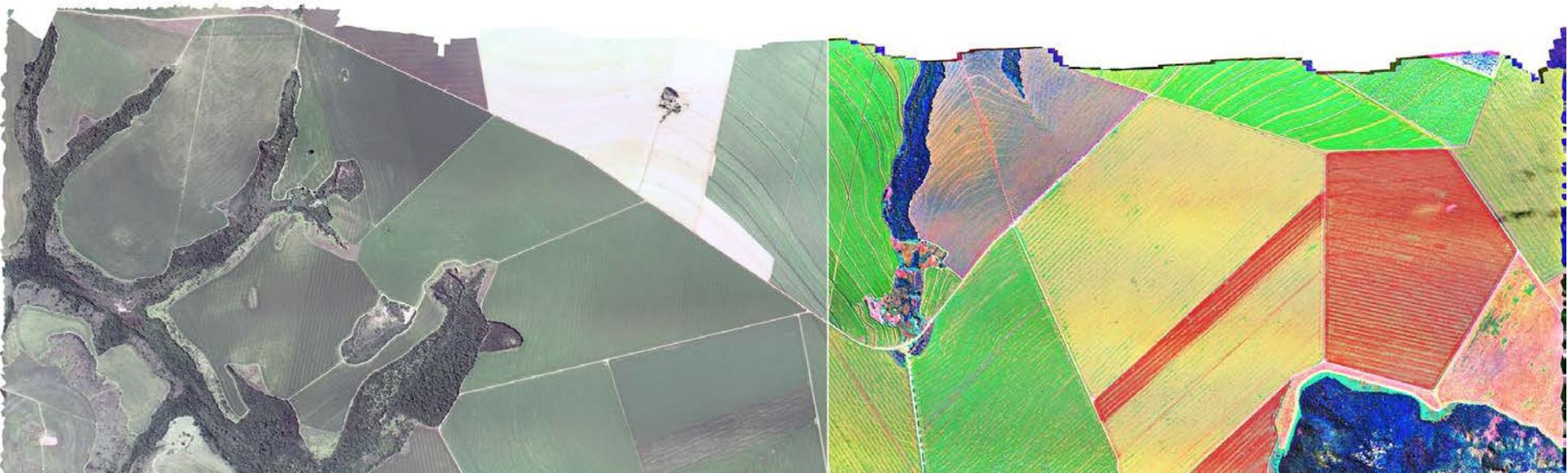




Igor Ivanov  
Chief Commercial Officer



## KNOW YOUR LAND – ADVANCED CROP ANALYTICS

**A company supported by:** Venture Kick | Swiss CTI/KTI | FIT Foundation | Venture: companies of tomorrow | Innovaud | Canton de Vaud  
SPECo | Venture Labs | EPFL Technology Transfer Office | EPFL Geodetic Engineering Laboratory | IMD Business School | Swisscom Startup  
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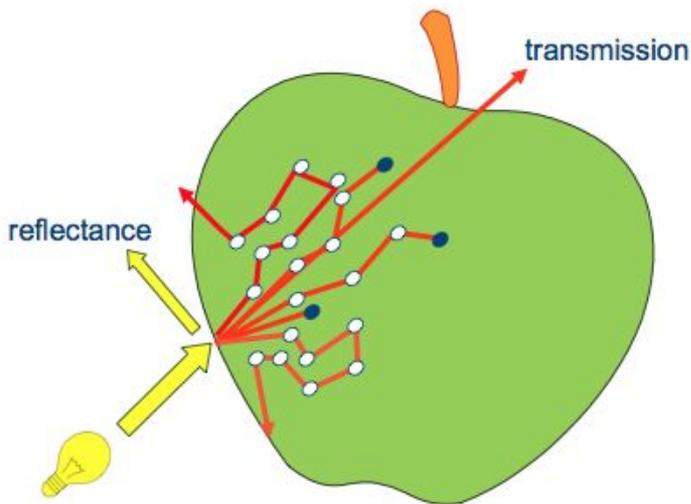
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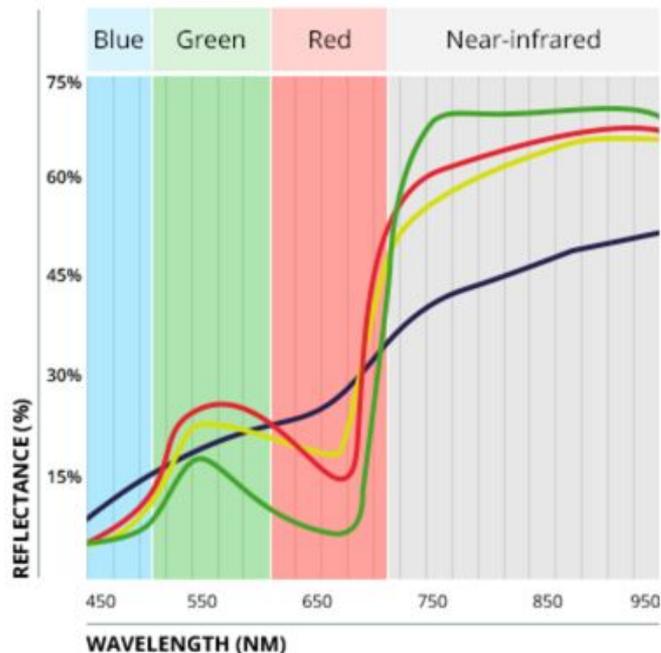
# HYPERSPPECTRAL IMAGING - DETECTION OF LIGHT REFLECTED FROM THE SURFACE (i.e. CROPS)

