**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

24<sup>th</sup> May 2022 Pullman Bangkok, Thailand







### **OUR HISTORY**

### Loxley (Bangkok) Company Limited



Import and sale of industrial products and advanced technology



### Loxley Rice Company



Export primary product from Thailand (rice, timber)





### Loxley Group



Business leader in advanced technology and infrastructure



### Loxley Public Company Limited



Become a listed company in Stock Exchange of Thailand







**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



### Services SBG









### **Network Solutions SBG**



### Trading 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.

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





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

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



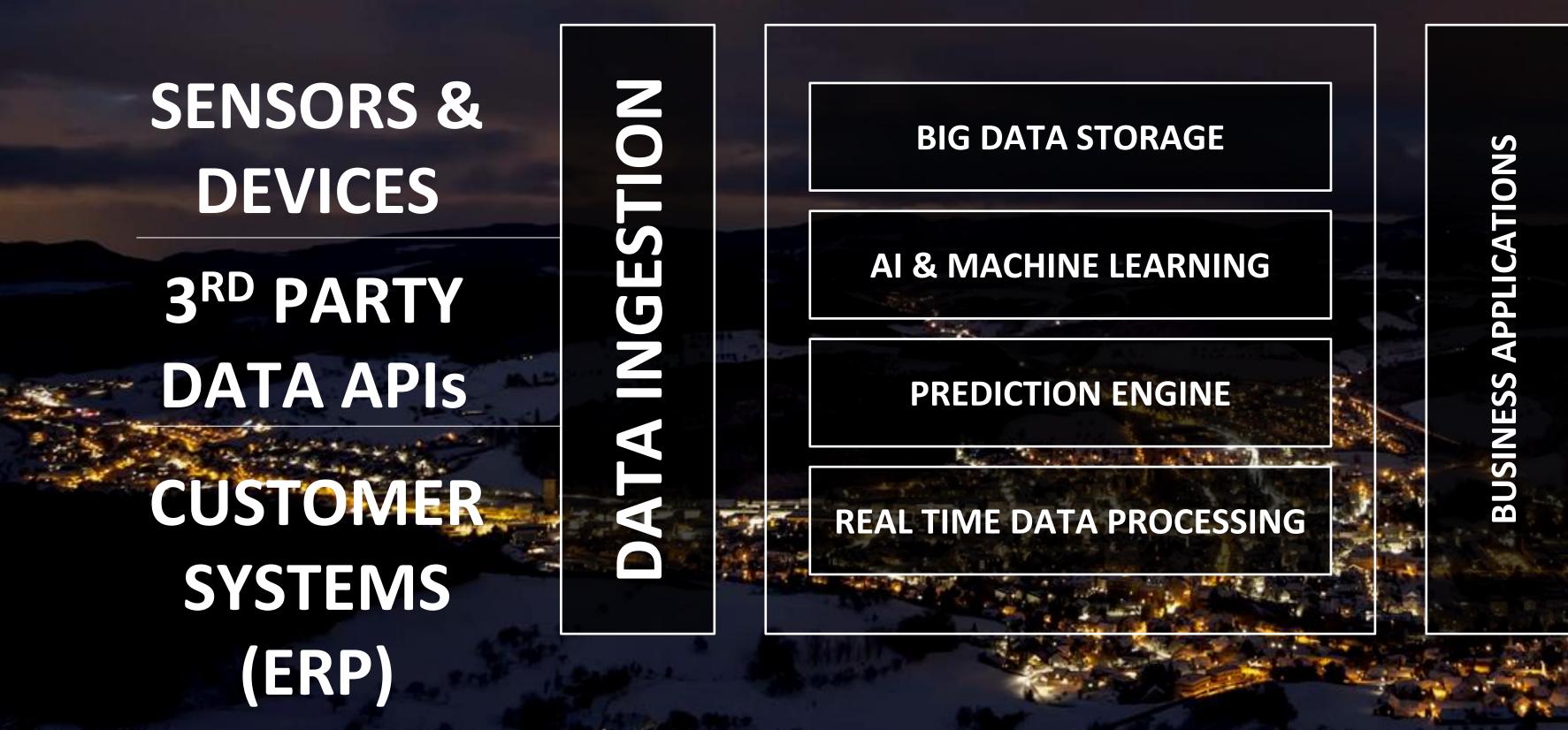
### DATA DRIVEN AGRICUTURE CONCEPT

### 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**

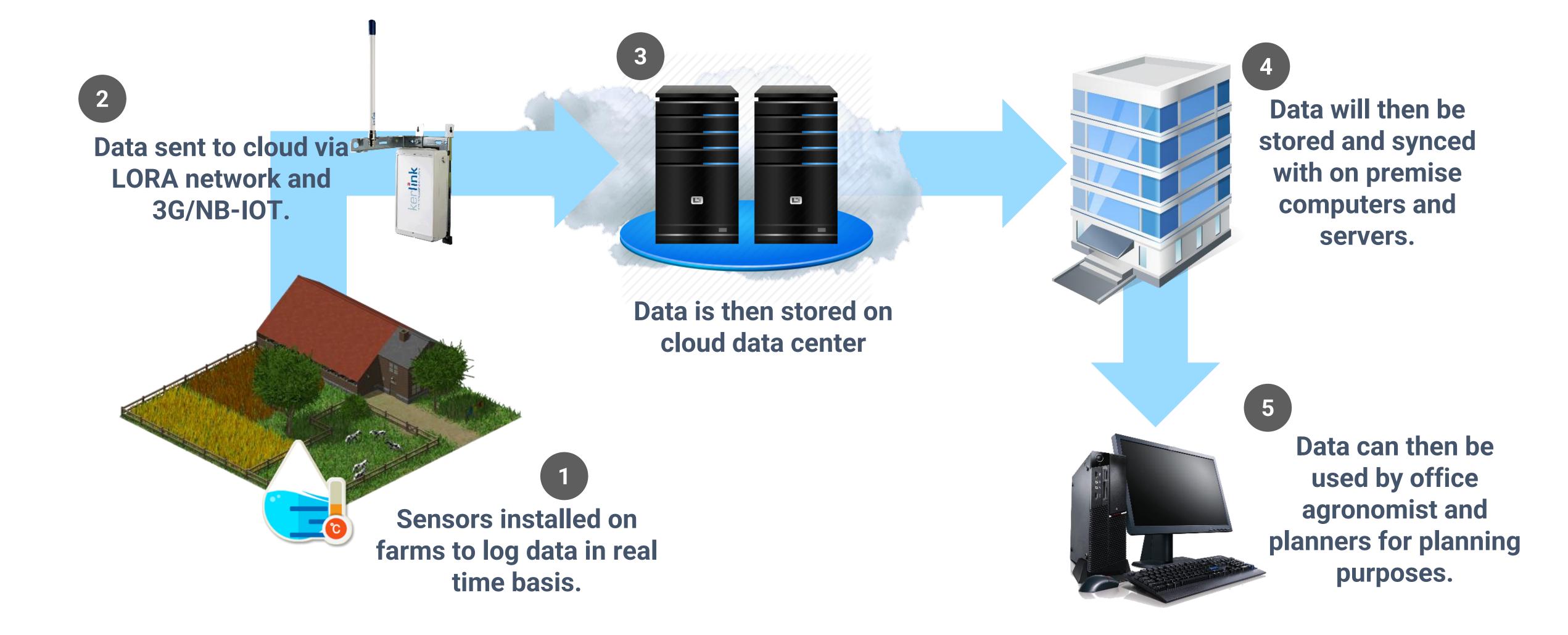


## AGRICULTURE

## BUILDINGS



### **LOXLEY SMART AGRICULTURE SYSTEM**









### Weather/Field Data Acquisition





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

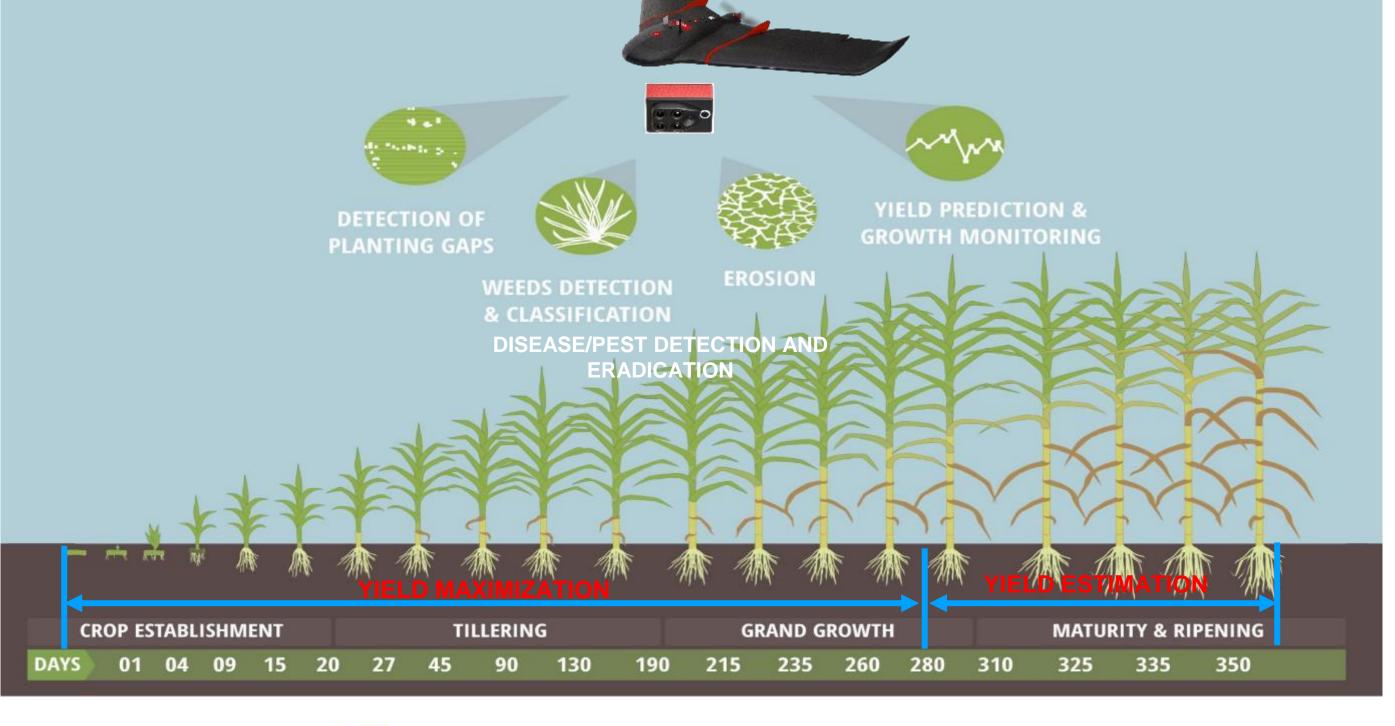




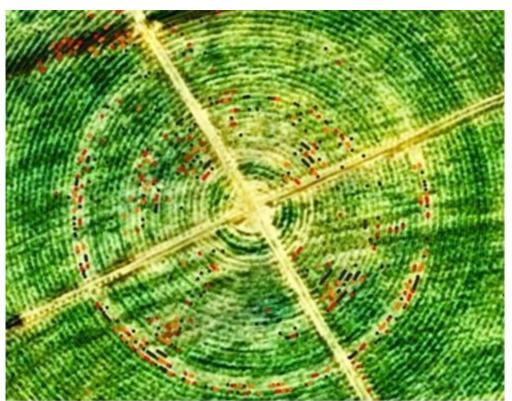


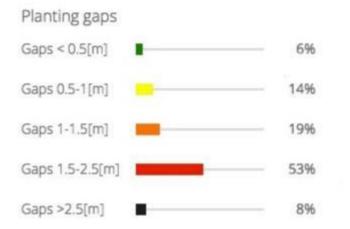


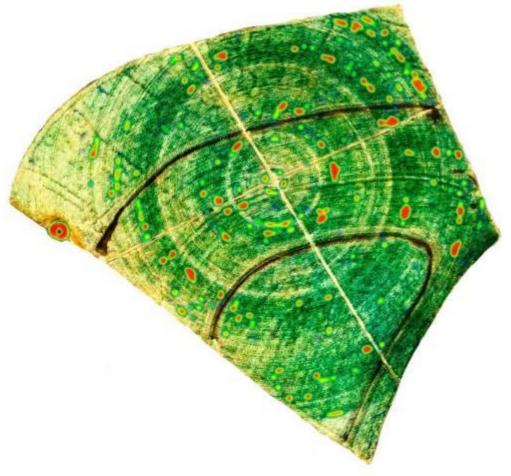
Image Analysis from **Drone mounted** Hyperspectral Camera



