# Precision Ag 2.0

## Investments, M&A and New Technologies on the Rise

### Report includes 200+ leading companies, with 101 investments and 56 M&A transactions since 2020

## Investment Banking and Advisory Services

FOCUS Investment Banking is a middle-market leading investment bank with specialized supply chain industry expertise, concentrating on providing highly tailored services to emerging middle market and larger organizations in this sector:

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- Capital Financing, Debt & Equity
- Corporate Valuations

## Who We Are

- Middle market investment bank since 1982; serving clients from $10-$300M in transaction size
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- Deep industry experience in targeted industry verticals
- M&A Worldwide partner firm, providing FOCUS clients local expertise - globally
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# Electric and autonomous vehicles. Artificial Intelligence. Machine Learning. Decision Analytics. Robotics. Drones. Sensor networks. Internet of Things. Nanotechnology.

There is one industry, agriculture, that is actually implementing all of them in one form or another.

## What is Precision Ag?

Precision Ag is a farm management technique that uses information technology and a wide array of technology components such as GPS guidance, sensors, robotics, drones, autonomous vehicles, variable rate technology, GPS-based soil sampling, automated hardware, telematics, and software.

Agricultural technology implementations are accelerating, as evidenced by the dramatic increase in sector investments as well as M&A activity. Some of the more advanced technologies gaining traction include nanotechnology, vertical farming, electric vehicles (EVs), AI-powered robotics and drones, matrixed sensor networks and several others. Grand View Research estimates the size of the market that includes these technologies at $6.96 billion in 2021, growing at a 12.8 percent per year rate.[1]

This report focuses on investments, M&A, the participants in Precision Ag, and those companies focusing on sustainability.

## The Past Decade in Precision Ag

Precision Ag technologies provide the information and systems that allow a farmer to optimize and customize the timing, amount, and placement of inputs (seed, fertilizer, pesticides, irrigation, etc.) for any given section of a field. This enables maximum yield from the entire field at the lowest possible cost. There have been major advancements, big deals (e.g., Monsanto's purchase of Climate Corp for $930 million in 2013), and billions in investments (454 companies raised $6.9 billion in 2021).[2]

The technical foundations of Precision Ag (GPS-guided auto steering, variable rate controls for inputs, and sensors) are now the base technology for most farmers as their costs have come down and the benefits (in terms of ROI) are being realized.

In 2014, FOCUS Investment Banking published Precision Ag: M&A, Investment, and Start-ups on the Rise to highlight the biggest technological change in agriculture since the introduction of hydraulics in the 1940s. Of the 16 public Precision Ag companies reported in 2014, six have been acquired (Bayer's $66.3 billion acquisition of Monsanto in 2018 headlined the acquisitions). John Deere and Valmont Industries, two industry leaders, experienced triple-digit growth fueled by acquisitions and product expansion. Additionally, of the 132 companies we reported on, 30% were acquired and 15% went out of business. Trimble, Telus Agriculture, and Raven Industries have been the most active acquirers over the past eight years.

The 2014 report highlighted 21 M&A transactions and 11 investments in Precision Ag companies. Of those that received funding, eight were later acquired. This contrasts with the past two years, where investments have significantly outpaced M&A activity.

If you're looking to invest or raise money in this burgeoning industry, FOCUS can help. FOCUS has been helping middle market companies worldwide to sell, buy, or raise capital since 1982. The author of this report, Managing Director Eric Oganesoff, has led over 80 M&A, debt, and capital raise transactions and has over 20 years' experience as the CEO or president of several companies. See Eric's contact information at the end of this report.

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[1] Grand View Research. 2021. Precision Farming Market Size Report. Available: https://www.grandviewresearch.com/industry-analysis/precision-farming-market.

[2] Jordan Rubio. 2022. Market Map: Precision ag startups are fertile ground for VCs. Available: https://pitchbook.com/news/articles/market-map-precision-agtech-startups-vc.

## Advanced Technologies – The Future of Agriculture

Precision Ag allows farmers to accurately track equipment and more efficiently use inputs to maximize yield. Auto-steering, variable-rate technology, and data-collecting sensors enable farmers to make more informed decisions. Sensors throughout the farm produce massive amounts of data, and analysis of the data represents the next frontier of Precision Ag.[3,4]

Technology can make instantaneous decisions based on analysis, and continually learn from those decisions. This advancement represents the shift from "precision" agriculture to "decision" agriculture.

Not surprisingly, this development has created a huge investment and M&A opportunity as companies in this sector seek to maximize the benefits of these new technologies. Venture capital and private equity firms are excited, but so are tech giants like Microsoft, which has taken an active interest in the agriculture sector and is seeking to partner with companies in the space.

### Several emerging technologies will contribute to this trend:

Artificial Intelligence and Machine Learning. Advanced sensors on vehicles, on plants, in the soil, on drones and satellites provide data that can be correlated with inputs, crop growth, and yields. By applying machine learning to agriculture allows for the data collected to determine, in real time, insights and recommendations that have not been able to be obtained previously to drive the equipment laying down the fertilizers, insecticides, herbicides and providing irrigation (see the Hands Free Hectare farm mention below).

## Farms Generate Massive Amounts of Data



North Carolina State University estimates that by 2025, an average-sized farm, which in 2021 was 445 acres, will produce over a million data points a day.

## Machine Learning at Work



Researchers at North Dakota State University have developed an automated tool using drones and machine learning to assess the severity of Goss's Wilt in corn fields. This bacterial disease causes long, dark lesions to occur on the leaves of corn.[5]

The machine learning algorithms replace the current method of manual visual inspections, improving accuracy and efficiency.

## The Connected Farm



Metos USA offers decision support systems that collect data from machine, handheld, and field IoT (Internet of Things) devices. These systems work together and communicate with one another to provide actionable insights (management of irrigation systems, timing of input application, machinery operation optimization, etc.) using artificial intelligence.

3   Jennifer Howard. 2019. Interpreting the Growing Field of On-Farm Data. Available: https://cals.ncsu.edu/crop-and-soil-sciences/news/interpreting-the-growing-field-of-on-farm-data/.

4   USDA. 2022. Farming and Farm Income. Available: https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/farming-and-farm-income.

5   Das, Anup Kumar; Zhang, Zhao. 2022. Assessment of Goss Wilt Disease Severity Using Machine Learning Techniques Coupled with UAV Imagery. In Proceedings of the 15th International Conference of Precision Ag (unpaginated, online). Monticello, IL: International Society of Precision Ag.

Robotics. With artificial intelligence and machine learning creating an intelligent and improving "brain," companies are automating processes throughout the farm. These smart machines are making decisions and executing those decisions in the areas of seeding, irrigation, crop picking, applying chemicals, and more. Autonomous vehicles are set to revolutionize the agriculture industry, providing enormous cost advantages.[6]

The autonomous future of agriculture can be seen at Hands Free Hectare, a 35-hectare (~86.5 acres) farm run through a collaboration between Harper Adams University, Precision Decisions, and Agri-EPI Centre in the United Kingdom. The farm grows arable crops fully remotely, without agronomists on the ground or operators in the driver's seat.

## Full Autonomy

The autonomous future of agriculture can be seen at Hands Free Hectare, a 35-hectare (~86.5 acres) farm run through a collaboration between Harper Adams University, Precision Decisions, and Agri-EPI Centre in the United Kingdom. The farm grows arable crops fully remotely, without agronomists on the ground or operators in the driver's seat.



Figure 1 Autonomous vehicles at HandsFree Hectare

## Precise Laser Weeding

In another example, Verdant Robotics, a startup located in Silicon Valley, created an advanced multi-crop platform that attaches to the back of operator-driven tractors. The system leverages machine learning to uniquely track 500,000 plants per hour over space and time to make chemical treatment decisions for crop protection and fertility. This indexing creates a digital twin of the entire farm, allowing the system to make real-time decisions.

The Verdant platform also leverages a laser weeding system that allows for precise, non-chemical weeding. The combination of laser weeding and plant-specific chemical application reduces chemical usage by up to 95% compared to a traditional farm.



Figure 2 Verdant Robotics Platform attached to New Holland Tractor

[6] Lowenberg-DeBoer, Franklin, Behrendt, Godwin. Economics of autonomous equipment for arable farms. Precision Ag. 2021;22(6):1992-2006. doi: 10.1007/s11119-021-09822-x. Epub 2021 May 27. PMID: 34075304; PMCID: PMC8154546.

## Nanotechnology – Inputs of the Future

Nanotechnology provides new tools for the grower by focusing on the molecular treatment of diseases and enhancing the ability of plants to absorb nutrients.[7] Since the concept of nanotechnology was first introduced in 1959 by American physicist and Nobel Prize laureate Richard Feynman, nanotechnologies have contributed to almost every field of science, including physics, materials science, chemistry, biology, computer science, and engineering. And now the science is entering into agriculture.

How Small is a Nanometer?
To give you an idea just how small a nanometer is, a human hair is about 80,000 nanometers thick.

### Moleaer Case Study

Moleaer, a nanotechnology company based in California, produces nanobubbles with features that improve water quality, root development, and plant health. Using nanobubbles on its farm, Rebel Farms saw plant volume increase by 22% and the growth cycle reduced from 10 to eight weeks.



*Figure 3 Moleaer Bloom nanobubble generator*

### Aqua-Yield Case Study

Another company, Aqua-Yield, leverages nanotechnology for the enhanced delivery of crop inputs. Bob Huck, a farmer from Tropical Star Vegetable Transplants in Donna, Texas, saw Aqua-Yield's solutions reduce his growth cycle by 30 days compared to nearby farms.

AgriTech Consulting, LLC, conducted an experiment to measure the impact of NanoN+, a nanoliquid product that enhances uptake of nitrogen fertilizer, on U.S Central Plains' corn fields. NanoN+ was added to two treatments with both realizing increased yield over the control without NanoN+. The extra bushels generated an ROI of 4:1.

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[7] L. Ravi Shankar. 2022. Nano technology – Future of Agriculture. Available: https://www.pydahfresh.com/post/nano-technology-future-of-agriculture.

