



**LAND AND SOIL EXPERIMENTAL
RESEARCH (LASER)
2013**



Central Statistical Agency of Ethiopia – World Bank – World Agroforestry Centre

ENUMERATOR MANUAL

Post-Planting – Crop-Cutting

August 2013

Table of Contents

- INTRODUCTION 3**
- METHODOLOGIES..... 3
- SAMPLE OVERVIEW..... 4
- FIELDWORK ORGANIZATION 4
- FILES AND FORMS..... 5
- ENUMERATOR DUTIES & GUIDELINES 6
- SUPERVISOR DUTIES 7
- EQUIPMENT LIST 7
- USING CAPI..... 8
- CONCEPTS AND MAIN DEFINITIONS..... 8
- QUESTION TYPES 9
- WHEN PROBLEMS ARISE... 11
- POST-PLANTING QUESTIONNAIRE 12**
- COVER 12
- PP1. HOUSEHOLD MEMBER ROSTER..... 13
- PP2. ASSETS 14
- PP3: LIVESTOCK 14
- PP4. PARCEL ROSTER 14
- PP5. FIELD ROSTER 15
- PP6. FIELD DETAILS..... 16
- PP7. CROP DETAILS 19
- PP8. FIELD SELECTION 20
- PP9. IN-FIELD MEASUREMENT..... 24
- COMPASS AND ROPE AREA MEASUREMENT..... 24*
- GPS AREA MEASUREMENT AND COORDINATES..... 27*
- CLINOMETER..... 30*
- CROP CUTTING..... 31*
- SOIL SAMPLING – See Annex III..... 34*
- Detailed Question Instructions 34*
- CROP-CUTTING FORM 38**
- ANNEX I: EDUCATION CODES..... 40**
- ANNEX II: CROP CODES..... 41**
- ANNEX III: SOIL SAMPLING INSTRUCTIONS 42**
- ANNEX IV: ALTERNATIVE DEVICE AREA MEASUREMENT 43**
- ANNEX V: FIGURE A 45**

Introduction

The Central Statistical Agency of Ethiopia, The World Bank, and the World Agroforestry Centre (ICRAF) have partnered to execute this methodological validation project.

Land holdings and soil quality are critical inputs in agriculture. Measuring these components, therefore, is essential in properly estimating the factors that both promote and hinder agricultural productivity. It is also critical to assess the accuracy of the key output variable, crop production, in order to validate the methodologies used to collect harvest data as well as analyze the impact of various input measurements on yield estimates. By measuring these components using a variety of methods we can identify the implications of using each and move forward with the superior methods in future household surveys administered by the Central Statistical Agency and agencies worldwide.

By working with a small number of highly trained and well-supervised enumerators, we aim to minimize enumerator error and variation and focus strictly on the methodologies. The success of this project is dependent on the dedication of all team members, including the enumerators, supervisors, and head office staff. The dedication and effort of the enumerators is especially important, as they will be the face of the project, surveying households and conducting the measurements.

Methodologies

This project will test a number of different methods for measuring land area and slope, soil fertility, and crop production. The questionnaires will be administered through Computer Assisted Personal Interviewing (CAPI). The methodologies included in this project are:

Land Area and Slope:

- GPS
- Compass and rope (also known as traversing)
- Farmer-estimated area
- Clinometer for slope
- Farmer-estimated slope

Soil Fertility:

- Spectral Analysis (conducted at ICRAF lab in Nairobi)
- Conventional Analysis (conducted at ICRAF lab in Nairobi)
- Farmer estimated fertility

Crop Production:

- Crop-cutting on 2m x 2m area
- Crop-cutting on 4m x 4m area
- Weighing with analog scale
- Weighing with digital scale
- Farmer estimated production

Sample overview

The sample is made up of 85 enumeration areas (EAs) with 12 households each, for a total of 1020 households. The 85 EAs have been randomly selected from the EAs in which the Agricultural Sample Survey (AgSS) is administered (but this project will not be administered to the same households).

Because this is a methodological validation experiment, and not aimed at collecting nationally representative data, we have restricted the geographic coverage to three administrative zones in Oromia: East Wellega, West Arsi, and Borena. These administrative zones have been selected based primarily on agroecology and geographic diversity. Secondary consideration was made for the availability of local soil research centers that can be used for soil processing.

