

Capacity Building Seminar in Crop Insurance

Mumbai

26th Sep 2019

Services for Farmers- Insurance product
design for contract farming and value-added services

MR. SONU AGRAWAL
Founder and MD





WRMS is a hyper innovative agriculture risk and outcomes management company.



Founded in 2004 we have built a sterling reputation in creating transgenerational value in agriculture for our clients, partners and farmers around the world.

FACTS

Founded
2004

Investors
UPL
SIDBI / IIT

Team
300+ scientists,
engineers &
mavericks

FOOTPRINT

Asia

India
Bangladesh
Philippines
Cambodia
Sri Lanka

Americas

United States
Brazil
Mexico

Africa

South Africa
Tanzania
Rwanda
Zambia
Mozambique

Australia

New Zealand

Europe

Germany
France

VISION

Our vision is to *secure smiles* for farmers worldwide by using analytics, technology and innovation in insurance to guarantee agriculture outcomes

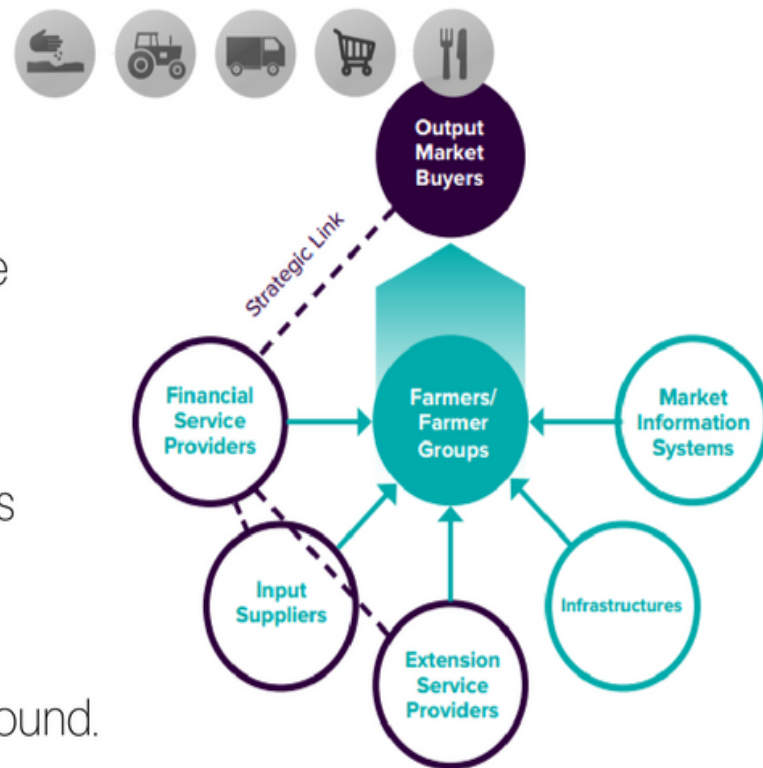
Securing Smiles®

THE SECRET OF THE AGRICULTURE VALUE CHAIN

INFORMATION

ASYMMETRY

- 01 Discover, Crunch and Integrate agriculture information in agriculture value chains worldwide.
- 02 Draw Insight for decision making.
- 03 Craft insight driven business models anywhere in the value chain anywhere in the world.
- 04 Execute complex models on the ground.



The ability to **aggregate information** rapidly, draw **deep insight** & drive fact-based interventions across the agriculture value chain separates the best in class stakeholders from the field.

Case Study: Potato, West Bengal

Challenges faced by Potato farmers in Bankura, Hooghly and Bardhaman in Bengal

- High rejection of produce by procurers
- Small land holdings and field size limitations leading to cultivation constraints
- Low and volatile productivity due to lack of machinery and on-farm support
- Improper crop planning due to lack of right information, leading to losses



Challenges

Pepsico-Case Study



Background

- PepsiCo requires high grade potato for its potato chips
- It procures it through contract farming in Bengal - Bankura, Hooghly and Midnapore
- PepsiCo provides seeds and a pesticide kit to the farmers who would then take up the cultivation of potato
- The final produce is checked for the quality standards set by PepsiCo

Challenges

— Pepsico-Case Study



Problems with the Bengal Potato

- 1. Small size of yield
- 2. Greenish colour of produce
- 3. High sugar content
- 4. High water content

Major Reason

1. Small size of ridge and low plant to plant distance which affect the ergonomic practices
2. Lack of right nutrition for the plant

Farm Yield & Income Assurance Solutions

Example Termsheet



Potato Yield Management and Assurance Services –Termsheet

Purpose	<ul style="list-style-type: none">WRMS will provide farm advisory and technical assistance (details in annexure) to improve farm yieldIn case the actual farm yield turns out to be lower than the promised level due to incorrect technical assistance, error and/or negligence, WRMS will compensate for the cost incurred by the farmer in proportion to shortfall in the farm yield vis-à-vis the promised level subject to other terms and condition stated below
Land details (land record details, Address)	Farmers located in Bankura, Midnapore and Hooghly GP & Block list given in Annexure IV
Crop (with variety details)	Crop: Potato Variety: Atlanta (FC-3) Date of Sowing: 30 October (\pm 7 days); Harvesting: 90-110 Days after Sowing
Maximum Liability	On a Per Farm basis Max (Yield Shortfall* Cost C2 ,0); where Yield Shortfall = (Yield Threshold- Actual yield)/ Yield Threshold Yield Threshold: 8000 kg/acre Cost of Cultivation (Cost C2) = Rs. 40,000 Rs/acre
Fees for Assurance & Technical Services	10% of Cost of Cultivation
Example Claim calculation	Actual Yield: 7000 kg/acre Yield Shortfall= (8000-7000)/8000= 12.5% Compensation = 12.5% *40000 = Rs. 5000/ acre

