

Agroecological approaches to climate change adaptation: Malawi & Tanzania case studies



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Contrasting approaches to food security & climate change adaptation in Africa

Sustainable intensification

- Reliant on fossil-fuel inputs
- Expert-driven
- Political & social dimensions of hunger absent



AFSA

Agroecology

- Diversification of species
- Maximize biological control
- Recycling of resources
- Farmer knowledge and experimentation
- Attention to social & political dimensions of food

Climate change & food security context

Over 3 million people planned to receive humanitarian food assistance through the lean season

October 2018

October 2018 - January 2019

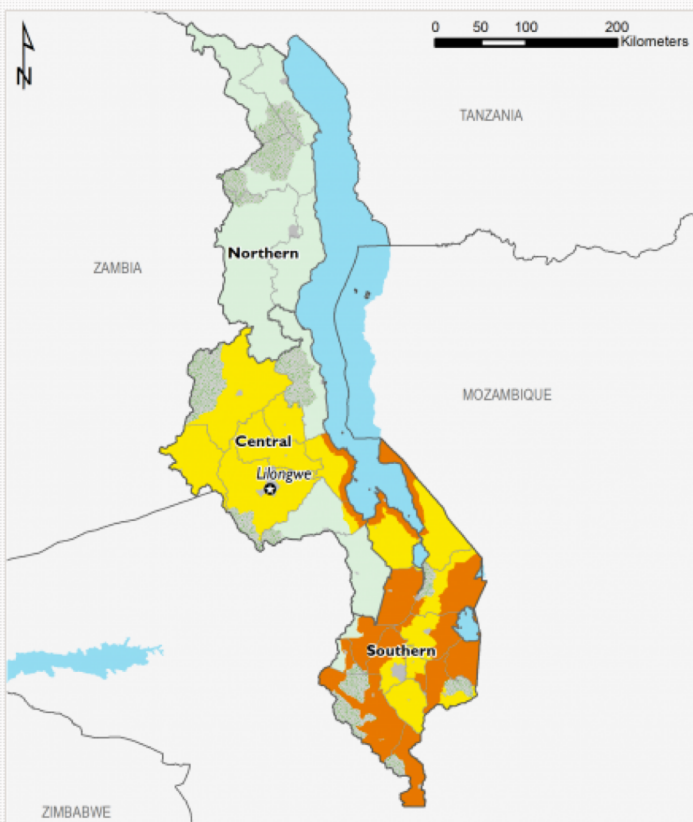


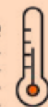
Figure 1: Summary of climate changes in Malawi

Map shows warming is evenly distributed across Malawi

Warming everywhere

2040s +0.5 to +1.5°C

2090s +4 to +4.3°C

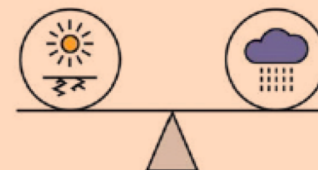


Higher evaporation



No clear signal in

average annual rainfall



Change in frequency and intensity of extremes

IPC 2.0 Acute Food Insecurity Phase

1: Minimal 2: Stressed 3: Crisis 4: Emergency 5: Famine National Parks/Reserves



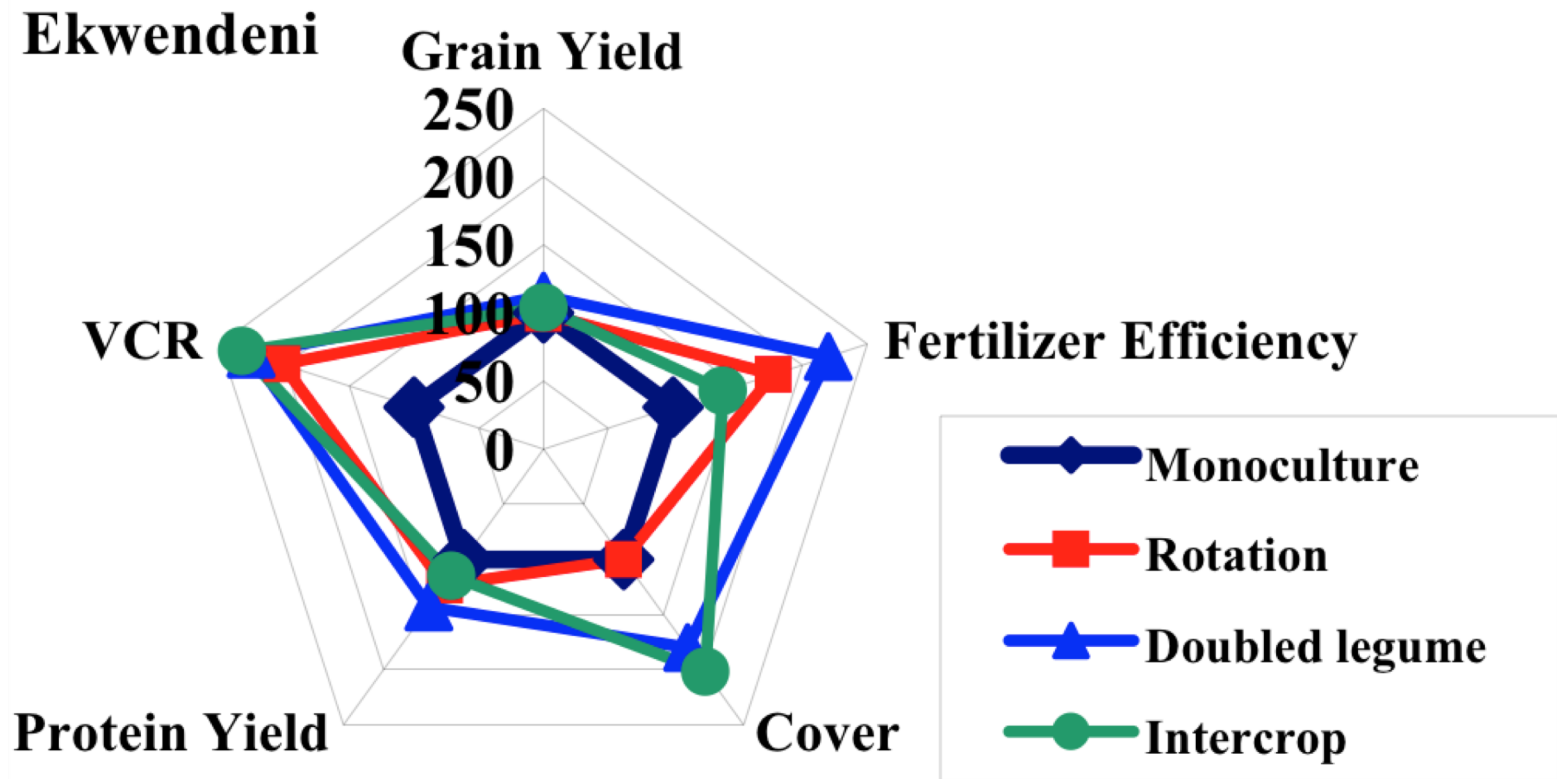
Would likely be at least one phase worse without current or programmed humanitarian assistance

FEWS NET classification is IPC-compatible. IPC-compatible analysis follows key IPC protocols but does not necessarily reflect the consensus of national food security partners.

