

Harnessing the potential of **Agricultural Biotechnology for Europe**

Enhancing commercial acceptance and
overcoming regulatory hurdles

10-11 July 2007 | Amsterdam Marriott Hotel, The Netherlands

KEYNOTE ADDRESS

**Towards a new communication strategy:
outlining ways to improve the European consumer
and political opinion**

Professor Klaus Ammann,
Guest Professor Department of Biotechnology, TU Delft

THE GREENS DEMAND A BAN ON
THE RELEASE OF GE ORGANISMS
BECAUSE THERE IS NO PROOF THEY ARE
SAFE...

AND WE WANT TO LEGALIZE
CANNABIS, EVEN THOUGH THERE
IS PROOF IT IMPAIRS MEMORY
AND LEARNING, AND PREMATURELY
AGES THE BRAIN...



Distorted Risk Perception II

Mankind belongs to nature and the globe

You cannot simultaneously blame men for Global Warming exclude them from risk-benefit balance in the Golden Rice:

Fact is, that 44'000 children die alone in India every year from vitamin A deficiency, because the Golden Rice is not regulated yet

**We must talk more
about the
benefits of GMOS**

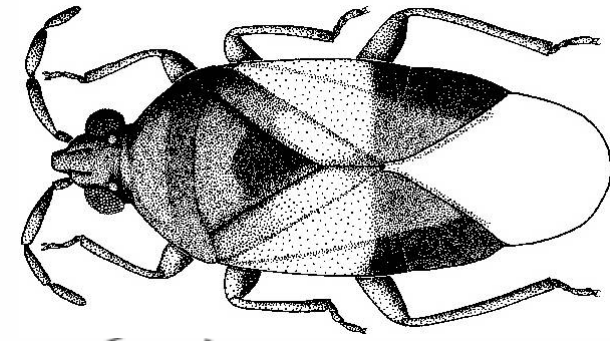
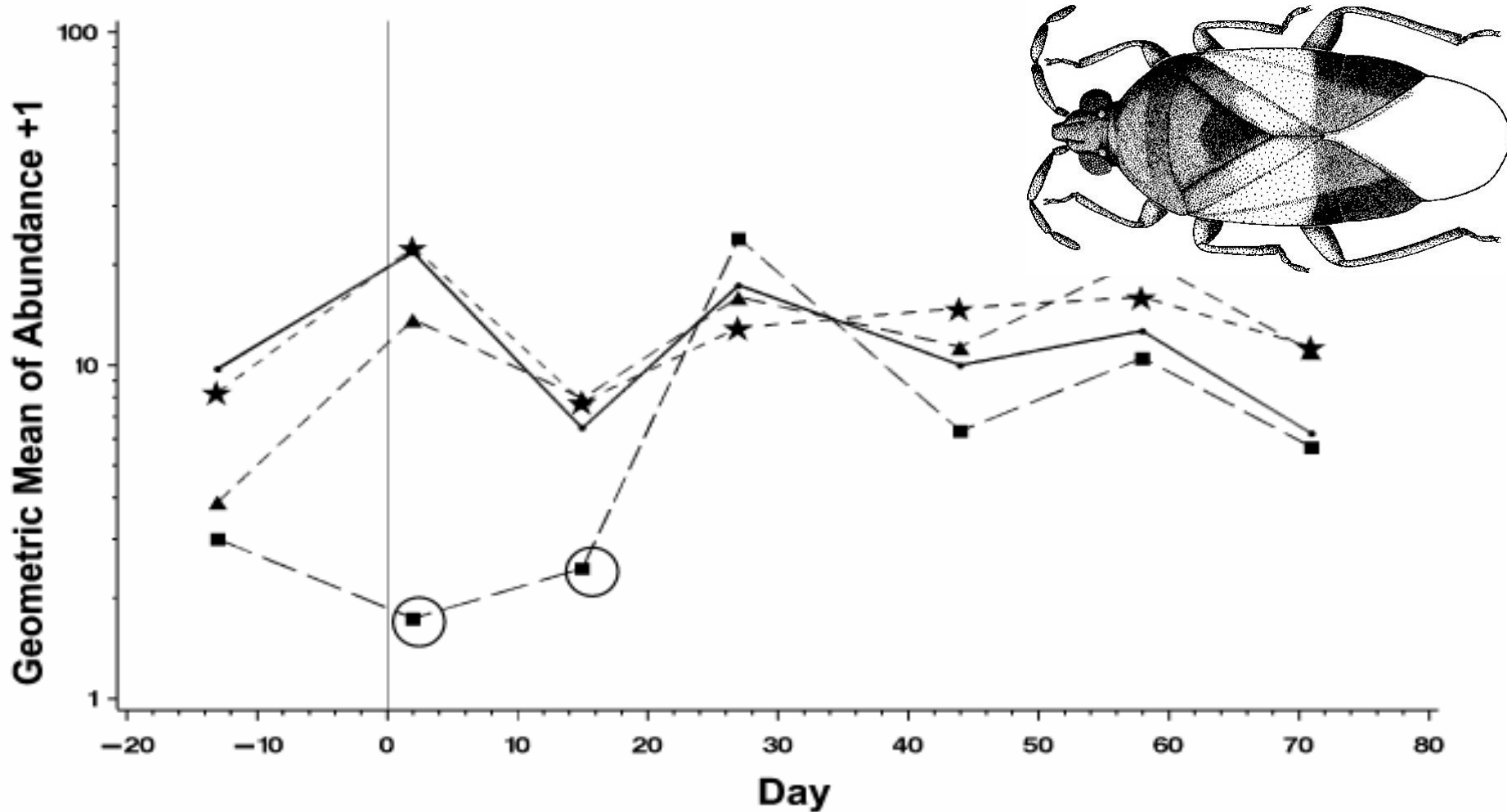


FIGURE 9. Population density of *Orius* sp. (Heteroptera: Anthocoridae). Plotted are the geometric means of abundance +1 per trap against time: (●) untransformed corn (control); (★) Bt-corn; (▲) untransformed corn treated with Delfin; (■) untransformed corn treated with Karate Xpress; Day 0, spray day. Statistically significant treatment effects when compared to control are circled (Tukey test, $P \leq 0.05$).

Candolfi, M.P., Brown, K., Grimm, C., Reber, B., & Schmidli, H. (2004)

A faunistic approach to assess potential side-effects of genetically modified Bt-corn on non-target arthropods under field conditions. *Biocontrol Science and Technology*, 14, 2, pp 129-170

<http://www.botanischergarten.ch/Bt/Candolfi-Biocontrol-2004.pdf>

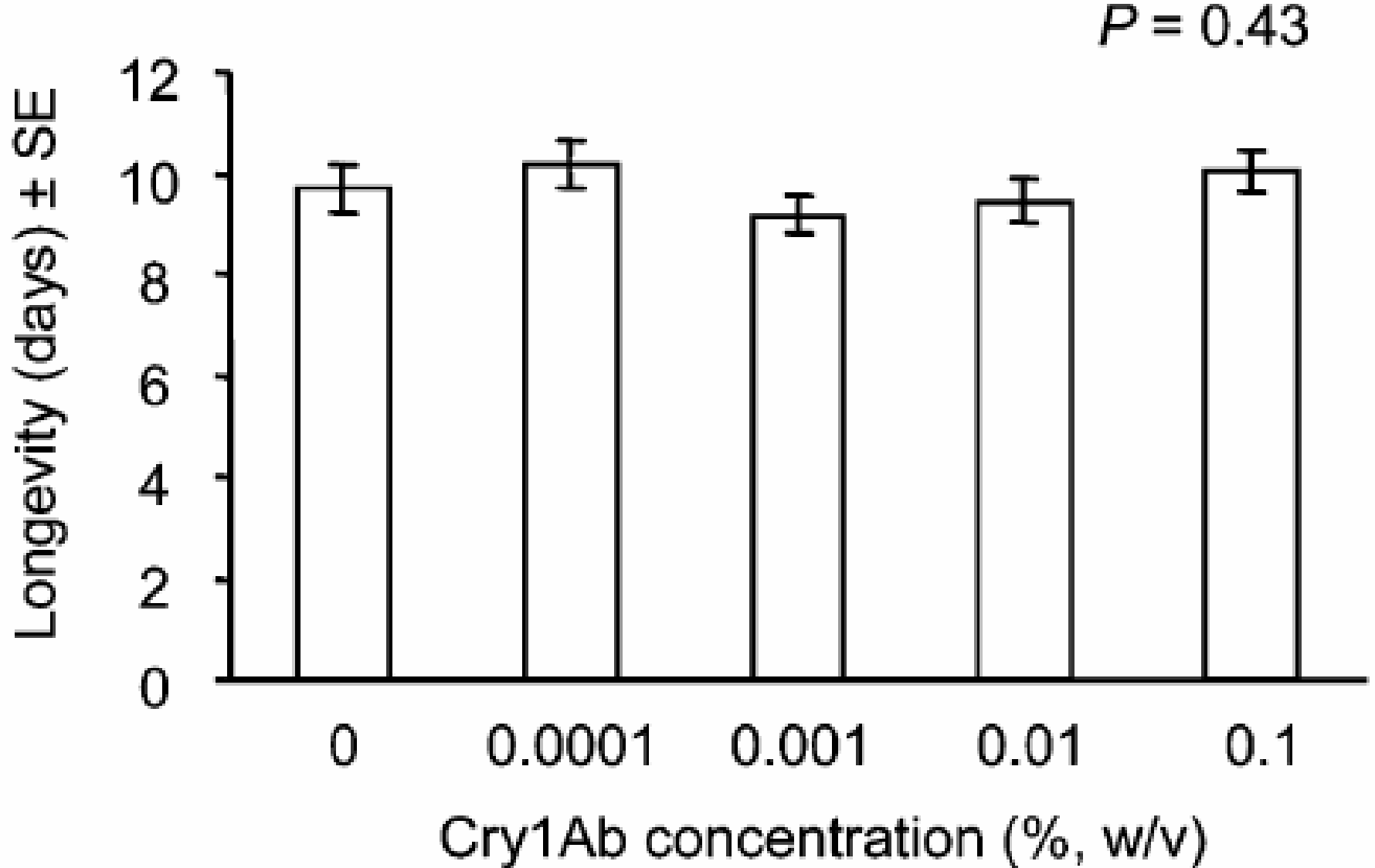


Fig. 1. Mean longevity (\pm SE) of first instar *C. carnea* fed with different concentrations of the Cry1Ab toxin dissolved in a 2 M sucrose solution ($n = 57-60$ per treatment). Romeis et al. 2004

