21ª CONFERENCIA INTERNACIONAL SOBRE PALMA DE ACEITE

21st International Oil Palm Conference

Implementation of information systems and precision agriculture tools in oil palm crops

Choon Cheak SIM
SD Guthrie Research Sdn. Bhd., Malaysia

24th September 2025

fedepalma | cenipalma

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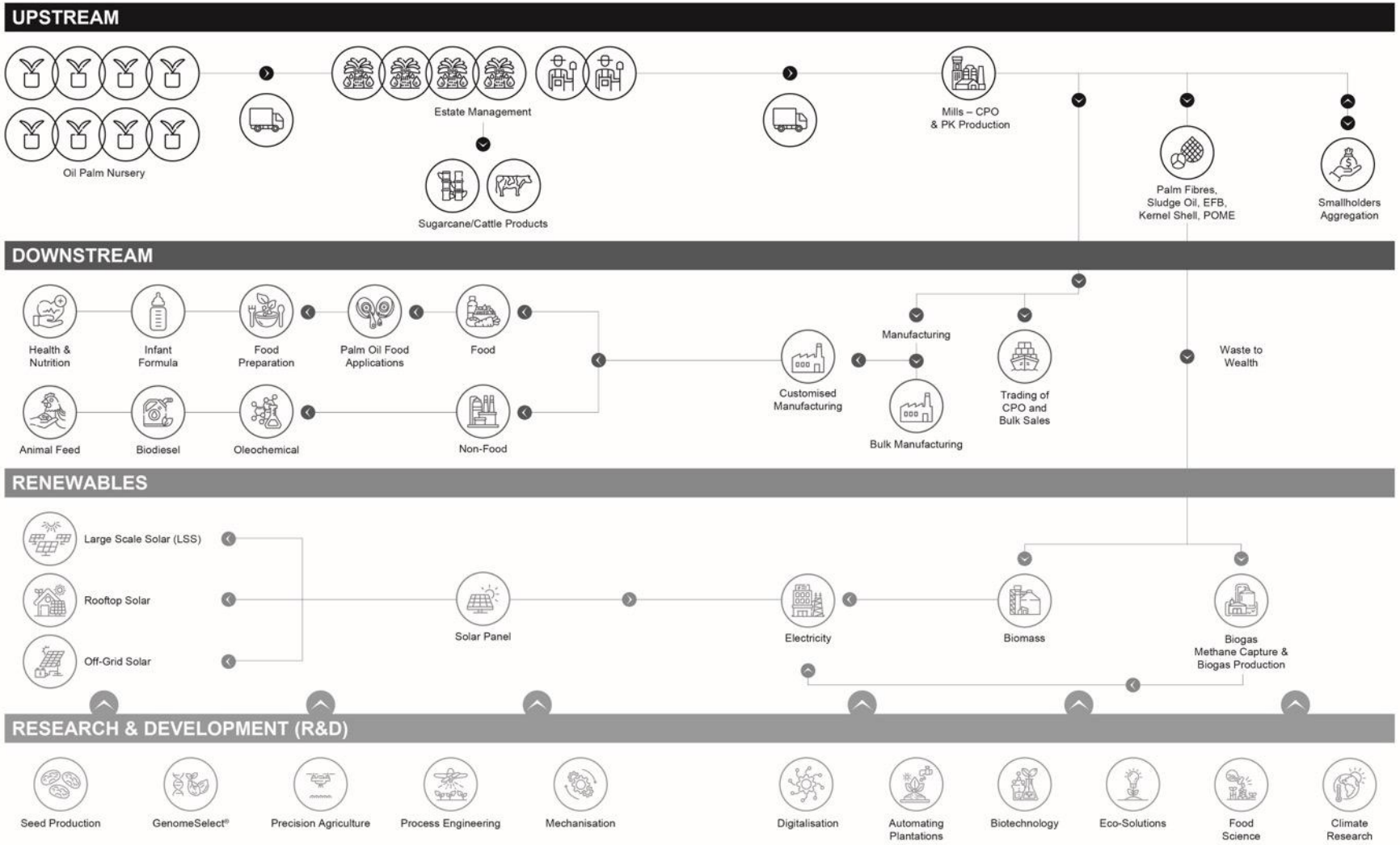
Formally, Sime Darby Plantation

One of the World's Largest Producers of Certified Sustainable Palm Oil

12% Global Production of CSPO

(as of Dec 2024)

Our Integrated Value Chain



729,711 Ha total landbank
566,533 Ha of planted area
Oil palm, sugarcane and coconut

Business presence in
12 countries

11 refineries with 4 mil MT/year
of refining capacity

Industry leader in **Mechanisation, Automation & Digitalisation**

World's 1st Palm Oil Company to have **SBTi-validated Net-Zero targets**

#85 in Fortune 500
Southeast Asia List

Journey Through the Years

SD Guthrie's continued innovation is founded on resilience, adaptability and dynamism.

From industry leading genetic seed technology to cutting edge innovation in the fields, we are changing the face of the plantation sector.

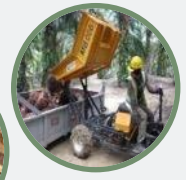
Challenges faced along the way…

- Low commodity prices
- El Nino and La Nina
- COVID-19 pandemic and subsequent intensified labour shortage
- 3D perception (dangerous, dirty and difficult) making the industry unattractive to local talent
- Negative perception on palm oil (Deforestation, Human & Labour Rights)
- Climate Change

1985

Zero Burning Methodology

1990



Mechanisation

2000

Tissue Culture

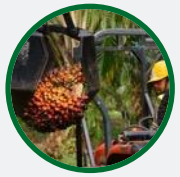
2002

Product Innovation

2009

Genomic R&D

2010



Upgraded Mechanisation

2016

GenomeSelect™ Planting

2018

DIGITALISATION

2020

Publication of Genome research

WRO by USCBP

PROJECT INFINITY

COVID-19

Projek Lokal Initiated

2021

Accelerated Advanced Mechanisation

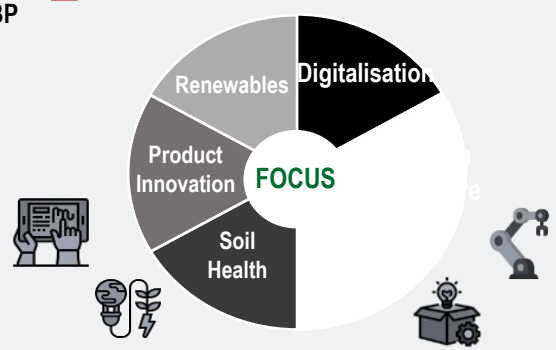
2022

Reimagining Plantations *Innovating for Sustainability*

USCBP's WRO Modification

2023

World's first palm oil company with net-zero targets that are fully validated by SBTi



1980's - 1990's | Early 2000's | Since 2010 & Moving Forward

integration of digital platforms that enable site-specific agronomic decisions, enhance communication between agronomy and operations teams, and support targeted interventions in underperforming fields.

I need to check the fertilizer ordering status and approve the PO

Are the fertilizer deliveries arriving as scheduled?

Which field(s) are showing poor palm health and requires my attention?

How was my production and workers productivity yesterday?

An **estate personnel** has to juggle multiple responsibilities at once.

How much time does an estate executive spend **in the office**, rather than **being in the field**?

Simplifying the steps to get to the information or perform the task will allow them to be more **effective**.

How was the quality of the crop sent to the mill yesterday?

How's the yield in the last few months and the predicted yield for the remainder of the year?

Where are the fertilizer machines working today? Are they applying according to plan?

Are the housing complaints being rectified within the stipulated time?

Are my workers' documentation complete, and are there any that need to be renewed?

El Nino is coming. Which areas are critical to hold water for the dry period?

