



**Current Awareness of Experimental and Commercial  
Releases of GM Crops Worldwide:**

**Quarterly Summary Report for  
October to December 2005**

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Provided for:  
Plant Variety Rights Office and Seeds Division, Defra

## Contents

Section	Description	Page
	<b>Executive Summary</b>	<b>1</b>
<b>1.</b>	<b>Introduction</b>	<b>1</b>
<b>2.</b>	<b>News concerning GM crops</b>	<b>2</b>
2.1	Headline news	2
2.2	Additional news	2
<b>3.</b>	<b>GM Crop Release Information</b>	<b>3</b>
3.1	Major Agricultural GM Crops – Category 1	3
3.2	Major Agricultural (& Horticultural) GM Crops – Category 2	6
3.3	Minor Agricultural GM Crops	7
3.4	GM Vegetable and GM Fruit Crops	7
3.5	Major GM Flower/Ornamental Crops	8
3.6	Minor GM Flower/Ornamental Crops	8
3.7	Miscellaneous GM species	9
<b>4.</b>	<b>Additional Information</b> - notes to be used in conjunction with charts and tables	<b>10</b>
	<b>ANNEX 1 – Sources of information/Notes</b>	<b>10</b>

## **Executive Summary**

This is the third quarterly report in an ongoing series monitoring worldwide releases of genetically modified (GM) crops, and covers the period October to December 2005. The report provides summary information for all known experimental and commercial release notifications within the specified reporting period. It also highlights any significant developments that have occurred in terms of GM technology and draws attention to any unauthorised releases of GM crops reported by the media.

In terms of GM-related news articles (Section 2), Germany has for the first time approved the commercial cultivation of GM crops, in the form of 3 varieties of MON 810 maize. In other news France and Germany have received final warnings of legal action unless they incorporate EU directive 2001/18/EC into their national laws; officials in Brazil have discovered illegal GM maize seed for sale; and Switzerland has voted to ban the cultivation and use of GM crops until 2010.

With regard to GM trials (Section 3), during the current reporting period there have been 88 notifications for the experimental release of GM maize, and this crop continues to be the most prolific GM species in terms of total number of trials despite a decline in the number of maize releases compared to the previous reporting period. Maize traits include herbicide tolerance, insect resistance, increased yield and altered oil. Most maize releases have taken place in the USA and Canada, but there have been single-figure releases in Japan, the Czech Republic and Spain. Oilseed rape has seen the greatest GM trials activity this quarter, with 128 notifications. The main traits associated with these releases, all of which have taken place in North America, include herbicide tolerance, yield enhancement, modified oil and altered fertility. Other significant experimental releases of agricultural crops include: soyabean (26 notifications, including herbicide tolerance, modified oil and insect resistance, all taking place in N. America); wheat (15 notifications, mostly in Canada and chiefly concerned with disease resistance); and alfalfa (17 notifications, the majority in the USA and mostly employing Glyphosate resistance). There have also been a number of GM releases of potato (13 notifications, mainly fungal resistance, including releases in Germany, Sweden and the Netherlands) and sugar beet (2 notifications, both in Canada and both employing herbicide tolerance). In terms of lower-volume agricultural crops there have been 15 notifications involving GM mustard (most taking place in Canada and employing the herbicide tolerant trait, but also some in Australia and the USA); and 1 release of GM barley (trait unknown) taking place in the USA. In the case of flower/ornamental crops, there have been 11 notifications for GM safflower trials during the reporting period (the majority of which have been in Canada and have employed the herbicide tolerance trait) and there have been 2 approvals for trials of GM rose plants (both in the USA and both for altered flower colour). The USA and Canada continue to undertake trials of herbicide tolerant creeping bentgrass, with a total of 10 trials, including salt tolerance, herbicide tolerance and fungal resistance; and the USA, Canada and Japan have all undertaken releases of GM trees, with 15 trials this quarter, including altered lignin, enhanced growth, salt tolerance and disease resistance. There have been no releases of GM vegetable or fruit crops this quarter. In total there have been 343 experimental release notifications during this reporting period. In addition there has been 1 new approval for the commercial release of GM maize (herbicide tolerant and insect resistant) in the USA this quarter.

