Benchmarking Precision Agriculture Adoption in the United States and Brazil: U.S. Dealer Survey Results and a Framework for Brazilian Replication

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Abstract

For decades, U.S. agriculture has been regarded as a global benchmark for efficiency, productivity, and technological sophistication. Yet emerging evidence suggests that other major producers are rapidly closing the gap. Brazil, in particular, has become one of the world's leading grain producers and is expanding its use of digital and precision agriculture tools. This paper presents recent U.S. results from the CropLife–Purdue Precision Agriculture Dealership Survey and lays the groundwork for replicating the survey within Brazil's agricultural retail sector. Conducted in the United States for nearly three decades, the CropLife–Purdue survey provides a consistent framework for examining how crop input dealers adopt and deliver precision technologies, manage data, evaluate profitability, and perceive barriers to adoption. In partnership with key Brazilian organizations and stakeholders, including the Brazilian Association of Precision and Digital Agriculture, the future Brazilian survey will adapt this framework to the local context while preserving methodological consistency with the U.S. survey. This research comes at a critical time for global agriculture, as producers face tighter margins, rising input costs, and intensifying international competition. Establishing comparable data on precision agriculture adoption in the United States and Brazil will provide insights into how innovation can strengthen efficiency, resilience, and environmental stewardship, while also creating a scalable framework for future international comparisons.

Keywords: Precision Agriculture, Technology Adoption, Crop Production, United States, Brazil

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1. Introduction

The adoption of novel technologies has fueled rapid growth in global agricultural production and supported the development of more efficient food production. Use of advanced information and computer technologies has contributed to enhanced performance in the economy and in the agricultural sector (Sonka 2014). Indeed, the availability of sensors, mapping technology, and tracking technologies has changed many farming systems and the management of the food system as it flows from producers to consumers (Coble et al. 2018). Previous technology innovations, such as synthetic fertilizers, pesticides, and biotechnology, have undoubtedly increased production but can also have serious environmental consequences – such as loss of biodiversity, degradation of soil health, and pollution of surface and groundwater. Precision agriculture is a set of technologies that holds promises to increase production while also potentially decreasing environmental impacts.

Widespread use began in the 1990s in the United States, then more commonly known as site-specific agriculture, or precision agriculture. GPS (Global Positioning Systems) became available to track field attributes and activities in specific parts of fields. Soil maps were digitized, yield monitoring systems were developed, and soil nutrients were sampled and tested in grids or zones instead of on a whole field basis. Seeds, fertilizers, water, and other inputs were applied in varying amounts within fields according to need. GPS-guided tractors, combines, sprayers, and other implements to more precisely follow pathways across fields, and were also embedded in systems to automatically turn on and off inputs in irregular areas of fields, reducing waste. There is much promise in interconnected networks of sensors, artificial intelligence, and automation/robotics for future advancements.

Meanwhile, studies have shown that the need for more understanding of appropriate technologies and skills in using these tools contributes to some farmers' apprehension about the adoption of digital technology (Bolfe et al. 2020; Gelb and Voet 2009). Adoption of some technologies requires more knowledge about how technology works, and other technologies demand more scale (Pivoto et al. 2019). Precision agriculture is commonly tied to changes in a farm's management, and often requires agronomic knowledge to benefit, different from new seeds that may be planted the same, fertilizers that may add another step, but crop management is the same, or pesticides that may simplify management. But precision agriculture often requires a rethink of the way a farm is managed.

Previous studies have reviewed publicly available farm-level data on global precision agriculture adoption, showing rapid adoption of selected technologies (Lowenberg-DeBoer and Erickson 2019). Precision agriculture has advanced rapidly over the last decades, particularly in the United States and Brazil, which are world leaders in grain production (USDA-ERS 2025a; USDA-ERS 2025b; Thompson et al. 2019). Some studies have been conducted on the adoption rate of precision agriculture technologies in these countries (Damasceno et al. 2026; Erickson and Lowenberg-DeBoer 2025; Silvi et al. 2021; Molin 2016; Silva et al. 2011). While results of these studies vary, adoption rates have generally increased over the last two decades, yet they remain below what many researchers expected. In the United States, the overall adoption rates of some well-established precision farming practices do not exceed 50% of farms or even 50% of planted areas (Pathak, Brown, and Best 2019; Schimmelpfennig and Ebel 2016). In Brazil, a study conducted in 2021 by IHS Markit – Business Intelligence showed an adoption rate of 34% among soybean farmers.

The introduction of precision agriculture in the United States generally preceded its corresponding adoption in Brazil. However, it remains uncertain whether U.S. farms have maintained a comparative advantage in this area. Although several individual studies have reported adoption rates in both countries, there is no recent research that directly compares, using a consistent methodology, how these technologies are being adopted by U.S. and Brazilian agriculture. This study directly addresses that knowledge gap by providing the first side-by-side benchmarking of precision agriculture adoption between U.S. and Brazilian agribusinesses using a consistent Purdue-developed methodology.

