UNIVERSITETI BUJQËSOR I TIRANËS
AGRICULTURAL UNIVERSITY OF TIRANA

Challenges for Introducing Precision Agriculture in Albania

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AUT

With funding from
Austrian Development Cooperation

Global Water Partnership Mediterranean

UNECE

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OBJECTIVES

- NEXUS implementation as a cross sectorial interlinkage with Precision Agriculture Practices in Albania

- Build a road map on how should Albania adapt the implementation of the different PA practices

- Adjust a pre-feasibility study on the application of PA technologies in pilot locations in Albania.

Actions

- Mapping the related national and local **strategies, plans** and **support schemes**
- Engage National **Stakeholders** in the Project Development and Implementation of PA
- Describe and Propose technical solutions for 3-4 different **pilot sites** depending on crop, irrigation and other farming inputs
- Propose **funding and budget** alternatives

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Actual Situation

- Agriculture production dominant by smallholders
- Extremely small and fragmented fields (average size of **1.2 ha**)
- Labour deficiency due to low mechanization
- Poor Irrigation and Drainage infrastructures – Maintenance Problems
- Land Ownership Problems and Migration of young farmers
- Lack of Market opportunities
- Regional Divisions by Crops: **(ATTC & AREB)**

Shkodra – Medicinal and Aromatic Plants & Maize
Lushnja – Vegetables & Wheat
Vlora – Olive orchards, grapevine and fruit trees
Korca – Apples and cherries

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Current Policy, Strategies and Action Plans

- SARDF is aligned with CAP and Green Deal
- SARDF states "**precision agriculture and digitalisation in agriculture are still rarely applied**"
- Implementation of Irrigation and Drainage Strategy 2019-2031 increasing resource-efficient irrigated land
- **MARD** Action Plan for 2022 – 2024: providing advice for farmers and the rural development/**demonstration farms**
- IPARD III (Strategy 2021-2027) : PA investments for **fruits and vegetable farmers**, related to precision agriculture

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Processes and analyzes temporal, spatial and individual data and combines it with other information to support management decisions .

Precision Agriculture – Smart Agriculture – Digital Agriculture – eAgriculture

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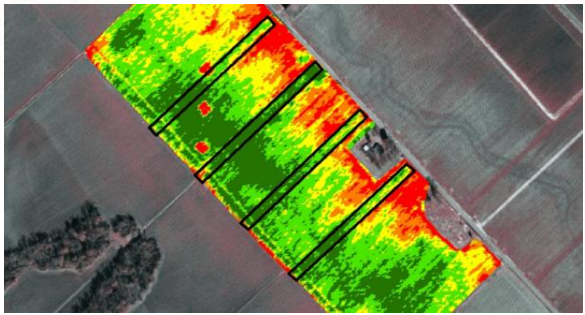
Precision Agriculture Technologies – Satellite Imagery

- Free resources from Copernicus (Sentinel 2)
- Ready available outputs – Vegetation Index NDVI
- 1 image per week (average)



Applications:

- Crop growth monitoring
- Harvest date decision
- Variable rate application of inputs
- Larger scale analysis for crops and drought

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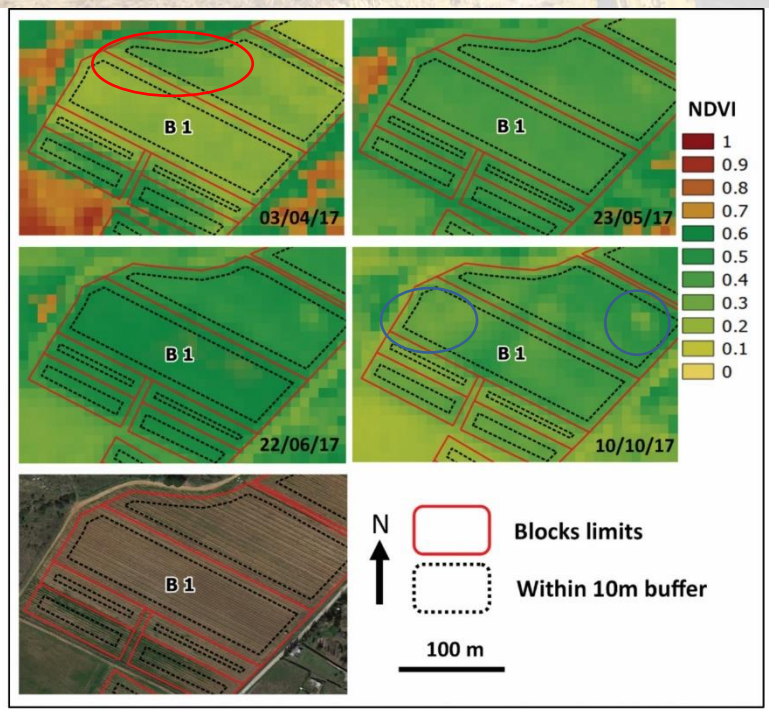
Precision Agriculture Technologies – Satellite Imagery



Crop growth monitoring - Grapevines

Limitations:

- Row crop – high % of soil cover is between rows and the proportion of vines/cover crop changes along the year
- Sentinel 2 imagery has a minimal pixel of 10 m

Benefits:

Possible to identify differences of cover-crop development at early stages and early canopy senescence

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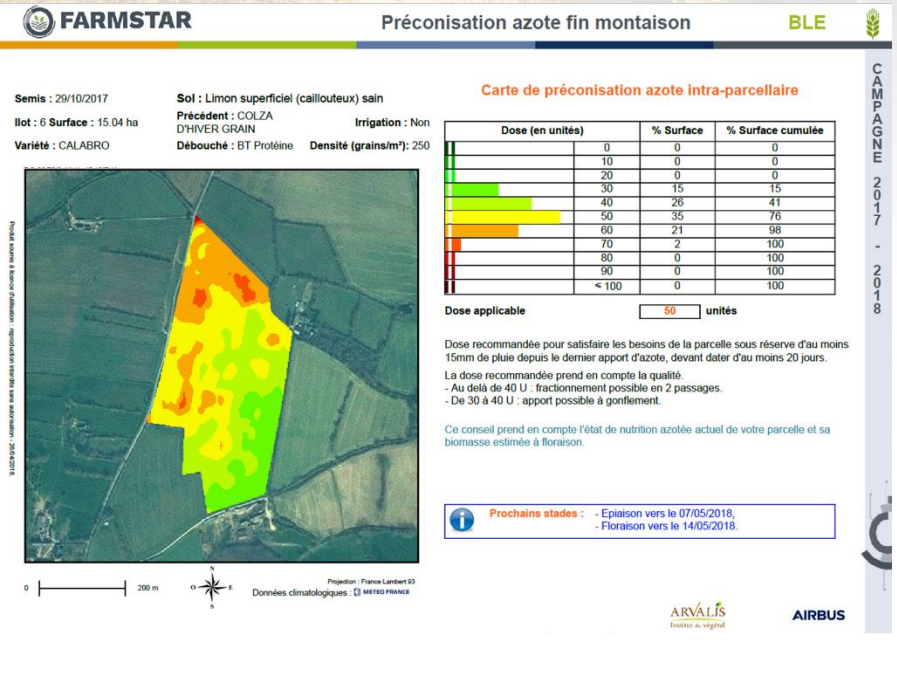
Precision Agriculture Technologies – Satellite Imagery


