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Attn: Enquiries – Dr Chris Parker
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RE: Draft proposal for spray drift risk assessment – invitation for public comment

Dear Dr Parker

Thank you for the opportunity to comment on the proposed methods for spray drift assessment.

My background in spraying and spray drift management includes one year as a Chemical Standards Office with the Victorian Chemical Standards Branch followed by 16 years as a Research Scientist in plant protection with the Victorian DPI, focussing on optimising spray application and pesticide residues, and including conducting drift trials for the wine industry. Since 2006 I have been an independent consultant frequently providing expert reports for insurers and solicitors on crop loss (most commonly associated with spray drift). I also configure and calibrate sprayers, and am involved in development and presentation of grower training related to chemical use and spraying.

My concerns about current processes for drift risk assessment and how that manifests on label directions for use was very influenced in 2016 when I was cross examined on matters related to spray drift. The case was in the Supreme Court and related to drift of a herbicide cocktail (2,4-D, metsulfuron and glyphosate) onto a vineyard that caused extreme damage.

1. Methodology used to determine regulatory acceptable levels (RALs)

The RAL for vegetation relates to habitat vegetation not commercial crop damage. The RAL for trade in the model relates to MRLs. The RAL seems to be fixed value for a particular active ingredient. It does not vary according to the downwind crop.

Presumably the RAL for trade gives consideration to ensuring that concentrations of residue in a downwind crop are below export MRLS or (I hope) below the Limit of Reporting of analytical laboratories, for example 0.01 ppm.

2,4-D causes damage symptoms in grapevines at concentrations lower than the Limit of Reporting.

The proposed label wording makes it clear that you must not cause damage to downwind crops, but provides no guidance to the appropriate buffer to protect downwind crops.

DO NOT cause contamination of plant or livestock commodities outside the application site from spray drift.

When assertions about loss of income due to drift are being disputed in court, the debate focusses on whether an active ingredient was causal to the alleged damage to a downwind crop. Questions are asked: what concentration and volume of active would have to be deposited to cause the observed damage? What role would the addition of adjuvants have? What significance does growth stage of the downwind crop have?

Lack of RAL values for downwind commercial crops creates an impression that APVMA the risk of damage to those crops is low and not a serious concern. In reality the lack of RALs is likely to be because there are so many variables and it becomes too complex to model.

Nonetheless, RALs need to give consideration to the complexity of protecting downwind crops.

2. Standard scenarios and deposition curves that define realistic worst case situations and are used to generate on-label spray drift buffers

The standard scenarios do not reflect the realistic worst case scenarios. They are based on data points collected in a limited set of trials that measure drift in conditions within 3 and 20 km/hr.

Worst case scenarios are when wind speeds suddenly and unpredictably change in direction and speed during a spraying event, and cause unintended drift. Wind in any particular day can gust.

In 2016 I was asked in brief from a solicitor brief to model the likely deposition of 2,4-D. to address the question I referred to and extrapolated from the APVMA standard curves for boom spraying. Under subsequent cross examination in court I was challenged on why I had not bothered to model the concentrations of tank mix that drifted to and across the breadth of the downwind crop. The relevance of the APVMA standard curves to the case was disputed because the wind speeds used in the models did not reflect the conditions on the day of spraying: while average wind speed had been less than 20 km/hr there had been sporadic gusts of much faster winds with associated drift risk that could not be modelled.

It may seem common sense that the wind gusting created a worse drift risk than the standard curves predict. However, in a court proceeding, if data can be shown to be not directly relevant it can be deemed inadmissible to the debate.

If the APVMA hope that the standard curves will be of assistance to regulate spraying and drift then the curves must reflect actual worst case situations.

3. Spray drift data guidelines to support the generation of custom deposition curves

The data used to generate the curves must encompass a broader range of conditions than are proposed in the trial protocols. At this stage it remains difficult to prosecute or defend alleged

drift. Data is needed that addresses the questions raised when drift is being disputed / prosecuted. Data needs to be generated that shows:

- drift under extreme weather conditions, or allowing extrapolations of the model to simulate extreme conditions, for purposes of resolving disputes.
    - Wind speeds greater than 20 km/hr
    - Air temperatures greater than 25 degrees Celsius (25 is a rare max temperature in Australian summers)
    - Low relative humidity
- drift of different formulations and tank mixtures, in particular including adjuvants/oils.
- relevance to commercial practice albeit may have been designed without observing the ISO protocols for drift data.
- the effects of machinery configurations including ducted air, multiple fan sprayers, recirculating sprayers with a shroud
- sprayer technology that reflects the most advances in sprayers
    - Recirculating sprayers
    - Sensors turning nozzles on and off.
    - Varying the spray quality at the top and bottom of a vertical boom to reduce drift risk at the top but maximise efficiency of coverage in low canopy.
- drift at greater heights than the minimum heights proposed.
- the benefits to drift reduction of observing any of the actions included in the UK LERAP system. In the UK, spray operators can reduce downwind buffer zones by adopting practices that minimise drift risk. If similar data could be collected that was relevant to Australian farms, crop types, sprayers and climatic conditions, and the value of the better practices or technologies quantified, then adoption of those practices would increase.

