Spray application in ornamental crops – founding principles

The art of application | BPOA conference 2024

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Ornamentals

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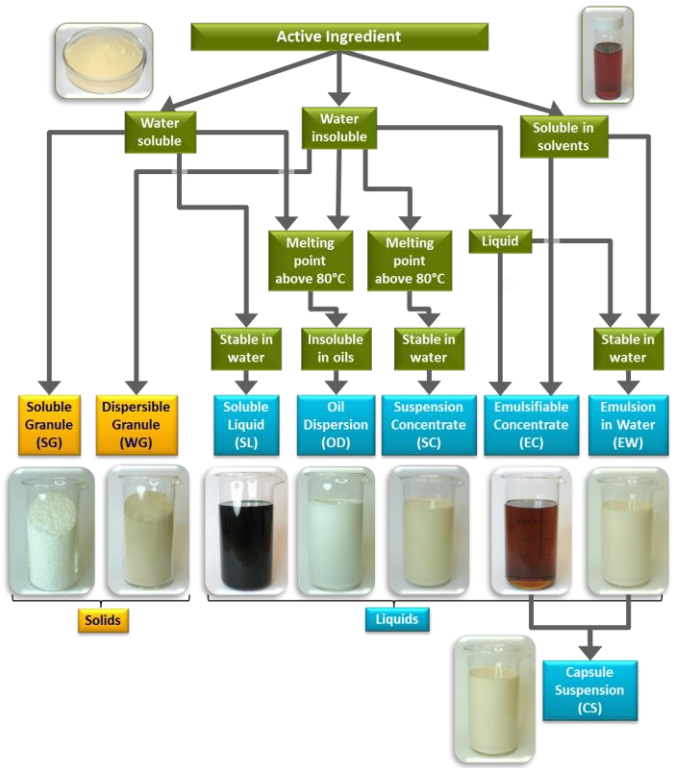
Only 50% of the effect comes from the bottle

Active ingredient & formulation often a compromise



Targets behave differently

Plants are different

What is the challenge?

- **Big variety in crop types**
- **Different technologies**

  (e.g. vertical vs horizontal)
- **Often very high crop density**

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What do we want to achieve?

- Good coverage
- Penetration in the canopy
- No product loss (run off)
- All related to optimal water volume!

Optimal coverage and penetration is all about…

Nozzle type

Pressure

Speed

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Leaf Area Index

Or: does every crop need the same water volume?

Leaf Area Index
(LAI) M2

LAI 1.0 means 10’000 m^2 leaves/ha
LAI 6.6 means 66’000 m^2 leaves/ha

Roses

	Vendela	Amber	Red Unique
LAI	6.60	6.62	7.84

Potatoes
LAI 5.62

Brussel sprouts
LAI 5.05

Winter Barley
LAI 4.82

Leaf Area Index

Or: does every crop need the same water volume?

Potatoes
LAI 5.62

Brussel sprouts
LAI 5.05

Winter barley
LAI 4.82

Av. 200 - 400 l/ha

Roses

	Vendela	Amber	Red Unique
LAI	6.60	6.62	7.84

>1,500 l/ha??!

