Dissemination of Soil Fertility Management Technologies for Improved Livelihoods by Farmer Groups in Pallisa District, Uganda

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DECLARATION

I **Medard Munywaniwawe,** declare that the work presented in this research dissertation is my original and has never been presented and submitted to any University or Institution of higher learning for any award.

Signature

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Date

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APPROVAL

This is to certify that this research dissertation presented hereby Munywaniwawe Medard was carried out under my supervision and now is ready for submission to the school of graduate and directorate of research training of Makerere University.

Signature

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DEDICATION

I first dedicate this research dissertation to The Almighty GOD, without Him in my life everything could be drawback.

I further dedicate this book to my beloved brother Mr. Jethro for bringing me up academically with his financial bear and educational decent in our family.

I do further dedicate this research dissertation to my biological parents Mr. Nehemiah and Mrs. Faith Ruhinda, and to Boleyn Nowawe my beloved daughter.

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ABSTRACT

The research assessed the dissemination of soil fertility management technologies for improved livelihoods by farmer groups in Pallisa district, Uganda. It was also investigating the role of farmer groups in dissemination of new soil fertility management technologies, factors affecting the dissemination, challenges the farmers meet in uptake and generally the best solutions to the difficulties in use of soil technologies. The study was carried out in Butabo and Opwateta Sub-counties in Pallisa district, Eastern Uganda. The district is generally environmentally degraded with sandy and sandy loams of medium to low productivity and there is rapid population increase. The study adopted cross-sectional research design which included survey of household farmers and other community members. A total of 100 respondents were simple random and systematic sampled for quantitative results where gender was highly considered. The study also included 38 respondents were purposively selected for qualitative findings, whereby 20 group leaders, 10 Extension workers and 08 local leaders were selected as key informants and five Focus Group Discussions. The research findings revealed that the greater involvement of farmers in farmer groups encourage the dissemination and adoption of soil fertility technologies. The results indicated that, farmers who are in farmer groups have high chances to disseminate and adopt Soil Fertility Management Technologies (SFMTs) than those who are not members for improved productivity and livelihoods, because easily share the knowledge and resources. The study findings indicated that, the dissemination and adoption of SFMTs for improved productivity by farmers in Pallisa district is not affected by size of farmer's land holdings, but rather rural communities prefer local practices because they are cheap in terms of cost, apply and carry out by farmers than inorganic fertilizers that are expensive. The study findings further show that, a positive relationship between the farmer groups and wide spread adoption and utilization of new innovation (soil fertility management technologies) by all farmers in the district. In conclusion, farmer groups remain the most and suitable for farmers' economic development. Ugandan farmers should therefore take into account and intervention in SFMTs practice to succeed food insecurity and rural poverty and government should empower farmers through incentives and infrastructure improvement in rural areas.

LIST OF ABBREVIATIONS AND ACRONYMS

ACEs	Area Cooperative Enterprises
ACORD	Agency for Cooperation and Research in Development
AIS	Agricultural Innovation Systems
ASARECA	Association of Strengthening Agriculture Research in Eastern and Central Africa
CAAD	Comprehensive Africa Agriculture Development Programme
CBOs	Community Based Organizations
CBRD	Community Based Rural Development
CD	Compact Disc
CSOs	Civil Society Organizations
DAO	District Agricultural Officer
DAP	Diammonium Phosphate
DANIDA	Danish International Development Agency
DENIVA	Development Network of Indigenous Voluntary Association
DSIP	Development Sector and Investment Plan
FAAP	Framework for Africa Agricultural Productivity
FAO	Food Agriculture Organization
FFS	Farmer Field School
FGs	Farmer Groups
FGDs	Focus Group Discussions
FIDA	Foundation for International Development Assistance
FOs	Farmer Groups
FYM	Farmer Yard Manure
HSUs	Homestead Units
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizers Development Centre
ISFM	Integrated Soil Fertility Management
KFIAP	Kaleko Farmers Initiatives against Poverty

KIIs	Key Informant Interviews
KWA	Kanyum Women's Association
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MFPED	Ministry of Finance, Economic Planning and Development
NAADS	National Agricultural Advisory Services
NARL	National Agricultural Research Laboratories
NARO	National Agricultural Research Organization
NEMA	National Environmental Management Authority
NEAP	National Environmental Action Plan
NGOs	Non Governmental Organizations
NPK	Nitrogen Phosphorus Potassium
PMA	Plan for Modernization of Agriculture
RDS	Rural Development Strategy
SACCOs	Saving and Credit cooperative societies
SARD	Sustainable Agriculture and Rural Development
S/C	Sub-County
SDA	Seventh Day Adventists
SFMTs	Soil Fertility Management Technologies
SPSS	Statistical Package for Social Scientists
SSA	Sub-Saharan Africa
SSP	Single Super Phosphate
TAN	Technical Advisory Note
TSP	Triple Super Phosphate
UBOS	Uganda Bureau of Standards
UHDR	Uganda Human Development Report
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VICs	Village Information Centers
ZARDI	Zonal Agricultural Research Development Institute

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CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The agriculture sector and the issue of soil fertility management in the developing world remain torn between the roles of stakeholders on the best practices and farmers. Sub-Saharan Africa's rapid population growth, combined with a stagnating agricultural productivity, has led to a decrease in per capita food production. It is now the only region in the world where both the number and the proportion of malnourished children has been consistently rising in recent years (FAO 2010, Rosegrant, Paisner and Witcover 2001). Throughout most of Eastern and Southern Africa small scale farming is dominant for food production (Byerlee and Eicher 1997), so maintaining soil fertility management technologies is essential for improving productivity and livelihoods. Soil fertility depletion on the other hand is increasingly being recognized as a fundamental root cause for declining agricultural growth among smallholder farmers of Sub Saharan Africa (SSA). Soil fertility was identified in the 1990s with the aim of increasing on the production and improving farmers' livelihoods that, 'No matter how effectively other constraints are, remedied per capita food production in Africa would continue to decline unless soil fertility depletion is effectively addressed' (Sanchez, Keith, Place, Uzo, Buresh, and Woomer 1997:37). Poor soil management practices are major reasons for slow growth in food production in SSA including Uganda. Soil nutrient and soil fertility decline is a fact for most areas in Uganda, as soil fertility management has remained rudimentary.

Low productivity may also be due to farming practices that have not adapted to changing circumstances, for instance farmers have limited access to farm implements. This is also leading to high-level post-harvest losses. Farmers rely on natural fallow to restore soil fertility levels. However, long term fallowing is no longer possible, as pressure from a growing population has made land a scarce commodity in Uganda- from 24.6 million in 2002 to over 30 million people in 2009 (UBOS 2002; Population reference bureau 2009).[1] There are no long-term studies monitoring the status of soils, nutrient balances and crop Productivity for improved livelihoods in Uganda. However, evidence from various sources indicate that soil fertility is declining as

[1] New Vision Uganda October 29, 2010 Released under the National Household Survey 2010 by Uganda Bureau of Statistics.

demonstrated by studies on farmers' perceptions of soil fertility change, nutrient balances and on-station fertilizer trails (Rubaihayo 2006; Bekunda and Woomer 2004; Wortmann, Lubanga and Kaizzi 2006; Opio-Odongo, Nsubunga, Bibangambah and Jossy 2003; Tukahirwa 1992). Although, the sector under discussion is of paramount strategic importance to the Ugandan economy, as it contributed 60 percent of GDP and providing employment for 90 percent of the population in 1990s (MAAIF/MFPED 2009), and the sector's performance since 1997 is worrisome. Real growth in agricultural output has been declining steadily from 7.9 percent in 2000/01 to 1.3 percent in 2007/08, although it did show signs of recovery during 08/09, with a 2.6 percent growth rate in agricultural output by Uganda Human Development Report (UHDR) on agricultural sector 2009/10. However, with 73 percent of all households in Uganda and the majority of the poor depending directly on agriculture for their primary livelihood, this is a serious setback in the drive to eradicate poverty. Critical analysis shows that during the 1990s, the agricultural sector grew at an annual rate of 7 percent in real terms (MAAIF/MFPED 2000), mainly through the expansion of cultivatable acreage rather than the intensification of agriculture (UNDP 2007). The practices in 1990s explain the current low crop yields. This is because the practices never put soil fertility management into consideration. The declining soil fertility has a significant impact on the crop yields and on the increase in poverty levels in the countryside rated 31 percent by African Development Bank (Joint Assistance Strategy 2005-2009).

The National Agricultural Research Organization (NARO) (2007) observed, that improving Integrated Soil Fertility Management (ISFM) has been given little consideration in agricultural policies and planning, largely because it is commonly believed that Ugandan soils are very fertile (Zake 2002; Mungyereza 1999). The policy making process cannot be improved unless those involved have sought understanding of the diverse soil fertility management strategies used by farmers for improving their livelihoods, and insight into the perceptions of all stakeholders involved in the agricultural sector. At the core of the stakeholder involvement are the farmers who are mobilized in farmer groups especially by NAADS programme that has tried to help in establishing farmer groups. This has fundamentally helped in the dissemination of extension services among which are the soil fertility management. Uganda's agriculture is characterized by a low application of modern inputs resulting in low yields. Fertilizer use, for instance, Uganda has the lowest fertilizer use in the world, according to ministry of agriculture official and to the

declaration; Uganda was recommended to apply 200kg of fertilizer per hectare annually but only applies 1 kg/hectare annually.[2] International experience shows that agricultural productivity has grown rapidly where modern varieties and fertilizers have been widely adopted. Whereas the farmer groups are deemed to be at the core of spearheading the soil fertility management technologies, there exists a challenge of limited data on the milestones so far made in the different parts of Uganda. For this purpose therefore, the research explored the fundamental role of farmer groups in Pallisa District.

The study examined the way in which various individual farmers and farmer groups perceived the processes used to formulate and implement soil fertility management technologies in Pallisa District Eastern Uganda. The research followed a participatory and interactive approach, involving farmers, extension workers and opinion leaders. The researcher identified the gaps and dynamics influencing the uptake and scaling up of soil fertility management technologies in Pallisa District that were introduced by National Agricultural Research Organization/Laboratories (NARO/NARL) in the area with the implementation of Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), which was put in place to promote economic growth, fighting poverty, eradicating hunger and enhancing resource through regional and collective action in agricultural research.

1.2 Statement of the Research Problem

Although the Agriculture sector in Uganda has over the past previous two decades been offered great attention it still shows stagnated results (Tukahirwa and Viet 1992). The agriculture sector continues to face a predictable set of challenges. The most important among these are; low levels of productivity due to the problems of rapid declining in soil fertility that further result into low yields, famine, poverty, poor health due to poor feeding, and yet continued low levels of use of modern or productivity-enhancing inputs; as consequence for productivity growth and performance in agriculture for improved livelihoods, there is a need to put emphasis on agricultural research to reach farmers.

[2] New Vision Uganda February, 7th 2011 Released under MAAIF by Commissioner of Crop Protein in the Ministry, Ms Komayombi Bulegeya.

On the other hand, many promising soil fertility management technologies and methodologies such as trainings, farmer field schools, farmer groups, demonstration farms, farmer field days, mother baby trails (NARO 2010), were developed and implemented by NARO are available to address the problems in Pallisa district, but after all these efforts there is little impact of the technology to farmers' adoption. Therefore, the key questions for this study were; how has the dissemination of soil fertility management technologies (SFMTs) been carried out in Pallisa District by farmer groups? How has the adoption of SFMTs by individual and group farmers helped to improve productivity and livelihoods? What are socio- economic and cultural practices that enhance or fail the adoption to new soil fertility management techniques? What are the different ways farmer groups use to disseminate new soil fertility management technologies? What are the different SFMTs disseminated to farmers? Are farmer groups adequately empowered to disseminate the technologies or not? What challenges affecting the dissemination of SFMT to farmers and what measures could be taken?

1.3 Objectives of the Study

1.3.1 General Objective

The overall objective was to establish the role of farmer groups in disseminating soil fertility management technologies for agricultural productivity and improved livelihoods in Pallisa District, Eastern Uganda.

1.3.2 Specific Objectives

i. To explore the nature of soil fertility management technologies used by farmers in Pallisa District.
ii. To assess the contributions of farmer groups in disseminating soil fertility management technologies.
iii. To examine the factors affecting dissemination of soil fertility management technologies by farmers and group farmers.
iv. To identify challenges and possible measures to ensure better performance of farmer groups in disseminating soil fertility management technologies and practices.

1.4 Significance of the Study

The study examined the dissemination of soil fertility management technologies by farmer groups for improved productivity and livelihoods. To me, it is believed that farmer groups are the best clarification to the declining soil fertility. However, the study identified the farmer groups as changing pattern through role the farmer groups play in uptake and adoption of soil management technologies and providing a better understanding of the methodology for farmers' participation in the adoption. The study also helped to reveal the contributions of farmer groups in disseminating soil fertility management technologies in most areas hence help to attract government, NGOs, and civil societies to support the farmer groups in order to enhance sustainability rural livelihoods as well as soil fertility management for improved productivity.

Study findings also guide policy makers to make appropriate policies on agricultural based activities to farmers. The study can help in enhancing soil fertility, increased crop production and reduction of poverty levels among rural farmers for their better livelihoods. The study findings will help ASARECA project, National Agricultural Research Organization (NARO)/ National Agricultural Research Laboratory (NARL), NAADS and Ministry of Agriculture, Animal Industries and Fisheries who are engaged in sustainable agriculture and improvement to identify farmer groups and SFMTs as an appropriate innovation approach for increased crop yields to all farmers where the soil infertility is increasingly affected areas. The study identified feasible measures and provides recommendations that farmer groups should be strengthened and infrastructure improvement in area for effective success of soil fertility management technologies adoption through farmer groups. The study provided aground for future references and studies in the field of agriculture more particularly farmer groups and soil fertility management. This greatly supplements the little information that is present in the area and by doing this; the study filled a knowledge gap in that research area for researchers and scholars.

1.5 Scope of the Study

This study drew attention in dissemination of soil fertility management technologies by farmer groups for improved livelihoods. It investigated the NARO soil fertility management technology practices, contributions of farmer groups, and impact and influence dissemination of new soil

fertility management technologies to farmers. The study was conducted in Pallisa District in Eastern Uganda.

1.6 Key Definitions

1.6.1 Soil Fertility Management Technologies (SFMTs)

Soil Fertility Management Technologies, refers to making best use of inherent soil nutrient stocks locally available soil amendments (for instance; crop residues, composts, animal manure, green manure), and inorganic fertilizers to increase land productivity even as maintaining and enhancing agricultural resource base, International Fertilizer Development Centre (IFDC) 2007.[3]

1.6.2 Farmer Groups

Farmer Groups are grassroots farmer institutions upon which the country's farming community can build strong local and national organizations and form networks that can help in fostering agricultural development through proactively demanding for farmers' rights. Such rights include the right to a share in national resource allocation and its accountability, the right to participate in decisions that affect the farming community (Farmer Group Article 2008).[4] Also can be defined as, the coming together of farmers whereby members help one another and through which they enhance their farming by solving production and marketing problems. Farmer groups encompass all forms of farmer' organizations formal and informal, production and marketing farmers-cooperatives and farmers' Saving and Credit Cooperative Societies (SACCOS).

1.6.3 Dissemination

Disseminate is a verb and it means to spread information or ideas to as many people as possible. However, in terms of the field of communication, means to broadcast a message to the public without direct feedback from the audience.

[3] International Fertilizer Development Centre (IFDC), 2007 on integrated soil fertility management technologies best bet practices.

[4] Farmer Group Article 2008 the relationship between quality of farmer groups and effectiveness of NAADS programme and other related factors which looked at the use of farmer group as intermediaries for developing farmers.

1.6.4 Livelihoods

Livelihood means of making a living or it is supporting and securing the necessities of life. The ways in which people earn access to the resources they need individually such as food, water clothing and shelter. It encompasses people, capabilities, assets, income and activities of life. State, Birungi and Nicoline (2009), describe livelihoods as people's means of day-to-day survival.

1.7 Theoretical Framework

The understanding of the dissemination of an innovation, which is new soil fertility management technologies by farmer groups to other farmers, can be drawn from diffusion of innovation theory whereby an innovation is communicated through certain channels over time among the members of social system (Greg 2003; Rogers 1995). The theory suggests five stages to the process of adopting an innovation: namely the need for knowledge for an individual to become aware of an innovation, persuasion of individuals to become actively interested in seeking knowledge about the innovation, making decision when weighing the advantages and disadvantages of the innovation and decisions whether or not to adopt it, later implementation by persons puts innovation into use and lastly confirmation/ evaluate the results of an innovation-decision already made (Rogers 1995).

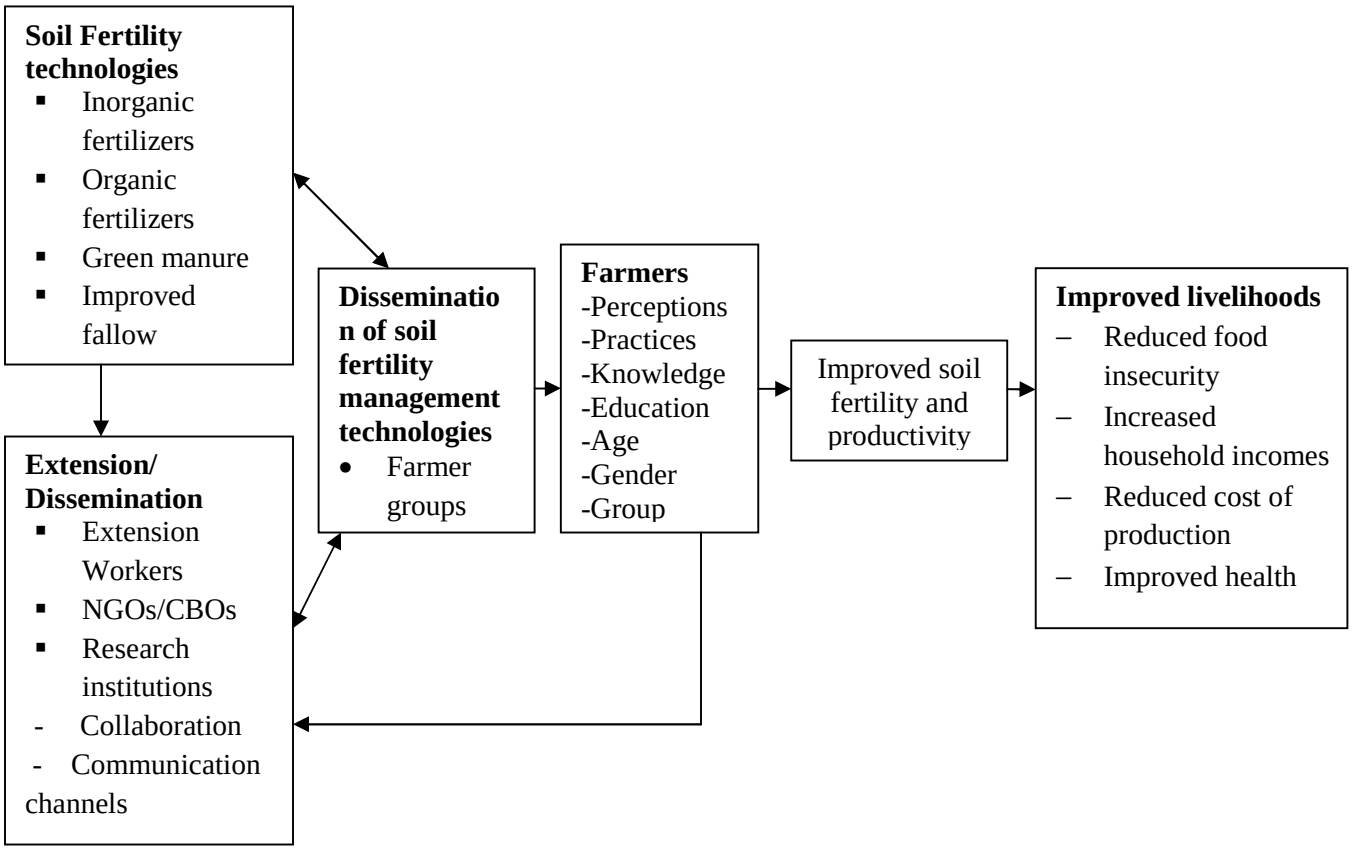
Applying the theory to the study, it is significant that farmers will be provided with the necessary information through farmer groups for the uptake of new soil fertility management technologies with clear indicators of the hazards involved. It is also vital that persuasion of farmers to become actively interested in seeking knowledge about interesting soil fertility management technologies is carried out. At this stage, care should be taken to point out the contributions and factors affecting the dissemination of new soil fertility technologies. It is important that follow-ups are made to encourage the farmers appreciate the dissemination of new soil fertility management technologies on which they will improve productivity for improved livelihoods.

In this case therefore, diffusion theory which is a set of generalization regarding the typical spread of innovations with in a social system one faces his/her own innovation-decision (some are early adopters of new thinking, and others are late). However, the effective use of new

technologies to become innovations is often defined by conditions and simple access to knowledge and information, it often requires appropriate, innovative institutional and organizational settings and what farmers today need most is a new perspective on their livelihoods.

1.8 The Conceptual Framework

Figure 1. 1. Conceptual Framework



The above conceptual framework presupposes that, successful soil fertility management technologies dissemination and adoption by all farmers is a function of three major interconnected aspects; technological development (research), technological dissemination (extension) and technological utilization by the farmers for improved soil fertility and later productivity hence improved livelihoods by reduced food insecurity, increased household incomes, reduced cost of production and improved health. The demographic factors represent the socio-economic characteristics of the population, which influences the uptake of soil fertility

management technologies by the farmers. The study therefore, examined the interface between the farmers, extension service providers and research institutions, and opinion leaders, in the dissemination of soil fertility management technologies. The study established the factors that hold back soil fertility management technologies dissemination and uptake or adoption in Pallisa District in Eastern Uganda as well as identified the gaps and possible opportunities.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section includes the review and analysis of the literature and it first introduces on context of soil fertility and agriculture productivity, and nature, and different of soil fertility management technologies and it entails the socio-economic perception of soil fertility depletion and role of farmer groups in disseminating soil fertility management for livelihood improvement. This section further assesses the feasibility of soil fertility management, factors influencing and affecting dissemination of soil fertility management technologies as the literature includes the relationship between the concepts of farmer groups and soil fertility management.

