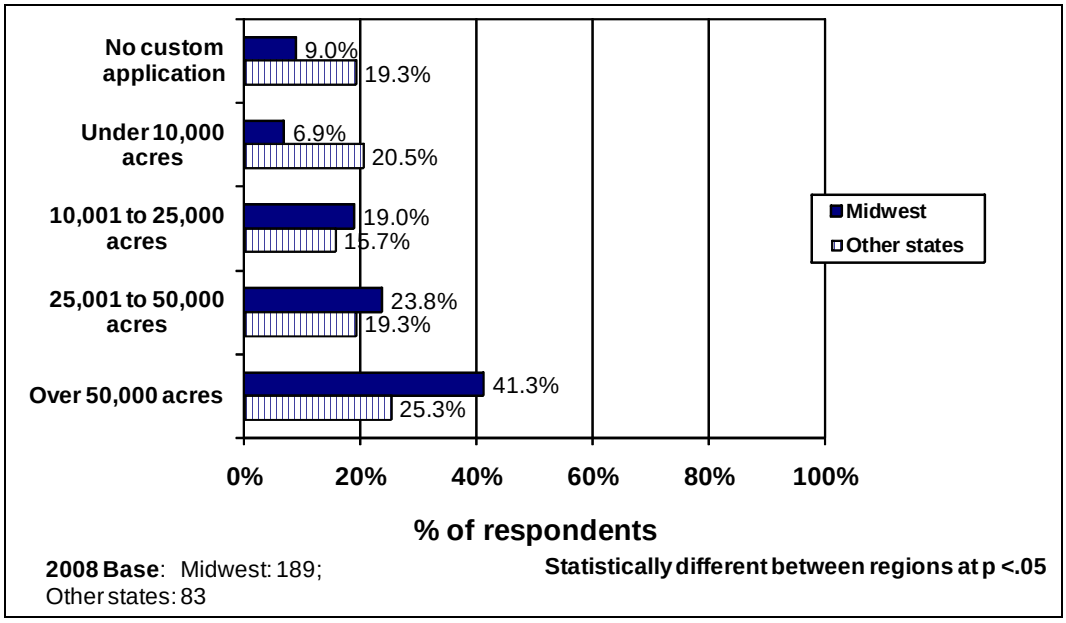
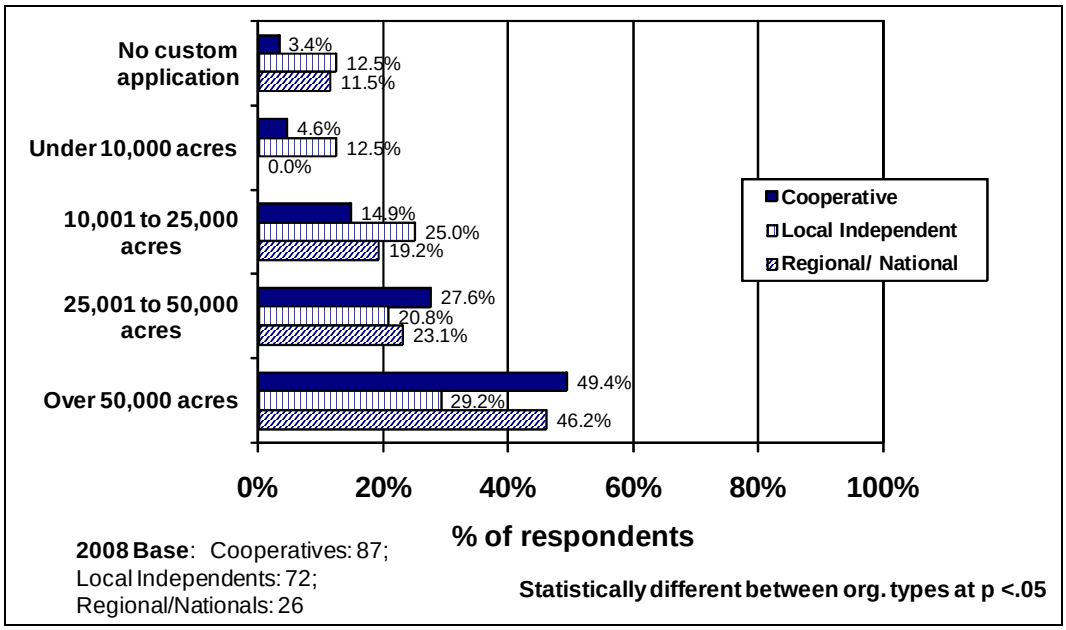


Figure 10. Acres Custom Applied by Region



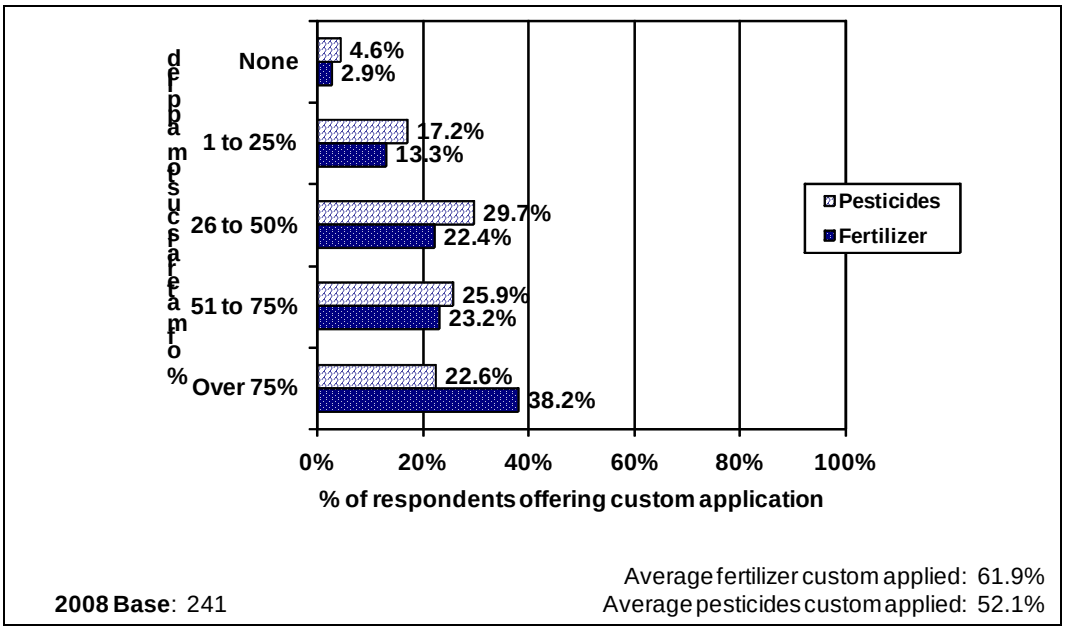
Similar to other years, local independents in the Midwest were less likely to offer custom application than were other organizations, with 13 percent of the local independents and 12 percent of the regional/nationals not offering custom application compared to only 3 percent of the cooperatives (Figure 11).

Figure 11. Acres Custom Applied by Organizational Type in the Midwest



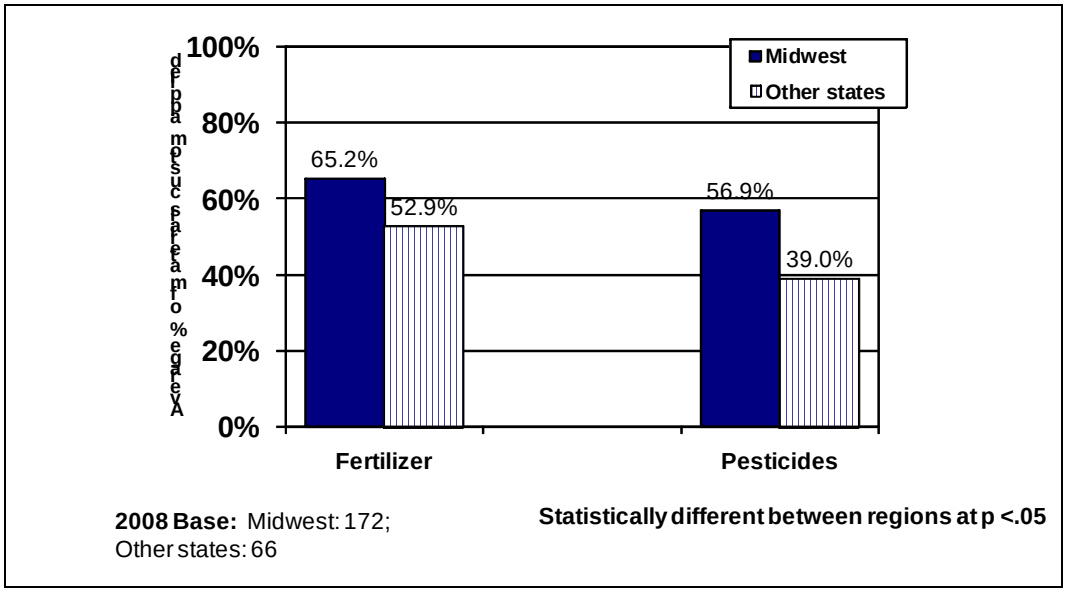
When asked specifically about custom application of fertilizer versus pesticides, respondents custom applied a slightly greater proportion of the fertilizer they sold relative to pesticides. On average, respondents who indicated their outlet offered custom application applied 62 percent of the fertilizer they sold and 52 percent of the pesticides they sold (Figure 12). A quarter of the respondents (23 percent) said their dealership custom applied over 75 percent of the pesticides sold. Over a third of the respondents (38 percent) said they custom applied over 75 percent of the fertilizer they sold.

Figure 12. Custom Application of Fertilizer and Pesticides



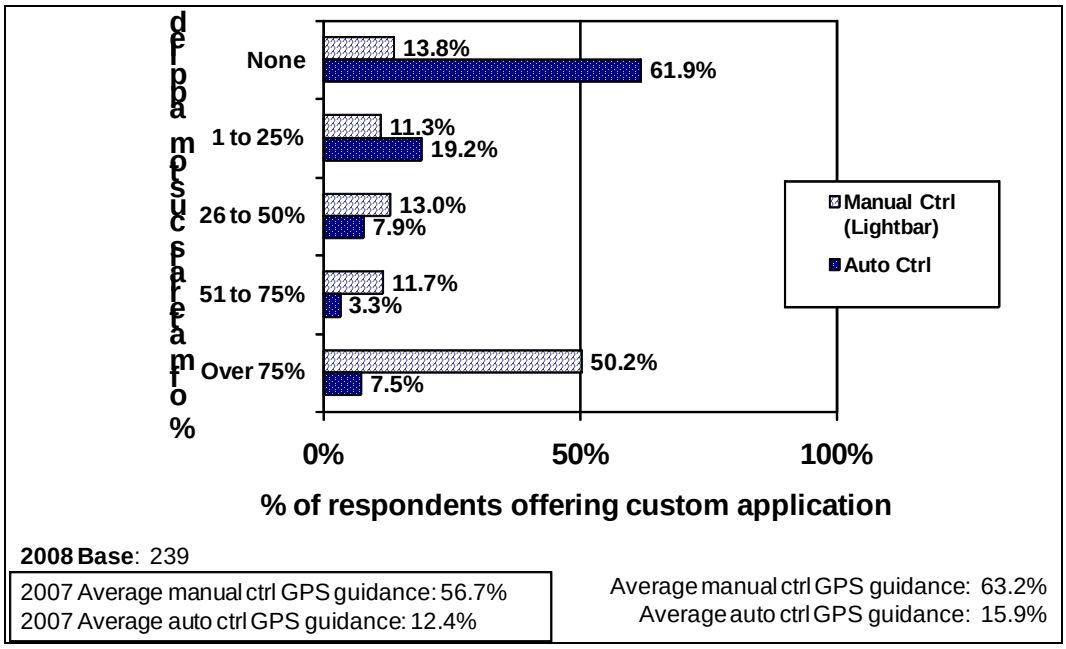
Those dealerships from the Midwest who offered custom application typically applied a greater proportion of the fertilizer and pesticides they sold. Midwestern respondents said they custom applied an average of 65 percent of the fertilizer they sold and 57 percent of the pesticides they sold while those from non-Midwestern states applied an average of 53 percent of the fertilizer sold and 39 percent of the pesticides sold (Figure 13). In the Midwest, there were no differences in the average amount of fertilizer or pesticides custom applied by organizational type.

Figure 13. Custom Application of Fertilizer and Pesticides by Region



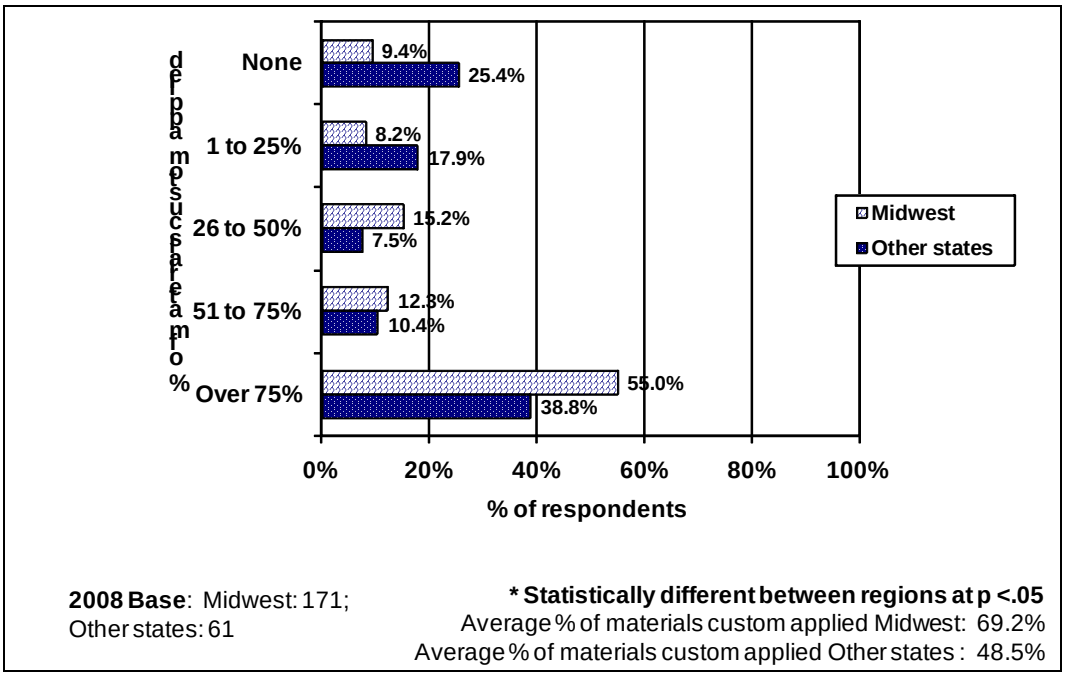
One of the fast growing areas the past few years has been in the use of GPS guidance systems for custom application. Of those who offered custom application, 86 percent said they were custom applying at least some of the fertilizer/chemicals using a GPS guidance system with manual control/light bar, up from 82 percent in 2007 (Figure 19). Twenty-eight percent said they used a GPS guidance system with auto control/auto steer for at least some of their custom application, similar to last year. Overall, an average of 63 percent of the materials custom applied were applied with GPS with manual control/light bar (compared to 57 percent in 2007) and 16 percent of the materials custom applied were applied with auto control GPS (compared to 12 percent in 2007).

Figure 14. Use of GPS Guidance Systems for Custom Application



The use of GPS guidance systems with manual control/lightbars varied by region (Figure 15), with heavier use in the Midwest than in non-Midwestern states. Over 90 percent of the respondents from the Midwest used some form of GPS guidance system with manual control, compared to only 75 percent of the respondents from non-Midwestern states. On average, 69 percent of the materials being custom applied in the Midwest were applied with manual control GPS guidance systems (up from 60 percent last year), compared to 49 percent of the material in non-Midwestern states. Use in non-Midwestern states was virtually unchanged from last year.

Figure 15. Use of GPS Guidance Systems for Custom Application by Region: Manual Control

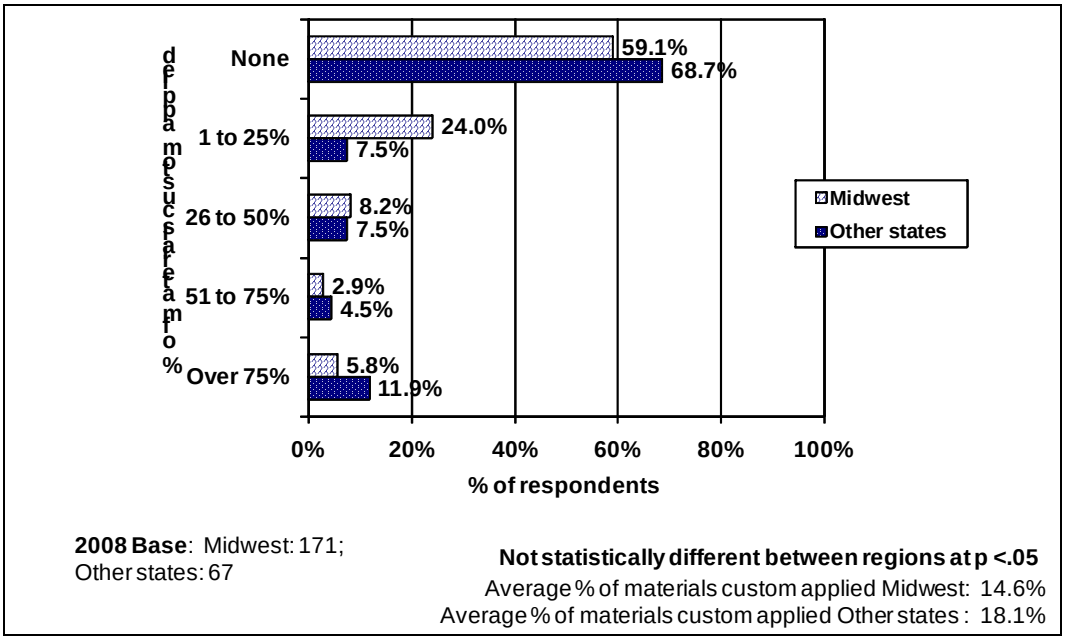


2008 Base: Midwest: 171; Other states: 61

*** Statistically different between regions at p <.05**
Average % of materials custom applied Midwest: 69.2%
Average % of materials custom applied Other states : 48.5%

There was no statistical difference in the use of auto control/autosteer GPS guidance systems between respondents from the Midwest states and respondents from non-Midwestern states (Figure 16).

Figure 16. Use of GPS Guidance Systems for Custom Application by Region: Auto Control



2008 Base: Midwest: 171; Other states: 67

Not statistically different between regions at p <.05
Average % of materials custom applied Midwest: 14.6%
Average % of materials custom applied Other states : 18.1%

In the Midwest, neither the use of GPS guidance systems with manual control nor GPS guidance systems with autosteer showed any statistical difference between the types of organizations (Figure 17 and Figure 18), though all types of organizations showed growth in the use of manual control guidance systems.

