HORTGRO
Growing Fruit IQ

Technical Symposium 2026

New technology options for deciduous fruit farmers

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Western Cape Government

FOR YOU

Western Cape Department of Agriculture

The Intelligent Harvest: New technology options for deciduous fruit farmers

27/05/2026

The 15 Cent Lighter and the Future of Agriculture

Your farm is a business, it needs precision

A new way of viewing Agriculture

- Precision beats scale
- Agriculture is entering an optimisation era
- Every drop, every meter, every second matters
- Modern orchards are becoming engineered systems

Key Points

- World economics and politics influencing costs
- Input costs rising sharply
- Water becoming critical
- Chemical regulations tightening
- Climate variability increasing
- Precision = survival

The future of fruit farming belongs to operations that optimise every tree, every spray droplet, and every decision. Waste is not an option.

Understanding Spectral Indices

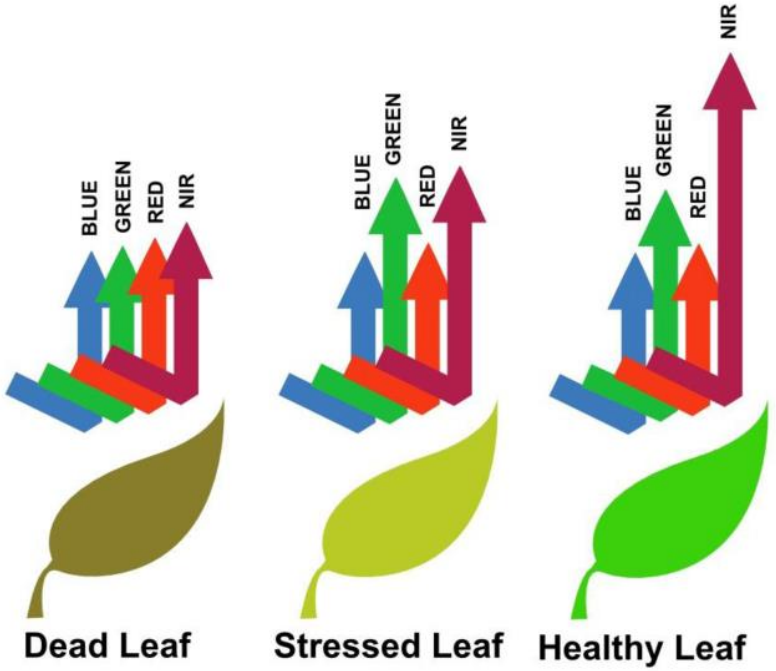
Introduction

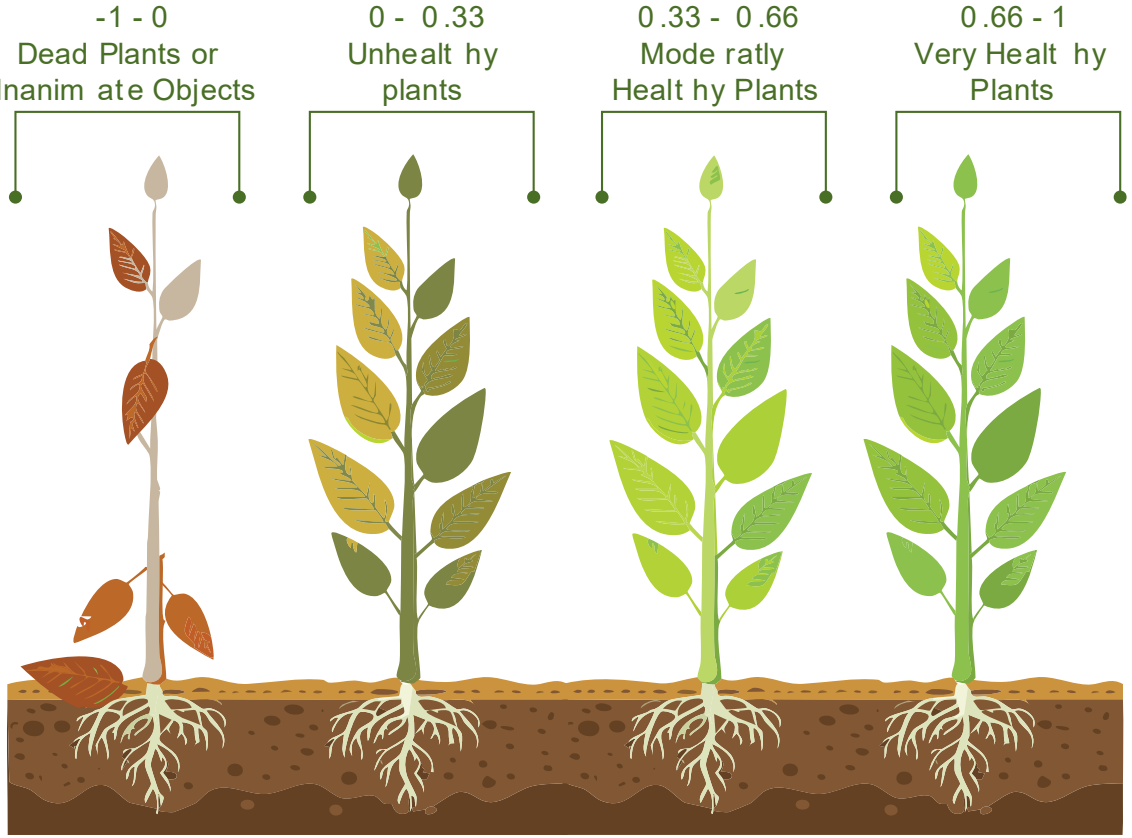
NDVI and NDRE in Action:

- Identify plant stress early to intervene before damage occurs
- Track nitrogen levels to avoid over or under-fertilization

