For all the tea in Kenya

Impact assessment and baseline situation of Farmer Field Schools

Annexes to the main report

Yuca Waarts, Lan Ge and Linda Puister

LEI WAGENINGEN UR

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Yuca Waarts, Lan Ge, Linda Puister[1]
Davies Onduru[2]

1 LEI Wageningen UR)
2 ETC East Africa

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Contents

1 Extended methodology

This appendix elaborates the methodological approach employed to assess the impact of Farmer Field Schools (TESA-led FFS) on the key performance indicators and to establish the baseline situation of farmer-led FFS with a more detailed description of the sampling strategy and data analysis.

1.1 General approach

The overall design employed in this study was a longitudinal impact evaluation using panel data[1] that include the baseline data, which measure the outcome before the intervention, and follow-up data that measure the outcome after a passage of time deemed sufficient for the impact of the intervention to set in. The evaluation combines the difference-in-difference (DiD) approach, propensity score matching (PSM), and regression analysis to net out the impacts of other factors.

As illustrated in the main report, the difference-in-difference approach essentially compares the changes among the FFS participants (before and after participating FFS) and changes among the non-participants (the control group). The control group ideally has similar observable characteristics as those of the participants and is assumed to share a parallel trend over time with the participants if they had not participated in an FFS. This assumption was assessed through the comparison of the status quo in the baseline situation on a number of key characteristics and performance indicators of the two groups.

The changes in the situation of the control group during the same period in which the participants undergo FFS activities are used as a proxy for the counterfactual situation of the participants, i.e. 'what would have happened to them if they had not participated in an FFS?'. The use of differences in the regression analysis made it possible to assess the impact of training activities that took place between 2010 and 2014 on the indicators of interest by 'differencing out' the influence of persistent factors about which no information is available.

To establish the baseline situation of farmers participating in the farmer-led FFS and the baseline situation of the control farmers, we performed a mean comparison of the two groups on a number of key characteristics and performance indicators. We also performed propensity score matching (PSM) using key characteristics – such as age, gender, farm size and education level – to assess potential selection bias that may influence the impact evaluation to be carried out in 2015.

1.2 Data sources and sampling

For the impact assessment of TESA-led FFS, this research used both factory data from KTDA (grower registration data, rainfall data, tea green leaf purchase data and quality information on processed tea) and survey data from households that supply tea (green leaf) to four KTDA managed factories sampled in 2010.[2] From all these four factories, households that were to undergo training activities were randomly selected for the baseline interview in 2010. Households in the control group, which were not to undergo the FFS training, were also randomly selected to be interviewed.

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[1] In statistics and econometrics, the term 'panel data' refers to multidimensional data that contain observations on multiple phenomena observed over multiple time periods for the same firms or individuals. A basic introduction to panel data techniques can be found in Verbeek (2000), A Guide to Modern Econometrics. John Wiley & Sons, Ltd Chichester.

[2] Detailed description of the four factories and the sampling strategy used can be found in Waarts, Y., Lan Ge, Giel Ton, Don Jansen, 2012, Sustainable tea production in Kenya: Impact assessment of Rainforest Alliance and Farmer Field School training. LEI Wageningen UR, The Hague.

Table A1.1 below shows the number of households interviewed in the pre-training situation (i.e. July 2010) per factory. The interviews were repeated in 2012 and 2014 using the same sample. The questionnaire used for the household interview can be found in Appendix 2.

The sampling of factories in 2010 took into account the following factors:
• Region: East of the Rift Valley and the West of Rift Valley
• Whether RA-trained/certified

The actual participation of households in the two types of training activities in 2012, however, turned out to be different from what was planned in 2010. For example, more households participated in FFS-training and training for RA-lead farmers than originally planned. Some farmers in the control group participated in FFS training. This made it necessary to identify *ex post* 'treatment group' and 'comparison group' to reflect the actual participation in RA and FFS training. The 'treatment' group and the 'control group' used in the impact assessment were therefore not exactly the same as the originally sampled groups (see Table A1.2).

Table A1.1
Distribution of sampled farmers over factories (pre-training situation, 2010).

Region	RA training sites		FFS training sites		Total	% of all sample
East of Rift Valley	Kinoro factory	60 farmers to undergo RA training	Ndima factory	58 FFS farmers	118	33
				30 comparison farmers 'near'	30	8
				30 comparison farmers 'far'	30	8
West of Rift Valley	Nyankoba factory	60 farmers to undergo RA training	Litein factory	58 FFS farmers	118	33
				30 comparison farmers 'near'	30	8
				30 comparison farmers 'far'	30	8
Total	120		236		356	100

Table A1.2
Distribution of sampled farmers over factories (after-training situation, 2014).

Region	Factory	FFS participation				Total	
East of Rift Valley		Non-FFS	% of all sample	FFS	% of all sample	Non-FFS+FFS	% of all sample
	Kinoro	0	0.0	47	15.3	47	15.3
	Ndima	37	12.0	67	21.8	104	33.8
West of Rift Valley							
	Litein	9	2.9	91	29.5	100	32.5
	Nyankoba	32	10.4	25	8.1	57	18.5
Total		78	25.3	230	74.7	308	100.0

For the baseline study of the farmer-led FFS, this research analysed survey data from households that supply tea (green leaf) to two KTDA managed factories, namely Gachege (east of the Rift Valley) and Mudete (west of the Rift Valley). The FFS participants and non-participants were randomly selected with the assistance of KTDA factory staff. Table A1.3 below shows the number of households interviewed in the pre-training situation (i.e. January 2014) per factory.

Table A1.3

Distribution of sampled farmers over factories (pre-training situation, 2014).

Region	Factory	FFS participation				Total	
East of Rift Valley		Non FFS	% of all sample	FFS	% of all sample	Non FFS+FFS	% of all sample
	Gachege	42	17.5	78	32.5	120	50
West of Rift Valley							
	Mudete	60	25.0	60	25.0	120	50
Total		102	42.5	138	57.5	240	100

1.3   Data analysis

The data analysis was carried out using the statistical analysis package Stata IC/13.1[3].

Variables and descriptive statistics
The survey data (processed as Stata data files) contain categorical variables and numerical variables. Categorical variables are characteristics that are not numbers per se, but categories or types. Examples of categorical variables are individual characteristics such as gender and position in the household, and group characteristics such as factory and region. Numerical variables are by their very nature numbers. Examples of numerical variables are the kilograms of tea green leaf sold and the number of people in a household.

We use simple descriptive statistics to provide basic information about the variables of interest. These descriptive statistics include, but are not limited to, number of observations (abbreviated as N in the tables), percentage distributions, medians, means and standard deviations (abbreviated as Std. Deviation in the tables).

Basic statistical tests
We used the following statistical tests to compare the means and proportions of different groups and the relationships between different variables:
- T-test
- Proportion test
- two sample Kolmogorov-Smirnov test of proportions
- Spearman's rank correlation

Propensity score matching (PSM)
Propensity score matching (PSM) is a commonly used method to match participants and non-participants based on the observable characteristics that affect their participation in the programme and the outcome being measured.[4] We use PSM to address potential self-selection bias. The propensity score is the estimated probability of getting a treatment (e.g. participating in the programme) for each household using a vector of pre-treatment covariates. We used the Stata commands 'psmatch2'[5] and 'teffects' for PSM and the estimation of ATT with kernel and nearest neighbour matching. After PSM, a balancing test was carried out on the covariates to gauge the comparability between the treatment group and the control group.

Regression analysis

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[3] StataCorp. 2013. *Stata Statistical Software: Release 13.* College Station, TX: StataCorp LP.
[4] See technical description in Rosenbaum, P.R., and
D.B. Rubin (1983). The central role of the propensity score in observational studies for causal effects. Biometrika 70 (1): 41-55
[5] E. Leuven and B. Sianesi. (2003). "PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing". http://ideas.repec.org/c/boc/bocode/s432001.html

Regression analysis is a statistical tool for the investigation of relationships between variables using observed data. It is usually used to ascertain the causal effect of one variable upon another that is predicted by a plausible theory (hypothesis). The focus of regression analysis is on the relationship between a dependent variable and one or more independent variables. More specifically, it helps one understand how the typical value of the dependent variable changes when any one of the independent variables (also called the explanatory variables) is varied, while the other independent variables are held fixed.

We used regression analysis to understand the impacts of potential contributing or influencing factors on the outcome indicators such as knowledge level, implementation of GAPs and yield. Since the dataset on the TESA-led FFS contains repeated observations on the same households, we used panel data techniques to analyse the changes in each household and the impact of FFS and other factors on these changes. Each household in the dataset is uniquely identified by its grower number and is one panel about which information was collected on various indicators in different periods, that is, the baseline situation (July 2010), the mid-term situation (February 2012) and the latest situation (January 2014). Changes in each individual household were calculated as the differences in values of various variables or indicators between 2010 and 2012. Regression analysis was then performed using these differences as the dependent variables, and training and other characteristics of the households as the explanatory variables. For a number of regression models, we performed post-estimation tests of model specification and coefficients (Hausman's specification test and Likelihood-ratio test after estimation).

Comparison groups
When relevant, different groups were compared to assess impact or potential bias. These groups were the following:
- FFS participants (FFS) vs. non-participants (non-FFS)
- Three 'degrees of participation' over time (see main report and Figure A1.1 for the sizes of the groups)
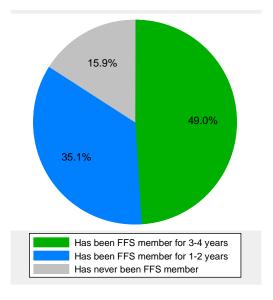- FFS participants vs. all farmers

Figure A1.1 *Groups with different 'degrees of participation' in FFS*

2 The questionnaire

2.1 Impact Assessment Questionnaire: Kinoro, Ndima, Nyankoba, Litein

Enumerators, no blanks are allowed:
- Please fill out -999 when the farmer does not know.
- Please fill out NA when the question is not applicable to the farmer, and for questions on inputs used a 0 when a farmer did not buy or use a certain input.

KTDA Sustainable Agriculture Project

A: Household identification + FFS

A	Date of interview (dd/mm/yyyy):………………… Start time: ……………. End time:………………

B	Name of enumerator……………………………………………………………………………………..

C	Name of Factory: ………………………………………………………………………………..

1	Factory grower number (2 letters for the factory, 3 numbers for buying centre, 4 numbers for grower number)

2	Name of the respondent (**Enumerator:** interview the person who attended FFS training or the person in charge of tea production):

	……………………………………………………………………………………………………

3a	What is the gender of the respondent? (Circle correct number)
	0	Female
	1	Male

3b	What is your year of birth?

	……………………………………………………………………………………………………

3c	How many years of education have you followed? (number of years, 'I do not know' = -999)

	……………………………………………………………………………………………………

4	Is the respondent the household head? (Circle correct number)

	0	No
	1	Yes

5	How many people are part of your household? ………………………

6 Did you sell tea in the July 2012/ June 2013 financial year?
   0 No
   1 Yes

6b Did you sell tea between July 2013 and December 2013?
   0 No
   1 Yes

If the answers to both questions 6 and 6b are NO, then stop the interview and go to another farmer on your list

7 Are you a member of a FFS or have you been a member of an FFS?
   0 No → **please continue with question 13**
   1 No, but a family member is/was an FFS member → **continue with question 8a**
   2 Yes → **please continue with question 8b**
   3 Not anymore → **please continue with question 8b**

8a If you did not participate in the FFS activities yourself but other person(s) from your household did participate, how did he/she/they value(s) the activities? **(Circle one option)**
   0 Unsatisfied → **please continue with question 13**
   1 Neutral → **please continue with question 13**
   2 Satisfied→ **please continue with question 13**
   3 I do not know→ **please continue with question 13**

8b How do you value FFS activities? How satisfied are you with the following aspects of the FFS? (*Enumerator: ask the farmer about all aspects and put one code in the square that corresponds with the given answer*)

Aspect: how satisfied are you with…?	1: Very satisfied 2: Satisfied 3: Neutral 4: Unsatisfied 5: Very unsatisfied 6: I do not know 7: Not applicable
1. FFS training	
2. Role of facilitators	
3. Group organization (officials, sub group)	
4. Group dynamics	
5. Frequency of meetings	
6. Time necessary	
7. Special topic sessions	
8. FFS commercial activities	
9. Micro credit	
10. Insurance	
11. Costs of running FFS	

8c Would you recommend other farmers to participate in an FFS?
   0 No
   1 Yes
   2 N/A / I don't know

9 Has your FFS group continued existing after you have graduated?
   0 No → **Continue with question 11**
   1 Yes → **Continue with question 10**

10a   What have been the activities of the FFS since your graduation? (List maximum 10 activities, in order of importance, as specific as possible e.g. training on chicken rearing)

- 0   No activities
- 1   Activity 1: ………………………………..
- 2   Activity 2: ………………………………..
- 3   Activity 3: ………………………………..
- 4   Activity 4: ………………………………..
- 5   Activity 5: ………………………………..
- 6   Activity 6: ………………………………..
- 7   Activity 7: ………………………………..
- 8   Activity 8: ………………………………..
- 9   Activity 9: ………………………………..
- 10   Activity 10: ………………………………..

11a   What would you like to see changed in the organization of the Farmer Field Schools to improve its functioning in the future? *(Enumerator: write down maximum 3 changes)*

1. …………………………………………………………………………………………..
2. …………………………………………………………………………………………..
3. …………………………………………………………………………………………..