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## Sustainability – Driving Investments and New Subsectors

Sustainable agriculture principles call for environmentally friendly production that promotes continuous soil health and minimizes water use, herbicides, insecticides and land usage. Precision Ag technologies and practices have provided the tools for growers to achieve these goals at a profitable level. What have also emerged are new growing methods and other incentives for creating a sustainable future.

Vertical Farming. Vertical farming consists of growing plants indoors vertically, using LED lighting and advanced growing systems. The value proposition of vertical farming is the ability to grow large amounts of crops in less space using fewer inputs. For example, Nordic Harvest, a Danish start-up growing mixed greens, uses 250 times less space and 250 times less water to grow the same amount as a traditional farm.[8]

The efficiency of these systems comes from year-round production, the sterile environment helping to reduce pathogens, and its local nature. Today, vertical farming and controlled environment agriculture systems are focusing on greens (lettuce, kale, arugula, spinach, etc.) and certain fruits, i.e., the higher value crops. These crops are compact in size, have short production cycles, and have a high market value, making vertical farms economically viable.[9]

Vertical farms will not fully replace outdoor farms, which will continue to focus on crops that do not fit the characteristics above, such as corn, soybeans, and wheat.[10]

Vertical farm companies are expanding and developing unique technology systems used in their controlled environments. This trend represents the culmination of many advanced technologies highlighted by the 200+ companies mentioned in this report.

## AeroFarms – A Vertical Farming Pioneer

Founded in 2004, this Newark, N.J., company doesn't grow its crops in soil but suspends crops in a fine mist of water and nutrients. This is known as aeroponics, and saves 95% of water compared to soil agriculture and 40% compared with hydroponics (where roots are submerged in water).

Lighting is also controlled – photosynthesis only requires light from the red and blue extremes of the visible spectrum (chlorophyll reflects the green mid-range). AeroFarms makes sure its plants get only this light, improving efficiency and reducing energy costs.

This is all driven by the company's data science, AI, and machine learning technologies.

The company claims its yields are – on average – 390 times higher per square foot than those of field agriculture.



*Figure 4 AeroFarms Vertical Farming System*

8  The Planetary Press. 2022. Vertical Farming – Is This the Future of Agriculture? Available: https://www.theplanetarypress.com/2022/05/vertical-farming-is-this-the-future-of-agriculture/

9  Adenaeuer, Lucie. (2014). Up, Up and Away! The Economics of Vertical Farming. Journal of Agricultural Studies.

10  iFarm. 2022. Vertical Farms vs Greenhouses: Financial Considerations Beyond the Energy Bill. Available: https://ifarm.fi/wiki/2022/01/vertical-farms-vs-greenhouses-part3.

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*Figure 5 Plenty Vertical Farming System*



*Figure 6 Bowery Vertical Farming System*



*Figure 7 Automation at Fifth Street Vertical Farm Facility*

## EVs Coming to Agriculture.

In December 2021, John Deere acquired a majority ownership in Kreisel Electric, a leader in the development of immersion-cooled battery technology. As electric vehicles are becoming more commonplace on roads throughout the country, the technology is moving into agriculture. Electric vehicles offer superior performance and cost significantly less to operate than traditional combustion engine vehicles; those advantages, however, are offset by the limited operating time and higher purchase prices. Transactions like the John Deere acquisition will likely continue as startups and incumbent tractor companies race to commercialize and mass produce electric farm vehicles, driving down costs and increasing operating time.



*Figure 8 Monarch MK-V electric and fully autonomous tractor*

## Agriculture Technology Public Companies

The public companies providing products and services in the agriculture technology industry are shown in the figure below.

They are categorized as "pure-play" agriculture or "diversified" (i.e.[11], they serve multiple markets beyond agriculture).

| Company | Ag Only or Diversified | Symbol | Precision Ag Products | Total Ent. Value (TEV) | TTM Rev | TTM EBITDA | TEV/ Rev | TEV/ EBITDA |
|---|---|---|---|---|---|---|---|---|
| AGCO Corp. | Agriculture | NYSE: AGCO | Challenger, Fendt, Massey Ferguson, & Valtra Series - Product lines of tractors, harvesters, tillage, and application equipment | $10,336 | $11,511 | $1,305 | 0.9 | 7.0 |
| Benson Hill, Inc. | Agriculture | NYSE: BHIL | CropOS platform which uses artificial intelligence, data, and various advanced breeding techniques | $764 | $279 | ($117) | 2.7 | NM |
| Deveron Corp. | Agriculture | TSXV: FARM | Drone data services to the farming sector in the United States and Canada | $46 | $7 | ($5) | 6.3 | NM |
| Exel Industries Société Anonyme | Agriculture | ENXTPA: EXE | Specialty sprayers and tractors. Leader in niche markets like high clearance tractors | $476 | $998 | $61 | 0.5 | 7.5 |
| Farmers Edge Inc. | Agriculture | TSX: FDGE | FarmCommand cloud-based software platform that provides real-time monitoring, predictive models, and recommendations | $35 | $28 | ($56) | 1.2 | NM |
| Kalera S.A. | Agriculture | NasdaqCM: KAL | Develops technology driven vertical farming techniques to conduct operations related to hydroponic food production | $144 | $4 | ($44) | NM | NM |
| Lindsay Corp. | Agriculture | NYSE: LNN | Zimmatic Irrigation Line - Variable Rate Irrigation system with software for remote irrigation mgmt. | $1,896 | $734 | $95 | 2.6 | 18.8 |
| AgEagle Aerial Systems, Inc. | Diversified | NYSEAM: UAVS | eBee Ag fixed wing drone and FarmLens, a subscription cloud analytics service that processes data | $55 | $12 | ($20) | 4.6 | NM |
| Bayer | Diversified | XTRA: BAYN | FieldView data analytics platform and other precision ag offerings | $92,098 | $50,551 | $5,791 | 1.9 | 15.5 |
| Bunge Limited | Diversified | NYSE: BG | AgroApp provides information supporting sustainable farming and agroideal.org, an online tool allowing users to integrate data | $22,696 | $64,613 | $2,908 | 0.4 | 4.7 |
| Case New Holland | Diversified | NYSE: CNHI | Case IH, New Holland Ag, & Steyr product lines - Including PLM crop & data mgmt. systems and PLM guidance & display tools | $36,403 | $34,885 | $3,477 | 1.0 | 10.1 |
| Dana Inc. | Diversified | NYSE: DAN | Tractor electrification and Spicer Smart Suite Intelligent Load Monitoring System (ILMS), software | $5,303 | $9,543 | $607 | 0.6 | 8.0 |
| Deere & Company | Diversified | NYSE: DE | Tractors, harvesters, and sprayers with section control and variable rate application as well as software solutions | $158,988 | $45,725 | $8,871 | 3.5 | 17.9 |
| Dupont Inc. | Diversified | NYSE: DD | Pioneer - Development of an agronomy software solution to assist in field management | $42,307 | $17,128 | $4,151 | 2.5 | 9.7 |
| GrainCorp Limited | Diversified | ASX: GNC | Hone Test, an application that provides in-field chemical analysis for soil and crop testing in the agricultural industry | $2,864 | $5,079 | $682 | 0.6 | 4.3 |
| IDEX Corp. | Diversified | NYSE: IEX | Manufactures precision farming components including waterproof motorized valves, manifolds, and controllers | $16,946 | $2,974 | $843 | 5.7 | 19.3 |
| KORE Group Holdings, Inc. | Diversified | NYSE: KORE | IoT platform that improves productivity, monitor assets, reduce waste, and maximize crop output | $645 | $271 | $31 | 2.4 | 19.0 |
| Kubota Corp. | Diversified | TSE: 6326 | Agri Robo Combine Harvester and other automated machinery | $30,370 | $17,336 | $1,946 | 1.7 | 15.2 |

**(continued)**

[11] Financial Information is converted to USD and based on the trailing twelve Months (TTM) from June 30, 2021

## Public Companies (continued)

| Company | Ag Only or Diversified | Symbol | Precision Ag Products | Total Ent. Value (TEV) | TTM Rev | TTM EBITDA | TEV/ Rev | TEV/ EBITDA |
|---|---|---|---|---|---|---|---|---|
| Planet Labs PBC | Diversified | NYSE: PL | Open Geospatial Consortium, a cloud-native technology that performs critical processing and harmonizing of images | $1,199 | $139 | ($115) | 8.6 | NM |
| STMicroelectronics N.V. | Diversified | ENXTPA: STM | Wireless connectivity, irrigation sensors, tractor positioning, and livestock monitoring solutions | $33,831 | $14,136 | $4,443 | 2.4 | 7.6 |
| The Andersons, Inc | Diversified | NasdaqGS: ANDE | Yield analysis, soil, crop, and farm analytics solutions | $3,282 | $15,210 | $382 | 0.2 | 8.1 |
| Topcon Corp. | Diversified | TSE: 7732 | Guidance systems, application control systems, field data collectors, GPS receivers, and field management software | $1,698 | $1,358 | $195 | 1.2 | 8.7 |
| Trimble Inc. | Diversified | NasdaqGS: TRMB | Guidance and positioning systems, autonomous steering, automated and variable-rate application, and technology systems | $18,825 | $3,762 | $782 | 5.0 | 21.7 |
| Valmont Industries Inc. | Diversified | NYSE: VMI | Valmont Irrigation - Irrigation control system, variable rate irrigation, & remote mgmt. | $7,234 | $3,948 | $480 | 1.8 | 14.3 |
| Yara International ASA | Diversified | OB: YAR | ZIM Series - Water sensor technologies for precision irrigation systems | $14,853 | $21,898 | $4,028 | 0.7 | 3.4 |
| High | | | | $158,988 | $64,613 | $8,871 | 8.6 | 21.7 |
| Low | | | | $35 | $4 | ($117) | 0.2 | 3.4 |
| Average | | | | $20,132 | $12,885 | $1,629 | 2.5 | 11.6 |
| Median | | | | $5,303 | $3,948 | $607 | 1.8 | 117.3 |

## Precision Ag Private Company Key Players, Investments, and M&A

In addition to the public companies mentioned above, we list 115 private companies below that currently offer Precision Ag products and services.

Many of these companies were recently founded and are in early stages of growth.