Up to 2 plots will be selected for objective measurement testing per household. First, if any plots contain pure stand maize, one will be randomly selected. Then, a second plot will be randomly selected from the remaining plots. If no plots contain pure stand maize, two plots will be randomly selected. Only those plots with pure stand maize will be subject to crop cutting.

The breakdown of EAs is as follows:

Zone	# Dega	# W. Dega	# Kolla	Total EAs
East Wellega	0	17	11	28
West Arsi	14	14	0	28
Borena	0	13	16	29
	14	44	27	85

Fieldwork organization

There will be 5 separate field teams, each with 3 enumerators, one supervisor and one driver. These teams will move from EA to EA interviewing households and conducting the measurements. Each team will be assigned to specific EAs. Within the EA, the enumerators will separate and each interview different households. Each enumerator may hire a local guide in each EA to assist with the measurements.

Each household will need to be visited more than one time. In fact, depending on the area and the timing of harvest, each house may be visited up to 4 times. The visits are as follows:

The **first visit** will take place in September or October, after the crops have been planted. During this visit, the enumerator will administer the post-planting questionnaire, conduct the in-field measurements (including GPS, compass and rope, and clinometer), collect soil samples, and set the area for crop-cutting.

It is important that the household be visited BEFORE the maize harvest in order to properly prepare for crop-cutting.

The team will return to the household for the **second visit** when the maize is ready to be harvested. The kebele officer will alert the supervisor when the field is ready. At this time, the enumerator will harvest the crop from the crop-cutting area and take the fresh weight. The enumerator will need to dry the maize until the weight is steady from one day to the next and then take the dry weight and return the crop to the household. Please

note, the timing of the crop-cutting visits will be different for every EA because it depends on the crop cycle. The team will need to be prepared to move whenever the crop is ready for harvest.

The **last visit** will take place in January or February, after the refresher training in early January. This visit will occur after all or most of the crops have been harvested. During this visit the enumerator will administer the post-harvest questionnaire.

The general timeline is as follows:

Fieldwork Training: August 21 – September 7, 2013
Post-Planting Fieldwork: September 12 – November 15, 2013
Crop-Cutting Activities: October - December 2013
Post-Harvest Training: January 8-10, 2014
Post-Harvest Fieldwork: January 13 – February 7, 2014

Files and forms

The data will be collected via computer assisted personal interviewing. That means, the questionnaires and forms will be electronic and the enumerators will enter the responses and measurements on the computer tablet. There will be three primary computer applications: Post-planting questionnaire, crop-cutting form, and post-harvest questionnaire. There will also be an Excel program which enumerators will use to calculate the compass and rope area measurement. The supervisor will have a paper form called the Master Household Selection Form which will be used to keep track of the status of the households. The enumerators will use the paper Enumerator Household List Form to keep to keep track of the households they are responsible for.

- **Master Household Selection Form:** This paper form will be used by the supervisor to document the random selection of households and provide the household IDs for each enumeration area. This form will be completed for each EA and will be submitted to head office upon completion of fieldwork. The supervisor will conduct the household selection and fill out the information on the master household selection form. Each enumerator will then copy the information onto their enumerator household list form so they have a copy for themselves. The supervisor will update his/her form at the end of each day so they have a master version with the status of each household. This master version will be submitted to head office upon completion of fieldwork.
- **Enumerator Household List Form:** The enumerators will use this form to track the progress of the households they are assigned to. It will also include the random number tables which will be used for field selection and crop-cutting. The enumerator will copy the household ID and head of household name from the supervisor's Master Household Selection Form. This form will be submitted to head office upon completion of fieldwork.
- **Post-Planting Questionnaire:** This questionnaire will be administered on the CAPI tablet. It includes questions on household make-up, education, etc. as well as questions on the agricultural holdings of the household. Part of the post-planting questionnaire is the in-field measurement which will be completed by the enumerator. This will include area measurement and soil collection on two fields as well as the demarcation of crop-cutting areas.
- **Crop-Cutting Form:** This form is also administered on the CAPI tablet. This form will be used when you conduct crop-cutting to record the date of harvest and the weight of the crop. You will access this form

at two separate times, once when the crop is harvested and weighed fresh, and another time when the crop is weighed dry.

