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Can Organic feed the world?

How worldwide conversion to organic farming and responsible consumption contribute to a sustainable food system

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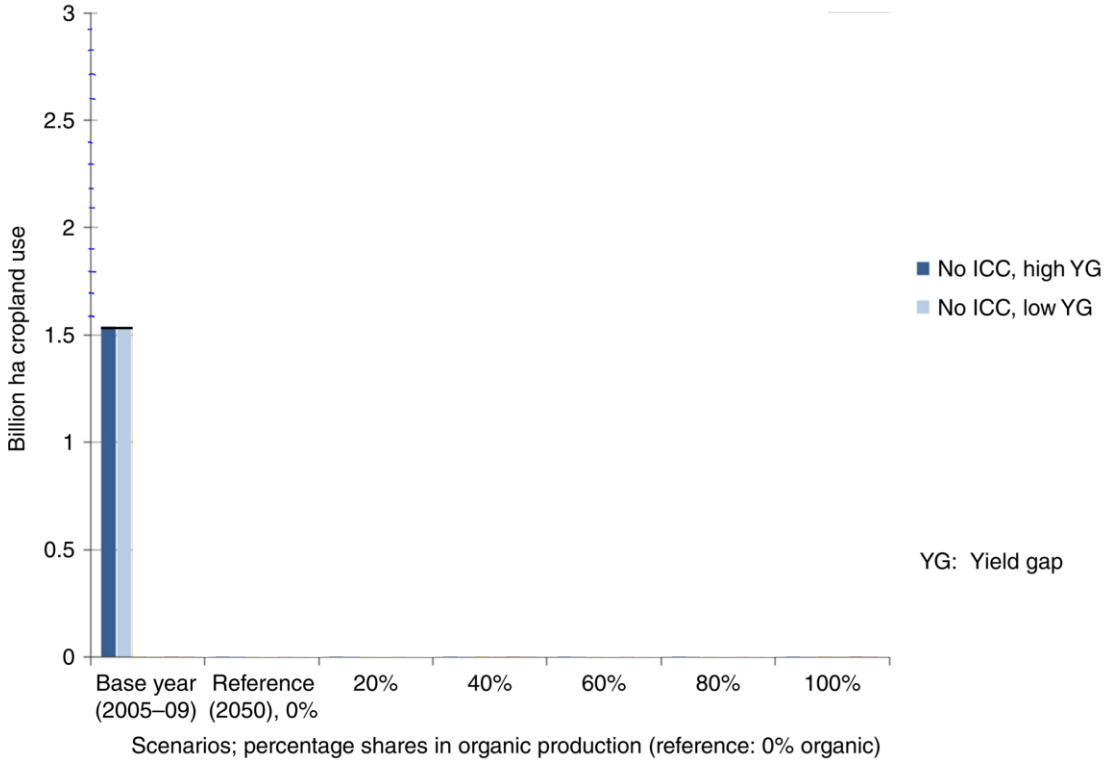
The Contribution of Organic Agriculture to the SDGs: Scientific evidence from comparative research

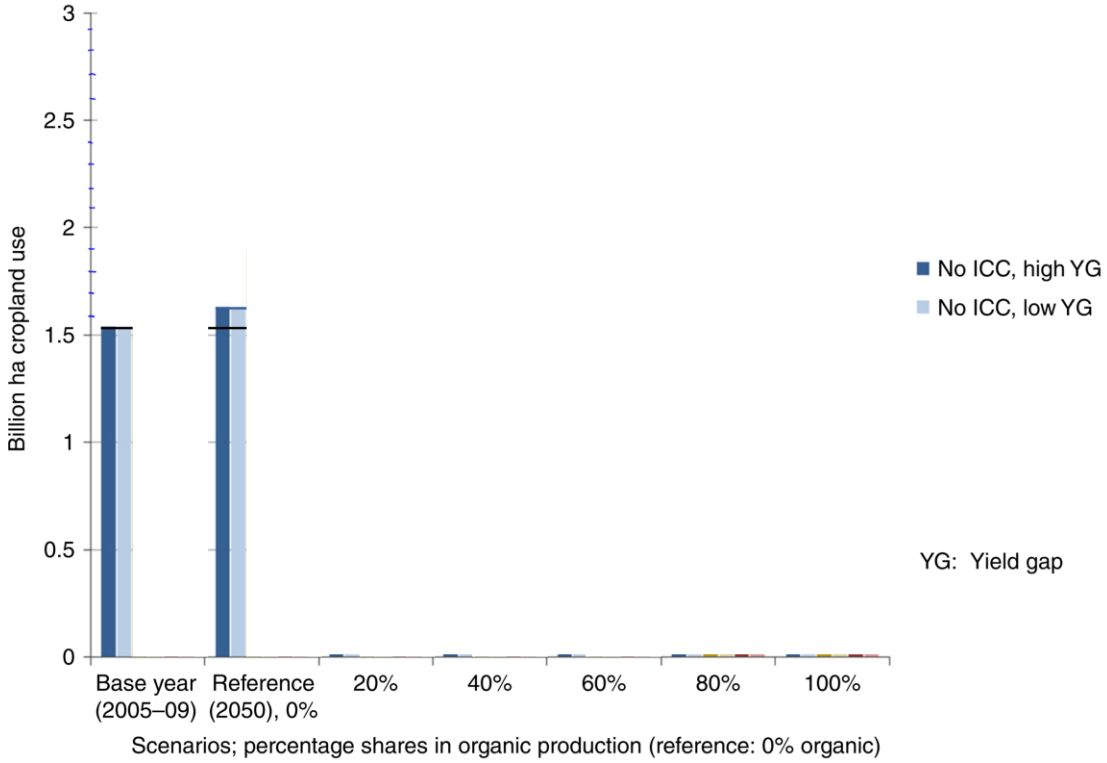
February 26 2019, Brussels

Can organic agriculture feed the world?

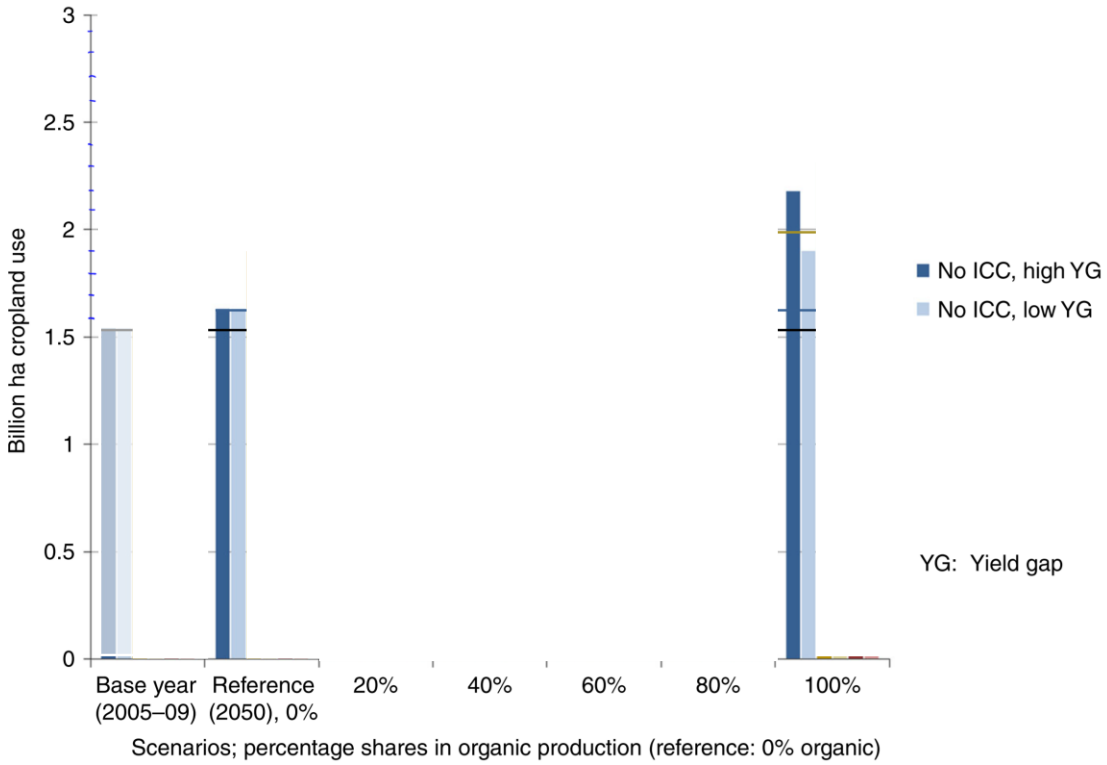
Land use



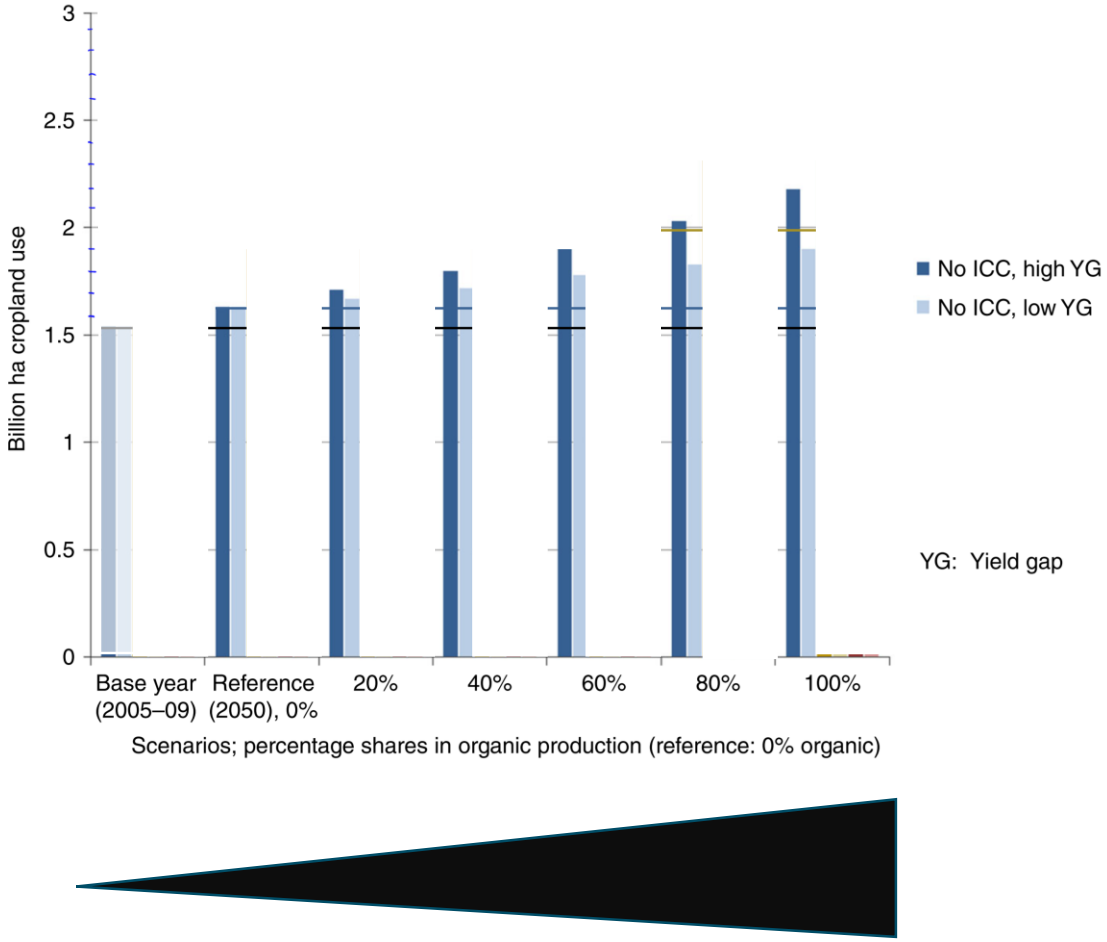
Muller et al. 2017; Courtesy: R. Zürcher