FARMSTAR

Préconisation azote fin montaison

BLE

Semis : 29/10/2017

Ilot : 6 Surface : 15.04 ha

Variété : CALABRO

Sol : Limon superficiel (caillouteux) sain

Précédent : COLZA D'HIVER GRAIN

Irrigation : Non

Débouché : BT Protéine

Densité (grains/m²): 250

Carte de préconisation azote intra-parcellaire

Dose (en unités)		% Surface	% Surface cumulée
	0	0	0
	10	0	0
	20	0	0
	30	15	15
	40	26	41
	50	35	76
	60	21	98
	70	2	100
	80	0	100
	90	0	100
	< 100	0	100

Dose applicable 50 unités

Dose recommandée pour satisfaire les besoins de la parcelle sous réserve d'au moins 15mm de pluie depuis le dernier apport d'azote, devant dater d'au moins 20 jours.

La dose recommandée prend en compte la qualité.
- Au delà de 40 U : fractionnement possible en 2 passages.
- De 30 à 40 U : apport possible à gonflement.

Ce conseil prend en compte l'état de nutrition azotée actuel de votre parcelle et sa biomasse estimée à floraison.

Prochains stades : - Epiaison vers le 07/05/2018, - Floraison vers le 14/05/2018.

0 200 m

Projection : France Lambert 93

Données climatologiques : METEO FRANCE

ARVALIS Institut du végétal

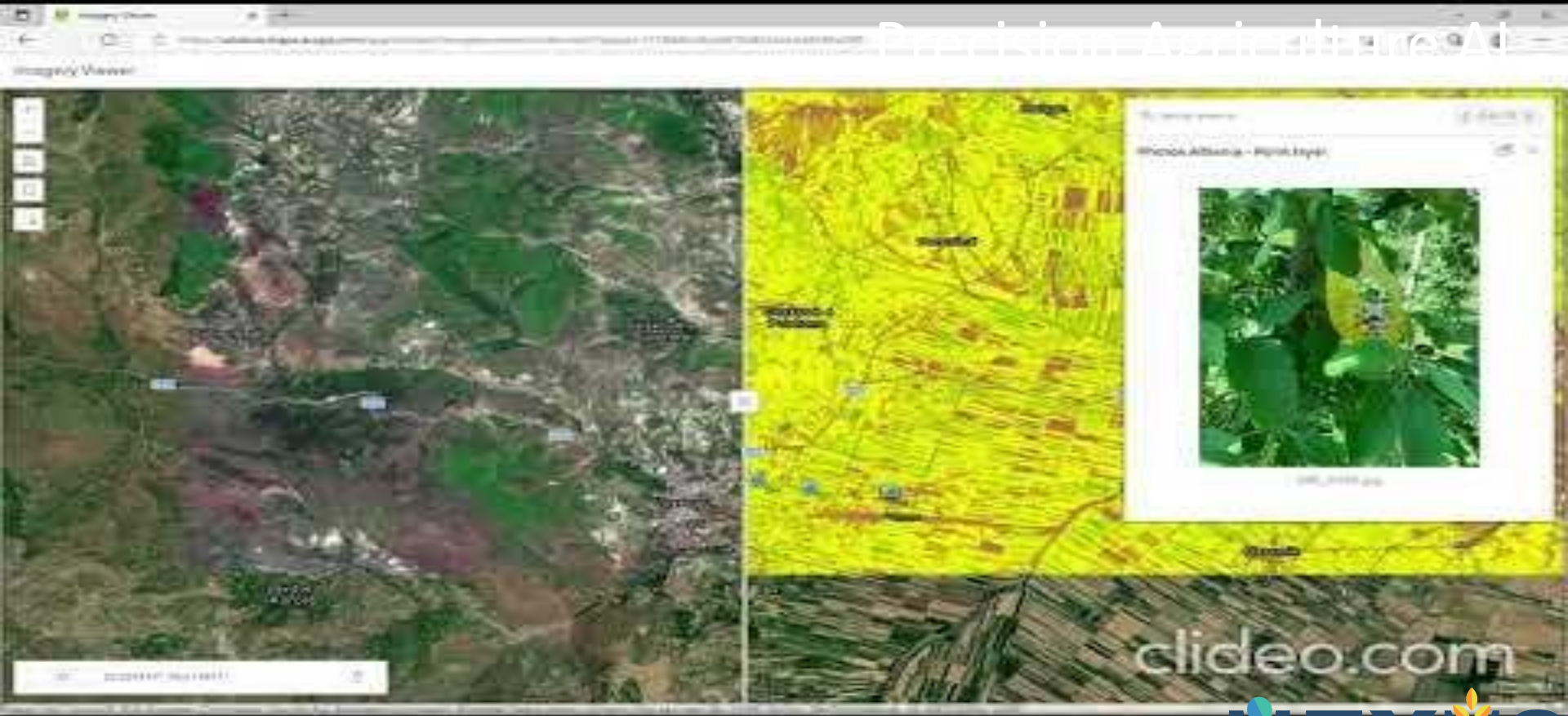
AIRBUS

CAMPAGNE 2017 - 2018

- Variable rate application of inputs – Colza
- Total area of 15 ha
- Map represent variable doses of nitrogen for application

