Sponsors

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Welcome to the symposium

This 14th Workshop on Spray Application in Fruit Growing offers the floor for presenting the scientific results and for discussing the societal context of the application of plant protection products in orchards and vineyards. As science evolves by open minded discussions and by exchanging results and opinions, we hope to offer you in this workshop an optimal scene for fruitful discussions.

The principal organiser of this conference is the Research Station for Fruit npo, mostly abbreviated as 'pcfruit npo'. Pcfruit was started in 1997 as a coordinating structure of three former research institutes and demonstration gardens, all specialized in fruit growing and located in Sint-Truiden, the heart of the fruit growing area of Belgium. The oldest of these comprising institutes was founded in 1943. Pcfruit is recognized as a reliable, neutral and science-based partner active in various domains of fruit growing. Pcfruit covers applied scientific research, demonstration activities to growers, co-development programs with various kinds of industries and services for fruit growers. All these activities are centralized at one central location with suitable infrastructure like labs, greenhouses, storage facilities, plastic tunnels, shelters, warehouses and orchards. High level of specialism and understanding of the fruit practices have over time been developed in areas as crop protection, biological control, IPM, plant nutrition, application technology, variety evaluation, precision agriculture.

Co-organizers of the 14th Workshop are the University of Louvain with a Faculty of Bio-engineering and ILVO, the Flemish Institute for Agricultural and Fisheries Research, which both have a specialised research team working on spray application technology.

The Workshop is taking place in the former prison of Hasselt, which serves now as the faculty of Law of the University of Hasselt. Hasselt is the capital of the Belgian province of Limburg, of which the south offers the most suitable soil and climate for fruit production. More than 50% of the Belgian fruit is growing in this area. Hasselt is a relatively small city of about 80.000 inhabitants. Today Hasselt traditionally welcomes a lot of short stay tourists and shoppers.

Inge Moors
Deputy of the Province of Limburg for Agriculture
Chairman of pcfruit

www.pcfruit.be
www.ilvo.be
http://www.biw.kuleuven.be/m2s/biosyst/mebios
www.hasselt.be
www.limburg.be

Convener

Kris Ruysen
Proefcentrum Fruitteelt vzw
Fruittuinweg 1, 3800 Sint-Truiden, Belgium
Tel.: +32 11 69 71 34 Fax: +32 11 69 71 10
E-mail: kris.ruysen@pcfruit.be

Local committee

Prof. Dany Bylemans, pcfruit vzw - Proefcentrum Fruitteelt vzw
Kris Ruysen, pcfruit vzw - Proefcentrum Fruitteelt vzw
dr. David Nuyttens, ILVO – Institute for Agricultural and Fisheries Research
dr. Pieter Verboven, KULeuven - MeBioS
Manuela Milissen, pcfruit vzw - Proefcentrum Fruitteelt vzw

Scientific committee

Paolo Balsari
Dany Bylemans
Jerry Cross
Grzegorz Doruchowski
Jean-Paul Douzals
Emilio Gil
David Nuyttens
Peter Triloff
Jan Van de Zande
Pieter Verboven
Marcel Wenneker

