Cropin®

SPACE4GOOD

UNCOVERING THE GRAIN OF TRUTH:

How **CropLens** uses remote sensing and geographic information system technology to drive pest control in smart rice farming

Contents

Partnering with like-minded entities to build damage-resilient crops

Space4Good, in collaboration with Cropin, is working on '**CropLens**', a prototype early warning model for pests and diseases in a transplanted rice paddy that utilizes in-situ field observations, satellite data, and meteorological data together with AI. Bringing diverse experiences and skillsets to the table, the CropLens project has won the European funding via the Globalstars India funding mechanism as well as earned a **EUREKA label** supported by the Netherlands Enterprise Agency (RVO).

About Space4Good: An impact maker leveraging space technology

Space4Good is an innovative social enterprise utilising earth observation technology for social and environmental good. Combining **remote sensing**, **geographic information systems**, and **artificial intelligence**, we map, analyse and model complex ecosystems and support leading organisations and institutions on topics such as environmental crime detection, regenerative agriculture, tropical agroforestry management, humanitarian aid, and air pollution, and sustainable urban development.

By doing so we help impact makers on the ground to make more informed decisions, improve operational efficiency, create data-driven transparency and unlock new revenue sources such as carbon credits. We are a growing team of impact-driven astropreneurs pushing the boundaries of geospatial innovation together with amazing partner multinationals, NGOs, universities, and like-minded social startups like The World Bank, Rabobank, Arsari Enviro Industri, Amnesty International, Red Cross, and Ecosia.

Space4Good, is a certified Benefit Corporation (B.Corp) and Social Enterprise

Addressing challenges in rice farming using geospatial data analytics and Artificial Intelligence (AI)

According to estimates, farmers lose an **average of 37%** per annum of rice produce to pests and diseases, leading to substantial income losses

Various challenges are encountered by the farmers, such as the inability to:

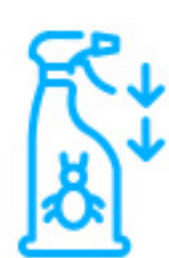- Predict the occurrence and severity of pests and disease spread

- Tackle the heterogeneous and fragmented characteristics of pest/disease infestation

- Make conventional field scouting methods inexpensive, easy, and quick

- Engage in early detection of pests and disease

- Drive an impactful and cost-effective mitigation process, which can considerably reduce the need for harmful pesticides and water contamination

As such, there is an emerging need to leverage agri-tech platforms of remote sensing (RS) & Geographic Information Systems (GIS), and AI applications for pest detection and disease mitigation.

The CropLens pilot study

Reinventing-and restoring-the rice agroecosystem with space technology at its core

For the prototype pilot, the crop data is being collected from seven districts (West Godavari, East Godavari, Nellore, Guntur, Krishna, Prakasam, and Chittoor) in the State of Andhra Pradesh, India, with a sample size of **500 farmers** in each season (Kharif and Rabi).

Farmers are selected using a **random sampling method**.

Objective #1: CropLens' crop classification model will help in the identification of paddy fields

End-goal: **The CropLens model can:**
Enable decision-makers, scientists, and also farmers to monitor and manage the paddy areas in a timely and sustainable manner

Paddy rice mapping is crucial for agricultural mitigation and food security as they allow for quantification of paddy rice production and subsequent pest and disease modeling

Objective #2: CropLens' spatial hotspot maps will generate reports on the distribution and severity of predicted pest and disease infestation

End-goal: **The CropLens model can:**
Empower farmers to make an informed decision and take proactive actions in preventing rice crop damage with real-time data at hand relating to pest and disease infestation

Objective #3:
A data processing pipeline and a prototype of the web interface will enable the end-user to track crop health

End-goal:
The CropLens model can:
Enable the end-user, a.k.a farmers and land managers, to track crop health and prevent undue loss

Objective #4:
Enable farmers to visualize crop risk

End-goal:
The CropLens model can:
Give a clear picture of crop risk using remote sensing (RS) & Geographic Information systems (GIS), and artificial intelligence (AI) technologies

Objective #5:
To provide insights and advisories to rice farmers in selected study areas on pest infestations and diseases

End-goal:
The CropLens model can:
Detect early warnings of pest infestations and diseases in transplanted rice

Offer real-time pest and disease (P&D) alerts and advisories to farmers for timely action and crop protection

Understanding how the tech works at the ground level (and the space level)

36%

58%

CropLens comes with in-built Remote Sensing (RS) & Geographic Information System (GIS) technologies, making it an excellent tool for identifying pest and disease infestation remotely.

Here's how the tool works:

Using **time-series satellite images**, CropLens identifies the paddy-grown areas in the region

CropLens identifies specific signatures of the likelihood of pest/disease infestation