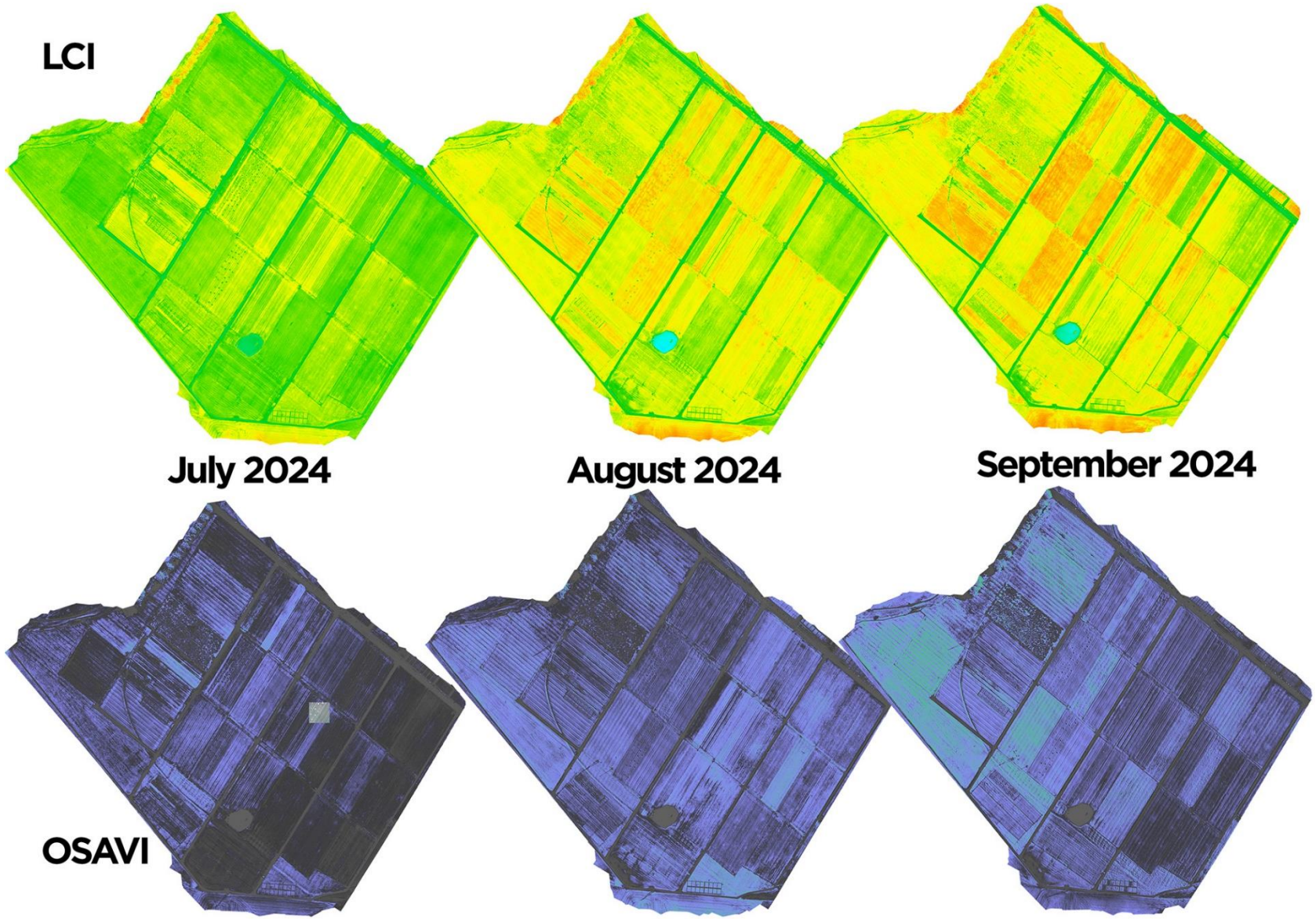
LCI (Leaf Chlorophyll Index):

- Monitor chlorophyll to assess crop photosynthesis levels
- Important to measure Nitrogen requirements