Figure 17. Use of GPS Guidance Systems for Custom Application by Organizational Type in the Midwest: Manual Control

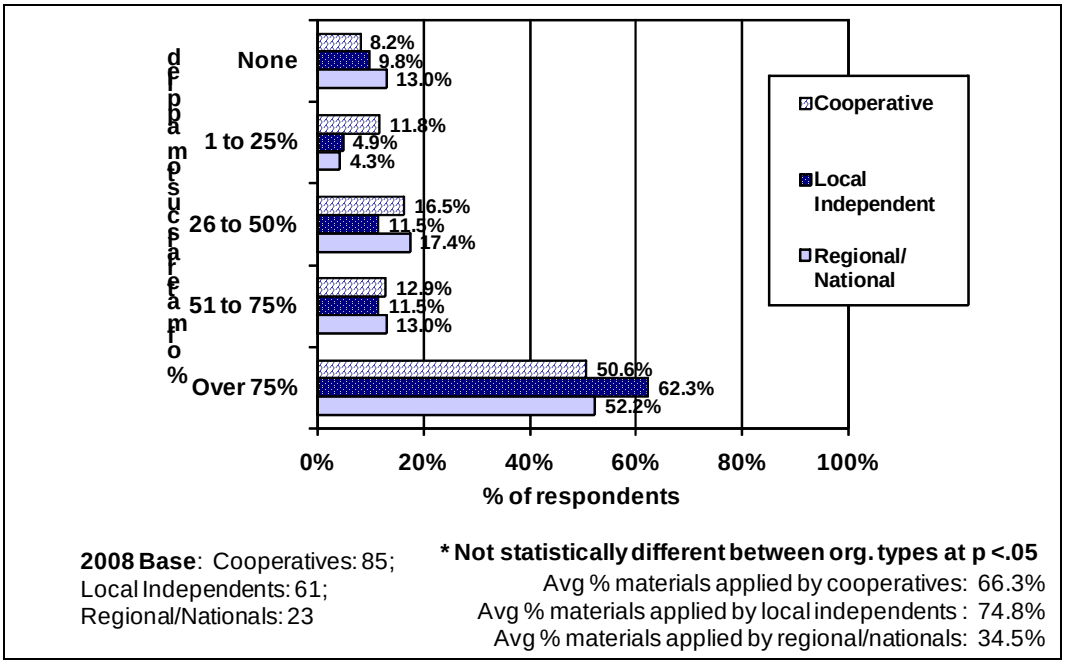
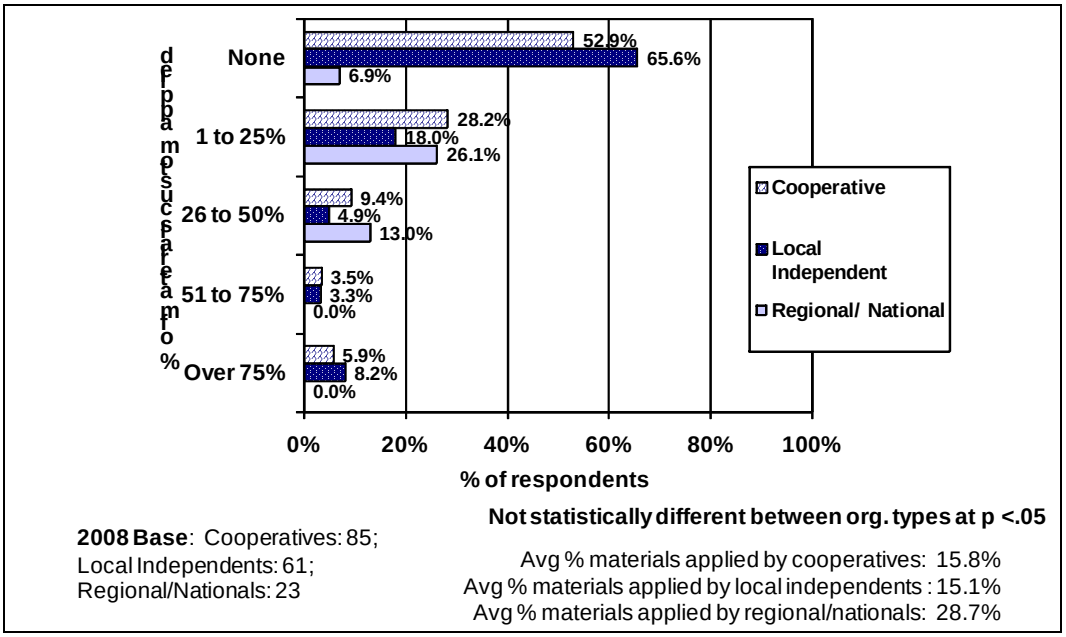


Figure 18. Use of GPS Guidance Systems for Custom Application by Organizational Type in the Midwest: Auto Control



Use of Precision Technologies and Offerings of Site-Specific Services

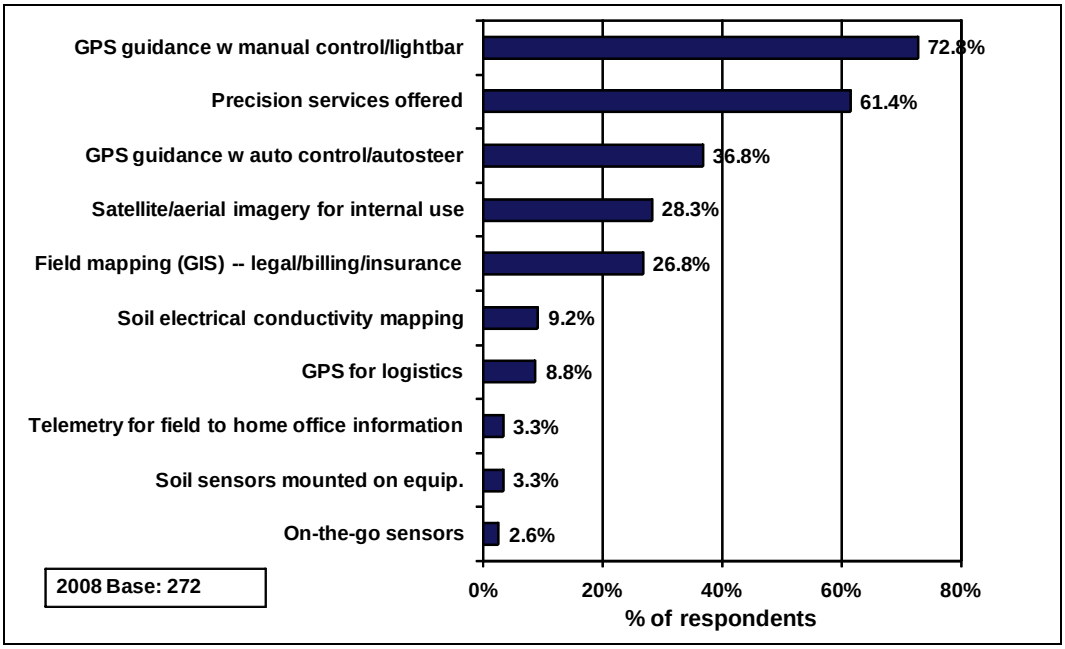
Respondents were asked several questions about their use of precision technologies and which site-specific services they were currently offering (or would be offering by the fall of 2008).

Use of Precision Technologies

Dealerships were asked how they were using precision technology in their dealerships – from offering their customers precision services to using precision technologies internally for guidance systems, satellite/aerial imagery, billing/insurance/legal activities, logistics, or field-to-home office communications.

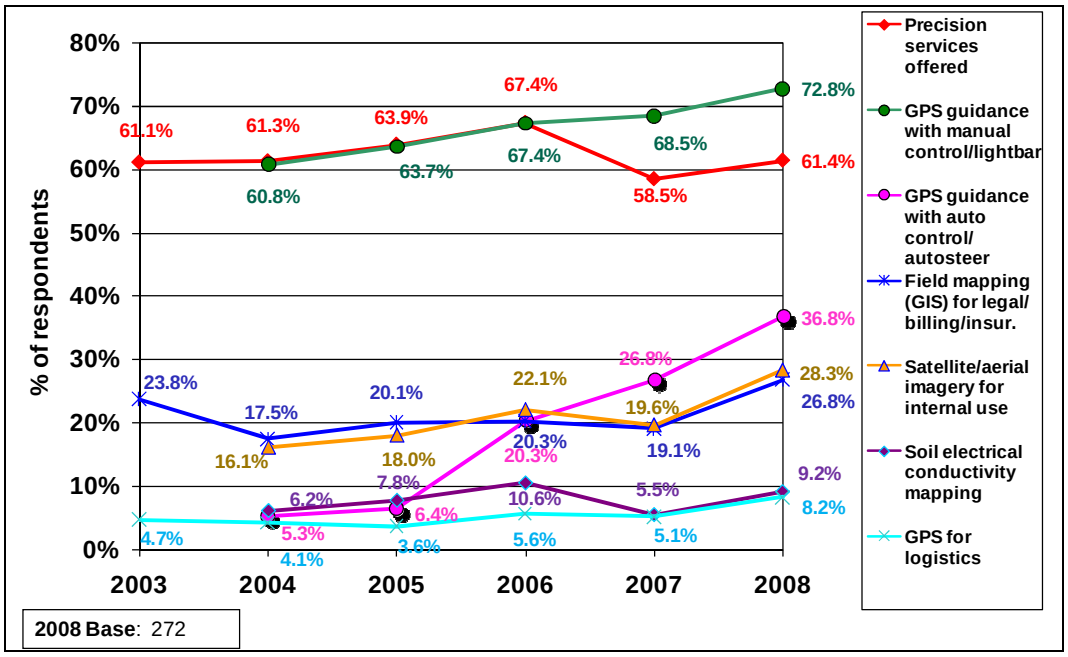
Showing some increase over last year, 83 percent of the respondents used precision technologies in some way in their dealership (similar to the sample from 2006 where 81 percent used precision technologies). The two most common uses of precision technology were using GPS guidance with manual control/light bar (73 percent of respondents) and precision service offerings for customers (61 percent of respondents) (Figure 19). As in 2007, the next three most common uses were GPS guidance with auto control/autosteer, satellite/aerial photography for internal uses and field mapping with GIS (Geographical Information Systems) for legal/billing/insurance purposes (37, 28 and 27 percent of respondents, respectively). Only 9 percent of the respondents said they used soil electrical conductivity mapping (Veris) or used GPS for logistics.

Figure 19. Use of Precision Technology Part A



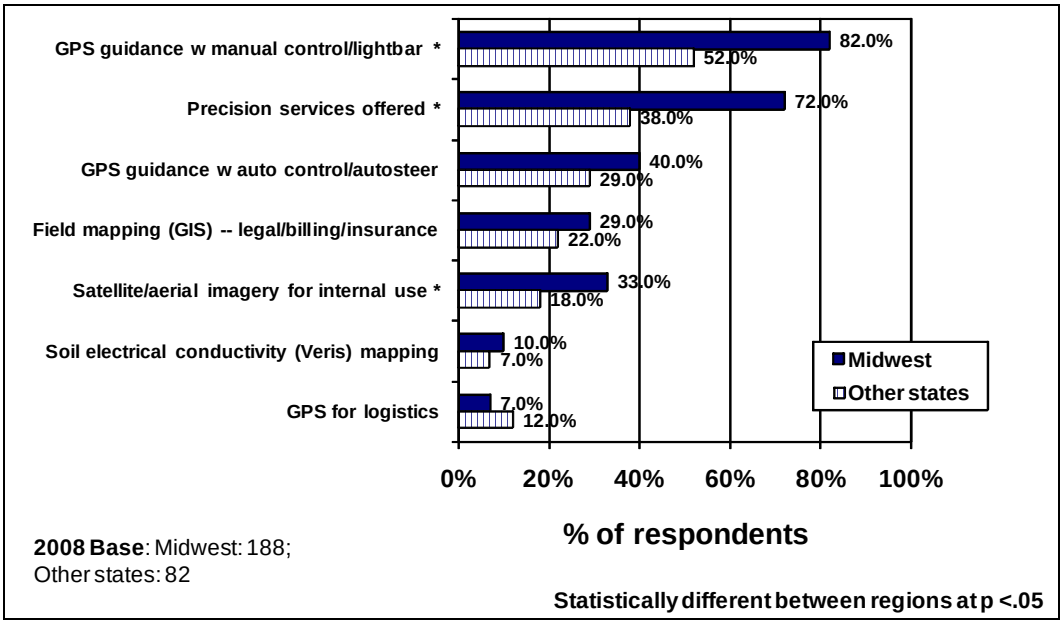
Over time, some uses of precision technology have increased while others have remained fairly stable (Figure 20). The biggest growth seen from 2007 to 2008 was in the use of GPS guidance systems with autocontrol/autosteer, growing from 27 percent of the dealerships in 2007 to 37 percent in 2007. All the other uses of precision technology also increased from last year. GPS guidance with manual control, GPS with auto control/auto steer, satellite/aerial imagery, field mapping with GIS for legal/billing/insurance purposes, and GPS for logistics were all being used at a historically high level. Only precision service offerings (any precision service) and soil electrical conductivity mapping did not reach a historical high.

Figure 20. Use of Precision Technology over Time



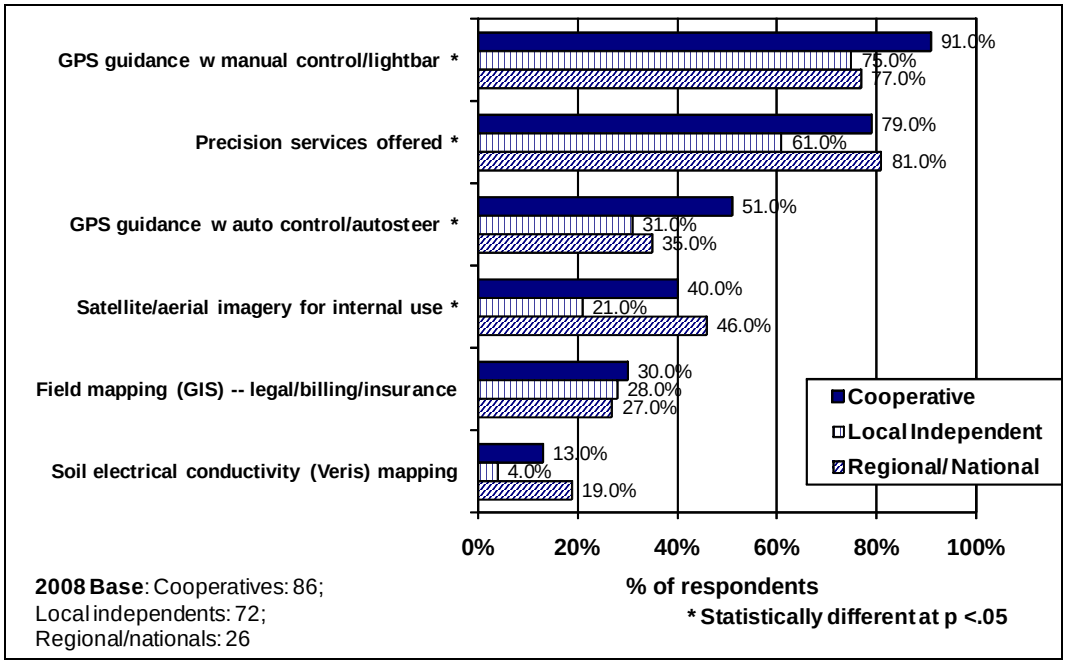
As in other years, precision technologies were being used by significantly more dealerships in the Midwest than in non-Midwestern states (Figure 21). Eight out of 10 of the respondents in the Midwest (81 percent) said their dealership used precision technologies in some way, compared to fewer than 7 out of 10 of the respondents from other states (67 percent). This compared to 85 percent of the Midwestern respondents in 2007 and 59 percent of the non-Midwestern respondents. GPS was used as a guidance system with manual control/lightbar by 82 percent of the Midwestern dealerships compared to 52 percent of the non-Midwestern respondents. Almost three-quarters (72 percent) of the Midwestern respondents said their dealership offered precision services compared to only 38 percent of the non-Midwestern respondents. GPS guidance systems with auto control/autosteer were used by 40 percent of the Midwestern respondents but only 29 percent of the respondents from other states.

Figure 21. Use of Precision Technology by Region



In the Midwest, adoption of precision technology varied by organizational type. Almost all of the respondents representing cooperatives and regional/nationals used at least one precision technology (95 and 96 percent, respectively) while 84 percent of the local independents said they used at least one precision technology. Eight out of ten of the cooperatives and regional/national outlets offered precision services to their customers (79 and 81 percent) (Figure 22), while only 60 percent of the local independents offered precision services. GPS guidance systems (both manual control/lightbar and autocontrol/autosteer) were used more commonly by cooperatives than by either local independents or regional/nationals. The other precision technology applications were used more commonly by the cooperatives and regional/nationals and less by the local independents. The one area that was fairly consistent across organizational types was field mapping with GIS for internal purposes, with approximately 3 out of 10 dealerships offering the service, regardless of organizational type.

Figure 22. Use of Precision Technology by Organizational Type in the Midwest



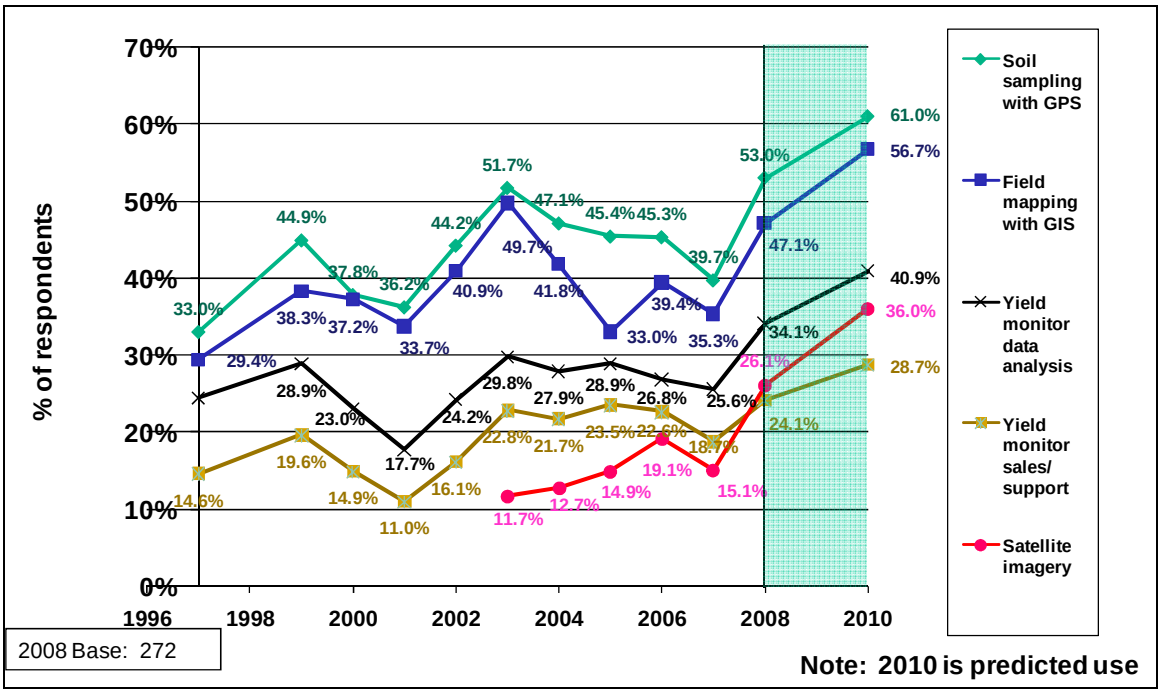
Precision Service Offerings

Respondents were asked which specific precision services they would be offering their customers by the fall of 2008. In most cases, current use and projections were up compared to numbers provided in 2007. However it is important to remember that there were some significant differences in the composition of the sample in 2007. As in previous years, the most common precision service offered by these dealerships was soil sampling with GPS – offered by 53 percent of the respondents (Figure 23). This was the highest recorded since tracking began in 1997. By 2010, 61 percent of the respondents expected their dealerships to be offering soil sampling with GPS.

Consistent with most previous years, field mapping with GIS was the second most common precision technology service to be offered, with 47 percent of the respondents offering the service by the fall of 2008. By 2010, over 56 percent of respondents expected to be offering this service.

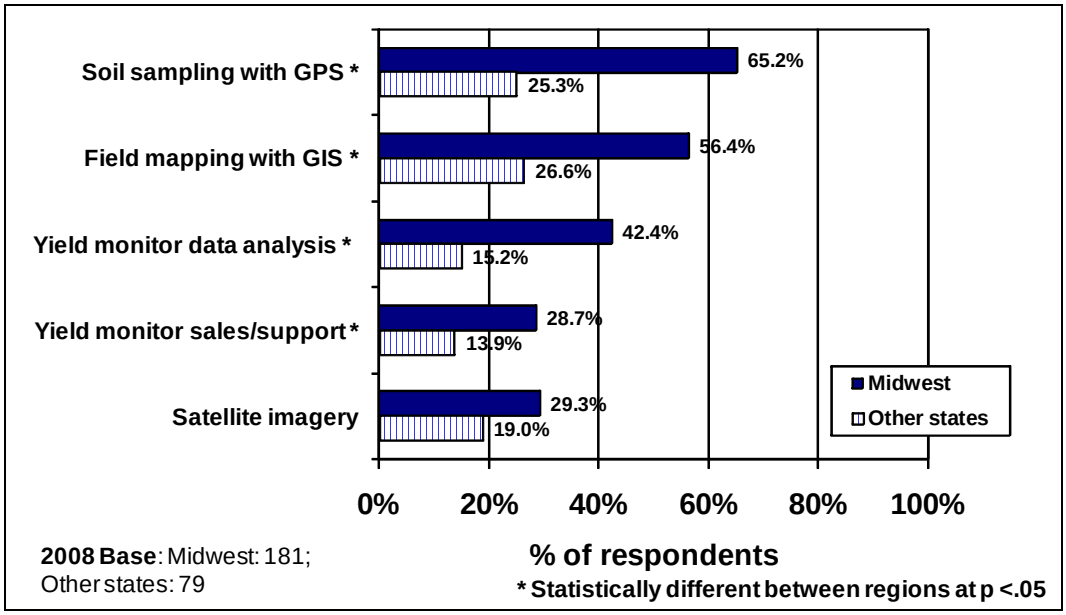
Yield monitor data analysis, yield monitor sales support and satellite imagery showed increased growth in 2008, each reaching new highs in the number of dealerships offering the service.

Figure 23. Precision Ag Services Offered Over Time



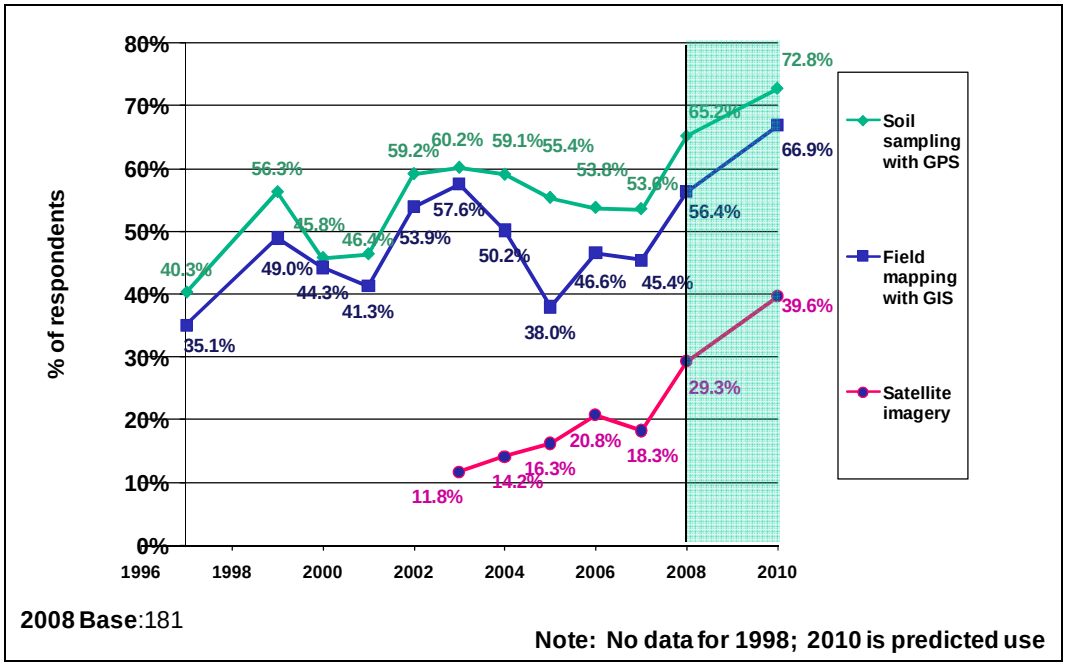
With the exception of satellite/aerial imagery, all of these precision service offerings were significantly more common in the Midwest than in other states (Figure 24). For example, 65 percent of the responding dealerships from the Midwest indicated they would be offering soil sampling with GPS by the fall of 2008. In non-Midwestern states, soil sampling with GPS was expected to be offered by only 25 percent of the respondents. Likewise, for field mapping with GIS, over half of the Midwestern respondents (56 percent) expected to be offering the service by the fall 2008 compared to 27 percent of the non-Midwestern respondents. Similar differences were apparent for yield monitor sales/support and data analysis.