Droplet size

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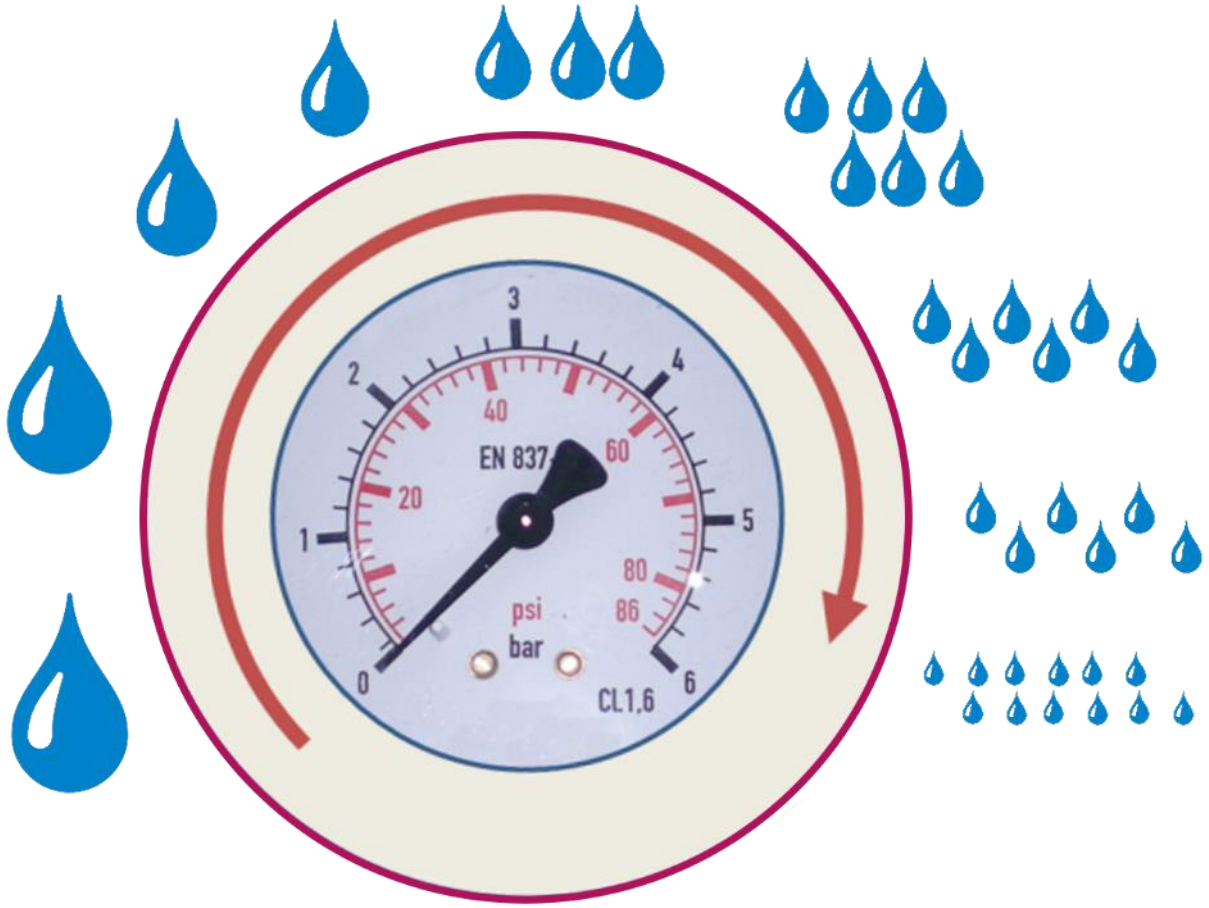
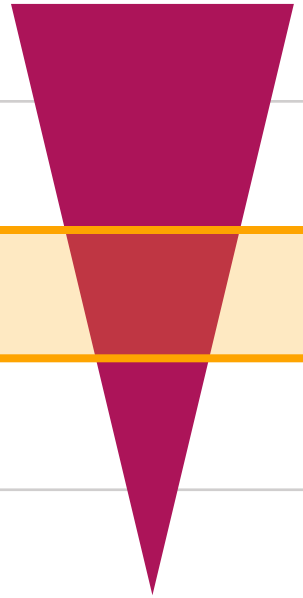
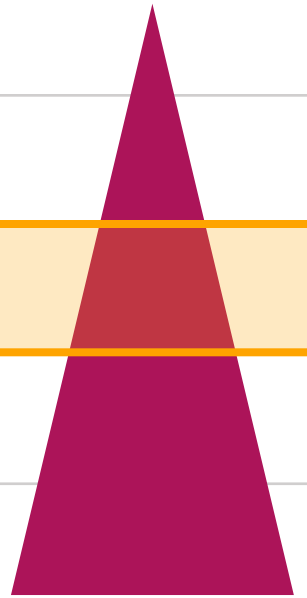
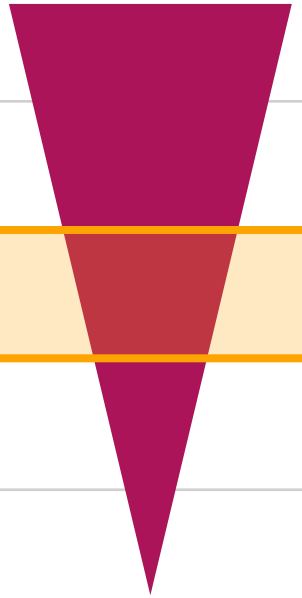
Droplet size is influenced by the spray pressure