NEXUS

Precision Agriculture Technologies – Satellite Imagery



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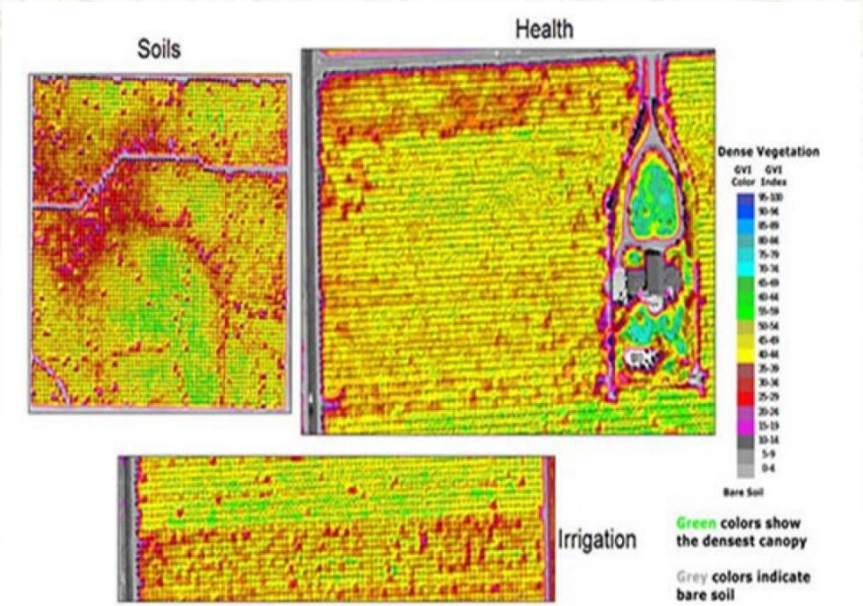
Precision Agriculture Technologies – Drone Imagery

Advantages over Satellite:

- Much higher resolution (cm level)
- Fly when want and “under clouds”
- Commercial available options

Disadvantages:

- Investment cost
- Operation constraints (know-how, risk evaluation)



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Precision Agriculture Technologies – Irrigation Management

Soil monitoring sensors:

- Soil water content monitoring;
- Define when and how much to irrigate
- Manage the irrigation system according to crop water requirements

Plant monitoring sensors:

- Adding an extra layer of information
- Manage crop stress in real time

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Project Progress…

1. Key National Actors and Stakeholders :

- Government, public agencies and institutions
- Academic and research institutions
- NGOs, organizations and farmer associations
- Private service providers involved in digitalization of agriculture

2. Online Survey

https://docs.google.com/forms/d/e/1FAIpQLScsHiu1v5XeKpBLc0PGBWaYQC0r9vgpK5LbnqXiKjRmYo-CbQ/viewform

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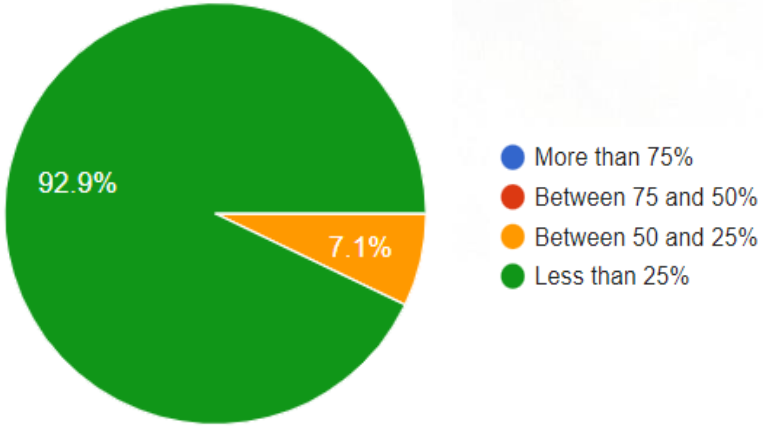
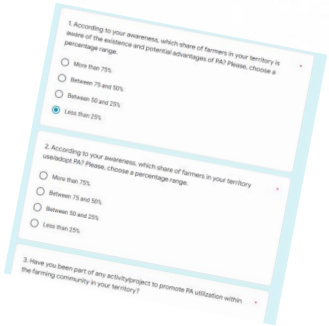
Project Progress…

According to the Survey and the Stakeholders Consultation:

i. Just a very small persentage of the farmers are aware and use/adopt PA.
These are mainly bigger producers in vegetable and/or apple farms.





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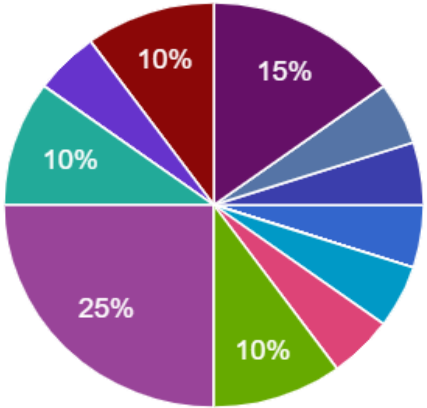
Project Progress…

ii. Which kind of PA was more encouraged through information/training/advisory activities?



- Global Navigation Satellite System (GNSS) - all navigation satellite systems
- Controlled Traffic Farming (fixed tracks on your field to avoid compaction)
- Yield monitor
- Parcel boundary mapping with GNSS or with Integrated Administration & Cont. System
- Airborne imagery made with drones
- Variable rate technology – fertilization
- Variable rate technology - crop protection
- Variable sowing / planting
- Precision mechanical weeding (e.g. with the help of camera support)
- Crop sensors
- Weather station in the field
- Irrigation at the field level
- Precision irrigation in management zones
- Soil moisture sensors
- Soil scanners
- Satellite imagery

