



COMPENDIUM ON BEST PRACTICES ADOPTED BY AGRI STARTUPS TO ADDRESS COVID-19 CHALLENGES IN AGRI & ALLIED SECTOR

year
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Mr. Hemendra Mathur

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Indian food supply (IFS) chain was disrupted in the first couple of weeks of lockdown, announced in India during third week of March' 2020. The timing could not have been worse from agriculture sector perspective as it was the harvest season for Rabi (winter) crop and then Kharif (Monsoon) sowing had to start. The supply chain needed immediate solutions and remedial measures to connect farmers with markets. It was important from both farmer and end consumer perspective.

Indian agritech ecosystem, though still at an evolution stage, played an important role in many ways working at both, consumer end and farmer end, to ensure continuity in food and agri supply chains. Governments at the central level and state level have also responded positively with multiple measures and reforms to ease farmer access to markets as well as inputs.

We received hundreds of calls, messages, and mails on a daily basis; from across the country from startups, farmers, farmer groups, FPOs and industry with request to solve for their problems during lockdown period. We at FICCI tried to be responsive in making sure their problems reach the right places within the state and central governments. Representation were made to the government on a continuous basis, till the situation got stabilized.

There were many agritech startups who pivoted their models and went out of their way to help farmers, FPOs, supply chain players to keep the operations running on the ground. It was not easy as the movement was restricted for employees as well as other supply chain players.

This compendium lists 12 such case studies talking about the response from agri startups to solve the crisis. Each of the case study is inspirational and offer huge learning for the ecosystem in terms of how to fight a crisis with frugal resources. I am sure that there are many more startups who did a brilliant job. We would love to profile them as well, in the coming issue. You all deserve a huge applause and appreciation.

The Indian agritech role in making supply chain demand driven, transparent and efficient is going to be critical in the post covid era. A combination of a progressive policy framework announced over the last few weeks with adoption of some the agritech solutions augurs well for Indian agriculture.

I sincerely thank all Twelve startups who participated in the study and my colleagues at FICCI in putting this compendium together.

Wishing you all the very best,

Hemendra Mathur

Chairman, FICCI Task Force on Agri start ups



Mr Venkatram Vasantavada
MD & CEO
SeedWorks International Pvt Ltd.

RACE TO SURVIVE – AGRITECH TO RESCUE The COVID-19 pandemic is a global health crisis; lack of sound measures may further lead to the global food security crisis and form a vicious cycle. Therefore, it is imperative to minimize the adverse effect and disruption of livelihood of the poor and marginalized citizens. Agriculture has taken the centre stage as Governments cannot manage additional issue of Food Security. Capital Investments and focus has risen around the Agricultural Industry from both the Private and Government sectors. It is high time for India to be constructive and productive – embracing quick, smart, and innovative approach to improve farm productivity and bridging between health and economic shock.

Globally agriculture is facing troubles of depleting natural resources, and uncertain weather patterns due to climate change. Indian farmers are plagued by various challenges such as hyper-fragmentation, generic & asymmetric Information, and lack of advisory leading to lower yields and weak market linkages, and in turn creating lower bargaining power and hitting the farmers' profitability. Today, farm distress is due to the supply surplus and hence market-facing solutions have seen boost. However, the larger issue of feeding the ever-growing population is a big challenge as food production growth is not keeping in pace with the population growth.

Since a few decades, not only Government's, but also private sector participation in upstream rose significantly, and in current decade, private sector has shown increased interest in downstream. Both Upstream and Downstream players in Agriculture will have to collaborate to resolve issues. More than ever, India need end-to-end value chains approach as against independent nodes to optimize efficiencies & profitability to farmers.

The present policies need a paradigm shift to be pro-farmer (Farmer FIRST) with income and prosperity being the central theme of agricultural planning in the future. The announcement of long-overdue big market reforms by the Government will benefit both farmers and consumers. If the APMC Act, Essential Commodities and Contract Farming were implemented in letter and spirit, they would make agriculture profitable and aspirational to attain the national goal of doubling farmers' income.

To encourage the private sector, a wave of policy reforms on encouraging R&D, Technology Investments, collaborations and protecting IP are warranted. Uniform implementation of structural reforms such as land leasing, contract farming, and private agricultural markets, etc. will bring investments into the agriculture sector to fuel its growth.

Given the decades-old challenges of affordability in fragmented land holdings, the primary sector is willing to experiment, innovate business models and collaborate with technology partners. A raft of AgTech start-ups is set to change the face of Indian agriculture. Rural changes such as increased mobile/internet penetration, cheaper data & storage and increased technology awareness are leading to mainstream VC/PE funds expressing interest in Agri sector and high-quality tech-entrepreneurs starting up, therefore making AgTech attractive.

In this journey, SeedWorks International Pvt Ltd, strongly believes to strengthen these AgTech start-ups by providing a pilot ground to test their solutions and a launch pad to take the best solutions to millions of its loyal farmers. To enable the same, SeedWorks also organized a day long Think-a-thon session by joint effort with FICCI, which saw participation from eleven Agtech start-ups and many opportunities to collaborate were identified. SeedWorks dreams to bring scale to AgTech solutions, primarily leveraging artificial intelligence-enabled Internet of Things across the value chain. Surely, all these efforts will make goal of doubling the farm income by 2022 a reality. The evolved Agri ecosystem will propel India towards its goal of becoming a \$5 trillion economy by 2025.

Warm Regards,
Mr Venkatram Vasantavada
MD & CEO
SeedWorks International Pvt Ltd.



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1. RAPID QUALITY TESTING FOR GOVERNMENT AND COMPANIES AT THE TIME OF LOCKDOWN

Company Name: Agnext Technologies Pvt Ltd

Author: Mr Taranjeet Singh Bhamra

Introduction

There was a popular slogan 'Government at your doorstep to deliver services'. Well, taking a cue from the current situation, where social distancing has become the norm, there are advisories not to undertake travel unless it is indispensable, the food processing industry is also taking steps forward to facilitate testing at the doorstep of the producer or anywhere.

Who would have thought that quality consciousness and testing would become the defining norm of a product and its acceptability in the market, specifically in the food processing industry? The food processing industry is ever evolving, and it continues to churn out new products. For each of these new products to make a name for themselves a certification of the raw material adds value to the equity, and it can only become authentic if rapid testing is undertaken.

