Drift potential of tilted shielded rotary atomisers based on wind tunnel measurements

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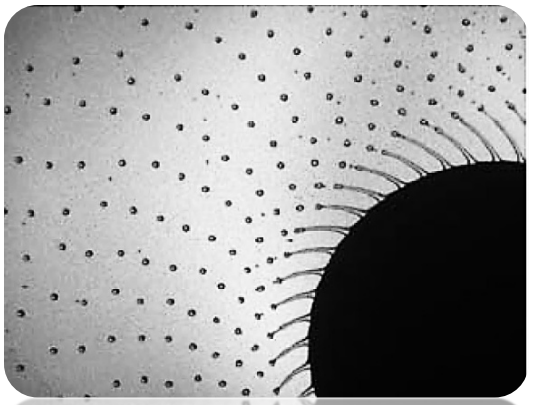
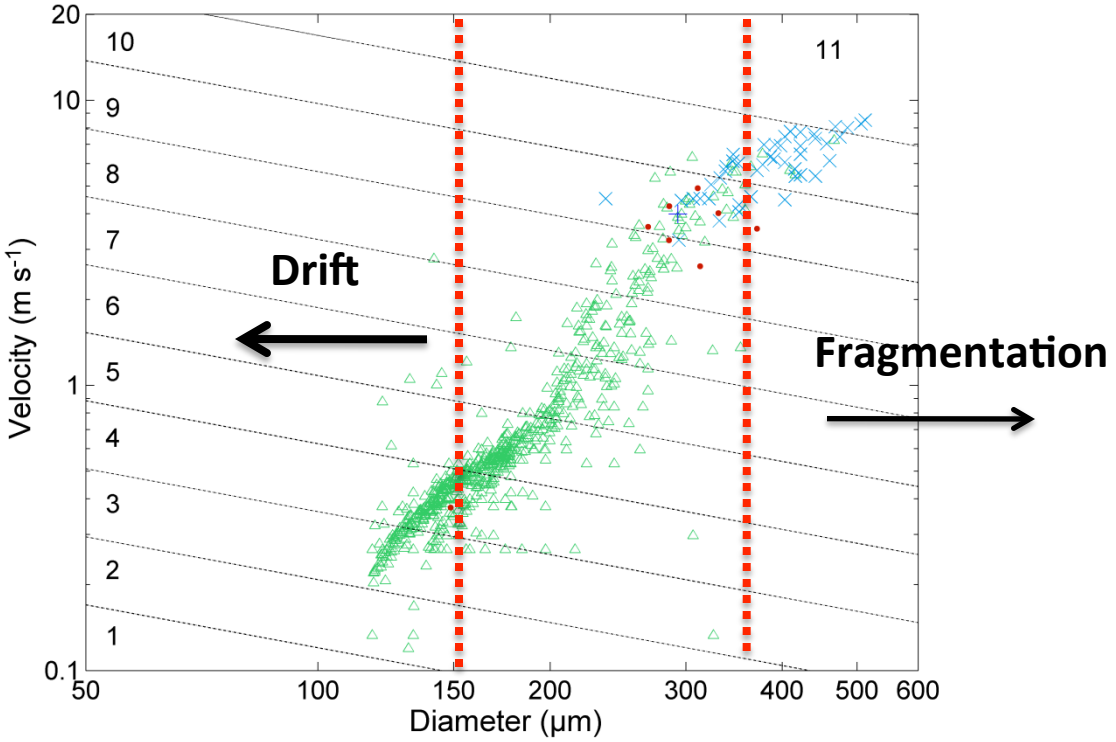


