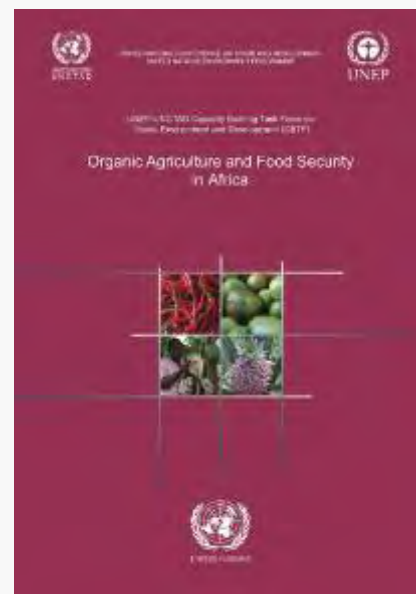


Improving food security among smallholder farmers in developing countries

- Niels Halberg, Denmark
- Selvam Panneer, India
- Mwatima Juma, Tanzania
- Charles Walaga, Uganda



Biofach 2009 Seminar

Saturday 21/2, 2-4 pm, Shanghai room

Is Organic Farming an Unjustified Luxury in a World With Too Many Hungry People?

Niels Halberg

International Centre for Research in
Organic Food Systems



Biofach 2009 Seminar:
Improving food security among
smallholder farmers in developing
countries

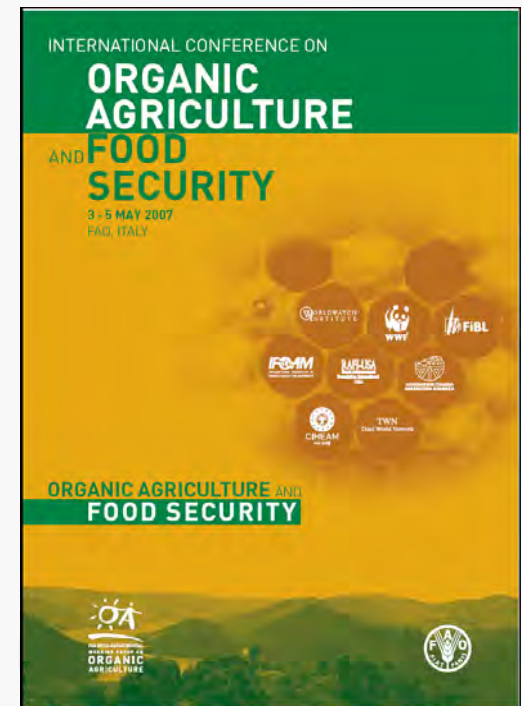


Worldwide undernourishment is not explained only by a lack of food availability

- Seventy-five percent of the world's 1.2 billion poor live in rural areas of developing countries.
- They suffer from problems associated with subsistence production in isolated and marginal locations with low levels of technology.

”There is need to seek new solutions to address the problems posed by growing populations (and disparities) and environmental degradation through new paradigms for agriculture and food supply chains”

International Conference on Organic Agriculture and Food Security, FAO, Rome, May, 2007

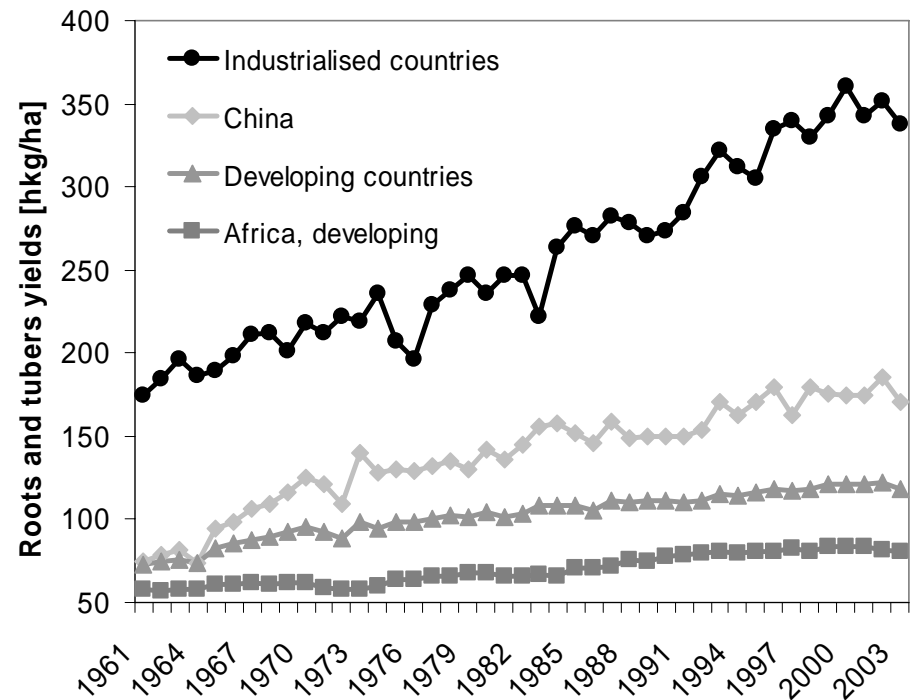
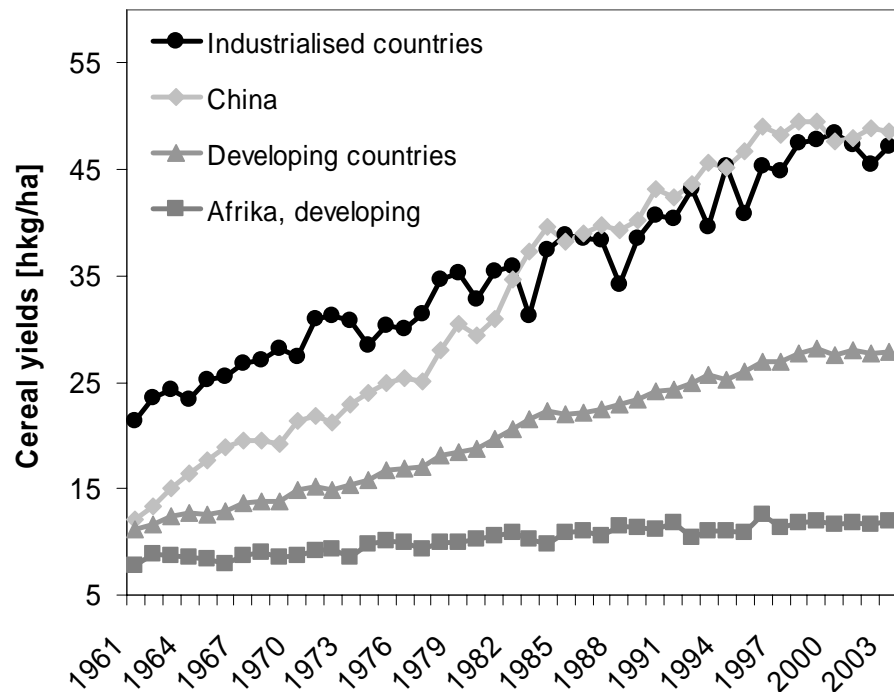


