

Sustainable tea production

An assessment of Farmer Field Schools in Kenya

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This report presents the results of the KTDA/Lipton Sustainable Agriculture Project. The aim of the KTDA/Lipton Sustainable Agriculture Project is to increase the sustainability of tea production by increasing the rate of adoption of Good Agricultural Practices (GAPs) and thereby directly improve profitability. In 2006 the Kenya Tea Development Agency and Lipton started four pilot Farmer Field Schools (FFS). The results of the four pilot FFS are encouraging. Although no quantitative increase in tea production per acre due to the FFS could be observed, overwhelming evidence has been gathered about the increase of knowledge on and implementation of GAPs. This will have short and long-term benefits for smallholders engaged in FFS. Indirect effects of the FFS were better group cohesion and strengthened learning capacities. The pilot suggests that FFS are a more efficient way of extending production management techniques than the traditional extension methodology.

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Preface

In 2006 the Kenya Tea Development Agency (KTDA) and Lipton jointly started a pilot project with funding from the UK government in Kenya, one of the largest world tea producers, aiming to improve the sustainability of tea production by increasing the rate of adoption of Good Agricultural Practices (GAPs) and improving the profitability of smallholder tea producers. Lipton sources Rainforest Alliance certified tea from large estates in Kenya and, through the results of this project, aims to start sourcing from smallholders, through the KTDA factories.

Adoption of GAPs by smallholders using conventional extension approaches proved to be low. Based on previous experiences in other agricultural sectors in Kenya and elsewhere in the world, the Farmer Field School (FFS) approach was identified as a potential alternative extension approach. FFS is a learner-centred approach, whereby farmers through observation, experimentation and evaluation, leading to understanding, are equipped to address challenges and introduce appropriate changes in their farm management practices.

Alterra and LEI were requested by KTDA and Lipton to assist the project staff in development of a quantitative monitoring of the sustainability of tea production with smallholders and facilitate the introduction of the FFS approach at the KTDA. During two years regular staff trainings, field observations and discussions with project management through missions of Wageningen staff to the 4 pilot FFSs were held. In 2007 the number of FFSs was increased with another 20 schools in the same production centres. This report presents the results of an impact assessment conducted on the 4 pilot FFSs.

The authors wish to thank the Kenyan project manager Zakaria Mitea and the Kenyan project staff Winfred Mwaniki and Andrew Mwaniki for their organisational support during the impact assessment exercise. Special thanks go to the enumerators having collected all the field data and last but not least the farmers having participated in this exercise.



Prof Dr R.B.M. Huirne
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Summary

Background

This report presents the results of the KTDA/Lipton Sustainable Agriculture Project. The aim of the KTDA/Lipton Sustainable Agriculture Project is to increase the sustainability of tea production by increasing the rate of adoption of Good Agricultural Practices (GAPs) and thereby directly improve profitability. Most of the GAPs involved have been developed in Kenya by the Tea Research Foundation (KTRF) and the KTDA extension service has been working for many years to encourage adoption of GAPs by farmers. In 2006 the Kenya Tea Development Agency and Lipton started four pilot Farmer Field Schools (FFSs) to spread knowledge about GAPs and encourage farmers to use GAPs in practice.

Results

Good Agricultural Practices

The FFS approach has significantly increased the knowledge of the FFS farmers. A high level of dissemination of information on sustainable tea production from FFS members to non-members is observed. This indicates that efforts invested in the FFS by KTDA/LIPTON reach more farmers than only the FFS members. About 30% of the interviewed non-FFS farmers implemented new tea management practices as a result of information received from FFS farmers. FFS members have implemented more GAPs in the last two years than the non-FFS farmers, resulting in a higher level of sustainability in tea production.

Tea Production

No conclusion can be drawn on the specific impact of the FFS approach on tea productivity. The last two years, both FFS and non-FFS farmers realised a considerable increase in productivity. It appears that climatic factors had a more serious impact than the knowledge generation and dissemination methodology. The relatively small sample size makes statistically-significant differences in yield difficult to find when changes in climate and/or social insecurity confound the issue.

Welfare and livelihood

Although both FFS and non-FFS farmers were positive about the change in the different aspects of their livelihood, FFS farmers are considerably more positive about the changes and believe that this is due to FFS activities. In most cases welfare increased as a result of having a wider variety of income-generating activities, better farm management practices, a more diverse diet and a higher income. The influence of the FFS on the welfare of the FFS farmers was mostly due to knowledge on GAPs, but FFS also contributed to better relationships in the family and a more diverse cropping pattern.

Sustainability of tea production

Farmers having participated in FFS activities have a substantial better sustainability score compared to non-FFS farmers, although there was no clear difference between sustainability scores before and after FFS participation. It is also important to appreciate that tea is a perennial crop and many sustainability indicators take more than two years to change significantly. FFS farmers' scores were especially high for product value, biodiversity and soil loss. Overall it can be concluded that FFS participation by farmers has led to implementation of more sustainable practices.

Overall Impact of the FFS approach

The results of the four pilot FFS are encouraging. Although no quantitative increase in tea production per acre due to the FFS could be observed, overwhelming evidence has been gathered about the short and long-term benefits for smallholders engaged in FFS. The increased knowledge, better group cohesion and strengthened learning capacities will also benefit KTDA/LIPTON in their efforts to engage smallholders in an effective way to improve sustainability of tea production and tap into certified niche markets.

The pilot also suggests that the FFS is an efficient way of extending production management techniques. However, for a more definite conclusion more experiences with the currently ongoing process of up-scaling of the methodology need to be gathered.

1 Introduction

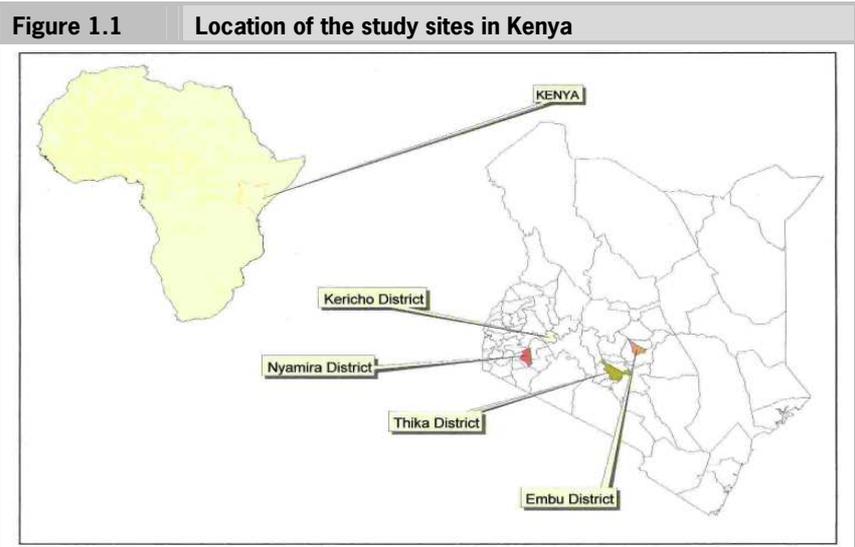
1.1 Context

This report presents the results of the KTDA/Lipton Sustainable Agriculture Project. The aim of the KTDA/Lipton Sustainable Agriculture Project is to increase the sustainability of tea production by increasing the rate of adoption of Good Agricultural Practices (GAPs) and thereby directly improve profitability. Most of the GAPs involved have been developed in Kenya by the Tea Research Foundation (KTRF) and the KTDA extension service has been working for many years to encourage adoption of GAPs by farmers. In 2006 the Kenya Tea Development Agency and Lipton started four pilot Farmer Field Schools (FFS) to spread knowledge about GAPs and encourage farmers to use GAPs in practice.

Improved environmental and social management not only directly benefits the area and people, but has indirect values too; some of these relate to longer-term sustainability, but can also create value in the shorter-term since external validation of sound practice in these areas (in this case by Rainforest Alliance, certifying against the SAN Standard) will increase the value of the tea in the marketplace. Currently Lipton sources Rainforest Alliance certified tea from large estates in Kenya. The part sourced from the KTDA factories has yet to be certified.

Adoption of GAPs by smallholders using conventional extension approaches proved to be low. Therefore KTDA and LIPTON initiated this project with the aim to increase adoption rates of GAPs by smallholder tea producers. Based on previous experiences in other agricultural sectors in Kenya and elsewhere in the world, the FFS approach was identified as a potential alternative extension approach.

The FFS approach was initially developed in Asia in the early 1990s to address a major threat to food security resulting from dramatic yield losses caused by the brown planthopper. FFS are a learner-centred approach, whereby farmers through observation, experimentation and evaluation, leading to understanding, are equipped to address challenges and introduce appropriate changes in their farm management practices. Farmers are the main actors in this process and outsiders (extension agents, researchers, NGOs) take a role as facilitators or resource centres.



