2002
Precision Agricultural Services Dealership Survey Results

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Introduction

The use of precision technologies in agriculture continues to evolve. Learning how best to apply these technologies on the farm and in the dealership, finding out where and how they can be profitable at various stages of the distribution channel, and discovering where and when these technologies are most efficient and effective are on-going processes. At some dealerships, use of precision technologies has become standard throughout the business. Other dealerships have decided that these technologies are not appropriate for them and/or their market at the current time. Still other dealerships have either taken small steps into the precision arena or are still considering it.

This year marked the 7th 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 are adopting them. In addition, the survey was designed to collect opinions on the future use of precision technologies by dealerships and their grower customers.

The survey was conducted in February and March 2002. The questionnaire was sent to 2500 retail agronomy dealerships across the US. A second questionnaire was mailed to participants approximately two weeks after the first one as a reminder to complete it and send it back. (See Appendix I to this report for a copy of the questionnaire.) A total of 375 questionnaires were returned, with 336 being usable, providing an effective response rate of 13 percent. This response rate was higher than last year's, though not as high as other years (response rates have ranged from a high of 38 percent in 1996 to a low of 11 percent in 2001).

Survey participants were asked a wide range of questions. Some of these questions included: the types of precision services the dealerships were currently offering and their future plans for offering these services; the fees they were charging for the services they were offering; how profitable various precision components were; and how quickly their customers were adopting precision agricultural practices. Similar to the 2001 questionnaire, the profitability of precision services was explored in more depth, however to reduce the length of the questionnaire, questions about enhanced seed were dropped, as were questions about the challenges of adopting precision technology.

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. The unusable rate was slightly higher this year due to wording changes that enabled responding

wholesalers and farmers to be identified easier. One question asked specifically how many retail outlets the respondent's firm had. If the response was "none," the questionnaire was deemed "unusable." In prior years, these respondents were identified only by comments that they made on the questionnaire itself.

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.). 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 has not been weighted.

As in previous years, data were analyzed to identify statistical differences by region (Midwest versus other states) and differences between organizational types within the Midwest. (The split by organizational types was not possible last year due to lower response rates.) Where charts or data are provided for these breakouts, differences are statistically different at $p < .05$ unless specifically stated otherwise.

The Respondents

The 336 survey respondents came from 42 states, with the highest representation from Illinois and Iowa accounting for 11 percent and 10 percent of the respondents, respectively (Figure 1). The Midwest was heavily represented in the distribution of respondents, with 6 out of 10 of the respondents from the Midwest states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North and South Dakota, Ohio and Wisconsin. Almost a quarter of the respondents (17 percent) were from the South, 12 percent were from the West and 9 percent were from the Northeast.

Responding dealerships represented a wide variety of organizational types with more than half being local independents (51 percent), while 38 percent represented cooperatives and 12 percent were part of a national or regional chain of dealerships. Compared to 2001, this represents significantly fewer local independents (62 percent in 2001) and more regional/national dealerships (6 percent in 2001), however the 2002 respondents more closely reflect the organizational types represented in earlier years. When organizational types were broken out by region, cooperatives were more heavily represented in the Midwest than in the other states, with 44 percent of the Midwestern respondents representing cooperative firms compared to only 26 percent outside the Midwest (Figure 2). Correspondingly, the proportion of local independent respondents was higher outside the Midwest (58 percent) relative to the proportion of such dealerships in the Midwest (47 percent).

Figure 1. States Represented

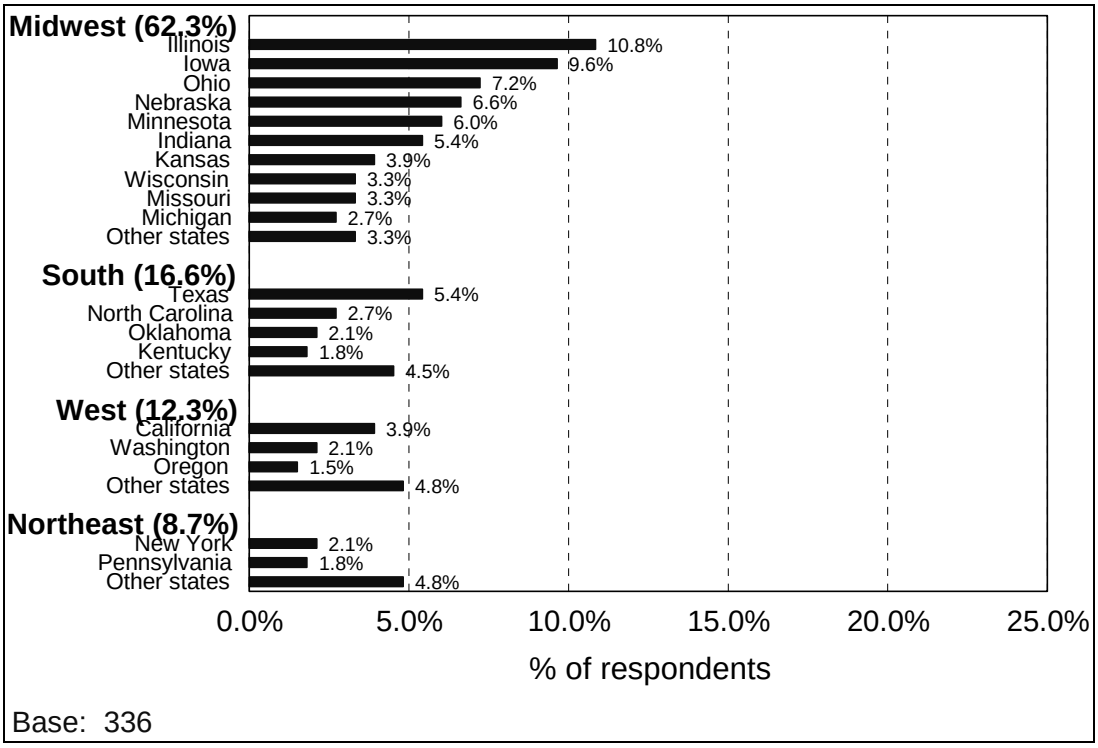
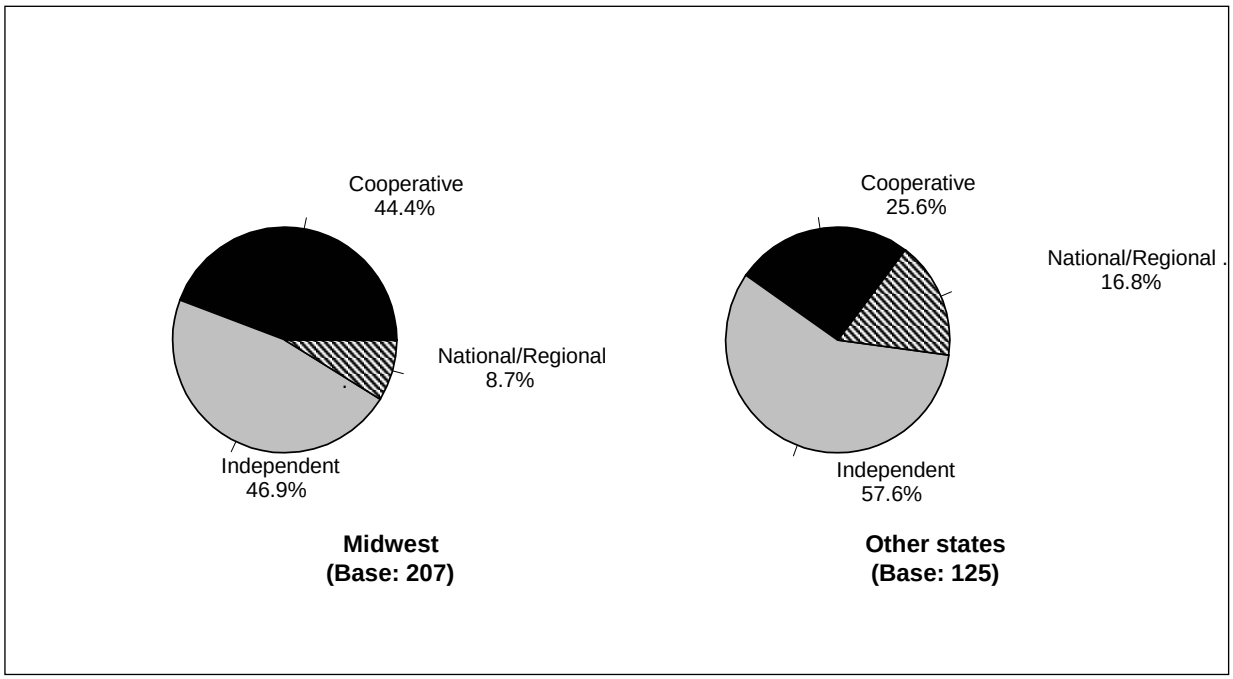


Figure 2. Organization Types by Region



The size of the responding dealerships ranged from one outlet (42 percent of the respondents) to more than 25 outlets (12 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 2 to 15 outlets while respondents in other states were more likely to represent firms at each extreme – either one outlet or firms with more than 25 outlets (Figure 4). As might be expected, local independents in the Midwest were significantly more likely to have only one retail outlet (67 percent). Cooperatives typically had 2 to 15 outlets (79 percent) while 44 percent of the respondents from regional/national organizations had over 25 outlets.

Figure 3. Number of Retail Outlets Owned or Managed

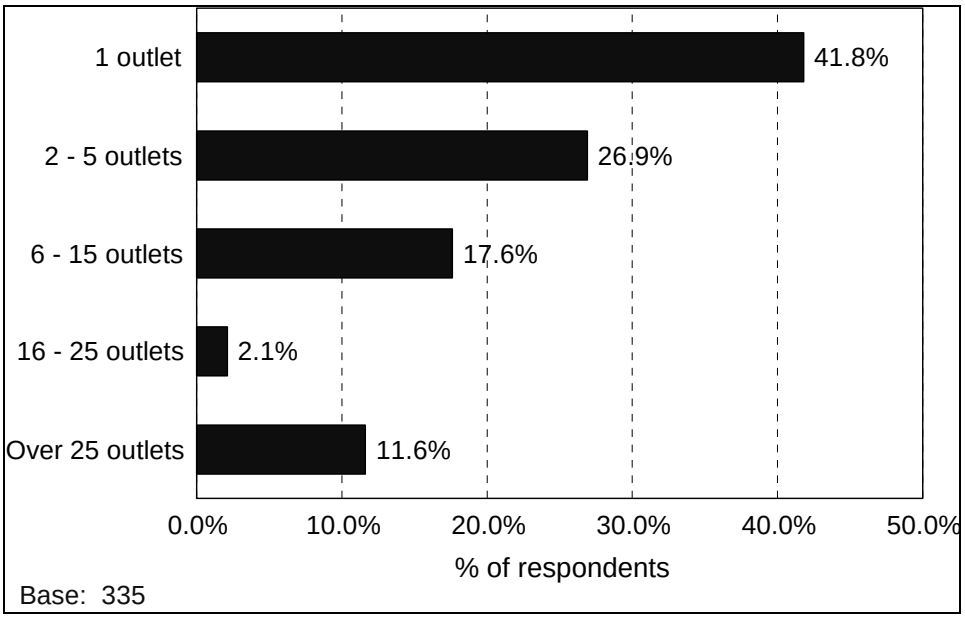
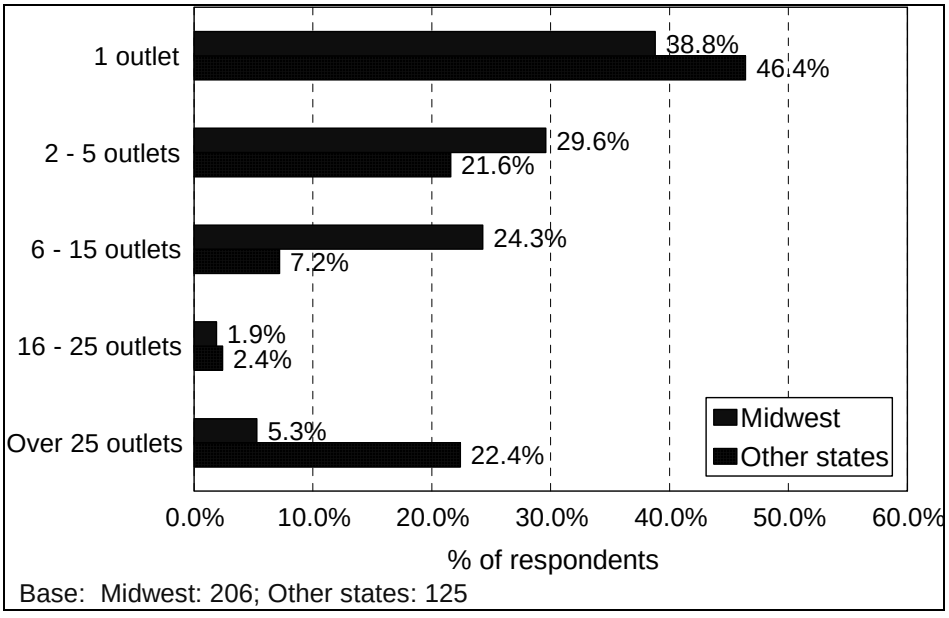


Figure 4. Number of Retail Outlets Owned or Managed by Region



There was also a range of individual location sizes represented by the respondents. Of this year's respondents, 23 percent had annual agronomic sales of less than $1 million at their location (compared to 36 percent of the 2001 respondents) while 25 percent had $5 million or more in agronomic sales (Figure 5). When broken out by region, respondents in the Midwest were fairly evenly distributed across size categories while those in the other states were more likely to be at each extreme, with 29 percent under $1 million in agronomic sales and another 29 percent being over $5 million in sales (Figure 6). This year there were no statistical differences in annual agronomic sales by organizational type in the Midwest.

Figure 5. Total 2001 Annual Agronomic Sales at Location

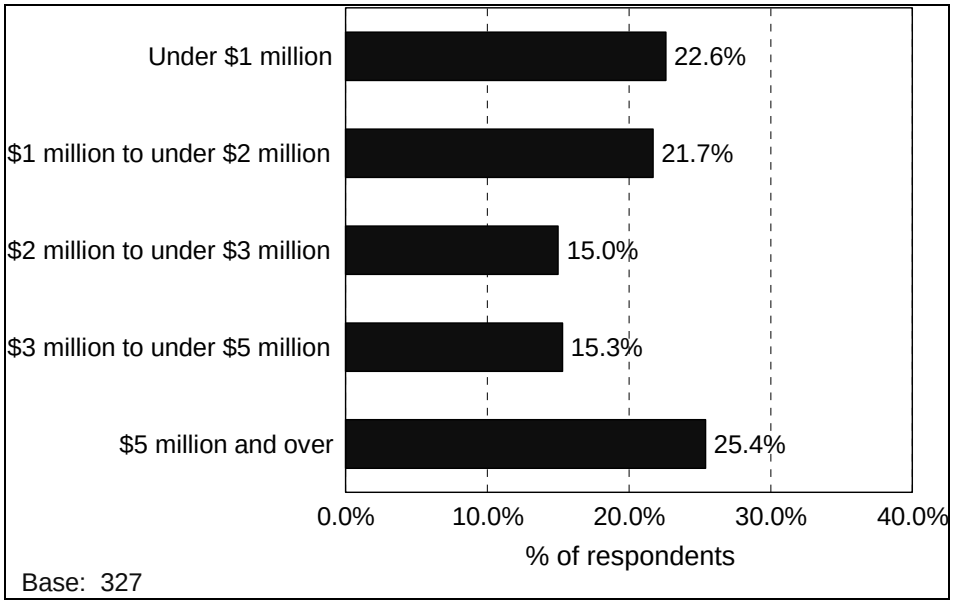
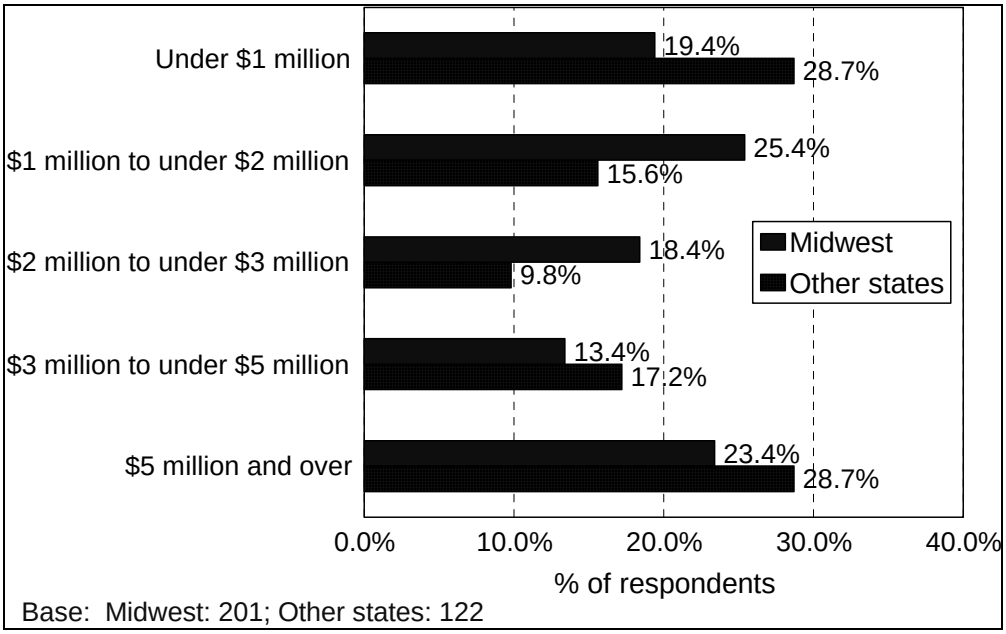


