

The organic food system model

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The logo for SUS+ features the word "SUS" in a bold, black, lowercase sans-serif font, with a green leaf-like shape above the 'U'. To the right is a large black plus sign (+).

SUS+

Innovative Education towards
Sustainable Food Systems

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Outline of the lecture

- The organic food system – values, statistics, consumers
- Outcomes of the organic food system – environment, food constituents
- Organic food from quality and food culture perspectives – examples
- Summary



Intended learning outcomes

Knowledge:

describe organic food system (OFS)

know about impacts of OFS on sustainability and health

Skills:

think in processes and systems according to organic food and food production

Competences:

conceptual understanding and critical awareness of current status and lessons learned from the organic food system



The organic agro-food system: values

- Shared mission values
The four principles of health, ecology, fairness and care
- Shared operation values
Transparency, integrity, trust



Sustainable Diets definition and IFOAM principles

Principle of health

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

Principle of fairness

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

Sustainable diets are those diets with low **environmental** impacts which contribute to food and nutrition security and to **healthy** life for **present and future generations**. Sustainable diets are protective and respectful of biodiversity and **ecosystems**, culturally acceptable, accessible, economically **fair** and affordable; nutritionally adequate, safe and healthy; while optimizing **natural and human resources**

Principle of ecology

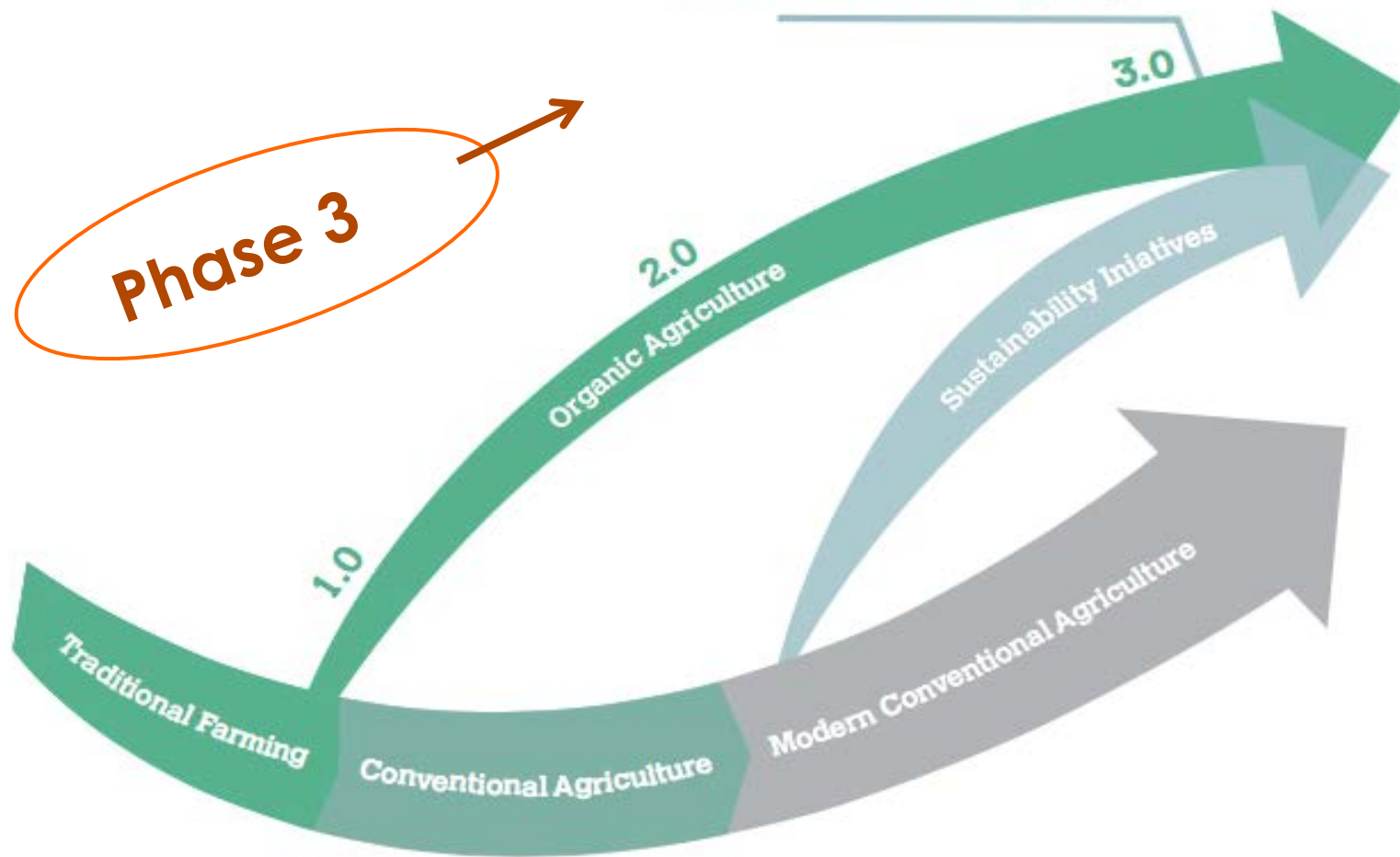
OA should be based on living ecological systems and cycles, work with them, emulate them and help sustain them