Figure 24. Precision Ag Services Offered by Region



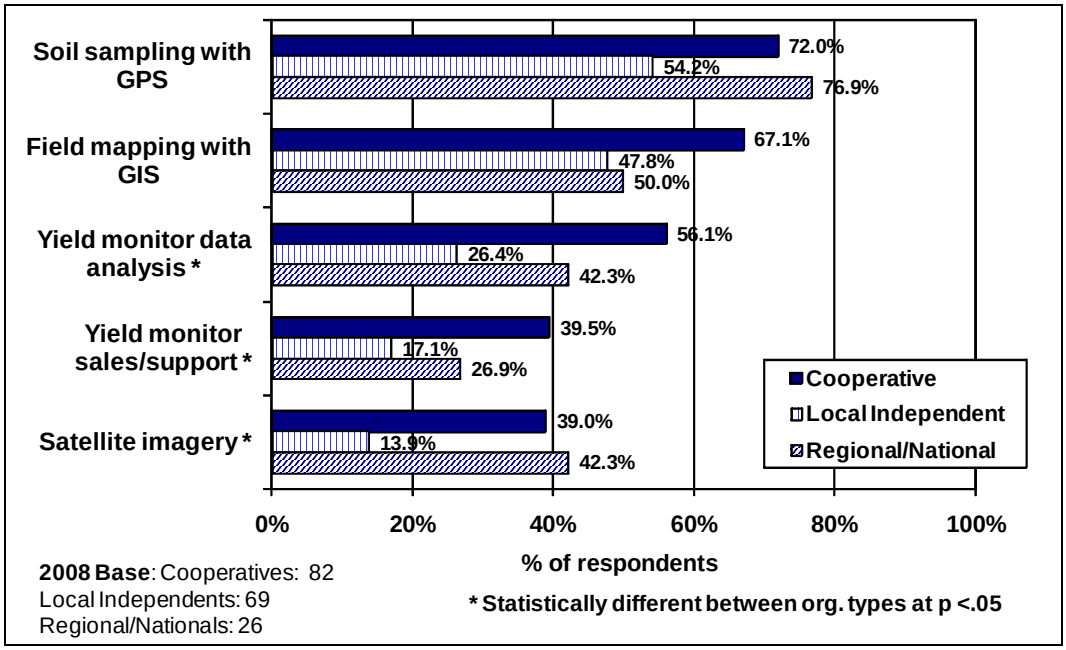
To get a better understanding of precision technology growth in the Midwest, Figure 25 shows the trends in key precision service offerings in the Midwest over the past 11 years. Both soil sampling with GPS and satellite imagery hit survey highs with 65 percent of the Midwestern dealerships offering soil sampling with GPS and 29 percent offering satellite imagery. Field mapping with GIS was offered by 56 percent, the highest since 2003.

Figure 25. Precision Ag Services Offered Over Time in the Midwest



As in previous years, precision service offerings were more extensive in national/regional organizations and cooperatives in the Midwest compared to local independents (Figure 26). In the Midwest, local independents were generally not as likely to offer these services relative to other organizational types. Yield monitor data analysis and sales/support, along with satellite imagery were all statistically significantly different between organization types, with cooperatives and regional/national respondents offering the services at a similar level and a third to half of the local independents offering the services.

Figure 26. Precision Ag Services Offered by Organizational Type in the Midwest



A Focus on Soil Sampling

As in previous years, the types of soil sampling dealerships were offering – by grid or by soil type – were explored in more detail. Ninety-two (92) percent of the respondents offered some type of soil sampling with seven out of ten respondents indicating their dealership offered traditional soil sampling. Half of the respondents (52 percent) said they offered soil sampling by grid, while a quarter offered soil sampling by soil type (Figure 27). Over time, there have been some fluctuations, with a general increase in soil sampling offerings overall as well as an increase in grid sampling specifically (Figure 28).

Figure 27. Types of Soil Sampling Offered

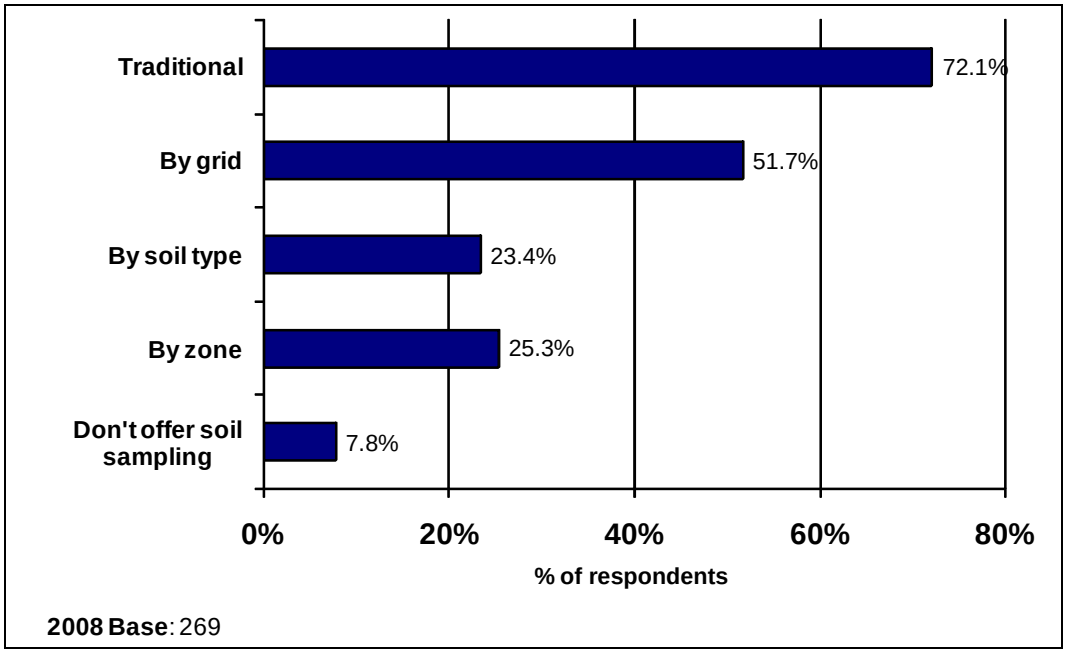
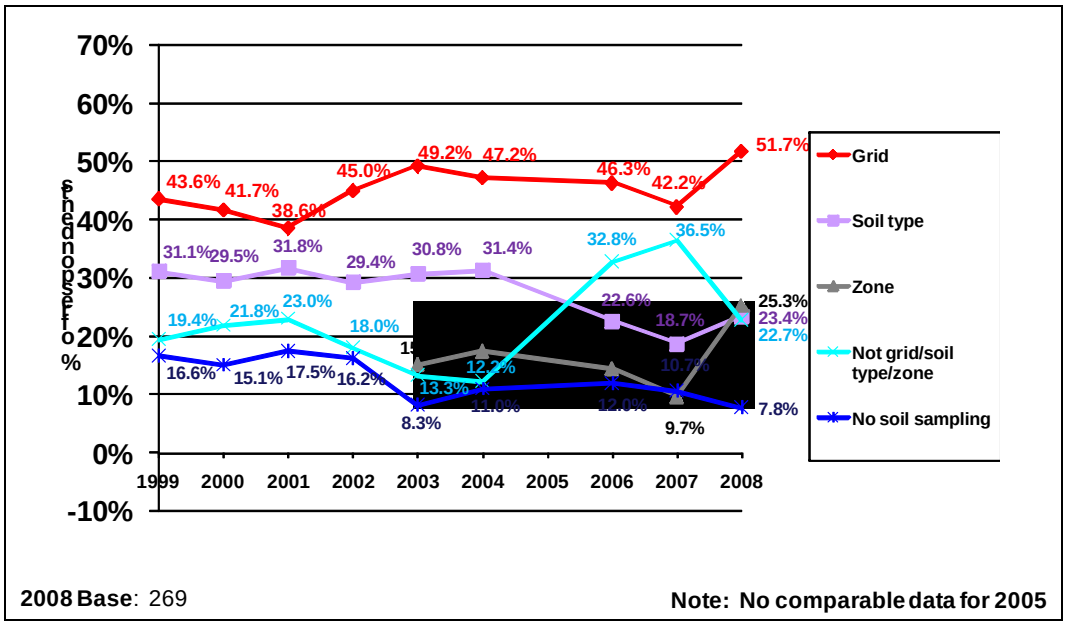
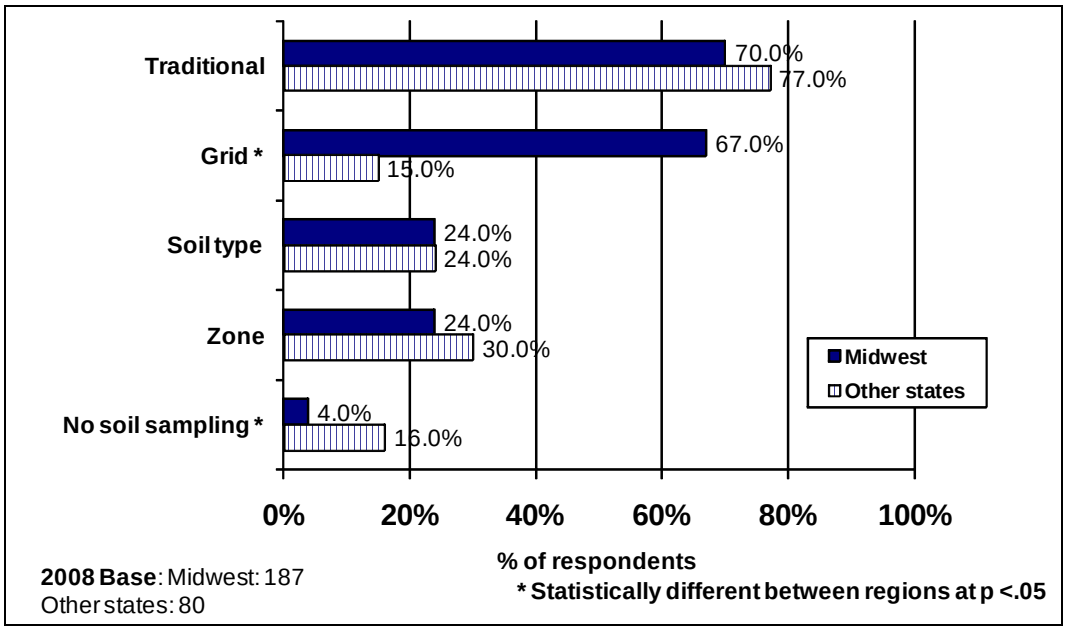


Figure 28. Types of Soil Sampling Offered Over Time



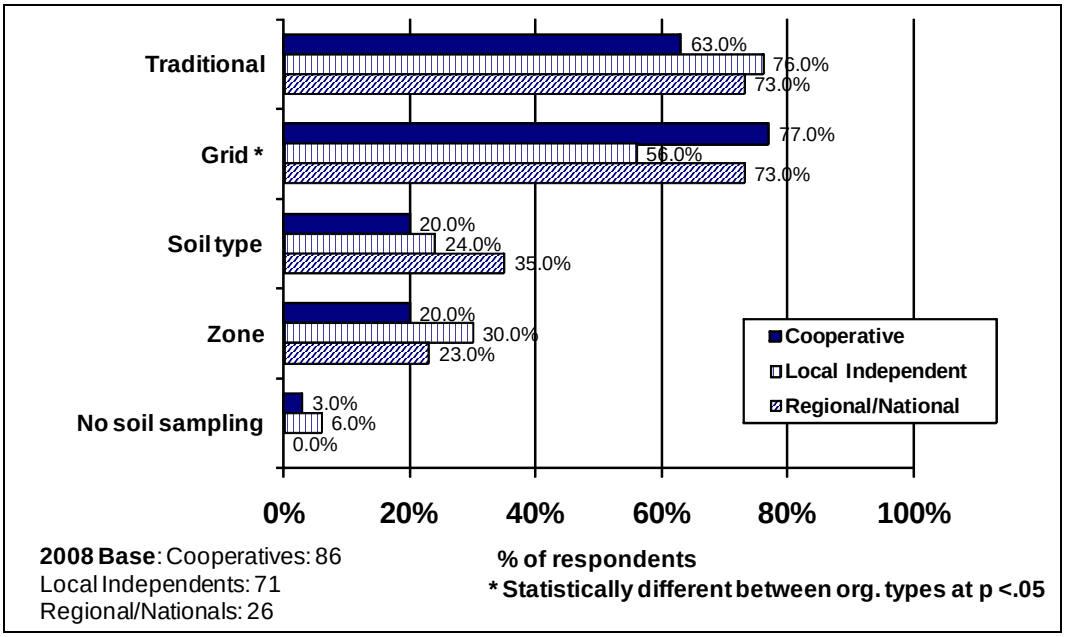
Soil sampling is more common in the Midwest than in other states (Figure 29) with 96 percent of the respondents in the Midwest saying their dealership offered some type of soil sampling, compared to 84 percent of the respondents from non-Midwestern states. The only specific type of soil sampling that varied statistically by region was grid sampling – offered by four times as many dealerships in the Midwest compared to other states (67 percent compared to 15 percent).

Figure 29. Types of Soil Sampling Offered by Region



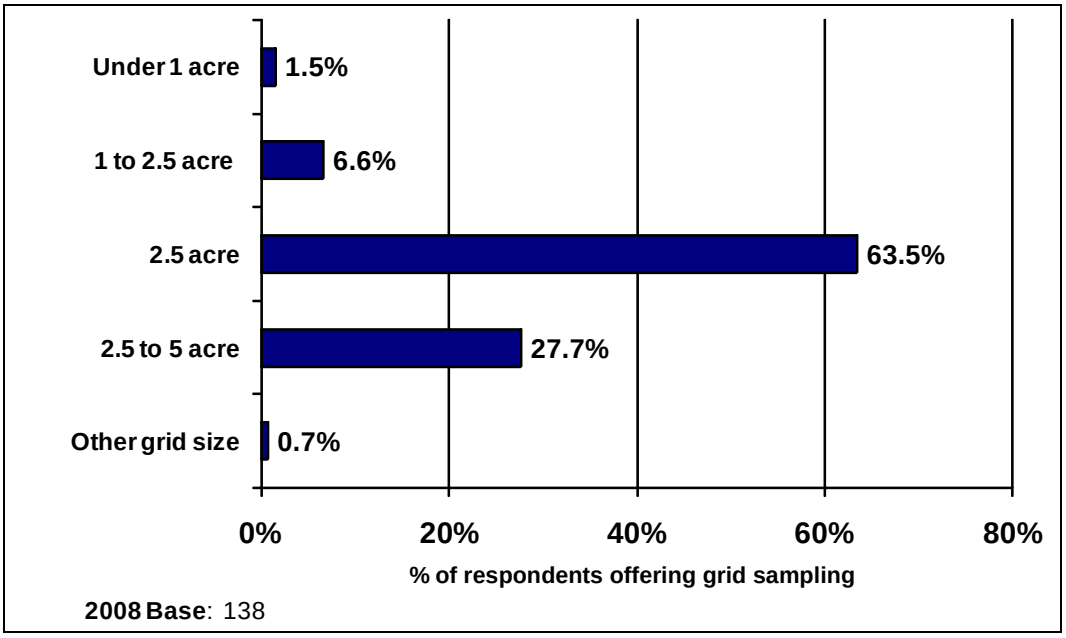
In the Midwest, the type of soil sampling also varied by organizational type (Figure 30). This year, every national/regional dealership who participated in the survey, 97 percent of the cooperatives and 85 percent of the local independents offered some type of soil sampling. Grid soil sampling was both more likely to be offered by cooperatives and national/regional dealerships than by local independents.

Figure 30. Types of Soil Sampling Offered by Organizational Type in the Midwest



The distribution of grid sizes has remained fairly constant over time with the most common grid size continuing to be 2.5 acres, followed by 2.5 to 5.0 acres (Figure 31). There was no variation in grid size by region or by organizational type within the Midwest.

Figure 31. Grid Sizes Used in Grid Sampling



Variable Rate Application

Variable rate custom application of fertilizer, lime and pesticides, as well as variable rate seeding with GPS have typically been provided along with traditional custom application services. Figure 32 shows the trends in variable rate application and seeding services over time. In general, all areas have continued to show growth each year, with each area showing a survey high in the proportion of dealerships offering the services.

Figure 32. Variable Rate Application Offered Over Time

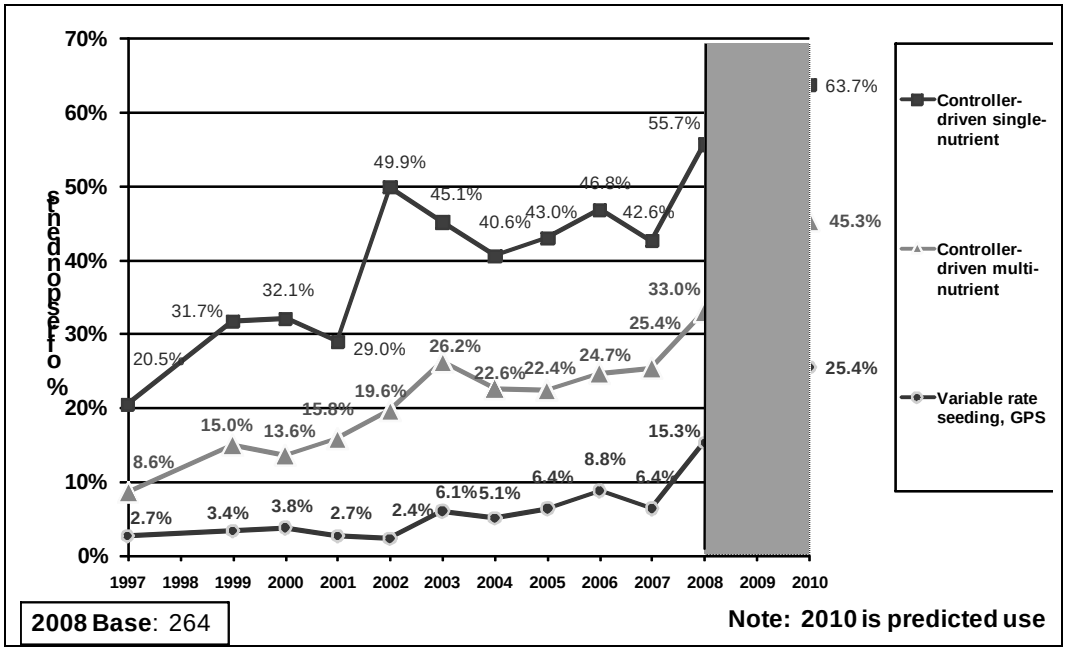


Figure 33 shows the offerings of specific controller-driven variable rate application services in 2008. Over half of the respondents (59 percent) offered some form of controller-driven application of fertilizer, lime and/or chemicals – either single nutrient or multi-nutrient application. This was up from 46 percent in 2007 and 51 percent in 2006. Single nutrient controller-driven application of fertilizer was the most common controller-driven variable rate application service offered, with 52 percent of the respondents expecting to offer the service by the fall of 2008 (up from 40 percent in 2007). Forty-five percent of the respondents offered single-nutrient controller-driven variable rate application of lime in 2008, up from only a third in 2007.

Multi-nutrient controller-driven application of fertilizer was also up this year, with 32 percent of the responding dealerships offering the service by the fall of 2008, compared to 25 percent in 2007. Almost a fifth of the responding dealerships (19 percent) offered lime in combination with other materials in multi-nutrient controller-driven application and 12 percent offered multi-nutrient controller-driven application of pesticides.

Figure 33. Precision Application Offered for Each Input Type

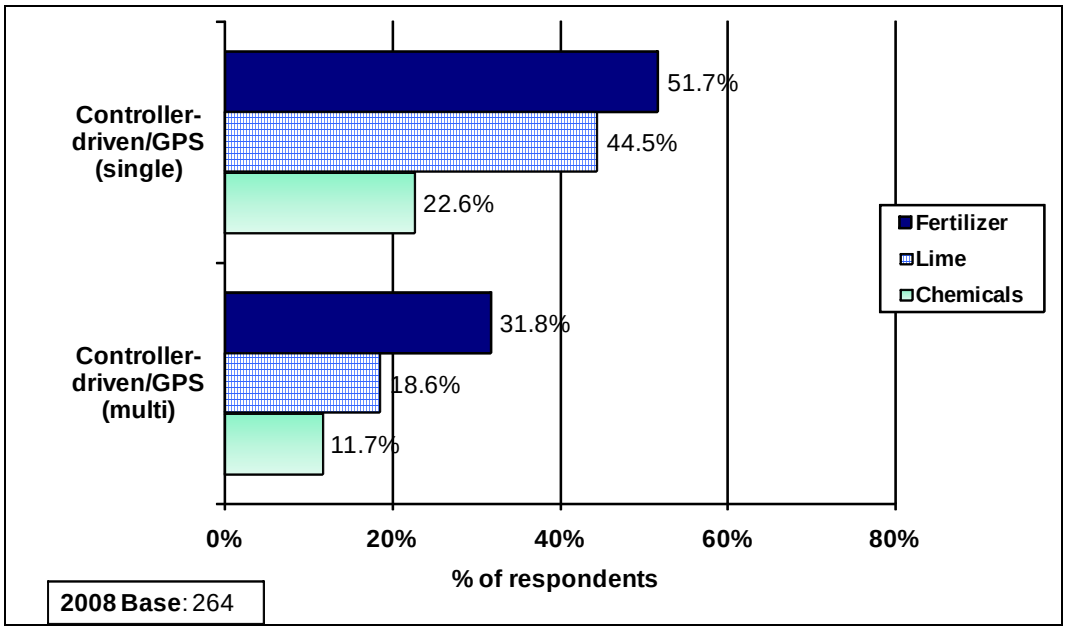
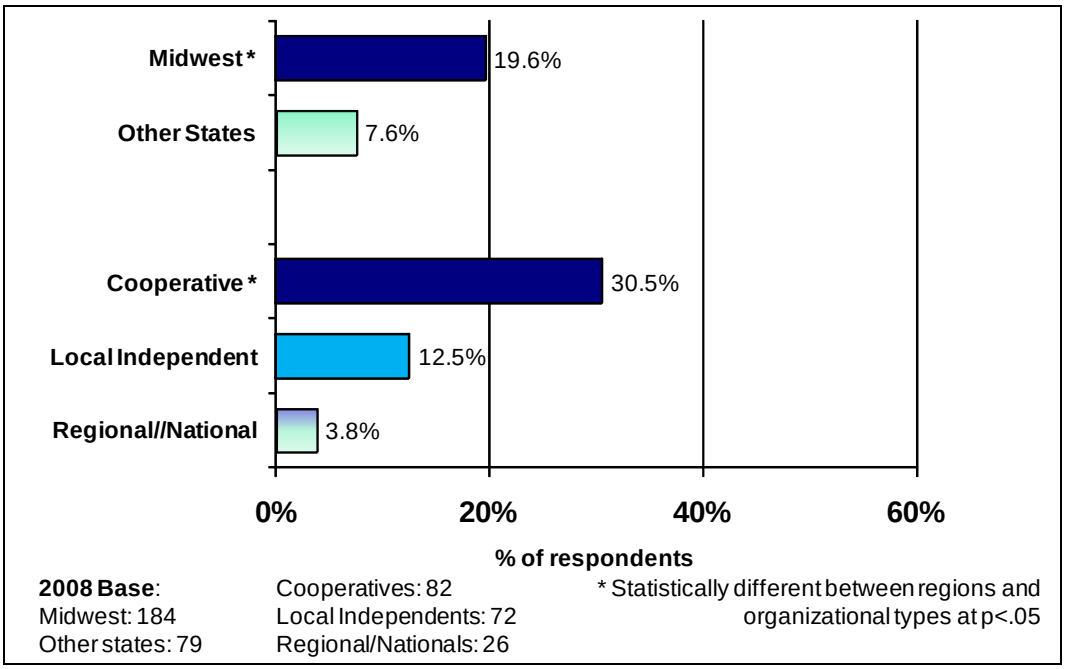


Figure 34 shows the regional and organizational breakout for variable seeding. Respondents in the Midwest were almost three times as likely to be offering variable seeding with GPS than were respondents from non-Midwestern states (20 percent of Midwestern respondents compared to 8 percent of the non-Midwestern dealerships).