The project started with the implementation of four pilot FFS in four different KTDA tea production centres: two west of Rift Valley, in Kericho and in Masaba (formerly Nyamira) district and two east of Rift Valley in Thika and Embu District (figure 1.1). Ngere and Mungania tea factory are located in Thika and Embu districts respectively. Momul tea factory is located in Kericho district while Nyan-siongo is in Masaba district. In 2007 the number of FFSs was increased with another 20 schools in the same production centres.

In 2006, before implementation of the pilot FFSs, a baseline study was implemented to obtain quantitative and qualitative information on the sustainability of the tea production at smallholders' level and other relevant technical and socio-economic livelihood indicators.

In March 2008 all FFS members of the four pilot FFSs graduated. As formulated in the project workplan an impact assessment of the FFS approach was conducted shortly after the graduation of the 4 pilot FFSs. This report presents the results of this impact assessment.

1.2 Approach

For the impact assessment the following approach was implemented:

- implementation of a semi-structured individual questionnaire for FFS members (including repetition of the initial sustainability questionnaire and some of the questions from the baseline survey);
- implementation of a semi-structured individual questionnaire for non-FFS members;

In total 121 farmers participated in the four pilot FFSs. At the start of the process all 121 farmers were interviewed in the baseline study to gather information about the sustainability of tea production and the farming system as a whole. In the impact assessment study, half of the FFS farmers were selected to be interviewed after the graduation for the longitudinal comparison (before versus after participation in FFS). Another 60 non-FFS farmers were selected to enable a latitudinal comparison (participation versus non-participation in FFS).

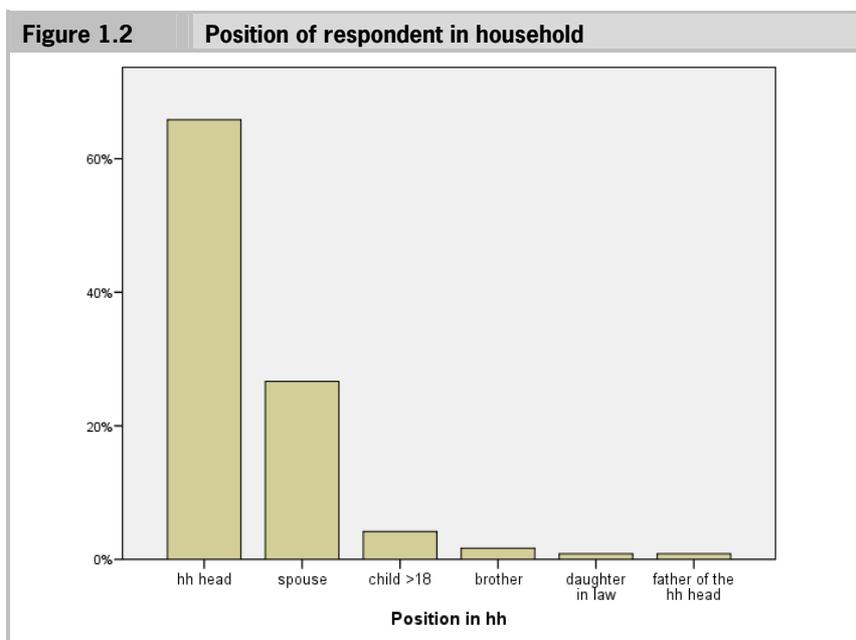
The changes in tea management and outcomes of the FFS farmers cannot be attributed to the impact of the FFS alone, as external factors may also influence the tea management and outcomes of the FFS farmers. To get a less biased idea of the impact of the FFS on the FFS farmers the changes in management practice and outcomes of non-FFS farmers were also collected to adjust the impact of the FFS for the increase due to external factors (the increase that FFS farmers would also have made without the FFS).

FFS farmers were selected from the list of FFS members by starting at a random number and selecting every second farmer. Half of the non-FFS farmers were selected from the same collection centre as the FFSs and half were selected from a neighbouring collection centre. This way the dissemination of information from FFS members to non-FFS members can be tested assuming that distance is an important factor in the dissemination of information.

At the beginning of April 2008 a 3-day workshop was held to train a group of independent enumerators. The enumerators were mainly students originating from the area of research who had some basic knowledge about tea production. In the second week of April the data were collected. In the third and fourth week the data were entered by the data clerks. In the second week of May all data were ready for analyses.

Name of factory	Number of FFS farmers	Male (%)	Number of Non-FFS farmers	Male (%)
Momul	15	90	15	70
Mungania	15	90	15	50
Ngere	15	70	15	50
Nyansiongo	15	90	15	20

Table 1.1 shows the number of respondents per factory including the gender balance. The household member most responsible for and involved in tea production was the preferred member to interview. In case this was not possible another knowledgeable member of the households was interviewed. In practice more family members were involved in answering the questionnaire, which represents the real decision-making process in the family. On average 65% of the respondents were male. The percentage of males is higher for the FFS than for the non-FFS farmers. Figure 1.2 shows the position of the respondent in the household. In most cases the household head was interviewed (47%), with the spouse in second place (40%).



1.3 Scope of the research

The objectives of the impact assessment are:

- to compare the sustainability score of FFS farmers at the start and after graduation;
- to assess the impact of the FFS on knowledge, implementation of good agricultural practices, and livelihood aspects before and after FFS participation and between FFS and non-FFS participants;
- to assess the perception of farmers of the FFS approach.

To address these objectives the semi-structured questionnaire consisted of the following components:

- household characteristics; for example name of the household head, name, age and gender of the respondent;
- knowledge on sustainability practices; the knowledge of the farmers was established through a number of questions covering the GAPs for tea production. The more correct answers given the more points a farmer scored on that question. The scores on the different GAPs were aggregated to a score on knowledge (0- 10);
- implementation of GAPs; this part identifies which of the GAPs have been actually implemented by FFS and non-FFS farmers on their individual tea fields;
- farm-level impacts; this part of the questionnaire collected data to see the effect on the FFS on tea farming and the farming system in general, such as amount of labour used;
- livelihood; assesses the effect of the FFS on different aspects of the livelihood of the farmers such as access to information and markets, empowerment, leadership skills, self-help activities etc.;
- sustainability scores; households are given scores on ten sustainability indicators based on various questions per indicator. The scores are presented in spider webs to facilitate an easy comparison between different scores;
- assessment of the FFS approach; farmers were asked to grade the different aspects of the FFS for usefulness.

1.4 Outline

Following this introduction (chapter 1), chapter 2 describes the assessment of knowledge and skills development. Chapter 3 gives an overview of which GAPs were implemented by the individual farmers before and after participation in the FFS and comparing FFS and non-FFS farmers. Chapter 4 analyses the impact of FFS activities on the tea productivity, one of the most crucial factors for both KTDA and LIPTON. Thereafter chapter 5 addresses farm level impacts other than tea and chapter 6 assesses the broader livelihood impacts of the FFS approach. In chapter 7 the impacts on the sustainability index before and after the FFS and between FFS and non-FFS members are assessed. Finally, chapter 8 addresses farmers' perception of the FFS approach. The report concludes with discussion and conclusions in chapter 9.

2 Knowledge and skills

2.1 Introduction

The main objective of the KTDA/LIPTON Sustainable Agriculture Project is to increase the sustainability of tea management practices by smallholder farmers. For farmers to adopt more sustainable practices they first need to obtain knowledge about tea management practices which increase sustainability. During the FFS special topic sessions (that resemble adult class room education with lots of discussions, demonstrations and group dynamic activities), observations and learning with Agro Ecosystem Analysis (AESA) during on-farm trials, knowledge on GAPs was gained by the farmers. This chapter firstly establishes whether farmers that participated in FFS have gained more knowledge on GAPs than farmers that did not participate and secondly tries to establish if information gained through special topic session or trials/observations is better absorbed by the farmers.

2.2 Knowledge of GAPs

Tables 2.1 and 2.2 show data on the knowledge on sustainable tea production of FFS farmers, non-FFS farmers located in the same area (same buying centre) and non-FFS farmers located in a neighbouring buying centre.

Production centres	FFS (n=60)	Non-FFS (n=60)
Momul	6.6	6.3
Mungania***	6.1	3.6
Ngere**	6.4	5.5
Nyansiongo***	6.8	4.9
Overall average	6.5	5.1

*, **, *** Significant difference between FFS and non-FFS farmers at 90, 95 and 99% confidence respectively.

Table 2.2			
Average knowledge of GAPs per factory for FFS, non-FFS nearby and non-FFS further away (0 – low; 10 – high)			
Production centres	FFS farmers (n=60)	Non-FFS farmer same buying centre (n=28)	Non-FFS farmers neighbouring buying centre (n=32)
Momul	6.6	6.0	6.5
Mungania***	6.1	3.7	3.5
Ngere**	6.4	5.8	5.2
Nyansiongo***	6.8	4.7	5.0
Overall average	6.5	5.1	5.1

*, **, *** Significant difference between FFS and non-FFS farmers at 90, 95 and 99% confidence respectively.

