# GM in agriculture – what does it mean for British farmers?

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**GM is an inescapably emotive topic. It has attracted an incredible ferocity of campaigning and even criminal damage since it became a commercial reality over a decade ago. Due to the apparent strength of public feeling at that time, it also became a highly political issue in the UK and the rest of Europe. This legacy is the context in which GM crop development and policy must be viewed. However, a new element has now been added to the picture: food security, particularly in the face of climate change, population growth and demographic shifts. There is an increasing recognition and acceptance that we will need every tool at our disposal in order to meet the challenge of producing more but impacting less. The trouble is that, unlike an increasing number of countries (25 in 2008[1]), GM technology is not really at our disposal in this country yet.**

## Current global picture

Despite the impression sometimes given in Europe, GM crops are now a well established part of the global food and feed supply chain. The technology is being applied and used at a rapidly increasing rate (figs 1 and 2). In 2008, 125 million hectares of GM crops were grown around the world, in 25 countries by over 13 million farmers. The top countries in terms of area are US, Argentina, Brazil, India, Canada and China, with 90% of farms growing GM crops being small scale and resource-poor[1]. In Europe, there are over 100,000 hectares of GM maize grown, mostly in Spain but also in Czech Republic, Romania and Portugal. This maize, resistant to the European corn borer pest is the only crop that has been approved for cultivation in EU.

