

DOSA3D system

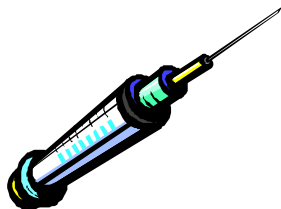
Dose expression & dose adjustment in the EU-Southern Zone

Santiago Planas
Generalitat de Catalunya, University of Lleida

EPPO - Panel on Efficacy Evaluation of Fungicides and Insecticides
Barcelona, 2017-11-28

Dose in humans

Pharmaceuticals: dose adapted to the body weight of the person



15 kg
child

55 kg
lady - teacher

100 kg
worker



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Workshop on harmonized dose expression for the zonal evaluation of plant protection products in high growing crops

Vienna, 2016-10-18/20

An EPPO Workshop on harmonized dose expression for the zonal evaluation of plant protection products in high growing crops will be held on 2016-10-18/20 in Vienna, Austria. It is organized in collaboration with the Austrian Agency for Health and Food Safety (AGES). The Workshop will take place in AGES, Spargelfeldstraße 191, 1220 Wien. The workshop will start on Tuesday 18th October at 09:00 and finish on Thursday 20th at 12:30, with an optional technical visit in the afternoon. To plan your journey, we inform you that the technical visit will finish late in the evening on Thursday (at 22:00!).

The workshop is organized upon request from EPPO Member Countries concerned with the harmonization of the dose expression in high growing crops (often referred to as 3-dimensional crops); e.g. orchards, vineyards. To allow better exchange of data between countries and to avoid unnecessary repetition of trials, dose expression should be harmonized in trials and in zonal efficacy evaluations. The best way to achieve this is to adopt the

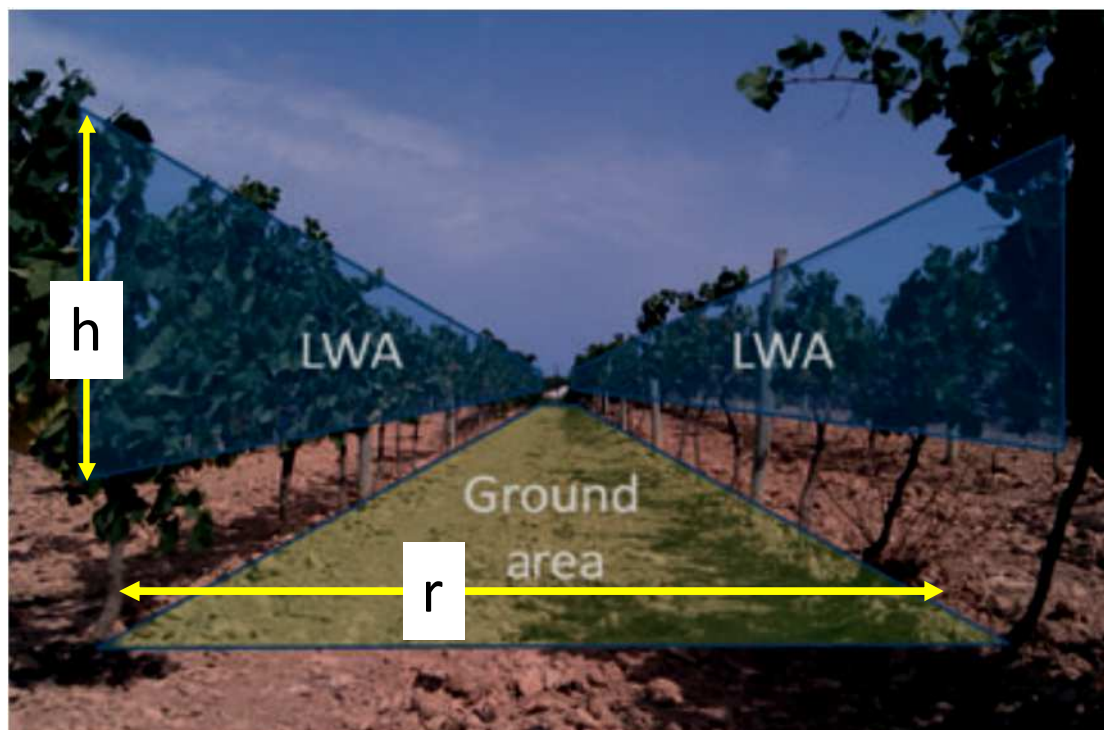
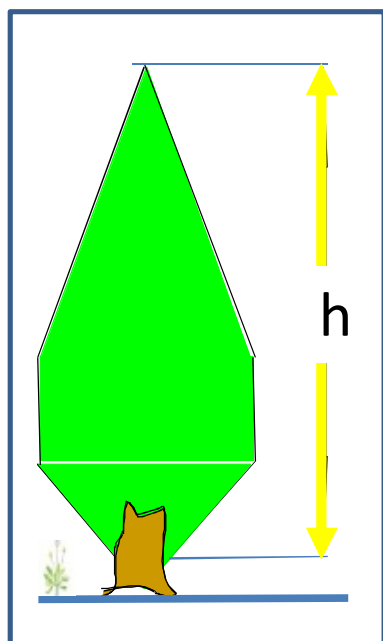


EPPO Workshop – Vienna, 18-20 Oct 2016

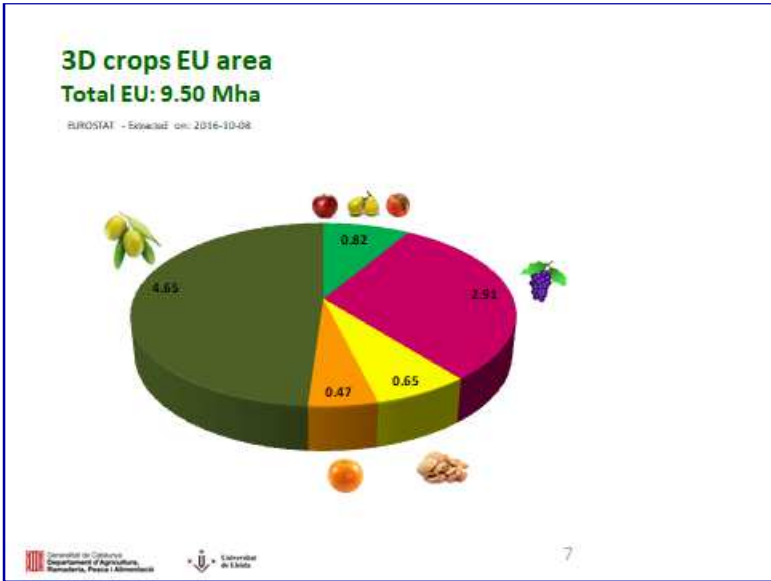
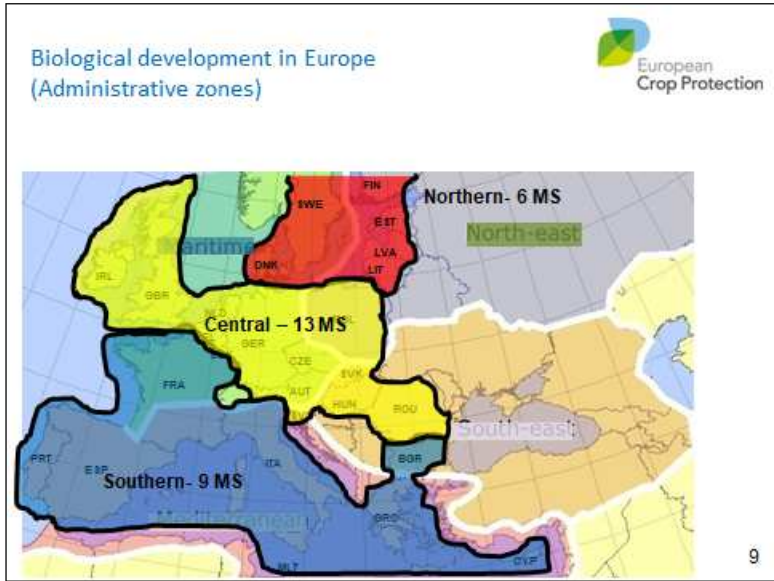
For the zonal evaluation of PPP, Leaf Wall Area (LWA) was agreed as an appropriate dose expression in pome fruit, grapevine and high growing vegetables



