

**2013 PRECISION AGRICULTURAL  
SERVICES DEALERSHIP SURVEY  
RESULTS**

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MAGAZINE AND THE CENTER FOR  
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BUSINESS

by

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November 2013

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# 2013 Precision Agricultural Services Dealership Survey Results

## Introduction

In the spring of 2013, *Crop Life* magazine and the Center for Food and Agricultural Business at Purdue University conducted the 16<sup>th</sup> survey of crop input dealers and their use of precision technology. As with the previous surveys, dealerships were asked questions about customer adoption of precision services, how precision technology is used at the dealership, and the profit potential of the technology. Questions regarding dealerships' total annual retail sales and total acres custom applied at the responding locations were modified in the 2013 survey to account for increased revenues and acreages. A new question was added in the 2013 survey to gain insight as to how dealerships perceive precision technology products to be adopted in the future.

## Questionnaire Logistics and Data Analysis Notes

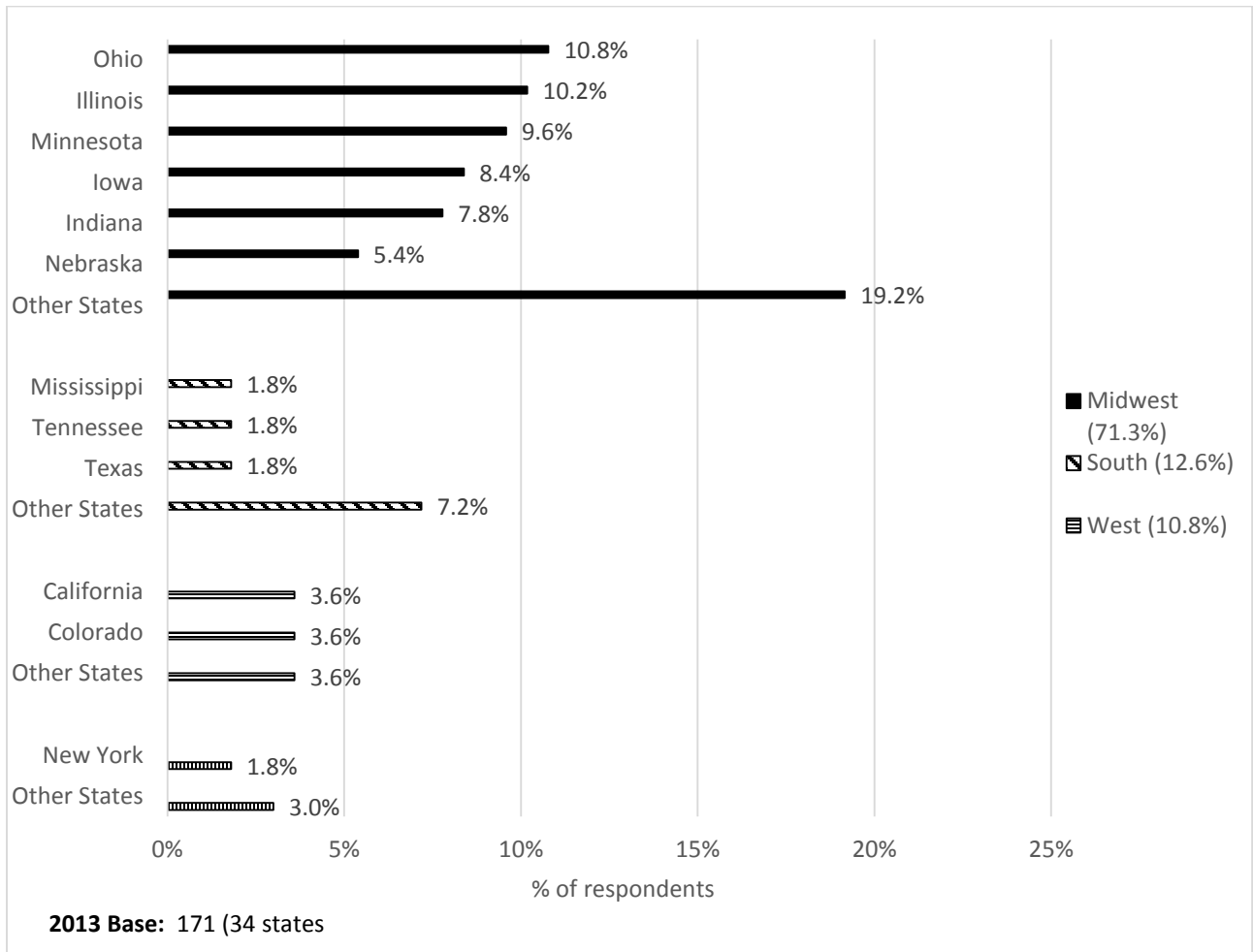
In February 2013, a questionnaire was mailed to 2,500 *Crop Life* retail crop input dealership readers across the US. (See Appendix I to this report for a copy of the questionnaire.) A total of 171 questionnaires were returned. This provided an effective response rate of 6.8 percent. Response rates have ranged from a high of 38 percent in 1996 to 9.4 percent in 2009.

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

## The Respondents

The survey respondents represented 34 states. Ohio had the highest amount of respondents, accounting for 10.8 percent of total respondents (Figure 1). Illinois followed close behind, with 10.2 percent of total respondents. By region, the Midwest had the largest representation in the survey, with 71 percent of the survey respondents hailing from the states of Indiana, Illinois, Iowa, Kansas, Wisconsin, Minnesota, Michigan, Missouri, Nebraska, North Dakota, Ohio, and South Dakota. 12.6 percent of respondents were from the South, 10.8 percent from the West, and 4.8 percent were from the Northeast. States were grouped into regions according to the United States Census Bureau census regions.

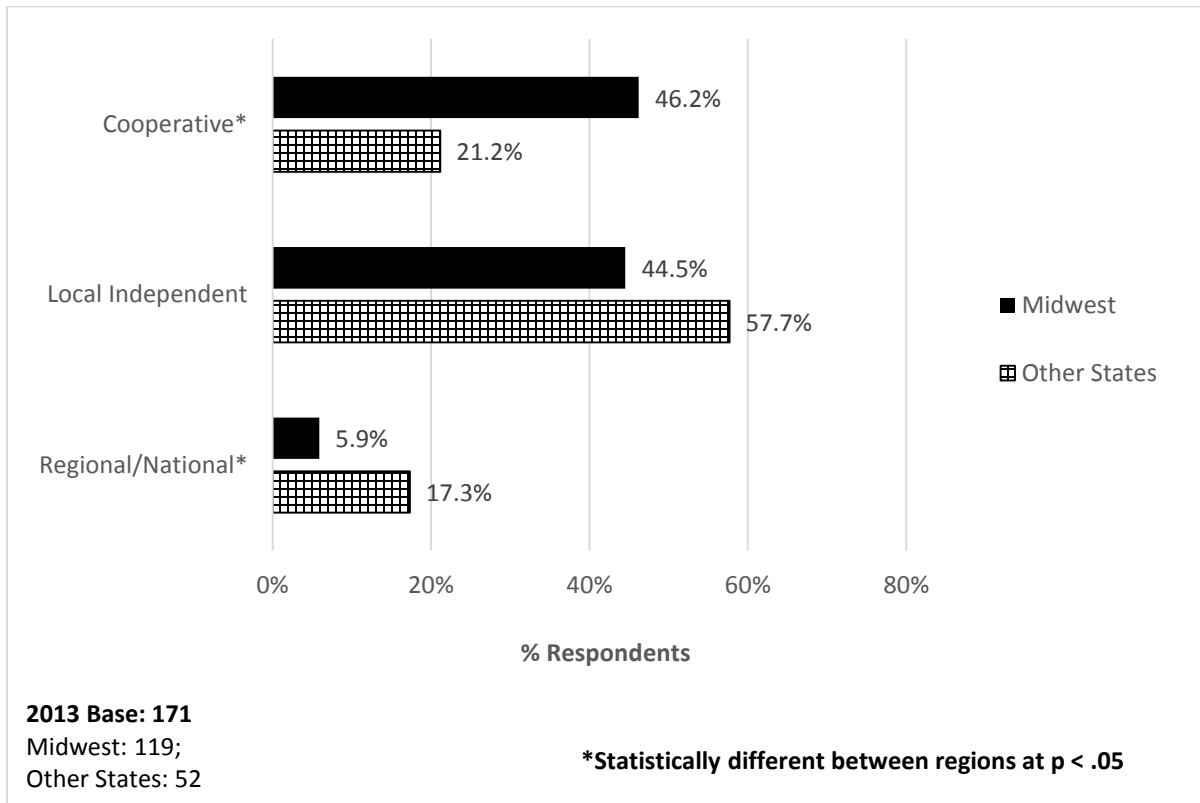
**Figure 1. States Represented**



In citing their dealership’s organization type, survey respondents largely indicated they were either an independent dealership (49 percent), a cooperative (39 percent), or were part of a national or regional chain of retail dealerships (9 percent).

Figure 2 shows the differences in organization type based on region. In the Midwest, cooperatives and local independent dealerships were the most frequent types of organization, making up 46 percent and 45 percent, respectively, of the Midwest market. Similarly, in Other States cooperatives (21 percent) and independent dealerships (58 percent) were the most common type of organizational structure observed. Regional/national chains were more likely to be observed more often in the regions outside the Midwest with 17 percent of respondents from Other States claiming to have been regional/national chains.

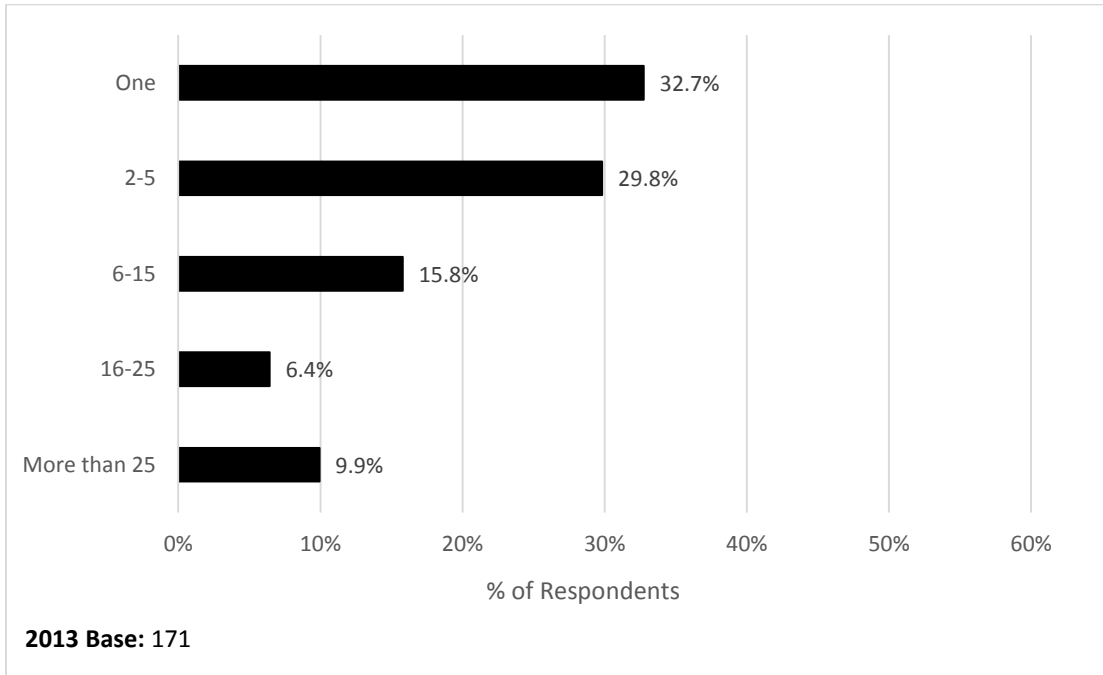
**Figure 2. Organization Types by Region**



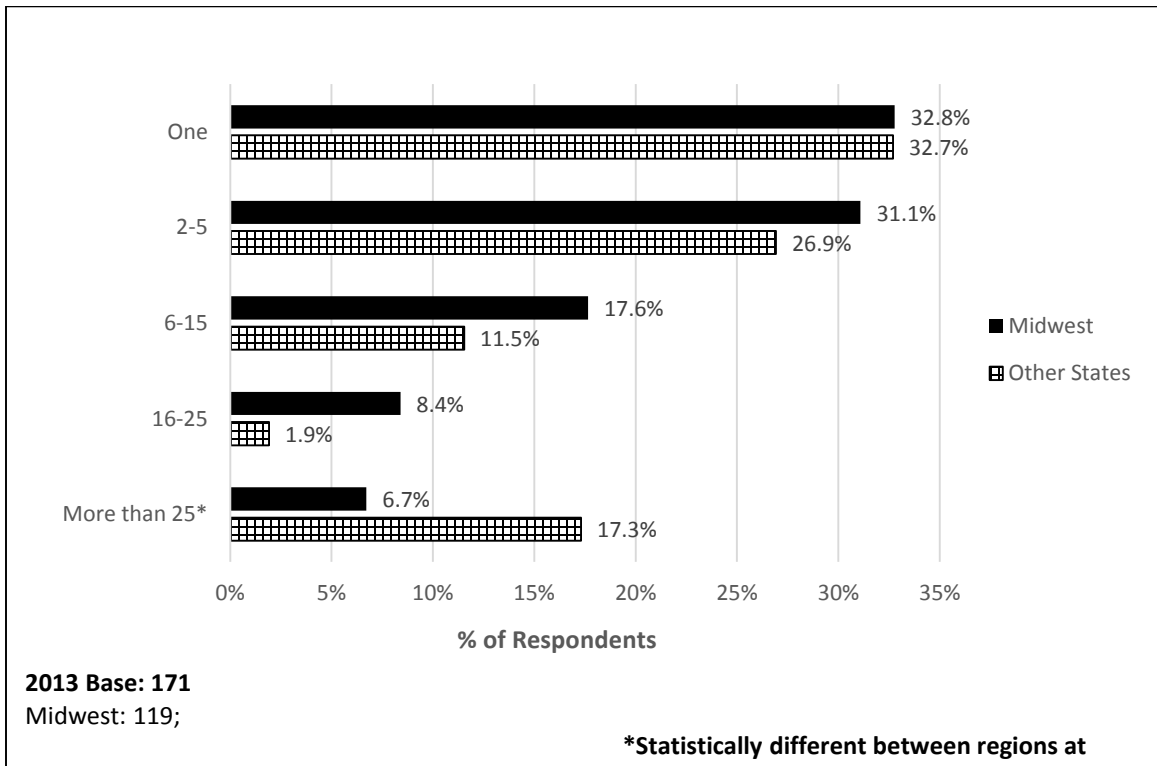
The number of total retail outlets owned or managed by the responding dealerships showed more variation than the 2011 survey. In the 2013 survey (Figure 3), dealerships ranged in size from one outlet (33 percent) to 25 or more outlets (10 percent). Dealerships with one outlet decreased from 36 percent to 33 percent, respondents with 6-15 outlets decreased from 20 percent to 16 percent, and dealers with more than 25 outlets decreased from 14 percent to 10 percent from the 2011 survey. Increases were seen in dealerships with 2-5 outlets (26 percent in 2011, 30 percent in 2013) and 6-15 outlets (4 percent in 2011, 6 percent in 2013). Dealerships with over 25 outlets have decreased from 19 percent in 2009 to 10 percent in 2013, which indicates the overall sample is increasingly weighted towards smaller dealerships in recent years.

When evaluating the number of total retail outlets owned or managed by the responding dealership according to region (Figure 4), an almost equal amount of respondents owned or managed a single outlet (33 percent) in the Midwest as well as the Other States. For dealership with 2-5 outlets, 6-15 outlets, and 16-25 outlets, relatively more of these dealerships were in the Midwest. Dealerships with more than 25 outlets were more common in Other States (17 percent) than Midwestern states (7 percent).

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



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



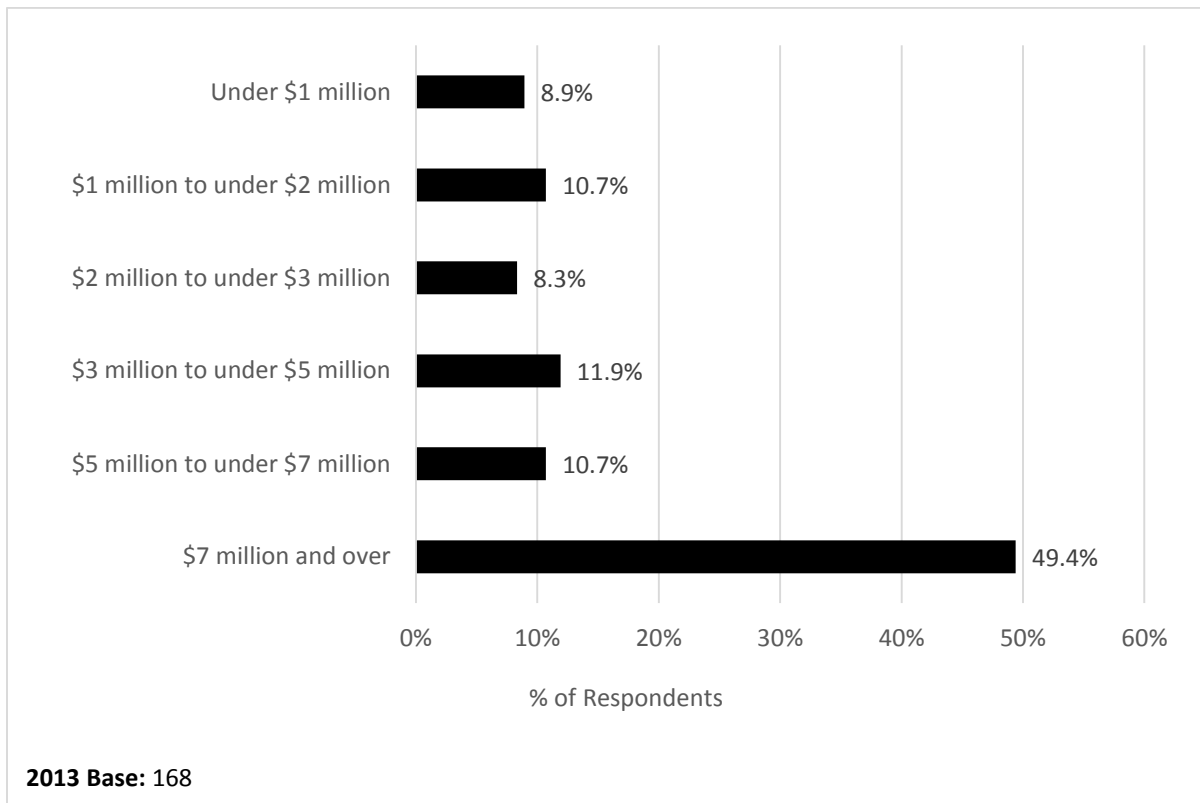


Annual agronomy sales per location was measured differently in 2013 than in previous surveys. In the 2013 survey, an additional option was offered for dealerships with \$5 million to \$7 million in annual agronomy sales and the \$5 million and over category was modified to \$7 million and over. This was done in an effort to gain more insight into the sales structure of the survey respondents.

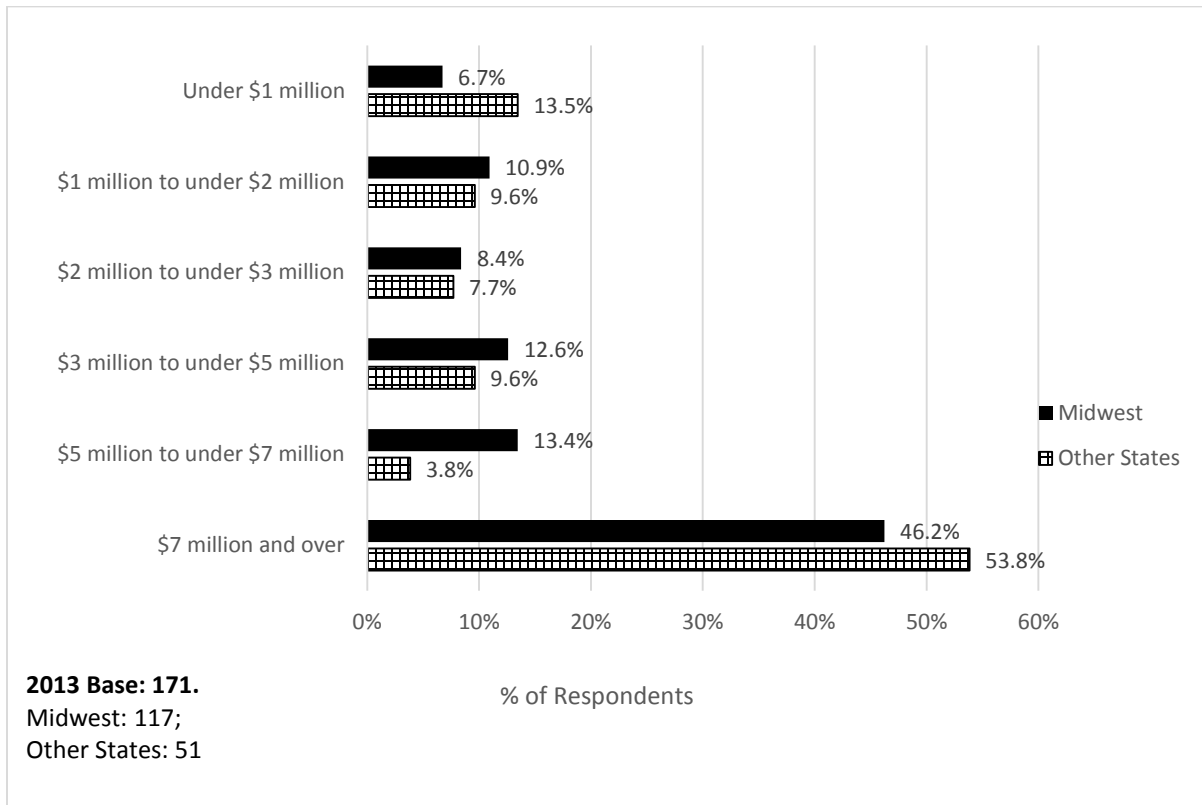
In comparison to the 2011 survey, 2013 respondents tended to be larger than 2011 respondents. The respondents who classified themselves in the ranges of “Under \$1 million” and “\$3 million to under \$5 million” totaled 47 percent in 2011, but was reduced to 40 percent in the 2013 survey (Figure 5). The category of “\$5 million and over” used in 2011 consisted of 53 percent of the survey respondents. This category was modified in the 2013 survey into two separate categories, titled “\$5 million to under \$7 million” (11 percent) and “\$7 million and over” (49 percent), totaling 60 percent of respondents in 2013 who earned annual sales over \$5 million.

When broken down by region, the gap between the Midwest and Other States in the “Over \$5 million” sales category diminished from the 2011 survey (Figure 6). While the cumulative gap between both Midwestern (60 percent) and Other States (58 percent) for the categories of “\$5 million to under \$7 million” and “\$7 million and over” was only 2 percent in the 2013 compared to 13 percent in 2011 there was no statistical significance between the differences between regions in the 2013 survey.

**Figure 5. 2012 Annual Agronomy Sales at Location**



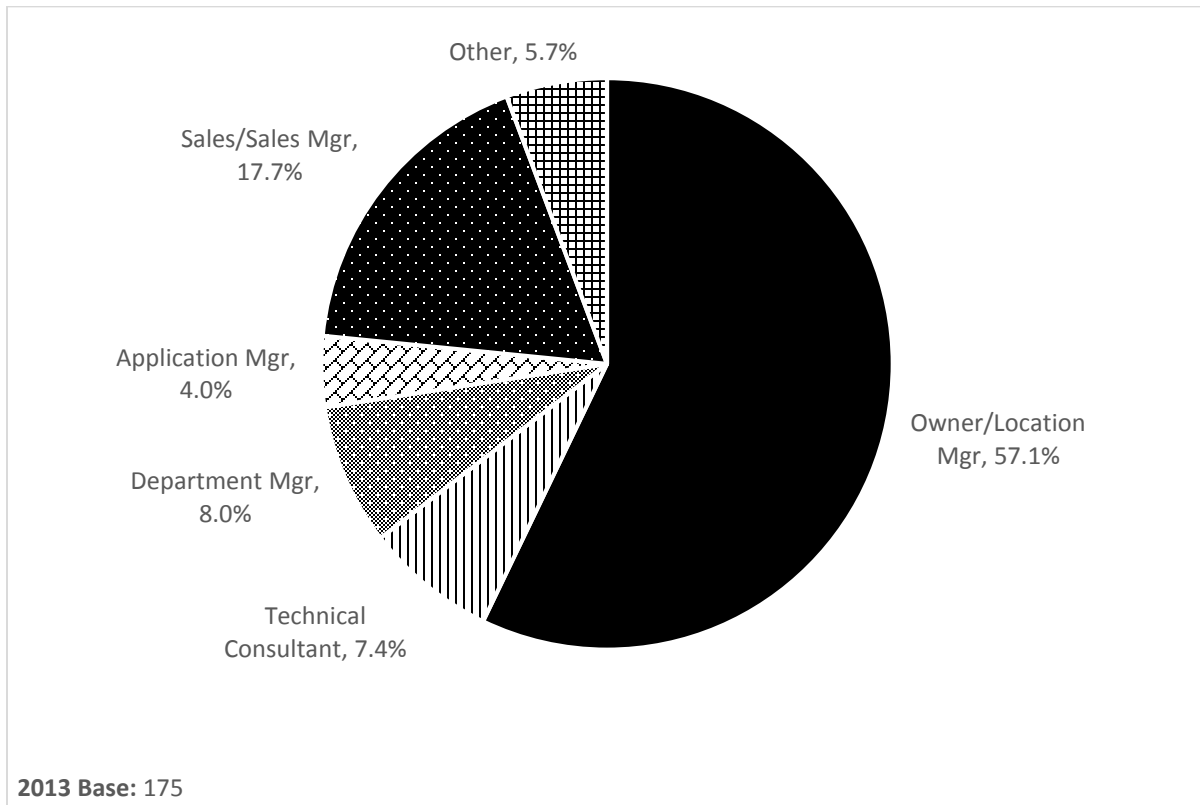
**Figure 6. 2012 Annual Agronomy Sales at Location By Region**



In the 2013 survey, the owner/location manager was the most common survey respondent (57 percent) (Figure 7). This is similar to the 2011 survey, in which owners/location managers consisted of 61 percent of survey respondents. Sales managers were the next largest respondent category with 18 percent. Department managers, technical consultants, and application managers consisted of 8 percent, 7 percent, and 4 percent, respectively, of the survey respondents. Other positions accounted for 6 percent of respondents.

In the Midwest, participants were most likely to be the owners/location managers of the responding dealerships (53 percent). By organization type, participating independent dealerships had 82 percent of their respondents answering as the owner/location manager. Owner/managers accounted for 36 and 38 percent, respectively, of responding cooperatives and national/regional chain dealerships.

**Figure 7. Responsibility of Survey Respondent**

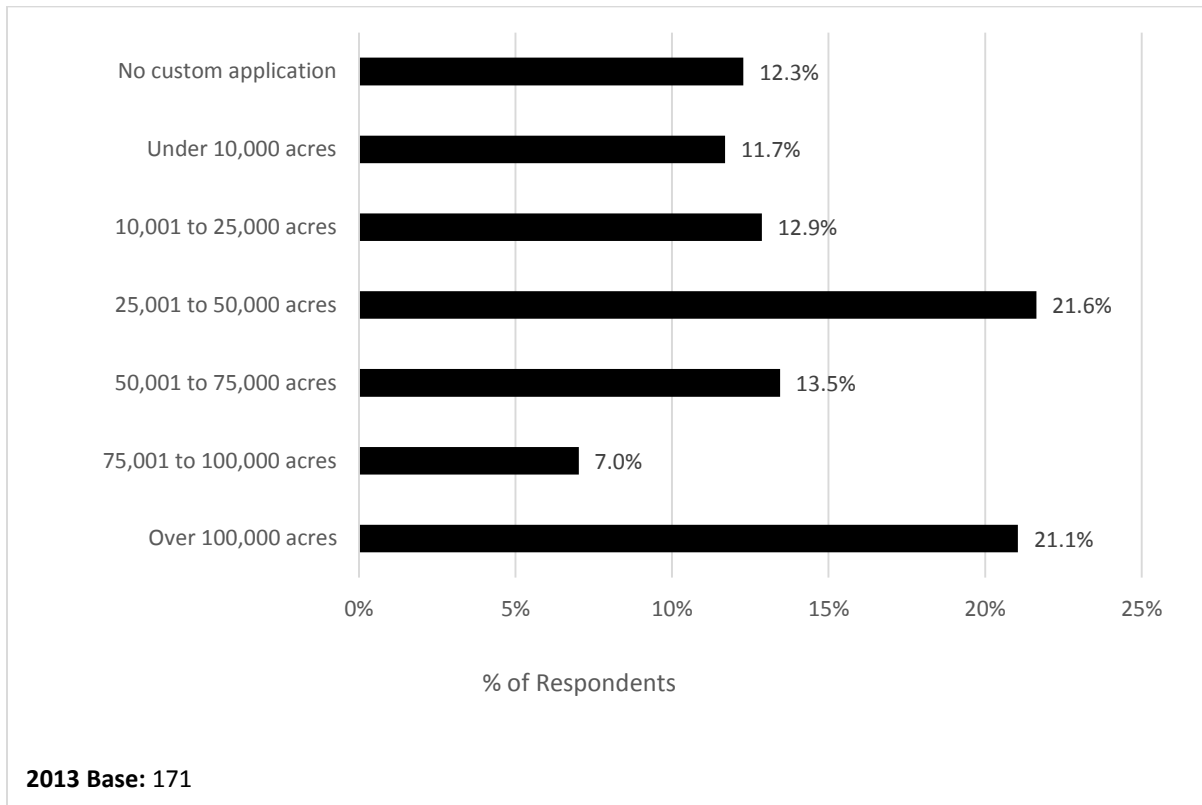


## Custom Application

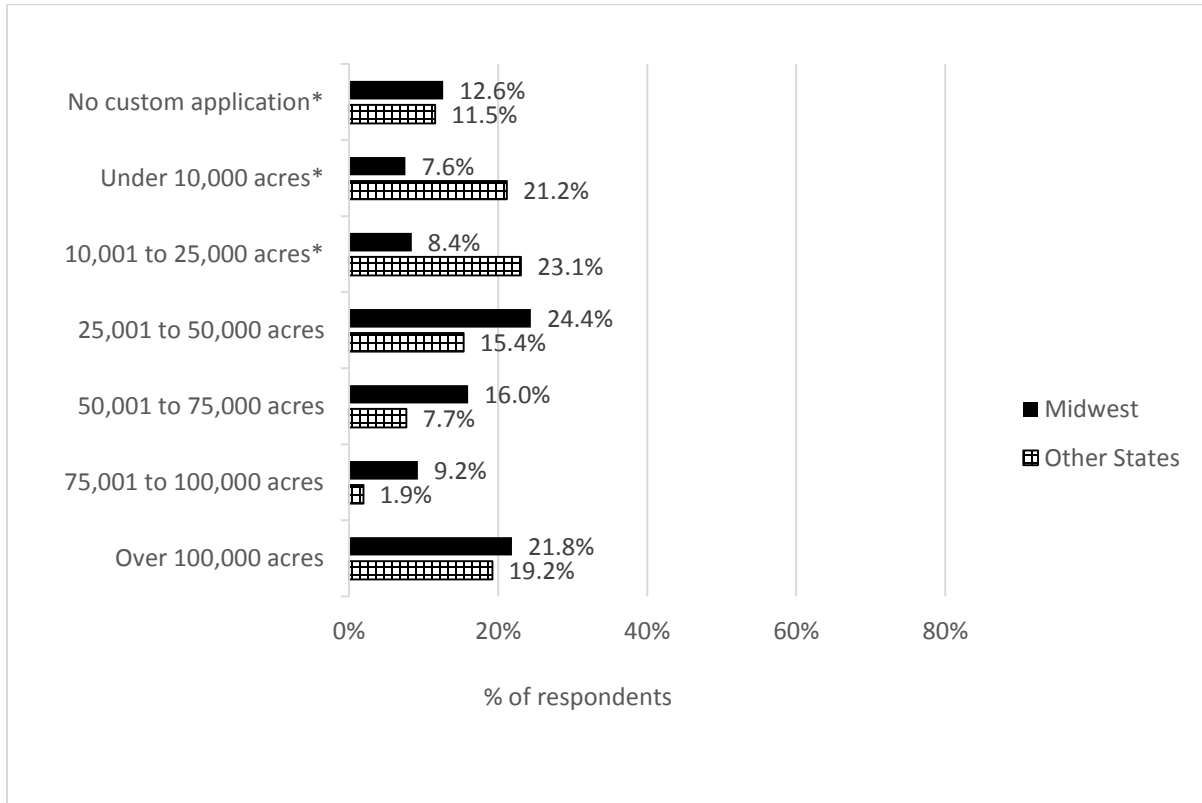
88 percent of dealerships participating in the 2013 survey indicated they offered custom application services, including fertilizer, pesticides, and/or custom seeding, to their customers (Figure 8). To account for growing farm size, in the 2013 survey additional acreage ranges were added. In the previous surveys, the ranges ended with the Over 50,000 acres option. In the recent survey, the ranges of 50,001 to 75,000 acres, 75,001 to 100,000 acres, and Over 100,000 acres were included. This helped to provide a better understanding of how many acres beyond 50,000 acres were custom applied by dealerships. A 5 percent decrease in the amount of dealers not offering custom application from 2011 to 2013 and an increase in dealerships custom applying over 50,000 acres was found.

