

Carbon and nitrogen cycles in organic farming: linking productivity, pollution and climate change

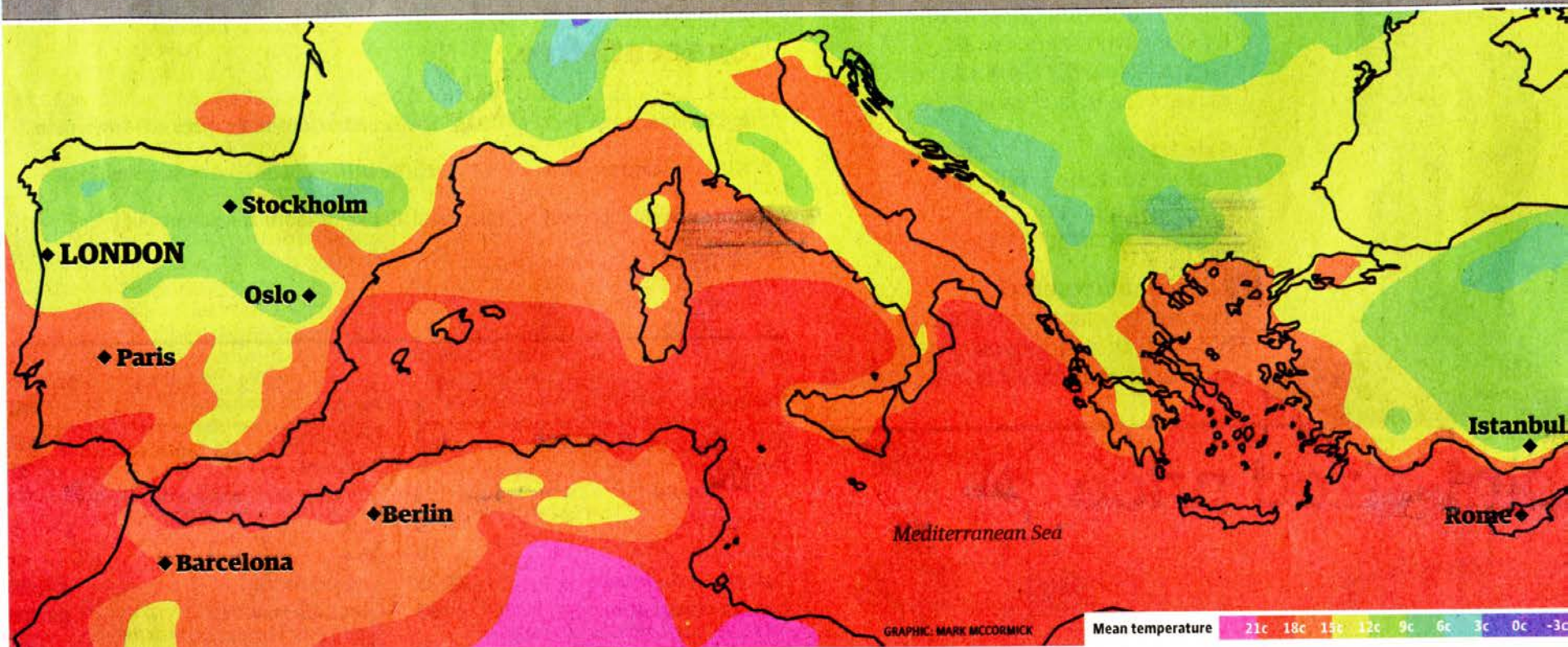
**11th Organic Producers' Conference:
Rising to the Challenge**