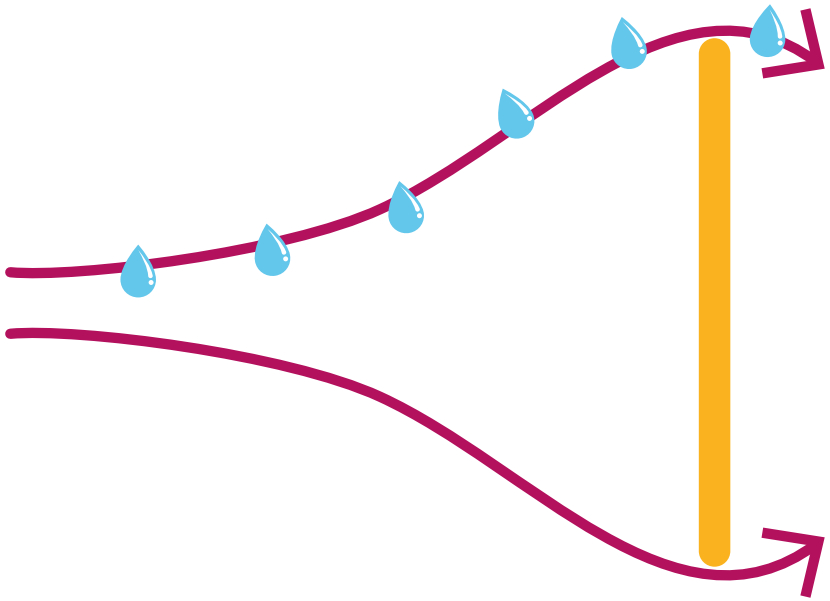


Increase of pressure reduces droplet size

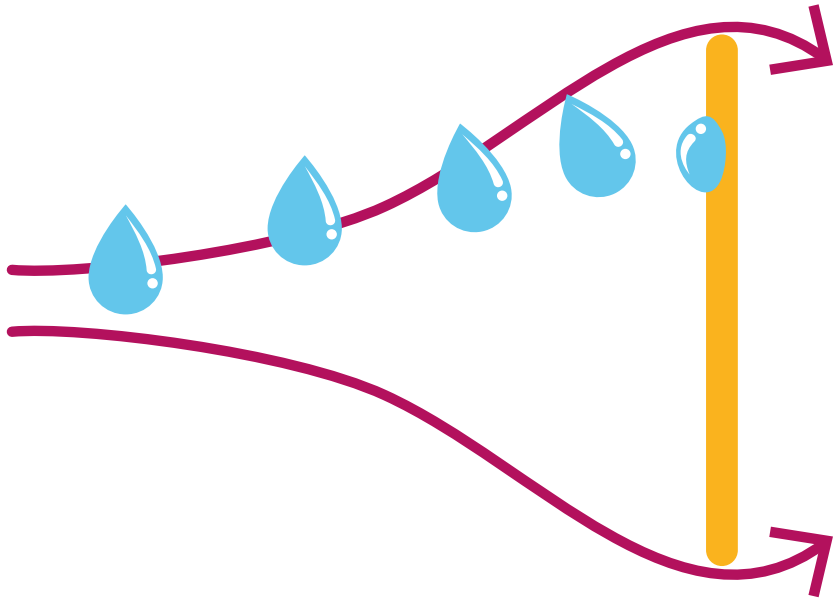
Advantages and disadvantages of droplet sizes

BCPC Classification	Droplet size	Volume Median Diameter (VMD)	Coverage	Penetration	Risk of drift
Very fine		125 µm=0,12 mm			
Fine		250 µm=0,25 mm			
Medium		350 µm=0,35 mm			
Coarse		450 µm=0,45 mm			
Very coarse		575 µm=0,57 mm			

Droplet trajectory and impact on target



Trajectory of fine droplets



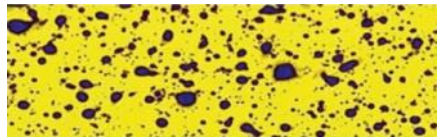
Trajectory of large droplets

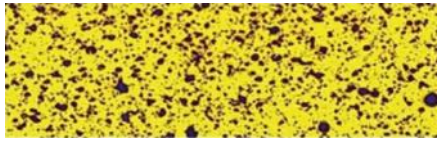
Air goes around a leaf – Coarser droplets will hit the target easier