In the Midwest, respondents were more likely to provide application services to larger acreage tracts, with 71 percent of dealerships in the Midwest custom applying over 25,000 acres (Figure 9). In contrast, the majority of dealerships in Other States (56 percent) either did not offer custom application or only applied 0 to 25,000 acres, indicating that smaller acreages are more common when offering custom application in states outside of the Midwest. The differences between regions in the No custom application, Under 10,000 acres, and 10,001 to 25,000 acres in the 2013 survey are statistically significant.

**Figure 8. Acres Custom Applied**

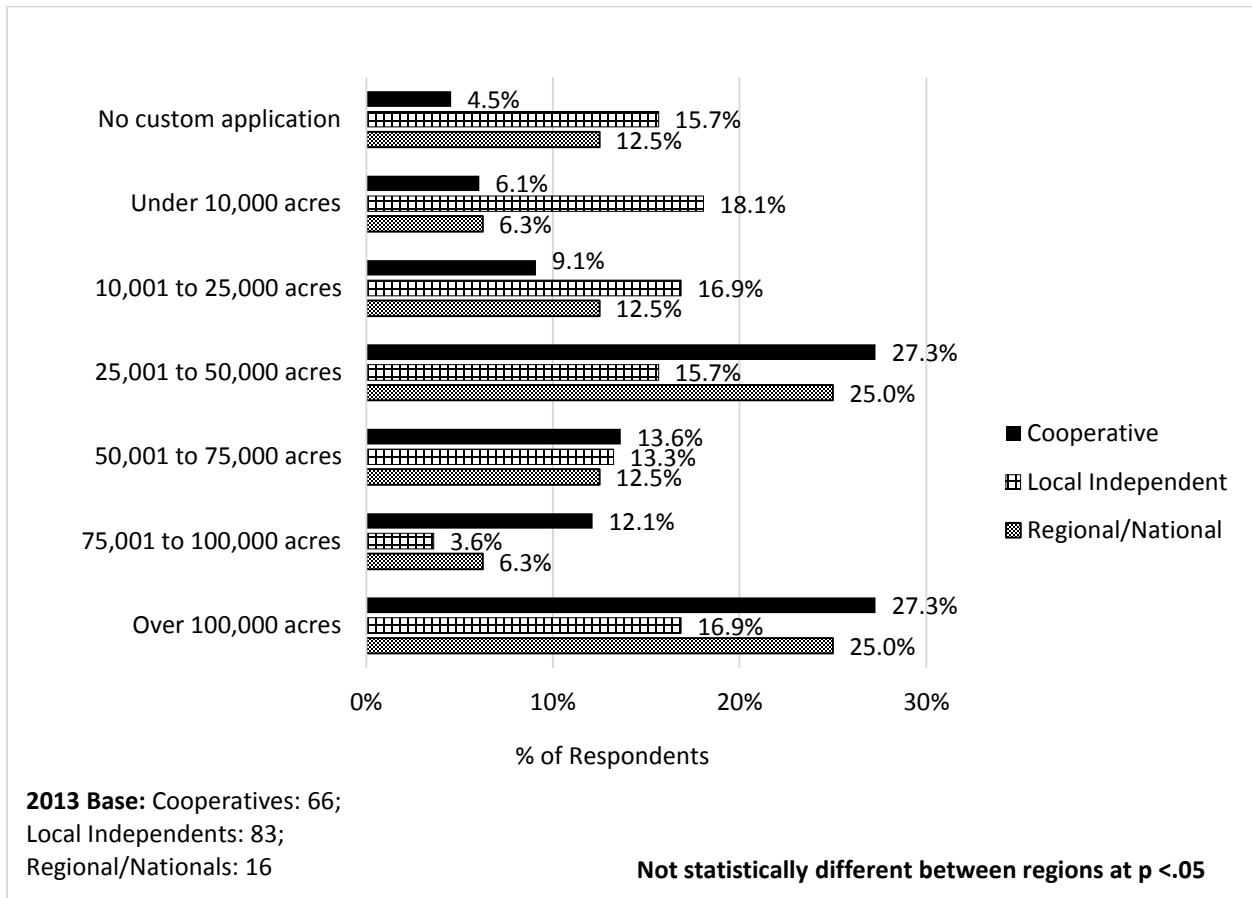


**Figure 9. Acres Custom Applied by Region**



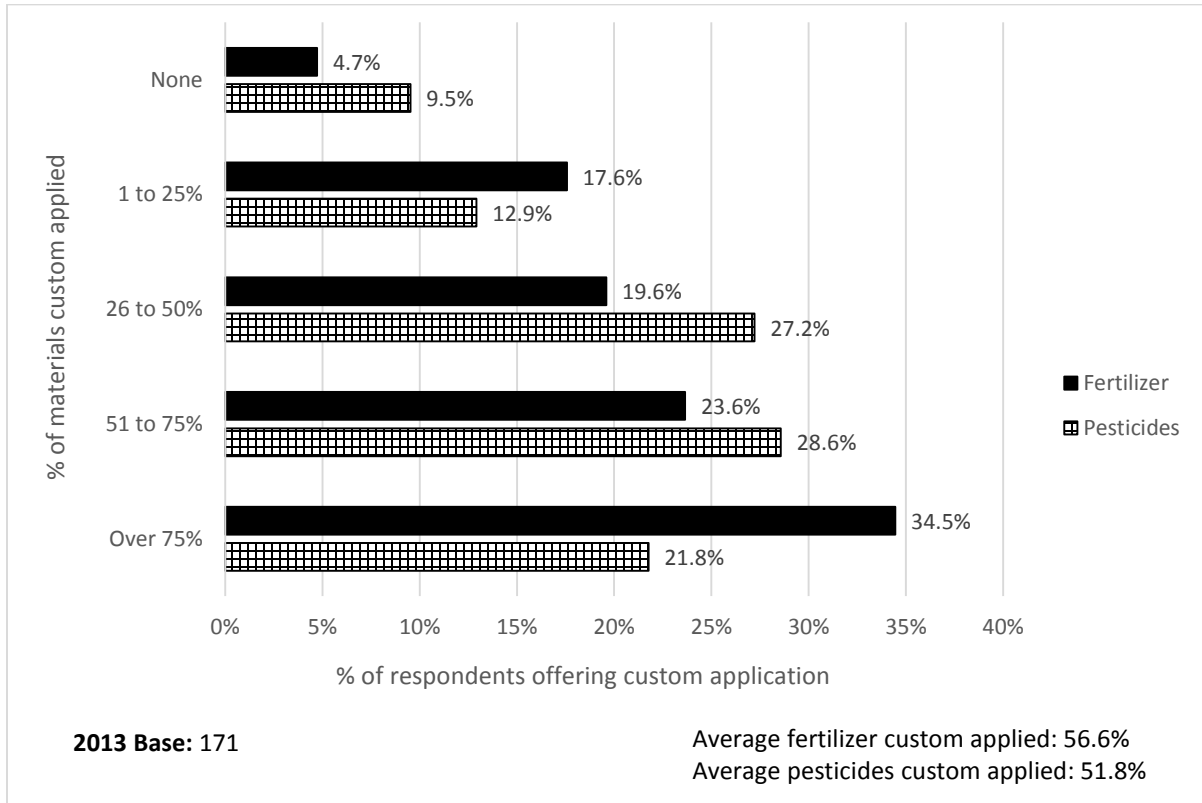
While the number of local independent dealerships not offering custom application was higher than cooperatives and regional/national chains (Figure 10), in previous years this difference has been greater. In the 2013 survey, 16 percent of local independents did not offer custom application, which was a decline of 8 percent from the 2011 survey. The number of cooperatives (5 percent) and regional/national chain dealers (13 percent) not offering custom application in the 2013 survey was similar to previous years.

**Figure 10. Acres Custom Applied by Organizational Type in the Midwest**



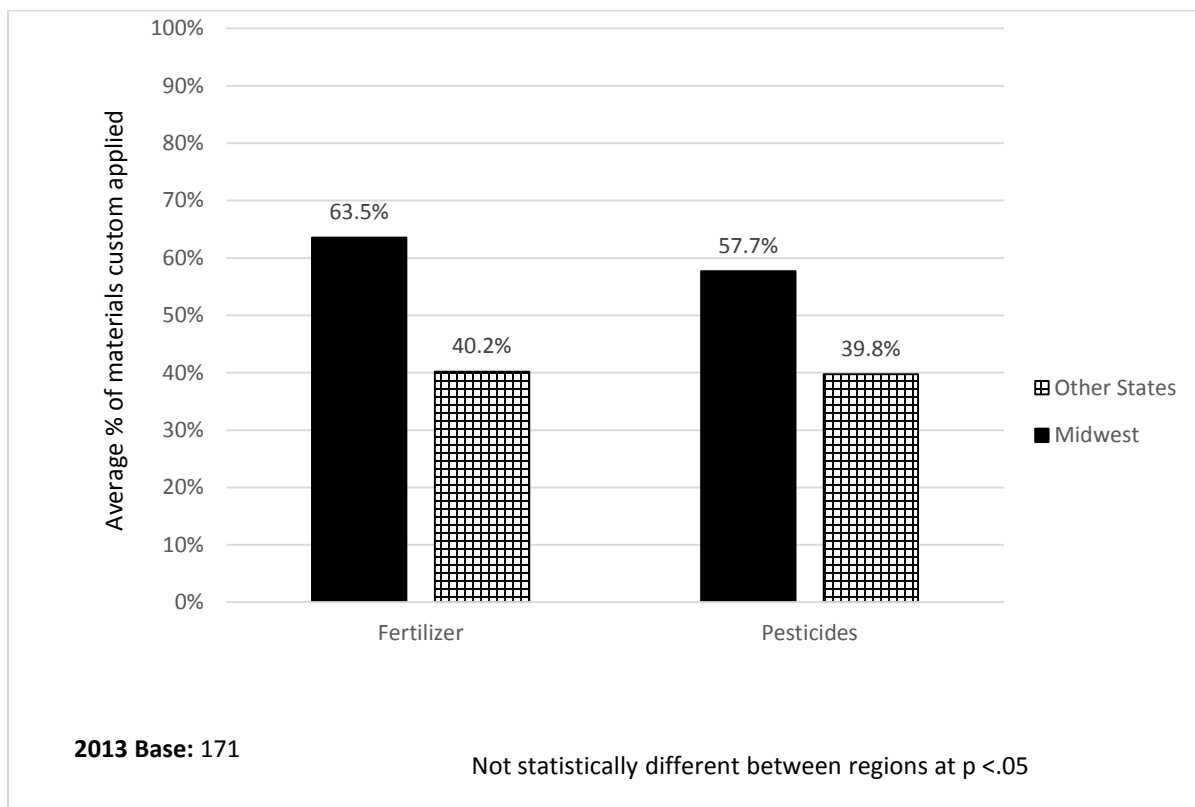
Among dealerships responding to offering custom application services, more respondents custom applied the fertilizer sold to farmers (95 percent) than the pesticides sold (90 percent) (Figure 11). The amount of fertilizer sales custom applied averaged 57 percent in the 2013 survey, which was down from 65 percent in the 2011 survey. On average, 52 percent of total pesticide/herbicide sales were custom applied, which was similar to the 2011 figure of 53 percent. Over a third (35 percent) of respondents custom applied over 75 percent of the fertilizer they sold to farmers in the 2013 survey.

**Figure 11. Custom Application of Fertilizer and Pesticides**



In the Midwest, dealerships offering custom application applied more of the fertilizer they sold than pesticides sold (Figure 12). 64 percent and 58 percent of respective fertilizer and pesticide sales were reported to have been custom applied in the Midwest. In comparison, 40 percent of both fertilizer and pesticide sales in Other States were custom applied.

**Figure 12. Custom Application of Fertilizer and Pesticides by Region**

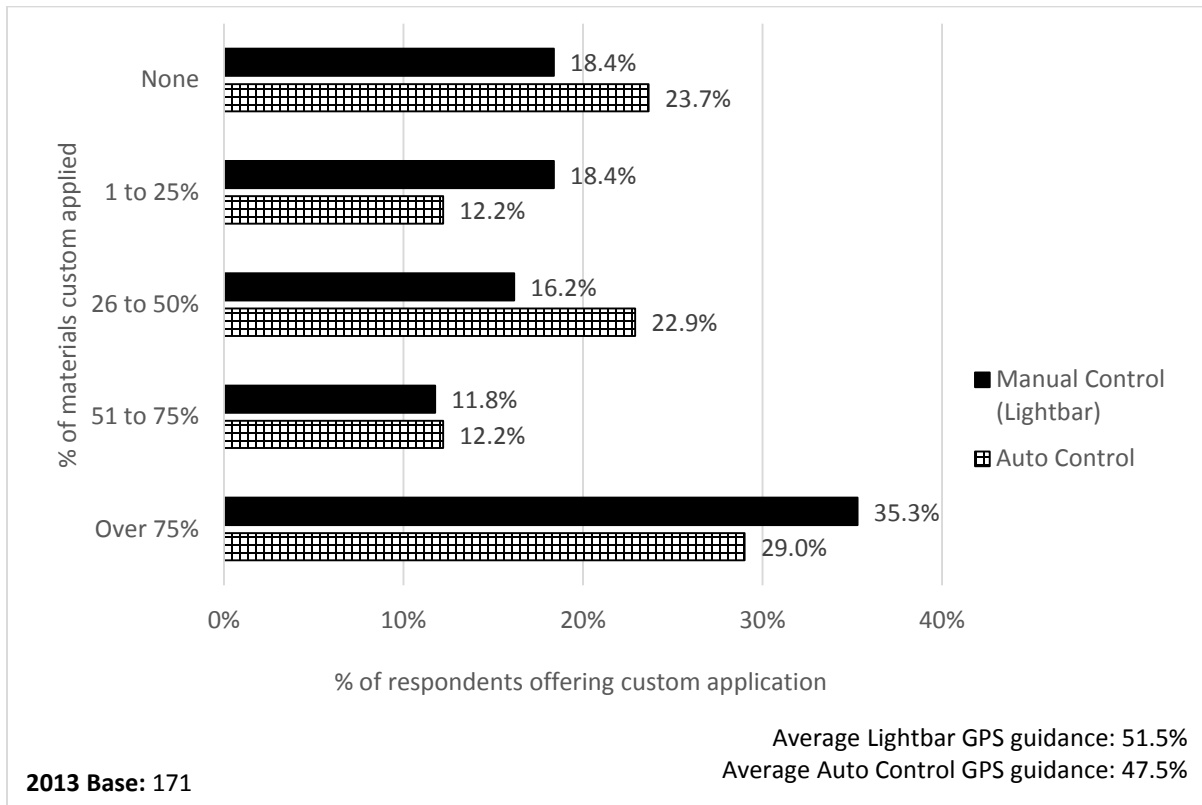


GPS guidance systems have been the poster children for advancements in precision agricultural technology in recent history. As reflected in past surveys, manual control systems (light bar) were the most popular type of guidance system until the 2009 survey when their popularity peaked. In the 2013 survey, 82 percent of respondents offering custom application provided manual control systems to their customers, up from 72 percent in the 2011 survey but still below the peak of 92 percent in the 2009 survey (Figure 13). In contrast, automatic control systems (autosteer) have been trending upwards in recent surveys. Of the total respondents offering custom application, 76 percent of participants used autosteer in the 2013 survey. This rising trend is consistent with previous survey results, with 28 percent of respondents in 2008 using automatic control, which increased to 56 percent in 2009 and to 70 percent in 2011.

To further elaborate on the increased use of automatic guidance technology, the average amount of respondents offering custom application who used automatic control guidance/autosteer in 2013 was 48 percent, up from 40 percent in the 2011 survey. 52 percent of responding dealerships offering custom application used manual control guidance/light bar systems in the most recent survey. While this number is up from 46 percent in the 2011 survey, it is still lower than the 78 percent of respondents who used light bars in the 2009 survey. This could indicate that in recent years, late adopters and smaller operators have begun adopting GPS guidance system technology.

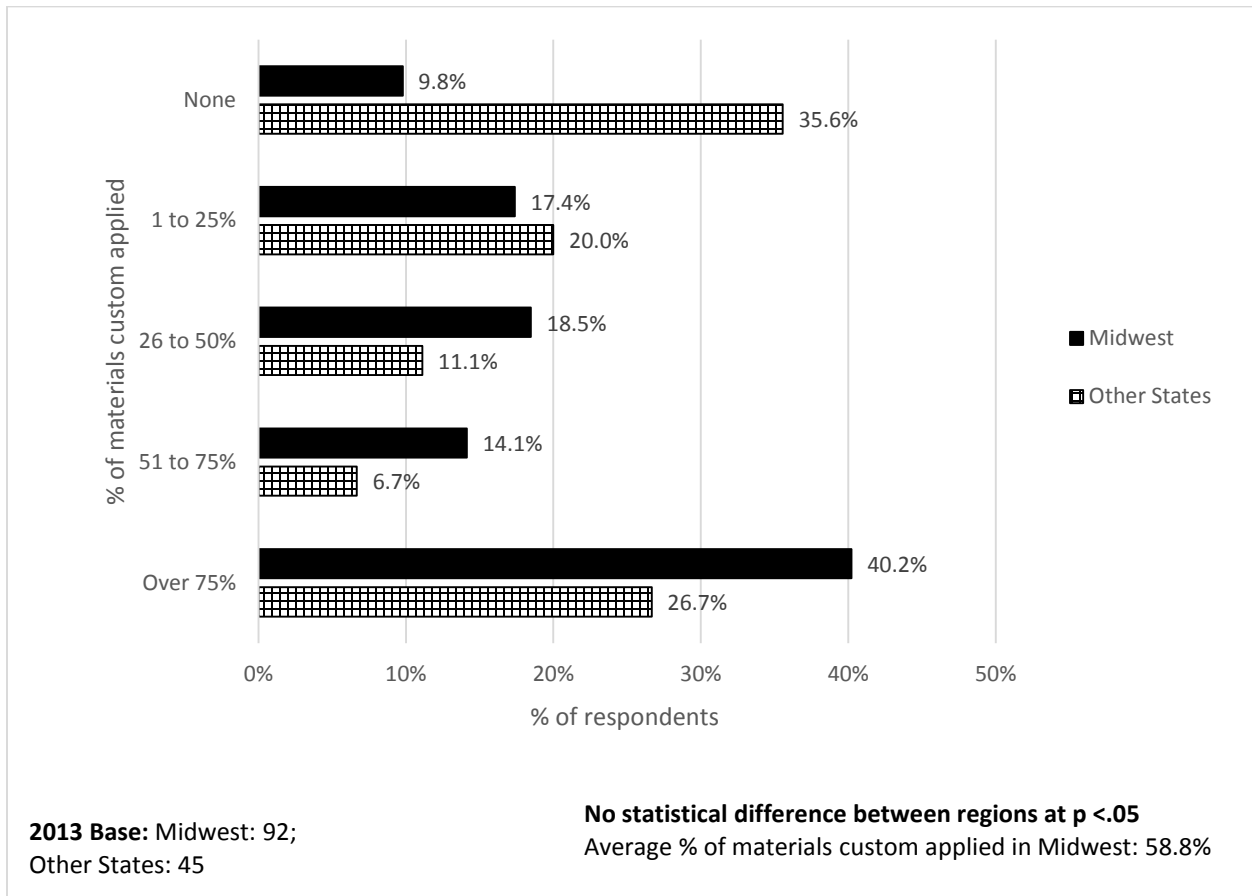


**Figure 13. Use of GPS Guidance Systems for Custom Application**



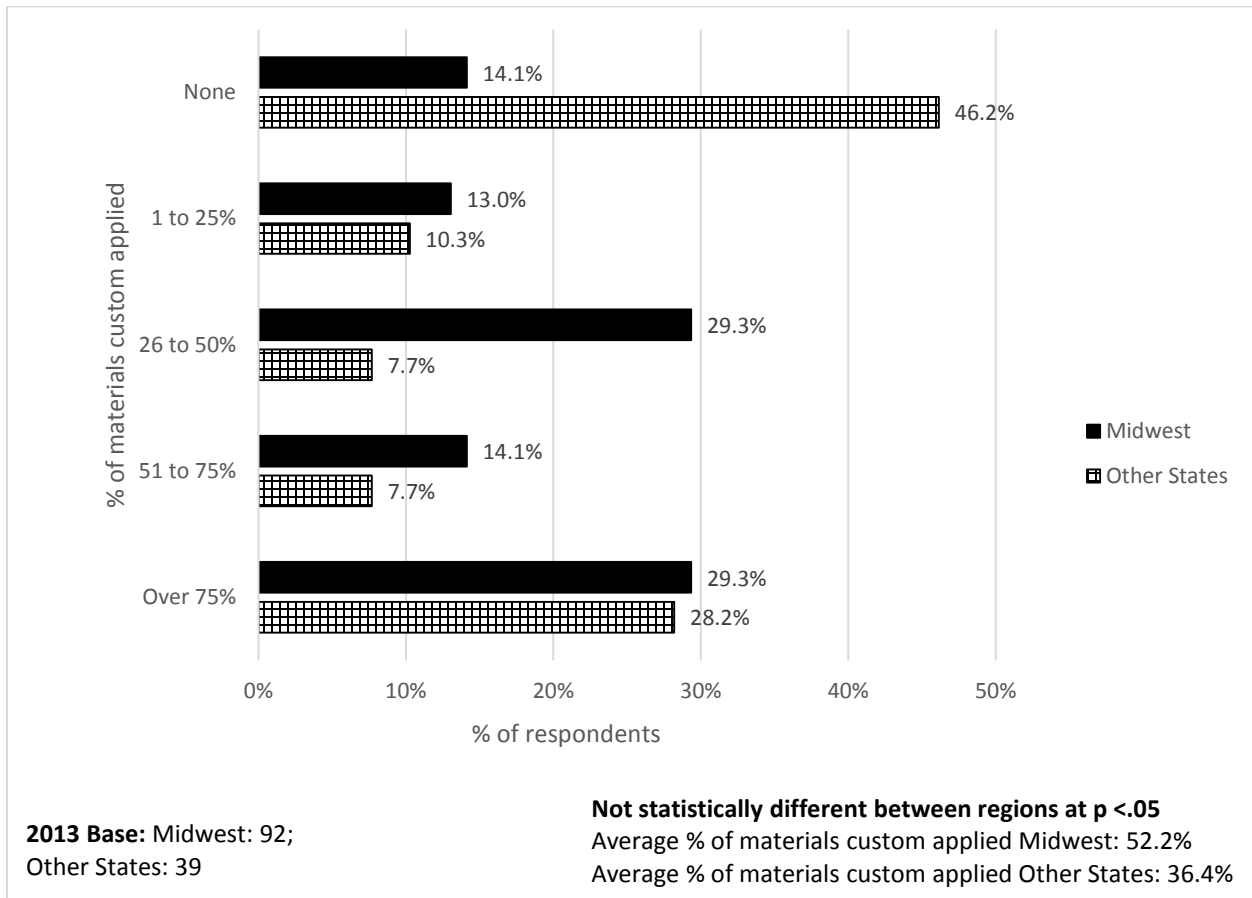
When broken down into use by region, manual control guidance systems (light bars) are more commonly used in the Midwest (used by 90 percent of dealerships offering custom application) than in Other States (used by 64 percent of dealerships). As seen in Figure 14, Midwestern dealerships use manual control guidance systems for custom application more frequently than their counterparts in Other States. On average, 59 percent of respondents from the Midwest used light bars, while 38 percent of respondents from Other States used light bars. In the last 3 surveys, light bar use by region has varied. In the current survey, 90 percent of Midwestern respondents used this technology compared with 78 percent of respondents from Other States in 2011 and 98 percent in 2009. Similarly in Other States, 64 percent responded to using light bars for custom application in 2013, in comparison to 54 percent in 2011 and 74 percent in 2009.

**Figure 14. Use of GPS Guidance Systems for Custom Application by Region: Manual Control**



There is a different story to be told by region in observing the results of auto control/autosteer systems versus manual control/light bar systems. As with manual control systems, the Midwest dominates in their frequency of the use of auto control systems in comparison to other regions in the United States. In the 2013 survey, the average amount of materials custom applied in the Midwest was 52 percent (compared to 43 percent in 2011) and 36 percent in Other States (compared to 34 percent in 2011) reflecting the increasing popularity of automatic control technology amongst responding dealerships (Figure 15). The total amount of survey participants in the Midwest using auto control systems in the 2013 was 86 percent, up from 69 percent in 2011 and 62 percent in 2009. Use of autosteer in Other States increased to 54 percent in the 2013 survey. While this number was up from the 2011 survey (55 percent) as well as the 2009 survey (40 percent), this growth was not as intense as the upsurge of autosteer technology adoption in the Midwest.

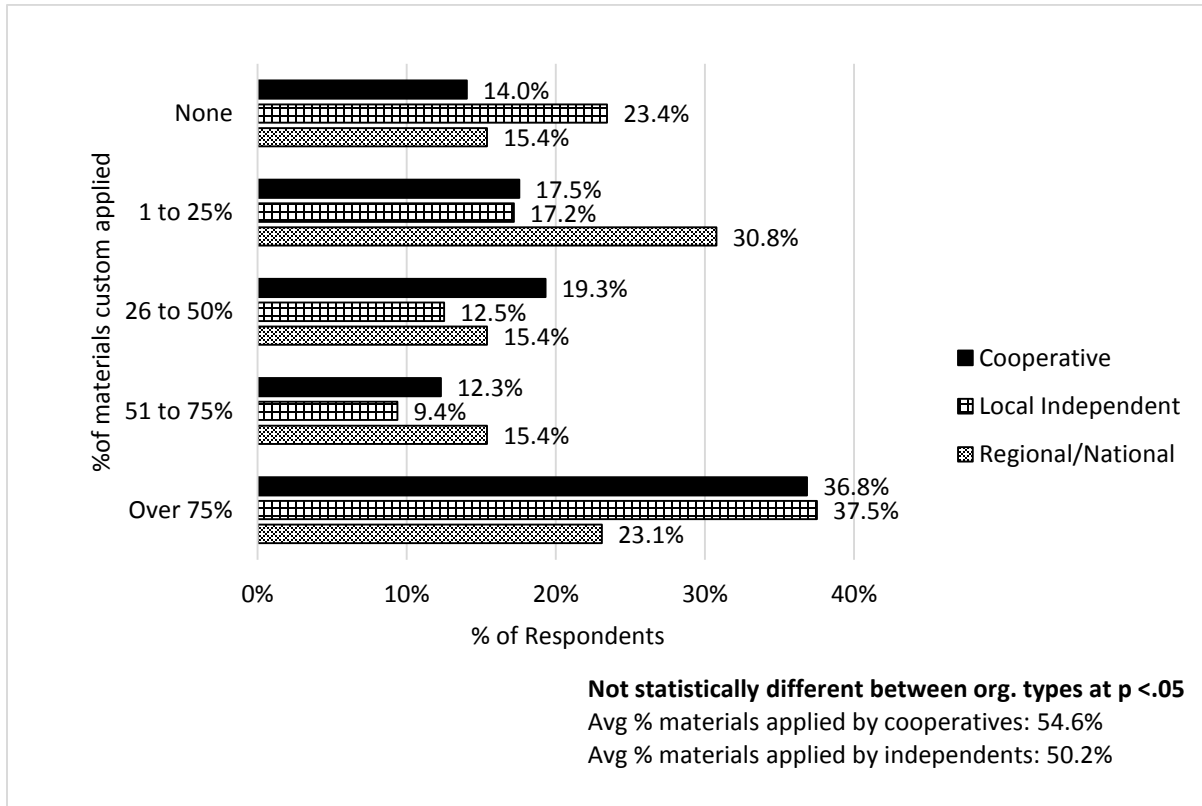
**Figure 15. Use of GPS Guidance Systems for Custom Application by Region: Auto Control**



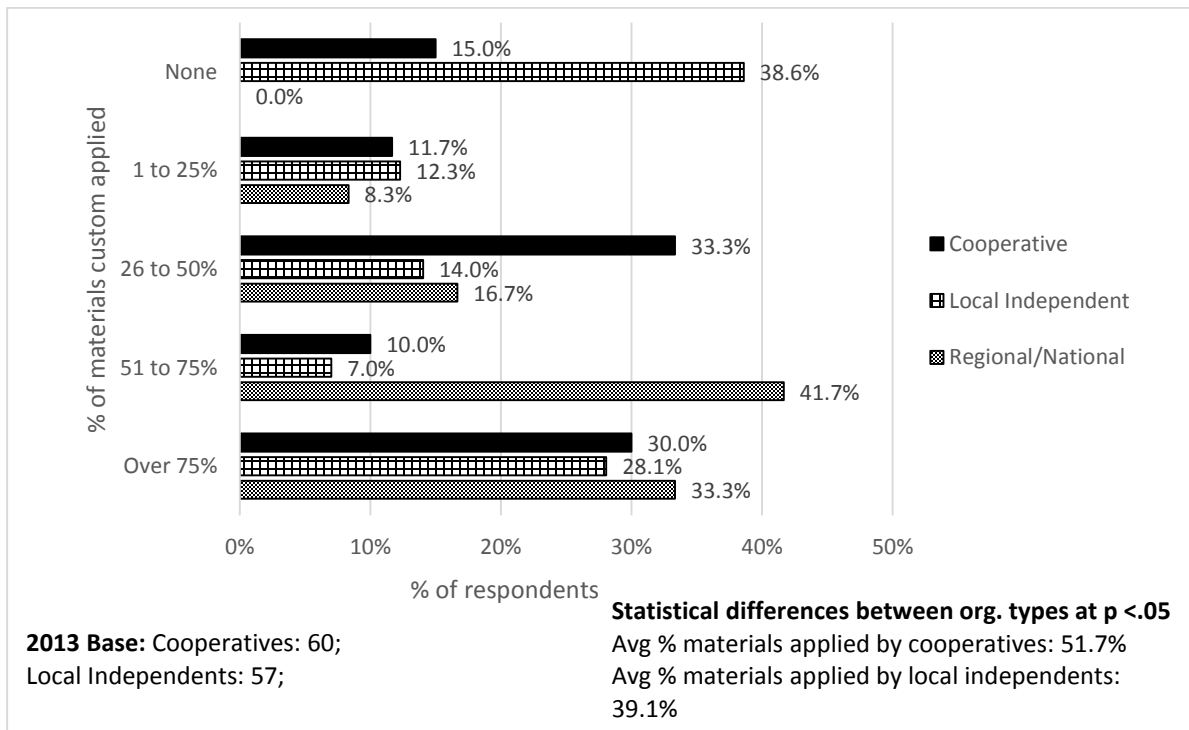
No statistical differences were observed across organizational types for use of manual control guidance systems for respondents offering custom application (Figure 16). The highest increase in use of light bar systems was found in regional/national chain dealerships, of which 85 percent responded to using light bar systems for custom application, which was an increase from 2011 when only 62 percent of regional/national dealers used light bars.