12a   Have you or your household benefitted from participating in the Farmer Field School group in the last 2 years?
0.   No ➔ **please go to question 12b**
1.   Yes ➔ **please go to question 12c**

12b   Why have you not benefitted from participating in the Farmer Field School group in the last 2 years? *(Enumerator: Write down maximum 3 reasons)*

1. …………………………………………………………………………………………
2. …………………………………………………………………………………………
3. …………………………………………………………………………………………

12c   What benefits have you or your household realised from participating in the Farmer Field School in the last 2 years? (Enumerator: write down maximum 3 benefits)

1. …………………………………………………………………………………………
2. …………………………………………………………………………………………
3. …………………………………………………………………………………………

13   Have you been trained as a lead farmer by Rainforest Alliance?
        0   No
        1   Yes

14a   If you are not a lead farmer, have you, or any person from your household attended
        Rainforest Alliance certification training?
        0   Nobody
        1   Yes, me
        2   Yes, somebody else (Q14b……….. (Record
                relationship)
        3   I do not know

15a   Have you or any member of your household participated in any other certification
        scheme training or workshops, other than by Rainforest Alliance over the past 12
        months? Trainings are defined as educational events; for instance, one-on-one training,
        group training, workshop, demonstration, training during TESA visit. (E.g. UTZ Certified,
        Fairtrade/FLO, ISO)
        0   No
        1   Yes, UTZ Certified
        2   Yes, FLO/Fairtrade
        3   Yes, ISO
        4   Yes, I have received training to become certified, but I do not know for which
                certificate
        5   I do not know

15b   Have you or any member of your household participated in any non-certification scheme
        trainings or workshops over the past 12 months (trainings defined as educational
        events; for instance, one-on-one training, group training, workshop, demonstration,
        training during TESA visit)?
        0   No
        1   Yes → Skip question 16

16   If **no**, what was the reason?
        1) No training offered
        2) Offered, but could not get to training, no transportation or resources
        3) Offered, but other reasons for not attending (no time, not interested in topic).

17   If **yes**, how many trainings (trainings defined as educational events; for instance, one on
        one training, group training, workshop, demonstration, training during TESA visit) have
        you and other persons from your household attended in the past 12 months?
        1) 1 training
        2) Between 1-5 trainings
        3) More than 5 trainings
        4) I do not know

18   Did the person(s) that participated in training follow the following topics? (one-on-one training, group training, workshop, demonstration, training during TESA visit)? Fill in 1 for yes or 0 for no in column 1. (If **yes**, who gave the training? Fill in codes 1 to 6).

Topics	Attended training on this topic? [0 = No, 1 = Yes, 2= Do not know]	Name the type of organization 1= factory 2= government 3= NGO 4= input supplier 5= Local individual (e.g. neighbour) 6= others 7 = I do not know
18a Crop production (for instance new crops)	a1…………	a2i………….. a2ii ……………… a2iii……….
18b Health and safety (for instance HIV/AIDS, housekeeping, food)	b1…………	b2i………….. b2ii ……………… b2iii……….
18c Farm management skills (for instance record keeping, economic decision making)	c1…………	c2i………….. c2ii ……………… c2iii……….
18d Agro-chemical application (chemicals used for all farm activities)	d1…………	d2i………….. d2ii ……………… d2iii……….
18e Others/ combination of topics	e1…………	e2i………….. e2ii ……………… e2iii……….

19   Apart from information provided in the trainings, does the extension staff provide you with information or services that helps you with your tea production?
    0   No **→ Please go to Section B on the next page**
    1   Yes **→ please go to question 20**
    2   I don't know **→ Please go to question 20**

20   Can you name the services the factory provides you with and if you are satisfied with it / them?

(Instructions for enumerators: _please read the options to the farmers_ and record one response/possible answer in each box according to the code)

Services by the Factory	1: Very satisfied 2: Satisfied 3: Neutral 4: Unsatisfied 5: Very unsatisfied 6: I do not know 7: Not applicable
20a Training	
20b Market information on inputs	
20c Market information on sales and prices (e.g. also of other crops than tea)	
20d Providing information about inspection results and corrective actions after Internal Inspections (Internal Management System)	
20e Providing information about the external Inspections (audit)	
20f Providing access to fertilizer	
20g Providing access to seedlings, planting material	
20h Providing access to pesticides	
20i Providing access to (micro) credits	
20j Insurance	
20k Information on Group Commercial activities; sales and marketing	

B: Implementation of sustainable practices

1. Answering options should not be read out to the households, options are for enumerators' convenience only!
2. Select one answer option per question _by circling the corresponding letter, apart from questions with questions which state multiple answers can be given_
3. Do not give any additional information about the 'right' answers as we will be questioning knowledge later on.

Profit (questions are all related to tea)
1   How many times does your household pluck tea in the same tea plot per month (this refers to a normal month- when there is no drought and it is not very cold)?
    1. 4 times (every 7-8 days)
    2. 3 times (every 10 days)
    3. 2 times (every 2 weeks)
    4. Less than twice (less than once every 2 weeks)

2   Where does your household experience leaf spillage at the farm, during transport to buying centre or at the buying centre?
    1. No spillage at all places
    2. Spillage in all three places
    3. Spillage at home only
    4. Spillage at BC only
    5. Spillage during transport

3   Does your household use a plucking stick/wand? Is the table firm (Interviewer to observe)
    1. Use stick & table firm
    2. Use stick table not firm
    3. No stick table firm

4. No stick table not firm

4   If you or your household raise your own planting material: what is the success rate in your nursery?
        1. High (More than 80% success rate)
        2. Mediate (Between 80% and 50% success rate)
        3. Low (Less than 50% success rate)
        4. N/A – i.e. no planting or infilling in the last few years, used external source, or farmer does not want to tell.

5   What clones have been planted in your household's nursery?
        (Enumerator: multiple answers can be circled)
        1. Clones developed from own tea bushes (own nursery)
        2. Clones received from neighbours/other farmers
        3. Improved clones (VPS) from TRFK
        4. Any other/ do not know which clones
        5. N/A (no clones planted)

6   When are tea VP plants in-filled in the tea plots?
        (Enumerator: multiple answers can be circled)
        1. During heavy rains.
        2. During moderate/light rains.
        3. During dry season.
        4. None of the above.

7   What is the percentage crop cover (absence of gaps in the tea) on your farm (interviewer to ask _and_ observe)?
        1. 90-100%
        2. 75%- 90%
        3. Less than 75%
        4. I do not know

8   At what height is mature tea pruned?
        1. 20 inches and above
        2. Below 20 inches
        3. N/A
        4. Do not know

9   At what period are tea bushes pruned?
        1. Dry season (January – March)
        2. Wet season (April – May/ October - December)
        3. Cold season (June – August)
        4. Warm season (September)

10   How often is the same tea plot/block pruned?
        1. Prune every 6 (or more) years
        2. Prune every 3-5 years
        3. Prune every 1 or 2 years

11   What is the major tool used to prune the tea your household produces? (**Enumerator: multiple answers can be circled**)
        1. Use pruning knife
        2. Use pruning machine
        3. Other tools

12   Who prunes the tea bushes and have they been trained? (***Enumerator:*** *multiple answers can be circled*)

1. Untrained family member.
2. Trained family member.
3. Untrained non family member.
4. Trained non family member

13   At what height are your bushes tipped in?
1. More than 6 inches above pruning height
2. 4 to 6 inches above pruning height
3. Less than 4 inches above pruning height

14   How frequently do you apply composted manure in tea (= organic fertilizer)?
1. Never / do not apply
2. Less than once every three years
3. Every three years
4. More often than once every three years

15   How frequently do you apply chemical fertilizer in tea?
1. Once per year
2. Twice a year
3. More than twice per year
4. Never / Do not apply

16   Do you keep records on input use and production in tea?
1. Only records on production/sales
2. Only records on inputs
3. Records on input use and production
4. No records kept

People *(question 17 about tea, other questions about the whole production system)*

17   Who plucks your tea?
1. Only household members
2. Regular workers
3. Seasonal workers
4. Mixture of household members and workers

18   Do you hire workers? Do you have agreements with hired workers about pay and timing of payment?
1. Yes, agreement in writing
2. Yes, oral agreements
3. No
4. I do not hire workers, only family members work on the farm → **please go to question 19b**

19a   Do your workers have access to easily accessible water for drinking and latrines?
1. Access to potable water
2. Access to latrines
3. Both
4. Neither

19b   Does your household have access to easily accessible water for drinking and latrines?
1. Access to potable water
2. Access to latrines
3. Both
4. Neither

20   How often did your family or any of your workers need medical attention after injury on the farm for example fractures or wounds requiring stitches, in the last 12 months?
1.   More than three occasions
2.   On one or two occasions
3.   No occasions

21   When chemicals are sprayed, which personal protective equipment (PPE) does your family or your workers use?
1.   All PPE (Mask, gloves, boots, overall, goggles)
2.   Some of the above PPE
3.   No PPE
4.   N/A (don't spray)

22a   Do you group together with other farmers to carry out certain activities e.g. sourcing of fertilizer, leaf transport, plucking, learning visits to other farmers etc.?
1.   Yes
2.   No → continue with question 23

22b   If yes, do you group together with other farmers more frequent than 2 years ago?
1.   Less frequent
2.   Not more or less frequent than 2 years ago
3.   More frequent
4.   I do not know

23   Do you turn to KTDA if you experience any problems in your tea production?
1.   Yes
2.   No

24   Do your children go to school?
1.   N/A, no, the children are too young or too old to go to school
2.   No, some children are not going to school although they have the age to attend primary or secondary school
3.   Yes, all children in the age to attend primary or secondary school are attending school
4.   Yes, all children in the age to attend primary or secondary school are attending school and one or more children are following college or university

Planet

25   Do you collect prunings from the tea field?
1.   No
2.   Yes - use as mulch elsewhere on farm
3.   Yes - use as fuel

26   Do you infill open areas in your tea (*Interviewer to ask and observe*)?
1.   Yes
2.   No
3.   N/A (no gaps)

27   When do you apply fertilizer to your tea?
1.   Apply fertiliser during moderate rains
2.   Apply fertiliser during heavy rains
3.   Apply fertiliser during dry periods
4.   Apply fertilizer on another moment
5.   Do not apply fertilizer

28   In case of chemical control in your tea (pesticides /herbicides /insecticides) how do you apply the agrochemicals?
      1. Blanket spraying
      2. Edges/ spot spraying
      3. Other
      4. Do not use chemical control

29   Does your farm border a river or water body? If so, do you have a Riparian strip covered by indigenous vegetation and how wide is it A Riparian strip is a strip of indigenous vegetation between rivers or other water bodies and cultivated field (*Interviewer to ask and observe*)?
      1. No; farm does not border a river or water body
      2. Yes, farm borders a river/ water body, but no Riparian strip
      3. Yes, a strip less than 10 meter
      4. Riparian strip wider than10 meters, but smaller than 30 meters
      5. Riparian strip wider than 30 meter

30   Do you have indigenous trees on your farm? If so how many in total on your land?
      1. More than 10 indigenous trees
      2. Between 5 and 10
      3. Less than 5
      4. No native trees

31   If your farm borders a water stream, how many eucalyptus trees are growing within 10 meters of the water stream?
      1. More than 50 trees
      2. Between 20 and 50 trees
      3. Between 5 and 20 trees
      4. zero to 5 trees
      5. N/A farm does not border river

32   if your farm borders a water body, what distance do you leave out without applying agrochemicals and chemical fertilizer, compost and organic matter?
      1. No area is left
      2. 0 – 5 metres
      3. 5 – 15 metres
      4. Over 15 metres
      5. N/A farm does not border a river

33   How much area of the total farm is conservation area (area under indigenous trees/ natural vegetation)?
      1.   More than 10%
      2.   Between 2 % and 10%
      3.   Zero to 2 %

34   What is your main source of energy for domestic purposes?
      1. Renewable firewood from Eucalyptus and Gravillea trees, electricity, solar, biogas
      2. A mixture of sustainable and unsustainable (petroleum products, bottled gas, ….) sources
      3. Cutting down of indigenous trees
      4. Petroleum products

35   What is your main source of water for domestic use?
      1. River/ stream or spring
      2. Tap
      3. Harvested rainwater

36   How do you manage household waste water and effluent from livestock (interviewer to observe if possible)?
    1. Presence of soak pits/ waste pits;
    2. Other ways of filtering water
    3. Part of the waste in soak pits, part runs directly into farm
    4. Discharge direct onto the farm or into waterways

37   How do you manage household solid waste?
    1. No waste management in place
    2. One pit for all waste
    3. One pit for organic waste and one pit for other waste
    4. More than two pits in place: non-organic waste is further separated, for instance for plastic or glass

38   Is waste collected and taken elsewhere?
    1. Glass, plastic and other waste is collected
    2. One of three waste types is collected (either glass, or plastic, or other waste)
    3. No, recycling options known but no transportation available
    4. No, collection service is not available
    5. N/A no waste pit available

Decision-making in tea

*We also would like to ask you some questions on how you make decisions about tea production and management activities at the moment and how you made such decisions two years ago. (**Enumerator:** multiple options are possible, read the options aloud to the farmers and tick the relevant box).*

39a   How do you generally make decisions on tea production activities at the moment and two years ago? (Enumerator, put relevant code in the box; **every row must be filled; multiple answers possible as many factors contribute to making a decision)**

Nr	Way for decision-making on tea production (more than one factor may contribute to making a decision)	Now (39a) No = 0 Yes = 1	Two years ago (39b) No = 0 Yes = 1
0	Based on advice from my parents/friends/neighbours		
1	Based on what I did last year		
2	Based on a routine		
3	Based on the state of my tea bushes/field(s)		
4	Based on recommendations by the TESA/FSC/factory		
5	Based on regular check of my records to see whether my farm is doing well		
6	Based on comparing my records with the records of my neighbours/friends/other farmer to see how my farm is doing		
7	Based on what I learned from the training		
8	Based on information on prices for tea and other crops		
9	Based on comparing my production with figures with average tea production in Kenya to see how my farm is doing		
10	Based on my own experience		
11	Other, please specify ……………… ………………………………		

39c   If any of the answers are not the same for specific questions 39a and 39b above: Why did you change the way you make decisions since two years ago? (**Give the three most** important reasons.) (**Enumerator:** when all answers are the same, write NA)

1. ....