Incentive & Penalty Structure- Farm Based Product



Example

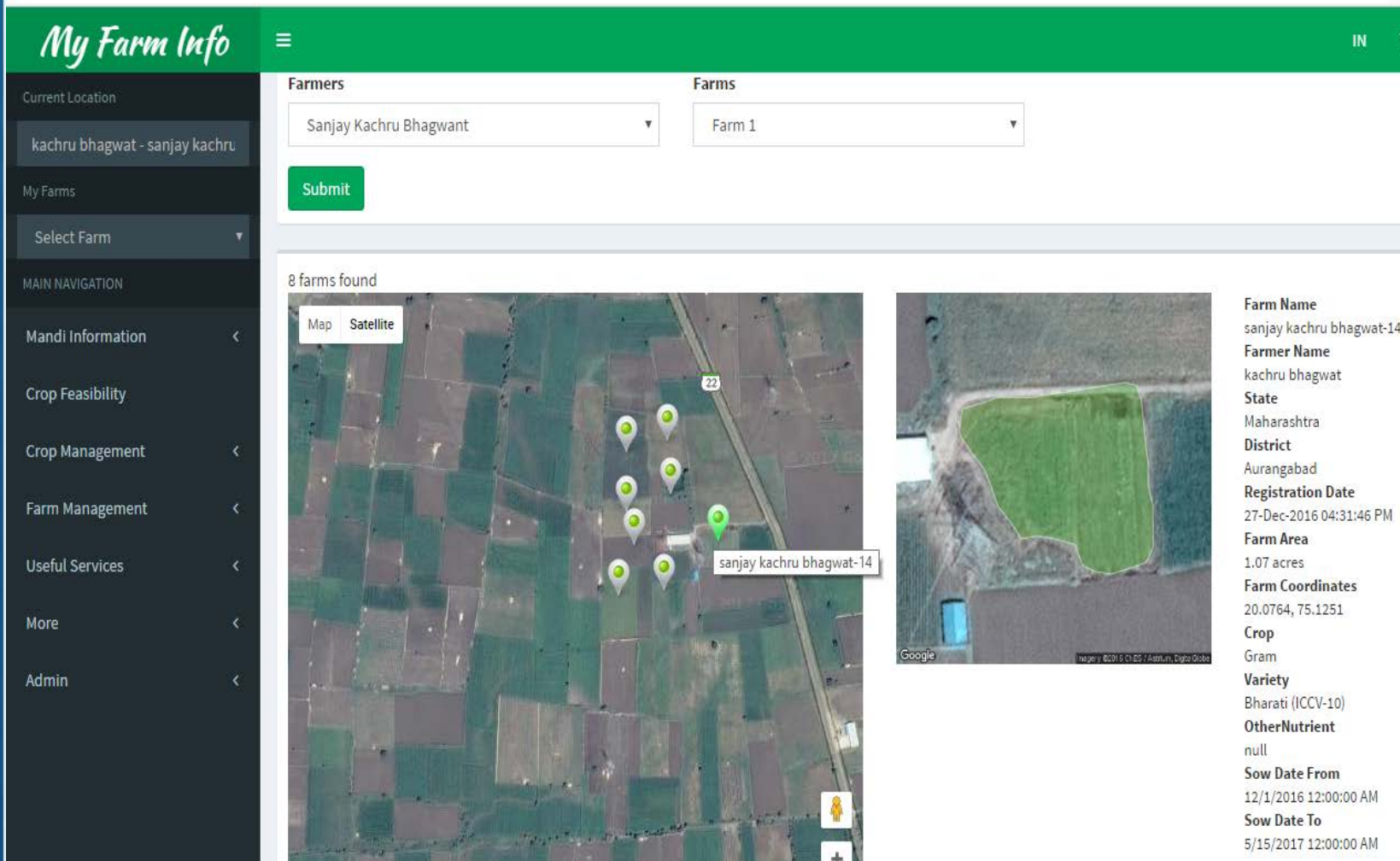
Critical Step	Incentive (increase in Threshold yield in kg/acre)	Documents Required *
Soil treatment	200	Bill or purchase receipt of the recommended Chemical with quantity and price mentioned
Sowing of recommended seed varieties & Seed Treatment	300	Bill or purchase receipt of the recommended seed variety with quantity and price mentioned
Application of Fertilizer	200	Bill or purchase receipt of the fertilizers with quantity and price mentioned
Pesticide & Weedicide application	500	Bill or purchase receipt of the pesticides with quantity and price mentioned; geo tagged photograph of pesticide application in the covered farm through WRMS smart phone app
First Irrigation	500	Geo tagged photograph of applying irrigation in the covered farm through WRMS smart phone app

Penalty: 15-30% depending on the critical steps not followed. In case the major critical steps are not followed policy will be cancelled with prior intimation.

*Geo-tagged picture of seed/soil treatment and irrigation/fertilizer/pesticide/weedicide application in the covered farm to be sent by farmer on WRMS smart phone app.

Farm Services Solutions

1. Locating the field



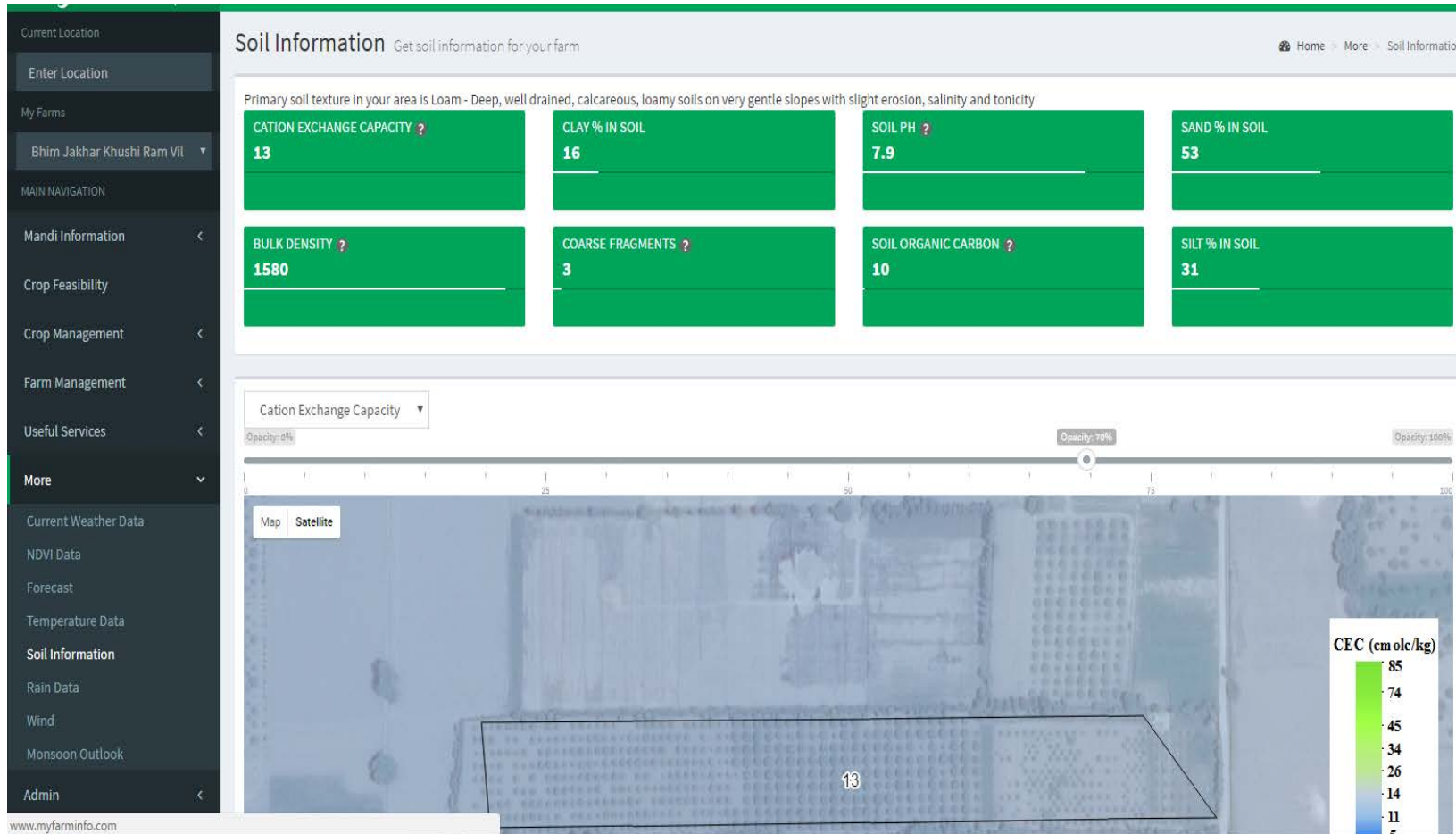
The screenshot displays the 'My Farm Info' web application. The top navigation bar is green with the text 'My Farm Info' and a hamburger menu icon. Below this, there are two dropdown menus: 'Farmers' (selected: Sanjay Kachru Bhagwat) and 'Farms' (selected: Farm 1). A green 'Submit' button is positioned below these menus. The main content area shows a map with 8 farms found, indicated by green location pins. One pin is highlighted with a tooltip that reads 'sanjay kachru bhagwat-14'. To the right of the map is a detailed view of the selected farm, showing a satellite image of a green field. Below the map and image, a list of farm details is displayed:

Farm Name	sanjay kachru bhagwat-14
Farmer Name	kachru bhagwat
State	Maharashtra
District	Aurangabad
Registration Date	27-Dec-2016 04:31:46 PM
Farm Area	1.07 acres
Farm Coordinates	20.0764, 75.1251
Crop	Gram
Variety	Bharati (ICCV-10)
OtherNutrient	null
Sow Date From	12/1/2016 12:00:00 AM
Sow Date To	5/15/2017 12:00:00 AM

The Potato farmer is geo-tagged for his field, precise details of which can be viewed by just hovering over the location on myFarmInfo

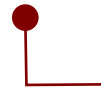
Farm Services Solutions

2. Providing soil information



We also provide a comprehensive soil information of the field like cation exchange capacity, clay content, soil PH, etc. so that the farmer can take best cultivation decisions.

Farm Services Solutions



2. Ensuring crop nutrition



My Farm Info ☰ IN 🛒 NAFA

Current Location
Enter Location

My Farms
Select Farm ▼

MAIN NAVIGATION

Mandi Information <

Crop Feasibility

Crop Management ▼

Pest and Disease <

Nutrition

Weed

Nematode

Water

Farm Management <

Useful Services <

Nutrition Management

Get essential nutrition information for your farm 🏠 Home > Crop Management > Nutrition Management

Input

Crop: Paddy ▼ Season: Kharif ▼ Soil: Loamy ▼ Irrigation: Good Irrigation ▼ Nutrition Status: Fertile ▼

Submit

NITROGEN
Four equal split application during basal, tillering, panicle initiation stage and heading stage of 130 kgs of N/ ha

PHOSPHORUS
Basal application of Phosphorus through SSP or DAP of 45 kgs/ha

POTASSIUM
Four equal split application during basal, tillering, panicle initiation stage and heading stage of 40 kgs/ha

MICRONUTRIENTS
Apply 12.5 kg of zinc sulphate mixed with 50 kg dry sand just before transplanting

SOIL RECLAMATION
Apply 500 kg of Gypsum /ha at last ploughing

FYM APPLICATION
Apply 10t/ha of FYM or compost, or 5t/ha of green leaf manure before ploughing

We provide the information for temperature, rainfall/humidity and wind even via SMS. The picture above shows our Automated Weather Station which collects all the weather data and sends to our remote server.

