APEC PPFS Webinar on
‘Sharing Good Practices on Sustainable Agricultural Development Through the Principle of Sufficiency Economy Philosophy’

Session 6: Data Driven Agriculture & Precision Agriculture

Ms.Narudee Euswas
Manager, Business Development
Loxley Public Company Limited

24th May 2022
Pullman Bangkok, Thailand

OUR HISTORY

1939

Loxley Rice Company

Export primary product from Thailand (rice, timber)

1957

Loxley (Bangkok) Company Limited

Import and sale of industrial products and advanced technology

1993

Loxley Public Company Limited

Become a listed company in Stock Exchange of Thailand

Present

Loxley Group

Business leader in advanced technology and infrastructure

VISION AND MISSION

Vision

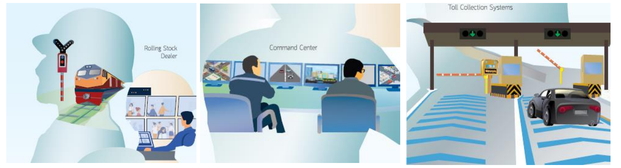
"INSPIRED CHOICE FOR CUSTOMERS, BUSINESS PARTNERS AND INVESTORS"

Mission

1. Offer products and services that best suit customers, meeting their requirements and primary interest.
2. Strengthen financial stability and increase profitability on a continuous sustainable basis.
3. Conduct business with integrity and fairness with a view towards growth, trust and long-term relationships with business partners.
4. Create the pleasant workplace environment while continuing to develop human resources capabilities and competencies.
5. Operate business with responsibilities and grow along with community and society engagement.

OUR BUSINESS

Information Technology SBG

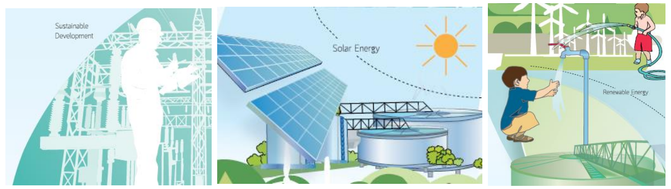


Network Solutions SBG

Services SBG

Trading SBG

LOXLEY



Energy SBG

Special Projects

Loxley Smart Agriculture

DATA DRIVEN AGRICULTURE & PRECISION AGRICULTURE

WEATHER RISK AND AGRICUTURE

Weather represents roughly 70% of the ***Uncontrollable risks*** a farmer faces.

Erratic weather events can reduce crop yields by ***as much as 50%.***

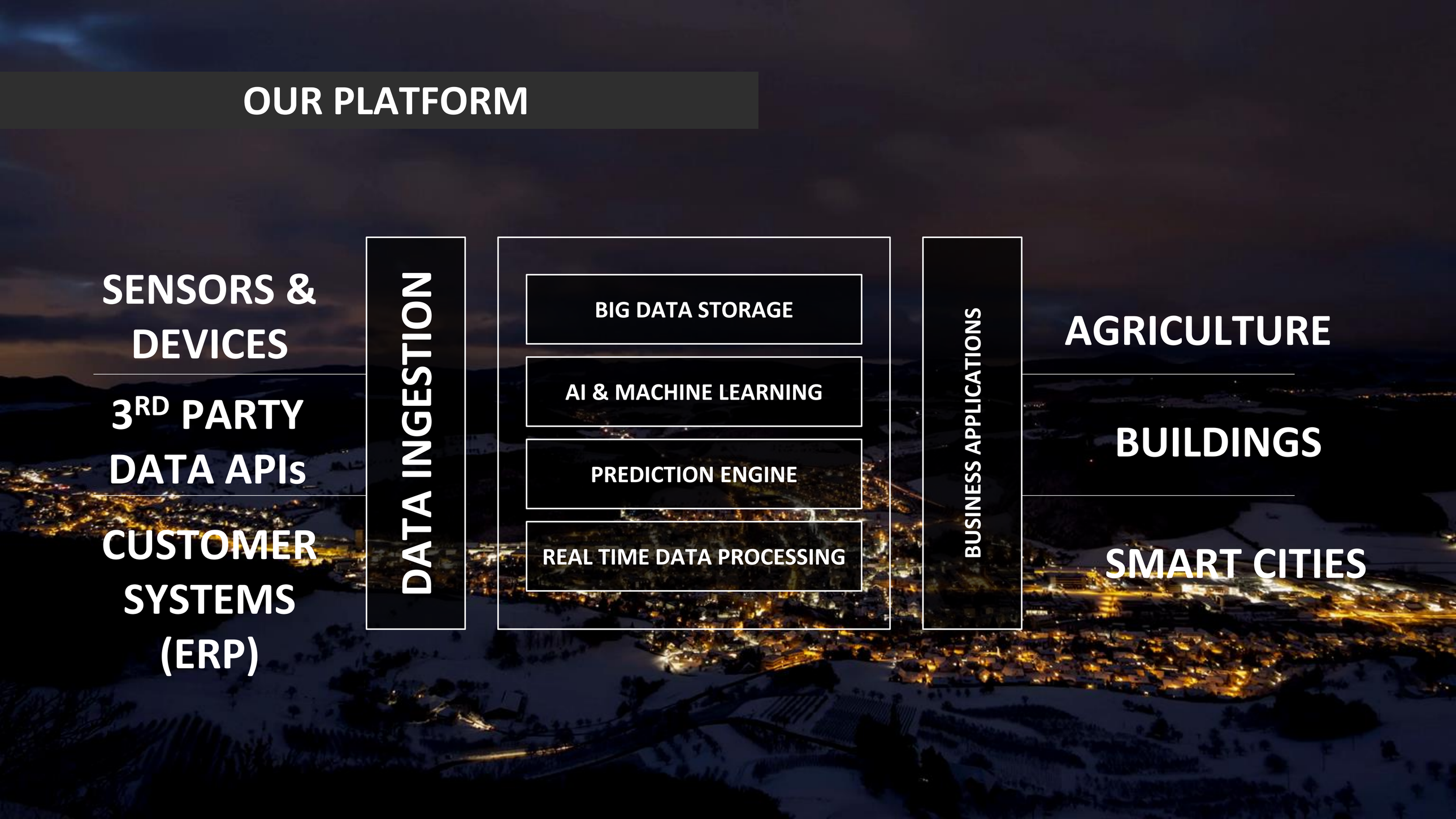
Blind application of chemical inputs is proven to be **ineffective.**

Climate-Smart agriculture eco-system is only **sustainable** way forward.

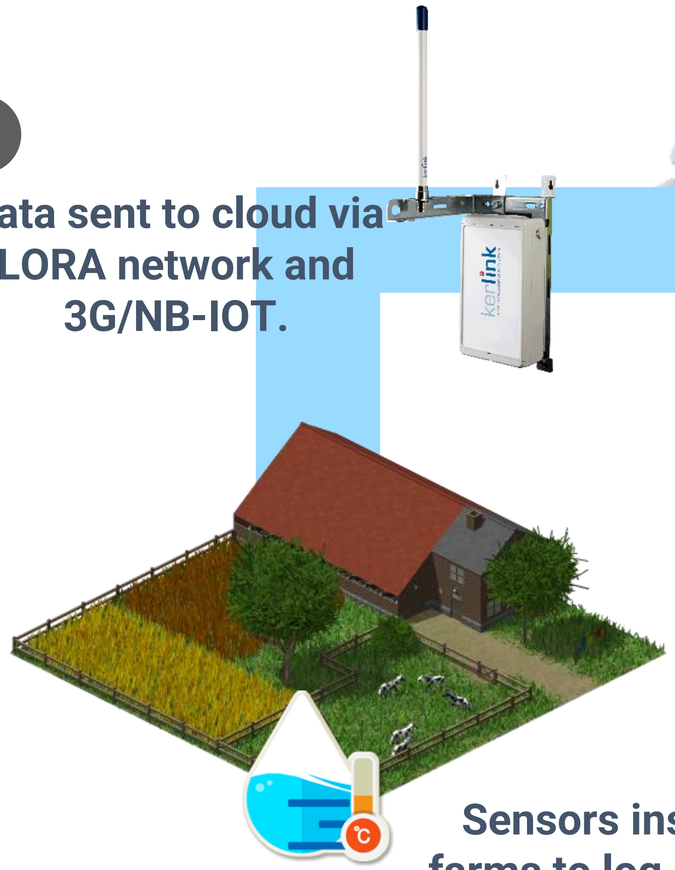
DATA DRIVEN AGRICUTURE CONCEPT

Data-driven agriculture is the system of using big data to supplement on-farm precision agriculture – using the right farm data, at the right time and in the right formats to make better decisions.

OUR PLATFORM



LOXLEY SMART AGRICULTURE SYSTEM

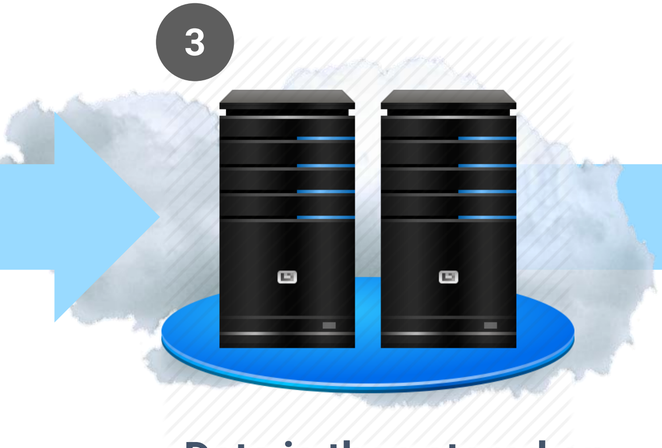


1

Sensors installed on farms to log data in real time basis.

2

Data sent to cloud via LORA network and 3G/NB-IOT.



3

Data is then stored on cloud data center

4

Data will then be stored and synced with on premise computers and servers.

5

Data can then be used by office agronomist and planners for planning purposes.

Weather/Field Data Acquisition

UAV

Area of application :
- High resolution
- Small localized survey
- Independent of Clouds (Monsoon season)
- Crop health (biomass production, NDVI)
- Soil moisture (topsoil)
- Asset monitoring

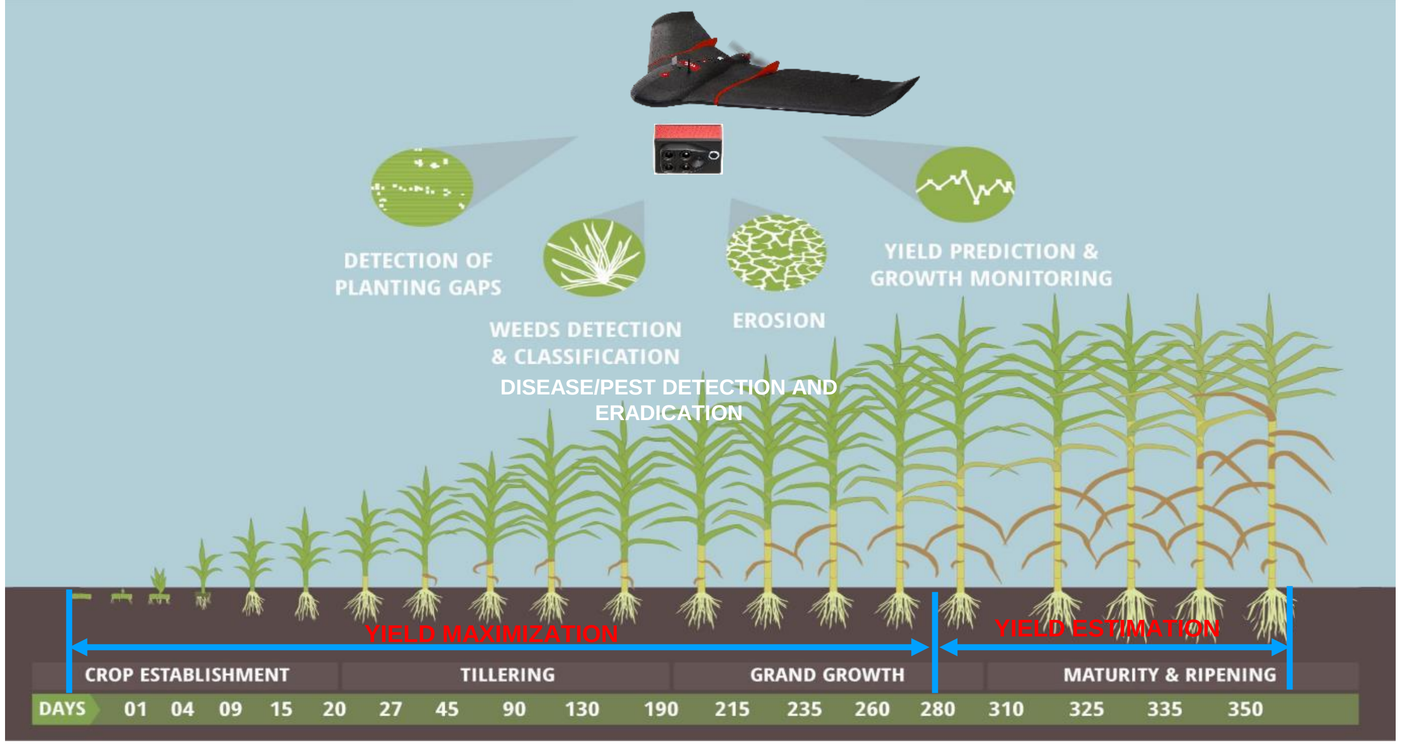
Area of application :
- Accurate microclimatic data and information
- All meteorological parameters measured
- Multiple depth soil moisture
- Easy to combine with models Continuous real time measurements
- Historical record keeping