The private companies in Precision Ag are divided into five categories:
- Robotics/Automation/AI/ML
- Decision Analytics
- Sustainability
- Sensors/Remote Monitoring/Data/Planning, and Imaging/Mapping/Variable-Rate

## Private Companies [12]

| Company | Location | Founded | Business Type | Products/Services |
|---|---|---|---|---|
| **Robotics/Automation/AI/ML** | | | | |
| American Robotics, Inc. | Marlborough, Massachusetts | 2016 | AI/Automation | Scout System – fully-autonomous, AI-powered drone platforms that provides on-demand insights |
| Carbon Robotics | Seattle, Washington | 2014 | AI/Robots/Automation | Autonomous LaserWeeder – artificial intelligence-based robot that uses lasers for eliminating weeds and unwanted plants |
| FarmWise Labs, Inc. | San Francisco, California | 2016 | AI/Robots/Automation | Titan – AI powered robot to identify and cut weeds without harming the desired plants |
| Verdant Robotics, Inc. | Hayward, California | 2018 | AI/Robots/Automation | Digital mapping of entire farm, automatically tracking and treating every part of every plant |
| SparkAI Inc. | White Plains, New York | 2020 | Automation/Decision Analytics | Automation software that provides real-time resolutions to support tasks |
| OnePointOne, Inc. | San Jose, California | 2017 | Automation/Vertical Farm/Sustainability | Opollo – a fully automated vertical farming system |
| Monarch Tractor | Livermore, California | 2017 | EV/Automation | MK-V Tractor - fully electric, driver-optional tractor |
| Advanced Farm Technologies, Inc. | Davis, California | 2018 | Robots/Automation | Robots that harvest fruit, including apples and strawberries as well as pack strawberries |
| Four Growers, Inc. | Turtle Creek, Pennsylvania | 2017 | Robots/Automation | Autonomous harvesting and analytics robots for greenhouse farms |
| Future Acres, Inc. | El Segundo, California | 2017 | Robots/Automation | Autonomous robotic solutions to help automate many of the elements involved in producing specialty crops |
| Harvest Automation Inc | Billerica, Massachusetts | 2007 | Robots/Automation | HV-100 – robot automates spacing, respacing, and consolidation on greenhouse operations |
| Harvest CROO Robotics | Tampa, Florida | 2012 | Robots/Automation | Harvesting service that automates crop management, harvesting, and packing of specialty crops |
| Iron Ox, Inc. | San Carlos, California | 2015 | Robots/Automation | Angus - autonomous mobile farm robot used for crop harvesting |
| Pharm Robotics LLC | San Jacinto, California | 2019 | Robots/Automation | Robotic injection system for dairy farms using RFID, camera IF reader, and a dairy management software |
| Root AI, Inc. | Woburn, Massachusetts | 2017 | Robots/Automation | Virgo 1 – agricultural robot to pick tomatoes without bruising them and detect ripeness |
| Tortuga Agricultural Technologies, Inc. | Denver, Colorado | 2016 | Robots/Decision Analytics | Robots that perform farm services while empowering growers with information |
| GreenSight Agronomics, Inc. | Brookline, Massachusetts | 2015 | UAV/Automation/Remote Sensing | GreenSight Platform includes a suite of autonomous drone hardware and sensors for remote sensing and mapping |

**(continued)**

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## Private Companies (continued)

| Company | Location | Founded | Business Type | Products/Services |
|---|---|---|---|---|
| **Decision Analytics** | | | | |
| Labby Inc. | Cambridge, Massachusetts | 2017 | AI/Cloud/Decision Analytics | Labby - AI-based cloud platform then translates raw optical data into meaningful insight on the individual and herd levels |
| Teralytic, Inc. | New York, New York | 2016 | AI/Decision Analytics | Soil sensors and artificial intelligence (AI) platform that generates real time conditions |
| Opti-Harvest, Inc. | Los Angeles, California | 2016 | AI/ML/Decision Analytics | Opti-View, a proprietary multi-vendor agricultural intelligence and machine learning Precision Ag platform for commercial agriculture |
| Automated Fruit Scouting Inc. | Yakima, Washington | 2019 | AI/Software/Decision Analytics | FruitScout mobile with computer vision enabling fast data collection for precision crop load management |
| Conservis Corp. | Minneapolis, Minnesota | 2009 | Cloud/Decision Analytics | Conservis – cloud-based solution that turns business data into actionable insights |
| CropX inc. | San Francisco, California | 2015 | Cloud/Decision Analytics | Cloud-based platform for farm management that integrates data from soil sensors, satellites, and crop models |
| Granular, Inc. | San Francisco, California | 2009 | Cloud/Decision Analytics | Cloud based software and analytics platform for the farming industry |
| Innov8 Ag Solutions Inc. | Walla Walla, Washington | 2019 | Cloud/Decision Analytics | Cloud-based platform to enable data-informed farming, using on & off-farm data |
| Native AgTech Inc | New York, New York | 2017 | Cloud/Decision Analytics | Cloud-based business-to-business farm and customer insights management software platform |
| Reed Ag Solutions | Durham, North Carolina | 2018 | Cloud/Decision Analytics | Cloud-based Precision Ag solutions, including crops, soils, and weather algorithms that creates new data layers |
| Regrow Agriculture, Inc. | Durham, New Hampshire | 2018 | Cloud/Decision Analytics | FluroSense - cloud-based crop management platform and Operational Tillage Information System (OpTIS) - remote sensing-based maps |
| ClimateAI, Inc. | San Francisco, California | 2017 | Cloud/Decision Analytics | Cloud-based agricultural forecasting platform to predict the physical risk of climate change on agricultural assets |
| M8 Systems, Inc. | San Juan Capistrano, California | 2019 | Cloud/Decision Analytics | M8 WaterGuard - intelligent cloud-connected valve that monitors the flow and pressure in irrigation lines |
| Agdaptive LLC | Boston, Massachusetts | 2018 | Cloud/Software/Decision Analytics | Cloud-based software that relays actionable information to cultivators |
| Advanced Agrilytics, LLC | Huntington, Indiana | 2013 | Decision Analytics | Agronomics services to agronomists and scientists that allows growers to interpret and utilize field data to influence yields. |
| Ag-Land FS, Inc. | Perkin, Illinois | 1991 | Decision Analytics | FS MiField program that provides insights on yield optimization |
| AquaSpy | San Diego, California | 1998 | Decision Analytics | Crophesy Pay as You Grow system uses soil moisture sensors paired with a mobile app to deliver advanced data analytics |
| Farm Service Cooperative | Harlan, Iowa | 1930 | Decision Analytics | Grid sampling for variable rate application, soil sampling, advanced field mapping, and individual yield recommendations |
| Gar Bennett LLC | Reedley, California | 1949 | Decision Analytics | Pest diagnosis and control, yield monitoring, water conservation and management, and soil and crop analysis solutions |
| Land O'Lakes, Inc. | Arden Hills, Minnesota | 1921 | Decision Analytics | Solution pulls satellite images, biomass metrics, and agronomic data into an algorithm that provides insights |
| Orbia | Mexico City, Mexico | 1953 | Decision Analytics | NetBeat – digital farming solution that enables farmers to automate irrigation, fertigation, and crop protection |
| Pollen Systems Corporation | Bellevue, Washington | 2017 | Decision Analytics | PrecisionView software - applies algorithms and crop profiles specific to each crop variety |
| Ricult Inc. | Philadelphia, Pennsylvania | 2015 | Decision Analytics | Suggests farm inputs for increased yields using geographic information systems (GIS), remote sensing, soil mechanics, and weather studies |
| Vinsight, Inc. | San Francisco, California | 2014 | Decision Analytics | Bountiful - crop forecasting platform helping farmers understand agricultural production processes |
| Aker Technologies Inc. | Creve Coeur, Missouri | 2016 | Hardware/Software Decision Analytics | TrueCause – drone system that captures above and below crop stressors and digital agronomy software |
| Raptor Maps, Inc. | Somerville, Massachusetts | 2015 | Imaging/Cloud/Decision Analytics | Software collects multi-spectral images that are analyzed by cloud computing to provide insights |

