SOL MACC
ORGANIC FARMERS COUNTERING CLIMATE CHANGE

SOLMACC FINAL CONFERENCE

Farmers tackling climate change:

Systemic solutions for greater mitigation and adaptation of EU's agriculture sector

16 May 2018

9:30 – 13:15 Representation of the State of Hessen to the EU, Brussels

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Part I

The impact of implementing climate-friendly practices – the SOLMACC project results

Results from the scientific monitoring of the SOLMACC practices

Lin Bautze & Matthias Meier, FiBL

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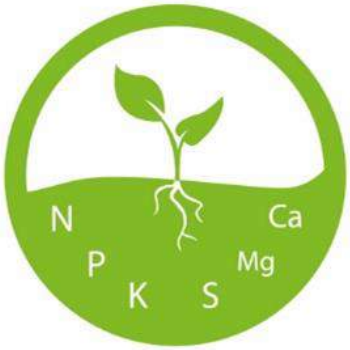

OPTIMISED ON-FARM NUTRIENT RECYCLING

OPTIMISED CROP ROTATIONS

CLIMATE-FRIENDLY PRACTICES

OPTIMISED TILLAGE SYSTEM

AGROFORESTRY

Optimized Nutrient Management

- Composting
- MC treatment
- Biogas production and/or utilization
- Mobile livestock systems

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Farmyard Manure Composting

Farm	Amount Farmyard Manure (DM t)	Reduction (total in kg CO2-eq.)		
		Minimum	Average	Maximum
Fontanabona (IT)	40	2 360	13 160	16 880
Kreppold (DE)	115	6 773	37 769	48 446
Gut Krauscha (DE)	215	12 700	70 817	90 836
Relative Mitigation Potential		**- 9%**	**- 49%**	**-63 %**

Optimized Crop Rotation

- Introduction and/or increasing percentage of grain and/or forage legumes
  - Stabilisation of soil fertility, N-fixation (Leithold et al., 2015)
  - Average C-sequestration of 0.32 Mg ha^{-1} a^{-1} by cover crops (Poeplau & Don, 2015)



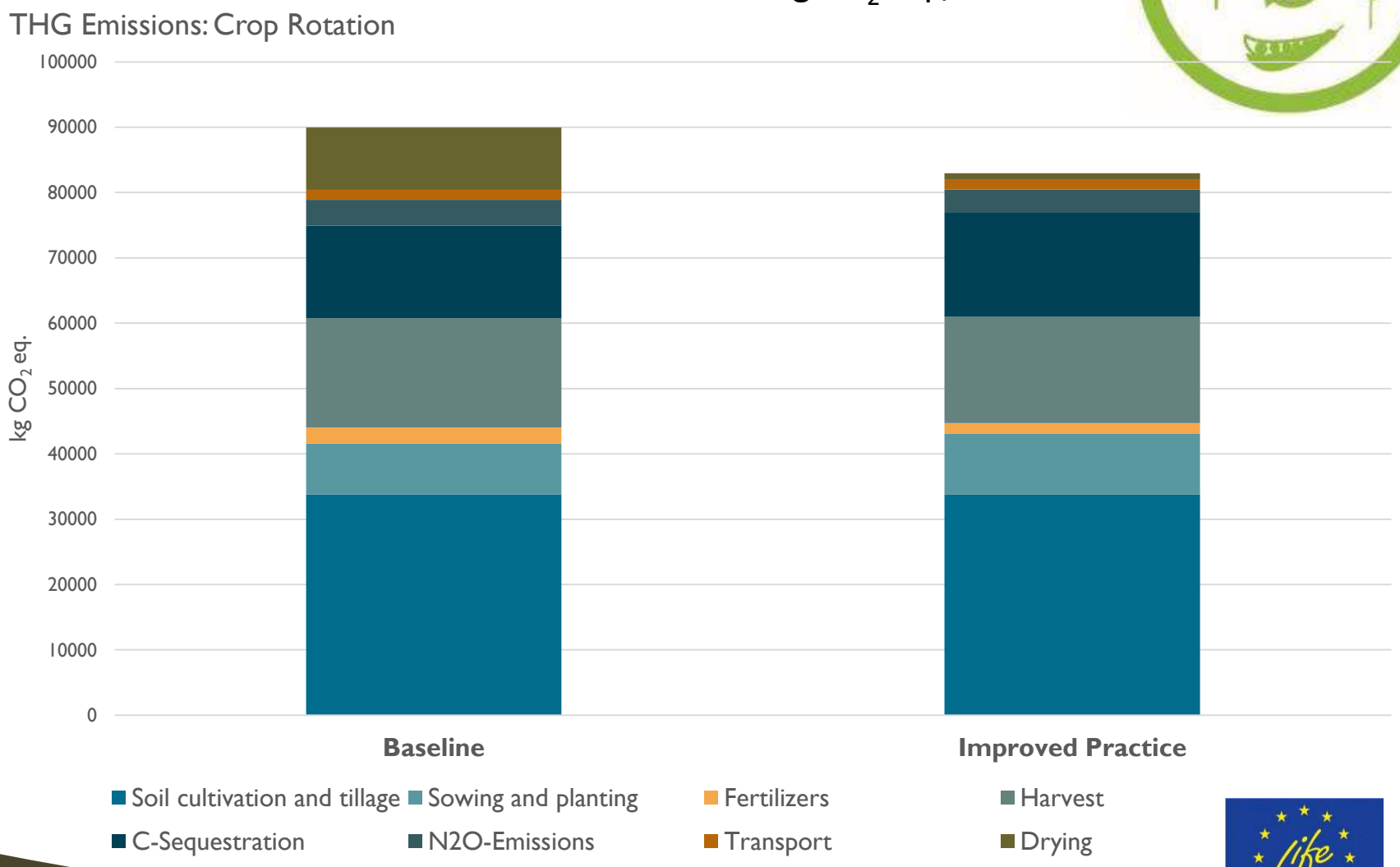
Photos (von links): © Gut Krauscha, ©**Körslätts Gård** © Fontanabona

