Potential for Improved Spray Coverings and Reduced Drift Using Remotely-Piloted Aircraft (RPA) in Almonds

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PROJECT SUMMARY

Objectives:

- Determine the spray deposition achieved by an RPA in a typical almond orchard as compared to a typical ground based sprayer.
- Determine the work rate (acres/hour) that can be achieved by an RPA in an almond orchard.
- Develop economic data to determine the cost of RPA applications using a commercial RPA.
- Demonstrate the RPA to growers and solicit feedback on grower opinion.

Background and Discussion:

There is a continuing, perhaps perennial, need in the orchards, such as almonds, for improved spray application technology that increases pesticide deposition while reducing spray drift and runoff. The size and canopy density of almond trees, coupled with the requirements for uniform and efficient deposition of pesticides, particularly when pest resistance is an issue, make the physical movement and successful deposition of pesticide sprays very challenging.

Often the areas of poor spray deposition are in the tops of the trees, where ground-based, air blast sprayers have limited penetration. The traditional approach to address this problem has been to increase spray liquid volumes, increase the carrier air volume, modify the air blast flow characteristics or reduce ground speeds.

Remotely-piloted aircraft, or RPA, (the preferred term for unmanned aerial vehicles, UAV's or drones) are a relatively new technology for agricultural use. While extensively used in military, defense and law enforcement, their use is now greatly expanding for inspection, sensing and imaging crops.

Using RPA for payload delivery, such as pesticide spraying, is much less common than uses for sensing and imaging. Since 2012, UC Davis ag engineers have been conducting research on pesticide applications from RPA. Currently, RPA are much smaller than manned aircraft and therefore carry significantly less payload; however, designs in the RPA industry are underway to produce larger aircraft, with payloads approaching what can be carried by manned aircraft.

Field work in orchards is currently underway to determine spray deposition from the RPA operating in test orchards and to compare to ground based applications. The RPA being used is the Yamaha RMAX which is a 220 lb conventional helicopter with a payload of approximately 5 gallons and a flight endurance of 1 hour.

Spray application rates of 5-10 gal/acre have been demonstrated as feasible in crop spraying and in some conditions, productivity rates of 3-6 acres per hour have been established. However, there are currently many issues impeding use of RPA for orchard spraying including: need for pilot visual contact while operating RPA, requirement for a secondary observer to also maintain visual contact, limited materials with aerial labels for almonds, and ag pilot and pesticide handler licensing and training.

Project Cooperators and Personnel: Franz Neiderholzer, UCCE – Sutter/Yuba Counties; Stan Cutter, Nickels Soil Lab; Ryan Billing, UC Davis

For More Details, Visit

- Poster location 106, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2017) at Almonds.com/ResearchDatabase
- Related projects: 15-WATER3-Niederholzer/Markle