Supporting Spray Drones for CP Applications: Overview of Industry Initiatives to Address Regulatory Requirements

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Administrative Chair, UAPASTF

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EPA Stakeholder Communication
November 2025 – RPAAS Conference

OPP – RPAAS Considerations

- **EPA does not have established policy regarding pesticide applications using RPAAS, data re… implementation on pesticide labe…**
- Currently, there is no established … approved model to evaluate drift … RPAAS.
- Priority for EPA is to understand th… from RPAAS and how it compares … technology.
  - Task force data has been submitte…
- EPA continues to work towards a s… assessment method to evaluate p… applications.

Regulatory Considerations for Emerging Technologies

- EPA needs to understand the exposure … environment of applications of pesticide…
  - Identify relevant exposure and trans…
    - Human Health: occupational, re…
    - Non-target Organisms (wildlife a… adjacent to the field, terrestrial …
  - Identify parameters relevant to the …
  - Understand how exposure and risk … methods
- Develop common practices/standards f…
- Development of EPA regulatory framew… technologies

Stakeholder Involvement on RPAAS

- Registrant drone task force (USPASTF)
  - Generation of Spray Drift Data – conducted field trial data to compare RPAAS with ground application – data has been recently submitted to Agency
- Crop Life America (CLA) – Drone Workgroup
  - Best Management Practice document for applicators
  - Open literature review of off-site drift exposure and development of empirical drift curves – builds off OECD drone subgroup white paper
  - Labeling workshop series
- OECD subgroup on Drones – still engaged in this effort, building off the data gaps identified in the State of the Science white paper

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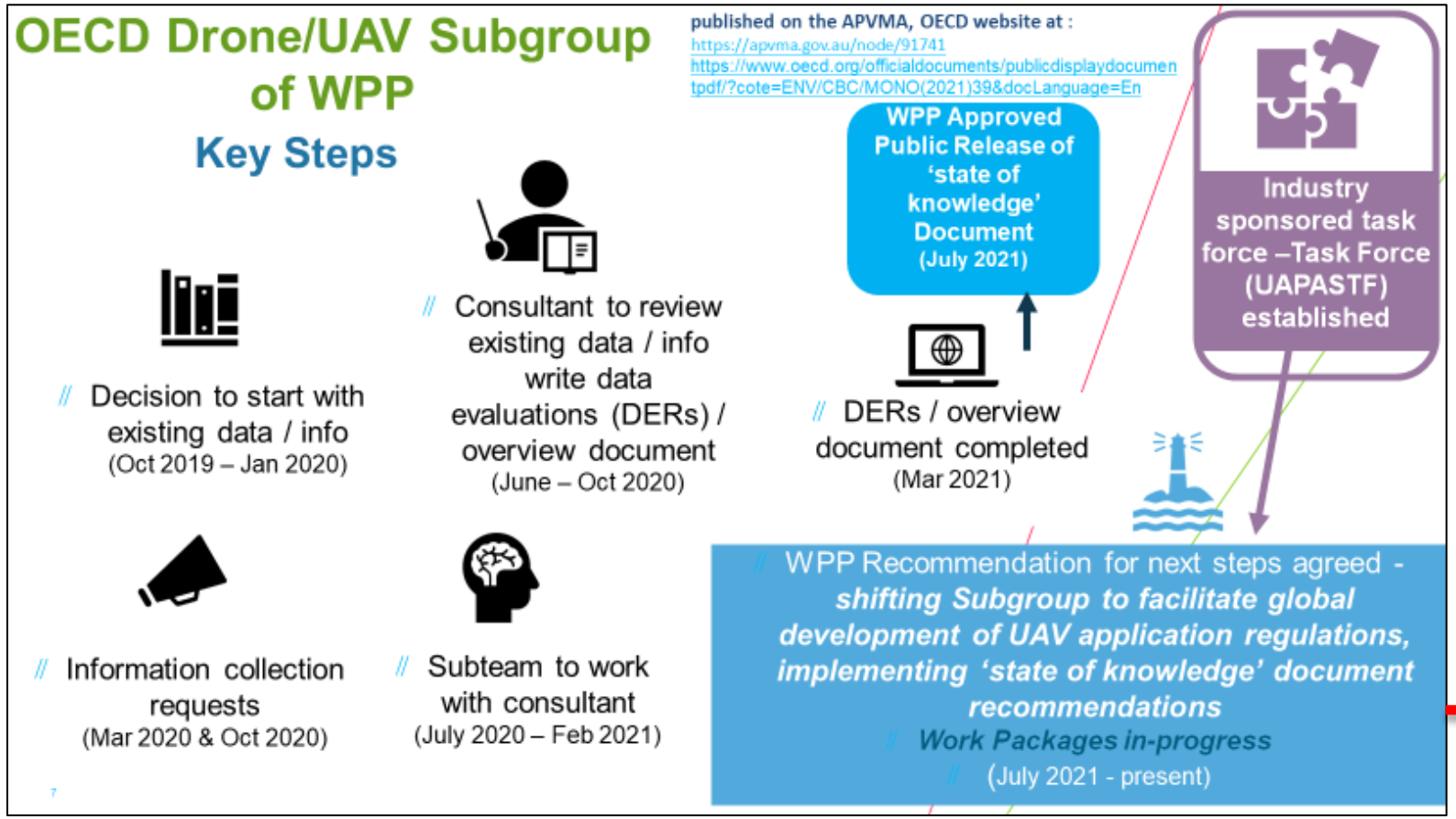
OECD WPP Drone Subgroup – est. 2019



