

Cropin®



# THE CONNECTED FUTURE OF AGRICULTURE

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Digital integration is the key  
to building a well-financed, transparent,  
and sustainable Agri-ecosystem







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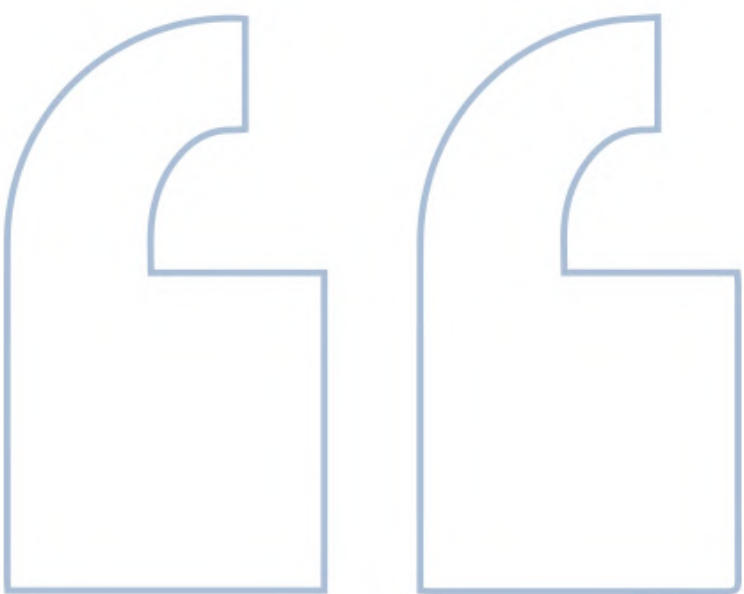
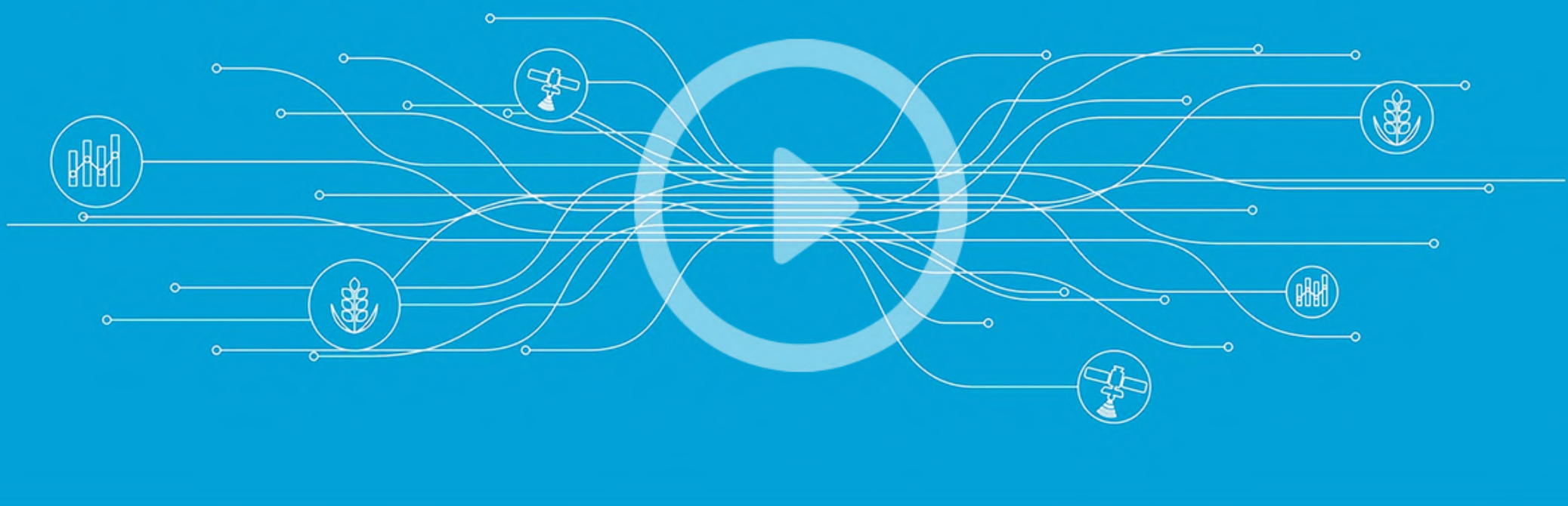
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# The Connected Future of Agriculture

**Mohit Pande**  
CRO, Cropin



As organizations prepare themselves to take advantage of advancements in technology, they must bring together not just data, but also applications so that there is a consistent layer of software, to monitor operations, digitize assets, and get enough intelligence; all these at a global scale, in cost effective manner and - more importantly by keeping sustainability at the core.

**Mohit Pande**  
CRO, Cropin







# INTRODUCTION

Farmers have always looked towards the clouds as rain determines the success or failure of their crops. We are now on the cusp of the next revolution, which is secured by another kind of cloud - intelligent agriculture cloud.

Evidence of this shift is that the global Agtech market is set to grow at a CAGR of 10.80% between 2021 and 2030.

Of this, Agtech-as-a-service segment is pegged to grow twice as rapidly at a CAGR of 24.42% between 2022 and 2026 alone to USD 36.4 billion.



The growing demand for Agtech has resulted in increased investments in point-solutions by tech-first companies, many of which are built to solve for specific challenges without adequate understanding of agronomy.

These point-solutions fall short in connecting the entire agri-ecosystem and enabling all stakeholders to maximize per acre value via an integrated platform or suite of solutions.



An integrated approach to Agtech, will be a critical enabler to accelerate transformation at the farm and across downstream value chain of every player in the agriculture ecosystem.



# Together we can improve the “P” triad of



Moreover, an integrated approach to Agtech is critical to improve Total Factor Productivity (TFP). This holds true for both, rural agrarian economies and technologically advanced Agri-economies.

It can help optimize and reallocate resources for non-routine tasks, which can significantly improve the income of smallholder farmer families.

It can also ensure optimal use of natural and industrial resources for sustainable Agri-output - a TFP benefit that has become an urgent priority even for the most agriculturally advanced nations in the face of growing food security and climate change crisis.







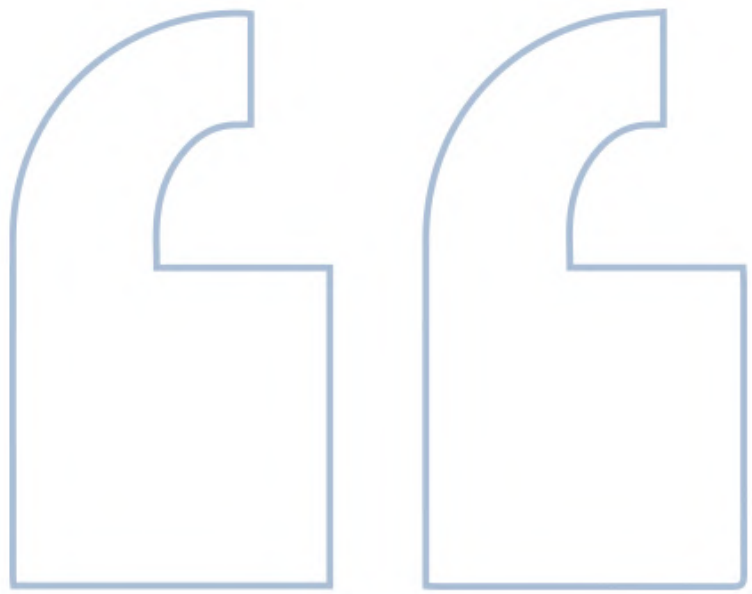
# THE INTEGRATED FUTURE OPPORTUNITY

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An end-to-end integrated global food supply chain, connected using intelligent technologies, can help transform the future of agriculture and communities, efficiently and sustainably.