Observations

- FFS farmers have significantly more knowledge on the GAPs than non-FFS farmers, with FFS having an average score of 6.5 against 5.1 for non-FFS.
- Especially in Mungania, Nyansiongo and Ngere areas, FFS farmers score significantly higher on knowledge than non-FFS.
- Mungania FFS and non-FFS score significantly lower than the other three regions.
- No significant difference is found between the non-FFS nearby and further away.
- Mungania and Ngere show the expected trend: FFS farmers have the highest level of knowledge on GAPs, non-FFS in same area as FFS have a lower knowledge level as FFS members, but higher than non-FFS members further away.

Conclusion and discussion

Farmers who have participated in FFS know significantly more about GAPs than farmers who have not participated in FFS. This conclusion is drawn under the assumption that knowledge of farmers in the two groups was comparable at the start of the FFS process. This indicates that the FFS approach significantly contributed to the increase of knowledge of the FFS farmers.

The results provide no clear evidence that information travels from the FFS to the farmers around the FFS and that the information decreases with distance.

2.3 Special topic session versus observations

A learner-centred approach, whereby farmers gain knowledge through observation, experimentation and evaluation is a relative new extension approach. This approach is based on the idea that if students (farmers) are actively involved in learning and experimentation, the information is better absorbed than in classroom-like lectures/discussions. The FFS approach makes use of both methods. Members of the FFS conducted experiments on various topics jointly identified by TESAs and farmers themselves. Every FFS was subdivided in 4-5 host-groups, each of which conducted a similar experiment on one of the host-group members' farm. Important topics on GAPs that were not suitable for experimentation were dealt with during special topic sessions facilitated by TESAs or outside experts.

Four of the nine knowledge questions tested for knowledge that was gained through experimentations and observations. Five questions referred to knowledge addressed through special topic sessions. The score on both observations and special topic sessions was measured on a scale from 0 to 10.

Production centres	Observations	Special topic session
Momul	6.7	6.5
Mungania***	6.9	5.6
Ngere	6.7	6.2
Nyansiongo***	6.2	7.1
Overall average	6.6	6.4

*, **, *** Significant difference between FFS and non-FFS farmers at 90, 95 and 99% confidence respectively.

Observations

- FFS farmers in Mungania gained significantly more knowledge from the observations than from the special topic sessions.
- FFS farmers in Nyansiongo gained significantly more knowledge from the special topic sessions.
- Farmers that scored high on knowledge from special topic sessions also scored significantly higher on knowledge from observations.

Conclusion and discussions

The results do not show evidence of a different impact of experimentation and special topic sessions on knowledge. Other factors are more likely to influence the impacts such as the ability to grasp information of the farmers, the skills of the facilitators and the organisation of the FFS. It is impossible to attribute the differences between the factories due to factory specific teaching methods and different processes during the FFS.

3 Implementation of GAPs

3.1 Introduction

Chapter 2 addressed the knowledge gained by farmers through the FFS process. This chapter tries to establish how much of this knowledge actually led to changes in the management practices of individual farmers.

3.2 Implementation of GAPs

Table 3.1 shows the percentage of FFS and non-FFS farmers who have implemented a certain practice on their individual tea plot. The practices in the table are a comprehensive list of the topics in the curriculum of all FFS and encompass the GAPs that KTDA promotes amongst all farmers to increase the sustainability of tea production.

Management practices	Implementation 2007		Implementation 2005	
	FFS	Non-FFS	FFS	Non-FFs
Retain prunings in field	100	87	40	62
Prune at 20 inches	97	57	30	35
Indigenous trees	93	48	40	38
Soil conservation	92	63	53	48
Tipping-in at 4-6 inches	90	57	30	32
7-8 day plucking intervals	82	45	29	10
Infilling	83	53	32	37
Rain storage	80	60	48	52
Renewable energy	78	72	37	55
Records	75	20	32	18
Pruning knife	67	77	47	69
Pruning machine	52	2	7	0
Worker circumstances	52	40	27	32

Management practices	Implementation 2007		Implementation 2005	
	FFS	Non-FFS	FFS	Non-FFs
Manure	35	14	18	4
Protective equipment	34	29	20	23
Sleeves (polypots)	31	30	17	24
Riparian strip	28	25	20	15

Observations

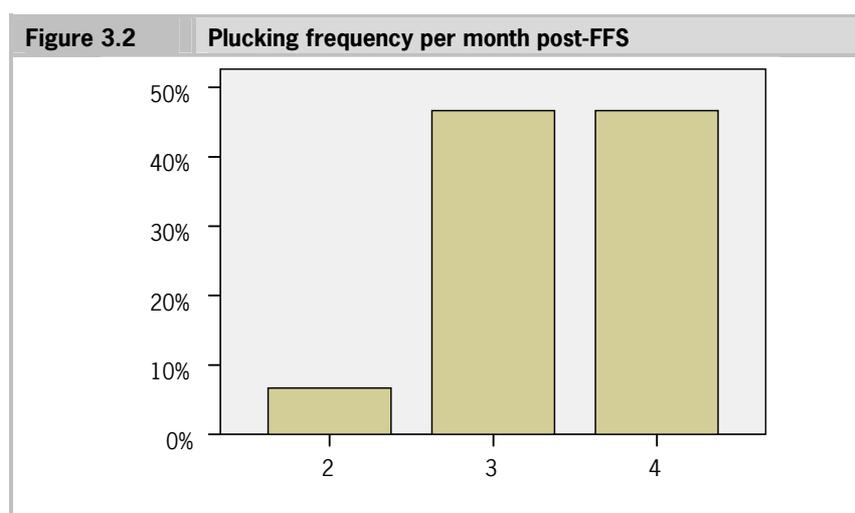
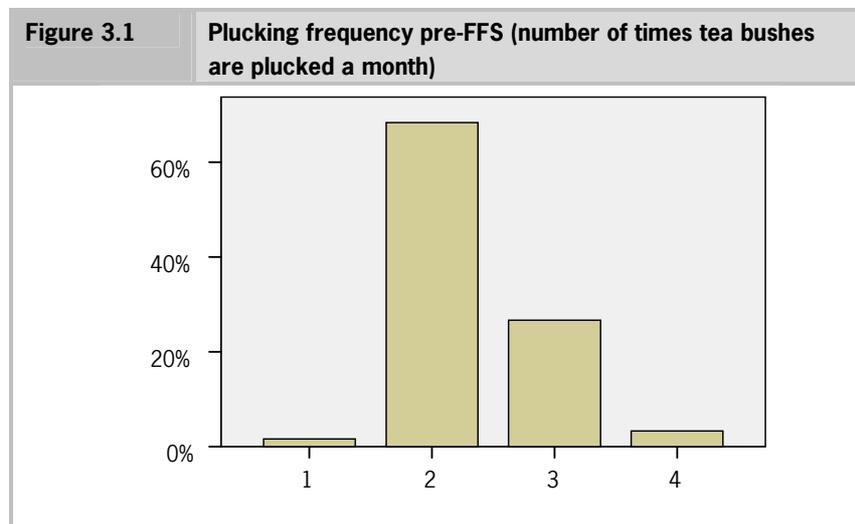
- All of the GAPs are implemented by a higher percentage of FFS than non-FFS farmers.
- The increase in implementation of GAPs by the FFS is much higher than the increase of the non-FFS.
- Some GAPs have high adoption rates in both groups such as retaining prunings and applying fertilisers.
- Some GAPs have high adoption rates with FFS farmers and considerable lower adoption rates with non-FFS farmers such as pruning height, use of indigenous trees, soil conservation, tipping-in, plucking intervals, infilling and rain storage.
- Medium rates of adoption with FFS farmers and low adoption in non-FFS include use of pruning machine, use of records.
- GAPs with low adoption rates in both groups are use of riparian strips, sleeves and personal protection equipment.

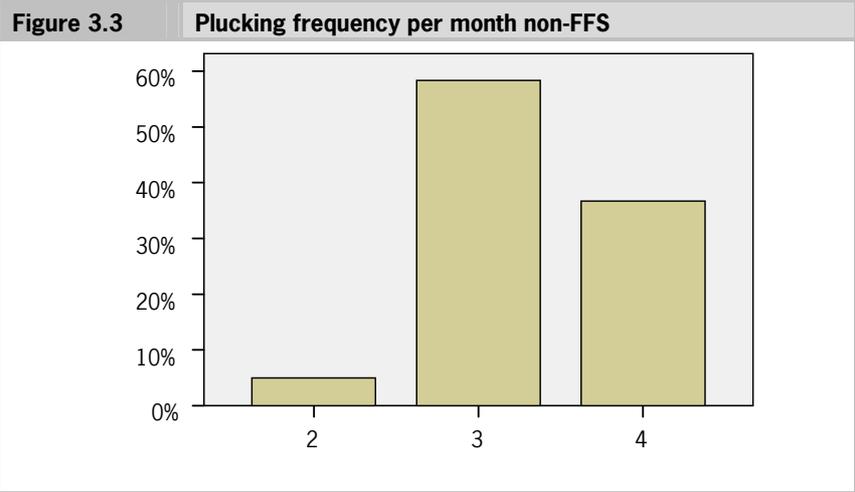
Conclusion and discussion

The GAPs that KTDA/LIPTON project promotes has a high level of implementation amongst FFS and non-FFS farmers. FFS farmers have a higher level of implementation than non-FFS farmers. However, more than half of these GAPs were already implemented before the FFS. The practices implemented by the farmers in the last two years can be a direct or indirect result of the FFS. Large differences in adoption rates between the various practices are observed. There are obvious reasons why some GAPs are implemented less by the non-FFS farmers. The pruning machine for instance is only available through the FFS. More research is necessary to explain the difference in adoption rate of the other GAPs.