A share of resistant and sensitive populations of weeds. Results of monitoring in Czech Republic

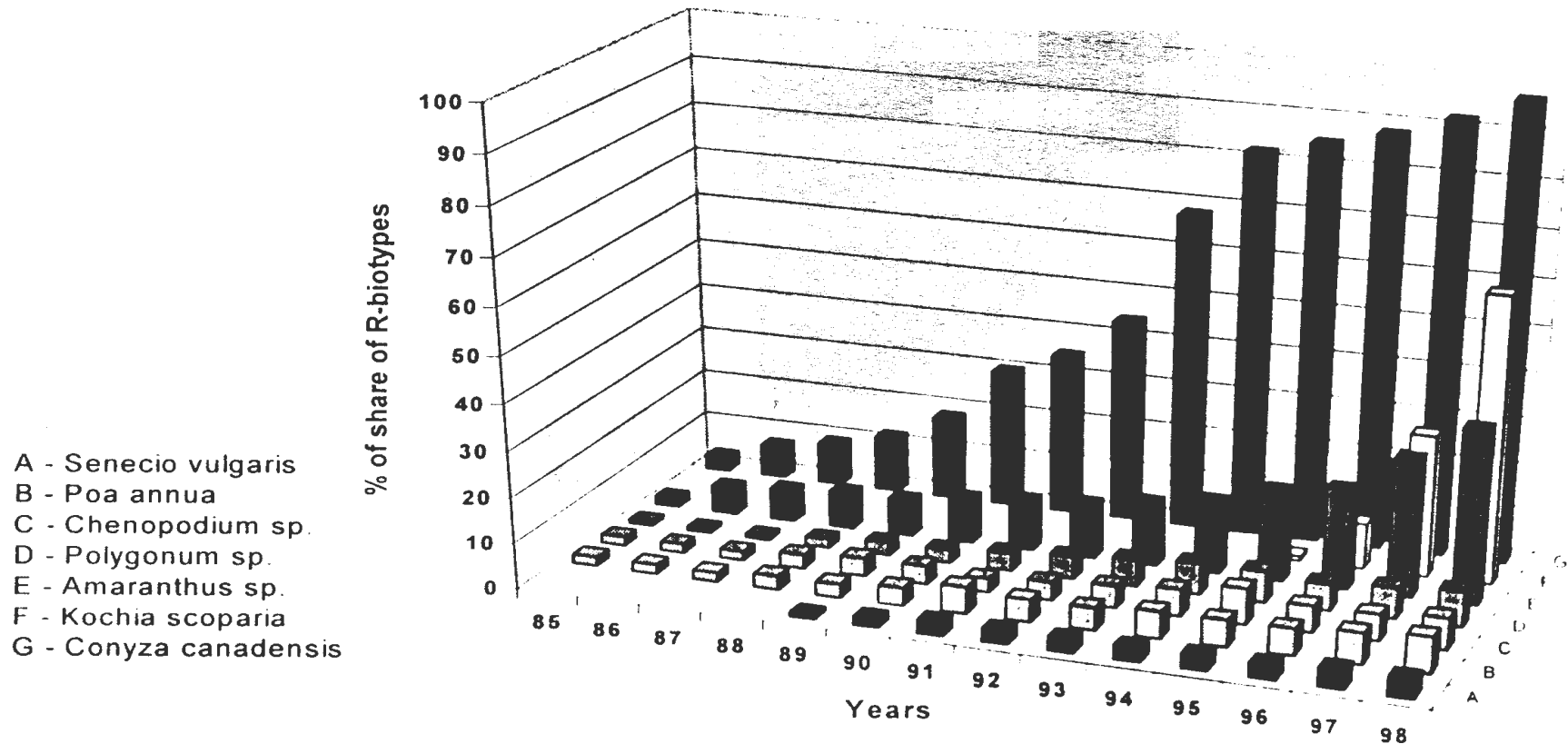


Fig 1: A share of resistant and sensitivity populations of weeds

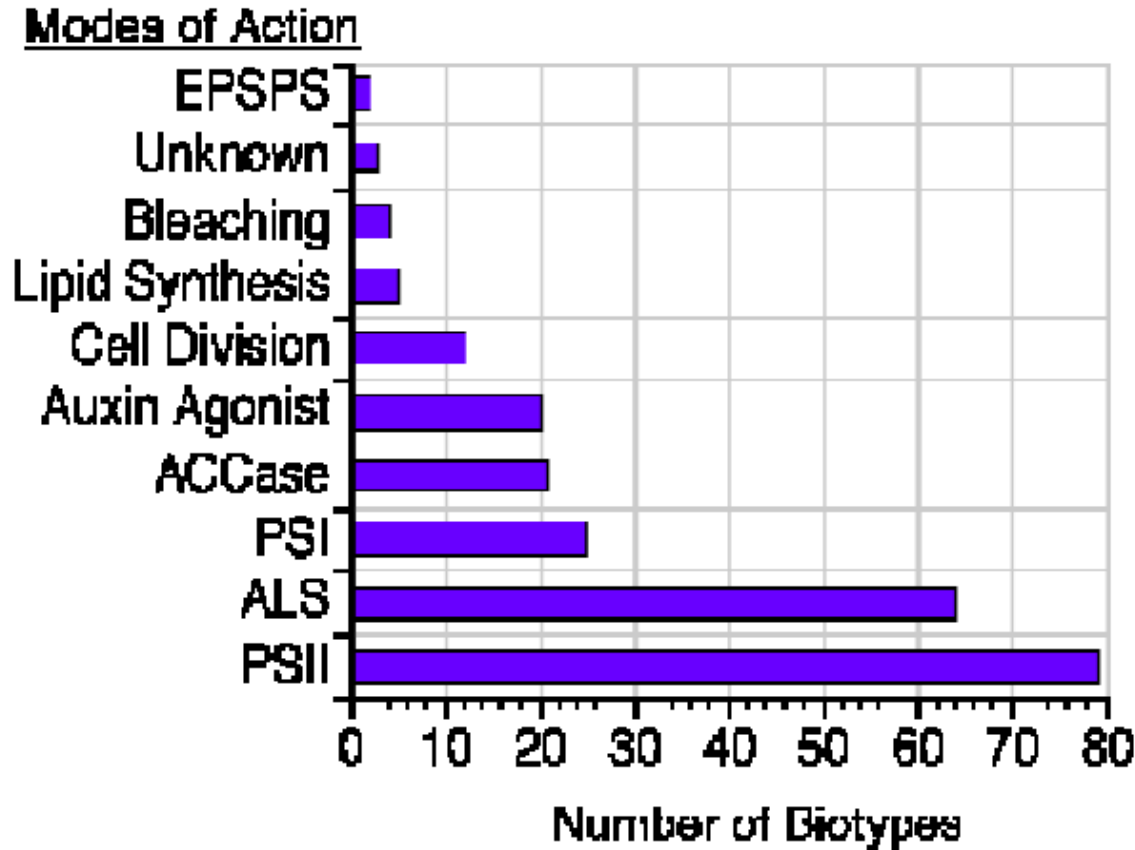
Abb. 1: Anteil sensibler und resistenter Unkrautpopulationen in der Tschechischen Republik

Mikulka, J. & Chodova, D. (2000)

Long-Term Study on the Occurrence of Weeds Resistant to Herbicides in the Czech Republic. Zeitschrift Fur Pflanzenkrankheiten Und Pflanzenschutz-Journal of Plant Diseases and Protection, pp 373-376

FIGURE 1

Number of plant biotypes resistant to herbicides, categorized by mode of herbicide action.



PSII, photosystem II inhibition; ALS, acetolactate synthase inhibition; PSI, diversion of electrons at photosystem I; ACCase, inhibition of lipid biosynthesis by blocking acetyl co-enzyme A carboxylase; EPSPS, glyphosate resistance caused by inhibition of enolpyruvyl shikimate phosphate synthase.

Felsot, A.S. (2000)

Herbicide Tolerant Genes, Part 3, Super Weed" Myths and Kryptonite Remedies. In Agrichemical and Environmental News, Vol. 176, pp. 8
<http://www.adobe.com/prodindex/acrobat/readstep.html> AND
<http://www.aenews.wsu.edu/Dec00AENews/Dec00AENews.htm> AND
<http://www.botanischergarten.ch/HerbizideTol/FelsotHerbTolGen3Environm.pdf>

