

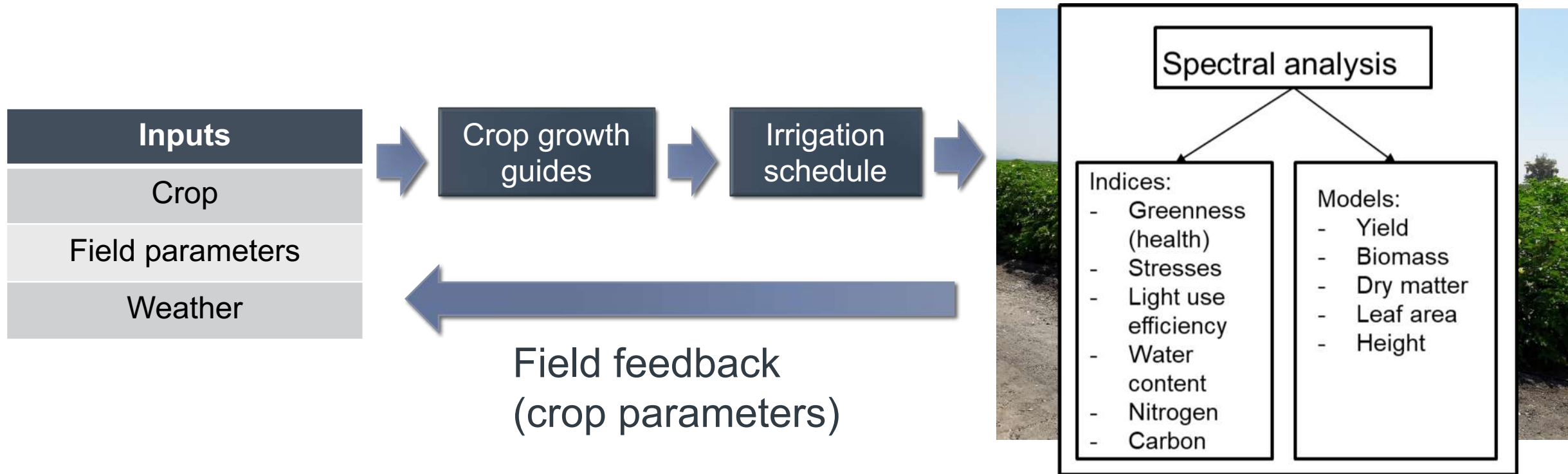
# ESTIMATION CROP PHYSICAL PARAMETERS FROM UAV RGB IMAGERY AND DEEP LEARNING

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# Irrigation management



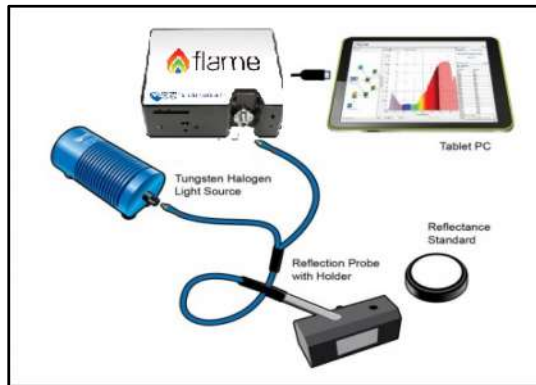
# Study Area





# Data collection

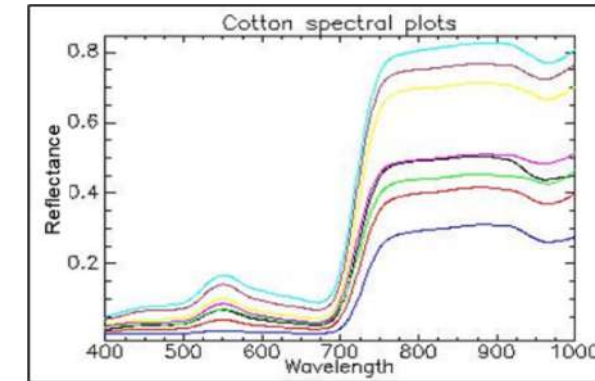
OceanOptics USB4000-VIS-NIR



Point measurements (20-50 per plant)



Spectra 400-1000nm (accuracy 1nm)



