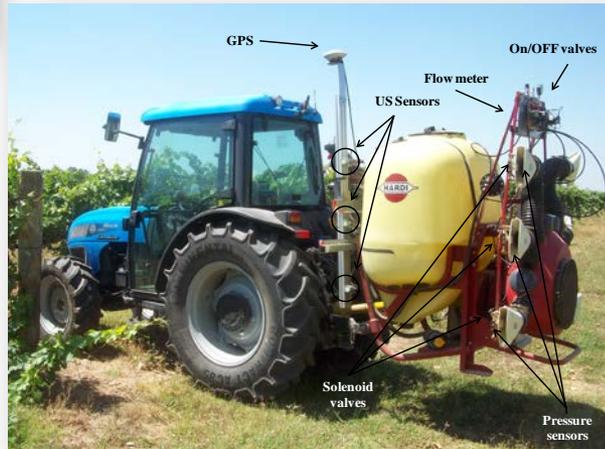


INTERNATIONAL CONFERENCE FIMA-EurAgEng, Zaragoza, February 17th 2016



Innovation in Agricultural Machinery and Spray Equipment in Mediterranean Agriculture

Prof. Emilio Gil

Department of Agricultural Engineering and Biotechnology
Universidad Polit cnica de Catalu na

Challenges regarding to spray application techniques

Productivity – optimization (Cost vs. Gain Approach)

Food quality (input management, market requirements, residues)

Safety (Operator, Environment, Equipment)

Information – Feedback (traceability)



Technologies providing potential answers
Dosage - Volume/ha adjustment
GNSS based solutions (traceability, guiding)
Canopy detection and adjustment
Drift management

Every crop production industry has unique specifications
MEDITERRANEAN AGRICULTURE PRESENTS SPECIFIC REQUIREMENTS

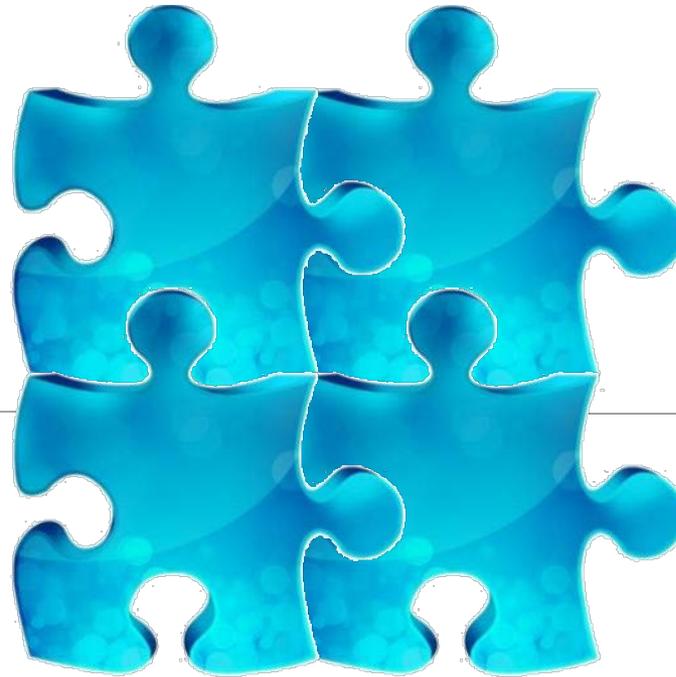








Pesticide Authorisation (placing on the market) 2009/1107 repl.
Directive 91/414

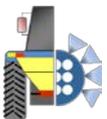


Framework Directive on Sustainable Use of Pesticides (SUD) **2009/128**

Revision of Machinery Directive (Pesticide application equipment) **2009/127**

Water Framework Directive (WFD) 2000/60/EC

TREND: INCREASING FOCUS ON THE USE PHASE OF PESTICIDES

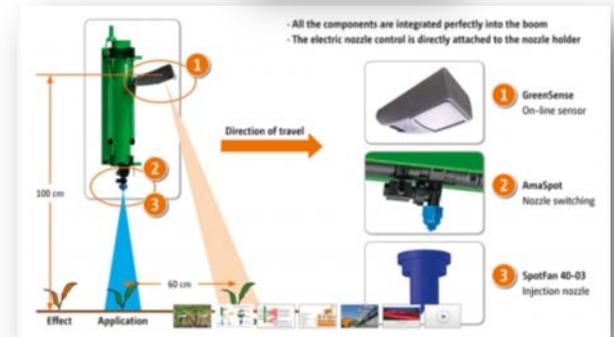
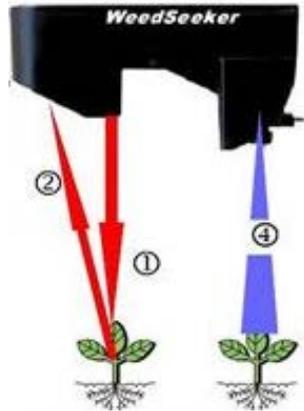