Principle of care

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

Developmental processes within OFS

- #1 A culture of innovation
- #2 Continuous improvement towards best practice
- #3 Diverse ways to ensure transparent integrity
- #4 Inclusive of wider sustainability interests
- #5 Holistic empowerment from farm to final consumer
- #6 True value and fair pricing



Sustainable Food & Farming Systems



Organic regulation in EU

Organic is:

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,

natural substances and processes.

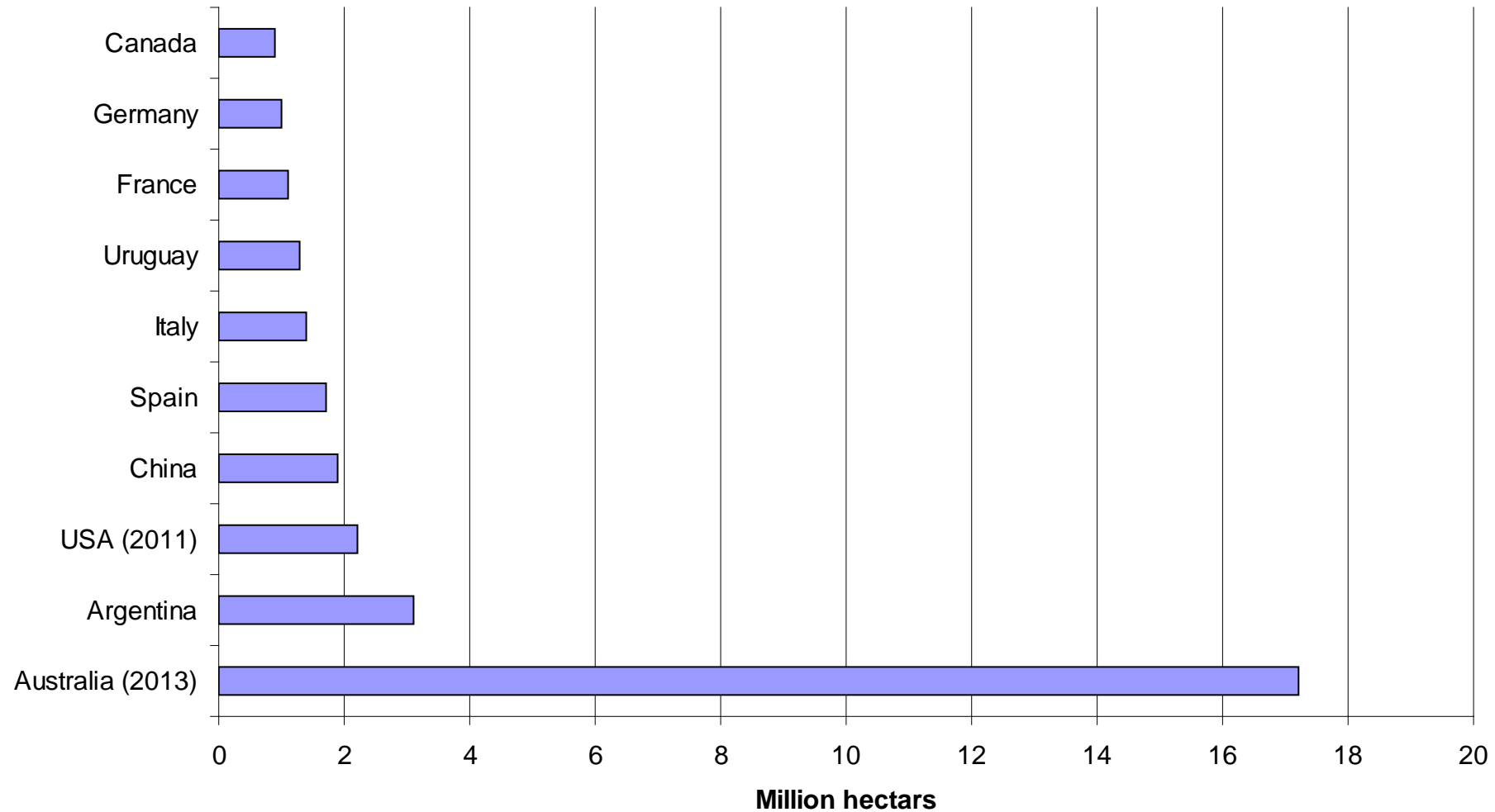
(EC No 834/2007)

