Moving beyond GMO risk assessment towards innovation for Agroecology

How to maintain GMO-free agriculture in Europe
Socio-economic considerations of GM crops

Földművelésügyi Minisztérium
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Content

- Organic farming in Europe
- Socio-economic impacts of GMOs on organic farming
- Key demands to maintain agriculture GMO-free
  - At EU level
  - At national/regional level
- National opt outs
- Research for agroecology

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IFOAM EU GROUP

- The EU Group of the International Federation of Organic Agriculture Movements is the European umbrella organisation for organic food and farming
- Fights for the adoption of ecologically, socially and economically sound agriculture systems based on the principles of organic agriculture – health, ecology, fairness and care
- More than 170 member organisations
- Work spans the entire organic food chain and beyond: from farmers and processors, retailers, certifiers, consultants, traders and researchers to environmental and consumer advocacy bodies

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What is Organic Farming?

Definition of Organic Agriculture

"Organic Agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved."

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What is Organic Farming?

- Organic Agriculture is an alternative to conventional and industrial agriculture, legally defined by Regulation (EC) No 834/2007, complemented by private standards.
- Organic Agriculture is based on a systemic approach, considers the interaction between the plants and their environments, and is a driver for agronomic innovation.
- It forbids the use of GMOs and pesticides.

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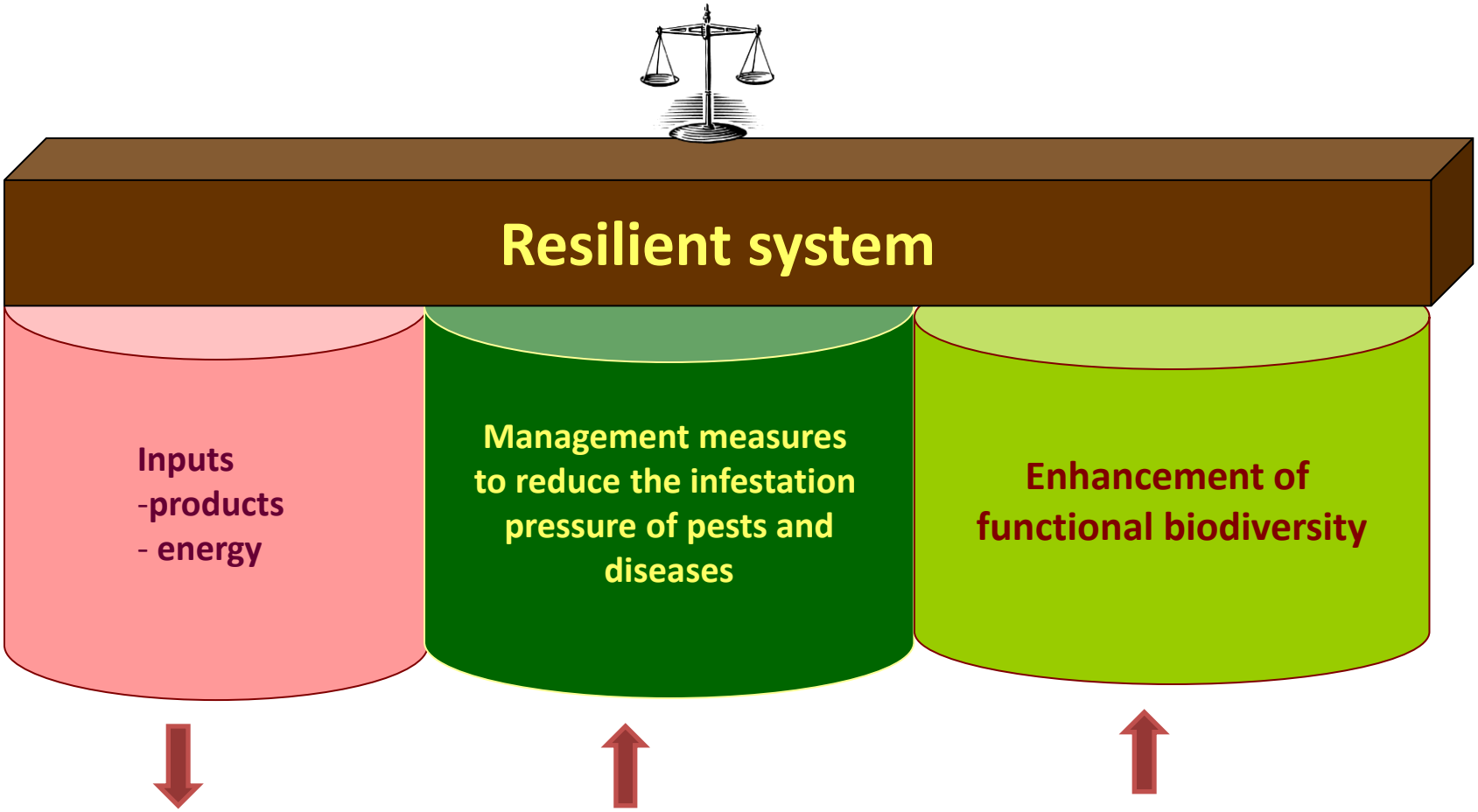
The System Approach of Plant Health Care Strategies in Organic Farming Systems



☛ **Aim: Reduction of the <u>dependence</u> on inputs**

Inputs = PPP in OF limited mainly to speciality crops

The Leading and Pioneering Role of Organic Farming Systems in the Implementation of „Indirect Plant Protection Measures“

