Fiera delle Utopie Concrete
Agricoltura, Cibo e Clima
Accelerare la conversione ecologica
3 – 6 novembre 2016 | Città di Castello

Il biologico può nutrire il mondo?

Paola Migliorini
Vice Presidente IFOAM Agribiomediterraneo
Ricercatrice Università di Scienze Gastronomiche

ORGANIC CAN FEED THE PLANET

http://www.feder.bio/Forum_ExpoOrganic_can_feed_the_Planet.php

The world health situation is worsening

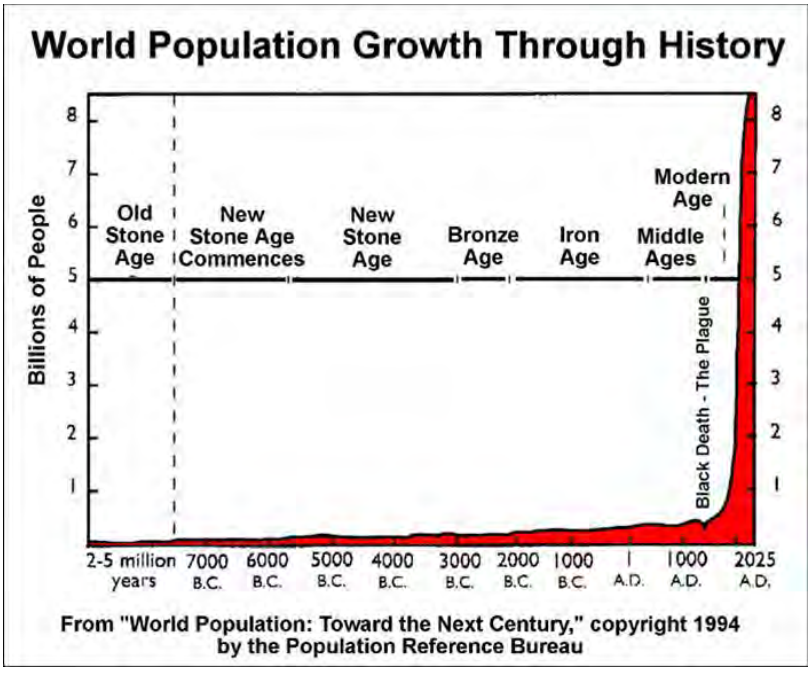
Nine billion people to be fed in the coming decades (2040/50)

Global mega trends
- urbanization
- aging population

Health
Under and overnutrition
- 925 mio people hungry
- 17.5 mio deaths due to undernutrition
- 1.6 bio people overweight

Health
Chronic diseases increasing
- 366 mio with diabetes
- 160 mio with osteoporosis
- 32 mio new CVD cases/year
- 31 mio new cancer cases/year

World Population Growth Through History

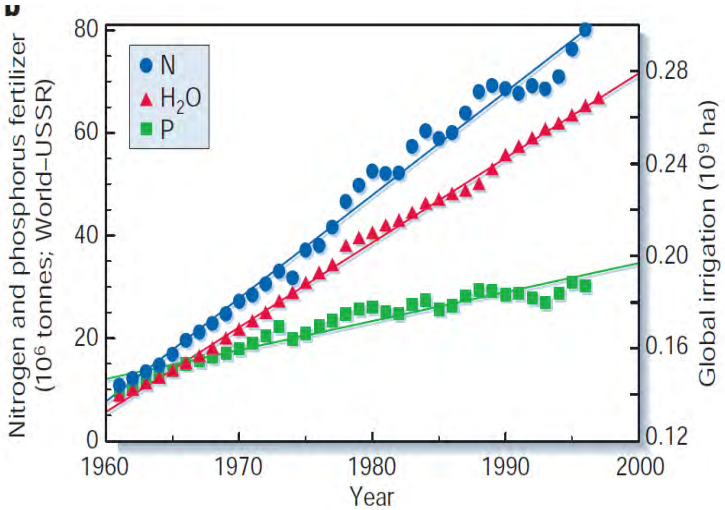


From "World Population: Toward the Next Century," copyright 1994 by the Population Reference Bureau

Arable land and population

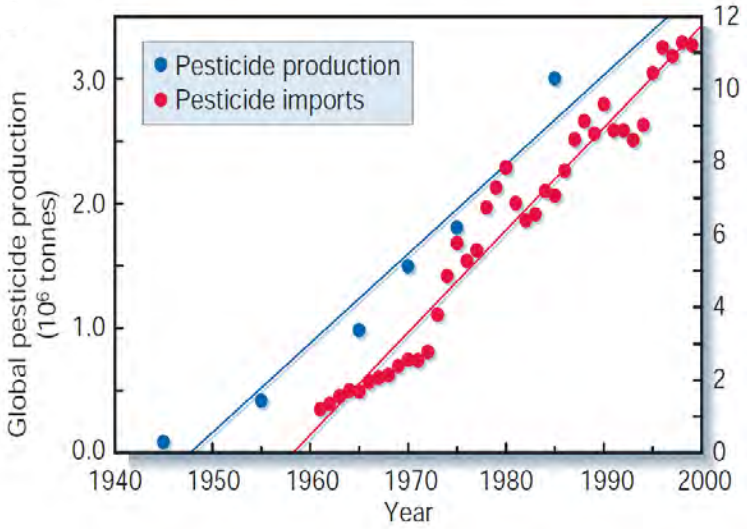
year	hectare (million)	Population (million)
1860	650	1200
1920	1080	2500
1978	1500	5000
2100	2000	12000

Global Agriculture: Input Use



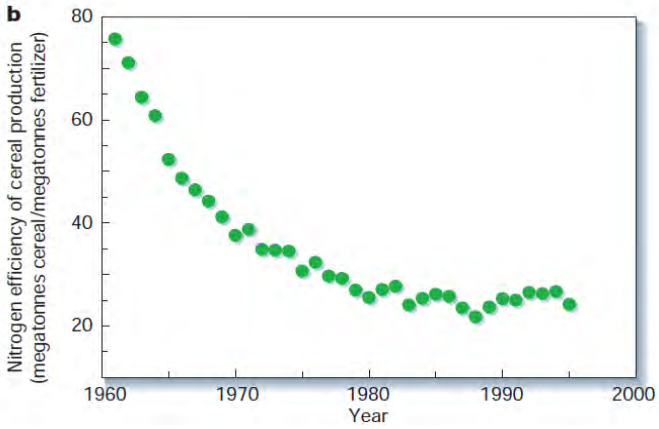
David Tilman, Kenneth G. Cassman, Pamela A. Matson, Rosamond Naylor & Stephen Polasky (2002) Agricultural sustainability and intensive production practices. Nature 418