Dual societal role:

consumer demand for organic products, delivers public goods



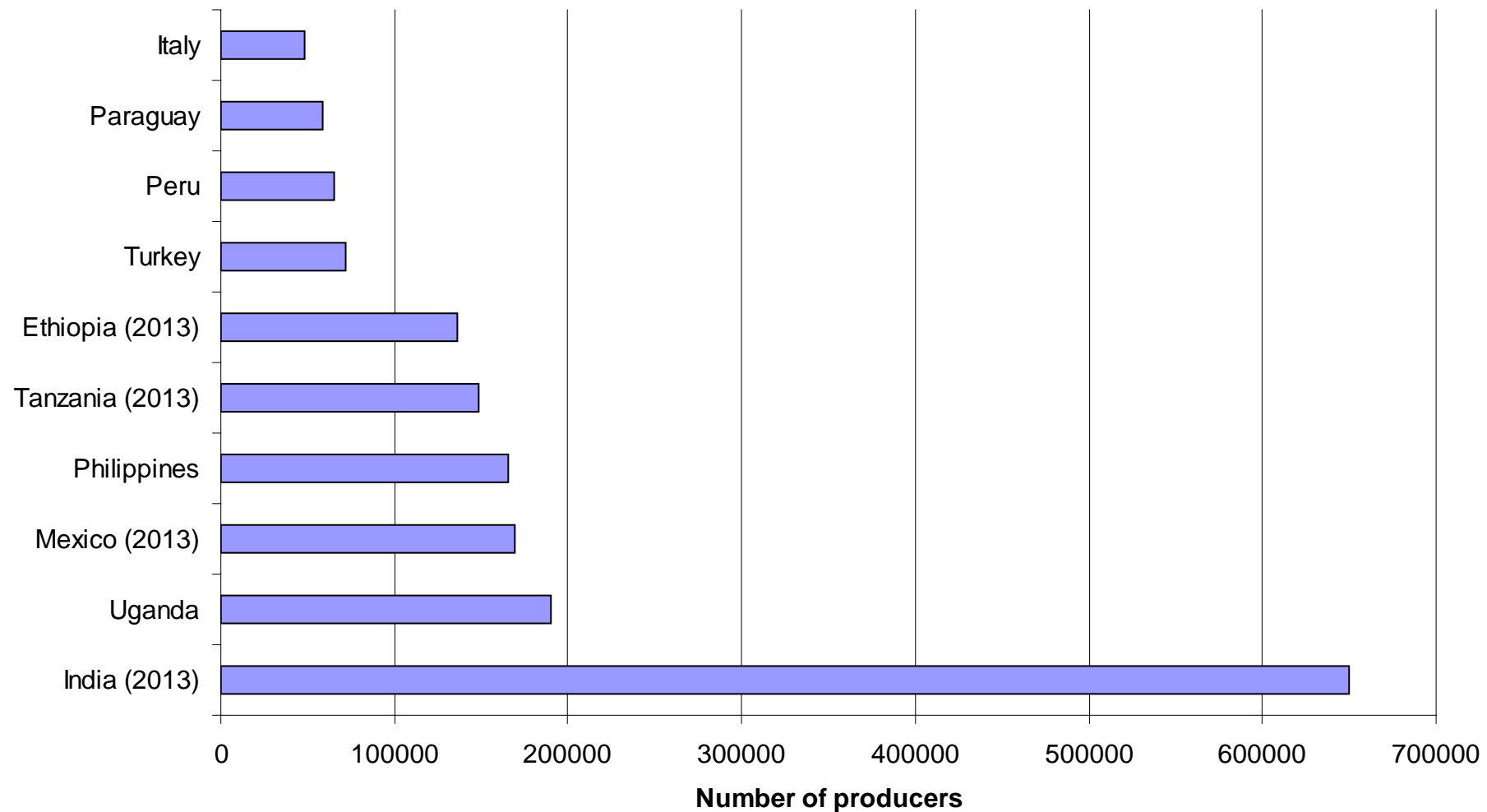
The ten countries with the largest areas of organic agricultural land (2014)



(FiBL 2016)



