UAV for Pesticide Application Overview of OECD WPP Drone / UASS Subgroup & the Unmanned Aerial Pesticide Application System Task Force (UAPASTF)

Industry Response to Pesticide Regulators' "State of the Knowledge" Review of Unmanned Aerial Vehicle (UAV) Use for Pesticide Application

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Greg Watson
Chair, Administrative Committee
UAPASTF

Regulatory Scientific Affairs,
Regulatory Policy Analysts
Bayer Crop Science

RPAAS Workshop
Davis, CA / Oct 2-4, 2023

OECD WPP Drone/UASS Subgroup – State of the Knowledge Report Recommendations

The Subgroup has become an advisory body to provide expert input on how to fill knowledge gaps

- Grouping of 'state of knowledge' recommendations needed to develop / implement
- Workstreams Established, work in-progress

Work Package #1 – off-site exposure including exposure modeling **(BIAC / CDN / US)**

Work Package #2 – scanning / survey to stakeholders **(Australia, UK)**

Work Package #3 – 'best practices' guidance **(BIAC)**

Work Package #5 – connect to ISO **(Research Institute / ISO representative)**

Grouping of Recommendations from 'State of Knowledge' Report

#7. Develop an empirical database and standard drift curve or model to estimate off target exposure.

#9. Develop a useable publicly available model for predicting spray deposition and drift including parameters for static hovering, forward speed and spray equipment.

#1. Establish database to classify UASS into groups to reduce burden of testing each different platform/configuration.

#2. Survey manufacturers about future trend of UASS design/ use profiles to produce a benchmark platform as a common starting point for regulators (others may differ and need bespoke assessment but would cover most common uses).

#8. A data gathering exercise for operational practices mixing, loading, cleaning and transport scenarios.

#5. Develop and publish a user-friendly summary of best practice (including the essential nature of calibration), pitfalls and a trouble shooting guide (both for generating trials data and applying pesticides in practice), including preliminary recommendations for operational parameters (release height, application volumes, forward speed and spray quality).

#6. Promote the advice in Annex D recommendations for researchers conducting UASS drift studies.

#4. Develop set of standard methodologies that will support regulatory decision making.

#3. Encourage manufacturers to develop improved spray systems including the pump systems, nozzle placement and closed transfer loading systems. * ISO standard project

Unmanned Aerial Pesticide Application System Task Force (UAPASTF)

Industry sponsored task force – (UAPASTF) established

// **Based in the US - but <u>global</u> in its work / focus**

// **UAPASTF to interact with OECD Drone/UASS Subgroup of WPP, regional / national regulators, CropLife, & other stakeholders to develop & provide information / data**

// **UAPASTF operating as a Limited Liability Company**

Member Company	Administrative Committee	Technical Committee
BASF Corporation	Rebecca Willis	**Frank Donaldson (Chair)**
Bayer CropScience LP	**Greg Watson (Chair)**	Jane Tang
Corteva Agriscience	**Travis Bui (Vice Chair)**	Rajeev Sinha
Gowan Company LLC	Raymond Layton (subbing for Ephraim Gur)	Jason A. McDonald
FMC Corporation	Hector Portillo	Roberto Barbosa
NuFarm Americas Inc.	Patti Turner	Tyler Gullen
Syngenta Crop Protection LLC	**Nestor Algarin (Treasurer)**	Jo Davies
Valent U.S.A. LLC	Robin Charlton	Christopher Read

Parties interested in the work of, or registrants interested in joining the UAPASTF should contact:
Dr. Greg Watson,
Chair, UAPASTF
Administrative Committee
greg.watson@bayer.com
+1 314 343 8120

// **Task force managers: Rhonda Bichsel & Eric Bruce**

// **Established collaborative agreements with UAV-application companies, seeking further agreements with other companies (e.g., additional UAV-application companies in other world areas, UAV & nozzle manufacturers)**

Unmanned Aerial Pesticide Application System Task Force (UAPASTF)
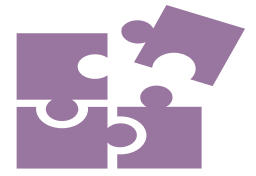
Industry sponsored task force – (UAPASTF) established

// _**Technical teams actively working**_

   // **Off-site movement GLP study protocol & trials (Frank Donaldson, BASF)**

      // **Environmental / Ecological Exposure Subteam: Naresh Pai (Bayer Crop Science)**

   // **'Best practices' guidance (Hector Portillo, FMC)**

   // **Field crop residue project – Agriculture & AgriFood Canada (Pam Livingston, Syngenta; Greg Watson, Bayer Crop Science) –**

   // _**Occupational / Applicator Exposure Subteam forming (**_ _Project lead nomination in progress_ _**)**_