As per COP 27, a 45% reduction in GHG emissions by 2030 is critical to minimize droughts, heat waves, and other extreme climate events. In this context, CSA has been underlined as a top priority for the agriculture industry; the sector is among the most polluting industries when it comes to releasing GHG emissions.



Implementing CSA calls for an integrated approach to connect all the stakeholders in the ecosystem. To enable transformation at scale, we need a platform that can give smallholder farmers the intelligence, access, and finance they need to adopt crops and practices that optimize resources for maximum yield and income. At the same time, it equips institutions and consumer-facing stakeholders with the real-time visibility they need for risk mitigation and greater food security.

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**Kunal Prasad**

Co-founder & COO,  
Cropin



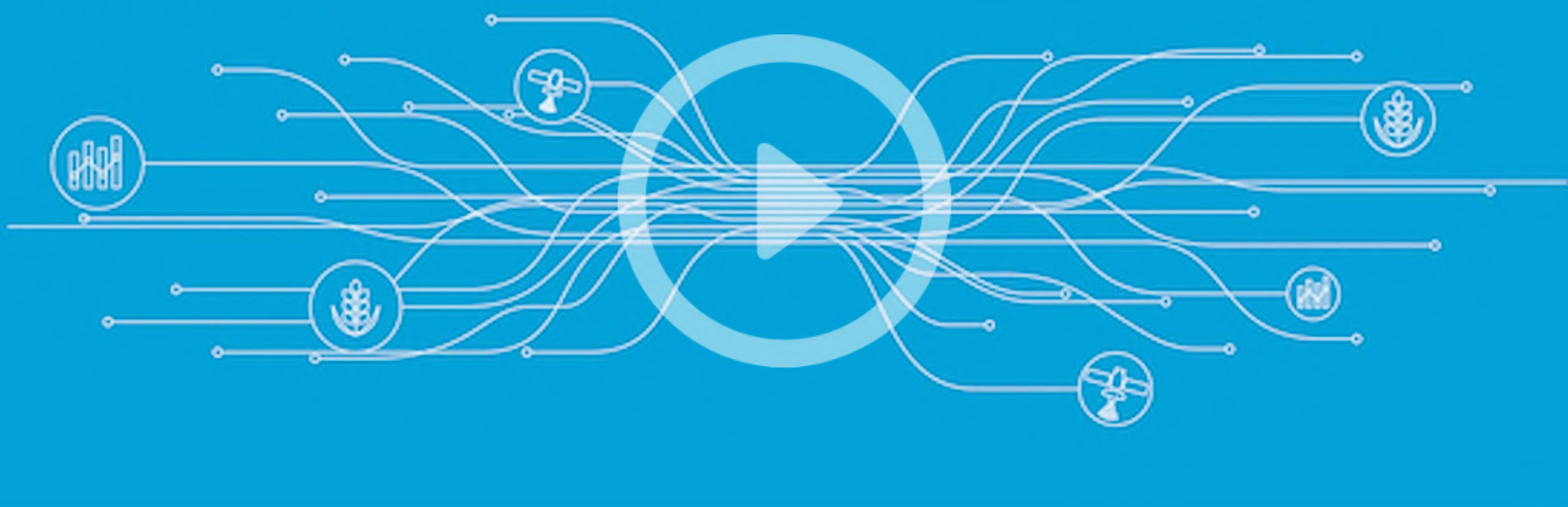


The potential such connected platforms hold for a more sustainable and equitable world is massive. For instance, Cropin Cloud is set to further accelerate the impact made by Cropin - enabling the lives of more than 7 million farmers.

Cropin™

## The Connected Future of Agriculture

**Vijay Nelson**  
CPO, Cropin




Cropin's solutions for connected agriculture are being adopted by stakeholders across the ecosystem, including global consumer goods giants such as Unilever.

With an aim to improve livelihoods and incomes of smallholder farmers, Unilever introduced mini coconut trees. These grow to a height of 10 metres, making it easier for smallholder farmers, especially women, to collect sap.

The field representatives at Unilever leverage Cropin's app to update location-specific data and share real-time advisory with coconut farmers. Cropin Grow enables Unilever to track production forecasts of coconut sugar and reinforce its supply chain resilience.





Loacker, a nearly 100-year-old global wafer brand headquartered in Italy, is popular for its confections, particularly 'Quadratini'. Loacker kick-started the "Italian hazelnut groves" project with a focus on **Quality**, **Italian Origin**, and **Sustainability** to keep up with its promise —————

After all,  
goodness is a  
choice.

————— The company is investing in vertical integration when it comes to hazelnut cultivation. By leveraging Cropin's end-to-end Agtech capabilities, the company could address numerous tangible and intangible challenges to ensure the highest ingredient quality and **adherence to sustainable practices.**





# ENABLING COMPREHENSIVE TRANSFORMATION

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The benefits offered by a connected agriculture cloud platform such as Cropin Cloud are already unlocking significant growth opportunities for Agri-ecosystem players across their operations.



**Using NDVI signature,  
it classified crops as  
wheat or non-wheat in  
13 states | Analysed in  
the form of pixel level  
(10m x 10m) data grid  
| Crop yield estimated  
accurately from  
sowing to harvest**

## ENABLING REGIONAL FOOD SECURITY FOR MARGINALIZED COMMUNITIES

**Optimize water use for  
soil types | Crop stage  
wise (New crop, 1<sup>st</sup>  
tillering, 2<sup>nd</sup> tillering)  
activity plan tracking |  
Proper crop nutrition  
management to  
maintain crop health**

A wheat crop value chain survey project implemented in Nigeria benefited greatly from Cropin's integrated Agtech offering. In this specific use case Cropin's Regional Intelligence solution was leveraged to estimate the yield for wheat across Nigeria to enable the government and public sector officials to make better decisions for enabling food security. The accuracy for the yield estimation use case was improved to over 85% with the use of hyper-local plot level data from the field for geo-tagged plots across the regions in Nigeria.

One of Thailand's largest sugar and bioenergy producers leveraged the power of Cropin Cloud to enhance crop health and yield predictability. By digitizing its entire sugarcane plantations, it gained end-to-end visibility of operations across its entire supply chain. Using this the company could impact crop nutrition, resource optimization, productivity, procurement, and pre-planning, translating into greater transparency and reduced crop losses.



## CREATING SUSTAINABLE VALUE CHAINS FOR FARMER COMMUNITIES

**80,000 farmers  
impacted**

Cropin partnered with two entities - Oxfam in Bangladesh and Agrithmics in Sri Lanka - to create Agtech access for local communities in South Asia, a region prone to high impact from climate change. The initiative, which saw stakeholders leverage SmartFarm (Cropin Grow), covered around 80,000 farmers, including women farmers. It offered smallholder farmers with timely access to climate-resilient advisory, sustainable farming intelligence, and improved post-harvest and pricing support.

