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## Spray Performance Assessment of a DJI Agras T30 Drone Sprayer to Optimize Application Efficiency

Authors: Coleman Byers, Simerjeet Virk, Glen Rains, Steve Li

### Abstract:

Application of pesticides with Unmanned aerial systems (UAS) is gaining tremendous interest recently. While many UAS spray platforms are commercially available today, information on best management practices including selection of optimal spray parameters is limited. The DJI Agras T30 is one of the most widely used UAS sprayers among researchers and growers in the United States, therefore a study will be conducted (in Spring 2023) to understand the spray performance characteristics (spray coverage and uniformity across the swath) of a DJI T30 at different application parameters with a goal to determine optimal spray parameters that maximize application efficiency. The experimental design for this study consisted of one application volume ( $18.7 \text{ L ha}^{-1}$ ) across a factorial arrangement of three application heights (1.5, 2.3, and 3.0 m), three different droplet sizes (medium, very coarse and ultra coarse), and three flight speeds (4.5, 5.6, and  $6.7 \text{ ft s}^{-1}$ ). Each treatment combination (volume x height x droplet size) will be replicated three times. Tests will be conducted in a spray area that measured 100 m long x 30 m wide while the application swath of the UAV sprayer will be between 4 and 9 m. Spray deposition, effective spray swath and application uniformity across the swath for each treatment combination will be evaluated by placing water sensitive paper along the swath at 0.33 m intervals. During testing, each treatment combination (volume x height x droplet size) will represent one sprayer pass and



all other application parameters will be kept constant between all the tests. Results from this study will help understand the application performance of a commercially used UAS sprayer (DJI Agras T30) and how certain spray parameters (e.g. height and nozzle type) can be optimized for improving the pesticide application efficiency.

**Keywords:** Spray Drones, Pesticide Application, Unmanned Aerial Systems, Spray Systems