

**Data and Information Collected by Genetically Modified Organism
Suppliers: For Who's Benefit?**

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Abstract

The suppliers of agricultural equipment, inputs and services are all likely to increasingly collect data and information about their equipment, inputs and services. This data and information has great potential to improve their businesses *and* agricultural competitiveness. This article reviews the current arrangements in Australia about collecting data and information in the supply of plant genetically modified organisms (GMOs) as inputs to agriculture under the *Gene Technology Act 2000* (Cth), the *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), and a GMO supplier contract. This is a case study about the ways that regulation empowers and validates suppliers collecting their customers' data and information. The article concludes that there needs to be a comprehensive assessment and review of whether these regulatory impositions are unfairly favouring suppliers through facilitating their access to their customers' data and information.

Introduction

There is a vision of the farming future that is founded in data and information:¹

Imagine a farmer who, rather than relying on his gut instincts, lets farm management software apply smart algorithms and a large pool of field data to make the daily decisions on how to work his fields. Instead of sitting on equipment outdoors, he and a handful of associates operate all the equipment for a farm covering thousands of hectares from a control room. GPS-guided autonomous drones constantly provide the data required for the algorithms, and other GPS-guided equipment works the fields with precision, sometimes even at the level of the individual plant. The crops have been genetically engineered to resist most

¹ While these terms are not clearly defined the following working definitions are adopted: "data" might be considered the quantitative or qualitative values and "information" might be considered the meaning that is apparent from the data when considered alone or in combinations and within a particular context: see, for example, Lee Bygrave, "Information Concepts in Law: Generic Dreams and Definitional Daylight" (2015) 35 *Oxford Journal of Legal Studies* 91, 95.

fungi, viruses, and insects and are highly efficient in their uptake and use of nutrients. As a result, the farm needs less fertilizer, water, and crop protection than it did in the past.²

As a part of this vision, the suppliers of equipment (like tractors and harvesters), inputs (like seeds and fertilisers) and services (like communications and meteorology) are all likely to increasingly collect data and information about their equipment, inputs and services.³ This data and information has a usefulness and value in improving the equipment, inputs and services, and more broadly, competitiveness in agriculture.⁴ The contract between the suppliers and the purchasers (predominantly farmers) is the site for establishing the legal obligations for the collection of the data and information. The purpose of this article is to review the current arrangements in Australia about collecting data and information in the supply of plant genetically modified organisms (GMOs) as inputs to agriculture. This is a case study about the ways that regulation empowers and validates suppliers collecting their customers' data and information in ways that improve the suppliers' businesses and that may be to the disadvantage of their customers. Whether the customers own the information remains controversial, although in the context of this article the contracts address this data and information so that the customer and supplier agree to the collection and uses of the data and information.⁵ In this sense the question of who owns the data and information is not addressed in this article.

The following parts examine: the regulatory framework for GMOs in Australia under the *Gene Technology Act 2000* (Cth) and the *Agricultural and Veterinary*

² Lorenzo Corsini, Kim Wagner, Andreas Gocke and Torsten Kurth, *Crop Farming 2030: The Reinvention of the Sector* (Boston Consulting Group, 2015) p 3.

³ For an overview of precision agriculture see, for example, Jacob Strobel, "Agriculture Precision Farming: Who Owns the Property of Information? Is it the Farmer, the Company Who Helps Consults the Farmer on How to Use the Information Best, or the Mechanical Company Who Built the Technology Itself?" (2014) 19 *Drake Journal of Agricultural Law* 239, 242-247.

⁴ See, for example, Christy Couch Lee, "Data's Double-Edged Sword" (2013) 10(4) *Farm Futures* 26.

⁵ See Australian Farm Institute, *The Implications of Digital Agriculture and Big Data for Australian Agriculture*, Research Report (Australian Farm Institute, 2016) pp 34-47.

Chemicals Code Act 1994 (Cth) to show that the contracts adopted by suppliers reflect regulatory requirements that impose obligations on purchasers (essentially farmers); a recent Monsanto Australia Ltd contract is then examined as a case study to demonstrate the form of the provisions imposing data and information obligations on purchasers of GMOs; and then the final part sets out a discussion about the ways that regulatory requirements for information collect also enhance the GMO providers businesses and enable other contractual terms and conditions that favour the GMO providers' businesses. The article concludes that there needs to be a comprehensive assessment and review of whether the regulatory impositions under the *Gene Technology Act 2000* (Cth) and the *Agricultural and Veterinary Chemicals Code Act 1994* (Cth) are unfairly favouring the GMO providers at the expense of GMO users (being predominantly farmers).

Regulatory framework for GMOs in Australia

In Australia, GMOs are regulated according to an inter-governmental agreement legislated in the *Gene Technology Act 2000* (Cth) and *Gene Technology Regulations 2001* (Cth) and mirror legislation in each State and Territory (collectively the GMO Act's scheme).⁶ The GMO Act's scheme seeks to regulate gene technology⁷ by regulating organisms with artificially modified genes or genetic materials.⁸ The objective of the GMO Act's scheme is to 'protect the

⁶ See *Gene Technology Act 2000* (Cth), s 5.

⁷ *Gene Technology Act 2000* (Cth), s 10 defines "gene technology" to mean "any technique for the modification of genes or genetic material, but does not include: (a) sexual reproduction; or (b) homologous recombination; or (c) any other technique specified in the regulations for the purposes of this paragraph". The *Gene Technology Regulations 2000* (Cth), reg 4 presently declares "gene technology does not include somatic cell nuclear transfer if the transfer does not involve genetically modified material".

⁸ *Gene Technology Act 2000* (Cth), s 10 defines "GMO" to mean a "genetically modified organism", which in turn, is defined to mean: "(a) an organism that has been modified by gene technology; or (b) an organism that has inherited particular traits from an organism (the initial organism), being traits that occurred in the initial organism because of gene technology; or (c) anything declared by the regulations to be a genetically modified organism, or that belongs to a class of things declared by the regulations to be genetically modified organisms; but does not include: (d) a human being, if the human being is covered by para (a) only because the human being has undergone somatic cell gene therapy; or (e) an organism declared by the regulations not to be a

health and safety of people, and to protect the environment, by identifying risks posed by or as a result of gene technology, and by managing those risks through regulating certain dealings with GMOs'.⁹ The GMO Act's scheme, administered by a statutory office holder, the Gene Technology Regulator (the Regulator),¹⁰ prohibits all dealings with¹¹ GMOs,¹² unless the dealing is exempt,¹³ a notifiable low risk dealing,¹⁴ licensed,¹⁵ on the Register of GMOs,¹⁶ an emergency dealing,¹⁷ or a dealing with an organism, or class of organisms, declared to be outside the definition of a GMO.¹⁸ Where the GMO is to be intentionally released into the environment,¹⁹ the Regulator considers the characteristics and effects of the

genetically modified organism, or that belongs to a class of organisms declared by the regulations not to be genetically modified organisms". The Regulations do not presently declare anything to be a GMO for the purposes of para (c). However, the *Gene Technology Regulations 2000* (Cth), reg 5 does declare a number of organisms set out in Sch1 of the Regulations as being not GMOs for the purposes of para (e) of the GMO definition.

