UAVs and Sensors

Area 2 – Technologies

Lesson 5 – Remote Sensing

Sequence ID – 18

Agrosap

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Who am I?

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Passionate about research & UAVs **in agriculture**

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DISCLAIMER

A2.L5.T2 Remote sensing

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1. Typology of UAVs & some limitations

2. On-board sensors and utilities

3. Other agricultural applications of UAVs

1. Typology of UAV's & some limitations

Fixed wing type

Rotary wing type

Fixed wing type

Less flight autonomy

Lower speed

Flight control over rotation speed of rotors

Sensors flight in the lower part

Greater manoeuvrability

Static flight

Rotary wing type

Longer flight range

Higher speed

Flight control over primary surfaces

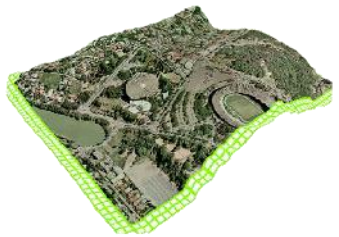
Cargo bay for in-flight sensors

Less control and manoeuvrability

Take-off and landing (more space)

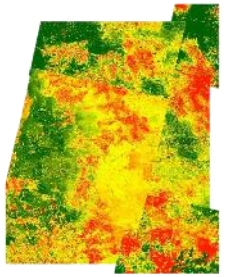
2. On-board sensors and applications

RGB sensor



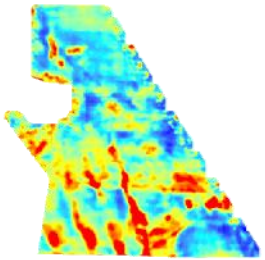
High-resolution orthomosaic
Digital Surface models

Multiespectral / Hyperspectral sensors



Multispectral high-resolution mosaic. Accurate spectral information

Thermal sensor



Thermal mosaic

RGB Sensors

Photogrammetry

3D terrain models

Assessment for Trial Definition

Plot recognition

Plant/tree count

Zones definition

Earlier problem detection

How can RGB Sensors Help?