Picture: pcfruit vzw

List of participants

Name	Institution	Country	Email
Abts, Willem	Bayer CropScience NV	Belgium	willem.abts@bayer.com
Arantes Rodrigues da Cunha, João Paulo	Federal University of Uberlândia	Brasil	jpcunha@ufu.br
Bakache, Adel	IRSTEA	France	adel.bakache@irstea.fr
Bals, Edward	Micron Sprayers Ltd	United Kingdom	edward.bals@micron.co.uk
Bals, Thomas	Micron Sprayers Ltd	United Kingdom	tom.bals@micron.co.uk
Balsari, Paolo	DiSAFA/University of Torina	Italy	paolo.balsari@unito.it
Beeston, Michael	Oxford Lasers Ltd	United Kingdom	mike.beeston@oxfordlasers.com
Belien, Tim	Proefcentrum Fruitteelt vzw	Belgium	tim.belien@pcfruit.be
Berger, Lars	Pulverizadores FEDE	Spain	lcubi@fedepulverizadores.com
Bjugstad, Nils	Norwegian University of Life Sciences	Norway	nils.bjugstad@nmbu.no
Bylemans, Dany	Proefcentrum Fruitteelt vzw	Belgium	dany.bylemans@pcfruit.be
Campos, Javier	Universidad Politécnica de Cataluña	Spain	javier.campos@upc.edu
Carra, Mathilde	IRSTEA	France	mathilde.carra@irstea.fr
Chueca, Patricia	Instituto Valenciano de Investigaciones Agrarias	Spain	patriciaadell@hotmail.com
Claes, Ruben	Proefcentrum Fruitteelt vzw	Belgium	ruben.claes@pcfruit.be
Codis, Sebastien	IFV (French Institute for Vine and Wine)	France	sebastien.codis@vignevin.com
Cotteux, Eric	IRSTEA UMR ITAP	France	eric.cotteux@irstea.fr
Cross, Jerry	NIAB EMR	United Kingdom	jerry.cross@emr.ac.uk
De Baets, Tessa	pcfruit vzw	Belgium	tessa.debaets@pcfruit.be
de Hoog, Dirk	Wageningen UR	The Netherlands	dirk.dehoog@wur.nl
Dekeyser, Donald	ILVO	Belgium	donald.dekeyser@ilvo.vlaanderen.be
Delele, Mulugeta Admasu	KULeuven	Belgium	mulugetaadmasu.delele@kuleuven.be
Dieleman, Patrick	Management & Techniek	Belgium	patrick.dieleman@boerenbond.be
Doruchowski, Grzegorz	InHort - Research Institute of Horticulture	Poland	grzegorz.doruchowski@inhort.pl
Douzals, Jean-Paul	IRSTEA	France	jean-paul.douzals@irstea.fr
Everaerts, David	Proefcentrum Fruitteelt vzw	Belgium	david.everaerts@pcfruit.be
Foubert, Herve	ALBUZ-SOLCERA	France	herve.foubert@solcera.com
Freyeisen, Marc	Application Technology Team Syngenta	Switzerland	marc.freyeisen@syngenta.com
Garnodier, Justine	IRSTEA Montpellier	France	justine.garnodier@irstea.fr
Gil, Emilio	Universidad Politécnica de Cataluña	Spain	emilio.gil@upc.edu
Grella, Marco	DiSAFA/University of Torino	Italy	marco.grella@unito.it
Gyesu, Eric	Kwame Nkrumah University of Science and Technology	Ghana	da2ruprince@gmail.com
Hoheisel, Gwen-Alyn	Washington State University	USA	ghoheisel@wsu.edu
Hudebine, Yoan	IRSTEA Montpellier	France	yoan.hudebine@irstea.fr
Jaun, René	Syngenta Crop Protection AG	Switzerland	rene.jaun@syngenta.com

Name	Institution	Country	Email
Koopmans, Kim	Proefcentrum Fruitteelt vzw	Belgium	kim.koopmans@pcfruit.be
Landers, Andrew	Cornell University	USA	ajl31@cornell.edu
Langenakens, Jan	Aams-Salvarani	Belgium	jan.langenakens@aams-salvarani.com
Levesque, Patrick	ALBUZ-SOLCERA	France	patrick.levesque@solcera.com
Marucco, Paolo	DiSAFA/University of Torino	Italy	paolo.marucco@unito.it
Michielsen, Jean-Marie	Wageningen Plant Research	The Netherlands	jean-marie.michielsen@wur.nl
Milissen, Manuela	Proefcentrum Fruitteelt vzw	Belgium	manuela.milissen@pcfruit.be
Miranda-Fuentes, Antonio	University of Córdoba	Spain	antonio.miranda@uco.es
Nuyttens, David	ILVO	Belgium	david.nuyttens@ilvo.vlaanderen.be
Ozkan, Erdal	Ohio State University	USA	ozkan.2@osu.edu
Pelzer, Tanja	Julius Kuehn Institute, Institute for Application Techniques in Plant Protection	Germany	tanja.pelzer@julius-kuehn.de
Perez Salvador, Federico	Pulverizadores FEDE	Spain	lcubi@fedepulverizadores.com
Planas, Santiago	Universitat de Lleida/Generalitat de Catalunya	Spain	santiago.planas@udl.cat
Roettele, Manfred	BetterDecisions	Germany	manfred.roettele@betterdecisions.de
Román, Carla	Universitat de Lleida	Spain	carlaroman@eagrof.udl.cat
Ruysen, Kris	Proefcentrum Fruitteelt vzw	Belgium	kris.ruysen@pcfruit.be
Salcedo, Ramon	Universidad Politécnica de Cataluña	Spain	ramon.salcedo@upc.edu
Shillitoe, James	Fruit Advisory Services Team LLP	United Kingdom	kate.barker@fastllp.com
Stallinga, Hein	Wageningen University & Research	The Netherlands	hein.stallinga@wur.nl
Tamagnone, Mario	DiSAFA/University of Torino	Italy	mario.tamagnone@unito.it
van de Zande, Jan	Wageningen University & Research	The Netherlands	jan.vandezande@wur.nl
Vanderwaeren, Reinaart	BASF Belgium	Belgium	reinaart.vanderwaeren@basf.com
Verboven, Pieter	KULeuven	Belgium	pieter.verboven@kuleuven.be
Vergès, Adrien	IFV (French Institute for Vine and Wine)	France	adrien.verges@vignevin.com
Verpont, Florence	CTIFL	France	verpont@ctifl.fr
Wohlhauser, Ronald	Syngenta Crop Protection AG	Switzerland	ronald.wolhlauser@syngenta.com

