TRANSFORMING AGRICULTURE IN AFRICA
AGROECOLOGY and ORGANIC TRADE

Reducing Synthetic Pesticides and Fertilizers

Results from the Long-term Farming Systems Comparisons Trials

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Content

Background

Main findings

- Productivity & Profitability
- Soil fertility
- Biodiversity

Conclusions

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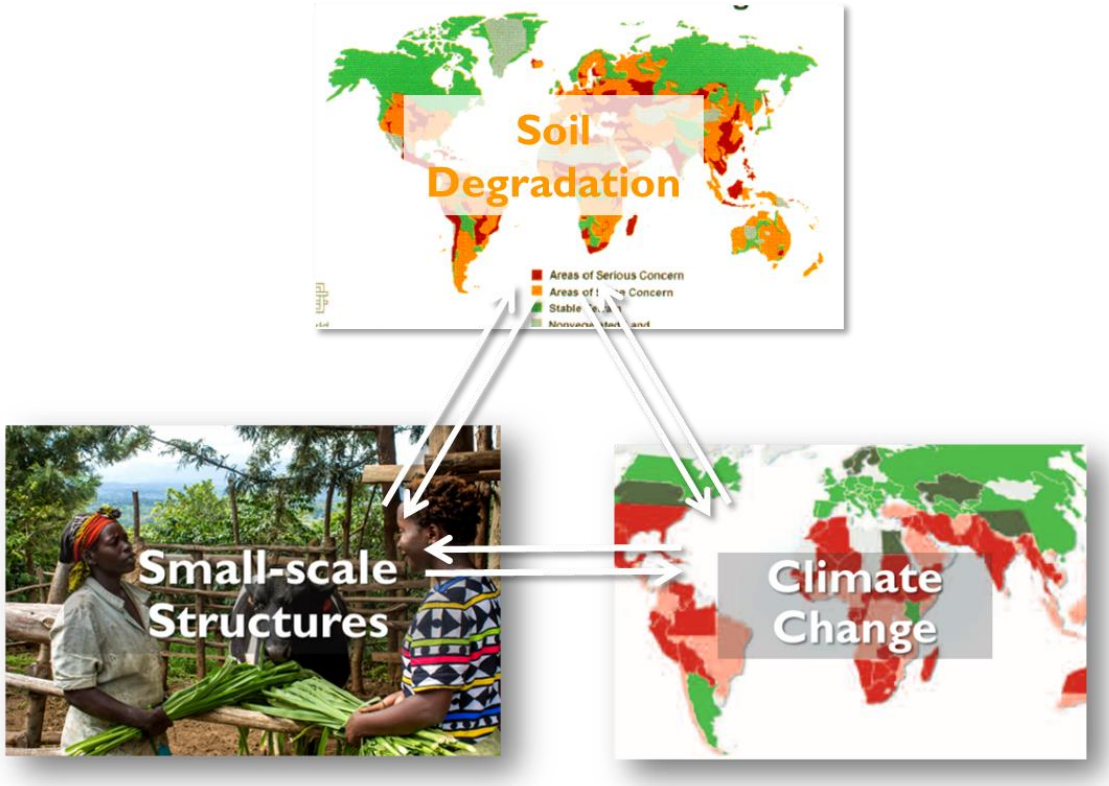
Global challenges



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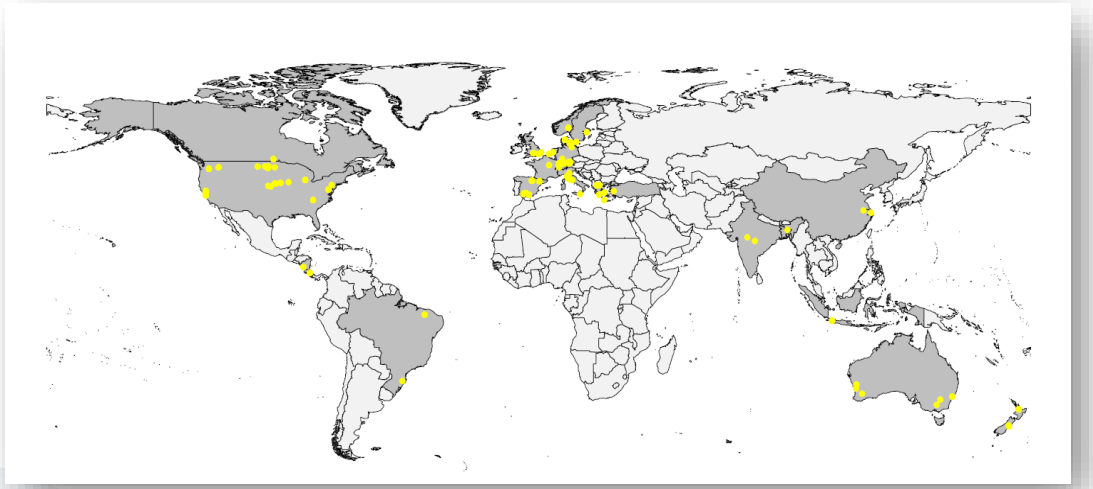
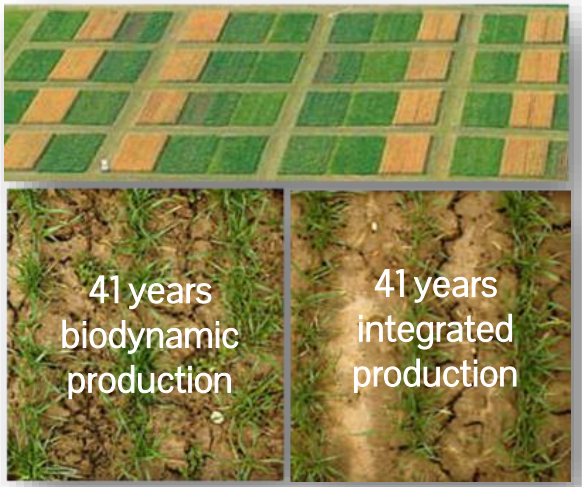
Focus on research in Global North