This paper presents recent U.S. results from the CropLife–Purdue Precision Agriculture Dealership Survey and lays the groundwork for replicating the survey within Brazil's agricultural retail sector. For nearly three decades, this survey has documented how U.S. agronomic retailers and service providers implement precision technologies, deliver digital services, manage data, and evaluate profitability and barriers to adoption. Applying the same framework internationally allows for a rigorous comparison of adoption patterns, service offerings, and decision-support practices across two of the world's most influential grain-producing regions. Understanding how precision agriculture technologies are being adopted and delivered across countries is essential for sustaining productivity, profitability, and environmental performance in modern farming systems.

The Brazilian survey will be implemented in collaboration with national agricultural retail networks, producer organizations, and academic partners. The instrument will capture dealership characteristics, precision service offerings, sensing and data technologies, data management practices, profitability perceptions, and barriers to adoption from both retailer and farmer perspectives. Minor contextual adjustments will ensure relevance to Brazilian production systems while maintaining methodological consistency. Responses will be analyzed using descriptive statistics and comparative benchmarking indicators.

Beyond measuring adoption rates, the study examines how institutional environments, market structures, and service delivery models influence technology diffusion. Precision agriculture often requires new management approaches, technical skills, and data integration capabilities, making the role of retailers and service providers critical in facilitating adoption. By comparing the United States and Brazil, the research will identify structural factors that accelerate or constrain digital agriculture uptake and highlight opportunities to improve technology transfer and public–private collaboration.

This research comes at a critical time for global agriculture, as producers face tighter margins, rising input costs, and intensifying international competition. Benchmarking precision agriculture adoption in two giant markets will provide insights into how innovation can strengthen efficiency, resilience, and environmental stewardship. The project also establishes a scalable framework for future international comparisons, reinforcing data-driven decision-making and supporting strategies to maintain global competitiveness in agricultural production.

2. Materials and Methods

This article presents the most recent CropLife/Purdue Precision Survey, the longest-running continuous study of precision farming adoption conducted for three decades. In February-April 2026 CropLife magazine and the Departments of Agricultural Economics and Agronomy at Purdue University conducted the 26th survey of crop input dealers about precision agriculture technologies. Respondents were asked questions about their company profile (organizational type, number of outlets, and respondent position) and on their precision agriculture activities, including: (a) the use of precision technologies in their own business operations; (b) precision service offerings to farmer customers (e.g., VRT fertilizer, seeding, and pesticide applications); (c) adoption of sensing technologies (imagery, EC mapping, UAVs); (d) data management and decision-support practices; (e) profitability of precision services; and (f) barriers to adoption from dealer and producer perspectives (Erickson and Lowenberg-DeBoer, 2025). The questionnaire was administered electronically using *QuestionPro* due to its formatting capabilities, with a link emailed to a subset of CropLife's email list. Survey questions are at the end of this report.

In this paper, we summarize 96 survey responses from agricultural retail input suppliers working with field crops only (Erickson and Lowenberg-DeBoer 2026). Because these results are based on dealer-reported estimates of technology use in local market areas, they should be interpreted as indicators of market-level adoption patterns rather than direct farm-level adoption measures. Respondents, mostly from the Midwest, included cooperatives, independent retailers, and those parts of a regional or national chain. The results reported are for dealers that identified as primarily working with field crops such as corn, soybeans, wheat, rice, cotton, milo, sugar beets, and forages. To keep the survey length reasonable for respondents, we ask some questions in alternate years, and report some time-series information that goes back many years, in some cases into the 1990's.

As an extension of this work, the survey will be replicated in Brazil, using the same methodology used in the United States to the Brazilian agricultural input retail context. The Brazilian replication will use a similar survey instrument, translated into Portuguese. Minor adaptations will be made to ensure contextual relevance, including the inclusion of major Brazilian crops and regional terminology related to application practices. The survey will be distributed electronically through the mailing list of the National Association of Agricultural and Veterinary Input Distributors. Additional outreach will be conducted in partnership with other organizations, such as the Brazilian Association of Precision and Digital Agriculture, the Federal University of Rio Grande do Sul and agricultural cooperatives. Participation will be voluntary and anonymous. Following the Purdue methodology, incomplete or ineligible responses (e.g., from equipment dealers or consultants) will be disregarded.

Data will be analyzed using descriptive statistics and trend comparisons. Key indicators – such as the percentage of dealerships offering specific precision services, profitability levels, and perceived barriers – will be benchmarked against U.S. data to assess similarities and differences in adoption trajectories. Results will be disaggregated by organizational type, region, and crop focus to highlight structural and technological heterogeneity within Brazil's precision agriculture sector, in a way that will allow comparison with the United States.