In a departure from previous years, in 2008 within the Midwest, cooperatives were 10 times as likely to be offering variable seeding with GPS than were the regional/national organizations and 2 ½ times as likely as local independents. There were no statistical differences between organizational types in the Midwest.

Figure 34. Variable Rate Seeding by Regions and Organizational Types within the Midwest



Manual and controller-driven variable rate application was more common in the Midwest relative to the other states (Figure 35 to Figure 37). For fertilizer, over half of the respondents (56 percent) expected to offer single nutrient controller-driven application in the Midwest by the fall of 2008 compared to only 27 percent of the respondents from other states (Figure 35). This showed a slight increase from 53 percent in the Midwest last year but similar numbers to 2006 in non-Midwestern states. Multi-nutrient controller-driven application of fertilizer in both Midwestern and non-Midwestern states were up in 2008 compared to both 2007 and 2006. In the Midwest, multi-nutrient controller-driven application of fertilizer was offered by 38 percent of the respondents (up from 31 percent) while 19 percent of the respondents from non-Midwestern states offered the service (up from 11 percent in 2007).

Like fertilizer, controller-driven application of lime was much more common in the Midwest than in non-Midwestern states (

Figure 36) in both a single and multi-nutrient controller-driven application. Just over half of the respondents from Midwestern dealerships offered lime application in a single-nutrient controller-driven application compared to 19 percent of the respondents in non-Midwestern states. Fewer offered multi-nutrient application of lime (23 percent of the respondents from the Midwest and 8 percent of the respondents from non-Midwestern states).

For chemicals, there was no statistical difference between the Midwestern dealerships and those in non-Midwestern states for either single or multi-nutrient controller-driven application (Figure 37), with just under a quarter of the respondents offering chemicals in a single-nutrient controller-driven application and one out of ten offering it in a multi-nutrient application.

Figure 35. Precision Application of *Fertilizer* Offered by Region

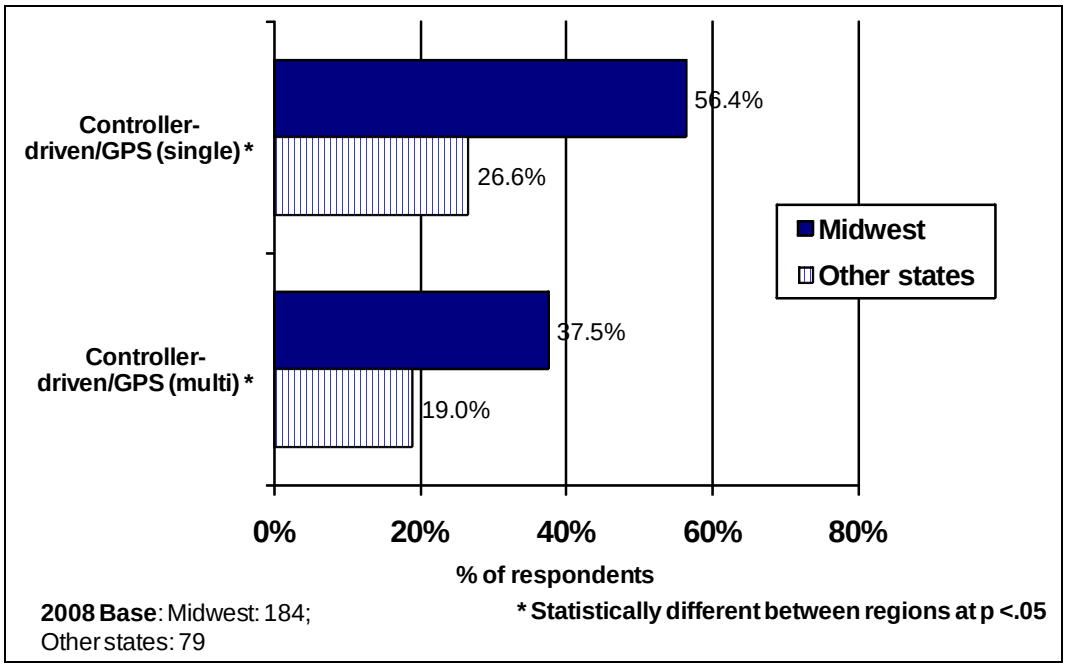


Figure 36. Precision Application of *Lime* Offered by Region

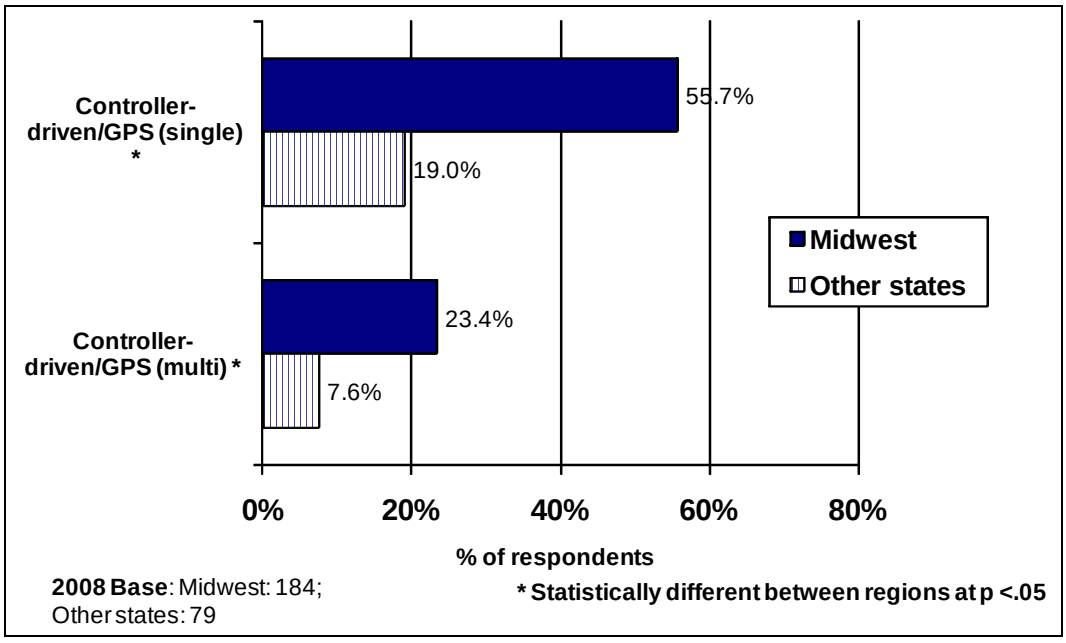
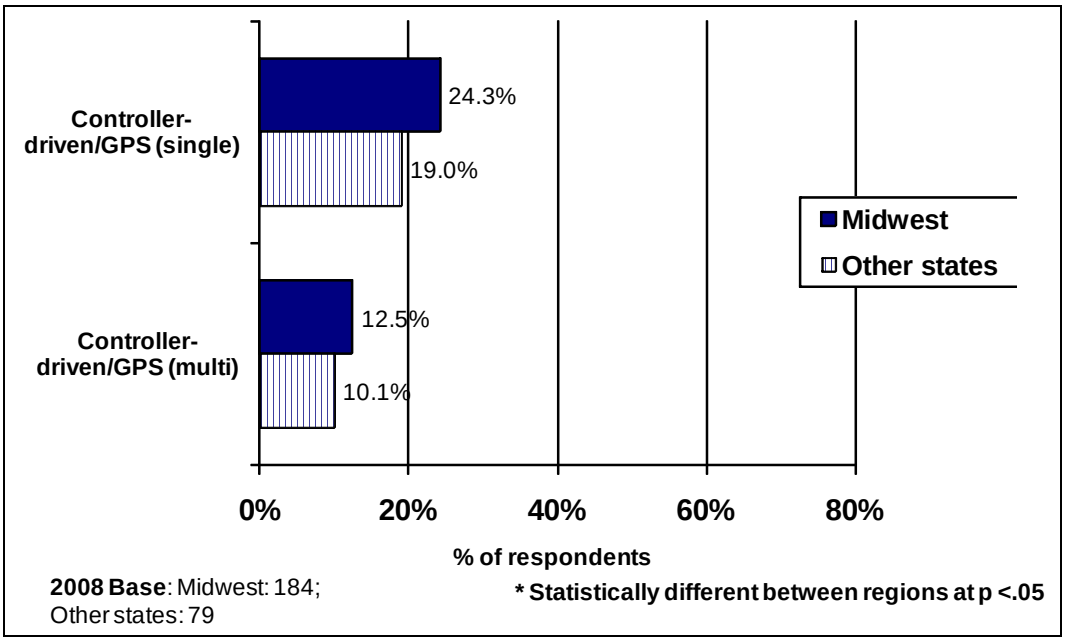


Figure 37. Precision Application of *Chemicals* Offered by Region



To provide a perspective of overall adoption of controller-driven application in the Midwest, Figure 38 shows the levels of controller-driven variable rate application over the past 11 years. Both single-nutrient and multi-nutrient controller-driven application have grown steadily or held level for the past few years.

Figure 38. Precision Application Offered Over Time in the Midwest

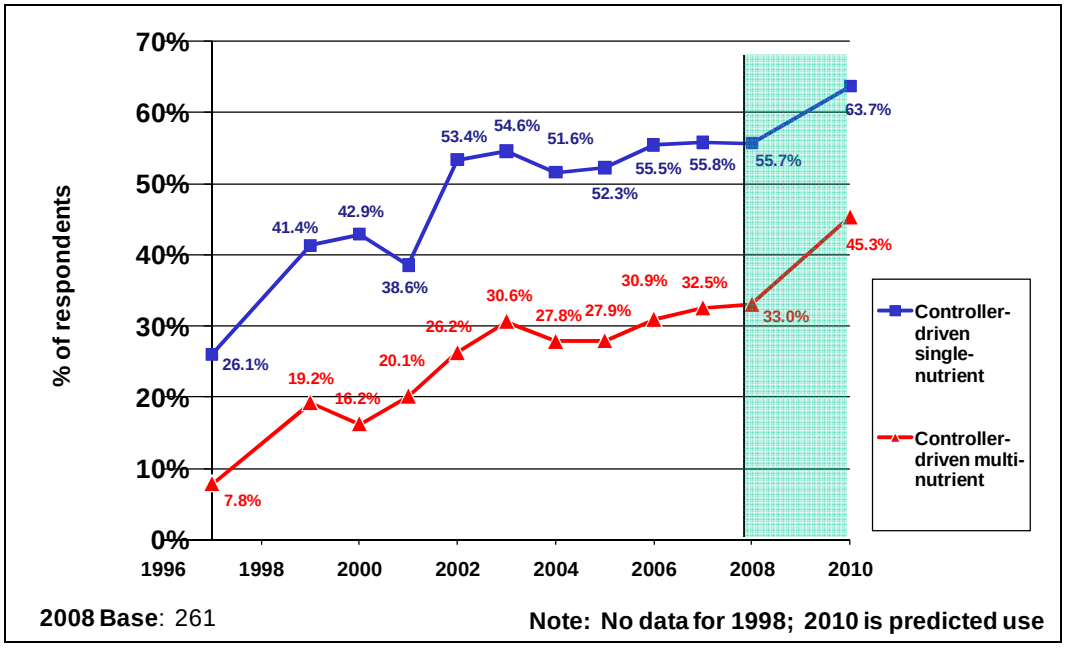
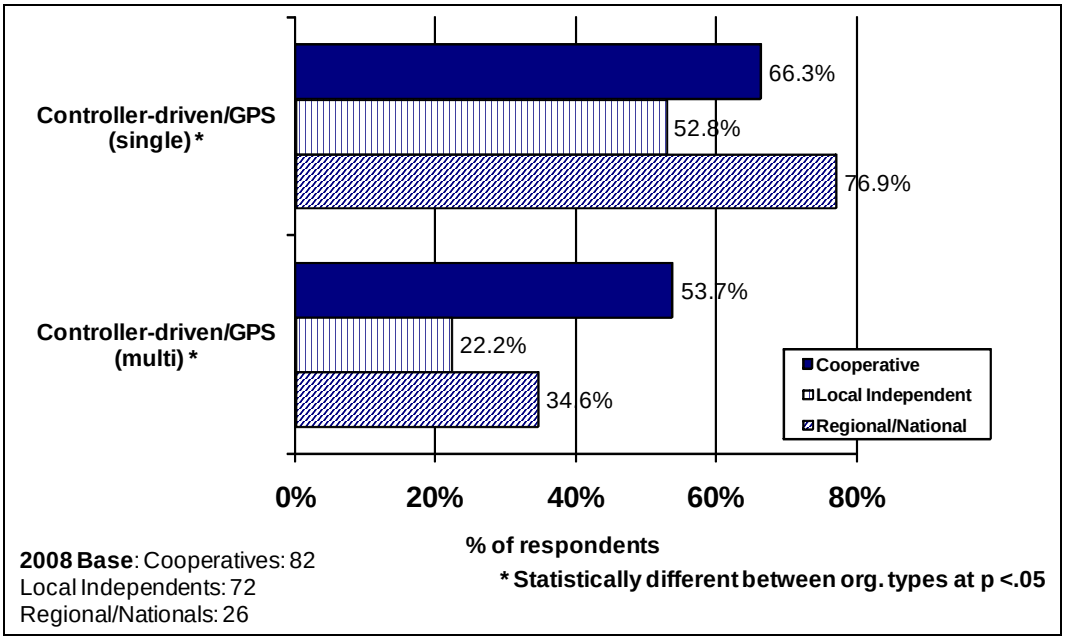


Figure 39 to Figure 41 show the precision application offerings by organizational type in the Midwest. In general, the patterns are similar to those seen for other services, with regional/national outlets and cooperatives being more likely to offer precision application than local independents. For fertilizer, three-quarters (77 percent) of the regional/nationals offered single-nutrient controller-driven variable rate application compared to two-thirds of the cooperatives (66 percent) and just over half of the local independents (53 percent). Multi-nutrient controller-driven application of fertilizer was much more common among cooperatives in the Midwest with 54 percent of the respondents offering the service, compared to 35 percent of the regional/national respondents and 22 percent of the local independents.

Figure 39. Precision Application of *Fertilizer* Offered by Organizational Type in the Midwest



Similar patterns were seen for both lime and chemical applications, though there is no significant difference between organizational types for single-product controller-driven application of chemicals.

Figure 40. Precision Application of *Lime* Offered by Organizational Type in the Midwest

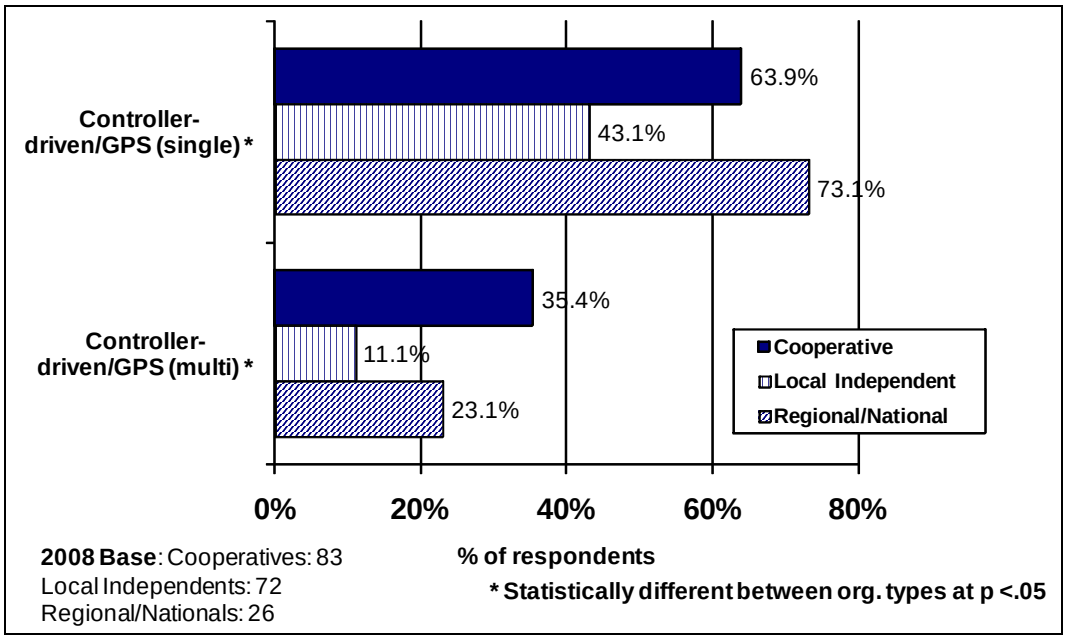
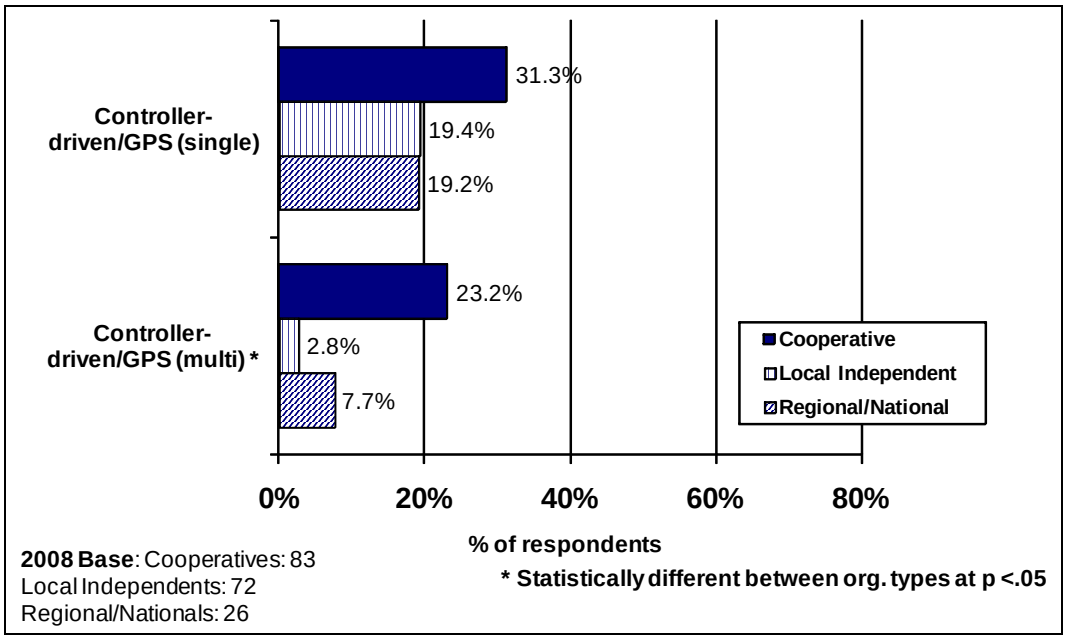


Figure 41. Precision Application of *Chemicals* Offered by Organizational Type in the Midwest



Profitability of Precision Service Offerings

Dealerships were asked how profitable they felt their precision offerings were. Overall, results were similar to those of last year.

Each bar in Figure 42 and Figure 43 shows the proportion of respondents who indicated that a particular service was:

- not covering fixed or variable costs;
- covering variable costs;
- covering both variable and fixed costs; or
- generating a profit.

Using soil sampling with GPS in Figure 42 as an example, four out of ten of the respondents said the service generated a profit for their dealership (43.7 percent). Over a quarter (29.6 percent) said that it just covered fixed and variable costs. One in six respondents (17.6 percent) felt that they were covering variable costs but not fixed costs for soil sampling with GPS and 4.9 percent said they were covering neither variable nor fixed costs. Only 4.2 percent of the respondents did not know how profitable soil sampling with GPS was for their dealership.

In looking at the precision services in both charts, the most profitable precision service appeared to be multi-nutrient controller-driven application, with 49 percent of the respondents reporting that the service was generating a profit. Traditional, non-precision custom application was actually the most profitable service this year; with 50 percent of the respondents indicating they were making a profit on custom application. Soil sampling with GPS generated a profit for 44 percent of the respondents.

Similar to previous years, the least profitable of the precision services were variable seeding with GPS and yield monitor data analysis, with fewer than one in five respondents saying they made a profit on those services. For yield monitor data analysis, only 40 percent of the respondents thought it did more than cover variable costs. Respondents were most uncertain about the profitability of variable seeding with GPS, with 21 percent indicating they didn't know whether or not they were covering costs, though these results were based on few responses.