2.2 Context of Soil Fertility Management and Agriculture Productivity

The world in general and developing world particular, need reliable information and knowledge on soil fertility management and agriculture productivity which are threatening the rural livelihoods. Numerous studies have found that, number of African countries already face socioeconomic factors that make agriculture challenging. Poor soil fertility management is likely to reduce the productivity, in certain parts of the Continent and at worst may force large regions of marginal agriculture out of production (Woodfine 2009). Most ecological and social system have a measure of in-built adaptation capacity projected reductions in crop yields due to poor soil management among smallholder farmers, in some Countries such as Senegal, Ghana, Kenya, Zimbabwe just mention but a few have already implemented strategies for such misfortune. Crop net revenues could fall by as much as 90 percent by 2020 (Woodfine 2009), with small-scale farmers being the most affected due to not being addressed and this will inevitably adversely affect food security among nations.

African agriculture stands at crossroads either improved productivity and livelihoods will remain elusive with isolated success in dissemination and adoption of new soil fertility technologies by smallholder farmers to improve on productivity and their livelihoods. African countries, soil fertility management and agriculture productivity in which groups of farmers learn together, exchanging know-how and organizing their own knowledge networks and sharing are rapidly declining as it is no longer supporting plant life for farmers' livelihoods. A number of guiding

principles have been derived from consultation with Africa's agricultural people and with their development partners. The Framework for African Agricultural Productivity (FAAP) indicates how such best practice can be employed to improve the performance of agricultural productivity and improve livelihoods in Africa. Beyond improving the performance of individual initiatives, the FAAP also highlights the need to replicate and expand such programmes through increased levels of investment (FAAP 2006). Therefore, this research study contextualized and added knowledge to the area under discussion.

Uganda is among the countries in SSA that is largely depending on agriculture for daily livelihoods. Soil nutrient depletion is one of the most critical problems in Uganda that cause low production and poor livelihoods; scientists indicated increasing soil fertility management and farmers continuously decline in uptake (Lufafa and Rucker 2000). Development of methodologies and new technologies in the agricultural sector, but experiences and skills on ground challenges with rural farmers in utilization and uptake in order to improve their livelihoods and among which soil fertility management technologies dissemination shows a great slow down in uptake by smallholder farmers to improve productivity in Uganda and therefore this study established whether farmer groups in the study area (Pallisa district, eastern region) are effective in disseminating about soil management and in helping farmers adopt the soil fertility management technologies in Pallisa district.

2.3 Soil Fertility Management Technologies in Uganda

There is a wide range of soil fertility management technologies in Uganda perhaps the most prominent include; Fallowing, Use of crop residues, Farm Yard Manure, Use of green manure, Use of inorganic fertilizers, Crop rotatiosn, Intercropping and Organic crop residues (Tukahirwa and Viet 2005).

2.3.1 Fallowing as a Mechanism for Soil Fertility Maintenance

Fallow is a communal practice which brings farmers together for participation across the community and this contribute to social exchange of ideas and knowledge for a common purpose and therefore to move a step forward in uptake, farmer groups are required as essential mechanisms. However in the previous years, soil fertility management in Uganda was

maintained mainly through resting land for 5 to 10 years (Tukahirwa and Viet 2005). In most African countries, off-take of major plant nutrients regularly exceeds replacement, the organic matter content of soils has declined and increasing population pressure has made traditional fertility restoration by bush-fallowing (shifting cultivation) increasingly ineffective (IFDC 2007). Fallowing is increasingly no longer possible due to increasing population pressure on land (Okalebo, Gathua and Roomer 2003). Hence, the introduction of new technologies as alternative to full boost soil, improved fallow (NARO 2007), was put in place as new effective technology substitute to the 5-10 years traditional fallow which needs to be disseminated and adopted by farmers and this is needed by the role of farmer groups into considerations to channel the utilization.

2.3.2 Farm Yard Manure (FYM)

Farm yard manure, is one of the important soil fertility technology which is currently being recognized by the soil scientists for maintaining fertility in the soil and increase crop productivity. However, farmers' preference and choice have not been long put into consideration for effective adoption, farmer groups could be well recognized for dissemination of FYM because of their collective action in achieving common interests, what is not established is how this arrangement benefits the poorer farmers and how this relates to the value of nutrients exported out of their farming systems. One response to smaller land holdings and reduced fallow has been to farm the available land more intensively, especially the fields around the homestead known as Homestead Units (HSUs) (Walaga, Egulu, Bekunda and Ebanyat 2001). Farmers apply farmyard manure in these gardens and have refined existing technologies such as NPK use. The most pressing question for this study was how the technology practice of change and progress itself can be uptake and managed.

2.3.3 Inorganic Fertilizers

Despite the contributions of the agricultural sector, agricultural development remains a challenge in developing countries with little attention to the challenges facing agricultural sector. There has been a notable decline in food production due limited use of artificial fertilizers, increase in poverty levels (Keith 2008). Therefore, the study intended to find out how has the dissemination of inorganic fertilizers been carried out by farmers in the study area, Pallisa district what if it is

well recognized, would it help in understanding why soil management technologies are disseminated or not? When farmers are together into farmer groups, dissemination of new innovations are likely to be easily shared from relatives to neighbors and entire community members about inorganic fertilizers. Ugandan farmers do not depend much on purchased soil management technologies, due to the fact that most of them are rural poor farmers who cannot afford the prices whether locally manufactured or imported. However, it was observed that use of inorganic fertilizers is not affordable in Africa where subsidies are insignificant or non-existent (Okalebo, Gathua and Woomer 2004). Another issue sighted for non-spread and adoption of inorganic fertilizers is due the lack of village information centers (VICs) to farmers in its utilization. In addition, fertilizers are sold in big quantities, which they cannot afford. In such a situation, the farmers look for alternative means of improving and sustaining the fertility of their soils. The plan for the modernization of agriculture (PMA 2003) acknowledges that, increased agricultural output can come from increase in areas under cultivation and intensification of management on existing farms through the application of agro-chemicals, plant breeding and adaptable soil conservation techniques (NEMA 2006). Small-scale farmers mainly apply inorganic fertilizers such as DAP, TSP, urea, nitrogen, phosphorus, potassium, rhizobia and among others, therefore what different ways farmer groups use to disseminate inorganic as new soil fertility technology.

2.3.4 Crop Rotation and Intercropping

Soil fertility management can be maintained without use of fertilizers through crop rotation and intercropping as identifying existing alternative farming practices and calling for scientific investigations to understand how these systems worked. Worldwide, most extension agents have, in fact, had broader impacts than merely transferring technology (Keith 2008). Thus, increasing agricultural productivity not only relies on improved production efficiencies, such as through adoption of modern or improved technologies and practices, but also critically relies on crop rotation and intercropping. Farmers in different environment can increase their farm productivity more than what they actually produce when they link between knowledge and action in crop rotation and intercropping. Crop rotation is also used, though not as soil management technology (Ssekabembe 2005), but rather unexpectedly. Moreover, the way it is practiced is very unscientific. Very few do it rightly, whereby cereals are rotated with legumes, which help in

development of legume biomass and nitrogen fixation. Otherwise, in most areas, farmers rotate similar categories of crops, which end up mining nutrients in soil. This is likely to be a case for farmer groups in Pallisa district who participate and carry out crop rotation as soil fertility management practice.

On the other hand, intercropping is practiced not necessarily as soil management technology, but for reasons of food security and better livelihood such that a farmer is assured of a crop harvest in a crisis period and to reduce chances of total crop failure. The world of agricultural information and communication is changing as agricultural innovators become active creators and managers of information and knowledge and information managers become innovators (Ballantyne 2009**).** Proper intercropping involves planting two or more crops simultaneously on the same piece of land but in this case, at least one of the component crops is planted in rows (Nsubuga 1994). For example in Uganda, bananas are intercropped with robust coffee (Ssekabembe 2005). In Eastern Uganda, maize is usually intercropped with beans, peas or groundnuts. The crops that are intercropped must benefit from one another. Therefore the study was conducted and analyzed that, farmers' perception on intercropping techniques are less scientific which need practical utilization for adoption.

2.4 Socio-economic Perception of Soil Fertility Management Technologies by Farmers

Socio-economic perception depends on the land/ household land user applying the technologies that is farmer groups; population density, land ownership and level of income are key issue for dissemination of new innovation. However, low soil fertility is associated with population increase in the nation where by the birth rate of 3 percent in 2004 (Zake 2002) and the current 3.2 percent in Uganda is far out of phase with agricultural production rate at 1.5 percent.[5] The high population pressure and the reduced per capita land availability make fallowing impossible. Farmers continually cultivate their land parcels always leading to soil exhaustion. It is observed that the effects of soil fertility depletion decrease food security through lowering production (Sachez, Keith, Place, Buresh and Woomer 2002). This therefore, as failure for farmers to perceive the better use of new technologies, however this study was proposed to find out what role of farmer groups can play in dissemination of new technologies on improving soil fertility in

[5] UBOS October 2010 Report on population growth rate projections in the Housing and Household Survey in Uganda

eastern Uganda. Hence one of the questions for this study was what are socio economic and cultural practices that enhance or fail the adoption of new technologies to farmers in the area?

2.5 Role of Farmer Groups in Dissemination of New Innovations in Agricultural for Improved Livelihoods

There are several roles that organizations contribute towards its formation based on the mission and goals for particular purposes. Farmer groups are among the small organizations that do exist and assist at grass root levels and majority to farmers for jointly decisions in the rural development. Farmer groups enable the farmers to improve farming practices, however, despite the decentralization of these services including those directly related to agriculture. Farmer groups are asked to take lead in the provision of government services such as agricultural extensions during the transaction to demand driven for services to farmers, but rural farmers (MAAIF 2007). However, the majority of the farming community in Uganda (composed of smallholder farmers), suffers from lack of knowledge and capabilities which impinges on its participation and bargaining power in spheres that affect farmers' livelihoods.

Farmer organizations identify markets; introduce farmers to buyers through group dynamics in community networks like personal community network ties that are usually socially diverse and widely dispersed. It is also, observed that farmer groups help farmers to negotiate and this assists rural farmers to access market both at local, national levels plus abroad. It becomes easy to go as a group to negotiate for prices at the world market (Byarugaba 1998). In this regard, Ugandan Civil Society Organizations (CSOs) have been working with farmer grassroots institutions to help them improve their capabilities in demanding their rights. During the first half of 2005, taken the lead in encouraging the communities to adapt to climate change in Uganda by providing a platform for collective achievement Development Network of Indigenous Voluntary Associations (DENIVA) in particular carried out an analytical study on farmer groups (DANIDA 2009). It was under National Agricultural Advisory Services (NAADS), to establish their viability to address farmer concerns. The study revealed important shortage in the capabilities of farmer groups as institutions for promoting farmer interests at local and national levels.

Further, in Uganda, farmer groups take different mode, but were mostly brought into mainstream economy by government programmes such as NAADs, PMA, NARO, and NGOs to enable

farmers benefit from mechanism, agricultural intensification though soil improvement is the main goal of a network and advocates for farmers' problems (NAADs 2009). However, was it the case in the ecological zone of eastern Uganda, therefore, the study was intended to find out? Farmer groups have been paying increasing attention to ways of promoting more chances to take up certain technologies as stepping stones for tangible results.

Basing on the theory of diffusion of innovation, farmer groups play the role of transferring of new knowledge from creators to users involves their network connections and in this case therefore diffusion of innovation seeks to explain how innovations are taken up in population and that is perceived as new by its audience (Rogers 1995; Greg 2003). Apparently, farmer organizations were established for the necessary coordination and linkages arrangements with the sub counties, parishes, villages and communities so that whatever is disseminated have reached a large number of people, and go across greater social distance when passed on. Farmer groups assist farmers to access facilities such as credits, fertilizers, and other extension services from the government, financial institutions, NGOs, CBOs, and other stakeholders. In addition, the research is passed on through farmer groups as they act demonstrations for new technologies for example; new improved seeds thus welfare to farmer in rural areas adopt.

Farmers themselves are among the most effective extension agents through farmer groups who promote and enhance collaboration among members through collaboration networks, which is seen as appropriate devices to tackle problems such as dissemination of new technologies from researchers to farmers. Putnam (1993; 2000), described collaboration as the act or process of "shared creation or discovery" it involves the creation of new valve by doing something new or different. However, groups offer rural development partners an entry point into a community, enhance efficiency, effectiveness of research, equity, demand orientation and participation in rural development activities such as soil fertility management through empowerment build social capital and human capital and offer collective learning with spill out effects (Lumumba, Kasenge, Oryokot and Mbowa 2007).

2.6 Feasibility of Soil Fertility Management Technologies

Initiatives to address soil fertility management require tailoring of soil fertility interventions with multifaceted approach, away from purely technical focus. Ikombo, Elilaba, Kilewe and Okalebo (1994) noted that before proper management strategies could be designed and implemented, problems that are related to soil and that limit production must first be identified. These have to be combined with some forms of inquiry, which include; farmer's assessment of soil changes; historical materials and social economic analysis, which together provide a complete picture of the environment (Ikombo et al 1994).

In addition, there is need for assessment of current farming system, soil fertility management and how they develop in the future given the broader economic context and the livelihood systems (Ikombo et al 1994). They further noted that attention has to be paid to the dynamic process in the role of technical change, diversity of conditions at different scale and the impact of policy over the years.

Mixture of different connections between actors, farmers, and institutions and between knowledge, skills, and practices pose a great challenge. Scoones and Toulmin (1999), in their study observed that in order to address soil fertility issues, there were various pathways, which could be followed. Such choices included: direct intervention to improve soil status; strengthening farmer's knowledge and skills; and Improvement of organizational linkages which promote better learning and sharing of ideas. They further observed that the design of improving soil fertility management needed to consider how best to combine intervention options in different places and at different levels over a period of several years. However this study intended to find out whether it was the same or not in the study area, Pallisa district.

2.7 Factors Affecting Dissemination of Soil Management Technologies (New Innovations)

The factors affecting dissemination are varied in nature but the most outstanding include: length of intervention, availability of intervention, land ownership, availability of labor, education of farmers, income of farmers, and age of farmers, gender, religion, tribe and farmers' perception of changes required. Farmers are faced with important choices related to their farm enterprises, economic and domestic commitments. Farmers' decision to utilize soil management practices is

often governed by their individual assessment of benefits and resource implications of using particular practices in order to avoid investment in risky ventures (Nuwagaba, Mangheni and Tumuhairwe 2001). Yet analysis of farmers' criteria for determining choice of practice for enhancement of soil fertility is often never done. This study was intended to assess the farmers' background characteristics in relationship to soil fertility management in Pallisa district. Understanding the basic reasons for choice and decisions of farmers' perception on practices by advantages and disadvantages was crucial for extension and other advisory services to be effective.

This is not effective at disseminating information about soil management and in helping farmers in their adoption. It was identified that, factors affecting soil fertility management in Uganda; non-participatory extension approach, poor facilitation of extension services, unwillingness of farmers to take advice, limited allocation of national budget to research and extension activities, limited fiscal powers granted to district council by central government (Walaga, Egulu, Bekunda and Ebanyat 2003). Therefore, this study intended to find out whether it was true or false in the study area of Pallisa district.

According to the literature review, there are implications which determine dissemination of new innovations to be different; there is no normal design for understanding the factors that affect dissemination of new innovations across the social system. Literature has pointed out several issues to dissemination of new technologies on soil fertility management could prefer on various issues depending on nature of intervention, length of intervention, availability of intervention, culture and density of the population. There is need to understand that dissemination channels are different because dissemination process, method and the knowledge vary according to different people with different perception in the society that are produced by culture, age and gender, education level, income level, land ownership, religion, tribe and government policies therefore, what influences one farmer in adoption of new innovation is not the same that affect the other. What is missing is that, how farmers can approve the effective dissemination of soil fertility management technologies and how the adoption of SFMT by group farmers helped to improve productivity and livelihoods among farmers. The study established whether farmer groups in the study area (Pallisa-eastern Uganda) are effective in disseminating and in helping

farmers adopt the soil fertility management technologies for improved productivity and livelihoods.

In conclusion therefore, from the above literature, it is much found and evident that the subjects of soil fertility management technologies dissemination by farmer groups remain less documented. It revealed limited research on how farmer groups have contributed to dissemination of soil fertility management technologies in SSA, Uganda and Pallisa district in particular. In addition whereas, there is cognizance of the relationship between soil fertility and quality of production, there is less attention offered to the interface of soil fertility management technologies and improving livelihoods. There are some of the avenues that can be looked at, while trying to come up with feasible solutions to soil fertility technology dissemination and later adoption for the rural poor farmers for improved productivity and livelihoods. Therefore, this research study in its completion has inserted body of knowledge to the subject.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter approaches the analysis of the dissemination of soil fertility management technologies for improved livelihoods through the use of farmer groups in Pallisa District. This section contains and highlights the investigation techniques used in collecting and analyzing the data, both qualitative and quantitative methods. It went on and explained the research design and area of the study, the study population, the sampling procedure, data collection methods, data processing and analysis, ethical considerations and the problems that were incurred during the study.

3.2 Research Design

The study adopted a cross-sectional research design involving smallholder farmers and communities using a survey. The survey components was crucial in understanding the role of farmer groups and farmers' response to decisions of soil fertility management technologies dissemination and adoption, because with the view of identifying most viable options based on the farmer's efficiency in Butebo and Opwateta Sub-counties. Cross-sectional survey was also appropriate because data was collected from a cross section of a population in short time and then results were generalized to represent the entire population of the study (Krishnaswami 2003). The study involved use of Key Informants Interviews (KIIs) and FGDs which were important in gathering rural farmers' experiences, perceptions and socio-economic practices and attitudes that enhance SFMTs and also helped clarify how farmers deal with challenges to disseminate and adopt the technologies.

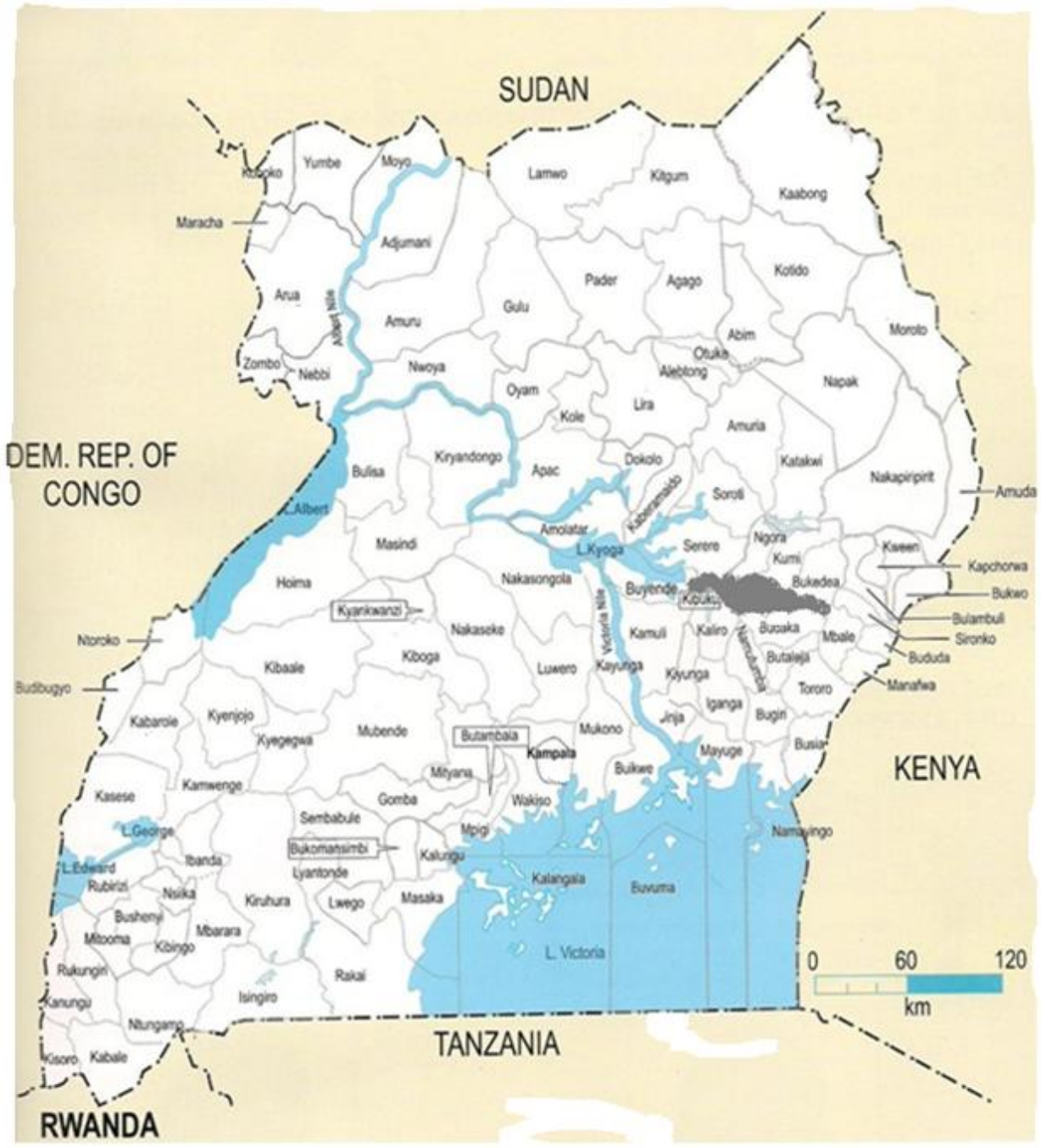
3.3 Study Area

The study was conducted in Butebo and Opwateta[6] Sub-counties, Pallisa district, Eastern-Uganda. Pallisa is generally characterized by gently rolling landscape, with wide valleys draining into Lake Kyoga. The soils are acidic, low in organic matter and generally low in nitrogen and available phosphorus (Nyende 2008). Pallisa District receives about 800 to 1200 mm rainfall

[6] Opwateta was part of Butebo Sub-County before it became a new Sub-County in 2010 (Pallisa District Development Report 2010).

