

**The McKnight Foundation**  
**Collaborative Crop Research Programme: Improving Food**  
**Security and Nutrition through Edible Legume Research in**  
**Malawi, Mozambique and Tanzania**

**SCALING-UP INTEGRATED SOIL FERTILITY MANAGEMENT|:**  
**ECONOMICS, POLICY AND EXTENSION STRATEGIES TO**  
**IMPROVE HUMAN NUTRITION AND SOILS IN MALAWI**

**09-298**

**ANNUAL REPORT 2009-10**

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## 1.OVERVIEW

Smallholder farmers in Malawi face significant challenges of small landholdings, depleted soils, climate variability, high input costs and limited access to markets. Production of maize, the main staple, has fluctuated in recent years, depending on rainfall and access by smallholders to inorganic fertiliser and hybrid seed at subsidised rates. There is recognition by government and farmers alike that the high maize production achieved over the past four years cannot be sustained economically or ecologically. Many of the policies and programmes initiated in Southern Africa in recent years to improve soil fertility have focused either on increasing availability and accessibility to inorganic fertiliser, or 'sustainable' agriculture practices on the other. However research is points to the need for an integrated approach to soil fertility management (ISFM), combining different inputs for agroecological and socioeconomic niches.

Policy-makers require ISFM recommendations that are evidence-based, consider performance over the long-term, promote efficient use of fertilisers and other inputs, and enhance smallholder abilities to cope with variability imposed by weather and markets. The project aims to significantly increase legume production and utilisation by poor households through supporting uptake of ISFM approaches by increasing policy-makers', NGOs' and farmers' knowledge of best bet technologies and uptake pathways.

The project is synthesising findings from ongoing or past programmes and supplementing them with new information on economic, social and agronomic aspects of ISFM, and the unique role legumes can play in enhancing sustainability of smallholder livelihoods. Main project activities are:

- Identifying existing 'best bet' ISFM technologies for different agroecological and socioeconomic niches from published and unpublished reports
- Assessing the economic viability of ISFM technologies for smallholder farmers, particularly composting and legume intercrops
- Assessing extension pathways for scaling up ISFM by government and NGOs
- Assessing performance of different ISFM practices for a range of rainfall scenarios will be assessed.
- Informing and promoting policy debate on ISFM options through production of policy briefs and supporting a series of high level stakeholder consultations.
- Capacity building in agricultural economics, extension and policy analysis through the training of two Masters Students at Bunda College, University of Malawi.

The project is expected to directly benefit over 50,000 farm families (including vulnerable groups) in the two study districts of Kasungu and Mzimba, through increased uptake of ISFM technologies with partner development organisations. Through its direct impact on ISFM policy the project is expected to bring further benefits to up to 2 million smallholder farmers in Malawi.

The project is being implemented by researchers by from Bunda College of Agriculture, University of Malawi in collaboration with two Government and two NGO organisations in Malawi. This report covers activities carried out in the first year of this two year project.

## 2. RESEARCH REPORT

### *2.1 Research Team*

**Dr Daimon Kambewa**, University of Malawi, Bunda College, Lilongwe, Malawi  
– Principal Investigator

**Dr. Kate Wellard**, University of Malawi, Bunda College, Lilongwe and  
Development Planning Unit Associates - Collaborator

**Dr MAR Phiri**, University of Malawi, Bunda College, Lilongwe, Malawi –  
Principal Investigator

**Patrick Thawe**, University of Malawi, Bunda College and Malawi Enterprise  
Zone Association, Kasungu, Malawi – MSc Student

**Hyton Lefu**, University of Malawi, Bunda College and COOPI-Malawi  
Enterprise Zone Association, Malawi – MSc Student

## **2.2 Project Narrative**

Malawi faces a huge challenge: how to produce more food under smallholder farmers' conditions of limited cash and labour, the burden of HIV/AIDS and continually deteriorating land sizes and fertility. Government- and donor-funded Targeted Input Programmes (fertilizer and seeds) policies since 2006 coupled with relatively good rains have dramatically increased production of the main staple, maize, with some increase in minor crops, including beans. However the cost to the government budget is heavy and it is increasingly clear that food security in Malawi at national and household levels cannot be sustained through reliance on inorganic fertilizer use alone. The situation is exacerbated by increasing variability in climate, to which the Malawi agriculture sector is particularly vulnerable with a unimodal rainfall system and heavy reliance on rainfed agriculture.

Over the past few years researchers have been developing alternatives to inorganic fertiliser, such as agroforestry (including intercropping with leguminous crops), manures and composts, biomass transfer and green manure. A number of organisations have begun developing and promoting these technologies in Malawi, including the Department of Agricultural Extension Services (DAES) of the Ministry of Agriculture and Food Security (MoAFS), non-governmental organisations (NGOs) and farmer organisations such as Malawi Enterprise Zones Association (MALEZA) and Soils and Food For Health Communities (SFHC). Some farmers have themselves been developing new composting technologies (FAIR Mzuzu).

