UAV PESTICIDE APPLICATION WORK GROUP: PROGRESS UPDATE

March 23rd, 2022 CLA Drones Working Group Update

Trilateral Stakeholder Workshop

CropLife AMERICA

Co-Chairs:

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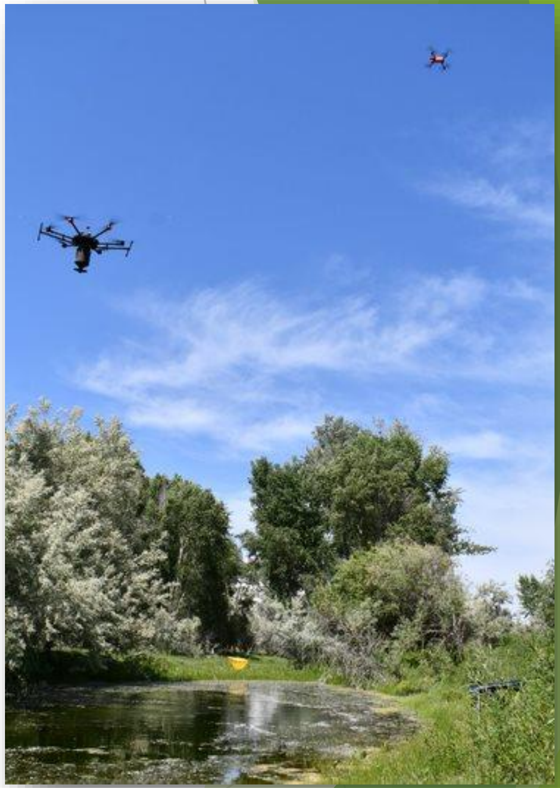
Drone specialized for crop input application

UAVs used in agriculture and for public health are primarily used for sensing or input application

- In the context of the evolution of digital technologies to improve the future of farming, UAVs/drones are part of the solution towards practices that have the potential to positively affect climate and sustainability goals.
- Pesticide applications made by UAVs/drones are an emerging practice that current regulatory frameworks should work to fully incorporate.
- CLA supports the EPA's position to enable these technologies' commercial use for products registered for manned aerial application.
  - In general, the anticipated UAV use pattern is covered by existing risk assessments.
  - Potential further data generation (e.g., spray drift, operator exposure, and crop residue) will facilitate their fit into the regulatory risk assessment process.