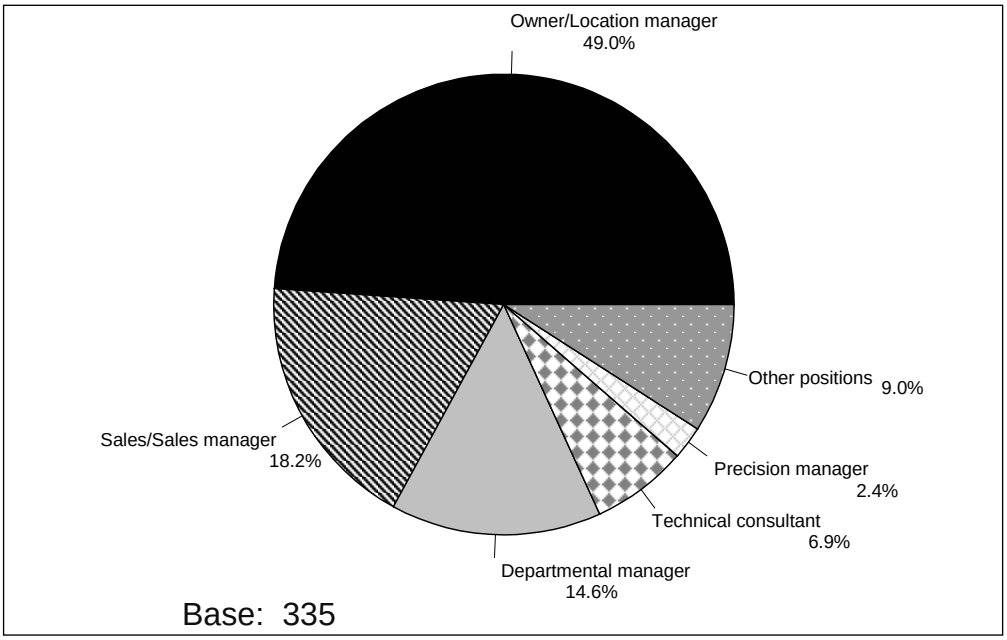
Figure 6. Total 2001 Annual Agronomic Sales at Location by Region



Almost half of the questionnaires were completed by the owner or manager of the outlet (49 percent), while 15 percent were completed by departmental managers, and 18 percent of the respondents were involved in sales (Figure 7). Technical consultants and "precision managers" accounted for 9 percent of the respondents. Respondents' positions varied by region. Only 41 percent of the Midwestern respondents were owner/location managers compared to almost two-thirds of the respondents from other states (62 percent).

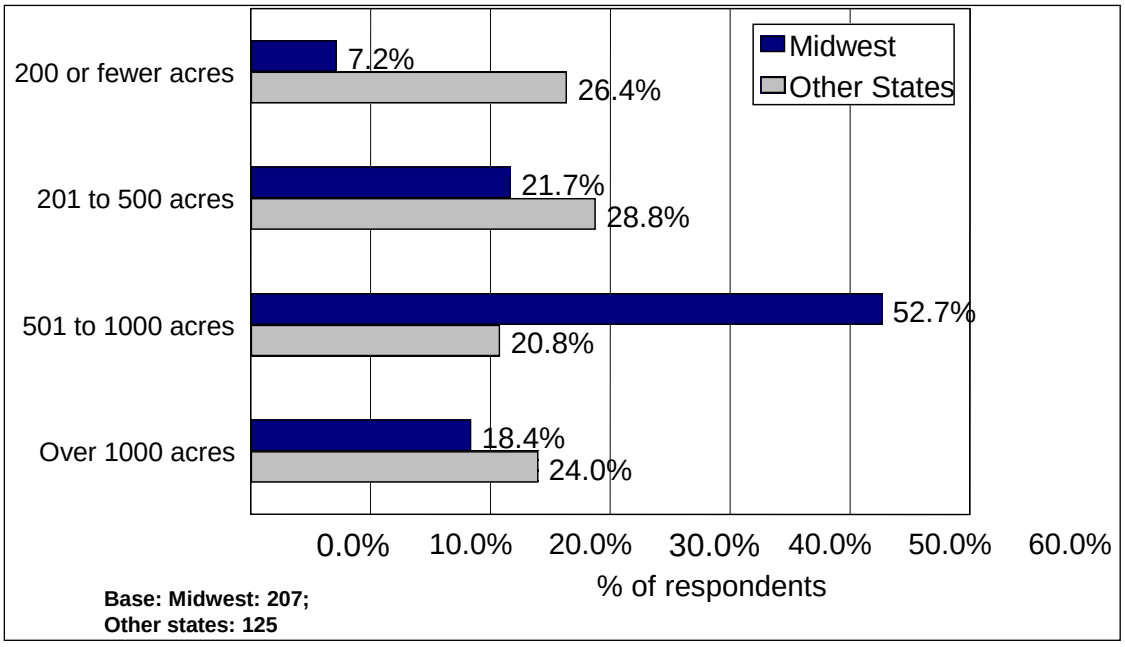
Respondents' positions also varied by organizational type in the Midwest. Sixty-four percent of the respondents representing local independents owned or managed the location. The most common position held by respondents representing cooperatives was departmental manager (33 percent) while the most common position held by respondents from regional/national organizations was sales/sales manager (36 percent).

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. More than 6 out of 10 of the respondents said their average customer farmed more than 500 acres (61 percent of respondents) with 21 percent of the respondents indicating their average customer farmed more than 1000 acres. 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 (53 percent) and another 18 percent of the Midwestern respondents said their average customer farmed over 1000 acres. The average customer size for dealerships in other (non-Midwest) states was more evenly divided among the four size categories (Figure 8).

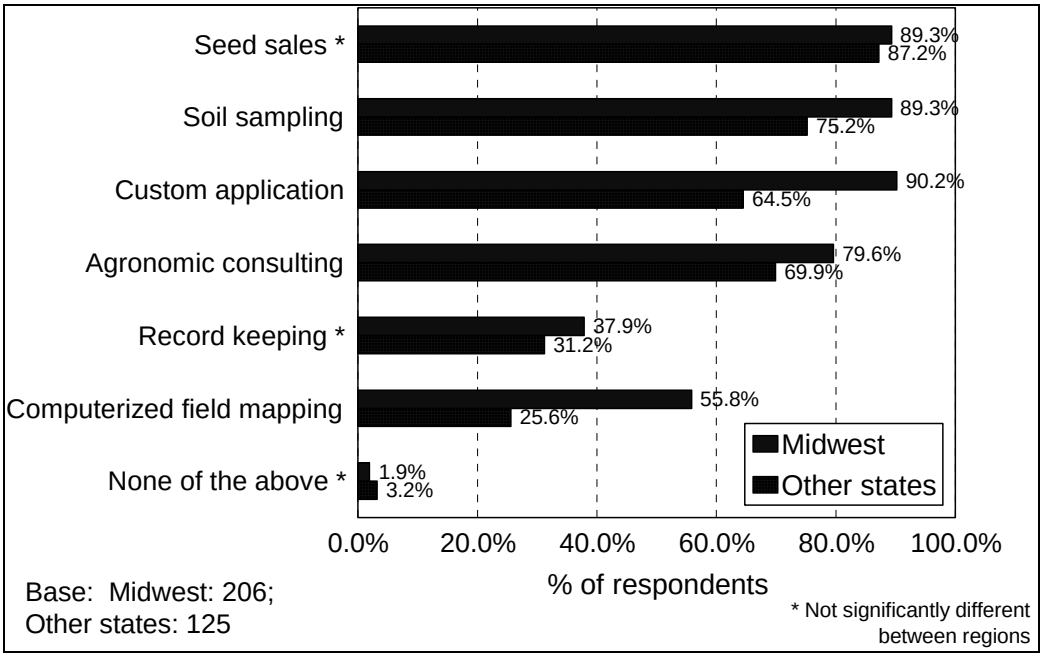
Figure 8. Average Customer Size by Region



Traditional Services Currently Offered by Respondents

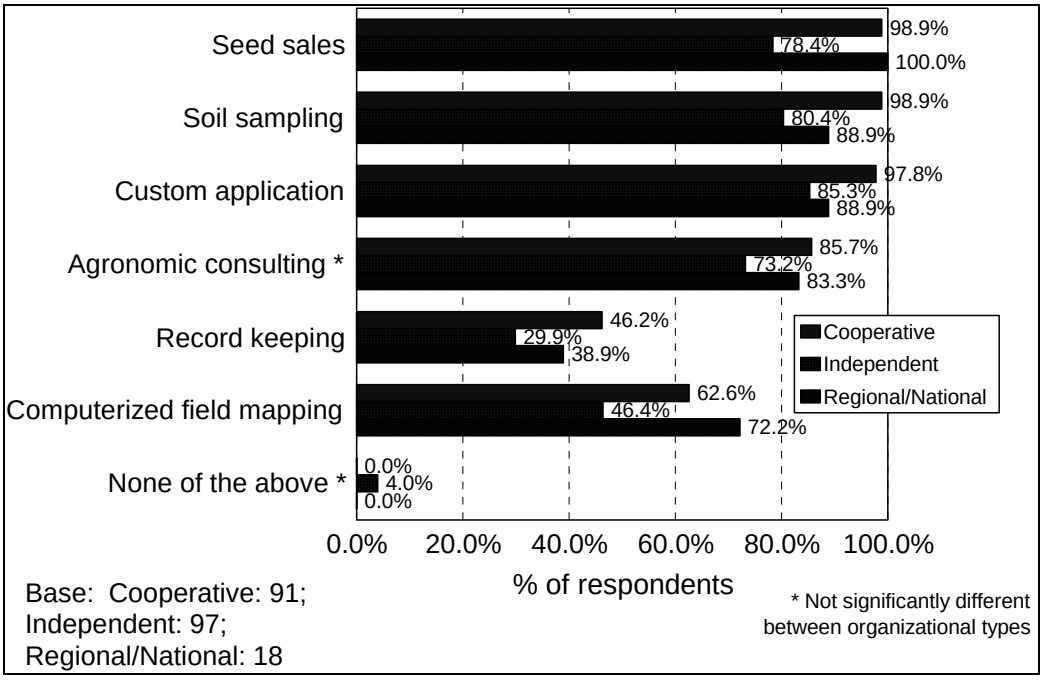
The most common traditional agronomic services offered by the responding dealerships were seed sales and soil sampling (88 and 84 percent of the respondents, respectively). Custom application was offered by 81 percent of the respondents while three-quarters of the respondents offered some form of agronomic consulting (75 percent). Only 2 percent of the respondents did not provide at least one of the traditional agronomic services listed on the questionnaire. All of these service offerings varied statistically by region and were most commonly offered in the Midwest where only 2 percent of the respondents did not offer at least one of the traditional services compared to 3 percent in the other non-Midwestern states (Figure 9). These results were very similar to those reported in 2001

Figure 9. 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 resources across dealerships. Figure 10 shows the services offered in the Midwest by organizational type. Local independents were least likely to offer many of the services. At the other end of the spectrum, cooperatives were the most likely to offer the traditional services, reflecting the high service approach these firms often take. Outlets belonging to regional/national organizations had service offerings comparable to the cooperatives.

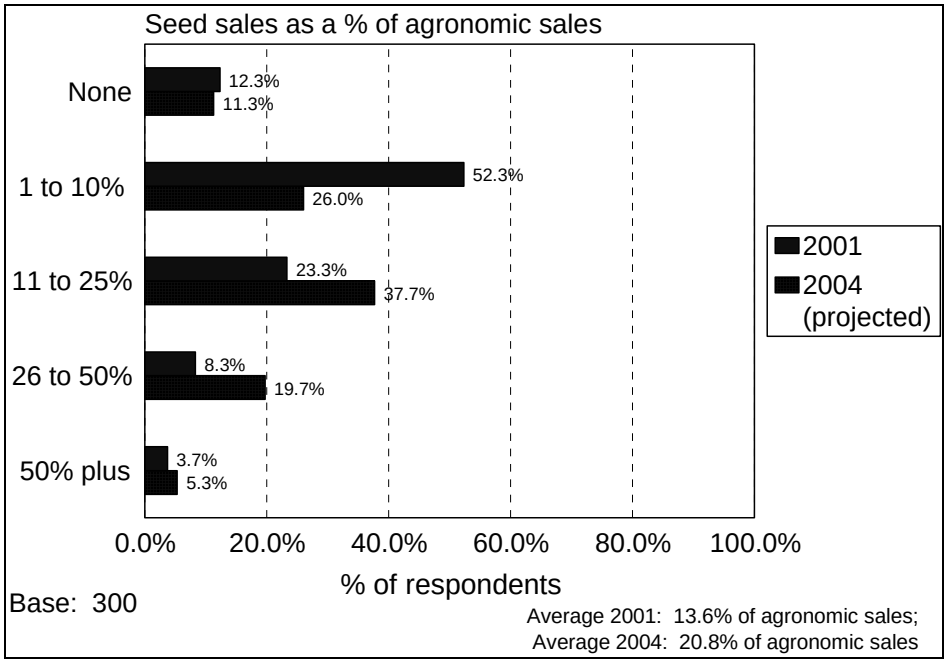
Figure 10. Traditional Agronomic Services Offered by Organizational Type in the Midwest



Seed Sales

As discussed above, 88 percent of the respondents reported that their dealerships sold seed. Figure 11 shows seed sales as a percent of total agronomic sales for 2001. On average, seed sales accounted for 14 percent of total agronomic sales in 2001. Dealerships that did not sell seed in 2001 did not expect to add seed sales in the next 3 years. However, many of the respondents who sold seed did expect seed sales to increase over the next 3 years. By 2004, seed sales were expected to represent 21 percent of total agronomic sales. Unlike previous years, seed sales as a percent of total agronomic sales were not statistically different by region or by organizational type.

Figure 11. Seed Sales as a Percent of Agronomic Revenue



Custom Application

Looking at custom application in more detail, over half of the respondents custom applied more than 25,000 acres per year (52 percent). (Custom application here is defined as dealership application of fertilizer, pesticides, and/or custom seeding.) Across the US, however, custom application was most common in the Midwest where 91 percent of the respondents offered custom application services compared to 64 percent of the respondents from other states (Figure 12).

Reflecting the overall higher service level of cooperatives, 98 percent of the cooperatives in the Midwest offered custom application compared to 85 percent of local independents and 89 percent of the regional/national outlets. Over a third of the cooperatives and regional/national outlets in the Midwest custom applied over 50,000 acres in 2001.