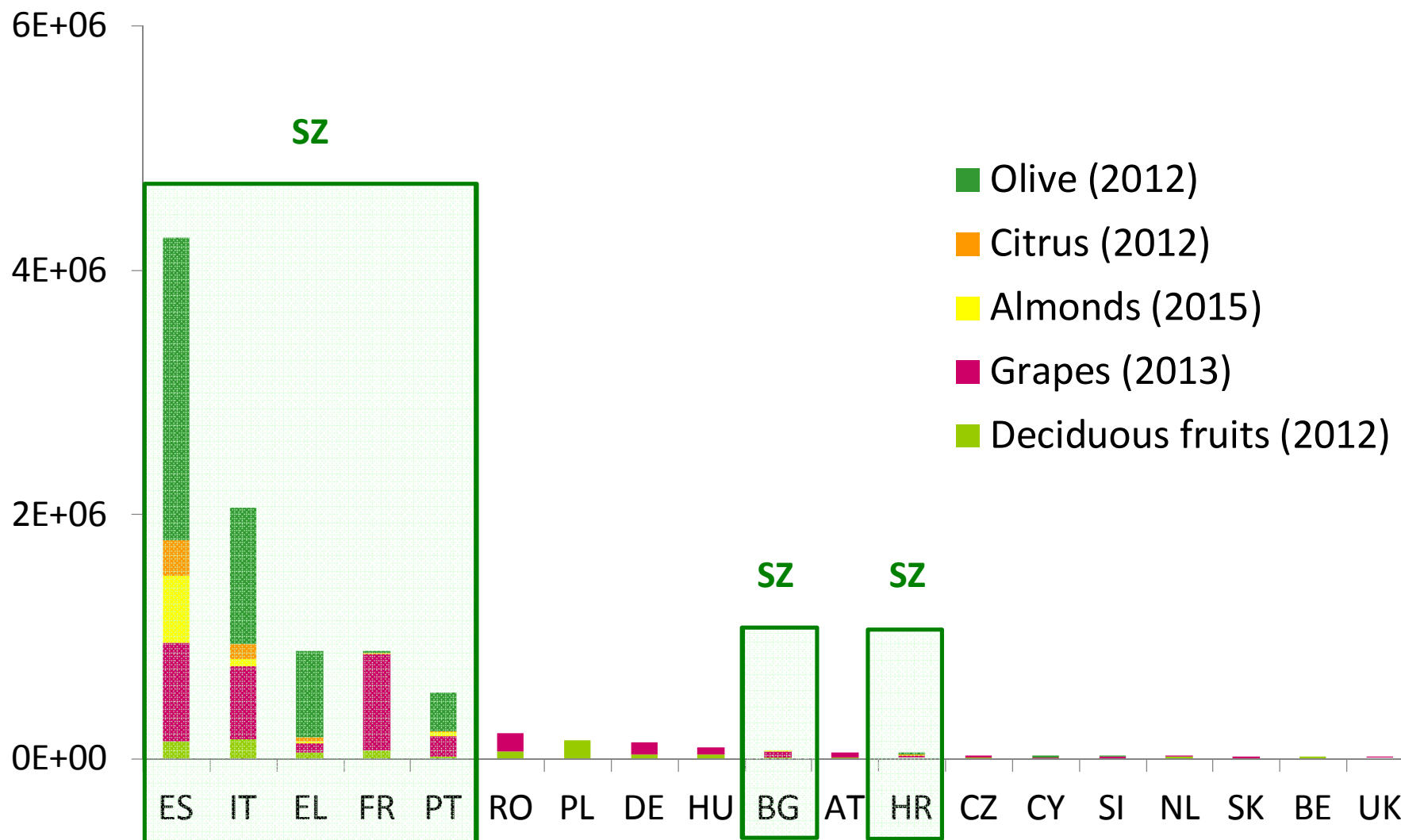
$$LWA(m^2/ha) = 2 * h * 10000 / r$$



Area (Mha) - source: Eurostat (2103), Idescat (2016)				
	EU-28	EU South	España	Catalunya
Utilized Agricultural Area (UAA)	175.35	76.89	23.30	1.15
3D Crop Land (3DCL)	9.51 → 8.70 (92%) → 4.26 (49%)			0.27
Ratio 3DCL/UAA (%)	5%	11%	18%	23%



Production area for EU Member States (ha)





Var. Golden June 2015 ES-Castellserà (Lleida)



June 2016 ES-Montoliu de Lleida



Peaches – paraguay ES-Sunyer (2016)



Grapes var. Parellada , Santes Creus - DO Penedès



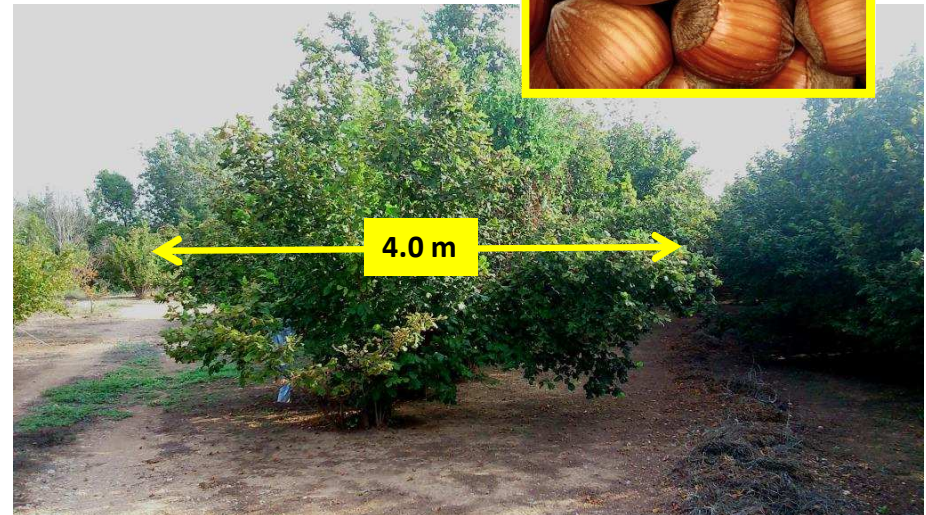
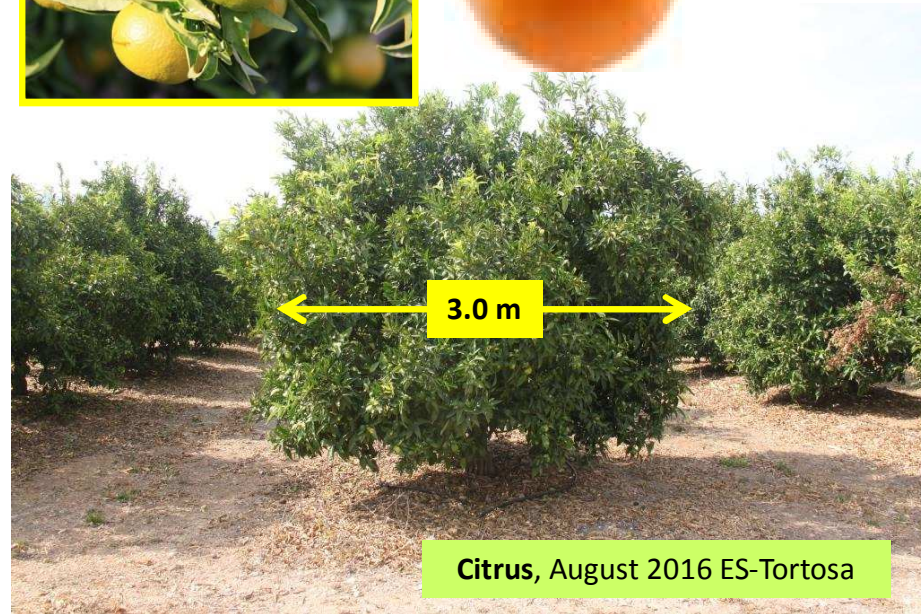
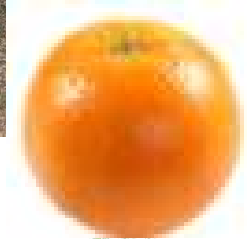
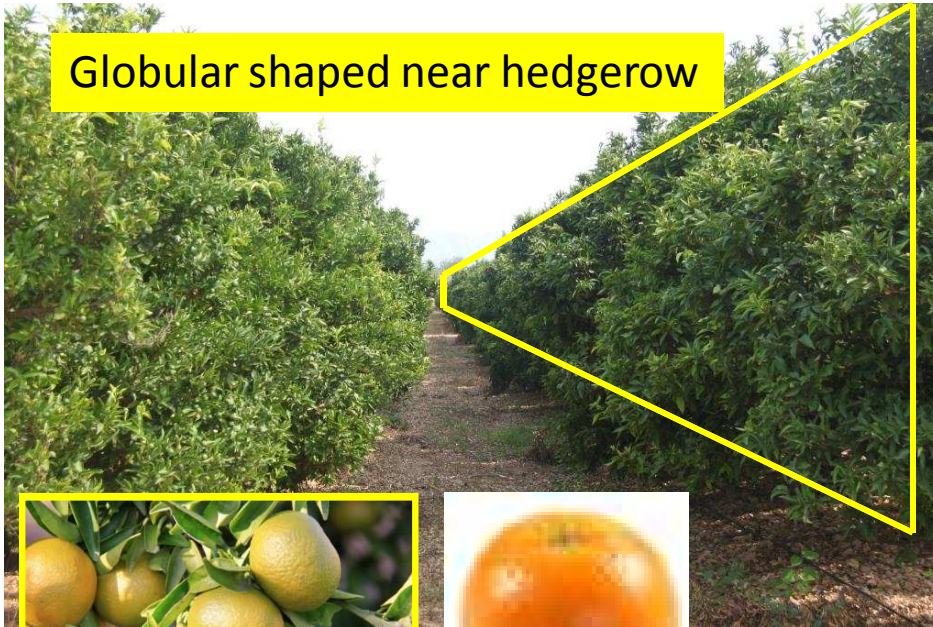
Var. Albariño, June 2016 ES-Raimat - DO Costers del Segre



Almonds, May 2016 ES-Alcanó (Lleida)