OECD *State of the Knowledge* Work Packages
Drift/Off-site Movement
Operator Exposure
Crop Residue
Best Practices

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Pesticide Evaluation Process - Overview

Human Health Risks	• **Dietary Risk** – Food + Water • **Aggregate Risk** – Food + Water + Residential • **Non-Dietary/Occupational risks** - to those applying the product during their work
Environmental Risks	• Contamination of surface water or ground water from leaching, runoff, and **spray drift**. • Risks to non-target organisms (such as wildlife, plants, fish and other aquatic organisms) as well as impacts to endangered and threatened species
Benefits & Values	• EPA benefit assessments provide information on the "economic, social, and environmental" benefits of the use of a pesticide, such as improvements in agricultural production, urban and recreational land management, and public health. • PMRA requirement to show the product has value and performs as stated
Risk management & Regulatory decisions	• Balance risks and benefits • Determines whether additional mitigation measures on the pesticide product label can address any risks deemed unreasonable • Grant registration

https://www.epa.gov/pesticide-registration/about-pesticide-registration

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Crop Residue

Survey

Drift Trials & Models

BMPs

Product Labels

https://www.epa.gov/pesticide-registration/about-pesticide-registration

UAPASTF

Unmanned Aerial Pesticide Application System Task Force Established 2021

- Based in the US - but **global** in its work / focus
- UAPASTF global core mission is to supply regulatory data / information to inform the potential use of UAV-based pesticide application
  - Where appropriate, the UAPASTF will focus on generating data for submission to pesticide regulatory authorities to inform estimates for **off-site movement**, determine **operator/handler exposure**, and assess **crop residue** contributions.
  - This data will be used to conduct human and environmental risk assessments and inform the regulatory approval processes
- UAPASTF interacts with OECD Drone/UASS Subgroup of WPP, regulatory agencies, CropLife, EUPAF & other stakeholders to develop & provide information / data
  - UAPASTF alignment with work of the OECD WPP Drone/UASS Subgroup critical to success—State of the Knowledge Report (2021)
  - Established and seeking collaborative and confidentiality agreements with **UAV-application companies and experts** (e.g., additional UAV-application companies in other world areas, UAV manufacturers)

Member Company	*Administrative Committee*	*Technical Committee*
BASF Corporation	Rebecca Willis	**Frank Donaldson (Chair)**
Bayer CropScience LP	**Sarah Hovinga (Vice-Chair)**	Jane Tang
Corteva Agriscience	**Travis Bui (Chair)**	Rajeev Sinha (Vice-Chair)
Gharda Chemicals Intl	**Ram Seethapathi (Treasurer)**	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	Jonathan Nicholas	Jo Davies
Valent U.S.A. LLC	Leslie Garcia	Frank Carey
Task force managers	*Rhonda Bichsel*	*Eric Bruce*