Figure 12. Acres Custom Applied by Region

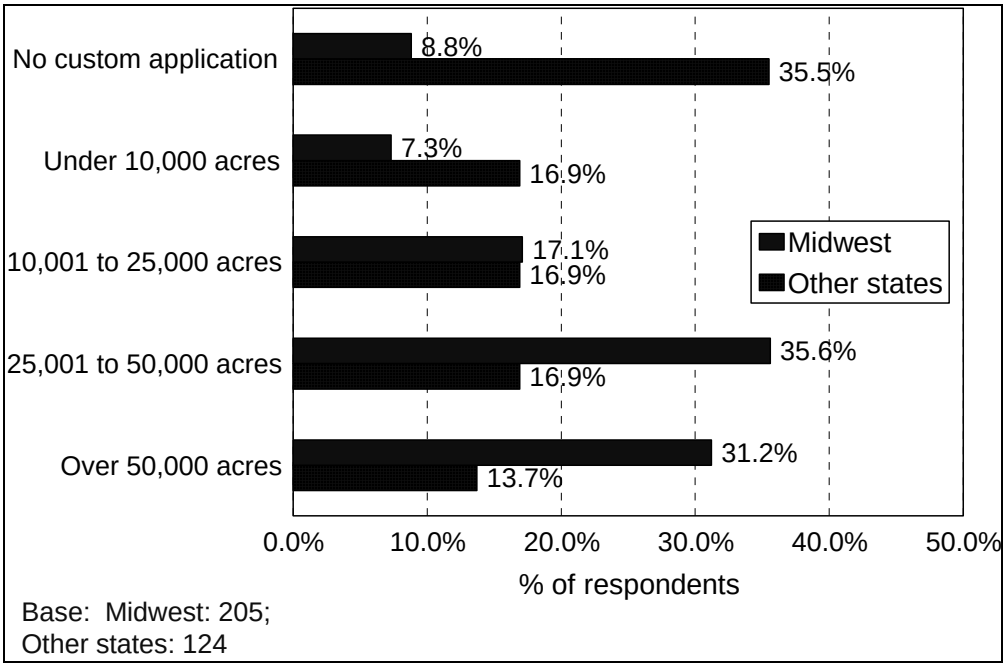
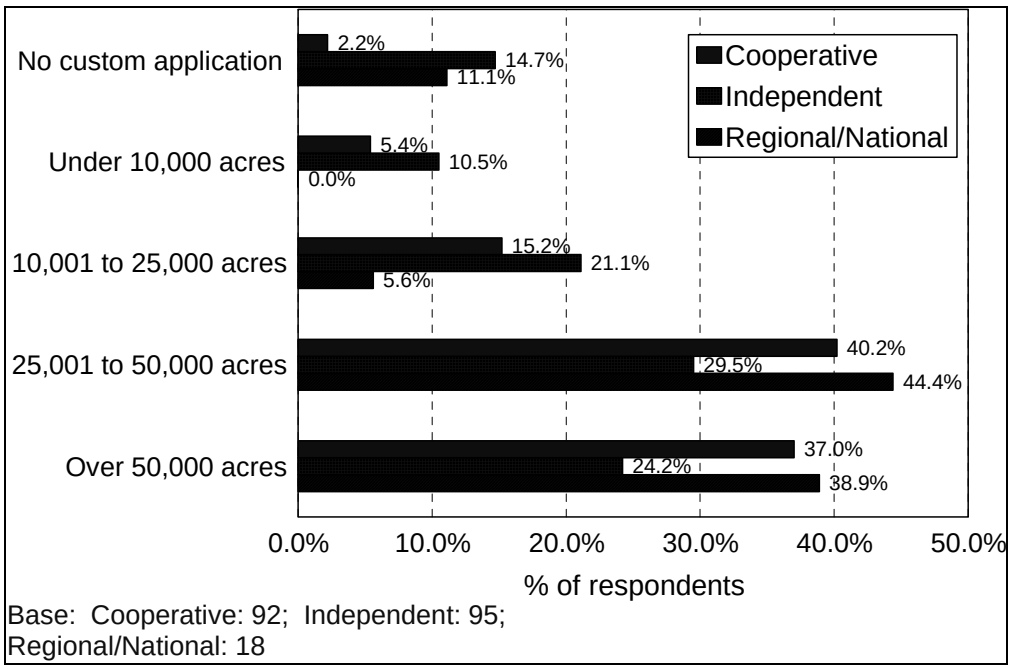


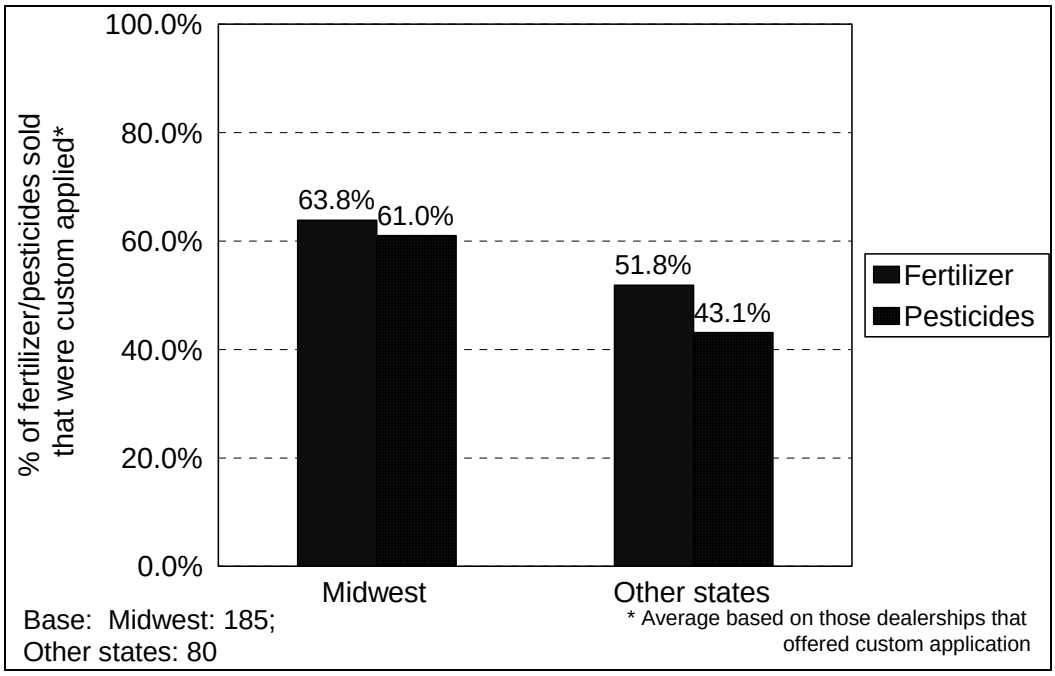
Figure 13. Acres Custom Applied by Organizational Type in the Midwest



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 57 percent of the fertilizer they sold and 56 percent of the pesticides they sold. Those

dealerships from the Midwest who offered custom application applied an average of 64 percent of the fertilizer they sold and 61 percent of the pesticides they sold while those from non-Midwestern states applied an average of only 51 percent of the fertilizer sold and 43 percent of the pesticides sold (Figure 14). This did not vary by organizational type within the Midwest.

Figure 14. Custom Application of Fertilizer and Pesticides by Region

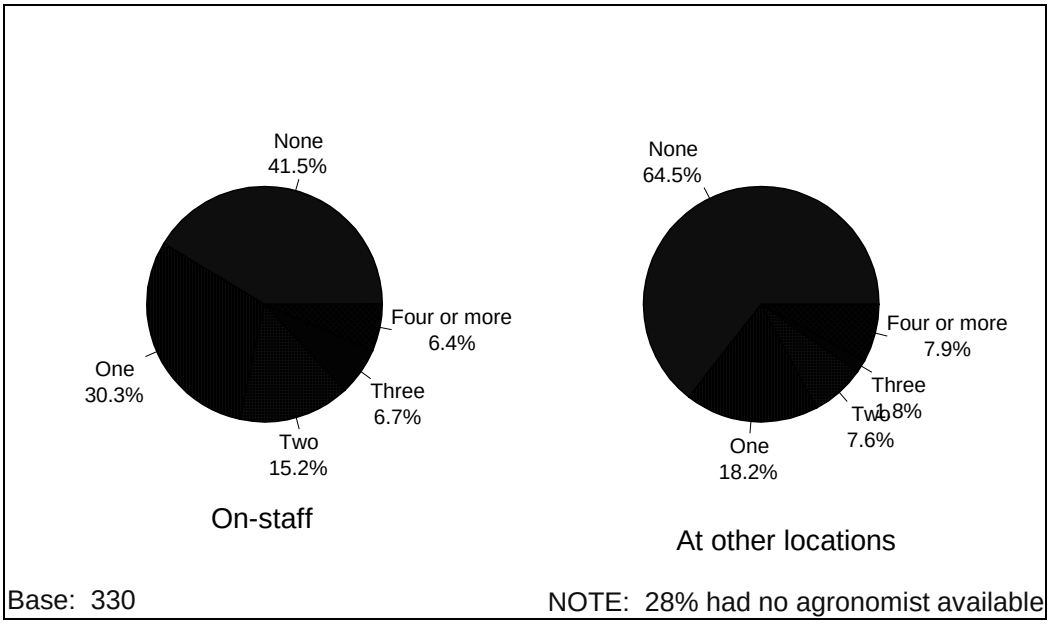


Full-Time Agronomists

To support these services, many dealerships had agronomists available, either full-time on staff or shared with other locations. On average, the respondents had 1.5 full-time agronomists available on staff and shared an average of approximately two agronomists with other locations (1.9). Over half of the responding dealerships had at least one full-time agronomist on staff at their location (58 percent) (Figure 15), 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 (28 percent) had no full-time agronomist available to them at all.

Though there were no differences in the number of agronomists available between regions, the type of the organization in the Midwest did have an impact. Regional/national organizations had the largest number of agronomists available (4.4 on staff) versus 1.6 available for cooperatives and 0.84 for local independents.

Figure 15. Full-time Agronomists Available



Use of Precision Technologies and Offerings of Site-Specific Services

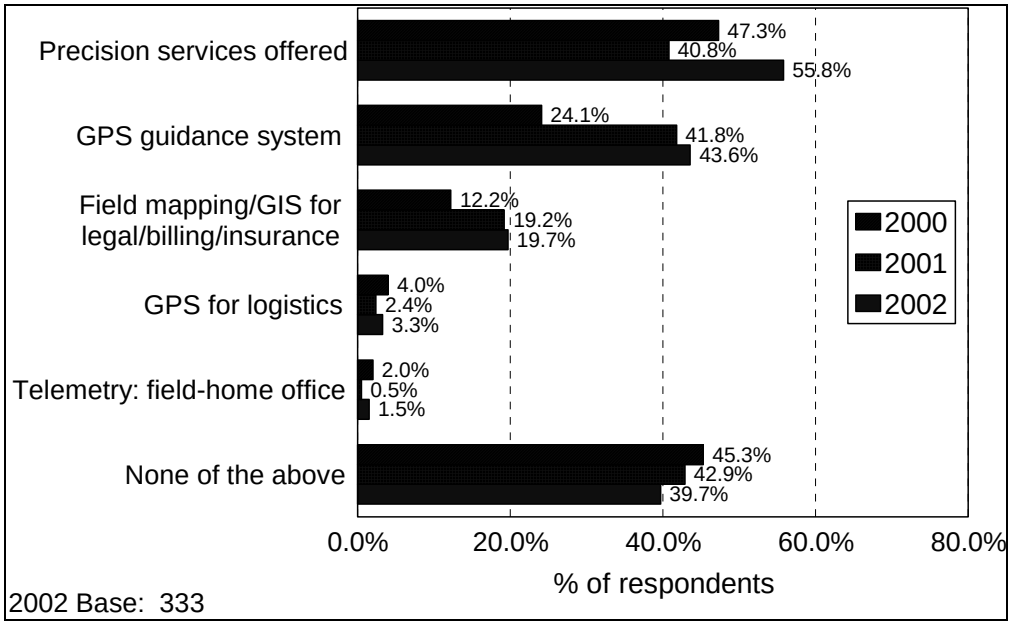
Respondents were asked several questions about their use of precision technologies and which site-specific services they were currently offering (or would be offering by the fall of 2002).

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 (Figure 16). Six out of 10 of the respondents used precision technologies in some way in their business. Almost all of these dealerships (56 percent of all respondents) offered their customers precision services. This was up significantly from last year's results when only 41 percent of the respondents said they offered precision services, but not too different from prior year results.

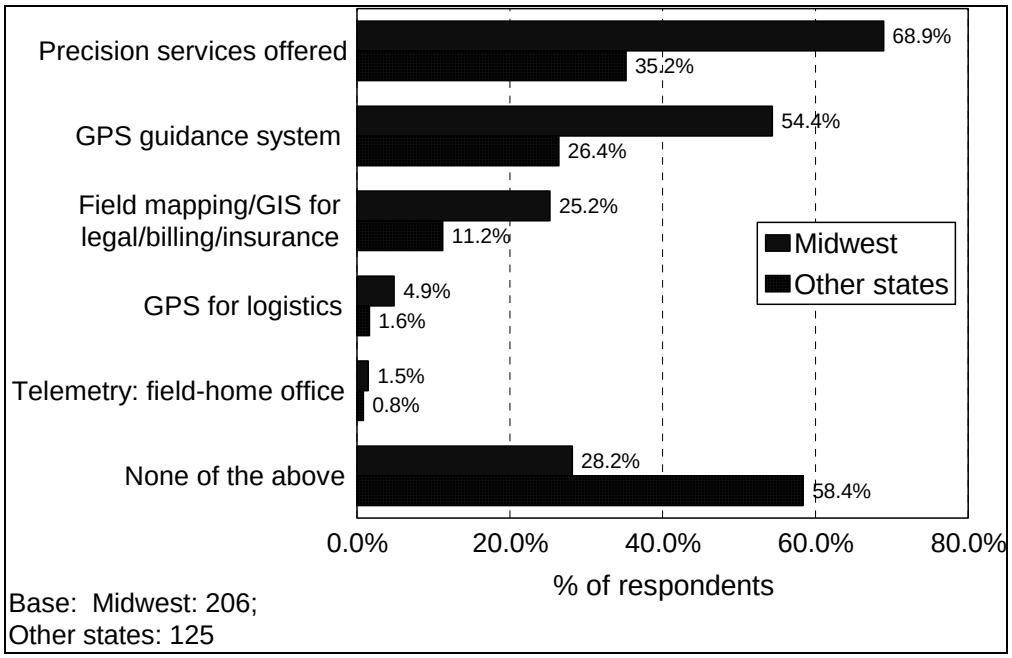
Non-service use of precision technology such as GPS (Geographical Positioning System) guidance systems and field mapping with GIS (Geographical Information Systems) for legal and/or billing purposes was up slightly over 2001 levels. Forty-four percent of the respondents used GPS for guidance systems to reduce skips and overlaps when custom applying uniform rates of fertilizer and chemicals. Field mapping with GIS was used by 20 percent of the respondents for internal purposes. GPS for vehicle logistics, and telemetry to send field information from the farm to the home office were both used by fewer than 5 percent of the respondents.

Figure 16. Use of Precision Technology



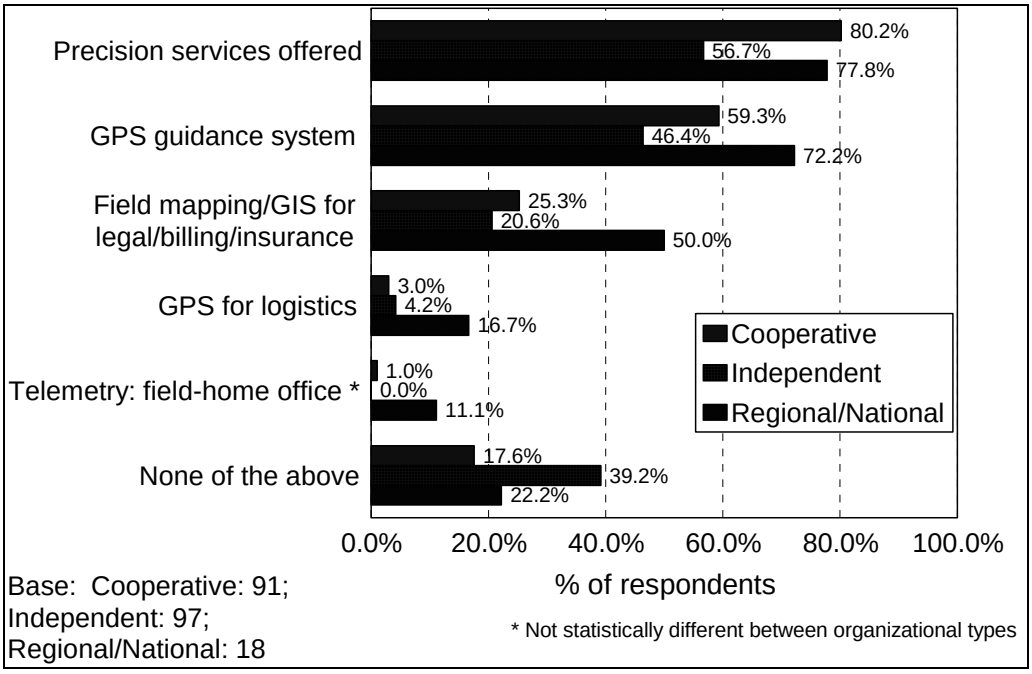
Precision technologies were being used by significantly more dealerships in the Midwest than in non-Midwestern states (Figure 17). Over two-thirds of the Midwestern respondents offered precision services (69 percent) compared to only a third of the non-Midwestern respondents (35 percent). GPS was used in a guidance system by 54 percent of the Midwestern dealerships compared to only 26 percent of the non-Midwestern respondents. Precision technology use increased from 2001 to 2002 in both the Midwest and non-Midwestern regions.