⁹ *Gene Technology Act 2000* (Cth), s 3. See also Explanatory Memorandum, *Gene Technology Bill 2000* (Cth), p 13.

¹⁰ *Gene Technology Act 2000* (Cth), ss 25-30.

¹¹ *Gene Technology Act 2000* (Cth), s 10 defines "deal with, in relation to a GMO, means the following: (a) conduct experiments with the GMO; (b) make, develop, produce or manufacture the GMO; (c) breed the GMO; (d) propagate the GMO; (e) use the GMO in the course of manufacture of a thing that is not the GMO; (f) grow, raise or culture the GMO; (g) import the GMO; and includes the possession, supply, use, transport or disposal of the GMO for the purposes of, or in the course of, a dealing mentioned in any of paras (a) to (g)".

¹² *Gene Technology Act 2000* (Cth), s 32(1).

¹³ *Gene Technology Act 2000* (Cth), ss 32(1) and 32(4); *Gene Technology Regulations 2000* (Cth), reg 6.

¹⁴ *Gene Technology Act 2000* (Cth), ss 32(1) and 74-75; *Gene Technology Regulations 2000* (Cth), regs 12-13C.

¹⁵ *Gene Technology Act 2000* (Cth), ss 32(1) and 39-72; *Gene Technology Regulations 2000* (Cth), regs 7-11A.

¹⁶ *Gene Technology Act 2000* (Cth), ss 32(1) and 76.

¹⁷ *Gene Technology Act 2000* (Cth), ss 32(1) and 72B.

¹⁸ *Gene Technology Act 2000* (Cth), s 10; *Gene Technology Regulations 2000* (Cth), reg 5 and Sch1.

¹⁹ *Gene Technology Act 2000* (Cth), ss 10 (defines "environment" to include "ecosystems and their constituent parts", "natural and physical resources" and "the qualities and characteristics of locations, places and areas") and 11 (provides "a dealing with a GMO involves the intentional release of the GMO into the environment if the GMO is intentionally released into the open environment, whether or

genetic modification to the organism²⁰ and assesses the risks posed by the proposed dealings with the GMO.²¹ The GMO Act's scheme accepts that there are risks associated with gene technology (in a detrimental sense) and attempts to apply a level of regulation to protect the health and safety of people and protect the environment that is commensurate with the risks posed by the proposed dealing with GMO.²² Under the GMO Act's scheme, some form of risk assessment is required for licenses to deal with GMOs,²³ notifiable low risk dealings with GMOs²⁴ and dealings with GMOs on the GMO Register.²⁵

Table 1 lists the licensed GMOs that have been approved for commercial release in Australia that involve an intentional release of the GMO into the environment.²⁶ The recent Monsanto Australia Ltd application for the commercial release of cotton genetically modified for insect resistance and herbicide tolerance, Bollgard III and Bollgard III x Roundup Ready Flex, provides an example.²⁷ The Regulator assessed the application under the GMO Act's scheme preparing a risk assessment and risk management plan,²⁸ and concluded:

389. The risk assessment concludes that this proposed commercial release of GM cotton poses negligible risks to the health and safety of people or the environment as a result of gene technology.

not it is released with provision for limiting the dissemination or persistence of the GMO or its genetic material in the environment²⁹).

²⁰ *Gene Technology Act 2000* (Cth), s 49(2).

²¹ *Gene Technology Act 2000* (Cth), s 50(1).

²² Explanatory Memorandum, *Gene Technology Bill 2000* (Cth), p 39.

²³ *Gene Technology Act 2000* (Cth), ss 47(1) and 50(1).

²⁴ *Gene Technology Act 2000* (Cth), s 74.

²⁵ *Gene Technology Act 2000* (Cth), s 78(1).

²⁶ *Gene Technology Act 2000* (Cth), ss 40-45 and 48-72.

²⁷ Office of the Gene Technology Regulator, *Risk Assessment and Risk Management Plan for DIR 124: Commercial release of cotton genetically modified for insect resistance and herbicide tolerance (Bollgard®III and Bollgard®III x Roundup Ready Flex®)* (OGTR, 2014).

²⁸ See *Gene Technology Act 2000* (Cth), ss 50 and 51-52.

390. The risk management plan concludes that these negligible risks do not require specific risk treatment measures. However, general conditions have been imposed to ensure that there is ongoing oversight of the release.²⁹

A license was issued subject to the general conditions.³⁰ There are information obligations imposed by the license that requires Monsanto Australia Ltd to collect data and information from its customers using the GMOs. The following license conditions illustrate this. First the condition requiring Monsanto Australia Ltd to inform the Regulator about data and information about health, safety and environmental risks and license contraventions:

15. The licence holder must inform the Regulator if the licence holder becomes aware of:
 - (a) additional information as to any risks to the health and safety of people, or to the environment, associated with the dealings authorised by the licence; or
 - (b) any contraventions of the licence by a person covered by the licence; or
 - (c) any unintended effects of the dealings authorised by the licence.³¹

The license then draws attention to the *Gene Technology Act 2000* (Cth) provision,³² among others, that Monsanto Australia Ltd would be guilty of an offence if it “intentionally takes an action or omits to take an action” and “the action or omission contravenes the licence, and the holder knows or is reckless as to that fact”.³³ In this context “reckless” means, as a question of fact:³⁴

- (1) A person is reckless with respect to a circumstance if:
 - (a) he or she is aware of a substantial risk that the circumstance exists or will exist; and
 - (b) having regard to the circumstances known to him or her, it is unjustifiable to take the risk.

²⁹ Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 27, 62.