3.3 Plucking frequency

Increasing the plucking frequency is one of the primary focuses of KTDA/LIPTON project since it is known to increase yield and quality of tea due to better maintained plucking tables. The KTDA/LIPTON project recommends farmers to pluck every 7-8 days or 4 times a month.





Observations

- Both the FFS and non-FFS have dramatically increased the plucking frequency in the past two years, with more than 90% of the farmers plucking 3-4 times a month.

Conclusion and discussion

Plucking frequency has greatly improved over the last two years for both FFS and non-FFS. The equal improvement of plucking frequency of non-FFS farmers may be explained by knowledge dissemination through farmers. Also change in focus of the other TESAs in their extension message may have influenced this change with non-FFS farmers.

4 Tea production

4.1 Introduction

One of the important aspects in sustainable tea production both for the small holder farmers as well as for the KTDA/LIPTON project is a high productivity (production per acre) and high quality. Better methods of plucking, tipping-in, pruning and plant nutrition, all contribute to the increase of productivity of the tea fields. This chapter analyses the difference in productivity (kg per acre), size of the tea field (in acres) and total production (kg per farm). Production data per farm are derived from the factories and can be considered relatively accurate under the assumption that no tea is sold through other channels than the KTDA factories.

Production indicators are compared for both the FFS farmers and the non-FFS farmers, for their production in 2005 (March 2005 to February 2006) and 2007 (march 2007 to February 2008). The change in non-FFS farmers is compared to the change of FFS farmers to assess the change due to the FFS.

4.2 Tea acreage

This part establishes the increase in production due to an increase in acreage of tea production.

Production centres	FFS		Non-FFS	
	2005	2007	2005	2007
Momul	.89	.89	.70	.70
Mungania	.78	.78	.71	.71
Ngere	1.14	1.14	1.33	1.31
Nyansiongo	.53	.53	.46	.46
Average	.83	.83	.80	.80

Observations

- Only very few farmers changed their tea acreage.
- Average tea acreage of FFS farmers (0.83 acres) was slightly higher than the acreage of the non-FFS farmers (0.80 acres) both in 2005 and 2007.
- Farmers in Ngere have the largest tea fields; farmers in Nyansiongo have the smallest tea fields.

Conclusions and discussion

In general farmers do not seem to have changed their tea acreage. This can be explained by a lack of fallow land in the tea producing areas and the perennial nature of the tea crop. However, with the relatively high returns in tea, farmers would have an incentive to increase area under tea cultivation at the cost of other subsistence crops. The baseline study and studies in other farming systems show that risk aversion attitude of smallholders result in a certain portion of the farming land always being allocated to subsistence crops.

4.4 Productivity

In table 4.2 the average tea productivity per acre for the 4 production centres is presented. Tea productivity is the number of kg of tea produced per acre. An increase in productivity can be the result of more yield per bush or more bushes per acre due to better infilling.

Production centres	FFS			Non-FFS		
	2005	2007	change	2005	2007	change
Momul	2,666	2,470	-196	3,191	3,316	125
Mungania	3,373	4,252	878**	3,837	4,261	540
Ngere	2,530	2,894	365***	1,972	2,510	538***
Nyansiongo	2,429	3,482	1,053***	2,761	3,367	606
Average	2,749	3,274	525***	2,909	3,363	449**

*, **, *** Significant change between 2005 and 2007 at 90, 95 and 99% confidence respectively.

Observations

- In 2005 on average productivity amounted to 2,800 and 2,900 kg of green leaves per acre and increased to 3,300 kg per acre in 2007 for both FFS and non-FFS farmers.
- Both FFS and non-FFS farmers significantly (95% confidence) increased productivity with respectively 525 (19%) and 449 (15%) between 2005 and 2007.
- No obvious difference in productivity between the FFS and non-FFS can be observed.
- Productivity is highest in Mungania for both FFS and non-FFS farmers.
- Productivity showed highest increase in Nyansiongo.

Conclusion and discussion

The last two years, both FFS and non-FFS farmers realised a considerable increase in productivity. It appears that climate factors had a more serious impact. Therefore no conclusion can be drawn on the specific impact of the FFS approach on tea productivity.

Momul and Nyansiongo were hit by a severe drought in February 2008, which can explain the decrease in Momul's production compared to 2005. The opening of the Kapchebet factory in Momul can also have negatively affected some farmers' productivity. The election problems caused a decline in production in January for all factories except Ngere, as transport of tea was limited due to road blocks to the factory and from the factories to Nairobi.

5 Farm level impacts

5.1 Introduction

This chapter assesses broader farm level impacts of the FFS. Diversification of crop production and income-generating activities in general are important for sustainability of the farming system and should thus not be negatively affected by increased tea production.

5.2 Indicators

Farmers were asked about the changes in farming practices and farm level results in the past two years, both for FFS and non-FFS farmers (table 5.1).

Production centres	Estimation of the change of the farm-level indicators between 2005 and 2007 (%)					
	FFS (n=60)			Non-FFS (n=60)		
	farmers that increased	farmers that remained stable	farmers that decreased	farmers that increased	farmers that remained stable	farmers that decreased
Tea yield	98	0	2	68	10	22
Size of tea field	32	68	0	32	65	3
Number of bushes	55	45	0	37	55	8
Labour used for tea	42	47	12	28	53	18
Income from tea	98	0	2	62	13	25
Labour other activities	52	45	3	25	65	10
Income other activities	78	18	3	57	28	15
Total farm income	98	2	0	68	15	17

Observations

- 98% of the FFS farmers say that their yield increased in the last two years, versus 68% of the non-FFS. These farmers' estimates are slightly higher than the KTDA figures of these farmers that show that 73% of the FFS farmers and 60% of the non-FFS farmers increased their yield.
- For both FFS and non-FFS farmers the size of the field has increased for 32% of the farmers. Interestingly this is not in line with the figures of chapter 2 on tea production that show stable tea acreage. Farmers could be growing a larger area of tea without expanding their field due to more intensive use of the area they use.
- 55% of the FFS farmers have increased the number of bushes versus 37% of the non-FFS farmers. This could be due to the infilling that the KTDA/LIPTON project promotes. This shows the intensification of the land by FFS farmers.
- The labour used for tea has increased for 42% of the FFS farmers versus 28% of the non-FFS; this difference can be related to the increased plucking interval that the FFS promotes. Income from tea has increased for 98% of the FFS versus 62% of the non-FFS.
- Surprisingly, the labour used for non-tea production activities had also increased (52% FFS and 25% non-FFS). As labour used for tea had also increased this is only possible if either labour was unused earlier or labour is hired.
- Income from other activities had also increased; 78% for FFS and 57% for non-FFS.
- Total income has increased for 98% of FFS farmers and 68% of non FFS farmers.

Conclusion and discussion

98% of all FFS farmers increased their yield and thus their tea income. However, also more than 62% of the non-FFS farmers increased their yield and their income from tea. This shows a general trend towards increased tea income. The difference between the increase in income from tea production of FFS and non-FFS farmers can therefore not be attributed to the FFS activities.

FFS farmers also increased the labour used for the production of other crops. This is a very positive result as it indicates that the FFS does not hinder diversification of income sources and biodiversity. The increased effort for other income-generating activities could also be a result of the FFS as some FFS had special topic sessions about other income generating activities like dairy farming. Also the non-FFS farmers increased their effort in other income generating

activities and increased their overall income, but to a smaller extent than the FFS farmers.

98% of the FFS farmers and 68% of the non-FFS farmers indicate that they have increased their household income. This indicates that households will feel they have increased their welfare.

6 Livelihood

6.1 Introduction

In this chapter the effect of the FFS activities on the livelihood aspects of the farming families is analysed. Various indicators for welfare, other than income, are compared for FFS and non-FFS farmers. Farmers were also asked how their welfare changed and what the effect of the FFS was in this.

6.2 Changes in livelihood aspects

Table 6.1 shows the percentage of the households that perceive a certain aspect of the livelihood has negatively changed, remained stable or changed in a positive sense over the last two years for FFS and non-FFS farmers.

