



15 April 2013

Melbourne Water
990 La Trobe St,
Docklands, Melbourne 3008

Environmental Risk Sciences Pty Ltd
6 Wilshire Ave
Carlingford NSW 2118

Phone: +61 2 9614 0297
Fax: +61 2 8215 0657
Email: therese@enrisks.com

www.enrisks.com

Attention: Judy Blackbeard/Rose Crossin

RE: LETTUCE POT TRIAL REPORT – “POT TRIALS TO DETERMINE CONCENTRATIONS AT WHICH THE HERBICIDE DICAMBA CAUSES STRESS IN LETTUCES”

Environmental Risk Sciences Pty Ltd (enRiskS) provides the following comments on the RMIT report entitled “Pot trials to determine concentrations at which the herbicide DICAMBA causes stress in lettuces.”

An extensive study has been undertaken by RMIT to investigate the effects of low levels of dicamba in recycled water on lettuces. This work has been undertaken because, occasionally, low levels of dicamba have been found in recycled water from the Western Treatment Plant in Victoria. Previously, a desktop study was undertaken to develop irrigation guidelines for this herbicide. The desktop review was followed up by pot trials. This work is the second phase of those pot trials undertaken to better quantify the effects of dicamba on the lettuces.

The study looked at a range of endpoints – all of which would be helpful for growers using the recycled water. The normal range of parameters for toxicity studies in plants – root mass and length and shoot mass and length – were measured along with observations of visual changes in the leaves of the plants.

Two types of trials were undertaken – one where the plants were grown from seeds and the recycled water was applied from the time of sowing while the other involved the use of seedlings and recycled water was applied from the time the 4 leaf stage was present. The two series were required because growers in the catchment use both approaches.

The study has clearly identified that at high concentrations of dicamba (405 and 1215 $\mu\text{g/L}$) the lettuces die regardless of the time of the first application of herbicide.

Quite an array of different patterns of effect were seen in the early stages of growth for these plants at the first and second thinning stage for the two different approaches. This may have been because of the effects of the herbicide but they may also have been due to the difficulty in accurately measuring the very small changes in length and mass being examined and analysed or the number of plants in each pot or the higher salinity of the recycled water (although this should have been covered by the controls which were also watered with the higher salinity water). Some further discussion of the confidence in the measurements at these early stages given the equipment used in the study would be helpful. Also a comment about the acceptability of the plant loadings would be useful. It is expected that for the early stages of growth the number of plants in the pots would not significantly impact on each other but it would be useful to have that confirmed.



Further discussion should be added to the report about the leaf rot that occurred in the final stages of the study. Information such as when it was first observed, how quickly it progressed, when a decision was taken to harvest the plants in terms of the first observation and how much earlier the harvest occurred than originally intended would all be useful. It would also be helpful to understand if there was a likely explanation of why it occurred given the experience of the staff involved. It is a significant issue that impacts on the robustness of the study so adequate explanation of what occurred (and potential reasons why it occurred if available) should be included in the report.

The discussion of the results for the harvested plants should be expanded. These results could potentially be discussed first before the results for the various thinnings. This will highlight that these results are the most reliable (due to the size of the plants making them amenable to accurate measurement) and the most important with regard to the potential concerns of the growers.

It may also be useful to expand on the results for the visual observations. It would be useful to make clear when such observations were first noted, whether the data in Table 5 and 6 was taken at harvest or whenever the observations were made and whether these effects could be used as an indicator of issues at the farms which the growers could pass onto Melbourne Water for followup. Information such as whether those effects are likely to be happening regularly already and whether they can be caused by other things that are not likely to be related to the recycled water would be helpful to include.

Further edits and queries/comments have been included in a copy of the report attached to this letter.

The lowest NOEC (no observed effect concentration) or EC25 developed in the study was for the visual effects on the leaves which would be of concern to growers – the leaf cupping and curling etc. The NOEC was 15 µg/L. In the original desktop review an irrigation guideline of 1.6 µg/L was developed. It would appear from this study that this value has been confirmed as it is equal to the NOEC divided by a safety/uncertainty factor of 10 which is normally applied in such situations.

I understand Chris Lee Steere is reviewing the statistical analysis in detail. I have not undertaken such a review but I have provided comments in the attached copy of the report on some of the results of the analyses.

3.0 Limitations

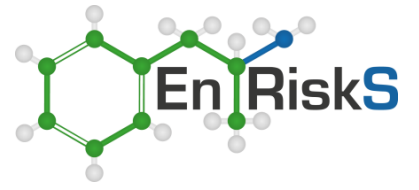
Environmental Risk Sciences has prepared this letter report for the use of Melbourne Water in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Environmental Risk Sciences has made no independent verification of this information beyond the agreed scope of works and assumes no responsibility for any inaccuracies or omissions. No indications were found that information contained in the information provided by Melbourne Water for use in this assessment was false.

This report was prepared in April 2013 and is based on the information provided and reviewed at that time. Environmental Risk Sciences disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

If you require any additional information please do not hesitate to contact me on (02) 9614 0297 or 0487 622 551.



Yours sincerely,

A handwritten signature in black ink, appearing to read 'Therese Manning', written in a cursive style.

Therese Manning
Principal
Exposure and Risk Assessment
Environmental Risk Sciences Pty Ltd