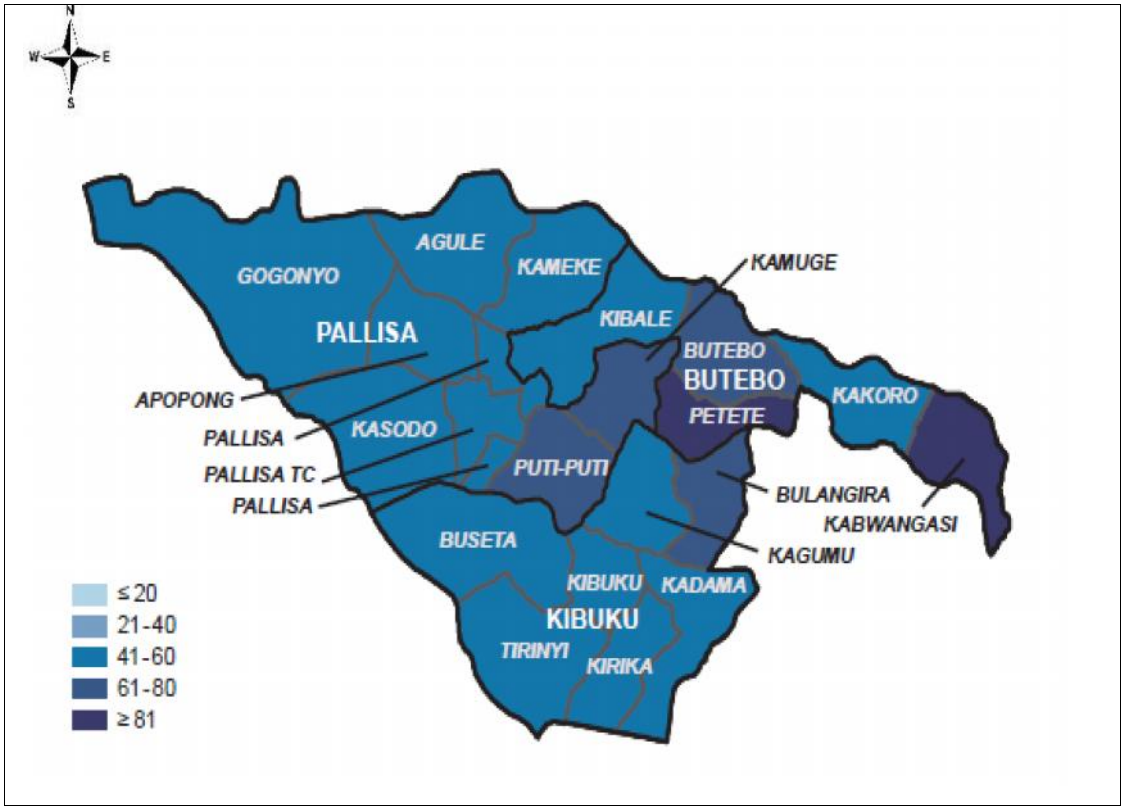
annually and has relatively high temperatures (16 to 25^0C). This district was chosen because according to NARL- NARO, Progress report January to May 2010, there was a noticeable decline of soil fertility in Pallisa district which is the main reason for low crop production in the area. The district covers approximately 1564 square kilometers with four counties, twenty eight sub counties, one hundred thirty parishes, population capacity of over 520532 and population density 228.7persons/Sq.km (Pallisa District Development Report 2010). The economic activity is mainly agriculture. The major crops grown include finger millet, rice, maize, sorghum, beans, sweet potatoes, soybeans, cassava, groundnuts, coffee and cotton (Walaga et al 2005). The indigenous people in Pallisa are predominantly of Bagweri and Itesot only, the Bagweri are mostly cultivators even though some rear animals and the Itesot are generally cattle keepers but have adopted subsistence farming to improve on the their livelihood.

Fig.3. 1: **Map of Uganda Showing the Location of Pallisa District**



Source: www.map+of+uganda+showing+districts-jpq

Fig.3. 2 : Map of Pallisa District



Source: Directorate of Water Development, Ministry of Water and Environment 2010

3.4 Study Population

The study targeted the smallholder farmers whose productivity and livelihoods can be threatened by increasingly soil depletion and in the community they live. The population consisted of both men and women who were all at least 18 years of age, as this is the age at which every one considered mature and able to make decisions on their own in mostly nations. The population for this study was smallholder farmers from various farmer groups, some community farmers in randomly selected from villages in the two Sub-Counties of Pallisa district who were involved in soil fertility management dissemination and adoption. Some other farmers were interviewed, who did not involve in the uptake and adoption of the technologies, but participated in the study because their views were important. The study also covered Key Informants such as local leaders and agricultural extension workers (District Agricultural Officer (DAO), NARO Field Officers and Farmer Group Leaders). This was done and it got variety of views which made the study findings more reliable and comprehensive.

3.5 Sampling Techniques

Three types of sampling techniques were employed in this study namely; simple random sampling, systematic random sampling and purposive sampling.

Simple random and systematic random samplings were used on the farmers from various farmer groups and other community farmers who acted as study respondents. I used simple random because is the easiest to apply and require prior knowledge and systematic sampling due to the fact that, it is much simpler and require less time. This provided adequate data for analysis the in two Sub-counties of Butebo and Opwateta. Purposive sampling involved selection of key informants respondents based on their role in organization, society, and their experience in the area of study. The respondents under purposive sampling were the extension workers (NARO Field Officers), farmer group leaders, local leaders and the district agricultural officer. The FGDs were used and whereby few individuals were identified in helping to mobilize other members who formed FGDs of members who were between 15 to 30 members and this aided in gathering information across the research objectives and where the population under study is unusual and cannot be identified through simple random sampling in Pallisa district. The five FGDs were conducted from the four selected parishes in Butebo and Opwateta Sub-counties, and other one universal focus group discussion.

3.6 Sample Size and Selection

The total numbers of 100 respondents were drawn from the unknown population because it was efficiency and accuracy of the sample results (Krishnaswami 2003). This included the sampled farmers for farmers' questionnaires where 100 farmer respondents were interviewed for quantitative data results. Other selected as key informants Interviews (KIIs) and that is 10 extension workers (field officers and DAO), 20 farmer groups' leaders/ employees and 08 local leaders and involved in between 15 to 30 members in each of the five FGDs. The researcher also employed other sources of information which included project reports, journals, group meeting reports and agricultural reports from the district. The formula for the sample size was taken an example of Sarantakos 1994 as;

Sample size $N = PQZ^2 / E^2$

Where **p** is the proportion with the characteristics in the population 7% (this sample is just probable because there is no study so far done to determine the number of farmers who have disseminated and adopted the new soil fertility technology and those who have not disseminated. However, I occupied farmers in 5 FGDs and asked to estimate how many farmers use new technologies and 93% of these groups said 7% farmers use new technologies in their communities.

Q is 1-p = 100-7 = 93

Z is the value that correspondents to a given confidence interval. Therefore at 95% the value is 1.96

E is the maximum deviation from the population that can be tolerated and the study has assumed the deviation to be at 5.

The sample size N = 7×93×3.84/ 25 = 99.9 = 100 Respondents

Therefore the quantitative sample size was 100 respondents because accuracy and efficient for quantitative sample results. The table 3.1 summarizes the distribution of sample selected, data collection methods that were used in the study as indicated.

Table 3. 1: The Sample Selection, Data Collection Methods and Sample Types Used

APPROACH	**DATA COLLECTION METHODS**	**SAMPALE SELECTION**	**TYPES OF SAMPLES**
Quantitative	Structured and unstructured interviews	Simple random and systematic sampling	65 female and 35 male farmers 100 Respondents
Qualitative	Key Informant Interviews (In-depth) Focus Group Discussion guide	Purposive sampling	10 Extension workers 20 Group Leaders 08 Local leaders **5** FGDs from selected farmers and farmer groups

3.7 Data Collection Methods and Data Sources

3.7.1 Data Collection Methods

Different methods were used in the data collection process. I used survey on quantitative and qualitative methods. The research instruments used in the data collection were farmer survey questionnaire and key informant guide. The study tools used included key informant guides (In-depth), and FGDs guide.

3.7.1.1 Farmer Survey questionnaire

Farmer survey questionnaires were administered to the 100 randomly selected farmer respondents who had or not used the technologies. The survey questionnaires consisted of both open and close-ended questions that focused on themes and sub-themes. This saved time and other resources, and it also ensured that I collect even secretive information which could not be got through FGDs, as secrecy and privacy was assured to the respondents (see appendix 1).

3.7.1.2 Key Informant Interviews

Key informant interviews were conducted with the help of a key informants guide (see appendix 2). The guide was organized in form of research questions or and topics like the nature of SFMTs used by farmers, contribution of farmer groups, factors affecting the dissemination of SFMTs and challenges facing farmers and farmer groups in adoption. This gave the researcher room to probe and prompt respondents, thereby yielding to detailed and in-depth data.

3.7.1.3 In-depth Interviews

The in-depth interview method used to collect data from the selected key informants respondents and this involved in-depth interviews arranged to provide deeper understanding of soil fertility management dissemination and adoption by farmers for improved productivity and better livelihoods among the population. In addition, 38 key informants were purposively sampled who included one District Agricultural Officer (DAO), nine Field officials from NARO, 20 farmer group leaders and eight local leaders. They were chosen because of their experience and knowledge on SFMTs dissemination and adoption for improved productivity and better farmer livelihoods. Besides they were deemed complement and provide deeper insights into the findings of the survey analysis.

3.7.1.5 Focus Group Discussions (FGDs)

Focus group participants were purposively selected and helped researcher to gather detailed expressions from participants. It created an open forum for the free exchange of ideas among the respondents and enabled the research process to be interactive discussion with the respondents freely in their group (Krishnaswami 2003). They were group interviews conducted using FGD guide (see appendix 3). The separate FGDs were arranged and conducted for men and women, one in Kayum parish and another in Kabelai parish both in Butebo Sub-county and two other FGDs in Opwateta parish and Kapuwai parish respectively in Opwateta Sub-county. Finally, one universal FGD that composed of both farmers from Butebo and Opwateta Sub-counties that allowed comparison between experiences of soil fertility technology adopters and non technology adopters. The method was also preferred, because of the room it created for the researcher to quote some of the responses that were relevant for the research.

3.7.2 Data Sources

3.7.2.1 Primary Data

Primary data was the main source. Data from the field was obtained through the use of questionnaires to the respondents following systematic and established academic procedures. Some of the data was collected by the researcher through administering and recording interviews of respondents, key informants and FGDs. Primary data was used because, its original sources and first hand information collected by the researcher precisely.

3.7.2.2 Secondary Data

Secondary data was obtained from existing documents such as, management information records, reports and journals. Secondary data was used because, to strengthen the primary data and to wider geographical area and long reference period without much cost.

3.8 Data Collection Procedures

The researcher was given an official introductory letter from the Department of Sociology, Makerere University by the programme coordinator (check appendix 4). The letter officially introduced the researcher to Pallisa district officials and other relevant officials and stakeholders. This enabled the researcher to officially conduct the study in the areas with ease. Then proceeded

to the field, and the introductory letter was presented to respondents on request. The introductory letter thus helped the researcher to establish a strong relationship and confidence building with the respondents.

3.9 Data Processing and Analysis

This included both qualitative and quantitative data processes and analysis procedure.

3.9.1 Quantitative Data Processing and Analysis

The researcher edited the data before and after leaving the field. The process entailed checking for uniformity, accuracy, consistency, legibility and comprehensibility. Coding followed a self constructed coding frame. The social-demographic variables that were quantified such as age, gender, educational level, ethnicity and religion, and marital status were coded and then entered in the computer for analysis using the Statistical Package for Social Sciences (SPSS). Descriptive statistics namely; frequencies and percentages, including cross tabulation for comparison means were used to establish the priority of farmers in adoption of soil fertility management technologies that are available. In addition, charts and tables were used in the report to give deeper meaning to the data presented and variability of responses given by respondents about the factors influence dissemination and adoption of soil fertility management technologies intervention and its impact on household livelihoods in the community.

3.9.2 Qualitative Data Processing and Analysis

Data were sorted and analyzed according to themes while grouping responses of the same themes together. During the process of data collection and data analysis after data collection phase, emphasis was placed on the research themes that were considered important variables of Social-structure meanings, contributions and role on farmer groups and other factors that influence dissemination of SFMTs. I then interpreted the data and some responses were used as quotations in the presentation and discussion of findings. Most of the analysis in qualitative was done manually because the study was more qualitative in nature.

3.10 Ethical Considerations

The study followed ethical considerations and procedures whereby social and moral conduct was observed in each Sub-County, which avoided embarrassment and discomfort among the population. The researcher explained to the respondents the purpose of the study and information offered to be treated as confidential, restricted and used by the researcher for the purpose of the study, although stakeholders and government would use the findings to improve on agricultural productivity and peoples' livelihoods in Uganda. Where the researcher was to make quotations and developed a coded mechanism to derive sources as a means to ensure confidential treatment of answers. In this way the respondents were assured that none of their answers would be used against them when they were frank and rather demeaning for people in positions of responsibility.

3.11 Limitation of the Study

The researcher anticipated misconception and uncertainty about the purpose of the study by the respondents. The topic under study was sensitive given the cultural setting of the rural community in which productivity and livelihood improvement issues are not openly discussed. This created a risk of withdrawing sensitive and useful information by respondents. This limitation was minimized by establishing a good relationship with respondents which enabled the researcher to gain their trust and confidence thereby discussing all matters openly and giving all the information without holding back.

The researcher also encountered the problem of language barrier. This is due to the fact that the study area was not the researcher' local area and comprised of different tribes of people with different local languages. However, this was minimized by the interpreters, as the researcher cannot speak the two most dominant local languages in the study area. The Researcher however, employed the services of competent translators (NARO Field Officers) in order to assist and minimize the impact, because of finance and limited time to train researcher assistants.

In addition, the researcher was faced with the challenge of fatigue among the respondents. This is because of the frequent assessments carried out by the various researchers with the same population. This was however minimized through establishing enough plans before interviews

and this also solved by having a well timed tools to avoid a lot of time taken with a single respondent.

The problem of scarce resources were also incurred, because the study required transport costs, accommodations and meals since the area of study was very far and inaccessible with poor roads from the university. Financial constraints nearly prevented the accomplishment of the study. Funds for transport to data collections sites coupled with the numerous call backed made to the selected respondents, buying stationary and money for research assistants were not easily available. To alleviate these challenges, the researcher used the appropriate and cheapest stationary, NARO Field officers who acted as interpreters in terms of research assistants and boda boda for cheap transport means to complete the study within the specified time in an exhaustive manner.

CHAPTER FOUR
DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS AND SFMTs UPTAKE

4.1 Introduction

These chapters below present and describe the empirical evidence from the research study conducted in Pallisa district, in between 9th November to 5th December 2011. The research findings were obtained mainly from primary sources and being strengthened by secondary citations from the management records and journals. This chapter presents the demographic background of respondents in the study area in relationship to dissemination and uptake of soil fertility management technologies. The study analyzed the background characteristics of respondents such as; ethnicity, gender, marital status, education level and religion. It was important to analyze people's background characteristics with their present SFMTs dissemination and adoption towards improved productivity and livelihoods in their community that they live in.

4.2 Demographic Characteristics of Respondents (Farmers)

Background characteristics are important in understanding whether the dissemination and adoption of new innovations is possible to farmers in the situation where there are low responsive soils (Scoones 2008). Rural populations in Africa depend almost entirely on agriculture and the exploitation of natural resources for their livelihoods and development. Many countries and regional policies recognize agriculture as the backbone of their economy (African Network for Agriculture, Agro forestry and Natural Resource Education 2008). However, they farmers do not clearly link agricultural education with ambitions to achieve rural livelihoods for their development. Well, farmers are strategic priority to achieve dissemination and adoption of SFMTs, eradicate poverty and encourage development in rural areas since agriculture underwrites livelihoods of rural poor farmers.

This chapter analyzes and gives the description on socio-demographic characteristics of the study informants that are deemed to influence the soil fertility management technologies dissemination and uptake. Similarly, this section assessed farmers' ethnicity, age, gender, marital status,

education, and religion play a role or not in determining and implementation of new innovations that is SFMTs in the study area.

4.2.1 Ethnicity or Tribe of Respondents

Ethnic or tribe[7] is necessary more that, kin in the neighborhood easily to share and disseminate the new innovations for better livelihoods in the community (Cook 2001). Tribe homogenous in the study area-Pallisa district (i.e. most of farmers and their collaborations members were of Itesots). Increase in the dissemination and adoption of innovations, action must be based on an understanding of the dynamics of adoption and the critical factors that determine whether farmers accept or do not accept can partially be on tribe social composition in the area. It was found out that in Pallisa district, there is combination and complex of tribes (Pallisa district Development Report 2010). Individual farmers and group farmers of different tribes used various soil fertility management technologies for their improved productivity and livelihoods depending on their proper sequences that are beneficial to them. The study however, analyzed the ethnic in the study area on the way to effective dissemination and adoption of soil fertility technologies from surveyed farmer respondents as shown in the table 4.1.

Table 4. 1*: Ethnicity of Respondents (n=100)*

Ethnicity of Respondents	Frequency	Percent	Valid Percent	Cumulative Percent
Bagwere	22	22.0	22.0%	22.0
Itesot	78	78.0	78.0%	100.0
Total	100	100.0	100.0%	

From the table 4.1 above, the research findings show that there were two major predominant tribes living and staying and who participate in farming activities in Pallisa district. The findings affirmed that the Itesot and Bagwere are the dominant tribes in the area and majority of the respondents interviewed were the Itesots who practice and dominate farming activities more

[7] Ethnic is relating to a particular race, nation, or tribe and their customs and tradition or it is social group consisting of people of the same interest and race who have the same beliefs, customs, language etc, and usually live in one particular area.

especially in crop production with 78 percent of the respondents. This means that, the total household populations in the district are engaged in agriculture which provides important source of household's livelihood. Further, the findings show that 22 percent were Bagwere who were assumed to be reluctant towards dissemination and adoption of SFMTs in improving productivity for better livelihoods of their household. In addition, ethnicity is an important determinant of socio economic standing and thus being the factor when analyzing the performance in which farmers relate in the community and therefore, Bagwere and Itesot were majorly relied upon for the information.

The researcher further revealed that, other tribes such as Bagisu, Acholi, Japadholah, Baganda and Karamojong were also in staying in the area, but not participating and involved in the soil fertility management technologies uptake and adoption. They were only making businesses in the trading centers, some have shops and others were trading in commodities such as cottons, maize, beans, sorghum, sesame seeds (sim sim), and rice and among others for their livelihoods. In this case therefore, their information was not relied upon by the researcher. The most significant problem facing rural areas of Pallisa like any other districts, is the rapid population increase in almost every county through birth rate and migration and the district can be referred to as an ethnically rich district with nearly numerous tribes like other districts in Uganda and thereby represented by the Bagwere followed by the Itesot tribes and other minor tribes (Pallisa District State of Environment report 1997).

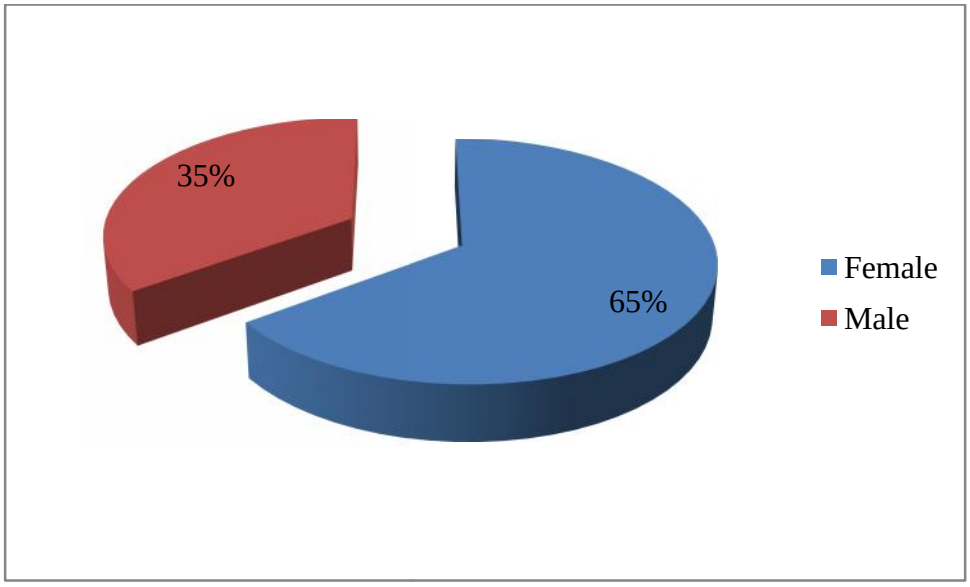
4.1.2 Gender of Respondents

Besides tribe, gender is another determinant aspect to be dealt with when investigating the style in which farmers influence the dissemination and uptake of new soil technologies for improved productivity and livelihoods in the area. The research study arrangement was also more on gender sensitive in scheming research findings that would meet the research needs of the researcher from farmers in disseminating and adopting technologies. Gender as the fact of being male or female, men are the chief controllers of everything and decision makers in the households while women are invisible and their contributions to household production are always ignored even though they are of great value. In a study by Odendo, Onyango and Wanyonyi (2010), found out that male headed households where men realized the need to apply

soil fertility technologies on their gardens were in position to adopt and utilize soil fertility management technologies, than the households where the women as household heads realized not the need to apply.

Basing on the above citation, this study sought to investigate the extent to which gender affects the dissemination and adoption of soil fertility management technologies for improved productivity and livelihoods among farmers in Pallisa district. The study discovered that, sometimes gender roles have been discussed at the village level to encourage female and male farmers to work hard together. However, male headed household had 3 times higher chances of adopting soil fertility management technologies as compared to female headed households (African Network for Agriculture, Agroforestry and Natural Resource Education 2008). On the other hand, access to resources is often differed among household members and women had only limited access to certain resources in the household compared to men. Therefore introduce the chart 4.1 that, female respondents were the majority interviewed than males.