Vegetation detection for site specific applications

AmaSpot sensor nozzle system

WeedSeeker®

Direction of Travel ←

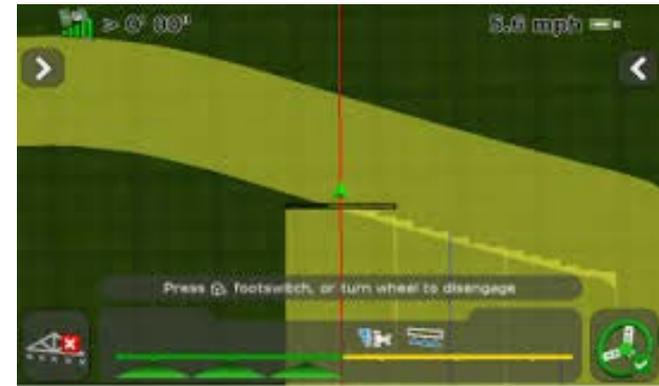


Principles and applications of Boom Section Control

1- Automatic switch of boom sections

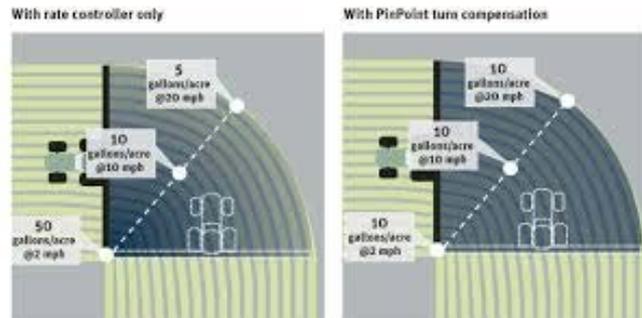


2- GNSS aided control

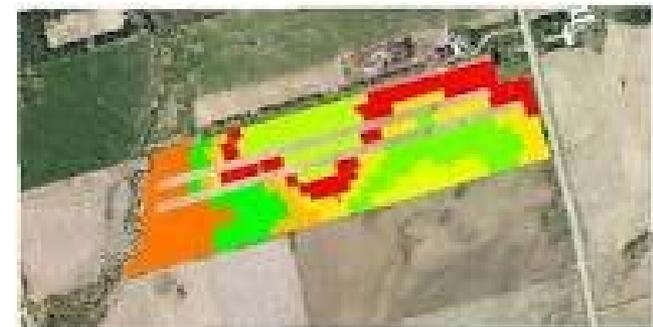


Trimble CFX-750 Display with Field-IQ
Six boom sections