The problem: Abundance of food globally but still too many hungry people!

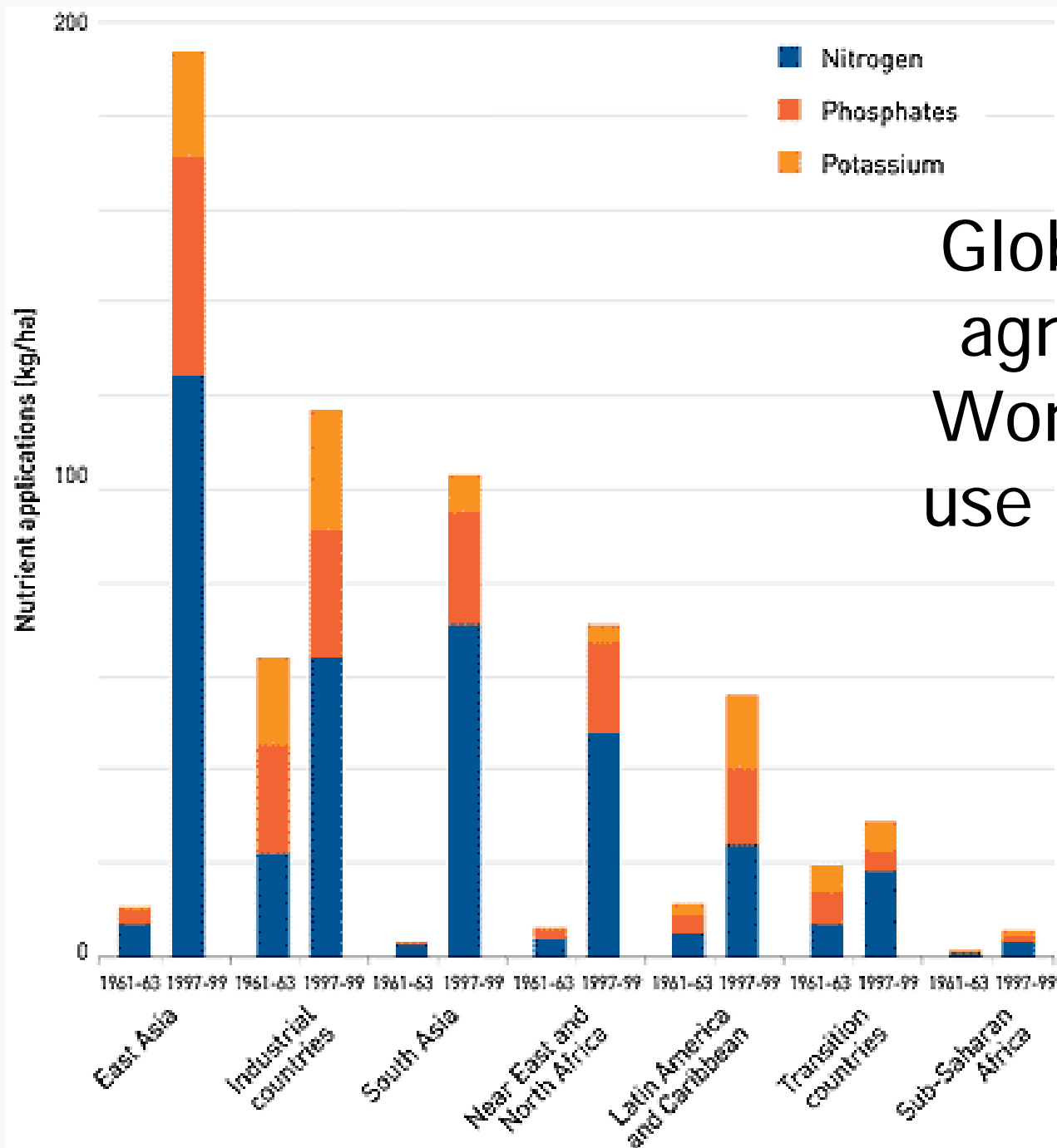
- The production of food worldwide has been sufficient to meet everybody's needs for energy and protein for many years
- Still 750-800 million food insecure
- Food insecurity: A question of access to food
- The green revolution led to great increases in yields in Asia, but
- The yields in for example Africa South of Sahara are still low
 - Millions of smallscale farmers don't have access to or cannot afford artificial fertilizers and pesticides,
 - Poor infrastructure and market systems
 - Families lack access to basic health and social services
- The number of food insecure families will increase if the current development continues



