

# Farmer Field Schools as a Springboard for Enhanced Uptake of New Agricultural Technologies: Lessons for Tanzania

\*Z. S. K. Mvena<sup>1</sup>, A. Z. Mattee<sup>1</sup>, R. M. Wambura<sup>2</sup>, D. L. Mwaseba<sup>1</sup>, E. A. Lazaro<sup>3</sup>,  
E. D. Kiranga<sup>4</sup> and D. M. Kilave<sup>2</sup>

<sup>1</sup>Department of Agricultural Education and Extension, Sokoine University of Agriculture,  
Morogoro, Tanzania

<sup>2</sup>Institute of Continuing Education, Sokoine University of Agriculture,  
Morogoro, Tanzania

<sup>3</sup>Department of Agricultural Economics and Agribusiness, Sokoine University of Agriculture,  
Morogoro, Tanzania

<sup>4</sup>Agricultural Research Institute-Uyole Mbeya, Tanzania

---

## Abstract

*The uptake of proven agricultural technologies in less developed countries has not been very impressive over the years. This is in spite of the different methods used to disseminate these technologies, including the focal approach, the improvement approach, the transformation approach and others. With the collapse of the relatively expensive transformation approach in the late 1960s, more practical (in terms of resources and clientele characteristics) approaches, namely, the persuasive and dialogical models were adopted. Thereafter the World Bank introduced the Training and Visit system which has been in use at different periods in Tanzania and at different levels of resource commitment. The latest approach in enhancing the uptake of agricultural technologies is through the Farmer Field Schools that have only a short history in Tanzania. This paper reviews the literature on Farmer Field Schools, first giving a brief description of the nature of Farmer Field Schools. This is then followed by experiences from selected countries in terms of: the purpose of introducing the FFS, the process used in implementing the FFS approach, impact of the FFS approach, conclusions on the effectiveness of FFS in promoting the uptake of agricultural technologies, and finally the lessons learned. This discussion is then followed by a brief presentation of the history of FFS in Tanzania. The paper then makes an assessment of the effectiveness of the approach in the uptake of agricultural technologies and the challenges it faces. The paper concludes by underscoring the importance of FFS, offers some recommendations including the creation of more awareness on FFS and monitoring how FFS graduates sustain the FFS spirit. Finally, the paper gives a critical evaluation of the FFS approach vis-à-vis other approaches in use today.*

**Key Words:** Farmer Field Schools, technology uptake, farmer empowerment, scaling up, scaling out, Tanzania.

---

## Introduction

For many decades, the Tanzania government and donors such as the World Bank have strived to modernize agriculture by promoting the use of modern agricultural technologies including agro-inputs, farming implements, and improved farming practices. The mandate of bringing about this change traditionally was within the realm of agricultural extension services, but of late researchers have also

taken a more active role in this endeavour. To researchers and extension officers, the primary interest is to enhance the uptake of technologies by farmers.

Agricultural extension service in Tanzania began during the British rule (Kahama *et al.*, 1986 cited in Lugeye, 1995). Agricultural officers were employed to oversee government agricultural directives intended to improve agricultural practices

\*Corresponding Author: Z.S.K. Mvena

particularly those related to proper soil and water conservation practices. The focal or improvement approach was used where the colonial regime trained selected farmers on improved practices and other farmers were expected to emulate through observing these progressive farmers (Lugeye, 1995).

Soon after independence in 1961, the Tanganyika government, through the Ministry of Agriculture adopted a dual system of extension, the improvement and transformation approaches. With the improvement approach, the government directed the extension service to bring gradual improvement in farming methods for selected small scale farmers while adhering to their traditional values and customs (Lugeye, 1995). The transformation approach on the other hand, aimed at bringing more radical changes in the rural areas as leaders became eager to radically transform the rural sector into a modern peasantry. This is evident from the then President of Tanzania, the late J.K. Nyerere's address to the National Assembly on December 10th, 1962, during which he promised to "try to achieve in ten years most of the things our colonial rulers failed to achieve during the whole of the time they governed our country" (Cliffe and Cunningham, 1973:134). The transformation approach involved the establishment of settlement schemes where selected farmers were encouraged to use improved farming practices including mechanization under close supervision of the government. This approach was short-lived because of the heavy cost of the venture as well as lack of interest on the part of the intended beneficiaries (Mvena, 1984; Lugeye, 1995). With the collapse of the settlement scheme approach in the late 1960s, different approaches, namely, the persuasive and dialogical models were adopted. These approaches were then followed by the World Bank-supported Training and Visit (TandV) system, which was introduced through the National Agricultural and Livestock Extension Rehabilitation Project (NALERP). This also proved ineffective under Tanzanian conditions.