3. Results in the United States

3.1 Crop Inputs with Drones a Growing Market Factor

The survey also included questions about UAV/drone applications and how these services are being provided to customers. Over 90% of dealers are aware of UAV-based input applications in their market area (Erickson and Lowenberg-DeBoer 2026). Half of dealers say they offer crop input to customers with drones, either as an in-house service or contracted to another company (Table 1). Competition from independent UAV service providers seems to be increasing sharply. Dealers report costs have gone up sharply since 2024, although the number of responses is small, only for those providing these services. Dealers said setting up a crew costs an average of around $145,000, to equip, license, and train. And it costs around $36,000 per month to keep each crew running – the variable costs which could include wages, fuel, repairs and maintenance, insurance, etc. Dealers doing their own in-house drone spraying have, as an average, added more crews.

In 2024 dealers offering drone services indicated that around two-thirds of applications were for fungicides on corn, around 13% herbicide applications in pastures and fencerows, approximately 10% for insecticide applications on corn, and about 6% for insecticide applications on soybeans.

Table 1. UAV/Drone Services and Dealer Operations, 2024 and 2026.

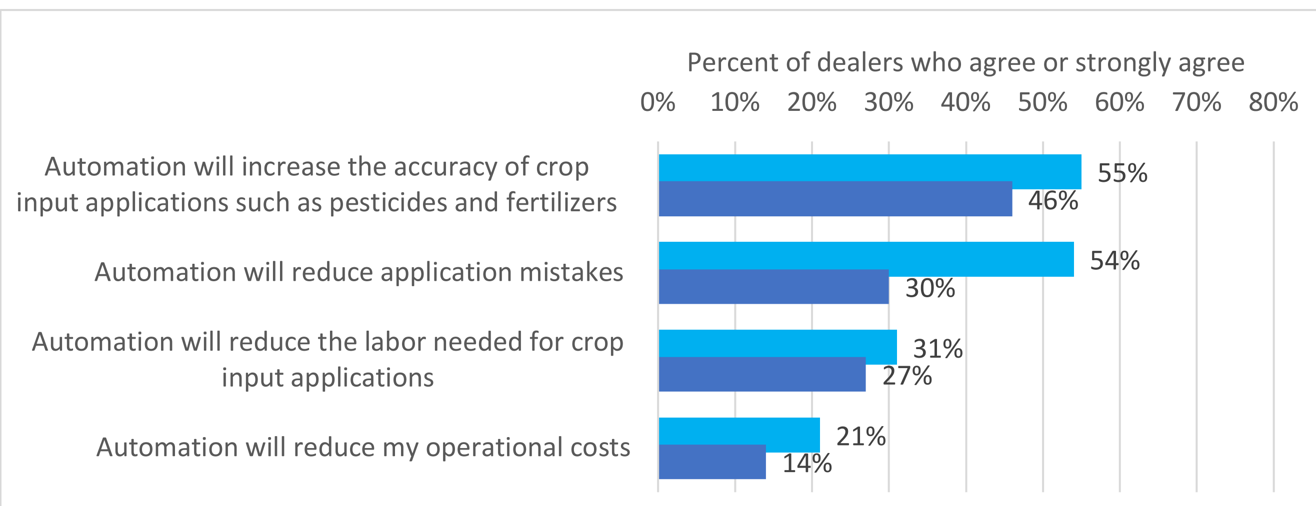
How UAV/drone services are procured by customers	Percent of dealers 2024	Percent of dealers 2026
Service provided to customers in-house	27%	21%
UAV/drone service to customers contracted to another company	25%	28%
Customers use UAV/drone companies not affiliated with us	27%	44%
Not aware of inputs applied via UAV/drone in my area	20%	8%

Operations of those offering UAV/drone applications in-house	Mean 2024	Mean 2026
Number of UAV/drone crews per dealer	1.7	4.6
Workers per crew	2.2	1.7
Drones per crew	1.4	1.2
Investment to equip, license and train one crew	$62,000	$145,000
Monthly variable cost per crew	$13,000	$36,000