3- Variable rate adaptation



Capstan Ag



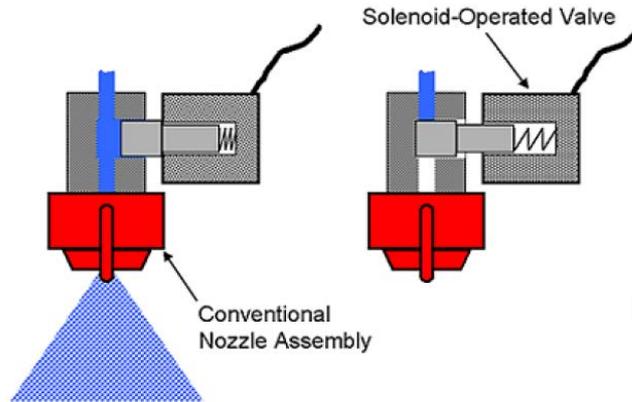
VRA map



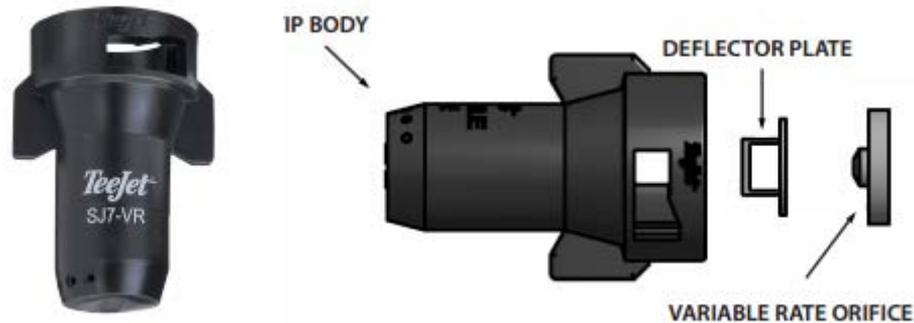




GNSS based solutions : Single nozzle control



PWM control valve - Raven

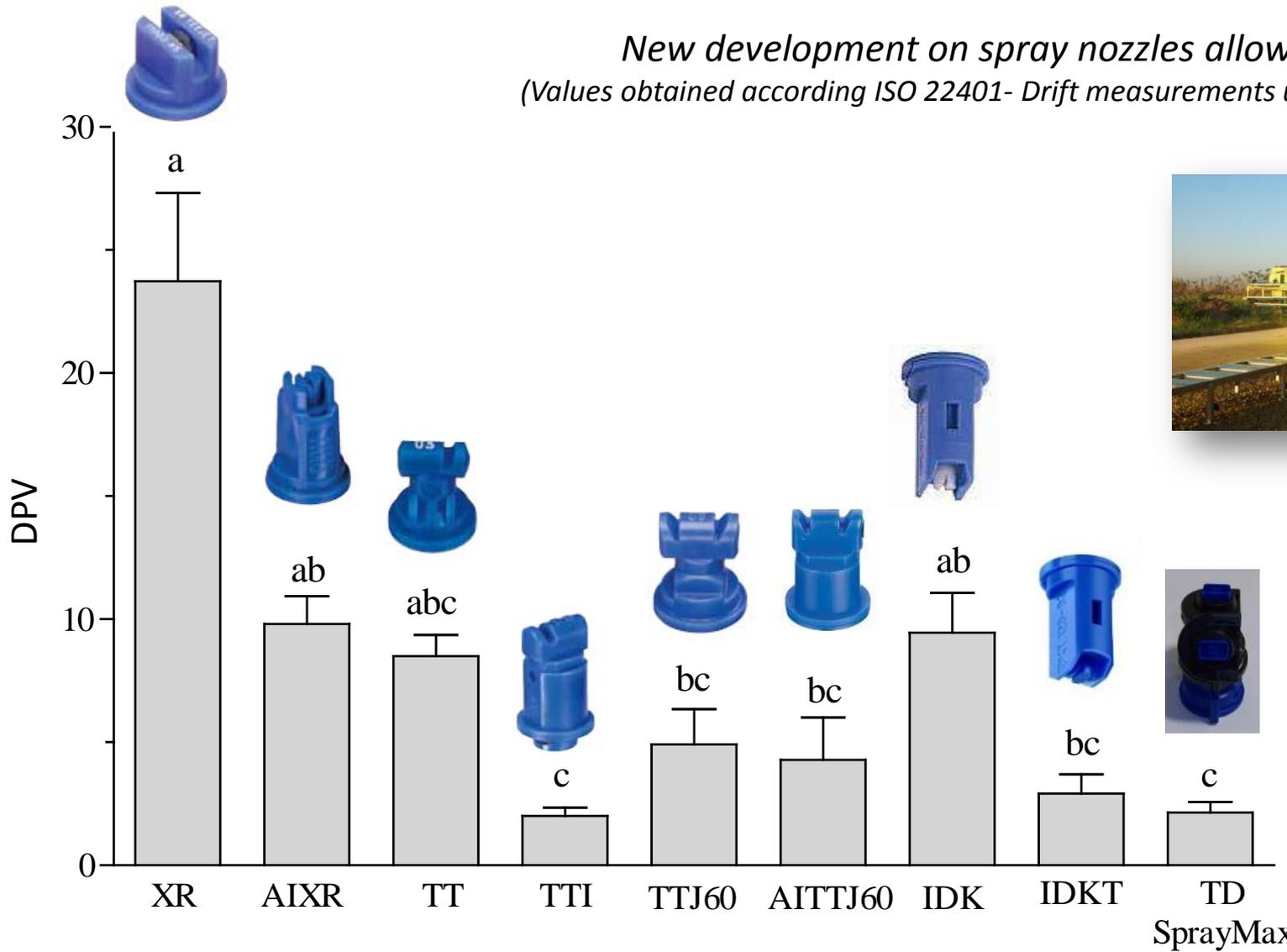


Variable Rate Nozzle - Teejet



Drift

New development on spray nozzles allows to reduce drift
(Values obtained according ISO 22401- Drift measurements using drift test bench)

