



# Technological Innovations in Agricultural Financing

7th World Congress on Rural and  
Agricultural Finance



## Current Landscape

# Communication and information gaps plague the agri sector, limiting opportunities to scale investments and Services

### Key Technology



Satellites & Drones



Digital Applications - Mobile & Web Platforms



Regional connected databases - AI & Agri Sciences



IoT Sensors , Smart machines , blockchain

Combining Technology to bring real impact for farmers

- Adoption & awareness



Stakeholders are restricted by lack of precise and accurate data for Business decisions



### Producers & Producer groups

540 Million Farmers - 80% SMF

60 % of Farmers are Unbanked

Rising Risk & uncertainty due to Climate change  
Increasing Cost of Operations , reducing Margins

### Key Players



Financial Institutions



Insurance Sector



Seed & Agro chemical Enterprises



Governments & Social Development Agencies



Other Agribusinesses

**NEED** FOR UNIFYING  
TECHNOLOGY  
SOLUTIONS AT ONE  
PLACE

INTEGRATION WITH  
OTHER SYSTEMS

OPEN FOR CONTINUOUS  
INNOVATION WITH  
OTHER SERVICE  
PROVIDERS

# Intelligent Agriculture Cloud



## Cropin Intelligence

AI/ML models to process/extract critical intelligence that enables decision making on and off the field

## Cropin Data Hub

Raw and processed ingest data pipelines of structured agri-data from the field via apps, IoT devices, mechanization data, weather, remote sensing data from satellites through a common object model

## Cropin Apps

An integrated suite of applications enabling the digital transformation of human effort intensive on-field complex operations and scouting processes

# Need based Solutions for BFSI Sector



## Distribution Strategy

Intelligence led risk assessment for Geography selection

- # Regional Analytics
- # Relative scoring of geographies
- # Land Profile evaluation



## Pre disbursement Risk Assessment

Plot level understanding of Agriculture and Risk

- # Farm Agri worthiness
- # Past 6 seasons cropping pattern
- # Yield estimates
- # Climate Risk Forecasts



## Post Disbursement Monitoring

InSeason plot monitoring on crop performance - Reduce Supervision Cost

- # In Season Yield prediction
- # Harvest Window prediction
- # Cropping pattern change
- # Crop Health



## Farmer Engagement

Direct Farmer Outreach , Farmer Groups

- # Climate risk advisory
- # Market Intelligence
- # Add-on services to Farmer
- # Embedded Finance