Overall, respondents were confident about the profitability of their total precision service offerings. Four out of ten of the respondents (42 percent) indicated their precision package generated a profit while another 30 percent said they were covering both the fixed and variable costs of providing the services. Both numbers were up slightly from 2007.

Other than multi-nutrient controller-driven application where Midwestern respondents felt the service was significantly more profitable than did non-Midwestern respondents, there were no regional differences in profitability. Due to small numbers, no conclusions can be made about the profitability across organizational types within the Midwest.

Figure 42. Profitability of Precision Service Offerings

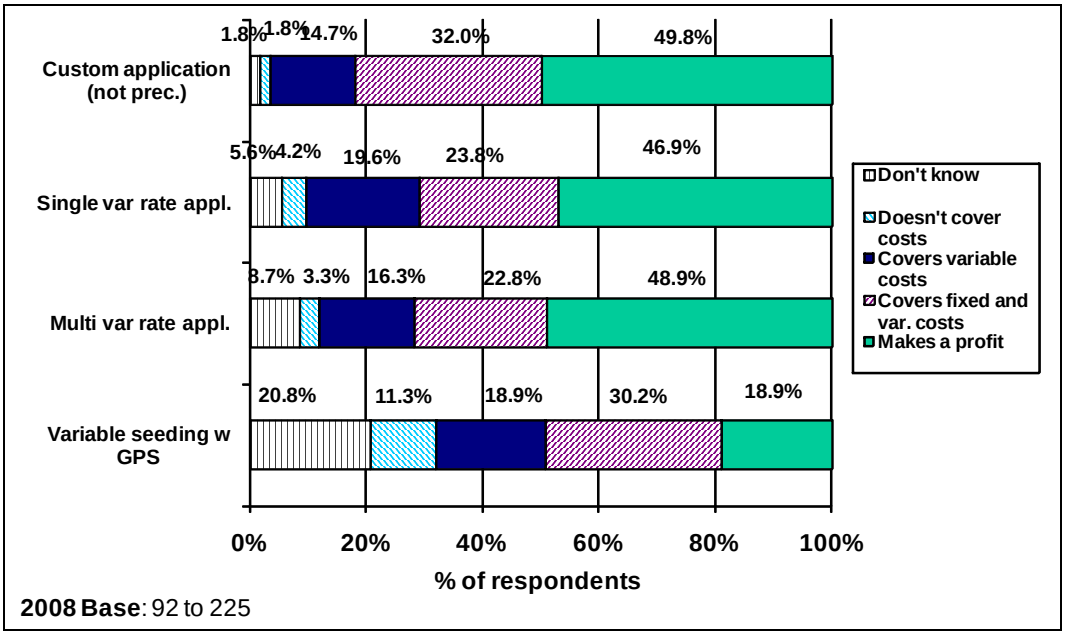


Figure 43. Profitability of Precision Application Offerings

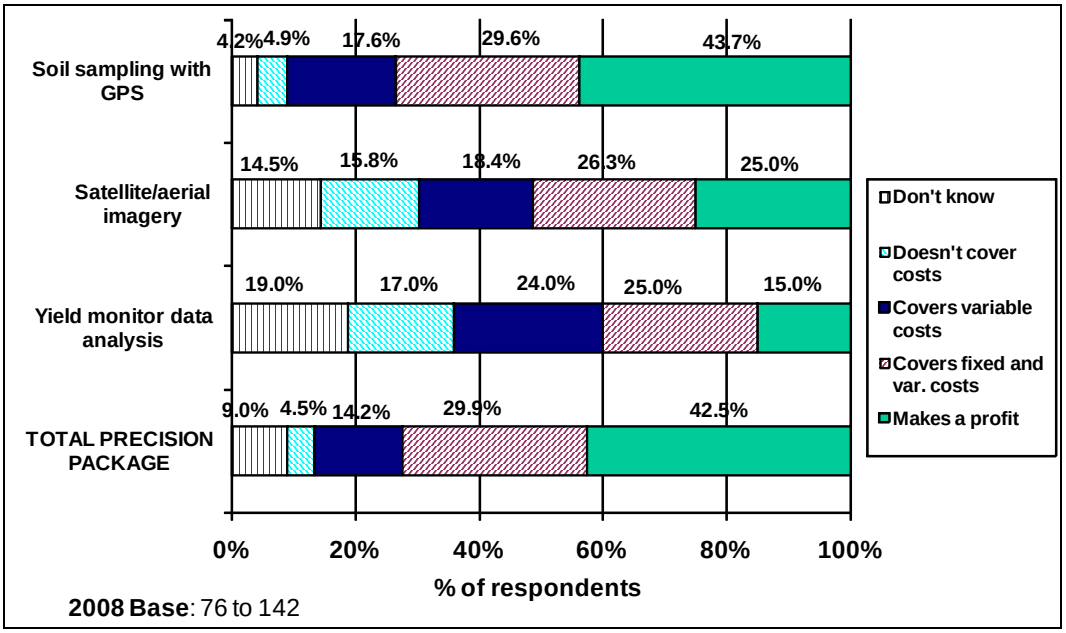


Figure 44 shows the profitability of the services across time, indicating the percentage of respondents generating a profit on the service. This year showed increases in profitability in both single and multi-nutrient controller-driven application, as well as soil sampling with GPS. The profitability of the yield monitor data analysis dropped while the profitability of both satellite imagery and the total precision packaged remained similar to that reported last year.

Figure 44. Respondents Generating a Profit from Precision Services

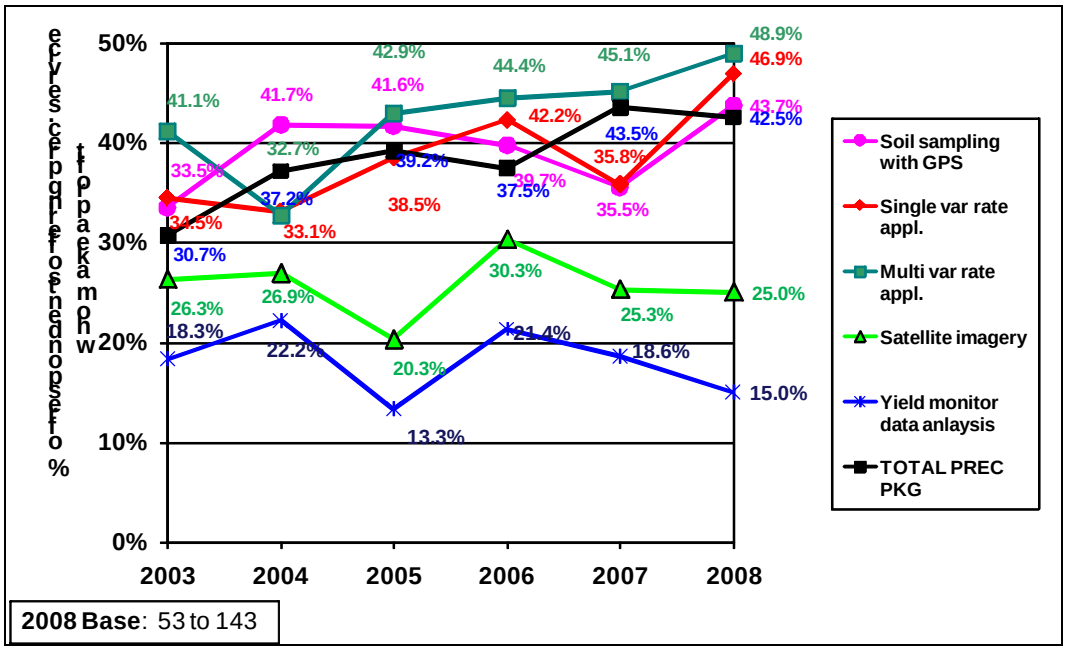
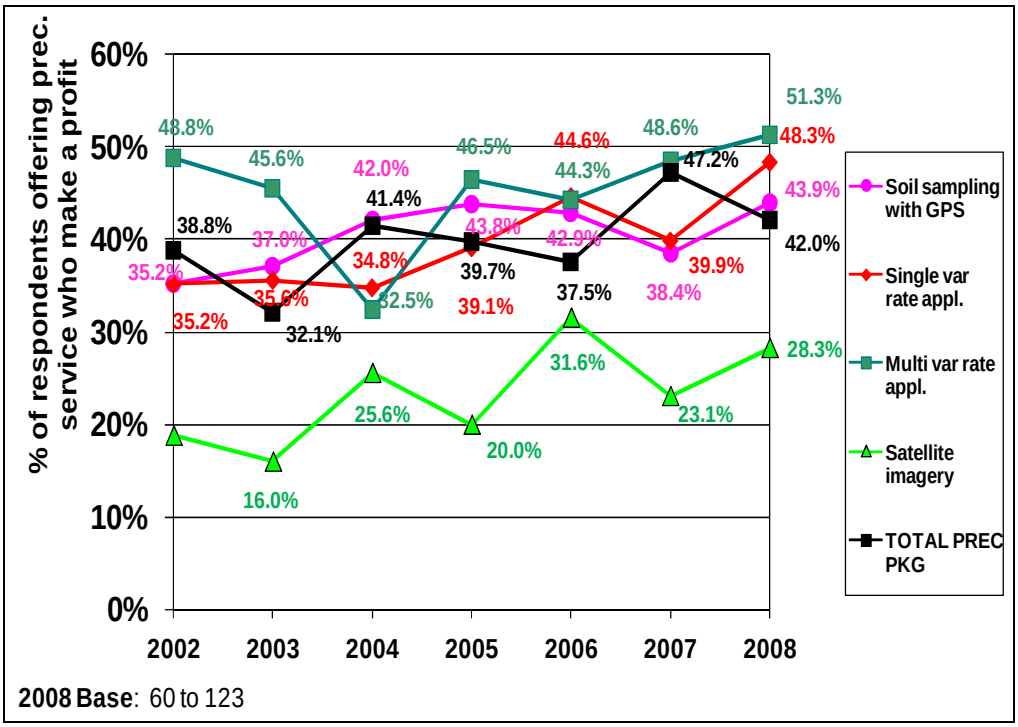


Figure 45 shows the same trends broken out just for the respondents from the Midwest. After a dip in 2004, multi-nutrient controller-driven application once again was the most profitable precision service. The other services showed a similar profit pattern to that of the entire sample.

Figure 45. Respondents Generating a Profit from Precision Services in the Midwest



Customer Use of Precision Services

To get a better understanding of how quickly growers are adopting precision services, survey participants were asked what percentage of the total acreage in their market area (all growers, not just current customers) were currently using various site-specific management services; and, in their opinion, what proportion of the local market acres would be using these services in 3 years. Figure 46 to Figure 49 show the trends over time in the estimated market use of specific precision agriculture management services.

Overall the average market acreage using the specific precision technologies increased this year with the largest percentage change being in GPS guidance systems with auto control/auto steer (40 percent increase in average market area). Expectations continue to be optimistic for growth over the next 3 years.

Figure 46. Estimated Market Area Using Precision Services

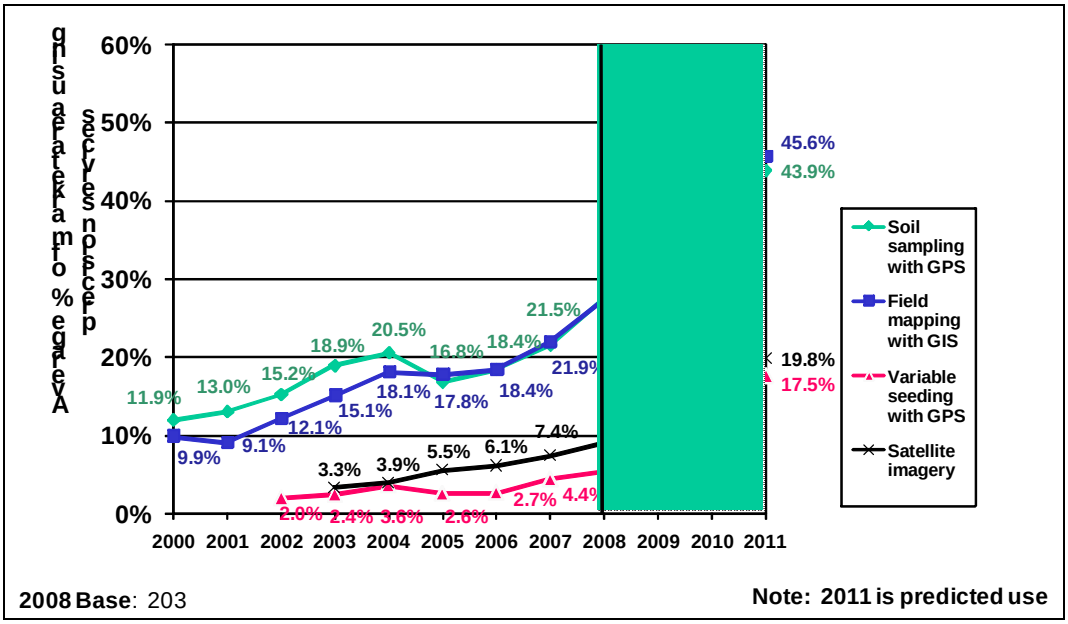
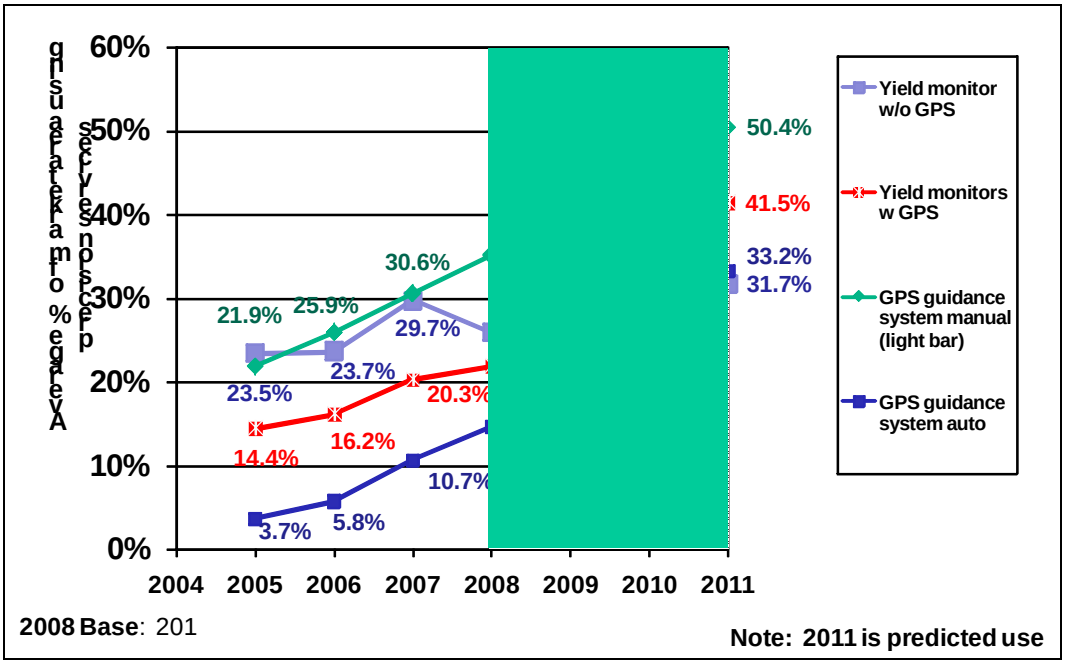


Figure 47 shows the use of yield monitors with and without GPS as well as use of the different types of guidance systems in each market area. On average, 26 percent of each respondent's market area was using yield monitors without GPS while 22 percent was using yield monitors with GPS. From 2007 to 2008, the average acreage using yield monitors with no GPS fell approximately 2 percentage points, similar to the amount that acreage with yield monitors/GPS increased by. The use of GPS guidance systems with light bars grew from an average of 31 percent to 35 percent of the local market while autosteer GPS guidance systems grew from an average of 11 percent to 15 percent of the market acres.

Figure 47. Estimated Market Area Using Yield Monitors and Guidance Systems



The use of variable rate application showed slight increases from 2007 to 2008 (Figure 48 and Figure 49), with continued growth expected into 2011. By 2011, respondents estimated that, on average, over a third of their market acreage would be having fertilizer and/or lime applied using single-nutrient controller-driven application (38 percent of the market acreage), both expected to grow from just over 20 percent in 2008. Expected growth rates in the use of multi-nutrient controller-driven application were greater, with all types of multi-nutrient controller-driven application expected to at least double in use in the next 3 years.

Figure 48. Estimated Market Area Using Single Nutrient Controller-Driven Application

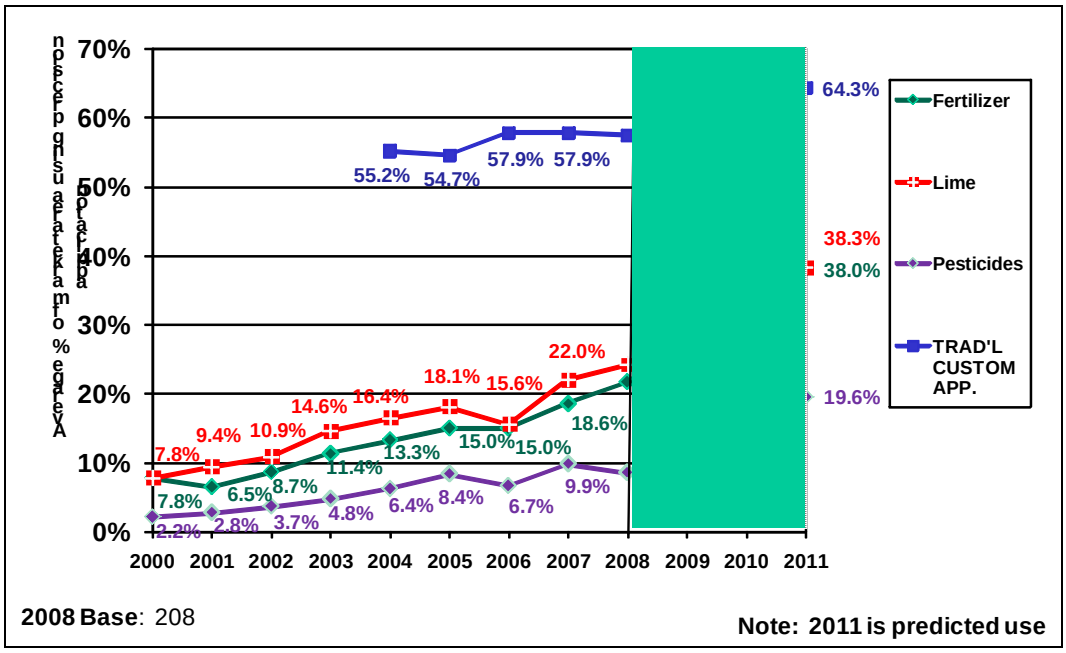


Figure 49. Estimated Market Area Using Multi-Nutrient Controller-Driven Application

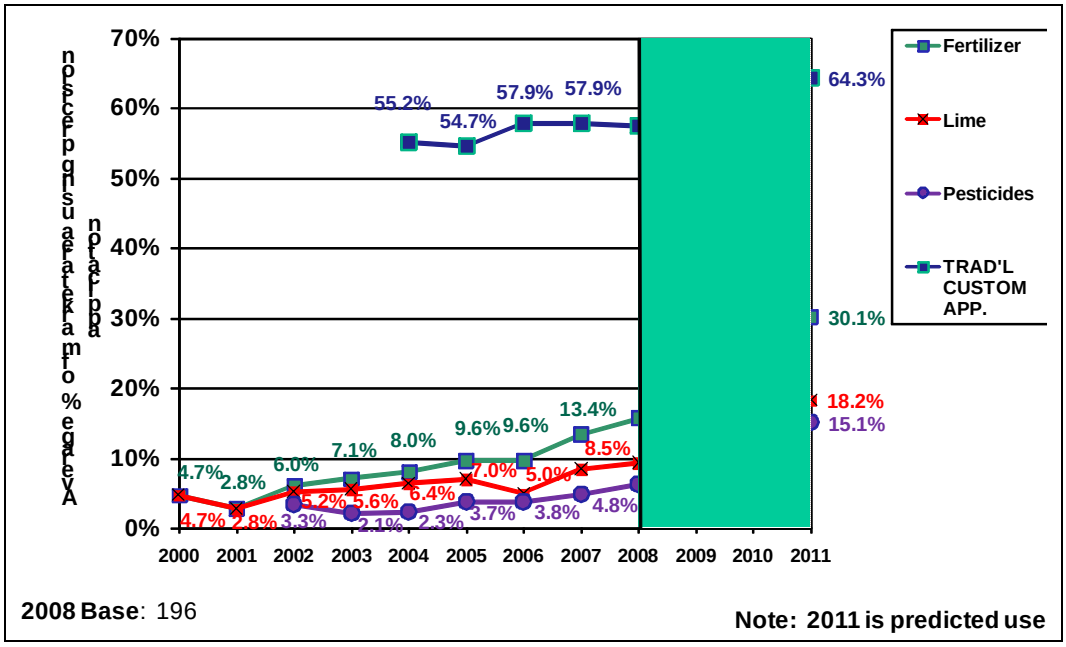


Figure 50 to Figure 57 break out estimated market usage of precision services by region. Some market use estimates were significantly higher in the Midwest than in other states. Current usage was significantly higher in the Midwest for soil sampling with GPS, field mapping with GIS, yield monitors both with and without GPS, manual GPS guidance systems (lightbars), and single and multi-nutrient controller-driven application of fertilizer and lime.