Global Agriculture: Input Use

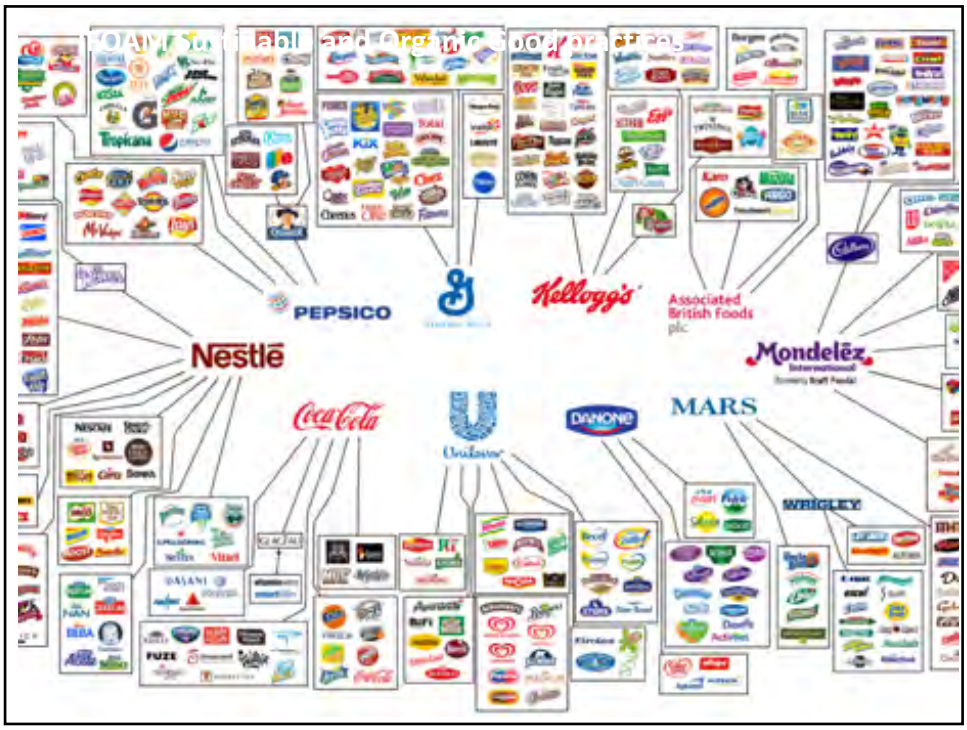


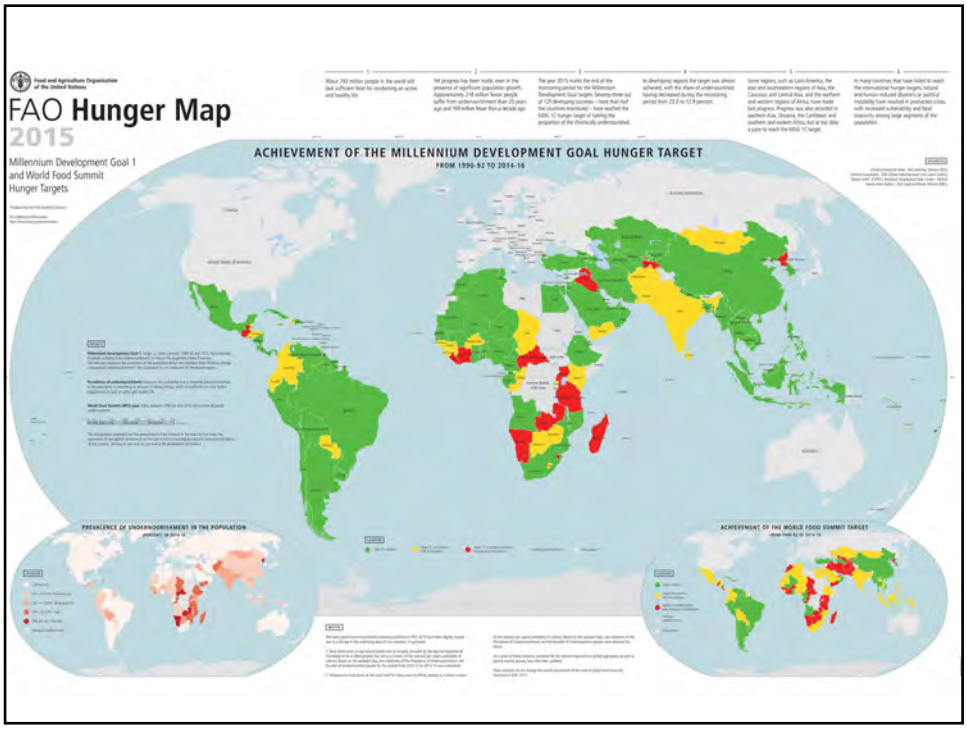
David Tilman, Kenneth G. Cassman, Pamela A. Matson, Rosamond Naylor & Stephen Polasky (2002) Agricultural sustainability and intensive production practices. Nature 418

Global Agriculture: Input (N) Efficiency



David Tilman, Kenneth G. Cassman, Pamela A. Matson, Rosamond Naylor & Stephen Polasky (2002) Agricultural sustainability and intensive production practices. Nature 418


PEPSICO
Kellogg's
Associated British Foods plc
Nestlé
Mondelēz International
Coca-Cola
DANONE
MARS
WRIGLEY

