Project funded by the EUROPEAN UNION

# FruitFlyNet

Location Aware Systems (LASs) for Fruit Fly Monitoring and Pest Management Control

## E-monitoring and pest management design issues of a location-aware system for olive fly and other fruit fly pests

Dr. Mohammed AlQasem

National Center for Agricultural Research and Extension, Jordan

Presented in OLIVEBIOTEQ 2014, 4 November

Amman - Jordan

# FruitFlyNet Project

- **Title:** A Location–aware System for Fruit Fly Monitoring and Pest Management Control
- **Code:** Standard II-B/2.1/0865/ENPI CBC MED/EU
- **Priority 2:** Promotion of environmental sustainability at the basin level
- **Measure 2.1:** Prevention and reduction of risk factors for the environment and enhancement of natural common heritage
- **Budget:** € 1.662.872,32
- **Programme contribution (90%):** € 1.496.585,09
- **Project co-financing (10%):** € 166.287,23
- **Duration:** 24 months
- **Start Day:** 31.01.2013
- **End Day:** 31.12.2015
- **Website:** fruitflynet.aua.gr

**Contact person:**
Mr. Theodore Tsiligiridis
Professor on Networking and ICT in Agriculture
Informatics Laboratory,
Agricultural University of Athens
e-mail: tsili[at]aua[dot]gr
tel: +30 (210) 529.4176,
fax: +30 (210) 529.4176
skype: tsiligiridis.theodore

Project funded by the EUROPEAN UNION

ENPI CBCMED

# FruitFlyNet Project

The project is running in five Mediterranean countries. a Location-Aware System (LAS) for fruit fly e-monitoring and spraying control is already under development and it will be deployed and tested for ***Bactrocera oleae*** (in Jordan and Spain). LAS based on a real-time Wireless Multimedia Sensor Network (WMSN) should be able to acquire and transmit data and images from the field to a host station.

Project funded by the EUROPEAN UNION

ENPI CBCMED

# Objective

**General Objective:** To contribute to the development and implementation of environmentally effective e-monitoring and ground spraying control solutions based on prototypes, technological innovations, and knowledge transfer for specific key-pests in the Mediterranean, in order to increase the quality and quantity of available fruit to local consumers at lower prices.

**Indicators:**

1. One prototype developed per case to increase efficacy of sprays per pilot area by the end of the project.
2. Knowledge transfer to the final beneficiaries/ target groups of good practices (reduce sprayings, better applications, etc.) developed by the outputs of the project activities.

Project funded by the EUROPEAN UNION

ENPI CBCMED

# FruitFlyNet Project

**Target Groups:**

- Farmers, growers, landowners
- SMEs, Cooperative Union
- Citizens
- Local communities living near spraying areas
- Phytosanitary inspectors
- Spraying operators

**Final Beneficiaries:**

- Pest-control operational industry
- National and/or International organizations dealing with the supervision of Tephritid control and their geographic expansion
- Agricultural, Environmental Protection, UN Food, UN FAO, IAEA Institutes and/or Organizations

Project funded by the EUROPEAN UNION

ENPI CBCMED

# Indicators

1. Five (5) operational pilots developed by **month (21)** in each one of the participating countries. Prototyping FruitFlyNet solutions in representative application scenarios applied for four key-pests.
2. A semi-automatic, early identification system developed by **month (12)** and based on a distributed imaging sensor network that is able to acquire and transmit images of the trapping area to a remote host.
   - Indicator: Number of visually identified invasive and/or nuisance species per trap and per study area
3. An e-monitoring trap system, developed by **month (15)** integrated with:
   - A distributed imaging sensors network able to visually discriminate insect species or typology
   - A Real-time Trapping and Insect Counting (ReTIC) module able to estimate insect populations, as well as, to support countering measures selection and alarm spraying levels

Project funded by the EUROPEAN UNION

ENPI CBCMED

# Indicators

4. As the cases will be, estimations will be obtained, with and/or without the use of LAS, by **month (22)** on:
   - The amount of pesticide used
   - Fruit Fly Infestation levels (Infestation risk) with and without LAS
   - The number of captured fruit flies by the ReTIC/LAS trapping devices, per fly and per trap
   - The tractor's optimum path for each spraying area
   - The fuel and water consumption for sprayings
   - Statistics acquired from the agro-meteorological stations