Better Targeting

Informed Customer selection

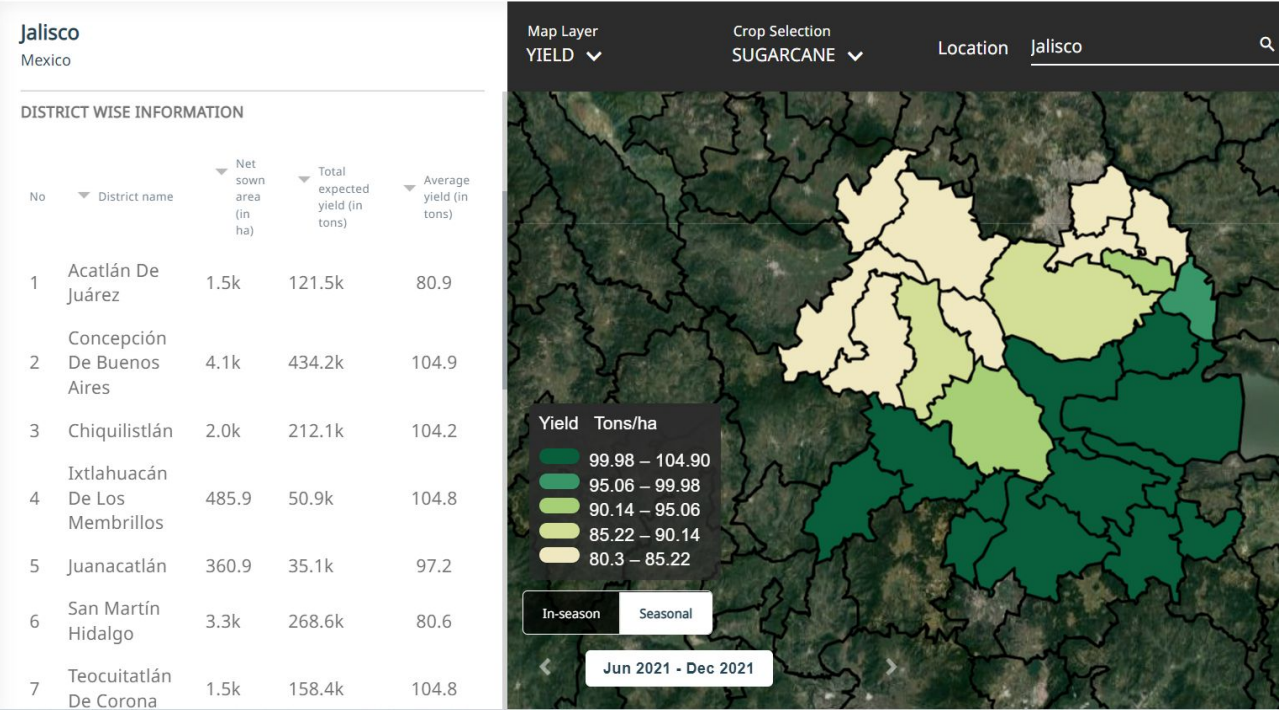
Reduced Supervision Cost

Effectively engage farmers

How do we do it...



# Regional Intelligence for Planning & Target Setting



Sugarcane, 25 Districts of Jalisco. Mexico

USERS : NATIONALISED BANKS AND CREDIT RATING AGENCIES

INSURANCE : NATIONAL INSURANCE SCHEME OF GOVT OF INDIA - PMFBY



## Solutions

 Nation-wide reliable & granular intelligence

 Crop , Yield , Climate , Pest and Disease Hotspots

 Priority value chain financing based on Market Opportunities

 Monthly Analysis for Risk assessments

## FARMER & FARMER GROUP SELECTION & ONBOARDING

- Mobilising of Field Team in Areas of Interest to generate leads
- Leverage Existing Geo Tagged Customer Datasets

**Harvest Receipt**  
Farmer Name

| Grade Name                  | Quantity      | Unit Price | Amount        |
|-----------------------------|---------------|------------|---------------|
| Tomato-Hybrid               |               |            |               |
| Superb Grade top in class A | 120 kg        | 100        | 12,000        |
| Grade B                     | 120 kg        | 100        | 12,000        |
| <b>Total</b>                | <b>240 kg</b> |            | <b>24,000</b> |

SGST 0.97 % ₹234

**ADD TAX**

**Total Harvest Price ₹24,234**

Debit for XYZ 1 ₹240

**ADDITIONAL COST**

**Total Price ₹24,474**

Amount Paid ₹24,000

**To Pay ₹474**

SKIP COST

Cancel Next

**Asset/CA/CU Name**  
Asset Name | CA Name

Trip Plan

Step 1 Step 2 Step 3

**Select Batch Number**

Search Farmer, Asset & Batch Number

☒ A4365EXZ876509  
Chilli - Arkavardhan  
Collected On - 08/05/2019  
Farmers - 5 DETAILS ✓

☐ A4365EXZ876509  
Chilli - Arkavardhan  
Collected On - 08/05/2019  
Farmers - 5 DETAILS ✓

☐ A4365EXZ876509  
Chilli - Arkavardhan  
Collected On - 08/05/2019  
Farmers - 5  
Plots - 10  
Total Area (Acres) - 28  
SKU Type - Black Box - 1x180KG  
No. of SKU(s) - 4  
Quantity (TONNES) - 20 SHOW LESS ^

CANCEL CONFIRM

Close Task

Back Submit

**Receive Harvest**

Crop variety  
**Brown - Bullet (Rice)** View Task

Grade: **A1 Grade**

Harvest Quantity: **293 Kg**

Harvest Date: **29 Jan 2022**

**Collection Details**

Standard Deduction - 10 %

Location **Wonderland**

**Harvest Details**

| SKU Type                    | Recieved Qty. (kg) | No. of SKU(s) | Net Qty. (kg) |
|-----------------------------|--------------------|---------------|---------------|
| Box (5m x5m) long long name | 293                | 100           | 263.7         |
| <b>Total</b>                | <b>293</b>         | <b>263.7</b>  | <b>293</b>    |