Optimized Crop Rotation: Fontanabona (IT)

- saved around 1605 kg CO_2 eq. for ethylene vinyl film
- saved around 5687 kg CO_2 eq. for seedlings

Optimized Crop Rotation: Kreppold (DE)

Reduction: 725 kg CO_2-eq./ha = **- 8 %**



Optimized Tillage Management

- No common definition exists (Mäder & Berner, 2011)
- Can help to reduce diesel consumption
- System boundaries for mitigation assessments differ
- Need to be balanced with weed pressure/yields
  - Up to 7.6 % lower yields (Cooper et al., 2016)

Fotos (from left): ©Daniele Fontanive, Caramadre, ©S. Griese, Pfänder

Optimized Tillage Management

To reduce diesel consumption, several options exist:

1) Reduced depth: 0.5 – 1.5 l/ha per cm (around 0.22 – 0.67 kg CO2eq./ha) (Moitzi et al., 2014)
2) Change of machinery: from ploughs to field cultivators (saved around 49 kg CO2eq./ha)
3) Reduce frequency (e.g. only plough every second year)
4) No tillage (saves around 125 kg CO2 eq./ha)

Fotos (from left): ©Daniele Fontanive, Caramadre, ©S. Griese, Pfänder

Agroforst and Landscape Elements

Implementation of different agroforestry systems:

- Boundary hedges
- Buffer stripes
- Alley cropping
- Silvopasture (lifestock integration)
- Olive groves and vineyards




Fotos (from left): © Hånsta Östergärde © Kreppold, © Haus Holte

Agroforesty

C-accumulation in **tree biomass (above and below-ground):** 5,1 – 7,8 t/ha/year up to 24 t/ha (grapes) and 37 t/ha (olives) (Scandellari et al., 2016)

C hedge biomass (above-ground): 1,64 – 4,8 t/ha or above-ground net primary production of **herbaceous vegetation**: 0.48 – 6.52 t/ha/year (Scandellari et al., 2016)

C-sequestration soil: 0,455 t/ha/year = 3,64 t/year (based on Schrumpf et al., 2014) up to 6.5 t/ha (Ordonez-Fernandez et al.)

Climate Change Adaptation - Farmer's Perspectives

Crop Yield Changes

- Composting most effective in Italy
- Biogas slurry application most effective in Sweden
- Introduction of leguminous crops most effective in Italy, followed by Sweden
- No decrease of crop yields from reduced tillage practices were reported; in Italy yields even increased
- Yields were mainly stable in all countries for the agroforestry practices

Climate Change Adaptation - Farmer's Perspectives

Soil Parameters

- No negative effects reported
- Compost application improved visibly soil parameters in Italy
- Biogas slurry application was less effective compared to compost application at German and Swedish farms
- Improvements due to the introduction of legumes and reduced tillage management seem to be more visible for Italian farmers
- Effects of agroforestry practices on soil parameters seems to be most difficult to evaluate for farmers in all countries