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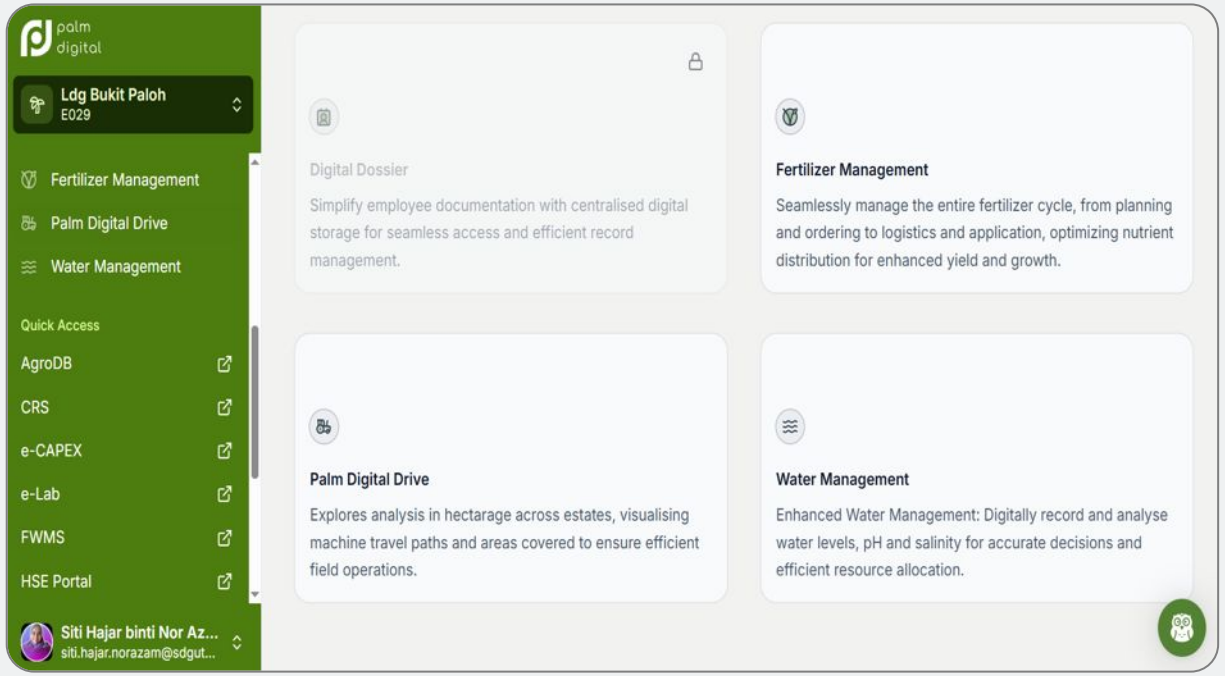
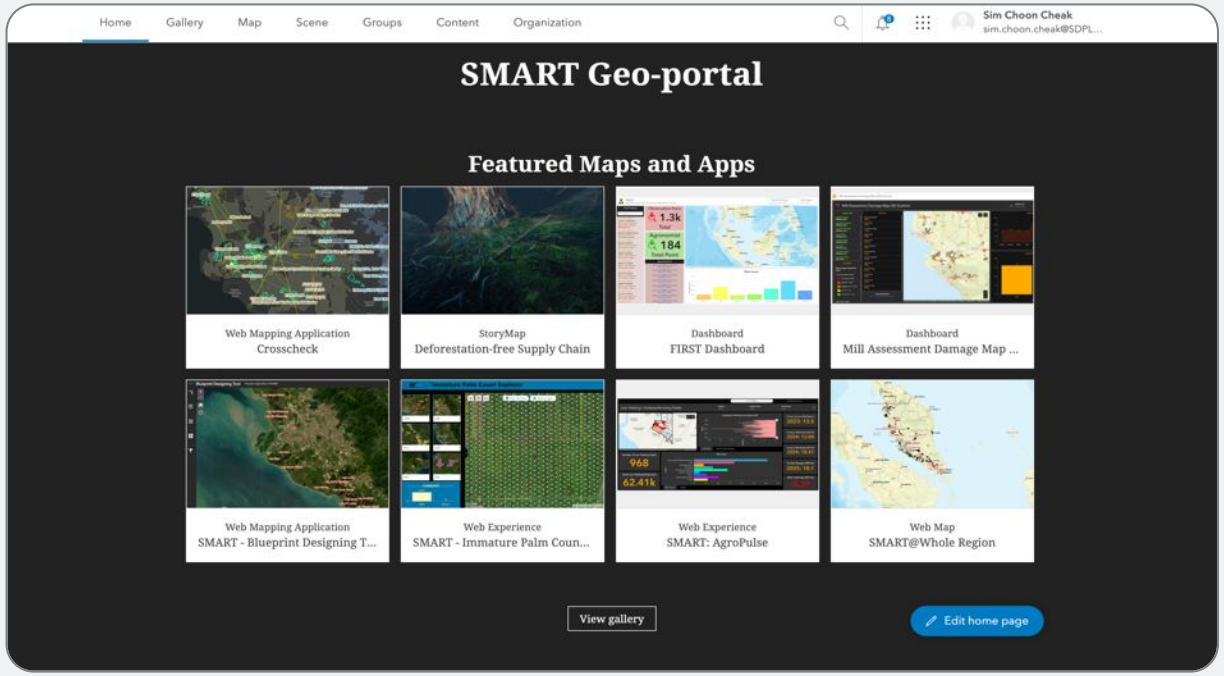
Information Systems & Precision Agriculture Tools

A modular platform that brings together all current and future information systems into a unified platform. Leveraging geo-spatial analytics, enabling precision ag.





User Friendly | Simple & Efficient | Accessible Anywhere | Data-Driven Decisions | Digitized Workflows | Modular & Integrated

Powered by

SMART
A GeoSpatial Backbone

SCMUN
A legacy database for Operation

Data, Analytics and AI

Cloud Technologies

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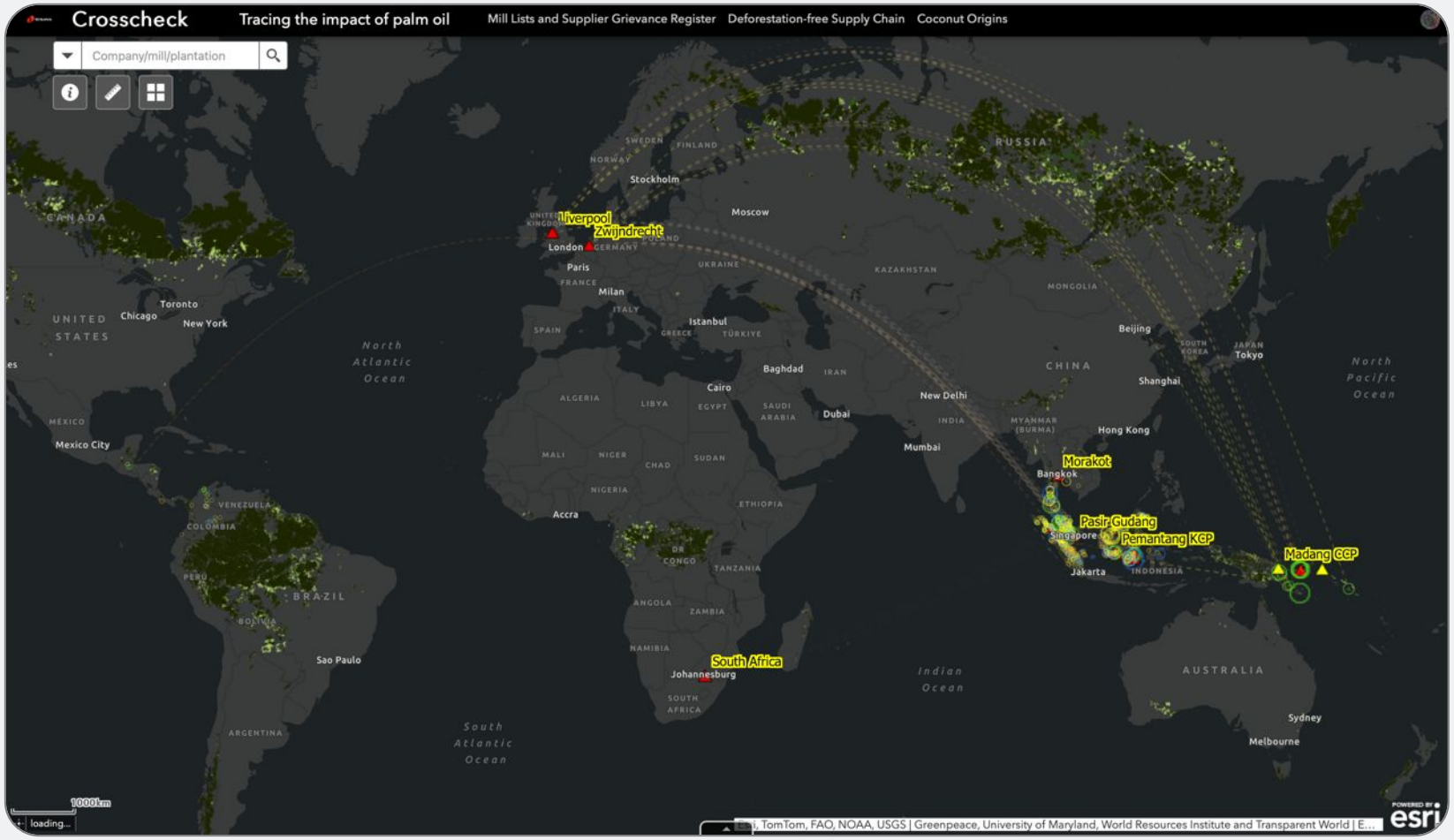
Information System & Precision Agriculture Tools