The tool augments this information with the weather data

Improves modeling accuracy against certain weather conditions that favor infestation and facilitate spread
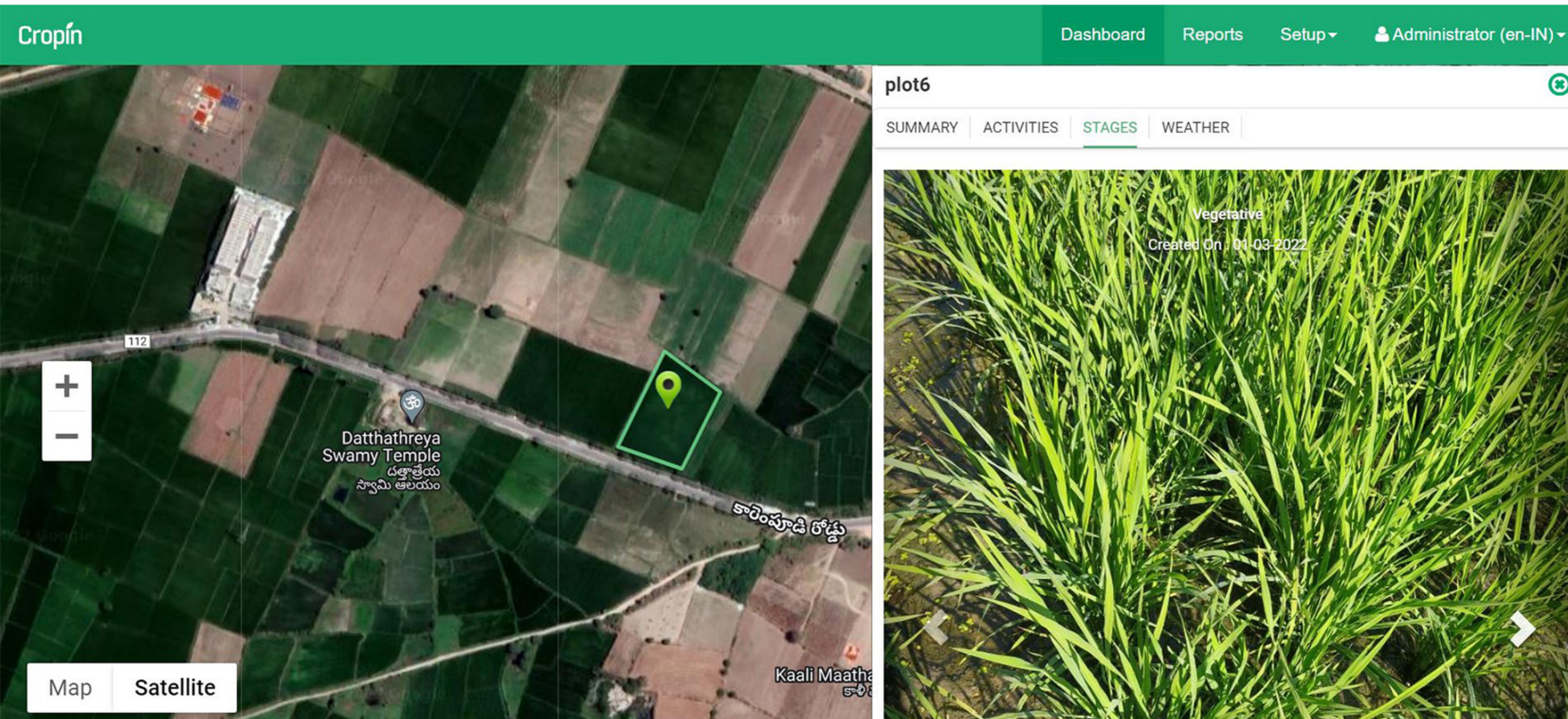
The takeaway: CropLens can emerge as the key to solving common challenges of pest infestation in rice farming.

The expected outcomes of
using space-tech for
productive smart rice farming
using CropLens

- **Crop classification maps** for classifying and identifying the acreage of different crops in the region

- **Spatial hotspot maps** portraying the distribution and severity of predicted pest and disease infestation

- A **data processing pipeline** and a **prototype of the web interface** will help farmers and land managers to:

| Keep track of crop health | Understand crop risk | Receive insights and advisories on how to proceed |

The 360-degree proposed benefits of satellite data for one of the biggest commodities in the world, rice

CropLens is a comprehensive early warning system that can offer synoptic coverage in fragmented agricultural landscapes. With this effort, CropLens envisages helping small landholding farmers to:

Enhance **crop productivity** and boost their **income**

Use satellite remote sensing data as an effective **replacement for ground surveys**

Employ **sustainable agricultural practices**

Save on **manual labor, time, and costs**

After completing this study and developing a successful pest and disease forecast model, it is predicted that smallholder rice farmers will enjoy a:

20% increase in productivity driven by yield improvement

15% reduction in fungicide expenses

The road ahead: Strengthening-and advancing-smart farming with tech-powered data and insights

CropLens will be scaled to multiple crop types and agricultural landscapes as the momentum grows and the training potential increases. Furthermore, there is immense potential for institutions and stakeholders (like insurance companies) to contribute to improved risk management—an integral component that is lacking within the scope of this project.

The inclusion of these entities will help with improved dissemination of the pest and disease risk estimates and advisories with the early adopters such as farmers, supply chain managers, governmental entities, and the entire ecosystem at large

About Cropin: A pioneer in agri-tech

Cropin, a pioneer in the Agri-tech space, is building the first most comprehensive global Intelligent Agriculture Cloud. Cropin's platform enables various stakeholders in the agri-ecosystem to leverage digitization and AI at scale, to make decisions that increase efficiency, scale productivity, and strengthen sustainability.

Cropin has worked with **250+ customers** and has digitized **16 million acres of farmland**, improving the livelihoods of more than **7 million farmers**. It has built the world's largest farming data insights over a decade, spearheading a global 'Ag-intelligence' movement with a knowledge graph of **488 crops** and **10,000 crop varieties in 56 countries**.

With its AI/ML platform tailor-made for the agriculture ecosystem, Cropin has computed **0.2 billion acres of farmland in 12 countries, covering 24 major commodities**.