

Utilizing AI In Agriculture Requires A Strong IP Strategy

By **Bree Vculek, Lestin Kenton Jr. and Jean Selep** (January 21, 2026)

At this year's Consumer Electronics Show in Las Vegas, industry leaders made clear earlier this month that artificial intelligence has moved from experimentation into the economic core of modern farming.

Agricultural technology, or agtech, executives highlighted AI-enabled autonomy, machine vision and data platforms already embedded in production agriculture, underscoring that competitive advantage is increasingly tied to control over AI systems rather than hardware alone.[1] That shift is already reshaping how food is grown, managed and distributed.

AI now underpins a wide range of agricultural operations, from precision crop monitoring and predictive analytics to autonomous machinery and robotics. These AI-enabled tools promise higher yields, reduced input costs and more sustainable farming practices at a time when the agricultural sector faces mounting pressure from labor shortages, climate variability and global food demand.

Yet, as agtech companies race to deploy AI solutions at scale, many underestimate the importance of intellectual property strategy. In an increasingly crowded and fast-moving innovation landscape, patents and complementary IP rights are no longer ancillary considerations. They are essential business assets that determine who captures value from AI-driven agricultural innovation and who is left competing in commoditized markets.

The timing matters. As AI functionality converges and commercialization accelerates, decisions made early in the IP life cycle increasingly dictate pricing leverage, transaction outcomes and who controls core platforms, frequently long before products reach full market adoption.

AI's Expanding Role in Agriculture

AI adoption in agriculture spans the full life cycle of crop production and distribution.



Bree Vculek



Lestin Kenton



Jean Selep

Computer vision systems deployed via drones, satellites and ground-based cameras now detect early signs of pest infestation, disease and water stress, enabling targeted intervention before yield losses occur.

Machine-learning models integrate weather data, soil metrics and historical performance to guide planting schedules, irrigation timing and nutrient application. These tools help producers optimize inputs while managing uncertainty.

Autonomous machinery represents another major frontier. Self-driving tractors, robotic harvesters and precision sprayers reduce reliance on scarce labor while operating with a level of accuracy that humans cannot match.

AI-enabled weed control systems, for example, use real-time image recognition to distinguish crops from weeds and apply herbicides only where needed, dramatically reducing chemical usage and environmental impact.

Beyond the field, AI is improving supply-chain efficiency through demand forecasting, logistics optimization and pricing analytics. Together, these technologies are moving agriculture away from reactive decision-making toward continuous, data-driven optimization.

This technological convergence has accelerated commercialization. Adoption is no longer limited to experimental pilots or large industrial farms. AI tools are increasingly embedded in mainstream agricultural equipment and platforms, signaling a shift from experimentation to broad commercialization.

The IP Challenge Facing Agricultural AI Innovators

Despite the pace of innovation, agtech companies often lag in building patent portfolios that reflect the strategic value of their AI systems. Many innovators focus on speed to market, assuming that first-mover advantage or data scale alone will provide defensibility. In practice, those advantages erode quickly once competitors reverse engineer product functionality or deploy similar models trained on alternative datasets.

Patents remain one of the few mechanisms capable of providing enforceable exclusivity in this environment. Utility patents can protect AI-enabled systems, methods and architectures, including sensor fusion platforms, machine-vision pipelines, decision-support engines and integrated hardware-software solutions. When properly drafted, these

patents can prevent competitors from offering functionally equivalent products even if underlying implementations differ.

This does not suggest that patents stand alone. Data scale, execution, customer relationships and platform integration all matter. But in the absence of enforceable IP rights, these advantages often fail to stop competitors from replicating features or driving down margins once AI functionality converges.

At the same time, not every aspect of an AI system can or should be patented. Training datasets, model-tuning techniques and internal calibration processes may be better protected as trade secrets, particularly where disclosure would enable rapid imitation or where enforcement would be impractical.

The most effective IP strategies combine patents and trade secrets in a coordinated manner, preserving exclusivity while minimizing unnecessary disclosure.

Patent Eligibility and Drafting Considerations

AI-related patents continue to face scrutiny under Title 35 of the U.S. Code, Section 101, particularly when claims are framed as abstract data processing or mathematical optimization. While recent statements from the [U.S. Patent and Trademark Office](#) suggest a more receptive posture toward AI innovation,[2] eligibility outcomes still turn on how inventions are characterized.

For agricultural AI technologies, successful patent applications emphasize concrete technical improvements tied to real-world agricultural operations. Claims that focus on improved sensor accuracy, reduced latency, enhanced machine control or more efficient resource allocation are more likely to withstand eligibility challenges than those framed around generalized data analysis.

Importantly, claim abstraction does not merely affect examination outcomes. Overly functional or generalized AI claims are also more vulnerable to postgrant challenges, including inter partes review proceedings, where technical specificity and demonstrable system-level improvements often determine claim survivability.

