

# **Strengthening research on organic food and farming: a strategic advantage for the EU and European countries**

**>Urs Niggli**

# Focus of my presentation

- > Why is organic farming research a priority?
- > History and state-of-the-art of organic farming research
- > How to approach best research in organic farming (methodology).
- > Priorities for future research

# Research for organic food and farming systems – a European priority. Why?

- > Societal benefits
- > Growing sector of the food and farming economy
- > Highly accepted by consumers and taxpayers
- > Efficient use of research money (good results/progress for little money)

# Societal benefits of organic farming

- > Stolze, M., A. Piorr, A. Häring and S. Dabbert (2000) The environmental impacts of organic farming in Europe. Organic farming in Europe, Volume 6, University of Stuttgart-Hohenheim, Stuttgart
- > El-Hage Scialabba, N. and Hattam, C. (2002) Organic agriculture, environment and food security. Environment and Natural Resources Series No. 4, FAO. Rome, 258 pp.
- > Mäder, P., Fliessbach, A., Dubois, D, Gunst, L., Fried P. and Niggli, U. (2002) Soil fertility and biodiversity in organic farming. Science 296, p. 1694-1697.
- > Hole D G, Perkins A J, Wilson J D, Alexander I H, Grice P V and Evans A D, 2005: Does organic farming benefit biodiversity? Biological Conservation 122, 113-130.



# Biodiversity: organic versus conventional agriculture

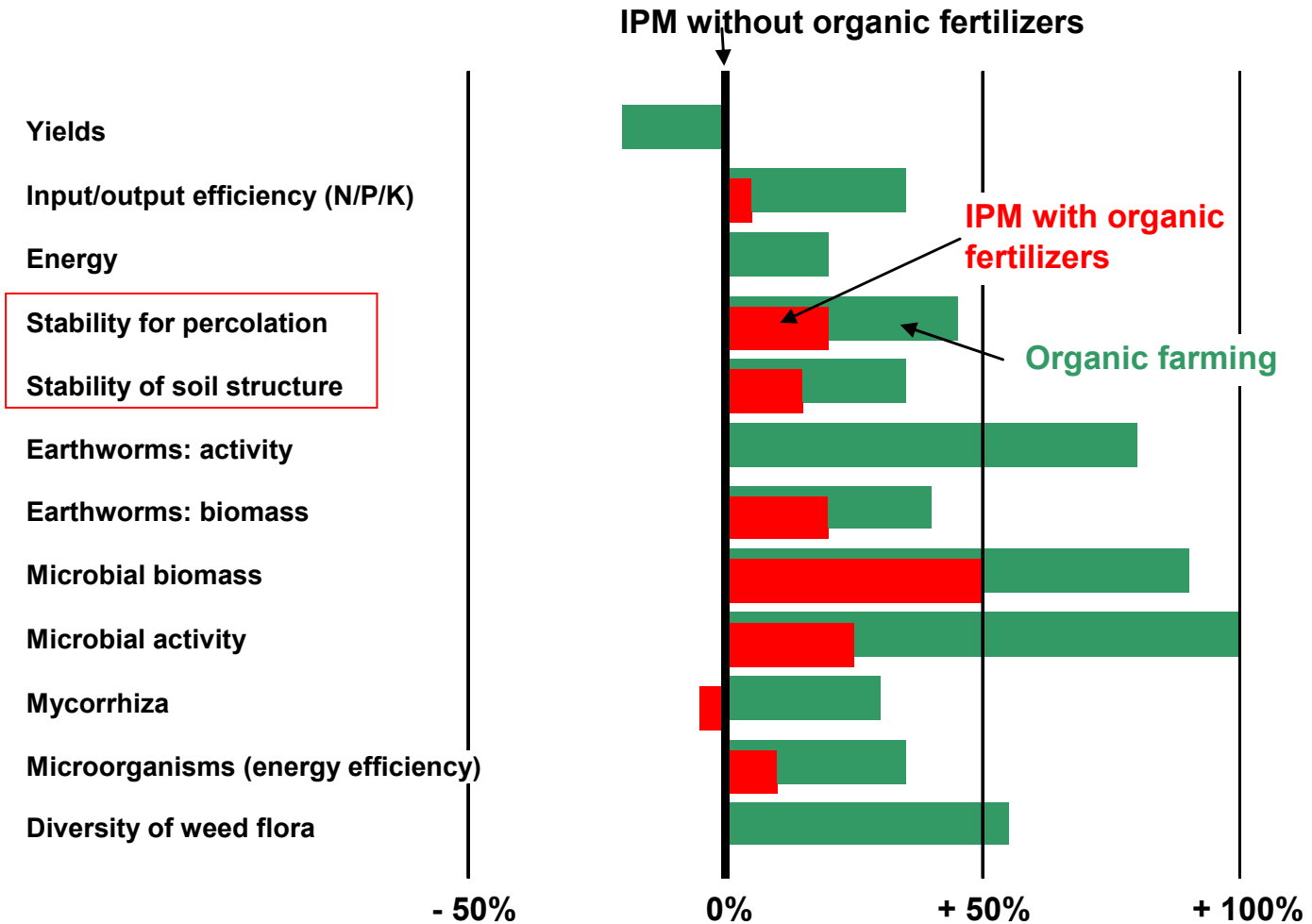
<b>Taxon</b>	<b>Positive</b>	<b>Negative</b>	<b>No difference</b>
Birds	7		2
Mammals	2		
Butterflies	1		1
Spiders	7		3
Earthworms	7	2	4
Beetles	13	5	3
Other arthropods	7	1	2
Plants	13		2
Soil microbes	9		8
<b>Total</b>	<b>66</b>	<b>8</b>	<b>25</b>

# DOK long-term experiment, Switzerland



- **running since 1978**
- **7 year crop rotation (P-WW-Veg-WW-WB-GC-GC)**
- **0 – bio dynamic - organic - IP - conventional**
- **Loess soil, 833 mm precipitation, 9.4 °C temperature**