Muller et al. 2017; Courtesy: R. Zürcher



Muller et al. 2017; Courtesy: R. Zürcher

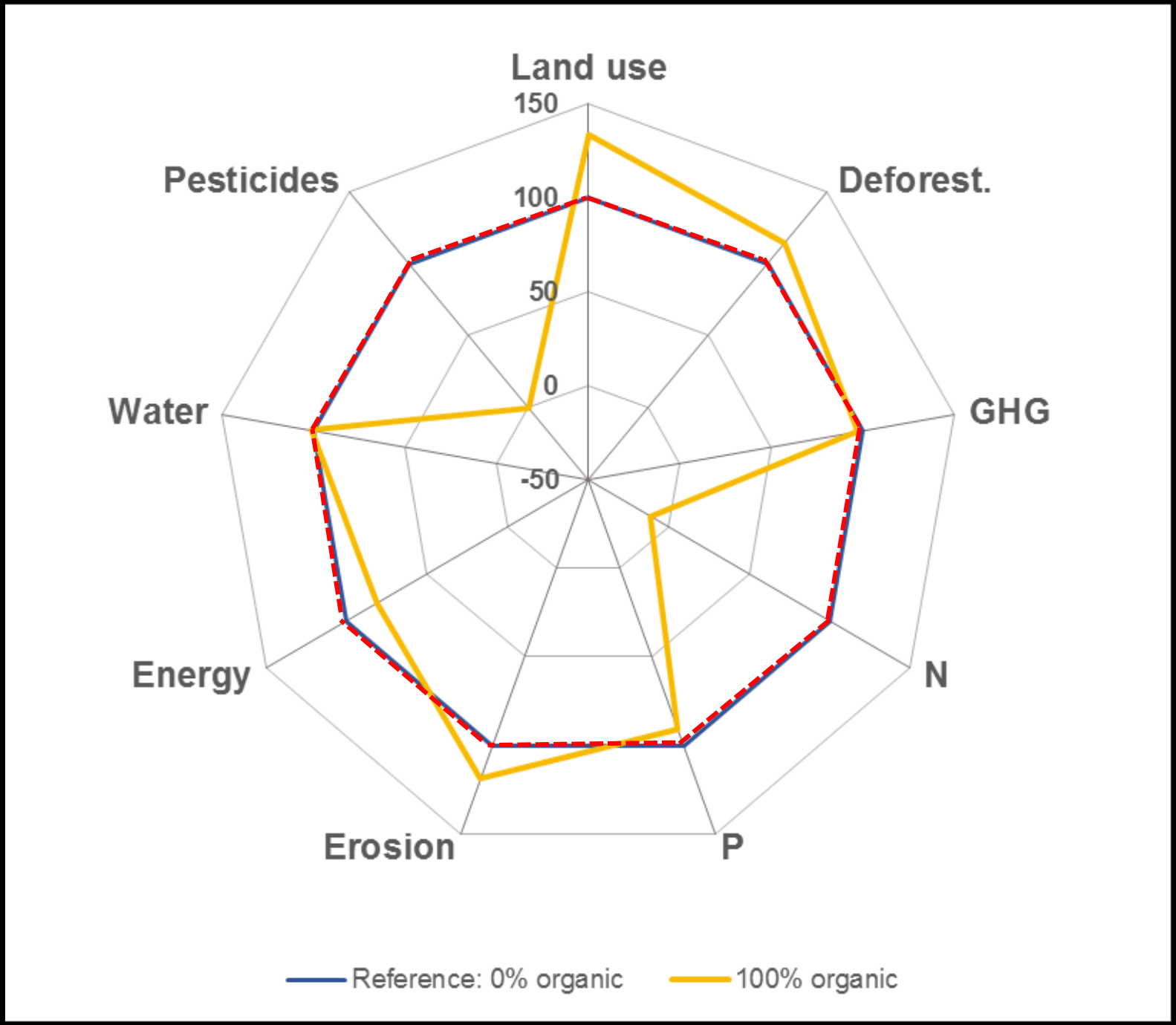


Muller et al. 2017; Courtesy: R. Zürcher

Can organic agriculture feed the world?

Is land use and yields an interesting topic?

It is one sustainability indicator among many others



Muller et al. 2017

What does «feeding the world» mean?

- Over 9 Billion people in 2050
- FAO: over 3000 kcal/cap/day
- High shares of animal protein in diets