³⁰ See Office of the Gene Technology Regulator, *License for Dealings Involving an Intentional Release of a GMO into the Environment: Commercial Release of GM Insect Resistant and Herbicide Tolerant (Bollgard®III and Bollgard®III x Roundup Ready Flex®) Cotton, Licence No.: DIR 124* (OGTR, 2014) pp 3-6.

³¹ License – Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 30, 4.

³² See License – Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 30, 4-5.

³³ *Gene Technology Act 2000* (Cth), s 43(1)(b).

³⁴ *Criminal Code Act 1995* (Cth), s 3 and sch (s 5.4(3)).

- (2) A person is reckless with respect to a result if:
- (a) he or she is aware of a substantial risk that the result will occur; and
 - (b) having regard to the circumstances known to him or her, it is unjustifiable to take the risk.³⁵

The key concern here is that Monsanto Australia Ltd is made accountable for the actions or omissions of its customers, and so needs to assess whether and how it might mitigate that commercial risk. A solution is to impose obligations on its customers through contractual terms and conditions that specifically address its regard to the circumstances and limiting the potential for allegations of recklessness.

Second, the license imposes annual reporting obligations:

20. The licence holder must provide an Annual Report to the Regulator. An Annual Report must include the following:
- (a) information about any adverse impacts, unintended effects, or new information relating to risks to human health and safety or the environment caused by the GMOs or material from the GMOs;
 - (b) information about the volumes of the GMOs grown for commercial purposes, including seed increase operations, in each State and Territory for each growing season in the period;
 - (c) information about the volumes of the GMOs grown for non-commercial (eg research) purposes in each State and Territory for each growing season in the period.³⁶

Again, Monsanto Australia Ltd is made accountable for the actions of its customers, and so needs to obtain the relevant data and information from its customers. The contract terms and conditions that specifically address these requirements are a solution. The Monsanto Australia Ltd contract is considered below to demonstrate how this data and information is collected from its customers.

³⁵ *Criminal Code Act 1995* (Cth), s 3 and sch (s 5.4).

³⁶ License – Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 30, 5-6.

The GMO Act's scheme acts in conjunction with the scheme for the approval of agricultural and veterinary chemicals (AgVet chemicals) under the *Agricultural and Veterinary Chemicals Code Act 1994* (Cth) administered by the Australian Pesticides and Veterinary Medicines Authority (APVMA). Where a GMO includes a substances or mixture of substances, such as an insecticide *cry1Ac* and *cry2Ab* genes from *Bacillus thuringiensis* and *vip3Aa1* gene from *Bacillus thuringiensis*,³⁷ then further regulatory approval is required as an AgVet chemical.³⁸ For example, the Regulator's recent assessment of Bollgard III cotton stated:

210. The APVMA has regulatory responsibility for agricultural chemicals, including herbicides and insecticidal products, in Australia. Bollgard III cotton meets the definition of an agricultural chemical product under the *Agricultural and Veterinary Chemicals Code Act 1994* [(Cth)], due to its production of insecticidal substances, and therefore these plants are subject to regulation by the APVMA. Resistance management is an issue considered by the APVMA in registration of herbicides and insecticidal products. The applicant has applied to the APVMA for registration of Bollgard III as an insecticidal product and will need to comply with an approved insect resistance management plan and any other relevant conditions that may be imposed.³⁹

Next the regulatory scheme for AgVet chemicals is considered demonstrating similar data and information obligations.

Regulatory framework for AgVet chemicals in Australia

In Australia, AgVet chemicals are regulated under a cooperative National Registration Scheme according to an intergovernmental agreement legislated in the *Agricultural and Veterinary Chemicals Act 1994* (Cth), the *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), the *Agricultural and Veterinary Chemicals Regulations 1999* (Cth), the *Agricultural and Veterinary Chemicals Code Regulations 1995* (Cth) and mirror legislation is found in the states and territories (collectively the AgVet Act's scheme). Under these arrangements the

³⁷ See License – Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 30.

³⁸ See Australian Pesticides and Veterinary Medicines Authority, *Registration of a Bollgard III Cotton Expressing the Three Insecticidal Bt Proteins Cry1Ac, Cry2Ab and Vip3A Bollgard III in a Plant Incorporated Pesticide, No 61357* (APVMA, 2014).

³⁹ License – Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 30, 32.

pre-market assessment, registration, control of manufacturing and supply activities and compliance up to the point of retail sale is addressed by the Commonwealth, while the control of uses after sale is the responsibility of individual states and territories.⁴⁰ The AgVet Act's scheme seeks to regulate "the evaluation, approval, and control of the supply, of active constituents for proposed or existing agricultural chemical products or veterinary chemical products" and "the evaluation, registration, and control of the manufacture and supply, of agricultural chemical products and veterinary chemical products".⁴¹ The AgVet Act's scheme is administered by the APVMA⁴² and provides approval of an active constituent, the registration of a chemical product and the approval of a label for containers for a chemical product,⁴³ and may imposed conditions on approval and registration.⁴⁴ The AgVet Act's scheme prohibits, without approval or registration, the supply of an active constituent,⁴⁵ the possession or custody with the intention of supplying a substance that is likely to be used as an active constituent,⁴⁶ the possession or custody with the intention of supplying a chemical product,⁴⁷ and the supply of an approved active constituents or chemical product contrary to the conditions of approval,⁴⁸ or supply a chemical product without a label or an approved label.⁴⁹ The APVMA may issue a permit for an active constituent or chemical product to do something that would otherwise be prohibited ("off label" uses).⁵⁰ The threshold for approval and registration is that there be a "chemical product" that means an "agricultural

⁴⁰ See Explanatory Memorandum, Agricultural and Veterinary Chemicals Legislation Amendment (Removing Re-approval and Re-registration) Bill 2014 (Cth), p 4.

⁴¹ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 1).

⁴² *Agricultural and Veterinary Chemicals (Administration) Act 1992* (Cth), s 6.

⁴³ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 10(1)).

⁴⁴ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 23(1)).

⁴⁵ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 76(1)).

⁴⁶ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 74(1)).

⁴⁷ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 75(1)).

⁴⁸ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 77(1) and 79(1)).

⁴⁹ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 80(1) and 81(1)).