Biodiversity in the production area as part of the production strategy

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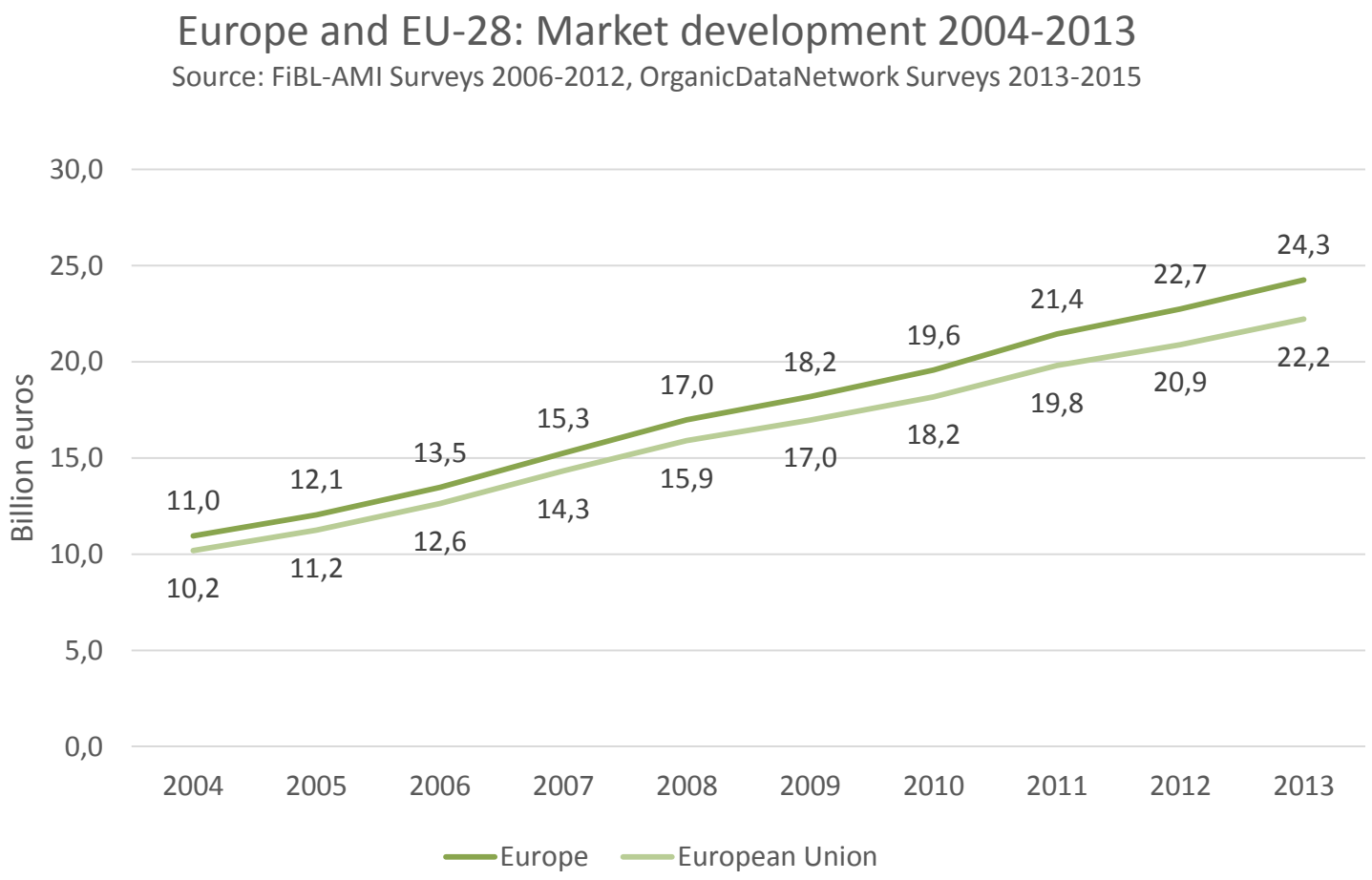
A growing market

Organic Market Trends 2004-2013



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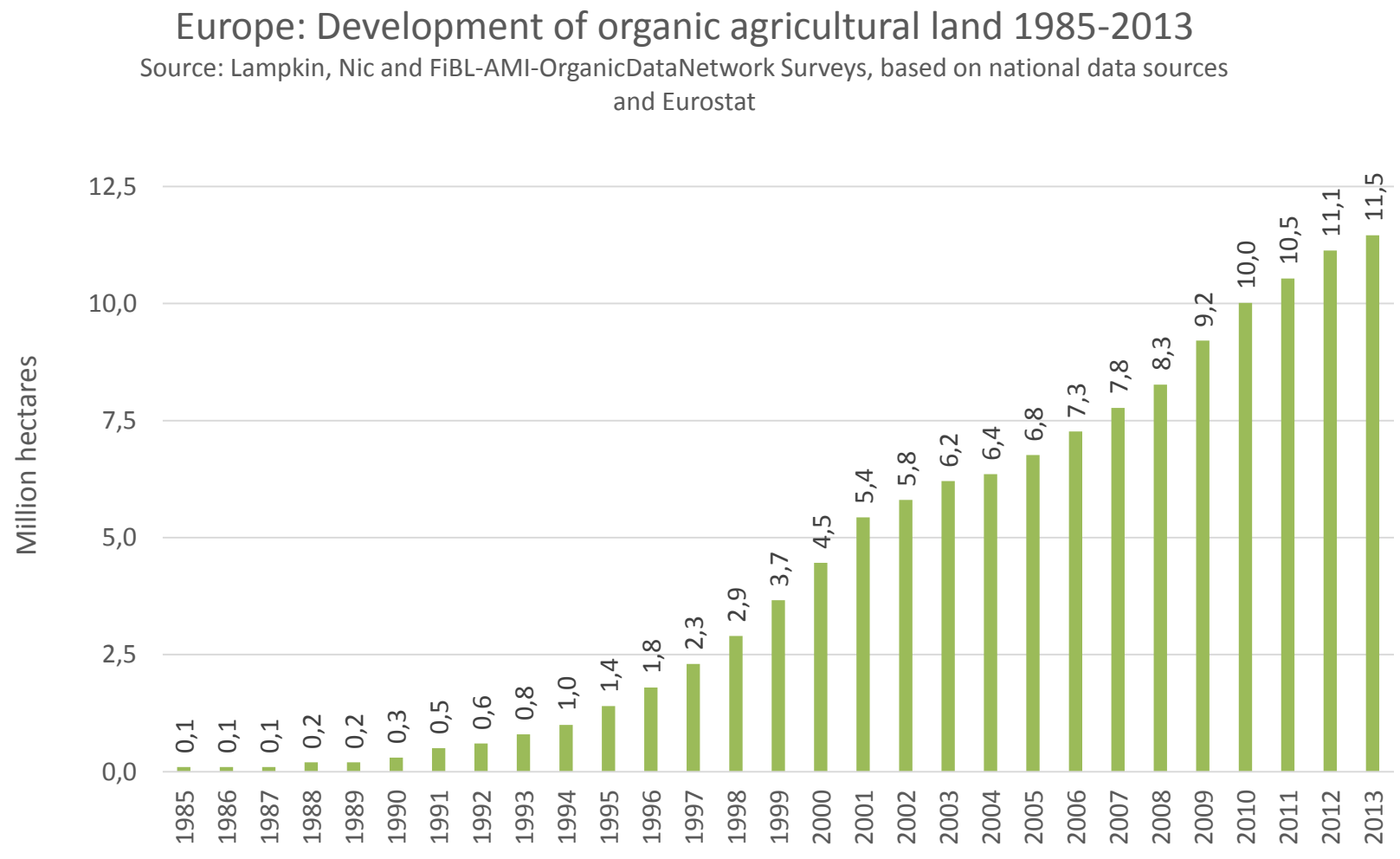
Organic Production Trends 1985-2013