DJI Phantom 4 Professional



Flight planning

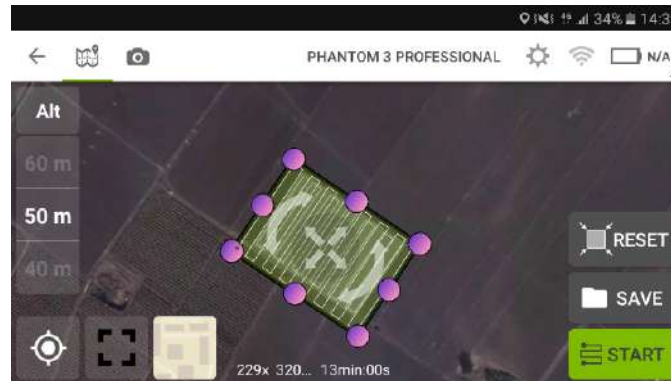
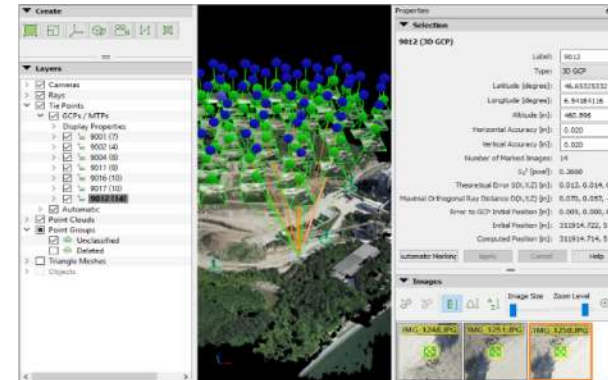


Image processing



Orthophotomosaic





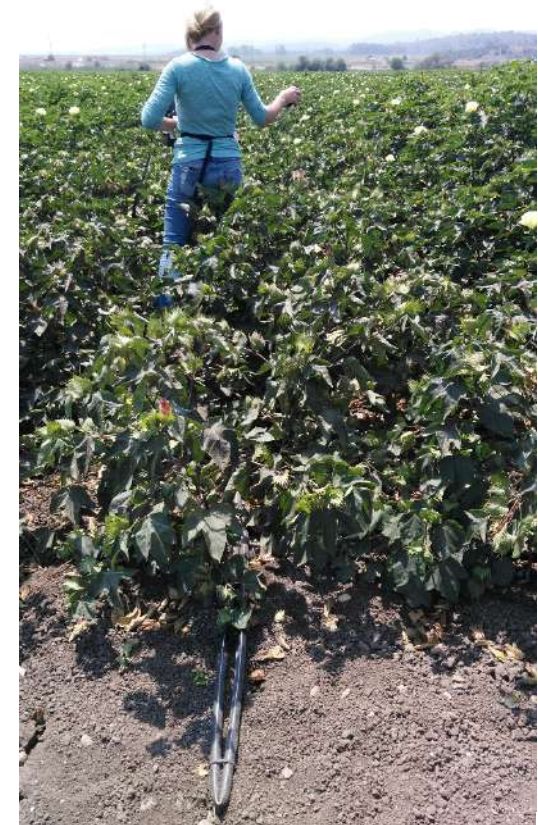
# Representative crops



High patches ("health")