Project funded by the EUROPEAN UNION

ENPI CBCMED

# Main expected results

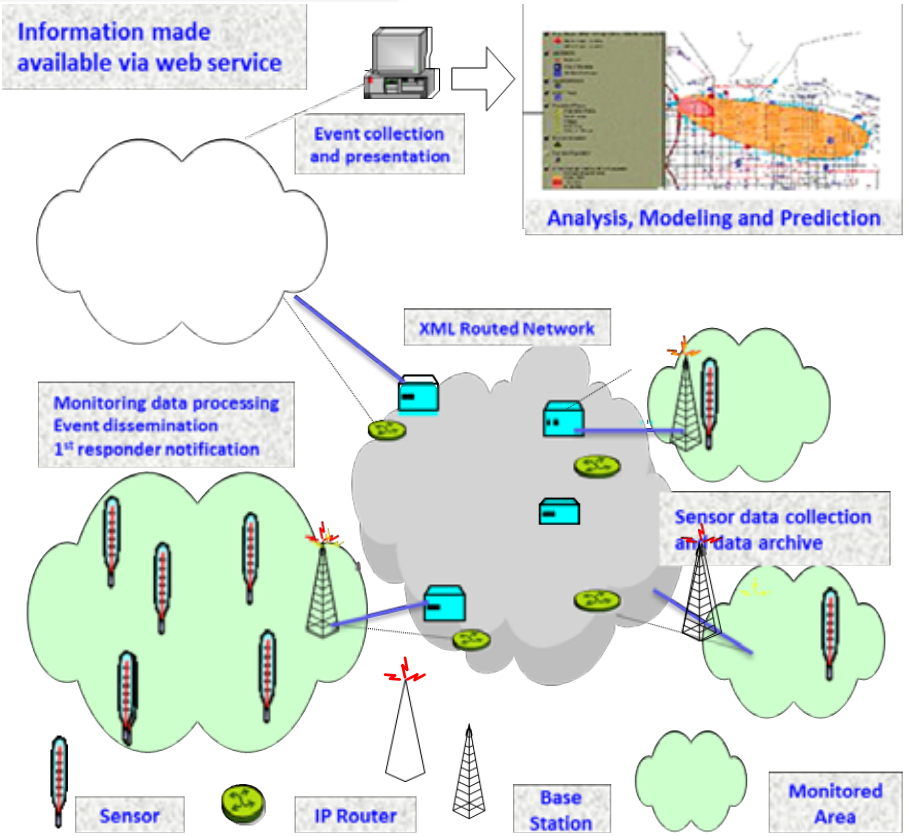
- An operational pilot in each one of the five Med-countries, prototyping *FruitFlyNet* solutions in representative application scenarios applied for four key-pests

- An e-monitoring system, integrated with a Real-time Trapping and Insect Counting (ReTIC) module to estimate insect populations, and support countering measures selection and alarm spraying levels

