

# Mitigating Risk Through Education in Agricultural Drone Adoption



<sup>1</sup>Erika Crowl, [ecrowl@umd.edu](mailto:ecrowl@umd.edu) and <sup>2</sup>Andrew Kness, [akness@umd.edu](mailto:akness@umd.edu)

<sup>1</sup>Senior Agent Associate, University of Maryland Extension, Harford County | 1114 Shawan Rd., Cockeysville, MD 21030

<sup>2</sup>Senior Agent, University of Maryland Extension, Harford County | 3525 Conowingo Rd., Street, MD 21154

## Need, Justification, and Goals

- Unmanned aerial systems (UAS), also known as drones, are becoming increasingly popular in agriculture. While they offer potential production benefits, they also introduce many regulatory, financial, and liability risks.
- This program was developed to help farmers and agricultural (ag) service providers navigate the associated risks to facilitate smooth adoption and implementation of the technology on Maryland farms.

## Educational Methods

### Background

- The University of Maryland Extension (UME) has an existing drone program for nursery professionals, but the need existed for a program tailored to Maryland's row crop/agronomic farmers.
- Grants were obtained from the Maryland Soybean Board and the Maryland Grain Producers Utilization Board and used to offset costs associated with the development and implementation of an "Agronomic Drone School" program.

### Program Design

- A half day, in-person program incorporated classroom instruction and hands-on demonstration (Figures 1 & 2). Instructors consisted of UME educators and specialists, UMD instructors, and a licensed drone operator.
- Presentations addressed learning objectives and included the following topics:
  - 1. *Introduction to drones in agronomic systems.* An overview of what drones are, how they work, and what they can be used for in agronomic systems.
  - 2. *Drone & equipment overview.* Hands-on of how a how a drone works and the associated support equipment (truck, trailer, generator, etc.).
  - 3. *What you need to operate.* An overview of the licenses and permits needed to legally operate a drone, as well as how to obtain these licenses.
  - 4. *Using drones to spray crops and seed cover crops.* Presentation on best practices for spraying and seeding with a drone, including data from Maryland drone research trials.
  - 5. *Live drone demonstrations.* Hands-on demonstrations of mapping, flight planning, and flying a drone.

## Results & Impact

- 61 individuals participated in the program across three training locations from 2024-2025. Three locations were chosen to facilitate attendance from across the state and included Southern Maryland, Northern Maryland, and Maryland's Eastern Shore.
- 31% were farmers, 30% were government workers involved in agriculture, and 17% were private industry. 90% had no prior experience with drones.
- Post-course surveys revealed significant knowledge gain in the following areas:
  - Equipment requirements (88%), agronomic applications (90%), cover crop seeding (89%), pesticide application (77%), licensing and certification (82%), and field mapping and flight planning (79%). Participants reported an improved understanding of how to mitigate risks associated with drone use, including compliance, equipment selection, and appropriate use cases.
- 70% indicated plans to begin or expand drone use in their business and 97% expressed interest in additional training.



Figure 2. Students learn about drone support equipment (top) and observe a live flight over soybeans.



Figure 1. Classroom instruction showing students learning about how to create a flight map.

## Acknowledgements

This work was funded by the Maryland Soybean Board and the Maryland Grain Producers Utilization Board. Special thanks to Scout Applicators for the use of their drones and equipment used for demonstrations.