Much of the research on soil fertility has focused on technical issues. The nature and extent of uptake of the technologies by smallholder farmers has not been well documented although it appears quite low. Some technologies have been established in the fields but not utilised by farmers (such as compost heaps along M1 road). Only a few studies have looked at factors affecting smallholder farmers willingness and ability to adopt Integrated Soil Fertility Management technologies, including agroecological, social and economic aspects.

A project entitled "Scaling-up Integrated Soil Fertility Management: Economics, Policy and Extension Strategies to Improve Human Nutrition and Soils in Malawi" is being implemented in Malawi using participatory approaches. The project is funded by the McKnight Foundation under the Grant Number 09-298. The project runs for a period of two years and covers economics, extension and policy issues across the whole country, but with a focus on ISFM activities in two districts of Malawi. In Central Malawi, the project is being implemented in Mkanakhoti Extension Planning Area (EPA) of Kasungu Agricultural Development Division (KADD) in Kasungu District. The Malawi Enterprise Zone Association (MALEZA) is the main collaborating partner. In the North, it is being implemented in Ekwendeni area of Mzimba District in collaboration with the Soils, Food and Healthy Communities (SFHC) Project of Ekwendeni Mission Hospital. The project is being carried out in close collaboration with the Legume Best Bets project.

The Scaling-up ISFM project is synthesising findings from ongoing and past programmes and supplementing them with new information on economic, social and agronomic aspects of ISFM, and the unique role legumes can play in enhancing sustainability of smallholder livelihoods. Policy-makers require ISFM recommendations that are evidence-based and consider performance over the long-term, promote efficient use of fertilisers and other inputs, and enhance smallholder abilities to cope with variability imposed by weather and markets.

The overall objective of the project is to significantly increase legume production and utilisation by poor households and improve soil fertility in Malawi. The purpose of the project is to support uptake of integrated soil fertility management approaches by increasing policy-makers', NGOs' and farmers' knowledge of best bet technologies and uptake pathways.

The project started activities in December 2009. This report covers the first year (2009/10) of the Scaling-up ISFM project.

### **2.3. Project Activities and Results**

#### **2.3.1 Objective 1: Identify promising best bet ISFM technologies for different agroecological and socioeconomic niches**

There is an urgent need to identify promising 'best bet' technologies: soil fertility improvement practices that can be used by smallholder farmers to enhance crop productivity and maintain the soil fertility status over a long period of time without compromising the socio-economic situation and natural environment in a given farming system. Technologies may be identified from multiple sources, including international or national research institutions, government extension services, NGOs, farmers' own innovations, traders etc. They include both hard innovations (the technology) and soft systems (the scaling-up pathways).

**Activities Year 1:** This activity is screening candidates for ISFM best bets from a wide range of sources in Malawi and the region, including Government: the Department of Agricultural Research Services, Land Resources Department (MoAFS), Kasungu ADD, Mzuzu ADD, Lilongwe ADD, University of Malawi, APRU, Green Belt Initiative; International Organisations: ICRAF, CIAT, ICRISAT, AGRA, CAADP, RUFORUM; NGOs: MALEZA, SFHC, NASFAM, FUM, LOMADEF, FAIR, World Vision, Research Into Use; other McKnight projects in the region (Legume Best Bets, Bean Seed Systems, Climbing Beans, Groundnut seed projects); and the Internet. During the first year of the project, published and unpublished literature and reports have been collected and interviews are being carried out with stakeholders and key informants from each of the organizations concerned.

A framework for assessment (Matrix) has been developed. This includes criteria from multiple disciplines: agronomy, soil science, livestock, nutrition, economics, sociology,

extension, environmental, farmer assessments etc. A 'best bet' technology is both location and farmer specific (though may be appropriate to several systems): thus a range of best bets are being sought for farmers in different ecological, social and economic niches (including women, child-headed households and other vulnerable groups), and for promotion by different types of organisations, with linkages with each of these groups.

The framework includes characteristics for candidate technologies e.g.:

- Long-term contributions to increased soil fertility
- Appropriateness for farmers in one or more dominant agro-ecologies
- Limited additional cash and/or labour requirements
- Appropriateness to different land sizes (i.e. level of competition from maize and other staple crops)
- Likely ease of adoption by farmers
- Limited reduction in maize yields or substitution by production of other crops
- Compatibility with other components of the farming systems
- Income and livelihood contribution
- Contribution to nutrition of vulnerable household members (including seasonality and palatability)

The best bet technology documentation and key informant interviews are being carried out MSc Extension students at Bunda College (Memory Tchale and Patrick Thawe).

**Planned Year 2 activities** under this objective include: Publishing comprehensive review as a report and on University of Malawi and CCRP websites; stakeholder panel reviews of technologies including research, extension, farmer organisations.

### **2.3.2 Objective 2: Evaluate economic incentives and constraints and opportunities for increasing uptake and utilization**

Farmers require technologies that enable them to use available resources efficiently and provide an adequate return for their efforts. High labour requirements particularly at key times in the cropping calendar and the length of time taken before benefits are realised by farmers appear to be key constraints to adoption of organic soil fertility management technologies such as composting (particularly by households with limited labour and cash to hire labour, including female- and child-headed households) (Carter, 1995)<sup>1</sup>. However, understanding of costs and benefits of ISFM technologies is currently limited in Malawi and the region.