1



- absorption
- scattering

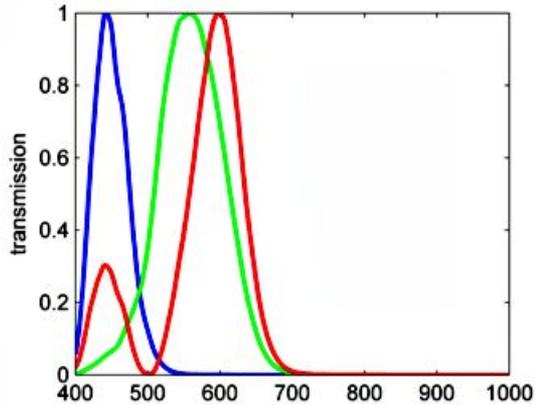
2



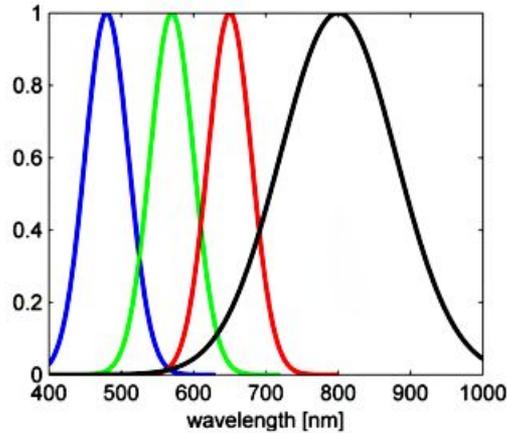
- Healthy
- Stressed Crop
- Nitrogen deficiency
- Necrotic