Figure 50. Estimated Market Area Using Precision Services in the Midwest

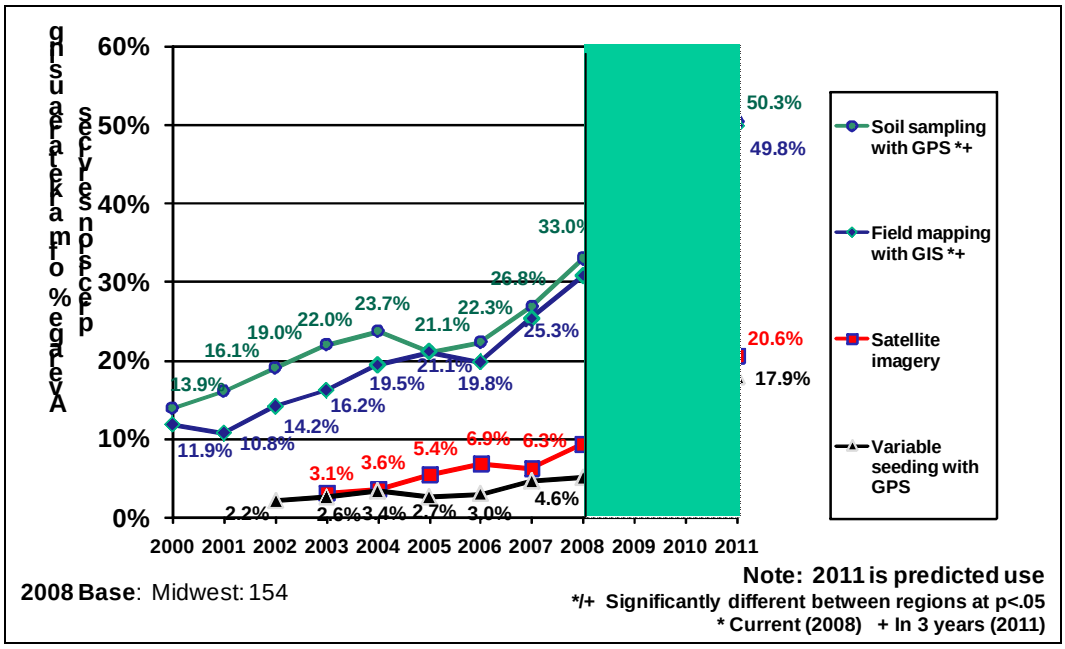


Figure 51. Estimated Market Area Using Precision Services in the Other States

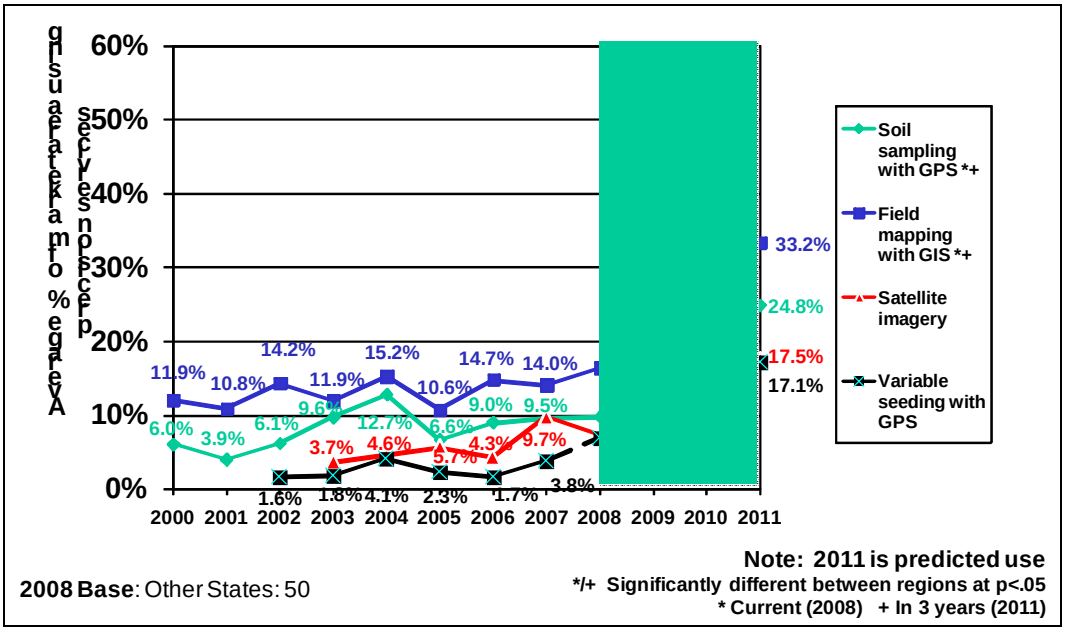


Figure 52. Estimated Market Area Using Yield Monitors and Guidance Systems in the Midwest

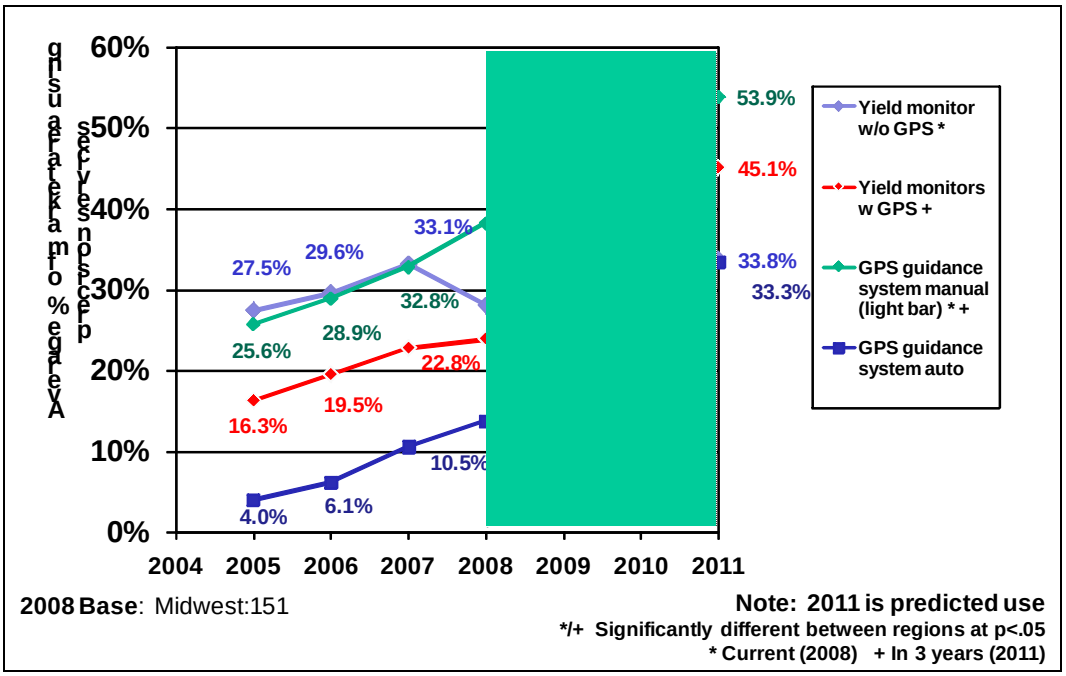


Figure 53. Estimated Market Area Using Yield Monitors and Guidance Systems in Other States

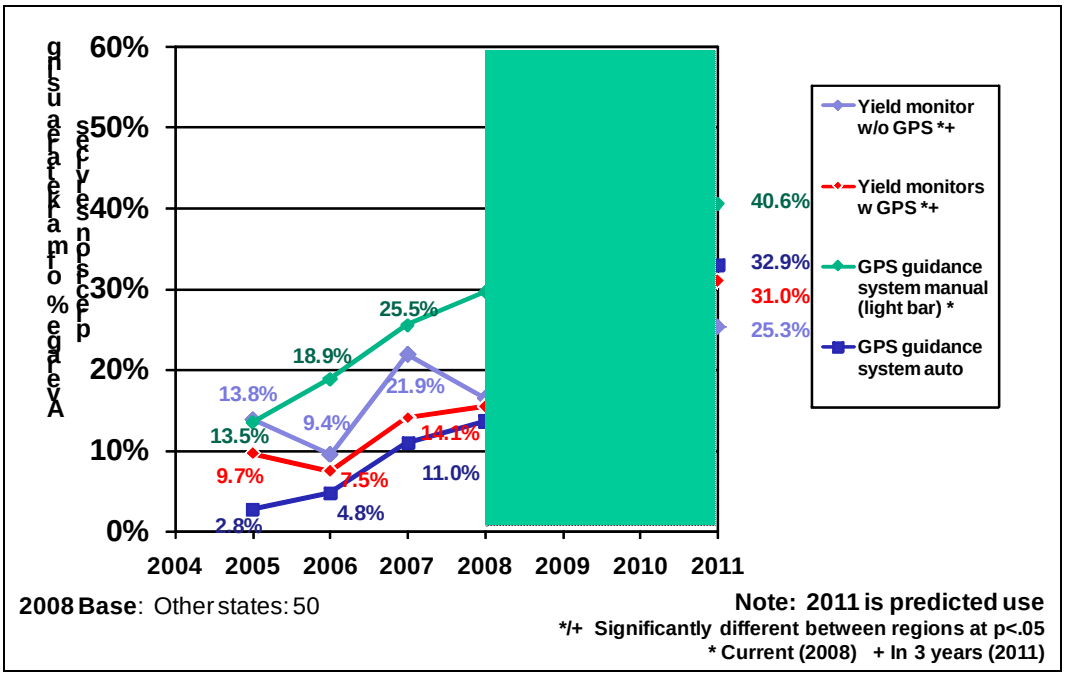


Figure 54. Estimated Market Area Using Single Nutrient Controller-Driven Application in the Midwest

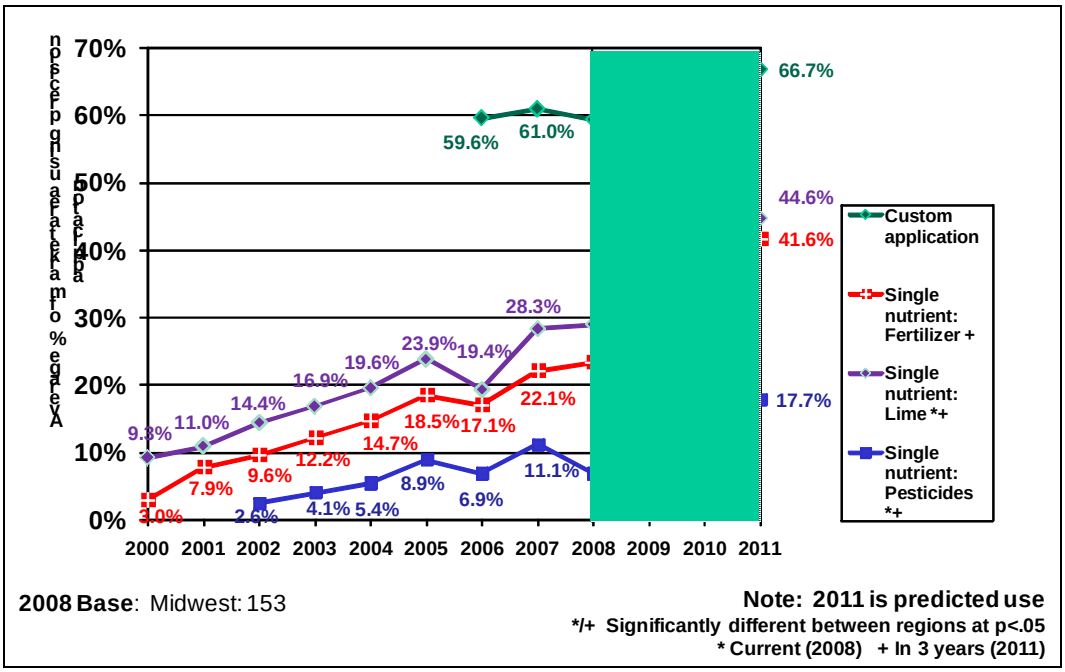


Figure 55. Estimated Market Area Using Single Nutrient Controller-Driven Application in Other States

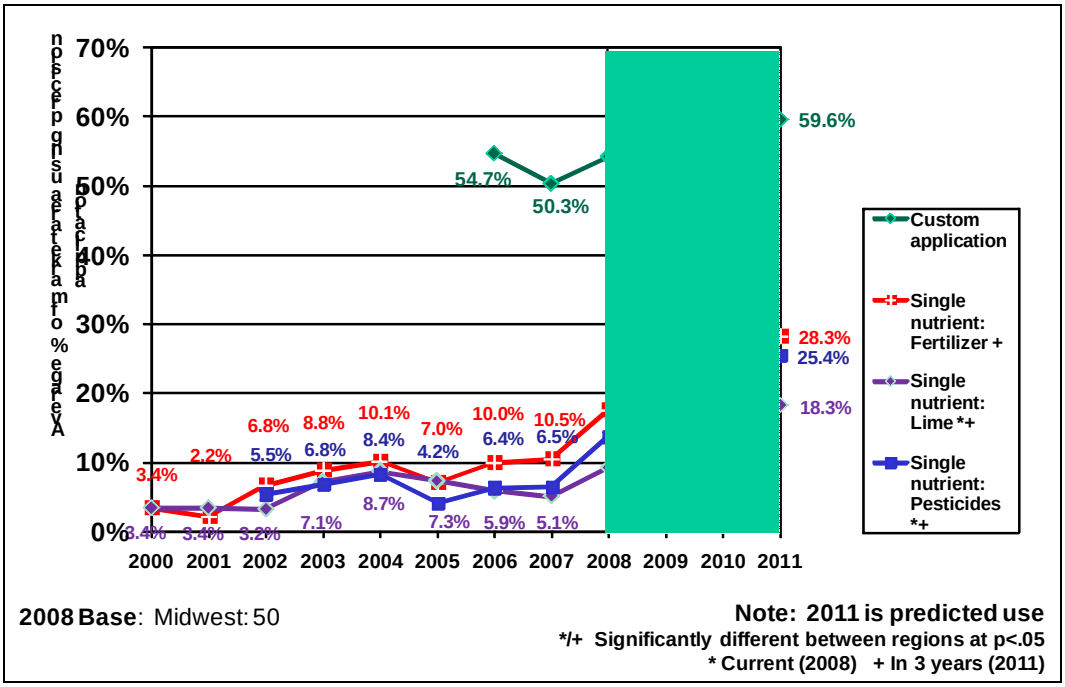
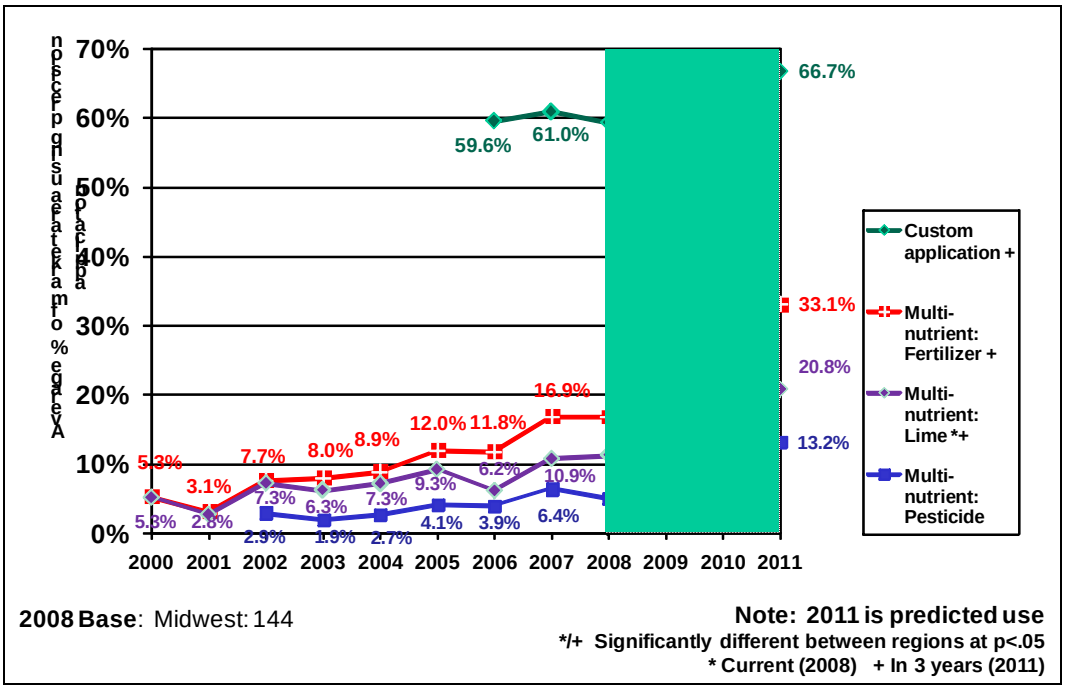


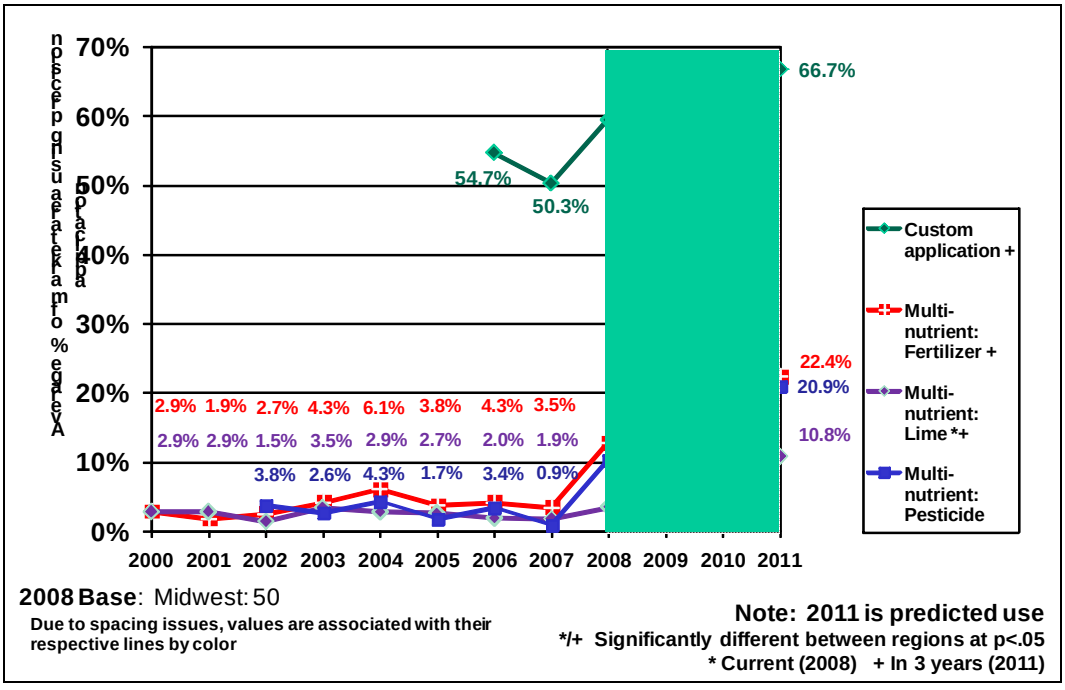
Figure 56. Estimated Market Area Using Multi Nutrient Controller-Driven Application in the Midwest



2008 Base: Midwest: 144

Note: 2011 is predicted use
*/+ Significantly different between regions at p<.05
* Current (2008) + In 3 years (2011)

Figure 57. Estimated Market Area Using Multi Nutrient Controller-Driven Application in Other States



2008 Base: Midwest: 50

Due to spacing issues, values are associated with their respective lines by color

Note: 2011 is predicted use
*/+ Significantly different between regions at p<.05
* Current (2008) + In 3 years (2011)

Precision 2.0

With all of the changes that have occurred with precision technology over time, this year some questions were asked about "Precision 2.0", how much participants intended to spend on precision technology in 2008, and what the barriers were to higher adoption rates of precision technology.