Chart 4. 1*: Sex of Respondents*



The findings in chart 4.1 above show that, majority of the respondents 65 percent was female mainly because they are the main participants in agricultural activities for family level hold up. Culturally in Africa, rural women have to provide food for the family and they were taken as

assets in production. Women bear the burden of providing for the home, and men provide little or no support (State, Birungi and Nicoline 2009). Further results show that, the minority 35 percent were male. Due to fact that, male are not active and interested in the soil fertility management for increased productivity and better livelihoods and though have all the rights to force any progress in the households. In this regard, male have the most rights and access to land compared to women either, by inheriting from parents or buy from neighbors.

However, several studies show that male headed households had a higher chance to adopt organic and inorganic fertilizers and combinations than females because of their likelihood to access requisite resources and information. Perhaps, the ways in which men take on difficult situations differ from those of women which create an opportunity that even the roles and activities engages in may be different (Sanginga, Nina and Tumwine 2001). Women usually cooperate with their husbands to grow or work for better livelihoods of household, but another study made, show that many men have turned to drinking alcohol and have abandoned the concept of cooperating with their wives (State, Birungi and Nicoline 2009). On assessing the gender issues, the Butebo and Opwateta Sub-counties, Pallisa district being the rural district like most other districts in Uganda. It was important means to evaluate the female and male farmers and study discovered that there is higher number of female than male likelihoods of disseminating and adopting SFMTs for improved productivity and livelihoods.

4.1.3 Age of Respondents

Age is one of the social factors that can influence farmers in the dissemination and adoption of soil fertility management technologies. People of different age groups may have a different bearing and perception of issues and for example young people are likely not act so quickly towards new innovation even though they are energetic and strong compared to old who are committed for the better livelihoods of their families. The age can be define as, experience one has. Therefore more years, more ability and experience while as less years, less practice and uptake of new ideas since there are still few roles and responsibilities to perform for better livelihoods more especially increased productivity.

The most elderly people are familiar with manure than a combination of organic and inorganic fertilizers which they view as totally new practice and not easy for them to adopt. However older farmers have more experience in the use of available soil fertility management technologies are in a better position to assess characteristics of new technologies than younger farmers (Mugwe, Mugendi, Kungu and Onguso 2007). The dissemination and adoption of renewable replenishment technologies in the southern African region, was common among the youth than the very old (Ajayi, Akinnifesi, Gudeta and Chakeredza 2007). Farmers' age has been found to increase as well as decrease the probability of dissemination and adoption of SFMTs for improved productivity and livelihoods. It may be that older farmers who have more experience in the agriculture sector to use the available soil fertility management technologies are in a better position to assess characteristics and possessions of new technologies than younger farmers. The table 4.2 demonstrates the age and show that there is a significant difference in the age category of the respondents, where by majority of the cross- sectional survey of respondents were more than 25 years as indicated in the below.

Table 4. 2*: Age Categories of Respondents*

Age of Respondents in Years	Frequency	Percent	Valid Percent	Cumulative Percent
< 25	20	20.0	20.0%	20.0
26-35	29	29.0	29.0%	49.0
36-45	35	35.0	35.0%	84.0
> 45	16	16.0	16.0%	100.0
Total	100	100.0	100.0%	

The study results indicate that majority of the interviewed farmers, 80 percent were more than 25 years old with a vast experience of farming in the study area Pallisa district. This helps to show that these farmers had interacted with farmer groups for quite some time and their responses towards assessment of farmer groups in disseminating soil fertility management technologies for improved productivity and better livelihoods would be more accurate. It was observed that 35 percent of the respondents were mature adults who were in the age bracket of 36-45 years that have many tasks and duties to perform for the better livelihoods of their households. This indicate that their responses could be relied upon while the respondents that interviewed who

were in the age category of 26-35 years constituted 29 percent, those who were less 25 years was revealed by 20 percent which suggested that they are predominantly not engaged in the dissemination and scale up of soil fertility management technologies. Also the results show that the respondents who were 45 years and above constituted 16 percent who receive support from their entire household for livelihoods. However it could be that older farmers are more risk reluctant than younger farmers and have a lesser likelihood of adopting new innovation (new technologies) and further it is of common sense that elderly people are less energetic and needs a lot of care and social support.

4.1.4 Marital Status of Respondents

In spite of the age categories, marital status can be consider as the initial relationship between members which can influence behaviors regarding soil fertility management in the community or an area. The study made by Simon (2002), indentified that variety of reasons that there is a negative or a positive relationship between married people compared to divorced people. To increase the scale of dissemination and adoption must be based on an understanding of the dynamics of dissemination and adoption, marital status is critical factors that determine whether farmers accept or do not accept (Mugwe, Mugendi and Kungu 2007). However, by good judgment one can easily recognize that happily married families have high advantages of improving their livelihoods through improved productivity by cheering soil fertility compared to unhappy families. The members in the well and stable households, are likely to acquire all the innovations from all directions which promote the development of their households. In this case therefore, single and unstable families could be different in terms of management, cooperation, collaboration and relation in life. Proper development and application of agricultural knowledge such as soil fertility management for better productivity depends on the marital status of the households in the community and due to many compelling reasons, the research discovered from the study area as noted below.

Table 4. 3*: Marital Status of Respondents (n=100)*

Marital Status of Respondents	Frequency	Percent	Valid Percent	Cumulative Percent
Single	14	14.0	14.0%	14.0
Married	48	48.0	48.0%	62.0
Widowed	24	24.0	24.0%	86.0
Divorced	14	14.0	14.0%	100.0
Total	100	100.0	100.0%	

From the table 4.3 above, majority of the respondents, 48 percent were married with stable and happily families which relied heavily on food production for their families and this was further agrees with study made by (Simon 2002), that married people enjoy better well-being than unmarried who are ever disorganized and unstable. The unmarried (single) respondents (14 percent) were still young people who had the simple responsibilities of supporting productivity in terms of labour for their families but still have anxiety in their life. The widowed respondents (24 percent) have unstable families because they are in a single headed family with many challenges in life and this can either enhance uptake of soil fertility management through hardworking for better living or hinder the dissemination of the new innovation in the community by disappointment, discourage and lack of hope. Further, the results show that 14 percent were the divorced respondents and the study assumed that, these could be the result of domestic related violence, financial problem, lack of faithfulness, mistrust among the partner and poverty.

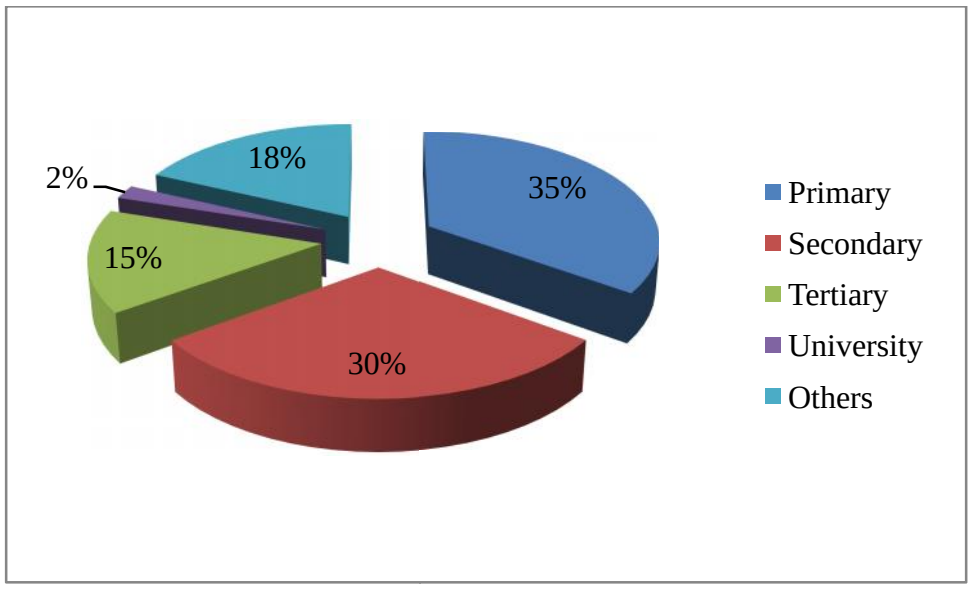
4.1.5 Education Levels of Respondents

This is also another important aspect to mention when describing the background characteristics of the respondents in order to make good analysis, study made by Egulu and Ebanyat (2000) show that participation adoption of soil management varies on knowledge and education level. Perhaps, those with high level of education have many choices than those who have low level of education to disseminate and adopt an innovation (new technologies) for improved productivity and livelihoods. Formal education is costly than informal and informal is slower than formal education, however people do not clearly link education with agricultural productivity with

ambitions to achieve better livelihoods and rural development. The low educational level of most rural farmers can slow down agricultural productivity.

The rate at which one can assimilate and idealize new knowledge could depend on the educational level of the individual (Ani and Ifah 2004). Thus, low level of education tends to foster unfavorable attitudes towards the acceptance of improved farm practices. Farmers may be eager in disseminating and adopting new practices but may be constrained by inadequate education and most of these results confirm the priority expectations and are consistent with other research findings. For example, it is believable that educated or experienced farmers are more likely to decide for inorganic fertilizers; the research study made in Malawi reported that, education increases farmers' productivity by improving the level of understanding which makes them able to effectively process technical information relatively faster than uneducated farmers (Hardwick and Peter 2005). The rate at which one can assimilate and idealize new knowledge could depend on the educational level of the individual. Thus, low level of education tends to foster unfavorable attitudes towards the acceptance of improved farm practices. The chart 4.2 shows the research results that, majority of the respondents 80 percent were literate, having attended or attained at least primary level education and this means that they can be successful in the soil fertility technologies application, dissemination and later adoption.

Chart 4. 2*: Education Levels of Respondents*



From the chart 4.2 above, with education levels of the respondents, the majority of the respondents interviewed, 35 percent had primary level of education, followed by 30 percent who had attained secondary education. Further the study revealed that 15 percent have attended tertiary education in the study area, the findings shows the most educated do not actively participate in the agriculture and this was revealed by 2 percent. They further said that, others are mainly farm owners who employed other workers to do the farming activities while they attended to other bigger jobs.

Education level of the respondents shows a negative relationship with SFMTs dissemination and adoption however, study made by Nkonya and Kaizzi (2003) show that farmers who have completed primary education are less likely to apply household residues and mulch than those who did not complete primary education. This is consistent with Nkonya, Sserunkuma and Pender (2002), who noted that education increases farmers' opportunities to be engaged in non-farm activities. Such options may reduce farmers' incentive to invest efforts in enhancing technologies.

> **Orogoi Michael;** *in his middle 30s, from Opwateta Sub county affirmed that, education is the most influencing factor in uptake of the soil management technologies because the largest population of the people who are educated are not bothered about agriculture and they just enjoy their profession work for their better livelihoods more compared to less educated who rely on other means. He further said, in this area the educated have their saying "better education, less labour"* **(Opinion leader, Opwateta Sub-County).**

However, the uneducated who are the majority in the farming and agriculture sector face it accordingly without the support from them. If farmers are more educated, they are likely to be better equipped to utilize alternative channels for faster and more efficient information and knowledge in the agriculture.

4.1.6 Religion of Respondents

Proper dissemination and application of soil fertility knowledge depends to a large extend on the religion context whereby people have different religious affiliations. Sometimes, religions have been discussed at the village level to stimulate female and male farmers of different religion to work together (Technical Advisory Notes (TAN) 2007). However, access to resources often

differed among household members in the area; study found out that Catholics and Muslims were the most dominating religion in the study that were totaling over 50 percent.

Table 4. 4*: Religious Affiliation of Respondents*

Religion of Respondents	Frequency	Percent	Valid Percent	Cumulative Percent
Protestant	21	21.0	21.0%	21.0
Catholics	36	36.0	36.0%	57.0
Moslem	24	24.0	24.0%	81.0
Others	19	19.0	19.0%	100.0
Total	100	100.0	100.0%	

In terms of religion, the research found out that respondents interviewed respondents were God fearing people and had different religious affiliations. The majority were Catholics (36 percent) followed by the Muslims and Protestants (24 percent and 21 percent respectively), Muslims are the members of a group of people who believe in the religion of Islam and while as protestants are members of part of Christian church that separated from the Roman Catholics church, and those who had other religions such as Seventh Day Adventist (SDA), Redemption church and Apostle of God, (19 percent) also do exists in the area of the study as the demographic details are summarized in table 4.6 above. Given all the above socio-demographic background of the study respondents, there is still a central role in the rural economy, development policies should clearly recognize that it holds the key to reducing levels of poverty across the country. Therefore, in this research study was very important to first analyze and determine socio-background and characteristics of farmers influencing the uptake and adoption of soil fertility management technologies in Pallisa district, Eastern Uganda.

In conclusion, this chapter has presented the study findings about the respondents' perception, attitudes and culture practices towards utilization the technologies. Therefore, it is worth nothing that majority of respondents were involved in agriculture and plays a central role for the better livelihoods of farmers and rural economy, demographic characteristics of farmers should be clearly recognized that it holds the key to reducing levels of poverty across the country. It was observed and noted that dissemination of soil fertility management technologies are associated

with differences in socio demographic characteristics towards soil management practices. However, the reasons are that ethnicity, gender, age, marital status, education level and religion are different which make difference in dissemination and adoption of SFMTs for improved agriculture productivity and better livelihoods to nearly all farmers with different perceptions and decisions as they employ low-input in farming system.

CHAPTER FIVE

NATURE OF SOIL FERTILITY MANAGEMENT TECHNOLOGIES USED BY FARMERS IN PALLISA DISTRICT

5.1 Introduction

This chapter presents empirical findings in reference to the research objectives in chapter one and the discussion focuses on the nature of soil fertility management technologies used by the farmers and assess the contributions of farmer groups in disseminating and adoption of soil fertility management technologies for increased production and better livelihoods among farmers, awareness about usage of fertilizers by the farmers, benefits of using fertilizers among farmers and limitation from other farmers who are not. It also shows the methods used for dissemination and uptake of SFMTs, the technology practices used fertilizers, benefits and contributions of the technologies to farmers.

5.2 Nature of Soil Fertility Management Technologies Used

Specifically, one of the specific objectives for this study was to explore the nature of soil fertility management technologies used by the farmers in Pallisa district. The nature of soil fertility was determined by the application and location by the farmers. The earlier soil management techniques that the farmers had been using previously on their pieces of land and one of the among research key questions for this study were how has the dissemination of soil fertility management technologies been carried out in Pallisa district by farmer groups and has the adoption of SFMTs by individual farmers and farmer groups helped to improve productivity and better livelihoods. The most common soil fertility management technologies used in the Butebo and Opwateta Sub-counties were the use of farm yard manure, crop rotation, intercropping, green manure and organic crop residues to maintain and get yields from the farm since their soils are sandy clay and loam soils (District State of Environment Report 1997). Low soil fertility in Pallisa district is associated with sandy soils which covering the eastern ecological zone that cause reduced and poor crop production among farmers in Pallisa ditrict. Farmers from Butebo and Opwateta Sub-counties reported that most of the fields in the area are infertile due to continuous cropping, which had put pressure on land with little inputs. They further, reported that however, the extension were quick to suggest ways of managing and replenishing soil fertility in their fields such as application of fertilizers and improved seeds, use of improved

fallow, compost, planting tree species and leguminous plants for better and increased production. Agricultural productivity in the district is still low having been declining over time as a result of soil infertility, unsustainable farming methods, increased population, unreliable and unpredictable weather patterns, and crop diseases.

The nature of inorganic fertilizers introduced would affect its adoption, from the study area farmers who own Farm Yard Manure (FYM) have little or limited possibility to go for fertilizers compared to those who does not have. Some study show that when the technology is locally made there are high chances of adoption because farmers are familiar with the environment within which the technology is introduced (Ajayi, Clifford, Festus, Gudeta and Sebastian 2007). Generally, the efforts towards promotion of soil fertility technologies so far seem to have had limited impact at the farmer level dissemination and adoption (Mugwe, Mugendi and Kungu 2007). The farmers have assumptions that locally made technologies are effective, easily and affordable to apply compared to inorganic technologies which they say that, the technologies are not affordable, available and need experience. However, the new technologies are unique and different in the support of crop productivity in that they may require a very small or very big space. Therefore, can be suitable and managed by either poor rural farmers and urban farmers or commercial entrepreneurs and companies.

5.2.1 Level of Awareness of SFMTs by the Farmers

The levels of awareness of SFMTs amongst the respondents regardless of having knowledge or understanding in the application and use of a particular soil fertility management technologies used or applied by farmers. The table 5.1 highlights, how respondents were knowledgeable about soil fertility management technologies in Pallisa District, where the study was conducted.

Table 5. 1*: Soil Fertility Management Technologies Awareness (N=100)*

Ethnicity of Respondents	Do you know Soil Fertility Management Technologies						Total	
	Yes		No		Not Sure			
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent
Bagwere	11	50.0%	08	36.4%	03	13.6%	22	100.0%
Itesot	54	69.0%	17	21.8%	07	9.0%	78	100.0%
Total	65	65.0%	25	25.0%	10	10.0%	100	100.0%

Research findings indicate first that, majority of the respondents 65 percent knew about the existence of SFMTs in the area. This shows that they are early users or adopters and it was found that, these have highest degree of opinion in the dissemination and adoption of innovation in the community. The researcher assumed that they are likely to have strong communication with the concerned bodies such as extension workers, for the NARO and NAADS which are working hard to support and improve farmers' livelihoods through agriculture improvement.

Secondly, that 25 percent of the respondents did not know the existence of SFMTs in the study area. Consequently, the farmers are not linked to any new innovations, assumed to be satisfied with old technologies only and the new SFMTs knowledge. It has not been optimally used to solve low productivity for better livelihoods problems or they are unwilling towards the knowledge to that has been introduction to them. During survey, it was examined that the proportion of farmers in the Butebo and Opwateta Sub-counties had inadequate access to information sources. Despite the fact that the concerned bodies were implementing soil fertility management technologies through limited numbers of farmers and could not yet reach to all farmers.

Thirdly, that 10 percent of the respondents who were occupied in the study were not sure either to be knowing soil fertility management technologies or not. The researcher found out that Limited in awareness and sensitization by the responsible bodies made farmers not well to recognize the technologies in their present likelihood. The farmers' unwillingness on the importance and economic feasibility of SFMTs could be the setback. However too much effort is needed into the implementation for the farmers of disseminates and adopts the technologies. The

study further revealed that, majority of Itesot had understanding on SFMTs were due having either cattle or poultry in their households which could be the driving force for their livelihood improvement.

The implication of this results show that, the majority were aware about the existence of SFMTs in the area. This therefore prove that, smallholder farmers are likely to perceived and improve on the agriculture and support their livelihoods as a soil fertility management technology adaptation strategy is a driving force. This suggests existence of other important reasons for practicing and improving agricultural productivity not only focus on technical approaches to increase adoption rates, but also consider social aspects such as perceptions that are equally important in conservation agriculture.

5.3 The Methods Used for Dissemination and Up Take of SFMTs

Methods are planned ways of doing some things especially one that a lot of people know about and use or it is well-organized and well-planned way of doing something might be direct, indirect and barrier methods. The survey study conducted in two Sub-counties of Butebo and Opwateta, Pallisa district, the respondents reported about the methodologies as good way of learning and adopting but generally includes few farmers. However, some circumstances have changed the population to increase land farming systems to change. The respondents in the study area express the importance that, farmers attach to SFMTs rising which is considered as social activity that every family should practice.

It requires not only links but also alliances between FOs and other institutions and the success of any strategy depends on its perceived importance (Odendo, Onyango, amd Wanyonyi 2010). However, the government still has much to do to convince those at grassroots level that it is prepared to put its expression into practice. The study also intended to find out and examine the methods and ways in which various farmers perceive the implementation of soil fertility management technologies in Pallisa District Eastern Uganda. One among the research questions was; do you (farmers) know about SFMTs and how did you get to know about SFTMs? Crop and soil enhancing strategies were introduced to the farmers in Pallisa district with the aim of improving soil fertility and enhancing food security in the area among farmers. On the other

hand, many methodologies such as trainings, farmer field schools, farmer groups, demonstration farms, farmer field days, mother-baby trails and posters (NARO 2010). They were available to farmers in the Pallisa district to easily disseminate the soil fertility technologies and to be adapted to improve on production through high yields and sustain their livelihoods.

Demonstration farms and trainings have shown to be the most popular and suitable means of communicating, disseminating and adoption of SFMTs. However special emphases need to be placed on farmer groups due to fact that they focus on receiving knowledge services for-innovation-services rather than orienting these services around members need (Wennink and Heemskerk 2006). Given access to information and appropriate support, can be believed that farmer groups can effectively organize to produce good results through knowledge implementation and increase productivity and livelihoods amongst its members. The research findings in the table 5.2 show that, different methodologies were used as indicated.

Table 5. 2*: Methodologies Used for Scale up SFMTs*

Methodologies used for scale up SFMTs	Frequency	Percent	Valid Percent	Cumulative Percent
Demostration Farms	35	35.0	35.0%	35.0
Trainings	28	28.0	28.0%	63.0
Farmer Groups	22	22.0	22.0%	85.0
Farmer Field Schools (FFS)	12	12.0	12.0%	97.0
Posters	1	1.0	1.0%	98.0
Others	2	2.0	2.0%	100.0
Total	100	100.0	100.0%	

The research findings in table 5.2 show that, from the total farmer survey of 100 respondents, 35 percent of the respondents confirmed that demonstration farms were the main method through which they receive and learn about SFMTs. Where they come together, gain knowledge of the system to practice in their gardens. The results also revealed that, 28 percent of respondents said that, were from trainings which they regularly receive from the implementers and example the extension workers from the government institutions. Furthermore, study exposed that, 22 percent

of the respondents were through farmer groups. It can be noted that, farmer groups are not so well recognized as the best method for the dissemination and uptake of soil fertility management for increased productivity and better livelihoods with the restraining factors and challenges as found out from the research study in the next sub chapters below. However, the respondents talked that creation of social groups for practical training as an agent of change in rural communities have boosted the farmers in joining for benefits. This implies that agricultural diversification is increasing in many rural communities and farmers are motivated, there are likely to be improvements in their livelihoods (State, Birungi and Nicoline 2009).

