

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

SuproFruit2017, Hasselt, Belgium, 12 May 2017

Hein Stallinga



WAGENINGEN
UNIVERSITY & RESEARCH

Contents

- **Introduction**
- Experiments
- Results
- Conclusions

Introduction

- Spray drift reduction fruit crop spraying in NL (3 m cfbz)
 - 75% all fields
 - 90% alongside waterways
 - >90% depending on toxicity applied product; label

Technology / Crop-free zone (m)	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	→
standard									
DRT50									
DRT75									
DRT90									
DRT95									
DRT99									



Combination not authorised



Combination authorised



Combination not authorised, based on other legislation³



WAGENINGEN
UNIVERSITY & RESEARCH

Introduction

- What is the spray drift reduction of the KWH Mistral cross-flow fan sprayer with VLBS – (DRT?):
- Effect Variable Air Balance System (VLBS)
- Effect lower level of air assistance (PTO 400rpm vs 540rpm)
- Is it possible to obtain enough drift reduction when spraying the outer tree row from two sides using VLBS and lower level of air assistance?

Reference: cross-flow fan sprayer (Munckhof)

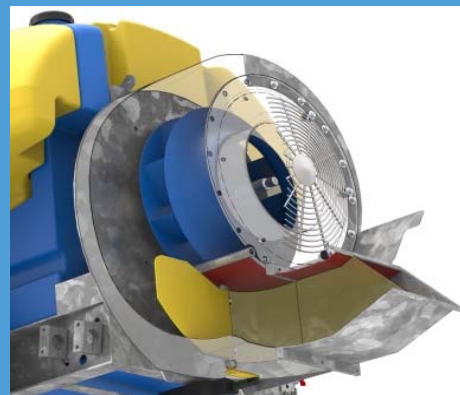
- Albuz ATR Lilac at 7 bar spray pressure
- PTO 540 rpm
- Air assistance max 21 m/s
- Driving speed 6.4 km/h
- Spray volume 200 l/ha





KWH Mistral with VLBS

- Measures wind direction with sensor
- Variable Air Balance System (VLBS)
 - Against the wind more air assistance
 - Downwind direction less air assistance
- 90% drift reducing nozzle Albus TVI 80015 at 7 bar
- Forward speed 6.5 km/h
- PTO 400 rpm; 382 l/ha; low air assistance 6.4 m/s
- PTO 540 rpm; 390 l/ha; low air assistance 7.6 m/s