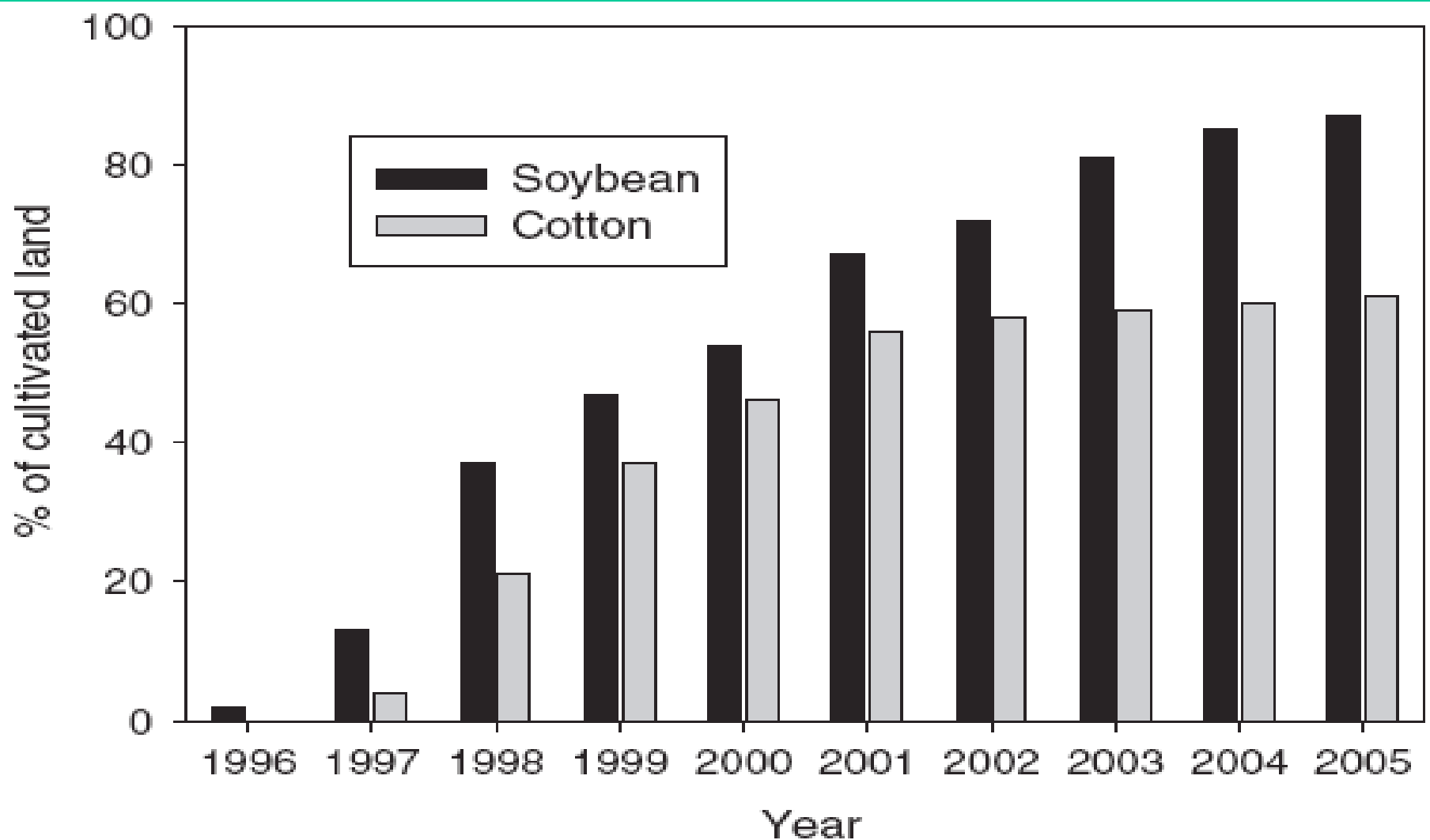


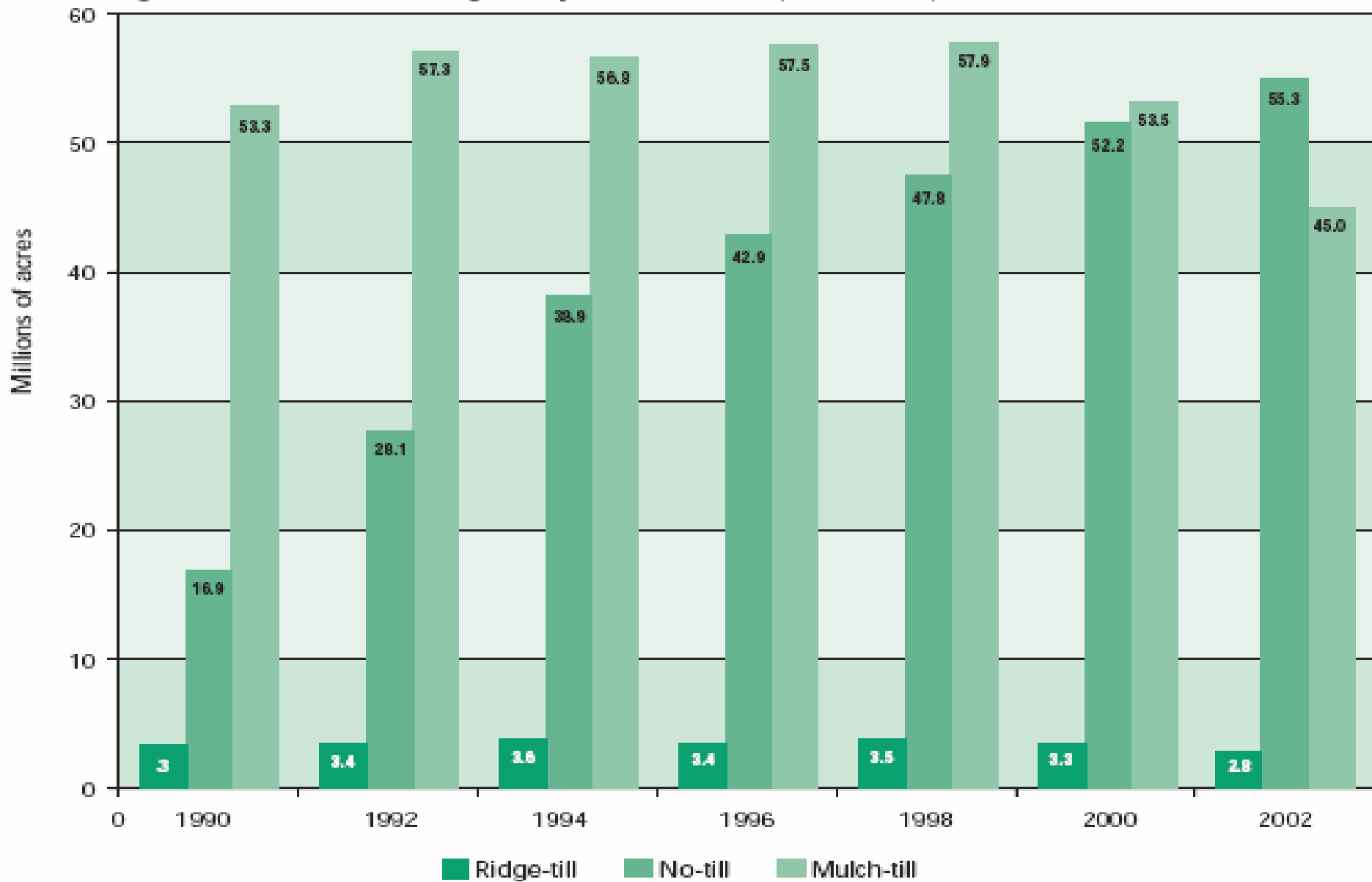
Fig. 2. Adoption of glyphosate-resistant soybean and cotton in the U.S.A. by year. (Duke, 2005; USDA-ERS, 2005a).

Cerdeira, A.L. & Duke, S.O. (2006)

The Current Status and Environmental Impacts of Glyphosate-Resistant Crops: A Review. *Journal of Environmental Quality*, 35, 5, pp 1633-1658

<http://www.botanischergarten.ch/HerbizideTol/Cerdeira-Status-2006.pdf>

Figure 7. Conservation Tillage Adoption in the U.S. (1990–2002)

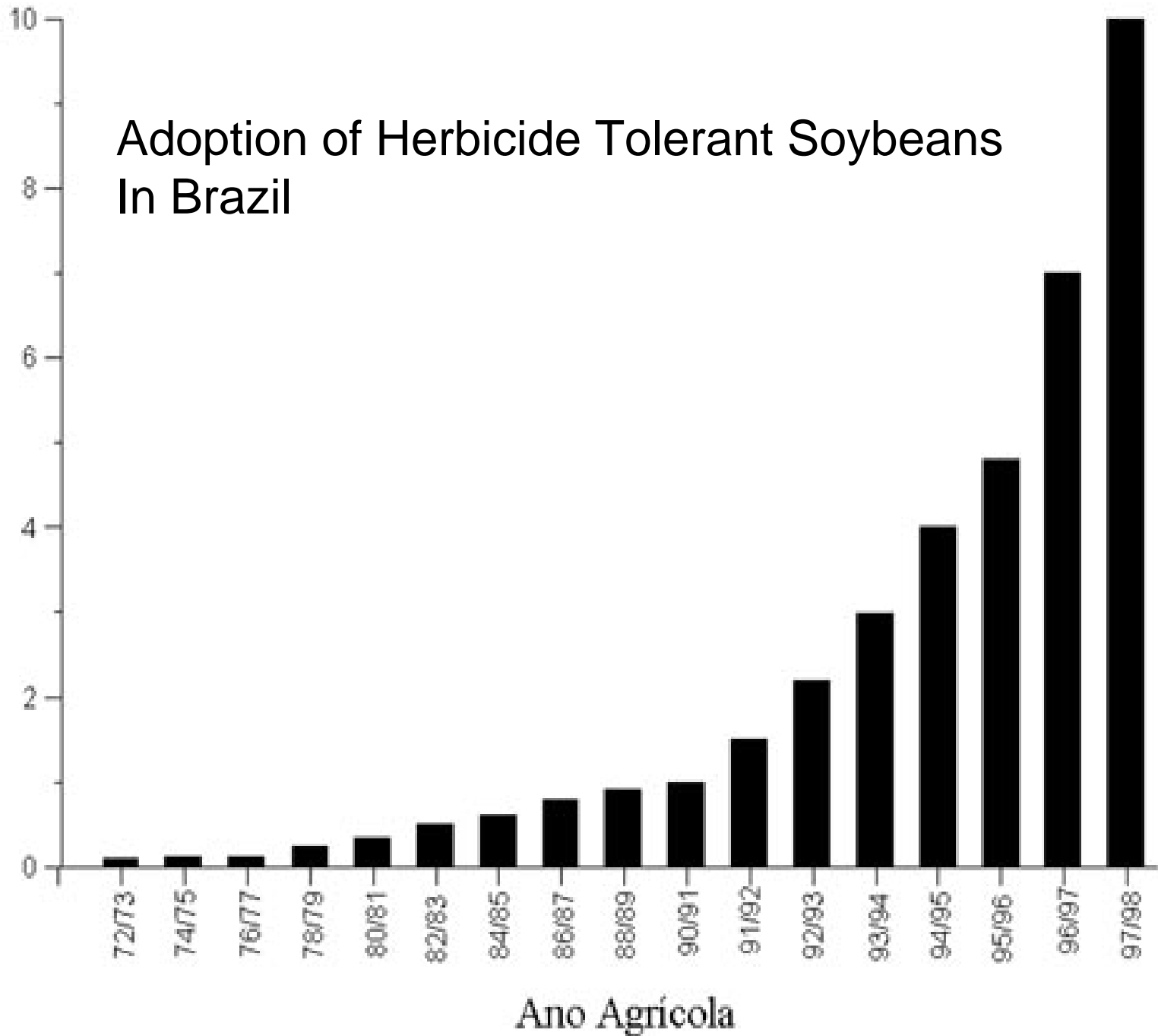


Fawcett, R. & Towery, D. (2002)

Electronic Source: Conservation Tillage and Plant Biotechnology: How New Technologies Can Improve the Environment by Reducing the Need to Plow., published by: Purdue University, www.ctic.purdue.edu/CTIC/CTIC.html or <http://www.botanischergarten.ch/HerbizideTol/Fawcett-BiotechPaper.pdf>