From Traceability to P&D Management



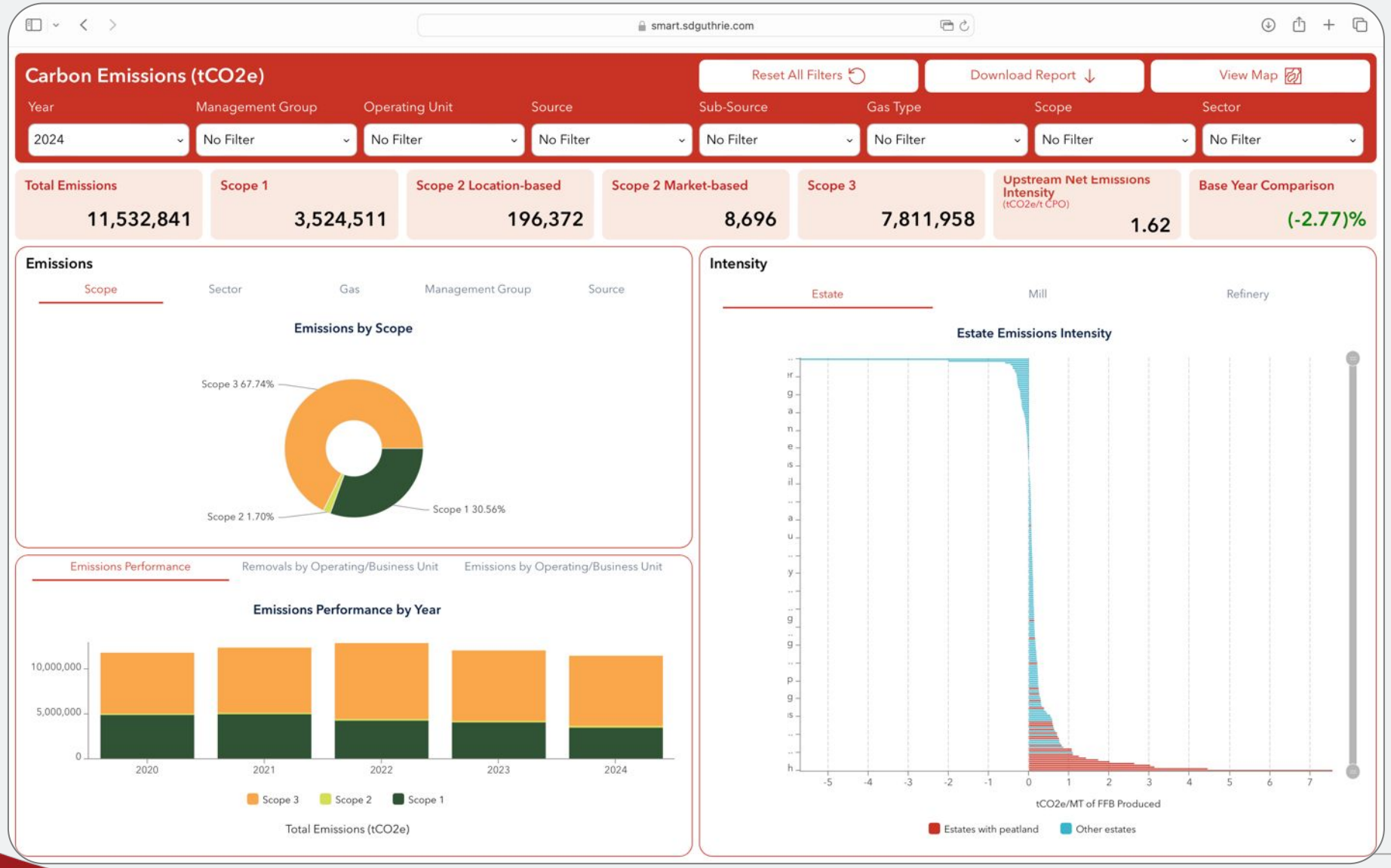
Sime Darby Plantation launched its "Crosscheck" open-access online tool on May 23, 2019. The tool was introduced to provide public access to its palm oil supply chain data, allowing users to trace palm oil sources down to the mill level to promote transparency and support its No Deforestation, No-Peat, and No-Exploitation (NDPE) policy.

Traceability of raw materials across our refineries are summarised below;

- 97.9% traceable to mills (100% traceable to internal mills, 94.6% traceable to third-party mills/suppliers)
- 90.8% traceable to plantations (100% traceable for internal mills, 71.1% traceable for third-party mills/suppliers)

Information System & Precision Agriculture Tools

Carbon Emission baseline monitoring of business processes with aim to reduce emission for net zero goal
Net Zero targets that are fully validated by SBTi



Dashboard that consolidates data from multiple sources and applies the GHG Protocol Corporate Accounting and Reporting Standard to calculate emissions for Scope 1 (direct), Scope 2 (energy), and Scope 3 (supply chain).

It visualises emissions trends, highlights key contributors, and quantifies carbon removals across operations and the supply chain

This enables the company to identify hotspots, set reduction targets, and monitor progress towards net-zero emissions, supporting transparent reporting and continuous improvement in sustainability performance

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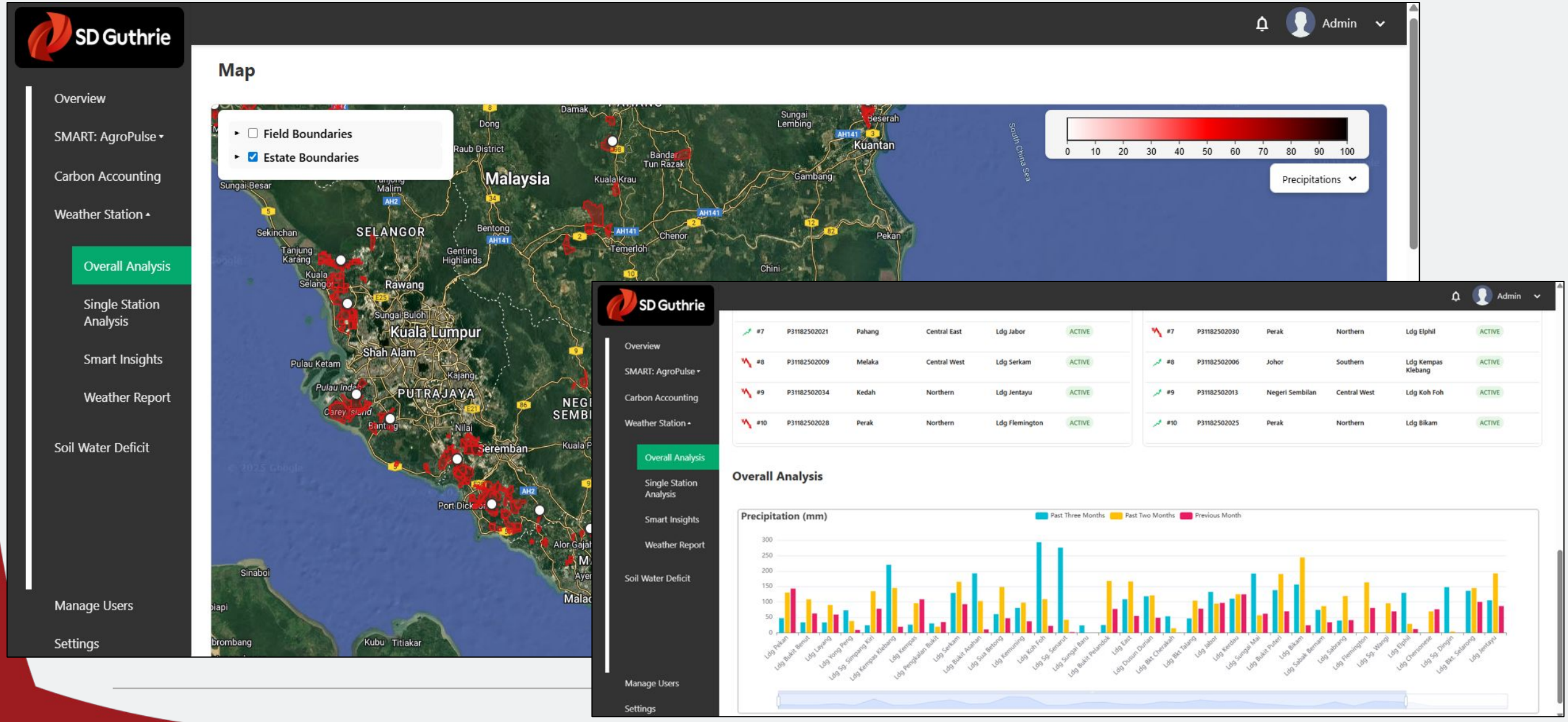
Information System & Precision Agriculture Tools

Fully Automated Weather Station on site & dashboard for data sharing



Information System & Precision Agriculture Tools

Digitized Estate Management Applications: Automation & digitization of manual tasks improve efficiency & accuracy, while enabling advanced new capabilities.

