30 March 2018

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Attn: Enquiries – Dr Chris Parker

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RE: APVMA's Proposed Approach To Spray Drift Management

Dear Dr Parker

We appreciate the opportunity to provide comment on the APVMA's proposed approach to spray drift management.

The apple and pear industry are seeking these fundamental issues to be resolved before any implementation plan:

1. Actual RALs are calculated across key apple and pear products are shared so that the actual subsequent buffer zones for various sensitive areas is known.
2. Buffer zones must be based on science relevant to current Australian orchard conditions and represent real risks to sensitive areas.
3. More known Drift Reduction Technologies to be included for vertical sprayers prior to the implementation.
4. Assurances that industries will get assistance in developing future R&D to support the generation of custom deposition curves.

Apple & Pear Australia Limited (APAL) is the national peak industry body representing the interests of apple and pear growers. APAL is a registered not-for-profit organisation that supports and provides services to Australia's apple and pear growers towards the goal of a growing, profitable and sustainable apple and pear industry.

The apple and pear industry are concerned with the implications of this proposed approach to managing spray drift for vertical sprayers. This approach lacks a sound basis of adequate relevant supporting data which will likely impose higher buffer zones well beyond what is actually required.

It will also have an adverse effect where grower businesses will be further pushed to not spray whereby effectively reducing land areas in which crops can be grown. The effect will impose an unreasonable burden on industry resources particularly to seek drift reduction technologies adding significant complexity on labels for chemical users.

APAL do not support this management approach because in its current form does not adequately provide assurances that more "*reasonable buffer zones*" will in fact be set, "*labels will be clearer*" or "*more flexible*." APAL believe in all instances this proposal is more likely to deliver the opposite of what is intended.

While this consultation is a good step we believe further initiatives in engagement and further research and development by the APVMA towards this is critical. If this is not done we will see the roll-out of a scheme that is imposing excessive buffer zones based on assumptions on industry which are wrong but could have had in the first place mitigated the impact by at least introducing Drift Reduction Technologies already well known.

As a summary the APAL's position on this matter are:

1) APAL acknowledges the need to manage agrichemical use to minimise the risk of harm from spray drift (and other off target losses).
2) APAL accepts that the use of buffer zones is a sensible and effective way of achieving drift risk protection.
3) APAL supports the APVMA proposal to allow worst case buffer zones to be reduced under certain conditions.
However:
4) The methods used to set the worst case buffer zones need to be scientifically valid and reflect real risks of off target chemical losses at potentially damaging levels. The current base assumptions to set maximum buffer zone requirements for tree crops are overly simplistic and appear to be overly conservative.
5) The ability to modify worst case buffer zones in light of a local risk assessment is important. However, the APVMA proposed system/tools for buffer zone reductions *for fruit crops* are too limited and will be difficult to effectively implement. Further work is recommended to develop a workable and effective system for buffer zone adjustment.

- APAL proposes that a system by which buffer zones could be reduced would ideally be based on a property spray plan similar to the Local Environmental Risk Assessment for Pesticides (LERAP) system used in the UK for protection of water ways (http://www.hse.gov.uk/pesticides/topics/using-pesticides/spray-drift/leraps/local-environment-risk-assessment-for-pesticides-le.htm).
- APAL and other industry bodies can play a significant role in helping growers achieve safe and effective use of agrichemicals.

The currently proposed approach to agrichemical product label changes to incorporate modified buffer zones has the real potential to complicate labels rather than achieve the goal of "providing clearer label instructions".

The apple and pear industry places spray drift as high importance and are concerned about the implications of the APVMA proposal. The following pages detail our comments addressing the topics required. APAL look forward to further opportunities to assist in regard to this proposal.

Kind Regards

Phil Turnbull

CEO

Detailed comments on the APVMA proposal

1. **Methodology used to determine regulatory acceptable levels (RAL's)**

Generally speaking the methods to determine RALs are valid, however, there is a major lack of supporting information to describe the likely effect on likely buffer zones for sensitive areas that specific apple and pear agri-chemical products will have. Therefore, it is unreasonable for the APVMA to expect any informed comment as APAL have not seen if the subsequent buffer zones are reasonable. Prior to implementation APAL require that RALs are calculated across a number of key agrichemical products used today where the subsequent buffer zones for various sensitive areas being protected are shown.

