



Gentechnik in der europäischen Landwirtschaft:

Ökonomische und gesellschaftliche Fragestellungen

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Outline

- **overview about planting**
- **concerns in the EU**
- **precautionary principle**
- **co-existence**
- **international dimension**





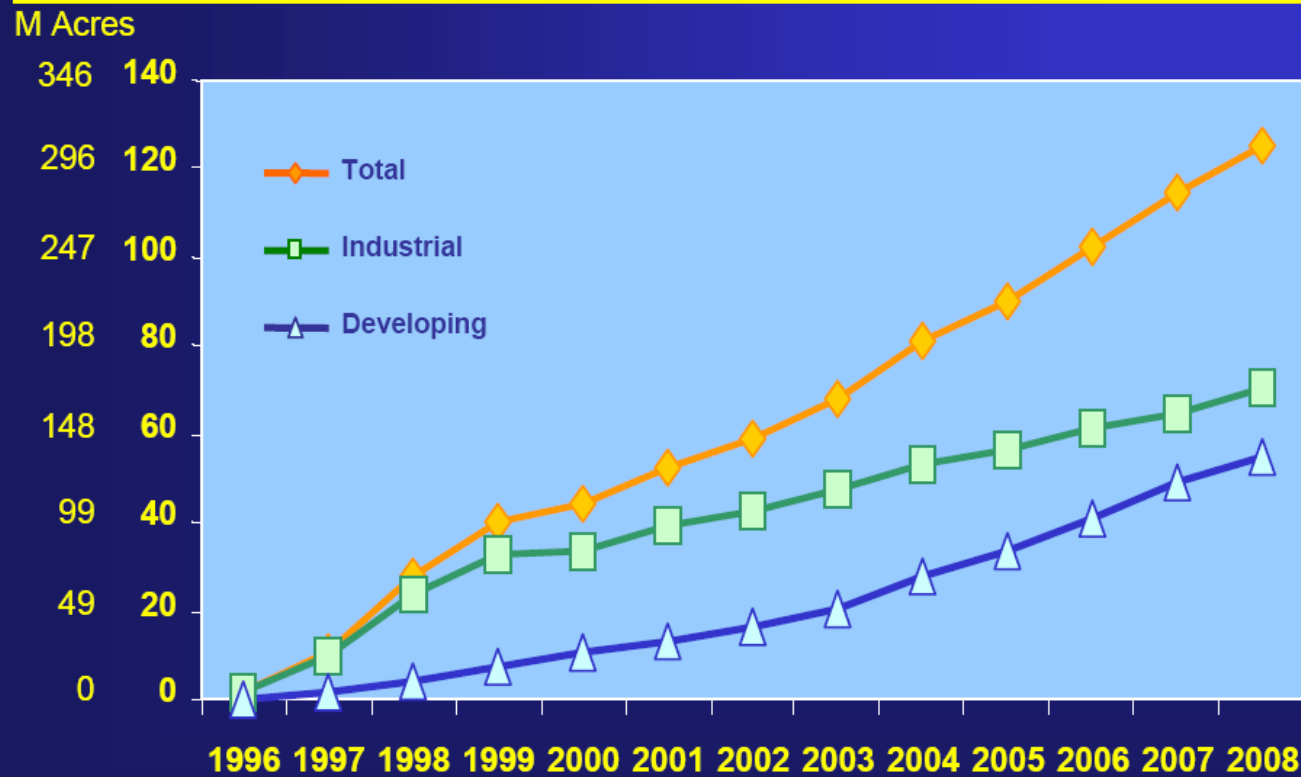
Why GM crops ?

- **Advantages in plant breeding**
 - more specific
 - faster success
 - larger gene reservoir (elite varieties × any gene source)
- **Potential applications**
 - sustainable food, feed, fibre, and fuel production
 - health (pharmaceuticals)
- **A number of farm-level benefits**
 - direct environmental benefits (e.g. pesticide use, soil erosion, land use)
 - lower levels of mycotoxins (ECB resistant maize)
 - increase in yield per hectare
 - non-pecuniary benefits





Global Area of Biotech Crops, 1996 to 2008: Industrial and Developing Countries (M Has, M Acres)