FiBL long-term DOK trial proved higher top soil carbon values for organically farmed soils compared to non-organic

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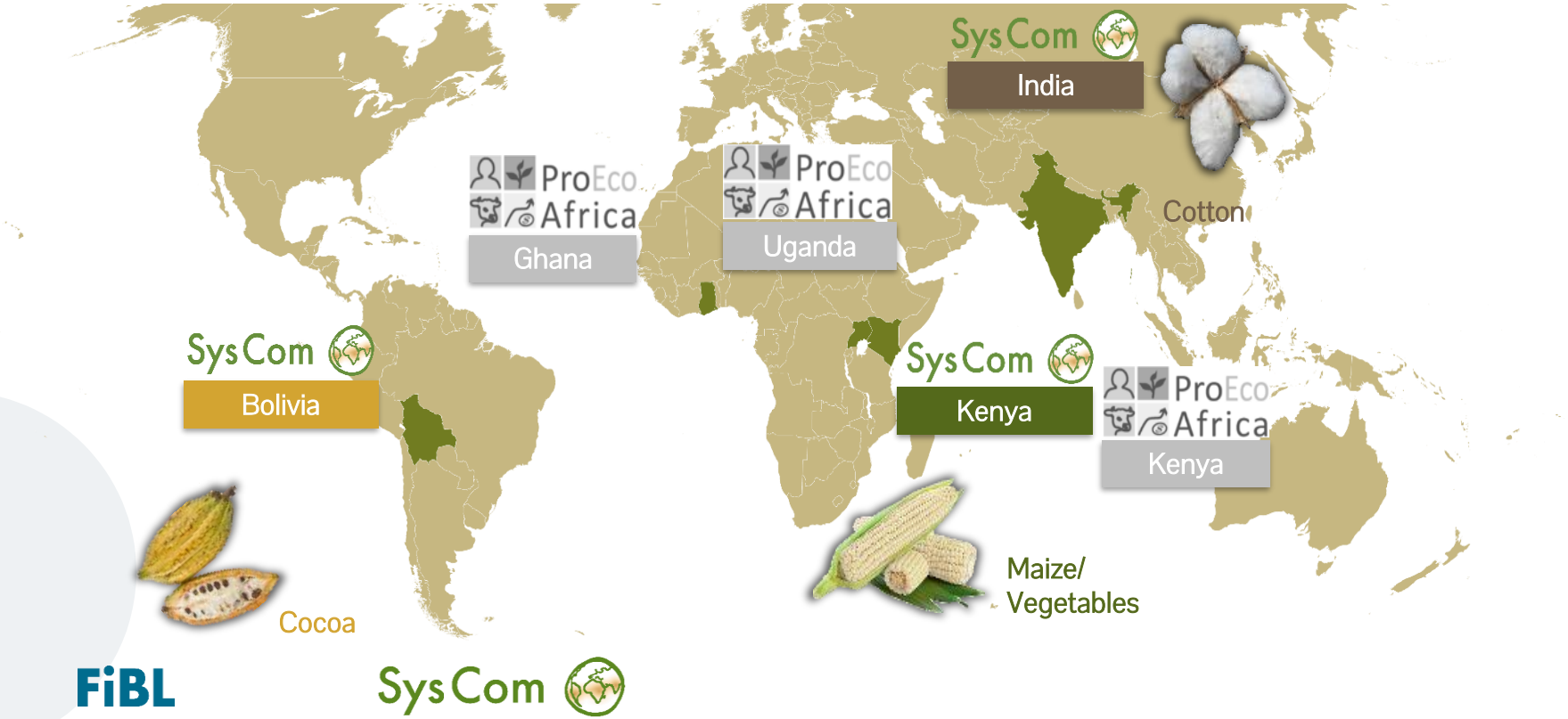
Source: Gattinger et al. (2012)

Long-term Farming Systems Comparisons Trials in the Tropics (SysCom)



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Why SysCom in the tropics project?