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

It is unlikely the Basic Drift Values determined for vertical sprayers in Germany in the 1990s are at all relevant to Australian conditions in 2018. The Australian apple and pear industry particularly in the past 10 years like the rest of the world has moved on from the 1990s towards much higher density production systems. The planting density of these systems allows little room for any variability or spaces between canopies, are often protected by overhead netting, and sprayed using sprayers which are recognised under certain set ups as known Drift Reduction Technologies (DRTs).

The standard scenarios and deposition curves used to generate the buffer zones on labels do not reflect the range of conditions under which sprays are applied in Australian apple and pears.

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

The guidelines to support generation of custom deposition curves are prescriptive and appear to preclude any data from small trials by industry being used. Most horticultural industries seeking to apply for custom deposition curves for recognition of drift reducing practices will find under these guidelines the level of information and R&D required is far too significant and will be beyond their financial resources.

APAL would value opportunity to discuss collaborating on the collection of data regarding DRTs, to make sure that the trials reflect the machinery and use in the industry.

The current APVMA proposal uses spray droplet size classifications as the key DRT that can be used to decrease required buffer zones. The system proposed allows for potential effects of spray adjuvants and formulations and mixtures on droplet sizes.

Spray droplet sizes produced by nozzles used in boom and aerial spraying is well documented and models that describe downwind deposition profiles from boom and aerial spraying are well developed and have proven useful in the context of the APVMA proposal where all of the spray plume is emitted from above the crop.

However, the downwind deposition models and effects of droplet size on drift risks are not well established for "vertical" sprayers used in tree crops where the spray plume is emitted from within the crop canopy and a significant proportion of the plume can be captured by the target canopy before it could be subject to drift. The reliance on droplet size classes and lack of tree crop drift models in the current APVMA proposal is therefore likely to misrepresent the risks of drift from tree crops.

Table 1: Comments regarding the following documents referred to by APVMA that provide guidance on methods for measuring spray drift:

Reference	Detail in the reference	APAL's Comment
Julius Kühn Institute (JKI), Germany—Guideline for the testing of plant protection equipment 7–1.5: Measuring direct drift when applying liquid plant protection products outdoors.	The air temperature, throughout the entire trial, must not exceed 25 °C.	Conditions during spray application in Australia are often greater than 25°C and trials and the modelling need to reflect these conditions.
	The average wind speed must be between 1-5 m/sec (3.6 - 18 km/hr). The average wind direction must not exceed more than 30 ° in the median vertical plane of the direction of traffic.	If the modelling is not based on data showing drift when if winds exceeded 20 km/hr, then models to simulate drift risk in faster wind will not be based on real data. A broader range of conditions must be included in the trials and modelling.
	Measurement must be up to at least 6 metres on a vertical collector in fruit crops and vines.	Seems ok.
Julius Kühn Institute (JKI), Germany—Guideline for the testing of plant protection equipment 2–2.1 Procedure for the registration of plant protection equipment in the section "drift-reduction" of the register of loss reducing equipment of the descriptive list	Further to requirements of JKI 7-15, three trials are required to support claims for any DRT, each with 30 data points at each measure distance.	This is comprehensive, which is good, but only a chemical company or large research project would do this. Industry can't afford this.
	Nozzles can be tested in a wind tunnel using ISO 22856:2008	We need more nozzle testing which is good.
	The extent of drift reduction is classed (50%, 75%, 90%)	This seems ok. There are so many variables/influences, so it seems appropriate to only promise general categories of drift reduction.
US EPA—Generic Verification Protocol for Testing Pesticide Application Spray Drift Reduction Technologies for Row and Field Crops	Comprehensive description of trial design and sampling requirements. Stipulates that raw data must be supplied in all reporting.	The requirements are complex. This is only for contract or university researchers. Industry can't afford trials of this type as they deliver very little back to industry to improve production.

ISO 22866: Equipment for crop protection—Methods for field measurement of spray drift		No comment. The document costs CHF88 (Aus$120) to purchase for review and was not reviewed.
ASAE S561: Procedure for Measuring Drift Deposits from Ground, Orchard, and Aerial Sprayers		No comment. The document costs AU$80 to purchase for review and was not reviewed.
ISO 22369-2: Crop protection equipment—Drift classification of spraying equipment—Part 2: Classification of field crop sprayers by field measurements		No comment. The document costs AU$52 to purchase for review and was not reviewed.

