



Orchard Sprayer Trials: spray drift & coverage

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Spray trials were conducted to assess drift and coverage of standard and new sprayer technologies. The trials identified which sprayer types and calibration options are most effective in achieving uniform coverage and drift reduction. Sprayers used in this study included:

- A conventional 500-gallon PTO-driven air-blast sprayer (Air-O-Fan, Reedley, CA) with hydraulic cone nozzles operating at 120 PSI
- A modified version of the same air-blast sprayer using plywood doughnuts of one-half and two-thirds area of the air intake
- An airblast sprayer with air-induction nozzles (Teejet flatfan AI)
- Proptec tower sprayer, (Blueline, Moxee, WA)
- Hardi Arrow tower sprayer, (Hardi, Fresno, CA)

200 GPA was used for dilute (dormant season) spray trials, and 100 GPA was used for concentrate (post-bloom) spray trials. The sprayers were assessed for their drift potential and spray coverage in Mid-Columbia orchards by measuring spray deposition on trees up to 8 rows (128 feet) away from the sprayer, and capturing spray above the trees and up to 162.5 feet away.

Trial summaries for each sprayer type are included below. It should be noted that tree coverage and drift potential are affected by sprayer design, including fan type and size, and the air speeds that they produce, and the weather conditions when you spray, particularly wind speed, temperature and humidity. Any one of these can impact the efficiency of your sprays, and it is essential to follow chemical labels and sprayer guidelines.



Airblast sprayer fitted with two-thirds area plywood donut



Plywood donuts of one-half (front) and two-thirds (rear) the area of fan intake.

Airblast Sprayer: Spray drift was high because of the small, light-weight drops produced. The low profile, radial airflow pattern and largely unidirectional airflow resulted in variable spray coverage throughout the canopy, especially with lower water volumes per acre.

Airblast sprayer with doughnuts: Doughnuts enable spray output to be lowered to match the different growth stages of the canopy while maintaining the same tractor speed. The donuts reduced the airspeed output of the sprayer by up to 40%, which resulted in larger spray drops and lower drift.

Air-induction nozzles: Air-induction nozzles reduced drift because they release larger drops. Spray deposition rate was, however, not as high as with conventional nozzles.

Tower sprayers: Tower sprayer nozzles spray horizontally, and they have lower drift potential, with improved spray coverage. Comparisons of different tower sprayers are difficult because they operate using different principles: the Proptec sprayer produces uniformly sized drops in a narrow stream, from nozzles with high air speeds; the Hardi sprayer delivers a wide drop size range in a low speed, but high volume air flow.

Proptec tower sprayer: During the dormant season, the Proptec tower sprayer had significantly lower drift potential than the airblast sprayer. In spring/summer sprays, the coverage was slightly better than the Hardi sprayer, and any drift that occurred fell away rapidly with distance from the sprayer.

The Hardi tower sprayer: The Hardi provided uniform coverage also with low drift, but the small amounts of drift that were measured, traveled further than the Proptec.

Summary: Conventional airblast sprayers are visibly inefficient, releasing a large cloud of pesticide drops subject to extensive air drift. In these trials, the conventional airblast sprayer had good coverage but higher drift than the other sprayers that were tested.

The Proptec and Hardi tower sprayers and the modified air-blast sprayer using air-induction nozzles and low cost plywood donuts all resulted in drift reduction. Although these alternatives resulted in reduced drift, they also affected spray coverage. Further studies designed to assess efficacy of pest control for these alternatives are currently being conducted at the OSU-MCAREC. When considering purchase of a new sprayer, factors such as convenience and ease of calibration and productivity (acres/day) should also be taken into consideration.

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Proptec tower sprayer



Hardi tower sprayer