- Mobile app and IoT sensors capture water management params
- Data streamed to cloud and processed in real-time
- GIS dashboards provide historical and real-time analytics
- Focus on what matters
- Optimize resource for maximum yield and sustainability

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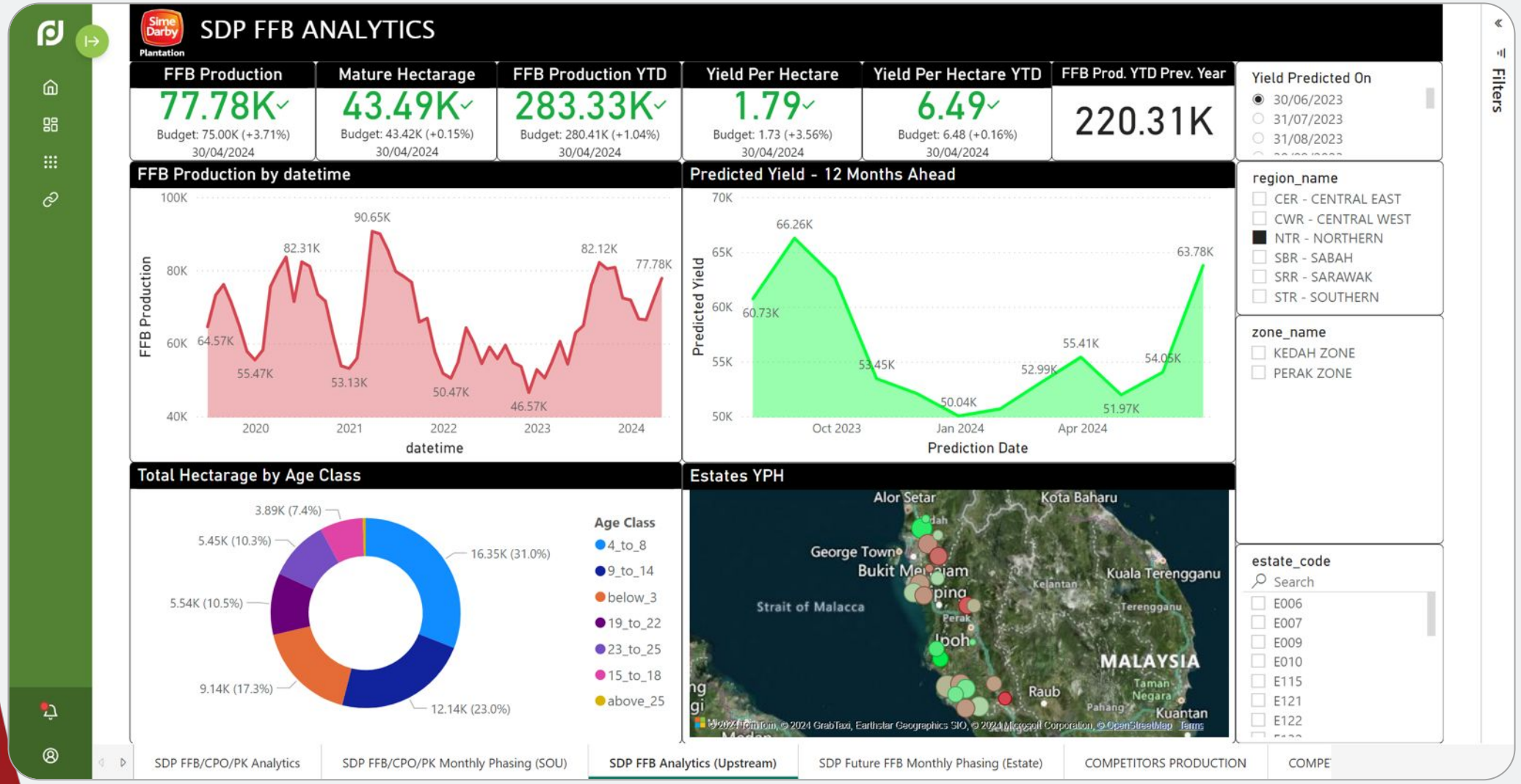

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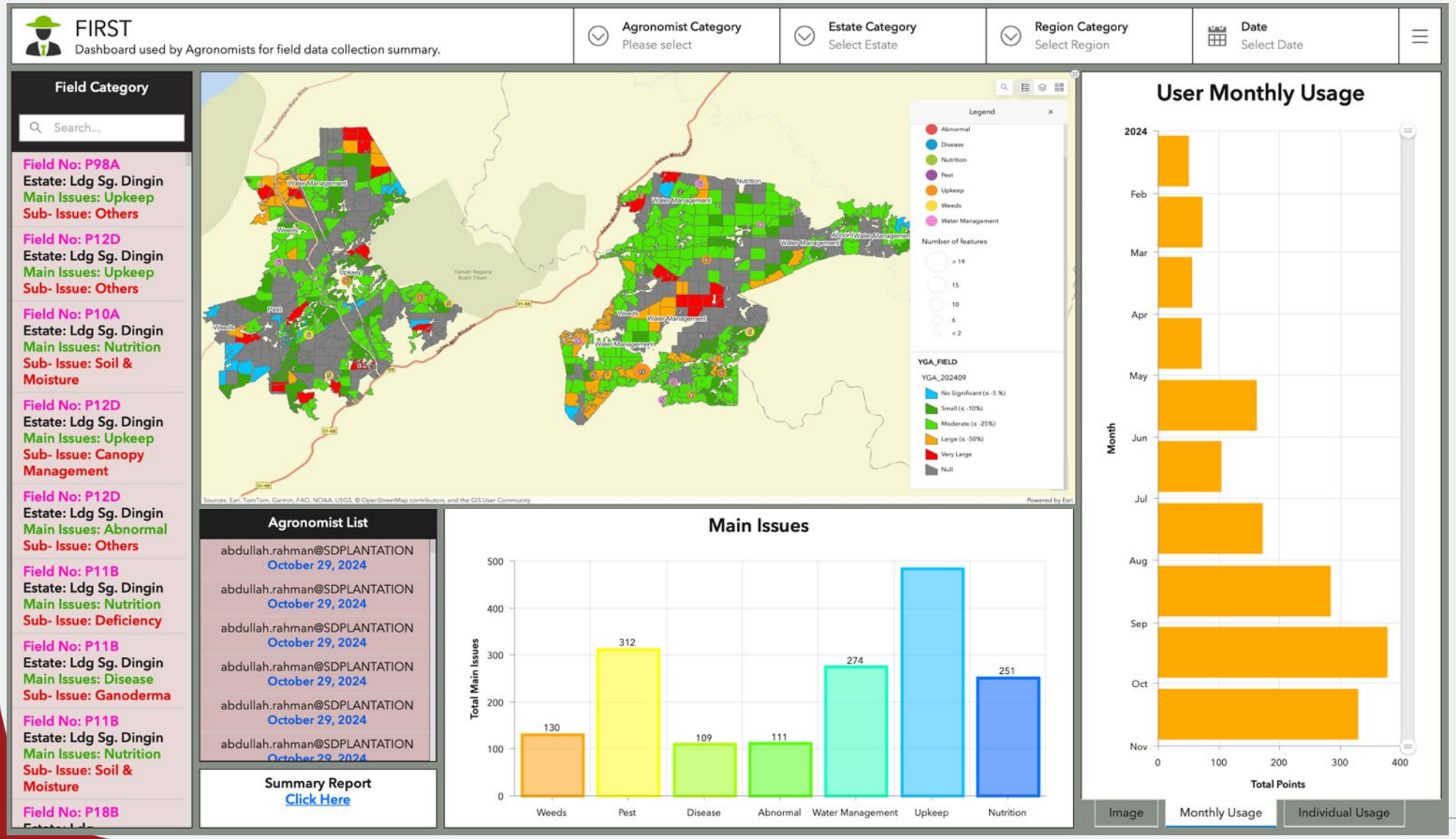