### **Planting Gap Detection**



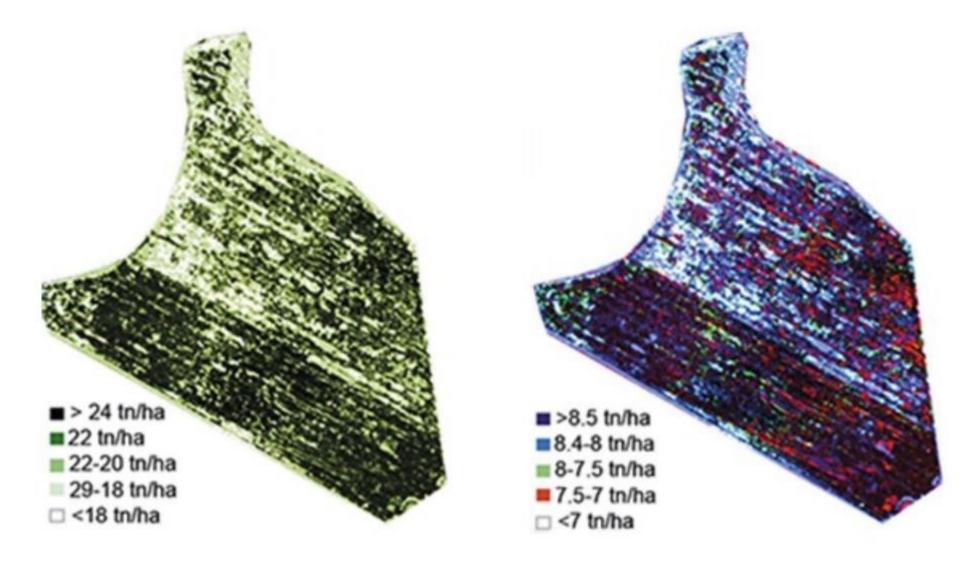




### Weed/Disease/Pest **Detection and Eradication**







**Soil Erosion Detection** 

### **Biomass Concentration Map / Yield Estimation**













**Precision Agriculture** 

1000

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

## Flight Planning

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## Plant Population Count @ V-2



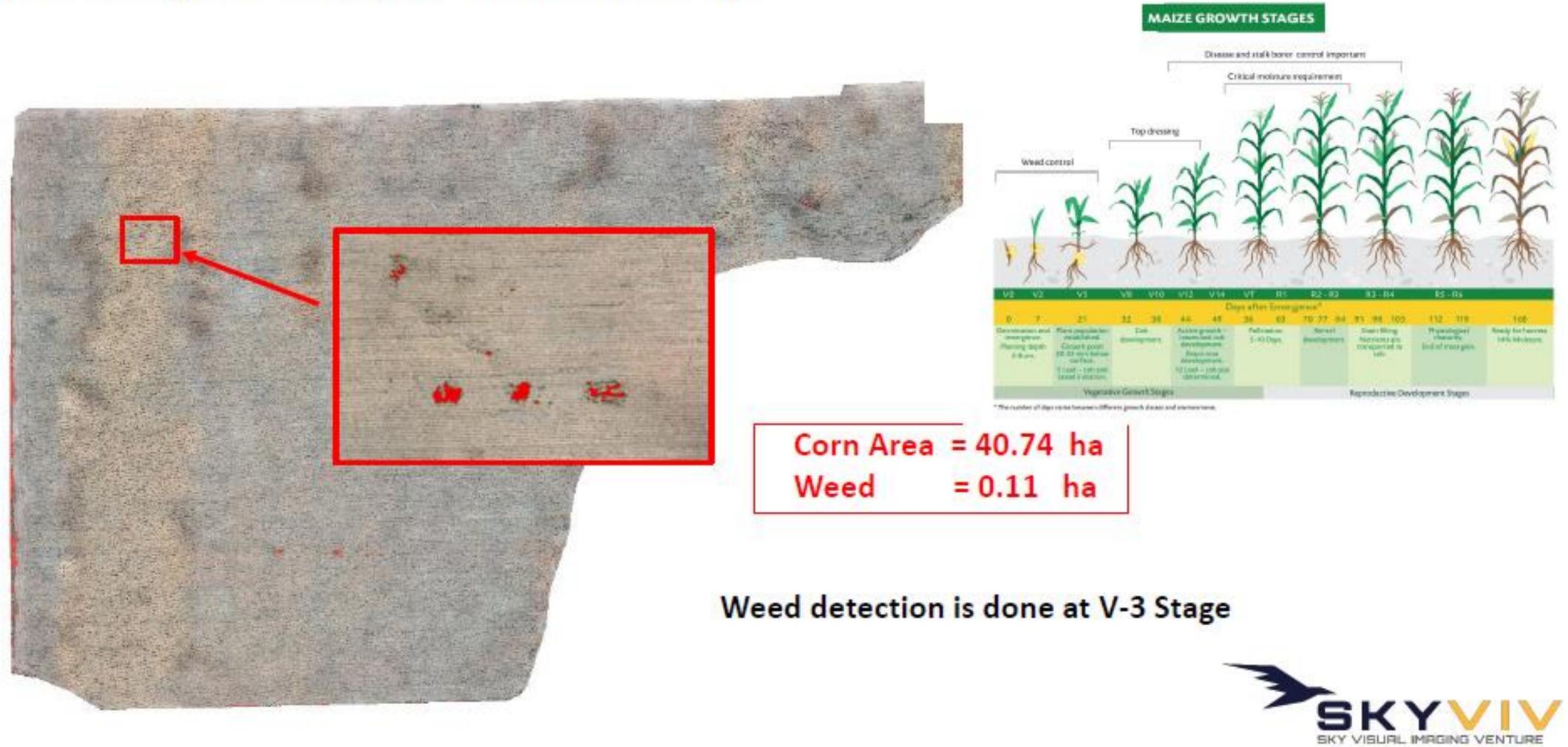
The "Planned Number of Plants" is derived from given the row distance of 50 cm, plant distance within a row of 25 cm







### Weed Detection by measuring differences in Chlorophyll Concentration (weed has higher Chlorophyll Content than corn leaf)

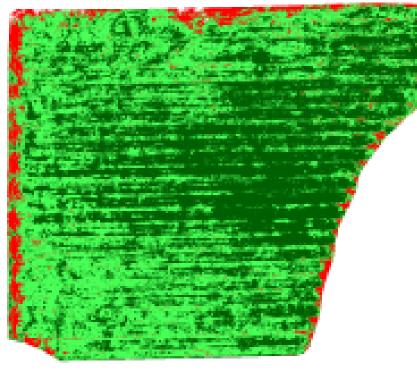






## **Crop Protection**

## V10



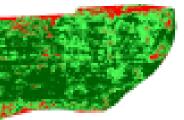
### V11

Decrease NDVI values due to lack of (rain) water

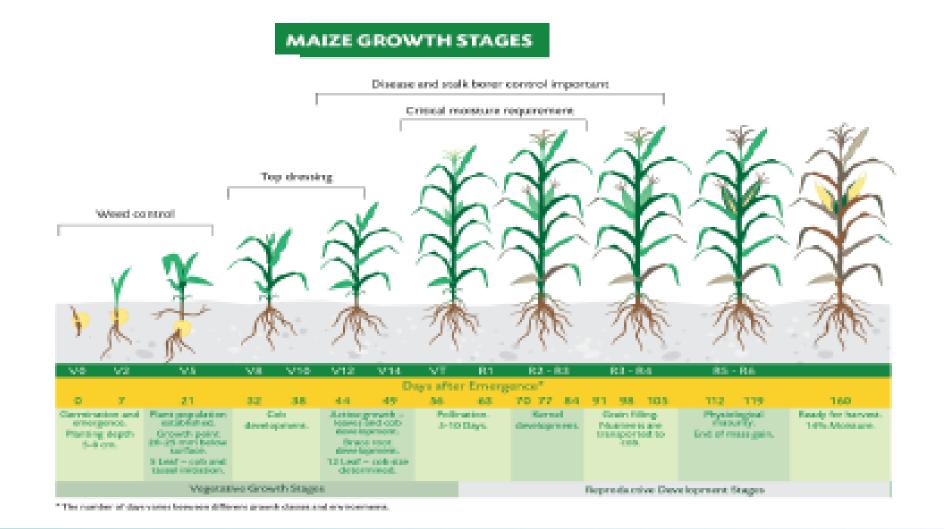




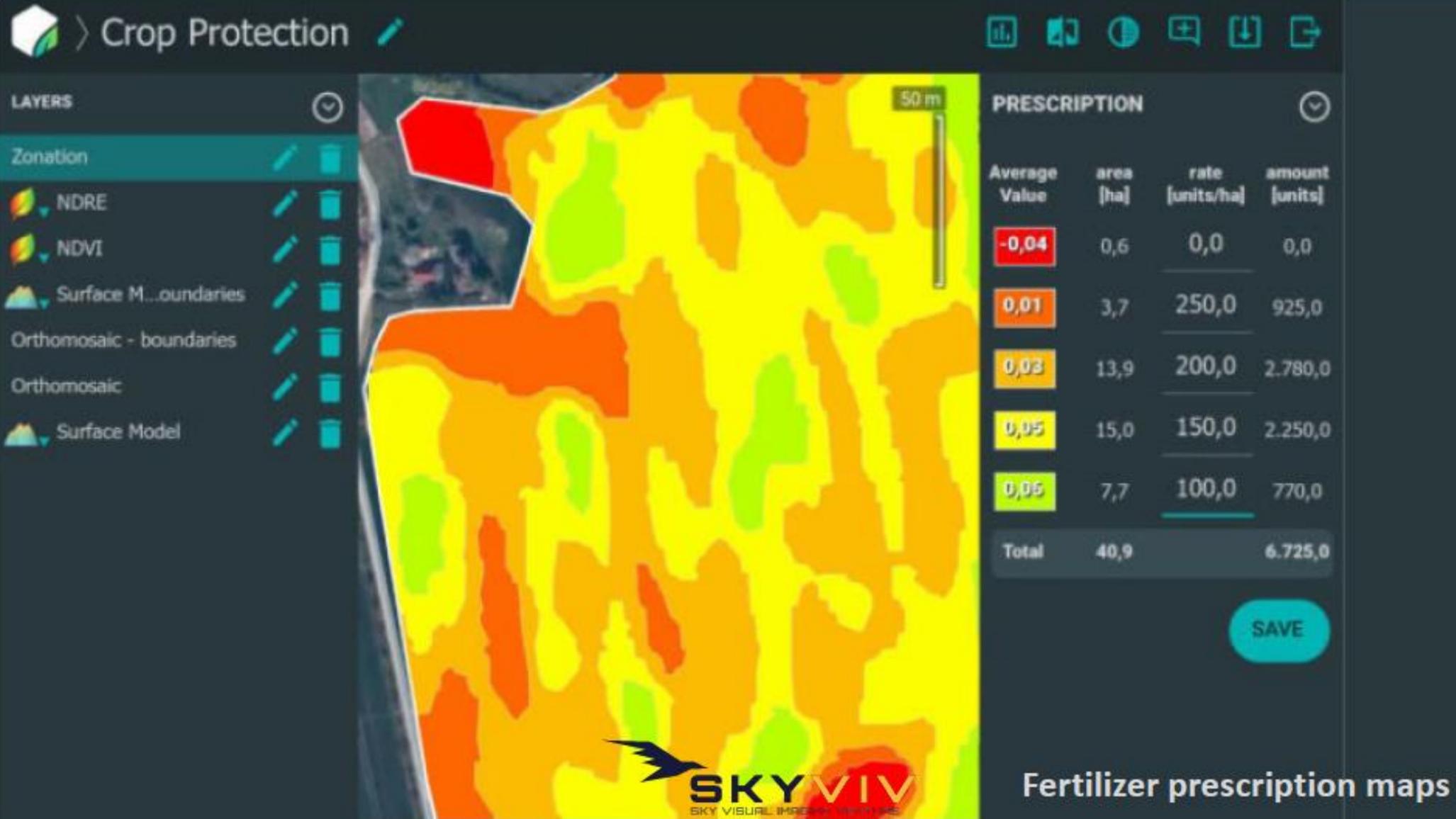
# The digital outputs generated by the multispectral images when assessing stress and crop growth can help to guide the proper and efficient application of crop protection products.