Adoption of Herbicide Tolerant Soybeans In Brazil

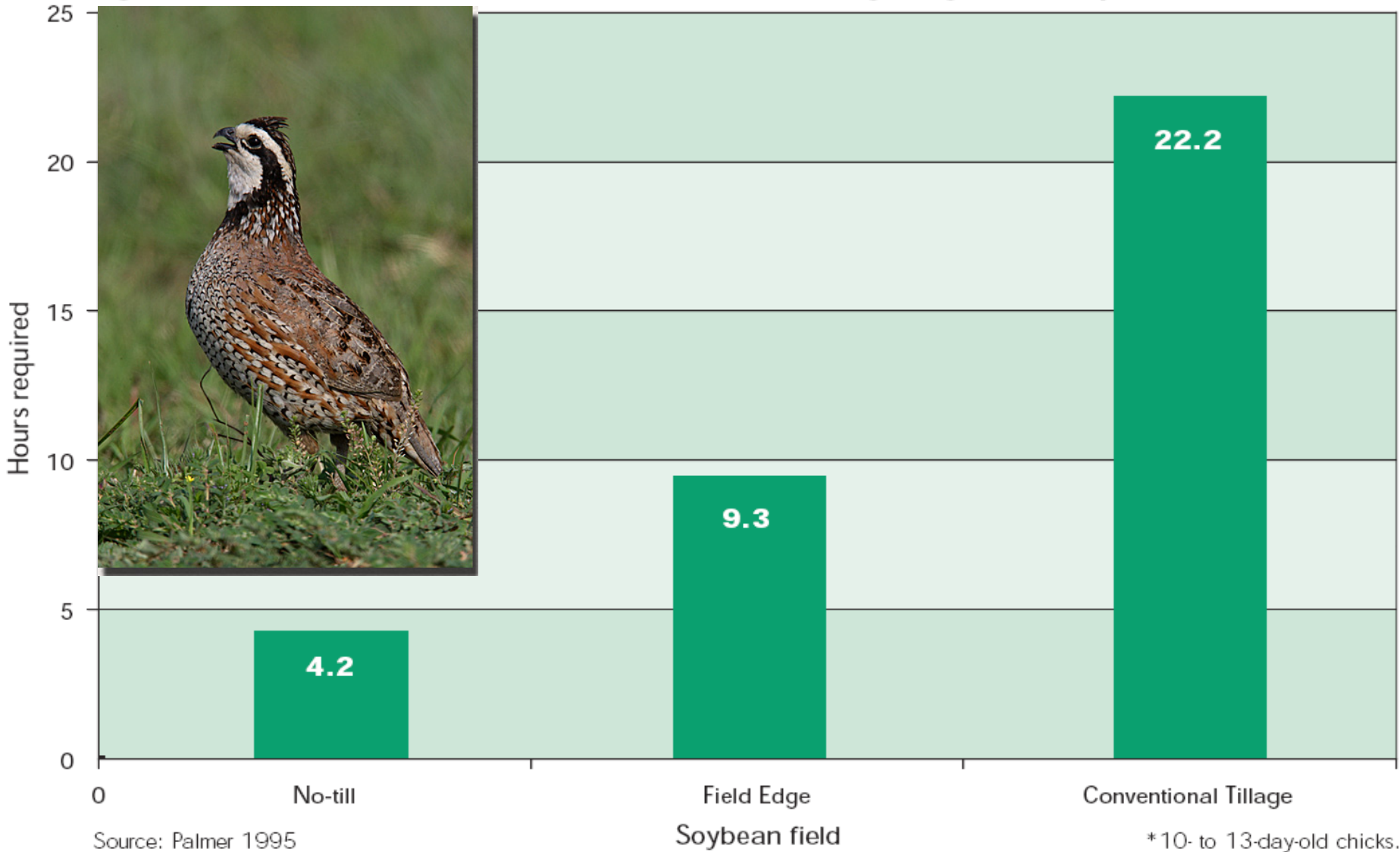
Milhões de ha ⁻¹



Amado, T.J.C. & Reinert, D.J. (1998)

Electronic Source: No-Tillage as a Tool for Sustainable Agriculture in South Brazil (ed C.P. FAO), published by: FAO, <http://www.botanischergarten.ch/HerbicideTol/Amado-Notillage-Brazil-1998.pdf> AND

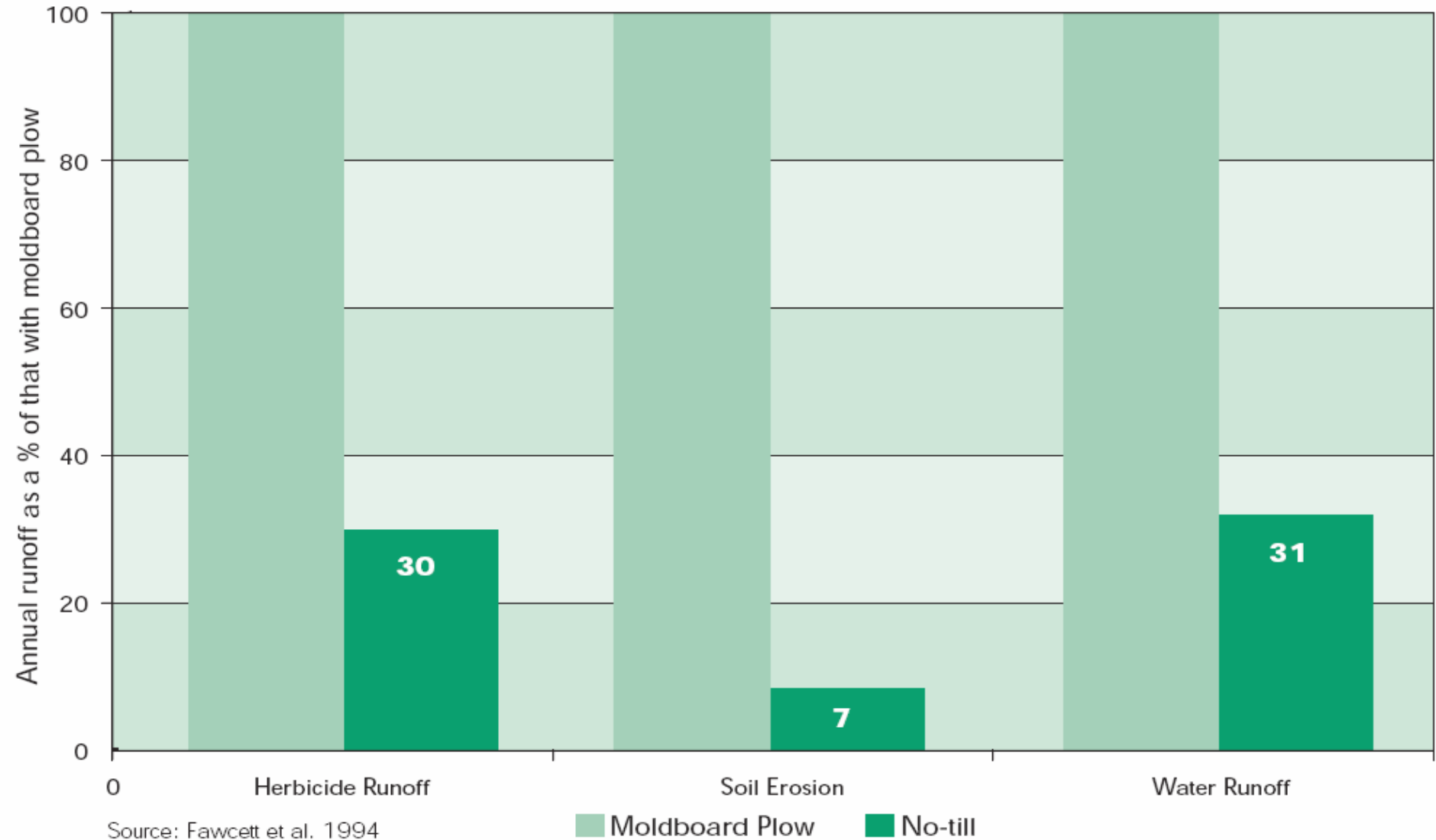
Figure 3. Time Needed for Bobwhite Quail Chicks to Satisfy Daily Insect Requirements*



Fawcett, R. & Towery, D. (2002)

Electronic Source: Conservation Tillage and Plant Biotechnology: How New Technologies Can Improve the Environment by Reducing the Need to Plow., published by: Purdue University,