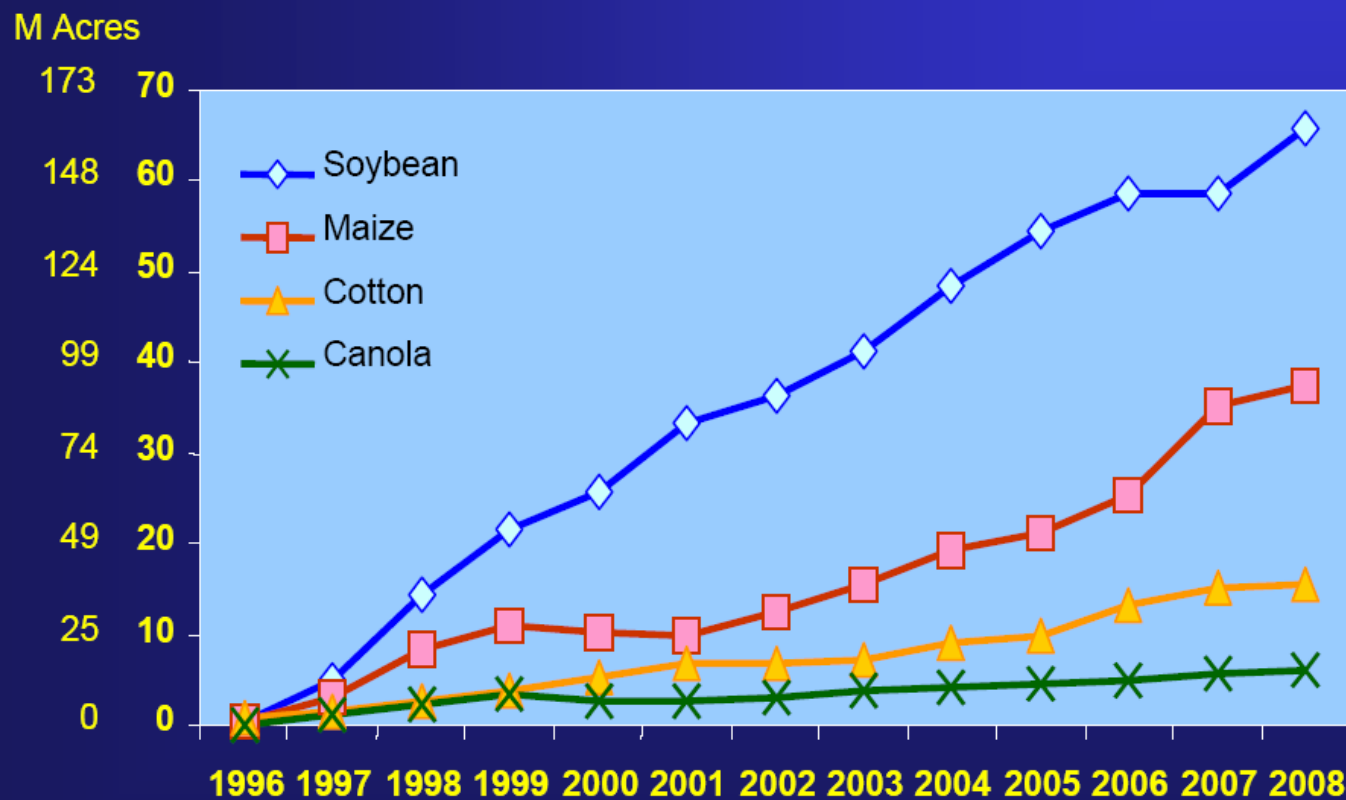


Source: Clive James, 2009





Global Area of Biotech Crops, 1996 to 2008: By Crop (Million Hectares, Million Acres)