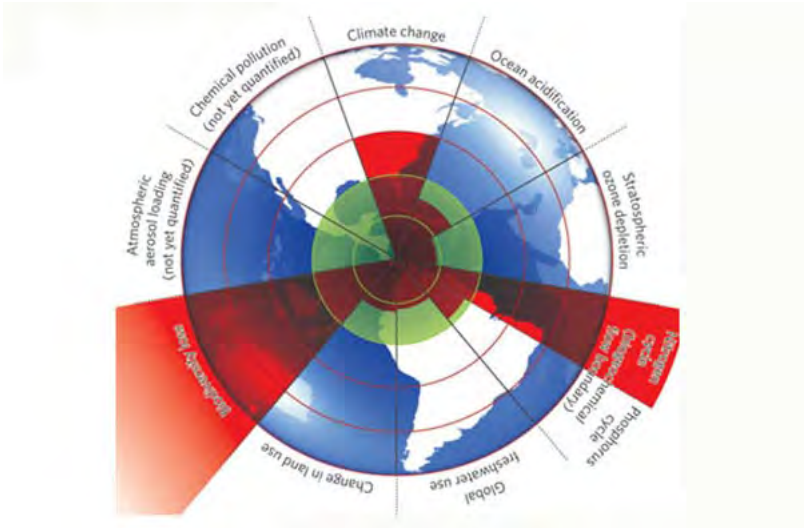

FAO Hunger Map
2015
Millennium Development Goal 1 and World Food Summit Hunger Targets
ACHIEVEMENT OF THE MILLENNIUM DEVELOPMENT GOAL HUNGER TARGET
FROM 1990-92 TO 2014-16

Sicurezza alimentare in cifre

Media nutrizionale nel mondo oggi: 2 770 kcal/persona/giorno ma…
- 0.5 miliardi di persone < 2 000 kcal
- 2.3 miliardi di persone < 2 500 kcal
- 1.9 miliardi di persone > 3 000 kcal

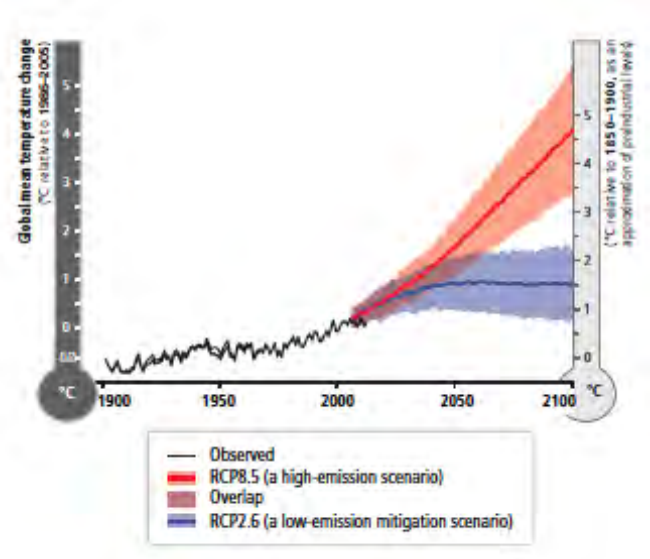
Nel 2050, la domanda di 9.15 miliardi (con GDP globale x2.5):
- La produzione di cibo dovrà crescere del 60%
- 3 130 kcal/cap (ma 290 milioni di persone avranno ancora fame)
- 91% da intensificazione + 9% deforestazione

Limiti Planetari



Rockström et al. 2009 A safe operating space for humanity. *Nature* **461**, 472-475

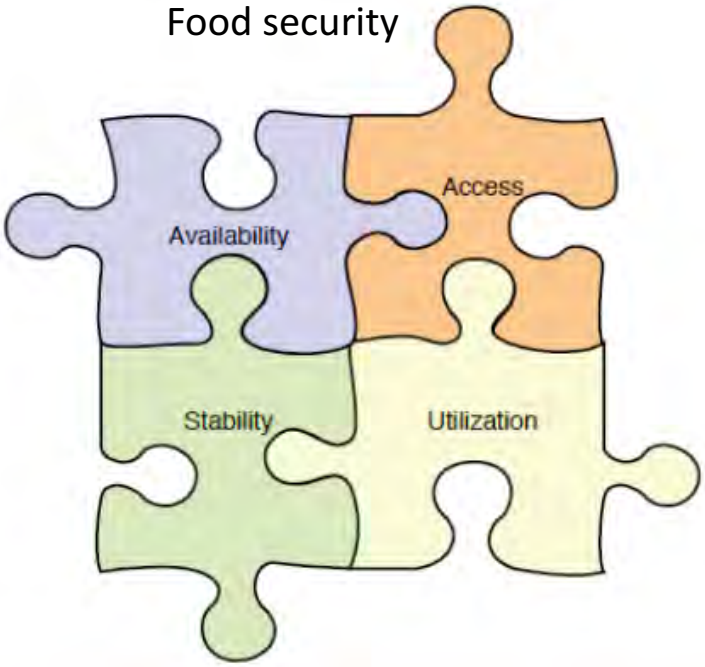
EFFECT OF CLIMATE CHANGE



IPCC (2014). Climate Change 2014. Synthesis Report.

Social sustainability: labour & human right

Food security



Solution for hunger?

- Reduce food waste
- Sustainable diet
- Improve quality instead of quantities
- Democracy and socio-economic equity
- …

Enought food for 10 billion : stop food waste

Economic cost of loss of production 1.0 trillion US$

Enviromental cost	0,7 trillion US$
Social cost	0,9 trillion US$
Total	2,6 trillion US$

3-4% of the gross global product

www.fao.org/publication

Sustainable diets

Figure 1. Schematic representation of the key components of a sustainable diet.

Denis Lairon
President, Federation of European Nutrition Societies
INRA, UMR 1260 & INSERM, ERL 1025
University Aix-Marseille, Marseille, France

Food unbalances and wastage

Balanced vegetarian diet = 2,200 cal./day = **200 kg of cereal/year**

Food consumption in Western industrialised countries

Total consumption = 3,200 cal./day

- from crop products = 2,200 cal./day
- from animal products = 1,000 cal./day = 7,000 cal. from crop products

total = 9,200 cal./day from crop products = **840 kg of cereal/year**

7 out of 10 tons of grain are fed to cattle in developed countries. A vegetarian diet of an equivalent 2,200 kcal per day requires 33% less fossil energy than the average American diet with meat (Pimentel and Pimentel, 2008).

