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*Engineering a Sustainable Future*

# Unmanned Aerial Pesticide Application System Task Force Update on Off-target Movement Studies Conducted Globally

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# Background

- The Organization for Economic Co-operation and Development (OECD) Working Party on Pesticides (WPP) was formed in 1992.
- One of its goals is to harmonize data and methods used to test and assess pesticide risks.
- In 2019, OECD Working Party on Pesticides (WPP) formed a Drone/UASS Subgroup, which published a ‘State of the Knowledge’ report on pesticide application using UAVs
- Multiple recommendations in the report, but one specifically focused on
  - “...a clear and urgent need for a set of standard testing protocols to be agreed upon for the assessment of UASS,” in order to ensure that any new data generated to describe spray drift is of sufficient quality to draw conclusions on UAV applications”.
- Pesticide registrant industry formed the UAPASTF to support OECD efforts





# Task Force & Its Objectives



| <i>Member Company</i>        | <i>Administrative Committee</i>   | <i>Technical Committee</i>       |
|------------------------------|-----------------------------------|----------------------------------|
| BASF Corporation             | Rebecca Willis                    | <b>Frank Donaldson (Chair)</b>   |
| Bayer CropScience LP         | <b>Sarah Hovinga (Vice-Chair)</b> | Jane Tang                        |
| Corteva Agriscience          | <b>Travis Bui (Chair)</b>         | <b>Rajeev Sinha (Vice-Chair)</b> |
| Gharda Chemicals Inc Int.    | Ram Seethapathi                   | Frank Sobotka                    |
| Gowan Company LLC            | Raymond Layton                    | Jason A. McDonald                |
| FMC Corporation              | Hector Portillo                   | Roberto Barbosa                  |
| NuFarm Americas Inc.         | Patti Turner                      | Tyler Gullen                     |
| Syngenta Crop Protection LLC | <b>Nestor Algarin (Treasurer)</b> | Jo Davies                        |
| Valent U.S.A. LLC            | Leslie Garcia                     | Frank Carey                      |
| <i>Task force managers</i>   | <i>Rhonda Bichsel</i>             | <i>Eric Bruce</i>                |

- Engage with regulatory agencies (e.g., US-EPA/CDN-PMRA/AU-APVMA/EU Commission) to support UASS use for application of crop protection products.
- Develop study protocol to ensure high quality data generation
- Generate/submit regulatory data on drift
- 9 GLP field studies completed across 5 regions in 2023 (5) and 2024 (4)
- Contribute toward evaluation of existing (or development of new) UASS drift models for regulatory purposes

## Global Off-target Movement Trials (GLP)



- ☐ Off-target movement trials conducted globally by the same contract research organization
- ☐ Utilized the same UAV platform and the pilot
- ☐ Presence of representatives from regional regulatory agencies in most of the trials (e.g., Brazil & Australia)
- ☐ Summary data presented pertinent to 2 trials conducted in 2023 (Canada & Brazil)