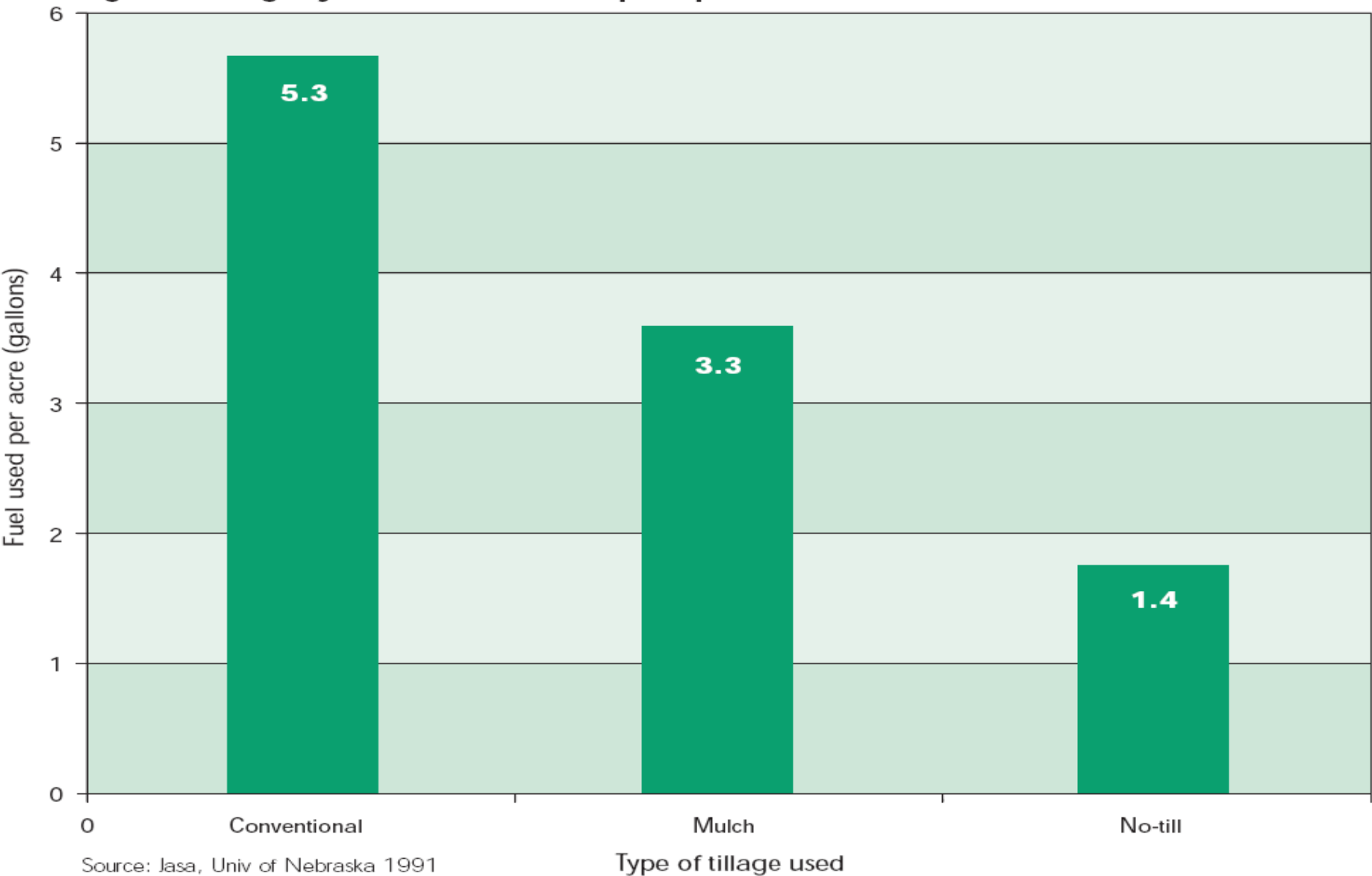
Figure 4. Runoff and Erosion in No-till Watersheds Compared to Conventional Tillage Watersheds



Fawcett, R. & Towery, D. (2002)

Electronic Source: Conservation Tillage and Plant Biotechnology: How New Technologies Can Improve the Environment by Reducing the Need to Plow., published by: Purdue University,

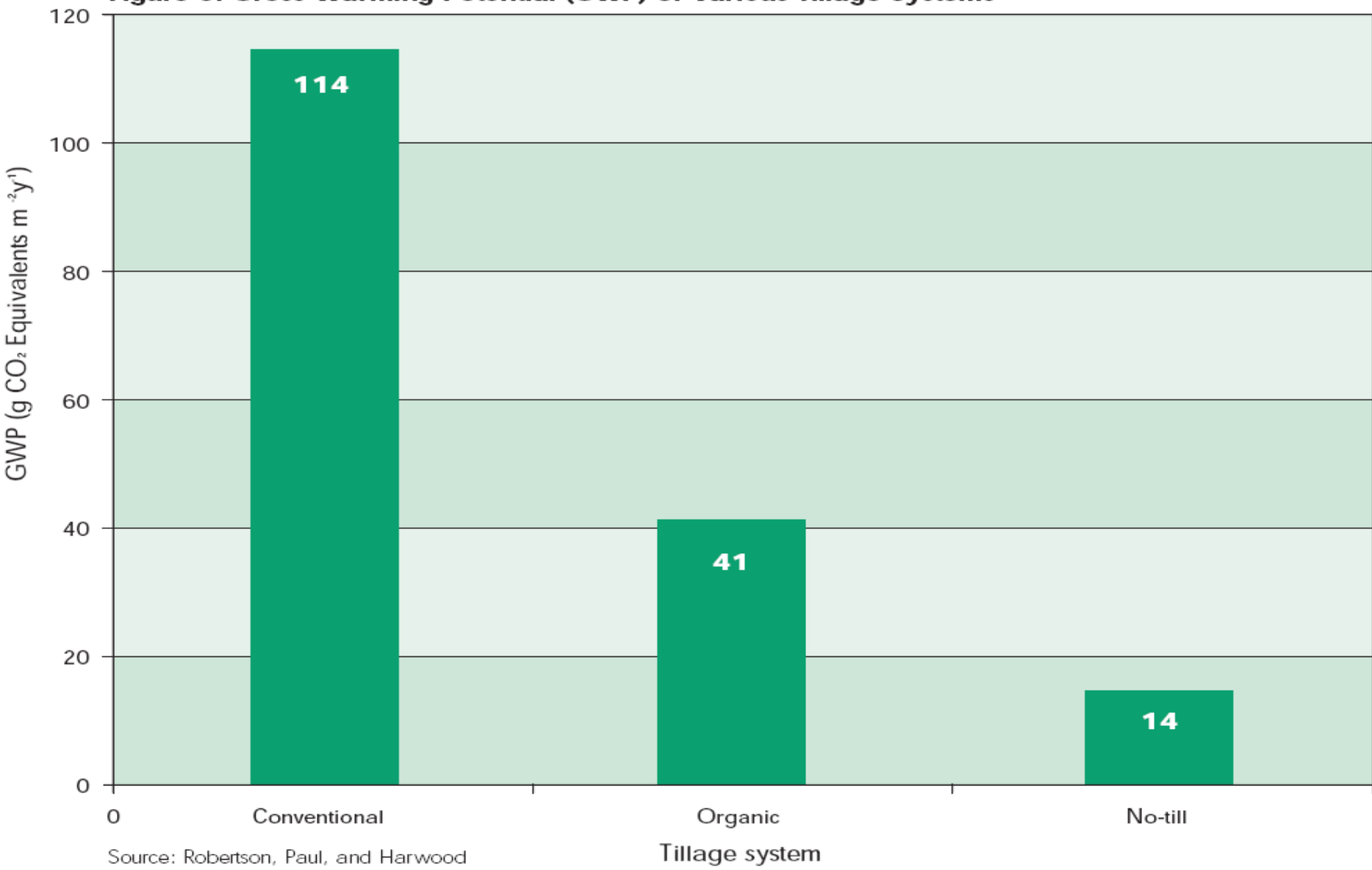
Figure 6. Tillage System vs. Fuel Consumption per Acre



Fawcett, R. & Towery, D. (2002)

Electronic Source: Conservation Tillage and Plant Biotechnology: How New Technologies Can Improve the Environment by Reducing the Need to Plow., published by: Purdue University,

Figure 5. Gross Warming Potential (GWP) of Various Tillage Systems



Fawcett, R. & Towery, D. (2002)

Electronic Source: Conservation Tillage and Plant Biotechnology: How New Technologies Can Improve the Environment by Reducing the Need to Plow., published by: Purdue University,

basic thoughts
on how to
enhance the
Situation

**From the
Precautionary Principle**

**back to the
original**

Precautionary Approach

Precautionary Approach:

is the original wording in the protocols

Term coined at Rio 1992

Convention of the Biological Diversity

Term based on REAL negative

Environmental pollution data, but:

trends difficult to project into the future

Precautionary Approach:

In the Biosafety Protocol:

Term in its concept

changed fundamentally:

Now based on mainly unknown risks

Potential risks are

difficult to project into the future

Rethink
the term Risk

危机 = 危 + 机

Risk = Hazard / Chance

Widespread definition, but onetrack-minded

Risk = Hazard x Likelihood

Or worse: Risk = Social bla bla x media frenzy

Ammann, K. (2004)

The Role of Science in the Application of the Precautionary Approach,. *In Molecular Farming, Plant-made Pharmaceuticals and Technical Proteins* (eds R. Fischer & S. Schillberg), Vol. 1, pp. 291-302. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim,

<http://www.botanischergarten.ch/Precautionary/Ammann-Precautionary-Approach1.pdf>

**revive the familiarity
approach of
OECD**

The **Familiarity Approach** needs some more precise definition:

1. Regional differentiation
2. Monitoring basic research
3. Differentiation according to new traits

<http://www.agbios.com/cstudies.php?book=BIOSAFETY&ev=RISKANALYSIS&chapter=Ch-2>
http://www.biotech-info.net/regulating_biotech.html

The OECD Familiarity Approach

<http://www.botanischergarten.ch/OECD/ScaleupCropPlants.pdf> or

http://www.oecd.org/searchResult/0,2665,en_2649_37437_1_1_1_1_37437,00.html

Proposal:

Article 14:

1. Parties may enter into bilateral and multilateral agreements and arrangements regarding international transboundary movements of LMOs, consistent with the objective of this Protocol and provided that such agreements and arrangements

This is where the **Familiarity Approach** could be introduced in new interpretations:

Example: **Bt strategy in crops** : hundreds of high quality papers have shown that there are **no major problems** left to be solved.

Even toxicological studies in the lab have shown that the effects many non-target insects are minor (example of the lacewings)

Romeis et al. 2004.

Candolfi et al. 2004: Baseline comparison shows clear benefits of Bt-crops over pesticide spraying

Rethink
communication

**if science wants
to be heard!**

**it must not
monopolize
the debate**

Unfortunately, planning problems in the field of green biotechnology have now evolved into **wicked problems** with complex structures and no obvious causal chains

Solving wicked
problems needs new,
second generation
system approaches in
communication and
decision making

discursive model systems approach different kinds of knowledge

Ammann, K. & Papazova Ammann, B. (2004)

Factors Influencing Public Policy Development in Agricultural Biotechnology. *In RISK ASSESSMENT OF TRANSGENIC CROPS*. (ed S. Shantaram), Vol. 9, pp. 1552. Wiley and Sons, Hoboken, NJ, USA.

P. Christou & H. Klee: Handbook of Plant Biotechnology,

<http://www.botanischergarten.ch/Wiley/Factors-Discourse-Wiley.pdf>

1st Generation

Operation Research

Simon (Nobel Prize 1978)

Artificial Intelligence

Cognitive Model

Expert Systems to be better Planners ?

ill-structured + wellstructured problems: bounded rationality leads to satisfying solutions

Problem: Until today there are no planning machines possible, since any such structure needs at a certain point some guidance, bounded rationality is just not enough. Problems cannot be pre-defined precisely

2nd Generation

Schön

Rittel

Model of reflective Practitioner

Dialogue with the situation of the Problem

Problem: Schön's instrumentarium is not broad and practical enough

Argumentative Model

Symmetry of Ignorance, unite different kinds of knowledge

Difficulty: Rittels planning unites *people* with different kinds of knowledge

3rd Generation no follow-up

Broadbent Expertise as Hypothesis

Poppers Conjecture + refutation

Problem: *Symm. Of Ignorance* Not >> to *Symm. of knowlege*

Operation Research (Simon)

Separation of Problem Definition
and Problem Solution

Objectivity of Solution

Classification (Taxonomy)
of planning problems

Expertise alone

Ill- and wellstructured problems
depends on completeness of problem
description

Systems Approach (Rittel)

Problem Definition and Problem
solution cannot be separated

Political nature of solution

Every planning problem is
basically unique

Symmetry of ignorance
Different kinds of Knowledge

Wicked and Tame Problems are
two different classes, no common
denominator

Every scientific or technical problem is also a **social** problem.