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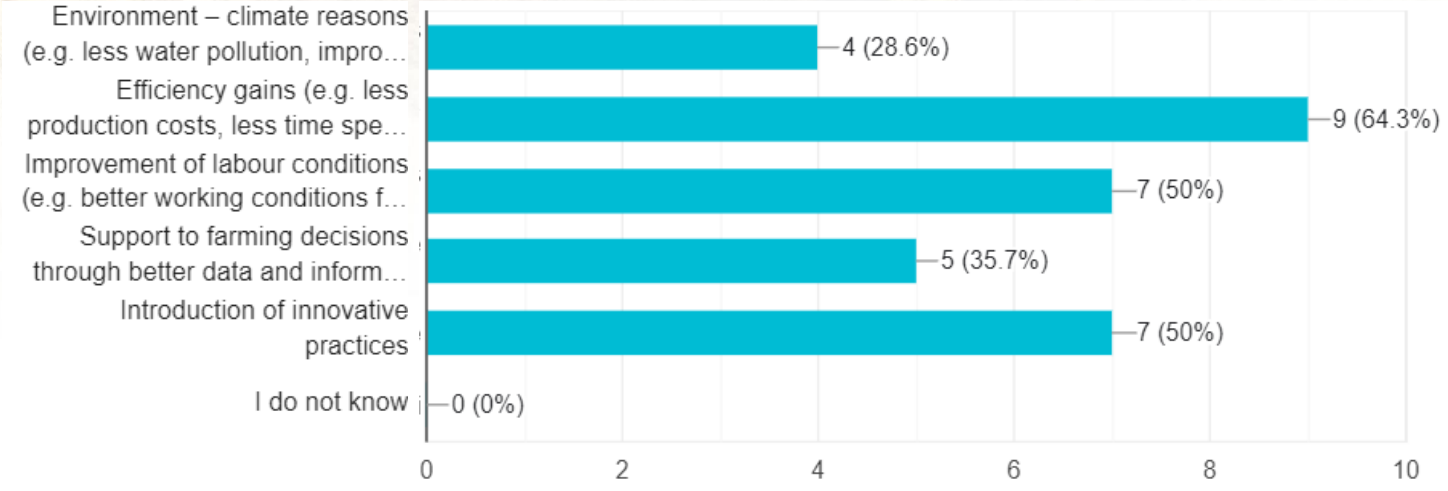
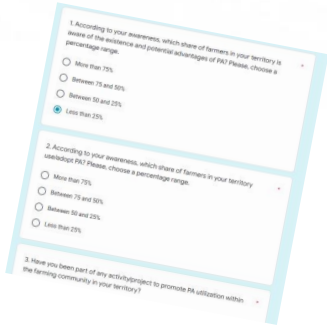
Project Progress…

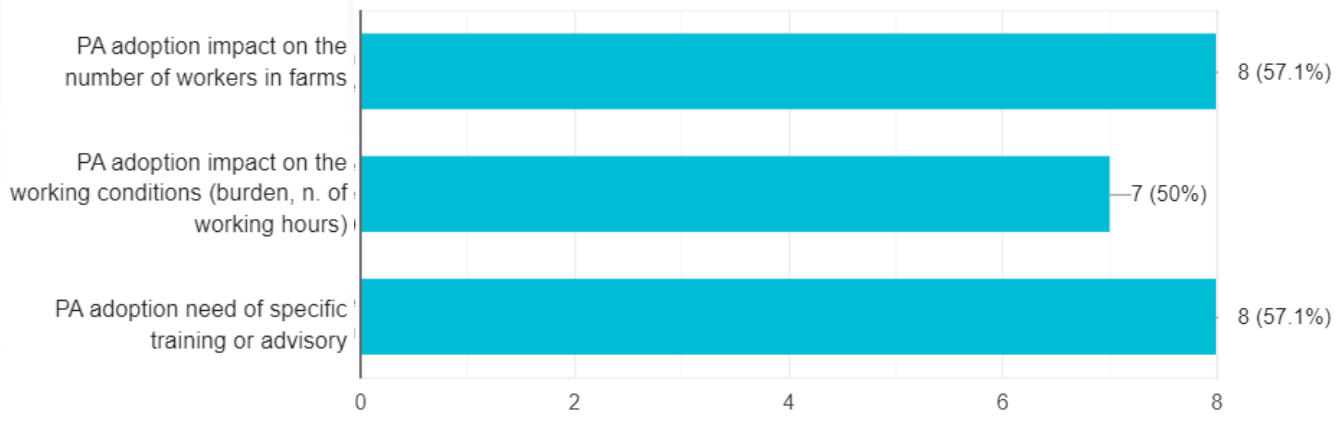
iii. What factors influence farmers' adoption of PA in your territory?

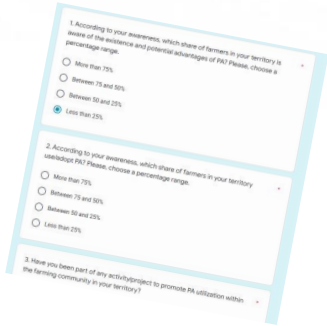




Project Progress…

iv. How would you assess the potential effects of PA on labour at farm level?





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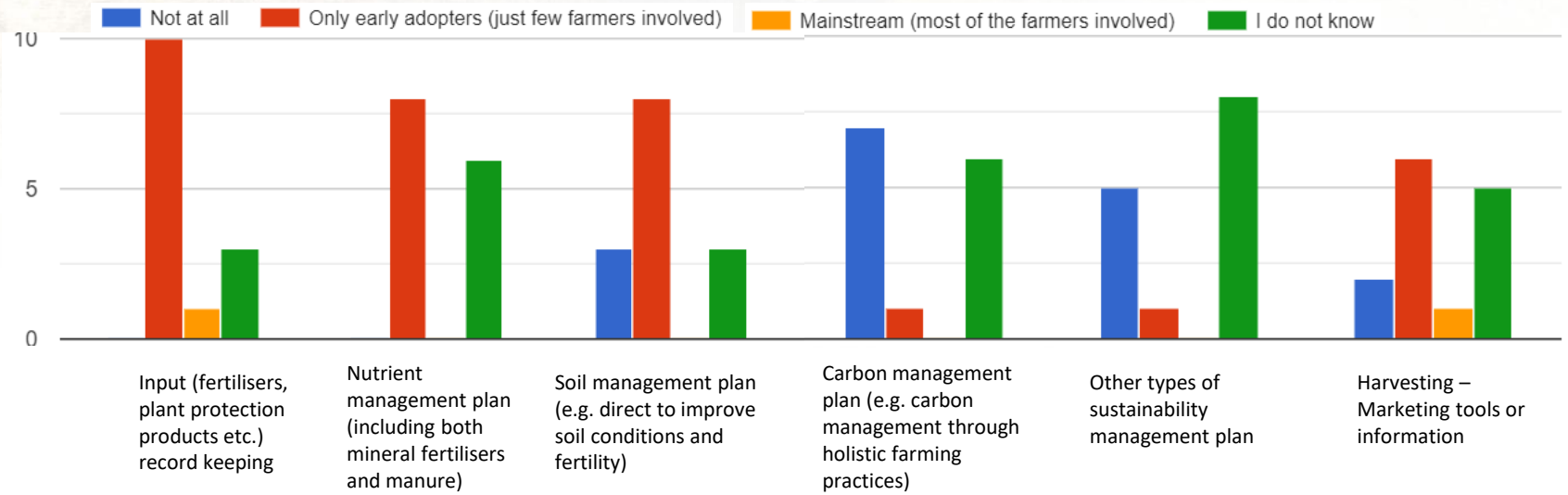
Project Progress…

According to the Survey and the Stakeholders Consultation:

v. Are farm Management Information Systems used by farmers in your territory?