Testing the products facilitates in maintaining a cutting-edge reputation. It also in sync with the demands of market factoring in the latest developments, and therefore infusion of new technical innovations become even more imperative to stand out from the crowd. The game clincher in such a situation is the cost-effectiveness. But there are certain operational hurdles associated with getting products tested. The accredited laboratories are few and far between, and there are logistical nightmares in getting the products transferred.

Intervention by Agnext

To address this issue, the units dealing in the food-processing sector have set up their own laboratories that undertake some rudimentary tests. However, had COVID-19 not happened, this situation may have continued to manifest, but now TEST is one of the words that has gained phenomenal traction in the lexicon of every Indian. It is the test, which has become the determinant factor whether the concerned individual is safe or must be quarantined. This test is also going to be the fundamental determinant for the industry as well. However, akin to the campaign-government at your doorstep, there seems to be a way out from this situation through solutions of AgNext Technologies, a company based out of Mohali, Punjab. Qualix - an integrated quality testing solution - is a revolutionary Artificial Intelligence-based rapid quality testing platform for food-processing businesses to take quick decisions of procurement, anytime & anywhere.

Implementation by Agnext

Qualix is a portable solution that has the potential of scalability and can provide testing solutions in a jiffy. This invention has the potential to identify raw material quality issues at the factory gate and solve the headache of approaching testing logistics for certification of the product on defined parameters. The solution in-turn provides complete traceability linked with quality, which is a one-of-a-kind solution for processors. They get full visibility about what quality is originating from which region, subsequently improving procurement, and strengthening trust within consumers.



Key Impact

Presently this solution can address quality issues of different range of agro-commodities like grains, oilseeds, pulses, spices, milk, tea & animal feed. Its efficacy and usage can be tested real-time in the present agricultural season.

It is, in fact, the right time for the business entities that deal with commodities like the raw material to test this product. After all, the world is trying all kinds of innovative solutions to deal with and mitigate the menace of Corona; the same experimentation can be adopted by the food industry as well. It can become a cost-effective solution that the industry has been looking for! After all, it is set to remove the manual processes of quality testing, cut down the higher costs and provide the solution at your doorstep, so why not try it out!



2. AN AGRI-COMMERCE PLATFORM HELPING FARMERS IN THE TIMES OF COVID-19

Company Name: BigHaat
Author: Mr Sateesh Nakula

Introduction

Agriculture is the primary source of livelihood for about 58 percent of India's population. 70 percent of rural households depend primarily on agriculture for their livelihood, of which 82 percent of farmers are small and marginal. As public life shuts down around India under the strain of the coronavirus pandemic, its potential impacts on the security of food supply and the livelihood of the farming community is a matter of grave concern.

To begin with, the on-going lockdown aimed at curbing the spread of the deadly Covid-19 has become a nightmare for Indian farmers. As the Kharif season ends, there is a need for laborers and transport vehicles to harvest horticultural and vegetable crops. However, in these unprecedented times due to the restricted movement of people, farmers are facing challenges in protecting the crop, harvesting it, and marketing the produce.

The lack of labor due to non-availability of migrant workers has interrupted the harvesting activities. Some of the crops have been left unharvested and have thus become damaged. This is resulting in quality deterioration and loss of income to the farming community. The lack of transportation facilities due to restricted movement of trucks in inter and intra-state has disrupted the supply chain. The whole crop value chain operations have been severely affected, which includes procurement, logistics, manufacturing, export shipment and domestic sales of finished goods. Consequently, the farmers who are at the bottom of this chain are affected the most.

Also, farmers are facing challenges to manage the standing crops or plan new crops due to the non-availability of appropriate agricultural inputs. Further, the villages far from major cities are adversely impacted as perishables are not getting picked up and demand is down.

The farmers have inadequate knowledge and expertise to handle these unforeseen circumstances and are in a state of panic.

Hence, it is no wonder that during this lockdown period, BigHaat has been receiving a huge number of distress calls for advice and guidance from farmers all over the country. In the hope to effectively manage the crops and avoid any further damage, farmers are seeking BigHaat's efficient advisory and essential agriculture inputs to fight the crisis. Few of the farmers have also called to get advice about planting the new horticulture crops, realizing there might be a potential shortfall of supply soon.

Lack of appropriate agricultural knowledge and high-quality inputs leads to distress among farmers and consequently impacts food security and food inflation. Thus, access to the right support, guidance, products, and services is extremely crucial for farmers at all stages of the life cycle of the crop.

Intervention by BigHaat

BigHaat has always strived to live by their mission to help and support farmers. In these unprecedented times, now more than ever, BigHaat's undisputed priority is to help solve the problems of the farmers. The company has taken

several steps to ensure safety, supply of the highest quality inputs and to maintain the best practices and procedures of hygiene at all fulfillment centers. Realizing the gravity of the issue, the company has taken the initiative and worked closely with the government as well as organizations like FICCI to find a solution. The efforts have been fruitful in this context. The Central Government took no time in including Agricultural Inputs under essential category when it was conveyed to them the issues farmers were facing. The state governments have been directed to follow the same.

Implementation by BigHaat

Consequently, with no stone left unturned, to make sure that farmers get access to essential inputs and to ensure the delivery of necessary supply Pan India, it started working effectively as soon as the necessary permissions are received. The untiring efforts of logistic partners have enabled them to deliver to 70% pin-codes across India. The company have received a positive response from last-mile delivery partners and are expecting to serve the remaining 30% within the next few days.

Considering the present scenario, the top priority has been maintaining the hygiene at the fulfillment centers which includes frequent sanitization of centers as well as making sure that the delivery partners also stay sanitized. They are also supplying the highest quality agricultural inputs.

Although it has anticipated some delays in deliveries due to the current lockdown in various states, the team has been working day and night with various stakeholders in the supply chain ecosystem to address supply and logistics breakdown.

Team BigHaat is walking the extra mile to continue uninterrupted supply of necessary inputs and agronomy advisory at farmer's doorsteps, keeping in mind their convenience.

Such proactiveness on the part of the team has led to many positive outcomes.

Key Impact

There has been an upsurge in inquiries from farmers. More and more farmers have started accessing the platforms. They have been spending more time in watching knowledge-based videos and blogs updated by the company's agronomy team. Compared to the same period last year, they acknowledged almost twice the traffic on the BigHaat platform. Farmers have shared their contentment about the convenience and comfort of receiving inputs and advisory while at home. Such amazing feedback keeps us highly motivated.

Other stakeholders like the brands it has been working with, they have been approaching the company for new strategies and initiatives to continue to deliver the products directly to the farmers and provide support to them in such troubled times.

