

# Expert Report

**Stephen Powles, B.Sc., M.Sc., Ph.D**  
**10 Lifford Road,**  
**Floreat WA 6014**  
[spowles@iinet.net.au](mailto:spowles@iinet.net.au)  
August 6th 2012

Mr Brian Bradley  
Bradley Bayly Legal  
524 Hay Street,  
Perth WA 6000

Dear Mr. Bradley,

Re: S W Marsh v M O Baxter

Thank you for your letter of May 28<sup>th</sup> 2012 and your phone conversation of July 26<sup>th</sup> seeking an expert report relevant to the Marsh v Baxter matter. I confirm that if necessary I am able to give expert evidence at the Supreme Court trial. Thank you for providing the expert witness code. I believe that the below expert report complies with the code of conduct.

My qualifications and experience relevant to preparing this expert report include the following:

I hold undergraduate, Masters and PhD degrees in plant and agricultural science. I have been a research and academic professional in plant and agricultural science for over 37 years. I am an author of approximately 200 plant science related research papers in international research journals. I lead a large research team focussed on herbicide resistance in crops and weeds. For ten years, 1999-2009, I was a member of GTTAC, the national expert committee advising the Australian Gene Technology Regulator on assessment of GM organisms for release in Australia. I must state that during the period that I was a member of GTTAC the Australian Gene Technology Regulator (OGTR) approved RR canola for release in Australia. I have high level knowledge of Australian agriculture, particularly crops. I have considerable knowledge on GM crops in Australia and internationally. I own a 600 hectare WA grain belt farm that is devoted to wheat, barley and canola crops. Both GM and non-GM canola are cultivated on my farm

Please find below my responses to the questions posed in your letter of May 28<sup>th</sup> 2012:

1) *The nature and derivation of GM canola.*

In this matter the canola (*Brassica napus*) is a commercial canola variety marketed as Roundup Ready canola (hereinafter referred to as RR canola, a trademark of the Monsanto Corporation). RR canola is endowed with two gene traits (hereinafter referred to as RR genes) that provide canola with resistance to the herbicide glyphosate. Without the RR

genes, glyphosate is lethal to canola. As recombinant DNA technology was used to endow canola with the RR genes, the RR canola is defined as genetically modified. RR canola is commercially grown in WA, NSW and Victoria.

In understanding the nature and derivation of RR canola it is necessary to define Roundup. Roundup is a retail name (Monsanto trademark) for the herbicide glyphosate. As glyphosate is a generic herbicide, it is the active ingredient in several herbicide products. Hereinafter, Roundup or any other herbicide with glyphosate as the active ingredient will be referred to as glyphosate. RR Canola is resistant to glyphosate, enabling glyphosate to be sprayed over the young canola crop so as to control infesting weed species. Non-GM canola is not resistant to glyphosate and glyphosate will be lethal to the young non-GM canola crop.

2) *Whether the GM canola plant or seed contains any harmful or toxic substances.*

To my knowledge there is no evidence of harmful or toxic substances specifically present in RR canola plants or seed. RR canola is substantially equivalent to non-GM canola, differing by the addition of the gene cassette with the two RR genes. Canada, the world's largest canola producer and exporter, has cultivated RR canola for the past 15 years over very large areas (approximately 4 million hectares annually). RR canola seed and food products derived from RR canola seed are globally traded and have been widely consumed by humans and livestock for many years. Notwithstanding this widespread history of RR canola production and consumption, to my knowledge there are no reports establishing RR canola plants or seeds exhibiting harmful or toxic substances.

Any GM organism proposed for intentional release in Australia must be assessed by the Australian Gene Technology Regulator (OGTR) for human safety and effect on the environment. For food products, assessment and approval is conducted by the Australian Food Standards Authority (FSANZ). RR canola has been assessed and approved for release in Australia by the OGTR as not being a risk for human health or the environment. Food products from RR canola seed have been assessed by FSANZ as being safe for humans and not differing from non-GM food products.

3) *Whether a GM canola plant or seed is capable of contaminating soil with toxic or harmful substances or residues.*

As discussed in (2) above, RR canola has been assessed and approved by OGTR as not being an environmental risk. In Canada, for over a decade, several million hectares have been annually planted to RR canola. To my knowledge there is no evidence that RR canola plants or seeds contaminate soil with toxic or harmful substances or residues.

4) *Whether the GM canola or seed is capable of contaminating or otherwise detrimentally affecting the health of an animal which consumes it or which grazes upon the land where the GM canola seed is present.*

In southern Australian rain-fed broad-acre agriculture as practiced in the Kojonup area, agricultural fields are devoted to annual crops (wheat, barley, canola, grain legumes) and/or pasture that are in rotation from year to year. In a year that a field is seeded to canola,

livestock animals are usually excluded from the field from the time of canola seeding (April-May) until after canola grain harvest (November). Some wild animals (eg kangaroos) could enter RR canola fields and graze on foliage of RR canola plants and domestic animals could inadvertently gain access to RR canola fields and graze on foliage for short periods of time before detection and removal.