## Private Companies (continued)

| Company | Location | Founded | Business Type | Products/Services |
|---------|----------|---------|---------------|-------------------|
| **Decision Analytics** | | | | |
| Farm Flight, Inc. | Tucson, Arizona | 2019 | Imaging/Decision Analytics | Imaging solution that facilitates data collection, image analysis, and data display that helps in agronomic decision making |
| NetraDyne, Inc. | San Diego, California | 2015 | IoT/Data/Decision Analytics | Internet of Things-based platform for processing visual and other sensory input and VisionPRO, an integrated vision safety system |
| Pessl Instruments | Styria, Austria | 1984 | IoT/Decision Analytics | IoT field sensors and decision support systems that allow for decision-making and field planning |
| SenseGrass, Inc. | Fremont, California | 2017 | IoT/Decision Analytics | Develops IoT devices that monitor plants and work of machine operators right from the office |
| Zyter, Inc. | Rockville, Maryland | 2016 | IoT/Decision Analytics | Zyter Smart Agriculture - gathers data on soil and atmospheric conditions from a network of IoT sensors |
| iMatrix Systems, Inc. | Zephyr Cove, Nevada | 2018 | IoT/Decision Analytics | iMatrix communication gateways enables all wireless sensor configuration, control, monitoring, and analytics |
| DTN | Santa Ana, California | 1984 | Software/Decision Analytics | DTN Agronomy, comprehensive solution to streamline farm operations and an Agronomic Platform that identifies risks from field data |
| Evergreen FS, Inc. | Bloomington, Illinois | 1926 | Software/Decision Analytics | MiField - Platform that delivers data-backed recommendation to help farmers increase profitability |
| FlyGuys, Inc. | Lafayette, Louisiana | 2014 | UAV/Data/Decision Analytics | Drones deliver real-time feedback on soil, plant, moisture, and topography to maximize yield and avoid waste |
| Micro Aerial Projects L.L.C. | Gainesville, Florida | 2016 | UAV/Data/Decision Analytics | UAV Agriculture Monitoring, small UAVs that collect high resolution data to enable precision farming |
| Space AG | Miami, Florida | 2017 | UAV/Imaging/Decision Analytics | Captures data from drones equipped with infrared and thermal cameras and from mobile sensors attached to tractors to generate models |
| SeeTree Systems Ltd. | Tel Aviv, Israel | 2017 | AI/Decision Analytics | Intelligence Platform for Trees - per-tree intelligence allows for data driven planning through actionable analytics |
| **Sustainability** | | | | |
| GrowX Inc. | Oakland, California | 2015 | AI/Sustainability | Ai-powered systems for high-light intensity fruiting and flowering crops |
| Boomitra | Mountain View, California | 2016 | Decision Analytics/ Sustainability | Measure soil moisture, nutrients, and carbon using satellites and AI |
| Veris Technologies | Salina, Kansas | 2015 | Decision Analytics/ Sustainability | Soil based management and sensing allowing for digital soil mapping and measurement of carbon |
| Regen Network | Wilmington, Delaware | 2018 | Hardware/Software Sustainability | Remote sensing and soil sampling to measure carbon sequestration |
| GrowFlux, Inc. | Philadelphia, Pennsylvania | 2017 | IoT/Sustainability | FluxScale Top Light - control and connectivity in the horticultural lighting industry |
| Aqua-Yield | Sandy, Utah | 1979 | Nanotechnology | Nanaoliquid technology input delivery system that improves uptake and efficiency |
| Moleaer | Carson, California | 2016 | Nanotechnology | Industrial-scale nanobubble technology that delivers improvements in chemical-free water treatment and food production |
| Fifth Season | Pittsburgh, Pennsylvania | 2016 | Vertical Farm// Sustainability | Vertical farming mobile robotic solution and software management |
| AeroFarms | Newark, New Jersey | 2004 | Vertical Farm/ Sustainability | Fully connected indoor vertical farms |
| AmplifiedAg, Inc. | Charleston, South Carolina | 2018 | Vertical Farm/ Sustainability | AMP-X - a container farm model that maximizes space and provides scalability |
| Crop One Holdings, Inc. | Millis, Massachusetts | 2012 | Vertical Farm/ Sustainability | Technology platform and vertical indoor farms produce food using technology |
| Fork Farms LLC | Green Bay, Wisconsin | 2010 | Vertical Farm/ Sustainability | Flex Farm - machine grows 394 pounds of produce using less than 10 square feet |
| Laava Tech Inc. | Sunnyvale California | 2017 | Vertical Farm/ Sustainability | Smart LED lighting solutions for vertical and hydroponics farms |

## Private Companies (continued)

| Company | Location | Founded | Business Type | Products/Services |
|---|---|---|---|---|
| **Sensors/Remote Monitoring/Data/Planning** | | | | |
| Independent Data Management, LLC | Effingham, Illinois | 2012 | Cloud/Data | MyAgData - cloud-based data system providing planting and harvesting reporting information |
| ioBridge, Inc. | Marlborough, Massachusetts | 2008 | Data/Sensors | ThingSpeak provides data ingestion and storage for your agricultural sensors and control |
| Intuicom, Inc. | Boulder, Colorado | 1999 | GPS | GPS/GNSS-related solutions |
| Swift Navigation, Inc. | San Francisco, California | 2012 | GPS/Auto-steer | GNSS solutions allow for smart agricultural applications, and auto steering systems |
| Teejet Technologies Illinois, LLC | Springfield, Illinois | 1937 | GPS/Auto-steer | Matrix 908 precision guidance system, FieldPilot auto steering system, and RX 720 GNSS smart antenna |
| Ag Leader Technology, Inc. | Ames, Iowa | 1992 | Hardware/Auto-steer | INTEGRA display - precision farming HD touchscreen and EDGE displays - guidance and automated steering control performance |
| RDO Equipment Co. | Breckenridge, Minnesota | 1968 | Hardware/GPS | Displays and receivers, guidance systems, field and crop solutions, and information management solutions |
| SwineTech, Inc. | Cedar Rapids, Iowa, Iowa | 2015 | Remote Monitoring | SmartGuard, a farrowing platform for swine houses that monitors all things pregnancy and piglet related |
| Vence Corp | San Diego, California | 2016 | Remote Monitoring | Connected wearable devices for livestock and virtual fencing software |
| Inertial Sense LLC | Lindon, Utah | 2013 | Sensors/Automation | Sensor-driven solutions for aerial surveying and autonomous commercial agriculture solutions |
| Arable Labs, Inc. | San Francisco, California | 2014 | Sensors/Data/Remote Monitoring | Mark 2, infrared sensor that collects ground-truth data in real time from the field |
| Hiniker Company Inc. | Mankato, Minnesota | 1970 | Sensors/GPS/Remote Monitoring | Flowmeters, and servo valves, console and GPS speed sensors, and acre monitor systems |
| EarthBend LLC | Sioux Falls, SD | 1981 | Sensors/Remote Monitoring | VCAS platform supports grain bin monitoring, feed/water sensors, feeding operations, and irrigations management systems |
| AMI Global, LLC | Las Vegas, Nevada | 2009 | Sensors/IoT | IoA Fertigation machines allows farmers to inject up to five fertilizers simultaneously or individually using EC sensors |
| PrecisionHawk Inc. | Raleigh, North Carolina | 2010 | Software/AI/UAV/Sensors | PrecisionAnalytics Agriculture combines drones, sensors, software, and AI to empower farmers to make more efficient decisions |
| Ag-Analytics Technology Company, LLC. | Ithaca, New York | 2018 | Software/Data | AcreValue - comprehensive farmland data and ProfitLayers - software that creates location-based profit maps |
| Continuum Ag, Inc. | Washington, Iowa | 2016 | Software/Data | TopSoil Tool helps farmers to gain access to products and independent data |
| GroGuru, Inc. | La Jolla, California | 2014 | Software/Data | GroGuru InSites - Software-as-a-Service platform that collects data from the root zone of the crop |
| GVM Inc. | Biglerville, Pennsylvania | 1975 | Software/Data | Adjunction - web-based data management system for field boundary management |
| Sentera, Inc. | Minneapolis, Minnesota | 2014 | Software/Data | FieldAgent Software - integrates weather data, satellite data, soil data, drone data and field operations data and OnTop - mobile app |
| Trace Genomics, Inc. | Burlingame, California | 2015 | Software/Data | Soil microbiome test and microbiome database |
| Hemisphere GPS | Euless, Texas | 2013 | Software/GPS | Airborne agricultural global positioning system measuring units and post-analysis software tools |
| AgSquared, LLC | Washington, District of Columbia | 2009 | Software/Planning | TotalFarm all-in-one farm management software for record-keeping, day-to-day operations, and long-term planning |
| Beck's Superior Hybrids, Inc. | Atlanta, Indiana | 1937 | Software/Planning | FARMserver, a Web-based solution that serves as farm's foundation for various precision agricultural activities |
| FarmQA, Inc. | Fargo, North Dakota | 2015 | Software/Remote Monitoring | FarmQA Controller monitors all aspects of operations and provides intuitive map-based dashboard |
| Northern Country Cooperative Company | Stacyville, Iowa | 1941 | Software/Sampling | Precision agronomy support, soil sampling, field scouting, plant analysis, and other software |
| Aerial Vantage, Inc. | Washington, District of Columbia | 2021 | Software/UAV | Accelerate proprietary software program, drone flights as a service, and cutting-edge drone data analytics |

## Private Companies (continued)

| Company | Location | Founded | Business Type | Products/Services |
|---------|----------|---------|---------------|-------------------|
| **Imaging/Mapping/Variable-Rate** | | | | |
| Astro Digital US, Inc. | Mountain View, California | 2014 | Imaging/Mapping | Landmapper-HD satellites for imaging agricultural land and Landmapper-BC coverage satellites with HD sensors |
| VineView SAI, Inc. | Saint Helena, California | 2012 | Imaging/Sensing | Remote sensing image data analysis and aerial photography services |
| Prairie Ag Partners, Inc. | Lake Preston, South Dakota | 1984 | Mapping/Variable-rate | Field mapping, crop scouting, variable rate application of fertilizer and chemicals, and custom application for protection of plants |
| SentryAg, Inc. | Mayaguez, Puerto Rico | 2020 | Mapping/Variable-rate | Soil EC mapping, field management zones, zone soil mapping, and variable rate prescriptions service |
| Reinke Manufacturing Co., Inc. | Deshler, Nebraska | 1954 | Cloud/Variable-rate/GPS | RPM control panels, navigator GPS, variable rate irrigation, and Rein Cloud smart irrigation controller dashboard |
| NEW Cooperative, Inc. | Fort Dodge, Iowa | 1973 | Mapping/Decision Analytics | Provides soil mapping, site-specific field management, and precision technology services |
| Premier Cooperative | Mount Horeb, Wisconsin | 1893 | Sampling/Mapping | Soil sampling, plant tissue analysis, nutrient management plans, and grid and field boundary mapping services for Ag |
| AgriData Incorporated | Grand Forks, North Dakota | 1991 | Software/Mapping | Surety, a customized online mapping software to gather and display professional land maps |
| NuWay-KH Cooperative | Trimont, Minnesota | 1981 | Software/Mapping | Grid soil testing and mapping, crop nutrient application, crop protection application, and other software |
| TerraGo Technologies, Inc. | Sterling, Virginia | 2005 | Software/Mapping/Data | TerraGo for Drones with a suite of COTS products maps, mobilizes, and maximizes the value of commercial drone data |
| Guardian Ag | Woburn, Massachusetts | 2017 | UAV/Variable-rate | UAVs provide aerial crop protection and aerial spray services, including insecticides, herbicides, fungicides, and liquid fertilizers |
| Rantizo, Inc. | Iowa City, Iowa | 2017 | UAV/Variable-rate | Agricultural drones that provide spraying services for crops |
| Effingham Equity Inc. | Effingham, Illinois | 1919 | Variable-rate | Crop protection, custom application, planters' precision, and seed services |
| Nozzleworks, Inc. | Bothell, Washington | 1986 | Variable-rate | O-Nozzle System, a spray nozzle system that applies liquid mixtures from a moving vehicle |
| Caledonia Farmers Elevator Company | Caledonia, Michigan | 1918 | Variable-rate/Mapping | Agronomy department offers soil sampling, variable-rate fertilizer spreading, field mapping, and field scouting |
| Central Ohio Farmers Co-op Inc. | Marion, Ohio | 1934 | Variable-rate/Mapping | Agronomy department offers soil sampling, variable-rate fertilizer spreading, field mapping, and field scouting |
| Deerfield Ag Services, Inc. | Deerfield, Ohio | 1959 | Variable-rate/Sampling | Agronomy division provides soil sampling, VRT application, seed selection, and seed treatment |
| DroneDeploy, Inc. | San Francisco, California | 2013 | UAV/Mapping | DroneDeploy for Agriculture platform allows farmers to map fields in minutes |