Field Sensors

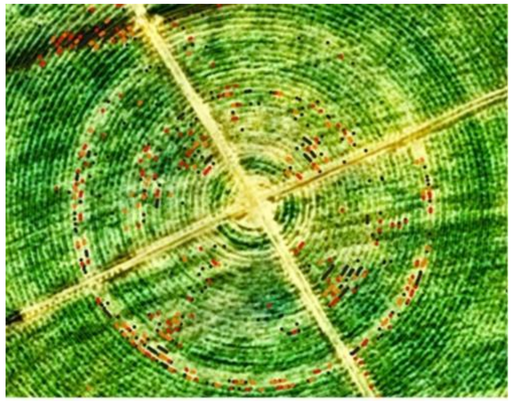
UAV

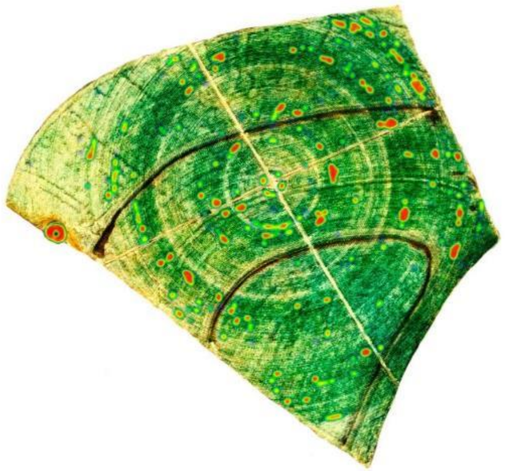
GAMAYA

Image Analysis from Drone mounted Hyperspectral Camera

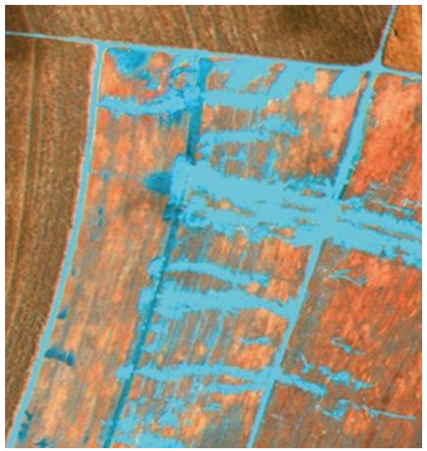


Planting Gap Detection

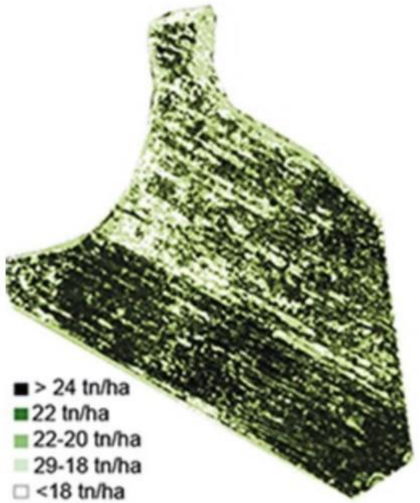


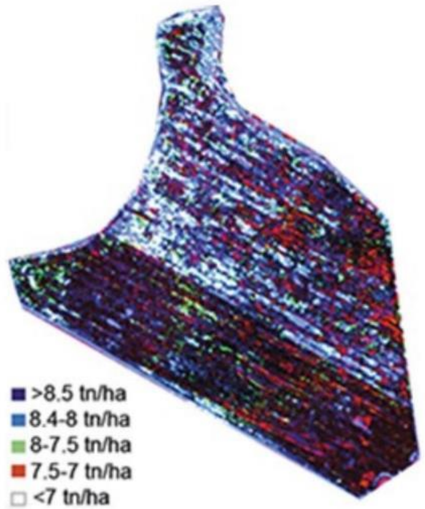


Weed/Disease/Pest Detection and Eradication



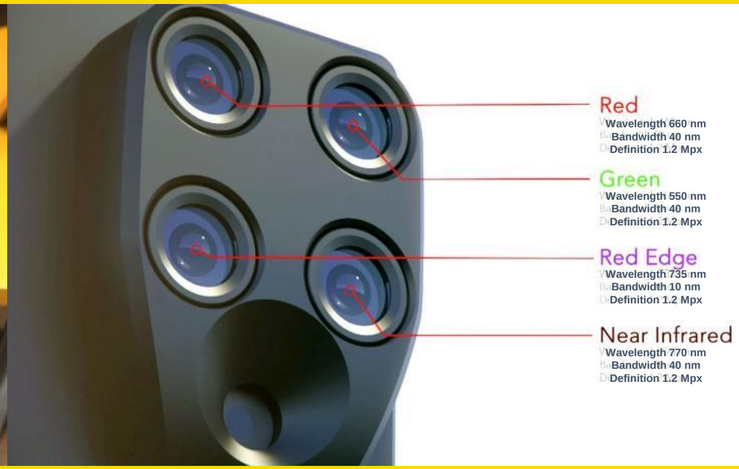
Soil Erosion Detection



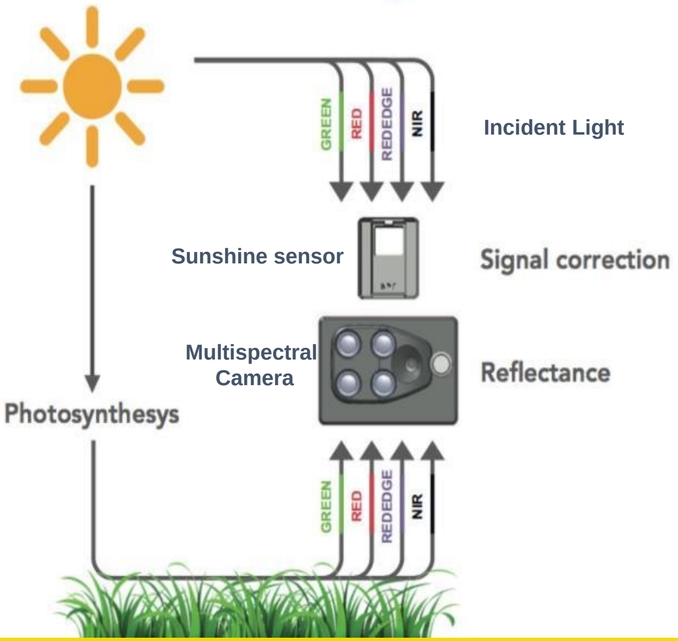


Biomass Concentration Map / Yield Estimation

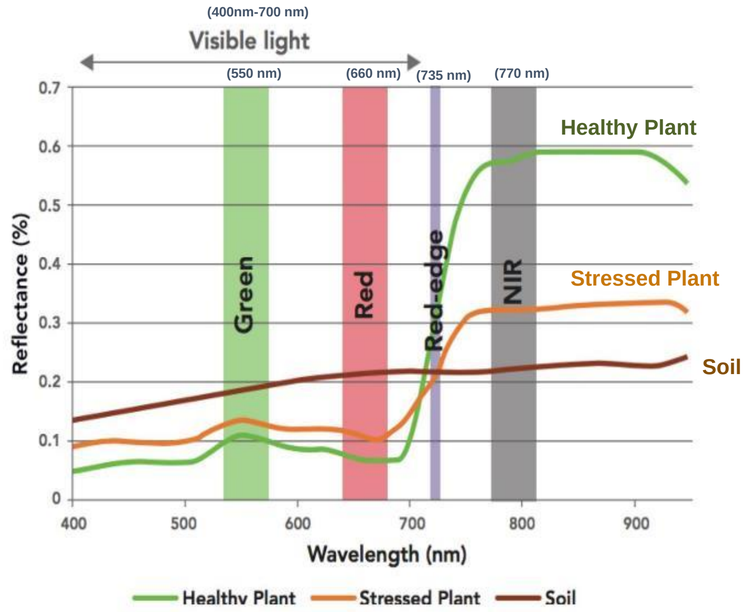
SKYVIV
SKY VISUAL IMAGING VENTURE



Concept



Green Vegetation Reflectance

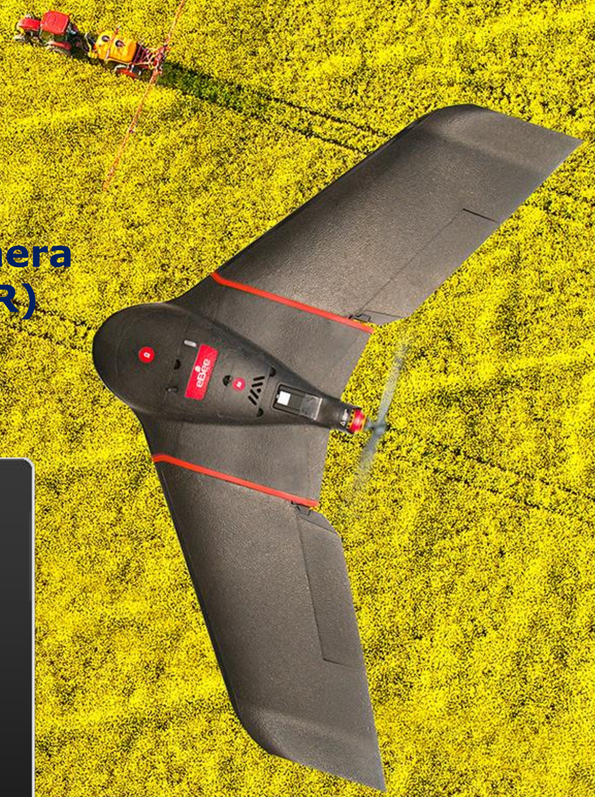


Precision Survey

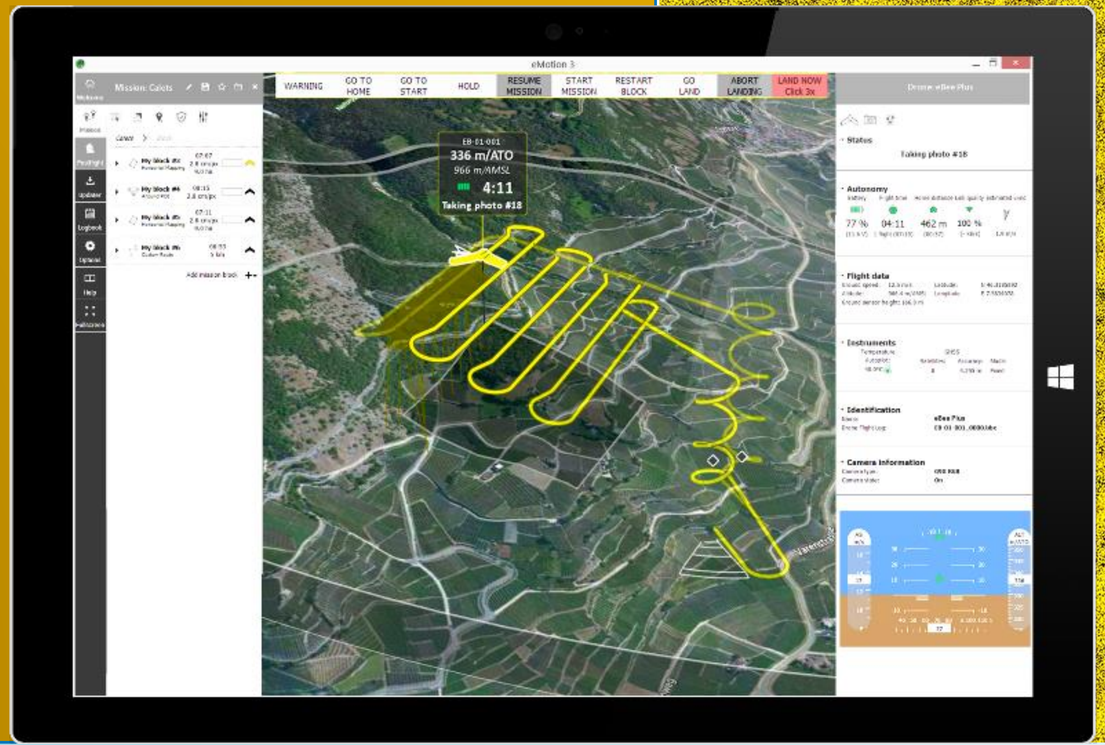
RGB Camera

Precision Agriculture

Multispectral Camera
(RGB,R,G,RE,NIR)

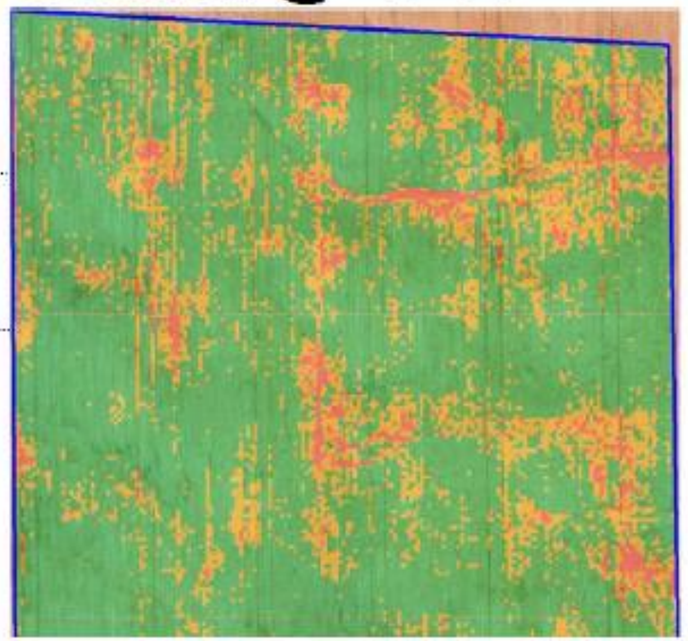


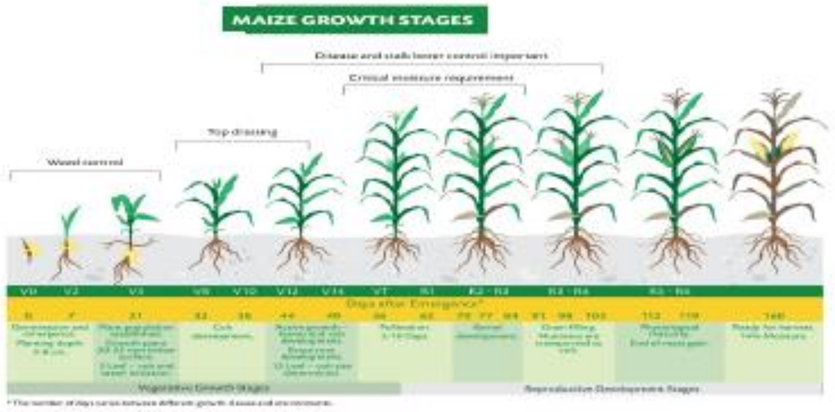
Flight Planning



SKYVIV
SKY VISUAL IMAGING VENTURE

Plant Population Count @ V-2

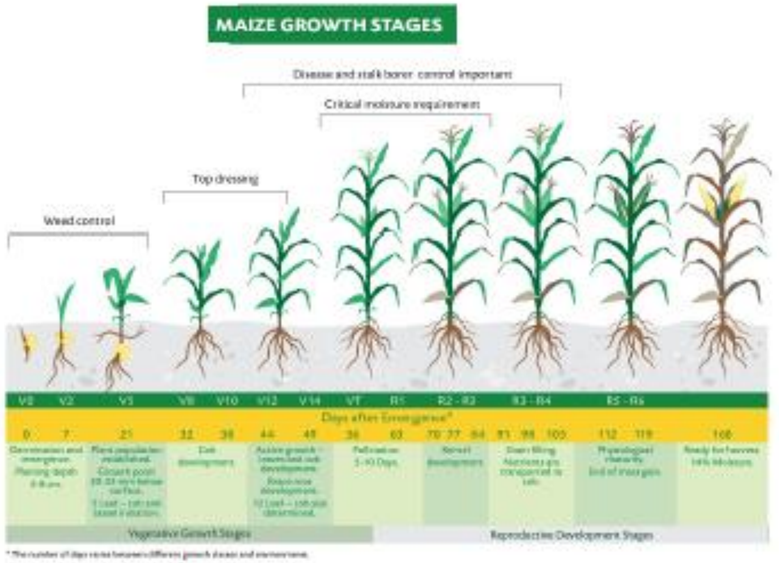




The "Planned Number of Plants" is derived from given the row distance of 50 cm, plant distance within a row of 25 cm