Climate Change Adaptation in Context



Previous findings: Biodiversity has multiple impacts on ecosystems and livelihoods



Source: Snapp, S. S., M.J. Blackie, R.A. Gilbert, R. Bezner Kerr, G.Y. Kanyama-Phiri.
'Biodiversity can support a greener revolution in Africa' *Proceedings of the National Academy of Sciences* 107(48):20840-20845 doi:10.1073/pnas.1007199107

Research Project 1: Participatory Research on Climate Change Adaptation



Climate Change farmer experimenters selected based on perceived vulnerability to food insecurity due to age, HIV status, poverty level using participatory ranking system.

Agroecological Farmer Experiments



- Agroforestry (fruit & leguminous trees)
- Double intercropped legumes (pigeonpea, groundnuts, soya)
- Intensive application of animal manures
- Crop diversification e.g. sorghum, finger millet, cowpea, cassava & sweet potatoes.
- Livelihood diversification: Small-scale irrigated gardens, small livestock, fuel efficient wood stoves



Participatory approach

- Farmers choose own experiments
- Receive seeds for one season and support from Farmer Research Team
- Farmer exchanges, apprenticeships and field days



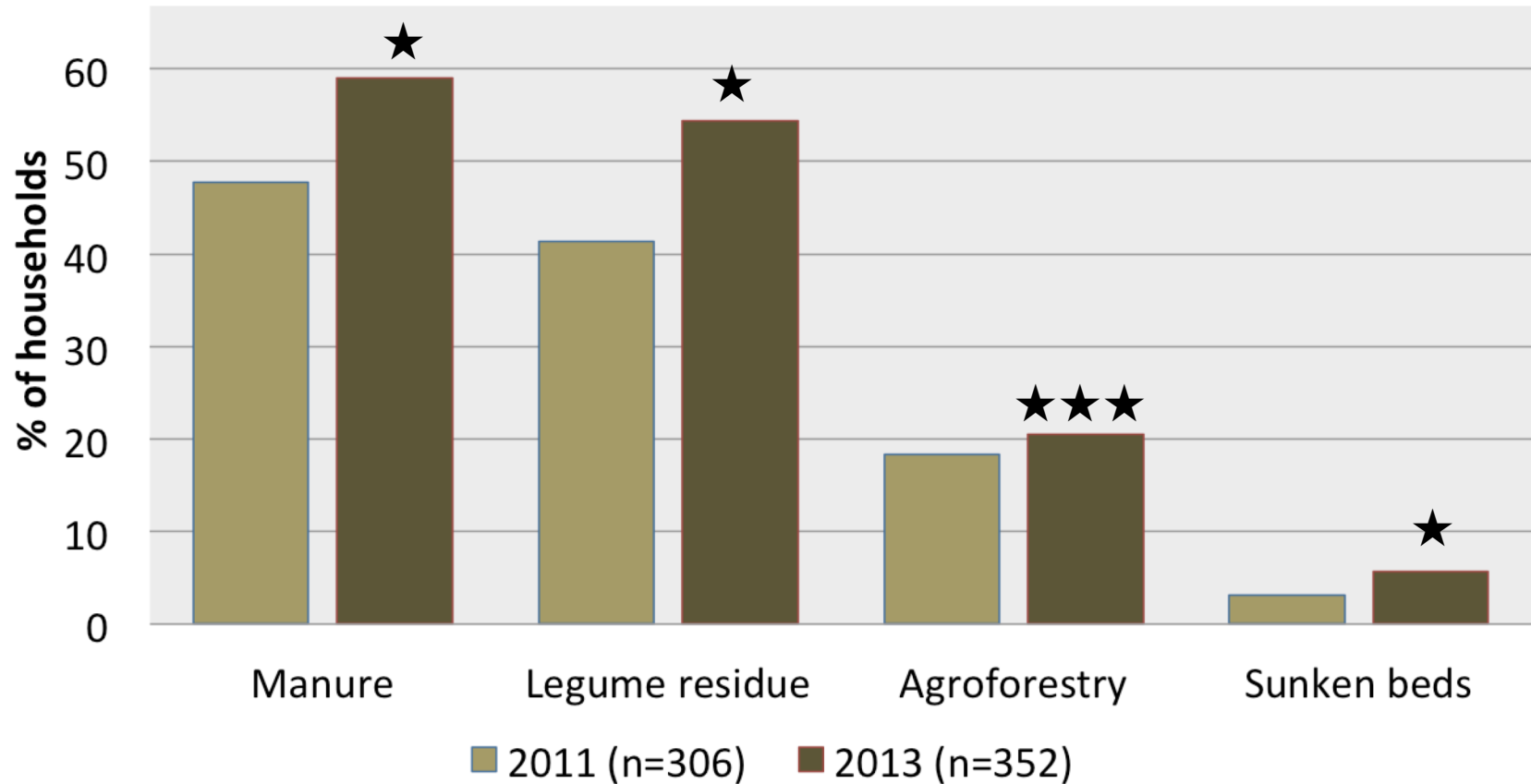
Dialogue-based approaches

- Agriculture and Nutrition Discussion Groups
- Livestock community discussions



Compost Can Turn Agricultural Soils Into A Carbon Sink, Thus Protecting Against Climate Change

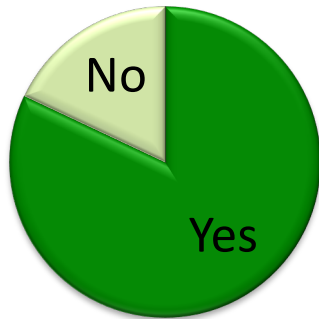
Date: February 27, 2008



Significant difference between 2011 and 2013, ★ $p \leq 0.1$, ★★★ $p \leq 0.01$

Increased Tree Planting

Have you planted trees in response to learning about climate change?