An MSc Agricultural Economics student (Hyton Lefu) supervised by Dr MAR Phiri, Prof D Ng'ong'ola and Dr K Wellard is carrying out the following activities under this objective:

- i) Conduct comprehensive literature review on the economics of 'best-bets' in Malawi.
- ii) Quantify labour demand of selected 'best-bet' technologies in Mzimba and Kasungu.

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<sup>1</sup> Carter J. (1995). Alley Farming: Have Resource Poor Farmers Benefited? Natural Resource Perspectives no. 3. ODI, London



iii) Assessment of the profitability of selected 'best-bet' technologies within the maize-based cropping systems, and

iv) Assess economic viability of the selected 'best-bet' technologies, through analysis of, Gross margins, Payback Period, Net Present Value; Internal Rate of Return; Benefit-Cost Ratio and sensitivity analysis of the investment options.

**Activities Year 1:** This activity is examining the costs and benefits of ISFM Technologies with a focus on labour issues. An MSc Student in Agricultural Economics, Hyton Lefu, is researching a dissertation entitled: Economic Analysis of Integrated Soil Fertility Management Options among Smallholder farmers in Maize-based cropping Systems in Malawi: A Case Study of Kasungu and Mzimba Districts. Activities carried out in Year 1 were:

- Development of research proposal and tools
- Scoping study to identify range of ISFM technologies being practised in the 2 districts, incidence of the technologies, research and extension organizations testing or promoting ISFM technologies. The focus in Year 1 was on 2 areas where MALEZA and SFHC have been promoting farmer participatory approaches to ISFM and where legume best bet technologies have been tested with mother and baby trials by Legume Best Bets project. This activity was carried out in May 2010.
- Household Interviews with 102 farmers in Kasungu and Mzimba District. Households were sampled in a 2-stage sampling process: Stage 1 Purposive sampling of villages with good incidence of ISFM technologies; Stage 2 Random sampling of farmers practising 1 or more ISFM technologies on their main maize fields. Interviews were carried out in July 2010.
- Case studies of key ISFM technologies. Direct researcher observation and farmer recording of labour and other inputs in 3 types of composting were carried out in Kasungu.
- Data inputting was carried out in August 2010. Data analysis and writing up findings September-October 2010. Dissertation expected to be completed and submitted October 2010.

Main findings to date: Data are currently being analysed but preliminary results indicate (Appendix 2):

- Soil fertility technologies practiced by smallholder farmers in Kasungu and Mzimba include: inorganic fertilizers only (46%), compost only (10%), legume intercrop (8%), fertilizer/compost intercrop (23%)

- Most popular Legume Best Bet technologies practiced by smallholders on their farms (not mother or baby trials): Groundnuts + soya + maize (19%), maize + groundnuts (10%), maize + soya (8%), groundnuts + soya (7%) maize + pigeonpea (5%)
- Pit composting is the most common composting technology among farmers in Kasungu and Mzimba (32% farmers practicing)
- Farmers' perceptions of the 'best' soil fertility technology are: fertilizer (38%), followed by composting (28%) and manure (22%). Legume intercrops are the best technology for 13% farmers. It should be noted that currently not all technologies are available to all farmers (it is planned to increase legume seed availability this season).
- Most labour demanding technologies are: pit manure (27% farmers assessed it as very intensive), fertilizer (19%), khola manure (12%). Only 4% farmers found legume intercrop technologies labour-demanding: some farmers perceived there to be reduced labour requirements for weeding intercrops.

Activities planned for Year 2 are:

- MSc thesis defence
- Writing up findings for journal publication.
- Extend work on cost benefit-analysis of ISFM technologies: Identification of second MSc Agricultural Economics student; refine research tools for studying labour inputs. (It is expected that Legume Best Project will support the provision of planting materials for expanded areas of legume intercrops, so that preliminary Gross Margins and CBA can be assessed); extend economic analysis of composting technologies based on findings and lessons of Year 1. MSc Agricultural Economics candidates at Bunda College have now completed Year 1 of their studies and are currently drawing up research proposals for research to be conducted during 2010/11. One student will be attached to the project, supervised by Dr Mapemba and Kate Wellard.

### **2.3.3 Objective 3: Map Pathways for scaling up ISFM through government and NGOs extension**

Many of the ISFM technologies which may be considered best bets are currently being tried out by a small number of farmers in a few locations. Disseminating promising agricultural technologies to a wider group of farmers in different locations and from different backgrounds is a challenge. Government and NGOs are increasingly using farmers or communities as agents of dissemination. There are also professional change agents whose role is to influence client's innovation decision in a direction deemed desirable by the change agency. The rate of adoption has generally been understood in a narrow sense and little is known about how to make the agents of dissemination more

effective. This activity is carefully and critically analysing pathways for generation and sustainability of best bet technologies, including institutional and social factors supporting and limiting their development. It will provide policy-makers with practical information on organisations and their approaches in terms of efficiency in disseminating information, equity in terms of target group reached, effectiveness of resources used and impact on the ground, and sustainability in terms of ability of communities to maintain the innovation and supporting systems.