Visit Our Website

www.UAPASTF.com

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Global Regulatory Data Needs – “State of the Knowledge”

Environmental Exposure & Risk Assessments

- Understand Spray Drift/Off-site Movement
- Development of Empirical and Mechanistic Models

Operator Exposure

- Qualitative “Job Steps” Survey
- Evaluation of Current NDE Models

Best Practices

- Pesticide application requires expertise and stewardship—especially with new technologies
- September 2024 – v1.0 Released

Crop Residue

- Are crop residues from UAV applications equivalent when compared to conventional applications?
- Connection to Agriculture and AgriFood Canada Residue Program

Agriculture & Agri-Food Canada

- Martin Trudeau, AAFC
- Jessica Stoeckli, AAFC

Agriculture and Agri-Food Canada

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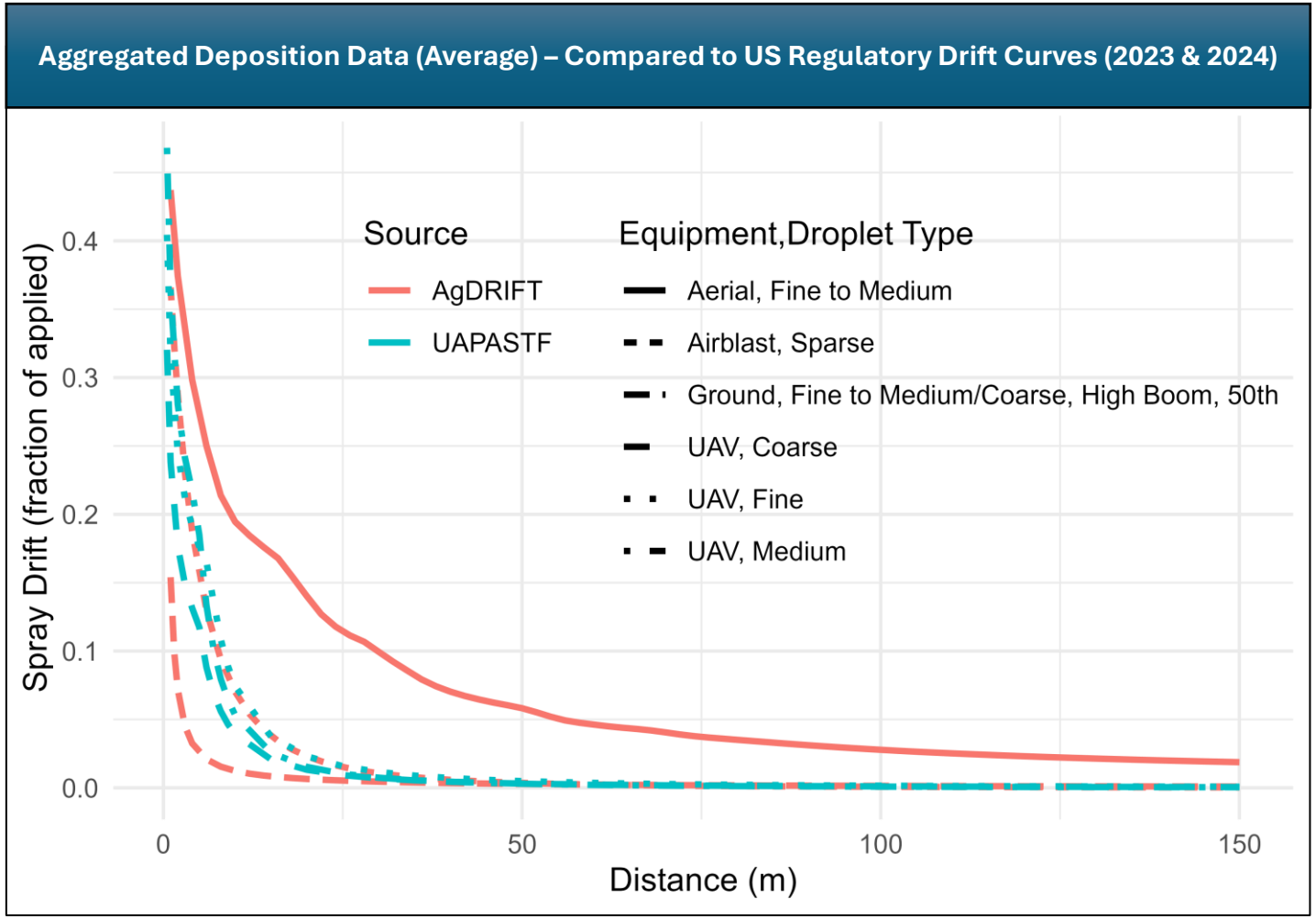
UAPASTF Spray Drift Trials – 2023 & 2024

