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CROSS-BORDER COOPERATION IN THE MEDITERRANEAN

FruitFlyNet

A Location–aware System for Fruit Fly Monitoring and Pest Management Control

OliveFlyNet test site implementation in Attiki, Greece

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CRA
CONSIGLIO PER LA RICERCA E LA SPERIMENTAZIONE IN AGRICOLTURA

UIB Universitat de les Illes Balears

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The project FruitFlyNet total budget is 1.662.872,32€ and it is financed, on an amount of 1.496.585,09€ (90 %), by the European Union (ENPI CBC Mediterranean Sea Basin Programme) through the European Neighbourhood and Partnership Instrument.

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Introduction

- The implementation stages of Olive Fly Net prototype
- Materials and methods
- Results
- Conclusions

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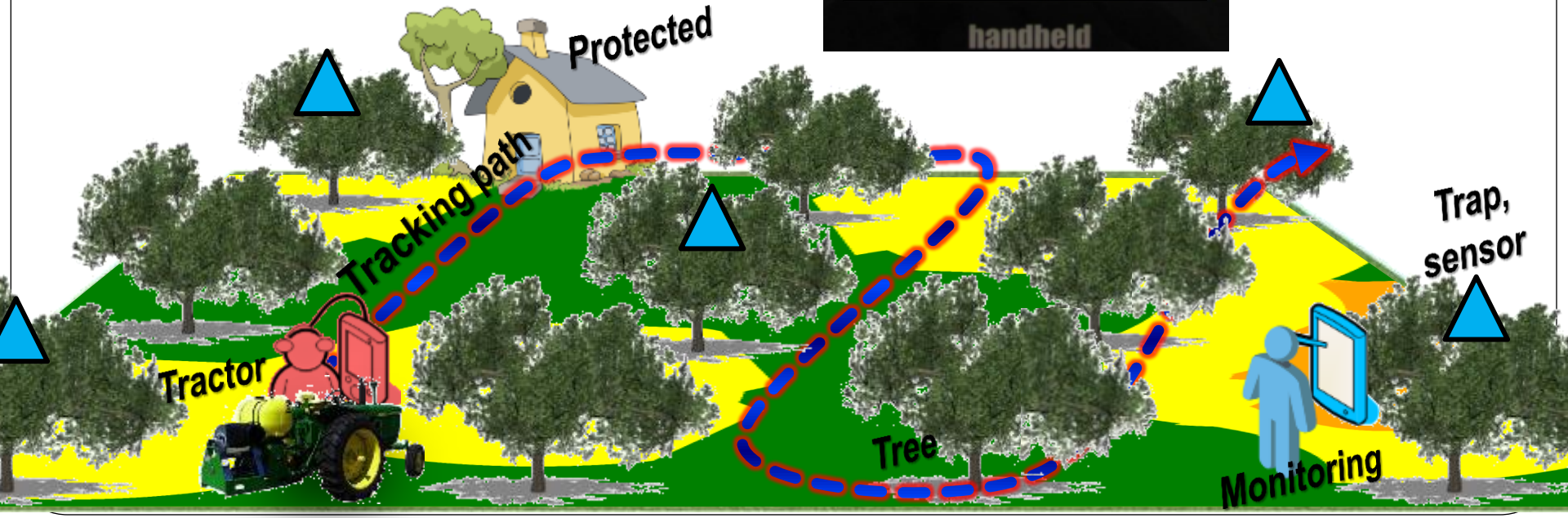
Implementation stages

- Digitization of the orchard
- Monitoring (traps, insect population, remarks, sampling)
- DSS (when, where, how to spray)
- Spraying treatments

FruitFly Net



Materials and methods

- Orchard digitization
- Protected areas
- Monitoring traps (insect population)
- Monitoring trees (phenological stage)
- Olive Fly DSS for spray
- Month temperatures

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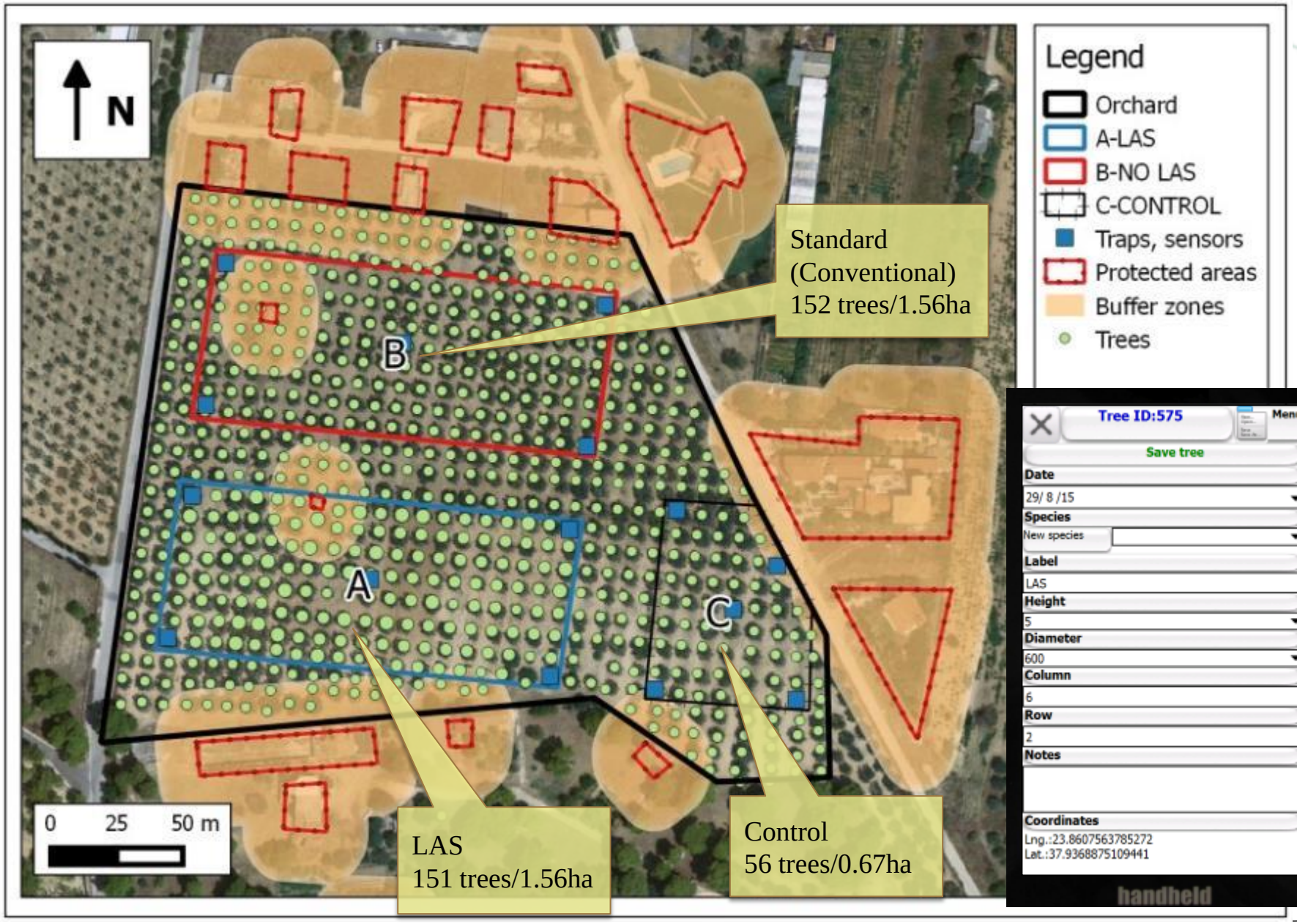
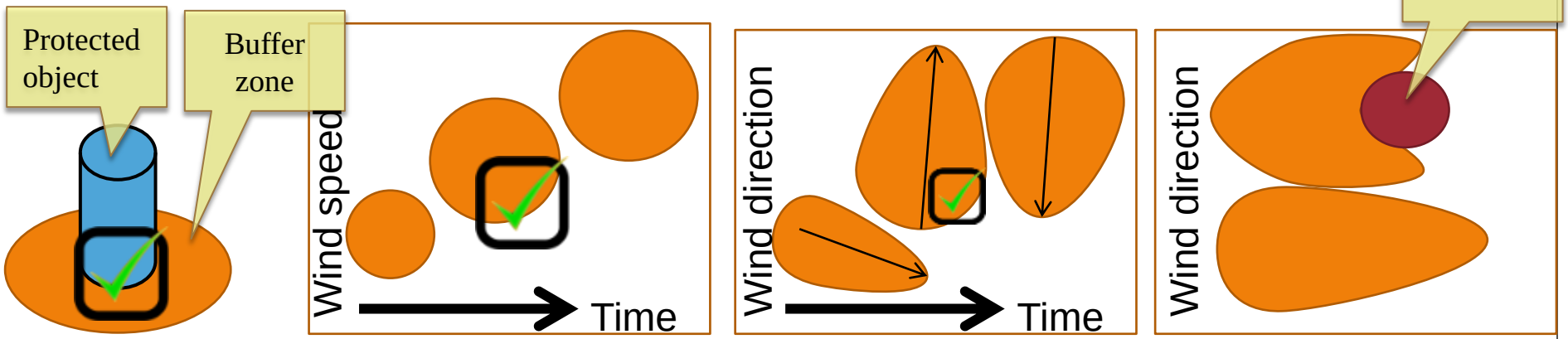
Orchard digitization



Protected areas –Dynamic buffer zones

- For each type of protected area (biological cultivations, domestic areas, playgrounds, hospitals etc) we can set a minimum distance for zero wind speed
- Dynamic buffer zones. Depend on wind speed and direction.
- To avoid spray in protected areas the DSS optimized to handle large number of “protected polygons”



✓ Developed ✓ Implemented	✓ Developed ✓ Implemented	✓ Developed ❑ Needs more research	❑ Not developed ❑ Not investigated (future work)