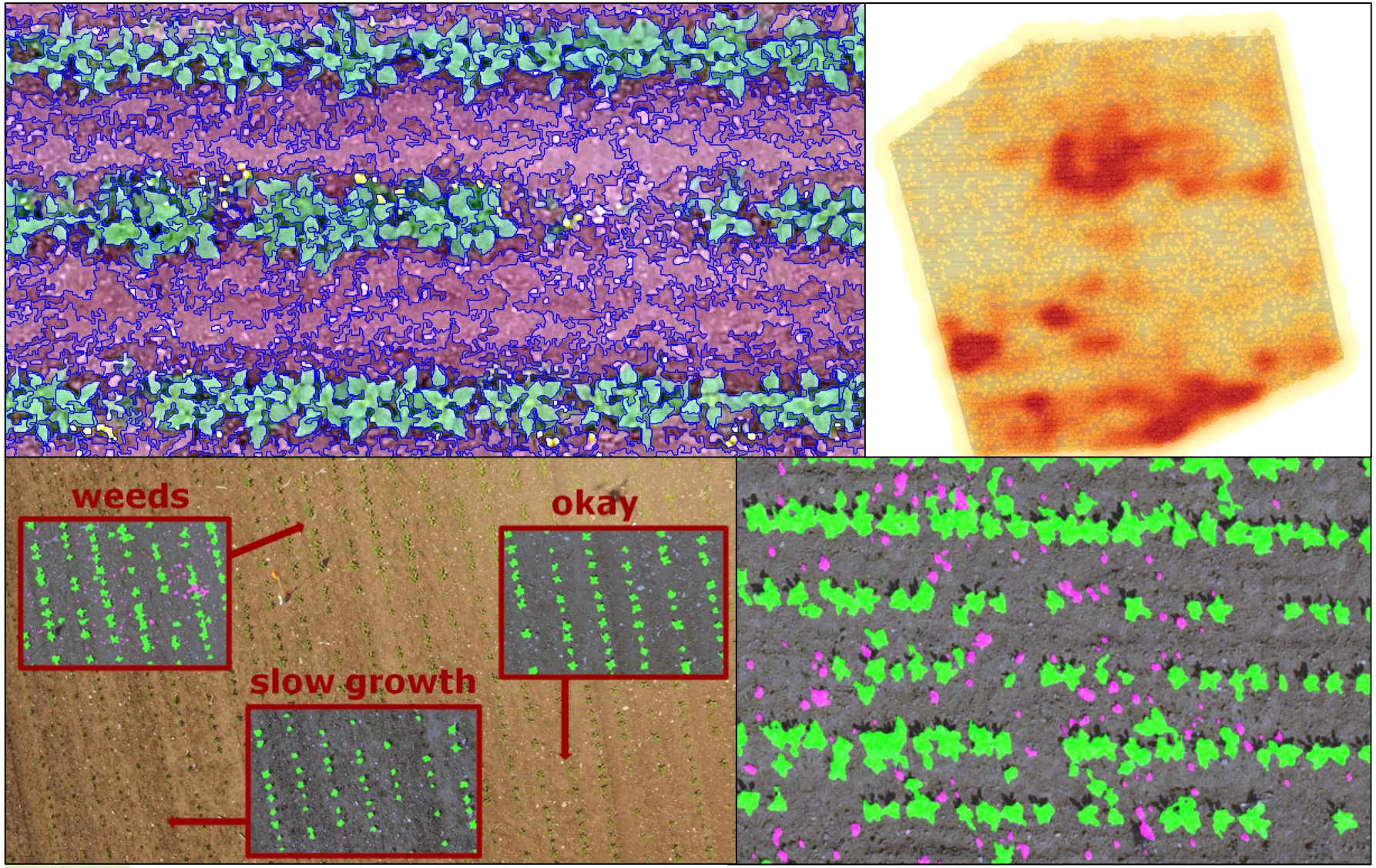
Faster Field Scouting

RGB Orthomosaics

Georeferenced data (GPS/Glonass)

Basic Remote Sensing

Crop vs weed automated discrimination