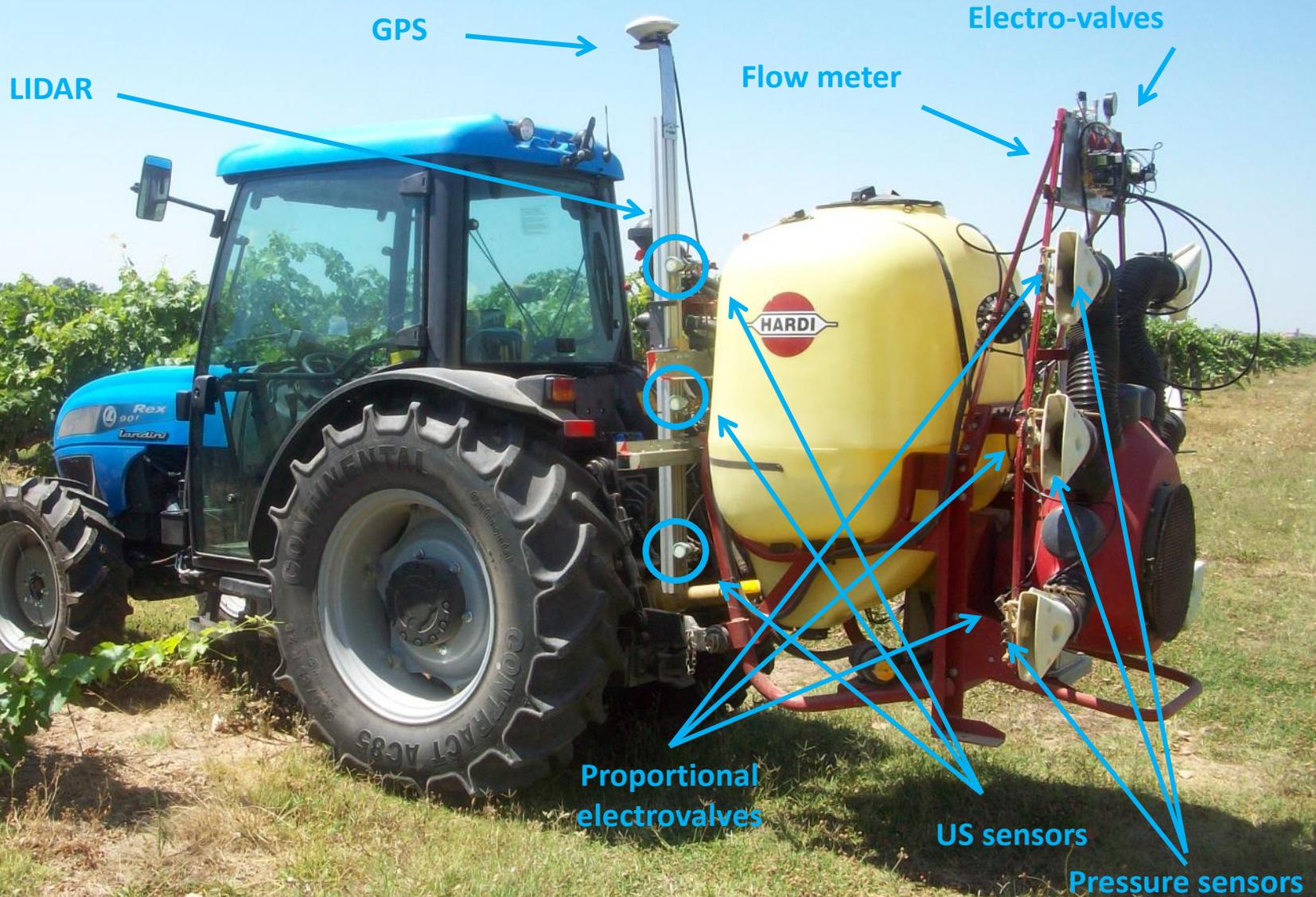


(Gil et al., 2013)



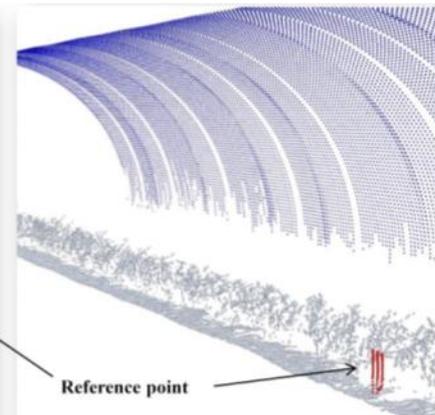
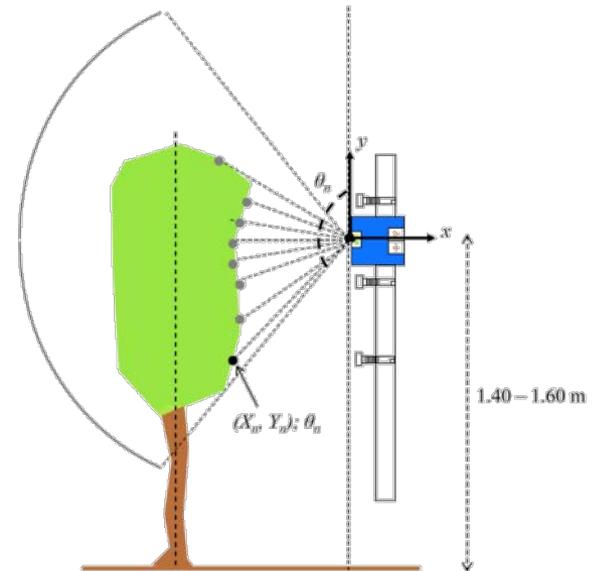