## Investments in Precision Ag Since 2020

Precision Ag has generated lots of excitement among many venture capital and private equity firms. Strategic investors like Bayer, Wilbur-Ellis, CNH Industrial, and Yamaha are also playing an active role in these investments, developing relationships with early-stage companies with promising technologies. As these companies grow and come to market, these relationships often turn into acquisitions.[13]

The investments in Precision Ag are divided into the five categories as the previous list:
- Robotics/Automation/AI/ML
- Decision Analytics
- Sustainability
- Sensors/Remote Monitoring/Data/Planning, and Imaging/Mapping/Variable-Rate

## Investments (2020 – Present)

| Target Company | Investor | Business Type | Target Company Products/Services | Date Announced | Announced Investment Size ($mm) |
|---|---|---|---|---|---|
| **Robotics/Automation/AI/ML** | | | | | |
| AgroScout Ltd. | The Trendlines Group Ltd., Kibbutz Yotvata, and Others | AI/Decision Analytics | Artificial intelligence-based system identifies and monitors crop diseases on crops | Aug-04-2021 | 7.5 - Series A |
| Bear Flag Robotics | True Ventures, AgFunder, and Others | Automation | Autonomous driving technology for existing machines | Feb-01-2021 | 7.9 - Seed Extension |
| Automated Fruit Scouting Inc. | Undisclosed | AI/Decision Analytics | Artificial intelligence (AI) powered precision crop load management (PCLM) platform | Aug-27-2021 | 4 |
| Braintree Technologies | AgFunder Inc., GROW Impact Fund | AI/Automation/Decision Analytics | Artificial intelligence driven UAV platform for farm automation | May-06-2021 | 0.1 |
| Monarch Tractor | Musashi Seimitsu Industry, CNH Industrial, and Others | EV/Automation | Self-driving electric tractor allowing a single operator to manage a fleet of up to 8 tractors | Mar-16-2021 | 20 - Series A |
| Ceres Imaging | XTX Ventures, Romulus Capital, and Others | AI/Decision Analytics | AI applications to improve irrigation management practices | Sep-29-2021 | 23 - Series C |
| Koidra | Ospraie Ag Science, Amritam Holdings, and Others | Automation/Decision Analytics | End-to-end decision platform helps automate and continuously improve smart farming operations | Mar-30-2022 | 4.5 - Seed |
| Root AI | AgFunder, Calacanis, and Others | Robots/Automation | Virgo 1 – agricultural robot to pick tomatoes without bruising them and detect ripeness | Aug-13-2020 | 7.2 - Seed |
| Saga Robotics | Nysno, ADM Capital, and Rabo Food & Agri Innovation Fund | Robots/Automation | Thorvald – multi-functional robot used for autonomous tasks around the farm | Sep-02-2020 | 11.3 |
| Solena AG | CerraCap Ventures | AI/Data | AI-powered Prometheus platform soil repository | Jun-22-2020 | Undisclosed |
| SparkAI Inc. | Undisclosed | AI/Automation/Decision Analytics | Automation software – supports tasks like obstacle navigation, tree counting, and plant classification | Nov-23-2021 | 7.4 - Seed |
| SuperAnnotate AI, Inc. | Runa Capital Management, Point Nine Management GmbH, and Others | ML/Decision Analytics | ML pipeline that monitors soil health, protects crops, feeds crops, and detects weeds | Jun-16-2021 | 14.6 - Series A |
| SwarmFarm Robotics | Tenacious Ventures, Artesian | Robots/Automation | Fully autonomous swarms of small, nimble, autonomous platforms | Aug-08-2020 | 3.22 |
| Tevel Aerobotics Technologies | Kubota, Forbon, Maverick Ventures, AgFunder, and Others | Robots/Automation | Autonomous fruit-picking flying robots | Jan-27-2021 | 20 |
| Tortuga AgTech | Lewis & Clark AgriFood, Root Ventures, and Others | Robots/Decision Analytics | Robots that perform farm services while empowering growers with information | Apr-08-2021 | 20 - Series A |

**(continued)**

[13] Source: Capital IQ, Mergermarket, and Google Search

## Investments (continued)

| Target Company | Investor | Business Type | Target Company Products/Services | Date Announced | Announced Investment Size ($mm) |
|---|---|---|---|---|---|
| **Decision Analytics** | | | | | |
| Agrivi | South Central Ventures, European Investment Fund, and Others | Software/Data/Decision Analytics | Farm management software that collects data throughout the farm to provide real-time insights | Nov-20-2020 | 4.8 |
| Aker Technologies Inc. | Undisclosed | Hardware/Decision Analytics | TrueCause - drone system that captures above and below crop stressors from leaf tip to the soil line | Mar-04-2022 | 2.4 - Seed |
| Arable | Prelude Ventures, M20, and Others | Sensors/Decision Analytics | Crop management platform using sensors | Oct-29-2020 | 20 - Series B |
| Absolute | Sequoia, Alpha Wave Global, Tiger Global, and Others | Decision Analytics | Farm OS Platform - insights for farmers to maintain optimal growing conditions | May-05-2022 | 100 |
| Adatos Pte Ltd | Genting Plantations Berhad | Decision Analytics | Agriculture surveillance, monitoring, and analysis solutions | Sep-15-2021 | Undisclosed |
| AgriTask Ltd. | Liechtensteinische Landesbank Aktiengesellschaft, and Others | Decision Analytics | Platform that converts field procedures into computerized protocols and integrates data from different source | Feb-03-2022 | 26 - Series B |
| Auravant | Addenda Capital Inc., The Yield Lab Latin America, and Others | Decision Analytics | Fertilization services that facilitate yield on agricultural land using satellite and drone imagery | Jun-30-2021 | 1.9 - Series A |
| Blue Orange Digital, Inc. | Oliver Wyman | Decision Analytics | Data transformation, visualization & integration, and predictive analytic solutions | Mar-29-2022 | 1.7 |
| Hydenmet Solutions Private Limited | ah! Ventures India Private Limited | Decision Analytics | End-to-end solution through data collected from ground-mounted sensors and satellites | Apr-26-2022 | 0.15 - Angel Funding |
| Hydrosat Inc. | Undisclosed | Decision Analytics | Solutions for crop yield forecasting, irrigation optimization, and drought prediction | May-06-2022 | 15 |
| Rantizo | Leaps by Bayer, Fall Line Capital, and Others | Automation/Decision Analytics | Platform integrates with imagery companies to deliver in-field applications with autonomous drones | Dec-01-2020 | 7.5 - Series A |
| SenseGrass, Inc. | Cox Enterprises, Inc. | IoT/Decision Analytics | Develops IoT devices that monitor plants and work of machine operators right from the office | Jan-24-2022 | Undisclosed |
| SenseGrass, Inc. | Entrepreneurs Roundtable Accelerator | IoT/Decision Analytics | Develops IoT devices that monitor plants and work of machine operators right from the office | Jan-11-2021 | 0.1 |
| Sentera, Inc. | Continental Grain Company Corp., and Others | Decision Analytics | FieldAgent Software - integrates weather data, satellite data, soil data, drone data to provide insights | Jan-25-2021 | 30 |
| Agrihawk Technologies Pvt. Ltd. | Indian Angel Network Services Pvt. Ltd., and Others | Software/Hardware Decision Analytics | Fyllo device - real-time crop, environment, and soil data | May-13-2022 | 2 - Seed |
| Continuum Ag, Inc. | Clean Energy Trust, Ag Ventures Alliance, and Others | Decision Analytics | Web-based data mapping and boundary integration, soil fertility recommendations, and crop planning services | Oct-06-2021 | 0.2 |
| Continuum Ag, Inc. | Undisclosed | Decision Analytics | Web-based data mapping and boundary integration, soil fertility recommendations, and crop planning services | Mar-08-2021 | 0.5 |
| CultYvate | The Chennai Angels, LetsVenture Online Pte. Ltd, and Others | Decision Analytics | Platform collects farm and crop parameters, analyzes them in real time, and takes corrective actions | Apr-05-2022 | 0.57 |
| Deveron Corp. | Undisclosed | Hardware/Decision Analytics | Drone data services to the farming sector in the United States and Canada | Aug-03-2021 | 0.5 |
| DroneDeploy, Inc. | Deer Management Company, LLC, and Others | Hardware/Decision Analytics | Services include field mapping and in field recommendations | Jan-11-2021 | 45 - Series E |
| Farm Flight, INC | Undisclosed | Decision Analytics | Imaging solution - data collection, image analysis, and data display that helps in agronomic decision making | Jan-11-2022 | 2.5 |
| Fieldin | Fortissimo Capital, Zeev Ventures, and Others | ML/Data/Decision Analytics | AgOS - ML and real-time data analytics to provide recommendations | Sep-01-2021 | 30 - Series B |
| Omega Crop | Oxford Science Enterprises | Decision Analytics | Yield prediction and crop loss diagnosis services | May-24-2021 | 1.4 |

