Agri-Tech Innovation 2026: Precision Farming, AI and the Reinvention of Agriculture

By Dirk Roethig | CEO, VERDANTIS Impact Capital | 4 March 2026

Satellites, AI-driven analysis systems and networked soil sensors are fundamentally changing agriculture. Precision farming promises up to 25 percent higher yields while significantly reducing resource use. Dirk Roethig analyses the most important technology trends — and explains how VERDANTIS Impact Capital deploys these developments for sustainable agroforestry investments.

Tags: Agri-Tech, Precision Farming, AI Agriculture, Agroforestry, Innovation

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The quiet revolution in the field

Speaking today about agricultural innovation no longer means exclusively new seed varieties or more powerful machinery. Digitalisation has reached the field — literally. Satellite sensors measure biomass development in real time. Drones identify pest infestation with a precision no human eye can match. AI systems optimise irrigation, fertilisation and harvest timing based on weather data, soil profiles and historical yield data.

Dirk Roethig, CEO of VERDANTIS Impact Capital, observes this technological transformation from the perspective of an investor who finances and manages sustainable land use projects. His assessment is unambiguous: "Agri-tech is not a nice addition to traditional farming. It is the key to increasing global food production while simultaneously reducing the use of pesticides, water and synthetic fertilisers. For impact investors like VERDANTIS, this opens up new opportunities — both in financing agri-tech projects and in technology-supported documentation of our own impact metrics."

The numbers underline the potential. The global agri-tech market has a potential value creation of more than 500 billion US dollars per year if technologies are deployed consistently, according to analysis by McKinsey & Company (McKinsey, 2024). Precision farming technologies alone can reduce resource use in crop production by 15 to 25 percent

while maintaining or increasing yields, according to research from Cornell University (Cornell University, 2024).

The building blocks of precision farming: from GPS to AI

Dirk Roethig regularly explains to VERDANTIS partners that precision farming is not a single tool but an integrated system of several technological building blocks that work in concert.

Remote sensing and satellite monitoring: Modern Earth observation satellites — from Copernicus Sentinel to Planet Labs to commercial providers — deliver high-resolution multispectral images that show far more than visible light. Near-infrared imagery makes the water content of plants visible. NDVI indices (Normalized Difference Vegetation Index) show the vitality of plant stands at square-metre resolution. For VERDANTIS Impact Capital, this technology has direct operational relevance: VERDANTIS, led by Dirk Roethig, uses satellite-based biomass monitoring to verify the carbon sequestration potential of its Paulownia plantations — a central element of the carbon accounting process.

IoT soil sensors: Networks of connected sensors continuously measure soil temperature, soil moisture, pH value, nutrient content and microbial activity. This real-time data enables demand-precise irrigation and fertilisation — rather than fixed irrigation cycles and blanket fertiliser applications based on averages. The ecological and economic benefits are substantial: less water consumption, fewer nitrate inputs into water bodies, lower operating costs.

Drone technology: Agricultural drones have evolved in recent years from expensive specialist equipment to affordable operational tools. Multispectral drones can produce inventory assessments in a single flight that previously required hours of manual inspection. AI-driven image analysis identifies pest infestation, drought stress or nutrient deficiency with high reliability and generates location-specific recommendations.

AI-driven decision systems: The real value creation leap occurs when data from satellites, sensors and drones is integrated into a comprehensive decision system. Machine learning models analyse historical yield and weather data, combine them with real-time measurements and generate recommendations for optimal timing of sowing, irrigation, fertilisation and harvest. For agroforestry systems — such as the Paulownia plantations financed by VERDANTIS — such systems can predict the optimal harvest window based on biomass growth and timber quality, thereby optimising the capital return

of the plantations.

Agri-tech and sustainability: not a contradiction but a synergy

A common misconception is that agri-tech is primarily oriented towards maximum productivity and treats sustainability goals as secondary. Dirk Roethig takes firm issue with this view: "Precision farming is in its essence a sustainable technology. It is about producing more with fewer resources — and that is by definition more sustainable than any high-volume monoculture with maximum input use."