## 1. Introduction

This is the third in an ongoing series of surveillance reports looking at the status of GM crop releases worldwide and covers the reporting period of October to December 2005. The report is produced on behalf of UK Plant Variety Rights Office & Seeds Division of Defra (PVS) and gives details of the numbers of experimental trial notifications issued for GM crops by the relevant competent authorities during the specified reporting period. The report also highlights those countries where the commercial cultivation of GM crops has been authorised. Findings are presented in terms of plant species that have undergone genetic modification, including the types of introduced trait and the countries where experimental trials have been conducted. A news section aims to highlight any significant developments in GM-related issues and flag up any reported incidents of unauthorised GM crop release. The aim of these surveillance reports is to maintain current awareness of the number and types of GM plant releases taking place around the world, with the aim of helping to inform policy makers and those that implement seed-related policy about the potential risks of GM releases to UK seed. Any newly identified risks, such as the commercialisation of additional GM species around the world are also highlighted. The crop types that have been included in this reports belong to species which are grown in the UK, or where there is a possibility that they may be grown in the UK. Some borderline species (e.g. sweet potato) have been included because, although they are not grown widely in the UK, they are currently available to the UK amateur market. GM crops such as cotton and rice, which are unlikely to be grown in the UK in the foreseeable future, are not included in this report.

## 2. News concerning GM crops

The following GM-related articles have appeared in the news during the period October to December 2005:

### 2.1 Headline news

#### **Germany Starts Sowing GM Seeds For First Time**

In December the German Federal Office for Plant Registration approved the commercial cultivation of three genetically modified maize varieties. Although the distribution of approved transgenic plants from other European countries has previously been authorized in Germany, this is the first time a genetically engineered plant has been approved for cultivation in the country. The three MON 810 maize varieties have been developed by Monsanto and Pioneer for resistance to corn borer. With the advent of the new coalition government, many in the GM industry are seeing this approval as a turning-point for biotech crops in Germany.

(See: <http://www.dw-world.de/dw/article/0,2144,1831085,00.html>)

### 2.2 Additional news -

#### **EU warns France and Germany over lapses in GMO laws**

In December France and Germany received final warnings of legal action and possible fines unless they quickly update their national laws on GM foods and crops. The European Commission stated that it had issued its last written warnings to both countries for failing to integrate EU directive 2001/18/EC concerning the deliberate release into the environment of GMOs into their national statute books. The directive, agreed by EU Member States in 2001, is the cornerstone of the EU's legislative framework on GMOs. The warnings are the final chance for both countries to update their legislation before the Commission is entitled to ask the European Court of Justice

(ECJ) to impose financial penalties. EU governments had a deadline of October 2002 to revise their national laws to include the directive. France and Germany had failed to comply with an ECJ judgement from 2004, and then proceeded to ignore warnings from Brussels, the Commission said. Germany has failed to adopt an additional law needed to integrate the EU directive into its national statute book and France had only partially integrated it and has still not specified when it would fully integrate it.

(See: <http://www.agbios.com/main.php?action=ShowNewsItem&id=7119>)

### **Illegal GM maize seed found in Brazil**

Also in December it was reported that GM maize was being illegally sold in the southern Brazilian state of Rio Grande do Sul. Investigators found that over 25% of maize seed purchased from one company consisted of line GA21 (produced by Monsanto). The GM seed is understood to have been smuggled from Argentina. In November 2005 Brazil enacted a law allowing GM crop commercialisation in the country, however seed companies must obtain permission to sell such crops from Brazil's National Commission for Biosafety (CTNBio). As yet no permission has been granted for growing GM maize in Brazil because of fear it might contaminate native species. In 2003 it was found that about 90 per cent of the soya grown in Rio Grande do Sul was GM due to seeds smuggled from Argentina. Currently no maize or soya from Brazil is imported into the UK as seed for sowing.