Understanding Spectral Indices



Drone Imagery Map Viewer

RGB
Opacity: 80%

Flight Date
Remove
August 29, 2024

GNDVI
Opacity: 100%

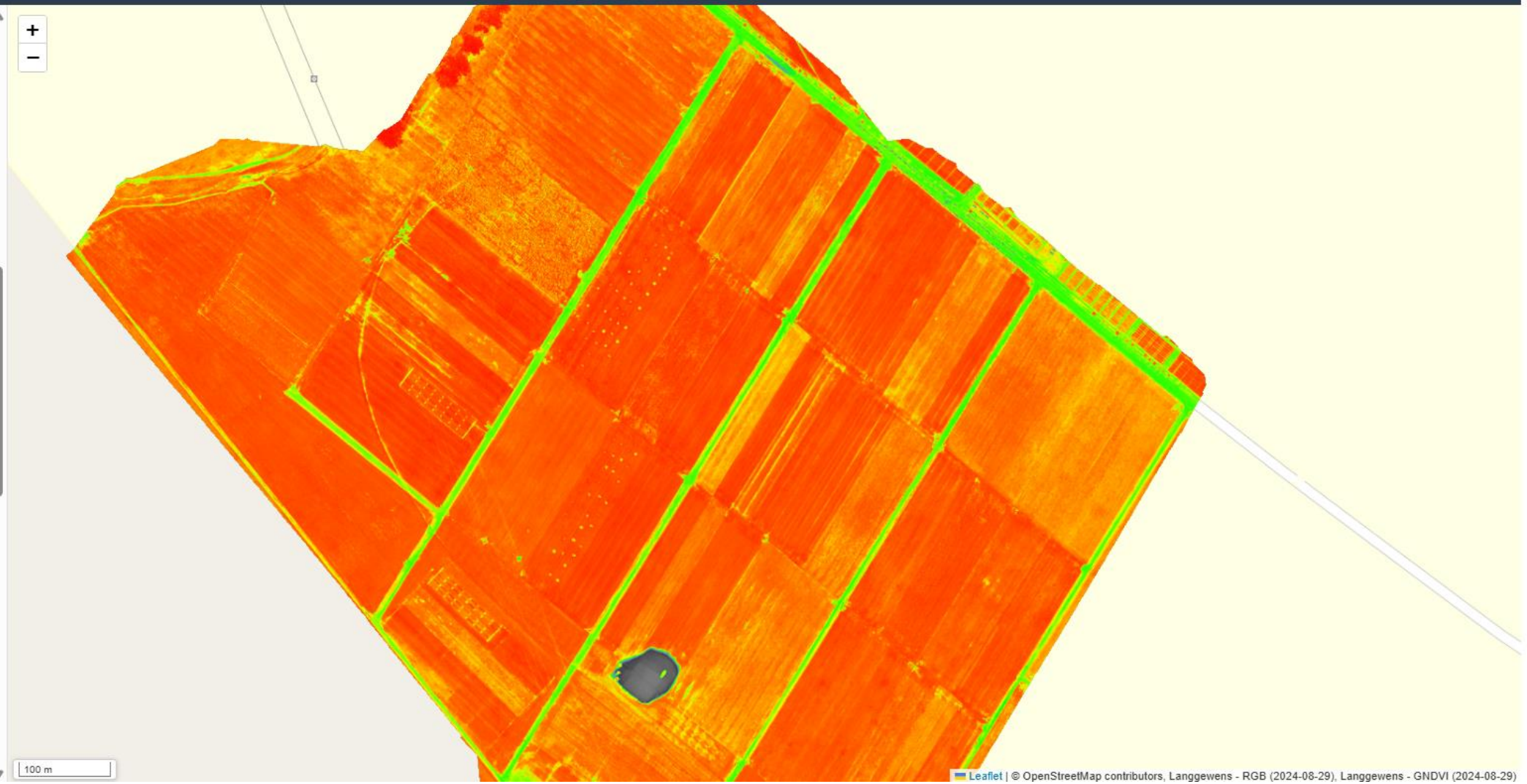
LCI
Opacity: 80%

NDRE
Opacity: 80%

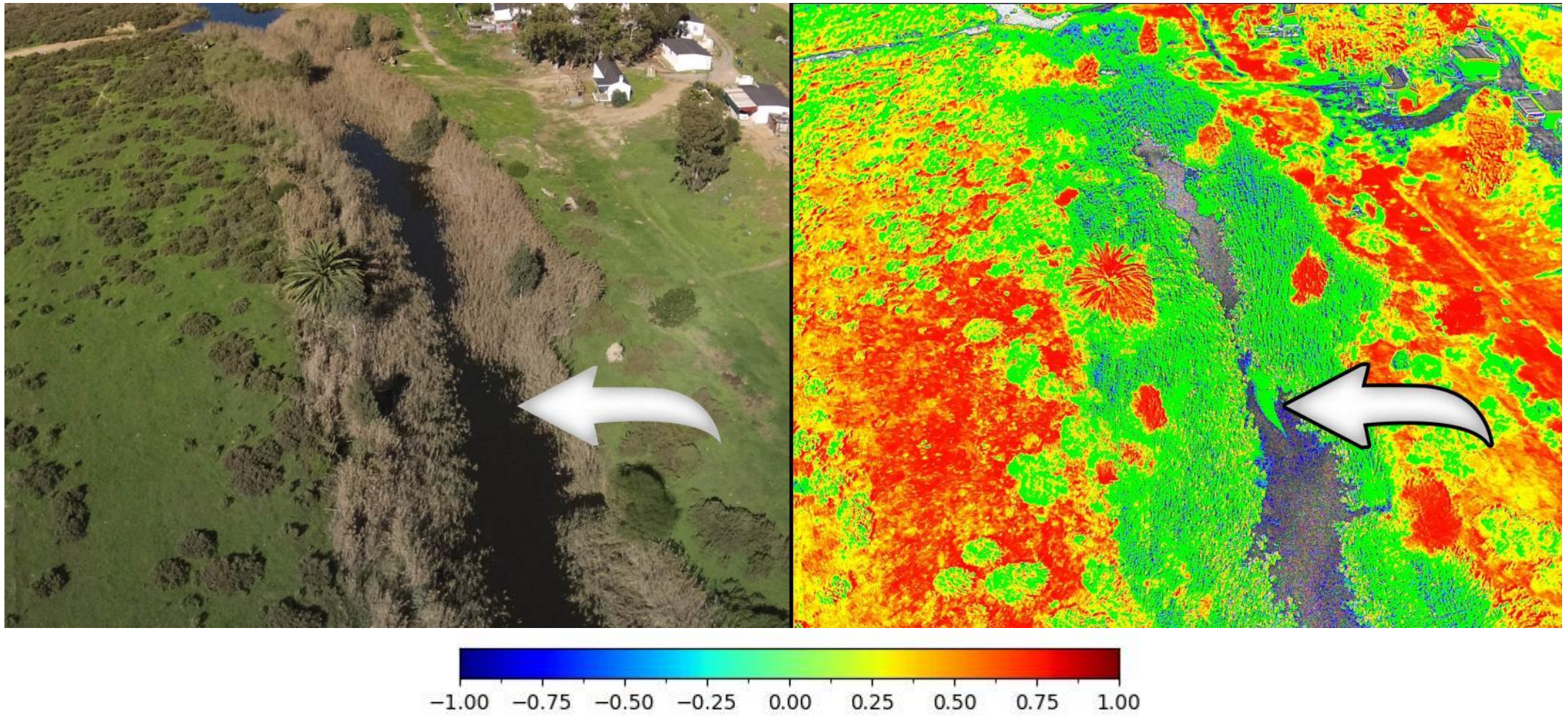
NDVI
Opacity: 80%

OSAVI
Opacity: 80%

RGB
Opacity: 80%



Multispectral cameras are proven to be very useful



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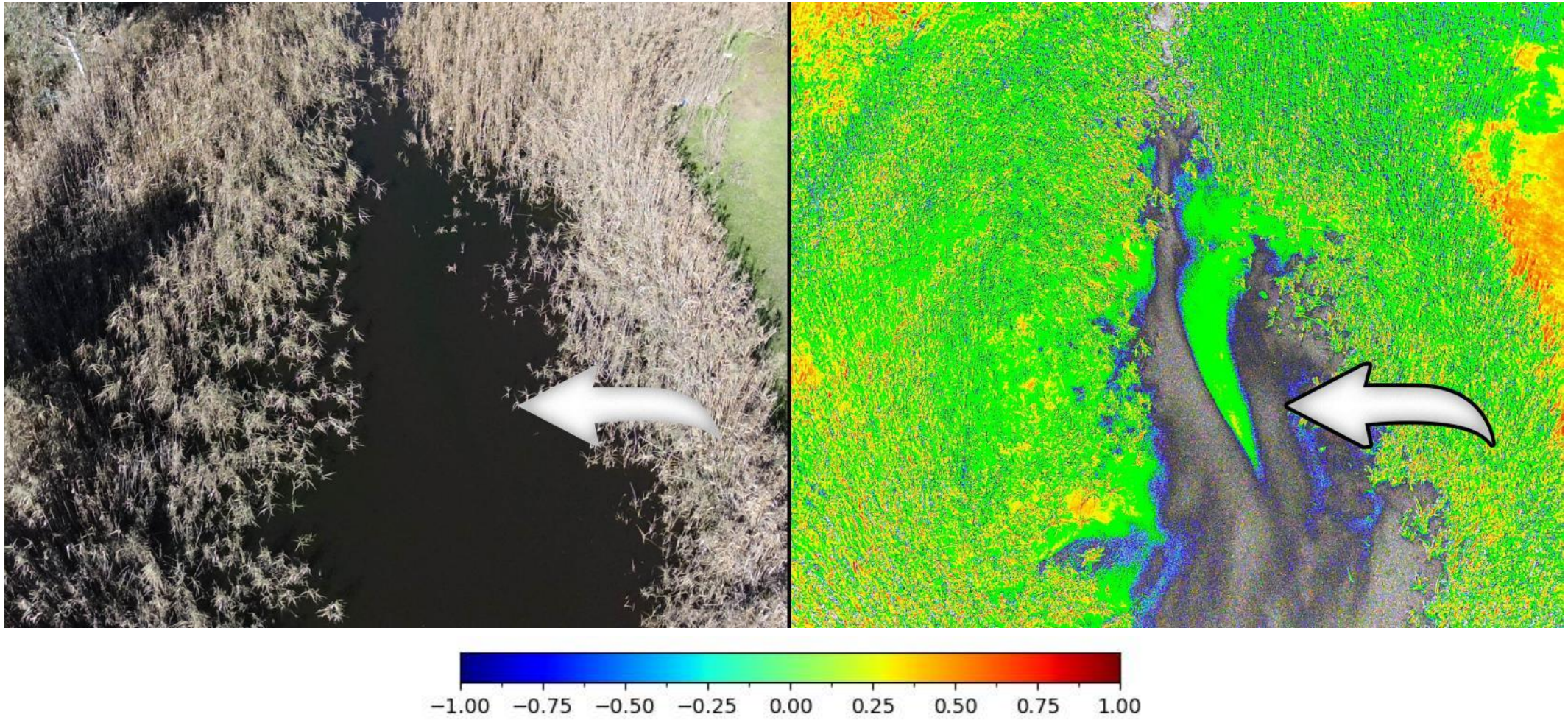