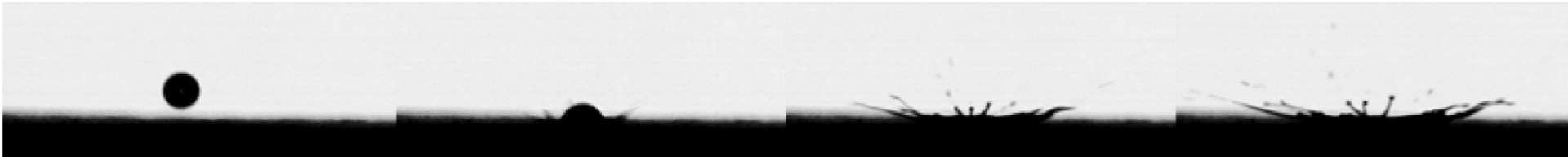
Context



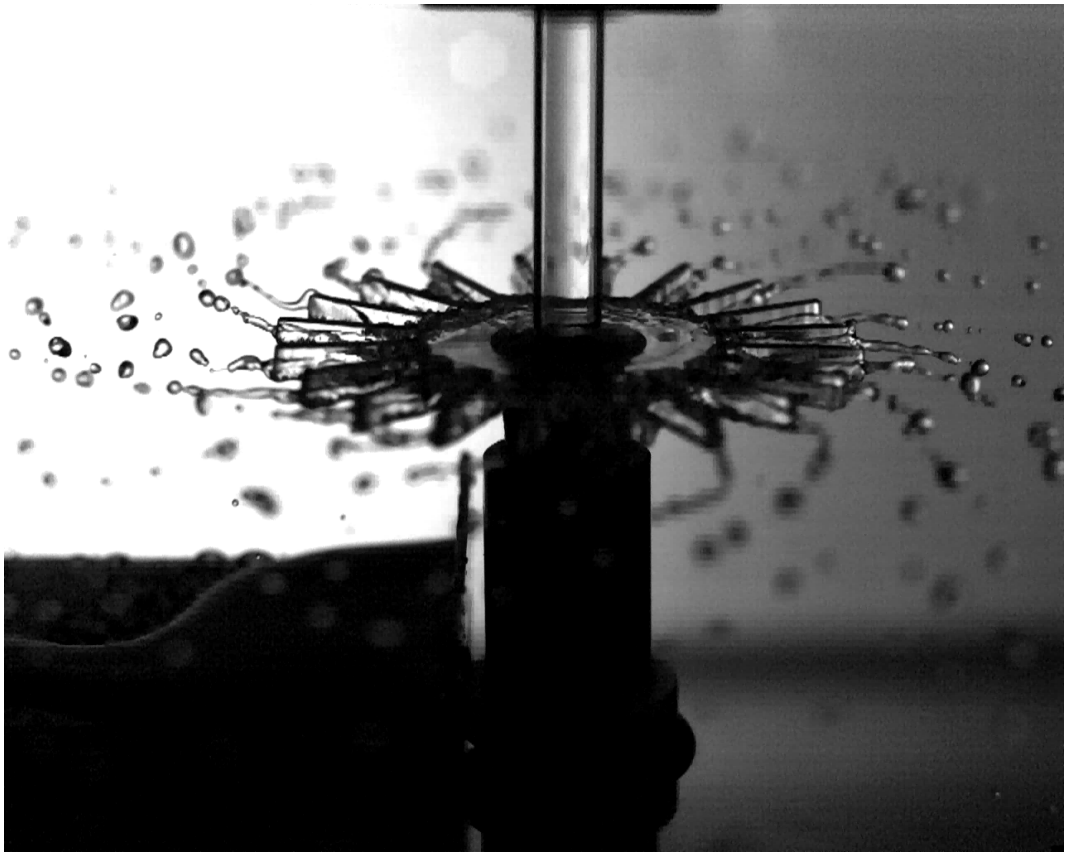
Flat fan nozzles

Extended droplet size distribution

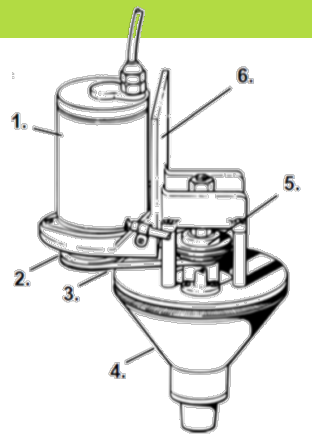
