Spray Drift Reduction

In 3D Crops

The German Regulations

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Spray Drift Reduction in 3D Crops in Germany: The System

The approach: Drift reduction is designed as a worst case scenario

Technical components

a) Hardware: fan type, nozzle types with coarse droplet spectra, crop height

b) + Methods: fan speed, air support shut off, noozle shut off, reduction of spray liquid pressure, and max. forward speed (via good agricultural practice: must be deleted without substitution!!)

- Hardware is very much preferred (is considered controlable)
- Methods should be avoided (are considered uncontrolable; questionable!)

c) Drift reduction classification system is related to reference drift values
= one of the drift reduction classes: 50% (= nozzle), 75%, 90%, 95%, 99% (= fan type + nozzle + methods)

Restrictions of product use

a) + Basic buffer zone:
1) A value, e.g. 15 m, allows the use of products without any drift reduction means beyond the value from a surface water
2) No value prohibits the use of the product with a sprayer not in any drift reduction class in the whole orchard closer 40 m to a surface water

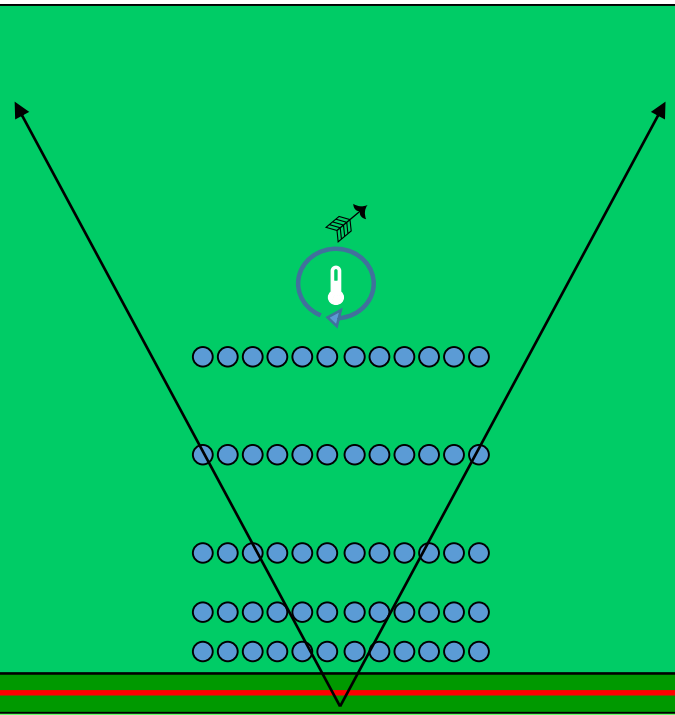
b) + Buffer zones related to toxicity of product; decreasing with increasing drift reduction class of the fan (20 m, 15 m, 10 m, 5 m, 3 m). If the toxicity / exposure ratio (TER) results in a buffer zone larger than 20 m, the product is not registered at all.

= buffer zone for the product

Spray Drift Reduction Trials Germany: The Setup of the Trial

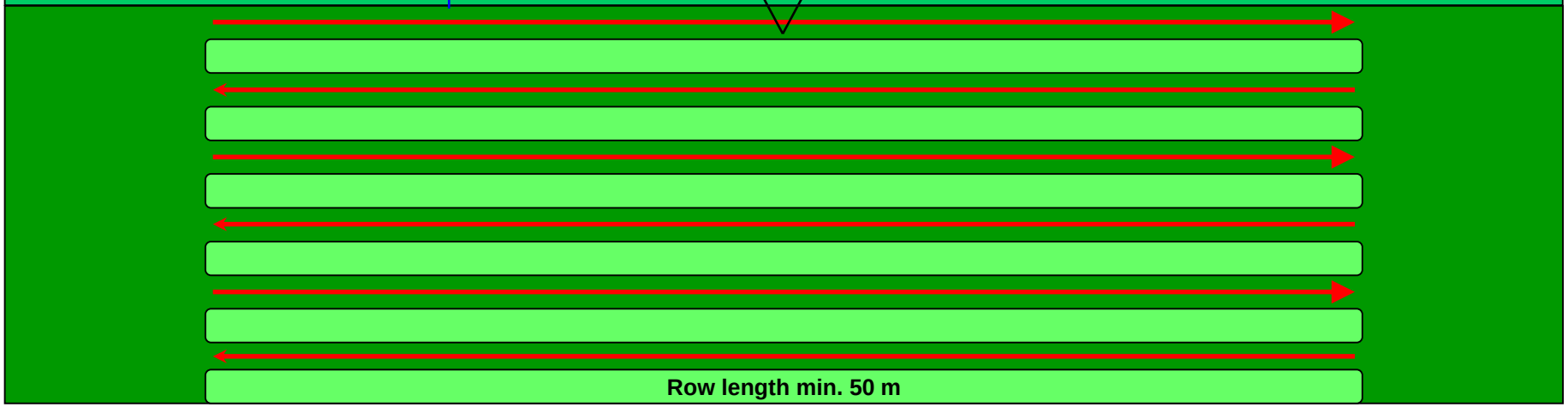
Record wind speed + direction + temperature at two spots
Ranges for valid results:
Wind speed: 2,0 - 5,0 ms^{-1},
Temperature: ≤ 25°C