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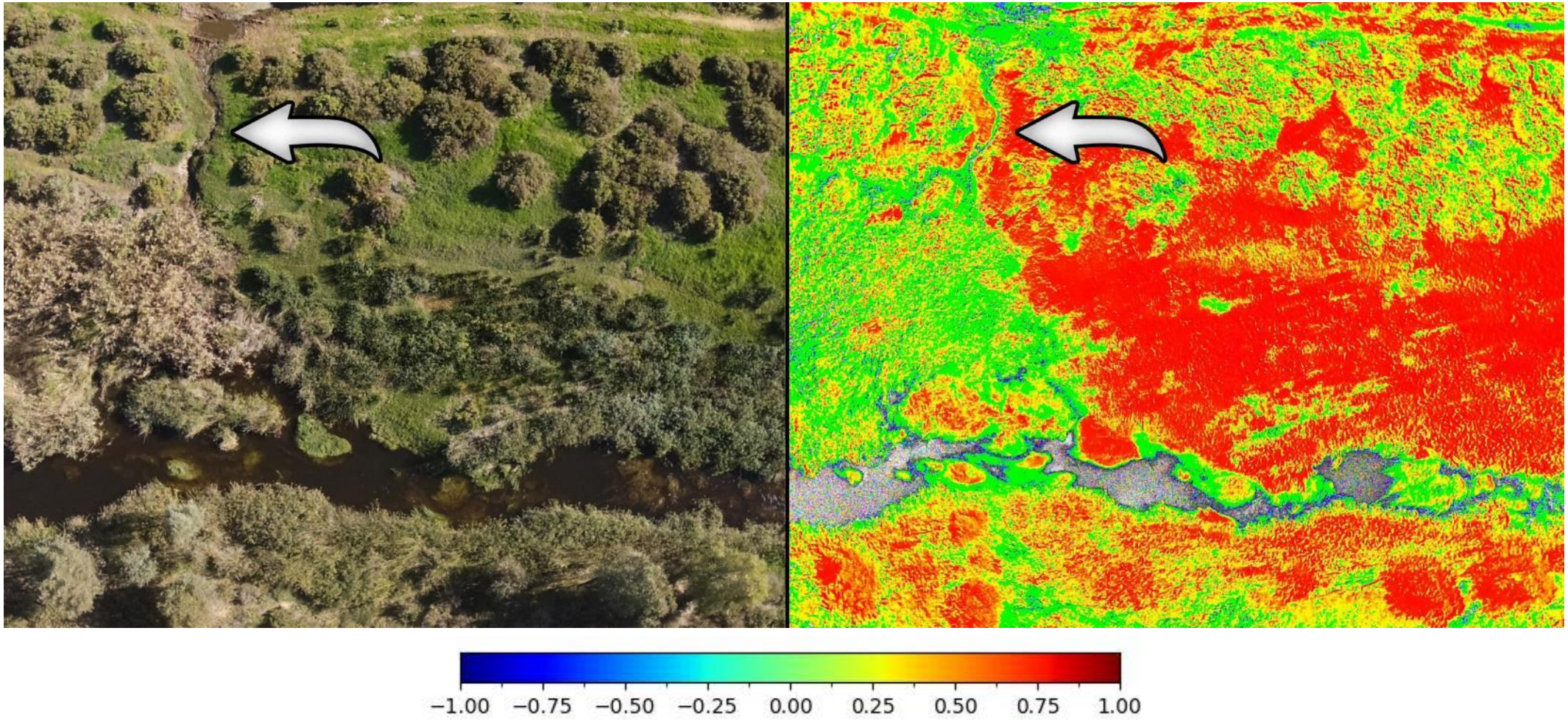
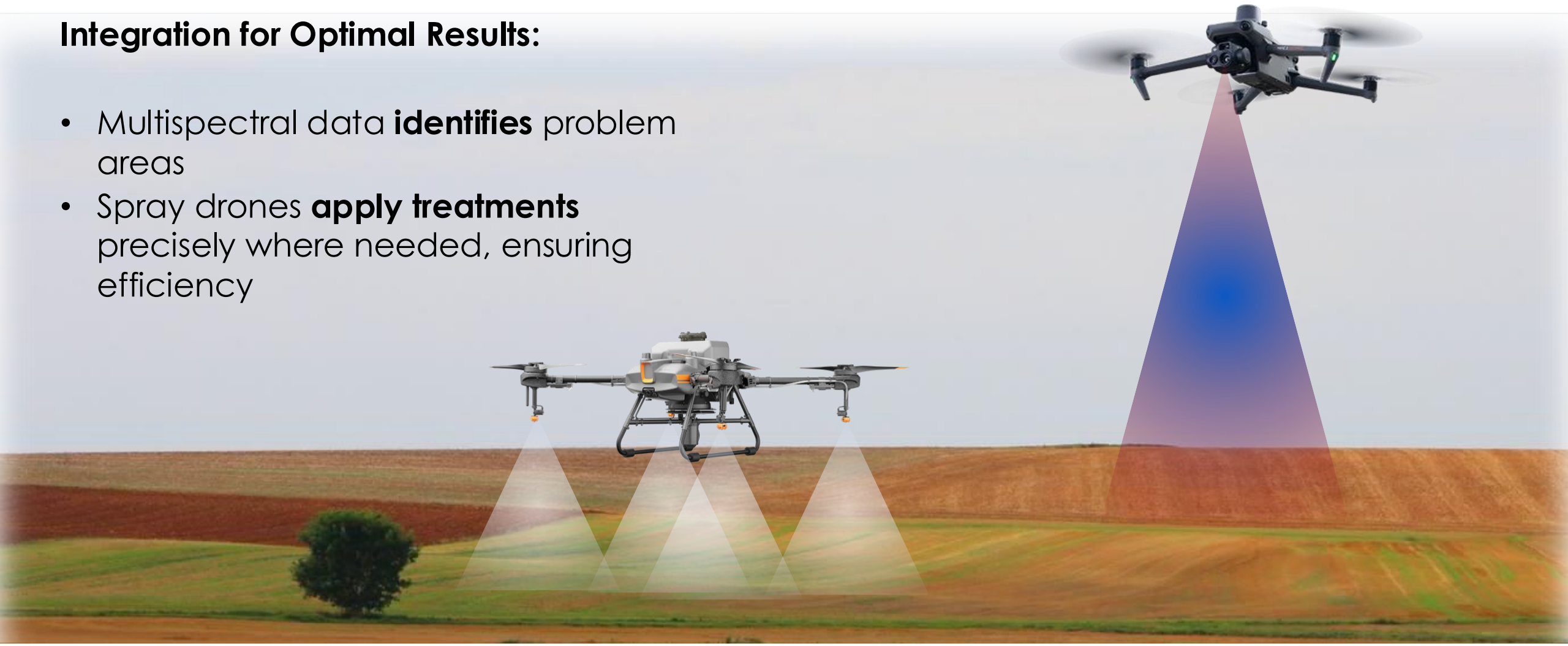