2nd February 2017

**Laurence Smith
Senior Sustainability Researcher**

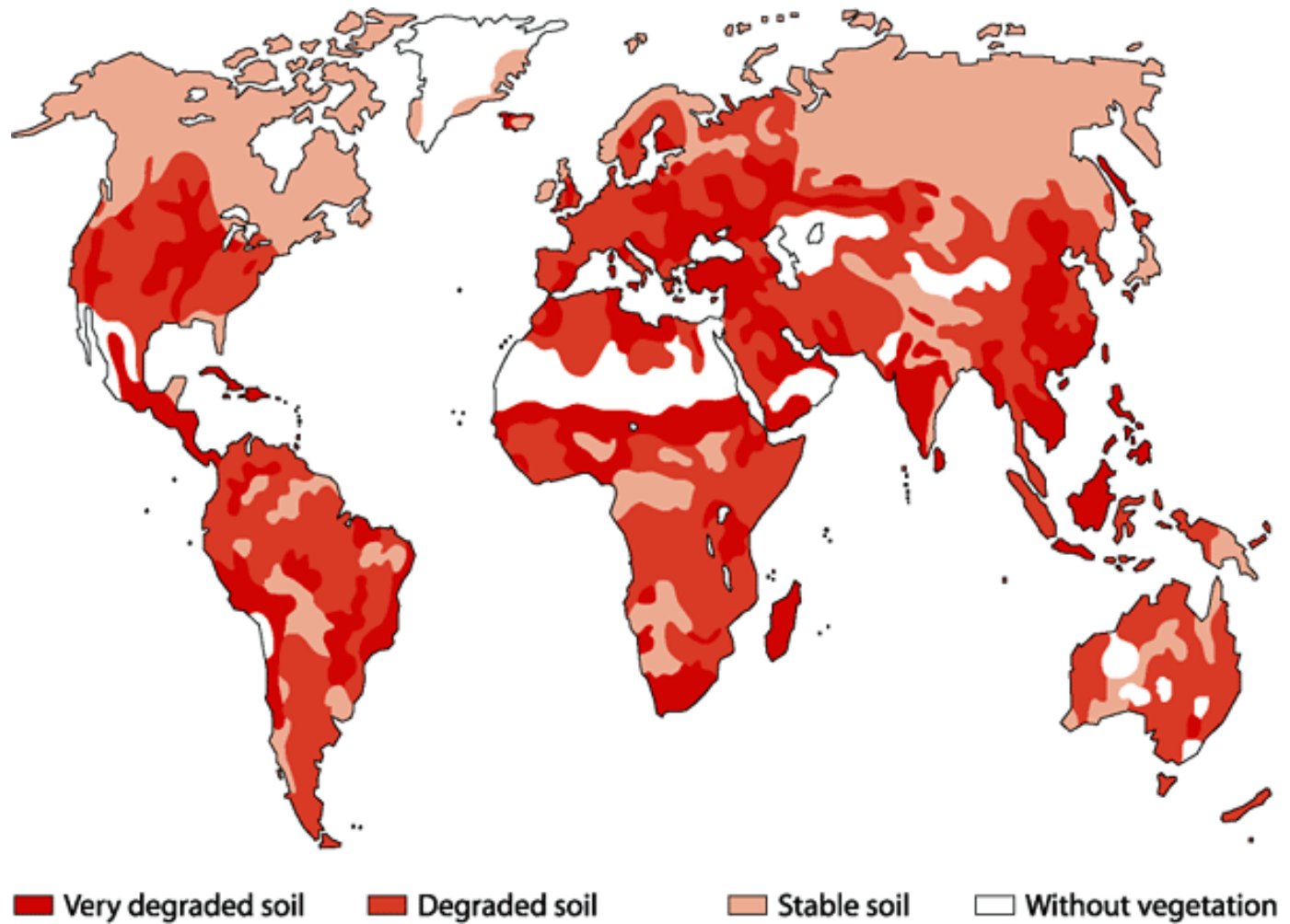
London, Portugal: how Europe's climate is heading south

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Guardian 15/5/07 – reporting French work