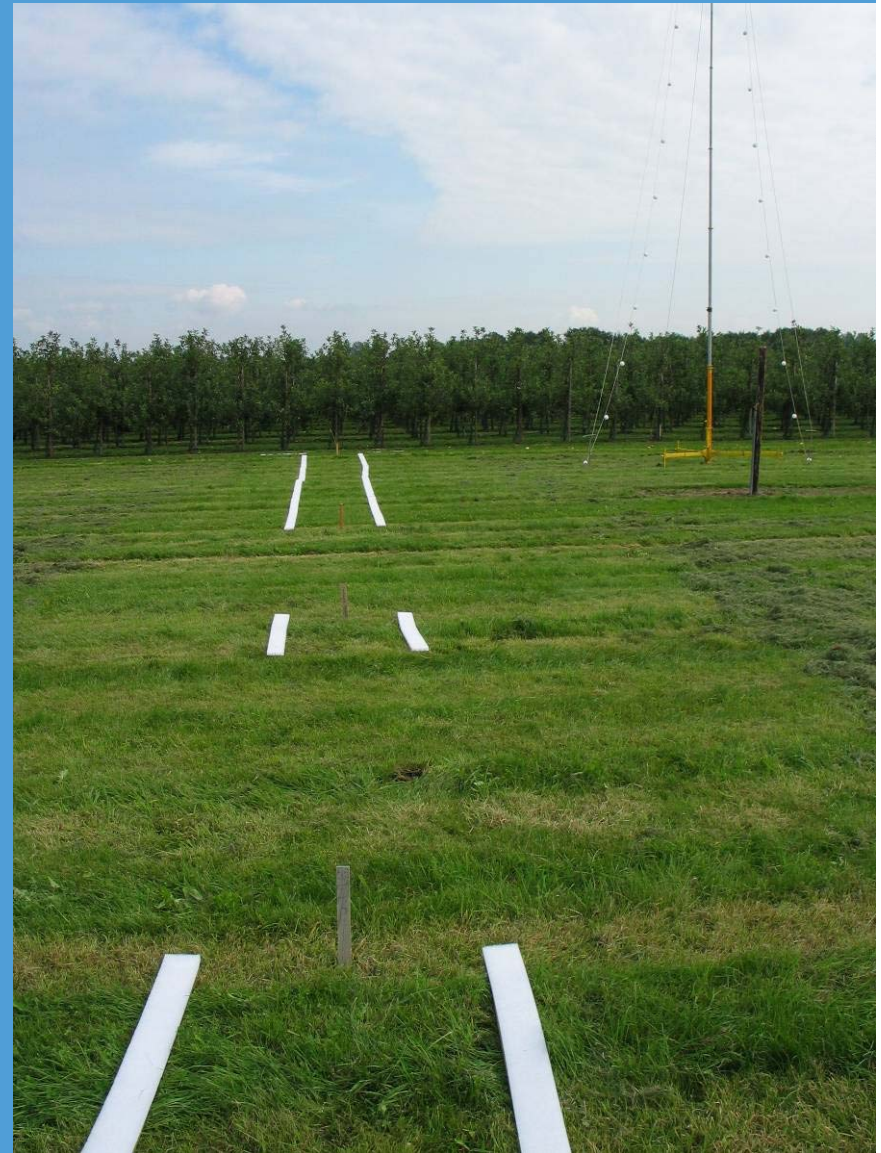
Contents

- Introduction
- **Experiments**
- Results
- Conclusions

Experiments

- Leeward outside 24 m (8 rows) apple orchard (Elstar)
- Full leaf stage (BBCH 91/92)
- Two-sided spraying outside tree row
- Fluorescent tracer Brilliant Sulpho Flavine (BSF)
- Spray drift deposition up to 25m downwind from the last tree row in double lines
- Filter collectors (Technofil TF-290)
- 0.50x0.10m in a continuous line 3-15m
- 1.00x0.10m at 20m and 25m

