

**2004 PRECISION**  
**AGRICULTURAL SERVICES**  
**DEALERSHIP SURVEY RESULTS**  
SPONSORED BY *CROPLIFE* MAGAZINE  
AND THE CENTER FOR FOOD AND  
AGRICULTURAL BUSINESS

by

Dr. Linda D. Whipker\* and Dr. Jay T. Akridge

Staff Paper # 04-07

June 2004

**Dept. of Agricultural Economics**

**Purdue University**

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# **2004 PRECISION AGRICULTURAL SERVICES DEALERSHIP SURVEY RESULTS**

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## Abstract

As precision technology has been slowly but steadily incorporated into the agribusiness arena, and as the technology and its uses become more defined, questions continue to arise as to where it is effective, how many growers will use precision technologies, and how quickly the industry will embrace the various technologies. Initially, when new technology is introduced, the biggest task is helping potential users become familiar with its scope and potential. However, after the first growers try out the technology, it's often a challenge to get the next wave of users to try it. In addition to the annual 'state of the industry' focus, this year's survey of precision technology use also explored the barriers of adoption to better understand what is limiting grower adoption and/or expansion of their use of precision technologies.

This year marked the 9<sup>th</sup> year for the annual Precision Agriculture Dealership Survey sponsored by *Crop Life* magazine and Purdue University's Center for Food and Agricultural Business. As in previous years, the survey was designed to gain a better understanding of who is adopting precision technologies and how quickly they're adopting. This year, some of the barriers that dealers feel are limiting grower adoption or expanding grower use of precision technology were also explored.

Keywords: Precision Agriculture Dealership Survey, Variable Rate Seeding and Application, Levels of Precision Adoption, Barriers to Adoption/Expansion of Precision Technology

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The survey was conducted in late January to early March 2004. The questionnaire was sent to 2500 retail agronomy dealerships across the U.S. A second questionnaire was mailed to participants approximately two weeks after the first one as a reminder to complete and return it. (See Appendix I to this report for a copy of the questionnaire.) A total of 483 questionnaires were returned, with 439 being usable, providing an effective response rate of 18 percent. This response rate was similar to that of last year, though not as high as some other years. (Response rates have ranged from a high of 38 percent in 1996 to a low of 11 percent in 2001.)

Dealerships 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 fast their customers are adopting precision agriculture practices, and how profitable they are finding precision services to be in their businesses. This year they were also asked to rate several types of barriers that are limiting adoption in their area. The responses to these questions provide insight into where dealers are in adopting precision technologies and some of the changes they expect in the future.

## *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 44 unusable questionnaires among the 483 returned.

In 2000 and 2001, the data were statistically weighted to have the same demographics as the 1999 data 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 those two years made this necessary (timing of the survey, survey length, etc.). As in 2002 and 2003, this year’s data were not statistically different from the 1999 data in terms of these demographic variables and therefore the data used in this report have not been weighted.

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

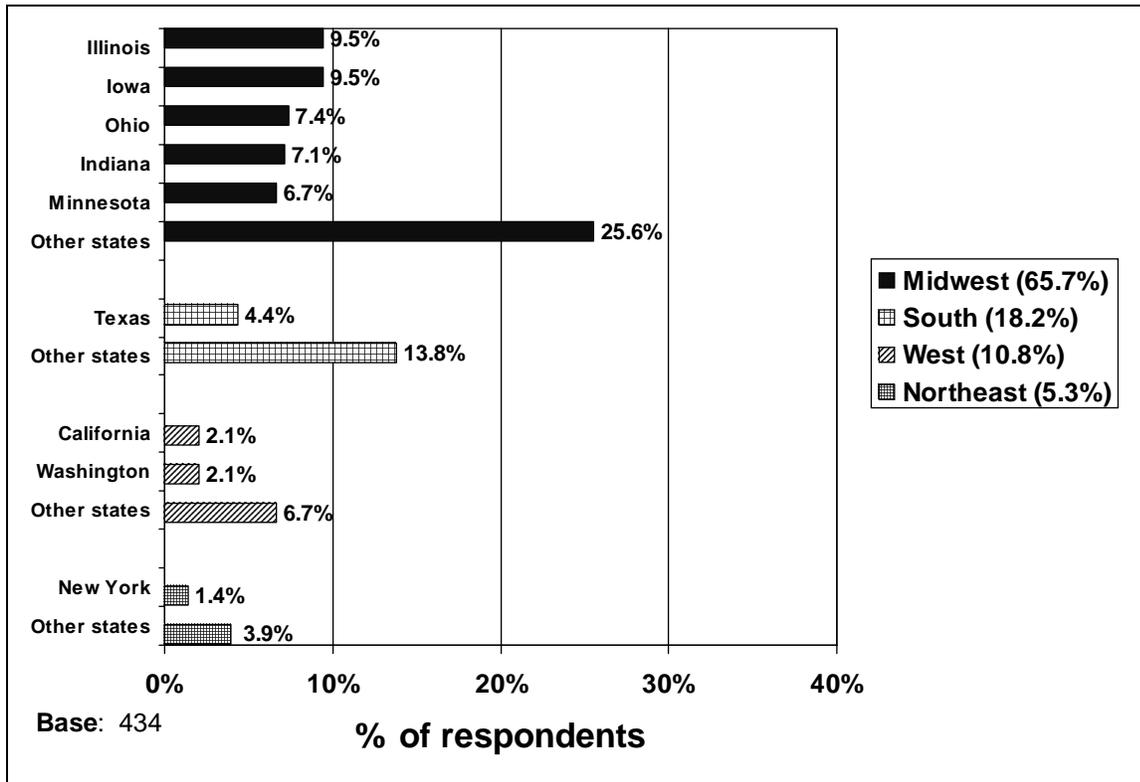
## **The Respondents**

The 439 survey respondents came from 40 states, with the highest representation from Iowa and Illinois, each accounting for 10 percent of the respondents (Figure 1). The Midwest was heavily represented in the distribution of respondents, with two-thirds of the respondents being from the Midwest states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North and South Dakota, Ohio and Wisconsin. Almost a fifth of the respondents (18 percent) were from the South, 11 percent were from the West and 5 percent were from the Northeast.

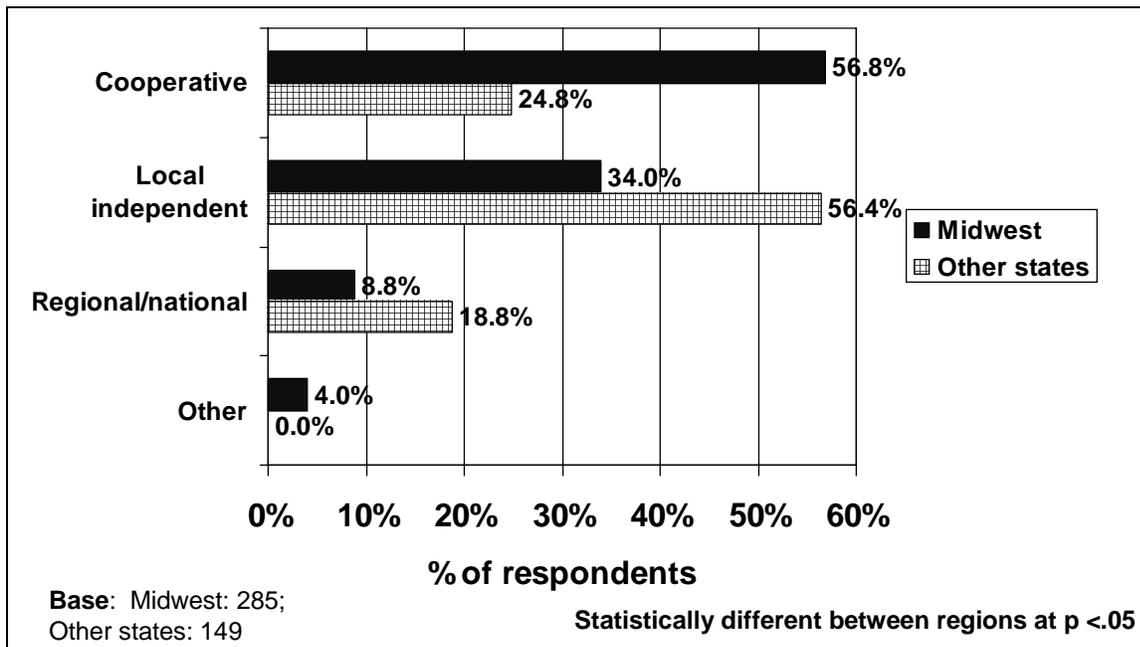
Responding dealerships represented a wide variety of organizational types with more than four out of 10 being cooperatives (46 percent), while 41 percent represented local independents and 12 percent were part of a national or regional chain of dealerships. Compared to 2003, this represents more local independents (36 percent in 2003) and fewer regional/national dealerships (20 percent in 2003).

As in other years, cooperatives were a larger part of the sample in the Midwest (57 percent of respondents) compared to other states (25 percent of respondents) (Figure 2). Local independents were more heavily represented in non-Midwestern states, accounting for over half of the respondents (56 percent) compared to a third in the Midwest (34 percent). Regional/ national organizations were also more heavily represented in non-Midwestern states (19 percent of respondents) compared to Midwestern states (9 percent of respondents).

**Figure 1. States Represented**

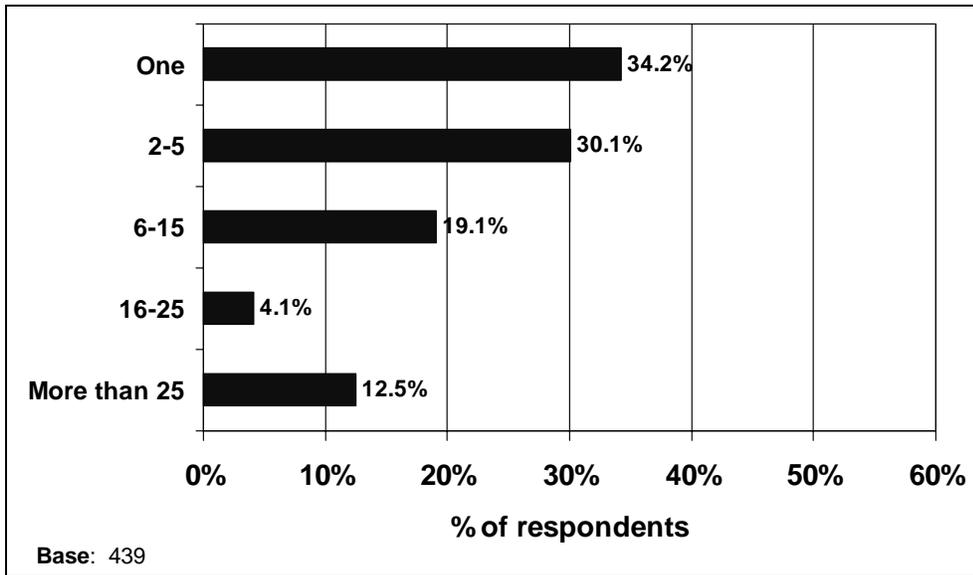


**Figure 2. Organization Types by Region**

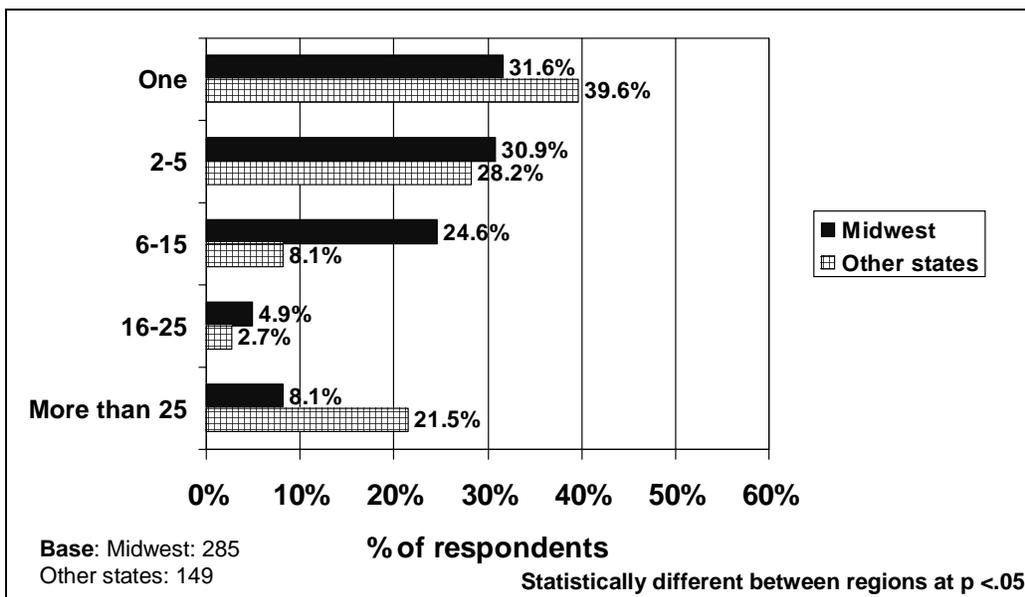


The size of the responding dealerships ranged from one outlet (34 percent of the respondents) to more than 25 outlets (13 percent of the respondents) (Figure 3). When the number of retail outlets were broken out by region, respondents in the Midwest were more likely to be from firms with 6 to 15 outlets while respondents in other states were more likely to represent firms at each extreme – either firms with one outlet or firms with more than 25 outlets (Figure 4). In the Midwest, local independents were significantly more likely to have only one retail outlet (65 percent) while cooperatives typically had 2 to 15 outlets (74 percent) and regional/national organizations had over 25 outlets (56 percent of these respondents).

**Figure 3. Number of Retail Outlets Owned or Managed**

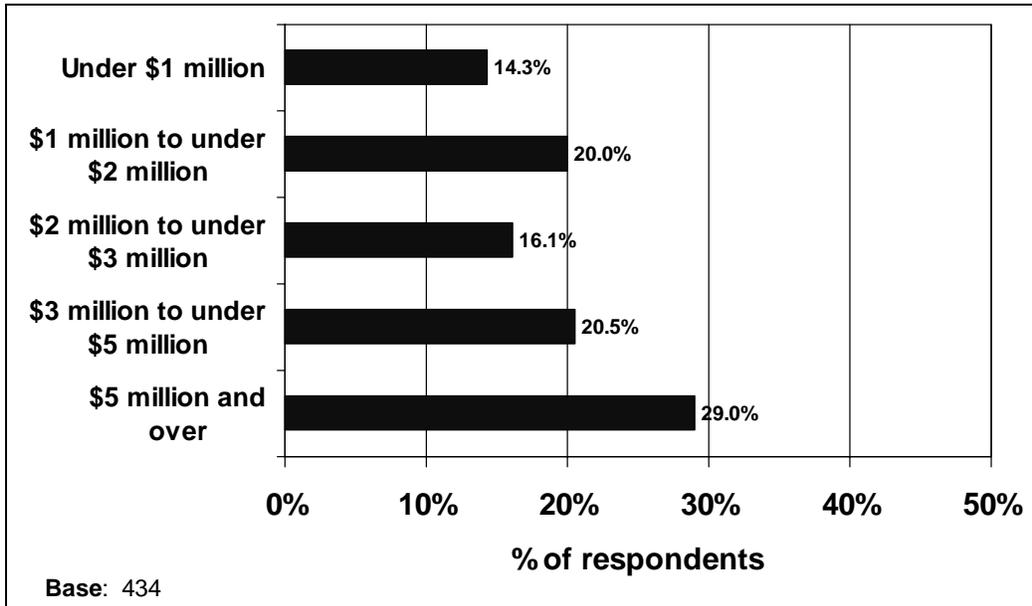


**Figure 4. Number of Retail Outlets Owned or Managed by Region**

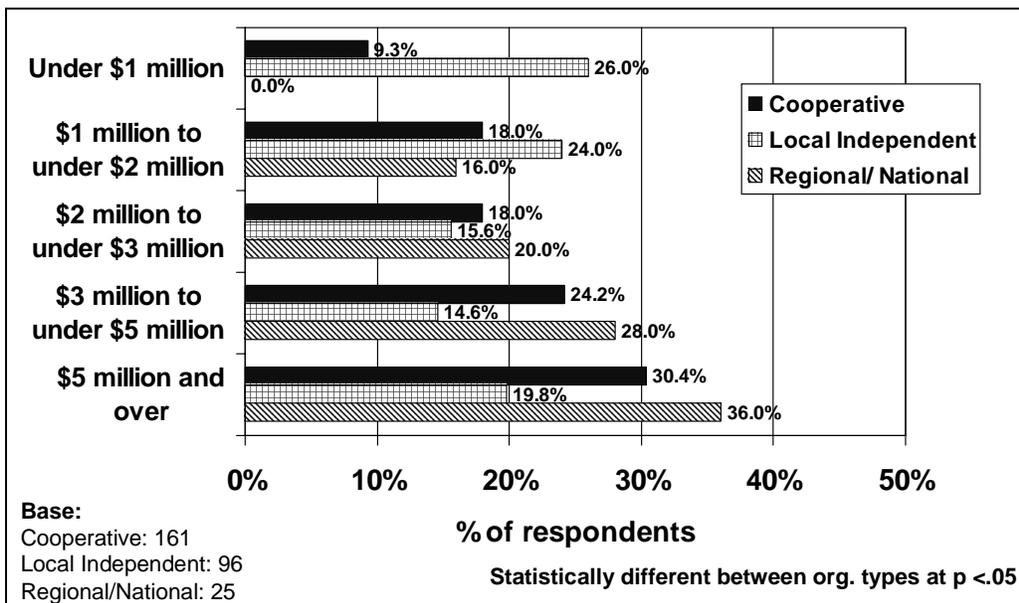


Respondents also represented a range of outlet sizes. Fourteen percent of this year's respondents had annual agronomy sales of less than \$1 million at their location, similar to last year, while 29 percent had \$5 million or more in agronomy sales (Figure 5). When broken out by region, there were no significant differences in outlet size between respondents in the Midwest and other states. However, within the Midwest, there were significant differences in annual agronomy 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 agronomy sales dollars per outlet (Figure 6).

**Figure 5. Total 2003 Annual Agronomy Sales at Location**

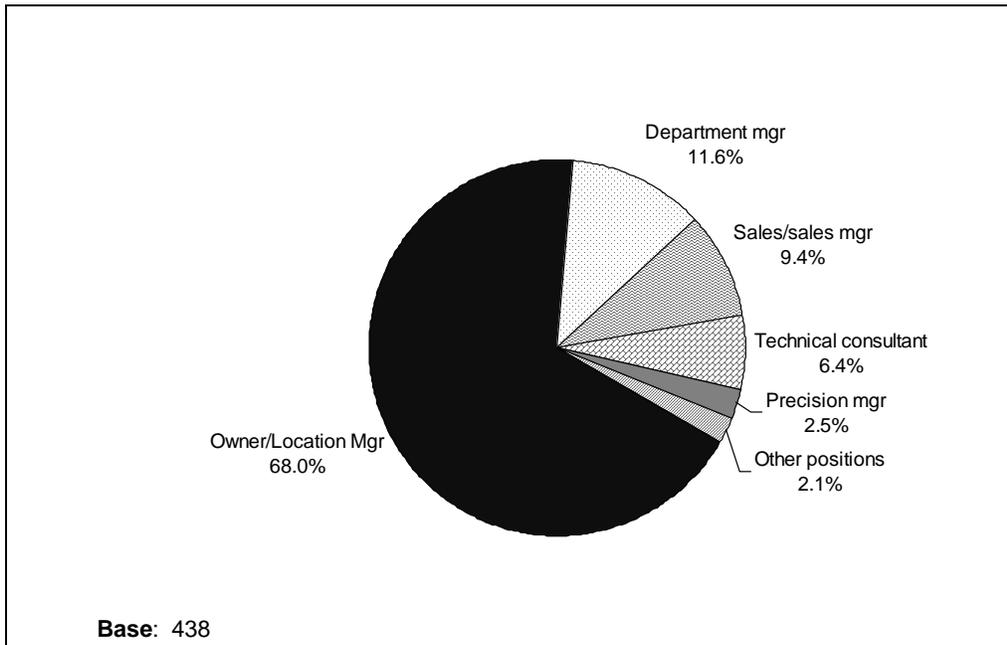


**Figure 6. Total 2003 Annual Agronomy Sales at Location by Organizational Type in the Midwest**



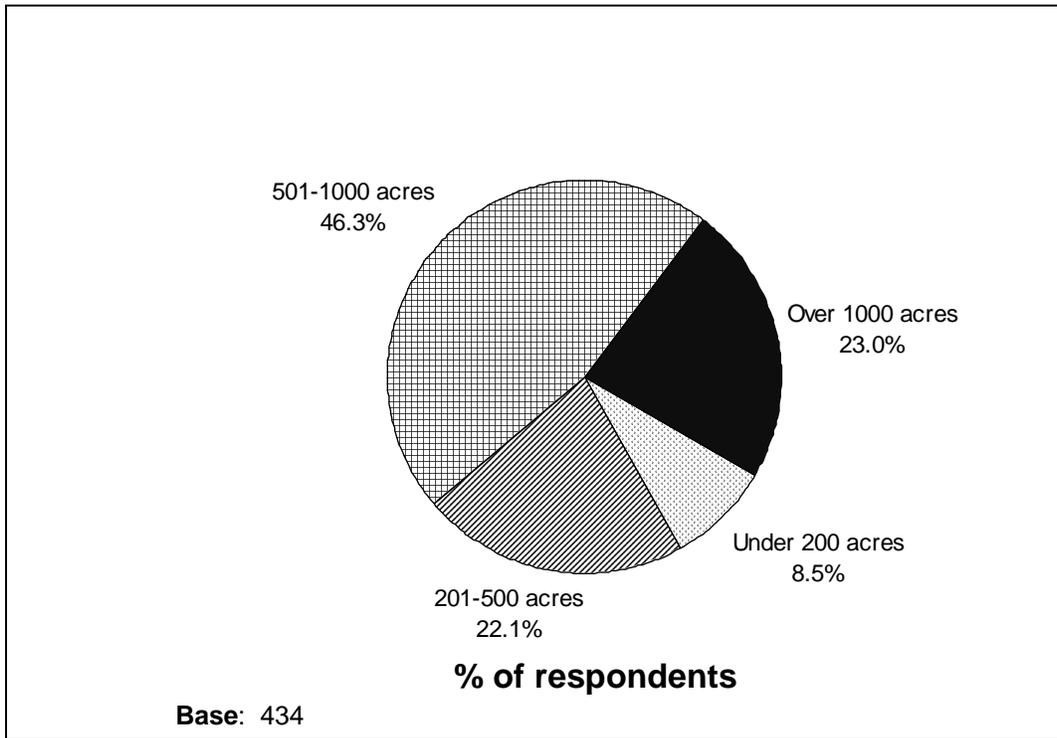
Two-thirds of the questionnaires were completed by the owner or manager of the outlet (68 percent), while 12 percent of the respondents were departmental managers (Figure 7). Technical consultants and “precision managers” accounted for 9 percent of the respondents. Respondents’ positions did not vary regionally but they did vary by organizational type. In the Midwest, the owner/manager was the most common position for respondents from all three types of organizations. Almost nine out of 10 (88 percent) of the respondents representing local independents owned or managed the location, while 53 percent of the respondents representing cooperatives were the owners or managers and 64 percent of those representing regional/national organizations were owners/managers.