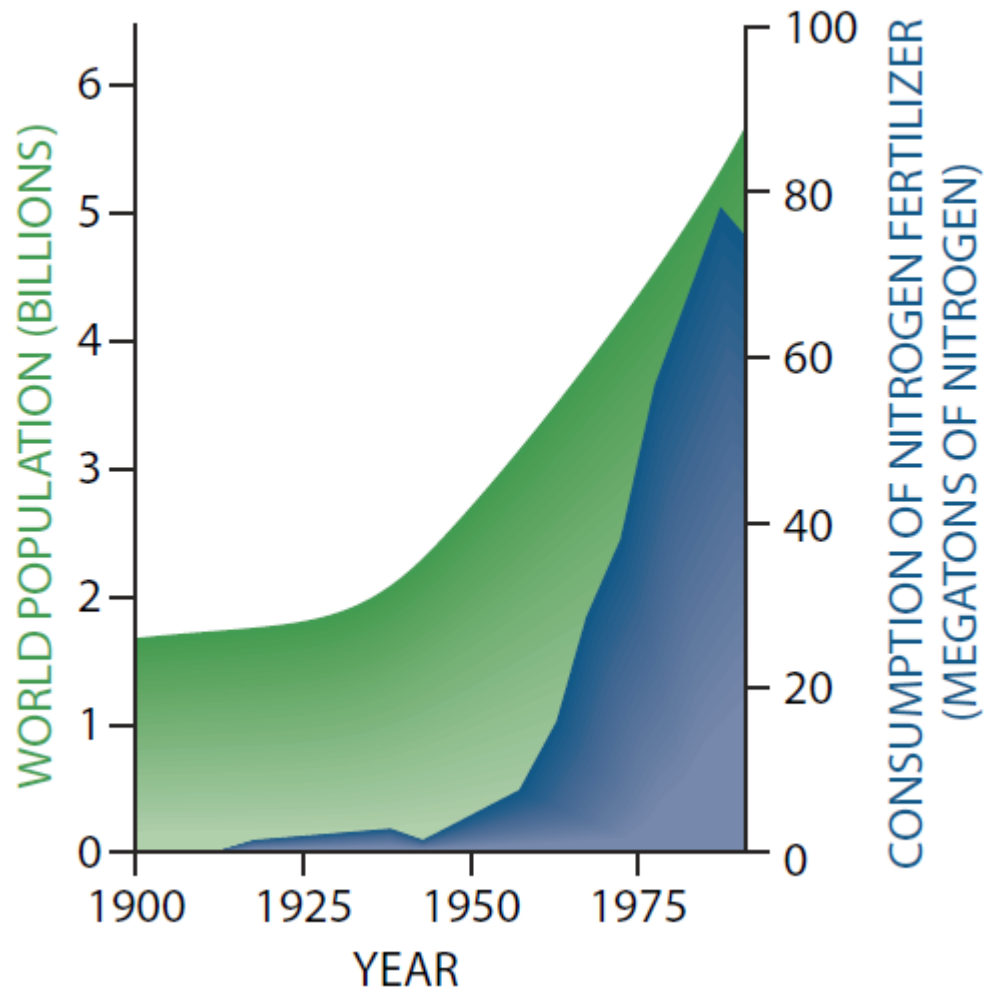




UNEP Global Assessment of Human-induced Soil Degradation (GLASOD)