Weed Detection by measuring differences in Chlorophyll Concentration

(weed has higher Chlorophyll Content than corn leaf)



Corn Area = 40.74 ha

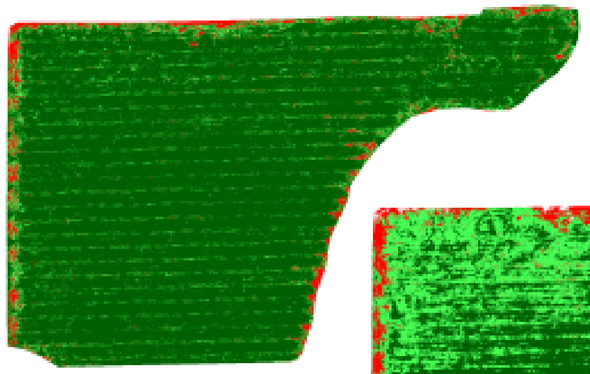
Weed = 0.11 ha

Weed detection is done at V-3 Stage

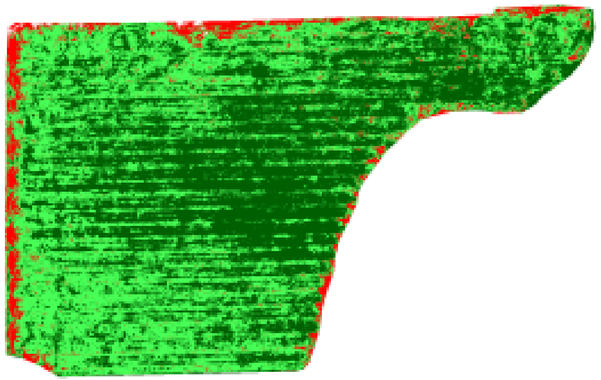
SKYVIV

SKY VISUAL IMAGING VENTURE

Crop Protection



V10

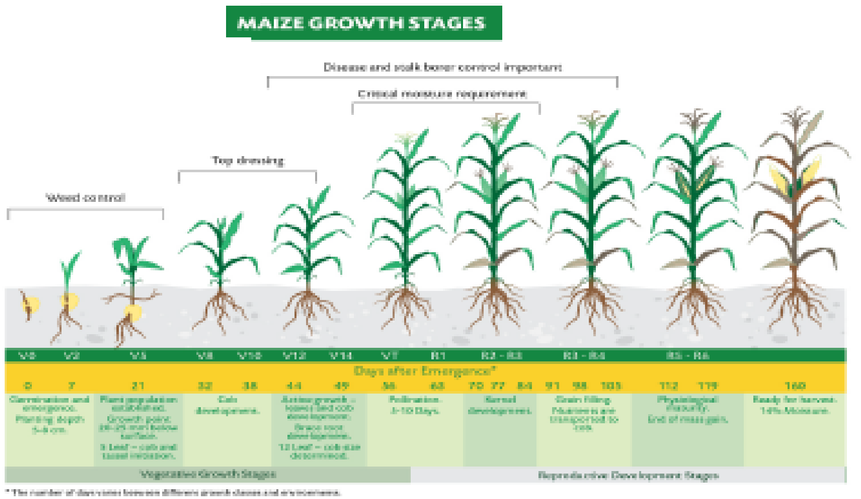


V11

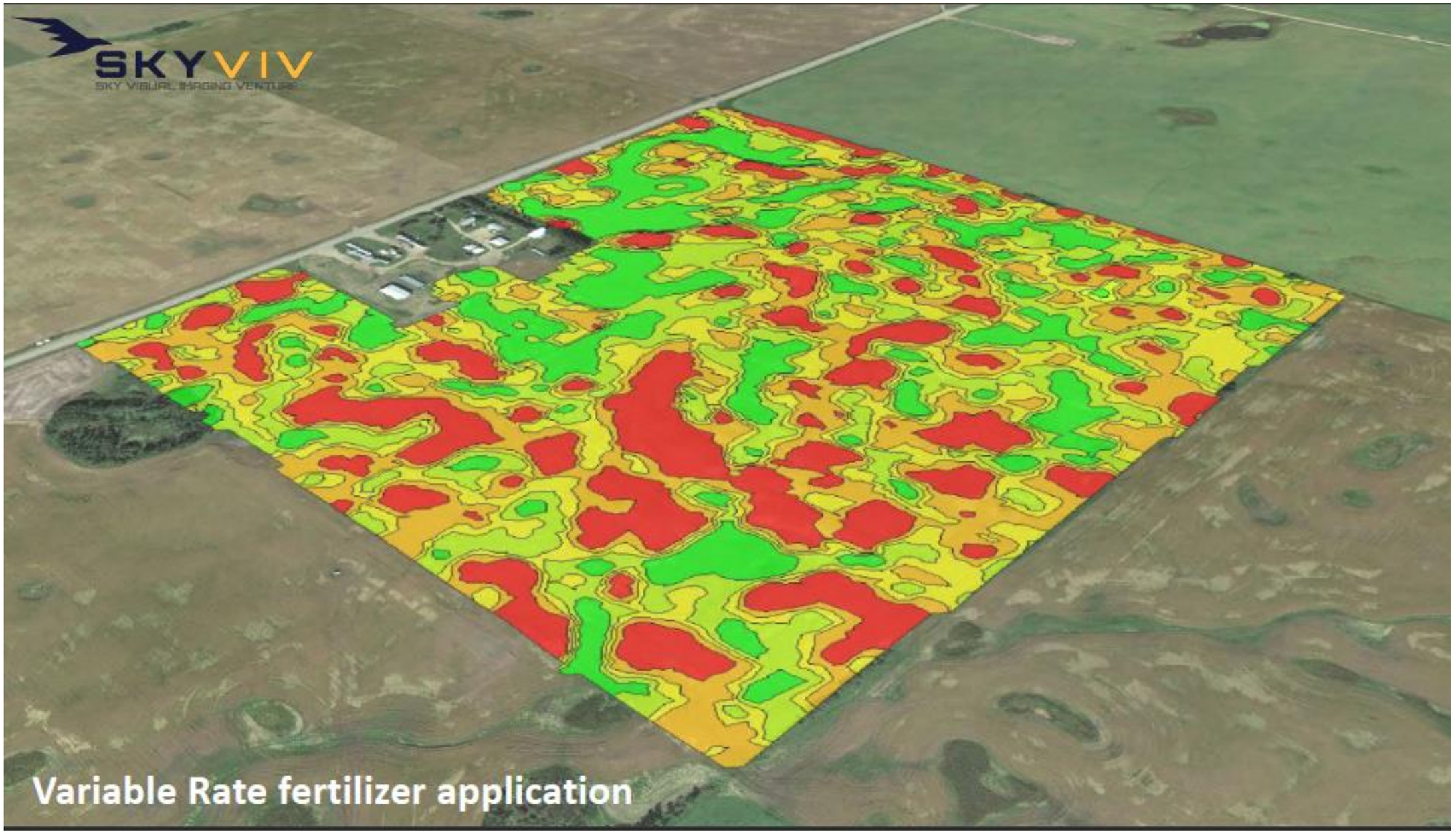
Decrease NDVI values due to lack of (rain) water

The digital outputs generated by the multispectral images when assessing stress and crop growth can help to guide the proper and efficient application of crop protection products.

Allowing the team to finely tune applications that meet the exact need of each plot.



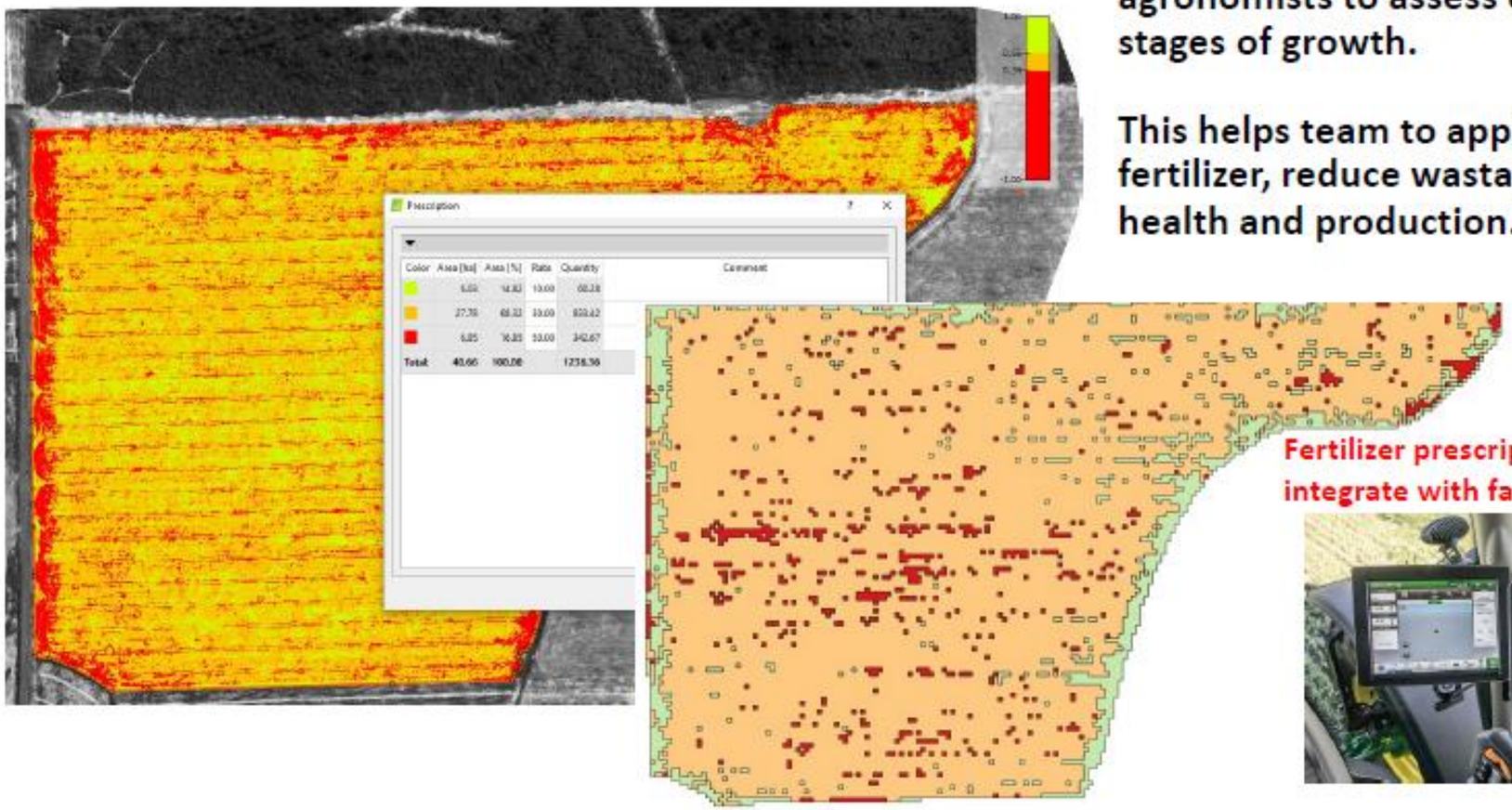
Crop Protection
LAYERS
Zonation
NDRE
NDVI
Surface M...oundaries
Orthomosaic - boundaries
Orthomosaic
Surface Model
50 m
PRESCRIPTION
Average Value
area [ha]
rate [units/ha]
amount [units]
-0,04
0,6
0,0
0,0
0,01
3,7
250,0
925,0
0,03
13,9
200,0
2.780,0
0,05
15,0
150,0
2.250,0
0,06
7,7
100,0
770,0
Total
40,9
6.725,0
SAVE
SKYVIV
SKY VISUAL
Fertilizer prescription maps


SKYVIV
SKY VISUAL IMAGING VENTURE
Variable Rate fertilizer application

Fertilizer Prescription Map

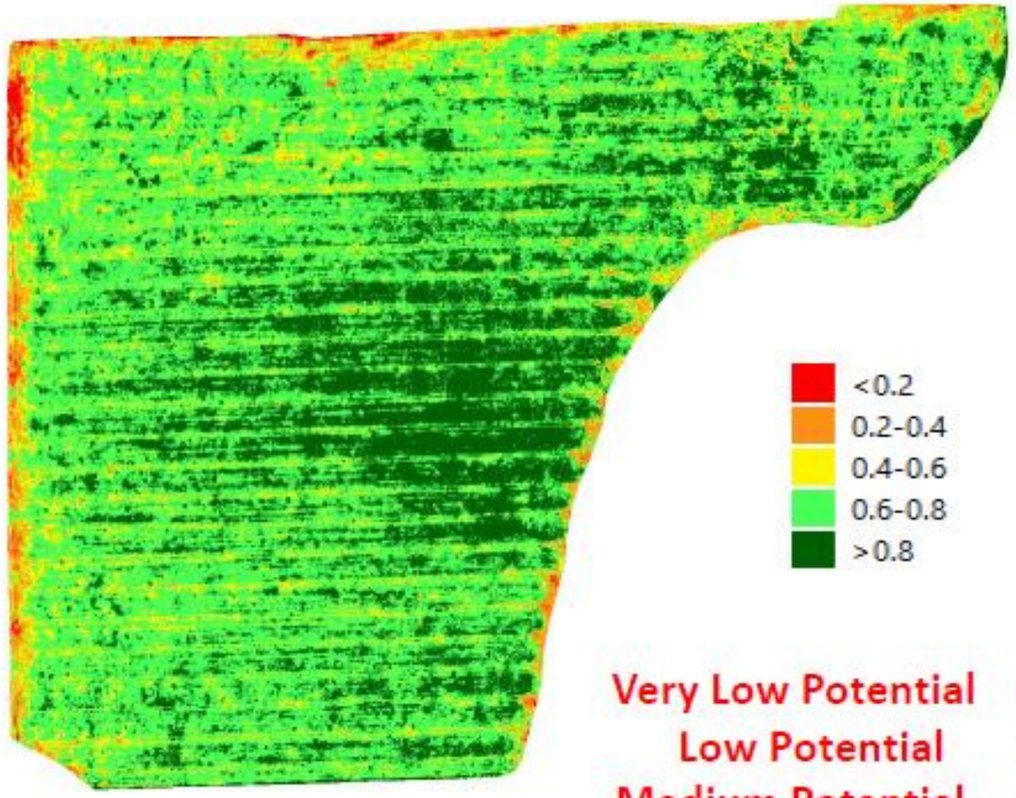
High-resolution drone data allows agronomists to assess crop vigor at different stages of growth.