# Ecological parameters in the DOK trial: Conventional, IPM, organic, biodynamic



# Summarised DOK results (over 21 years)

**Organic farming enhanced soil fertility and biodiversity and showed a high energy and nutrient efficiency**

## **Input**

Organic farming used

- > 34 to 53 % less fertiliser
- > 97 % less pesticides than conventional

## **Output**

- > Organic farming produced 80 % of conventional yields



# Soil properties in the DOK trial after 28 years of ...



**biodynamic farming**



**integrated farming (IP)**



# Soil properties in the DOK trial after 28 years of ...



**biodynamic farming**



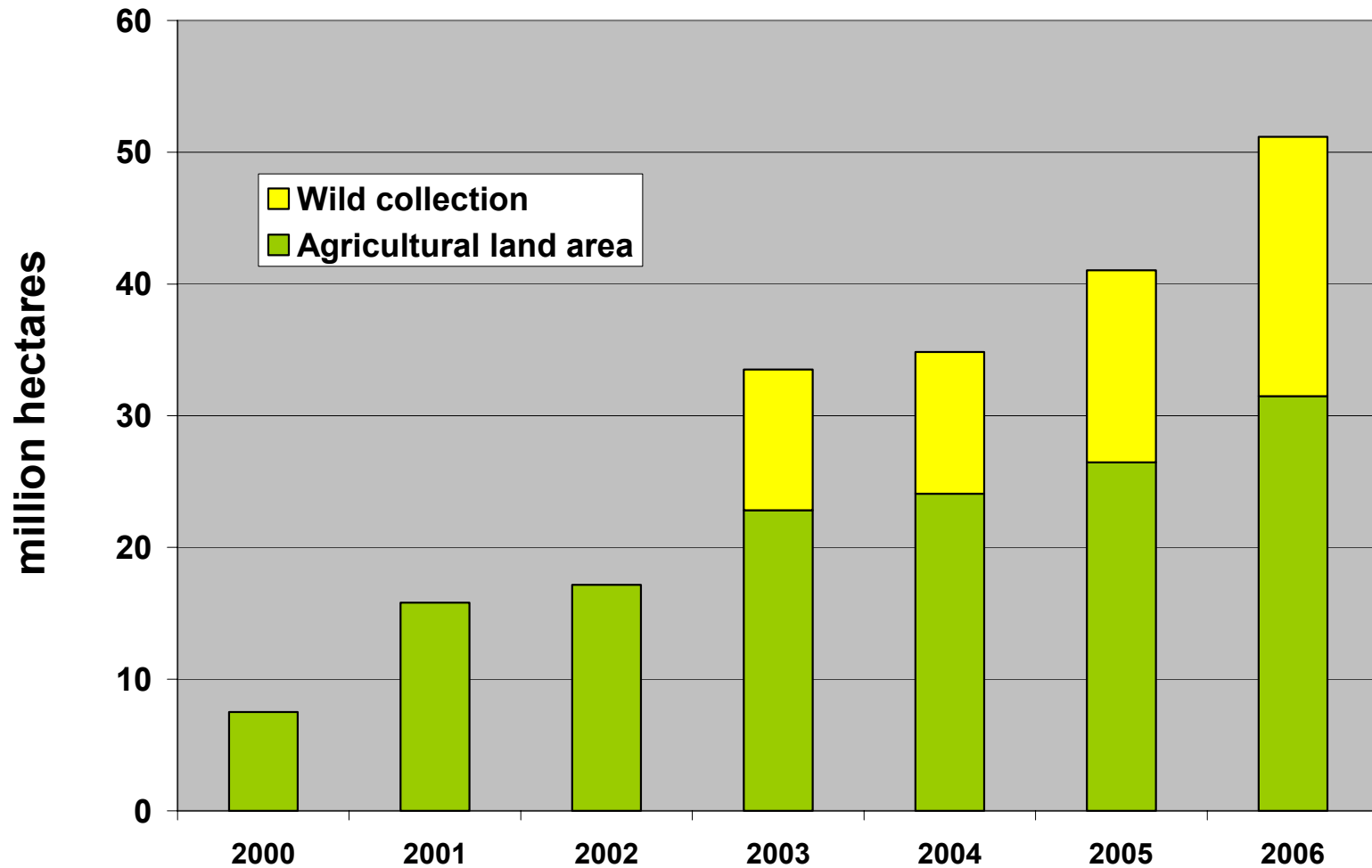