## Investments (continued)

| Target Company | Investor | Business Type | Target Company Products/Services | Date Announced | Announced Investment Size ($mm) |
|---|---|---|---|---|---|
| **Decision Analytics** | | | | | |
| Inauro Pty Ltd | SafetyCulture Plus Pty Ltd | IoT/Decision Analytics | Perpsio – data fusion and IoT integration platform providing real-time insights | Jun-06-2022 | 2.1 |
| Intelinair | Regulator Group, Scientia Ventures, and Others | Software/Decision Analytics | AGMRI - crop intelligence platform providing actionable insights throughout the farm | Sep-27-2021 | 20 - Series B |
| Kin and Carta plc | Undisclosed | AI/Decision Analytics | AI platform that provides intelligent crop yield management and insights | Apr-21-2022 | 0.82 |
| Protenga Pte Ltd | Undisclosed | Decision Analytics | Smart insect farming systems to produce animal feed and fertilizer | Mar-09-2022 | 2 - Seed |
| RAW DATA SL | Afi Inversiones Globales, SGIIC, S.A., and Others | Decision Analytics | Yield improvement analytics software for agricultural | Sep-15-2021 | 0.2 - Seed |
| Regrow Agriculture, Inc. | Cargill, Incorporated, M12, and Others | Cloud/Decision Analytics | FluroSense, a cloud-based crop management and analytics platform to boost yield | May-24-2022 | 38 - Series B |
| Regrow Agriculture, Inc. | Ajax Strategies, Tenaclous Ventures, and Cargill | Cloud/Decision Analytics | FluroSense, a cloud-based crop management and analytics platform to boost yield | Aug-17-2021 | 17 - Series A |
| Ricult Inc. | Sojitz Corporation, elea Foundation for Ethics in Globalization | Decision Analytics | Platform which helps farmers procure crops and suggests farm inputs | May-13-2021 | 3.5 - Pre-A |
| Meteomatics AG | Alantra Private Equity, Enagás, and Others | Software/Decision Analytics | Weather API, MetX - weather visualization, and EURO1lk - weather models | Jun-01-2022 | 14.15 - Series B |
| OneSoil AG | Almaz Capital Partners, PortfoLion Ltd. | ML/Imagery/Decision Analytics | Machine learning and satellite imagery platforms provides analytics and field insights | Apr-21-2021 | 5 - Series A |
| Outfield Technologies Ltd | Amadeus Capital Partners Limited and Others | Hardware/Decision Analytics | Drone systems for yield measurement and orchard management of high value fruit crops | Sep-28-2021 | 0.8 - Seed |
| PatternAg | Valor Capital Group, Osprarie Ag Science, and Others | Sensors/Decision Analytics | Biological analytics company mapping to optimize crop protection and fertility plans | Aug-27-2020 | 15 |
| Picketa Systems Inc. | East Valley Ventures Inc., Startup TNT | Hardware/Decision Analytics | Handheld scanning fertilizer analysis technology | May-03-2022 | 0.30 - Angel Funding |
| Picterra SA | VI Partners AG, ACE & Company SA | Decision Analytics | Combines AI, satellite, drone, and aerial data to provide users with optimized geo-information | Apr-26-2022 | 6.5 - Series A |
| Pitik Digital Indonesia | Wavemaker Partners, LLC, Alpha JWC Ventures, and Others | IoT/Decision Analytics | Pitik technology - IoT platform, algorithm, and digital assistant that provides farm insights | May-19-2022 | 14 |
| precision.ai Inc. | BDC Capital Inc., Golden Opportunities Fund Inc., and Others | AI/Decision Analytics | Sprayer Retrofit - AI equipped sprayer from the ground and Farm Drones for spraying from the air | May-04-2021 | 20 |
| SatSure Analytics India Private Limited | Baring Private Equity Partners (India) Ltd. | IoT/Decision Analytics | Satellite and IoT platform monitors crops in real-time | Nov-01-2021 | Undisclosed |
| SatSure Analytics India Private Limited | Baring Private Equity Partners (India) Ltd., and Others | IoT/Decision Analytics | Satellite and IoT platform monitors crops in real-time | Feb-07-2022 | 5 - Seed |
| SORACOM, INC | Sony Group Corporation, Hitachi, Ltd., SECOM CO., LTD., and Others | IoT/Decision Analytics | IoT sensors with theft protection, monitoring, and predictive analytics capabilities | Jun-10-2021 | Undisclosed |
| Space AG | Yield Lab, LLC, Winnipeg Capital S.A.C. | Decision Analytics | Software solutions for the analysis and management of specialty crops | Aug-16-2021 | 1.2 - Seed |
| Taranis | Vertex Growth, K3 Ventures, and Others | Software/Decision Analytics | SmartScout - outcome-based, broad-acre scouting tool | Jul-21-2020 | 30 - Series C |
| Trace Genomics, Inc. | Undisclosed | AI/Decision Analytics | Artificial intelligence-based diagnostic tools for farmers, providing insight on soil conditions | Nov-09-2021 | 10 |
| Ukko Agro Inc. | Whitecap Venture Partners, TELUS Ventures, and Others | Decision Analytics | Online analytics platform for farmers | Dec-16-2021 | 4 - Seed |

*(continued)*

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# Investments (continued)

| Target Company | Investor | Business Type | Target Company Products/Services | Date Announced | Announced Investment Size ($mm) |
|---|---|---|---|---|---|
| **Sustainability** | | | | | |
| AmplifiedAg Inc. | Undisclosed | Vertical Farm/ Sustainability | AMP-X - container farm model and AmpEDGE - system for tracking farm production | May-26-2022 | 10 - Convertible Debt |
| Freight Farms | Osprarie Ag Science and Spark Capital | Vertical Farm/ Sustainability | Vertical farming system in a shipping container | Feb-12-2020 | 15 - Series B |
| Future Crops | Tencent | Vertical Farm/ Sustainability | Soil-based vertical farming using high levels of automation and advanced water recycling infrastructure | Apr-29-2022 | Undisclosed |
| Carbon Count Pty Ltd | Undisclosed | Decision Analytics/Sustainability | Platform that measures soil carbon, calculates project emissions, and create precision Ag maps and tools | Apr-14-2022 | 46 - Series B |
| CarbonSpace | Rockstart, Yield Lab Europe | Sustainability | Platform that estimates carbon footprint of farms and fields | Oct-12-2021 | 1 - Seed |
| Boomitra | Chevron Technology Ventures L.L.C., Yara Growth Ventures | AI/Decision Analytics/ Sustainability | Measure soil moisture, nutrients, and carbon using satellites and AI | Jun-04-2021 | 4.1 |
| Bowery | Ample, Gaingels, GGV Capital, and More | Vertical Farm/ Sustainability | Tech-powered vertical farming using no pesticides or GMOs | May-25-2021 | 300 - Series C |
| eAgronom | Yolo Investments and ZGI Capital | Software/Sustainability | Farm management software and carbon credits platform | Feb-18-2022 | 7.4 - Series A |
| EarthOptics | Leaps by Bayer, S2G Ventures, and Others | Decision Analytics/ Sustainability | Soil measurement and analysis of soil health, compaction, and carbon content | Sep-28-2021 | 10.3 - Series A |
| iUNU | Lewis & Clark AgriFood, S2G Ventures, and Others | Vertical Farm/ Sustainability | Hardware and software solutions for indoor farming | Mar-16-2022 | 24 - Series B |
| iUNU | S2G Ventures, Ceres Partners, and Others | Vertical Farm/Decision Analytics/Sustainability | LUNA – greenhouse monitoring tool allowing for real time updates of the entire facility | Dec-15-2020 | 7 - Series A |
| Kalera S.A. | Canica AS, Lightrock, Nox Management | Vertical Farm/ Sustainability | Vertical farming using advanced automation and no harmful sprays | Mar-07-2022 | 20 |
| SupPlant | Red Dot Capital Partners, Smart-Agro Fund, and Others | Decision Analytics/ Sustainability | Climate smart and sustainable irrigation recommendations | Mar-14-2022 | 27 |
| SupPlant | Boresight Capital, Menomadin Foundation, and Others | Decision Analytics/ Sustainability | Climate smart and sustainable irrigation recommendations | Jun-14-2021 | 10 |
| ForFarming | TechOne VC, APY Ventures, Korun Teknoloji | Decision Analytics/ Sustainability | Internet of things (IoT) based software helps users to grow crops indoors | Sep-21-2021 | 0.45 - Seed |
| iFarm | Gagarin Capital Partners, Matric Capital, Impulse VC, and Others | Vertical Farm/ Sustainability | Full-service support for growing greens, berries, and veggies in automated vertical farms | Aug-20-2020 | 4 |
| Infarm | LGT Lightstone | Vertical Farm/Cloud/ Sustainability | Vertical cloud-connected farms that integrate advanced engineering, software, and farming technology | Sep-17-2020 | 170 - Series C |
| Leaf Agriculture | S2G Ventures, Cultivian, and Others | Software/Sustainability | Carbon and sustainability tracking API that consolidates farm data | Apr-12-2022 | 5 - Seed |
| Oishii | Mirai Creation Fund, SPARX Group, and Others | Vertical Farm/ Sustainability | Indoor vertical strawberry farm | Mar-11-2021 | 50 - Series A |
| RootWave | V-Bio Ventures and Rabo Food & Agri Innovation Fund and Others | Sustainability | Electricity-based weed killing applications | Feb-22-2020 | 7.2 - Series A |
| Perennial | Temasek, Bloomberg, Microsoft | Software/Sustainability | Soil carbon measurement, reporting, and verification platform | May-17-2022 | 18 |
| Plenty | Walmart, One Madison Group, and Others | Vertical Farm/ Sustainability | Indoor vertical farming producing nutrient-rich plants without pesticides | Jan-25-2022 | 400 - Series E |
| Sollum Technologies | Real Ventures, Alter Ego Capital, and Others | Sustainability | SUNaaS – lighting control solution that monitors and optimizes growing conditions | Jun-17-2020 | 3 - Seed |
| Ucrop.it | Yugen Partners, The Yield Lab, and Others | Sustainability | Block-chain enabled sustainability verification | Jul-19-2022 | 3.1 - Pre-Series A |