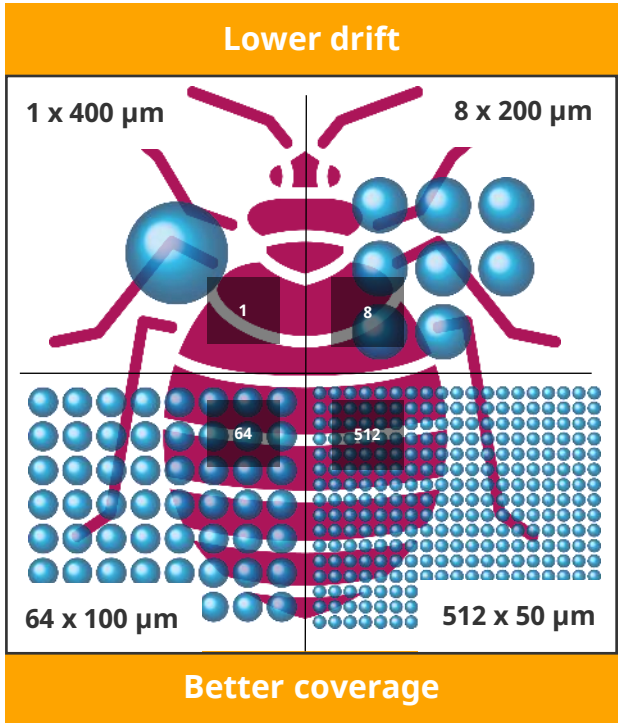
Droplet size – always a compromise

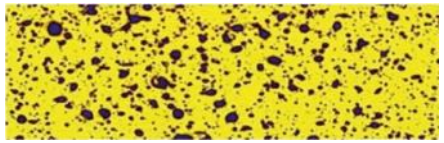
Coverage and spray pattern

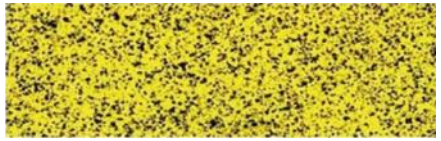
Larger droplets are safer but less efficient