**integrated farming (IP)**



# Organic farming: mitigating the consequences of climate change?

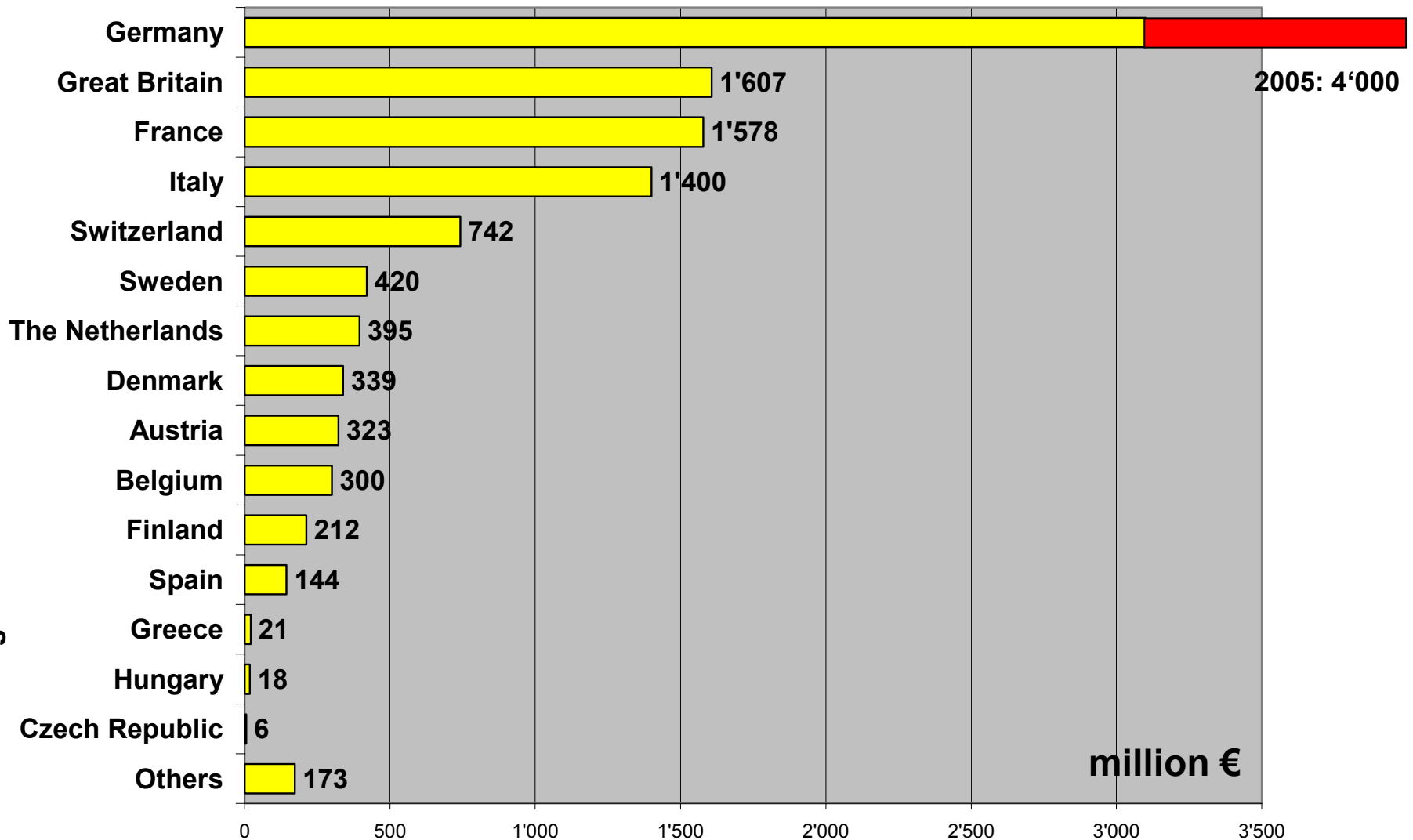


# World-wide organic area (certified)

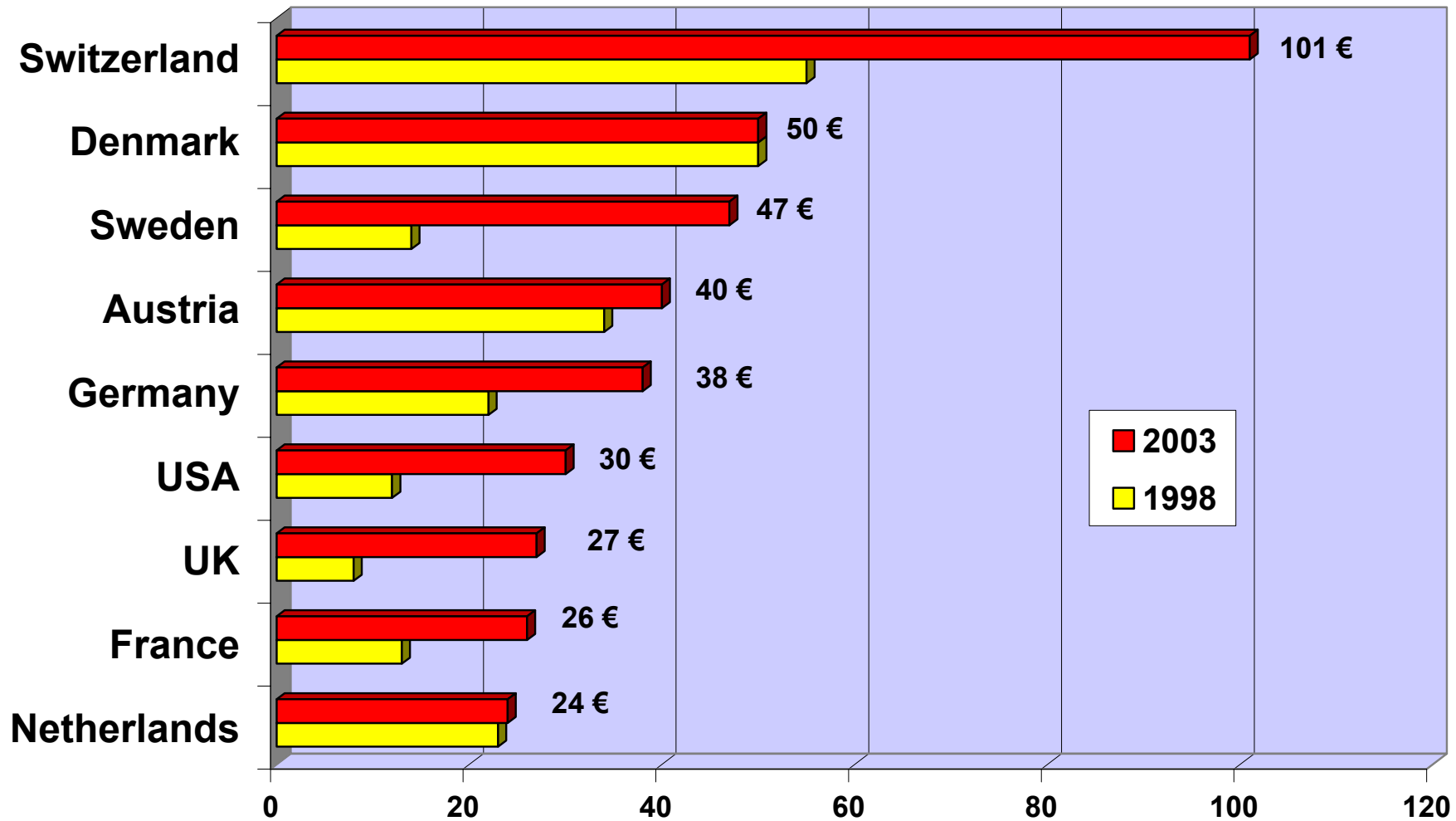




# Domestic organic markets (turnover, year 2003)



# Growing markets: per capita sales in €



# Consumers: very interested in quality/ health aspects

www.fibl.org

Nr. 4 May 2006  
1<sup>st</sup> edition



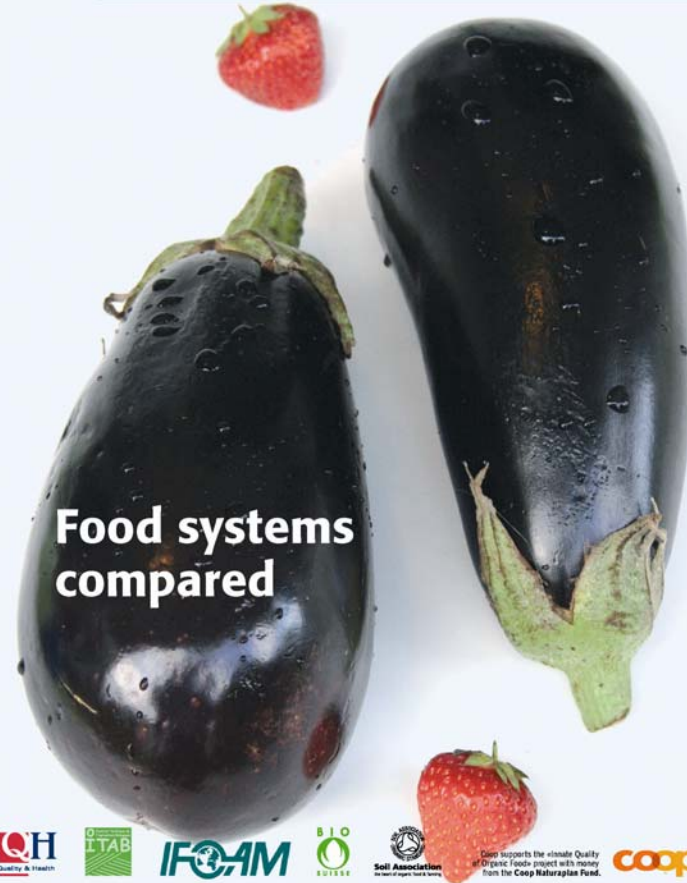
## **FiBL DOSSIER**

### Quality and Safety of Organic Products

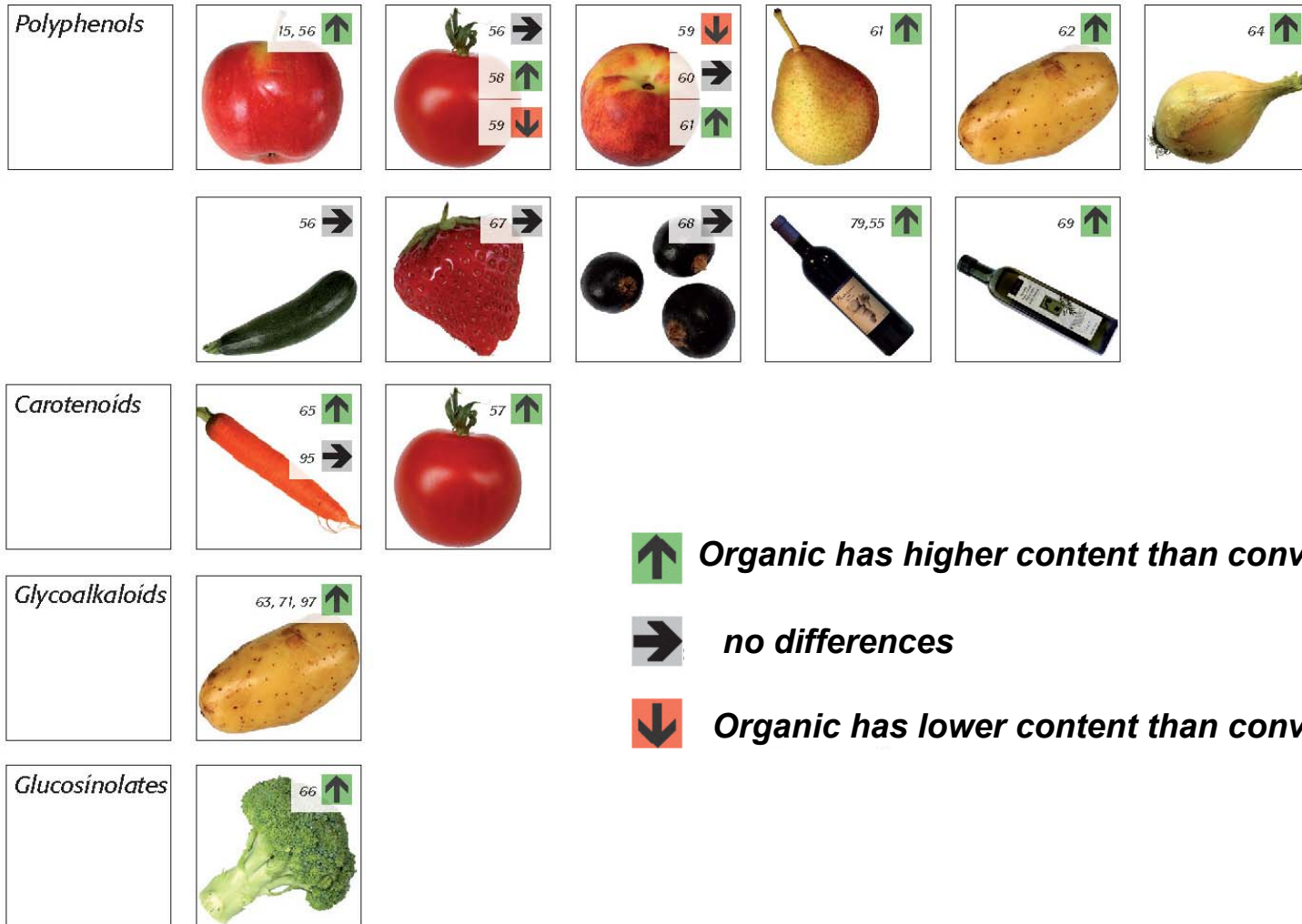
**Food systems  
compared**






Coop supports the climate Quality of organic foods project with money from the Coop Naturaplan Fund.