Farm Services Solutions



3. Irrigation Management

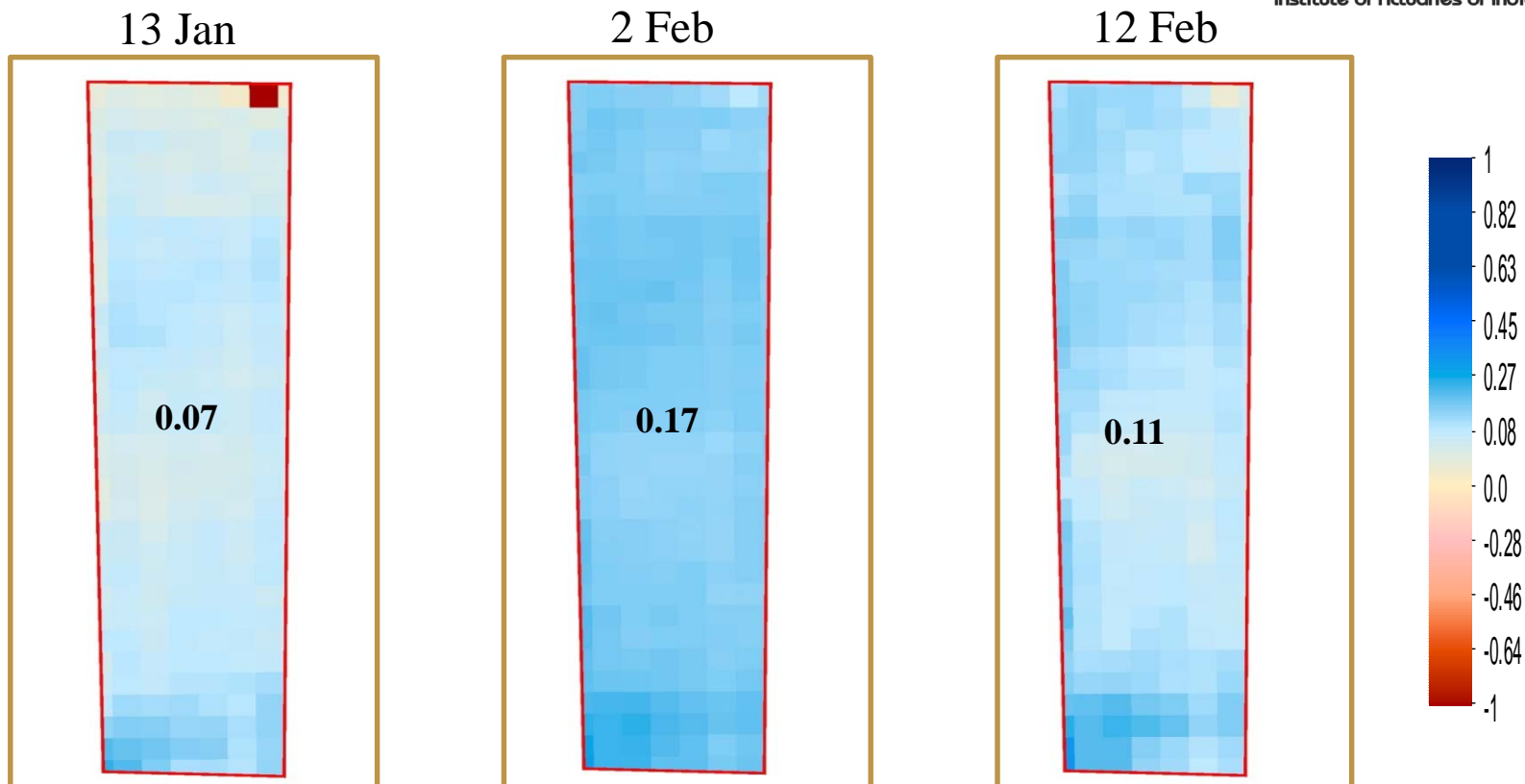


**Soil
Moisture
Sensors
planted in
the Potato
fields**



Farm Services Solutions

3. Irrigation Management



The above pictures show the soil moisture situation on the Potato farm. We also have the information about the on-field irrigation schedule of the farmer. This information can be productively used to plan the cultivation. The farmer is also advised about the right irrigation schedule to be followed .

Farm Services Solutions

4. Mechanized Sowing and Harvesting

The figure to the left top shows the mechanized potato planter.

- The machine builds ridges and plants the potato seeds inside the soil.
- Every Potato is tracked through a GPS chip attached to it. Figure to top right presents the layout

The figure on the left bottom shows the mechanized potato harvester.

- The machine digs into the soil and churns out the fully-grown potato which is then collected on a vehicle



Farm Services Solutions



5. Providing weather data and forecasts

We provide Latest weather Data and Forecasts for Temperature rainfall, Humidity And wind. We also Provide Historical Data for all These parameters



iNGEN Automatic Weather Station Data

Date	MaxTemp	MinTemp	Rain	HumidityMor	HumidityEve
2017-02-01T00:00:00	20.28	9.09	0	95.77	78.77
2017-02-02T00:00:00	20.68	8.69	0	84.27	61.17
2017-02-03T00:00:00	21.18	8.69	0	87.77	61.37
2017-02-04T00:00:00	25.08	10.99	0.3	72.27	47.97
2017-02-05T00:00:00	19.28	6.9	0	100	74.77
2017-02-06T00:00:00	20.83	6.9	0	57.99	38.59
2017-02-07T00:00:00	22.73	8	0	72.89	36.39
2017-02-08T00:00:00	22.63	8.4	0	49.99	40.29

We provide latest weather data and forecasts for temperature, rainfall, humidity and wind. We also provide historical data for all these parameters

Farm Services Solutions

5. Providing weather data and forecasts

Sat, 25/03/2017

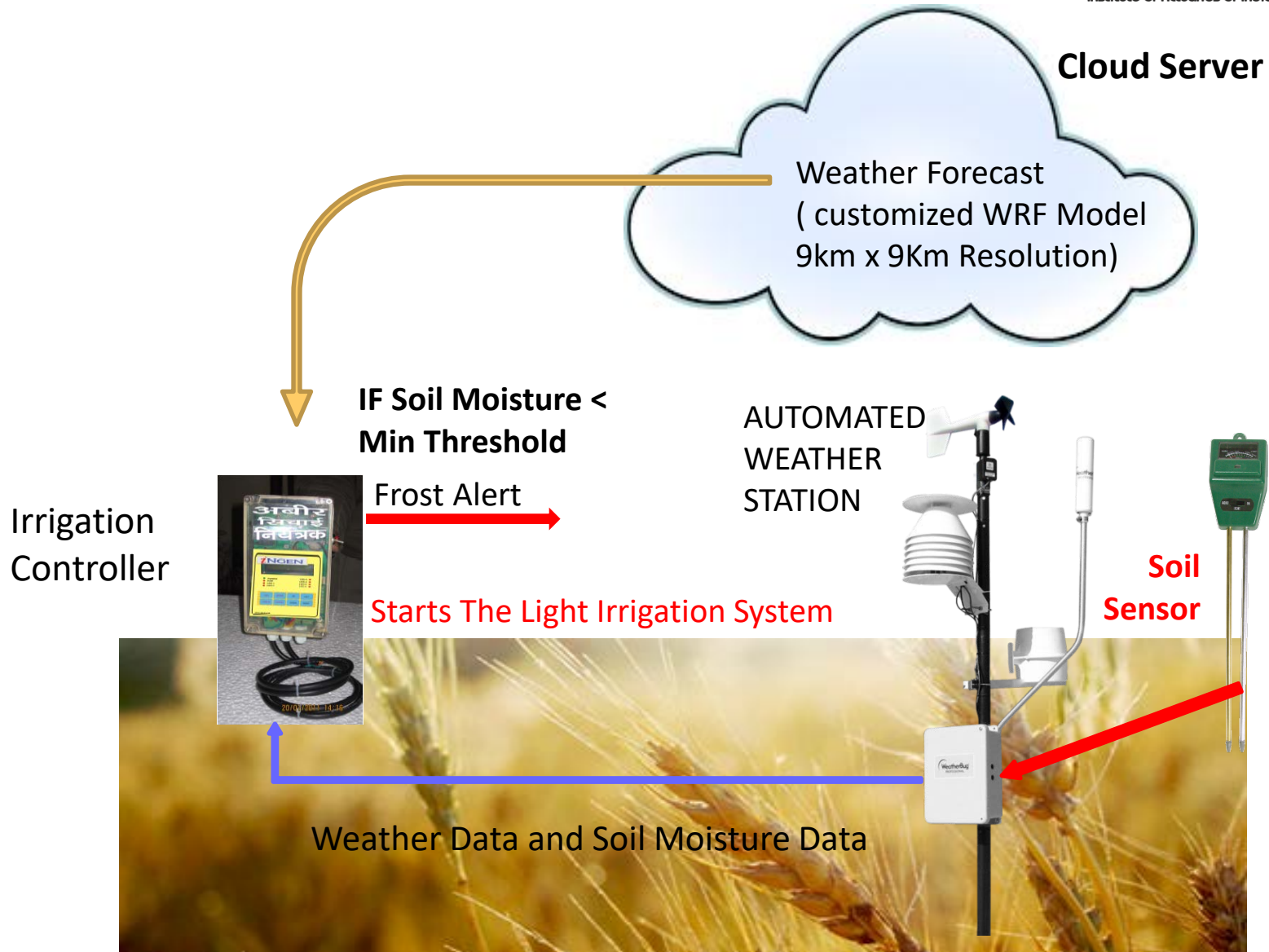


তোমার এলাকায়
ধসা রোগের জন্য
আবহাওয়াটি
উপযুক্ত নয়. দয়া
করে পেপসিকো
কৃষিবিদের দ্বারা
প্রদেয় স্প্রে
তালিকাটি অনুসরণ
করুন।

13:29

We provide the information for temperature, rainfall/humidity and wind even via SMS. The picture above shows our Automated Weather Station which collects all the weather data and sends to our remote server.

