Global Developments in Coexistence

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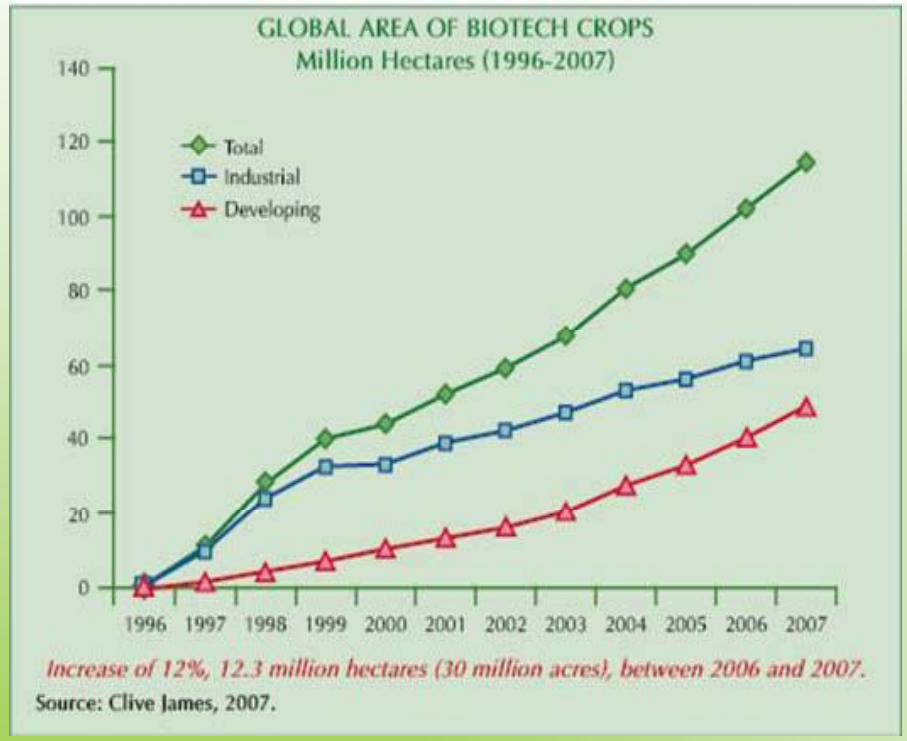
Operational background for GM, non-GM coexistence



Uptake of GM crops continues to expand around the globe. The Americas lead the way and soybean, maize, cotton and canola dominate.

Area of Biotech Crops in 2007: 100,000 ha and above

Rank	Country	Million Hectares	Key crops
1	USA	57.7	Soybean, maize, cotton, canola, squash, papaya, lucerne
2	Argentina	19.1	Soybean, cotton
3	Brazil	15.0	Soybean, cotton
4	Canada	7.0	Canola, maize, soybean
5	India	6.2	Cotton
6	China	3.8	Cotton, tomato, poplar, petunia, papaya, sweet pepper
7	Paraguay	2.6	Soybean
8	South Africa	1.8	Maize, soybean, cotton
9	Uruguay	0.5	Soybean, maize
10	Philippines	0.3	Maize
11	Australia	0.1	Cotton
12	Spain	0.1	Maize
13	Mexico	0.1	Cotton, soybean

Source: Clive James 2007

What do we mean by coexistence?

Coexistence: Dictionary definition:

- To exist together at the same time and in the same place
- To occupy the same place in a peaceful way

The application of the term 'coexistence' to GM and non-GM supply chains is simply to give a name to the process whereby the industry expresses freedom of choice – for producers, grain handlers, marketers, processors and consumers.

There are two implications worth highlighting in the context of GM and non-GM crops:

- That there is value in segregating the two – just as the marketplace currently segregates by variety or receival standards to best meet market demands.
- The dictionary concept of coexistence operating 'in a peaceful way' points to the benefits of both an operational and management framework formalising the ground rules of fair and reasonable behaviour.

GM and non-GM coexistence – the basis for differentiation

Why GM?