The Australian wine industry generated some drift data in 2004 in a vineyard trial by Department of Primary Industries in Mildura, Victoria. The trial design was supported by the University of Qld Centre for Pesticide Application and Safety. Drift from three sprayer types and eight different sprayer settings were collected on a 12 metre tower. A range of nozzle types were used and configuration of the sprayers adjusted to see the effects that would have on airborne drift at different heights, and on fall out on the ground. A mass balance of the deposits collected on the ground, canopy, and as airborne drift sprayer relative to sprayer output showed that sprayer set up was critical to drift risk associated with each machine. Significant drift was deposited on collectors 10 to 12 metres above the ground, indicating that the drift probably went much higher than that.

The DPI trials represented the most useful data set available at that time to the Australian wine industry. But the trials were not designed to be compliant with ISO standards for collection of drift data and so cannot be considered as part of developing custom deposition curves.

More recent vineyard drift data has been collected by University of Qld as part of DRT trials. Drift was compared from an airblast sprayer and electrostatic sprayer. While that data can presumable be used to develop custom deposition curves, the equipment used in the trials does not reflect the sprayers used on commercial corporate winegrape vineyards (although electrostatic sprayers are gaining popularity in table grape vineyards).

4. On label spray drift instructions

The current wording on labels regarding herbicide use near sensitive crops is not specific.

Despite farmers' good intentions and vast experience, every season some spraying causes drift that damages downwind crops.

Use of volatile herbicides is banned in some areas for some periods of the year to minimise the risk to herbicide damage to horticultural crops. Certainly in Victoria the Agricultural Chemical Control Areas (ACCA) do help to prevent losses to sensitive crops by restricting use of ester formulations of 2,4-D and some other volatile actives. Yet every season there are new complaints about damage by drift of 2,4-D amine. The label wording on amine and other herbicides is not clear enough to caution spray operators that 'Do not … apply near sensitive crops' means sensitive crops within a wide radius around the sprayed area.

In a legal dispute around use of amines or other herbicides that are not restricted under the ACCAs, the fact that there is not specific buffer on a label to prevent their use near a vineyard can be argued as indicating that the likelihood of damage is perceived as low and therefore drift is unlikely to be the cause of any alleged crop damage.

I believe that the same issue would apply to organic crops or aquaculture.

The wording must be reviewed to make a much clearer point about protecting downwind crops.

5. Spray drift risk assessment tool

It was an excellent and progressive step that the APVMA took when it began to review the potential for drift and apply the models to new or reviewed pesticide registrations. I commend this step. It has been the impetus behind excellent and needed up-skilling or operators, and research and technology.

The spray drift risk assessment tool must continue to be revised and improved, because its relevance will always be limited by the simplicity of the model and the data included in the model.

Data collected according to the ISO protocols does not encompass the range of conditions that are experienced during spraying in Australia; that is one distinct limitation.

I am asked by solicitors whether it is my opinion that drift has occurred and whether the concentrations drifting from the alleged source paddock would have been high enough to cause the observed damage. The risk assessment tool does not allow for enough variables to be manipulated to answer those questions to the satisfaction of an aggressive barrister.

The consequence of not being able to answer the questions adequately is that most complaints about drift are quashed. State governments seem to shy away from prosecuting drift incidents, I presume because they are unlikely to win a case.

The modelling is to improve chemical use and protect people, crops and the environment, but my impression has been that there are holes that leave too many questions unanswered and an aggressive barrister can target those, to discredit the modelling.

6. Spray drift management tool that allows chemical users to refine these realistic worst-case risk assessments based on their own circumstances and recalculate buffer zone distances accordingly

It has been excellent to see the detail within the drift management tool. Thank you.

I am unclear whether, in a legal dispute, it would be considered acceptable that an operator recalculated buffer zone distances according to their own perceptions of risk.

All farmers think that their own crop is at risk while their neighbour's crop poses a risk. If the conditions seem suitable for spraying at the outset, all farmers will consider that they can reduce the buffer zone distance.