- **Post-Harvest Questionnaire:** This questionnaire will also be administered on the CAPI tablet. This questionnaire is asked to households in the final visit, after all crops have been harvested. In this questionnaire we ask about the farmer's estimate of harvest for all of the household's crops.
- Excel program for compass and rope

Enumerator Duties & Guidelines

The duties of the enumerators are detailed throughout this manual. It is critical that the enumerator collect the necessary data accurately, as the entire outcome of the research project will hinge upon the way the enumerator fulfills his/her responsibilities.

General enumerator duties include:

- Administration of post-planting, crop-cutting, and post-harvest questionnaires
- Objective measurements, including land area, slope and crop-cutting
- Collection of soil samples
- Communication of any problems to team supervisor

In order to successfully complete their duties, enumerators should conduct their work according to the following **guidelines:**

- The enumerator must follow instructions step-by-step to successfully accomplish their tasks.
- During the interview the enumerator should behave professionally and formally in accordance with the important work he/she performs.
- The enumerator should visit households in decent and professional outfit, bearing in mind that this is an important aspect of ensuring cooperation from the household and good quality data.
- The enumerator must remember that his/her role is to ask questions, whereas the respondent's role is to answer them. Therefore, s/he must not offer suggestions to the respondent. Nor should the enumerator express annoyance or any other reaction in response to the answers given by the respondent, as this may bias the data collected.
- The enumerator should do their best to earn the maximum cooperation of the interviewed households by explaining that the research is for the benefit of the country. If a household continues to refuse to participate in the survey, the enumerator should report this to the supervisor. The enumerator should fill in the household identification information as done for other households.
- If the enumerator encounters any problem, he/she should petition help from their supervisor. It is important to remember that by collaborating in this way with the supervisor, the best data will be obtained.
- For the various tasks to be performed for each household, enumerators will be given equipment such as compasses and GPS units, which are the property of the Central Statistical Agency. Enumerators must ensure that the tools are maintained and kept carefully, as they cannot be obtained easily and there will not be excess tools issued for those that are destroyed.
- The enumerator should visit the household as many times as necessary, in order to find direct respondent, to correct inaccurate information or to complete incomplete information. **REMEMBER:** the interviewer is obliged to make him/herself fully available for work, thus he/she must be available for

carrying out the survey tasks at any time the respondent specifies as the most convenient for him/her: weekend, holidays, evenings, etc.

- The work of the interviewer cannot be transferred to anybody else. In other words, no one else can do the interviewer's work.
- No one involved in the survey (interviewer & supervisor) can be engaged in any other job during the survey. Work on the survey is a full-time job throughout the duration of the survey.
- The interviewer must not disclose, repeat or comment on any information obtained from the respondent, nor show filled or completed questionnaires to any other person but his/her supervisor or other project staff. Remember that information given by the respondent is **confidential**.
- Do not bring anybody who is not a team member to any interviews with respondents.
- Do not pressure respondents nor entice them to answer by making false promises or offers.
- All collected information must be handed over to the supervisor without any amendments such as changing, adding or erasing information.

Supervisor Duties

Each team will have one supervisor who will travel with the team at all times. The supervisor will be the overall coordinator and supervisor for the fieldwork. He/she is responsible for ensuring the team is completing all duties in a timely and high-quality manner. If the enumerators have any problems or need assistance, they will report to the supervisor. The supervisor will be responsible for completing many activities, including:

- Coordination of fieldwork within assigned EAs
- Supervision of questionnaire administration and measurements, including spot checking some questionnaires with the household and repeating some measurements
- Coordination of transportation of soil samples to laboratory
- Household listing in each EA
- Communicate with kebele officers about the timing of crop-cutting
- Transmission of data to head office
- Communication with head office

The supervisor duties are explained in detail in the Supervisor Manual.