Muller et al. 2017; Courtesy: R. Zürcher

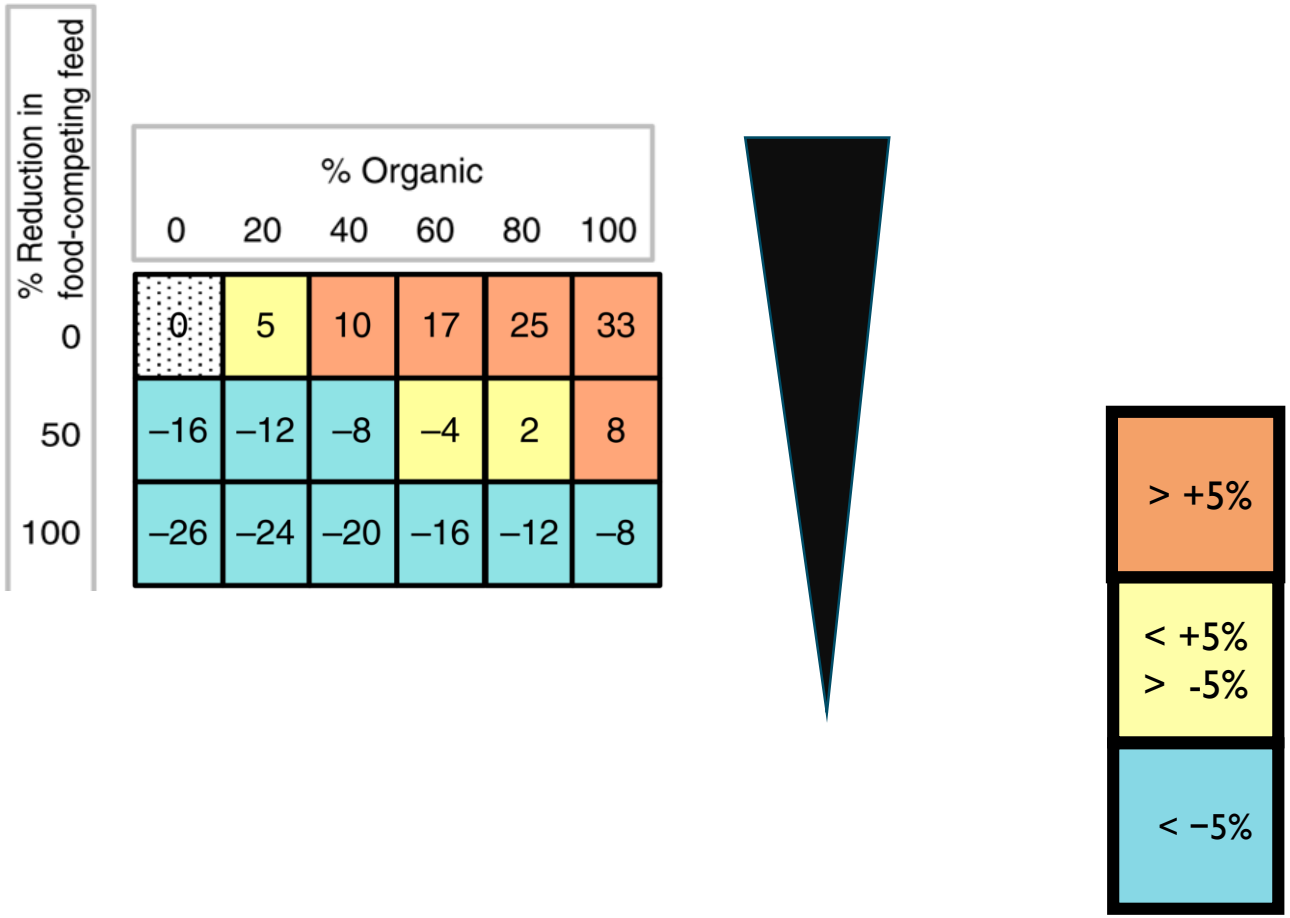
% Reduction in food-competing feed

0 50 100

% Organic

0 20 40 60 80 100

Muller et al. 2017; Courtesy: R. Zürcher



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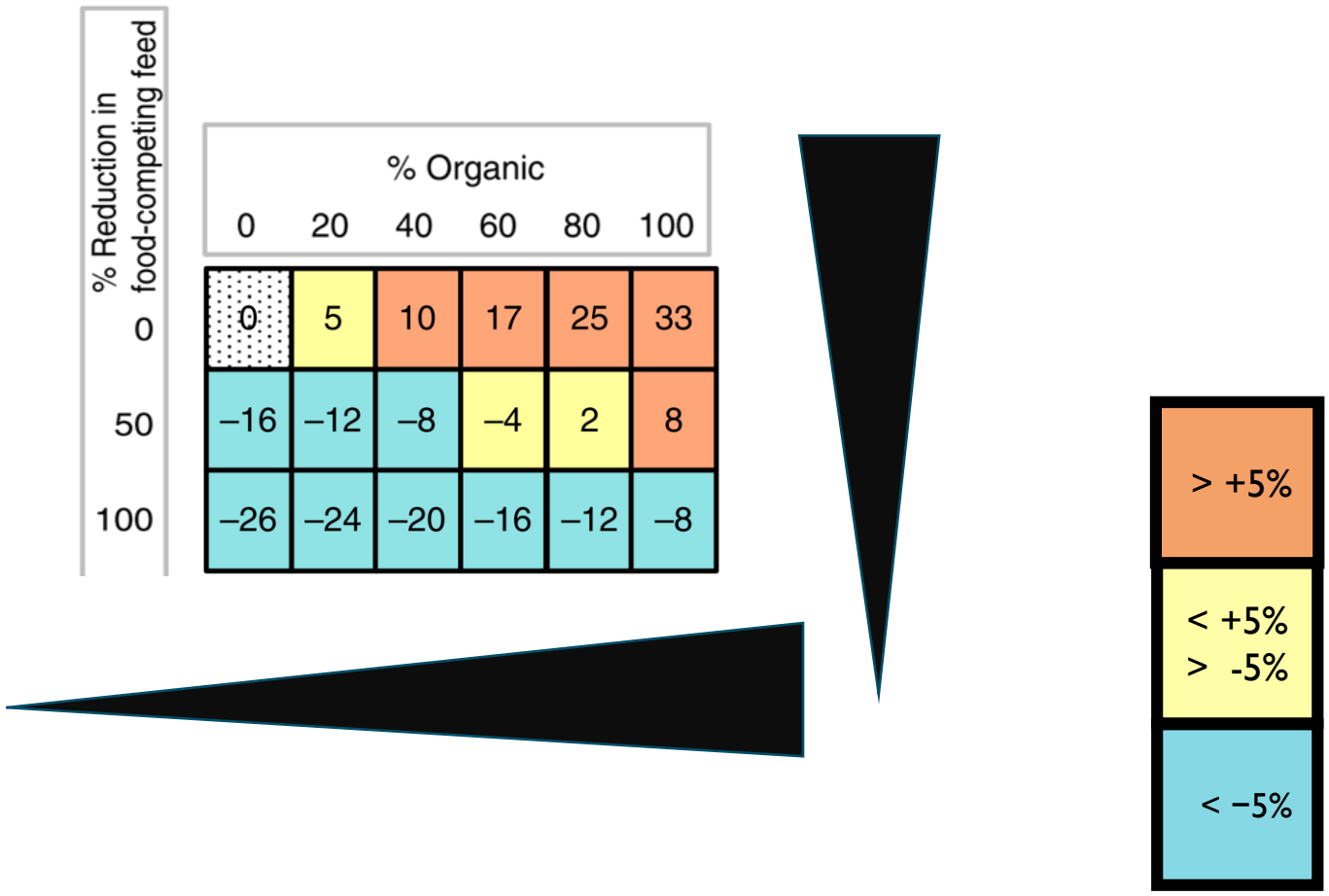


Muller et al. 2017; Courtesy: R. Zürcher

% Wastage reduction	% Reduction in food-competing feed	Climate change impact on yields: Zero — % Organic 0	20	40	60	80	100
0	0	0	5	10	17	25	33
	50	–16	–12	–8	–4	2	8
	100	–26	–24	–20	–16	–12	–8
25	0						
	50						
	100						
50	0						
	50						
	100						

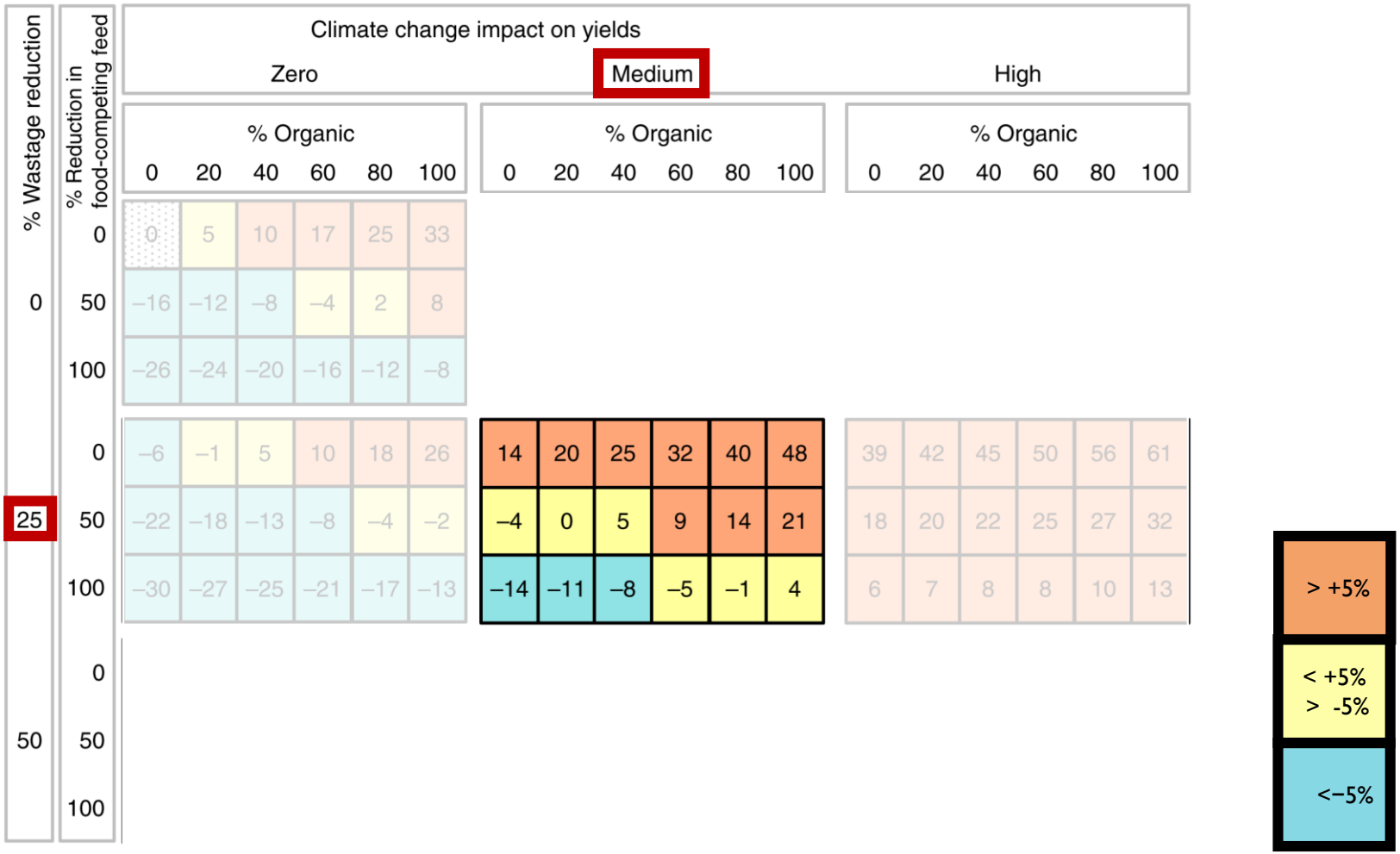
Climate change impact on yields: Medium, High