**Activities Year 1:** The MSc student in Agricultural Extension and Rural Development (Patrick Thawe) supervised by Dr Kambewa has carried out field research focusing on extension initiatives in Kasungu and Mzimba Districts, namely:

- Department of Agricultural Extension Services (DAES) approaches including, lead farmer, model village, greenbelts etc;
- NGOs: MALEZA's Community Agricultural Workers (Kasungu) and SFHC's Farmer Research and Extension Teams (Ekwendeni) – in support of farmer testing and development of legume technologies and their utilisation, and on-going farmer participator research and extension by the Legume Best Bets CoP (assessing pathways and rates of uptake across communities from 'mother and baby' trials, including a comparison with the 2006/7 baseline survey), as well as numerous informal pathways.

The objectives of this component are:

1. To identify main ways in which smallholder farmers access and share information about soil fertility management technologies.
2. To assess effectiveness of extension pathways which smallholder farmers use to access and share information about a technology.
3. To determine level of adoption of ISFM technologies among smallholder farmers and the role of different extension pathways in promoting or hindering uptake of ISFM technologies.
4. To identify adaptations of ISFM technologies undertaken by smallholder farmers including reasons for adaptations.
5. To provide recommendations to policy-makers on assessed options for technology dissemination.

Activities carried out included:

- 1) Literature review on technological pathways: theory and practice

2) Household questionnaire survey (190 interviews), focus group discussions, seasonal calendars, transect walks

3) Data inputting and analysis

Preliminary findings:

- Main sources of information for farmers on non-fertiliser soil fertility management technologies are: Agricultural Extension Officer (20%), NGO (14%), Community agricultural extensionist (5%)
- Three-quarters of farmers interviewed are making adaptations to ISFM technologies as promoted by extension and research organizations: 32% of adopters of legume technologies and 55% for composting
- Reasons for adaptations include: to reduce labour or other input costs, to extend the technology over a wider area, or to improve performance.

**Planned and On-going activities (Year 2) include:**

1) Case studies of farmer adaptations of technologies (own farmer experimentation)

2) Key informant interviews with extension providers (MoAFS, MALEZA, SFHC) on extension approaches and characteristics

3) Data analysis and interpretation of findings including :

- a. Assessment of characteristics of technologies that make farmers adopt or not adopt the technologies (these include relative advantage, trialability, complexity, observability, compatibility, re-innovation).
- b. Identification of the main ways farmers create and share information or technologies among each other.
- c. Identification of sets of factors (including institutions) promoting or constraining dissemination of technologies

#### **2.3.4 Objective 4: Assess nature and impact of climate variability on maize and legumes in two districts**

Researchers, policy-makers and farmers in Malawi are acutely aware of variability in climate as a critical characteristic in rainfed farming. Information on responses and resilience of different soil fertility technology options to rainfall and temperature variation is urgently needed. At the same time farmers have been facing variability in climate and other factors over a number of years, with limited understanding or support for their strategies by research, extension and policy-makers. The project sets out to increase

understanding of the nature of climate variability in Kasungu and Mzimba and farmer adaptation and mitigation practices. This activity is being carried out jointly with the Legume Best Bets project to assess productivity of maize and legumes in different ISFM technologies under a range of rainfall scenarios. The project is collaborating with the Department of Meteorology with support Statistical Services Centre, Reading.

### **Activities Year 1:**

#### **1. Climate data analysis.**

The project has been working with Prof Roger Stern to develop a detailed methodology for to collate data collection and analysis. TA funds were sought to support a researcher from Malawi Meteorology Department (Fred Kossam) to:

1. Collect and clean climatic data on rainfall, radiation and temperature in Kasungu and Mzimba districts
2. Model productivity of various technologies in Kasungu and Mzimba

Funds have now received and activity 1 is ongoing: the researcher has scoped the data available from stations and sub-stations in the 2 districts and is now collecting and cleaning the data ready for modeling.

#### **2. Farmer perceptions of climate variability**

This activity is documenting the knowledge and processes of adaptation of smallholders to change over a generation in two areas of Malawi (Ekwendeni and Kasungu). Activities already completed include:

- 1) literature review of existing documentation of farmer perceptions of climate change and mitigation and adaptation strategies
- 2) Focus group discussions with communities in 2 districts
- 3) Drafting chapter for a book: 'Farmers on the Frontline: Adaptation and Climate Change in Malawi' (Brokensha et al., forthcoming)

Preliminary findings:

- 1) Farmer perceptions show rainfall patterns over the last thirty years have changed across Malawi, with a generally negative impact on cropping and livelihoods. Narratives are compounded by changes in population, the environment, and political, social and economic context. (Table)
- 2) Adaptation strategies adopted by farmers include: planting trees, shorter duration crop varieties, drought resistant crops, planting earlier or later, using soil and water conservation strategies, engaging in off farm activities (Box 1)

**Planned activities Year 2:**

Detailed individual interviews with 60 households in Kasungu and Mzimba, focusing on adaptation and mitigation strategies, particularly in relation to integrated soil fertility (and water) management strategies, their impact, potential for adaptation and scaling-up, challenges etc.