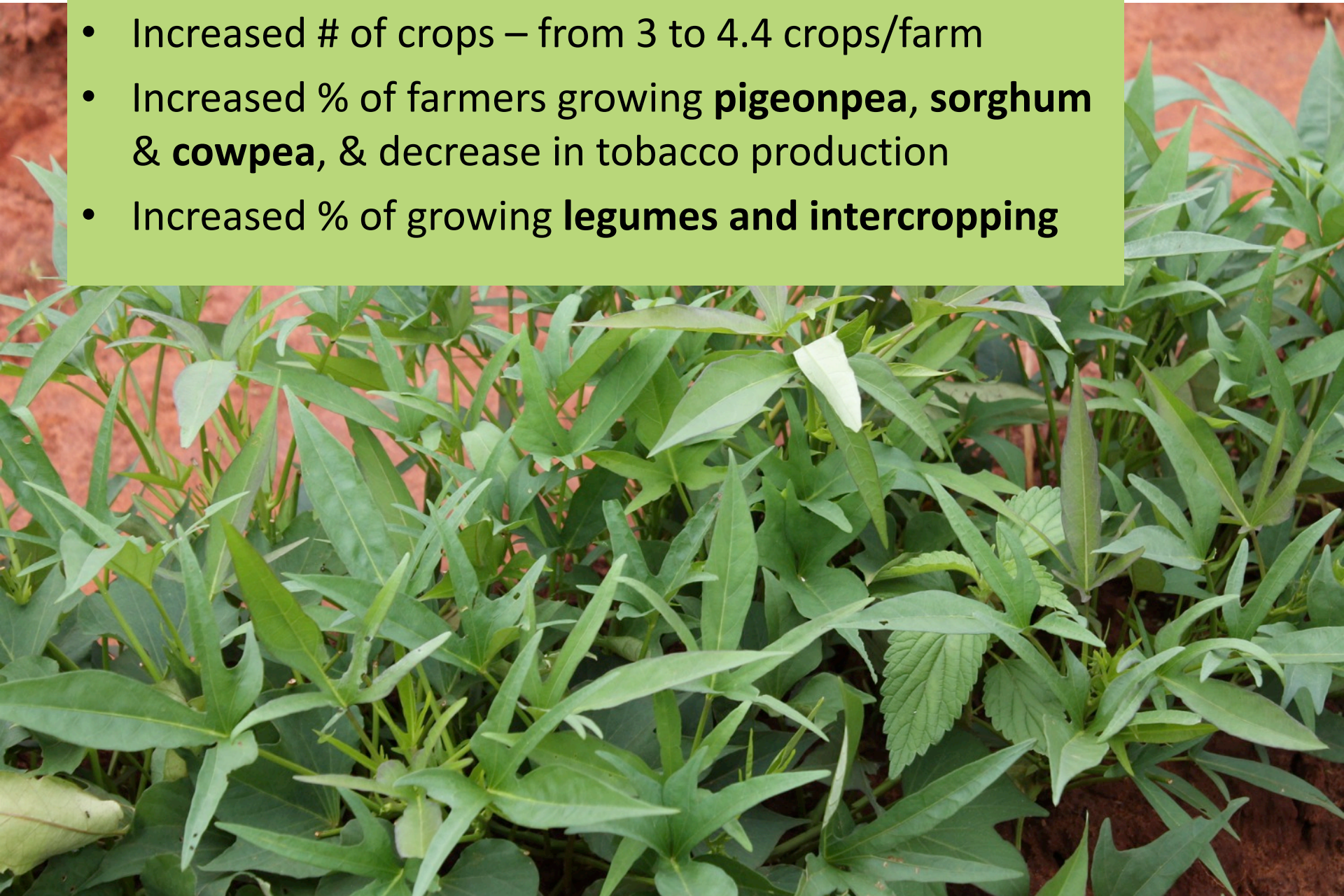
- Seven village nurseries were started and maintained by farmers.
- The majority of participating farmers reported planting one or more species of tree on their homestead.
- Project arranged for extension support from government sources.



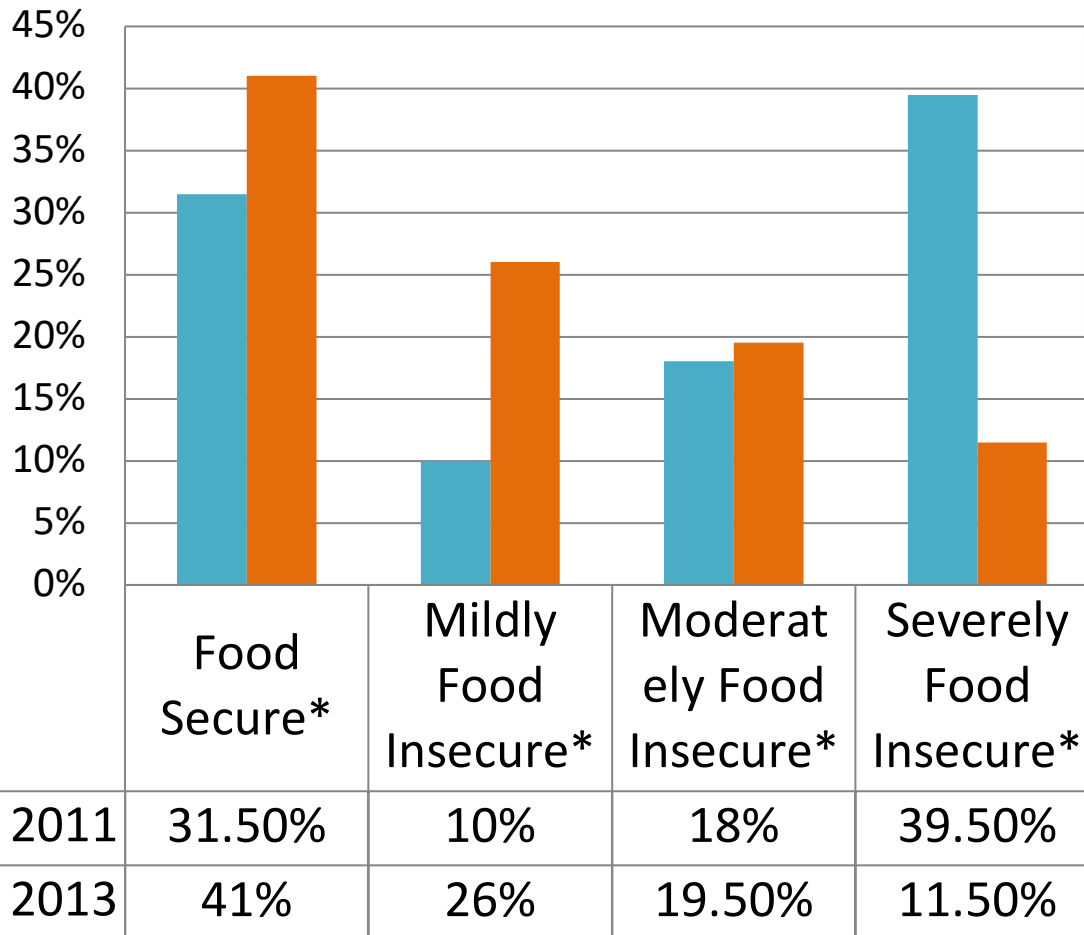
Afforestation in semi-humid croplands can increase soil carbon stocks and reduce risk from climate change through increased soil organic matter, microbial activity and multipurpose uses (e.g. fruit, tree nuts).