# HYPERSPECTRAL IMAGING DEALS WITH NARROW SPECTRAL BANDS

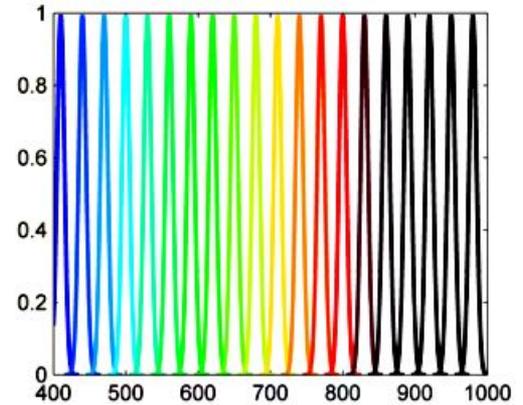
## COLOR



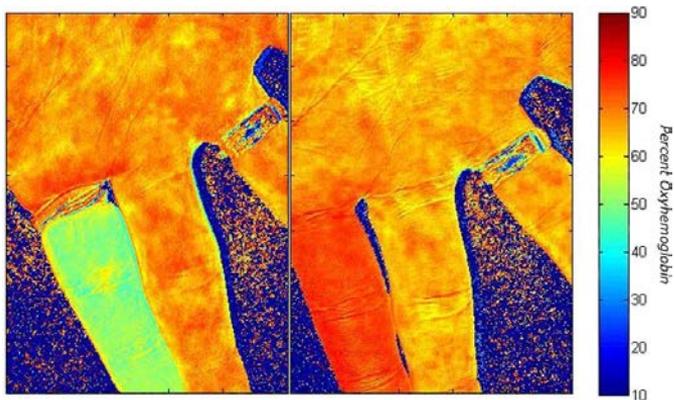
## MULTISPECTRAL



## HYPERSPPECTRAL



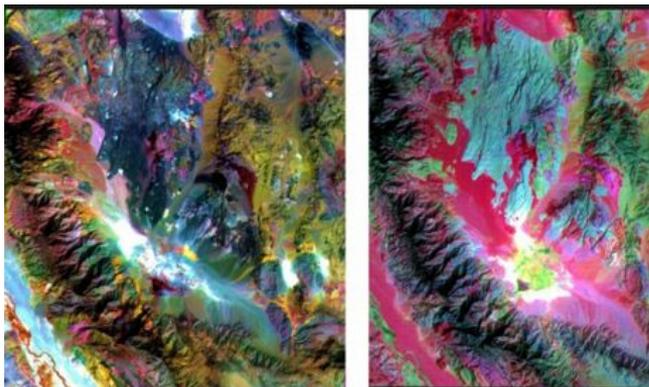
# POTENTIAL APPLICATIONS OF HYPERSPECTRAL IMAGING



MEDICAL IMAGING



PRECISION AGRICULTURE



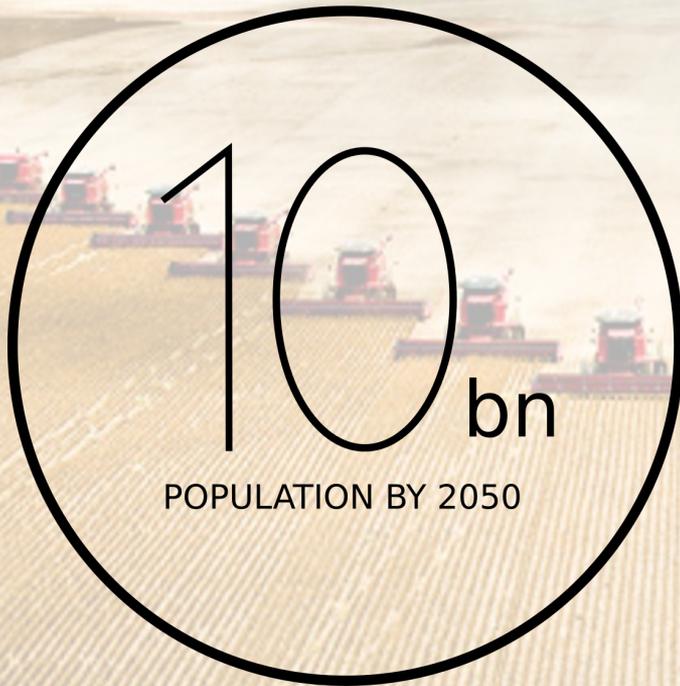
MINERALOGY



OPTICAL SORTING/ MACHINE VISION



# TRILLION DOLLAR PROBLEM



# SMART FARMING

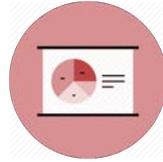


## SENSING

Lack of integrated sensing technology for soil and crops

Limited crop access, visibility and coverage

Expensive and fragmented methodology for crop diagnostics



## ANALYSIS

Lack of analytical tools to translate data into valuable information

Low quality of the data for analysis

Missing integrated data-driven decision tools



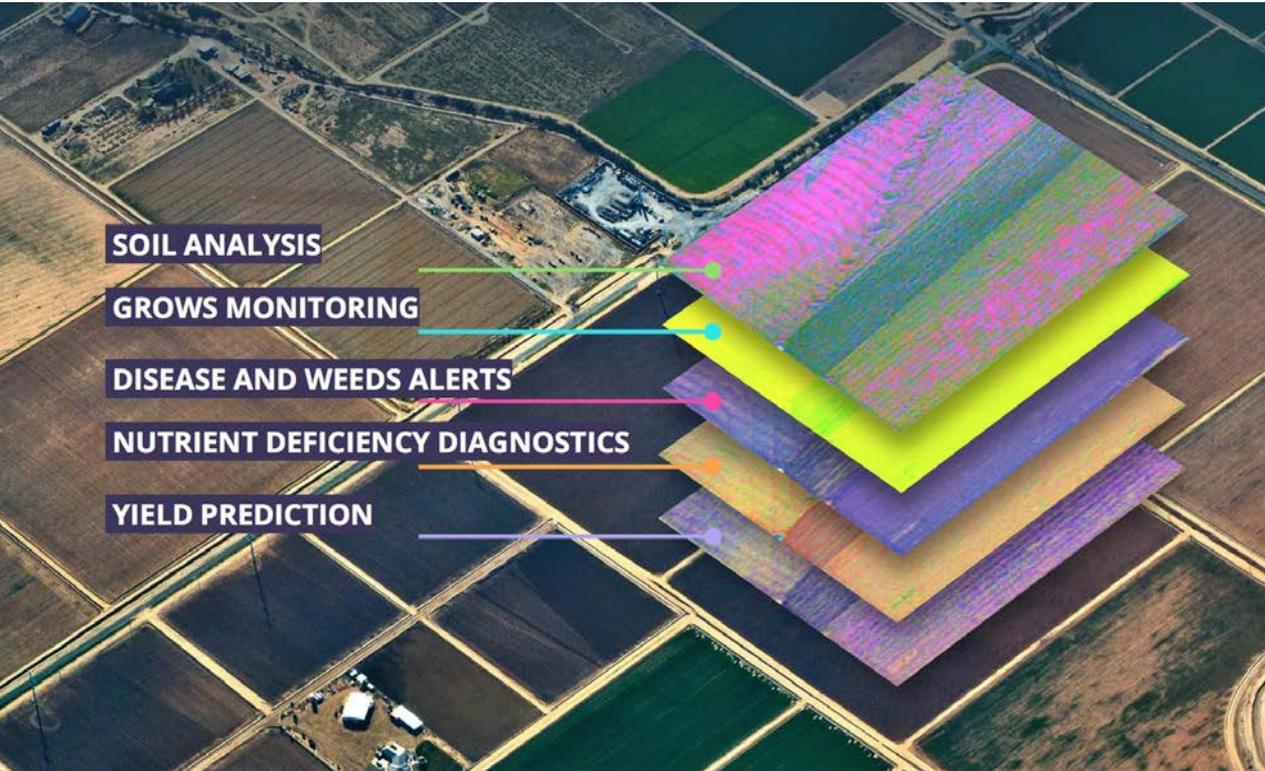
## AUTOMATION

Precision AG machinery with on-board computers, GPS and sensors

Machinery with variable rate dosing of fertilizers and chemicals

Yield mapping, automatic and precise seeding