Frost Management By Automated Irrigation



Farm Services Solutions

6. Checking crop diseases

Log New Request

Resolve Requests

Send Resolutions 0

On Hold

Report

Drafts 0

Utilities

Overview Map

Pending Requests

Phone No.	Name	Crop	Location	Image	Conversation	Action	Delete
7760776284	Dyamappa	arecanut	Hosadurga,Chitradurga,Karnataka,India		<p>Shivani 14 Jul 2016 05:48 PM Identify the disease</p> <p>Karthik 16 Jul 2016 12:48 PM Image not clear. Please clear image of the crop</p>	Move	
8553933357	No name	Wild badhami			<p>Shivani 16 Jul 2016 05:03 PM Wild badhami two year old... it stars drying.... sir what may be the reason ?</p> <p>Pradeep 12 Aug 2016 06:58 PM</p>	Move	
9480751606	Manjunath K Bailhongal	Coconut	Belagavi,Karnataka,India		<p>Shivani 19 Jul 2016 10:47 AM Identify the disease.</p> <p>Pradeep 12 Aug 2016 06:34 PM Will get back to you with solution from</p>	Move	

1. The farmer can easily send a crop related query to our WhatsApp Number and receive a timely feedback for improvement
2. The figure to the right shows a spraying machine used to spray plant nutrients in a Potato field



Farm Services Solutions



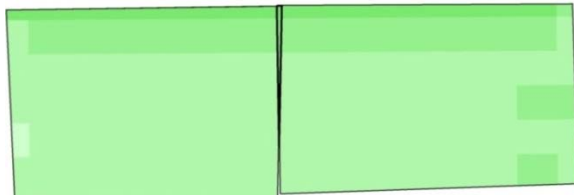
Institute of Actuaries of India

7. Analyzing Crop Situation

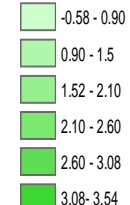
S -1

Chlorophyll

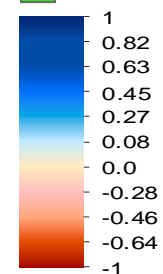
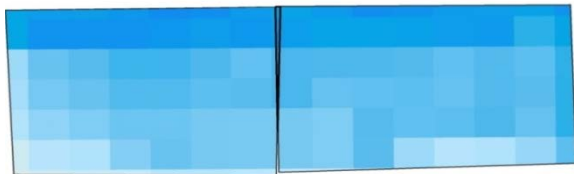
S-2



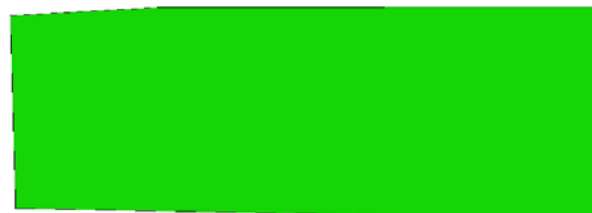
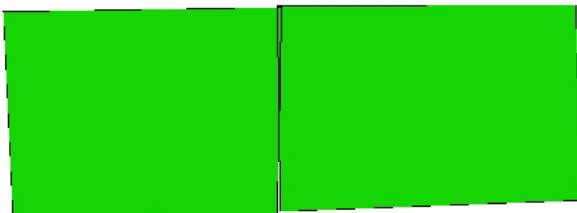
Chlorophyll



Soil Moisture



Cation Exchange Capacity(cmol/kg)



Percentage Soil Organic Matter

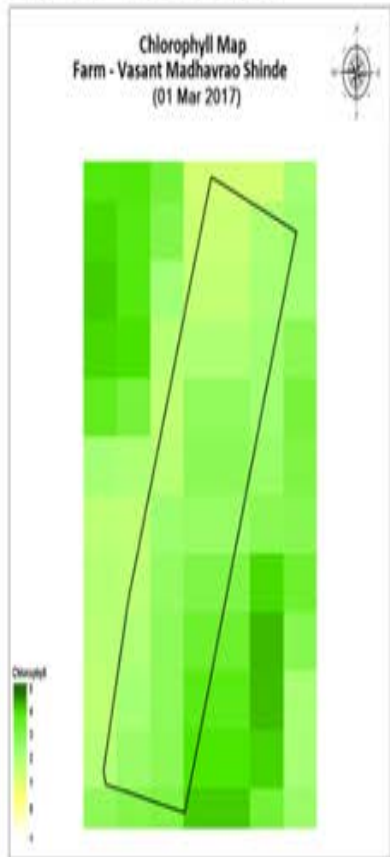


We infer from the above pictures that when the soil organic matter content is optimum and the soil moisture content is higher, photosynthesis (as inferred from the chlorophyll content) is better.