- **UASS deposition results**
  - Follow expected trend by droplet size
  - 90% ground deposition within 16m
    - 99% ground deposition observed by 32m
  - Data fall between regulatory drift curves for ground and aerial applications

- **Data Submission Timeline**
  - **2023 Data**: Submitted to UK CRD, APVMA, US EPA, CAN PMRA
  - **2024 Data**: Submitted to EPA & PMRA, UK CRD & APVMA *in progress*
  - Includes Non-GLP Summary Drift Analysis

- **Modeling**
  - **Empirical Curves** using UAPASTF + Literature Database
  - **Mechanistic Models** – discussions on-going

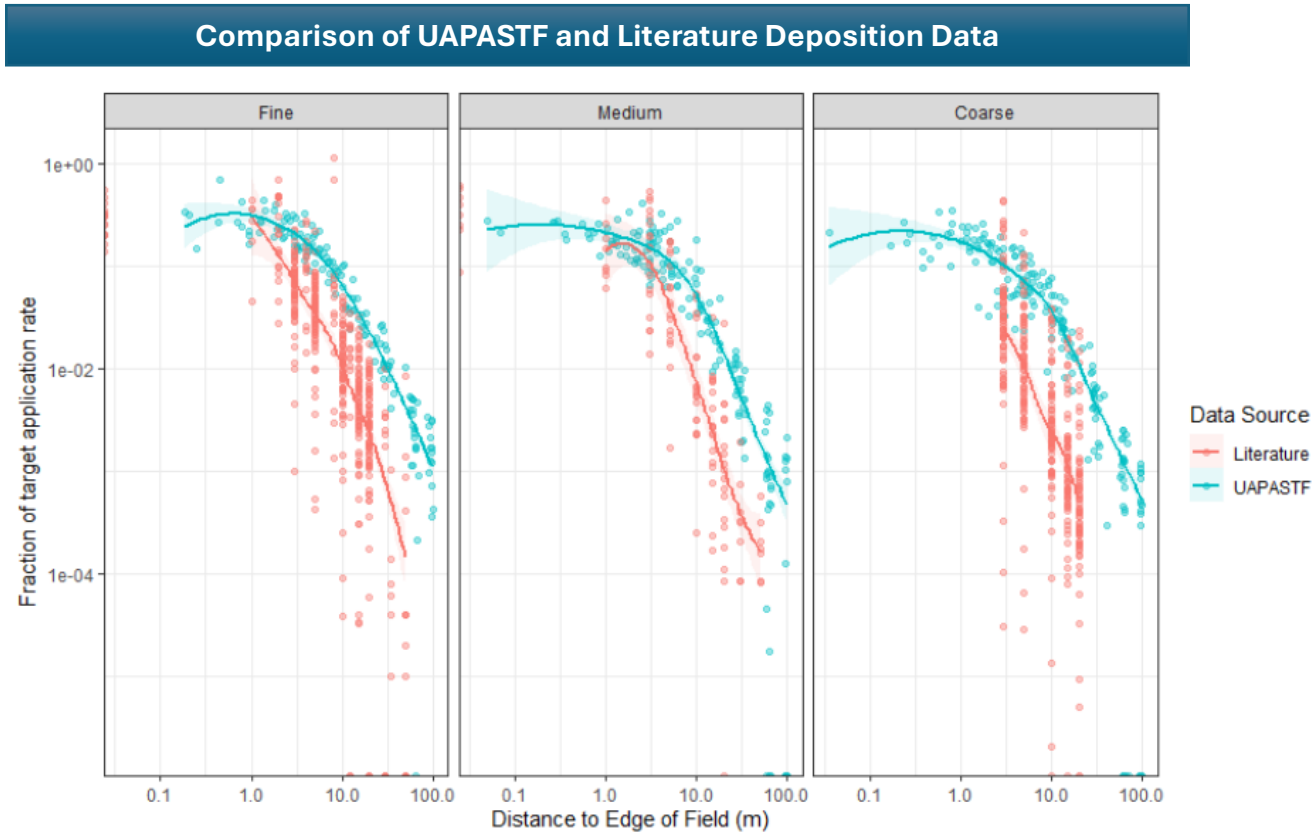


Comparison to Published Literature

- **Collaboration with Dr. Jane Bonds & CropLife America**
  - Database was initially built with data from publications deemed to be relevant and reliable for regulatory purposes
  - Includes 6 studies from prominent global drift researchers
  - These literature studies covered a range of UAV types, application/environmental conditions, presence / absence of crop (and crop type), and spray particle size distribution.

- **Results**
  - Deposition data is within an order of magnitude—despite substantial differences in study parameters.

  - This high-level analysis indicates the UAPASTF dataset tends to be higher than the published literature.



Bonds Publication:

Non-Dietary Exposure - Survey

GOAL 1: collect qualitative information on job step distribution for operators (mixer/loader/applicator)