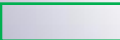
## Trial Details

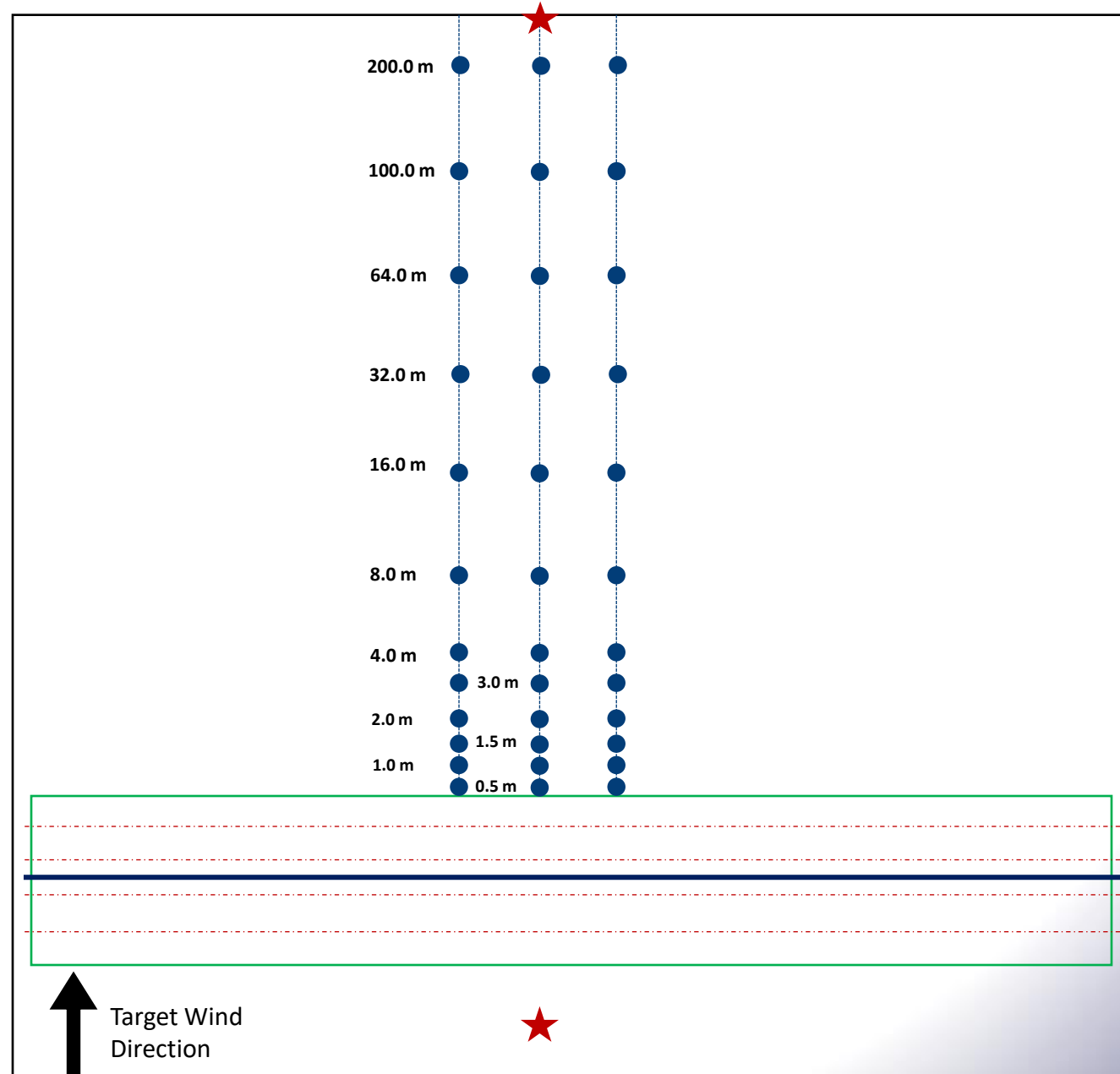
Utilized the “Recommendations for Conducting UAV Field Drift Trials – Proposed Field Study Protocol Guidance” available at UAPASTF website (<https://uapastf.com/>)



| Item               | Details                                                |
|--------------------|--------------------------------------------------------|
| UAS Platform       | DJI Agras T30                                          |
| Benchmark          | Ground Boom Sprayer                                    |
| Nozzles            | Fine, Medium & Coarse categories (ASABE S572.1)        |
| Analyte            | PTSA Dye                                               |
| Weather            | Anemometers at 2 heights; upwind and downwind          |
| Sampler            | Mylar cards (ground drift)                             |
| Sampling           | Up to 200 m downwind from edge of the spray area       |
| Replications       | 3 transects/drift lines per run replicated three times |
| Passes             | 4 for UAVs and 1 for Ground Sprayer                    |
| Treatment Sequence | UAV treatments followed by Ground Sprayer              |