There is the need for a more sustainable agriculture

REGULATIONS
Council Regulation (EC) No 834/2007
of 28 June 2007
on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91

(1) Organic production is an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using natural substances and processes. The organic production method thus plays a dual societal role, where it on the one hand provides for a specific market responding to a consumer demand for organic products, and on the other hand delivers public goods contributing to the protection of the environment and animal welfare, as well as to rural development.

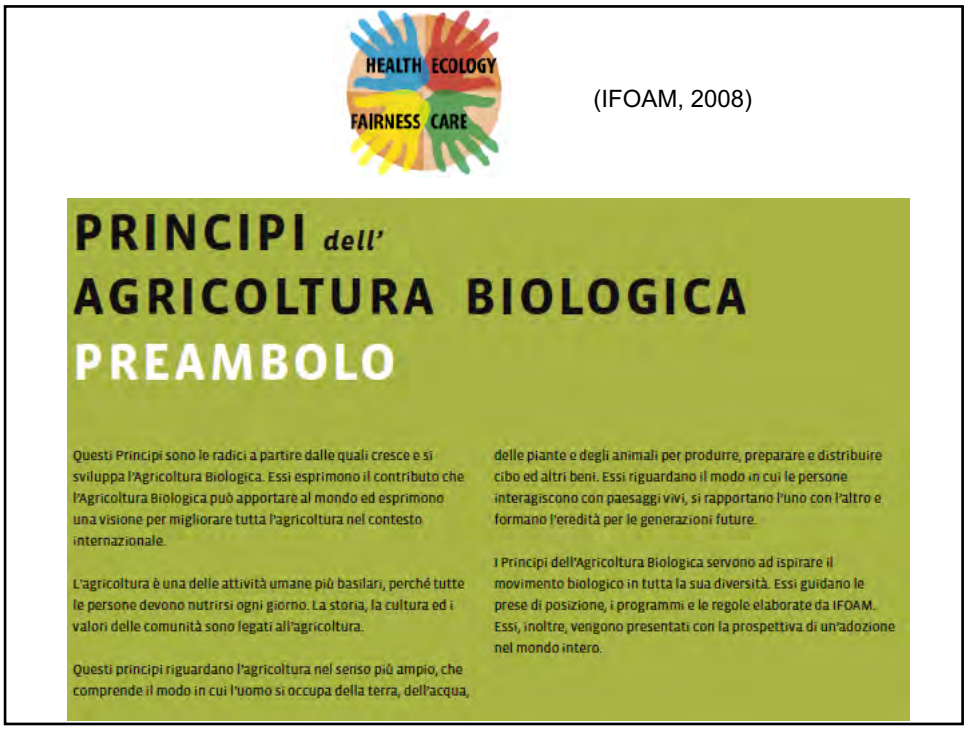
Comprendere l'agricoltura biologica

"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."

(IFOAM, 2007)

L'agricoltura biologica è più della necessità di soddisfare la domanda del mercato

IFOAM
INTERNATIONAL FEDERATION OF ORGANIC AGRICULTURE MOVEMENTS


HEALTH ECOLOGY
FAIRNESS CARE
(IFOAM, 2008)
PRINCIPI dell'
AGRICOLTURA BIOLOGICA
PREAMBOLO
Questi Principi sono le radici a partire dalle quali cresce e si sviluppa l'Agricoltura Biologica. Essi esprimono il contributo che l'Agricoltura Biologica può apportare al mondo ed esprimono una visione per migliorare tutta l'agricoltura nel contesto internazionale.
L'agricoltura è una delle attività umane più basilari, perché tutte le persone devono nutrirsi ogni giorno. La storia, la cultura ed i valori delle comunità sono legati all'agricoltura.
Questi principi riguardano l'agricoltura nel senso più ampio, che comprende il modo in cui l'uomo si occupa della terra, dell'acqua, delle piante e degli animali per produrre, preparare e distribuire cibo ed altri beni. Essi riguardano il modo in cui le persone interagiscono con paesaggi vivi, si rapportano l'uno con l'altro e formano l'eredità per le generazioni future.
I Principi dell'Agricoltura Biologica servono ad ispirare il movimento biologico in tutta la sua diversità. Essi guidano le prese di posizione, i programmi e le regole elaborate da IFOAM. Essi, inoltre, vengono presentati con la prospettiva di un'adozione nel mondo intero.


HEALTH ECOLOGY
FAIRNESS CARE
PRINCIPI dell'AGRICOLTURA BIOLOGICA
Il principio del
BENESSERE
L'Agricoltura Biologica dovrà sostenere e favorire il benessere del suolo, delle piante, degli animali, degli esseri umani e del pianeta, come un insieme unico ed indivisibile.
Il principio dell'
ECOLOGIA
L'Agricoltura Biologica dovrà essere basata su sistemi e cicli ecologici viventi, lavorare con essi, imitarli ed aiutarli a mantenersi.

Organic agriculture today

- Global Organic Market at 80 Billion US Dollars
- 43,7 Million Hectares of Organic Agricultural Land Worldwide
- 2,3 Million farmers
- 172 countries report organic farming activities
- consumer demand increases, reflected in the significant market growth of 11.5% in the US, the world's largest organic market
- 1% Share of total agriculture land as organic

ORGANIC AGRICULTURE IN MEDITERRANEA BASIN

currently:

- 5.000.000 has over organic in the Mediterranean
- more than 200.000 companies

	Agri. Land	wild	tot	share
Europa	ha	ha	ha	%
Spagna	1.593.197		**1.593.197**	6,5
Francia	1.032.941	3.380	**1.036.321**	3,7
Italia	1.167.362	17.988	**1.185.350**	9,0
Slovenia	35.101		**35.101**	7,6
Croazia	31.903	0	**31.973**	2,4
Bosnia Erzegovina	343	78.550	**78.893**	0,0
Serbia	6.340		**6.340**	0,1
Montenegro	3.068	139.809	**142.877**	0,6
Albania	515	467.783	**468.298**	0,0
Grecia	462.618		**462.618**	5,5
Malta	26		**26**	0,3
Cipro	3.923		**3.923**	2,7
Portogallo	200.151		**200151**	6,0
Asia				
Turchia	523.627	535.317	**1.058.944**	2,2
Siria	19.987	8.000	**27.987**	0,1
Libano	3.303	1.686	**4.989**	0,5
Israele	6.187		**6.187**	1,2
Giordania	2.895		**2.895**	0,3
Palestina Terr. Occ.	6.354		**6.354**	1,7
Africa				
Egitto	82.167		**82.167**	2,2
Libia	-	-		
Tunisia	137.188	41.716	**178.904**	1,4
Algeria	700		**700**	0,0
Marocco	16.600	418.000	**434.600**	0,1
	5.336.496	**1.712.229**	**7.048.795**	**2,4**