⁵⁰ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 109 and 110).

chemical product or a veterinary chemical product, or both”.⁵¹ For our purposes the definition of an “agricultural chemical product” is relevant, being:

a substance or mixture of substances that is represented, imported, manufactured, supplied or used as a means of directly or indirectly:

- (a) destroying, stupefying, repelling, inhibiting the feeding of, or preventing infestation by or attacks of, any pest in relation to a plant, a place or a thing; or
- (b) destroying a plant; or
- (c) modifying the physiology of a plant or pest so as to alter its natural development, productivity, quality or reproductive capacity; or
- (d) modifying an effect of another agricultural chemical product; or
- (e) attracting a pest for the purpose of destroying it.⁵²

The APVMA must: approve the *active constituent* if the “safety criteria” are met;⁵³ register the *chemical product* if the “safety criteria”, the “trade criteria” and the “efficacy criteria” are met or complies with the established standard;⁵⁴ and approve the *label* if the “labelling criteria” are met or complies with the

⁵¹ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 3 and 10(1)).

⁵² *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 4(2)).

⁵³ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 5A and 14(1)(b)). Section 5A(1) (“safety criteria”) provides: “[a]n active constituent or chemical product meets the safety criteria if use of the constituent or product, in accordance with any instructions approved, or to be approved, by the APVMA for the constituent or product or contained in an established standard: (a) is not, or would not be, an undue hazard to the safety of people exposed to it during its handling or people using anything containing its residues; and (b) is not, or would not be, likely to have an effect that is harmful to human beings; and (c) is not, or would not be, likely to have an unintended effect that is harmful to animals, plants or things or to the environment”.

⁵⁴ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 5A, 5B, 5C, 8U(2) and 14(1)(b)). Section 5B (“efficacy criteria”) provides: “[a] chemical product meets the efficacy criteria if use of the product, in accordance with instructions approved, or to be approved, by the APVMA for the product or contained in an established standard, is, or would be, effective according to criteria determined by the APVMA by legislative instrument”, and s 5C (“trade criteria”) provides: “[a] chemical product meets the trade criteria if use of the product, in accordance with instructions approved, or to be approved, by the APVMA or contained in an established standard, does not, or would not, unduly prejudice trade or commerce between Australia and places outside Australia”.

established standard.⁵⁵ The AgVet Act's scheme accepts that there are risks associated with AgVet chemicals (in a detrimental sense) and attempts to apply a level of regulation to protect the public health, occupational health and safety, the environment, product performance, and trade and commerce commensurate with the risks posed by the AgVet chemical.⁵⁶ Some form of risk assessment is required for active constituents and chemical products assessing that the "safety criteria" are met.⁵⁷

As set out, GMOs with introduced insecticidal genes are considered to require APVMA approval and registration.⁵⁸ The recent Dow AgroSciences Australia Pty Ltd application for the new active constituent *Bacillus thuringiensis* synthetic *cry1Ac(synpro)* and *cry1F(synpro)* genes and their controlling sequences and chemical product Widestrike Insect Protection Cotton Event 281-24-236/3006-210-23 provides an example.⁵⁹ The APVMA assessed the application under the AgVet Act's scheme and then seeks public consultation through a public release summary of its assessment.⁶⁰ The APVMA concluded that the active constituents and chemical products:

- would not be an undue hazard to the safety of people via occupational or dietary exposure due to the inherent low toxicity of the endotoxins and low exposure to them; and
- would not be likely to have an effect that is harmful to people due to the low toxicity; and

⁵⁵ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 5D, 8U(3) and 14(1)(b)).

⁵⁶ Australian Pesticides and Veterinary Medicines Authority, *The Risk Analysis Process* (2014) <<http://apvma.gov.au/node/316>>.

⁵⁷ *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (s 5A).

⁵⁸ See, for example, License – Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 30, 32.

⁵⁹ Australian Pesticides and Veterinary Medicines Authority, *Public Release Summary on the Evaluation of the New Active Bacillus thuringiensis subsp. kurstaki Cry1Ac (synpro) Gene and Bacillus thuringiensis subsp. aizawai Cry1F (synpro) Gene and their Controlling Sequences in the Product Widestrike Insect Protection Cotton Event 281-24-236/3006-210-23*, APVMA Product Number 62268 (AVPMA, 2011).

⁶⁰ See *Agricultural and Veterinary Chemicals Code Act 1994* (Cth), s 4 and sch (ss 12 and 13).

- would not be likely to have an unintended effect to the environment due to the high specificity, low toxicity and exposure to the endotoxins, or the cotton plant it is part of; and
- would not unduly prejudice Australia's trade with other countries due to the similarity with to other transgenic Bt cotton; and
- would be efficacious according to the label claims and APVMA requirements (ie when used according to the [Resistance Management Plan]).⁶¹

The labelling requirements were for the label to carry product identification and use instructions.⁶² In addition, the conditions included that users be required to sign a Technology User Agreement that includes a Resistance Management Plan.⁶³ The conditions also imposed reporting obligations about the hectares of cotton containing Widestrike Insect Protection planted per farm, grower compliance with the Technology User Agreement and Resistance Management Plan and the adequacy of the Resistance Management Plan,⁶⁴ and other information obligations:

Dow AgroSciences [Australia Pty Ltd] must keep a record of or have access to:

- a. each [Technology User Agreement] made, including details of the size and location of cotton containing Widestrike Insect Protection, the resistance management strategy used as per the [Resistance Management Plan], if the user was compliant with the [Technology User Agreement] and if not, what steps were taken to ensure compliance; and
- b. each seed supplier's records of seed supplied containing Widestrike Insect Protection, including the details of the purchaser, the relevant [Technology User Agreement], the date of supply and quantity supplied.⁶⁵

Like the GMO Act's scheme, the AgVet Act's scheme's approval and registration makes Dow AgroSciences Australia Pty Ltd accountable for the actions of its customers, and so Dow AgroSciences Australia Pty Ltd needs to obtain the relevant data and information from its customers. The contract terms and conditions that specifically address these requirements are a solution. The

⁶¹ *Public Release Summary 281-24-236/3006-210-23*, above n 59, 34.

⁶² *Public Release Summary 281-24-236/3006-210-23*, above n 59, 35-38.

⁶³ *Public Release Summary 281-24-236/3006-210-23*, above n 59, 35-38.

⁶⁴ *Public Release Summary 281-24-236/3006-210-23*, above n 59, 36.

⁶⁵ *Public Release Summary 281-24-236/3006-210-23*, above n 59, 36.

2014/2015 Monsanto Australia Ltd GMO canola contract is considered below to demonstrate how this data and information is collected from its customers.