Var. Arbequina, May 2016 ES-Torres de Segre – DOP Garrigues



Hazelnuts, August 2016 ES-Puigpelat



Citrus, May 2017 ES-Tortosa

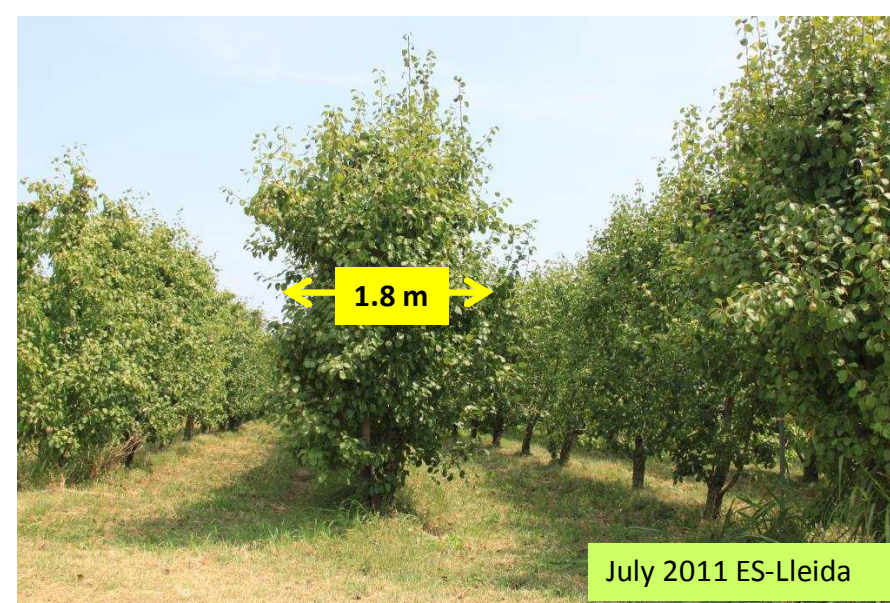
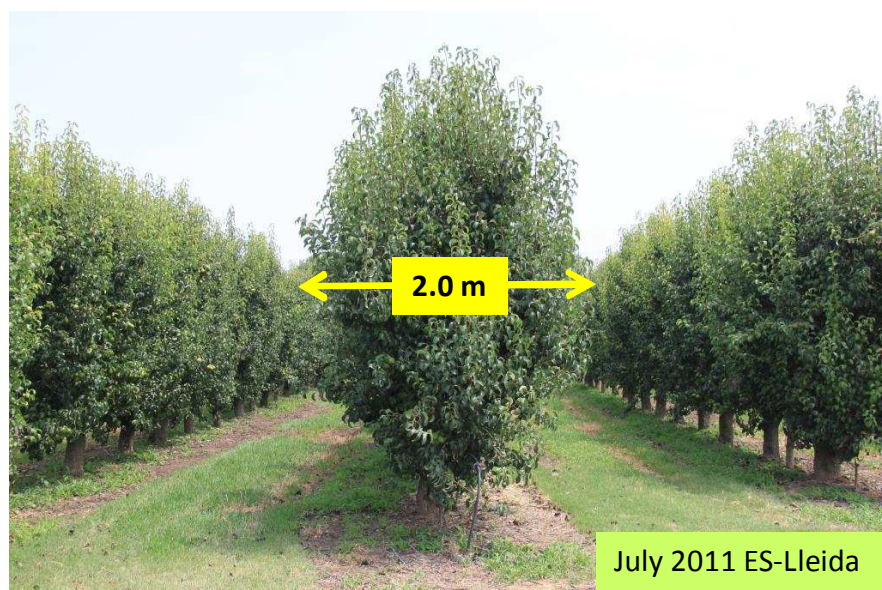
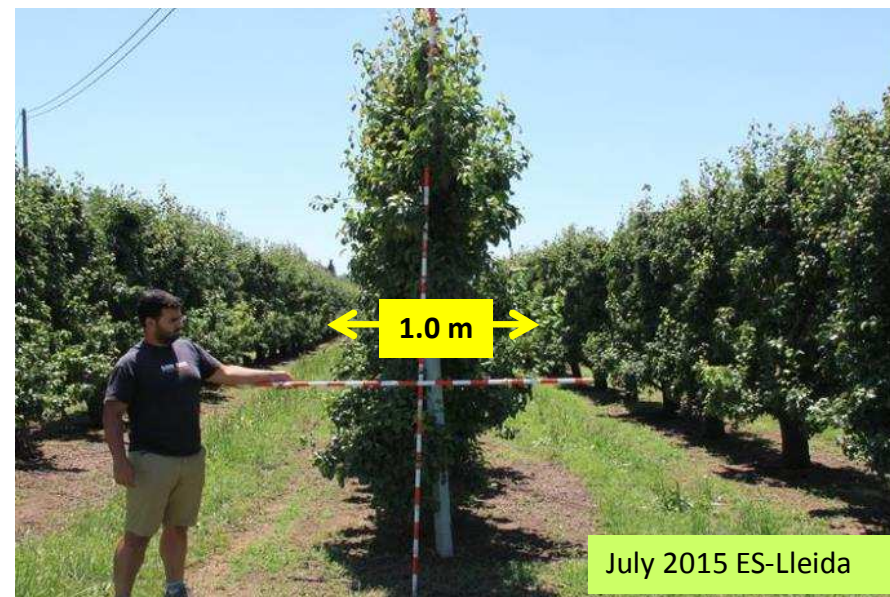
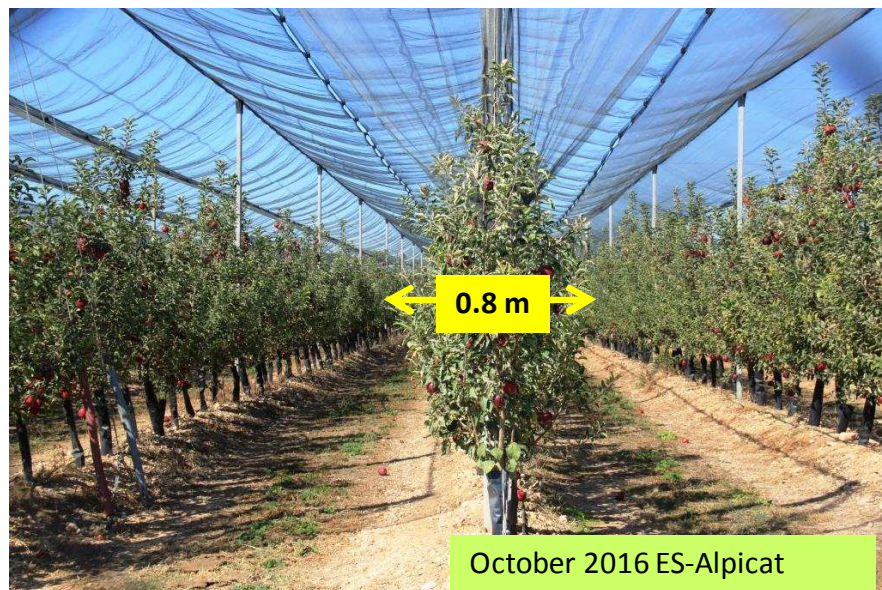
Orchards with isolated trees (traditional)



Orchards with isolated trees (traditional)



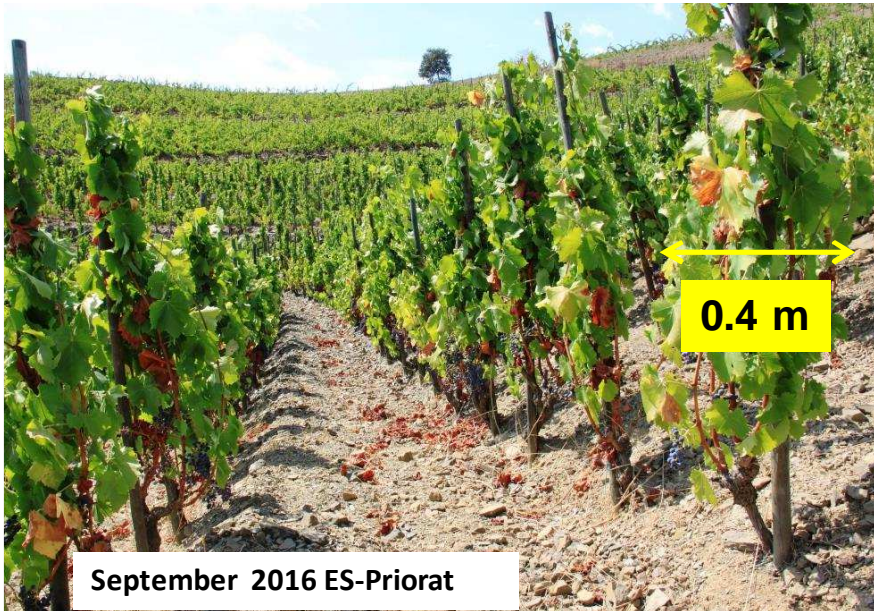
**Extreme differences on training systems & cropping practices within crops
Do they be protected with the identical amount of pesticide?**



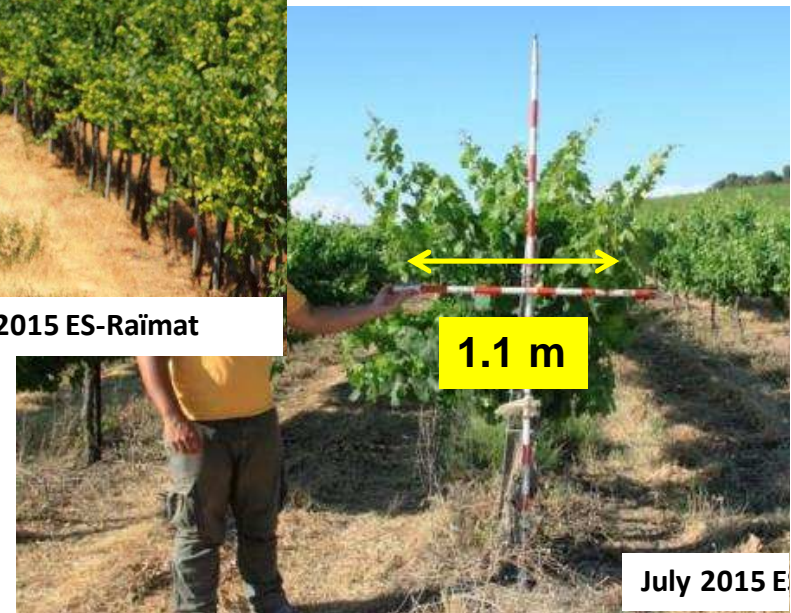
**Extreme differences on training systems within crops
Should they be protected with the identical amount of pesticide?**



Differences on training & pruning practices within crops
Should these vineyards be protected with the identical amount of pesticide?