Statistical differences were significant across organization types for use of automatic control guidance systems in custom application (Figure 17). In the 2013 survey, 85 percent of cooperatives surveyed that offered custom application to their customers used autocontrol.

**Figure 16. Use of GPS Guidance Systems for Custom Application by Organizational Type in the Midwest: Manual Control**



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



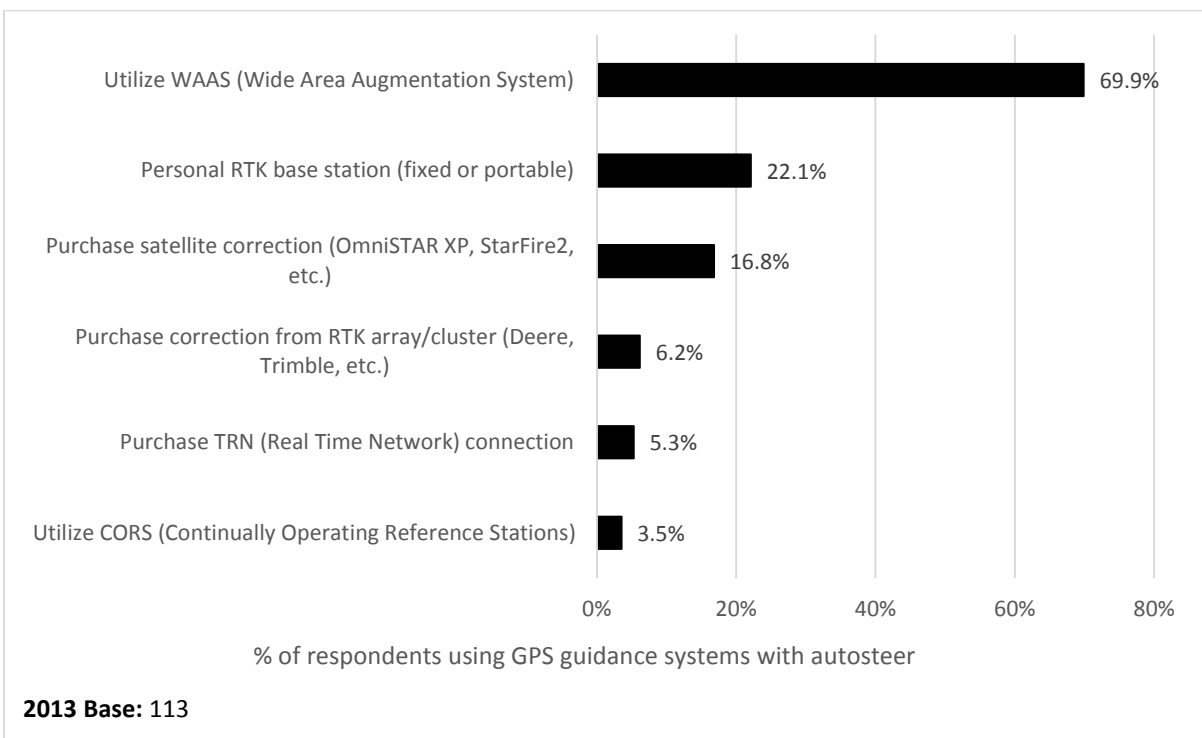
For respondents who used automatic control guidance systems, they were further asked what types of corrections they used (see Table 1). As in previous surveys, the most common type of correction used was Wide Area Augmentation Systems (WAAS). 70 percent of respondents using GPS systems with autosteer utilized WAAS correction in the 2013 survey (Figure 18), a slight increase from 67 percent in the 2011 survey. A contributing factor to the high amount of respondents using WAAS versus the other technology options listed is that the WAAS technology is a free service available through the FAA. 22 percent of the respondents used a personal RTK base station, which was an increase from 14 percent in 2011. With a personal RTK base station, an individual base station is purchased, as this technology is ideal for users who have poor signal strength in their fields.

Decreases were seen in the 2013 survey in respondents who purchased satellite correction and correction from an RTK array/cluster. The 2013 survey indicated 17 percent of respondents using auto control had purchased a satellite correction such as OmniSTAR XP and StarFire2, a decline from the 2011 survey when 22 percent of respondents had used satellite correction. Purchasing correction services from an RTK array/cluster such as Deere and Trimble dropped from 25 percent in 2011 to 6 percent in 2013.

4 percent of respondents purchased Real Time Network connection and 3 percent utilized Continually Operating Reference Stations. These were slight increases from the 2011 survey.

Statistical differences were observed between Midwestern and Other States at  $p < .05$  for respondents selecting Wide Area Augmentation Systems (WAAS) and for those who purchased RTN correction. Additionally, statistical differences were also observed by organizational type at the same significance level for WAAS.

**Figure 18. Types of GPS Correction Used**



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

In addition to responding to questions about their use of GPS guidance systems for custom application, responding dealerships also answered questions about other precision technologies and site-specific services they were currently using and/or offering to their customers. They were also asked to look forward 3 years to estimate what precision products they would be using and/or offering their customers by 2016.

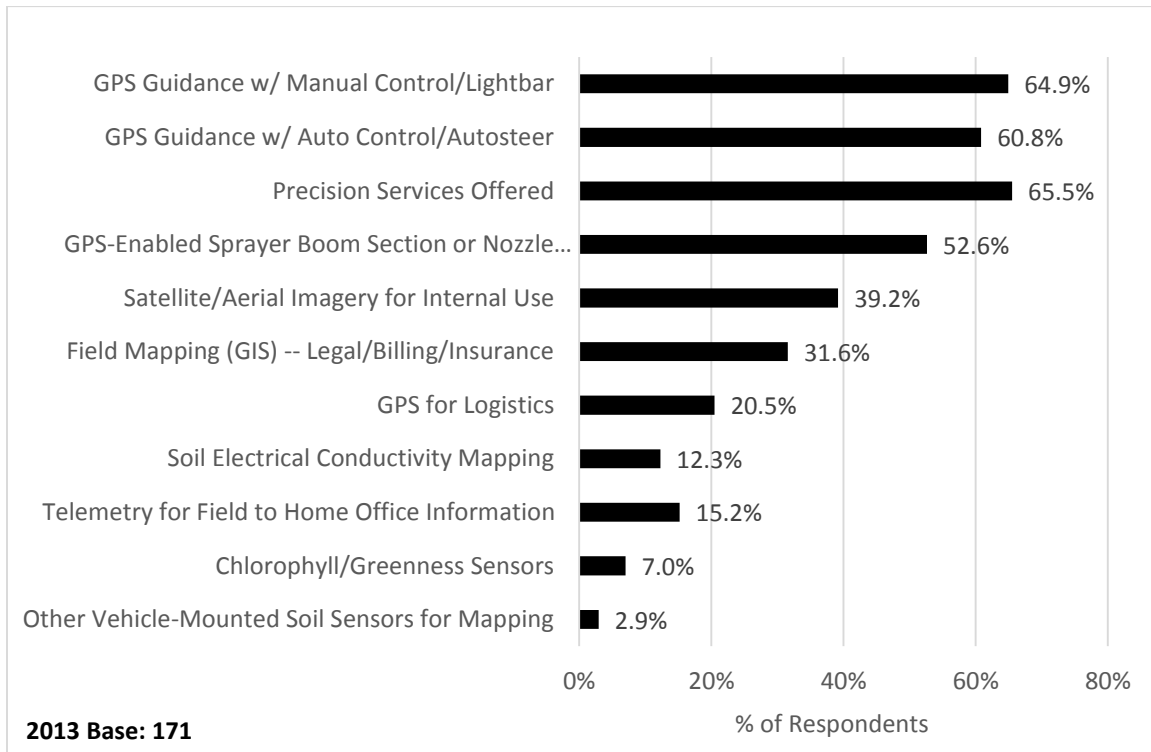
### Use of Precision Technologies

Dealerships were asked about the cumulative precision technologies they offered their customers, such as GPS guidance for custom application, as well as the technologies they used internally, including billing/insurance/legal activities and field-to-home office communications.

Precision agronomic services, such as soil sampling with GPS, GIS field mapping, etc., were the most popular use in the 2013 survey, ahead of lightbar and autosteer GPS systems, with 66 percent of respondents offering these services to their customers (Figure 19). This was an increase from 59 percent in the 2011 survey. GPS guidance systems with manual (light bar) and automatic (autosteer) control were offered by 65 percent and 61 percent, respectively, of responding dealerships. GPS-enabled sprayer boom sections (53 percent), satellite/aerial imagery (39 percent), field mapping with GIS for billing purposes (32 percent), and GPS for logistics (21 percent) all made gains from the 2011 survey. One of the biggest increases was seen in dealerships' use of telemetry for field-to-home office communications.

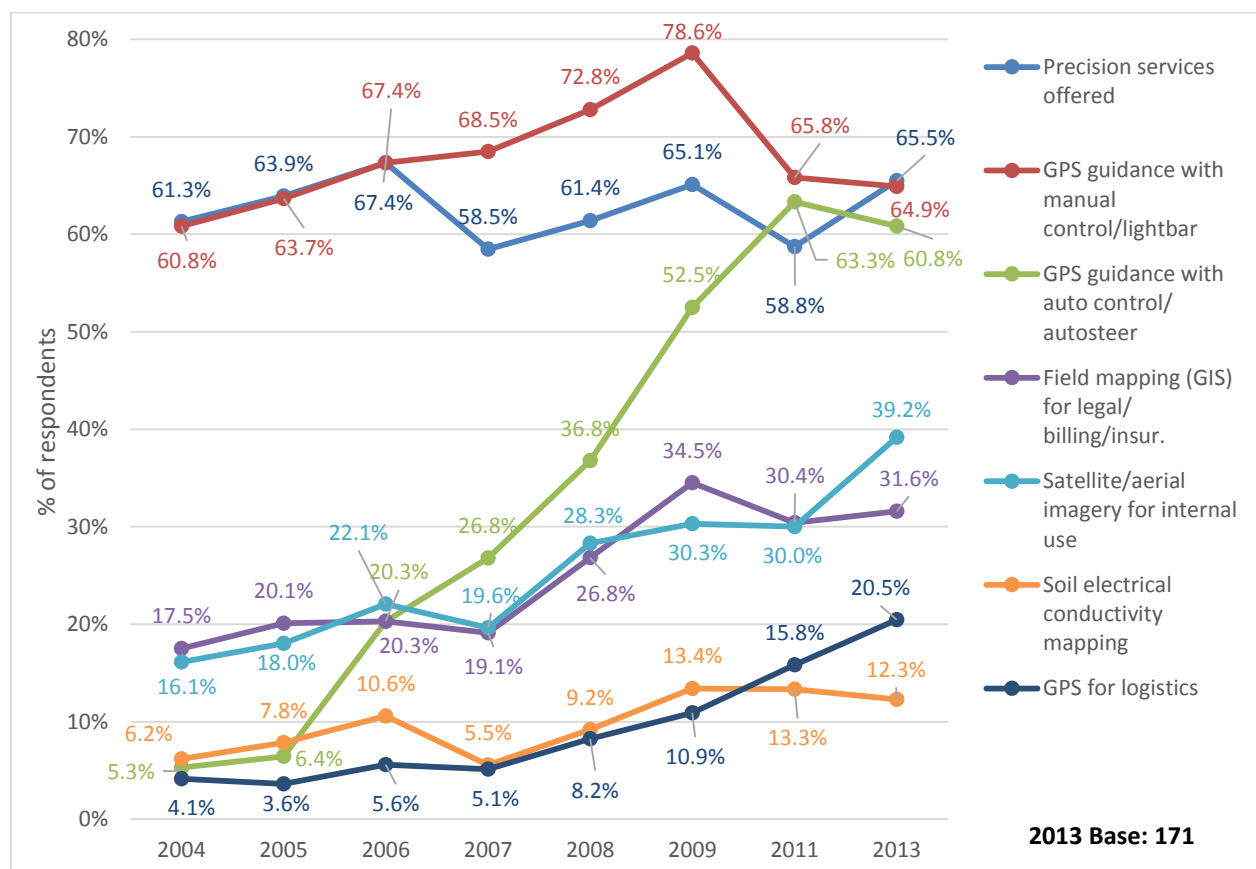
15 percent of participants used this technology in 2013, which was a jump from 7 percent in 2011. Chlorophyll/greenness sensors also increased to 7 percent from 4 percent previously. Soil electrical conductivity mapping (12 percent) and other vehicle-mounted soil sensors for mapping (3 percent) were similar to 2011 results.

**Figure 19. Use of Precision Technology**



In the past decade, differing applications of precision technology have grown in popularity of use at different rates. GPS guidance with manual control/light bar continued a decline first observed in the 2011 survey, accounting for 65 percent of respondents (Figure 20). The decrease in respondents using GPS guidance with automatic control/autosteer (63 percent in 2011 to 61 percent in 2013) was unexpected. Field mapping (GIS) for legal/billing/insurance purposes and satellite/aerial imagery for internal use continued along an upward trajectory in the 2013 survey.

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



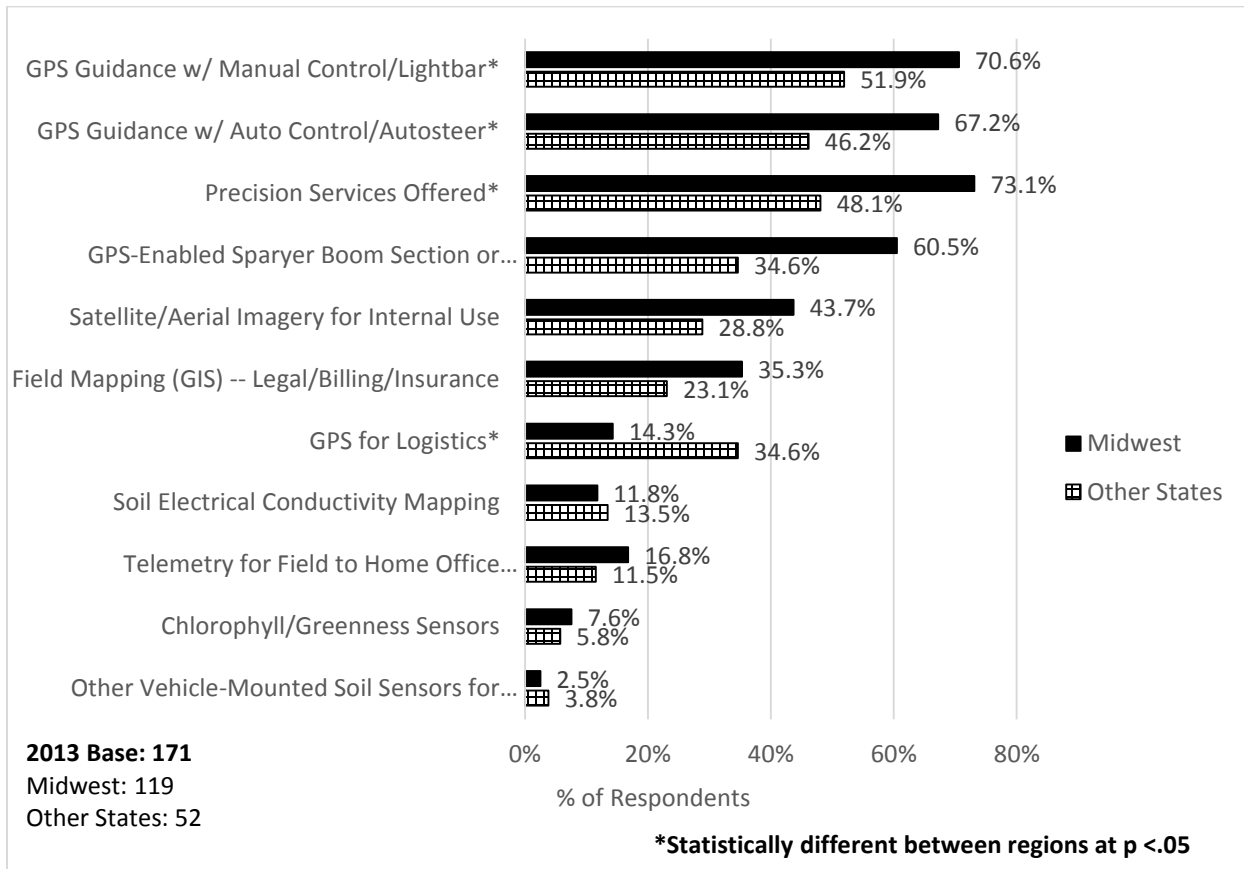
Consistent with surveys in previous years, dealerships in the Midwest used precision products and services more frequently than in other regions of the country (Figure 21). GPS guidance systems and total precision services offered remained among the most common uses of precision technology indicated by dealerships nationwide.

In the 2011 survey, a new option was introduced allowing dealerships to indicate whether or not they used GPS-enabled sprayer boom sections or nozzle controls. In the 2013 survey, 61 percent of respondents in the Midwest used this technology, an increase from 46 percent of Midwestern respondents in the 2011 survey. The implementation of this technology has taken off in Other States in recent years, moving from 19 percent in 2011 to 35 percent in the 2013 survey. Statistical differences in regions between  $p < .05$  was observed for GPS-enabled sprayers.

In Other States, the only services used more commonly than in Midwestern states were GPS for logistics used by 35 percent of Other State dealerships (statistically different between regions), soil electrical conductivity mapping (14 percent of Other State respondents), and other vehicle-mounted soil sensors for mapping (4 percent of Other State respondents).



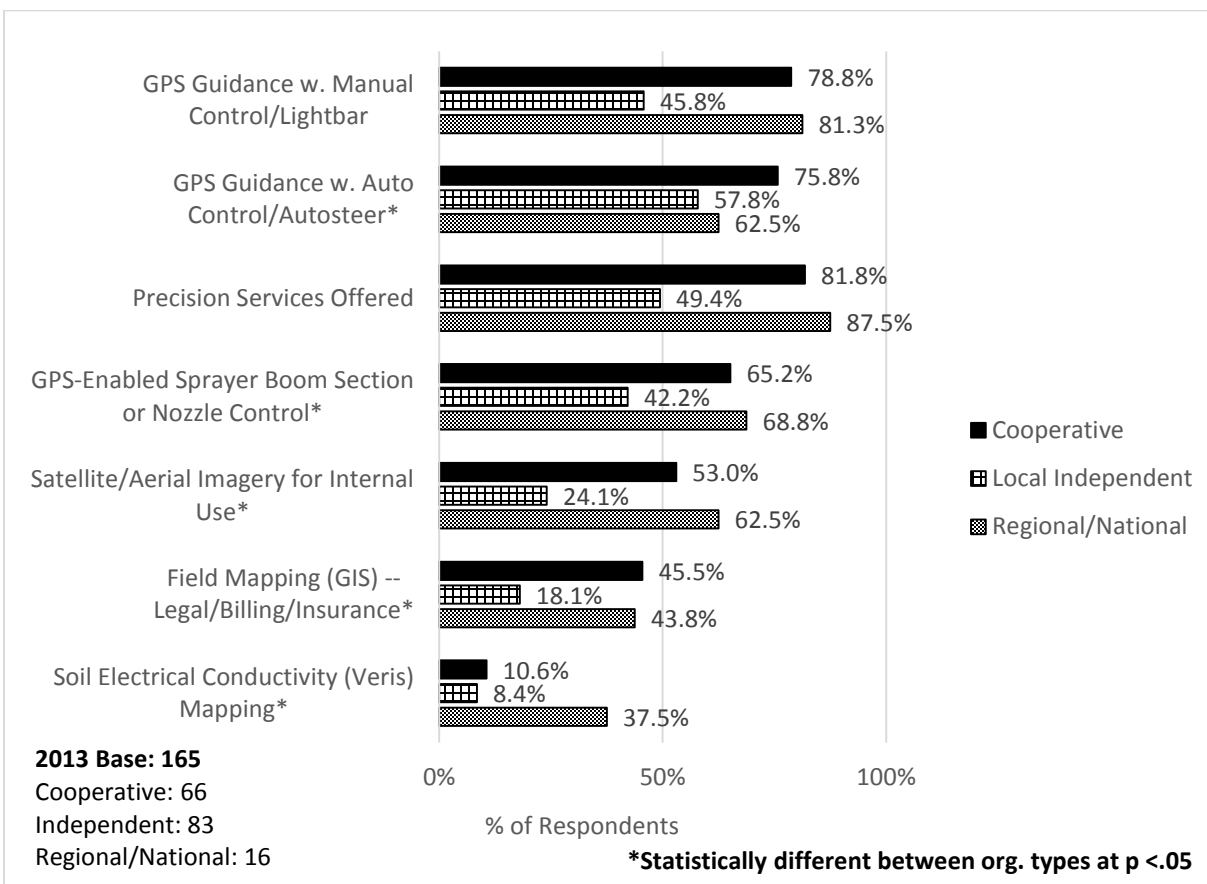
**Figure 21. Use of Precision Technology by Region**



Use and offering of precision technology also varied by organizational structure in the 2013 survey. Across the board, fewer local independents used or offered the amount of precision services and/or products as compared to cooperatives and regional/national chains, which is consistent with findings in previous surveys (Figure 22). GPS guidance with manual control and automatic control remained the most commonly used precision technologies throughout all three organizational types. Differences were statistically significant between organization types for autosteer guidance, satellite/aerial imagery, field mapping with GIS, and soil electrical conductivity mapping.

88 percent of regional/national dealerships and 82 percent of cooperatives offered precision services to their customers, while only 49 percent of independent dealerships gave customers precision technology options. GPS-enabled sprayers, satellite/aerial imagery for internal use, and field mapping with GIS showed increased use across all organization types. Use of soil electrical conductivity mapping at regional/national dealership chains increased dramatically from 7 percent in 2011 to 38 percent in 2013.

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

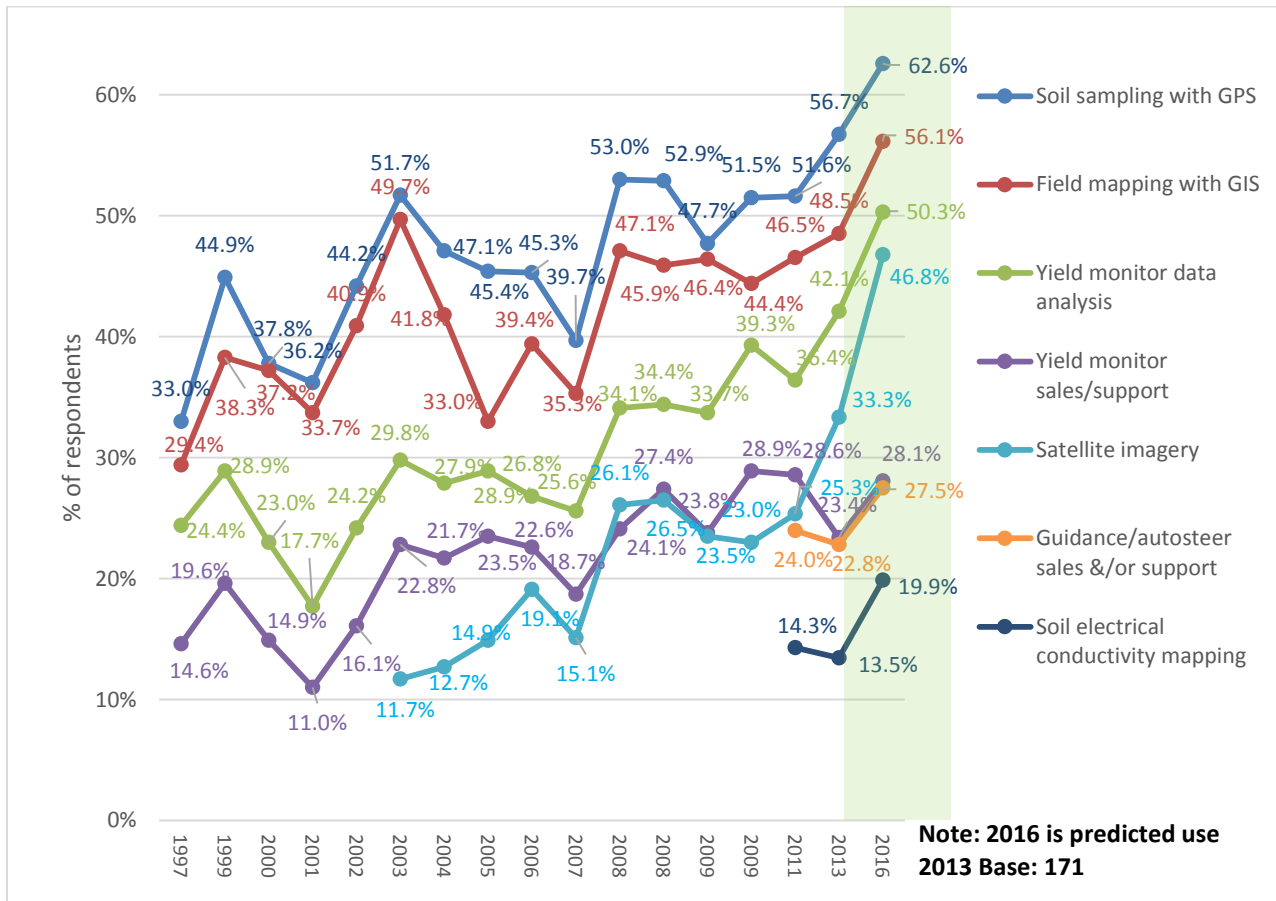


## Precision Service Offerings

Survey respondents were asked which specific precision services they would be offering by Fall 2013. Survey results indicated soil sampling with GPS was the most commonly offered precision service provided by dealerships. 57 percent of participants expect to be offering soil sampling at their dealerships by the end of 2013, with 63 percent expecting to provide this service by 2016 (Figure 23). As in previous surveys, field mapping with GIS followed behind soil sampling in the 2013 survey, with 49 percent of dealerships providing the service by fall 2013 and 56 percent by 2016.

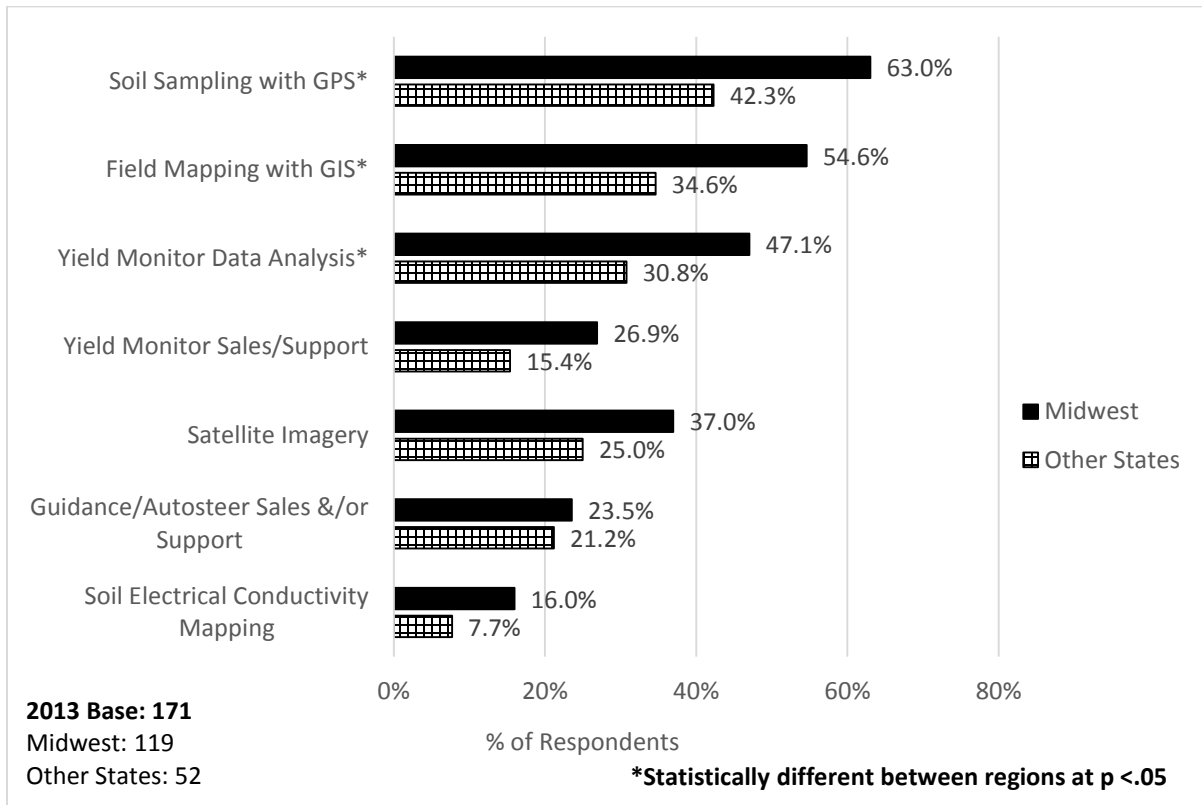
Growth in yield monitor data analysis had dropped in the 2011 survey but recovered in the 2013 survey when the amount of respondents offering the service rose from 36 percent to 42 percent. Dealerships expect further growth in their yield monitor data analysis offerings, with 50 percent of dealerships expecting to offer this service by 2016. Yield monitor sales/support, guidance/autosteer sales and/or support, and soil electrical conductivity mapping showed decreases in their frequency of offerings from the 2011 survey, but participating dealers expected to recover growth in these services by 2016.