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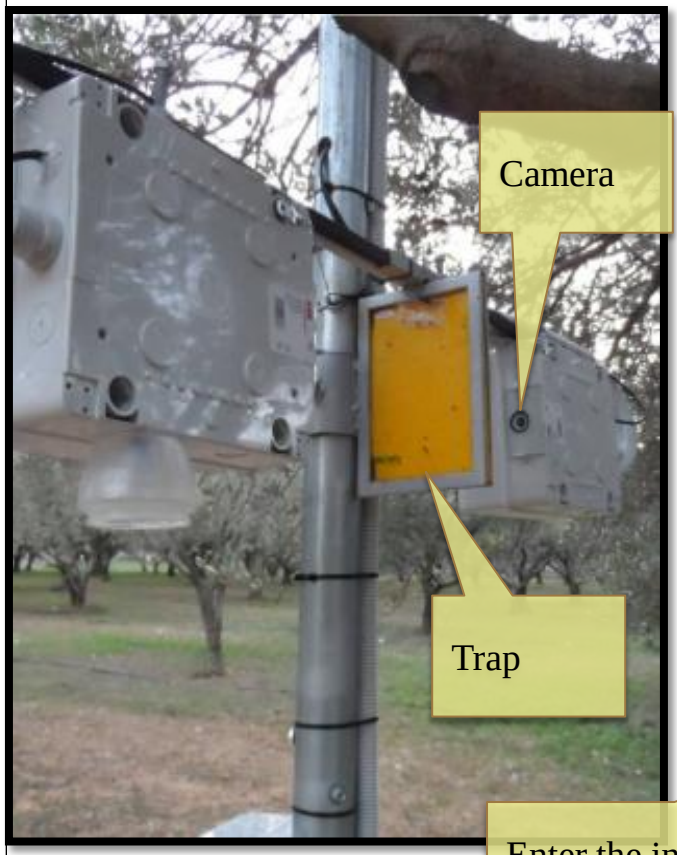
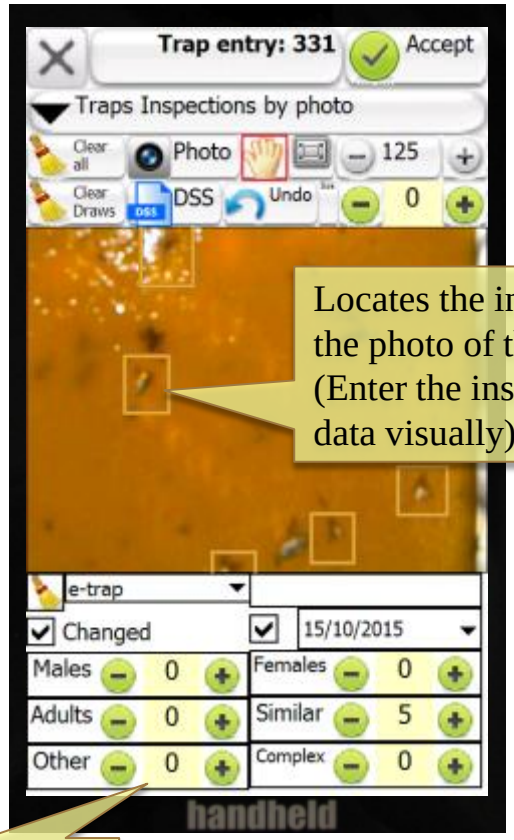
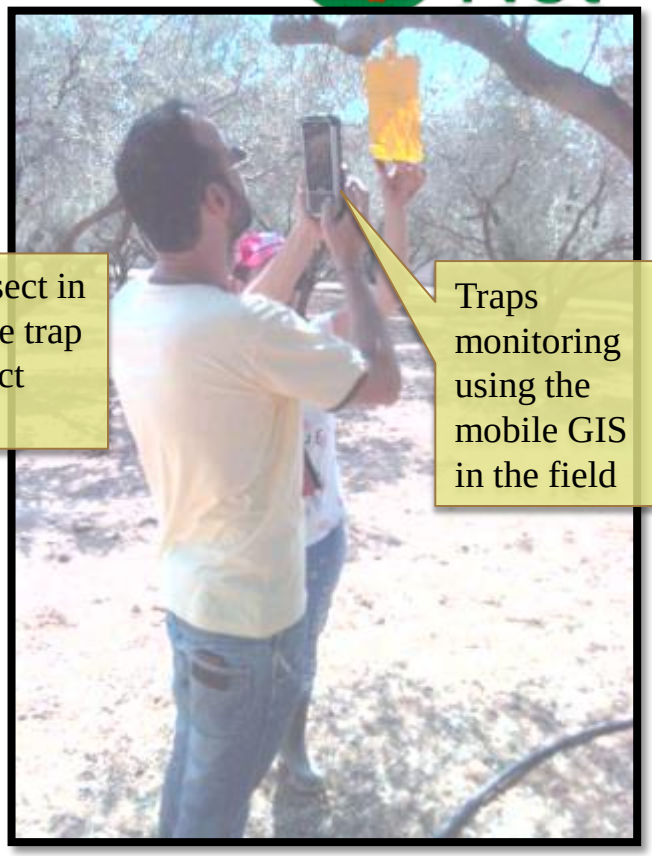
Monitoring traps



e-trap



mobile GIS



Trapping (conventional and e-trap)

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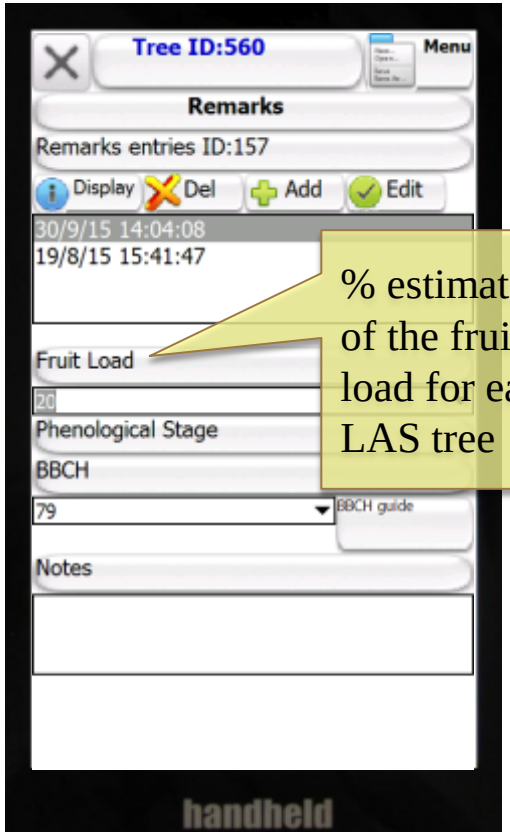
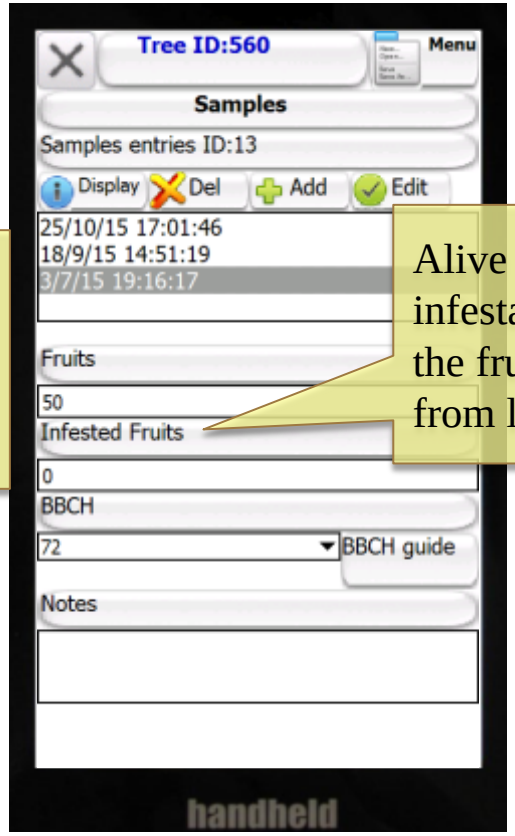
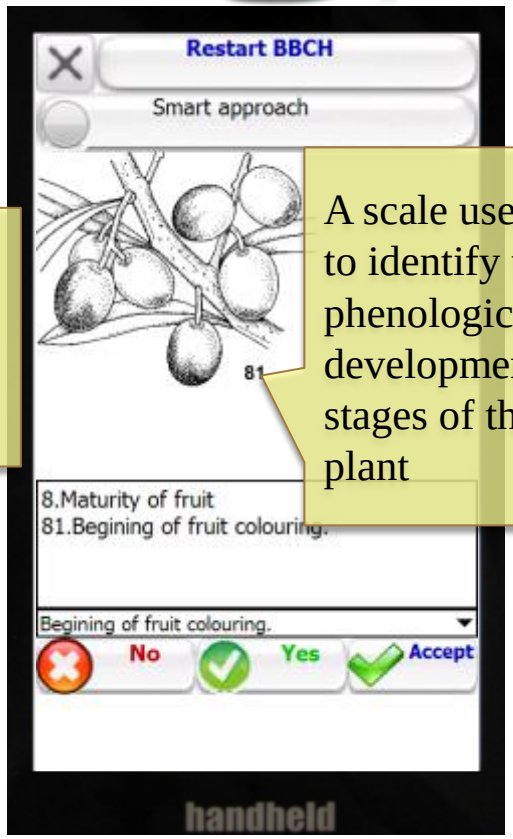
Monitoring trees



% estimation of the fruit load for each LAS tree



Alive infestation of the fruits from larvae



A scale used to identify the phenological development stages of the plant

Remarks

Sampling

BBCH

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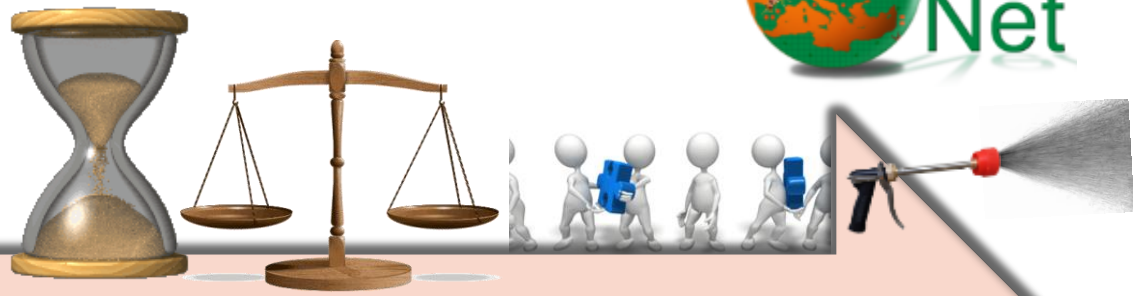
Olive Fly DSS for spray

The main menu of the implemented DSS



B. DSS when to spray

As output it gives if we have to spray or not

C. DSS where to spray

As output it gives interpolated risk maps and the risk for each tree

D. DSS how to spray

It gives instructions to the tractor attendant how to spray (to avoid protected areas, to spray with specific density, to stop the spray process)

E. DSS spraying action

It helps to find out the trees that have been sprayed and avoid over spraying on trees.

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Olive Fly DSS for spray (LAS)

- DSS A (Automatic counting of insects using photo)
  - Not performed (not enough data available)
- DSS A (Semi-automatic trapping)
  - Conducted more than 100 times
- DSS B (when to spray)
  - Conducted 20 times (20 trapping dates)
- DSS C (where to spray)
  - The Inverse Distance Weight (IDW) interpolation was used (power=2, Buffer=50m) for infestation risk maps
- DSS D (how to spray)
  - Minimum buffer zone distance for protected areas defined to 20m
- DSS E (spraying action)
  - The <RIGHT> method for locating the trees that are spraying

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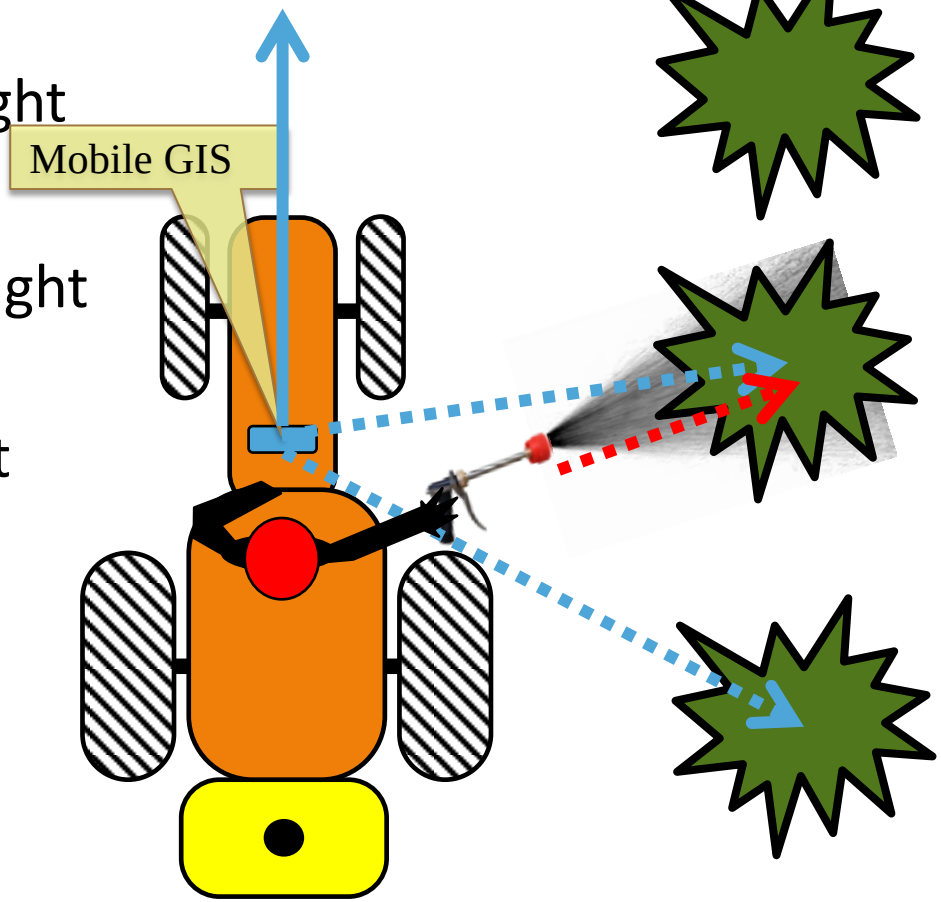
Methods for locating the sprayed trees