Further, 12 percent of the respondents affirmed that, they were from farmer field school (FFS) and these were also put in place to cater the farmers and facilitators who are in agriculture. According to the key informants from the study revealed that, the collection of farmers involved in FFSs are combination, both the rich and the poor, educated and uneducated to equally and adequately participate and gain the knowledge. From the all other respondents, 1 percent declared through posters such as bill boards, notice boards, and sign posts along the roads. On the other hand, 2 percent of the respondents from the results indicated that, others methods which included mother-baby trails, farmer to farmer dissemination, from trading centers and market places, community clubs like funeral, drama shows, circumcision ceremonies and public places. Mother-baby trail is the approach or method which is an on-farm participatory mechanism to introduce and test technology options to suite heterogeneous community. A key informant; NARO Field Officer in Butebo Sub-county further described mother-baby trail said,

> "*mother-baby trails are the best ways and methods for disseminating and adopting new soil fertility technologies to farmers for improved production and food security in the area because, NARO institution introduced 5 treatments in the area; (1) farmer practice or control, (2) manure, (3) manure and fertilizer, (4) nitrogen and phosphorous, (5) nitrogen, phosphorus and potassium as trails for the farmers to pick alternative which is better, quick and easy for him or her in application"* **(Key Informant, NARO Field Officer in Butebo S/C).**

Most respondents reported that they had learned a lot about SFMTs for improved productivity and better livelihoods such as increase on yields and having enough food, adequate income and among others from the above methodologies. Although had to adapt different methods to the changing period and the situation to avoid future frustrations and defaulting from their time,

money and energy. One of the key informants; Parish Chief from Opwateta parish, Opwateta Sub-county marked that,

> "*One of the ways of adopting the technologies, is that the farmers have to engage in various methods so that when one fails in one method and should get assistance from the other methods, therefore the new technologies could be easily and quickly disseminated and adopted by farmers to improve on soil fertility as we try to engage them in these exercises by increasing on their knowledge for high yields and better productivity*" (**Key Informant, Parish Chief in Opwateta S/C)**.

However, the view of the researcher from the respondents show that, there is need for more clear understanding of the methodology benefits to farmers; especially in the study area (Pallisa district). The fact that, the immediate return in the uptake or adoption of soil fertility management technologies by farmers because, through these methodologies is still relatively low. Some farmers complained of corruption and nepotism by the organizing holders which negatively affect the dissemination and uptake of the SFMTs. One respondent from Kaleko village, Kayum parish, Butebo Sub-county summarized this by saying that "the organizers select farmers of their own choice who go head and call or inform their family members and relatives only and for us, we are left aside, generally it's not good for development, however there should be emphasis for the public and everyone feel cheerful." This consequently led into low interest by farmers in dissemination and adoption of the technologies that affect production and hence poor living standards among the farmers which results into low and poor livelihoods.

5.4 Soil Fertility Management Technology Practices Used (SFMTs)

Farmers in different environment can increase their farm productivity more than what they actually produce when they link between knowledge, technology practices and action in agricultural production. Technology practices can be classified according to the availability, cost, use or labor and benefits among the farmers. Adoption of new technologies or innovation can become easier for farmers who are part of farmer groups or any social group because information diffuses fast compared to farmers who are not in groups (Wennink and Willem 2006). This study contextualized the dissemination and adoption of SFMTs by farmer groups for improved livelihoods. The study assessed the cross-sectional survey from farmers about SFMTs practices in Pallisa district. The findings indicated that, both traditional and new technology practices are

practiced in the study area. Farm Yard Manure (FYM) is commonly practiced in Butebo and Opwateta Sub-counties because, the Itesots keep cattle and FYM is common forms of animal manure and poultry and such as from cattle, pigs, goats, sheep, chicken, turkey, rabbits and among others. The table 5.3 summarizes the technology practices that farmers from Butebo and Opwateta, Pallisa district were using in their gardens as indicated below.

Table 5. 3*: **Technology practices (n=100)***

Technology Practices	Tally	Percentage
FYM	38	38.0%
Compost	30	30.0%
Crop Rotation	27	27.0%
Intercropping	22	22.0%
Organic Crop Residues	16	16.0%
Green Manure	15	15.0%
Use of Fertilizer	12	12.0%
Improved Fallow	7	7.0%
Improved seeds	2	2.0%
Others	3	3.0%

Multiple responses were elicited.

The research results above, conducted by survey from the 100 respondents who provided total of 172 tally responses indicate that, majority 38 percent of the responses confirmed FYM as mainly used technology practice by farmers. The reason behind this, were that being cheap to manage and apply more especially to those who have livestock and poultry in their household. The study reveals that, most of the respondents at least own cow, goat and sheep or poultry such as chicken, geese and ducks in the homesteads. Female participant from FGD in Kapuwai parish said, “we can get manure to apply in your gardens from farmers who have cattle at either free of charge when are family member, friends and neighbors or at extremely little cost compared to buying fertilizers which are inadequate in our markets.” The results went ahead and indicate that, 30 percent as compost manure and where farmers create a compost heap from the mixture of decayed plants, leaves etc used to improve the quality of soil to increase on crop production so that they can get a good harvest.

Further the findings show that, 27 percent of the responses from the respondents used crop rotation and it is being practiced to change the crops that farmers grow in the field each season to preserve the good qualities in the soil. One of key informant respondent; NARO Field Officer in Butebo Sub-county said,

> "*Cereals rotate rightly with legumes; example planting beans after harvesting millet and beans can perform highly with increase in yields and the farmer benefits more through enough food for the household and other for sale"* **(NARO, Field Officer in Butebo S/C).**

When crops are carefully selected for crop rotation, other agronomic benefits are also achieved and may be given structural support by their companion crops. However, sensitive plants in a garden where you grow vegetables or flowers, these plants typically consume large quantities of fertility in order for the plants to grow properly and they need the right crop rotation.

In additional the research findings show that, 22 percent of responses pointed out intercropping where more than one crop is cultivated in one garden such groundnuts and beans, maize and beans, cassava and maize, soybeans and beans and among others. Perhaps the most common goal of intercropping is to produce a greater yield on a given piece of land by making use of resources that would otherwise not be utilized by a single crop (Nkonya and Kaizzi 2003). It is a practice often associated with sustainable and organic farming and is commonly used in tropical parts of the world, particularly by small scale farmers in Africa. One local leader said,

> "*in intercropping, there is often one main crop and one or more added crops, with the main crop being the one of primary importance because of economic or food production reasons and the NARO facilitators also told us that the two or more crops used in an intercrop may be from different species and/or different plant families and there are some different variants of intercropping; mixed intercropping, row intercropping, and relay intercropping which now days we try to practice as new in this local area*" **(Key Informant in LC1 Ekinare Village, Kapuwai Parish, Butebo S/C).**

Furthermore, 16 percent acknowledged as crop residues and these ones have no big difference with compost but are the plants left in the gardens after harvest to decay and form fertility. While 15 percent of the responses confirmed with green manure which is the same as crop residues and compost. A respondent from Opwateta Sub-county approved that, "green manure is associated with green manure crops including legumes such as cowpeas, soybeans, annual sweet clover, and velvet beans, as well as non-leguminous crops such as grass, millet, sorghum, and buckwheat."

In additional 12 percent affirmed that, use of fertilizers and are said to be for farming, as it improves the soil structure, so that it holds more nutrients and water, and the soil becomes more fertile, this increases crop quality and yield. The research study revealed more that, 7 percent as improved fallow[8]. In other part of the country such as south western Uganda fallowing is seasonal and is carried out to stabilize cultivated land and to maintain soil fertility (Nkonya 2002). The findings also included improved seeds as the technology practice and this was disclosed by 2 percent. Improved seeds and other farm technologies are best bet for enhanced agricultural productivity in Sub Saharan Africa (SSA) where smallholder farmers make up 70 percent of people that depend solely on agriculture for livelihoods (Kyetere 2012).

Others included green manure usage, organic crop residues, improved fallow and use of improved seeds and the findings exposed that most of the farmers do not use inorganic fertilizers. And fallowing also is most often found on freehold plots. This is probably because fallowing is considered a practice that increases tenure insecurity under customary tenure systems (Komugisha 2008). The implication of these results shows that, application and use of fertilizers are very low in Butebo and Opwateta Sub-counties, Pallisa district where the research study was conducted. Perhaps, the land is poor they are still believing on local practices and less reliance is placed on the purchase of inputs which cannot maintain production goal with smaller amount of farmers' efforts. Therefore, the remaining questions which need to be addressed are; why most farmer stick on old practices? Why are farmers not using fertilizers? Hence need further investigation and subsequent in the next sub sections.

5.5 Benefits from Using SFMTs and Limitations from Other Farmers

The success of any strategy depends on its perceived importance and benefits. The study made by Rewana and Namvong 2010 found out that, in using soil fertility management progressively increase on the yields and productivity of farmers that leads to increased income and standards of living. Involving stakeholders in a given sector in strategy support and implementation would contribute significantly to creating support for the plan in improving farmers' livelihoods through better productivity. The SFMTs depends on the size of land/ household, land user

[8] Fallowing contributes to productivity through a buildup of soil nutrients and improved structure, reduction in erosion and control of harmful weeds and crop pests (Nkonya 2002).

applying the technologies and different farmers have different level of needs and capacities that require different practices and technologies for better productivity whereby, the larger the garden and application of fertilizers, the higher the increase on production and small the garden and application of fertilizers, lower the production.

From the research study proved that majority, 85 percent obtain benefits after using the soil management technologies, while as 15 percent said that they do not get benefits and definitely make losses from the using the SFMTs. The tally table 5.4 shows the benefits from the farmers who were getting advantage in using SFMTs and multiple responses were obtained.

Table 5. 4: Benefits from Using SFMTs (n=100)

Benefits farmers get	Tally	Percentage
High Yields	53	53.0%
Enough Food	30	30.0%
Maintains Soil Fertility	14	14.0%
Purchase of house items	8	8.0%
Bought clothing	7	7.0%
Renovated house	6	6.0%
Bought land	5	5.0%
Paid school fees	4	4.0%
Bought motor cycle (boda boda)	3	3.0%

Multiple responses were obtained.

The research results from the table 5.4 show that, the respondents were getting benefits from the use of SFMTs. This was disclosed with the following multiple response reasons registered. Where 53 percent of the responses confirmed with the benefits of high yields, and 30 percent of the responses were saying that they get enough food for the household. While 14 percent show that, maintains of soil fertility and 8 percent purchased household items. Furthermore 6 percent revealed that, they renovated house and 7 percent bought clothing after harvest and sell the production. Others said that they bought land and paid school fees for their children, this was asserted by 5 percent and 4 percent respectively as summarized in table 5.4. Indeed, the findings

from the FGDs disclosed in the following case study drawn from an act by the respondents in one of the case study sessions in Kayum parish, Butebo Sub-county as asserted below:

Case Study1: Benefits from the Use of SFMTs by Respondents

Christopher (assumed name) is a male resident and chairman Kanyum farmers Group from Kanyum village in his early 30s. he used technologies; manure with N+P and rhizobia with P in the gardens of maize and ground nuts respectively, and at the end of his harvest, yields multiplied five times from what he actually produces and the benefits he got was enough food for his family and for sell and it is whereby he bought a boda boda.[9] He asserted that "*I am a farmer and who further conduct other activities like transport in my local remote rural in Kanyum, Butebo Sub-county and neighboring Sub-counties, my livelihoods have improved by having outside income not only form farming"* **(FGD participant in Kanyum Parish)**.

Okurut (stage name) is also a male from Kituba village, Butebo sub county explained that "*I applied manure (FYM) on the 2 acres of land of maize only due to the fact that I lacked enough money to buy fertilizers after harvest there was more increase on productivity, where I got enough food, bought wheel barrow, watering can and a mobile phone, encourage other farmers who are not having enough money like me to purchase the fertilizers, but have livestock and poultry in their homes to use it and improve on soil fertility and increase their production but it is really good to adopt the new technologies that in existence"* **(Participant during the FGD in Kanyum Parish)**.

5.6 Fertilizer Usage

Most of the research results confirm that priority expectations and are consistent with other research findings. For example, it is believable that educated or experienced farmers are more likely to choose for inorganic fertilizers than uneducated farmers (Hardwick and Wobst 2005). Because, education increases farmers' productivity by improving the level of understanding which makes them able to effectively process technical information relatively faster than

[9] Boda boda is the livelihood activity of young men after various life reason to survival and among which drop out of school and other reasons and dominate the urban and rural transport by transporting goods and passengers on motorcycles. It got its name from the borders where it was mostly practiced across Ugandan and Kenyan borders (State, Birungi and Nicoline 2009).

uneducated farmers. The study made by Ani, Ogunnika and Ifah (2004), in Nigeria show that the low educational level of most farmers can slow down agricultural productivity. The rate at which one can understand and idealize new knowledge could depend on the educational level of the individual. Thus, low level of education tends to foster unfavorable attitudes towards the acceptance of improved farm practices.

Therefore, the study was also interested in finding out what information significance in between the education levels of farmers and their fertilizer application and usage. The research findings made it clear and evident that, highly educated farmers use and apply fertilizers in their gardens compared to less or uneducated as indicate and show by the table5.5.1.

Table 5. 5*: Fertilizer Usage and Education Level of Farmers*

Educational Level of Respondents	Application of Fertilizers in Gardens by Farmers				Total	
	Yes		No			
	Freq	Percent	Freq	Percent	Freq	Percent
Primary	12	34.2%	23	65.8%	35	100.0
Secondary	9	30.0%	21	70.0%	30	100.0
Tertiary	9	60.0%	6	40.0%	15	100.0
University	2	100%	0	00.0%	2	100.0
Others	8	44.5%	10	55.5%	18	100.0
Total	40	40.0%	60	60.0%	100	100.0

From cross tabulation table 5.5 indicate that, majority 60 percent of interviewed respondents do not apply fertilizers in their gardens as compared to 40 percent which shows that they apply with their level of education.

The study show that, respondents who have tertiary, university and other forms of education use and apply fertilizers in their farming compared to the less educated and this was revealed by results in the table above; where 100 percent of university respondents interviewed made correct and primary level of education respondents 34.2 percent apply fertilizers in their gardens.

Further, the study confirms that, fertilizer use is not easily to be applied by the farmers' respondents who were interviewed in the study area. Fertilizers are therefore, more effective if they are applied and used well than any other soil technology or they are valuable if they are applied on the top of mulch than if they are applied on unprotected soil (Scholl 2004). In addition, fertilizer, crop husbandry measures, such as the use of green manure, are important in combating soil fertility problems. However, fertilizer usage and other technology application in soil fertility management among smallholder farmers have been generally limited, although experiences on ground scale challenges with rural farmers in utilization and uptake in order to improve their productivity. Fertilizer use in Uganda, at an average of 1 kg per ha, is much lower than Sub-Saharan Africa's average of 8 kg per hectare. Fertilizer application rates in Uganda have been found to be highest in plots operated by owners and on land under freehold tenure (Komugisha 2008).

Although, the use of fertilizers and other modern technologies in Pallisa district are still low in adoption and uptake by the farmers, but however show some deliberate interests from some of farmers in the adoption the technologies by over 35 percent who use different types.

However there are many challenges that hinder farmers from quick adoption. The study shows that various types of fertilizers and technologies were applied and used by farmers. The 100 respondents who were interviewed gave multiple responses which totaled 120 tally responses. The farmers use and apply FYM, nitrogen, phosphorus, rhizobia, potassium and nitrogen, phosphorus and potassium were mainly applied by farmers as based on the research findings and as shown in the table 5.6.

Table 5. 6*: Fertilizer Usage (n=85)*

Types of Fertilizers Used	Tally	Percentage
Manure(FYM)	37	43.5%
Manure+N+P	25	29.4%
N+P	12	14.1%
Rhizobia	14	16.4%
N+P+K	10	11.7%
Phosphorus	10	11.7%
Others	12	14.1%

With fertilizer usage, it was observed and noted that various types were being applied depending on the type of crops grown, accessibility and cost efficiency as well as short and long term benefits without forgetting the duration.

The majority, 43.5 percent of the responses from the respondents show that, they use FYM and the reason behind this was that it is very cheap and easy for them to apply more especially to those who have cattle, goats, sheep and poultry in their homestead. While as 29.4 percent apply Manure+N+P,[10] 14.1 percent of the responses from the respondents show that they use N+P,[11] while as 16.4 percent use Rhizobia and 11.7 percent use N+P+K.[12] Also the responses from the respondents 11.7 percent show the use of phosphorus. A male FGD respondent from the Opwateta Sub-county strongly supported that phosphorus is essential and most advantageous for crop yields and enables a plant to store and transfer energy, promote roots, flowers and fruit development and allows early maturity, however, we call on the private sector to partner with the public sector to contribute to the delivery and adoption of fertilizer technology to farmers in Pallisa district to help overcome productivity challenges to sustainable livelihoods. Since 80 percent of Ugandan population depend on agriculture as their main source of livelihood and 60 percent of Ugandan industries depend on agricultural produce as their main source of raw materials.[13]

[10] Combination of manure, nitrogen and phosphorus (Manure+N+P) it is well applicable by farmers
[11] Mixture of nitrogen and phosphorus only (N+P) can show lowest balance to the crop growth for better and improved productivity.
[12] Combination of nitrogen, phosphorus and potassium (N+P+K) this is the proper balance of nutrients in the soil management practices which leads to high yields and productivity.
[13] The Monitor Uganda, Saturday 15th October 2011 released under farmers column, the agriculture sector.

The others fertilizers used which constituted 14.1 percent from the responses by the respondents were using such as mucuna which is the important agro ecological practice that improve soil fertility and yield production. The mucuna is indeed a legume cover that is efficient in low-cost source of nitrogen with considerable potential to improve soil fertility as farmers get high yields. The urea is nitrogenous fertilizer that should be used for top dressing when maize plant is kneel high, Diammonium Phosphate (DAP). One key informant, Field Officer from NARO in Butebo Sub-county narrowed about other type of inorganic fertilizers that,

> *"fertilizer types such as DAP is widely used fertilizer and it made from two common constitutes in the fertilizer industry, Triple Super Phosphate (TSP), this one is used as a base fertilizer and if it is applied too early the phosphorus in it combines with the lime and other elements in the soil and loses its effectiveness and Single Super Phosphate (SSP) that is highly demanded fertility and mostly used at the time of preparation of land"* **(Field Officer, NARO in Butebo S/C).**

Respondents mentioned the formation of social groups for practical training as an agent of change in rural communities and can assist in the application and utilization of fertilizers. Community organizations had been formed for the raising of high yields and production among poor and rich farmers in the area to facilitate better livelihoods of men and women as well as their households hence rural and community development.

5.7: Limitations of not Using Fertilizers as Rated by Responses from the Respondents.

Many people have misinterpreted the use of fertilizers and it implies that utilization and recommendation of fertilizers are still a challenge among farmers. The economic factors such as price of fertilizers and marketing risks, and non economic factors include farmers' decision and characteristics (Okoboi and Barungi 2012). It was important to first assess the reasons that limit farmers from not adopting and using fertilizers as technology for increasing production in their present livelihoods. The research findings show that, respondents had reasons why they were not applying or using fertilizers and this led them giving out more than one response. Hence the outcomes from the respondents' reasons were ranked according the responses they gave as indicated and shown in table 5.7.

Table 5. 7*: Reasons why Fertilizers were not Applied (N=100)*

Reasons	Tally	Percentage
Too expensive	40	40.0%
Inaccessible	20	20.0%
Not easy to apply	25	25.0%
Damage soil	20	20.0%
Illiterate	10	10.0%
Other	5	5.0%

For the respondents who were not using fertilizers and the reasons behind this was noted that they were limited by a number of factors which included; 40 percent of the responses from respondents show that, fertilizers are being expensive to farmers and high price of fertilizers on the other hand and low price of crop produce on the other. The findings show that, 20 percent fertilizers damage their soil and the most of the farmers' principle. However, some farmers sacrificed to purchase and apply them in their gardens, but majority of respondents said that fertilizers are not good to use and apply in the farming. In terms of cost and purchase and this aspect was mostly raised during key informant and FGD participants and for instance, one female FGD participant in Kapuwai parish noted that; Atim (assumed name); in her early 40s strongly asserted that,

> *"my household, we are not using fertilizers because of being very expensive to purchase and due to my limited income, further from other farmers told me that fertilizers are not good to use because they damage and spoil the soil in the long run but however being encouraged by the fellow farmers who called and took me to join farmer group where I saw demonstration farms. Perhaps, I emphasize those who have negative approach like me to have a test so that, we can increase on production for better livelihoods"* **(FGD, Kapuwai Parish, Butebo S/C).**

While as 25 percent of the responses indicate that fertilizers are not easy to apply, which needs enough practical advises and capability and experience. The findings reveal that, 20 percent show that fertilizers are inaccessible in the area from nearby shops and trading centers. A respondent from Kabelai parish, in Butebo Sub-county said, "fertilizers are not easily obtained in this Kabelai local area and other trading centers, farmers say that when you want get fertilizer, go to Pallisa town which is far away from here, either Mbale and Tororo town which are the biggest cities in the region or Kampala therefore their inaccessibility has led us not use the fertilizers."

this indicated that fertilizers are limited in the availability and could be the cause of farmers not adopting the technologies for their changing environment. However, 10 percent show that it is due to illiteracy of farmers about the use of fertilizers, this show that they have limited understanding on the technology or they do not want to uptake and utilize the technology benefits of high yields and production. Finally 5 percent fall in other reasons such as; farmers' perceptions, education levels, unwillingness and choice to use the fertilizer technology to fight against poverty, famine and poor health in their households. Perhaps, Odendo, Onyango and Wanyonyi (2010) in their study found out that farmers' perception and willingness to upscale SFMTs is being influenced by socio economic factors that have positive effect on the adoption of inorganic fertilizers. The findings indicated that use of fertilizers as soil fertility management for improved productivity described above, despite their short falls, it is clear that soil fertility in the study area is at chance to increase, because some farmers who believe in cultural practices to be the best, will at time check and adopt the new and modern technologies.