Changing Farm Practices and Diets

- Increased # of crops – from 3 to 4.4 crops/farm
- Increased % of farmers growing **pigeonpea, sorghum & cowpea**, & decrease in tobacco production
- Increased % of growing **legumes and intercropping**

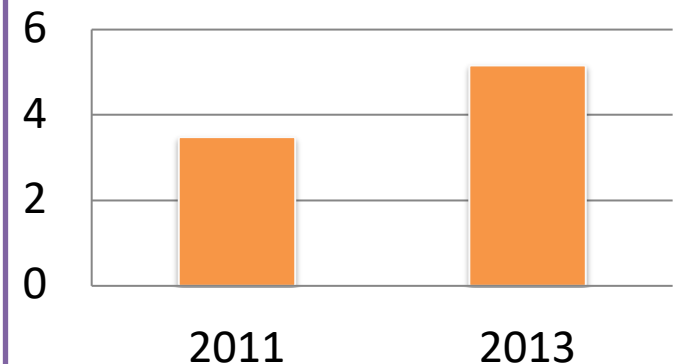


Positive impact on Household Food Security & Household Dietary Diversity



Percentage of households consuming 4 or more food groups changed from 54% to 67% in 3 years.

Average Household Dietary Diversity



* Significant percentage change @ $p < 0.05$

Added compost or manure to soil **was a significant determinant of household dietary diversity** after controlling for other important variables.

Multivariate analysis showed, after controlling for education, land size & wealth, that farmers who **discussed farming with their spouse** were 2.4 times more likely to be food secure & have diverse diets.



Project 2: Malawi Farmer-to-Farmer Agroecology

- Can agroecological farmer-to-farmer methods work in rural Malawi to improve food security, nutrition, livelihoods and social equity?
- 6000+ households testing agroecological practices; participatory methods, farmer experimentation and farmer-to-farmer teaching
- Measure changes in food security, dietary diversity, gender relations, farmer knowledge.

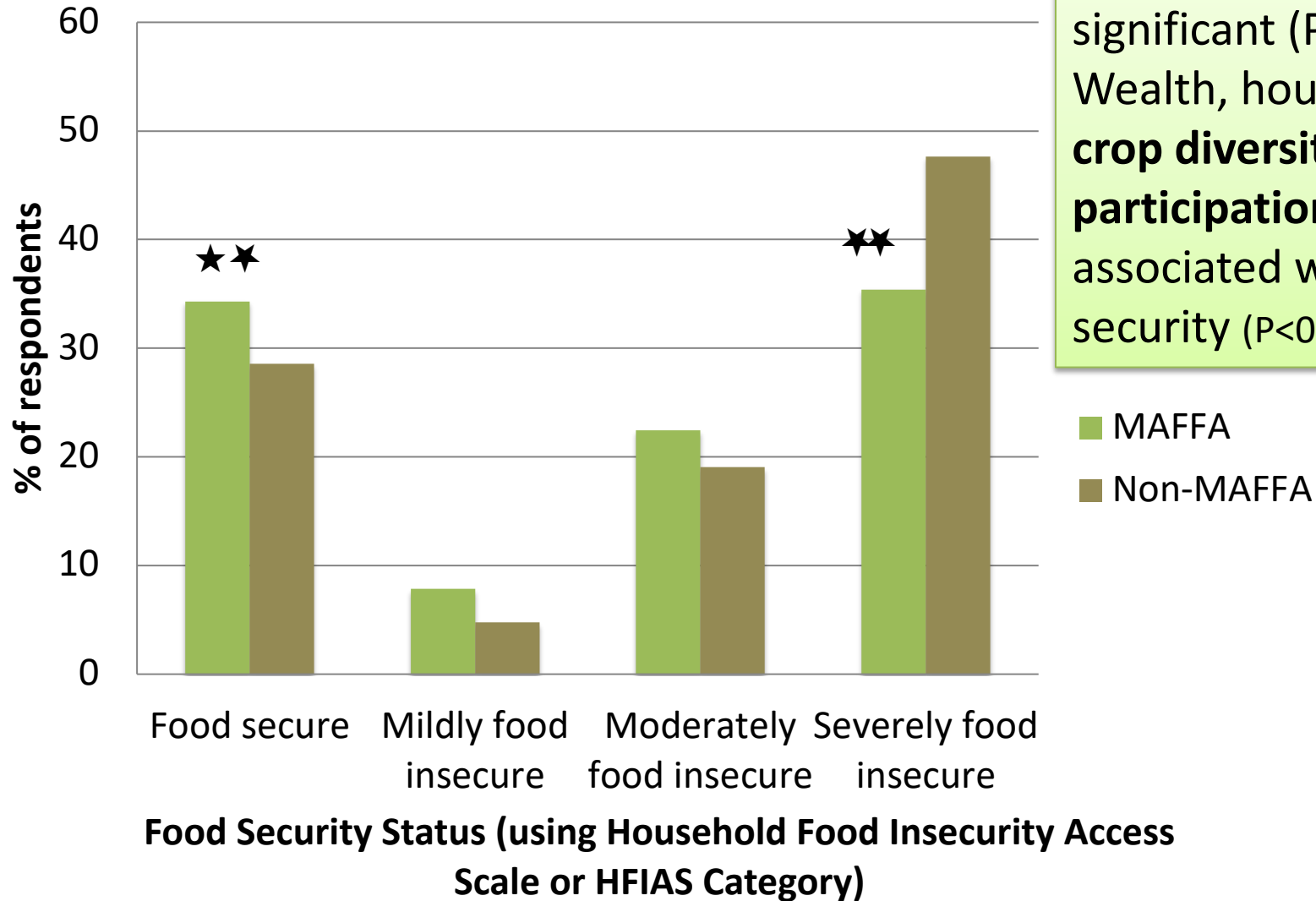


Community events to highlight equity and agroecology



Patel, R., R. Bezner Kerr, L. Shumba and L. Dakishoni. Cook, eat, man woman: Understanding the New Alliance for Food Security and Nutrition in Malawi, and its alternatives. 2014. *Journal of Peasant Studies* November online DOI: 10.1080/03066150.2014.971767