2. ....

3. ....

40   How do you decide how much fertilizer to apply on tea now, and how did you do so 2
      years ago? (<u>Enumerator, put relevant code in the box</u>; **multiple answers; fill every
      row**)

Nr	Way for decision-making on fertilizer application on tea (more than one factor may contribute <u>partly/wholly</u> in making a decision)	Now (40a) No = 0 Yes = 1	Two years ago (40b) No = 0 Yes = 1
1	I apply the same amount per bush / hectare as my parents / neighbours do		
2	I apply the same as last year		
3	I always apply the same amount		
4	I apply on the basis of the state of the tea bushes		
5	I apply on the basis of recommendations by the factory		
6	I apply on the basis of recommendations obtained in the training		
7	I apply on the basis of the records that I kept last year (analysed fertilizer input and yield relations)		
8	I apply on the basis of my own experience		
9	Other, please specify **(one only)**		

41   How do you decide on how often to pluck tea (plucking frequency) now, and how did you
      decide on this 2 years ago? (Enumerator, put relevant code in the box)

Nr	Way for decision-making on frequency of plucking (more than one factor <u>may partly/wholly</u> contribute to making a decision)	Now (41a) No = 0 Yes = 1	Two years ago (41b) No = 0 Yes = 1
0	I pluck as often as my parents/neighbours/friends do		
1	I pluck frequently as I did: (last year); (….two yrs ago for column 2)		
2	I pluck on the basis of the state of the tea bushes		
3	I pluck on the basis of recommendations by the factory		
4	I pluck on the basis of recommendations obtained in the training		
5	I pluck on the basis of the records that I kept last year		
6	I pluck on the basis of my own experience		
7	Other, please specify **(one only)**		

42   How do you decide how to handle (apply, store etc.) agro-chemicals now and how did
      you do so 2 years ago? (<u>Enumerator, put relevant code in the box</u>; **multiple answers;
      fill every row**)

Nr	Way for decision-making	Now (42a) No = 0 Yes = 1	Two years ago (42b) No = 0 Yes = 1
1	Based on advice from my parents/friends/neighbours		
2	Based on what I did last year		
3	Based on a routine		
4	Based on recommendations by the TESA/FSC/factory		
5	Based on requirements for RA certification		
6	Based on what I learned from the training to make my decisions		
7	Based on the basis of my own experience		
8	Other, please specify **(one only)** ………………. ……………………………………		

C: Tea production

We would like to know more about your tea production.

1a   How many times was your tea rejected by the buying centre the last 12 months?
      0   Never ➔ **please skip question 1b**
      1   Less than 3 times
      2   More than 3 times
      3   I do not know

1b   How many kilograms of your tea was rejected by the buying centre in the last 12 months?

      ……..……………………

1c   How many times was your tea rejected by the buying centre 2 years ago?
      0   Never ➔ **please skip question 1d**
      1   Less than 3 times
      2   More than 3 times
      3   I do not know

1d   How many kilograms of your tea was rejected by the buying centre 2 years ago?

      …………………………………………………………………………………………………..……………………

2. Labour for tea (tea production within your household, not work for someone else)

Enumerator: Please fill out -999 when the farmer does not know.

*1) How much time is spent on tea production? This can be **both family and hired labour**. We ask these questions for plucking weeding and pruning. The unit is different per activity.*
Example: for weeding we ask the days per year spent on weeding.
2) The cost of hired labour are in different units. Tea plucking is cost per kg of green leaves, while for other activities the costs per day or per bush should be stated.
If the labour is family labour the costs are zero.

Activity	Quantity (0 when farmer/labourer did not spend time on activity)	Unit of measurement	Cost (Family labour cost = 0)	Per unit:
C2 Plucking			1b.................	Ksh/Kg green tea leaves
C2 Weeding	2a.....................	Days last year	2b.................	Per day
C2 Pruning	3a..................	Number of bushes last year	3b.................	Ksh/ bush
C2 Applying fertilizer	4a..................	Number of bags applied last year	4b.................	Ksh/bag applied

Inputs used for tea production in the last 12 months (questions 4 until 9)

1) *Please state the inputs used for your total tea area in the last 12 months. If the respondent has difficulties answering this question ask him/her the quantity of these inputs they might have bought and if they finished all these inputs.*
2) *As different people might use different measures this question allows for different units in question 5 and 6: for example quantity 1, unit kg or quantity 0.5, unit litre.*
3) *Write down the cost for one unit*
4) *Give respondent time to think about any other inputs used for tea*

Enumerator: Please fill out -999 when the farmer does not know. And 0 when the farmer did not buy any fertilizer/chemicals/tea plants.

Input	Quantity used in last 12 months 0, 1, 2, 3, ½, ¼, ¾ etc.	Unit:	Cost per unit input (may be 0)	Number of bushes receiving input
4. Fertilizer (chemical) List common/ trade names incl. composition (N,P,K): 1a. .... 2a........…...................... 3a......…...................... 4a. …........................	1b. .... 2b........... 3b......…... 4b. ….........	Bag Bag Bag Bag	1d...…...... 2d........... 3d........... 4d...........	1e. .... 2e........... 3e......…... 4e...........
5. Organic fertilisers, compost, manure List types, if any: 1a. .... 2a........…...................... 3a......…...................... 4a. …........................	Quantity in last 12 months 0, 1, 2, 3, ½, ¼, ¾ etc. 1b......... 2b........... 3b......…... 4b. ….........	Unit 1c. .... 2c........... 3c......…... 4c. ….......	Cost per unit input 1d...…...... 2d........... 3d........... 4d...........	Number of bushes receiving input 1e......... 2e......…... 3e......…... 4e...........
6. Other chemicals (pesticides/ herbicides/ insecticides), if any: **List common/ trade names**: 1a. .... 2a........…...................... 3a......…...................... 4a. …........................……	Quantity in last 12 months 0, 1, 2, 3, ½, ¼, ¾ etc. 1b. .... 2b........... 3b........... 4b. ….........	Unit: 1c. .... 2c........... 3c......…... 4c. ….......	Cost per unit input 1d...…...... 2d........... 3d........... 4d...........	Number of bushes receiving input 1e......... 2e......…... 3e......…... 4e...........
7. New tea plants, if any	7b.................	Number in last year:	7d..............	
8. Other input used: 8a..	8b.................	8c............	8d...............	8e...............
9. Other input used: 9a..	9b.................	9c............	9d...............	9e...............

10a   Have you bought any Personal Protective Equipment for your tea or other production in
       the 2012/2013 financial year?
       0   No → **please continue with Section D on the next page**
       1   Yes
       2   I do not know → **Enumerator: please add -999 in the table for 1a-7a and
              continue with Section D on the next page**

       → **Please fill out -999 when the farmer does not know, and 0 when the question is
         not applicable (the farmer did not buy a certain PPE item); when a full PPE set
         row is filled, then fill 0 in row 1-6, column one)**

10b. If yes, what did you buy?	How many?		Cost per piece
1 Overall	1a..............	Piece	1d............
2 Hat	2a..............	Piece	2d............
3 Mask/respirator	3a.............	Piece	3d............
4 Gumboots	4a..............	Piece	4d............
5 Goggles	5a.............	Piece	5d............
6 Apron/plucking cape/nylon bags/raincoat	6a.............	Piece	6d.............
7 Full PPE set	7a.............	Piece	7d............

11   If you **bought** protective equipment (PPE) last year, why did you buy it?
       *(Enumerator: multiple answers are possible but do not read aloud to
       respondent)*
       0   I was taught in training that I can benefit from it
       1   I need it for required practises for Rainforest Alliance or UTZ Certification
       2   I have seen my neighbour / colleague farmer using it
       3   I wanted to buy it for a long time but just recently got the required funds
       4   It increases my status as a farmer
       5   Other

12   Do you (or your labourers) use a tea harvesting machine for plucking tea?
       0   No
       1   Yes

D: Other sources of income in the last 12 months

1   Can you give an approximation of the percentage of income from tea production in total
       household income, in the last 12 months?
       0   100% → **please continue with question 4**
       1   Between 80 and 100%
       2   Between 60 and 79%
       3   Between 40 and 59%
       4   Between 20 and 39%
       5   Less than 20%

2   Can you state your families' sources of income, starting with the most important income generation activity (excluding tea)? Can you give an approximation of the yearly income and costs from the activities?

Enumerators: you can use the bottom of the sheet to take notes before filling the table.
Help respondents with possible sources of income: vegetables, fruit, grain, dairy, calves, pigs, rabbit, chicken. Remittances, retirement, business, employment, teaching, and more.
Enumerators: write down -999 when the farmer does not know. And -888 when the farmer does not want to answer! **(Every row must have an answer in column 1)**

D2	Income generating activities *from most to least important income generating activity*		**Yearly gross income** from this activity (last 12 months)	**Yearly** costs from this activity (last 12 months)
	Category	**I**	**ii**	**iii**
		0 = No 1 = Yes		
D2.1.	a. Plant production (vegetable, fruit, grain etc.)	A	c	d
D2.2.	a. Livestock (dairy, cows, chicken etc.)	A	c	d
D2.3.	a. Business (trade, shop etc.)	A	c	d
D2.4.	a. Employment	A	c	d
D2.5.	a. Services (teaching, government etc.)	A	c	d
D2.6.	a. Remittances	A	c	d
D2.7.	a. Retirement	A	c	d
D2.8.	a. Other….	A	c	d
D2.9.	a. Other…..	A	c	d
D2.10.	a. Other….	A	c	d

3 Can you indicate the monthly income earned from all your activities <u>except tea production</u> over the last 12 months? **(Read answer options and ask farmer to select one)**

  1. Less than 2000 Ksh per month
  2. Between 2000 and 5 000 ksh per month
  3. Between 5 000 and 10 000 ksh per month
  4. Between 10 000 and 15 000 ksh per month
  5. Between 15 000 and 20 000 ksh per month
  6. More than 20 000 ksh per month

4 Indicate whether you agree or disagree with the following statements:

4a I earn more income from tea production now than two years ago:
  1. I do not agree, I earn less income from tea now than 2 year ago
  2. I do not agree, I earn the same amount from tea now as 2 years ago
  3. I agree
  4. I do not know

4b I earn more income from other sources of income than tea production than two years ago
  1. I do not agree, I earn less income from other sources now than 2 year ago
  2. I do not agree , I earn the same amount from other sources as 2 years ago
  3. I agree
  4. Not applicable: I do not have other sources of income now, and neither 2 years ago.
  5. I do not know

5 Does your household have any loans / (micro)credit at this moment?
  0 No **→ please skip question 6**
  1 Yes

6 Whom has provided you with the loan / (micro) credit?

  ………

7 Does your household have any insurance (related to agricultural production) at this moment?
  0 No **→ please skip question 8**
  1 Yes

8 With which organisation/company did you take out the insurance?

  ………

9   How did you use the income from your tea farm last year?
         (**Enumerator**: ask all options and record the relevant answer code in the box).