July 2015 ES-Raïmat



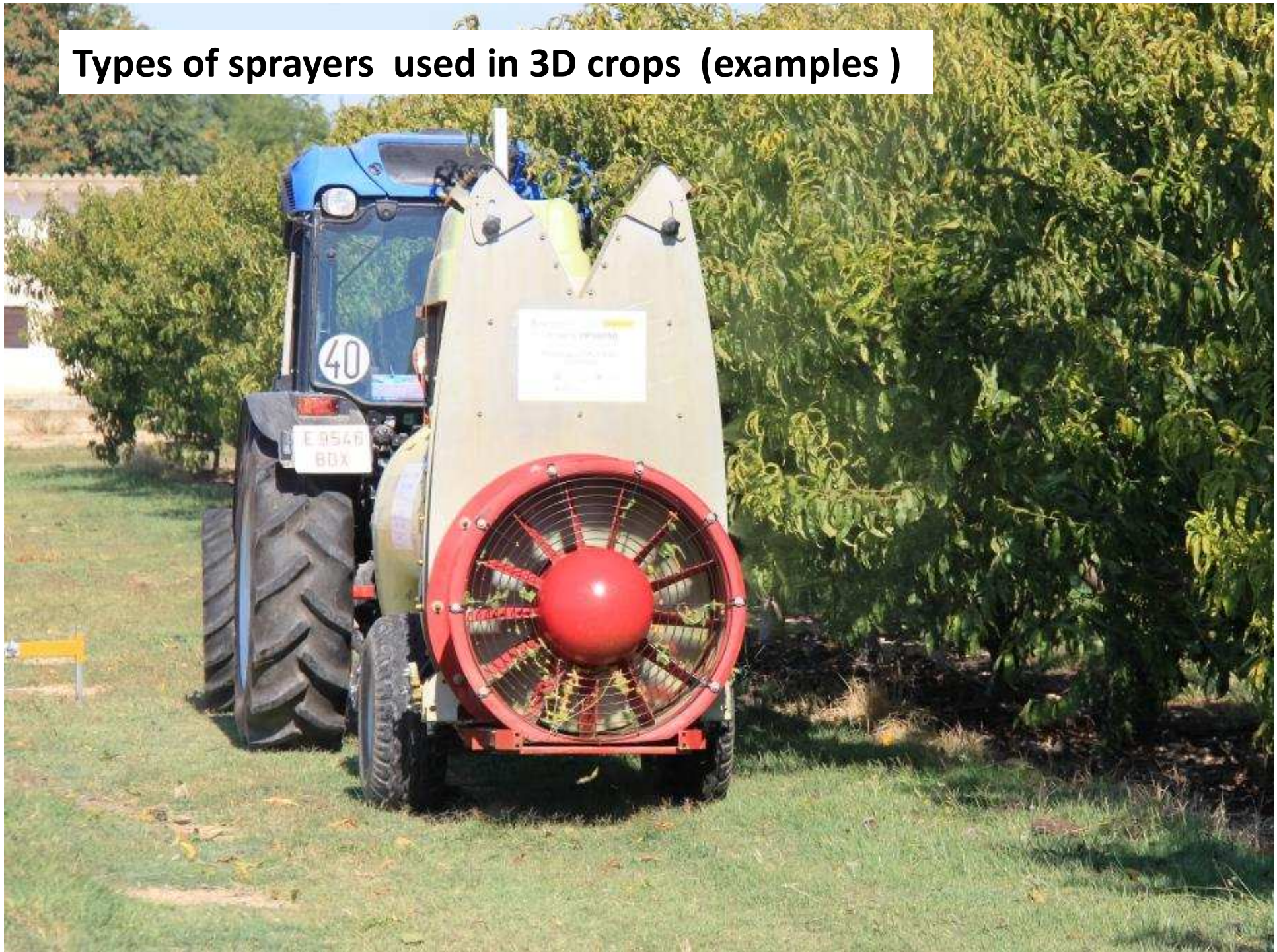
Extreme differences through growing stages



Peach, from March to October 2016 ES-Sunyer



Types of sprayers used in 3D crops (examples)





Grapes, April 2016 ES-Raïmat



20150420 ES-Raimat DO Costers del Segre



July 2017 ES-Avinyonet del Penedés



Olive trees 1999 ES-Lleida



Citrus 2013 ES-Roquetes



Citrus 2014 ES-Tortosa

Orchards with isolated trees (traditional)



Different types of sprayers used on registration trials (examples)



FINAL
DRAFT

INTERNATIONAL
STANDARD

ISO/FDIS
22522

ISO/TC 23/SC 8

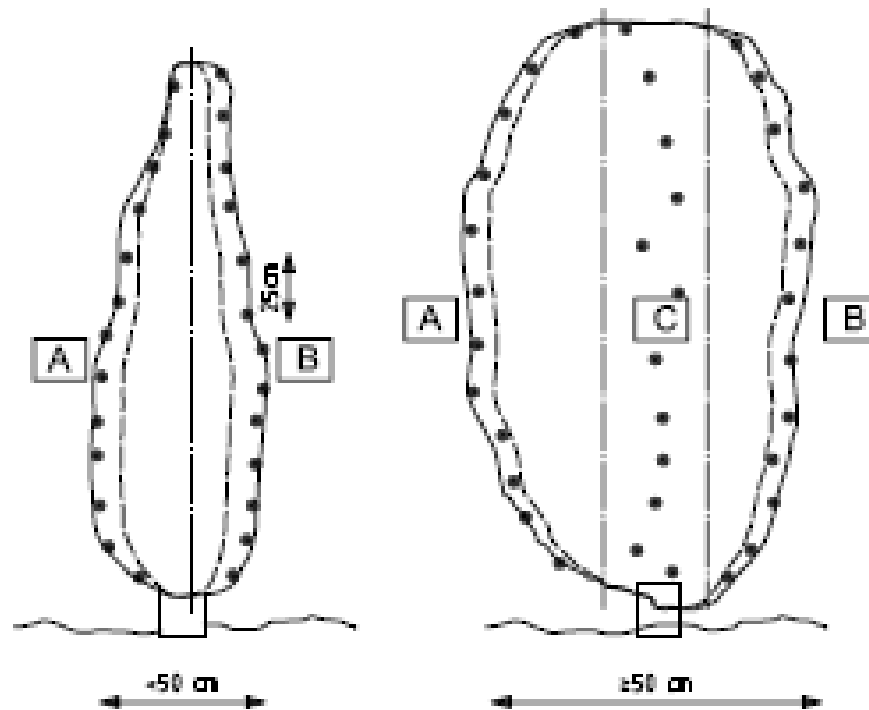
Secretariat: AFNOR

Voting begins on:
2006-11-24

Voting terminates on:
2007-01-24

Crop protection equipment — Field measurement of spray distribution in tree and bush crops

*Matériel de protection des cultures — Mesurage au champ de la
répartition de la pulvérisation pour arbres et arbustes fruitiers*



a) Sample collection in vertical plane

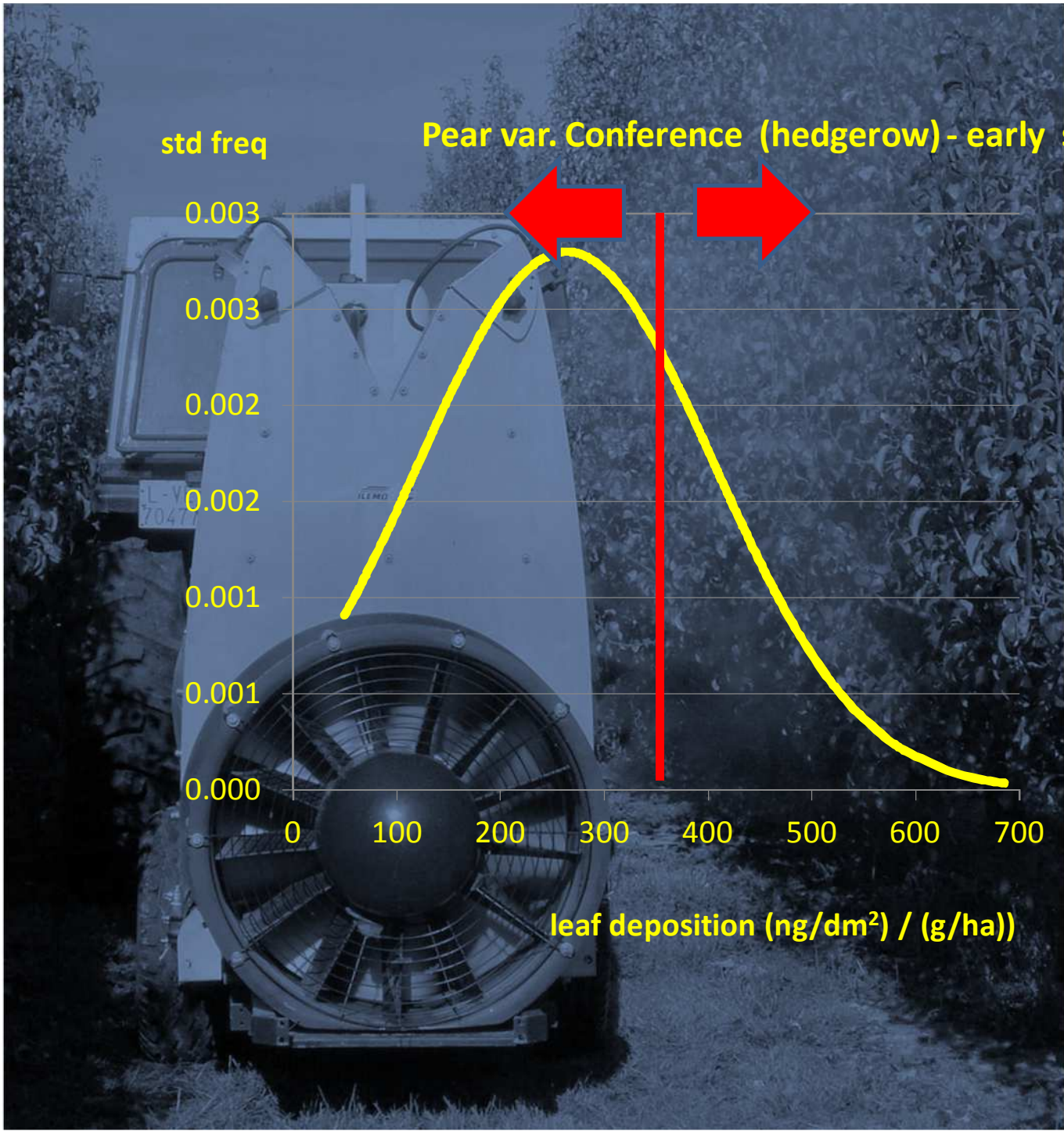
Crop protection equipment — Field
measurement of spray distribution in tree
and bush crops