# EMPOWERING FARMERS WITH BETTER KNOWLEDGE OF THEIR LAND AND CROPS



**MOST ADVANCED SENSOR** hyperspectral imaging technology



**ANALYTICAL SOFTWARE** to translate data into chemical and biological indicators



**ACTIONABLE INFORMATION** based on database of phenological factors - weather, diseases, pests, nutrient stress

# GAMAYA OXI: HYPERSPECTRAL IN THE PALM OF YOUR HAND

2016







# UNIQUE SELLING PROPOSITION



**INFORMATION RICH DATA**  
delivered by the Gamaya  
hyperspectral camera



**DETECTION OF PESTS AND  
DISEASES** addressing billion \$  
problems

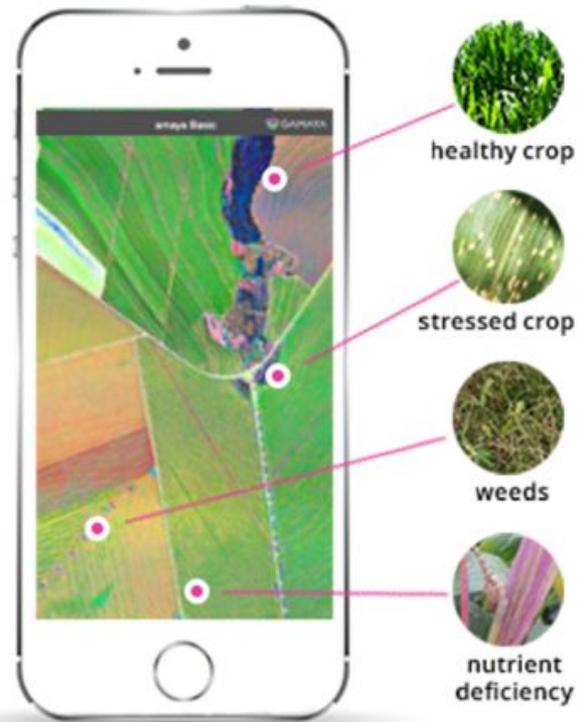
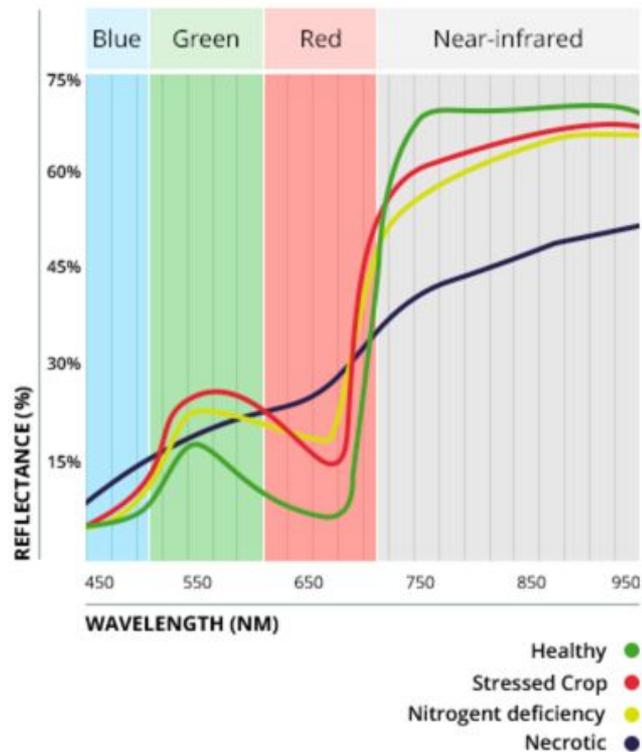
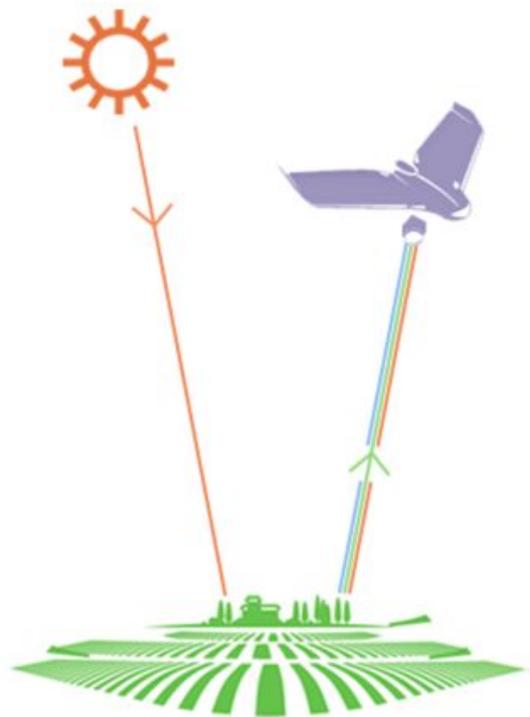


**CROP SPECIFIC TOOLS**  
taylor-made on demand for each  
farm



**FLEXIBILITY** to tackle new  
agricultural challenges

# WE ANALYSE SPECTRUM OF REFLECTED LIGHT AND CORRELATE IT WITH CROP AND SOIL CHARACTERISTICS





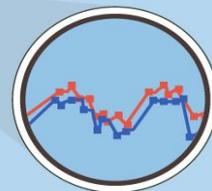
Weed detection & classification



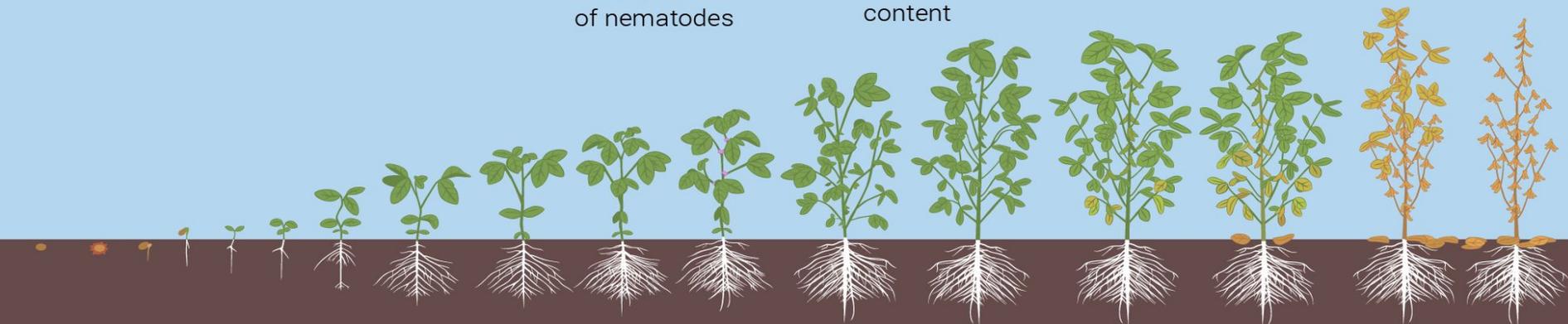
Detection of nematodes



Plant nutrient content



Yield prediction & growth monitoring



Seed	Germination	Leaf Development			Flowering	Pod Development		Ripening	Senescence	
Days 00	07 09 10 11	12	13	15	17	61	69 70	79	89	96 97