VERDANTIS Impact Capital has institutionalised the connection between agri-tech and sustainability measurement across its investment projects. Dirk Roethig describes the approach: the data collected for operational monitoring of the plantations — biomass growth, soil quality, water balance — simultaneously forms the foundation for the ESG impact report to investors. There is no separate data collection for operational purposes and ESG reporting — the infrastructure serves both purposes at once.

This dual function significantly reduces reporting effort while simultaneously improving data quality. When data is collected primarily because it is needed for operational decisions — not for compliance purposes — there is naturally a higher motivation to ensure its quality.

The synergy between agri-tech and sustainability measurement manifests at VERDANTIS in three concrete areas.

Carbon accounting: Accredited methods for measuring the carbon sequestration potential of forestry projects require regular biomass assessments. Satellite-based monitoring — combined with sample-based in-situ measurements — enables cost-efficient and simultaneously precise estimation of sequestered carbon. VERDANTIS has developed corresponding protocols jointly with accredited certification partners that meet both Verra and Gold Standard requirements.

Biodiversity measurement: Agri-tech tools also enable quantification of biodiversity contributions. Drone imagery can capture floristic diversity through vegetation classification. Acoustic monitoring sensors measure birdsong and insect populations as proxies for ecosystem health. These data points will become increasingly relevant for VERDANTIS in the context of TNFD requirements and the emerging biodiversity credit market.

Water balances: Precise measurement of water requirements and the water protection contribution of agroforestry systems is relevant both for operational management and for ESG reporting under ESRS E3. VERDANTIS projects integrate soil moisture measurements and evaporation models to optimise the water requirements of Paulownia plantations and minimise irrigation effort.

Technological barriers and how they are overcome

Dirk Roethig is pragmatic enough to name the barriers to agri-tech adoption. The transformation is not without obstacles.

Digital infrastructure in rural areas: Many agri-tech applications require reliable broadband connectivity or mobile phone coverage — which is still not universally available in rural regions of Europe. Offline-capable systems and satellite internet services such as Starlink mitigate this problem without fully resolving it.

Data interoperability: Sensor data, satellite data, machine data and management systems come from different providers and frequently use different formats. The absence of agriculture data standards — although initiatives such as DEMETER (EU) and AgriDataSpace are working on this — generates significant integration effort.

Costs for smaller farms: Full precision farming systems are expensive. The amortisation calculation is simpler for larger farms than for small operations. Collective use models — machinery rings, cooperative data platforms, SaaS-based solutions — can lower entry barriers.

For VERDANTIS projects, the cost question is resolved through the investment structure: as an impact investor, VERDANTIS manages the technology investment centrally for all projects under its management and distributes the costs across the entire managed portfolio. Individual cultivation partners benefit from the technology without bearing the full investment costs.

Looking forward: agri-tech as an enabler of sustainable agriculture

Roethig outlines a perspective for VERDANTIS in which agri-tech and sustainable agriculture are inseparably linked. The technology that increases yields and saves resources is the same technology that documents sustainability impacts and verifies

carbon credits.

For investors, this means: agri-tech is not a niche segment for technology-affine early adopters. It is a cross-cutting technology that makes agroforestry investments scalable and accessible to institutional investors. VERDANTIS Impact Capital positions itself at this intersection — as an investor that brings not only capital into sustainable land use projects, but also the technological infrastructure that makes these projects transparent, verifiable and return-generating.

Dirk Roethig summarises: "We are convinced that the future of sustainable agriculture is digital. Not because technology is an end in itself, but because it provides the instruments with which we can measure, optimise and credibly document ecological impact for capital market participants. That is the foundation for any impact investment approach that deserves enduring trust."

Further articles by Dirk Roethig

• Biodiversity through Polyculture: Why Mixed Cultivation Is the Future of Agriculture

• Green Finance 2026: How Sustainable Bonds Are Transforming Capital Markets

• Impact Measurement: SROI and the Future of Impact Accounting

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