Source: Clive James, 2009

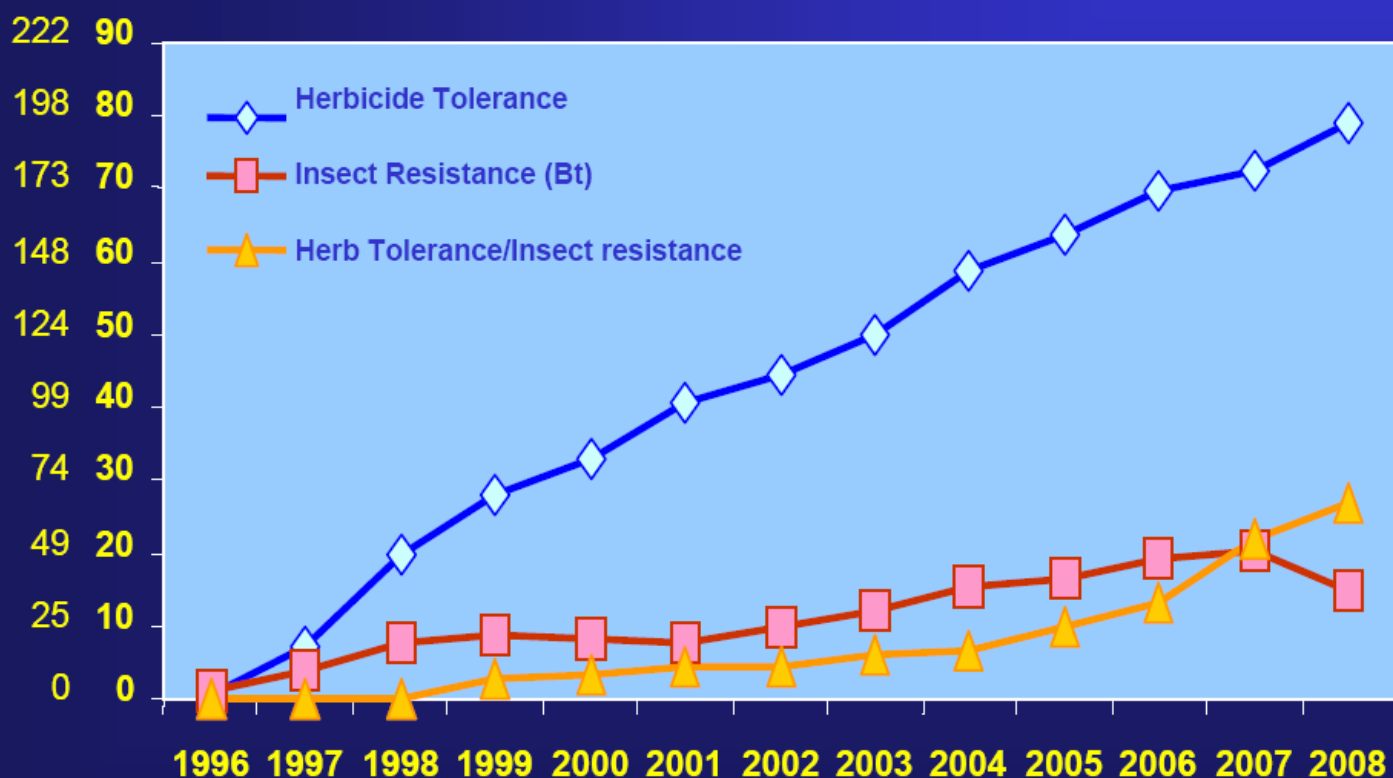




Global Area of Biotech Crops, 1996 to 2008: By Trait (Million Hectares, Million Acres)



M Acres



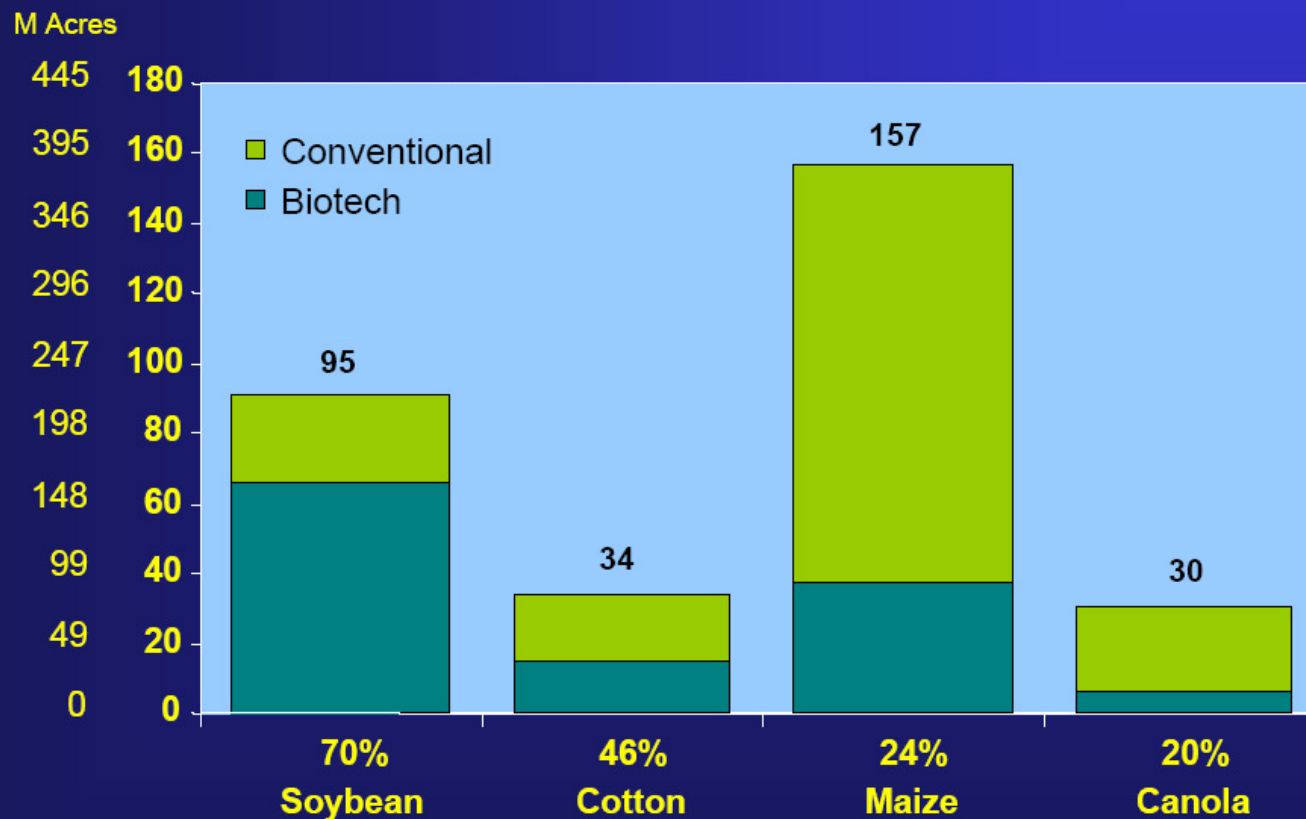
Source: Clive James, 2009



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Global Adoption Rates (%) for Principal Biotech Crops (Million Hectares, Million Acres), 2008