- A data gathering exercise for job-step or operational practices, including mixing and loading scenarios, would help to both better understand the potential exposure pathways and develop or adapt existing exposure scenarios in order to make them more representative of working practices with drones.

GOAL 2: collect quantitative information on job steps and applications

- It may be possible to use established exposure models and approaches to predict the levels of operator exposure resulting from the use of drones.
- The most relevant quantitative information related to the parameters that drive the current risk assessment should be collected
    - Formulations handled
    - Area treated per Day
    - Volume sprayed per unit area
    - Equipment and techniques used to mix, load, clean, etc

Status

March 2025 – Test Survey Conducted

- Purpose: test various applicator exposure concepts and questions on people using unmanned aerial spraying systems in preparation for a larger global survey
- 147 Participants with 72 usable responses

October 2025 – US Main Survey Initiated (n = 250)

- FAA Part 137 Operators
- Mailers sent out; 1-on-1 phone surveys in progress
- 250 Surveys Completed (100%)!

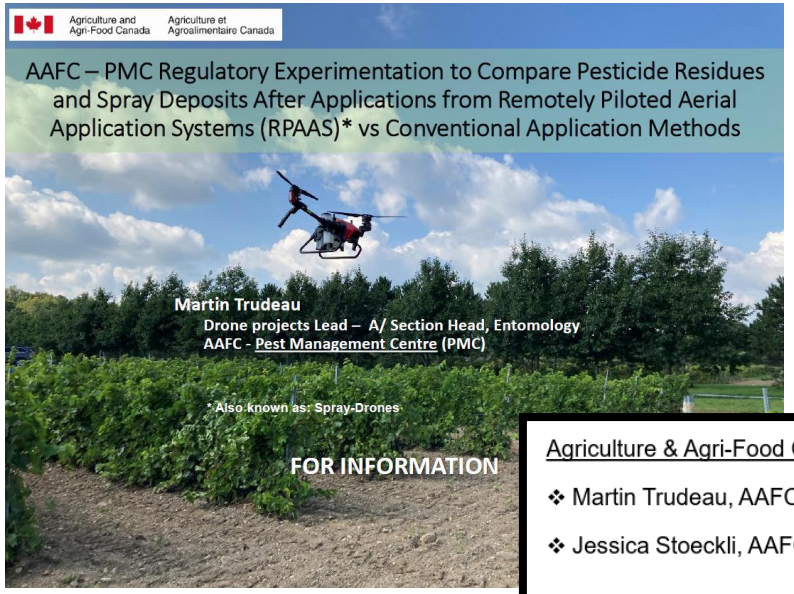
Current & Future Collaboration Efforts

- Compare results to concurrent UK CRD survey in EU & APAC
- Submit Survey to regulators—Summer 2026
- Additional regional surveys TBD (LATAM? AUS?)