(See: <http://www.scidev.net/dossiers/index.cfm?fuseaction=dossierreaditem&dossier=6&type=1&itemid=2517&language=1>)

### **Switzerland votes for a five-year ban on GMOs**

Following a referendum in November the Swiss public voted in favour of a five-year moratorium on the farming of genetically modified crops. Over 55% voted for the ban. Swiss farmers will now be prohibited from growing GM crops or using GMO's in their animal feed until 2010. The result reflects the widespread scepticism in Switzerland about the use of GMOs in farming.

(See: <http://www.euractiv.com/Article?tcmuri=tcm:29-150075-16&type=News>)

## **3. GM Crop Release Information**

The following section provides information on the number of experimental releases of GM crops during the period October to December 2005. It also highlights those GM crops that have undergone commercialisation, showing the countries that have given approval for cultivation. Data has been sourced from online databases and general web searches, and the number of experimental releases is primarily based on notifications issued by the relevant national or federal authorities (see Note 1 under Section 4 for a definition of the term 'notification'). Here, as in previous surveillance reports, stacked bar charts and accompanying tables summarise this information on a country by country basis and specify the predominant GM traits.

For ease of comparison GM crop releases have been grouped on the basis of crop type and number of notifications, with categories consisting of: Agricultural & Horticultural Crops (split between crops for which there has been a very large number of experimental releases, e.g. maize and oilseed rape, and crops where there have been fewer releases e.g. mustard and barley); Vegetable and Fruit Crops; Flower/Ornamental Crops; and Miscellaneous species (those plant species which do not easily fall into the above categories). It should be noted that data concerning Canada covers the total number of experimental releases conducted in 2005 in that country (the Canadian Food Inspection Agency publishes GM crop release information annually), and this data has significantly boosted the number of experimental releases reported for this quarter.

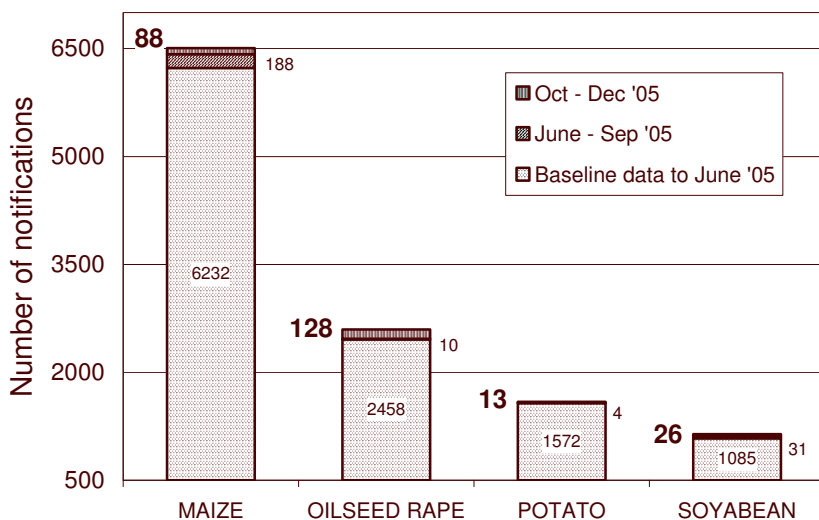
### 3.1 Major Agricultural GM Crops - Category 1 (over 1000 experimental releases per species)

At over 6500 notifications in total, maize remains unchallenged as the most prolific GM crop in terms of number of overall experimental releases (see figure 1). This is despite there being a drop in the number of maize releases compared with the previous quarter (88 notifications compared with 188 for July - September '05). This decrease is not surprising, however, as most GM trials activity is concentrated in USA and Canada which have now entered their Winter season. Other countries that have issued notifications for GM maize trials this quarter are Japan, the Czech Republic and Spain. Most of the reported GM traits are fairly standard, including herbicide tolerance, insect resistance and increased yield (see table 1). Altered oil does however appear to be a new attribute for maize, although there is no indication whether the oil has been altered for industrial or food use.