- NEAREST: The nearest tree
- RIGHT: The nearest tree at right
- LEFT: The nearest tree at left
- RIGHT>:The nearest tree at right and forward
- LEFT>:The nearest tree at left and forward
- Visual using Tracking path
- Ground truth



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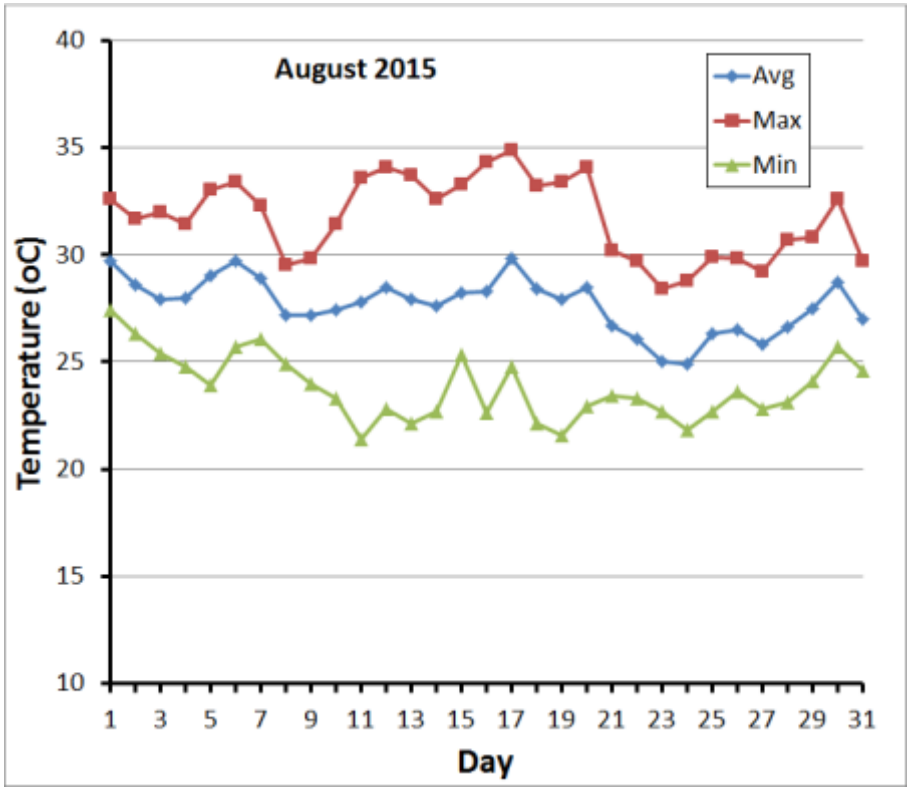
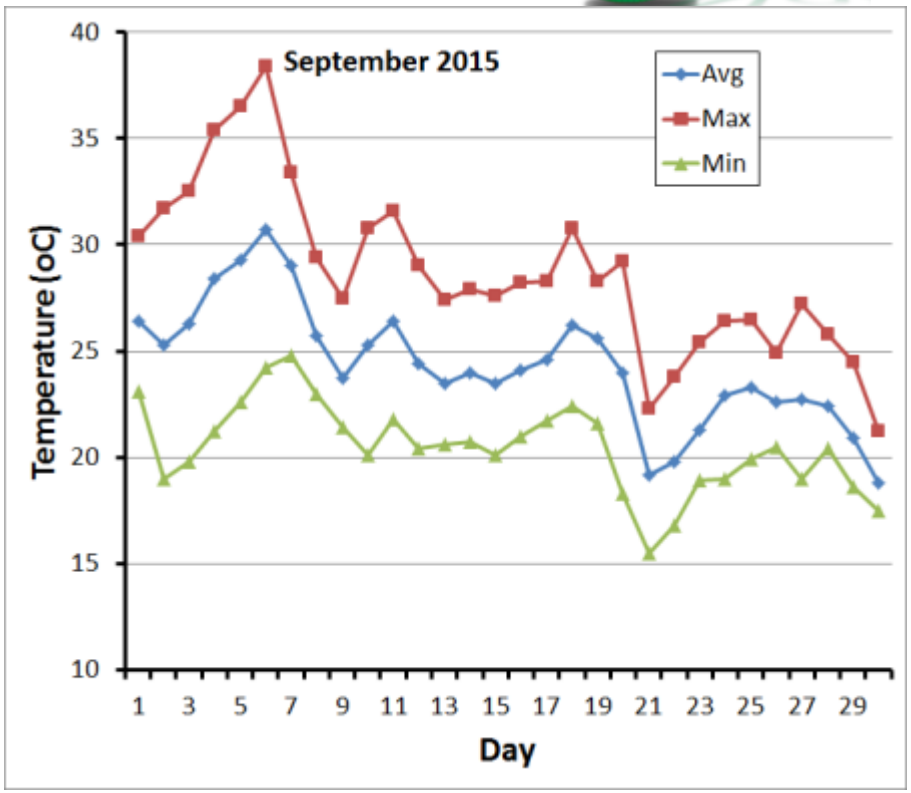
Month temperature





- At August and 10 first days of September were high temperatures

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Results

- Olive fly population
- DSS B
- DSS C
- DSS D
- DSS E

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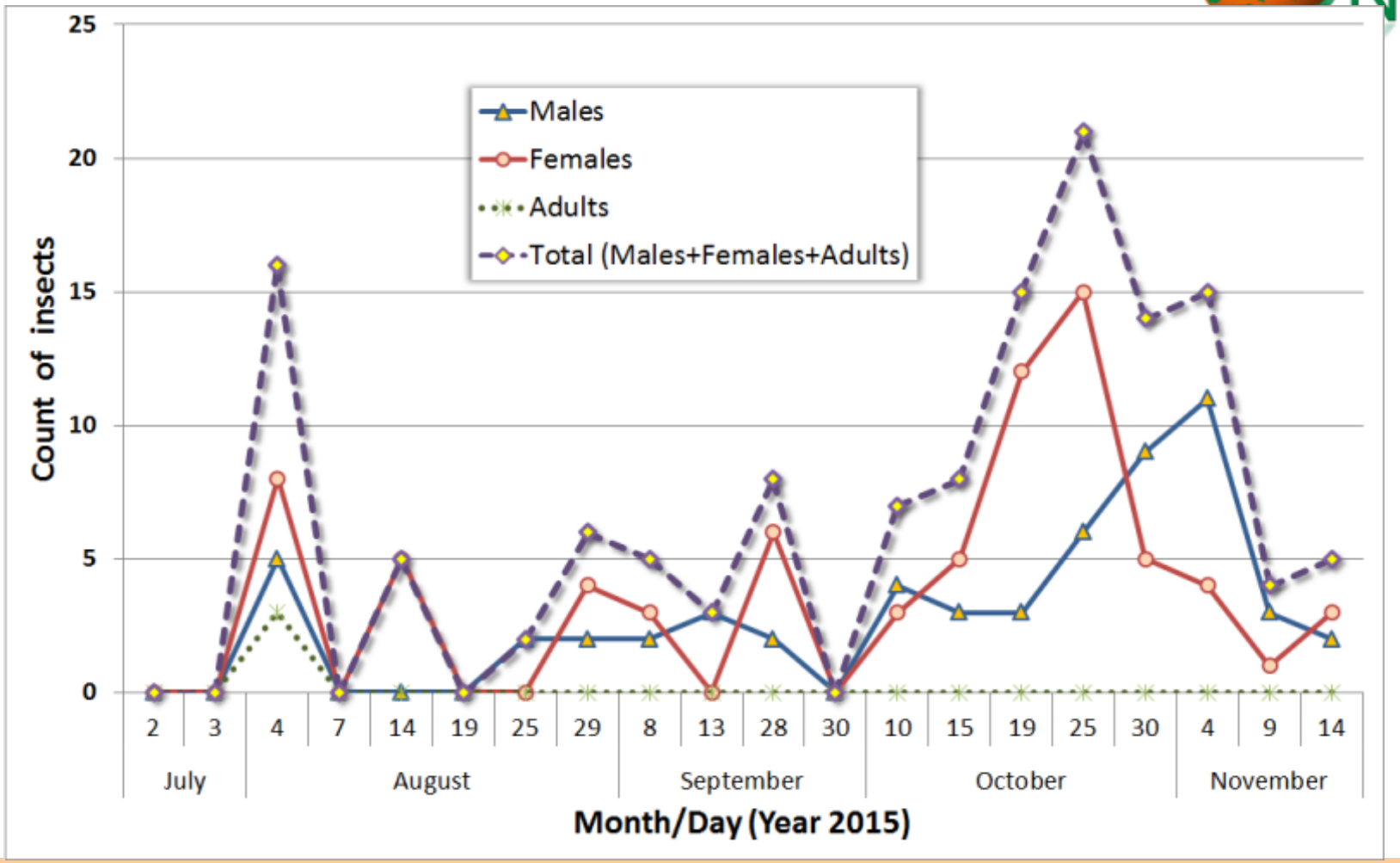
Olive fly population (mobile GIS) - Block