Nr	Item	No = 0 Yes = 1
0	Buying inputs / equipment for tea production	
1	Buying inputs / equipment for other crops/animals	
2	Hire labour for tea production	
3	Hire labour for other crops/animals	
4	Buy food	
5	Medical bills for family	
6	Education fees for children	
7	Investment in business	
8	Mobile phones	
9	Buy home use items e.g. Radio/TV/sofa set	
10	Other, please specify (maximum 3, most important uses of income) ………………………………………… ………………………………………… …………………………………………	

E: Knowledge and skills learned

1. *Answering options should **not** be read out to the households, options are for enumerators' convenience only!*
2. *In this part it is encouraged that the enumerators stimulate the farmers to give more options (time to think), but never mention the options!*
3. *Select the given option by circling the corresponding letter, more answer options can be selected*

1   Can you mention some benefits of leaving prunings in the field?
         1. To suppress weeds
         2. To prevent soil erosion
         3. To improve soil structure
         4. Releases nutrients into the top soil at decomposition
         5. Reduces loss of water by evaporation (mulch)
         6. None of the above / I do not know

2   Can you mention the best height to prune mature tea?
         1. Never below 20 inches
         2. 2 inches above the former height
         3. After reaching 28 inches, the bush should be down pruned to 21 inches
         4. None of the above / I do not know

3   Can you mention reasons to prune tea?
         1. To maintain a manageable plucking table
         2. To rejuvenate the bush / increase production
         3. To remove diseased, dead and knotted branches
         4. None of the above / I do not know

4   Can you mention some recommended methods to handle weeds in tea?
     1. Slashing using panga
     2. Use of plain jembe
     3. Uprooting using hands
     4. Use of round up for perennial weeds such as couch grass (new fields and young tea only)
     5. None of the above / I do not know

5   Can you mention benefits of fertilizer application to tea?
     1. Get better yields of green leaf.
     2. Get better quality of green leaf
     3. Maintain the tea bush for a long time
     4. Increase nutrients to soil/improve soil fertility.
     5. None of the above / I do not know

6   Can you mention any benefits of plucking tea every 7 to 8 days (during normal weather)?
     1. To maintain good quality (older tea is of less quality; more than 2 leaves per bud)
     2. To maintain enough yield (if leaves are plucked too early this leads to less yield; less than 2 leaves per bud)
     3. To maintain good plucking table
     4. None of the above / I do not know

7   Can you mention any benefits of maintaining a plucking table? (*A plucking table is the surface of the tea bush from which the farmer plucks the tea, 2 leaves and a bud.*)
     1. Yields increase when shoots can grow because they are not hindered by shade
     2. Shoots are missed during plucking/ plucking goes faster with an even plucking table
     3. None of the above / I do not know

8   Can you mention benefits from infilling?
     1. Maximises the yield of land in tea production / increases yield
     2. Reduces weeding efforts
     3. None of the above / I do not know

9   Can you mention the best height for tipping-in tea?
     1. 4 inches above pruning height
     2. None of the above / I do not know

10   A Riparian strip is a strip of indigenous vegetation between rivers or other water bodies and cultivated field. Can you mention benefits of a Riparian strip?
     1. A riparian strip helps protect and conserve wetlands
     2. A riparian strip helps prevent soil erosion
     3. A riparian strip enriches biodiversity
     4. A Riparian strip forms a buffer so that pollution cannot reach the water
     5. None of the above / I do not know

11   What are the benefits of personal protective equipment (PPE)?
     1. Protects your skin from being touched by chemicals
     2. Protects you from inhaling chemicals
     3. Protects your feet from chemicals
     4. Prevents illness
     5. None of the above / I do not know

12 What are the potential dangers of applying agrochemicals and fertilizer near the natural water bodies like rivers, streams, pools, ponds etc. ?
    1. Kill the aquatic life (water plants and animals)
    2. Kill the plants growing near the water body
    3. Poison the people drinking water downstream
    4. None of the above / I do not know

13 Why is application of agrochemicals discouraged in tea?
    1. High cost of agrochemicals
    2. Harmful effect on people
    3. Risk of getting into made tea
    4. Loss of market of tea
    5. Harmful effect on environment
    6. None of the above / I do not know

14 What methods can you use to improve the yield and quality of tea in your farm?
    1. Application of the right fertilizer at the right time.
    2. Regular plucking rounds
    3. Maintaining the plucking table.
    4. Training of pluckers
    5. None of the above / I do not know

15 What are the benefits applying soil conservation measures?
    1. Preserve soil fertility
    2. Prevent loss of soil
    3. Get high production
    4. Prevent siltation in water bodies
    5. None of the above / I do not know

F: Experiments, dissemination and diffusion of Good Agricultural Practices

1   Have you experimented with or implemented any new agricultural practices or tools on your land (for example on tea, new crops, other fertilizer) in the last year?
    0   No → **skip question 2 (the table below).**
    1   Yes

2   New practice
    1) *Fill in any practices the farmer has experimented with, for instance new crop varieties, other fertilizer, more/less frequent maintenance, new tools, and new income generating activities).*
    2) *Fill in if the farmer experimented alone or in a group.*
    3) *Do not read aloud the possible reasons: let the respondents come up with reason him/herself*

What did the farmer experiment?	0=Alone or 1= in group	Reason (e.g. learned from neighbour, training or because of certification)
Tea related		
F2.1a	F2.1b	F2.1c
F2.2a	F2.2b	F2.2c
F2.3a	F2.3b	F2.3c
F2.4a	F2.4b	F2.4c

What did the farmer experiment?	0=Alone or 1= in group	Reason (e.g. learned from neighbour, training or because of certification)
Not tea-related		
F2.5a	F2.5b	F2.5c
F2.6a	F2.6b	F2.6c
F2.7a	F2.7b	F2.7c
F2.8a	F2.8b	F2.8c

7   Did you share information on good agricultural practices that you or your household member were taught during the FFS training over the last year?
0   No **➔ please go to question 9**
1   Yes

8   If yes, did any of your friends, relatives or neighbours that you shared information with (on FFS training) changed their tea production practices due to information they got from you?
0   No
1   Yes
2   I do not know

9   How often do your neighbours share information on good practices with you or your household members?
1   Daily
2   Weekly
3   Monthly
4   Yearly
5   Never

G: Social indicators

1   Can you indicate to what extend you are satisfied with the following issues.

(**Enumerator**: *mention each question: start with "how satisfied are you with the relation with ………" see options below, <u>then put one code in the relevant box</u> after the farmer answers*)

How satisfied are you with:	1: Very satisfied 2: Satisfied 3: Neutral 4: Unsatisfied 5: Very unsatisfied
a) The relation with your neighbours	
b) The relation with your family members	
c) The relation with the tea factory	
d) Knowledge on good tea management practice	
e) Leadership skills	
f) Access to information on agri commodity prices	
g) Access to self-help activities like Merry-go-rounds	
h) Diversification of income/ number of income sources	
i) Your homestead (house, access to water/electricity etc)	
j) Your families health	
k) Possibility to send children to school	
l) Family welfare	
m) Family income	

That was the last question in this questionnaire. Thank you very much for your time and effort to help us understand more about tea production. Is there anything else you would like to tell us or ask us?

Do you have any comments or questions?

....

....

....

....

....

....

Enumerator: please read through questionnaire to make sure no questions were left unanswered before leaving the farmer! (NO blanks are allowed.) Thank you!

2.2 Impact Assessment Questionnaire: Gachege, Mudete

Enumerators, no blanks are allowed:
- Please fill out -999 when the farmer does not know.
- Please fill out NA when the question is not applicable to the farmer, and for questions on inputs used a 0 when a farmer did not buy or use a certain input.

KTDA Sustainable Agriculture Project

A: Household identification + FFS

A   Date of interview (dd/mm/yyyy):………………… Start time: …………….. End time:………………

B   Name of enumerator……………………………………………………………………………….…

C   Name of Factory: …………………………………………………………………………………..

1   Factory grower number (2 letters for the factory, 3 numbers for buying centre, 4 numbers for grower number)

2   Name of the respondent (**Enumerator:** interview the person who attended FFS training or the person in charge of tea production):

        ………………………………………………………………………………………………………

3a   What is the gender of the respondent? (Circle correct number)
        0   Female
        1   Male

3b   What is your year of birth?

        ………………………………………………………………………………………………………

3c   How many years of education have you followed? (number of years, 'I do not know' = -999)

        ………………………………………………………………………………………………………

4   Is the respondent the household head? (Circle correct number)

        0   No
        1   Yes

5   How many people are part of your household? ………………………

6   Did you sell tea in the July 2012/ June 2013 financial year?
        0   No
        1   Yes

6b Did you sell tea between July 2013 and December 2013?
   0   No
   1   Yes

If the answers to both questions 6 and 6b are NO, then stop the interview and go to another farmer on your list

7 Are you a member of a Farmer Field School (FFS)?
   0   No
   1   No, but a family member is an FFS member
   2   Yes
   3   Not anymore

13 Have you been trained as a lead farmer by Rainforest Alliance?
   0   No
   1   Yes

14a If you are not a lead farmer, have you, or any person from your household attended <u>Rainforest Alliance</u> certification training?
   0   Nobody
   1   Yes, me
   2   Yes, somebody else (Q14b………………………………………………………… (Record relationship)
   3   I do not know

15a Have you or any member of your household participated in any other certification scheme training or workshops, other than by Rainforest Alliance over the past 12 months? Trainings are defined as educational events; for instance, one-on-one training, group training, workshop, demonstration, training during TESA visit. (E.g. UTZ Certified, Fairtrade/FLO, ISO)
   0   No
   1   Yes, UTZ Certified
   2   Yes, FLO/Fairtrade
   3   Yes, ISO
   4   Yes, I have received training to become certified, but I do not know for which certificate
   5   I do not know

15b Have you or any member of your household participated in any non-certification scheme trainings or workshops over the past 12 months (trainings defined as educational events; for instance, one-on-one training, group training, workshop, demonstration, training during TESA visit)?
   0   No
   1   Yes → Skip question 16

16 If **no**, what was the reason?
   1) No training offered
   2) Offered, but could not get to training, no transportation or resources
   3) Offered, but other reasons for not attending (no time, not interested in topic).

17   If **yes**, how many trainings (trainings defined as educational events; for instance, one on one training, group training, workshop, demonstration, training during TESA visit) have you and other persons from your household attended in the past 12 months?
1) 1 training
2) Between 1-5 trainings
3) More than 5 trainings
4) I do not know

18   Did the person(s) that participated in training follow the following topics? (one-on-one training, group training, workshop, demonstration, training during TESA visit)? Fill in 1 for yes or 0 for no in column 1. (If **yes**, who gave the training? Fill in codes 1 to 6).

Topics	Attended training on this topic? [0 = No, 1 = Yes, 2= Do not know]	Name the type of organization 1= factory 2= government 3= NGO 4= input supplier 5= Local individual (e.g. neighbour) 6= others 7 = I do not know
18a Crop production (for instance new crops)	a1………	a2i………… a2ii ……………… a2iii……….
18b Health and safety (for instance HIV/AIDS, housekeeping, food)	b1………	b2i………… b2ii ……………… b2iii……….
18c Farm management skills (for instance record keeping, economic decision making)	c1………	c2i………… c2ii ……………… c2iii……….
18d Agro-chemical application (chemicals used for all farm activities)	d1………	d2i………… d2ii ……………… d2iii……….
18e Others/ combination of topics	e1…………	e2i………… e2ii ……………… e2iii……….

19   Apart from information provided in the trainings, does the extension staff provide you with information or services that helps you with your tea production?
1   No → **Please go to Section B on the next page**
2   Yes → **please go to question 20**
3   I don't know → **Please go to question 20**

20   Can you name the services the factory provides you with and if you are satisfied with it / them?
        (Instructions for enumerators: <u>please read the options to the farmers</u> and record one response/possible answer in each box according to the code)

Services by the Factory	1: Very satisfied 2: Satisfied 3: Neutral 4: Unsatisfied 5: Very unsatisfied 6: I do not know 7: Not applicable
20a Training	
20b Market information on inputs	
20c Market information on sales and prices (e.g. also of other crops than tea)	
20d Providing information about inspection results and corrective actions after Internal Inspections (Internal Management System)	
20e Providing information about the external Inspections (audit)	
20f Providing access to fertilizer	
20g Providing access to seedlings, planting material	
20h Providing access to pesticides	
20i Providing access to (micro) credits	
20j Insurance	
20k Information on Group Commercial activities; sales and marketing	

B: Implementation of sustainable practices

1. *Answering options should <u>not</u> be read out to the households, options are for enumerators' convenience only!*
2. ***<u>Select one answer option</u> per question** by circling the corresponding letter, apart from questions with questions which state multiple answers can be given*
3. *Do not give any additional information about the 'right' answers as we will be questioning knowledge later on.*

Profit (questions are all related to tea)
1   How many times does your household pluck tea in the same tea plot per month (this refers to a normal month- when there is no drought and it is not very cold)?
        1.   4 times (every 7-8 days)
        2.   3 times (every 10 days)
        3.   2 times (every 2 weeks)
        4.   Less than twice (less than once every 2 weeks)

2   Where does your household experience leaf spillage at the farm, during transport to buying centre or at the buying centre?
        1.   No spillage at all places
        2.   Spillage in all three places
        3.   Spillage at home only
        4.   Spillage at BC only
        5.   Spillage during transport

3   Does your household use a plucking stick/wand? Is the table firm (Interviewer to observe)
        1. Use stick & table firm
        2. Use stick table not firm
        3. No stick table firm
        4. No stick table not firm

4   If you or your household raise your own planting material: what is the success rate in your nursery?
        1. High (More than 80% success rate)
        2. Mediate (Between 80% and 50% success rate)
        3. Low (Less than 50% success rate)
        4. N/A – i.e. no planting or infilling in the last few years, used external source, or farmer does not want to tell.

5   What clones have been planted in your household's nursery?
        (Enumerator: multiple answers can be circled)
        1. Clones developed from own tea bushes (own nursery)
        2. Clones received from neighbours/other farmers
        3. Improved clones (VPS) from TRFK
        4. Any other/ do not know which clones
        5. N/A (no clones planted)

6   When are tea VP plants in-filled in the tea plots?
        (*Enumerator: multiple answers can be circled*)
        1. During heavy rains.
        2. During moderate/light rains.
        3. During dry season.
        4. None of the above.