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

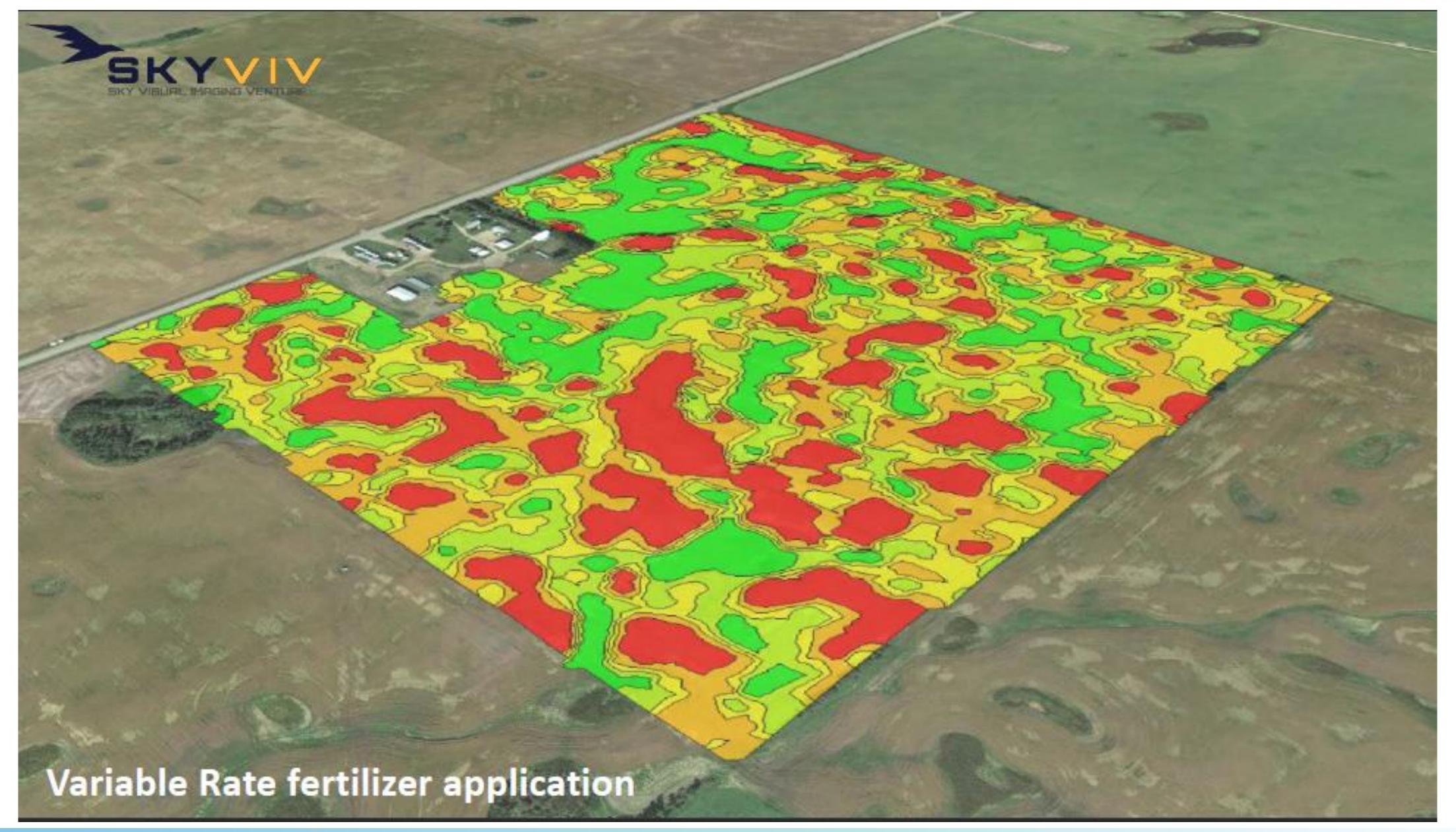








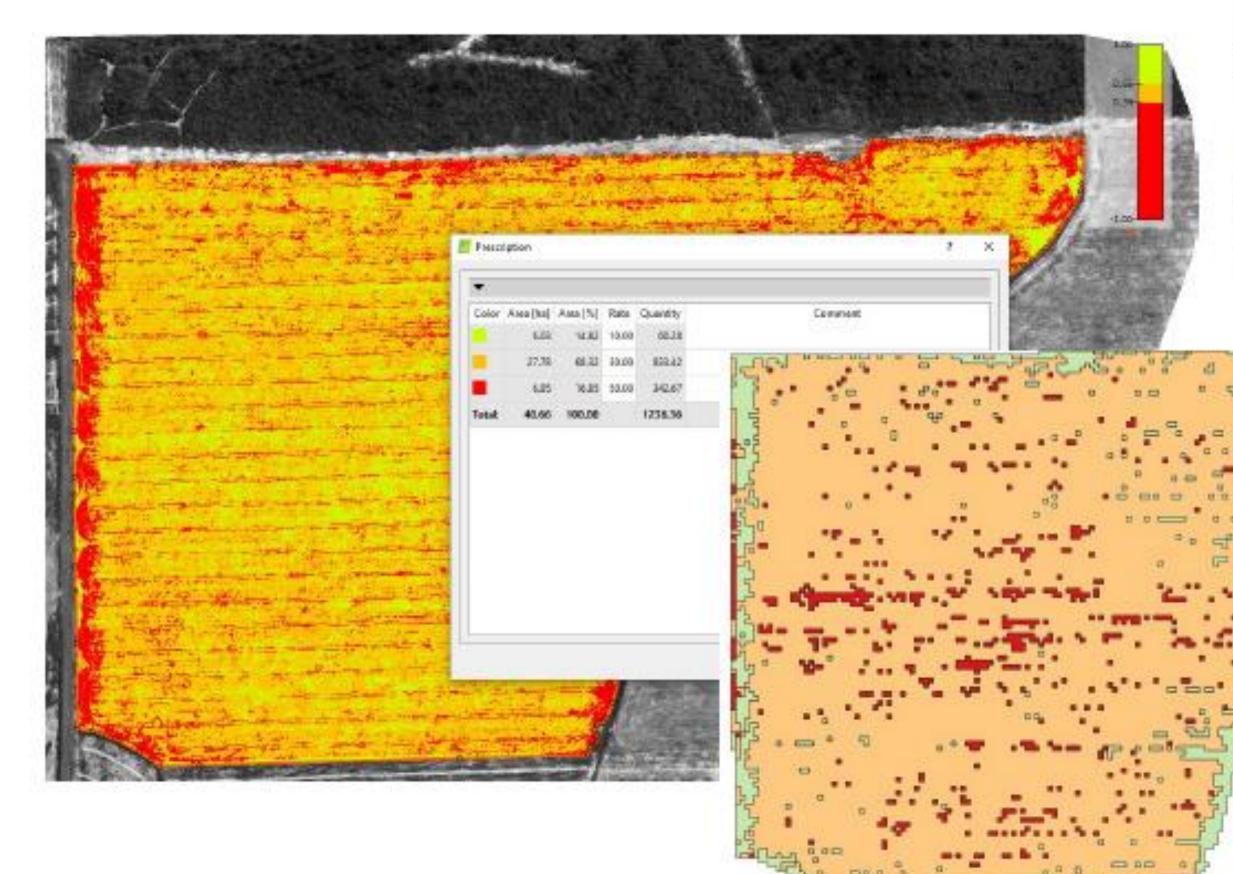








## **Fertilizer Prescription Map**







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.

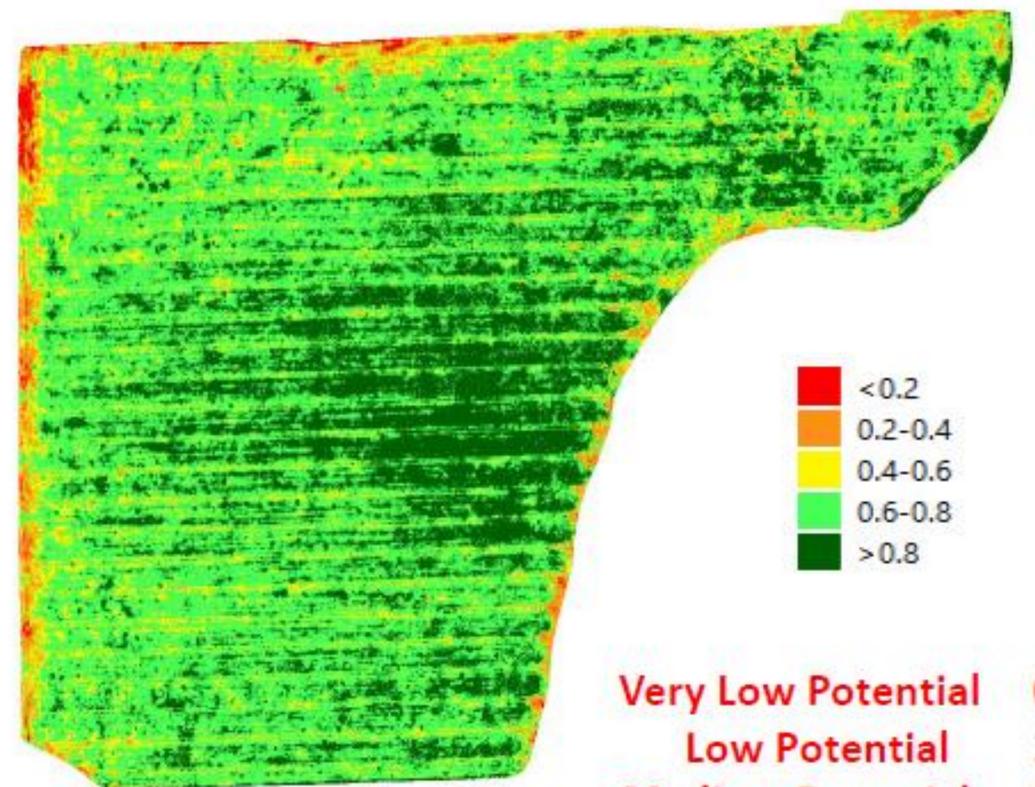
Fertilizer prescription map can directly integrate with farming machinery







### Harvest Planning – Yield Estimation



Medium Potential **High Potential** Very high Potential 11.32 ha





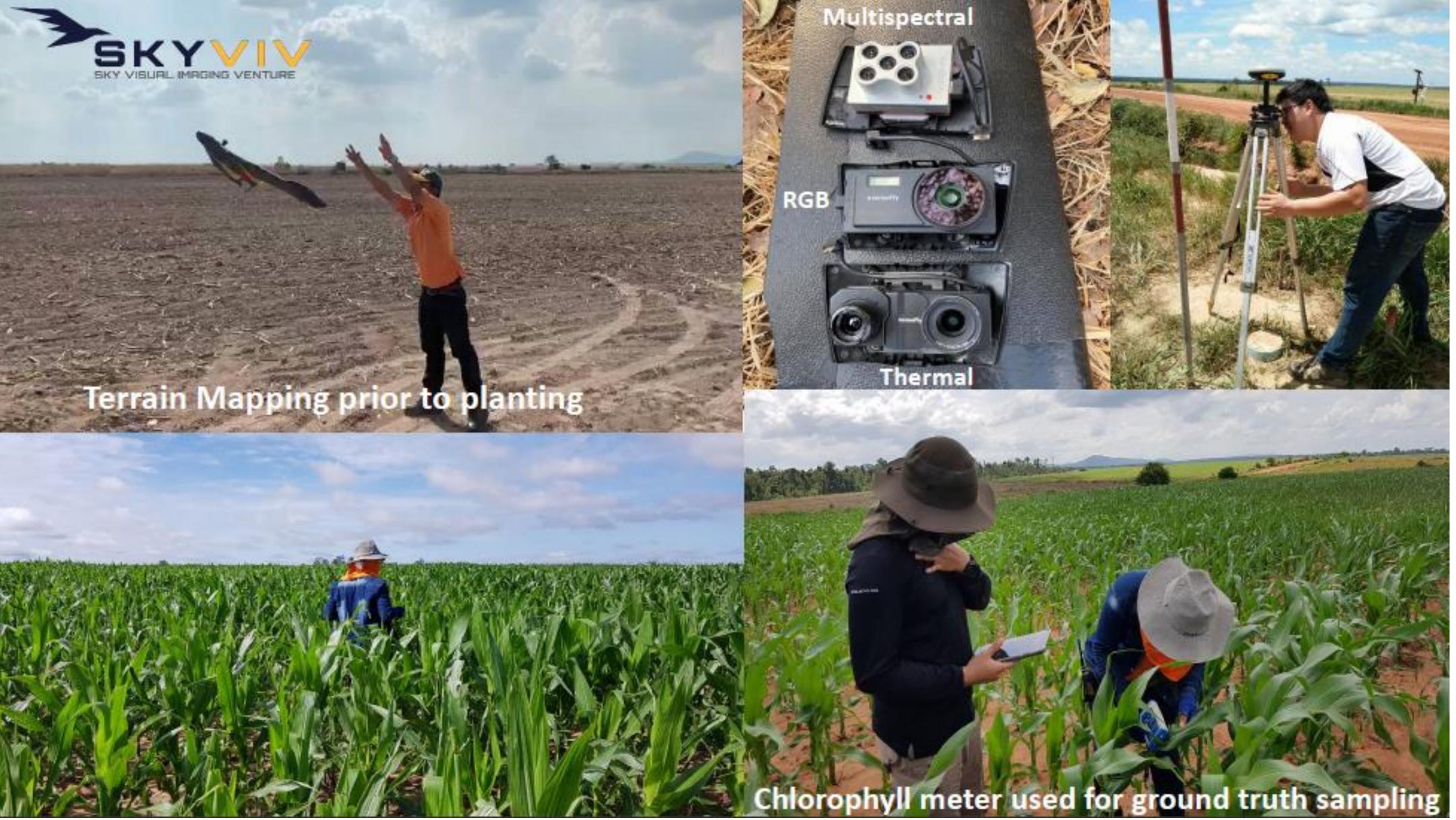
Drone data, collected at critical growth stages throughout the growing season, can help agronomists improve their models, predictions and planning.