Global trends in agriculture I : World yields of cereals and roots and tubers from 1961-2003 (hkg/ha)



Yields have not grown significantly in Africa south of Sahara for 45 years



Global trends in agriculture II: World fertilizer use 1961 to 1999 (kg ha⁻¹)

Very small increase in Fertiliser use in SSA

(FAO, 2003).



- ⇒ Developmental strategies based on a high consumption of af input sources can't be the only solution!

Food security dimensions

- Food Availability: *sufficient quantities of food of appropriate quality*
- Food Access: *Access, by individuals, to adequate resources and entitlements for acquiring appropriate foods for a nutritious diet*
- Food Stability: *access to adequate food at all times, resilience to economic and climatic shocks*
- Food Utilisation: *ways in which food contributes to an adequate diet, clean water, sanitation and health care, and in turn, to a state of nutritional well-being where all physiological needs are met*

Used by World Food Summit and FAO



UNCTAD : Organic agriculture could boost African food security

- African agricultural productivity could be restored through organic agriculture
- The organic solution - which uses local resources, improves soil fertility and is environmentally friendly - is *"equal or better than most conventional systems and more likely to be sustainable in the longer term"*
- But the continent will have to overcome formidable challenges if it is to seize these opportunities, UNCTAD warns, including limited productive capacity, market access, government support, and certification.

10 Feb 09

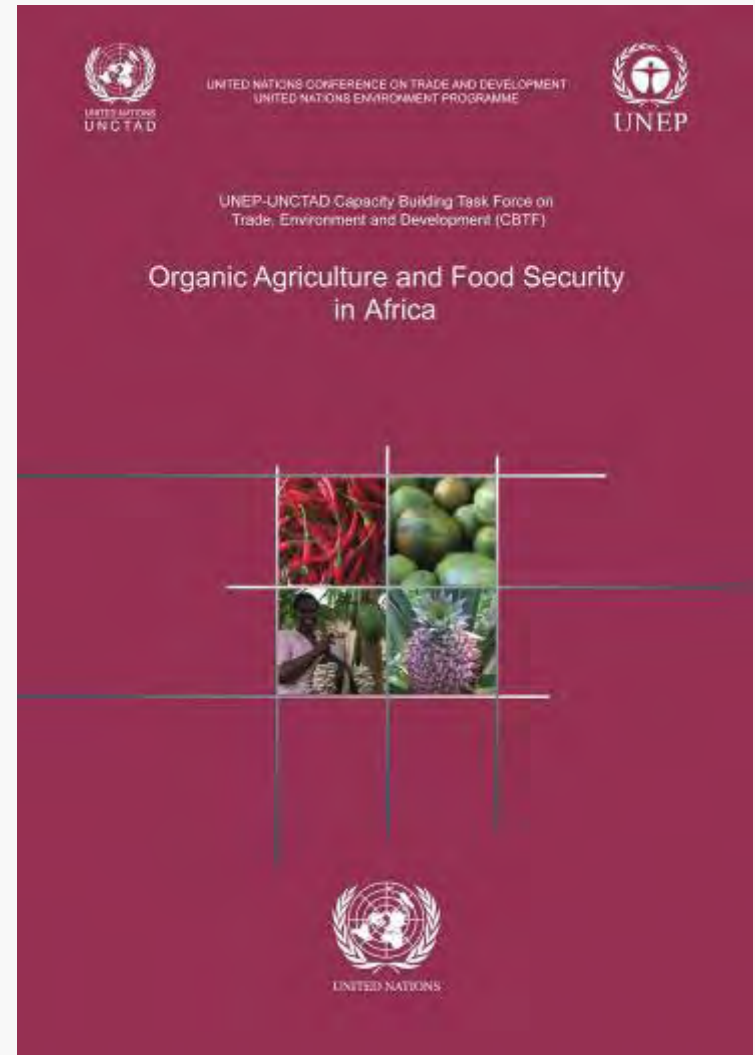


UNCTAD

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

Organic agriculture is a "good option for food security in Africa"

"... organic agriculture can be more conducive to food security than most conventional systems, and that it is more likely to be sustainable in the long term."
(UNEP-UNCTAD, 2008).