7   What is the percentage crop cover (absence of gaps in the tea) on your farm (*interviewer to ask <u>and</u> observe*)?
        1. 90-100%
        2. 75%- 90%
        3. Less than 75%
        4. I do not know

8   At what height is mature tea pruned?
        1. 20 inches and above
        2. Below 20 inches
        3. N/A
        4. Do not know

9   At what period are tea bushes pruned?
        1. Dry season (January – March)
        2. Wet season (April – May/ October - December)
        3. Cold season (June – August)
        4. Warm season (September)

10   How often is the same tea plot/block pruned?
        1. Prune every 6 (or more) years
        2. Prune every 3-5 years
        3. Prune every 1 or 2 years

11 What is the major tool used to prune the tea your household produces? (***Enumerator:*** *multiple answers can be circled*)
1. Use pruning knife
2. Use pruning machine
3. Other tools

12 Who prunes the tea bushes and have they been trained? (***Enumerator:*** *multiple answers can be circled*)
1. Untrained family member.
2. Trained family member.
3. Untrained non family member.
4. Trained non family member

13 At what height are your bushes tipped in?
1. More than 6 inches above pruning height
2. 4 to 6 inches above pruning height
3. Less than 4 inches above pruning height

14 How frequently do you apply composted manure in tea (= organic fertilizer)?
1. Never / do not apply
2. Less than once every three years
3. Every three years
4. More often than once every three years

15 How frequently do you apply chemical fertilizer in tea?
1. Once per year
2. Twice a year
3. More than twice per year
4. Never / Do not apply

16 Do you keep records on input use and production in tea?
1. Only records on production/sales
2. Only records on inputs
3. Records on input use and production
4. No records kept

People *(question 17 about tea, other questions about the whole production system)*
17 Who plucks your tea?
1. Only household members
2. Regular workers
3. Seasonal workers
4. Mixture of household members and workers

18 Do you hire workers? Do you have agreements with hired workers about pay and timing of payment?
1. Yes, agreement in writing
2. Yes, oral agreements
3. No
4. I do not hire workers, only family members work on the farm ➔ **please go to question 19b**

19a   Do your workers have access to easily accessible water for drinking and latrines?
1. Access to potable water
2. Access to latrines
3. Both
4. Neither

19b   Does your household have access to easily accessible water for drinking and latrines?
1. Access to potable water
2. Access to latrines
3. Both
4. Neither

20   How often did your family or any of your workers need medical attention after injury on the farm for example fractures or wounds requiring stitches, in the last 12 months?
1. More than three occasions
2. On one or two occasions
3. No occasions

21   When chemicals are sprayed, which personal protective equipment (PPE) does your family or your workers use?
1. All PPE (Mask, gloves, boots, overall, goggles)
2. Some of the above PPE
3. No PPE
4. N/A (don't spray)

22a   Do you group together with other farmers to carry out certain activities e.g. sourcing of fertilizer, leaf transport, plucking, learning visits to other farmers etc.?
1. Yes
2. No → continue with question 23

22b   If yes, do you group together with other farmers more frequent than 2 years ago?
1. Less frequent
2. Not more or less frequent than 2 years ago
3. More frequent
4. I do not know

23   Do you turn to KTDA if you experience any problems in your tea production?
1. Yes
2. No

24   Do your children go to school?
1. N/A, no, the children are too young or too old to go to school
2. No, some children are not going to school although they have the age to attend primary or secondary school
3. Yes, all children in the age to attend primary or secondary school are attending school
4. Yes, all children in the age to attend primary or secondary school are attending school and one or more children are following college or university

Planet

25   Do you collect prunings from the tea field?
1. No
2. Yes - use as mulch elsewhere on farm
3. Yes - use as fuel

26   Do you infill open areas in your tea (*Interviewer to ask <u>and</u> observe*)?
1. Yes
2. No
3. N/A (no gaps)

27   When do you apply fertilizer to your tea?
1. Apply fertiliser during moderate rains
2. Apply fertiliser during heavy rains
3. Apply fertiliser during dry periods
4. Apply fertilizer on another moment
5. Do not apply fertilizer

28   In case of chemical control in your tea (pesticides /herbicides /insecticides) how do you apply the agrochemicals?
1. Blanket spraying
2. Edges/ spot spraying
3. Other
4. Do not use chemical control

29   Does your farm border a river or water body? If so, do you have a Riparian strip covered by indigenous vegetation and how wide is it A Riparian strip is a strip of indigenous vegetation between rivers or other water bodies and cultivated field (*Interviewer to ask and observe*)?
1. No; farm does not border a river or water body
2. Yes, farm borders a river/ water body, but no Riparian strip
3. Yes, a strip less than 10 meter
4. Riparian strip wider than10 meters, but smaller than 30 meters
5. Riparian strip wider than 30 meter

30   Do you have indigenous trees on your farm? If so how many in total on your land?
1. More than 10 indigenous trees
2. Between 5 and 10
3. Less than 5
4. No native trees

31   If your farm borders a water stream, how many eucalyptus trees are growing within 10 meters of the water stream?
1. More than 50 trees
2. Between 20 and 50 trees
3. Between 5 and 20 trees
4. zero to 5 trees
5. N/A farm does not border river

32   if your farm borders a water body, what distance do you leave out without applying agrochemicals and chemical fertilizer, compost and organic matter?
1. No area is left
2. 0 – 5 metres
3. 5 – 15 metres
4. Over 15 metres
5. N/A farm does not border a river

33   How much area of the total farm is conservation area (area under indigenous trees/ natural vegetation)?
      1.   More than 10%
      2.   Between 2 % and 10%
      3.   Zero to 2 %

34   What is your main source of energy for domestic purposes?
      1.   Renewable firewood from Eucalyptus and Gravillea trees, electricity, solar, biogas
      2.   A mixture of sustainable and unsustainable (petroleum products, bottled gas, ….) sources
      3.   Cutting down of indigenous trees
      4.   Petroleum products

35   What is your main source of water for domestic use?
      1.   River/ stream or spring
      2.   Tap
      3.   Harvested rainwater

36   How do you manage household waste water and effluent from livestock (interviewer to observe if possible)?
      1.   Presence of soak pits/ waste pits;
      2.   Other ways of filtering water
      3.   Part of the waste in soak pits, part runs directly into farm
      4.   Discharge direct onto the farm or into waterways

37   How do you manage household solid waste?
      1.   No waste management in place
      2.   One pit for all waste
      3.   One pit for organic waste and one pit for other waste
      4.   More than two pits in place: non-organic waste is further separated, for instance for plastic or glass

38   Is waste collected and taken elsewhere?
      1.   Glass, plastic and other waste is collected
      2.   One of three waste types is collected (either glass, or plastic, or other waste)
      3.   No, recycling options known but no transportation available
      4.   No, collection service is not available
      5.   N/A no waste pit available

Decision-making in tea

We also would like to ask you some questions on how you make decisions about tea production and management activities at the moment and how you made such decisions two years ago.
*(**Enumerator:** <u>multiple options are possible, read the options aloud to the farmers and tick the relevant box).</u>*

39a   How do you generally make decisions on tea production activities at the moment and two years ago? (Enumerator, put relevant code in the box; **every row must be filled; multiple answers possible as many factors contribute to making a decision)**

Nr	Way for decision-making on tea production (more than one factor may contribute to making a decision)	Now (39a) No = 0 Yes = 1	Two years ago (39b) No = 0 Yes = 1
0	Based on advice from my parents/friends/neighbours		
1	Based on what I did last year		
2	Based on a routine		
3	Based on the state of my tea bushes/field(s)		
4	Based on recommendations by the TESA/FSC/factory		
5	Based on regular check of my records to see whether my farm is doing well		
6	Based on comparing my records with the records of my neighbours/friends/other farmer to see how my farm is doing		
7	Based on what I learned from the training		
8	Based on information on prices for tea and other crops		
9	Based on comparing my production with figures with average tea production in Kenya to see how my farm is doing		
10	Based on my own experience		
11	Other, please specify ……………….

………………………………… | | |

39c   If any of the answers are not the same for specific questions 39a and 39b above: Why did you change the way you make decisions since two years ago? (**Give the three most** important reasons.) (**Enumerator:** <u>when all answers are the same, write NA</u>)

1……………………………………………………………………………………………

2……………………………………………………………………………………………

3……………………………………………………………………………………………

40   How do you decide how much fertilizer to apply on tea now, and how did you do so 2
      years ago? (Enumerator, put relevant code in the box; **multiple answers; fill every
      row**)

Nr	Way for decision-making on fertilizer application on tea (more than one factor may contribute partly/wholly in making a decision)	Now (40a) No = 0 Yes = 1	Two years ago (40b) No = 0 Yes = 1
1	I apply the same amount per bush / hectare as my parents / neighbours do		
2	I apply the same as last year		
3	I always apply the same amount		
4	I apply on the basis of the state of the tea bushes		
5	I apply on the basis of recommendations by the factory		
6	I apply on the basis of recommendations obtained in the training		
7	I apply on the basis of the records that I kept last year (analysed fertilizer input and yield relations)		
8	I apply on the basis of my own experience		
9	Other, please specify **(one only)** ……………… …………………………………		

41   How do you decide on how often to pluck tea (plucking frequency) now, and how did you
      decide on this 2 years ago? (Enumerator, put relevant code in the box)

Nr	Way for decision-making on frequency of plucking (more than one factor may partly/wholly contribute to making a decision)	Now (41a) No = 0 Yes = 1	Two years ago (41b) No = 0 Yes = 1
0	I pluck as often as my parents/neighbours/friends do		
1	I pluck frequently as I did: (last year); (….two yrs ago for column 2)		
2	I pluck on the basis of the state of the tea bushes		
3	I pluck on the basis of recommendations by the factory		
4	I pluck on the basis of recommendations obtained in the training		
5	I pluck on the basis of the records that I kept last year		
6	I pluck on the basis of my own experience		
7	Other, please specify **(one only)** ……………… …………………………………		

42 How do you decide how to handle (apply, store etc.) agro-chemicals now and how did you do so 2 years ago? (Enumerator, put relevant code in the box; **multiple answers; fill every row**)

Nr	Way for decision-making	Now (42a) No = 0 Yes = 1	Two years ago (42b) No = 0 Yes = 1
1	Based on advice from my parents/friends/neighbours		
2	Based on what I did last year		
3	Based on a routine		
4	Based on recommendations by the TESA/FSC/factory		
5	Based on requirements for RA certification		
6	Based on what I learned from the training to make my decisions		
7	Based on the basis of my own experience		
8	Other, please specify **(one only)** ………………. …………………………………		

C: Tea production

We would like to know more about your tea production.

1a How many times was your tea rejected by the buying centre the last 12 months?
  0   Never ➔ **please skip question 1b**
  1   Less than 3 times
  2   More than 3 times
  3   I do not know

1b How many kilograms of your tea was rejected by the buying centre in the last 12 months?

  ……

1c How many times was your tea rejected by the buying centre 2 years ago?
  0   Never ➔ **please skip question 1d**
  1   Less than 3 times
  2   More than 3 times
  3   I do not know

1d How many kilograms of your tea was rejected by the buying centre 2 years ago?

  ……

2. Labour for tea (tea production within your household, not work for someone else)

Enumerator: Please fill out -999 when the farmer does not know.

4. How much time is spent on tea production? This can be **both family and hired labour**. We ask these questions for plucking weeding and pruning. The unit is different per activity. Example: for weeding we ask the days per year spent on weeding.
5. The cost of hired labour are in different units. Tea plucking is cost per kg of green leaves, while for other activities the costs per day or per bush should be stated.
6. If the labour is family labour the costs are zero.

Activity	Quantity (0 when farmer/labourer did not spend time on activity)	Unit of measurement	Cost (Family labour cost = 0)	Per unit:
C2 Plucking			1b………………	Ksh/Kg green tea leaves
C2 Weeding	2a………………..	Days last year	2b………………	Per day
C2 Pruning	3a………………	Number of bushes last year	3b………………	Ksh/ bush
C2 Applying fertilizer	4a………………	Number of bags applied last year	4b………………	Ksh/bag applied

Inputs used for tea production in the last 12 months (questions 4 until 9)

7. *Please state the inputs used for your total tea area in the last 12 months. If the respondent has difficulties answering this question ask him/her the quantity of these inputs they might have bought and if they finished all these inputs.*
8. *As different people might use different measures this question allows for different units in question 5 and 6: for example quantity 1, unit kg or quantity 0.5, unit litre.*
9. *Write down the cost for one unit*
10. *Give respondent time to think about any other inputs used for tea*

Enumerator: Please fill out -999 when the farmer does not know. And 0 when the farmer did not buy any fertilizer/chemicals/tea plants.

Input	Quantity used in last 12 months 0, 1, 2, 3, ½, ¼, ¾ etc.	Unit:	Cost per unit input (may be 0)	Number of bushes receiving input
4. Fertilizer (chemical) List common/ trade names incl. composition (N,P,K): 1a. .... 2a............…................... 3a.…............................ 4a. ….........................	1b. .... 2b.........…. 3b.......…... 4b. ….........	Bag Bag Bag Bag	1d. .... 2d.......…. 3d.......…... 4d.......…...	1e. .... 2e.........…. 3e.......…... 4e.......…...
5. Organic fertilisers, compost, manure List types, if any: 1a. .... 2a.......…................... 3a.…............................ 4a. ….........................	Quantity in last 12 months 0, 1, 2, 3, ½, ¼, ¾ etc. 1b. .... 2b.........…. 3b.......…... 4b. ….........	Unit 1c. .... 2c.........… 3c......…... 4c. ….......	Cost per unit input 1d. .... 2d.......…. 3d.......…... 4d. ….........	Number of bushes receiving input 1e. .... 2e.........…. 3e.......…... 4e.......…...
6. Other chemicals (pesticides/ herbicides/ insecticides), if any: **List common/ trade names**: 1a. .... 2a.......…................... 3a.…............................ 4a. …....................…..……	Quantity in last 12 months 0, 1, 2, 3, ½, ¼, ¾ etc. 1b. .... 2b.........…. 3b.......…... 4b. ….........	Unit: 1c. .... 2c.........… 3c.......…... 4c. ….......	Cost per unit input 1d. .... 2d.........… 3d.......…... 4d. ….........	Number of bushes receiving input 1e. .... 2e.........…. 3e.......…... 4e.......…...
7. New tea plants, if any	7b................	Number in last year:	7d................	■
8. Other input used: 8a...	8b.................	8c............	8d................	8e................
9. Other input used: 9a...	9b.................	9c............	9d................	9e................