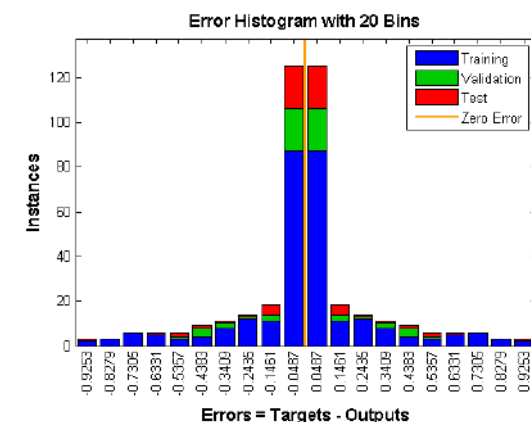
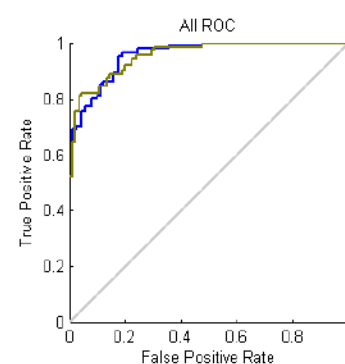
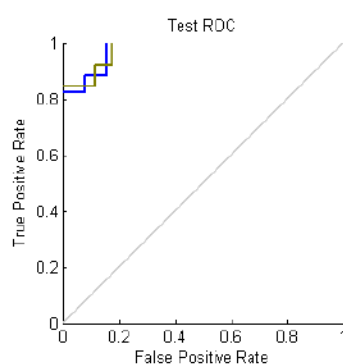
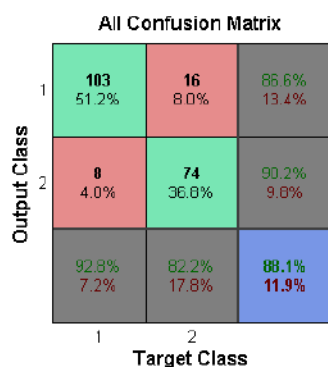
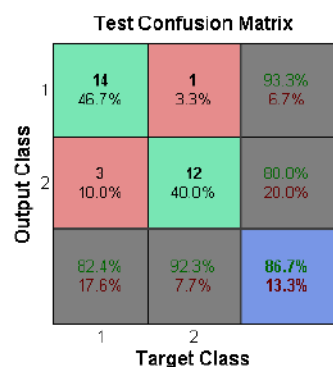
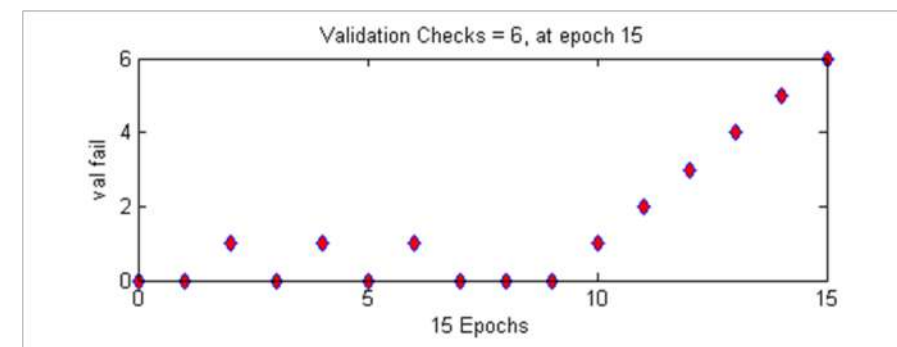
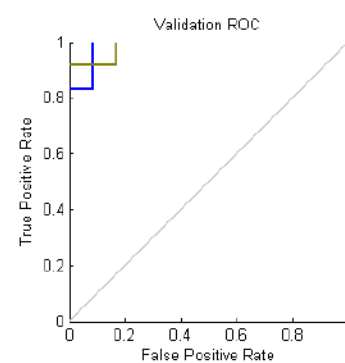
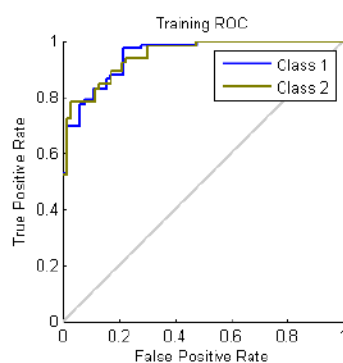
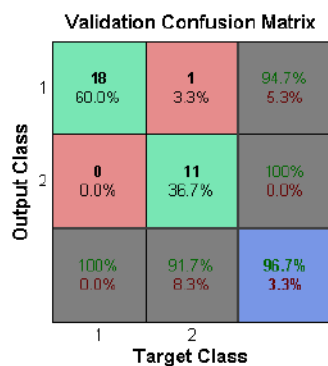
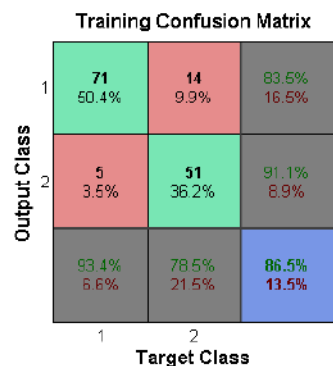