With the broadening of actors in the provision of extension services, including non-governmental organizations, private enterprises and public institutions involved in research and training, a variety of approaches to extension have emerged in

Tanzania. These have included the Farming Systems Research and Extension approach (Eicher and Staatz, 1984), and its variants like the Client Oriented Research and Extension (Kyakaisho, 2000), various Farmer to Farmer Extension approaches (Muhikambebe *et al.*, 1995), Innovative Rural Action Learning approaches (Lugeye, 1995), FFS and others. Many of these conventional extension approaches have received criticism for being limited to demonstration of technologies, limited use of farmer's knowledge, and using the already packaged information. The Farmer Field Schools approach was introduced in Tanzania in 1998 piloted in the Southern Highlands under Southern Highlands Extension and Rural Financial Services Project (SHERFS) funded by the International Fund for Agricultural Development (IFAD).

## Methodology

This paper looks at the Farmer Field Schools approach from a conceptual point of view, its application and experiences from selected countries and makes an assessment of the applicability of these schools in Tanzania based on the limited experiences from other countries. The paper is based on review of literature on the subject of Farmer Field Schools as well as review of documents from research and training institutions in Tanzania.

### The Farmer Field Schools concept

The term "Farmer Field Schools" came from the Indonesian expression Sekolah Lapangan meaning field school (Gallagher, 1999). The first field schools were established in 1989 in Central Java during a pilot season by 50 plant protection officers to test and develop field training methods as part of their Integrated Pest Management (IPM) training of trainers' course. The name Sekolah Lapangan was adopted to reflect the educational goals; the course took place in the field, and the field conditions defined most of the curriculum, and real field problems were observed and analyzed from planting of the crop to harvest. According to Gallagher (1999), the following are the basic concepts that define what FFS are all about:

- Adult non-formal education: FFS assume that farmers already have a wealth of knowledge and experience.
- FFS require an extension officer with technically

strong facilitation skills. The extension officer must have skills and confidence and be able to tell trainees, “I don’t know, let us find out together” when confronted with an unknown situation in the field.

- The field schools and season long training for trainers are based on the crop phenology; seedling issues are studied during the seedling stage, fertilizer issues are discussed during high nutrient demand stages, etc. This method allows the use of the crop as a teacher, and to ensure that farmers can immediately use the practice soon after learning it.
- Most field schools are organized in groups of about 25 farmers with common interests, who can support each other, both with their individual experiences and strengths, and to create the required critical mass. This situation enhances the learning capabilities of participating farmers.
- The field schools are always held in the community where farmers live so that they can easily attend weekly and maintain the field school studies.
- Farmers observe and discuss dynamics of the crop’s ecosystem or animal lifecycle.

It was observed that farmers can learn optimally from field observation and experimentation. Simple experimentation helps farmers understand functional relationships between pest population-crop damage-yields. In this cyclical learning process, farmers develop the expertise that enables them to make their own crop management decisions. Further, the FFS approach empowers farmers by enhancing their decision-making capabilities and they eventually become researchers-cum-farmers. Thus, the focus of FFS is not so much to teach farmers about new technologies, but rather develop farmers’ own capacities to critically analyze situations, think for themselves, and develop their own solutions (Bunyatta *et al.*, 2006).

Over the years, the FFS model has seen a wide range of applications and adaptations to serve different development needs, while preserving the underlying principles of capacitating, empowerment, and organizing farmers. The training experience has proven to be effective and is appreciated by international organizations. It is pioneered by FAO

(Pontius, 2003; Pontius *et al.*, 2002) and promoted by the World Bank (Feder *et al.*, 2003). Farmers, who benefit from learning to gather information, make informed decisions, and manage their farms independently in a liberalizing and rapidly changing development climate, have also appreciated this approach (Nederlof and Odonkor, 2006; Fliert *et al.*, 2007).