# Plot Layout

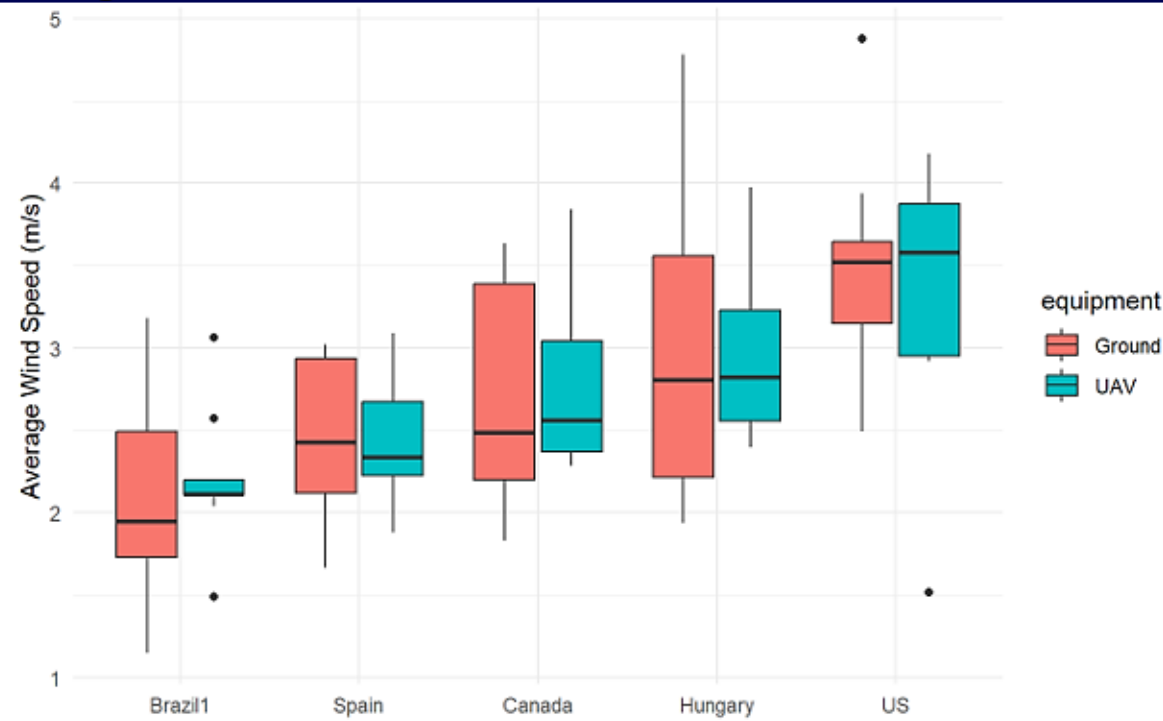
-  Spray Area
-  Weather Station
-  Mylar card samplers
-  UAV Flight Pass
-  Ground Sprayer Pass