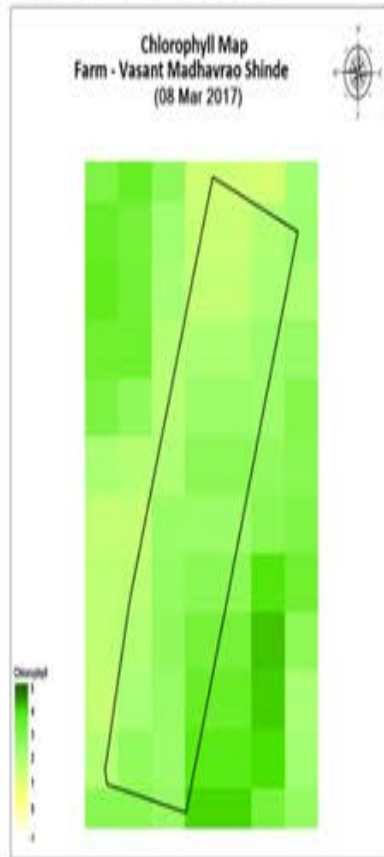
NUTRITION

Chlorophyll

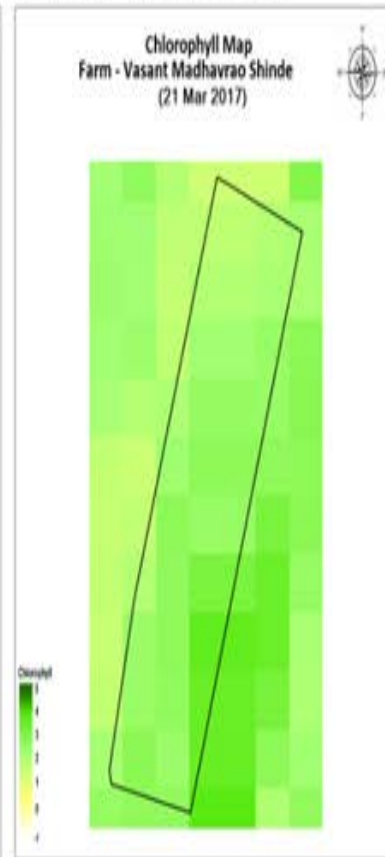
01 Mar 2017 - 1.05787209102086



08 Mar 2017 - 1.03099495172501



21 Mar 2017 - 1.11722168326378



17 Apr 2017 - 1.131866589669260

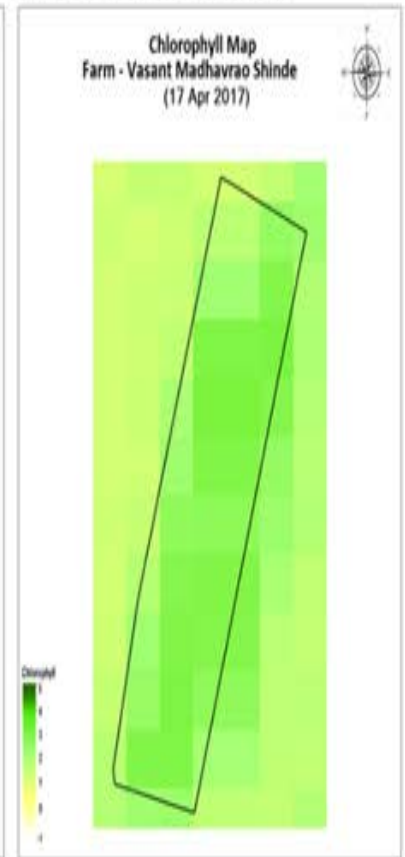


Image Processing

Result Format

Image Name	Edges Count	Crop Type
plants_leaves_1538560398208.jpg	23331	Dense Crop
plants_height_1538560298503.jpg	15561	Dense Crop
No_Of_plants_1538552656972.jpg	1240	Medium Crop
plants_leaves_1538641677341.jpg	1162	Medium Crop
plants_leaves_1538547816759.jpg	157	Low / No Crop
plot_sample_1538639946363.jpg	0	Low / No Crop

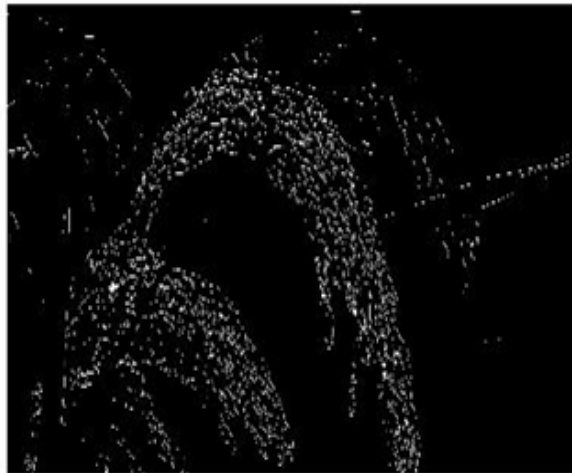


Image Processing: can be used to see what satellites cannot see

In Season Crop Damage

Dividing crop period into stages

Vegetative : Count of consecutive unfolded leaves, until the reproductive parts are visible

Reproductive : As soon as flowers / tuber / ear head are visible until all kernels / seed / tuber are physiologically mature

Damage based on parts of the crop

Crop Stand Damage : Count or % of crop stand area with no living axils / buds

Crop Stem Damage : Count or % of crop stem snapped off with inability to yield or inactive

Branch Damage : Position and % of branches snapped off or damaged

Leaf Damage : Count and % of leaves snapped off, shredded, de-colored and inactive

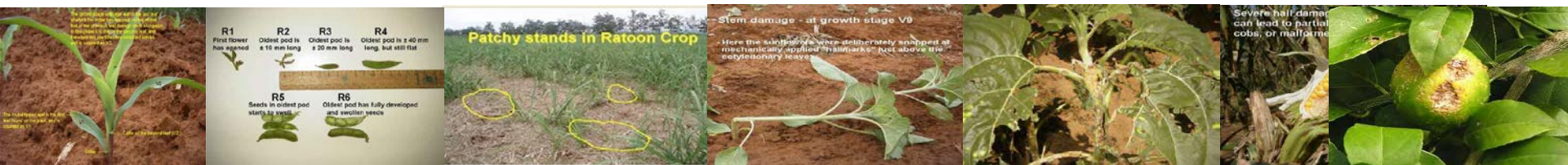
Ear / Pod / Head / Boll Damage : Count and % of yield part knocked off / chaffed / shriveled / broken or disease / pest infected

Fruit Damage

Count and % of fruits / tree knocked off / malformed / disease / pest infected

Crop Yield estimation before Harvest

Locating representative sample area. Determining plant stand, row width & density (plant / ear / fruit / pod) sample population / 100 m². Estimating yield based on observations.