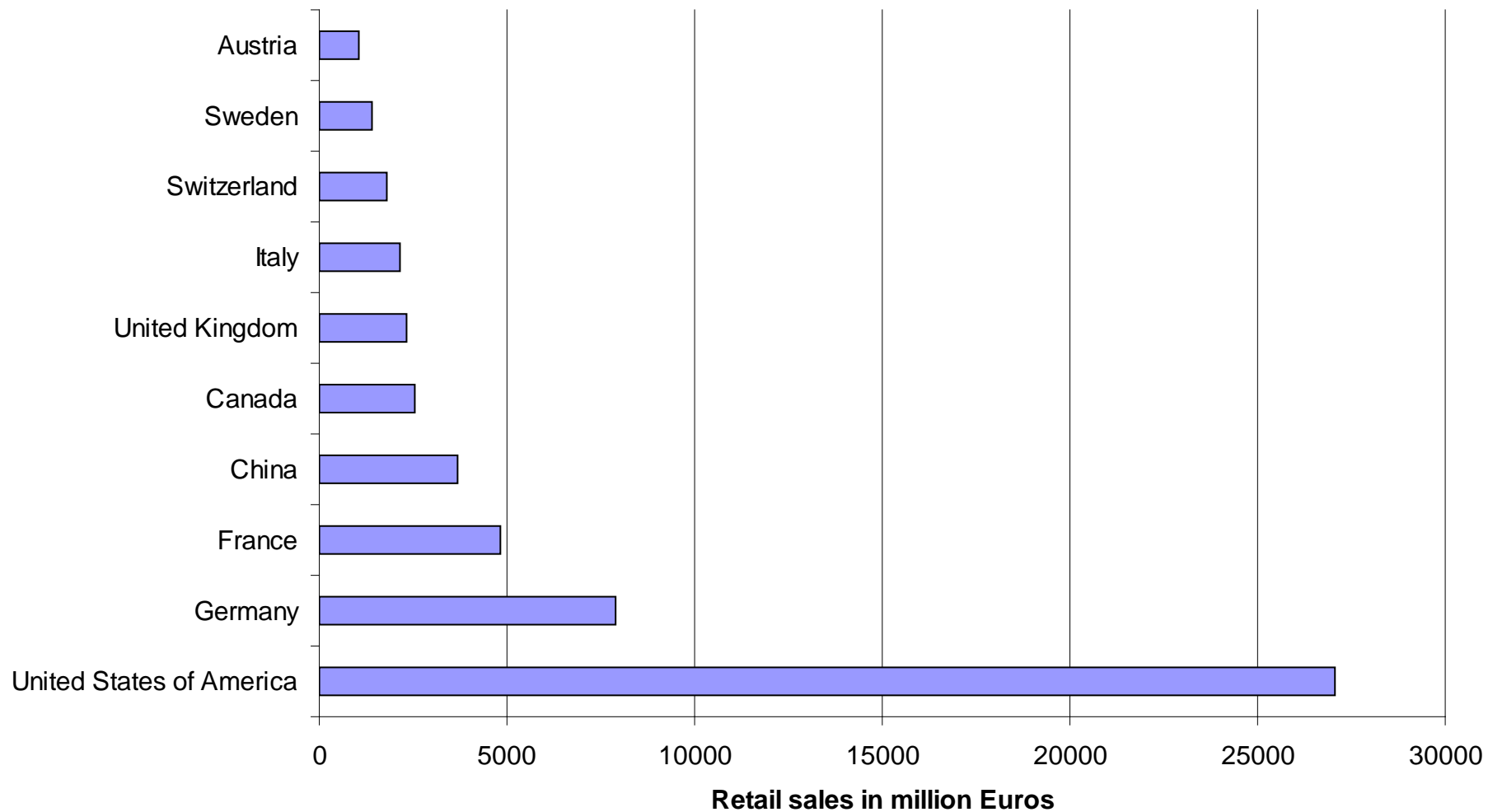
The ten countries with the largest numbers of organic producers (2014)



(FiBL 2016)



The ten countries with the largest markets for organic food (2014)



(FiBL 2016)



Motivations and beliefs of organic consumers (EU)

Ethically motivated (occasional buyers) or **food safety concerns** (Pino et al. 2012, Michaelidou&Hassan 2008)

Believe it is more healthy and environmental friendly (Pino et al. 2012, various)

Associate a **healthy diet with organic products** (Padel & Foster 2005)

Higher adherence to a healthy and sustainable dietary pattern

(e.g. Torjusen et al. 2015 Bradbury et al. 2014, Eisinger-Watzl et al. 2014, Kesse-Gyout et al. 2013)



Environment impact of OFS

Life cycle assessment (LCA) is a tool to assess the potential environmental impacts and use of resources through a product's life cycle

Environmental impact categories

Included in LCA

- GHG
- Land use
- Water use
- Eutrophication and acidification

Organic performs better than non-organic when calculated per area unit; no difference or organic performs worse if calculated per kg

Not included in LCA

- Soil organic matter
- Carbon sequestration
- Biodiversity

Lower output yield
Developing countries different?

Organic performs better than non-organic

(Seufert et al. 2012
Reganold & Wachter 2016)



Impact of the organic food system on biodiversity

Organic farming potentially offers a means of **returning functional evenness into ecosystems** (Crowder et al. 2010)

 Organic shows **30% higher species richness**, when compared to non-organic. Effect varies with organism, crop, intensity (Bengtsson et al. 2005, Gabriel et al. 2013, Tuck et al. 2014)

Why organic performs "better"?