We can call it wicked, complicated or wild...depending on how we operate in society

Elements of second generation
communication and decision making:
reduce hidden agendas
encourage collaborative learning
atmosphere

Symmetry of ignorance

different kinds of knowledge:

to respect different kinds of knowledge
is better than the stakeholder concept

factual knowledge

deontic knowledge

explanatory knowledge

instrumental knowledge

procedural knowledge

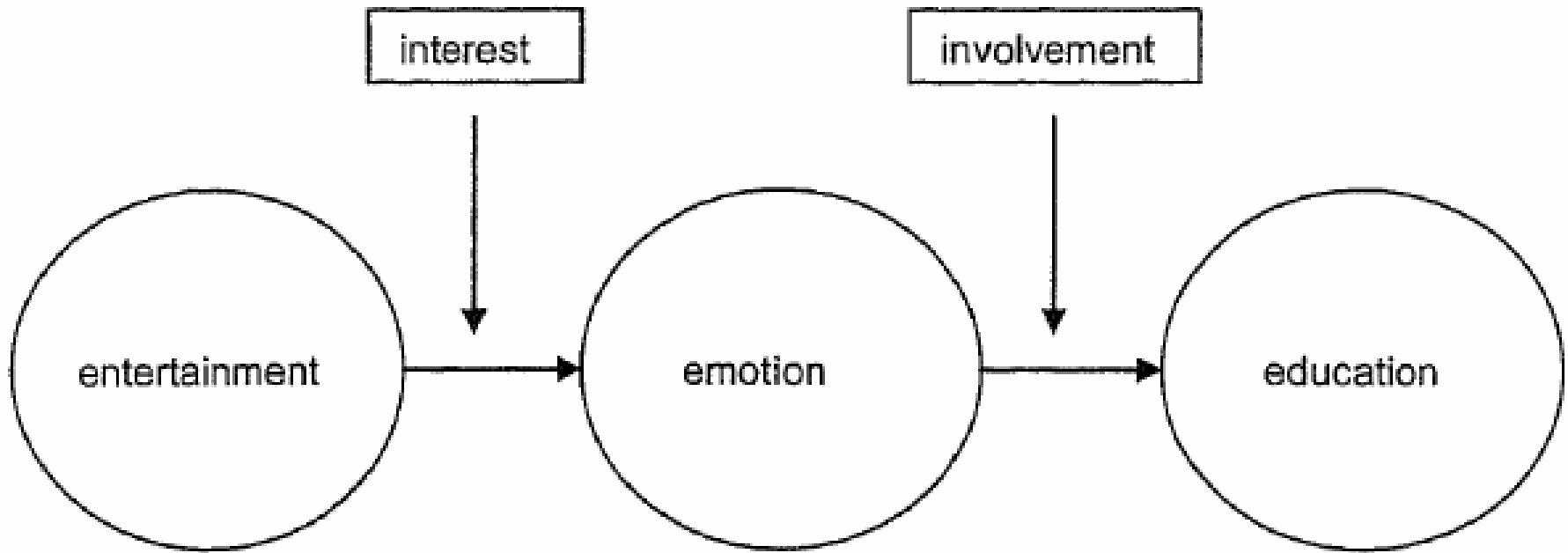
conceptual knowledge

traditional knowledge

only those should
participate

who are
part of the problem

**more important
debate elements**



Osseweijer, P. (2006)

Imagine Projects with a Strong Emotional Appeal. *Nature*, 444, 7118, pp 422-422
<http://www.botanischergarten.ch/Ask-Force/Osseweijer-Nature-2007.pdf>

Osseweijer, P. (2006)

A New Model for Science Communication That Takes Ethical Considerations into Account - the Three-E Model: Entertainment, Emotion and Education. *Science and Engineering Ethics*, 12, 4, pp 591-593
<http://www.botanischergarten.ch/Ask-Force/Osseweijer-EEE-2006.pdf>

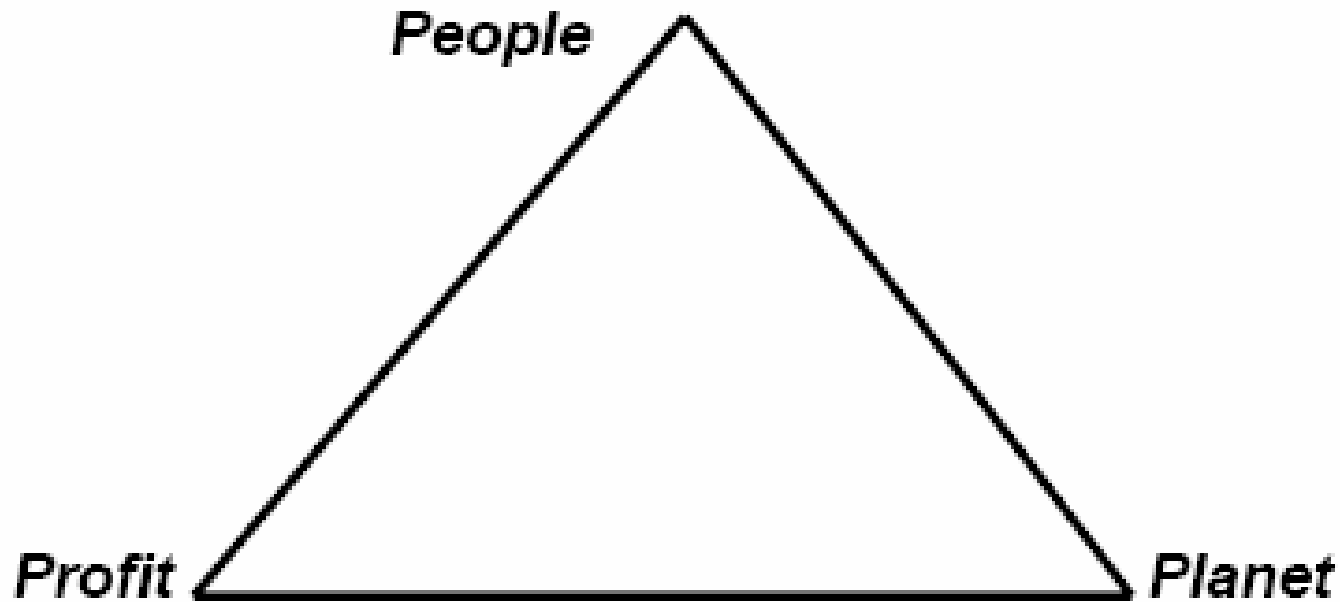


Figure 1. The 3P triangle, representing economic, ecological and socio-cultural values

Slingerland, M.A., Klijn, J.A.E., Jongman, R.H.G., & van der Schans, J.W. (2003)

The Unifying Power of Sustainable Development. Towards Balanced Choices between People, Planet and Profit in Agricultural Production Chains and Rural Land Use: The Role of Science., Wageningen University pp 1-94 WUR-report Sustainable Development Wageningen
<http://www.botanischergarten.ch/Discourse/Slingerland-Unifying-Power-2003.pdf>

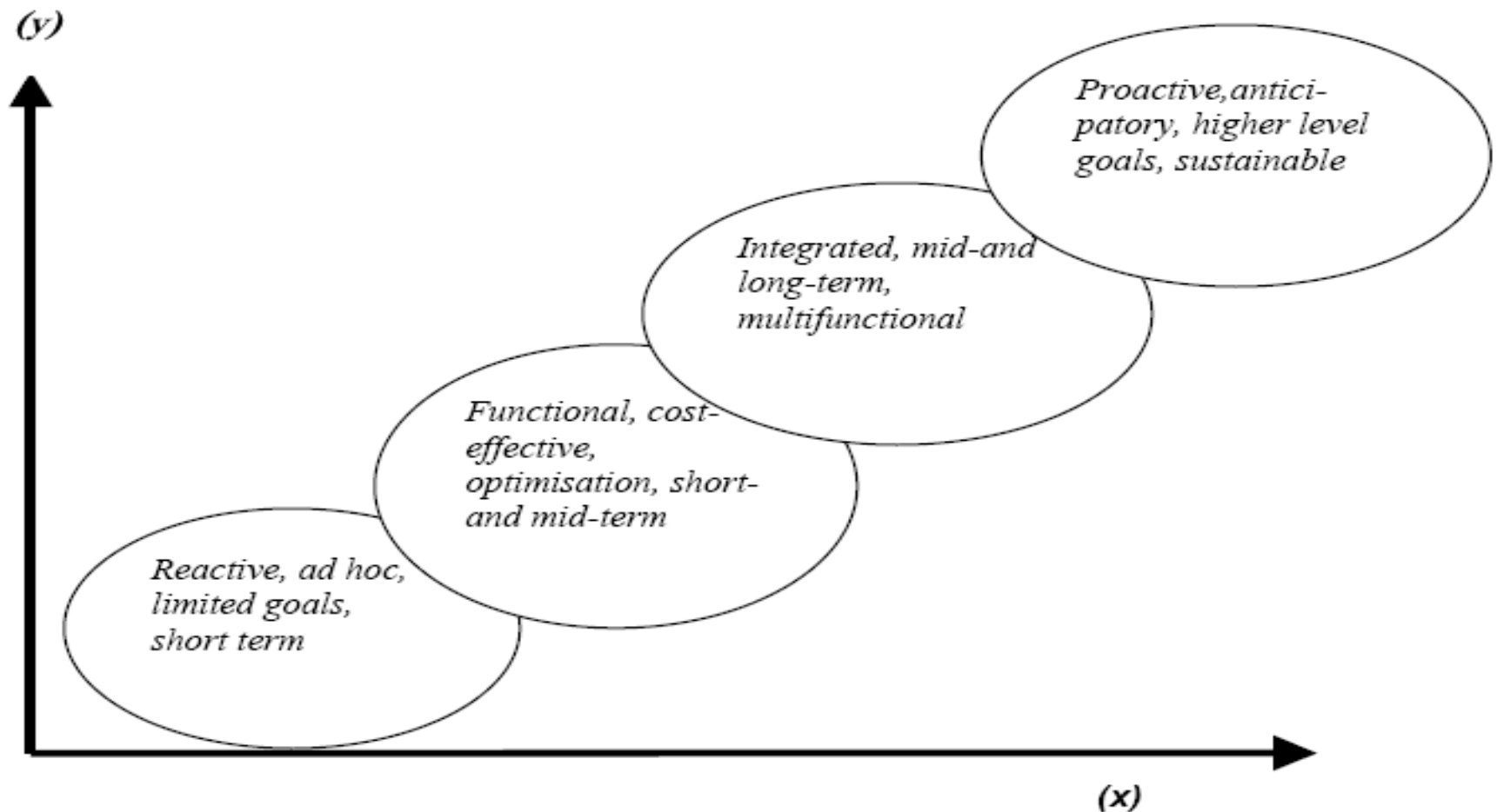


Figure 6. How to classify decision making ? (**x-axis** : spatio-temporal scale ; **y-axis**: increasing number of values and level of integration, anticipation and balance in values; ovals show the various stages of decision-making and their main characteristics (from Klijn, 2003; inspired by Winsemius and Guntram, 2002)