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













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### 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

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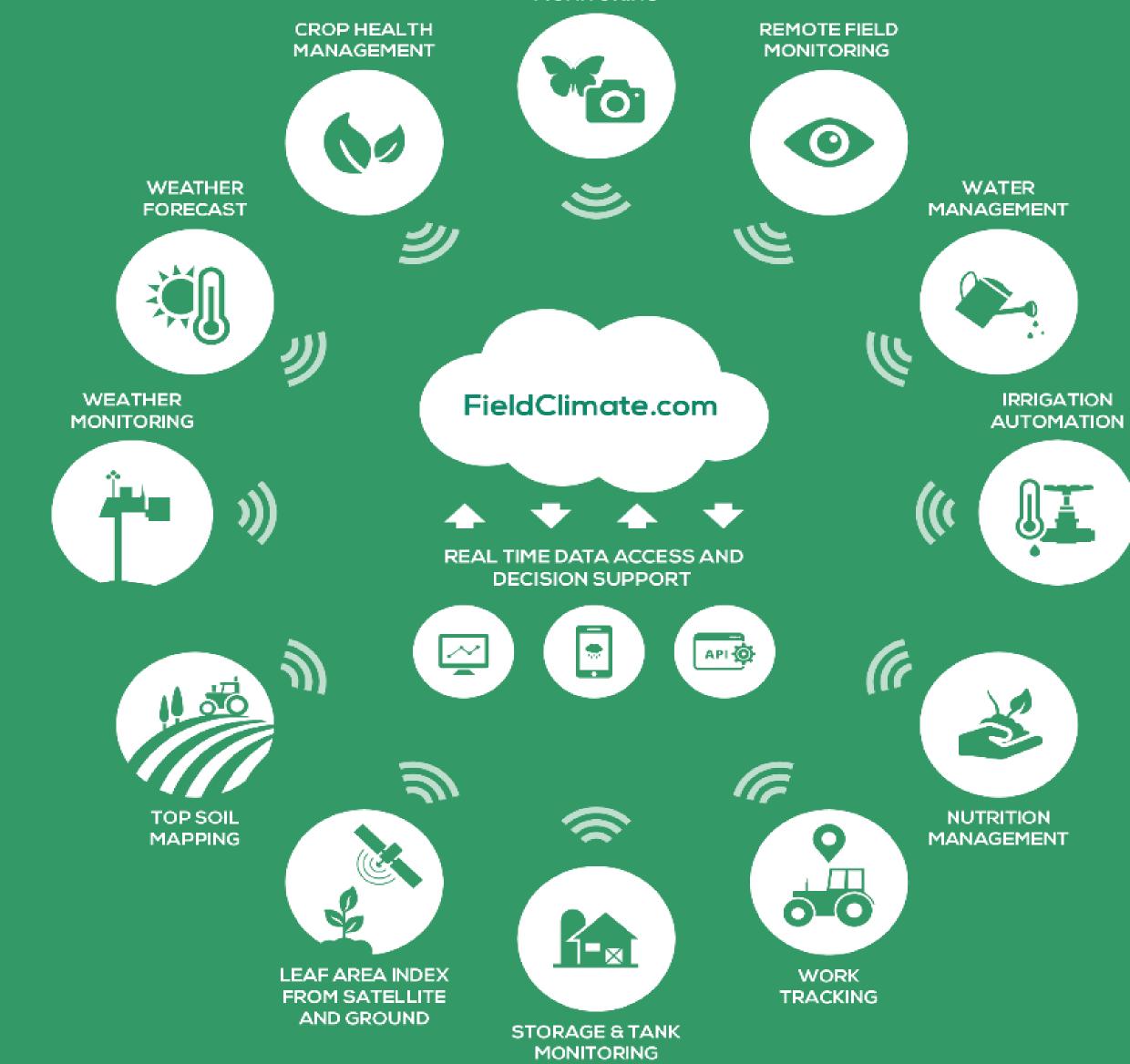
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## **Pessl Instruments**



INSECT MONITORING



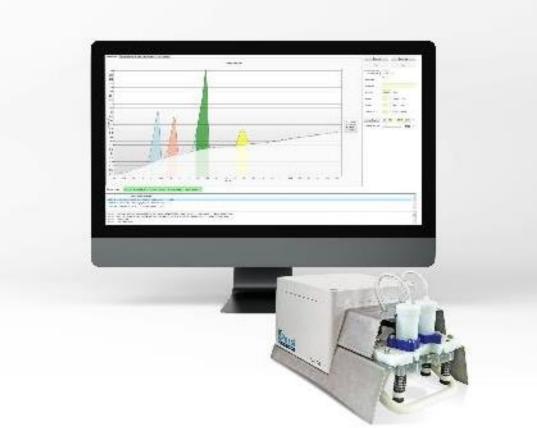
### Weather/Field Data Acquisition



**iMETOS® 3.3** 



### **IMETOS® ECO D3**



iMETOS<sup>®</sup> MobiLab





**iMETOS CropVIEW**<sup>®</sup>









### 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

Optimized Resource Use

use less water and fertilizer – produce more with less.

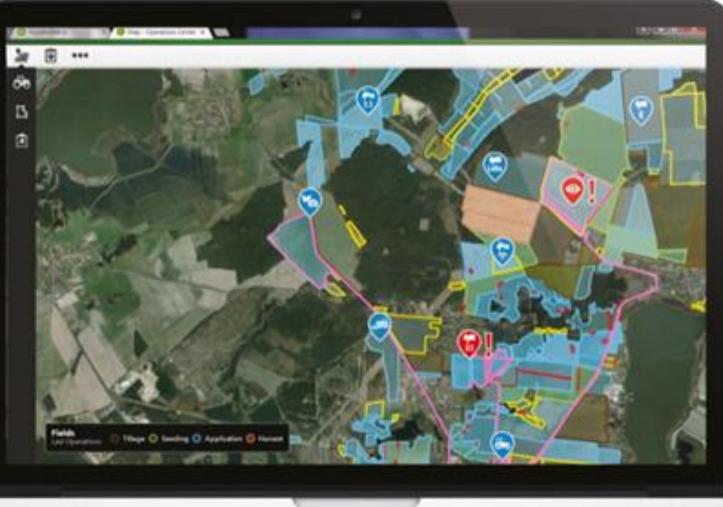
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Soil Moisture & Irrigation Management



### Value Proposition = Less Risk, Efficient Management, Higher **Yields**

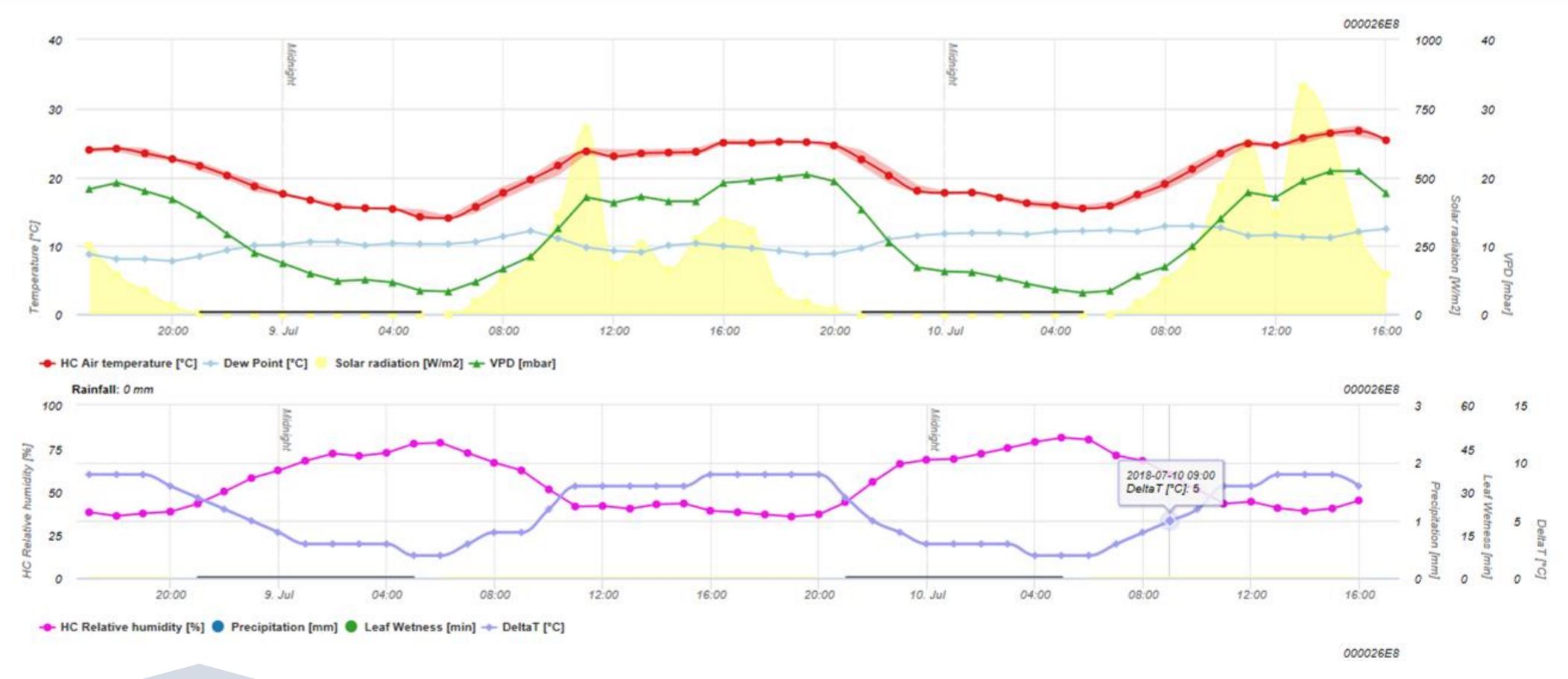








### **Example of Data: DELTA T**



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.



Delta T trend in relation to Air Temperature and Relative Humidity in FieldClimate.