- No herbicide and chemically-synthesized pesticides
- Less and pure organic fertilization
- Fewer cattle per m²
- More diversified crop rotation
- Conservation tillage
- More diversified from farming structure

(Piffner&Balmer 2011)



Impact of organic agriculture on food constituents

Pesticide



Much lower probability to have pesticide residues in organic fruit and vegetables

Nitrate



Lower content in organic

Mycotoxins



No scientific evidence of higher contamination in organic products

Antibiotic resistance



Lower in organic

Food composition



- Protein in cereals
+ Vitamin C and phenolic compounds in organic fruit and vegetables
+ ω 3 fatty acids and CLA in organic milk and dairy products


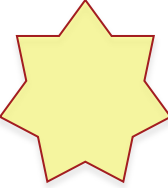

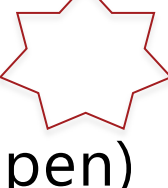


Smith-Spangler et al. 2012

Baranski et al. 2014

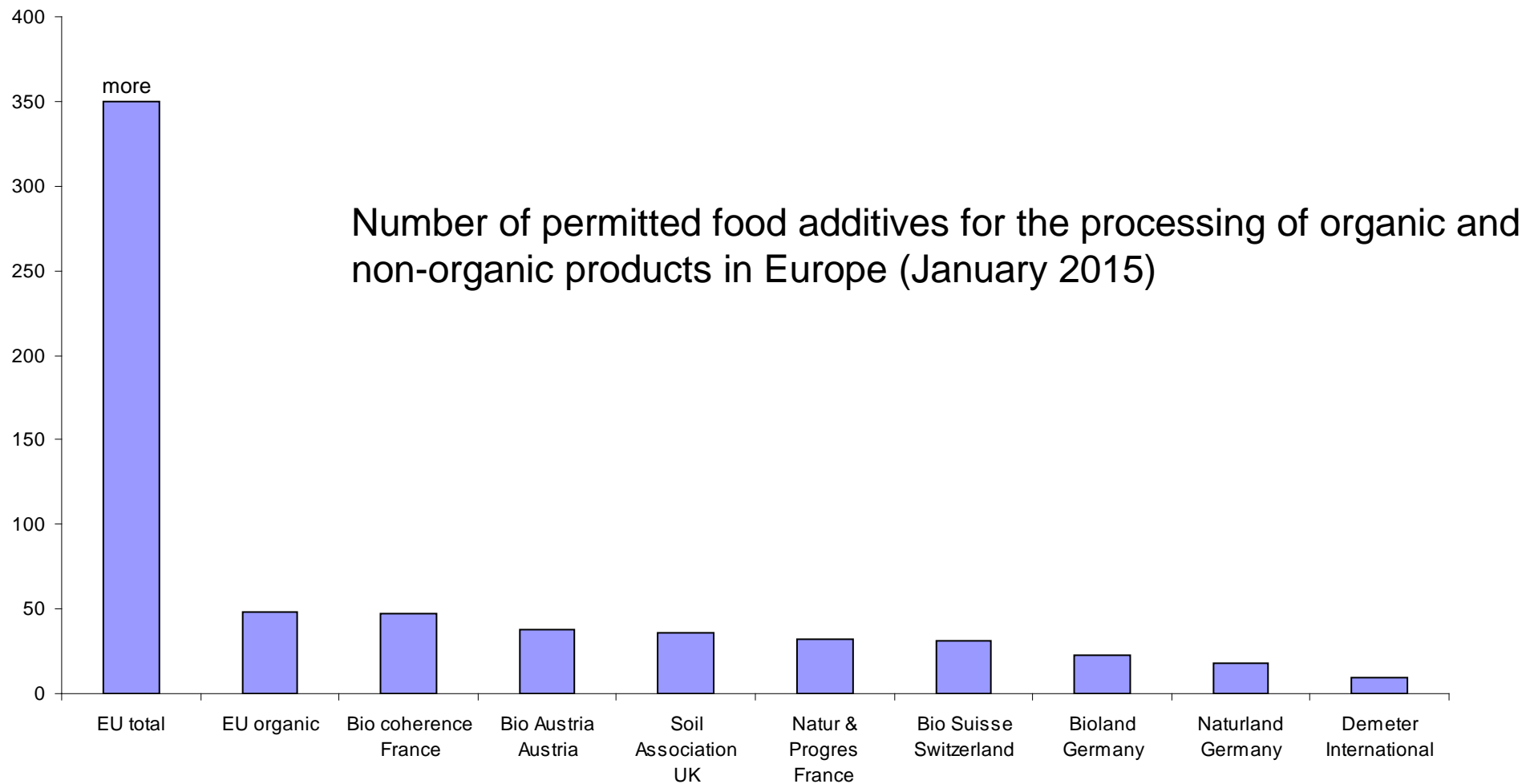
Średnicka-Tober et al. 2016



Factors potentially influencing organic food composition

- No herbicide and chemically-synthesized pesticides 
- No synthetic fertilizer (N) 
- Less and pure organic fertilization (<179 kg N/ha/y) 
- No GMO 