**Figure 23. Precision Ag Services Offered Over Time**



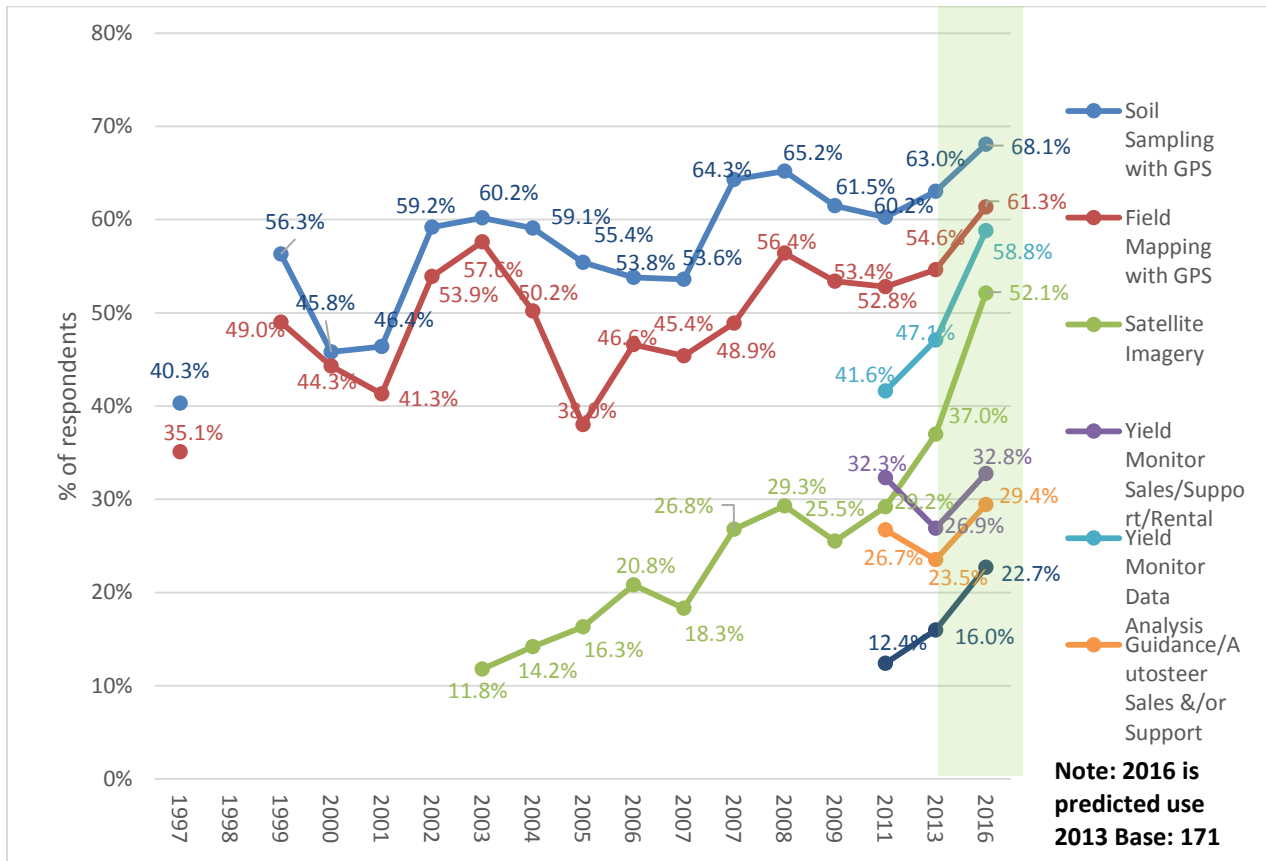
All of the precision service offerings shown in Figure 23 were more prominent in the Midwest than in Other States, with soil sampling with GPS, field mapping with GIS, and yield monitor data analysis statistically more common in the Midwest than in other regions. However, in several categories, the Other States are closing the gap between the Midwest in terms of precision technology offerings. 63 percent of respondents in 2013 offered soil sampling with GPS in the Midwest with 42 percent of respondents from Other State offering similar services, an increase from 27 percent in the 2011 survey (Figure 24). Other States also caught up to the Midwest in every other service category except soil electrical conductivity mapping. In 2011, dealerships 20 percent of Other States and 12 percent of Midwestern dealerships offered soil electrical conductivity mapping, but the regions reversed positions in the 2013 survey, with 16 percent of Midwestern and 8 percent of Other States dealerships providing the service.

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



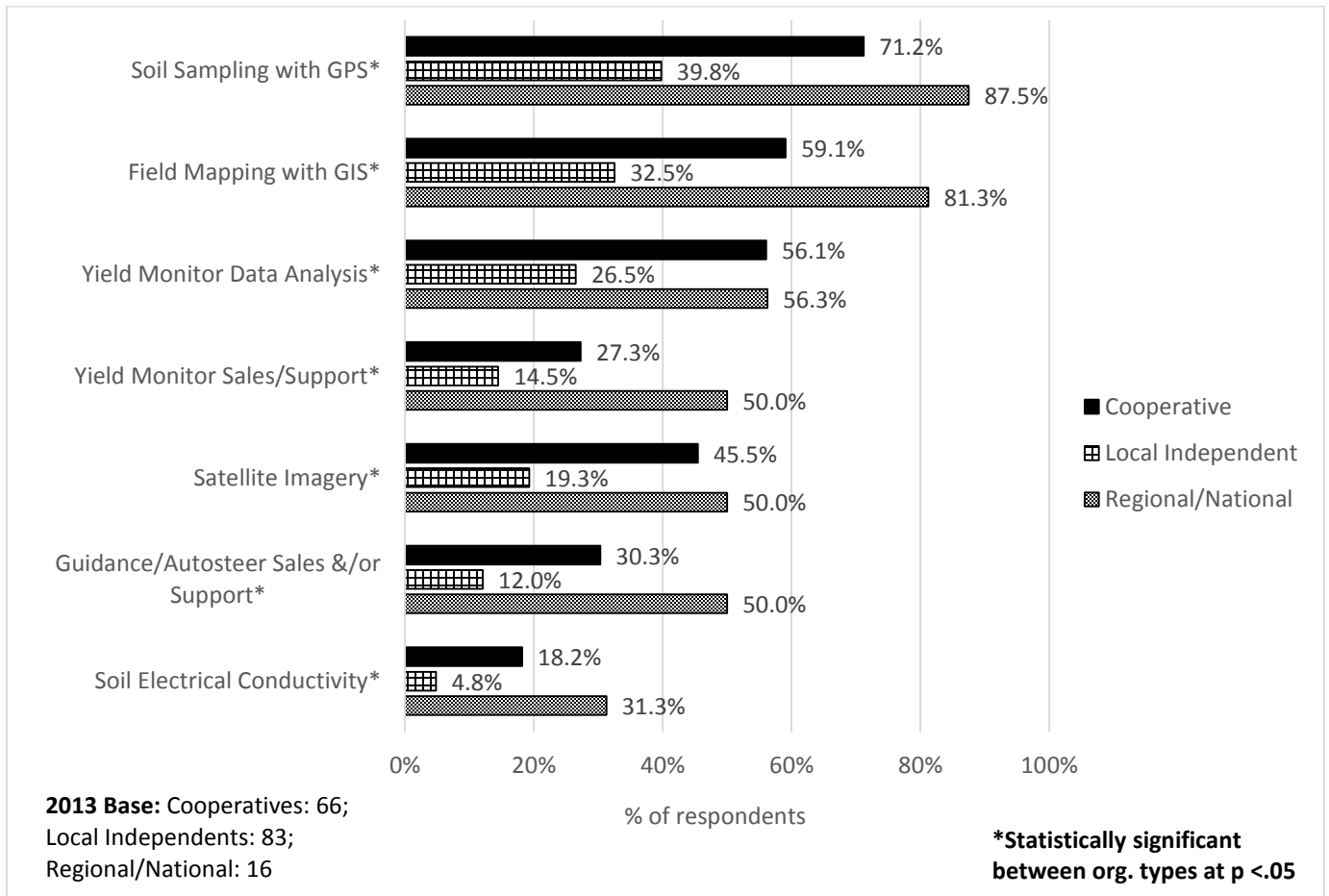
Over the last 15 years in the Midwest, trends in key precision technology service offerings have occurred, as evidenced by Figure 25. These trends have generally maintained upward stability over time, particularly from 2008 to 2013. While some offerings have seen slight decreases in the 2013 survey, including yield monitor sales/support/rental and guidance/autosteering sales and/or support, responding dealerships expect to recover these losses through growth by 2016.

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



The 2013 survey results showed that regional/national dealership chains have a more extensive precision service offering than cooperatives, and especially local independents (Figure 26). This finding is consistent with results from previous years' surveys. In the 2013 survey, all offerings were statistically different across organizational types.<sup>a</sup>

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

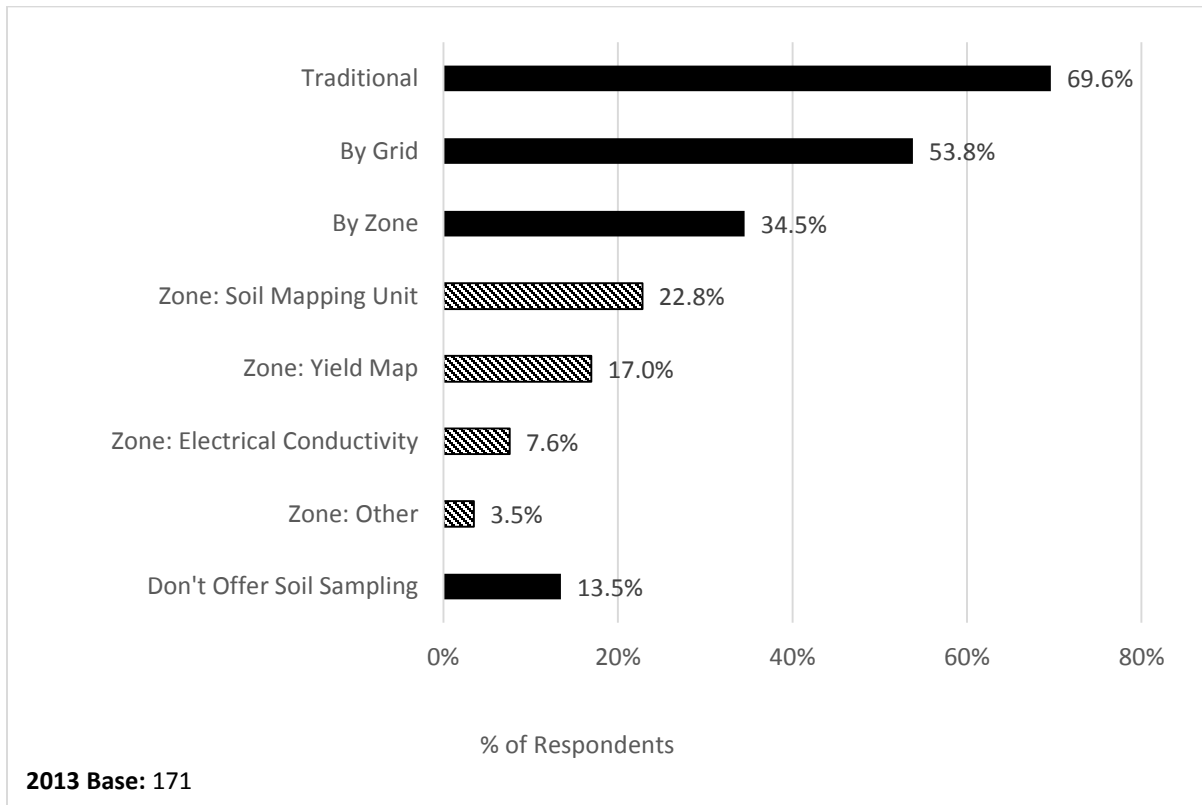


## A Focus on Soil Sampling

Survey respondents were asked about their soil sampling services and the types – by grid or by management zone – offered to their customers. This question was modified in the 2011 survey to more closely reflect the changes to soil sampling technologies and service offerings. The 2013 survey provided an opportunity to compare the findings of the 2011 survey.

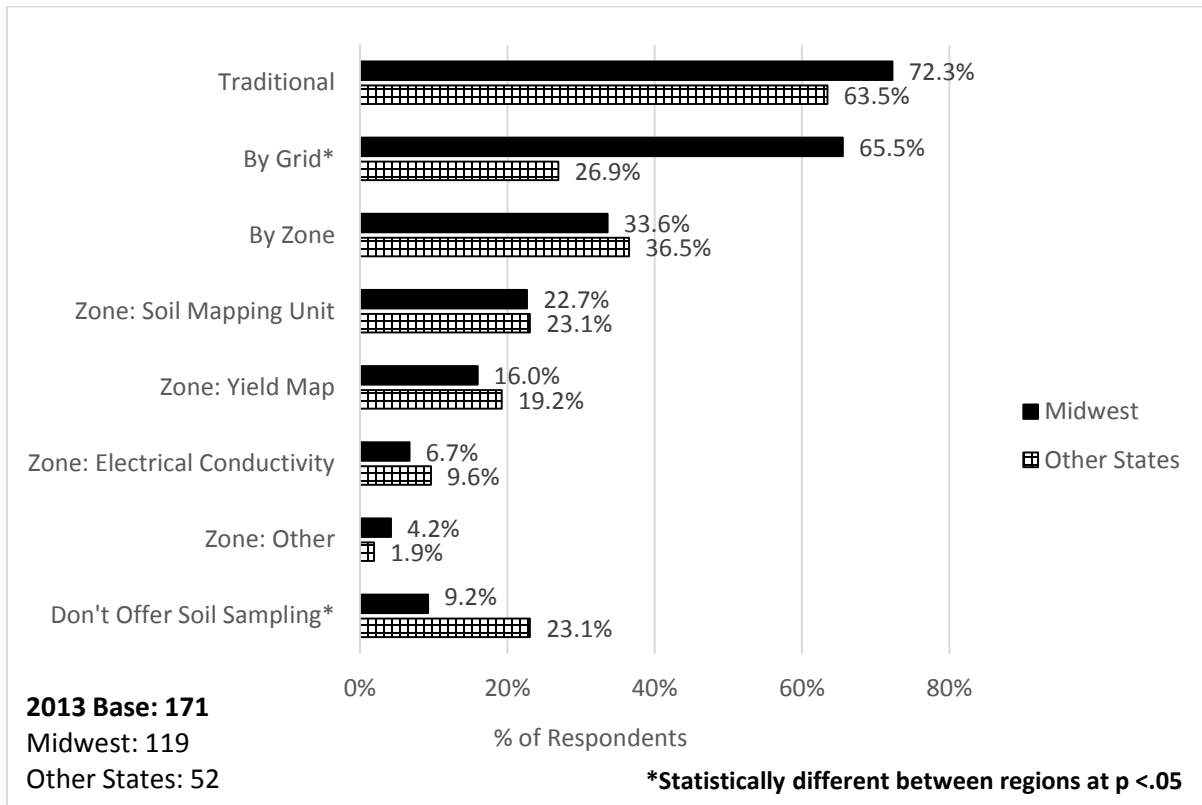
87 percent of survey respondents offered some type of soil sampling at their dealership, according to the 2013 survey (Figure 27). Of these dealerships, 70 percent offered traditional sampling, 54 percent offered sampling following a grid pattern, and 35 percent offered sampling by management zone. Consistent with the 2011 survey, soil sampling by management zone was most commonly offered by soil type zone (23 percent) or by zones based on yield maps (17 percent)

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



Soil sampling in the Midwest is more commonplace than in Other States, as 91 percent of dealerships in the Midwest offered soil sampling (Figure 28). 77 percent of dealerships in Other States offered soil sampling services, which was only a slight increase from the 75 percent of Other States dealerships in the 2011 survey who offered soil sampling. In fact, soil sampling by grid was offered more than twice as often in Midwestern states (66 percent) as it was in Other States (27 percent). Sampling by soil zone type increased in Other States and surpassed Midwestern states since the 2011 survey. In 2011, only 16 percent of dealerships in Other States offered zone sampling, whereas 27 percent of Midwestern dealerships offered this service. In the current survey, 37 percent of dealerships in Other States offered sampling by soil zone type, pulling ahead of the 34 percent of Midwestern dealers who offered similar services.

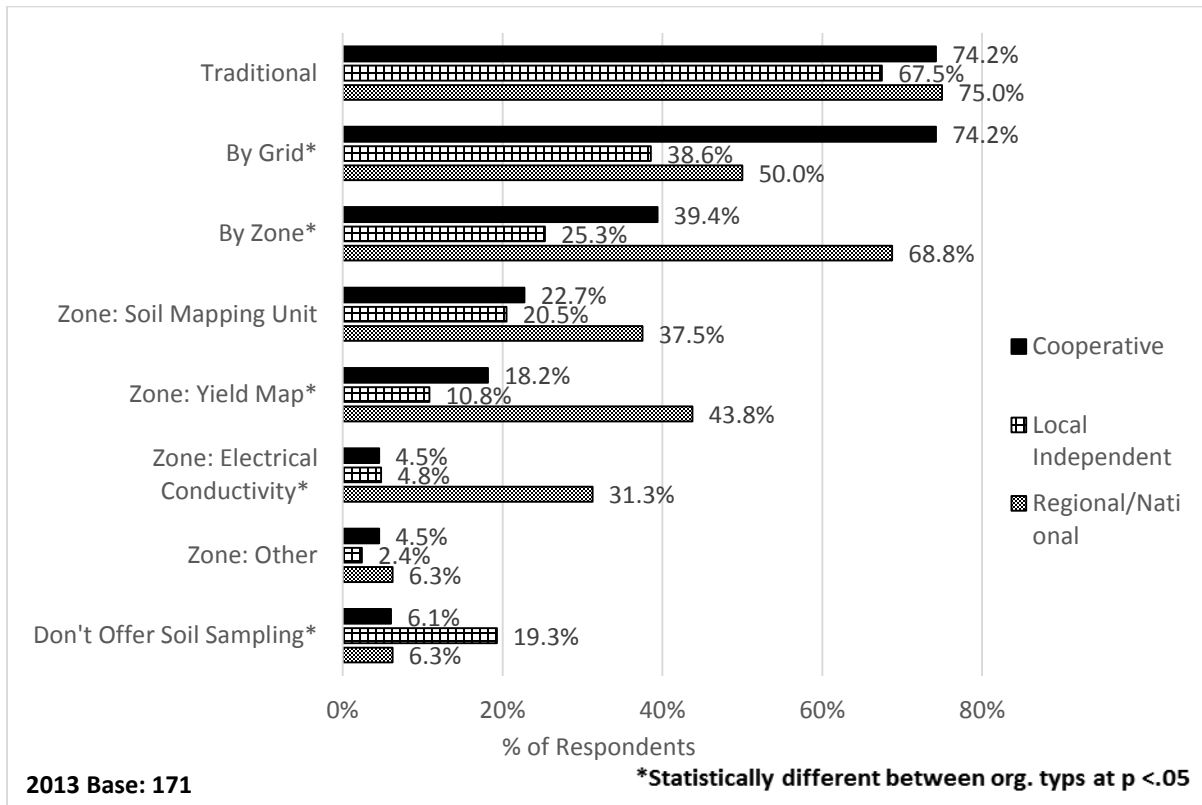
**Figure 28. Types of Soil Sampling Offered by Region**



Soil sampling types also varied by organizational structure of the individual dealerships (Figure 29). Cooperatives provided slightly fewer soil sampling services in this survey (94 percent in 2013 compared to 96 percent in 2011), but they were still ahead of independent dealerships (81 percent) and regional/national dealership chains (94 percent). Cooperatives offered more grid sampling services (74 percent) than other organization types, but generally regional/national dealership chains offered the most soil sampling services.

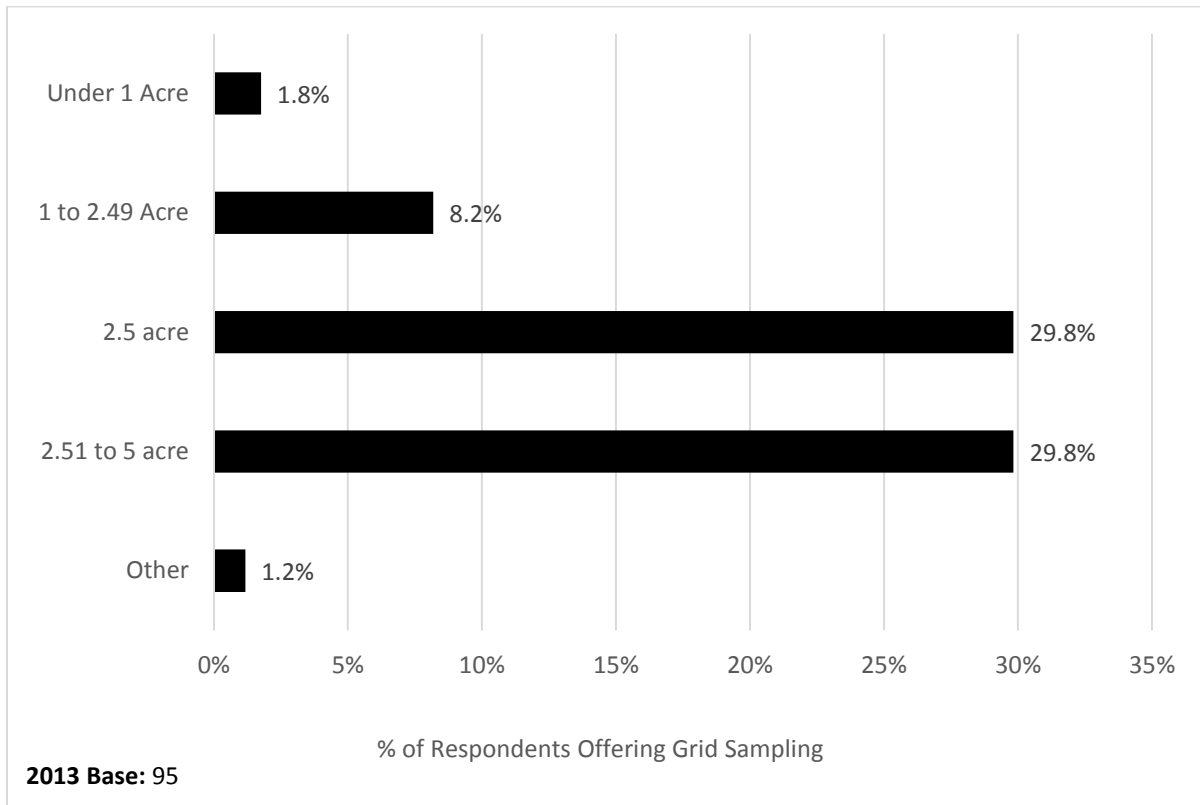


**Figure 29. Types of Soil Sampling Offered by Organizational Type in the Midwest**



Further analysis on soil sampling offered by retailers shows that, of those dealerships sampling by grids, the 2.5 acre grid is very common, with 29.8 percent of retailers offering that sample size (Figure 30). Equally popular was the option for retailers to offer a grid sample between 2.51 and 5 acres in size.

**Figure 30. Grid Sizes Used in Grid Sampling**



## Variable Rate Application

In addition to information about traditional custom application services, survey respondents also provided information about services they currently provide using variable rate custom application of fertilizer, lime, and pesticides, and variable rate seeding using GPS. Participants also projected the variable rate application services they hope to provide by 2016. In comparison to the 2011 survey, the numbers showed that dealerships felt only slightly more optimistic in 2013 about growth prospects for variable rate services in 2016. 51 percent of respondents currently offer controller application of fertilizer (single nutrient), while 47 percent offer a multi-nutrient fertilizer option (Figure 31). Variable rate pesticide application decreased from 2011 (22 percent) to 2013 (16 percent), while variable rate lime application made a minor gain from 2011 (45 percent) to 2013 (47 percent).

Variable seeding rates with GPS increased to 32 percent in 2013 from 24 percent in 2011. This continues the upward trend of variable seeding observed since the 2009 survey (18 percent). 42 percent of the responding dealerships indicated they would be offering variable seeding rates with GPS by 2016.

**Figure 31. Variable Rate Application Offered**

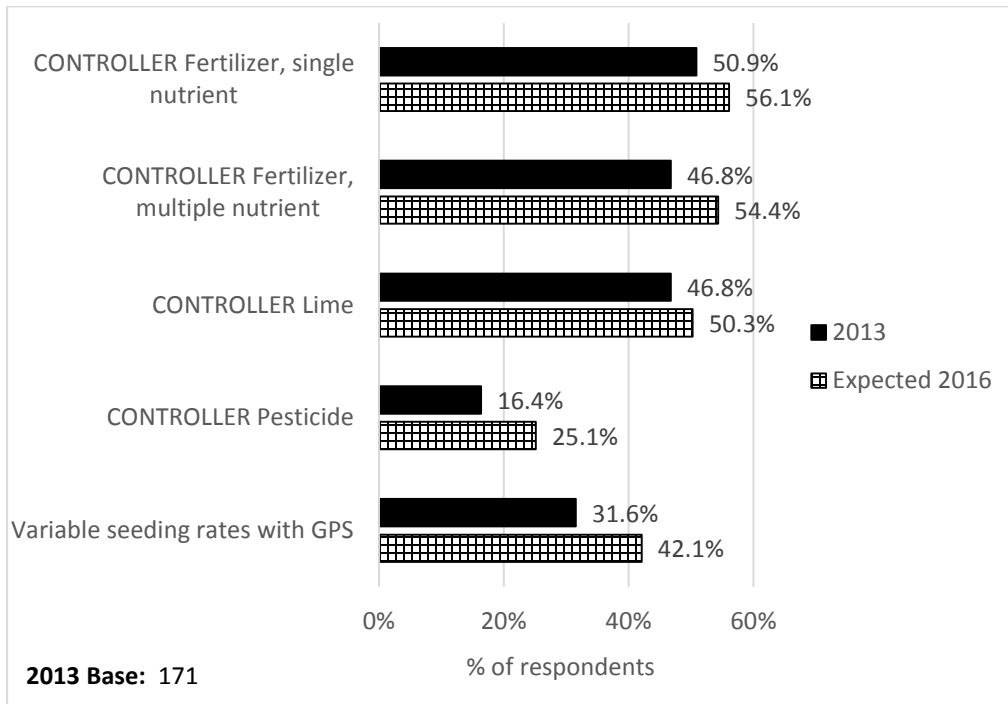
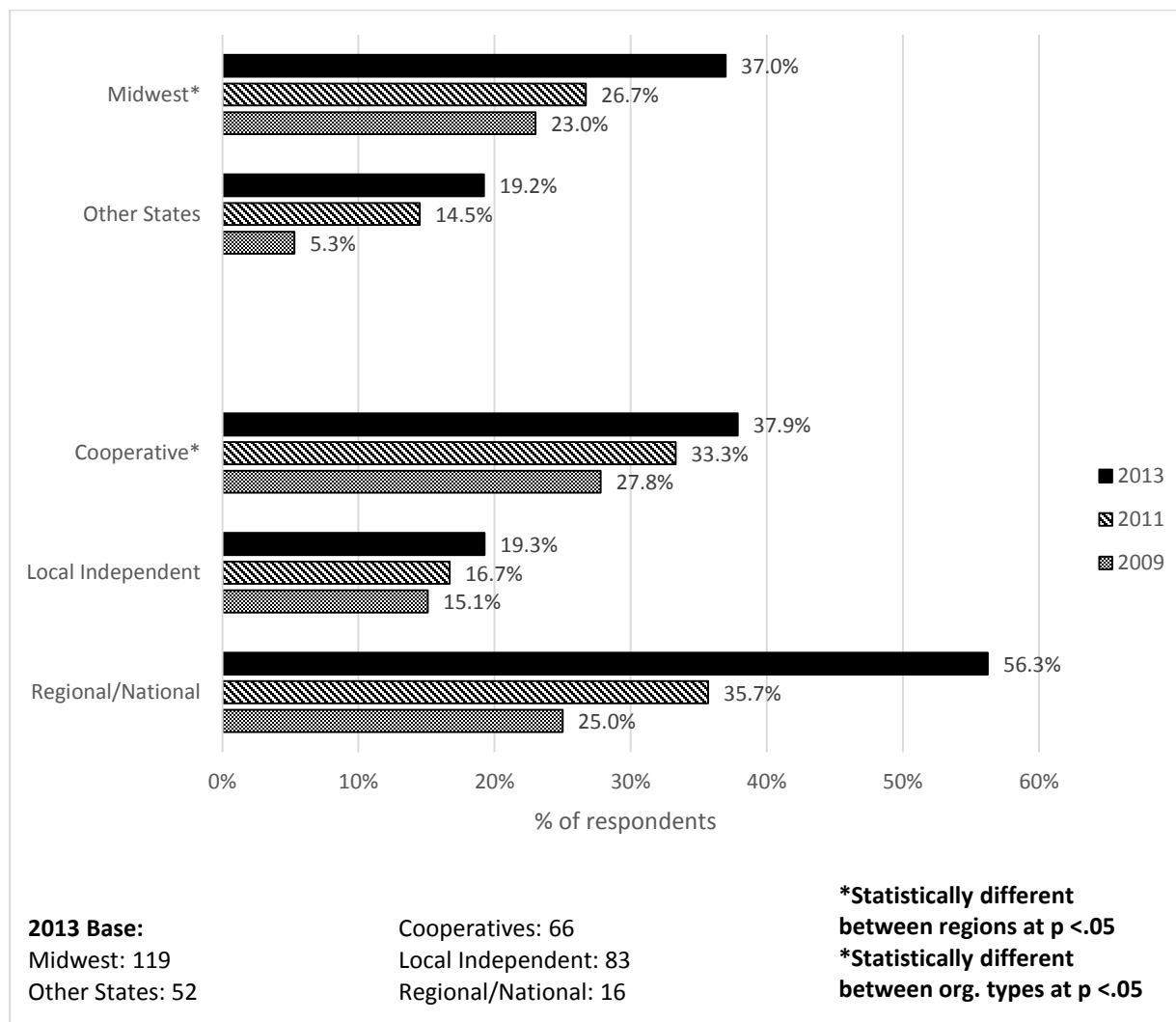


Figure 32 compares variable rate seeding services between regions and organization types over the past 3 surveys. Across the board, dealerships offering variable rate seeding has increased since 2009 by region as well as by organization type. The 2013 survey showed the most growth by region as occurring in the Midwest (27 percent in 2011 to 37 percent in 2013). Among dealerships, regional/national dealerships had the largest increase in variable rate seeding offerings, increasing from 36 percent of respondents in 2011 to 56 percent in 2013.