**2.3.5 Objective 5: Develop briefs for policy-makers and Objective 6: Support policy-making fora in ISFM**

The aim of the proposed activities is to enhance capacity of government and non-governmental organisations to improve soil fertility and nutrition among smallholders in Malawi. This research project is providing direct inputs into policy in the form of policy briefs to assist the Ministry of Agriculture and its development partners to design Integrated Soil Fertility Management strategies and through participation in policy fora.

**1. Produce policy briefs, web profiles for ISFM best bet technologies**

**Activities Year 1** The main activities to date have been:

1. Production of a briefing paper: Policy Context for Scaling up ISFM and seed supply in Malawi by K Wellard and D Kambewa.
2. Collection and review of existing research and extension materials on ISFM technologies in Malawi. The review will be completed early in Year 2.

Planned activities for Year 2 are:

1. Draw up 2 more policy briefs on best bet ISFM options and dissemination pathways.
2. Develop extension materials, a 'how to' of the top 3 best bets: pamphlets and posters for extensionists and farmers. Bunda Department of Extension will collaborate with Agricultural Communications Branch, DAES, in this activity. The possibility of producing a participatory video and/or radio show with ACB will also be explored.
3. Write up research findings for journal publication (at least 2 articles)
4. Inventory of ISFM technologies will be documented and disseminated to all research partners in Malawi and the region on CD. A webpage for best bets will be posted on University of Malawi Website etc.

## **2. Support policy fora/taskforce on ISFM technologies and their promotion.**

Project activities presented above constitute an action plan to catalyze changes in policy and implementation of science-based ISFM which incorporates improved legume varieties and cropping system management practices. The team, in collaboration with other CoP projects, is uniquely placed to catalyze this scaling up to the highest policy level by building on the first McKnight supported policy workshop.

**Year 1 Activities** This objective is being met through the following activities:

1. A joint McKnight TA-funded ISFM consultation on Integrated Soil Fertility Management and Seed Systems in Malawi was held 31 August-1 September 2010 in Lilongwe. This was the product of collaboration between 3 old McKnight projects plus the incoming ISFM Scaling-up project participating on Organising Committee, presenting a keynote paper, and being responsible for editing and producing the workshop report.
2. Participation in policy fora such as the Conservation Agriculture Task Force in the Ministry of Agriculture and Food Security, the Green Belt Initiative, NGO meetings (FAIR)

**Year 2 Activities** A series of consultations for policy-makers and practitioners from government, research, extension, NGOs, farmer organizations, the private sector and research are planned for Year 2. The first will be District level workshops in Mzuzu/Kasungu followed by a 2<sup>nd</sup> National ISFM Workshop in Lilongwe mid-2011. These will include presentation for discussion of best bet technologies and pathways for scaling these up.

The activities will be led by Drs Kambewa, Phiri and Wellard from the project, in collaboration with DAES and the Director for Agricultural Research (national workshops) and the Programme Managers of Kasungu and Mzimba Agricultural Development Divisions (District Workshops).

### **2.3.6 Objective 7: Strengthen capacity of development institutions in agricultural extension and agricultural economics**

#### **Activities Year 1:**

1. **Two Masters students** are being trained under the project:
  - a. Patrick Thawe was registered for an MSc in Agricultural Extension in the Department of Rural Development and Extension, Bunda College. He successfully completed coursework in Year 1 and presented his research proposal entitled: An Analysis of Extension Pathways of Integrated Soil Fertility Management Technologies by Small-scale Farmers in Kasungu and

Mzimba. Patrick has conducted the bulk of fieldwork and data analysis and will be submitting his dissertation in December 2010.

- b. Hyton Lefu, MSc candidate in the Department of Agricultural and Applied Economics, Bunda College, was supported in his MSc research work under the project. He presented his research proposal, entitled: An Economic Analysis of Integrated Soil Fertility Management Options among smallholder farmers in Malawi. Hyton carried out fieldwork and data analysis and is currently finalizing his dissertation to be submitted end 2010.
2. **NGO and farmer capacity** strengthening in agricultural research and extension: Patrick Thawe is Natural Resources Coordinator with MALEZA Simlemba Project, Kasungu. Hyton Leyu is Project Manager with COOPI-MALEZA, Kasungu. MALEZA is a key partner in the project: with a strong emphasis on farmer participatory technology development activities. Through engagement of farmers and NGO staff in the project, farmer research capacity is strengthened.

### **Planned Activities**

1. **Support for MSc students.** Two further Masters students, one in Agricultural Economics and one in Rural Development and Extension, registered in the Faculty of Development Studies, Bunda College, will be supported to do their research projects under the project.
2. **Climate data modeling.** This activity involves training of Bunda College staff in MARKSIM and will take be supported by Statistical Services Centre, University of Reading.