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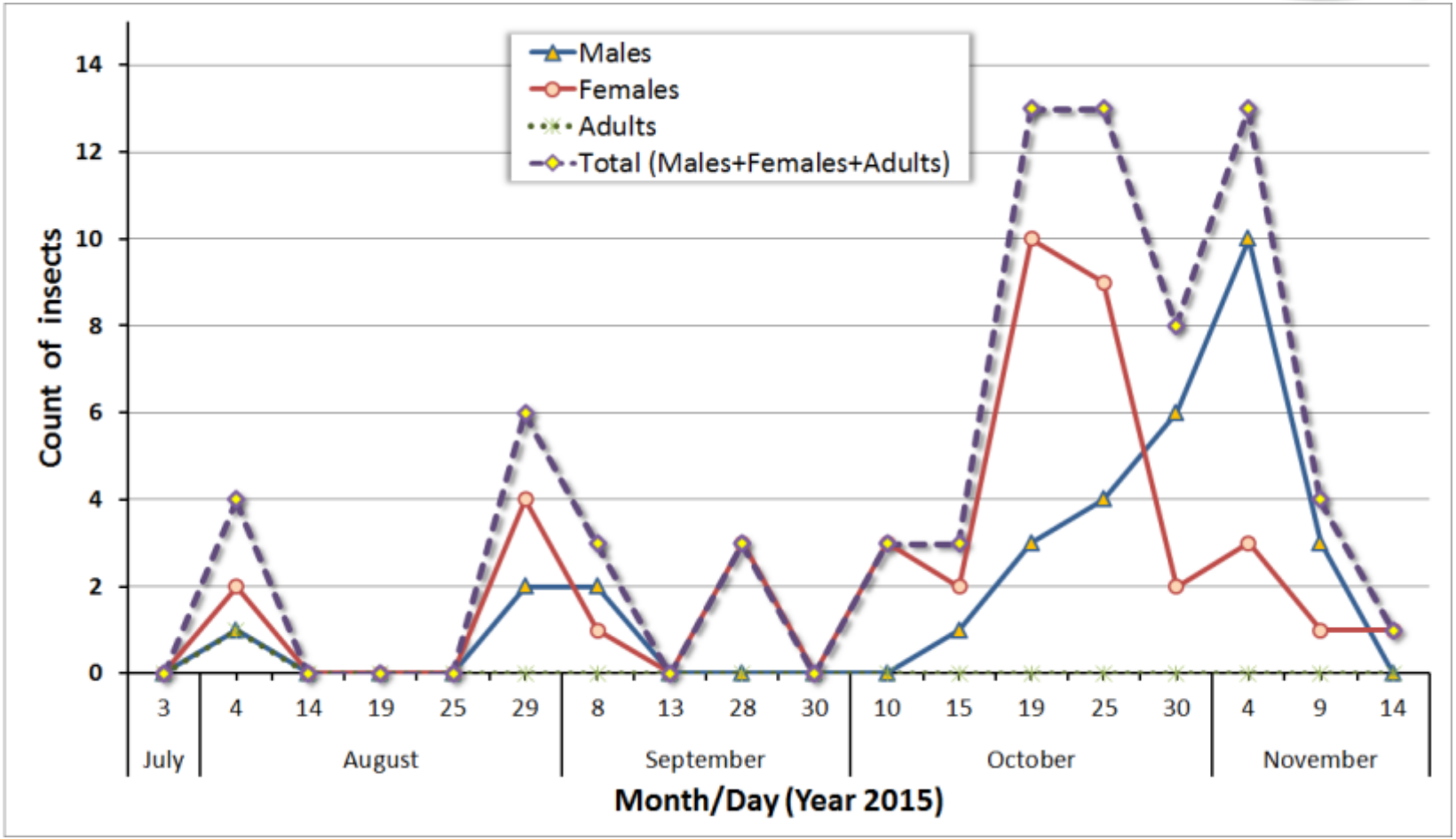
Olive fly population (mobile GIS) - Control



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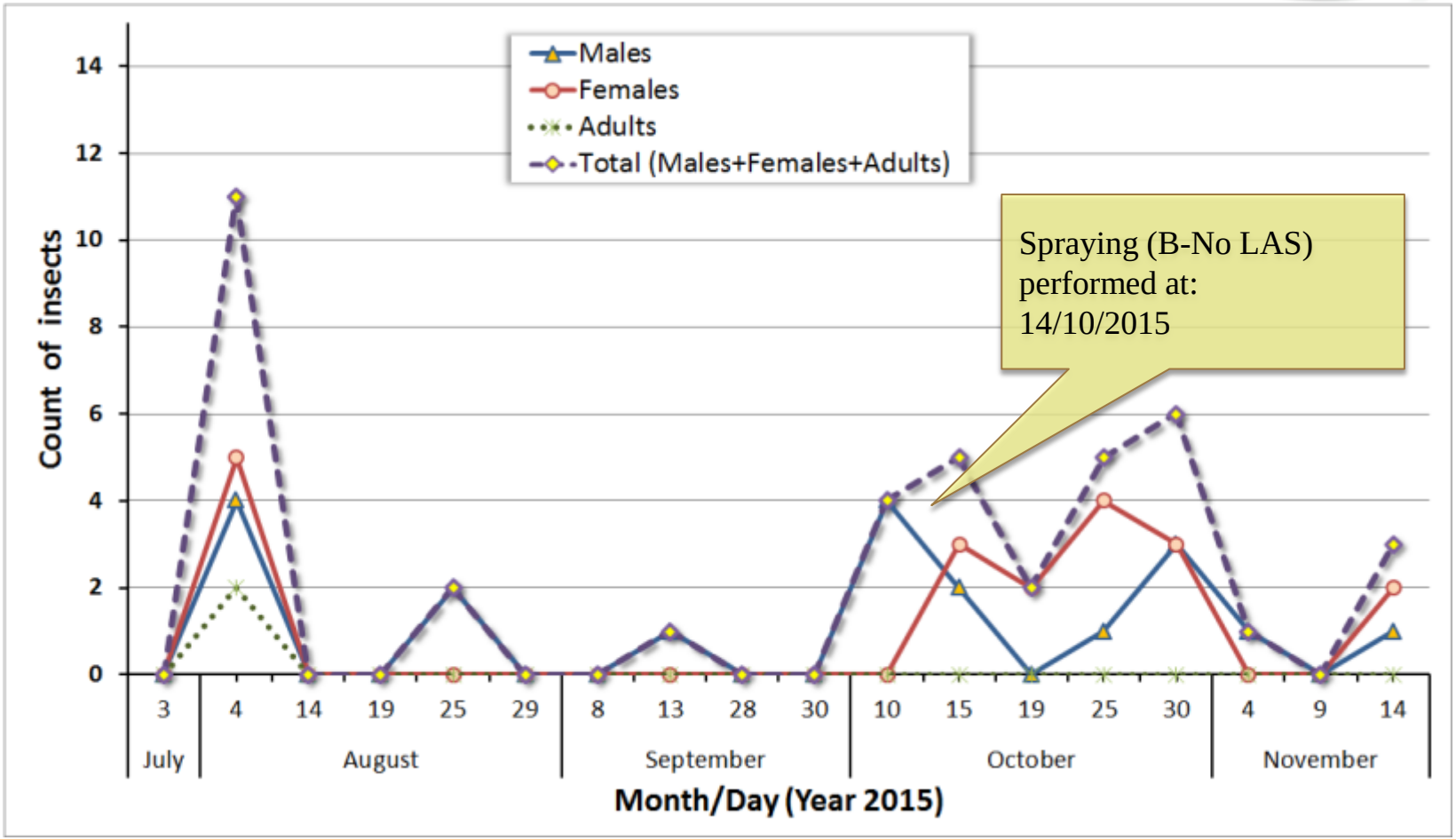
Olive fly population (mobile GIS) - Convectional



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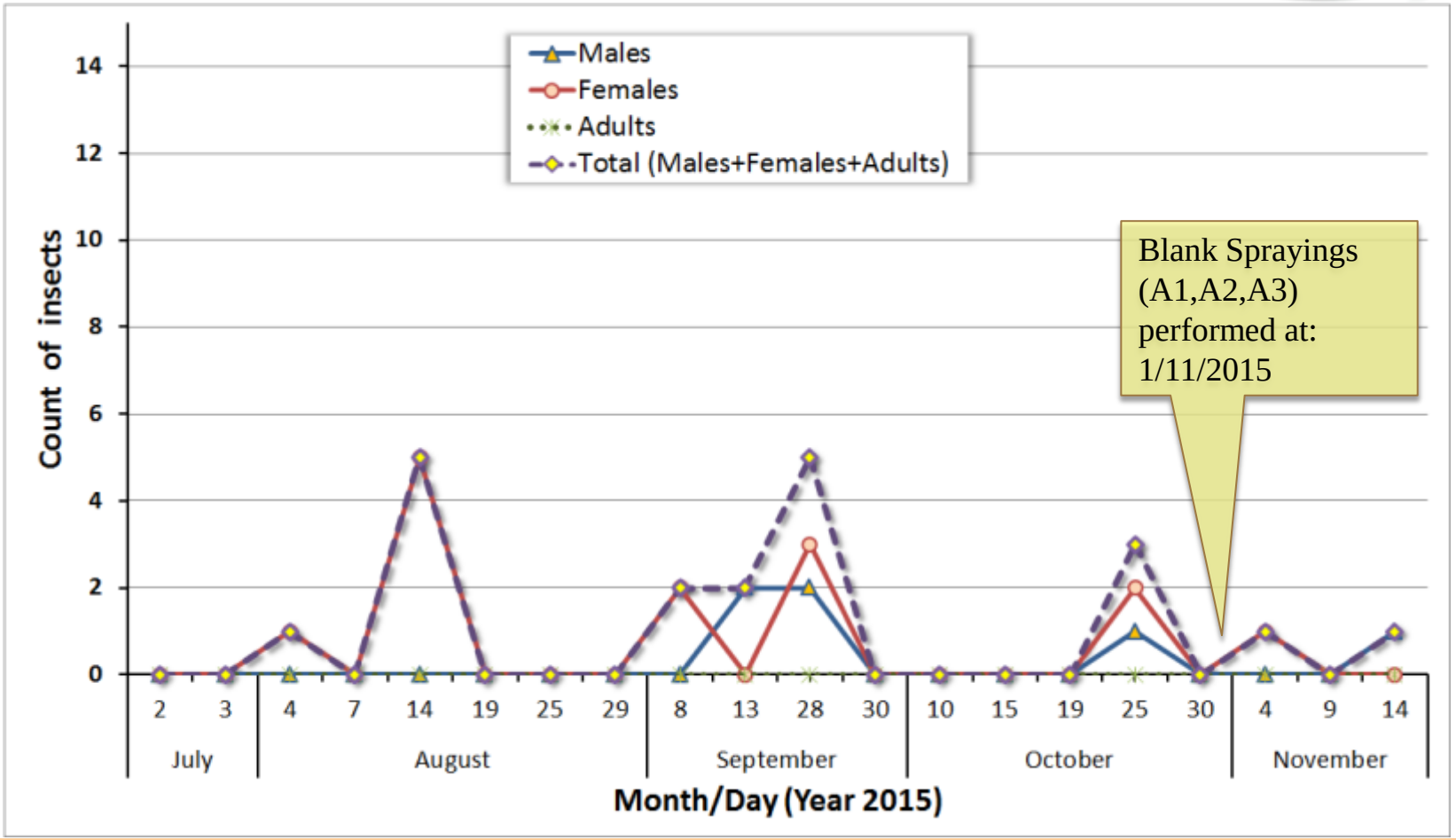
Olive fly population (mobile GIS) - LAS