Cancel Next

### Database Creation

Targetting farmers based on region and Performance

### Farmer Scouting

Cutting Plan Resources Trips

### Loan Origination

Complete Digital Farmer and Land Profiling , Other KYC

### In Season Asset Monitoring

Schedule Tasks based on Crops and Risk

### Recovery Intimations

Using Remote sensing based harvest & Recovery Alerts

# Credit Risk Evaluation - Historic Performance

| Agriworthiness Report            |               |                             |           |                     |                                    |                                      |                          |                       |              |
|----------------------------------|---------------|-----------------------------|-----------|---------------------|------------------------------------|--------------------------------------|--------------------------|-----------------------|--------------|
| Season Data Summary              |               |                             |           |                     |                                    |                                      |                          |                       |              |
| (a) Sep 2020 - May 2021 (Rabi)   |               |                             |           |                     |                                    |                                      |                          |                       |              |
| Land Usage Category              | Crop          | Crop Detection Reliability* | Area (ha) | Crop Family         | Crop Family Detection Reliability* | Estimated Yield (ton/ha) (min - max) | Reference Yield (ton/ha) | Relative Growth Index | Water Stress |
| Non-Agriculture Land             |               | -                           | 0.57      | -                   | -                                  | -                                    | -                        | -                     | -            |
| Agriculture                      | Banana        | Low                         | 0.04      | Fruits              | Low                                | 0.0 - 0.0                            | 50.0                     | ● Medium              | Mild         |
|                                  | Sugarcane     | Medium                      | 0.33      | Sugar crops         | Medium                             | 40.2 - 54.38                         | 82.82                    | ● Medium              | Mild         |
|                                  | Crop unknown  |                             | 2.3       |                     |                                    | 0.0 - 0.0                            | -                        | ● Medium              |              |
| (b) May 2020 - Oct 2020 (Kharif) |               |                             |           |                     |                                    |                                      |                          |                       |              |
| Land Usage Category              | Crop          | Crop Detection Reliability* | Area (ha) | Crop Family         | Crop Family Detection Reliability* | Estimated Yield (ton/ha) (min - max) | Reference Yield (ton/ha) | Relative Growth Index | Water Stress |
| Agriculture                      | Red grams     | High                        | 0.18      | Pulses              | High                               | 0.97 - 1.31                          | 1.01                     | ● Medium              | Mild         |
|                                  | Finger millet | Medium                      | 0.08      | Cereals and millets | Medium                             | 1.01 - 1.37                          | 1.06                     | ● Medium              | Mild         |
|                                  | Crop unknown  |                             | 0.36      |                     |                                    | 0.0 - 0.0                            | -                        | ● Medium              |              |
|                                  | Banana        | High                        | 0.04      | Fruits              | High                               | 47.81 - 64.69                        | 50.0                     | ● Medium              | Mild         |
|                                  | Paddy         | High                        | 2.01      | Cereals             | High                               | 2.16 - 2.92                          | 2.26                     | ● Medium              | Mild         |
| Non-Agriculture Land             |               | -                           | 0.57      | -                   | -                                  | -                                    | -                        | -                     | -            |

Company Logo

Agriworthiness Report

Reference Code

23876534

Survey Numbers

22

Report Generated On

09 May 2022 18:30:56 IST

1. Survey Number 22

Survey Number Score :

36.29 / 100

Village **Pune (M Corp.)**

Taluka **Pune City**

District **Pune**

State **Maharashtra**

Plot Area(in ha)

Plot Co-ordinates (lat,long)

3.27

18.53819816750128,73.7795460129744

Comments

Google

Imagery ©2022 CNES / Airbus, Maxar Technologies

\*Plot boundary is mapped based on the coordinates procured by government land record department.

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CONFIDENTIAL

Powered By Cropin

## Farm Level Agri worthiness

### Last Six Season Crop Report analysed by Cropin AI:

Season wise details of plots including %age of fallow vs cultivated land, water stress, identification of crop boundaries, crop identification as well as yield estimated, Water stress , Risk Score etc.

# Post Disbursal Asset monitoring



SmartRisk™  
ver 1.0

Q Bahubali



Map



Dashboard



History



OVERVIEW



CROPS



PLOTS



LAND USE



FARMERS

India - Maharashtra - Kolhapur -  
**Bahubali**



Total plots

**2000**

Total net sown area

**779.5 ha**

Largest Plot

**12.9 ha**

Smallest plot

**0.1 ha**

Crop varieties

**7**

Farmers

**2000**

CROP COLOR AND NAME



Grapes



Crop Not Detected



Chickpea (Bengal Gram)



Wheat



Maize



Ageratum



Babycorn

View Dashboard

REGIONAL ANALYSIS

Powered by Cropin

Bahubali

300 m

N



2019 JAN

Leaflet



Type here to search



18:57

26-09-2019



# Post Disbursement Asset Monitoring - Reducing Operational Costs

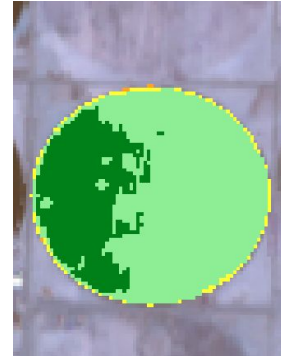
**Farmer:** John  
**Farm:** Potato Field 1  
**Variety:** Kennebec  
**Farm size:** 100 acres

**Expected Production (Tons):** 1800  
**Expected Harvest Date:** 26th May 2022  
**Crop progression:** 83.27%  
**Stage:** Developed tubers (dia: > 5cm)

## Greenness

Stress due to various extreme conditions including, pest & disease attack / nutritional deficiency.