Indicators	FFS (n=60)			Non-FFS (n=60)		
	negative	neutral	positive	negative	neutral	positive
Empowerment	10	18	72	13	23	63
Access to information	7	20	73	13	35	52
Diversity income sources	10	23	67	13	18	68
Personal development	15	17	68	13	27	60
Conflict resolution	10	28	62	17	33	50
Relation with factory	10	15	75	17	15	68
Self help activities	13	30	57	20	13	67
Entrepreneurship	5	32	63	10	28	62
Leadership ability	5	28	67	17	30	53
Cohesion in community	0	27	73	5	15	80

Observations

FFS and non-FFS farmers on average observe a positive change in livelihood aspects: on average 67% of the FFS farmers and 62% of the non-FFS farmers indicate that a certain aspect of their livelihood has positively changed over the last 2 years.

The most observed positive changes in livelihoods are:

- the FFS farmers perceived more positive changes than non-FFS farmers concerning empowerment, access to information, personal development, conflict resolution, relationship with the factory and leadership ability;
- a higher share of the non-FFS than the FFS farmers perceived a positive change in cohesion of the community and self-help activities. It is interesting that non-FFSs rate only these two livelihood indicators higher than the FFS farmers.

Table 6.2 shows to what extent the perceived changes of the FFS farmers were achieved as a result of the activities of the FFS.

	Negative	Neutral	Positive
Empowerment	0	17	83
Access to information	0	8	92
Diversity income sources	0	18	82
Personal development	2	13	85
Conflict resolution	2	22	77
Relation with factory	3	17	80
Self help activities	7	23	70
Entrepreneurship	2	17	82
Leadership ability	2	10	88
Cohesion in community	0	18	82

Observations

- In general FFS farmers perceive that FFS has positively influenced changes in livelihood aspects (70-92% depending on specific aspect).
- FFS farmers are the most positive about the effect of the FFS on the access to information of the farmers.
- On average 16% of the FFS farmers felt the FFS did not have an effect on a certain livelihood aspects.

- 0-7% felt that the FFS had had a negative effect on the changes in a certain livelihood aspect. 7% of the FFS farmers feel the FFS has negatively influenced the self-help activities.

Conclusion and discussion

Both FFS and non-FFS farmers were positive about the change in the different aspects of their livelihood. FFS farmers are more positive about the changes and contribute this to the FFS activities.

6.3 Welfare aspects

The farmers were asked if their welfare had changed in the last two years, taking into account for example the diversity of their diet and access to health care (table 6.3).

Table 6.3		Estimation of the change of the farm-level indicators between 2005 and 2007 (%)		
	Negative	Neutral	Positive	
FFS (n=60)	0	5	95	
Non-FFS (n=60)	12	19	69	

Observations

- 95% of the FFS farmers felt the welfare of their family has increased in the last 2 years, compared with 69% of the non-FFS.

Table 6.4 shows in which way welfare of FFS and non-FFS farmers has changed (see to appendix 4 for a comprehensive list of responses).

Table 6.4 Observed reason of changes of welfare by FFS and non-FFS farmers (n=120)	
	% of farmers
<i>Reasons for positive change:</i>	
More diversified income/new crops	18
Better management of farm (due to knowledge from the FFS)	18
Better diet due to more crops planted or increased knowledge on food	16
Increased (farm) income	14
Increased income from tea	9
Increased income from other income generating activities	8
Improved health (care)	6
More knowledge on home economics (economize on expenditure)	3
<i>Reasons for negative change:</i>	
Increased costs of living	3

Table 6.5 Perceived influence of the FFS activities on the changes in welfare by the FFS farm households (n=60)	
	% of farmers
Increased knowledge on GAPs/tea production	37
Better family relationships	13
Diversified crop production (income and diet)	12
Income increased	12
Better management resources/input management	7
Increased tea yield	5

Observations

- A wide variety of reasons are identified by farmers influencing their welfare.
- Increase of knowledge is perceived to be the most important contribution of the FFS to increase in welfare.
- Only 3 farmers observed that the FFS had contributed to increase in welfare due to increased tea yields.

Conclusion and discussion

82% of the FFS farmers indicated that changes in their livelihood are the result of the FFS. There is a general trend of increased welfare amongst the tea growers. A higher percentage of FFS farmers than non-FFS farmers perceive to have realised an increase in welfare (95% versus 69%). Welfare increased as a result of having a wider variety of income-generating activities, better farm management practices, a more diverse diet and a higher income. The influence of the FFS on the welfare of the FFS farmers was mostly on the knowledge on GAPs, but also contributed to better relationships in the family and a more diverse cropping pattern.

7 Sustainability

7.1 Introduction

Sustainable tea production encompasses economic, environmental and social practices leading to higher yield, income and improved livelihood in the short and long term. Sustainability of tea production in the KTDA/LIPTON project is measured using ten indicators:

1. Product value
2. Social and human capital
3. Local economy
4. Soil fertility
5. Soil loss
6. Nutrients
7. Water & effluent
8. Pest & weed management
9. Biodiversity
10. Energy use

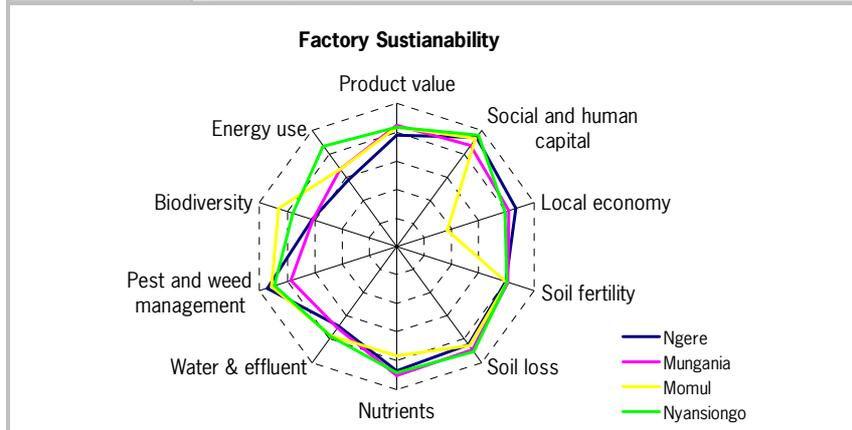
For further description of these indicators, see the Unilever publication *Sustainable Tea; Good Agricultural Practices for Farmers* (2004; www.growingforthefuture.com).

Tea management practices that influence these ten aspects were assessed before farmers joined the FFS and this was repeated two years later after graduation.

7.2 Sustainability at factory level

Figure 7.1 compares the sustainability of the FFS farmers after graduation in the four different tea factories. The webs indicate the scores on the ten indicators. If the lines are close to the centre of the web the score on this indicator is low, if the score is near the outside of the web the score is high.

Figure 7.1 Average sustainability scores per factory at the end of the project (2007)



Observations

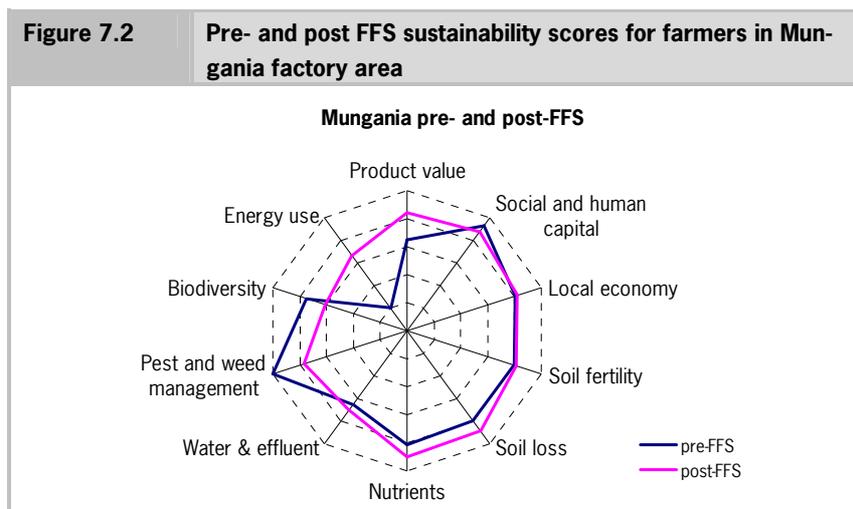
- In general all factories score high (around 8 out of 10 points) on all ten indicators with little difference between the factories.
- Momul scores low (4) on local economy, because the farmers buy very few inputs locally, partly due to unreliable suppliers.
- Mungania and Ngere score low on biodiversity. The KTDA/LIPTON project stimulates the planting of different crops and planting a riparian strip along rivers. It is possible that these areas have fewer riverbanks or are more specialised in tea and grow few other crops and that a riparian strip activity has been less pronounced in these two factories.
- There is a relatively high amount of variation in the score on the sustainability of energy use; Nyansiongo scores the best, while Ngere scores lowest.

7.3 Pre- and post FFS comparison

In this part a comparison is made between the average sustainability before (pre-FFS) and after the FFS (post-FFS). The pre-FFS score is the average of all FFS farmers interviewed in the baseline. The post-FFS score is based on the 15 FFS farmers randomly selected. Figure 7.2 and Figure 7.3 show the difference for Mungania and Momul. The picture of Ngere and Nyansiongo can be found in appendix 6.