Monsanto Australia Ltd contracts

Monsanto Australia Ltd is an Australian unlisted public company and a wholly owned subsidiary of Monsanto Company in the United States. Monsanto Australia Ltd develops, imports and distributes agricultural herbicides, seeds and other agricultural products. As Table 1 shows, Monsanto Australia Ltd distributes GMO canola and cotton in Australia. These distributions, in accord with the regulatory permissions under the GMO Act's scheme and the AgVet Act's scheme require compliance. The contracts, known as grower license and stewardship agreement between Monsanto Australia Ltd and the farmer sets out the specific data and information obligations. As a generalisation, Monsanto Australia Ltd provides its cotton and canola seeds to its distributors known as a "Technology Service Provider" under a distributor agreement, and these distributors then sell the seeds to farmers (known as "growers") requiring the grower to complete a separate agreement known as a "Grower License and Stewardship Agreement" for canola⁶⁶ and a "Technology User Agreement" for cotton.⁶⁷ The data and information obligations are imposed in these agreements.

By way of illustration, the Grower License and Stewardship Agreement is a standard form contract that requires the grower, or their authorised representative, to "acknowledge that I have read the terms and Conditions of this Agreement ... and agree to be bound by them".⁶⁸ The key terms and conditions

⁶⁶ See Monsanto Australia Ltd, *Grower License and Stewardship Agreement for Roundup Ready® Canola and Roundup Ready® Triazine Tolerant Canola* (2015) 1 <<http://www.monsanto.com/global/au/products/documents/2015%20roundup%20ready%20canola%20lsa.pdf>>.

⁶⁷ See Monsanto Australia Ltd, *Cotton Essentials Guide 2014/2015* (2014) 11-25 (General Terms & Conditions of the Technology User Agreement (TUA) 2014/2015) <http://drylandcotton.com.au/wp-content/uploads/2015/04/2014_15-Cotton-Essentials-guide.pdf>.

⁶⁸ License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 1.

for the 2015 Roundup Ready canola and Roundup Ready Triazine Tolerant (TT-RR) canola seed are:

- 1.5 Grower authorizes each applicable [Technology Service Provider] or Monsanto [Australia Ltd] representative to complete an annual Roundup Ready Canola Planting Declaration form electronically on Grower's behalf for each year that Grower plants Roundup Ready canola and TT-RR Canola. The Declaration shall specify the Grower's Roundup Ready canola and TT-RR Canola seed purchases including variety and volume and such other information as may be reasonably requested by Monsanto. The terms of all completed Roundup Ready Canola Planting Declarations are incorporated herein by reference. Each year, prior to taking possession of, or planting Roundup Ready canola and TT-RR Canola seed, Grower will provide such information as may be necessary to each applicable [Technology Service Provider] to enable the [Technology Service Provider] to complete the Declaration form ... Grower agrees to participate fully in any audit or other review of that information by or on behalf of Monsanto ...
- 1.6 To authorise Monsanto or its representative to conduct annual audits or surveys on farm in regard to Grower's purchase ...
- 1.8 To read and comply with the Canola Crop Management Plan ("CMP"), which is incorporated into and is a part of this Agreement, and to abide by and be bound by the terms of the most recent CMP as it may be amended from time to time by Monsanto ...
- 1.12 To accept and continue the obligations of this Agreement on any new land purchased or leased by Grower that has Roundup Ready canola and TT-RR Canola planted on it by a previous owner or possessor of the land ...
- 1.18 Grower agrees that they have been made aware of the conditions under DIR020 as they pertain to them and agrees to comply with all applicable licence requirements of the Office of Gene Technology Regulator relating to the use of Roundup Ready canola and TT-RR Canola ...
- 1.21 If requested by Monsanto, to promptly provide to Monsanto written details sufficient for Monsanto to identify each paddock in which Roundup Ready canola and TT-RR Canola will be planted (eg farm map or GPS location) ...
- 4.2 Any Personal Information [being the meaning given in the *Privacy Act 1988* (Cth)] which is provided by or on behalf of the Grower to Monsanto, DocuSign, or any licensed or authorised TSP (the "Participants") or information acquired about the Grower's farm unit in connection with this Agreement may be used by the Participants to perform and administer this Agreement and will be shared by them for this purpose. The Participants may also use that Personal Information or farm unit information:
 - (i) for planning, research, product development, strategic and marketing purposes in relation to Monsanto's products and services (including without limitation seed companies, grain handlers and [Technology Service Providers]);

- (ii) to fulfil regulatory requirements;
- (iii) to ensure compliance by the Grower with this Agreement, including compliance with any obligations that survive termination of this Agreement;
- (iv) to assist relevant seed companies, grain handlers or crushers from time to time to anticipate Roundup Ready canola and TT-RR Canola demand;
- (v) to enable Monsanto, and [Technology Service Providers] as Monsanto's agents, to exercise Monsanto's rights and perform Monsanto's obligations under this Agreement, including those rights and obligations that survive termination of this Agreement;
- (vi) to enable [Technology Service Providers] to perform their role as agent for Monsanto in connection with this Agreement (including to conduct surveys and other research in relation to Monsanto's products);
- (vii) where the Grower has otherwise consented; and
- (viii) as otherwise required or authorised by or under law.

4.3 Monsanto may also disclose Personal Information provided by the Grower or information acquired about the Grower's farm unit:

- (i) to applicable third parties that Monsanto considers it necessary to disclose such information to for any of the purposes set out in Clause 4.2(i) to (viii) (inclusive);
- (ii) to regulatory authorities (including the APVMA and the OGTR);
- (iii) to Monsanto's third party IT providers including providers who are located outside of Australia(ie DocuSign, Salesforce.com, etc.), as the case may be;
- (iv) to a related entity of Monsanto who is located outside of Australia;
- (v) where the Grower has otherwise consented; and
- (vi) as otherwise required or authorised by or under law (including under the *Privacy Act 1988* (Cth), as amended from time to time).

4.5 The Grower ... if the Grower is a natural person, consents to the collection, use and disclosure of Personal Information about the Grower by the Participants in accordance with this Clause 4 and otherwise in accordance with Monsanto's Privacy Policy, as updated from time to time ...⁶⁹

In addition to these clauses, the Canola Crop Management Plan forms part of the contract (set out in the above quote clause 1.8) and provides, in part:

All growers must maintain paddock records annually regardless of their proposed management practice intentions during and post harvest of Roundup Ready canola. The Technology Service Providers will be conducting Resistance Management Surveys and these records will form the basis of the surveys.

⁶⁹ License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 2-5.