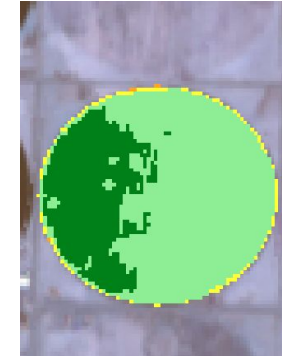
Please scout



## Nitrogen Uptake

Lower chlorophyll content majorly due to nutritional deficiency.

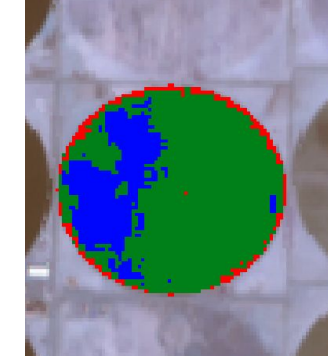
Requires nitrogen fertilization



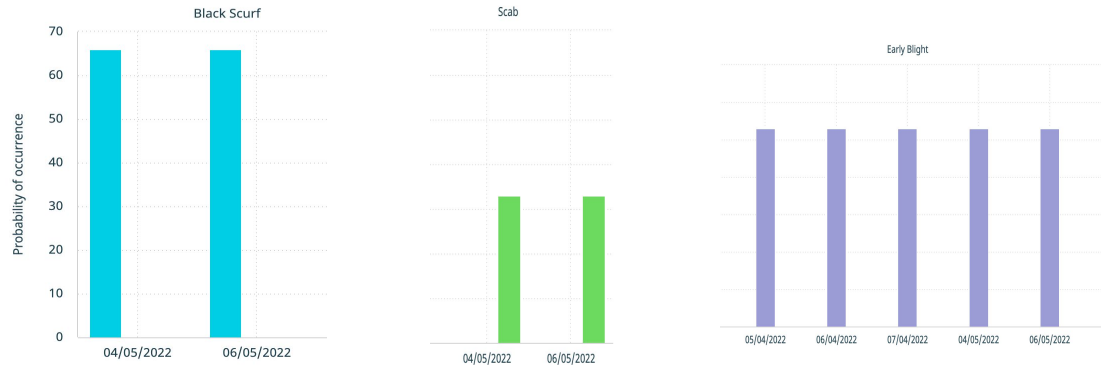
## Water Stress:

Low water content in the crop canopy.

Need attention to supply water



## Possibility of Black scurf, scab and blight on the farm in the coming week!



## Crop progression

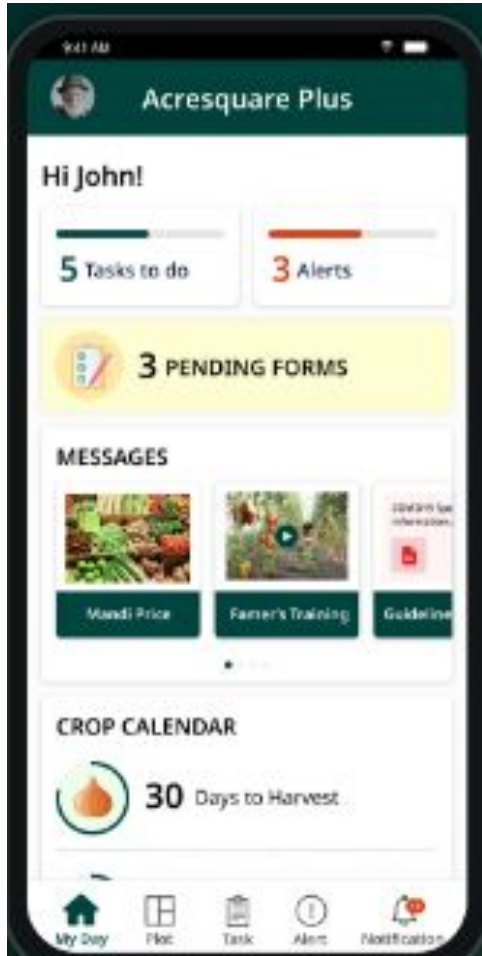


## A farm level view

“Actionable” insights from Cropin knowledge graphs along with threshold base indices like NDVI, LSWI, NDRE, EAI etc.