Drafting strategies also play a critical role. Many agricultural AI innovations lend themselves to layered claiming, including system claims covering integrated hardware and software, method claims capturing operational workflows, and computer-readable media

claims directed to executable instructions. This approach broadens enforcement options and reduces the risk that competitors can design around a single claim category.

Drafting decisions made early in prosecution often shape enforcement leverage, licensing value and transaction outcomes years later.

Commercial and Competitive Implications of Patent Strategy

A well-constructed patent portfolio delivers a competitive advantage across multiple dimensions. Exclusivity prevents copycat products from eroding market share and compressing margins. In capital-intensive sectors such as agricultural equipment and robotics, this protection can determine whether innovators recoup development costs or lose ground to better-resourced incumbents.

Patents also play a central role in investment and partnership decisions. For startups, issued patents and pending applications signal technical maturity and reduce risk for investors. For established agribusinesses, patents facilitate licensing, joint ventures and technology integration without sacrificing proprietary advantage.

M&A activity in the agtech sector further underscores the importance of IP ownership. Acquirers often value patent portfolios as highly as product revenue, particularly where patented technology can be integrated across existing platforms. Clear IP rights simplify due diligence and reduce post-transaction risk.

Global expansion adds another layer of complexity. Agricultural innovation is inherently international, and competitors in emerging markets may move quickly to replicate unprotected technologies. Strategic foreign filings in key jurisdictions are essential for companies seeking to commercialize AI solutions worldwide or prevent parallel development abroad.

Litigation Risk and Freedom to Operate

As AI adoption accelerates, patent disputes in agriculture are becoming more likely. Core technologies such as machine vision, robotics and autonomous control are often surrounded by dense patent landscapes owned by multiple incumbents. Without early freedom-to-operate analysis, innovators risk launching products that inadvertently infringe existing rights.

A strong patent portfolio provides both defensive and offensive leverage in this environment. Defensively, it deters litigation by increasing the cost of enforcement for potential adversaries. Offensively, it enables companies to challenge infringing competitors or negotiate licenses from a position of strength.

As AI-enabled features become standardized across equipment platforms, IP enforcement is increasingly shifting from defensive posturing to proactive exclusion strategies, particularly by incumbents seeking to protect platform ecosystems.

Importantly, freedom-to-operate analysis should be treated as an ongoing process rather than a one-time exercise. As portfolios evolve and new patents are issued, continued monitoring is essential to avoid unexpected exposure.

Market Timing and Strategic Urgency

The current moment presents a narrowing window of opportunity for agricultural AI innovators. While adoption is accelerating across farm sizes^[3] and industry forecasts sustained double-digit growth through the end of the decade,^[4] the patent landscape surrounding agricultural AI remains comparatively underdeveloped.

Companies that invest early in patent protection are uniquely positioned to shape that landscape, secure foundational intellectual property positions, and influence emerging technical and commercial standards.

Those that delay face a far less favorable environment. As more patents are issued and portfolios consolidate, late entrants may find themselves navigating dense patent thickets dominated by competitors, forced into narrow design-arounds or unfavorable licensing arrangements.

In fast-moving technical fields such as AI-enabled agriculture, waiting until commercialization to pursue patent protection can result in the permanent forfeiture of rights, particularly where public disclosures or parallel development have already occurred.

Lessons From Industry Experience

In agricultural AI, intellectual property strategy is often the difference between market leadership and commoditization, regardless of technical merit.

Companies that pair innovative AI systems with disciplined patent planning are better positioned to scale operations, attract strategic partners and execute strategic exits. Conversely, innovators that deprioritize IP frequently see early differentiation erode as competitors replicate features without consequence.

These outcomes are rarely failures of engineering. More often, they stem from delayed or poorly coordinated IP planning.

Case Studies: Successes and Missed Opportunities

The experience of Blue River Technology illustrates the commercial power of aligning AI innovation with a disciplined patent strategy. Founded as a small California agtech startup, Blue River pioneered an AI-enabled precision spraying system that used computer vision to identify weeds and selectively apply herbicide only where needed.

The company protected its "See & Spray" platform through a coordinated patent filing strategy that captured both the underlying computer-vision technology and its integration into agricultural machinery.

The results were significant. Technologically, Blue River's AI-driven systems reduced herbicide usage by more than 90% while improving crop yields, delivering measurable sustainability and cost benefits for farmers.[5] Strategically, the strength of its patent portfolio made the company an attractive acquisition target.

In 2017, [John Deere](#) acquired Blue River Technology for approximately \$305 million, integrating the patented technology into its equipment lineup and accelerating global deployment.[6] Absent early patent protection, the same technical breakthrough would likely have been replicated and absorbed by incumbents without a comparable acquisition premium.