Free space ≥ 20 m in main wind direction



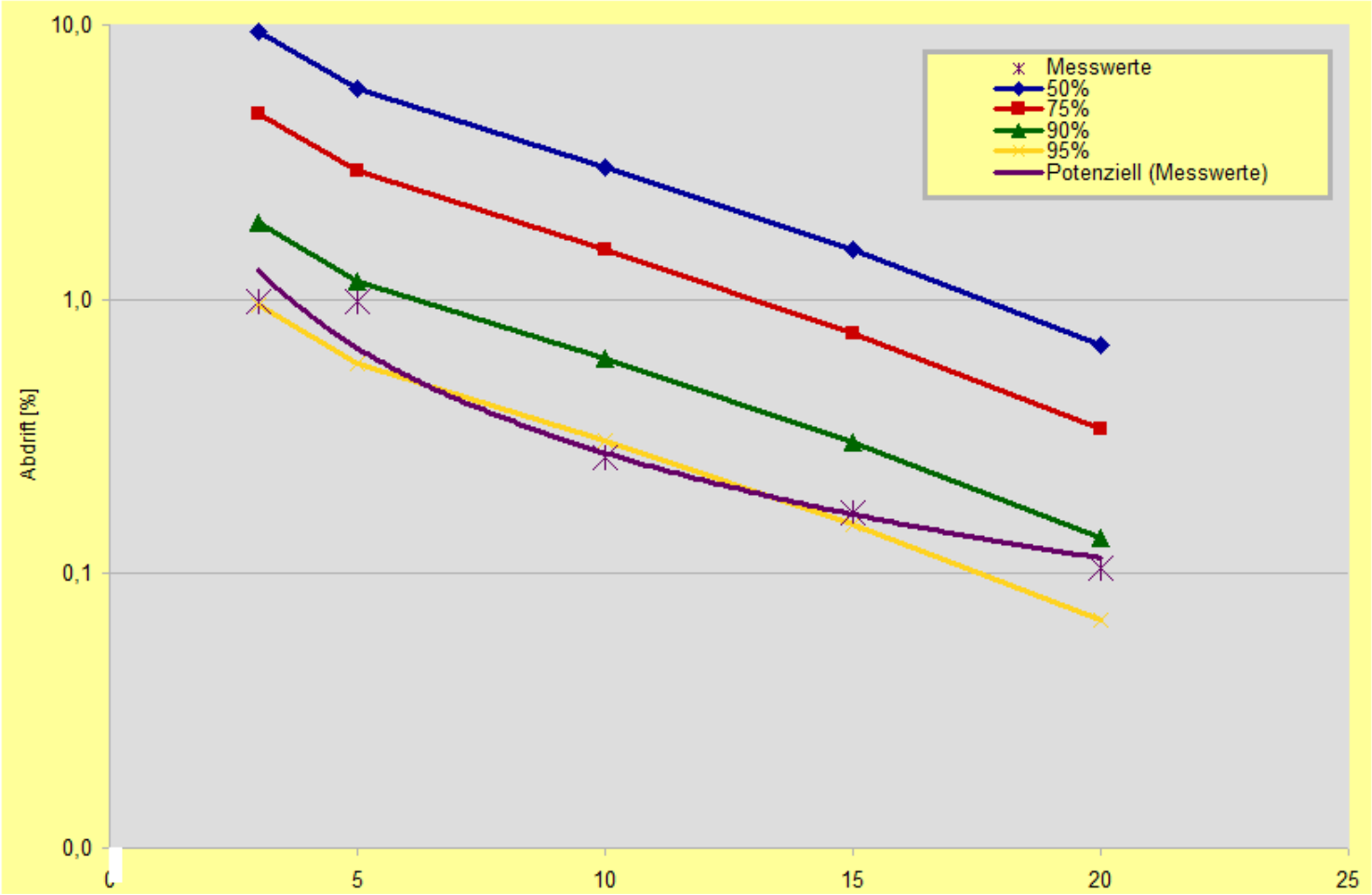
Wind direction max ± 30° from the perpendicular to the row direction