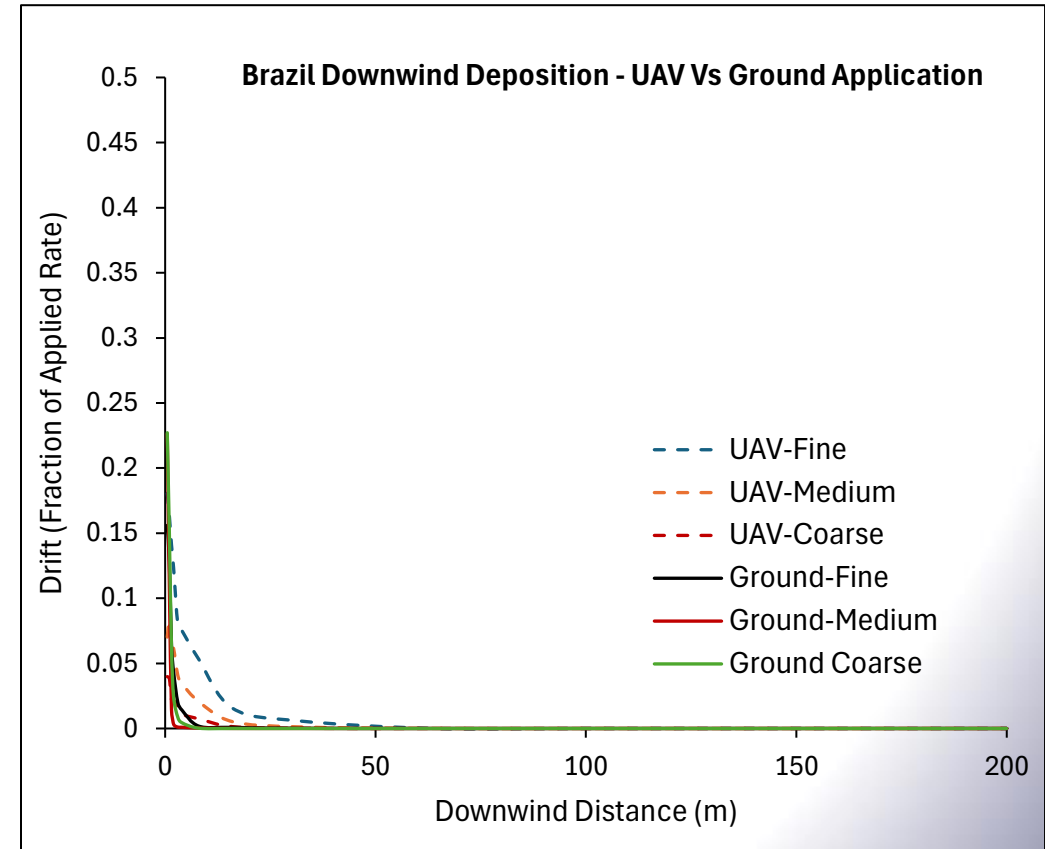
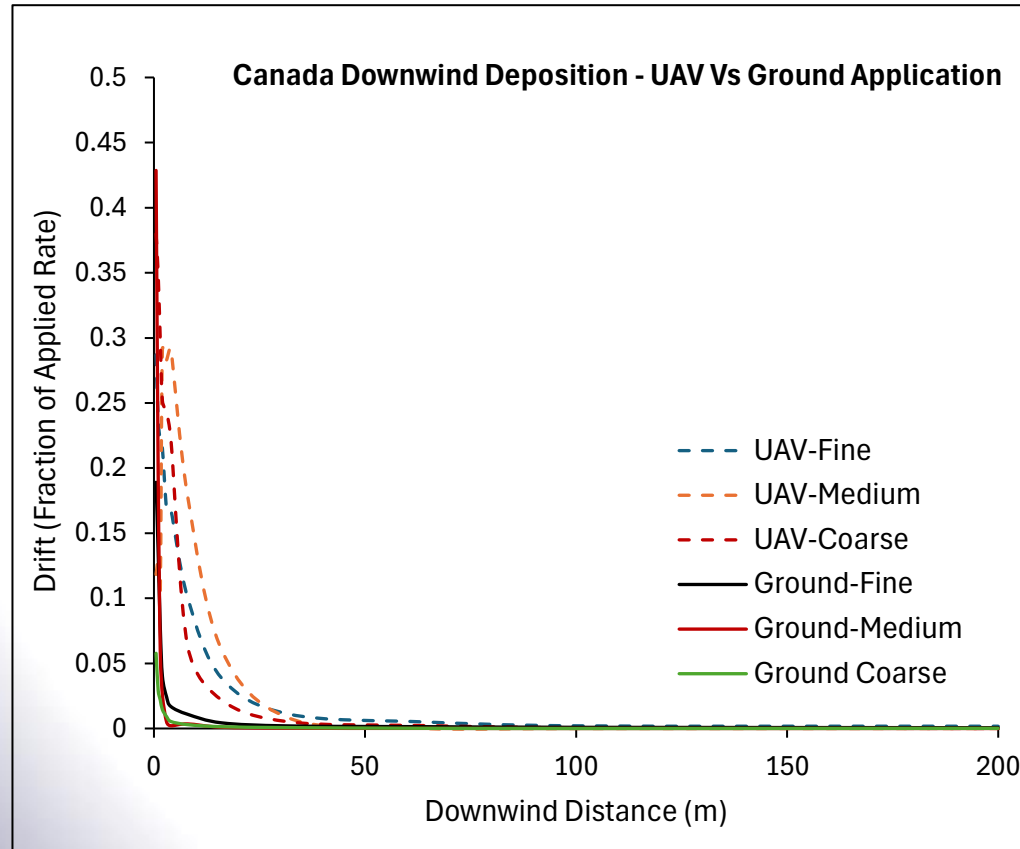


# Results: *Weather*

| Parameter                  | Trial Location |             |             |             |             |
|----------------------------|----------------|-------------|-------------|-------------|-------------|
|                            | Canada         | Brazil      | Hungary     | Spain       | USA         |
| Temperature Range (°C)     | 20.9 - 32.2    | 27.5 - 36.7 | 11.6 - 27.5 | 17.2 - 21.4 | 16.3 - 23.8 |
| RH Range (%)               | 32.0 - 64.0    | 33.0 - 68.0 | 37.0 - 61.0 | 70.0 - 92.0 | 48.0 - 89.0 |
| Wind Speed Range (m/s)     | 0.57 - 6.62    | 0.36 - 6.15 | 0.93 - 6.51 | 0.93 - 5.7  | 1.2 - 7.7   |
| Wind Deviation from Target | 0 - 18°        | 2 - 29°     | 0 - 33°     | 2 - 28°     | 0 - 19°     |