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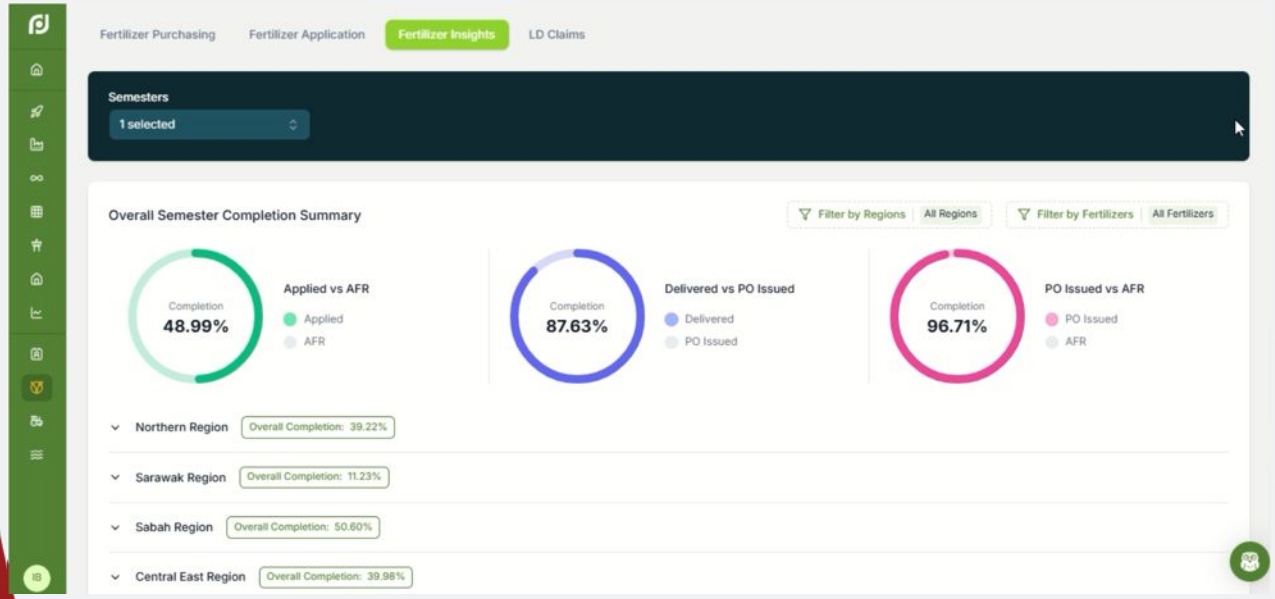
Information System & Precision Agriculture Tools

Fertilizer Management Module: An end-to-end solution to digitally monitor the planning, execution and impact of fertilizer program at our estates. Ensuring every palm receives the nutrition needed to produce the best yield and oil content.

Receive Agronomist recommendation	Planning	Ordering	Logistics & Storage	Fertilizer Application	Impact Analysis
• The Agronomist recommends fertilizer rates for each manuring block after annual site visit & analyzing data.	• Estates plan for fertilizer programs based on fertilizer recommendation report by the Agronomist.	• Estates place fertilizer orders with suppliers for planned programs against supply contracts tendered at group level	• Suppliers arrange for deliveries. • Estates receive consignments and stores them. • Estates monitor deliveries and stock levels at the warehouse. • System tracks timeliness, quality, and quantity deviations and triggers penalty claims	• Estates monitor fertilizer application at the field against planned programs (adherence to Agronomist's recommendation). • GPS trackers used to monitor mechanized applications	• The Agronomist analyses foliar sampling results, yield statistics, palm health index to optimize the following year's recommendation. • Estates measure yield & COY performance as KPI.



Fertiliser Insights

Monitor the progress of manuring programs at different stages; order, delivery and application.

- Keep track of manuring program against plan
- Drill down on pending tasks based on completion rates
- Compare progress between estates at regional-level

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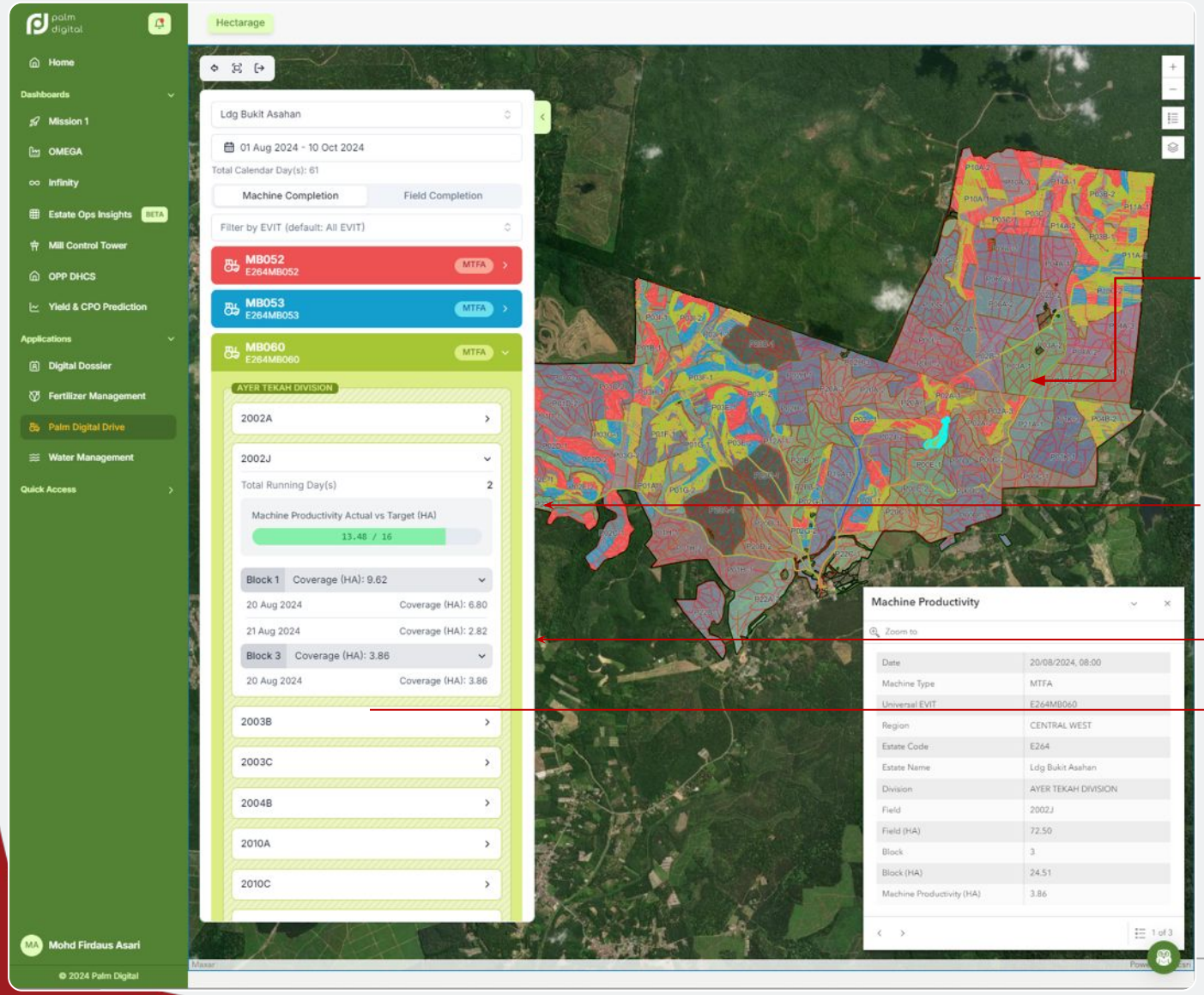
Palm Digital Drive (PDD)

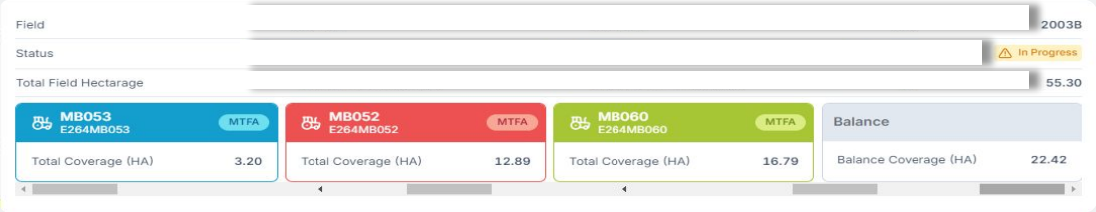
The mobile app supports machine operators in carrying out timely fertiliser application, ensuring that all palms receive the recommended amount.