Figure 1

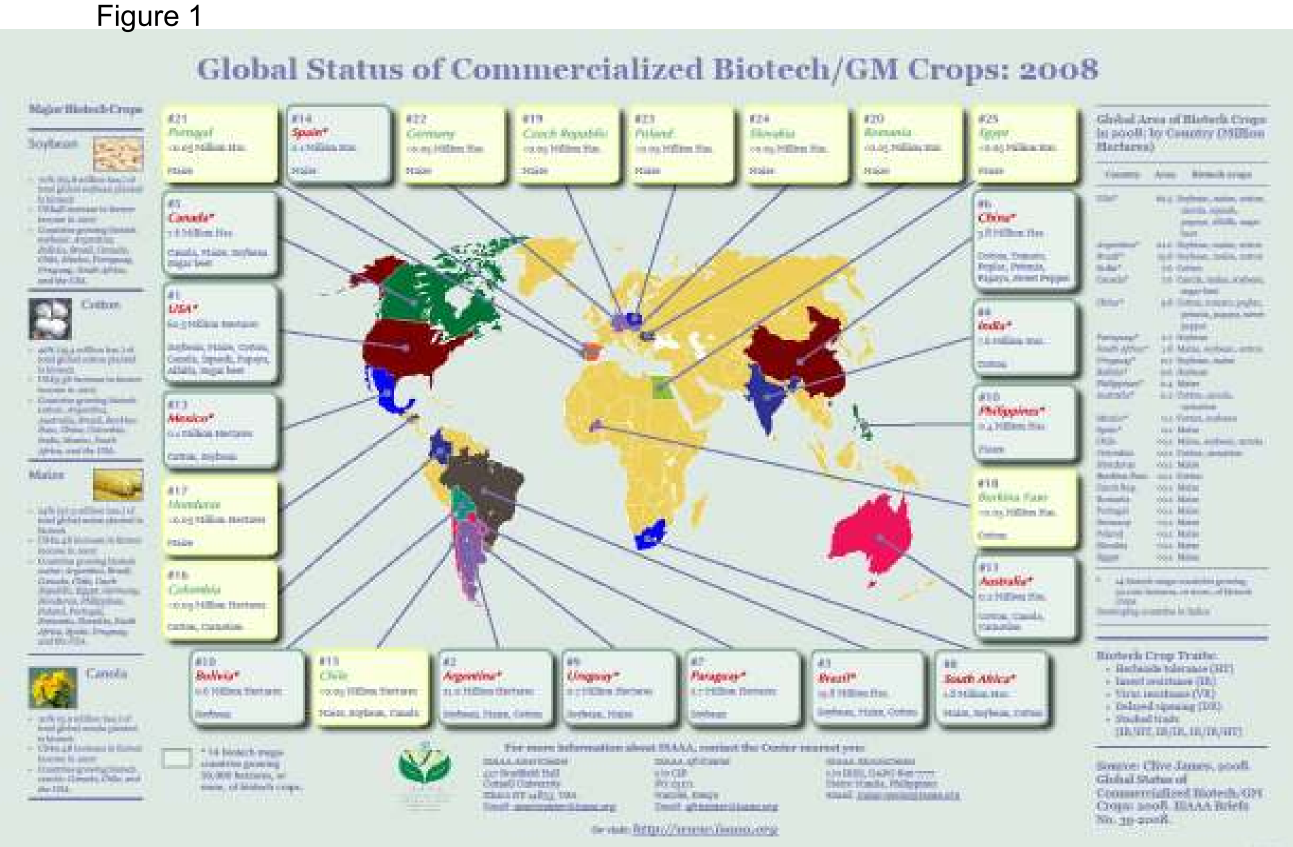
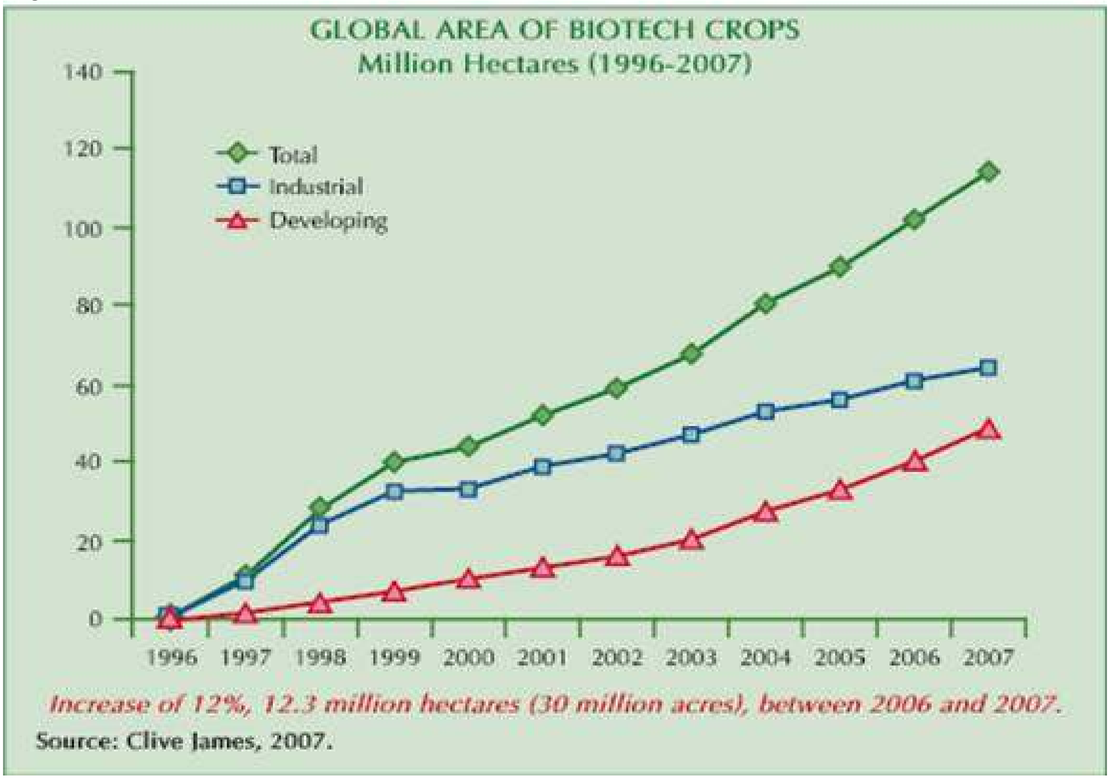


Figure 2




The major crops being grown commercially world wide are soybean, maize, cotton and canola (oilseed rape). Other crops include sugar beet, rice, papaya, squash, carnation, pepper and tomato. The dominant trait remains herbicide tolerance (HT), with insect resistance (Bt) the other main trait, and stacked trait products are increasingly important. There are about 30 GM 'events' now being grown commercially, and a recent estimate by the European Commission's Joint Research Centre estimated this would rise to over 120 in the next 5 years [2]. Figure 3 show the development pipeline for maize, which gives an idea of the types of traits likely to be commercialised in coming years.

**GM sugar beet?**

Beet was one of the crops grown in the UK farm-scale evaluation field trials that started in 1999[3]. The GM variety was tolerant to glyphosate. While interpretation of the results stated that wildlife would be adversely affected due to fewer weeds and therefore less food for birds, this was clearly about weed management rather than the genetically modified nature of the variety. Also, the differences between crop types were found to be much greater than between GM and non-GM varieties.

