Agrichemical spray drift: why it's a problem and what we can do about it

Rory Roten, Lincoln Agritech, Ltd.

When it comes to the application of pesticides, it is imperative that we make our best efforts so that we get the chemicals where they need to go, but also to do so in a way that is responsible and respectable.

Few people are willing to admit that they have a spray drift problem, but no one wants to be accused of damaging nearby crops and potentially affecting someone else's livelihood. For the past six year, Lincoln Agritech's Precision Ag. group has been researching spray drift solutions under MBIE grant, "Protecting NZ's Environment from Pesticide Exposure" which is coming to a close and it is the purpose of this article to highlight some key findings regarding drift reduction technologies (DRTs) and how they could be a benefit for New Zealand farmers.

Firstly, to understand the solution, the problem needs to be understood: as a whole, spray drift is predominately a function of how coarse a given spray is as well as your local meteorological conditions such as wind speed and direction, humidity and temperature. The coarseness of the spray can easily be controlled by using the correct nozzles for a given application but it also essential that the sprayer is calibrated for maximum efficacy of the sprayer and the chemicals to which you are applying. Examples of key points regarding minimizing spray drift from conventional booms/nozzles are 1) operate at an appropriate pressure that will promote coverage while minimising fine droplets (small nozzle orifice and high pressures promote fine, driftable particles); 2) inspect your nozzles frequently: depending on the corrosiveness of your sprays, nozzles can wear out surprising fast so flow rates and spray patterns should be examined frequently; and 3) be sure to read your labels for recommended spray instruction.

Just this past year there were 69 complaints regarding spray drift received between Waikato, Marlborough and Canterbury (1/3 of New Zealand by land area). Many options are available to mitigate spray drift which can be quite inexpensive or very costly, hence the reason due diligence is necessary to protect the chosen investment and to be sure that the equipment is adequate for the job's needs. Technologies which

were assessed in this project have included directed solution placement with drop-legs or hoods and droplet enhancers such as atomisers and electrostatics. By using technologies such as these, the ability to use a finer spray is possible due to these technologies' ability to put these droplets where they need to go. This can be rather counterintuitive as fine droplets are typically frowned down upon, however this smaller fraction of a spray's volume which are finer than a human hair, are better at getting to the hard to reach location such as under the leaf and down through the canopy

Our nation's potato crop is worth approximately $500 million; $105 million of this value is from frozen potato exports which is the 4th largest export behind wine, kiwifruit and apples. Do to this value, Potatoes NZ's support, and the need for such work to battle the Tomato Potato Psyllid (TPP), a lot of our attention has been focused towards this crop; however, the principles are relevant for all row crops. We originally published our findings in the NZ Plant Protection Society's journal (NZPP; Volume 66) which was presented here, in NZGower, July 2013. This research compared the use of a conventional boom against three DRTs (drop-legs, electrostatics and an atomiser) for their effect on the movement of droplets through a closed canopy. This concluded that any DRT had better canopy penetration regardless of the application volume which ranged from 160 to 400 litres/hectare. Then, most recently published in volume 68 of NZPP, the dose of active ingredient which was deposited on the leaves was examined and displayed that we had relatively equivalent deposition regardless of what sprayer type was used; however the DRT treatments used 13% to 44% less spray to achieve a similar result. Lastly, to tie it all together, a drift study was conducted which assessed selected treatments mentioned above as well as the popular Amistar potato nozzles illustrated 33% to 58% less drift between 2 and 20 m away from the sprayer. So, it is fair to say that with these technologies and technologies like these, better leaf coverage and canopy penetration is possible with less spray volume and little to no drift.

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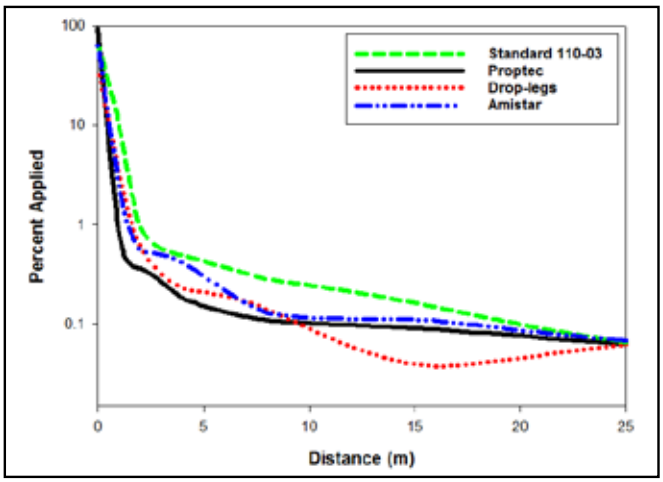

Moving away from potatoes (but still applicable) spray hoods were examined for their retardation of drift. Spray hoods are not a new technology, however with today's GPS guided systems they have started gaining popularity. For example Micron Group's Varidome hoods which our project examined and published (NZPP, Volume 67) reduced spray drift 95% to 99% compared to a standard 110-03 nozzles on a conventional boom. Now this work was done using low drift nozzles with and without the spray hoods and saw little difference. In fact the low drift nozzles alone still reduced downwind deposition by 84% to 98%. However, if your cropping system allows for it, the use of hoods can be coupled with an over row boom so that two solutions can be sprayed simultaneously as well as spray chemicals that would hurt the crop if not controlled. For example, work in the UK observed successful weed control in drilled oil seed rape and sugar beets with no injury to the crop. This also provides the ability to rotate your herbicide chemistries and use various non-selective chemicals which will avoid potential resistance issues such as glyphosate resistant ryegrass.

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For more information on this or other spray application technology research at Lincoln Agritech Ltd., contact Rory Roten at 03-325-3700.