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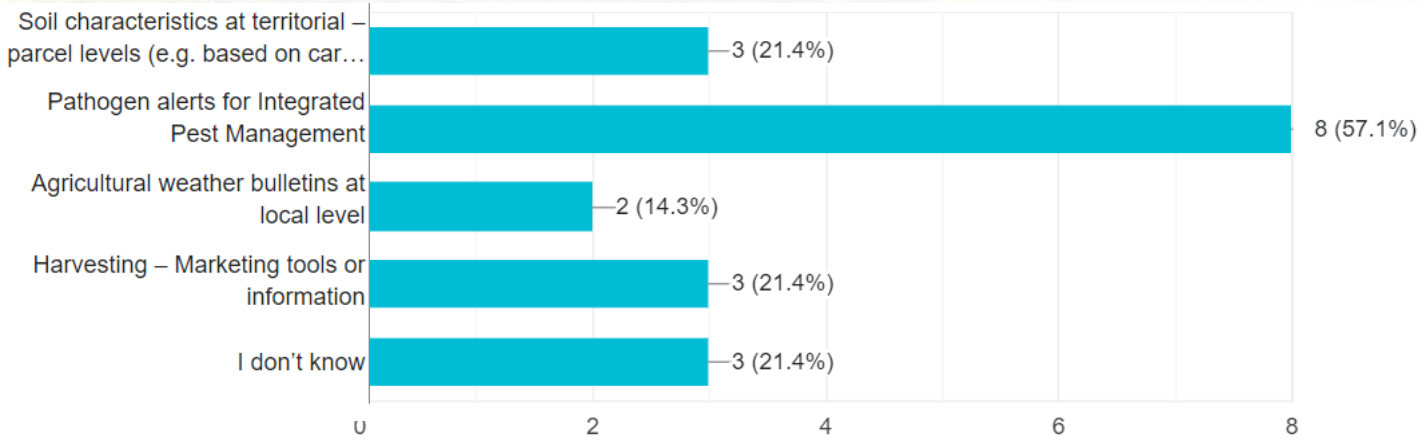
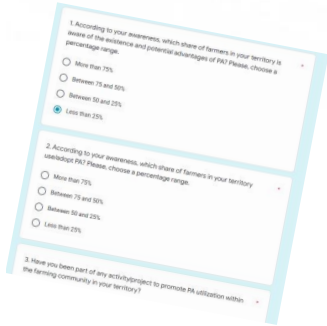
Project Progress…

According to the Survey and the Stakeholders Consultation:

vi. Are there any systems providing information to improve decision making for farmers?





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Key findings

- Less than 25% of the farmers are aware of the precision agriculture existence
- Pioneer examples already exist and shows benefits in terms of production, safe water and labour force.
- PA shows to be adequate tools in improving labour condition and making agriculture attractive for new generations
- Both public and private sector shows a lack in capacity building, in expertise and agronomist specialized in PA adaptation techniques, capable to transfer and share these tools to the farmers
- There is a policy support to introduce digitalization in agriculture, smart farming and PA technologies. These technologies will be eligible for support under the national scheme and IPARD funding
- There are already private service providers offering PA related services to agricultural enterprises but the costs are still high

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Next Step…

3. Workshop with stakeholders to discuss on proposed pilots from Project team

- Academic and research institutions
- NGOs, organizations and farmer associations
- Private service providers involved in digitalization of agriculture

Pilot 4

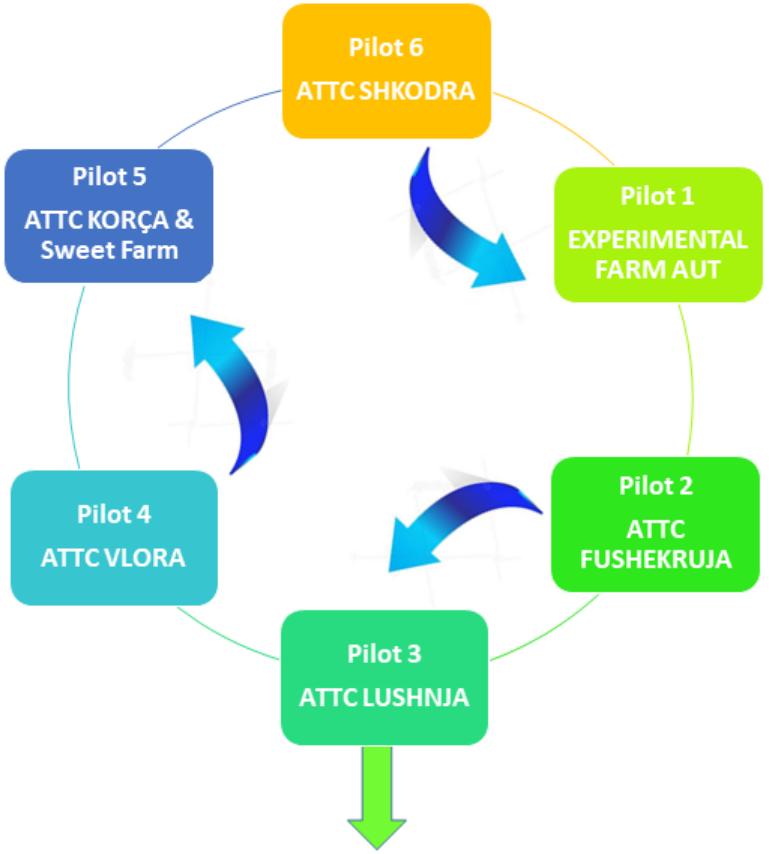
- Agriculture and Rural Development Agency (ARDA)
- Agricultural Technology Transfer Centre of VLORA
- Regional Directorate of Irrigation and Drainage Fier
- Albanian Council of Agribusiness