10 Petri dishes at 1 m distance and in distances von 3 m, 5 m, 10 m, 15 m, 20 m from the last tree row
3 repetitions



Spray Drift Reduction in 3D Crops The Reference Values

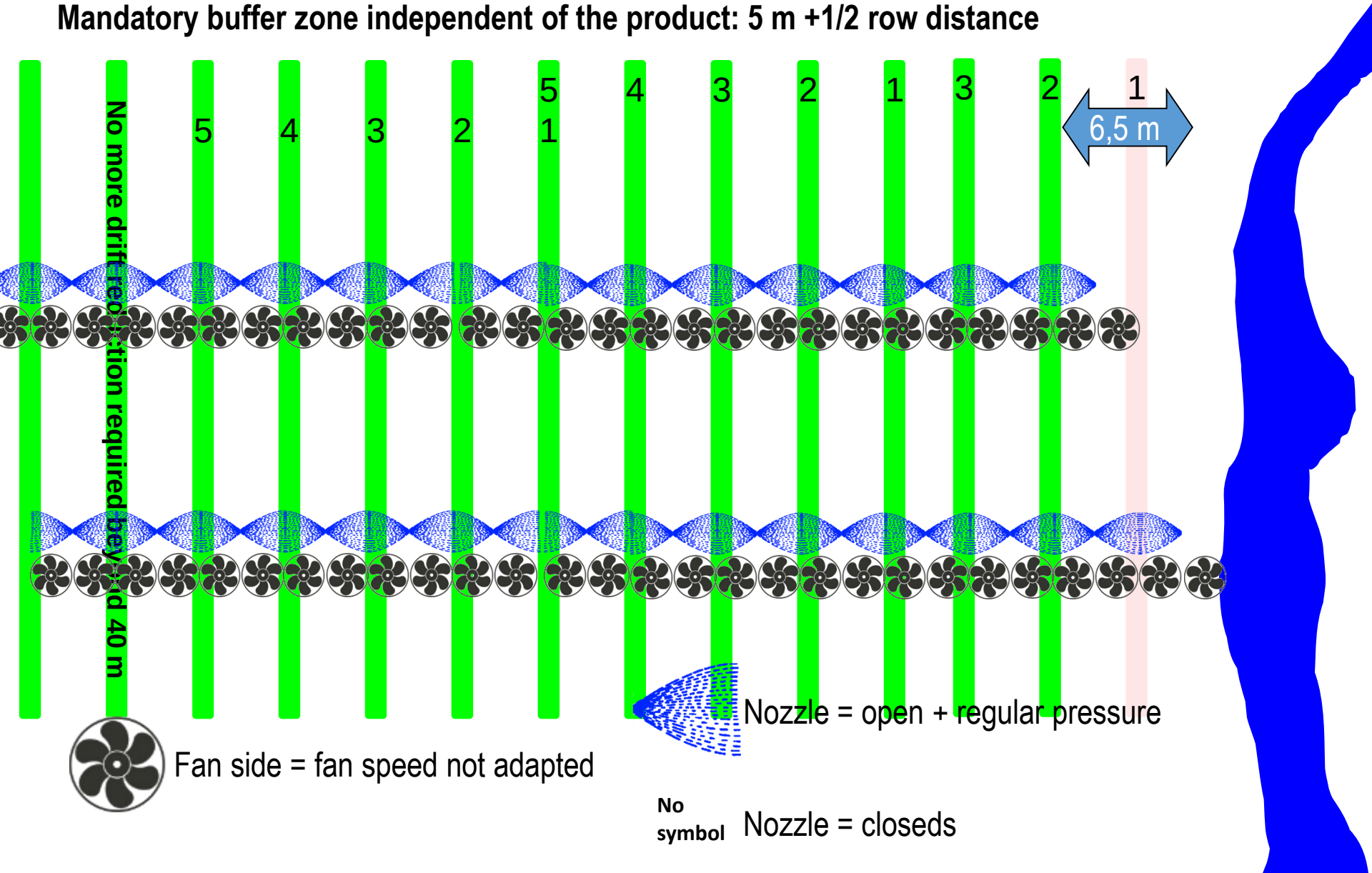
Trial results in relation to thresholds for drift reduction classes



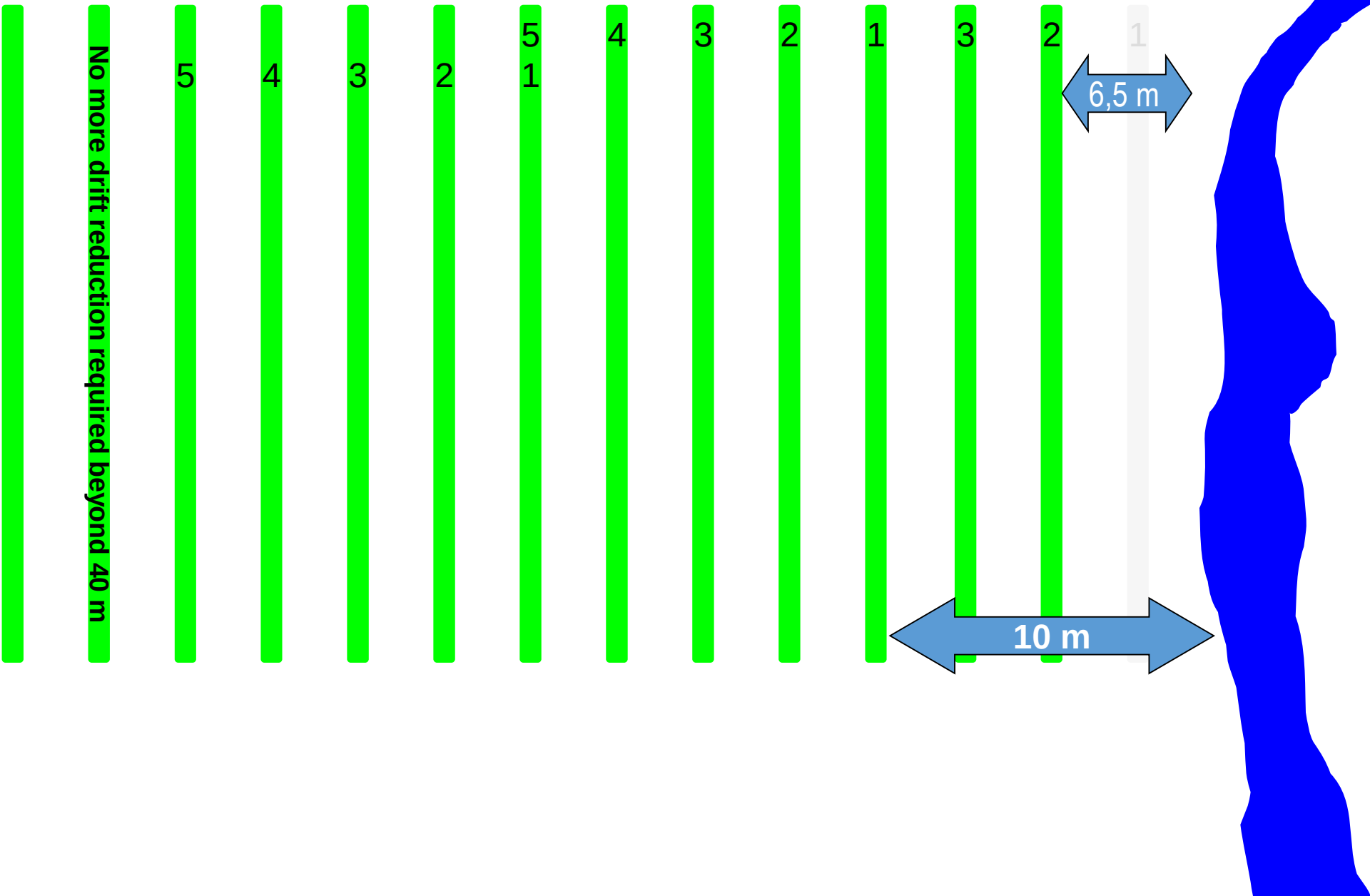
This fan achieves 90% drift reduction (all sediment values are below the 90% drift reduction reference values