Oilseed rape, despite only being second in terms of total GM releases, has seen the greatest number of field releases (128 notifications) in the current reporting period. The numbers have no doubt been boosted by the annual release figures recently issued by Canada (Canada only publishes GM-trials notifications on a yearly basis). The main traits involved include herbicide tolerance, yield enhancement, modified oil and altered fertility.

Other experimental releases of major GM crops are potato (13 notifications, mainly fungal resistance) with releases in Germany, Sweden and the Netherlands, and soyabean (26 notifications, including herbicide tolerance, modified oil and insect resistance).

**Figure 1 – Total number of experimental release notifications of Major Agricultural GM Crops**



**Notes to be used in conjunction with graphs:** Numbers within bars indicate releases prior to April 2005 (baseline data) for each crop species; numbers adjacent to bars show the number of releases per subsequent quarter. Releases for the current quarter are shown in **bold**.

In terms of commercial releases, the USDA's Animal and Plant Health Inspection Service (APHIS) has recently (14/12/05) granted deregulated status for Monsanto's MON 88017 maize, thus clearing the way for commercialisation in the USA (see table 1, overleaf). MON 88017 is a herbicide tolerant (Roundup Ready) and insect resistant variety designed to guard against corn rootworm. This is the 19<sup>th</sup> GM maize variety to be approved for commercialisation in the USA.

**Table 1 – GM releases of Major Agricultural GM Crops in the last quarter showing number of releases per country, main GM traits, and commercial status**

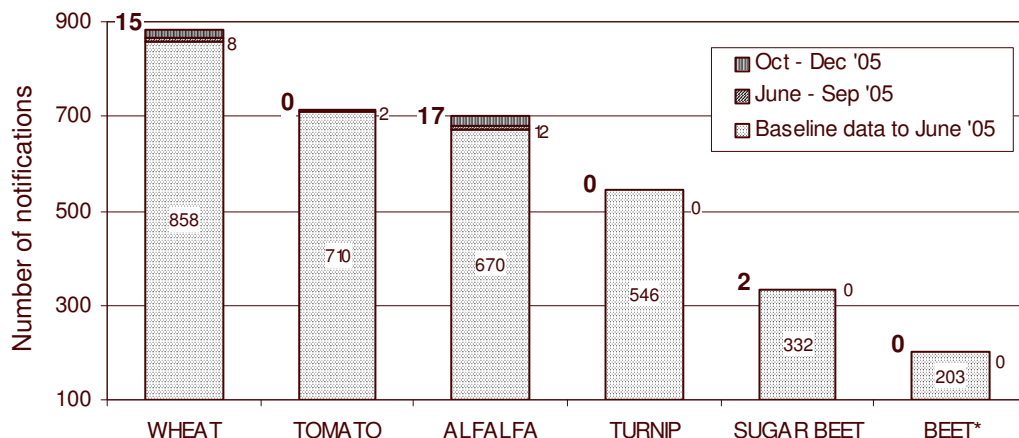
CROP TYPE	RELEASES THIS QUARTER	COUNTRY	MAIN TRAITS	COMMERCIAL STATUS <sup>1</sup>
MAIZE incl. sweetcorn  ( <i>Zea mays</i> L.)	36	Canada	Insect resistance; herbicide tolerance; modified oil	EU – 3 notifications APPROVED (cultivation); 4 notifications PENDING (cultivation)
	1	Czech Republic	Herbicide tolerance	
	3	Japan	Herbicide tolerance & insect resistance	USA – 18 notifications APPROVED
	1	Spain	Glyphosate tolerance & insect resistance	USA - 1 additional notification approved
	47	USA	Herbicide tolerance; insect resistance; altered oil; increased yield; altered fertility;	Other countries with approval for commercialisation incl.: Argentina; Canada; South Africa; Japan; Philippines; Uruguay
OILSEED RAPE ( <i>Brassica napus</i> )	122	Canada	Herbicide tolerance; enhanced yield; modified oil; fertility restoration	Canada – 4 notifications APPROVED
	6	USA	Insect resistance; stress tolerance;	EU – 3 notifications APPROVED (1 for seed for breeding activities only; 2 for cultivation for which France has not issued the consent); 4 notifications PENDING (cultivation). USA – 7 notifications APPROVED
POTATO ( <i>Solanum tuberosum</i> )	8	Canada	Fungal resistance; stress tolerance	USA – 5 notifications APPROVED (4 for Colorado potato beetle resistance 1 for Coleopteran resistance)
	1	Germany	Increased stomata density	
	1	Sweden	Fungal resistance	
	3	Netherlands	Fungal resistance; altered starch	
SOYABEAN ( <i>Glycine max</i> )	6	Canada	Modified oil; herbicide tolerance	Numerous notifications APPROVED for Roundup Ready soybean, incl.:
	20	USA	Herbicide tolerance; insect resistance; altered oil; bacteria resistance	Argentina Brazil Canada Japan Mexico South Africa USA Uruguay