Agricultural productivity performance of organic and near organic agriculture in Africa

Region	Number of countries represented	Number of projects analysed	Number of farmers in projects (million)	Number of hectares* million ha	Average change in crop yields** per cent
Africa***	24	114	1,900,000	2.0	+116
East Africa	7	71	1,600,000	1.4	+128
Tanzania	1	9	27,000	0.06	+67
Uganda	1	17	241,000	0.68	+54

- * Organic and near-organic agriculture, million ha
- ** compared with beginning of projects, per cent
- *** all countries with data



After Pretty et al., 2005

Succes with agro-organic methods: Review of 208 projects in 52 countries



- Intensifying the “kitchengarden”
- Introduction of new element in the farm system,
 - Fish farming,
 - “multipurpose trees”



- Better exploitation of natural resources, soil, water and organic matter,
 - Mulching and soil cover,
 - Feed crops along field edges
 - Water accumulation,
- Increased yields in basic crops:
 - Leguminous plants,
 - Prevention of harmful organisms
 - Better genetic material

What is "organic farming" in developing countries?

Certified organic farming:

- Oriented towards products
- Focused on few high-value crops and quality
- Agro-organic methods used in varying degrees
- Gives access to the market and better prices
- Increasing market, globally
- Will remain a niche in the great number of small householders



What is "organic farming" in developing countries?

Non-certified/ informal organic farming:

- Agro-ecological farming systems
 - Conscious use of organic methods
 - Follows the principles or ideas of IFOAM,
 - - but are not necessarily certified
- Improving the soil fertility
 - Using primarily local resources
 - Using diversity in time and space
 - Promote natural regulation and recycling
 - Decreasing the use of limited resources



Basic principles of organic agriculture

Endorsed by IFOAM, september 2005

PRINCIPLES of ORGANIC AGRICULTURE

Principle of **HEALTH**

Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.

Principle of **ECOLOGY**

Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

Principle of **FAIRNESS**

Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

Principle of **CARE**

Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.



Healthy soil
Healthy crops
Healthy livestock
Healthy people

Agro-ecology
Diversity
Recycling

Ecological and social justice
Fair trade?

Precaution

Effect of large scale conversion to organic agriculture on food security

- Two recent reports confirm that large scale conversion to organic agriculture may improve sustainable food security especially in the south
- Halberg et al. 2006
- Badgley et al. 2007

Promoting organic agriculture in smallholder farms is a viable way to increasing local food availability and access among the poor and food insecure



"Michigan" study on global organic food production

- Compared present global food production with 100% organic scenarios
- Relative organic crop yields, average of experiments
- in "developed" world: 96% of conventional
- in "developing" world: 213%

Results	Kcal/capita
■ Present global food availability	2785
■ Estimated global food availability after conversion	
■ I. All yields as in developed world: Kcal/capita:	2634
■ II. Higher yields in developing world	4878

Modelling food security with IFPRI's IMPACT model

- **Baseline scenario for 2020:**

- Assumptions on yield growth rates, economic development and food demand trends by regions
- **Increasing dependence on food imports in developing countries**
- **Increase in numbers of malnourished children in Sub-Saharan Africa, especially among rural poor**



Rosegrant et al.,
2004.

- Defining large scale scenarios for conversion to Organic farming in selected...
 - High input regions (Europe and North America)
 - Low input agriculture regions (Africa South of Sahara)