Buffer Zones: Basic Buffer Zone up to 2018

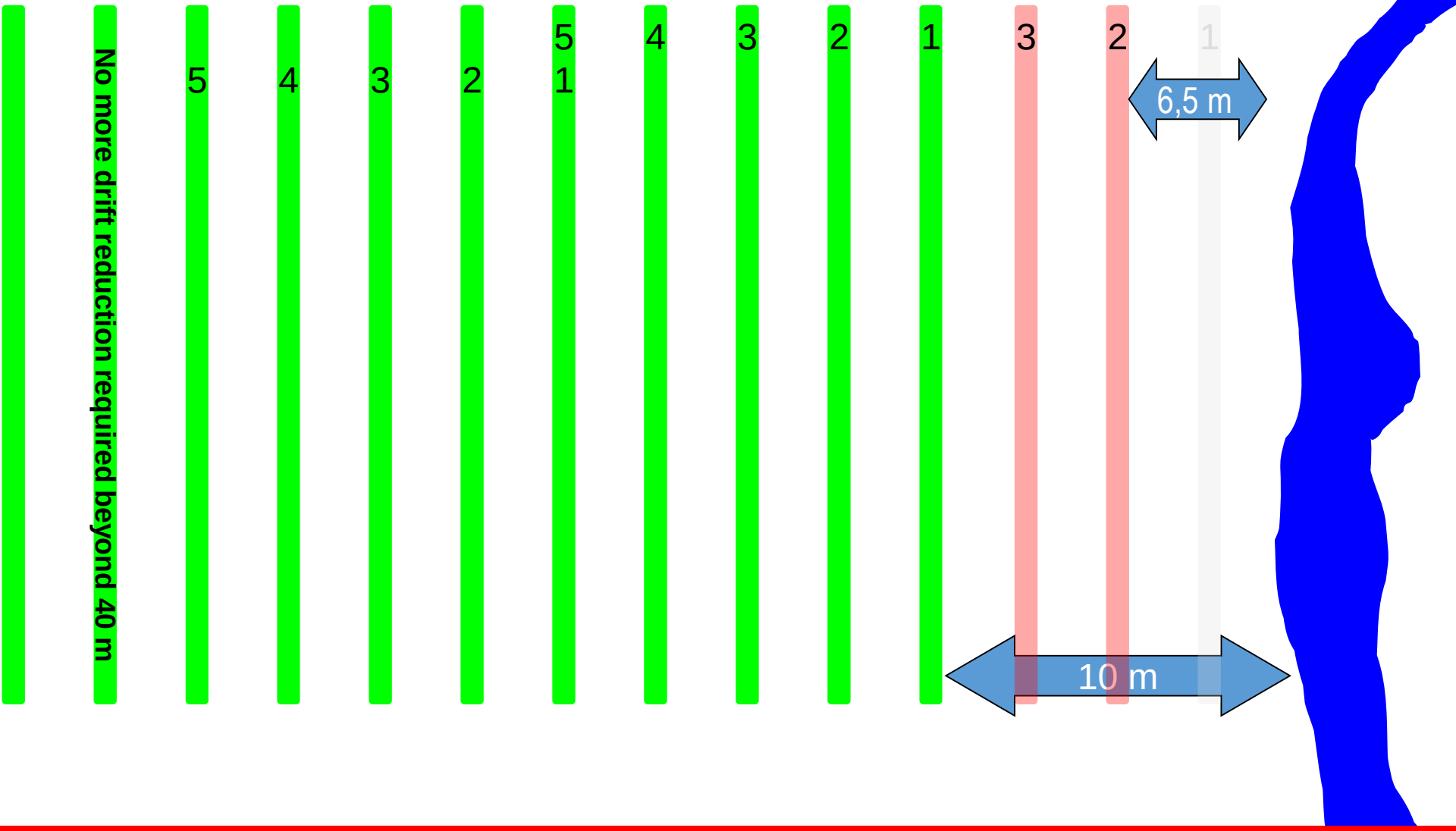
Mandatory buffer zone independent of the product: 5 m +1/2 row distance