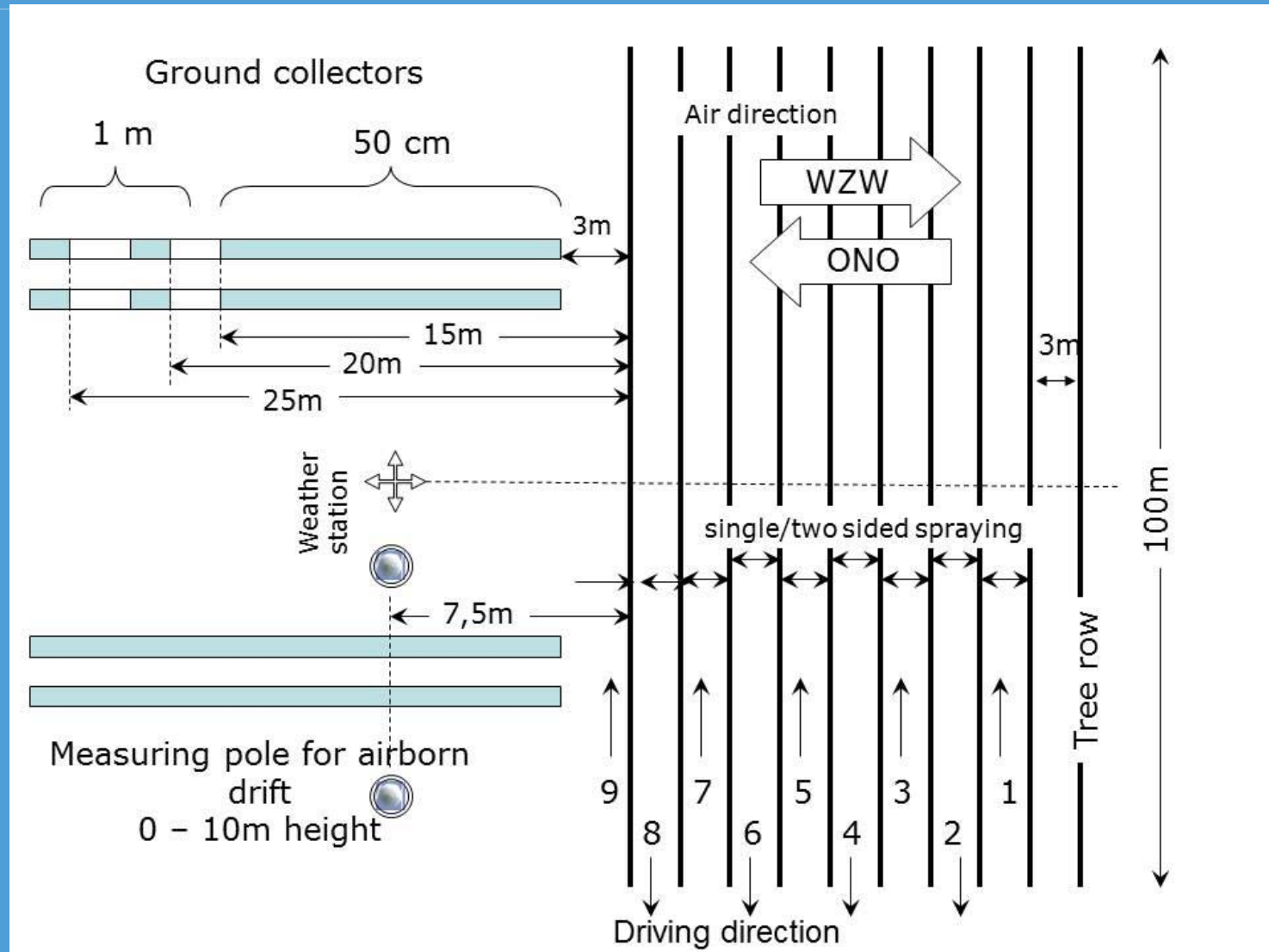
Spray drift in measurement setup



Experiments

- Airborne drift at 7.5m from last tree row
- 10m high pole with double lines of ball shaped collectors (Siebauer Abtrifftkollektoren) at 1m intervals up to 10m height
- Weather conditions with sensors at a pole 7.5 m downwind: average temperature 12.5 °C, mean wind angle 14° from cross to the tree row direction, wind speeds at 2m height 1.5m/s and at 4m 2.5m/s
- 10 repetitions in 3 days
- Differences in spray drift statistically tested with Genstat IRREML Procedure (95% probability interval)
- Drift reduction KWH Mistral calculated in comparison with spray drift deposition reference spraying

