Improving spray deposition in apple orchards by multiple-row sprayers

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Spray drift from orchard applications

- (re-) registration of PPP will be more difficult:
  - Water quality and non-target organisms (>95-99% drift reducing tech.)

- Residents and bystander exposure.

- Need for increased **emission** reduction
  - Spray drift reduction
  - Improved spray deposition (=> lower dose rate)
Drift and drift reduction

- Since 2007: it is mandatory to use one of 7 drift mitigations measures to realize 90% drift reduction along water ways (+ additional label restrictions).
- Recently: 75% drift reduction for all orchards!
- Label restrictions: depending on toxicity of product.
- Classified drift reducing techniques for orchards
  - DRT: 50%, 75%, 90%, 95%, 97.5%, 99%.
- Spray drift reducing technology in drift reduction classes
  - Nozzles + specific sprayer type and configurations.
Multiple row sprayers

- Rapid increase in numbers of multiple row sprayers in NL.
- Require less time to spray an orchard.
  - Timeliness is higher.
  - Better anticipation to weather conditions.
- Efficacy of pest and disease control improves.
- It is proven that these sprayers reduce spray drift, compared to standard cross-flow sprayers.
Deposition trials - sprayers

- Sprayers were tested as 2-row sprayers spraying the tree rows alongside the sprayer from both sides.
Field measurements

- Dry after spraying
  - Pick the leaves
- 4 trees - Each tree in 7 compartments
- Pick every 10\textsuperscript{th} leaf and store
Results - spray deposition in the tree leaf canopy

KWH and Munckhof multiple-row orchard sprayers (2R) using Albuz ATR lilac nozzles (7 bar) and high (540 rpm PTO) and low (400 rpm PTO) air settings relative to that of the reference spray system (set to 100%).
Results

- Spraying from both sides at the same time increases deposition.
- Lowering air assistance increases deposition.
- Coarse droplets increases deposition.
- Sprayer depended results:
  - Optimize settings per sprayer type
- Still (some) variable results
  - Tree effect?
  - Sprayer effect?
Further research is needed to adjusted sprayer configurations for improvement of spray deposition in the tree canopy.

Many questions remain, e.g.:

- Minimal required deposition per leaf (µl/cm²) => agrochemical industries? No answers!!
- Uniform deposition? (upper/lower leaf side)?
- Single – multiple applications
- TRV/LWA/BBCH (agrochemical industries)

Minimizing variation of deposition
Only a small proportion of the applied volume is deposited on the target!

- Hugh losses in early season (fine <> coarse droplets).
- Also high losses in full canopy.
- High soil deposits.
  - Will inevitably result in problems (near future).

What is most important: increase deposition <> minimize losses?

Adjust tree architecture? (2-D crops)

Tunnel sprayers are the future? Intelligent spraying system?
Many thanks for your attention

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