Buffer Zones: Products Requiring 10 m Distance with 90%-Fan

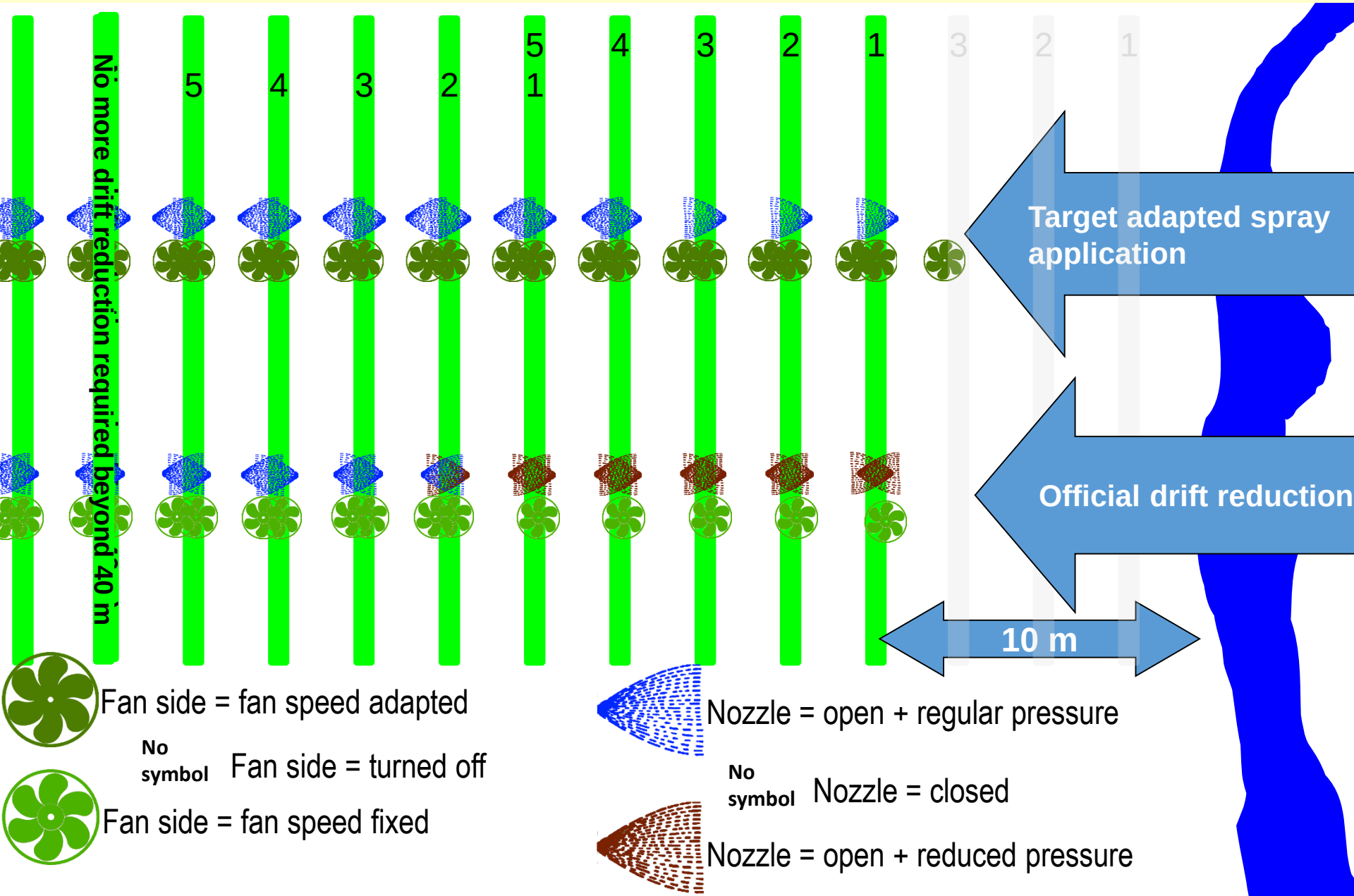


Buffer Zones: Products Requiring 10 m Distance with 90%-Fan

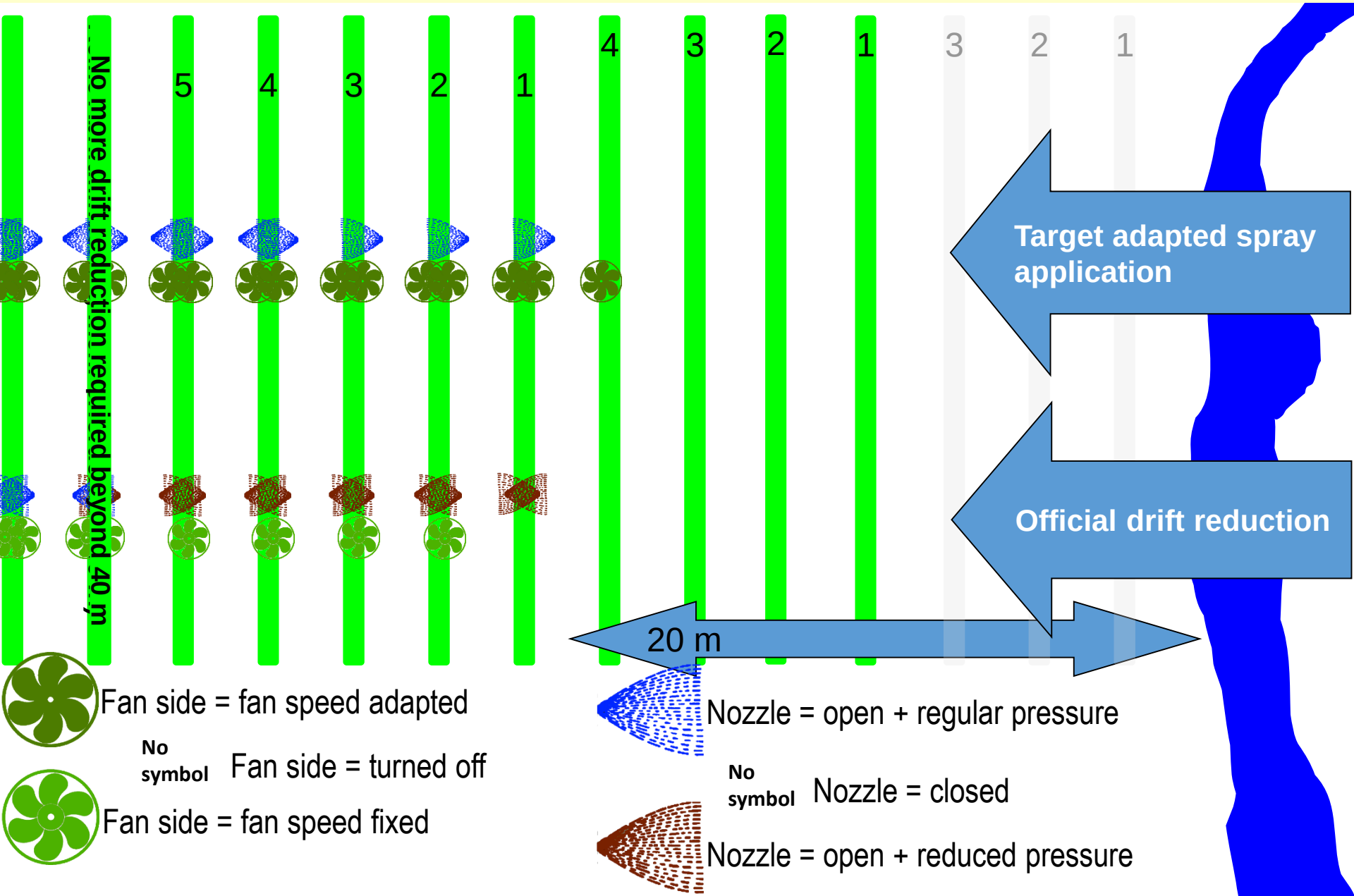


Even with a 90%-sprayer, crop protection is impossible below 10 m buffer zone because of only very few products left

Buffer Zones: Product 10 m Distance with 90%-Fan: How to Treat



Buffer Zones: Product 20 m Distance with 90%-Fan: How to Treat



Buffer Zones: Fan Types registered for ≥ 90% Drift Reduction

Drift reduction required: 90%: ≥90% fan type

Fan Types in the Drift Reduction Classes 90%, 95% and 99%

Manufacturer	Drift Reduction Class 90%	Drift Reduction Class 95%	Drift Reduction Class 99%
KWH		3R2	
Lipco	OSG-N		OSG-N Tunnelhöhe 2,5 m
	OSG-N hight of tunnel 3,5 m		
Lochmann	80Q + air support closure AD90 (retired)	90UQH2-A	
	80 UQ (retired)	80UQ2-A	
	90 Q (retired)		
Munckhof	Tunnel height 2,75 m or 3,05 m	105 with cross flow tower	
		105 with cross flow tower 2,75 m or 3,05 m	
		106 with air support closure	
Vicar	Turbine 460		
	Turbine 450 Maxi		
	Turbine 456		
	Turbine 540		
Wanner	ZA28	H63	
	ZA32	NTR 20	
	Fan with WKR	N42	
	36 GA nA		
Weber	QU 15 H		
	QU 16 H		
	QU 17 H		
Zupan		DT-O 25.000 m³ + air flow control	
		DT-O 30.000 m³ + air flow control	