3.2 Automation and Artificial Intelligence

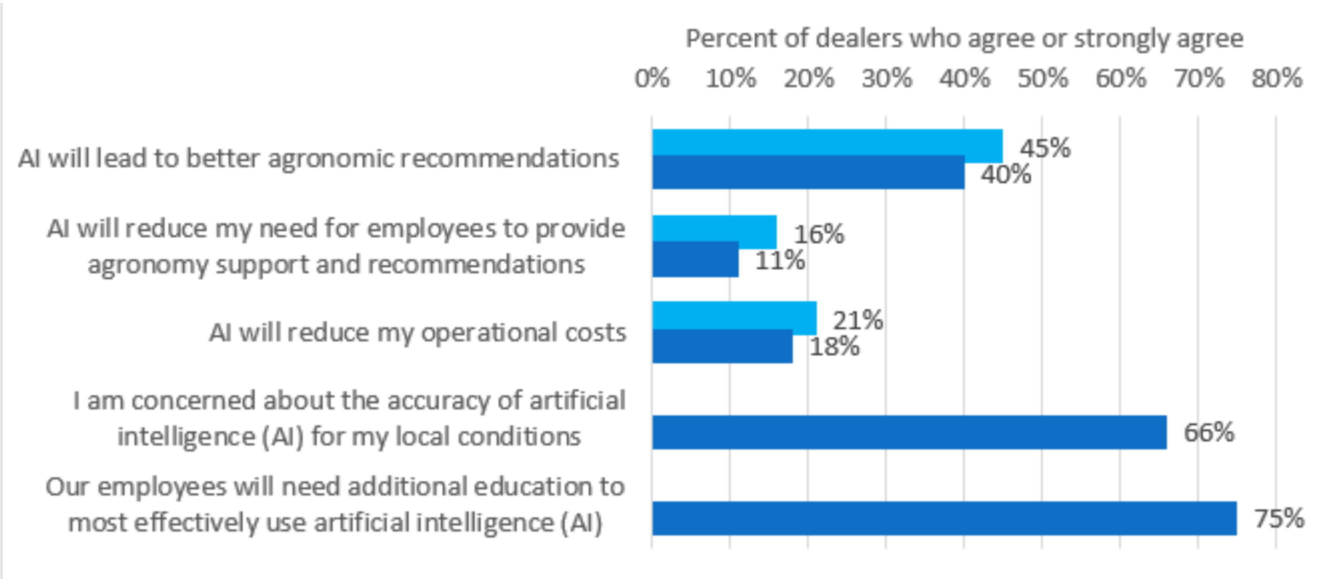
Two years ago, dealers were asked how they thought automation/robotics might affect their businesses, and the CropLife/Purdue survey asked that question again in 2026. Automation is already widely used in crop production – for example boom/nozzle controllers and autosteer but appears poised for greater expansion. Around half of dealers think that automation/robotics will increase the accuracy of crop input applications (Figure 1) – but fewer dealers say automation will reduce application mistakes. Less than a third of dealers indicate automation will reduce their labor needs associated with crop inputs, and many fewer think it will reduce costs. To some the labor response may be a surprise, as labor savings are often viewed as the most obvious result of automation – to take a human's hands that we pay to employ.

Figure 1. Dealer attitudes about automation, 2024 light blue and 2026 dark blue.



The promise of artificial intelligence dominates general US business and financial news, but less than half of dealers say AI will lead to better agronomic recommendations (Figure 2). Even fewer dealers say AI will reduce their operational costs, perhaps by needing fewer workers or being more efficient. Questions added in 2026 showed most dealers have concerns that AI will not capture their unique local situation, and there will need to be investments in education to get workers to effectively use AI. Dealers currently using AI indicate they use it the most for imagery analysis, and less for variable rate prescription generation, agronomic recommendations, logistics/routing of equipment, and customer relationship management.

Figure 2. Dealer attitudes about artificial intelligence, 2024 light blue and 2026 dark blue.



3.3 Overall Steady Use of Digital Ag by Farmers

Dealers report that most acres in their areas use guidance, a combine yield monitor, section controllers, and planter controllers, as has been the case for the last few years and most have been steady (Figure 3). Added to those at half or more for the first time is cloud storage of farm data, which has nearly doubled since 2020.

Crop inputs applied with a UAV/drone have increased rapidly, but other newer technologies such as machine vision weed detection on a sprayer, which enables VRT herbicides, and autonomous grain carts are still mostly in the single digits of adoption. Note that variations of a few percentage points may not signal a trend, as there are different responders every year.

But dealers are reporting a decline in farmer use of some precision ag practices introduced in the 1990s. Slowly declining to half is precision soil testing, and below half of acres now for the last few years are VRT fertilizer applications. It makes sense that adoption of precision soil testing would mirror adoption of VRT applications, as one informs the other. Dealers report fewer acres using variable rate seeding. And despite being available for two decades or more, dealers report most farms are not using imagery as a stand-alone service (whether that is satellite, aerial, or drone), but imagery could be bundled as part of a scouting or data analysis service.