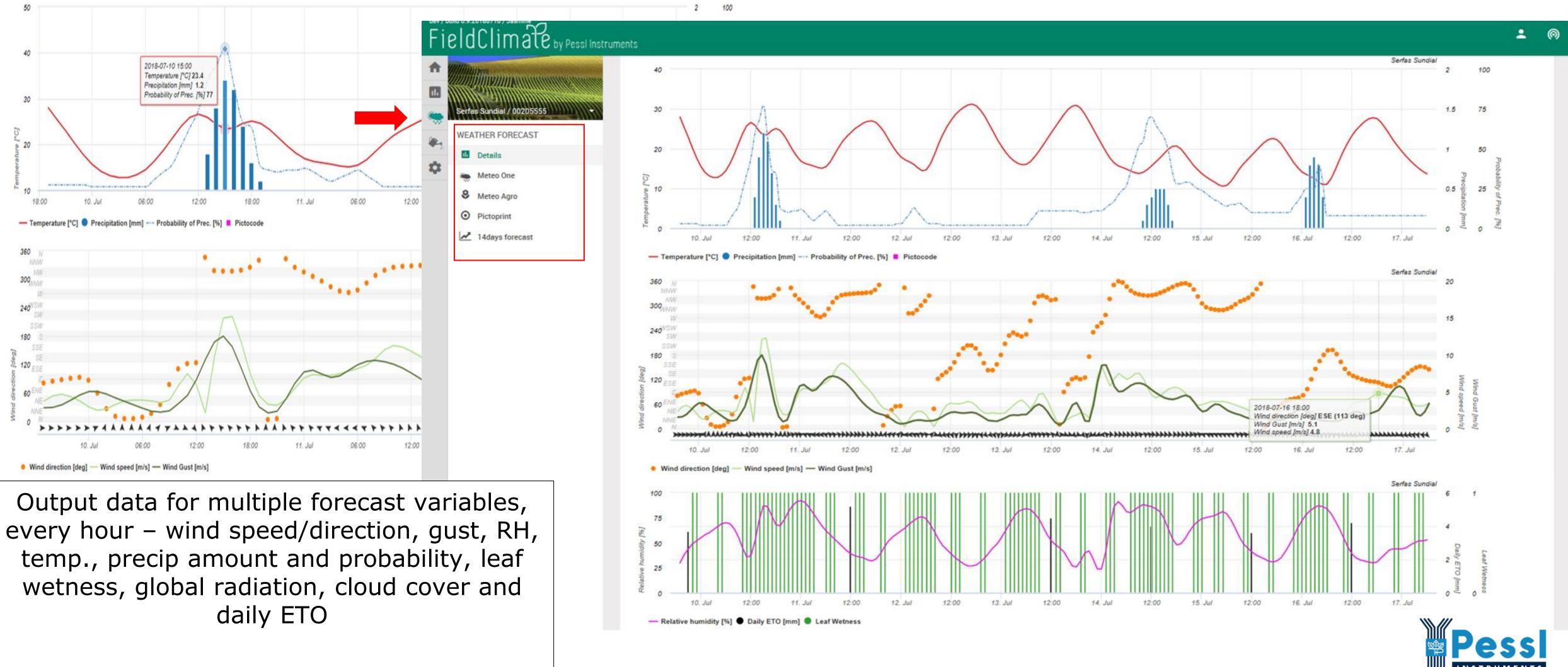






### Weather Forecast

### **Detail Point Forecasts**



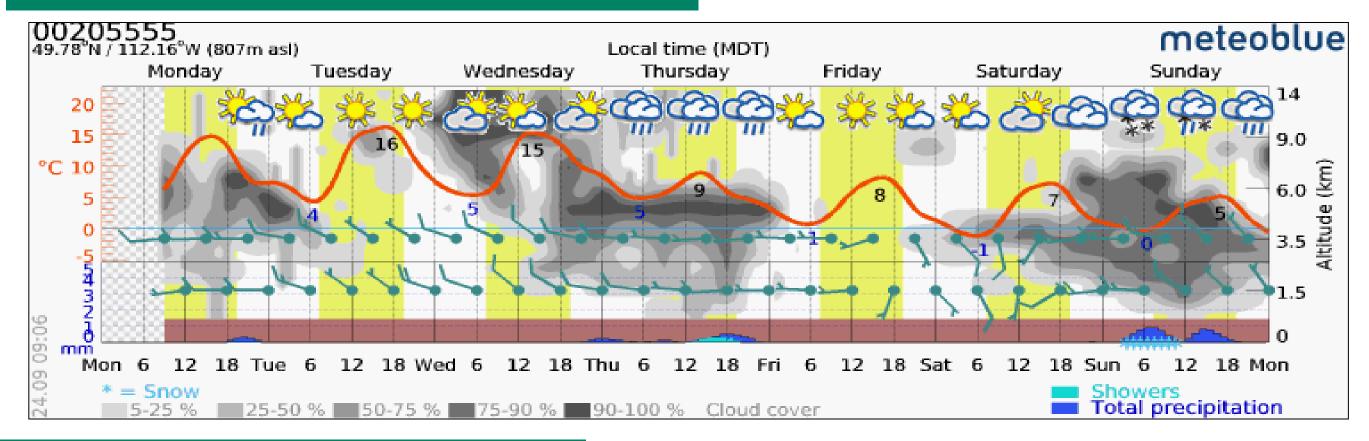




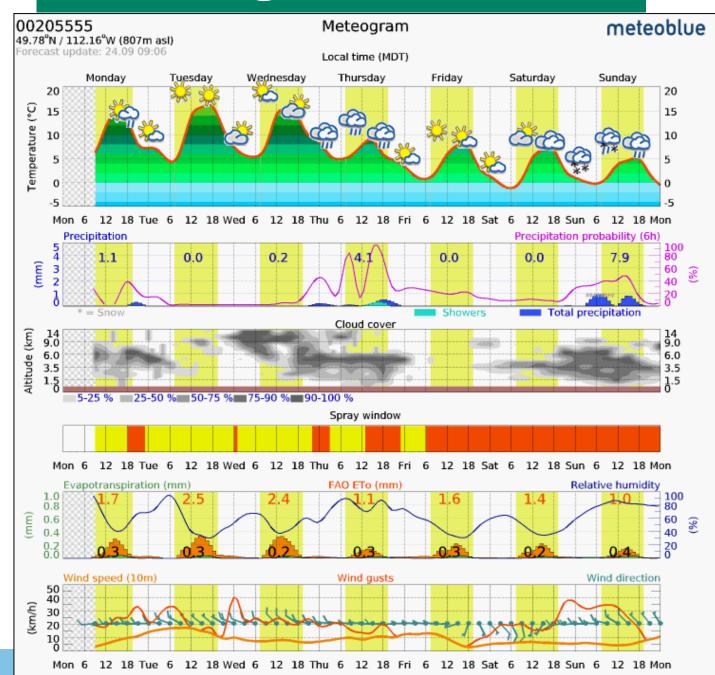


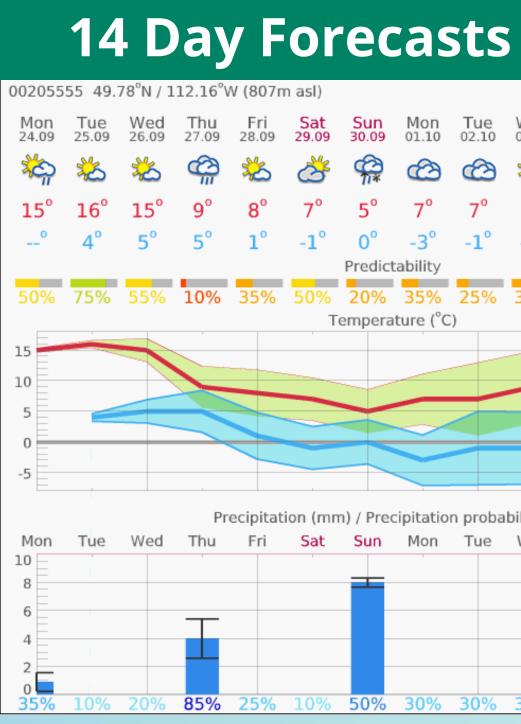
### **Graphical Weather Forecast**

### **Meto One Forecasts**



### **MetoAgro Forecasts**







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### **Pictoprint Forecasts**

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### Monday

24.09.2018

Temperature (\*C) Wind km/h Precipitation probability

Precipitation (mm)

rainSPOT Radius: 35 km

### Tuesday 25.09.2018

Temperature (\*C) Wind km/h Precipitation probability Precipitation (mm)

rainSPOT Radius: 35 km

### Wednesday 26.09.2018

Temperature (\*C) Wind km/h Precipitation probability Precipitation (mm)

rainSPOT Radius: 35 km

### Thursday 27.09.2018

Temperature (\*C) Wind km/h Precipitation probability Precipitation (mm)

rainSPOT Radius: 35 km

### Friday 28.09.2018

Temperature (\*C) Wind km/h Precipitation probability

Precipitation (mm)

rainSPOT Radius: 60 km

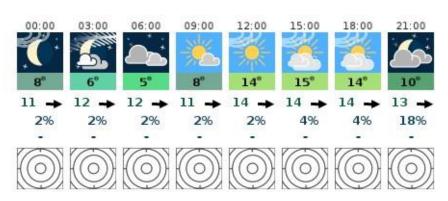


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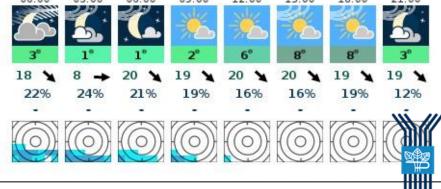
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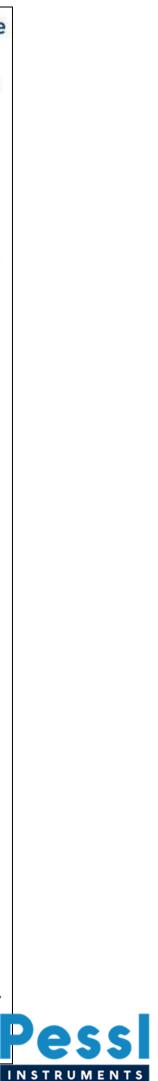


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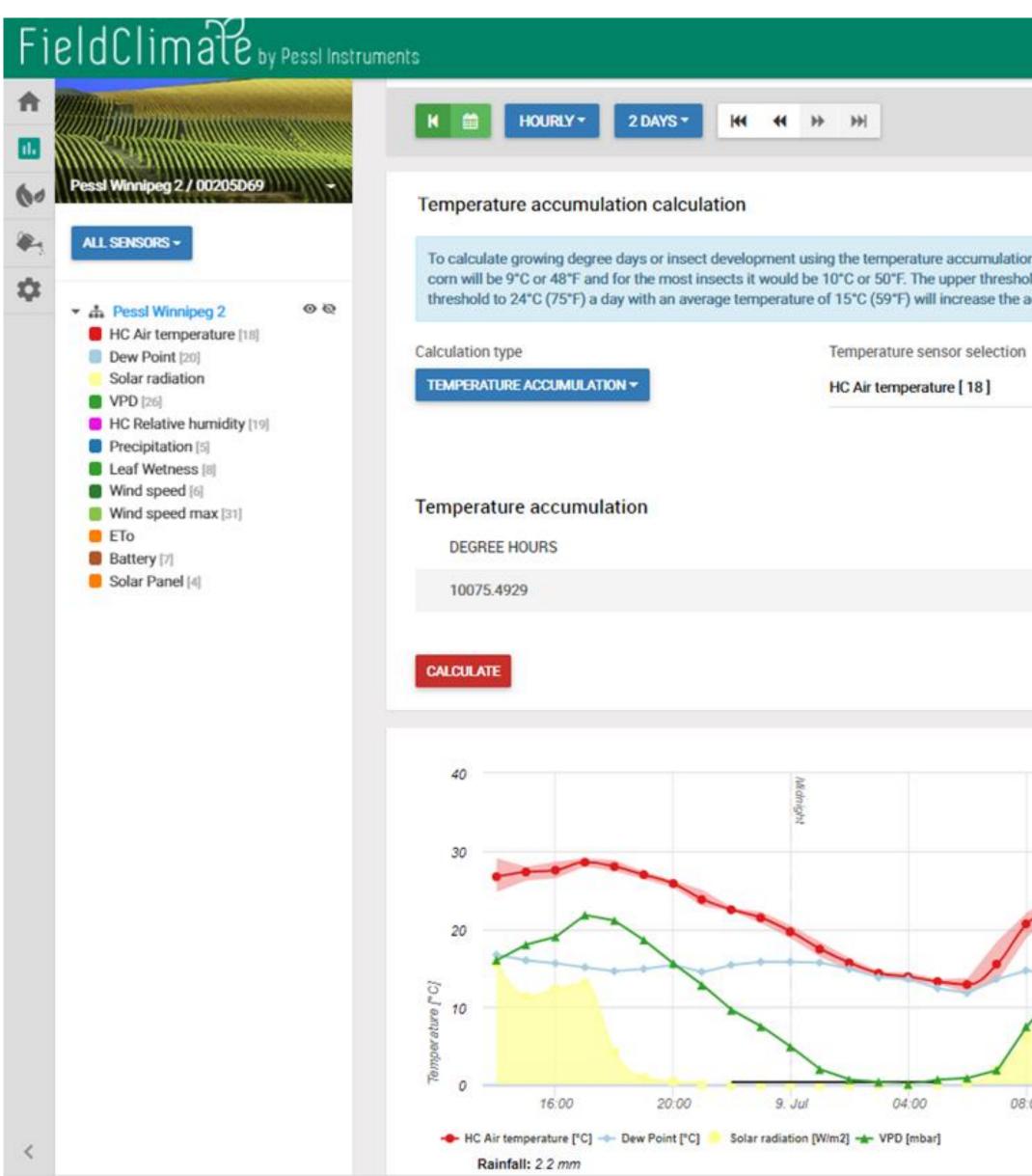


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### **Growing Degree Day Calculator**