**Figure 32. Variable Rate Seeding by Regions and Organizational Types within the Midwest**

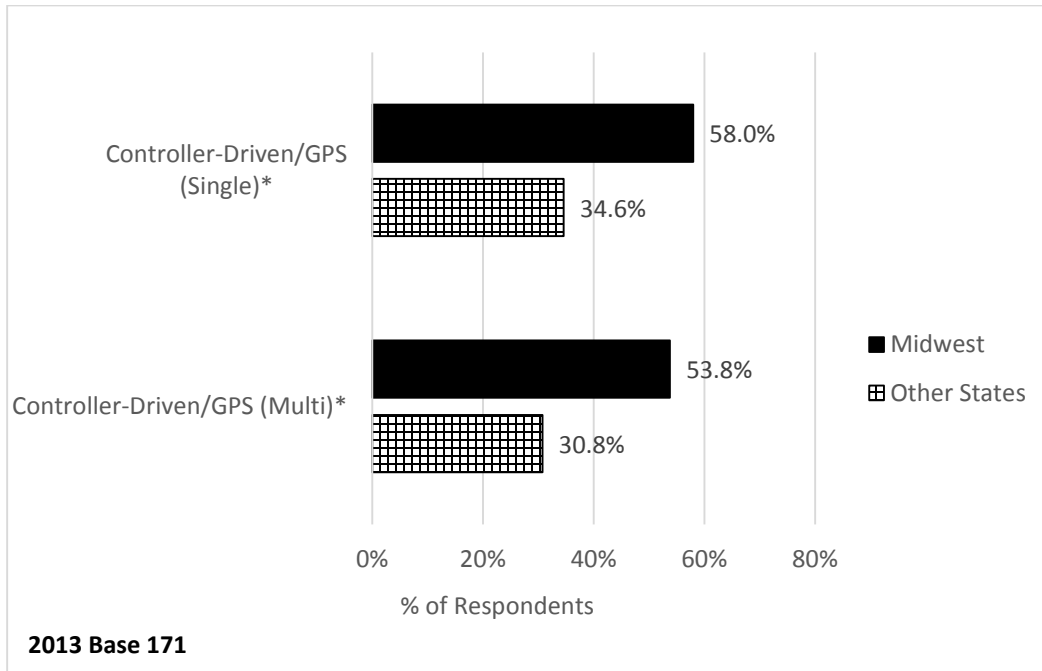


Precision application of fertilizer was significantly more common in the Midwest, a result that was consistent with previous surveys. Single nutrient application in Midwestern states decreased slightly in the 2013 survey, sliding down to 58 percent from 62 percent in the 2011 survey (Figure 33). Multi-nutrient application rose up from 47 percent of Midwestern respondents in 2011 to 54 percent in 2013. Meanwhile, single and multi-nutrient fertilizer application in regions outside of the Midwest made small gains from the 2011 survey.

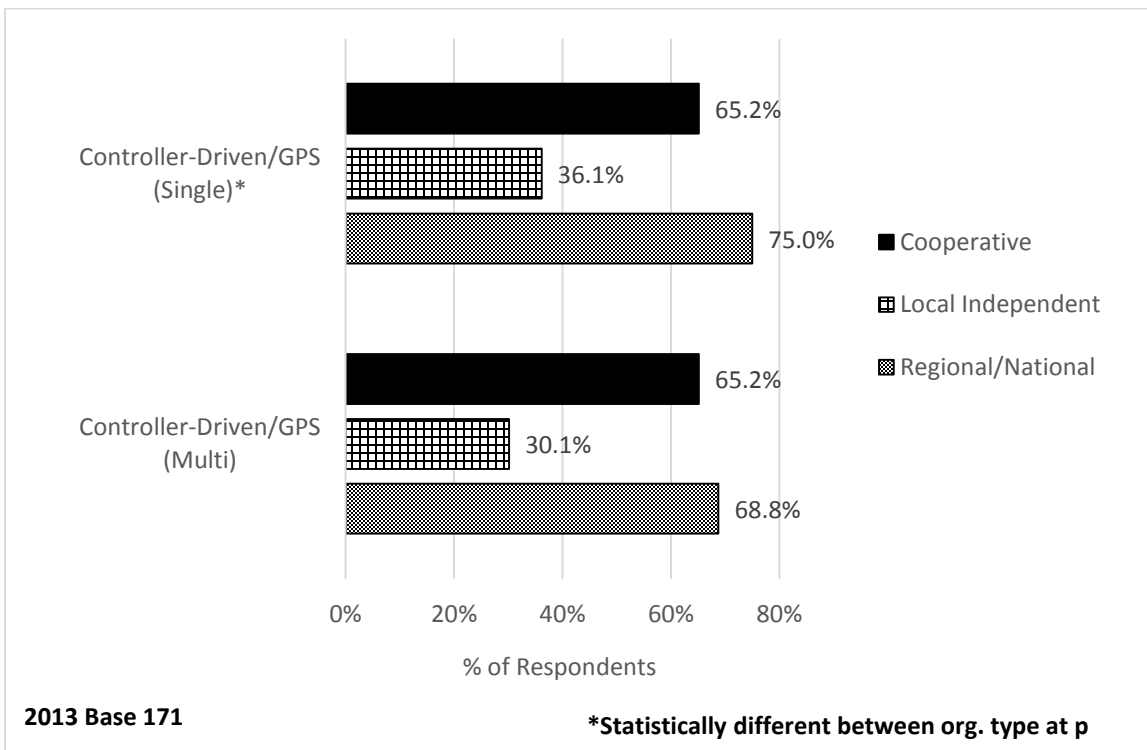
Precision fertilizer application sorted by organization type told a different story in 2013 than in 2011. In the previous survey, cooperatives used single and multi-nutrient fertilizer application more commonly than independent dealers and regional/national dealerships (Figure 34). However, in the 2013 survey, regional/national dealerships edged out cooperatives in their offerings of precision fertilizer application services. Cooperatives offering single nutrient application dropped from 77 percent in 2011 to 65 percent in 2013. Regional/national dealerships offering the same service increased from 71 percent in 2011 to 75 percent in 2013. Co-ops offering multi-nutrient application stayed steady at 65 percent in

both surveys, but still could not match the growth of regional/national chains' offerings, which increased to 69 percent in 2013 from 50 percent in 2011.

**Figure 33. Precision Application of Fertilizer Offered by Region**

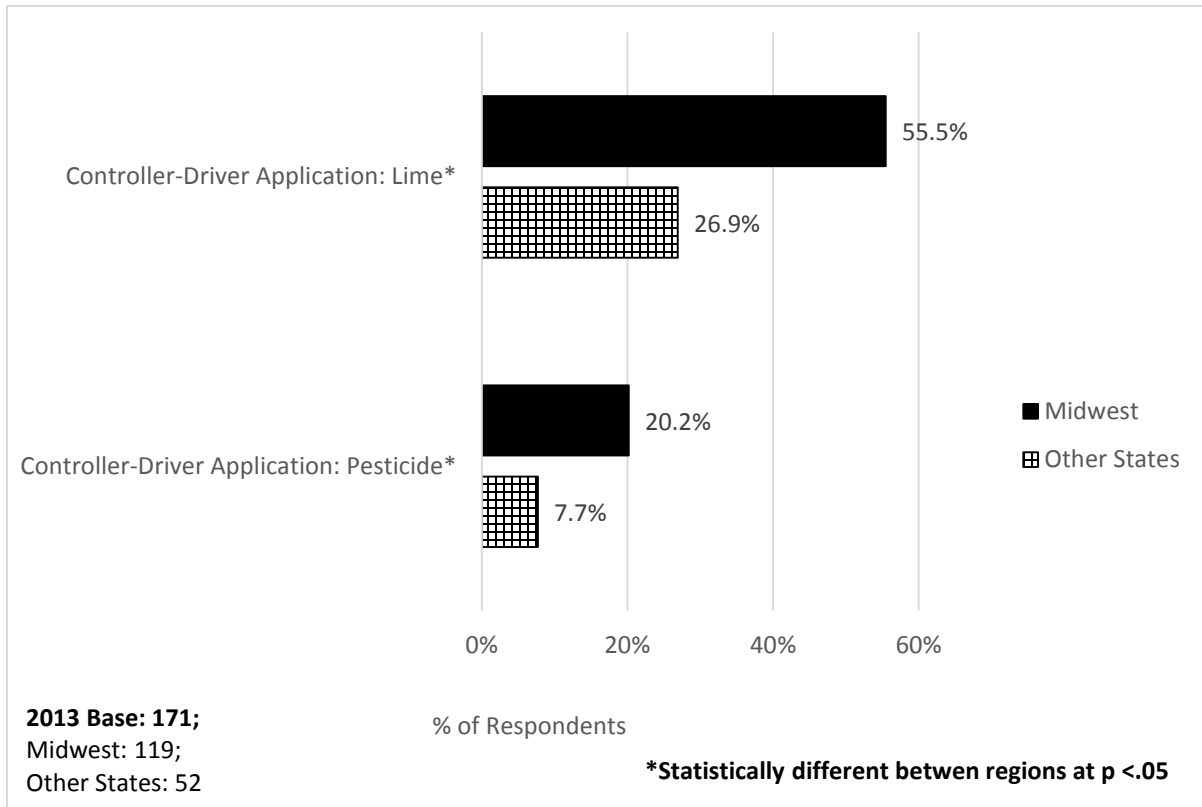


**Figure 34. Precision Application of Fertilizer Offered by Organizational Type in the Midwest**

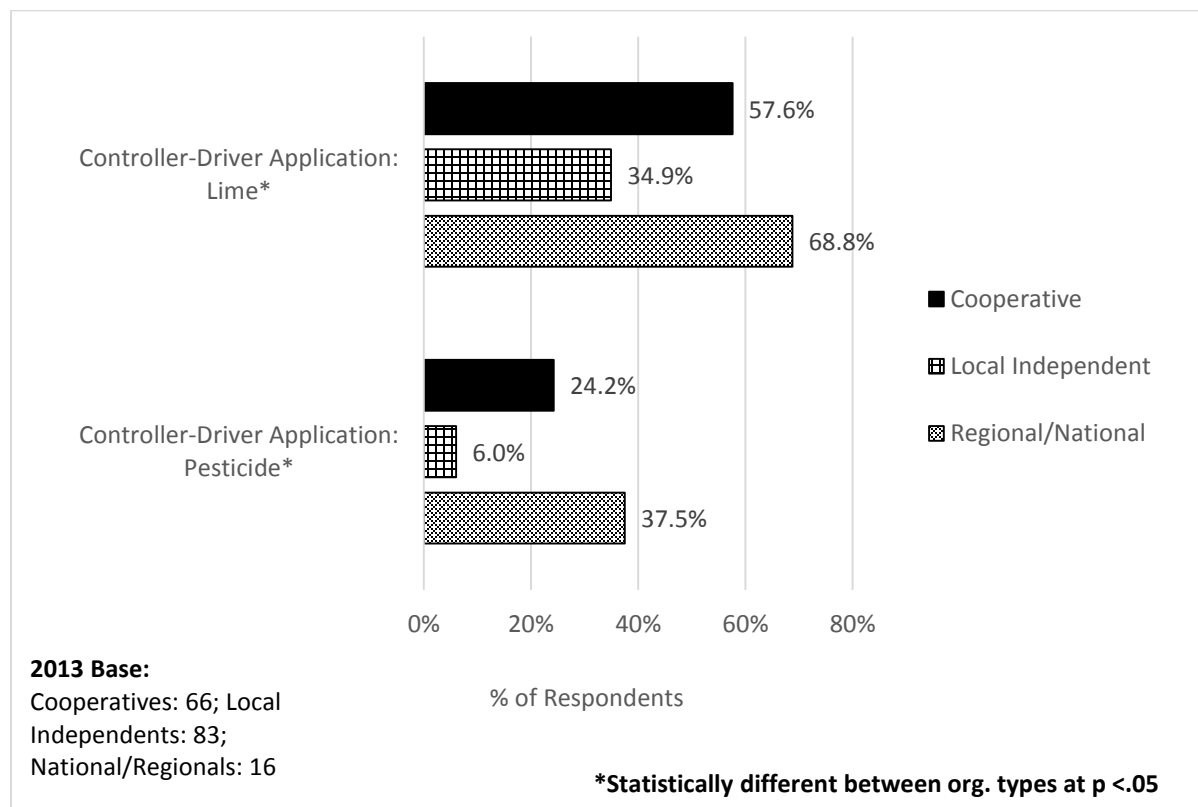


Similar trends were reflected in variable rate application of lime and pesticides by both region and organization type (Figure 35). One difference in the 2011 and 2013 surveys was the presence of statistically significant differences between regions and organization types for both variable rate lime and pesticide applications in 2013 (Figure 36). In the 2011 survey, the only statistically significant difference found was between regions in variable rate lime application.

**Figure 35. Precision Application of Lime and Pesticides Offered by Region**



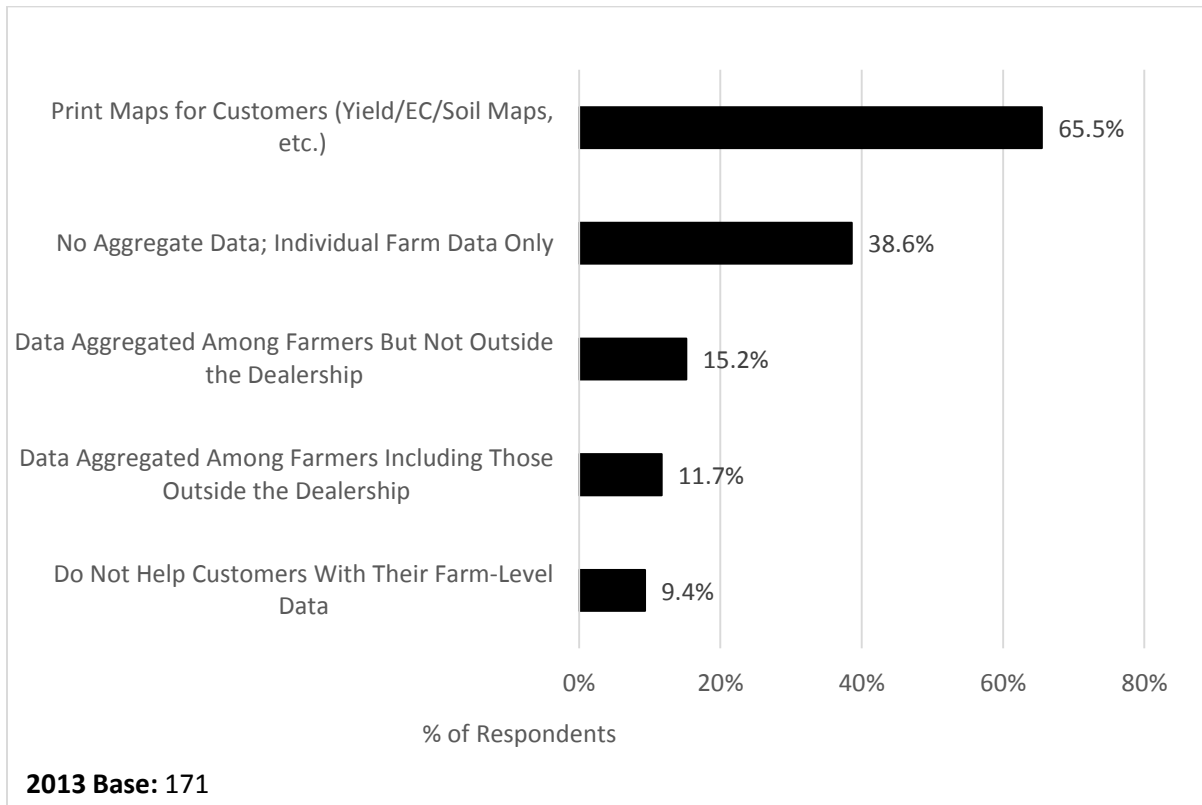
**Figure 36. Precision Application of Lime and Pesticides Offered by Organizational Type in the Midwest**



## Analysis of Farm Data in More Detail

The increase of farm data collected by precision technologies allows dealerships to provide additional value to their offerings by way of information sharing and analysis. Dealerships can offer many services to their customers using this data in order to assist in their customers' decision-making processes. 96 percent of respondents offered some type of assistance with their growers' farm-level data, which was a drastic increase from the 76 percent of respondents who offered assistance with farm-level data in 2011 (Figure 37). Two thirds (66 percent) of these dealerships print some type of yield map/EC/soil map for their customers. 39 percent of respondents mapped only data for individual customers. 15 percent aggregated the data collected among farmers within the dealership only, while 11 percent collected aggregate data from farmers both inside and outside the dealership.

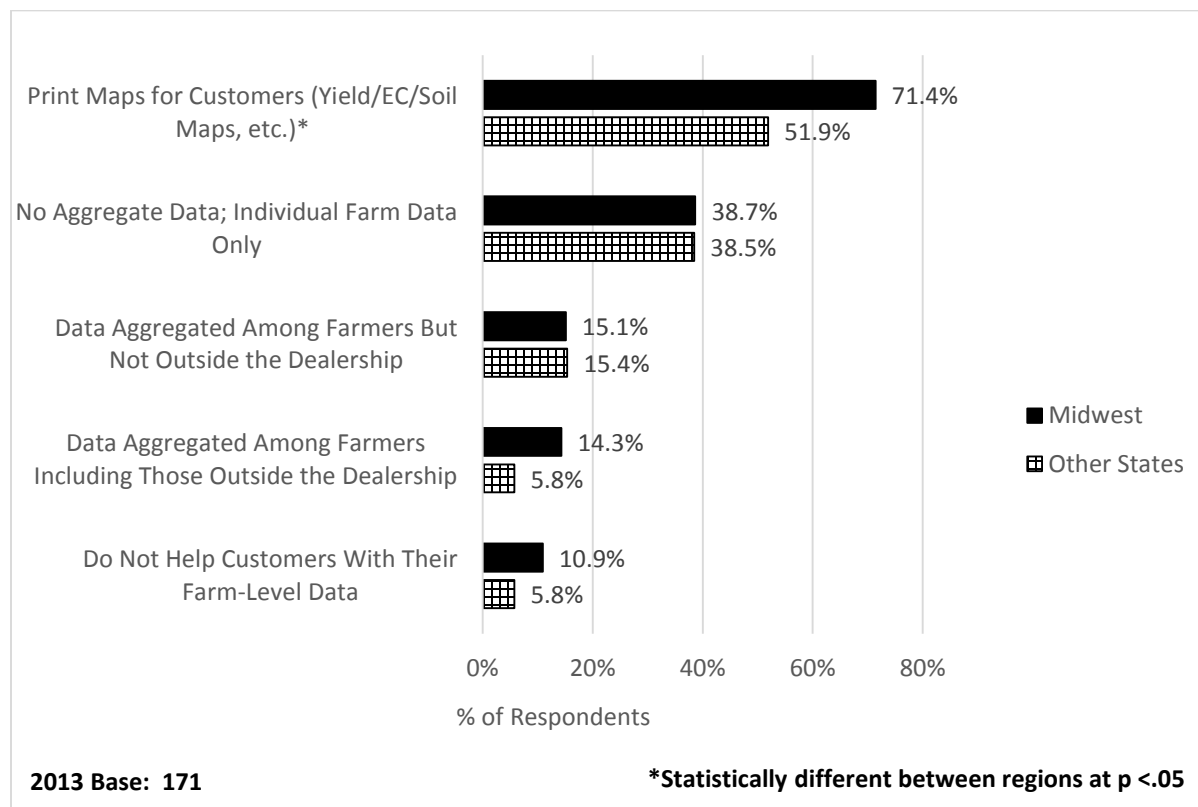
**Figure 37. Managing Farm-Level Data to Assist Customers in the Decision Making**



The only statistical difference shown in between regions was evident in map printing (Figure 38). 71 percent of Midwestern dealerships print maps for their customers, while 52 percent of Other States dealerships offer the same service. Contrary to 2011, when no statistical differences were observed between organization types, in 2013 statistical differences by organization type were observed by dealerships which printed maps for customers and aggregated data among farmers, but not outside the dealership.



**Figure 38. Managing Farm-Level Data to Assist Customers in the Decision Making by Region**



## Profitability of Precision Service Offerings

Dealerships were asked how profitable they believed each of their precision technology offerings to be. Each bar in Figures 39 and 40 shows the proportion of respondents who indicated that a particular service was:

- Not covering fixed or variable costs;
- Covering variable costs;
- Covering both variable and fixed costs; or
- Generating a profit.

Over half of the dealerships (51 percent) offering a total precision package to their customers reported generating a profit based on their offerings. 24 percent of dealerships offering the total precision package were breaking even on their offerings. 9 percent were covering only variable costs, 4 percent were not covering their costs, and the remaining 13 percent did not know how profitable their total precision package was to their dealership.

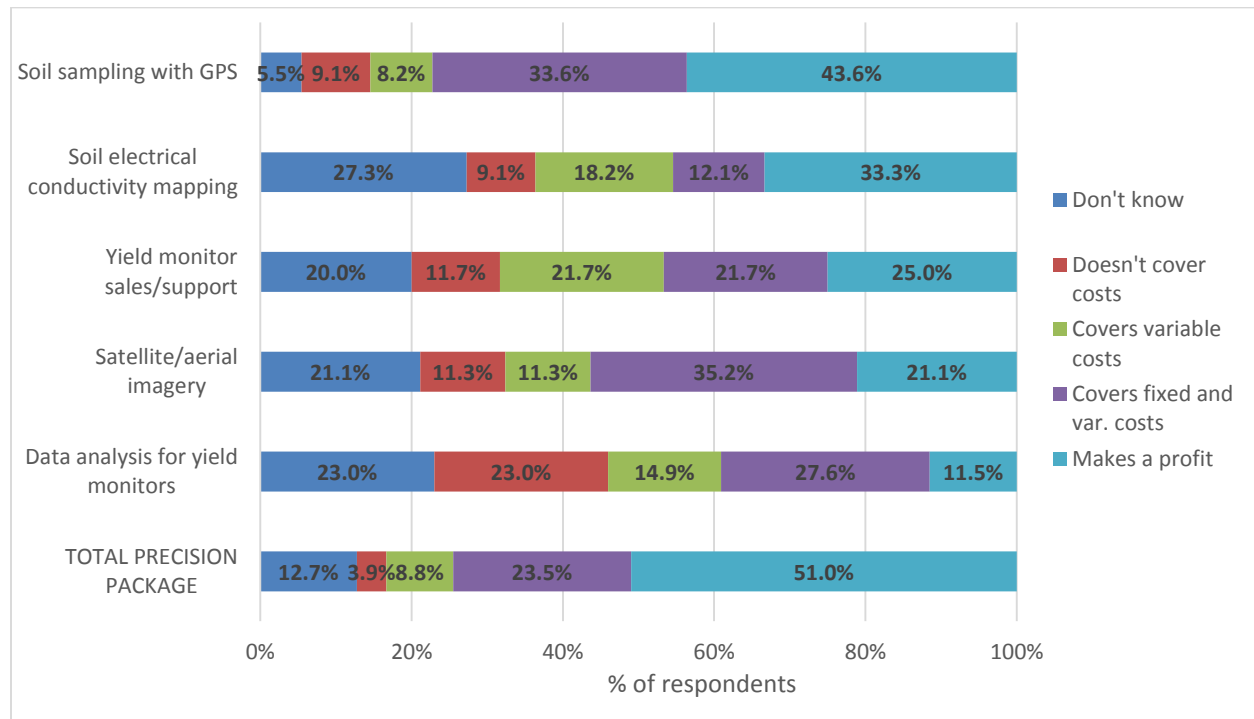
Similar to the 2011 survey, custom application services appeared to be the most profitable of the precision services offered by dealerships. Over 60 percent of respondents were generating profits by using non-precision applicators. Dealerships also cited controller-driven single and multiple nutrient

applicators as being strong sources of profit, with 60 percent and 63 percent of responding dealerships, respectively, seeing profits from these services. These numbers were all up since the 2011 survey, when custom (non-precision), single nutrient, and multiple nutrient application services were all listed as profitable by 58 percent, 51 percent, and 57 percent of respondents. Soil sampling with GPS was the highest-ranking non-application precision service, with 44 percent of respondents earning profits from this offering.

In contrast, only a quarter or less of respondents indicated data analysis for yield monitors, satellite/aerial imagery, and variable seeding rates with GPS were earning profits. Generally, the profitability of these service offerings increased slightly from the 2011 survey, but these offerings remain less profitable than the precision application services.

There were significant differences in reported profitability between regions in soil sampling, custom application (non-precision), GPS single nutrient application, GPS multiple nutrient application, and the total precision package.

**Figure 39. Profitability of Precision Service Offerings**



**Figure 40. Profitability of Precision Service Offerings (cont.)**

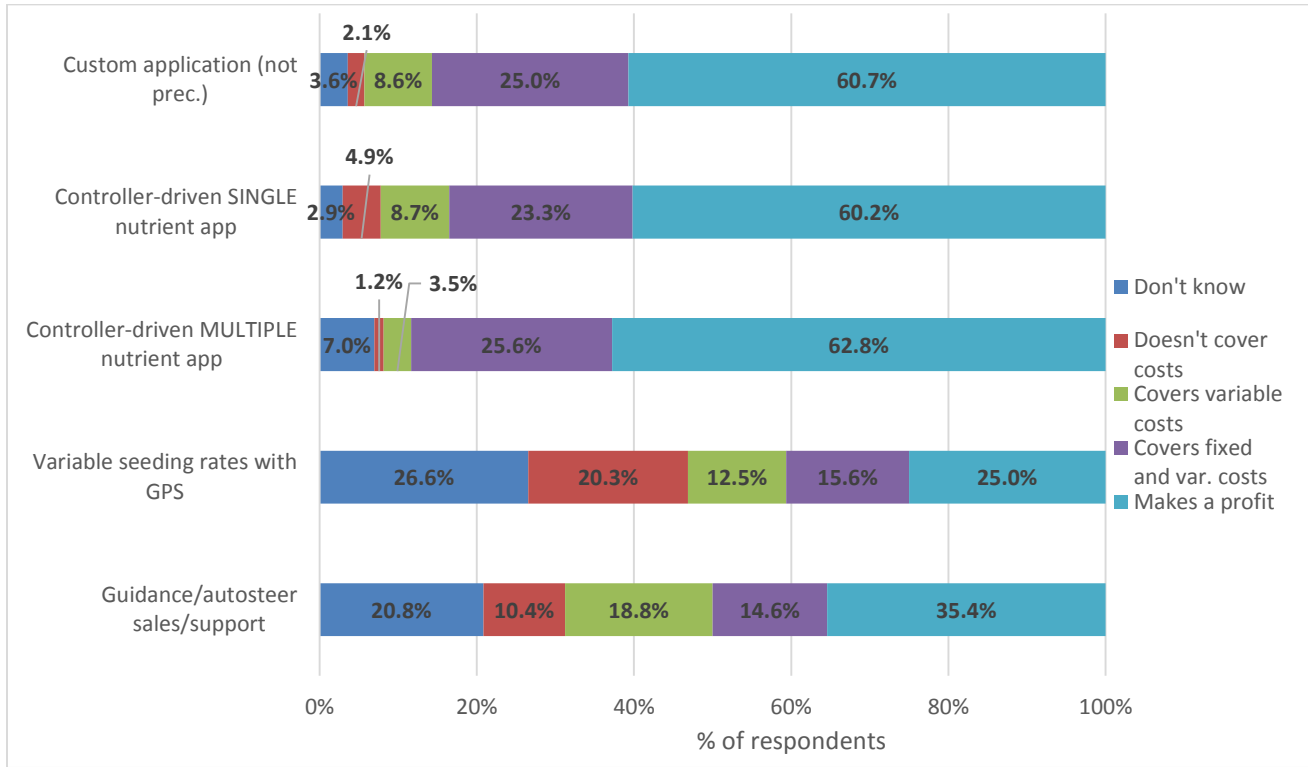
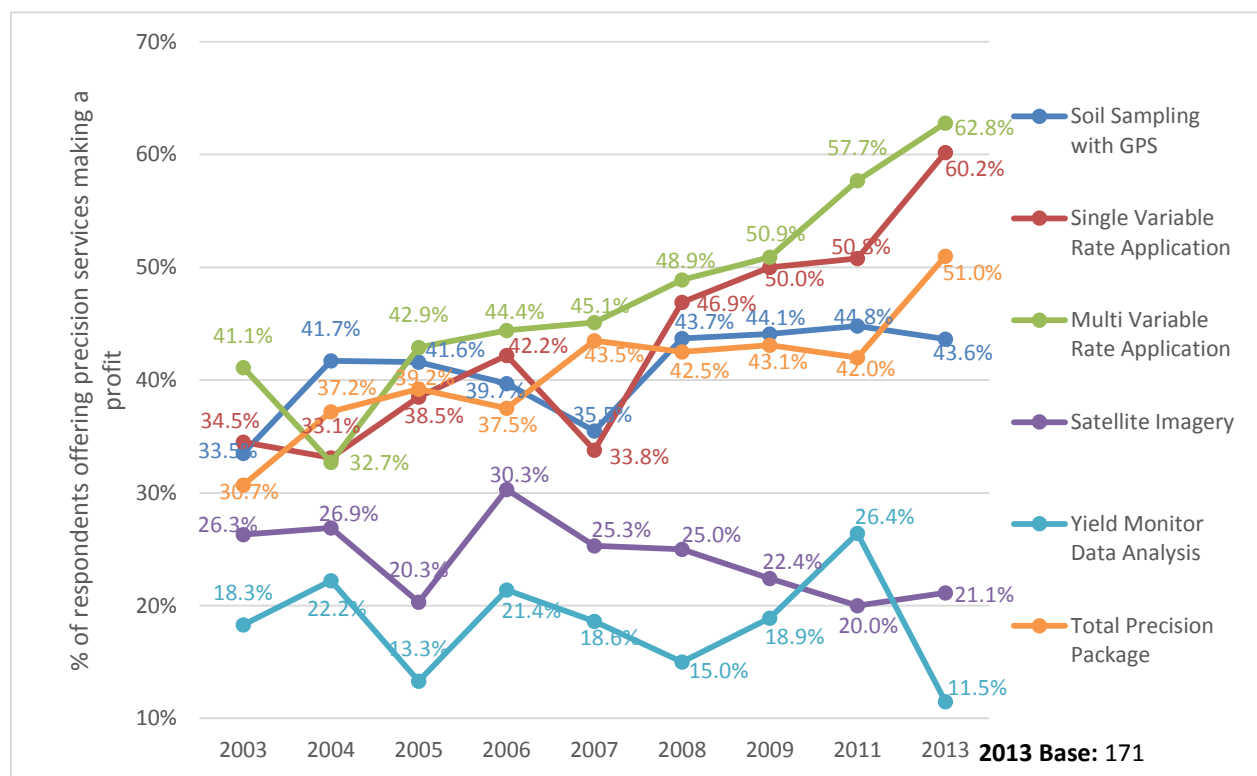


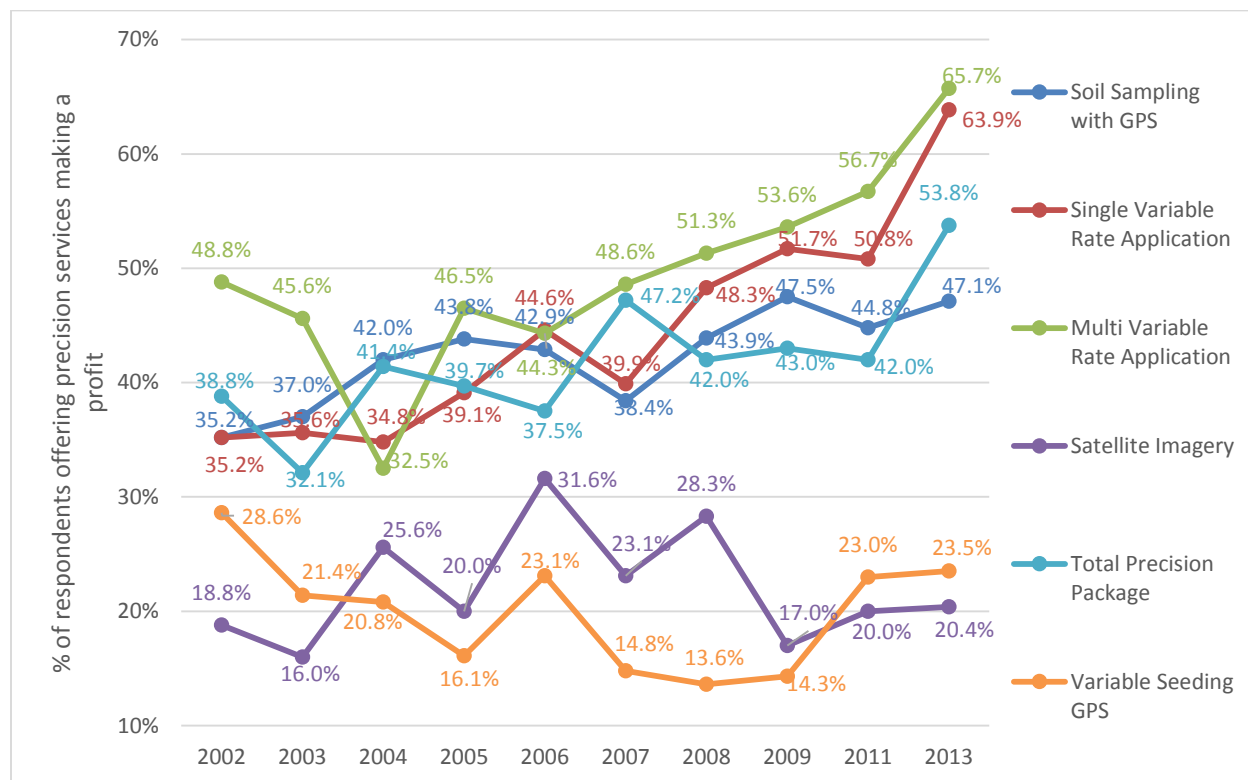
Figure 41 demonstrates the percentage changes in the profitability of selected services over time. Overall, more respondents were able to report they are generating a profit from different precision services than in the past. The only exceptions are with data analysis from yield monitors which decreased to 11.5 percent in 2013 (down from 26.4 percent in 2011) and soil sampling with GPS (which fell from 44.8 percent in 2011 to 43.6 percent in 2013); indicating that retailer are struggling to capture profit from these businesses. Other all, however, the majority, or 51 percent of respondents, indicated they are making a profit from their overall total precision service program. This is the first time more than half of respondents have agreed with that statement.

