



# **Report on the Current Status of Commercialised Genetically Modified Crops**

**1 July 2007 – 1 June 2008**

Import Standards Group  
MAF Biosecurity New Zealand

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# 1 Summary

This report reviews the commercial status of genetically modified (GM) crops globally, and serves to inform policy makers of the potential for imported seeds to contain GM organisms. This report is part of an ongoing series and covers the period 1 July 2007 to 1 June 2008.

Section 2 lists the **GM crops released for commercial growing purposes** during the reporting period, and describes the genetic modification associated with each crop.

Section 3 lists the **pending approvals** for GM crops, providing an indication of the crops likely to be commercialised in the future. This information can be used by MAF Biosecurity New Zealand and other agencies to plan and allocate resources for future work streams.

Section 4 lists the **field-trials** for GM crops for the period, indicating crops likely to be in the pipeline for commercialization in the medium term.

Section 5 lists the information sources used to prepare this report.

Appended to this report are a series of tables which summarise the commercial varieties of GM crops currently available in the market place. GM events which have been discontinued, or were never commercialised are not included in these tables.

## 2 Commercially Released Genetically Modified Plants

From the information sources scanned, MAF has determined that there have been **four** GM crops released for commercial cultivation between 1 July 2007 and 1 June 2008, as recorded in the table below. These are mostly crops which already have GM varieties commercially released into the environment and market place, with the exception of the C5 plum.

Each of these commercially released varieties is described in more detail below.

Crop	Common name	Company	Altered Traits	Date of Approval
<i>Prunus domestica</i> C5 plum	C5 plum	USDA-ARS	Plum pox virus resistance (PPV)	United States deregulated - 13-7-2007
<i>Zea mays</i> Event 3272	maize	Syngenta	Modified amylase for ethanol production	United States deregulated - 15-11-2007 Approved Canada - 31-3-07 Approved Australia - 3-10-07
<i>Zea mays</i> MON 89034	maize	Monsanto	European Corn borer resistant	United States deregulated - 13-12-2007
<i>Glycine max</i> DP356043	soybean	Pioneer Hi-Bred International	Tolerance to glyphosate and ALS-inhibiting herbicides	United States deregulated - 21-09-2007

**Table 1. Commercially released GM crops for June 2007 – June 2008.**

### 2.1 *Prunus domestica* –C5 plum

Transformation of the plum cultivar ‘Bluebyrd’ with the coat protein gene of the plum pox virus, containing the 35S promoter and the nos terminator. The resistance mechanism is post-transcriptional gene silencing (PTGS), via short interfering RNA molecules (siRNA) specific to PPV coat protein genes.

The United States has no plans to release the transgenic varieties for commercial use, as the disease is being controlled through quarantine practices, however they have initiated discussions with breeders to develop plans for the deployment of this trait should the need arise.

The MAF Import Permit Application for Nursery Stock (which includes *Prunus domestica* tissue cultures or budwood) requires importers to declare they are not knowingly importing unapproved genetically modified plants. At this stage, there is no plan to develop a border testing regime for *Prunus* imports, as (unlike seeds) it is unlikely importers would *inadvertently* import GM tissue cultures or budwood.

Code	Name	Promoter, other	Terminator
<i>nptII</i>	neomycin phosphotransferase II ( <i>Escherichia coli</i> )	nopaline synthase ( <i>nos</i> ) from <i>A. tumefaciens</i>	<i>nos</i> 3' non-translated terminator from <i>A. tumefaciens</i>
<i>uidA</i>	beta-D-glucuronidase ( <i>Escherichia coli</i> )	CaMV 35S	<i>nos</i> 3' non-translated terminator from <i>A. tumefaciens</i>
CP	Coat protein ( <i>Plum pox virus</i> )	CaMV 35S	<i>nos</i> 3' non-translated terminator from <i>A. tumefaciens</i>

[http://www.aphis.usda.gov/brs/fedregister/BRS\\_20070713b.pdf](http://www.aphis.usda.gov/brs/fedregister/BRS_20070713b.pdf)

## 2.1 *Zea mays* (maize) Event 3272

Maize line 3272 has been genetically modified to express a thermostable alpha-amylase enzyme (AMY797E) for use in dry-grind fuel ethanol production in the United States.

Code	Name	Promoter, other	Terminator
<i>amy797E</i>	Thermostable alpha-amylase ( <i>Thermococcales spp.</i> )	GZein promoter - from maize 27-kDa <i>zein</i> gene PEPC9 - intron 9 from maize phosphoenolpyruvate carboxylase gene	35S terminator from cauliflower mosaic virus
<i>pmi</i>	Mannose-6-phosphate isomerase ( <i>Escherichia coli</i> )	ZmUbiInt ( <i>Zea mays</i> polyubiquitin gene promoter and first intron).	<i>nos</i> 3' non translated terminator from <i>A. tumefaciens</i>

The existing screening tests in the MAF Protocol will be able to detect this event, using the *nos* 3' terminator.