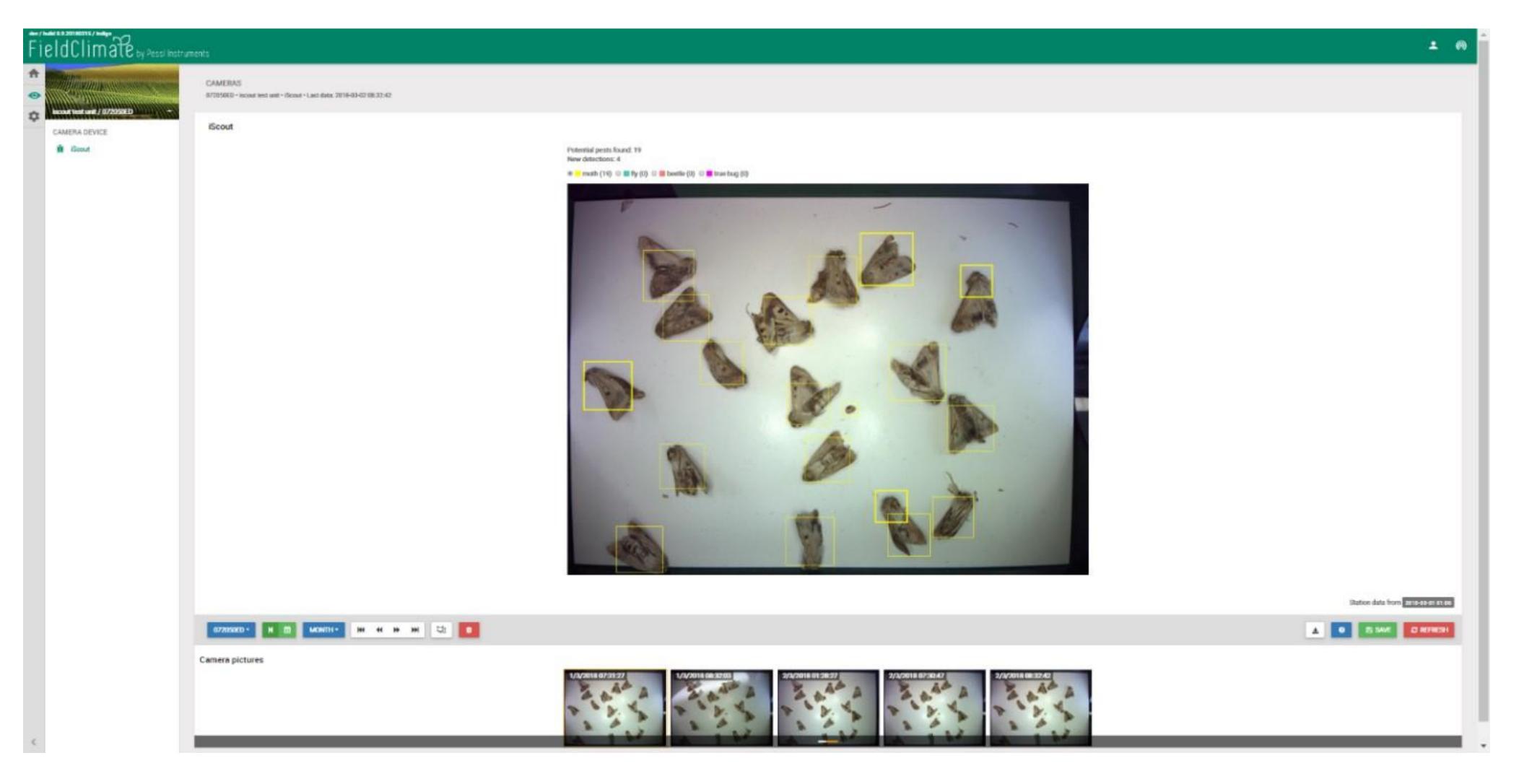
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### **Insect Detection Tool**



### 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

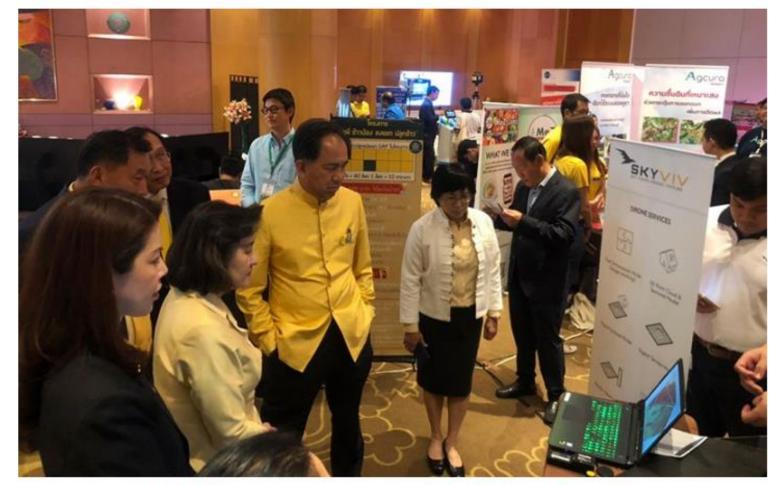






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หน้าแรก / ในประเทศ



รมว.เกษตรฯนำทัพเปิดแปลง'เกษตรอัจฉริยะ'นำร่อง6พืชหลัก วันพุธ ที่ 24 เมษายน พ.ศ. 2562, 15.48 น.

## ล็อกซเล่ย์ส่ง'ไอโอที่'หนุนเกษตรอัจฉริยะ

กรุงเทพธุรกิจ 🛛 ล็อกชเล่ย์ติดตั้ง เทคโนโลยีไอโอทีเซ็นเซอร์ในนาข้าวแปลง ต้นแบบ 20 ไร่ จ.สุพรรณบุรี สนับสนุน โครงการเกษตรอัจฉริยะของกระทรวง เกษตรฯ หวังปั้น "สมาร์ทฟาร์มเมอร์" ก้าวสู่เกษตรกรยุคไทยแลนด์ 4.0

นายอนันต์ สุวรรณรัตน์ ปลัด กระทรวงเกษตรและสหกรณ์เปิดเผยถึง การจัด "งานรณรงค์การใช้เทคโนโลยี เกษตรอัจฉริยะ เพื่อเพิ่มประสิทธิภาพ และลดดันทุนการผลิตข้าวในนาแปลงใหญ่ ปี 2562" ณ นาแปลงใหญ่บ้านสวนแดง จ.สุพรรณบุรี เพื่อส่งเสริมให้เกษตรกรได้ ทราบถึงเทคโนโลยีใหม่ๆ ที่สามารถเข้ามา ช่วยทดแทนและใช้พัฒนาต่อยอดงานด้าน การเกษตรมุ่งสู่การเป็น "สมาร์ทฟาร์มเมอร์" ตามโรดแมพของกระทรวงเกษตรฯ

"การจัดงานครั้งนี้ได้รับความร่วมมือ จากหน่วยงานราชการและภาคเอกชน หลายหน่วยงาน ในการนำนวัตกรรม และเทคโนโลยีใหม่ๆ มาถ่ายทอดให้ เกษตรกรได้ทราบถึงเทคโนโลยีเกษตร อัจฉริยะในรูปแบบต่างๆ ที่จะเข้ามาช่วย งานด้านการเกษตรให้มีประสิทธิภาพ มากขึ้น โดยเฉพาะเทคโนโลยี ไอโอที





กาญจน์ ทองใหญ่ ทดสอบระบบไอโอทีเซ็นเซอร์ในนาข้าวแปลงต้นแบบ

แพลตฟอร์มวิเคราะห์ข้อมูลด้านการเกษตร

ของบมจ.ล็อกซเล่ย์ นับเป็นเทคโนโลยีสำคัญ

ที่จะเข้ามามีบทบาทด้านการบริหารจัดการ

ในพื้นที่ของเกษตรกรที่ขาดแคลนแรงงาน

เนื่องจากสามารถวิเคราะห์และแจ้งเตือนปัญหา

เบื้องต้นที่อาจจะเกิดในนาแปลงใหญ่ให้

เกษตรกรทราบและแก้ไขได้อย่างทันท่วงที"

ผู้จัดการใหญ่ บริษัท ล็อกซเล่ย์ จำกัด

(มหาชน) กล่าวว่า บริษัทมีความเชี่ยวชาญด้าน

นายกาญจน์ ทองใหญ่ รองกรรมการ

อปกรณ์และแพลตฟอร์ม ที่ล้ำสมัยมีความยินดีอย่าง ยิ่งที่ได้เข้ามาถ่ายทอด เทคโนโลยีที่เป็นประโยชน์ ต่อภาคเกษตรของไทย ให้เกษตรกรได้รับ องค์ความรู้นำไปบูรณาการ ต่อยอดดำเนินการสร้าง ผลผลิตทางการเกษตร

ซึ่งมีความพร้อมทางด้าน



ล็อกซเล่ย์ ทดสอบระบบไอโอที เซ็นเซอร์ (loT Sensors) ที่ติดตั้งในนาข้าว แปลงต้นแบบ 20 ไร่ ที่ นาแปลงใหญ่บ้าน สวนแตง จ.สุพรรณบุรี ตามโครงการเกษตร อัจฉริยะของ กระทรวงเกษตรและสหกรณ์ เพื่อเก็บข้อมูลอุณหภูมิ แสงแดด แรงลม น้ำฝน ความชื้น, ใช้ UAV (อากาศยานไร้ คนขับ) สำรวจโรคและแมลงศัตรูพืช ทั้งนี้เพื่อ สนับสนุนนโยบาย **"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