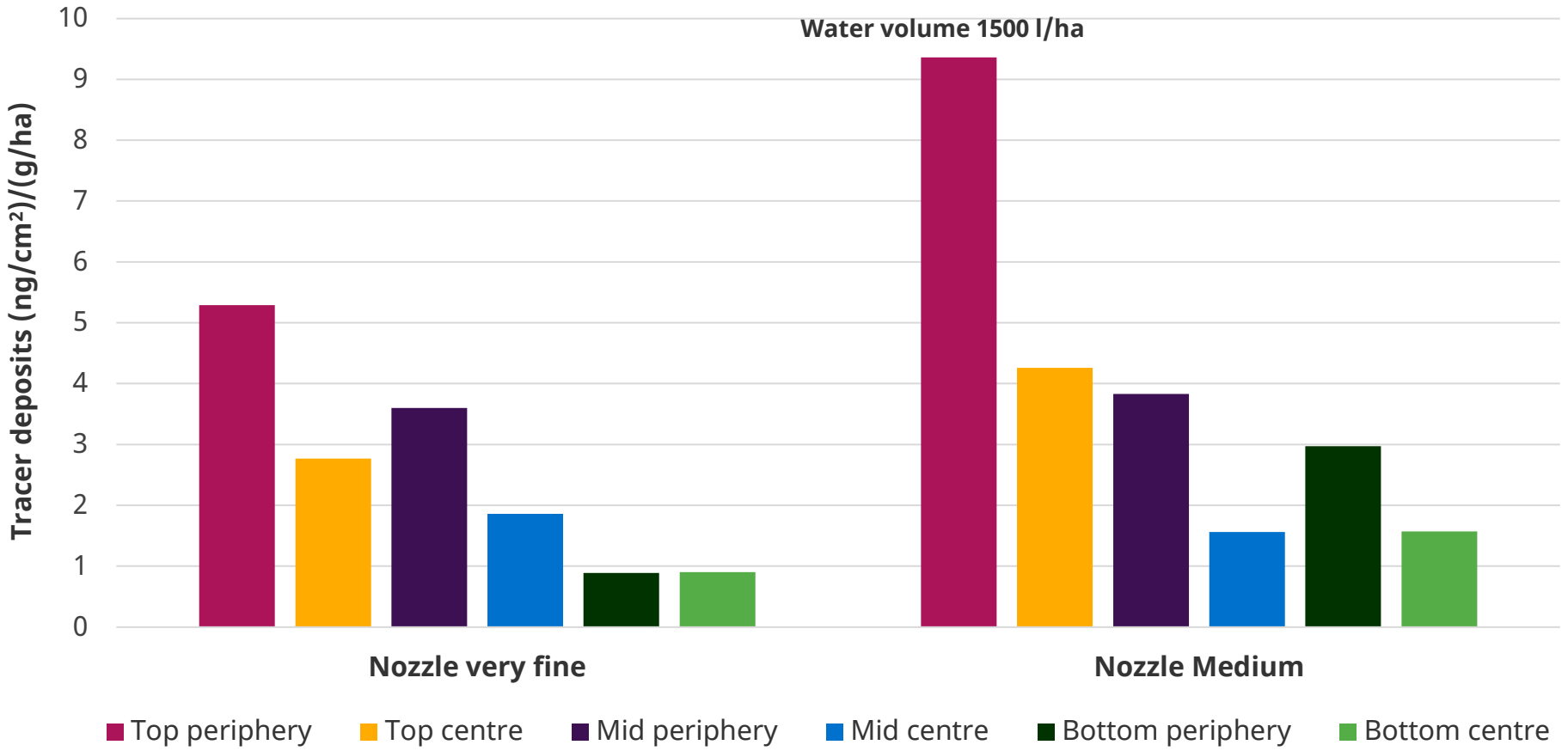




The choice of optimum spraying parameters is always a compromise between application volume, droplet size, product recovery and drift.

Droplet size

the effect on leaf deposits in roses



!

Higher and lower parts are better reached with medium sized nozzles

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Calibrations and formulas

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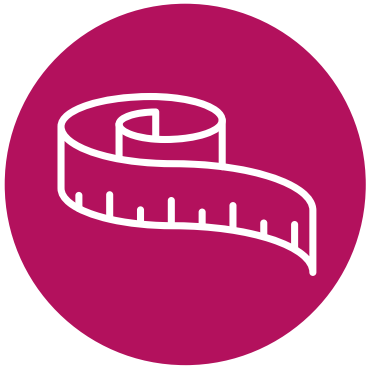
Calibrating your Boom sprayer

What tools do you need to calibrate?

A **stop-watch** to help you measure your average travel time



Measuring tape to mark distances for measuring travel speed, and to check nozzle spacing on the boom

Manual or **digital calculator**

A **measuring jug** with a capacity of at least 2 litres for measuring individual nozzle flow rate