<http://www.agbios.com/dbase.php?action=Submit&evidx=533>

## 2.2 *Zea mays* (maize)- MON89034

MON 89034 has been developed as a second-generation insect-resistant maize, giving a wider spectrum of insect control through the production of both Cry1A.105 and Cry2Ab2 proteins derived from *Bacillus thuringiensis*.

Code	Name	Promoter, other	Terminator
<i>cry1A.105</i>	chimeric cry1 delta-endotoxin ( <i>Bacillus thuringiensis</i> )	CaMV 35S 5' untranslated leader from wheat chlorophyll a/b-binding protein Rice actin gene intron	3' untranslated region of wheat heat shock protein 17.3
<i>cry2Ab</i>	cry2Ab delta-endotoxin ( <i>Bacillus thuringiensis</i> )	FMV-35S - promoter from Figwort Mosaic Virus <i>Hsp70</i> intron from maize heat shock protein gene. Transit peptide from maize RBC-small subunit.	<i>nos</i> 3' non-translated terminator from <i>A. tumefaciens</i>

The existing screening tests in the MAF Protocol will be able to detect this event, via the 35S promoter and *nos* 3' terminator.

<http://www.agbios.com/dbase.php?action=Submit&evidx=534>

## 2.3 *Glycine max* (soybean) – DP356043

DP356043 has been transformed to express two novel genes, providing tolerance to two different classes of herbicide. The line contains two genes; *gat4601* which provides tolerance to glyphosate by detoxifying the compound, while *gm-hra* encodes for a modified acetolactate synthase (ALS) enzyme which is not affected by the imidazolinone class of ALS inhibiting herbicides.

Code	Name	Promoter, other	Terminator
<i>gat4601</i>	glyphosate N-acetyltransferase ( <i>Bacillus licheniformis</i> )	SCP1 - constitutive synthetic core promoter TMV omega 5'-UTR	<i>Solanum tuberosum</i> proteinase inhibitor II (PINII)
<i>gm-hra</i>	acetolactate synthase ( <i>Glycine max</i> )	S-adenosyl-L-methionine synthetase (SAMS)	native soybean acetolactate synthase terminator

Neither the promoters or terminators will be detectable by the existing 35S and nos screens used in the MAF Protocol, and the MAF accredited testing laboratories will need to develop and validate a specific test for this event.

<http://www.agbios.com/dbase.php?action=Submit&evidx=535>

### 3 Pending Approvals for Genetically Modified Crops

There are six crop plants with petitions for non-regulated status pending in the USA for this period, as shown in the following table.

**Table 2. Pending Approvals for GM crops between 1 July 2007– 1 June 2008**

Crop	Common name	Company	Altered Traits	Status
<i>Agrostis stolonifera</i>	Creeping bentgrass	Monsanto & Scotts	Glyphosate tolerant	Submitted to USDA on 5 Jan 2004 EIS in development, 12 Oct 2005.
<i>Medicago sativa</i>	lucerne	Monsanto	Glyphosate tolerant	USA - return to regulated status 23 March 2007
<i>Zea mays</i> HT98140	Corn	Pioneer	Glyphosate and Imidazolinone tolerant	No information currently available
<i>Gossypium hirsutum</i> COT67B	Cotton	Syngenta	Lepidopteran resistant	No information currently available
<i>Gossypium hirsutum</i> GHB614	Cotton	Bayer CropScience	Glyphosate tolerant	No information currently available
<i>Glycine max</i> DP305423-1	Soybean	Pioneer	High oleic acid	No information currently available

[http://www.aphis.usda.gov/brs/fedregister/BRS\\_20070713b.pdf](http://www.aphis.usda.gov/brs/fedregister/BRS_20070713b.pdf)

## 4 Field-Trials

### 4.1 USA

Species	Number of field-test permits	Species	Number of field-test permits	Species	Number of field-test permits
Corn	324	Peanut	2	Grapevine	1
Soybean	143	Pitch x loblolly pine	2	Hybrid pine	1
Cotton	35	Sorghum	2	Loblolly pine and pitch x loblolly pine	1
Tobacco	19	Sugarcane	2	Melon	1
Potato	17	American chestnut	1	Onion	1
Alfalfa	11	American elm	1	Papaya	1
Loblolly pine	11	Arabidopsis thaliana	1	Pink bollworm	1
Safflower	10	Bahiagrass	1	Plum	1
Tomato	10	Bermudagrass	1	Poplar	1
Eastern cottonwood	8	Black nightshade	1	Sweet potato	1
Eucalyptus hybrid	8	Camelina	1	Sweetgum	1
Rice	7	Cassava	1	Thale cress	1
Barley	6	Cavendish banana	1		
Sugarbeet	6	Cbi	1		
Wheat	6	Cowpea	1		
Rapeseed	5	Creeping bentgrass	1		
Apple	3	Dwarf bahiagrass	1		
Guayule	2	Festuca arundinacea	1		
Hybrid aspen	2	Grape	1		
Hybrid poplar	2	Grapefruit	1		