- Self-correction by machine operators to prevent missed areas
- Connects fertiliser type information
- Mark inaccessible areas, along with reasonings
- Mark the status of fertilisation task

Information System & Precision Agriculture Tools

Palm Digital Drive: The mobile app supports machine operators in carrying out timely fertiliser application, ensuring that all palms receive the recommended amount. Machine Completion tab allows estate to monitor and improve machine productivity and work quality

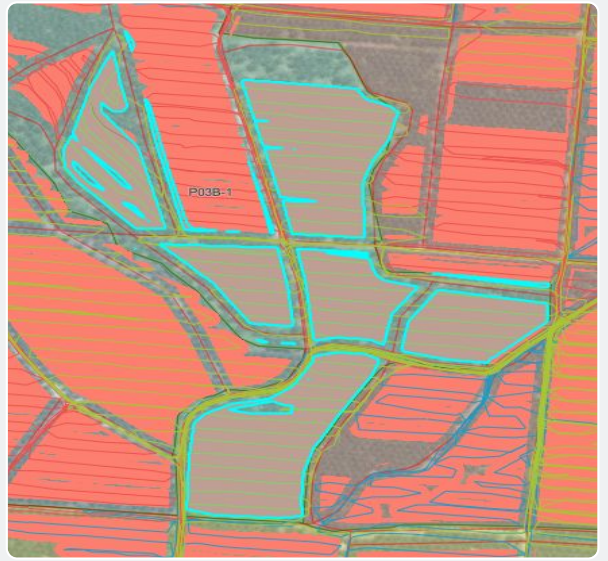




Map view to visually analyse total area covered by selected machines during the period selected with the ability to filter various layers such as slope, contour, etc.

Expandable list to show which fields and blocks a machined worked on

GPS hectarage covered to monitor productivity



Clicking on the record will zoom the map in to display the GPS tracks of the day's application process, allowing estate to validate the quality of work done, addressing issues such as missed areas or rows

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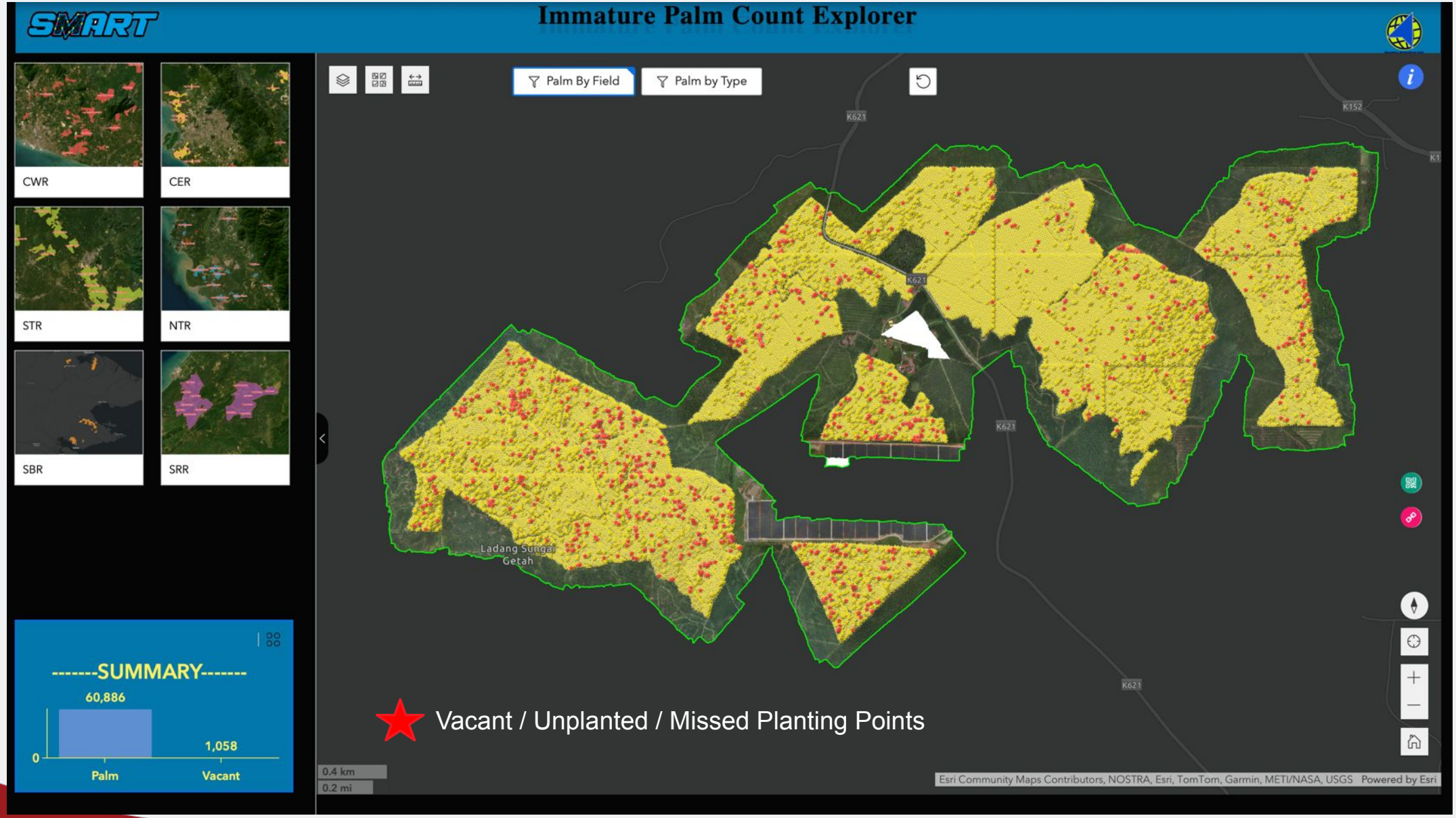
Information System & Precision Agriculture Tools

Image Analytics from Aerial Imagery: Large scale mapping & identification of healthy palms, pest – defoliation, etc.