5.8 Role and Contributions of Farmer Groups in Dissemination and Adoption of SFMTs

The research also look at farmer groups which express collective action among farmers or which facilitate or hinder dissemination and adoption of soil fertility management technologies for improved production and better livelihoods. Farmer organizations are well recognized for their contributions to improving food security and alleviating poverty, creating new local and expert markets driving sustainable rural development though empowering farmers and their organizations (IFAD 2010). Farmer groups which are the grass root levels, provide farmers with many services that are critical to their success in livelihoods such as access to loans, new innovations, trainings, sensitization, and markets. It is also assumed that farmers who are members of different social groups easily adopt new innovations because they get information from different sources (Singinga, Delve, Lule, Matsiko and Miiro 2008). Many success stories of farmer organizations leading to active and effective farmer participation in dissemination and communication of information on knowledge-intensive of SFMTs have proved challenging as transfer of technical knowledge from scientist is difficult. Thus exist a considerable amount of information from farmers and farmer group members and one of the research study objective was to assess the contributions of farmers and farmer groups in the dissemination and adoption of SFMTs in Pallisa district.

The research findings collected from farmer groups and other community farmers who were and not members of the groups reveal that, 82 percent of the respondents knew about farmer groups and their existence in the study area. The findings show that, 18 percent did not know about farmer groups' existence in the study area. This indicated that six farmer groups were sampled from four parishes in the two Sub-counties to find out the influence of farmer groups helping farmers to disseminate and adopt the soil fertility management technologies as noted by 5.8.

Table 5. 8: The Sampled Farmer Groups in Pallisa District (n=82)

Farmer Groups	Tally	Percentage
Kabelai FG	10	12.1%
Opwateta FG	13	16.0%
Kanyum SACCO	28	34.1%
Kaleko Farmers Initiatives Against Poverty (KFIAP)	8	10.0%
Ekenere FG	7	8.5%
Kanyum Womens' Association (KWA)	14	17.0%

The findings indicate that, the majority 34.1 percent of the respondents interviewed openly and confirmed that, they are members of Kanyum farmers SACCO where the farmers save and borrow money to support them in their livelihoods and this statement can be agreed with the study made by Okurut, Banga and Mukungu (2004) that, micro-credit for long has been discovered to have the potential to alleviate poverty among rural poor through small loans as essential inputs to increase productivity of the poor at the level. A male FGD participant from Kaleko village, Butebo Sub-county noted that, "I cannot talk bad to the SACCOs because, we go there and get loan which we use to buy seeds, pay school fees for our children as we look forward to pay back." The results show that, 17 percent who were members of Kanyum Women's Association (KWA) and this group was formed and started by women only in Kunyum parish, Butebo Sub-county to promote on their living standards in the community and this group was later supported by government institutions such as NARO which promote productivity through soil fertility technologies and these women have improved on their production since majority of them are farmers.

The respondents who represent, 16 percent were member of Opwateta Farmers Group and this was well known to be biggest farmer in the whole Opwateta Sub-county. At the grass-roots level, farmers' associations, producers' groups and cooperatives, as well as specially created farmers' groups, are all involved in research and extension activities (Framework for African Agricultural Productivity 2006). While as, 12.1 percent were members of Kabelai Farmers Group and this group was found in Kabelai parish, Butebo Sub-county, 9.7 percent were members of Kaleko Farmers' Initiatives against Poverty, while 8.5 percent were members from Ekenare Farmer Group. Perhaps, this shows that most of farmers were willing and contented to operate with Farmer Groups (FGs). FGs are most preferred and this is because, they are highly interactive and bring out feedback to its members and community-based channels have been found to be very important in developing countries and may ever be used instead of other methodologies (Esilaba, Adolwa, Okoth, and Mulwa 2011). A key informant respondent from Kabelai parish said that, "farmer groups perform many roles and contributions mostly to farmers and among which promote collaboration and share amongst other farmers in the area for benefits, training, proving loans to members and farmer groups are very good at lobbying from government and other NGOs to its members for development."

In this perspective, soil fertility management has been the entry point to interventions aiming at improving agricultural productivity and livelihoods of farmers. To this effect, the research programme has embedded on SFTMs whereby farmer groups and farmer field schools are popular as knowledge sources because they foster solidarity and build in-group morale (Ramisch, Misiko, Ekise and Mukalama 2006). Community-based channels have been found to be very important in developing countries, and may even be used instead of mass media at knowledge stage in the information-decision process, as mass media are not widely available (Rogers 1995; Creg 2003), farmer groups deemed to be the spearheading dissemination of SFTMs for improved productivity and livelihoods. The research findings show that majority of the respondents knew the role and contributions of farmer groups in Butebo and Opwateta Sub-county, Pallisa ditrict and the most said that farmer groups provide demonstration as shown in the table 5.8.

Table 5. 9: ***Role of Farmer Groups (N=82)***

Roles of FGs	Tally	Percentage
Share Knowledge	17	20.7%
Provide Demostration	22	26.8%
Cultivate Crops	18	22.0%
Sensitizing the farmers	15	18.2%
Loan Provision	15	18.2%
Collaboration	14	17.0%
Saving	12	14.6%
Training	10	12.1%
Marketing	9	11.0%
Others	8	9.7%

The findings indicated in the table 5.9 show, that the respondents interviewed gave out multiple responses which totaled to 140 from the 82 respondents who were interviewed and said they know about farmer groups. Whereby, 26.8 percent of the responses from the respondents show that the farmer groups were providing demonstration garden and exhibit to farmers on how to improve on their farming methods through adoption of new technologies. A female respondent from Opwateta village further narrated that, “farmer groups allocate members in one area where they perform experiments of plot garden with applications of new technologies so that we should go and practice in our homes.” While, 22 percent indicate that farmer groups encourage cultivation of crops where by farmers come together clear up land and cultivate for communal production and benefit in the community and the respondent said that it good to work together because it promotes hardworking among the member of social group in the community.

In addition, 20.7 percent show that farmer groups support knowledge sharing among farmers and while, 18.2 percent of the responses from respondents as loan provision and sensitizing farmers. Further findings 17 percent of the responses from the respondents show that, farmer groups promote collaboration, and 14.6 percent confirm that farmer groups perform as saving site for money of the members in the society. The study made by Okurut, Banga and Mukungu 2004 found out that, groups were previously preferred by most low income earners because it take into account to socio economic status of the poor people. While 12.1 percent also show that, farmer groups promote marketing of the farmers produces to the business people and setting prices as

well as providing stores to the produce. Finally, 9.7 percent were included in others such as; goat rearing and lobby funds, choir and drama shows with plays more inclined to HIV/AIDS prevention and protection. It is believed that a healthy body is a basis for power and energy to perform other activities such as agriculture productivity for better livelihoods. The Findings from the respondents about the contributions of farmer groups in the dissemination of SFMTs were summarized by following case study drawn from an act by the respondents in one of the case study sessions that were conducted in Opwateta and Butebo Sub-counties as noted below:

Case study 2: Role and Contributions of Farmer Groups to Farmers

From the FGDs conducted in Butebo and Opwateta sub counties, members really agreed that farmer groups have very important role in their area as confirmed by their strong statements;

Omagido (Stage name); One member from Kaleko farmers against poverty in Butebo, during the session asserted that "farmer groups contribute and play role of cultivating crops through use of soil technologies for improved productivity and as Kaleko Farmers Initiative Against Poverty, we have our motto ***"feed the soil and soil feeds you"*** and we are working beyond our motto as the mission and targeted goal to achieve better livelihoods" hence, this was supported by other members in that farmer group with the claps and shouting.

Lidiah Odongo (Assumed name) ; from Opwateta Sub-county said that farmer groups are offer big role by providing demonstration farms to the farmers where they go and learn from the new technologies, further said demonstration farms are in every village to be near and easily identified.

Odolle (Unspoken name); from Kanyum farmers SACCO Butebo S/County asserted that, "really farmer organizations are the best, because I make savings with them and in turn make profits, I also borrow money from them, truly are good and as now I do praise Kanyum farmers SACCO for the services and help they provide to me and to other members and our livelihoods have changed. I further advise all those who are out there and not members to seriously and quickly join farmers organization and see change in their life"

(FGD participants in Butebo and Opwateta Sub-counties).

From the belief points of view, these FGD participants found it very useful in being members and joining groups have high advantages to benefit more than those who are not members and have not joined. In rural areas, farmers' organizations are the nearest and often only institution providing essential goods and services to the rural poor and helping them to break the poverty cycle (Sustainable Agricultural and Rural Development 2007).

5.9 Reasons for not being Members of Farmer Groups

Currently there is insufficient information in understanding of farmer groups by some farmers, what they actually do and what the farmer groups contribute towards the improved productivity and livelihoods improvement in the community. The results show that, slow adoption of soil fertility management practices in Pallisa district by farmers is due to some farmers not being concerned to become members of the groups. Yet better knowledge, sensitization, skills and services are easily acquired through groups and organizations because, the government bodies and institutions and other NGOs prefer working with the groups and CBOs. Individual farmers and their farming practices do not prefer to operate with organizations and groups perhaps it is where service delivery goes from the government, NGOs and other institutions (Mugwe et al 2007). After joining farmer groups and other organizations would affect adoption for example NAADS, NARO and among others are the institutions in Uganda that promote agriculture productivity for better livelihoods among rural poor farmers. Therefore it was important for this research study to further assess and determine the farmers' reasons why some farmers are not members or influenced by farmer groups in the adoption of soil fertility technologies. The findings show that, over 50 percent faced with the reasons of not being members of FGs and the table 5.9 summarizes the research results.

Table 5. 10 ***: Reasons for not being Members of FGs (n=100)***

Reasons of not being members of FGs	Tally	Percentage
Lack of membership fees	45	45.0%
Never joined any	20	20.0%
Have much competition	5	5.0%
Not interested	10	10.0%
Expensive	3	3.0%
Others	7	7.0%

The research findings revealed that, the respondents who knew do not know, and who were not members of farmer groups in the study area, from the 90 responses they gave; majority 50 percent was that people could not afford membership fee for joining in the most groups. A key informant from Kituba village said that, "good number of farmers has failed to join the farmer groups because of limited income to give up joining and farmer groups cannot allow members

who have nothing to unite them." However, 20 percent of the responses from respondents indicate that, they had never joined any farmer group and this show that it is either the perception or decision not to take interest in farmer groups. While as 10 percent of the responses from the respondents indicated that, they were not interested in farmer groups and this could be that, farmers are comfortable with their life in farming. The study findings further revealed that, 5 percent they have much competition amongst people and most of farmers are rushing to join and this led some to remain behind. While, 3 percent show that, farmer groups are expensive for them to join while those who had different other reasons such as; no knowledge about farmer groups, negative attitudes on farmer groups, laziness and ignorance constituted 7 percent. The farmer groups have a potential, which could be utilized for technology dissemination to enhance adoption as a result of wide scope of operation in Pallisa district.

In conclusion, it can be evidenced that, use of farmer groups as one of the methodology for the dissemination and adoption of available soil fertility management technologies in the district can be of great significance to smallholder farmers perceived conservation agriculture. Soil fertility management technology adaptation strategy is very low and this suggests existence of other important reasons for practicing maintenance agriculture. The implications of all above, show that largest population of farmers have recognized about SFMTs in the area as the good likelihood, but hindrance to adopt which may lead limited productivity. There is also significant proportion of farmers in Pallisa district who had inadequate access to information sources about soil fertility management technologies. The implication of this, the household farmers face limited adoption of soil fertility management technologies which later leads to low production and poor livelihoods. Despite the fact that, the concerned bodies who were implementing soil fertility management technologies through limited numbers of farmers and other methods, the field level workers of that bodies could have not yet reached to all categories of farmers.

CHAPTER SIX

FACTORS AFFECTING THE DISSEMINATION OF SOIL FERTILITY MANAGEMENT TECHNOLOGIES

6.1 Introduction

This chapter focus on conceptual and establish the issues associated with factors affecting dissemination of soil fertility management technologies for improved productivity and better livelihoods. These factors are different in nature and understanding the basic reasons for choice of practices and farmers' perception of advantages and disadvantages is crucial for extension and other advisory services to be effective. This chapter analyzes and discusses the factors affecting the dissemination and adoption of soil fertility management technologies, impact of training on farmers in the dissemination, challenges faced by the farmers in dissemination. The chapter further assesses the factors that enhance adoption of new soil fertility management technologies by farmers and farmer groups in the study area and impact of trainings on farmers in the dissemination adoption of the technologies.

6.2 Impact of Training on Farmers in Dissemination of SFMTs

Trainings have specific goals of improving ones capability, capacity and performance and training upgrade and up train skills of an individual in the adoption of an innovation. According Wayman 1992 says that, trainings have become an integral part of organizational life as organizations devote for great deal of efforts, manpower, and money in development and utilization of employees' training for knowledge sharing, skills and education abilities and training tends to foster effective utilization of organizational resources. This was in the same line of argument with Omole (2003), who ascertained that training programs have a direct positive influence on job security, increased productivity as well as improved workers' performance among workers in business field. One of the primary ways by which training may be acquired information or knowledge source provides the content or expertise of interest to the information seeker while channels refer to the methods or vehicles by which information is transferred or received (Napier and Tucker 1999). Sources of SFM knowledge and information are implemented by agricultural research institutions, government institutions and administration such as local government, learning institutions, community- based organizations (CBOs), Non-

Governmental Organizations (NGOs), churches, provincial administration, agricultural companies, extension workers, and among others. The agricultural Innovation Systems (AIS) idea considers trainings as links between actors, interactive learning processes, and the policy and institutional context that govern the agriculture sector in order to better understand the new innovation such as SFMTs dissemination and application by farmers and it also emphasizes the need for all stakeholders to work together with farmers towards innovation adoption for improved productivity and livelihood development.

The findings show that farmers in the study area were receiving training as the potential tool in dissemination and adoption of soil fertility management for improved productivity and livelihoods progress through agricultural inputs. The study shows that, 74 percent of the respondents had received training about new SFMTs. While 26 percent affirmed that, they had not received training from survey study in the two Sub-counties of Pallisa district on SFMTs and this could be limited access to information sources due to the fact that the concerned bodies were jointly implementing soil fertility management with not the all population. The field level workers of institutions could not yet have reached to all categories of farmers which would give all farmers equal priority (Pender 2009). Trainings were provided to farmers as tool for speeding up dissemination and adoption of SFMTs. The table 6.1 shows that, majority of the respondents interviewed, highlighted and confirmed that they receive trainings as indicated in the table below.

Table 6. 1*: Training Providers to Farmers about Soil Fertility Management Technologies (74)*

The Providers of the Trainings	Frequency	Percentage
NARO	58	78.3%
NAADS	12	16.2%
Others	04	5.5%
Total	74	100.0%

From the table 6.1 above, on the side of training as knowledge adoption on the new SFMTs to farmers to improve on their production for food security and better livelihoods, The result further revealed that farmers who received trainings on existing soil fertility technologies, 78.3 percent of the respondents said that, were mostly and mainly provided by NARO and it is the most and

the influential body or institution in Uganda by government which is largely concerned with soil management and development, particularly the soil science department at the institute, it function all over the country where by NARO formed up Zonal agricultural research Development Institute (ZARDI) in every region and at district levels. Assistant Chairperson Local Council V, Pallisa district said,

> "*Trainings are offered to our farmers on soil fertility improvement for high yields and better production by people from research institutions and universities such as, Kawanda research institute and Makerere University, faculty of agriculture"* **(Key Informant, Pallisa district Local government).**

This proves is that, trainings influence adoption of the introduced soil fertility technologies could be enhanced through targeting all farmers, both young and old. Thus people in the community work fulltime on the farm, and also this show that through training households increase on food security through enough production for their families.

The study findings show that, 16.2 percent of the respondents receive training from NAADS on soil fertility management technologies for better production and well-being of their livelihoods. The research further show that, NAADS is the body implemented by the government to support and give farmers hopes in their agriculture production, through agricultural service advisory and achievement and it is operating throughout all the districts in the country. While as, 5.5 percent show that they were other training service provider from NGOs such as FIDA, local councils such as from the district agriculture department, staff at Sub-county level and among others. Research findings further revealed and discovered that these trainings used to come or happen to farmers after period especially after once in month, after 3 months or more than 3 months as indicated by the results below.

Table 6. 2*: Regular Trainings Offered to Farmers (n=74)*

How often trainings provided to farmers	Frequency	Percentage
After 1 month	8	10.8%
After 3 months	20	27.1%
More than 3 months	46	62.1%
Total	74	100.0%

The table 6.2 above from the research findings shows that, the majority respondents 62.1 percent receive trainings on soil fertility management technologies to improve on the production in more than 3 months. A key informant local leader (retired Chief) from Butebo Sub-county supported this by saying,

> *"we are notified about the trainings to inform farmers about new agricultural developments towards the production in this local area when it has gone to five or ten months and even to a year, when the farmers have already left the vision and role of trainings since it take long."*

This shows that, trainings are still limited and need some adjustment so that farmers prove the meaning of SFMTs implementation in the area to farmers, hence adoption and end result better productivity.

While 27.1 percent of the respondents said that, they usually received training after 3 months and the people with in the profession and occupation may refer to this as specialized training, however 10.8 percent of the respondents exposed that they get their training about the application and adoption of soil fertility technology after 1 month and this is the good measure which keep farmers aware, sensitized and knowledge as summarized and indicated in the table below.

The implications of these results is that, adoption of the introduced soil fertility technologies could be enhanced through increase on the trainings to farmers where the results show that, the trainings very low to farmers from and among the stakeholders therefore are received at a low pace. Consequently this can hold back the dissemination and adoption of soil fertility management technologies among farmers and at the same time, farmers lead to low production.
The research study went ahead to reveal whether the farmers were gaining any advantage from trainings on soil fertility management technologies, the findings further show that the

respondents (farmers) were gaining from trainings and this show that trainings are good and necessary to human life for experience and development of the community. However, the respondents gave out multiple response views and of which sharing knowledge out-weighted the others by the majority as summarized in the table 6.3.

Table 6. 3*: Showing Benefits of Trainings by Respondents (n=74)*

Benefits of trainings	Tally	Percentage
Knowledge Sharing	32	43.2%
Collaboration	21	28.3%
Sensitization	25	33.7%
To improve on yields	20	27.0%
Competence and workshops	14	19.0%
Others	18	24.3%

Multiple responses were elicited.

From the table 6.3 show that, farmer were getting benefits from the trainings and it is where the majority 43.2 percent of the responses from the respondents indentified knowledge sharing among themselves for the use and application new technologies. The study shows that 33.7 percent get the benefit of sensitization so that they get experience to a particular problem and while 28.3 percent, affirmed by collaboration. Furthermore, results shows that, 27 percent benefited on how to improve on the yields and these trainings are conducted as tertiary agricultural education which take a centre stage in the as well education and training for rural people is a strategic priority to achieve food security, eradicate malnutrition and poverty and spur development in rural and 19 percent of the responses show that benefited the competence and workshops. On other hand however, 24.3 percent show other benefits of trainings such ideas, skills, timing the planting period, how to use different types of fertilizers and to which crop, just mention but a few.

Trainings are generally essential to the knowledge and mastery of technology-based production processes (Scott 2007), and allowing people, for instance farmers to new motivations, to keep pace with the constantly changing environment. It is also used as a strategy to retain farmers to perform in the cultivation practice by supporting Natural Resource Management (NRM) for

improved productivity and livelihoods.[14] In this context, training has been the entry point to interventions aiming at improving dissemination and adoption of soil fertility management technologies for increased agricultural productivity and livelihoods among the farmers in Pallisa district.

6.2 Challenges Faced by Farmers in the Dissemination and Use of SFMTs

Agriculture support livelihoods of rural poor people. Proper development and application of agricultural knowledge depends to a large extend on the tertiary education institutions. There are many challenges affect the successful and useful of SFMTs among farmers and among which socio economic factors take a lead. Effective education, in addition produces useful and improved production which lead to improved livelihoods through science and practice (African Network for Agriculture, Agro forestry and Natural resource education 2008). While Ugandan farmers will increasingly need to increase the productivity of the land they farm in the face of increasing land pressures. Obviously Uganda is a country endowed with a warm climate, ample fertile land and regular rainfall which provides one of the best environments for agricultural production in Sub-Saharan Africa (ACORD Uganda 2010). The agricultural transformation is still in its influential stages and yet the population is expanding at frightening rate against the physically limited land available in Uganda and this is an explosion turn for human livelihoods at risk.

The factors challenging dissemination of soil fertility management technologies are different in nature but the most amazing include: length of intervention, availability of intervention, land ownership, availability of labor, education of farmers, income of farmers, and age of farmers, gender, religion, tribe and farmers' perception of changes required. Farmers are faced with important choices related to their farm enterprises, economic and domestic commitments. Farmers' decision to utilize soil management practices is often governed by their individual assessment of benefits and resource implications of using particular practices in order to avoid investment in risky ventures (Nuwagaba, Mangheni and Tumuhairwe 2001). The study aimed at assessing the socio-economic challenges faced by respondents identified in the area of study

[14] Production trainings strategy may have large impact on land management which in turn has a large influence on soil nutrients (Nkonya and Kaizzi 2003).

Pallisa district. Principle challenges facing the development of agricultural sector include: low/no use of improved technologies, lack of inputs including seeds and improved breeds, fertilizers, mineral blocks and tools, poor rural infrastructure that hampers access to markets, low literacy and numeracy rates, lack of financial services, weak agricultural and livestock research and extension services (Margaret and Ahmed 2009).