## 4.2 Europe and Australia

Plant	Country	Company	Date	Altered Traits	Status
Poplar	France	INRA	2-7-2007	Wood properties and biofuel production.	Field test – Agronomical and environmental assessment.
<i>Arabidopsis thaliana</i>	Denmark	Aresa Biodetection ApS	5-7-2007	Localisation of explosive components in soil.	Field-test development.
<i>Solanum tuberosum</i>	Netherlands	AVEBE	23-8-2007	Reduced amylase content potato.	Field-test.
<i>Solanum nigrum</i> Black nightshade	Germany	Max Planck Institute for Chemical Ecology	5-9-2007	Environmental interaction of defense genes	Field-test.
<i>Gossypium hirsutum</i> Cotton	Australia	Deltapine Australia Pty	11-9-2007	Insect resistance and herbicide tolerance	Limited and controlled release
<i>Zea mays</i>	Germany	Pioneer Hi-Bred Northern Europe	6-11-2007	Application for the deliberate release of NK603, 1507xNK603, 59122x1507xNK603	4 – year program
<i>Gossypium hirsutum</i> Cotton	Australia	Monsanto Australia	7-11-2007	Insect resistance and herbicide tolerance	Limited and controlled release
Triticale	Poland	Plant Breeding and Acclimatization Institute	5-12-2007	Investigation of GM triticale	Field-test
<i>Solanum tuberosum</i>	Netherlands	Wageningen University	5-12-2007	Late-blight resistant potatoes	Field-test
<i>Solanum tuberosum</i>	Netherlands	BASF Plant Science	5-12-2007	Potato with improved resistance to <i>Phytophthora infestans</i> Potato with altered starch composition	Field-test  Environmental release application
<i>Zea mays</i>	Sweden	Syngenta	5-12-2007	GA21	Field-testing between 2008-2012

Plant	Country	Company	Date	Altered Traits	Status
<i>Solanum tuberosum</i>	Germany	BASF Plant Science GmbH	5-12-2007	Potato with improved resistance to <i>Phytophthora infestans</i> or altered starch composition	Environmental release application
<i>Brassica napus</i>	Sweden	Syngenta	5-12-2007	Increased oil content in seeds	Notification A & B <sup>1</sup>
<i>Zea mays</i> DP098140	Germany	Pioneer Hi-Bred Northern Europe	9-1-2008		4 year program
Sugar beet	Sweden	Syngenta Seeds AB	9-1-2008	Tolerant to glyphosate and resistant to virus <i>Rhizomania</i>	Field-test
<i>Solanum tuberosum</i>	Netherlands	AVEBE	9-1-2008	Reduced amylase content potato	Field-test
<i>Zea mays</i>	Poland	Plant Protection Institute	9-1-2008	NK603	Field comparison with conventional maize
<i>Solanum tuberosum</i>	United Kingdom	University of Leeds	10-1-2008	Control of potato cyst-nematodes	Field-test
Poplar	Belgium	VIB	10-1-2008	Altered wood composition for biofuel production	Field-test
Sugar beet	Germany	Planta GmbH	15-1-2008	Glyphosate-tolerant sugar beet	Field-test
<i>Zea mays</i> DP098140	Netherlands	Pioneer Hi-Bred Northern Europe	15-1-2008	DP098140	Deliberate release
Cucumber	Poland	Warsaw University of Life Sciences	15-1-2008	Quality evaluation of cucumber with taumatin gene	Field-evaluation
<i>Zea mays</i>	Slovak Republic	Slovak Center of Agricultural Research	29-1-2008	MON89034, MON 88017, MON 89034 x MON88017 maize	Field-test
<i>Zea mays</i> DP098140	Portugal	Pioneer Hi-Bred	5-2-2008		Field-test
<i>Zea mays</i>	Portugal	Syngenta	5-2-2008	GA21	2008-2012 Field tests