10a   Have you bought any Personal Protective Equipment for your tea or other production in the 2012/2013 financial year?
       0   No **→ please continue with Section D on the next page**
       1   Yes
       2   I do not know **→ Enumerator: please add -999 in the table for 1a-7a and continue with Section D on the next page**

    → **Please fill out -999 when the farmer does not know, and 0 when the question is not applicable (the farmer did not buy a certain PPE item); when a full PPE set row is filled, then fill 0 in row 1-6, column one)**

10b. If yes, what did you buy?	How many?		Cost per piece
1 Overall	1a………….	Piece	1d………….
2 Hat	2a………….	Piece	2d………….
3 Mask/respirator	3a………….	Piece	3d………….
4 Gumboots	4a………….	Piece	4d………….
5 Goggles	5a………….	Piece	5d………….
6 Apron/plucking cape/nylon bags/raincoat	6a………….	Piece	6d………….
7 Full PPE set	7a………….	Piece	7d………….

11   If you **bought** protective equipment (PPE) last year, why did you buy it?
       (Enumerator: multiple answers are possible but do not read aloud to respondent)
       0   I was taught in training that I can benefit from it
       1   I need it for required practises for Rainforest Alliance or UTZ Certification
       2   I have seen my neighbour / colleague farmer using it
       3   I wanted to buy it for a long time but just recently got the required funds
       4   It increases my status as a farmer
       5   Other

12   Do you (or your labourers) use a tea harvesting machine for plucking tea?
       0   No
       1   Yes

D: Other sources of income in the last 12 months

1 Can you give an approximation of the percentage of income from tea production in total household income, in the last 12 months?
- 0   100% **→ please continue with question 4**
- 1   Between 80 and 100%
- 2   Between 60 and 79%
- 3   Between 40 and 59%
- 4   Between 20 and 39%
- 5   Less than 20%

2 Can you state your families' sources of income, starting with the most important income generation activity (excluding tea)? Can you give an approximation of the yearly income and costs from the activities?

Enumerators: you can use the bottom of the sheet to take notes before filling the table.
Help respondents with possible sources of income: vegetables, fruit, grain, dairy, calves, pigs, rabbit, chicken. Remittances, retirement, business, employment, teaching, and more.
Enumerators: write down -999 when the farmer does not know. And -888 when the farmer does not want to answer! **(Every row must have an answer in column 1)**

D2	Income generating activities *from most to least important income generating activity*		**Yearly gross income** from this activity (last 12 months)	**Y**early costs from this activity (last 12 months)
	Category	**I**	**ii**	**iii**
		0 = No **1 = Yes**		
D2.1.	a. Plant production (vegetable, fruit, grain etc.)	A	c	d
D2.2.	a. Livestock (dairy, cows, chicken etc.)	A	c	d
D2.3.	a. Business (trade, shop etc.)	A	c	d
D2.4.	a. Employment	A	c	d
D2.5.	a. Services (teaching, government etc.)	A	c	d
D2.6.	a. Remittances	A	c	d
D2.7.	a. Retirement	A	c	d
D2.8.	a. Other….	A	c	d
D2.9.	a. Other…..	A	c	d

D2	Income generating activities *from most to least important income generating activity*		**Yearly gross income** from this activity (last 12 months)	**Yearly** costs from this activity (last 12 months)
	Category	**I**	**ii**	**iii**
		0 = No **1 = Yes**		
D2.10.	a. Other….	A	c	d

3   Can you indicate the monthly income earned from all your activities <u>except tea production</u> over the last 12 months? **(Read answer options and ask farmer to select one)**

1. Less than 2000 Ksh per month
2. Between 2000 and 5 000 ksh per month
3. Between 5 000 and 10 000 ksh per month
4. Between 10 000 and 15 000 ksh per month
5. Between 15 000 and 20 000 ksh per month
6. More than 20 000 ksh per month

4   Indicate whether you agree or disagree with the following statements:

4a   I earn more income from tea production now than two years ago:
1. I do not agree, I earn less income from tea now than 2 year ago
2. I do not agree, I earn the same amount from tea now as 2 years ago
3. I agree
4. I do not know

4b   I earn more income from other sources of income than tea production than two years ago
1. I do not agree, I earn less income from other sources now than 2 year ago
2. I do not agree , I earn the same amount from other sources as 2 years ago
3. I agree
4. Not applicable: I do not have other sources of income now, and neither 2 years ago.
5. I do not know

5   Does your household have any loans / (micro)credit at this moment?
0   No → **please skip question 6**
1   Yes

6   Whom has provided you with the loan / (micro) credit?

    ……..…………………….

7   Does your household have any insurance (related to agricultural production) at this moment?
0   No → **please skip question 8**
1   Yes

8   With which organisation/company did you take out the insurance?

    ……..…………………….

9   How did you use the income from your tea farm last year?
         (**Enumerator**: ask all options and record the relevant answer code in the box).

Nr	Item	No = 0 Yes = 1
0	Buying inputs / equipment for tea production	
1	Buying inputs / equipment for other crops/animals	
2	Hire labour for tea production	
3	Hire labour for other crops/animals	
4	Buy food	
5	Medical bills for family	
6	Education fees for children	
7	Investment in business	
8	Mobile phones	
9	Buy home use items e.g. Radio/TV/sofa set	
10	Other, please specify (maximum 3, most important uses of income) …………………………………… …………………………………… ……………………………………	

E: Knowledge and skills learned

11. *1.Answering options should **not** be read out to the households, options are for enumerators' convenience only!*
12. *2. In this part it is encouraged that the enumerators stimulate the farmers to give more options (time to think), but never mention the options!*
13. *3. Select the given option by circling the corresponding letter, <u>more answer options can be selected</u>*

1   Can you mention some benefits of leaving prunings in the field?
         1.   To suppress weeds
         2.   To prevent soil erosion
         3.   To improve soil structure
         4.   Releases nutrients into the top soil at decomposition
         5.   Reduces loss of water by evaporation (mulch)
         6.   None of the above / I do not know

2   Can you mention the best height to prune mature tea?
         1.   Never below 20 inches
         2.   2 inches above the former height
         3.   After reaching 28 inches, the bush should be down pruned to 21 inches
         4.   None of the above / I do not know

3   Can you mention reasons to prune tea?
         1.   To maintain a manageable plucking table
         2.   To rejuvenate the bush / increase production
         3.   To remove diseased, dead and knotted branches
         4.   None of the above / I do not know

4   Can you mention some recommended methods to handle weeds in tea?
        1.   Slashing using panga
        2.   Use of plain jembe
        3.   Uprooting using hands
        4.   Use of round up for perennial weeds such as couch grass (new fields and young tea only)
        5.   None of the above / I do not know

5   Can you mention benefits of fertilizer application to tea?
        1.   Get better yields of green leaf.
        2.   Get better quality of green leaf
        3.   Maintain the tea bush for a long time
        4.   Increase nutrients to soil/improve soil fertility.
        5.   None of the above / I do not know

6   Can you mention any benefits of plucking tea every 7 to 8 days (during normal weather)?
        1.   To maintain good quality (older tea is of less quality; more than 2 leaves per bud)
        2.   To maintain enough yield (if leaves are plucked too early this leads to less yield; less than 2 leaves per bud)
        3.   To maintain good plucking table
        4.   None of the above / I do not know

7   Can you mention any benefits of maintaining a plucking table? (*A plucking table is the surface of the tea bush from which the farmer plucks the tea, 2 leaves and a bud.*)
        1.   Yields increase when shoots can grow because they are not hindered by shade
        2.   Shoots are missed during plucking/ plucking goes faster with an even plucking table
        3.   None of the above / I do not know

8   Can you mention benefits from infilling?
        1.   Maximises the yield of land in tea production / increases yield
        2.   Reduces weeding efforts
        3.   None of the above / I do not know

9   Can you mention the best height for tipping-in tea?
        1.   4 inches above pruning height
        2.   None of the above / I do not know

10   A Riparian strip is a strip of indigenous vegetation between rivers or other water bodies and cultivated field. Can you mention benefits of a Riparian strip?
        1.   A riparian strip helps protect and conserve wetlands
        2.   A riparian strip helps prevent soil erosion
        3.   A riparian strip enriches biodiversity
        4.   A Riparian strip forms a buffer so that pollution cannot reach the water
        5.   None of the above / I do not know

11   What are the benefits of personal protective equipment (PPE)?
        1.   Protects your skin from being touched by chemicals
        2.   Protects you from inhaling chemicals
        3.   Protects your feet from chemicals
        4.   Prevents illness
        5.   None of the above / I do not know

12   What are the potential dangers of applying agrochemicals and fertilizer near the natural
     water bodies like rivers, streams, pools, ponds etc. ?
     1.   Kill the aquatic life (water plants and animals)
     2.   Kill the plants growing near the water body
     3.   Poison the people drinking water downstream
     4.   None of the above / I do not know

13   Why is application of agrochemicals discouraged in tea?
     1.   High cost of agrochemicals
     2.   Harmful effect on people
     3.   Risk of getting into made tea
     4.   Loss of market of tea
     5.   Harmful effect on environment
     6.   None of the above / I do not know

14   What methods can you use to improve the yield and quality of tea in your farm?
     1.   Application of the right fertilizer at the right time.
     2.   Regular plucking rounds
     3.   Maintaining the plucking table.
     4.   Training of pluckers
     5.   None of the above / I do not know

15   What are the benefits applying soil conservation measures?
     1.   Preserve soil fertility
     2.   Prevent loss of soil
     3.   Get high production
     4.   Prevent siltation in water bodies
     5.   None of the above / I do not know

F: Experiments, dissemination and diffusion of Good Agricultural Practices

1   Have you experimented with or implemented any new agricultural practices or tools on
     your land (for example on tea, new crops, other fertilizer) in the last year?
     0   No → **skip question 2 (the table below).**
     1   Yes

2   New practice

14. *Fill in any practices the farmer has experimented with, for instance new crop varieties, other
    fertilizer, more/less frequent maintenance, new tools, and new income generating activities).*
15. *Fill in if the farmer experimented alone or in a group.*
16. *Do not read aloud the possible reasons: let the respondents come up with reason him/herself*

What did the farmer experiment?	0=Alone or 1= in group	Reason (e.g. learned from neighbour, training or because of certification)
Tea related		
F2.1a	F2.1b	F2.1c
F2.2a	F2.2b	F2.2c
F2.3a	F2.3b	F2.3c
F2.4a	F2.4b	F2.4c

What did the farmer experiment?	0=Alone or 1= in group	Reason (e.g. learned from neighbour, training or because of certification)
Not tea-related		
F2.5a	F2.5b	F2.5c
F2.6a	F2.6b	F2.6c
F2.7a	F2.7b	F2.7c
F2.8a	F2.8b	F2.8c

7   Did you share information on good agricultural practices that you or your household member were taught during the FFS training over the last year?

           0   No **→ please go to question 9**
           1   Yes

8   If yes, did any of your friends, relatives or neighbours that you shared information with (on FFS training) changed their tea production practices due to information they got from you?

           0   No
           1   Yes
           2   I do not know

9   How often do your neighbours share information on good practices with you or your household members?

           1   Daily
           2   Weekly
           3   Monthly
           4   Yearly
           5   Never

G: Social indicators

1   Can you indicate to what extend you are satisfied with the following issues.

(***Enumerator***: *mention each question: start with "how satisfied are you with the relation with ………." see options below, <u>then put one code in the relevant box</u> after the farmer answers*)

How satisfied are you with:	1: Very satisfied 2: Satisfied 3: Neutral 4: Unsatisfied 5: Very unsatisfied
a) The relation with your neighbours	
b) The relation with your family members	
c) The relation with the tea factory	
d) Knowledge on good tea management practice	
e) Leadership skills	
f) Access to information on agri commodity prices	
g) Access to self-help activities like Merry-go-rounds	
h) Diversification of income/ number of income sources	
i) Your homestead (house, access to water/electricity etc)	
j) Your families health	
k) Possibility to send children to school	
l) Family welfare	
m) Family income	

That was the last question in this questionnaire. Thank you very much for your time and effort to help us understand more about tea production. Is there anything else you would like to tell us or ask us?

Do you have any comments or questions?

....

....

....

....

....

....

Enumerator: please read through questionnaire to make sure no questions were left unanswered before leaving the farmer! (NO blanks are allowed.) Thank you!