Nozzle assortments for fan types in the drift reduction classes 90%, 95% and 99%

Manufacturer	Drift Reduction Class 90%	Drift Reduction Class 95%	Drift Reduction Class 99%
KWH		OIFD75-2	
Lipco	random		OIFD75-1
	OIFD75-2		
Lochmann	OIFD75-1		
	OIFD75-1		
	OIFD75-1		
Munckhof	random	OIFD75-1	
		OIFD75-1	
		OIFD75-1	
Vicar	OIFD75-2		
	OIFD75-2		
	OIFD75-2		
	OIFD75-2		
Wanner	OIFD75-1	OIFD75-1	
	OIFD75-1	OIFD75-1	
	random	OIFD75-1	
	OIFD75-1		
Weber	OIFD75-1		
	OIFD75-1		
	OIFD75-1		
Zupan	OIFD75-1		
	OIFD75-1		

Fan types underlaid with green obtained the clearance to the MABO sprayer subsidy program 2022

Updated 02.02.2022 according the JKI-"Verzeichnis Verlustmindernde Geräte" from 25.10.2021

Fan types underlaid green: Certified for a 50%-subsidy by MABO. Mandatory components: Officially registered in the JKI 90% drift reduction class or higher, listed in the actual **AirCheck®** white list, air and liquid vertical distribution individually adjusted and certified through the **AirCheck®** Fan Type Selection Aid, automatic vat cleaning, a set of registered drift reducing nozzles, 4-fold section control, wide tires for soil protection and test connections for pressure gauge and pump in accordance with the current **AirCheck®** directive.