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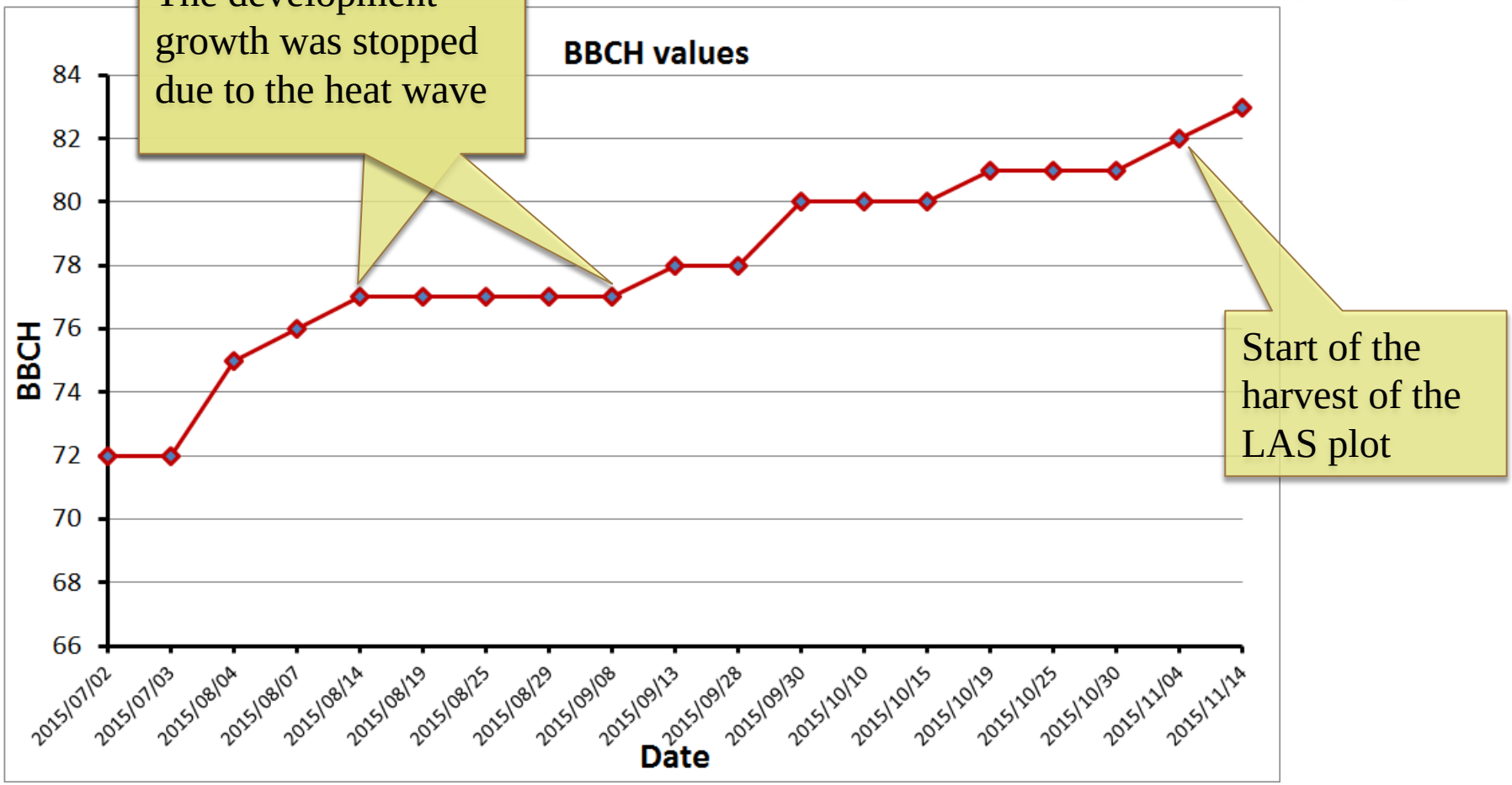
BBCH values used in DSS B (LAS plot)



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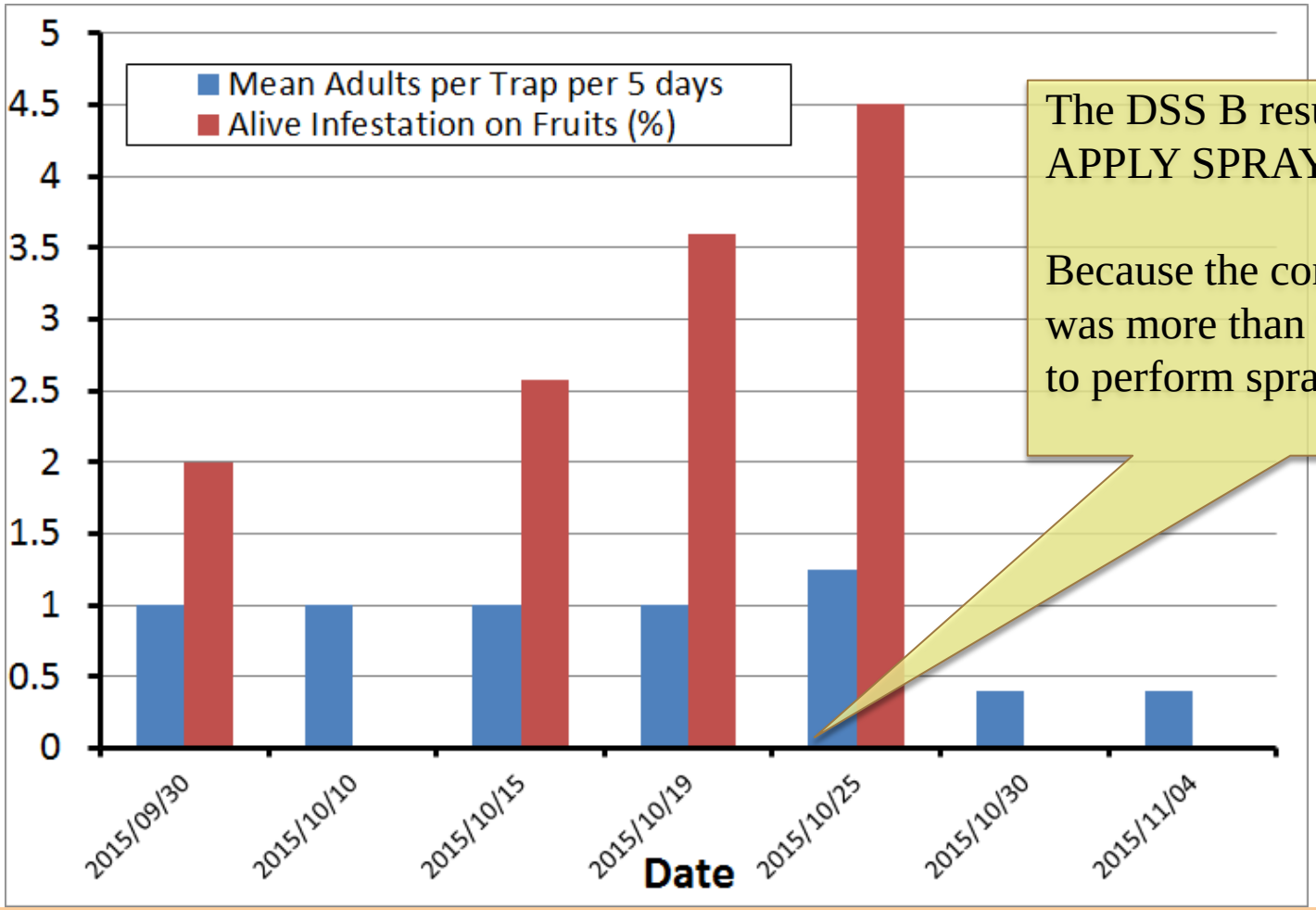
DSS B mean adults, alive infestation (LAS plot)



The DSS B result was:
APPLY SPRAY TYPE C(72.9%)

Because the confidence to spray was more than 70% we decided to perform spraying.

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Spraying applications performed

Application	Plot	Method of spraying	Method of locating sprayed trees	Type of spraying
B1	B	Conventional	Right	Real
A1	A	Conventional	Right	Blank
A2	A	LAS	Right	Blank
A3	A	LAS	Right	Blank
(Many)	-	-	-	Simulated

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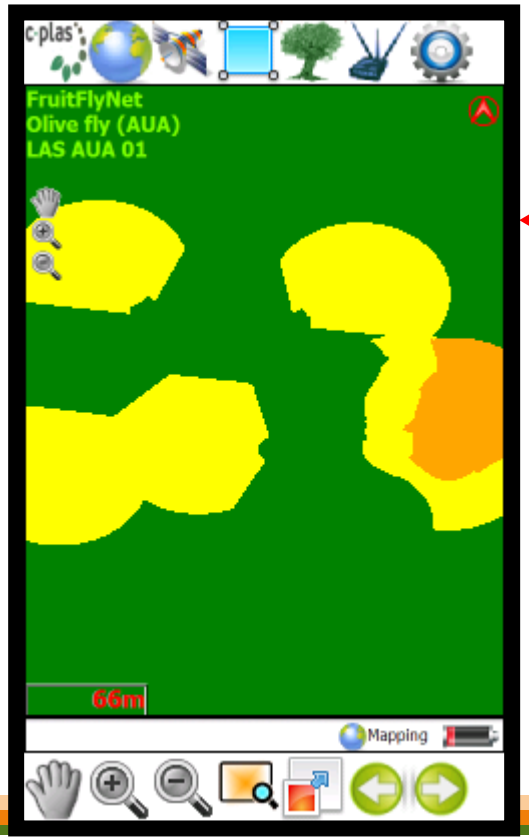
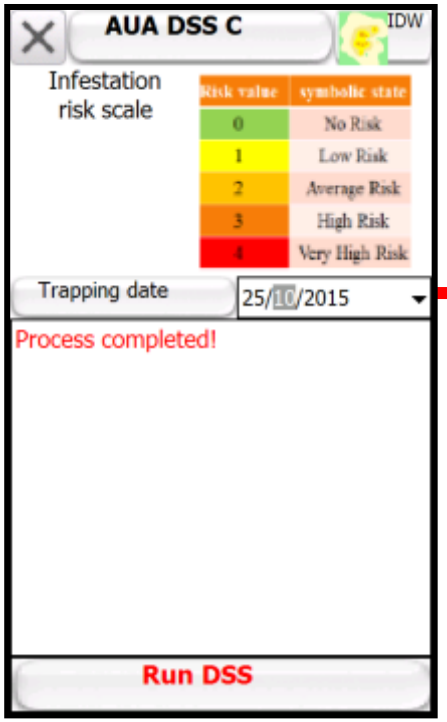
DSS C: Where to spray Application-A (LAS plot)

Infestation risk map

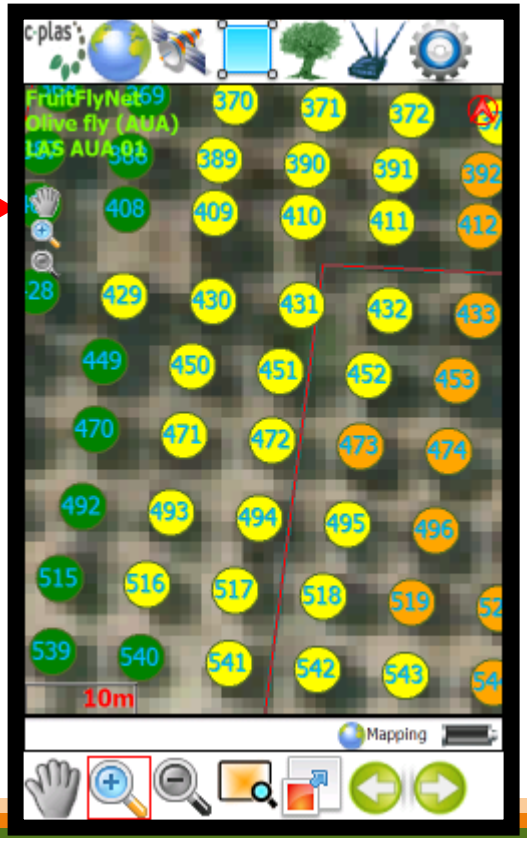


Mobile GIS DSS C



Risk	symbolic state
0	No Risk
1	Low Risk
2	Average Risk
3	High Risk
4	Very High Risk