Current 'first generation' GM crops offer production benefits in terms of yield and/or more effective or less costly means of controlling weeds or pests.

- The key GM traits dominating production are glyphosate-tolerance in soybeans, canola, cotton and maize and Bt based insect resistance in cotton and maize.
- Examples are appearing of 'second generation' GM crops with novel quality performance/health attributes, even as far as producing pharmaceutical products or precursors that could command significant market premiums.

Why non-GM?

Non-GM crops can offer market access or price premiums in some markets.

- Throughout the Americas, Asia and Africa, there is no substantial differentiation on the basis of GM/non-GM origin.
- In Japan and Europe there is a preference for non-GM soy and maize in food markets that would trigger GM labelling. Non-GM volumes are low (~15% of imports) and premiums modest (ranging from 2-8%).
- Japan is the only significant canola importer where non-GM preferences are expressed. Premiums prices are difficult to find and restricted to niche uses.

Supply chains with the flexibility to offer both GM and non-GM products into the future will be best placed to capture the contrasting rewards

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The tools of coexistence

An ounce of prevention is better than a pound of cure

GM, non-GM coexistence principles and practice cover a broad spectrum of commonsense measures that would be readily recognised by any grain supply chain where segregation carries financial incentives.

Prevention

In a 'paddock to plate' quality assurance system, there is a logical sequence of steps to ensure purity levels meet agreed market standards. Included are:

- Seed purity (both in purchased seed and farmer-saved second generation seed),
- Field separation distances, or different flowering times where cross pollination is likely to be significant,
- Field separation augmented by buffer zones or 'harvest discard' (non-GM border rows marketed as GM),
- Cleaning of equipment (silos, seeders, headers, bins, trucks),
- Control of volunteers (through sensible rotations and direct weed control),
- Effective segregation in post-farm grain handling (segregated receivals, transport and storage) and
- Testing regimes appropriate to pertaining standards.

Cure

As in normal segregation systems, cure is most often in the hands of the supply chain. Where testing reveals a failure, batches can be diverted to another market or blended up or down to meet the required standard.

Global coexistence models

The pragmatic nature of the global grains market means that coexistence is the rule rather than the exception. Broadly speaking, two models exist.

Market driven

This is the model adopted through virtually all of the key GM production areas – the Americas, China, the Indian subcontinent and in Africa. The main features:

- Market driven by productivity *per se* or by production cost benefits of GM.
- The supply chain identifies niche opportunities for non-GM and sets in place appropriate segregations.
- Industry self-regulates.

Regulatory overview

The European Union has taken a more centralised approach to the same drivers:

- The European Commission controls health and safety regulation, but
- The Member Countries have legislative control over socio-economic matters - which means coexistence. There are parallels in this respect with the Australian Commonwealth/State responsibilities.
- The EU has invested massively in coexistence research and delivers advice through the European Co-existence Bureau.

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Three case studies

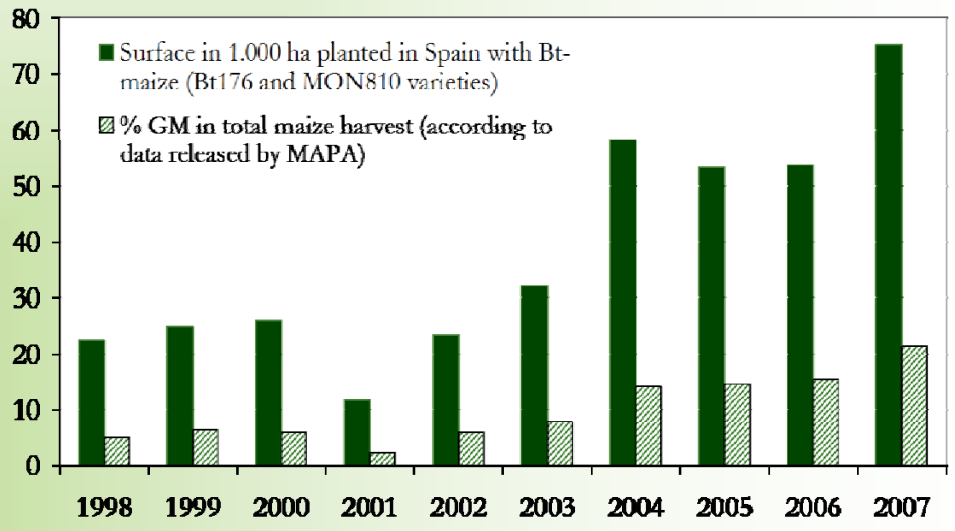
The European approach to coexistence using maize as the example is contrasted to the two major GM production systems, US corn and Brazilian soybeans.