At crop maturity the harvest occurs with large mechanical grain harvesters which harvest the mature canola plants, 15-20 cm from the soil surface. Canola seed is retained whereas the canola chaff and straw material is returned to the soil surface. Remaining in the field are the 15-20 cm high, dry, dead, residue of the canola plants, anchored by their root system.

In some situations in the WA grain belt there are no domestic livestock allowed to graze in crop fields after harvest, including canola fields. In some situations, livestock (mainly sheep) do graze in crop fields after harvest, including harvested canola fields. Thus, in these situations domestic livestock (and wild animals) do have access to the canola crop residue present in harvested canola fields and could consume limited amounts of crop residue during the post-harvest summer and autumn period. If a field was devoted to pasture in the year following a canola crop then some volunteer canola seedling emergence occurs and is present as a component of the pasture sward. Livestock would graze the pasture and consume the canola foliage, along with the foliage of the other species present in the pasture. It is emphasised that all of the above statements in this paragraph refer to both non-GM canola and RR canola.

Canola seed and/or the by products from canola seed oil extraction can be components of processed livestock feed granules/pellets etc.

The only RR canola that livestock on the Eagle Rest farm would graze would be any volunteer plants. Any such volunteer RR canola plants would presumably be at very low density, thus present as a small component of the total plant foliage on which livestock would graze. To my knowledge there is no evidence that canola, RR or non-GM, contaminates or detrimentally affects the health of an animal which consumes it or which grazes upon the land where the RR canola seed is present.

*5) Whether the GM canola plant or seed can directly or indirectly contaminate or otherwise create harmful residues in the produce of an animal (eg meat, eggs, milk, cheese, wool) which has consumed the plant or seed or grazed upon the land where it is present.*

Canola is not cultivated as a pasture plant and therefore grazing of pre-harvest canola foliage by domestic animals does not usually occur (see 4 above). However, as described above (see 4), after grain harvest the dry canola crop residue remain in harvested canola fields. In some cases livestock are placed in fields after crop harvest and can consume a portion of the largely unpalatable residue dry canola stalks, as a partial component of their diet. It is emphasised that the same practices occur for harvested fields which had RR canola or non-GM canola.

Canola seed and/or the by products from canola seed oil extraction can be components of processed livestock feed granules/pellets etc.

As the Eagle Rest farm does not cultivate canola then the only RR canola that livestock would encounter would be any volunteer RR canola individual plants that emerge in the fields on which livestock graze.

To my knowledge there is no evidence that RR canola would contaminate or leave harmful residues in the produce (eg meat, eggs, milk, cheese, wool) of animals that have consumed RR canola plants or grazed upon the land where RR canola is present.

7) *The methods (if any) by which volunteer GM canola plants can be identified and eradicated from a farm such as Eagle Rest where conventional canola is not grown.*

As canola has not been grown on the Eagle Rest farm, any volunteer canola plants, RR or non-GM, would be at very low densities. The annual summer drought and high temperatures which prevail in the Kojonup area would mean that canola volunteer plants would be very rare or non-existent during the summer or dry autumn months. With the advent of cooler temperatures and rainfall from April onwards the conditions would be appropriate for germination of any viable canola seed present on the Eagle Rest farm to be canola volunteer seedlings. It is possible but difficult to identify small volunteer canola plants growing at low density as a component among several to many plant species at the young vegetative stage. The easiest stage at which to visually assess for the presence of volunteer canola plants is at the time of canola flowering, normally commencing in early August and terminating by mid-October. Canola at the flowering stage is an erect plant with a distinctive yellow flower. Thus, on the Eagle Rest farm, canola volunteers would be easily identifiable at the flowering stage and the plants easily removed. However, RR and non GM canola are visually identical, thus it is impossible to distinguish whether any flowering canola plants on the Eagle Rest farm are RR or non-GM. Definitive identification of RR canola would require that leaf tissue be sampled and tested for the presence of the RR gene, using commercially available tests.

8) *The practicality and expense of removing GM volunteer canola plants in such circumstances.*

As the Eagle Rest farm has not grown canola then any RR canola volunteers on the Eagle Rest farm would be at low density. As outlined in (7) above, at the flowering stage canola is readily identifiable by its erect habit and distinctive yellow flowers. Although it is not possible to visually identify between non-GM canola and RR canola it is easy to identify canola volunteers due to their erect habit and bright yellow flowers. It would thus be feasible to locate and hand-remove volunteer canola plants before any viable seed is produced. As the Eagle Rest farm is relatively small the fields could be walked at least twice during the canola flowering period to hand-remove all canola volunteers. The expense would be the cost of low-skilled labour in walking the fields on the Eagle Rest farm during the spring months and hand-removing all observed canola plants prior to any seed production.

9) *Whether following the eradication or removal of GM canola plants there is any scientific evidence to support a case that the volunteer plants will have left harmful or other residues in or on the land or in animals which graze upon the land.*

To my knowledge there is no evidence to support a case that volunteer RR canola plants will have left harmful or other residues in or on the land or in animals which graze upon the land.