Automated Tree Counting

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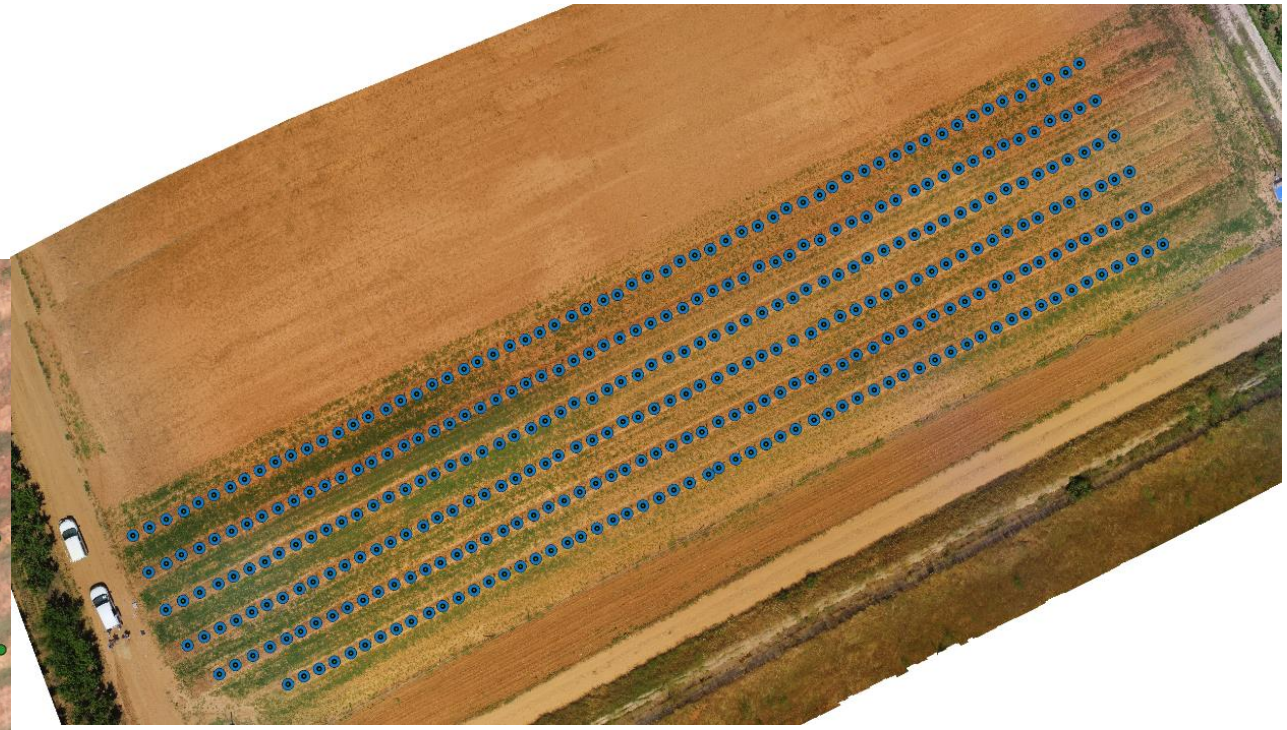
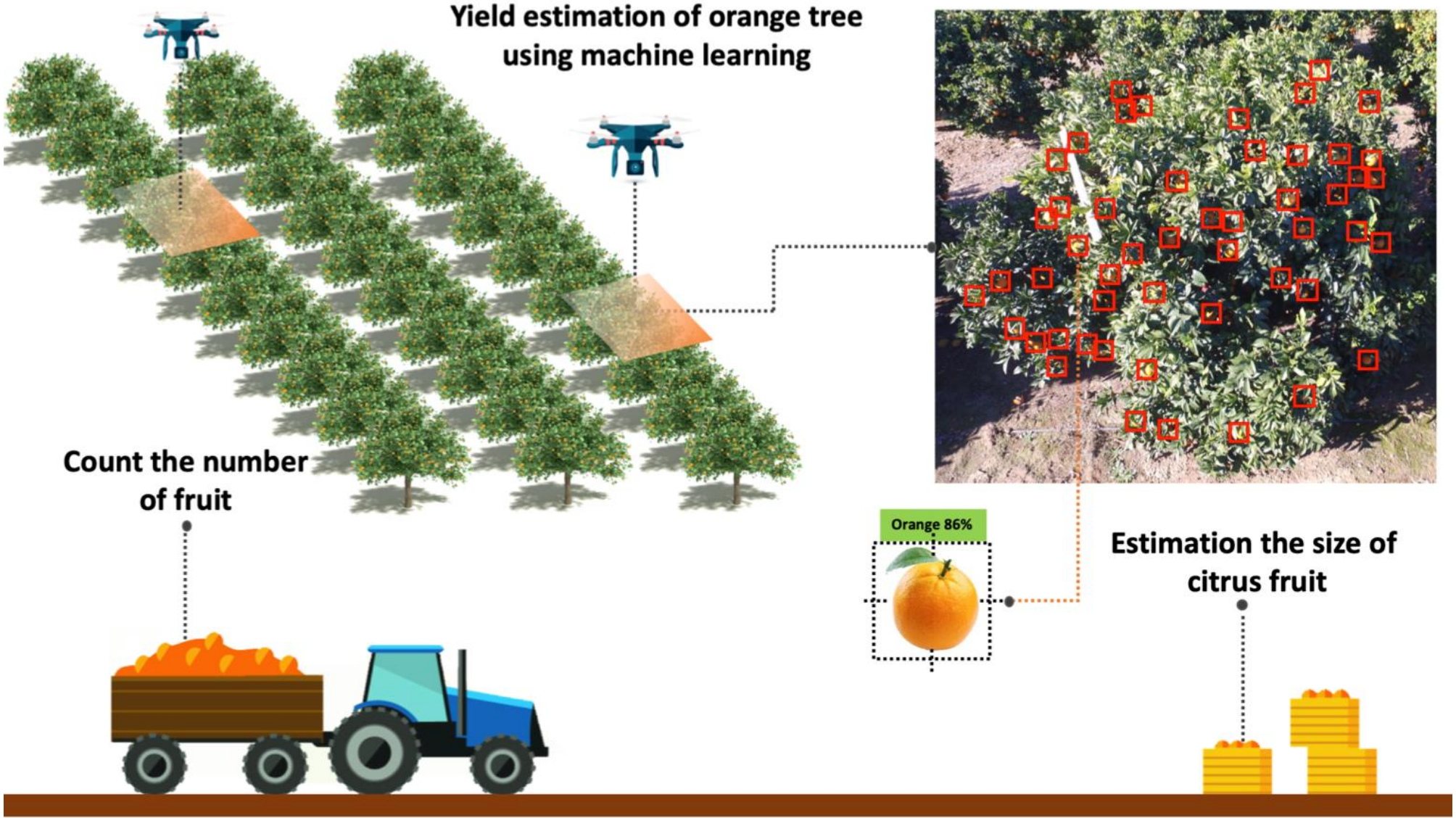
Using RGB images from UAVs,