This helps team to apply the right rates of fertilizer, reduce wastage and optimize crop health and production.



Fertilizer prescription map can directly integrate with farming machinery

Harvest Planning – Yield Estimation



Drone data, collected at critical growth stages throughout the growing season, can help agronomists improve their models, predictions and planning.

Allowing the team to better anticipate both harvest quality and its final yield

Very Low Potential	0.17	ha
Low Potential	1.43	ha
Medium Potential	5.15	ha
High Potential	22.49	ha
Very high Potential	11.32	ha

SKYVIV
SKY VISUAL IMAGING VENTURE
Terrain Mapping prior to planting
Multispectral
RGB
Thermal
Chlorophyll meter used for ground truth sampling

TUESDAY, JUNE 18, 2019 | Bangkok Post

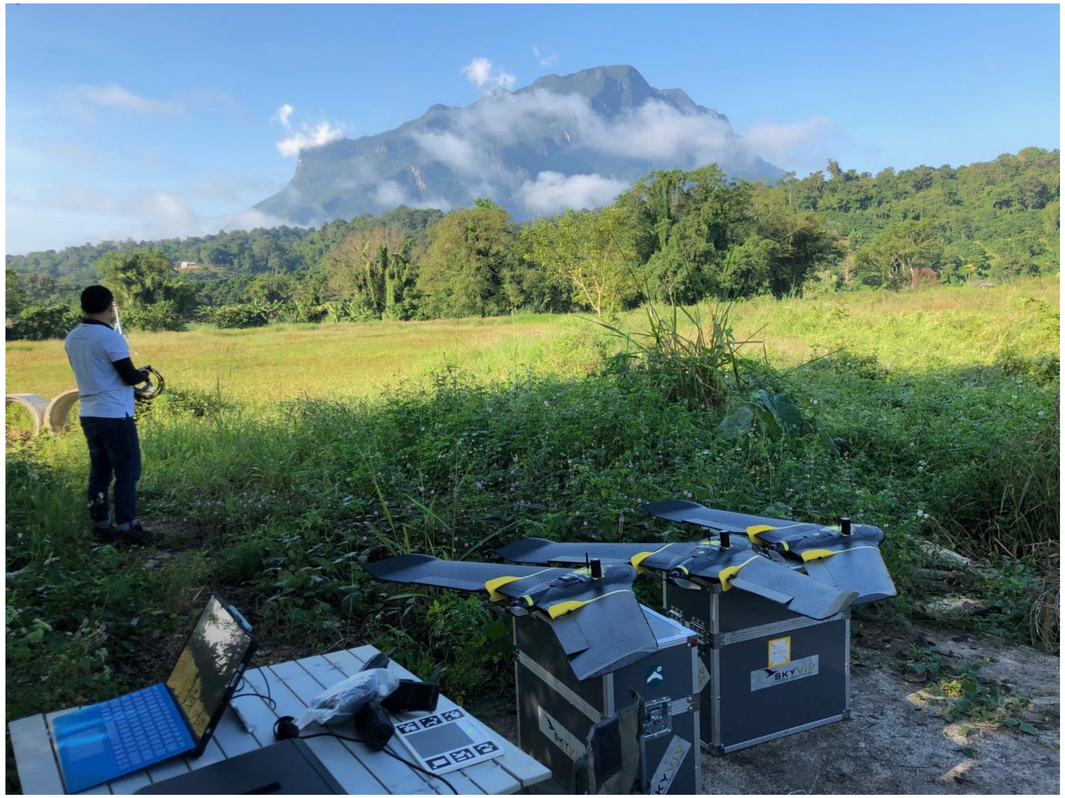
NATIONAL BUSINESS | B5

SkyVIV takes flight to predict crop yields

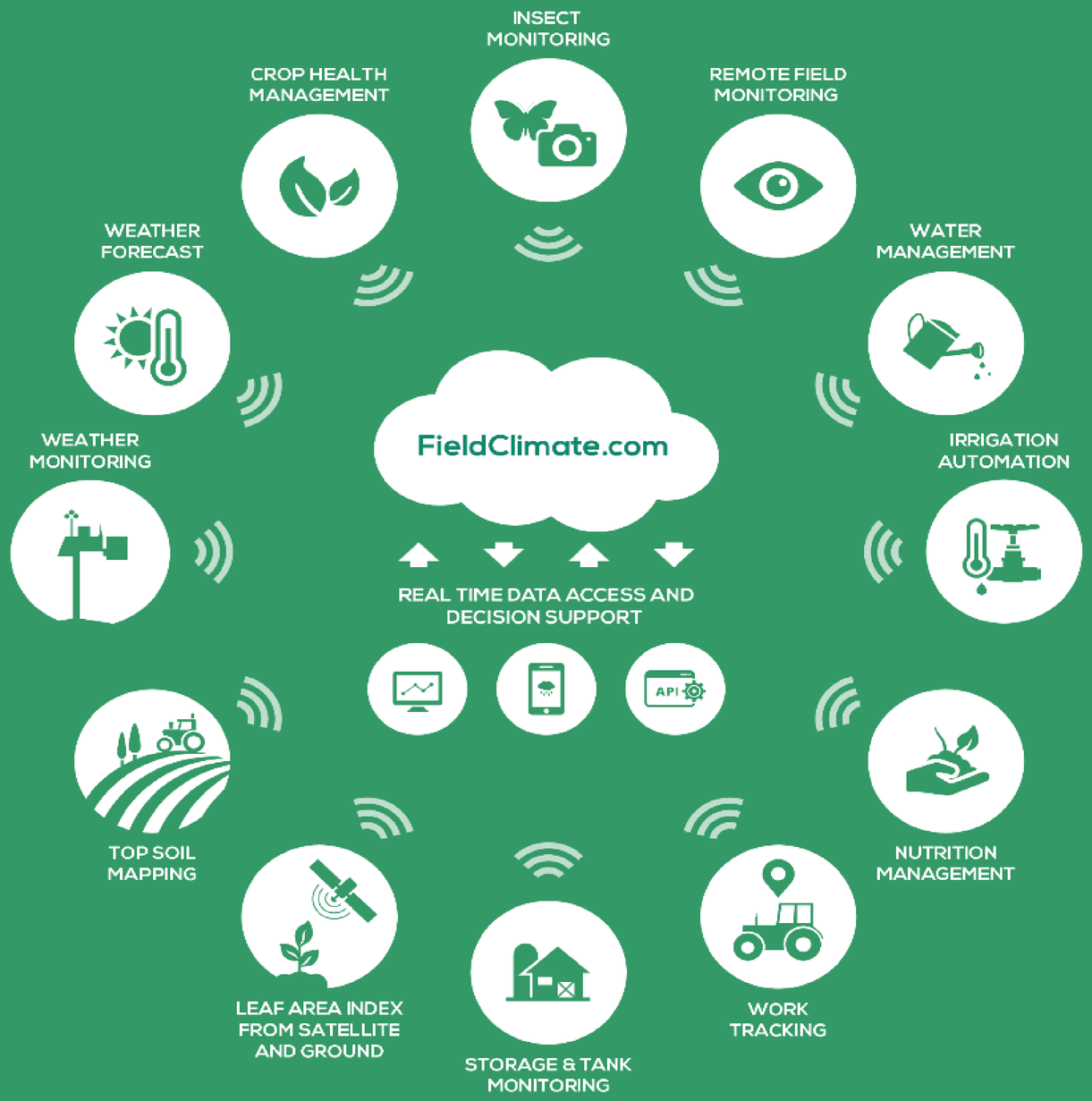
A forward-thinking startup is using drone imaging to make long-term investment in agriculture less risky and more profitable, writes **William Hicks**

"We're looking at agriculture as a long-term investment because of the problems we have predicting crop yields.

VIVATVONG VICHIT VADAKAN
Chief executive, SkyVIV



Pessl Instruments

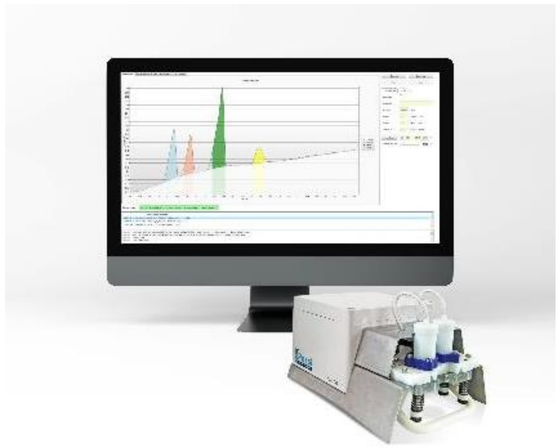


Weather/Field Data Acquisition

iMETOS® 3.3

iMETOS® ECO D3

iMETOS CropVIEW®



iMETOS® MobiLab

iMETOS iSCOUT®

Weather/Field Data Acquisition

Hyper Localised Weather Forecast

HYPER LOCALISED WEATHER FORECAST FOR WEATHER-DEPENDENT OPERATIONS

Monitor field accessibility, calculate spay windows, estimat
yield and better plan your field operations.

metos.at/home/weather-forecast/

Disease Models

DISEASE MODELS

More than 50 disease models for more than 85 crops.

metos.at/home/disease-models/

Soil Moisture & Irrigation Management

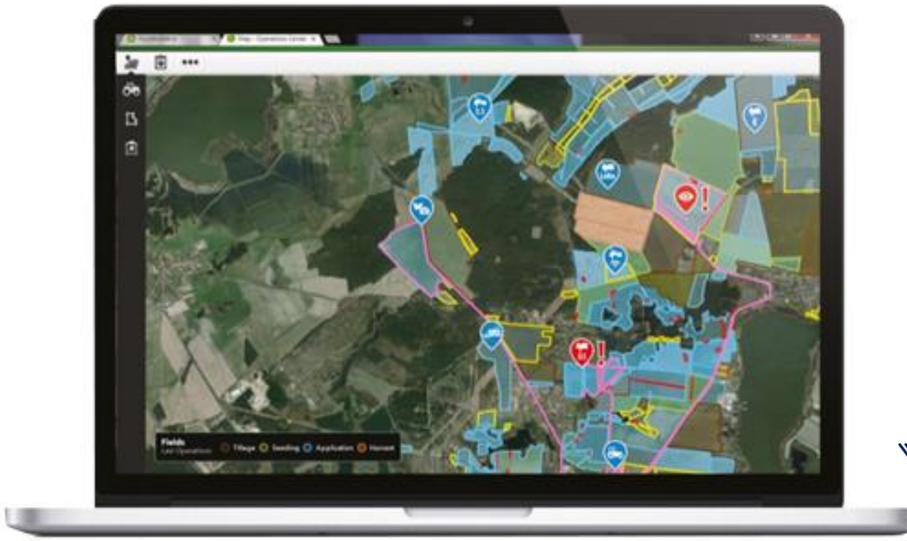
SOIL MOISTURE & IRRIGATION MANAGEMENT

Optimized Resource Use

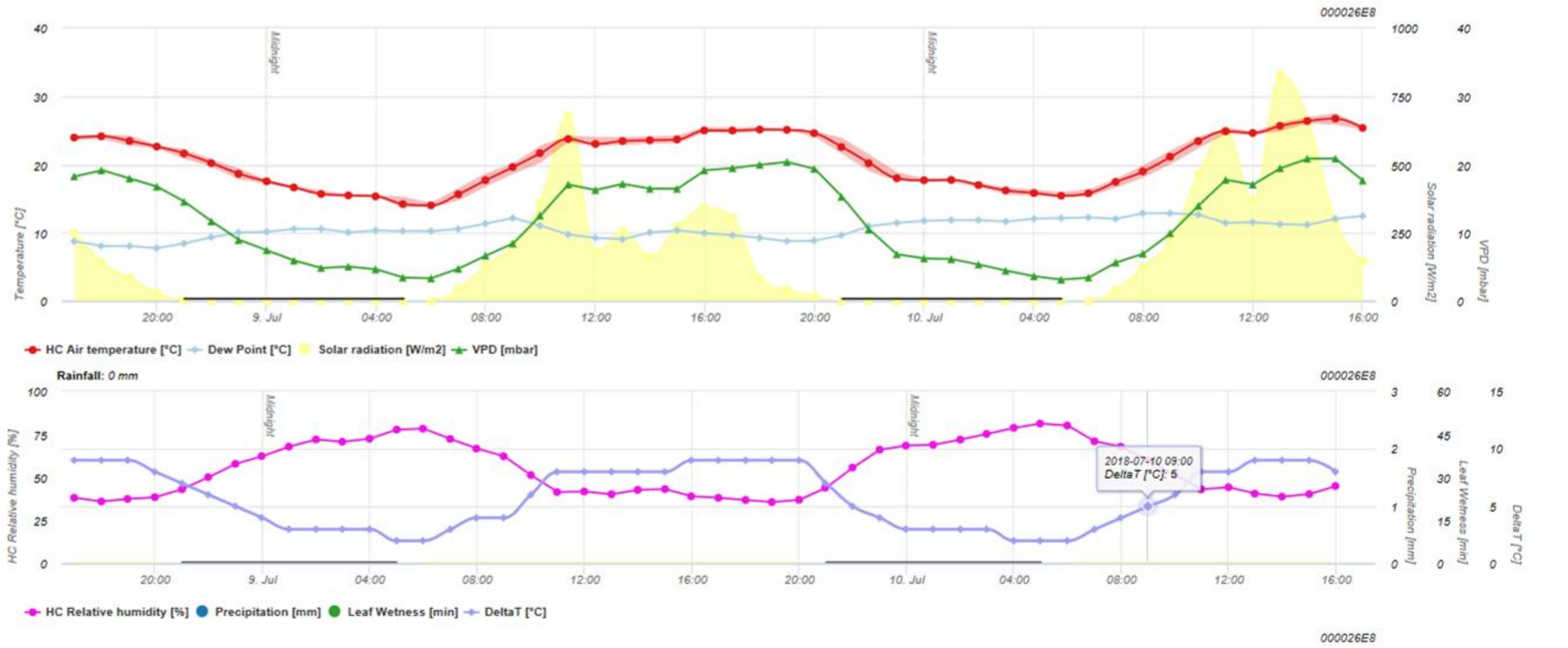
use less water and fertilizer – produce more with less.