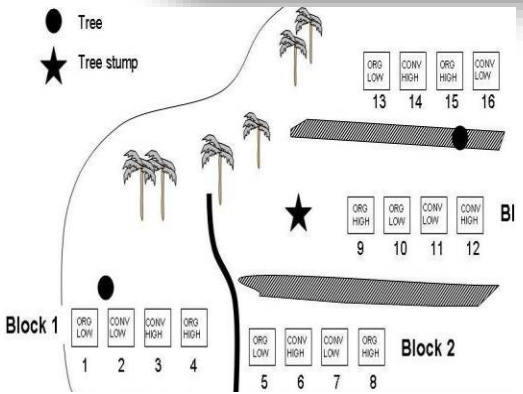
1. **To compare organic versus conventional farming in relation to:-**
   a) Quality and quantity of crop products
   b) Resource use efficiencies
   c) Sustainability of the agro-ecological system

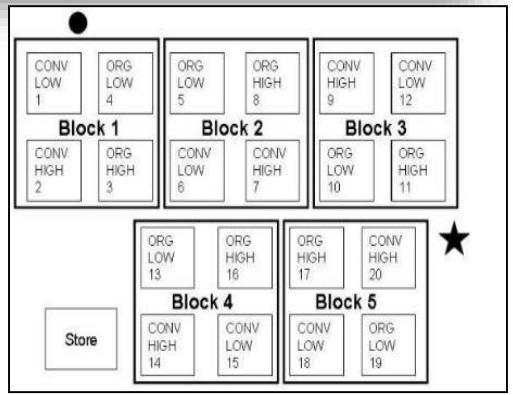
2. **Provide solid data that can be used to influence policy**

3. **To disseminate findings to stakeholders**

Long-term Experiments at Chuka and Thika

- Running since 2006 at Chuka (Tharaka Nithi) and Thika (Murang'a county)
- 3-years-6-seasons maize-based crop rotation
- Randomized Complete Block Design with four farming systems





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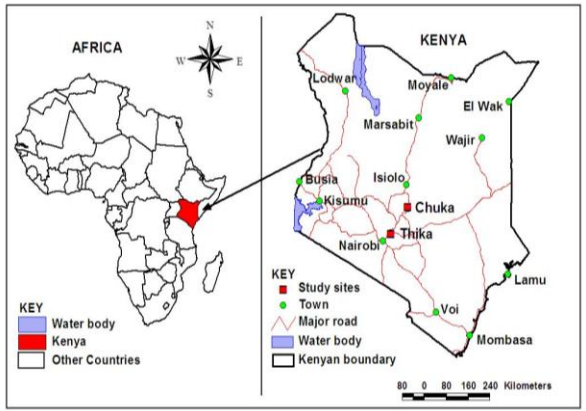
Farming systems/Cropping pattern

System	Approach	Fertility mgt.	N (kg ha^{-1})	P (kg ha^{-1})	P&D mgt.	Water mgt.
Conv-Low	Small-scale, home consumption and local market	Organic & synthetic fertilizer	45	60	Synthetic pesticides	Rainfed
Org-Low		Organic fertilizer	45	60	Bio-Pesticides	Rainfed
Conv-High	Commercial, domestic and export markets	Organic & synthetic fertilizer	225	286	Synthetic pesticides	Irrigation
Org-High		Organic fertilizer	225	286	Bio-Pesticides	Irrigation

Season	1st	2nd	3rd	4th	5th	6th
High input systems						
Low input systems						



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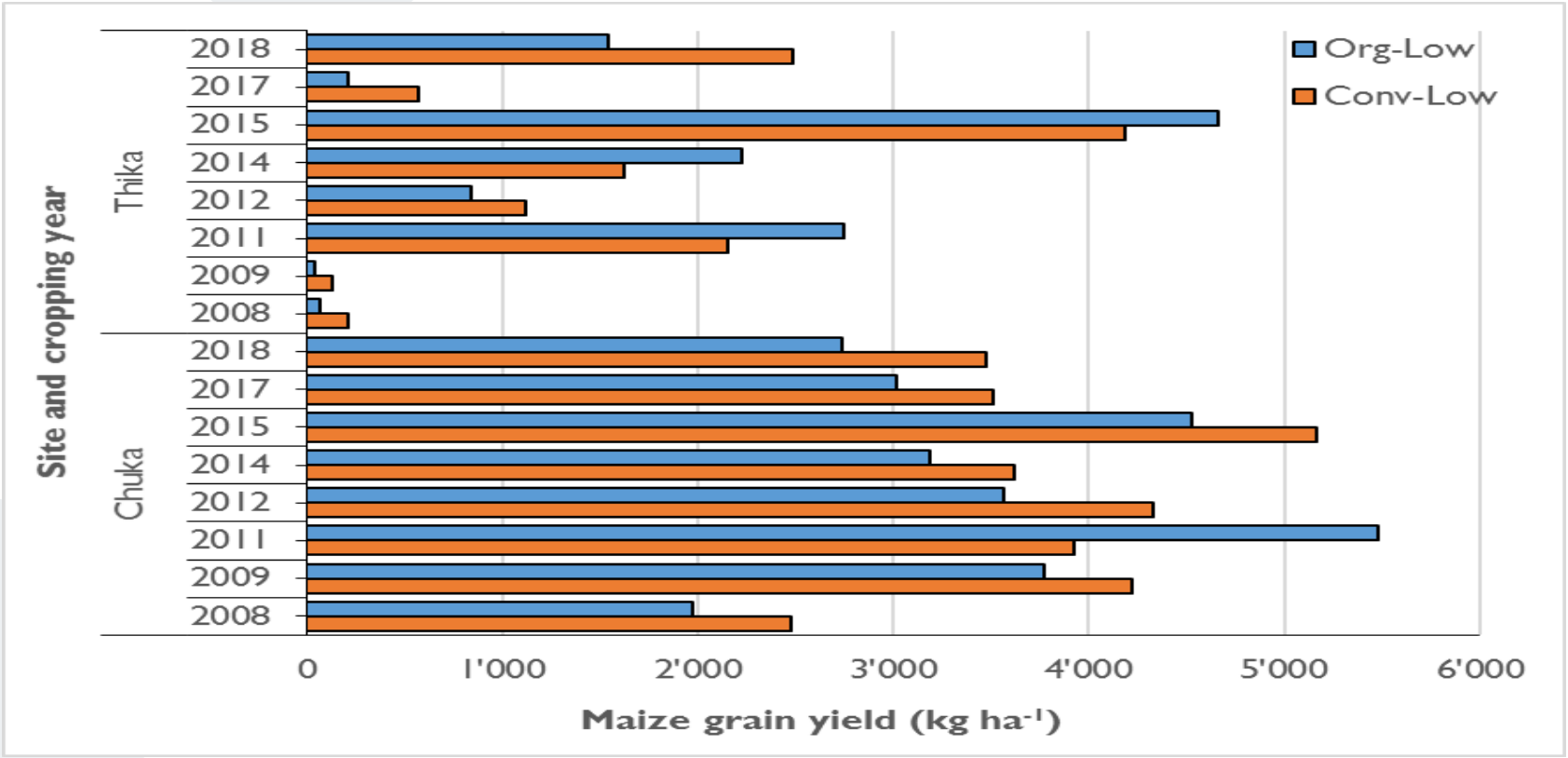
Main findings – Productivity (Maize)