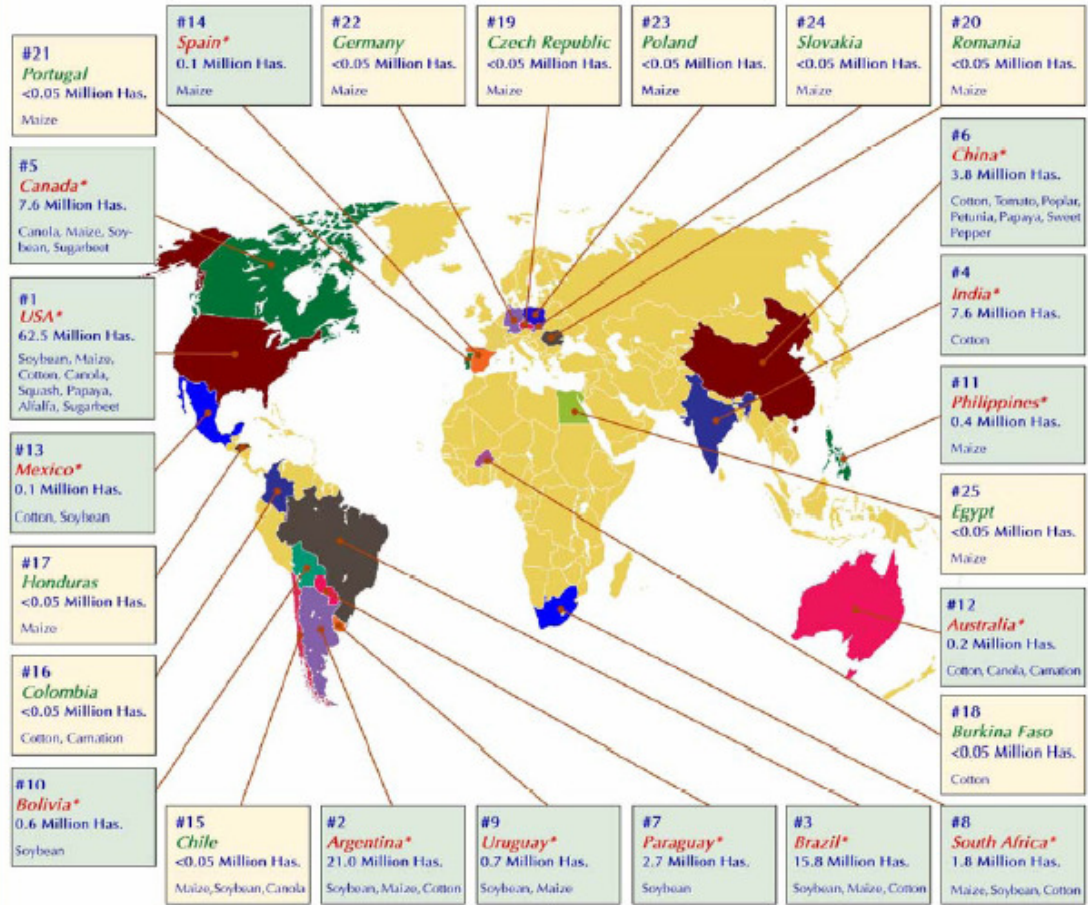


Source: Clive James, 2009





Biotech Crop Countries and Mega-Countries*, 2008



* 14 biotech mega-countries growing 50,000 hectares, or more, of biotech crops.

Source: Clive James, 2008.





| | Cultivation of GM plants in the EU in hectares | | | |
|-----------------------|---|---------------|----------------|----------------|
| | 2005 | 2006 | 2007 | 2008 |
| Spain | 53,225 | 53,667 | 75,148 | 79,269 |
| France | 492 | 5,000 | 21,147 | - |
| Czech Republic | 150 | 1,290 | 5,000 | 8,380 |
| Portugal | 750 | 1,250 | 4,500 | 4,851 |
| Germany * | 342 | 947 | 2,685 | 3,173 |
| Slovakia | - | 30 | 900 | 1.900 |
| Romania | **110,000 | **90,000 | 350 | 7,146 |
| Poland | - | 100 | 320 | 3,000 |
| Total GM maize | 54,959 | 62,284 | 110,050 | 107,725 |

Source: GMO-Compass.

* public register of commercially-grown or trial-released genetically modified organisms of the Federal Office of Consumer Protection and Food Safety (BVL)