Buffer Zones: Nozzle Types registered for Drift Reduction

Drift reduction required: 90%: ≥90% fan type + registered drift reducing nozzles

JKI Registered Drift Reducing Nozzle Types (top fruit)

Nozzle Assortment OIFD75-1		
Nozzle type	Pressure range	Reduction of spray liquid pressure in the first 3, resp. 5 tree rows
Albuz TVI 80-0050	5 - 25 bar	
Albuz TVI 80-015	5 - 25 bar	
Albuz AVI 80-01	2 - 20 bar	x
Albuz AVI 80-015	3 - 20 bar	x
Albuz AVI 80-02	3 - 20 bar	x
Albuz AVI 80-03	3 - 20 bar	
Albuz CVI 80-01	2 - 20 bar	x
Albuz CVI 80-015	2 - 20 bar	x
Albuz CVI 80-02	2 - 20 bar	x
Lechler ID 90-015 C	3 - 20 bar	x
Lechler ID 90-02 C	3 - 20 bar	
Lechler ID 90-025 C	3 - 20 bar	
Lechler ID 90-03 C	3 - 20 bar	
Lechler AD 90-01 C	2 - 20 bar	x
Lechler AD 90-015 C	2 - 20 bar	x
Lechler AD 90-02 C	2 - 20 bar	x
Lechler AD 90-03 C	2 - 20 bar	x
Lechler AD 90-04 C	2 - 20 bar	x
TeeJet DG 8002 VS	2 - 15 bar	x
TeeJet DG 8003 VS	2 - 15 bar	x
Teejet DG 8004 VS	2 - 15 bar	x
TeeJet DG 8005 VS	2 - 15 bar	x
Lechler IDK 90-0067 C	2 - 20 bar	x
Lechler IDK 90-01 C	2 - 20 bar	x
Lechler IDK 90-015 C	2 - 20 bar	x
Lechler IDK 90-02 C	2 - 20 bar	x
Lechler ITR 80-01 C	3 - 20 bar	x
TeeJet AITX A/B 80015 VK	4 - 20 bar	
TeeJet AITX A/B 8002 VK	4 - 20 bar	
TeeJet AITX A/B 80025 VK	4 - 20 bar	
TeeJet AITX A/B 8003 VK	4 - 20 bar	

Nozzle Assortment OIFD75-2		
Nozzle type	Pressure range	Reduction of spray liquid pressure in the first 3, resp. 5 tree rows
Albuz TVI 80-0050	5 - 25 bar	
Albuz TVI 80-015	5 - 25 bar	
Albuz AVI 80-015	3 - 20 bar	x
Albuz AVI 80-02	3 - 20 bar	x
Albuz AVI 80-03	3 - 20 bar	
Albuz CVI 80-015	2 - 20 bar	x
Albuz CVI 80-02	2 - 20 bar	x
Lechler ID 90-015 C	3 - 20 bar	x
Lechler ID 90-02 C	3 - 20 bar	
Lechler ID 90-025 C	3 - 20 bar	
Lechler ID 90-03 C	3 - 20 bar	
Lechler AD 90-04 C	2 - 20 bar	x
Teejet DG 8004 VS	2 - 15 bar	x
TeeJet DG 8005 VS	2 - 15 bar	x
Lechler IDK 90-0067 C	2 - 20 bar	x
Lechler IDK 90-01 C	2 - 20 bar	x
Lechler IDK 90-015 C	2 - 20 bar	x
Lechler IDK 90-02 C	2 - 20 bar	x
Lechler ITR 80-01 C	3 - 20 bar	x
TeeJet AITX A/B 8002 VK	4 - 20 bar	
TeeJet AITX A/B 80025 VK	4 - 20 bar	
TeeJet AITX A/B 8003 VK	4 - 20 bar	

Nozzle types in the column (reduction of spray liquid pressure in the first 3, resp. 5 tree rows): With fan types in the 90% drift reduction class and higher in combination with nozzle types listed, spray liquid pressure needs to be reduced to the value noted, in the first 3, resp 5 tree rows (for affected blower types, see the conditions of use for the respective blower type in the JKI list of drift reducing devices).