Halberg et al., 2006

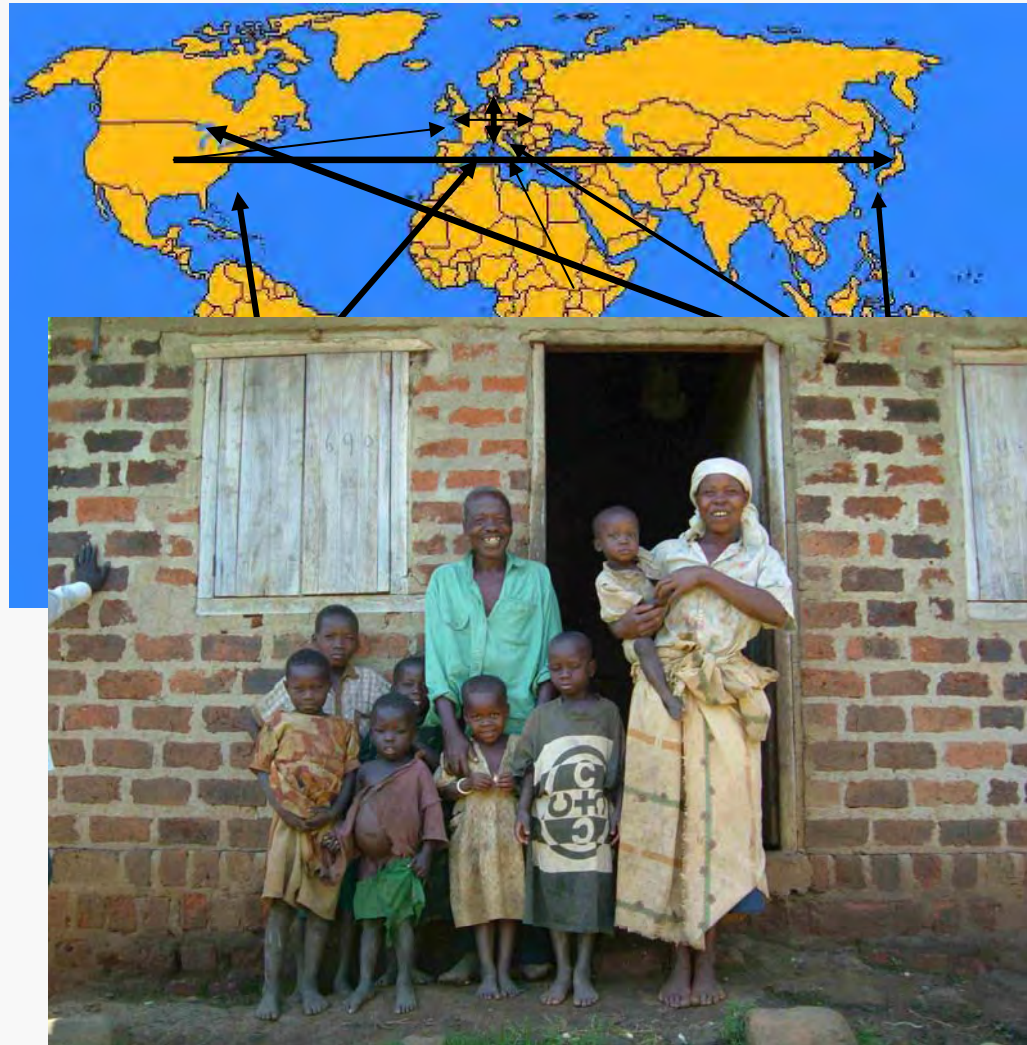


Modelling food security with IFPRI's IMPACT model

- Modelling food projections to 2020 relative to baseline scenario

- **Response variables are changes in**

- World trade in major food items
- World market prices
- Changes in demand by crops and by region
- Changes in child malnutrition



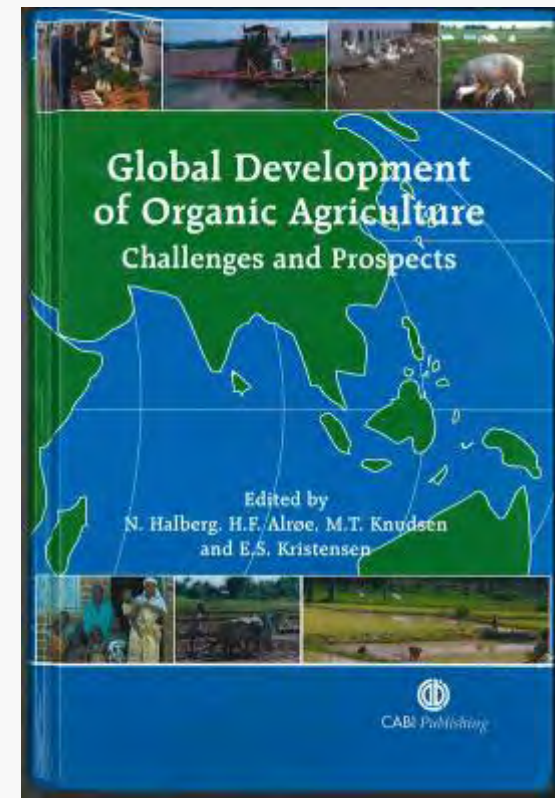
Modelling food security with IFPRI's IMPACT model



- **Modelling food projections to 2020 relative to baseline scenario**

Conclusions in brief:

1. Possible to convert 50% of Europe and North America to OA without significant effects on food security in Sub-Saharan Africa