FIBL & IFOAM (2014). The world of organic Agriculture 2014. frick and Bonn

Mainstream

- In Swiss Alp 63% of land are organically managed
- State of Salburg (Austria) 49%

Agronomically and socio-economically adapted?

Innovation needed!

Policy change needed!

Niche

- In intense productive systems OA is less than 1%

Tecnically immature?
Economically not competitive?
No true cost accounting?

28

Le sfide di oggi dell'AB, globali e nel Mediterraneo

- **Sicurezza alimentare**
- **Sostenibilità**
  - Cambio climatico
  - Uso sostenibile delle risorse naturali (biodiversità, suolo, acqua, etc,)
  - Ogm
  - Socio-economici

Renewable Agriculture and Food Systems: 22(2); 86–108 doi:10.1017/S1742170507001640

Organic agriculture and the global food supply

Catherine Badgley[1], Jeremy Moghtader[2,3], Eileen Quintero[2], Emily Zakem[4], M. Jahi Chappell[5], Katia Avilés-Vázquez[2], Andrea Samulon[2] and Ivette Perfecto[2,*]

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[2]School of Natural Resources and Environment, University of Michigan, Ann Arbor, MI 48109 USA.
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[4]School of Art and Design, University of Michigan, Ann Arbor, MI 48109, USA.
[5]Department of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, MI 48109, USA.
*Corresponding author: perfecto@umich.edu

Accepted 9 June 2006 **Research Paper**

Abstract

The principal objections to the proposition that organic agriculture can contribute significantly to the global food supply are low yields and insufficient quantities of organically acceptable fertilizers. We evaluated the universality of both claims. For the first claim, we compared yields of organic versus conventional or low-intensive food production for a global dataset of 293 examples and estimated the average yield ratio (organic : non-organic) of different food categories for the developed and the developing world. For most food categories, the average yield ratio was slightly <1.0 for studies in the developed world and >1.0 for studies in the developing world. With the average yield ratios, we modeled the global food supply that could be grown organically on the current agricultural land base. Model estimates indicate that organic methods could produce enough food on a global *per capita* basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base. We also evaluated the amount of nitrogen potentially available from fixation by leguminous cover crops used as fertilizer. Data from temperate and tropical agroecosystems suggest that leguminous cover crops could fix enough nitrogen to replace the amount of synthetic fertilizer currently in use. These results indicate that organic agriculture has the potential to contribute quite substantially to the global food supply, while reducing the detrimental environmental impacts of conventional agriculture. Evaluation and review of this paper have raised important issues about crop rotations under organic versus conventional agriculture and the reliability of grey-literature sources. An ongoing dialogue on these subjects can be found in the Forum editorial of this issue.

Key words: organic agriculture, conventional agriculture, organic yields, global food supply, cover crop

Organic farming can feed the world?

Three meta-analysis :

A) -20%+/-21;
B) =1 D.edW e >1 D.ingW;
C) -5% al 30%.

It depends on pedo-climatic conditions, agroecological practices and cropping/animal systems.

a) de Ponti, T., Rijk, B., van Ittersum, M.K., 2012. The crop yield gap between organic and conventional agriculture. Agricultural Systems, 108: 1–9.
b) Bennett, M., Franzel, S., 2013. Can organic and resource-conserving agriculture improve livelihoods? A synthesis. International Journal of Agricultural Sustainability, 11 (3) 193–215.
c) Seufert, V., Ramankutty, N., Foley. J.A., 2012. Comparing the yields of organic and conventional agriculture. Nature, 485: 229–232

INTERFACE

rsif.royalsocietypublishing.org

Research

Cite this article: Schader C *et al.* 2015 Impacts of feeding less food-competing feedstuffs to livestock on global food system sustainability. *J. R. Soc. Interface* **12**: 20150891. http://dx.doi.org/10.1098/rsif.2015.0891

Received: 10 October 2015
Accepted: 18 November 2015

Impacts of feeding less food-competing feedstuffs to livestock on global food system sustainability

Christian Schader[1], Adrian Muller[1,2], Nadia El-Hage Scialabba[3], Judith Hecht[1], Anne Isensee[1], Karl-Heinz Erb[4], Pete Smith[5], Harinder P. S. Makkar[3], Peter Klocke[1,6], Florian Leiber[1], Patrizia Schwegler[2], Matthias Stolze[1] and Urs Niggli[1]

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[3]Food and Agriculture Organization of the United Nations (FAO), Viale Terme di Caracalla, 00150 Rome, Italy
[4]Institute of Social Ecology Vienna (SEC), Alpen-Adria University Klagenfurt-Vienna-Graz, Schottenfeldgasse 29, 1070 Vienna, Austria
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The first SEKEM building in 1979

The same building in 2009

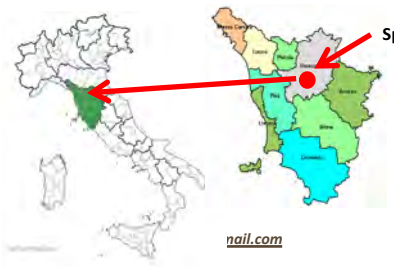
A SEKEM field in 1987

The same fields in 2009

MATERIALS: STUDY SITE

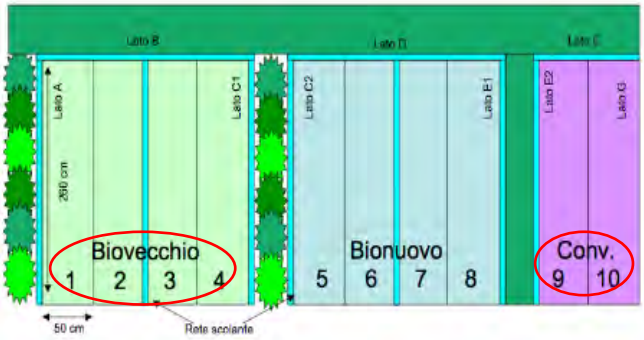
The Montepaldi Long Term Experiment (MOLTE) has been ongoing since 1991 at the experimental farm of the University of Florence.