<sup>1</sup> EU legislation – regulations Deliberate releases

Plant	Country	Company	Date	Altered Traits	Status
<i>Brassica napus</i>	Sweden	Plant Science Sweden	11-2-2008	Improved seed oil composition	Field-test
<i>Zea mays</i> NK603	Slovak Republic	Slovak Center of Agricultural Research	20-2-2008	NK603	Field-test
<i>Zea mays</i>	Slovak Republic	Slovak Center of Agricultural Research	20-2-2008	DP098140, DP098140 x DAS01507, and DP098140 x DAS01507 x DAS 59122	Monitoring of key non-target arthropods
<i>Zea mays</i>	Germany	RWTH Aachen	20-2-2008	Effects of stacked traits on non-target organisms	Field-test
<i>Zea mays</i>	Denmark	Monsanto	20-2-2008	Weed control strategies	Field-test
Sugar beet	Spain	Monsanto	3-3-2008	Glyphosate resistance	Field-test
<i>Zea mays</i>	Romania	Monsanto	4-3-2008	MON89034 x MON88017, and NK603	Field-tests
<i>Arabidopsis thaliana</i>	Sweden	Department of Plant Physiology, Umea University	10-3-2008	The photosynthetic genome	Field-tests
<i>Zea mays</i>	Romania	Monsanto	10-3-2008	MON89034 and MON88017	Field-tests
<i>Zea mays</i>	Romania	Syngenta	10-3-2008	BT11 x MIR604 x GA21, Bt11 x GA21, MIR604, BT11, GA21	Field-tests  Review authorization conditions
<i>Zea mays</i>	Czech Republic	Pioneer Hi-Bred Northern Europe	18-3-2008	DP098140	Field-test
<i>Zea mays</i>	Denmark	Syngenta	26-3-2008	GA21	Field-tests between 2008-2012
<i>Zea mays</i>	Poland	Plant Breeding and Acclimatization Institute	10-4-2008	NK603	Official variety testing for economic evaluation
<i>Solanum nigrum</i>	Germany	Max Planck Institute for Chemical Ecology	24-4-2008	Environmental interaction of defense genes	Field-test.
Tobacco	Czech Republic	Charles University in Prague	24-4-2008	Tobacco	Experimental release
<i>Musa acuminata</i> banana	Australia	Queensland University of Technology	24-4-2008	Increased levels of pro-vitamin A, vitamin E or iron.	Limited and controlled release
Citrus	Spain	Instituto Valenciano de Investigaciones Agrarias.	29-4-2008	Modified flowering gene, <i>Phytophthora</i> tolerance,	Field-test grafted oranges

				modified plant architecture, flowering & fruiting, modified fruit aroma and interaction with insects	
<i>Zea mays</i>	Spain	Monsanto	15-5-2008	NK603, NK603 x MON810, and MON88017	Field test

## 5 Information Sources

### Databases

<http://www.agbios.com/main.php>  
[http://gmoinfo.jrc.it/gmp\\_browse.aspx](http://gmoinfo.jrc.it/gmp_browse.aspx)  
<http://biosafety.ihe.be>  
<http://www.fao.org/biotech/>  
[http://ec.europa.eu/food/food/biotechnology/index\\_en.htm](http://ec.europa.eu/food/food/biotechnology/index_en.htm)  
<http://www2.oecd.org/biotech/frameset.asp>  
<http://webdomino1.oecd.org/ehs/biotrack.nsf>

### Commercial Status

[http://www.biotradestatus.com/query\\_results.cfm](http://www.biotradestatus.com/query_results.cfm)