2. Converting 50% of Sub-Saharan Africa to OA can reduce needs for food import and improve local food access





Definition of scenarios for large scale conversion to OF in Sub-Saharan Africa



Conventional = low input/traditional farming

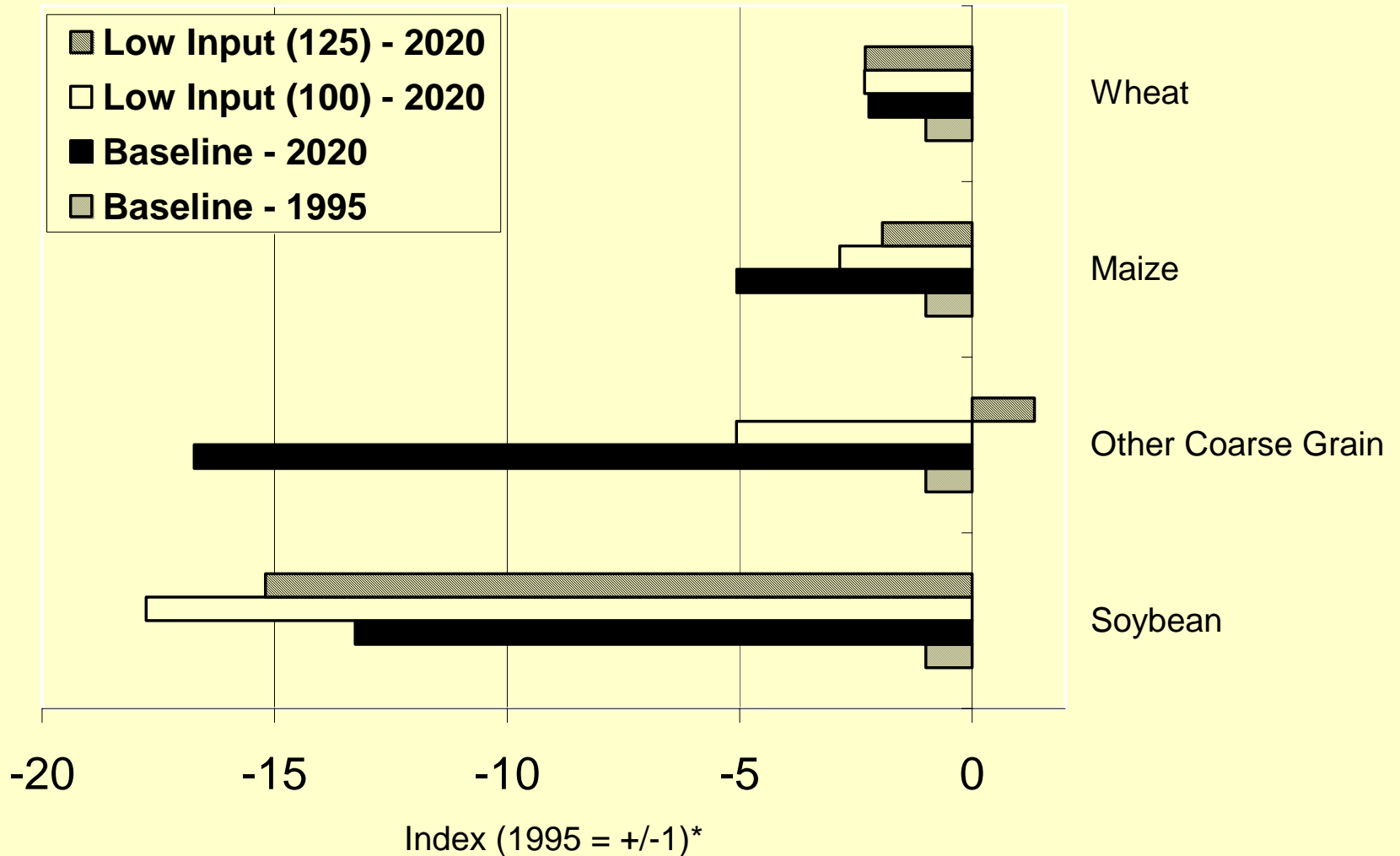
	Conservative	Optimistic
Yield growth rates		
% crop area converted	50	50
OF Yields, percent of conventional	80-120	80-120
Relative yield growth rate, OF vs. Baseline, %	100	125
% OF Livestock ruminants		
Dairy cattle	50	50
Beef cattle	50	50
Sheep & goats	50	50
% OF Livestock, non-ruminants		
Pigs	0	0
Poultry only	50	50