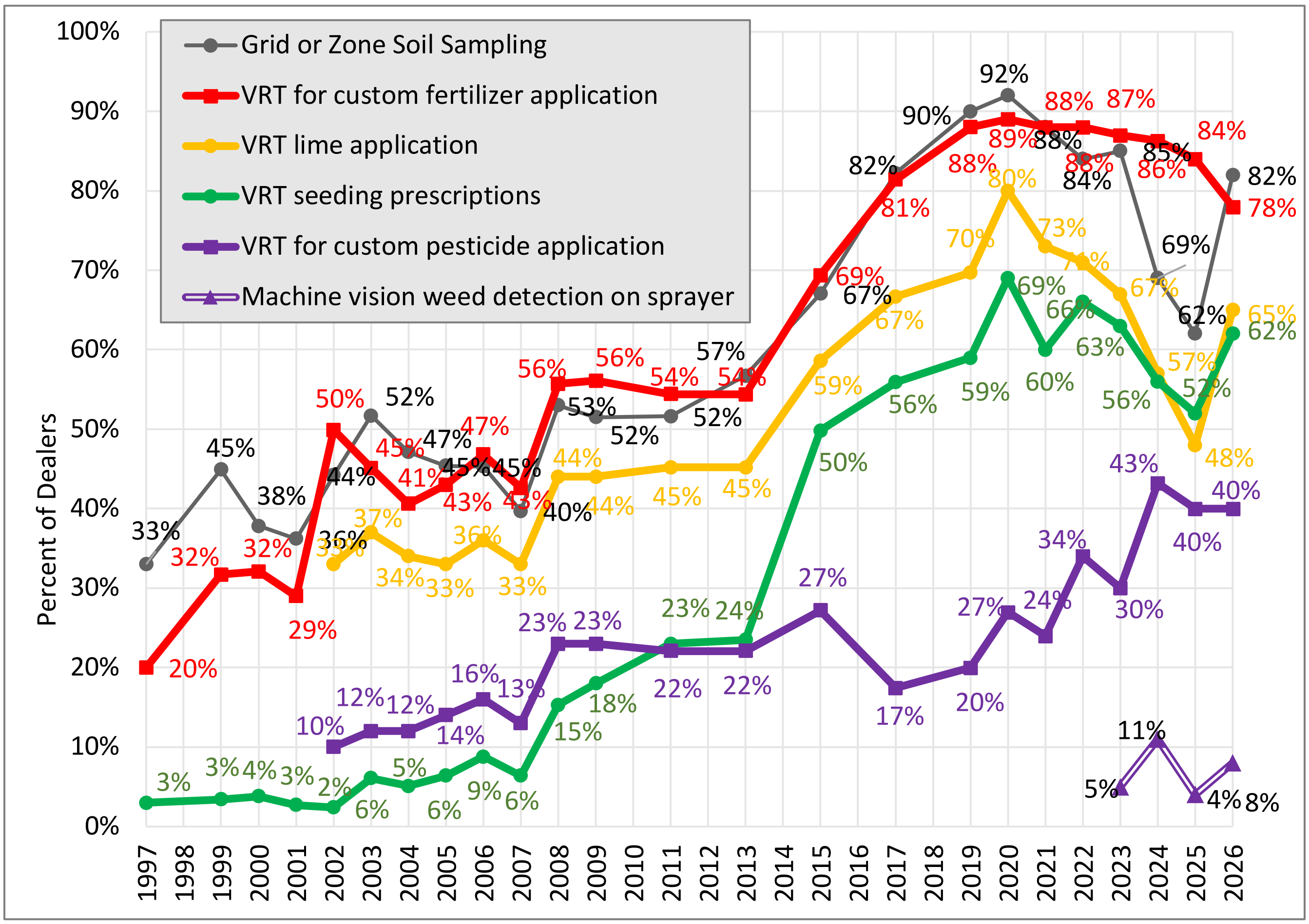
Figure 3. Farmer use of precision technologies, local market area estimated by retailers, ranked for 2026. Color shading shows green most, yellow middle, and orange lower. This question was skipped in 2024.

	2019	2020	2021	2022	2023	2025	2026
Yield Monitor	69%	65%	75%	68%	72%	66%	72%
Guidance/Autosteer	66%	66%	76%	69%	77%	74%	70%
Sprayer Section Controllers	56%	62%	65%	63%	64%	60%	65%
Planter Row or Section Shutoffs	45%	46%	52%	51%	54%	52%	59%
Cloud Storage of Farm Data	21%	29%	36%	42%	40%	43%	51%
Grid or Zone Soil Sampling	52%	52%	60%	57%	51%	52%	50%
VRT Lime Application	41%	44%	56%	52%	43%	40%	43%
VRT Fertilizer Application	39%	44%	51%	49%	43%	43%	42%
Variable Down Pressure on Planter	29%	31%	40%	41%	38%	39%	39%
Any Data Analysis Service	26%	25%	33%	38%	30%	31%	37%
Electronic Records/Mapping for Quality Traceability	20%	21%	21%	34%	31%	39%	33%
Satellite or Aerial Imagery	26%	31%	27%	31%	21%	22%	17%
VRT Seeding	19%	19%	23%	22%	22%	20%	16%
Variable Hybrid Placement Within Fields	11%	17%	15%	14%	12%	9%	15%
Crop Inputs Applied with a UAV/Drone	-	-	-	-	5%	8%	12%
UAV or Drone Imagery	9%	12%	10%	17%	10%	8%	11%
VRT Pesticide Application	8%	7%	8%	9%	6%	15%	7%
Soil EC Mapping	10%	14%	17%	19%	15%	9%	7%
Chlorophyll/Greenness Sensors for N Management	5%	5%	6%	8%	4%	5%	4%
Machine Vision Weed Detection on Sprayer	-	-	-	-	2%	5%	3%
Autonomous Support Vehicle (grain cart) for Harvest	-	-	0%	5%	6%	5%	2%
Robotics/Automation on Harvester	0%	1%	1%	3%	3%	4%	2%
Robotics/Automation for Scouting	-	-	1%	3%	1%	3%	1%
Robotics/Automation for Weeding	0%	0%	0%	3%	1%	2%	1%

3.4 Shifting of Emphasis with Dealer Offerings

Going along with declines in farmers using precision nutrient management, fewer dealers are reporting that they offer VRT fertilizer application custom services (Figure 4). The percentage of dealers offering VRT fertilizer was around half in 2010 and peaked in 2020 at 89%, and has been declining since, now at 78%. Since 2024 this calculation has only been for dealers who are providing custom fertilizer applications, not all dealers. A similar trend can be seen for dealers offering variable rate seeding prescriptions, with around a quarter of dealers offering in 2010, peaking at 69% in 2020, and now at 62%. Up in recent years are dealers offering VRT pesticide applications and crop inputs applied with a UAV/drone.