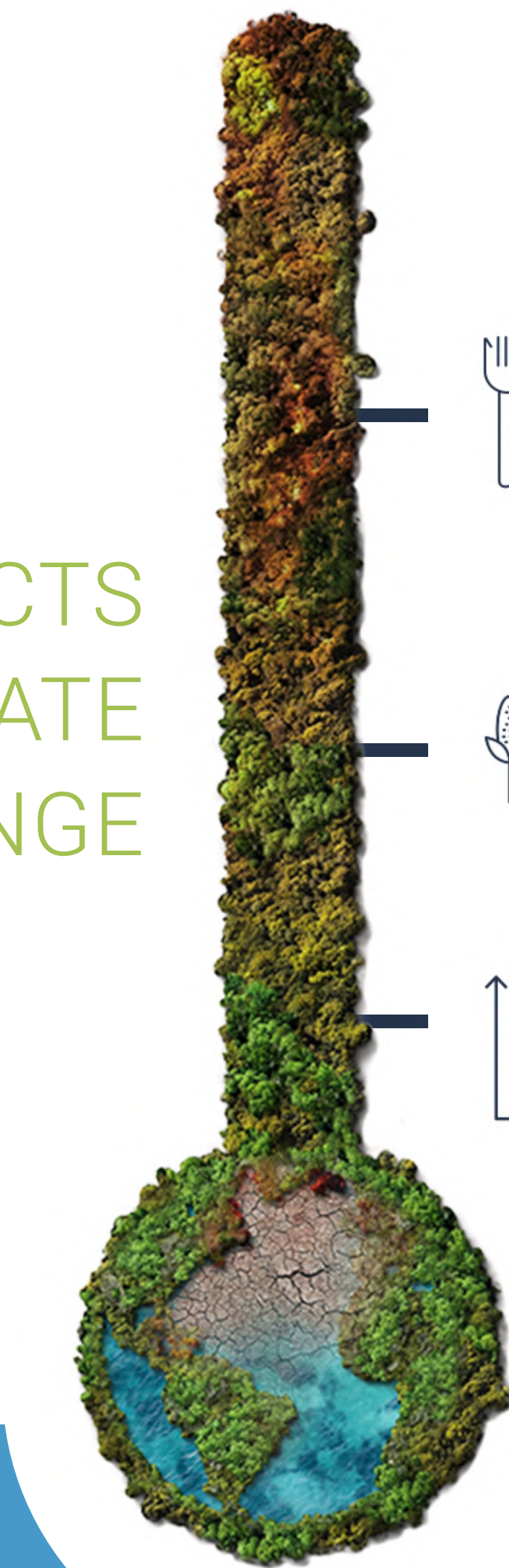
## UNLOCKING INTELLIGENCE FOR CSA

**13 crop varieties  
impacted**

The Cropin offering has been instrumental in unlocking crop intelligence for a global MNC across varying geographies like U.S. and Ecuador. Features such as Diseases Early Warning System Model, Prescriptive Indices, Water Stress Analysis, Nitrogen Uptake Monitoring, etc. have offered precise inputs for CSA to all stakeholders that impact farm-level output. This has helped the company transform agricultural practices for as many as eleven varieties of sweet corn in Ecuador and two varieties of cucumber in the U.S.



## EFFECTS OF CLIMATE CHANGE



1% reduction in consumable food calories annually for top 10 global crops



24% drop in maize yields by 2030



Yield of some key staples are on the decline

## FACILITATING SEED ANALYSIS FOR OPERATIONAL EFFICIENCY

Cropin's solutions have been instrumental in digitizing farm operations for one of the largest private players with a presence across Agri and Agri-related businesses in India. Using Cropin's integrated cloud platform, the company was able to analyze seed quality and make interventions to improve operational efficiency for crops such as okra and watermelon. This was basis ML-powered yield comparisons and sensor-based tracking technologies for PoP (Package of Practices) adherence.

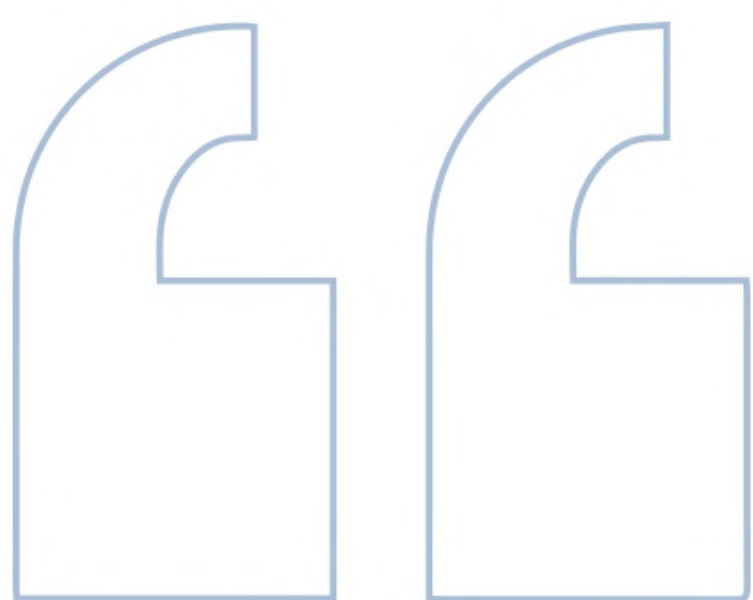




KEY INDUSTRY  
TRENDS THAT RELY  
ON AN INTEGRATED  
FUTURE



The adoption of platforms and tools that simplify and accelerate a connected future is critical for ensuring sustainable growth in agriculture. Top trends that will impact the next phase of growth for agriculture depend on access to an integrated platform.



Micro-finance is mostly available to the top of the pyramid - the large holder farmers, but when a smallholder farmer goes to access finance, to help them get access to seeds, fertilizers, drip-irrigation systems, they do not have it, and that is the biggest challenge to the entire agriculture community - to bring sustainable microfinance to smallholder farmers.

**Kunal Prasad**

Co-founder & COO,  
Cropin







## INCLUSIVE MICROFINANCE AND SUSTAINABILITY INVESTMENTS TO SKYROCKET

Smallholder farmers deliver close to one-third of global crop produce. This reiterates the urgency to equip them with the financial resources they need to adopt CSA; their adoption of sustainable practices is critical to growth in yield volumes and quality. An integrated intelligent cloud platform can give financial institutions the transparency using remote intervention mechanisms they need for risk mitigation when building financial products for smallholder farmers.



## FOOD SECURITY AND NUTRITION IN EMERGING ECONOMIES

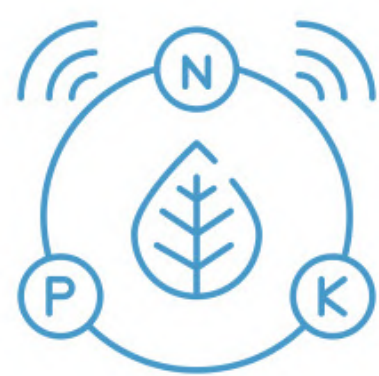
The bulk of the demand for resilient food supply chains comes from emerging economies owing to two reasons - higher population growth and purchasing power and more proneness to extreme weather caused by climate change. Ensuring food security and nutrition for communities in these economies calls for an integrated platform; public and private sectors can collaborate to align food chains as per evolving needs and climate patterns.