# Results: *Off-target Movement UAV against Ground Application*



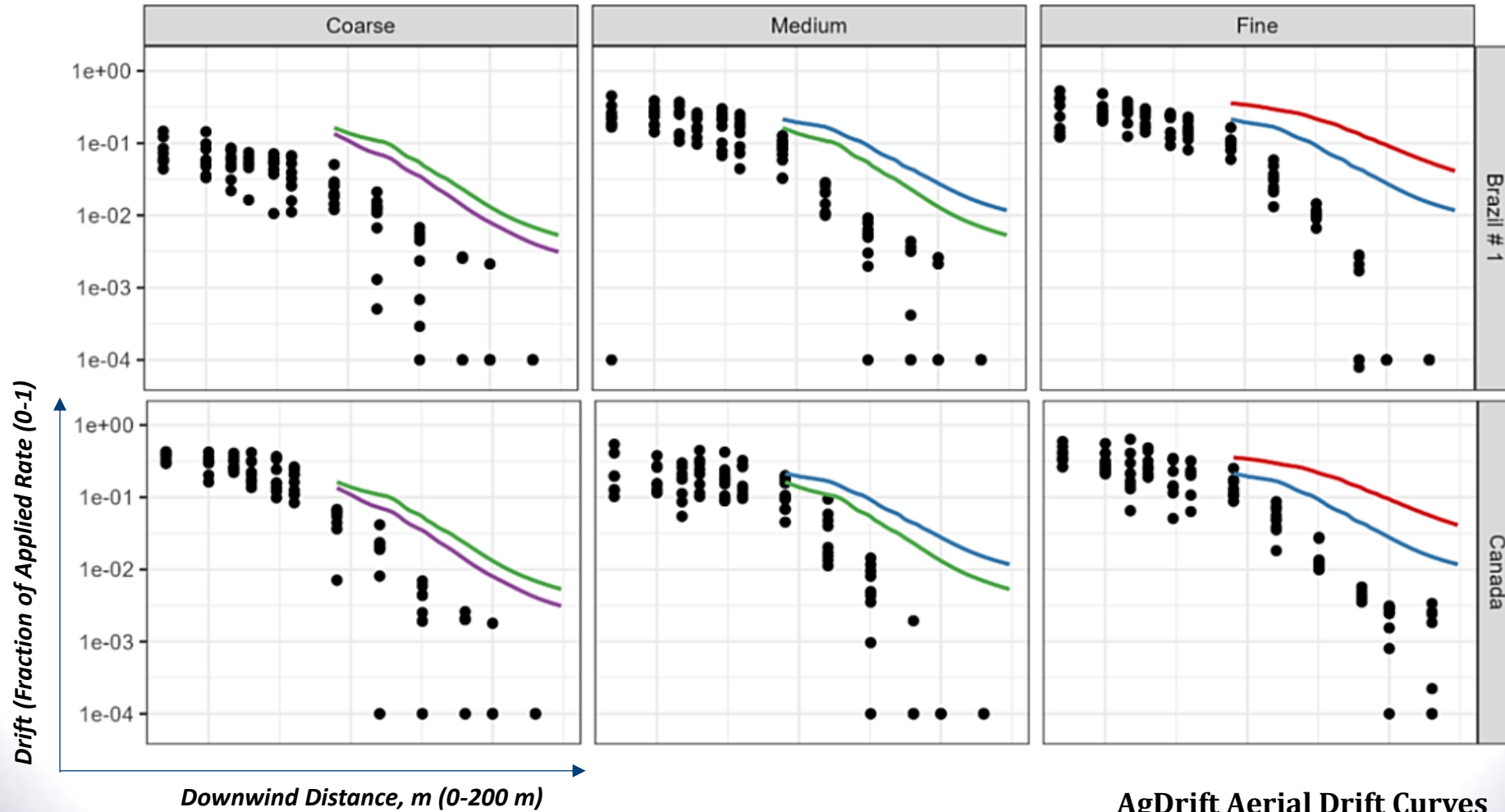
**Note:** Statistical analysis is currently being conducted to derive the range of downwind distances where significant differences occur between the two application scenarios





