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The 'On Farm' impact of GM canola in New South Wales & Victoria (2008 – 2010)



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Methodology

The project comprised a 3 year quantitative & qualitative benchmarking study.

Quantitative:

- **On-farm impacts and differences between GM canola and non-GM canola weed control programs.**

Qualitative:

- **Explored attitudes perceptions and behaviour of both GM and non GM canola growers**
- **Tracked attitudes towards adoption and co-existence of GM and non-GM production systems**

Study period 2008-2010

Independent Telephone Survey

Sample: (total over 3 yrs)

- **968 - Non GM farmers interviews / 378 - GM farmer interviews**
- **70% - 95% of GM farmers also planted non-GM canola**





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Key Findings

1. Agronomy
2. Environment
3. Economic
4. Coexistence





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Key Findings: Agronomic impacts

- GM canola increased its share of the area planted to canola, primarily at the expense of triazine tolerant canola

Area of canola planted by Survey Participants	2008	2009	2010	Change 2008 - 2010
Conventional canola	12%	13%	16%	+ 4%
Triazine Tolerant canola	62%	43%	40%	- 22%
Imidazollnone Tolerant Canola	19%	25%	28%	+ 9%
GM Canola	7%	19%	16%	+ 9%

- GM canola growers were more likely to increase their overall plantings of GM canola
 - 2008: 94.3 ha (average area planted to GM canola)
 - 2009: 156.1 ha
 - 2010: 199.5 ha
 - GM growers' area increased by 52.4% across all canola types v. 16.2% for non GM growers





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Target Weeds (Multiple Answers)	Frequency of Response (%)	
	Non GM Canola Respondents	GM Canola Respondents
Annual Ryegrass	84 %	91 %
Wild Radish	43 %	48 %
Wild Oats/ Black Oats	32 %	29 %
Capeweed	27 %	23 %

- **Effective weed control was the most common reason why farmers planted GM canola**
 - **>85% of respondents said weed control with GM canola was ‘better than’ or ‘about the same’ than alternate weed control systems**
- **>95% of GM canola respondents were satisfied with their experience growing GM canola**





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- GM canola led to the reduction in the use of “high risk” Group A & B herbicides and moderate risk Group C & D herbicides
- GM canola led to an increased the use of moderate risk Group M herbicides

Area treated with herbicide groups (Average 2008 – 2010)										
Herbicide Resistance Risk Category	High Risk		Moderate Risk							
Herbicide Group	A	B	C	D	G	I	K	L	M ^{x1}	M ^{x2}
I) Pre-emergent Herbicides										
Conventional canola	5%	0%	0%	75%	3%	0%	9%	0%	0%	0%
Triazine tolerant canola	1%	0%	51%	49%	2%	0%	2%	0%	0%	0%
Imidazolinone tolerant canola	1%	3%	0%	60%	2%	0%	9%	0%	0%	0%
GM canola	0%	0%	0%	44%	1%	0%	4%	0%	0%	0%
II) Post-emergent Herbicides										
Conventional canola	70%	0%	0%	0%	0%	26%	0%	0%	0%	0%
Triazine tolerant canola	37%	0%	59%	0%	0%	8%	0%	0%	0%	0%
Imidazolinone tolerant canola	45%	62%	0%	0%	0%	14%	0%	0%	0%	0%
GM canola	5%	0%	0%	0%	0%	1%	0%	0%	56%	42%



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Key Findings: Environmental impacts

- GM canola growers were more likely to undertake conservation tillage practices
 - Cultivation for weed control decreased by 29%
 - Use of low soil impact equipment increased by 39%
 - Use of direct drilling equipment for crop establishment increased by 5%
- GM canola reduced the use of soil residual herbicides

Area treated with soil residual herbicides (Average 2008 – 2010)		
Weed Control System	Soil Residual Herbicide Only	
	Pre-emergent Herbicides	Post-emergent Herbicides
	%	%
Conventional canola	77 %	26 %
Triazine tolerant canola	80 %	62 %
Imidazollnone tolerant canola	62 %	75 %
GM canola	45 %	1 %





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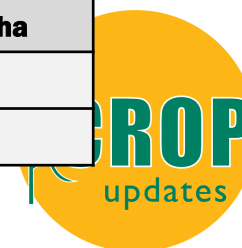
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- On average, GM canola growers demonstrated lower levels of fuel consumption