## OPTIMIZED FOOD VALUE CHAINS AND WASTAGE CONTROL

Food wastage reduction, which stands at 17% of the total global production today, needs to reduce to half by 2030, as per SDG's (Sustainable Development Goals) Target 12.3. This includes wastage at all levels, starting from post-harvest to the end consumer's food table. End-to-end visibility for all stakeholders across the supply chain, along with intervention mechanisms to reroute supply to high-demand areas, is critical to achieving this goal.



## EFFECTIVE SOIL AND RESOURCE MANAGEMENT

Sustainable agriculture, zero hunger, and climate action are all SDGs that rely heavily on healthy soil and resource management. Good soil health - the root of sustainable agriculture warrants constant check on soil degradation, maintenance that improves soil health; it ensures soil conservation and biodiversity. With farm resources across geographies impacted by a host of factors, restoring their health to optimum levels is an urgency that demands Agtech intervention. A connected real-time intelligence platform can track and advise on various aspects and efficiently align all stakeholders and activities for balanced yield optimization and resource management.





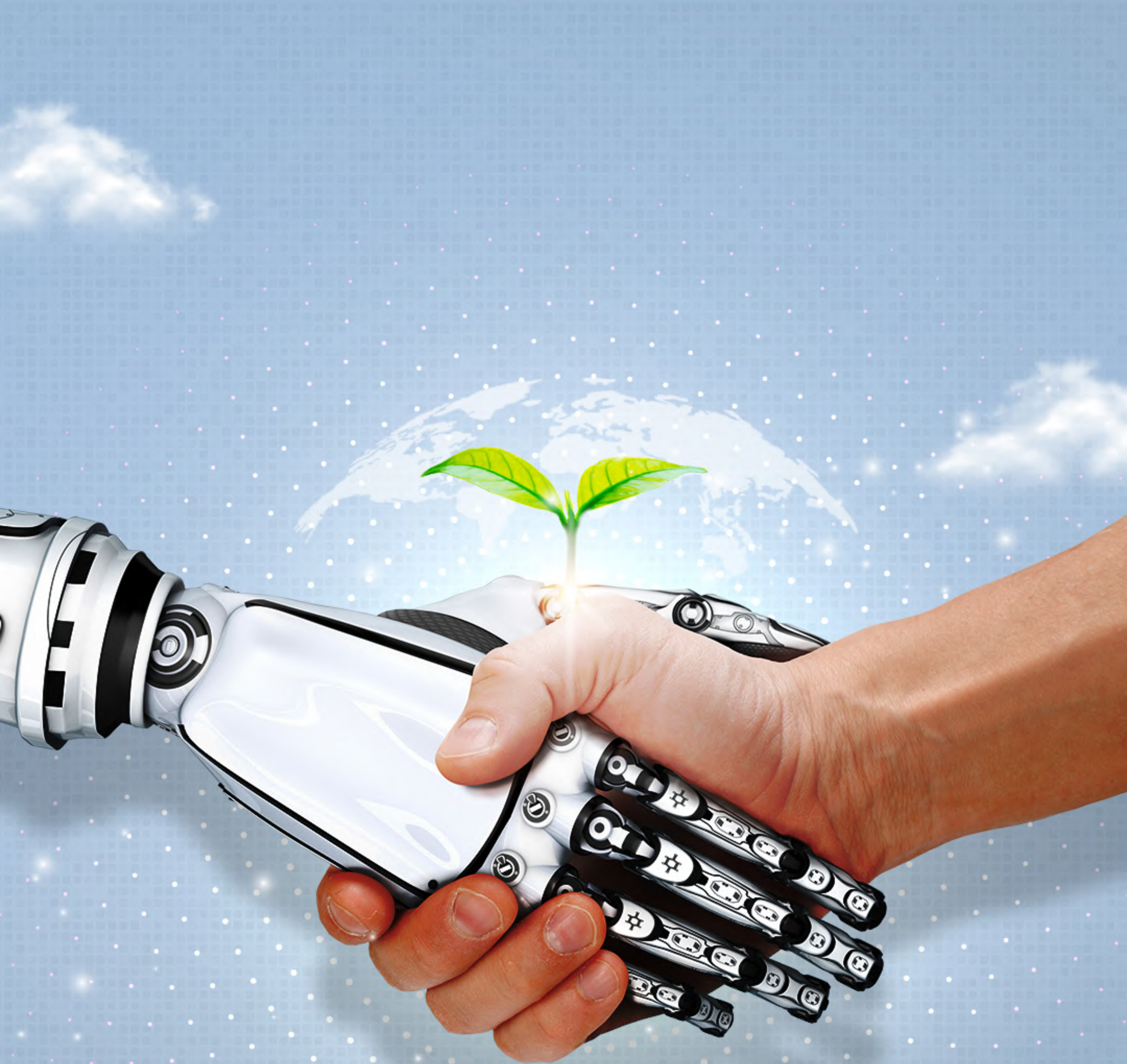
## TRACEABILITY AND ETHICAL SOURCING

Across markets, consumers are keen to know how their food has been grown, sourced and how it has impacted communities and the environment in the process. This calls for Agri-businesses to invest in integrated solutions that simplify access to traceability and supply chain visibility for the end consumer. Such transparency is critical to earning customer loyalty, adhering to certifications, and meeting regulations in new markets across the globe.

All these trends point to the need for a powerful, coherent, and scalable solution - a fully integrated industry cloud rooted in hyper-local intelligence.







# CHALLENGES TO THE ADOPTION OF A CONNECTED FUTURE

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Despite the clear benefits posed by a connected intelligent cloud platform, the pace of adoption remains cautious among public and private sector entities owing to a host of practical challenges.





## CHANGE-RESISTANT AND RISK-AVERSE CULTURE

The biggest barrier to connecting all stakeholders on an integrated platform is reluctance across various players to adopt innovative technologies and operational practices. This makes it challenging to implement change at scale, a factor critical for visible results. Phased implementation further results in a culture of prolonging new technology adoption.

Often, investments in integrated Agtech solutions take a backseat since they are not considered urgent in the context of immediate business goals. They are parked aside as tomorrow's issues given budget constraints.



## LACK OF PRIORITIZATION



## ABSENCE OF A LONG-TERM STRATEGY

Joining the dots between integrated Agtech offerings and future impact is often missing from long-term business private and public sector strategies. This is because each team focuses on their area of impact rather than on the big picture. It is also why point solutions often make it to strategy planning decks.





## LACK OF A COLLABORATION BLUEPRINT

Most organizations that can benefit from an integrated approach with an intelligent agriculture cloud are unclear on identifying the right tie-ups and partnerships. They are also overwhelmed by the technology-focused discussions that most potential partners focus on. This results in them not arriving at decisions to move forward.

Decision-makers often find it difficult to visualize a clear implementation path for digitization across the entire value chain and its impact on ongoing operations. This is especially true when operations extend across remote locations that do not have adequate infrastructure, thereby impeding connectivity as well as access to innovative tools and technologies and are global in nature.



## IMPLEMENTATION COMPLEXITIES



## LIMITED LOCALIZED INTELLIGENCE

An efficient, connected intelligent agriculture platform should facilitate global scalability while offering hyper-local intelligence in terms of crop, variety, and Agri ecosystems. Very few platforms offer such comprehensive scope, preventing decision-makers from taking the big leap. Most platforms offer point solutions that result in technology sprawl.