metos.at/home/water-management/

Value Proposition = Less Risk, Efficient Management, Higher Yields



Example of Data: DELTA T

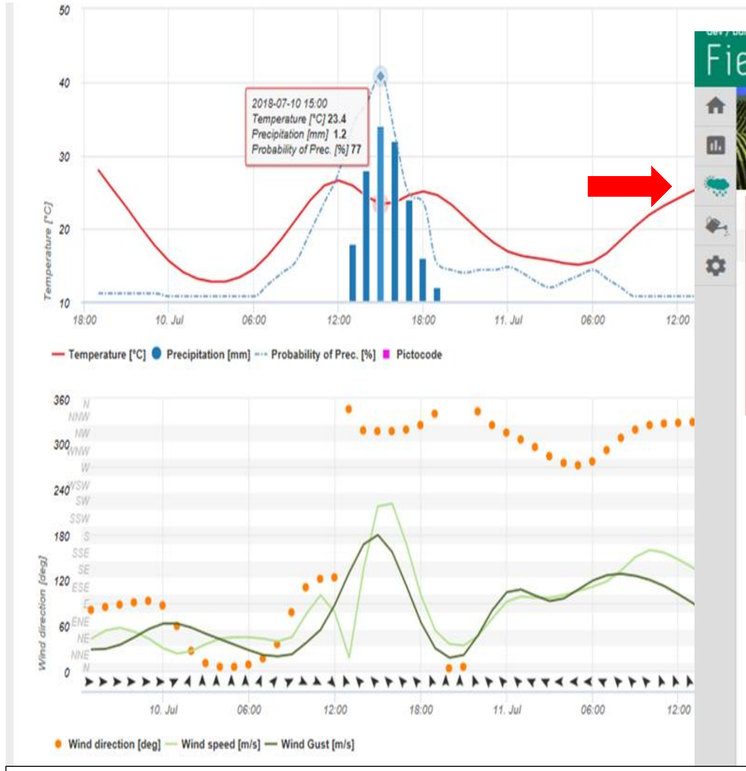


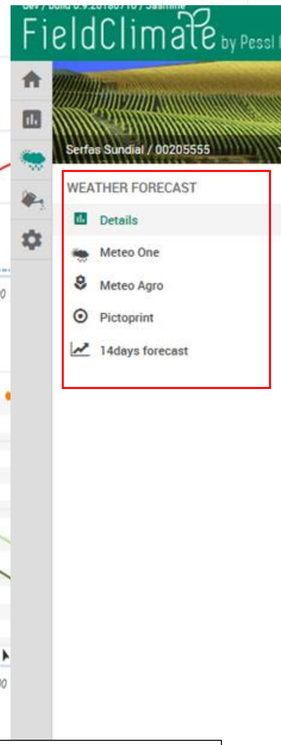
Delta T trend in relation to Air Temperature and Relative Humidity in [FieldClimate](#).

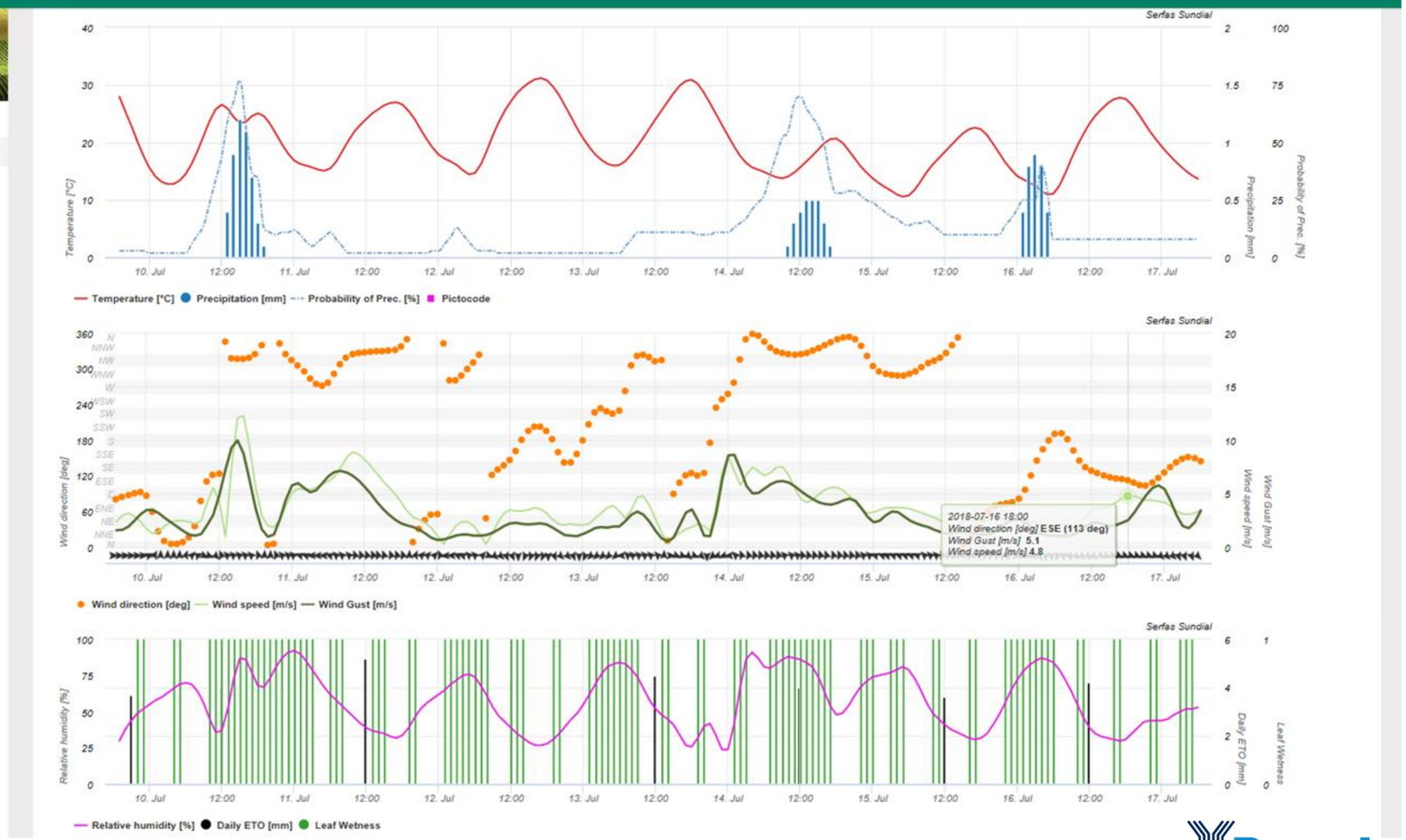
Delta T will soon be integrated in the Spraying Climate Window in the Weather Forecast page. It will be available as a 7-day accurate forecast, calculated on an hourly basis and calibrated with on-side data from your iMETOS station.

Weather Forecast

Detail Point Forecasts



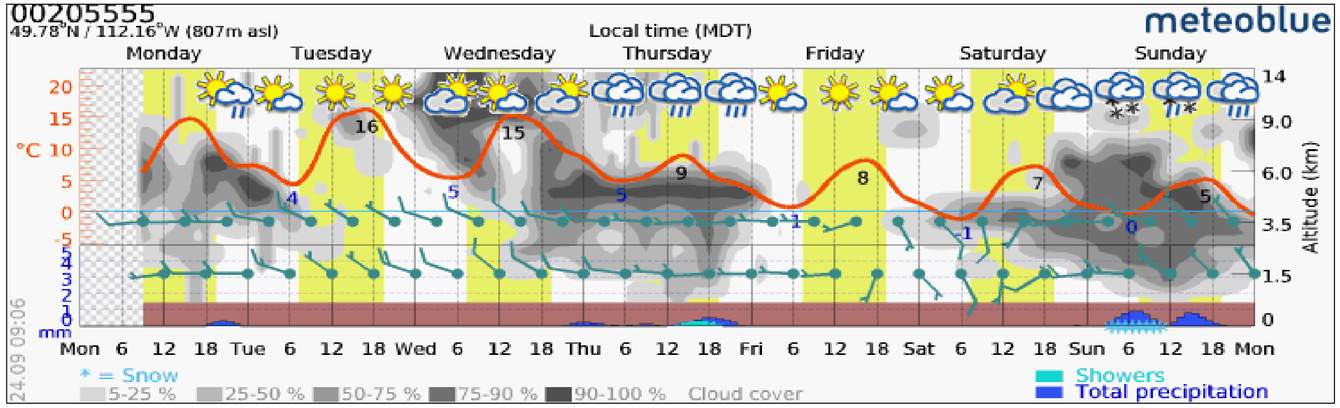




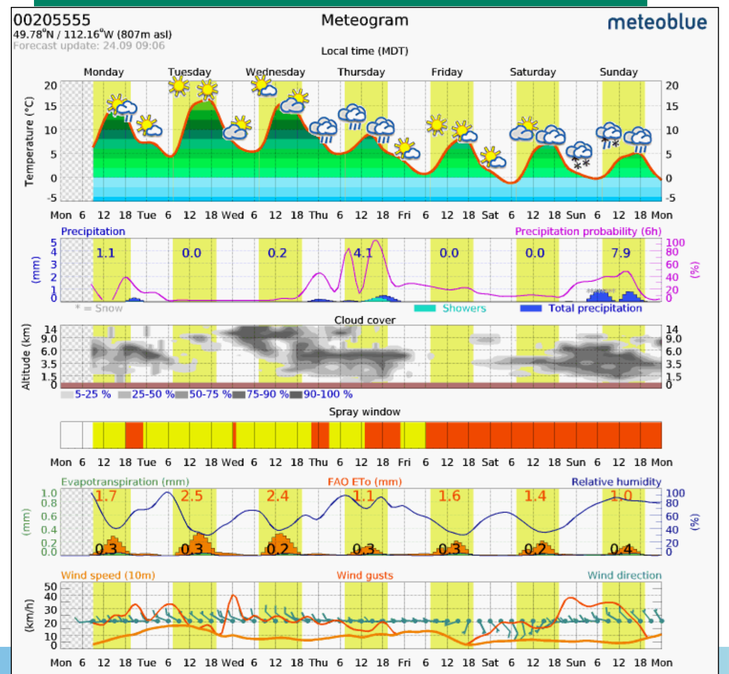
Output data for multiple forecast variables, every hour – wind speed/direction, gust, RH, temp., precip amount and probability, leaf wetness, global radiation, cloud cover and daily ETO