### International Field Test Sources

Argentina:	<a href="http://translate.google.com/translate?hl=en&amp;sl=es&amp;u=http://www.sagpya.mecon.gov.ar/new/0-0/programas/conabia/index.php&amp;sa=X&amp;oi=translate&amp;resnum=1&amp;ct=result&amp;prev=/search%3Fq%3Dcona">http://translate.google.com/translate?hl=en&amp;sl=es&amp;u=http://www.sagpya.mecon.gov.ar/new/0-0/programas/conabia/index.php&amp;sa=X&amp;oi=translate&amp;resnum=1&amp;ct=result&amp;prev=/search%3Fq%3Dcona</a>
Australia:	<a href="http://www.ogtr.gov.au/gmorec/ir.htm">http://www.ogtr.gov.au/gmorec/ir.htm</a>
Brazil:	<a href="http://translate.google.com/translate?hl=en&amp;sl=pt&amp;u=http://www.ctnbio.gov.br/&amp;sa=X&amp;oi=translate&amp;resnum=1&amp;ct=result&amp;prev=/search%3Fq%3Dctnbio%26hl%3Den%26lr%3D">http://translate.google.com/translate?hl=en&amp;sl=pt&amp;u=http://www.ctnbio.gov.br/&amp;sa=X&amp;oi=translate&amp;resnum=1&amp;ct=result&amp;prev=/search%3Fq%3Dctnbio%26hl%3Den%26lr%3D</a>
Bulgaria:	<a href="http://webdomino1.oecd.org/ehs/biotrack.nsf">http://webdomino1.oecd.org/ehs/biotrack.nsf</a>
Canada:	<a href="http://active.inspection.gc.ca/eng/plaveg/bio/pntvcne.asp">http://active.inspection.gc.ca/eng/plaveg/bio/pntvcne.asp</a> <a href="http://www.inspection.gc.ca/english/plaveg/bio/confine.shtml#sum">http://www.inspection.gc.ca/english/plaveg/bio/confine.shtml#sum</a>
Czech Republic:	<a href="http://webdomino1.oecd.org/ehs/biotrack.nsf">http://webdomino1.oecd.org/ehs/biotrack.nsf</a>
EU:	<a href="http://biotech.jrc.it/deliberate/gmo.asp">http://biotech.jrc.it/deliberate/gmo.asp</a> <a href="http://gmo-compass.org/eng/gmo/db/">http://gmo-compass.org/eng/gmo/db/</a>
Hungary:	<a href="http://biosafety.abc.hu/biosafe_eng.html">http://biosafety.abc.hu/biosafe_eng.html</a>
Ireland:	<a href="http://www.epa.ie/Licensing/GMOLicensing/DeliberateReleaseofGMOs/">http://www.epa.ie/Licensing/GMOLicensing/DeliberateReleaseofGMOs/</a>
India:	<a href="http://webdomino1.oecd.org/ehs/biotrack.nsf">http://webdomino1.oecd.org/ehs/biotrack.nsf</a>
Japan:	<a href="http://www.s.affrc.go.jp/docs/sentan/eguide/edevelp.htm">http://www.s.affrc.go.jp/docs/sentan/eguide/edevelp.htm</a> <a href="http://www.bch.biodic.go.jp/english/e_index.html">http://www.bch.biodic.go.jp/english/e_index.html</a>
New Zealand:	<a href="http://www.ermanz.govt.nz/no/index.asp">http://www.ermanz.govt.nz/no/index.asp</a>
Poland:	<a href="http://gmo.mos.gov.pl/english/index_en.html">http://gmo.mos.gov.pl/english/index_en.html</a>
Russian Federation:	<a href="http://webdomino1.oecd.org/ehs/biotrack.nsf">http://webdomino1.oecd.org/ehs/biotrack.nsf</a>
South Africa:	<a href="http://www.nda.agric.za">http://www.nda.agric.za</a>
South Korea:	<a href="http://www.niab.go.kr/bio/english/database/database_search.jsp">http://www.niab.go.kr/bio/english/database/database_search.jsp</a>
Switzerland:	<a href="http://webdomino1.oecd.org/ehs/biotrack.nsf">http://webdomino1.oecd.org/ehs/biotrack.nsf</a>
Thailand:	<a href="http://www.biotec.or.th/biosafety/">http://www.biotec.or.th/biosafety/</a>
United Kingdom:	<a href="http://www.defra.gov.uk/environment/gm/regulation/registers.htm">http://www.defra.gov.uk/environment/gm/regulation/registers.htm</a>
United States:	<a href="http://www.isb.vt.edu/cfdocs/fieldtests1.cfm">http://www.isb.vt.edu/cfdocs/fieldtests1.cfm</a>