Industry experience also reveals what happens when intellectual property protection is delayed or deprioritized. In the early development of precision spraying, crop imaging and machine-vision-based decision tools, several startups and university-affiliated research teams demonstrated promising AI capabilities through pilot deployments, conference presentations and field trials.

Many relied on technical complexity, speed to market or proprietary know-how rather than

securing patent protection, assuming these factors would be sufficient to deter imitation.

That assumption proved misplaced. As machine-learning frameworks matured and sensor hardware became more accessible, larger agricultural equipment manufacturers and well-capitalized agribusinesses were able to replicate similar functionality internally or incorporate it through acquisition.

Features that once differentiated early innovators — real-time weed detection, selective spraying, yield prediction and decision-support analytics — quickly became baseline capabilities embedded within broader equipment and digital agriculture platforms.

In the absence of enforceable patent rights, early innovators often lacked leverage to prevent feature replication or to negotiate favorable licensing or acquisition terms.

A similar dynamic has played out in academic and open-source agricultural AI. Over the past decade, researchers released open-source tools for crop imaging, phenotyping and yield analysis to accelerate scientific collaboration.

Platforms such as OpenDroneMap[7] and other open-source multispectral imaging and phenotyping pipelines were widely adopted across the research community. Commercial actors soon incorporated the same algorithms and workflows into proprietary offerings, pairing them with hardware integration, refined user interfaces and customer support.

Open-source development plays a critical role in advancing agricultural research, but absent parallel commercialization or IP strategies, it often shifts value capture downstream.

These examples underscore a recurring lesson in agricultural AI innovation. Early disclosure — whether through demonstrations, publications or open-source releases — can accelerate adoption, but without corresponding IP protection, it can also enable fast followers to commercialize identical functionality at scale.

The resulting loss of differentiation is rarely a failure of technology. It is a failure of timing and foresight. Proactively integrating patent strategy into research and product development, before public disclosure or commercialization, remains one of the most effective ways for agricultural AI innovators to preserve competitive advantage and long-term value.

Conclusion: Strategic Takeaways for Ag-AI Innovators

AI is reshaping agriculture with unprecedented speed and scope, but innovation alone does not guarantee a durable advantage. In a sector defined by high capital costs, global competition and rapid technological convergence, intellectual property strategy is a central determinant of commercial success.

Several lessons emerge for agricultural AI innovators navigating this landscape. Leading agricultural AI companies are filing provisional applications during product iteration, auditing AI pipelines for patentable components, securing data-rights agreements before model training begins, and coordinating patent filings with product road maps rather than lagging behind commercialization.

Early priority filings in major agricultural and IP jurisdictions — including the U.S., Europe, Brazil, India and China — can preserve global options and deter foreign imitation.

In short, patents transform AI-driven agricultural technologies from technical achievements into enforceable business assets. Those that cultivate innovation without cultivating IP risk losing control of the technologies they create. Those that invest early and strategically in patent protection will be best positioned not only to complete, but to shape the future of smart farming.

Bree Vculek is an associate, [Lestin Kenton Jr.](#) is a director and [Jean Selep](#) is an associate at [Sterne Kessler Goldstein & Fox PLLC](#).

The opinions expressed are those of the author(s) and do not necessarily reflect the views of their employer, its clients, or Portfolio Media Inc., or any of its or their respective affiliates. This article is for general information purposes and is not intended to be and should not be taken as legal advice.

[1] [Consumer Technology Association](#). (2026, January 9). FarmerAI: Imagining an AI-Powered Farm [Video]. CES. <https://www.ces.tech/videos/farmerai-imagining-an-ai-powered-farm/>.

[2] Appeal 2024-000567.

[3] McKinsey & Company. (2022, October 27). Agtech: Breaking down the farmer adoption dilemma. <https://www.mckinsey.com/industries/agriculture/our-insights/agtech-breaking-down-the-farmer-adoption-dilemma>.

[4] Grand View Research. (2024). Agricultural robots market size, share & trends analysis report. <https://www.grandviewresearch.com/industry-analysis/agricultural-robots-market>.

[5] DCVC. (2017, September 6). John Deere acquires Blue River Technology for \$305 million, bringing full stack AI to agriculture. DCVC. <https://www.dvc.com/news-insights/john-deere-acquires-blue-river-technology-for-305-million-bringing-full-stack-ai-to-agriculture/>.

[6] PR Newswire. (2017, September 6). Deere to advance machine learning capabilities in acquisition of Blue River Technology. PR Newswire. <https://www.prnewswire.com/news-releases/deere-to-advance-machine-learning-capabilities-in-acquisition-of-blue-river-technology-300514879.html>.

[7] OpenDroneMap. (n.d.). OpenDroneMap: Open source photogrammetry toolkit. <https://opendronemap.org/>.