Observations

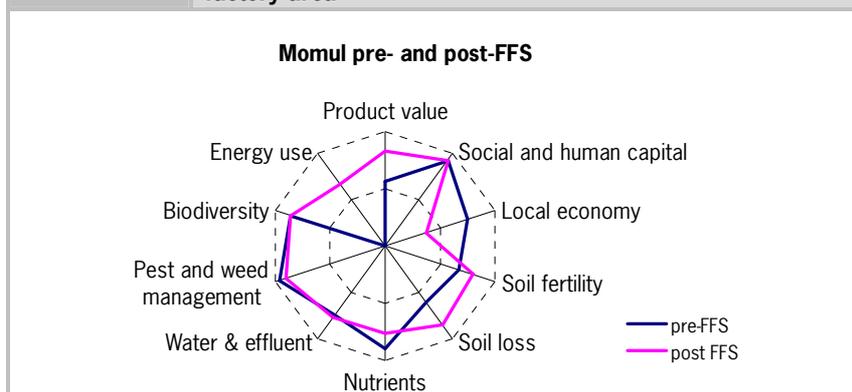
- Sustainability scores of the FFS members in Ngere and Nyansiongo show minimal differences before and after the FFS.



Observations

- In Mungania tea factory FFS farmers managed to increase the average score on energy use and product value, soil loss, nutrients and water and effluent.
- An average decrease in score on pest & weed management and biodiversity was observed.

Figure 7.3 Pre- and post FFS sustainability scores for farmers in Momul factory area



Observations

- Substantial positive changes in sustainability scores in energy use, product value, soil fertility, and soil loss.
- Lower scores were realised on local economy.

	Pre FFS (n=60)	Post FFS (n=60)	Change
Momul	7.0	7.8	0.8
Mungania	7.4	7.9	0.5
Ngere	8.0	7.9	0.0
Nyansiongo	8.3	8.4	0.1
Average	7.7	8.0	0.3

Observations

- On average the farmers score an 8 on overall sustainability.
- Farmers in Nyansiongo score the highest sustainability score.
- Farmers in Momul improved their sustainability the most, with 0.8 (11%), but are still the least sustainable.
- Farmers in Ngere seemed to have made no progress in their sustainability.

Conclusion and discussion

FFS farmers score high on sustainability. All factory averages for the different sustainability indicators (except one) are higher than 5.5 (on a 0-10 scale). The overall average score per factory varies from 7.8 to 8.4.

East of the Rift Valley, Ngere's sustainability does not seem to have changed at all. Mungania however improved a lot on sustainable use of energy and product value. Sustainability of pest and weed management and biodiversity decreased in Mungania, overall sustainability increased. West of the Rift Valley, Momul farmers showed an overall increase in the sustainability index. Increases were realised on energy use, product value, soil fertility and soil loss, and decreased on the use of the local economy. Sustainability scores in Nyansiongo remained mostly unchanged before and after the FFS. It would be interesting to compare these results with the differences in organisation of the FFS.

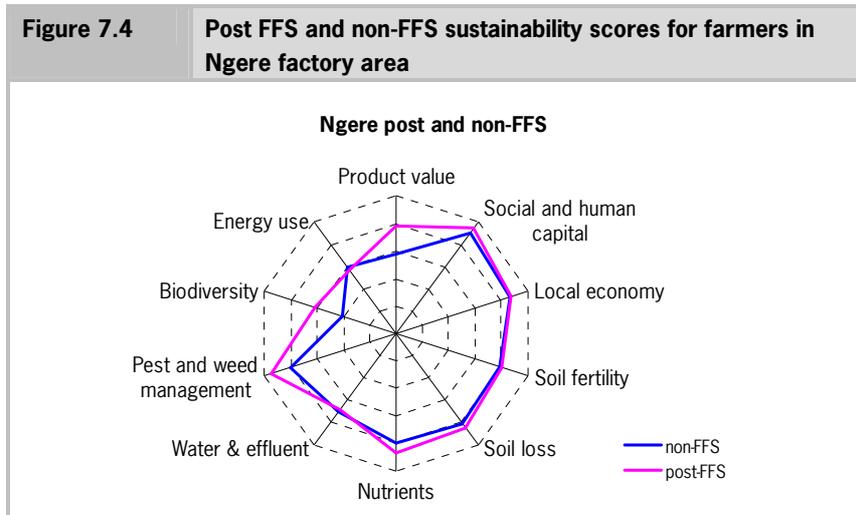
The impact of the FFS activities on increase of the sustainability after the FFS was limited and does not support observations in the field and perceptions of the farmers suggesting a considerable increase in sustainability. On average high sustainability scores were found during the survey before the start of the FFS activities, obviously limiting the room for further improvement. A more likely cause is an overestimation of the initial scores since that assessment was implemented by the extension staff (TESA, having a motivation of realising high scores in their extension area) while the second assessment was implemented by independent enumerators. Another cause is the limited training of the TESAs during the initial survey leading to misinterpretations of survey questions. Also the perennial nature of tea results in relatively slow changes in sustainability.

7.4 FFS and non-FFS farmers comparison

In this section the scores of the FFS farmers (post FFS) and the scores of non-FFS farmers are compared. The difference between non-FFS and post-FFS cannot fully be attributed to the FFS as there might have been a difference in characteristics of the farmers prior to the start of the FFS. However, the results of this comparison together with the comparison pre- and post of the FFS gives an indication of the impact of the FFS. In the figures 7.4 to 7.6 these comparisons in sustainability are presented for the four factories. Appendix 7 shows the results for Momul as in momul the spiderweb shows no difference between FFS and non-FFS farmers.

Observations

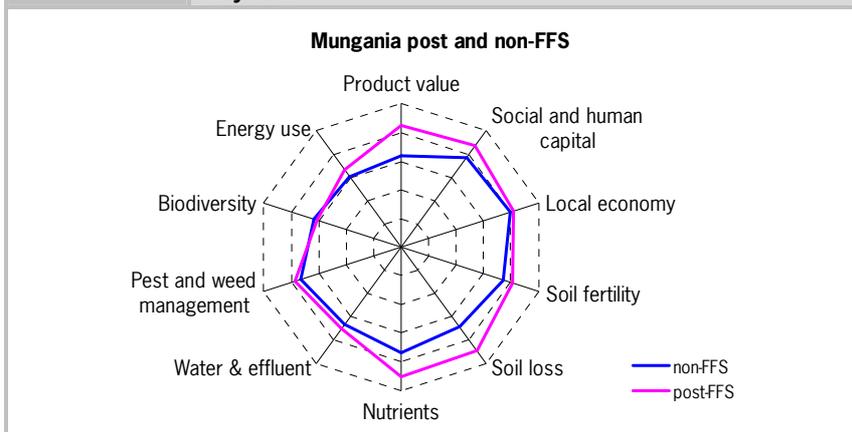
- FFS farmers in Momul achieve comparable scores to the non-FFS farmers



Observations

- FFS farmers in Ngere score higher on the sustainability scores for product value, biodiversity and pest and weed management compared to non-FFS farmers, with other scores comparable.

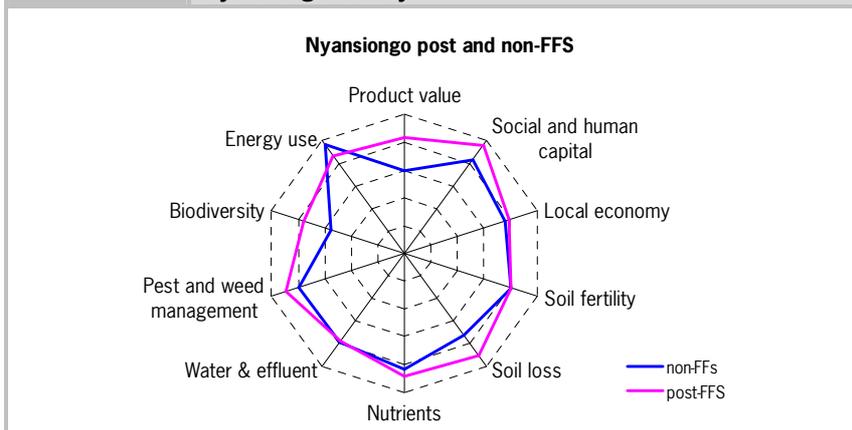
Figure 7.5 Post FFS and non-FFS scores for farmers in Mungania factory area



Observations

- FFS farmers score higher on most of the indicators, with only local economy and biodiversity having comparable scores.

Figure 7.6 Post FFS and non-FFS sustainability scores for farmers in Nyansiongo factory



Observations

- FFS farmers score higher on product value, social and human capital, soil loss, nutrients, and pest and weed management, and biodiversity.
- Average score of FFS farmers was only lower than non-FFS for the aspect of energy use.