### **2.4 Team Report**

Team activities carried out in Year 1 include:

1. Participation by D Kambewa, P Thawe, K Wellard in the IMEP Project Workshop, Bunda, March 2010: IMEP plan for the project summarized in Appendix
2. Participation by D Kambewa, K Wellard, P Thawe and H Lefu at the Annual CoP meeting held at Mangochi, September 26-October 1 2101. Presentation by D Kambewa.
3. Participation and presentation of paper by D Kambewa and K Wellard at First Stakeholder Consultative Policy Workshop on Integrated Soil Fertility Management and Seed Systems in Malawi, Lilongwe, 31 August-1 September 2009.



## **2.5 Challenges and Lessons Learned**

The main challenges encountered and resolutions adopted were as follows:

### **1. Methodology**

The project is research the economic viability and scaling-up potential of relatively new and under-researched ISFM technologies in Malawi. This presents methodological challenges such as sample size, given limited numbers of farmers who have been exposed to some of the technologies to date, and small areas on which the legumes are being practised; and identification of defined technologies, given the variation in farmers practices. The project is liaising with the Legume Best Bets Projects to provide farmers with larger quantities of planting material so they can extend their areas under the different technology. Farmer practices and technology assessments will be done jointly by the Scaling-Up and Best Bets projects, MALEZA and farmers.

### **2. Partnerships**

Partnerships are critical for this project since it synthesizes and builds on findings from other projects. Collaboration with other McKnight projects, such as Legume Best Bets, and with NGO partners, MALEZA and SFHC, has been excellent. The research includes a new partnership between the University of Malawi and Malawi Department of Meteorology. There are different institutional procedures and expectations which have needed to be addressed to enable meeting of project objectives within budget. However these have now been ironed out and we look forward to a successful collaboration.

### **3. IMEP**

The project is a new departure for the CoP, looking at institutional issues around development and scaling-up of legume and other ISFM technologies and policy-influencing. This has resulted in challenges in drawing up an IMEP framework to fit into the boxes of the SAf CoP Framework. However, with in discussion with IMEP team, it has been noted that the project strengthens the linkages between the boxes (thinking outside the boxes!).

### **4. Accounting**

As this is a new project there have been some challenges in reconciling the project budget, resulting in a delay in submission of the annual report and in funding some activities at the end of Year 1. However the financial accounts have now been thoroughly checked and represent actual expenditures under the project.

### 3. WORKPLAN: Scaling-Up ISFM Outputs and Activities Year 1 – 2009/10

Year 1	Descriptor	Activities completed Year 1	Institutions responsible (Lead*)	Outputs	Cost (see budget)
<b>Overall objective</b>	To significantly increase legume production and utilization by poor households and improve soil fertility in Malawi for sustainable agricultural production				
<b>Output 1</b>	Promising best bet ISFM technology for different agroecological and socioeconomic niches identified for at least 2 Districts in Malawi	<b>Literature review, Interviews with Key Informants</b> Scope review/draft technology evaluation matrix Visits to Chitedze, MoAFS, Zomba, NGOs, DARS, CGs Report writing.	BC*	Literature being collected	
<b>Output 2</b>	Constraints and opportunities for increasing uptake and utilisation, including economic incentives appraised	<b>Technical Review:</b> <b>Economic assessment</b> Construct tools for assessment Literature review Pilot survey of farmers with key technologies (composting, legumes) Labour inputs, non-labour costs, benefits of technologies identified; GM, CBA	BC	MSc Economics student thesis: economic incentives: composting	
<b>Output 3</b>	Pathways for scaling up ISFM through government and NGOs extension assessed and strengthened	<b>Ext. pathway assessment</b> Construction of model for assessment of pathways. Identification of extension approaches by different institutions (MALEZA, SFHC, Govt), and differences in uptake associated with these	BC FICA FAIR	MSc Extension student thesis: extension pathways	

		<p>approaches                      Characterisation of farmer adaptation (experimentation) to recommended technologies                      Mapping of extension pathways (GIS)</p>			
<b>Output 4</b>	Climate variability on maize and legumes modeled in two districts	<p>Collect data Kasungu Mzuzu sub-stations                      Clean, Input data for modeling                      Training in modeling e-course                      Run and review models                      Study: Farmer vulnerability, adaptation and mitigation strategies, gaps</p>	BC, MET Office, SSC	Farmer perceptions of climate change: KU, Mz: Book chapter (KW, DK)	
<b>Output 5</b>	Policy briefs, web profiles produced for ISFM best bet technologies	<p>Review technical assessments                      Design, write, illustrate briefs                      Reproduction: pamphlets, CDs, web</p>	BC, MoAFS, MSU, FAC, CAADP	Brief produced for ISFM workshop	
<b>Output 6</b>	<p>Policy fora for development of ISFM/ fertiliser subsidy exit strategy catalysed</p> <p>SF Task Force supported.</p>	<p><b>Workshops</b>                      Kasungu/Mzimba                      National workshop                      Preparation of papers                      Transport and accommodation                      Support for SF Task Force</p>	BC, MoAFS, Best Bets, Bean Seed projects, FAC, MSU, IFPRI	TA funded ISFM Workshop conducted	
<b>Output 7</b>	Two MS students trained in Agricultural Extension and Agricultural Economics	<p>Registration                      Course work                      Proposal writing                      Literature review                      Fieldwork                      Write-up                      Presentation</p>	BC	2 students completed coursework and fieldwork	