** Cultivation of GM soybeans

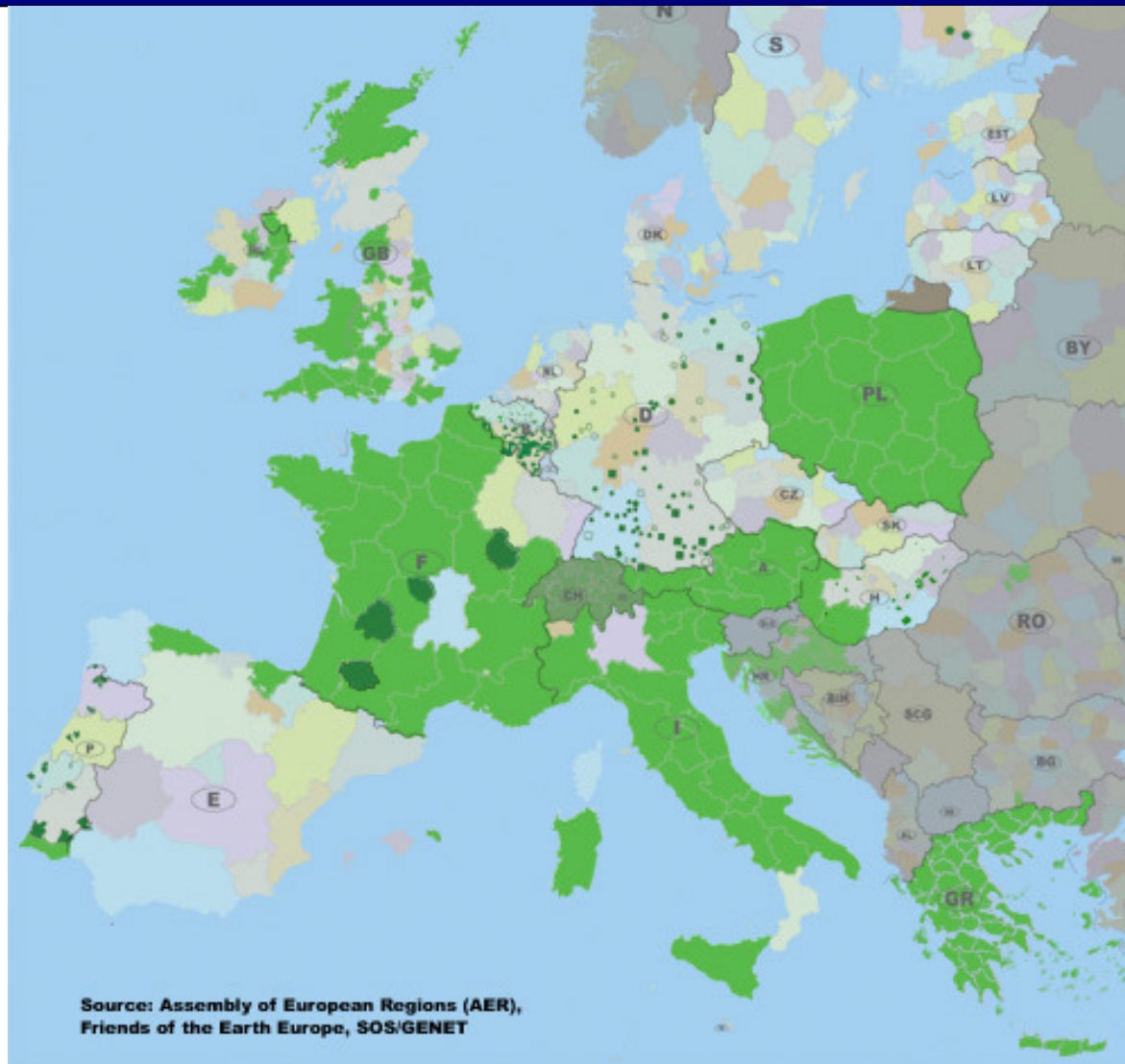




GMO-free areas in the EU As of May 2008



www.gmofree-europe.org



Source: Assembly of European Regions (AER), Friends of the Earth Europe, SOS/GENET



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The European Perspective

- The irreversible costs of introducing transgenic crops were of major concern to decision makers in the EU:
 - In June 1999 five member states declared they would block new approvals of genetically modified organism (GMOs) until the European Commission proposed additional legislation governing their introduction (Commission of the European Communities, 1999).
- => The decision became to be known as the *quasi moratorium* on GMOs.





Declaration by the Danish, Greek, French, Italian, and Luxembourg delegations concerning the suspension of new GMO authorisations

The Governments of the following Member States (**Denmark, Greece, France, Italy and Luxembourg**), in exercising the powers vested in them regarding the growing and placing on the market of genetically modified organisms (GMOs),

given the need to put in place a tighter, more transparent framework, in particular for **risk assessment**, having regard to the specifics of **European ecosystems**, monitoring and **labelling**,

given the need to restore public and market confidence,

point to the importance of the Commission submitting without delay full draft rules ensuring **labelling and traceability** of GMOs and GMO-derived products and state that, pending the adoption of such rules, in accordance with **preventive and precautionary principles**, they will take steps to have any new authorisations for growing and placing on the market suspended.





Declaration by the **Austrian, Belgian, Finnish, German, Netherlands, Spanish and Swedish** delegations

...

Against this background the Governments of these Member States, having regard to the precautionary principle set out in Article 174(2) of the Treaty, intend:

- to take a thoroughly **precautionary approach** in dealing with notifications and authorizations for the placing on the market of GMOs,
- not to authorise the placing on the market of any GMOs until it is demonstrated that there is no adverse effect on the environment and human health, and
- to the extent legally possible to apply immediately the principles, especially regarding **traceability and labelling**, laid down in the political agreement for a revision of Directive 90/220/EEC reached by the Council on 24/25 June 1999.

...