Educating all stakeholders through the Agri-value chain, including farmers, across geographies basis remote engagement, helps decision-makers adopt a connected transformation. However, stakeholders resist change and may misinterpret the introduction of new technology and consider it as a threat to their role in the value chain. This makes it even more difficult to educate them to use the platform.

Decision-makers often find it difficult to see the value gap that exists between integrated solutions that enable a connected future versus those that resolve specific operational challenges with digitization. Moreover, it feels safer to invest in function-specific, cheaper solutions, test the impact, and then scale in a value-conscious environment. This is often counterintuitive since such solutions do not lead to value-accretive growth like an integrated platform.



INABILITY TO  
DIFFERENTIATE  
INTEGRATED  
PLATFORMS  
FROM POINT  
SOLUTIONS





## PLANNING AND UNLOCKING HIGH RETURN ON INVESTMENT (ROI)

The biggest barrier to connected Agtech adoption is a gap in understanding the ROI; while returns remain clear in the context of industry-wide goals, decision-makers often struggle to link them to the immediate, unique needs of their organizations. Moreover, identifying and measuring the KPIs for integrated Agtech can be a time-consuming and complex exercise when starting out.

An intelligent integrated cloud platform facilitates global scaling while offering hyper-local intelligence in terms of crop, variety, and Agri ecosystems.

Busy decision-makers often find it difficult to see the value gap that exists between solutions that enable a connected future versus those that resolve specific operational challenges with digitization.



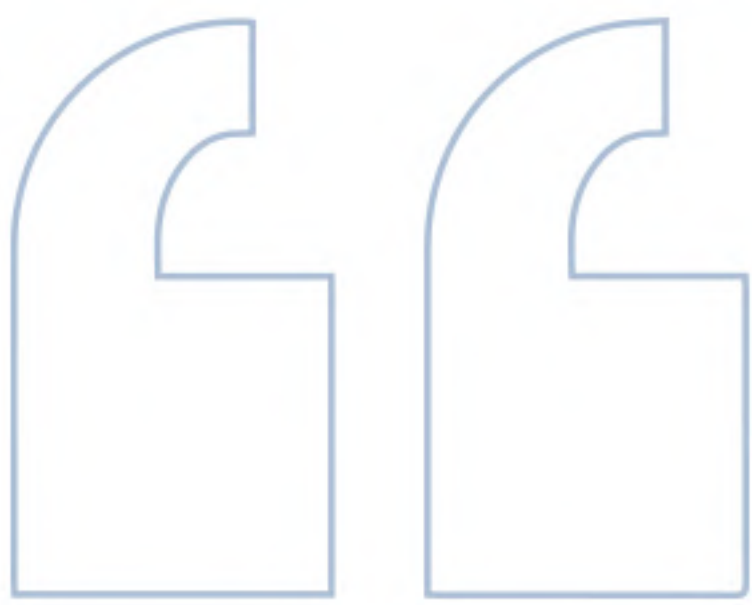




EMPOWERING  
DECISION MAKERS  
TO ACCELERATE  
ADOPTION



The launch of integrated platforms that harness emerging technologies along with an extensive crop-knowledge graph is critical in getting past industry adoption challenges. Cropin Cloud is an unique offering developed using extensive experience and insights from about 500 crops and 10,000 varieties across geographies.



The global Agri-ecosystem is gigantic in depth and breadth, but strangely, the tools to capture and share data coherently were sorely missing.

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**Krishna Kumar**

Founder and CEO,  
Cropin

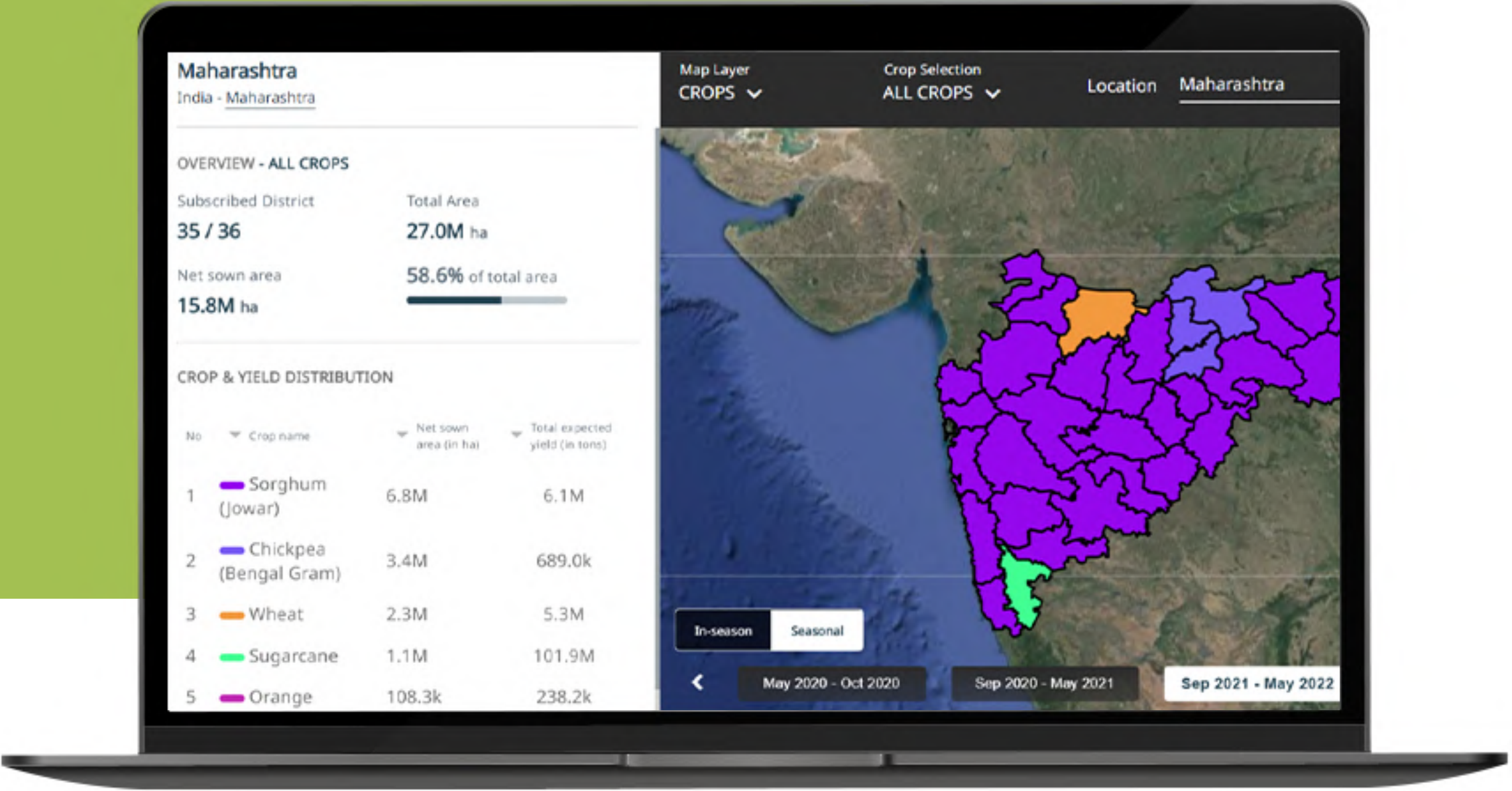


The cloud-based platform allows decision-makers to choose their nature and pace of transformation basis their unique organizational needs and digitization state.