The Synergy Between Multispectral and Spray Drones

Integration for Optimal Results:

- Multispectral data **identifies** problem areas
- Spray drones **apply treatments** precisely where needed, ensuring efficiency



Introduction to Spray Drones

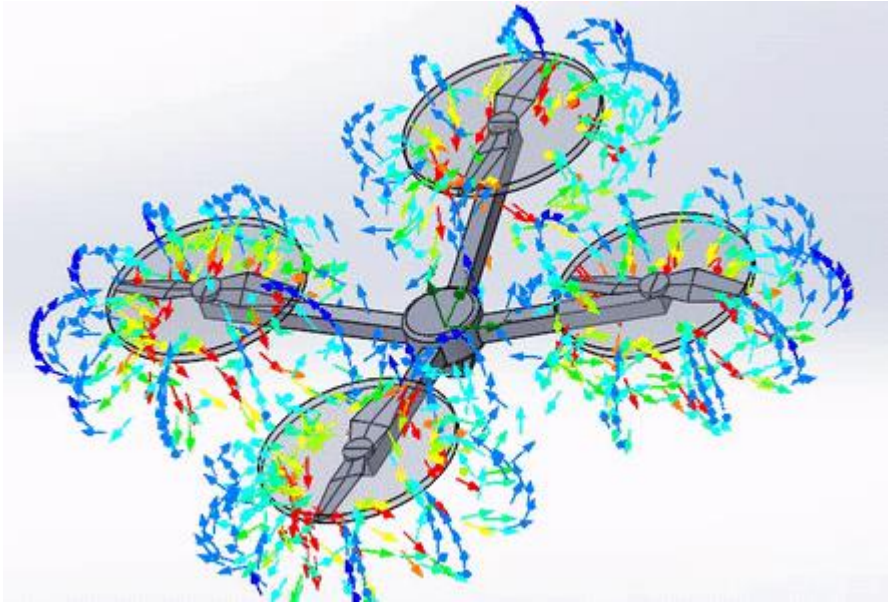
•**Spray Drones:**

- Deliver chemicals with accuracy and precision
- Minimize wastage by targeting specific areas identified by multispectral data
- Can spray Autonomous or piloted
- Reach difficult areas with ease

How Spray Drones Work

Vortex Effect:

- Downward rotor vortex ensures chemicals are sprayed directly onto plants
- Reduces chemical drift compared to plane spraying methods
- Sprays around the leaf for complete coverage
- Height and spray drone size determines spray width



The Science of the Drone Vortex

Why drone spraying works

Rotor Downwash Creates:

- Air vortex tunnels
- Droplet acceleration
- Canopy penetration
- Leaf underside coverage
- Reduced drift

Spray Advantages

- Dense canopy penetration
- Better disease coverage
- Lower water requirements
- Smaller droplet optimisation
- Targeted application

Major Discovery

The drone was not just a flying sprayer.

It became:

An airflow engineering platform.

Key Lesson

“The airflow system became more important than the spray tank.”

The Rise of Autonomous Rover Sprayers

The Next Agricultural Shift

Why Ground Rovers Are Growing Fast

- No aviation regulations
- Longer operating times
- Larger payload capacity
- Better energy efficiency
- Safer operation
- Autonomous navigation

Orchard-Specific Advantages

- Narrow row navigation
- Steep orchard capability (very strong electric motors)
- Reduced compaction
- Low-noise operation
- Night operations possible
- Battery or diesel (solar connected probability)

Rover Technology Trend

Ground robots are now combining:

- Drone atomisation
- Airflow penetration
- AI navigation
- RTK positioning
- Sensor fusion
- Autonomous operation

Latest Spray research project: Intelligent Autonomous Rover Spraying

Key Specifications

- 240 L spray tank
- 16 L/min flow rate
- 60–200 µm droplet size
- 7 m horizontal spray range per side
- Autonomous path planning
- AI pedestrian detection
- RTK centimetre positioning
- 6-wheel drive
- 270 mm ground clearance
- 80 cm narrow-width chassis

Important Innovation

- JetSprayer Cannons
- Directed airflow into canopy
- Multi-angle adjustment
- Deep leaf penetration
- Precision spray targeting
- Mimics drone vortex concepts

Why It Matters for Fruit Farming

- Orchard-specific design
- Dense canopy optimisation
- Reduced chemical waste
- Reduced water use
- Modular design (it becomes what you need)

The Power of Integration (machines to AI)

Sensors Are Becoming the Eyes of the Orchard

Modern Orchard Sensors

- Ground Sensors
- Soil moisture probes
- EC sensors
- pH sensors
- Root-zone monitoring
- Salinity sensors

Optical Sensors

- Multispectral cameras
- Hyperspectral sensors
- Thermal cameras
- LiDAR systems

Tree-Level Monitoring

- Fruit counting
- Canopy density
- Tree stress detection
- Chlorophyll analysis
- Disease detection

Why Sensors Matter

- Detect stress earlier
- Reduce unnecessary spraying
- Improve irrigation precision
- Enable variable-rate application
- Convert orchards into measurable systems
- Key Industry Shift

Farmers are moving from visual farming to measurable farming.

AI + Computer Vision in Fruit Farming

AI Is Changing Agriculture Rapidly

AI Can Now:

- Detect disease early
- Count fruit automatically
- Estimate yield
- Analyse canopy health
- Detect nutrient stress
- Identify spray misses
- Predict irrigation demand

Computer Vision Systems

- RGB imaging
- Thermal analysis
- Multispectral analysis
- Hyperspectral analysis

Edge AI processing

Research Results

- Modern orchard AI systems now achieve:
- Up to 97% tree counting accuracy
- Real-time canopy classification
- Automated fruit detection
- Tree-level analytics

AI as a Farming Tool, Not Just Software

Practical AI Uses for Agriculture Teams

Major Shift

Previously:

You needed software developers

Now:

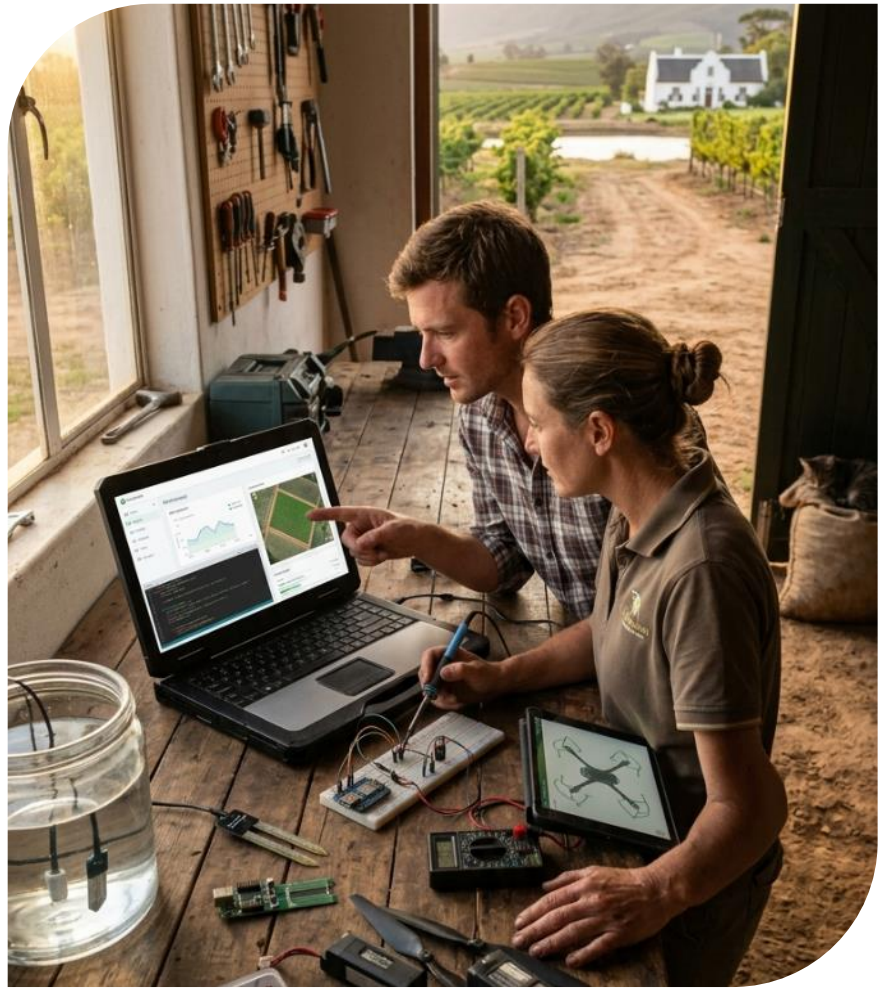
Agricultural teams can build systems themselves (They still need to understand the underlaying code and architecture)

Example Applications

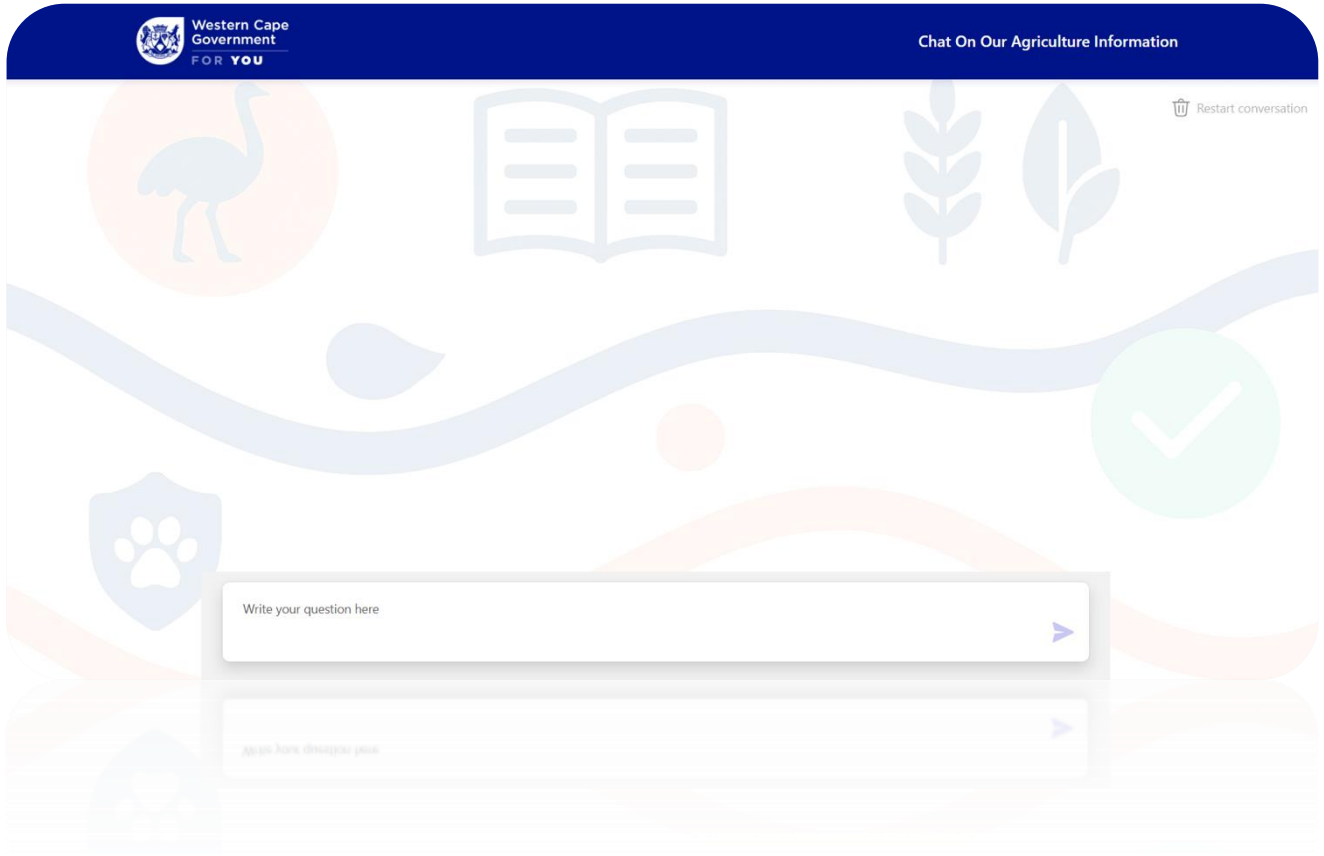
- AI-generated irrigation dashboards
- AI-assisted disease analysis
- AI-created farm apps
- AI-generated drone analytics
- AI-assisted sensor calibration
- AI-assisted Calculators and algorithms

AI Can Help With:

- Writing code
- Building dashboards
- Sensor integration
- Data analysis
- Technical troubleshooting
- Report generation
- Research summaries
- Farm management systems
- Convert old systems into new modern systems.



