Just Enough: Ground Speed and Spray Coverage for Efficient Orchard Spraying

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PROJECT SUMMARY

Objectives:

- Evaluate airblast spray deposition in mature tree canopies to determine sprayer ground speed and nozzle placement needed to provide as uniform coverage at different times of the day and year.
- Measure off-target deposition in and outside the orchard following spraying with a range of different spray setups.
- Build data set to use in presentations and publications on spray application in almonds.

Background and Discussion:

This year, the collaboration of UC Davis, UC Cooperative Extension, and CURES seek to gather basic information related to conventional airblast sprayer application that doesn't currently exist for the new almond orchard systems – high density, low pruning – in the arid climate of the Central Valley of California.

This project builds on the collaborative network established in previous 4 years work supported by the Almond Board. Ken Giles (UCD) and Franz Niederholzer (UCCE) are interested in the efficacy of new and existing spray technologies for tree crops, both for crop deposition efficacy and reducing off-site movement.

James Markle (CURES) is interested in finding techniques applicators can implement with current equipment to improve precision. CURES is involved with helping growers meet more stringent surface water quality standards.

To date, field studies in a mature, cropping almond orchard in early June, using a PTO sprayer with a 36" fan documented a 20x reduction in spray deposition in the tree tops (20' off the ground) compared with low in the canopy (10' off the orchard floor) at slow (recommended) ground speed of 1.7 MPH. This difference was increased by another 10x when the tractor/ sprayer ground speed was doubled. Additionally, tractor speed had no influence on spray coverage at 10' off the orchard floor. These data are not novel, but reinforce existing information. In addition, spray coverage was not uniform from tree to tree in the upper canopy.

The same sprayer was used in the same orchard at different times of the day in mid-June to test if spray coverage was influenced by differences in temperature and relative humidity (RH). It was. Upper canopy (20' off the ground) spray deposition was halved when spraying at 88^{o}F (23% RH) compared to 80^{o}F (35% RH), due to droplet evaporation as the droplets traveled from the nozzle to the tree tops. Temperature/RH changes did not change deposition in the lower (10' off the ground) canopy under the same conditions. This work will continue at bloom 2015.

Our results, so far, show that spray coverage using a conventional airblast sprayer is:

- Non-uniform, with much more spray deposition at 10' in the canopy compared to 20', even at slow sprayer speeds (1.7 MPH). Driving faster further reduced coverage in the tree tops;
- Irregular from tree to tree at the same height in the canopy;
- Reduced when spraying at seasonal temperatures (90^{o}F; 25% RH) compared to just lightly cooler and slightly higher humidity (80^{o}F; 35% RH).

Project Cooperators and Personnel: Stan Cutter, Nickels Soil Lab

For More Details, Visit

- Poster location 23, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2015) at Almonds.com/ResearchDatabase
- 2013-2014 Annual Reports CD (13-WATER3-Giles-Markle); or on the web (after January 2015) at Almonds.com/ResearchDatabase
- Related project: 14-ENTO11-Siegel/Walse