Δ adhesion, ● rebond , x fragmentation

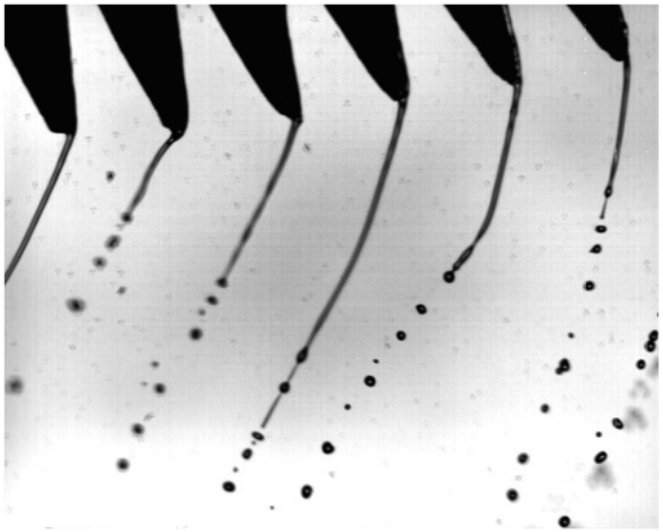


Controlled Droplet Application (CDA)… !

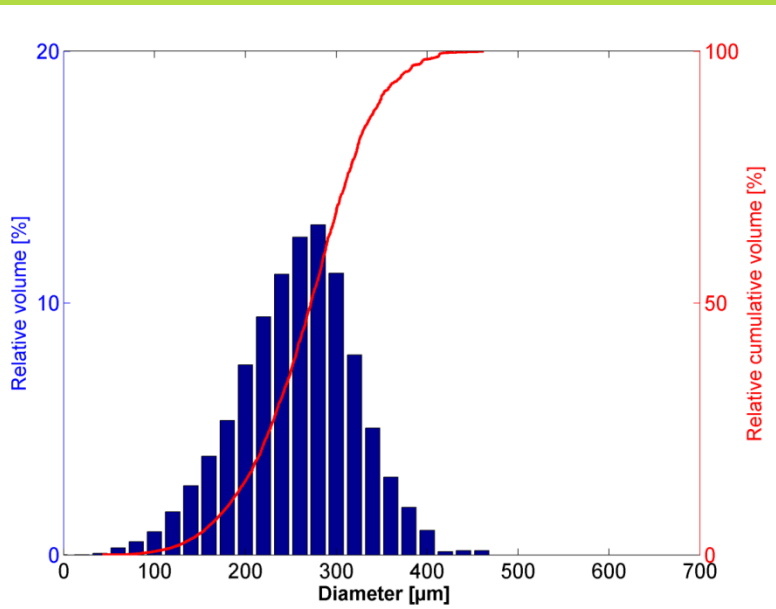


Rotary atomiser
(GRASP)