- Restricted animal feeding regime (e.g. grass instead of silage) 
- Restricted use of antibiotics 
- Restricted use of food additives (48 instead of several hundreds)
- Principle of processing with care (regulation of technologies still open)

Organic food processing „with care“



(Beck et al. *BÖLN* 2012)



Example: Reality in OFS

Example Babyfood:

1. Organic industry moved from fresh to frozen (result from EU-Eranet Core organic QACCP)
2. Survey among mothers in different EU countries (result from EU-Eranet Core organic QACCP)
 - = little knowledge on the production processes
 - = different cultural practises of preparing
3. EU political framework (EC regulation 655/2004)
 - Babyfood: $\text{NO}_3 < 200 \text{ mg/kgDM}$: organic raw material for non-organic food
 - Vitamins added
 - Discussion needed (artificial vitamins, sterilisation, behaviour)

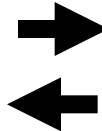
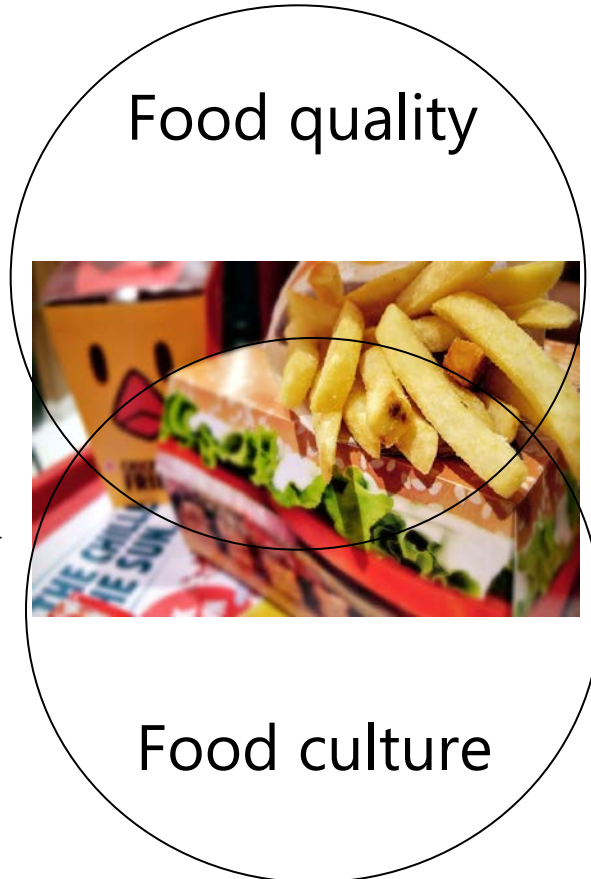
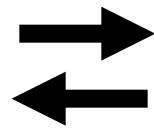


Summary: Organic food from a system view

Production



Processing



Preparation



Social practise of eating



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