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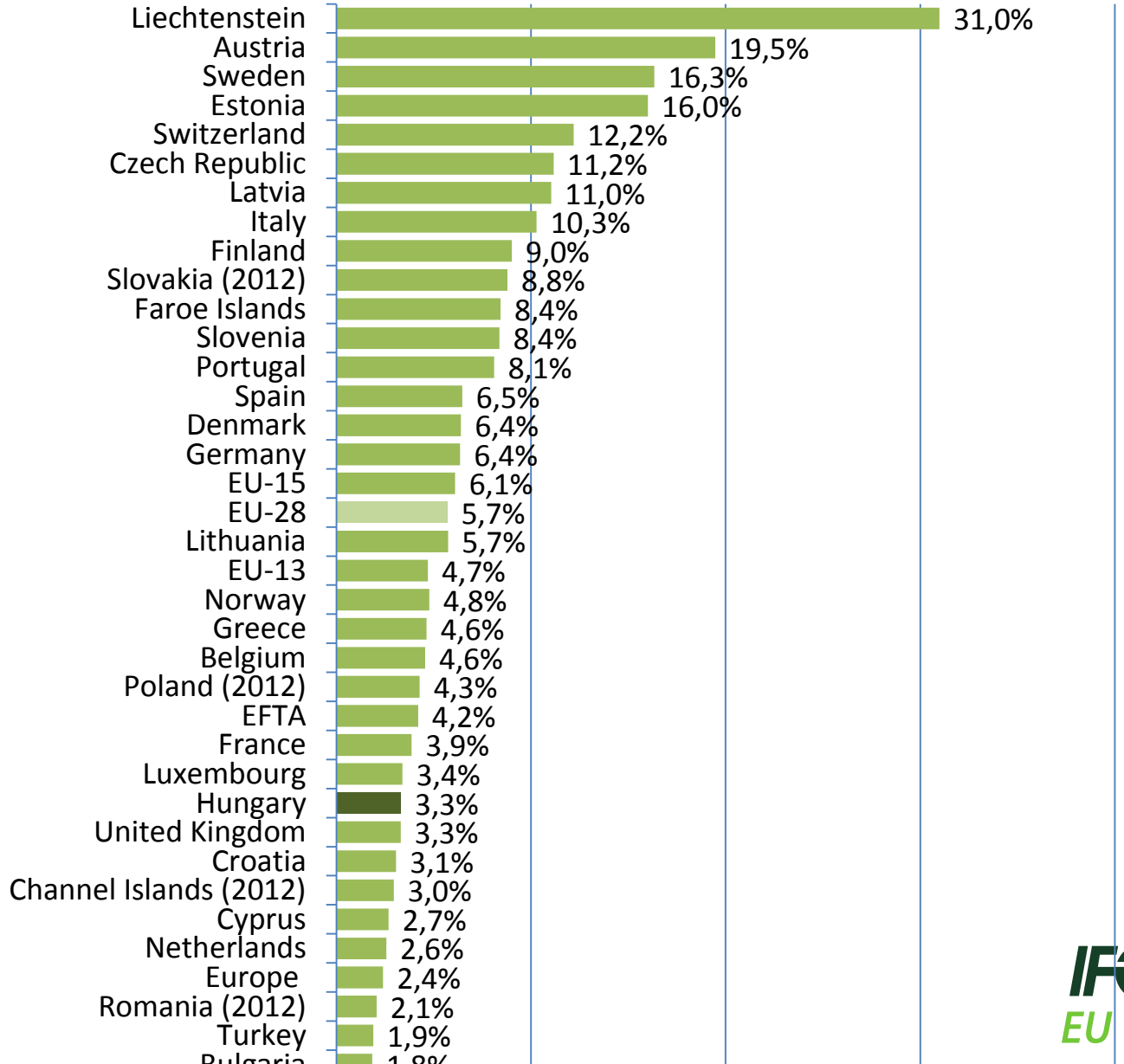
Europe: Shares of organic agricultural land by country 2013

Source: OrganicDataNetwork-FiBL-AMI Survey 2015



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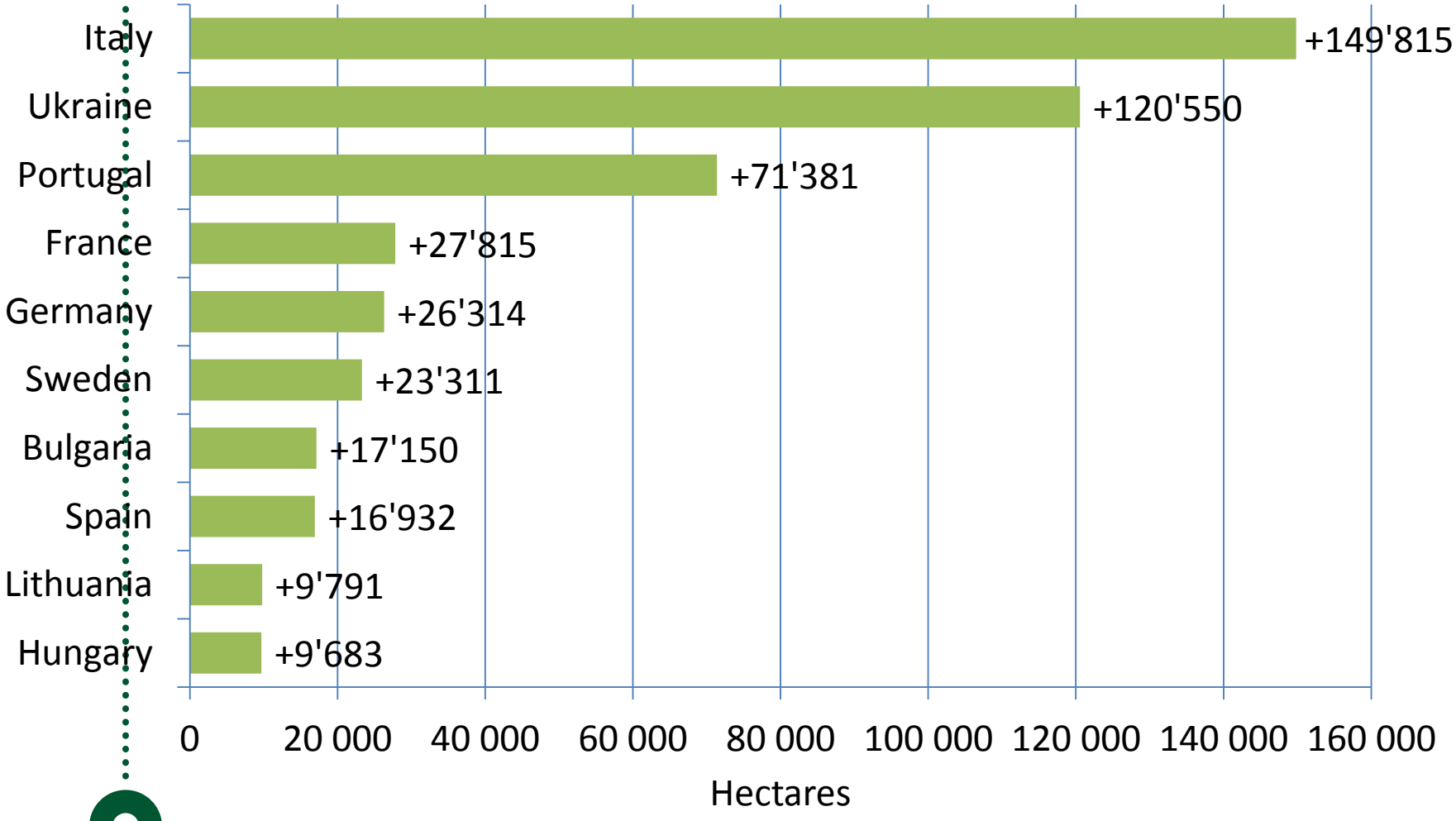
Europe: The 10 countries with the highest growth of organic agricultural land in 2013