**ISFM SCALING-UP ACTIVITIES PLANNED YEAR 2**

Year 1	Descriptor	Activities Year 2	Institutions responsible (Lead*)	Timing	Cost (see budget)
<b>Overall objective</b>	To significantly increase legume production and utilization by poor households and improve soil fertility in Malawi for sustainable agricultural production				
<b>Output 1</b>	Promising best bet ISFM technology for different agroecological and socioeconomic niches identified for at least 2 Districts in Malawi	<b>Screening of ISFM technologies</b> Completion of lit. review. Set up ISFM database. Completion of extension /economic matrix, identification of gaps, re-planning of research/technology focus	BC*	Q1-2	
<b>Output 2</b>	Constraints and opportunities for increasing uptake and utilisation, including economic incentives appraised	<b>Technical Review: Economic assessment</b> Refine research tools. Extend survey on labour inputs for composting and other soil fertility technologies; compare with fertilizer equivalents. Agroecological assessment: composting composition. Economic assessment of Best Bets (Yr 2: MSc Agricultural Economics student	BC, FAIR	Q1 Q1-4	
<b>Output 3</b>	Pathways for scaling up ISFM through government and NGOs extension assessed and strengthened	<b>Ext. pathway assessment</b> Focus on scaling up of SF technologies (Legume Best Bets, composting) Govt, NGO, farmer technologies: comparison of pathways: adoption rate effectiveness, equity. Supporting extension pathways: Learning Circles. LFs, model village. Institutions affecting innovations (Yr 2: MSc student) Mapping of extension pathways (GIS)	BC FICA FAIR	Q1 Q1-4	

<b>Output 4</b>	Climate variability on maize and legumes modeled in two districts	Collection, cleaning, analysis of rainfall, temp, radiation data Yield data, modeling Case studies: Household Survey of farmer adaptation and mitigation strategies, including ISFM	BC, MET Office, SSC, Best Bets	Q1-4	
<b>Output 5</b>	Policy briefs, web profiles produced for ISFM best bet technologies	2nd ISFM Workshop Policy briefs: Design, write, illustrate briefs Reproduction: pamphlets, CDs, web	BC, MoAFS, MSU, FAC, CAADP	Q2-4	
<b>Output 6</b>	Policy fora for development of ISFM/ fertiliser subsidy exit strategy catalysed	<b>Workshops</b> Kasungu/Mzimba National workshop Preparation of papers Transport and accommodation Support for SFpolicy fora: MoAFS Conservation Agriculture Task Force, Green Belt Strategy, NGOs	BC, MoAFS, Best Bets, Bean Seed projects, FAC, MSU, IFPRI	Q2: KU/Mz workshop; Q4 National workshop	
<b>Output 7</b>	Two MS students trained in Agricultural Extension and Agricultural Economics	Writing up and submission of theses (2 students); drafting research, policy and extension papers with project staff. 2 <sup>nd</sup> year 2 MSc students: identification, proposal writing, Literature review, Fieldwork, Write-up, Presentation	BC	Q1 Q1-4	

## Appendix A: Research Findings

**Tables** (Preliminary findings explained in Section 2 above)

**Table 1: Soil fertility technologies Practised by Smallholder farmers in Kasungu and Mzimba**

Soil improving technology	N	%
Inorganic fertilizers	47	46.1
Compost manure	10	9.8
Legume intercrop	8	7.8
Khola manure (from livestock)	5	4.9
Fertilizer/compost manure	23	22.5
Fertilizer/khola manure	9	8.8
<b>Total</b>	<b>102</b>	<b>100.0</b>

**Table 2: Legume Best Bets technologies practiced by smallholder farmers on their fields (not mother or baby trials) in Kasungu and Mzimba**

	N	%
Maize+groundnuts	10	9.8
Maize+pigeon peas	5	4.9
Maize+soya	8	7.8
Maize+beans	5	4.9
Pigeon pease+soya	2	2.0
Pigeon pease+g/nuts	2	2.0
G/nuts + soya + maize	19	18.6
Gnuts + soya	7	6.9
G/nuts, pp, soya	1	1.0
Maize + g/nuts	2	2.0
Maize, g/nuts,pp, soya	2	2.0
Maize, g/nuts, soya, beans	3	2.9
Maize, soya and beans	3	2.9
Farmers not practicing legume intercropping	33	32.4
<b>Total</b>	<b>102</b>	<b>100.0</b>

**Table 3: Compost technologies practiced by farmers in Kasungu and Mzimba**

Type of compost	N	%
Pit	32	31.4
Bokash	2	2.0
Chimato	1	1.0
Pit and chinese	1	1.0
Pit and chimato	1	1.0
Pit and bokash	1	1.0
Not practicing compost	64	62.7
<b>Total</b>	<b>102</b>	<b>100.0</b>

**Table 4: Best technology as observed by the farmer**

Best technology for the farmer	N	%
Use of fertiliser	39	38.2
Use of compost manure	28	27.5
Use of khola manure	22	21.6
Legume intercrop	13	12.7
<b>Total</b>	<b>102</b>	<b>100.0</b>