Infestation risk for each tree



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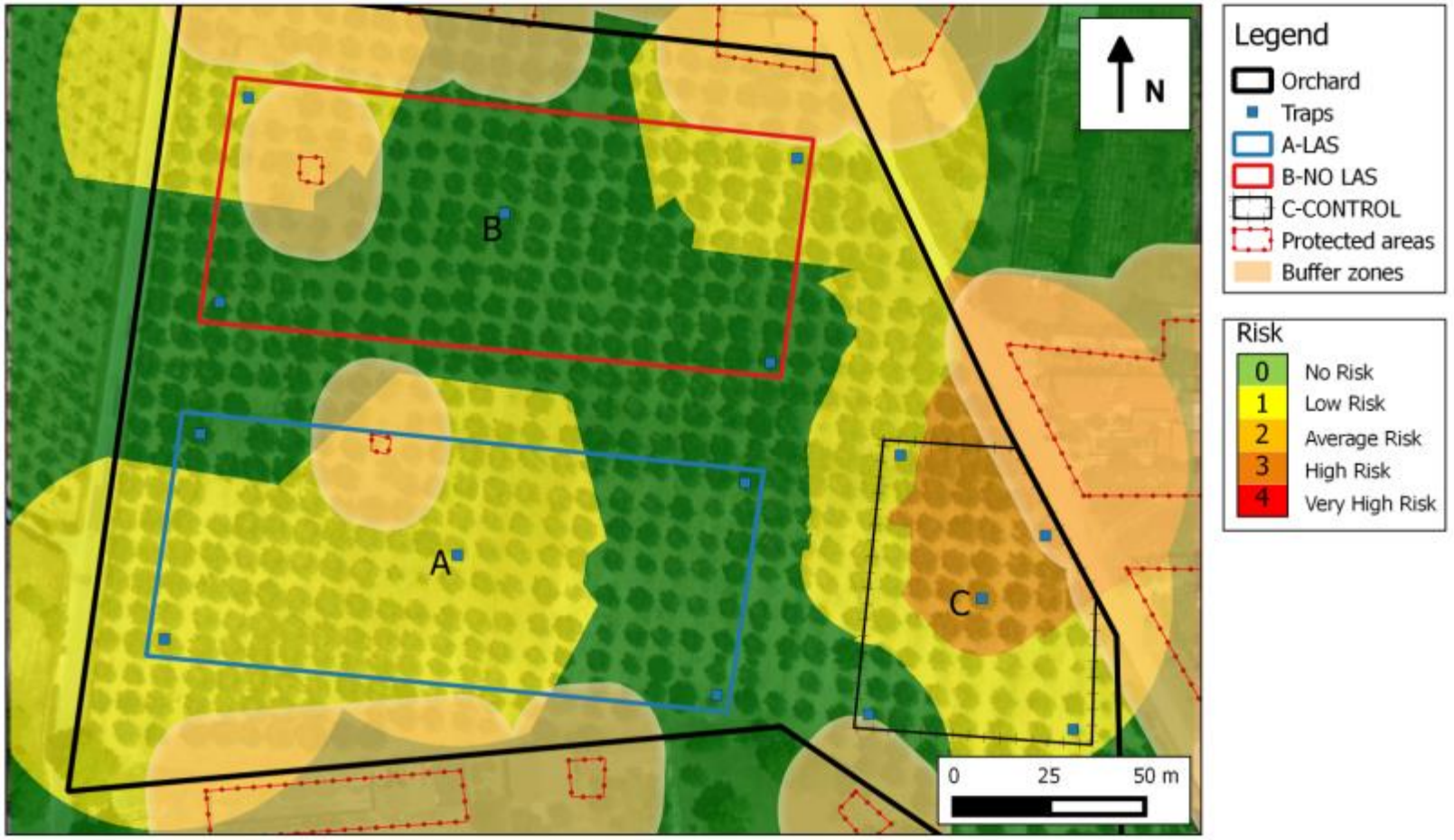
Infestation risk map and protected areas



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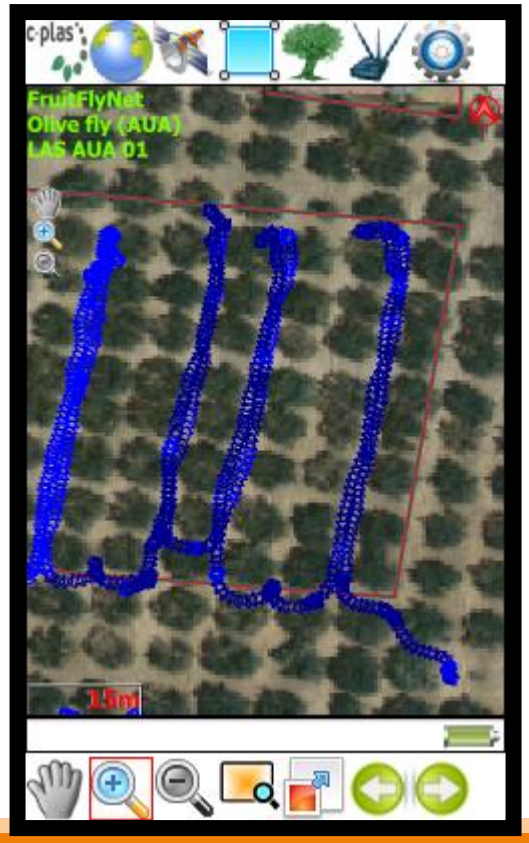
DSS D and E: Spraying (Conventional plot)

Tracking path



Decisions, Locating sprayed trees

During spraying

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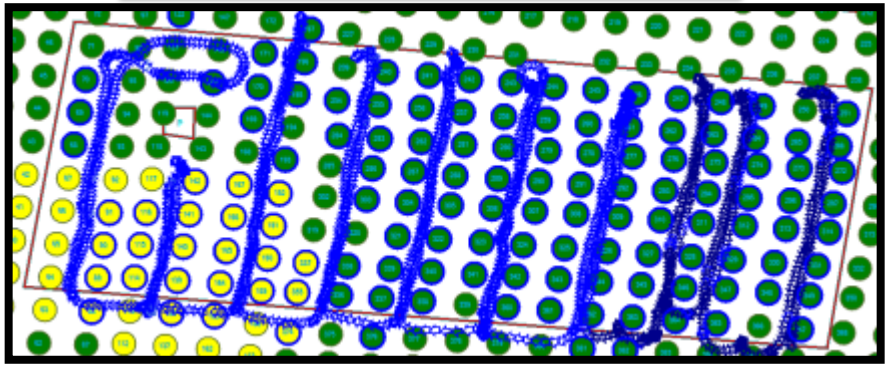
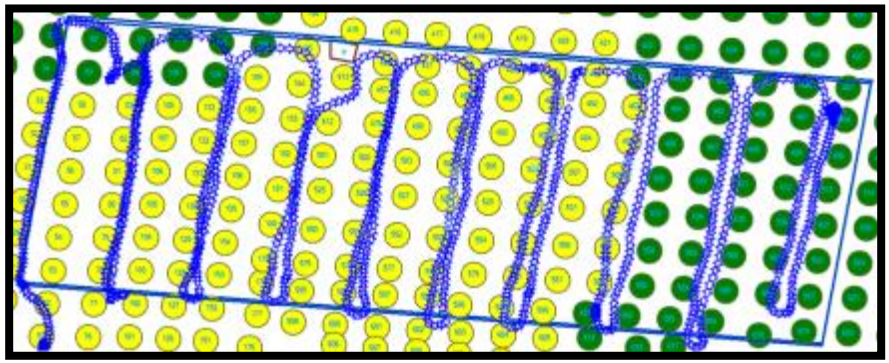
DSS D (how to spray): Tracking paths (LAS)

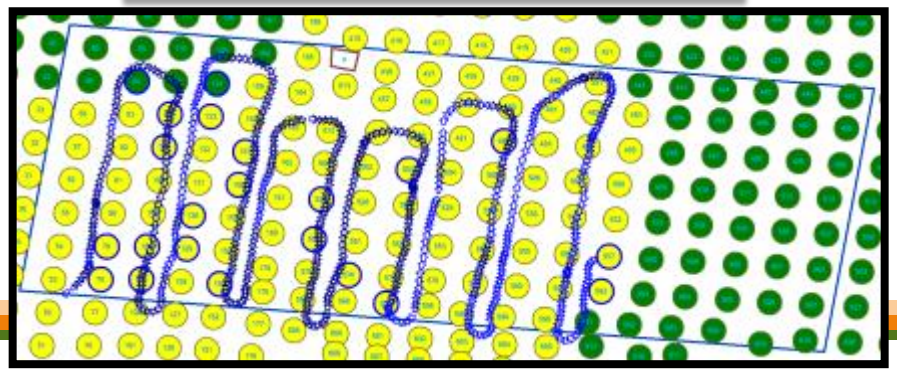
Application B
Plot B, Conventional spray



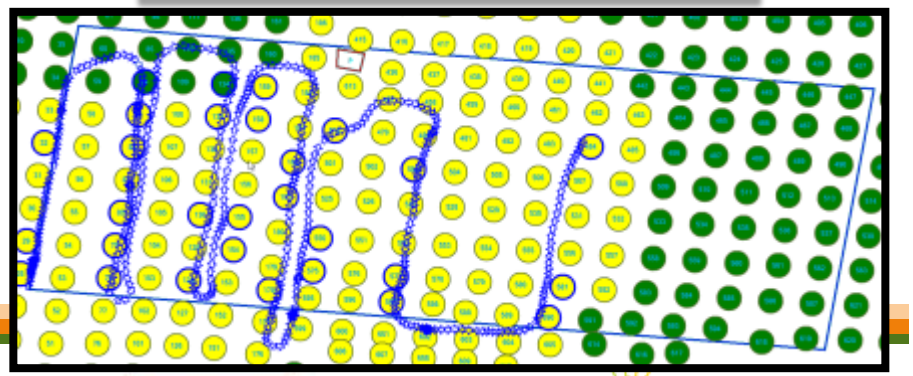
Application A1
Plot A, Conventional spray



Application A2
Plot A, LAS spray



Application A3
Plot A, LAS spray



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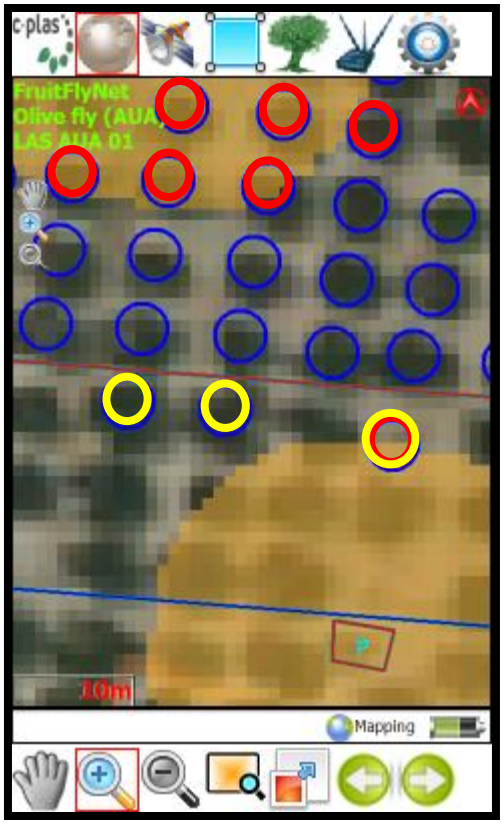
Off target spraying (Conventional plot)