> +5%

< +5%
> -5%

<−5%

Muller et al. 2017; Courtesy: R. Zürcher



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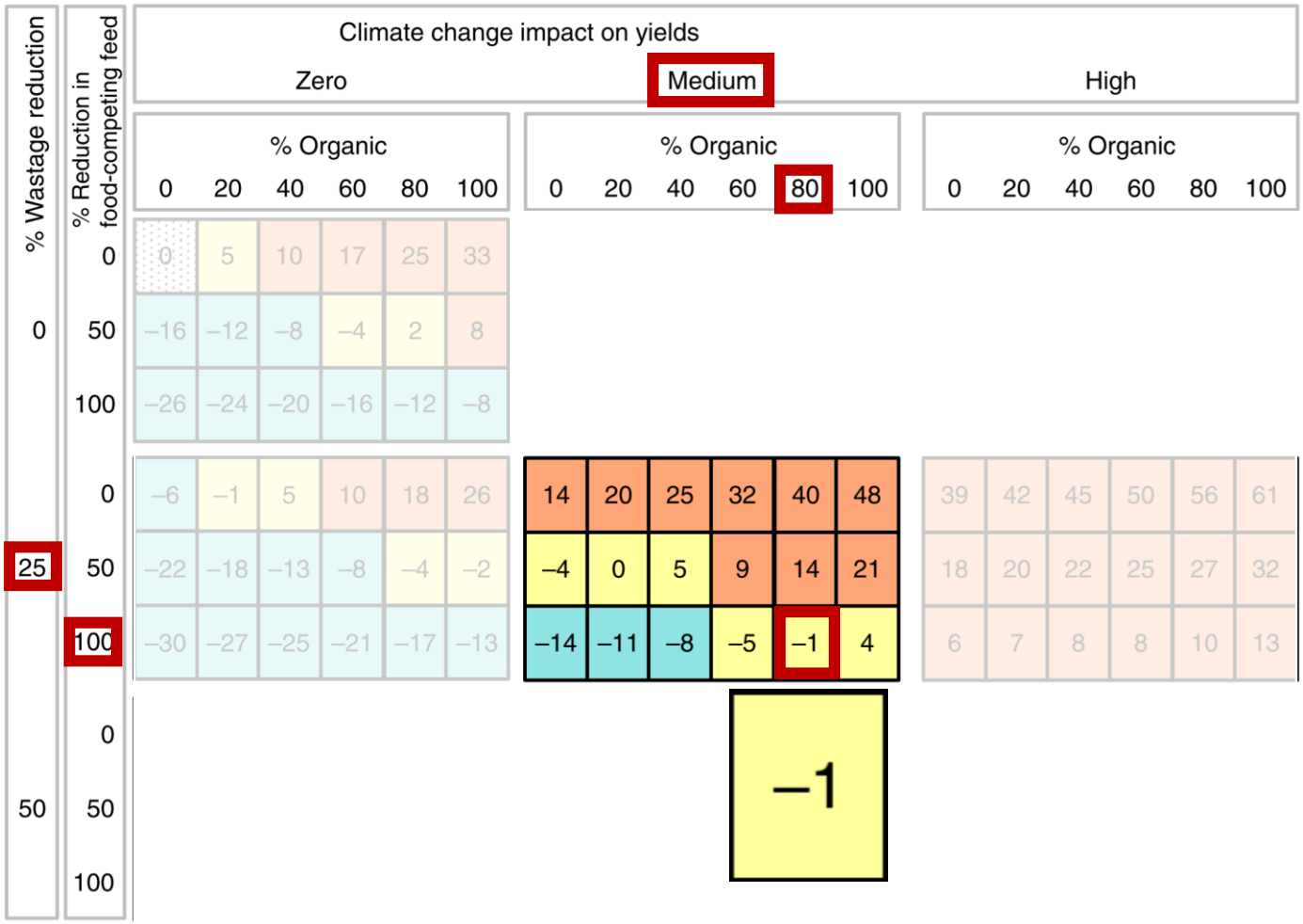
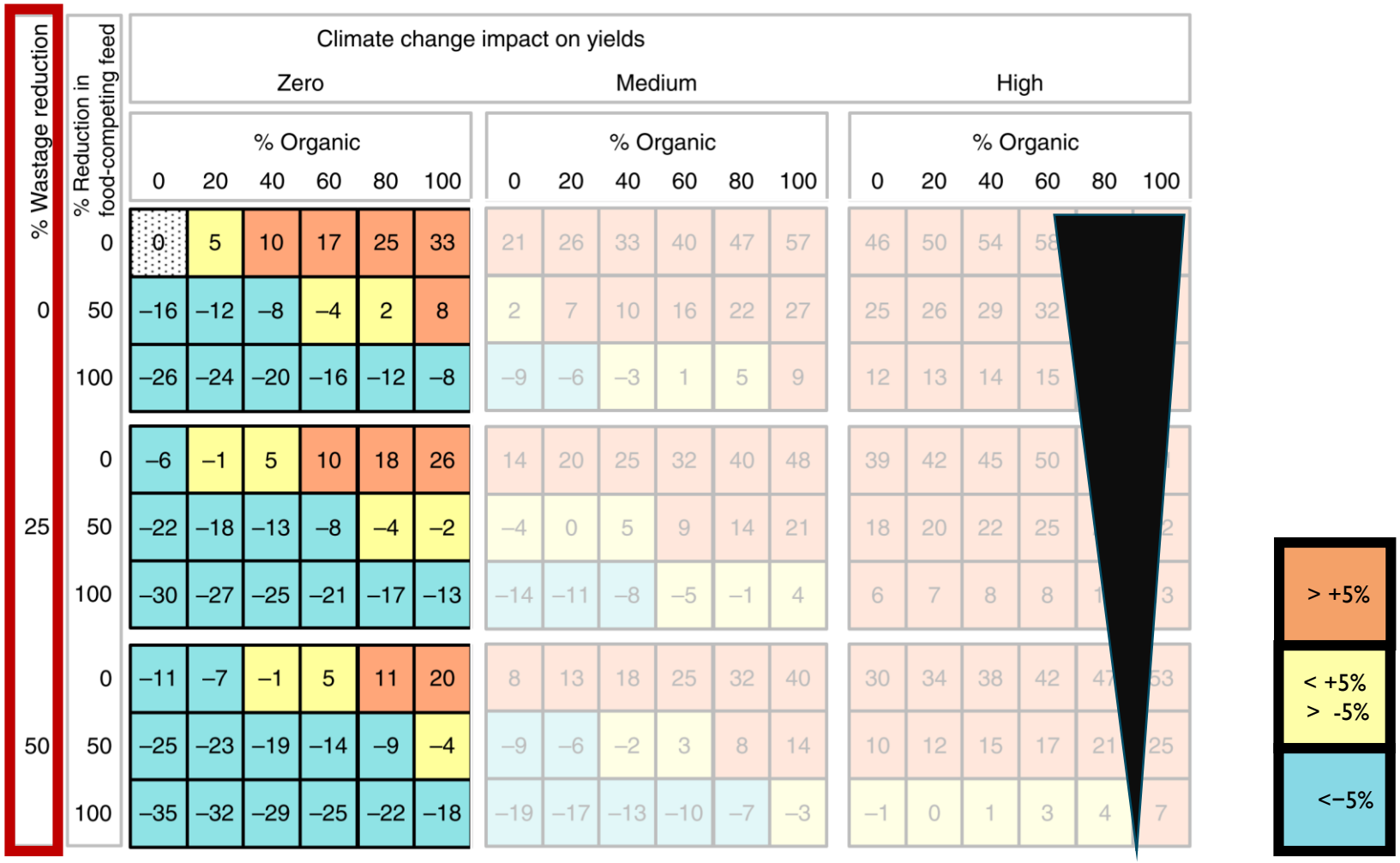
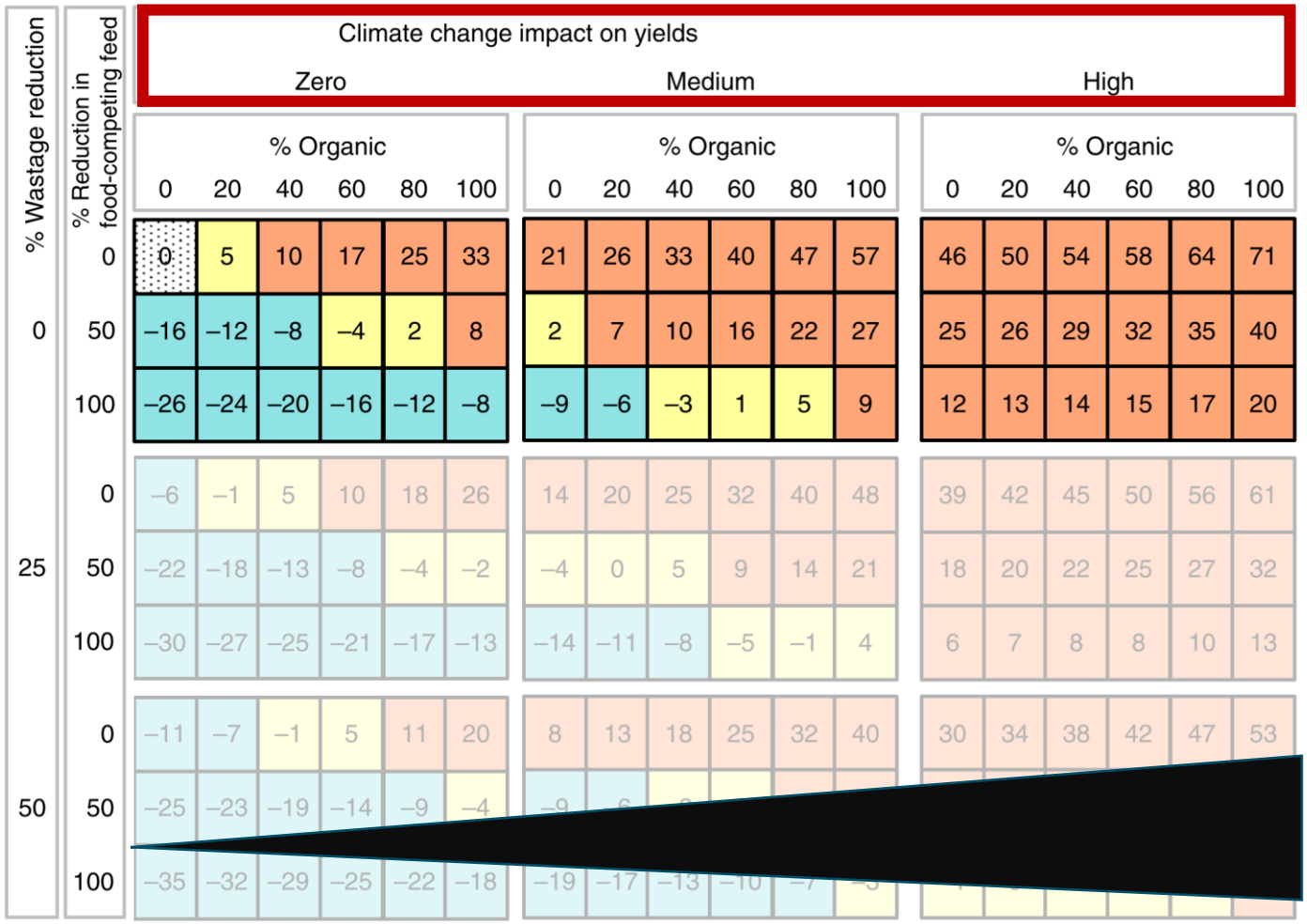