Table 7.2	Average sustainability score for FFS and non-FFS farmers (0 – low; 10 – high)		
	FFS (n=60)	Non-FFS (n=60)	Difference
Momul	7.8	7.6	0.2
Mungania	7.9	7.0	0.9 ***
Ngere	7.9	7.2	0.7 ***
Nyansiongo	8.5	7.7	0.8 ***
Average	8.0	7.4	0.6 ***

*, **, *** Significant difference FFS and non-FFS at 99, 95 and 90% confidence respectively.

Observations

- FFS farmers score significantly higher on average sustainability score than non-FFS farmers.
- In Momul the difference between FFS and non-FFS is smallest, difference is highest in Mungania.

Conclusion and discussion

In Ngere, Mungania and Nyansiongo FFS farmers score higher on 4 to 6 of the nine indicators than the non-FFS. FFS farmers score higher on the product value, biodiversity and soil loss indicator than non-FFS farmers. In Momul there is hardly any difference in sustainability of FFS and non-FFS farmers.

7.5 Impact FFS on sustainability

The fact that FFS farmers already scored very high on sustainability before the FFS started makes it difficult to come to a conclusion about the impact of the FFS. However, both before and after the FFS the farmers are producing in a very sustainable way according to the chosen indicators.

The comparison between FFS and non-FFS shows more differences than the pre-post comparison. In the former analysis especially product value, biodiversity and soil loss are aspects where FFS farmers are more sustainable than non-FFS farmers.

Due to discrepancies in the data collection it is difficult to quantify the results of the pre- and post FFS sustainability score with confidence. However there appears to be a trend that product value and biodiversity has increased during the time span of the FFS indicating that the FFS contributed to the increase of these indicators.

Before the FFS all farmers scored low on biodiversity and product value. After the FFS the FFS farmers have increased their sustainability on these issues, while non-FFS farmers still score low on these indicators. This shows that the increase in sustainability on biodiversity and product value is very likely an effect of the FFS.

8 Assessment of the FFS

8.1 Introduction

The former chapters assess the impact of the FFS by analysing the results of the FFS. This chapter shows the opinion of the FFS farmers on the FFS.

8.2 FFS activities

FFSs aim to put farmers in the driving seat implying that the group jointly with the facilitator decided on the curriculum topics. This section presents the farmers' assessment of the usefulness of the various aspects of the FFS methodology (table 8.1).

	Not so good	Neutral	Good
Curriculum development	2	0	98
Facilitators	8	2	90
Organisation	8	0	92
Meeting frequency	13	2	85
Time necessary	7	5	88
Special topic sessions	12	0	88
AESA subgroup	17	0	83
AESA plenary	15	3	82
Commercial activities	16	11	73
Group dynamics	8	0	92

Observations

- In general FFS farmers felt that all components of the FFS approach were useful.
- The relatively lowest score was given to commercial activities.

Conclusion and discussion

Farmers were very positive about the usefulness of the different aspects of the FFS.

8.3 Special topic sessions versus trials and observations

In section 2.3 it was concluded that farmers did not seem to have learned more from the observations compared to special topic sessions. In this section an assessment is made of farmers' perception of the usefulness of the two approaches. Table 8.1 showed that 88% of the farmers assessed the usefulness of the special topics as 'good'. AESA activities got a slightly lower rating with 82% of the farmers assessing them as useful.

Table 8.2	Farmers' perception of usefulness of trials versus special topic sessions (n=60) (in %)		
	Trials	Special topics	Both
Prefer trials or special topic sessions?	37	10	53
Learned more from trials or special topic sessions?	55	18	27

Observations

- Most farmers did not have a preference for either of the approaches. 37% preferred the trials while 10% preferred the special topic sessions.
- 55% of the farmers felt they had learned more from the trials while 18% farmers felt they had learned more from the special topic sessions.

Conclusion and discussion

Although section 2.3 did not give any proof of our expectation that trials have a higher learning effect than special topic sessions, the results in this section indicate the importance of the trials as an instrument to knowledge generation. Those farmers that have a preference for either one of the two learning methods also prefer trials as a method of learning, although most farmers do not have a preference for one of the two learning methods.

8.4 Organisation

All farmers indicate that they expect their FFS will continue after graduation. In table 8.3 results are presented what farmers would like to see changes in the FFS organisation (full list in appendix 1).

Table 8.3 Suggested improvements in FFS organisations by farmers (n=60)	
Improvements	% of farmers
Introduce new projects (e.g. rearing silk worm, goats)	13
Expand FFS to more farmers (teach farmers to disseminate knowledge)	10
Raise funds for FFS (Establish income generating activities)	7
Field trips/tours to learn from other places	7
Reduce frequency of meetings (reduce to once a month)	7
More trials	5
Allowance for the members that attend FFS	5

Conclusion and discussion

The fact that all farmers expect their FFS to continue is a very important sign indicating that farmers perceive they benefitted from the FFS and that it was worth their time and effort. According to the list of changes that could be made to the organisation of the FFS no major problems in the current organisation and approach are observed.

8.5 Dissemination of information

Section 8.3 showed that the FFS members would like to be involved in spreading the information of the FFS to other farmers. This section tries to establish to which extend this is already happening.

All FFS members indicate they have disseminated information to others, by talking to friends, relatives or neighbours about something they learned in the FFS and 90% indicate that this led to changes in production methods of the people they spoke to.

Of the non-FFS farmers interviewed, 65% know a farmer that is participating in an FFS. 39% of the non-FFS farmers indicate they received information on GAPs from the FFS. In table 8.4 the type of information disseminated is presented.

Table 8.4	
Type of information non-FFS farmers received from FFS farmers (full list see appendix 2; n=60)	
Type of information	% of farmers
Plucking rounds (plucking every 7-8 days)	27
Maintaining a plucking table/Use of plucking stick	25
Pruning	10
Weeding	10

Observations

- The information disseminated from FFS to non-FFS farmers is mostly about the use of a plucking stick, plucking rounds of 7-8 days, pruning and weeding practices.
- In 81% of the cases the information was disseminated through conversations of FFS with non-FFS members. In the other cases the non-FFS farmers visited the trials.

77% of the non-FFS farmers who received information about GAPs practices taught in the FFS implemented at least one practice in their own tea field. In table 8.5 practices implemented by non-FFS farmers as a result of information received from FFS farmers are presented.

Table 8.5	
Practices implemented by non-FFS farmers as a result of disseminated information from FFS farmers (full list in appendix 3; n=60)	
Practices	% of farmers
Plucking rounds of 7-8 days	15
Maintain plucking table/plucking stick	13
Pruning	10
Fertiliser application	8
Weeding	7

Observations

- Most implemented were better plucking practices (plucking rounds and plucking table).

Conclusion and discussion

A high level of dissemination of information on sustainable tea production occurs from FFS members to non-members. This indicates that efforts invested in the FFS by KTDA/LIPTON project reach more farmers than only the FFS members. Topics that are most interesting for the non-FFS members seem to be those that directly increase the volume of their production. The practices that most information is disseminated about, are also the practices most implemented. 30% of the interviewed non-FFS farmers implemented new tea management practices due to information they received from FFS farmers.

8.6 Impact assessment of the FFS according to the farmers

Farmers are very positive about the usefulness of the different aspects of the FFS. Commercial activities and the trials and observation are aspects of the FFS that could be improved. Half of the farmers feel they have learned more from the trials than from the special topic sessions. This indicates the importance of the trials as an instrument to transmit information. All farmers expect their FFS to continue, indicating that the farmers feel they benefitted a lot from the FFS and that it was worth their time and effort.

There seem to be no big problems in the organisation at the moment. However improvements can always be made. Farmers would like to be rewarded for the time they spend attending the FFS. Four farmers would like the FFS to engage in income generating as a group. This way farmers generate money that they can invest in improving the FFS or to give them an allowance and it increases farmers' capacity to engage in income generating activities outside the FFS and improve their livelihoods.

There is a very high level of dissemination of information on sustainable tea production from FFS members to non-members. This is a very positive signal indicating that the efforts invested in the FFS by the KTDA/LIPTON project reach more farmers than only the FFS members. 50% of the non-FFS farmers indicate they have received information on tea practices from FFS members; especially information about plucking is shared with non-FFS farmers. 30% of the interviewed non-FFS farmers implemented new tea management practices due to information they received from FFS farmers.

9 Conclusion and discussion

This report presents the results of the KTDA/Lipton Sustainable Agriculture Project. The aim of the KTDA/Lipton Sustainable Agriculture Project is to increase the sustainability of tea production by increasing the rate of adoption of Good Agricultural Practices (GAPs). In 2006 the Kenya Tea Development Agency and Lipton started four pilot Farmer Field Schools (FFS) to spread knowledge about GAPs and encourage farmers to use GAPs in practice.

Knowledge of GAPs

The FFS approach has significantly increased the knowledge of the FFS farmers. For instance the FFS farmers in Momul have nearly double the score on GAPs knowledge questions than the non-FFS farmers.