The two complementing solutions of Cropin Cloud - Cropin Intelligence and Cropin Data Hub - ensure investments are channelled into a comprehensive offering that directly impacts productivity, profitability, and sustainability goals.



Cropin Intelligence works to help stakeholders align operations at all stages by democratizing access to intelligence and remote intervention for crops, farms, and ecosystems across locations.



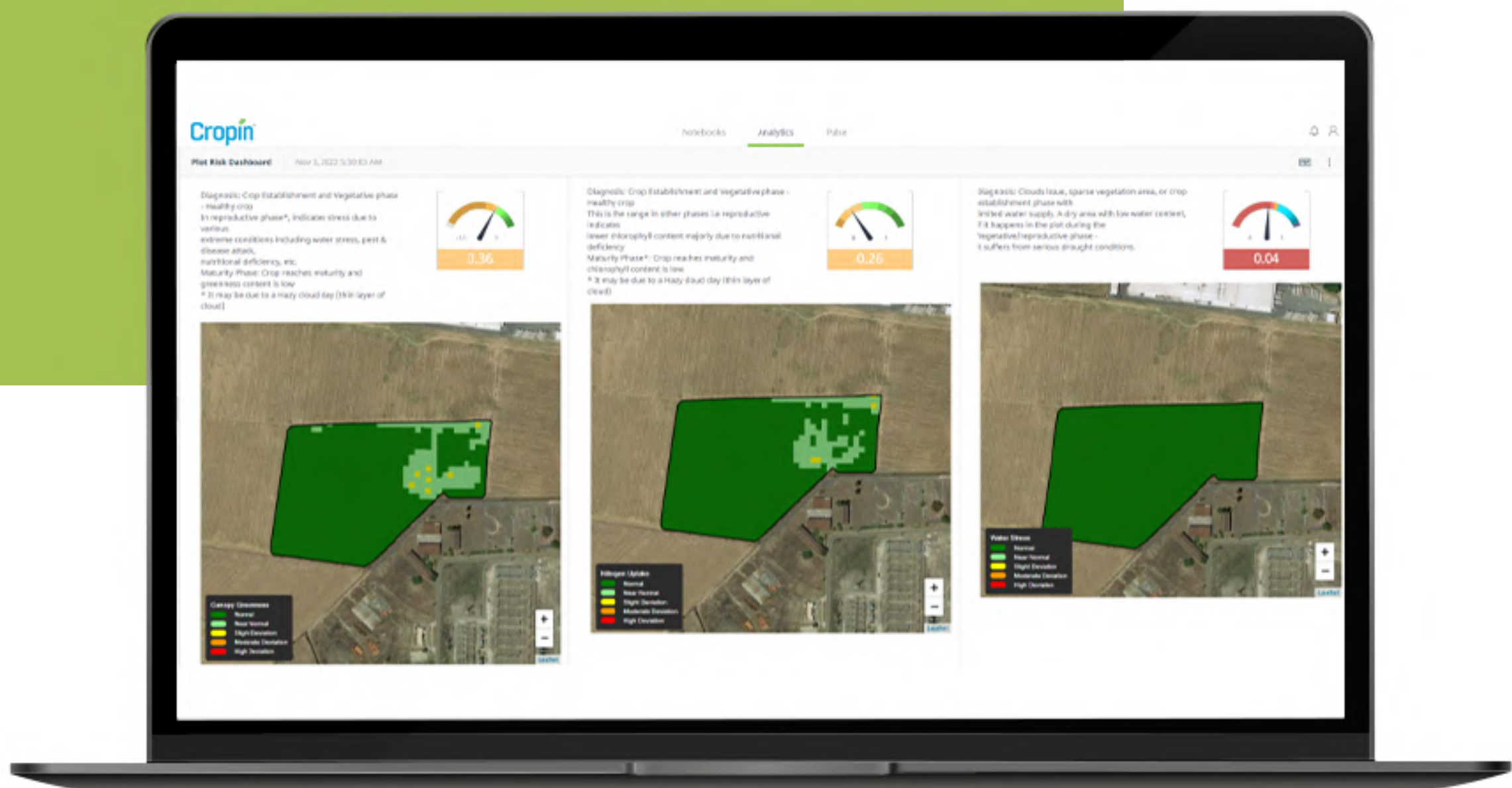
An extensive data lake serves as the base for sophisticated AI and ML-based analytics; stakeholders can leverage actionable insights to make smarter decisions and unlock better output.

From predicting farm outcomes to improving acreage and from making farms climate-smart to building resilient food chains, Cropin Intelligence enables a host of possibilities for the agriculture industry.

———— Cropin Data Hub  
serves as a powerful tool  
for making sense of  
structured and unstructured  
———— data sets at scale.



It has the exceptional capacity to stitch together disparate digital intelligence systems. As a result, it gives every player - regardless of their current infrastructure or scale of operation - the ability to leverage information and intelligence that goes above and beyond what their current Technology Sprawl can cater to.

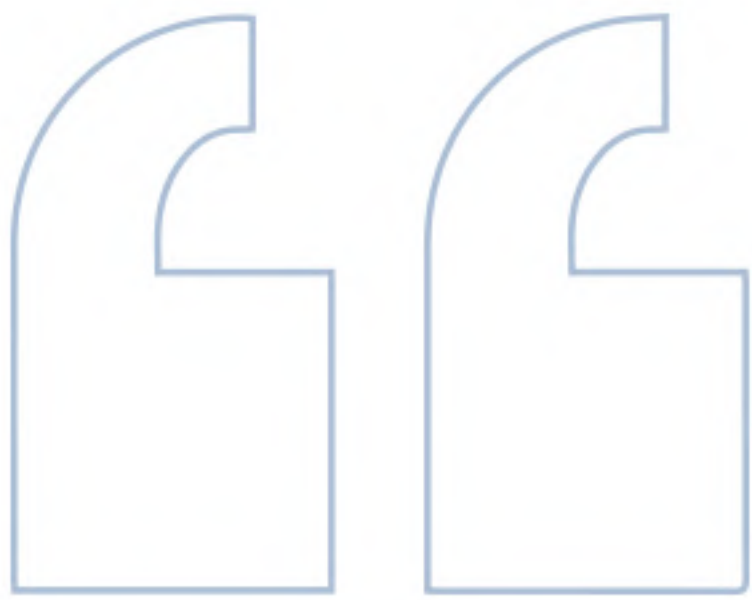


The diversity of data is essential to remove bias and conduct stress tests in agriculture.

A large quantity of spectral data with higher resolution on a near day-to-day basis helps to monitor farm management and control input resource usage.

Near daily data is crucial to make data-driven decisions in smart farming.





Data or ML alone are not enough to solve for problems. Adding agronomy know-how and also bringing in expertise in earth observation sciences is critical, which is what Cropin is seeing when we bring these AI/ML models to production.

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**Praveen  
Pankajakshan**

VP-AI & Data Science,  
Cropin



In order to meet the above needs Cropin AI Labs was launched in early 2023 with a vision to bring together experts in multiple domains like data science, researchers, earth observation, agronomy, under a single umbrella.

— Cropin was one of the winners  
in the ‘NASSCOM AI Game  
Changers 2022 Awards’  
— in the Agriculture category





Cropin AI Labs uses satellite imaging and machine learning to improve per acre yield in agriculture.