**Figure 41. Respondents Generating a Profit from Precision Services**



In Figure 42, the percentage of Midwest respondents that were able to generate a profit are shown. Overall, most services have higher profitability level in the Midwest than compared to all the states in Figure 41.

**Figure 42. Respondents Generating a Profit from Precision Services in the Midwest**

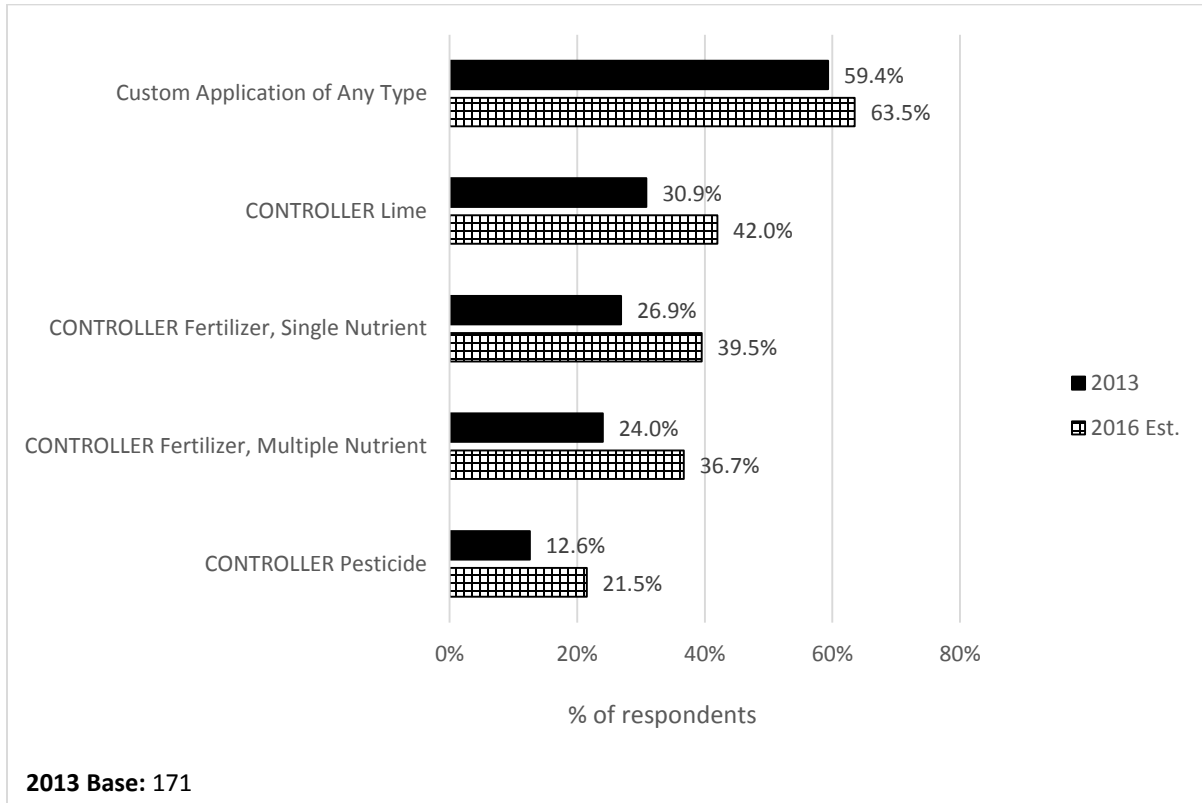


## Customer Use of Precision Services

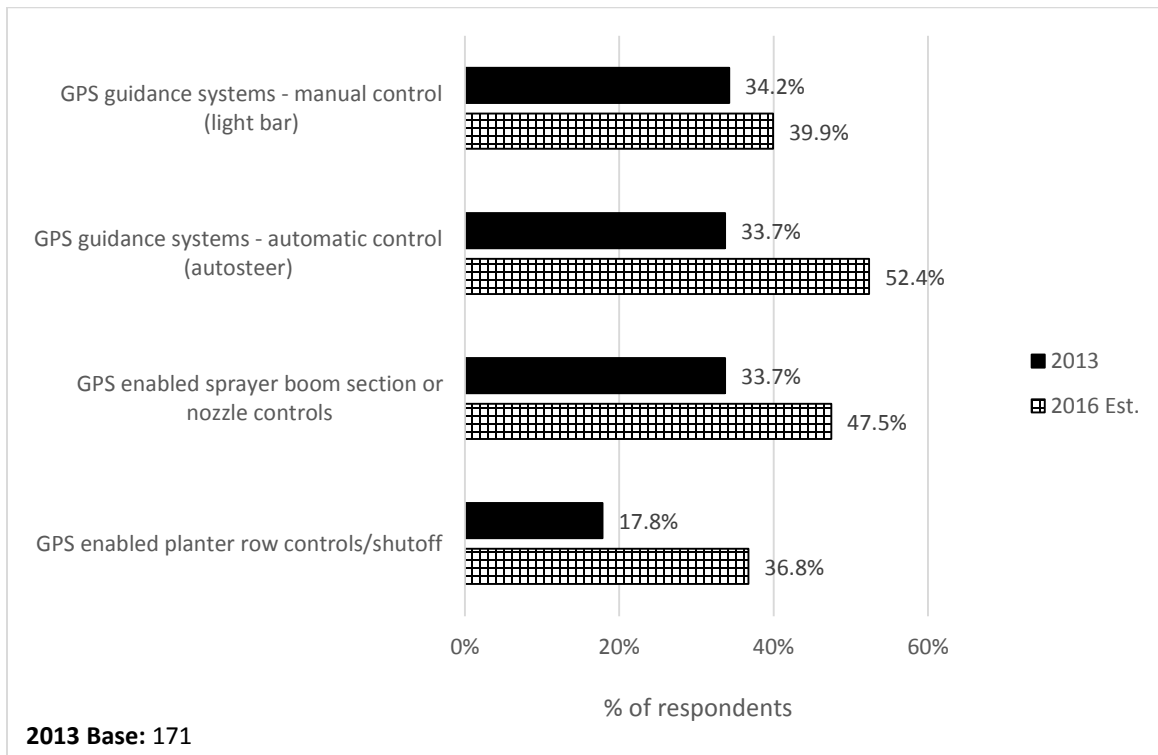
In order to better understand how quickly growers are using precision services and their prospects for adopting these services in the future, responding dealerships were asked about the total percentage of their market area—including both customers and non-customers—currently using the various precision technologies available. Additionally, dealerships were asked what proportion of their market would be adopting these services within the next 3 years. Figures 43 to 46 show the estimated market use in 2013 as well as the expected use by 2016.

All of the estimated market shares are projected to increase by 2016. Some of the biggest gains in the precision market are expected to come from autosteering (Figure 44), GPS enabled planter row shut off (Figure 44), soil sampling with GPS (Figure 45), and variable rate seeding with GPS (Figure 45), each have a nearly 20 percentage point increase in market area use.

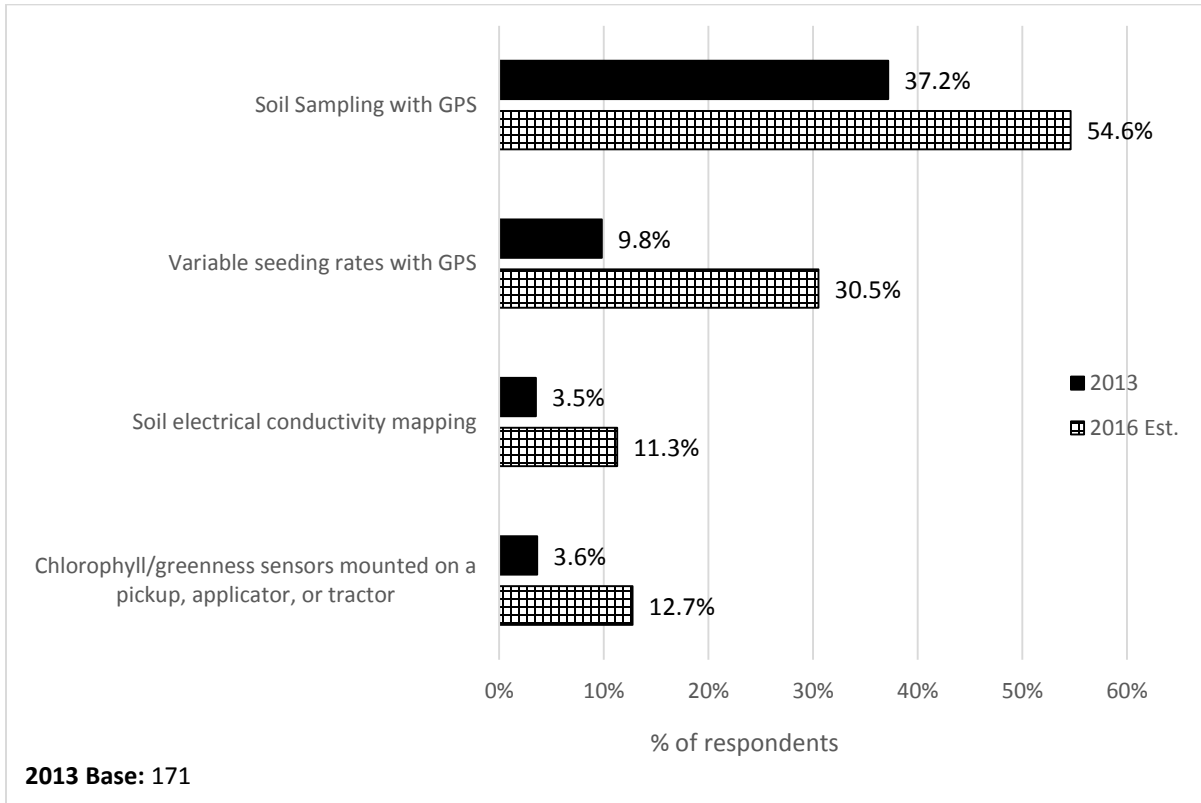
**Figure 43. Estimated Market Area Using Application Services**



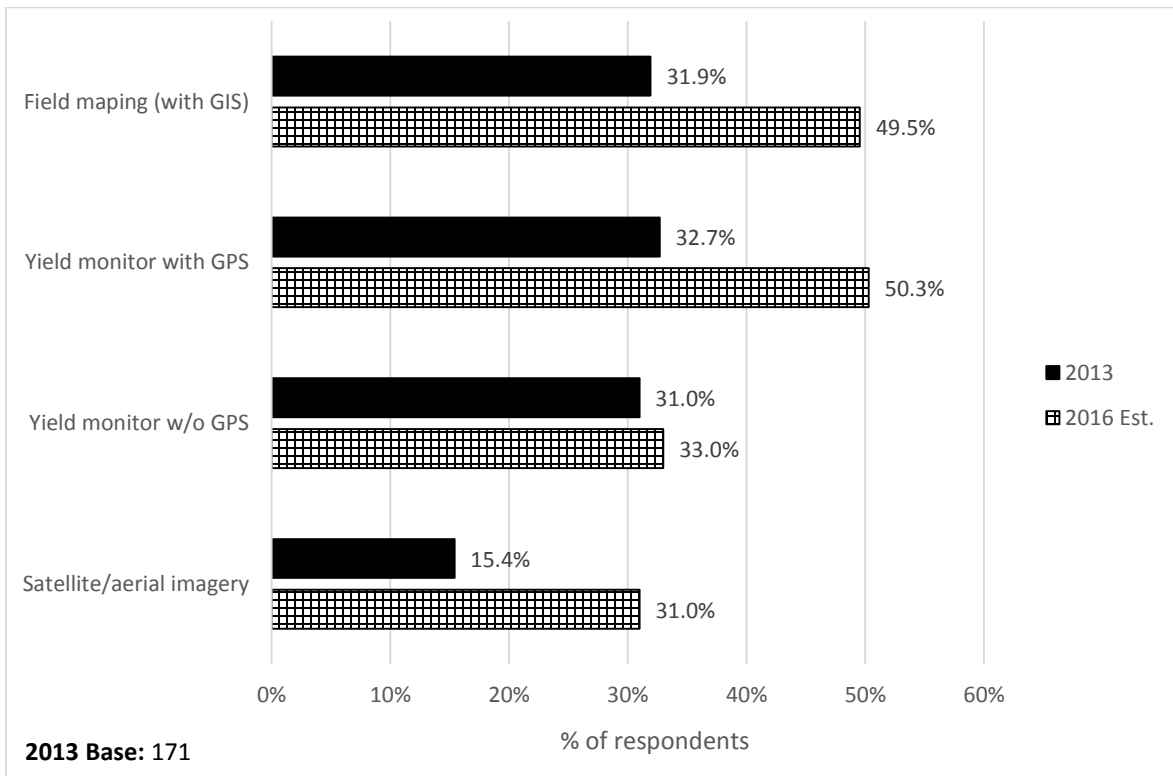
**Figure 44. Estimated Market Area Using Precision Guidance and Control**



**Figure 45. Estimated Market Area Using Precision Sensors and Variable Seeding**

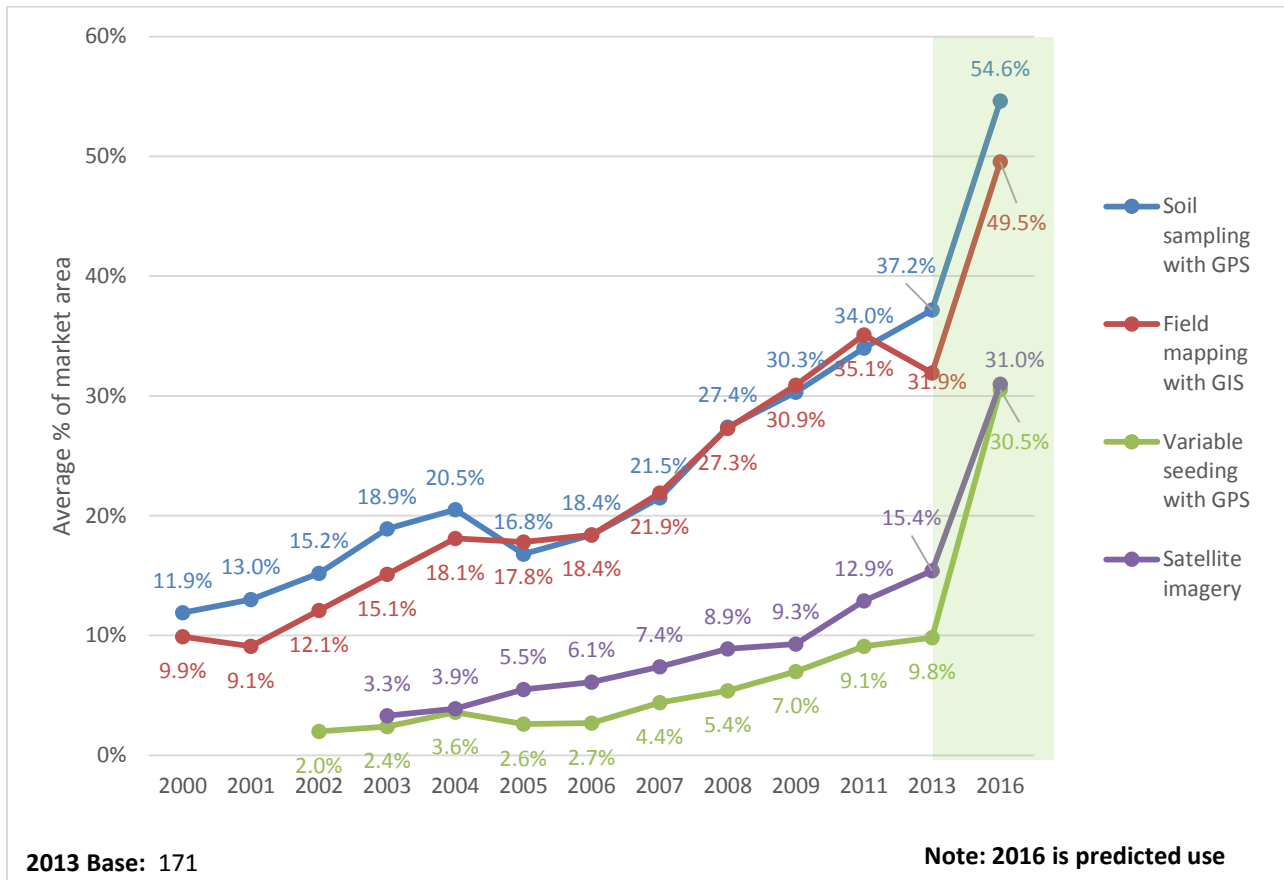


**Figure 46. Estimated Market Area Using Field Mapping, Yield Monitors, and Satellite Imagery**



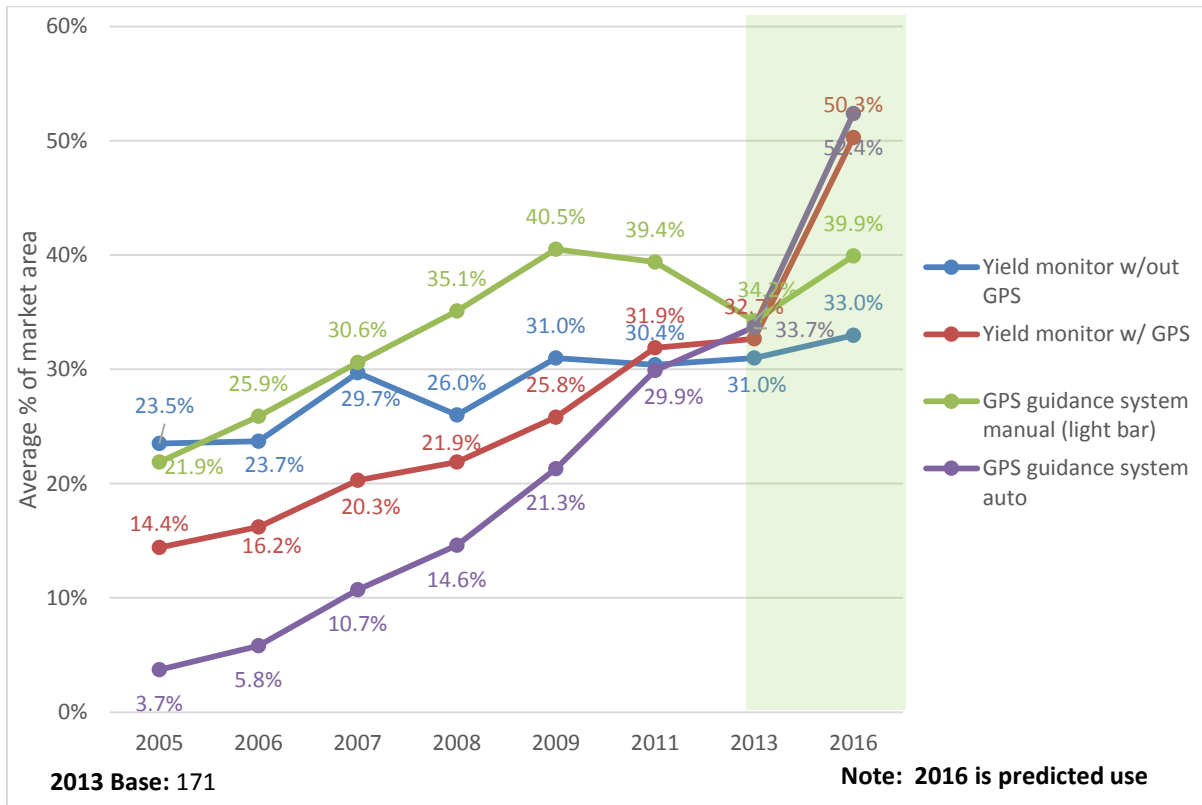
Figures 47 and 48 show the adoption of additional precision services over time as well as their anticipated adoption. Generally, all services increased in the 2013 survey except field mapping with GIS, which dropped to 32 percent from its 2011 level of 35 percent, and manual GPS guidance systems (light bar), which continued its 3-year decline to 34 percent (41 percent in 2009 and 39 percent in 2011). All dealerships remained optimistic about the growth in their service area of these offerings over the next 3 years.

**Figure 47. Estimated Market Area Using Precision Services over Time**



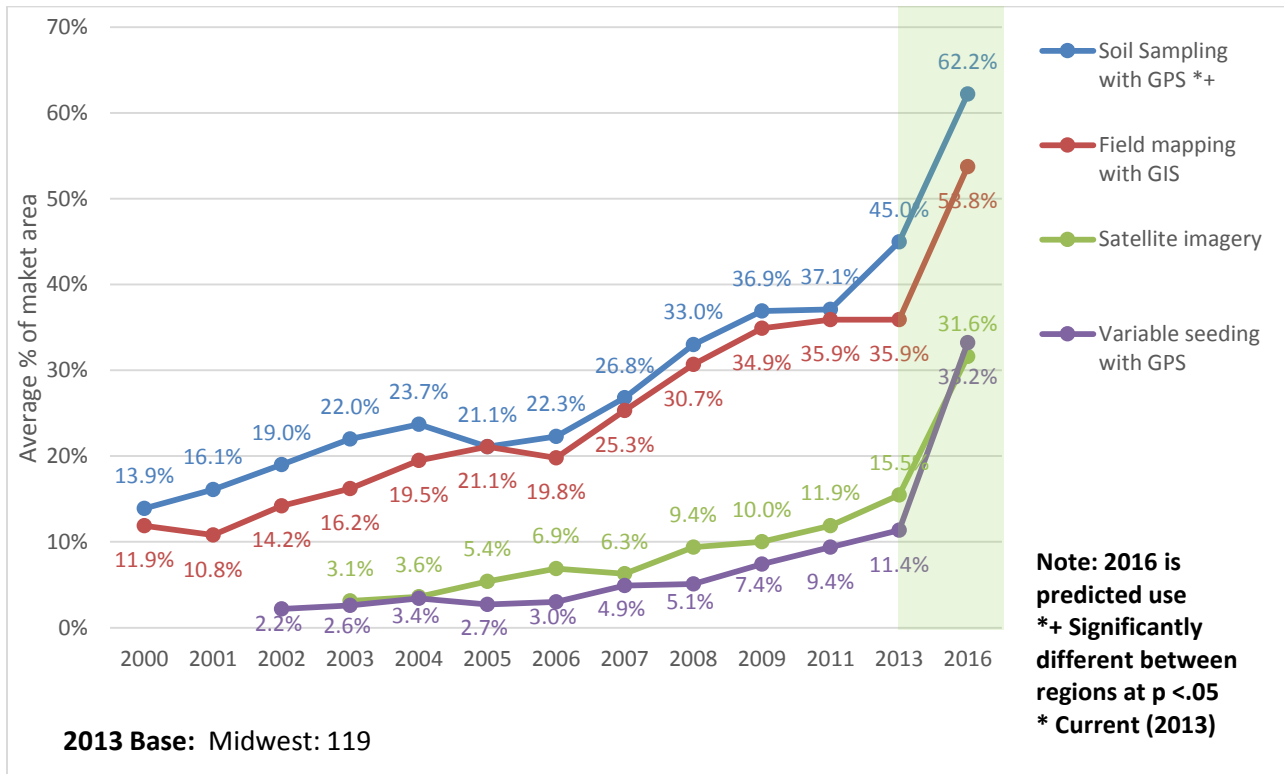


**Figure 48. Estimated Market Area Using Yield Monitors and Guidance Systems over Time**

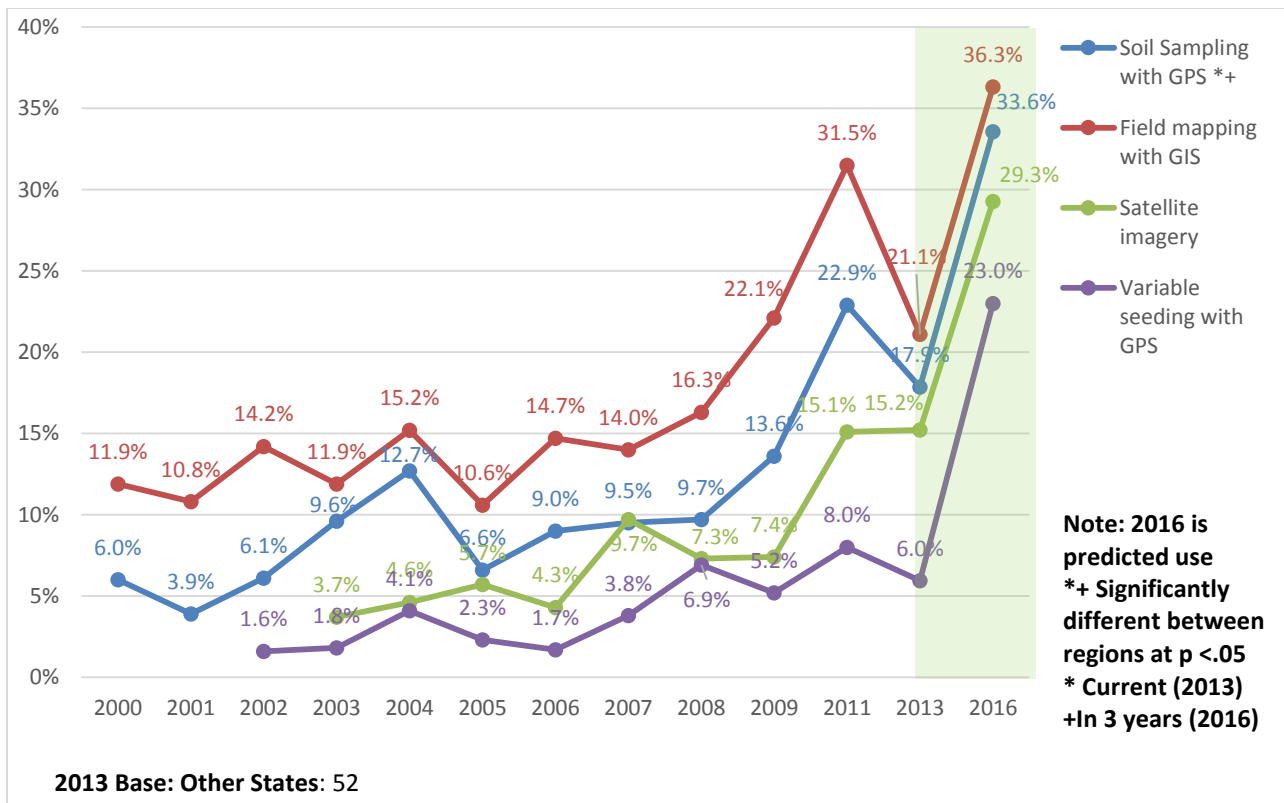


Figures 48 through 52 looked at the same services as in Figures 46 and 47, separated by region. In the Midwest, most estimates of market penetration were typically higher than those of Other States. These differences were significant across regions for soil sampling with GPS for both 2013 and projected 2016. Differences were also significant in 2013 only for yield monitor with GPS. The largest gains in the Midwest were in autosteering offerings (30 percent in 2011 to 37 percent in 2013) and soil sampling with GPS (37 percent in 2011 to 45 percent in 2013), while in Other States, it was yield monitors without GPS (19 percent in 2011 to 24 percent in 2013).