Unmanned Aerial Pesticide Application System Task Force (UAPASTF)

// *__Technical teams actively working__*

- // **Off-site movement GLP study protocol, 8-10 GLP field studies planned in 2023**
  - // **Including identifying 'reference' / 'benchmark' UAV & spray system**
  - // **Input from internationally recognized off-site movement experts sought & received**
  - // **Requested & received review / input from OECD WPP Drone / UASS Subgroup on study protocol**
    - // **Plan to public release 'general' study protocol to support increasing quality of published studies**
  - // **Trial sites in North America, Latin America, Europe for GLP studies in 2023; in 2024 Africa, & Australia being considered**
    - // **Non-GLP 'dry run' 1st Q 2023 –** *completed*
    - // **GLP study in Canada –** *completed*
    - // **GLP study in Brazil -** *completed*
    - // *GLP work in Europe Oct-Nov, NA (US) Dec, 2nd study Brazil Q1 2024*

OECD Drone/UASS Subgroup of WPP Work Package #1 – off-site exposure including exposure modeling (BIAC / CDN / US)

Unmanned Aerial Pesticide Application System Task Force (UAPASTF)

Environmental / Ecological Exposure Subteam (Naresh Pai, BCS) leading this effort

// *__Technical teams actively working__*

- // **Advancing work of Crop Life America project with Dr. J. Bonds, development of interim exposure estimate/model based on empirical data**

  - // **Determine quality criteria for data to include in further exposure estimate/model work,**

  - // **Request additional raw data from published off-site movement studies,**

  - // **Incorporation of UAPASTF off-site movement study protocol data into these exposure estimates, &**

  - // **Mathematical approach to use raw data to develop off-site movement curves**

- // **Longer term: development of a mechanistic off-site exposure estimate/model for UAV-based pesticide application**

  - // **__Desired:__ establishment of a tripartite (e.g., government / academia / industry) forum for development of exposure estimates for regulatory purposes**

OECD Drone/UASS Subgroup of WPP __Work Package #1__ – off-site exposure including exposure modeling
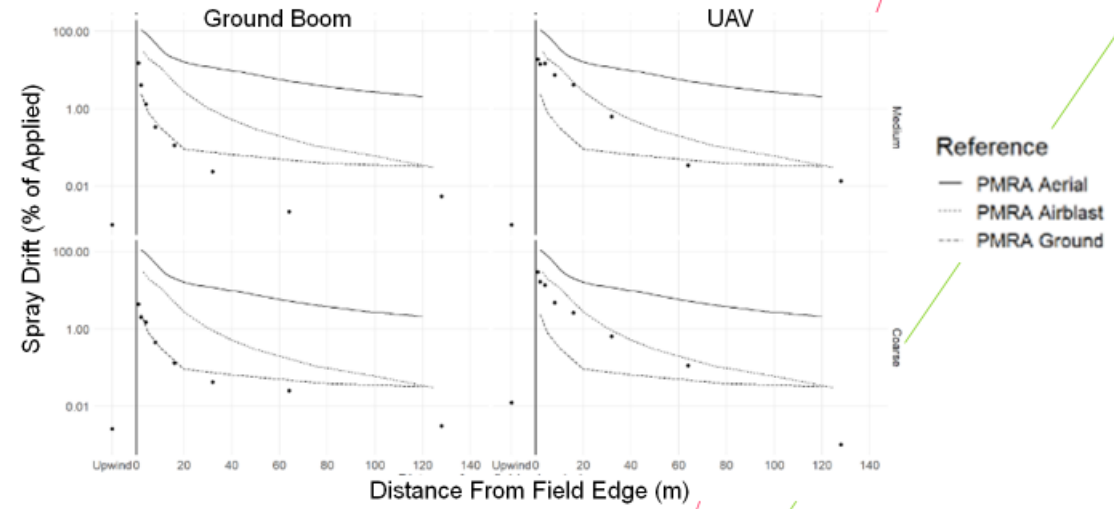(BIAC / CDN / US)