Source: OrganicDataNetwork – FiBL-AMI survey 2015 based on national data sources



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Organic food and farming in Europe

A growing market

	2005	2013	
Land	• 6.9 Mio ha	• 11.5 Mio ha	+49%
Producers	• 187,780	• 334,870	+78%
Sales	• 10.2 bl euros	• 24.3 bl euros	+138%

- Strong growth but a gap between demand and production
- RDPs should also be used to develop the domestic market and the processing industry

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EU regulation for organic food and farming does not allow the use of GMOs

EU Regulation 834/2007

- **Overall principles** (Art 4) exclude the use of GMOs and products produced from or by GMOs with the exception of veterinary medicinal products
- **Prohibition on the use of GMOs** (Art 9): GMOs and products produced from or by GMOs shall not be used as food, feed, processing aids, plant protection products, fertilisers, soil conditioners, seeds, vegetative propagating material, micro-organisms and animals in organic production

Consumer attitudes

… not only in Europe….

EU consumers

- 66 % are worried about GMO in food

(Eurobarometer 354; 2010)

EU Organic consumers

- name absence of GMOs amongst important reasons to buy organic food

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The organic sector already faces higher costs due to GM contamination

Oilseed rape

- *2002+: Canadian organic farmers sue over contamination of oilseed rape seed bycross-pollination.* 73% of the oilseed rape area is GM, resulting in almost complete contamination of non-GM seed stocks. The lack of clean seed has forced farmers in Saskatchewan to all but **abandon organic oilseed rape production**.

Maize

- *2003 – 2005: Several GM contamination cases in Spain with Bt176 and MON810 (up to 34%).* ***Organic certificates and premium prices lost****. Loss of* local varieties of seeds
- *2001:* Across the USA, organic farmers were being affected by lower prices or loss of sales due to GM contamination from neighbouring farms estimated **to *$90 million/year***.
- *1998: US food company* Terra Prima had to **recall 87,000 bags of organic tortilla chips** found to be GM contaminated, at a **cost of $150,000**.

Soya

- *2007: Post-harvest GM contamination of* organic soybean oil ***cost* US *food company $100,000*** *and* ***closure of*** **business for a month** following positive GMO test.
- *2006: Tests show* ***57% of Japanese organic tofu is GM contaminated****.*
- *2005: GM contamination of* South *Korean organic* ***soya baby milk forced removal of brands' organic labels*** without compensation.
- *2002: GM contamination of organic soya animal feed causes losses to feed-mill and organic farmers in UK.* **Removal of organic status** from **feed, and livestock** caused **major financial losses** to the feed-mill and organic farmers.

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In practice

- Food and feed containing GMO have to be labelled, with the exception of **adventitious and technically** unavoidable presence of below 0.9% (Reg. 1829/2003)
- Organic products are GMO free & **lose certificate if they must be labelled containing GMOs** (EC 834/2007)

Commodity	price €/ton organic	price €/ton conventional	Loss of organic premium in %
Soybean (1)	€ 680	€ 390	-43,00%
Maize (2)	€ 274	€ 190	-30,70%

Data from (1) Rapunzel, DE and (2) survey Italy (October 2011)

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Industry sets practical thresholds

- **0,9%** thresholds for calculation of economic costs **does not reflect industry** and farmers **reality**
- Organic food processors do not accept the presence of more than ≈**0.01-0.1%** of GMOs in raw materials
- Food industry sets maximum thresholds of **0.1 -0.3%** presence in raw materials (Co-extra 2009)
- Industry buys preferable **from regions with no GM cultivation** at all to minimise costs and risks
- **Once contamination found** in a product the farmer risks **losing his/her market forever**

Costs on farm level – organic crops

Prevention: Untimely sowing, isolation distances, total change of crops, give up shared machinery/transport vehicles

In case of damage: loss of organic premium, sell food as feed quality, loss of reputation and markets

Maize case (Aragon, Spain) contamination of 16 organic farms (2003 - 2007); in all cases organic certification was withdrawn, livestock farmers needed to buy in maize feed from other regions. Example for financial loss: organic farmer Ballarin (2007)