<sup>1</sup> 'Commercial Status' highlights those GM crops for which approval for *commercial cultivation* has been granted in the specified country. It does not include GM crops that have been approved only for food and/or feed use (i.e. not for sowing). Any new approvals granted within the current reporting period are shown in **bold** within a greyed-out cell.

### 3.2 Major Agricultural (and Horticultural) GM Crops - Category 2 (200 to 1000 experimental releases per species)

During the current reporting period there have been 15 notifications relating to GM wheat, most granted by Canada and most concerned with disease resistance; 17 GM alfalfa notifications, mostly by the USA and employing Glyphosate resistance; and 2 GM sugar beet notifications, both for Canada and both employing herbicide tolerance.

**Figure 2 – Total number of experimental release notifications of Major Agricultural (and Horticultural) GM Crops**



\*The term 'Beet' is not defined in the database from which the information was extracted, and may be either sugar beet or fodder beet

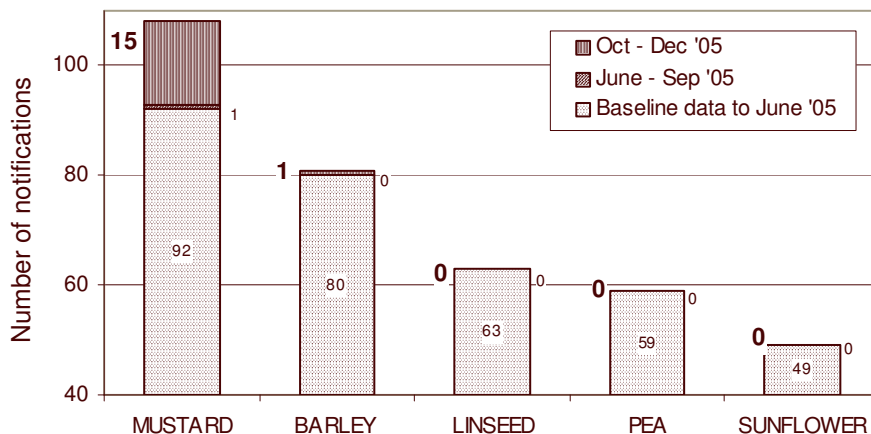
**Table 2 – GM releases of Major Agricultural GM Crops in the last quarter showing number of releases per country, main GM traits, and commercial status**

CROP TYPE	RELEASES	COUNTRY	MAIN TRAITS	CURRENT COMMERCIAL-ISATION STATUS
WHEAT ( <i>Triticum aestivum</i> L.)	11	Canada	Disease resistance; fungal resistance; herbicide tolerance	None
	4	USA	Starch level increased; Fusarium resistant; storage protein altered	
ALFALFA ( <i>Medicago sativa</i> L.)	4	Canada	Altered flavonoid patterns; antibiotic resistance	USA – 1 notification APPROVED (Roundup Ready)
	13	USA	Glyphosate tolerance	
SUGAR BEET ( <i>Beta vulgaris</i> L.)	2	Canada	Herbicide tolerance	USA – 2 notifications APPROVED (Glyphosate tolerance & Glufosinate tolerance)

### 3.3 Minor Agricultural GM Crops

During the reporting period there have been 15 notifications for GM mustard (*Brassica juncea*), mainly in Canada, but also single-figure releases in Australia and the USA. Most have employed the herbicide tolerant trait. In addition there has been 1 notification for GM barley (trait unknown) in the USA.