*Matériel de protection des cultures — Mesurage au champ de la
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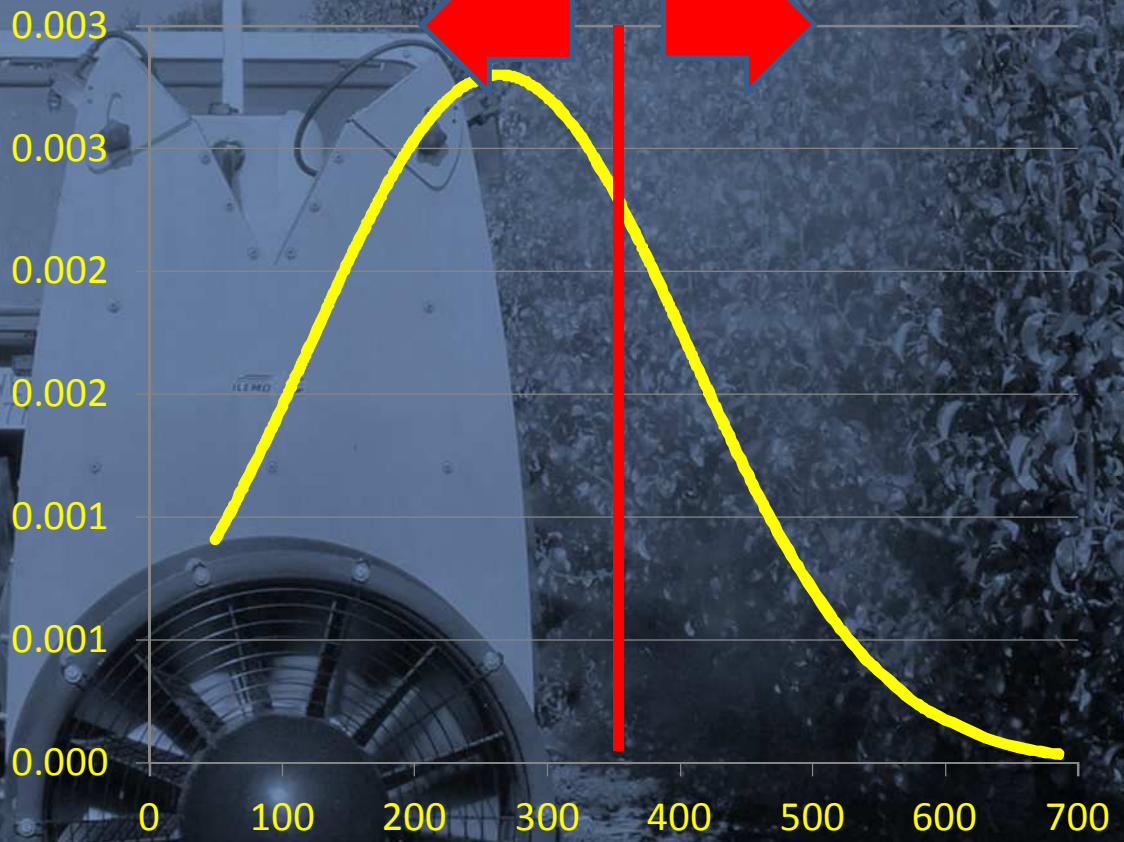
Reference number
ISO/WDIS 22522:2006(E)

© ISO 2006



std freq

Pear var. Conference (hedgerow) - early stage (n=154)



800 g/ha (metal ++)

800 L/ha (1.0 g/L)

leaf deposition (ng/dm²) / (g/ha)

Leaf deposition early & full leaf stages



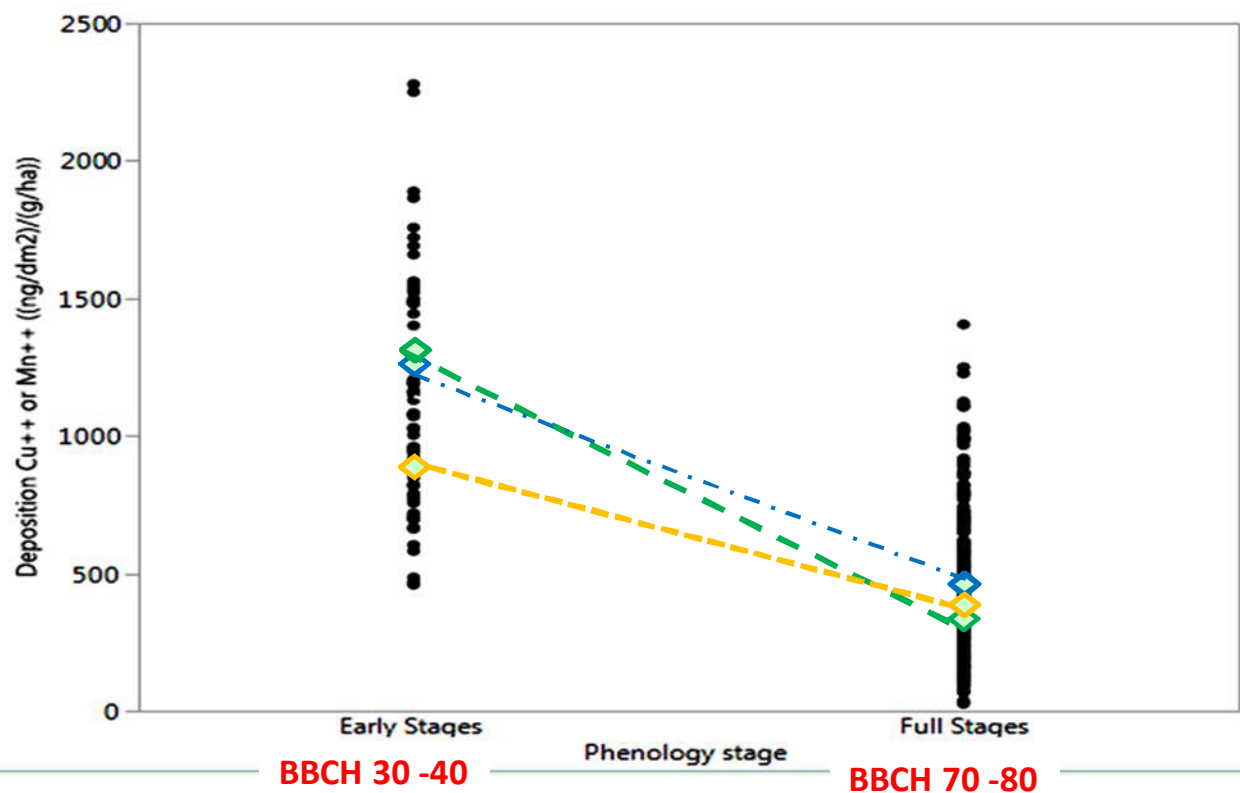
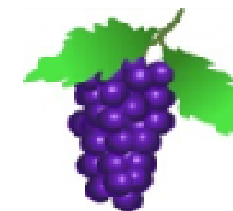
HARDI - IRIS



MAKATO



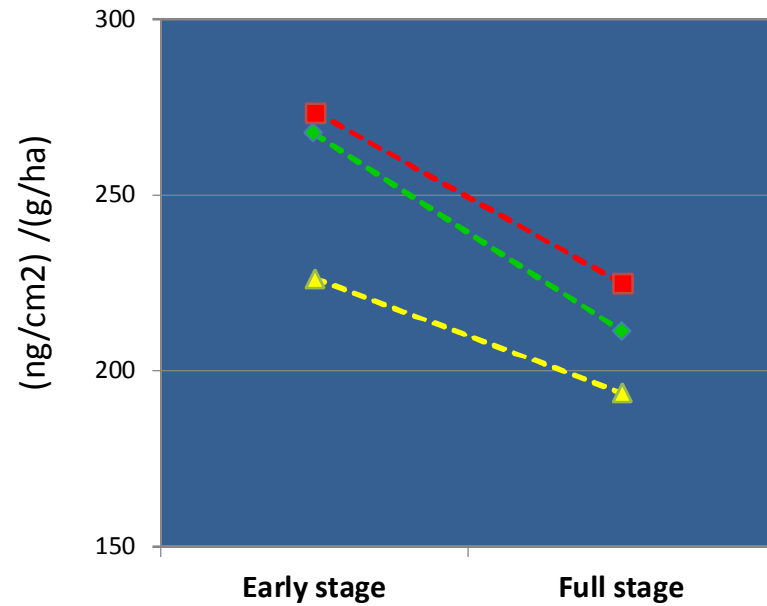
HARDI - MULTIOUTLET



Leaf deposition for early & full leaf stages



◆-Blanquilla ■-Conference ▲-Golden



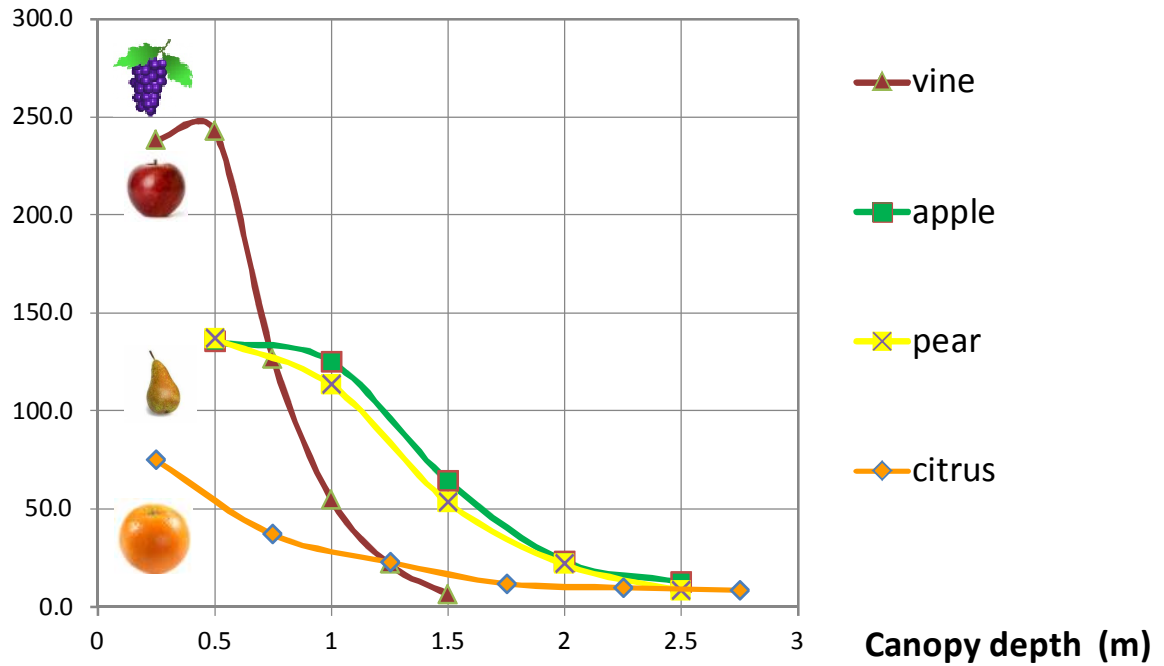
Volume rate: 800 L ha⁻¹



Penetrability leaf deposition vs. depth



(ng/dm²) / (g/ha)