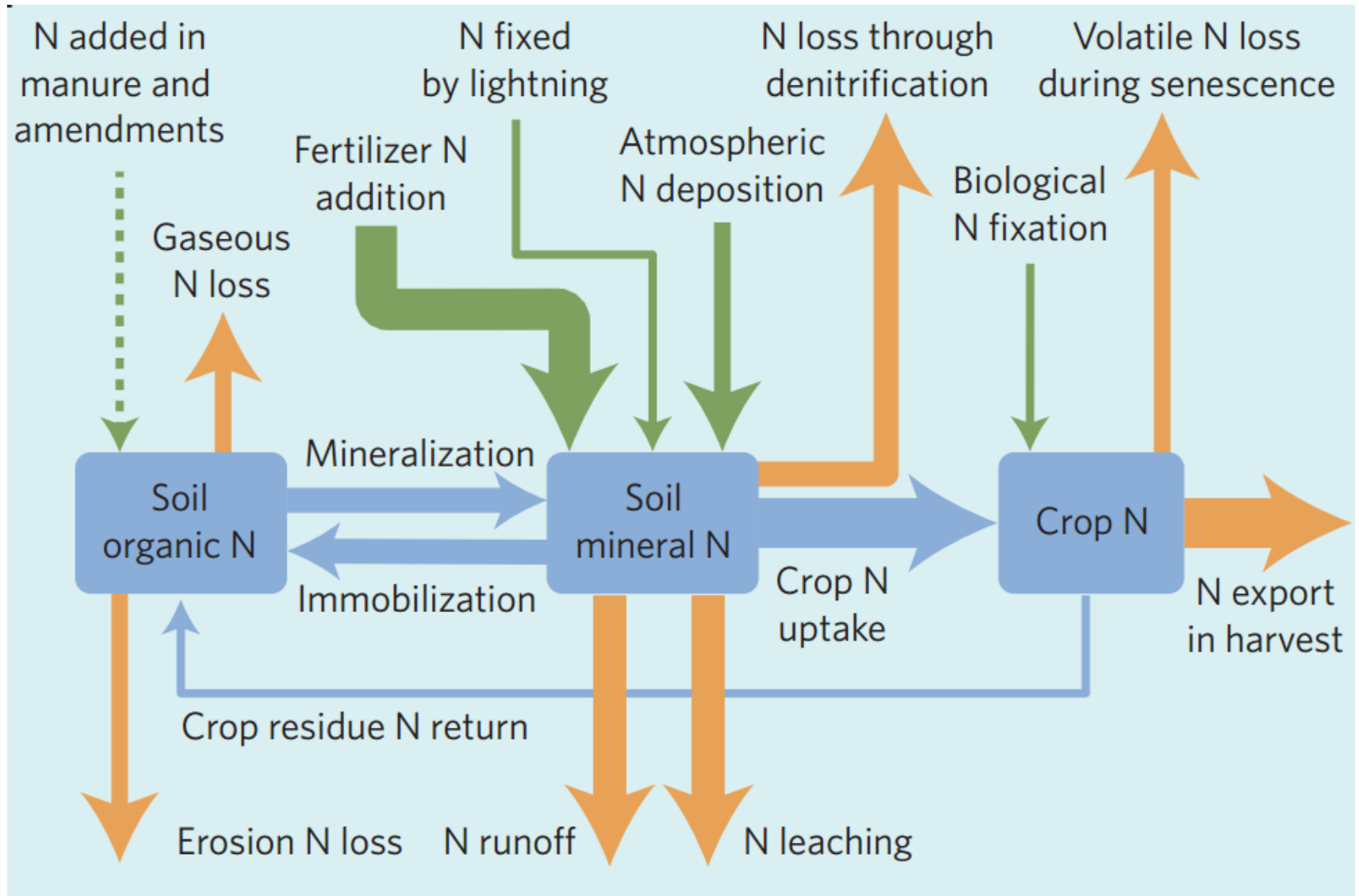
The Organic Research Centre