3 Basic characteristics of respondents from the TESA-led FFS

Table 1

Basic characteristics of respondents from the TESA-led FFS

Group	Non-FFS				FFS				Total			
Characteristics	N	Mean	Median	Std. Deviation	N	Mean	Median	Std. Deviation	N	Mean	Median	Std. Deviation
Age	78	51.3	50.5	14.7	230	50.3	50.0	13.1	308	50.6	50.0	13.5
Year of education	78	8.3	8.0	4.0	230	8.7	8.0	3.3	308	8.6	8.0	3.5
Household size	78	5.6	5.0	5.4	230	5.6	5.0	2.7	308	5.6	5.0	3.6
Tea planting area (ha)	75	.35	.25	.55	218	.45	.25	.59	293	.42	.25	.58
Gender (% female)	78	47.4%			230	38.7%			308	40.9%		
Percentage RA-trained	78	28.2%			230	77.8%			308	65.2%		

4 Key performance indicators of respondents from TESA-led FFS

Table 2
Key performance indicators per year per group (2014)

| Group | Statistics | KPI (Year=2014) | | Number of bushes | Tea green leaf sold (kg) | Revenue from tea green leaf sales (Ksh) | Gross margin from tea production (Ksh) | Revenue from other income sources (Ksh) | Gross margin from other income sources (Ksh) |
		Knowledge score	Implementation score						
Non-FFS	N	78	78	75	75	75	75	78	78
	Mean	5.72	6.59	1597.1	2562.7	119682.0	88636.1	31739.7	17557.0
	Median	5.18	6.54	1075.0	2130.6	89057.0	66778.0	3000.0	0.0
	Std. Deviation	2.06	0.88	1588.9	2106.0	104023.8	87635.5	104639.7	49209.6
	min	2.62	4.48	304	8.4	346.08	-26162	0	-13200
	max	9.40	8.23	12000	10219	504307.6	491233.6	840000	332600
FFS	N	230	230	219	219	219	219	230	230
	Mean	6.61	7.34	2138.7	3245.8	140000.0	108278.4	120100.3	88596.3
	Median	6.42	7.39	1500.0	2053.3	91239.0	70384.8	30000.0	16450.0
	Std. Deviation	1.82	0.65	2085.4	4174.2	163361.6	143307.1	441139.0	428415.4
	min	2.90	5.27	299	3.9	160.68	-99410	0	-83000
	max	10.00	8.77	16700	32602	1238876	1228410	6170035	6117035
Total	N	308	308	294	294	294	294	308	308
	Mean	6.39	7.15	2000.6	3071.5	134816.9	103267.6	97723.3	70605.8
	Median	6.34	7.26	1417.5	2092.0	91159.9	69352.4	20000.0	11000.0
	Std. Deviation	1.92	0.79	1982.241	3764.7	150557.3	131503.8	386507.4	372118.7
	min	2.62	4.48	299	3.9	160.68	-99410	0	-83000
	max	10.00	8.77	16700	32602	1238876	1228410	6170035	6117035
Difference in mean* (FFS- Non-FFS)		**0.89**	**0.75**	**541.7**	683.0	20318.0	19642.3	88360.6	71039.3

*Differences in bold are statistically significant (p<0.05)

Table 3

Key performance indicators per year per group (2012)

Group	Statistics	KPI (Year=2012)					
		Knowledge score	Implementation score	Number of bushes	Tea green leaf sold (kg)	Revenue from tea green leaf sales (Ksh)	Gross margin from tea production (Ksh)
Non-FFS	N	127	127	125	125	124	123
	Mean	5.51	6.60	1818.2	2253.7	154116.3	130687.6
	Median	5.26	6.59	1500.0	1800.0	113000.0	94654.6
	Std. Deviation	1.32	0.67	1266.2	1876.5	130447.5	114848.4
	min	3.19	4.82	150	12	732	5634.027
	max	9.61	8.23	8000	11000	682000	610653.4
FFS	N	180	180	180	180	179	178
	Mean	5.93	6.94	2566.0	3101.9	210724.8	177230.0
	Median	5.72	6.88	2000.0	2500.0	175680.0	142108.9
	Std. Deviation	1.79	0.68	1974.8	2236.5	147730.9	126285.2
	min	2.40	5.36	300	300	23560	15571
	max	10.00	8.76	14000	12000	730000	623909
Total	N	307	307	305	305	303	301
	Mean	5.76	6.80	2259.5	2754.3	187558.3	158211.0
	Median	5.53	6.75	1800.0	2020.0	146400.0	125418.1
	Std. Deviation	1.62	0.70	1756.691	2134.5	143426.9	123687.1
	min	2.40	4.82	150	12	732	5634.027
	max	10.00	8.76	14000	12000	730000	623909
Difference in mean*							
(FFS- Non-FFS)		**0.42**	**0.34**	**747.75**	**848.20**	**56608.5**	**46542.4**

*Differences in bold are statistically significant (p<0.05)

Table 4

Key performance indicators per year per group (2010)

Group	Statistics	KPI (Year=2010)					
		Knowledge score	Implementation score	Number of bushes	Tea green leaf sold (kg)	Revenue from tea green leaf sales (Ksh)	Gross margin from tea production (Ksh)
Non-FFS	N	127	128	128	126	126	125
	Mean	4.83	5.79	1711.6	2134.7	88009.7	62775.0
	Median	4.64	5.82	1400.0	1500.0	62265.0	43665.0
	Std. Deviation	1.35	0.75	1288.8	2050.0	81668.4	63170.1
	min	2.04	4.15	150	240	9588	3760
	max	7.88	7.21	8000	14000	536200	426350
FFS	N	179	180	179	178	178	177
	Mean	4.87	5.98	2470.5	2997.0	120960.0	86097.7
	Median	4.49	6.02	2000.0	2500.0	98452.0	70100.0
	Std. Deviation	1.47	0.68	1937.1	2577.6	100500.5	75205.2
	min	2.04	4.37	250	130	4979	3250
	max	9.09	7.45	12600	17600	674080	517600
Total	N	306	308	307	304	304	302
	Mean	4.86	5.90	2154.1	2639.6	107303.0	76444.3
	Median	4.54	5.92	1760.0	2000.0	87552.0	61785.0
	Std. Deviation	1.42	0.71	1735.668	2407.5	94425.1	71297.7
	min	2.04	4.15	150	130	4979	3250
	max	9.09	7.45	12600	17600	674080	517600
Difference in mean*							
(FFS- Non-FFS)		0.04	**0.19**	758.9	862.3	32950.3	23322.7

*Differences in bold are statistically significant (p<0.05)

Table 5

Implementation score assigned to different answers to questions on sustainable practices

Question no.	Question on sustainable practices	Score to different answers				
		1	2	3	4	5
B1	How often pluck per month?	10	7	2	0	0
B2	Experience leaf spillage at farm or buying centre?	10	0	3	3	3
B3	Use plucking stick/ wand, table firm?	10	5	8	0	0
B4	Success rate your nursery?	10	5	0	5	0
B6	When plant VP plants?	5	10	0	0	0
B7	What is the % of crop cover?	10	8	4	0	0
B8	At what height do you prune?	10	0	0	0	0
B9	At what period do you prune	0	0	10	0	0
B10	How often do you prune same tea plot/block?	4	10	6	0	0
B11	What tools are used to prune your tea?	6	10	0	0	0
B12	Who prunes the tea and have they been trained?	0	10	0	10	0
B13	At what height do you tip in?	2	10	2	0	0
B14	How often apply composted manure t?	0	4	10	6	0
B15	How frequently do you apply fertilizer	10	0	0	0	0
B16	Do you keep records?	5	5	10	0	0
B17	Who plucks your tea?	8	10	0	5	0
B18	Do you have a fixed agreement with employees?	10	0	5	0	0
B19	Do your workers have access to potable water and latrines	5	5	10	0	0
B20	How often did your family or workers need medical attention	0	2	10	0	0
B21	Do you use any personal protective equipment (PPE)?	10	5	0	10	0
B22	Do you group together with others farmers to carry out activities	10	0	0	0	0
B23	Do you turn to KTDA if you experience any problems in your tea production?	10	0	0	0	0
B24	Do your children go to school?	5	0	8	10	0
B25	Do you collect prunings from the tea field?	10	5	0	0	0
B26	Do you infill open areas?	10	0	5	0	0
B27	When do you apply fertilizer to your tea?	10	0	0	0	0
B28	How do you spray?	0	10	2	10	0
B29	Does your farm border a river or water body?	5	0	8	10	0
B30	Do you have indigenous trees on you farm?	10	6	3	0	0
B31	How many eucalyptus trees grow within 10 meters from water?	0	2	4	10	5
B32	If your farm borders a water body, distance spray from water?	0	2	8	10	5
B33	How much area of the total farm is conservation area?	10	8	4	0	0
B34	What is your main source of energy for domestic purposes?	10	5	0	4	0
B35	What is your main source of water for domestic use?	4	5	10	0	0
B36	How do you manage household waste water and effluent from livestock?	10	8	5	0	0
B37	How do you mange household solid waste?	0	4	8	10	0
B38	Waste is collected and taken elsewhere for recycling?	10	7	1	2	0

Table 6

Changes in implementation scores for sustainable practices

No.	Indicators are grouped into 'profit' (yellow), 'people' (blue), and 'planet'(green)	Difference in Difference (FFS vs. Non FSS) *=significant at 0.05 level	Differences (2014-2012)	
			Non-FSS	FFS
B13	At what height do you tip in?	2.30*	-1.3	1.00
B16	Do you keep records?	2.29*	-0.65	1.64
B3	Use plucking stick/ wand, table firm?	1.68*	-0.38	1.30
B1	How often pluck per month?	1.31*	-1.19	0.12
B14	How often apply composted manure t?	1.29*	-0.54	0.75
B8	At what height do you prune?	0.75	0.26	1.01
B15	How frequently do you apply fertiliser	0.58	0.64	1.22
B11	What tools are used to prune your tea?	0.52*	-0.38	0.14
B7	What is the % of crop cover?	0.42	1.27	1.69
B12	Who prunes the tea and have they been trained?	0.02	0.77	0.79
B2	Experience leaf spillage at farm or buying centre?	0.00	0.33	0.33
B10	How often do you prune same tea plot/block?	-0.15	0.54	0.39
B4	Success rate of your nursery?	-0.32	0.71	0.39
B6	When plant VP plants?	-0.75*	0.71	-0.04
B9	At what period do you prune	-2.05*	2.44	0.39
B23	Do you turn to KTDA if you experience any problems in your tea production?	1.93*	-0.95	0.98
B19	Do your workers have access to potable water and latrines	1.10*	0.16	1.26
B21	Do you use any personal protective equipment (PPE)?	0.93	1.67	2.60
B27	When do you apply fertiliser to your tea?	0.57	0.00	0.57
B17	Who plucks your tea?	0.55	-0.72	-0.17
B25	Do you collect prunings from the tea field?	0.52	-0.13	0.39
B24	Do your children go to school?	0.50	-0.09	0.41
B22	Do you group together with others farmers to carry out activities	0.23	1.56	1.79
B28	How do you spray?	0.20	0.51	0.71
B20	How often did your family or workers need medical attention	-0.30	-0.72	-1.02
B26	Do you infill open areas?	-1.04	1.54	0.50
B18	Do you have a fixed agreement with employees?	-1.25*	-6.36	-7.61
B36	How do you manage household waste water and effluent from livestock?	2.27*	-0.11	2.16
B38	Waste is collected and taken elsewhere for recycling?	1.94*	-2.54	-0.60
B37	How do you mange household solid waste?	1.67*	-0.31	1.36
B34	What is your main source of energy for domestic purposes?	1.52	-0.33	1.19
B32	If your farm borders a water body, distance spray from water?	1.16	-1.13	0.03
B30	Do you have indigenous trees on you farm?	0.70	-0.09	0.61
B33	How much area of the total farm is conservation area?	0.58	0.22	0.80
B29	Does your farm border a river or water body?	0.04	1.08	1.12
B35	What is your main source of water for domestic use?	-0.09	0.03	-0.06
B31	How many eucalyptus trees grow within 10 metres from water?	-1.16*	1.57	0.41

Table 7

Impact of FFS participation on knowledge score and implementation score

Treatment variables and covariates	Regression outputs						
Logistic regression					Number of obs	=	308
					LR chi2(7)	=	101.02
					Prob > chi2	=	0
Log likelihood = -123.77876					Pseudo R2	=	0.2898

Treatment variable	Variable name in dataset						
Whether had FFS training (1= yes; 0= No)	dm_ffs	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Covariates used for PSM							
age	a4_age	0.0118145	0.014181	0.83	0.41	-0.0159805	0.039609
years of education	a4_edu	-0.0191967	0.053804	-0.36	0.72	-0.124651	0.086258
gender (1= male; 0= female)	a4_sex	0.1077675	0.335738	0.32	0.75	-0.5502673	0.765802
household size	a5	0.0287918	0.040365	0.71	0.48	-0.050323	0.107907
region (1=East of Rift Valley; 0= West of Rift Valley)	region1	-0.6307424	0.3713	-1.70	0.09	-1.358476	0.096991
whether had RA-training (1= yes; 0= No)	dm_ra	2.021678	0.332468	6.08	0.00	1.370054	2.673303
whether had non-certification training (1= yes; 0= No)	a15b	2.294422	0.396254	5.79	0.00	1.517779	3.071066
Constant	_cons	-2.036177	1.084656	-1.88	0.06	-4.162063	0.089709

Outcome variable					
Sample	Treated	Controls	Difference	S.E.	T-stat
knowledge					
Unmatched	6.61159417	5.71965807	.891936098	.246841891	3.61
ATT	6.6022319	5.85398933	.748242563	.444336788	1.68
implementation					
Unmatched	7.33967224	6.59134107	.748331162	.094097264	7.95
ATT	7.37759795	6.88417669	.453421262	.189868804	2.39