Graphical Weather Forecast

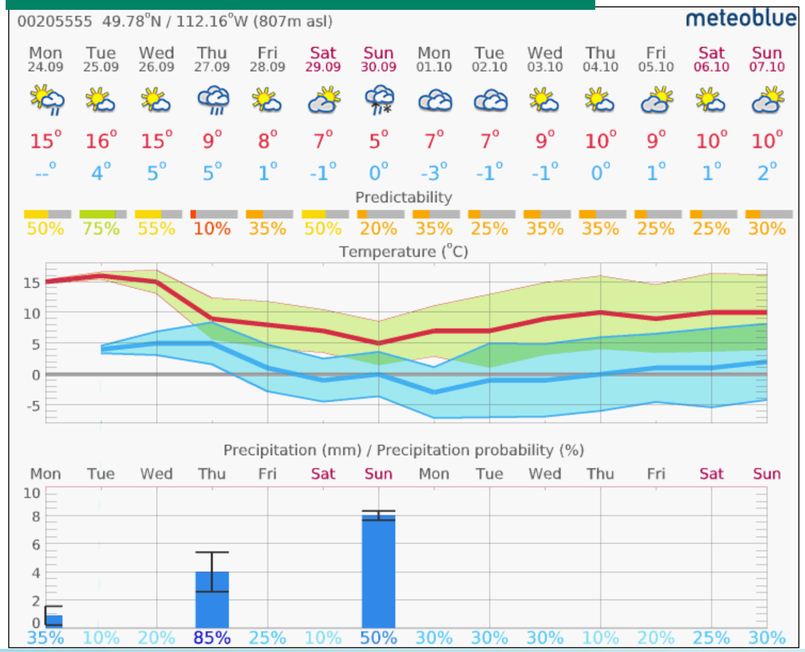
Meto One Forecasts



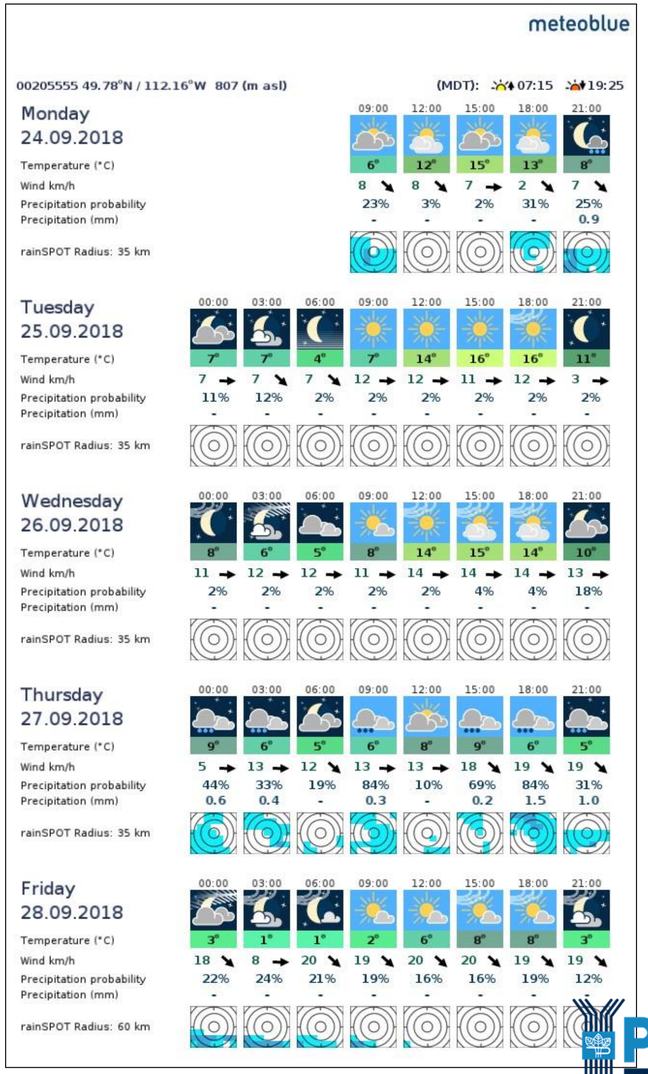
MetoAgro Forecasts



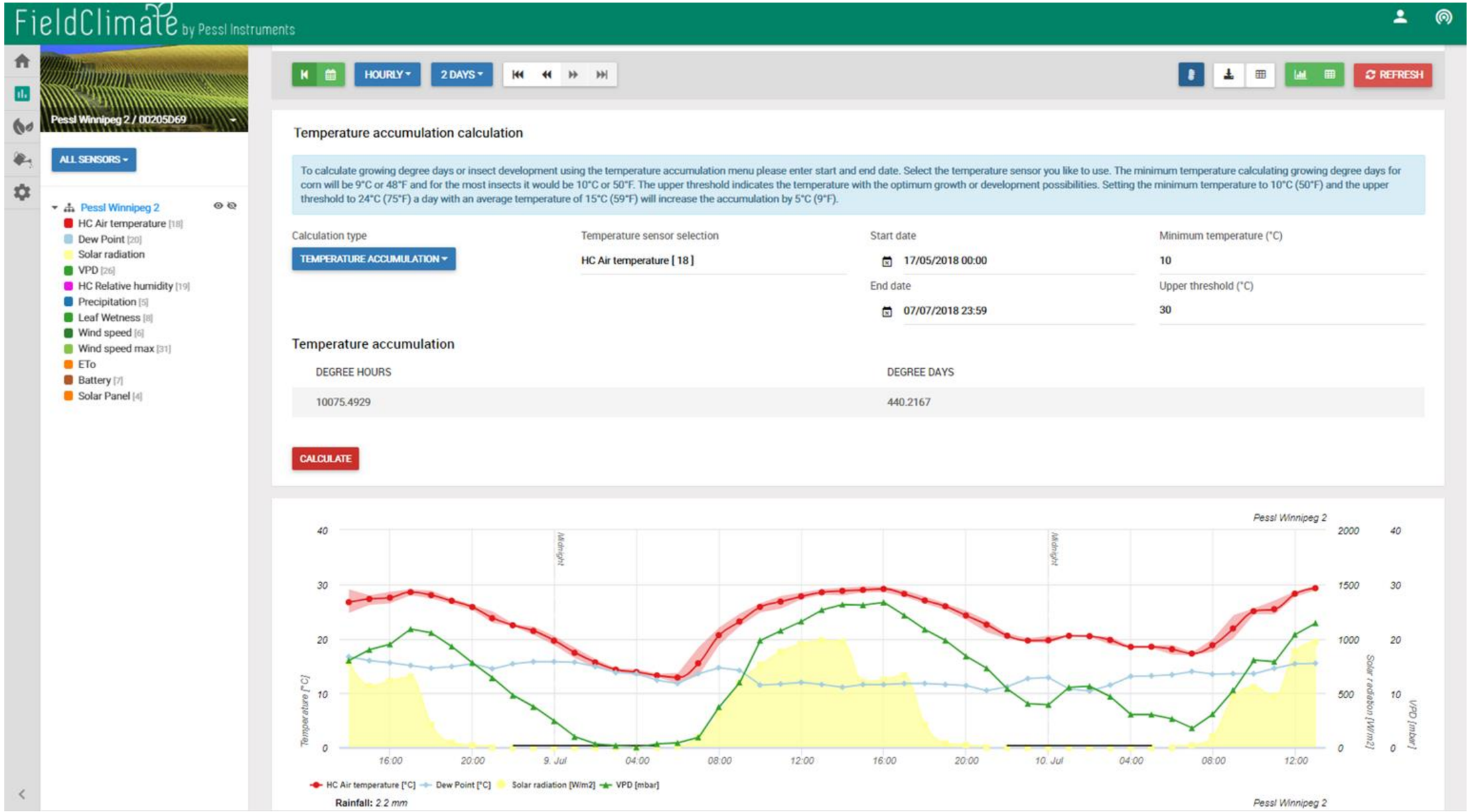
14 Day Forecasts



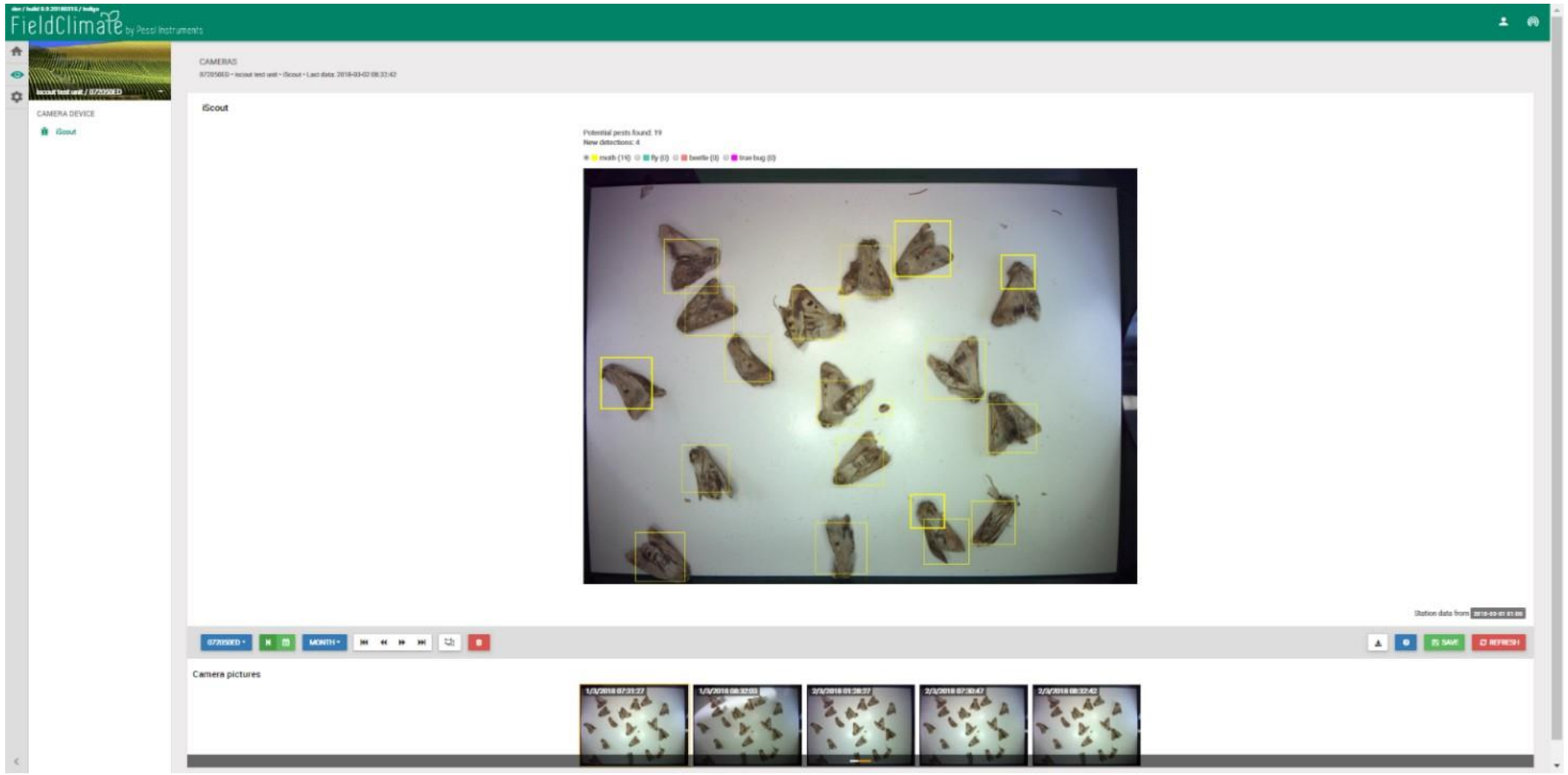
Pictoprint Forecasts



Growing Degree Day Calculator



Insect Detection Tool



Insect detection tool automatically detects and counts all insects marked with rectangles.

Loxley-MOAC

Smart Agriculture Pilot Project

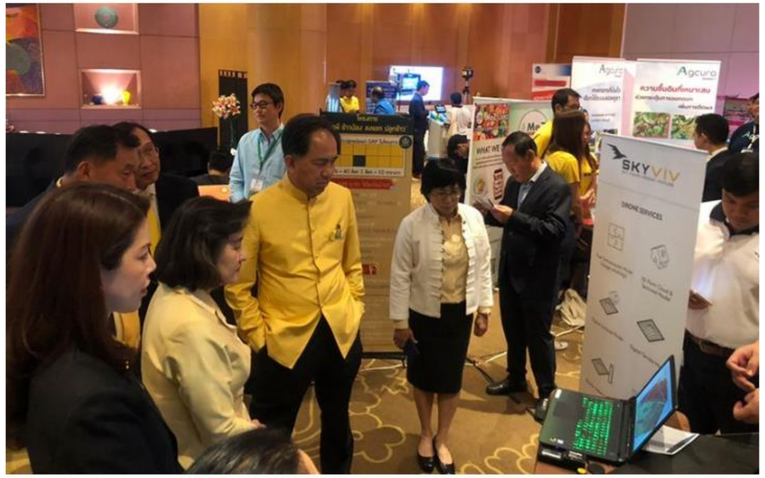
Data Driven Agriculture for Smallholder Farming

LOXLEY-MOAC MOU Signing

MOU Signing Ceremony on 20 September 2020 to commence official cooperation between MOAC and Loxley in developing the pilot project to implement the use of technology and data in Agriculture

โชว์เทคโนโลยี กาญจน์ ทองใหญ่ รอง กก.ผจก.ใหญ่ บมจ. ล็อกซเล่ย์ โชว์เทคโนโลยี IOT Sensor และอากาศยานไร้คนขับสำรวจการเติบโตของพืชเพื่อประหยัดต้นทุน ที่นาแปลงใหญ่บ้านสวนแตง จ.สุพรรณบุรี.

หน้าแรก / ในประเทศ



รมว.เกษตรฯนำทัพเปิดแปลง'เกษตรอัจฉริยะ'นำร่อง6พืชหลัก

วันพุธ ที่ 24 เมษายน พ.ศ. 2562, 15.48 น.

ล็อกซเล่ย์ส่ง'ไอโอที'หนุนเกษตรอัจฉริยะ

กรุงเทพธุรกิจ ● ล็อกซเล่ย์ติดตั้ง เทคโนโลยีไอโอทีเซ็นเซอร์ในนาข้าวแปลงต้นแบบ 20 ไร่ จ.สุพรรณบุรี สนับสนุนโครงการเกษตรอัจฉริยะของกระทรวงเกษตรฯ หวังปั้น "สมาร์ทฟาร์มเมอร์" ก้าวสู่เกษตรกรยุคไทยแลนด์ 4.0

นายอนันต์ สุวรรณรัตน์ ปลัดกระทรวงเกษตรและสหกรณ์ เปิดเผยถึงการจัด "งานรณรงค์การใช้เทคโนโลยีเกษตรอัจฉริยะ เพื่อเพิ่มประสิทธิภาพและลดต้นทุนการผลิตข้าวในนาแปลงใหญ่ ปี 2562" ณ นาแปลงใหญ่บ้านสวนแตง จ.สุพรรณบุรี เพื่อส่งเสริมให้เกษตรกรได้ทราบถึงเทคโนโลยีใหม่ๆ ที่สามารถเข้ามาช่วยทดแทนและใช้พัฒนาต่อยอดงานด้านการเกษตรมุ่งสู่การเป็น "สมาร์ทฟาร์มเมอร์" ตามโรดแมพของกระทรวงเกษตรฯ

"การจัดงานครั้งนี้ได้รับความร่วมมือจากหน่วยงานราชการและภาคเอกชนหลายหน่วยงาน ในการนำนวัตกรรมและเทคโนโลยีใหม่ๆ มาถ่ายทอดให้เกษตรกรได้ทราบถึงเทคโนโลยีเกษตรอัจฉริยะในรูปแบบต่างๆ ที่จะเข้ามาช่วยงานด้านการเกษตรให้มีประสิทธิภาพมากขึ้น โดยเฉพาะเทคโนโลยี ไอโอที แพลตฟอร์มวิเคราะห์ข้อมูลด้านการเกษตรของ บมจ.ล็อกซเล่ย์ นับเป็นเทคโนโลยีสำคัญที่จะเข้ามามีบทบาทด้านการบริหารจัดการในพื้นที่ของเกษตรกรที่ขาดแคลนแรงงาน เนื่องจากสามารถวิเคราะห์และแจ้งเตือนปัญหาเบื้องต้นที่อาจจะเกิดในนาแปลงใหญ่ให้เกษตรกรทราบและแก้ไขได้อย่างทันท่วงที"

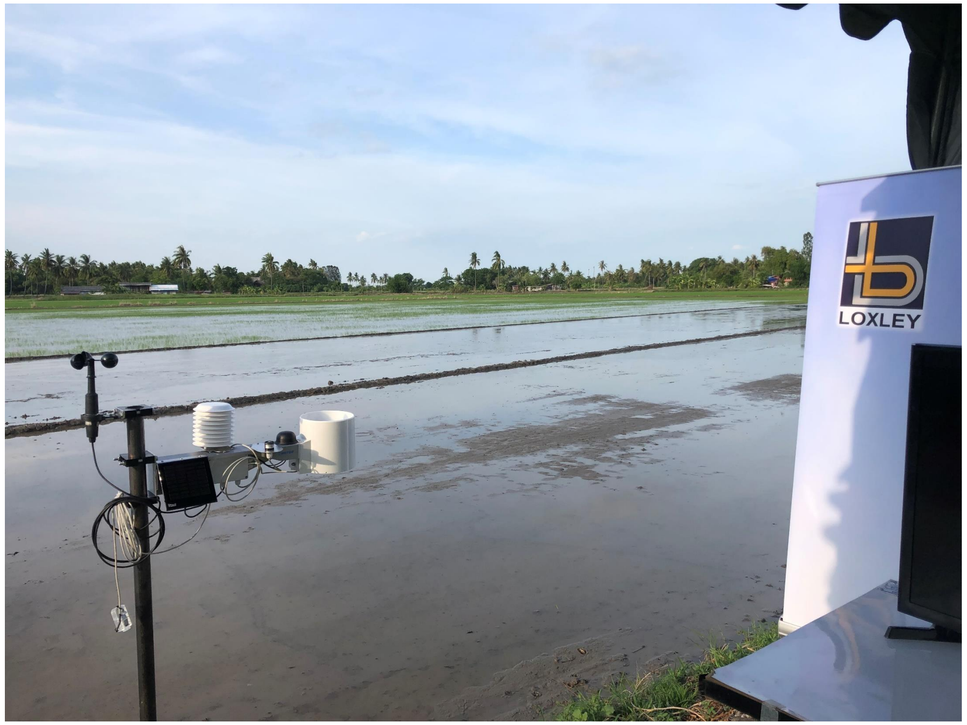
กาญจน์ ทองใหญ่ ทดสอบระบบไอโอทีเซ็นเซอร์ในนาข้าวแปลงต้นแบบ