and K-nearest algorithms

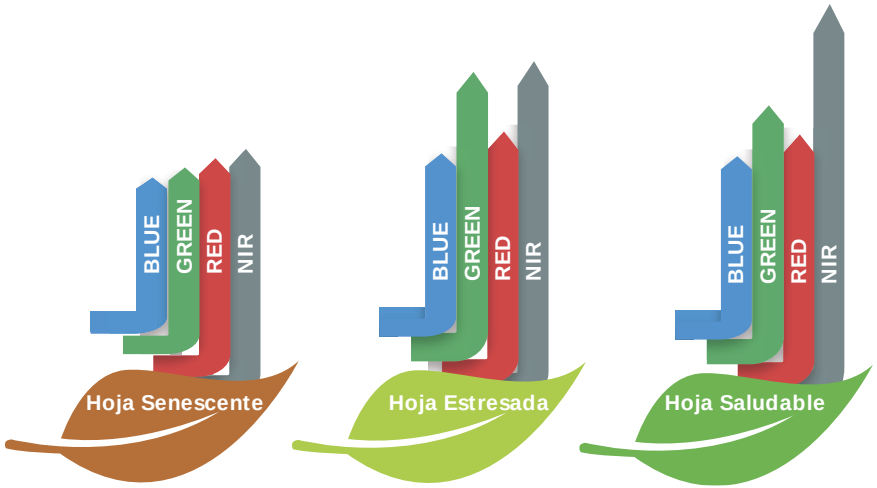


Yield Estimation



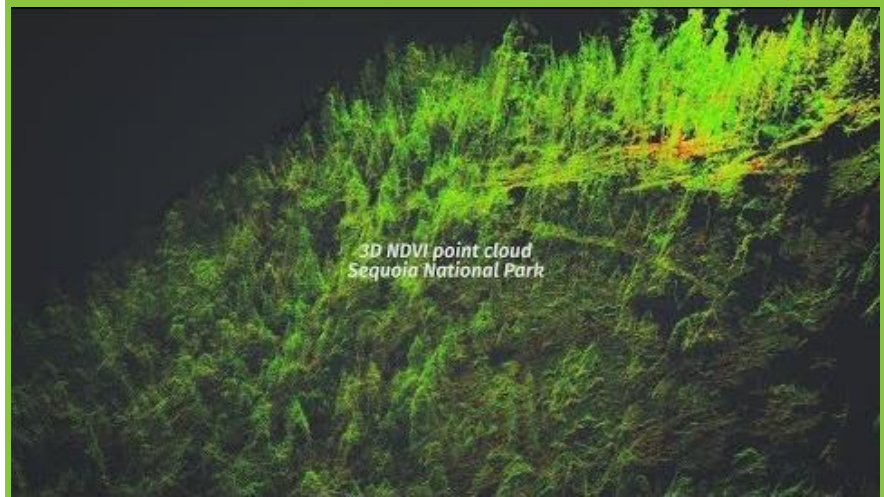
Multispectral Sensors

Differences in crop reflectance.
Information on their **vegetative state.**

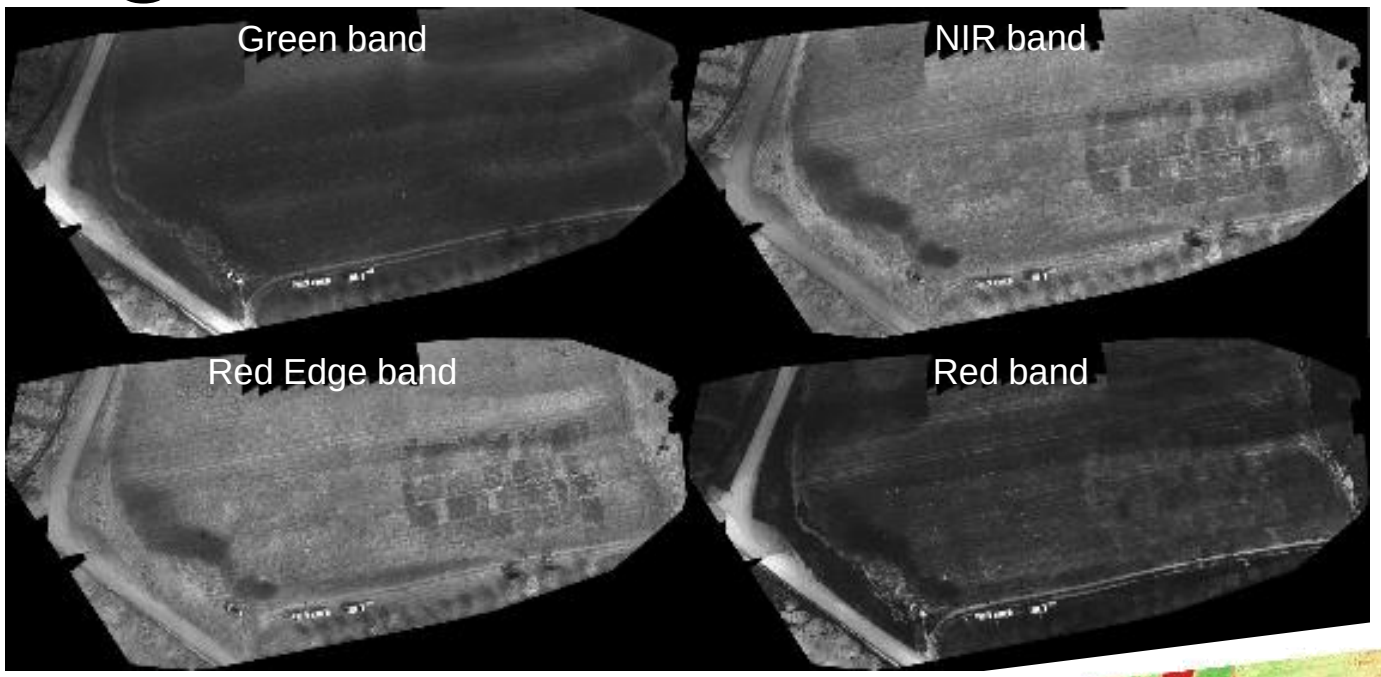


Multispectral indices

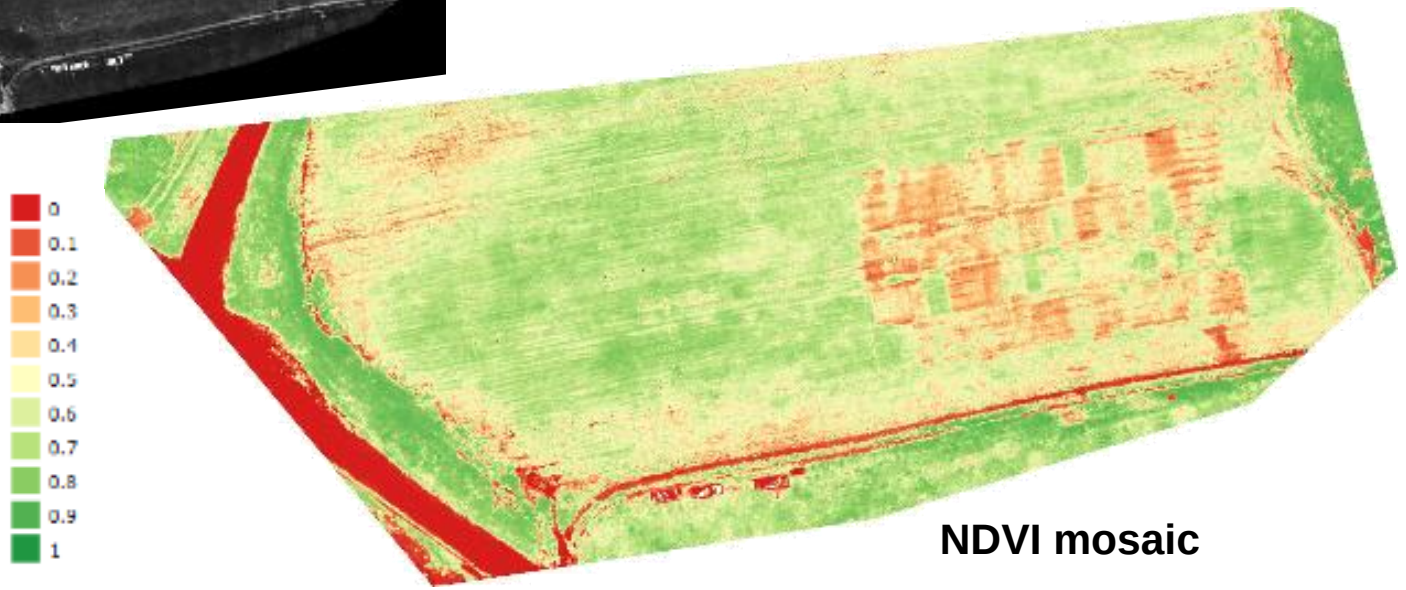
NDVI, GNDVI, NDRE, CI, etc. are **spectral indexes** that help to explain plant nutritional or water stresses.