Table 8

Regression analysis on the changes in knowledge

Dependent and explanatory variables

Source	SS	df	MS	Regression outputs		
Model	992.4409	4	248.11022	Number of obs	=	612
Residual	1570.537	607	2.587376	Prob > F	=	0
				R-squared	=	0.3872
Total	2562.978	611	4.1947269	Root MSE	=	1.6085

Change in knowledge score	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Length of participation in FFS (1=3-4 years; 2=1-2 years; 3= never participated)	-0.53983	0.090956	-5.94	0.00	-0.7184548	-0.3612028
Whether participated in RA training (1 = yes; 0= No)	0.456768	0.144134	3.17	0.00	0.173705	0.7398302
Whether West of Rift Valley (1= yes; 0= No)	-0.98236	0.139015	-7.07	0.00	-1.255373	-0.7093535
Implementation score in previous year	-0.73229	0.041231	-17.76	0.00	-0.8132653	-0.6513194
Constant	5.771858	0.303645	19.01	0.00	5.175536	6.36818

Table 9

Regression analysis on the changes in implementation

Dependent and explanatory variables				Regression outputs		
Source	SS	df	MS	Number of obs	=	307
Model	165.3526	5	33.070529	Prob > F	=	0
Residual	104.2627	301	0.3463877	R-squared	=	0.6133
Total	269.6153	306	0.8810959	Root MSE	=	0.58855
Change in implementation score (2014-2012)	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Length of participation in FFS (1=3-4 years; 2=1-2 years; 3= never participated)	-0.18513	0.05545	-3.34	0.00	-0.2942469	-0.0760084
Whether participated in RA training (1 = yes; 0= No)	0.326858	0.075485	4.33	0.00	0.1783124	0.4754037
Whether West of Rift Valley (1 = yes; 0= No)	-0.52899	0.070273	-7.53	0.00	-0.6672772	-0.3907016
Implementation score in previous year	-0.96065	0.050641	-18.97	0.00	-1.060306	-0.8609951
Whether had non-certification training	0.567236	0.101836	5.57	0.00	0.3668365	0.767636
Constant	6.79393	0.402181	16.89	0.00	6.002486	7.585373

Table 10

Panel data estimation of impact of FFS on green leaf yield per bush

Regression model	Regression outputs
Cross-sectional time-series FGLS regression	
Coefficients: generalised least squares	
Panels: heteroskedastic	
Correlation: common AR(1) coefficient for all panels (-1.6492)	

Estimated covariances	= 288	Number of obs	= 576
Estimated autocorrelations	= 1	Number of groups	= 288
Estimated coefficients	= 3	Time periods	= 2
		Wald chi2(2)	= 86883.01
		Prob > chi2	= 0

Dependent and explanatory variables

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Kilograms of tea green leaf sold						
Number of bushes	0.883443	0.0088908	99.37	0.000	0.866017	0.900868
Number of bushes (with participation in FFS)	0.162823	0.0087908	18.52	0.000	0.145593	0.180052
Constant	713.2272	5.463416	130.55	0.000	702.5191	723.9353

Table 11

Comparison of changes in key profitability parameters

Profitability parameters	Changes among FFS and Non FFS (2014- 2012)		% bias	t	p>t
	FFS	Non FFS			
Total revenue from tea green leaf sold	-18863	-16338	-2.9	-0.20	0.84
Tea green leaf production (kg)	445.74	-64.085	18	1.19	0.236
Number of tea bushes	-248.1	-354.15	5.8	0.41	0.68
Fertiliser use per bush	0.00047	-0.00312	3.6	0.29	0.771
Hired labour costs	2.519	10.886	-21.9	-2.23	**0.027**
Cost of PPE	-727.19	-783.35	2.7	0.14	0.89
Number of other income sources	-0.11354	-0.75641	41.6	3.24	**0.001**

6 Basic characteristics of respondents from the farmer-led FFS

Table 12

Comparison of changes in key profitability parameters

Statistics	Non FFS				FFS				Total			
	N	Mean	Median	Std. Deviation	N	Mean	Median	Std. Deviation	N	Mean	Median	Std. Deviation
Age	138	53.5	51.5	13.0	102	56.5	57.5	13.9	240	54.8	54.5	13.4
Year of education	138	7.6	7.0	3.6	102	8.1	8.0	3.6	240	8	8	4
Household size	138	5	5	2	102	6	6	3	240	6	5	3
Number of tea bushes	138	1465	1036	1262	102	1545	1299	1068	240	1499	1181	1182
Kilograms of green leaf sold	135	1603	971	1859	99	1778	1346	2245	234	1677	1217	2028
Gender (% female)	138	49.2%			102	52.9%			240	50.8%		
Percentage RA-trained	138	26.8%			102	72.5%			240	46.2%		

7 Key performance indicators in baseline situation from the farmer-led FFS

Table 13

Basic cost-benefit model for analysing profitability of tea production

Profitability analysis				
Revenue (Ksh)	117,000	Parameters in grey cells (can be changed)		
		Calculated values in blue cells		
Costs (Ksh)	26,464			
Gross margin (Revenue–Costs) (Ksh)	90,536			
Revenue–Costs (USD)	1,065			
Gross margin per capita per day (USD)	2.9			
Exchange rate (Ksh/USD)	85			
Farm business model	**Parameters**	**Revenue**		**Costs**
		(Ksh)		(Ksh)
		117,000		26,464
Income from other sources				
Total income			0	
Total costs				0
Farm characteristics				
Number of tea bushes	2000			
Farm land (acre)	5			
Household size (number of people)	1.3			
Yield (kg green leaf/bush)	0.4			
Proportion of pruning				
Tea revenue	**117,000**	**117,000**		
Green leaf production (kg/bush)	2,600			
Price green leaf	14			
Bonus green leaf	31			
Tea production costs				
Labour input				
Plucking (1=hired labour, 0=own)	1			
Weeding (number of days)	10			
Pruning (number of bushes)	800			

Applying fertiliser (number of bags)	2.8	
Labour wage		
Plucking (ksh/kg)	6	
Weeding (ksh/day)	180	
Pruning (ksh/bush)	3	
Applying fertiliser (ksh/bag)	80	
Labour costs	**20024**	
Plucking (ksh/kg)	15600	15600
Weeding (ksh/day)	1800	1800
Pruning (ksh/bush)	2400	2400
Applying fertiliser (ksh/bag)	224	224
Material costs	**6440**	
Fertiliser costs (ksh)	6440	6440
Fertiliser price (ksh/bag)	2300	
Fertiliser use (kg/bush)	0.07	
Total fertiliser use (bags)	2.8	
Chemicals costs	0	0
price (ksh/kg)		
quantity(kg)		
Organic fertiliser	0	0
price (ksh/kg)		
quantity(kg)		
Planting materials	0	0
price (ksh/kg)		
quantity(kg)		
Other costs	0	
PPE		0
Other		0

Table 14
Input use and costs in the baseline situation (1)

Statistics	Group	Labour costs				Labour input		
		Plucking (Ksh/kg)	Weeding (Ksh/day)	Pruning (Ksh/bush)	Applying fertiliser (Ksh/bag)	Weeding days	Bushes pruned	Bags applied
	Non FFS							
N		138	138	138	138	136	138	138
Mean		5.05	77.72	1.80	31.31	4.82	736.20	2.49
Median		7	0	2	0	3	475	2
sd		4.01	92.59	1.70	59.37	4.37	1247.34	2.00
min		0	0	0	0	0	0	0
max		15	350	6	200	30	13500	12
	FFS							
N		102	102	102	102	101	102	101
Mean		5.03	80.59	2.24	49.51	4.86	1059.20	2.76
Median		7	100	2	0	4	700	2
sd		3.81	85.06	1.78	68.03	4.43	1531.34	2.05
min		0	0	0	0	0	0	0
max		10	300	8	200	30	13001	15
	Total							
N		240	240	240	240	237	240	239
Mean		5.04	78.94	1.98	39.05	4.84	873.47	2.61
Median		7	0	2	0	3	500	2
sd		3.91	89.30	1.74	63.70	4.39	1381.46	2.02
min		0	0	0	0	0	0	0
max		15	350	8	200	30	13500	15
Difference (FFS- Non-FFS)		-0.02	2.87	0.44	18.20	0.04	**323.00**	0.27

Table 15
Input use and costs in the baseline situation (2)

Statistics	Group	Fertiliser			Organic fertiliser			Chemicals		Planting	
		Bags	Price (Ksh/bag)	Number of bushes	Bags	Price (Ksh/bag)	Number of bushes	Quantity	Price (Ksh/bag)	Quantity	Price
	Non FFS										
N		138	137	137	136	73	73	138	4	138	138
Mean		2.49	2256.6	1643.9	15.1	953.8	855	0.02	475	0.21	0.21
Median		2	2200	1200	1	0	723	0	350	0	0
sd		1.86	164.3	1607.7	86.8	2822.1	608	0.13	287.2	2.55	2.55
min		0	2000	200	0	0	0	0	300	0	0
max		12	3500	13500	1000	15000	2500	1	900	30	30
	FFS										
N		102	102	102	101	48	48	102	10	102	102
Mean		2.90	2262.3	2104.2	11.2	1245.2	1131	1.06	555.0	0.39	0.00
Median		2	2262	1500	0	0	950	0	400	0	0
sd		2.09	174.3	3113.4	60.0	3703.6	774	9.90	375.2	3.96	0.00
min		1	2000	500	0	0	0	0	250	0	0
max		15	3500	30000	600	19000	3600	100	1200	40	0
	Total										
N		240	239	239	237	121	121	240	14	240	240
Mean		2.66	2259.1	1840.3	13.5	1069.4	964	0.46	532.1	0.29	0.13
Median		2	2250	1396	0	0	800	0	400	0	0
sd		1.97	168.3	2375.4	76.4	3189.3	689	6.46	343.4	3.22	1.94
min		0	2000	200	0	0	0	0	250	0	0
max		15	3500	30000	1000	19000	3600	100	1200	40	30
Difference (FFS- Non-FFS)		0.42	5.69	460.3	-3.96	291.44	275.89	0	80.00	0.17	-0.22

8 Regression outputs baseline situation of farmer-led FFS

8.1 Propensity Score Matching (PSM)

The covariates used are the respondents' age (a4_age), years of education had (a4_edu), gender (a4_sex), farm size in hectare (ha_fact) and household size(a5). A number of dummy variables are also included to represent whether the household is from the east of Rift Valley (region1), had other non-certification trainings (a15b), had RA-training (dm_ra). The outputs of the logic regression are shown below.

Table 16
Outputs of the logic regression

Treatment variables and covariates	Regression outputs							
	Logistic regression			Number of obs		=		238
				LR chi2(8)		=		68.26
				Prob > chi2		=		0
				Pseudo R2		=		0.21
	Log likelihood = -128.40015							
	variable name in dataset							
Treatment variable								
Whether had FFS training (1= yes; 0= No)	dm_ffs	Coef.	Std. Err.	z	P>z	[95% Conf.		Interval]
Covariates								
age	a4_age	0.0056955	0.015946	0.36	0.72	-0.0255573		0.036948
years of education	a4_edu	0.0139842	0.051956	0.27	0.79	-0.0878483		0.115817
gender (1= male; 0= female)	a4_sex	-0.5535804	0.343791	-1.61	0.11	-1.227399		0.120238
farm size (hectare)	ha_fact	0.4199396	0.284152	1.48	0.14	-0.1369873		0.976867
household size	a5	-0.0104036	0.066442	-0.16	0.88	-0.1406271		0.11982
region (1=East of Rift Valley; 0= West of Rift Valley)	region1	-0.4382225	0.382099	-1.15	0.25	-1.187122		0.310677
whether had RA-training (1= yes; 0= No)	a15b	1.009884	0.332553	3.04	0.00	0.3580922		1.661675
whether had non-certification training (1= yes; 0= No)	dm_ra	1.785564	0.318074	5.61	0.00	1.162151		2.408978
Constant	_cons	-1.998846	1.242453	-1.61	0.11	-4.43401		0.436317

8.2 Balancing test of covariates before and after matching

Table 17

Balancing test of covariates before and after matching

Variable	Unmatched/Matched	Mean		%bias	% bias reduction	t-test	
		Treated	Control			t	p>t
a4_age	Unmatched	56.49	53.581	21.8		1.67	0.096
	Matched	56.49	59.118	-19.7	9.7	-1.54	0.125
a4_edu	Unmatched	8.1176	7.6471	13.2		1.01	0.316
	Matched	8.1176	7.3725	20.8	-58.3	1.51	0.132
a4_sex	Unmatched	0.47059	0.51471	-8.8		-0.67	0.503
	Matched	0.47059	0.48039	-2	77.8	-0.14	0.889
ha_fact	Unmatched	0.80453	0.6678	24.6		1.88	0.061
	Matched	0.80453	0.86877	-11.6	53	-0.66	0.508
a5	Unmatched	6.1275	5.3971	28.9		2.24	0.026
	Matched	6.1275	5.6961	17.1	40.9	1.28	0.203
region1	Unmatched	0.41176	0.55882	-29.6		-2.26	0.025
	Matched	0.41176	0.56863	-31.6	-6.7	-2.26	0.025
a15b	Unmatched	0.78431	0.47059	68.3		5.15	0.00
	Matched	0.78431	0.89216	-23.5	65.6	-2.1	0.037
dm_ra	Unmatched	0.72549	0.27206	101.3		7.74	0.00
	Matched	0.72549	0.67647	11	89.2	0.76	0.447

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