BigHaat is transforming the pre-harvest journey of the farmers by applying science, data, and technology and reshaping the experience of the farmers in the most important journey of the crop cycle. With digitization of the Agriculture Inputs ecosystem, it is not only solving the toughest problem in the Agriculture value-chain but building transparency and efficiency in the value chain.



3 ■ ROLE OF AGRITECH IN MINIMISING THE IMPACT OF COVID-19 IN INDIAN AGRICULTURE

Company Name: Cropin Technology Solutions Pvt Ltd

Author: Mr. V R Rajesh

Introduction

India's farm activity is at its peak between April and June because this is when the winter crop (wheat and pulses) is harvested and sold. It is also the time of the year when farmers begin sowing the summer rain-fed crops such as paddy, pulses, cotton, and sugarcane. The lockdown has hit both the seasons. Key challenges that need the urgent attention of the government are:

1. **Access to Services:** During the lockdown or any such time of distress, the inability of farmers to buy inputs, sell agriculture produce and the breakdown of the supply chain as well as a lack of access to ancillary services like credit could result in complications that adversely affect the agriculture sector and rural economy.
2. **Access to Markets:** Farmers should be provided with market options by the government to sell their produce to ensure that there is no distress selling and wastage of produce due to markets not functioning full scale.
3. **Building Trust:** Establishing a clear communication channel between government agencies and farmers to build trust and reduce stress. Providing crisis communication digitally has a major role to play to educate and inform the farmer's about disease prevention techniques, local updates on quarantines, and relevant market and crop information.

Intervention by CropIn

CropIn intends to provide a one-stop solution to address the challenges faced by government agencies and to connect with farmers with near real time data and the use of AI powered advisory services to help farmers. The overall objective of the solution proposed is to improve the farmers' engagement and reduce risk by creating a seamless direct communication channel between the farmers and the government agencies. To achieve this, the following are the propositions:

1. Provide a direct channel of communication between government and farmers to share information on the availability of services and schemes provided by the government and how to access them.
 - a. Nearest Markets
 - b. Demand and Logistics situations (Integration to Pass platform)
 - c. Proposed crops if any
 - d. Schemes and benefits
 - e. Connect to value chain stakeholders
2. Reduce farming risk by providing AI-powered hyper-local prescriptive & predictive advisory directly to farmers. These advisories would include:
 - a. Weather forecasts & Extreme weather conditions
 - b. Crop planning for next season (variety, date of sowing, market trends etc.)
 - c. Agronomic best practices (crop variety-specific)
 - d. Market Information (info on mandi prices)
 - e. Health & personal care advisories



Implementation by CropIn

The company proposes to set up a comprehensive digital platform to educate farmers, enable them with relevant and timely information and advisories to ultimately minimize the impact of Covid-19 on rural households. CropIn would also monitor the cadastral map of the farmers plots using Satellite and GIS and based on the crop and stage provided these unique sets of advisories are related to crop.

Key Impact

The platform would enable farmers with a mobile application, through which they can access Advisories, Training and POP Videos, Weather bulletins, Pest and disease advisory and request other services. Farmers who do not have a smart mobile device can access the advisories via SMS or IVRS. This way a direct line of communication with all the farmers across the countries is established for the government to use.



4. USING TECHNOLOGY TO DISRUPT THE WAY PERISHABLES ARE HANDLED ACROSS VALUE CHAIN

Company Name: : Ecozen Solutions
Author: Mr Abhinav Verma

Introduction

With the organizations connect platform, Ecozen is enabling agri-commodity businesses, residential societies, and even local retailers to identify and procure quality produce directly from farms. Ecozen is a technology company enabling Farm-To-Fork value chain for perishables and has empowered a network of 25000+ farmers across India.

Intervention by Ecozen

Being cold chain enabled, the company is offering the option of long-distance sourcing of unique perishables while ensuring quality and economical pricing. "Ecofrost" is a standalone solar powered cooling system designed to operate reliably in regions with a challenge of quality power supply.

Implementation by Ecozen

The products are strongly integrated with the internet and give extensive data about product usage and operation. On this basis, they have been able to bring challenging further market commodities, unique fruits and vegetables to buyers and retailers. The expertise of the organization is in handling very perishable commodities such as cherry, litchi, cut flowers, etc. and they are very good at optimizing logistics for these commodities by using a combination of cold chain solutions depending upon the commodity and the load.

Also, Ecofrost customers have been able to keep their produce safe, reduce wastage as well as sell at better rates in the market.

"Connect by Ecozen" is a platform that seamlessly connects farmers and markets, ensuring quality & reliability. It helps widen the reach of buyers and sellers, which would ensure better value for the commodity.

Key Impact

Currently it supplies to brands like Ninjacart, Big Basket, Reliance Retail, Aditya Birla and have been able to connect over 50 farmers to further markets. They have managed to source over 100MT of fresh perishable commodities and serve over 200 households.



5. HOW CAN DIGITISING QUALITY CUT DOWN FOOD LOSS?

Company Name: :: Intello Labs
Author: MrRamakrishnan

Introduction

Globally, 30~70% of fresh produce goes to waste. In India, experts say that 25 to 40% of loss occurs during transit, i.e., the time taken for food to reach from farm to store.

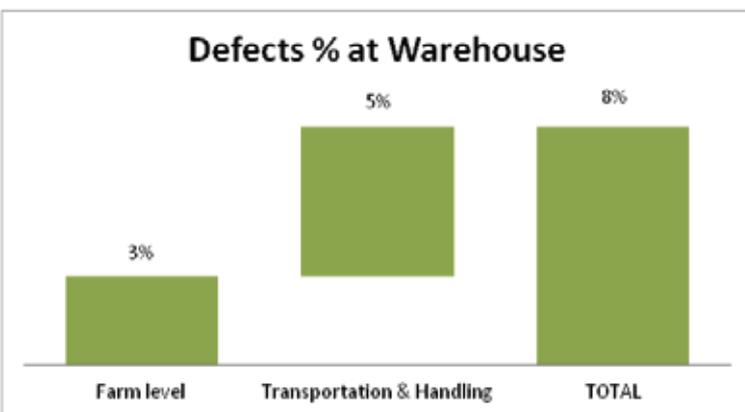
The reason for such losses is that logistics are far more complicated here in India. There are multiple handling points across a fragmented supply chain. The ambient temperature hastens food deterioration.