Household Food Security & Crop Diversity



★ ★ Significant percentage difference between MAFFA and non-MAFFA @ $p < 0.05$

Child intake of Vitamin A rich foods

- **Participation in MAFFA and crop diversity** positively impacted child intake of vitamin A rich foods after controlling for other covariates.
- Controlled for child's age, wealth, household size, farm size, participation in MAFFA, crop diversity, & household food security.



Global Change Biology

PRIMARY RESEARCH ARTICLE | [Open Access](#) |

Agricultural diversification as an important strategy for achieving food security in Africa

Katharina Waha , Mark T. van Wijk, Steffen Fritz, Linda See, Philip K. Thornton, Jannike Wichern, Mario Herrero

First published: 31 March 2018 | <https://doi.org/10.1111/gcb.14158> | Cited by: 1

Research Project 3: Singida Nutrition and Agroecology Project (SNAP)

Can a participatory, agroecological peer farmer education intervention improve legume production, food security, and infant and young child feeding in Singida District, Tanzania?

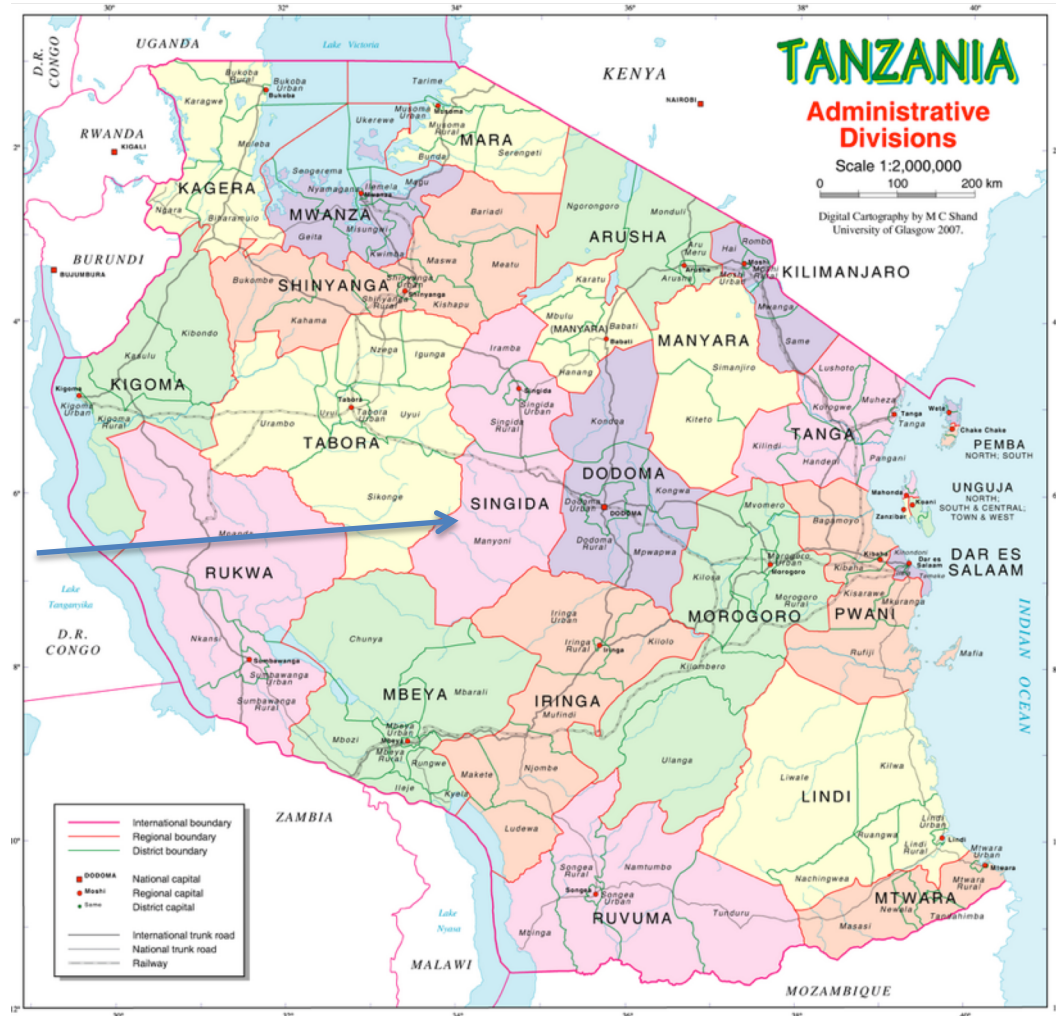
- 588 households, 20 villages
- 4 year project
- Delayed intervention design
- Peer mentors received training & supported participating farmers
- Seeds provided in year 1 based on farmer interest.