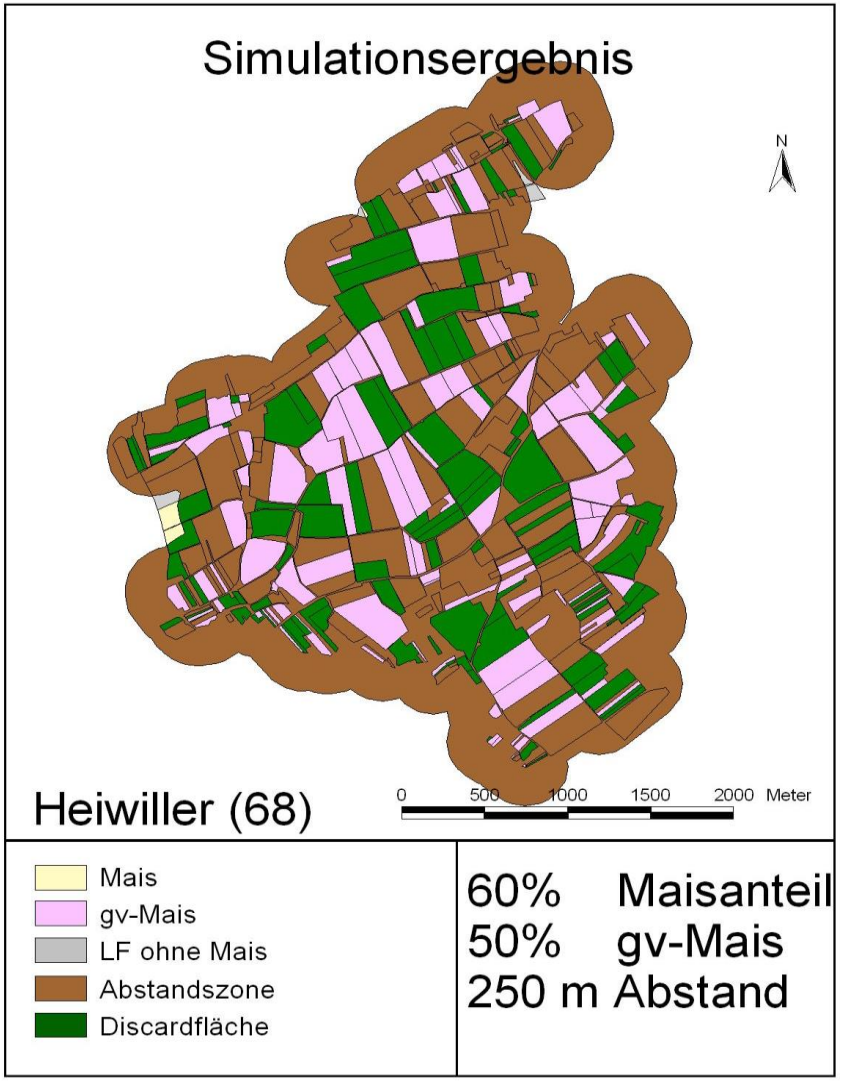
Forced untimely sowing date	**Lower yield as consequence**	**3t/ha x 7,7 ha x 360 €/t**	**8.316 €**
Loss of organic status and sale in conventional market	**-Price he would have received in the organic market: 360 €/t -Price in conventional market: 220€ /t**	**6 t/ha x 7,7 ha x 140€/t**	**6.440 €**
Economic loss that can be directly attributed to problems caused by GM farming			**14.756 €**

Prevention costs on farm level

- If GMO maize would be cultivated in Alsace region the costs for non-GMO producers would increase between 7.1€/ha and 98.3€/ha
- Potential additional yield of Bt-maize (70€/ha) does not cover costs for co-existence, only beneficial with BT Maize >90%
- Cultivation of Bt maize would suppress cultivation of conventional and organic maize (SIGMEA 2009)

Other studies:

- Additional costs for farms calculated between 10-41% of the price of oilseed rape & 5-10% of the price for Maize (Bock/Rodriguez-Cerezo 2002)
- Co-existence costs of Bt Maize for GM farmer of 52-78€/ha
  (Schiefer et al. 2008; Consmüller et al. 2008; Messean et al. 2006)



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Case study: Organic Farms in Poland

Co-existence is too expensive: A Polish animal feed processor (organic and conventional) shut down organic section in 2010 after contamination in organic feed (stemming from conventional feed) – despite proper cleaning and separation **=>** Since 2010 Polish organic egg producers buy organic feed from Dutch and German companies

Transparency 1st pre-condition to protect organic markets: Rumours that GMO are grown in Poland with no official government objection.

But: No legislation to rule co-existence, no GMO register

=> Organic farmers and certifiers cannot properly assess risk of GMO contamination in their area

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Seed & Breeders

- **Seed labelling thresholds** as proposed in 2005 do not comply with conventional food standard (Data: SCP 2001)
- Organic breeders underline that testing for overall presence is cheaper than testing for quantity
- Technical detection limit
- Prevention on seed level cheapest possibility to avoid contamination throughout food chain

Input side: Possible AP of GE seed **in non-GE seed***	Output side: three scenarios for maximum presence of GE components in agricultural raw materials accepted by food industry/processors E		
	0.10%	0.30%	0.50%
0.50%	Agricultural output fails industry standards (presence of GE components 0.77 %)	Agricultural output could pass industry standards only with special measures: (1) Use of special seed produced according to private standard with max. 0.1% GE seed traces and (2) Minimized cross pollination at 0.1% (presence of GE components 0.27%)	Agricultural output could pass industry standards only with special measures: (1) Use of special seed produced according to private standard with max. 0.1% GE seed traces (presence of GE components 0.37%)
0.30%	Agricultural output fails industry standards (presence of GE components 0.57 %)	Agricultural output could pass industry standards only with special measures: (1) Use of special seed produced according to private standard with max. 0.1% GE seed traces and (2) Minimized cross pollination at 0.1% (presence of GE components 0.27%)	Agricultural output could pass industry standards only with special measures (1) Use of special seed produced according to private standard with max. 0.1% GE seed traces and (achievable 0.37%) **or** (2) Minimized cross pollination at 0.1% (presence of GE components 0.47%)
0.10%	Agricultural output fails industry standards (presence of GE components 0.37 %)	Agricultural output could pass industry standards only with special measures: (1) Minimized cross pollination at 0.1% (presence of GE components 0.27%)	Agricultural output passes industry standards without extra measures: (presence of GE components 0.37%)

* *Unlabelled AP at the described level could be due to a European labelling threshold or*

Co-existence/prevention costs of food industry

- Food industry faces already today (almost no GMO growing in EU) costs for segregation, quality management, testing, training, investments etc.
- Survey among DE companies (10) organic/conventional found significant extra costs for prevention costs (**extra costs 3%-10%** of product), co-extra project estimates **up to 13% of** product turnover
- Stolze&Then 2009 (see below) find up to 86,20€/t prevention costs at company level which means **additional costs of 12,6%** on top of organic soybean price

	Milling company, DE	Processing company DE	Processing comp. FR
	Conventional Maize	Organic soybean	Organic soybean
Type of costs	**€ per ton**	**€ per ton**	**€ per ton**
Additional commodity costs (e.g. Contracting, seed certification and testing)	20.0 €	20,00 €	65,20 €
Quality Management (e.g. training, communication, updating checklists, manuals, tracability)		60,70 €	5,20 €
Testing costs	1.9 €	5,50 €	6,80 €
Total prevention costs per ton	**21.9 €**	**86,20 €**	**77,20 €**
Total prevention costs per year	**876.800 €**	**155.230 €**	**269.398 €**

Benefits for society?