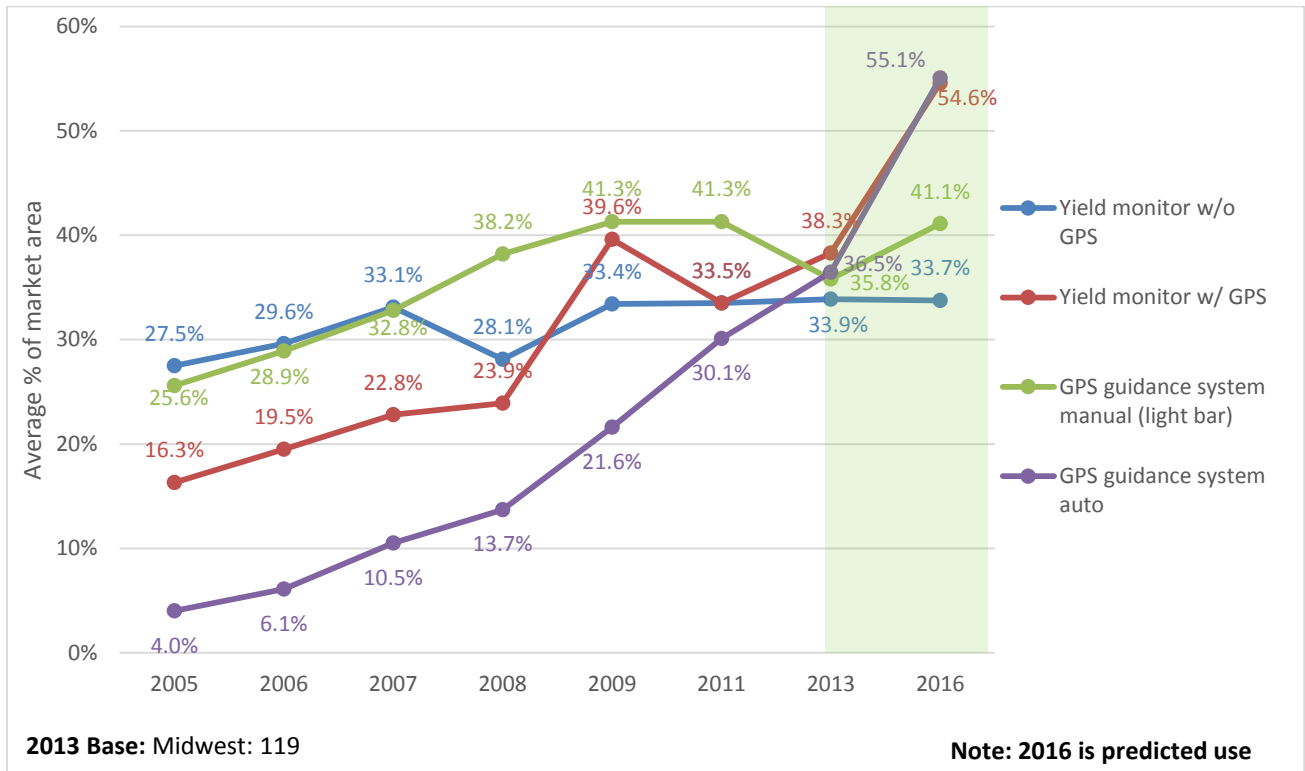
**Figure 49. Estimated Market Area Using Precision Services in the Midwest**



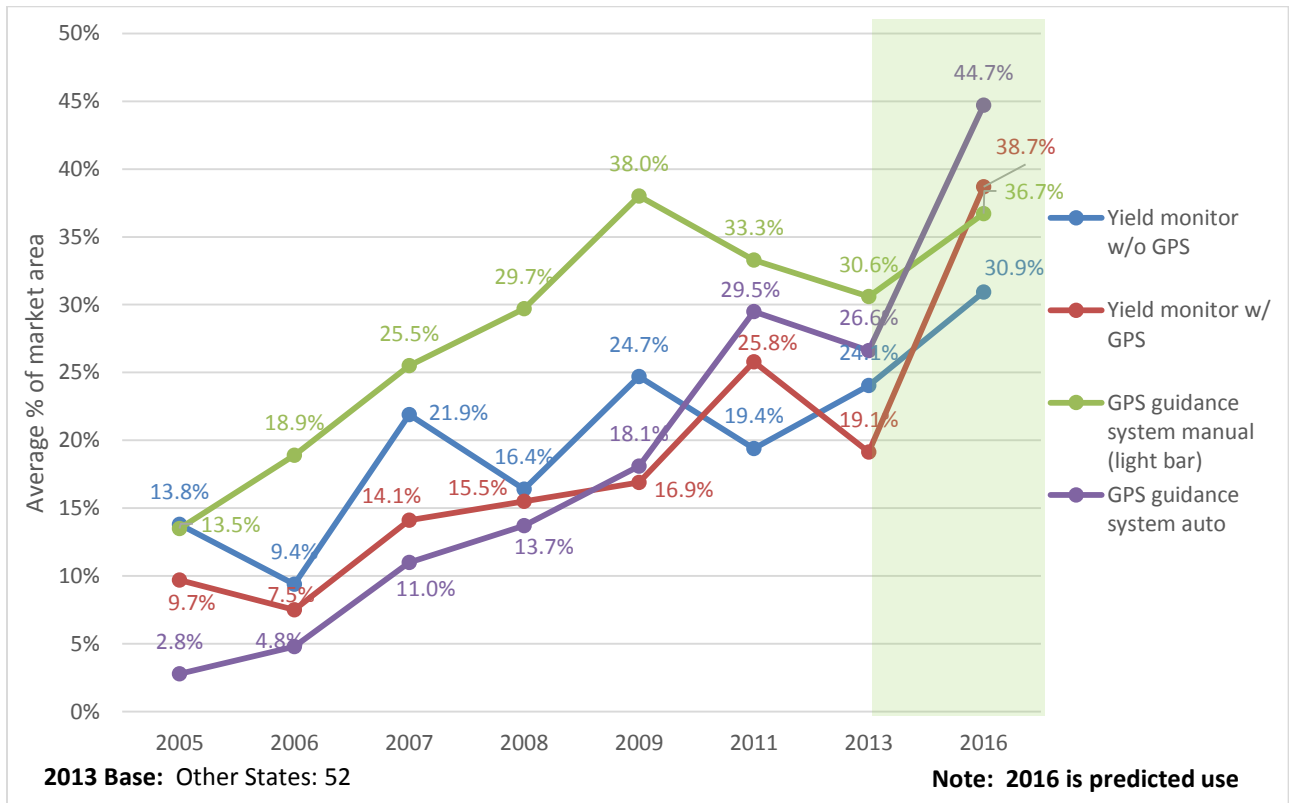
**Figure 50. Estimated Market Area Using Precision Services in Other States**



**Figure 51. Estimated Market Area Using Yield Monitors and Guidance Systems in the Midwest**



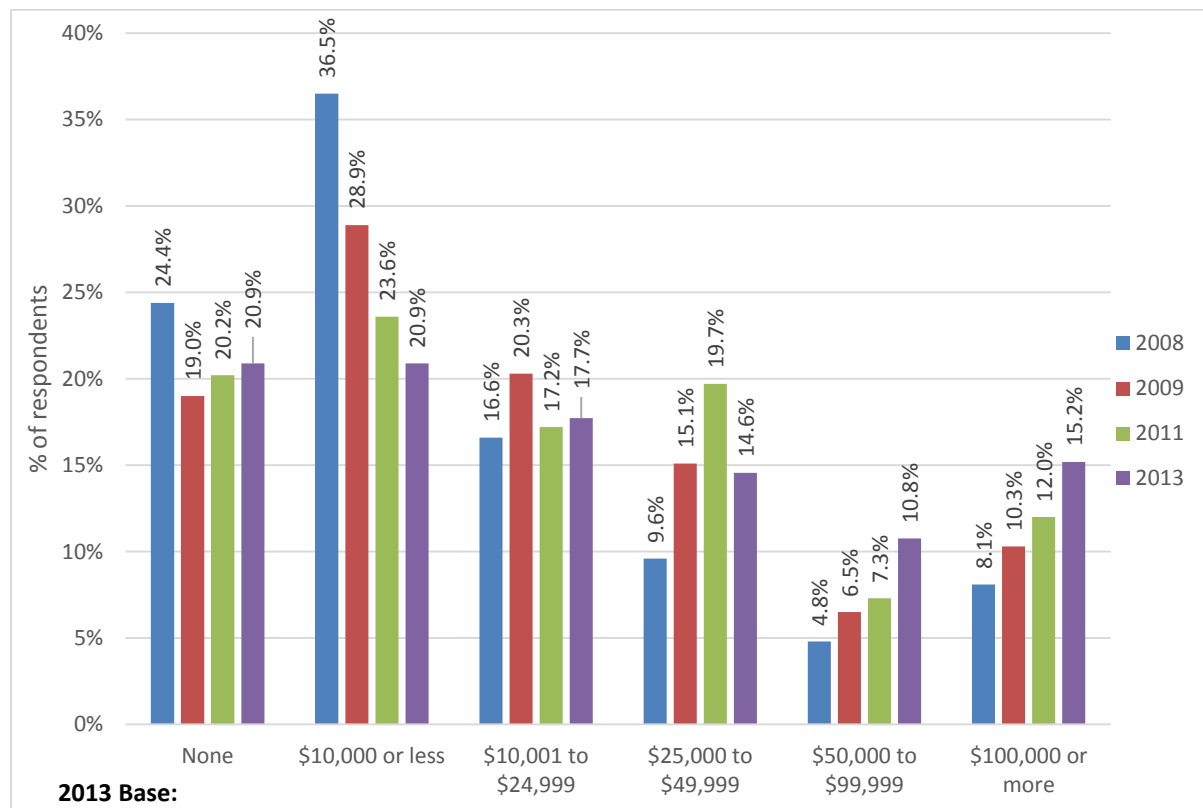
**Figure 52. Estimated Market Area Using Yield Monitors and Guidance Systems in Other States**



## What's Expected of Precision Technology in the Future?

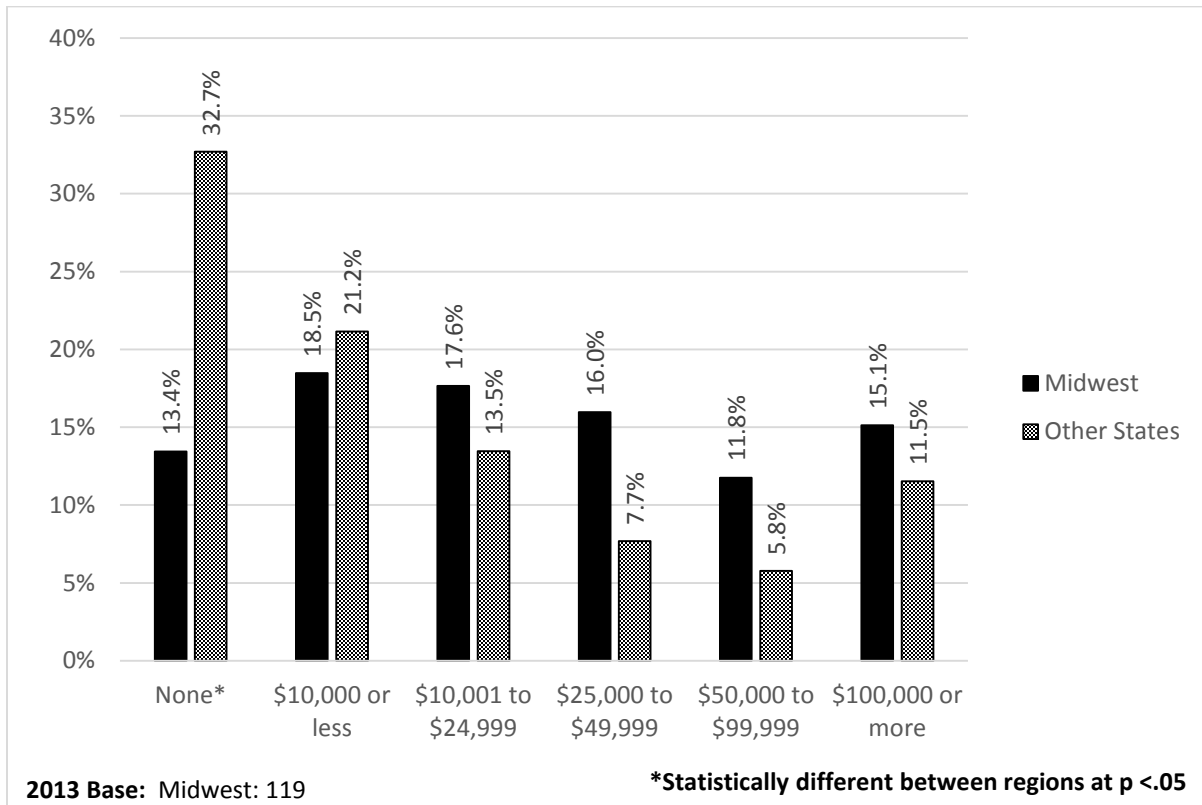
When asked about their propensity to invest in precision technology in the future, the responding dealerships indicated investment would continue to grow. 81 percent of respondents said they plan to allocate funds to precision technology, a slight increase from the 80 percent of respondents investing in precision technology in 2011 (Figure 53). Overall, companies are looking to make much larger investments in precision technology in the future. The increasing trend of dealership investments at the \$50,000 to \$99,999 and \$100,000 or more levels, as seen in 2011, continued in the 2013 survey. 10 percent of respondents plan to invest \$50,000 to \$99,999 (7 percent in 2011) and 14 percent plan to invest over \$100,000 in precision technology (12 percent in 2011).

**Figure 53. Expected Investment in Precision Technology in 2013**



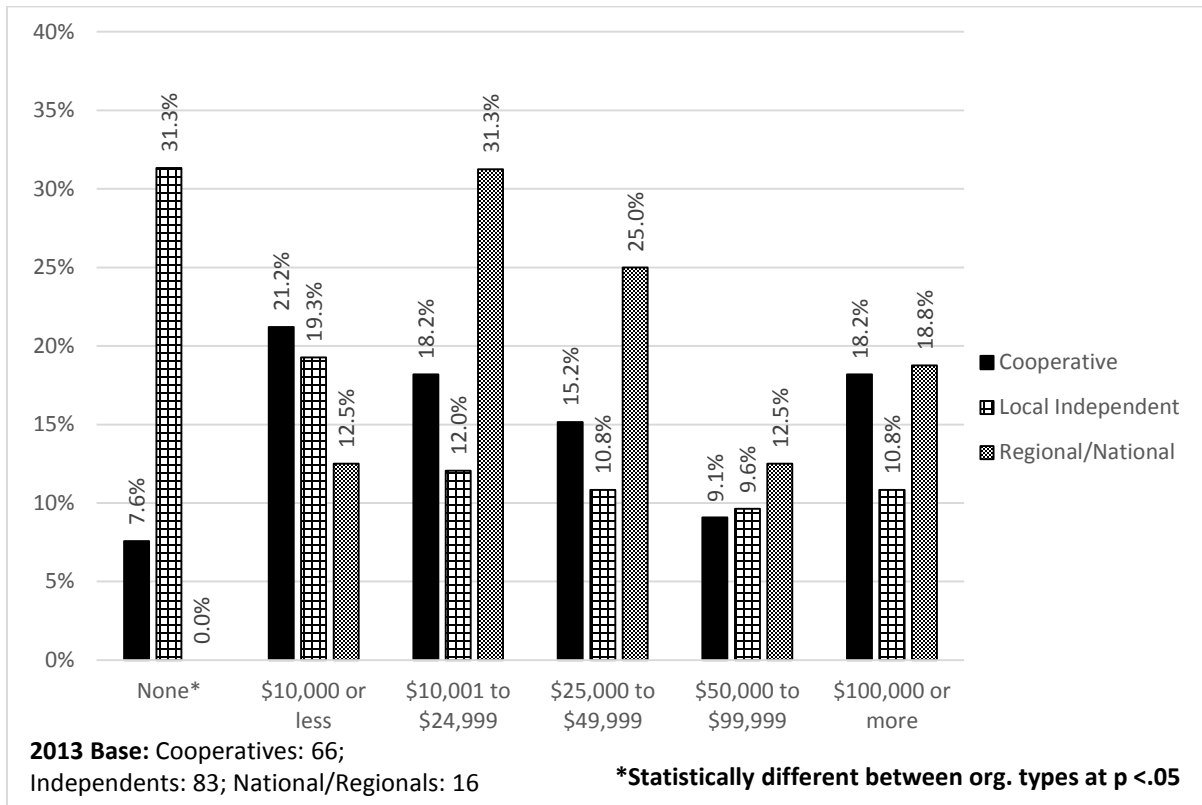
As seen in earlier figures, use of precision technology varies by region. Thus, there were no surprises when the dealerships from the Midwest responded to being more likely to invest in precision technology than their counterparts in other regions of the country. Statistical differences between were significant among dealerships not choosing to invest in precision application services. 87 percent of respondents from the Midwest planned on investing in precision technology, while only 67 percent of Other State respondents indicated they would be allocating funds for future investment (Figure 54).

**Figure 54. Expected Investment in Precision Technology by Region**



Almost a third of responding local independent dealerships (31 percent) were not planning to invest further in precision technology in the future, a difference that was statistically significant among organization types (Figure 55). Investing at the \$10,001 to \$24,999 level was the most common preference for regional/national dealerships (31 percent of responding regional/national chains), while cooperatives were most likely to invest \$10,000 or less (21 percent of responding coops). 18 percent of responding cooperatives and 19 percent of regional/national dealerships planned to allocate \$100,000 or more for future precision technology use.

**Figure 55. Expected Investment in Precision Technology in 2011 by Organizational Type in the Midwest**



## Barriers to Growth and Expansion in Precision Agriculture

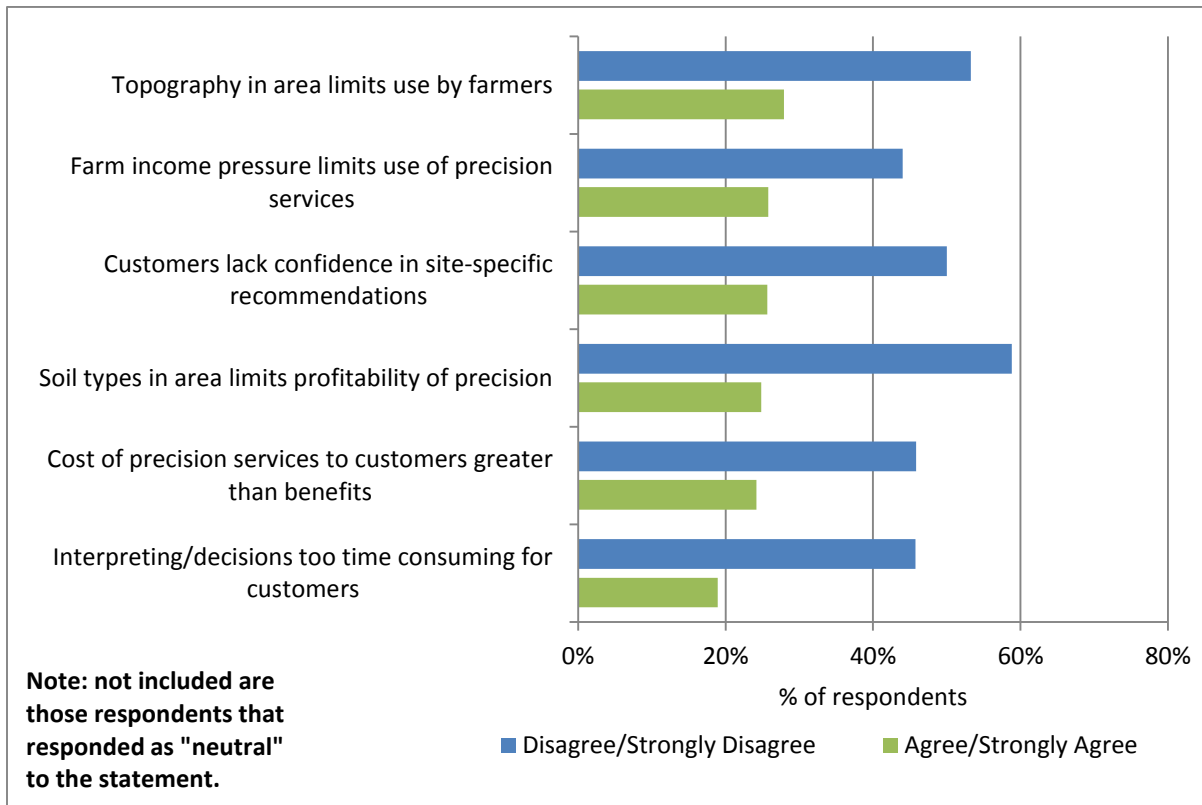
Responding dealerships were asked about their perceptions of challenges to adoption within the precision technology boom as they relate to their growers as well as within their dealerships.

Figures 57 and 60 compare the 2013 survey responses of dealerships who agreed or strongly agreed with each statement to the past 4 surveys (2011, 2009, 2008, and 2004). When broken down into region, there were statistical differences between the Midwest and Other States for some of the perceived issues.

## Customer Barriers

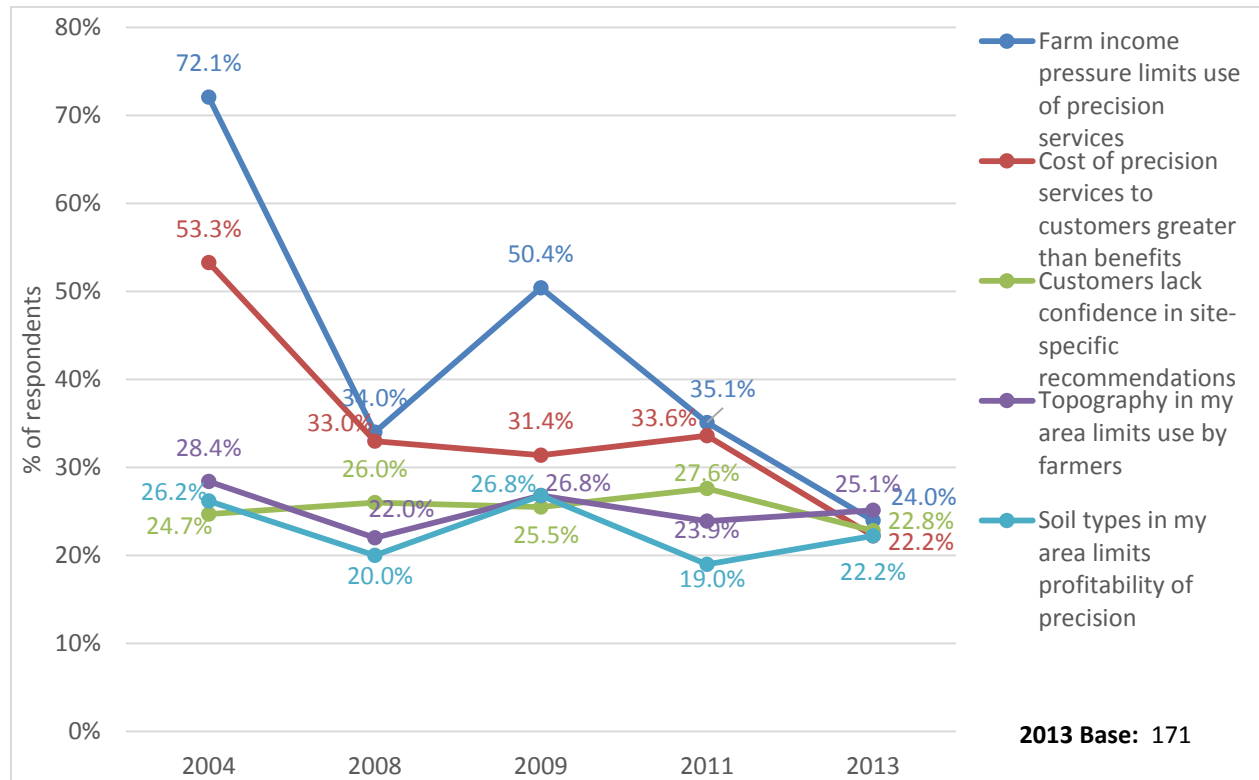
When respondents were asked to think about barriers those in there are face when adopting technologies, there was little variation in their responses. Overall, more respondents (between 44 and 59 percent) disagreed or strongly disagreed with the potential barriers presented (Figure 56). Only between 19 and 28 percent of respondents agreed or strongly agreed with any of the potential barriers asked about. In total, respondents were more likely to agree with topography issues created barriers than the other issues (although more disagreed or strongly disagreed with the statement). Also, soil issues as a barrier was rejected the most by respondents, with 59% indicating they disagree or strongly disagree.

**Figure 56. Customer Issues that Create a Barrier to Expansion/Growth in Precision Agriculture**



Looking at how respondents have agreed or strongly agreed with the presented potential barriers to precision agriculture over time, Figure 57 shows across all previous surveys, the barriers have hit a collective low point. Soil and topography are the only listed barriers that were slightly higher in 2013 than in 2011.

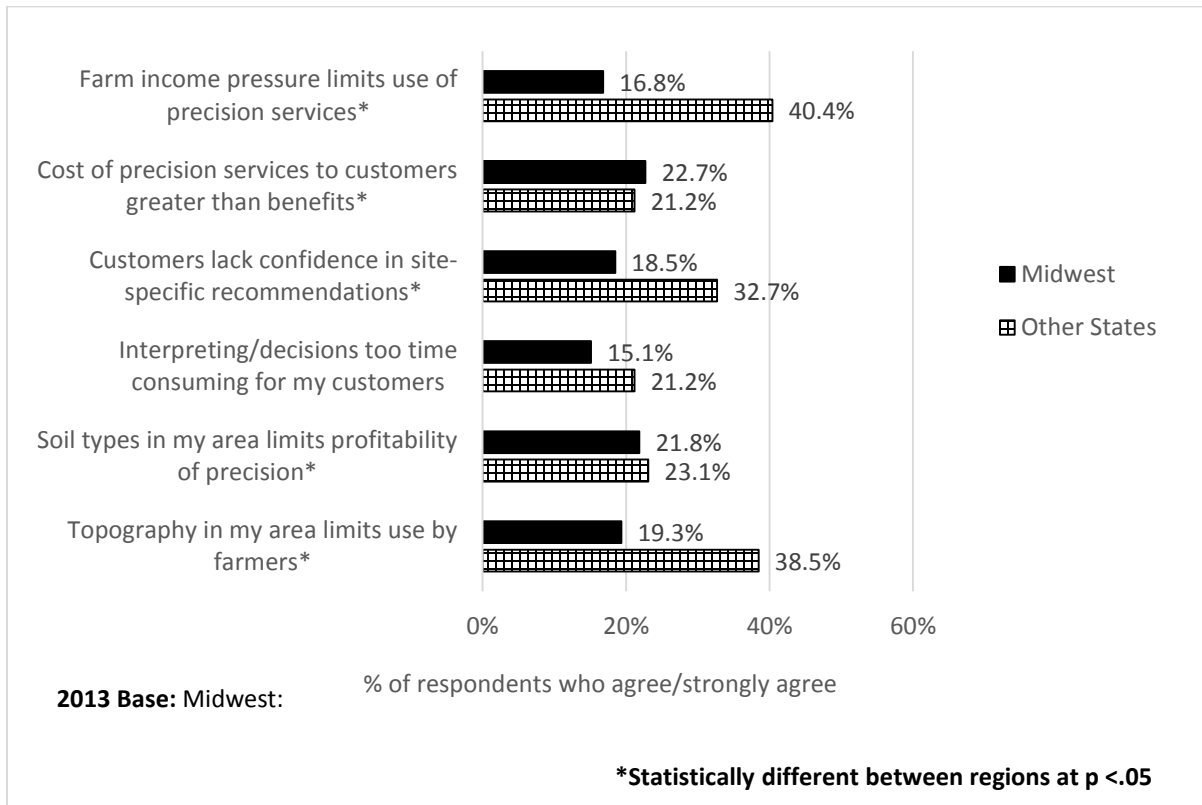
**Figure 57. Percent of Respondents who Agree/Strongly Agree that Customer Issues Create a Barrier to Expansion/Growth in Precision Agriculture Over Time.**



In Other States, the three largest customer barriers preventing the adoption of precision agriculture were farm income pressures, topography, and lack of customer confidence in site-specific recommendations. Lack of customer confidence in site-specific recommendations replaced the cost of precision services to customers outweighing the benefits as one of the top concerns in Other State from 2011 to 2013, decreasing to 21 percent of respondents who agreed or strongly agreed this was a concern, down from 44 percent in 2011. There were significant differences across the different organizational types in customers who were concerned with the cost of precision services and how soil type affected the profitability of precision technology.