Variable application rate prototype



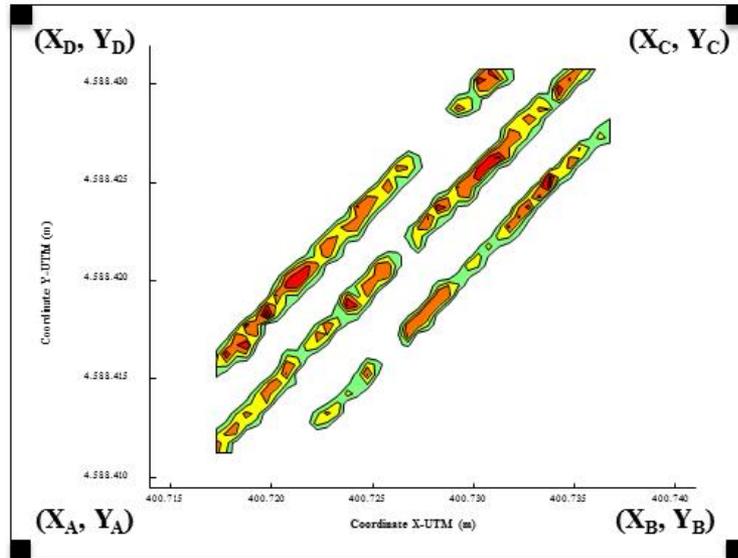
Canopy characterization

Use of sensors

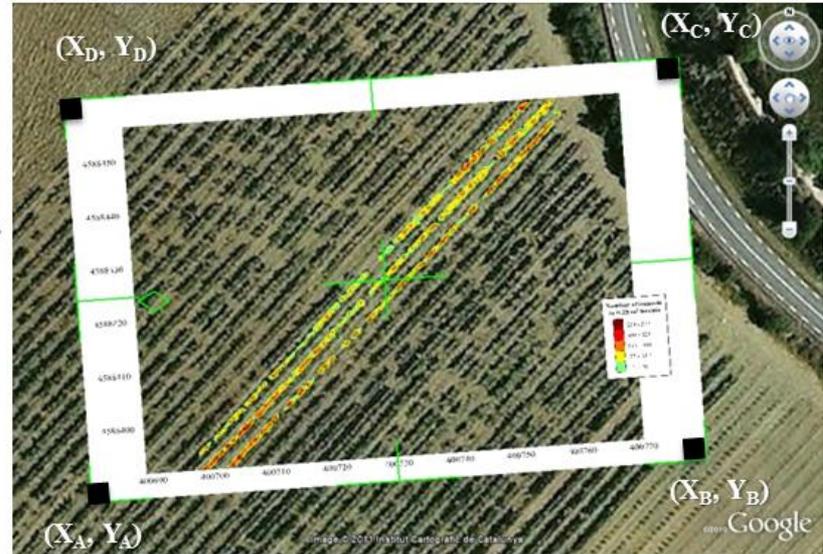


New technologies for canopy characterization

Density map image file (*.gif)



Converted file (*.kmz)



Gil, E.; Llorens, J.; Llop, J.; Fàbregas, X.; Gallart, M. Use of a terrestrial lidar sensor for drift detection in vineyard spraying. *Sensors* **2013**, *13*, 516–534.

Gil, E., Arnó, J., Llorens, J., Sanz, R., Llop, J., Rosell-Polo, JR., Gallart, M., Escolà, A. 2014. Advanced Technologies for the Improvement of Spray Application Techniques in Spanish Viticulture: an overview. *Sensors* **2014**, *14*, 691-708





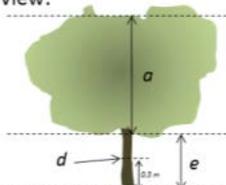
Healthy Crop,
Healthy Environment,
Healthy Finances



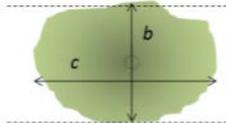
Ellipsoid volume



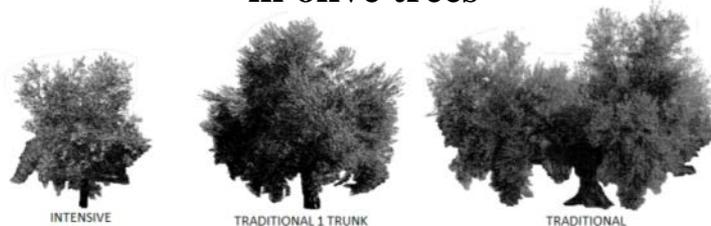
Lateral view:



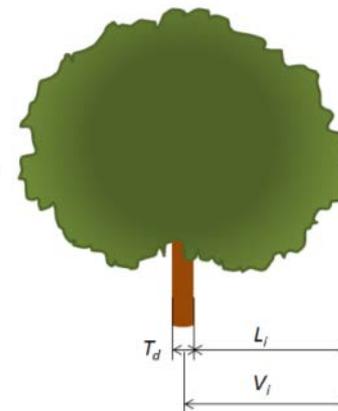
Top view:



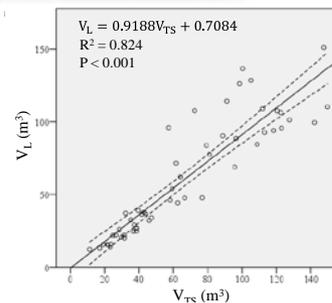
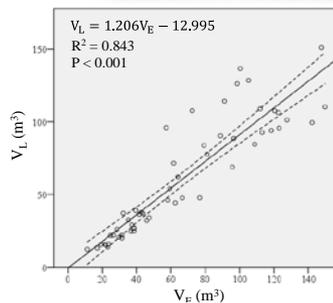
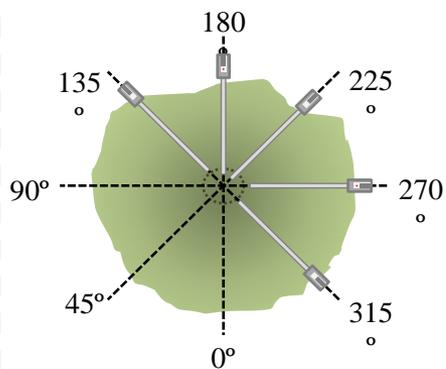
Tree crown volume measurements in olive trees