- **GM production only profitable** if **no tracebility** and **segregation** – but **EU decided** that **consumers** have the **right to buy non GM products**
- GMOs in food chain cause **segregation and traceability** costs: International Food & Agricultural Trade Policy Council estimates for non-LMO soybean and maize "**additional annual cost** to consumers in Japan and Europe of ca. **$100 million**."
- **Europe's weapon is quality production** – do GMOs fit into this strategy or risk future non GM markets in Japan/EU and North America?
- Benefits only for big seed companies, **GMO farmers benefits** often **eaten up** by **higher coexistence costs**
- Introduction of GMO in food chain **already causes high costs** for **non-GM-food sector** in EU on farming and industry level

Organic sector demands regarding socio-economic impacts

- **Socio-economic impacts** of placing on the market and the cultivation of GMOs for **the non-GMO sector** must be **considered before any authorisation,** societal benefits and costs must be considered
- **Precautionary principle** must apply, also regarding socio-economic impacts
- The costs linked to "**coexistence"** should be borne by the GM producers and the owners of the patent, who disrupt existing practices by introducing a new type of crop. And the following questions should be asked when agreeing legislation on liability and compensation: Which damages can be taken into consideration? How is it possible to prove the causal link between a GM crop and a given case of contamination? Who can ask for compensation? How will the amount of compensation be evaluated?
- Strict liability should apply (as opposed to fault-based liability); even if the source of the contamination is difficult to identify, farmers should receive compensation in all cases. The compensation should cover the loss of premium price but also loss of contracts, loss of markets and moral damages (loss of reputation).

(The whole food production chain, different regional structures, costs for the prevention of contamination and mitigation measures in case of contamination in: seed production, on the field; cleaning of commonly used machinery, transport and storage facilities; sampling, testing, segregation systems, compensation for damage and loss of reputation must be considered.)

KEEPING GMOs OUT OF ORGANIC FOOD A

A 3 YEARS IFOAM EU PROJECT

1. Develop positions and coordinate advocacy work

- Analysis of the current legal framework
- Assessment of the socio-economic impacts of the cultivation and use of GMOs in the EU on the organic food chain.

2. Strengthen GMO-free organic food production by organising and supporting the organic movement in its effort to **develop practical strategies** to stay GMO free:

- Roundtable
- Practical guidelines

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New report

http://www.ifoam-eu.org/sites/default/files/ifoameu_policy_gmos_dossier_201412.pdf

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How to maintain GMO-free agriculture in Europe ?

At the EU level:

- **No new approvals of GMOs for cultivation and import** (e.g. oilseedrape)
- **Review of the decision-making system to make it more democratic**

President Juncker said that "*the Commission should be in a position to give the majority view of democratically elected governments at least the same weight as scientific advice, notably when it comes to the safety of the food we eat and the environment in which we live* (…) *I would not want the Commission to be able to take a decision when a majority of Member States has not encouraged it to do so*" (Political Guidelines for the next European Commission, 2014, http://ec.europa.eu/priorities/docs/pg_en.pdf).

- The proposal for an « opt out » on GMO applications for imports is not a solution: difficult to implement, legally fragile, shifts the responsibility to Member States
- Need to change the specific voting rules for GMO authorisations: respecting majorities would improve the quality of the risk management

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How to maintain GMO-free agriculture in Europe ?

At the EU level:

- **No tolerance thresholds for unauthorised GMOs in food products should be set up (Low Level Presence)**
- **No tolerance thresholds either for unauthorised or authorised GMOs in seeds should be set up**

Seeds are the first step of the production chain. Allowing contamination in seeds would jeopardise the ability of the whole production chain to stay GMO-free and multiply costs down-stream. It would rapidly render GMO-free production impossible in Europe. The standard should remain the technical detection limit.

- **Trade negotiations should not lead to more authorisations or to a lowering of European standards, directly or indirectly**

No trade agreement, including any Transatlantic Trade & Investment Partnership (TTIP), should contain mechanisms (such as Investor State Dispute Settlement (ISDS) or regulatory cooperation) that could be later used to lower standards, e.g. for approval, cultivation and labelling of GMOs.

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How to maintain GMO-free agriculture in Europe ?

At the EU level:

- **Labelling of animal products made with animals fed with GMOs should be mandatory**

Products from animals fed with GM feed should be clearly labelled. The loophole in the EU traceability and labelling regulation currently allowing them not to be labelled should be closed. In the meantime Member States should introduce **national schemes for a voluntary labelling of GMO-free animal products.** The standards for GMO-free labelling should be in line with the GMO-free production rules laid down in the Organic Regulation 834/2007… **but organic farming is GMO-free by definition and provides many environmental benefits.**

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How to maintain GMO-free agriculture in Europe ?

At the EU level:

- **New breeding techniques should be regularly evaluated and if necessary be legally defined as GMOs** under Directive 2001/18/EC, and should therefore not be exempted from the evaluation and authorisation of GMOs (Directive 2001/18/EC and Regulation 1829/2003) and should be subject to the traceability and labelling system (Regulation 1830/2003). The evaluation of new breeding techniques should be based on transparent procedures involving all stakeholders.

- **The seed legislation should provide transparency on the breeding techniques used for the production of the seeds**, whether these techniques are considered as GMOs or not from a legal point of view for the time being. Transparency should include the intellectual property rights attached to these breeding techniques. This is the condition for the organic breeding sector to be able to provide consumers and processors with plants that meet the principles of organic agriculture.

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The European seed legislation - Change needed

Uniformity requirements are not adapted to open pollinating / organic varieties. OA needs plant varieties adapted to *low input, as well as different climatic and geographic conditions*, which are more *resistant to diseases* and which bear excellent qualities in terms of *taste and nutritional value*.