Protected area sprayed

Non target area sprayed

Protected area sprayed in non target area



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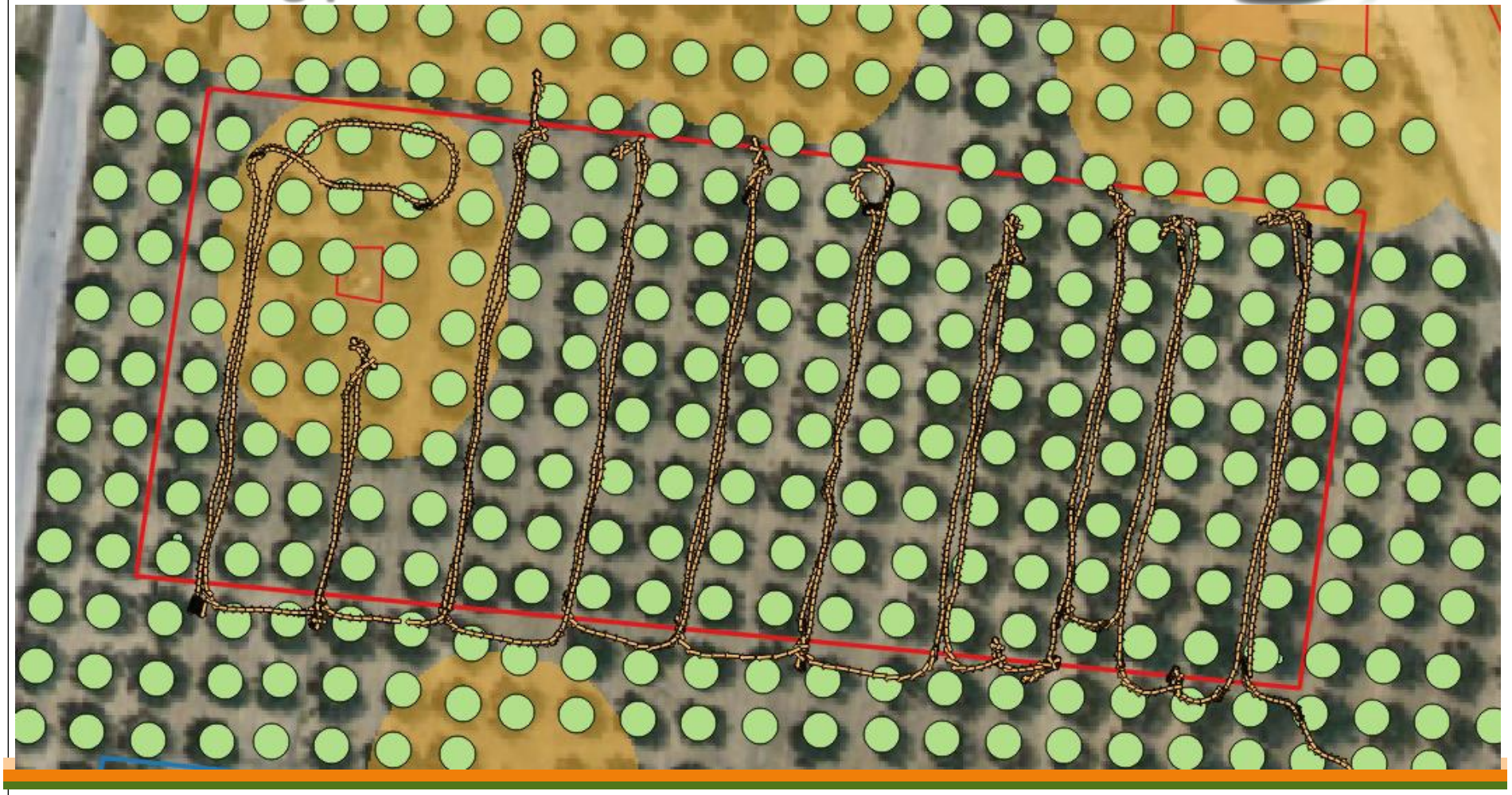
Spraying (Conventional plot)
Tracking path



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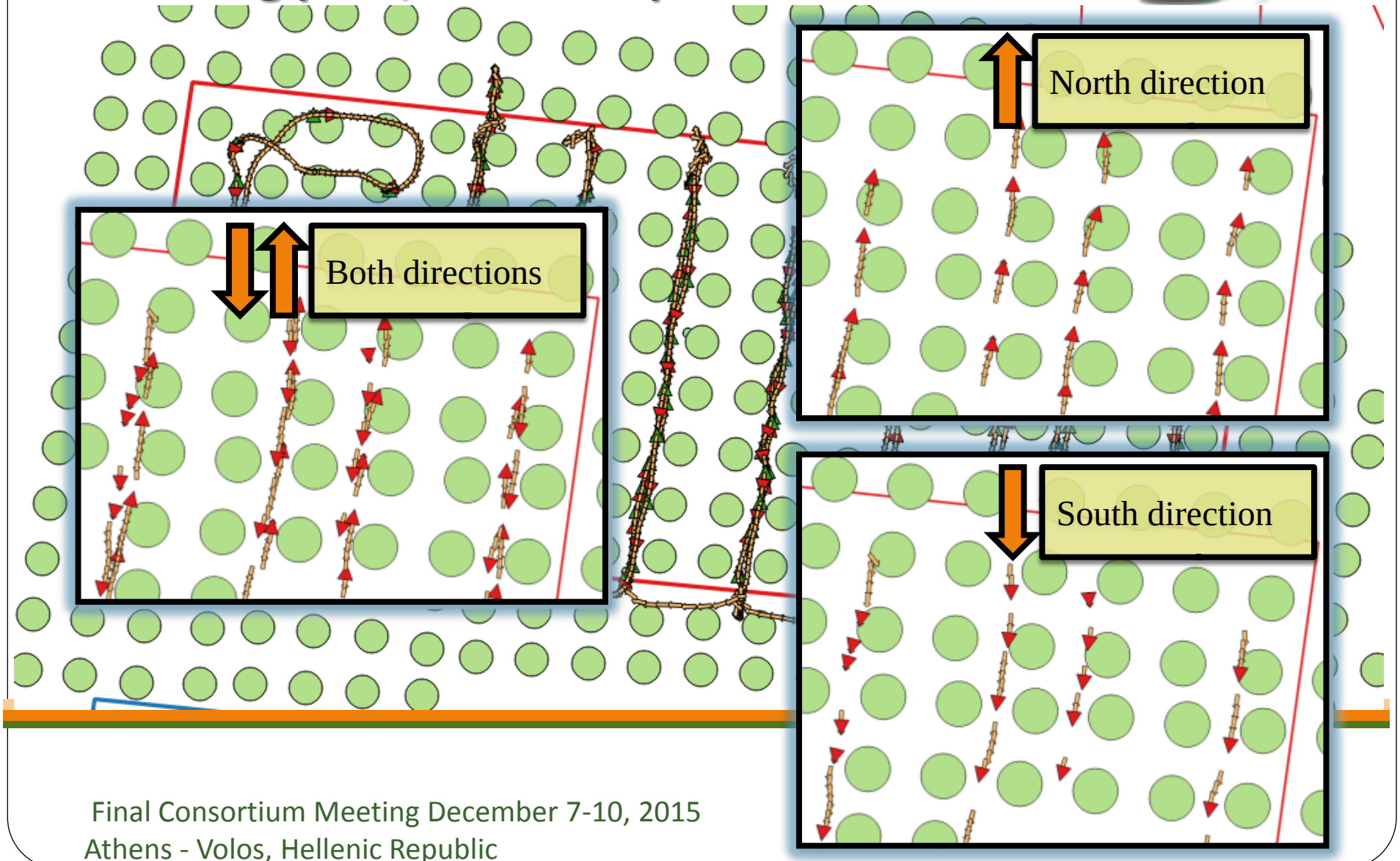
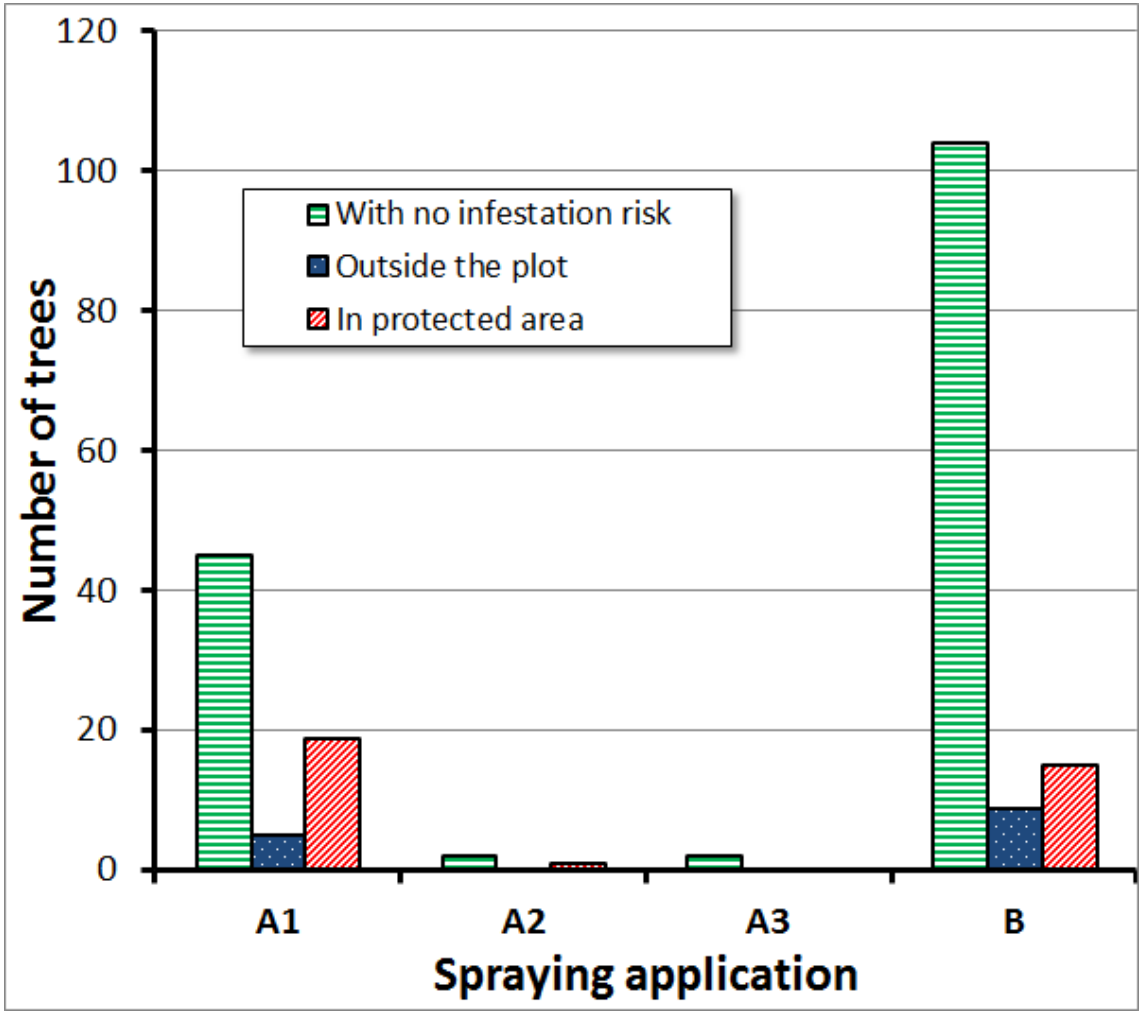
Spraying (Conventional plot)
Tracking path, start-end points