Residue Data for UAV Crop Applications

- **Are crop residues from UAV applications equivalent when compared to conventional applications?**
  - A multidisciplinary working group (WG) was formed
  - A side-by-side GLP comparative study of chemical residues levels from drone and conventional (ground) applications:
    - Multiple UAV platforms
    - 4 crop types (large field, small field, orchard & trellis)
    - Increased application rates above labeled rates and reduced PHI to ensure quantifiable residues
    - PMC conducted field trials at 7 locations in Canada

- **Initial results show that residues from drone application are equivalent (or no worse) than boom applications.**
  - Residues for side-by-side drone applications were not statistically different.



Agriculture & Agri-Food Canada

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Agriculture and Agri-Food Canada

Working Group Membership	
AAFC – Strategic Policy Branch	Bayer
AAFC – Pest Management Center	Syngenta
HC – Pest Management Regulatory Agency	Strongfield Environmental Solutions
Transport Canada	Precision AI
TBS – Center for Regulatory Innovation	Protein Industries Canada
OMAFRA	Aerial Evolution Canada

UAPASTF BMP Considerations

- Pesticide application requires expertise and stewardship—especially with new technologies
- BMPs increase the likelihood of good environmental and occupational practices
- Not our intention to make this a standard (for example ASAE) but the UAPASTF BMPs could be utilized in works towards standards
- Can be used as guide to expand on local BMPs
- The registered and current product label should ultimately be followed above any other source of information
- Input sought and received from key external experts including: academics, government entities, OECD & CropLife, application specialists and drone manufacturers
- This document is not endorsed or approved by any other organization besides the UAPASTF

Unmanned Aerial Spray Systems (UASS):

Start Here for Best Practice Resources

UAPASTF

Drone Pesticide Application is Unique and Growing in Popularity

- Changes in UASS technology and regulations are happening rapidly.
- UASS has broad global appeal, with uptake examples in all four regions of the world.
- Regulatory frameworks and best practices are available and will differ based on the local situation.

Best Management Practices (BMPs) and UASS

- Pesticide application requires expertise and stewardship for proper use and safe handling, especially with a new technology like UASS.
- BMPs increase the likelihood of good environmental and operator practices while considering economic factors, availability, technical feasibility, and effectiveness.
- The BMPs provided here are intended to supplement information on the local product label. The registered and current product label should ultimately be followed above any other source of information. Readers should therefore ensure that this guidance is adapted or supplemented by other country/state/region specific needs, conditions, laws, and regulations, as relevant, including official and required aviation training, to ensure safe operations, which may not be explicitly mentioned on pesticide labels.

Purpose and Scope

- This BMP document intends to provide general guidance on best practices for the safe and effective application of pesticides when using UASS primarily for agriculture. The following areas are discussed:
  - **Current licensing regulations in key UASS markets**
  - **User safety in the context of pesticide handling**
  - **Equipment set up and calibration parameters that impact spray deposition while reducing off target movement (drift), including impact of equipment selection and environmental conditions**
- Because changes in UASS technology and regulations are happening rapidly, this document is intended to be updated regularly to ensuring the guidance and references within stay relevant.