4. **On label spray drift instructions**

Clarity and revision is required regarding proposed wording (section 5.1.1 General instructions) for spray drift instructions:

SPRAY DRIFT RESTRAINTS

DO NOT *cause an unacceptable impact to … outside the application site from spray drift. The advisory buffer zones in the relevant buffer zone table/s below provide guidance but may not be sufficient in all situations. Wherever possible, correctly use application equipment designed to reduce spray drift and apply when the wind direction is away from these sensitive areas.*

- The wording in this label claim is ambiguous.
    - The reference to unacceptable impact suggests that some impact is OK providing that it is not unacceptable. Who decides what is acceptable?
    - The last sentence, "*…Wherever possible, correctly use application equipment designed to reduce spray drift…*" suggests that where that it is not possible, then it's ok to use the equipment incorrectly.
- The proposed text in the table (section 5.1.3) is too wordy and risks losing all meaning.
- The table referred to (section 5.1.3) is complicated yet the data it is based on is an oversimplification of the canopy types and equipment being used. Therefore, the buffer distances are arguably unjustified.

DO NOT *apply unless the wind speed is between 3 and 20 kilometres per hour at the application site during the time of application*

- This is important wording, models don't show the drift effect greater than 20 km/hr
- How exactly are these wind speed requirements to be measured and interpreted? Are these average wind speeds over the spray application period? How are wind gusts interpreted and responded to?

DO NOT *apply if there are surface temperature inversion conditions present at the application site during the time of application*

- This is important wording.

5. Spray drift risk assessment tool

The current APVMA proposal does not appear to adequately recognise the role of wind speed within the accepted range of spraying wind speed conditions on drift risks.

The Local Environmental Risk Assessments for Pesticides (LERAP) is a potential alternative approach that has been adopted in the UK and parts of Europe for protection of waterways from agrichemical contamination.

Under the LERAP system a user develops a property based spray plan that allows for reductions in the worst case label buffer zones by implementing different drift risk reduction tools (droplet sizes, sprayer drift risk profile, chemical application rate). The attraction of the LERAP approach is that it would allow relatively simple agrichemical label based requirements to be interpreted on the basis of local and relevant risk assessments.

The LERAP approach is an established and legally enforceable system that appears to have been effectively implemented in the UK and parts of Europe and is likely to prove more effective than the label complications that APVMA currently proposes.

Chemical application rate adjustment is a DRT; reducing application rate effectively reduces the risk of harmful drift and is an important buffer zone reduction tool in the LERAP system.

The APVMA proposal specifically refers to optical sensing herbicide spot spraying technologies as an effective drift reduction tool where the drift reduction occurs as a result of reduced average application rates.

Application technology in orchards is on the cusp of significant changes - where sprayers will ultimately make more use of canopy sensors to turn off spray output in the absence of the target canopy and where application rates will be adjusted on the basis of canopy density. It will be important that the impact of this type of technology as a DRT can be readily incorporated into the buffer zone adjustment system.

Setting required buffer zones implies that some kind of enforcement system exists by which an agrichemical user could be prosecuted for non-compliance. The current specifications of the buffer zones and exactly how they are measured and interpreted appears to be quite loose and not well written to allow enforcement of compliance. If the primary purpose is to achieve enforceable protection of sensitive areas they do not appear to be well conceived or executed and the basis on which they have been implemented should be reviewed.

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

The new spray drift regulatory framework aims to enable the setting of more reasonable buffer zones. We agree that the current system lacks flexibility and discourages adoption of DRTs. Therefore, the review is appropriate in that respect.

The use of buffer zones to protect sensitive areas from risk of harm from spray drift is a sensible approach and the use of conservative (large) buffer zones offers a real and mostly reliable protection from risk of exposure to harmful levels of drift.

However, buffer zones are a relatively blunt instrument and the imposition of overly conservative buffer zones could significantly restrict practical agrichemical use required for crop protection. These buffer zones will have flow on impacts of less horticultural land areas available in which crops can effectively be grown. It is therefore important that mandated buffer zones can be modified (usually decreased) on the basis of some kind of situational risk assessment.

Regarding page 1 of the SDRAM, the apple industry supports the proposed transparency associated with the online tools being publicly accessible, as it will help industries and operators to understand the rationale behind buffer zones and the impact of using DRTs.