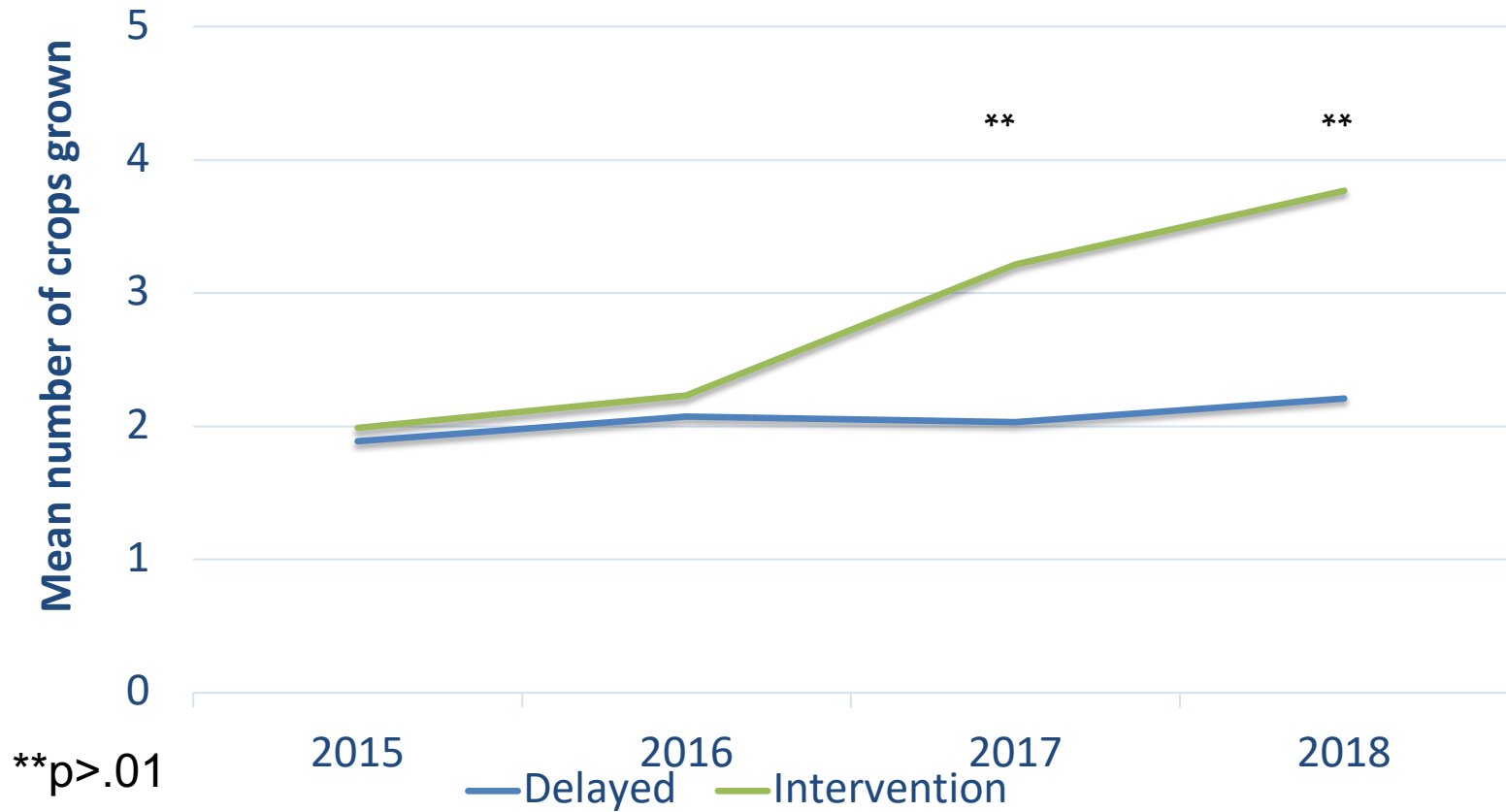


Tanzania context

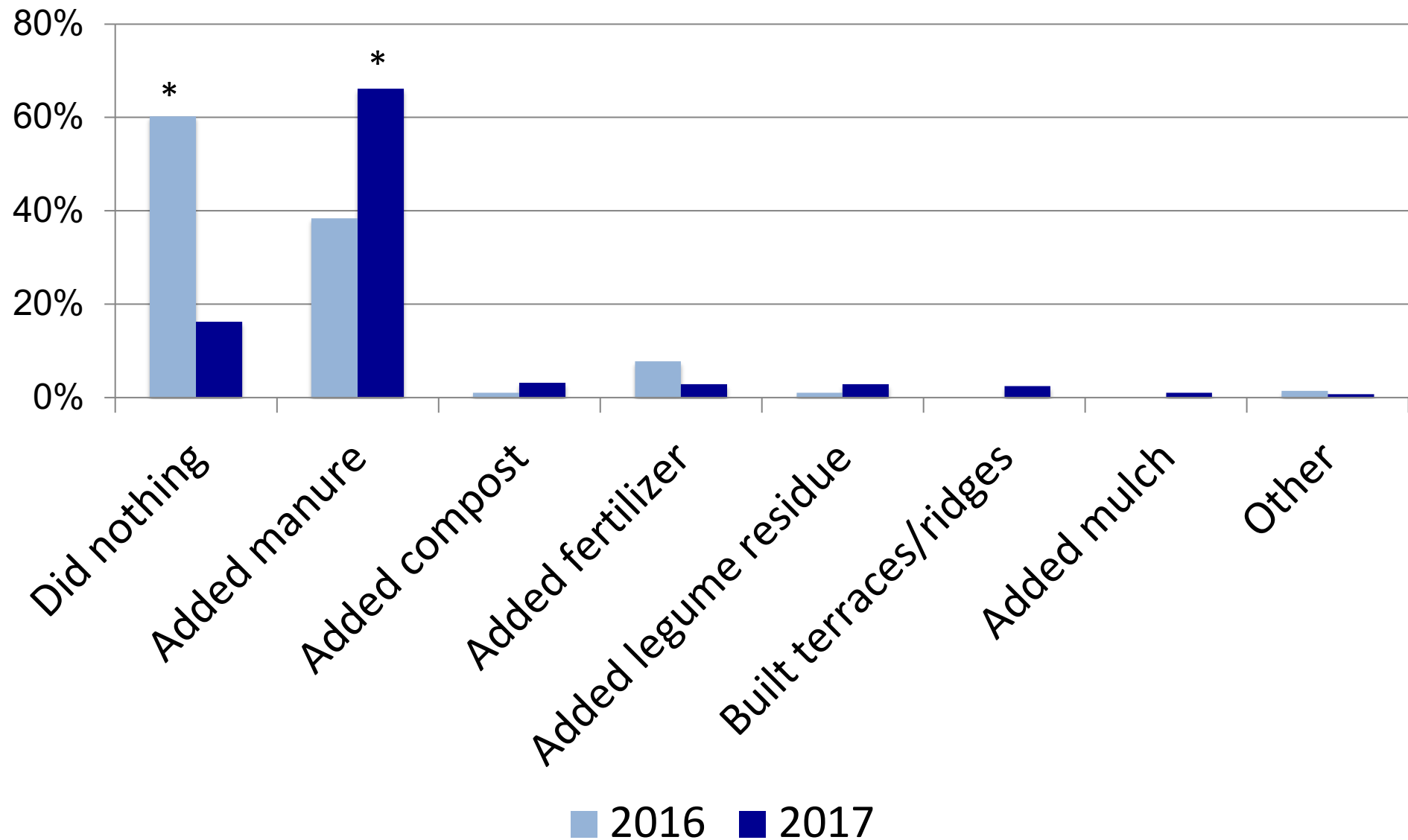
- High food insecurity (70%)
- Low dietary diversity, 34% child stunting
- Singida District: semi-arid region, most households rely on farming for livelihoods;
- High levels of gender inequality.
- Low soil fertility, limited legume production and limited use of agroecological methods to improve soil fertility.