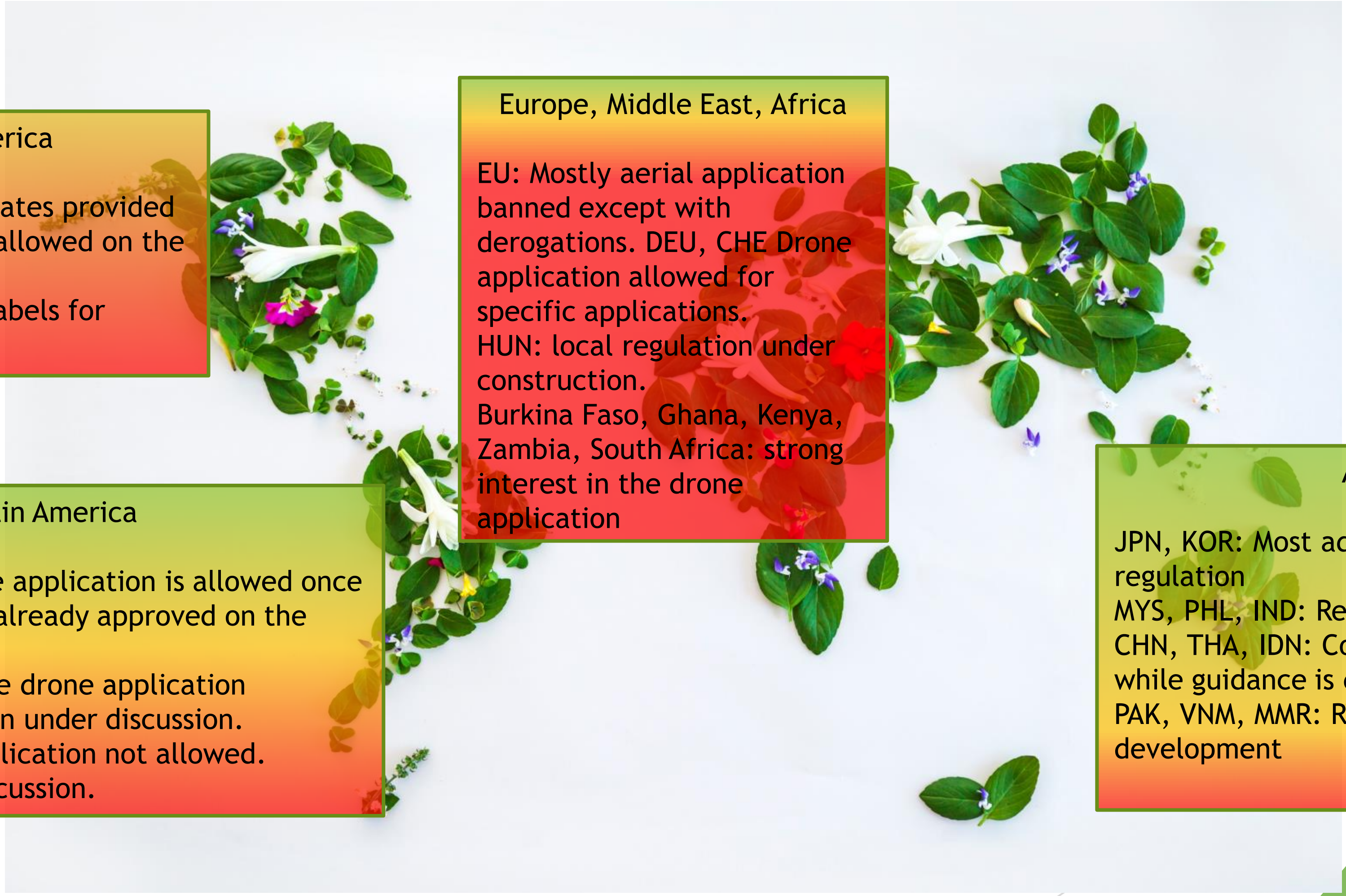


Drone used for vector control in a hard-to-access location. (2) drones are shown: one for application, one for visualization. (Courtesy of Clarke)

Potential benefits of drone technology in the U.S.

Flexibility	• Amenable technology for hard-to access locations
	• Larger areas can be treated precisely with multiple drones (e.g., swarms)
Cost	• Relatively less expensive technology compared to more expensive equipment (e.g., ground sprayers)
	• Decreased application costs due to optimized applications
	• Decreased crop damage due to minimizing field passes
Worker Exposure	• Potential decreased operator exposure
Innovation	• Enabling future of digital and precision tools including targeted and optimized applications
	• Positive industry disruption (e.g., attracting a diverse work force, creating possibilities for spray-as-a-service business models, further attracting technology partners not traditionally associated with agriculture [e.g., Google and Microsoft])
Environment & Sustainability	• Input reduction via customized rates, optimal timing, and placement
	• Emissions reduction
	• Reduced water consumption
	• Soil health
	• Enables specialty crop care to contribute to a diverse food supply (e.g., small acreage, minor crop uses, orchards and vineyards)

Global regulatory landscape of drone application technology



North America

USA: EPA defers to states provided aerial application is allowed on the federal label.
CAN: No registered labels for drones.

Europe, Middle East, Africa

EU: Mostly aerial application banned except with derogations. DEU, CHE Drone application allowed for specific applications.
HUN: local regulation under construction.
Burkina Faso, Ghana, Kenya, Zambia, South Africa: strong interest in the drone application

Latin America

BRA, CRI, URY: Drone application is allowed once aerial application is already approved on the label.
GTL, COL, MEX: Some drone application permitted. Regulation under discussion.
ECU, PER: Drone application not allowed. Regulation under discussion.