# Farmer Connect

## Acre Square Plus to connect directly with Farmer

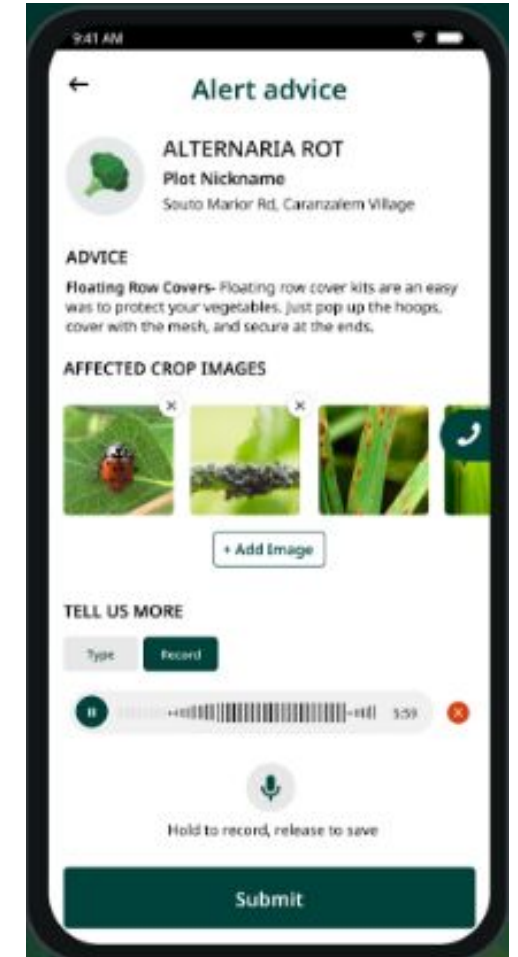


**Embedded Finance** - Digital lending to Farmers associated with Cropin's partner for farm working capital requirement

**Collections outreach for Repayment** - Direct connect of FIs with borrower for timely collections alerts and follow ups.

**Sales Campaign for Borrowers** -  
# Targeted Customer specific sales campaign like for Progressive farmers  
# Cross sell and upsell Loan products and partners product

**Add-on Services to Borrower Farmers** -  
# Access to Agri Advisory services and Agronomist connect as an add-on  
# Crop Health monitoring access to farmer as an add-on



## Climate Smart Agriculture Advisory - WEATHER , PEST & DISEASE EARLY WARNING



SmartFarm™

ver 2.4









8/10

The Chilli Project






<

Climate Smart Advisory



High Precipitation Alert

High precipitation expected in next 15 days. Please cover your pot and stop irrigation because of bad weather...

show more

1 Plot affected



Root Moisture Alert

High precipitation expected in next 15 days. Please cover your pot and stop irrigation because of bad weather...