## Plant nutrient content

**Accurate detection** of Nitrogen and Potassium with a 30cm resolution  
Nutrient deficiency maps at **all critical crop stages**  
Crop stage specific detection and fertilisation recommendations



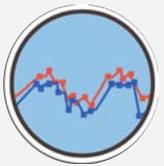
## Detection of nematodes

**Quick and cost effective assessment** of your farm. No more manual sampling and lab costs  
**Planting recommendations.** Know exactly where to plant your sensitive cultivars to contain the infestation and minimize your losses



## Weed detection and classification

**Precise detection** of the weeds infestation in your field  
**Weeds identification** so that you can decide if and what chemicals you will use to treat them  
Varied application rate maps so that you target the weeds and only the weeds, **saving significantly in herbicides**



## Yield prediction & growth monitoring

An accurate **yield prediction 45 days before harvest**  
Harvesting dates at pick crop maturity to optimise the yield  
**Growth monitoring** throughout the season so that you better plan your on-field operations



# PLANT NUTRIENT CONTENT

## BENEFITS



Up to 15% yield increase



Up to 30% reduction in chemical usage

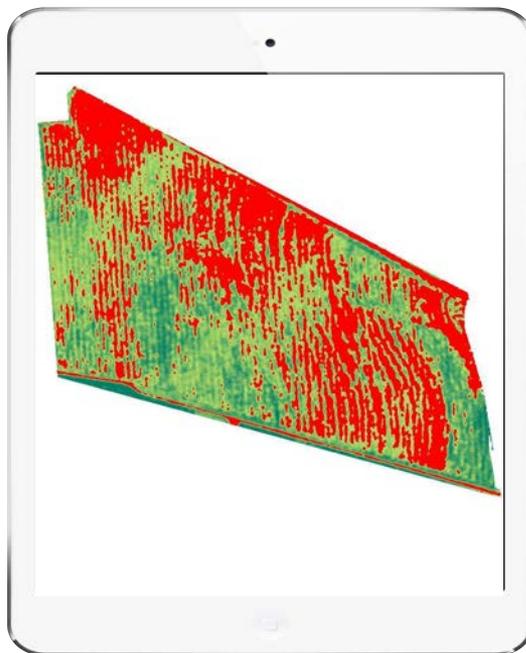


Environmental protection from excess fertilisation

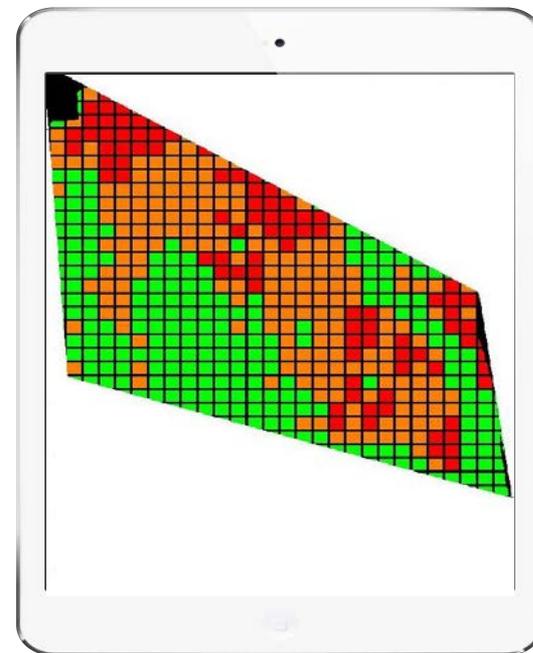
## DELIVERABLES

- Accurate representation of nutrient content
- Variable rate application maps directly integrated to your machinery
- Crop stage specific