Figure 4. Dealer offerings of precision services over time, precision soil sampling and variable rate technologies. Starting in 2024, VRT fertilizer is only for dealers who indicate they custom apply fertilizers, and starting in 2024 VRT pesticides are only for dealers who indicate they custom apply pesticides. Prior to that they were for all dealers responding.



3.5 Questions About Profits in Precision Farming

Dealers were asked how their revenue from precision products and services changed in the last three years. 38% responded with about the same, nearly half said revenue was up, and 12% said down. And while revenues are up, so are expenses. As a simple, non-weighted average of all precision products and services offered, 54% of dealers said they were at least breaking even in 2026, lower than the 67% in 2020, 64% in 2022, and 66% in 2024. Dealers have long indicated, as an average, that their precision products and services were not making a profit, but at least most were breaking even--a profitability question has been a part of the survey since its beginnings. Dealers indicate the most profit with fertilizer-related offerings such as soil sampling and VRT fertilizer applications, a situation seen for many years. The technologies with the greatest number of dealers not breaking even are relatively new technologies, including UAV or drone imagery, where one fourth shows a loss, and machine vision weed detection on sprayer, with one third showing a loss.

In addition to dealers indicating lower profits, more dealers say they don't know. Again, as a simple non-weighted average of all technologies asked, 35% of dealers say they did not know the profitability in 2026, compared to just 17% in 2020, 23% in 2022, and 13% in 2024. Understandably the greatest uncertainty where most respondents don't know is with newer precision agriculture, such as robotic crop weeding and scouting, and machine vision weed detection on sprayer, where half of the dealers responding didn't know. This is not surprising, as new offerings may not be particularly profitable or dealers may not know about the first few years, as it takes time for dealers to gain experience and for farmers to learn about possible benefits.

4. Conclusions and Next Steps

The most recent CropLife–Purdue survey results show that precision agriculture adoption in the United States continues to advance, although progress varies across technologies. Some tools, such as guidance/autosteer, yield monitors, sprayer section controllers, planter controllers, and cloud storage of farm data, are now widely used across dealer market areas. At the same time, other practices that have been available for decades, including precision soil sampling, variable-rate fertilizer applications, and variable-rate seeding, appear to have plateaued or declined in recent years. Newer technologies, such as UAV/drone input applications, machine vision weed detection, robotics, and artificial intelligence, are gaining attention but remain at earlier stages of adoption. The results also suggest that profitability and uncertainty remain important challenges, especially for newer precision services, where dealers may still be learning how to price, manage, and integrate these technologies into their business models.

A key next step is to replicate the CropLife–Purdue survey in Brazil using a consistent methodology adapted to the Brazilian agricultural input retail sector. This extension is important because Brazil is one of the world's largest grain producers and has experienced rapid growth in digital and precision agriculture, yet comparable data on how these technologies are adopted and delivered through agribusinesses remain limited. Applying the same survey framework in Brazil will allow for side-by-side benchmarking with the United States, helping identify similarities and differences in technology adoption, service offerings, data management practices, profitability, and barriers to adoption. More broadly, this approach can provide a foundation for future international comparisons and contribute to a better understanding of how precision agriculture can support productivity, profitability, and environmental performance in major agricultural economies.

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Appendix

26th Precision Agriculture Services Dealership Survey

CropLife | PURDUE UNIVERSITY

Dear agricultural retailer, IRB APPROVAL 1702018754

The CropLife/Purdue survey is the longest-running, most widely used survey that chronicles the development and adoption of precision agriculture! We depend on your continued input. Please complete by March 1, 2026. **Thank you for your participation!**

Bruce Erickson & Jess Lowenberg-DeBoer *Purdue University* | Eric Sfiligoj *CropLife/Meister Media*

1. Which best describes your business? *[mark only one]*

[ ] Agricultural retail input supplier. *Sell fertilizers, seeds, or pesticides, and related crop production services to farmers.*

[ ] Farm equipment dealer. We appreciate your interest, but are focusing on ag retail input suppliers. [Survey terminates]

[ ] Agricultural consultant. *Provide advice and services to farmers such as soil testing, scouting, or farm management.* [Survey terminates]

[ ] Other: *[please specify]* ______. [Survey terminates]