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# Results: Off-target Movement Compared with USEPA Aerial Standard Deposition Curves



Similar off-target movement results for other trial locations

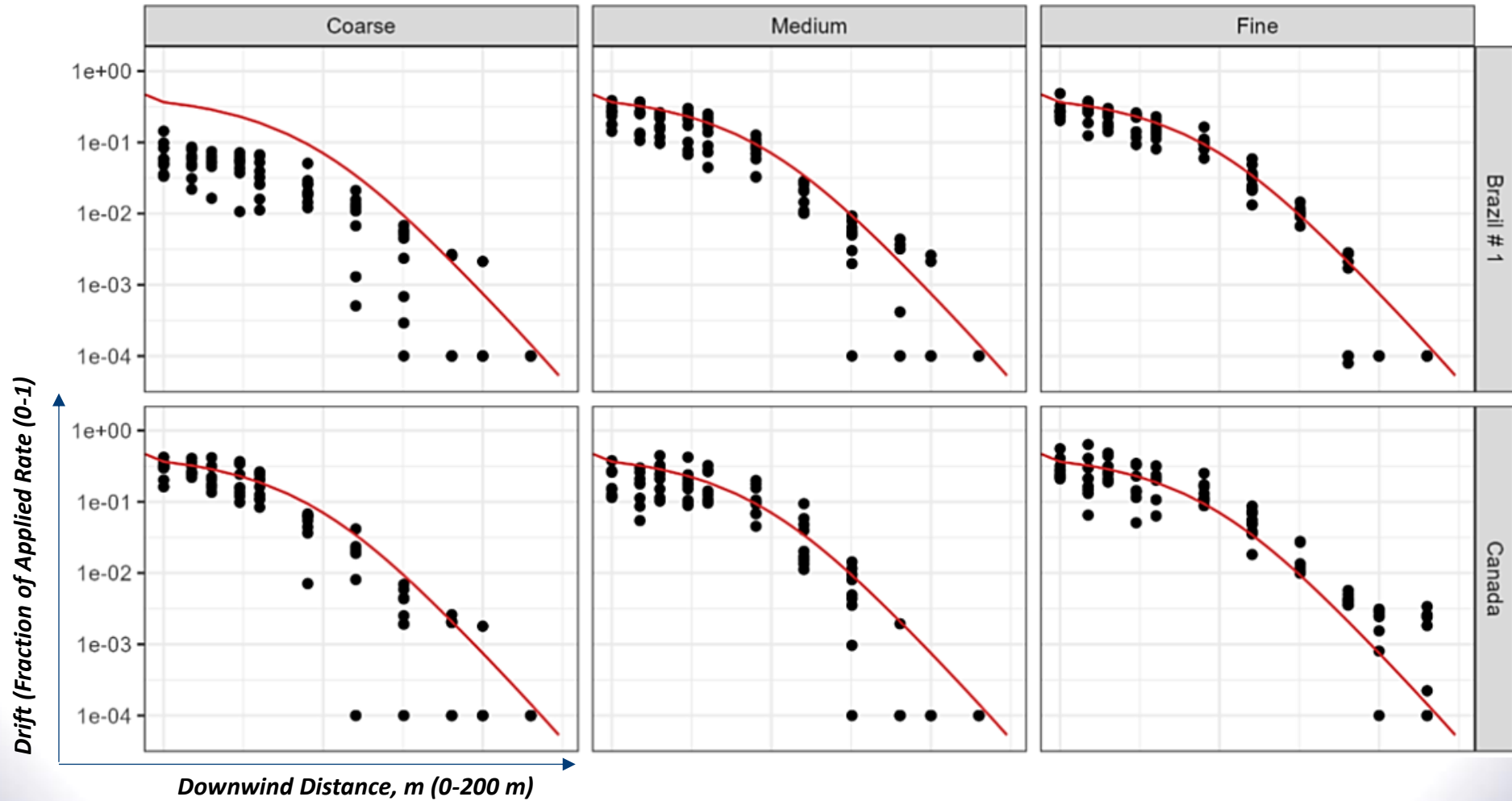
## AgDrift Aerial Drift Curves

- Very Fine to Fine
- Fine to Medium
- Medium to Coarse
- Coarse to Very Coarse



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## Results: Off-target Movement Compared with USEPA Orchard Standard Deposition Curves