When asked where they saw the biggest potential for precision technologies in the future, some of the dealers surveyed were stumped. Responses included comments such as:

- *Don't know!! That is a big part of the problem! (TX)*
- *First we need to start with Precision 1.0. (NY)*

However, many dealers did see changes coming. Some focused on changes at the grower level and mentioned the need to make technology more user-friendly to support more on-farm growth in use of precision services:

- *Farmer purchase and use of GPS technology for planting/harvesting purposes is where this area is going. (AL)*
- *Compatibility and reliability of precision equipment continues to be a challenge. The complexity is a major drawback for many growers – [they] don't want to take the time to learn. (OH)*
- *Data interpretation. My customers have data overload. They need help to make the data they are getting usable. (KS)*

Several technology changes were mentioned by responding dealers as part of the changes needed to move precision agriculture to the next level:

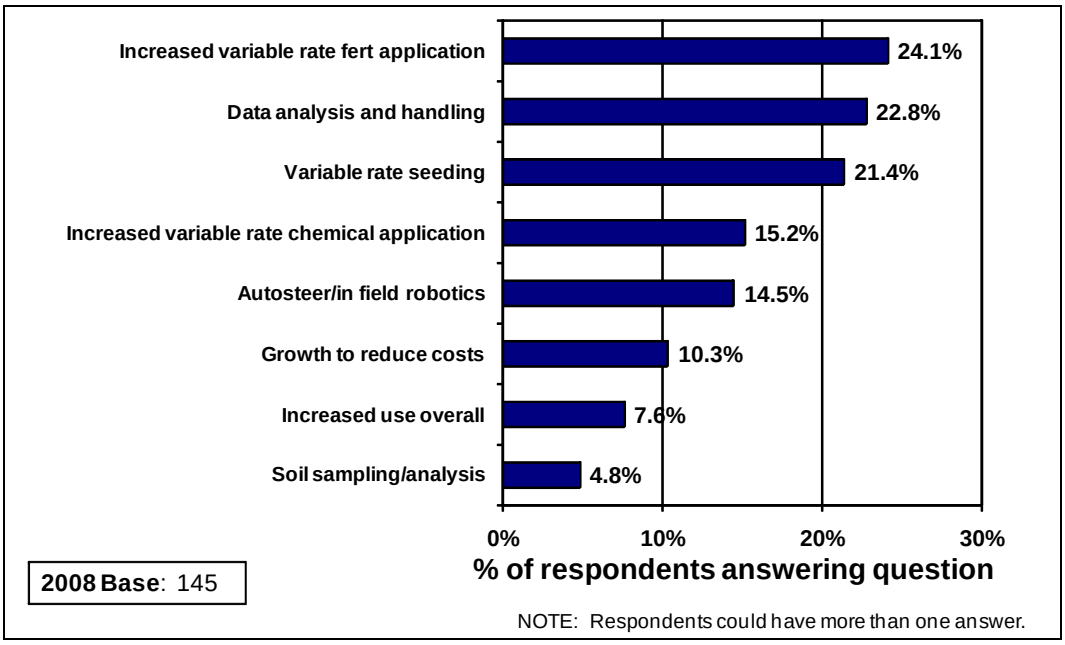
- *More autosteering. Sprayer that recognizes weeds and applies herbicides only to the weed, seed that carries multiple traits to overcome insect and herbicide issues, multiple use application equipment. (MN)*
- *Manure management may be the next big opportunity with large livestock enterprises. (WI)*
- *Incorporation of all aspects from soil test through harvesting. (WA)*
- *I see the future becoming more technical from the office's standpoint. Everything being implemented on the computer in the office before being put into the machine. (IL)*
- *Interpreting the data collected in an efficient and timely manner! (IL)*
- *Right now the industry is doing a good job of helping the producer manage his inputs. Next step is on-the-go sensing and data pooling for analysis. (MO)*
- *RTK sub-inch technology on everything. (IN)*

And, the comments included a bit of cynicism about the whole process of Precision 2.0:

- *Using yield maps to blame dealer for fertilizer o chemical problems. (IA)*

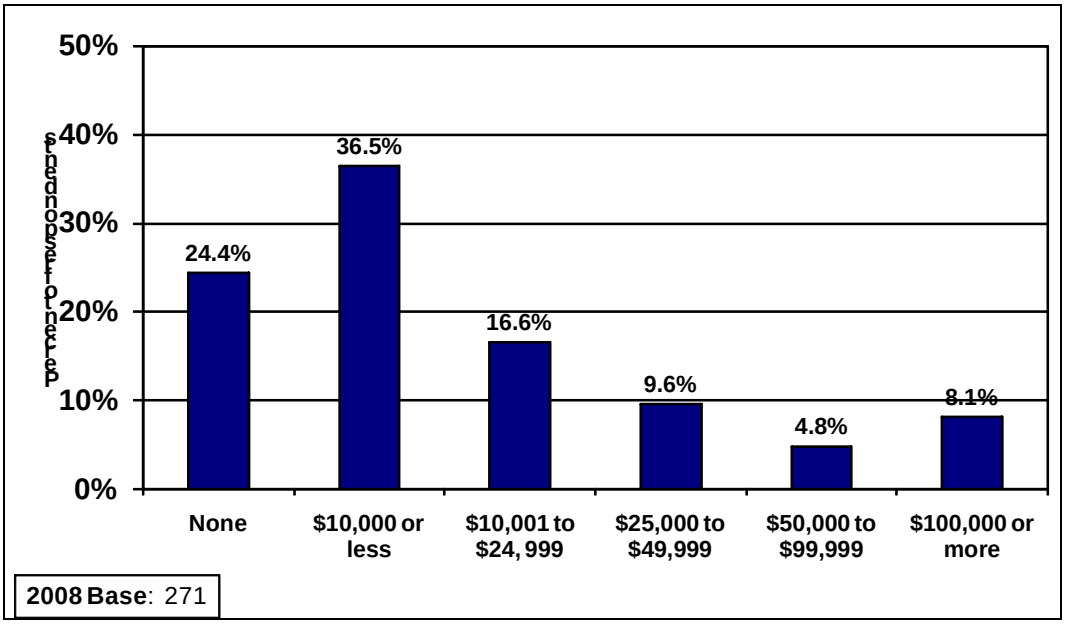
The responses to the open-ended question about what Precision 2.0 are summarized in Figure 58. Increased use of variable rate fertilizer application, often driven by increased input prices, was the most common change, mentioned by a quarter of the respondents answering this question (24 percent). Changes in data analysis and handling were mentioned by 23 percent of the dealers – often with the idea that more efficient and quicker data analysis was going to be required to get to the next level. Variable rate seeding was seen to be an important growth area in the future (21 percent), followed by increased variable rate application of chemicals (15 percent). The other two areas where more than 10 percent of the respondents mentioned changes were increases in autosteer/in-field robotics and overall growth in precision application (not specifically for fertilizer or chemicals) due to increased input costs/lower product prices (15 percent and 10 percent, respectively).

Figure 58. What Will Precision 2.0 Look Like?



When asked how much they expected to invest in precision technology in 2008, three-fourths of the responding dealerships expected to invest some money in precision technology (Figure 59), with 39 percent expecting to invest more than $10,000 this year.

Figure 59. Expected Investment in Precision Technology in 2008



Barriers to Growth and Expansion in Precision Agriculture

Survey respondents were also asked to rate a series of potential barriers (customer focused, dealer focused and technically focused) as to how much of a limitation they were to the growth and expansion of precision agriculture. Figure 60, Figure 62 and Figure 64 show the percentage of respondents who agreed (rated 4 or 5 out of 5, where 5=strongly agree and 1=strongly disagree) or disagreed (rated 1 or 2 out of 5) with each customer, dealer, and technology barrier listed. A similar list of potential barriers was explored in the 2004 *CropLife*/Purdue Precision Survey and Figure 61, Figure 63, and Figure 65 compare results from 2008 to those of 2004, focusing on the percentage of respondents who agreed or strongly agreed with each statement.

Customer Barriers

Dealers were almost evenly split on whether they agreed, disagreed, or were neutral that the cost of precision services to their customers was greater than the benefits they received, and that farm income pressure limits the use of precision services (Figure 60), with 33 percent of the dealers agreeing that the cost was greater than the benefits and 34 percent agreeing that farm income was a limiting factor.

Though these two factors were also the top 2 customer barriers in 2004 (Figure 61), the perceived impact seems to have decreased dramatically. At that time, 72 percent of the dealers

responding to the survey said that farm income limits use of precision technologies and 53 percent agreed or strongly agreed that the grower costs were greater than the benefits.

Compared to farm income and costs vs. benefits, there was less agreement about the other barriers to growth in precision technology adoption. For approximately a quarter of the dealers, interpreting data/making decisions was believed to be too time consuming for customers and they felt customers lack confidence in site-specific recommendations. However, 41 percent of the responding dealers disagreed with each statement.

The time invested in interpreting data and making decisions was the only customer issue that was rated higher in 2008 than in 2004, suggesting that it is becoming more of an issue now as other issues become less important.

Over half of the respondents did not believe that soil types limited precision profitability or that local topography limited the profitability and use of precision technologies. But, both soil types and topography seemed to be a problem for 20 percent of the responding dealerships. The least agreement about barriers was that all customers who benefit from using precision are already using it (61 percent disagreed, only 18 percent agreed), suggesting that there are still many growers who could benefit from precision technologies are not currently using them.

The limitation of farm income was more of an issue for non-Midwestern respondents than those in the Midwest. None of the customer issues were significantly different between organizational types within the Midwest.

Figure 60. Customer Issues that Create a Barrier to Expansion/Growth in Precision Agriculture

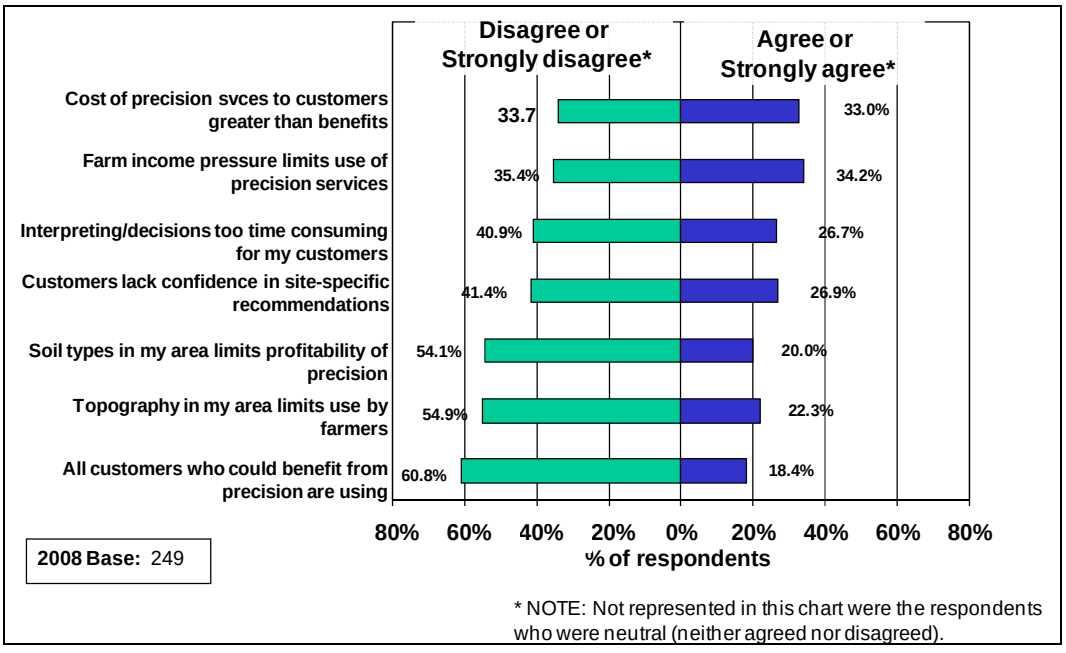
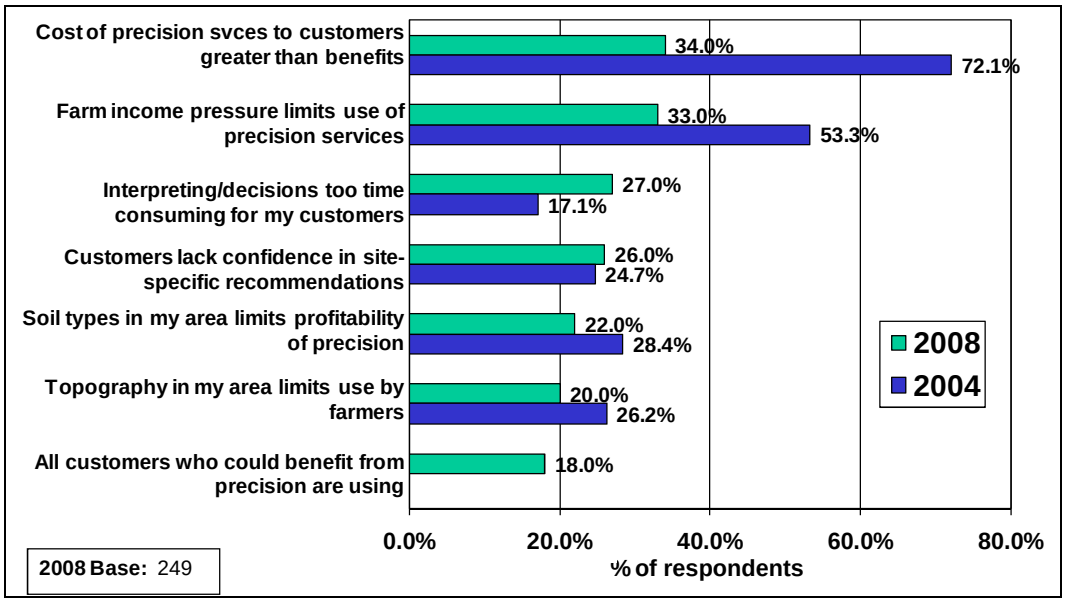


Figure 61. % of Respondents who Agree/Strongly Agree with Customer Issues that Create a Barrier to Expansion/Growth in Precision Agriculture 2004 vs. 2008



Dealer Barriers

When looking at issues that are creating barriers for dealers, almost six out of 10 (57 percent) (Figure 62) said that they just weren't able to charge fees high enough to make precision services profitable. Over half agreed that the cost of the equipment limits their precision offerings (51 percent). Almost half said they had a challenge finding employees who could deliver precision services (49 percent) and almost as many (45 percent) agreed that the cost of employees was high enough to limit the growth of precision services. Another concern that 44 percent of the dealers had was that it was hard to demonstrate the value of precision technologies to growers. And, for almost 4 out of 10 of the respondents (38 percent), another barrier was that competitors priced precision services at unprofitable levels. For all of these issues, there were 20 to 25 percent of the respondents who disagreed that the issue was a barrier to expansion.

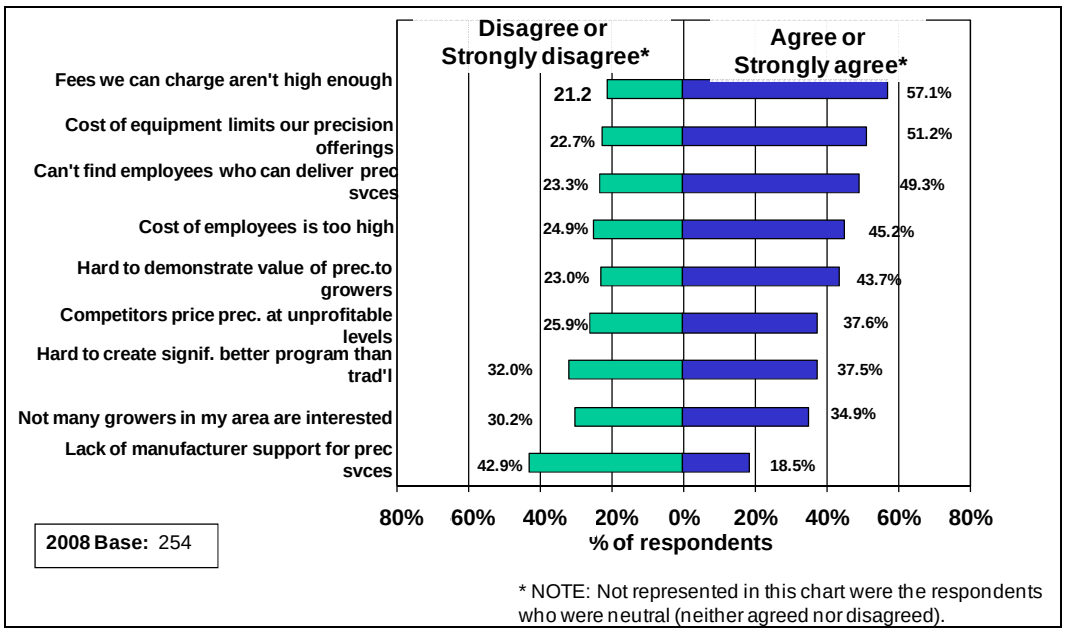
The respondents were more evenly split (approximately a third disagreed, a third agreed, and a third were neutral) on the issues of it being difficult to create a precision program that adds significantly more value for the grower than a traditional program, and that not many growers in their area were interested in precision agriculture services.

The most disagreement occurred with the issue that a lack of manufacturer support for precision services limits their ability to provide such services (disagreed with by 42 percent while only 19 percent agreed).

The only regional difference between differences in dealer issues were in being able to create a significantly better (more profitable) precision program compared to traditional programs, where more respondents in non-Midwestern states agreed that that was a problem compared to those in the Midwest.

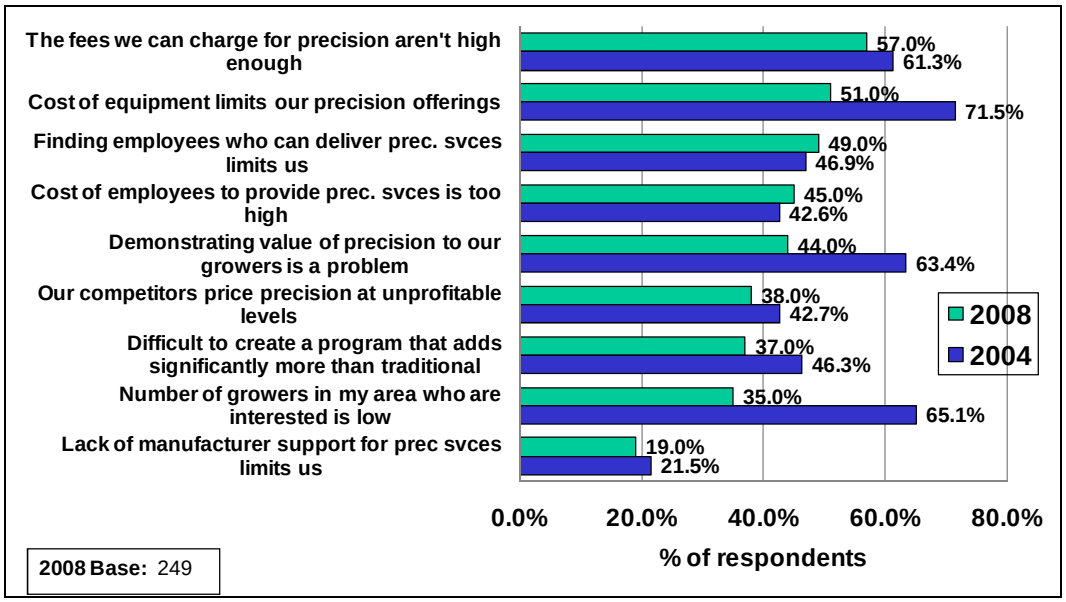
Some of the dealer issues were different across the organizational types within the Midwest. Respondents of regional/national outlets were significantly more likely than other respondents to say that finding employees who can deliver precision services and the cost of employees was a barrier to expansion. Local independents were more concerned than others with the lack of manufacturer support and how to create a significantly better precision program than the traditional program. Both of these may be due to the smaller size of those dealerships.

Figure 62. Dealer Issues that Create a Barrier to Expansion/Growth in Precision Agriculture



Compared to 2004, several of these issues have declined in perceived importance (Figure 63). In 2004, almost three-quarters of the dealers (72 percent) believed that the cost of equipment to the dealer was a limitation in growth of precision technology (compared to only half of the dealers in 2008). Almost two-thirds (65 percent) of the dealers in 2004 said that growers were just not interested in precision services – and this has dropped by almost by half to 34 percent in 2008. Demonstrating value to the customer was a challenge to 63 percent of the dealers in 2004 compared to only 44 percent in 2008. Opinions on most of the other issues were similar both years as precision technology becomes more integrated into the business.

Figure 63. % of Respondents who Agree/Strongly Agree with Dealer Issues that Create a Barrier to Expansion/Growth in Precision Agriculture 2004 vs. 2008

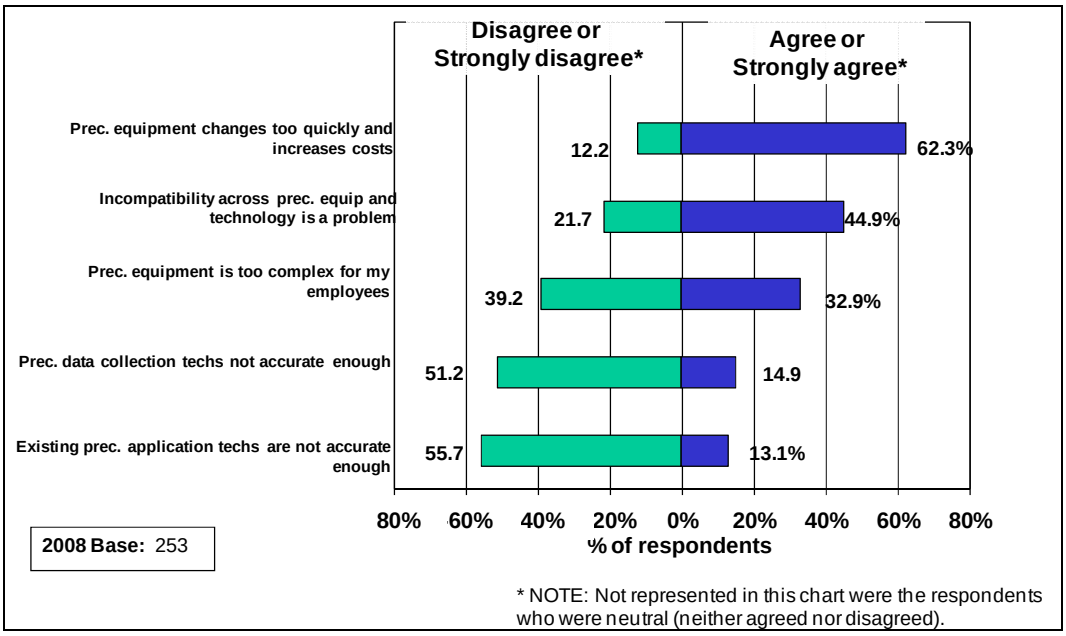


Technology Barriers

The biggest technology issue that is perceived to be preventing expansion of precision agriculture is a common characteristic of technology overall. Over 6 out of 10 respondents agreed that precision equipment changes too quickly and increases the costs of offering precision services (Figure 64). Four out of 10 respondents (45 percent) said that incompatibility across precision equipment and technology was a problem. Respondents were fairly split about the complexity of the equipment with 39 percent who did not believe that precision equipment was too complex for employees, 33 percent believing that it was too complex, and the remaining 28 percent neutral on the issue. Overall, there was not a lot of agreement that accuracy was a problem (in either the data collection technologies or the precision application technologies).

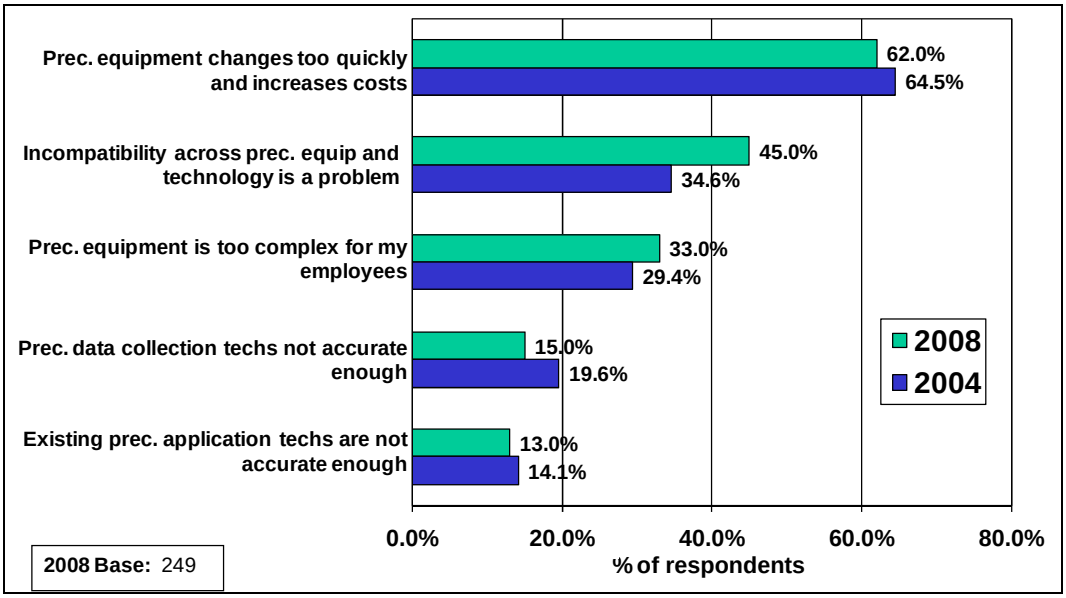
There were no significant differences in perceived technological barriers between regions or between organizational types within the Midwest.