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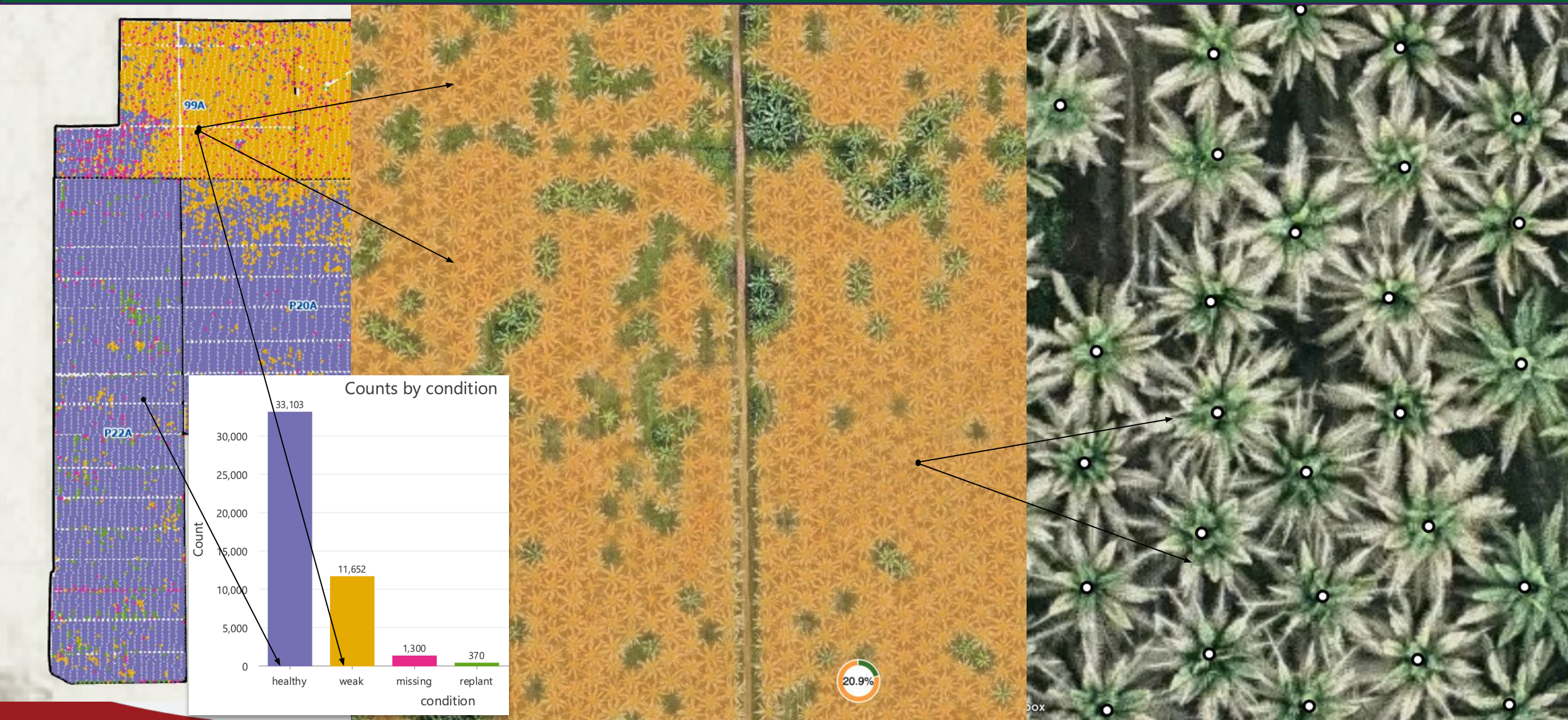
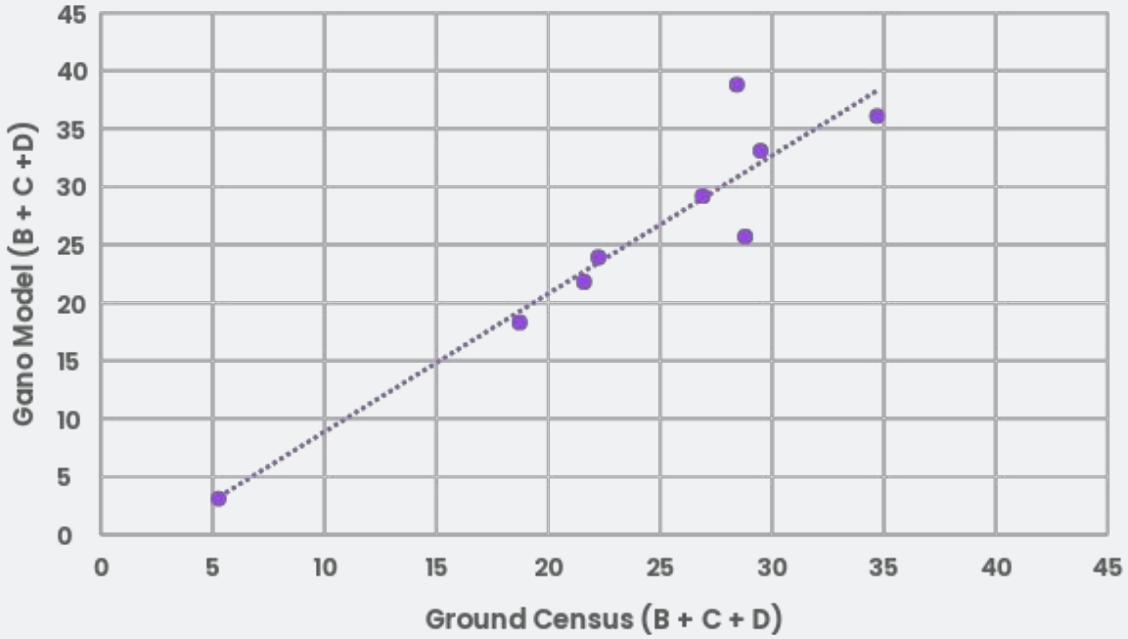
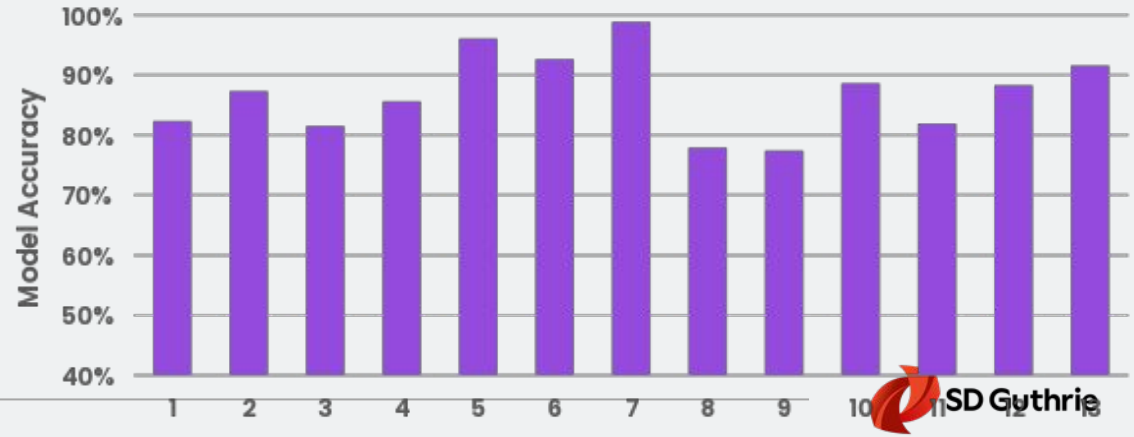


Disease (Ganoderma) infected palms detection via aerial image analytics

- The accuracy for *Ganoderma* - infected but productive palms (Class B) is slightly lower due to the mild symptoms displayed by these palms.