**Figure 3 – Total number of experimental release notifications of Minor Agricultural GM Crops**



**Table 3 – GM releases of Major Agricultural GM Crops in the last quarter showing number of releases per country, main GM traits, and commercial status**

CROP TYPE	RELEASES	COUNTRY	MAIN TRAITS	COMMERCIAL STATUS
MUSTARD	2	Australia	Herbicide tolerance	None
	12	Canada	Herbicide tolerance; fertility restoration	
	1	USA	Herbicide tolerance	
BARLEY ( <i>Hordeum vulgare</i> L.)	1	USA	Unknown	None

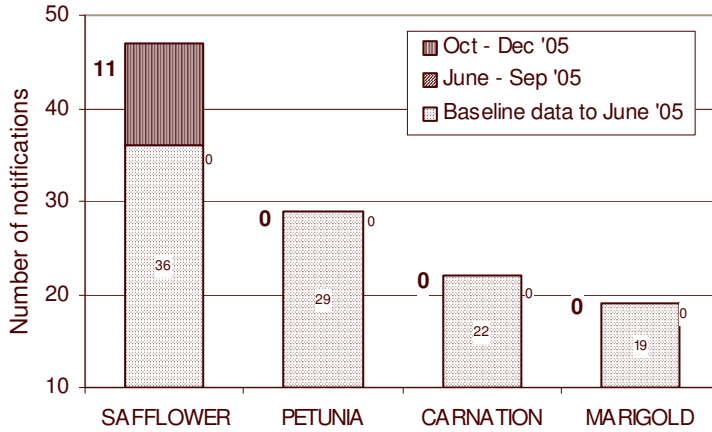
### 3.4 GM Vegetable Crops and GM Fruit Crops

No notifications this quarter - interrogation of online databases and general web searches indicate have been no releases of GM fruit or vegetables this quarter.

### 3.5 Major GM Flower/Ornamental Crops

There have been 11 approvals for GM safflower trials during the reporting period. The majority have been in Canada and have employed the herbicide tolerance trait.

**Figure 5 – Total number of experimental releases of Major GM Flower/Ornamental Crops**



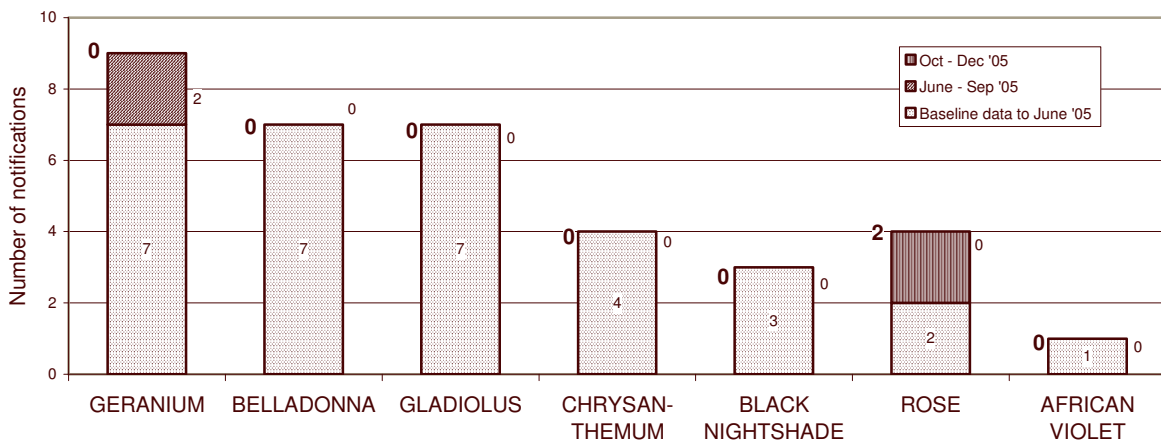
**Table 4 – GM releases of Major GM Flower/Ornamental Crops in the last quarter showing number of releases per country, main GM traits, and commercial status**

CROP TYPE	TOTAL	COUNTRY	MAIN TRAITS	CURRENT COMMERCIALISATION STATUS
SAFFLOWER ( <i>Carthamus tinctorius</i> L.)	9	Canada	Herbicide tolerance	None
	2	USA	unknown	

### 3.6 Minor GM Flower/Ornamental Crops

There have been 2 approvals for trials of GM roses in the USA during the reporting period, both for altered flower colour.

