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# How remote sensing satellite data & deep tech solutions are helping distressed farmers

Agri-tech startup RMSI Cropalytics executes satellite-based crop health tracking and yield estimation for several districts in India. Roli Jindal, Co-founder, RMSI Cropalytics, shares how they are deploying deep technologies such as machine learning, artificial intelligence and big data analytics to combat many complex challenges of the agricultural sector



By Sudipta Dev

On Aug 17, 2020

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**Can you share with us a brief background of your agri-tech startup? What have been your key milestones/ achievements since inception?**



*Roli Jindal, Co-founder, RMSI Cropalytics*

RMSI Cropalytics is an agri-tech start-up that focuses on agricultural data analytics.

RMSI Cropalytics was incorporated to address the emerging need arising from the rapid growth of institutional financing of the agriculture sector through crop loans and crop risk financing (insurance), which requires comprehensive and well-organised data and analytics.

Headquartered in Noida (India), the company has its operations spread across all dtates. We combine advanced modeling, machine learning, and crop and meteorological domain expertise to provide solutions to decision-makers in government, crop insurance, agriculture input sector, banking, commodity trading and social sector.

RMSI Cropalytics is a subsidiary of RMSI, a global leader in geospatial and engineering solutions. These solutions address global issues of climate change, natural calamities, human habitation, food security, autonomous transportation, smart utilities and networks.

Growth story:

RMSI Cropalytics has grown remarkably since its inception in 2019. One of our major achievements is being selected by the Ministry of Agriculture and Farmers' Welfare (the Government of India) to execute satellite imagery-based crop yield estimation.

The company has a team of multi-disciplinary professionals including meteorologists and agriculture scientists. The team has developed a comprehensive platform for crop insurance management for insurers and reinsurers including real-time insured portfolio risk assessment and tracking. Several large crop insurance companies have engaged us to verify their insurance portfolio.

We have also executed satellite-based crop health tracking and yield estimation for several districts in India. Our user-friendly platform forecasts crop-wise yields and productions for upcoming crop season for more than 700 districts.

**What are your key products and solutions for various stakeholders associated with the Indian agricultural sector?**

RMSI Cropalytics helps decision-makers in government, crop insurance, agriculture input sector, banking, commodity trading and social sector. The key products and solutions have been curated to address the technological requirements in the agriculture sector:

- **Policy verification:** This is a part of our technology-based solution PInCER (Profiler for Insured Crop Exposure and Risk) that helps insurance companies in verifying hundreds of thousands of crop insurance policies.
- **Crop season tracking:** Using satellite imagery, we estimate sown acreage, crop health and likely yield. This helps insurance companies to project likely claim payouts, agri-input companies to plan stock availability and agri-traders to estimate commodity supply.
- **Seasonal outlook:** We have created an online portal from which users can readily download district-wise, crop-wise outlook reports for the upcoming season for more than 700 Indian districts.
- **Portfolio analysis:** Based on extensive yield and hazard databases, our solution PInCER has developed a sophisticated probabilistic and stochastic model to calculate portfolio risk to help reinsurance companies arrive at term-sheets for their cedants.
- **Crop Insurance Premium Calculator:** This is an efficient tool for new entrants into the crop insurance business. It helps them arrive at 'burn cost' as stipulated by the PMFBY guidelines and probability-based premium cost for different covers using hazard databases.

### **What has been your focus on tech innovation?**

The advancements in the agriculture sector currently depend on the use of the latest technological interventions. We have deployed deep technologies such as machine learning, artificial intelligence and big data analytics to combat many of these agri challenges.

A few of them includes addressing the lack of cloud-free satellite imagery during peak vegetative stage of the cropping season, using machine learning to forecast crop yield and creating parametric modelling platforms for streamlining crop yield forecasting and estimation.

What makes us unique is our world-class GIS and remote sensing capability, highly experienced meteorologists and agriculture scientists. To deliver qualitative and timely results, we ensure that our team is equipped with the best-in-class software competencies.

## **How is your technology helping the marginalised farmers?**

Every year, the government declares the agriculture production – crop-wise, season-wise. There are millions of farms in India. However, the government can't measure the yield on each farm. Do you wonder how the government arrives at these estimates?

Every crop season, local governments undertake thousands of crop cutting experiments (CCEs) in each district for each major crop. In small patches of randomly selected fields, crop yield from a fixed area (say, 10mx10m) is carefully measured and recorded. Then such yields are averaged for each crop and district.