Project funded by the EUROPEAN UNION

ENPI CBCMED

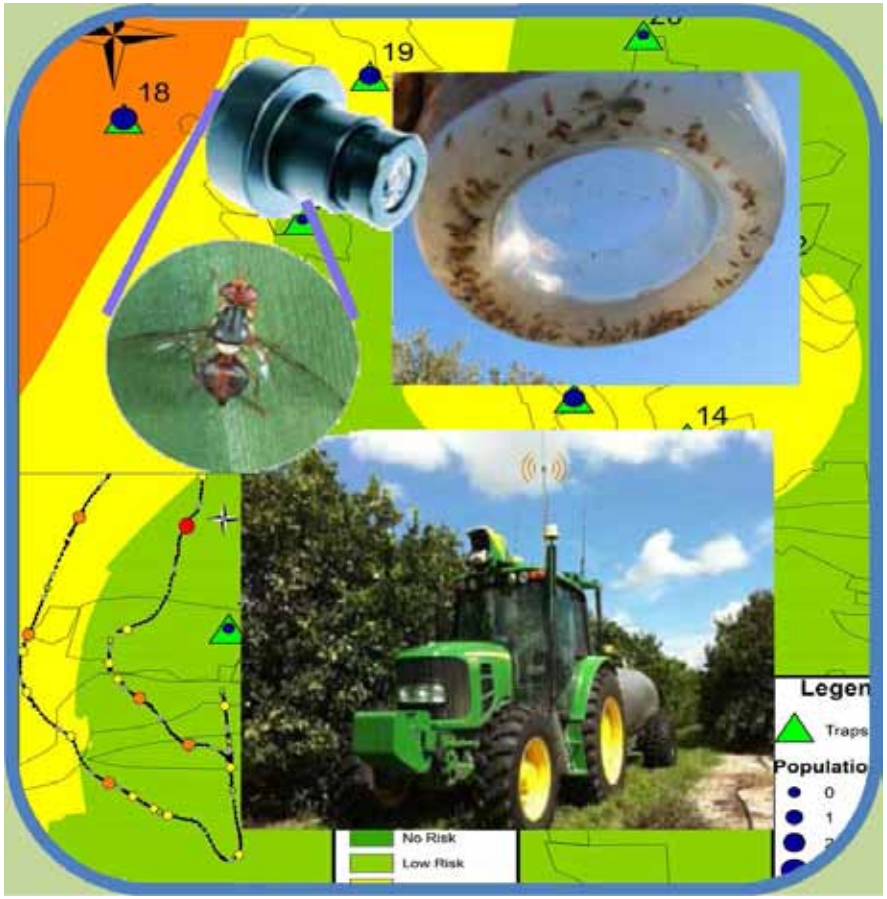
# High-Level Architecture: multiple WSN, fixed Core




- Examples:
  - Monitoring hazard areas
  - Farm monitoring
  - Monitoring insects
  - Precision agriculture
  - Reliable Identification
- Wireless Sensor Networks:
  - Dynamic re-tasking
  - New sensor types/data
  - Improved algorithms and protocols
- Fixed Networking:
  - Distribute sensor data to different recipients
  - Discover sensors and their capabilities