### NUTRIENT MAP



### VARIABLE RATE APPLICATION (VRA)





# NEMATODES DISEASE DETECTION

## BENEFITS



Up to 30% decrease in disease-related losses



No more scouting and sample analysis

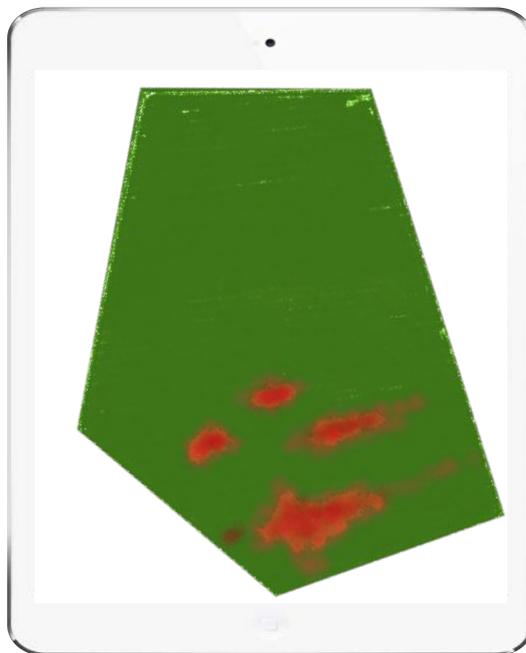


In time and targeted treatment

## DELIVERABLES

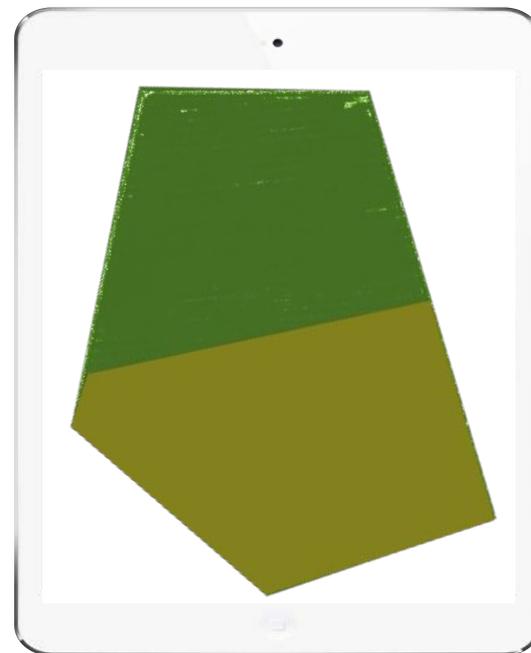
- Affected areas and Infestation level
- Sowing recommendations
- Seasonal monitoring of the infestation development

### NEMATODES IDENTIFICATION MAP



 Nematodes affected areas

### PLANTING RECOMMENDATION MAP



 Current variety

 Nematodes-resistant variety



# WEED DETECTION AND CLASSIFICATION

## BENEFITS



Up to 20% decrease of weed-related losses



Up to 30% reduction in chemical usage

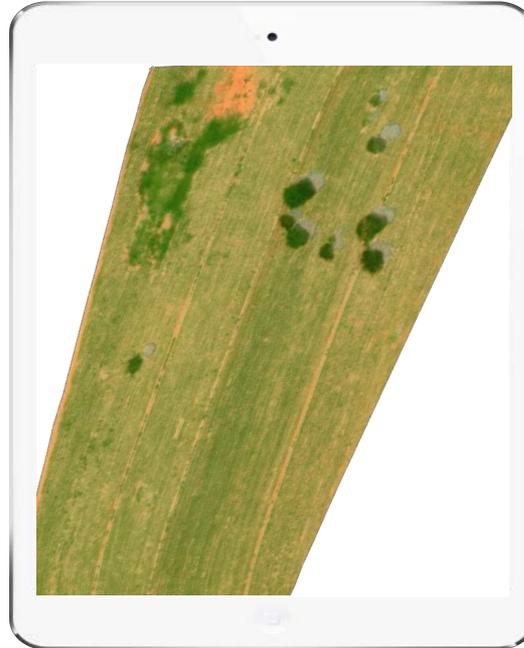


Reduction of manual scouting costs

## DELIVERABLES

- Detailed counting per m<sup>2</sup>
- Categorization by species
- Prescription maps
- Evaluation of economic impact