**Figure 7. Responsibility of Survey Respondent**

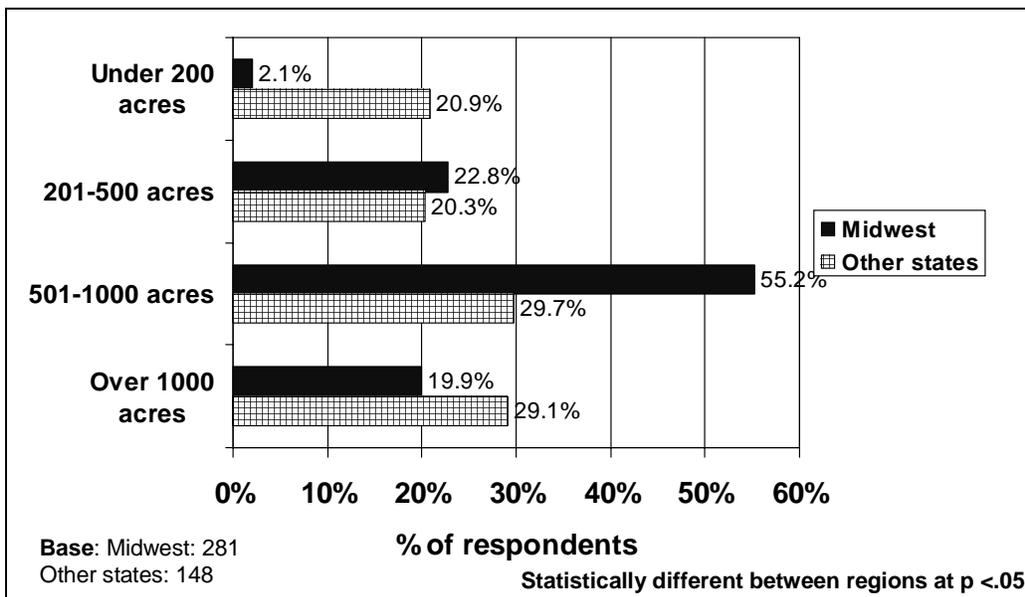


To better understand the size of growers in the dealerships’ markets, respondents were asked for the average size (in acres) of their customers. Two-thirds of the respondents said their average customer farmed more than 500 acres (68 percent of respondents) with 22 percent of the respondents indicating their average customer farmed more than 1000 acres (Figure 8). As expected, the average customer size varied greatly across geographic regions. Over half of the respondents in the Midwest said their average customer farmed between 501 and 1000 acres (55 percent) and another 20 percent of the Midwestern respondents said their average customer farmed over 1000 acres. The average customer size for dealerships in other (non-Midwestern) states was almost evenly divided among the four size categories (Figure 9). There were no statistical differences in average customer size across organizational types.

**Figure 8. Average Customer Size**



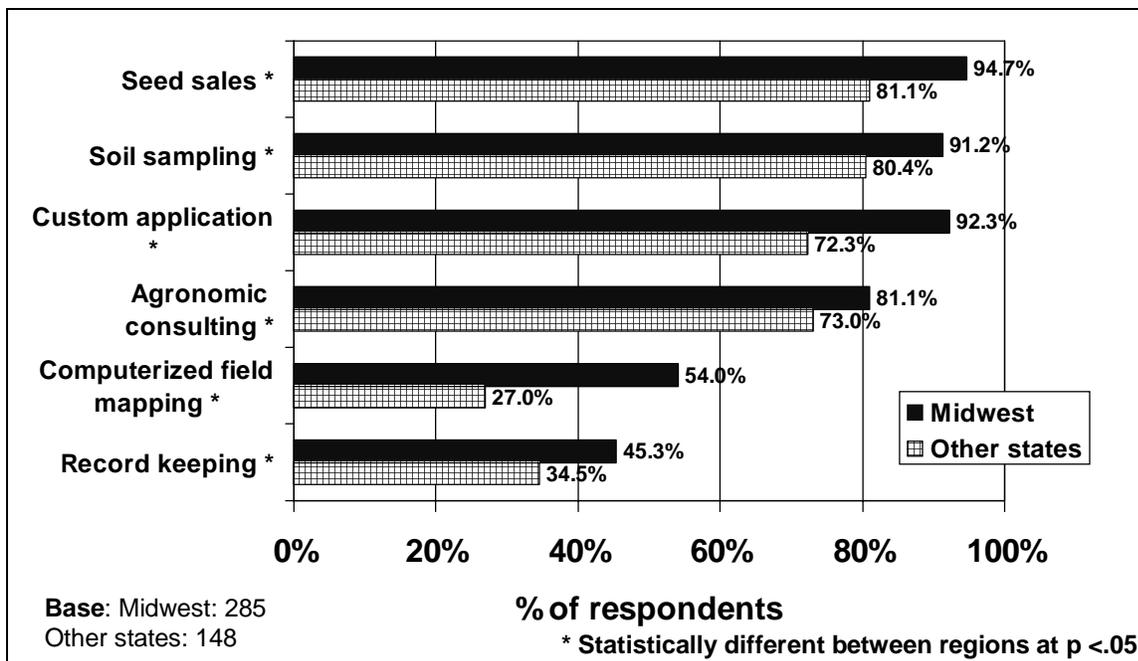
**Figure 9. Average Customer Size by Region**



## Traditional Services Currently Offered by Respondents

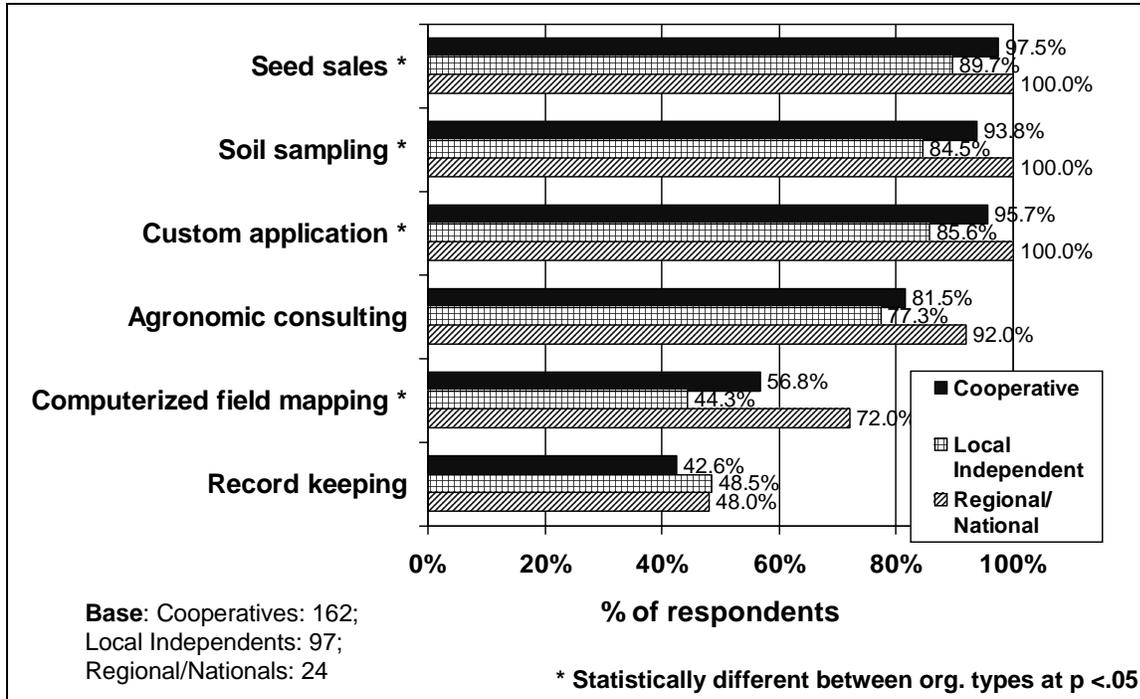
The most common traditional agronomic services offered by the responding dealerships were seed sales, soil sampling and custom application (90, 87 and 85 percent of the respondents, respectively). Over three-quarters of the respondents offered some form of agronomic consulting (78 percent). Less common services were computerized field mapping and record keeping (offered by 45 percent and 41 percent of the respondents, respectively). Only 2 percent of the respondents did not provide at least one of the traditional agronomic services listed on the questionnaire. Many of these service offerings varied statistically by region. For each service, more respondents in the Midwest said their dealerships offered the service than did respondents from non-Midwestern states (Figure 10).

**Figure 10. Traditional Agronomic Services Offered by Region**



Traditional services offered by the different types of organizations in the Midwest likely reflect both philosophical differences and different levels of available resources across dealership types. Figure 11 shows the services offered in the Midwest by organizational type. Local independents were least likely to offer most of the services while there were few differences between cooperatives and regional/nationals in the services offered. This year all of the respondents representing regional/national organizations said their dealership offered seed sales, soil sampling, and custom application.

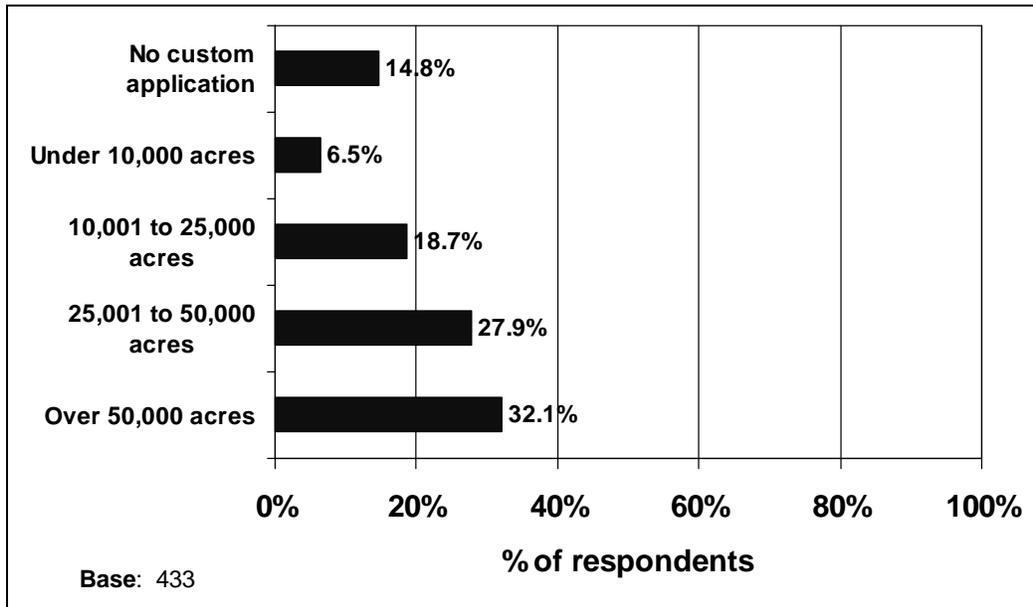
**Figure 11. Traditional Agronomic Services Offered by Organizational Type in the Midwest**



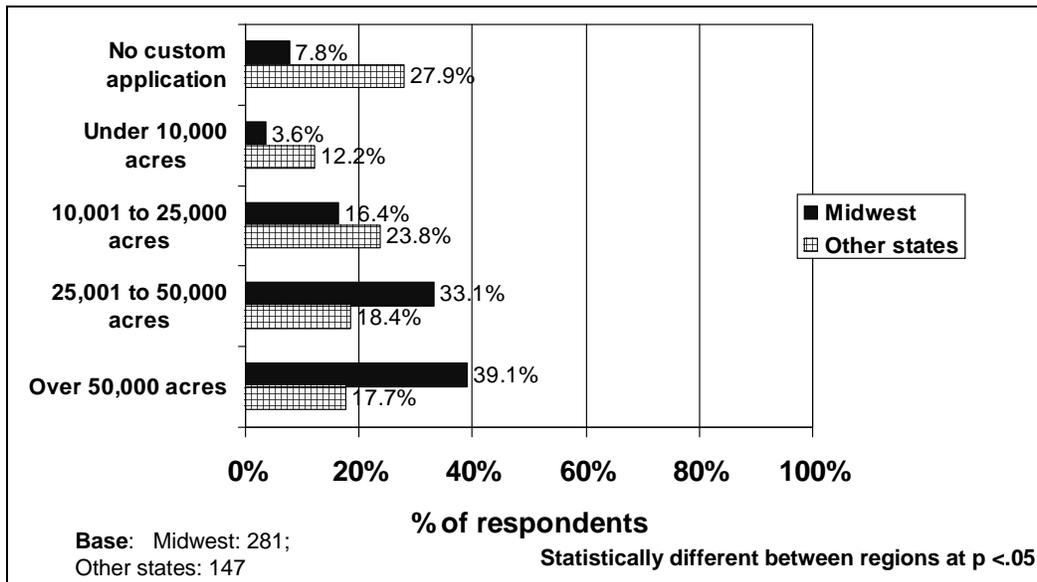
### *Custom Application*

As indicated earlier, 85 percent of the respondents said their dealerships offered custom application. (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 (60 percent) (Figure 12). Across the U.S., however, custom application was most common in the Midwest where 92 percent of the respondents offered custom application services compared to 72 percent of the respondents from other states (Figure 13).

**Figure 12. Acres Custom Applied**

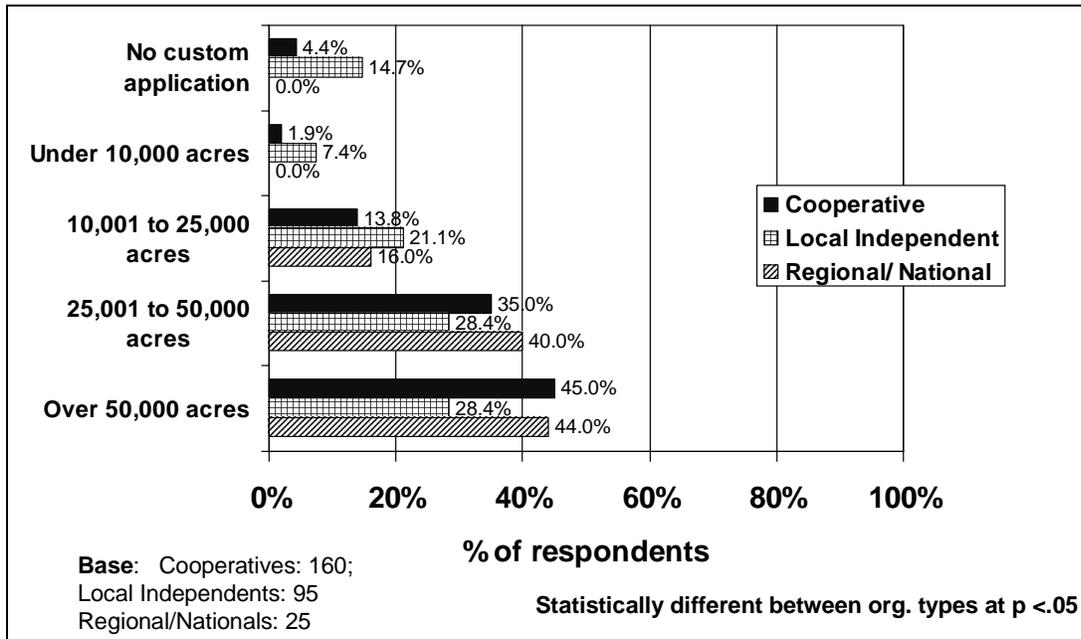


**Figure 13. Acres Custom Applied by Region**



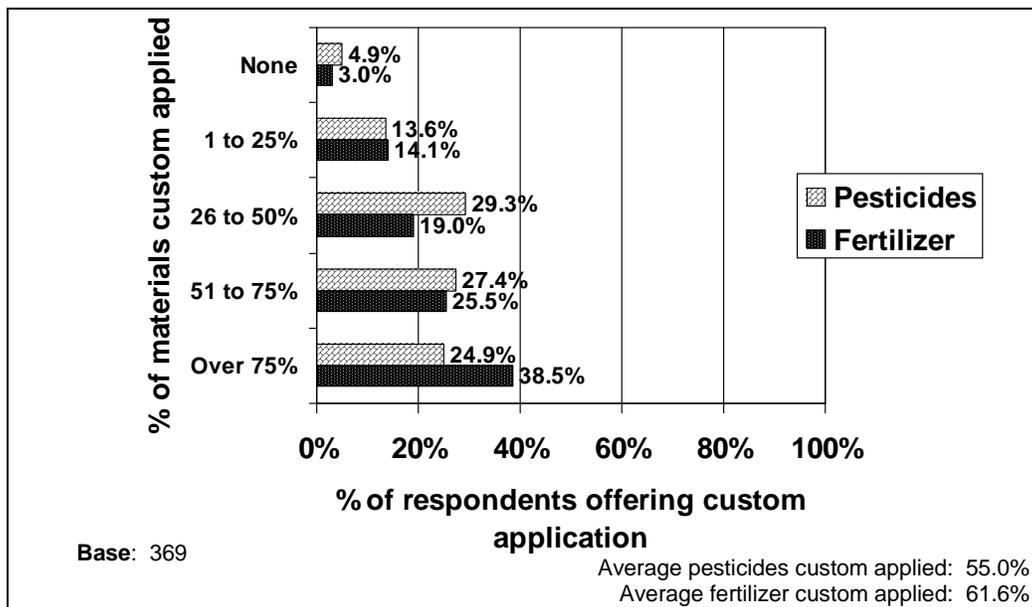
Reflecting the higher level of focus on services by cooperatives and regional/nationals, 96 percent of the respondents representing cooperatives and 100 percent of the regional/nationals in the Midwest offered custom application compared to 85 percent of the local independents (Figure 14). Almost half of the cooperatives and regional/national outlets in the Midwest custom applied over 50,000 acres in 2003.

**Figure 14. Acres Custom Applied by Organizational Type in the Midwest**



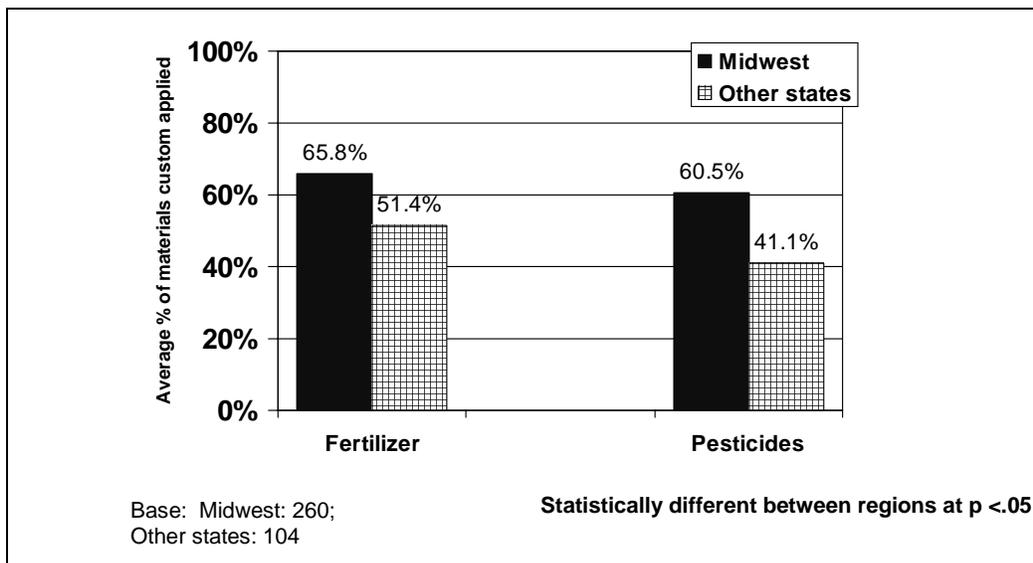
When asked specifically about custom application of fertilizer versus pesticides, respondents custom applied a slightly greater proportion of the fertilizer they sold relative to pesticides. On average, respondents *who indicated their outlet offered custom application* applied 62 percent of the fertilizer they sold and 55 percent of the pesticides they sold (Figure 15). A quarter of the respondents offering custom application said their dealership custom applied over 75 percent of the pesticides sold. Over a third of the respondents offering custom application said they custom applied over 75 percent of the fertilizer they sold.

**Figure 15. Custom Application of Fertilizer and Pesticides**



Those dealerships from the Midwest who offered custom application typically applied a greater proportion of what they sold. Midwestern respondents said they custom applied an average of 66 percent of the fertilizer they sold and 61 percent of the pesticides they sold while those from non-Midwestern states applied an average of 51 percent of the fertilizer sold and 41 percent of the pesticides sold (Figure 16). In the Midwest, there were no differences in the average amount of fertilizer custom applied by organizational type but significantly more pesticide sales were custom applied by local independents (65 percent) than by either cooperatives (60 percent) or regional/nationals (49 percent).

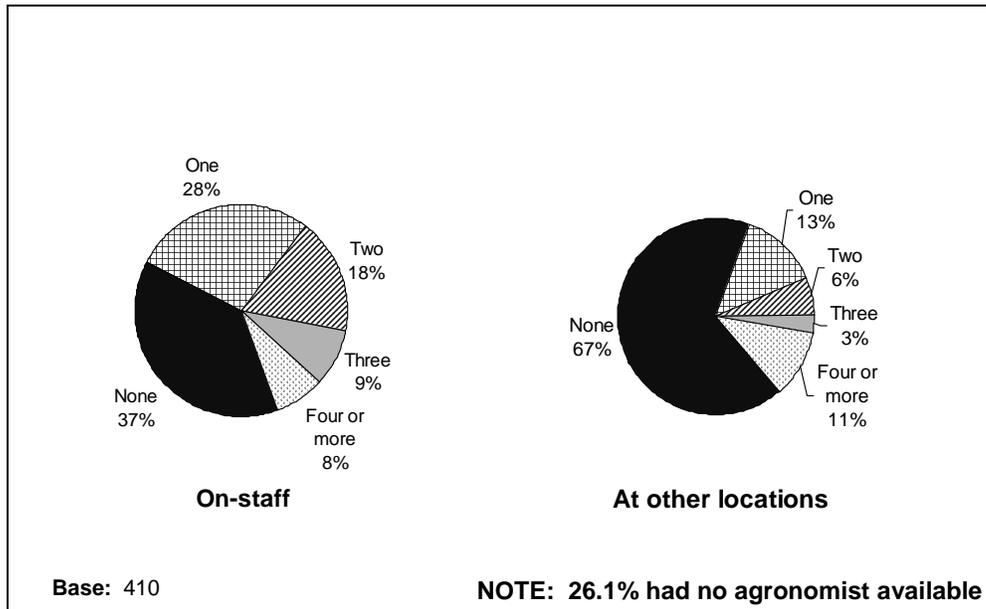
**Figure 16. Custom Application of Fertilizer and Pesticides by Region**



### ***Full-Time Agronomists***

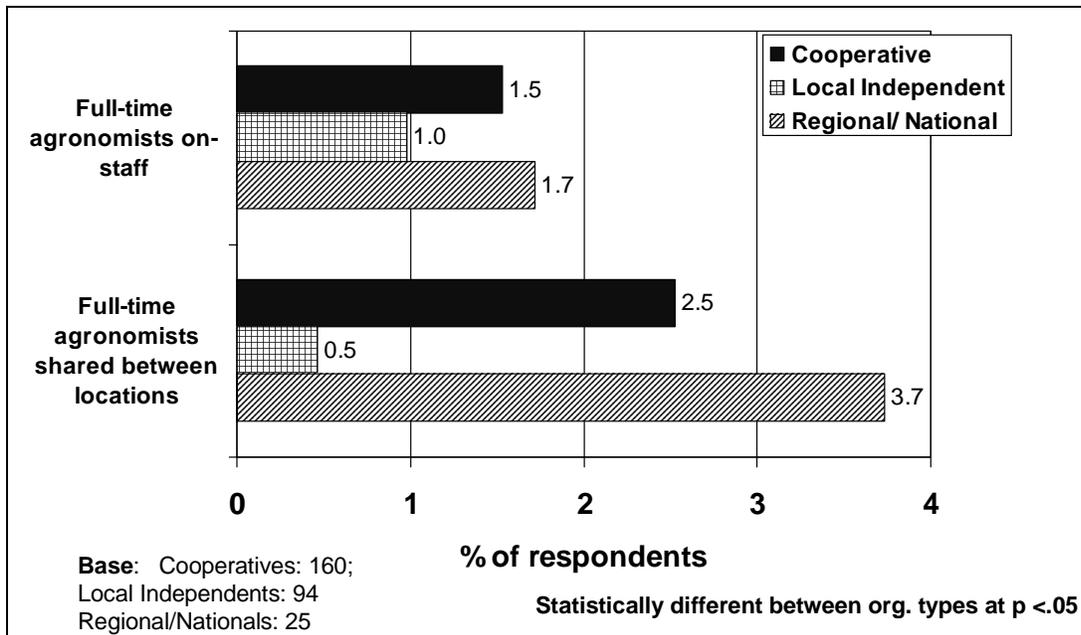
To support these services, many dealerships had agronomists available, either full-time on staff or shared with other locations. On average, the respondents had 1.4 full-time agronomists available on staff and shared an average of 1.9 agronomists with other locations. Two-thirds of the responding dealerships had at least one full-time agronomist on staff at their location (63 percent) (Figure 17), however several of those with no full-time agronomist at their location did have one available for their use at another location. Just over a quarter of the respondents (26 percent) had no full-time agronomist available to them at all.