Figure 17. Use of Precision Technology in 2002 by Region



As in previous years, precision technology adoption varied by organizational type in the Midwest. Approximately 8 out of 10 respondents representing cooperatives and regional/national organizations said they offered at least 1 precision service (Figure 18) with only 56 percent of the local independents offering at least 1 precision service. Internal uses of precision technology were more likely for the larger regional/national organizations than for the other organizational types, possibly reflecting the greater overall resources available to these firms. GPS was used for guidance systems by 72 percent of the regional/national organizations while GIS/field mapping was used for legal/billing and insurance purposes by half of the regional/national outlets.

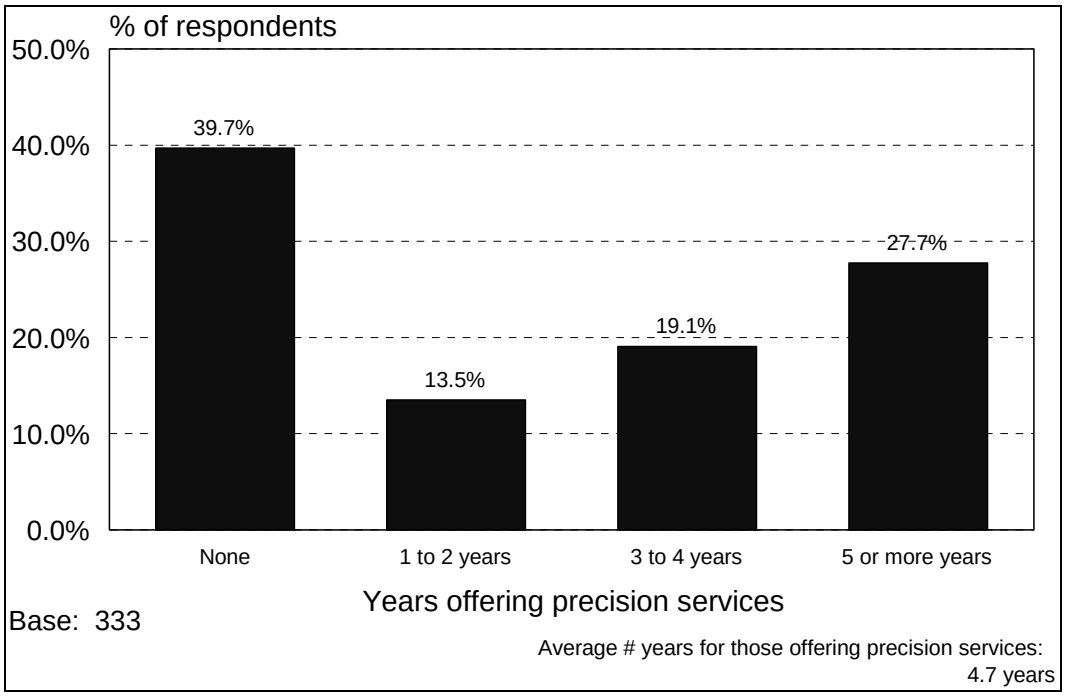
Figure 18. Use of Precision Technology in 2002 by Organizational Type in the Midwest



Experience with Precision Services

Respondents were asked how many years they had offered precision services to their customers. Over a quarter of the respondents (28 percent) said they had offered these services for 5 years or more while 20 percent said they had been offering precision services for 3 to 4 years (Figure 19). Only 14 percent of the respondents indicated they had begun offering precision services 1 to 2 years ago. Interestingly, there were no significant differences in the length of time precision services had been offered by region or by organizational type within the Midwest.

Figure 19. Years Offering Precision Services



Soil Sampling, Field Mapping and Yield Monitors

Respondents were asked which specific precision services they would be offering their customers by the fall of 2002. In all cases, figures were higher than those reported in 2001. The most common precision service offered by these dealerships was soil sampling with GPS – offered by 44 percent of the respondents (Figure 20). This was up from the 36 percent reported in 2001 but not much different than the peak of 45 percent reported in 1999. By 2004, half of the respondents expected their dealerships to be offering soil sampling with GPS.

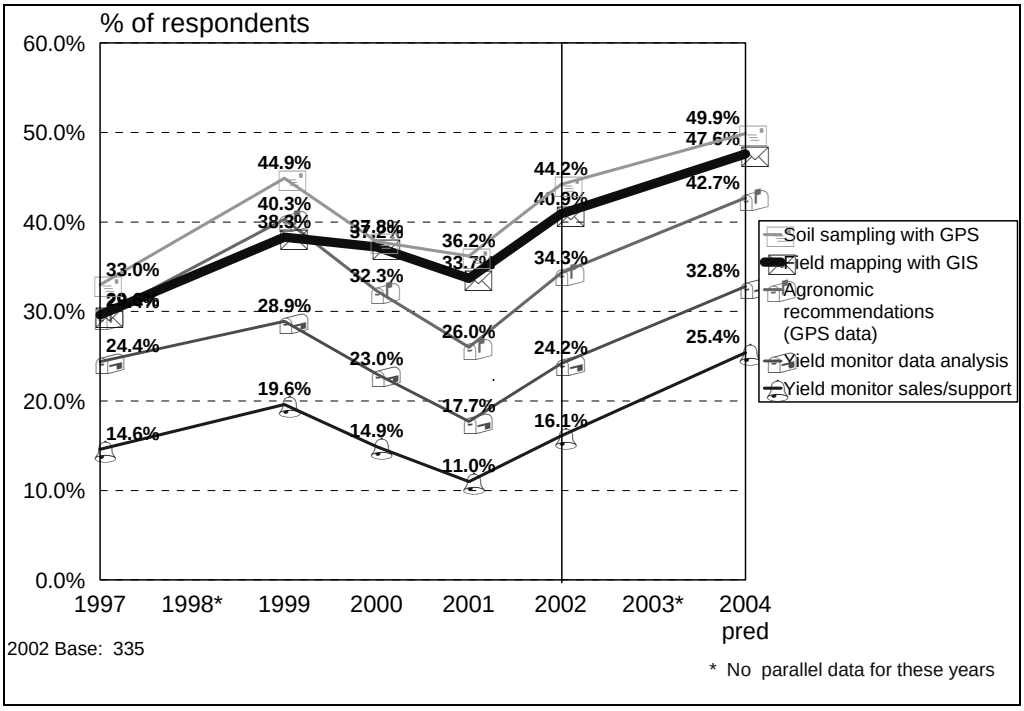
The second-most common precision service offered was field mapping with GIS. By the fall of 2002, some 41 percent of the respondents expected to be offering a GIS mapping service, a figure higher than in any previous year the survey was conducted. Growth was expected in this area as well, with an additional 7 percent of respondents expecting to add the service in the next 3 years.

Offering agronomic recommendations based on GPS data was up relative to 2001 with just over a third of the respondents indicating they offered the service (34 percent) in 2002 compared to a low of 26 percent in 2001 and a high of 40 percent in 1999.

Yield monitors often represent the first step into the precision agricultural arena for farmers. Because their customers are involved, dealerships sometimes get involved in this area as well – either in the form of sales/rental/support of the units or else through the analysis of the resulting yield data. By the end of 2002, a quarter of the respondents (24 percent) said they

would be offering yield monitor data analysis (Figure 20). A smaller percentage offered yield monitor sales/rental/support services (16 percent). The offerings of both of these services were up from previous years but neither were as high as they were in 1999.

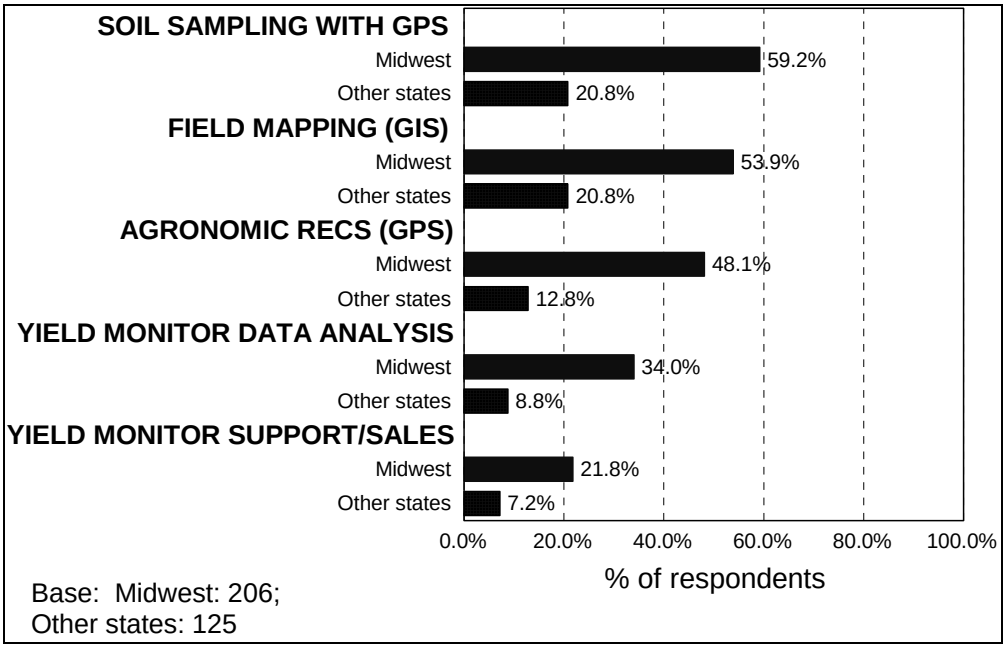
Figure 20. Precision Ag Services/Technologies Offered: Soil Sampling, Field Mapping and Yield Monitors



All of these precision service offerings were significantly more common in the Midwest than in other states (Figure 21). For soil sampling with GPS, 59 percent of the responding dealerships from the Midwest indicated they would be offering this service by fall 2002 compared to only 21 percent of the respondents from the other states.

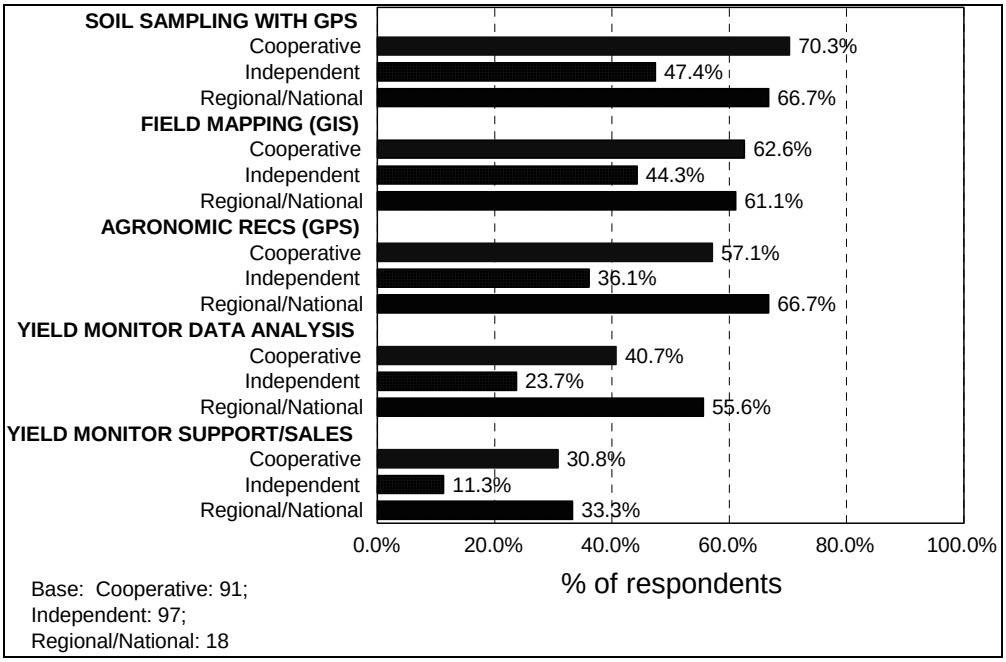
Field mapping with GIS was more than twice as common in the Midwest compared to other states, offered by 54 percent of the Midwestern respondents compared to 21 percent of the respondents from other states. This gap was even greater for agronomic recommendations based on GPS data, offered by 48 percent of the respondents in the Midwest but only 13 percent of the respondents in other states. Yield monitor data analysis and yield monitor sales/support were also more common in the Midwest relative to the other states. A third of the responding dealerships in the Midwest offered yield monitor data analysis compared to only 9 percent in non-Midwest states.

Figure 21. Soil Sampling, Field Mapping and Yield Monitors Offered by Region



As in previous years, use of precision technology was more intense in national/regional organizations and cooperatives relative to local independents. Figure 22 shows the soil sampling (GPS), field mapping (GIS) and yield monitor services offered by different organizational types in the Midwest. For every service, local independents were not as likely to offer the service relative to the other organizational types.

Figure 22. Soil Sampling, Field Mapping and Yield Monitors Offered by Organizational Type in the Midwest



A Focus on Soil Sampling

As in previous years, the type of soil sampling dealerships were offering – by grid or by soil type – was explored in more detail. Most of those offering soil sampling with GPS were sampling by grid (45 percent of the respondents), with over half offering a 2.5 acre grid (Figure 23). Sampling by soil type was offered by 32 percent of the respondents. Almost one in ten of the dealerships (9 percent) offered soil sampling by both grid and soil type. Only 18 percent of the respondents offered soil sampling (with or without GPS) but did not offer it either by soil type or by grid.