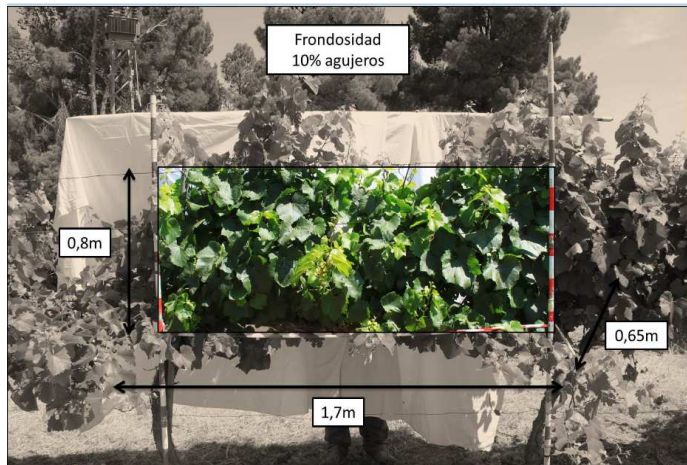
OPTIDOSA Project (2007-10)

Real LAI measuring & crop parameters correlation

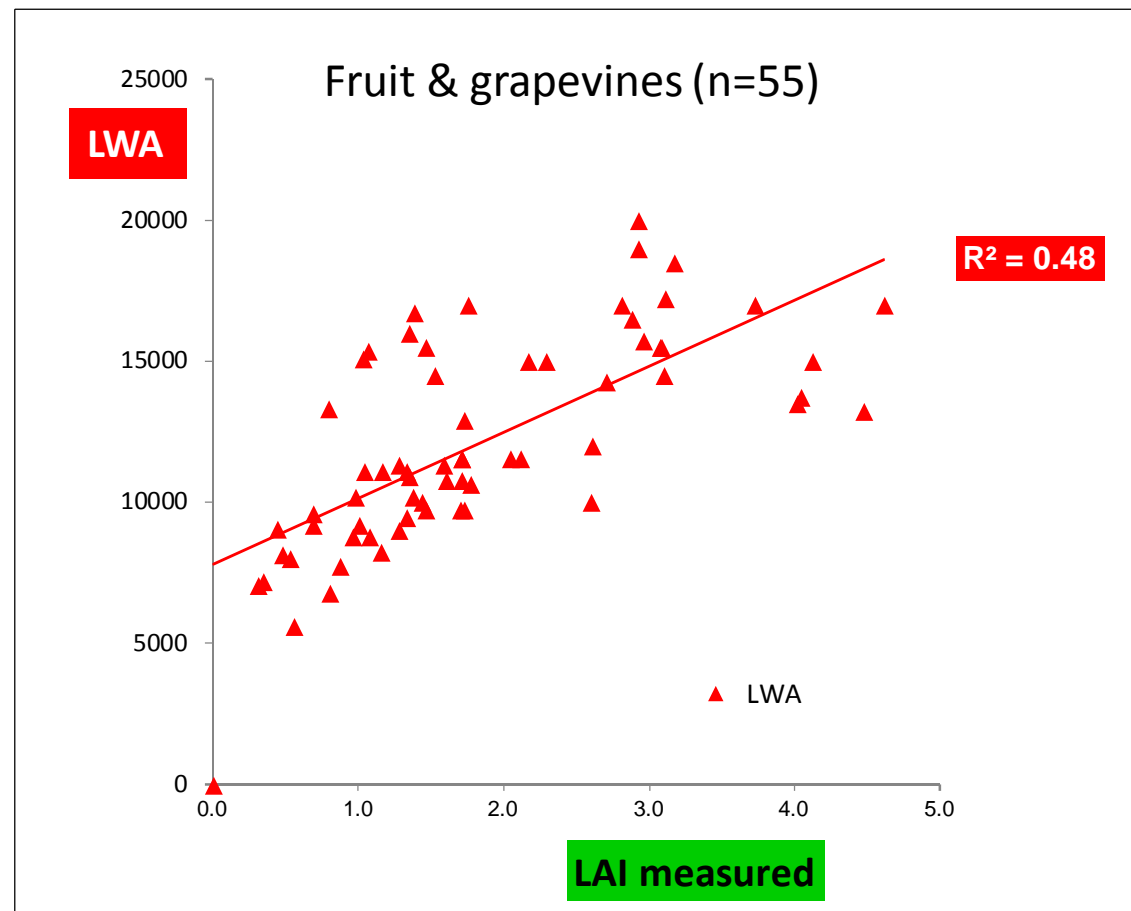
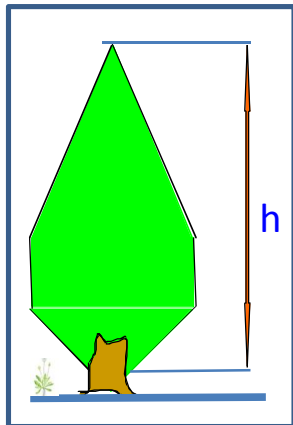


Picking-up
leaves to measure
leaf area index (LAI)

Pear (n=17)
Apple (n=18)
Peach (n=1)
Grapevine (n=19)

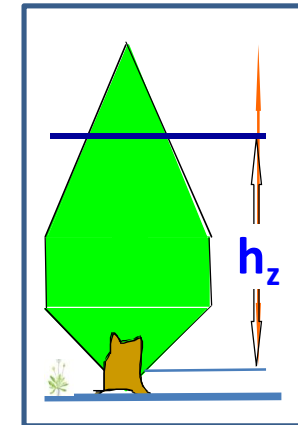
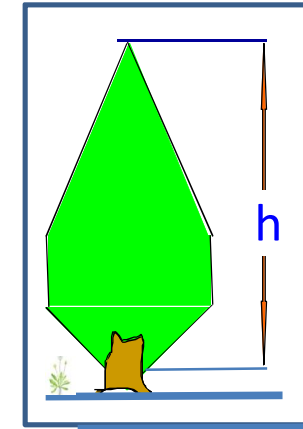
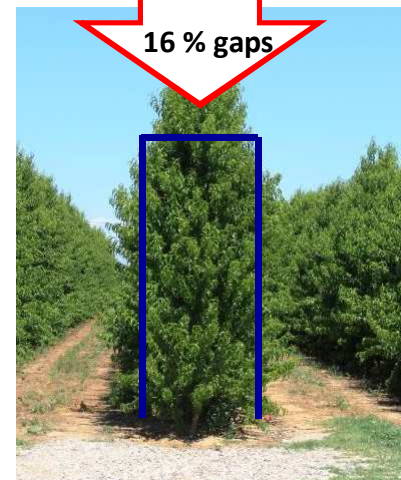
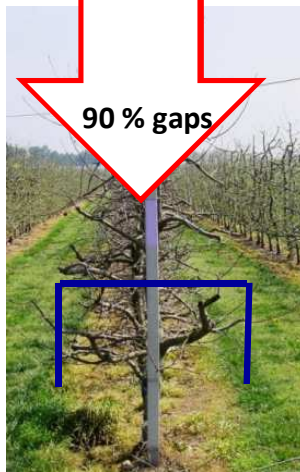


Leaf Wall Area (LWA)



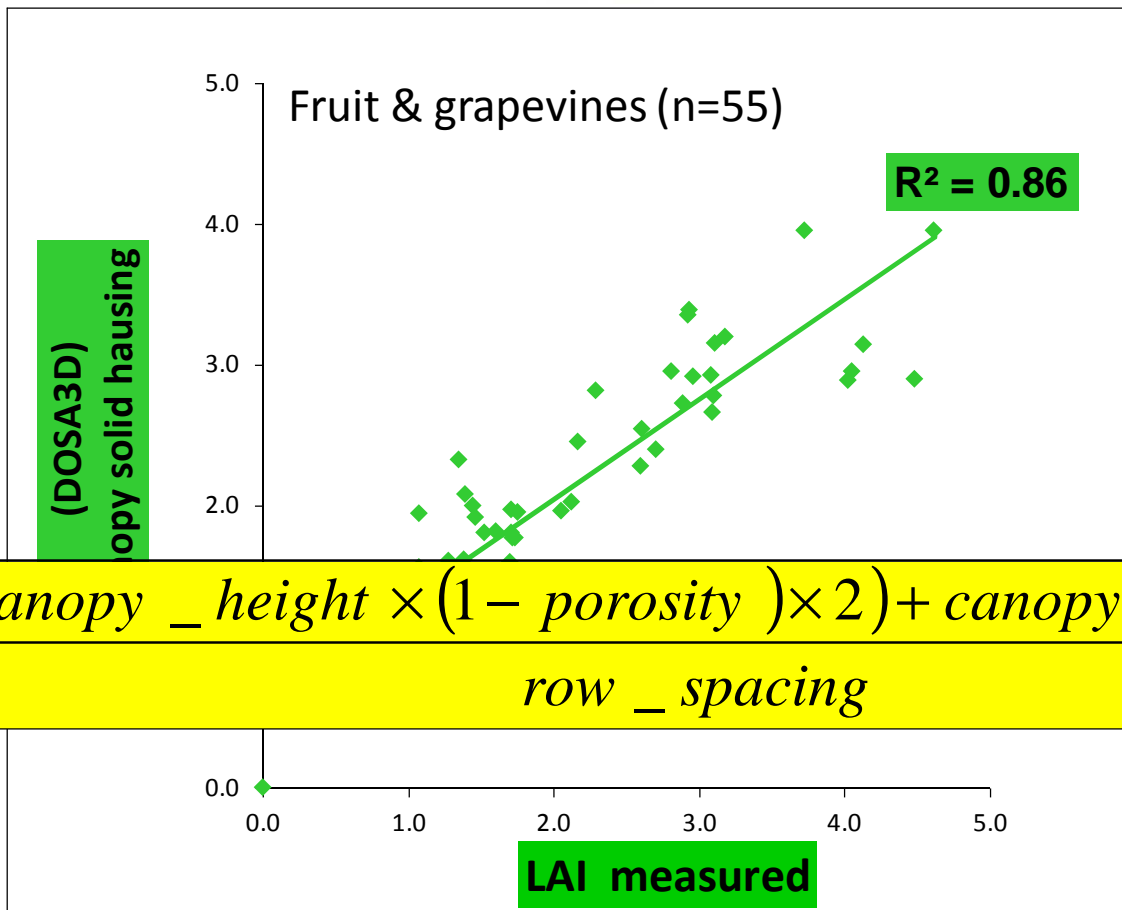
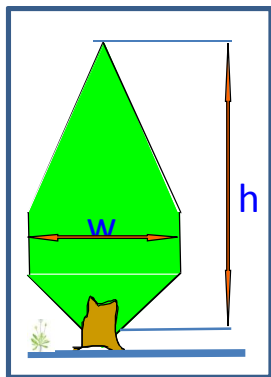
Canopy solid housing (CSH)

$$h_z = h * (100 - \% \text{ gaps})$$



$$LAI = f(\text{height}, \text{width}, \text{porosity})$$



Canopy solid housing (CSH)