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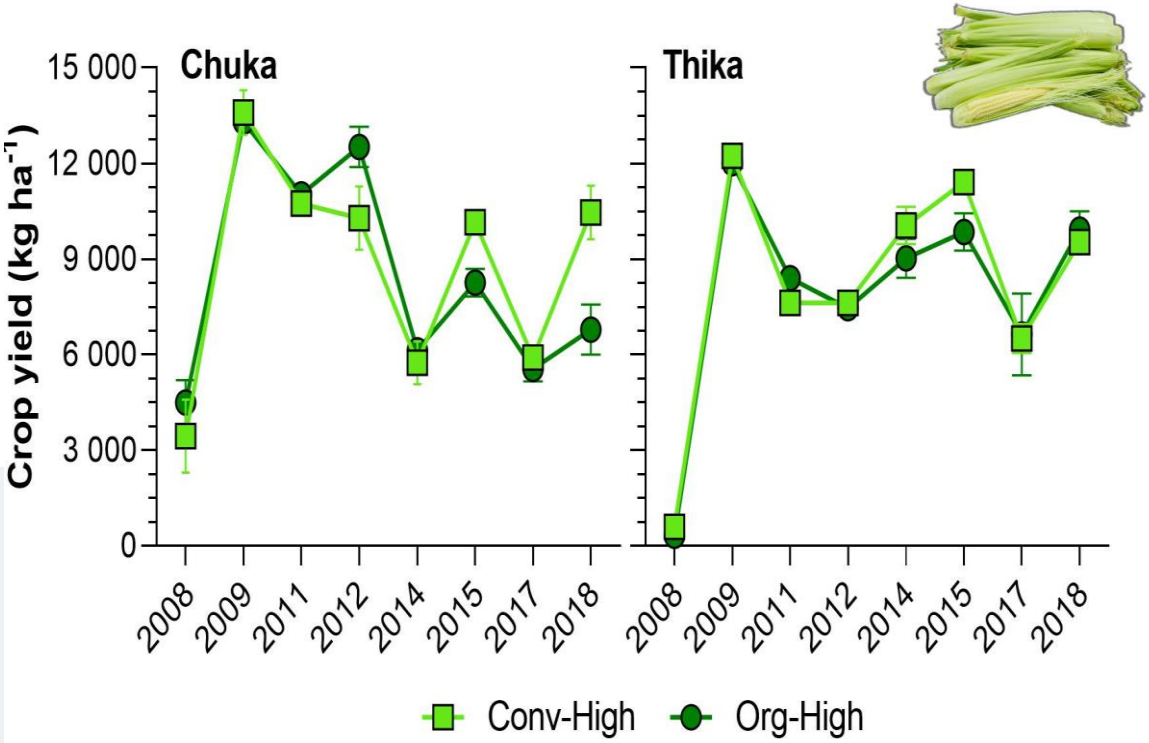
Main findings – Productivity (Baby corn)



- Comparable yields for organic and conventional farming system
- Spatial and temporal changes depending on weather, pest and disease pressure, and soil fertility

Source: Adamtey et al. (2016)