Muller et al. 2017; Courtesy: R. Zürcher



Muller et al. 2017; Courtesy: R. Zürcher



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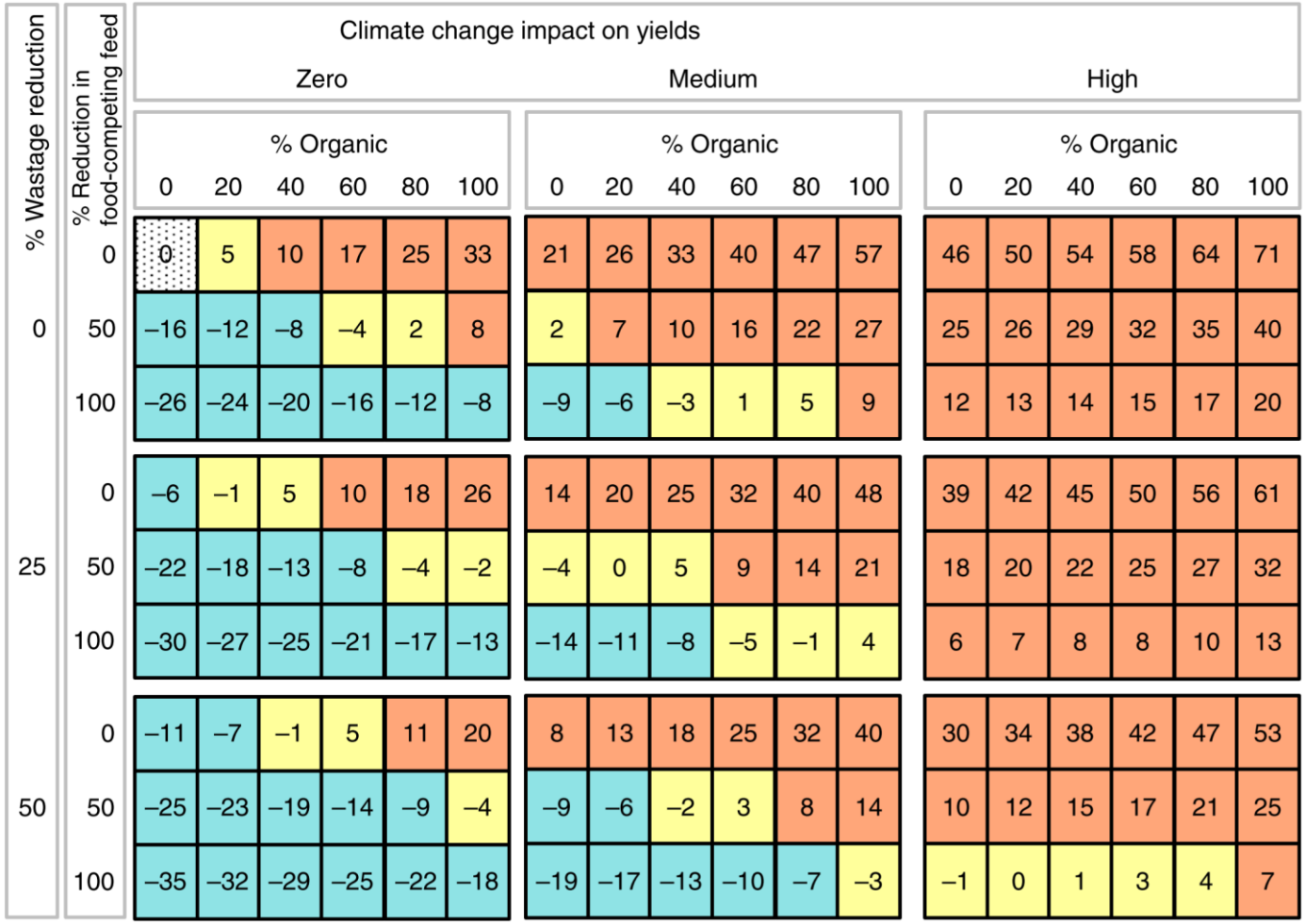


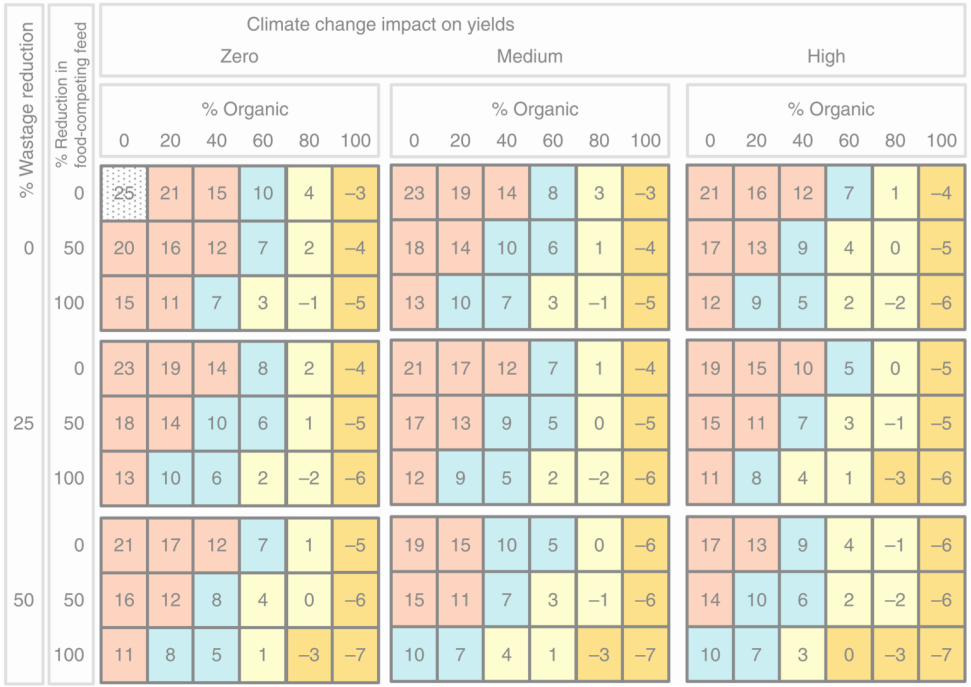
Muller et al. 2017; Courtesy: R. Zürcher

Can organic agriculture feed the world?

Nutrient supply

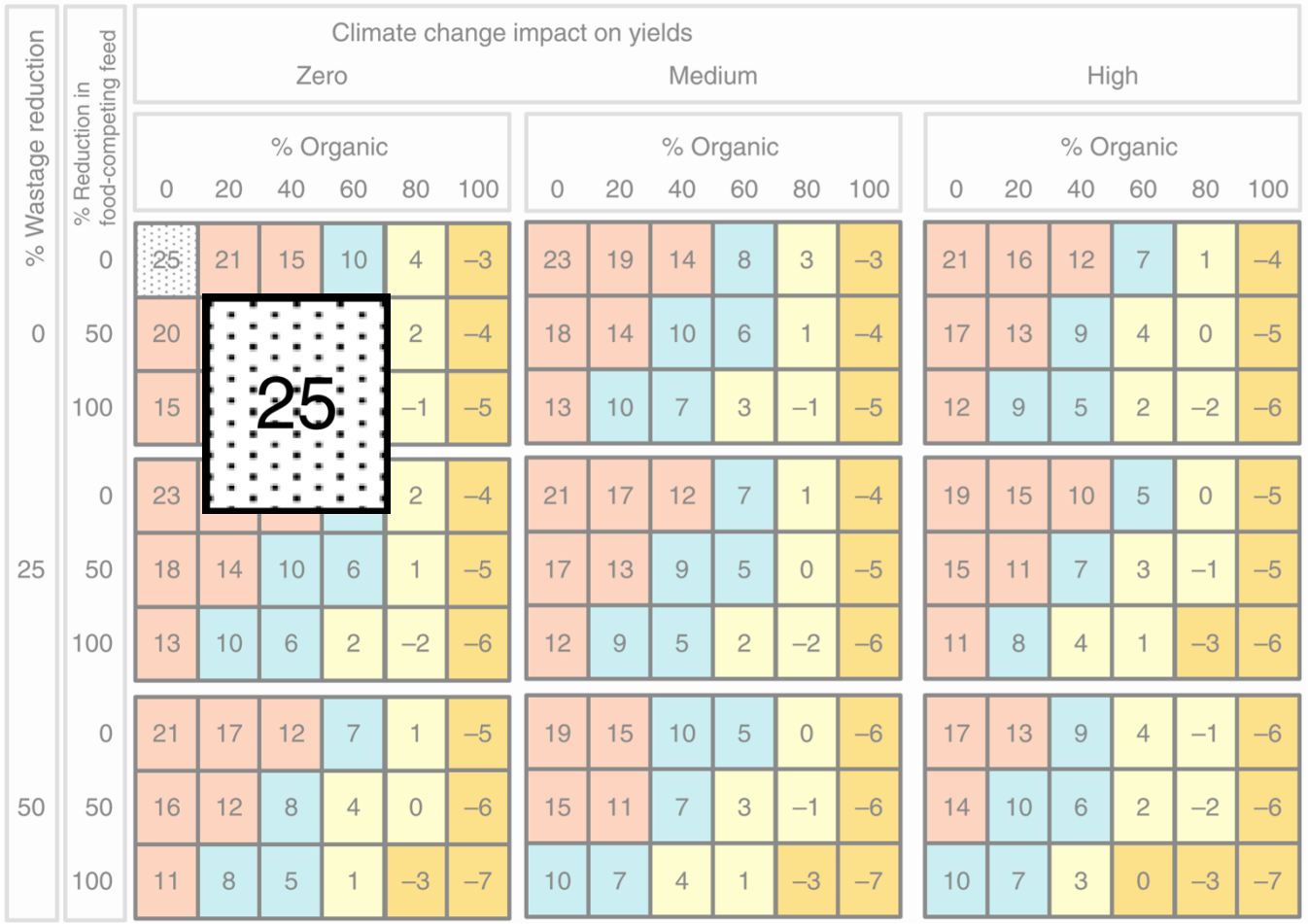
- Not only the products but also the fertilizers are grown on the areas

- Adequate nitrogen supply could become a challenge



> 10kg/ha	Surplus
between 10 and 5kg/ha	Optimal
between +5 and -5 kg/ha	Critical
<-5kg/ha	Deficit