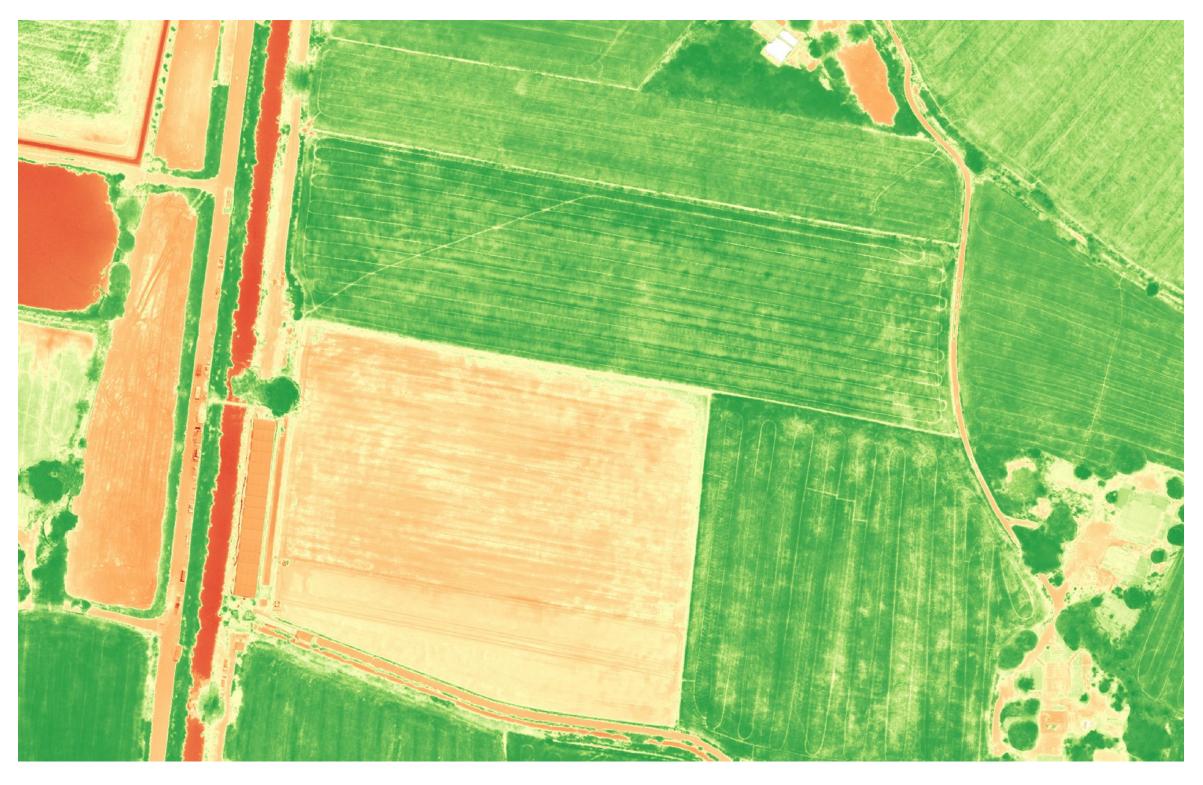


### LOXLEY-MOAC DATA DRIVEN AGRICULTURE Pilot Project in Suphanburi Province



### **UAV Survey (RGB)**

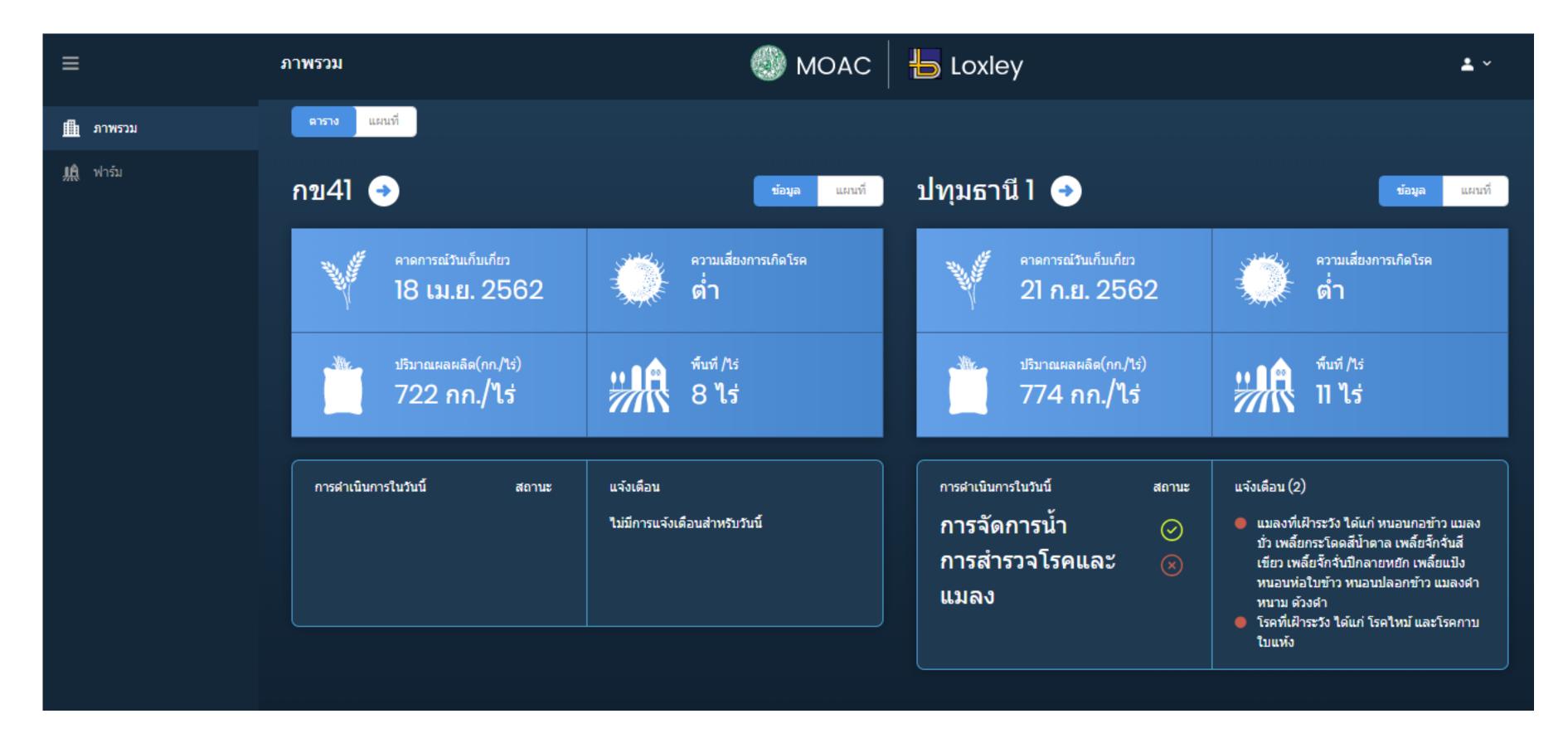




### **UAV Survey (NDVI)**



#### **LOXLEY-MOAC DATA DRIVEN AGRICULTURE Pilot Project in Suphanburi Province**



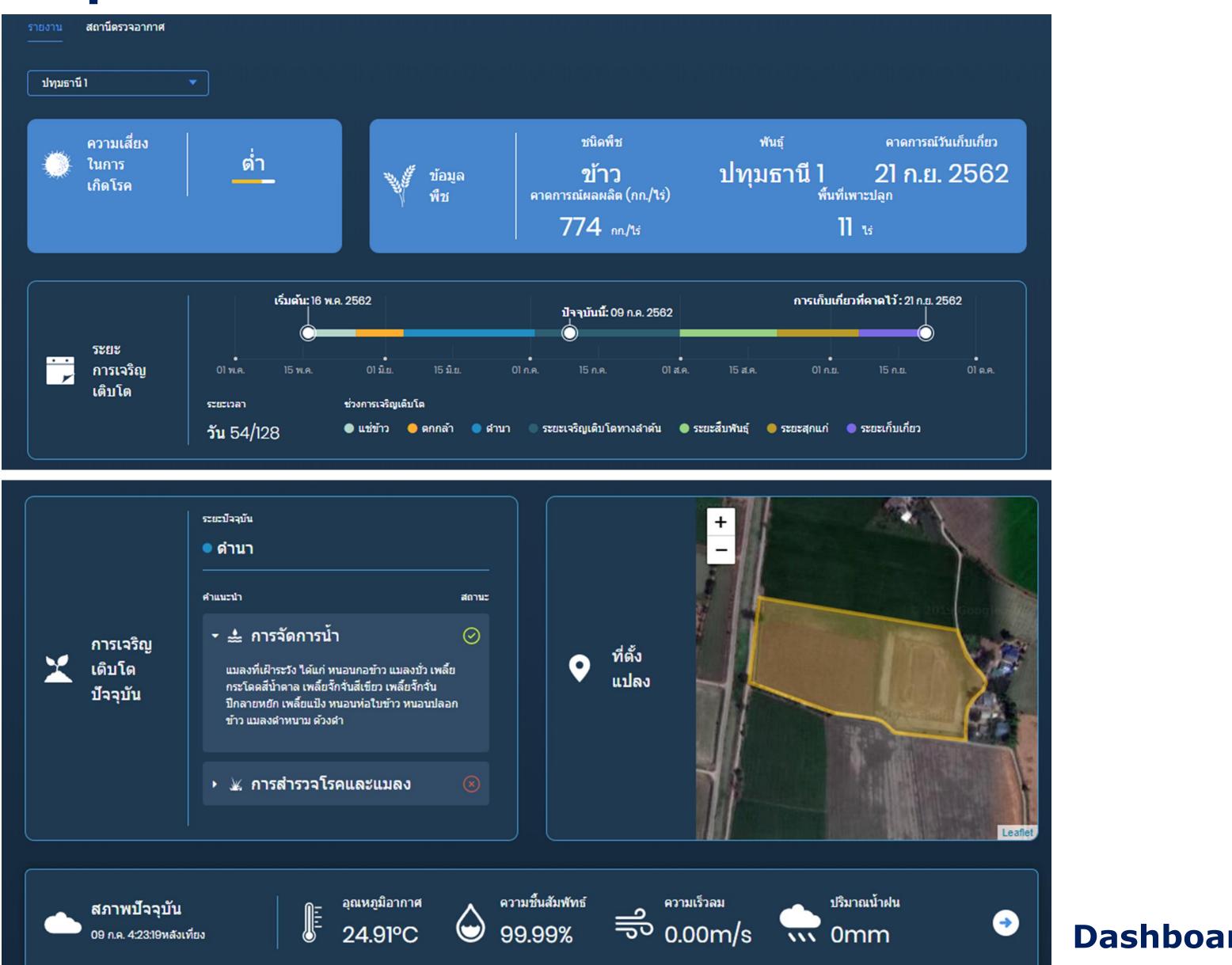




#### **Dashboard Overview**



#### **LOXLEY-MOAC DATA DRIVEN AGRICULTURE Pilot Project in Suphanburi Province**





#### **Dashboard Overview**

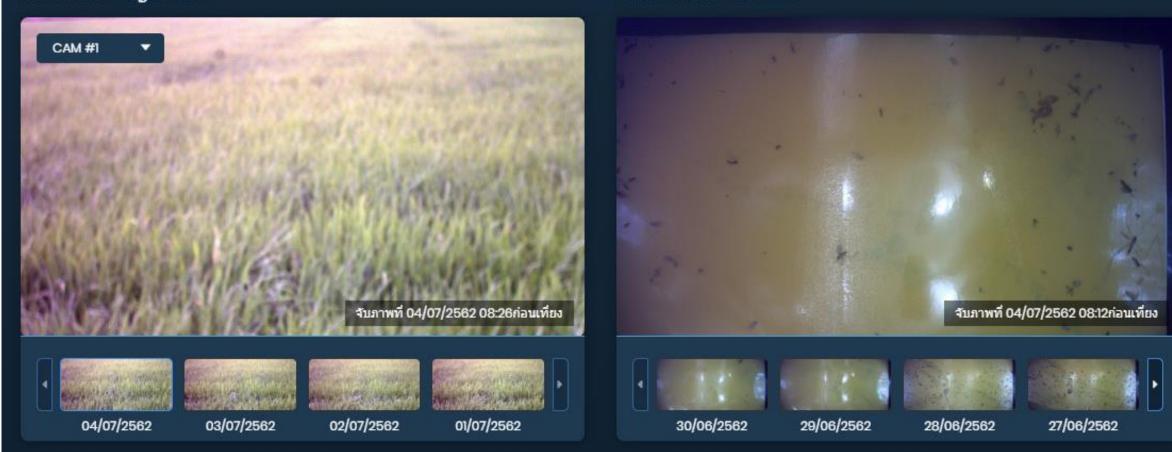




#### LOXLEY-MOAC DATA DRIVEN AGRICULTURE Pilot Project in Suphanburi Province

#### ภาพการเจริญเติบโต

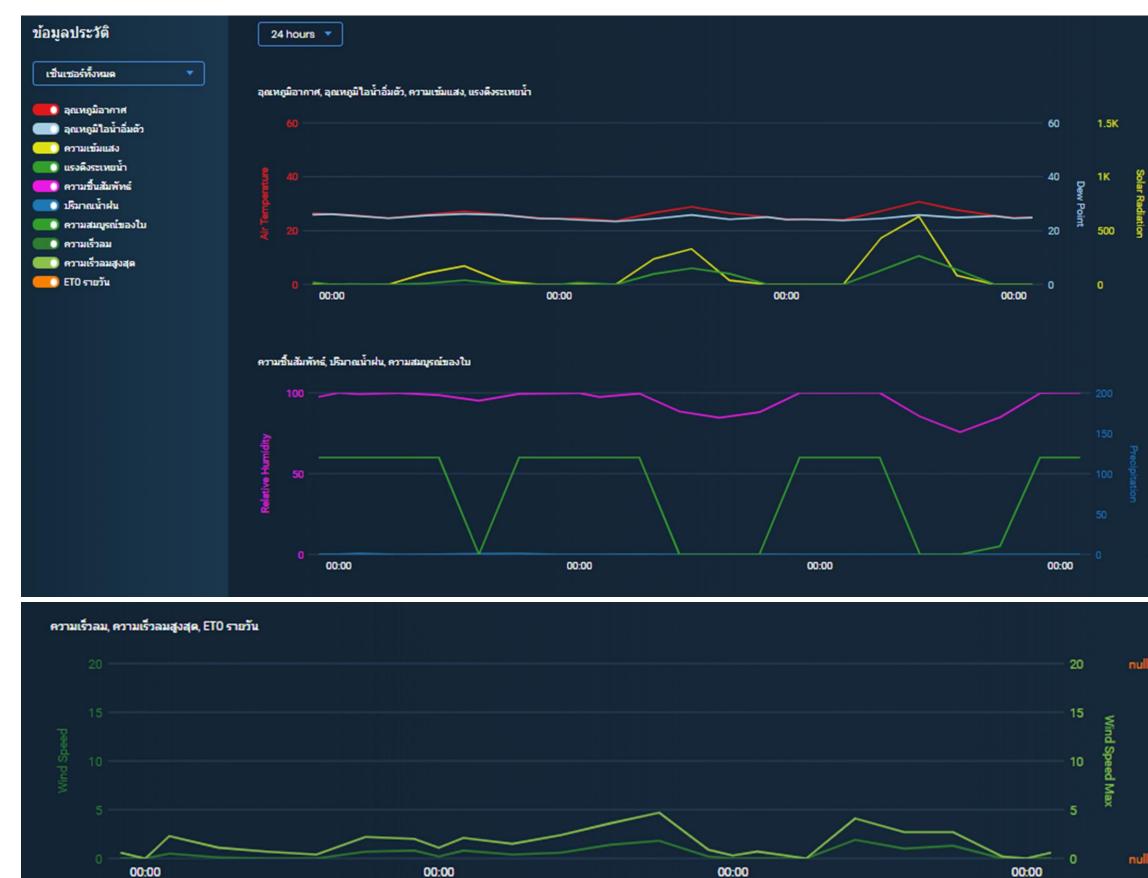
แมลงที่พบในกับดัก





#### **Dashboard Overview**







	60		
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	20	ure Deficit	
	100		
	80		
	60	Leaf	
	40	Leaf Wetness	
	20		
d			
ราง รามวัน			

### "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**



#### **Economy Partners**

- 1.Thailand
- 2.Vietnam
- 3.Indonesia

#### **Project Focus**

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





# **Project Execution Plan for Thailand**

- Rice field area in Suphanburi Province  $\bullet$
- Install approx.70 Automated Weather Stations (AWS) in the project area
- Integrate all data to MOAC's Server ullet
- 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

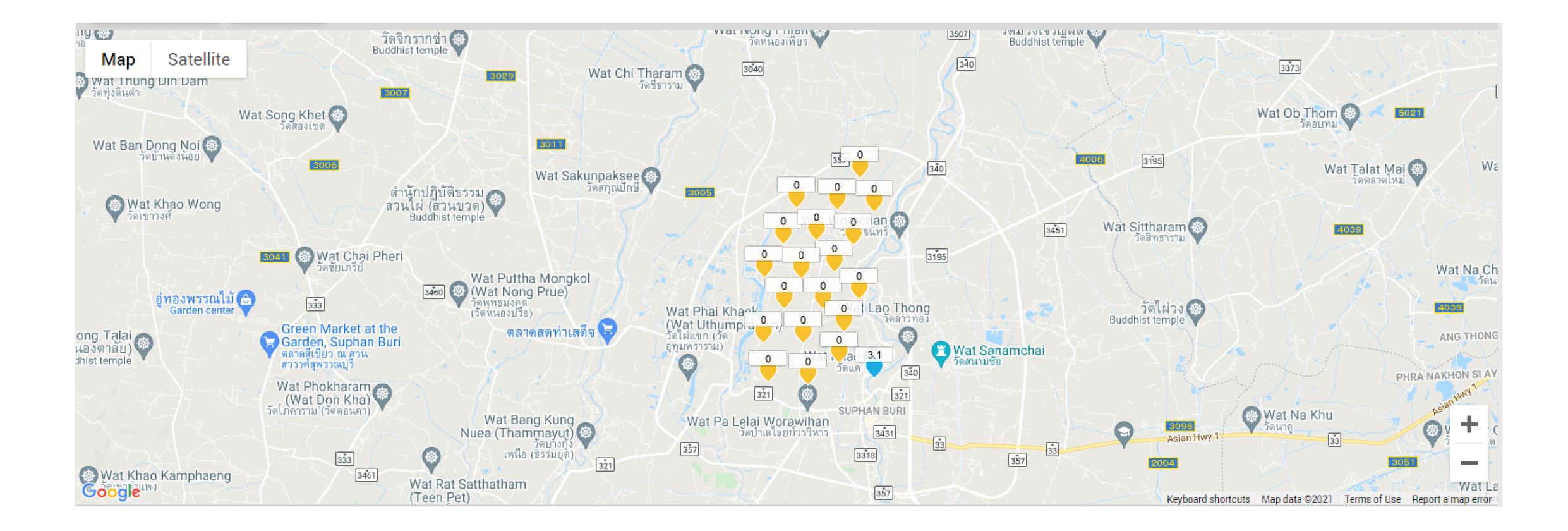
The training and certification of local village talent into trained DFA who will know how to interpret data from the equipment advanced and provide actionable agronomic advisory to the rice farmers across the regions.