Agrochemical trial in nettles field



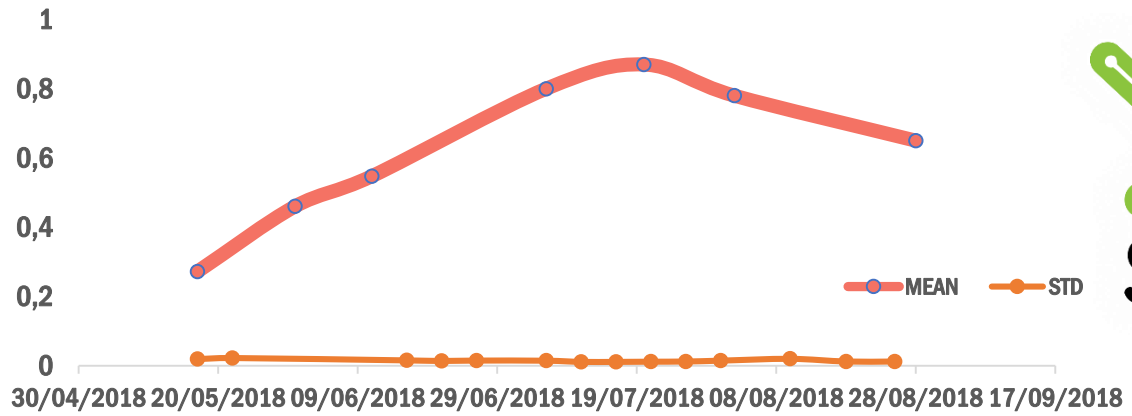
30 m height



NDVI mosaic

Maize growth & status monitoring

Evolution of the GNDVI over the time



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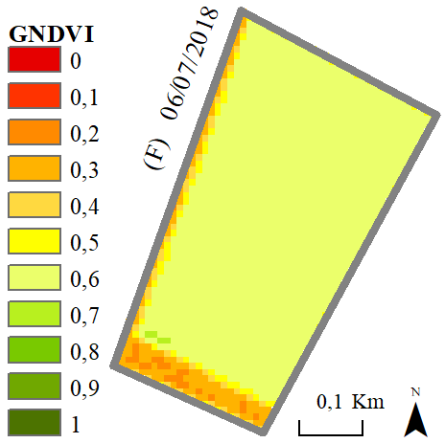
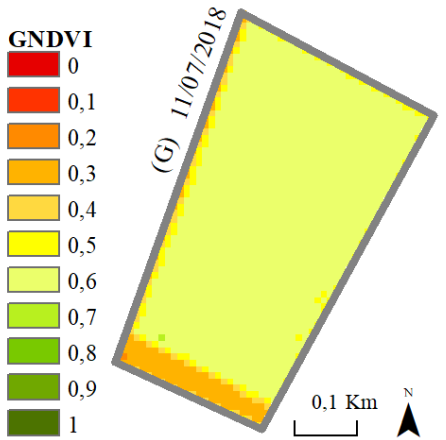
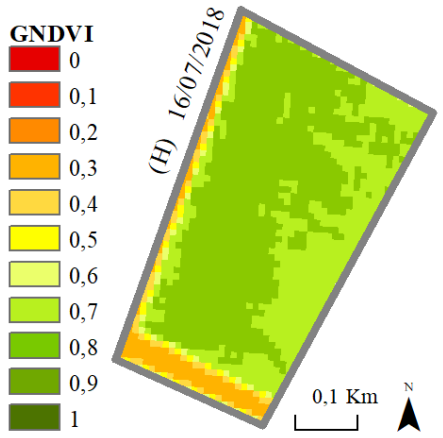
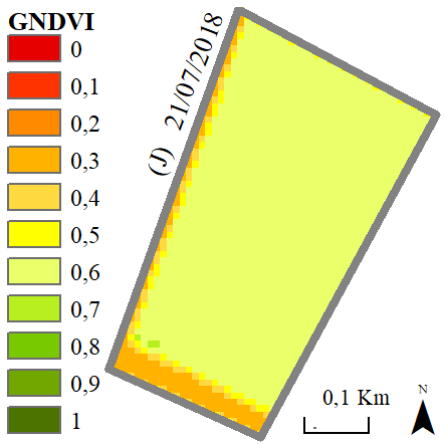
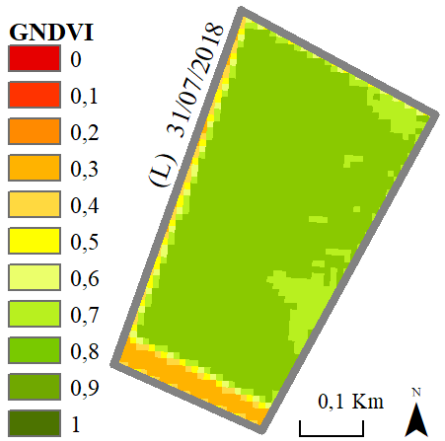
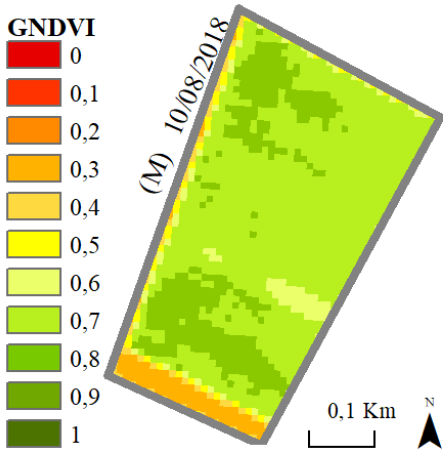