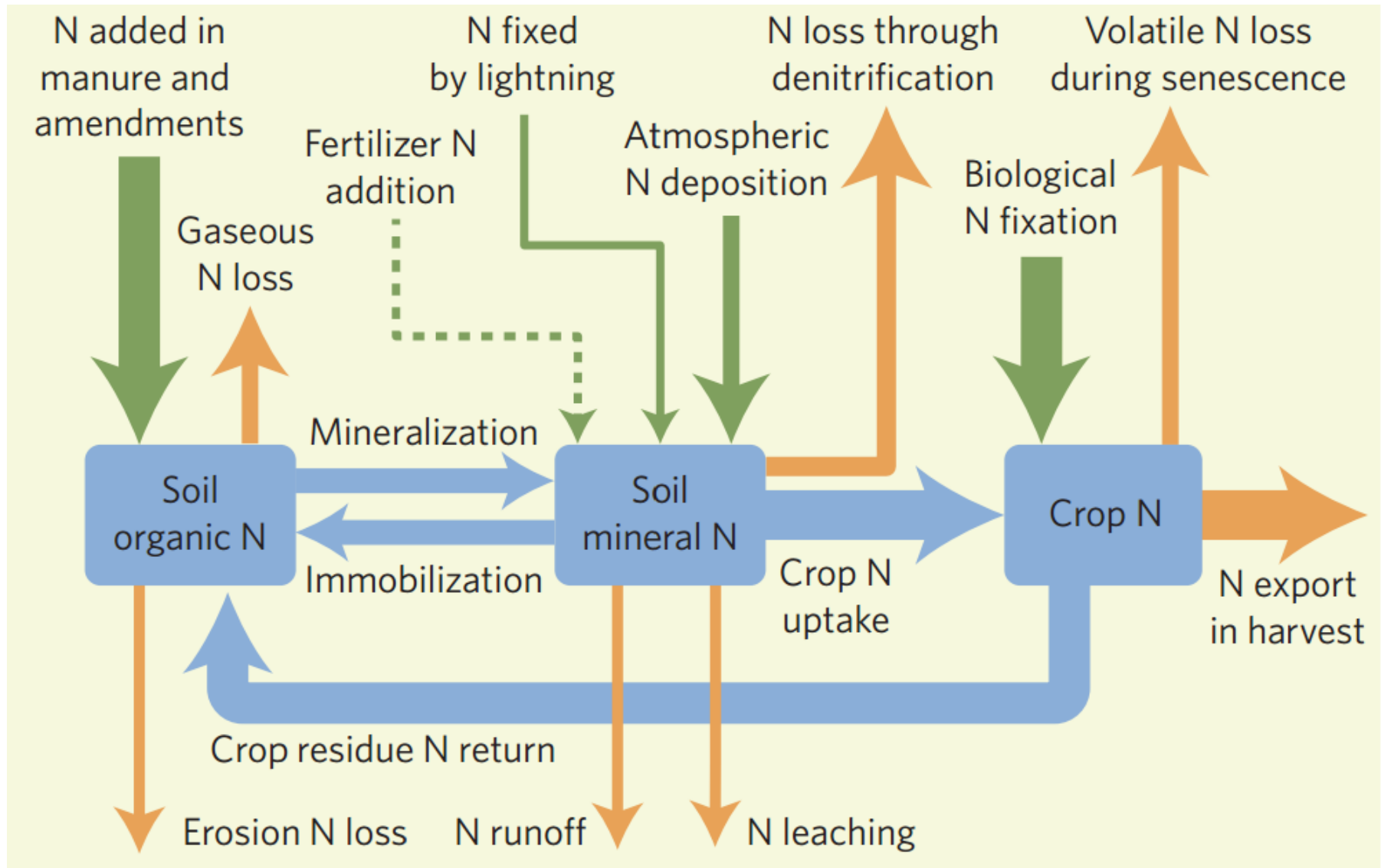
Source: Smil (1997)