**Figure 17. Full-time Agronomists Available**



Though there were no differences in the number of agronomists available between regions, in the Midwest the type of organization did have an impact. Regional/national organizations had the largest number of agronomists available (an average of 1.7 on staff versus 1.5 agronomists available for cooperatives and 1.0 for local independents) (Figure 18). Regional/nationals were also more likely to have shared agronomists, with an average of 3.7 agronomists available that were shared between locations, compared to 2.5 shared agronomists for cooperative organizations and 0.5 for local independents.

**Figure 18. Average Number of Agronomists Available by Organizational Type in the Midwest**



## Use of Precision Technologies and Offerings of Site-Specific Services

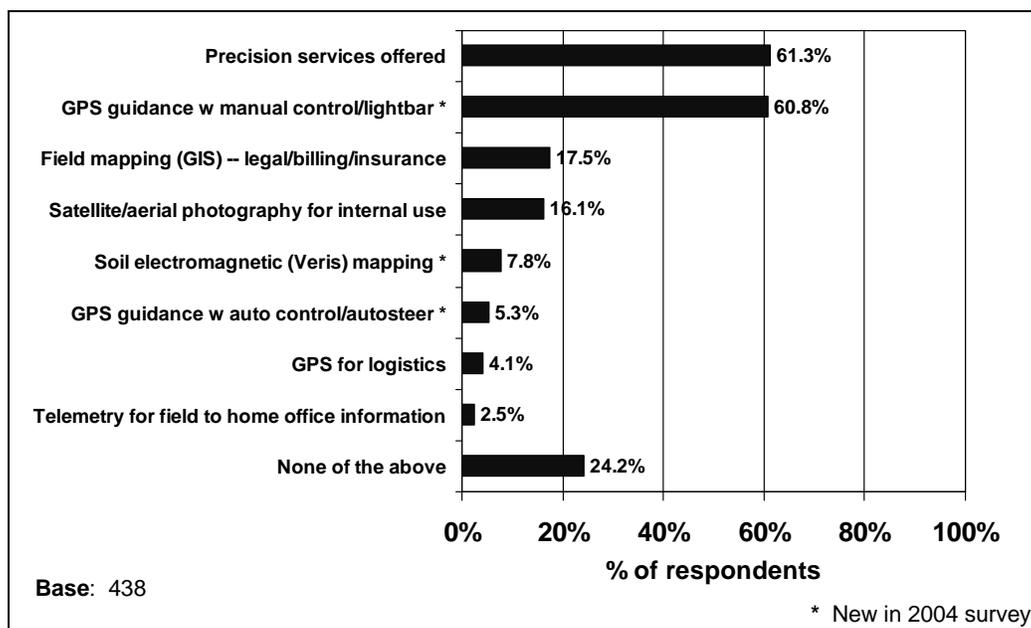
Respondents were asked several questions about their use of precision technologies and which site-specific services they were currently offering (or would be offering by the fall of 2004).

### *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, billing/insurance/legal activities, logistics, or field-to-home office communications. A few new uses of precision technology were included in this year’s survey. GPS (Geographical Position Systems) used as guidance systems for fertilizer/chemical application was split into GPS guidance with manual control or lightbar and GPS guidance with auto-control or auto-steer. In addition, soil electromagnetic (Veris) mapping was added as a potential use of precision technology.

Three-quarters (76 percent) of the respondents used precision technologies in some way in their dealership (Figure 19). The two most common uses were offering precision services to their customers (61 percent) and using GPS guidance with manual control/lightbar (also 61 percent). The next two most common uses were field mapping with GIS (Geographical Information Systems) and satellite/aerial photography for internal uses (18 and 16 percent of respondents, respectively). Two of the new uses of technology included in this year’s survey (soil electromagnetic (Veris) mapping and GPS guidance with auto-control/autosteer) were used by fewer than 10 percent of the respondents at this time.

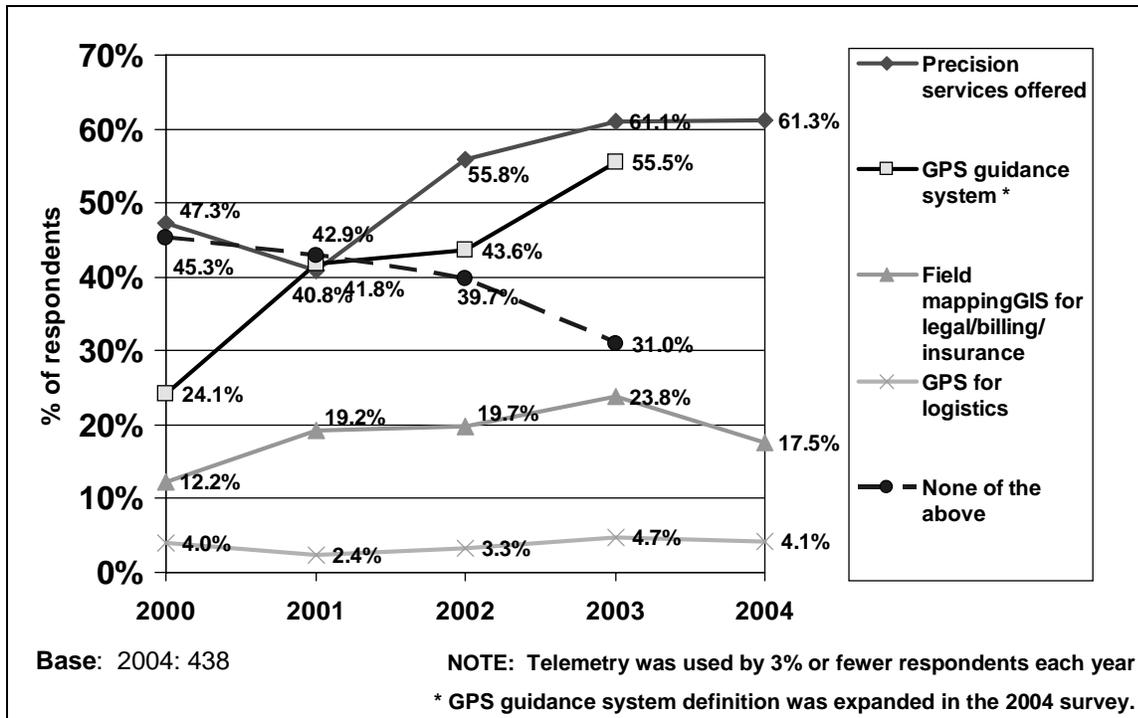
**Figure 19. Use of Precision Technology**



Focusing on the technologies which were included on both last year’s survey and this year’s survey, not many changes were seen in the uses of precision technology (Figure 20). Offerings of

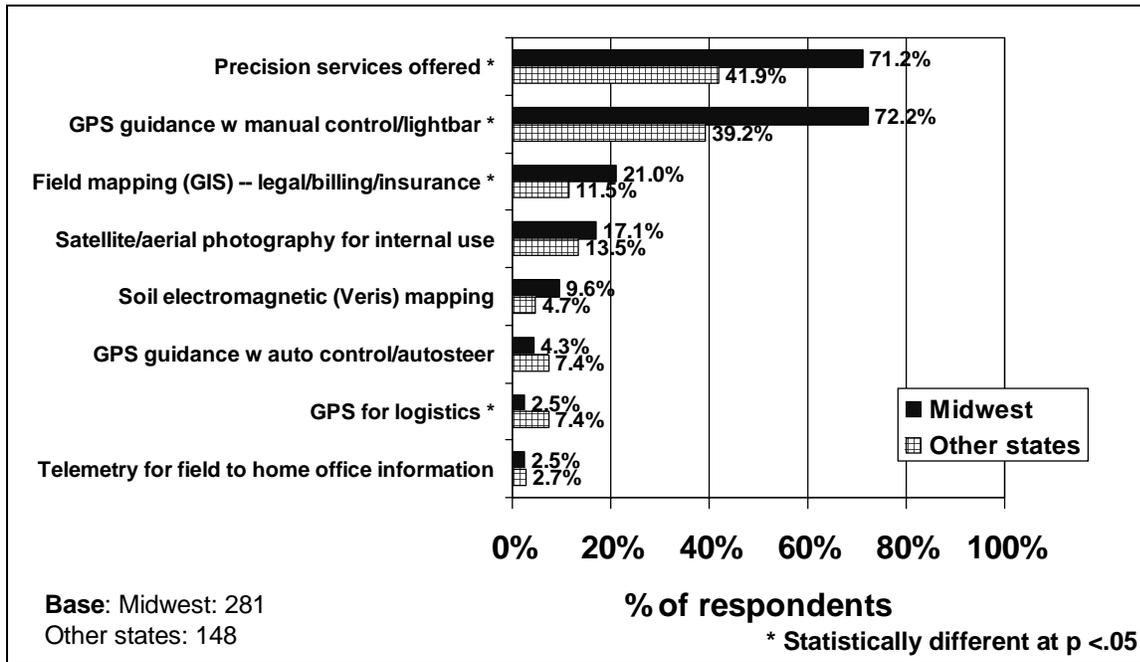
precision services remained the same at 61 percent while field mapping (GIS) for legal/billing/insurance purposes dropped from 24 percent of respondents to 18 percent. Though GPS guidance systems were not asked about in the same way, it appears as though there was growth in that area. Last year, 56 percent used a GPS guidance system whereas this year, 61 percent said they used a GPS guidance system with manual control/lightbar and 5 percent said they used GPS with auto-control/auto-steer (62 percent of the respondents used one or both of the options).

**Figure 20. Use of Precision Technology over Time**



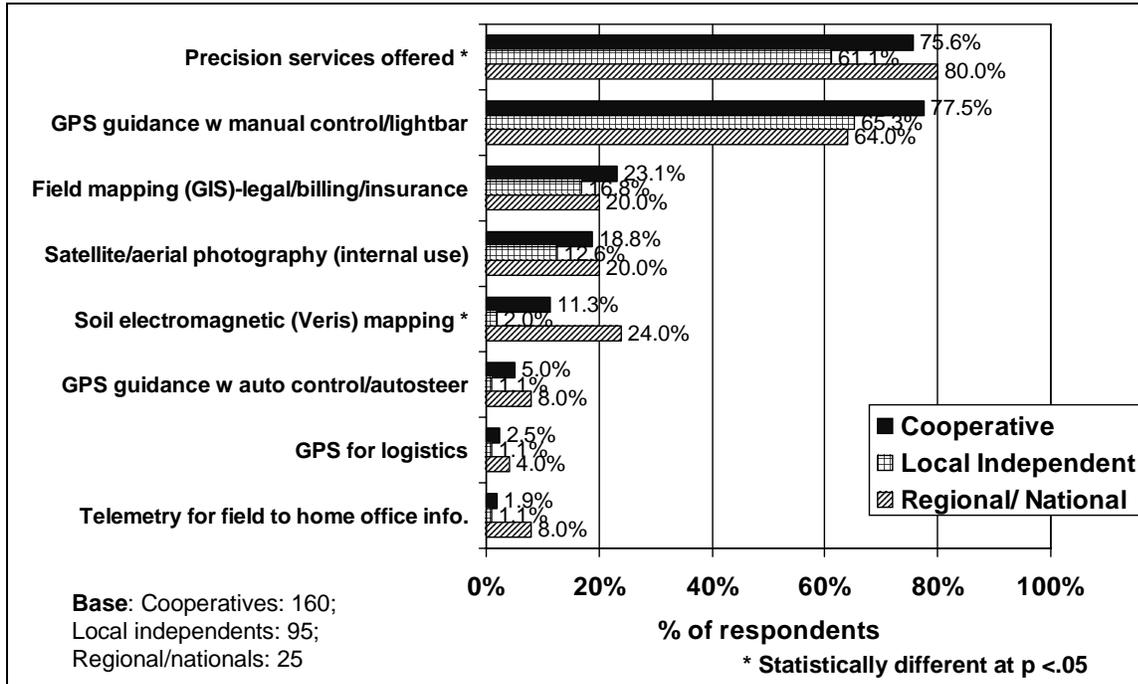
As in other years, precision technologies were being used by significantly more dealerships in the Midwest than in non-Midwestern states (Figure 21). More than 8 out of 10 of the respondents in the Midwest (84 percent) said their dealership used precision technologies in some way, compared to six out of 10 of the respondents from other states (60 percent). Over two-thirds of the Midwestern respondents offered precision services (71 percent) compared to only 41 percent of the non-Midwestern respondents. GPS was used in a guidance system with manual control/lightbar by 72 percent of the Midwestern dealerships compared to only 39 percent of the non-Midwestern respondents. Field mapping with GIS for internal uses was used by twice as many respondents in the Midwest compared to other states (21 percent in the Midwest compared to 12 percent in other states). There were no statistical differences between regions in the use of satellite/aerial photography for internal use, soil electromagnetic mapping, GPS guidance with autosteer, or telemetry.

**Figure 21. Use of Precision Technology by Region**



In the Midwest, adoption of precision technology varied by organizational type. Approximately 9 out of 10 respondents representing cooperatives organizations said they used at least one precision technology while 80 percent of those representing regional/ nationals used at least one precision technology and only 77 percent of the local independents used at least one. Eighty percent of the respondents representing regional/nationals offered precision services to their customers (Figure 22), while almost as many (76 percent) of the cooperatives offered precision services. This can be contrasted to the local independents where only 61 percent of the respondents offered precision services. In general, internal uses of precision technology were also more likely for the larger regional/national organizations and cooperatives than for the local independents, possibly reflecting the greater overall resources available to these firms.

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



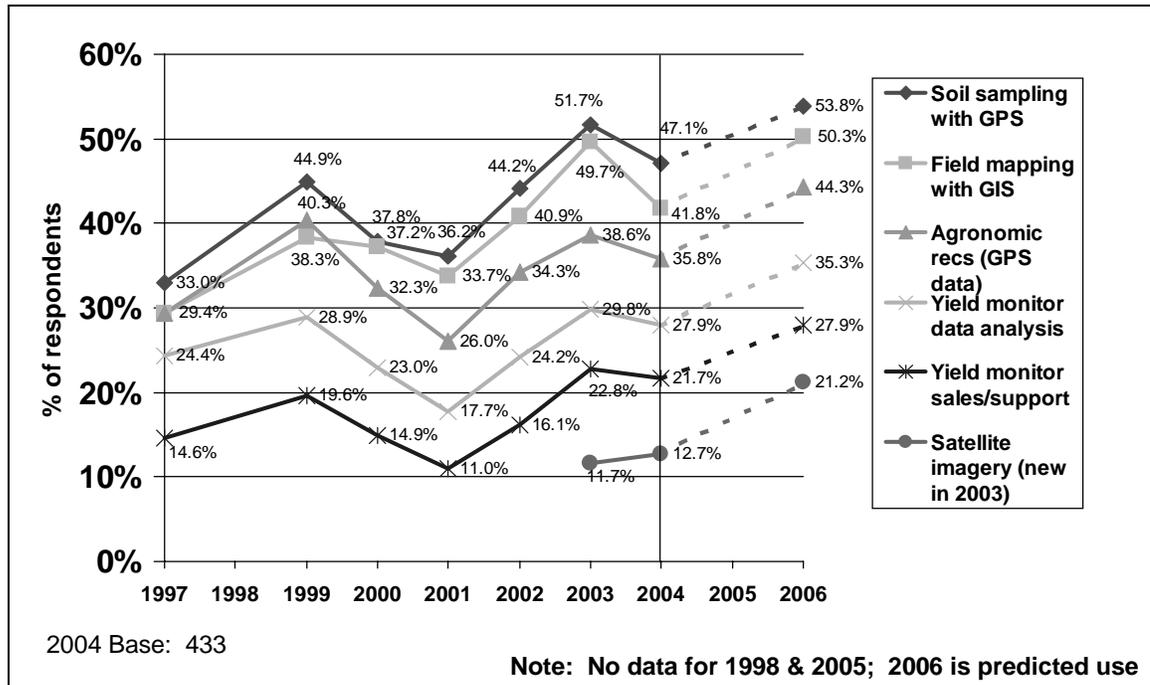
### *Precision Service Offerings*

Respondents were asked which specific precision services they would be offering their customers by the fall of 2004. In most cases, use dropped somewhat this year over last year. The most common precision service offered by these dealerships was soil sampling with GPS – offered by 47 percent of the respondents (Figure 23). This was down somewhat from last year’s high of 52 percent but higher than any previous year. By 2006, 54 percent of the respondents expected their dealerships to be offering soil sampling with GPS.

The second-most common precision service offered was field mapping with GIS. By the fall of 2004, four out of 10 of the respondents expected to be offering a GIS mapping service, also down somewhat over last year’s high of 50 percent. By 2006, over half of the respondents expected to be offering this service.

The remaining precision services changed little from 2003 to 2004. Agronomic recommendations based on GPS data showed a slight drop from 39 percent of the respondents offering the service in 2003 to 36 percent in 2004. By 2006, 44 percent expected to offer the service. Yield monitor data analysis and yield monitor sales/support both were relatively stable from 2003 to 2004, though future growth was expected. Satellite imagery grew a bit, from 12 percent of respondents offering it in 2003 to 13 percent in 2004. However, use was expected to almost double to 21 percent by 2006.

Figure 23. Precision Ag Services Offered Over Time

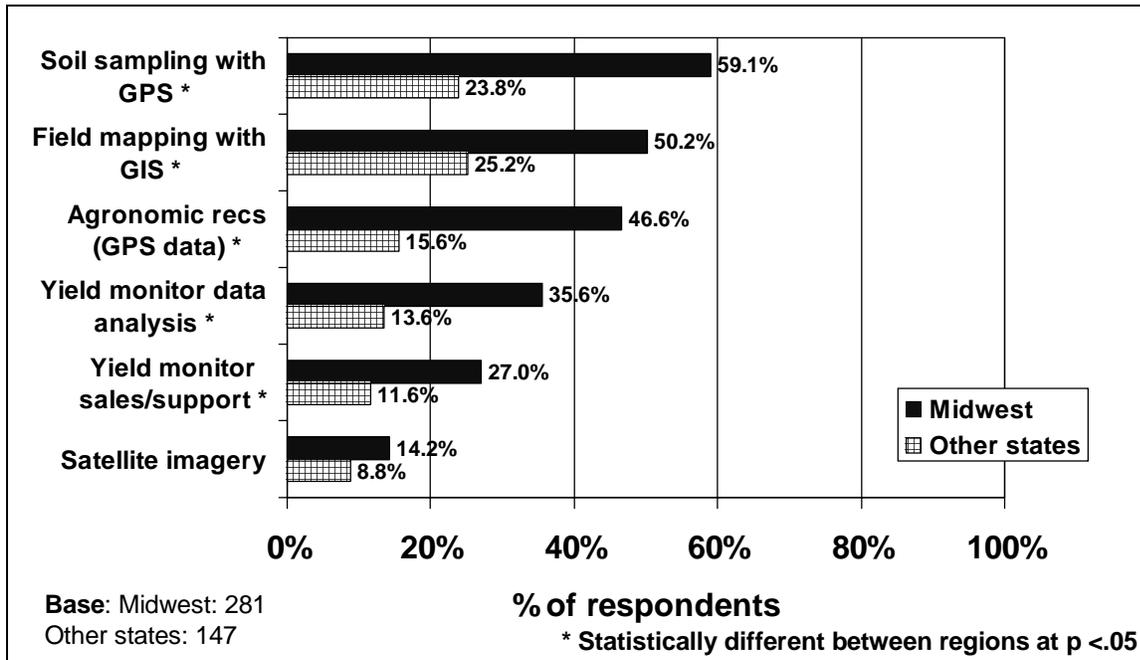


With the exception of satellite imagery, all of these precision service offerings were significantly more common in the Midwest than in other states (Figure 24). For example, 59 percent of the responding dealerships from the Midwest indicated they would be offering soil sampling with GPS by the fall 2004. In non-Midwestern states, soil sampling with GPS was expected to be offered by 24 percent of the respondents (down from last year's 33 percent).

Field mapping with GIS was also offered by fewer people this year, dropping from 58 percent in 2003 to 50 percent in 2004 in the Midwest. A similar drop was seen in non-Midwestern states, with 25 percent saying they would be offering field mapping with GIS by the fall of 2004, compared to 32 percent last year.

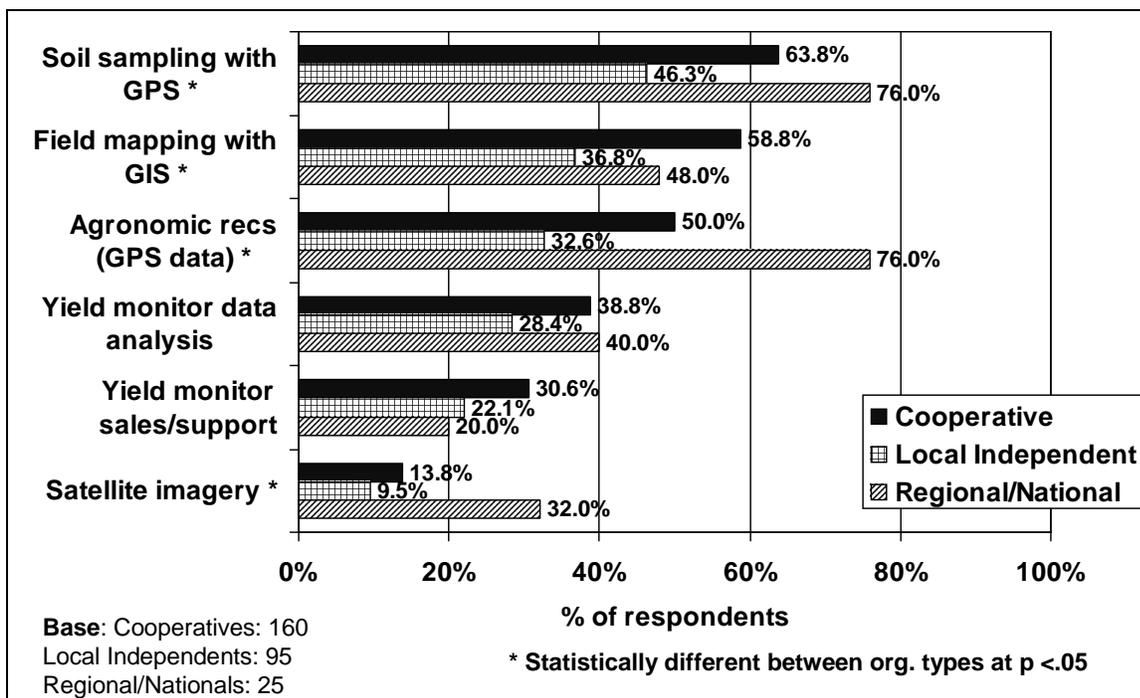
The gap between regions was similar for agronomic recommendations based on GPS data, yield monitor data analysis, and yield monitor sales/support. For these services, two to three times as many respondents offered the service in the Midwest compared to respondents offering them in other states.