Asia Pacific

JPN, KOR: Most advanced countries for drone regulation
MYS, PHL, IND: Regulations in place.
CHN, THA, IDN: Commercial use permitted while guidance is developed in parallel
PAK, VNM, MMR: Regulations under development

Active Stakeholder Groups Involved in Drones for Application of Plant Protection Products

*Organization	Geographic Scope
EPA (Environmental Protection Agency)	USA
OECD (Organization for Economic Co-operation and Development) Working Party on Pesticides (WPP) UAV/Drone Subgroup	Global
Industry-sponsored Task Force *(Forming)*	Global
RPAAS (Remotely Piloted Aerial Application System)	North America
NC State CERSA	USA, CAN - some representation from Brazil (MAPA, IBAMA)
ISO (International Organization for Standardization)	Global
AAPCO (Association of American Pesticide Control Officials)	USA
CLI (CropLife International)	Global
CLA (CropLife America)	USA
CLC (CropLife Canada)	CAN
CLA (CropLife Asia)	Asia Pacific

*List not exhaustive

CLA Drones Working Group

- The Working Group's mission is to evaluate existing data used to assess or generated by aerial and/or traditional pesticide application methods within a regulatory context to identify equivalencies and gaps for UAV/drone applications.
- Group focused on (4) distinct areas: Registration/label, Spray Drift, Crop Residue, and Operator Exposure
  - Developed white paper entitled:

    UAV Pesticide Application: Benefits and Fit into the Current Regulatory Framework
- In conjunction with stakeholders, CLA looks forward to enhancing stewardship for this advancement in technology and to clarifying the appropriate scientific paradigms under FIFRA.

Recommendations: Spray Drift

- It is possible that drift data could be organized and compared to conventional application methods to be used for regulatory purposes to confirm that existing risk assessments cover the UAV/drone use pattern. To support this, there is a need for:
  - A standardized protocol for measuring spray drift considering UAV/drone types
  - Spray drift data to understand the effect of variables associated with UAV/drone operation (e.g., horizontal speed, height above the target treatment, nozzle configuration, and unique UAV/drone aerodynamics) as part of the effort to develop Best Management Practices and how drift from UAVs/drones generally compares to other methods
  - Development of a new predictive model or, more expediently, adaptation of an existing model platform, to estimate drift from the most common UAV/drone platforms (e.g., multi-rotor, fixed-wing, and helicopter) with flexibility to accommodate future design elements

Team Lead: Naresh Pai (Bayer)

Recommendations: Crop Residue

- Residue level comparisons between UAV/drone applications and conventional application methods (e.g., ground, handheld, and aerial applications) would help in understanding potential differences in pesticide deposition of these systems and whether bridging to existing data would be sufficient.
- We recommend that UAV/drone-specific residue data be generated if needed to address:
  - Ultra-low volume (ULV) applications (e.g., <2 gallons spray per acre for most crops, or <10 gallons per acre for orchards)
  - Change in carrier type (e.g., water versus oil) used in UAV/drone applications
  - Applications outside of the existing critical Good Agricultural Practice (GAP) (i.e., crop, dose, or pre-harvest interval)

Team Lead: Sheila Flack (Bayer)

Recommendations: Operator Exposure

- The overall process in using a UAV/drone to make pesticide applications can be summarized in 4 parts:
  - Initial mixing and loading, Spraying, Subsequent mixing and loading, and Cleaning and maintenance
- In many ways, the process to use a UAV/drone for pesticide applications is similar to currently approved methods, particularly for manned aerial applications, but there are also several areas which potentially differ and/or may not be fully understood.
- As the EPA Surrogate Reference Guide contains a wealth of pesticide handler exposure data, there is potential to estimate drone handler exposure by bridging to already existing handler scenarios.
  - However, unless current data exists, one area of further work would be to collect data on UAV/drone work practices, possibly in the form of a survey.

Team Lead: Travis Bui (Corteva)

Recommendations: Registration

- As UAV/drone technology continues to evolve, CLA encourages the EPA to maintain the current approach (i.e., UAV/drone applications for products with manned aerial uses) and to enable regulation of pesticide application via UAVs/drones under the current Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) framework.
- Following the EPA assessments of emerging technologies, if additional label language is required for drones, continuous collaboration to streamline the process of label reviews is imperative. It is suggested that the overall use pattern be considered, and that label language, as much as possible, be consistent, standardized, and then added to EPA instructional documents such as the Label Review Manual.
- CLA additionally encourages EPA to continue efforts on electronic labels and look ahead to digital labels, that are fit for machine readable and machine actionable capabilities.