Due to Covid-19 pandemic, the situation has become more complex. Labour availability has been erratic, transport & logistics have been under extreme duress, and supply has been unreliable.

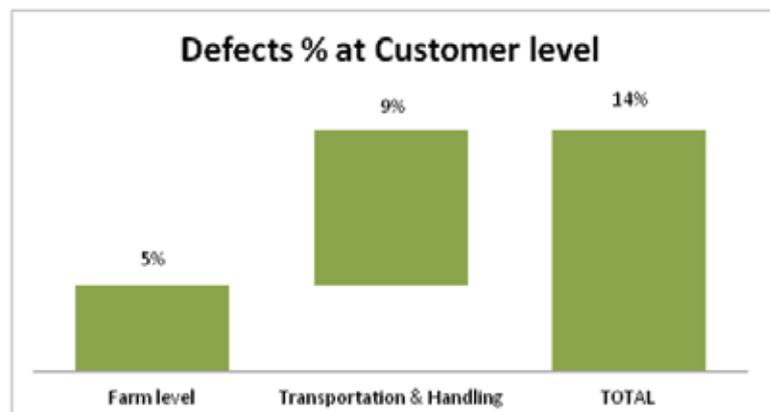
Intervention by Intello Labs

What is the extent of quality damage at each stage of the supply chain? Intello Labs assessed the defects in the food supply chain starting from farm, to warehouse, to retail. This was initiated in the pre-covid scenario. The study, which analysed 38 commodities encompassing 4 locations over 3 months, threw up some eye-opening figures.

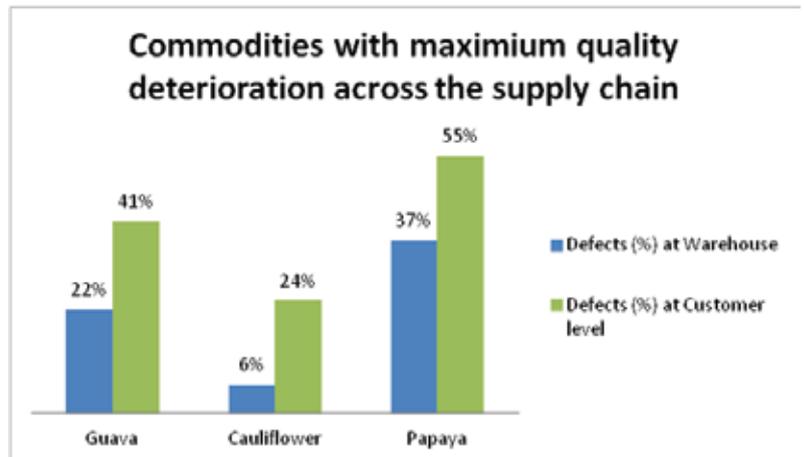
When an item reaches a distribution or fulfilment centre, i.e., a warehouse, it has 8% defect. Of this total, 3% defect happened at the farm level and could have been eliminated at an earlier stage.



By the time an item reaches the customer, either on shelf of a retail store or at home via an e-commerce retailer, it has 14% defect. 5% of these defects occurred at the farm-stage and again *could have been avoided*. The balance 9% materialise during transportation and handling.



As depicted in the figure, guava, cauliflower, and papaya see a much sharper rise in defect from warehouse to customer. The incremental defect is as much as 18 to 19%! Each blemish, bruise, and tear is a loss. In hard numbers, they translate to 15% dump; the measure food businesses use to define food loss.



Implementation by Intello Labs

The alternative: digitally tracing food quality along the supply chain

Defects and losses in food can be checked by controlling quality at the place of origin. Evaluating quality at a farm or in a collection centre close to the farm as opposed to dumping them later in the supply chain, losses can be reduced.

Existing processes and tools are clearly ineffective, as the defects and dump data indicate. The alternative is AI-enabled quality processing which is forte of Intello Labs.



Intello's image processing method is better as it is an easy-to-use and simple-to-install mobile app that can be deployed to better measure food quality across all points of the supply chain.

- Entirely objective and consistent, making quality assessment free of bias or manual errors.
- Digital and verifiable, ensuring anyone at any later stage can authenticate - what quality was approved.
- Mobile and scalable, dismissing the need for expensive equipment or specialized training.

Key Impact

By controlling quality, food retail and e-commerce companies can cut down 'dump' and thereby, improve profits. In a recent engagement with a large food retailer in India, the projected increase in profits was 3%. How does it cut down food loss? By separating items "fit for retail" from "fit for food processing." It trims the 'dump' in the subsequent parts of the supply chain and contributes to sustainability efforts.

During lockdown (especially the first few weeks), the customer level quality dipped by 5-10% points, across most commodities. Using the company's digital tools, the clients have started seeing an upward swing in their quality levels. The company is in the "ongoing-covid-phase" and is on the path to monitor the situation carefully.

The bottom line on tracing food quality: Digitising food quality is not without its pain points. It takes time. For each commodity, it is essential to gather data on defects, train the algorithm and then test it. Even the ecosystem needs to evolve; it is impossible to get a certification of accurate quality assaying if you offer a purely digital solution.

Nonetheless, it is merely a question of 'when' - by when the complete change will happen. The company firmly believe digital quality assessment is the inevitable future.



6 ■ FARMER WELLNESS & FERTILIZER BALANCE THROUGH RAPID, AUTOMATED SOIL TESTING DURING & AFTER COVID-19 PANDEMIC

Company Name: : Krishitantra
Author: Mr. Sandeep Kondaji

Introduction

A fertilizer recommendation serves the purpose of managing the fertility of the soil, i.e. the productive capacity of the land. With Covid-19 pandemic sweeping the world, the fertilizer sector may face a crisis! Will fertilizer recommendations have a positive impact on the demand of fertilizers? Could farmers benefit from limited need and balanced use of nutrients?

Covid-19 was officially declared a global pandemic recently by the WHO. This pandemic is creating ripple effects throughout markets worldwide. The fertilizer sector too has not been immune. Production constraints, tighter supply of fertilizers and movement of raw materials in and out of the country have continued to plague the industry. Large manufacturing units are being shut down which is limiting both demand and supply. Among all these troubles, transport and storage constraints are manifesting themselves as mounting challenges across the sector.

Across the world, borders are being closed; vessels are being quarantined which has directly resulted in limiting the movement of people and products. Such disruption in the fertilizer sector is anticipated to continue in the days to come across the globe. This is especially a concern for a highly populated country like India, given its prominence as a producer, importer, and consumer. As Indian ports have put in stringent regulations including 14-day quarantine rules for vessels arriving from affected areas, additional disruption to the movement of fertilizers and raw materials between ports and plants is to be expected. Many large fertilizer companies have curtailed their operations in these trying times, however, there is no doubt that if this situation persists it may affect the Kharif season.