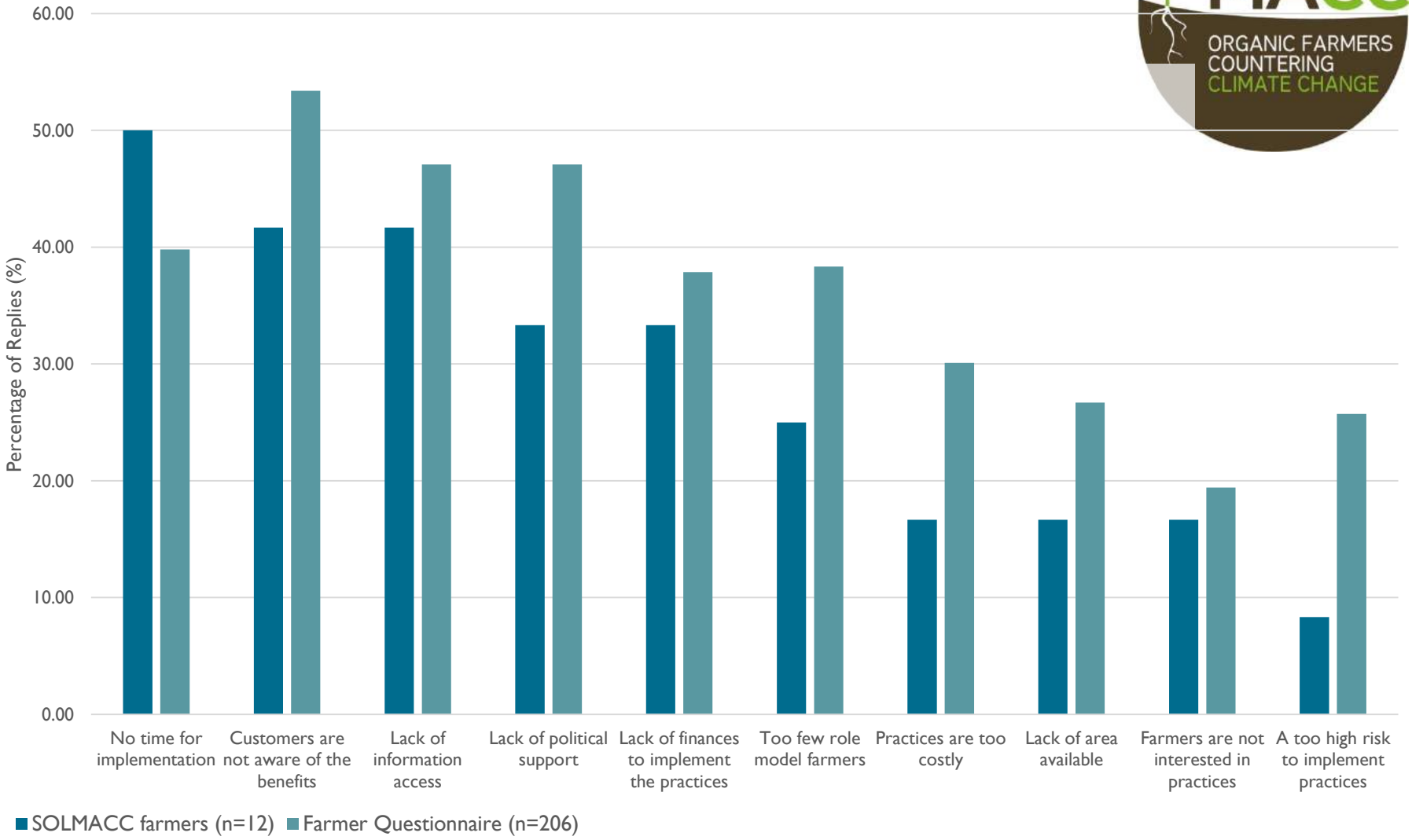
Economic Viability - Farmer's Perspectives

Income vs. Costs

- Yields were stabilized or increased for all practices
- Operational costs (e.g. diesel, energy consumption) were mainly stabilized or reduced (except for composting)
- Input costs (e.g. seeds, irrigation, livestock feed) mainly did not change due to the collaborative selection process of practices
- Labour costs could be reduced due to the tillage management, but did increase with the agroforestry practices

Mainstreaming climate-friendly and resilient practices

Hindering Factors for Climate-Friendly Practices



Conclusions

Diverse practices exist that are climate-friendly and resilient:

- Consumers are very important to achieve climate goals
- Some need additional financial/political support

Collaborative projects between farmers, farm advisors and scientists may **help to overcome hindering factors**.

Farmers are the best role models to mainstream climate-friendly practices to other farmers.

Further **research & project funding for dissemination and scientific on-farm monitoring activities** is needed.

Thank you for your attention!

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