นายกาญจน์ ทองใหญ่ รองกรรมการผู้จัดการใหญ่ บริษัท ล็อกซเล่ย์ จำกัด (มหาชน) กล่าวว่า บริษัทมีความเชี่ยวชาญด้านซึ่งมีความพร้อมทางด้านอุปกรณ์และแพลตฟอร์มที่ล้ำสมัยมีความยินดีอย่างยิ่งที่ได้เข้ามาถ่ายทอดเทคโนโลยีที่เป็นประโยชน์ต่อภาคเกษตรของไทย ให้เกษตรกรได้รับองค์ความรู้นำไปบูรณาการต่อยอดดำเนินการสร้างผลผลิตทางการเกษตร

Tech for Life สมาร์ท ฟาร์ม

ล็อกซเล่ย์ ทดสอบระบบไอโอทีเซ็นเซอร์ (IoT Sensors) ที่ติดตั้งในนาข้าวแปลงต้นแบบ 20 ไร่ ที่ นาแปลงใหญ่บ้านสวนแตง จ.สุพรรณบุรี ตามโครงการเกษตรอัจฉริยะของ **กระทรวงเกษตรและสหกรณ์** เพื่อเก็บข้อมูลอุณหภูมิ แสงแดด แรงลม น้ำฝน ความชื้น, ใช้ UAV (อากาศยานไร้คนขับ) สำรวจโรคและแมลงศัตรูพืช ทั้งนี้เพื่อสนับสนุนนโยบาย **"สมาร์ท ฟาร์มเมอร์"** ก้าวสู่เกษตรกรยุคไทยแลนด์ 4.0

LOXLEY-MOAC DATA DRIVEN AGRICULTURE
Pilot Project in Suphanburi Province



Installed weather & field data acquisition in demonstrating field

LOXLEY-MOAC DATA DRIVEN AGRICULTURE
Pilot Project in Suphanburi Province

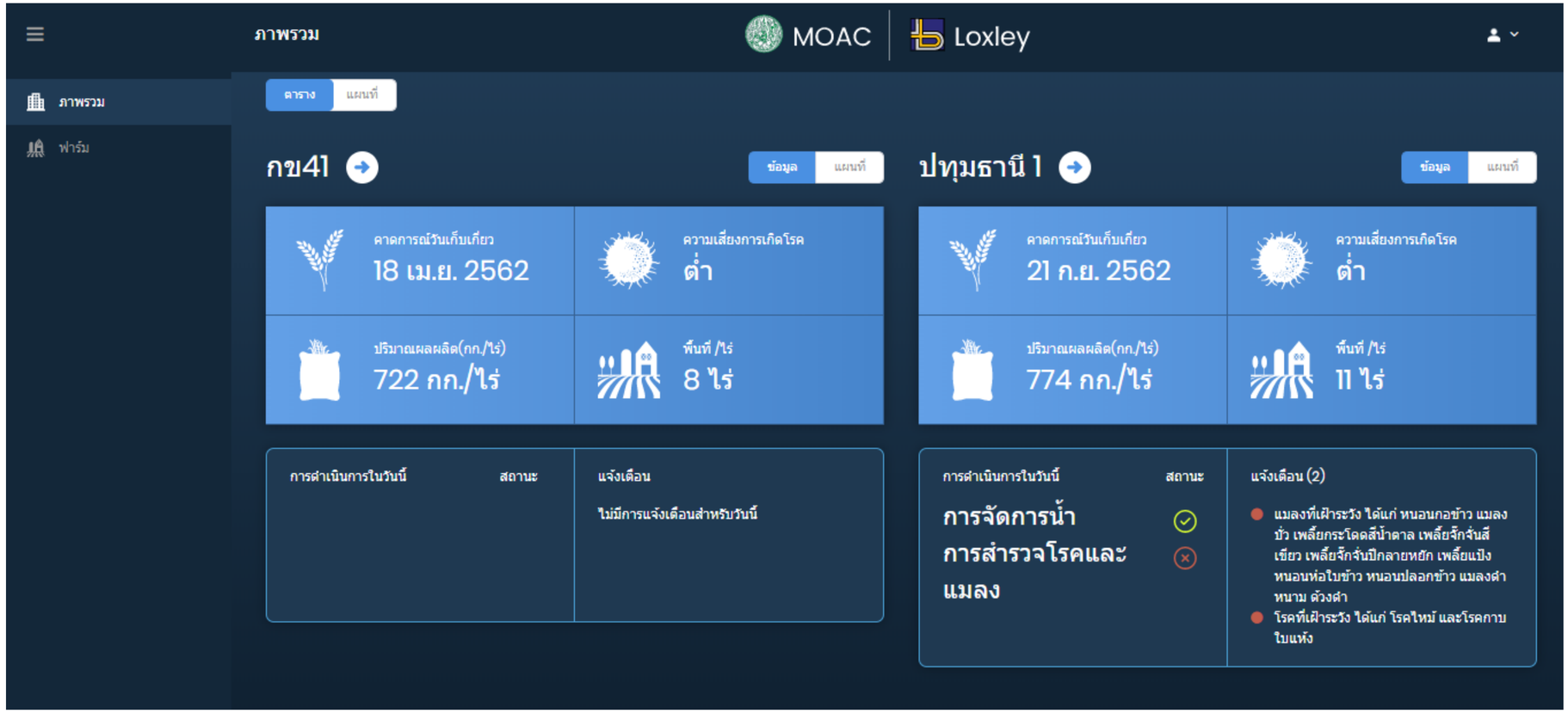
UAV with multispectral camera launched to collect aerial image of demonstrating field to analyze crop health and growth monitoring

LOXLEY-MOAC DATA DRIVEN AGRICULTURE
Pilot Project in Suphanburi Province

UAV Survey (RGB)

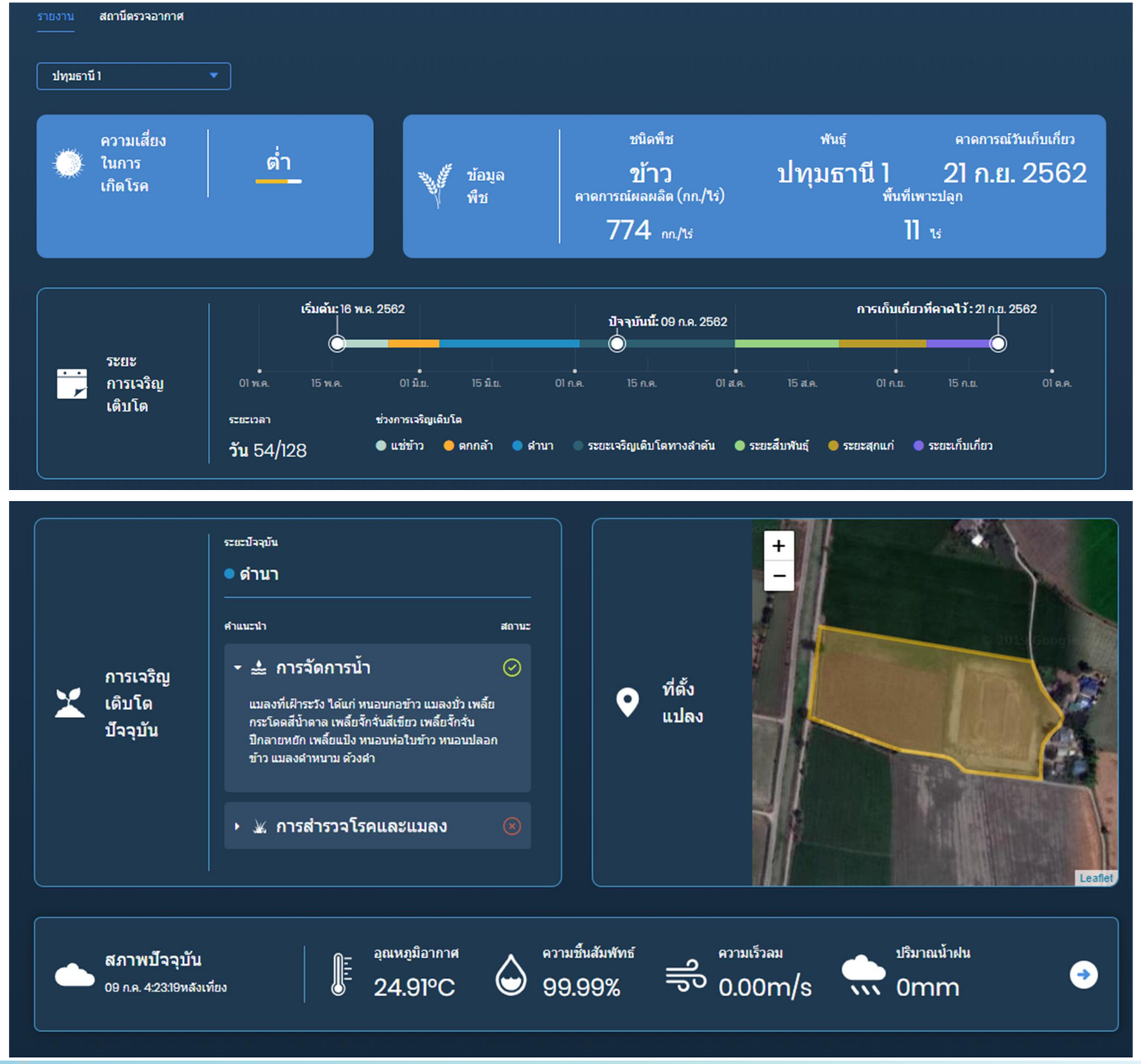
UAV Survey (NDVI)

LOXLEY-MOAC DATA DRIVEN AGRICULTURE
Pilot Project in Suphanburi Province



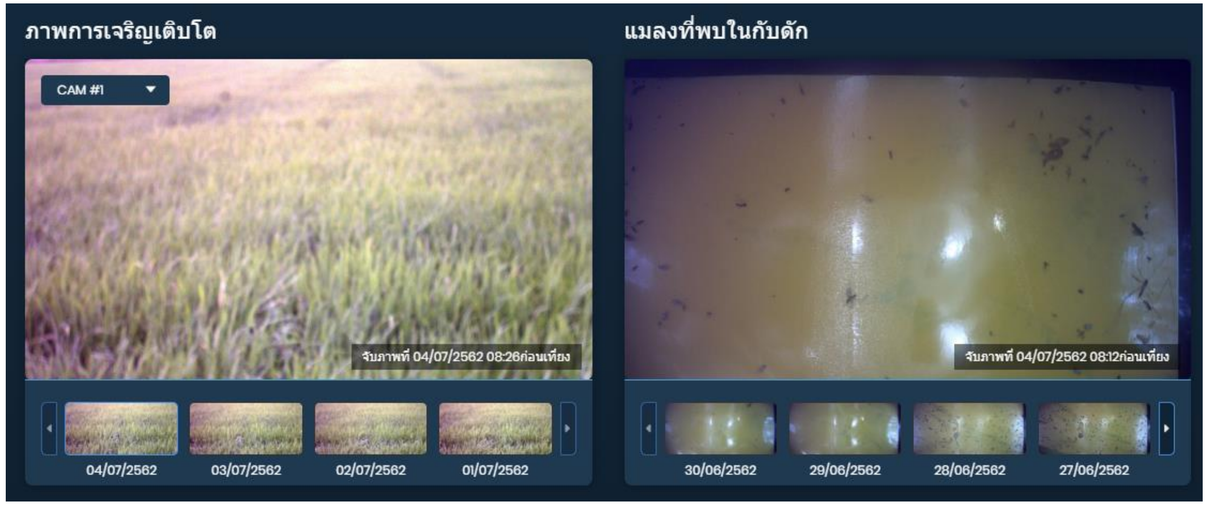
Dashboard Overview

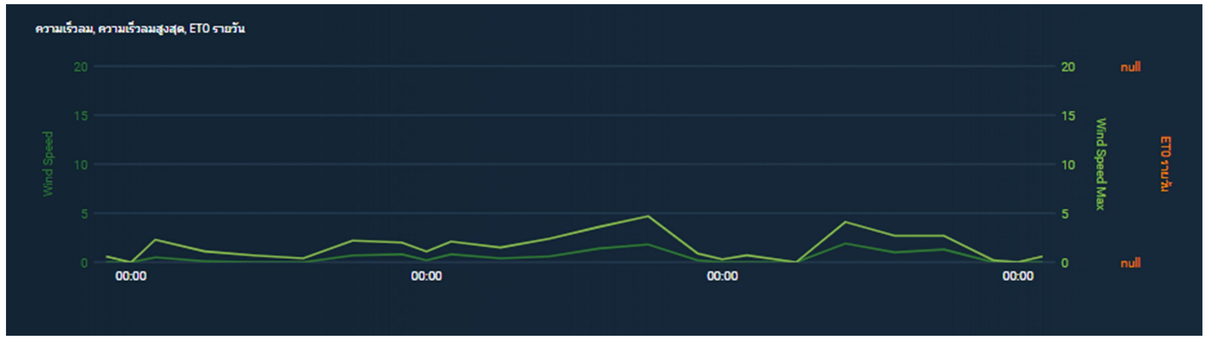
LOXLEY-MOAC DATA DRIVEN AGRICULTURE
Pilot Project in Suphanburi Province



Dashboard Overview

LOXLEY-MOAC DATA DRIVEN AGRICULTURE
Pilot Project in Suphanburi Province





Dashboard Overview

“Data Driven Agriculture for South East Asian Rice Farmers – Introduction to Agro-Meteorological Networks and Digital Farm Advisors”

by Loxley PLC– PESSL Instruments GmbH
and co-sponsored by the Austrian Development Agency

Project Detail

Project Focus

1. Providing simple and actionable advice to smallholder rice farmers and stakeholders in Southeast Asia
2. Enhancing rice farming value chain.