# Nutritional benefits of organic produce: e.g. secondary plant metabolites

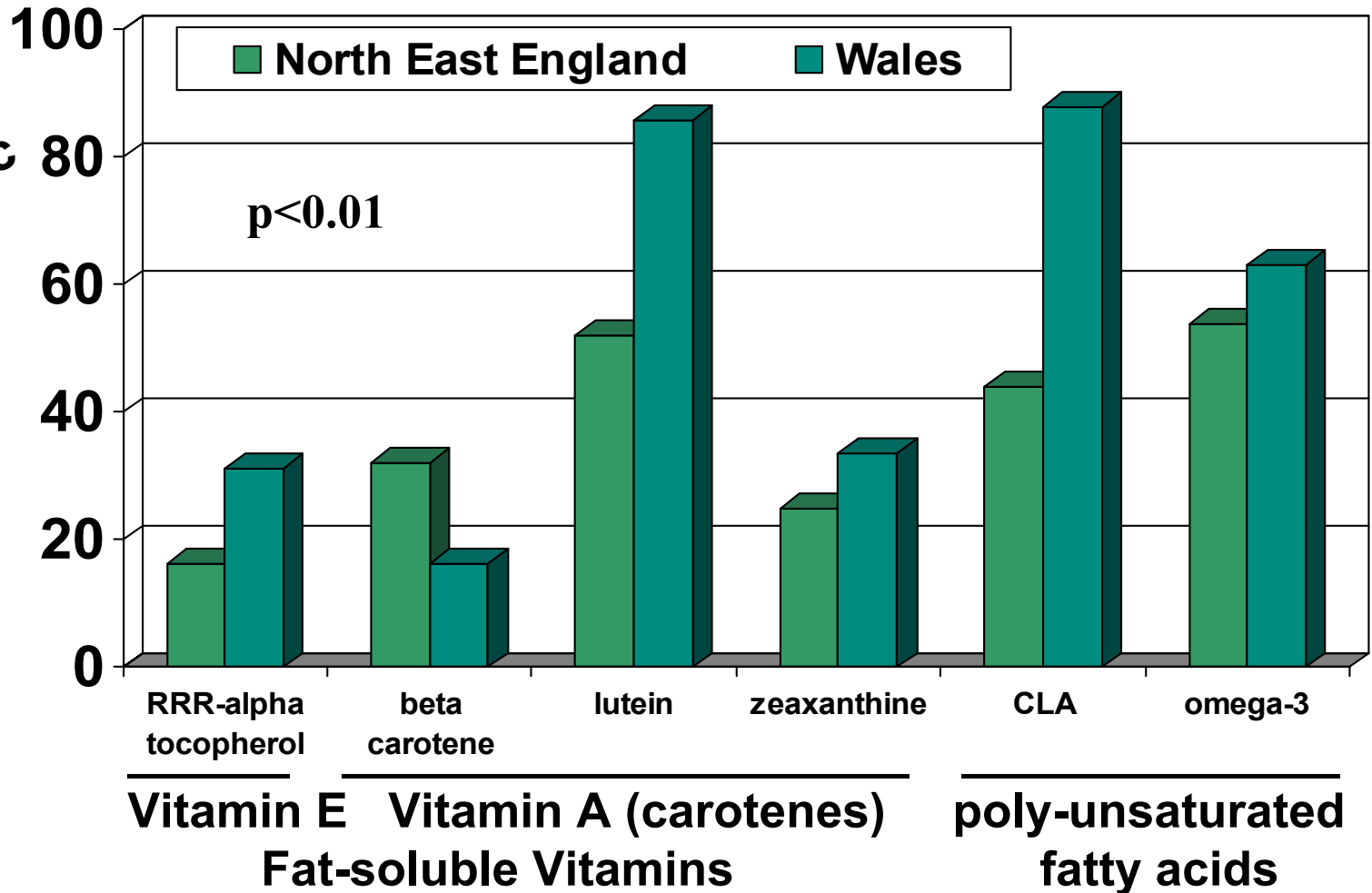


-  **Organic has higher content than conventional**
-  **no differences**
-  **Organic has lower content than conventional**

# Milk quality (2005/2006)

## Effect of organic and conventional production systems

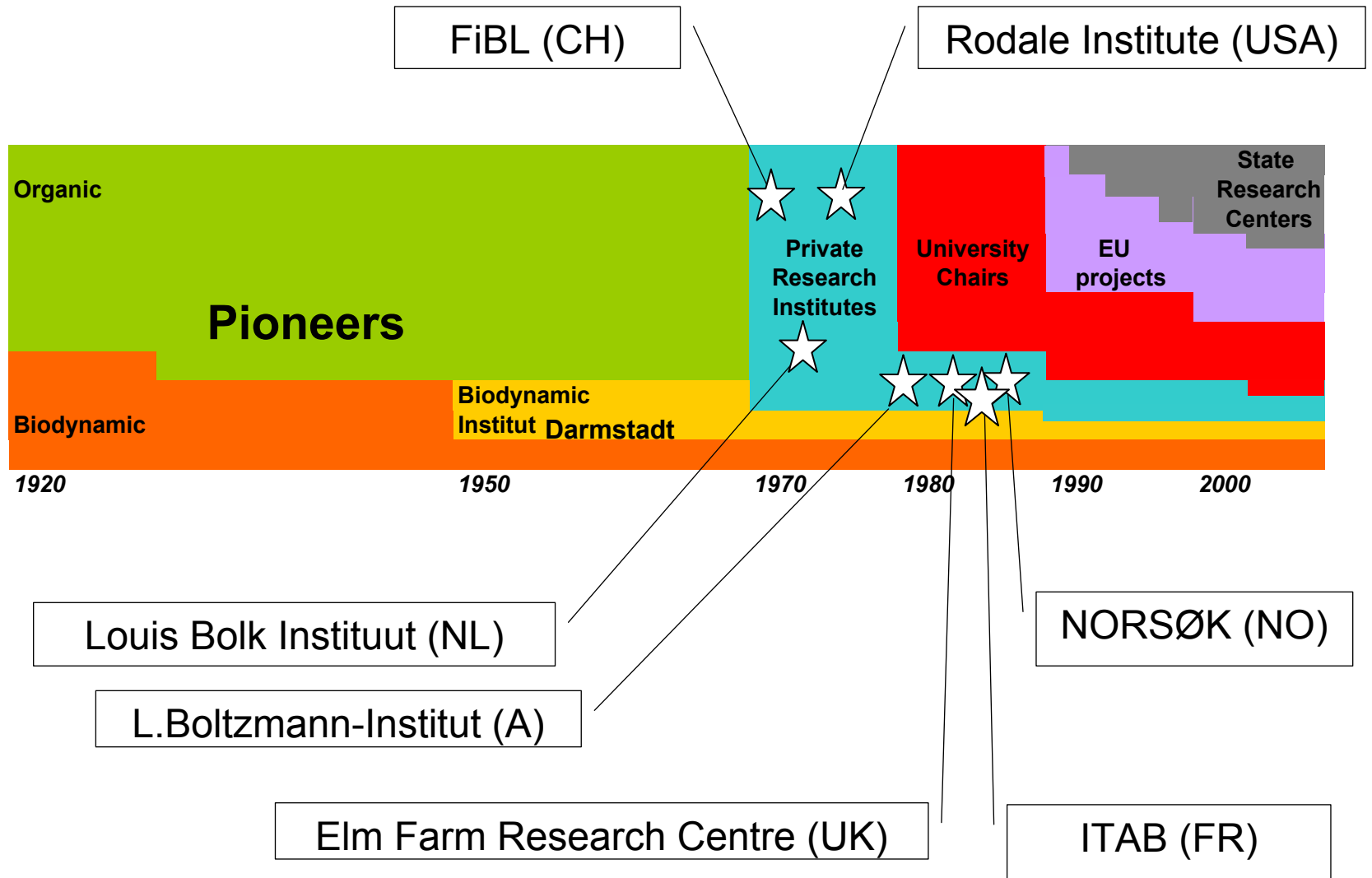
% higher  
in organic  
milk



# Focus of my presentation

- > Why is organic farming research a priority?
- > History and state- of the-art of organic farming research
- > How to approach best research projects (methodology).
- > Priorities for future research