Coexistence measures for European maize

- Bt Maize is the only significant GM crop in Europe.
- The main focus of production is Spain, followed by France and Germany.
- Up to a third of Spanish production is GM and an estimated 15,000 Spanish farmers have successfully grown GM maize for a decade - with major yield and quality benefits.
- There are no price premiums for non-GM.
- The coexistence guidelines are underpinned by a massive EC investment in coexistence research, e.g. the 'Co-Extra' program 2005-2008 budgeted at €24 million.

10 years of Bt-maize cultivation in Spain

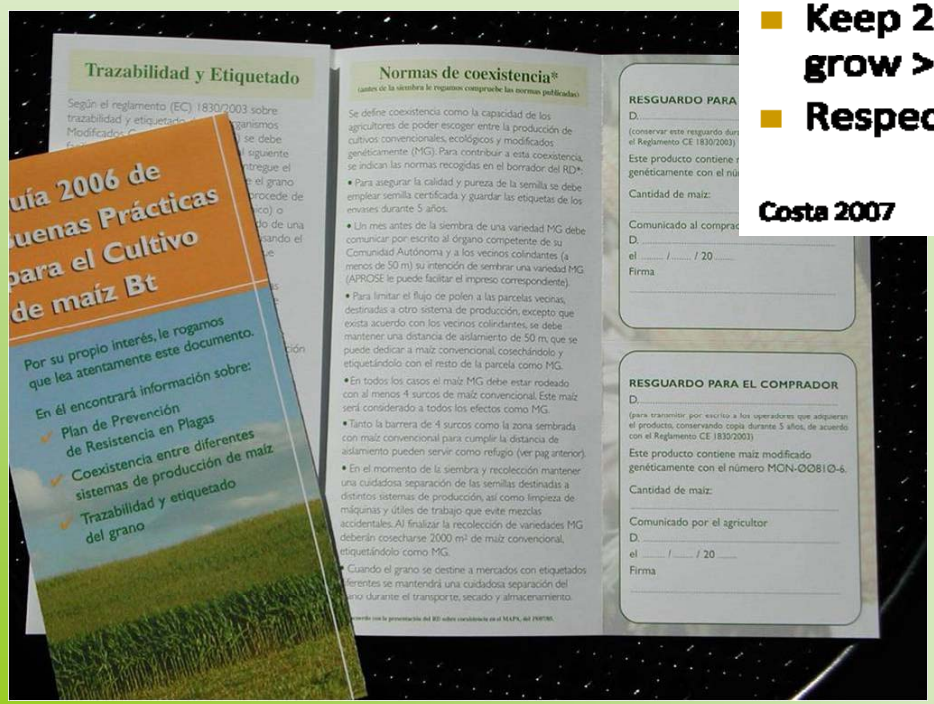
1-2 GM → 2-40 varieties → 30-140 distributors → ~15.000 farmers



Costa 2007

The Spanish experience of coexistence

The supply chain from seed producers through to processors has cooperated to ensure compliance with best practice guidelines. The system has been shown to work.