What records should be kept:

1. All growers must maintain records annually for each paddock they plant to Roundup Ready canola ...
3. Prior to planting Roundup Ready canola, growers must record the pre-planting details pertaining to their field history in the grower logbook.^[70]
4. During the season and post harvest, the grower must record all other relevant details including management practices implemented following harvest of the Roundup Ready canola crop and continuing through to in-crop weed control practices undertaken in crop grown in the same field after Roundup Ready canola.
5. Each year, a sample of grower farms will be selected by Monsanto to have a Resistance Management Survey completed, where the Technology Service Provider will use these records to complete the survey.⁷¹

The effect of this contract is that Monsanto Australia Ltd collects information from its customers about their farming (growing) practices and circumstances.⁷² The kinds of information include: amounts of seed purchased, amounts of seed sown, amounts of seed harvested, pre-cropping activities, in-crop activities, post-harvest activities, herbicide applications, weed control practices, locations of paddocks, and so on. While these forms of information undoubtedly satisfy the regulatory requirements under the GMO Act's scheme and the AgVet Act's scheme, this information is useful for other purposes as well. These are now considered.

⁷⁰ See Monsanto Australia Ltd, *Roundup Ready Canola Grower Logbook* (2014) <<http://www.monsanto.com/global/au/products/documents/grower%20log%20book.pdf>>.

⁷¹ Monsanto Australia Ltd, *Roundup Ready Canola Crop Management Plan (CMP)* (2014) 7 <<http://www.monsanto.com/global/au/products/documents/roundup-ready-canola-crop-management-plan.pdf>>.

⁷² See, for example, Geoff Baker, Tracey Leven, Tony May and Colin Tann, "Planting Window Requirements for Bt Cotton in Australia: Do they Limit the Exposure of *Helicoverpa* spp. (Lepidoptera: Noctuidae) to Bt Toxins?" (2016) 55 *Austral Entomology* 32, 33 stating "Monsanto Australia Ltd ... maintains a database of the dates (day/month/year) of Bt cotton cropping practices at the level of contractual agreements made with farmers (Technology User Agreements ...)".

Discussion

The article so far has shown that both the GMO Act's scheme and the AgVet Act's scheme require the GMO suppliers (and their agents) to be authorised, and these authorisations require some measures of accountability. The GMO Act's scheme for health and safety and the environment and the AgVet Act's scheme for pre-market assessment, registration, control of manufacturing and supply activities and compliance up to the point of retail sale. The analyses then show that the GMO Act's scheme and the AgVet Act's scheme impose information obligations on those supplying GMOs and that these obligations are then passed on to purchasers (predominantly farmers) through contractual arrangements. The terms and conditions of these contracts, however, only partly reflect the obligations imposed by the regulatory arrangements. So, for example, under the GMO Act's scheme the Monsanto Australia Ltd's license for Bollgard III and Bollgard III x Roundup Ready Flex cotton imposes an obligation to report any unintended effects of the dealings authorised by the licence⁷³ and this is carried through to the contract with purchasers of these materials (the "Technology User Agreement").⁷⁴ More importantly for our purposes, however, these contracts also impose a lot more obligations on farmers (called growers) to provide information to the suppliers. And it is these additional obligations that are interesting. In short, this becomes a case study about the ways that regulation empowers and validates suppliers collecting their customers' information to improve the suppliers' businesses that may be to the disadvantage of their customers.

A contract model has also been adopted to protect the interests of the technology providers. These contracts protect intellectual property by asserting ownership and licensing the intellectual property to prevent an exhaustion of the rights. So, for example, the Monsanto Australia Ltd 2014/2015 Grower License and Stewardship Agreement for canola provides:

⁷³ License – Bollgard®III and Bollgard®III x Roundup Ready Flex®, above n 30, 4.

⁷⁴ See Cotton Essentials Guide, above n 67.

2.3 Monsanto Technologies or their methods of use are protected under one or more of the following Australian patents: Nos, 712463, 2002230899, 2005235111, 2006222670 and 2007200557. Grower agrees that the said patents are and remain the sole property of Monsanto, Monsanto Technology LLC or Monsanto Company LLC, and Grower shall not in any way, directly or indirectly, question, challenge or dispute the ownership or validity thereof. Monsanto licenses the Grower, under applicable patents owned or licensed by Monsanto, to use Roundup Ready canola and TT-RR Canola subject to the conditions listed in this Agreement ... ⁷⁵

The contract can also operate to generate the commercial returns for researching and developing the GMO, and this is usually done through a technology fee.⁷⁶ So, for example, the Monsanto Australia Ltd 2014/2015 Grower License and Stewardship Agreement for canola provides:

1.4 To pay (as directed by Monsanto) all technology and stewardship fees due to Monsanto and any royalties due to Monsanto. A notice setting out the applicable fees, royalties and payment terms for the next canola planting season will be sent to Grower's address ... ⁷⁷

Perhaps more subtly, the contract also imposes incentives and penalties to promote legal uses of the supplied materials and avoid illegal or improper uses of the materials. Studies suggest that legal uses of the supplied materials are enhanced with lower technology fees and illegal or improper uses of the materials declines with an increased probability of detecting illegal or improper uses.⁷⁸ So, for example, the Monsanto Australia Ltd 2014/2015 Grower License and Stewardship Agreement for canola limits plantings to a single commercial

⁷⁵ License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 3-4.

⁷⁶ Interestingly, these contracts also enable a system of end point royalties to be imposed: see Charles Lawson, “The Evolution of a Workable Scheme for End Point Royalties for Plant Varieties” (2013) 94 *Intellectual Property Forum* 36.

⁷⁷ License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 2.

⁷⁸ See, for examples, Brett Maxwell, William Wilson and Bruce Dahl, *Marketing Mechanisms in GM Grains and Oilseeds*, Agribusiness & Applied Economics Report No 547 (North Dakota State University, 2004) pp iv and 14-25; Ross Kingwell, “Incentive Design for Introducing Genetically Modified Crops”. In Rob Fraser and Jan Taylor (eds), *Research Profile: Agricultural and Resource Economics at The University of Western Australia in 2000* (The University of Western Australia, 2000) pp 395-406.

crop,⁷⁹ compliance with a Canola Crop Management Plan (dealing with management practices),⁸⁰ use of specific (Monsanto Company branded) herbicides to maintain warranties,⁸¹ delivery of the cropped canola to a Monsanto Australia Ltd licensed seed company,⁸² and enables Monsanto Australia Ltd's access to farm records and the farm for up to three years after termination or expiry of the agreement.⁸³

More interestingly, however, are the contractual terms and conditions enabling the collection of information about agronomic performance: amounts of seed purchased, amounts of seed sown, amounts of seed harvested, pre-cropping activities, in-crop activities, post-harvest activities, herbicide applications, weed control practices, locations of paddocks, and so on. It is this information about their customers' farming (growing) practices and circumstances that goes to the vision of the farming future founded in data and information. And there is early evidence that this is exactly what is happening. Monsanto Company illustrates how this is being embraced and the way that data and information are becoming a part of the supplier's business engagement with its customers.