Formulas

Nozzle capacity

$$l/min = \frac{l/ha \times km/h \times W}{60.000}$$

Spray volume

$$l/ha = \frac{l/ha\ 60.000 \times l/min}{km/h \times W}$$

Speed

$$km/h = \frac{l/min \times 60.000}{l/ha \times W}$$

l/min = capacity per nozzle

W = - nozzle spacing (cm) for broadcast spraying

- spray width (cm) for single nozzle

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Adjuvants

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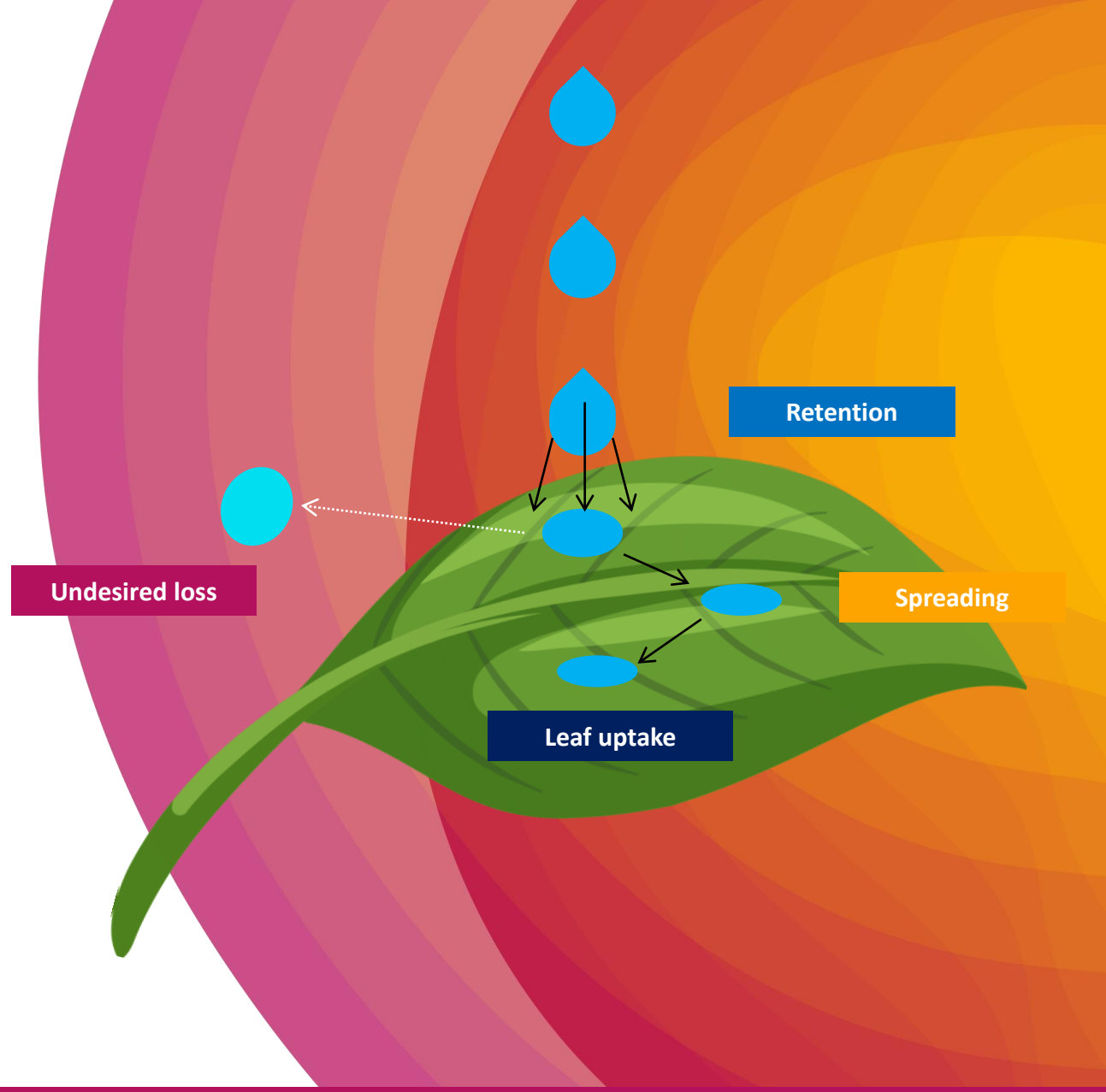
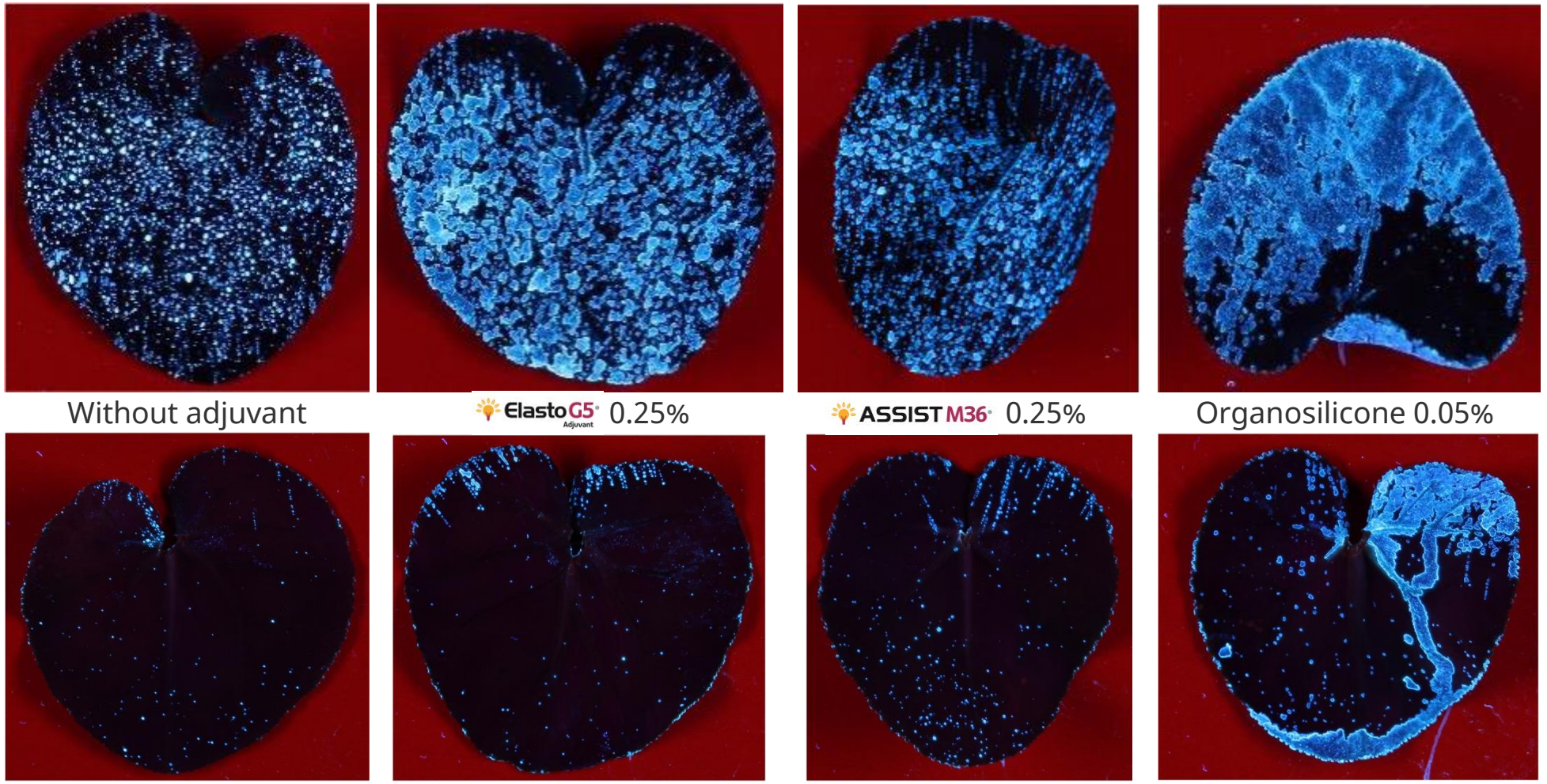
The droplet is the vehicle to deliver the a.i. to its target site