Slingerland, M.A., Klijn, J.A.E., Jongman, R.H.G., & van der Schans, J.W. (2003)

The Unifying Power of Sustainable Development. Towards Balanced Choices between People, Planet and Profit in Agricultural Production Chains and Rural Land Use: The Role of Science., Wageningen University pp 1-94 WUR-report Sustainable Development Wageningen
<http://www.botanischergarten.ch/Discourse/Slingerland-Unifying-Power-2003.pdf>

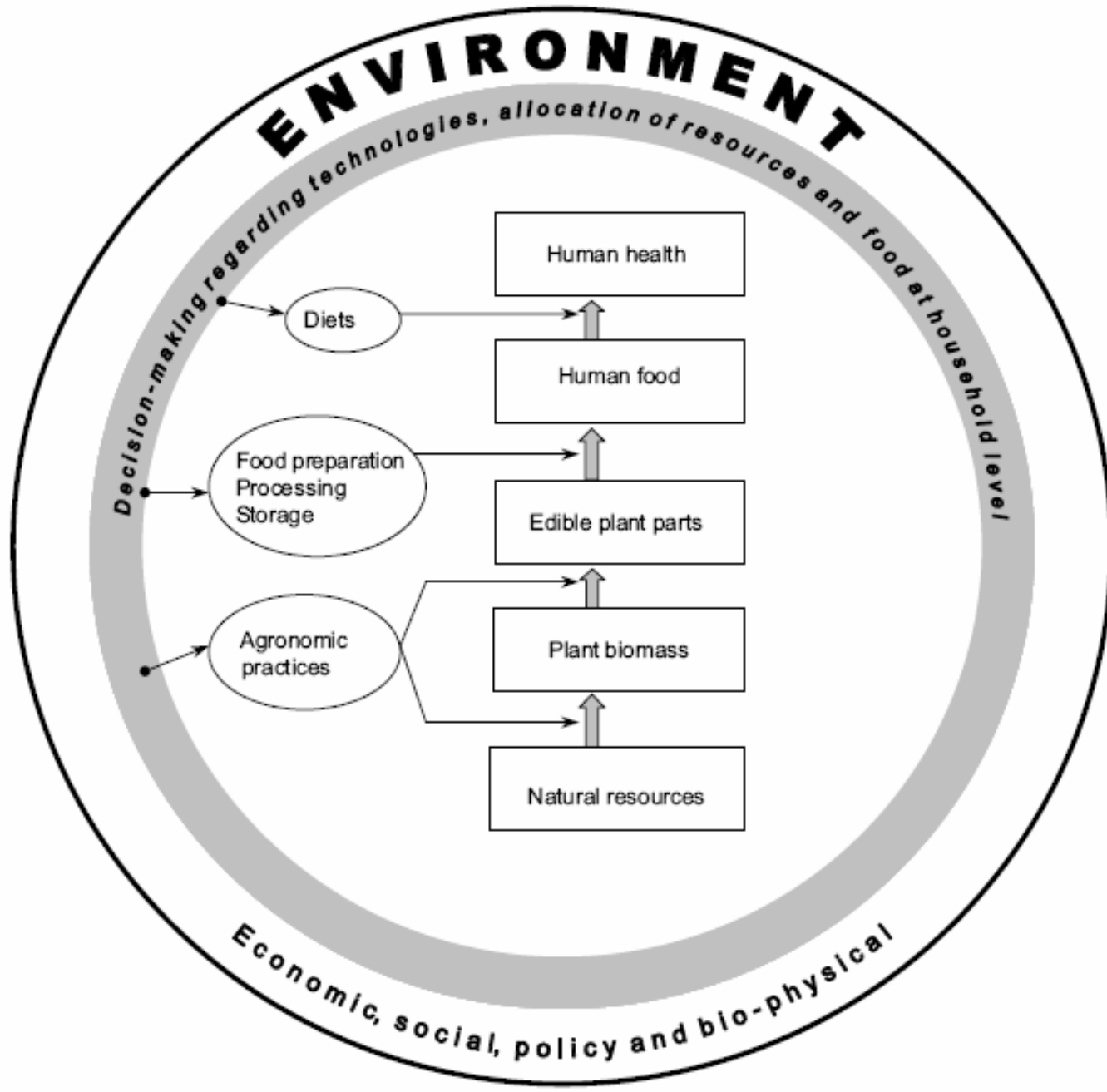


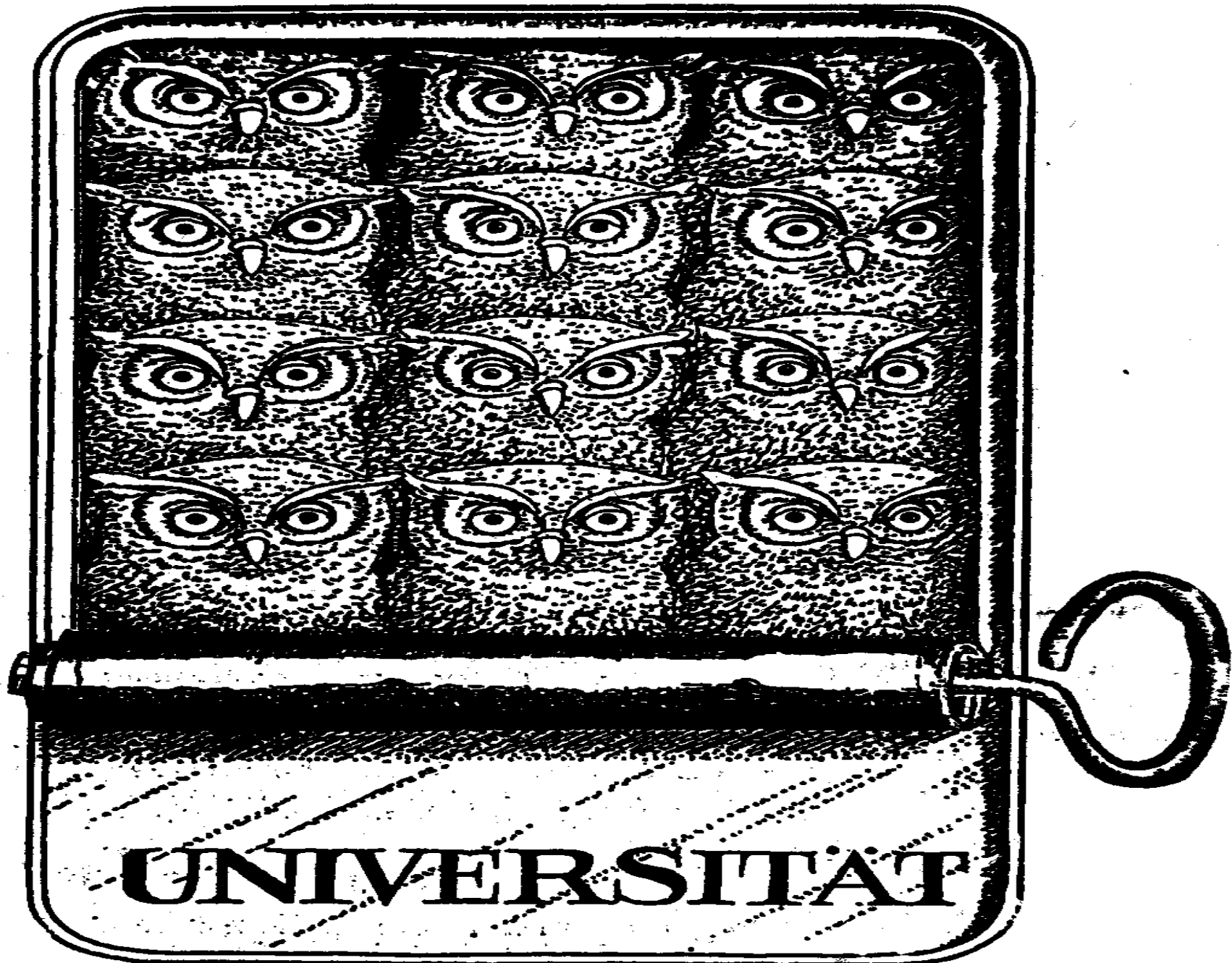
Figure 2. Analytical framework for the research programme: food chain approach and context.

Slingerland, M.A., Traore, K., Kayode, A.P.P., & Mitchikpe, C.E.S. (2006)

Fighting Fe Deficiency Malnutrition in West Africa: An Interdisciplinary Programme on a Food Chain Approach. *Njas-Wageningen Journal of Life Sciences*, 53, 3-4, pp

<http://www.botanischergarten.ch/Africa-Harvest-Sorghum-Lit-1/Slingerland-Deficiency-Sorghum-2006.pdf> AND <http://www.botanischergarten.ch/Facultyof1000/Slingerland-F1000-2006.pdf>

possible
conclusions



UNIVERSITAT

Conclusion

Biotechnology should evolve into
Precision Biotechnology:
Adapt to local needs of farmers
and environment, eliminate gene
flow where necessary, mimic
biodiversity in nature.