# History of organic farming research





# Pioneer institute for organic food & farming since 1973

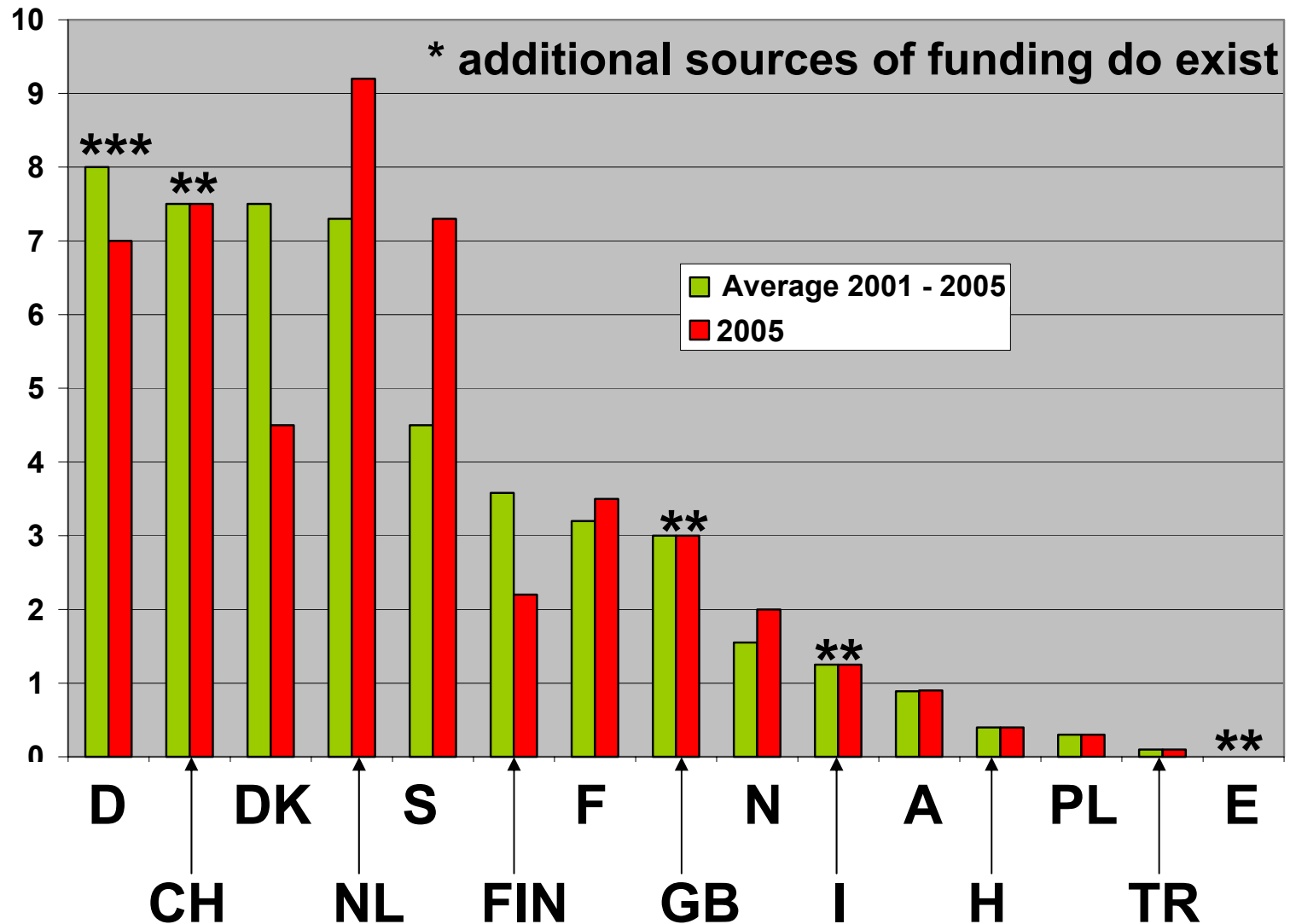




# Different models how organic farming research is organised, e.g.

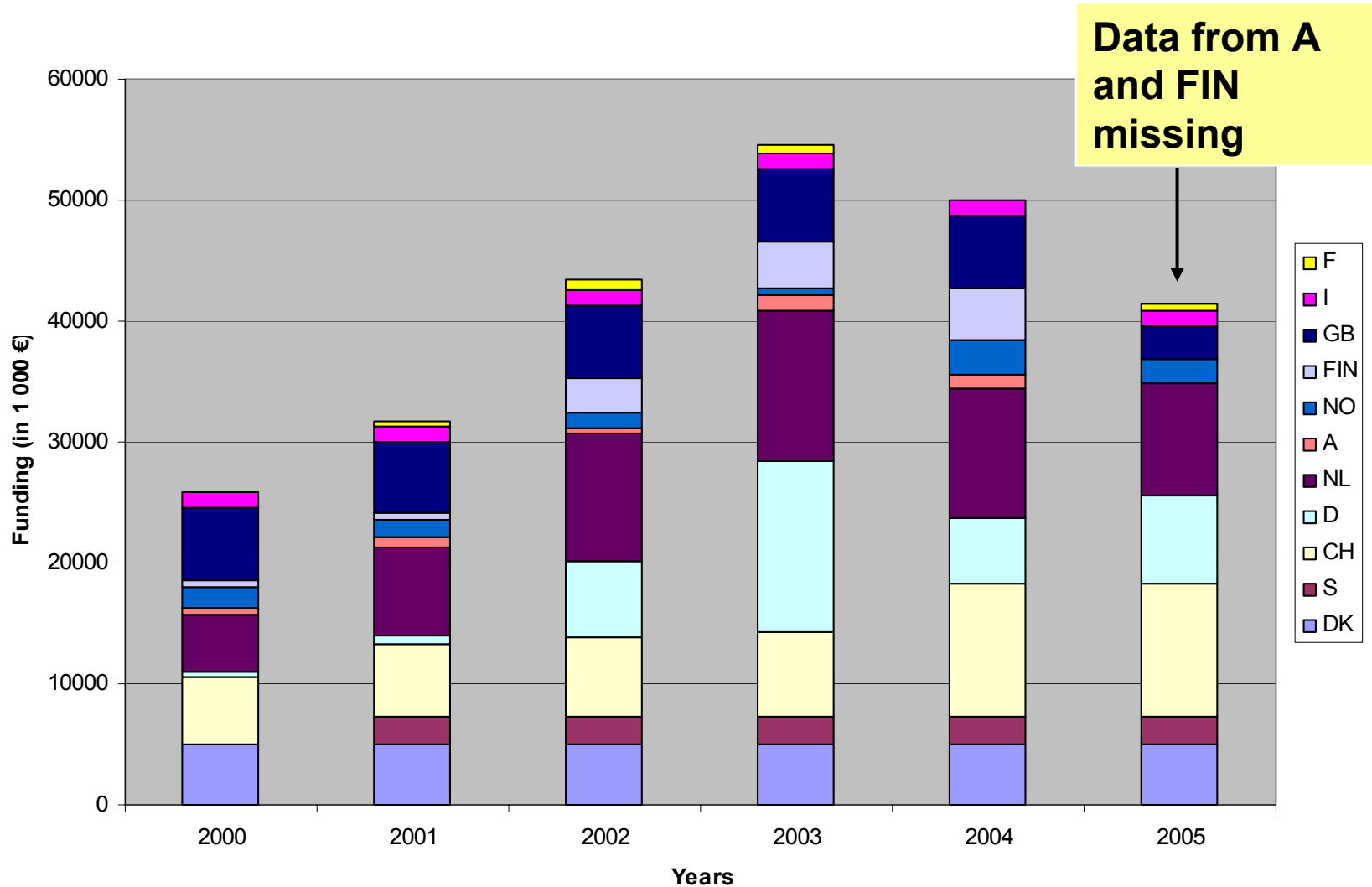
- > Dominant institute with a lot of networking (FiBL, → Switzerland)
- > ‘Centre without walls’ (virtual institute DARCOF with the background of DIAS and universities, → Denmark)
- > Many research units (conventional and organic ones) without co-ordination (→ Germany)
- > Many research units (conventional and organic ones) with co-ordination (ITAB, → France)