Muller et al. 2017; Courtesy: R. Zürcher



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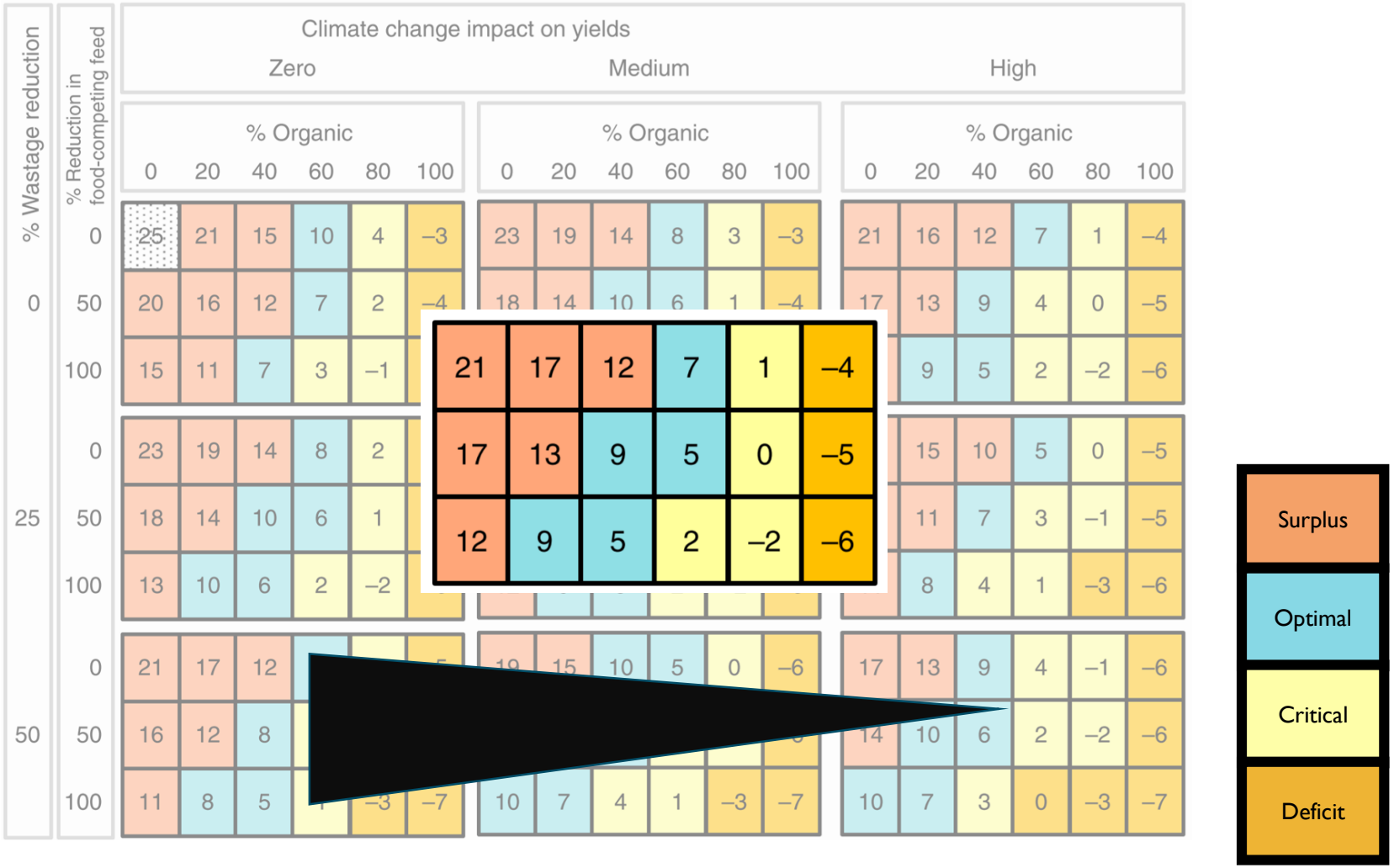


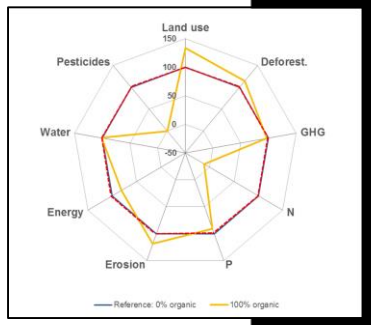
Muller et al. 2017; Courtesy: R. Zürcher

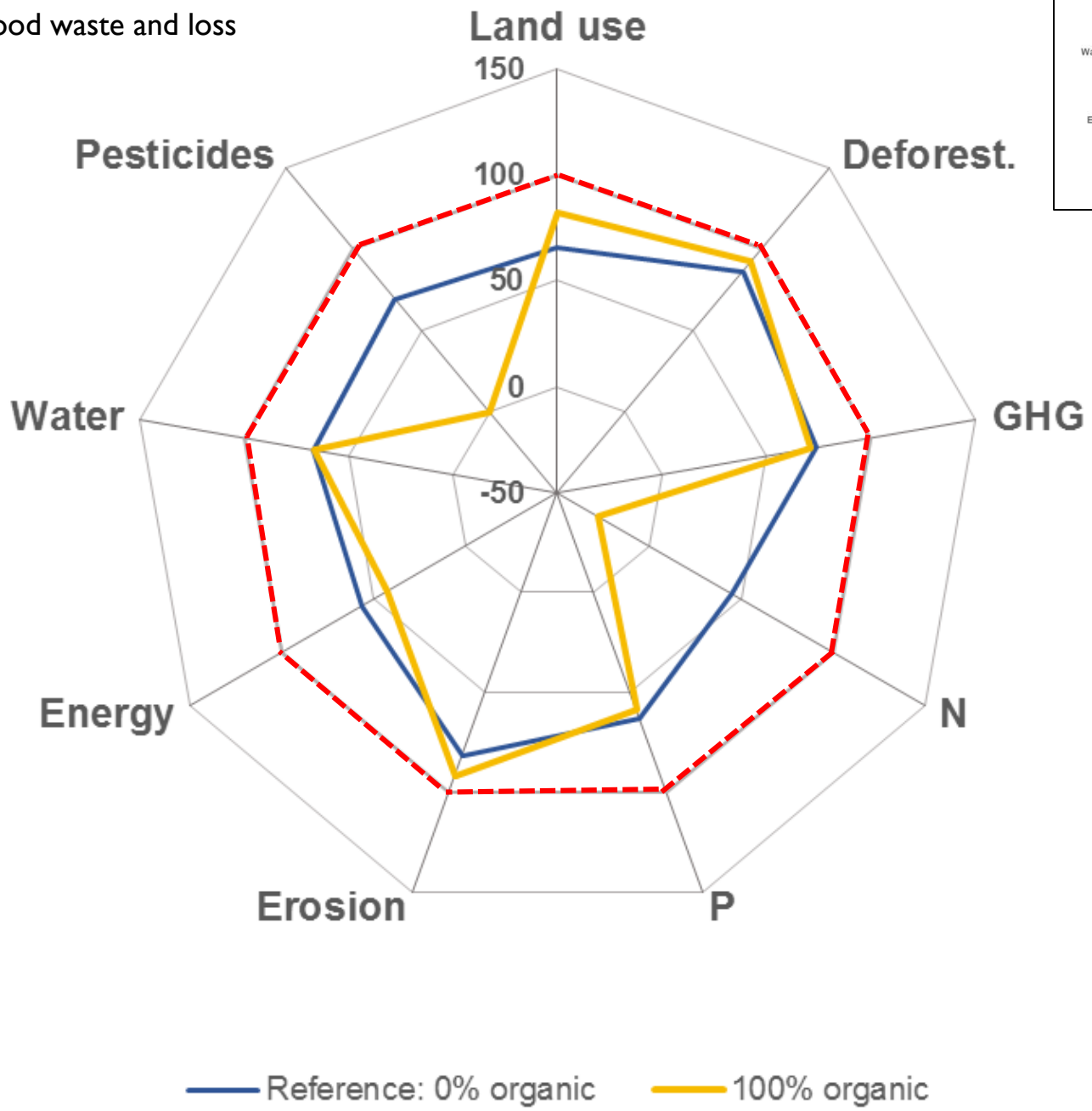
Can organic agriculture feed the world?

Again: land use and N-surplus

are only two sustainability indicators among many others

100% food competing feed reduction
50% less food waste and loss





Muller et al. 2017

Can organic agriculture feed the world?

Ultimately, we are not interested in this dichotomy of conventional versus 100% organic.

% Wastage reduction	% Reduction in food-competing feed	Climate change impact on yields: Zero — % Organic 0	20	40	60	80	100	Medium — % Organic 0	20	40	60	80	100	High — % Organic 0	20	40	60	80	100
0	0	0	5	10	17	25	33	21	26	33	40	47	57	46	50	54	58	64	71
	50	−16	−12	−8	−4	2	8	2	7	10	16	22	27	25	26	29	32	35	40
	100	−26	−24	−20	−16	−12	−8	−9	−6	−3	1	5	9	12	13	14	15	17	20
25	0	−6	−1	5	10	18	26	14	20	25	32	40	48	39	42	45	50	56	61
	50	−22	−18	−13	−8	−4	−2	−4	0	5	9	14	21	18	20	22	25	27	32
	100	−30	−27	−25	−21	−17	−13	−14	−11	−8	−5	−1	4	6	7	8	8	10	13
50	0	−11	−7	−1	5	11	20	8	13	18	25	32	40	30	34	38	42	47	53
	50	−25	−23	−19	−14	−9	−4	−9	−6	−2	3	8	14	10	12	15	17	21	25
	100	−35	−32	−29	−25	−22	−18	−19	−17				−3	−1	0	1	3	4	7

3

% Wastage reduction	% Reduction in food-competing feed	Climate change impact on yields: Zero — % Organic 0	20	40	60	80	100	Medium — % Organic 0	20	40	60	80	100	High — % Organic 0	20	40	60	80	100
0	0	25	21	15	10	4	−3	23	19	14	8	3	−3	21	16	12	7	1	−4
	50	20	16	12	7	2	−4	18	14	10	6	1	−4	17	13	9	4	0	−5
	100	15	11	7	3	−1	−5	13	10	7	3	−1	−5	12	9	5	2	−2	−6
25	0	23	19	14	8	2	−4	21	17	12	7	1	−4	19	15	10	5	0	−5
	50	18	14	10	6	1	−5	17	13	9	5	0	−5	15	11	7	3	−1	−5
	100	13	10	6	2	−2	−6	12	9	5	2	−2	−6	11	8	4	1	−3	−6
50	0	21	17	12	7	1	−5	19	15	10	5	0	−6	17	13	9	4	−1	−6
	50	16	12	8	4	0	−6	15	11	7	3	−1	−6	14	10	6	2	−2	−6
	100	11	8	5	1	−3	−7	10	7				−7	10	7	3	0	−3	−7