*10) The benefits (if any) to the agricultural industry associated with the growing of GM canola in the traditional grain growing regions of Western Australia.*

In 2012, approximately one million hectares of canola are under cultivation in the WA grain belt, of which I would estimate only around 8% is RR canola, with the remainder being non-GM canola. There are two main benefits to farmers associated with the cultivation of RR canola in the WA grain belt:

1. Better weed control: RR canola is resistant to the herbicide glyphosate. This means that glyphosate can be applied twice to the young, standing RR canola crop to remove a wide spectrum of infesting weed species. Weeds infesting a canola crop will reduce the possible canola grain yield and glyphosate is considered superior to other herbicides in achieving weed control in standing RR canola crops.
2. Higher yield: RR canola has a higher yield and oil seed content than the most commonly grown canola grown in WA, known as triazine tolerant canola. This is because there is an intrinsic yield penalty in triazine tolerant canola that is not present in RR canola. Therefore, other factors being equal, RR canola will produce higher yield and higher oilseed content than the triazine tolerant canola commonly grown in WA.

*11) The disadvantages (if any) to the agricultural industry of growing GM canola in the traditional grain growing areas of Western Australia.*

A disadvantage to the WA agricultural industry of growing GM canola in the WA grain belt is the requirement that GM canola be segregated from non-GM canola. This necessitates extra costs as the industry must ensure segregation at all stages of the supply chain. The RR canola seed is harvested and transported independently from non-GM canola. RR canola can be delivered and stored only at certain designated grain storage facilities and the RR canola is marketed separately from non-GM canola. There are costs to the agricultural industry at all stages in the segregation of RR canola seed that is not incurred with non-GM canola. In Canada, the world's biggest canola producer, GM canola (including RR canola) is not segregated from non-GM canola and both GM and non-GM canola harvested seed are mixed together in transport, storage and sale.

*12) The viability of organic farming on a property such as Eagle Rest.*

The two major factors determining the economic viability of organic farming on a property such as Eagle Rest would be the annual production of organic grain and livestock and the prices received for these products. It is important to recognise that farms in the WA grain belt are among the very largest family farms in the world. This is because productivity per hectare is low, necessitating that WA grain belt farms be large in order to be viable. In current conditions it is a conservative estimate that for a conventional (not organic) grain and livestock farm in the Kojonup area that at least 1,500 hectares would be needed to generate

sufficient income from annual grain and livestock sales to be viable for one family unit. The Eagle Rest farm appears to be less than 500 hectares and it is therefore a small farm, perhaps 1/3<sup>rd</sup> of the average size of comparable farms in the area. Whether or not the Eagle Rest farm would be viable as an organic farm would be determined by the annual total quantity of organic produce and the prices received for this organic produce. These figures are unknown to me.

13) *The viability of growing GM canola on a farm in the traditional grain growing areas in Western Australia.*

Factors determining the viability of growing GM canola in the WA grain belt have been discussed above (10, 11). Most canola in WA is grown in the medium to higher rainfall areas of the WA grain belt, with less canola in lower rainfall areas. Some WA farmers have repeatedly chosen to grow RR canola and are presumably doing so because they believe that it is financially viable to do so. In my experience the net financial returns from growing RR canola versus non-GM canola are roughly similar. Therefore, at current prices for canola grain, it is viable to grow RR canola in areas of the WA grain belt suitable for canola.

14) *The degree of risk that stems and pods from a swathed GM canola crop may be blown by the wind to a neighbouring farm, as is alleged in this case.*

A swathed canola crop means that the canola plants have been swathed (cut) approximately 15-20 cm from the soil surface and the stems containing the near-mature seed pods are placed in windrows for drying prior to harvest. The cut canola stems maintained in windrows do not generally move as the plant material is somewhat inter-twined. However, should strong winds occur during the period that canola is in windrows, then some canola stems may dislodge from the windrow and these dislodged canola stems with pods can be moved by strong wind. I have examined the literature but have not found any published research studies of wind-impelled physical movement of canola stems from windrows. However, on rare occasions I have observed canola stem movement from windrows, due to strong winds. Therefore, I expect that strong winds could move some canola stems from windrows in a canola field to an adjacent field. If the two adjacent fields were on different farms then this would move canola stems from one farm to the other. This could occur equally whether the windrowed canola was RR or non-GM.

It is difficult to quantify the “*degree of risk that stems and pods from a swathed GM canola crop may be blown by the wind to a neighbouring farm*”. I believe that only strong winds can move swathed, windrowed canola plants from a canola field to an adjacent field, in this case an adjacent field on a neighbouring farm. Strong winds can infrequently occur during the period that swathed canola is in the windrow. Thus, where a swathed, windrowed RR canola crop field abuts a field on a neighbouring farm then there is a risk of wind-induced movement of canola plants from one farm to another.

15) ...

Should you require any clarification regarding this document or require further information in this matter please contact me.

Sincerely,

.....

Winthrop Professor Stephen Powles, FAA, FTSE

I, Stephen Powles, have made all inquiries which I believe are desirable and appropriate and that no matters of significance which I regard as relevant have, to my knowledge, been withheld from the Court.