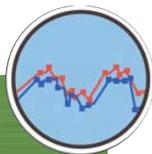
FIELD OVERVIEW



WEEDS DETECTION MAP



■ Weed type 1    ■ Weed type 2



# YIELD PREDICTION AND GROWTH MONITORING

## BENEFITS



Know your yield and negotiate your price early in the season



Better yield quality

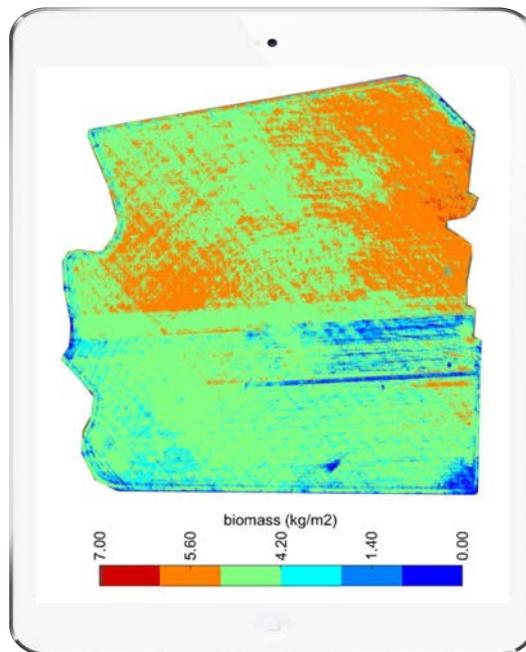


Optimization of your harvesting plan

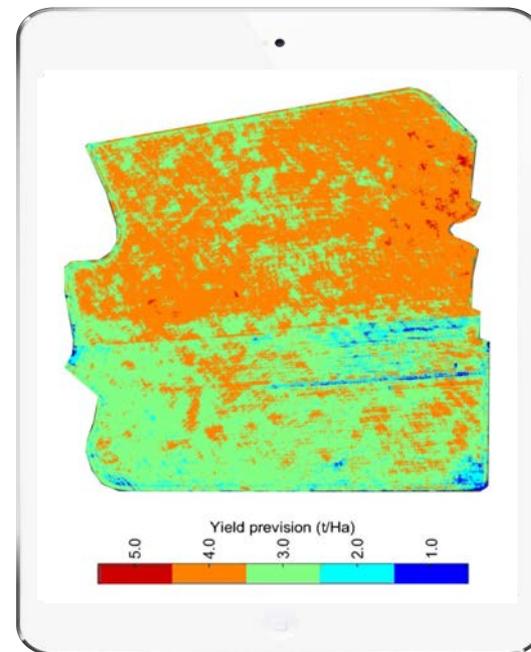
## DELIVERABLES

- Detailed biomass growth maps
- Yield maps
- Harvesting dates

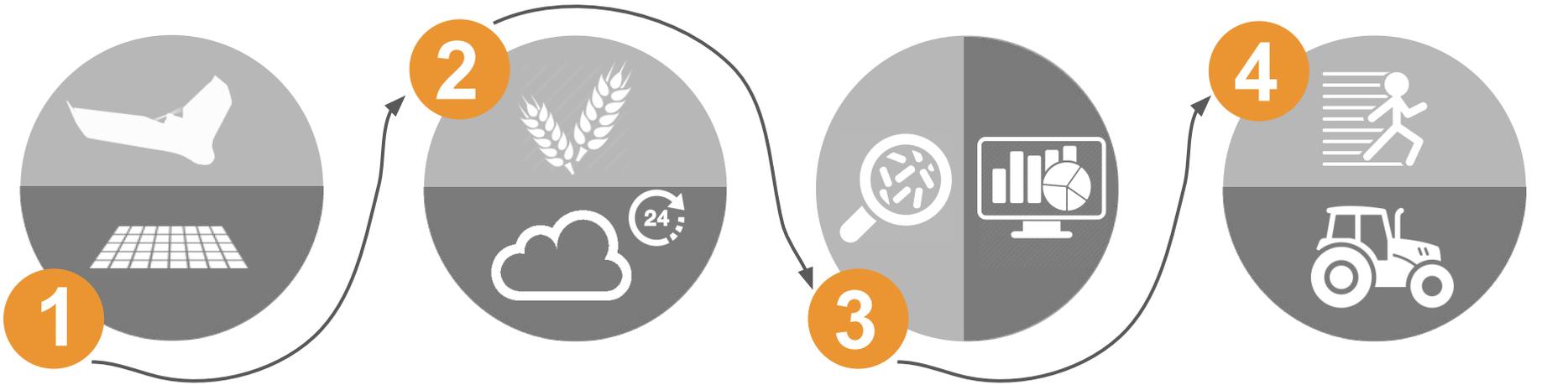
### BIOMASS GROWTH MAP



### YIELD PREDICTION MAP



# HOW DOES IT WORK?



## 1 Aerial survey of your farmland

We collect high-resolution imagery of your farmland using our network of drones/manned aircraft operators

## 2 Crop-specific analysis via Gamaya software

Using acquired data we perform a crop-specific analysis via cloud services to provide a full diagnostics of your crop health

## 3 Actionable information in your farm management platform

Actionable information (diseases and weed alerts, recommendations for fertilization, growth monitoring, etc). uploaded into your farm management platform

## 4 Executing agrotechnical actions

Information from farm management platform transferred to precision farming machinery to implement required treatment and agrotechnical operations

# ACTIONABLE DELIVERABLES



## LARGE COVERAGE OF YOUR FARM

Based on your operational needs at all critical stages of your cultivation. Our operational solutions can cover industrial farm easily and accurately.



## CONTINUOUS & FLEXIBLE MONITORING OF ISSUES

5-7 flights per season based on the requested tools. I.e. crop nutrient status monitoring flights are concentrated at the earlier development stages so that you can quickly take corrective measures.



## RESULTS WITHIN 48 HOURS

The reaction time is based on the urgency of the monitoring request and it is custom to it.



# U-FARM: SUGARCANE, SP BRAZIL, 50'000 HA



REVENUE  
per season

\$0.5bn

\$0.53bn (+7%)



LOSSES  
weeds and planting  
errors

15%

7% (-50%)



OP. EXPENSES  
Fuel, fertilisers,  
chemicals and machinery

\$0.3bn

\$0.25bn (-15%)