Further weakening of INR against the USD and the availability of labor, disruptions in the supply chain and logistics can significantly increase risk in terms of fertilizer availability and pricing.

As a preventive measure, can reducing the demand of fertilizers counterbalance the limited availability of the commodity?

In our country, the amount of food grain produced per kg of fertilizer applied, declined from 13 kgs in the 1970s to 4 kgs in 2010. The perpetual, often indiscriminate use of fertilizers has an impinging effect on the soil fertility and triggers a chain reaction on the yield and thus, of course, on the income of the farmer. The unscientific approach to fertilizer application and procurement has been looming large on the demand/supply in fertilizer sector. A constructive mechanism to reclaim soil health and alleviate farmer distress is by advocating soil tests. A well-informed soil test and recommendation can help the farmer make an informed decision and purchase optimum quantities of the right fertilizer. A broader implementation can accomplish the goal of diminishing the demand for fertilizers and can act relevant in crisis.

The Soil Health Card Scheme (SHC) by the Government of India is indeed a significant measure to bring monumental change to alleviate the agrarian crisis and rejuvenate fertility in the agricultural landscape of the nation. But, as quoted in the International Journal of Agriculture Sciences, the time gap between soil samples and issuing cards is too high, which may deter the farmers from making purchase decisions on time.

Therefore, an ideal technological intervention is required to curtail the time taken to conduct the test and also disseminating the test results in shortest possible time to the farmer, if the objective of the SHC and Govt. of India's novel initiatives has to be fulfilled.

Intervention by Krishitantra

Krishi RASTAA – Rapid Automated Soil Testing and Agronomy Advisory is an indigenously designed soil testing device which can conduct tests in less than 35 minutes, store it on the cloud and share it via SMS. Developed by Krishitantra, this is the only automated soil testing device capable of conducting rapid soil tests in comparison to available alternatives, at present. This innovative solution can complement the SHC scheme by increasing pace of conducting tests, provide accurate readings and compliment it with right fertigation advice. The balance use of nutrients will also be achieved, and we would be able to avoid any crisis in demand/supply of fertilizers.

Implementation by Krishitantra

Soil testing is an extremely important diagnostic tool and the only available tool to evaluate the fertilizer needs of the crops. While some soils are inherently deficient in nutrients, some soils get depleted over a period of time due to crop harvest. Mostly, without diagnosing the exact requirement of the nutrients in the soil, fertilizers are applied based on blanket recommendation or word-of-mouth of fellow farmers. Unscientific guesstimates often lead to the procurement of inappropriate quantities. This affects the farmer's productivity and profitability. It also heavily impacts the availability of fertilizer across the entire agrarian community.

As fertilizer manufacturing plants depend on raw materials from across the globe, pandemic situations like Covid-19 limit the availability of raw material due to logistics, labour restrictions and regulations. This can create a spike in demand and uneven distribution amongst the farmers. While farming in an unrestrained activity, all farmers should have access to fertilizers based on optimum level actually required by the land they are holding.

In this crisis, rationing of fertilizer is suggested to ensure that everybody's approximate quantity needs are met. It would be unfair to ration fertilizers based on the size of their land holding; rather it should be based on the actual fertility status of the land. The fertility status can only be measured by soil testing.

Hence, they are intervening in the system by introducing efficient soil testing solutions which are accessible and affordable to the farmers, while simultaneously overcoming all the challenges arising due to time, accuracy, and interpretation in comparison to the existing traditional solutions.

Key Impact

With its limited engagement with several foundations and FPO's across various parts of the country the farmers who have conducted soil testing and followed fertilizer recommendation based on the test results have witnessed better yields. The optimum usage of fertilizers also increases their profitability. So, the farmers in these locations are now convinced to test their soil regularly. This habit will lead the change into need based buying, which will further lead to soil rejuvenation, fair distribution of fertilizers based on soil fertility across geographies and sustenance of supplies during crisis situations.



7. SOLVING THE PROBLEMS OF FISHING COMMUNITY DURING COVID-19 CRISIS

Company Name: : NUMER8
Author: Ms Devleena Bhattacharjee

Introduction

The Janta Curfew declared on March 22nd, 2020 saw 15,000+ tons of fish being dumped back into the sea in Maharashtra alone. This amounts to a loss of Rs 200-300 cr in revenues. The last fishing season (August-November'19) was a weak season for fishermen owing to bad weather and cyclones. The Covid-19 pandemic and the Janta Curfew during the months of April and May' 20 have only added to the woes of the already overburdened fishermen community. The fishermen community is looking at a staggering loss of around Rs. 1000+ crores.

The company has been working with the fishermen community for over a year and Numer8 help them with access to affordable and ethical finance, reduce their operating costs, help them yield more fish during a fishing trip and keep them safe in the high seas with the use of technology. More importantly, it connected the fishermen with the market to help them sell their yield.

The disruption of formal supply chain and logistics during the pandemic spelled trouble for the fishermen folk. The essentials required by the fishermen for the purposes of fishing was scarce and on the other end, the yield wasn't being carted to the markets due to lack of essentials viz. ice, storage, transport etc., leading to huge losses for the fishermen community.

Intervention by Numer8

The fishing industry came to a grinding halt despite fish being declared as an essential commodity by the Government of India. The first effort was to connect the fishermen with the buyers in the market through online channels including instant messaging social media and phone calls. It identified consumers willing to buy as Numer8 set up a quick process of taking in requirements and getting them fulfilled by fishermen who had stock to sell.

Implementation by Numer8

The challenges in the marketplace has made it re-evaluate the need for an end to end B2B supply chain channel that can keep working seamlessly for the benefit of the fishermen and consumers during such a crisis. The marketplace being driven by Numer8 ensures sustainability and traceability while aspects of fair trade are maintained, even during these unforeseen circumstances. Numer8's marketplace will enable both the demand and the supply side of the market to use such a trading channel more efficiently in good times and bad times.

Key Impact

The company was successful in not only delivering affordable and quality seafood to the buyers but also in helping fishermen generate better revenue and earnings for their fish yield. This makes the community happy and ensures healthy business for all stakeholders in the supply chain.