show more

1 Plot affected



18 / 200

Open Alert on 11 Plots



09 / 15

Weather Alert on 9 Plots



127 / 12937

Not As Planned on 93 Plots



21%

Less Harvest Estimated on 32 Plots

High Precipitation Alert

×

Details

Plot



Crop Stage : Sowing

Location : Bengaluru

MESSAGE

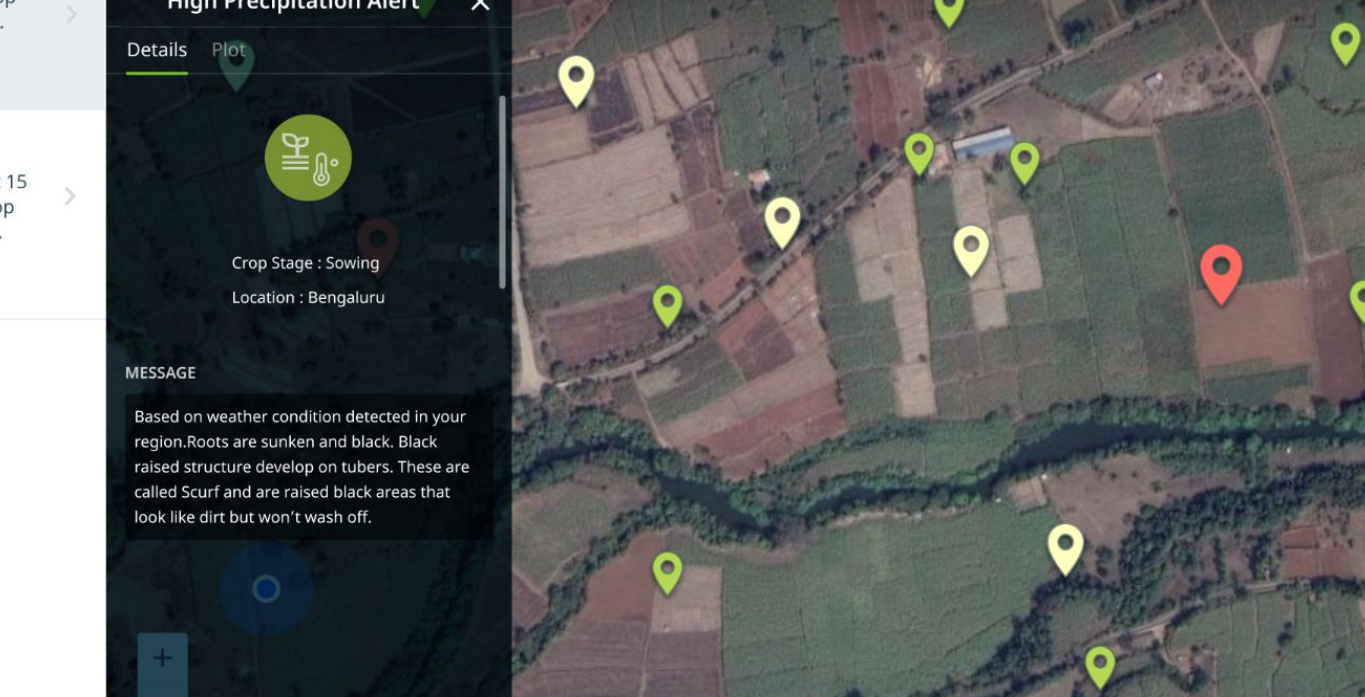
Based on weather condition detected in your region. Roots are sunken and black. Black raised structure develop on tubers. These are called Scurf and are raised black areas that look like dirt but won't wash off.