Our own AI systems and test platforms



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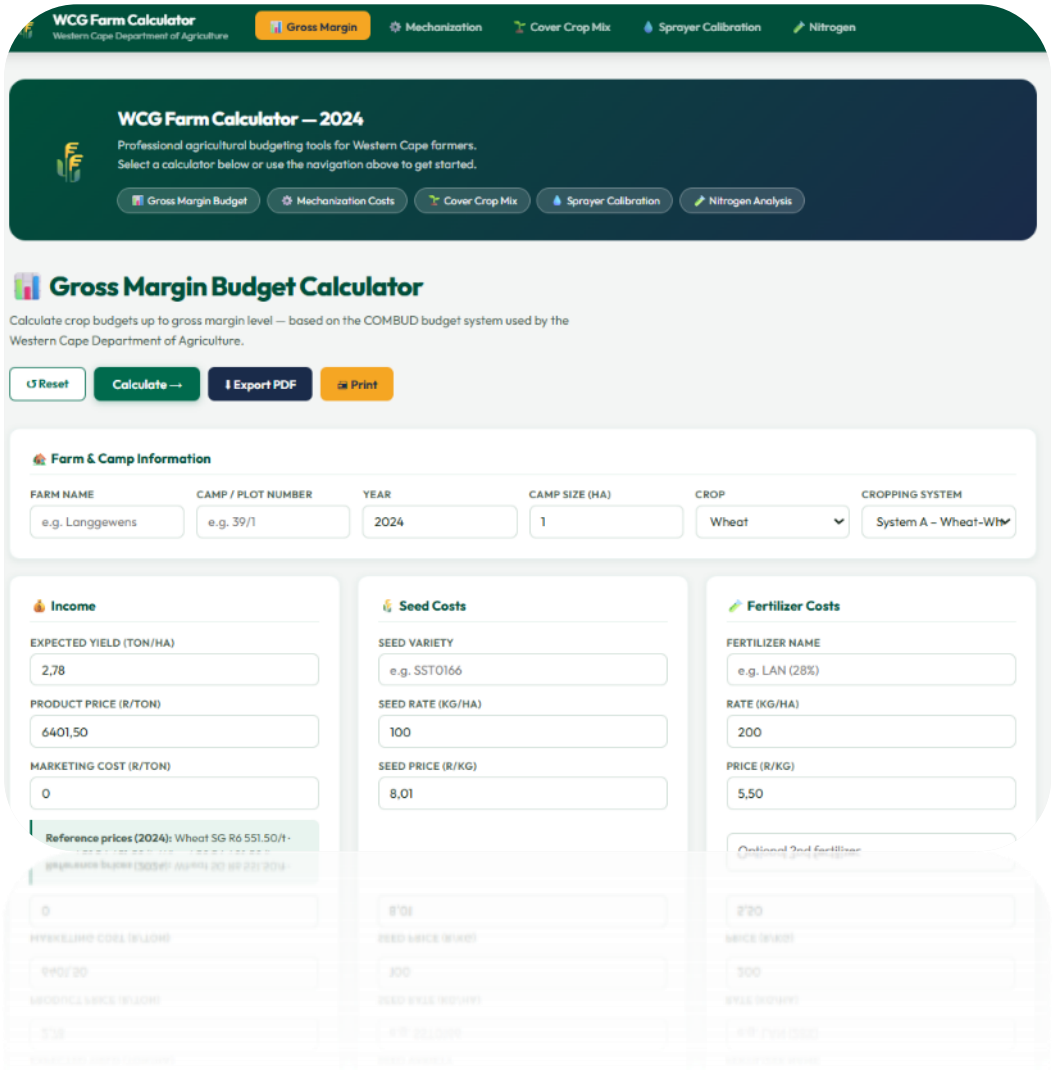
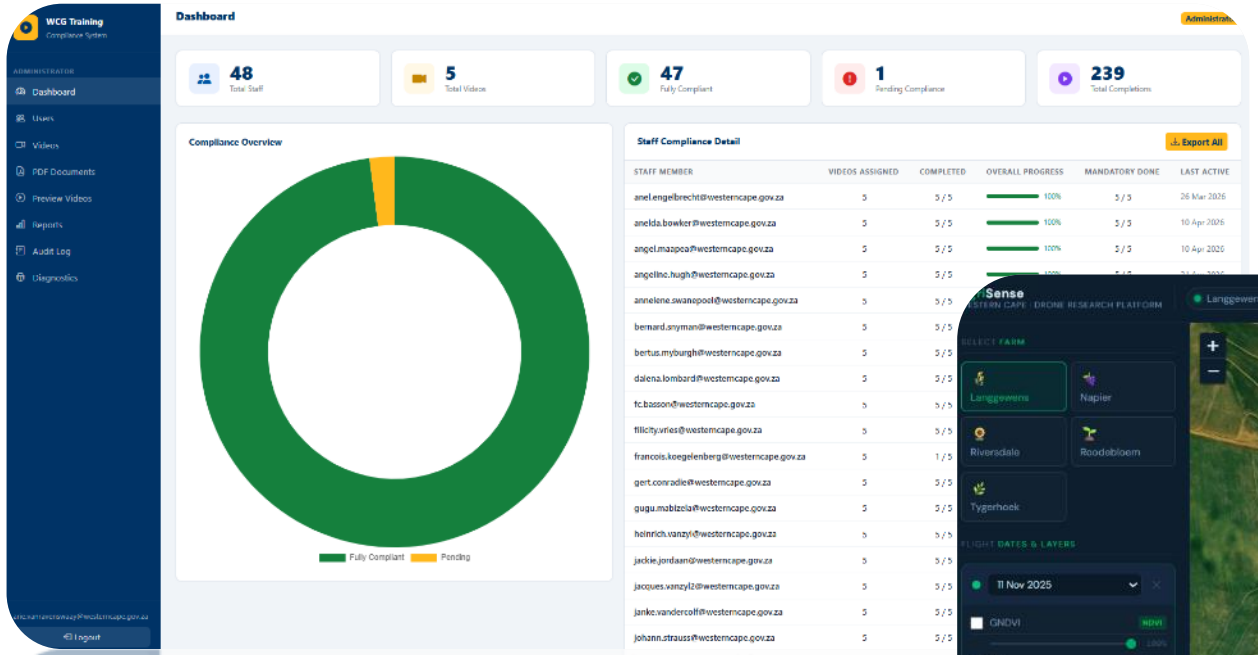