- How does a farmer understand the sensitivity of habitat in a windbreak at the end of their paddock? They see the area as a source of nuisance weed seeds/kangaroos
- How does a farmer know the destination market and therefore trade implications of residues in their neighbours crop?
- How does a farmer know in advance that an unusual turbulent wind gust, 90 minutes after they start spraying, is going to send their spray cloud up and over the windbreak, rendering the barrier useless?

The option for recalculating a buffer zone is limited to defining whether there is a barrier, and the porosity of the barrier.

- Clearly an enormous volume of research has gone into the development of the data set on barriers, and I applaud that data and the resultant modelling.
- The tool can hopefully soon include options to reduce buffers through adoption of other DRTs.
    - There is no option to select or vary spray quality. The tool merely asks for a minimum droplet size. When I had a selection of hollow and solid cone nozzles tested in the wind tunnel at Gatton in 2004, they all produced some fine droplets. Therefore the answer for every cone nozzle used in horticulture is probably that the minimum droplet is fine. Yet the volume in the driftable fraction from those nozzles varied widely. As data becomes available the option to select specific nozzles should be included. If this data is not available from nozzle manufacturers it can be collated by the wind tunnel facility at Gatton.
    - Please add the option to select whether you are using a shrouded or recirculating sprayer.
    - There is no option for include more than one nozzle type at once on an orchard or vineyard sprayer. For example nozzles on a high set fan, or high on a vertical boom, might be courser than nozzles on a low set fan on the same sprayer.
    - There is no option for describing the air volume, air speed or ducting of air. The original German deposition curves were developed from data collected from spraying with, or without, air. There are many types of air assisted sprayer, with varying associated drift risk. The need to consider air will become even more relevant when multi-fan head orchard/vineyard sprayers start varying air speed/volume from either side of the sprayer in response to sensors measuring

the direction and speed of the prevailing cross wind: while that technology is not yet mounted on a commercial sprayer, the Spray Drift Management Tool needs to consider that sprayers will soon be using more advanced technologies that have potential for huge impact on drift risk.

- The relevance to commercial practice of the canopies included in the model is unclear.
    - Is an almond orchard at flowering considered non-foliated or foliated?
    - Is a vineyard canopy in October with 20 cm shoot growth non-foliated or foliated?
    - Is a citrus orchard planted with 2 year old trees, each with a foliage diameter of 1.5 metres but at 4 metre tree spacing non-foliated or foliated?
    - Sprayers are being trialled with mounted sensors that turn nozzles on or off in response to presence or absence, or density of canopy.
    - Air directed up into eg an almond tree canopy produces a very different drift risk than air directed from the top, down into a vineyard canopy. The model does not distinguish between these modes of air delivery.
- Users of the tool will be well informed if they can run more 'what if' scenarios. The current selections allow the user to explore the effects of using a barrier, changing nozzles or selecting a different product. There is no option to explore the required buffer zone if for example:
    - wind gusts reach 50 km/hr, or
    - there is a nil tolerance for drift downwind, or
    - an oil adjuvant is used, or
    - spray volume is increased and a more dilute spray applied.

7. Interim measures prior to an interactive web-based tool being available (stage 2) and legislative requirements to enable off-label spray drift conditions set by the tool to be enforced

A web based tool is a great advance on the excel curves that have been previously available from the APMVA.

An interim tool that allows users to provide feedback to the APVMA about its relevance and ease of use will certainly help to make the tool better informed, relevant and user friendly.

To make the tool useable in the short and long term, consider the audience who will hopefully use it.

- Farmers are busy, generally don't like computers and resist regulation.
- If a farmer has purchased a chemical product, they will use it. If they have used it before, they will use it again without considering that there may be a different sensitive downwind crop. Farmers will not run the Tool ad hoc before they spray a product.

- The simplest way to enforce a QA type process is to build it into their auditable QA program, as a requirement by their marketing authority or wholesaler. Many of the requirements for compliance with an audit process are outsourced to consultants/pest scouts etc. Using the tool to identify drift risk associated with chemical use may similarly be most efficiently done by a consultant or administrator rather than a farmer. The simplest way to achieve compliance may be for industry bodies to facilitate/support farmers to start each season with their property map, identifying downwind sensitive areas, and running example chemicals and example scenarios through the model to determine that a selection of chemicals can be used without requiring buffers that exceed the property boundaries.

Requirements associated with Off-label use will be under permit (7.4.1. SDMT generic conditions). Permits are usually requested by industry bodies. Cooperation from the representative industry body to communicate the constraints on use (buffers) of chemical use under permit is a reasonable was to ensure compliance.

Thank you for inviting public comment.

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