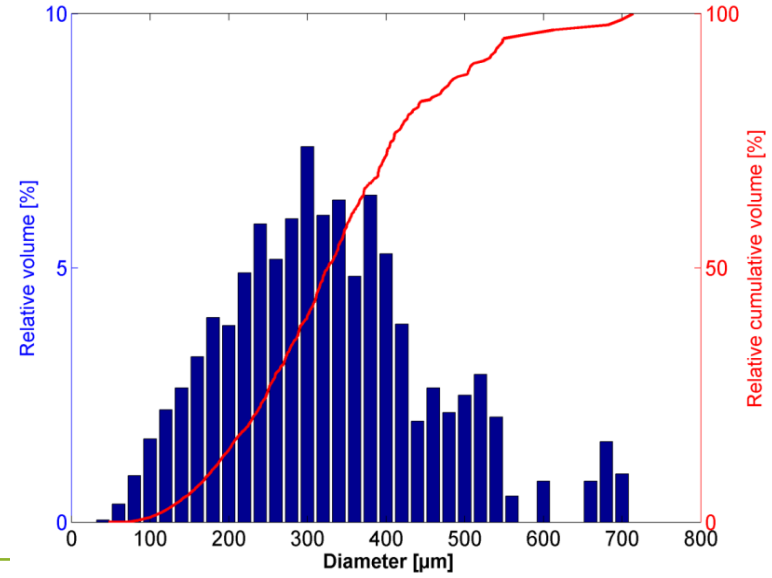




Compromise in termes of droplet sizes …



Rotary atomiser (Micromax 120)



Anti-drift nozzle (Hardi Injet 015)

Objective

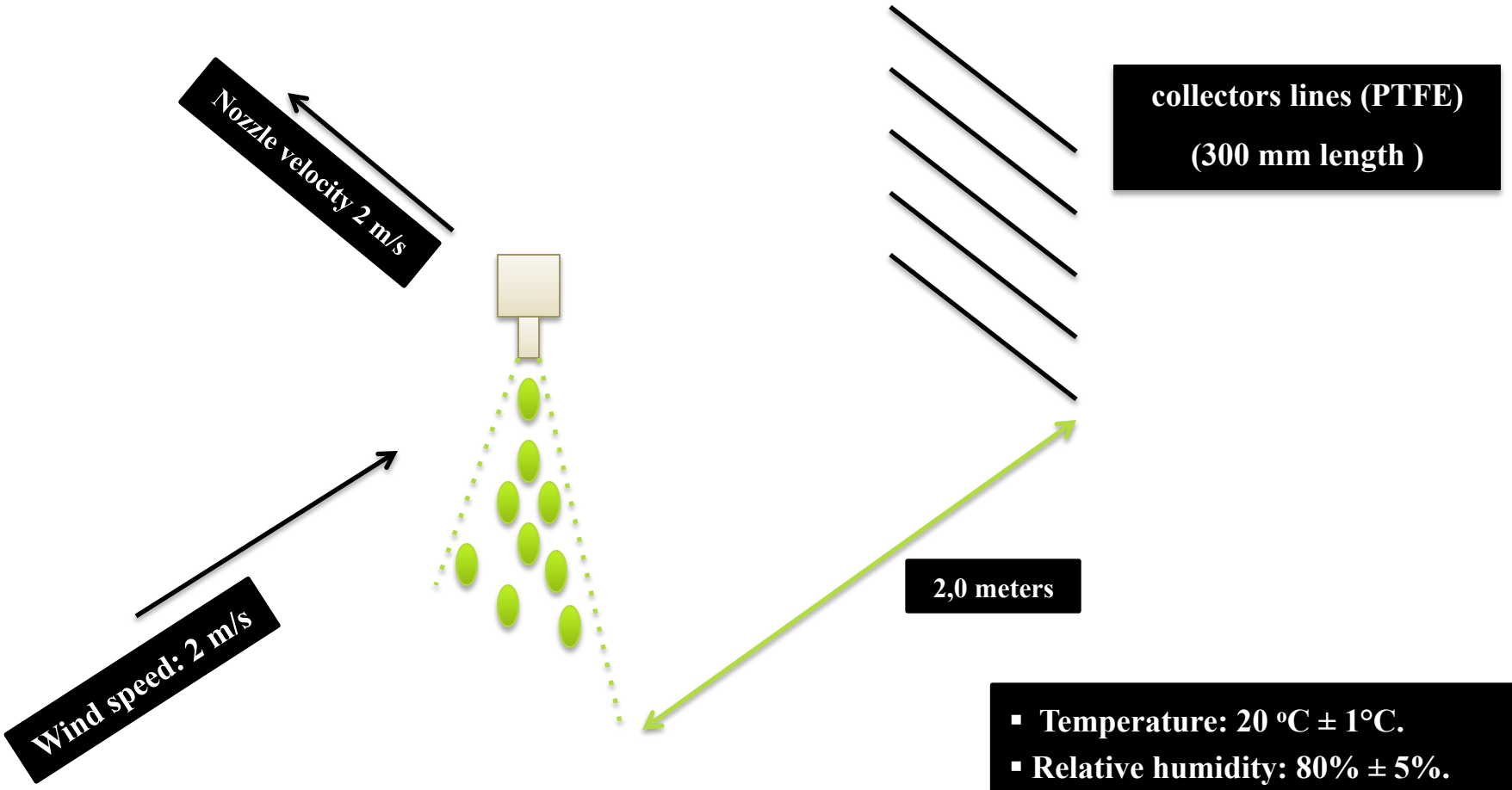
The objective is to investigate whether a rotary atomizer with:

- a 60° forward tilt
- a reduced driftable droplet proportion and a VMD centered around 300 µm

can reduce drift potential to acceptable levels

Drift trials

ISO 22856 (2008)



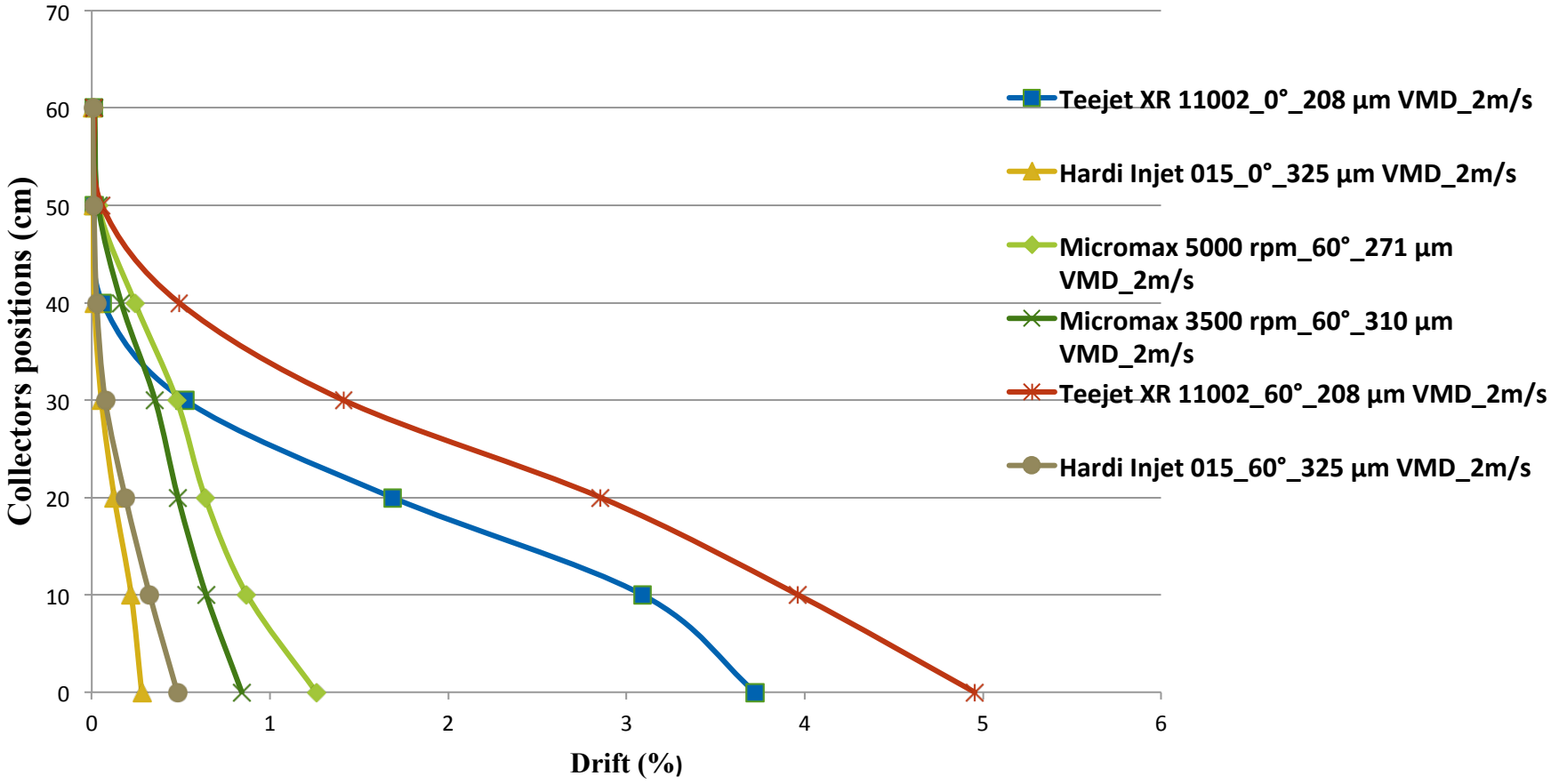
- Temperature: 20 °C ± 1°C.
- Relative humidity: 80% ± 5%.
- Spray mixture: Tap water+0.1% Break Thru.