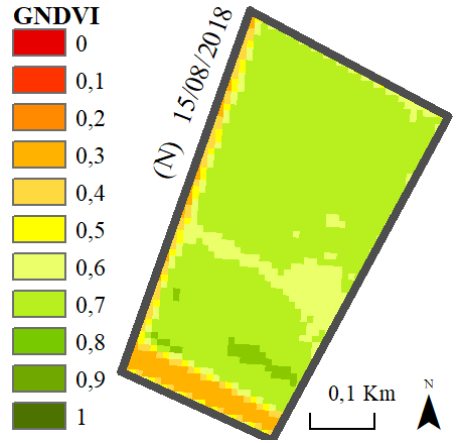


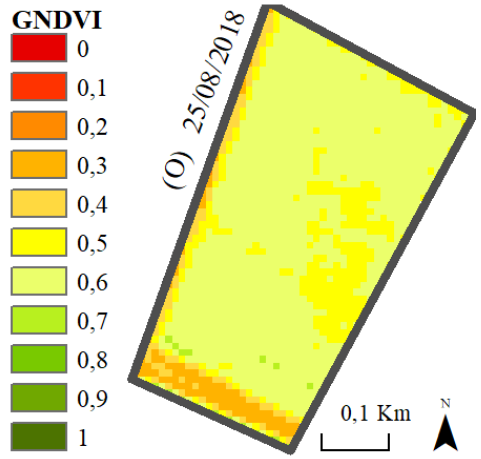




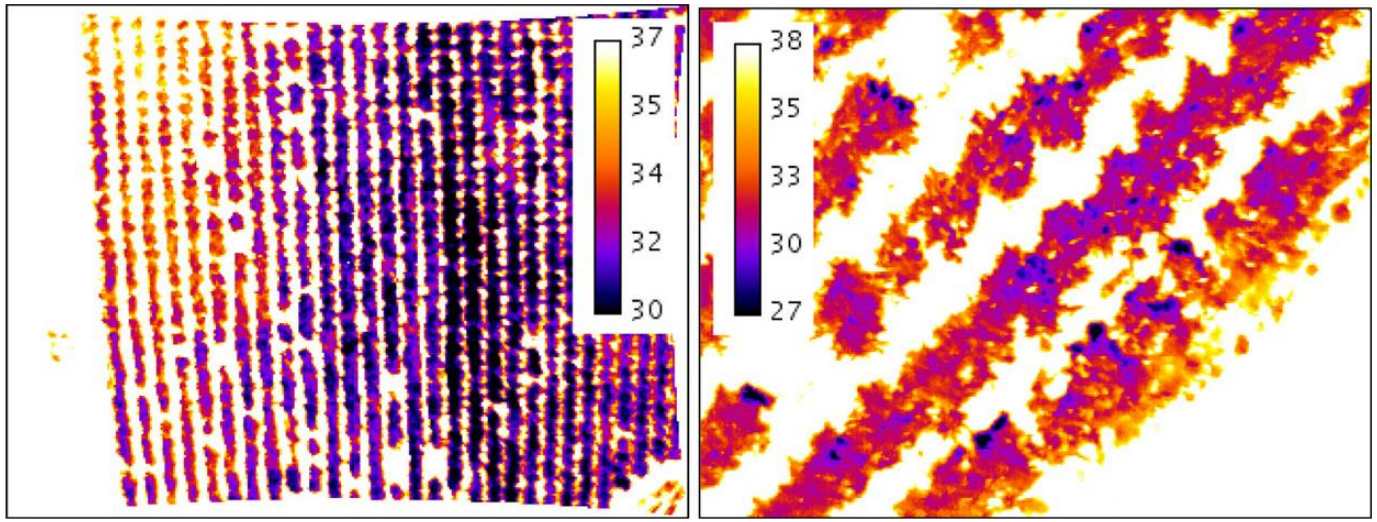








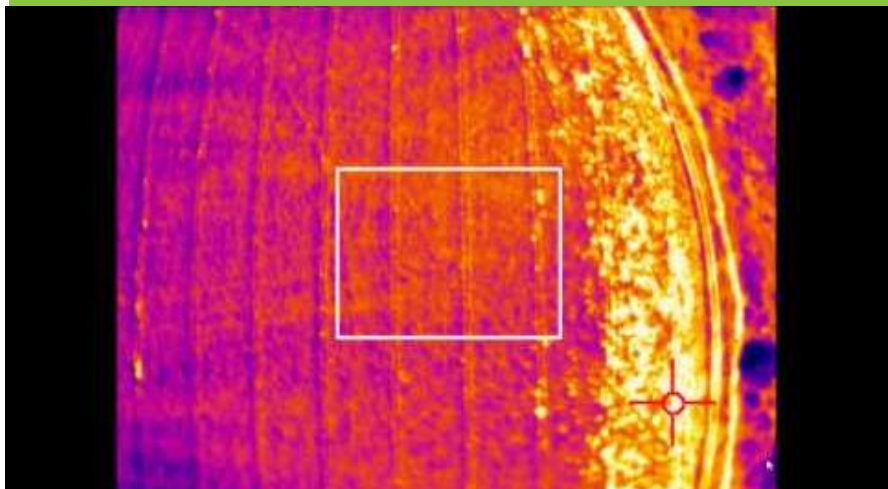