Results: Relative production under large-scale conversion to OF in low input regions

Scenario	Low input	
Relative Yield Growth Rate (% of baseline)	100	125
Projected Production in Africa South of Sahara		
Wheat	89	92
Maize	105	108
Other Coarse Grain	106	109
Sweet Potato & Yam	104	107
Cassava	104	105
Soybean	95	98
Projected World prices		
Wheat	100	100
Maize	99	98
Other Coarse Grain	98	96
Sweet Potato & Yam	96	94
Cassava	92	89
Soybean	100	100

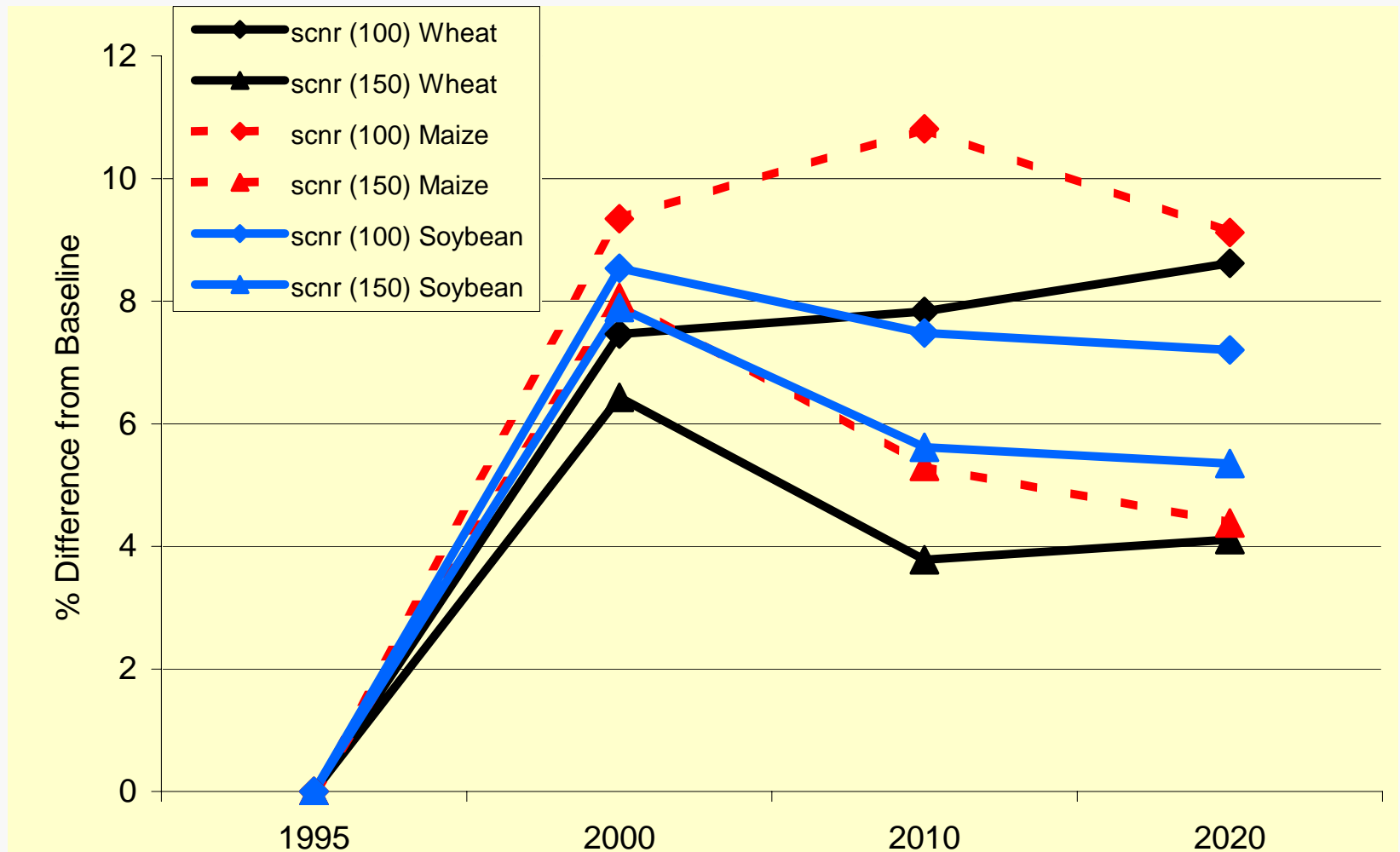


Results :



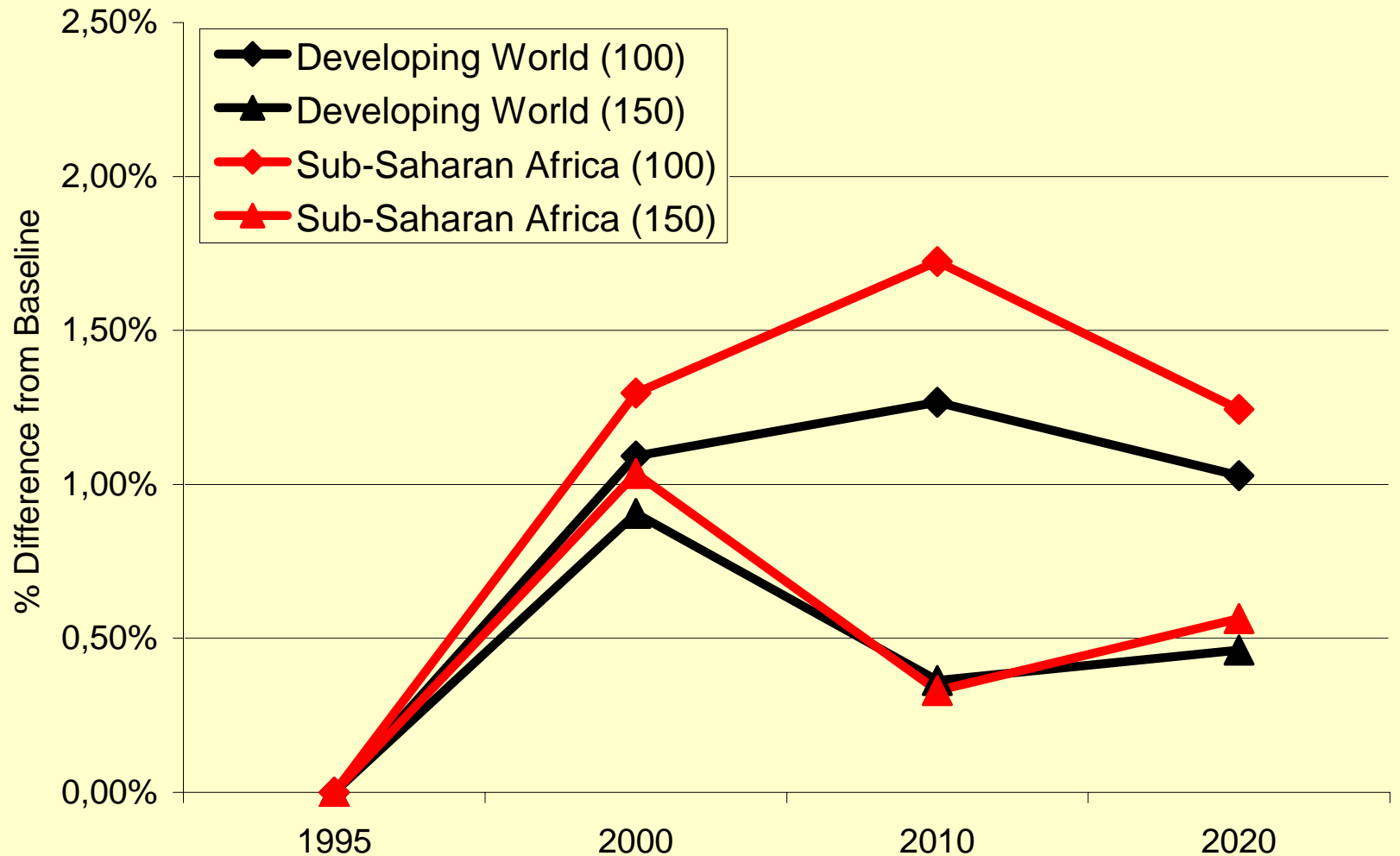
Changes in net trade for Sub-Saharan Africa under large-scale conversion to organic farming in Sub-Saharan Africa (*negative means increased import*)

Combined results 1



Projected changes in world prices on major cereals and soybeans after large scale conversion to OA in Europe, North America and Africa South of Sahara compared with IFPRI baseline scenario

Combined results 2



Projected changes in number of malnourished children in Sub-Saharan Africa and the Developing World after large scale conversion to OA in Europe, North America and Africa South of Sahara compared with IFPRI baseline scenario