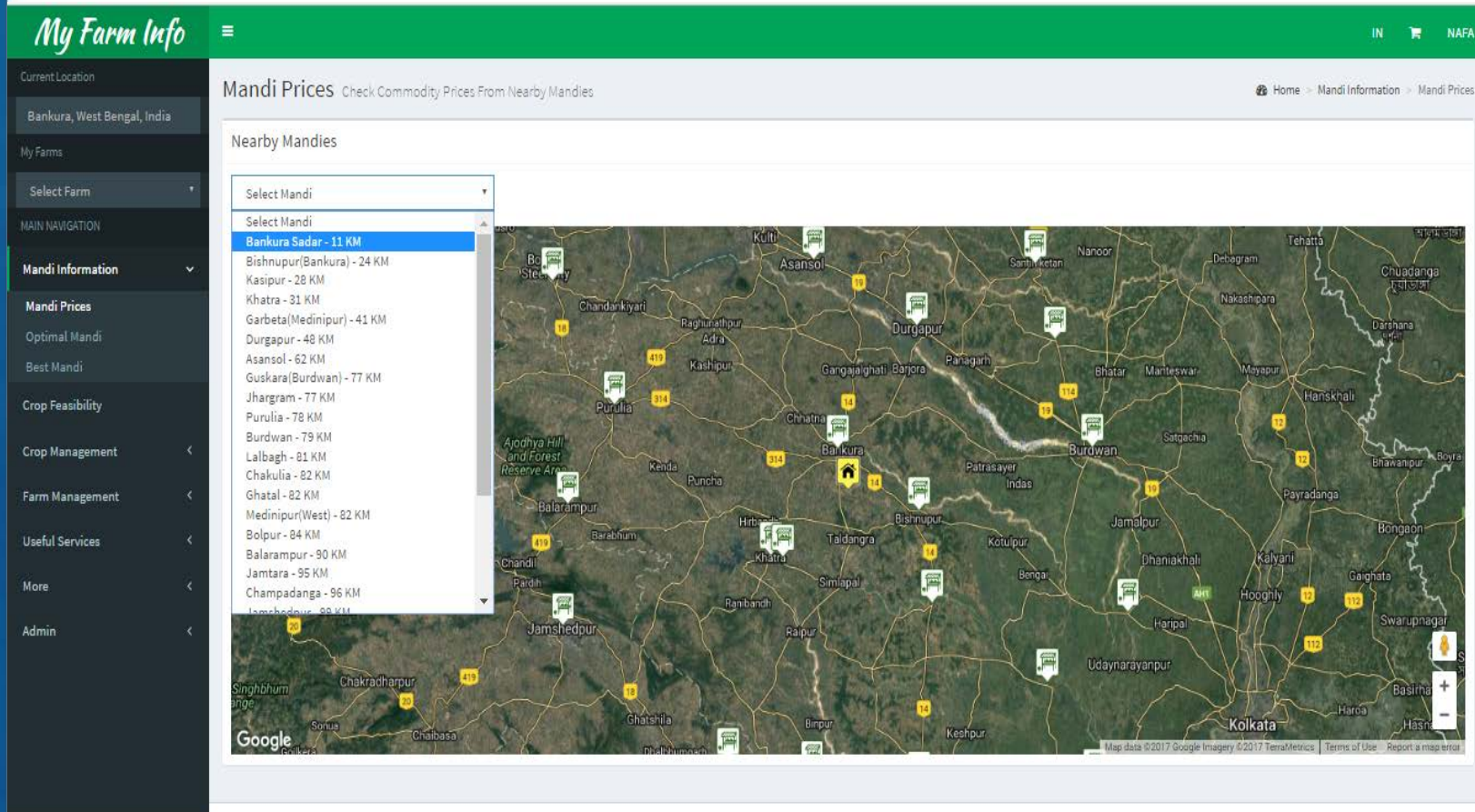


Farm Insurance Solutions

8. Hedging Ourselves



Crop		Potato	
Location		Bakura, Hugli, Burdhman (West Bengal)	
Data Provider		INGEN Technologies P Ltd	
Unseasonal Rainfall			
Date From		15-Dec 2016	
Date to		10-Mar 2017	
Index		Maximum of 3 consecutive day's cumulative rainfall above strike during the phase.	
Strike_1 (mm)		20	
Strike_2 (mm)		70	
Exit(mm)		120	
Notional (Rs. / mm)_1		27	
Notional (Rs. / mm)_2		133	
Total Maximum Payout (Rs.)		8000	
Total Sum Insured (Rs/Acre)			8000
Premium Rs./Acre		550 (Excluding Service Tax)	



My Farm Info IN NAFA

Current Location: Bankura, West Bengal, India

Mandi Prices

 Check Commodity Prices From Nearby Mandies

Home > Mandi Information > Mandi Prices

Nearby Mandies

Select Mandi
Select Mandi
Bankura Sadar - 11 KM
Bishnupur(Bankura) - 24 KM
Kasipur - 28 KM
Khatra - 31 KM
Garbeta(Medinipur) - 41 KM
Durgapur - 48 KM
Asansol - 62 KM
Guskara(Burdwan) - 77 KM
Jhargram - 77 KM
Purulia - 78 KM
Burdwan - 79 KM
Lalbagh - 81 KM
Chakulia - 82 KM
Ghatal - 82 KM
Medinipur(West) - 82 KM
Bolpur - 84 KM
Balarampur - 90 KM
Jamtara - 95 KM
Champadanga - 96 KM
Jamshedpur - 98 KM

Map data ©2017 Google Imagery ©2017 TerraMetrics Terms of Use Report a map error

The prices of Potato in all the nearby Mandis is provided. The farmer can take advantage by finding the best deal for his produce.

- MAIN NAVIGATION
- Mandi Information <
- Crop Feasibility
- Crop Management <
- Farm Management >
- Plan your Farm >
- Locate your Farm
- Your Farm
- Farm Report
- Crop Scheduler
- Activity Logger <
- Farm Layout
- Monitor your farm
- Flood Risk <
- Wind Risk Management
- Useful Services <
- More <
- Admin <

Optimal Mandies

Optimal mandi for your crop is Bankura Sadar (📍) where you can sell your crop for Rs 340/Quintal
 * Optimal mandi estimation is based on highest price and distance ratio from your farm to the mandi



Location	Price(Rs/Quintal)	Distance(KM)	Date
Bankura Sadar	340	11	09-Mar-17
Bishnupuri(Bankura)	375	24	24-Mar-17
Kasipur	350	28	24-Mar-17
Khatra	350	31	24-Mar-17
Garbeta(Medinipur)	340	41	04-Mar-17
Durgapur	400	48	25-Mar-17
Asansol	380	62	25-Mar-17
Guskara(Burdwan)	440	77	25-Mar-17
Jhargram	420	77	23-Mar-17
Purulia	360	78	24-Mar-17

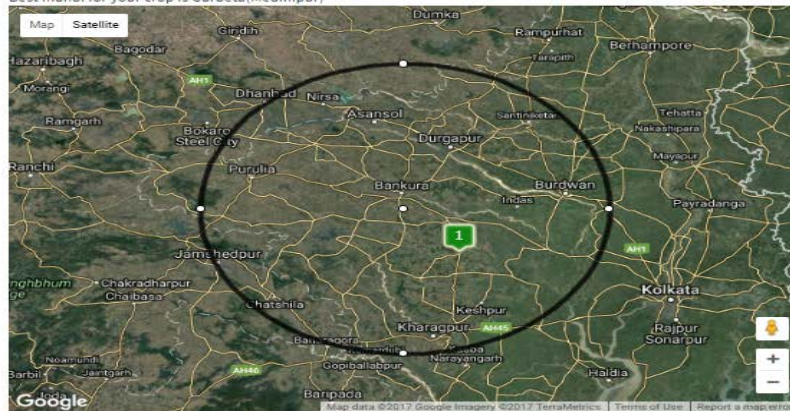
The farmer can find the best suited Mandis and also the map the location

Best Mandi Discover the mandi where you can sell your crop for the best price

Home / Mandi Information / Best Mandi

Optimal Mandies

Best mandi for your crop is Garbeta(Medinipur)