Directive:

- 2001/18/EC: on deliberate release of GMOs (includes the safeguard clause)

Regulations:

- 1829/2003: on genetically modified food and feed
- 1830/2003: on labelling and traceability of GMOs
- 1946/2003: on the transboundary movements of GMOs

Recommendation:

- 2003/556/EC: on coexistence of GM crops





Labelling of GM-Food and GM-Feed – Examples ¹¹

| GMO-type | EXAMPLE | Labelling Required at present | Labelling required in future |
|---|---|-------------------------------|------------------------------|
| GM plant | Chicory ¹² | Yes | Yes |
| GM seed | Maize seeds | Yes | Yes |
| GM food | Maize, Soybean sprouts, Tomato | Yes | Yes |
| Food produced from GMOs | Maize flour ¹³ | Yes | Yes |
| | Highly refined maize oil, soybean oil, rape seed oil ¹⁴ | No | Yes |
| | Glucose syrup produced from maize starch ¹⁴ | No | Yes |
| Food from animals fed on GM feed | Eggs, meat, milk | No | No |
| Food produced with the help of a GM enzyme | bakery products produced with the help of amylase | No | No |
| Food additive/flavouring produced from GMOs | Highly filtered lecithin extracted from GM soybeans used in chocolate ¹⁴ | No | Yes |
| GM Feed | Maize ¹⁵ | Yes | Yes |
| Feed produced from a GMO | Corn gluten feed, Soybean meal | No | Yes |
| Feed additive produced from a GMO | Vitamin B2 (riboflavin) | No | Yes |





Precautionary Principle

This principle was enshrined at the 1992 Rio Conference on the Environment and Development, during which the Rio Declaration was adopted, whose principle 15 states that:

“in order to protect the environment, the precautionary approach shall be widely applied by States according to their capability. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”.

- Goes back to the “Vorsorgeprinzip” in German Law.
- Relevance in the 1980’s acid rain and forest death in Europe.





Interpretations of the Precautionary Principle

- Strong interpretation: the prospect of harmful effects of a new technology take precedence over the prospect of beneficial effects.

Harmful effects => catastrophic potential.

The infinite costs of a possible catastrophic outcome necessarily outweigh even the slightest probability of its occurrence.





Interpretations of the Precautionary Principle

The logic of Pascal's wager (Henk van den Belt, 2003)

“Given an unknown but non-zero probability of God's existence and the infinity of the reward of an eternal life, the rational option would be to conduct one's earthly life as if God indeed exists.”

‘Many gods’ objection:

“Consider the possible existence of another deity than God, say Odin. If Odin is jealous, he will resent our worship of God, and we will have to pay an infinite price for our mistake.

Never mind that Odin's existence may not seem likely or plausible to us. It is sufficient that we cannot exclude the possibility that he exists with absolute certainty.

So the very same logic of Pascal's wager would lead us to adopt the opposite conclusion not to worship God. Pascal's argument, then, cannot be valid.”





Interpretations of the Precautionary Principle

In the words of Arrow et al. 1996:

“... regulate until the incremental benefits from regulation are just off-set by the incremental costs. In practice, however, the problem is much more difficult, in large part because of inherent problems in measuring marginal benefits and costs.”

In addition, other issues become relevant as well: distribution, compensation, discount rate and all other problems of economic benefit-cost analysis.

K. J. Arrow, M. L. Cropper, G. C. Eads, R. W. Hahn, L. B. Lave, R. G. Noll, P. R. Portney, M. Russell, R. Schmalensee, V. K. Smith, R. N. Stavins (1996): Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation? *Science* 272, 12 April, 221-222.





Interpretations of the Precautionary Principle

Economic assessment under the precautionary principle:

- Irreversible costs of the technology
- Opportunity costs: irreversible benefits of the technology and foregone reversible net-benefits of delayed introduction





Economic assessment under the precautionary principle

- irreversible and reversible benefits and costs
- uncertainty

=> real option approach (Arrow and Fisher, 1974; Henry, 1974; Black and Scholes, 1973; Merton, 1973;)

- $I > I^* = \gamma W + R$ (γ , factor considering uncertainty and irreversibility;
W, net-reversible benefits;
R, irreversible benefits)
- I^* : Maximum Incremental Social Tolerable Irreversible Costs (**MISTICs**)





SIRBs, SIIBs, Hurdle Rates, and MISTICs for Bt grain maize on average per year for the EU-15 at 10.5% discount rate w/ and w/o CAP subsidies (in 2005 prices).

| Country | SIRB | | SIIB | | Hurdle Rate | MISTIC | | | |
|----------|--------|------|--------|------|-------------|--------|------|----------|-----------|
| | Mio. € | €/ha | Mio. € | €/ha | | Mio. € | €/ha | €/capita | €/farmhl. |
| France | 62 | 204 | 0.24 | 0.81 | 1.14 | 54 | 179 | 0.90 | 467 |
| Greece | 12 | 280 | 0.04 | 1.03 | 1.79 | 7 | 157 | 0.60 | 74 |
| Italy | 60 | 299 | 0.19 | 0.98 | 1.23 | 49 | 244 | 0.84 | 214 |
| Portugal | 4 | 194 | 0.02 | 1.08 | 1.21 | 4 | 162 | 0.36 | 31 |
| Spain | 27 | 340 | 0.07 | 0.90 | 1.28 | 21 | 269 | 0.51 | 258 |
| France | 36 | 118 | 0.24 | 0.81 | 1.16 | 31 | 102 | 0.52 | 267 |
| Greece | 7 | 169 | 0.04 | 1.03 | 2.50 | 3 | 69 | 0.26 | 32 |
| Italy | 37 | 187 | 0.19 | 0.98 | 1.31 | 29 | 143 | 0.49 | 125 |
| Portugal | 2 | 87 | 0.02 | 1.08 | 1.19 | 2 | 74 | 0.16 | 14 |
| Spain | 18 | 223 | 0.07 | 0.90 | 1.03 | 17 | 218 | 0.41 | 210 |

Source: Wesseler, Scatasta, Nillesen (2007) The Maximum Incremental Social Tolerable Irreversible Costs (MISTICs) and other Benefits and Costs of Introducing Transgenic Maize in the EU-15. *Pedobiologia* 51(3):261-269.