- Numerous loss mechanisms during Biodelivery journey
- A significant portion of AI could be lost before reaching the target!
- Adjuvants are used to mitigate against losses and maximise delivery to the target
- Adjuvare (Lat.): to aid



Improved retention and coverage



Upperside

Bottom

Without adjuvant | ElastoG5 Adjuvant 0.25% | ASSIST M36 0.25% | Organosilicone 0.05%

A very low surface tension can result in run-off

www.WALES - the tank mixing sequence

w	**Water** goes into the clean tank first. Fill the tank at least ½ full and start agitation
w	Add **water-soluble bags** (WSB) to the tank into **clean** water before adding any other tank mix partners. Allow the bags to completely dissolve before adding any other partners
w	Add any **Wettable** powders (WP)
W	then any **Water**-dispersible granules (WG)
A	**Agitation** should be maintained; allow these harder-to-mix ingredients to disperse evenly, which may take a few minutes, before continuing
L	**Liquid flowables** – suspension concentrates (SC) and suspo-emulsions (SE)
E	**Emulsifiable Concentrates (EC)** or microemulsion concentrates (MEC)
S	**Solutions (SN)** or Soluble Liquids (SL) are the easiest types of product to mix so come last; these include any biostimulants and liquid fertilisers and most adjuvants

A few closing remarks

- Optimal application technology is key for performance:
  - Less options available
  - Modern products are different
  - Emission restrictions

- Adjuvants can support better performance:
  - Doesn’t compensate bad application technologies
  - Depending on product/target/adjuvant type

Direct access to specialist knowledge and support for ornamental growers

- Art of Application
- Biostimulants
- Resistance management tools
- The Potcast Podcast

Thank you

Any questions?