Figure 23. Types of Soil Sampling Offering in 2002 and Grid Sizes

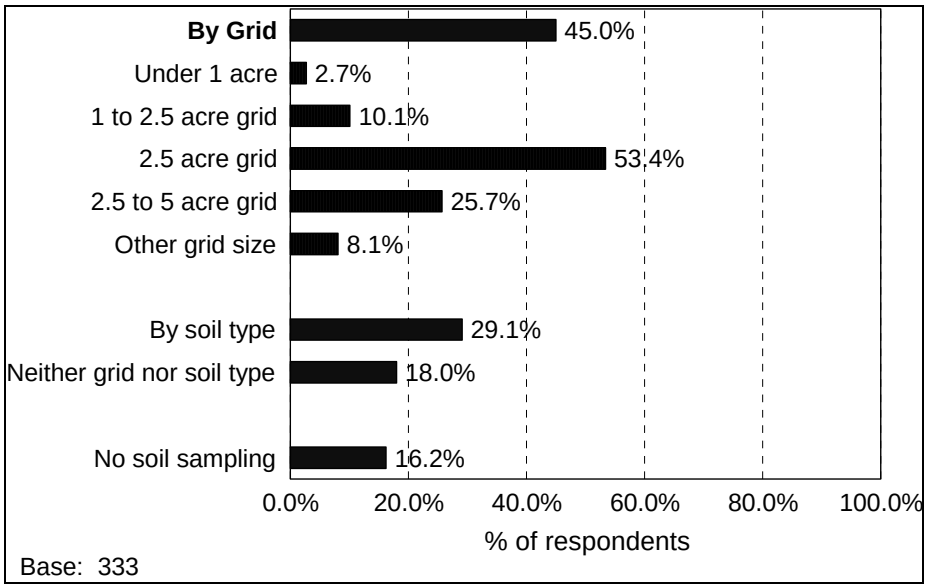
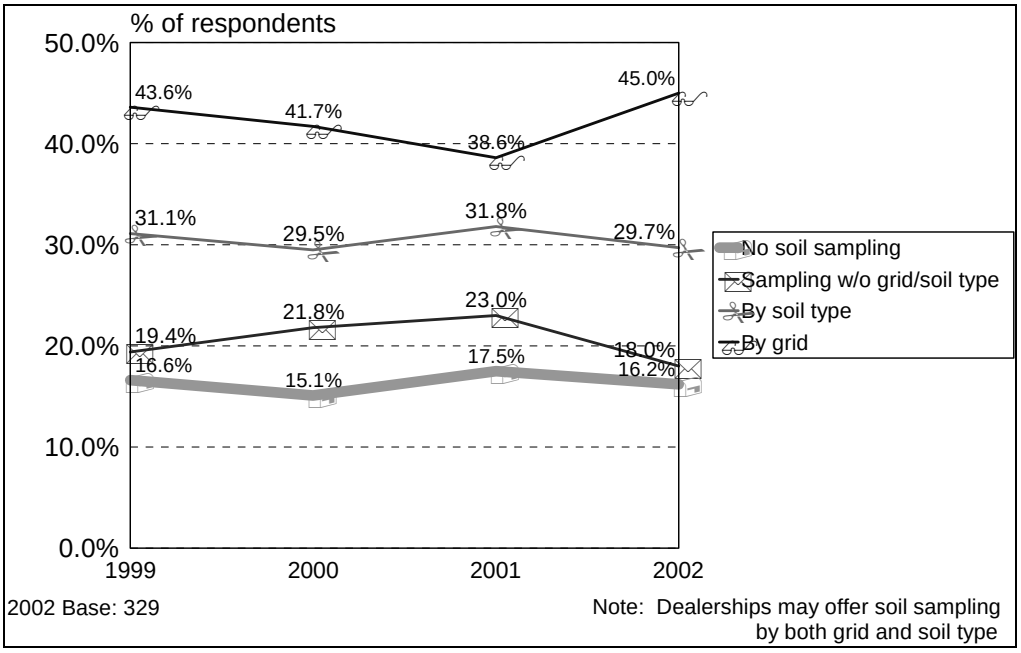


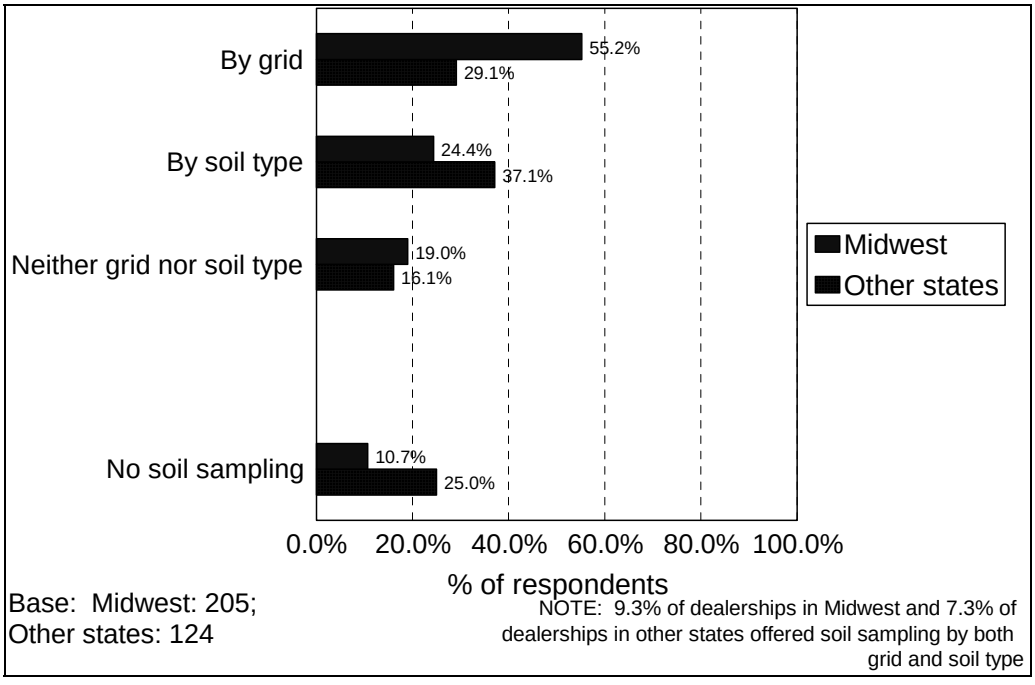
Figure 24 shows the changes in types of soil sampling offered over time. After a dip in grid soil sampling in 2000 and 2001, the use of this form of soil sampling was higher among respondents in 2002. Soil sampling by soil type has remained fairly steady, with 3 in 10 dealerships offering it each year.

Figure 24. Types of Soil Sampling Offered Over Time



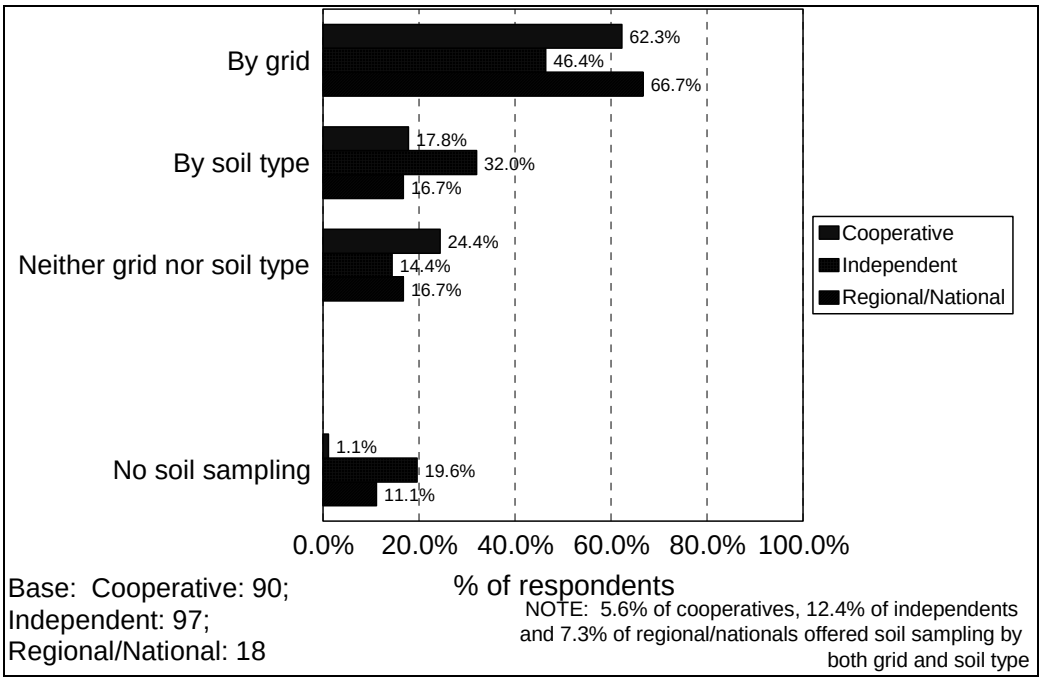
As in other years, those in the Midwest were more likely than dealerships in other locations to sample by grid (55 percent versus 29 percent of the respondents in other states) while sampling by soil type was more popular outside of the Midwest (Figure 25).

Figure 25. Types of Soil Sampling Offered by Region



Local independents were less likely to combine GPS with their soil sampling services, and this is reflected in the types of soil sampling they offered. The responding local independents focused more heavily on offering sampling by soil type while cooperatives and regional/national organizations were more likely to offer sampling by grid (Figure 26).

Figure 26. 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 technologies. Less than 10 percent of the responding dealerships offered variable seeding, either with or without GPS in 2002 (Figure 27). These numbers were very similar to those reported in previous years. Variable rate seeding with GPS was more common in the Midwest than in other states (Figure 28). There were no statistical differences by organizational type within the Midwest (Figure 29).

Figure 27. Variable Rate Seeding Offered Over Time

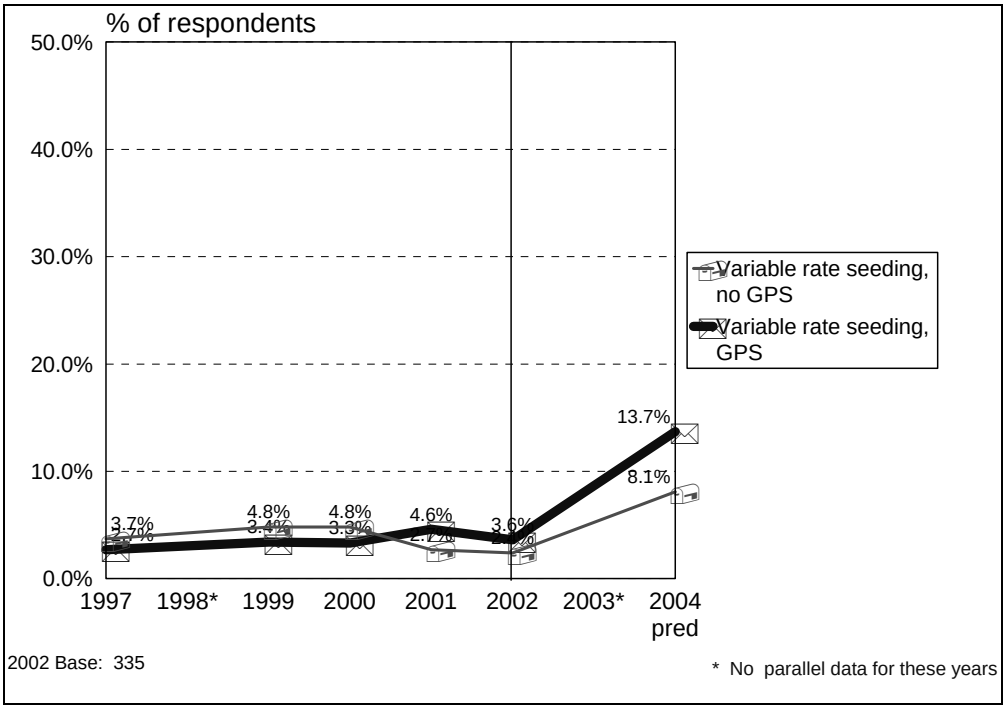


Figure 28. Variable Rate Seeding Offered by Region

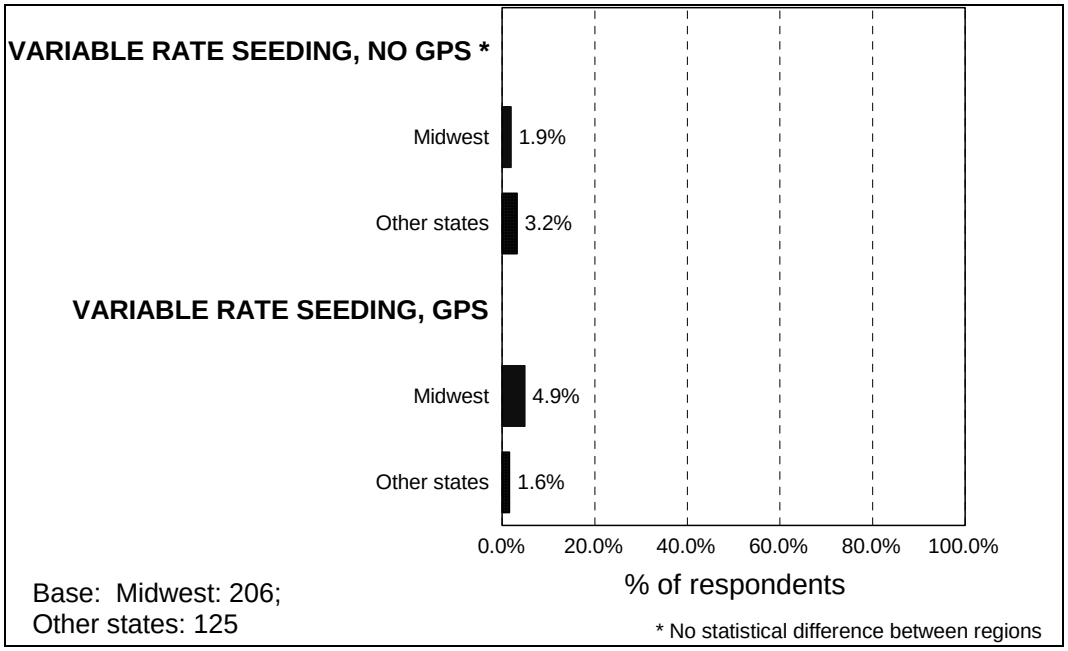
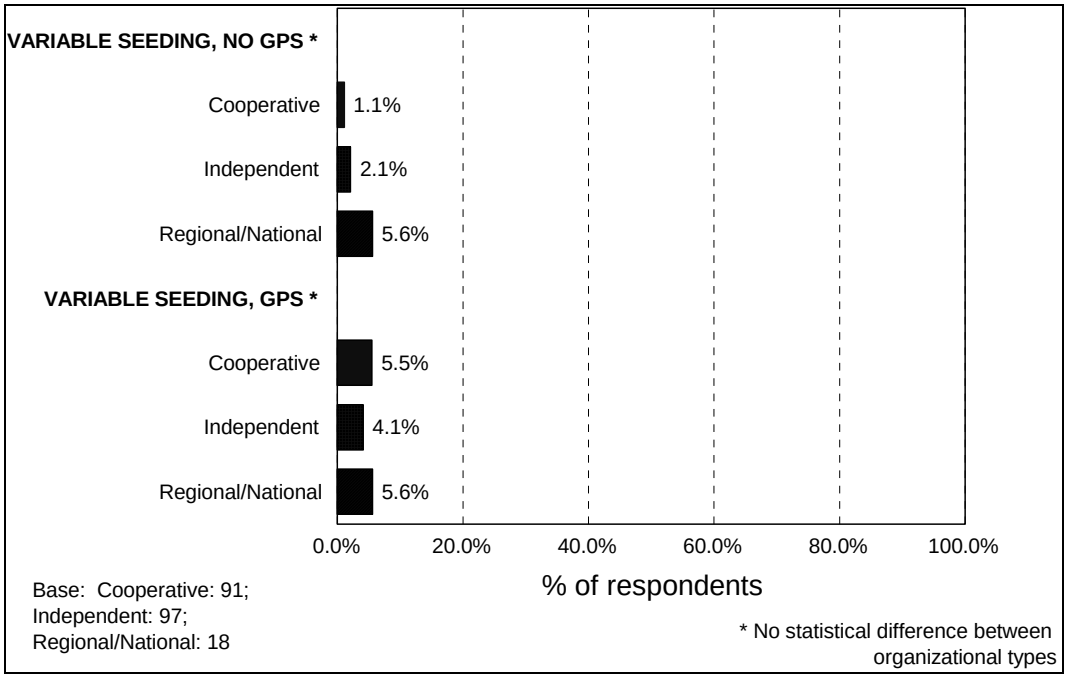


Figure 29. Variable Rate Seeding Offered by Organizational Type in the Midwest



Variable Rate Application

Among the group of responding dealerships, variable rate custom application services were often provided along with traditional custom application services. Of the 81 percent of the dealerships who offered custom application, almost two-thirds expected to offer some type of variable rate application service by the fall of 2002 (including both controller-driven and manual variable rate application).

Figure 30 shows the trends in variable rate application service offerings over time. This year, the proportion of dealerships offering manual and controller-driven single nutrient variable application was up from previous years, with each service being offered by approximately 40 percent of the respondents. Manual variable rate application increased from 27 percent last year while controller-driven single nutrient variable rate application increased from 29 percent. Controller-driven multi-nutrient variable rate application continued on its slow but steady growth, increasing from 16 percent of the respondents offering the service in 2001 to almost 20 percent expecting to offer the service by the fall of 2002.