Pilot 5

- Ministry of Agricultural and Rural Development (MARD)- Drainage & Irrigation
- Agricultural Technology Transfer Centre of KORCA
- Albanian National Extension Service of Korca
- Regional Directorate of Irrigation and Drainage of Korca
- Sweet Farm Korca
- Regional Development Agency Korca
- IDRA

Pilot 6

- Albanian National Extension Service of Shkodra
- Regional Directorate of Irrigation and Drainage Lezha
- Albanian National Extension Service of Shkodra
- ADAD Malore
- General Directorate of wáter and Land Administration



Pilot 1

- IGEWE - Institute of Geosciences and Energy, Water and Environment
- Agricultural University of Tirana
- Polytecnic University of Tirana
- Faculty of Agriculture Fan Noli Korca
- Albanian Network for Rural Development (ANRD)
- GIZ Albania

Pilot 2

- Agricultural Technology Transfer Centre of FUSHEKRUJA
- Albanian National Extension Service of Tirana
- ASIG -State Authority for Geospatial Information Specialist
- SKAITECH
- AgroTechnica ShPk

Pilot 3

- Agricultural Technology Transfer Centre of Lushnja
- Albanian National Extension Service of Lushnja
- Albanian National Extension Service
- Regional Directorate of Irrigation and Drainage Durres
- X-METER
- VODAFONE ALBANIA
- AgroKoni shpk

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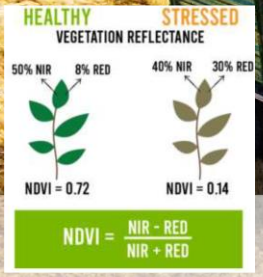
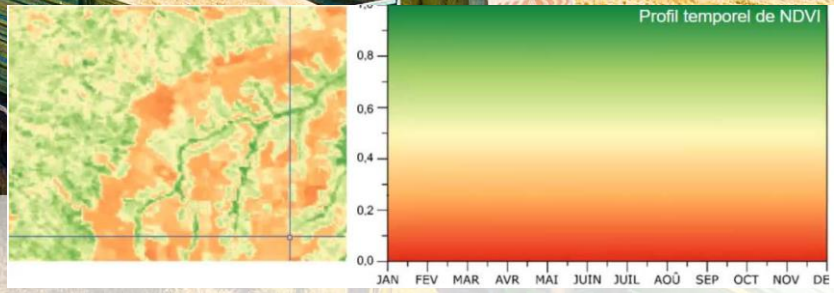
PILOT 1 – DEF/AUT

Some ideas for smart farming research and demonstration activities planned to take place at DEF/AUT





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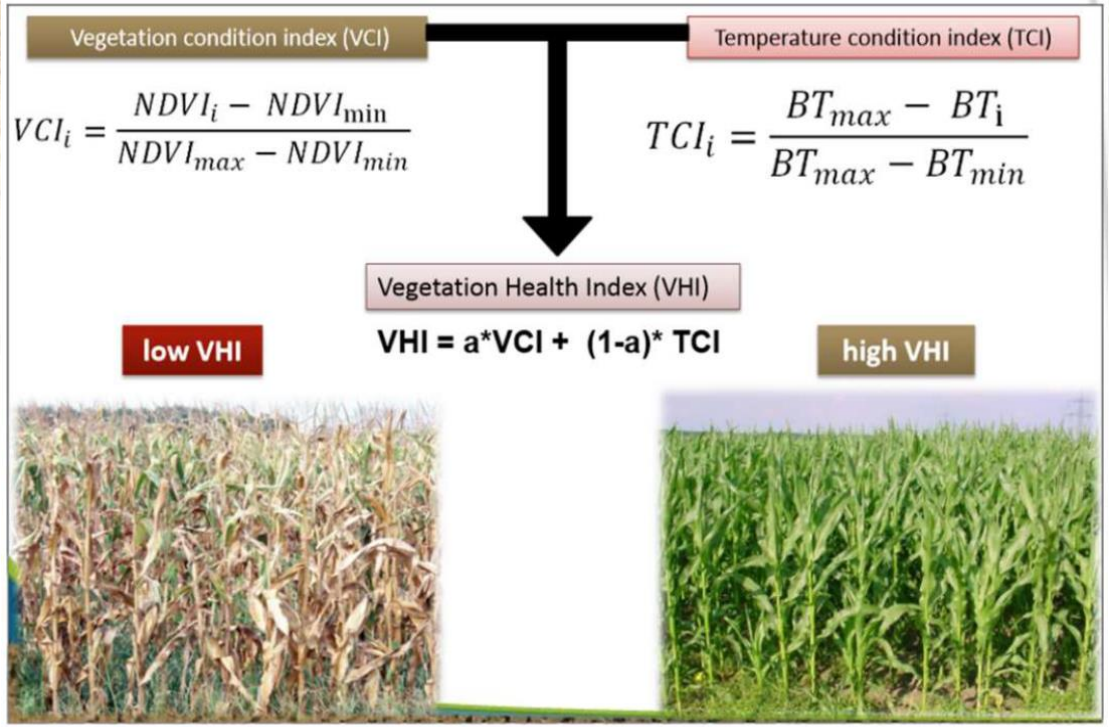
PILOT 1 – DEF/AUT



It offers best conditions to be a pilot for several facets of precision agriculture, i.e. fertiliser application, seeding, crop protection, irrigation and soil cultivation

- Normalized Difference Vegetation Index (NDVI),
- Vegetation Conditions Index (VCI)
- Temperature Conditions Index (TCI)
- Vegetation Health Index (VHI)