### Experiences from other countries

With the initial success in Indonesia, the FFS has spread to other countries such as Viet Nam, Peru, Trinidad, Nigeria, Kenya, Zimbabwe, Ghana, as well as covering other crops and not just rice. In this section we examine experience from selected countries, namely, Kenya, Indonesia, Peru and Thailand. We discuss these experiences in terms of purpose of introducing the FFS, the process used in implementing FFS, the social, economic, and technological impact of the approach, an assessment of the effectiveness of FFS in promoting the uptake of agricultural technologies and the lessons learned.

#### *The purpose of introducing the FFS*

Drawing from the experiences from the selected countries, the main purpose of introducing FFS appears to have been to disseminate integrated pest management technology among rice farmers in Indonesia (Braun *et al.*, 2006), farmers cultivating other types of crops such as potatoes in the Peruvian Andes and to measure environmental and economic impacts in Thailand (Praneetvatakul and Waibel, 2006). Overtime, FFS approach has been adapted for purposes other than pest management in enterprises such as livestock (Braun *et al.*, 2006). Furthermore, other crop and livestock enterprises and technological innovations have been incorporated in FFS activities as was the case in Kenya (Abate, A. and D. Duveskog 2003).

#### *The process used in implementing FFS*

Although training was the main process used in implementing the FFS, different countries used different approaches in this training. In Kenya, for example, implementation of FFS involved the following steps: (a) training extension staff under the Ministry of Agriculture and Livestock Development to build national FFS capacity in the country, (b) pilot implementation of FFS through grant systems; and

(c) expansion of the initiative to other districts in the country. In Indonesia, on the other hand, the FFS approach started with providing training to a core group of farmers who were later expected to pass on what they had gained through this training to other farmers indirectly. In the Peruvian Andes, a series of training sessions were conducted. FFS participants were expected to attend twelve training sessions (typically once a week with each session lasting for three hours). Focusing on the biology of late blight, the fungus that attacked the potato crop, the training strategy was based on the principle of learning by discovery where the facilitator organized various activities and experiments implemented by farmers themselves. A similar approach was used in Thailand (Praneetvatakul and Waibel, 2006).

*Socio-economic and technological outcomes of FFS*  
Experiences from all selected countries indicate that farmers who participated in the FFS have significantly more knowledge than those who did not participate. This knowledge had further impact in improving agricultural productivity and hence household income and food security. In the case of Kenya, participation in FFS also led to strong and cohesive FFS networks and associations pushing on marketing and policy issues. In addition, FFS participation led to farmers possessing better analytical skills, critical thinking and ability to make better decisions as well as familiarity with agricultural practices and understanding of interactions within the agricultural system. However, the econometric study on FFS from Indonesia indicated that the tests of the programme impact did not provide evidence of improvements in yield and reductions in pesticide use for either FFS graduates or exposed households. The study pointed further that no difference in performance was seen to have emerged between graduates and exposed farmers after the program.

#### *Effectiveness of FFS in promoting the uptake of agricultural technologies*

Different countries exhibited different outcomes in relation to the effectiveness of FFS in promoting the uptake of agricultural technologies. Drawing from the experience from Indonesia, Feder *et al.* (2004) indicated that there is insignificant impact attributed by the FFS approach. However, the same authors

acknowledged that knowledge gained in the course of FFS training is complex as farmers do not master a specific set of contents or messages (Feder *et al.*, 2004). They further contend that it is difficult to achieve significant yield gains when there are systemic factors causing yield declines such as decline in soil fertility, increased plant diseases, and climate change. The Thailand study results showed that trained farmers significantly reduced pesticide use on the short term and retained their reduced pesticide use practices several years after training. However, the study points out that no significant change in rice gross margin could be detected.