Project funded by the EUROPEAN UNION
ENPI CBCMED

# ***FruitFlyNet*** Project




Project
funded by the
EUROPEAN UNION

ENPI
CBCMED

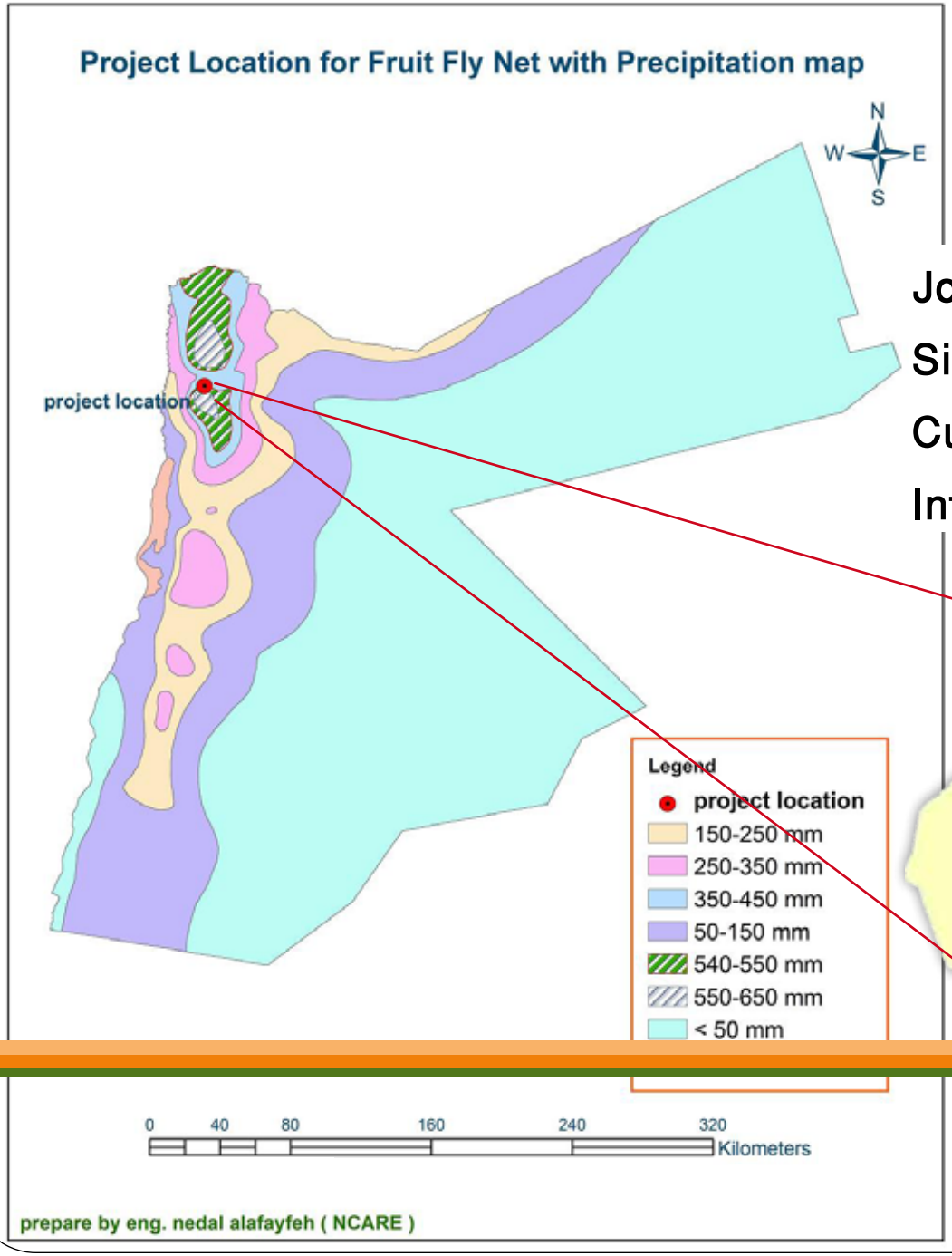
# Specific Objective

To develop, implement, test, and demonstrate an innovative, integrated, Location Aware System (LAS) for fruit fly ground spraying control, by means of four (4) pilot prototypes in five (5) Med-countries aimed at developing prototypes, technological innovations and knowledge transfer.

| Pilot Prototype | Pest | Country<br>Eligible area | Implementing<br>Partner |
|---|---|---|---|
| OliveFlyNet | Bactrocera oleae | Spain (Islas - Baleares) | PP4 (BIU) |
| | | Jordan (Al-Balqa) | PP2 (NCARE) |
| CherryFlyNet | Rhagoletis cerasi | Greece (Thessaly) | PP5 (UTH) |
| MedFlyNet | C. capitata | Italy (Lazio) | PP3 (CRA – FRU) |
| InvasiveFlyNet | Bactrocera zonata<br>Dacus ciliatus | Israel (Arava) | PP1 (ARO) |
| Test site | Bactrocera oleae | Greece (Attiki) | A (AUA) |

Project funded by the EUROPEAN UNION

ENPI CBCMED




FruitFly Net

Jordan SCENARIO

Site Location: Balqa, AlSoubiehi area

Cultivar: "Nabali", susceptible

Infestation levels: High


Project funded by the EUROPEAN UNION

ENPI CBCMED

Jordan SCENARIO

Experimental design:

3 Blocks contains 3 Treatments (3 Plots) 100×100m each

Treatment 1 (LAS)

Treatment 2 (farmers practices)

Treatment 3 (Control)

Buffer zone 150-250m

Distance between plots 50-70 m

Distance from field edges 50 m

Project funded by the EUROPEAN UNION

ENPI CBCMED

Jordan SCENARIO

DIGITIZATION

Data have to be digitized in plots include: Orchard, Blocks, Plots , Trees, Sensors, Captures

Climatic data, Damage levels

Spraying process - tractor tracking, trees sprayed

Project funded by the EUROPEAN UNION

ENPI CBCMED

# Estimations/ Goals (1/2)

Compared to common spray tactics against olive, cherry, med, and some invasive fruit flies population the project is expected to achieve:

- An increase by 3-5% of the efficacy of the sprays from ground
- A reduction by 3-5% of the mean spray
- A reduction by 10-15% of the mean spray duration of the spray applications
- A reduction by 10-15% of the spraying volume
- A reduction by 20-25% in the number of insecticide applications

Project funded by the EUROPEAN UNION

ENPI CBCMED

# Estimations/ Goals (2/2)

- Making sprayings more easier and effective
- Achieving fewer, locally applied and more effective sprayings.
- Creating a less polluted and healthier Med-basin Environment

Project funded by the EUROPEAN UNION

ENPI CBCMED


*Thank you!!!*

Project
funded by the
EUROPEAN UNION

ENPI
CBCMED