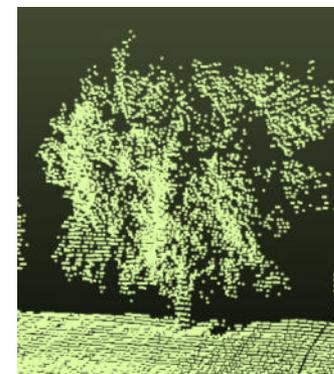
Vertical crown projected Area



Tree silhouette



LiDAR canopy characterization

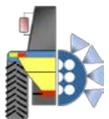


spray drift – ISO 22866

Quantity of plant protection product that is carried out of the sprayed(treated) area by the action of air currents during the application process



Drift management (boom sprayers)





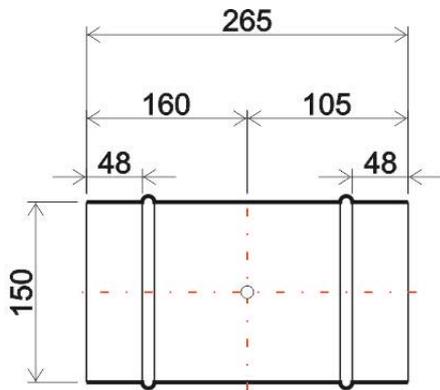
Drift management (bush and tree crop sprayers)



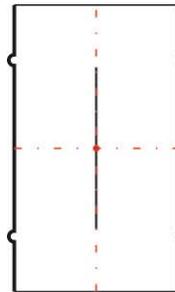
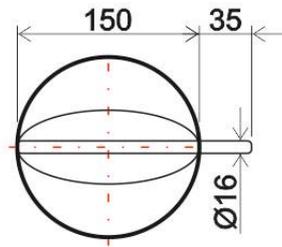


DriftStopper EVO (Caffini, SpA)

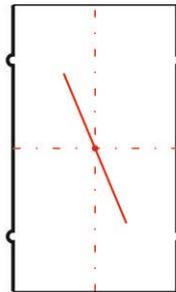




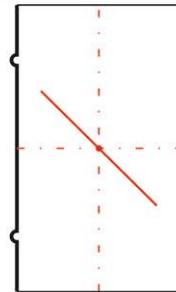
cotes en mm



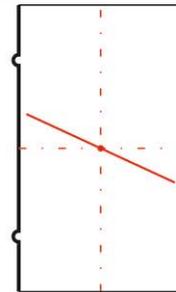
100%



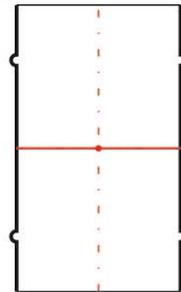
75%



50%



25%



0%



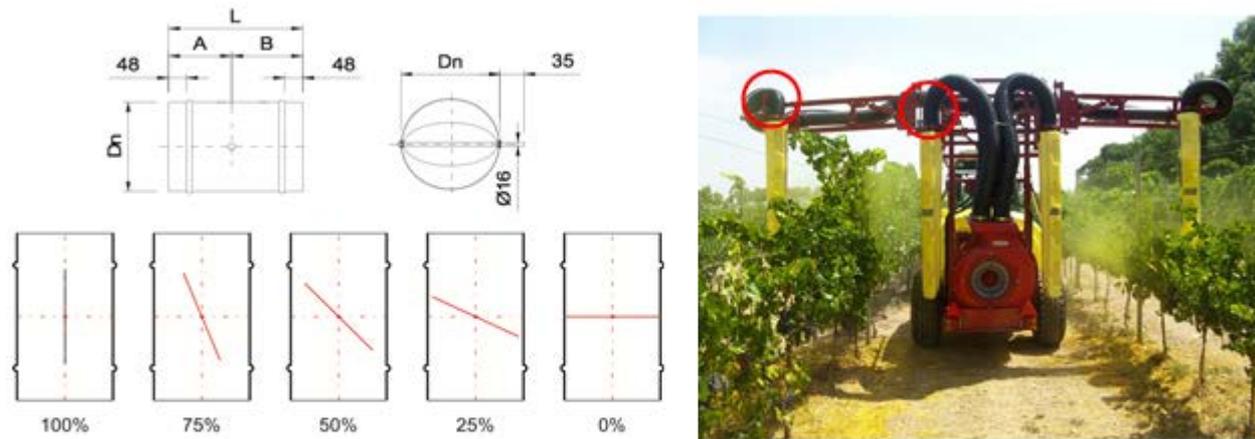
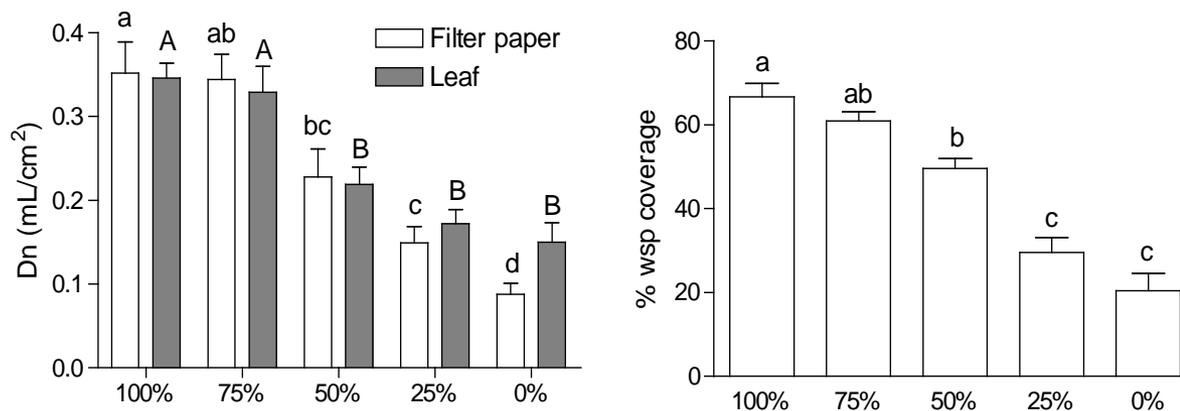