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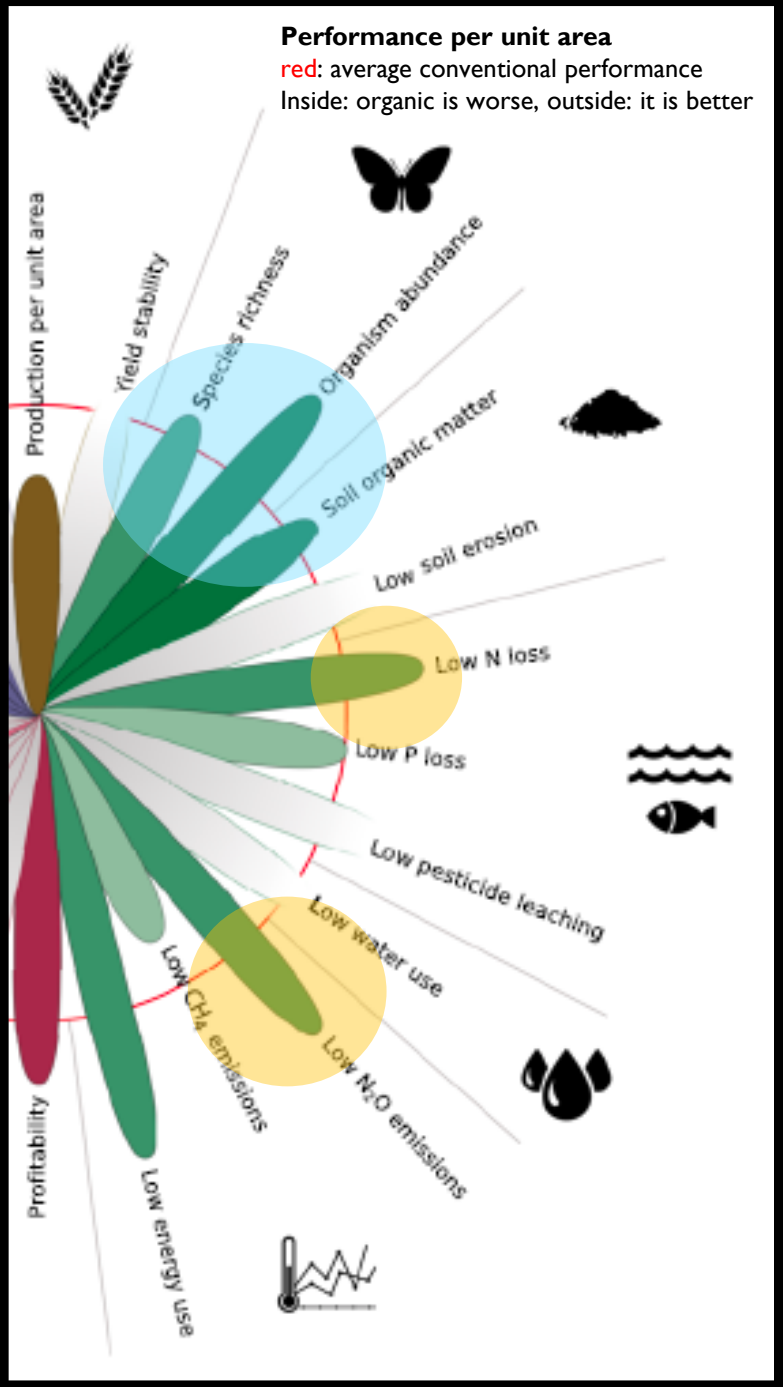
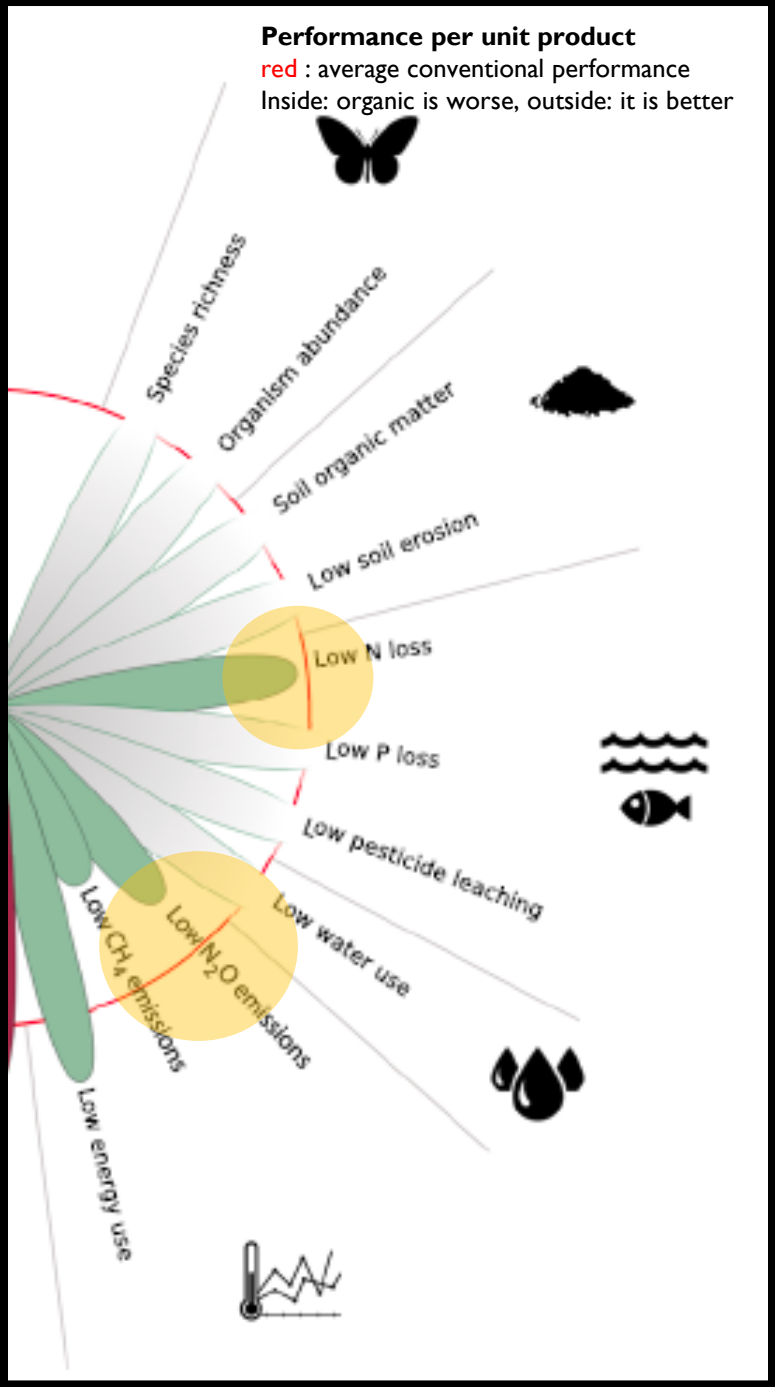
Muller et al. 2017; Courtesy: R. Zürcher

Can organic agriculture feed the world sustainably?

How do we measure sustainability?

- per unit produce
- per area
- total aggregate

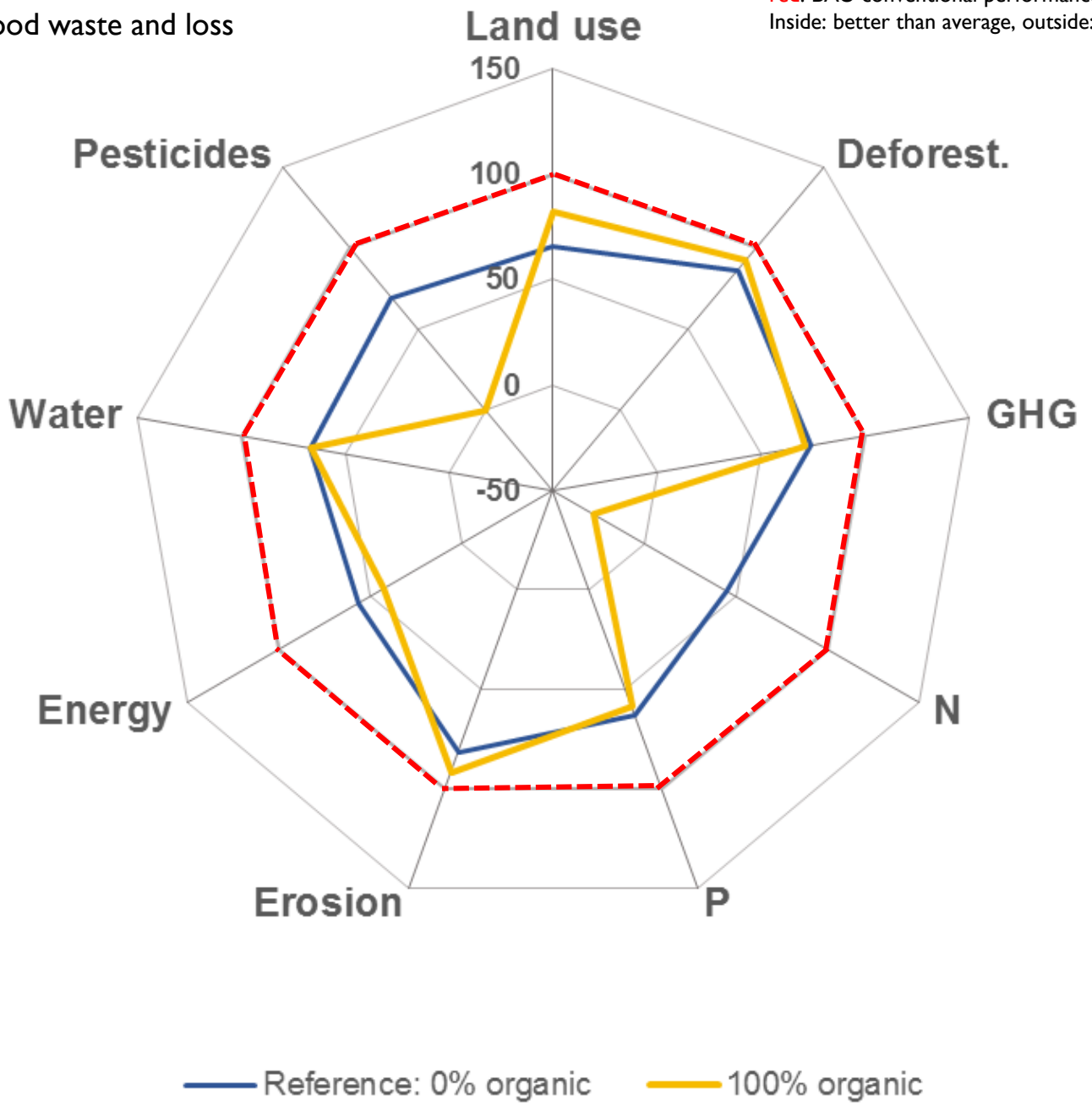




Seufert and Ramankutty 2017

100% food competing feed reduction
50% less food waste and loss

TOTAL performance
red: BAU conventional performance 2050
Inside: better than average, outside: worse



Muller et al. 2017

Can organic agriculture feed the world sustainably?