High input / output systems



Reganold and Wachter (2016)

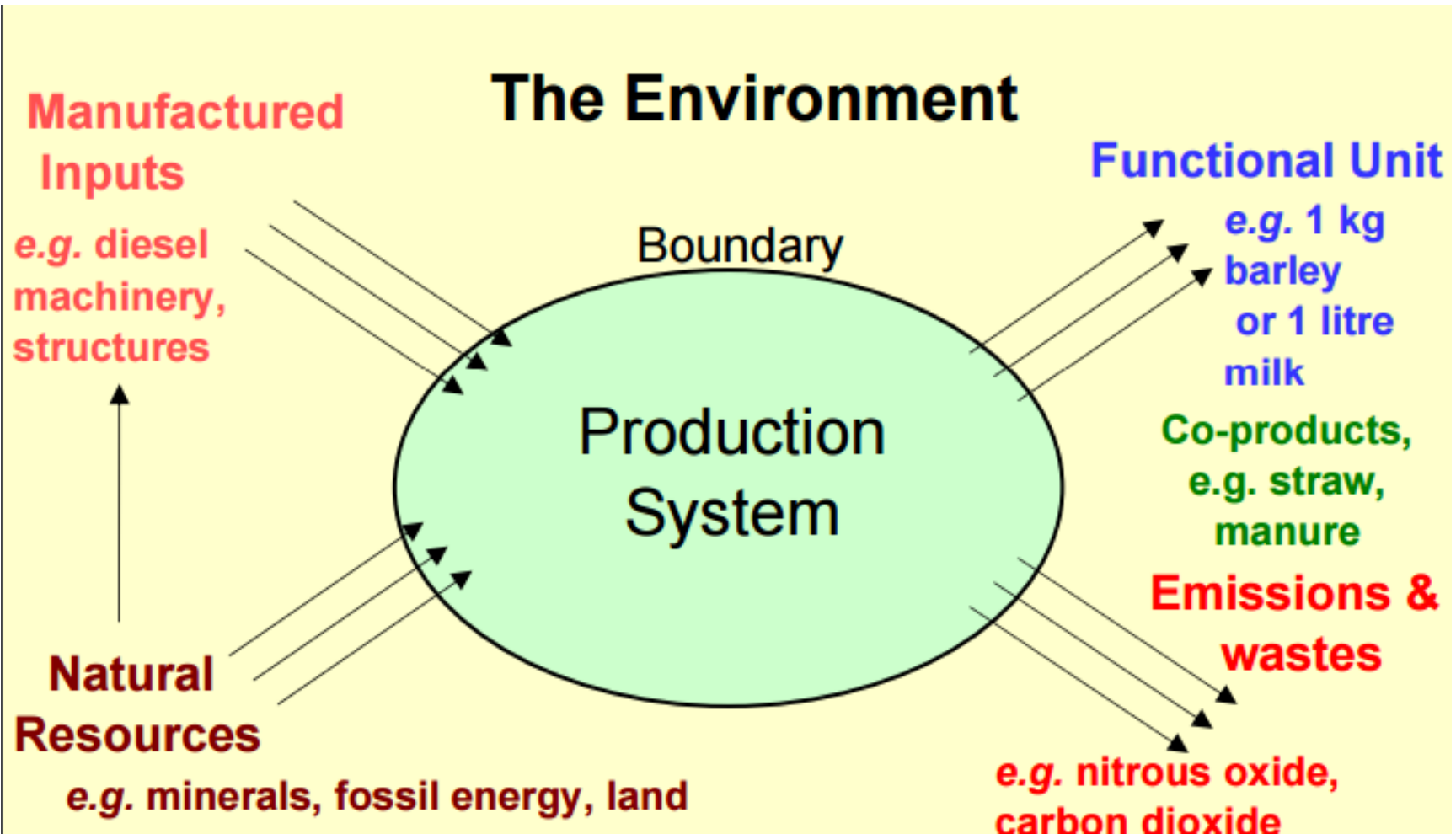
Integrated and organic systems



Reganold and Wachter (2016)

LCA outline

Williams (2010)



Nitrous oxide
 N_2O



Methane
 CH_4

Organic farming practices and carbon sequestration:

Recent meta-analysis by Gattinger et al. (2012)* confirms higher soil organic carbon concentrations ($0.18 \pm 0.06\%$) and stocks ($3.50 \pm 1.08 \text{ t C ha}^{-1}$) in top soils under organic management.

Lower reliance on imported feed within organic systems can help to avoid deforestation/land clearance for growing crops such as soya and maize

*Gattinger et al. 2012. Enhanced top soil carbon stocks under organic farming

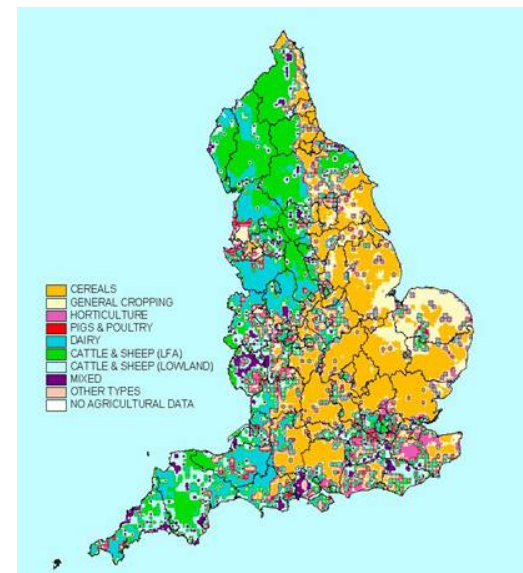


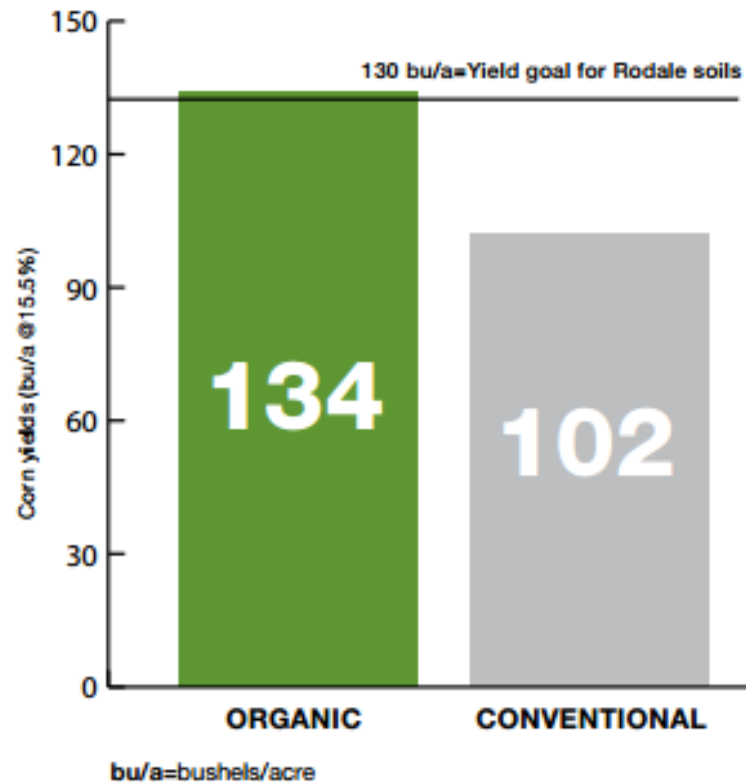
Image: Defra & Wiki Commons

Better infiltration, retention, and
delivery to plants helps avoid drought
damage

