Spray coverage and drift in vineyard applications in Australia

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Introduction

A University of Queensland research project titled *A generic approach to improving spray coverage* has been established to help Australian vineyards maximise spray coverage while reducing environmental risks associated with using agricultural plant-protection products. Much of the work is being carried out at Treasury Wine Estates’ vineyards at Lake Cullulleraine in North-western Victoria and Langhorne Creek in South Australia. A mass-balance approach has been adopted to quantify the amount of applied product that is retained as coverage on the canopy (upper/lower leaves and inner/outer canopy), the amount that is lost to the ground and the amount that is lost to drift, including the fraction that deposits on downwind flat surfaces and that which is carried away as airborne flux.

Field Research

- Initially, three sprayers were evaluated: a typical non-targeted airblast sprayer (Figure 1) and two targeted sprayers – a twin row multihead fan sprayer (Figure 2) and a pneumatic-electrostatic sprayer (Figure 3).
- A key aim of the research was to understand how much spray was lost to drift (ground and air) during a typical spray application. This is important information as spray drift can remain airborne and travel long distances with significant potentially consequences to other crops and people.

Results

- In airborne drift testing, the airblast sprayer generated drift up to a height of 15 meters in the air (Figure 4). The canopy was just 2.5 metres high resulting in significant off-target spray drift and wasted chemical. The twin-row multihead fan sprayer and electrostatic sprayer also overshot the top of the canopy but by far lesser amounts than the airblast sprayer.
- Figure 5 shows the amount of agrochemical deposited on leaf surfaces in the upper and lower half of the canopy. The airblast sprayer places significantly more agrochemical onto the lower canopy, compared to other sprayers tested, as it sprays mostly from below. While the airblast has less deposition onto the upper canopy, it produced the most off-target spray drift as only a fraction of the spray was intercepted by the canopy (Figures 4 & 5). The design of the electrostatic and multihead fan sprayer resulted in much more even spray coverage on the upper and lower canopy (Figure 5).
- These results demonstrate how targeted spray applications increase deposition rates and achieve higher dosing of chemical on the canopy.

Figure 1: Airblast sprayer

Figure 2: Interlink Multi – a twin-row multi-head fan sprayer which targets the canopy of each row with three fans and an array of nozzles.

Figure 3: An ESS electrostatic sprayers produce positively charged, ultra-fine droplets emitted from air outlets mounted to a boom to target spray into the canopy.

Figure 4: Off-target spray deposit collected in the air for the three sprayer types.

Figure 5: Agrochemical deposition on vine leaves for the three sprayer types.

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