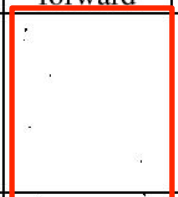
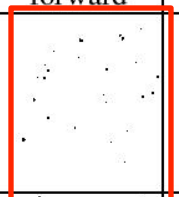
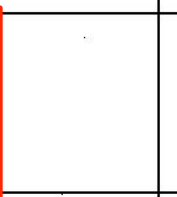
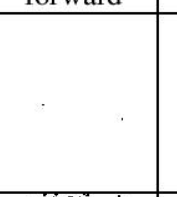
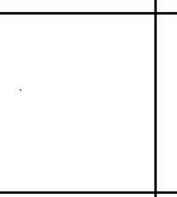
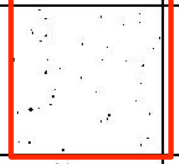
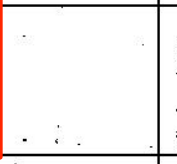
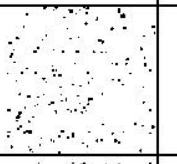
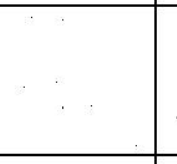
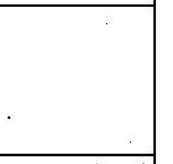
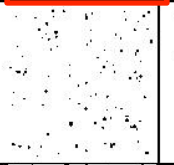
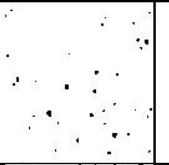
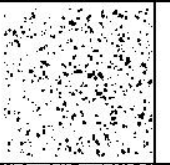
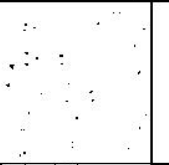
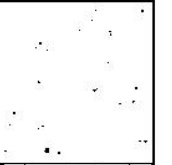
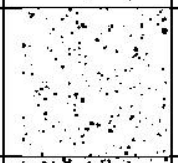
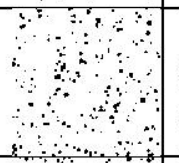
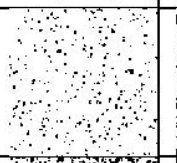
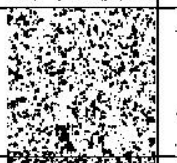
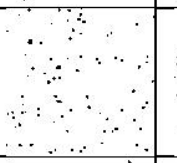
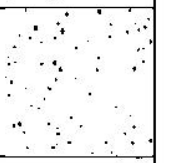
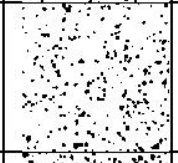
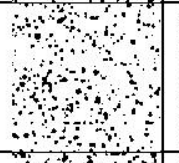
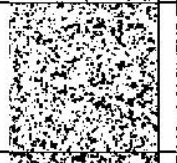
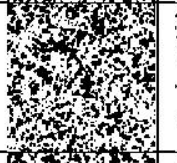
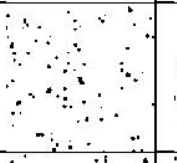
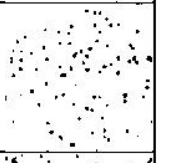
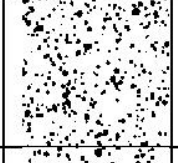
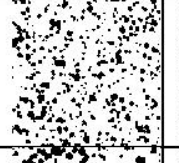
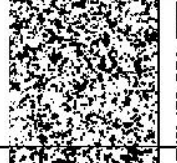
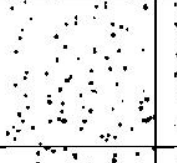
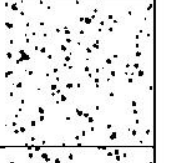
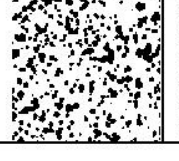
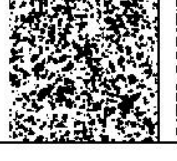
Spray characteristics