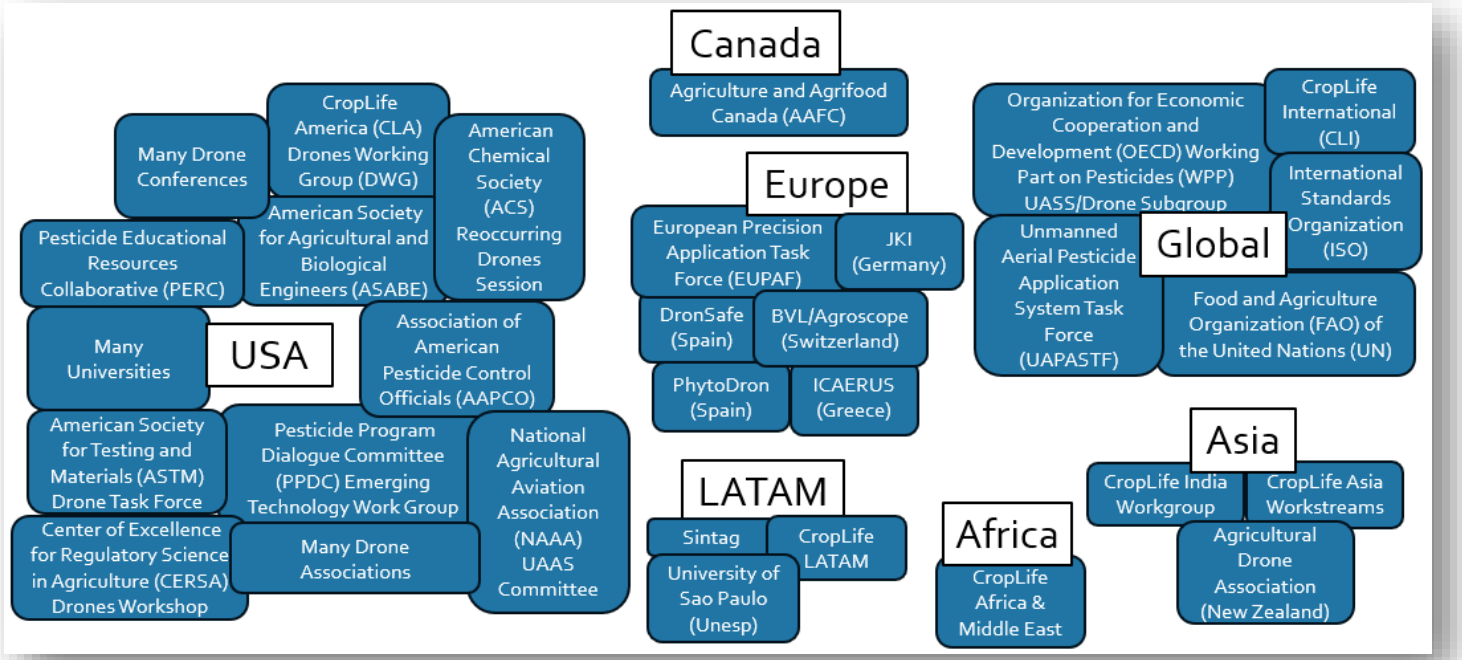
While this is an exciting space, it should also be noted that in many geographies, UASS represent a complementary application technique to existing methods, and further understanding of their unique value and best local practices will help position their use appropriately and more effectively.

The Unmanned Aerial Pesticide Application System Task Force (UAPASTF) consists of the pesticide member companies: BASF Corporation, Bayer CropScience LP, Corteva Agriscience LLC., FMC Corporation, Gowan Company LLC, Nufarm Americas, Inc., Syngenta Crop Protection LLC, and Valent U.S.A. LLC. The UAPASTF, convened by industry, generates, submits, and/or shares/provides access to information and data to governmental agencies to address limitations in available regulatory information and to support risk assessment.

https://uapastf.com/

UAPASTF Next Steps

- **Regulatory Submissions**
  - 2024 Field Trial Data – Q4 2025
  - Updated Environmental and Ecological Summary Report
- **Building an off-site movement database**
  - Looking for tripartite opportunities to develop empirical / mechanistic exposure models for regulatory exposure / risk assessment
- **Complete & Submit Non-Dietary Exposure Survey**
- **Potential Additional Regulatory Considerations**
  - UAV Platforms
  - Nozzle configurations
  - Labeling



And…Continued Connection & Collaboration with to Working Groups

OECD WPP, EUPAF, CropLife orgs, etc.

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Thank you!

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