In relation to scaling up and scaling out of innovations, experiences from Kenya appear to paint a different picture. Here, the FFS have proved to be a powerful way of rapidly scaling up and scaling out agricultural technologies. The FFS is an effective and comparatively cheap tool for speeding the uptake of improved technologies at community level. The same outcome is reported from the Peruvian Andes even though it takes a longer time (Godtland *et al.*, 2004).

#### *Lessons learned*

In spite of some failures in a few cases, the key messages that the FFS approach offers include: FFS approach is more effective than the traditional transfer-of-technology in imparting knowledge of technical issues related to IPM (Gallagher, 1999). Also, in the case of Kenya, the FFS approach can be successfully applied for a very wide range of crop/livestock/natural resource management enterprises (Bunyatta *et al.*, 2006). The case of Indonesia cautions that, when using the FFS approach, inappropriate selection of technology for dissemination provided insignificant outcomes. This is because pest management, on which the FFS training in Indonesia placed a major emphasis, is a small component (only 10%) of the rice farmers' cost structure (Feder *et al.*, 2003). Finally, for rice farmers in Thailand, the FFS is an effective method to reduce uneconomical use of chemical pesticides and made farmers to adopt more environmentally benign pesticide use practices (Praneetvatakul and Waibel, 2006).

#### *FFS in Tanzania*

Though the FFS approach has been in use for several

years now, its use, outcomes, and effectiveness are not well documented. One of the institutions that popularized FFS is the Ministry of Agriculture and Training Institute (MARTI) Uyole, Mbeya. In 2002, the Institute initiated Farmer Field Schools (FFS) that were first started in the district of Namtumbo in Ruvuma region and in some areas in Mbeya district leading to enhancement of participatory skills in agriculture and livestock production to farmers. In 2005/06, the Institute became an FFS training centre under the DANIDA-supported District Agricultural Development Support (DADS) programme funded by Agricultural Sector Programme Support phase II (ASPS II). Up to the end of 2007/08, the following had been achieved:

- 285 extension workers were trained on FFS as trainers and 44 master trainers to enhance the adoption of FFS in Mbeya and Iringa Regions;
- Thirty farmers were trained under DADS and Ministry of Agriculture Food Security and Cooperatives; and
- Six FFS groups were started in areas close to the pilot villages to serve as demonstration plots for farmers (Ms Pia Andrew Urio, FFS Coordinator, personal communication, 2008).

Other places where FFS started include Mbinga and some districts in Arusha region (under the ministry responsible for agriculture) and Kagera under FAO. Since 2006, through the NORAD-funded Programme for Agricultural and Natural Resources Transformation for Improved Livelihoods, Sokoine University of Agriculture has also adopted the use of the FFS approach in its research and outreach activities. Due to being relatively new, not much can be discerned from this short experience in terms of the processes, impacts, and if there are any lessons learned from the experience.

### **Effectiveness of FFS in Technology Uptake**

#### *Factors enhancing uptake of technologies through FFS*

From the experiences of the four case studies cited above, that is Indonesia, Peru, Thailand and Kenya, FFS is apparently an effective tool for cultivating farmers' learning, capacity building and knowledge empowerment. Farmers are particularly encouraged to develop their critical thinking and make sound farm management decisions, resulting in adoption of

improved technologies. Farmers actively cultivate interpersonal networks and use these networks for acquiring much of their new knowledge and information. There is considerable informal knowledge sharing that takes place within a village setting. Participants learn from field school experience and retain most of the basic knowledge they learned in these schools. In this way then it can be argued that such an atmosphere is conducive to effective learning though uptake of technologies may be influenced by other factors such resources and availability of such technologies at the right time. This also offers an opportunity for a closer working relationship between researchers, extension officers and farmers and at the same time gives farmers the opportunity to make an input into the work of researchers.