Figure 30. Precision Ag Services/Technologies Offered: Variable Rate Application

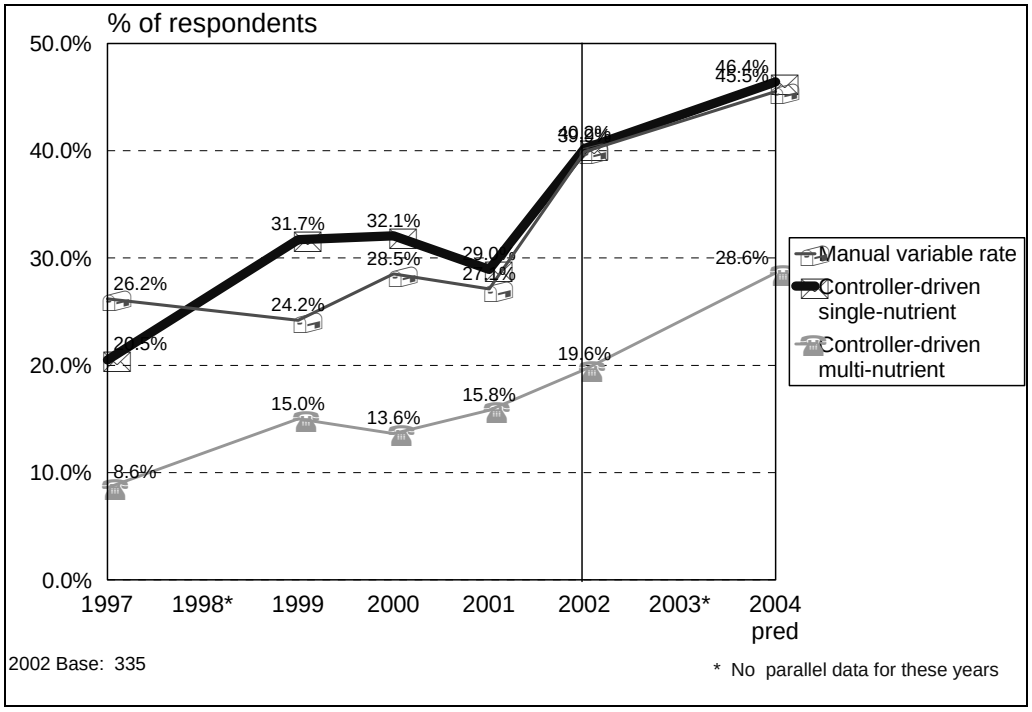
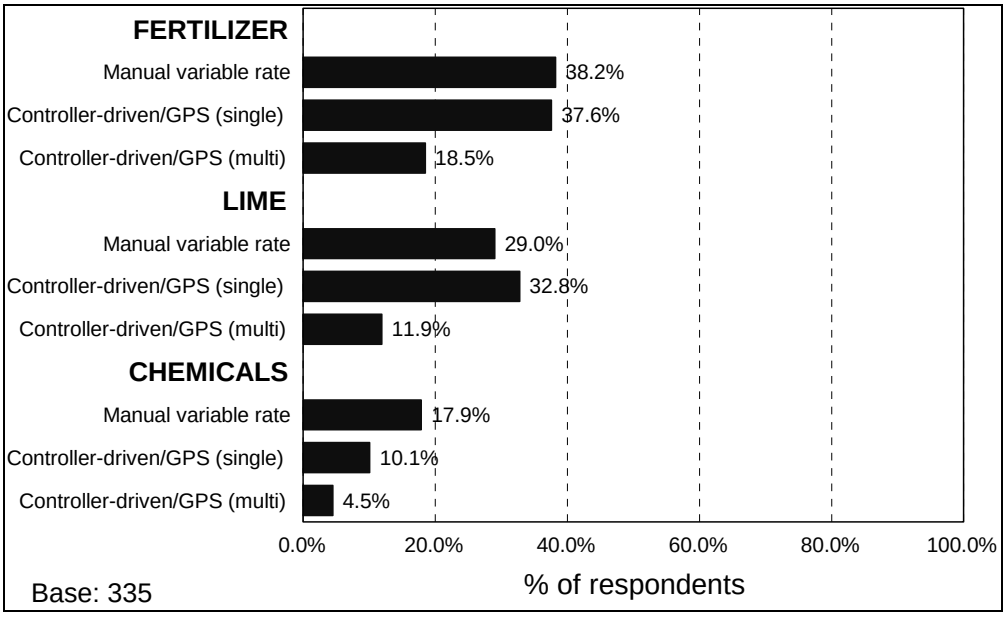


Figure 31 shows the offerings of specific controller-driven variable rate application services in 2002. More than 4 out of 10 of the respondents (43 percent) offered some form of controller-driven application of fertilizer, lime and/or chemicals – either single nutrient or multi-nutrient application. Single nutrient controller-driven application of fertilizer was the most common variable rate application service offered, with 38 percent of the respondents expecting to offer the service by the fall of 2002. This figure was up from 2001 and was expected to grow to 43 percent by 2004. Multi-nutrient controller-driven application of fertilizer was also up this year – offered by 19 percent of the responding dealerships in 2002 compared to 13 percent offering the service in 2001. Chemicals were being applied with controller-driven technology at a slightly higher frequency compared to last year. Approximately 10 percent of the respondents offered single variable rate application of chemicals compared to 7 percent last year. This also was expected to grow – to 21 percent in 2004.

Figure 31. Variable Rate Application Offered in 2002 by Input Type



Manual and controller-driven variable rate application was more common in the Midwest relative to the other states (Figures 32 to 34). For fertilizer, half of the respondents expected to offer single nutrient controller-driven application in the Midwest by the fall of 2002 compared to only 19 percent of the respondents from other states (Figure 32). Multi-nutrient controller-driven application of fertilizer in both Midwestern and non-Midwestern states was offered at half the rates of single nutrient controller-driven fertilizer application. In the Midwest, multi-nutrient controller-driven application was offered by a quarter of the respondents while 10 percent expected to offer the service in non-Midwestern states. Controller-driven application of lime was offered at slightly lower levels than fertilizer in both regions (Figure 33). For chemicals, variable rate application was not as common as for fertilizer and lime but the same pattern held across regions (Figure 34)

Figure 32. Variable Rate Application for *Fertilizer* Offered by Region

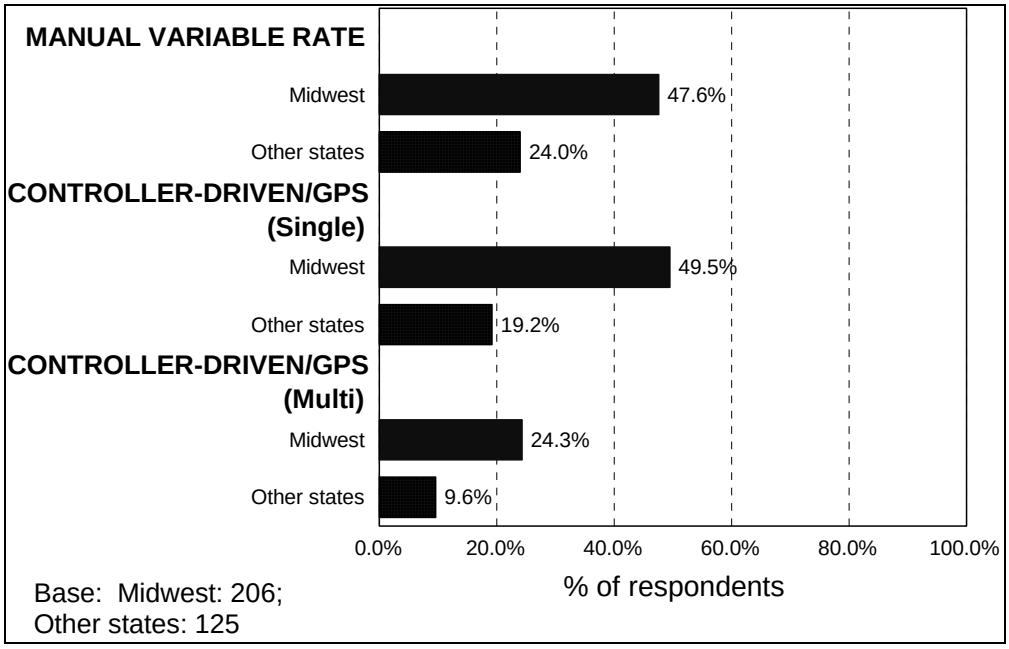


Figure 33. Variable Rate Application for *Lime* Offered by Region

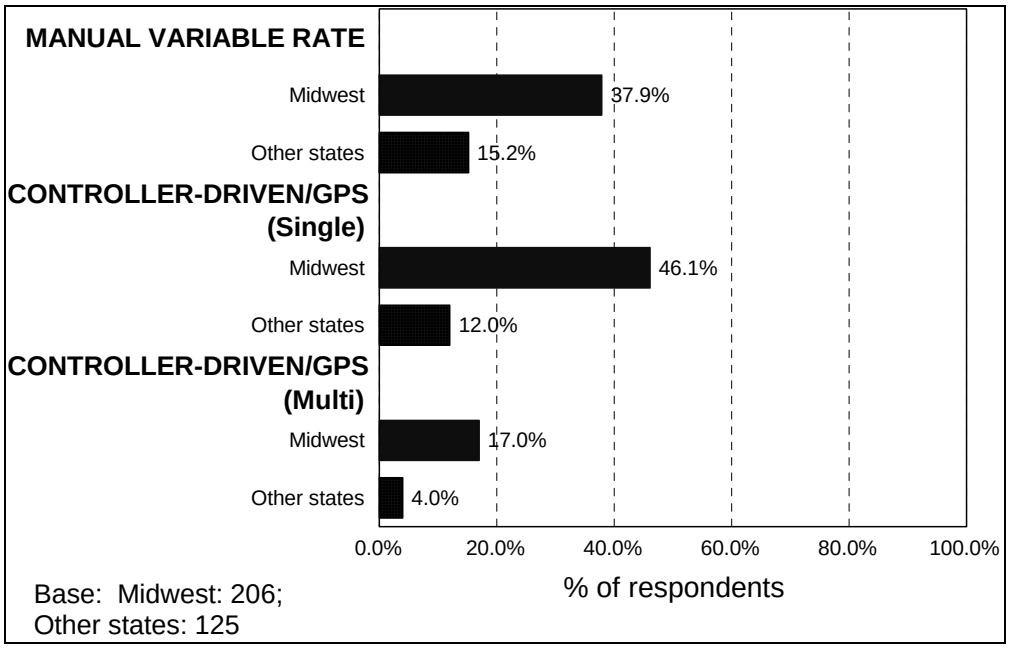
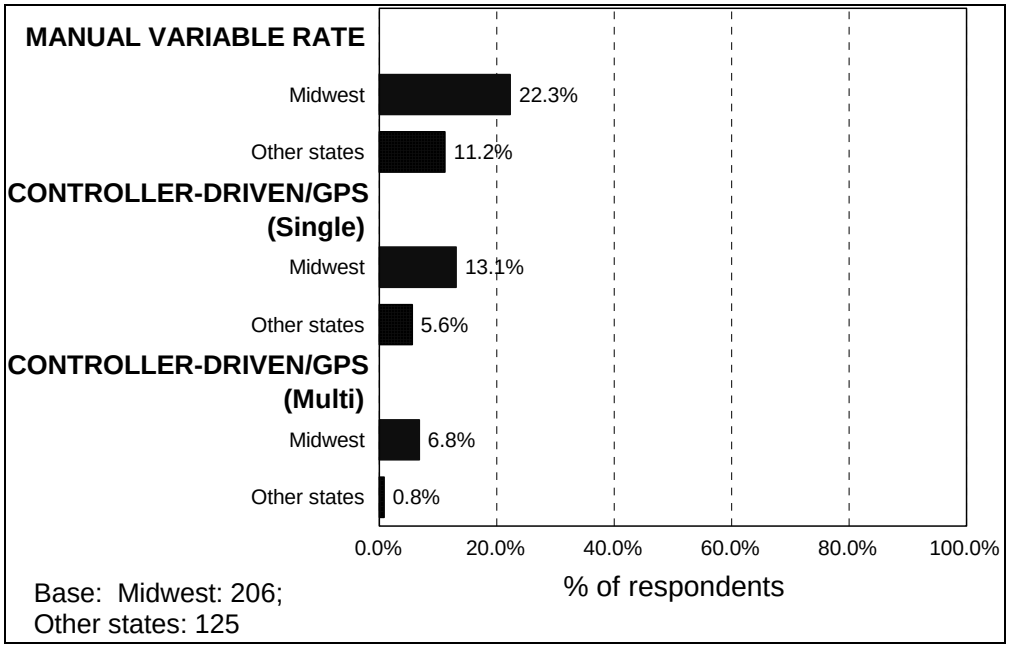


Figure 34. Variable Rate Application for *Chemicals* Offered by Region



Figures 35 to 37 show results for organizational types 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 services than local independents.

Figure 35. Variable Rate Application for *Fertilizer* Offered by Organizational Type in the Midwest

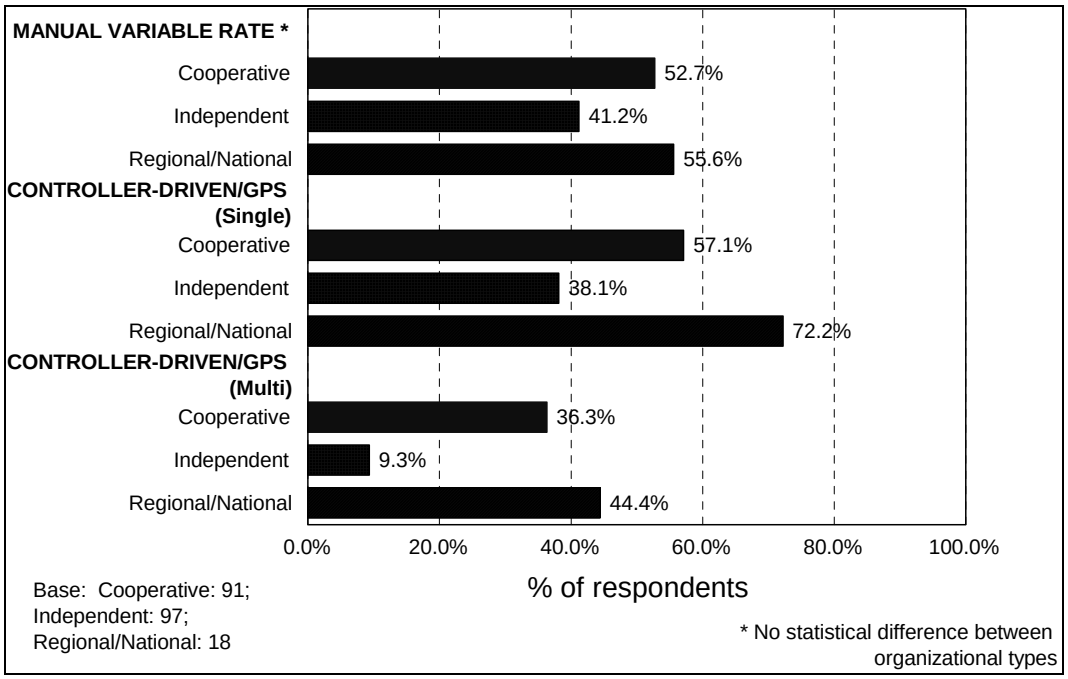


Figure 36. Variable Rate Application for *Lime* Offered by Organizational Type in the Midwest