Why AI matters for designing new systems



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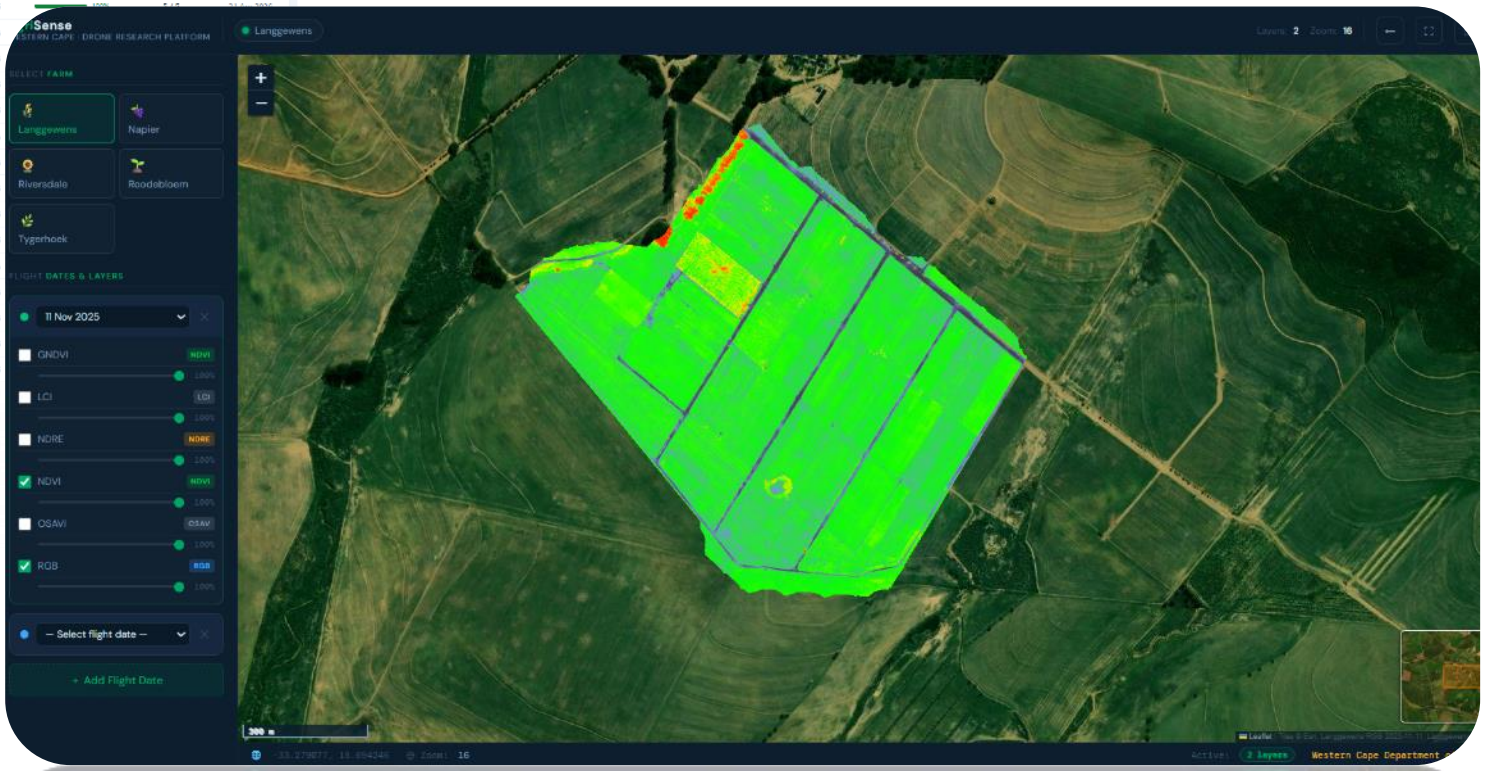


The Future Farm

The Farm of the Future Will Combine:

- Autonomous rovers
- Spray drones
- AI decision systems
- Smart sensors
- Computer vision
- RTK positioning
- Real-time analytics

Human Workflow

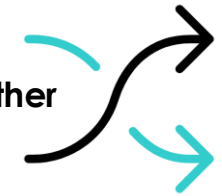
Farmers monitor →

Managers plan →

Teams execute →

Production improves

Human and machine work together



Future Workflow

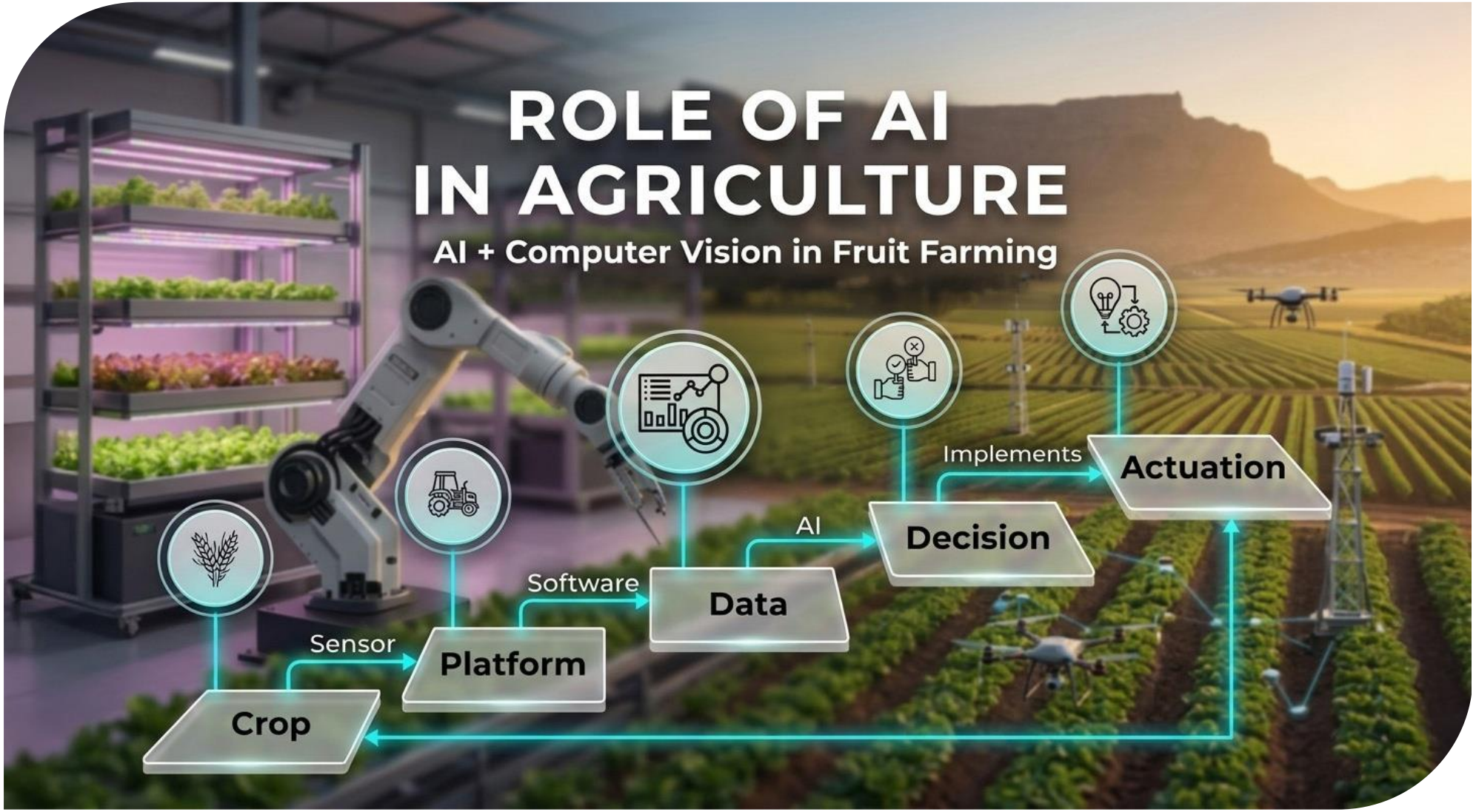
Sensors detect →

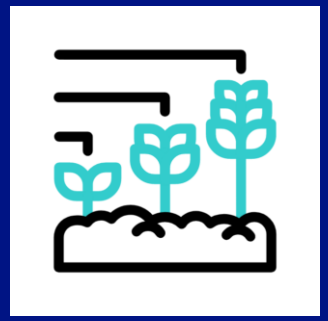
AI analyses →

Rover/drone responds →

Data updates automatically

AgriTech is moving towards something new





Technology is not replacing nature, it is helping us understand and manage it with greater precision.

By combining AI, sensors, drones, and autonomous systems with modern fruit farming, we can optimise every tree, every drop, and every decision to produce better quality fruit more efficiently and sustainably.

South Africa should not copy the world blindly, we should adapt these technologies to our own farming realities and strengths.

Thank you

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