#### *Factors hindering the uptake of technologies through FFS*

From the case studies, success in the technology uptake is not so apparent. However, the FFS approach has succeeded in empowering farmers to make informed decisions. Certain factors may hinder efficient uptake of such technologies through the FFS approach. FFS - acquired knowledge and information do not flow readily through the informal farmer-farmer interactions that take place in a typical rural environment. According to Feder *et al.*, (2003), in terms of acquiring new knowledge and information, non-FFS farmers do not appear to have benefited from the national field school programme in Asia. This is contributed by several factors: first, the new knowledge - which is based largely on IPM - is very abstract for most farmers; it does not diffuse well to other community members without the explanatory activities that are the key ingredients of the FFS approach itself. This suggests that while the FFS approach may convey new technologies to participants, follow-up of farmer-to-farmer informal communication alone cannot be relied upon to diffuse this new knowledge to others in the community. Secondly, most FFS participants themselves are outside the informal network of farmers that exchange information on a regular basis. While women FFS graduates partake in decision-making for example, they are not usually the principal decision makers nor are they generally treated as important sources of information in a

typical rural environment. Finally, the FFS approach needs significantly more time for FFS-acquired knowledge to filter down from graduates to other farmers through informal farmer-to-farmer channels. Okoth *et al.* (2003) point to the fact that broader uptake of FFS approach has been hindered by a lack of information. This is apparently due to the fact that currently information and publications on FFS are limited and only accessible to very few people.

A study by Mattee *et al.* (2008) on the effectiveness of extension service delivery noted that while some extension staff were working with FFS groups and while these groups were able to learn about improved practices, the rest of the farming community was not benefiting from these FFS plots because no effort was made to engage the non- FFS farmers in the work of the FFS groups.

It was seen that while in many cases the FFSs have served to demonstrate some improved practices that could lead to improved productivity, there was need for the extension staff to take into consideration the following issues:

- How the FFSs can serve as demonstration sites for farmers outside the FFS groups. The F F S plots could be used as demonstration or farmers field day sites for the rest of the farming communities;
- The economic viability of the activities being promoted. There is need for a careful economic analysis of the practices being promoted and to consider the possibility of sustaining the practices once the support to the group stops, especially considering that prices of inputs have recently escalated;
- The extent to which the FFS approach can expand to cover more farmers. Since it is expected that once the group members 'graduate' they will move on to establish new FFSs, the over-arching question is to what extent can the FFS approach expand to cover more farmers and to what extent can the extension worker cope with an expanded number of FFS groups in his/her locality.

It would appear therefore that researchers will need to get an orientation on how they can use the FFS approach to work with their target farmers to improve

the uptake of agricultural technologies in their research areas.

### **Challenges of the FFS Approach**

Notwithstanding what has been stated above, there are number of challenges or unresolved issues that still need to be addressed in the course of implementing the FFS approach.

#### *The FFS agenda*

While it is possible that researchers, extension officers and farmers may share mutual interest in starting a farmer field school, experience has shown that in most cases farm level research and extension activities at farm level may also be interventionist in design. The intervention may be more of the researcher's or extension officer's initiative than the farmers'. Whether the agenda is from the farmers or the researcher/extension officer has implication for the uptake and sustainability of the technologies. Researchers have to ensure that the target farmers are fully involved in deciding on the research agenda so as to ensure that they sustainably adopt the technologies that are generated.

#### *Participation of farmers*

The biggest challenge here is how to constitute the group that will participate in the FFS. Will the selection guarantee the participation of all social and economic groups such as women, the youth, the poor, or other socially and economically disadvantaged groups in the FFS plot? The question is how should the groups be constituted and what will be the consequences of selecting one category of farmers and leaving out the others to the success of the FFS approach?

#### *Cost to farmers*

As pointed out earlier in this paper, FFS require commitment of considerable resources in terms of time and money apart from other resources such as land. The FFS activities require long term commitment of participating farmers in terms of their labour as well as financial contributions that may be required in the course of implementing FFS activities. Questions may arise such as, how is the time and resources of farmers compensated? Can farmers be guaranteed tangible benefits after they graduate? If everything committed to the FFS is

given a monetary value, does it pay on the side of the farmers?

#### *Sustainability of FFS activities*

Perhaps one of the intriguing issues in the FFS approach is the sustainability of the activities once outside support comes to an end. The outside support can be in form of provision of agricultural inputs or advice and sometimes financial inducements in form of lunch allowances and tours. Experience from other extension approaches has shown that agricultural productivity goes down as soon as subsidies are curtailed (Machumu, 1995).