2. If you answered agricultural retail input supplier above. Are you a: *[please mark only one]*

[ ] Independent dealership
[ ] Cooperative
[ ] Part of a national or regional chain (not a cooperative)
[ ] Other: *[please specify]* ___________________________

3. Your primary responsibility*:* *[please mark only one]*

[ ] Owner/general manager/location manager
[ ] Departmental manager
[ ] Precision manager
[ ] Application manager
[ ] Technical consultant/agronomist
[ ] Sales/sales management
[ ] Other: *[please specify]* _____________________

4. How many total retail outlets does your company own or manage? *[please mark only one]*

[ ] None [ ] 1 [ ] 2-5 [ ] 6-15
[ ] 16-25 [ ] More than 25

5. Rank the following crop types according to the value of products and services you provide to each
[1=highest, 2=next highest, etc. Leave blank if less than 2% of your business.]

[ ] field crops (corn, soy, wheat, rice, cotton, milo, sugar beets, dry beans, etc.)
[ ] hay and forages
[ ] nursery or greenhouse
[ ] vegetables (incl. potatoes, melons, lettuce, tomatoes)
[ ] tree fruits & nuts
[ ] berries (strawberries, blueberries, raspberries, etc.)
[ ] grapes
[ ] Other: *[please specify]* _________________

6. How are your customers getting most of their UAV/drone application services? [please mark one]

[ ] Service provided to customers in-house, using drones we own and operated by our employees.
[ ] UAV/drone service to our customers contracted to another company.
[ ] Our customers use UAV/drone companies not affiliated with us.
[ ] I am not aware of inputs applied via UAV/drone in my area.

7. Answer the following only if you provide UAV/drone input services, whether in-house or contracted.

How many UAV/drone application crews do you run? ____
How many workers are in each crew? ___
How many drones are in each crew? ___
What is the investment required to equip, license and train one UAV/drone crew? ____
What is the monthly variable cost needed to keep one drone crew in the field including wages, fuel, repairs and maintenance, insurance, etc.? ____

ARTIFICIAL INTELLIGENCE (AI)

8a. Please rate the following statements on a scale from 1 (strongly disagree) to 5 (strongly agree).

AI will lead to better agronomic recommendations
AI will reduce my need for employees to provide agronomy support and recommendations
AI will reduce my operational costs
I am concerned about the accuracy of AI for my local conditions
Our employees will need additional education to most effectively use AI

8b. How are you currently using AI at your retail location? [please mark all that apply]

[ ] Agronomic recommendations
[ ] Imagery analysis (weed/disease detection)
[ ] Variable rate prescription generation
[ ] Customer segmentation / CRM
[ ] Logistics or routing optimization
[ ] Equipment diagnostics / predictive maintenance
[ ] We are not currently using AI
[ ] Not sure
[ ] Other: [please specify] _________________

AUTOMATION/ROBOTICS

9. Please rate the following statements on a scale from 1 (strongly disagree) to 5 (strongly agree).

Automation/robotics will increase the accuracy of crop input applications such as pesticides and fertilizers
Automation/robotics will reduce application mistakes
Automation/robotics will reduce the labor needed for crop input applications
Automation/robotics will reduce my operational costs

DEALER PRODUCTS AND SERVICES

10. Which services/products do you offer now? If not now, will you in three years? If you don't offer now and have no plans for the near future, leave blank.

	Offer now	Will offer by 2029
VRT fertilizer application	[ ]	[ ]
VRT lime application	[ ]	[ ]
VRT pesticide application	[ ]	[ ]
VRT seeding prescriptions	[ ]	[ ]
VRT biologicals application/prescriptions	[ ]	[ ]
Yield monitor and other data analysis	[ ]	[ ]
Satellite or crewed airplane imagery	[ ]	[ ]
UAV/drone imagery	[ ]	[ ]
Grid or zone soil sampling	[ ]	[ ]
Grid or zone plant tissue sampling	[ ]	[ ]
Soil electrical conductivity (EC) mapping	[ ]	[ ]
Services using other soil sensors mounted on a pickup, applicator or tractor (example:pH sensor)	[ ]	[ ]
N management using Chlorophyll/greenness sensors (GreenSeeker, Augmenta Mantis, OptRx, etc.)	[ ]	[ ]
Precision planter equipment sales	[ ]	[ ]
Telematics equipment sales (Farmobile, Trimble DCM-300, etc.)	[ ]	[ ]
Profit/cost mapping	[ ]	[ ]
Electronic records/mapping for traceability	[ ]	[ ]
Wired or wireless sensor networks, IoT, hardware and software	[ ]	[ ]
Robotics/automation used for crop scouting	[ ]	[ ]
Robotics/automation for mechanical weeding services	[ ]	[ ]
Machine vision weed detection on sprayer for custom applications	[ ]	[ ]
Robotics/automation for soil sampling services	[ ]	[ ]
Crop inputs (seeding, pesticides, fertilizers) applied with a UAV/drone	[ ]	[ ]
Other digital product or service not mentioned above. *[Please specify]*____________	[ ]	[ ]

ADOPTION IN MARKET AREA

11. Approximately what percentage of the total acreage in your market area (all growers, not just your current customers) is currently using the following practices?