Equipment list

Each enumerator should be equipped with the following materials:

- 1 CAPI tablet
- 1 Android tablet (some enumerators)
- 1 Garmin eTrex30 GPS unit (with batteries)
- 1 Suunto MC-2G compass with built-in clinometer
- 3 ranging poles
- 30m of rope per household
- 1 analog scale
- 1 digital scale (with batteries)
- Bags for weighing crop
- 1 soil sampling kit (auger, buckets, plastic bags, labels, mixing trowel, sampling plate, ruler, marker)
- 1 HH Listing Form for each EA in designated area
- Scratch paper for area measurement
- Figure A

- Notebook & pencil

Each supervisor should be equipped with the following materials:

- 1 CAPI tablet
- 1 internet dongle (with airtime)
- 1 USB flash drive
- 1 Garmin eTrex30 GPS unit (with batteries)
- 1 Suunto MC-2G compass with built-in clinometer
- 1 Master HH Listing Form for each EA in designated area
- Spare batteries (or allowance)
- EA Maps

Using CAPI

Using computer assisted personal interviewing (CAPI) has advantages but field teams need to be aware of possible problems. It is critical that the CAPI tablets are charged at all times. The tablets will be charged with vehicle chargers so whenever possible, the tablets should be plugged in. It is also possible for the tablets to get viruses, just like a computer. It is critical that the USB drive that is used to provide the supervisor with the data is only used on the CAPI tablets and is never used on another computer. The USB may only contain the project data.

It is critical that the CAPI tablets are always charged and protected from viruses. Never use the USB drive for anything but data sharing.

Concepts and Main Definitions

In order to manage the survey properly, a list of key terms have been established, which should help enumerators in carrying out their work.

- **Household** is social unit consisting of one or more persons who use joint accommodation and food. In other words, a household is a group of people who normally live in the same household unit (“live under the same roof”), who are or are not related and who eat together (“eat from the same pot”).
- **Head of the household:** is a person defined as such for the purpose of the survey, irrespective of reason (the oldest by age, decision maker in the household, a person who earns the most income, based on tradition, etc.).
- **Guest:** a person who uses joint accommodation and food free of charge together with household members. A guest who stays longer than six months is considered a household member.
- **Tenant of the household:** a person who pays for accommodation in a part of a household. This person is not a member of the household whether he/she eats with or without the household. Such tenant is considered a separate household.

- **Household members:** Anybody who meets the following criteria:

Members	Non-members
<ul style="list-style-type: none"> • A household member present at the moment of interview, if that is the place where he/she spent at least 6 months of the previous 12 months. • Person absent at the moment of interview, if he/she is absent less than six months during the previous 12 months. • Guests or other persons who live in the household longer than six months during the previous 12 months. • Newborn babies irrespective of duration of their stay in the household 	<ul style="list-style-type: none"> • Person absent from the household longer than 6 months (including ones serving military service, in prison, religious service, etc.) • Students who are absent longer than six months. • Those who live elsewhere, visitors or tourists who are in the household less than six months. • Tenants who eat and who do not eat with the household. • Those who eat in the household but live elsewhere or live in the household but eat elsewhere. • Similar to tenants, students who pay for accommodation and food to the household.

- **Parcel:** A parcel is a contiguous piece of land with identical (uniform) tenure and physical characteristics. It is entirely surrounded by land with other tenure and/or physical characteristics or infrastructure e.g. water, a road, forest, etc. A parcel can have one or more cultivated or uncultivated fields.
- **Field:** A field is defined as a contiguous piece of land within a parcel on which a specific crop or a crop mixture is grown. A parcel may be made up of one or more fields.

Question Types

All of the questions are written as they are to be read to the respondents. Enumerators should not ask the questions according to their own criteria, except in situations where the respondent does not understand the question. In such situations, you must explain the content without changing the meaning of the question. This is important to ensure that all respondents are answering the same questions.

There are different question formats:

- **Closed questions:** for this type of question the possible responses are coded. Only the code (number) for the respondent's answer will be entered. The enumerator must read the question exactly as it appears in the questionnaire.
- **Open questions:** for this type of question, the interviewer reads only question text and then enters answer *exactly* as given by the respondent. For such questions there are no coded answers, and the interviewer enters either words or numbers depending on the question and answer. "Respondent's name" is an example of open question where the interviewer enters words.
- **'Other' responses.** If the respondent says 'other' as his/her response to a closed question, you should record the code provided for 'other' for that question, and then write the specific response next to the number.