Conclusion

Organic Farming should evolve into a pragmatic mainstream strategy, taking up new ideas from biocoenological and biotech research, eliminate ideological ballast.

Conclusion

Maybe we need some newly designed production lines which will fit to terms like

Organo - Transgenic Crops and
Organic Precision Biotechnology

Ammann, K. (2007)

Reconciling Traditional Knowledge with Modern Agriculture: A Guide for Building Bridges.
In Intellectual Property Management in Health and Agricultural Innovation a Handbook of Best Practices, Chapter 16.7 (eds A. Krattiger, R.T.L. Mahoney, L. Nelsen, G.A. Thompson, A.B. Bennett, K. Satyanarayana, G.D. Graff, C. Fernandez & S.P. Kowalsky), pp. 1539-1559. MIHR, PIPRA, Oxford, U.K. and Davis, USA

The general link to the www.ipHandbook.org. (as of September 2007), AND the Flyer:

<http://www.botanischergarten.ch/TraditionalKnowledge/ipHandbook-Flyer.pdf> AND chapter 16.7

<http://www.botanischergarten.ch/TraditionalKnowledge/Ammann-Traditional-Biotech-2007.pdf>

free of copyrights AND the exported bibliography with the links:

<http://www.botanischergarten.ch/TraditionalKnowledge/Exported-Bibliography-links-Ammann-2007.pdf>



Amish farmers in biotech-debate: subsequent partial adoption of transgenic crops: 1999, see: http://www.ifpri.org/2020conference/PDF/summary_ammann.pdf

We need a network of networks

Three good examples of science based websites

On Regulation: www.pubresreg.org

On Science with comments: <http://www.isaaa.org/>

On Science references: <http://www.icgeb.org/~bsafesrv/>

Strategic Thoughts:

Ask Force –strategy: blog within EFB

Pro-active information policy,
not waiting for the next attack of the anti-GMO-activists
asking questions ourselves to whom WE choose

Myth-Buster –strategy: blog within PRRI

Activists are publishing each month new pseudoscience statements
The must be expediently rebutted with good science
A first short statement must be accompanied by full scientific documentation

1.

Opinion of the Scientific Panel on Genetically Modified Organisms on a request from the Commission related to the safety of foods and food ingredients derived from insect-protected genetically modified maize MON 863 and MON 863 x MON 810, for which a request for placing on the market was submitted under Article 4 of the Novel Food Regulation (EC) No 258/97 by Monsanto² (Question No EFSA-Q-2003-121)

Opinion adopted on 2 April 2004

3.



Colloquium Series

EFSA Scientific Colloquium 8

Environmental Risk Assessment of Genetically Modified Plants - Challenges and Approaches

20-21 June 2007 Tabiano (PR), Italy

Example of MYTH-BUSTER

http://www.efsa.europa.eu/etc/medialib/efsa/press_room/press_release/pr_efsa_maize-mon863.Par.0001.File.dat/pr_efsa_mon863.pdf

Seralini, G.E., Cellier, D., & de Ventomois, J.P. (2007)

New Analysis of a Rat Feeding Study with a Genetically Modified Maize Reveals Signs of Hepatorenal Toxicity Archives of Environmental Contamination and Toxicology, 52, 3, pp --
<http://www.springerlink.com/content/02648wu132m07804/fulltext.html> AND
<http://www.botanischergarten.ch/Pusztai/Seralini-Maize-2007.pdf>

Archives of Environmental Contamination and Toxicology

© Springer Science+Business Media, LLC 2007

10.1007/s00244-006-0149-5

2.

New Analysis of a Rat Feeding Study with a Genetically Modified Maize Reveals Signs of Hepatorenal Toxicity

Gilles-Eric Seralini^{1, 2}, Dominique Cellier^{1, 3} and Joël Spiroux de Vendomois¹



4.

European Food Safety Authority

Parma, 28 June 2007

PRESS RELEASE

EFSA reaffirms its risk assessment of genetically modified maize MON 863

At the request of the European Commission (EC), EFSA has examined a paper by Seralini et al. on the statistical evaluation of a 90-day feeding study in animals with genetically modified maize MON 863, to identify any consequences for EFSA's risk assessment of the safety of MON 863.¹ The paper presents an alternative statistical analysis of the 90-day rat study that was considered in the original risk assessment. Following a detailed statistical review and analysis by an EFSA Task Force, EFSA's GMO Panel has concluded that this re-analysis of the data does not raise any new safety concerns.



Public Research & Regulation Initiative





Public Research & Regulation Initiative

- Public Sector Research in Modern Biotechnology
- Cartagena Protocol on Biosafety & CBD
- EC Directives and Regulations
- Aarhus Convention
- Liability
- Risk Assessment
- GURTS (Genetic Use Restriction Technologies)
- GM Trees
- IPR-ABS-PGR
- Communication – Public Perceptions
- Field Trials
- Future Issues
- Outreach to non-English speaking public researchers



Public Research & Regulation Initiative

- Memoranda of Understanding:

- FARA
- BSBA
- IFPRI



- Under discussion:

- EFB
- ISBR
- ABSF
- ANBio





Public Research & Regulation Initiative

**public researchers:
get organized for
MOP4 in Bonn 2008**

make sure that science is heard

Make sure that you check frequently the website:

<http://pubresreg.org/>

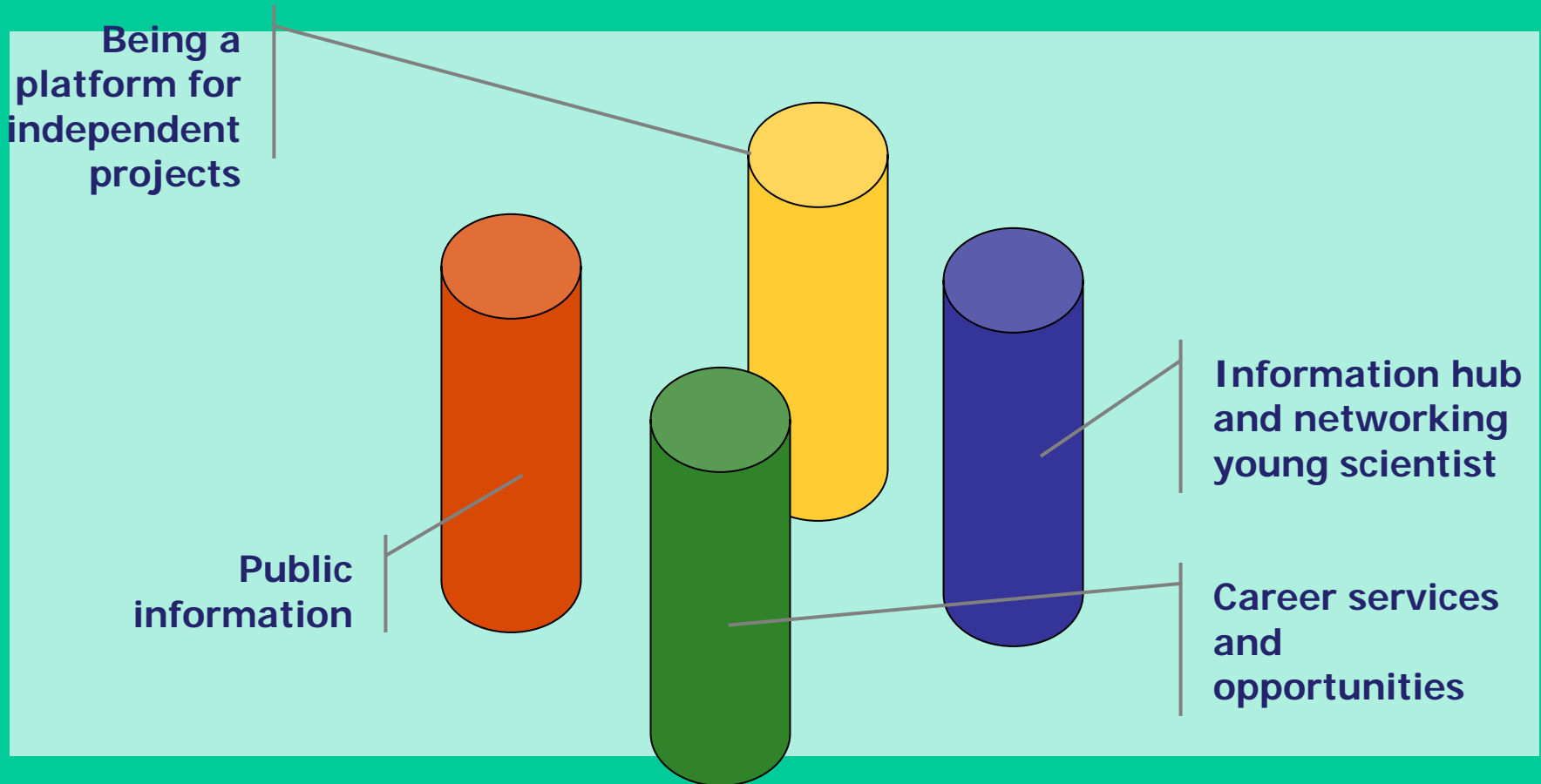
**if we want to make
real progress
in the future,
we must also
address the
young generation**

Contact Kim Meulenbroeks via
www.pubresreg.org

The Young European Biotech Network

A dynamic community of young Life Scientists

Our goal: promote Life Sciences in Europe



<http://www.yebn.org/portal/modules.php>

School competition Imagine

Foundation Imagine Life Sciences aims to:

- encourage scientists in applying their expertise to pressing problems in the South;
- make young people aware of the global issues and help them to take action;
- carry out valuable projects where they are most needed and build on existing capacities involving local universities and NGO's;
- make young people enthusiastic about life sciences and technology.

To realise these objectives the school competition Imagine is organised. Life scientists are invited to submit suggestions for the application of a specifically useful and affordable technology in a less developed country. High school students create a business plan for the proposal of their choice. The group with the best report and presentation wins. This group's project is carried out in the country of their choice.



- **BIOPOP: public communication of life sciences and biotechnology by students and young researchers** funded by the Framework Programm 6 of the EU
- **Job migration:** publish a call from Young Scientists for European Leaders on how to create a more favourable business and regulatory climate in Europe in order to stop the migration of Europe's young scientists.
- **Job matching platform:** a pan-European job matching database for job-search in the field of Life Sciences, co-operation with the Swiss Biotech Association, funded by the Swiss KTI



Demonstration of
Swiss Researchers





Not this kind of future, PLEASE