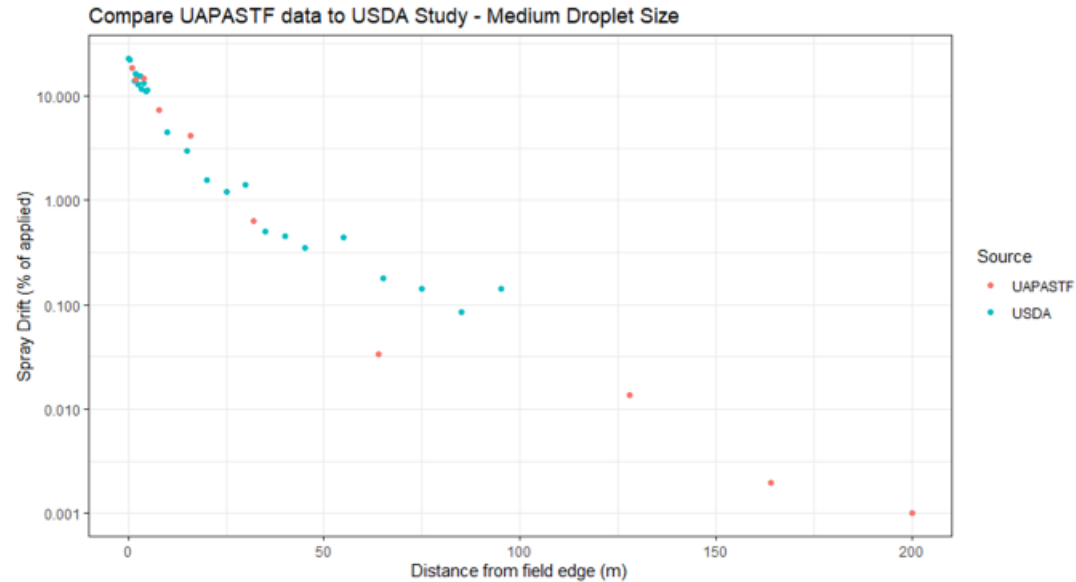**UK authority (HSE CRD) considering requesting government funding to create this entity**

Non-GLP Pilot Spray Drift Trial Results – Comparison with EPA Drift Curves
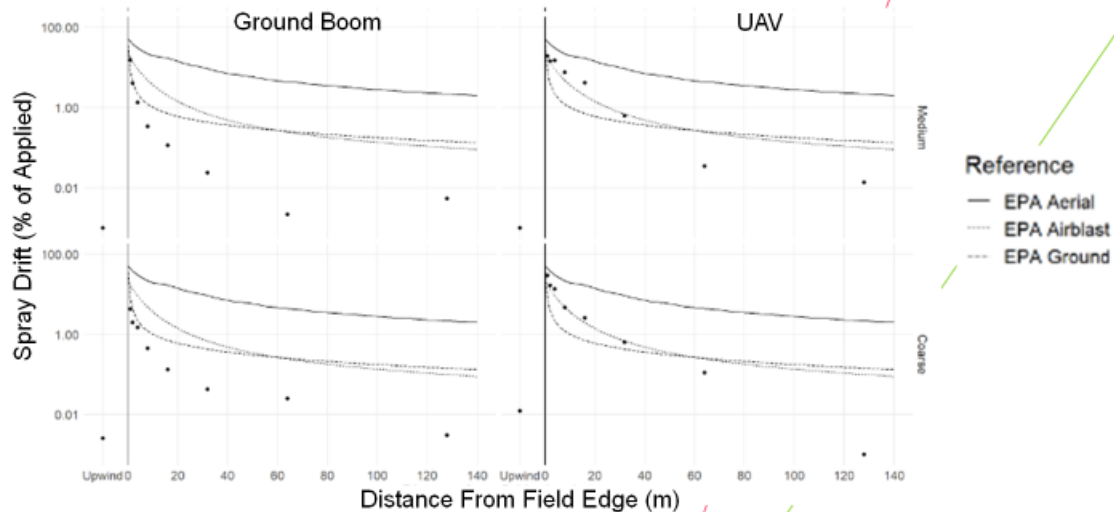
Non-GLP Pilot Spray Drift Trial Results – Comparison with PMRA Drift Curves

Non-GLP Pilot Spray Drift Trial Results – Comparison with USDA Bayer Crop Science Trial

Results - Single Swath "Medium" Spray

// Optimal swath width calculated for each pass was used (avg. 3.0 m)

// Swath displacement based on optimal swath width was used (avg. 1 m)

// The modeled depositions match the field measurements very well

UAS Field and AGDISPpro Results Comparison (Medium DSD Treatments)

Results - Single Swath "Extra Coarse" Spray

// Optimal swath width calculated for each pass was used (avg. 2.1 m)

// Swath displacement based on optimal swath width was used (avg. 1.4 m)