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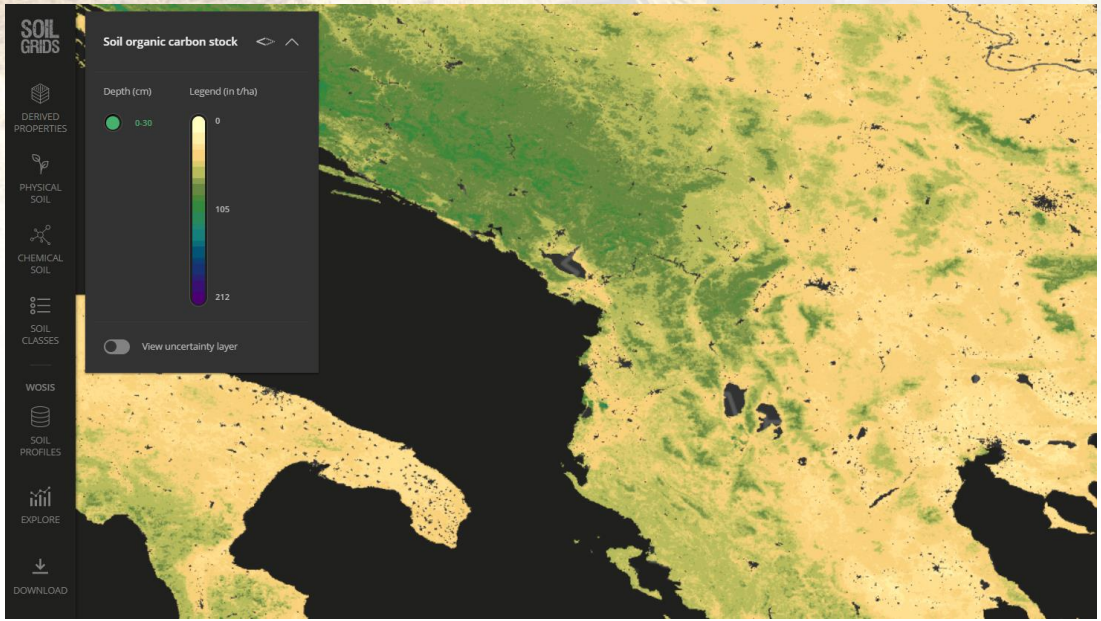
PILOT 2 – QTTB Fshk.



In cooperation with ASIG GEOPORTAL, this ATTC could make available various SUITABILITY MAPS for agricultural purposes.

- hyperspectral remote sensing data for the classification of soil types and the measurement of soil total nitrogen (TN) content
- diagnosis, climate change effects and agricultural shocks, soil degradation, soil erosion, soil carbon, crop insurance and environmental hazards (i.e. floods)

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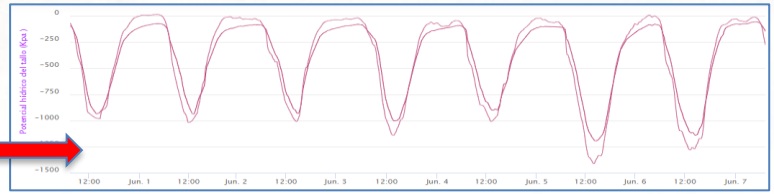
PILOT 3 – ATTC Vlora

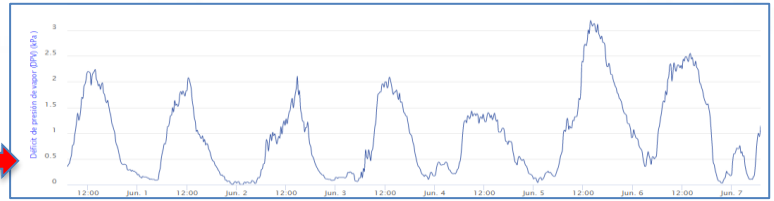
Considering the special focus on water in agriculture and irrigation, for fruit trees the Pilot will establish correlations between the different vegetation indices obtained by multispectral satellite imagery and the agronomic parameters at the orchard level:

- continuous stem potential measurements (Florapulse water potential sensors);
- dendrometric measurements;
- water content measurements (capacitive probes).

STEM WATER POTENTIAL



VPD : Vapour Pressure Deficit



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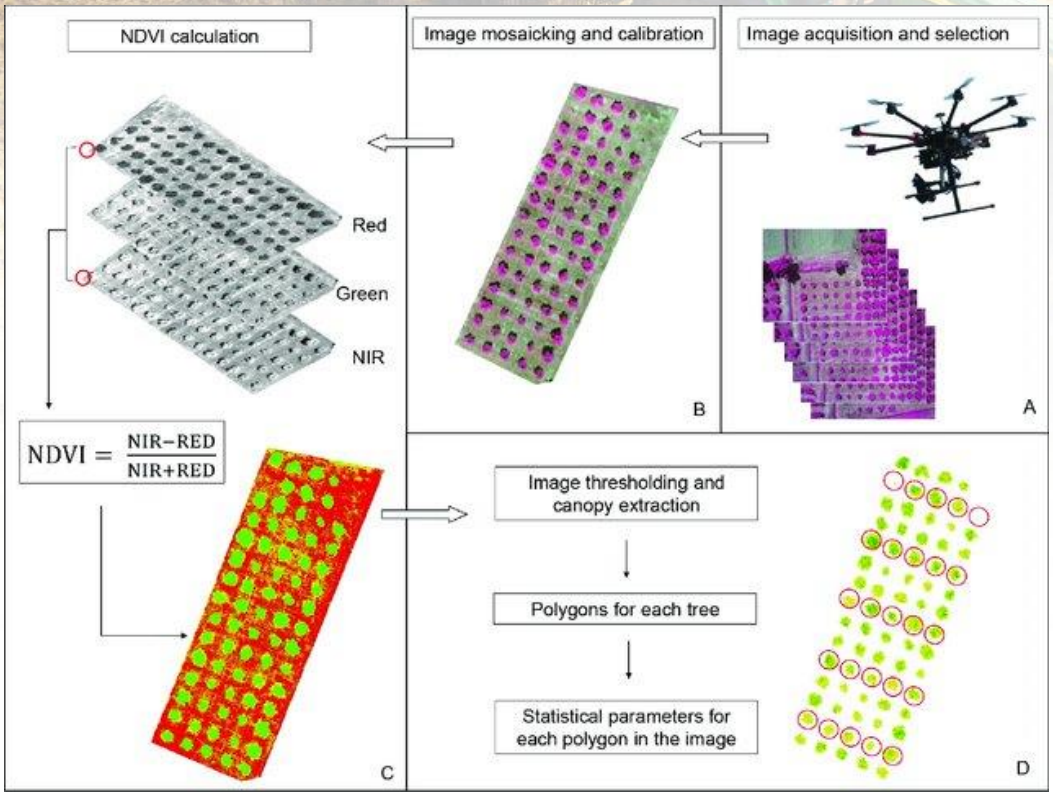