+

-

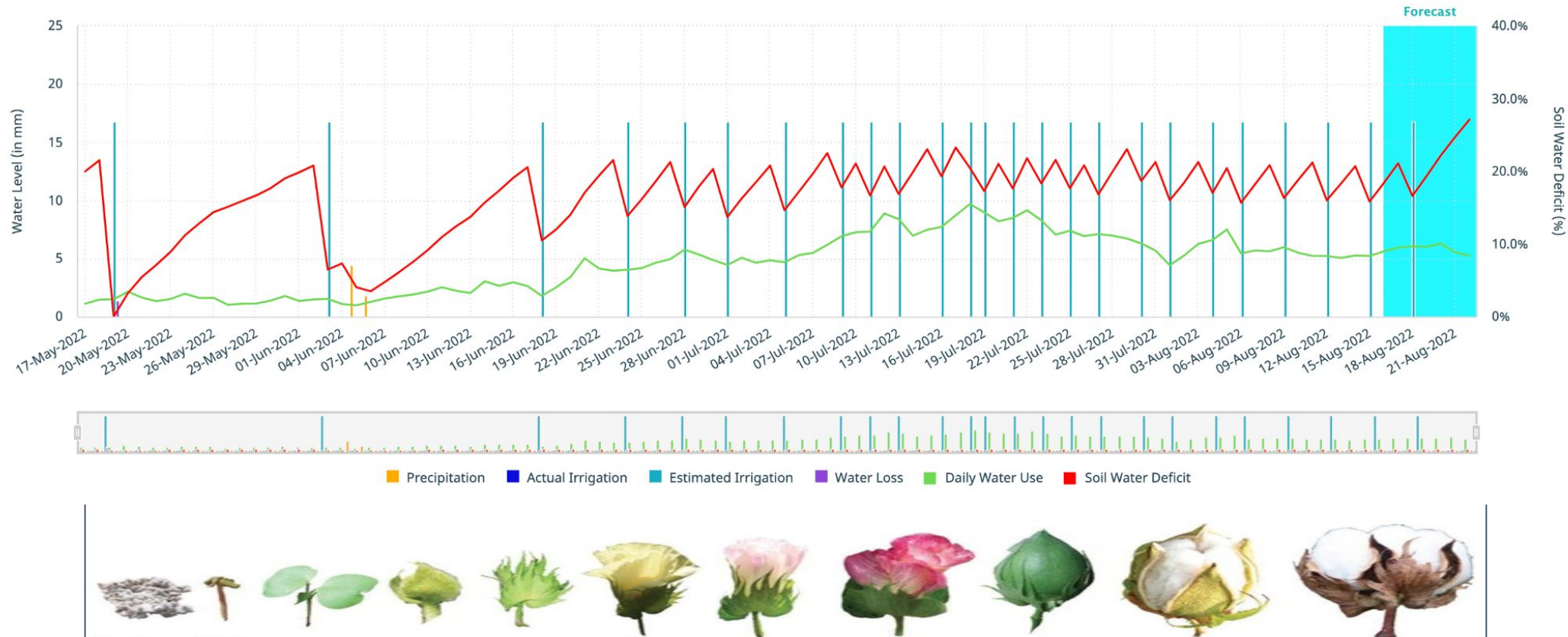
Map

Satellite



# Supporting Sustainable Agriculture - SMART IRRIGATION

**Smart Irrigation system** – Since we have limited water and soil type varies between plots, we would need a system where we know how our fields are doing relative to each other (on moisture levels), so that the water received can be most equitably distributed. A plot wise distribution algorithm is created for achieving this goal. Early results have shown 30% Savings of water



# MONITORING DASHBOARD



Sustainability Targets



Manage Projects



Configure



Admin Set up

All Regions

W. Africa

Europe

M East

SW Asia

03



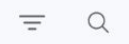
Olam Ivoire Sarl

Project ID:  
GH562-AS8902

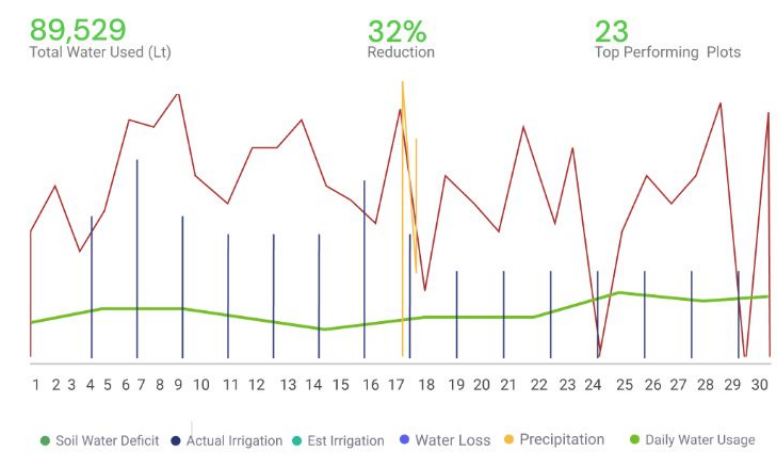
Location:  
Abidjan, Côte d'Ivoire

Acrage:  
345 Ha

Crop:  
Coffee



## Irrigation Analysis



## Deforestation

All Crops

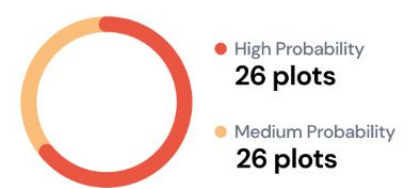
Year on Year change in Forest Cover as per Remote Sensing (LULC)