**Figure 24. Precision Ag Services Offered by Region**



As in previous years, precision service offerings were more extensive in national/regional organizations and cooperatives compared to local independents (Figure 25). In general, in the Midwest, local independents were not as likely to offer these services relative to the other organizational types.

**Figure 25. Precision Ag Services Offered by Organizational Type in the Midwest**

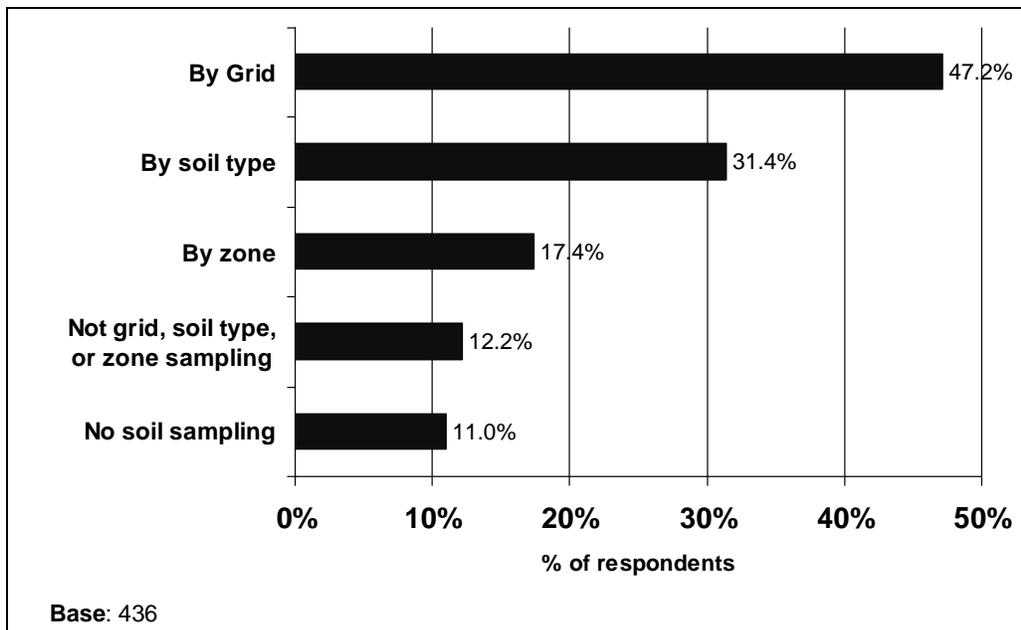


### *A Focus on Soil Sampling*

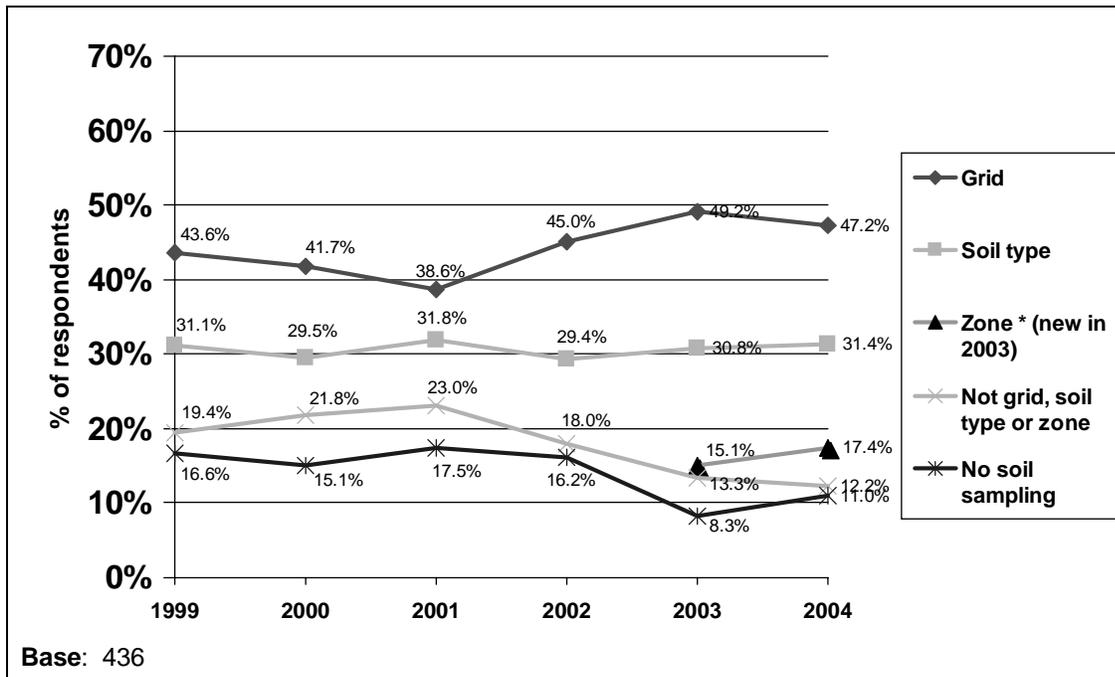
As in previous years, the types of soil sampling dealerships were offering – by grid or by soil type – were explored in more detail. Almost half of all respondents said their dealership offered soil sampling by grid (Figure 26). Almost a third of the respondents offered soil sampling by soil type (8 percent offered their customers a choice of either grid sampling or sampling by soil type), and almost one in five respondents offered soil sampling by zone.

Most of the soil sampling services have remained fairly constant over time (Figure 27), with slight growth seen in soil sampling by zone (15 percent in 2003 to 17 percent in 2004) and a slight decline in traditional soil sampling without grid, soil type or zone specifications.

**Figure 26. Types of Soil Sampling Offered**

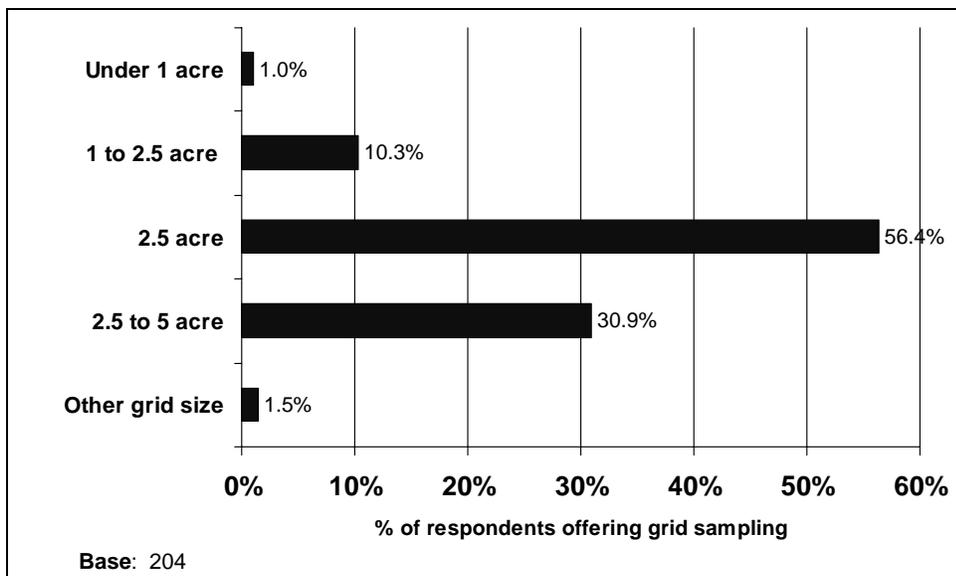


**Figure 27. Types of Soil Sampling Offered Over Time**



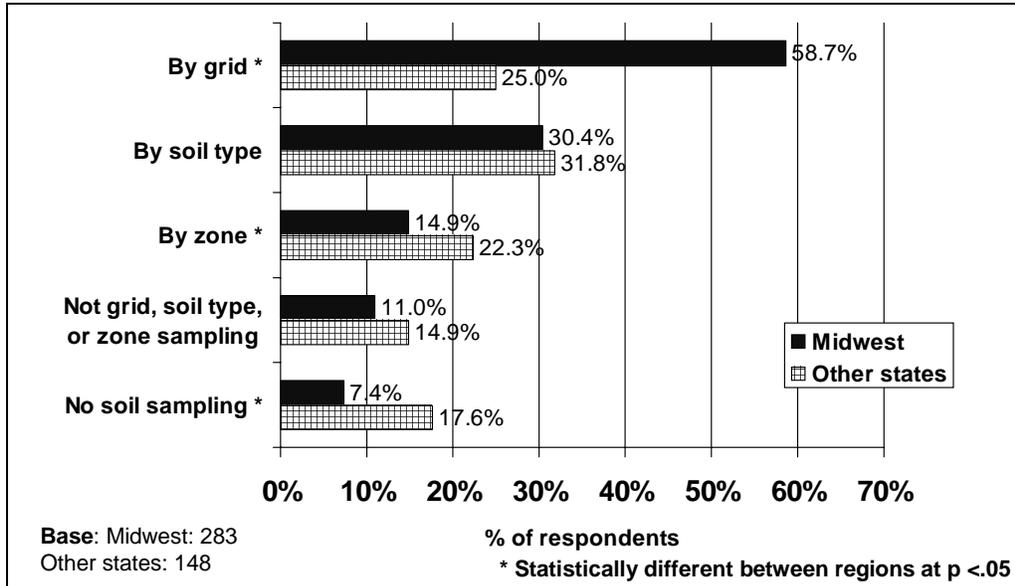
As grid sampling increases in popularity, the distribution of grid sizes has remained fairly constant, with the most common grid size continuing to be 2.5 acres (Figure 28). This did vary somewhat across regions, with the 2.5 grid size being most common in the Midwest (62 percent of respondents) with more variety of grid sizes being used by those in other states.

**Figure 28. Grid Sizes Used in Grid Sampling**



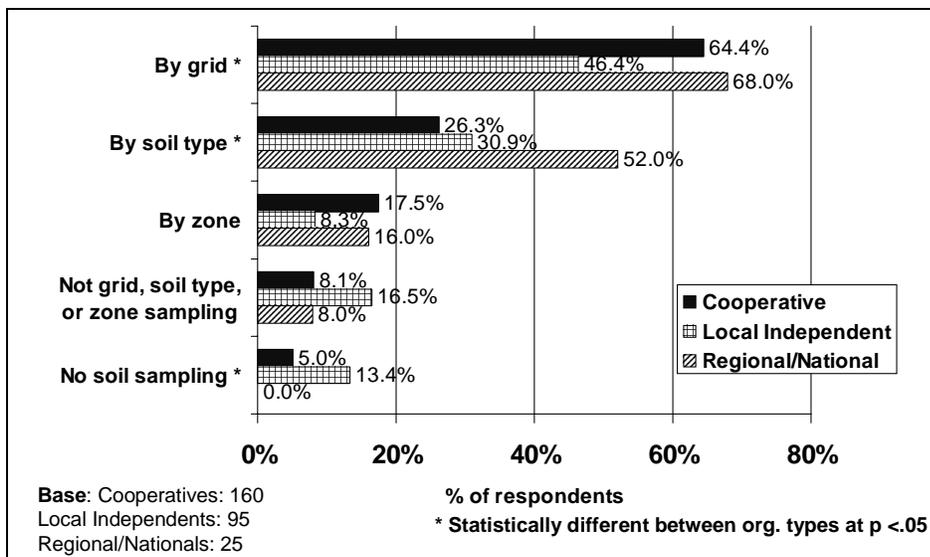
As in other years, those in the Midwest were more likely than dealerships in other locations to sample by grid (59 percent versus 25 percent of the respondents in other states) while sampling by soil type and zone were more popular outside of the Midwest (Figure 29).

**Figure 29. Types of Soil Sampling Offered by Region**



In the Midwest, local independents were the least likely organizational type to offer any soil sampling (Figure 30). Correspondingly, they were also least likely to offer grid sampling. Regional/nationals were the most likely to offer soil sampling by soil type.

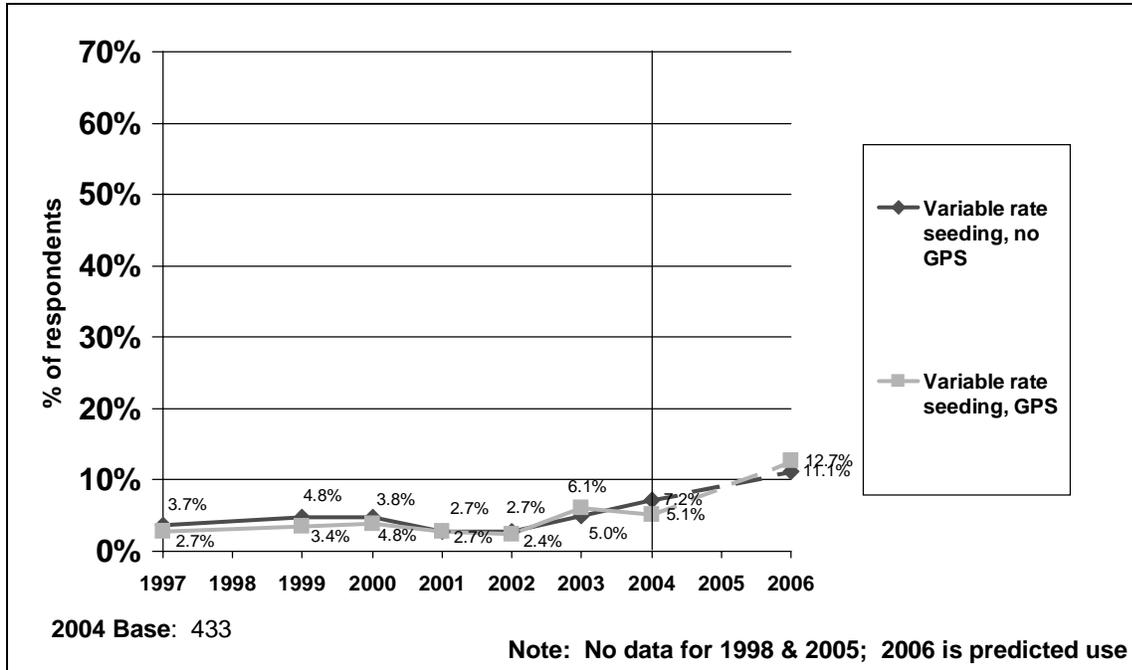
**Figure 30. Types of Soil Sampling Offered by Organizational Type in the Midwest**



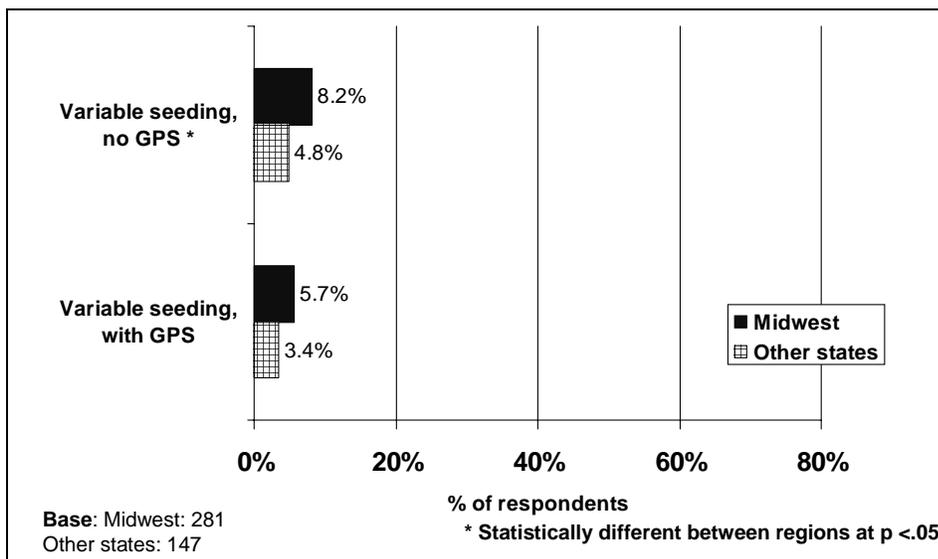
## Variable Rate Seeding

Variable rate seeding continues to be an area where dealerships show less interest relative to other precision services. Less than 10 percent of the responding dealerships offered variable seeding, either with or without GPS in 2004 (Figure 31). There was slightly more variable seeding without GPS in the Midwest than other states but no other statistical differences between regions or by organizational type (Figures 32 and 33).

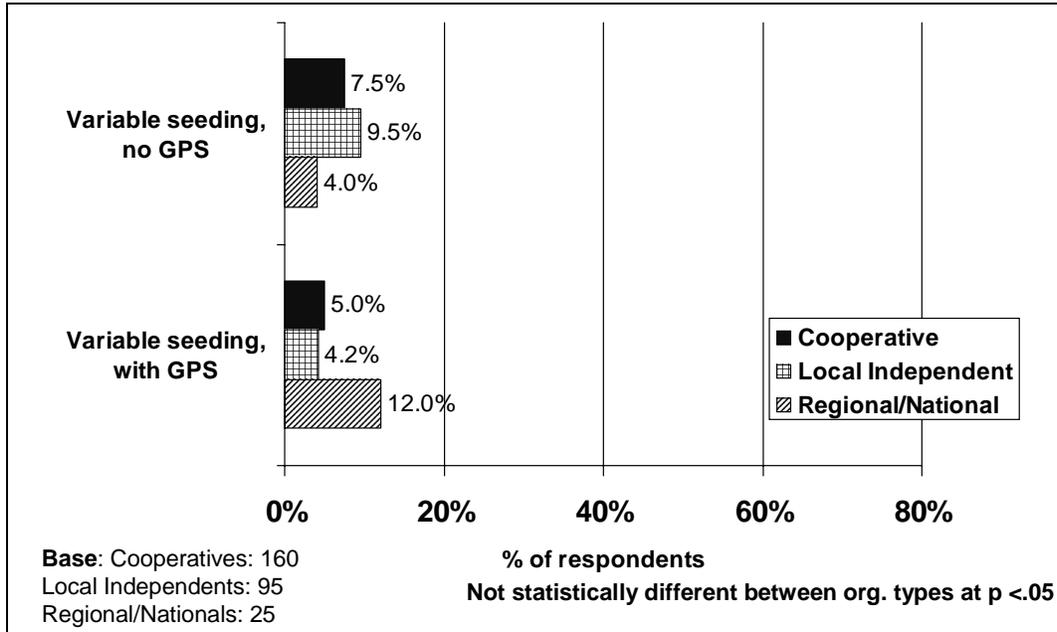
**Figure 31. Variable Rate Seeding Offered Over Time**



**Figure 32. Variable Rate Seeding Offered by Region**



**Figure 33. Variable Rate Seeding Offered by Organizational Type in the Midwest**



### *Variable Rate Application*

Variable rate custom application services have usually been provided along with traditional custom application services. Of the 85 percent of the dealerships who offered custom application, two-thirds expected to offer some type of variable rate application service by the fall of 2004 (including both controller-driven and manual variable rate application).

Figure 34 shows the trends in variable rate application service offerings over time. This year, growth in the adoption all types of variable rate application took somewhat of a breather, including controller-driven multi-nutrient application which had not shown any decreases in adoption until this point. In addition, though some growth was expected in the future, it appears to be at a slower rate than seen in previous years.

**Figure 34. Precision Application Offered Over Time**

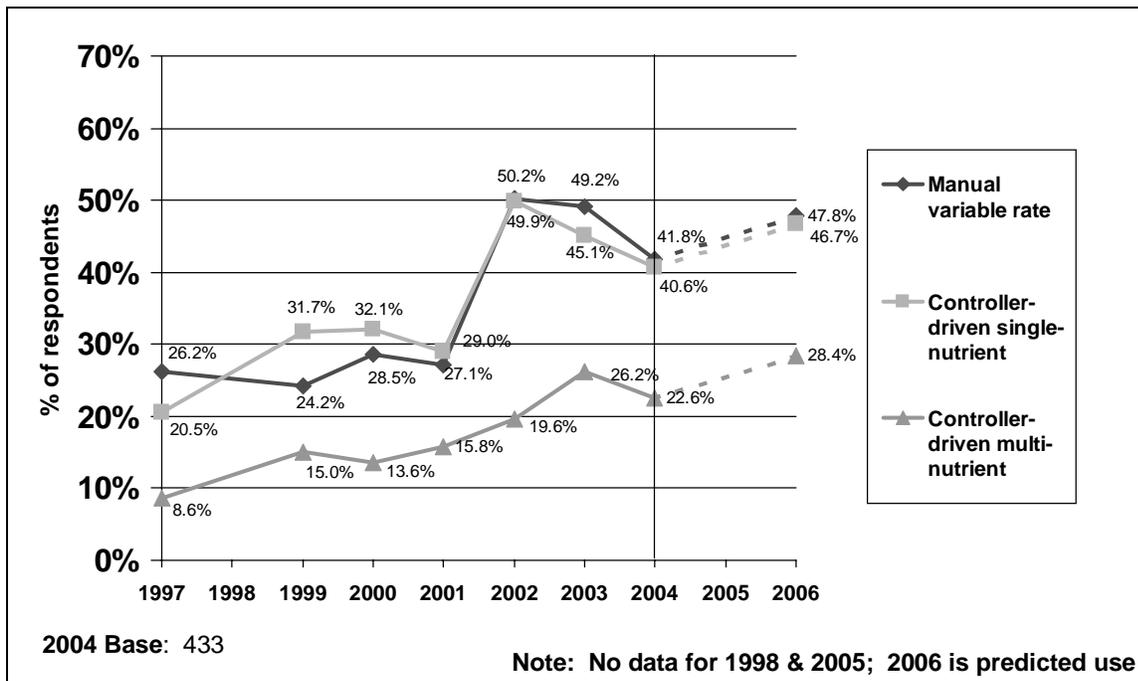
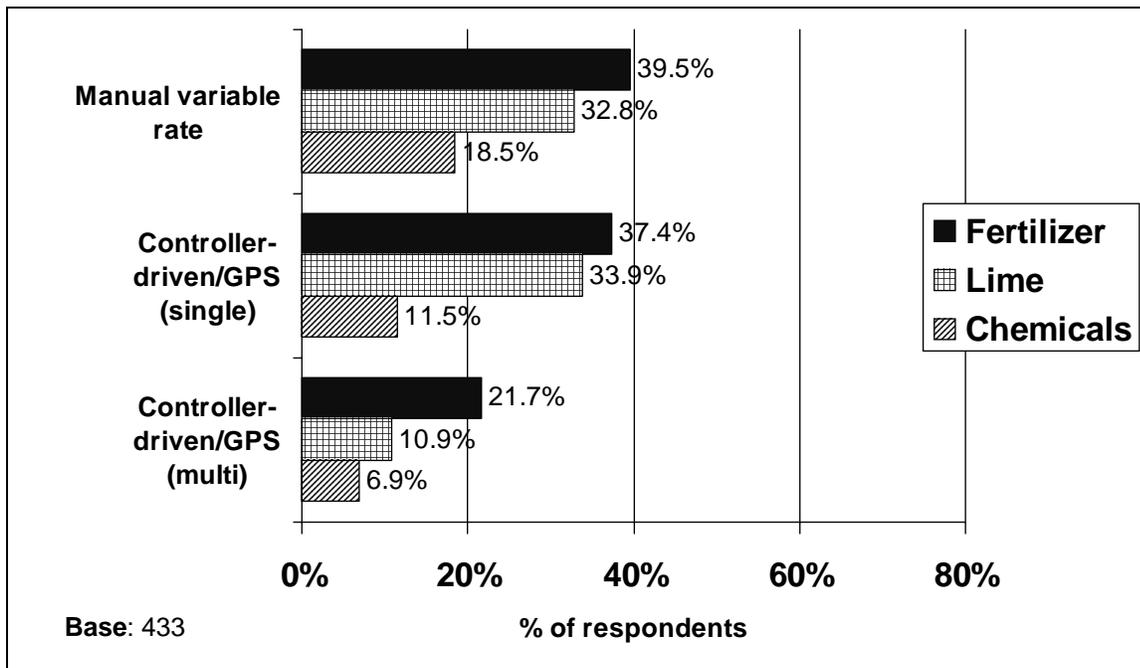


Figure 35 shows the offerings of specific controller-driven variable rate application services in 2004. Almost half of the respondents (43 percent) offered some form of controller-driven application of fertilizer, lime and/or chemicals – either single nutrient or multi-nutrient application. Single nutrient controller-driven application of fertilizer was the most common controller-driven variable rate application service offered, with 40 percent of the respondents expecting to offer the service by the fall of 2004. This figure was up from 2002 when only 38 percent offered the service but down from 2003. Multi-nutrient controller-driven application of fertilizer was also down this year – offered by 22 percent of the responding dealerships in 2004 compared to 26 percent offering the service in 2003. Approximately 12 percent of the respondents offered single nutrient, controller-driven variable rate application of chemicals, roughly the same proportion as last year.