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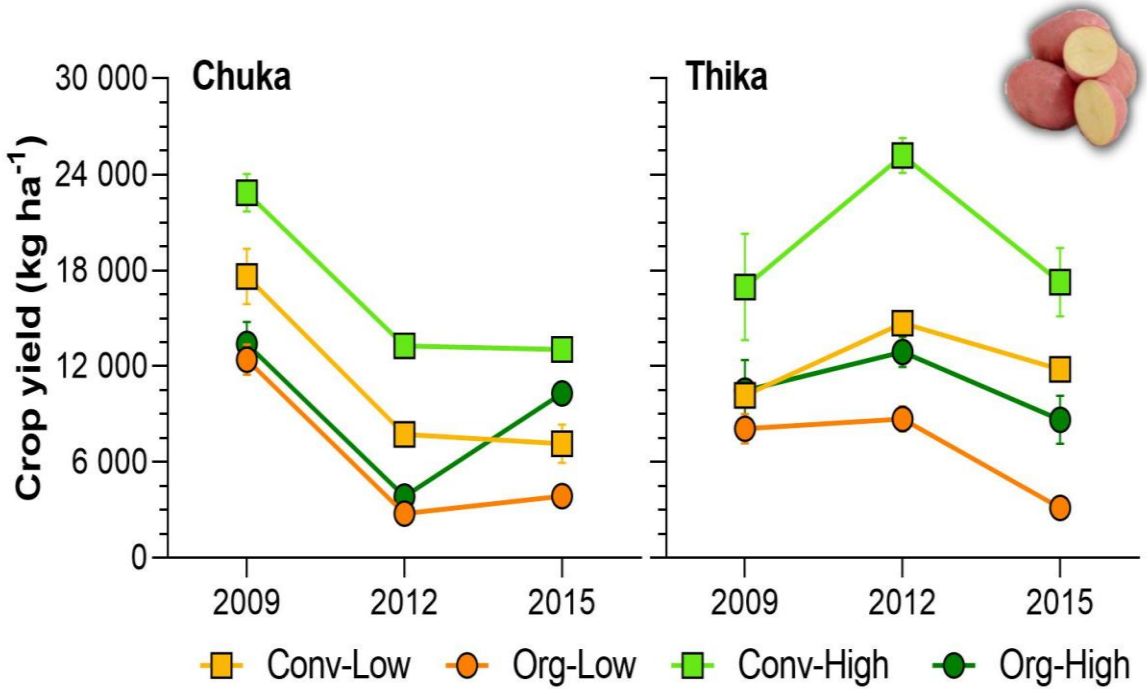
Main findings – Productivity (Potato)



- Yields for organic farming system generally lower in vegetables (sole crops, potato)
- Difference mostly due to pest and disease pressure, and nutrient availability

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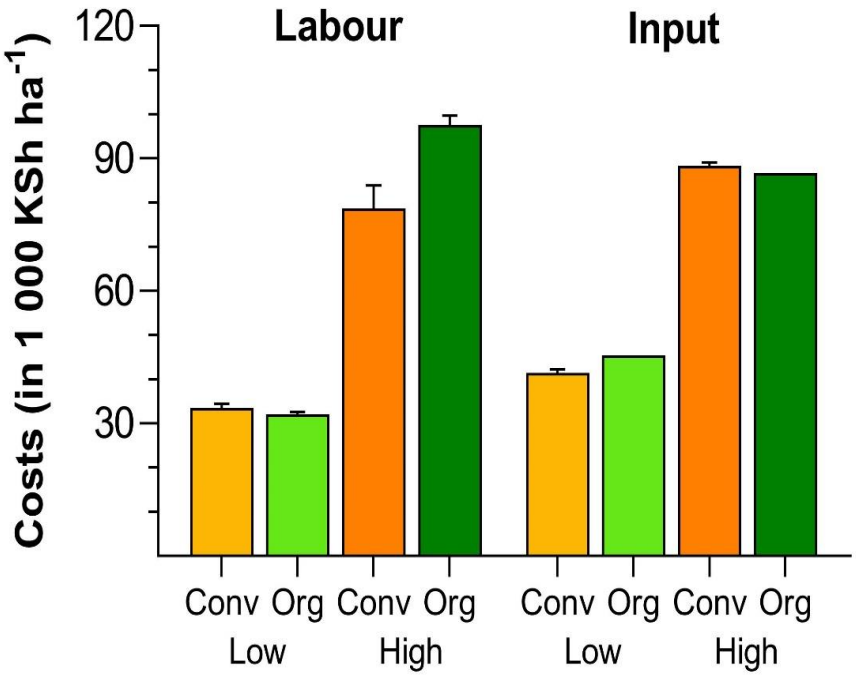
Source: unpublished data

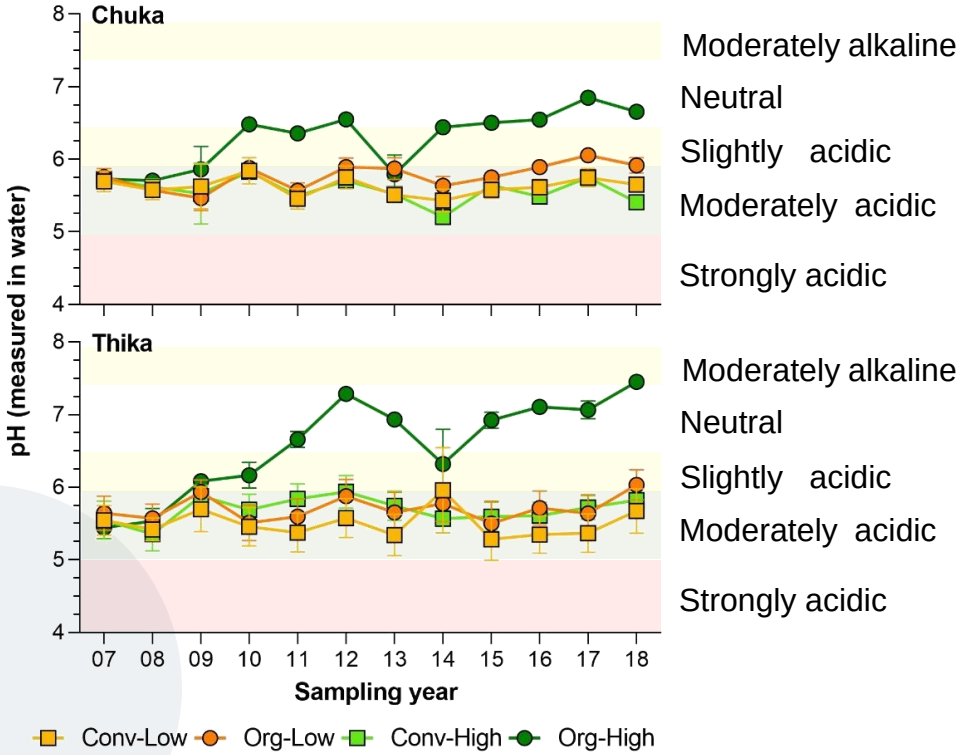
Main findings – Profitability (production costs)