## Crop Health



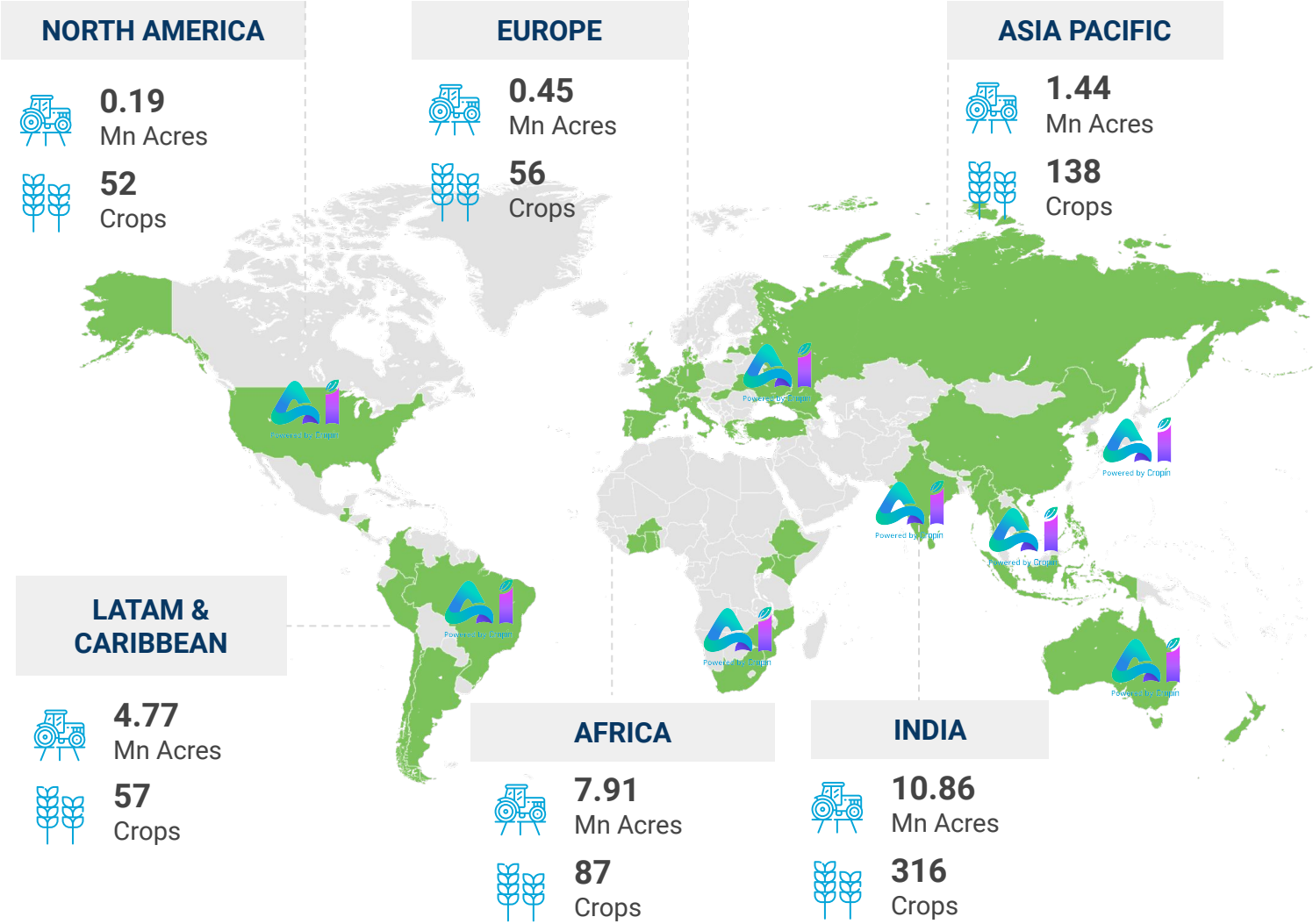
## DEWS Summary



## Harvest Tracker



# CropIn Journey ( 12 Years )



## Global Scale





# Every Farmer counts.

[Kunal@cropin.com](mailto:Kunal@cropin.com)

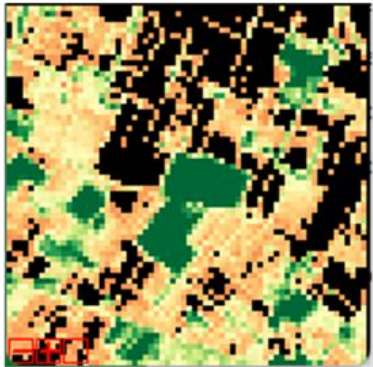


[www.cropin.com](http://www.cropin.com)



# Supporting Sustainable Agriculture - CARBON & GHG

NBR time series Sep.-Dec. 2021, Punjab



Cumulative burnt area map  
Oct.-Dec. 2021

**Black:** Burnt scars accumulated throughout the period

**Green:** Areas permanently green throughout the period

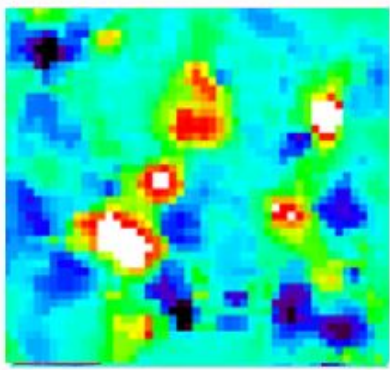
**Yellowish/orange:** Harvested plots

## Stubble burning - Normalised Burn Ratio

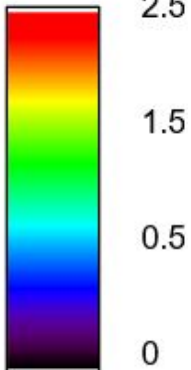
Rice paddies



Methane process



Methane index



## Methane emissions in Paddy

- Detection module to correlate with methane (Ch4) emissions.
- Quantifying N2O Emissions Reductions in Agricultural Crops through Nitrogen Fertilizer Rate Reduction (Nitrogen (N2) Uptake Model)
- Cover crop/ bare soil detection
- Biomass carbon storage based on phenological stage estimation (GDD or NDVI).
- Agroforestry advisories
- DEWS-Risk of Disease incidence for looking of reduction of pesticides and insecticides (impacts carbon emission)
- Crop Residue Management