Summary of Spanish Good Agricultural Practices recommended for 2008 season

- **Inform the neighbours of your plans to grow Bt-maize**
- **If conventional maize is expected within 25 m, plant a buffer at the edge with at least 4 rows with conventional maize, to be harvested and labelled as GM maize**
- **Clean planters and combines by working on 0.2 ha of conventional maize, GM labelled**
- **Keep 20% refuge –which can be used as buffer- if you grow > 5 ha, to delay development of resistance (IRM)**
- **Respect the traceability and labelling obligations.**

Costa 2007

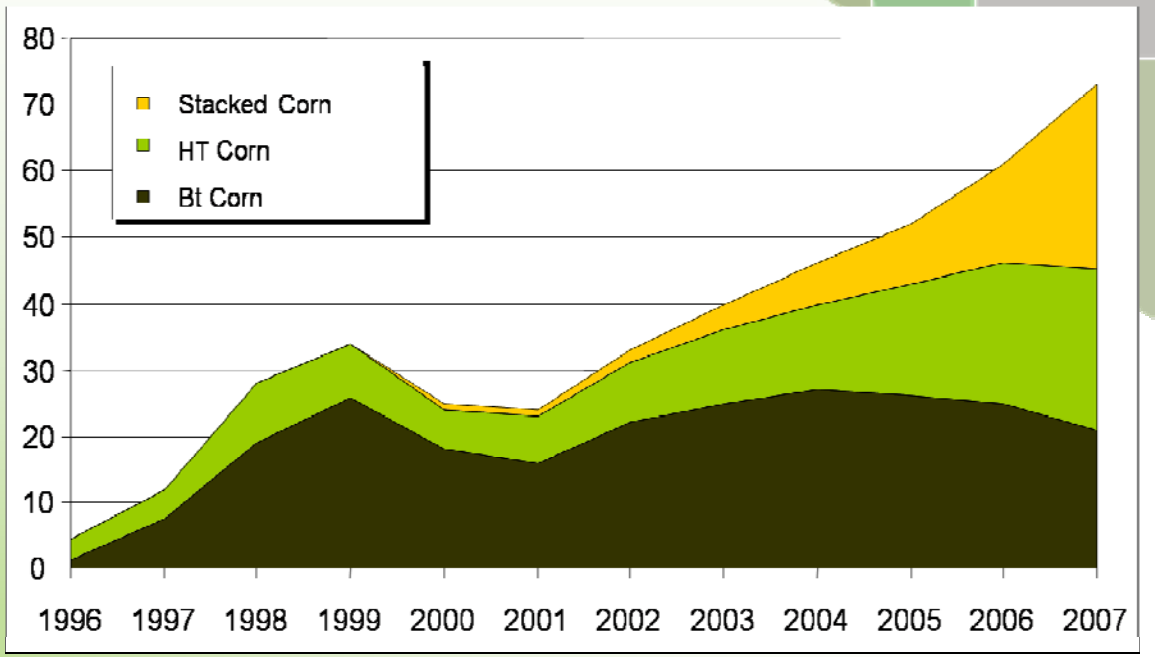
A comprehensive research study of Spanish maize production 2002-04 identified a gross margin advantage €80+ per hectare for the GM product.

- There was no evidence of price premiums for non-GM.
- GM growers bear the modest cost of coexistence in respect of separation distances and increased testing.

Corn coexistence in the US

- After GM soybeans, GM maize/corn represents the largest uptake of GM technology at over 35% globally (James 2008).
- GM corn varieties dominate US production.
- The grain receival centres have long offered segregation for specialty corn products and around 30% offer non-GM segregations.
- There is a high capacity for on-farm storage in the US and the growers work with the elevators and marketers to phase deliveries.