Figure 64. Technology Issues that Create a Barrier to Expansion/Growth in Precision Agriculture



In comparing 2004 to 2008, most of the technology issues were rated about the same (Figure 65). In both years, over 6 out of 10 dealers agreed that the equipment changed too quickly, a third agreed the incompatibilities between equipment and technologies were a challenge, and just under a third of the dealers said the equipment was too complex for their employees.

Figure 65. % of Respondents who Agree/Strongly Agree with Technology Issues that Create a Barrier to Expansion/Growth in Precision Agriculture 2008 vs. 2004



Retailer-Manufacturer Roles

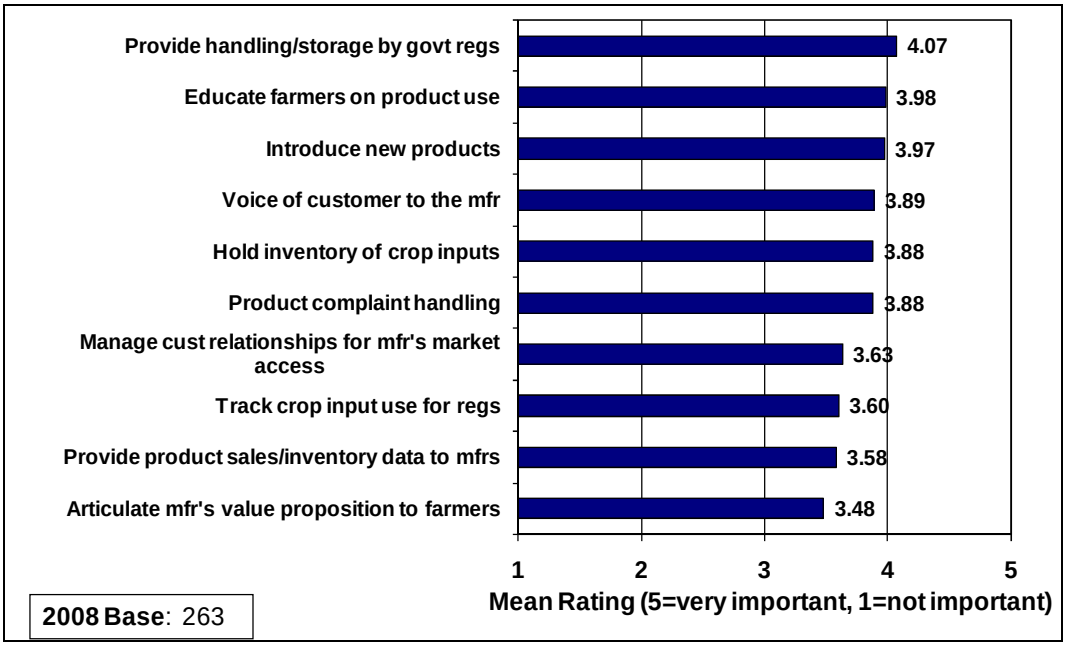
One other issue explored in this year's Precision Survey was the role retailers play for manufacturers and producers of fertilizer, crop protection chemicals and seed. Given a list of roles, respondents were asked to rate how important they currently saw that role and then indicate whether they thought it would become more or less important in the next 2 to 3 years.

Of the roles reviewed, the one rated highest in importance was to provide handling/storage for the manufacturers in compliance with government regulations (rated an average of 4.07 out of 5 where 5 was "a very important role" and 1 was "not important"). Educating farmers on products and product usage was the second-highest rated role, followed closely by introducing new products to the market on behalf of the manufacturer/producer (rated 3.98 and 3.97, respectively).

Respondents also saw their role of being the voice of the customer to the manufacturer as being important (3.89 out of 5) as well as holding inventory for the manufacturer/producer and handling complaints (both 3.88 out of 5).

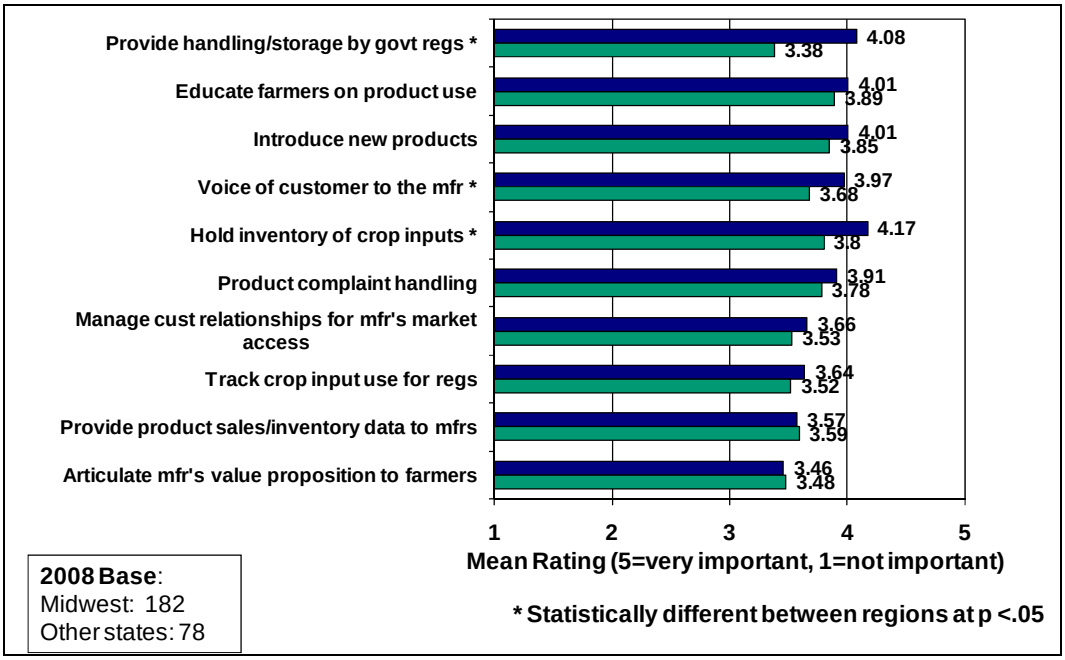
Lower on the list were managing customer relationships to give the manufacturer broad market access, tracking crop input use for regulatory purposes and providing product sales/inventory data to manufacturers. Lowest on the list (though still rated 3.48 out of 5) was the importance of the role of the retailer in articulating the manufacturer's value proposition to farmers.

Figure 66. Importance of Different Aspects of the Retailer-Manufacturer Role



The importance of different retailer-manufacturer roles did vary by region. Providing handling/storage to be compliant with government regulations was significantly more important in the Midwest than in other states (Figure 67). Being a voice of the customer to the manufacturer was also perceived more important by the Midwestern retailers (3.97 vs. 3.68 out of 5). And, holding inventory of crop inputs was the highest rated retailer role in the Midwest at 4.17 compared to only 3.8 for the non-Midwestern respondents. These ratings did not vary by organizational type within the Midwest.

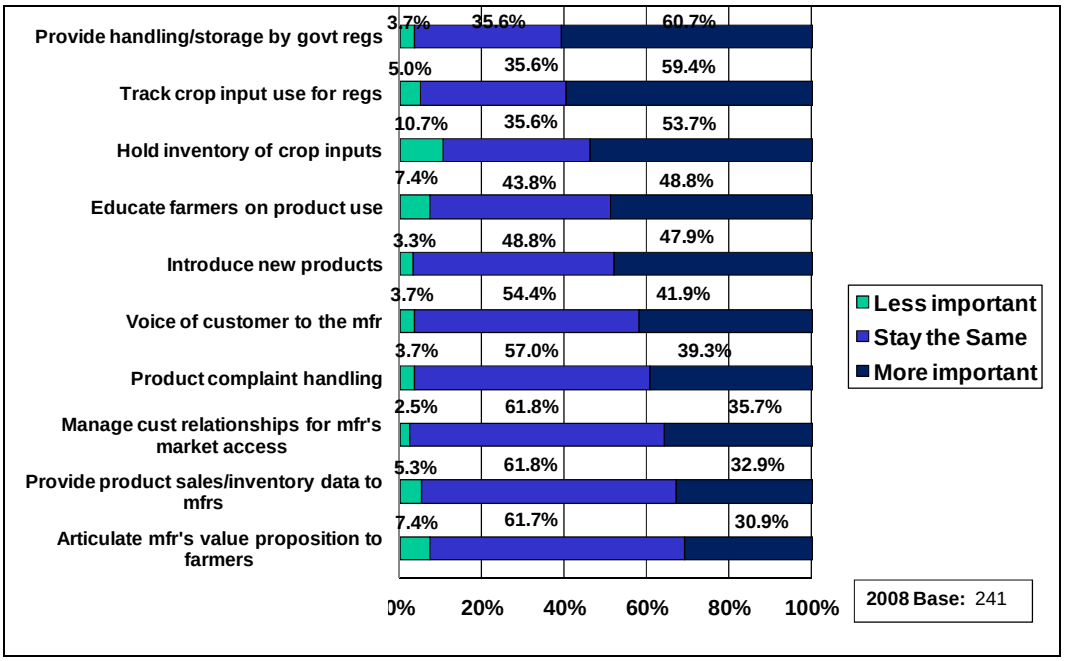
Figure 67. Importance of Different Aspects of the Retailer-Manufacturer Role by Region



When asked how they saw these roles changing in the next 2 to 3 years, the biggest increase in importance expected was in providing handling/storage in compliance with government regulations and tracking crop input use for regulations (both expected to increase in importance by 6 out of 10 respondents) (Figure 68). Over half of the respondents also expected their role in holding inventory to become more important (expected to increase by 54 percent of the respondents). Almost half thought that their role of educating farmers on product use and introducing new products would become more important.

There were no significant differences in changes expected by region. In the Midwest, the respondents representing regional/national organizations were more likely than the other organizations to feel that introducing new products and managing customer relationships for manufacturers' access would increase in importance in the next 2 to 3 years.

Figure 68. Change Expected in the Next 2 to 3 Years with Dealers' Relationship with Manufacturers



Summary

As prices of crop production inputs increase, precision technology is once again showing wide-spread growth across the U.S. Not only is the technology becoming easier to use, but the justification of the costs at the dealer and customer level is less difficult. Education and training of customers is no longer as challenging as precision technology becomes more widespread. This year, an added incentive is increased input costs which may make investing more to get more efficient and accurate crop input placement even more critical. At the same time, precision technologies have not matured to the point that they are mainstream in crop production practice. Dealers remain optimistic that these precision technologies will reach that point in the future.

APPENDIX I:
Questionnaire

13th ANNUAL PRECISION AG SURVEY

CropLife • PURDUE CENTER FOR FOOD AND AGRICULTURAL BUSINESS • PURDUE UNIVERSITY

Play a part in agricultural history! *Please fill out and return this brief survey in the enclosed pre-addressed, postage-paid envelope, and send to:* **CropLife**, *37733 Euclid Ave., Willoughby, OH 44094; Fax: 440-942-0662.* ***PLEASE RETURN BY FEBRUARY 29, 2008.***

1. Your primary responsibility: [*check one*]
- ☐ Owner/general manager/location manager
- ☐ Departmental manager
- ☐ Precision manager
- ☐ Application manager
- ☐ Technical consultant/agronomist
- ☐ Sales/sales management
- ☐ Other: _____ (Please specify)

2. Are you a: [*check one*]
- ☐ Cooperative
- ☐ Independent dealership
- ☐ Part of a national or regional (multi-state) chain of retail dealerships (not a cooperative)
- ☐ Other: _____ (Please specify)

3. What were the **total annual retail sales** (in dollars) of agronomic products and services (fertilizer, chemicals, seed, services) **at this location** in 2007?
- ☐ Under $1,000,000
- ☐ $1,000,000 - under $2,000,000
- ☐ $2,000,000 - under $3,000,000
- ☐ $3,000,000 - under $5,000,000
- ☐ $5,000,000 or more

4. How many total retail outlets does ***your company*** own or manage? [*check one*]
☐ None ☐ 1 ☐ 2-5 ☐ 6-15 ☐ 16-25 ☐ More than 25

5. In a typical year how many total acres do you custom apply **at your location** (fertilizer, chemicals, seeding – total acres including multiple applications)? [*check one*]
- ☐ None >go to Question 9
- ☐ Under 10,000 acres
- ☐ 25,001 to 50,000 acres
- ☐ 10,001 to 25,000 acres
- ☐ over 50,000 acres

6. In 2007, approximately what proportion of your total fertilizer sales were custom applied? _____%

7. In 2007, approximately what proportion of your total herbicide/pesticide sales were custom applied? _____%

8. In 2007, approximately what proportion of your total custom application (total acres, all products) used:
GPS guidance systems with manual control (light bar)? _____% "0" if None
GPS guidance systems with automatic control (autosteer)? _____% "0" if None

9. Do you offer soil sampling — traditional, following a grid pattern and/or by soil type? (check all that apply)
- ☐ Traditional
- ☐ Grid pattern — Grid size most commonly used?
  ☐ < 1 acre ☐ 1 ac. - 2.49 ac. ☐ 2.5 ac. ☐ 2.51 ac. - 5 ac. ☐ Other:_____
- ☐ Soil type
- ☐ By zone other than soil type
- ☐ Other: _____
- ☐ Don't offer soil sampling

10. In which of the following ways does your dealership use precision technology? (check all that apply)

- ☐ Precision agronomic services for customers (such as soil sampling with GPS, GIS field mapping, etc.)
- ☐ GPS guidance systems with manual control (**light bar**) for fertilizer/chemical application
- ☐ GPS guidance systems with automatic control (**autosteer**) for fertilizer/chemical application
- ☐ Satellite/aerial imagery for internal dealership purposes
- ☐ Soil electrical conductivity mapping
- ☐ Field mapping with GIS to document work for billing/insurance/legal purposes
- ☐ Telemetry to send field information to home office from field
- ☐ GPS to manage vehicle logistics, tracking location of vehicles, and guiding vehicles to next site
- ☐ Soil sensors for mapping, mounted on a pick-up, applicator, or tractor (example: pH soil sensor, chlorophyll/greenness sensor)
- ☐ On-the-go sensors (Crop Circle, Greenseeker, Yara N-Sensor, etc.)
- ☐ **Don't use precision technology**

11. Which "site-specific" ("precision") services/products will you offer in the following time periods?

Service	By Fall 2008	Offer by 2011	Never/ Don't Know	Don't offer now but did
Field mapping (with GIS)	☐	☐	☐	☐
Controller-driven (GPS), **single** nutrient variable rate application				
Fertilizer	☐	☐	☐	☐
Lime	☐	☐	☐	☐
Chemicals	☐	☐	☐	☐
Controller-driven (GPS), **multiple** nutrient variable rate application				
Fertilizer	☐	☐	☐	☐
Lime	☐	☐	☐	☐
Chemicals	☐	☐	☐	☐
Yield monitor sales/support/rental	☐	☐	☐	☐
Yield monitor data analysis	☐	☐	☐	☐
Variable seeding rates with GPS	☐	☐	☐	☐
Satellite/aerial imagery	☐	☐	☐	☐
Soil sampling with GPS	☐	☐	☐	☐

12. For the following services **that you offer**, currently how profitable is each specific service for your dealership?

	I am not close to breaking even	I am just covering variable costs (See NOTE)	I am covering both variable and fixed costs	I am generating a profit	Don't know	Don't offer
Custom application (Not-precision)	1	2	3	4	5	6
Data analysis for yield monitors	1	2	3	4	5	6
Variable seeding rates with GPS	1	2	3	4	5	6
Satellite/aerial imagery	1	2	3	4	5	6
Soil sampling with GPS	1	2	3	4	5	6
Total precision program, all components	1	2	3	4	5	6
Controller-driven (GPS) **single** nutrient variable rate application	1	2	3	4	5	6
Controller-driven (GPS), **multiple** nutrient variable rate application	1	2	3	4	5	6

NOTE: **Variable Costs** are the costs of actually performing the service — costs increase or decrease with how much business you do (fuel, supplies, etc.) **Fixed Costs** are the costs of making the service available (depreciation on equipment, computers, labor, training, etc.)

13. Please answer the following question *whether or not* you offer any precision services.
Approximately what percentage of the total acreage in your market area **(all growers, not just your current customers)** is currently using the following site-specific agricultural practices? Approximately what percentage of the total acreage will be using these practices in three years (the year 2011)?

% of market acres (fill in blank with a percentage; *indicate 0 if none*)

Practice	Currently	3 years from now (2011)
Custom application of any type	_____%	_____%
Field mapping (with GIS)	_____%	_____%
Controller-driven (GPS), **single** nutrient variable rate application		
Fertilizer	_____%	_____%
Lime	_____%	_____%
Chemicals	_____%	_____%

% of market acres (fill in blank with a percentage; *indicate 0 if none*)

Practice	Currently	3 years from now (2011)
Controller-driven (GPS), **multiple** nutrient variable rate application		
Fertilizer	_____%	_____%
Lime	_____%	_____%
Chemicals	_____%	_____%
GPS guidance systems with manual control (light bar) for field operations (tillage, planting, etc.)	_____%	_____%
GPS guidance systems with automatic control (autosteer) for field operations (tillage, planting, etc.)	_____%	_____%
Yield monitor without GPS	_____%	_____%
Yield monitor with GPS	_____%	_____%
Variable seeding rates with GPS	_____%	_____%
Satellite/aerial imagery	_____%	_____%
Soil sampling with GPS	_____%	_____%

14. In many areas, the adoption of precision agriculture has stabilized in the past few years or the growth has at least slowed down. As you think about the potential for precision agriculture in your market area, what are the primary barriers preventing more farmers from adopting or expanding their use of precision agricultural services and/or preventing you from offering more precision services? Please rate the following statements on a scale from 1 (strongly disagree) to 5 (strongly agree).

• Customer Issues	
The cost of precision services to my customers is greater than the benefits many receive	1 2 3 4 5
My farmers are interested in precision services, but pressure on farm income in my area limits their actual use of precision services	1 2 3 4 5
The topography (i.e., rolling ground, etc.) in my area limits use of precision services by farmers	1 2 3 4 5
Soil types in my area limit the profitability of precision agricultural practices for my customers	1 2 3 4 5
Interpreting and making decisions with precision agricultural information takes too much of my customer's time	1 2 3 4 5
Customers lack confidence in the agronomic recommendations made based on site-specific data (e.g., yield maps, GPS soil sampling, remote sensing)	1 2 3 4 5
All customers who can profit from precision services in my market are already using them	1 2 3 4 5
• Dealer Issues	
The cost of the equipment required to provide precision services limits our precision offerings	1 2 3 4 5
The cost of the employees who can provide precision services is too high for precision agriculture to be profitable	1 2 3 4 5
Finding employees who can deliver precision agricultural services limits our ability to provide these services	1 2 3 4 5
The fees we can charge in our market for precision services are not high enough to make precision services profitable	1 2 3 4 5
The number of growers in my market who are interested in precision agricultural services is limited	1 2 3 4 5
Lack of manufacturer support for precision services limits our ability to provide such services	1 2 3 4 5
Creating a precision program that adds significantly more value for the grower than a traditional agronomic program is difficult for us	1 2 3 4 5
Demostrating the value of precision services to our growers is a challenge	1 2 3 4 5
Our competitors price precision agricultural services at levels that are not profitable for us	1 2 3 4 5
• Technology Issues	
The equipment needed to provide precision services changes quickly, increasing my costs of offering precision services	1 2 3 4 5
The existing precision data collection technologies are not accurate enough to create value for my farmers	1 2 3 4 5
The existing precision application technologies are not accurate enough to create value for my market	1 2 3 4 5
The equipment required to deliver precision services is too complex for many of my employees to use	1 2 3 4 5
Incompatibilities across types of precision equipment and technology (different data formats, inability to share information) limit my ability to offer precision services	1 2 3 4 5

15. How much will your location be investing in precision/site-specific technology during 2008?

☐ None	☐ $25,000 - $49,999
☐ $1 - $10,000	☐ $50,000-$99,999
☐ $10,001-$24,999	☐ More than $100,000

16. As GPS and other precision technology becomes more commonly incorporated into agricultural practices, where do you see the biggest potential for the next area of growth with this type of technology? In other words, what does Precision 2.0 look like?

_____

_____

_____

_____

_____

_____

17. As a retailer, you play a number of very important roles for manufacturers/producers or fertilizer, chemicals, and seed. A number of these roles are presented below. For each, rate the importance of your role to manufacturers currently on a scale of 1 (not an important role) to 5 (very important role). In addition, as you think about the next 2-3 years, do you see each role becoming more or less important? (Circle the response)

Dealer Role	Current Importance	In 3 years, this role will be
Hold inventory of crop inputs	1 2 3 4 5	Less Same More
Educate farmers on proper use of products for manufacturer	1 2 3 4 5	Less Same More
Introduce new products to the market	1 2 3 4 5	Less Same More
Articulate the manufacturers' value proposition to farmers	1 2 3 4 5	Less Same More
Provide product compliant handling/troubleshooting	1 2 3 4 5	Less Same More
Serve as the voice of the customer to manufacturers	1 2 3 4 5	Less Same More
Track crop input use for regulatory purposes	1 2 3 4 5	Less Same More
Provide handling and storage of products in compliance with government regulations	1 2 3 4 5	Less Same More
Manage customer relationships to give the manufacturer broad market access	1 2 3 4 5	Less Same More
Provide manufacturers with data on product sales, inventory levels, etc.	1 2 3 4 5	Less Same More

18. What proportion of your customers has your location communicated with via e-mail during the last 12 months?

☐ None ☐ 1%-5% ☐ 6%-15% ☐ 16%-25% ☐ 26%-50% ☐ Over 50%

19. What is the two-letter abbreviation for the state your location is situated in? _____

20. What is your ZIP code? _____

Thank you for your cooperation! PLEASE SEND YOUR COMPLETED SURVEY TO:
CropLife, 37733 Euclid Ave., Willoughby, OH 44094, Fax: 440-942-0662.