#### *Scaling out of FFS*

Of interest to most researchers and extension officers is seeing that their achievements go beyond the areas they are working. Where possible such activities ought to be scaled out to wider areas. The issue at hand is how. Is it through the graduates? For example, in recognition of the importance of farmer-to-farmer communications, all FFS graduates are expected to retain and share their knowledge and experiences with other farmers within their local village and community organizations (Rola *et al.*, 2002; Simpson and Owens, 2002). Another related issue is whether these “volunteers” will have resources to do this. What will be the role of researchers and extension officers in this?

### **Conclusions and recommendations**

Experience from different countries shows that the FFS approach has some potential and limitations for enhancing the uptake of technologies by farmers. In spite of this potential, however more needs to be done in order to realize benefits of this relatively new approach. It is therefore recommended that:

1. The Farmer Field School approach is an important institutional innovation that needs to be studied in depth in different agro-ecological zones, different institutional arrangements and over time. Because of the lack of baseline data and inadequate monitoring of ongoing FFS activities at the farmer and community levels, the available evidence suggests that it is premature to promote the FFS approach as the “best model” for Tanzania. It will take time and resources for researchers to study and evaluate this important institutional innovation. The country should be

encouraged to collect data on the impact, costs and returns of the FFS model, including its financial sustainability, in a learning-by-doing manner;

2. More awareness of FFS approach to all stakeholders in agricultural development from the lowest cadre of both extension and research officers to policy makers is needed so that they are sensitized on key attributes of FFS methodology;
3. There is a need to continuously monitor how the FFS graduates are applying the knowledge they learn and changes taking place in their social behaviour. The information collected will assist in improving the FFS approach, the technologies disseminated and also in identifying key entry points for relevant development activities in specific areas;
4. A critical comparison of FFS to other research-cum-extension approaches that have been so far adopted in Tanzania is done as a way of the appraising the FFS approach.

### **Acknowledgement**

The authors would like to thank the NORAD funded Programme for Agricultural and Natural Resources Transformation for Improved Livelihoods (PANTIL) for the support.

### **References**

- Abate, A. and D. Duveskog (2003). In Kenya. In Sones, K.R. Duveskog and Minjauw B. (eds), *Farmer Field Schools: the Kenyan experience*. Report of the Farmer Field School Stakeholders’ Forum held 27<sup>th</sup> March 2003 at ILRI, Nairobi Kenya.
- Braun, A.; Jiggins, J.; Rolling, N.; van den Berg, H and Snijders, P., (2006). *A Global Survey and Review of Farmer Field School Experiences*. Report prepared for the International Livestock Research Institute (ILRI) Endeleva Rietveldlaan 3, 6708 SN Wageningen, The Netherlands. Pp 91.
- Bunyatta, D. K.; Mureithi, J.G.; Onyango, C. A. and Ngesa, F.U., (2006). *Farmer Field School Effectiveness for Soil and Crop Management*