GM Corn adoption in the US 1996-2007

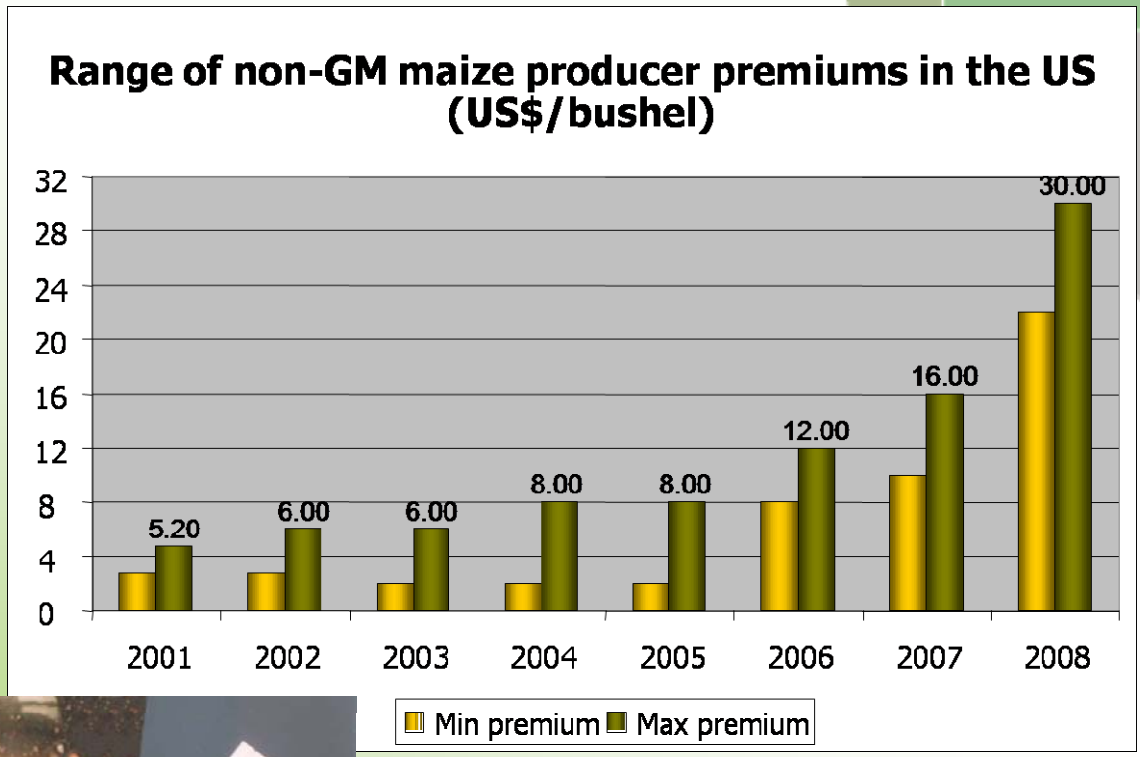


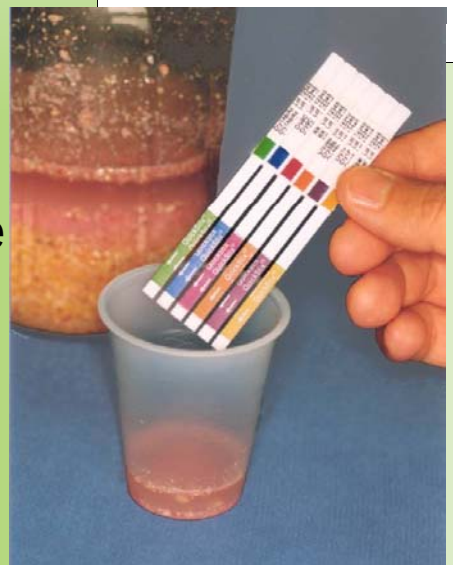
The key features of US best practice guidelines are:

- Seed with low GM adventitious presence (AP),
- Adequate isolation distances and border rows,
- Effective clean up procedures for planters, harvesters, trucks and storage bins,
- Use of dedicated storage and other equipment,
- Availability of cost-effective testing procedures.

Corn coexistence in the US

- The US is the main exporter of corn to Japan (both GM and non-GM).
- The price premiums for non-GM corn are rising with increased corn prices. At current levels the 2008 prediction represents a 6-9% premium.
- Non-GM growers pay the segregation costs out of price premiums. The aim is to meet market demands -
  - but only as costs are covered by market rewards, and
  - factoring in the loss of productivity/cost benefits of GM.