Organic

Conventional

FST CORN YIELDS IN YEARS WITH MODERATE DROUGHT



Rodale Institute Trials

Organic matter increases infiltration:

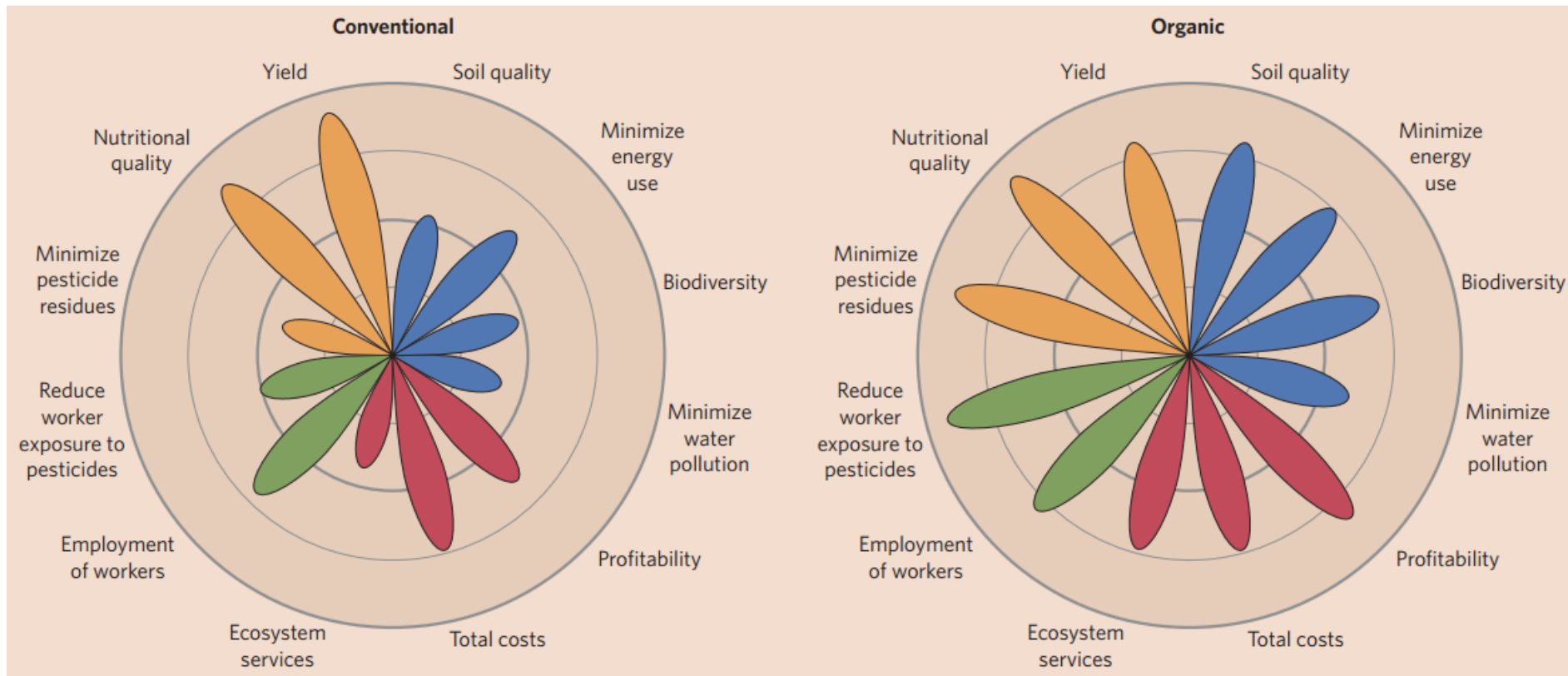


Organic

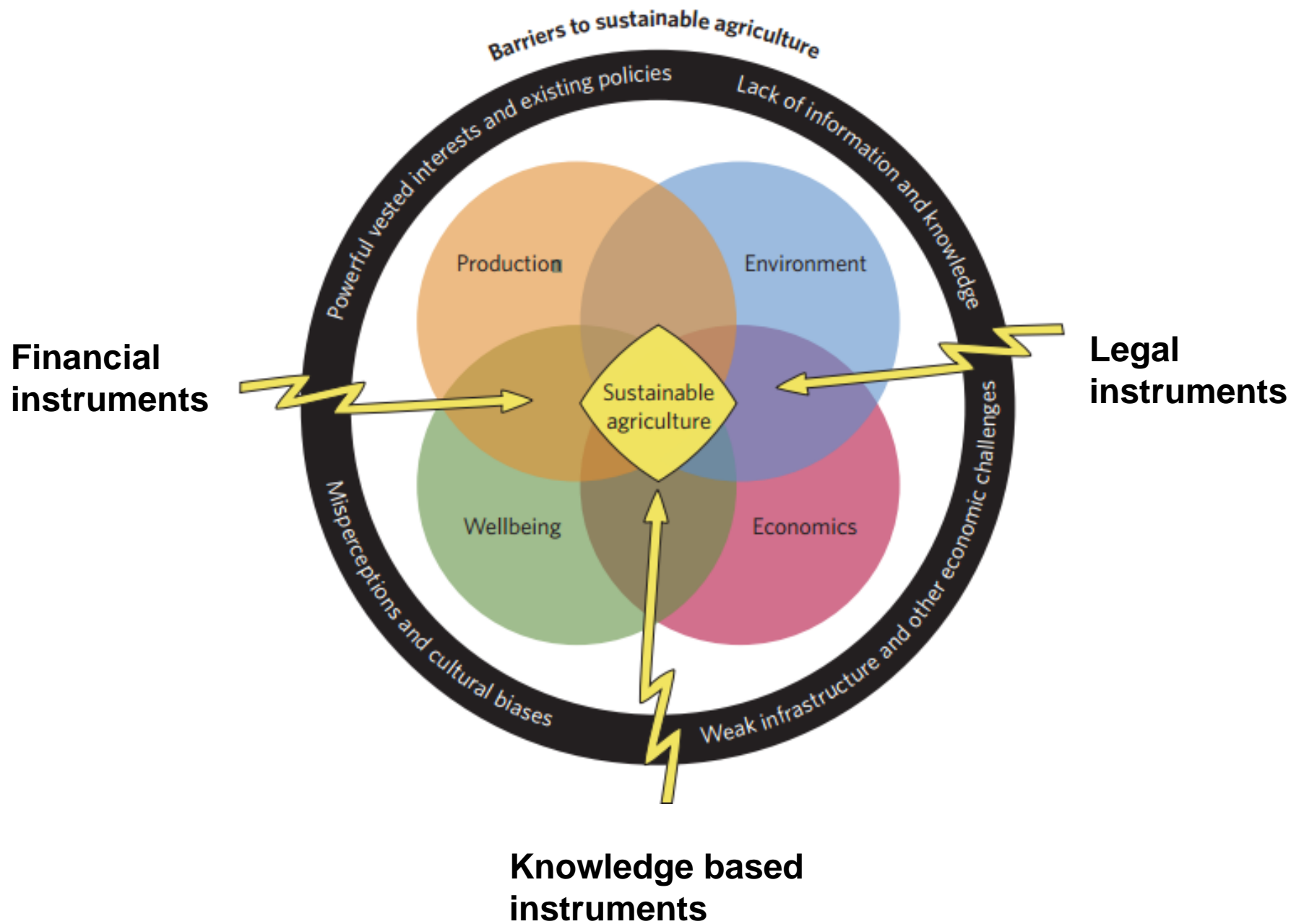


Conventional

Picture: FiBL DOK Trials



Reganold and Wachter (2016) Review of over 74 studies



- **Creating a culture for continuous improvement towards best practice**
- **Move towards outcome based standards**
- **Move from organic as an objective towards mult-objective sustainable development**



Conclusion:

- Clear evidence that organic practices provide substantial improvements in GHG mitigation, particularly when C sequestration is included
- Challenge for policy makers to create an enabling environment for scaling up
- No single farm-system will address the complex challenges we face

Make Vegetables Great Again!

By: Andy Hollandbeck, George Rector and Jeff Nilsson

Published: October 6, 2016

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