## **Appendices: Current Commercialised GM Crops**

**Appendix 1:** Genetically Modified Varieties of *Zea mays* (maize and sweet corn)

**Appendix 2:** Genetically Modified Varieties of *Brassica napus* var. *oleifera* (oilseed rape)

**Appendix 3:** Genetically Modified Varieties of *Glycine max* (soybean)

**Appendix 4:** Genetically Modified Varieties of *Gossypium hirsutum* (cotton)

**Appendix 5:** Other Genetically Modified Crop Varieties

## Appendix 1. Genetically Modified Varieties of *Zea mays* (maize and sweet corn).

Event	Company	Description	35S Promoter	Nos 3'Terminator	Other element	Date of environmental approval (country)
Bt176	Syngenta Seeds NatureGard, Maximizer	Insect-resistant (cry1Ab), <i>bla</i> and also non-expressed PAT	Yes	No		1995 (US)
BT11 (X4334CBR, X4734CBR)	Syngenta Seeds Yieldgard	Insect-resistant (cry1Ab) & glufosinate-tolerant (PAT)	Yes	Yes		1996 (US) 2004 (EU)
CBH-351 (StarLink)	Bayer CropScience	Insect-resistant (cry) & glufosinate-tolerant (PAT)	Yes	Yes		1998 (US)
GA21 <sup>2</sup>	Syngenta Roundup Ready	Glyphosate-tolerant (EPSPS)	No	Yes		1997 (US) 2006 (EU)
MON80100	Monsanto	Insect-resistant (cry)	Yes	Yes		1995 (US)
MON802	Monsanto YieldGard	Insect-resistant (Cry1Ab) & glyphosate-tolerant (cp4 epsps), <i>gox</i> and <i>nptII</i> genes	Yes	Yes		1997 (US)
MON810	Monsanto YieldGard	Insect-resistant (Cry1Ab)	Yes	Yes		1995 (US)
MON832	Monsanto Roundup Ready	Glyphosate-tolerant ( <i>gox</i> , <i>cp4 epsps</i> and <i>nptII</i> )	Yes	Yes		Not approved (Canada only)
MON863	Monsanto YieldGard	Insect-resistant ( <i>cry3Bb1</i> and <i>nptII</i> )	Yes	Yes		2003 (US) 2006 (EU)
MS3 (InVigor)	Bayer CropScience	Male sterility (barnase) & glufosinate-tolerant ( <i>bar</i> and <i>bla</i> )	Yes	Yes		1996 (US)
MS6 (InVigor)	Bayer CropScience	Male sterility (barnase) & glufosinate-tolerant (PAT)	Yes	Yes		1999 (US)
NK603	Monsanto Roundup Ready	Glyphosate-tolerant (EPSPS)	Yes	Yes		2000 (US) 2004 (EU)
T25	Bayer CropScience	Glufosinate-tolerant (PAT and <i>bla</i> )	Yes	No		1995 (US)
T25 x MON810	Pioneer Hi-Bred	Glufosinate-tolerant (pat) & insect-resistant (cry1Ab)	Yes	Yes		10

<sup>2</sup> Discontinued in 2001 in Canada, Demeke *et al* – Adventitious presence of GMOs, Canadian Grain Commission. 16 August 2005.

Event	Company	Description	35S Promoter	Nos 3'Terminator	Other element	Date of environmental approval (country)
TC1507 DAS1507	Mycogen/ Pioneer Overseas Corp. Herculex	Insect-resistant ( <i>cry1Fa2</i> ) and glufosinate- tolerant (PAT)	Yes	No		2001 (US) 2006 (EU)
MON810 x NK603	Monsanto	Stacked insect resistant ( <i>cry1Ab</i> ) & glyphosate-tolerant ( <i>cp4 epsps</i> )	Yes	Yes		2004 <sup>3</sup> (EU)
MON88017	Monsanto	Glyphosate-tolerant (EPSPS) & insect resistant ( <i>cry</i> )				2005 (US)
LY038	Monsanto	Enhanced lysine level (cDHDPS)	No	No	cordapA	2006 (US)
MON810 x LY038	Monsanto	Stacked insect resistant ( <i>cry</i> ) & enhanced lysine level (cDHDPS)	Yes	Yes		<sup>10</sup>
MON863 x NK603	Monsanto	Stacked insect resistant ( <i>cry</i> ) & glyphosate- tolerant (EPSPS)	Yes	Yes		<sup>10</sup>
MON863 x MON810	Monsanto	Stacked insect resistant ( <i>cry</i> )	Yes	Yes		<sup>10</sup>
MON810 x MON863 x NK603	Monsanto	Stacked insect resistant ( <i>cry</i> ) & glyphosate- tolerant (EPSPS)	Yes	Yes		<sup>10</sup>
MON810 x GA21	Monsanto	Stacked insect resistant ( <i>cry1Ab</i> ) & glyphosate-tolerant ( <i>epsps</i> )				2005 <sup>10</sup> (EU)
MON810 x MON88017	Monsanto	Stacked insect resistant ( <i>cry</i> ) & glyphosate- tolerant (EPSPS)	Yes	Yes		<sup>10</sup>
TC1507 x DAS59122- 7	Dow AgroSciences & Pioneer Hi-Bred	Stacked insect resistant ( <i>cry</i> ) & glufosinate-tolerance (PAT)				2006 (Japan)
MIR604	Syngenta	Insect-resistant ( <i>cry3A</i> )	No	Yes		2007 (US)
Event 3272	Syngenta	Modified amylase for ethanol production	No	Yes		2007 (US)
MON89034	Monsanto	Resistance to lepidopteran pests ( <i>cry1A.105</i> and <i>cry2Ab</i> )	Yes	Yes		2008 Canada & Australia 2007 (US) 2008 (Japan)

<sup>3</sup> This stacked maize hybrid is a product of traditional plant breeding, and is not automatically subject to regulation in all jurisdictions. Certain jurisdictions may request notification in advance of the release of a stacked hybrid, or may request information to conduct an environmental and food safety assessment.



DLL25 (B16) Dekalb Genetics – withdrawn from market, discontinued prior to 2001 season<sup>4</sup>  
DBT418 Dekalb genetics Bt Xtra – withdrawn from market, discontinued prior to 2000 season<sup>11</sup>

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<sup>4</sup> Demeke *et al* – Adventitious presence of GMOs, Canadian Grain Commission. 16 August 2005.