	R^2
LWA	0.48
CSH	0.86*

$$LAI = \frac{((canopy_height \times (1 - porosity) \times 2) + canopy_width) \times 1,6}{row_spacing}$$

$$LAI = \frac{((canopy_height \times (1 - porosity) \times 2) + canopy_width) \times 1,6}{row_spacing}$$

Growth stage  

Plant density (tree/ha) 

Leaf area index (LAI) (assessed) 

Until petals fallen (BBCH: 1) ▼

Until petals fallen (BBCH: 10-69)

From petals fallen to fruit half final size (BBCH: 71-75)

From fruit half final size to harvesting (BBCH: 76-89)

(1.4-1.5)

Summary

- Cropping structures in SZ: extreme differences
- Spraying equipment & penetrability
- Principles for dose expression and dose adjustment
- **DOSA3D system**
- Conclusions & proposal

$$V = \max [100 \times h; (120 \times LAI)/E]$$

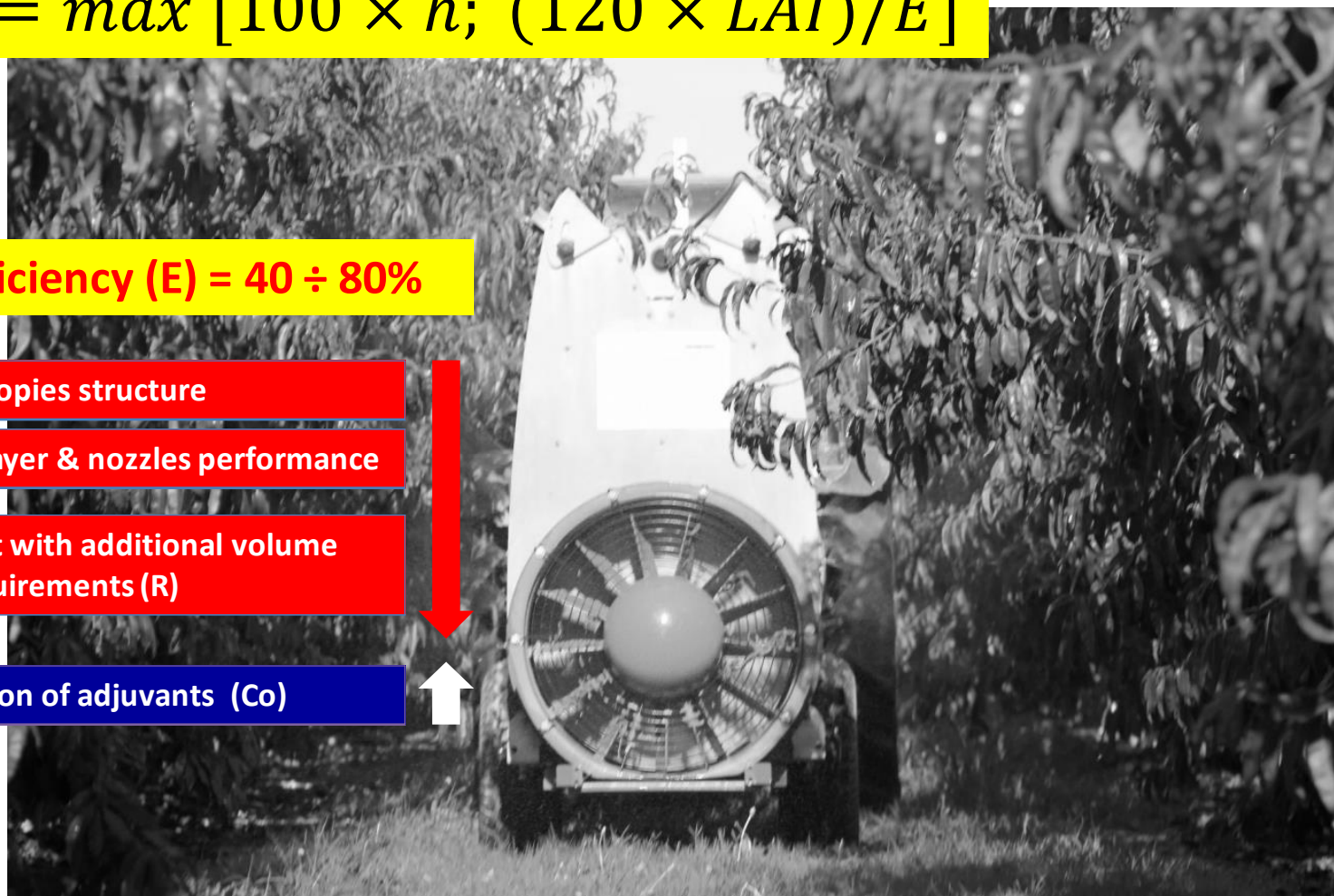
Efficiency (E) = 40 ÷ 80%

Canopies structure

Sprayer & nozzles performance

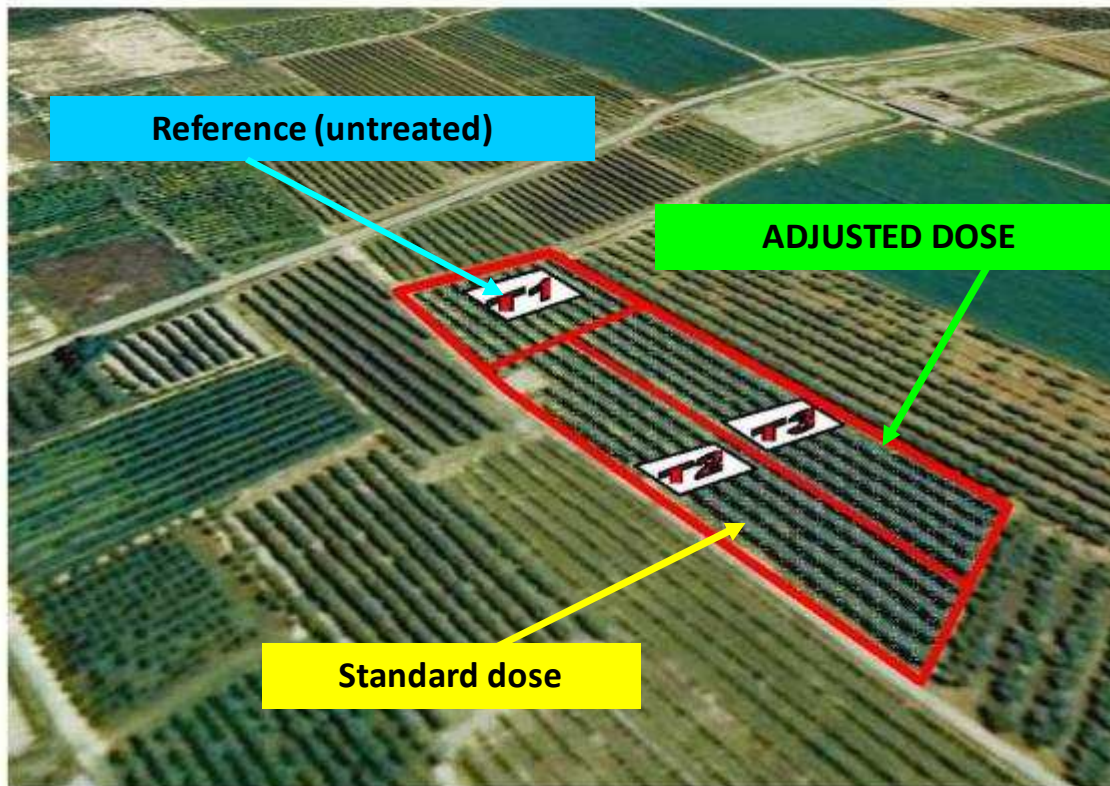
Pest with additional volume requirements (R)

Action of adjuvants (Co)

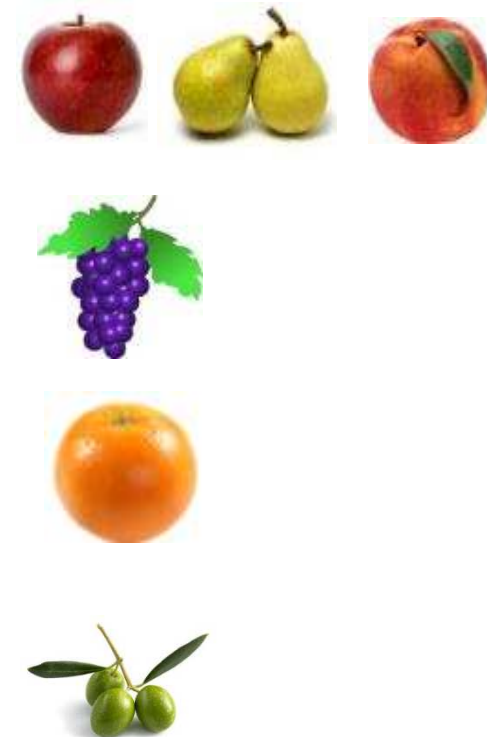


DOSAFRUT validation trials (2009 -2016)