Program

Tuesday May 9th, 2017	
16:30-18:30	Registration Hasselt University - Aula Louis Roppe Martelarenlaan 42, 3500 Hasselt
19:00-20:00	Welcome reception at the Gouverneurshuis of Hasselt (we walk (+/- 15 min) together from the registration desk)

Wednesday May 10th, 2017	
Opening Session	Hasselt University - Aula Louis Roppe Martelarenlaan 42, 3500 Hasselt
08:00-09:00	Registration
09:00-10:00	Welcome to the Symposium

Oral Session 1 : Pesticide dosing			**Wed May 10**
Time	**Oral Abstract Number**	**Title**	**Presenter**
10:00-10:20	1	Harmonization of pesticide dose expression is a key to dose adjustment	Doruchowski, Grzegorz
10:20-10:40	2	Towards a new model of dose expression in viticulture: Presentation of an experimental approach based on deposition measurement to test the relevance of different scenarios	Codis, Sébastien
10:40-11:00		Coffee and snack break	
11:00-11:20	3	Pesticide dose in persimmon orchards: Bases for its adjustments	Chueca, Patricia
11:20-11:40	4	Adjusting spay volume rates to the canopy vigour from aerial images in a vineyard	Román, Carla
11:40-12:00	5	Effect of formulation and spray application characteristics on the biological efficacy of a contact fungicide	Bakache, Adel
12:00-13:30		Lunch	

Oral Session 2 : Spray coverage			**Wed May 10**
Time	**Oral Abstract Number**	**Title**	**Presenter**
13:30-13:50	6	Spray deposition and distribution of a cross-flow fan orchard sprayer in spindle apple trees	Michielsen, Jean-Marie
13:50-14:10	7	First results of a campaign for the optimization of spray patterns of orchard sprayers by a moving test bench	Claes, Ruben
14:10-14:30	8	Improving spray deposition in orchard spraying by a Munckhof multiple row sprayer	Wenneker, Marcel
14:30-14:50	9	Basic experimental investigations of different influencing parameters on the quality of the vertical distribution of sprayers	Pelzer, Tanja
14:50-15:10		Coffee and snack break	
15:10-15:30	10	PulvArbo: a French project to improve spray application in fruit growing	Verpont, Florence
15:30-15:50	11	Sprayer classification in viticulture according to their performance in terms of deposition and dose rate reduction potential	Vergès, Adrien
15:50-16:10	12	Spray deposits from a recycling tunnel sprayer in vineyard; effects of the forward speed and the nozzle type	Carra, Mathilde
16:10-16:30	13	Leaf surface topography affecting the dynamic impact behaviour of spray droplets	Delele, Mulugeta Admasu
16:30-16:50	14	Assessment of aerial spray deposition on banana crop based on flight conditions	Cotteux, Eric

Oral Session 3 : Air support of sprayers for three dimensional crops - Part 1			**Wed May 10**
Time	**Oral Abstract Number**	**Title**	**Presenter**
16:50-17:10	15	Lidar vs. test bench for measurement of drift as affected by sprayer type, air flow, nozzle type and density of vine canopy	Gil, Emilio
17:10-17:30	16	Characterization of the air-flow and liquid distribution of orchard sprayers	van de Zande, Jan