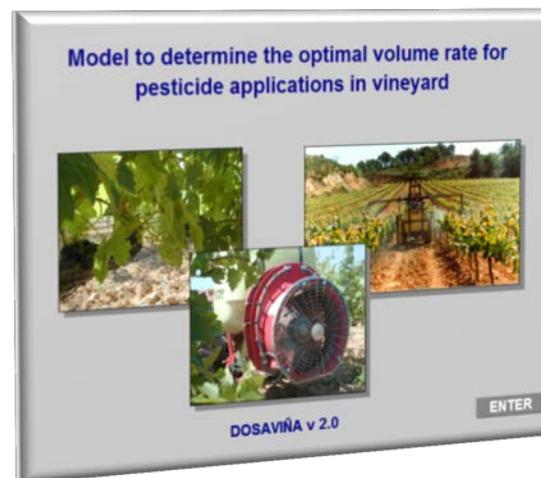
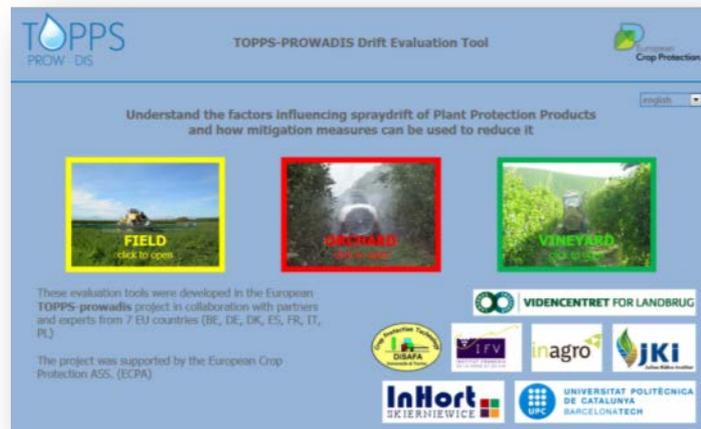
Figure 1. Technical characteristics of the adjustable valve (left) and Iris 1500 L sprayer (Ilema Hardi S.A.U.) modified for the trials (right).



(Developed by UPC)



Drift Evaluation Tool (TOPPS)



DOSAVIÑA - (Developed by UPC)



EU Directive 128/2009/CE



Sprayers in use
(farmers, advisors)

- Calibration
- Inspection
- BMP
- Drift reduction



EU Directive 127/2009/CE



New sprayers
(manufacturers, distributors)

- Environmental aspects
- Inspection
- Drift reduction
- Adjustment





CHAFAEA
Consumers, Health, Agriculture and Food Executive Agency

EUROPA > European Commission > Chafea > BTSF > Call 2013: Tenders - Training activities on The Rapid Alert System for Food and Feed (RASFF)

Organization and implementation of training activities on inspection and calibration of pesticide application equipment in professional use



ENVIRONMENT
LIFE Programme

European Commission > Environment > LIFE Programme

Project LIFE-FITOVID- Implementation of Demonstrative & Innovative Strategies to reduce the use of plant protection products in viticulture



TOPPS – WATER PROTECTION – Train the Operators to Promote best management Practices and Sustainability



FITOVID
LIFE 2014-2020

Hacla la reducci3n del uso de fitosanitarios en viticultura

Investigaci3n para reducir el uso de productos fitosanitarios en el sector vit3culo a trav3 de:

- La puesta en marcha de estrategias de control del mildu y o3ido segun las zonas agroclimaticas.
- La aplicaci3n de diferentes productos fungicidas y otros medios de defensa fitosanitaria.
- La calibraci3n de equipos agr3colas aplicadores.
- El an3lisis de residuos y evaluaci3n de la biodegradabilidad.
- La medici3n del impacto a nivel medioambiental, econ3mico y social.

www.fitovid.eu

Partners: neiker, agri, tecnalia, etc.