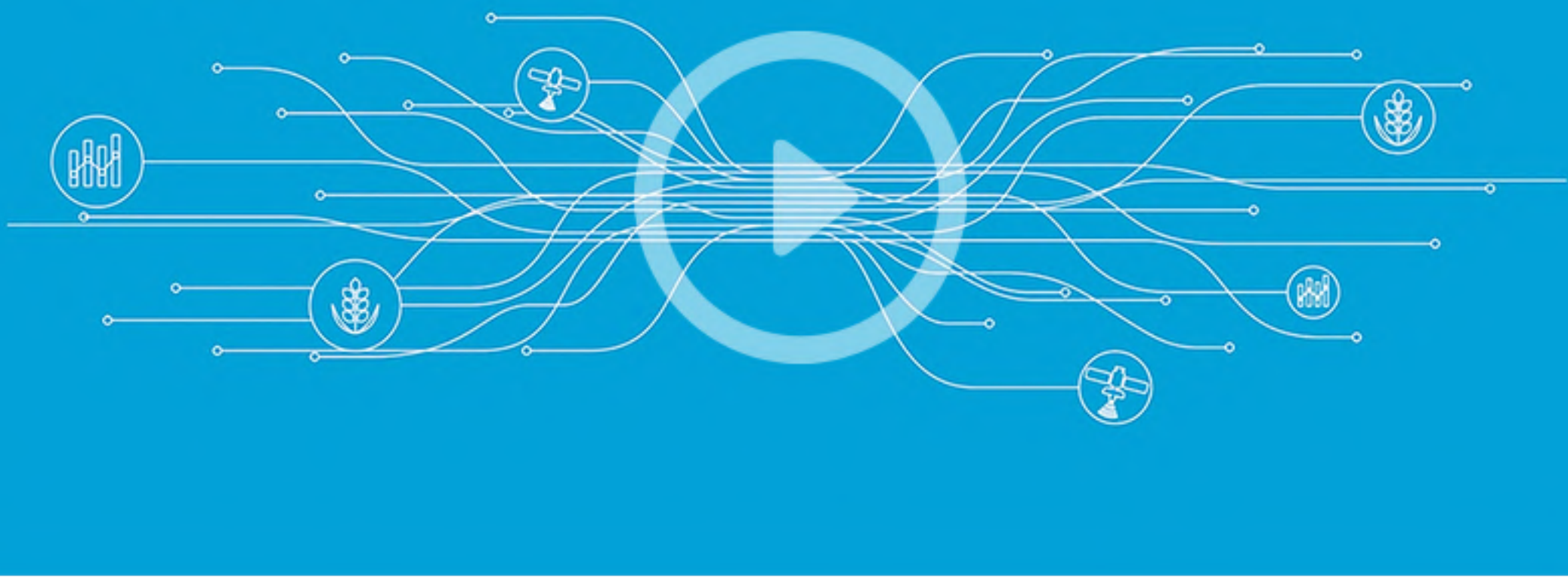
Cropin plans to launch dynamic crop map for various geographies globally in 2024.

It also intends to launch Disease Early Warning Systems (DEWS) for more number of crops and diseases by combining data and knowledge.

## The Connected Future of Agriculture

**Praveen Pankajakshan**

VP-AI & Data Science, Cropin







# ADVANTAGE 2.0

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Industry-wide adoption of connected Agtech will have a powerful impact on the urgent challenges the agriculture and food production industry faces. It will also pave the way for innovative use cases of integrated platforms to enhance our Agri-ecosystem and the lives of grower communities.



# ENGAGE WOMEN FARMERS TO DRIVE GENDER EQUALITY



Close to 60% of farm labour in low-income countries are women.

Yet, they do not get the ecosystem support and credit they deserve to unlock growth.

Cropin has collaborated with the World Bank and the Government of India on the Sustainable Livelihoods and Adaptation to Climate Change project as the technology partner to overcome this challenge.

With an unbiased and integrated Intelligent Agriculture Cloud platform, it has given women farmers the knowledge, resources, and ecosystem access they need to improve their livelihoods.



# DIGITIZE WORK TO PREVENT CHILD LABOUR



Engaging child labour for farming crops such as cocoa has long remained a pressing global issue that merits immediate and long-lasting resolution.

■ Cropin has done its bit in addressing this challenge too.

■ Owing to comprehensive remote monitoring, basis digitization of farms and farmer profiles, its partnership has seen entities in Ghana being able to change the narrative.



# IMPROVE CROP OUTCOMES TO SECURE AND ENHANCE LIVELIHOODS



Smallholder farmers find themselves struggling to secure incomes, especially in the face of climate change and its impact on crop yield.

By extending its integrated Agtech capabilities, Cropin has facilitated sustainable and improved livelihoods for thousands of smallholder farmers and their families in Ethiopia, Mozambique, and Kenya, among several other countries; it has empowered them with adequate data and knowledge on improved PoP and CSA to unlock greater yield and profits.



# ACHIEVE NUTRITION SECURITY WITH RISK MANAGEMENT



The agriculture resource ecosystem is under stress and threat owing to various human-induced factors, including climate change.

This significantly impacts the nutritional value it can offer the global population.

Cropin, with its crop-risk management solution, PlotRisk (Plot-level-Intelligence), offers alerts and data-driven insights to farmers that enable intelligent interventions to mitigate the loss of nutrition for communities across geographies.



# ENSURE FOOD SAFETY WITH FARM-TO-FORK TRACEABILITY



Contaminated food or food with compromised quality can impact global health and productivity significantly.

■ This makes food safety an economic and social priority.

■ Cropin's traceability solutions help entities with varying scale achieve end-to-end-traceability in a consistent and cost-effective manner.



# IMPACT PRODUCTION AND LIVELIHOODS WITH PEST AND DISEASE MANAGEMENT



Pest and disease result in 20-40% yield loss globally, impacting yields and profitability.

Cropin won the opportunity to partner with Space4Good, an innovative social enterprise utilizing earth observation technology for social and environmental good, to develop CropLens for rice farmers in India.

Using Remote Sensing and Geographic Information System technologies, CropLens identified pest and disease infestations and alerted farmers.

This led to a 20% increase in productivity and a 15% reduction in fungicide expenses.





# EFFECTIVE CARBON FARMING TO REDUCE GLOBAL WARMING

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Bringing down global warming levels to 1.5° above pre-industrial levels is a collective responsibility that demands serious innovation. In this context, carbon farming and carbon sequestration, which help in the long-term storage of atmospheric carbon in soil, plants, and micro-organisms, can prove to be a game changer.





Farmers must be encouraged and incentivized to adopt regenerative farming practices. Stakeholders across the Agri-ecosystem, including food value chain players, industry, and governments, must collaborate to create carbon credit models and strive towards net-zero carbon farming.

Global economies, be it developed or developing regions, should invest in carbon farming for a sustainable planet.

An integrated Agtech platform, Cropin Cloud offers the capabilities entities need to introduce, monitor, and enhance carbon farming practices on farms from remote locations.

Cropin pledges to continually work towards solutions that balance our planet's need for food security, environmental sustainability, and economic opportunity for all.