PILOT 3 – ATTC Vlora

Multispectral drone imagery can also be used for the estimate of biophysical and geometrical parameters of olive trees under different irrigation regimes. This can help identify regions of unequal development of trees and further investigate the causes but also for early warning of sanitary issues and changes in plant development. Assist in planning of:

- replanting, pruning, thinning;
- pesticide applications
- determining harvesting date

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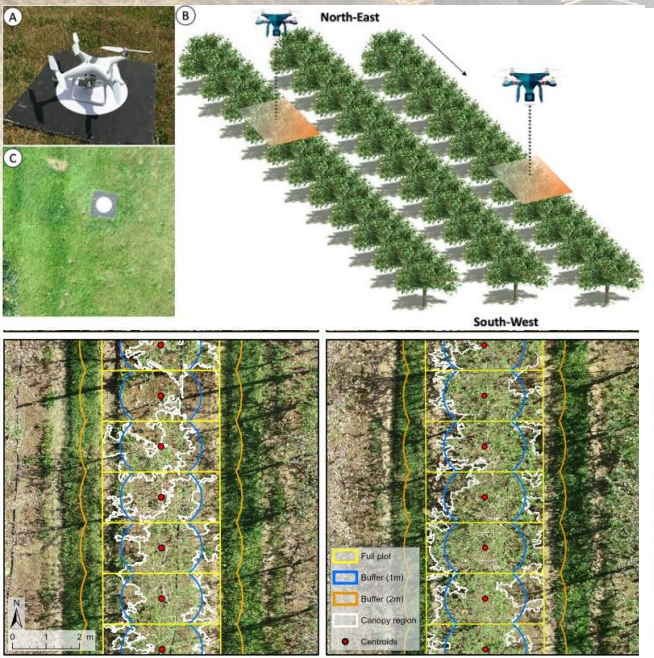
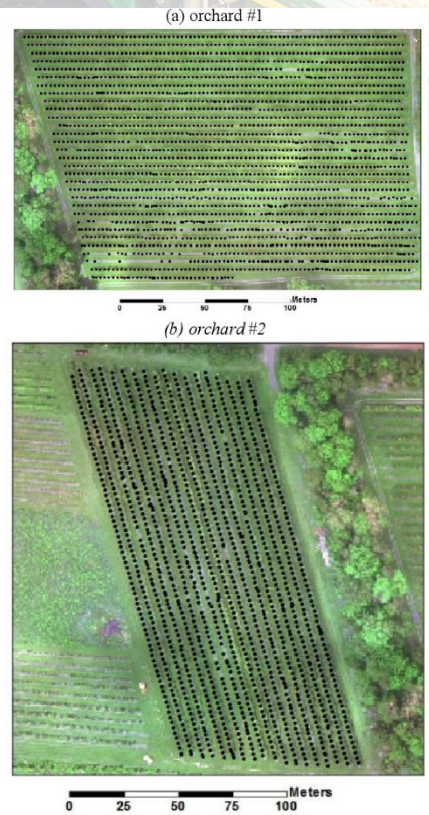
PILOT 4 – ATTC Korca



UAV flight good practices; right – apple tree identification; bottom left – canopy detection from RGB UAV imagery



Other uses of high-definition drone imagery can include fruit counting and estimation of production yield by plant/row with the assistance of deep learning image classification algorithms.

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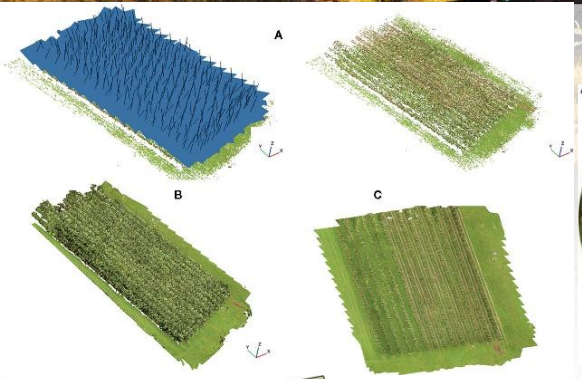
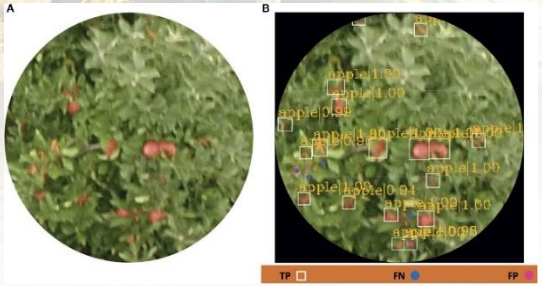
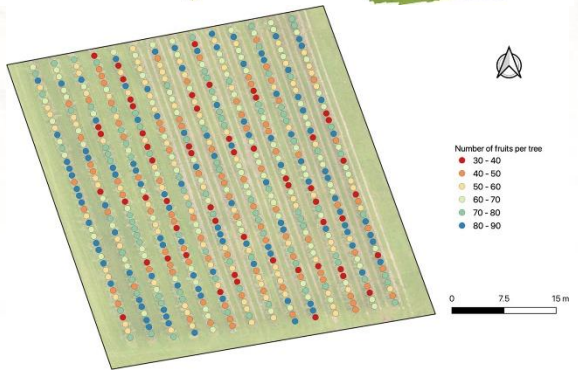
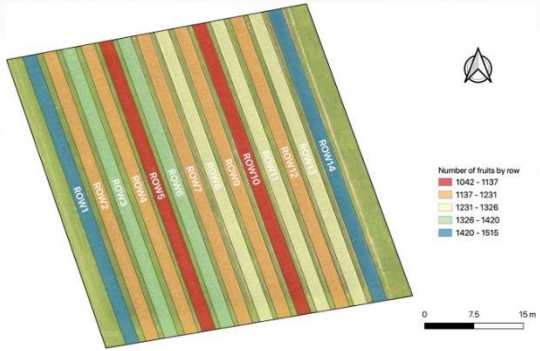
PILOT 4 – ATTC Korca









Other uses of high-definition drone imagery can include fruit counting and estimation of production yield by plant/row with the assistance of deep learning image classification algorithms.

3D view of point cloud of apple orchard; top right – apple fruit identification; bottom left – fruit count by tree; bottom right – fruit count by row.

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Thank you for your attention!