EIP-FOCUS GROUP PRECISION FARMING

AGRICULTURA Y DESARROLLO RURAL

<http://ec.europa.eu/eip/agriculture/>

Comisión Europea > Agricultura y Desarrollo Rural

Legal notice | Cookies | Contact on Europa | Search on Europa | My account | English (en) ▼

SHARING KNOWLEDGE - CONNECTING PEOPLE - TACKLING CHALLENGES

eip-agri
AGRICULTURE & INNOVATION

Home | About ▼ | Share ▼ | Meeting Point ▼ | Events ▼ | News ▼ | Publications | Focus Groups ▼
Service Point ▼ | Register/Login

Animal husbandry
Fertiliser efficiency
Genetic resources
High Nature Value
IPM for Brassica

Mainstreaming precision farming

How to organise the data capture and processing to mainstream the application of precision farming for an optimisation of inputs and yield?

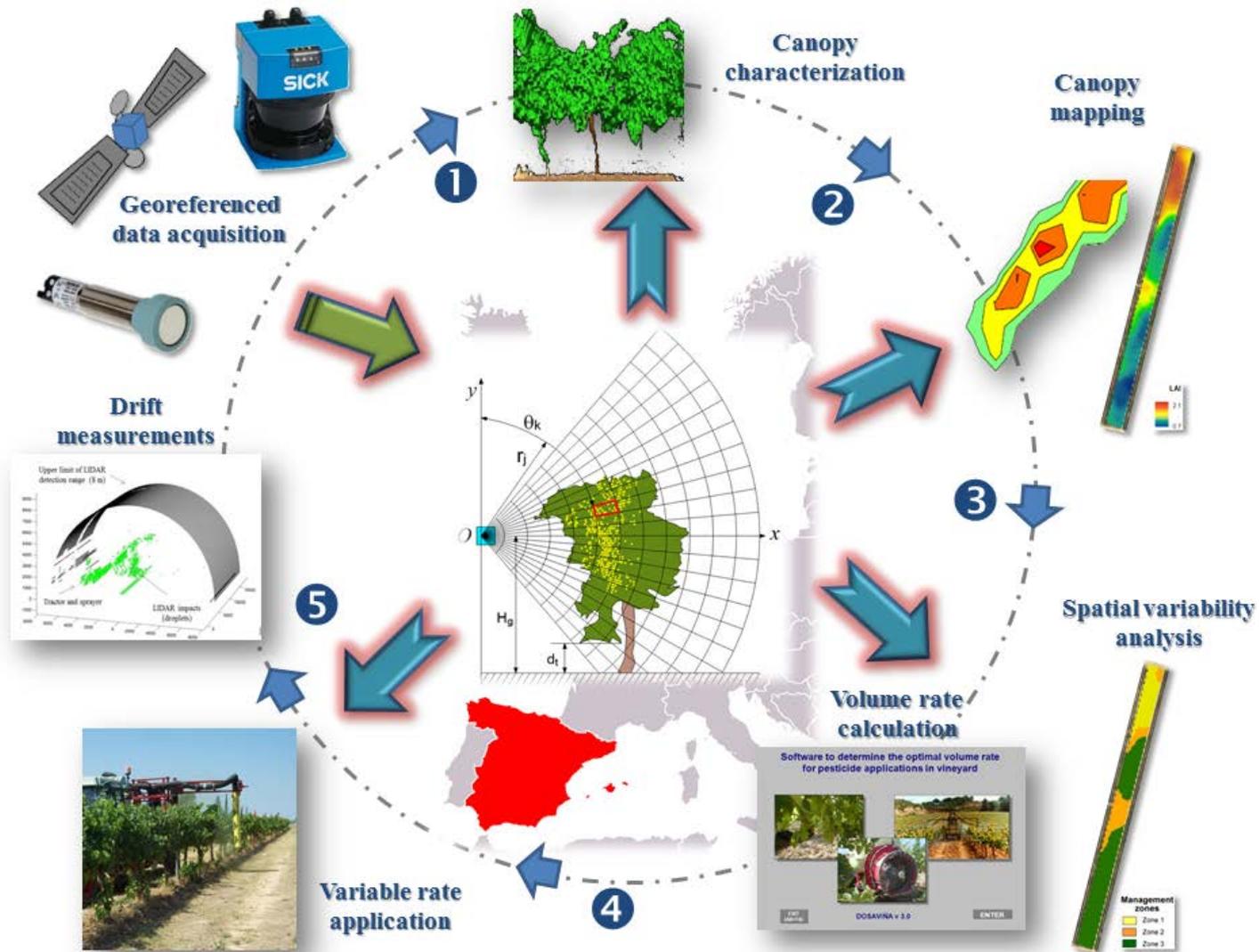
file:///C:/Users/EMILIO/Desktop/eip-agri_focus_group_on_precision_farming_final_report_2015.pdf



Unidad de Mecanización Agraria
<http://uma.deab.upc.edu>



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH



Gil, E., Arnó, J., Llorens, J., Sanz, R., Llop, J., Rosell-Polo, JR., Gallart, M., Escolà, A. 2014. Advanced Technologies for the Improvement of Spray Application Techniques in Spanish Viticulture: an overview. *Sensors* 2014, 14, 691-708





Thank you very much