VRT fertilizer application	______%
VRT lime application	______%
VRT pesticide application	______%
VRT seeding	______%
Variable hybrid/variety placement within fields	______%
VRT biologicals application	______%
Satellite or crewed airplane imagery	______%
UAV/drone imagery	______%
Guidance/autosteer	______%
Sprayer section controllers	______%
Planter row or section shutoffs	______%
Variable down pressure on planter	______%
Grid or zone soil sampling	______%
Grid or zone plant tissue sampling	
Soil EC mapping	______%
Other soil sensors mounted on a pickup, applicator or tractor (example:pH sensor)	
Chlorophyll/greenness sensors for N management	______%
Yield monitor	______%
Cloud storage of farm data	______%
Any data analysis service (Granular, FieldView, FBN, etc.)	______%
Wired or wireless sensor networks, IoT	______%
Robotics/automation for mechanical weeding	______%
Robotics/automation for crop scouting	______%
Robotics/automation on harvester	______%
Autonomous support vehicle (grain cart) for harvest	______%
Electronic records/mapping for traceability	______%
Machine vision weed detection on sprayer	______%
Selective harvest for quality improvement	______%
Crop inputs (seeding, pesticides, fertilizers) applied with a UAV/drone	______%

CUSTOM APPLICATIONS

12. In a typical year how many total acres do you custom apply at your specific location (fertilizer, chemicals, seeding – total acres including multiple applications)? ____________acres *[If none, go to Question 18]*

13. How many acres did you or a contracted company apply crop protection with a UAV/drone in 2025? __*acres*

14a. In 2025, approximately what percentage of your total fertilizer sales were custom applied? ______%

14b. In 2025, what percent of your fertilizers sold were applied to land where you provide soil sampling services?

15. In 2025, approximately what percentage of your total crop protection sales were custom applied? ______%

16. In 2025, approximately what percentage of your total herbicide application acres used machine vision weed detection? ______%

17. In 2025, approximately what percentage of your total crop protection applications (total acres, all products) used:

Manual GPS guidance (light bar) _______%

Automated GPS guidance (autosteer) _______%

Turn compensation _______%

Auto sprayer boom section or nozzle control ______%

Variable rate prescription map _______%

PROFITABILITY

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

	Not breaking even	Breaking even	Making a profit	Don't know	Don't offer this
	please mark only one column per row				
VRT fertilizer application	[ ]	[ ]	[ ]	[ ]	[ ]
VRT lime application	[ ]	[ ]	[ ]	[ ]	[ ]
VRT pesticide application	[ ]	[ ]	[ ]	[ ]	[ ]
VRT seeding prescriptions	[ ]	[ ]	[ ]	[ ]	[ ]
VRT biologicals applications/prescriptions	[ ]	[ ]	[ ]	[ ]	[ ]
Yield monitor and other data analysis	[ ]	[ ]	[ ]	[ ]	[ ]
Satellite or crewed airplane imagery	[ ]	[ ]	[ ]	[ ]	[ ]
UAV/drone imagery	[ ]	[ ]	[ ]	[ ]	[ ]
Grid or zone soil sampling	[ ]	[ ]	[ ]	[ ]	[ ]
Grid or zone plant tissue sampling	[ ]	[ ]	[ ]	[ ]	[ ]
Soil electrical conductivity (EC) mapping	[ ]	[ ]	[ ]	[ ]	[ ]
Other soil sensors mounted on a pickup, applicator or tractor	[ ]	[ ]	[ ]	[ ]	[ ]
N management using Chlorophyll/greenness sensors	[ ]	[ ]	[ ]	[ ]	[ ]
Precision planter equipment sales	[ ]	[ ]	[ ]	[ ]	[ ]
Telematics equipment sales	[ ]	[ ]	[ ]	[ ]	[ ]
Profit/cost mapping	[ ]	[ ]	[ ]	[ ]	[ ]
Electronic records/mapping for traceability	[ ]	[ ]	[ ]	[ ]	[ ]
Wired or wireless sensor networks, IoT	[ ]	[ ]	[ ]	[ ]	[ ]
Robotics/automation for crop scouting	[ ]	[ ]	[ ]	[ ]	[ ]
Robotics/automation for mech. weeding services	[ ]	[ ]	[ ]	[ ]	[ ]
Machine vision weed detection on sprayer for custom applications	[ ]	[ ]	[ ]	[ ]	[ ]
Robotics/automation for soil sampling services	[ ]	[ ]	[ ]	[ ]	[ ]
Crop inputs applied with a UAV/drone	[ ]	[ ]	[ ]	[ ]	[ ]

19. How has revenue from precision products and services changed in the last three years?

[ ] Up 5% or more
[ ] Up 0-5%
[ ] About the same
[ ] Down 0-5%
[ ] Down more than 5%

19. For your retail location, what state are you located in? ____________.

THANKS AGAIN FOR YOUR INPUT!