Thursday May 11th, 2017	
Field day	
08:00	Departure in Hasselt by bus Kattegatstraat 1, Hasselt (in front of the Holiday Inn Hotel)
09:00-12:00	Visit Proefcentrum Fruitteelt, SintTruiden
12:00-13:30	Lunch at Proefcentrum Fruitteelt, Sint-Truiden
13:30-18:30	Visit BAB Bamps, Sint-Truiden Orchard visit, Wamoss bvba, Hakendover Vineyard visit, Kluisberg, Assent
19:30-22:30	Symposium dinner at Holiday Inn, Kattegatstraat 1, Hasselt

Oral Session 3 : Air support of sprayers for three dimensional crops - Part 2			**Fri May 12**
Time	**Oral Abstract Number**	**Title**	**Presenter**
08:30-08:50	17	2D CFD simulations of the air profile of three sprayers adapted to tomato crops in greenhouse conditions	Salcedo, Ramón
08:50-09:10	18	Adjustment of vertical spray pattern of orchard sprayers with Ve.S.Pa. 2.0 application	Tamagnone, Mario

Oral Session 4 : Spray drift / Spray loses			**Fri May 12**
Time	**Oral Abstract Number**	**Title**	**Presenter**
09:10-09:30	19	Potential spray drift evaluation of airblast sprayers	Grella, Marco
09:30-09:50	20	Spray drift of a cross-flow fan sprayer with wind-dependent variable air assistance	Stallinga, Hein
09:50-10:10	21	First assessments of spray drift in poplar plantations	Marucco, Paolo
10:10-10:30		Coffee and snack break	
10:30-10:50	22	Increasing droplet size in pneumatic cannon-type nozzles to reduce spray drift	Miranda-Fuentes, Antonio
10:50-11:10	23	Spray quality, droplet velocity and spray drift potential of sprays sprayed with additives through standard and venturi nozzles	Rodrigues da Cunha, João Paulo
11:10-11:30	24	Development of a National Spray Application Work Group	Hoheisel, Gwen-Alyn
11:30-11:50	25	Perceptions on how to reduce the risk of Plant Protection Products (PPP) losses to water in fruit production. Results from the European TOPPS stakeholder survey 2016	Roettele, Manfred
12:00-13:30		Lunch	

Oral Session 5 : New technologies on spray applications			**Fri May 12**
Time	**Oral Abstract Number**	**Title**	**Presenter**
13:30-13:50	26	Measuring canopy density in orchards and vineyards	Landers, Andrew
13:50-14:10	27	Crop characterization by Lidar sensor in different French orchards: preliminary results at early stages	Douzals, Jean-Paul
14:10-14:30	28	Variable rate orchard sprayer based on Lidar sensor	Xiongkui, He

14:30-14:50	29	ICT platform for fruit growing sector in Belgium	Ruysen, Kris
14:50-15:10	30	Field testing and monitoring of newly designed airblast sprayers in traditional olive orchards	Miranda-Fuentes, Antonio
15:10-15:30		Coffee and snack break	
15:30-15:50	31	Optimization of the fogging application of biological control organisms in fruit cold stores	Dekeyser, Donald
15:50-16:10	32	How to stimulate the installation and use of on farm bioremediation systems to avoid point pollution?	Koopmans, Kim
16:10-16:30	33	The electronic measurement of spray coverage	Landers, Andrew
16:30-16:50	34	CFD modelling of spray applications in cool rooms	Delele, Mulugeta Admasu
16:50		End of Symposium	

Saturday May 13th, 2017	
Werktuigendagen SOLV Tuinbouwschool, Diestersteenweg 146, Sint-Truiden	
09:30	Departure in Hasselt by car Kattegatstraat 1, Hasselt (in front of the Holiday Inn Hotel)
10:00-18:00	Visit Open Field Fair for Fruit Growing Equipment (Werktuigendagen), Sint-Truiden

Oral Abstract 20
Spray drift of a cross-flow fan sprayer with wind-dependent variable air assistance

H. Stallinga, J.M.G.P. Michielsen, P. van Velde, P. van Dalfsen, M. Wenneker & J.C. van de Zande

Wageningen University and Research – Wageningen Plant Research, P.O. Box 16, 6700 AA Wageningen, The Netherlands
Email address: hein.stallinga@wur.nl