## Appendix 2. Genetically Modified Varieties of *Brassica napus* var. *oleifera* (oilseed rape)

Event	Company	Date of environmental approval (country)	Description	Promoter	Other Elements	Traits				Terminators
						Glyphosate resistance EPS PS	GOX	Glufosinate resistance PAT	BAR	
23-18-17, 23-198	Monsanto	1994 US 1996 Canada	High laureate & myristate canola		BayTE and <i>nptII</i> genes. (modified Thioesterase)	No	No	No	No	
HCN10	Bayer CropScience Innovator, Liberty Link	1995 US 1995 Canada 1997 Japan 2003 Australia	Laurical canola Glufosinate herbicide tolerance		<i>nptII</i>	No	No	Yes	Yes	
GT73, RT73	Monsanto Roundup Ready	1999 US 2003 Australia 1995 Canada Japan 1996	Glyphosate herbicide tolerance	FMV35S		Yes	Yes	No	No	CTP2 CTP1
MS8, Rf3, MS8 x Rf3	Bayer CropScience InVigor	1999 US 2003 Australia 1996 Canada 1998 Japan	Glufosinate herbicide tolerance & fertility restored	plant	<i>Barnase</i> , <i>barstar</i> and <i>bar</i> genes	No	No		Yes	
GS 40/90 Falcon T45 <sup>5</sup>	Bayer CropScience Bayer CropScience Excel, Liberty Link	2004? US 2004 EU	Glyphosate herbicide tolerance Herbicide resistance (glufosinate)	CMV35S		No	No	Yes	Yes	

Bayer CropScience Oxy 235 – last seed sales in 2001<sup>12</sup>

Bayer CropScience Topas 19/2, MS1/Rf1, and MS1/Rf2 – last seed sales in 2003<sup>12, 13</sup>

Bayer CropScience HCN92 Liberty Link – last seed sales in 2003<sup>6</sup>

<sup>5</sup> Biotrade Status - [http://www.biotradestatus.com/query\\_results.cfm](http://www.biotradestatus.com/query_results.cfm)

### Appendix 3. Genetically Modified Varieties of Glycine max (soybean)

Event	Company	Date of environmental approval (country)	Promoter	Selectable Markers	Antibiotic Markers		Traits				Terminators	
			P35S	GUS	Amp <sup>r</sup>	NptII	Glyphosate resistance		Glufosinate resistance		T35S	NOS
							EPSPS	GOX	PAT	BAR		
G94-1, G94-19, G168	DuPont Optimum	1997 US	Yes	Yes	Yes	No	No	No	No	No	No	Yes
		2000 Canada										
		1999 Japan										
GTS 40-3-2 MON040302	Monsanto Roundup Ready	1994 US	Yes	No	No	Yes	Yes	No	No	No	No	Yes
		1996 Argentina										
		1998 Brazil										
		1995 Canada										
		1996 Japan										
		1998 Mexico										
MON89788 DP356043	Monsanto Pioneer Hi-Bred International	2001 Sth Africa	Yes	No	No	No	Yes	No	No	No	No	Yes
		1997 Uruguay										
		2007 US										
		2007 US	No	No	No	No	No	No	No	No	No	No
			(SAMS)								(PINII)	

<sup>6</sup> Demeke *et al* – Adventitious presence of GMOs, Canadian Grain Commission. 16 August 2005.

#### Appendix 4. Genetically modified varieties of *Gossypium hirsutum* (cotton)

Event	Company	Description	Genetic elements	Date of approval
BXN <sup>TM</sup> cotton – 10215-4	Monsanto/Calgene	Oxynil herbicide tolerance	<i>Bxn</i> and <i>nptII</i>	2004 US 1997 Japan 2004 US
DAS-24236-5 x DAS-21023-5 Wildstrike <sup>TM</sup>	Dow AgroSciences	Herbicide tolerance (glufosinate) & insect resistance	bar, PAT, cry	US <sup>12</sup>
DAS-24236-5 x DAS-21023-5 x MON88913-8 Widestrike <sup>TM</sup>	Dow AgroSciences	Herbicide tolerance (glufosinate & glyphosate) and insect resistance	EPSPS, bar, PAT, cry	US <sup>7</sup>
DAS-24236-5 x DAS-21023-5 x MON1445-2 Wildstrike <sup>TM</sup> /RoundupReady <sup>R</sup>	Dow AgroSciences	Herbicide resistance	EPSPS	2005 EU 2006 Australia
LLCotton25	Bayer CropScience	Herbicide resistance	P35s::bar (PAT)::3' nos	2004 EU 2003 Australia
LLCotton25 x MON15985	Bayer CropScience	Herbicide resistance Insect-resistance	P35s::bar (PAT)::3' nos, cry1A(c)	2002 Australia 2006 Australia
MON1445/1698	Monsanto Roundup Ready	Herbicide resistance	<i>cp4 epsps</i> , <i>nptII</i> & <i>aad</i> genes	2004 EU 2003 Australia
MON15985	Monsanto	Insect-resistance	cry1A(c)	2006 Australia
MON1445 x MON15985	Monsanto	Herbicide resistance & insect-resistance	EPSPS & cry1A(c)	2004 EU 2003 Australia
MON531/757/1076	Monsanto	Insect resistance	<i>cry1A(c)</i> , <i>aad</i> and <i>nptII</i> genes	2004 EU 2006 Australia
MON531 x MON1445	Monsanto	Herbicide resistance & insect-resistance	EPSPS & cry1A(c)	2004 EU 2006 Australia
MON88913-8	Monsanto	Herbicide resistance	EPSPS	2006 Australia
MON88913-8 x MON15985	Monsanto	Herbicide resistance & insect-resistance	EPSPS & cry1A(c)	2006 Australia