## Investments (continued)

| Target Company | Investor | Business Type | Target Company Products/Services | Date Announced | Announced Investment Size ($mm) |
|---|---|---|---|---|---|
| **Sensors/Remote Monitoring/Data/Planning** | | | | | |
| Arduino S.r.l. | Renesas Electronics Corporation, ARM Limited and Others | Remote Monitoring/ Decision Analytics | Arduino Edge Control - remote monitoring and control solution | Jun-07-2022 | 30 - Series B |
| Aerial Vantage, Inc. | Undisclosed | Hardware/Software/Data | Drone and software platform that collects, manages, and analyzes data | Feb-11-2022 | 1 - Seed |
| Ceptu ApS | Da Shoppen A/S, Rockstart, Pajbjergfonden | Software/Data | FieldSense - hyper local weather measurements | Feb-18-2022 | 3 |
| iMatrix Systems, Inc. | Undisclosed | IoT/Sensors/Cloud | Cloud IoT solution and portfolio of wireless sensors | Feb-22-2022 | 2 - Angel |
| Semios | Morningside Group | Software/Remote Monitoring | Crop management and precision farming platform that remotely monitors weather, pests, and plant stress | Sep-29-2021 | 100 |
| Semios | Morningside Group | Software/Remote Monitoring | Crop management and precision farming platform that remotely monitors weather, pests, and plant stress | Feb-18-2020 | 75 |
| Sencrop SAS | Jerusalem Venture Partners, and Others | Software/Data | Agro-environmental data systems that provide real-time knowledge for rainfall-sensitive businesses | May-10-2022 | 18 - Series B |
| Spotta | REMUS, Martlet Capital, and Others | IoT/Sensors | Low-power, IoT pest control sensors | Aug-03-2020 | 1.2 - Seed |
| Stenon GmbH | Founders Fund, Inc., Atlantic Labs Manager GmbH, and Others | Sensors/Decision Analytics | Sensor technology equipment with supporting software, which offers real-time soil analysis | Dec-20-2021 | 20 - Series A |
| **Imaging/Mapping/Variable-Rate** | | | | | |
| Aria Agriculture Indonesia | PT Triputra Investindo Arya, East Ventures Pte. Ltd., PT Tibeka Logistik | Mapping/Variable-rate | Area mapping, spraying, and turbo spreader and IoT devices | Mar-10-2022 | Undisclosed |
| ARPAC | Yamaha Motor Ventures & Laboratory Silicon Valley, Inc. | UAV/Variable-rate | Agricultural spraying service with UAVs | Mar-17-2022 | 1.8 |
| Croptimistic Technology Inc. | Forage Capital Partners | Mapping/Variable-rate | Swat Maps - variable rate platform, Swat Box - soil mapping system, and Swat Records - fertilizer application | Jun-04-2021 | 5.2 - Series A |
| SentryAg, Inc. | Undisclosed | Mapping/Variable-rate | Soil EC mapping, field management zones, zone soil mapping, and variable rate services | Apr-13-2021 | 1.2 |
| Smart Apply | VisionTech Angels, Elevate Ventures, and Others | Software/Hardware/ Variable-rate | Smart Apply Intelligent Spray Control System - add-on kit for air blast sprayers | May-20-2022 | 1.3 - Seed |
| Wyvern Incorporated | Sustainable Development Technology Canada | Imaging/Decision Analytics | FirstLight satellites - hyperspectral imagery allowing for crop health, moisture mapping, and input optimization | Feb-07-2022 | 4 -Seed |

## M&A in Precision Ag Since 2020

Since 2020, on the M&A side, incumbent strategic companies are driving most of the acquisitions. The list below highlights the current trend of strategics looking to expand their offerings through acquisition. Most of the M&A activity has been focused on the software driving automation and decision analytics.[14]

The private companies in Precision Ag are divided into same five categories as the previous lists:
• Robotics/Automation/AI/ML
• Decision Analytics
• Sustainability
• Sensors/Remote Monitoring/Data/Planning, and Imaging/Mapping/Variable-Rate

## M&A Activity (2020 – Present)

| Target Company | Acquirer | Business Type | Target Company Products/Services | Date Announced | Transaction Price ($mm) |
|---|---|---|---|---|---|
| **Robotics/Automation/AI/ML** | | | | | |
| Solem SAS | Quilvest Capital Partners, Bpifrance | Software/Automation | Wi-Fi and Bluetooth automation systems that include battery operated irrigation, irrigation, and an irrigation application | 7/8/2021 | Undisclosed |
| Strio.AI, Inc. | Zoox Inc. | AI/Robots/Automation | Robotics for picking and pruning strawberry crops | 3/9/2022 | Undisclosed |
| Bear Flag Robotics | Deere & Company | Automation | Autonomous driving technology for existing machines | 8/5/2021 | 250 |
| DOT Technology Corp | Raven Industries | Automation | Autonomous power unit that can pair with a wide range of implements | 3/30/2020 | Undisclosed |
| Jaybridge Robotics | Raven Industries | Automation/Decision Analytics | Automated agricultural technology includes path planning, obstacle detection, and multi-machine control | 4/12/2021 | Undisclosed |
| Traptic, Inc | Bowery Farming Inc. | Robots/Automation | Automated strawberry harvest machines | 2/16/2022 | Undisclosed |
| Midnight Robotics | Fieldin | Automation | Retrofit kit for tractors that uses LiDAR perception | 11/17/2021 | Undisclosed |
| Prospera Technologies Inc. | Valmont Industries, Inc. | AI/ML/Automation | AI company focused on machine learning and autonomy in agriculture | 5/5/2021 | 300 |
| Raven Industries, Inc. | CNH Industrial N.V. (NYSE: CNHI) | Auto-steer/ Automation | Solutions include application controls, GPS-guidance steering systems, field computers, and machine automation | 6/21/2021 | 2137.02 |
| RootAI | AppHarvest | AI/Robots/Vertical Farm/Sustainability | AI to power robots that manage high-tech indoor farming operations | 4/8/2021 | 60 |
| **Decision Analytics** | | | | | |
| AgriSight, Inc. | Bushel Inc. | Software/Decision Analytics | FarmLogs - online farm management software solutions for farmers | 6/16/2021 | Undisclosed |
| Agworld Pty Ltd | SemiosBio Technologies Inc. | Cloud/Decision Analytics | Cloud-based farm management software platform for row and permanent crop growers | 8/24/2021 | 100 |
| Altrac | SemiosBio Technologies Inc. | Automation/Decision Analytics | Automation platform enabling armers to monitor and control agricultural systems | 6/10/2021 | Undisclosed |
| American Robotics | Ondas | AI/Automation/ Decision Analytics | Scout System – fully-autonomous, AI-powered drone platforms that provides on-demand insights | 5/19/2021 | Undisclosed |
| Business Mobility Partners/Simon IoT LLC | KORE Group Holdings, Inc. (NYSE: KORE) | IoT/Decision Analytics | IoT platform that improve productivity, monitor assets, reduce waste, and maximize crop output | 2/16/2022 | 80.93 |
| Cainthus | Ever.ag | AI/Decision Analytics | AI-enabled cameras for analyzing dairy operations | 6/21/2022 | Undisclosed |
| Centricity | SemiosBio Technologies Inc. | Decision Analytics | ApRecs – allows growers to make better process decisions through industry compliance | 6/22/2021 | Undisclosed |
| ClearAg | DTN | Decision Analytics | End-to-end weather analysis and forecasting, providing predictive analytics for decision support | 5/5/2020 | Undisclosed |
| Conservis Corp. | TELUS Agriculture, Rabobank | Cloud/Decision Analytics | Conservis - cloud based solution that turns business data into actionable insights for agricultural enterprises | 7/19/2021 | Undisclosed |
| Cromai | Stoller Group | Decision Analytics | Computational vision for agriculture to control invasive plants and optimize processes | 5/6/2021 | Undisclosed |