PROFIT MARGIN

3%

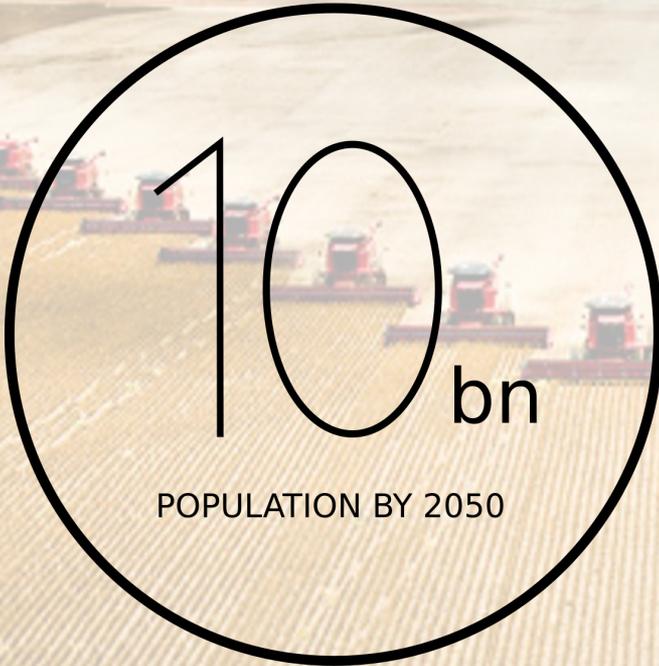
15%



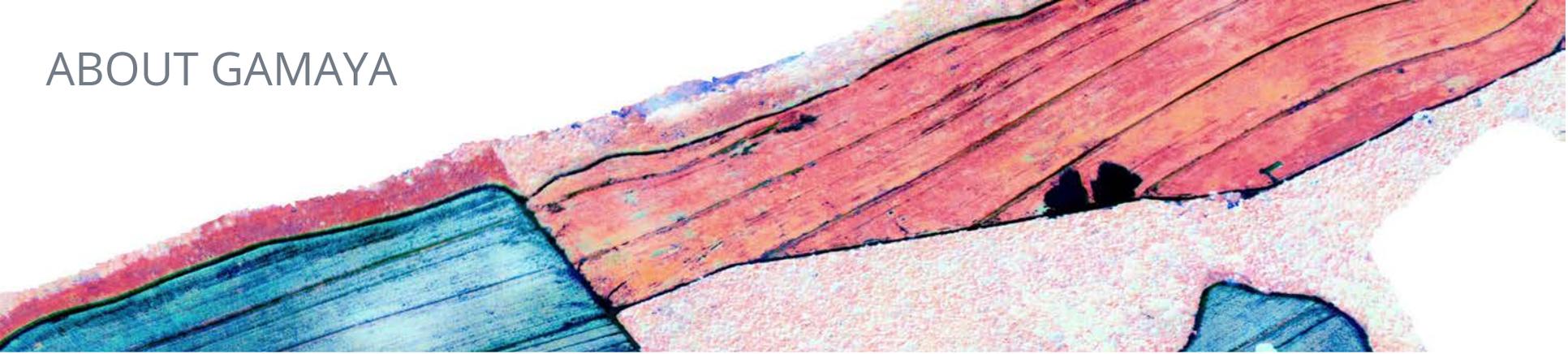
GHG EMISSIONS **100kt/yr**

**0**

# TRILLION DOLLAR PROBLEM



# ABOUT GAMAYA



**2015**

Company created

**14**

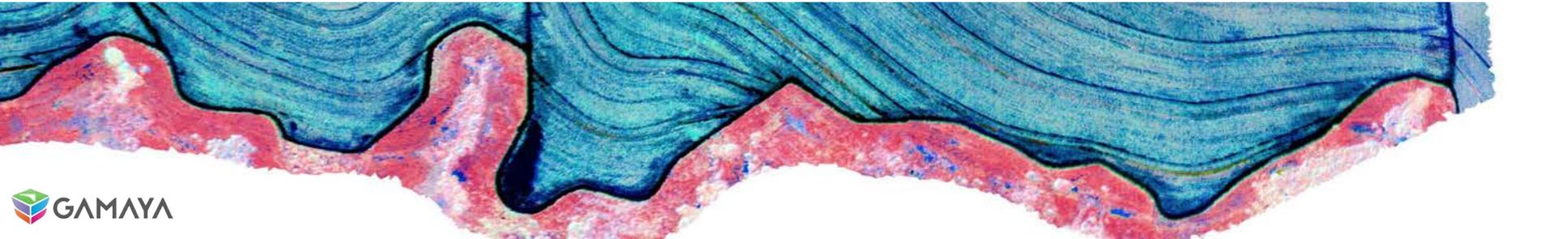
Full time employees

**3.2**

Mio CHF raised

**8**

Mio CHF sales pipeline



# INTERDISCIPLINARY **TEAM** OF **14 FTE** SUPPORTED BY OUTSTANDING BUSINESS AND SCIENTIFIC ADVISORS

## Business Advisors

**Nicolas Landolt**

Managing Director, Axial Holding, Sandoz Foundation

**Taha Ben Mrad**

Serial entrepreneur, Seed4Equity, Simalaya

**Andres Brabeck-Letmathe**

Managing Director, Glasshouse

## Scientific Advisors

**Prof. Michael Schaepman**

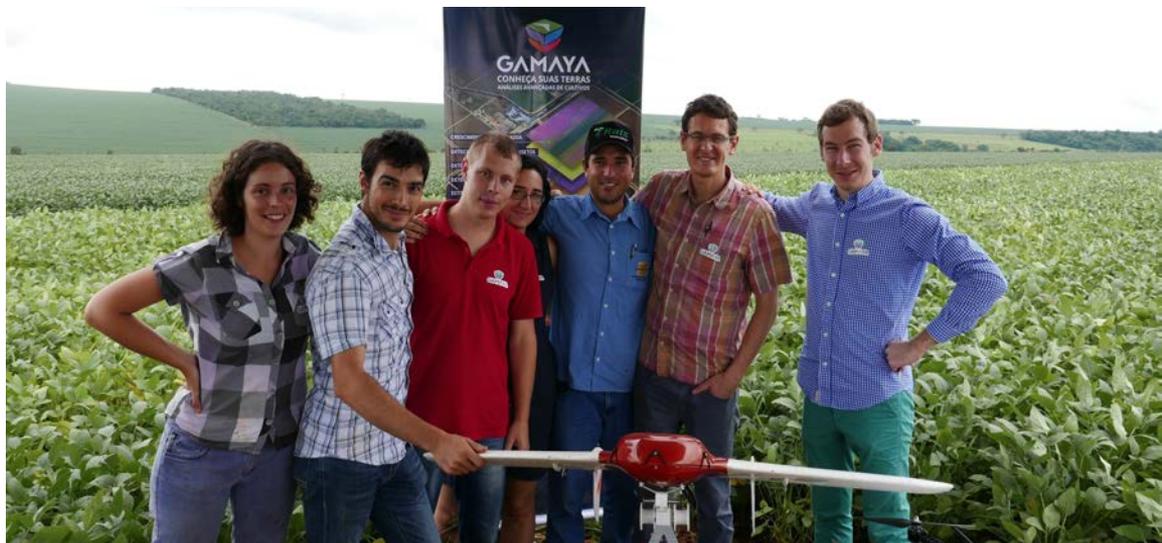
Vice Dean, University of Zurich

**Dr. José Achache**

Director of AP-Swiss

**Prof. Pierre Vandergheynst**

Head of Signal Proc. Laboratory, EPFL



# RECENT MEDIA COVERAGE



## Forbes

Gamaya is one of the 4 European AgTech startups with a potential to become a \$1 billion dollar company

## BUSINESS INSIDER

Gamaya is one of the 12 hottest startups in Switzerland based on the amount raised, headcount, and developed technology

## FORTUNE

Gamaya is changing farming with with drones and artificial intelligence.





THANK YOU!

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[igor.ivanov@gamaya.com](mailto:igor.ivanov@gamaya.com)