

# Using drones to control summer worm pests in alfalfa

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Six-rotor UAV sprayer (PV35X)

# Summer worm complex in alfalfa

## Western yellow-striped armyworm



## Beet armyworm



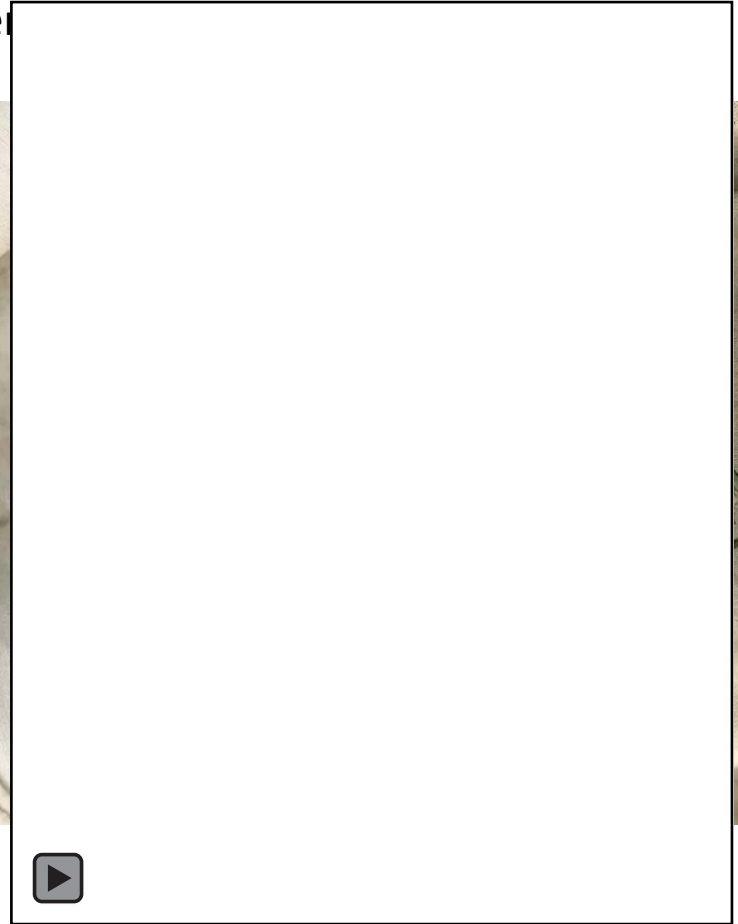
## Alfalfa caterpillar





## Monitoring and treatment thresholds for summer worms UC IPM guidelines, alfalfa hay

- 5 sweep samples in each of 4 different areas; average



Treatment threshold:  $\geq 10$  larvae/sweep (armyworms + alfalfa caterpillars)

## Check for natural enemy activity: parasitoid wasps



>1 wasp larvae per 10 summer worms, good biocontrol of pests



## Summer worm control practices:

➤ Early cutting

➤ Apply pesticides

Soft, selective insecticides:

- Prevathon® & Vantacor™ insect control (chlorantraniliprole)
- Xentari®, Agree®, Bt's (*B. thuringiensis*)
- Intrepid® (methoxyfenozide)

Vantacor™ highly concentrated formulation of Prevathon®. Registration expected for alfalfa this year.



## Use of drones for summer worm control in alfalfa



six-rotor UAV sprayer (PV35X)

Drones provide additional tool for managing pests:

- Highly efficient
- Precise
- Have a quick response time
- Can cover vast areas or local tough to reach places
- Good for spot treatments

