

Independent expert witness report

Supplemental 2

regarding

Stephen William Marsh v
Michael Owen Baxter

On instruction of

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Note: for ease of referencing the contents numbering is contiguous with my original and first supplementary reports.

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Introduction

The following expert opinion is provided in response to further instructions from Slater and Gordon with regard to Marsh v Baxter dated 27th November, 2013 and 8th January, 2014.

Please note: general discussion of the following witness statements is conducted in ascending paragraph order and notes have been made only where it is considered relevant. With regard to specific paragraph/s the instructions draw attention to; they are covered as they occur within the above format. For clarity I have added the witness' initials as a prefix to the paragraph reference where appropriate.

5. Re: Witness statement of Professor Dr. Patrick L. J. Rudelsheim 2/10/13.

Pages five to seven of Dr. Rudelsheim's report regarding the creation of the technology are not my area of expertise.

PR Page 8 *Re: Discussion of additional advantages (of Roundup Ready technology)...*

Point 1 *More options for integrated weed management...*

Re: the statement of ...“An additional efficient weed control *product*”

To clarify – in context of the chemical used, that is glyphosate, it is not new. RR canola technology allows a different pattern of use for this pre-existing product because the genetically modified canola can tolerate applications of glyphosate.

Farmers in Australia rely heavily on Roundup (glyphosate), Sprayseed (paraquat and diquat) and Gramoxone (paraquat) for knockdown weed control immediately prior to sowing. These non-selective herbicides, *particularly Roundup*, are also used for summer / fallow weed control and where silage or hay is made - as a follow up measure to control any weed regrowth to minimize potential weed seed set (as part of an effective 'double knock' herbicide resistance weed management strategy).

Because of these many roles it is supremely important to maintain Glyphosate's level of effectiveness as a non-selective herbicide for farmers in temperate Australia.

Unless RR canola technology is used very carefully as part of a well considered integrated weed management strategy, involving both herbicide and non-herbicidal practices, it is easy to see how repeated use or over reliance on glyphosate can occur. This will in turn intensify selection pressure and increase the proportion of resistant individuals in a weed population leading to RR weeds.

PR Page 8 Point 2 *More flexibility, ease of use in weed management...*

Dr. Rudelsheim’s first two sentences are completely wrong in the context of Australian temperate farming systems.

Of the herbicides frequently used in Canola, a single application of one of the knockdown herbicides (non-selectives) i.e. Roundup, Sprayseed or Gramoxone would be routinely used pre-sowing. All other herbicide options available are selectives. Of these Trifluralin would be used pre-emergent; Simazine, Atrazine or Terbyne can be used either pre-emergent or post-emergent, while Lontrel, Select, Verdict and Intervix are all post-emergents.

Note: Definitions: pre-emergent and post-emergent refers to the timing of the application of herbicide in relation to crop emergence - with pre-emergent referring to prior to the crop emerging and post-emergent after the crop has emerged and when weeds numbers are revealed.

For cereal crops, by far the majority of registered herbicides used are post emergents.

The rest of the paragraph is generally accurate, however “late applications are possible” requires some further explanation for clarity. Glyphosate is registered only up to the six leaf stage of canola, which in most seasons will occur approximately six weeks after crop emergence.

PR Page 8 Point 3 *More flexibility in crop management...*

The paragraph is accurate, however the timing of TT and IM canola’s post emergent herbicide applications can be held to the six leaf growth stage by which time the potential for crop failure would be evident and the application cancelled if appropriate, therefore the same flexibility applies as described for RR canola.

PR Page 8 - Data review

The Brookes and Barfoot papers referenced as the source of Australian genetically modified (GM) canola data, is a survey of GM canola growers conducted by Monsanto in 2008. This was the first year of commercial release of RR canola in the eastern states.

A survey conducted by the manufacturer of the technology, using farmer information is not objective research. It is also only *one* year's information contained in a paper covering a period from 1996-2011. It would be easy for a casual reader to be misled.

PR Page 9 Point 1 Principal rejection...

The author implies GM technology is the best and that current management schemes are limiting.

In the case of RR canola in Australia there is no credible evidence that RR canola is consistently more profitable than other types of canola. As an example, the independent National Variety Trials (NVT) at Kojunup in 2012 and 2013 (*Reference 4 appended*) produced results of:

Highest yielding variety	Yield t/ha	Least significant difference (LSD) t/ha
RR - 2012	2.61	± 0.23
TT - 2012	2.56	± 0.23
RR - 2013	3.32	± 0.19
TT - 2013	3.40	± 0.19

Note: NVT trials are not necessarily laid out with RR and TT lines in the same trial, rather they block RR lines in one trial and TT lines in an adjacent site. Technically, the results should not be directly compared, however if the results are similar then an inference can be drawn that the yield potential is similar in that season, on those sites.

In other words, there was effectively no difference in yield between the RR and TT lines.