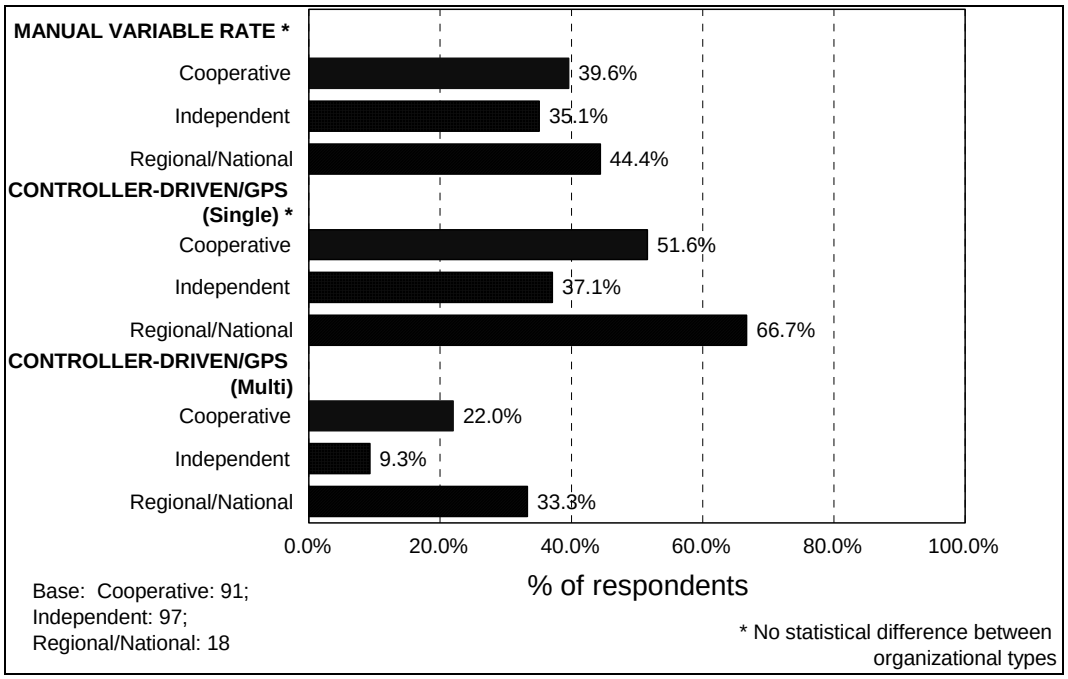
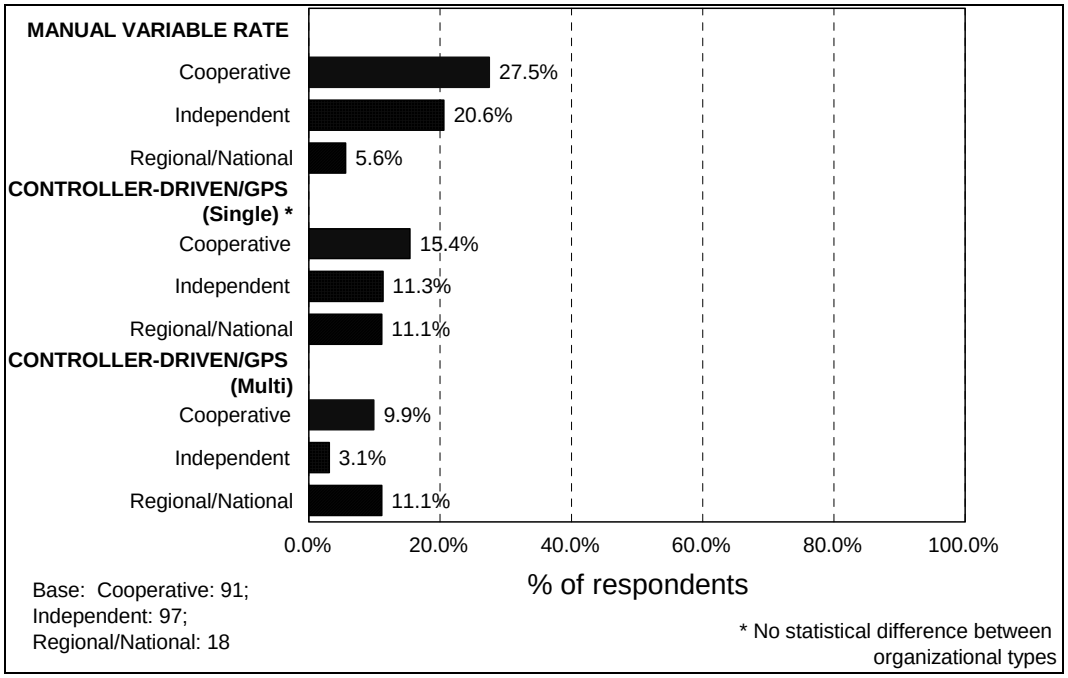


Figure 37. Variable Rate Application for *Chemicals* Offered by Organizational Type in the Midwest

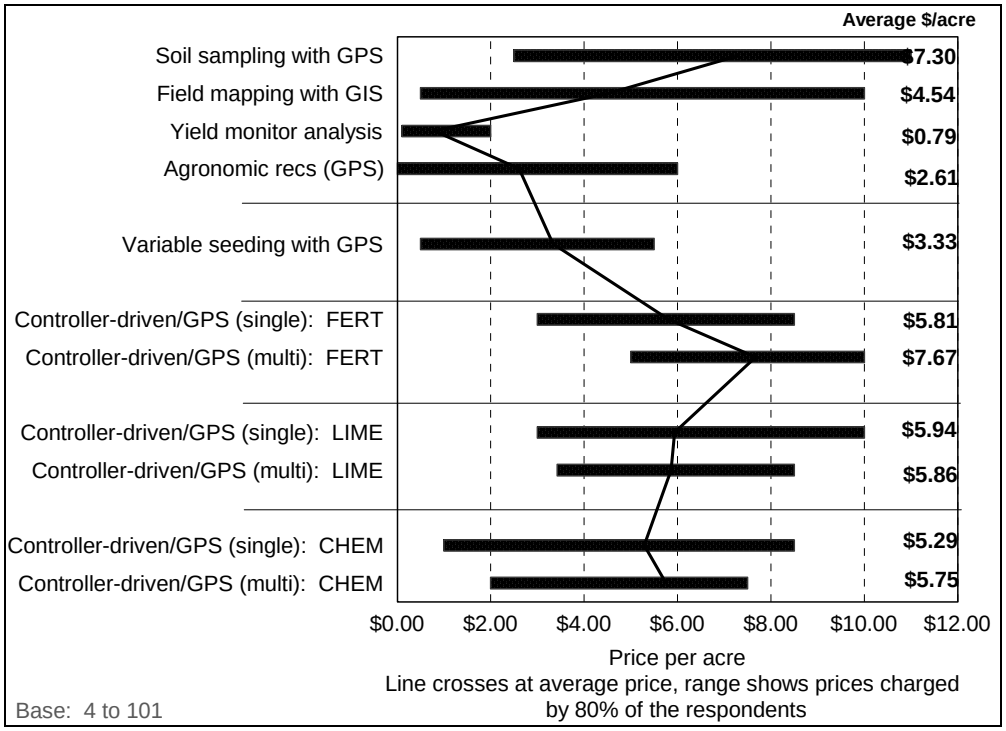


Pricing Site-Specific Services

There continues to be considerable variation in the prices charged for precision services from dealership to dealership. Factors influencing this variation include: customer willingness to pay, competitive price response, and uncertainty about the actual cost of providing the service. As the services become more familiar to both dealerships and their customers, this variation may shrink as prices stabilize in the marketplace. Dealerships were asked to provide the typical price they charge *per acre* for their precision services where possible. For those offering only packages of services or bundled pricing, it often wasn't possible to price out the components individually. Hence, far fewer dealerships typically responded to this question relative to the other questions in the survey.

Figure 38 shows the average prices charged per acre for each of the precision services. The bar indicates 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). As is evident by the chart, there is still a wide range of pricing strategies in place, depending on the competitive prices in the local market, the dealer's costs of providing the services, and the benefit local growers receive from precision services. Overall, though, the average prices charged were similar to, or slightly higher than, those seen in previous years. There were no overall differences between prices charged in the Midwest and in other states.

Figure 38. Prices Charged for Precision Ag Services



Profitability of Precision Service Offerings

We also asked dealerships 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 some precision service offerings appearing to generate more profit and some appearing to generate less profit than last year.

Each bar in Figure 39 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 a traditional custom application program as an example, less than half of the respondents said the service generated a profit for their dealership (42 percent). A third (33 percent) said that it just covered fixed and variable costs. One in 6 respondents (16 percent) felt that custom application covered variable costs but not fixed costs and 8 percent said it covered neither variable nor fixed costs. Only one percent of the respondents did not know how profitable their traditional custom application program was.

In looking at the precision services, the most profitable service appeared to be controller-driven multi-nutrient variable rate application with 43 percent of those offering this service indicating that the service generated a profit for their dealership. Another three out of 10 participants said that they were covering fixed and variable costs for this service. The second-most profitable services were soil sampling with GPS and single-nutrient controller-driven application, with just about half of the respondents indicating they were at least covering fixed and variable costs for these services, and in many cases actually generating a profit.

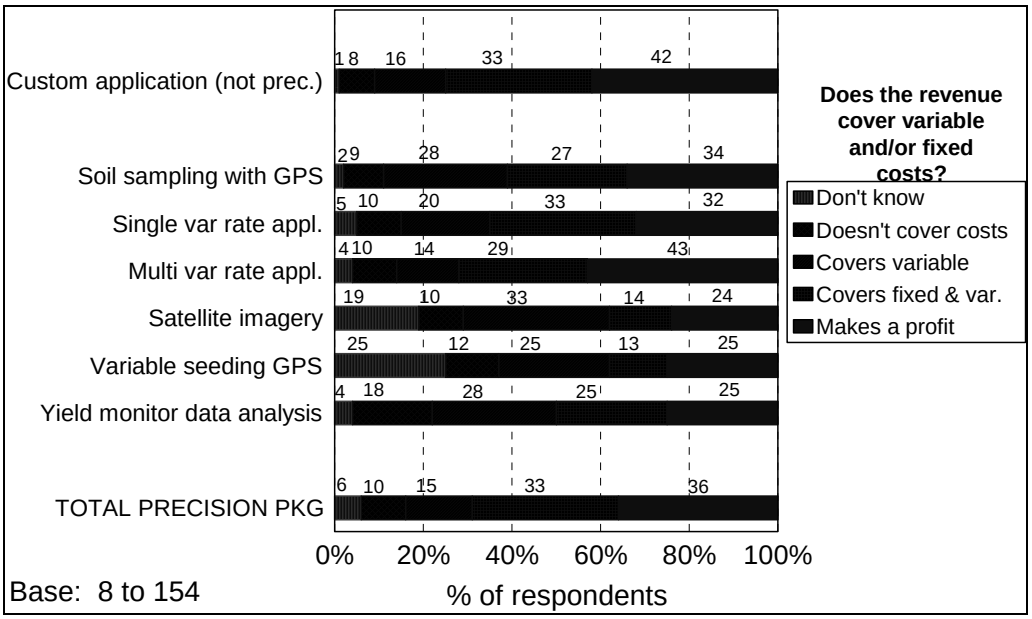
The least profitable of the precision services considered was satellite imagery, with fewer than 4 out of 10 dealerships offering the service saying it at least covered fixed and variable costs. This could represent some of the challenges associated with satellite imagery – determining the exact costs associated with it and the challenge of generating revenue directly with this service. Respondents were most uncertain about the profitability of variable seeding with GPS, with over half of those offering the service not sure what the profitability was (though this result was based on very few responses).

Overall, respondents were positive about the profitability of their precision service offerings. Over a third of the respondents indicated their precision package generated a profit while another third said they were covering both the fixed and variable costs of providing the services. These results suggest that, in general, responding dealers are feeling their precision services are becoming more profitable as they gain experience with the technology.

The perception of the profitability of the different precision service offerings did not vary across regions, with the exception of manual variable rate application and controller-driven

multi-nutrient variable rate application. Both of these were thought to be significantly more profitable by Midwestern dealerships than by dealers in other states. There were no significant differences in the perceptions of profitability between organizational types in the Midwest.

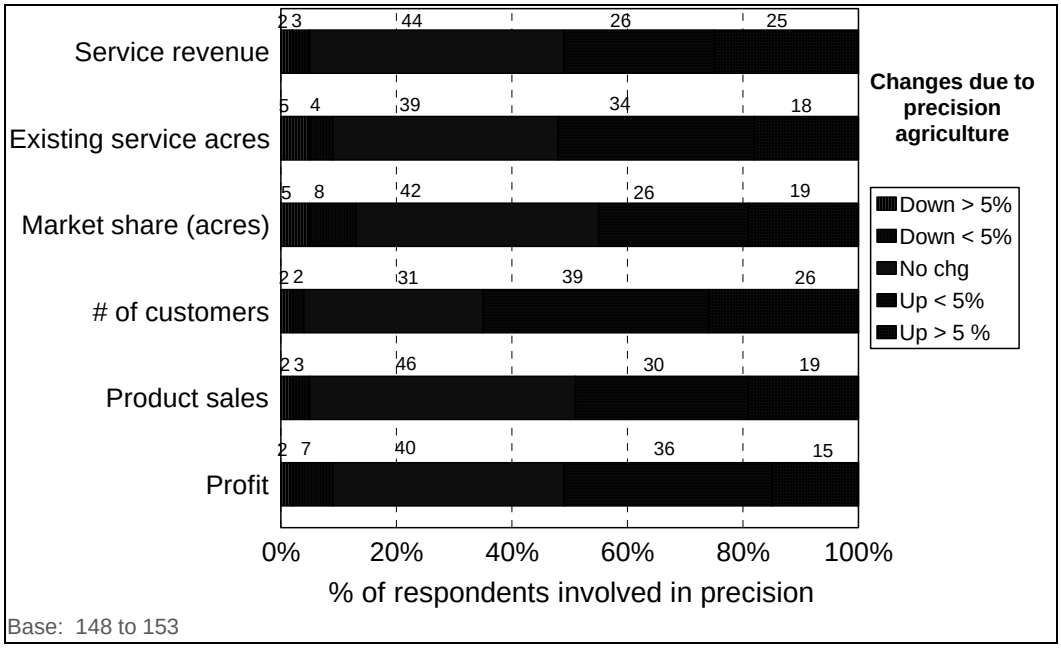
Figure 39. Profitability of Precision Service Offerings



In addition to the impact of precision services on profit, we also asked dealers what other impact precision services were having on various aspects of their business. Overall, precision services appear to have a positive impact on the dealership's business. Figure 40 shows responding dealers' perceptions of the impact. In general, the biggest positive impact was seen on the dealership's number of customers, with over a quarter of the respondents indicating they saw customer numbers increase more than 5 percent due to precision services and another 39 percent of the respondents said the number of customers increased but by less than 5 percent. Approximately half of the respondents said their service acres with existing customers, service revenue, product sales, and profit had increased due to precision service offerings.

There were no differences in perceived impact of precision technology either by region or by organizational type within the Midwest.

Figure 40. Impact of Precision Services on Business

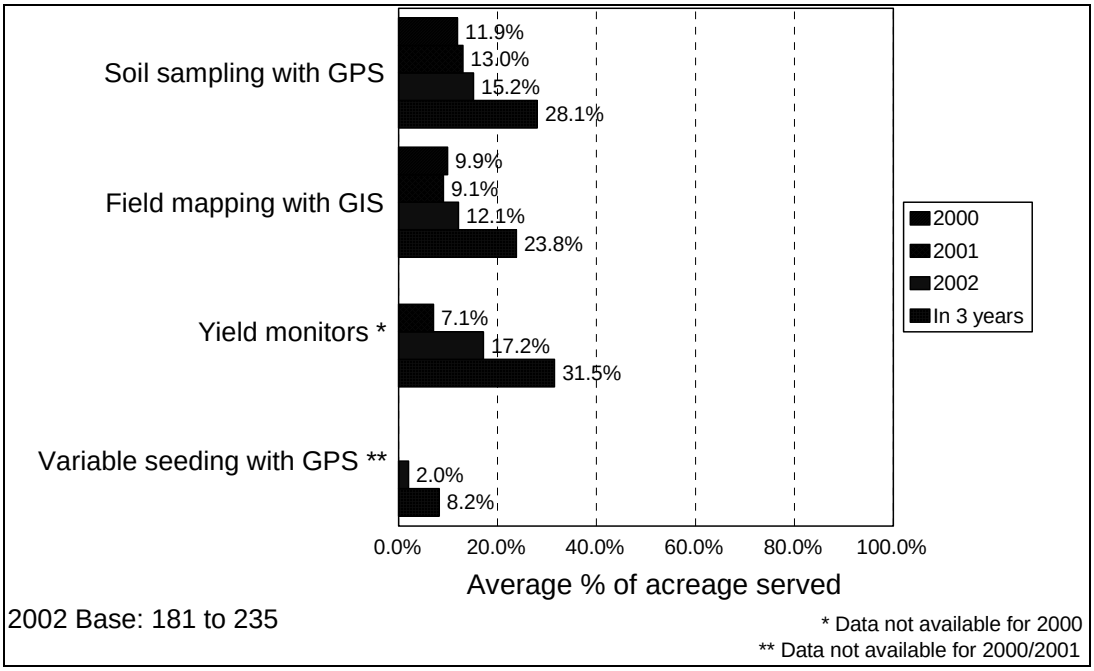


Customer Use of Site-Specific Services

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 will be using these techniques in 3 years. Figures 41 and 42 show the trends over time in the estimated market use of specific precision agriculture management techniques.