Need to develop the Organic Breeding sector

The current legal situation urgently needs a substantial change:

- which recognises the *diversity* of different users and providers of seeds and plant propagating material,
- which creates rules *adapted* to the needs of each different sector, also Organic Agriculture and Organic Breeding
- which considers *biodiversity* as a key value: Maintenance and further development of plant genetic diversity is key to secure food security of future generations.
- which respects the *exchange and informal sale* of seeds between farmers, gardeners and users as an (agri-) cultural asset

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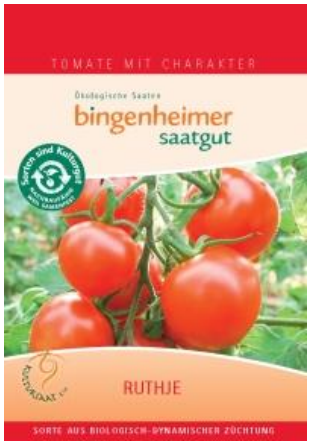
The Leading and Pioneering Role of Organic Farming Systems in the Implementation of „Indirect PP Measures“

- Introduction of disease tolerant varieties

Example Germany: more than 50 % of the new apple plantations in OF are scab-tolerant varietes
Monogene tolerance is already broken. A different approach is needed

- Organic breeding of robust varieties



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No Patents on genes and seed varieties

Reform the European Patent Office

On 27 March 2015 the European Patent Office upheld patents on broccoli and tomato

Patents on plants and animals derived from conventional breeding will continue to be granted

Media Release from No patents on seeds coalition : *The Enlarged Board of Appeal of the European Patent Office (EPO) has decided on the precedent cases of broccoli and tomato (G2 / 12 and G2 /13). The EPO made clear that while processes for crossing and selection cannot be patented, plants and animals stemming from these processes are still patentable. This illogical decision was a long awaited outcome of a precedent case on the patentability of plants and animals derived from conventional breeding. The coalition No Patents on Seeds! has heavily criticised this decision. The organisations are warning about the increasing monopolisation of breeding of plants and animals needed for food production.*

Patents on genes and plant varieties stiffle innovation

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How to maintain GMO-free agriculture in Europe ?

At the national level:

- **Ban GMOs**

A ban on GMO cultivation is the most efficient and least expensive way to protect organic and conventional farming from contamination. The new Directive on cultivation “opt-outs” offers new legal possibilities to ban the cultivation of GMOs in Member States, including groups of GMOs, on the whole territory of a Member State.

- **National and regional authorities should help GMO-free food and feed sectors access GMO-free supply from Europe or abroad**

In particular, public authorities should encourage the development of the production of alternative materials (proteins or seeds) in Europe.

- **In countries where GMO cultivation is not forbidden, governments should adopt measures to protect organic and conventional farming from contamination**

The position of the European Parliament was to make the adoption of coexistence measures compulsory for countries that would not use the opt-out clause. This was opposed by some Member States in the Council, but is an essential requirement.

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***I POSITION OF THE EUROPEAN PARLIAMENT

adopted at first reading on 5 July 2011

"The following Article is inserted:

'Article 26b
Cultivation

Member States may adopt***, after a case-by-case examination,*** measures restricting or prohibiting the cultivation of ~~all or~~ particular GMOs ***or of groups of GMOs defined by crop or trait or of all GMOs*** authorised in accordance with Part C of this Directive or Regulation (EC) No 1829/2003, and consisting of genetically modified varieties placed on the market in accordance with relevant Union legislation on the marketing of seed and plant propagating material, in all or part of their territory**,** provided that: **[Am 40]**

(a) those measures are based on

(i) ***duly justified*** grounds ~~other than those related to the assessment of the adverse effect on health and environment~~ ***relating to local or regional environmental impacts*** which might arise from the deliberate release or the placing on the market of GMOs ***and which are complementary to the environmental impacts examined during the scientific assessment of the impacts on the environment conducted under Part C of this Directive, or grounds relating to risk management. Those grounds may include:***

– ***the prevention of the development of pesticide resistance amongst weeds and pests;***

– ***the invasiveness or persistence of a GM variety, or the possibility of interbreeding with domestic cultivated or wild plants;***

– ***the prevention of negative impacts on the local environment caused by changes in agricultural practices linked to the cultivation of GMOs;***

– ***the maintenance and development of agricultural practices which offer a better potential to reconcile production with ecosystem sustainability;***

– ***the maintenance of local biodiversity, including certain habitats and ecosystems, or certain types of natural and landscape features;***

– ***the absence or lack of adequate data concerning the potential negative impacts of the release of GMOs on the local or regional environment of a Member State, including on biodiversity;***

(ii) ***grounds relating to socio-economic impacts. Those grounds may include:***

– ***the impracticability or the high costs of coexistence measures or the impossibility of implementing coexistence measures due to specific geographical conditions such as small islands or mountain zones;***

– ***the need to protect the diversity of agricultural production;***

– ***the need to ensure seed purity; or***

(iii) ***other grounds that may include land use, town and country planning, or other legitimate factors;*** **[Am 41]"**

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DIRECTIVE (EU) 2015/412 of 11 March 2015

"Article 1 Directive 2001/18/EC is amended as follows:

(…)

(2) The following Articles are inserted:

'Article 26b

Cultivation

(…)

3.Where no demand was made pursuant to paragraph 1 of this Article, or where the notifier/applicant has confirmed the geographical scope of its initial notification/application, a Member State may adopt measures restricting or prohibiting the cultivation in all or part of its territory of a GMO, or of a group of GMOs defined by crop or trait, once authorised in accordance with Part C of this Directive or with Regulation (EC) No 1829/2003, provided that such measures are in conformity with Union law, reasoned, proportional and non-discriminatory and, in addition, are based on compelling grounds such as those related to:

(a) environmental policy objectives;

(b) town and country planning;

(c) land use;

(d) socioeconomic impacts;

(e) avoidance of GMO presence in other products without prejudice to Article 26a;

(f) agricultural policy objectives;

(g) public policy.

Those grounds may be invoked individually or in combination, with the exception of the ground set out in point (g) which cannot be used individually, depending on the particular circumstances of the Member State, region or area in which those measures will apply, but shall, in no case, conflict with the environmental risk assessment carried out pursuant to this Directive or to Regulation (EC) No 1829/2003."

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The EP proposed to broaden the risk assessment to:

- address normative positions hidden in the risk assessment
- make clear that other concerns can also be scientific (no monopoly of rationality by the Commission vs irrational MS)
- move towards more inclusive and plural knowledge assessment processes
- Move from risk assessment to governance of innovation
- socio-economic impacts, environmental, agricultural and public policy objectives have to be considered in this light

Member States need their bans to be solidely grounded

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TPorganics
European Technology Platform

Strategic Research and Innovation Agenda

Members of TP Organics

2007

ISOFAR

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European CSOs

Sciences Citoyennes

Pesticide Action Network Europe

BirdLife International — BirdLife Europe

EUROMONTANA

Friends of the Earth Europe

eurocoop

EUROGROUP FOR ANIMALS

GREENPEACE

APRODEV

BEE

GENET — European NGO Network on Genetic Engineering

FQH Organic Food Quality & Health

ECOLOGICA INTERNATIONAL ASSOCIATION

Universities, scientists, advisory services

Education and Science

MOAN — Mediterranean Organic Agriculture Network

SWG Regional Rural Development Standing Working Group of South Eastern Europe

International

IFOAM AGRIBIO MEDITERRANEO

IDEAS

CIHEAM IAM BARI

ILS LEDA

National Mirrors

pt bio

EPOK

PTA Plataforma Tecnológica Agroecológica

Bionext

NOBL — Netwerk Onderzoek Biologische Landbouw & voeding

CZECH TECHNOLOGY PLATFORM FOR ORGANIC AGRICULTURE

Business representatives

EUROPEAN COORDINATION VIA CAMPESINA

eocc

ELO European Landowners' Organization

CEJA

EFFAT

AöL Die Öko-Lebensmittelhersteller

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Ökoland aus ökologischer Landwirtschaft

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Only Theme 2

Cooperation with the Agri Food sector group of the Enterprises Europe Network in terms of knowledge management and technology transfer.

alintec

SOMMER & CO.