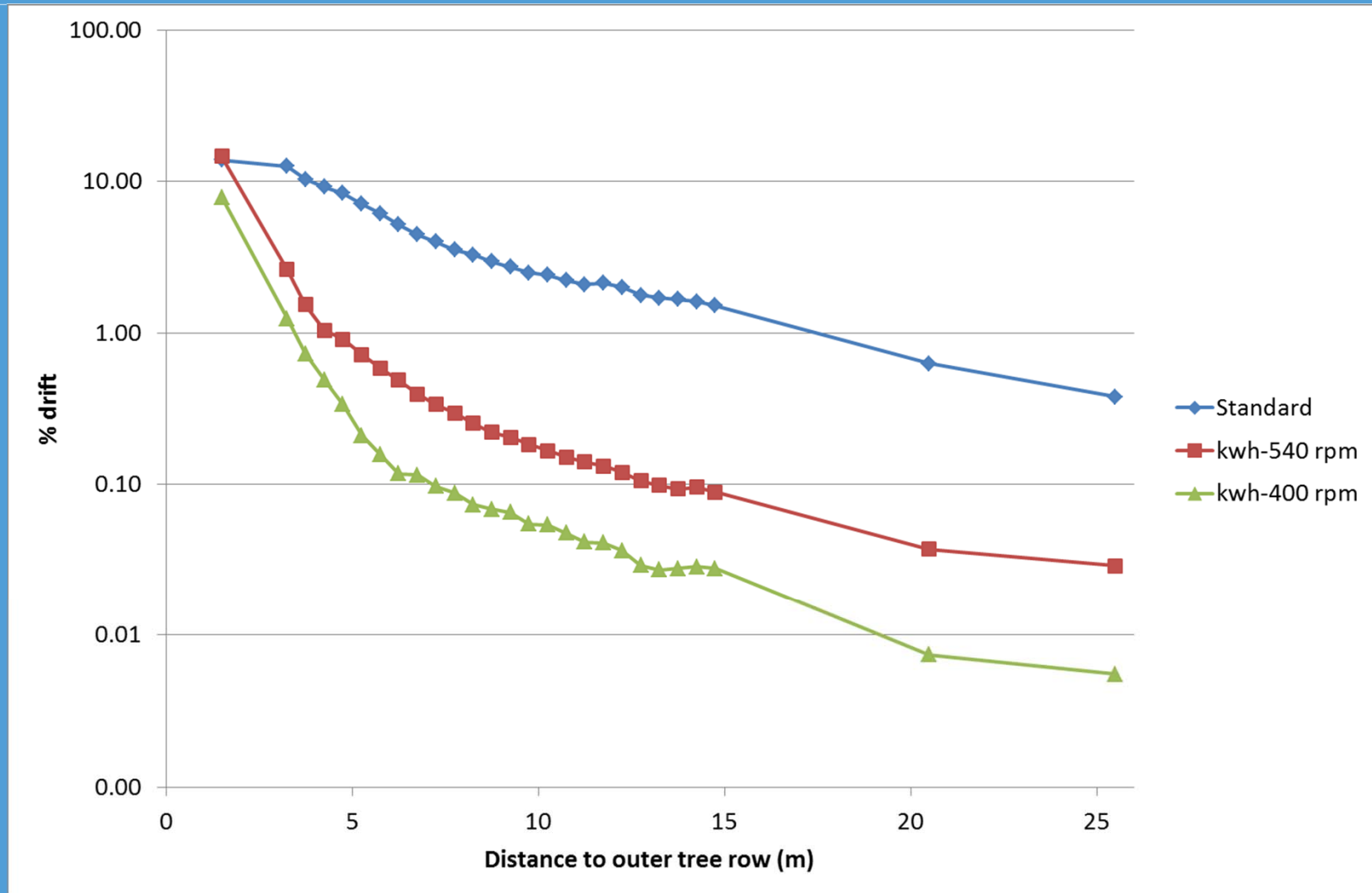
Lay-out field experiments



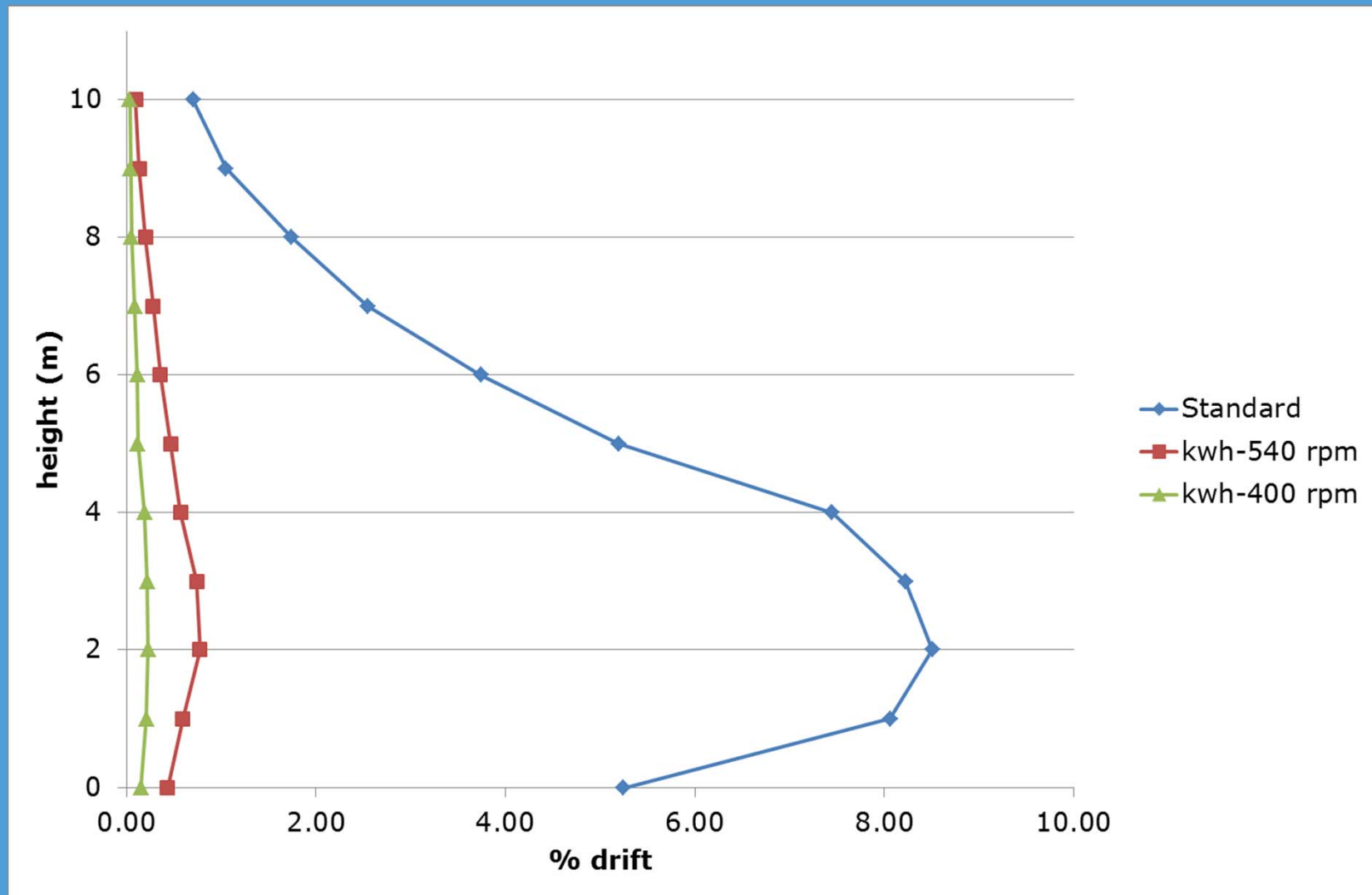
Contents

- Introduction
- Experiments
- **Results**
- Conclusions

Spray drift deposition (% sprayed volume)



Airborne spray drift (% sprayed volume)



Spray drift reduction (%)

Object	4.5-5.5 m	stats	Airborne (0-10 m)	stats
standard	*	A	*	A
KWH VLBS, 90% DRN, PTO 540 rpm	91.2	B	91.1	B
KWH VLBS, 90% DRN, PTO 400 rpm	96.5	C	97.3	C

Contents

- Introduction
- Experiments
- Results
- **Conclusions**

Conclusions

- Variable wind dependent direction of air assistance increases to spray drift reduction
- Low level of air assistance increases spray drift reduction
- KWH Mistral with VLBS and 90% DRN can be used in two sided spraying of the outside tree row and with 3 m crop-free buffer zone and is classified in the NL as:
 - a DRT90 with 540 rpm pto;
 - a DRT95 with 400 rpm pto.
- Airborne spray drift reduction comparable; resp. 91% and 97%

Thank you for your attention!

contact:

hein.stallinga@wur.nl

Acknowledgement: KWH,
Buren, the Netherlands



WAGENINGEN
UNIVERSITY & RESEARCH