A high level of dissemination of information on sustainable tea production from FFS members to non-members is observed. This indicates that efforts invested in the FFS by the KTDA/LIPTON project reach more farmers than only the FFS members. About 30% of the interviewed non-FFS farmers implemented new tea management practices as a result of information received from FFS farmers.

Implementation of GAPs

FFS members have implemented more GAPs in the last two years than the non-FFS farmers, resulting in a higher level of sustainability in tea production. Most of the practices implemented by the FFS farmers in the last two years were implemented as a result of the FFS. For most GAPs more than half of the participants mentioned to have started the practice since they joined the FFS.

Tea Production

No conclusion can be drawn on the specific impact of the FFS approach on tea productivity. The last two years, both FFS and non-FFS farmers realised a considerable increase in productivity. It appears that climate factors had a more serious impact than the knowledge generation and dissemination methodology.

Farm level effects

Most FFS farmers responded to have intensified tea production leading to an increase in income from tea. However no distinct difference between the FFS and non-FFS group could be observed. The majority also increased the labour used

for the production of other crops indicating that the FFS does not hinder diversification of income sources and biodiversity.

Welfare and livelihood

Although both FFS and non-FFS farmers were positive about the change in the different aspects of their livelihood, FFS farmers are considerably more positive about the changes and attribute this to the FFS activities.

In most cases welfare increased as a result of having a wider variety of income generating activities, better farm management practices, a more diverse diet and a higher income. The influence of the FFS on the welfare of the FFS farmers was mostly on the knowledge on GAPs, but also contributed to better relationships in the family and a more diverse cropping pattern.

Sustainability of tea production

Farmers having participated in FFS activities have a substantial better sustainability score compared to non-FFS farmers. However, no clear difference in sustainability score with the same farmers before and after FFS participation could be established. Especially product value, biodiversity and soil loss are aspects where FFS farmers are more sustainable than non-FFS farmers. Overall it can be concluded that FFS participation by farmers has led to implementation of more sustainable practices.

Farmers assessment of the FFS

Farmers are positive about the usefulness of the different aspects of the FFS. All farmers expect their FFS to continue, indicating that the farmers perceive they benefitted from participating in the FFS activities.

Overall Impact of the FFS approach

The results of the four pilot FFS focusing on increasing sustainable tea production at smallholder level are encouraging. Although no quantitative increase in tea production per acre due to the FFS could be observed, overwhelming evidence has been gathered about the short and long-term benefits for smallholders engaged in FFS. The increased knowledge, better group cohesion and strengthened learning capacities will also benefit KTDA and LIPTON in their efforts to engage smallholders in an effective way to improve sustainability of tea production and tap into certified niche markets.

Appendix 1

Improvements and changes to FFS (full list)

	No of hh
Introduce new projects (e.g. rearing silk worm , goats)	8
Expand FFS to more farmers (teach farmers to disseminate knowledge)	6
Establish income generating activities to raise funds for FFS	4
Field trips/tours to learn from other places	4
Reduce frequency of meetings (reduce to once a month)	4
More trials	3
Allowance for the members that attend FFS	3
Increase of funds to improve the FFS	2
Increase frequency of meetings	2
Increase duration of meeting	2
More facilitators (only one can be boring) or foreign facilitators	2
Longer learning period (3 years)	2
Shorter learning period (1 year)	2
Increase commitment of members (e.g. mechanisms to ensure that all members attend)	2
Continued meeting/alternative for after FFS	2
Offer a snack/lunch money	2
Better time keeping	1
More energisers	1
Offer new breeds of animals	1
More tea training	1
Regular visits and meetings with extension staff	1
Offer manuals for reference	1
Teach more on sustainable agriculture	1
Practical's should follow after all theory lessons	1
FFS should offer loans to the farmers	1
More follow ups from facilitators on adopted skills	1
Improve selection members (some members are not serious or expect too much)	1

Appendix 2

Information from FFS member to non-FFS (full list)

	No of hh
Plucking rounds (plucking every 7-8 days)	16
Use of plucking stick	9
Pruning	6
Maintaining a plucking table	6
Weeding	6
Fertiliser	4
Infilling	4
Retain prunings in field	4
Pruning machine	3
Planting indigenous trees	3
Tipping-in	1
Planting	1
Nursery	1
Pluck at two leaves and a bud	1
Avoid chemicals in the mature tea field	1
Use of baskets	1

Appendix 3

FFS practices implemented by non-FFS farmers

	No of hh
Plucking rounds of 7-8 days	9
Maintain plucking table/plucking stick	8
Pruning	6
Fertiliser application	5
Weeding	4
Retain prunings in field	3
Infilling	2
Using basket	2
2 leaves and a bud	1
Planting indigenous trees	1
Hire skilled labour	1
Tipping-in	1
Nursery	1
Removal of other crops from tea field	1

Appendix 4

How has the welfare changed?

	No of hh
More diversified income/new crops	21
Better diet due to more crops planted or increased knowledge on food	19
Increased (farm) income	17
Increased income from other income generating activities	9
Better management of farm (due to knowledge FFS)	17
Increased income from tea	11
Improved health (care)	7
More knowledge on home economics (economize on expenditure)	4
Implementation GAPs in other income generating activities	4
<i>Negative:</i> Costs of living have increased	4
Access to loans	2
<i>Negative:</i> Income decreased	2
<i>Negative:</i> tea income decreased	2
<i>Negative:</i> lack of access to information	1
Learning about hygiene and diet during special topic session	1
Household needs are becoming more affordable	1
Better environment due to proper disposal of waste	1
Family labour improved	1
More knowledge on inputs (where, when and how much to buy)	1
Enough food to feed the family	1
Empowerment on family and neighbourhood conflicts	1
Learned to delegate duties and encourage family participation in work	1
No (more) school fees have to be paid	1
More cash to spend on other projects	1

Appendix 5

How has the FFS contributed to family welfare?

	No of hh
Increased knowledge on GAPs/tea production	22
Better family relationships	8
Diversify crop production (income and diet)	7
Income increased	7
Better management resources/input management	4
Increased tea yield	3
Helped neighbours with information from FFS	2
Gained confidence/leadership skills	2
Interaction with others	2
Increased exchange of knowledge in community	2
Increased knowledge on other farm activities	1
Changes in way of living	1
Access to funds	1
Improved interpersonal skills for marketing production	1
Soil fertility and drought management	1
Changed approach of issues (e.g. obligations)	1
Admiration of neighbours	1

Appendix 6

Increase sustainability pre and post FFS

Figure 7.4 Pre- and post FFS sustainability scores for farmers in Ngere factory area)

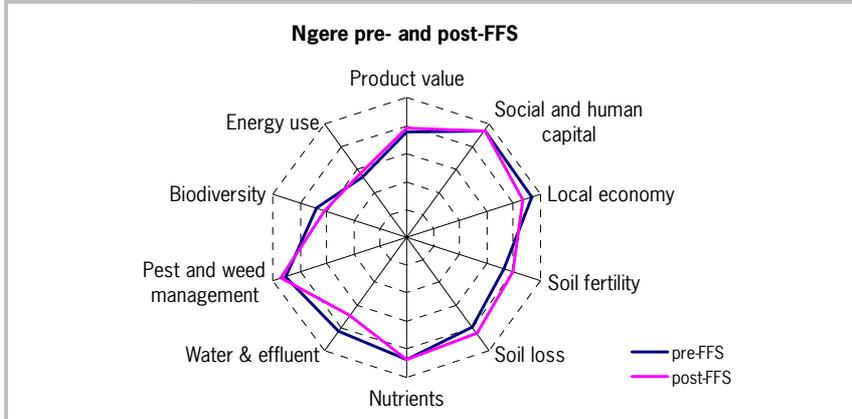
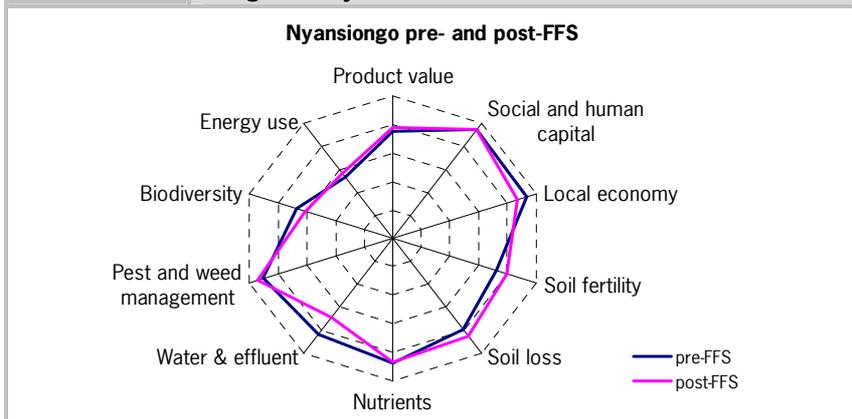


Figure 7.5 Pre- and post FFS sustainability scores for farmers in Nyansongo factory area



Appendix 7

Difference in sustainability between FFS and non-FFS