Large drones are currently being used to apply pesticides to fields worldwide



### 3 Alfalfa Fields, Sacramento Valley, 2020-21

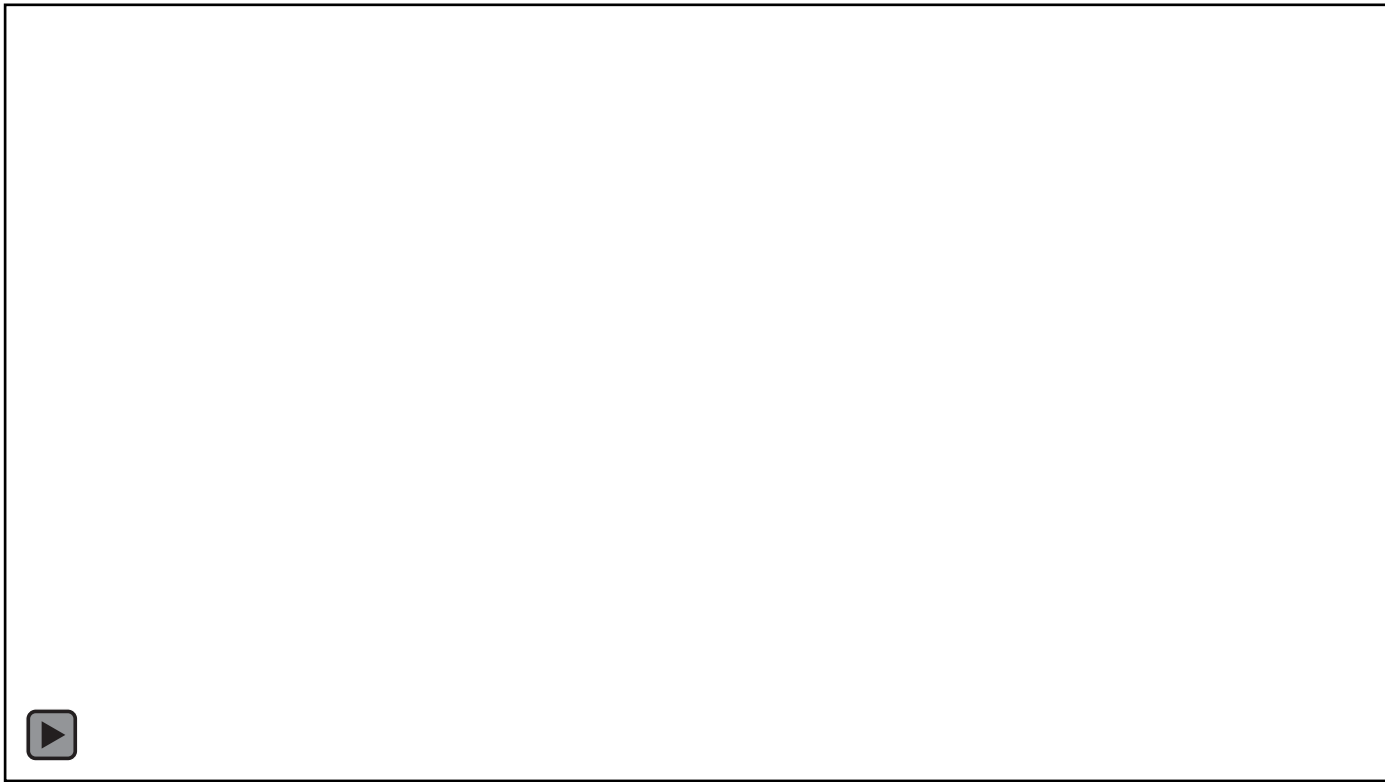
Field A. Drone vs. Airplane: Prevathon® at 10 gpa + untreated control

Field B. Drone vs. Airplane: Prevathon® at 5 gpa + untreated control

Field C. Drone at 2, 5 gpa (Vantacor™) vs. ground rig at 10 gpa (Prevathon®) + untreated control

Note: 2 gpa is the minimum labeled rate for aerial application of Vantacor™.