- **Instruction for enumerator:** these are printed in CAPITAL letters, which facilitates survey implementation. Questions that are in all CAPITAL letters should not be read to the respondent, they are for the enumerator only. In the Amharic version, the instructions are in **bold**. In the CAPI application, the instructions will appear in a different color than the question.
- **Brackets and capital letters:** it means that the interviewer has to replace the word in the brackets by another word, when he/she asks the question. In certain sections of the questionnaire, the word “name” is often written in brackets [NAME]. In such cases this word should be replaced by actual name of the person interviewed at that moment. This will be completed automatically in the CAPI program.
- **Skip patterns:** Questions are normally asked in order one after another. However, in some cases given answer defines which question to ask next, or which question is to be skipped. Paper questionnaires use certain marks which show which question is to be skipped. In the CAPI tablet, the skips will be automatic. An example of a skip is shown below. In this question, if the response is “2”, the enumerator skips to question 29 and asks question 29. If the response is “1”, the enumerator continues with the next question because the skip is only for response “2”.

3.	4.	3.	4.
Did [NAME] ever go to school?	At what age did [NAME] start school?	Did [NAME] ever go to school?	At what age did [NAME] start school?
YES . . 1		YES . . 1	
NO . . . 2		NO . . . 2	
(▶29)	AGE	(▶29)	AGE
1	7	2	

- **Zero response:** Responses that require a monetary figure have to be filled with ‘0’ if there was no amount used for the particular question. In the following example from Tanzania, the respondent says that he was not charged for being taken to the spiritual services or when taken to the witchdoctor. The correct method of recording is to put “0”, as in the first example. It is incorrect to leave the box blank, as in the second example.

CORRECT	INCORRECT	
15. What w as the total cost of [NAME]'s stay(s) at the traditional healer or faith healer? INCLUDE ESTIMATED VALUE OF ANY IN-KIND PAYMENTS. TSHS	15. What w as the total cost of [NAME]'s stay(s) at the traditional healer or faith healer? INCLUDE ESTIMATED VALUE OF ANY IN-KIND PAYMENTS. TSHS	15. What w as the total cost of [NAME]'s stay(s) at the traditional healer or faith healer? INCLUDE ESTIMATED VALUE OF ANY IN-KIND PAYMENTS. TSHS
0		--

It is never permissible to leave a question blank that is not intended to be blank from the skip patterns. If the respondent does not know, probe to get the necessary information. If after probing the respondent still does not know, indicate '99' on the questionnaire instead of leaving it blank. Note, '99' answers cannot be used in the analysis, so every effort should be made to minimize the incidence of these responses.

The questionnaires are to be filled in order question by question, except in case of special instruction, everybody is to be asked question 1, then question 2, 3 etc.

When problems arise...

Communicate with your supervisor or head office. Unforeseen issues will arise during fieldwork. If the enumerators have any questions, concerns, or problems during training or fieldwork, they should contact their supervisor immediately. It is better to communicate early so we can solve problems as they arise.

Post-Planting Questionnaire

The post-planting questionnaire will be administered after the crops have been planted but before harvest. During this first visit to the household the enumerator will administer the post-planting questionnaire, conduct land area and slope measurement, collect soil samples, and identify the area for crop-cutting. Fieldwork for this visit will begin in early September following completion of training. **It is important that this is completed before the maize harvest** so field teams should first visit EAs which harvest maize earlier in the year.

The post-planting questionnaire has the following sections:

Section	Topic
Cover	Household identifiers and Interview Details
PP1. Household Roster	Age, sex, etc. for all household members
PP2. Assets	Household assets
PP3. Livestock	Livestock
PP4. Parcel Roster	Parcel-level data for all parcels owned or cultivated by the household
PP5. Field Roster	Field-level data for all fields of all parcels in section PP3
PP6. Field Details	Field details for all cultivated fields
PP7. Crop Details	Crop details for all cultivated fields
PP8. Field Selection	Selection of 2 fields for measurement
PP9. In-Field Measurement	Objective measurements for 2 selected fields

Cover

Q1-7: Record the code and name of the region, zone, woreda, kebele, enumeration area (EA), cluster ID, and household ID. These codes should be copied from the Household List Form. The cluster ID is a unique number for every EA between 1 and 85. The 4-digit household ID is also unique.

Q8: Write the name of the current household head. The head of household is the member of the given household who holds the role of decision maker in that household; other residents normally recognize this individual as their head. In most cases, the household head takes part in the economy, control, and the welfare of the household in general.