In the MOLTE experiment, three micro-agroecosystems were set up to investigate differences between Old organic, Young organic and conventional management systems.



MATERIALS: STUDY SITE

In our study, we considered data from the following two micro agroecosystems:
i) the Old Organic (OldO) system of 5.2 ha, consisting of 4 fields under organic management since 1992 (EC reg. 2092/91 and following regulations; European Commission, 1991);
ii) the Conventional system of 2.6 ha, consisting of 2 conventional fields managed with the farming techniques generally adopted by the local conventional farms.



Some publications

Yield, better soil, climate change mitigation

- Migliorini P, Moschini V, Tittarelli F, Ciaccia C, Benedettelli S, Vazzana C, Canali S (2014). Agronomic performance, carbon storage and nitrogen utilisation of long-term organic and conventional stockless arable systems in Mediterranean area. EUROPEAN JOURNAL OF AGRONOMY, Vol 52(B):138–145
- Bedini S, Avio L, Sbrana C, Turrini A, Migliorini P, Vazzana C, Giovannetti M (2013). Mycorrhizal activity and diversity in a long-term organic Mediterranean agroecosystem. BIOLOGY AND FERTILITY OF SOILS, 49:781–790
- Simoni S, Nannelli R, Castagnoli M, Goggioli D, Moschini V, Vazzana C, Benedettelli S, Migliorini P (2013). Abundance and biodiversity of soil arthropods in one conventional and two organic fields of maize in stockless arable systems. REDIA, vol. XCVI, p. 37-44, ISSN: 0370-4327

Agrobiodiversity

- MIGLIORINI P, VAZZANA C (2007). Biodiversity Indicators for sustainability evaluation of conventional and organic agro-ecosystems. ITALIAN JOURNAL OF AGRONOMY, ISSN: 1125-4718, 2:105-110,
- Moschini V, Migliorini P, Sacchetti P, Casella G, Vazzana C (2012). Presence of aphid predators in common wheat (Triticum aestivum L.) in organic and conventional agroecosystems of Tuscany. NEW MEDIT, vol. Supplemento New Medit 4, p. 57-60, ISSN: 1594-5685

Energy efficiency and climate change mitgation

- Mazzoncini M., Migliorini P, Belloni P., Moschini V., Barberi P., Vazzana C. (2011). Maggiore efficenza energetica dai sistemi bio applicati in Toscana in ricerche di lungo periodo. In: L'agricoltura biologica in risposta alle sfide del futuro: il sostegno della ricerca e dell'innovazione.. Catania, 7-8 Novembre 2011, ROMA:ENEA. Agenzia nazionale per le nuove tecnologie,, ISBN: 978-88-8286-250-3
- Lazzerini G, Migliorini P, Moschini V, Pacini C, Merante P, Vazzana C, (2014) Evaluation of the carbon balance in different farming systems (organic and conventional) from a LTE in Tuscany, Italy. Italian Journal of Agronomy. Vol.9 ISSN: 1125-4718

Sustainability

- VAZZANA C, RASO E, MIGLIORINI P (2008). Sustainability evaluation of long term organic farm systems. In: proceeding of the ISOFAR International Scientific Conference, 16th IFOAM Organic World Congress, Modena, Italy,. Modena, June 16-20 2008, vol. 2, p. 700-703, ISOFAR, ISBN: 978-3-03736-023-1

Other important results

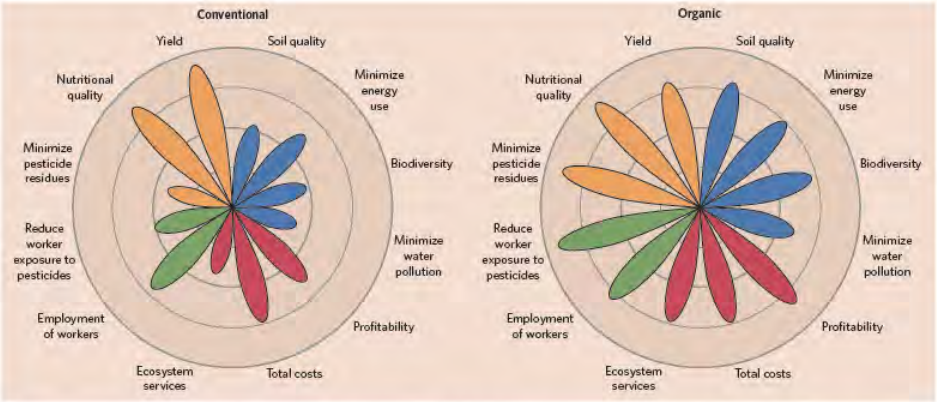
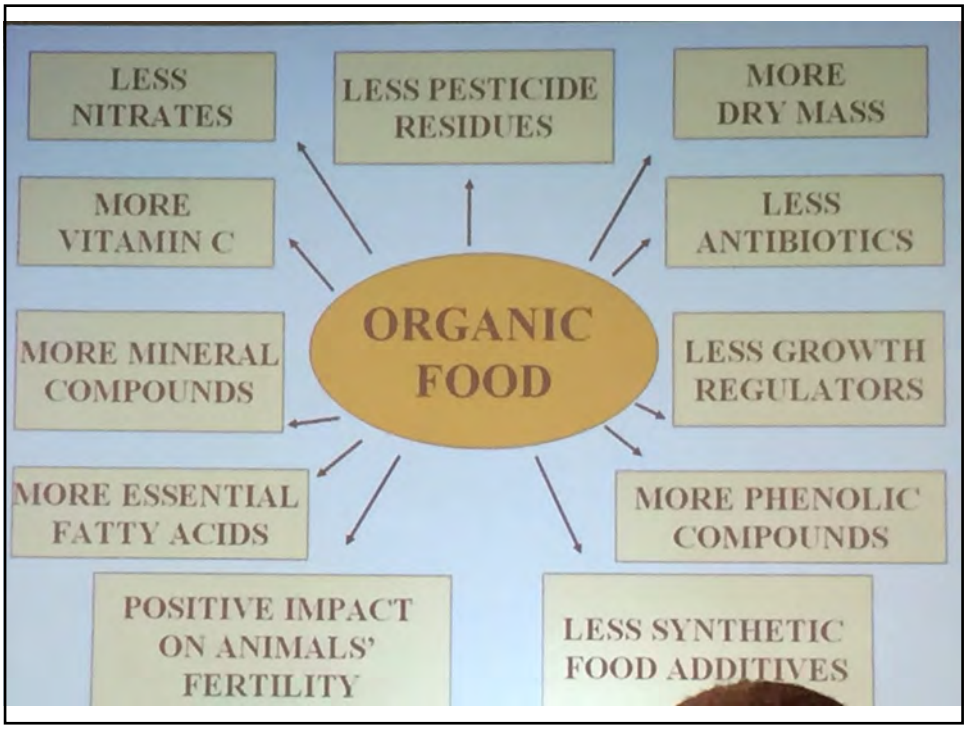