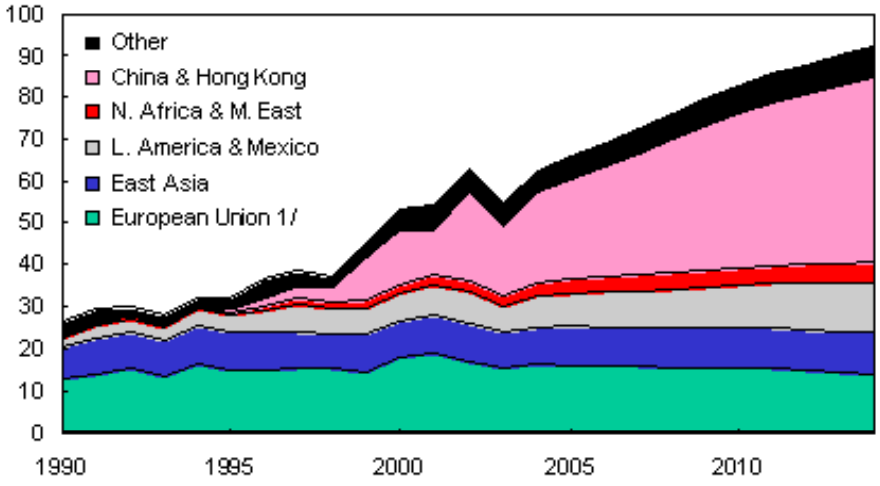
Innovations in testing procedures – more accurate, multi-purpose tests, on-the-spot results – are building on current capacity to deliver to market requirements within costs.

Soybean coexistence in Brazil

GM soybeans the world's foremost GM crop with nearly 60 million ha under cultivation in 2007, over half the world total of 114 million ha.

In 2007, Argentina grew 16 million ha and Brazil 14.5 million ha. Together, GM soybean production of the two Latin American countries amounted to over 25% of world GM production in 2007.

Soybean Import Projections (million tonnes)



1/ European Union-15 prior to 1999, EU-25 thereafter. Excludes intra-EU trade.

Source: *USDA Agricultural Baseline Projections to 2014*, February 2005. Economic Research Service, USDA.

Soybeans are the principal source of protein in livestock diets globally and are a major traded grain. Most of the key markets are non-discriminating on GM or non-GM soy, notably China, South Korea and Mexico. Europe and Japan however, despite the majority of their imports being GM, retain a small non-GM demand component.

Soybean coexistence in Brazil

- The market share for non-GM soybeans in Europe in 2004 was estimated to be 14-17% of total imports and the price premium 2-8%. By comparison, 2006 figures for Japan estimate a 15-20% market share and price premiums of the order of 6-9%.
- The US is the major supplier to the Japanese market and Brazil to the EU.
- The Brazilian grower cooperatives and grain traders have set in place traceability systems from seed purchase through to delivery at port. A quality assurance overview is applied through the use of commercial certifying organisations.
- These systems in Brazil are then integrated with corresponding systems managed by international grain traders and traceability measures followed through to end use in Europe.

A detailed analysis of costs have estimated €0.24 to 0.80 per tonne in Brazil and €1.0 per tonne in Europe. The combined costs represents less than 3% of the farmgate value of the crop and so on face value can be met by existing premiums.

Summary

Coexistence between GM and non-GM supply chains is the rule rather than the exception. This should not be surprising, given the history that the grains industry has in supplying product to meet market demand - for a price.

- In all cases, the supply chain carries the major responsibility for implementation and delivery of outcomes to markets.
- In the European Union, there is a regulatory overview of the system, based on Member Country jurisdiction over socioeconomic issues.
- In practice, the costs of coexistence have proven to be low.
- The key drivers are economic returns.
- The productivity/production efficiency gains from GM crops have seen them come to dominate production systems.
- Where markets identify a preference for non-GM, there must be sufficient financial incentive to induce the supply chain to choose non-GM.

Supply chains with the flexibility to offer both GM and non-GM products into the future will be best placed to capture the contrasting rewards.