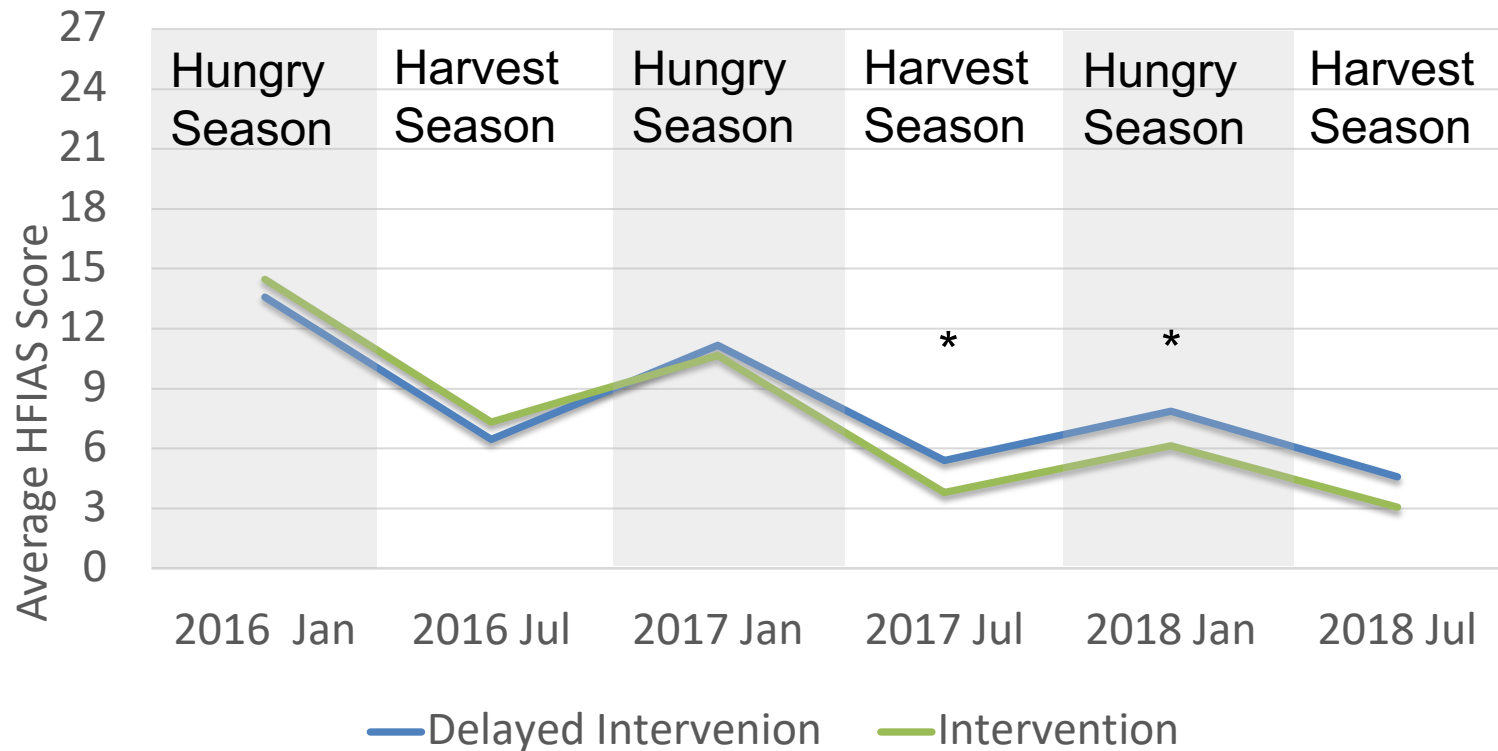
Increased Crop Diversity



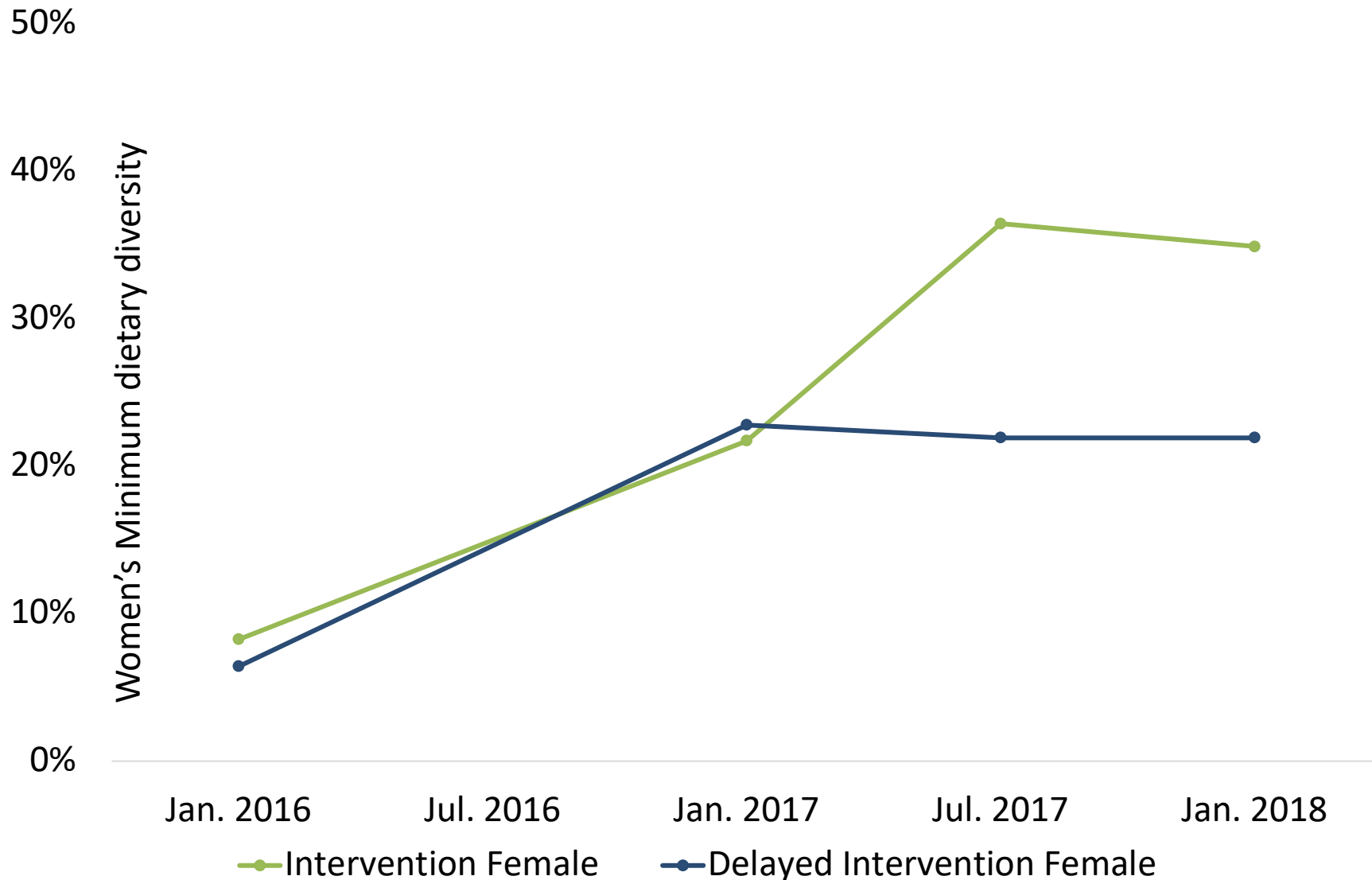
Soil Enhancement Methods Used



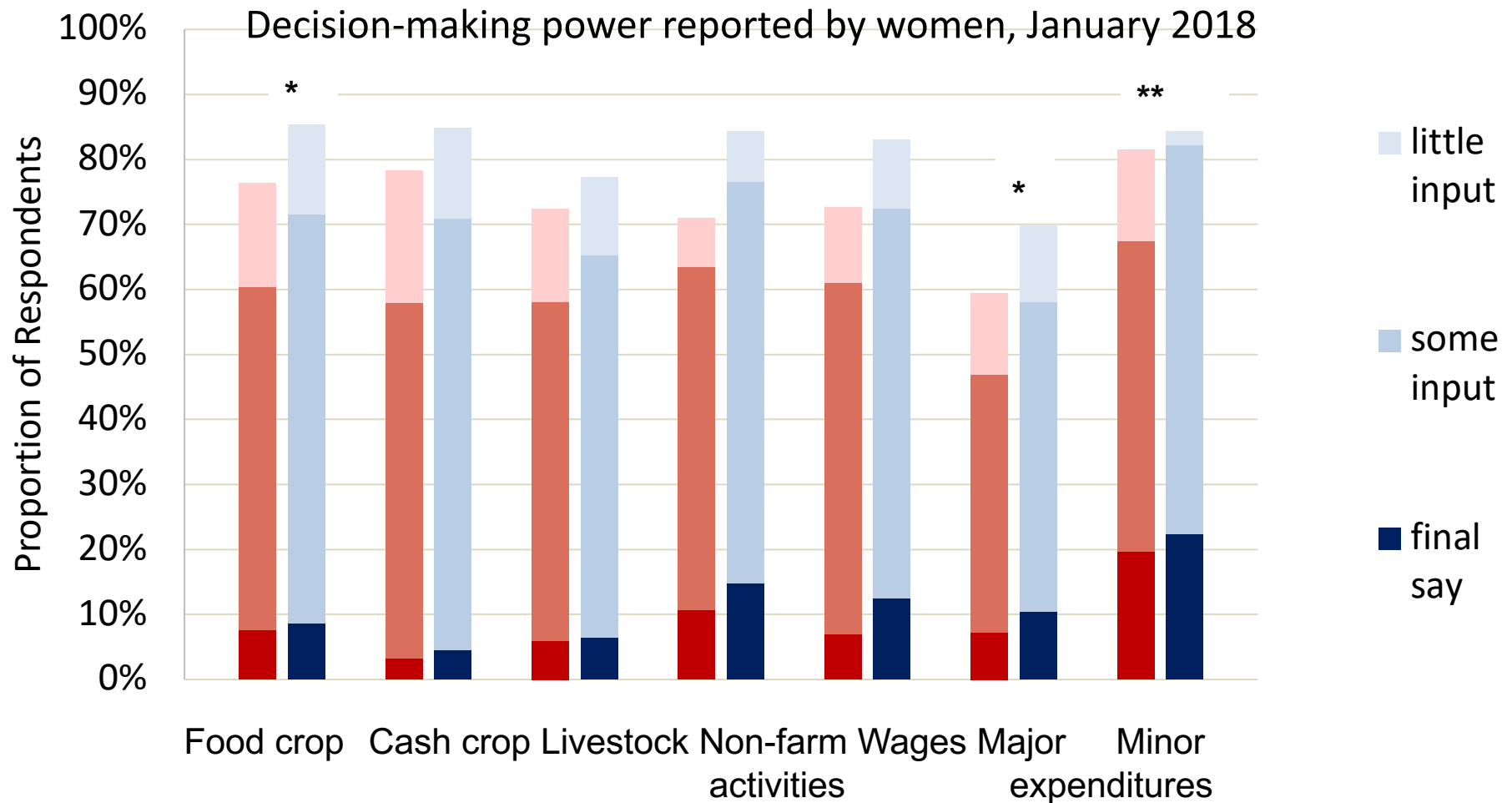
Food security significantly improved for intervention households



Women's Dietary Diversity improved for intervention households



Evidence of more equitable decision-making power between spouses



Conclusions

- Agroecology can be used to improve food security when combined with farmer-led experimentation and attention to social inequalities.
- Key methods in case studies: crop diversity, especially legumes, & use of organic material to improve soil fertility;
- Use of flexible, participatory approaches for farmers to test different strategies that fit their situation, including Dialogue and community-based approach e.g. dramas, meetings, small discussion groups, recipe days, songs.
- These strategies can also address climate change mitigation and adaptation.
- To ensure long term climate change adaptation however, need to address broader social inequalities e.g. land access, right to save seed, climate change and building local economies.

Acknowledgements

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