**Figure 6 – Total number of experimental releases of Major GM Flower/Ornamental Crops**



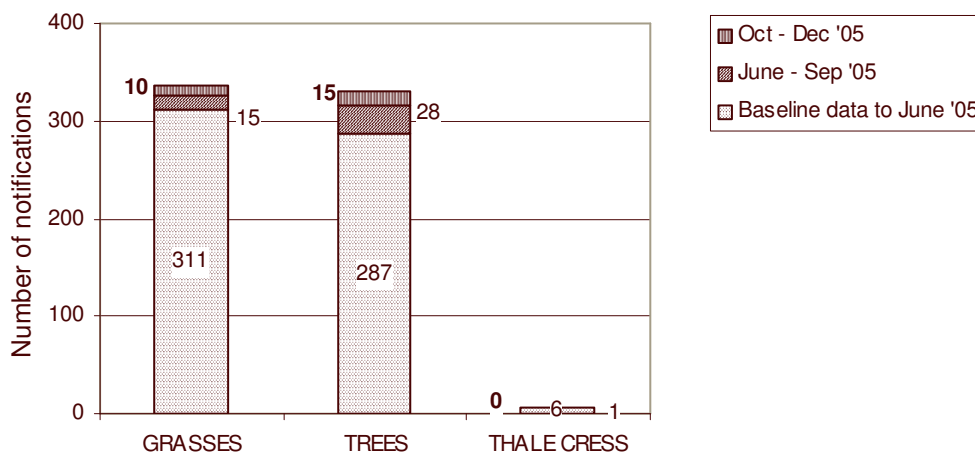
**Table 6 - GM releases of Major GM Flower/Ornamental Crops in the last quarter showing number of releases per country, main GM traits, and commercial status**

CROP TYPE	TOTAL	COUNTRY	MAIN TRAITS	CURRENT COMMERCIAL-ISATION STATUS
ROSE ( <i>Rosa</i> sp.)	2	USA	Altered flower colour	None

### 3.7 Miscellaneous GM Species

The USA and Canada continue to undertake trials of herbicide tolerant Creeping Bentgrass, with a total of 10 trials in this quarter, including salt tolerance, herbicide tolerance and fungal resistance (see table 7). The USA, Canada and Japan have all undertaken releases of GM trees, with 15 trials this quarter, including altered lignin, enhanced growth, salt tolerance and disease resistance.

**Figure 7 – Total number of experimental releases of Miscellaneous GM crops.**



**Table 7 – GM releases of Major GM Flower/Ornamental Crops in the last quarter showing number of releases per country, main GM traits, and commercial status**

CROP TYPE	RELEASES	COUNTRY	MAIN TRAITS	CURRENT COMMERCIAL-ISATION STATUS
GRASS (various incl. creeping bentgrass & Bahiagrass)	3	Canada	Herbicide tolerance	USA – 1 application PENDING (Creeping bentgrass, Glyphosate tolerant, Monsanto).
	7	USA	Salt tolerance; fungal resistance; herbicide tolerance	
TREES (various incl. Chestnut, Eucalyptus, Pine, Poplar)	2	Canada	Disease resistance; selectable marker	None
	3	Japan	Salt tolerance	
	10	USA	Altered lignin; enhanced growth; altered fertility; sterility	

## 4. Additional Information/Notes

**NOTE 1 to be used in conjunction with charts and tables:** the number of experimental release trials shown is based on the number of deliberate release ‘notifications’ that have been approved worldwide for each GM species. A notification is a declaration of consent issued by the relevant responsible body allowing the applicant to proceed with the release (subject to any conditions imposed). It should be noted that ‘approved’ refers to the fact that the regulatory authorities have given the go-ahead for the release(s) to take place, it does not indicate that the trials have actually gone ahead (although in the vast majority of cases they will have taken place).