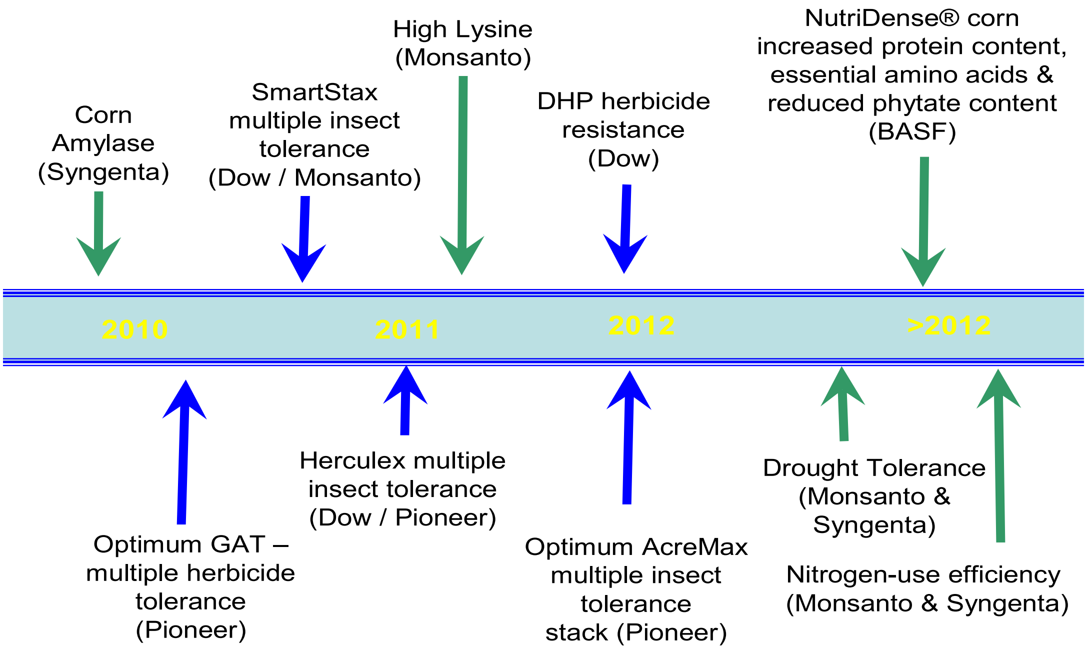
In 2007 the first Roundup Ready® sugar beet (H7-1) was launched in the US and Canada by KWS and Monsanto, and in 2008 accounted for 59% of beet acreage: 257, 975 hectares. It is expected that next year this will reach 90% of the national crop[1]. This variety is approved for food and feed use in the EU as well other key markets. No proteins or DNA is detectable in sugar from either conventional or GM beet, and the sugar is the same nutritionally and compositionally.

Picture 1

Picture 2

Potential benefits of growing H7-1 beet include simpler and more flexible weed management, with possibility to reduce the frequency and amount of sprays. The companies have estimated that the UK would achieve savings of £150/ha per year compared to conventional beet. They also point to the suitability to reduced tillage and the use of winter cover crops, which could reduce nutrient leaching, soil erosion, a wildlife habitat and reduction in fuel use and emissions [4]. Current breeding targets include fungus (Cercospora) and virus (Rizomania) resistance as well as processing quality, frost tolerance and control of bolting[5]. There are also several GM sugar cane events in the development pipeline[1].

Figure 3
GM maize pipeline (Source: Julian Little, Agricultural Biotechnology Council)




**Feed, food and trade**
The British government likes to point out that we are a 'trading nation', usually in reaction to any suggestion that we should increase our level of self sufficiency. This is true, but it does bring with it some challenges, and a specific problem related to GM has arisen in recent years due to the attitudes, policies and legislative process for GMOs in the EU. The political part of the EU authorisation process, once the scientific safety assessment has been completed, adds significantly to the time taken to make a decision on approving a new GMO. It is therefore much, much longer than in the major GM growing countries, taking from 2.5 to 10 years compared to an average of 15 months in the US[6]. This situation has been termed 'asynchronous approvals'. The other part of the problem is referred to as 'zero tolerance' i.e. the EU has a threshold of zero for the presence of GM material not approved in the EU and found in imports. Now that GM varieties of bulk commodity crops are being grown extensively, there will inevitably be low levels of GM material in shipments. It is inappropriate to operate without practical thresholds for adventitious presence of unintended material in agricultural commodities, and traces of GMOs that have been authorised cannot be considered a food safety risk.