Spray cards, water sensitive paper



Insecticide residue analysis

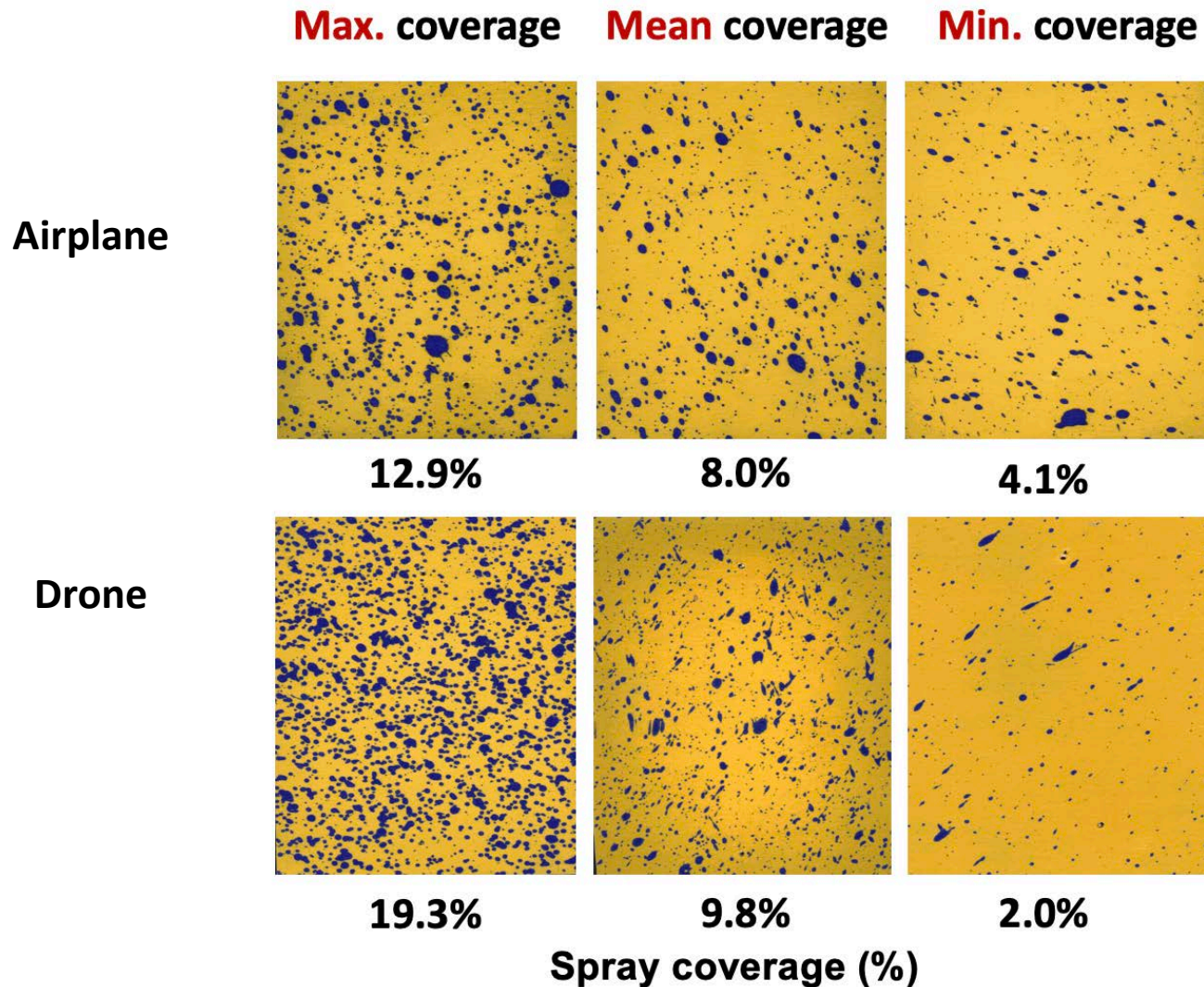


Summer worm counts



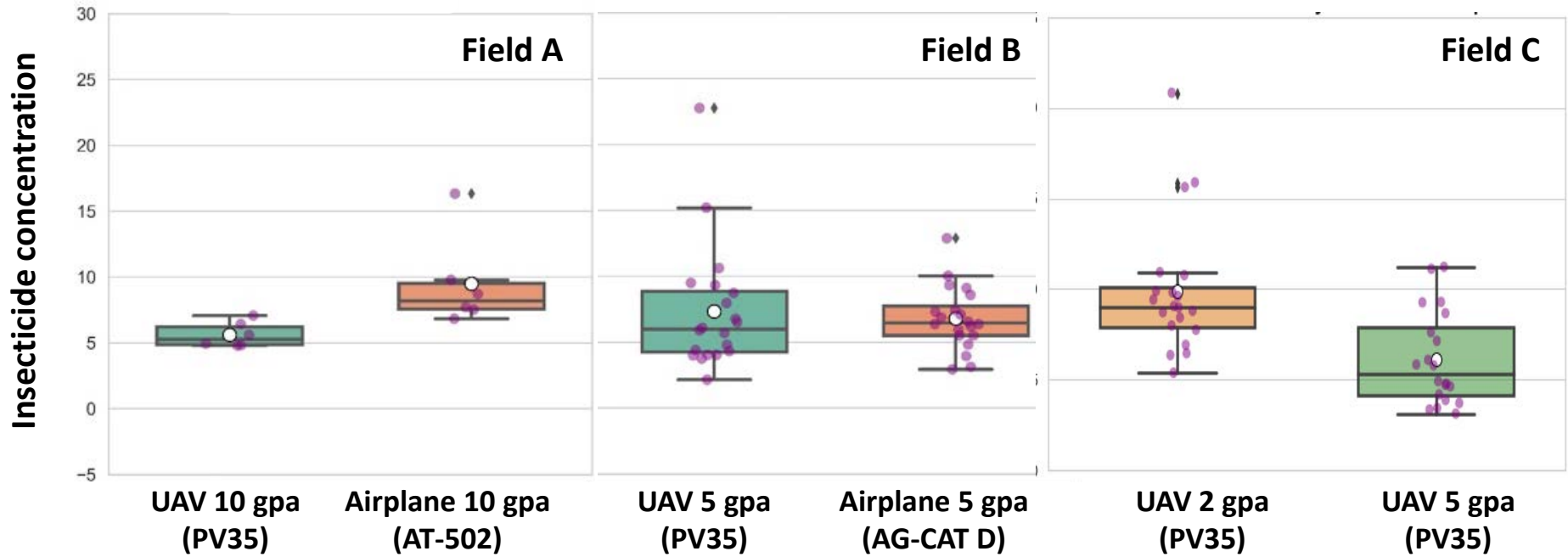
## Results:

**Spray coverage:** Patterns similar for airplane vs drone (Water Sensitive Paper), though a bit more variability with drone applications.



# Insecticide residue concentrations on plants, Prevathon® & Vantacor™

Similar for drone (UAV) and airplane application methods at 2, 5, and 10 gpa.

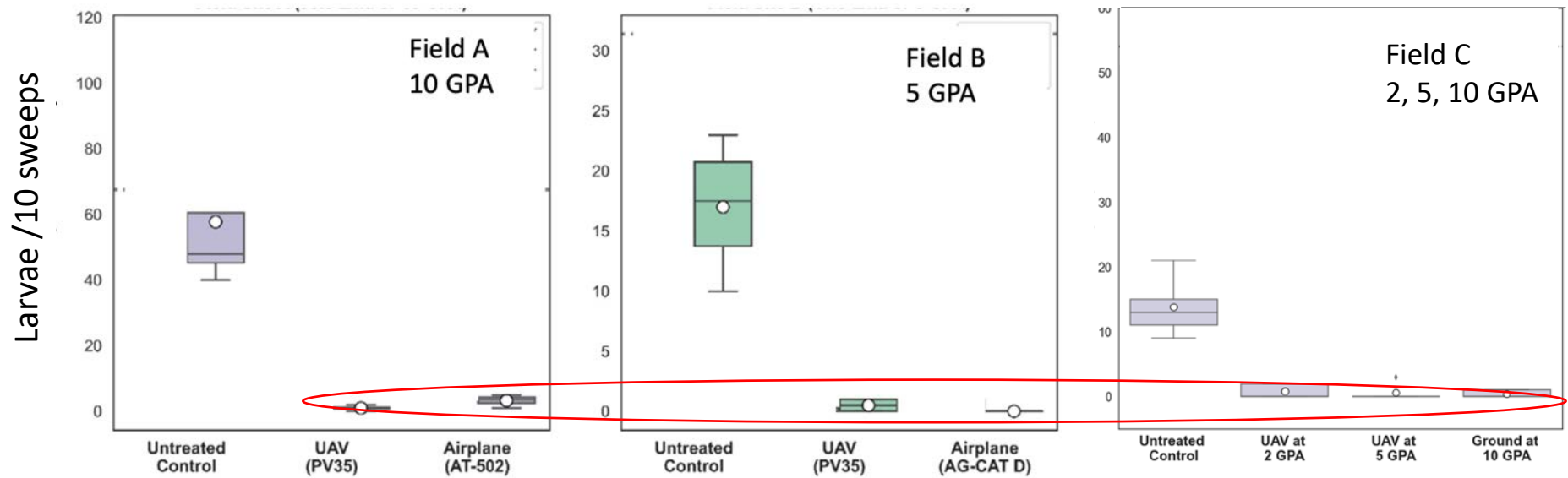




# Summer worm control, Prevathon® & Vantacor™

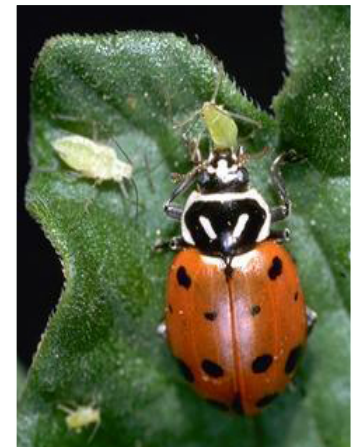
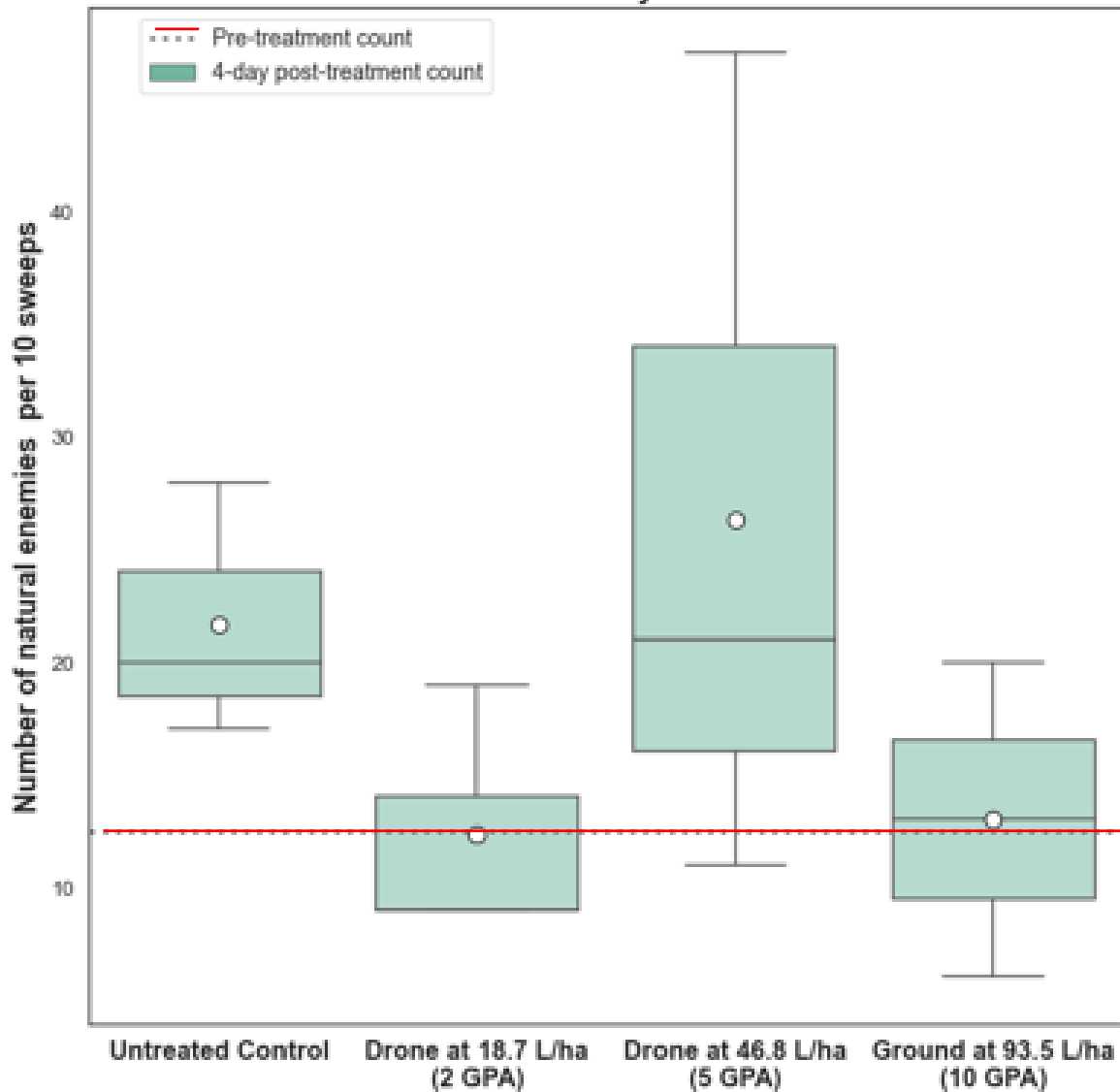
Number armyworms and alfalfa caterpillars/3 fields, Sacramento Valley

Drones gave excellent summer worm control at 2, 5, and 10 gpa, equivalent to airplane and ground rig application methods.



# Prevathon® & Vantacor™ soft on natural enemies:

No impact to predators and parasitoids compared to untreated control plots



## Drones: Viable tool for pesticide applications in alfalfa

Prevathon at 5, 10 gpa and ultra low volume application Vantacor™ 2 gpa: gave excellent summer worm control in alfalfa hay fields.





## Future of drone technology for pest control in agriculture



- California has a specific UAV (unmanned aerial vehicle) ag pilot license category; pilot not required to have a commercial pilot certificate, only UAV certificate.
- 55-lbs weight limit (FAA regulations) for most small UAV's.
- Some drone companies have certification for handling >55-lbs in the U.S., paving way for drone technology on a larger scale in crop production.
- Industry-wide UAV Task Force being formed to coordinate the development of labels and standards.

# Contributors and Acknowledgements

## Collaborators

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**Russ Stocker**– Ag. pilot
- Yolo Co. alfalfa growers
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