Similar off-target movement results for other trial locations

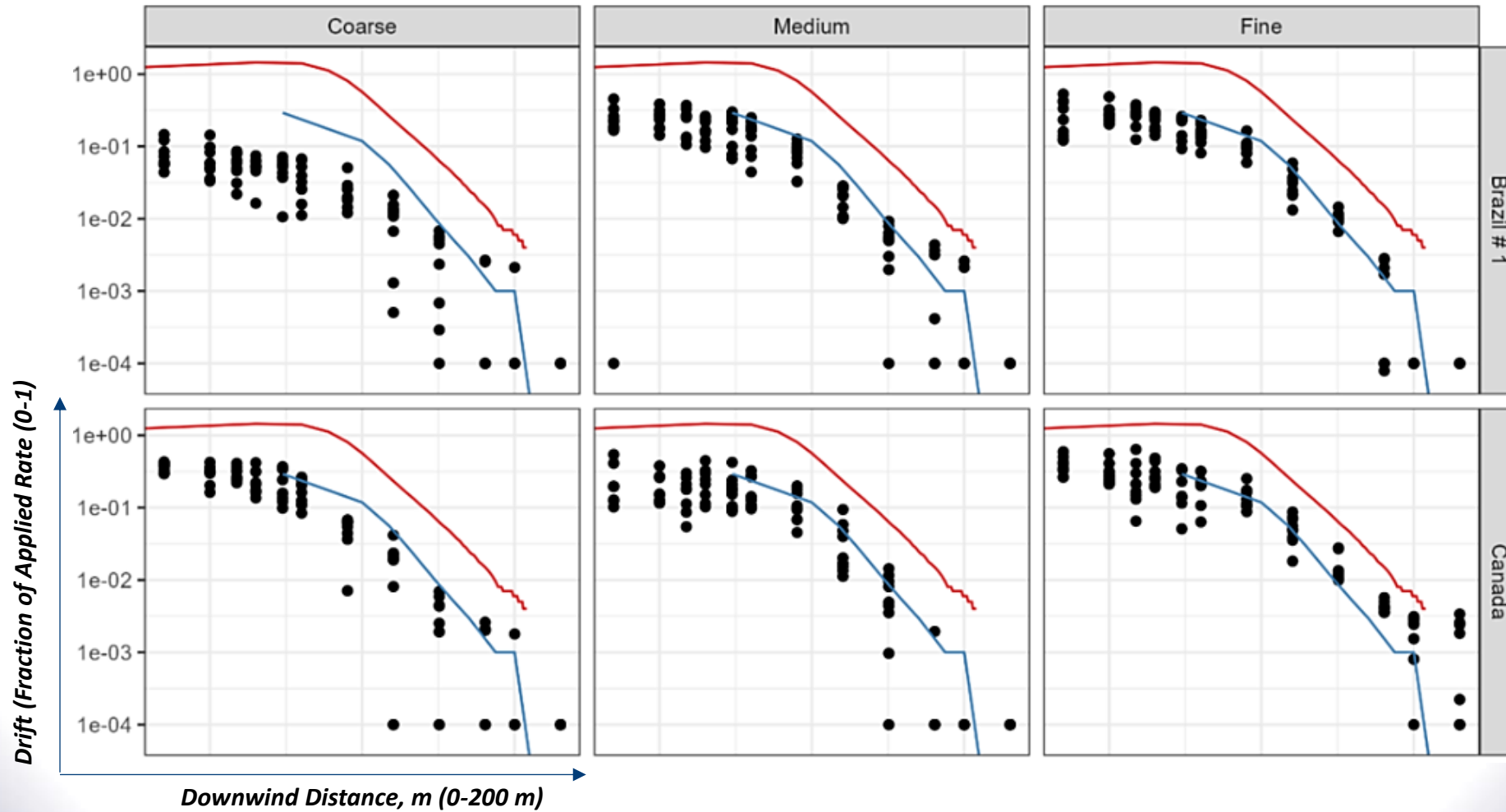
AgDrift USEPA Orchard Standard Deposition Curves