GM Canola Vs Non GM Canola	Fuel Consumption (KLs) Savings (-) (Cultivations + Spray Applications)			
	2008	2009	2010	Total Savings
Average Savings In Fuel Use (lt/ha)	- 6.68	- 0.79	- 5.24	- 12.71

- GM canola growers had a lower environmental foot print than farmers growing triazine tolerant canola

Weed Control Programs	2008	2009	2010
	EIQ Value/ha	EIQ Value/ha	EIQ Value/ha
GM Canola	21.9	23.2	22.6
Triazine Tolerant Canola	58.6	46.4	62.7





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Key Findings: Economic impacts

- GM canola demonstrated a higher average variable cost for weed control

Canola Type	Average Variable Cost(a) ¹ (AUD\$/ha)	Range (AUD\$/ha)
GM Canola	58.08	37.70 - 75.76
Imidazolinone Tolerant Canola	46.16	9.81 – 93.06
Triazine Tolerant Canola	38.70	9.25 – 93.06
Conventional Canola	25.12	7.62 – 44.45
(a) ¹ : Includes the cost of herbicides applied, the cost of herbicide application and for GM canola the GM canola Technology Access Fee.		

- Difference in costs due to:
 - Technology Access Fee (applied to GM canola only)
 - Increased complimentary use of the pre-emergent herbicide
 - Increased multiple applications of glyphosate for in-crop post-emergent weed control
- GM canola growers perception of GM canola 'value' fell across the study period





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Key findings: Coexistence

- 19% of non GM growers had a neighbouring (fence line) GM crop & 28% had GM crops in the district.
- Between years 70% - 95% of GM canola growers also planted non-GM canola
- Coexistence concerns were not evident for GM canola growers:
 - With their neighbours
 - With the surrounding farming community
- 88% of GM canola growers did not receive any complaints
- Majority of complaints received were from people outside the farming community vs neighbours or surrounding farming community (Predisposing beliefs, impact on other products – dairy/honey, herbicide resistance concerns)
- 94% of non GM canola growers said that GM canola had no impact on their farming operation





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Benchmark findings: Barriers to adoption

Barrier to the adoption of GM canola	Benchmark Trend
<ul style="list-style-type: none"> Limited range of GM canola cultivars 	<ul style="list-style-type: none"> Down from 36% in 2008 to 18% in 2010
<ul style="list-style-type: none"> Potential risks associated with the development of herbicide resistance in weeds (i.e. glyphosate) 	<ul style="list-style-type: none"> Up from 12% to 49% (GM growers) Up from 39% to 69% (Non GM growers)
<ul style="list-style-type: none"> Preference to observe the experience of other growers before adopting 	<ul style="list-style-type: none"> Down from 26% in 2008 to 5% in 2010
<ul style="list-style-type: none"> Relative 'high' cost of access to the glyphosate tolerant technology in GM canola 	<ul style="list-style-type: none"> Up from 13% in 2008 to 20% in 2010
<ul style="list-style-type: none"> Need for improved marketing options for grain from GM canola 'better access' to delivery sites a more competitive 'farm gate' price for GM grain 	<ul style="list-style-type: none"> Up from 31 % in 2008 to 67% in 2010
<ul style="list-style-type: none"> Philosophical views of some respondents opposed to the use of GM crops 	<ul style="list-style-type: none"> Down from 35% in 2008 to 4% in 2010
<ul style="list-style-type: none"> Very Likely and/or Somewhat likely to plant GM canola in the future 	<ul style="list-style-type: none"> GM Canola growers – 84% Non GM canola growers – 41%

Take Home Messages

- The study's findings demonstrate substantial benefits from GM herbicide tolerant canola when compared to alternate non GM weed control systems in canola including more effective weed control, reduced pesticide use, reduced use of cultivation, improvement in yields, reduced risk of herbicide resistance and a reduction in the environmental 'footprint'.
- The economic impacts of GM canola have been variable due to the initial lack of access to GM canola varieties, the cost of access to the GM technology and grain marketing/ logistic issues.
- Concerns relating to co-existence failed to materialize with the majority of GM canola respondents and non GM canola growers reporting no impacts on their farming operations. The issue of coexistence has not influenced farmers' choice in opting to grow GM canola or whether to increase the area of GM canola grown.
- The major barrier to adoption of GM canola is the perceived lack of economic value derived from GM canola compared to the alternate non GM weed control management system options.





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Acknowledgements

- Canola growers in Victoria and New South Wales
- Grains Research & Development Corporation
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Questions?