# National programmes for OF research

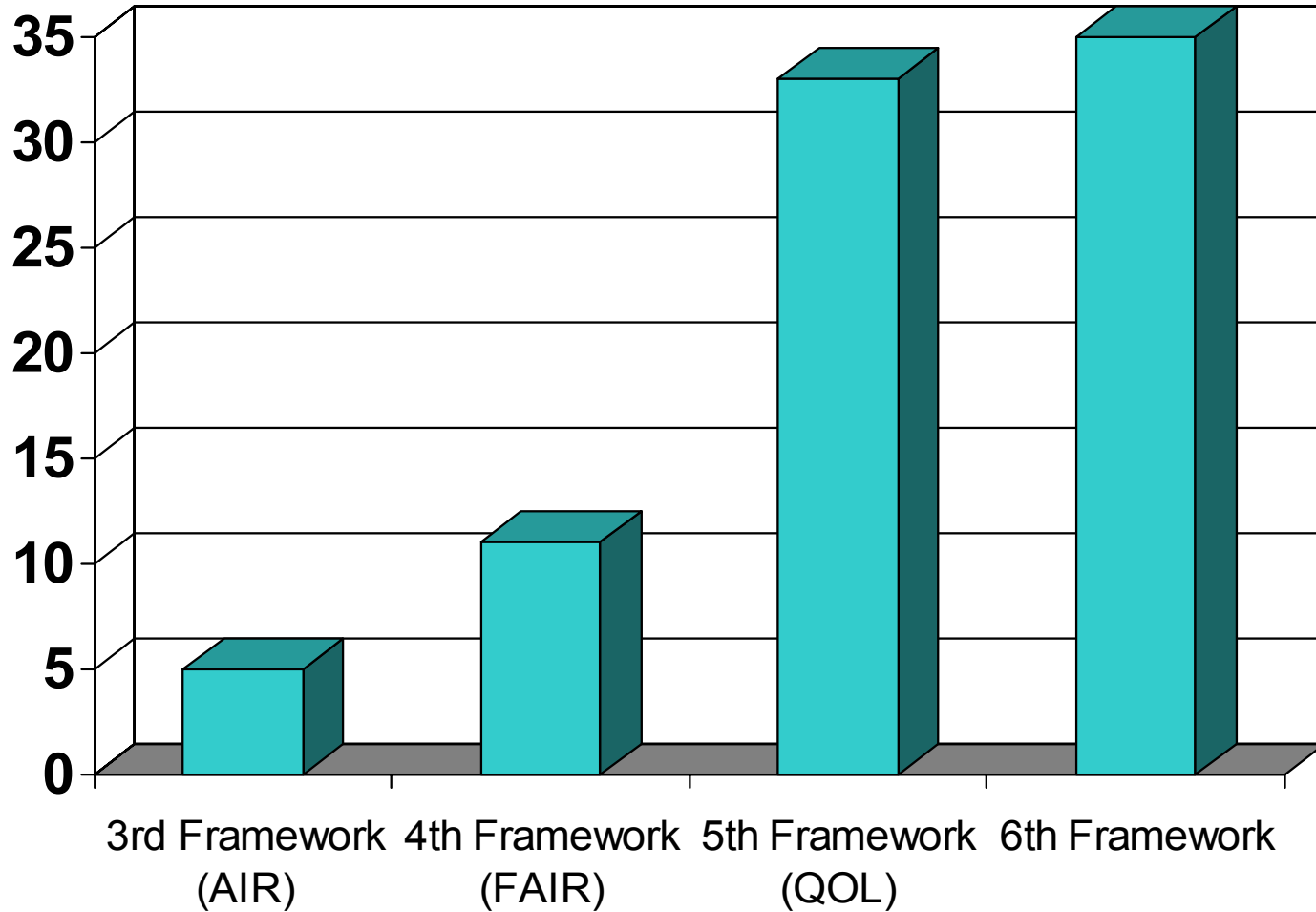


# National programmes for OF research

(11 partners of the ERA Net CORE Organic)

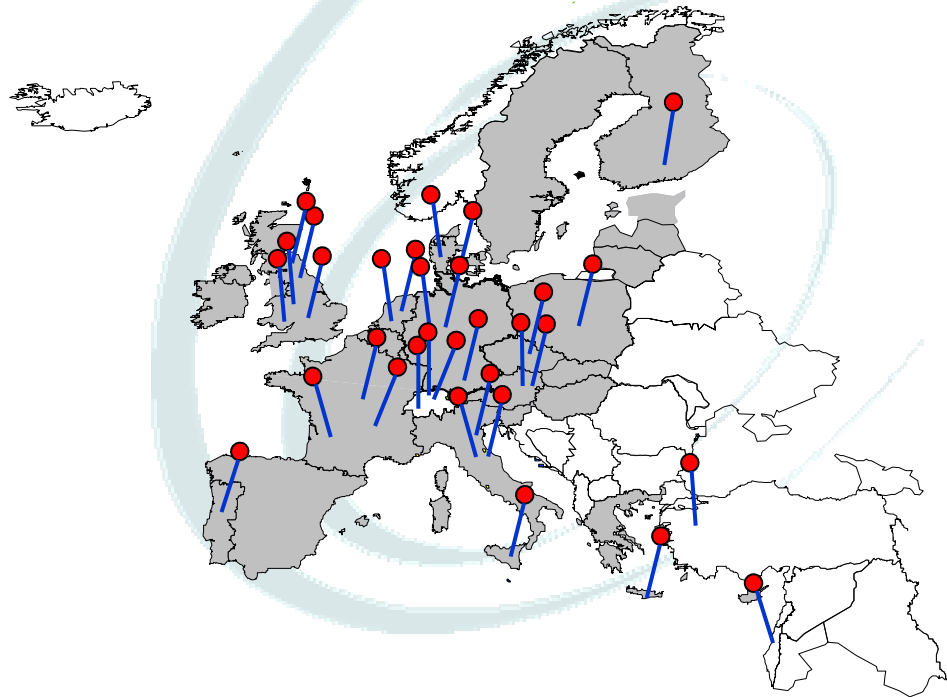


# EU funding for OF research (million €)



# Food from low input and organic production systems: Ensuring the safety and improving quality along the whole chain (QLIF)

<http://www.qlif.org>



# Improvement of organic crop production

- > Blight-Mop
- > REPCO
- > ISAFRUIT



# Animal health and food safety

> SAFO

> QLIF



# Agricultural policy, market data, economy

- > EU-CEEOPF
- > EISfOM
- > Organic Action Plan
- > OMIARD and COFAMI
- > ESOF (Entrepreneurial Skills of Farmers )

## Research strategy

- > ERA-Net CORE ORGANIC.
- > CHANNEL.