A large section of the fishermen community has suffered huge losses owing to the bad season in the last quarter of 2019 and the pandemic. They are currently working on a financial platform that will help fund the fishermen through the innovative financial model. This platform is expected to help them tide over debts and return to work without the stress of funds as soon as the crisis passes over. It uses a smart contract platform where it helps fishermen with cash and will also ensure affordable procurement of business essentials needed for their daily trade through Numer8's B2B platform.

What the Covid-19 crisis has helped us study, is the way we should be prepared for a pandemic across the entire value chain providers of the ecosystem. However, the most important takeaway for Numer8 is the fact that sustainability, traceability, fair trade and customer focus are values that stand tall and will remain the backbone of any business, more so under demanding conditions.



8. FIGHTING COVID-19 CHALLENGES WITH PRESERVATING TECHNOLOGY

Company Name: : Saptakrishi
Author: Mr Nikky Kumar Jha

Introduction

The extremely short shelf-life of horticultural produce results in a big chunk of the produce not making it to the market and ends up getting wasted. 70% of fruit and vegetable output is wasted, accounting for 40% of the total cost. Also, due to the open transportation of horticulture produces the pathogenic load increases, and significant water loss is experienced, which is a direct economic loss to farmers.

The Corona virus outbreak has forced humanity into a vertex of changes, amid the spread and continuing challenges, food is the most essential resource that has taken a toll. A large amount of food & horticulture produce continues being wasted due to

1. Lack of:
 - a. Proper storage to preserve the produce
 - b. Transportation to selling point due to possible risk of spreading virus
 - c. Possible chances of contamination of F&V at any point in the supply chain
2. The shutdown of markets due to safety concerns

Intervention by Saptkrishi

Saptkrishi addresses this issue and works on reducing waste by the provision of affordable technology directly to individual farmers, cooperatives, and traders to ensure better post-harvest outcomes. The enterprise has developed Preservator/'sabzi kothi,' which is a low-cost, storage cum transportation solution for extending the shelf-life of horticultural produce anywhere between 7 to 30 days. It requires 20 watts of power and 1 litre of water per day, and no further maintenance is needed to store up to 300 KG of fruits and Vegetables. It comes with an integrated battery that lasts for a day and an option for solar charging. Also, the product has a regulator that can switch the microclimate, which is adequate to store a broad range of horti-products hence works as a single storage unit for multiple commodities.

Preservator is a low-cost, technological solution that extends the shelf life of perishable horticultural produce through the construction of a highly-humid and sterile isolated chamber incorporated with high-end technology that suppresses pathogens as well as respiration rate, inhibits ethylene biosynthesis as well as oxidizes ethylene into small molecules, delays browning as well as ripening and regulates the activity of the antioxidant enzyme.

The controlled microclimate created inside the Preservator enables the storage of fruits and vegetables for anywhere between 7 to 30 days. A near sterile condition created inside the Preservator results in decreasing the pathogenic load of fruits and vegetables, the high-end technology used has the potential to kill Coronavirus and make fruits and vegetables safe for consumption. Also, in transportation and in the open market, it reduces the possible chances of contamination of fruits and vegetables with Coronavirus.

Implementation by Saptkrishi

In talks with various public and private agencies, state governments, Krishi Vigyan Kendras, District horticulture offices etc. for taking this product forward. However, field trials have been done at Bihar, Jammu, and Uttar Pradesh.

Key Impact

Increase in income of small and marginalized farmers by more than 40%. However, currently collecting more data to conclude significantly upon the shelf-life extension of a wide range of horticultural produces.



9 ■ TWO-WAY DIGITAL COMMUNICATION SYSTEMS FOR USAID- BANGLADESH AQUACULTURE & NUTRITION ACTIVITIES (BANA) FARMERS TO RETAIN THEIR LIVELIHOODS AMID COVID-19 PANDEMIC (INTERNATIONAL CASE STUDY)

Company Name: Source Trace

Author: Mr Om Routray

Introduction

The Bangladesh Aquaculture & Nutrition Activities (BANA) project aims to enhance the incomes, diets and nutrition of smallholder farmers and their families through increasing income, diversifying diets, and empowering women. The project embeds proven technologies in Bangladesh by harnessing public and private sector products and services to increase the productivity of smallholder aquaculture systems. Under the BANA framework, farmers usually receive technical know-how and follow-up support in their farming and enterprise management from public and private sector extension staff. However, the lockdown situation faced by the rest of the country has been declared in the southwest region too. As the movement of the extension staff has been restricted due to the pandemic, the farmers have been exposed to the risk of crop damage or lowered production because of lack of extension services. The farmers have no other source to receive advisory. Secondly, due to the restrictions on movement in public places, farmers have been unable to sell their produce at a fair price, with women farmers and marginal farmers being affected the most.

While the government has sponsored Covid-19 awareness campaigns, its primary focus is on the stay-at-home protocol coupled with practicing proper hygiene and sanitation. Unfortunately, this preventive protocol keeps farmers away from the marketplaces. Although they are still engaging in farming activities, it is done without maintaining this preventive protocol, due to the lack of awareness on alternative measures. This in turn makes them even more susceptible to the virus. In the absence of extension services amid the pandemic, farmers might experience lower farm output that can lead to a potential food shortage; farming being a time-bound and season-bound activity. The shortage of aquaculture products is likely to be even more devastating, as this is the segment that provides a major portion of the animal protein in Bangladesh.

Also, the Covid awareness campaigns currently running in Bangladesh are targeted towards urban areas with no differentiated messaging for different groups like adults and children, men and women, urban and rural population, farmers and entrepreneurs, and others. Ideally, each of these groups requires a different type of messaging, considering that they assimilate information and learn differently. The result is that the awareness campaign is not addressing each group appropriately and proportionally. This is even though preventive protocol for each target group is already in place.