// The modeled depositions match the field measurements very well

UAS Field and AGDISPpro Results Comparison (Extra Coarse DSD Treatments)
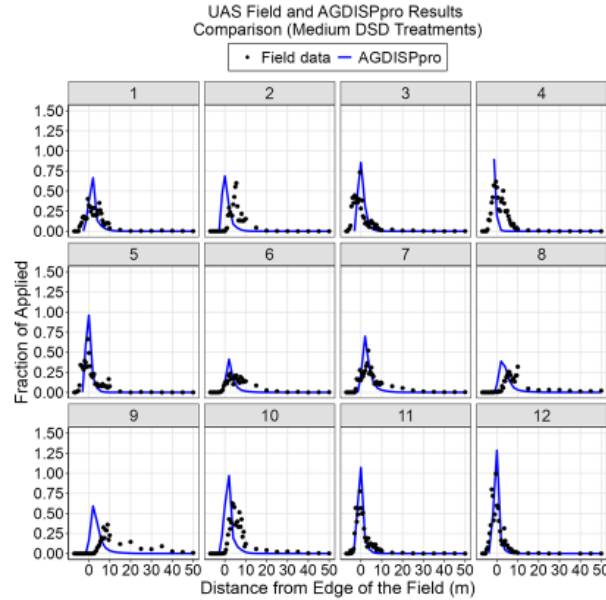
AgDISP Pro UAV spray drift mechanistic model against field trials /
Jane Tang (BCS) IUPAC Presentation

Results – Multi-Swath

// For offsite dispositions (spray drift), model predictions compare well to the field measurements

// For in-swath deposition
// Individual swath peaks in model simulations are more evident than in field data
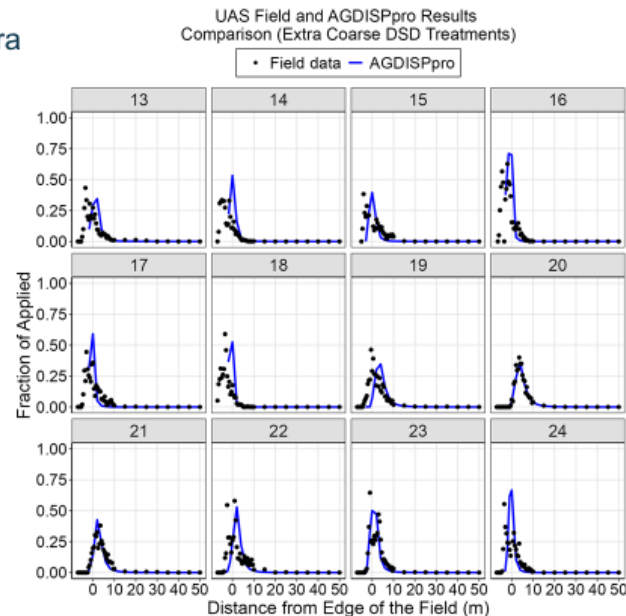// Under-predictions of "fine spray" need to be further investigated

UAS Field and AGDISPpro Results Comparison
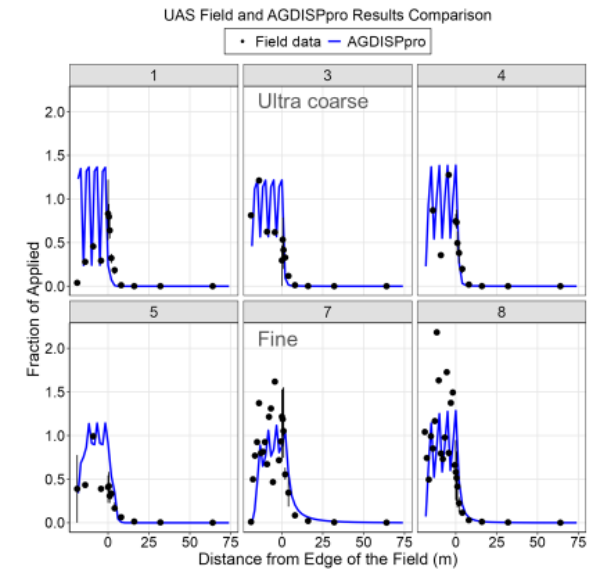
Further investigation on use of proprietary model needed

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Industry sponsored task force – (UAPASTF) established

// **_Technical teams actively working_**

// **'Best Practices' guidance**

    // **Preparation of draft completed by UAPASTF 4th Q 2022**

        // **Shared with UAPASTF collaborators 4th Q 2022**

    // **External stakeholder input on draft 1st Q 2023**

    // **OECD Cooperative Research Program funded workshop in 2023 for additional expert / stakeholder input on this guidance**

        // **In-person, May 23rd & 24th 2023, York, UK**

        // **Workshop well attended, very successful – follow up publications of content planned**

    // **UAPASTF 'best practices' subteam addressing input, will produce another draft**

// **Field Crop residue project – Canada**

    // **Supporting efforts for a funded Agriculture and AgriFood Canada project to address PMRA questions**

OECD Drone/UASS Subgroup of WPP Work Package #3 – 'best practices' guidance (BIAC)

UAPASTF plans public release BMP 'Version 1.0' in 2024

Thank you!

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