Uganda in particular, it was observed that there are many challenges faced by farmers in the dissemination and adoption of soil fertility management technologies towards improved productivity that will result into food security and better livelihoods, that most smallholder farmers continuously cultivate crops without using fertilizers or they have drastically reduced the use of mineral fertilizer after the elimination of farm inputs (Ajayi, Akinnifesi, Gudeta and Chakeredza 2007). The main obstacles identified by the researcher from the rural district of Pallisa, in the application, dissemination and adoption of soil fertility management technologies for improved productivity for better livelihoods by farmers are limited funds to invest into agriculture like other developing countries of the world. The study first examined whether the respondents do face constraints while trying to uptake the new soil fertility management technologies. The table 6.5 indicates that most face the challenges, while other said that they do not and others were not sure whether they have challenge or not as summarized.

Table 6.4 Do Farmers Face Constraints while Trying to Uptake New SFMTs

Farmers face problems	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	62	62.0	62.0%	62.0
No	30	30.0	30.0%	92.0
Do not Know	8	8.0	8.0%	100.0
Total	100.0	100.0	100.0%	

The findings are represented by the survey of farmers and purposive findings from key informants and FGDs from the two sub counties of Pallisa district whereby 62 percent of the respondents confirmed that they were faced by challenges when up taking and utilizing new soil fertility management technologies in their agricultural improvement through increased

production and eradicating rural poverty among households and 30 percent said that there is problem with the technologies. However, 8 percent of the respondents for them did not know whether they face the challenges or not in the uptake and adoption of soil fertility management technologies and this show that these respondents do not outweigh the difference between the old practices and new technologies that are currently available in improving the soil fertility for good and increased harvest.

The research study further, went ahead to know the views from the respondents who were facing challenges in the dissemination and adoption of SFMTs. The respondents gave out more than one responses and this indicate that problems were holding back their livelihoods which hamper the adoption of new soil fertility that would increase the production. The major responses show that, farmers were faced with lack of money and funds to put into their farming progress and the table 6.5, summarize the challenges faced by the respondents.

Table 6.5 Challenges Faced by Farmers in the Dissemination and Adoption of SFMTs (n=62)

Challenges Faced by Farmers	Tally	Percentage
Lack of enough funds	27	43.5%
Limited sensitization	18	29.0%
Unwillingness of farmers	16	25.8%
Too expensive	15	24.1%
Inadequate training	14	22.5%
Poor timing	12	19.3%
Limited research	11	17.7%
Climatic changes	10	16.1%
Limited market	10	16.1%
Illiteracy	9	14.5%
Traditional methods	5	8.1%
Disease and pests	3	4.8%

Multiple responses were extracted

From the table 6.5 show that, from 62 percent of the respondents who were facing challenges provided 150 multiple responses. First indicate that 43.5 percent of the responses from the respondents reveal that it is lack of enough funds in their households to support agricultural activities and more especially to buy, farm tools, fertilizers and their inputs. In addition,

Chairperson from Kaleko Farmers Initiatives against Poverty (KFIAP), Butebo Sub-county narrated how farmers are very poor in their homes and almost failing to meet the needs which lead them not uptake the new development in the agriculture sector, in an interview explained that,

> *"our farmers have limited finance to invest in the agricultural production so that they can receive improved productivity which in turn give them income, but poverty is still a big challenge in this home area and even our children have failed to join higher education because of fees otherwise we need support. However, the people who work with the government have corruption and have finished the poor rural peoples' money into their personal gains"* **(Key Informant Farmer Group Leader in Butebo S/C).**

This indicates that, largest population of farmers in Pallisa district is generally poor to afford the use of inorganic fertilizers in their gardens since the most needs money and hired labour and this is complicated by even more dramatic rises in fertilizer prices.

In addition, 29 percent show that there is limited sensitization and that farmers have inadequate experience on soil fertility management technologies so that they can notice it and understand quickly and adopt, and further this show that the sensitization to farmers is not enough. Furthermore results show that, 25.8 percent the challenge of unwillingness by farmers to adopt and accept the new technologies. The persistence of cultural practices is a hindrance to agricultural reforms to increase quality and quantity of crops. As a result food production levels are low and leading to increase in poverty and environmental degradation. A participant from FGD in Kupawai parish noted that, "farmers do not want and they refuse to apply the new technologies with no consequence and reason of refusal to use the technologies and since we poor farmers were the largest population in the area who depend on agriculture for the living but we neglect it." Of the total household population in the district are engaged in agriculture which provides important source of households' livelihood and its mainly subsistence farming which is practiced and a negligible proportion, 0.4 percent is engaged in commercial farming (Pallisa District State of Environment Report 1997). Consequently, 24.1 percent of the responses affirmed that they are too expensive either to apply and the cost in the market. One of the reasons, the replenishment of soil fertility with inorganic fertilizers at the recommended rate and appropriate time is constrained by high price of fertilizer and delivery delays (Chinangwa 2006). Transport and other costs like duties and taxes, double the international price of fertilizer by the

time it reaches the farmers in Uganda and Pallisa district in particular. However, this shows that the farmers have decided to remain on the tradition or old practices.

Although, 22.5 percent of the responses show that, inadequate trainings and a respondent from Ekinare village, Kabelai parish in Butebo Sub-county narrated that, "trainings provided to us are very few and when are limited we do not get enough knowledge and skills to apply the technologies so that we increase on our yields." Therefore problem in dissemination and adoption of SFMTs and this is worth pointing out that the response and exchange sessions did help raise awareness of SFMTs. Furthermore results indicate that, 19.3 percent as poor timing and this show that farmers mismanage and mistaken period of planting and the end the farmers are annoyed, 17.7 percent show that there is limited research to farmers and find out the factors affecting farmers in the adoption and give them feedback. While as, 16.1 percent exposed out limited market for their produce and the problems related to or associated with marketing as identified by research study included; low prices for their produce, high taxes especially for traders who transport produce to Mbale, Kampala or across borders to Kenya and Sudan, high costs of transport. The area is inaccessible, variations in price depending on seasonality, poor road networks, poor quality products, internal competition among farmers and middle men who take half of the profits and leave the farmer with very low prices. The study made by ACORD Uganda 2010 show that, liberalized market in Uganda where there are no efforts whatsoever to protect the interest of the small farmers and lack of export policies that favor such small-scale farmers. However, this could also be related to a conditional ties are embedded in agreements, to be signed to protect the smallholder farmers.

Furthermore, 16.1 percent of the responses from respondents verified climatic change which affect and interrupt their farming such as heavy rains that cause floods during the wet season and too much sunshine during the dry season. A male respondent from Opwateta Sub-county during the interview said,

> "*planted sorghum in February 2011, due to sunshine and birds, I harvested little from the half acre of land where I have applied manure and got one and half sacks and if was not the problem of climate change, I could have got a good harvest"* **(A male Respondent from Opwateta S/C).**

This is the challenges associated with the climatic and environment change which farmers cannot predict. Poor rural people are often the most vulnerable to the effects of climate change. Many live on ecologically fragile land and depend on agriculture, livestock, fisheries and forestry. Climate change is already having an impact on agriculture in many parts of our continent, leading to crop failures, livestock deaths and higher economic losses International Fund for Agricultural Development (IFAD 2010).

In additional, 14.5 percent illiteracy due to lack of proper understanding and adequate knowledge on the soil fertility management, 8.1 percent of the responses verify that they held in reserve on traditional methods and 4.8 percent show pests and diseases which affect their crops before maturity and this force them to harvest and produce low which is not enough for the household and to sale. Pallisa District Agricultural Officer confirmed that,

> *"Main causes of reduced agricultural productivity in the district include; unsustainable farming methods, inadequate land use policy, increased population, unreliable and unpredictable weather patterns, and crop diseases. The major pressures behind food insecurity in the district include; reduced agricultural productivity overtime, increase in crop disease like cassava mosaic, unreliable and predictable weather pattern, poor methods of farming, massive post harvest crop loss and commercialization of food crops"* **(Key Informant, Pallisa District Agricultural Officer).**

In general, farmers who perceive the adoption for conservation agricultural production, the systems will result in either increase in farming production or decrease in farming output costs will tend not to adopt such production systems because, the costs will be increased with no corresponding increase in benefits (Napier and Tucker 1999). Why it is difficult to address these challenges since they are easily identified? The agricultural productivity between tenure systems and climate change the adoption strategy and it is nearly all farmers employing low-input in farming system (Kalinda 2011).

6.3 Factors that Support Adoption of New Soil Fertility Management Technologies

Adoption of new agricultural technologies, including soil management practices among smallholder farmers has generally lagged behind scientific, practical and technological advances; hence their impact on agriculture production has been low (Odendo, Onyango and Wanyonyi 2010). Initiatives to address soil fertility management require tailoring of soil fertility

interventions with multifaceted approach, away from purely technical focus (Ikombo, Elilaba, Kilewe and Okalebo 1994). An information or knowledge source provides the content or expertise of interest to the information seeker while channels refer to the methods or vehicles by which information is transferred or received sources of SFMTs knowledge and information include agricultural research in the community. Bellon, Adato, Becerril, and Mindek (2005) described a number of channels available for the dissemination and adoption of ISFM practices among small-scale farmers. These could be separated into community-based (demonstration and field days, farmer field schools, farmer to farmer training), print-based (extension brochures, booklets), mass media (radio programs) and ICT-based audio-visual systems (video documentaries, CD video documentaries) and the findings in Pallisa district discovered that some are insufficient in present to the farmers.

Table 6.6 gives a summary of the enhancing factors that support the dissemination and adoption of SFMTs by all farmers in the area as suggested by their point of views. First and far most, majority 28 percent of the responses from the respondents deep-rooted that all farmers participate in application of new SFMTs for easy spread and acceptance and this can promote uptake when they actively get involved. A key informant chairperson farmer group leader from Kunyum Women Association said that,

> *"as leaders of farmers, we still have very big problem to influence the all farmers to join the groups, some want and others do not. The perception is that all farmers should get involved in the technology practices so that they increase on the yields and receive high production as we force famine and poverty outside of our homes"***(Key Informant, Chairperson Kanyum Women Association, Butebo S/C).**

These findings suggest the need to focus on farmers' engagement and adoption to increase food production at the household level and improving dissemination as primary options for redressing the limited uptake of soil fertility management technologies for constant food insecurity problem in Pallisa district.

In all responses from the respondents, 24 percent indicate the decrease or reduce the prices of fertilizers when the fertilizer prices are reduced, it easy for all categories of farmers for application can promote adoption hence improved productivity. Strategies for reducing fertilizer

prices need to be sought in order to make it more affordable to the resource poor farmer. A female FGD participant from Opwateta village, Opwateta parish said,

> *"there is a need to reduce on the fertilizers prices for all of us to gain through some measures such as increase the trade relationship between the Ugandan and Kenyan input traders in order to benefit from the economies of scale of the Kenyan fertilizer market since Kenya is near. Farmer associations may also help reduce the transaction costs of inputs and outputs. Therefore concerted efforts are needed to revive the strong and healthy farmer cooperative unions and associations"* **(FGD, Opwateta parish, Opwateta S/C).**

Further, 20 percent of the responses from the respondents reported improve on the sensitization on new SFMTs by the concerned bodies so that the farmers can be delivered with enough knowledge and skills about the technologies. While, 17 percent of responses from the respondents show big concern about the government support criticizing that government should support them financially and providing other incentives such as wheel borrows seeds and other garden tools. A male FGD participant from one among the conducted FGD of the two sub-counties that,

> *"we need support from the government by giving us money to put into agriculture production and the government has neglected us farmers and that why we are Performing poorly in terms of production, perhaps we are the one who feeds the nation we need and call up the support and help from the government."* (**FGD participant in Butebo and Opwateta Sub-Counties**).

Other potential factors supporting dissemination and adoption of soil fertility management technologies for improved productivity and better livelihoods amongst farmers identified included 15 percent of responses from them said that, increase on extension services by increase on the agriculture workers in the area. While, 13 percent that should be the provision of loans and 10 percent, increase on research and more demonstrations where more research is done and the concern body such as government put up more demonstrations that the farmers can learn from them, reduce interest rate (4 percent). A male respondent said that, the SACCOs reduce on the rate they charge on the farmers so that they can increase on borrowing from the farmer groups, CBOs and SACCOS, 3 percent need market for their produce and this can enhance uptake and adoption of SFMTs through encouragement of increasing on the production and least the provision of pesticides (2 percent) to fight against the diseases and infection in farming among the rural poor farmers and such a strategy might go a long way towards reducing poverty.

The table 6.6 shows the reasons that the 100 respondents gave during the interview and multiple responses were recorded that totaled to 150 responses from the respondents as summarized in the table.

Table 6. 6: Enhancing Factors that Support Adoption of New SFMTs (n=100)

Factors Support Adoption of SFMTs	Tally	Percentage
Participation of all farmers.	28	28.0%
Decrease the prices of fertilizers	24	24.0%
Increase Trainings	14	14.0%
Government Support	17	17.0%
Increase on the Extension	15	15.0%
Loan Provision	13	13.0%
Increase on Research & demonstration	10	10.0%
Reduce Interest Rate	04	4.0%
Market for produce	03	3.0%
Provide Pesticides	02	2.0%
Improve on Sensitization	20	20.0%

Multiple responses were elicited

Also another important factor indentified was infrastructure development whereby Pallisa district is in the rural and the study where it was conducted in the two Sub-counties of Butebo and Opwateta are remote. The roads are very poor and deep in the village feeder roads are too worse and no longer bypassed this could be the factor that holds back the commutation and transportation services to the rural poor farmers in the district. The interaction and farmer perception assessment provides a foresight with the combination the infrastructure development in the area which needs rehabilitation and makes people accept to ensure there is no misconception between and the development.

In the conclusion to this chapter therefore, due to many reasons to enhance dissemination and success adoption of soil fertility management technologies by farmers for improved productivity that results into better livelihoods. It is important to have a close understanding of the above mentioned active subjects in relation to farmers and put them into consideration. The clear issues made from the research findings in this chapter, such as factors affecting the dissemination and adoption of SFMTs, impacts of training to farmers; challenges faced by farmers to disseminate

and adopt the technologies and enhanced reasons to the success adoption of SFMTs by farmers. They are very crucial to the sustainability of rural livelihoods of farmers in the SSA countries in general and Uganda in particular which could be consumed for technology dissemination to enhance adoption.

CHAPTER SEVEN
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter presents summary of the findings and conclusions of the study about the dissemination of soil fertility management technologies for improved livelihoods by farmer groups in Pallisa district. In this chapter, the researcher made summary of findings and conclusions on the subject of the matter in the dissemination and adoption of SFMTs through farmer groups by farmers. The drive of the conclusion was based on the main objectives of the study; to explore the nature of soil fertility management technologies used by farmers, assess the contributions of farmer groups in dissemination and adoption of SFMTs, to examine the factor affecting the dissemination of SFMTs and challenges facing in the dissemination and adoption among farmers in Pallisa district-eastern Uganda. Since it is at low pace and with the increasing population that has put land on pressure. The researcher finally signifies and pointed out key areas for policy recommendations and further investigation.

7.2 Summary of Findings

7.2.1 Demographic Characteristics of Respondents and SFMTs Uptake

The findings revealed that the socio-demographic characteristics of the interviewed respondents had relation to SFMTs uptake were Bagwere and Itesots were the prominent tribes in the area. The majority was Itesots who practice and dominate the farming and women were mostly connected to soil fertility management technologies, as men usually leave farming to women and children because of the perception that they are household heads and control everything in the community. The results further show that, farmers who had the age groups of (26-35) and (36-45) were captured to have influence in agricultural productivity and soil fertility management adoption compared to younger and elderly people.

Education and marital status of respondents were also seen to have an influence. Concerning education, farmers who had primary and secondary education were the majority involved in agriculture but had less knowledge and experience on the new technologies adoption. The married farmers were seen having the potential to influence the dissemination and adoption

because are cooperative and seriously on livelihood improvement than single, winnowed and divorced. However, socio-demographic characteristics of farmers such as tribe, age, gender, marital status, education level and religion have high chances to influence the dissemination and adoption of SFMTs to change the population to increase or decrease land farming systems for better livelihoods.

7.2.2 Nature of Soil Fertility Management technologies used by Farmers in Pallisa district

The nature of soil fertility used by the respondents such as type component and application of soil fertility management technologies. The findings show that fertilizers and improved seeds, use of improved fallow, compost, planting tree species and leguminous plants were used by farmers for better and increased production. However, agricultural productivity in the district is still low having been declining over time as a result of soil infertility, unsustainable farming methods, increased population, unreliable and unpredictable weather patterns, and crop diseases.

The study found out that, Farm Yard Manure (FYM) was the main and most used technology by the farmers in the study area, followed by compost, crop rotation and intercropping. Others included green manure usage, organic crop residues, improved fallow and use of improved seeds and the findings exposed that most of the farmers do not use inorganic fertilizers. And fallowing also is most often found on freehold plots.

Furthermore, the study also indicates that, application and use of fertilizers are very low in Butebo and Opwateta Sub-counties, Pallisa district where the research study was conducted. Perhaps, the land is poor they are still believing on local practices and less reliance is placed on the purchase of inputs which cannot maintain production goal with smaller amount of farmers' efforts.

The findings show that, after using the soil fertility management technologies, farmers were getting benefits such as high yields, enough food, maintain soil fertility, paid school fees for their children, bought land and bought motor cycles. The findings further reveal that SFMTs depends on the household and land user applying the technologies. Different farmers have different level of needs and capacities that require different practices and technologies for better productivity

whereby, the larger the garden and application of fertilizers, the higher the increase on production and small the garden and application of fertilizers, lower the production.

7.2.3 Factors Affecting the Dissemination of soil fertility management technologies

It was noted that factors affecting dissemination of soil fertility management technologies are different in nature but the most outstanding include: length of intervention, availability of intervention, land ownership, availability of labor, education of farmers, income of farmers, and age of farmers, gender, religion, tribe and farmers' perception of changes required. The findings found out that, majority of farmers face with limited funds in their homes to support agricultural activities and other challenges such as limited sensitization, unwilling of farmers to uptake new innovation, that the technologies are expensive, inadequate training, poor timing, and limited research and stick on traditional methods and among others.

Many people have misinterpreted the use of fertilizers and it implies that utilization and recommendation of fertilizers are still a challenge among farmers. The economic factors such as price of fertilizers and marketing risks, and non economic factors include farmers' decision were also identified as factors affecting the dissemination and adoption of soil fertility management technologies.

The findings show that, farmers were receiving training as the potential tool in dissemination and adoption of soil fertility management for improved productivity and livelihoods progress through agricultural inputs. However these training were provided to them after one month, after three months and in more than three months. The study revealed that the majority were receiving training in more than three months.

7.2.4 Dissemination and Adoption Challenges of SFMTs to Farmers

In a similar manner, the study findings summarized that, structural and ecological factors such as climatic conditions, production price and market services, pest and diseases, extension services and government policy may be the challenges influencing the dissemination and adoption of SFMTs in Pallisa district. The study revealed that, farmers face the challenge of fertilizer prices which are expensive to them. The findings further reveal that, the sensitization is limited unwillingness of farmer to adopt the technologies.

Cultural beliefs and practices related to soil fertility soil fertility has significance within Ugandan farmers towards agricultural productivity. This should be considered in any potential intervention strategy. The findings revealed that, old practices, especially farm yard manure, intercropping, crop rotation, and other previous practices were identified as major practices in the study area. The current practices such as use of fertilizers and improved fallow were found limited, which generates a setback to adoption of important new soil technologies for increased crop production. The findings show that fertilizers damage and spoil the soil and this might go a long way towards hindering the dissemination and adoption.

7.3 Conclusions

Basing on the study findings, a number of conclusions are drawn standing on the study objectives. People's livelihoods are getting poorer because of declining soil fertility, making it difficult for families to even obtain sufficient food for households and little for trade. Productivity has decreased in the last decade years which might go a long towards poverty among rural households which depend on agriculture for livelihoods.

7.3.1 Nature of Soil Fertility Management Technologies Used by the Farmers

This research study conclude that, soil fertility management practices used to improve productivity and livelihoods among farmers in Pallisa district, where the study was conducted indicated that old practices such as use of farm yard manure, intercropping, crop rotation, organic crop residues were the most used by farmers not the new technologies. It's more importantly to highlight that educated people are not involved in the agriculture for their livelihoods because they have soft employment and the study approved that educated people use new technology practices whereby the Itesots were more knowledgeable than Bagwere which were the prominent tribes in the study area. Although many people in rural areas depend on others, but crop production is their major source of income and important survival strategy.

7.3.2 Contribution of farmer groups in the dissemination of soil fertility management technologies

The research study concludes that, farmer groups in the dissemination of SFMTs have contributions towards farmers' livelihoods. The farmer groups have a potential, which could be utilized for technology dissemination to enhance adoption as a result of wide scope of operation. The findings show that, farmer groups promote knowledge sharing, provide demostration, collaboration, training, marketing and others. The dissemination and uptake of soil fertility management technologies for improved productivity and livelihoods, necessitates the approach to farmer in groups as defined in the start of this study. The contributions of such groups have influenced the adoption and farmers expand and improve on the production through the sensitization, trainings, and knowledge sharing among members which contribute to adoption of soil management technologies to other farmers. The farmer groups deserve double appreciation for its role in engaging people into agriculture sector to boost their livelihoods such as food security and eradication of poverty among rural poor towards national development in the Country.

Farmer groups abased at the grass root local levels for driving sustainable rural development though collecting people together and empower them in their groups and organizations for particular purpose. However, the farmer groups and farmer organizations have continue to exist outside government protection. No economic recession has been able to affect it but there is now clear tendency for it to crumble under pressure. Despite the short falls that face the farmer organizations and groups, it is clear that they are progressively getting step forward and remain the most and suitable means of communicating and disseminating SFMT information and knowledge to farmers.

The study end that, demostration farms and farmer groups were the best and largely methodologies that farmers were using in getting and receiving information and knowledge about soil fertility management technologies for improved productivity and livelihoods. The research findings revealed that, farmer groups which are at the grass root level provide farmers with many services which are fundamental to their success in livelihoods such as access to loans, spread of new innovations, saving, collaboration and cultivating together, market provision and

supporting those who are too weak in the groups and organizations. In addition, farmers who are members of different social groups have chance of quick adoption of new innovations. They get information from different members in the community and farmer groups have boosted uptake of SFMTs for increased productivity and better livelihoods.