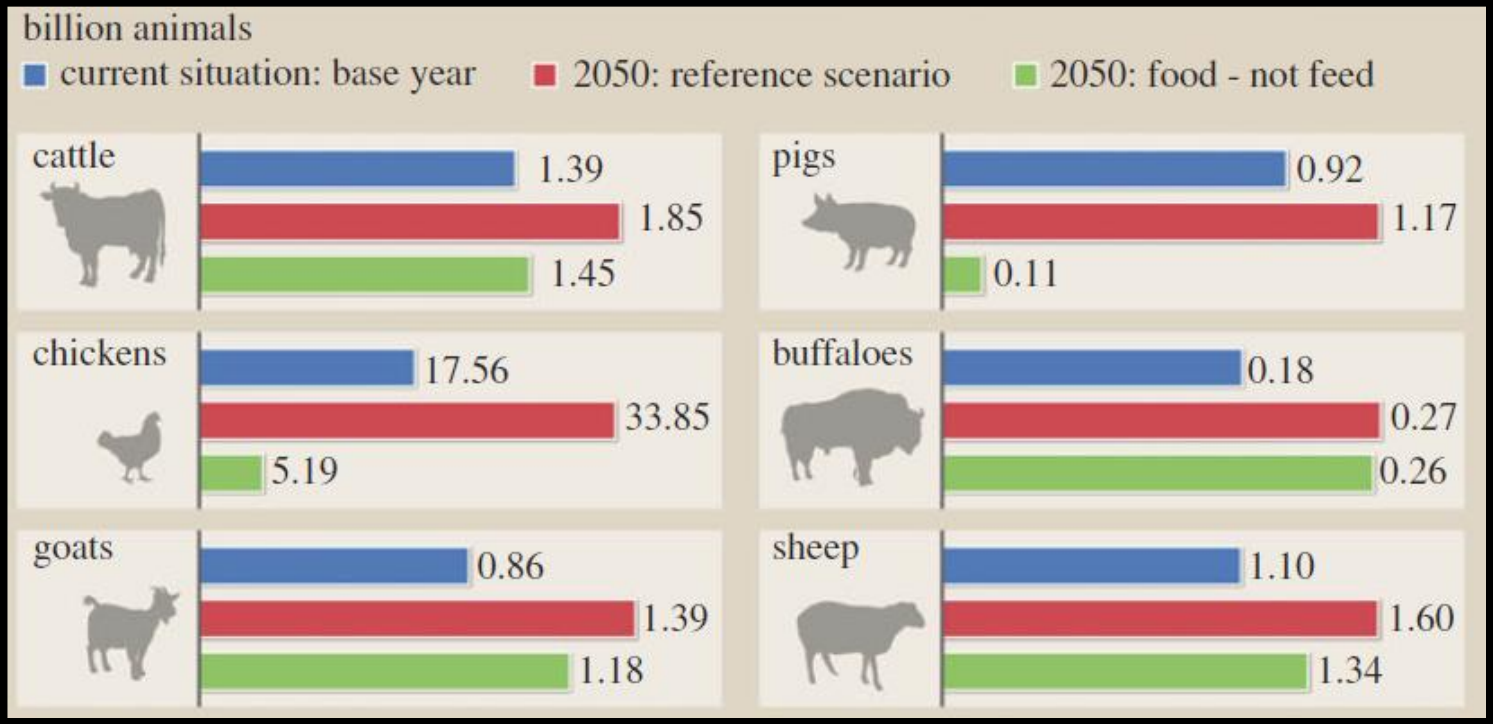
How do we measure sustainability?

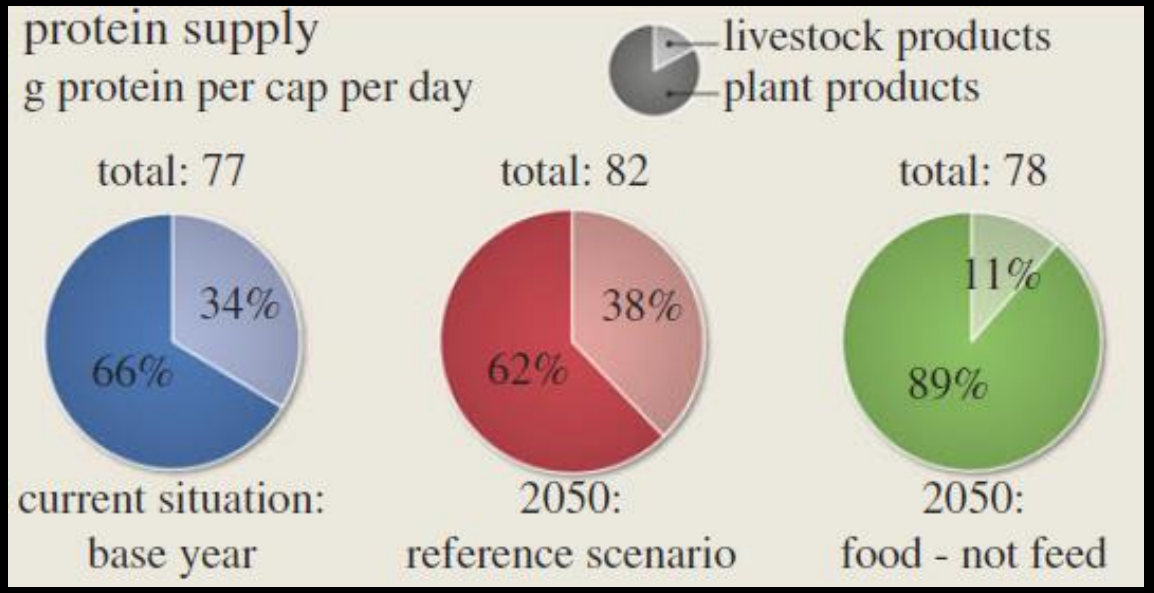
- per unit produce
- per area
- total aggregate

Ultimately, we are not interested in this strong focus on the yield gap – we need a food systems approach that also addresses consumption

Organic agriculture and sustainable food systems

Diets and consumption





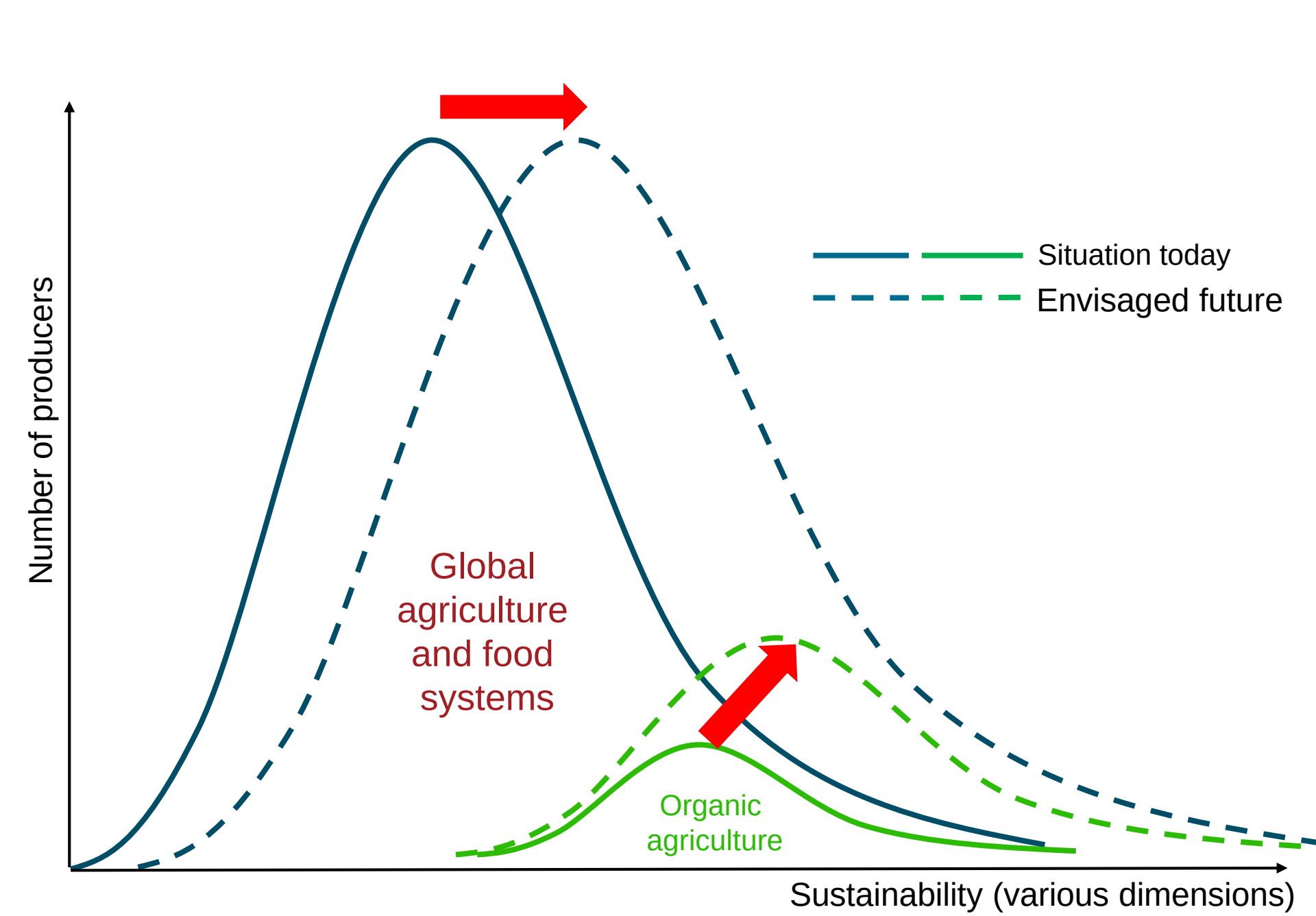
Schader et al. 2015

Conclusions I

- **It is important to discuss what «feeding the world» means:**
  - Animal products / waste

- **It is important how we measure sustainability:**
  - Per kg, per ha or in total; not only GHG emissions…
  - Land use and yield gaps must not dominate the discussion

- **Sustainable production cannot be discussed without addressing consumption and processing – i.e. without addressing the whole food system**
  - Efficiency – consistency – sufficiency



Eyhorn et al. 2019

Conclusions II

- **It is important to discuss what «feeding the world» means:**
  - Animal products / waste
- **It is important how we measure sustainability:**
  - Per kg or per ha; not only GHG emissions…
  - Land use and yield gaps must not dominate the discussion
- **Sustainable production cannot be discussed without addressing consumption and processing – i.e. without addressing the whole food system**
  - Efficiency – consistency – sufficiency

- **Organic agriculture is a role model, but it is no panacea**
  - Trade-offs and synergies
  - 100% organic and "feeding the world" narratives are not the key aspects for discussions on sustainable agriculture and food systems