**(continued)**

## M&A Activity (continued)

| Target Company | Acquirer | Business Type | Target Company Products/Services | Date Announced | Transaction Price ($mm) |
|---|---|---|---|---|---|
| **Decision Analytics** | | | | | |
| CropMetrics | CropX | Cloud/Software/ Decision Analytics | Cloud-based, precision irrigation tools | 1/13/2020 | Undisclosed |
| CropWalk | iUNU | Decision Analytics | Remote pest management services for greenhouses | 8/10/2021 | Undisclosed |
| Dacom Farm Intelligence | CropX | Cloud/Decision Analytics | Platform with cloud offerings, irrigation management, Farmlayer plotting, and FarmLook data exchange | 8/10/2021 | Undisclosed |
| GeoSpoc Geospatial | ANI Technologies Private Limited | Sensors/Decision Analytics | Geo-analytics and remote sensing solutions to strategize crop management | 10/5/2021 | Undisclosed |
| Growers Holdings | ICL | Decision Analytics | Data-driven farming platform providing farmers with better decision-making capabilities | 2/21/2020 | Undisclosed |
| Harvest Profit | John Deere | Software/Decision Analytics | Cost and profit tracking software for farmers | 10/16/2020 | Undisclosed |
| Hone Pty. Ltd. | GrainCorp Limited (ASX: GNC) | Decision Analytics | Hone Test, an application that provides in-field chemical analysis for soil and crop testing in the agricultural industry | 10/7/2021 | Undisclosed |
| JCA Industries Inc. | AGCO Corporation (NYSE: AGCO) | Decision Analytics | FlightPath - Precision Ag engine that performs task management functions | 5/2/2022 | 48.87 |
| Mettler Fertilizer, Inc. | Undisclosed | Decision Analytics | Precision planting and climate field view services | 8/25/2021 | Undisclosed |
| Probe Schedule | Wilbur-Ellis Co | Decision Analytics/ Sustainability | Software that accurately tracks soil moisture states and provides sustainable irrigation insights | 12/7/2020 | Undisclosed |
| Regen | CropX | Decision Analytics | Combines weather, soil, and environment data into recommendations for water irrigation management | 9/10/2020 | Undisclosed |
| Sigfox | UnaBiz Pte Ltd | Decision Analytics | Weather monitoring, virtual tracking, and data collection throughout the farm | 4/21/2022 | Undisclosed |
| **Sustainability** | | | | | |
| &ever | Kalera | Automation/Vertical Farm/Sustainability | Climate cell technology and vertical farming automation | 8/12/2021 | 153 |
| Autogrow Systems Limited | Bluelab Corporation Limited | Automation/Vertical Farm/Sustainability | Automated hardware, software, and data solutions for protected cropping, automated greenhouse, and indoor growing of plants | 4/5/2022 | Undisclosed |
| BrightFarms | Cox Enterprises | Vertical Farm/ Sustainability | Advanced-tech and pesticide free vertical farming of greens | 8/19/2021 | Undisclosed |
| Kreisel Electric | John Deere | EV/Sustainability | Electrification portfolio of state-of-the-art battery technology solutions | 12/14/2021 | Undisclosed |
| Gakon | Netafirm | Vertical Farm/ Sustainability | Advanced greenhouse construction company | 3/10/2021 | Undisclosed |
| Dagan | FluroSat | Automation/ Sustainability | Greenhouse construction and automation for pesticide treatment systems | 2/22/2021 | Undisclosed |
| Plant Response, Inc. | The Mosaic Company (NYSE: MOS) | Inputs/Sustainability | PowerCoat - optimizes nutrient utilization from dry fertilizers, BiOHP - increases the availability of phosphorous | 2/23/2022 | Undisclosed |
| Rivulis | Temasek | AI/Decision Analytics/ Sustainability | Micro-irrigation systems for greenhouses and soilless ag | 12/15/2020 | Undisclosed |
| Soil Metrics | Indigo Ag | Decision Analytics/ Sustainability | Solutions that measure and model soil carbon data | 10/26/2021 | Undisclosed |
| **Sensors/Remote Monitoring/Data/Planning** | | | | | |
| AcreValue | Ag-Analytics | Software/Data | Platform that provides research and data on farmland | 9/30/2021 | Undisclosed |
| AgBridge | Nutrien Ag | Software/Data | Universal wireless data transport solution for precision ag data | 7/17/2020 | Undisclosed |
| AgJunction Inc. | Kubota Corporation (TSE:6326) | GPS/Auto-steer | Wheelman white-label - an autosteering platform for manufacturers and supplies and RANGER - GPS guidance | 10/7/2021 | 73.06 |
| Appareo Systems, LLC | AGCO Corporation (NYSE: AGCO) | Sensors/GPS/RFID | Communication, monitoring, sensing, tracking, and controlling devices and systems used in agriculture | 12/31/2021 | Undisclosed |
| Business and Assets of Headsight, Inc. | Precision Planting, LLC | Sensors/Auto-steer | Header height sensors, autosteer row guidance, advanced control systems, and radar height control solutions | 8/4/2021 | Undisclosed |
| Myriota Pty. Ltd. | IAG Ventures Pty. Limited | Sensors/Remote Monitoring | Low power micro transmitters that send multiple small packets of data and ground stations for monitoring | 9/2/2021 | Undisclosed |
| Partners for Production Agriculture | EverAg | Software | Agricultural risk management solutions for swine and cattle | 5/16/2022 | Undisclosed |
| PivoTrac | Valley Irrigation | Remote Monitoring | Remote monitoring solutions for center pivot irrigation machines | 4/26/2021 | Undisclosed |
| PrecisionKing | Valley Irrigation | Remote Monitoring/ Sensing | Irrigation monitoring and sensing that optimizes water usage | 8/4/2020 | Undisclosed |
| TerrAvion | AgroScout | Imagery/Data | Imagery data management for agriculture | 1/5/2022 | Undisclosed |
| Visio-Green Agriculture | Sencrop | Software/Sensors | Sensors including agro-weather stations and irrigation probes | 2/13/2020 | Undisclosed |

## M&A Activity (continued)

| Target Company | Acquirer | Business Type | Target Company Products/Services | Date Announced | Transaction Price ($mm) |
|---|---|---|---|---|---|
| **Imaging/Mapping/Variable-Rate** | | | | | |
| Farm Guide | DeHaat | Imagery/Data | Expansive spatial dataset with satellite imagery and physical data points | 2/22/2021 | Undisclosed |
| senseFly SA | AgEagle Aerial Systems, Inc. (NYSEAM: UAVS) | Hardware/Software/ UAV | eBee Ag drone - maps and monitors crops | 10/18/2021 | 23 |
| KZValve | IDEX Corporation | Variable-rate | Flow management solutions for agriculture machinery | 5/2/2022 | Undisclosed |
| Salford | Linamar | Variable-rate | Crop nutrition application and tillage products | 5/2/2022 | 260 |

## Partnerships Driving the Future of Agriculture

There are many reasons for companies to partner: create a one-stop-shop; obtain access to a new customer base; enhance a product offering by adding new features; increase distribution; accelerate product development; gain access to new technology; and as a test run before completing a merger or acquisition, to name a few.[15]

In Q4 2021, Bayer and Trimble both partnered with Microsoft to expand the Microsoft cloud to the agriculture technology industry, highlighting the tech giant's growing interest in agriculture. As agriculture becomes more digitized, technology incumbents from other industries may look to boost their top and bottom lines through expanding into the agriculture market.

Recent partnerships have focused on these three themes: 1) precision/decision agriculture, 2) advanced technology, and 3) sustainability. See the table below for a list of partnerships announced since the beginning of 2021.

## Agriculture Technology Partnerships (2021–Present)

| Partners | Date Announced | Partnership Focus |
|---|---|---|
| Titan Machinery/Augmenta | Q2 2022 | Offer customers a smart and automated variable-rate application system |
| Clean Seed Capital Group/Canada West Harvest Centre | Q2 2022 | Promote SMART Seeder Max |
| CropX/Aliaxis | Q2 2022 | Collaborate in the field of data driven precision irrigation |
| Telit/ConectarAGRO Association | Q2 2022 | Promoting and enabling access to 4G mobile internet throughout Brazil |
| FarmQA/Planet | Q2 2022 | Deliver high-resolution daily satellite imagery |
| Topcon, MyAgData | Q2 2022 | Streamline access to electronic grain cart load data |
| Proman/CropX | Q1 2022 | Invest in Precision Ag technology |
| GeoPard/Origin Digital | Q1 2022 | Collaboration that will advance accessibility and efficiency of Precision Ag solutions in Ukraine |
| Origin Data/Aspia Space | Q1 2022 | Feeds radar data into a deep neural network to derive the view of a field that a satellite would see if no clouds were blocking the camera |
| Ceres Imaging/Sentek | Q1 2022 | Customers will be able to see real-time sensors and data from both companies on the Ceres Imaging app side-by-side |
| Sway AI/Trilogy Networks | Q1 2022 | Enable AI technology for precision farming |

**(continued)**

## Partnerships (continued)

| Partners | Date Announced | Partnership Focus |
|---|---|---|
| Trimble/Microsoft | Q4 2021 | Advance technology adoption and accelerate the digital transformation of the agriculture industry |
| Point One Navigation/Quectel | Q4 2021 | Bring precise location to robotics and agriculture markets |
| Bayer/Microsoft | Q4 2021 | Build a new cloud-based set of digital tools and data science solutions for use in agriculture and adjacent industries |
| Suterra/Phytech | Q4 2021 | Adds Suterra pest control products to Phytech's digital farming platform |
| Smart Fertilizer Software/SupPlant | Q4 2021 | Create a sensor-less precision plant nutrition platform to improve water and fertilization efficiency |
| EOS Data Analytics/Epik Systems | Q4 2021 | Provide small farmers with data to support them in precision farming and greenhouse gas tracking |
| Volta Power Systems/Draxxon Partners | Q4 2021 | Creating fully electric drone command center |
| Septentrio/ArduSimple | Q4 2021 | Bring reliable GPS/GNSS to emerging applications, like Precision Ag |
| CropIn/Unyiha Associates | Q3 2021 | Aims to enable the digital transformation of the agricultural ecosystem in Tanzania and East Africa |
| Telus Agriculture/Rabobank | Q3 2021 | Partner to acquire Conservis, a company that integrates disparate farm technologies into one streamlined interface to manage farming |
| NASA Harvest/CropX | Q2 2021 | Will give NASA harvest unprecedented soil insights for its global agricultural monitoring efforts to support a more sustainable food ecosystem |
| Trimble/Horsch | Q2 2021 | Collaboration focused on developing solutions that enable autonomy in agriculture with the goal of building a future of autonomous machines and workflows |
| AGCO/NEVONEX | Q1 2021 | Help farmers integrate technology to enable more efficient processes in agriculture |
| John Deere/Solorrow | Q1 2021 | Create app that allows farmers to create variable rate application maps for fertilizing and other operations and share them with the John Deere Operations Center |
| Solinftec/Planet | Q1 2021 | Deliver real-time data that will further drive efficiency and transparency across the agriculture industry |

# For more information about Precision Ag, contact:

### Eric M. Oganesoff
Managing Director and Supply Chain Team Leader
Eric.Oganesoff@focusbankers.com
202-470-1969

Eric Oganesoff has conducted over eighty M&A, debt and capital raise transactions and has served as the CEO or President of six companies. Mr. Oganesoff has over twenty years of senior executive level experience in leading businesses ranging from wireless solutions, software and RFID services to manufacturing, agricultural and industrial products, energy and environmental products and government contracting. Mr. Oganesoff is also a member of the FOCUS's Government and Defense Group.

He received a White House appointment to NASA as Special Assistant to the Associate Administrator, Office of Space Flight where he headed the NASA task force that developed NASA's first strategic marketing plan for Space Shuttle launch services. He received a Presidential Commendation from President Reagan for his work at NASA.

Mr. Oganesoff received his BS degree in Electrical Engineering from the University of Maryland. He has also served on the board of many high-tech and emerging companies and industry associations.

### Zachary Brodsky
Investment Banking Research Intern, Washington, DC, zbrodsky@umd.edu, zachbrodsky1@gmail.com 301-520-8109.

Zach is currently a junior at the University of Maryland, where he is majoring in finance and economics. He is set to graduate in the spring of 2024.

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|---|---|---|
| FOCUS Investment Banking LLC | FOCUS Investment Banking LLC | FOCUS Investment Banking LLC |
| Headquarters | Atlanta Office | Los Angeles Metro Office |
| 8065 Leesburg Pike | 3353 Peachtree Road NE | 18012 Sky Park Circle |
| Suite 750 | Suite 1160 | Suite 200 |
| Vienna, VA 22182 | Atlanta, GA 30326 | Irvine, CA 92614 |
| 202.785.9404 | 404.504.8620 | 213.943.1395 |
| 202.785.9413 (fax) | 404.814.9141 (fax) | 213.943-1397 (fax) |