- Higher labour and input costs in high input compared to low input
- Higher labour costs in organic high input compared to conventional, due to fertilizer preparation costs

Source: Adamtey et al. (2016) + unpublished data

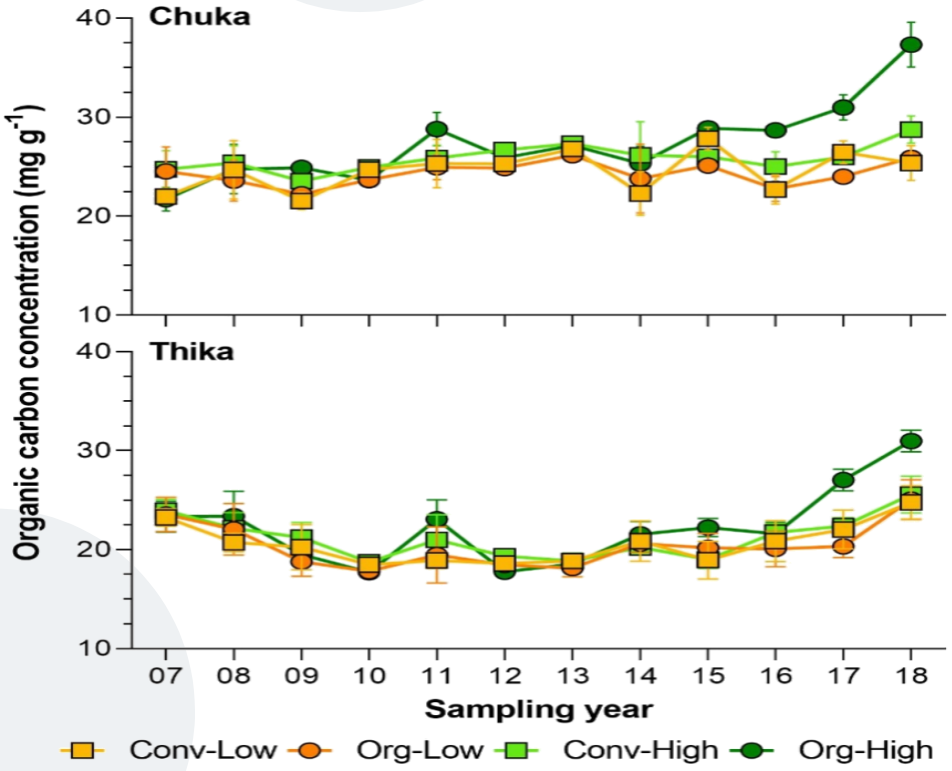
Main findings – Soil fertility (soil pH)



- Organic high input increased pH from 5.5 to 6.5 (Chuka) and 7.5 (Thika)
- Effect of alkaline materials like compost
- Improvement of nutrient availability

Source: Adamtey et al. (submitted)

Main findings – Soil fertility (soil organic carbon)



- Organic high input increased SOC at both sites
- Increase started in the 3rd crop rotation (mid-term effect)
- Stability of SOC is unknown

Source: Adamtey et al. (submitted)