Mixed patches

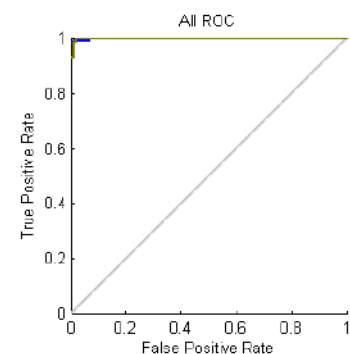
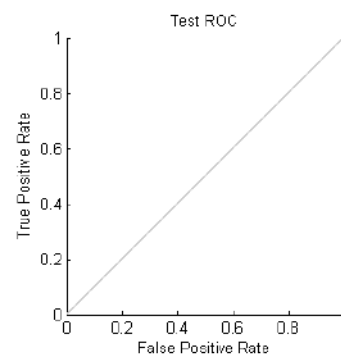
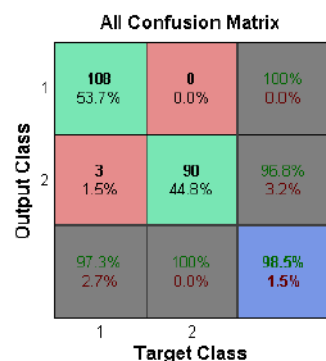
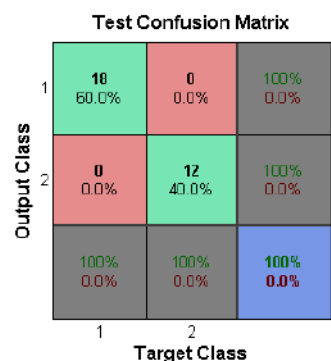
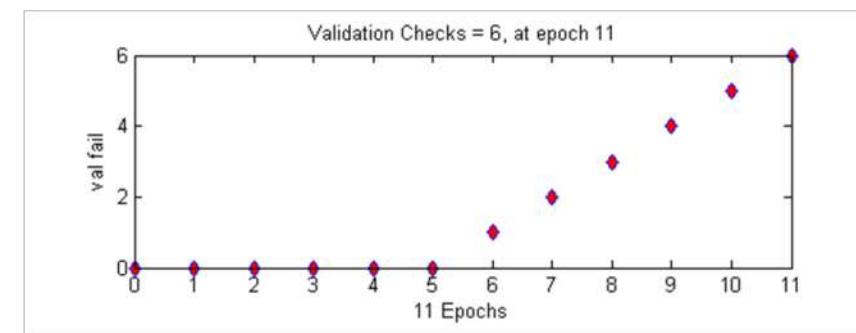
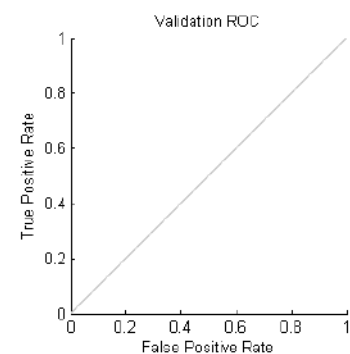
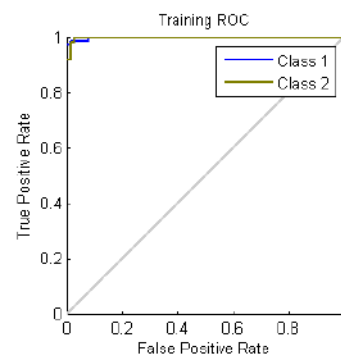
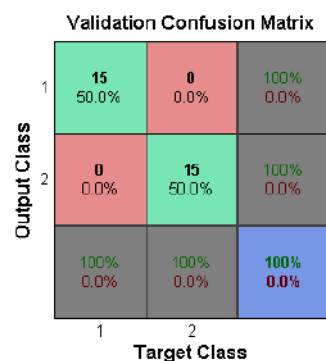
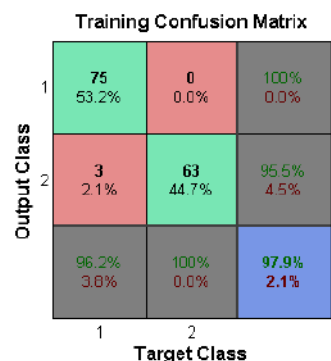


Low patches ("stressed")