**Figure 35. Precision Application Offered for Each Input Type**



Manual and controller-driven variable rate application was more common in the Midwest relative to the other states (Figures 36 to 38). For fertilizer, just under half of the respondents expected to offer single nutrient controller-driven application in the Midwest by the fall of 2004 compared to only 25 percent of the respondents from other states (Figure 36). Multi-nutrient controller-driven application of fertilizer in both Midwestern and non-Midwestern states dropped a bit in 2004. In the Midwest, multi-nutrient controller-driven application of fertilizer was offered by 27 percent of the respondents (compared to 30 percent in 2003) while 12 percent expected to offer the service in non-Midwestern states (compared to 14 percent in 2003). Controller-driven application of lime was offered at slightly lower levels than fertilizer in both regions (Figure 37). For chemicals, variable rate application was not as common as for fertilizer and lime (Figure 38), though the gap was less in non-Midwestern states than in the Midwest. There were no statistical differences across regions for variable rate chemical application.

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

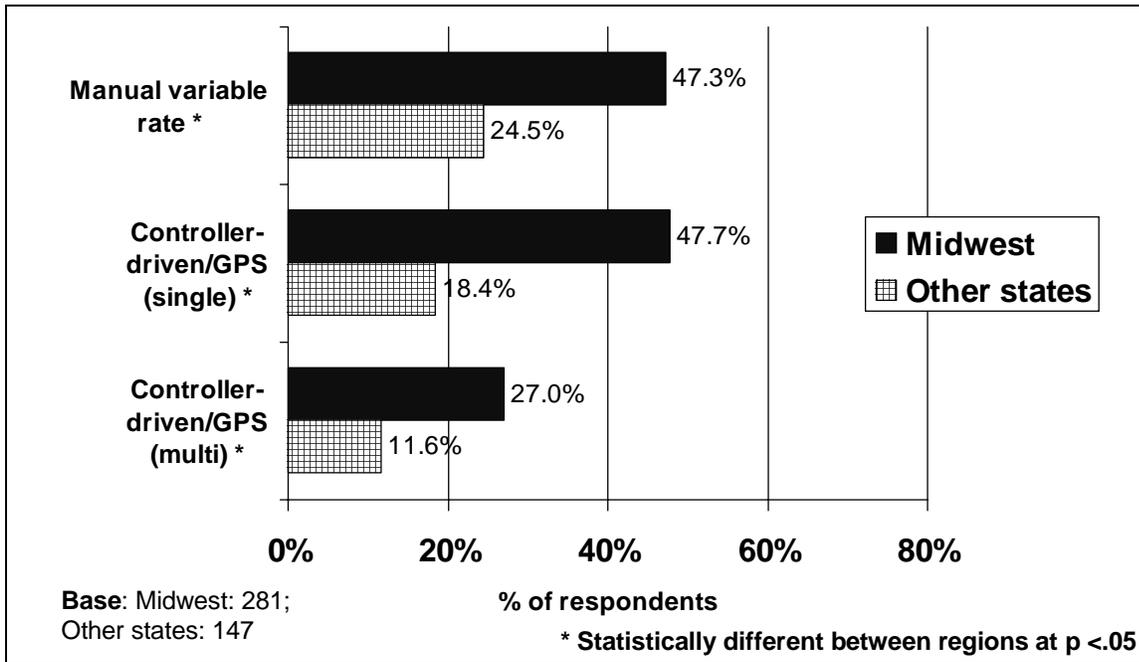
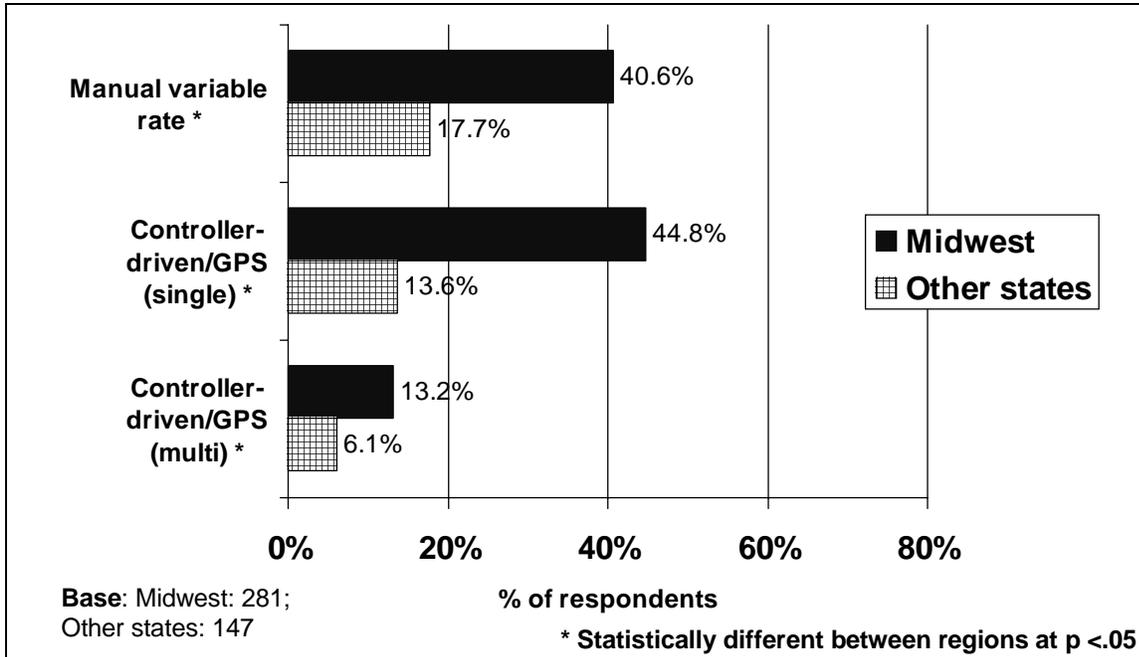
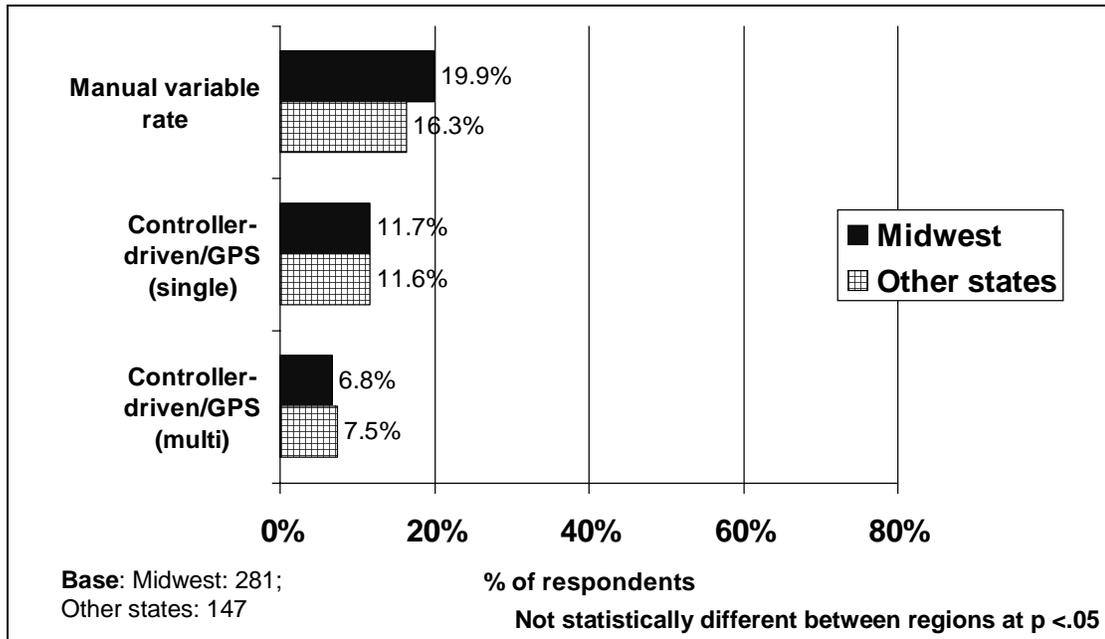


Figure 37. Precision Application of *Lime* Offered by Region



**Figure 38. Precision Application of *Chemicals* Offered by Region**



Figures 39 to 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, though there were no significant differences between regions in their offerings of manual variable rate application.

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

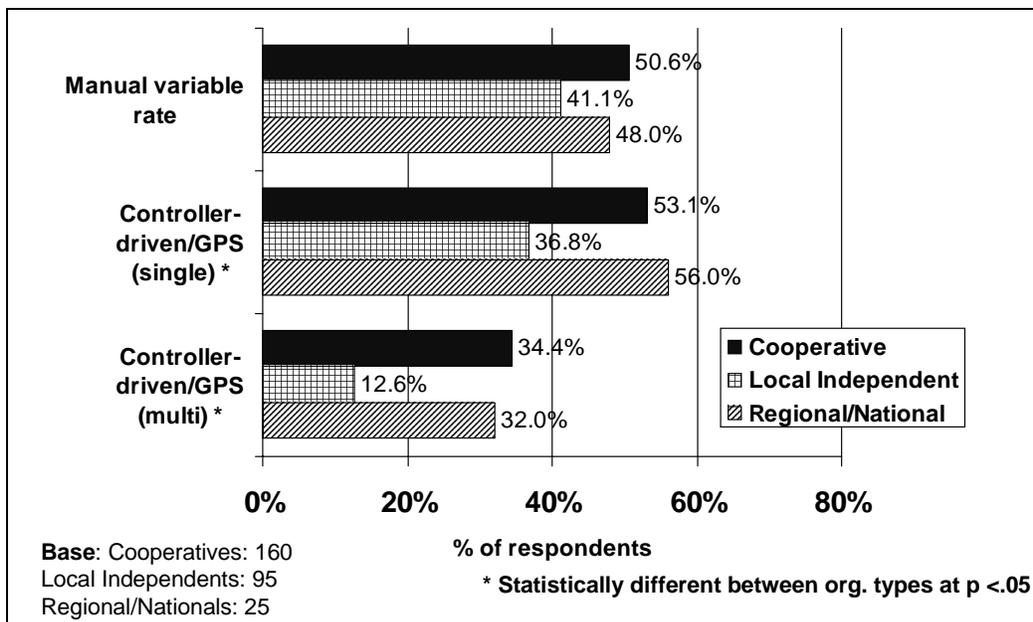


Figure 40. Precision Application of *Lime* Offered by Organizational Type in the Midwest

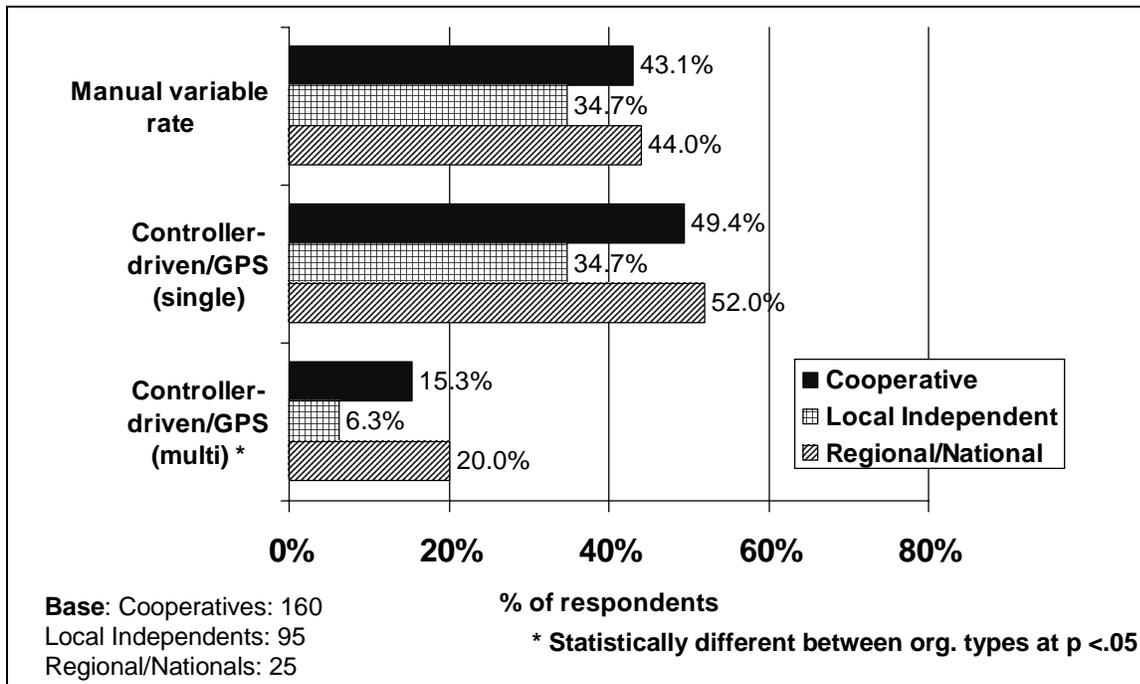
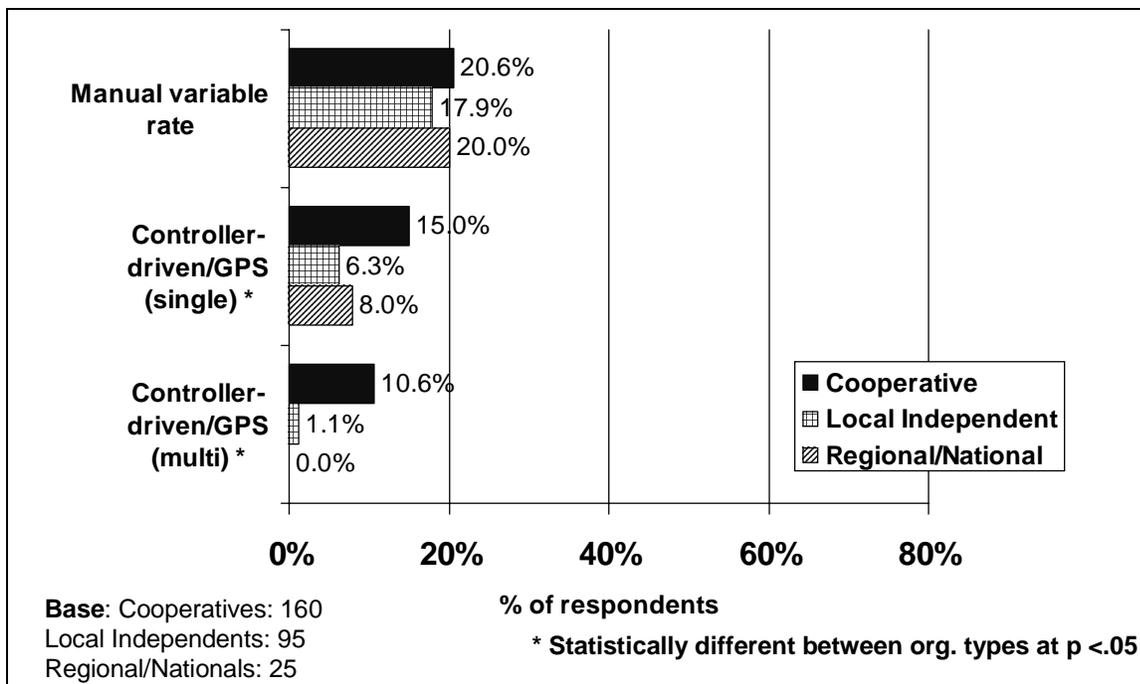


Figure 41. Precision Application of *Chemicals* Offered by Organizational Type in the Midwest



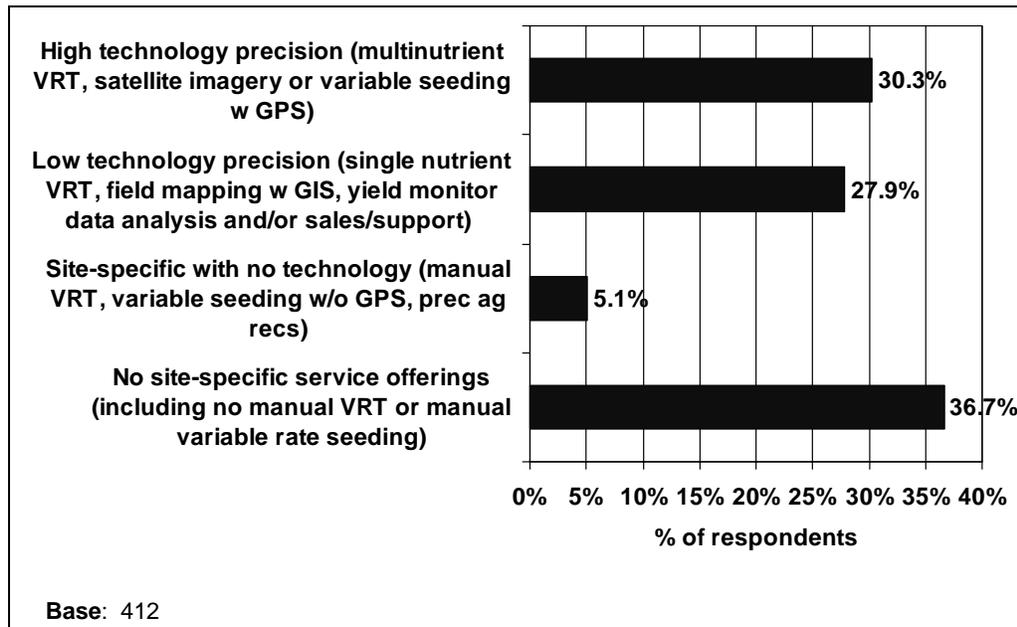
### ***Levels of Precision Adoption***

To summarize how extensively dealerships are incorporating precision technology into their service offerings, respondents were grouped into the following categories based on how extensive their precision service offerings were:

1. “High tech”: Multi-nutrient variable rate application, satellite imagery and/or variable seeding with GPS
2. “Low tech”: Single variable rate application, field mapping with GIS, yield monitor sales/support and/or data analysis, soil sampling with GPS
3. “Site-specific with no technology”: Manual variable rate application, variable rate seeding with no GPS, and/or agronomic recommendations based on precision data gathered elsewhere
4. No site-specific services at all.

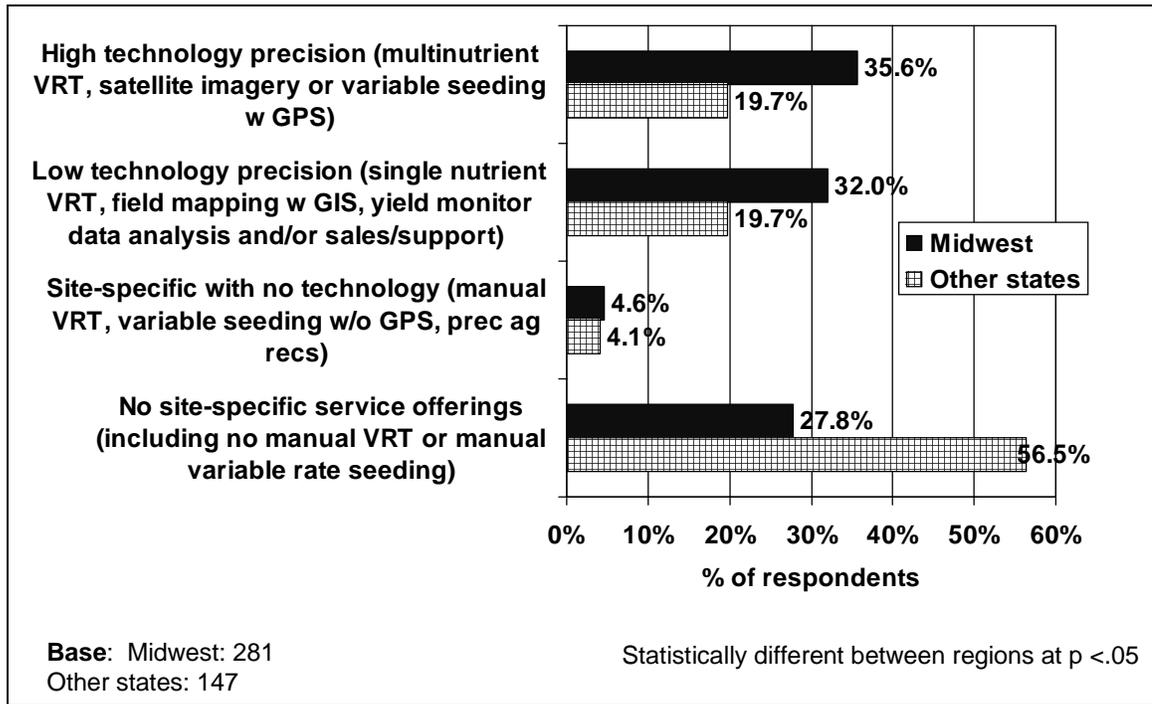
Just under a third of the respondents were in the “high tech” category (Figure 42), just under a third were in the “low tech” category and over a third offered no site-specific services at all (including manual variable rate application or making recommendations based on precision data). Very few respondents were offering manually-controlled site-specific services with no technology.

**Figure 42. Levels of Precision Adoption**



By region, almost four in 10 (36 percent) of the respondents from the Midwest were “High tech precision” users compared to only 20 percent in the non-Midwestern states (Figure 43). Over half of the respondents from the non-Midwestern states offered no site-specific services at all, compared to only 28 percent of the respondents from the Midwest.