We also foresee problems with the proposed approach:

2.1.1. Advisory buffer zones

> *… are established when …an experienced chemical user can …implement risk management strategies …based on …prior knowledge and experience. …users … may elect to either use the Spray Drift Management Tool or implement experiential risk management strategies to reduce advisory buffer zone distances at their discretion. Users with no or limited experience should be more cautious in reducing advisory buffer zone distances.*

Experience can lead to complacency. Most growers would consider themselves to be experienced chemical users. Most spray operators will consider that they have reason to reduce buffer zones. While reduced buffer zones will be welcomed by spray operators in the apple industry, horticultural crops are also at risk of damage from herbicide spraying on broadacre farms.

The 2017 findings by the Supreme Court in the case of Riverman Orchards versus Hayden, Rodney [1],[2] provide a sobering reminder of how easily a spray operator can underestimate risk associated with spraying conditions, in that case costing $7.5 million in damages. If reducing buffer zones is discretionary and can be based on subjective risk assessment, then how do you regulate operators or resolve disputes?

[1] http://www.sunraysiadaily.com.au/story/4773700/high-price-for-spraying-grower-awarded-more-than-7million/

[2] https://www.lawlibrary.vic.gov.au/judgments/riverman-orchards-pl-acn-087-671-118-trustee-ac-caccaviello-family-trust-v-hayden-rodney

2.1.3. Buffer zones and sensitive areas:

Table 1 under 2.1.3. provides examples of the sensitive areas that require mandatory or advisory buffer zones. It is not clear whether the user can define the nature of the sensitive area for all chemicals or just some. The distinction appears to be that if the downwind area is vegetated then the advisory buffer is used while if an area downwind has bystanders, water or bees then the buffer zone is mandatory.

This ignores risk associated with the proposed use, the chemistry and also vulnerability of the downwind area. For example a windbreak or narrow strip of native vegetation may be considered low risk, but bee hives are routinely placed there without notifying the neighbouring landowners, and on the far side of the vegetation is an organic orchard or an open channel that is drawn on eventually by a farmer stocking a tank or dam with native fish fingerlings.

2. Spray drift risk assessment overview:

> *...The SDRAT is used by the APVMA to conduct a risk assessment of the realistic worst-case scenario for the use of each product. The realistic worst-case is best summarised by considering the following assumptions for different equipment types: ...wind speed is between the lowest acceptable (ie 3 km/hr) and the highest acceptable (ie 20 km/hr), and no surface temperature inversion conditions are present at the time of application.*

There is no consideration in the current standard scenarios/deposition curves of risk associated with varying climatic conditions. Data in the predictive curves is based on wind speeds not exceeding 20 km/hr, which underestimates drift risk in worst case conditions. The modelling needs to show the risk of drift when wind exceeds 20 km/hr and Delta T exceeds 10 because during summer months in the south eastern Australia, Delta T commonly exceeds 10 and wind gusts commonly exceed 20 km/hr.

Spraying a 20 hectare apple orchard at 10 km/hr during the day could take about four hours, during which period the wind will vary in speed and direction and Delta T will also vary. Growers are discouraged from spraying at night, to avoid temperature inversions, but Delta T typically becomes less suitable for spraying during the day. To understand the implications of spraying in unsuitable conditions, growers need much better quality feedback from the models, not just the risk associated with operating within Good Agricultural Practice.

Growers need to base predictions of risk on data that considers the effect of wind gusts because spray drift is most likely to occur during moments when the wind gusts irregularly, in unpredicted directions at speeds exceeding 20 km/hr.

Growers also need to consider the role that humidity can play in drift risk so that they can respond to risks associated with weather conditions then adjust input and interpreting output from the Spray Drift Management Tool.

Adjusting input and interpreting output from the Spray Drift Management Tool

The variables that can be manipulated in SDMT, to generate adjusted buffer zones, are presumably limited to the parameters that were included in the Spray Drift Task Force trials or the trials to generate the German drift values. There are additional variables that can be considered without requiring new data (for example vegetation buffers and trade considerations). Recent advances in spraying practices and technology also make it reasonable to expect that the models would include a broader range of options that affect drift risk.

This proposal does not adequately recognise the role of natural and artificial shelterbelts as DRTs, which must be addressed prior to implementation. The incorporated SDMT example does not take into account overhead netting which is commonplace in the apple and pear industry, but instead relies on vertical windbreak barriers. Determining the optical porosity of the barrier is likely to impose a significant and unreasonable complications for a chemical user.

Sprayer engineering and operational setup can provide effective drift reduction. Notable examples are shrouded sprayers (with or without recapture) for vine and small tree crops and effective use of air assistance (eg air bags on booms or the direction of air assistance from orchard sprayers). Methods to rate and incorporate drift reduction features on sprayers will be important to the effective use of the proposed APVMA buffer zone management system.