## Appendix 5. Other genetically modified crop varieties

Crop	Event	Company	Description	Genetic elements	Date of approval
<i>Medicago sativa</i> lucerne <sup>8</sup>	J101, J163 J101 x J163	Monsanto	Herbicide tolerance (glyphosate)	FMV promoter, EPSPS	2005 US
<i>Cucurbita pepo</i> yellow crook-neck squash	CZW3	Monsanto (Seminis)	Virus resistance	CMV <i>cp</i> , ZYMV <i>cp</i> , WMV2 <i>cp</i>	1996 US
<i>Cucurbita pepo</i> yellow crook-neck squash	ZW20	Monsanto (Seminis)	Virus resistance	ZYMV <i>cp</i> , WMV2 <i>cp</i>	1994 US
<i>Radicchio rosso</i> chicory	RM3-3, RM3-4, RM3-6	Bejo Zaden seeds	Herbicide tolerance (glufosinate)  Male sterility	pTA 29, bar, PAT, PSsuAra	1996 Netherlands  1997 US
<b>Carnation</b>	4,11,15,16,66,959A, 988A, 1226A, 1351A, 1400A	Florigene	Altered flower colour, longer shelf life	SuRB, 35S, F3'5'H, DFR	2003 Australia  (moved to GMO register 27 March 2007)
<i>Nicotinium tabacum</i> tobacco	ITB 1000 OX	Seita	Herbicide tolerance (Oxynil)  Male sterility	tNos, RuBisCo SSU promoter, nitrilase	1994 EU (marketing only)
	Vector 21-41	Vector Tobacco Inc.	Nicotine reduced	NtQPT1, nptII	2002 US
<i>Carica papaya</i>	Rainbow	Cornell	Virus resistance	<i>nptII</i> , <i>gus</i> & CMV/PRV	1996 US

Crop	Event	Company	Description	Genetic elements	Date of approval
papaya	SunUp	University		<i>cp</i> genes	
<i>Lycopersicon esculentum</i> tomato	1345-4	DNA Plant Technology Corporation	Delayed fruit ripening	Truncated ACC	1995 US
	B, Da, F (1401F, H282F, 11013F and 7913F)	Zeneca Seeds	Delayed softening	Truncated PG	1995 US
	35 1 N	Agritope Inc.	Delayed fruit ripening	SAMase	1996 US
<i>Linum usitatissimum</i> Linseed FP967	CDC Triffid	University of Saskatchewan	Sulfonylurea herbicide tolerance	<i>als</i> , <i>nptII</i> , <i>bla</i> , <i>nos</i> & <i>spc</i> genes	1999 US
<i>Solanum tuberosum</i> potato	SEMT15-02 and SEMT15-15 Shepody NewLeaf™ Y potato	Monsanto	Beetle resistance  Potato virus Y resistance	<i>cry3A</i> , <i>nptII</i> , <i>aad</i> , & <i>PVY</i> <i>cp</i> genes	1999 US 1999 Canada
	EH92-527-1 (Amflora)	BASF	Amylopectin (starch production industry)	Pnos, <i>nptII</i> , tNos, <i>gbss</i>	2005 US
<i>Beta vulgaris</i> sugar beet	H7-1	Monsanto	Herbicide tolerance (Glyphosate)	EPSPS, 35S FMV promoter, <i>rbcS</i> E9, <i>nos</i>	2004 EU 2005 US 2007 Japan
<i>Oryza sativa</i> rice	LL601	Bayer CropScience	Herbicide tolerance (glufosinate)	Bar, pat	2006 US
<i>Prunus domestica</i> C5 plum	C5 plum	USDA-ARS	Plum pox virus resistance	CaMV 35S, <i>nos</i> 3', <i>nptII</i> , <i>uidA</i> , <i>PPV cp</i> gene	2007 US