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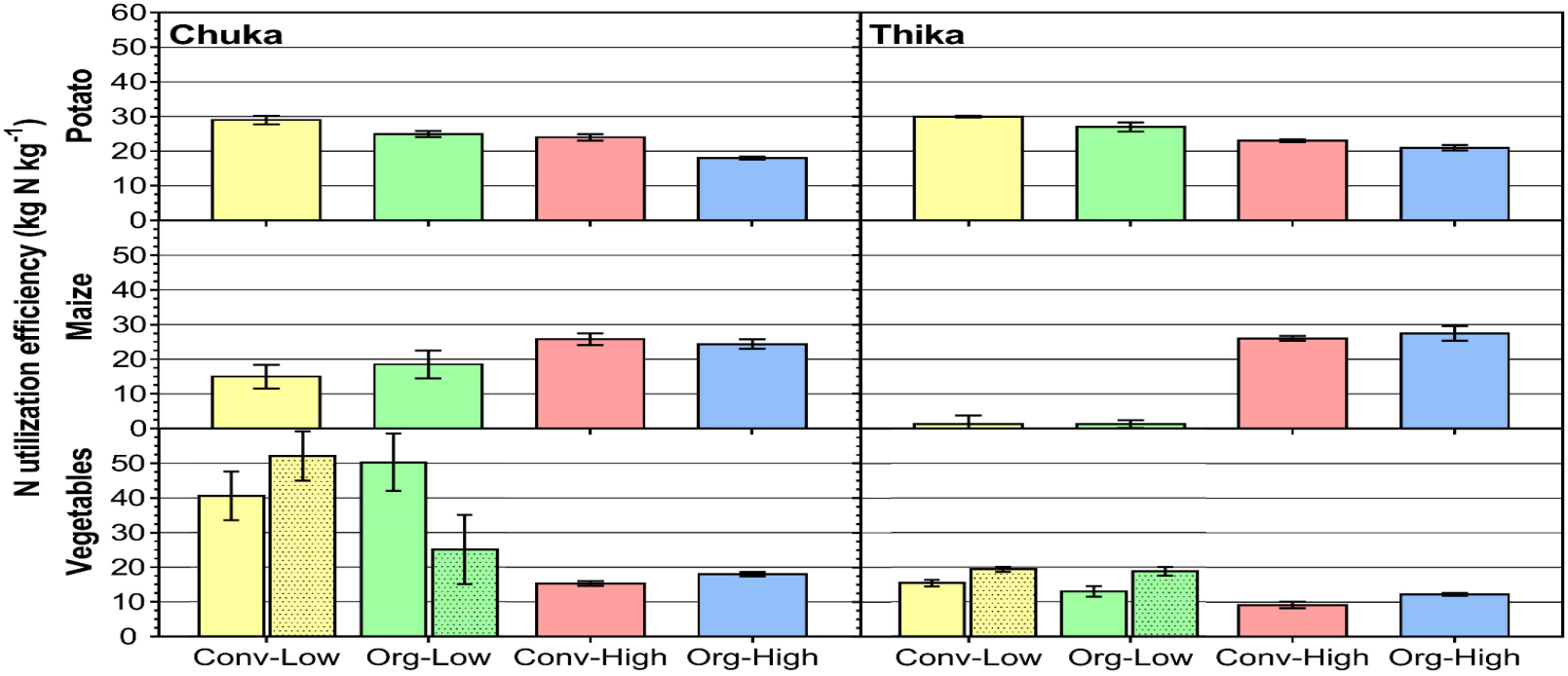
Nitrogen utilization efficiency (PhD study)



Source: Musyoka et al. (published)

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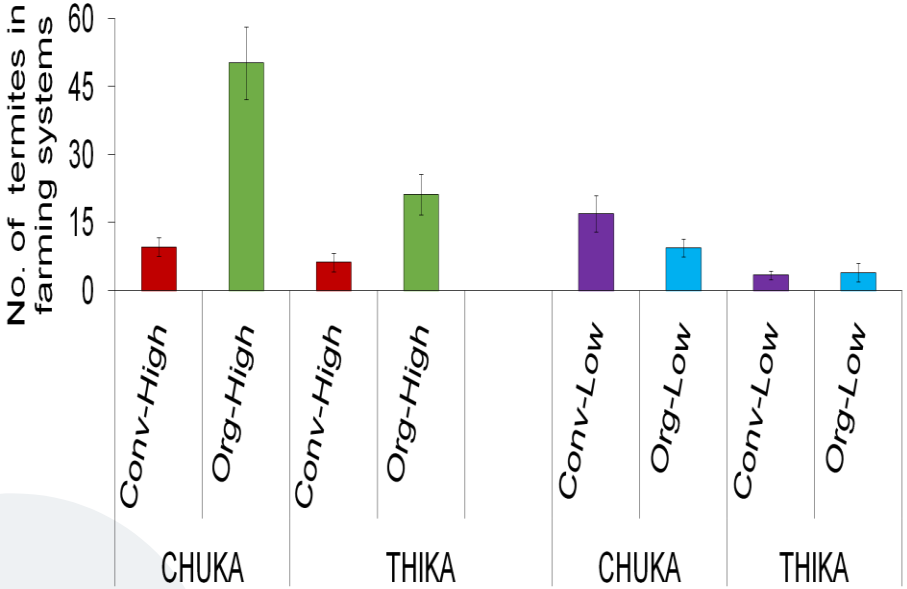
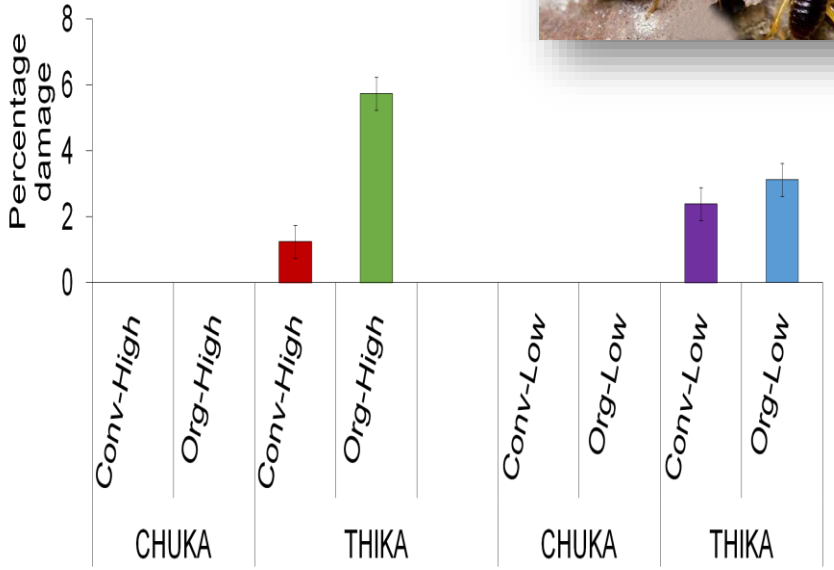
Main findings – Biodiversity (Termites) (PhD study)





- Higher abundance and diversity in organic high input systems at Chuka.
- More damage at Thika site.