Validation of Model Prediction against Ground Truth Census





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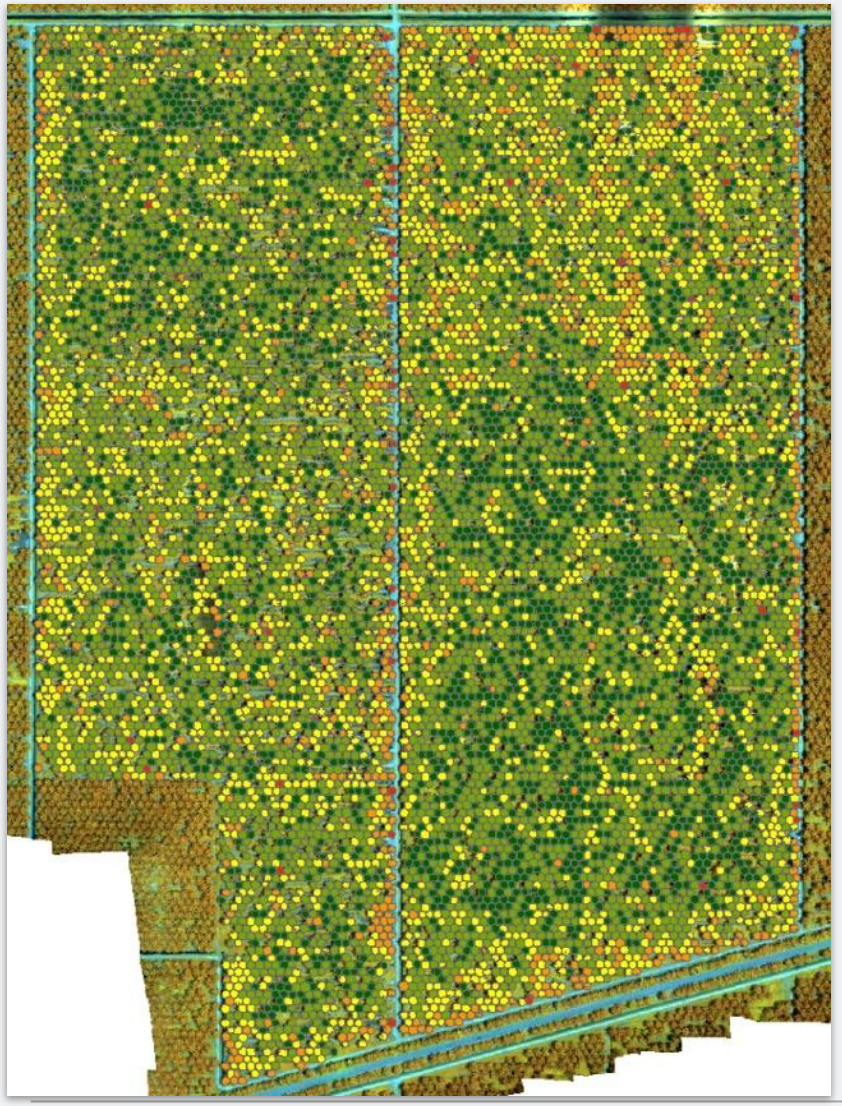
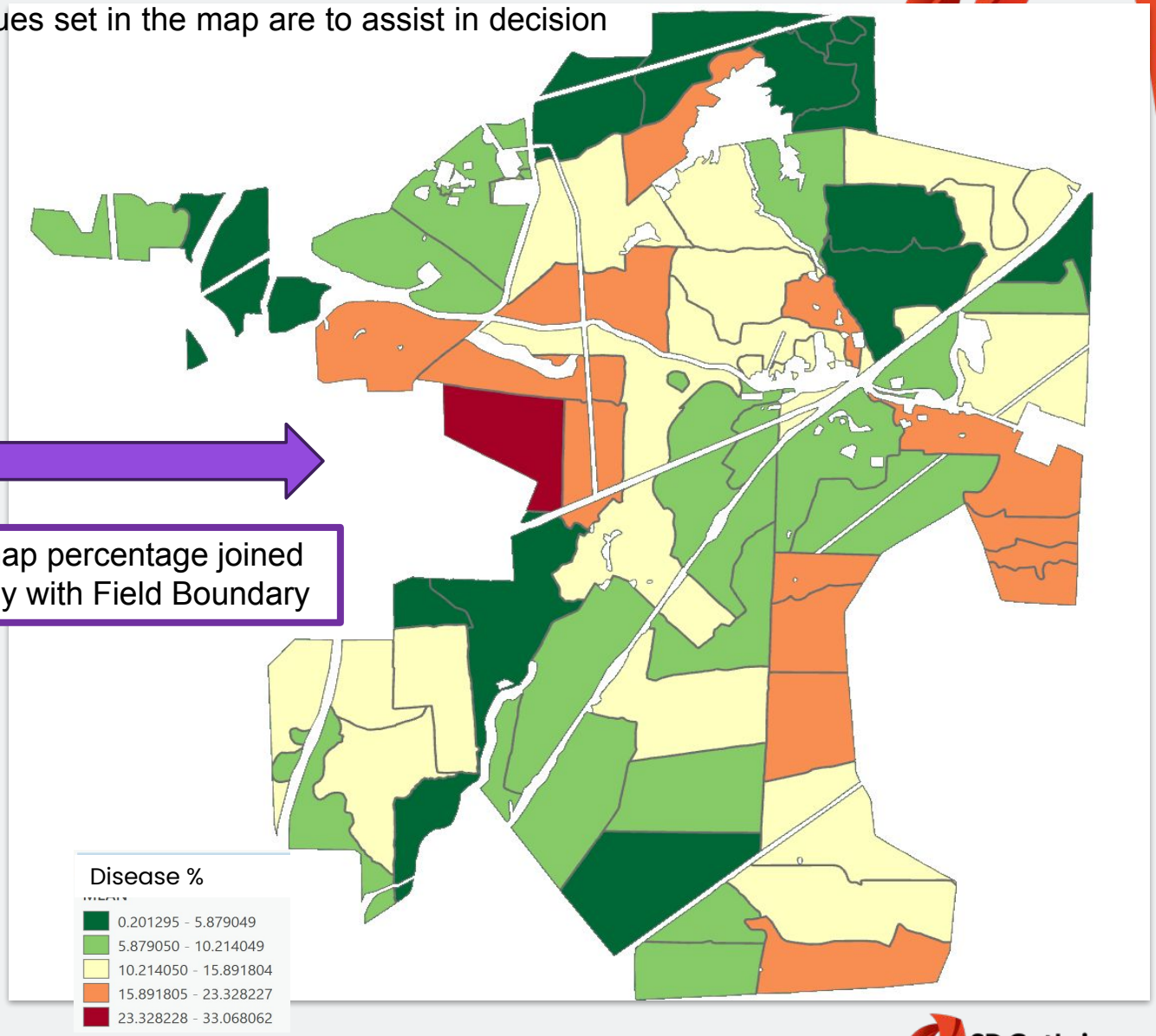
Disease (Ganoderma) infected palms detection via aerial image analytics

Retrospective Ganoderma infection, from single palm to field percentage map is used to visualize the severity of Ganoderma infection severity throughout the plantation. Threshold values set in the map are to assist in decision for disease management.



Heatmap percentage joined spatially with Field Boundary



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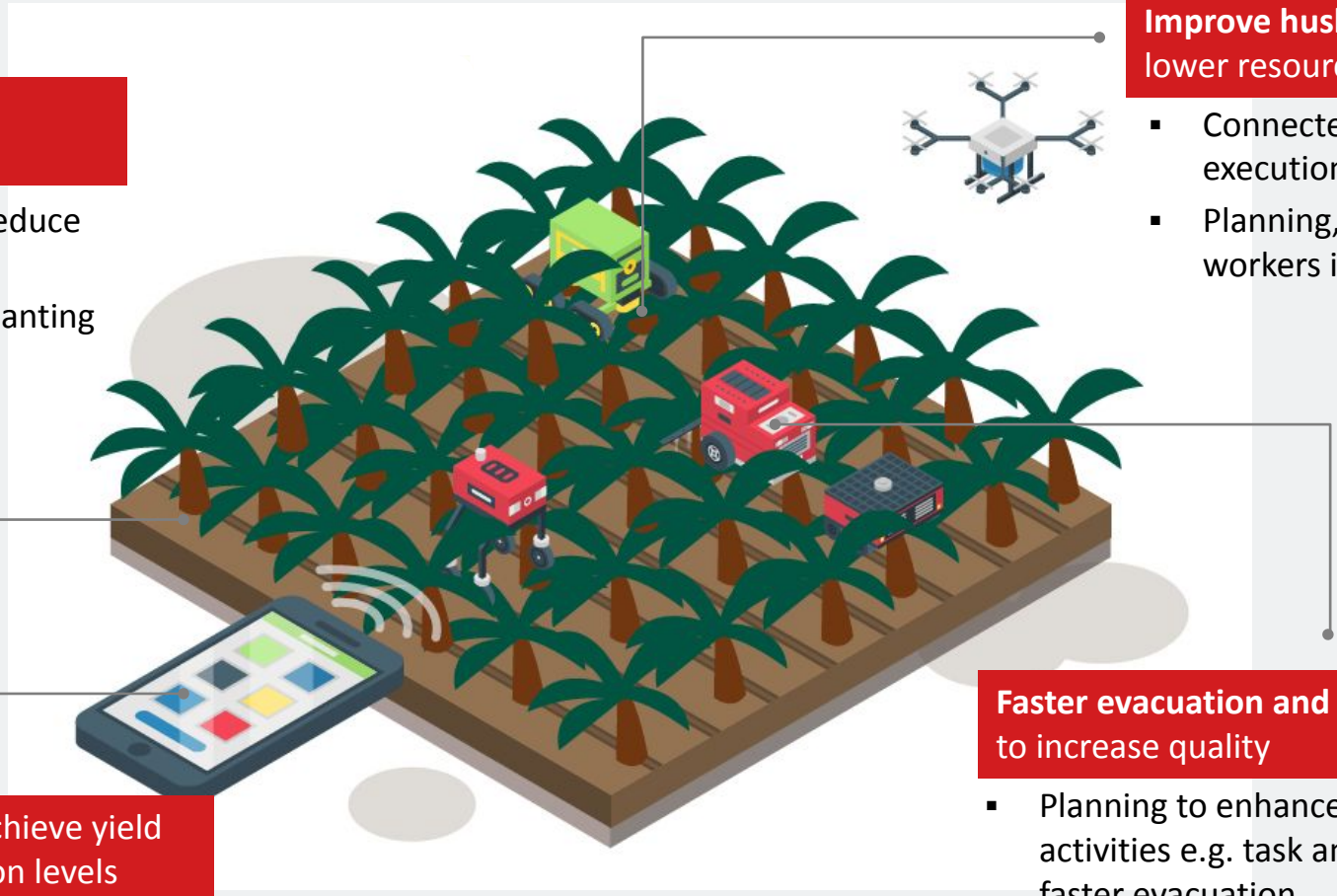
In Precision Agriculture, connected estates and workforce will improve land use, fertilizer application and FFB evacuation

INCREASE YIELD AND QUALITY PER HECTARE AT LOWEST COST

Increase land yield to increase value per ha

- Imaging and sensor inputs to reduce dead spots
- Analytics & tools to optimize planting



Improve husbandry to increase yield and lower resource costs

- Connected worker to enhance task execution
- Planning, task allocation to manage workers in real time

Improve fertilizer application to achieve yield potential and optimize tree nutrition levels

- Real-time information to inform agronomist on the ideal time and amount of fertilizer to apply

Faster evacuation and better grading to increase quality

- Planning to enhance the management of logistics activities e.g. task and equipment scheduling, faster evacuation.
- Use robotics and video analytics to identify, grade, and predict weight of FFBs

MUCHAS GRACIAS

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