Off target sprayings of each application



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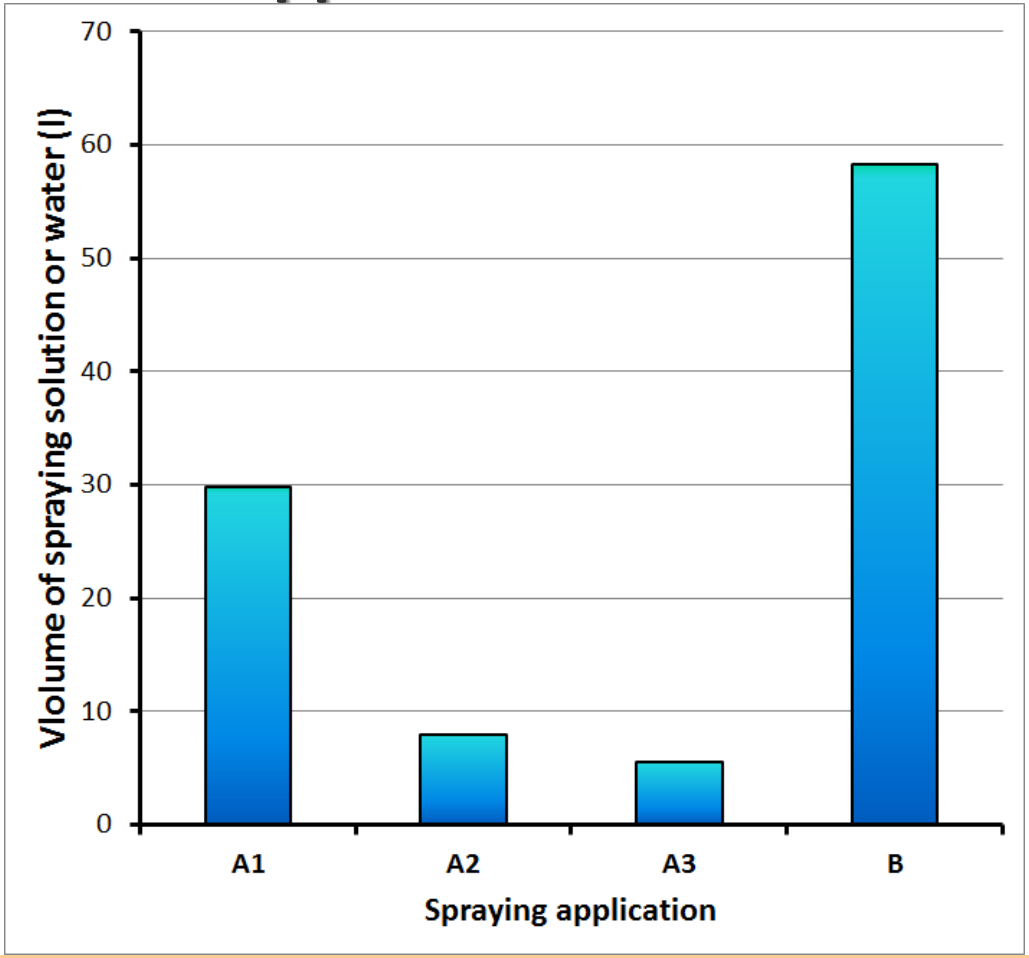
Volume of the spraying solution or water applied of each application



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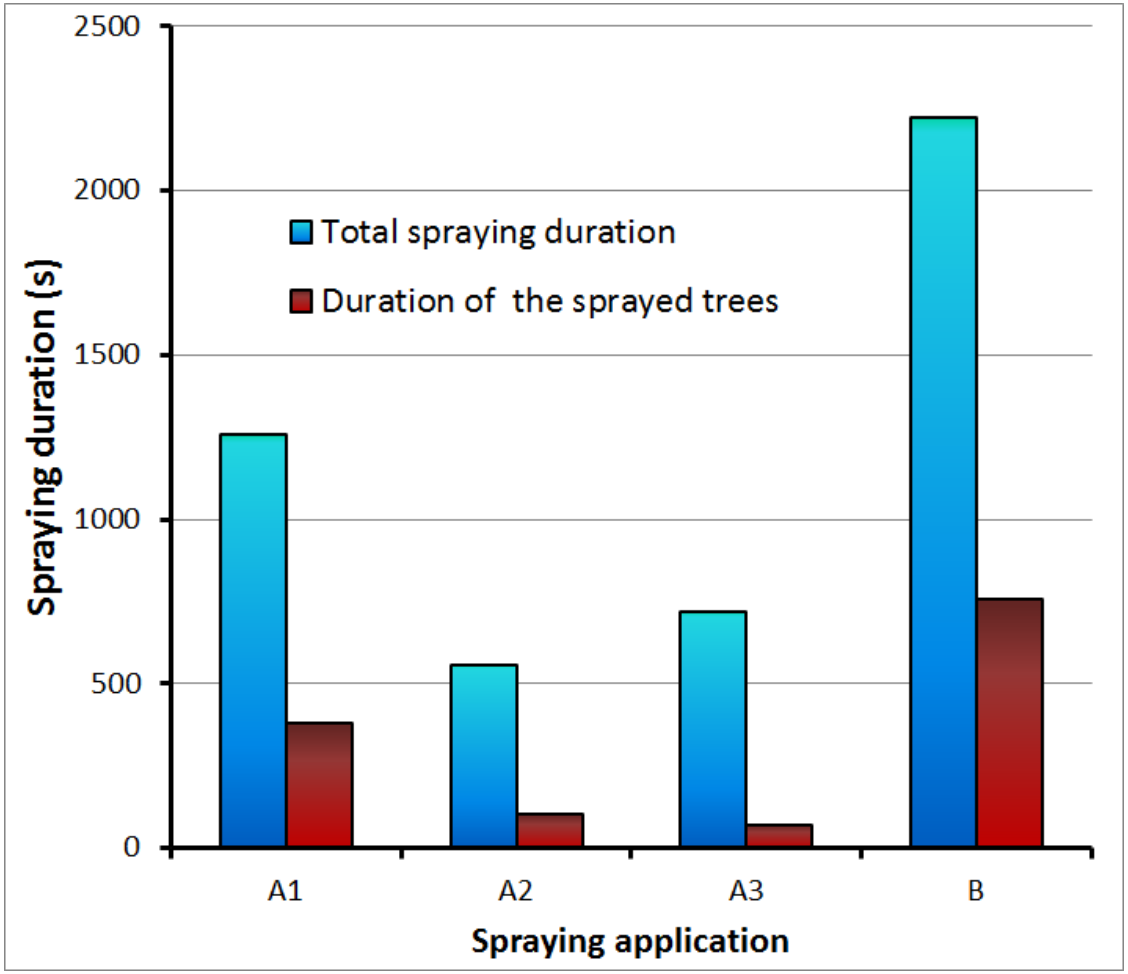
Spraying duration of each application



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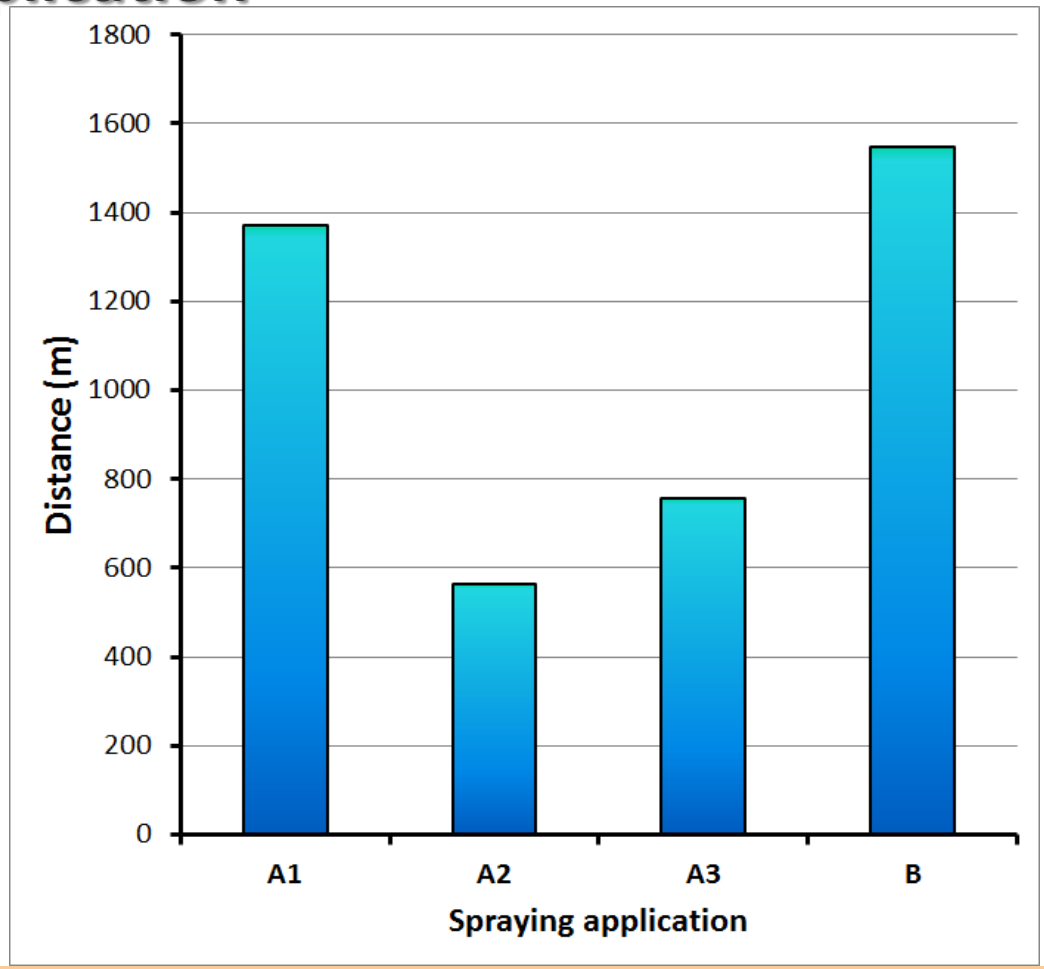
Length (distance) of the tracking path of each application



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Spraying (Conventional PLOT-No LAS)

Setup

Action

Recording

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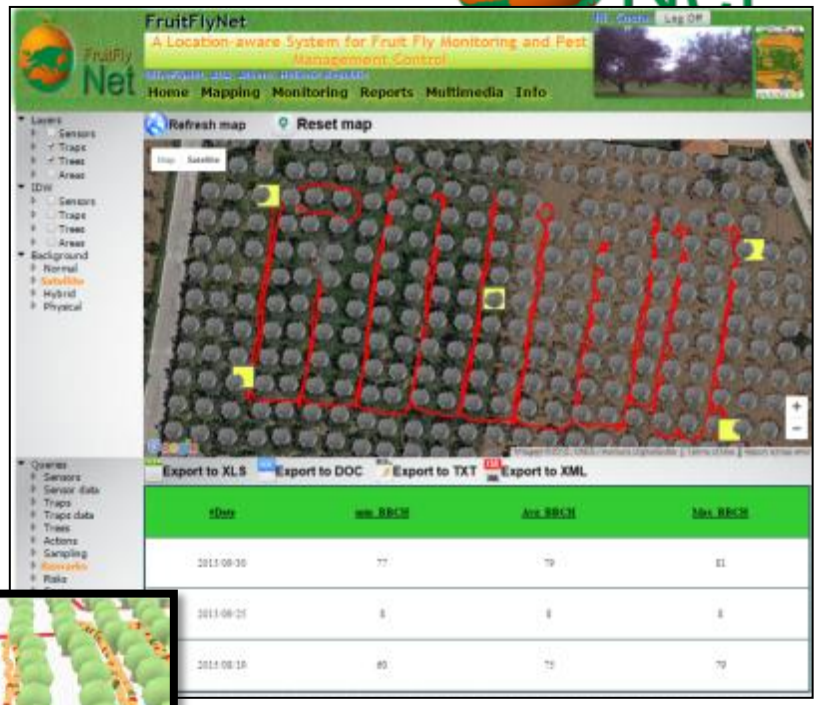
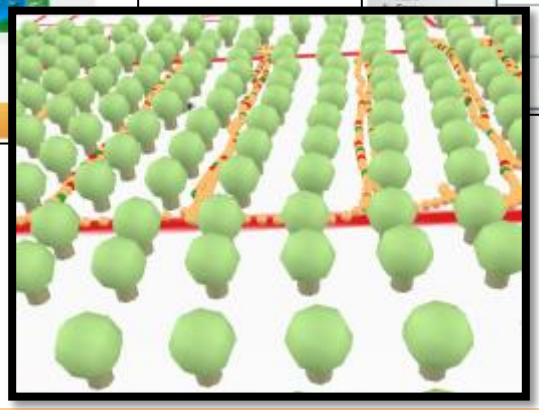
Distribution of the data using Web mapping





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Conclusions

- In LAS applications less off target sprayings occurred, less spraying solution was used, the duration of the sprayings and the length of tracking paths were less than Conventional applications
- Due to these results the cost of the treatments can be reduced
- The treatment applications are more environmental friendly
- The public health is protected

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Thank you!!!

Final Consortium Meeting December 7-10, 2015
Athens - Volos, Hellenic Republic

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