Praum

Neumarkter Lammsbräu

MÄRKISCHES LANDBROT

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NATUR UND MENSCH LEBENSBAUM

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TPorganics European Technology Platform

Towards a new research agenda

TPorganics
European Technology Platform

Research and Innovation Needs

TP Organics published a new version of its priority topics for the Horizon 2020 Work Programme 2016/2017.

The topics have been selected from TP Organics' Strategic Research and Innovation Agenda that was published in December 2014. This new Strategic Research and Innovation Agenda is the product of an **intensive participatory process,** which lasted for a year and a half and included an online consultation for members and stakeholder that attracted more than 300 responses. Together, the proposed research projects will support sustainable growth of the organic sector in Europe and beyond.

The topics have been clustered in two parts. Part A focuses on the contribution of the organic food & farming sector to Sustainable Food Security and resilient agricultural value chains. It includes following topics:

- Supply of organic seeds - Towards 100% organic seed
- Breeding for increased diversity and resilience in organic and low-input systems
- Alternatives to contentious inputs used in organic agriculture
- Eco-efficient production of animal feed at local level
- Innovative ICT tools for organic cropping systems
- Organic food processing concepts and technologies

Part B focuses on fostering innovation and entrepreneurship in the organic sector and strengthening the contribution of the organic sector to a rural renaissance. It includes following topics:

- Solutions for resource-efficient primary production, based on the Internet-of-Things
- Public health effects of organic food systems in Europe
- Developing the organic farming policies of the future
- Improving organic certification
- Use of big data analytics for better market and farm benchmarking data
- Improving food security and rural development in Sub-Saharan Africa and South Asia

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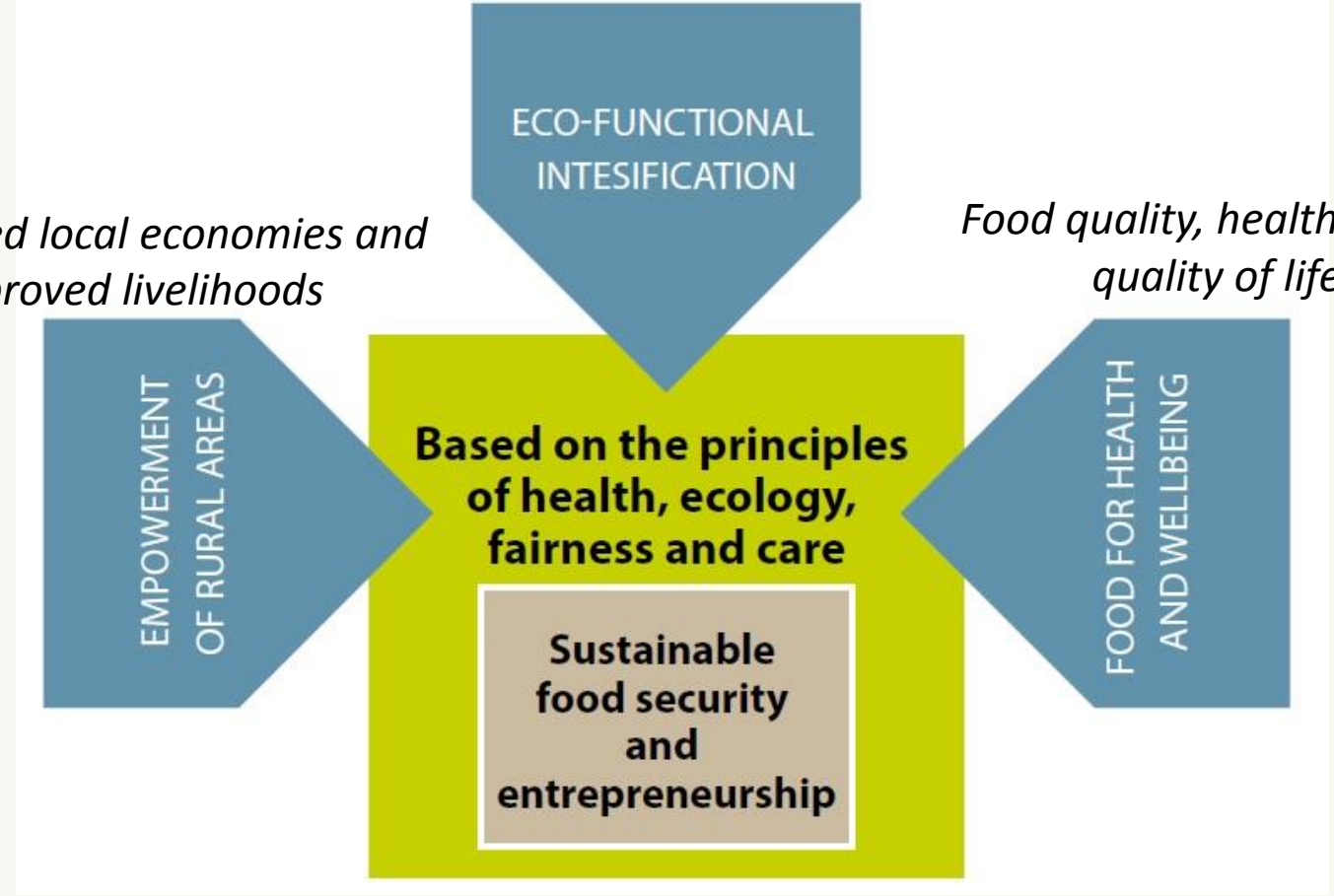
Research vision

Productivity, stability and resilience of agro-ecosystems



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Conclusion

- Broadening the risk assessment of GMOs to socio-economic impacts is the opportunity to consider alternatives to high input agriculture, which is environmentaly and socially destructive
- Maintaining Europe GMO-free (and GMO-free labelling) should be a first step: we need to change our agriculture systems
- Support innovation to move towards agroecology
- Develop protein production in Europe, and grasslands
- Mixed farming to close the nitrogen cycle
- Use RDP tools to develop organic farming along the whole supply chain

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Thank you

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