Buse	V_{10} (µm)	V_{50} (µm) ou VMD	V_{90} (µm)	Span (V_{90}-V_{10}/ V_{50})	Percentage by volume of droplets <100 µm (%)	Percentage by volume of droplets > 350 µm (%)
CDA (5000 rpm)	181	271	347	0.60	0.70	8
CDA (3500 rpm)	221	310	398	0.57	0.49	27
Hydraulic nozzle (Teejet XR 110 02)	113	208	361	1.18	6	11
Anti-drift nozzle (Hardi Injet 015)	177	325	514	1.03	0.99	41

Vertical profile of drift at 2.0 meteres

ISO 22856



Spray generator model / Spray orientation		Micromax 120 3500 rpm	Micromax 120 5000 rpm	Teejet XR11002		Hardi Injet 015	
		60° forward	60° forward	vertical	60° forward	vertical	60° forward
Water sensitive heights (mm)	600						
	500						
	400						
	300						
	200						
	100						
	00						

Cumulative drift measurements at 2.0 m downwind

	CDA 3500 rpm	CDA 5000 rpm	Hydraulic nozzle Teejet XR11002		Anti-drift nozzle Hardi Injet 015	
Nozzle orientation	60° forward	60° forward	vertical	60° forward	vertical	60° forward
Drift (%)	2.540	3.539	9.105	13.741	0.708	1.114
STD	0.12	0.17	0.591	0.75	0.04	0.07

Potential Drift Index (DIX)

	Micromax 120 3500 rpm	Micromax 120 5000 rpm	Teejet XR11002		Hardi Injet 015	
Nozzle orientation	60° forward	60° forward	vertical	60° forward	vertical	60° forward
DIX (%)	36.53	44.05	48.27	100	8.43	10.98

The 60° forward tilted Teejet XR11002 was chosen as reference nozzle (100 % of drift)

Conclusion

-60° forward tilted nozzles increased drift relative to vertically oriented nozzles.

-Rotary atomisers with a narrow droplet size distribution centred around a VMD of 300µm do not significantly reduce drift comparatively to hydraulic nozzles.

-Turbulence and lower entrained air flows may explain drift at higher sampling locations of rotary atomisers comparatively to hydraulic nozzles.

THANK YOU FOR YOUR ATTENTION