Coexistence addresses additional social concerns:

- Co-existence is about giving farmers the **practical choice** between conventional, organic and GM crop production in compliance with the legal obligations for labelling and purity standards.
- According to Directive 2001/18/EC (Article 26a), Member States may take appropriate measures to avoid the unintended presence of GMOs in other products.
- In order to help the Member States in developing national approaches to coexistence, the Commission adopted, on 23 July 2003, a recommendation (2003/556/EC) on guidelines for the development of national strategies and best practices to ensure the co-existence of genetically modified crops with conventional and organic farming.





Coexistence Policies

Combination:
ex-ante regulation
ex-post liability rules





Defining the Term Coexistence (Benefit)

“A state described by a set of policies exogenous to the farmers that results in the planting of ‘organic and/or non-organic-non-GM’ and ‘GM crops’ at the same point in time in a pre-defined region with at least one farm where

$$vc_{G_i}^n > vc_{N_i}^n \text{ and one where } vc_{G_i}^n < vc_{N_i}^n$$

under a GM farmer property right system and at least one farm where

$$vc_{G_i}^l > vc_{N_i}^l \text{ and one where } vc_{G_i}^l < vc_{N_i}^l$$

under a non-GM farmer property right system.”





Important to Consider!

**No Coexistence without
Threshold Levels!**





Ex-ante Regulations

| Policy | Countries |
|--|------------------------|
| Prohibition and approval procedures | |
| prohibition of planting GM crops in specific areas | AT, DE, HU, LU, PT, SK |
| case by case approval for each field by local auth. | AT*, HU, IE, SK |
| compulsory training of farmers planting GM crops to be paid for by the GM farmer | DK, HU, SK |
| consent from landowner needed | AT, BE, HU, LU, SK |
| consent from neighbors needed | AT, BE, HU, LU, SK |

AT*: parts of Austria only

Source: Beckmann, Volker, Claudio Soregaroli, Justus Wesseler (2006) Co-Existence Rules and Regulations in the European Union. *American Journal of Agricultural Economics* 88(5):1193-1199.





Ex-ante Regulations

Policy

Countries

Registration and information duties

registration of areas in publicly available database

AT*, DE, DK, EE, LT,
LV, SK

registration of areas in publicly available database,
restricted access

AT*, ES, FI, FR, HU, NL,
PL, PT

informing neighboring farmers and landowner

AT, DK, HU, NL, PL, SK

record keeping

CZ, DE, DK, ES, HU, IT,
NL, PL, PT

AT*: parts of Austria only

Source: Beckmann, Volker, Claudio Soregaroli, Justus Wesseler (2006) Co-Existence Rules and Regulations in the European Union. *American Journal of Agricultural Economics* 88(5):1193-1199.





Ex-ante Regulations

Policy

Countries

Technical segregation measure

minimum distance requirements

AT, CZ, DE, DK, ES, FR,
HU, NL, PL, SK

bufferzones

AT, CZ, ES, FR, PL, SK

rotation intervals

EE, LT, SE

AT*: parts of Austria only

Source: Beckmann, Volker, Claudio Soregaroli, Justus Wesseler (2006) Co-Existence Rules and Regulations in the European Union. *American Journal of Agricultural Economics* 88(5):1193-1199.





Ex-ante Regulations

Policy

Countries

Insurance measures

compensation fund paid by GM farmers (levy on GM crops) plus support from the central government

DK

compensation fund paid by private stakeholders

IE, FR, NL, PT, UK

private insurance against damage

AT*, LU

AT*: parts of Austria only

Source: Beckmann, Volker, Claudio Soregaroli, Justus Wesseler (2006) Co-Existence Rules and Regulations in the European Union. *American Journal of Agricultural Economics* 88(5):1193-1199.





Ex-Post Liability

Policy

Countries

Legal liability for damages

liability based on civil law

CZ, ES, HU, SK

fault based liability

AT*, DK, FR, NL

strict liability for GM-farmers

AT*, DE, IE, PL, UK

joint and several liability

DE

AT*: parts of Austria only

Source: Beckmann, Volker, Claudio Soregaroli, Justus Wesseler (2006) Co-Existence Rules and Regulations in the European Union. *American Journal of Agricultural Economics* 88(5):1193-1199.