Table 2: Options to select in the SDMT version for users to refine their buffer zones, with comments on the implication of the current model and the impact on industry or additional considerations.

Use details in the SDMT	Implication in the model	APAL's Comment
Chemical	The RAL for trade is fixed according to the product	The RAL should not be a fixed figure for the chemical. The RAL for trade needs to be variable according to the crop being sprayed and the critical market MRLs for that crop.

Rate	Altering the application rate results in changes to the output buffer distances.	While the application rate per hectare is important, the concentration applied is also a key factor determining the damage caused by droplets drifting. Spray mix concentration is not considered in the algorithm.
Sprayer (general category not sprayer type or droplet or air delivery system)	Sprayers used in orchards are all in one category: 'vertical'	Sprayers used in orchards reflect a very wide range of delivery systems, atomisation, spray plumes and therefore variable risk of drift. The model ignores this.
Canopy type	Canopy categories are limited to canopies 2 metres and smaller canopies 2 metres and smaller (with sprayer/air turned off) canopies taller than 2 metres (non foliated) canopies taller than 2 metres (fully foliated)	The options regarding canopy do not reflect the range of canopies in orchards. The model needs to consider fully foliated canopies with no gaps (continuous hedge) as a posing a different risk than fully foliated trees planted with gaps between the trees.
Is there a barrier present?	If there is a barrier, the user selects its optical porosity (0.1, 0.3, 0.5, or 0.7). Increasing porosity increases the required buffer zone.	Users will not know how to determine the optical porosity. If the barrier is a vegetation windbreak then the width and height of the windbreak influence the effectiveness of the barrier, as well as the porosity, but these are not considered. Netting that surrounds an orchard block including overhead is a particular situation and not considered in the barrier options.

Is there a natural aquatic system within the label buffer zone?	Options are Yes or No. In the model, shallow water bodies are at higher risk than deeper water bodies.	A 5cm deep aquatic system rates as higher risk than a deeper system. However, from a growers perspective, a 5 cm deep system is likely to be temporary runoff and may not be considered a water body and at risk.
Required	Option to select whether nozzles are being turned on/off by sensors in response to gaps in trees.	Variable rate technology is being considered across horticultural crops to reduce chemical wastage and drift. The model needs to encourage adoption of this technology.
Required	Option to select coarser output nozzles to spray the tops of canopies and finer nozzles to spray the lower canopy to reduce the drift risk from higher release points.	The majority of the Australian apple crop is now sprayed using tower sprayers or sprayers with multiple fan heads angled to direct the spray into the canopy. Using coarser nozzles at the top but finer nozzles at the tree base reduces drift risk significantly without unduly compromising coverage.
Required	Option to identify Organic farming as a downwind vulnerable area	There is no option to select that there are particular vulnerable areas downwind, for example an organic farm, although this would alter the risk associated with some chemicals.
Required	Nature of air delivery in a vertical delivery system, or modifications to reduce drift.	Modifications to sprayers or configuration of the air to focus the spray plume into the canopy reduce drift. These should be encouraged. The current model does not encourage any adapting of delivery to reduce drift other than turning off the air.

Required	Sprayer type should include option to select a vertical sprayer in a shroud or tunnel eg recirculating sprayer.	The model should encourage adoption of these technologies.
Required	Extreme weather conditions. Existing data in the model assumes winds less than 20 km/hr and German drift trials are conducted in temperatures below 25 degrees. The current modelling does not really address high risk scenarios.	Growers cannot anticipate wind gusts and so cannot stop spraying during a wind gust. By the time they are aware of the conditions, it's too late to turn off nozzles. The model needs to provide feedback regarding risk in conditions that are more extreme than 20 km/hr and less than 25 degrees.

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

Each new product label under the proposal refers to a link to a web-based spray drift management tool which gives chemical users the ability to enter information and recalculate buffer zones. Re-directing the user from reading a printed product label to the web is likely to have questionable ramifications on legal enforcement of the buffer zones in which the APVMA have already considered. APAL believe that the web based tool concept is the correct approach but has the effect of increasing the complexity of labels and levels of adoption may be low.

For some chemical users accessing internet can be problematic in many regional areas so enabling this to be an offline resource through an app or computer program would help overcome this. The spray drift management tool online is likely to have the effect of hiding the underlying modelling data in which the outputs are based and will therefore be less transparent than it is currently.