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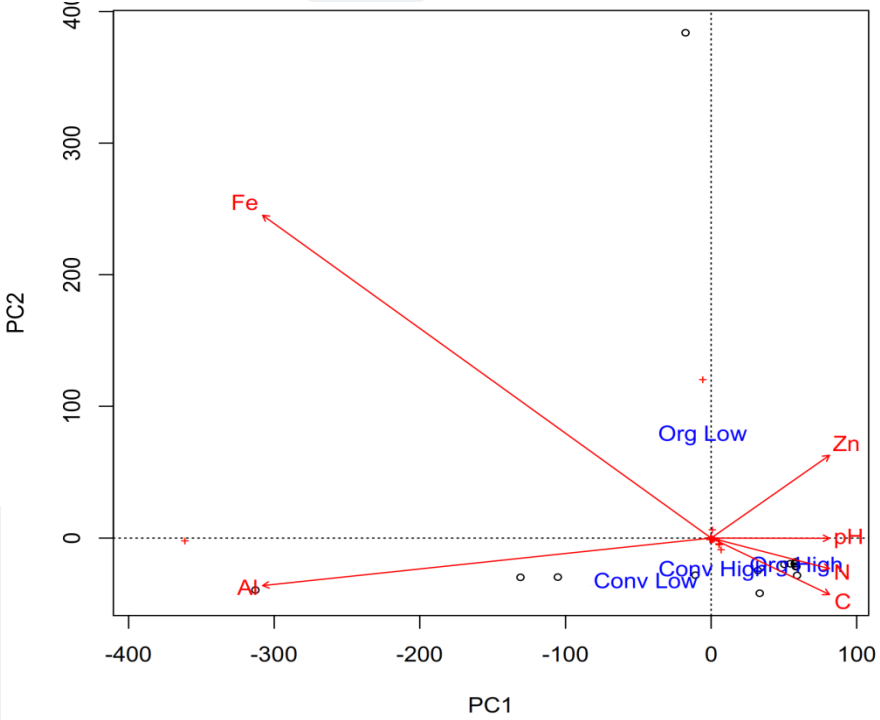
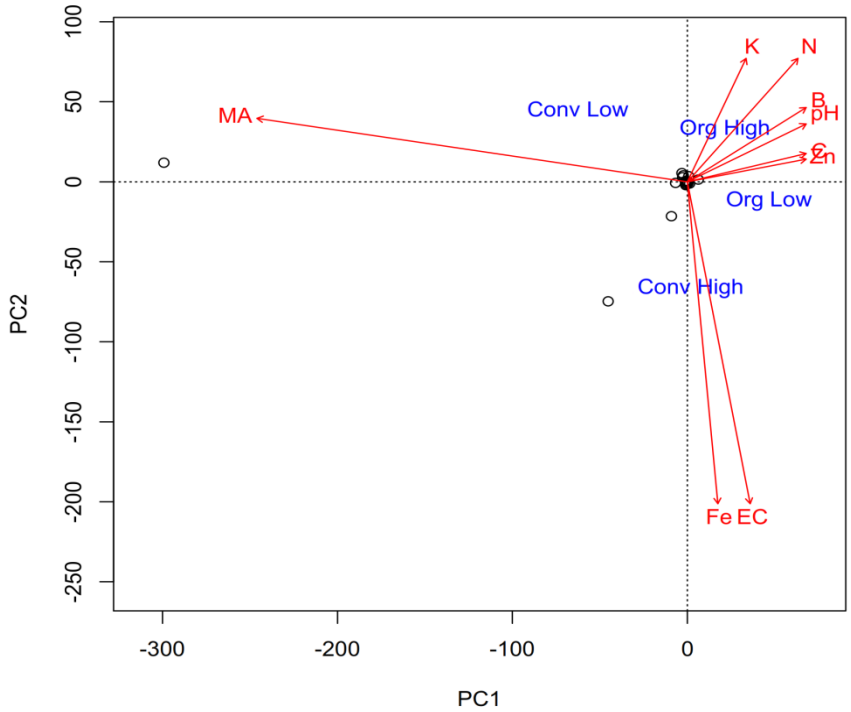
Source: Anyango et al. (submitted)

Soil physicochemical characteristics that influenced fungal diversity within farming systems (PhD study).



Chuka



Thika

Source: Karanja et al. (submitted)

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Conclusion

No silver bullet!!!

Organic agriculture has large potential to contribute to sustainable development

- Soil fertility
- Biodiversity Conservation
- Productivity & Profitability

For full exploitation major efforts are needed to tackle:

- Agronomic/technological challenges (lack of input, pest management)
- Capacity development for farmers (technical know how)
- Institutional/governance challenges (markets, agri-business)
- Policy challenges

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Acknowledgement

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Thanks!

ANY QUESTIONS?

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