**Figure 43. Levels of Precision Adoption by Region**



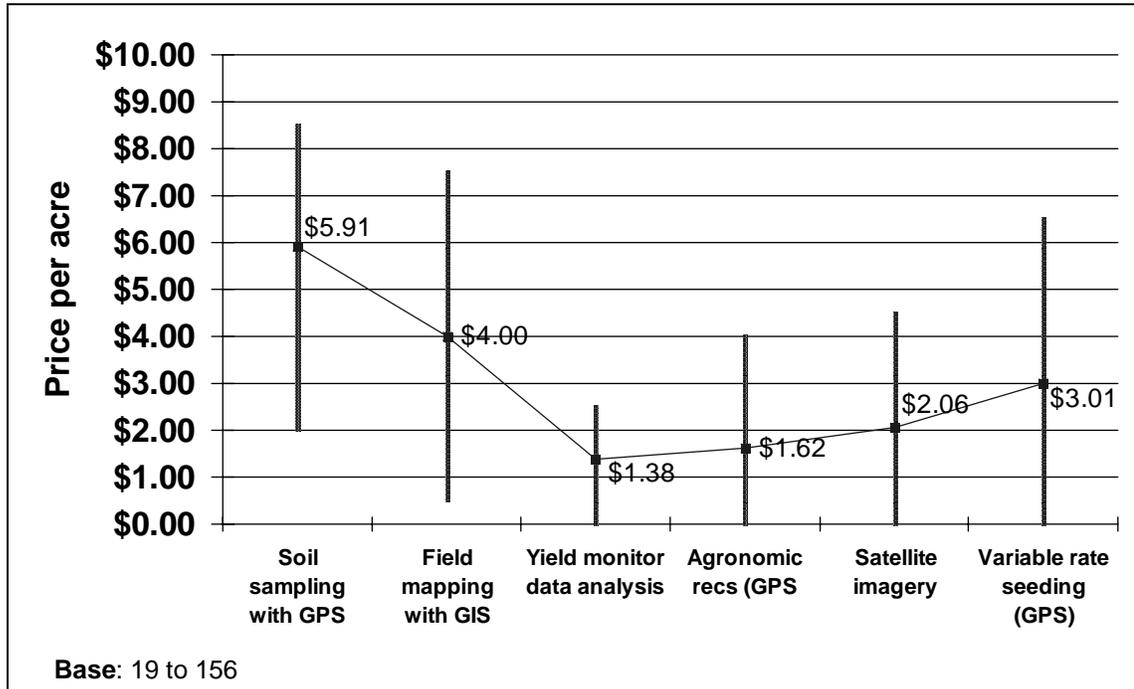
### Pricing Site-Specific Services

Each year less variation has been reported in the prices charged for precision services from dealership to dealership and market to market. Variation occurs because of differences in customer willingness to pay (often because of the market and/or environmental conditions), competitive price pressure, and uncertainty about the actual cost of providing the service. Though the price variation is shrinking as the services become more familiar to both dealerships and their customers, variation is still fairly large at this point.

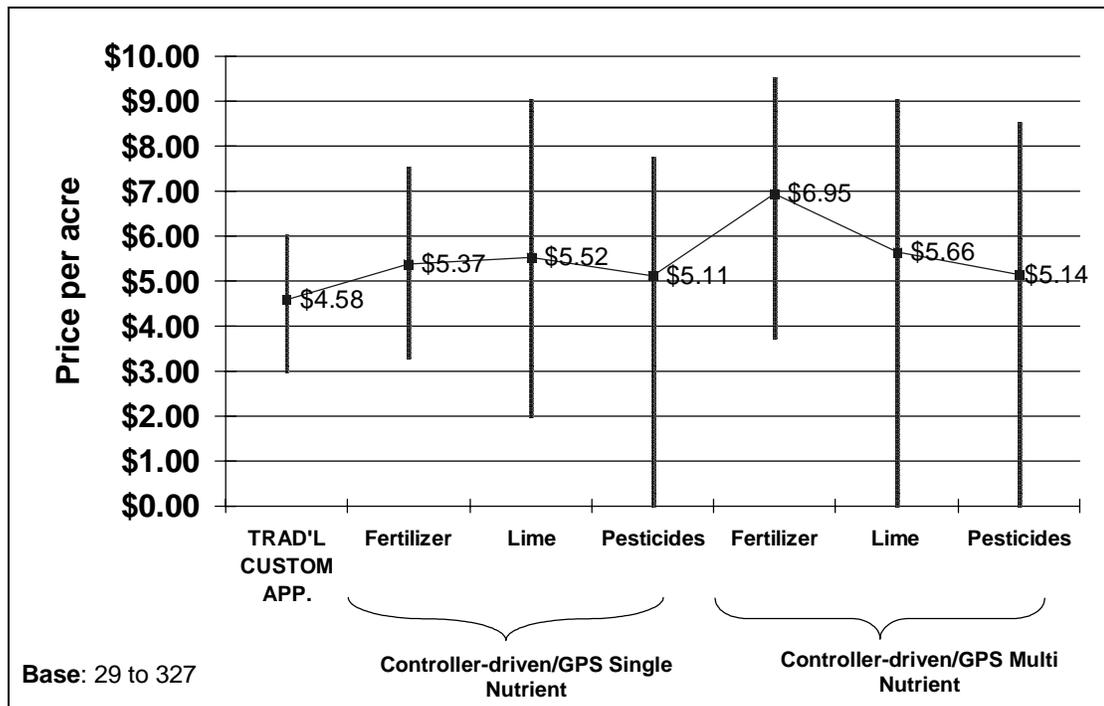
Dealerships were asked to report the typical price they charge per acre for their precision services where they could. For those offering only packages or bundled pricing, it often wasn't possible to price out the components individually. Hence, far fewer respondents completed this question relative to some of the other questions in the survey.

Figures 44 and 45 show the average prices charged per acre for each of the precision services. The bars indicate what the middle 80 percent of the dealers were charging (the top 10 percent and bottom 10 percent were dropped to make the ranges a bit more consistent). Overall, the average prices charged were similar to or slightly lower than, those seen in previous years. There were no overall differences between prices charged in the Midwest and in other states.

**Figure 44. Prices Charged for Precision Ag Services**



**Figure 45. Prices Charged for Precision Application Services**



***Profitability of Precision Service Offerings***

Dealerships were also asked how profitable they felt their precision offerings were. Compared to last year, dealers seemed to have a better feel for the profitability of their precision service offerings, with most precision service offerings appearing to generate more profit than last year.

Each bar in Figures 46 and 47 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; and
- generating a profit.

Using soil sampling with GPS in Figure 46 as an example, four out of 10 of the respondents said the service generated a profit for their dealership (42 percent). Just over a quarter (27 percent) said that it just covered fixed and variable costs. One in 6 respondents (14 percent) felt that they were covering variable costs but not fixed costs for soil sampling with GPS and 9 percent said they were covering neither variable nor fixed costs. Only 8 percent of the respondents did not know how profitable soil sampling with GPS was for them.

In looking at the precision services in both charts, the most profitable service appeared to be soil sampling with GPS, second only to a traditional custom application service. The second-most

profitable services were manual variable rate application (37 percent of respondents generating a profit with the service) and single-nutrient controller-driven application (a third generating a profit).

The least profitable of the precision services considered were variable seeding with GPS and yield monitor data analysis, with only 4 out of 10 dealerships offering the services saying they at least covered fixed and variable costs. Respondents were most uncertain about the profitability of variable seeding with GPS and satellite imagery (though these results were based on very few responses).

Overall, respondents were confident about the profitability of their total precision service offerings. Over a third of the respondents indicated their precision package generated a profit while another three out of 10 said they were covering both the fixed and variable costs of providing the services. The perception of the profitability of the different precision service offerings did not vary across regions or across organizational types in the Midwest.

When the profitability of the total precision package was broken out by those who offered a high tech version of precision technology (multi-nutrient controller-driven application, satellite imagery, or variable seeding with GPS) and those who offered a lower tech version of precision technology (single-nutrient controller-driven application, soil sampling with GPS, field mapping with GIS, yield monitor sales/support and/or data analysis), the high tech precision technology dealerships were almost twice as likely to say that their total precision package was profitable (46 percent of the high tech precision dealers versus 26 percent of the low tech precision dealers). While data is not available to explain the reason, it is clear that dealerships providing a more extensive array of precision services are more profitable. This may be a function of the market area: growers are interested in more sophisticated services and/or competitive pressure is less intense. Or, perhaps dealerships offering a full menu of precision services are simply better managed and/or are better service marketers.

Figure 46. Profitability of Precision Service Offerings

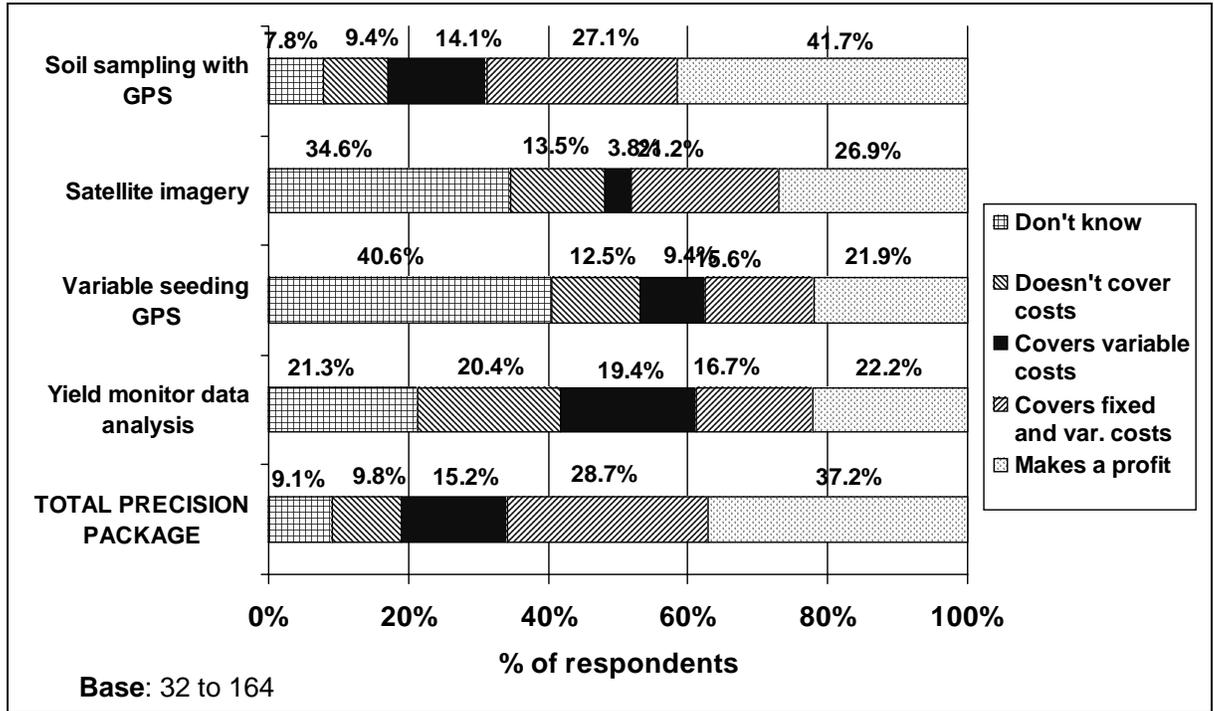


Figure 47. Profitability of Precision Application Offerings

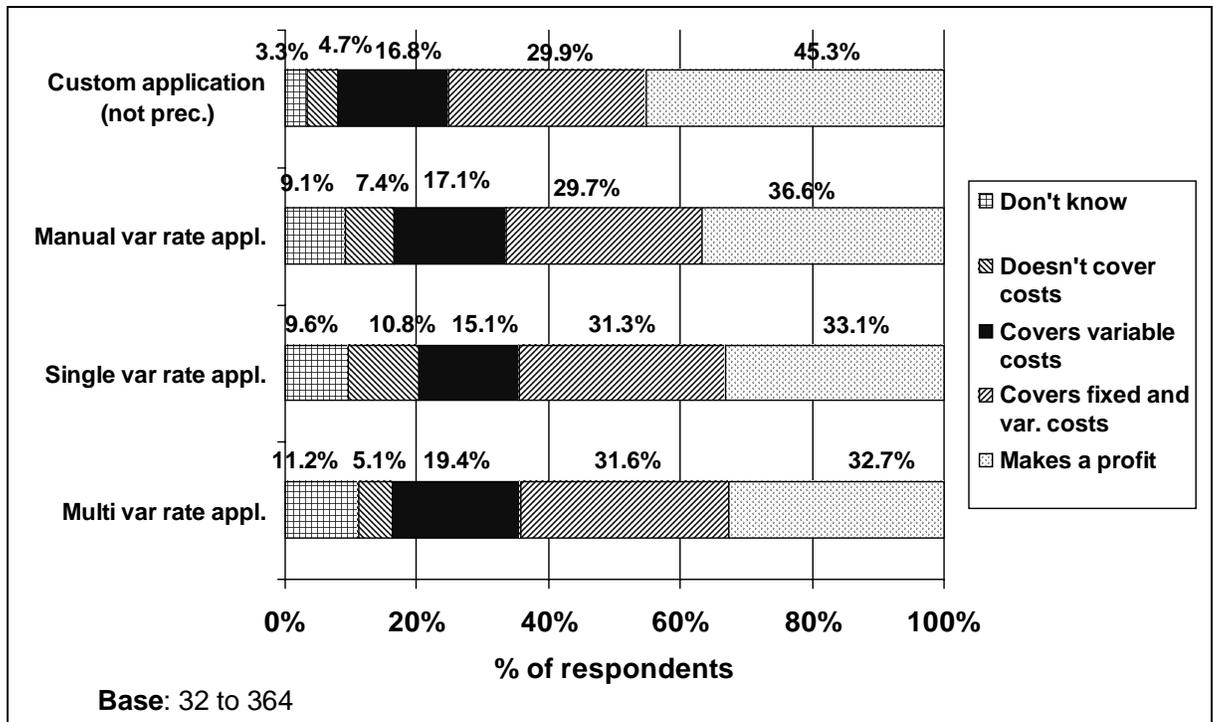
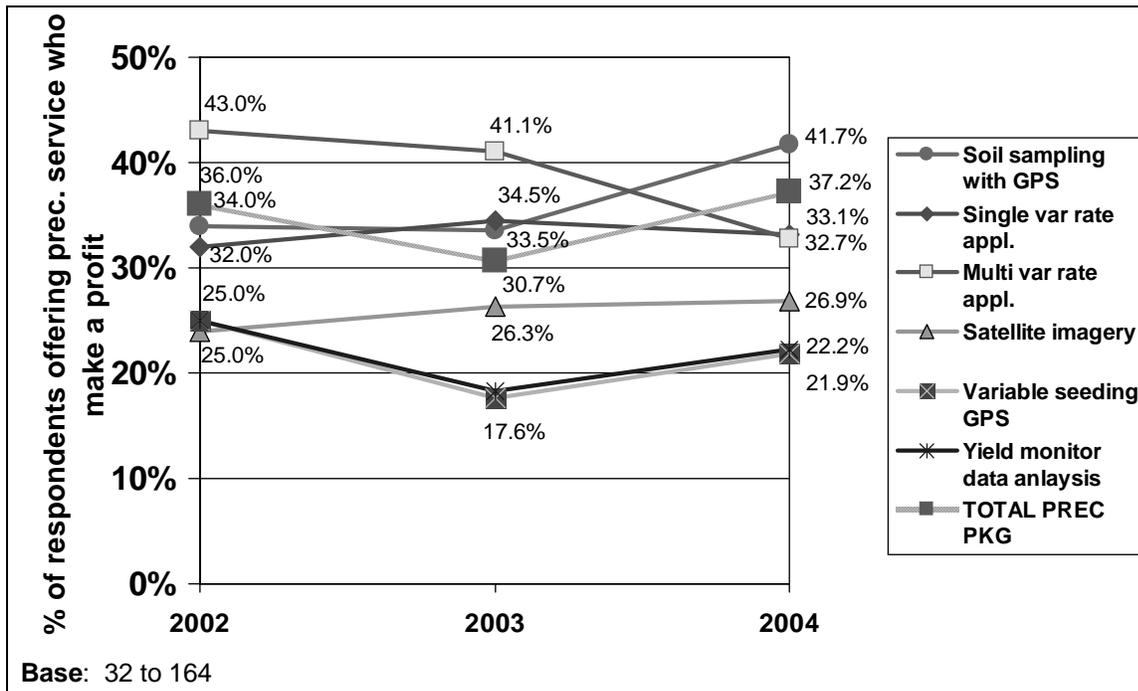


Figure 48 shows the profitability of the services across time, with the percentage showing those respondents reporting a profit on the service. Numbers were fairly consistent from 2003 to 2004, with the exception of multi-nutrient variable rate application whose profitability seemed to decline significantly from last year.

**Figure 48. Respondents Generating a Profit from Precision Services**

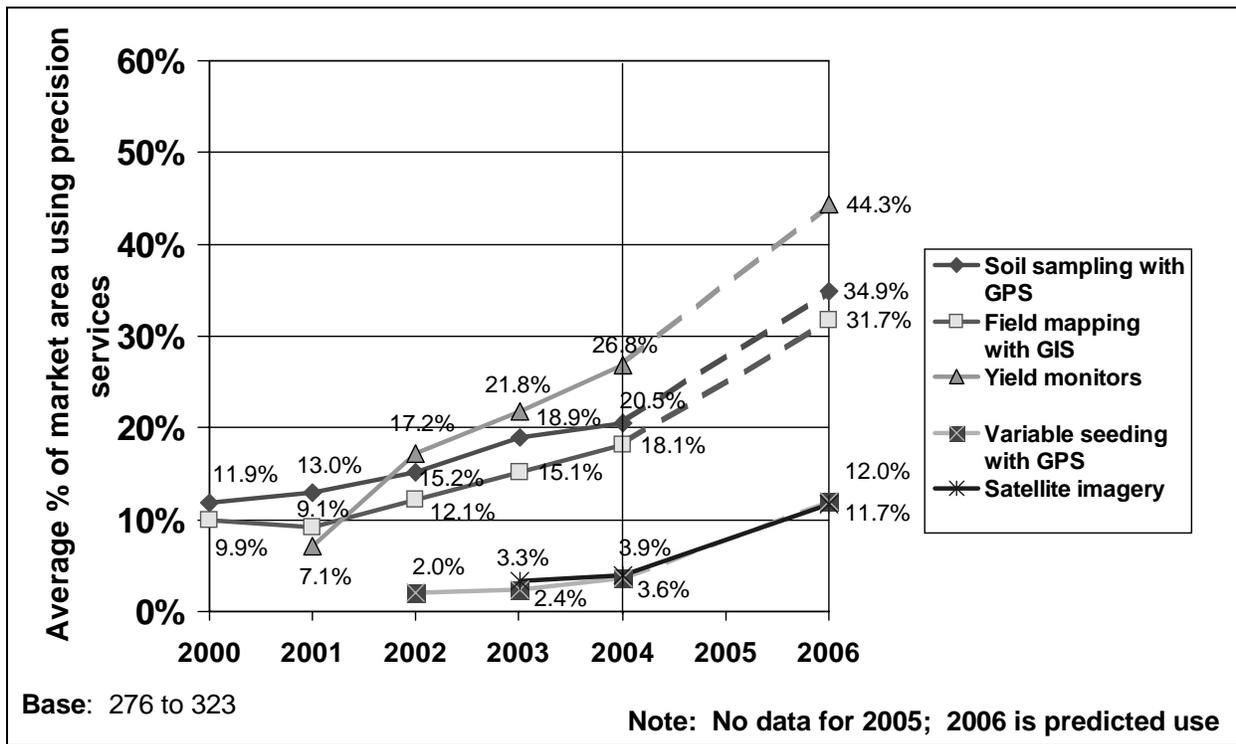


### *Customer Use of Site-Specific Services*

To get a better understanding of how quickly growers are adopting precision services, survey participants were asked what percentage of the total acreage they served in their market area (all growers, not just current customers) was using various site-specific management techniques currently, and, in their opinion, what proportion of the local market acres would be using these techniques in 3 years. Figures 49 to 51 show the trends over time in the estimated market use of specific precision agriculture management techniques.

During the time period market adoption has been measured by this survey, grower use of almost all services has grown each year. And, as in previous years, respondents are optimistic about future adoption. In 2004, the most widespread precision service or technology in use was yield monitors, estimated to be used on an average of 29 percent of the market acres served by each respondent (Figure 49). This was followed by soil sampling with GPS (used on an average of 24 percent of the market acres) and field mapping with GIS (used on 20 percent of market acres).

Figure 49. Estimated Market Area Using Precision Services



Growth in the use of variable rate application also increased from 2003 to 2004 (Figure 50 and 51), with continued growth expected into 2006. By 2006, respondents estimated that, on average, over a quarter of their market acreages would be applying lime in a single-nutrient controller-driven application. They also expected that market use of single nutrient controller-driven application of fertilizer would increase by 2006 from 13 percent to 22 percent of the market area. Expected growth rates in the use of multi-nutrient controller-driven application were similar.