Updated 02.02.2022 according the JKI-"Verzeichnis Verlustmindernde Geräte" from 25.10.2021

Buffer Zones: Further Requirements

Drift reduction required: 90%: ≥90% fan type + registered drift reducing nozzles + application provisions (reduced fan speed + shut off air support + reduction spray liquid pressure, forward speed, crop height, nozzles closed)

Buffer Zones: Example of Registrations of a Fan Type

Examples of registrations of the fan type „Wanner SZA32“ in top fruit

90 %	33-04	SZA 18.21 bis 18.24 und 18.41 bis 18.44 und 18.61 bis 18.64 und 18.81 bis 18.84 und 39.01 bis 39.12 alle mit Düse OIFD75-1	In den ersten 5 Reihen muss die nach außen gerichtete Luftunterstützung wirkungslos gemacht werden. Der Spritzdruck ist zu begrenzen: bei TeeJet DG 8002 VS und TeeJet DG 8003 VS auf 4 bar bei Lechler AD 90-01 C und Lechler AD 90-015 C auf 2 bar bei Lechler AD 90-02 C und Lechler AD 90-03 C auf 4 bar bei Lechler IDK 90-0067 C auf 7 bar bei Lechler IDK 90-01 C, Lechler IDK 90-015 C und Lechler IDK 90-02 C auf 8 bar bei Lechler ITR 80-01 C auf 5 bar bei Albuz AVI 80-01 auf 4 bar bei Albuz AVI 80-015 und Albuz AVI 80-02 auf 5 bar bei Albuz CVI 80-01, Albuz CVI 80-015 und Albuz CVI 80-02 auf 5 bar	Wanner Geräte mit ZA 32 Gebläse	B,O	WAN

Official registration of the fan type „Wanner SZA32“ for official dosing and spray application

75 %	33-07	SZA 18.21 bis 18.24 und 18.41 bis 18.44 und 18.61 bis 18.64 und 18.81 bis 18.84 alle mit Düse Albuz ATR lila in den unteren Düsenpositionen und Agrotop AVI 80-01 oder Lechler IDK 90-01 in den beiden oberen Düsenpositionen	Folgende Fahrgeschwindigkeiten und Zapfwellendrehzahlkombinationen sind einzuhalten: 6 km/h mit 380 U/min; 9 km/h mit 300 U/min oder 12 km/h mit 250 U/min. Im Übrigen ist das Gerät entsprechend dem MABO-Dosierungsmodell, Stand 1.1.2008, einzusetzen.	Wanner Geräte mit ZA 32 Gebläse	B,O	WAN

Official registration of the fan type „Wanner SZA32“ for target adapted dosing and spray application

New: A closed hail net + a vertical insect protection net behind the alley way of the last tree in the direction of the surface water row moves each fan type into the next higher drift reduction class! Please see the mounting provisions!

Mounting provisions drift net: The orchard needs a hail net mounted and closed. Outside the outer most alley way towards the surface water a vertical net with a 0,27 x 0,77 mm mesh is installed and tightly fixed at the ground and at the hail net leaving no gaps for spray drift to pass..

Product Use: Buffer Zones – How to Implement

Example product: „Consist plus“ **Fan type:** Hurricane S1000 with 75% drift reduction

Product	Basic buffer zone	Reduced buffer zones in spray drift reduction class				
		50%	75%	90%	95%	99%
Consist plus	20 m	15 m	10 m	5 m	- - -	- - -

Beyond that distance from surface water, drift reduction no more is required: 20 + 1,5 m

Buffer zone from last tree row in direction to surface water **with 50%** drift reducing technique: 15 + 1,5 m

Buffer zone from last tree row in direction to surface water **with 75%** drift reducing technique: 10 + 1,5 m

+

Buffer zone from last tree row in direction to surface water **with 90, 95 and 99%** drift reducing technique: 5 + 1,5 m

Application provisions for fan type Hurricane S1000 in the 75% drift reduction class

In the first 5 tree rows air support in direction of the surface water must be turned off. Spray liquid pressure must be reduced:

with TeeJet DG 8002 VS to 4 bar;
with Lechler AD 90-02 C to 4 bar,
with Albuz AVI 80-01 to 4 bar,

with TeeJet DG 8003 VS to 4 bar,
with Lechler AD 90-03 C to 4 bar,
with Albuz CVI 80-01 to 5 bar"

These application provisions must be applied from the first tree row near the surface water up to the 5th tree row , at 3,0 m row distance = 15 m.
Beyond that distance up to 20 m + 1,5 m regular drift reduction, beyond 20 m no drift reduction is required

Product Use: Buffer Zones – How to Implement

Example product: „Calypso“ **Fan type:** Hurricane S1000 with 75% drift reduction

Product	Basic buffer zone	Reduced buffer zones in spray drift reduction class				
		50%	75%	90%	95%	99%
Calypso	- - -	- - -	- - -	20 m	- - -	- - -

No basic buffer zone! Without drift reducing devices product must not be applied in orchards closer than 20 m + 5 tree rows!

With a fan in the 50% drift reducing class the product must not be applied in orchards closer than 20 m + 5 tree rows!

With a fan in the 75% drift reducing class the product must not be applied in orchards closer than 20 m + 5 tree rows!

With a fan in the **90**, **95** and **99%** drift reduction class the product must not be applied closer than 20 m + 1,5 m to the surface water

+

Application provisions for fan type Hurricane S1000 in the 90% drift reduction class

In the first 5 tree rows air support in direction of the surface water must be turned down. Spray liquid pressure must be reduced:

with TeeJet DG 8002 VS to 4 bar;
with Lechler AD 90-02 C to 4 bar,
with Albuz AVI 80-01 to 4 bar,

with TeeJet DG 8003 VS to 4 bar,
with Lechler AD 90-03 C to 4 bar,
with Albuz CVI 80-01 to 5 bar"

These application provisions must be applied from the first tree row near the surface water up to the 5th tree row , at 3,0 m row distance = 15 m.
After that distance the remainder of the orchard must be treated with a fan registered in the 90% drift reduction class!

Thank You very much for Your attention!

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