# Neural Network. Stage1 – Full Spectral Resolution

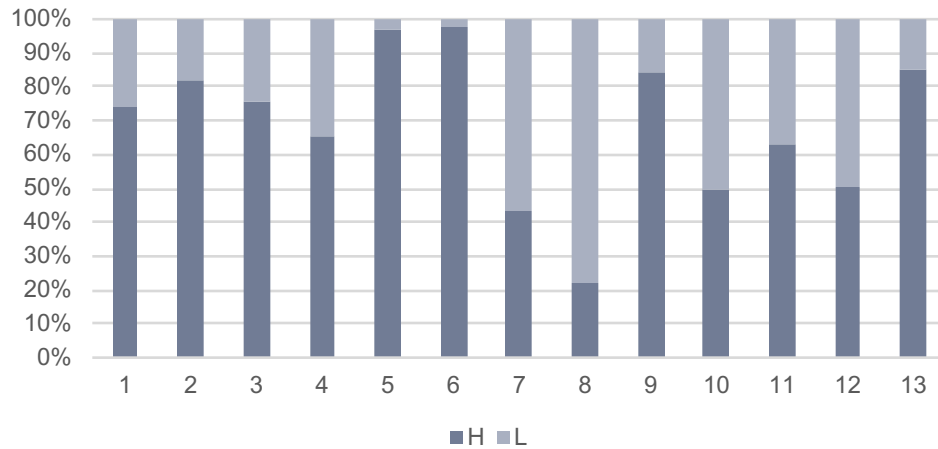


# Neural Network. Stage2 – Resampled Spec 2 RGB



# Neural Network. Results1– estimation accuracy

L2 Cotton 1 – Full Spec

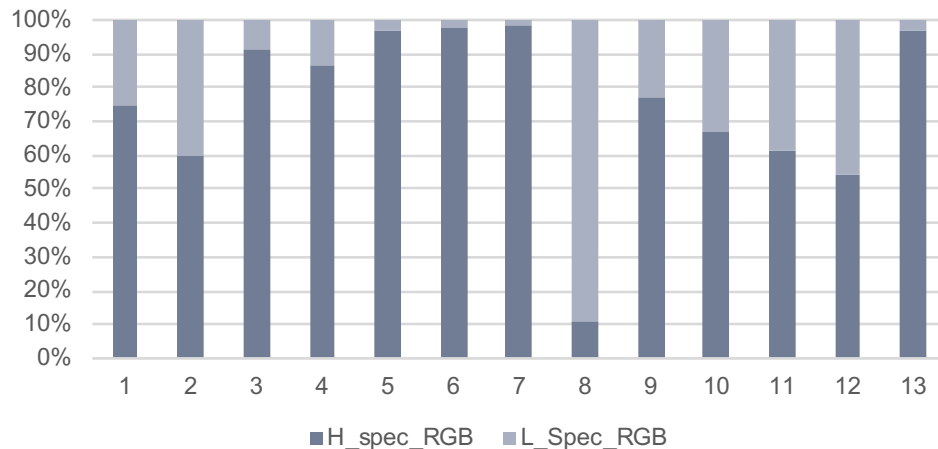


Crop1 – 1.30 m  
Crop2 – 1.41m  
Crop3 – 1.36m  
Crop4 – 1.36m

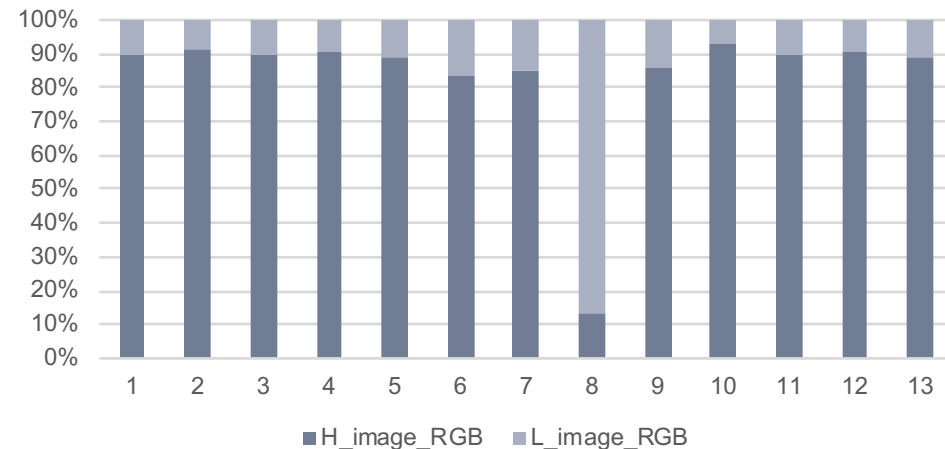
Crop5 – 1.64 m  
Crop6 – 1.59m  
Crop7 – 1.46m  
**Crop8 – 0.90m**

Crop9 – 1.47 m  
Crop10 – 1.39m  
Crop11 – 1.51m  
Crop12 – 1.43m  
Crop13 – 1.56m