**NOTE 2 to be used in conjunction with charts and tables:** approved notifications often give authorization for several separate releases at different sites. The actual number of release trials, therefore, will be greater than the number of notifications shown in the graphs/tables. This approach, of issuing 1 notification for several trials, seems to apply to most GM regulatory systems, including the EU system.

### ANNEX 1 – Sources of information

The information contained in this report is considered correct at the time of publication. The GM Inspectorate relies on a wide range of data sources to ensure that information presented is up to date and correct, and whilst every care is taken to verify this information the nature of the data sources means that authentication is not always possible. In a number of countries the experimental release of GM crops are not recorded in publicly available databases and the GM Inspectorate therefore cannot account for these.

#### General databases consulted in this study:

<http://www.agbios.com/main.php> & <http://biosafety.ihe.be/>

#### International Field Test Sources: databases consulted in this study:

Argentina: [http://www.sagpya.mecon.gov.ar/0-0/index/programas/conabia/index\\_conabia.htm](http://www.sagpya.mecon.gov.ar/0-0/index/programas/conabia/index_conabia.htm)  
 Australia: <http://www.health.gov.au/ogtr/index.htm>  
 Austria: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Belgium: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Bolivia: <http://webdomino1.oecd.org/ehs/biotrack.nsf>  
 Brazil: <http://www.ctnbio.gov.br/ctnbio/Sistema/LIBERACOESogm.asp>  
 Bulgaria: <http://webdomino1.oecd.org/ehs/biotrack.nsf>  
 Canada: <http://www.cfia-acia.agr.ca/english/plaveg/pbo/pbobbve.shtml>  
 China: <http://www.biosafety.gov.cn/BCHMEN/216172782113783808/index.shtml>  
 Czech Republic: <http://webdomino1.oecd.org/ehs/biotrack.nsf>  
 Denmark: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Egypt: <http://binas.unido.org/binas/trials.php3>  
 Finland: <http://biotech.jrc.it/deliberate/gmo.asp>  
 France: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Germany: [http://www.rki.de/GENTEC/GENENG/GENTEC\\_E.HTM](http://www.rki.de/GENTEC/GENENG/GENTEC_E.HTM)  
 Greece: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Hungary: [http://biosafety.abc.hu/biosafe\\_eng.html](http://biosafety.abc.hu/biosafe_eng.html)  
 Iceland: <http://biotech.jrc.it/deliberate/gmo.asp>  
 India: <http://webdomino1.oecd.org/ehs/biotrack.nsf>  
 Irish Republic: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Italy: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Japan: <http://www.s.affrc.go.jp/docs/sentan/eguide/edevelp.htm> & [http://www.bch.biodic.go.jp/english/e\\_index.html](http://www.bch.biodic.go.jp/english/e_index.html)  
 Luxembourg: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Mexico: <http://www.senasica.sagarpa.gob.mx/pagconasag/svtransgen.htm#ensayo>  
 Netherlands: <http://biotech.jrc.it/deliberate/gmo.asp>  
 New Zealand: <http://www.ermanz.govt.nz/no/index.asp>  
 Norway: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Portugal: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Russian Federation: <http://webdomino1.oecd.org/ehs/biotrack.nsf>  
 South Africa: <http://www.nda.agric.za/docs/GeneticResources/Geneticcontrol.htm>  
 Spain: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Sweden: <http://biotech.jrc.it/deliberate/gmo.asp>  
 Switzerland: <http://webdomino1.oecd.org/ehs/biotrack.nsf>  
 Thailand: [http://biodiversity.biotec.or.th/biosafety/doa/m\\_impmmo.asp](http://biodiversity.biotec.or.th/biosafety/doa/m_impmmo.asp)  
 United Kingdom: <http://biotech.jrc.it/deliberate/gmo.asp>  
 United States: <http://www.isb.vt.edu/cfdocs/fieldtests1.cfm>