There are several problems with this approach. The first is that the limited number of samples often does not capture the huge farm-to-farm variability in yield. Secondly, insurance payouts depend upon area-level yields estimated by the above method, and there are pressures and vested interests on both sides to declare a higher or lower yield, so the veracity of the recorded yield is often in doubt. Additionally, carrying out these hundreds of thousands of CCEs each season is a complex exercise in project management which sometimes questions accuracy in results.

The agricultural production statistics in India have been a massive exercise in approximation and averaging, all the way from the village patwari to the sub-district officer, to the district office. The structure of the exercise hides pockets of distress (and averages it over a larger area), and the system is not institutionally geared to broadcast distress in real-time to decision-making levels, as the compilation of yield results takes months after the harvest.

There is potential to target the distressed farmers for their benefit. Currently, agrarian distress is being identified at a coarser level (district or tehsil), and proxy parameters such as farm size are having to be used for benefit transfers.

How we can help? RMSI Cropalytics can provide a list of distressed farmers by name and land survey number in near real-time as the crop season progresses.

This output is based on a methodology that integrates remote sensing satellite data, weather and hazard databases, historical yields and farmer land records, and involves complex artificial intelligence and machine learning-enabled data modelling. This methodology has been tested in our pilot studies.

Hence, our satellite technology-based yield estimation can significantly help in reducing the agrarian distress through effective identification of distress at a higher resolution in near real-time.

We have conducted Gram-Panchayat level yield estimation for the Ministry of Agriculture and Farmers' Welfare, Government of India. We have already extended the model to cadastre-level yield estimation. There is no other known method for cadastre-level distress identification in India that can be carried out state-wide, in near real-time.

**What kind of association do you have with the government (Central and states)? How can your technology help the government in making informed decisions regarding the agricultural sector?**

We have been fortunate to be selected by the Ministry of Agriculture and Farmers' Welfare (Government of India) for various projects benefitting the agriculture sector. Technology is now helping the decision makers in the government in more effective policy formulation and implementation.

We have helped the government in developing the methodology for technology-based crop yield estimation on a large scale and conducting actual yield estimation at Gram Panchayat level for several districts.

**How are your data driven technology and analytics solutions being effectively used by agricultural insurance companies, banks and financial institutions?**

Our expertise in providing end-to-end data analytical solutions empowers the decision makers of the agricultural insurance companies, banks and financial institutions. We provide the following services:

- Crop yield and acreage forecasts for both cropping seasons available at district, state or all India level for single or multiple crops
- Reinsurance strategy planning, portfolio risk assessment and risk pricing
- In-season tracking for near real-time monitoring of acreage, crop health and yield
- Premium calculator for efficient bidding
- Pre-season yield and acreage forecasts
- Verification of policy applications for early claim settlements

**What are your plans for the future in terms of new technologies and strategic expansion?**

We design our services to ensure better utilisation of funds for the social sector. At the moment, our team is designing a program for donors, foundations and social sector organisations. This shall help in identifying distressed farmers and agrarian distress hotspots.

Besides, we are helping farm lending agencies to map a loanee farmer's risk score at farm level, monitoring crop yield and providing banks /NBFC's with an assessment of repaying capacity in an advance.

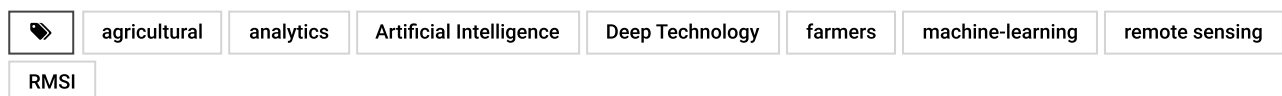
### **Is there any other significant factor you want to highlight?**

After the launch of Pradhan Mantri Fasal Bima Yojana (PMFBY) in 2016 and the Restructured Weather-based Crop Insurance Scheme (RWBCIS), India has become one of the largest crop insurance markets in the world with annual premium collections in the range of INR 35-40,000 crores.

The Ministry of Agriculture implements the complex program in 27 states/UTs. It involves multiple stakeholders from the enrolment of farmers to the claim disbursements. These include farmers, Central government, state governments, insurance companies, reinsurers, banks, insurance sales intermediaries such as common service centre (CSC) as well as allied inputs such as weather data providers and crop-yield estimators.

There are vast datasets in different silos such as insurance policy database, land records, cadastral maps, historical yields, historical weather data, farmer claims, and current season field progress as viewed from satellites. If all of these datasets are made to interact with each other, then the scheme implementation can be greatly streamlined and made more scientific and objective. Transparency will also benefit the distressed farmers.

*If you have an interesting article / experience / case study to share, please get in touch with us at [editors@expresscomputeronline.com](mailto:editors@expresscomputeronline.com)*



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