PR Page 9 Point 3 *Increased herbicide use...*

RR canola allows the use of glyphosate in a pattern different to the previous 25 years or so of it being on the market. Glyphosate has previously been (and still is) used as a non-selective, pre-sowing knockdown herbicide. RR canola allows for a post emergent application (up to the growth stage of canola of six leaves).

This, in itself, is unlikely to lead to excessive use of glyphosate in the national industry context, as long as growers of RR canola adhere to the recommended use of paraquat (Gramoxone) or a paraquat/diquat mix (Sprayseed) as the pre-sowing knockdown application (instead of glyphosate) in following crops.

As an observer of agriculture over many years, however my concern would be *recommended* practices are not always followed and growers with limited options because of herbicide resistance often tend to look for simple solutions that fix their immediate concerns which could lead to over-reliance on RR technology instead of a variety of strategies.

PR Page 9 Point 4 *Development of resistant weeds...*

In the second paragraph Dr Rudelsheim acknowledges “the selection of resistant weeds species can be attributed to how glyphosate was used” and over-reliance can lead to “weed populations predominated by resistant individual weeds”.

As Dr. Rudelsheim describes on page 10, growers of RR crops in other parts of the world are having to resort to other herbicides as well as cultivation to control weeds that are developing resistance to glyphosate and therefore RR technology.

PR Page 10 Point 1 *Monopolies and farmer dependency...*

Dr. Rudelsheim summarises the current situation quite well. Additionally in Australia, all states maintain a segregated delivery system.

In paragraph two however Dr. Rudelsheim describes the overwhelming reason for the use of genetically modified crops is to deliver substantial and sustainable, socio-economic and environmental benefits...

PR 2.3 Genetically Modified (GM) RR canola

The last paragraph of page 11 and first paragraph page 12 discusses conditions imposed by the Australian Pest and Veterinary Medicines Authority (APVMA)

The APVMA is a body based in Canberra and it is of concern whether this body alone has the resources to ensure such conditions are honoured in the field.

PR Page 12 - Point 1

This is generally true for a conventional farm, with the exception of where the contamination of RR canola occurs in a non-GM canola crop meaning the potential to use herbicide would not be feasible, roguing individual RR plants would be basically impossible because the canola types would be visually indistinguishable and within the crop phase mechanical removal is also not possible.

In addition, in the case of an organic grower, regardless of the crop type the contamination occurred in, herbicides cannot be used. The plaintiff's farm is an organic business.

PR Page 12 Table 3

The table shows the calculated reduction in active ingredient of herbicides used. In the case of Australia, the table is based on very limited information as RR canola has only been available in Eastern Australia (Queensland, New South Wales and Victoria) since 2008, WA from 2010 and is still banned in SA and Tasmania. It is important to note however that the triazine herbicide loading is 2.0 kg active ingredient/ha and the glyphosate loading in RR canola is 1.8 kg active ingredient/ha. Therefore, all other factors being equal RR canola should lead to a small reduction of herbicide use in absolute terms.

Unfortunately all other factors are not equal and theory and practice often diverge as indicated in the first paragraph of page 10 of Dr. Rudelsheim's report.

It should also be noted that Dr. Rudelsheim states that GM crops have led to wider adoption of reduced tillage or no till farming systems. This is emphatically not the case in Australia and especially WA which was already a world leader in no till farming systems before the local introduction of RR technology.

The statement immediately prior to Table 4 brings into question the author's practical experience of Australian canola growing systems. While the mutation that allows TT canola to withstand triazine herbicides produces a reduction in photosynthetic potential and therefore yield potential compared to other types of canola (including RR canola); in the field, in most seasons and in most situations, this *advantage* is not expressed. This means that in practice RR canola is not out-yielding TT canola in Australia - *see Ref 4 NVT data*.

PR Page 12 Table 4

This table is quite misleading. The data from which the Australian figure is derived is from ONE season (2008) and is drawn from a survey conducted by Monsanto. The relevant paper by Brookes and Barfoot is attached – *Reference 5*.

There is no scientific rigour in the survey results and Monsanto is clearly not an independent research body. It is more than a little disturbing that a peer reviewed academic paper quotes such a limited reference, which is then relied upon by Dr. Rudelsheim.

The quoted yield increases of 16 – 22% have not been realized in NSW, Victoria or WA. In fact the 2012 National Variety Trial data from Kojunup shows no effective yield advantage over TT canola lines (*see previous discussion PR Page 9 Point 1*).

PR Section 3 – Safety aspects – pages 13 – 15

3.2 Safety of GM RR Canola

This section does not address the issues that might confront an organic farmer.

Of note, Dr. Rudelsheim’s comments on Page 15 under Point 2 regarding the fate of seed left on the surface... Dr. Preston’s research is far more relevant to Australian conditions.