# Organic standards in progress

- > ORGANIC INPUTS EVALUATION
- > Organic Revision
- > Organic HACCP
- > ORWINE (wine processing standards)



# Focus of my presentation

- > Why is organic farming research a priority?
- > History and state- of the-art of organic farming research
- > How to approach best research projects (methodology).
- > Priorities for future research

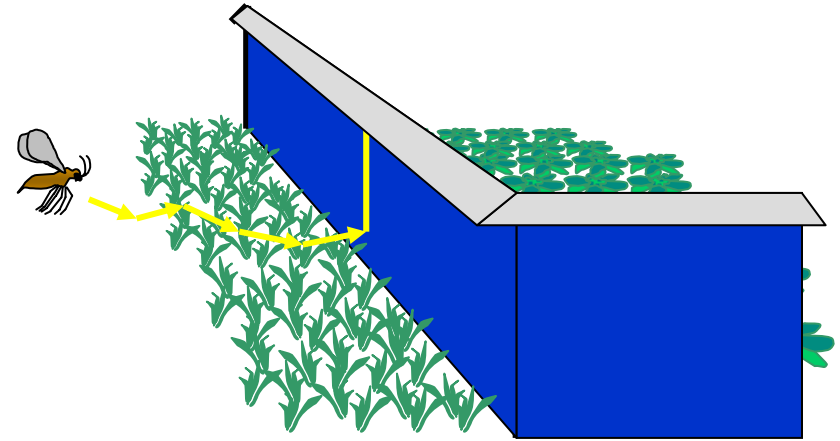
# On-farm research activities on commercial farms



**Real participation  
of farmers?**

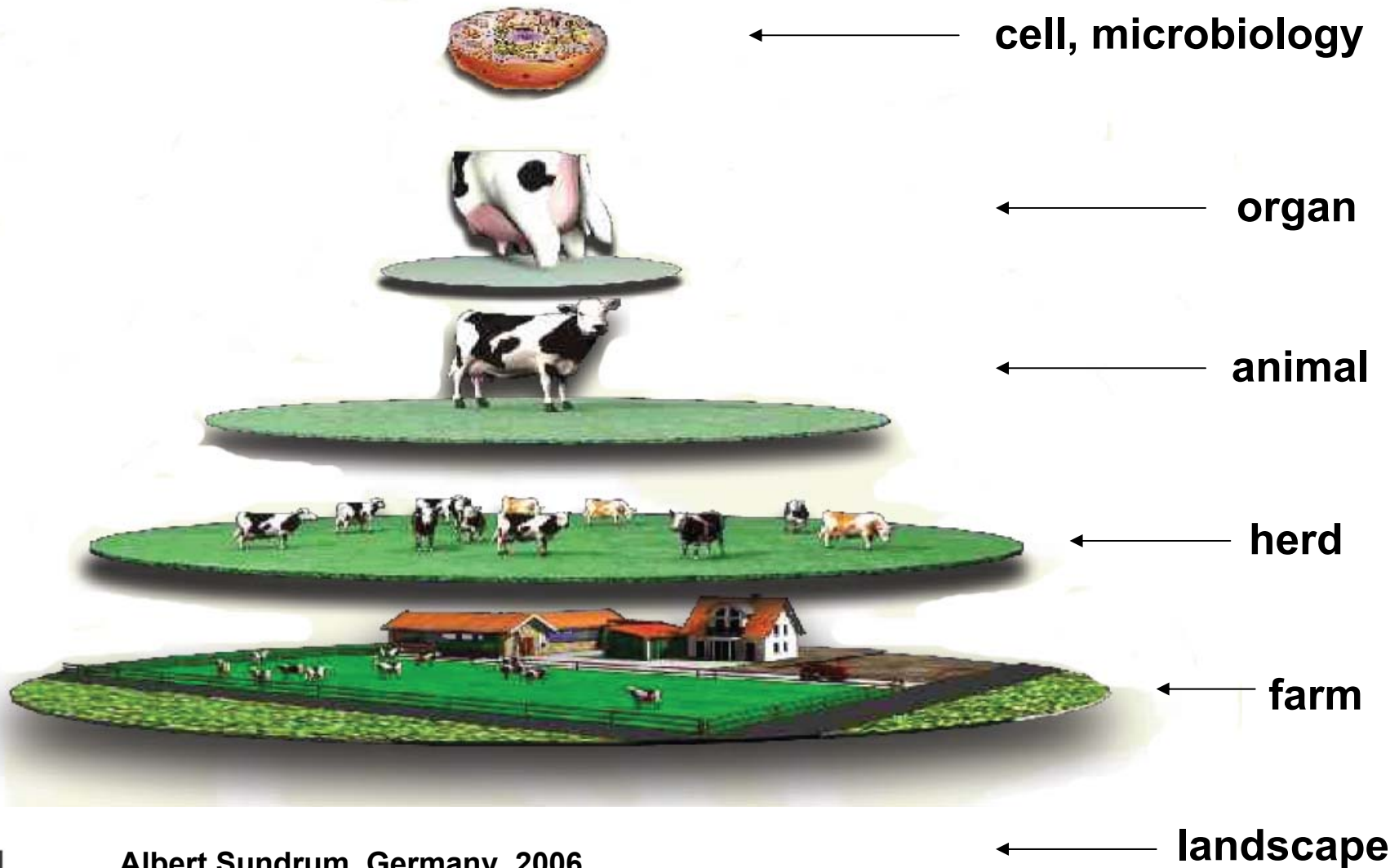
# Mechanical or biological control, e.g. insect fences

- > Swede midges (*Contarinia nasturtii*)
- > Cabbage fly (*Delia radicum* L.)
- > Carrot fly (*Psila rosae*)