Thermal Sensors



Thermal maps

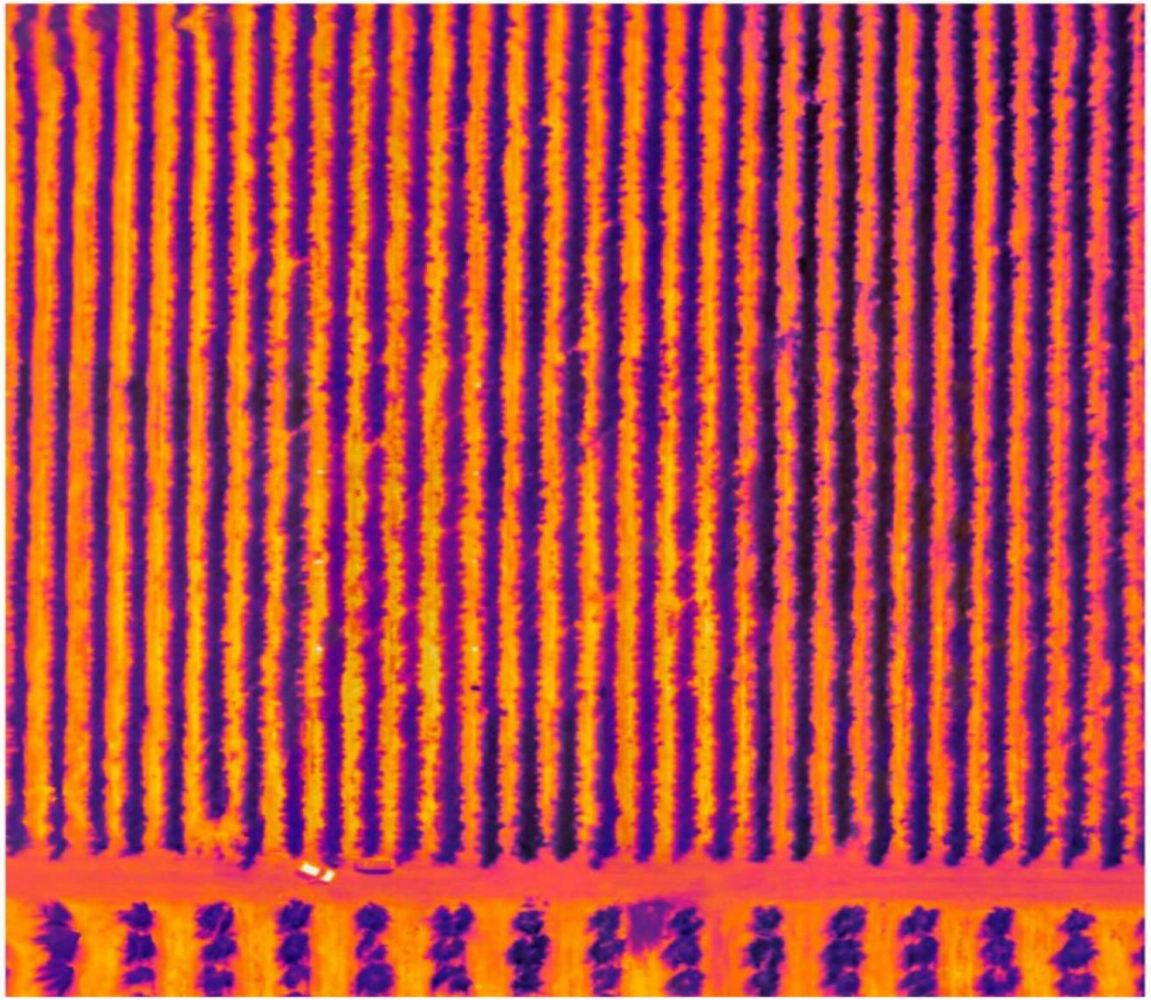
Crop Water Stress Index measures the stress degree due to water status of the plants.