The Monsanto Company has undertaken a series of company acquisitions that have enhanced its developing information services. Most significantly, the Monsanto Company acquired The Climate Corporation 2013 that complimented its existing Integrated Farming Systems research platform and FieldScripts to optimize seed plant according to the characteristics of paddocks.⁸⁴ As a result the Monsanto Company can now offer an enhanced range of services to compliment its GMO and herbicide business with information based tools, such as apps like

⁷⁹ License and Stewardship Agreement – Roundup Ready® and Triazine, above 66, 2 (cl 1.2).

⁸⁰ License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 2 (cl 1.8).

⁸¹ License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 2-3 (cl 1.13).

⁸² License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 3 (cl 1.14).

⁸³ License and Stewardship Agreement – Roundup Ready® and Triazine, above n 66, 3 (cl 1.22).

⁸⁴ See Monsanto Company, *Monsanto Acquires The Climate Corporation* (2013) <<http://www.monsanto.com/features/pages/monsanto-acquires-the-climate-corporation.aspx>>.

agIndex, agSeedSelect, Climate, FieldView, Weed Manager Plus, YieldCheck, and so on.⁸⁵ So, for example, Climate apps will allow a comprehensive database of hyper-local weather, soil quality analyses, ideal planting dates and yield information⁸⁶ that can be complimented (and perhaps individualised) with data and information from the grower contracts like the Grower License and Stewardship Agreement. The effect is that Monsanto Company can then tailor its business offerings to a particular customer (farmer) according to the customer's (farmer's) particular circumstances. Together with data and information from its other customers this offering, tied to its other business interests (such as supplying seeds and herbicides), this promises to be very valuable to both the Monsanto Company through increased sales and possibly the customer (farmer) through better performance (such as increased yields). With more information about their customers the Monsanto Company will also be better placed to set the prices for their goods and services for particular customers. This extra data and information directly benefitting the Monsanto Company based on data and information provided by their customers, partly including information required for Monsanto Australia Ltd to comply with its regulatory obligations.

Thus, the concern of this article is that the GMO Act's scheme and the AgVet Act's scheme require the collection of some information from farmers (growers) to satisfy the regulatory requirements. In collecting this information the GMO providers are then able to use this information for their commercial benefit and potentially to the disadvantage of farmers (growers). The analyses in this article show that a range of additional information collecting is also enabled together with addressing other interests (such as protecting intellectual property) in the contracts. The analyses are not, unfortunately, able to separate out the purely regulatory obligations from the other data and information collecting and interests. The key point, however, is that the GMO Act's scheme and the AgVet

⁸⁵ See Monsanto Company, *2015TUG – US Technology Use Guide and IRM Overview* (Monsanto Company, 2015) p 1.

⁸⁶ Marc Gunther, "Can Monsanto's Big Data Play Really Help Farmers and the Environment?", *The Guardian* (online) (9 April 2015), <<http://www.theguardian.com/sustainable-business/2015/apr/09/monsanto-big-data-agriculture-farming-environment-climate-corp>>.

Act's scheme are imposing obligations that may be unfairly favouring the GMO providers at the expense of GMO users (being predominantly farmers/growers). The unfairness arises from the ability of the GMO providers to aggregate the data and information across farms, regions and countries, and use that superior data and information (an information asymmetry) to charge higher prices for their products and services at the expense of farmers/growers. Whether this is important is unclear as there are undoubtedly significant benefits in the uses of this data and information, as demonstrated by the data and information based tools to enhance the range of services that compliment the GMO (and herbicide) businesses. But there remains the concern that regulation should generally be competitively neutral and should not advantage one side of a commercial transaction.⁸⁷ With asymmetric information in favour of GMO sellers, they will be able to capture more of the advantages of technological improvements at the expense of farmers, and over the longer term, using increasing amounts of data and information bundled from more and more farmers, this advantage is likely to be significant in any vision of a farming future that is founded in data and information. To address this concern there needs to be a comprehensive assessment and review of whether the regulatory impositions under the GMO Act's scheme and the AgVet Act's scheme are unfairly favouring the GMO providers at the expense of GMO users. Further research and evidence is necessary to resolve this question.

⁸⁷ The *Competition Principles Agreement*, cl 5(1) provides: "The guiding principle is that legislation ... should not restrict competition unless it can be demonstrated that: (a) the benefits of the restriction to the community as a whole outweigh the costs; and (b) the objectives of the legislation can only be achieved by restricting competition". See also Ian Harper, Peter Anderson, Su McCluskey and Michael O'Bryan, *Competition Policy Review*, Final Report (Australian Government Competition Policy Review, 2015) pp 114-117.

Table 1: Commercial uncontrolled released GMOs in Australia. This table is compiled from the licenses granted for the uncontrolled released GMOs into the environment by the Gene Technology Regulator under the *Gene Technology Act 2000* (Cth).