Economy Partners

1. Thailand
2. Vietnam
3. Indonesia

Project Execution Plan for Thailand

- Rice field area in Suphanburi Province
- Install approx.70 Automated Weather Stations (AWS) in the project area
- Integrate all data to MOAC’s Server
- Organize technical trainings to farmers and officers to be able to interpret and understand data

Project Implementation

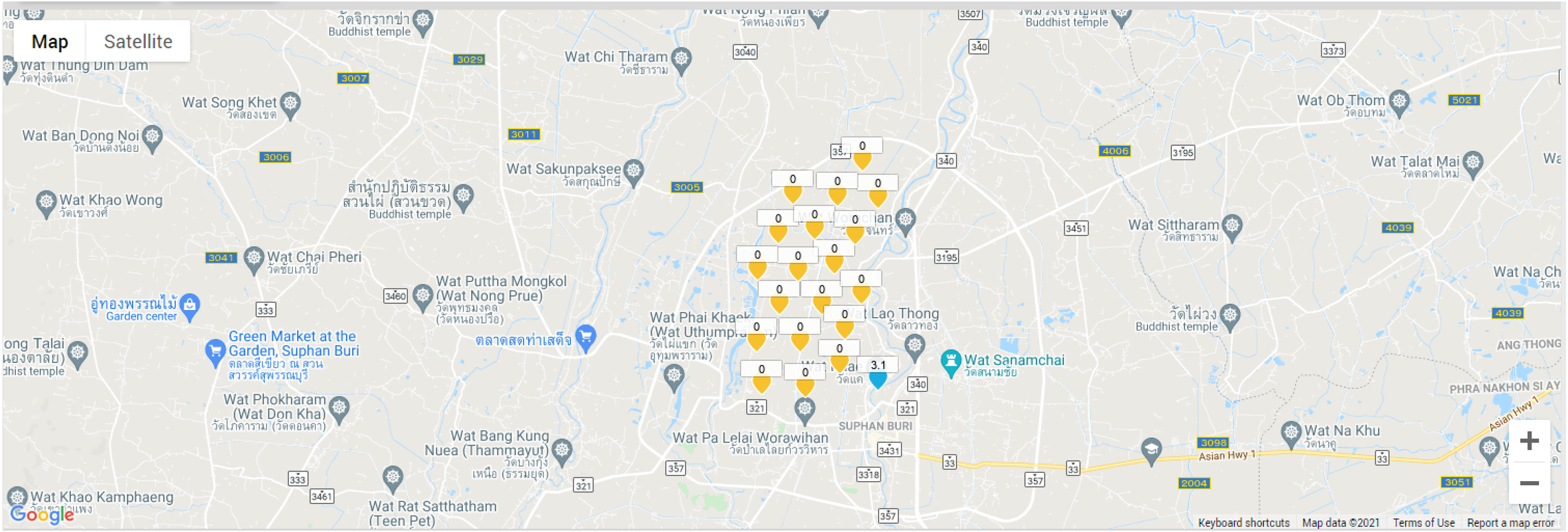
TECHNOLOGY

The deployment of a regional Agro-Meteorological IoT Network in a contiguous location populated with many rice farmers will serve as critical infrastructure that will enhance advisory capability to support Climate Smart Agriculture (CSA) adaptation.

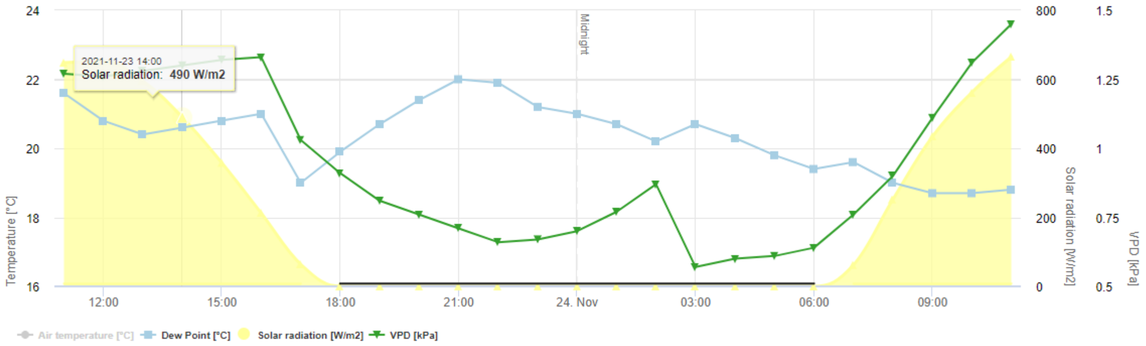
TRAINING

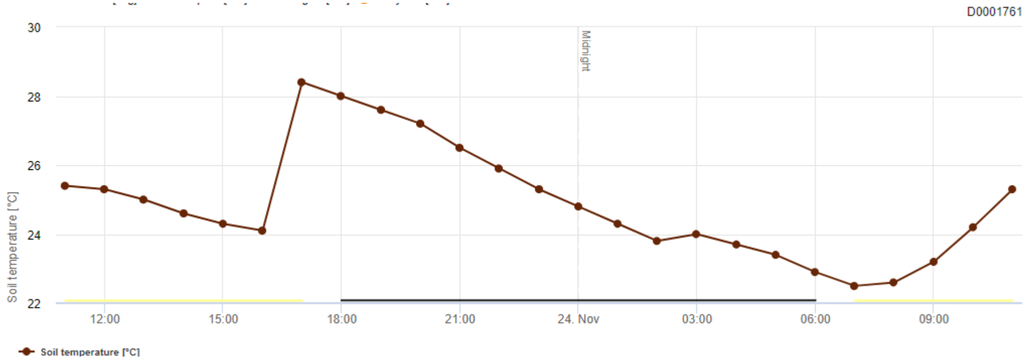
The training and certification of local village talent into trained DFA who will know how to interpret data from the equipment advanced and provide actionable agronomic advisory to the rice farmers across the regions.

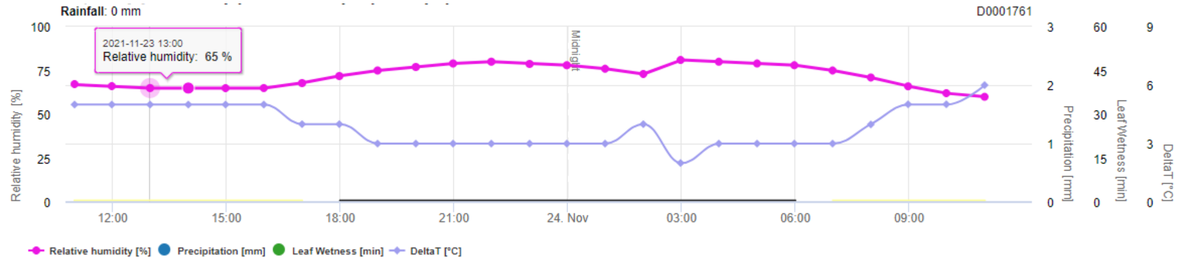
Virtual Stations in Suphanburi Province

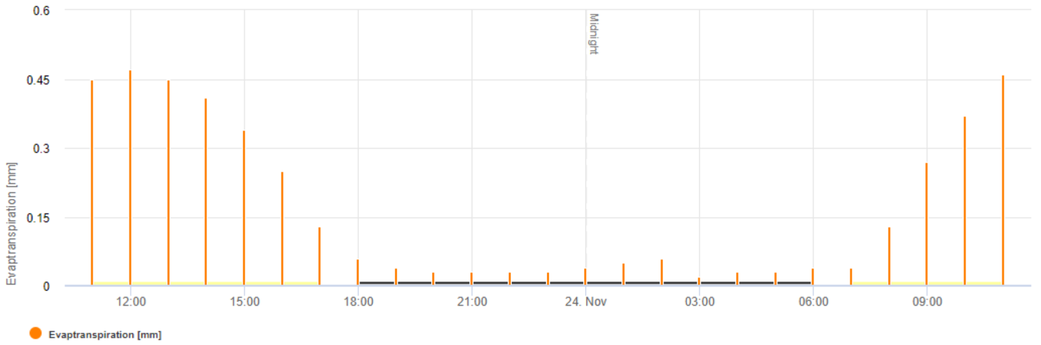


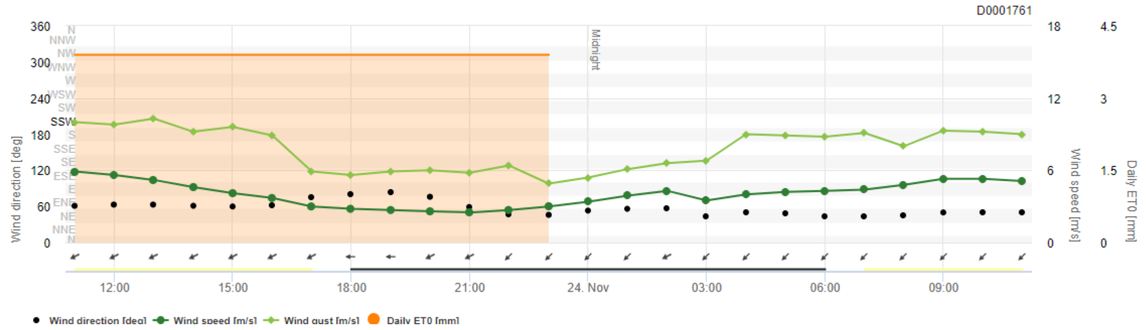
Example of Data



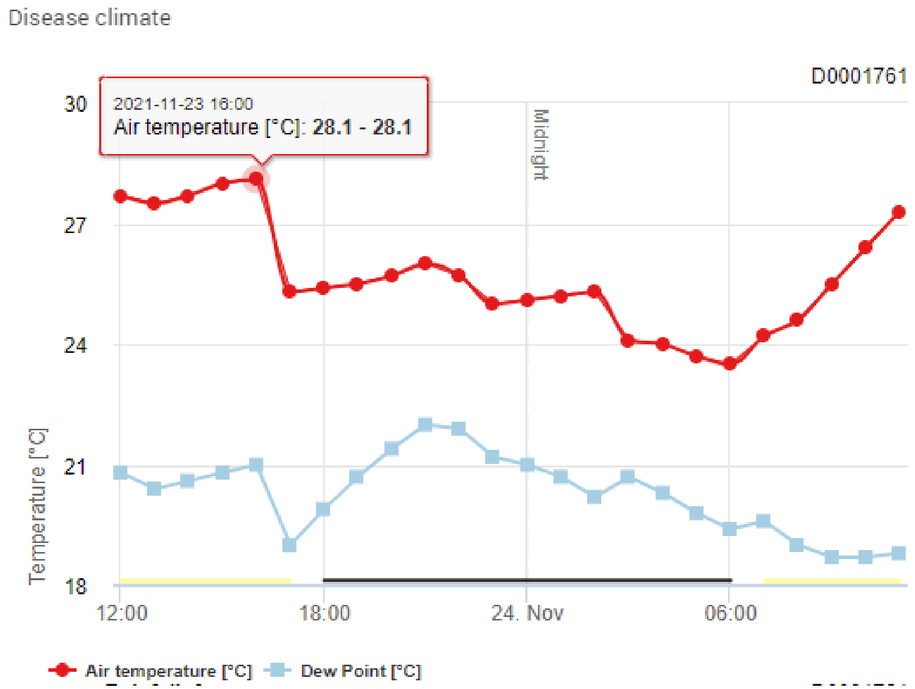


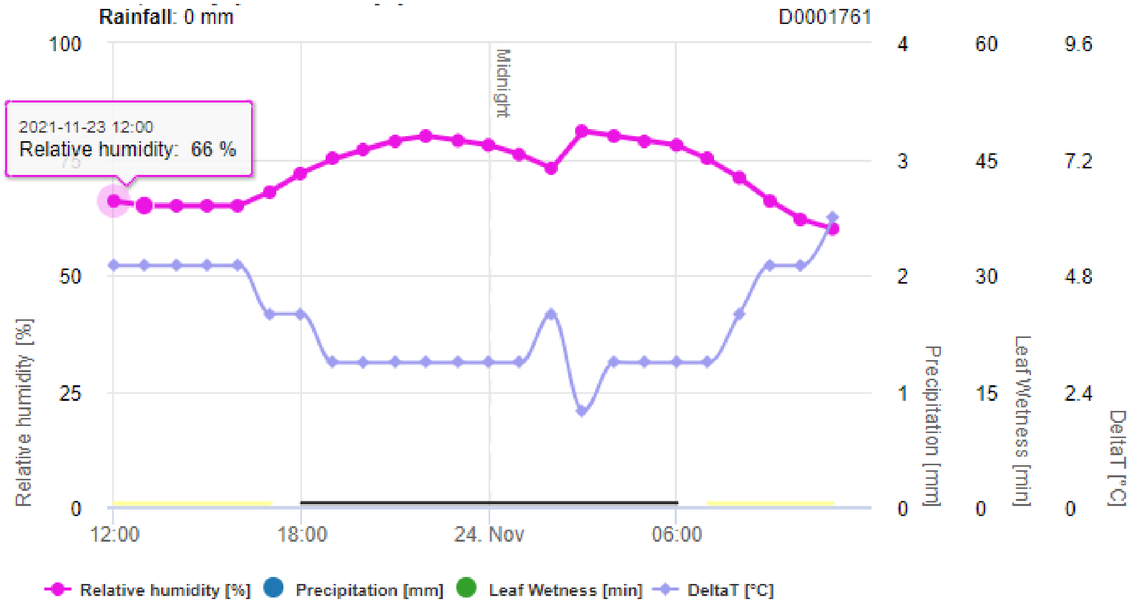






Example of Data





METOS – Certification Program
Course Detail

Course 1
Metos Stations and Sensors

Course 2
FieldClimate Software

Course 3
Station Preparation & Installation

Course 4
Maintenance, Repair, and Off Season Storage

Course 5
iMETOS IMT Weather Station

Course 6
ECO D3 Station

Course 7
iSCOUT

Course 8
CropVIEW Cameras

Course 9
Spray Applications

Course 10
Disease Applications

Course 11
Forecast Applications

Course 12
Soil Moisture and Plant Nutrition

Course 13
MobiLab: Nutrient Management

Course 14
MicroMetos: LoRA and NB-IoT

Course 15
Metos FarmView

Thank You