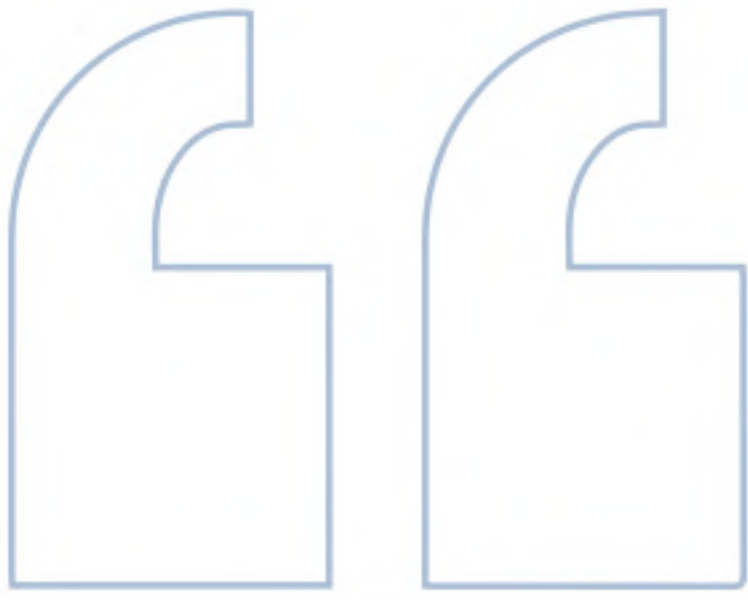
# CONCLUSION

A connected future for agriculture is upon us. Together, optimized food value chains and CSA can resolve some of the key challenges around food security and sustainability.

Already, public and private sector organizations across the Agri and food industry are harnessing the power of integrated agriculture cloud technology; they are digitizing operations on a single, unified platform to unlock growth that benefits all stakeholders and the Agri-ecosystem.

While accelerated adoption demands getting past multiple hurdles, the RoI experienced by businesses, organizations, and farmers, including smallholder farmers, serves as a window into the opportunity that lies ahead.





Food security, climate-resilient agriculture, and agri-financing were the central theme of discussions at the recent COP27 and the G20 Summit. In 2023 I expect to see accelerated digitization of agriculture, increased agri-financing and sustainability investments, wide adoption of regenerative farming practices, a stronger focus on empowering smallholder farmers with technology, and concerted steps by nations around the world to build food self-sufficiency and reducing food wastage, drawing from the experience and lessons of 2022.

**Krishna Kumar**

Founder and CEO,  
Cropin



Cropin

## The Connected Future of Agriculture

**Krishna Kumar**

Founder & CEO, Cropin





In this context, entities that are quick to adopt the integrated Agtech revolution will be the ones who find themselves gaining an edge in the industry - such a platform offers collective, evolving global knowledge that is critical for hyper-local success.

The transformation, however, demands choosing the right partners and platforms. For organizations across industries and scales, this will play a key role in determining the nature of impact and RoI.







# CROPIN REFLECTIONS 2022

Awards won: Cropin won the Global Public Startup Partner of the year at the 2022 AWS Partner Awards. The award recognizes leaders worldwide who play a key role in helping customers drive innovation and build solutions on Amazon Web Services (AWS).



# Asia-Pacific Agri-Food Innovation Summit 2022, Singapore



# World Agri-Tech Innovation Summit, London



# World Agri-Tech Innovation Summit, Brazil





## Agri Business Leaders Dinner Roundtable, Brazil



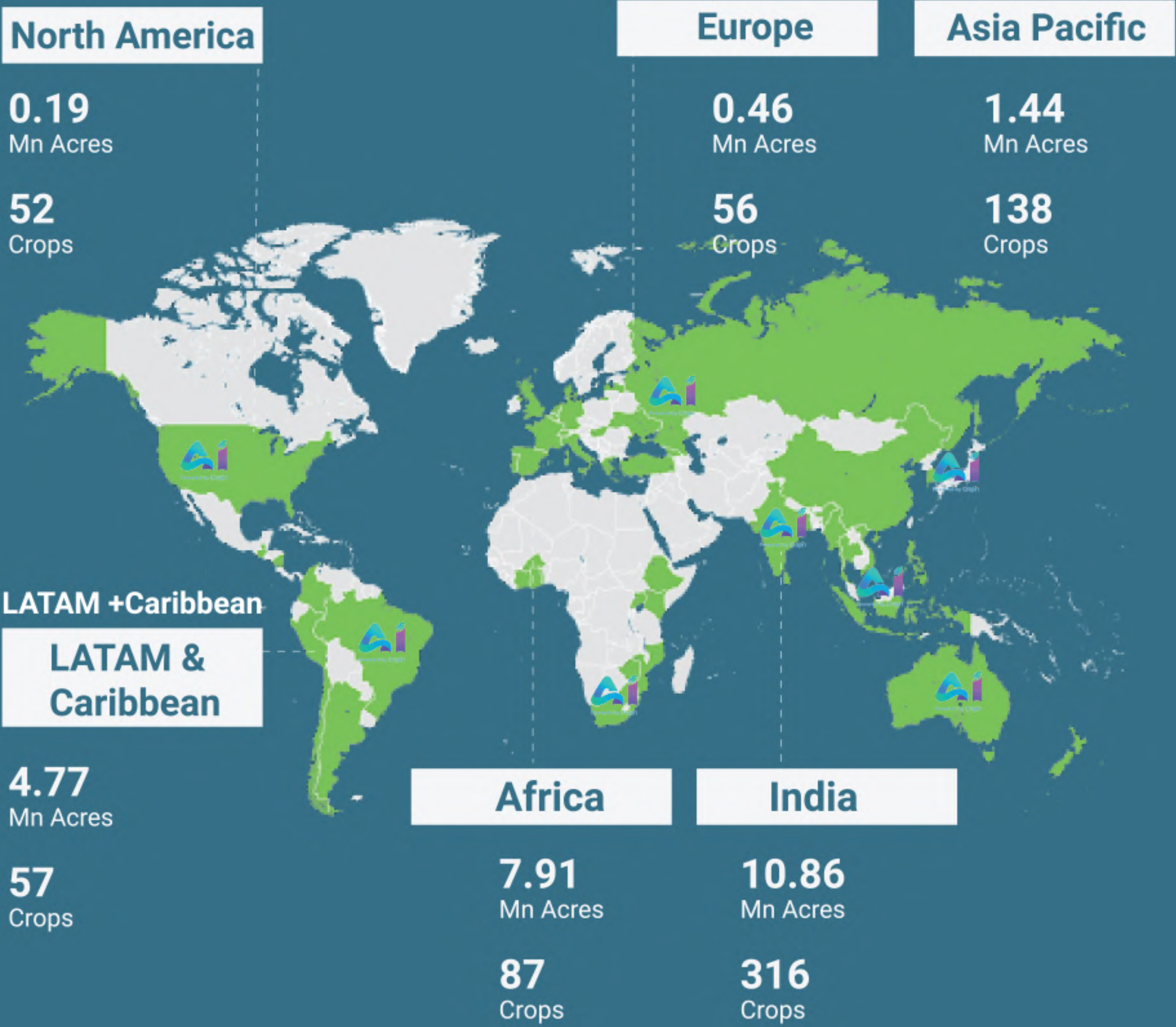
## Ag-celerating for Southeast Asia, Leaders Roundtable, Vietnam





# GLOBAL FOOTPRINT MAP

In so many ways, and in so many dimensions, we see the result of Cropin's intelligence as the protection of harvests



**7MN**  
Farmers



**16 MN**  
Acres Digitized



**488**  
Crops



**10,268**  
Crop Varities



**98**  
Countries



**6**  
Continents



**100+**  
Clients



**25**  
Global Partners