Conclusions on scenario modelling of food security

- Large scale conversion to OA in high input regions is possible without severe negative effects on global food availability
- Potential positive effect on local food security of large-scale conversion to OA in Sub-Saharan Africa
- Yearly yield growth in OA should be 50% higher compared with conventional (IFPRI baseline scenario)
- Global food production (*food availability*) not sufficient condition for improving food security
- Promoting local food production in food insecure regions better solution (*increasing food access*)
- Policy initiatives necessary to avoid negative distributional effects

Succes with agro-organic methods: Review of 208 projects in 52 countries



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Science needed to develop agro-ecological methods

'vuta sukuma' = ***pull - push system*** for reducing stem borer and striga infestation in Maize and Sorghum in Eastern Africa

- **Trap crops to attract moths to reduced pest problems in crops: Napier and other fodder grasses**
- **Intercrops with repellent properties: legumes**
- **Striga control by intercropping with Desmodium species (legumes)**
- **"Opportunities for breeding and use of molecular genetics"**

Exploiting chemical ecology and species diversity: stem borer and striga control for maize and sorghum in Africa[†]

Zeyaur R Khan,¹ John A Pickett,^{2*} Johnnie van den Berg,³ Lester J Wadhams² and Christine M Woodcock²

¹International Centre of Insect Physiology and Ecology, PO Box 30772, Nairobi, Kenya

²ACR-Rothamsted, Harpenden, Hertfordshire AL5 2JQ, UK

³ARC-Grain Crops Institute, Private Bag X1251, Potchefstroom 2520, Republic of South Africa

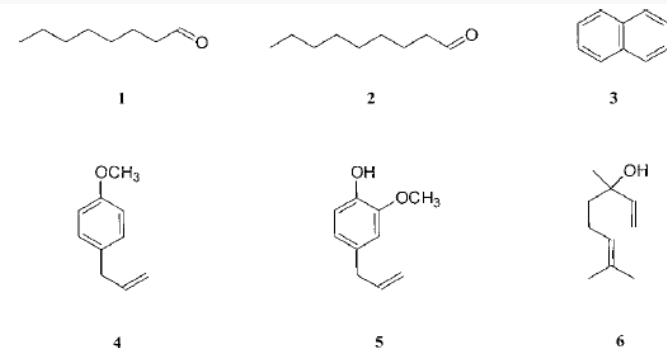


Figure 1. Volatile compounds from host plants having EAG activity with stem borers.

There is a need for more research in organic food systems in a globally

- The realisation of the potential of OA for combined food security and environmental improvement depends on *sufficient support to research and extension* as part of an integrated rural development approach
- European research in organic agriculture and food systems shows the potential of an integrated approach combining research along the whole food chain including environmental and rural development aspects



The "*Core organic*" model applied in a global perspective

- Research funding and collaboration between countries in the North and the South
- Knowledge exchange and methodological development
- Use of experience with Stakeholder involvement in different environments for improved design and utilisation of research
- Joint use of research infrastructure
- Researcher mobility and training
- Mutual benefits in a better understanding of agro-ecological and socio-economic processes

- *Improved development of organic food systems may lead to:*
 - Improvement of food security and environmental protection in times of changing climate
 - Reduction of poverty, migration, social unrest and environmental degradation



Global development of Organic Agriculture

Challenges and Promises

Modern agriculture and food systems, including organic agriculture, are undergoing a technological and structural modernisation and are faced with a growing globalisation. In a global perspective, globalisation and sustainable development has been two main discourses in the last decades. The organic agricultural movement can be seen as a global effort to create sustainable development.

There are large differences between, on one hand, modern farming and consumption in high-income countries and, on the other, smallholders and people without the means to be consumers in low-income countries.

With the point of departure in the increasing globalisation and the production of food, the main aim of this book is to provide an overview of the potential of organic agriculture in a global perspective.

The book includes sustainability, food security and fair trade as important considerations and discusses major aspects such as organic values and principles as guides for development of organic agriculture in different contexts in form of economic, political and social structures.

Global Development of Organic Agriculture
Challenges and Promises

Global Development of Organic Agriculture: Challenges and Promises

Edited by Niels Halberg, Marie Trudsen Knudsen,
Thage Holten Alnø & Erik Søren Knudsen

Thank you!

More: WWW.Globalorg.dk

<http://ecowiki.org/GlobalPerspective/Homepage>



CABI Publishing

CABI Publishing



Questions for debate

International Centre for Research in Organic Food Systems

- From DARCOF to..
- Centre without walls
- International board
- Asia, Africa, America, Europe, Ifoam
- 3 universities, 2 farmer organisations
- Core Organic II
- Collaboration with international funding bodies and research organisations interested in supporting Organic food systems



Organic agriculture, environment and human health

- Working with natural processes and enhancing biodiversity
- Improving soil fertility
- Using primarily locally available resources and recycling
- No synthetic pesticides
- Reducing harmful effects on nature and human health
- Reducing fossil energy use and greenhouse gas emissions

An ideal in need of research!?



FAO-SARD: *"Well-designed organic agriculture policies can address three crucial aspects of sustainable agricultural development":*

- environmental health – through conservation and sustainable use of natural resources within and outside the agro-ecosystem;
- rural development – through employment and community empowerment;
- income generation – through diversification, value-addition and marketing and trade.



www.fao.org/sard/initiative