## **Virtual Stations in Suphanburi Province**



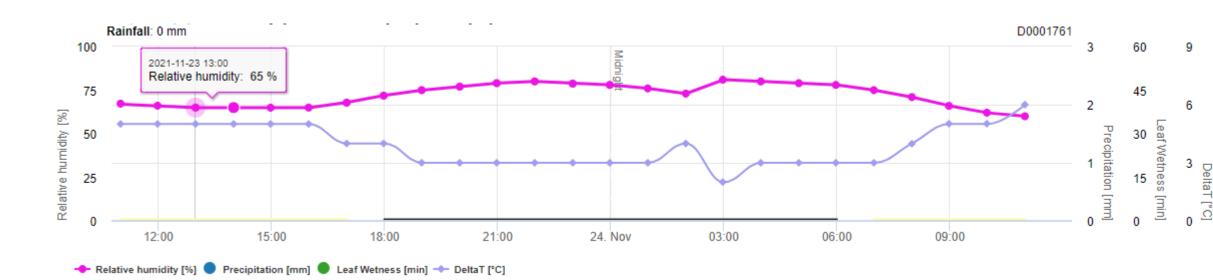


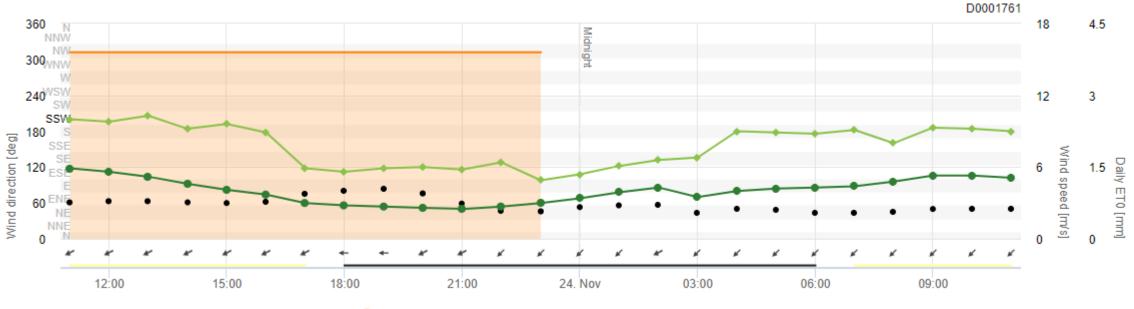




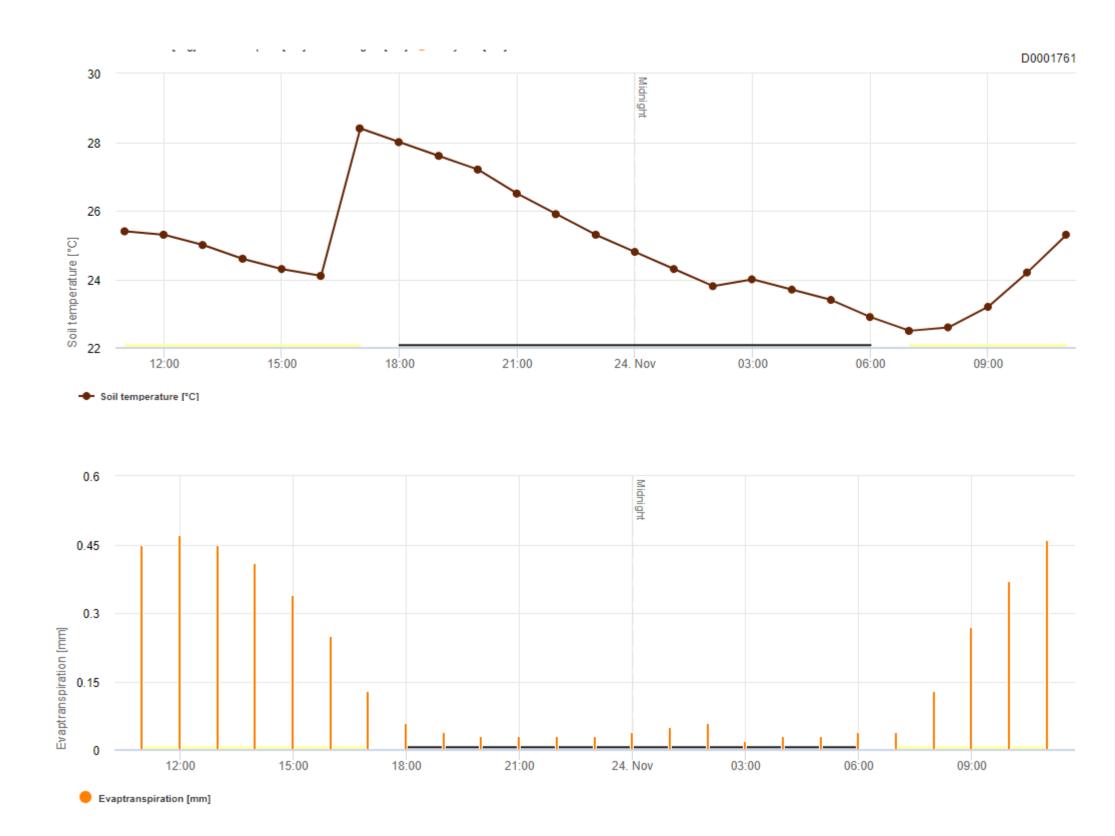
### **Example of Data**









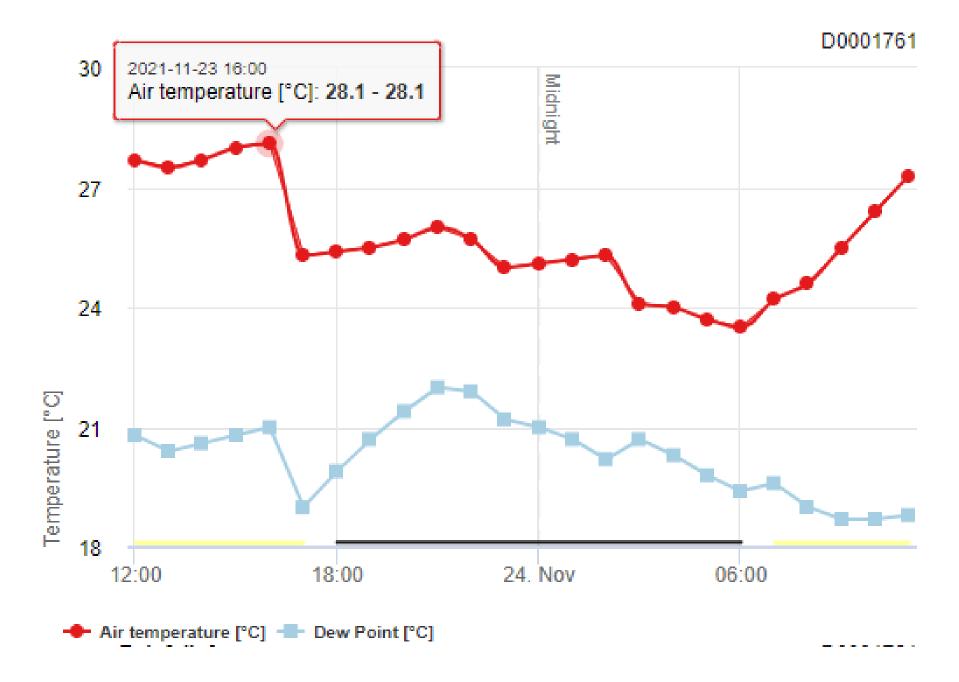




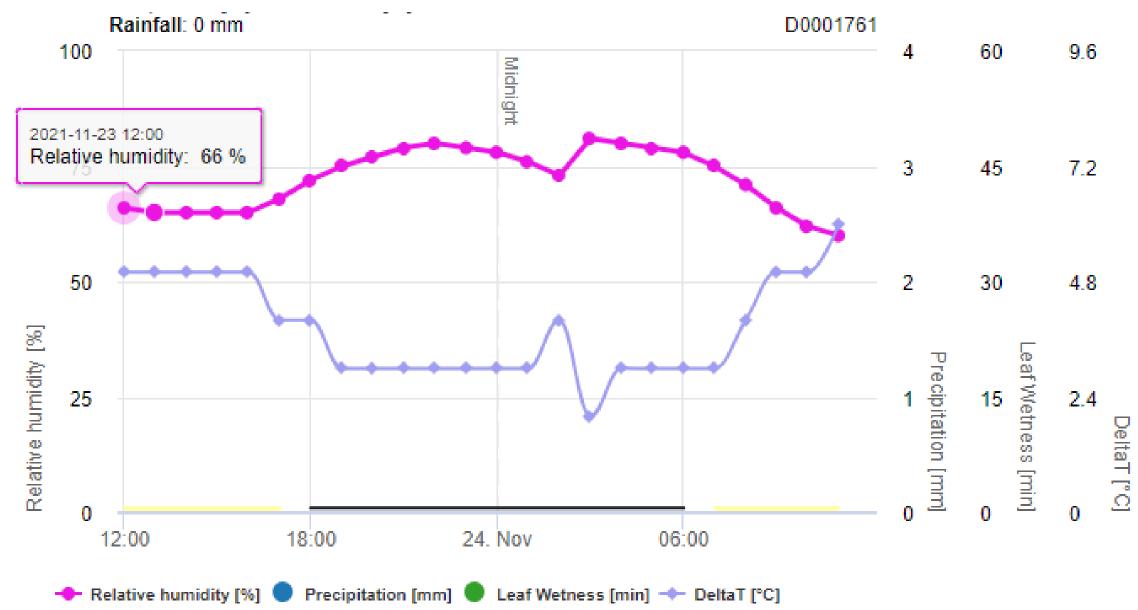


### **Example of Data**

Disease climate













### **METOS – Certification Program Course Detail**

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Course 1 Metos Stations and Sensors



**Course 2** FieldClimate Software



**Course 3** Station Preparation & Installation



**Course 4** Maintenance, Repair, and Off Season Storage

iMETOS IMT Weather Station



Course 6 ECO D3 Station

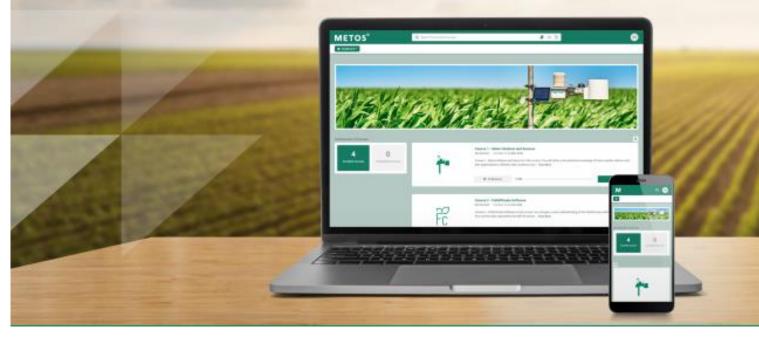


Course 7 iscout

CropVIEW Cameras

# METOS®

#### TECHNICIAN / INSTALLER eLEARNING & CERTIFICATION







Course 9 Spray Applications

Course 10

Disease

Spray

Course 11 Forecast Applications

**Disease Applications** 



Course 12 Soil Moisture and Plant Nutrition



Course 13 MobiLab: Nutrient Management



Course 14 MicroMetos: LoRA and NB-IoT



Course 15 Metos FarmView











