

Atmospheric Influences on Spray Droplet Deposition: Optimizing UAV Spray Application through Meteorological Modeling

Dissertation Proposal

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Abstract

The Philippines, a predominantly agricultural country, heavily relies on agrochemicals to sustain crop productivity. However, indiscriminate chemical use poses significant environmental and health risks. Unmanned Aerial Vehicles (UAVs) have emerged as a promising technology to address these challenges by enabling precise and efficient agrochemical application.

While previous studies have examined UAV operational parameters on spraying efficiency and effectiveness, the impact of meteorological factors on spray deposition remains understudied and is not fully understood. This dissertation proposal aims to investigate the complex interplay of factors influencing spray droplet deposition during UAV-based agricultural spraying in the Philippines. Specifically, my goal is to examine and understand the effects of UAV parameters (e.g., flight speed, height, and nozzle type), meteorological conditions (e.g., wind speed, humidity, and temperature), and spray liquid properties on spray deposition efficiency and uniformity. By conducting field experiments and employing Response Surface Methodology and Box-Behnken Design, I will develop a comprehensive model to predict and optimize spray deposition under various conditions. This research will contribute to the advancement of precision agriculture practices, enabling farmers to reduce chemical usage, minimize environmental impact, and enhance crop yields.