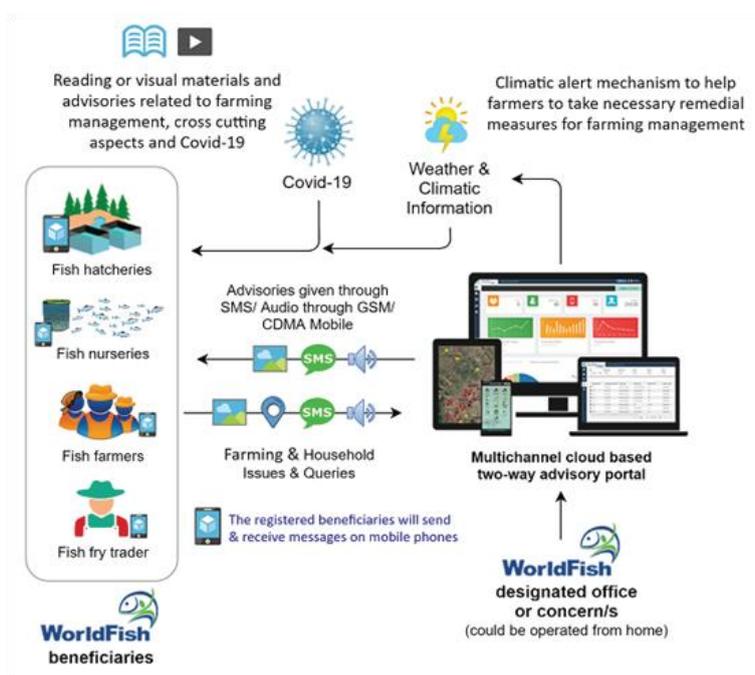
Intervention by Source Trace

For this initiative, SourceTrace is collaborating with WorldFish, under the USAID-sponsored Bangladesh Aquaculture & Nutrition Activities (BANA) project in Bangladesh. The digital solution is enabling farmers to continue with their activities; retain their livelihood and business security, including health safety in the wake of the Covid-19 pandemic.

Implementation by Source Trace

With the advent of ubiquitous connectivity and pervasive mobile devices, there is increased demand for targeted information that caters to the specific needs of farmers. Rapid deployment of a two-way interactive digital platform to provide advisory services remotely to the BANA farmers is being implemented to address the above issues.

Through SourceTrace's solution, voice and text-based messaging service in Bangla are providing



the latest advisory services to all farmers and entrepreneurs under BANA. Advisory can be disseminated through smart phones as well as feature phones. The smart phone users can download the app and get rich content in terms of video, audio or documents. In addition, they can also receive messages. Feature phone users can be sent advisory messages through SMS framework.

Using SourceTrace's solution, farmers can send farming-related queries/observations as well as household-related queries through a user-friendly interface to the platform using their android smart phones or feature phones. Farmers are also able to send picture, voice and GPS locations (which will be automatically captured in smart phones). Once the query is received, the designated technical members of the admin panel respond to the farmers in the form of voice, text SMS or other multimedia products. Apart from responses to farmer queries, the platform is being used to disseminate information on farm management, market linkage, weather, Covid-19, gender issues, health issues and other socio-economic issues. The advisories are being sent on a regular basis and are aligned with the cropping season.

Weather-related alerts are helping farmers to take necessary remedial measures related to farm management. Reading material, visual material and advisories related to Covid-19 are also being sent to registered mobile users on a regular basis. The software generates text messages or advisories in the web console which can readily be disseminated to the farmers through a remarkably simple operational procedure. Besides, farmers can share their observations using voice and text messaging with BANA field offices and can get feedback from the designated team. Automated SMS messages directly to women farmers through mobile are also being incorporated. The software access can be extended to other related service providers such as input retailers to connect with BANA beneficiaries and other community farmers. A dynamic and customizable dashboard provides real-time reports, visualizations and graphical representations in the web portal, which is available to the designated managers and staff.

Key Impact

The farmers and entrepreneurs have been able to reduce the associated risk and the impact of the Covid-19 pandemic and continue with their livelihood activities without compromising on safety protocol. The digital solution has equipped the BANA project to enhance facilitation to ensure service delivery capacity by their partner public/private sector and its data management remotely in a cost-effective manner. Farmers and entrepreneurs associated with BANA can receive the same level of extension services remotely as they earlier received from the public and private sector staff in the pre-pandemic situation. The farmers' food production system will continue to be operational without the risk of production failure. They are also able to receive appropriate gender-focused and context-specific Covid-19 information and reduce the risk of domestic violence.

Farmers are also able to receive site-specific weather forecast information to help protect their crops and market information that helps set their selling price. Women and youth farmers are being trained in the usage of ICT tools which serves to enhance their digital literacy, which will be useful to them during the pandemic and beyond.



10. SOLUTIONS FOR OVERCOMING COLD STORAGE PROBLEMS DURING COVID-19

Company Name: : Tan90 Thermal Solutions Pvt Ltd.

Author: Dr Soumalya Mukherjee

Introduction

Disruptions in the supply chain were observed during the present lockdown which was imposed to contain the outbreak of the deadly coronavirus pandemic. There has been a learning curve in this situation. However, it can help the company to prepare themselves better for the future and work at maximum efficiency under the present conditions. According to a report by the Agricultural Production Commissioner of Tamil Nadu, Mr. Gagandip Singh Bedi, about 1/3rd of the cold storages in the state were not used. This suggests that changes must be made to the present cold chain ecosystem that will not only benefit the farmers at the grassroots but will also help aggregators.

Collaborative efforts from all sectors of emerging start-ups, including cold storage (like Tan90, Ecozen), supply chain (like Agrowave, Ninjacart, KrishiHub) and AI-driven grading technologies (like Intello Labs) are the need of the hour. Grading should be made available at the farm-gate so we can make data-driven decisions as to which perishables are to be transported for immediate consumption and which can be put up in cold storage.

Intervention by TAN90

Small cold storage clusters need to be put up at the village level which can be mapped with the aggregation centers of farm-to-fork start-ups. New technologies can be adopted, wherein any room can be converted to a cold room. This is possible if a self-standing, modular solution is considered, as with Tan90's portable cold storage units. The benefits of this solution are lower operational costs, a greener approach with low consumption of electricity, and the building of village-level entrepreneurs who can monitor the temperature profiles of each unit and make informed decisions. Such an approach will take cold storage solutions to the remotest villages, as part-truck loading is now possible with these modular cold units. Construction of mud-chambers, working on the concept of evaporative cooling, can also be adopted in villages for perishables like potatoes and tomatoes, thereby offsetting the percentage of cold-storages used for storing only potatoes. FPOs and NGOs too play an important role here: educating the farmers of emerging technologies and processes. As these processes can be adopted at a fraction of cost at the village level itself as opposed to the present brick and mortar cold rooms. Change should begin at the grassroots level and then be scaled up the value chain.

The operational model adopted by ice-cream vendors can be customized, modified, and adopted by fisheries. Dependence on ice has a great impact on fishermen and tons of fish continue to go to waste. A centralized cooling station, which freezes thermal panels can be set up, which distributes the same to fishermen to put in insulated boxes (refer to Tan90 portable cold storages).