— Sparse (EPA Default)



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## Results: Off-target Movement Compared against PMRA Aerial and Airblast Standard Deposition Curves



Similar off-target movement results for other trial locations

### PMRA Reference Deposition Curves

- PMRA Aerial
- PMRA Airblast



## Key Highlights

- ❑ Peer-reviewed off-target movement protocol was developed and made publicly available by UAPASTF
- ❑ Off-target movement trials (GLP) were successfully conducted in different geographies globally
- ❑ Regulatory drift curves for different droplet size classifications (i.e., fine, medium and coarse) may form the basis for UAV-specific Tier 1 buffer determination (shorter buffers compared to conventional aerial)

## UAPASTF Ongoing/Future Efforts

### Spray drift work

- By end of 2025, UAPASTF will be positioned well to address risks due to **spray drift for UASS**
  - GLP datasets, analyses, and spray drift curves prepared
- Modeling support will accelerate end 2025 through 2026
- Additional research / modeling – Driven mostly by regulatory feedback

**Nozzle technology** - Work to begin 2025 (Impact of atomization type; hydraulic vs rotary)

### Non-dietary Exposure

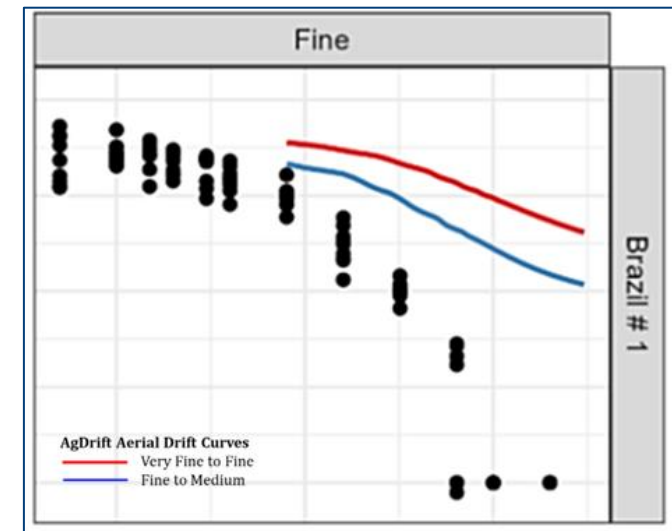
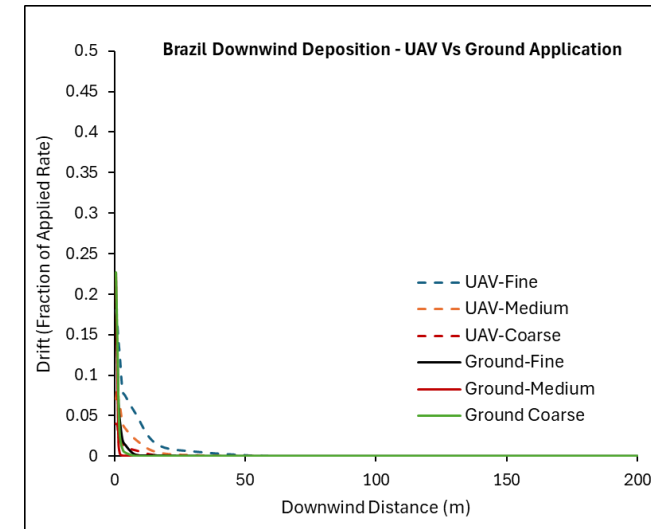
- Job Steps Survey 2025 in the US (By mid-2026, UAPASTF will have operator survey results from US analyzed)
  - Bridging to other regions to be explored
  - Findings and regulatory feedback drives additional research needs

**Off-site movement database development** - for regulatory exposure/risk assessment modeling

**Continue engagement activities (CropLife, EUPAF, CERSA, ACS, SETAC, ASABE, etc.)**

# Conclusion

- ❑ Drift potential of a UASS may be higher than ground application, lower than conventional aerial and comparable with an airblast sprayer
- ❑ Additional analysis is being conducted to further quantify the differences between UAV and ground applications.





**Welcome to  
Unmanned Aerial Pesticide  
Application System Task Force.**