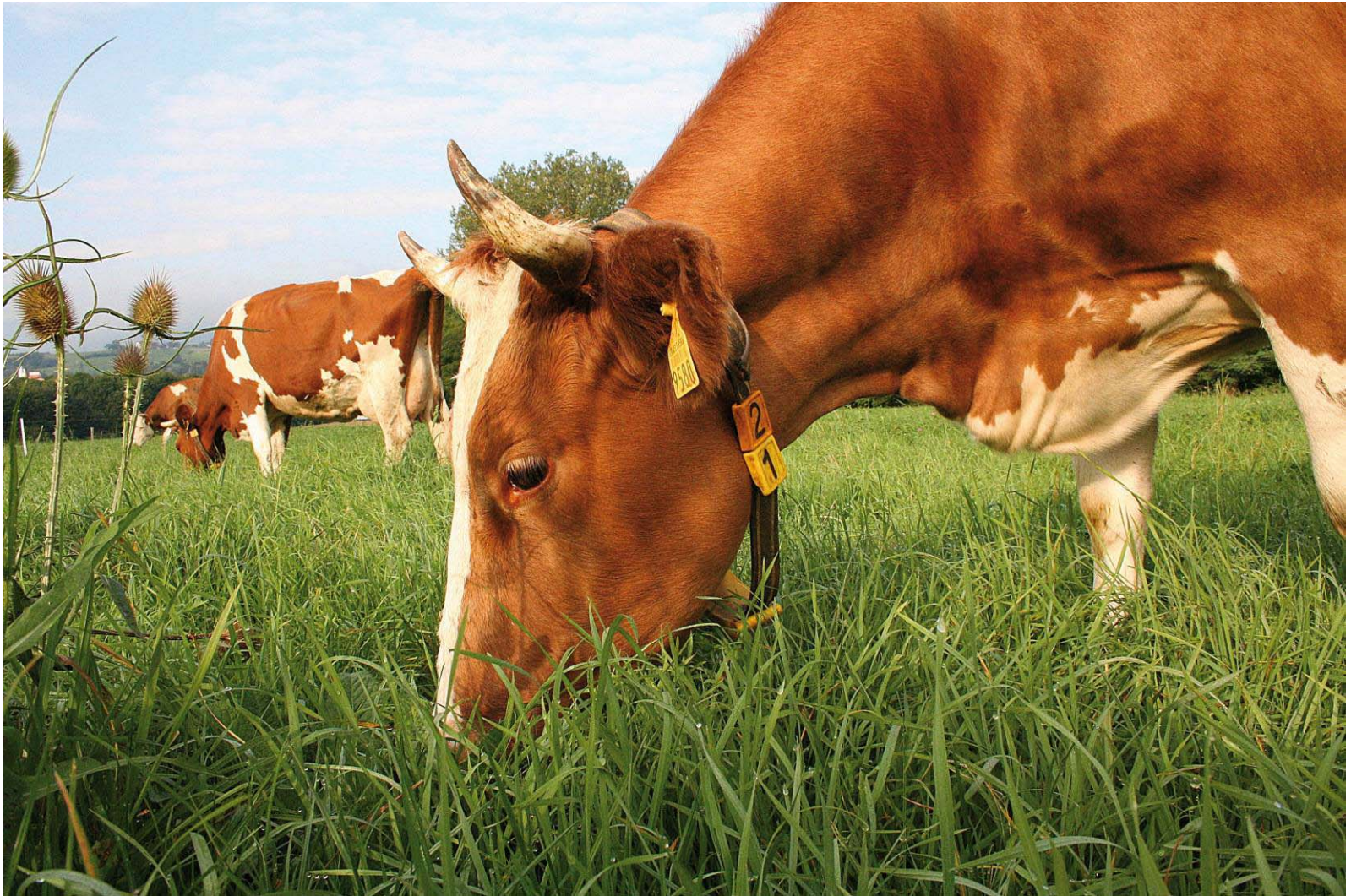




# What is a holistic approach?



# How to include ethical aspects?





# Integrity of living organisms?



**see Lammerts van Bueren, NL:  
standards for organic plant breeding**

# Focus of my presentation

- > Why is organic farming research a priority?
- > History and state-of-the-art of organic farming research
- > How to approach best research projects (methodology).
- > **Priorities for future research**



# Future priorities

- > Making organic systems really sustainable.
- > Replacing problematic inputs.
- > Animal health and animal welfare (no allopathic remedies).
- > Further improving the quality of organic produce.
- > Making better use of the genetic progress (breeding for low input and organic conditions).
- > Providing data for transparent organic food chains (farm to fork).
- > Better processing technologies.

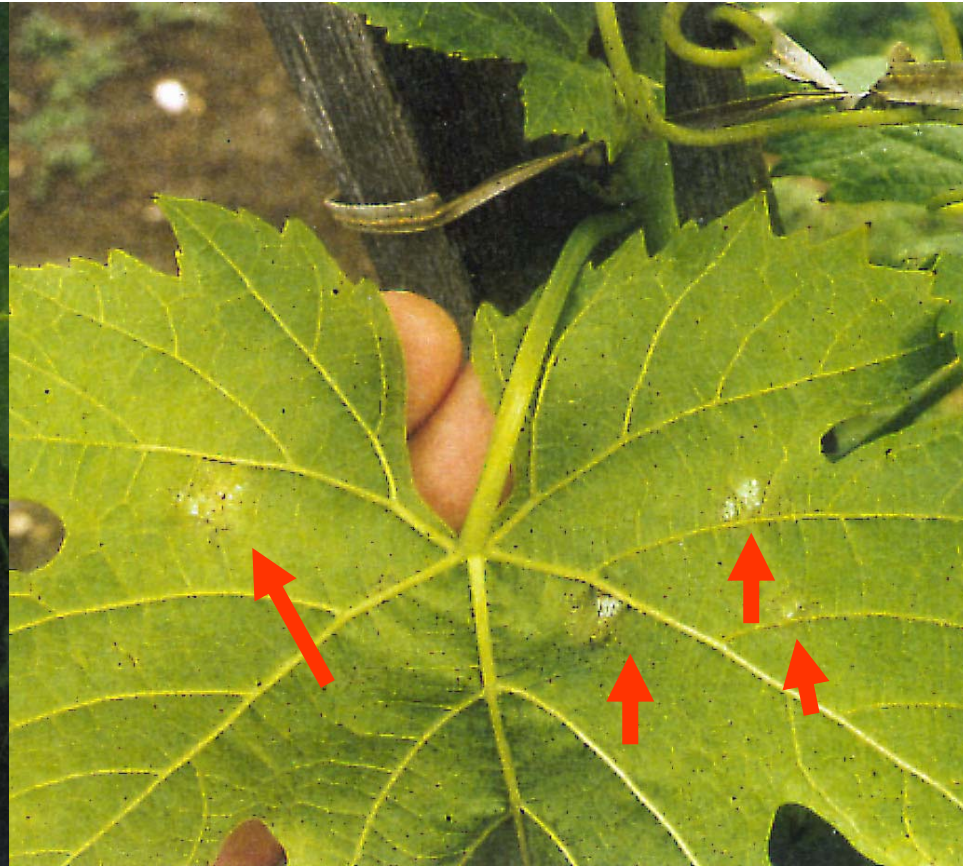
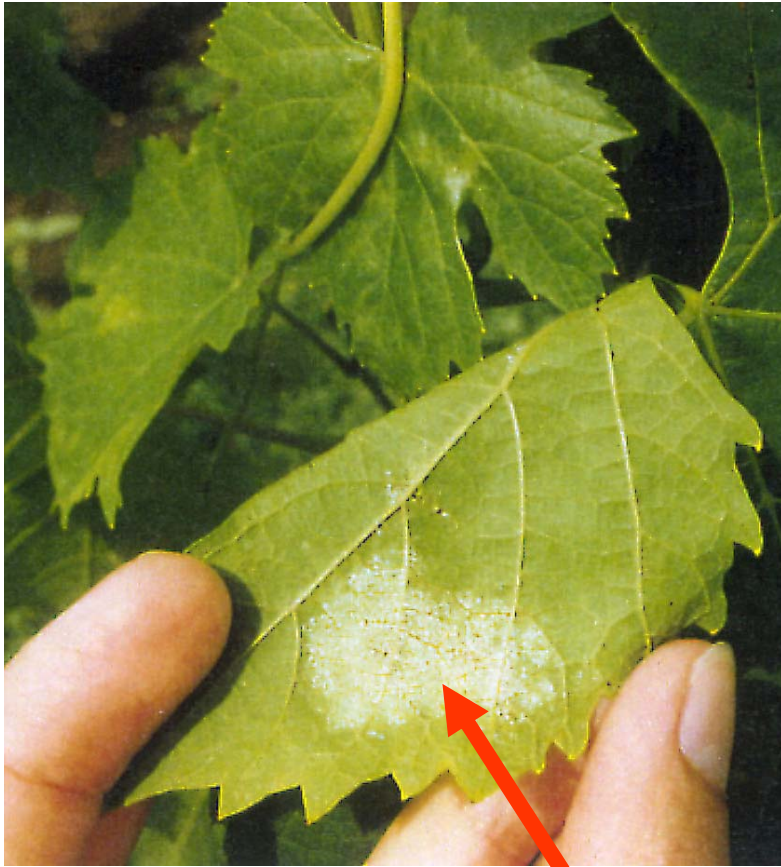
# Horticultural crops still depend on copper and sulphur



# Induced resistance (e.g. grapevine, downy mildew, *Plasmopara viticola*)

Control

PEN (natural elicitor)



# How to use this mechanism in practice?

> Resistance induced by soil fertility



> Resistance induced by spraying natural elicitors (dry mycelium of *Penicillium chrysogenum*)





# Control of endoparasites in livestock (replacing dewormers)



BioControl with  
*Duddingtonia*  
*flagrans*



Fodder crops with high contents of  
bioactive compounds (e.g. tannins)  
like sainfoin (*Onobrychis viciifolia*)



# Scab control by resistant cultivars







# Crop breeding: ideotypes adapted to organic farming

Special quality requirements  
(nutritional/technological quality)

Plant health/pathogenes  
(field tolerance, resistance)

Canopy competition  
(shoot architecture)

Nutrient absorption/-efficiency  
(root system architecture)



many  
specific  
breeding  
goals



INSTITUTE OF ORGANIC AGRICULTURE  
UNIVERSITY OF BONN

Ulrich Köpke, 2006



# Utilizing diversity functionally





# Organic farmers and environmentalists: becoming real partners



**Thank you very much for your attention!**