Ex-Post Liability

Policy

Countries

Proving damage

burden of proof lies with GM-farmer

AT, DE, FR, IT

burden of proof lies with non-GM farmer

IE, UK

Penalties

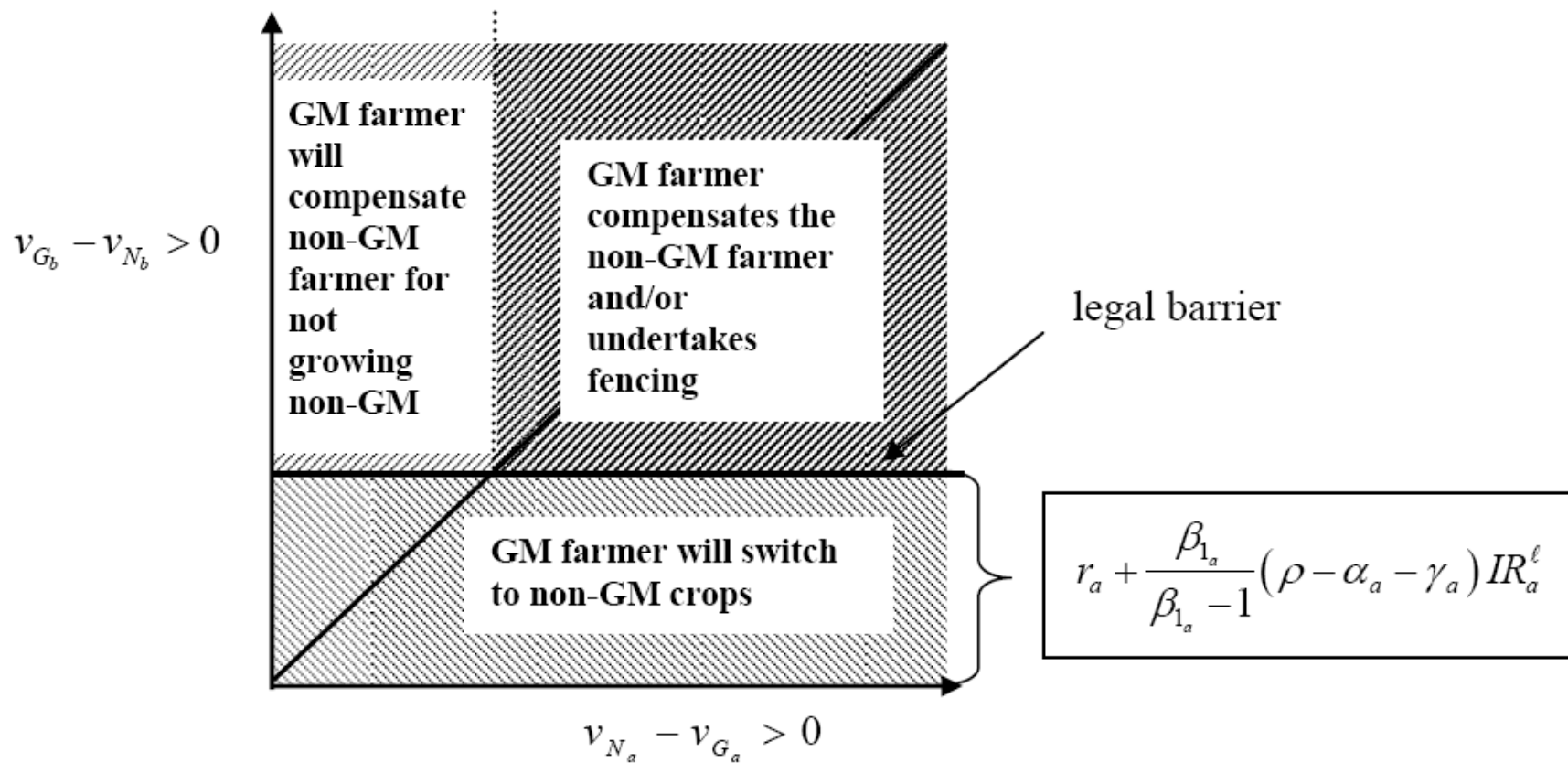
fines for non-compliance with ex-ante regulations

AT, CZ, ES, FR, IT, LV,
LT, LU, PL, PT, SK

AT*: parts of Austria only

Source: Beckmann, Volker, Claudio Soregaroli, Justus Wesseler (2006) Co-Existence Rules and Regulations in the European Union. *American Journal of Agricultural Economics* 88(5):1193-1199.





Agglomeration effects induced by ex-ante regulation and ex-post liability





Coexistence

Countries, like Austria, Hungary, Luxemburg, Poland, and the Slovak Republic, that prefer to ban GM crops totally from their territory, also introduce very restrictive ex-ante regulations.

= > In combination with relatively small farm sizes and a high share of organic farming, these ex-ante regulations may also, in the future, prevent GM-crops from being grown.

= > Countries can continue their policy of **banning** GM-crops by **regulatory means**.





Coexistence

Countries, that have less restrictive ex-ante regulations and more innovative ex-post liability rules, are more likely to gain experience; those like the Czech Republic, Denmark, Germany, The Netherlands and Spain.

= > Germany, e.g., opted for a flexible ex-ante regulation combined with a strict, joint and several liabilities of GM-farms. In this case, GM-farms and seed companies can innovate and co-operate to develop practices that reduce the risks of liability.





International Dimensions

- EU policy impact on Africa:
 - rejection of food aid
 - reduced research in plant breeding
 - Cartagena Protocol: socio-economic assessment
- => discriminates against relatively poorer households





Concluding

- 1. EU has addressed concerns of the ‘quasi’ moratorium**
- 2. Approvals still limited => political economy problem**
- 3. Coexistence policy supports regional agglomeration
=> possible exit**
- 3. Restrictive Ex-ante Regulations Reduces International Competitiveness**
- 4. EU policy important implications for Africa**





**Thank You Very Much
for Your Attention**



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