**Table 5: Sources of information on organic soil fertility technologies**

Source	Legumes (n)		Compost	
		(%)	(n)	(%)
Govt AEDO	4	2.1	37	19.5
NGO	12	6.3	26	13.7
Community Ext. agent	11	5.8	9	4.7
Parents	0	0	5	2.6
Bunda College	17	8.9	4	2.1
Radio	2	1.1	1	0.5
Friends	0	0	2	1.1
Not practising	144	75.8	106	55.8
		<b>Farmers adapting (n)</b>		<b>(%)</b>
Changes to legumes	9		20.2	
Changes to compost	19		43.3	
Changes to both	5		11.5	
No changes made	11		25	

**Table 6:  
Farmer  
adaptati  
ons to  
organic  
soil  
fertility  
technol  
ogy  
recomm  
endatio  
ns**

**Table 7: Reasons for farmer adaptations to existing soil fertility technologies**

Reason for changes	Changes to legumes (n)		Changes to compost (n)	
		%		%
To reduce labour	5	55.5	9	47.4
To increase performance	1	11.1	2	10.5
To cover a larger area	2	22.2	3	15.8
To reduce cost	1	11.1	5	26.3



**Table 8: Farmer perceptions of weather events and climate variability**

Year	Location	Weather event	Source
pre 1970 1970s 2000s	Salima	First rains started October: ripened mangoes, prevented bush fires. Rains began starting in November Rains now starting December: shorter season	Action Aid (2006)
1970- 80s	Kasungu (Chisazima)	Rain started November, ended March (or April). Sometimes fell for 2 weeks with intermittent breaks; or for 2 days and stopped for 2 weeks. Rain usually medium-heavy especially December-January. Planted beginning November. Hot season started August/September until December: very hot. Cold season started April if rains heavy until March: very cold due to moist soil. July: showers, sometimes heavy rains: sufficient water in dimbas.	Own survey
1984 1989 1997	(Mdoka) (Ndaya)	Last 'good' years: rain started November, ended February, good rainfall distribution, no floods. People planted early, finished weeding December, eating fresh maize February, harvested very well.	
2000	(Chaguma)	Rains good, no prolonged dry spells; good harvests. Very hot August-December, couldn't walk barefoot. Cold season began April, heavy showers July.	
2001/2 2004/5		Droughts. Rains started and dried up. People harvested nothing: cooked banana roots, maize husks. Reliant on piecework in other places, food-for-work programmes	
2000s	(Chaguma)	Rains start late, intermittent with dry spells, finish early. Not all areas receive rain. Insufficient moisture for main season and cold season dambo cultivation, wells dry.	
1970s- 80s	Mzimba (Ekwendeni)	Rainfall started November/early December, heavy to April when beans planted. Rains heavy but no floods. Sometimes chiperoni (cold season showers) and mzambwe winds. Hot season started early September. October very hot could not sleep in iron roofed houses. No winds except whirlwind; cold season windy.	Own survey
2000s		Rain coming late and finishing early. Can stop for several weeks. Very sunny, dries the crop. Windy, from different directions. Hot season started September: hot with dancing waves. Could not walk barefoot especially at noon. Hot even during rains.	
2008/9		Last good year. Rain began beginning of December up to April, with dry spells of maximum 2 weeks. Good harvest and enough water in dimbas.	

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2002	Nsanje	Floods over knee height	Action Aid
1990s		Floods increasing in intensity and frequency	

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**BOX 1: Community and individual strategies to cope with environmental change: Kasungu and Mzimba Districts, Malawi**

- Planting trees (to conserve watersheds and to protect houses from strong winds)
- Growing hybrid maize and cassava varieties that mature more quickly than local varieties (but only a few can afford these)
- Planting more drought resistant crops like cassava, sweet potatoes and soya
- Planting crops earlier or later, depending on the shift in rainfall patterns in the local area
- Not lighting bush fires
- Constructing contour ridges to conserve soil and water
- Adopting new planting technologies (e.g. single seeds only 25 cm apart)
- Boiling drinking water to avoid water-borne diseases in times of drought and floods
- Engaging in small businesses (e.g. selling fritters, charcoal, fish, traditional beer)
- Doing casual work, or ganyu (e.g. within the village, making bricks or working on someone else's plot, or in town, working in construction)
- Some resort to crime and sex-for-food transactions

## ***APPENDIX B: Publications***

Wellard K and Kambewa D (2009) 'Policy Context for Scaling-up Integrated Soil Fertility Management and Seed Supply in Malawi' in Proceedings of 1<sup>st</sup> Consultative Policy Workshop on ISFM and Seed Systems in Malawi, 31 August-1 September 2009, Lilongwe

Wellard K, Kambewa D and Snapp S (forthcoming) 'Farmers on the Frontline: Adaptation and Change in Malawi' in Brokensha D, Castro P and Taylor D (eds.) *Climate Change and Indigenous Knowledge: Perceptions and Adapations of Threatened Communities*. Rugby, UK: Practical Action Publications

## ***Appendix C: Training and Outreach***

Please See Section 2 above

## ***Appendix D: Photographs and Graphs***

Please see separate file