7.3.3 Factors Affecting Dissemination of SFMTs

The study concludes that most of rural households are engaged in agriculture for their livelihoods and on a smallholder production rather than a commercial source. The women play a significant role in production, which contributes to household food security and the well-being of the children. The study concludes that, socio-demographic characteristics significantly affect technology dissemination and adoption where the age, gender, marital status, education levels, religion and ethnicity of farmers differ in different households.

7.3.4 Challenges Face the Adoption of SFMTs

The study conclude that, the principle challenges facing the development of agricultural sector include: low/no use of improved technologies, lack of inputs including seeds and improved breeds, fertilizers, mineral blocks and tools, poor rural infrastructure that hampers access to markets, low literacy and numeracy rates, lack of financial services, weak agricultural and livestock research and extension services.

The scale up and uptake of SFMTs for improved productivity and livelihoods indeed, farmer groups contribute a lot in the dissemination to other farmers and they deserve dual recognition for its role to agriculture sector and in the national development for eradication of poverty. Therefore, the researcher made conclusion on the subject of the matter in the dissemination and adoption of SFMTs for improved livelihoods by farmer groups to all farmers.

Among the reasons given were that, households are now more rapidly to local practices than current technologies despite the fact that, rural subsistence farmers cannot afford private services such as buying the fertilizers.

A profile of livelihood activities suggests that a great number of people live in poverty, even though there is tremendous increase in people's livelihoods and main source of livelihoods in study area is subsistence farming. To both government and rural development partners are crucial to the sustainability of rural livelihoods in the SSA countries in general and Uganda in particular. The scale up and uptake of SFMTs for improved productivity and livelihoods indeed, farmer groups contribute a lot in the dissemination to other farmers and they deserve dual recognition for its role to agriculture sector and in the national development for eradication of poverty. Therefore, the researcher made conclusion on the subject of the matter in the dissemination and adoption of SFMTs for improved livelihoods by farmer groups to all farmers.
Finally, the researcher made conclusion that, of all above, show that largest population of farmers have recognized about SFMTs in the area as the good chance, but the hindrance aspects to adopt may lead to limited productivity. There is also significant proportion of farmers in Pallisa district who had inadequate access to information sources about soil fertility management technologies.

7.4 Policy Recommendations

Basing on the results made in this research, a number of recommendations were offered, the researcher thus recommends the following policy issues. Development policies and programs with rural development partners and practitioners take their lead for the real needs of rural communities more especially in Pallisa district in particular, and Uganda and East and Central Africa in general, which must be given the opportunity by providing the inputs into strategy design hence promoting increasing productivity and better livelihoods. For example empowerment, strengthen and complete control towards Zonal Agricultural Research Development Institute (ZARDI) for dissemination and implementation of soil fertility management technologies so that the small-holder farmers are key contributors to agriculture and get involved in setting up agricultural research agenda in all regions have to benefit from their zones, the districts and lower to Sub-counties and later the village levels to household farmers for improved production and food security to be attained.

Provisions of markets to smallholder farmers' produce such that, they can be boosted to support the productivity through increase on prices of their produce. The low-income people depend

directly or indirectly on agriculture for their livelihoods. According to the World Bank, supporting smallholder farming is the most effective way of stimulating economic development and reducing poverty. Therefore, the review of the researcher on soil fertility management technologies dissemination and adoption, the country like Uganda does not process fertilizers and therefore should take into deliberation of manufacturing her own fertilizers rather than importation to effectively support the present alarming situation in the farming surroundings.

Secondly, agriculture is the most important sector of the national economy, research and extension activities are still allocated a small proportion of the government budget, receiving very small percent of the total budget in the financial years and this need to be regulated. Soil fertility management technology is a capacity for the rural poor people to exit, famine and poverty. Direct financial support should be implemented through farmers groups and adaption to be success to different situations in different regions of the country. For example, SFMTs projects in the ecological zone of eastern Uganda to enhance the already important problem. To both government and rural development partners are crucial to the sustainability of rural livelihoods in the SSA countries in general and Uganda in particular.

Thirdly, along with strengthening the role of FOs, there is need for strengthening the farmer groups through clear policy environment and setting institutional context (notably the integration level of farmers and their organizations into markets); assets and needs of the organization's membership base; and type of FOs involved. Agricultural innovation (soil fertility management technologies) is an interactive, multi-actor process that cannot be achieved by farmers alone. It also requires building links and alliances between FOs and other institutions. Knowledge of these key elements therefore allows: Defining the roles of research, stakeholders, public and private sector knowledge-for-innovation service providers; Designing appropriate funding mechanisms to strengthen these relations and enhance the farmer-led and demand-driven services; Determining the innovation perspective (technological, institutional and/or organizational).The farmer groups have a potential, which could be utilized for technology dissemination to enhance adoption as a result of wide scope of operation. The concerned authorities should focus on disseminating information about SFMTs challenges to dissemination and adoption, their prevention and control, including how to use and apply certain technology practice and to which

crop, improve on the services, and the risks of poor application and use of the technologies, particularly in areas where the soil fertility are getting low to support the plant growth. This includes, decrease on the fertilizer prices, increase on the extension, and participation of all farmers and reduce on the interest rate. Therefore recommend that, there should be infrastructure development, such as roads to ease the transport, schools for formal knowledge, community centers where farmers meet, and markets both local and foreign to boost agricultural production.

Generally, in this contemporary world, strategic planning is one such value for any individual in the organization. Majority of the poor who access new technologies are less qualified to effectively and efficiently use the practices. Therefore, I seek to recommend that further trainings on uptake and utilization of SFMTs. It became clear that Uganda has no specific policy on soil fertility management, although various agricultural and environmental policies do deal with issues related to environment. Therefore, Community Based Rural Development (CBRD) it is the approach to the challenges and reducing rural poverty. It promotes collective action by communities and puts them in control of the development intervention by making them stakeholders. Also I recommend that, there should be opportunities provided to help smallholder farmers by government and other concerned bodies to improve their practices, by giving them enough access to better-quality seeds, improved fallow and fertilizers that significantly increase their yields – often double or even triple production.

Finally, I recommend that, for better utilization and improvement on the production in agriculture, the infrastructure development should be taken into consideration first such as roads, hospitals, schools and agricultural institutions, because the study carried out found that general infrastructures in Pallisa district are extremely poor. This needs immediate effect to expand the links and connections to the villages, parishes, sub-counties and to other districts in the eastern region which will join to entire country. There should be simple cost-effective methods that, the interventions to do with the improvement on smallholders' livelihoods, in terms of strategies. For example, increase and progress the communication on good approaches in the study area such as; exchange visits and study tours, farmer-to-farmer dissemination as well as involve farmers at the grassroots in setting up research agenda, in order to boost the uptake of soil fertility management technologies.

7.5 Recommendation for Further Research

The researcher has identified a number of study areas for further investigations. Future studies should put into consideration a wider geographic reach; extend the study to all other districts in Uganda and across regions which have poor soils that cannot support agricultural production since the largest population in Uganda depend on agriculture as their main source of livelihoods. Other critical issues for further investigations would include but not limited to; examine the sustainability of soil fertility management technologies to farmers in the provision to livelihoods uphold. There is need for further investigation on role played by farmer groups in influencing the well being of farmers particularly their livelihoods among family members in homesteads and in reduction of rural poverty. Particular study to further investigate measurement of farmer groups' effectiveness in technology dissemination and enhanced adoption is another added field. This would provide a basis of how best to provide rural economic production such as: money, agricultural inputs like fertilizers, improved seeds and farm tools, infrastructure such as roads, health services, stores to mention but a few to reduce on the wear and tear of farmers' future prospects.

Finally, there is a relatively limited research and literature on the role of government empowerment to farmer groups in dissemination of soil fertility management technologies and investments in agricultural productivity for improved livelihoods are in respect of Uganda and SSA. My assurance is that, future investigators would be interested in the between government regulatory framework, empowerment and the operations of agriculture with SFMTs in the developing countries. Further studies should be carried out to carefully monitor and assess how farmers continue using and adapting the technologies, as this is a part of adoption process, adjustments and adaptations of technologies by farmers. Lastly, future researchers need to evaluate the influence of social support and social networks on farmer groups in spread and adopt of SFMTs by farmers in rural situations.

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Appendices

Appendix 1: FARMER SURVEY QUESTIONNAIRE

RESPONDENT INFORMED CONSENT

Dear Sir/Madam, I am **Munywaniwawe Medard**, a student of Makerere University in the Department of Sociology, carrying out research study on ***dissemination of soil fertility management technologies for improved livelihoods by farmer groups in Pallisa district*** as one of the requirements for the award of a Master of Arts in Rural Development of Makerere University.

You are selected to participate in the study and requested to answer the questions honestly and the information given will be treated in especial way for academic and developmental purposes only.

Your cooperation is highly appreciated.

Identification	**Name**	**Code**
District		
Sub-County		
Parish		
Village		
Farmer group		

(CIRCLE OR FILL IN THE BLANK SPACE PROVIDED)

SECTION A: **Demographic Background of Respondents**

1. Sex of respondent

   1. Male 2. Female

2. Age of the respondent

   1. Below 25 2. 26-35 3. 36-45 4. Above 45

3. Marital status

1. Single 2. Married 3. Widowed 4. Divorced 5. Others (specify) …….

4. Education level

1. Primary Level 2. Secondary Level 3.Tertiary 4. University degree 5. Others (specify)……...

5. Religious Affiliation

1. Protestant 2. Catholics 3. Moslem 4. Others (specify)

6. Tribe ……

SECTION B: NATURE OF SOIL FERTILITY MANAGEMENT TECHNOLOGIES

7. Do you know about soil fertility management technologies?

1. YES 2. NO

8. If yes, how did you get to know about SFMTs?

1. Trainings 2. Farmer Groups 3. Farmer Field Schools 4. Demonstration Farms 5. Posters 6. Others (specify)……

9. What are the current soil fertility management practices do you use?

1. Improved Fallow 2. Organic crop residues 3.Crop rotation 4. Green manure 5.Compost 6. Improved seeds 7. Intercropping 8.Use of fertilizers 9.Farm yard manure 10. Others and specify……

10. Have you ever applied current soil fertility management technologies in your garden?

1. Yes 2. No (skip to 15)

11. If yes, what current SFMTs are you using in your garden?

12. Do get benefits from using soil fertility management technologies?

1. Yes 2. No

13. If yes, what are those benefits?

……

……

……

14. If no, what are possible causes?

……

……

……

15. If no, why?

……

……

16. Do you apply fertilizers in your garden?

1. Yes 2. No

17. If yes, what types of fertilizers are you applying in your garden? (multiple response)

1. Manure 2. Manure+NP 3. N+P 4. N+P+K 5. Rhizobia 6. Rhizobia+ phosphorus 7. Others (specify)……..

18. If no, why?

……

……

SECTION C: CONTRIBUTIONS OF FARMER GROUPS IN DISSEMINATION OF SFMTs.

19. Do you have farmer groups in this area?

1. Yes 2. No (skip to 23)

20. Do you belong to any of them?

1. Yes 2. No

21. If yes, what is the name of your farmer group? .....

22. What role is your farmer group playing in the dissemination of SFTM?

……

……

23. If no, why are you not a member of farmer group?

……

……

SECTION D: FACTORS AFFECTING DISSEMINATION OF NEW SFMTs

24. Have you ever received any training on current SFMT?

1. Yes 2. No

25. If yes, who provided the latest training on SFMTs?

1. NAADS 2. NARO 3. Others (specify)…….

26. How often are such trainings provided to you?

1. Once a month 2. After 3 months 3. Others (specify)……

27. What do you benefit from such training?

28. What benefits do you get from trainings?

29. If no, why?

30. As a farmer do you collaborate with others for easy benefit in the community on new technologies? 1. Yes 2. No (skip 31 to 33)

31. If yes, do you exchange information about new technology practices?

1. High 2. Low 3. Others (specify)…….

32. Do you exchange personal property on dissemination of new technologies?

1. Materials 2. Communal cultivation 3. Crop harvesting 4. Farm tools 5. Fertilizers 6. Seedlings 7. Others (specify)……..

33. If no, why?

……

……

34. In own opinion, what could be the factors affecting the dissemination of SFMT?

……

……

……

35. What are the enhancing factors that support adoption of new SFMT techniques?

……

……

……

SECTION E: CHALLENGES AND POSSIBLE MEASURES

36. Do you face any constraint when trying to uptake new SFMT?

1. Yes 2.No (Skip to 38)

37. What challenges are you facing in dissemination of SFMT at farmer group level?

……

……

……

38. What do you think can be done to solve the above problems/ challenges?

……

……

……

39. If no, why?

……

……

40. In your own opinion, what advice do you give for the better dissemination of SFMT to farmers?

.....

.....

.....

Thank you very much

Appendix 2: Key Informant Guide

(Local leaders, Leaders of farmer groups/ NARO field officers, and DAO)

Section A. Opinion/Local Leaders

1. What agricultural practices are commonly practiced in this area?
2. Have you heard about soil fertility management technologies?
3. If yes, what were the sources of information about SFMT?
4. How has the dissemination of SFMT been carried out in this area?
5. Have you ever heard about farmer groups in this area?
6. If yes, what contributions do farmer groups play in improving soil fertility in this area?
7. In your own opinion, what is the level of dissemination of SFM technologies in this local area?
8. What are the challenges that limit farmer groups and farmers from using new SFMT in this area?
9. In your own opinion, what is needed to be done to improve the increase uptake of SFM technologies in this area by farmers?

Section B. District Agricultural Officer (DAO)

1. Have you heard about Farmer groups in this area?
2. What role do farmer groups play in disseminating and maintaining soil fertility?
3. Have you heard about SFM technologies?
4. What were the sources of information about SFM technologies?
5. What different SFM technologies being disseminated to farmers in this district?
6. What different ways do farmer groups use to disseminate new SFMT to farmers?
7. Are there extension services that are provided to farmers in this area to improve on production?
8. What different ways farmer groups use to disseminate new SFMT?
9. What challenges do farmer groups face in disseminating and utilization of SFMT?
10. In your own opinion, what is needed to be done to improve the increase uptake of new SFM technologies in this area by farmers?

Section C. NARO field officers/ Farmer Group leaders

1. What agricultural practices are commonly practiced in Pallisa District?
2. Have you heard about SFM technologies?
3. What were sources of information about SFTM technologies?
4. What different SFM technologies disseminated to farmers?
5. How has the adoption of SFMT by individuals and group farmers helped to improve productivity?
6. Have you heard about Farmer groups in this area?
7. What role do farmer groups play towards soil fertility management dissemination?
8. Are the farmer groups adequately empowered to disseminate new technologies?
9. In your view, what do farmers comment about new soil fertility technologies?
10. What challenges have you faced in enhancing new SFMTs to farmers?
11. In your opinions, how can such challenges are addressed?

Appendix 3: FOCUS GROUP DISCUSSION GUIDE

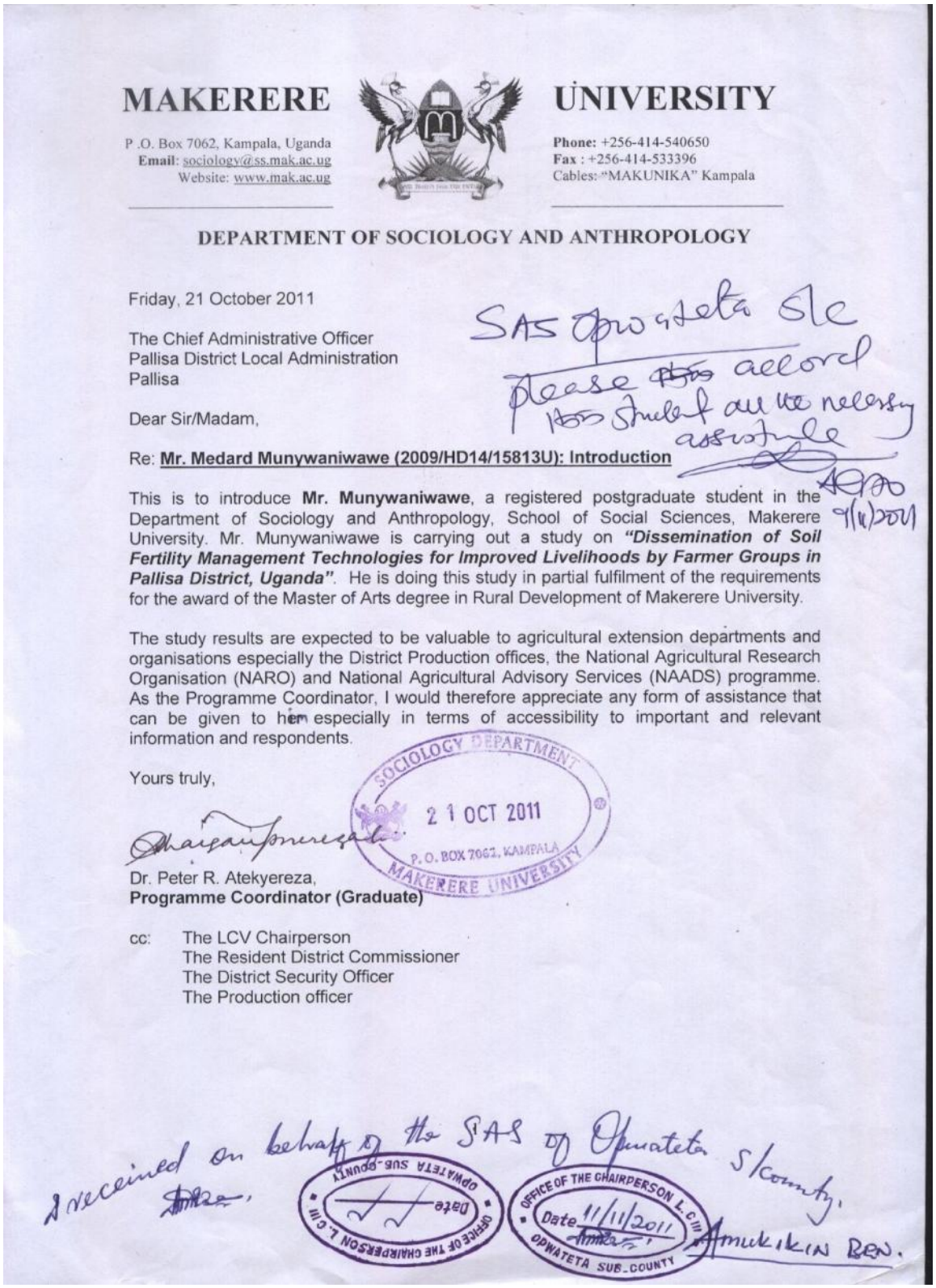
Dear Sir/Madam, I am **Munywaniwawe Medard**, a student of Makerere University in the Department of Sociology, carrying out research study on ***dissemination of soil fertility management technologies for improved livelihoods by farmer groups in Pallisa district*** as one of the requirements for the award of a Master Degree in Rural Development of Makerere University. This FGD guide is for selected key individuals and you are requested to answer the questions honestly and the information given will be treated in especial way for developmental and academic purposes only.

Your cooperation will be highly appreciated.

1. Name the economic activities carried out in this community?
2. What are the challenges affecting agricultural productivity in this area?
3. Do you know about soil fertility management technologies?
4. Mention some of the current SFMT implemented by NARO?
5. What were the sources of information about SFMT?
6. How many of you are using new SFMT as individual farmer and give reasons?
7. What benefits with using new SFMT?
8. Do you have farmer groups in this community?
9. How many of you belong to farmer groups?
10. Are the farmer groups of any function in your community?
11. What are activities of farmer groups in this area?
12. What different ways farmer groups use to disseminate the new technologies?
13. Are the farmer groups effectively empowered to disseminate the SFMTs?
14. What the challenges affecting the dissemination of SFMTs to farmers and what measures could be taken?

THANK YOU VERY MUCH

Appendix 4: Introduction Letter



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DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

Friday, 21 October 2011

SAS Opwateta S/c
Please accord Student all the necessary assistance
9/11/2011

The Chief Administrative Officer
Pallisa District Local Administration
Pallisa

Dear Sir/Madam,

Re: **Mr. Medard Munywaniwawe (2009/HD14/15813U): Introduction**

This is to introduce **Mr. Munywaniwawe**, a registered postgraduate student in the Department of Sociology and Anthropology, School of Social Sciences, Makerere University. Mr. Munywaniwawe is carrying out a study on ***"Dissemination of Soil Fertility Management Technologies for Improved Livelihoods by Farmer Groups in Pallisa District, Uganda"***. He is doing this study in partial fulfilment of the requirements for the award of the Master of Arts degree in Rural Development of Makerere University.

The study results are expected to be valuable to agricultural extension departments and organisations especially the District Production offices, the National Agricultural Research Organisation (NARO) and National Agricultural Advisory Services (NAADS) programme. As the Programme Coordinator, I would therefore appreciate any form of assistance that can be given to him especially in terms of accessibility to important and relevant information and respondents.

SOCIOLOGY DEPARTMENT
21 OCT 2011
P. O. BOX 7062, KAMPALA
MAKERERE UNIVERSITY

Yours truly,

Dr. Peter R. Atekyereza,
Programme Coordinator (Graduate)

cc: The LCV Chairperson
The Resident District Commissioner
The District Security Officer
The Production officer

I received on behalf of the SAS of Opwateta S/County.
Date.

OFFICE OF THE CHAIRPERSON L.C III
Date
OPWATETA SUB-COUNTY

OFFICE OF THE CHAIRPERSON L.C III
Date 11/11/2011
OPWATETA SUB-COUNTY

Amukikin Ben.

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DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

SAS Butebo SLC

Please accord
this student all
the necessary assistance

Friday, 21 October 2011

The Chief Administrative Officer
Pallisa District Local Administration
Pallisa

Dear Sir/Madam,

Re: **Mr. Medard Munywaniwawe (2009/HD14/15813U): Introduction**

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Yours truly,

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Dr. Peter R. Atekyereza,
Programme Coordinator (Graduate)

cc: The LCV Chairperson
The Resident District Commissioner
The District Security Officer
The Production officer