INTRODUCTION

In order to minimise the spray drift risk the Dutch manufacturer of orchard sprayers KWH has developed a crossflow fan sprayer, the KWH Mistral, which measures the wind direction with a sensor and adjusts the air support to the left and right hand side of the sprayer accordingly. The principle of the Variable Air Balance System (VLBS) is that when spraying against the wind more air assistance is given and in the downwind direction of the wind less air assistance. The KWH Mistral equipped with VLBS, 90% drift reducing nozzles (Zande et al., 2008; TCT, 2017) and utilizing a lower level of air assistance (with 400 rpm instead of 540 rpm PTO) was expected to obtain a drift reduction of 90% or even 95% even when the outer row of the orchard is sprayed from two sides (Wenneker et al., 2005). To underpin this claim field drift measurements were carried out.

MATERIALS AND METHODS

A comparison was made between spray drift of the Mistral KWH orchard sprayer with VLBS and 90% drift reducing venturi hollow cone nozzle (Albuz TVI80015 at 7.0 bar spray pressure) in combination with standard and a lower level of air assistance (540 rpm and 400 rpm of the PTO) and a standard cross-flow fan orchard sprayer (Munckhof; Albuz ATR lilac at 7.0 bar spray pressure). VLBS consists of an air pressure sensor at the top of the cross-flow air box measuring the left and right hand side pressure of the wind and steering a valve in the air conduct to guide air assistance more or less to the left/right hand side of the sprayer. The difference in left/right wind pressure sets the valve in the air conduct at the bottom of the cross-flow air box directing air assistance more against the wind and less in the downwind direction. Both sprayers were driving 6.5 km/h applying resp. 390 l/ha and 207 l/ha. Spray drift measurements were designed to meet the established requirements of the authorization of pesticides (Ctgb), the Environmental Activity Decree (I&M, 2012; CIW, 2003) and the international ISO standards for spray drift measurements and classification (ISO 22866, 2005; ISO 22369, 2006).

Spray drift measurements were made by spraying the fluorescent tracer Brilliant Sulpho Flavine (BSF) in the leeward outside 24 m (8 rows) of an apple orchard (Elstar) in the full leaf stage (BBCH 91/92). Spray drift deposit measurements were made on a short cut grass strip downwind of the orchard at distances up to 25 m from the last tree row. The collectors used consisted of filter material (Technofil TF-290) of 0.50 x 0.10 m arranged in a continuous line from 3 m up to 15 m and two single collectors of 1.00 x 0.10 m at 20 m and 25 m. At 7.5 m distance from the last tree row a 10 m high measuring pole was placed with double lines of ball shaped collectors (Siebauer Abtrifftkollektoren) at 1 m intervals up to 10 m height. The spray drift measurements were for each of the three techniques repeated 10 times over 3 days. Differences in spray drift deposition were statistically tested using Genstat procedure IRREML at specific evaluation zones and for airborne spray drift. Drift reduction of both the KWH Mistral was calculated in comparison with the spray drift deposition of the reference spraying.

Weather conditions during application were recorded with sensors at a measuring pole positioned 7.5 m downwind of the treated orchard. Average temperature during the experiments was 12.5°C, mean wind angle was 14° from cross to the tree row direction, mean wind speed at 2 m height was 1.5 m/s and 2.5 m/s at 4 m height (about 1 m above the top of the trees).

RESULTS AND DISCUSSION

The KWH Mistral with the VLBS system equipped with the 90% drift reducing nozzle and 540 rpm PTO compared to the standard cross flow sprayer gave at 4.5-5.5 m distance from the last tree row (3 m crop free buffer zone) a drift reduction of 91.2%. With this result this application technique can be classified in the drift reducing technique (DRT) class 90 (without the necessity of one sided spraying of the last tree row when using 90% drift reducing nozzles). For the same technique but with a reduced level of air assistance of 400 rpm PTO a drift reduction of 96.5% was obtained at the same position. With this result this combination can be classified in the drift reduction class 95 (without one sided spraying of the last tree row). Results of these spray drift experiments led to a certification of these spray drift reducing techniques in the Netherlands and are therefore allowed to be used with a crop-free buffer zone of 3m (distance between last tree row and top of bank of waterway). Measurement of airborne spray drift averaged over 0-10 m height resulted in a spray drift reduction of 91.1% at 540 rpm PTO and 97.3% at 400 rpm.

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