Team Lead: Nandita Chowdhury (Clarke)

CropLife America Drones Working Group (CLA DWG) Project Awarded* to Construct a Database to Inform an Interim Drift Model

- Context
  - The CLA DWG developed a white paper related to the application of crop protection products in commercial agriculture using unmanned aerial vehicles (UAVs, henceforth referred to as drones).
  - The white paper focuses on registration/labeling, crop residue, operator exposure, and spray drift. This project is targeted primarily to support the spray drift workstreams but will also inform the activities of other workstreams.
- Project
  - Based on expert analysis of the available data in published literature (https://www.oecd.org/chemicalsafety/pesticides-biocides/literature-review-on-unmanned-aerial-spray-systems-in-agriculture.pdf), there is potentially enough information to gain an understanding for where drones appear regarding drift compared to other conventional application types.
  - When the published information is collected in a systematic and curated database, it will potentially enable the comparison of the equivalency of drones, from a spray drift perspective, to other conventional application types via an interim drift model.

Drone specialized for crop input application

*Awarded to Dr. Jane Annelise Sara BONDS (Barber) D.I.C.; Bonds Consulting Group LLC. jasbonds@gmail.com

Conclusions

- CLA supports the position of EPA to enable these technologies' commercial use for products registered for manned aerial application since, in general, the anticipated UAV/drone use pattern is covered by existing risk assessments, knowing that potential further data generation (e.g., spray drift, operator exposure, and crop residue) will facilitate their fit into the regulatory risk assessment process.

- The industry will continue to further research and innovate to enhance the competence and responsible use of drones.

- As these efforts progress, the industry is committed to work with stakeholders, including the EPA, within transparent, science-based, and flexible regulatory frameworks that can enable these technologies to continually evolve for the future of sustainable farming.

Thank you

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Sarah Hovinga (Bayer) Sarah.Hovinga@bayer.com

Back-up

OECD recommendations

- Comparator & Protocol Creation
  - Establish database to classify UASS into groups to reduce burden of testing each different platform/configuration.
  - Survey manufacturers about future trend of UASS design/ use profiles to produce a standard platform as a common starting point for regulators (others may differ and need bespoke assessment but would cover most common uses).
  - Encourage manufacturers to develop improved spray systems including the pump systems, nozzle placement and closed transfer loading systems.
  - Develop set of standard methodologies that will support regulatory decision making.
- Best Management Practices
  - 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).
  - Promote the advice in Annex D recommendations for researchers conducting UASS drift studies.
  - A data gathering exercise for operational practices mixing, loading, cleaning and transport scenarios.
- Modelling
  - Develop an empirical database and standard drift curve or model to estimate off target exposure.
  - Develop a useable publicly available model for predicting spray deposition and drift including parameters for static hovering, forward speed and spray equipment.
- Report: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/CBC/MONO(2021)39&docLanguage=En

PPDC Emerging Agricultural Technologies Workgroup Outcomes

- Benefits
  - Potentially less worker exposure to pesticides and time/labor savings particularly in areas where hand application is needed
  - An opportunity to use this technology in tough and difficult conditions (e.g., cliff sides) where traditional application methods may not be feasible or present additional hazards
  - Potential to reduce environmental loading of pesticide/fertilizer/water as spot or partial field applications may become more viable
  - Depending on equipment type, reduced fuel use / emissions and a lower cost to entry may be realized in many scenarios
- Challenges
  - Benefits may be over-stated early in development and roll-out and therefore quantifying benefits as technologies evolve is very important
  - Safety, implementation, and regulatory compliance (What additional information / data is required)
    - Offsite movement that may impact applicators, bystanders, and/or wildlife that may be different than conventional application methods?
    - Are there differences in the applications that may impact pesticide efficacy and/or tolerances or result in crop injury?
    - What applicator training will be required and who will certify?
    - What label language changes will be required?
- Summary presentation: https://www.epa.gov/system/files/documents/2021-10/presentation-emerging-viral-pathogens-workgroup-report.pdf
- Report: https://www.epa.gov/system/files/documents/2021-10/emerging-agricultural-technologies-workgroup-report-and-recommendations-for-ppdc-review.pdf