Plant	Owner	Branding	Event	Description	
Cotton (<i>Gossypium hirsutum</i> L.)	Monsanto Australia Ltd	INGARD (Bollgard)	MON531	Insecticide – <i>cry1Ac</i> gene from <i>Bacillus thuringiensis</i>	
		Roundup Ready	MON1445	Glyphosate tolerance – <i>cp4 epsps</i> gene from <i>Agrobacterium</i> species CP4	
		Roundup Ready/INGARD	MON1445 x MON531	Insecticide – <i>cry1Ac</i> gene from <i>Bacillus thuringiensis</i> Glyphosate tolerance – <i>cp4 epsps</i> gene from <i>Agrobacterium</i> species CP4	
		Bollgard II	MON15985	Insecticide – <i>cry1Ac</i> and <i>cry2Ab</i> genes from <i>Bacillus thuringiensis</i>	
		Bollgard II/Roundup Ready	MON15985 x MON1445	Insecticide – <i>cry1Ac</i> and <i>cry2Ab</i> genes from <i>Bacillus thuringiensis</i> Glyphosate tolerance – <i>cp4 epsps</i> gene from <i>Agrobacterium</i> species CP4	
		Roundup Ready Flex	MON88913	Glyphosate tolerance – two modified <i>cp4 epsps</i> genes from <i>Agrobacterium</i> species CP4	
		Roundup Ready Flex/Bollgard II	MON88913 x MON15985	Insecticide – <i>cry1Ac</i> and <i>cry2Ab</i> genes from <i>Bacillus thuringiensis</i> Glyphosate tolerance – two <i>cp4 epsps</i> genes from <i>Agrobacterium</i> species CP4	
		Bollgard III	MON15985 x VIP3A	Insecticide – <i>cry1Ac</i> and <i>cry2Ab</i> genes from <i>Bacillus thuringiensis</i> and version of <i>vip3Aa1</i> gene from <i>Bacillus thuringiensis</i>	
		Bollgard III x Roundup Ready Flex	MON15985 x VIP3A x MON88913	Insecticide – <i>cry1Ac</i> and <i>cry2Ab</i> genes from <i>Bacillus thuringiensis</i> and version of <i>vip3Aa1</i> gene from <i>Bacillus thuringiensis</i> Glyphosate tolerance – two <i>cp4 epsps</i> genes from <i>Agrobacterium</i> species CP4	
	Bayer CropScience Pty Ltd	Liberty Link	LLCotton25	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i>	
Dow AgroSciences Australia Pty Ltd	WideStrike	281-24-236 x 3006-210-23	Insecticide – synthetic <i>cry1Ac(synpro)</i> and <i>cry1F(synpro)</i> genes and from <i>Bacillus thuringiensis</i>		
Canola (<i>Brassica napus</i> L.)	Monsanto Australia Ltd	Roundup Ready	GT73	Glyphosate tolerance – <i>cp4 epsps</i> gene from <i>Agrobacterium</i> species CP4	
		TruFlex Roundup Ready	MON 88302	Glyphosate tolerance – <i>cp4 epsps</i> gene from <i>Agrobacterium</i> species CP4	
	Bayer CropScience Pty Ltd	InVigor	MS8 RF3	MS8 RF3	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i> Fertility – <i>barnase</i> (male sterility; MS8) and <i>barstar</i> (fertility restorer; RF3) genes <i>Bacillus amyloliquefaciens</i>
			T45	T45	Glufosinate ammonium tolerance – <i>pat</i> gene from <i>Streptomyces hygroscopicus</i>
			Topas 19/2	Topas 19/2	Glufosinate ammonium tolerance – <i>pat</i> gene from <i>Streptomyces hygroscopicus</i>
			MS1	MS1	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i> Fertility – <i>barnase</i> (male sterility) gene from <i>Bacillus amyloliquefaciens</i>
			RF1 and RF2	RF1 and RF2	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i> Fertility – <i>barstar</i> (fertility restorer) gene from <i>Bacillus amyloliquefaciens</i>
			MS8	MS8	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i> Fertility – <i>barnase</i> (male sterility) gene from <i>Bacillus amyloliquefaciens</i>
			RF3	RF3	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i> Fertility – <i>barstar</i> (fertility restorer) gene from <i>Bacillus amyloliquefaciens</i>
		InVigor x Roundup Ready	MS8/RF3 x GT73	MS8/RF3 x GT73	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i> Fertility – <i>barnase</i> (male sterility; MS8) and <i>barstar</i> (fertility restorer; RF3) genes from <i>Bacillus amyloliquefaciens</i>

				Glyphosate tolerance – <i>cp4 epsps</i> gene from <i>Agrobacterium</i> species CP4 and the <i>goxv247</i> gene from <i>Ochrobactrum anthropi</i>
		InVigor x TruFlex x Roundup Ready	MS8 x RF3 x MON 88302	Glufosinate ammonium tolerance – <i>bar</i> gene from <i>Streptomyces hygroscopicus</i> Glyphosate tolerance – <i>cp4 epsps</i> gene from <i>Agrobacterium</i> species CP4 Fertility – <i>barnase</i> (male sterility; MS8) and <i>barstar</i> (fertility restorer; RF3) genes <i>Bacillus amyloliquefaciens</i>
	Pioneer Hi-Bred Australia Pty Ltd	Optimum GLY Canola	DP73496	Glyphosate tolerance – <i>glyphosate acetyltransferase (gat4621)</i> gene from <i>Bacillus licheniformis</i>
Rose (<i>Rosa X hybrida</i>)	Florigene Pty Ltd	Hybrid Tea	WKS82/130-4-1	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from <i>Viola x wittrockiana</i> and <i>anthocyanin 5-acyltransferase</i> gene from <i>Torenia x hybrida</i>
Carnation (<i>Dianthus caryophyllus</i> L.)	Florigene Pty Ltd	Moonlite	40644	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from petunia and <i>dihydroflavonol reductase</i> gene from petunia Herbicide tolerance selectable marker – <i>Acetolactate synthase (SuRB)</i> gene from tobacco
		Moonshade	40619	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from petunia and <i>dihydroflavonol reductase</i> gene from petunia Herbicide tolerance selectable marker – <i>Acetolactate synthase (SuRB)</i> gene from tobacco
		Moonshadow	11363	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from pansy and <i>dihydroflavonol reductase</i> gene from petunia Herbicide tolerance selectable marker – <i>Acetolactate synthase (SuRB)</i> gene from tobacco
		Moonvista	40685	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from pansy and <i>dihydroflavonol reductase</i> gene from petunia Herbicide tolerance selectable marker – <i>Acetolactate synthase (SuRB)</i> gene from tobacco
	International Flower Developments Pty Ltd	Florigene Moonaqua	FLO-40689-6	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from pansy and <i>dihydroflavonol reductase</i> gene from petunia Herbicide tolerance selectable marker – <i>Acetolactate synthase (SuRB)</i> gene from tobacco
		Florigene Moonberry	IFD-25958-3	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from pansy, <i>dihydroflavonol reductase</i> gene from petunia, and partial gene sequence of <i>dihydroflavonol reductase</i> gene from carnation Herbicide tolerance selectable marker – <i>Acetolactate synthase (SuRB)</i> gene from tobacco
		Florigene Moonvelvet	IFD-26407-2	Altered flower colour – <i>Flavonoid 3'5'-hydroxylase</i> gene from petunia and <i>cytochrome b5</i> from petunia Herbicide tolerance selectable marker – <i>Acetolactate synthase (SuRB)</i> gene from tobacco