PR Section 4 – Dispersal of RR canola material - pages 16 – 19

This section gives a good description of what can happen to cause canola seeds and material to move ‘off-site’. It does not address the implications for an organic farmer.

Regarding Dr. Rudelsheim’s concluding comment on Page 19...

If the RR canola flowers and set seed this contamination is not able to be effectively removed from oats which is the crop Mr. Marsh grew in the year in question – *see the discussion following in Section 6 – specifically CP 3 a), b) and c)*.

6. Re: Witness statement of Dr. Chris Preston 4/12/13.

CP Question 1: We refer you to part 3 of Dr. Preston's report on page 4, relating to the survival of canola seed bank in farmer-managed paddocks in agricultural regions in Australia. What management practices which farmers might be adopted by farmers to extinguish canola volunteers appearing on their farms? Would any, and if so which, such practices be unsuited to use on organic farms.

On most farms a cereal, usually wheat is the crop grown after canola. Broadleaf weeds such as volunteer canola, are readily and cost effectively controlled in cereals with selective post emergent herbicides. If there was a low enough population of volunteer canola in a wheat crop, hand roguing could be used.

In this particular situation where the claim is that seed crossed a boundary from one paddock to another from a conventional farming system to an organic farming system the situation becomes more complex.

Organic farmers are not permitted to use herbicides. If Mr. Marsh observed volunteer canola plants in his oat crop his only choice would be hand roguing. Hand roguing is not difficult if numbers are very low and labour is plentiful. However if labour is not plentiful, consider a 20 hectare field with 10 volunteer canola plants per hectare. That is 200 plants to find and remove. However, visualize these plants scattered across an area approximately the size of 10 Subiaco ovals i.e. an oval 1.91 km long by 1.32 km wide, making for a lengthy walk through crop to find and retrieve the rogue plants. This would need to be carried out at least twice through the growing season. Further consider this activity needs to be 'fitted in' over and above the farmer's normal workload.

CP Question 2. If any of the practices is unsuitable for organic farming, what if any impact would that fact impact on the period of time in which canola seed might remain viable to produce volunteer plants on an organic farm?

Given that the only method available to control volunteer canola 'in crop' is roguing, roguing would need to be 100% successful to stop the seed bank from being 'topped-up' through volunteer plants setting seed.

'Out of crop' methods available on an organic farm are mechanical methods such as cultivation after rain, which is not 100% effective in killing weeds.

Therefore to stop any replenishment of the seed bank roguing would have to be used every season until plants stopped emerging. Under such circumstances the contaminated area would be expected to be clean of germinable seeds three to four seasons after the initial contamination event, as per Dr. Preston's research referred to on page 4 of his report.

CP Question 3. We refer you to part 13 of Dr. Preston's report on page 15, relating to the practicality of screening canola seed from cereal grain seed.

CP 3 a) Do you agree with the observations of Dr. Preston in relation to the use of seed cleaning equipment in commercial farming practice in Australia?

Dr. Preston is correct in saying the harvester would remove the majority of small seed and blow it out the back of the harvester. However, this of course would increase the seed bank and ensure the contamination continued.

With regard to seed cleaning canola from cereals – I agree in the case of wheat and barley but not in the case of oats. Mr. Marsh grew oats in the year in question. See the discussion of reasons in the response to the following question.

CP 3 b) Are there any factors not mentioned by Dr. Preston which you consider to be relevant to the practicality of seeds screening and cleaning?

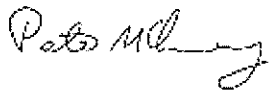
The relative density of the various cereals is quite different - Wheat (76 kg/HL), Barley (65 kg/HL) both of which are denser than canola (62.5 kg/HL) and oats (51 kg/HL). In addition, wheat and barley have relatively smooth surfaces.

Well grown oats are less dense than canola and additionally, oat seed frequently retains a portion of awn that could conceivably 'catch and hold' a canola seed.

CP 3 c) Are there any factors mentioned by Dr. Preston which you consider to be especially significant to the question of the practicality of seed screening and cleaning?

Seed passing through a harvester may be quite critical. In this matter, if Mr. Marsh harvested organic oats contaminated with volunteer RR canola, then each canola plant would have contributed hundreds of seeds, very efficiently distributed by the header front across the field during the harvesting operation.

I have made all inquires that I believe are appropriate to this matter. All relevant information has been provided in my reports and, to my knowledge, nothing of significance has been withheld from this report to the court.



Peter McInerney
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APPENDICES

APPENDIX V

Additional Instructions from Slater & Gordon Lawyers

27th November, 2013

&

8th January, 2014

Not attached to email copy

APPENDIX VI

References

4. *National Variety Trial (NVT) reports* (as PDFs)
RR canola trials 2012 and 2013
TT canola trials 2012 and 2013
5. *Key environmental impacts of global genetically modified (GM) crop use 1996-2011* (as PDF)