- Technologies in Kenya. *Journal of International Agricultural Extension Education*. Volume 13, Number 3. pp 47-63
- Cliffe, L. and Cunningham, G. L., (1973). Ideology, Organization, and the Settlement Experience in Tanzania. In L. Cliffe and J.S. Saul (Eds). *Socialism in Tanzania*. East African Publishing House. Dar es Salaam pp 131-140
- Eicher, C.K. and Staaz, J.M. (Eds), (1984). *Agricultural Development in the Third World*. Johns Hopkins University Press. Baltimore
- Feder, G.; Murgai, R. and Quizon, J.B., (2003). Sending Farmers Back to School: The Impact of Farmer Field Schools in Indonesia. *Review of Agricultural Economics*. Vol. 26, Number 1, Pp 45 - 62
- Feder, G.; Murgai, R. and Quizon, J.B., (2004). The Acquisition and Diffusion of Knowledge: The Case of Pest Management Training in Farmer Field Schools, Indonesia. *Journal of Agricultural Economics* Vol. 55, Number 2 July. Pp 221-243
- Fliert, E. van de., Dung, N. T Ole Henriksen, Dalsgaard, J.P.T., (2007). From Collectives to Collective Decision-making and Action: Farmer Field Schools in Vietnam. *The Journal of Agricultural Education and Extension*. Volume 13 Issue 3 September. Pp 245-256.
- Gallagher, K.D., (1999). Farmer Field Schools (FFS): A Group Extension Process Based on Adult Non-Formal Education Methods Global IPM Facility.
- Godtland E.; Sadoulet, E.; de Janvry, A.; Murgai, R and O. Ortiz, (2004). The Impact of Farmer Field School on Knowledge and Productivity: A Study of Potato Farmers in the Peruvian Andes. *Economic Development and Cultural Change*. Volume 53, no. 1 pp 63-92.
- Kyakaisho, P.K., (2002). Farmers Participation in Eastern Zone Client Oriented Research and Extension (EZCORE): Experiences from Muheza District. In Mlozi, M.R.S. and Mvena, Z.S.K. (Eds). *Reform of Agricultural Extension Services in Tanzania: Issues and Challenges for the New Millennium*. Proceedings of the 16th TSAEE Conference held in Morogoro. Pp 37-42.
- Lugeye, S., (1995). Towards Effective Extension Services. Lessons from the Innovative Rural Action Learning Areas (IRALAS) in Arusha, Tanzania. In Lugeye, S.C. and Ishuza, I.L. (Eds). *The Future of Agricultural Education and Extension in Tanzania*. Proceedings of a National Conference held in Dodoma, Tanzania 27<sup>th</sup> to 29<sup>th</sup> November, 1995. pp 67-75.
- Mattee, A. Z.; Ngetti, M. S. and Rwambali, E. A., (2008). Progress towards the Achievement of ASDP Outputs and Outcomes. Consultancy report submitted to the Ministry of Agriculture Food Security and Cooperatives, October, 2008.
- Machumu, F. B. N., (1995). Factors Associated With the Adoption of Agricultural Technologies: The Case of Sasakawa Global 2000 Project in Dodoma Rural Tanzania. MSc Thesis. Department of Agricultural Education and Extension, Sokoine University of Agriculture, Morogoro.
- Muhikambebe, V.R.M.; Mtenga, L.A.; Kifaro, G.C. and Lock, L.A., (1995). Farmer to Farmer Extension Approach: The Mgeta Experience. In Lugeye, S.C. and I.L. Ishuza (Eds). *The Future of Agricultural Education and Extension in Tanzania*. Proceedings of a National Conference held in Dodoma, Tanzania 27<sup>th</sup> to 29<sup>th</sup> November, 1995.
- Mvena, Z.S.K., (1984). Technology and Dependent Rural Development: Lessons from Selected Villages in Njombe, Tanzania. PhD Thesis. University of Missouri, Columbia, USA.

- Nedernorf E.S. and Odonkor, E.N., (2006). Lessons from an Experiential Learning Process: The Case of Cowpea Farmer Field Schools in Ghana. *Journal of Agricultural Education and Extension*. Vol, 12 Issue 4 December 2006. pp 249- 271.
- Okoth, J.R.; Khisa, G.S. and Julianus, T., (2003). Towards Self-financed Farmer Field Schools. *LEISA*. Vol. 19-1: 28-29.
- Pontius, J., (2003). The IPM Farmer Field School. *Encyclopedia of Pest Management*. 11<sup>th</sup> February 2003.
- Pontius, J.C.; Dilts, R. and Bartlett, A., (2002). From Farmer Field School to Community IPM: Ten Years of IPM Training in Asia. *RAP/2002/15*, FAO Regional Office for Asia and the Pacific, Bangkok. 106pp.
- Praneetvatakul, S. and Waibel, H., (2006). Farm Level and Environmental Impacts of Farmer Field Schools in Thailand. Working Paper No. 7, University of Hanover, Germany.
- Rola, A.C.; Jamias, S.B. and Quizon, J.B., (2002). Do Farmer Field School Graduates Retain and Share What they Learn? An Investigation in Iloilo, Philippines. *Journal of International Agricultural and Extension Education*. Vol. 9, Number 1. pp 65-76.
- Simpson, B. and Owens, M., (2002). Farmer Field Schools and the Future of Agricultural Extension in Africa, Sustainable Development Dimensions, Sustainable Development Department, FAO, July 2002.