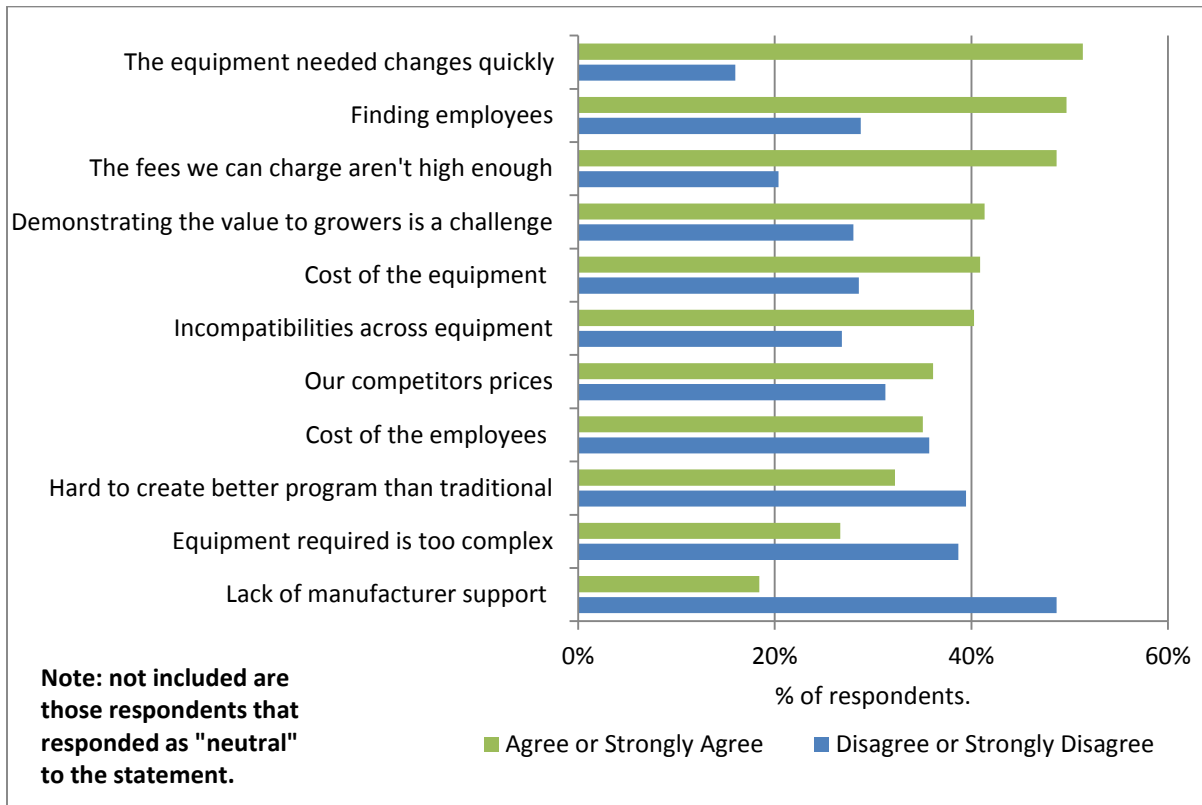
**Figure 58. Customer Issues Creating a Barrier to Growth in Precision Agriculture by Region**



### Dealer and Technology Barriers

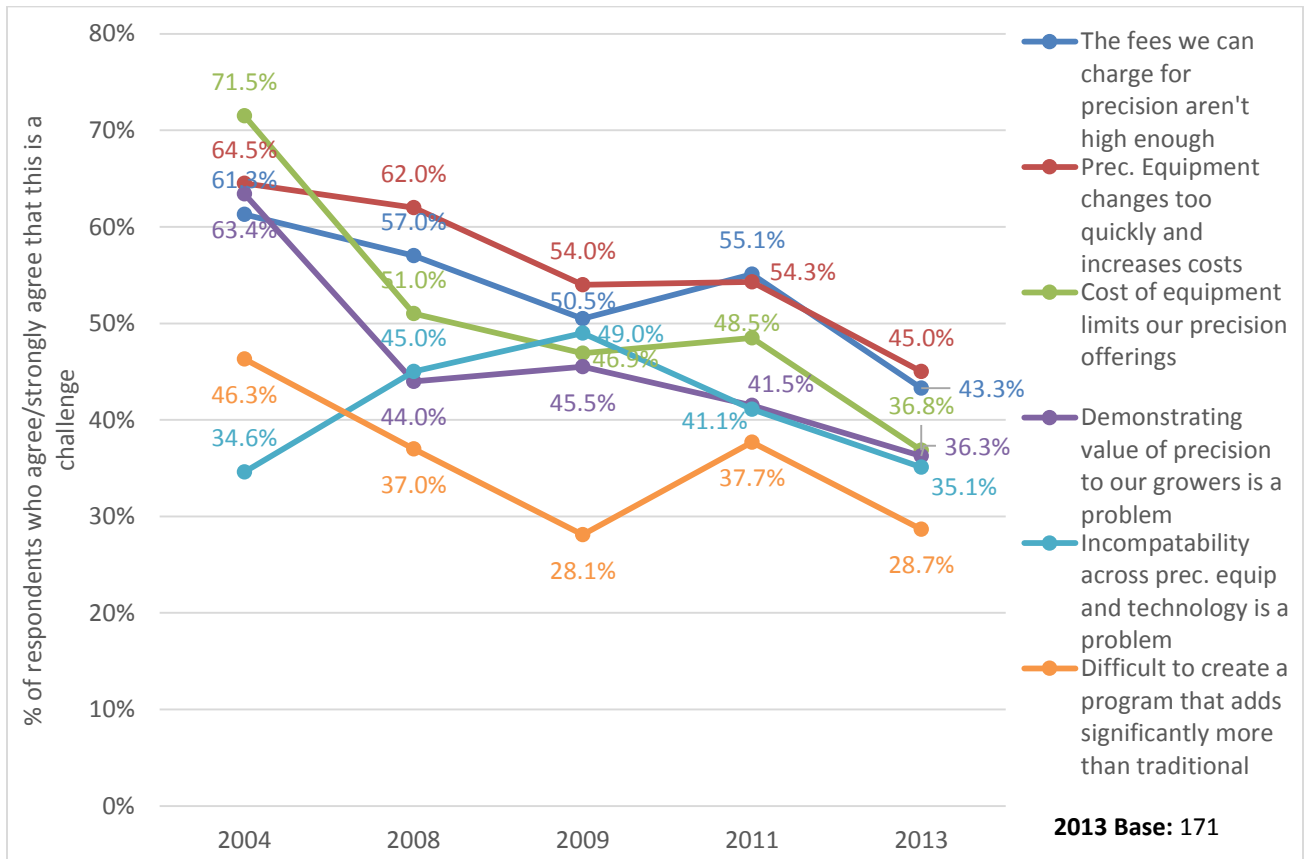
When dealers were asked to think about the barriers they foresee preventing them from expanding or growing their use of precision agriculture, frequent changes in needed equipment was selected often, with 51 percent agreeing or strongly agreeing that it was a barrier (Figure 59). On the other side of the spectrum, when presented with a lack of manufacturer support as a barrier, 49 percent of respondent selected disagree or strongly disagree that the issue was a barrier.

**Figure 59. Dealer/Technology Issues that Create a Barrier to Expansion/Growth in Precision Agriculture**



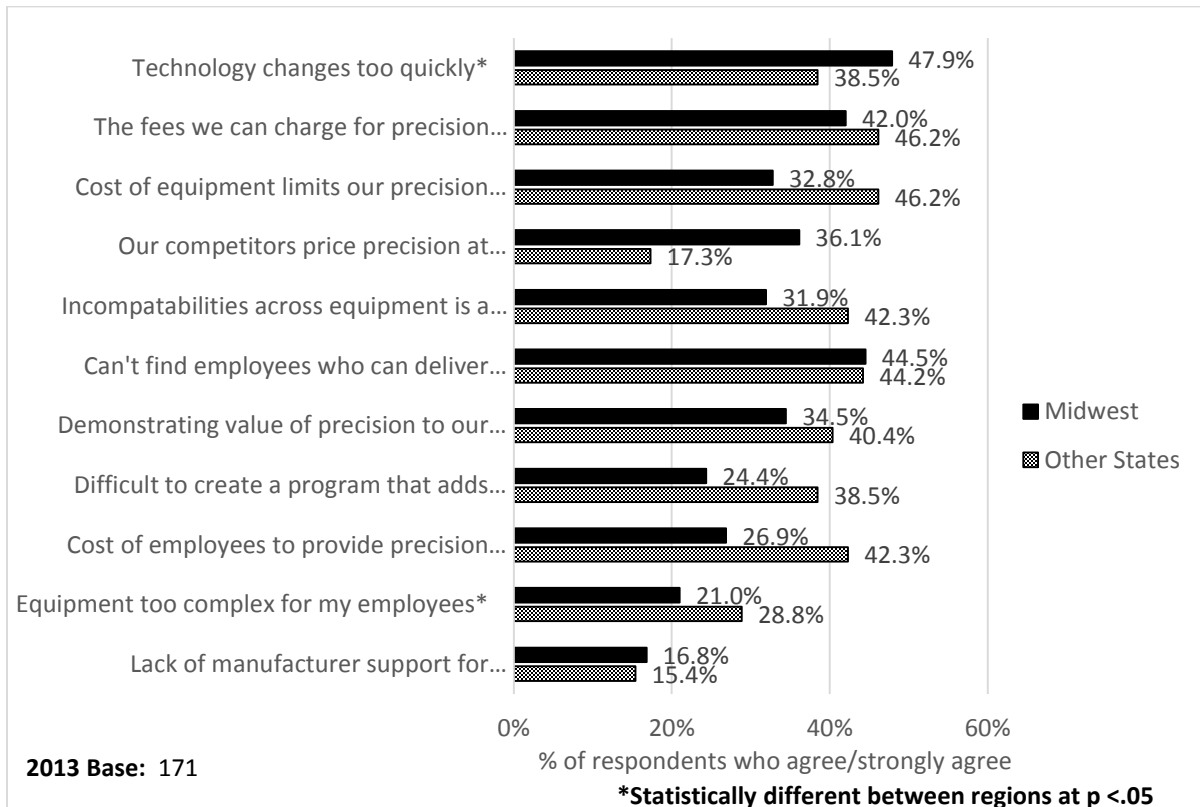
Over time, concern over dealership centric issues has declined (Figure 60). The biggest decrease in perceived barriers to technology for dealerships in the 2013 survey was fewer dealers were as concerned about the fees they charged for precision services (55 percent in 2011, 43 percent in 2013) (Figure 60). Since 2004, the perceived barrier with the largest decline has been the cost of precision equipment, dropping to 37 percent of dealerships expressing concern in 2013 from 72 percent of dealers in 2004, when the question was first incorporated into the survey.

**Figure 60. Dealer/Technology Issues that Create a Barrier to Expansion/Growth in Precision Agriculture Over Time**



The majority of the dealer issues dealerships responded to were shown to have significant differences between Midwestern and Other States (Figure 61). Some of the biggest concerns included the cost of employees to provide precision services as being too high, difficulty in creating a program that adds more value than traditional programs, and competitors pricing precision services at unprofitable levels.

**Figure 61. Dealer/Technology Issues that Create a Barrier to Expansion/Growth in Precision Agriculture over Time**



## Market Positioned of Precision Technology

Figures 61 and 62 highlight the results of a new question to the 2013 survey. In an attempt to learn more about why dealerships offer various precision services, respondents were asked to indicate which of the following statements they most agree with for various technologies:

- An obsolete technology. No longer used or has been nearly replaced
- A technology customer expect one to use
- A technology that separates one from the competition but would not generate additional revenue.
- A technology that separates one from the competition and helps generate additional revenue.
- An emerging technology with highly uncertain future. Used by few.
- An emerging technology with a promising successful future. Used by few.

The premise of this question was to understand where various products were in their life cycle. For example, an emerging technologies are likely to be used by very few and can either have a promising or uncertain future. Products that have been in the market for a while can create differentiation among competition retailers and if that differentiation is significant enough, a premium, or additional revenue, can be generated. Finally, a technology that has been in the market a while can be something that customer expect their retailers to use, or has become obsolete and said technology has been surpassed by another innovation.

Figure 62 shows the story of four popular technologies. The first is variable rate seeding, which the most respondents agreed is an emerging technology with a promising future. The second, chlorophyll/greenness sensors, had most of respondents (41.2 percent) agreeing it is also an emerging technology, but one with an uncertain future. Autosteer had most of retailer respondents indicating it is a technology their customers expect them to use (30.3 percent). Zero respondents indicated it was an obsolete technology. Finally, 27.9 percent indicated light bar technology was an obsolete technology and 45.6 percent indicated it was a technology they expected to be used.

**Figure 62 Perceptions about adoption of different precision technologies.**

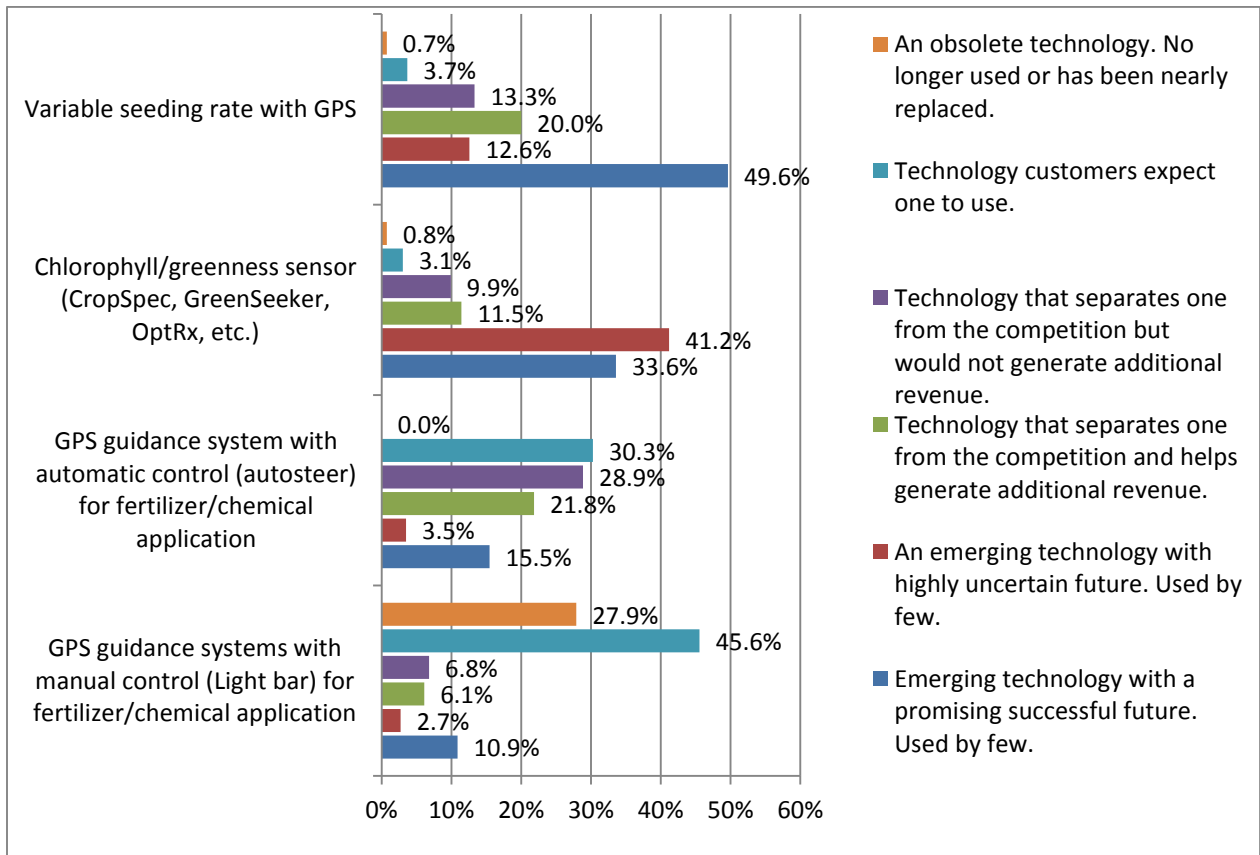
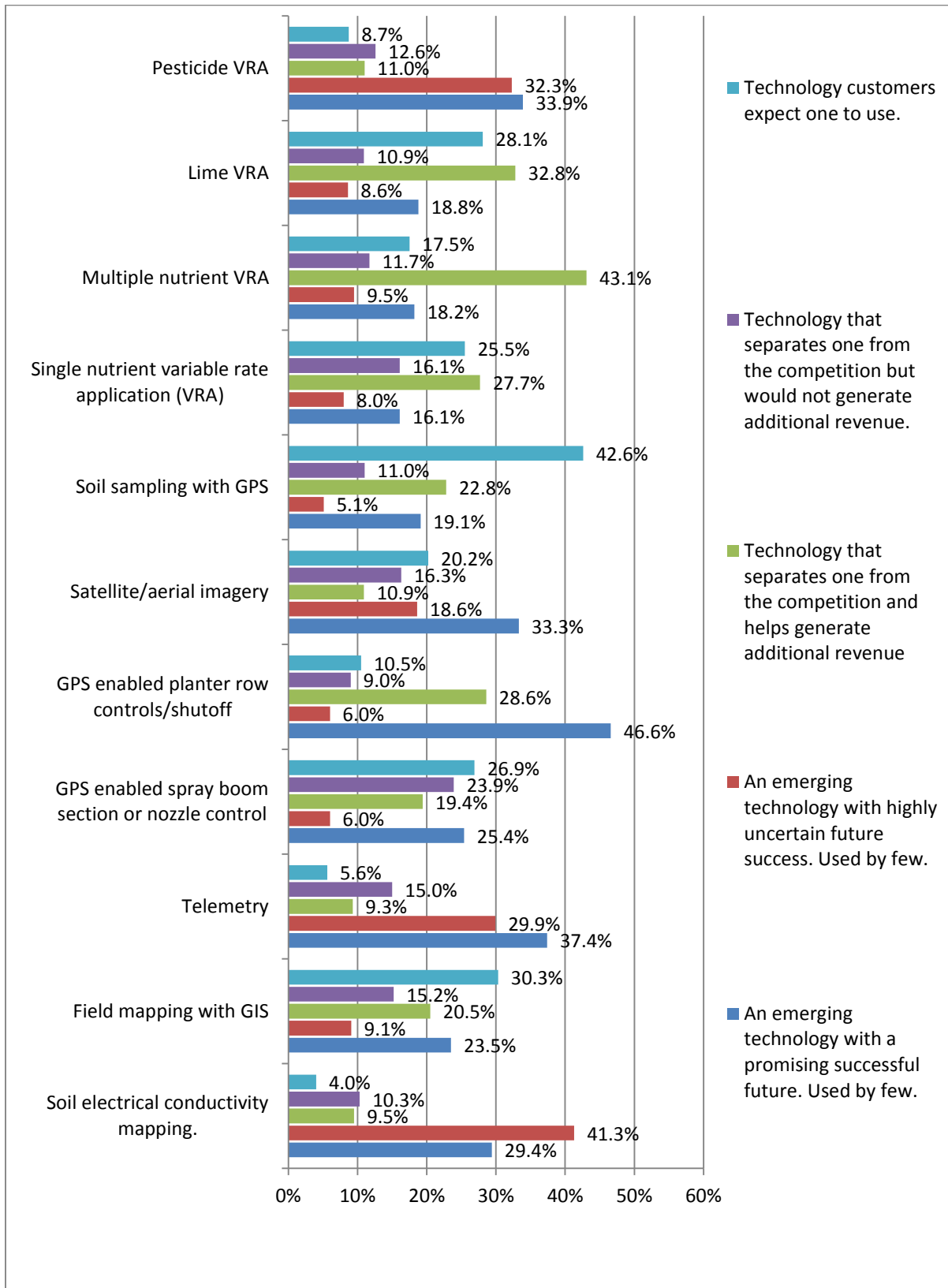


Figure 63, below, shows the results of the other 11 technologies. Respondents have various perceptions about these different technologies.

Figure 63 Perceptions about adoption of difference precision technologies (cont.).



## Summary

Precision Farming is a related set of tools that utilize information technology to increase the efficiency of field operations and crop inputs. Many retailers began working with precision farming in the mid-1990's by more intensely sampling soil nutrients via grids or zones, then offering variable rate applications of fertilizers according to the variation seen across the field. At the same time, farmers began using GPS-linked yield monitors in their combine harvesters. This combination of precise nutrient analysis/application and the yields that resulted fundamentally changed the intensity of how crops are managed. But it also revealed just how complicated the relationships can be among crop inputs and crop responses, and the complications of spatial and temporal variability. The survey results show that precision technologies are clearly more adopted in the Midwest.

At about the same time field guidance technologies were developed that depended only on field position, not other field characteristics. Manual guidance, where a display guides an operator to steer more precisely, and autoguidance, where field position is integrated into the steering of implements, has been rapidly adopted. More recent innovations that also depend on field position—planter row unit controls and sprayer section controls have also shown rapid adoption.

For many years the technologies that measure and manage field variability such as grid/zone soil sampling, remote sensing, and variable rate technology showed little change in adoption. The 2013 results indicate a positive shift in their adoption, as well as continued optimism for their future increase in adoption.

Clearly, both customer and dealer issues related to precision farming adoption are less important than in previous surveys.

Thinking forward, the biggest challenge for any technology's successful, and fast, adoption will be how obvious it is for dealerships, and their farmer customers, to realize the value. As the role of precision technology in production changes, there is no doubt that dealership offering these precision technologies and services will find creative ways to keep the industry relevant and growing.

**Table 1. GPS Guidance Terminology**

**GPS:** (Global Positioning System) – This is the name of the satellite-navigation network maintained by the United States Department of Defense. Also, the term “GPS” is often treated more generically to refer to any device that depends on navigation satellites for functionality.

**RTK:** (Real Time Kinematic) – refers to highly-accurate, highly-repeatable positioning. With RTK, a base station receiver is placed on a stable mount, allowing multiple GPS rover receivers to utilize this type of correction within a limited range of the base station.

**DGPS:** (Differential GPS) - refers to techniques used to enhance accuracy, integrity, reliability, and availability of GPS data. The following are all examples of DGPS:

WAAS (Wide Area Augmentation System):

- Free service offered through Federal Aviation Administration (FAA)
- Ground-based reference stations plus 2 geostationary satellites
- Point accuracy: 9-15 feet; Pass-to-pass accuracy: 6-12 inches

RTK array/cluster (Deere, Trimble, etc.):

- Annual subscription
- Cost and point accuracy varies by the service and technologies being used

Satellite correction (OmniSTAR XP, StarFire 2, etc.)

- Service offered by several companies using a correction
- Some services are free while others require a subscription and the receiver in the tractor to be specific to the company offering the service

Personal RTK base station (fixed or portable)

- Line of sight correction
- Grower positions stationary base station in the best location to cover his acreage, or moves a portable base around with from field to field to get the best signal
- Can be more expensive than using a service but better positioned for an individual’s needs

RTN (real time network)

- Generic term for a correction service offering more reliability than a single-station RTK.
- Several CORS or RTK base stations are connected in a “mesh” so correction data can be used from multiple locations to increase accuracy, reliability, and the distance covered.
- Offered by several companies, however often associated with a subscription fee.

CORS (Continually Operating Reference Station)

- Coordinated by National Geodetic Survey of National Oceanic and Atmospheric Administration (NOAA)
- Survey-grade GPS receiver is positioned in a fixed position providing continuous RTK-correction for receivers with Internet-accessible capabilities
- Internet-capable cell phone or cell modem (available from various cell phone data providers) is used to transmit correction signals from a server to the tractor so no line-of-sight requirements
- Requires cellular phone service and a data plan
- No personal base station is required so some cost is lower



# 16<sup>th</sup> PRECISION AG SURVEY

**CropLife**

• Purdue Center for Food and Agricultural Business •  
• Purdue Department of Agronomy •

**PURDUE**  
UNIVERSITY

*Play a part in agricultural history! Please fill out and return this brief survey in the enclosed pre-addressed, postage-paid envelope, and send to:*

**CropLife**, 37733 Euclid Ave., Willoughby, OH 44094; Fax: 440-942-0662.

**PLEASE RETURN BY FEBRUARY 15, 2013.**

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. 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
3. What were the **total annual retail sales** (in dollars) of agronomic products and services (fertilizer, chemicals, seed, services) **at this location** in 2012?
  - 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 - under 7,000,000
  - \$7,000,000 or more
4. How many total retail outlets does *your company* own or manage? *[check one]*
  - None
  - 1
  - 2-5
  - 6-15
  - 16-25
  - More than 25
5. In a typical year how many total acres do you custom apply **at your location** (fertilizer, chemicals, seeding – total acres including multiple applications)? *[check one]*
  - None >go to Question 9
  - Under 10,000 acres
  - 10,001 to 25,000 acres
  - 25,001 to 50,000 acres
  - 50,001 to 75,000 acres
  - 75,001 acres to 100,000 acres
  - Over 100,000 acres
6. In 2012, approximately what proportion of your total fertilizer sales were custom applied? \_\_\_\_\_ %
7. In 2012, approximately what proportion of your total herbicide/pesticide sales were custom applied? \_\_\_\_\_ %
8. In 2012, approximately what proportion of your total custom application (total acres, all products) used:
  - GPS guidance systems with manual control (light bar)? GPS \_\_\_\_\_ % “0” if None
  - guidance systems with automatic control (autosteer)? \_\_\_\_\_ % “0” if None
9. Do you offer soil sampling — traditional, following a grid pattern and/or by management zone? (check all that apply)
  - Traditional
  - Grid pattern — Grid size most commonly used?
    - < 1 acre
    - 1 ac. - 2.49 ac.
    - 2.5 ac.
    - 2.51 ac. - 5 ac.
    - Other: \_\_\_\_\_
  - Management Zone
    - By soil mapping unit
    - By yield map
    - By electrical conductivity
    - By other (specify): \_\_\_\_\_
  - Don't offer soil sampling
10. In which of the following ways does your dealership use precision technology? (check all that apply)
  - Precision agronomic services for customers (such as soil sampling with GPS, GIS field mapping, etc.)
  - GPS guidance systems with manual control (**light bar**) for fertilizer/chemical application
  - GPS guidance systems with automatic control (**autosteer**) for fertilizer/chemical application
  - Satellite/aerial imagery for internal dealership purposes
  - Soil electrical conductivity mapping
  - Other soil sensors for mapping, mounted on a pickup, applicator or tractor (example: pH sensor)
  - Chlorophyll/greenness sensors mounted on a pickup, applicator or tractor (CropSpec, GreenSeeker, Opfx, etc.)
  - Field mapping with GIS to document work for billing/insurance/legal purposes

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

- Telemetry to send field information to home office from field
- GPS to manage vehicle logistics, tracking locations of vehicles, and guiding vehicles to the next site
- GPS to enable sprayer boom section or nozzle control
- Do not use precision technology**

11. Answer the following only if you use GPS guidance systems with automatic control (autosteer) for fertilizer/chemical applications:

What type of GPS correction do you use for your guidance applications? (check any/all that apply)

- Utilize WAAS (Wide Area Augmentation System)
- Purchase satellite correction (i.e., OmniSTAR XP or HP, StarFire 2)
- Personal RTK base station (fixed or portable)
- Purchase correction from RTK array/cluster (i.e., Deere, Trimble)
- Utilize CORS (Continually Operating Reference Stations)
- Purchase RTN (Real Time Network) connection (i.e., Trimble ARS Now, Leica iMAX)
- No GPS guidance system with automatic control**
- Other (specify) \_\_\_\_\_

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

Service	By Fall 2013	Offer by 2016	Never/ Don't Know	Don't offer now but did
Field mapping (with GIS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controller-driven (GPS), variable rate technology (VRT)				
<i>Fertilizer, single nutrient</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Fertilizer, multiple nutrient</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>Pesticide</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 with GPS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satellite/aerial imagery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Guidance/autosteer sales & support	<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"/>
Soil electrical conductivity mapping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. How do you help manage the farm-level data (i.e., yield maps, soil tests, EC, satellite imagery) of your farmer-customers to assist in their decisionmaking? (Check any/all that apply.)

- Print maps for customers (yield, EC, soil maps, etc.)
- No data aggregated among farmers, work with farmers only with the data from their own farms
- Data aggregated among farmers but not outside the dealership
- Data aggregated among farmers including those outside the dealership
- Other (specify) \_\_\_\_\_
- Do not help customers with their farm-level data

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

	<u>I am not breaking even</u>	<u>I am just variable costs (See NOTE)</u>	<u>I am covering 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
Data analysis for yield monitors	1	2	3	4	5	6
Variable seeding rates with GPS	1	2	3	4	5	6
Satellite/aerial imagery	1	2	3	4	5	6
Soil sampling with GPS	1	2	3	4	5	6
Yield monitor sales/support	1	2	3	4	5	6
Guidance/autosteer sales/support	1	2	3	4	5	6
Controller-driven (GPS) <b>single</b> nutrient variable rate application	1	2	3	4	5	6
Controller-driven (GPS), <b>multiple</b> nutrient variable rate application	1	2	3	4	5	6
Soil electrical conductivity mapping	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.)

15. Please answer the following question *whether or not* you offer any precision services. Approximately what percentage of the total acreage in your market area (all growers, not just your current customers) is currently using the following site-specific agricultural practices? Approximately what percentage of the total acreage will be using these practices in three years (the year 2016)?

Practice	% of market acres (fill in blank with a percentage; indicate 0 if none)	
	Currently	3 years from now (2016)
Custom application of any type	_____ %	_____ %
Field mapping (with GIS)	_____ %	_____ %
Controller-driven (GPS), variable rate technology (VRT)		
<i>Fertilizer, single nutrient</i>	_____ %	_____ %
<i>Fertilizer, multiple nutrient</i>	_____ %	_____ %
<i>Lime</i>	_____ %	_____ %
<i>Pesticide</i>	_____ %	_____ %
GPS guidance systems with manual control (light bar) for field operations (tillage, planting, etc.)	_____ %	_____ %
GPS guidance systems with automatic control (autosteer) for field operations (tillage, planting, etc.)	_____ %	_____ %
GPS enabled sprayer boom section or nozzle controls	_____ %	_____ %
GPS enabled planter row controls/shutoff	_____ %	_____ %
Chlorophyll/greenness sensors mounted on a pickup, applicator or tractor (CropSpec, Greenseeker, OptRx, etc.)	_____ %	_____ %
Yield monitor without GPS	_____ %	_____ %
Yield monitor with GPS	_____ %	_____ %
Variable seeding rates with GPS	_____ %	_____ %
Satellite/aerial imagery	_____ %	_____ %
Soil electrical conductivity mapping	_____ %	_____ %
Soil sampling with GPS	_____ %	_____ %

+

16. For the following precision services you may or may not offer, please check which of the following statements you would use to explain this service, as it pertains to your business.

	An emerging technology with a promising successful future. Used by few.	An emerging technology with highly uncertain future success. Used by few.	Technology that separates one from the competition and helps generate additional revenue.	Technology that separates one from the competition but would not generate additional revenue.	Technology customers expect one to use.	An obsolete technology. No longer used or has been nearly replaced.
GPS guidance systems with manual control (light bar) for fertilizer/chemical application.						
GPS guidance systems with automatic control (autosteer) for fertilizer and chemical application.						
Soil electrical conductivity mapping.						
Chlorophyll/greenness sensor (CropSpec, GreenSeeker, OptRx, etc.)						
Field mapping with GIS						
Telemetry						
GPS enabled spray boom section or nozzle control						
Variable seeding rates with GPS						
GPS enabled planter row controls/shutoff						
Satellite/aerial imagery						
Soil Sampling with GPS						
Single Nutrient Variable Rate Application (VRA)						
Multiple Nutrient VRA						
Lime VRA						
Pesticide VRA						

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).

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

18. Of your farmer-customers who use a yield monitor with GPS, how do they use their yield monitor information/field maps?

<input type="checkbox"/> Document yields	<input type="checkbox"/> Divide crop production shares
<input type="checkbox"/> Monitor crop moisture	<input type="checkbox"/> Negotiate new crop leases
<input type="checkbox"/> Conduct field experiments	<input type="checkbox"/> Communicate with landowners or business partners
<input type="checkbox"/> Tile drainage decisions	<input type="checkbox"/> Do not collect data or use in decision making
<input type="checkbox"/> Irrigation decisions	

19. How much will your location be investing in precision/site-specific technology during 2013?

- |  |  |
|--|--|
| <input type="checkbox"/> None              | <input type="checkbox"/> \$25,000 - \$49,999 |
| <input type="checkbox"/> \$1 - \$10,000    | <input type="checkbox"/> \$50,000-\$99,999   |
| <input type="checkbox"/> \$10,001-\$24,999 | <input type="checkbox"/> More than \$100,000 |

20. As you look at the current and future precision situation in your local market, what emerging precision technologies have the potential to impact your business most substantially?

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21. What is your ZIP code? \_\_\_\_\_ 21. What state are you located in? \_\_\_\_\_

Thank you for your cooperation! PLEASE SEND YOUR COMPLETED SURVEY TO:

CropLife, 37733 Euclid Ave., Willoughby, OH 44094, Fax: 440-942-0662.

## 16th PRECISION AG SURVEY