Figure 4 | Assessment of organic farming relative to conventional farming in the four major areas of sustainability. Lengths of the 12 flower petals are qualitatively based on the studies discussed in this Review[15-23,25-29,32-56,58,62-74] and indicate the level of performance of specific sustainability metrics relative to the four circles representing 25, 50, 75 and 100%. Orange petals represent areas of production; blue petals represent areas of environmental sustainability; red petals represent areas of economic sustainability; green petals represent areas of wellbeing. The lengths of the petals illustrate that organic farming systems better balance the four areas of sustainability.

John P. Reganold and Jonathan M. Wachter (2015) Organic agriculture in the twenty-first century. Nature Plants, 15221. DOI: 10.1038



Other important results

British Journal of Nutrition, page 1 of 18 doi:10.1017/S0007114514001366

Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: a systematic literature review and meta-analyses

Marcin Barański[1], Dominika Średnicka-Tober[1], Nikolaos Volakakis[1], Chris Seal[2], Roy Sanderson[3], Gavin B. Stewart[1], Charles Benbrook[4], Bruno Biavati[5], Emilia Markellou[6], Charilaos Giotis[7], Joanna Gromadzka-Ostrowska[8], Ewa Rembiałkowska[8], Krystyna Skwarło-Sońta[9], Raija Tahvonen[10], Dagmar Janovská[11], Urs Niggli[12], Philippe Nicot[13] and Carlo Leifert[1]*

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[3]*School of Biology, Newcastle University, Ridley Building, Newcastle upon Tyne NE1 7RU, UK*
[4]*Center for Sustaining Agriculture and Natural Resources, Washington State University, Pullman, WA, USA*
[5]*Department of Agricultural Sciences, School of Agriculture and Veterinary Medicine, University of Bologna, Viale Fanin 42, 40127 Bologna, Italy*
[6]*Department of Pesticide Control and Phytopharmacy, Benaki Phytopathological Institute, GR 14561 Kifissia, Athens, Greece*
[7]*Department of Organic Farming and Food Technology, Technological Educational Institute of Ionian Islands, Iosif Momferatou & Ilia Miniati PC 28100, Argostoli, Cephalonia, Greece*
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(*Submitted 11 September 2013 – Final revision received 2 May 2014 – Accepted 6 May 2014*)

Other important results

Int. J. Environ. Res. Public Health **2014**, *11*, 3870-3893; doi:10.3390/ijerph110403870

OPEN ACCESS

International Journal of
Environmental Research and
Public Health
ISSN 1660-4601
www.mdpi.com/journal/ijerph

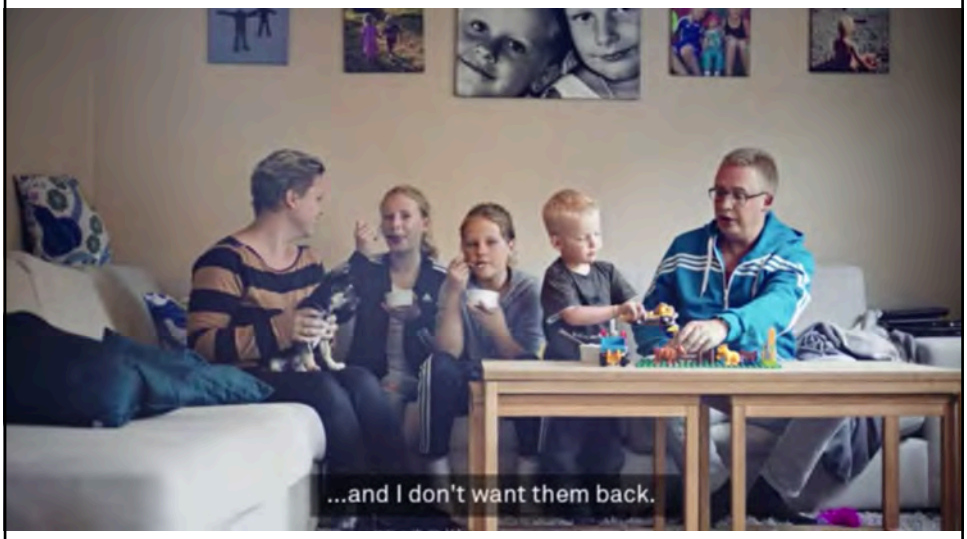
Review

Contribution of Organically Grown Crops to Human Health

Eva Johansson [1,*], Abrar Hussain [2], Ramune Kuktaite [1], Staffan C. Andersson [1] and Marie E. Olsson [1]