Mode of transportation is another important segment which the current ecosystem must work on. The Government of India, in a revolutionary decision, has announced 64 routes for the transportation of perishables, including dairy, medicines, and fish. Adoption of similar modular cold storages would be advantageous here due to the part-load feature, along with easy tagging and easy handling, and minimal or no changes in present rail infrastructure.

Implementation by TAN90

Taking the first steps in bringing together the marginal farmers, they have started to provide portable cold storages to 2 FPOs, one in Andhra Pradesh and another in Telangana for fish farmers, who are facing a lot of problems with the shortage of ice and the simultaneously peaking summer temperatures. They have been working in tandem and partnering with two organizations (NGOs) in Andhra Pradesh and Maharashtra to take its solution to the farmers (banana, turmeric, other vegetables as well as fish). Connecting and partnering with the appropriate authorities of the Indian Railways would be beneficial to take the cause of democratizing cold chain forward.

Key Impact

During the current lockdown, they have shipped the portable cold storage units to the Department of Horticulture, Government of Tamil Nadu, and other stakeholders in the Agri-space to reduce wastage given the sudden break in the supply chain. Fisheries have been a major focal point, given the shortage of ice. They are thrilled to say that these efforts have yielded a reduction in wastage of fish for its clients. They have also re-purposed its cold storage unit to transport and carry biological samples and are presently going to launch in the market with a laboratory in India.



11. HARNESSING THE POWER OF DIGITAL TECHNOLOGIES TO SOLVE UNFAVORABLE GROUND SITUATIONS IN AGRICULTURE

Company Name: : TraceX Technologies

Author: Mr Srivatsa Sreenivasarao

Introduction

Indeed, the COVID-19 and post COVID-19 world is going to be very different from many perspectives. It is going to redefine how we all engage and interact with each other be it humans or machines. While there are several predictions on how the world is going to look like post COVID-19, here is how our world is changing:

The company have adopted a 3 pronged approach as a response to COVID-19 challenges and to turn those challenges into opportunities: Building relevant technology that helps work on the ground, newer farmer/eco system engagement models to operationalize the technology on the ground and finally leveraging the power of connected eco-system.

Intervention by TraceX

The pandemic's adverse effects are being felt across the entire eco system, so instead of solving for it in pockets, it is important to take a holistic approach by partnering with the entire eco-system. The company is partnering with resource institutions (NGOs) and the government to bring eco system players such as farmers, producer organizations, processors, warehouse, logistics, traders, b2b buyers, finance/credit providers to leverage the power of a digitally connected supply chain. Every actor in the connected eco-system can leverage the platform for seamless connectivity and decision making.

To ensure employee safety and foreseeing the need for social distancing, a couple of weeks before the announcement of formal lockdown, everyone started working from home. Expecting that the on the ground situation would become increasingly unfavourable, they re-aligned its product road map and strategy to adopt to the emerging situation. They have consciously decided to focus on features that would help in easing the field operations.

Implementation by TraceX

One of the challenges its customers and their field teams were facing is not being able to go on the field and interact with the farmers at regular intervals. Therefore, they quickly built a solution to ensure the crop advisors and field assistants are remotely able to map farmer's fields and continue to track the on-field progress of the farm activities. To ensure that farmers are kept engaged, they simply started leveraging SMS as a medium to reach out to the farmers with crop specific, location specific, time bound agronomy intelligence at very frequent intervals based on their crop stages. Also, to help farmers adopt to digital first approach, they are working with its customers to put together a strategy to recognize the most digitally savvy farmers and incentivize them appropriately. All this is helping customers and farmers minimize the adverse impact of COVID-19.

While building technology is one aspect, operationalizing the same is a whole different ball game in agriculture. To ensure that farmers, ground staff and customers are well equipped to leverage its technology, they experimented with on-line capacity building trainings and webinars very early-on.

Key Impact

Things which were considered impossible and ineffective have made us rethink and re-align our thoughts; in the very first online training given to the farmers, it has successfully managed to deliver trainings to representatives from over 15 FPOs. Training lasted for over 3 hours! Participation was from remote locations across 2 different districts. It was convenient to have them participate through web conferencing, no network hiccups, many of them participated via their smart phones. Now this is a weekly routine, newer farmer engagement models leveraging digital technologies are helping us work around the unfavorable on the ground situations and continue to positively impact farmer livelihoods.



12. ENSURING RELIABLE INFORMATION DURING COVID PANDEMIC

Company Name: : Viridis RS
Author: Ms Heejae Cho

Introduction

Collecting information on smallholder farmers is difficult at the best of times, from crop cutting experiments to be conducted for crop insurance to identifying farms where harvesting has been completed and when the crop is ready to be transported. The remoteness of farms and the sheer number of farmers means it takes huge effort on the ground to collect data. Under the current travel restrictions and social distancing guidelines, traveling to and from farms is not only difficult but is also potentially dangerous as Covid-19 may be spread in this manner.

Remote sensing technology can reduce the need for in-person travel and capture information on a regular basis: from identifying the type of crop and area sown, to crop health and estimated yield. It can also confirm whether the crops have been harvested, signaling the need to ensure an open sales channel for the farmers in the area.

Intervention by ViridisRS

ViridisRS is focused on using light manned airplanes like Cessna or microlights for collecting data. Airplanes can fly below the clouds, ensuring data can be collected reliably throughout the year. Airplanes can also fly further and faster than drones which require the operator to drive to the survey site. Airplanes minimize human contact by being able to fly from the airfield to the survey site with no on ground interaction with the monitored villages, thereby safeguarding through isolation both the villages and the pilots.

The proprietary technology was developed by cofounder Dr. Mark Jeunette for his PhD at MIT, this technology enables one airplane to cover 50,000 ha of land per day, making it a highly scalable solution. The algorithms also ensure data collection at the plot level, enabling the monitoring of small farms including their horticulture at the farmer level.

To minimize the disruption during the current Covid-19 environment, reliable and regular information updates are essential. Covid-19 has highlighted the urgent need for greater adoption of technology in agriculture and we look forward to working with stakeholders to help them gain a greater understanding of the on the ground situation of the farms and minimize future disruption.

Implementation by ViridisRS

The company is starting its first full season pilot project in northern Karnataka from August 2020 monitoring mainly cotton farms with support from Deshpande Foundation.

Key Impact

The project aims to cover 10,000 hectares of land and inform farmers of any crop distress, helping detection of pests and disease





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