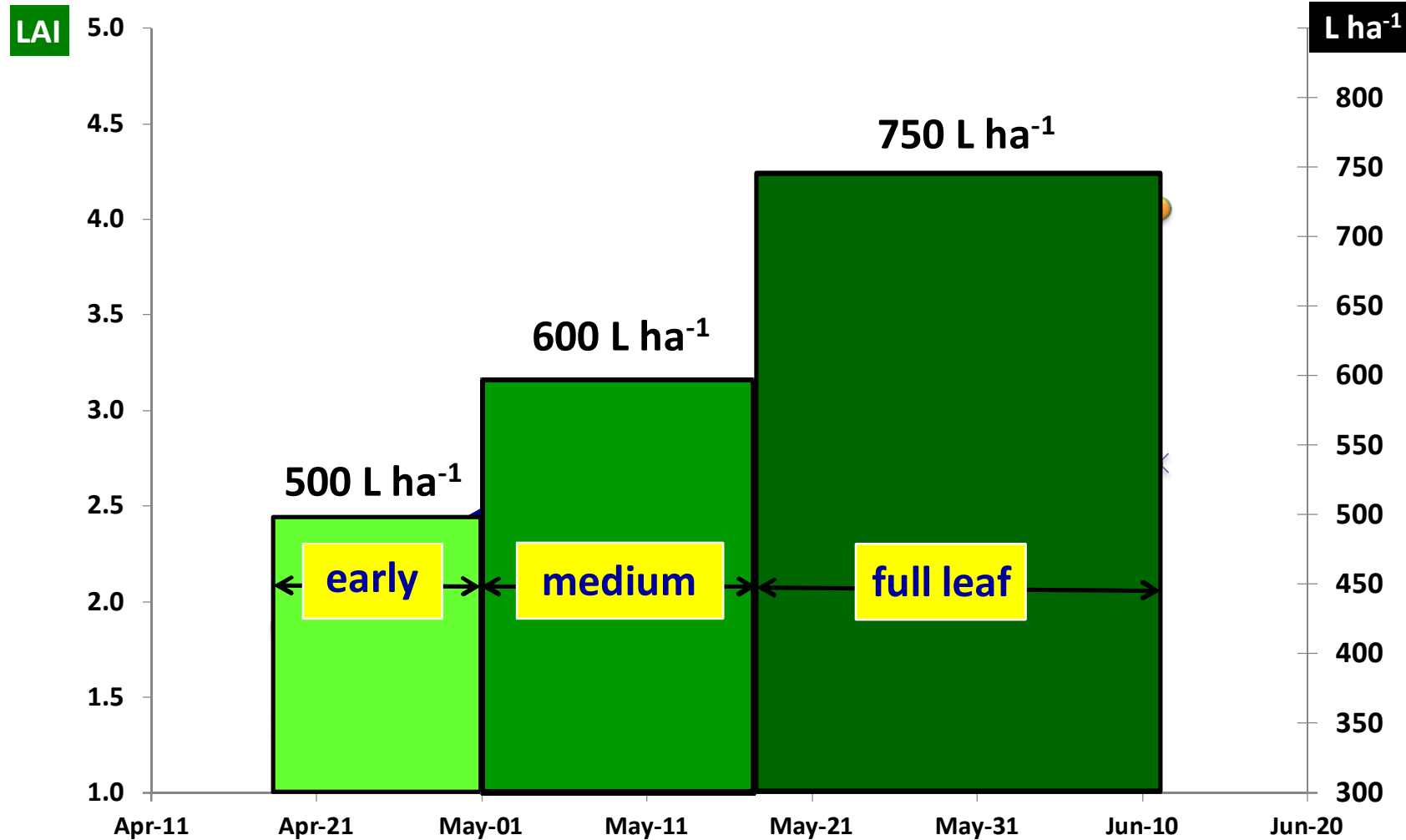
Bioefficacy (27) & chemical residues on fruits (7)



31T 291870mE, 4602320mN / 41°32'43"N / 0°30'16"E / Altura 116m



Ex.: Spray applications (7) during the growing season (pear orchard, cv. Williams)



Olive - hedgerow shaped



Var. Arbequina, May 2016 ES-Torres de Segre – DOP Garrigues

Citrus - Globular shaped near hedgerow



Citrus, May 2017 ES-Tortosa

Orchards with isolated trees (traditional)

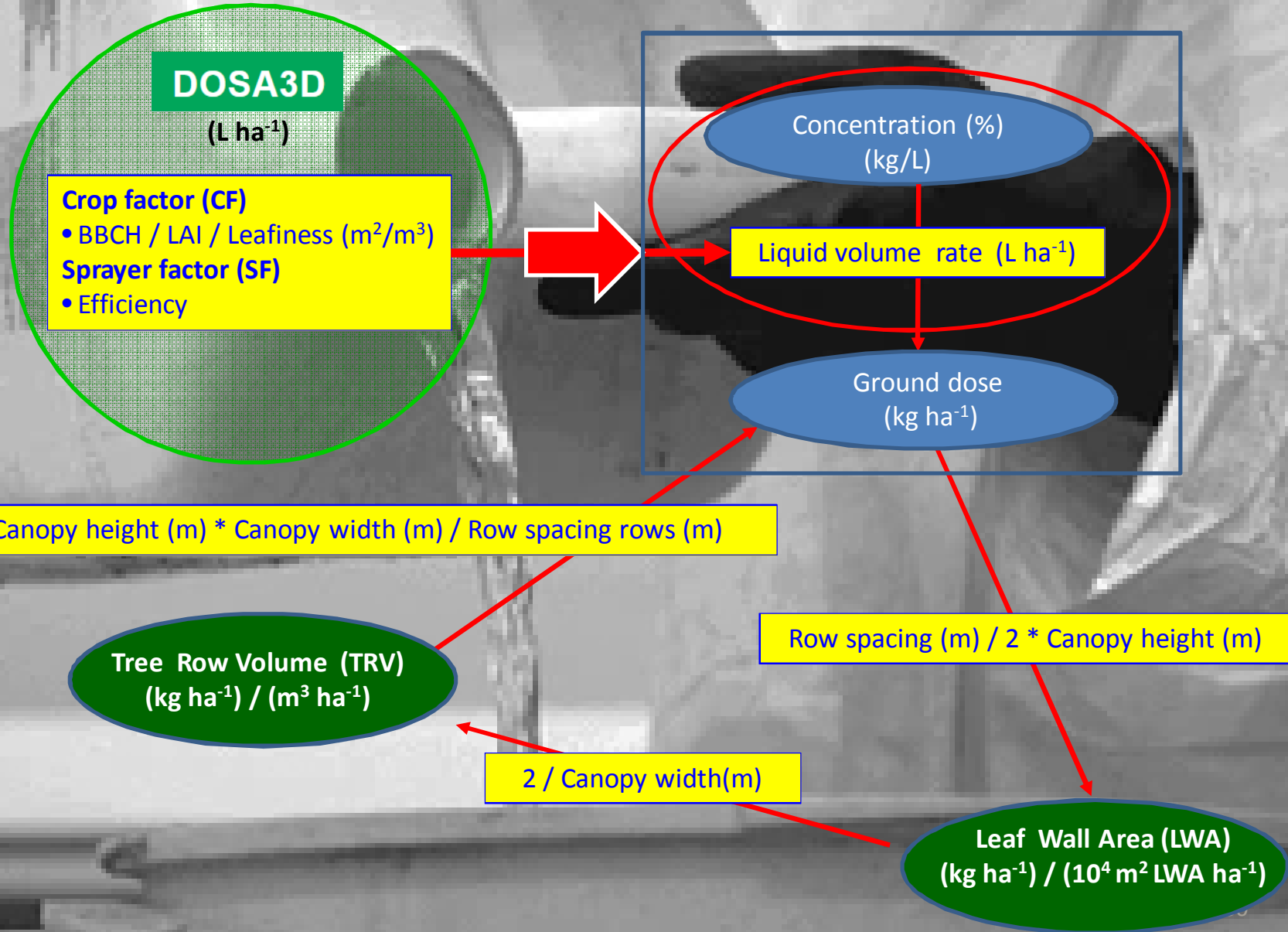


Olives, August 2016 ES-Tortosa


$$V(L\ ha^{-1}) = \text{Trees canopy volume (m}^3\ ha^{-1}) * f$$

- Canopies density
- Pest or disease to be treated

Conversion between models of dose expression





Experts

Focus grup – fruit & grapes

- Antonio Dolset (DARP-SSV), Ferran Camp (DARP-CMA), Montse Navarro (ADV), Rosa Bisa (ADV), Carla Roman (GRAP-UdL), Jaume Torres (consultor), Ricardo Sanz (GRAP-UdL), Joan Ramon Rosell (GRAP-UdL), Pere Masana (Agricolum), Francesc Masana (Agricolum), Joan Esteve (Codorníu SA), Santiago Planas (DARP-SSV/GRAP-UdL), Sònia Torguet (ADV), Maria Torné (AEPLA/DOW AS), Pere Masana (Agricolum), Francesc Masana (Agricolum).

Focus grup – citrus

- Anna Martínez (ADV Cítrics Terres Ebre), Secundino Barberà (ADV Viveros Alcanar), Angel Roda (ADV Soldebre), Dídac Royo (ADV Coop. Exp. Alcanar), Joan Porta (DARP-SSV), Sònia Ferrer (DARP-SSV), Santiago Planas (DARP-SSV/GRAP-UdL), J Miquel Fibla (IRTA), M Teresa Martínez (IRTA), J Miquel Campos (IRTA).

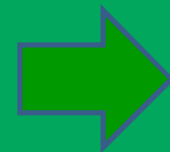
Focus grup – olive trees

- Angel Roda (ADV Soldebre), Joan Gisbert (ADV Soldebre), Juanjo Duatis (ADV per al control de la mosca de l'oliva al Baix Ebre i el Montsià), Enric Pedret (ADV per al control de la mosca de l'oliva al Baix Ebre i el Montsià), Joan Porta (DARP-SSV), Sònia Ferrer (DARP-SSV), Santiago Planas (DARP-SSV/GRAP-UdL).





Spray volume rate and optimum dosage for three-dimensional (3D) crops



This work was funded by the Spanish Ministry of Economy and Competitiveness through the project AgVANCE (AGL2013-48297-C2-2-R)