The EU's position has created significant disruption to trade, particularly trade in the protein-rich crops we rely on to feed our livestock. The most recent incident involved the discovery of traces of GM maize not yet approved in the EU in soya shipments from US to Spain and Germany. This has led to US shippers choosing to temporarily stop all exports of soya to EU. The potential for such disruption causes hikes in insurance premiums for traders and increased costs associated with testing, storage, re-export and identity preservation systems. This gets passed on to livestock producers who have to pay significantly more for feed and suffer greater volatility and uncertainty in feed prices. Model estimates, depending on the scale of disruption, range from 4% to over 300% increase in the price of feed. The current situation with soya has cost the UK livestock sector around £30m in additional feed costs. And it is not just the feed chain that suffers. There have also been cases when a miniscule amount of a GM rice event at research stage was found in commercial rice, causing

EU markets to be closed to US imports. This one isolated incident caused losses of €50m – 110m for the rice industry and wider food chain[2].

There have already been several studies looking at aspects of this situation, from DG Agriculture[6], feed industries[7], Defra and FSA[8], and the academic sector[9]. The European Commission has ordered two more evaluations this year, one on the legislative framework and another on the implications of asynchronous approvals on maize and soya imports. The latter is due to report in the second half of 2010. It is difficult to see how any more analyses will manage to produce an answer that breaks the current deadlock. There is no sign of the political influence loosening its grip in Brussels. However, the disruption and contamination incidents we have seen in recent years are likely to worsen as GM hectares increase and new products are grown.

**GM technology in agriculture is not going away. It is an extension of modern plant breeding, which is essential for agriculture to make progress against the challenge of pests, diseases, extreme weather events and climatic change, and to produce the quality and quantity of crops demanded. Multi-national plant breeding companies will respond to the market and growers around the world will be looking for the next best variety to meet their needs. In the 21st century, genetic modification is one of the tools breeders use to deliver this but they will only invest where they see a market. This leaves Europe increasingly out of the picture and uncompetitive in a global market. As more biotech crops are grown we will have to deal with the impact of GM material turning up in imports, even if we are not able to benefit from growing these new varieties ourselves. Being competitive is essential for British farmers. There is real potential for drops in production caused by attitudes to GM in Europe to be filled by increased imports. It is unacceptable for politics to override science, and for 21st century British agriculture to be denied the choice of all available technology in their efforts to produce more and impact less.**

**Figures**

1 Global Status of Commercialized Biotech/GM Crops: 2008 (Source: Clive James, 2008. Global Status of Commercialized Biotech/GM Crops: 2008. ISAAA Briefs No. 39-2008).
2 Global Area of Biotech Crops, 1996 to 2008: Industrial and Developing Countries (M Has, M Acres) (Source: Clive James, 2009)
2 Maize development pipeline (Source: Julian Little, Agricultural Biotechnology Council, 2009)

**Pictures**

1 GM beet plant, Fargo, North Dakota (Ruth Digby)
2 GM beet field, Fargo, North Dakota (Ruth Digby)

**Refs**

[1] ISAAA 2009, Brief 39-2008: Global Status of Commercialized Biotech/GM Crops: 2008. The First Thirteen Years, 1996 to 2008

[2] JRC 2009, The global pipeline of new GM crops. Implications of asynchronous approval for international trade, A. J. Stein and E. Rodriguez-Cerezo (JRC-IPTS. European Communities, Luxembourg)

[3] Defra 2003, FSE results (http://webarchive.nationalarchives.gov.uk/20080306073937/http://www.defra.gov.uk/environment/gm/fse/)

[4] Monsanto – KWS SAAT AG, 2007, Roundup Ready® sugar beet H7-1. Herbicide tolerance. Key facts. October 2007

[5] KWS, 2009, Breeding R&D, www.kws-uk.com/aw/KWS/company_info/breeding_r_d/Methods/~cjxj/genetic_engineering/

[6] European Commission, DG Agri, 2007, Economic impact of unapproved GMOs on EU feed imports and livestock production (http://ec.europa.eu/agriculture/envir/gmo/economic_impactGMOs_en.pdf)

[7] Toepfer International, 2008, Market Review January 2008 (www.toepfer.com)

[8] Defra/FSA, 2009, GM crops and foods; Follow-up to the Food Matters report by Defra and the FSA (http://www.defra.gov.uk/environment/gm/crops/index.htm)

[9] Backus, G.B.C. et al. 2008, EU policy on GMOs: a quick scan of the economic consequences. LEI Report 2008-070 (Wageningen University)