Figure 50. Estimated Market Area Using Single Nutrient Controller-Driven Application

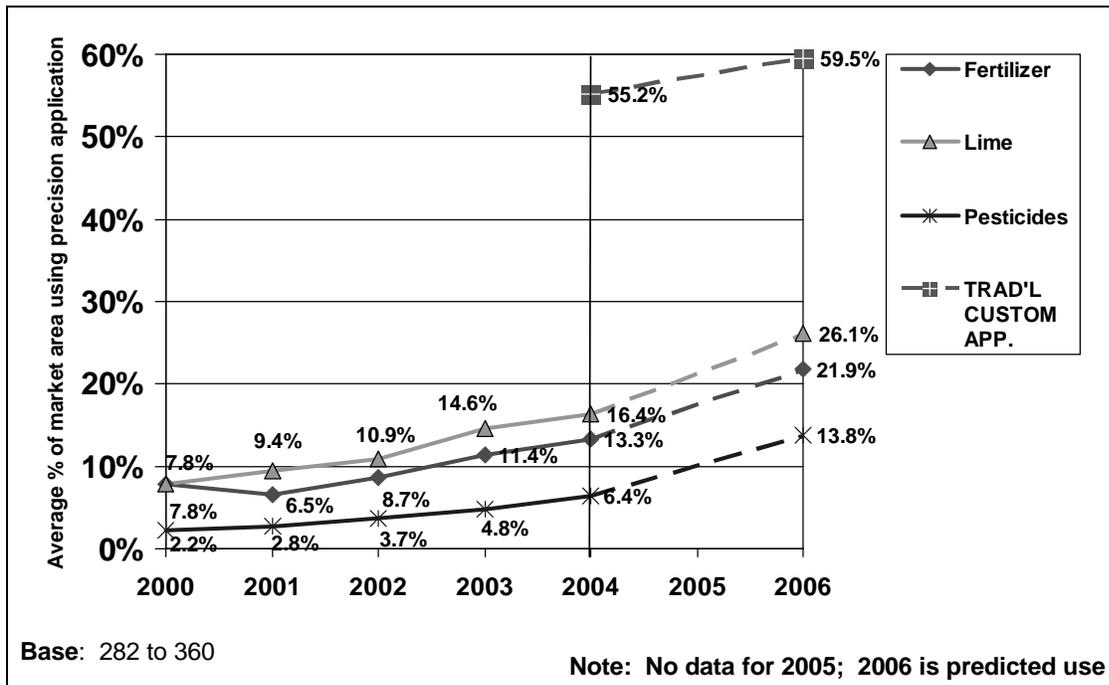
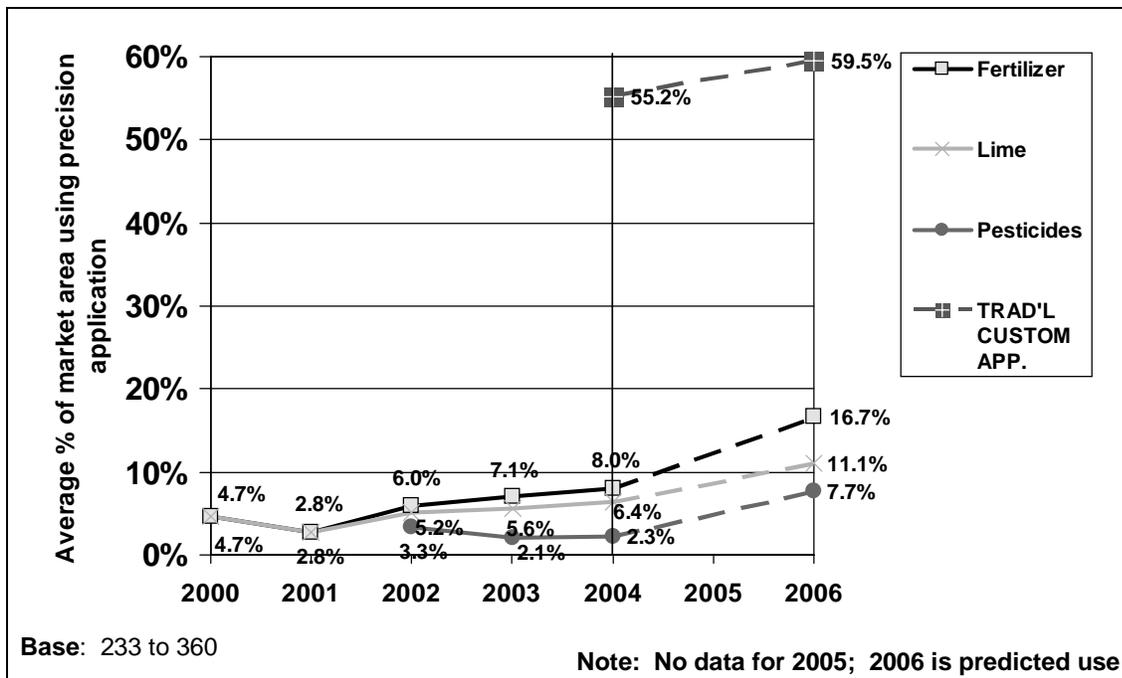
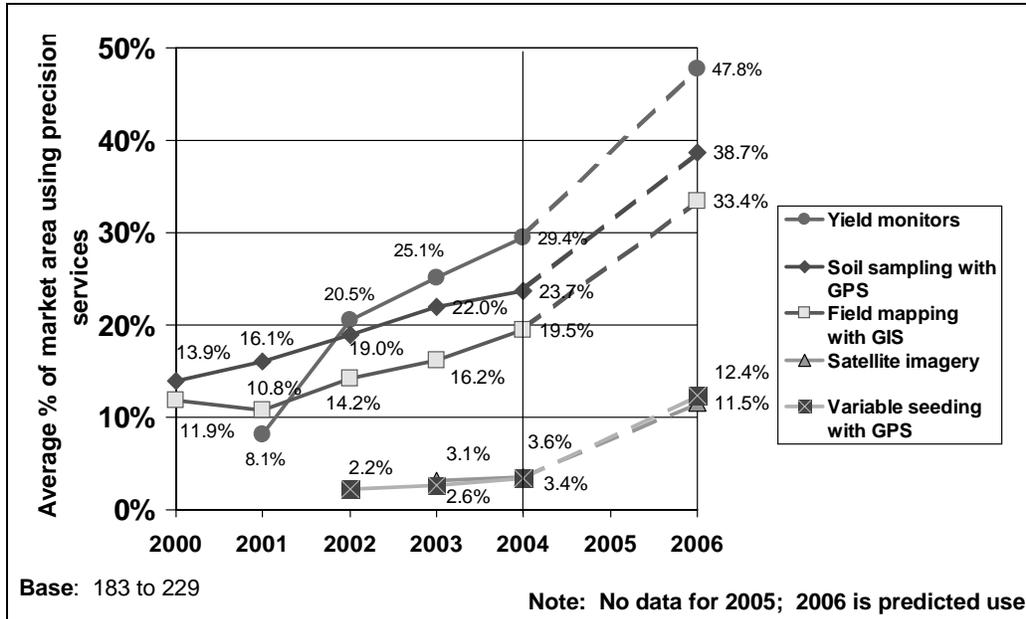


Figure 51. Estimated Market Area Using Multi-Nutrient Controller-Driven Application



Figures 52 to 55 show estimated market usage of precision services by region. Some market use estimates were significantly higher in the Midwest than in other states. These included yield monitor usage, soil sampling with GPS, and single-nutrient controller-driven variable rate application of fertilizer and lime. There were no significant differences across regions for the other services. Rapid growth in usage of these services was expected by 2006, with the most growth expected in the use of variable seeding with GPS and satellite imagery – both expected to quadruple in market usage in the next 2 years.

**Figure 52. Estimated Market Area Using Precision Services in the Midwest**



**Figure 53. Estimated Market Area Using Precision Services in the Other States**

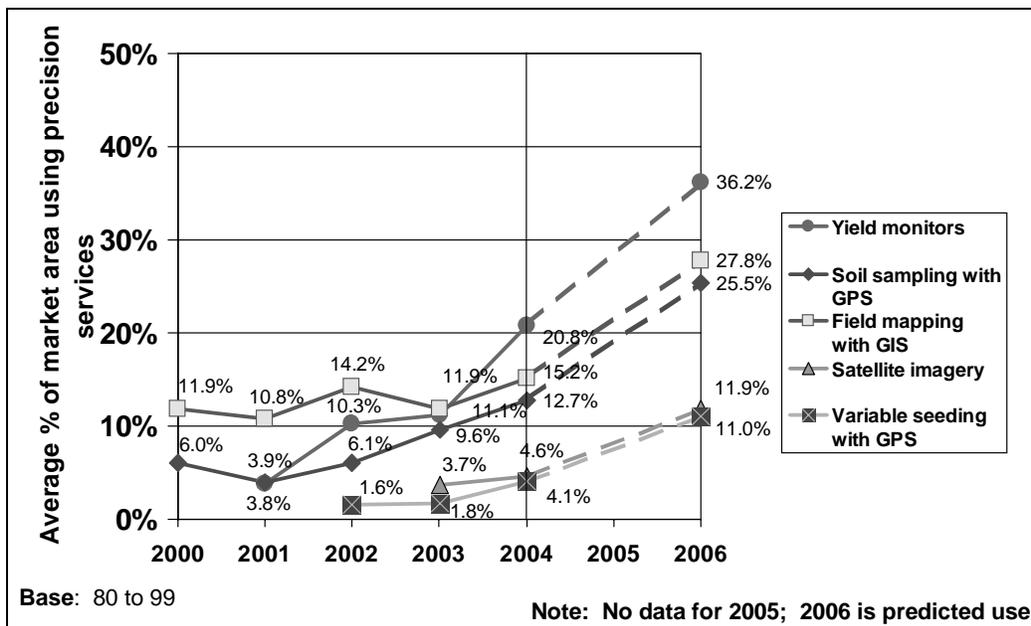


Figure 54. Estimated Market Area Using Variable Rate Application in the Midwest

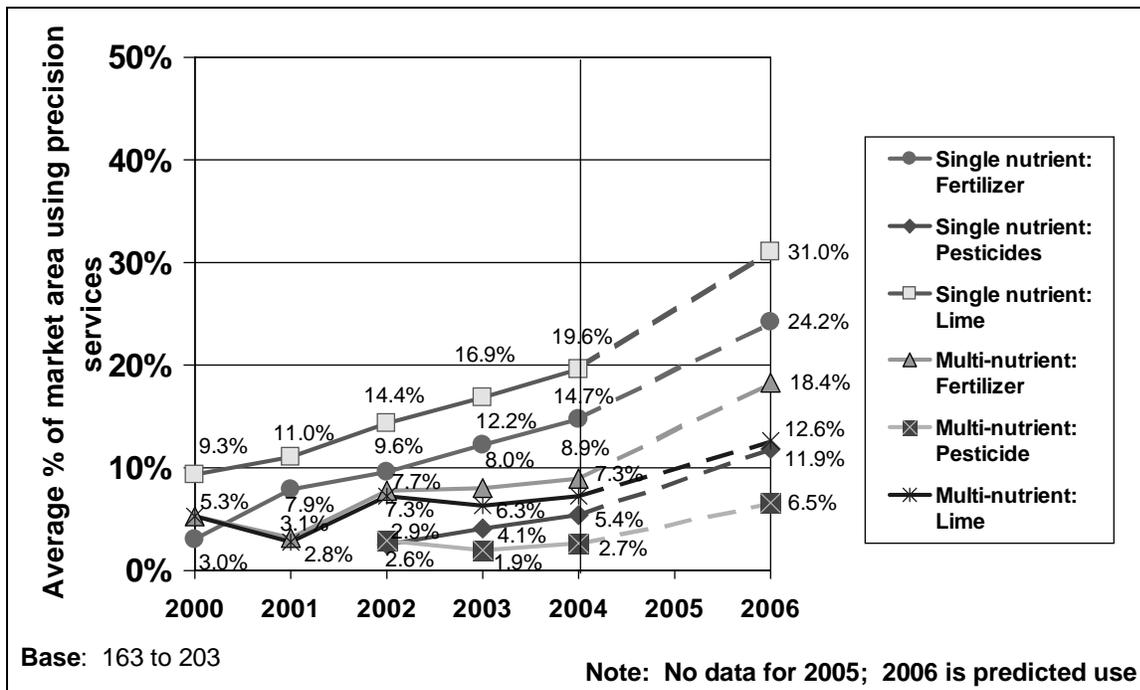
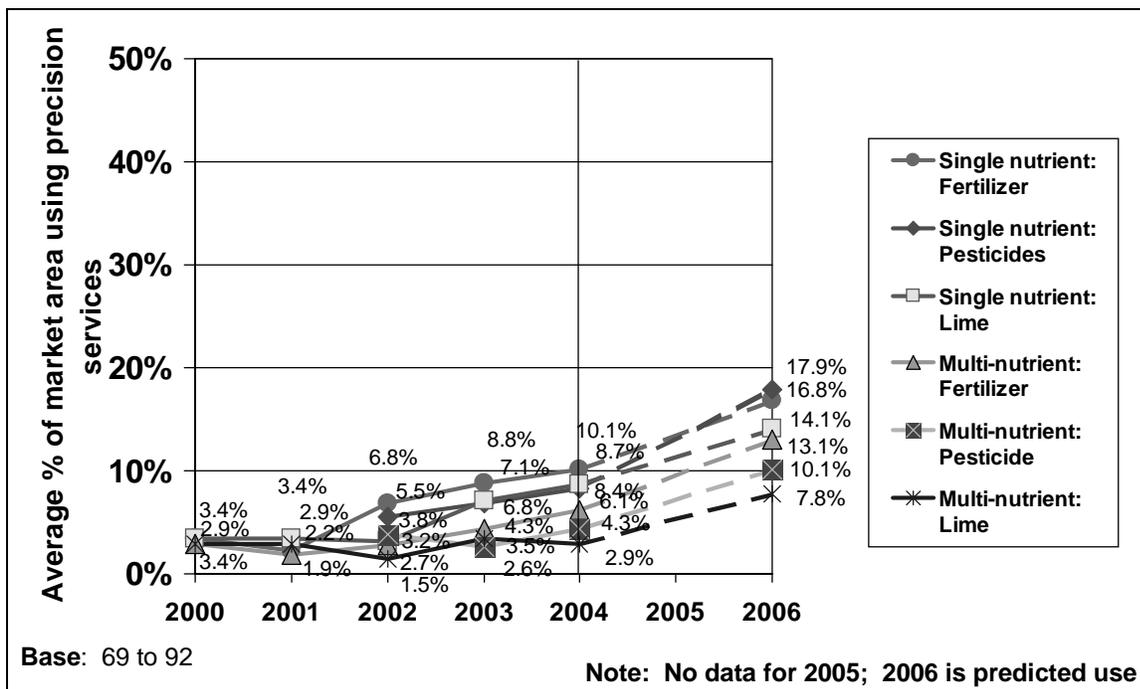


Figure 55. Estimated Market Area Using Variable Rate Application in Other States

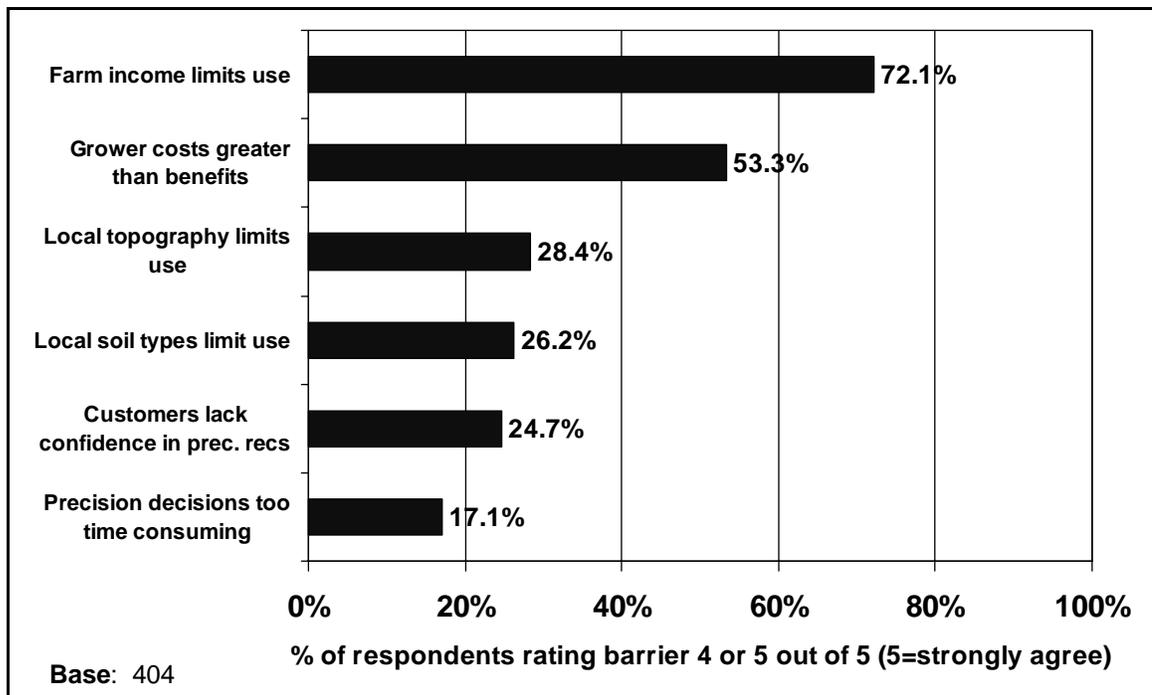


### ***Barriers to Adoption/Expansion of Precision Technology***

To get a better understanding of what the biggest barriers were to adopting and/or expanding precision technology use among growers, respondents were asked to rate their agreement or disagreement with 18 statements about customer barriers, dealer barriers and technology barriers that might prevent or discourage precision technology adoption. The following charts focus on those respondents who felt strongly that the specific issue was preventing adoption. Each chart shows the percentage of respondents who rated each barrier a 4 or 5 out of 5 (where 1 was that they strongly disagreed with the issue being a barrier and 5 indicated that they strongly agreed that the issue was a barrier).

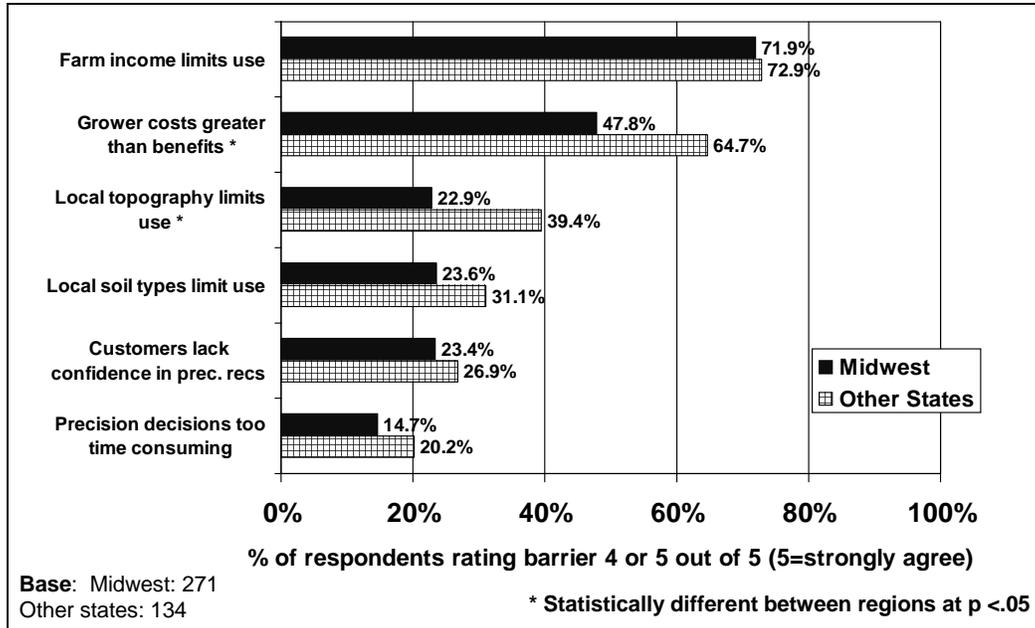
Figure 56 shows the rating for customer-oriented issues. The number one rated customer barrier to adoption was farm income (“My farmers are interested in precision services, but pressure on farm income in my area limits use”). Almost three-quarters of the respondents indicated that farm income was a major barrier to adoption (72 percent). The second barrier, rated important by more than half of the participants, was “the cost of precision services to my customers is greater than the benefits many receive.” Physical barriers, such as topography and soil types were only rated a 4 or 5 by approximately a quarter of the respondents. And, only a quarter of the respondents felt that customers lacked confidence in the recommendations based on site-specific data, while fewer than one in five felt that interpreting/making decisions with precision information took too much of their customers’ time.

**Figure 56. Customer Issues Preventing Adoption/Expansion of Precision Technology**



Because there was a consistent difference between the adoption of precision technologies among dealerships in the Midwest versus non-Midwestern states, presumably their ratings of different customer barriers for adoption would also be different. Figure 57 shows the customer barriers broken out by Midwest and other states. The two areas with significant differences were in the cost of precision to growers outweighing the benefits and the impact of topography. Both barriers were seen to be significantly more important in non-Midwestern states than in the Midwest. Though some differences can be seen in the other barriers on the chart, they were not statistically different.

**Figure 57. Customer Issues Preventing Adoption/Expansion of Precision Technology by Region**

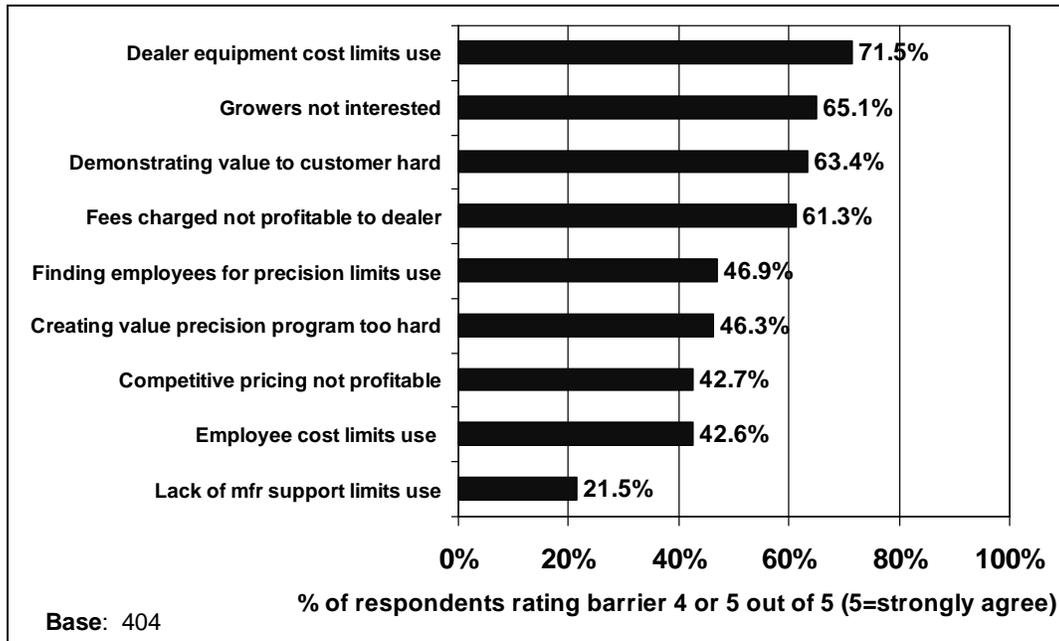


In addition to customer barriers, dealer issues were also explored. Figure 58 shows how the dealer issues were rated. The top rated dealer barrier was also cost-related. More than 7 out of 10 respondents (72 percent) said that “the cost of the equipment required to provide precision services limits our precision offerings.” Over six out of 10 respondents agreed that the number of interested growers in their market area was limited (65 percent), it was hard to demonstrate the value of precision services to their customers (63 percent) and that the fees they could charge in their market were not high enough to make precision technology profitable for them (61 percent).

Other dealer issues that appeared to be a major challenge for some dealerships included:

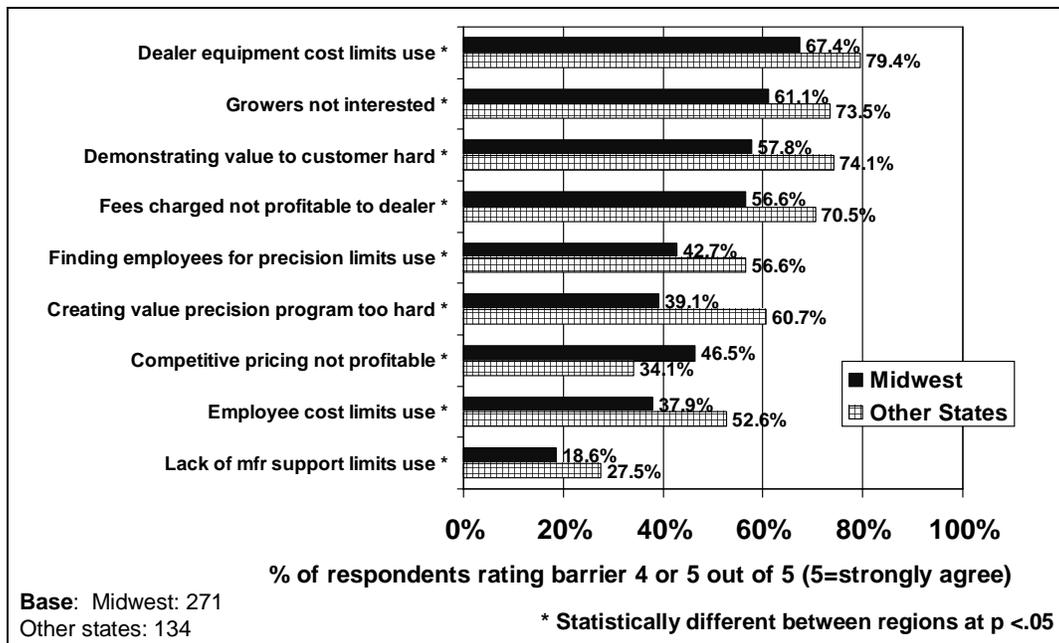
- Finding employees who can deliver precision services (47 percent)
- Creating a precision program that adds more value for the grower than a traditional program (46 percent)
- The competitive pricing level in the local market area is too low to make it profitable (43 percent)
- The cost of employees who can deliver precision services is too high to be profitable (42 percent).