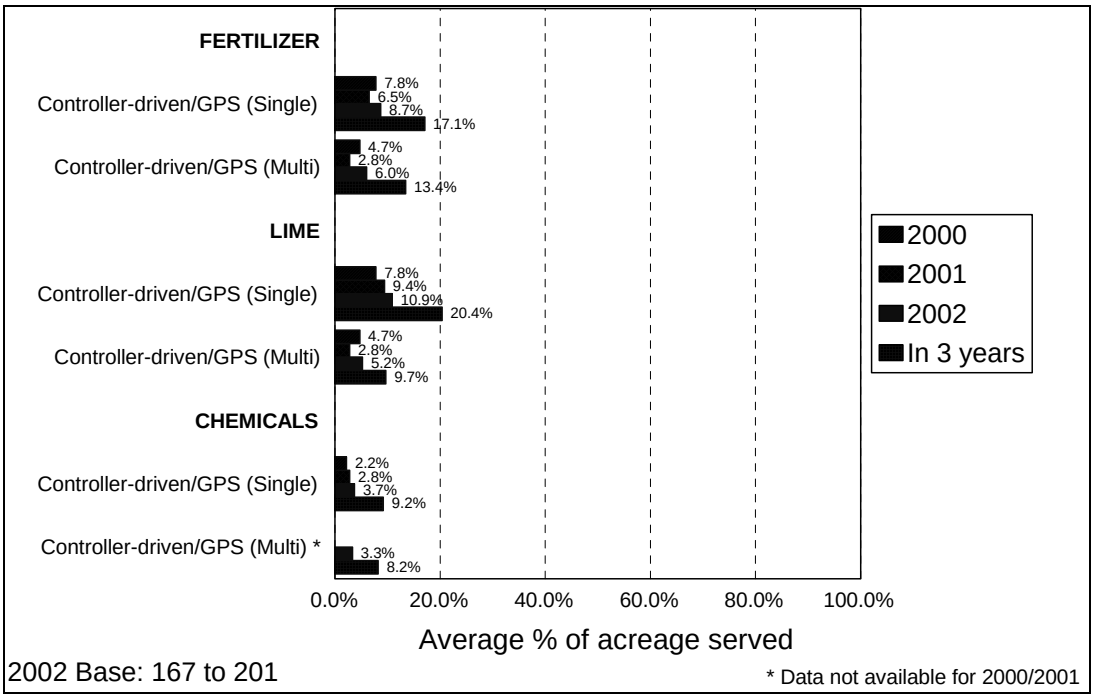
During the time period market adoption has been measured by this survey, use of almost all services has grown each year. And, as in previous years, respondents are optimistic about future adoption. In 2002, the most widespread precision service or technology in use was yield monitors, estimated to be used on 17 percent of the market acres served (Figure 41). This was followed by soil sampling with GPS (used on an average of 15 percent of the market acres) and field mapping with GIS (used on 12 percent of market acres).

Figure 41. Estimated Market Area Using Soil Sampling (GPS), Field Mapping (GIS), Yield Monitors



Growth in variable rate application use has been somewhat slower (Figure 42). However, as for less capital intensive precision services, respondents were optimistic about adoption of precision services in the future.

Figure 42. Estimated Market Area Using Variable Rate Application



Figures 43 to 46 shows estimated use of various precision services by region. As expected, precision use was significantly higher in the Midwest than in other states. Again, acreages under precision services are expected to increase over the next 3 years in both regions and for all services. There were no significant differences between respondents from different organizational types in the Midwest.

Figure 43. Estimated Market Area Using Soil Sampling and Field Mapping by Region

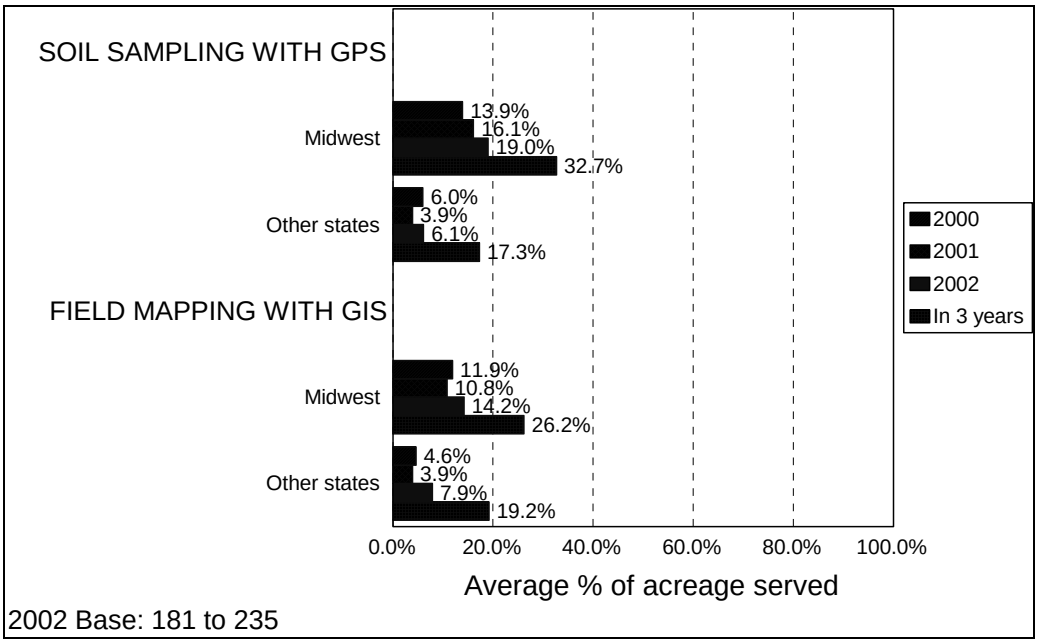


Figure 44. Estimated Market Area Using Yield Monitors and Variable Rate Seeding by Region

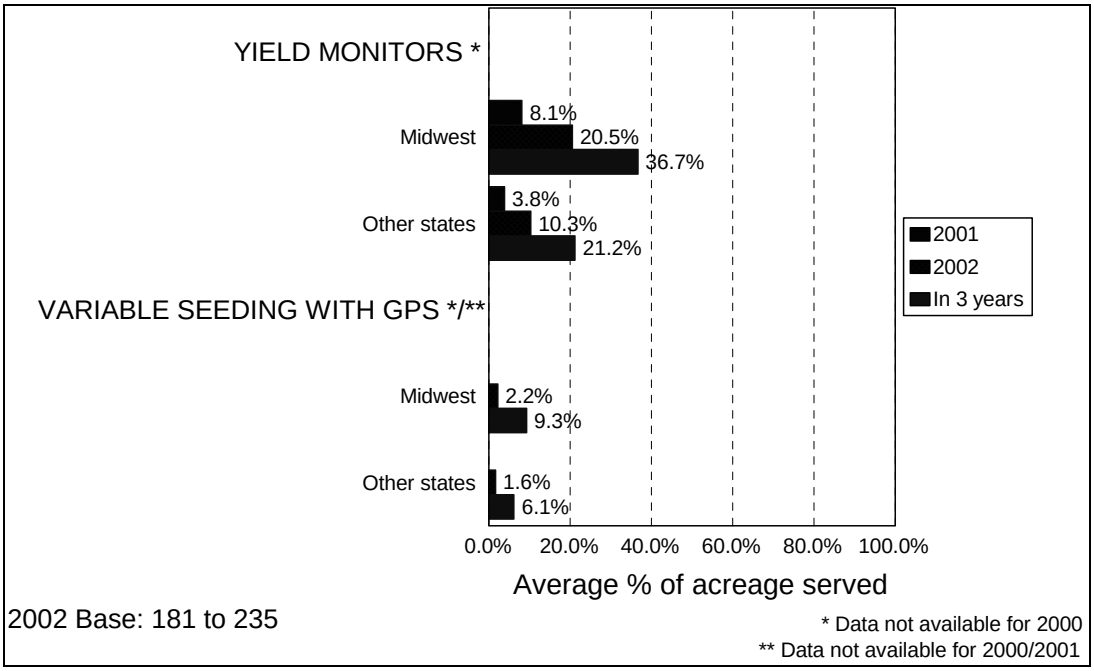


Figure 45. Estimated Market Area Using Variable Rate Application for *Fertilizer* by Region

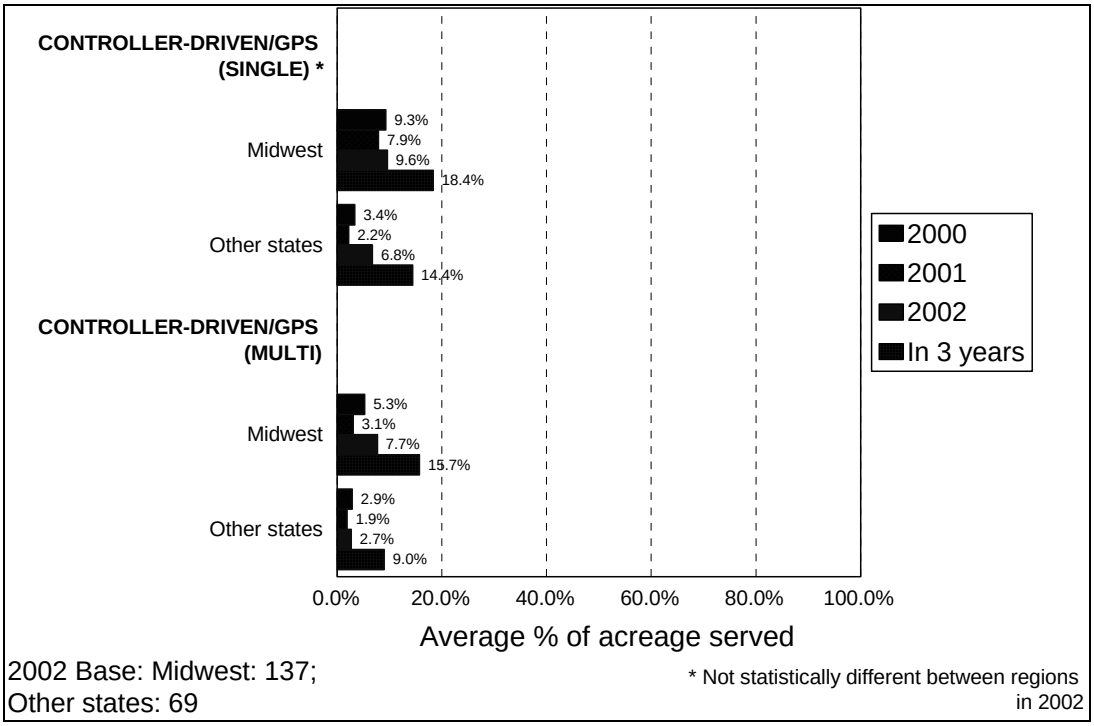
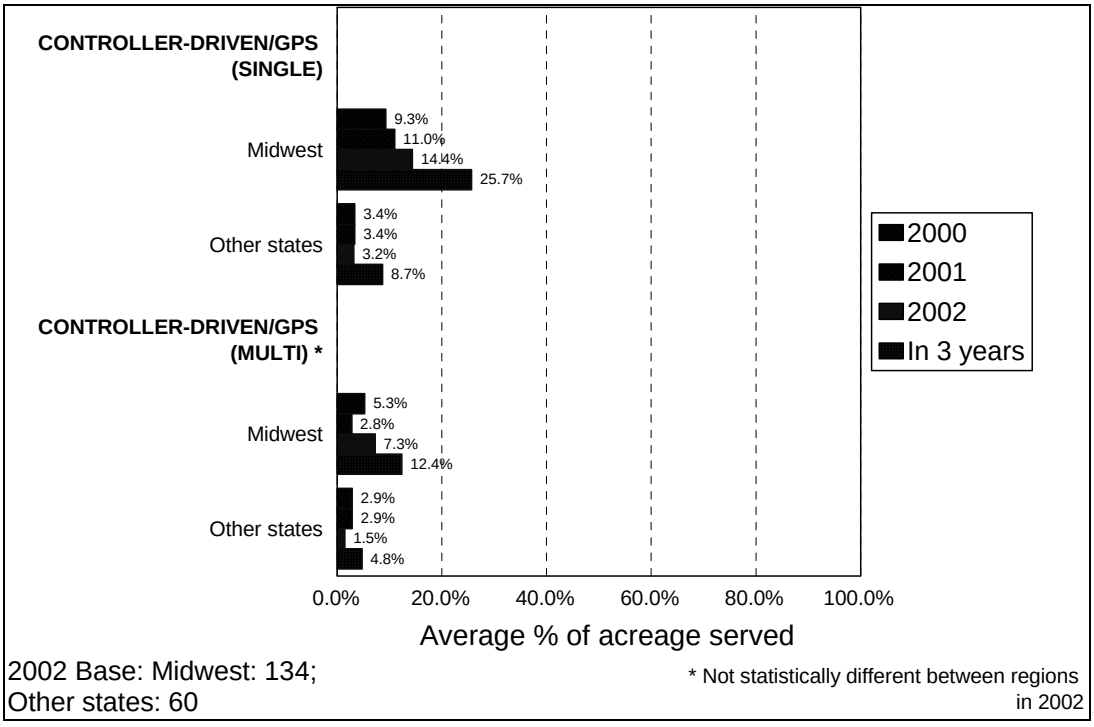


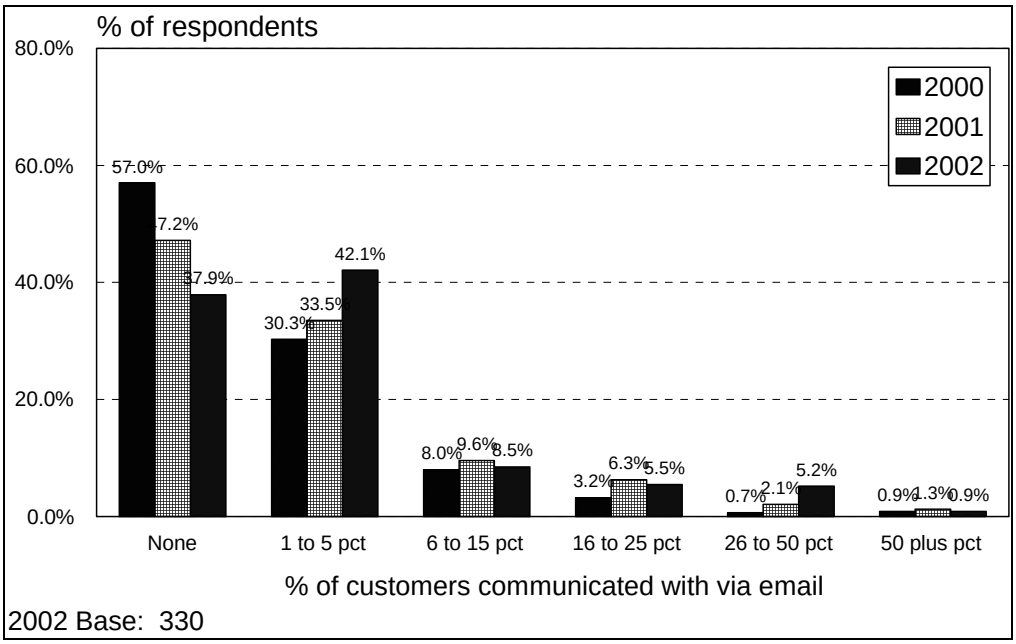
Figure 46. Estimated Market Area Using Variable Rate Application for *Lime* by Region



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 47 shows that more than 6 out of 10 of the respondents (62 percent) used email to communicate with at least some of their customers. This was up from 53 percent last year. In 2002, almost 12 percent of the respondents had communicated by email with over 15 percent of their customers within the past year, up from 10 percent last year.

Figure 47. Customers Communicated With Via Email



Summary

The use of precision technology continues to expand in the agricultural industry among both growers and retail agronomic dealerships. In 2002, after taking a brief breather in 2001, the growth in use of precision technology by dealerships appears to have picked up momentum again. As some of these technologies become more familiar, and as some new technologies enter the market, dealerships appear to be focusing on those they feel will add value for their farmer customers. No longer a new set of tools, dealerships are familiar with precision services and continue to find ways to use these services both inside the dealership and for their customers.

APPENDIX I: Questionnaire