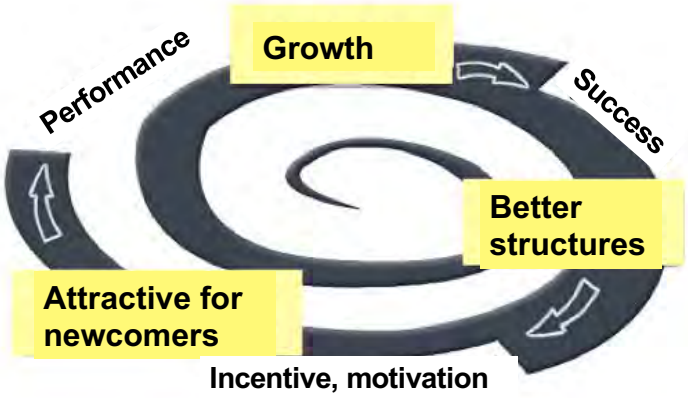
Organic cultivation did not influence the content of most of the nutritional beneficial compounds, except the phenolic compounds that were increased with the amounts of pathogens. However, higher amounts of pesticide residues and in many cases also of heavy metals were seen in the conventionally produced crops compared to the organic ones. Animal studies as well as *in vitro* studies showed a clear indication of a beneficial effect of organic food/extracts as compared to conventional ones. Thus, consumption of organic food seems to be positive from a public health point of view, although the reasons are unclear, and synergistic effects between various constituents within the food are likely.

Public health: the organic effect



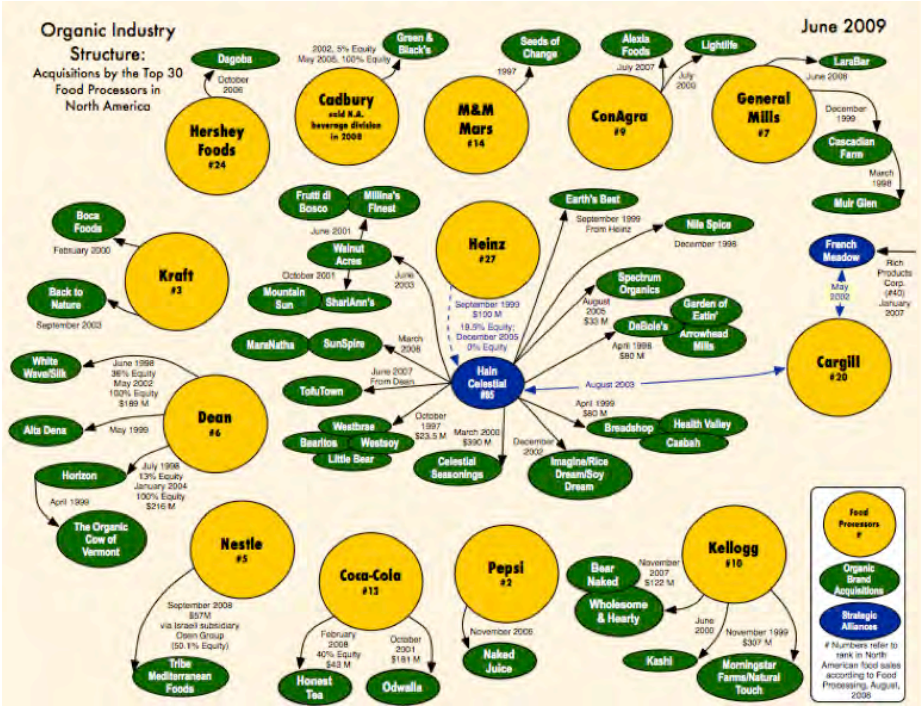
https://youtu.be/oB6fUqmyKC8

Process reinforces itself



Growth = Conventionalisation?

Source: Susanne Kummer, BOKU

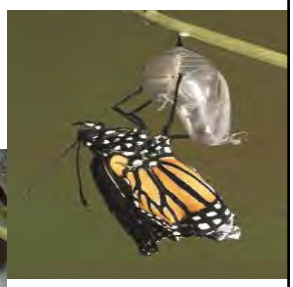


Strong sustainability of organic farming in the Mediterranean

- Multi-functionality
- Enhancement of biodiversity and genetic resources
- Protection of natural resources: soil, water, air
- Reduction of external inputs and non renewable energy
- Climate change resilience and adaptation
- Research of alternative market systems
- Sustainable rural development
- Decrease in food losses and waste
- Quality of product and health

Organic 1.0 >> 2.0 >> 3.0

Organic 3.0 is the next challenge for the SOAAN Think Tank



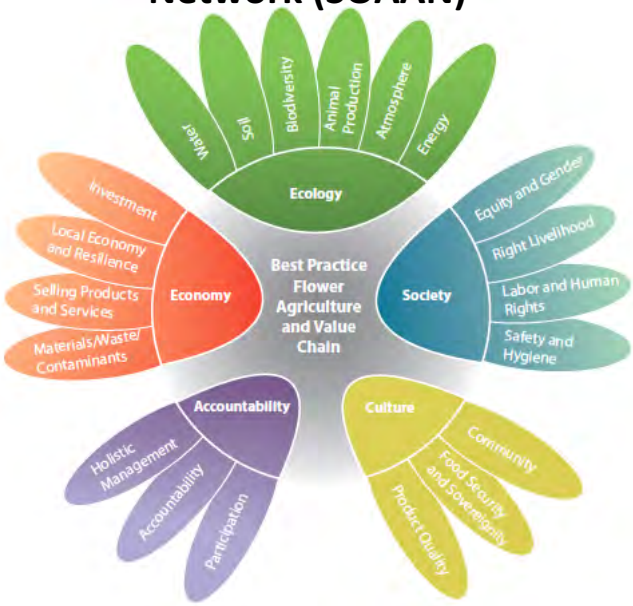
3.0 The future

SOAAN, the process of describing the revolution

2.0 Todays well-codified Organic World with 65 bil $ consumer purchases

1.0 The World of the Organic Pioneers

IFOAM Sustainable Organic Agriculture Action Network (SOAAN)



CORRECT QUESTIONS

1. Can industrial/GMO agriculture feed the world?
2. From “Who can best feed the world?” to “what system best enables the world to feed itself?”
3. How to remove barriers to adopt agroecological/organic approach?

Thank you!