L2 Cotton 1 – Sprc2RGB

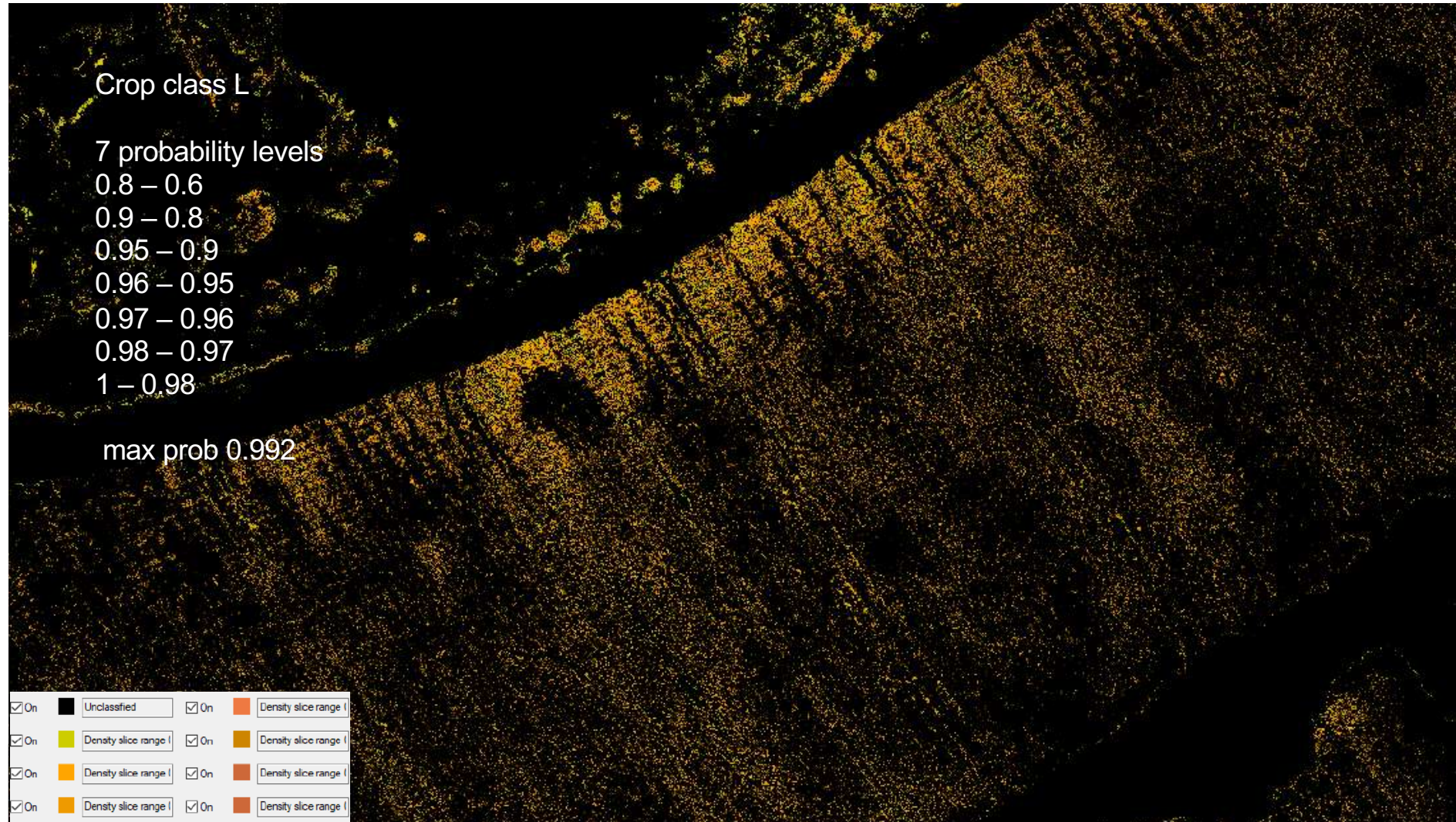


L2 Cotton 1 – RGB image



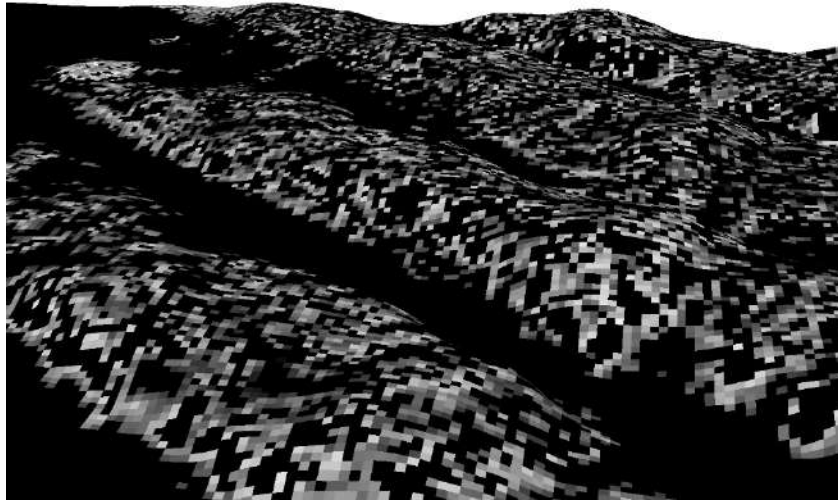


# Neural Network. Results2– field scale

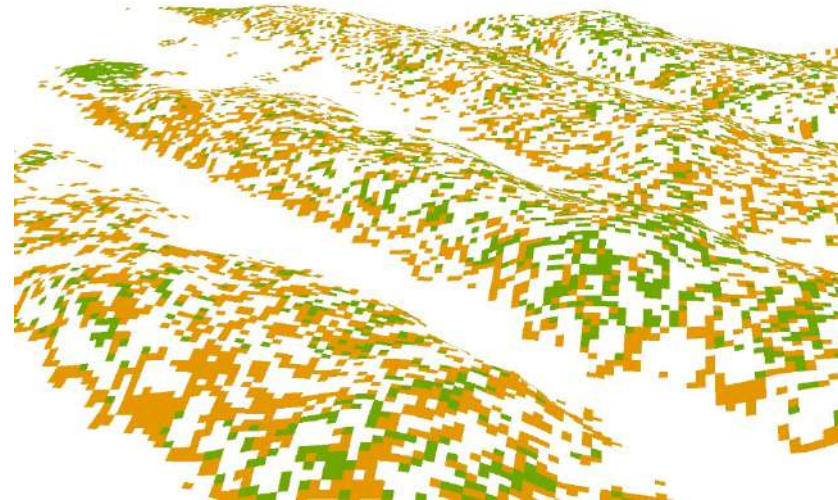




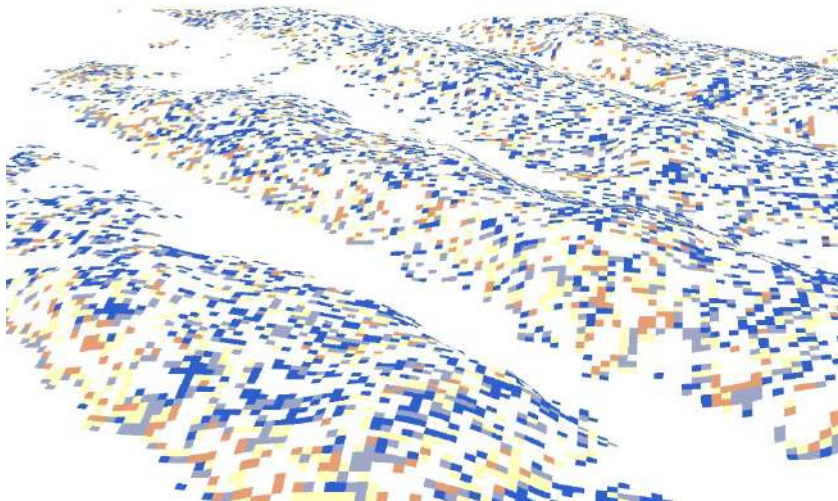
# Perspective of application



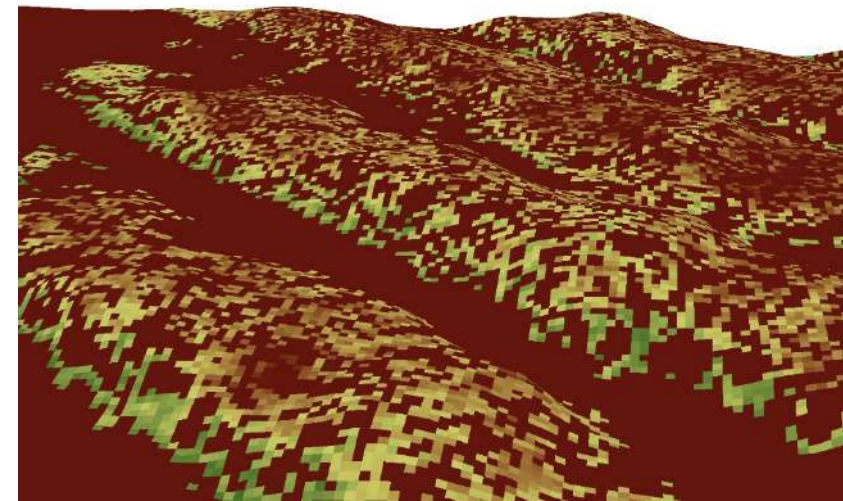
Biomass (g)  
60 180



Total chlorophyll  
content ( $\text{mg g}^{-1}$ )  
0.13 3.21



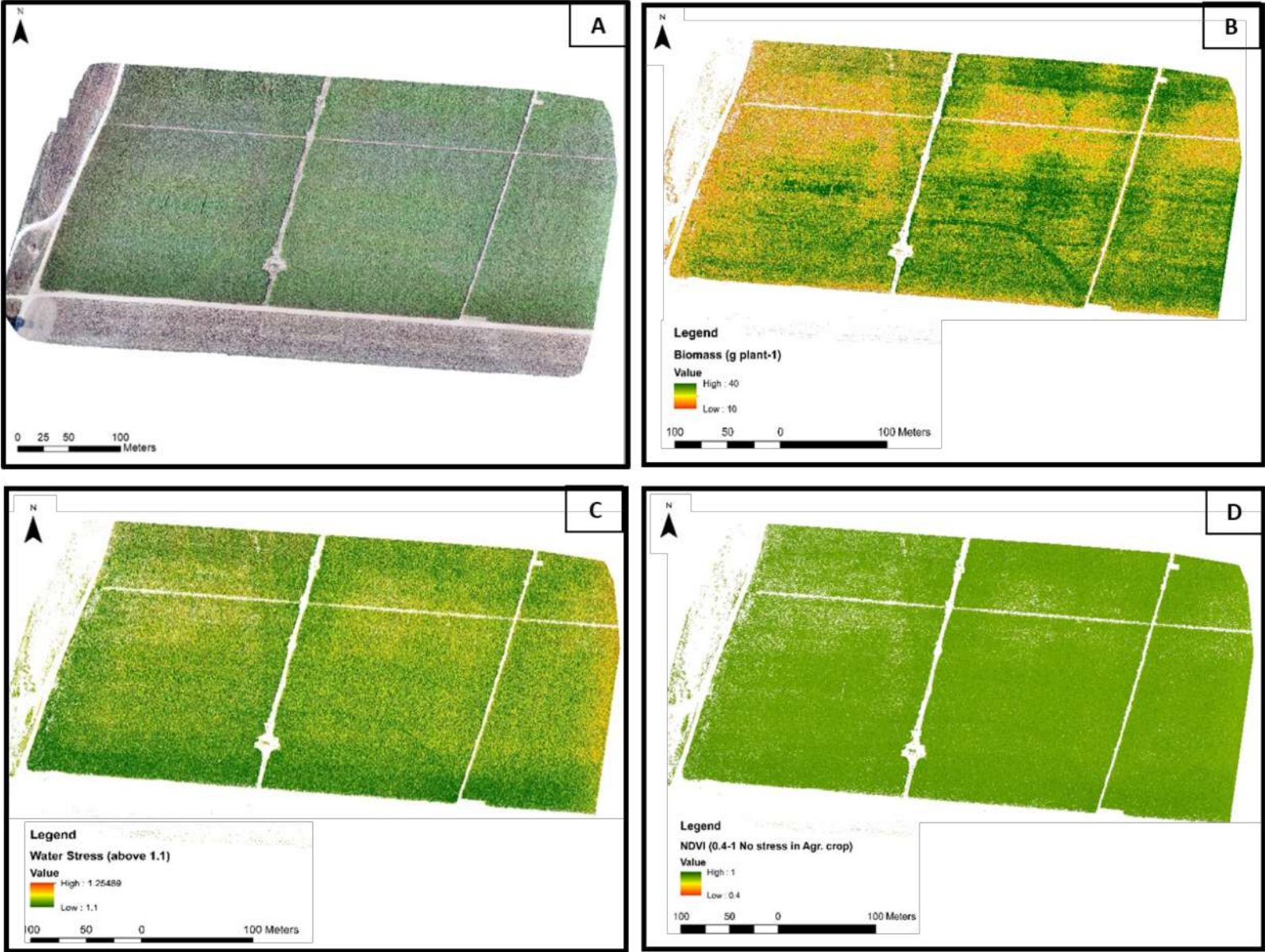
No water stress  
Water stress



Leaf area index ( $\text{m}^2/\text{m}^2$ )  
0.10 2.37



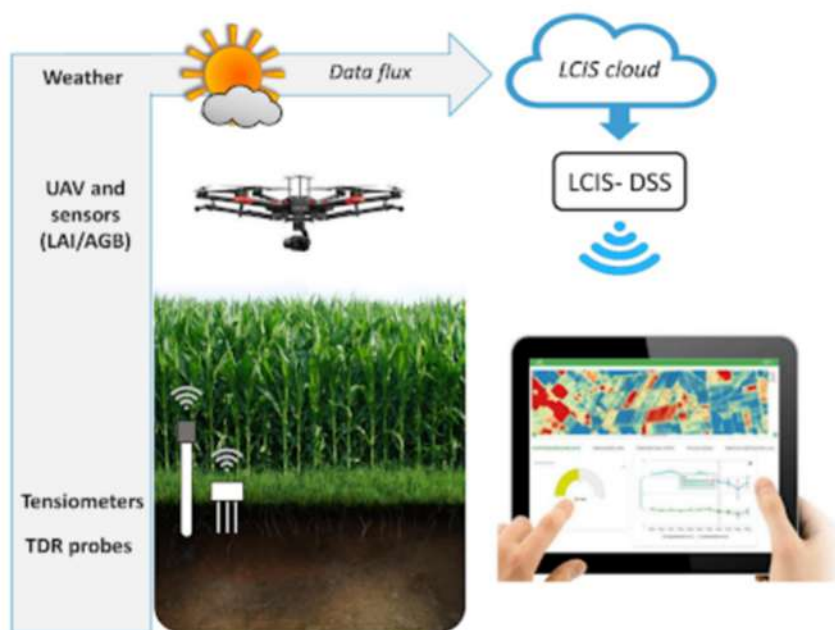
# Cotton field with disease



# Our projects



**The LCIS (AN ADVANCED LOW COST SYSTEM FOR FARM IRRIGATION SUPPORT) project is a joint Italian-Israeli R&D projects in the area of "agriculture and food science".** *"Fifteenth Call for Proposals for Joint R&D Projects – 2017, industrial track". funded by Ministry of Foreign Affairs and International Cooperation General Directorate for Country Promotion - Italian Republic and Ministry of Science Technology and Space of the State of Israel.*



**The aims of LCIS project are the following:**

1. Developing real-time Decision Support System (DSS) for optimal irrigation scheduling at farm scale for crop yield improvement, reducing irrigation cost, and water saving.
2. Developing a low-cost imaging spectroscopy framework to support the irrigation scheduling DSS above and facilitates its use in countries/places where expensive imaging spectroscopy is not available.
3. Examining the developed framework in real-life application, the framework will be calibrated evaluated using high resolution devices and tested using a low-cost system in Israel and Italy farms.

tion  
and



# Thank you for attention!

For more info please contact:

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