**Figure 58. Dealer Issues Preventing Adoption/Expansion of Precision Technology**



All of the dealer issues except one were significantly more important in non-Midwestern states than in the Midwest. Figure 59 shows the dealer issues broken out by region. In every case except one, the challenges were perceived to be greater outside of the Midwest. The one exception was competitive pricing – 46 percent of Midwestern respondents agreed that competitive pricing forced prices too low for them to make precision profitable compared to only 34 percent of the non-Midwestern respondents. This could reflect the lower level of competition in general across non-Midwestern states for precision services.

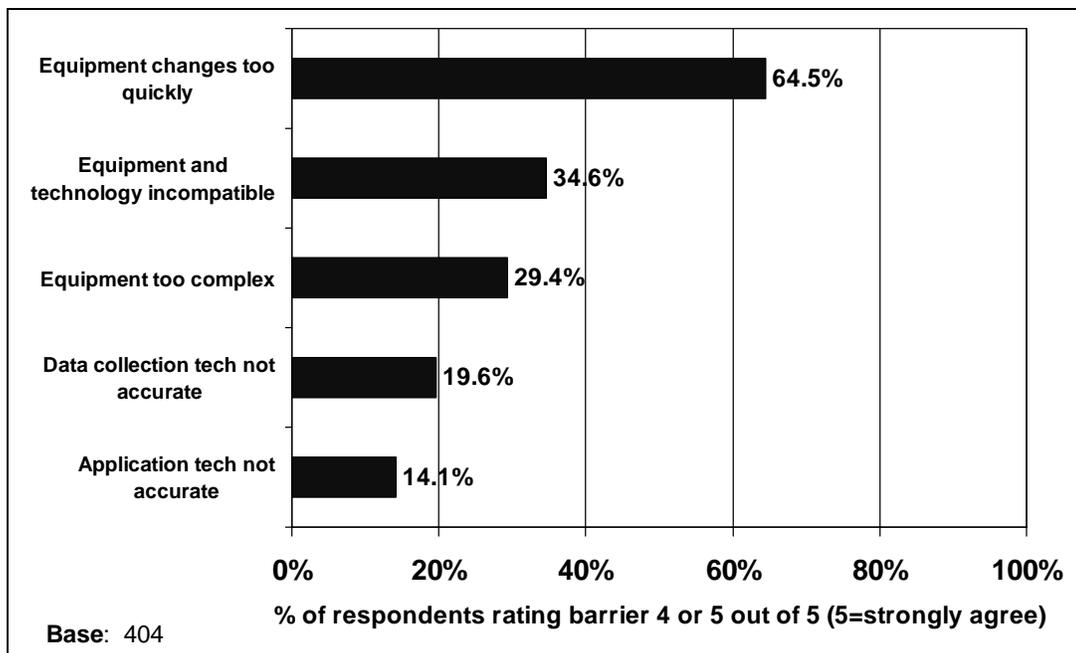
**Figure 59. Dealer Issues Preventing Adoption/Expansion of Precision Technology by Region**



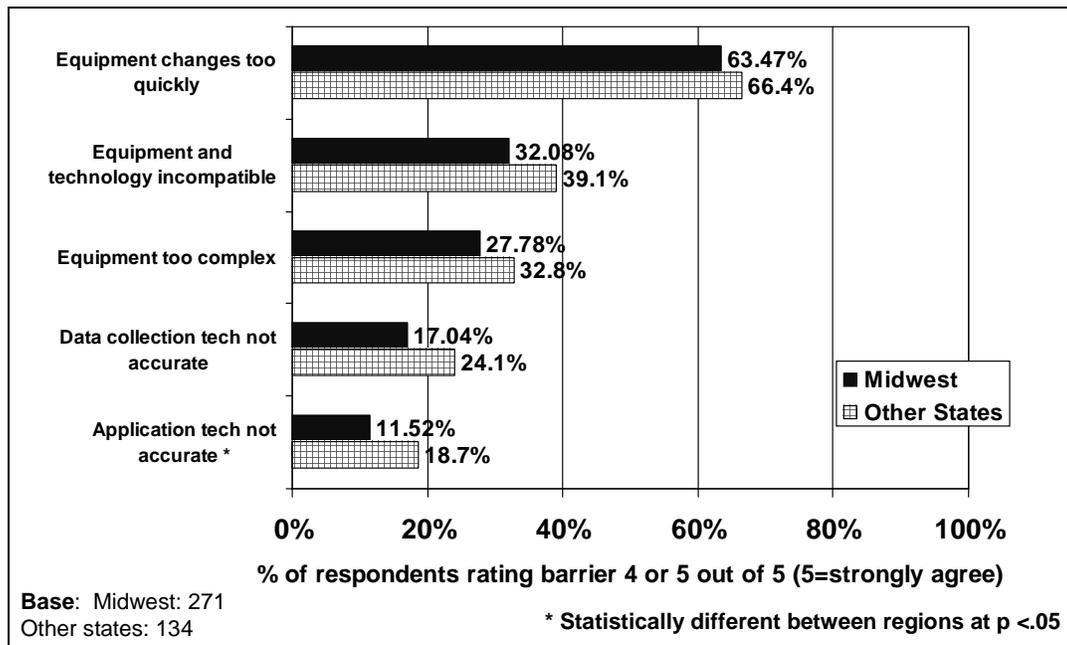
The technology barrier that respondents rated most critical was that the equipment needed to provide precision services changes quickly and increases the dealership's costs (rated 4 or 5 out of 5 by 65 percent of the respondents) (Figure 60). Equipment that was incompatible with other precision technology, or equipment that was too complex for employees to use easily were issues for some respondents (35 and 29 percent, respectively). However, accuracy in both data collection and precision application technologies did not seem to be a barrier for most respondents.

In general, ratings of technology barriers did not differ greatly by region (Figure 61). The only technology rating that differed was that the accuracy of the data collection technology was considered a problem for more non-Midwestern respondents than those from the Midwest (19 percent of non-Midwestern respondents compared to 12 percent of Midwestern respondents).

**Figure 60. Technology Issues Preventing Adoption/Expansion of Precision Technology**



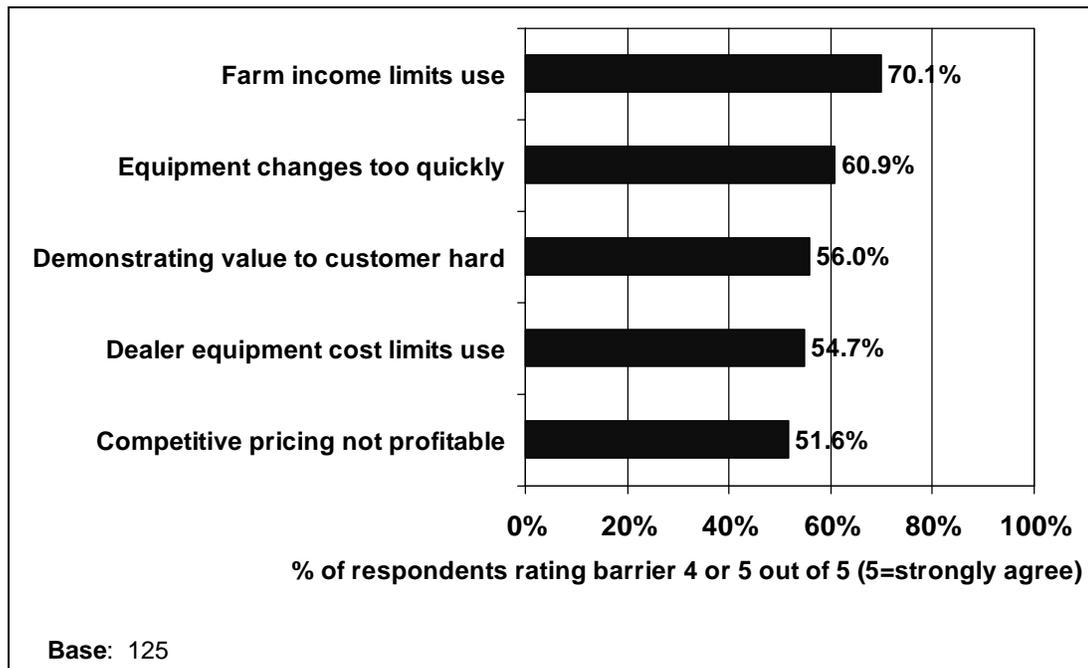
**Figure 61. Technology Issues Preventing Adoption/Expansion of Precision Technology by Region**



In looking at the adoption of precision technology, it seems logical to think that the barriers to initially adopting the technology may be different than barriers to expanding the use for those who have already adopted the technology. To look at this in more detail, barriers were compared for those who were categorized as offering “high tech” precision services to those who offered “no site-specific services.” The top barriers for each category (those rated 4 or 5 out of 5 by more than half of the respondents) can be seen in Figures 62 and 63.

For dealerships already offering “high tech” precision services, the biggest barrier they were facing was farm income; specifically that their customers were interested in precision services but pressure on farm income limited their use (agreed with by 70 percent of “high tech” precision dealers) (Figure 62). This was despite the stronger farm income levels in 2003, suggesting that lower farm income levels in the past were still being perceived as a barrier to adopting new technology. Another barrier was technology-based. Six out of 10 of the high tech respondents said that the equipment changes so quickly that it increases the cost to the dealership and is causing a barrier to expanding technology offerings, hence adoption. The other top barriers were all dealer-based for this group. Demonstrating value to the customer, the cost of the equipment, and highly competitive pricing for precision services were all creating obstacles in expanding the use of precision technology in their markets.

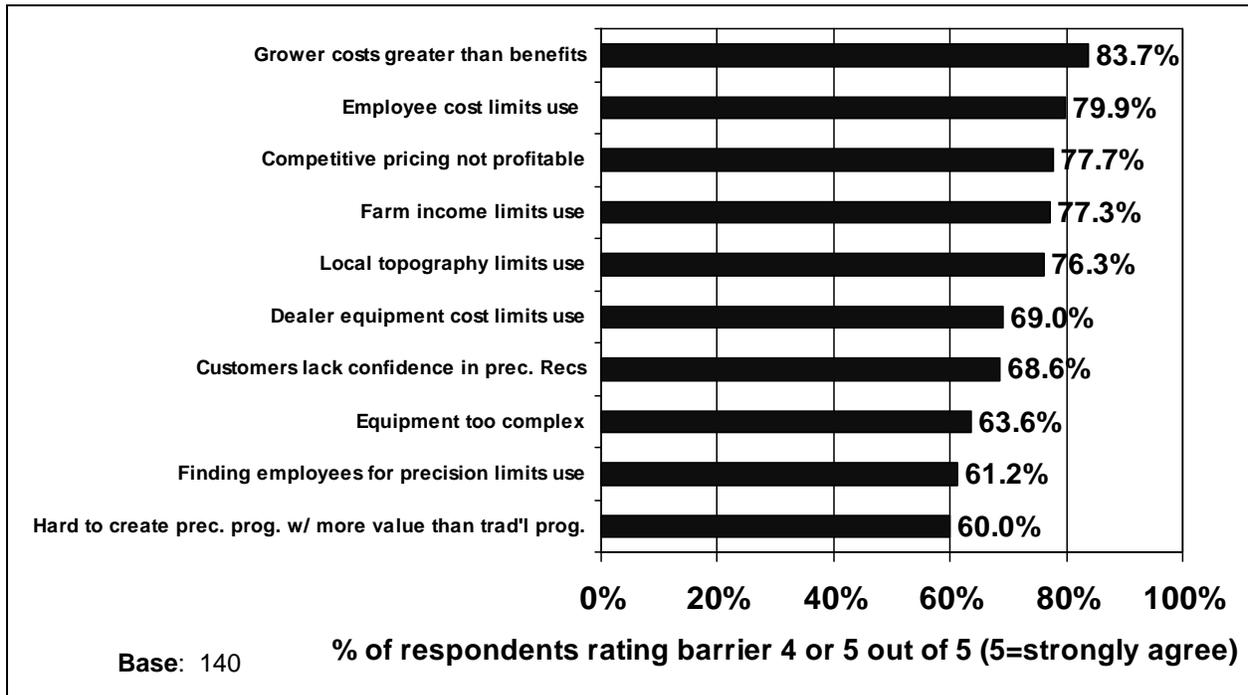
**Figure 62. Biggest Barriers to Expansion of Precision Technologies As Rated by “High-Precision” Dealers**



The top four barriers preventing adoption rated by respondents who offered no site-specific services were all financial: grower costs were greater than the benefits they received (84 percent), employee costs limit use by the dealership (80 percent), competitive pricing in the local market meant that they couldn't price the services to make a profit (78 percent) and farm income limits the use by growers, even though they might be interested in precision (77 percent of respondents). The only non-economic factor that over three-quarters of these respondents rated a 4 or 5 out of 5 was that the local topography limits the use of precision technology in their area.

Dealer equipment was an issue for this group as well as the high tech group. A lack of experience may be behind a few of the top barriers: customers lack confidence in the recommendations made from precision information, the equipment is too complex for employees to use and finding employees who can provide precision services limits its use. These factors suggest a high learning curve is preventing this group from adopting in the first place.

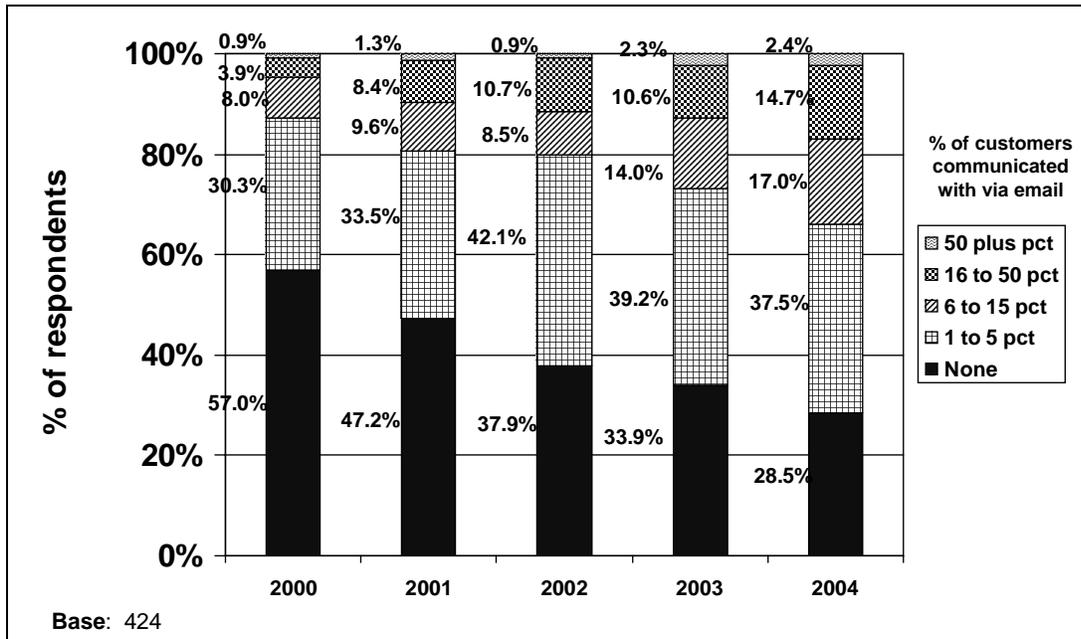
**Figure 63. Biggest Barriers to Expansion of Precision Technologies As Rated by “No Site-Specific Services” Dealers**



*Use of Email*

The survey also looked at another type of technology that is changing how business is conducted in today’s market. Dealerships were asked how many of their customers they were communicating with through email. Figure 64 shows that more than 7 out of 10 of the respondents (71 percent) used email to communicate with at least some of their customers. This was up from 66 percent last year. In 2004, 17 percent of the respondents had communicated by email with over 15 percent of their customers within the past year.

Figure 64. Customers Communicated With Via Email



## Summary

As precision technology becomes more widely understood to those in the agricultural industry, a more diverse set of barriers to adoption is beginning to appear. Dealerships continue to adopt precision technologies for internal uses but at a fairly slow rate. Grower adoption has continued to expand, however. For those not already offering precision services, profitability at the grower and dealer levels is a challenge, as is finding and paying people to provide precision services. For those who have already adopted precision services, questions of value are slowing adoption of precision technologies by the next round of growers. And, for the high tech users, keeping up with changes in technology and resulting incompatibilities is a big issue. With these barriers becoming more apparent, further large-scale adoption may depend on new types of lower-priced or more effective, easier to use precision technology, or more defined, better communicated benefits to using precision services.

## **APPENDIX I: Questionnaire**

# 9th ANNUAL PRECISION AG SURVEY

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*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 13, 2004.*

1. Your primary responsibility: *[check one]*
  - Owner/general manager/location manager
  - Precision manager
  - Technical consultant/agronomist
  - Other: \_\_\_\_\_ (Please specify)
  - Departmental manager
  - Application manager
  - Sales/sales management
2. Please indicate the number of full-time staff agronomists you have access to at your location or you share with other locations:  
Full-time agronomists at your location: \_\_\_\_\_ "0" if None  
Full-time agronomists shared with other locations: \_\_\_\_\_ "0" if None
3. Are you a: *[check one]*
  - Cooperative
  - Part of a national or regional (multi-state) chain of retail dealerships (not a cooperative)
  - Other: \_\_\_\_\_ (Please specify)
  - Independent dealership
4. What were the total annual retail sales (in dollars) of agronomic products and services (fertilizer, chemicals, seed, services) at this location in 2003?
  - 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
5. How many total retail outlets does your company own or manage? *[check one]*
  - None
  - 1
  - 2-5
  - 6-15
  - 16-25
  - More than 25
6. What is the average size (in acres) of your customers? *[check one]*
  - Under 200 acres
  - 201 to 500
  - 501 to 1000
  - Over 1000
7. Do you provide custom application?  No → go to Question 11  Yes → continue with Question 8
8. 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 11
  - Under 10,000 acres
  - 10,001 to 25,000 acres
  - 25,001 to 50,000 acres
  - over 50,000 acres
9. In 2003, approximately what proportion of your total fertilizer sales were custom applied? \_\_\_\_\_%
10. In 2003, approximately what proportion of your total herbicide/pesticide sales were custom applied? \_\_\_\_\_%
11. Please indicate other agronomic services you provide at your location. *[check all that you provide]*
  - Seed sales
  - Recordkeeping
  - Agronomic consulting
  - Computer-aided field mapping
  - Soil sampling
  - None of the above

12. Do you offer soil sampling following a grid pattern and/or by soil type?
- 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: \_\_\_\_\_

13. 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 photography for internal dealership purposes
  - Soil electromagnetic (Veris) 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
  - Don't use precision technology**

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

<u>Service</u>	<u>By Fall 2004</u>	<u>Offer by 2006</u>	<u>Never/ Don't Know</u>	<u>Don't offer now but did</u>
Field mapping (with GIS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manual variable rate application				
<i>Fertilizer</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Lime</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Chemicals</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controller-driven (GPS), <b>single</b> nutrient variable rate application				
<i>Fertilizer</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Lime</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Chemicals</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controller-driven (GPS), <b>multiple</b> nutrient variable rate application				
<i>Fertilizer</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Lime</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Chemicals</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yield monitor sales/support/rental	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yield monitor data analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variable seeding rates without GPS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variable seeding rates with GPS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satellite imagery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Agonomic recommendations based on GPS/GIS data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil sampling with GPS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. If you currently offer any of these services/products, what is the average per acre/per unit price you charge for individual services? (*do not include bundled pricing*)

<u>Service</u>	<u>Price \$/acre</u>	<u>Price \$/other units (\$/map, \$/hour, etc.)</u>
Custom application (not precision)	\$ _____/acre	\$ _____/(specify units) _____
Field mapping (with GIS)	\$ _____/acre	\$ _____/(specify units) _____
Manual variable rate application		
<i>Fertilizer</i>	\$ _____/acre	\$ _____/(specify units) _____
<i>Lime</i>	\$ _____/acre	\$ _____/(specify units) _____
<i>Chemicals</i>	\$ _____/acre	\$ _____/(specify units) _____

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Controller-driven (GPS), single nutrient variable rate application

Fertilizer	\$ _____/acre	\$ _____/(specify units) _____
Lime	\$ _____/acre	\$ _____/(specify units) _____
Chemicals	\$ _____/acre	\$ _____/(specify units) _____

Controller-driven (GPS), multiple nutrient variable rate application

Fertilizer	\$ _____/acre	\$ _____/(specify units) _____
Lime	\$ _____/acre	\$ _____/(specify units) _____
Chemicals	\$ _____/acre	\$ _____/(specify units) _____

Yield monitor data analysis	\$ _____/acre	\$ _____/(specify units) _____
Variable seeding rates without GPS	\$ _____/acre	\$ _____/(specify units) _____
Variable seeding rates with GPS	\$ _____/acre	\$ _____/(specify units) _____
Satellite imagery	\$ _____/acre	\$ _____/(specify units) _____
Agronomic recommendations based on GPS/GIS data	\$ _____/acre	\$ _____/(specify units) _____
Soil sampling with GPS	\$ _____/acre	\$ _____/(specify units) _____

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

	<u>I am not close to breaking even</u>	<u>I am just covering variable costs (See NOTE)</u>	<u>I am covering both variable and fixed costs</u>	<u>I am generating a profit</u>	<u>Don't know</u>	<u>Don't offer</u>
Custom application (Not-precision)	1	2	3	4	5	6
Manual variable rate application	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
Data analysis for yield monitors	1	2	3	4	5	6
Variable seeding rates with GPS	1	2	3	4	5	6
Satellite 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

**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.)

17. 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 use	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/making decisions with precision 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	1	2	3	4	5

1 = Strongly disagree  
 2 = Disagree  
 3 = Neither agree nor disagree  
 4 = Agree  
 5 = Strongly agree

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	1 = Strongly disagree	2 = Disagree	3 = Neither agree nor disagree	4 = Agree	5 = Strongly agree
<b>Dealer Issues</b>					
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 it to be profitable	1	2	3	4	5
Finding employees who can deliver precision 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 it 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 more value for the grower than a traditional one is difficult for us	1	2	3	4	5
Demonstrating 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
<b>Technology Issues</b>					
The equipment needed to provide precision services changes quickly, increasing my costs	1	2	3	4	5
The existing precision data collection technologies are not accurate enough to create market value	1	2	3	4	5
The existing precision application technologies are not accurate enough to create market value	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 limit my ability to offer precision	1	2	3	4	5

18. 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 techniques? Approximately what percentage of the total acreage will be using these techniques in three years (the year 2006)?

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

Service	Currently	3 years from now (2006)
Custom application of any type	_____ %	_____ %
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	_____ %	_____ %
Variable seeding rates with GPS	_____ %	_____ %
Satellite imagery	_____ %	_____ %
Soil sampling with GPS	_____ %	_____ %

19. 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%

20. What is your two-letter state abbreviation? \_\_\_\_\_

21. 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.

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