Potato

Potato

Get Best Mandi

Rank	Location	Average Price(Rs/Quintal)	Distance(KM)
1	Garbeta(Medinipur)	334	41

Previous 1 Next

Challenges in offering customized products

- **Insufficient historical yield data at lower administrative level**
(data is only available at District and sub district level major crops)
 - ❑ Possible Solution: Yield modelling for past years, Satellite based products
- **Lack of weather station network/ground observatory weather data**
 - ❑ Possible Solution: Satellite Gridded data, Satellite based products
- **Inadequate commodity derivative markets to design Income based products**
- **Products with high Premium rates in risky zones are unaffordable for farmers**
 - ❑ Possible Solution:
 - ❑ Subsidy from a FPO, Finance provider (Bank or corporate entity), procurers
 - ❑ Discount if farmer takes all precautionary measures and follow the expert recommendations

Current Partnerships

Current B2B partner base is further linked to farmers that can be targeted

Agri-input companies

Catalysts: UPL, Advanta, Unimart, Nath Seeds, Nuziveedu Seeds

Potential Farmer Base: 100,000



Multilateral Agencies

Catalysts: SDC, GIZ, IWMI, IFPRI, World Bank

Potential Farmer Base: .50,000

+



Banks and NBFCs

Catalysts: Bank of Baroda, Allahabad Bank, Samunnati Finance

Potential Farmer Base: 2,000,000



Farmers using SecuFarm

Organised Retail

Catalysts: PepsiCo, IB Foods, Welspun, Ambuja

Potential Farmer Base: 200,000



Central & State Governments

Catalysts: NRLM, PMFBY

Potential Farmer Base: 15000



FPOs

Catalysts: Across Karnataka, Maharashtra, Odisha, Karnataka, Andhra Pradesh, Telangana, Jharkhand

Potential Farmer Base: 50,000



We have already been engaging with these farmers for:

· Digitalizing farms

· SecuFarm Product Development

· Transactions

Thank You

* Join our mission to provide climate security
to all *



Institute of Actuaries of India

MR. SONU AGRAWAL, FOUNDER AND MD

INDIA HEADQUARTERS

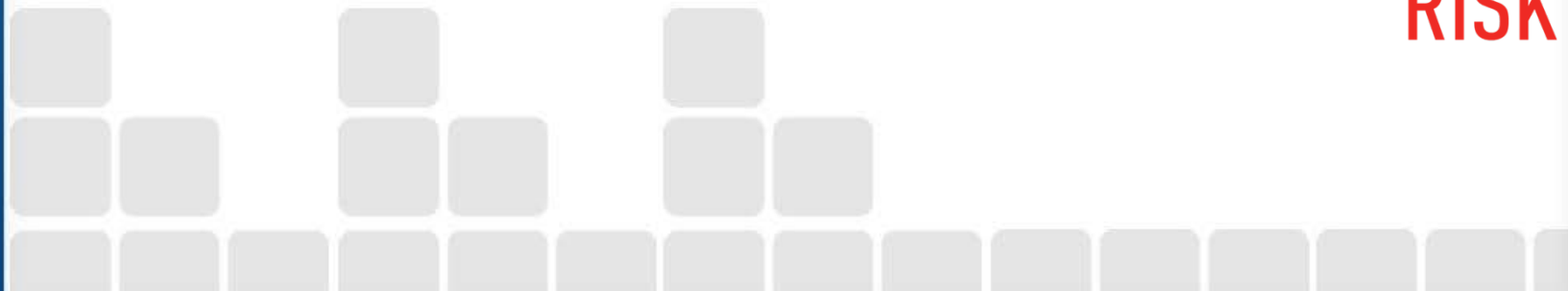
3rd Floor, J1/37,
The Perfect House
DLF City-2, Gurugram-
122002 India

NORTH AMERICA

350 Fifth Avenue
59th Floor, New York
City
NY 10118 USA

GLOBAL RESEARCH CENTER

SIDBI Innovation Center
Indian Institute of Technology
Kanpur 208 016 India

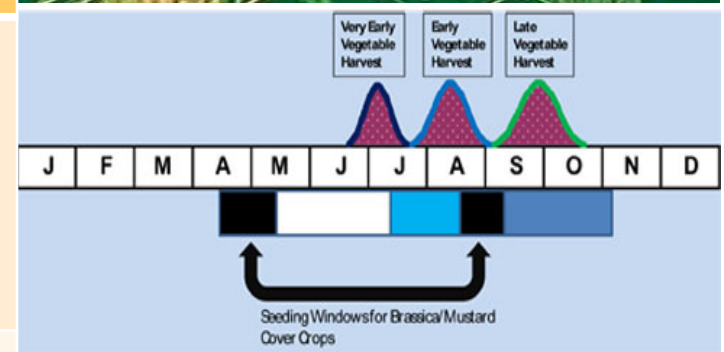


Field Management for Frost Protection

A. Soil testing to check if there is potassium, Copper, molybdenum deficiency. Prepare Soil Nutrition plan accordingly

B. Optimum sowing Window to Prevent Frost Injury using last 50 years weather data and climate projections for the region

C. Optimum canopy density calculation to minimize frost injury



Solution 1 : Mobile Application For Fertilizer

Get a New Fertilizer Can and scan bar code



Preparing Fertilizer Mixture, Pouring In Spray Container of Tractor & Recording Video Using same Mobile App



Yes

Reading Bar Code & GPS Through Mobile App



VTS Enabled Tractor

Spraying tracked as Tractor moves

SPRAYING DONE



VTS ENSURING THAT FARM IS COVERED OR NOT



Solution 1 : Mobile Application For Fertilizer Tracking



A. Spray Monitoring: An android app will be provided to each operator to monitor the whole spraying activity and to maintain the record of expenses incurred during a day. By using this app, we can record tank wise spraying activity for each farmer w.r.t machine assigned to operator.

- Mobile App
- Spray Activity Monitor
- Fuel Manager
- Report a Problem
- Machine Maintenance Module (at next level)

Solution 1 : Mobile Application For Fertilizer Tracking



B. Tracking of spraying machine: A Vehicle Tracking Device (referred as VTS) will be installed over each spraying machine to track its route. In addition to this, a flow sensor or level sensor will also be installed to estimate usage of spraying mixture, spraying distance within a field and status of tank before starting a new spray.

Key points:

- Unique ID to each Machine.
- Daily Distance covered by machine.
- Spraying distance covered per field.
- Spraying mixture qty used per field

Solution 2: Tracking Fertilizer Application using Remote sensing

- Landsat TM data to be used
- Soil sample collection for validation with satellite imagery.
- Algorithms to map potassium, nitrate, phosphorous.
- Fertilizer content identification using dark object subtracted method from landsat image.
- Supervised classification for fertilizer mapping.

e.g. Methods for Nitrogen Content Identification in Crops Using Remote Sensing

- ❑ Landsat data from Earth Explorer.
- ❑ Spectral Angle mapper classifier to be used for nitrogen mapping of crops.
- ❑ Regression Analysis of nitrogen content at different stages of crops.
- ❑ To predict the nitrogen in crops such method can be to be used including Soil Adjusted Vegetation Index (SAVI), Modified Chlorophyll absorption ratio index(MCARI).