Variable Irrigation is key for sustainability & profitability

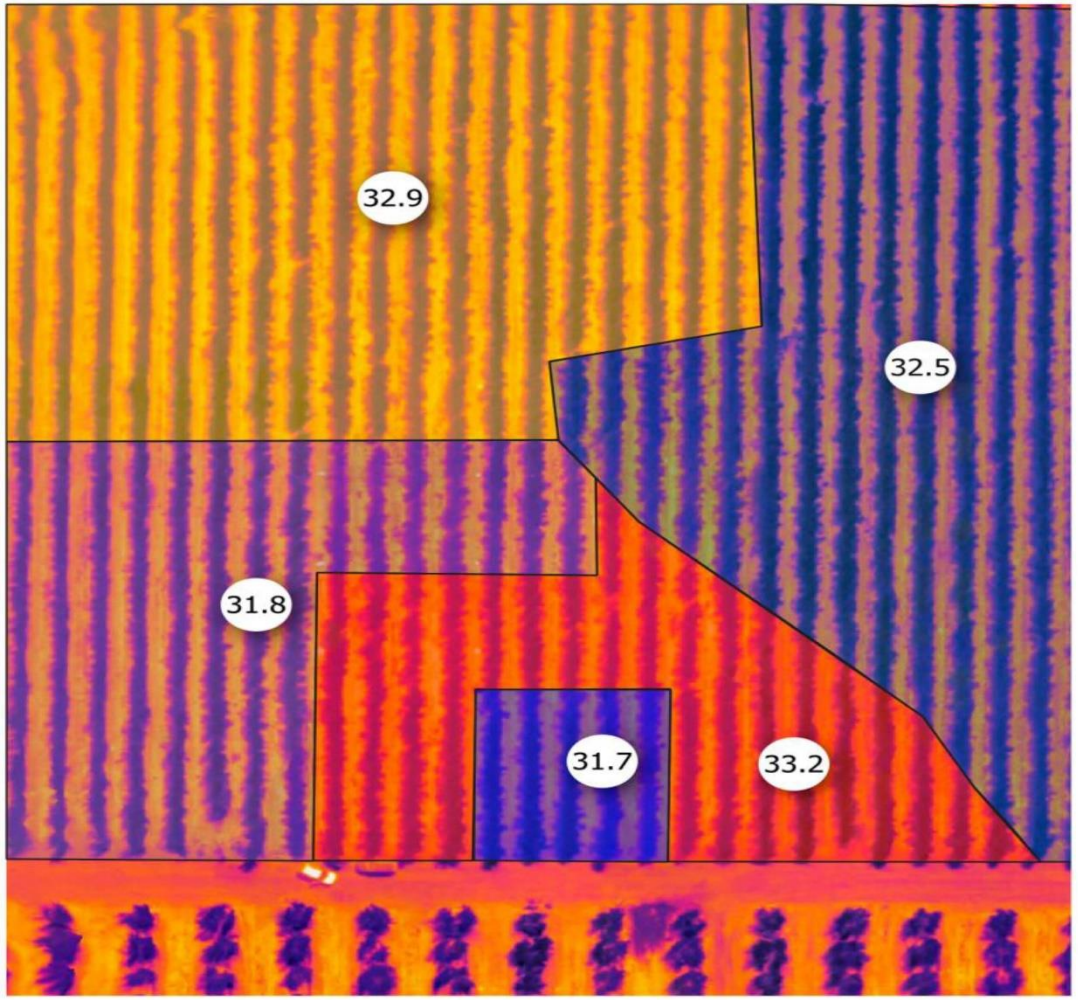


More info: https://bit.ly/34AeHCP

Thermal orthomosaic (60m)



Temperature management areas



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3. Other agricultural applications of UAVs

Accurate & fast field phenotyping

Canopy size
Biomass estimation
Leaf Area Index
Fraction covered
Radiation Use Efficiency
Transpiration efficiency

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Spraying Applications

Ultra-Low Volume

Precise chemical positioning

Low risk for operators

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More info: https://bit.ly/3aT8MtP