Q9: Enter the phone number of the household head. If the household head does not have a phone, enter the number of another household member. If there are no phones within the household, leave this question blank.

Q10: Record the GPS coordinates (latitude and longitude) of the dwelling in the space provided after allowing adequate time for the GPS unit to acquire a signal. Remember, the GPS must acquire at least 4 satellites. The instructions for creating and saving the coordinates of the household are listed below. See page 27 for more detailed GPS instructions.

For Household GPS Coordinates:

- a) Stand outside the Northwest corner of the house. Allow the GPS unit to acquire at least 4 satellites.
- b) Press the MENU button two times to arrive at the main menu.

- c) Highlight MARK WAYPOINT and press the Thumb Stick. The coordinates will be listed under the heading “Location”. Record these on the paper form.
- d) Rename the waypoint to match the “HHID”. Use the Thumb Stick to highlight the waypoint name which is located at the top of the page next to the flag icon. Press the Thumb Stick, delete the number that is filled in automatically and enter the HHID as it appears on the questionnaire. Click DONE when you have entered the HHID.

PP1. Household Member Roster

This section is used to identify the members of the survey household and to collect basic information on the household members. Information on all household members should be collected. Remember to follow the guidelines on page 10 to determine who qualifies as a household member.

Questions 1-5 should be asked first for every household member. The respondent for questions 1-5 should be the head of household or spouse. For questions 6-18, the respondent should be the individual household member or the mother/guardian in the case of young children. Questions 6-18 should be asked for one person before moving on to the next person.

Q1: List the names of all household members. The household head **must** be listed on the first line. There may only be **one** household head.

Q2: Ask the sex of the household member, do not assume or guess.

Q3 & Q4: If the respondent does not remember the year they were born or their age, you may use the Amharic calendar of historical events in Annex VI to help the respondent.

Q7: Ask for cumulative months of absence over the past 12 months. For example, if an individual was absent once over a period of 3 months, and again over another period of 1 month in the past 12 months, you should write 4. This should be the total number of months the individual was away from the household in the last 12 months. Round to the nearest month (for example, if 5.5 months, enter 6).

Q10: This is an instruction to the enumerator and should not be read aloud. Check the answer to Question 4 to determine whether the person you are discussing is 5 years or older. If so, continue with the remaining questions. If not, move to the next person in the household roster.

Q14: Enter the code for the highest grade completed by the individual. The education codes are found in Annex I on page 40.

Q16: Ask the respondent what their main industry or trade was over the past 12 months and record the code that matches. If the person was mainly engaged in household agriculture or livestock, use code 1. Codes 14 and 16-21 apply to people who were not employed. Use code 16 (“job seeker”) if the person was looking for a job but did not find one. Use code 20 if the respondent says the individual was too young to work –you must ask, do not assume this is the response.

Q18: Enter the marital status of the individual. For men with multiple wives, use code 3 (polygamous) to describe their marital status. Separated refers to a marital state concerning a man and woman who no longer live together as husband and wife, without being legally divorced. In this case, use code 5.

PP2. Assets

This section contains two questions that ask about the ownership of resources and valuable permanent assets by the household. Note that these are sensitive questions, as this is information that one would not like to share with a stranger. Therefore, be sure to use very polite language and remind the respondent of the confidentiality of the interview if s/he appears hesitant. This section should be asked of the head of household, who should be assisted by other informed adults within the household.

Q1: Read out to your respondent the list of the assets; ask how many they own and record the total number of the assets. If there are none, record “0” and skip to the next item.

Q2: Ask the respondent what the current market value of the item is. The current market value is the value that the household could sell the item for. If the household owns more than 1 of the item, enter the average value of just *one* of the items. For example, if a household has 2 *machid* and one is worth 100 birr and the other is worth 200 birr, you would enter 150. If they have 2 *machid* that are each worth 100 birr, you would enter 100.

PP3: Livestock

This section asks about the number of livestock and beehives the household owns at the time of the survey.

Q1: Ask the respondent how many of each livestock item the household owns. If they household does not own any, enter “0”, *do not leave it blank*.

PP4. Parcel Roster

This section collects data on all parcels owned or cultivated by the household. The respondent should be the best informed on the parcel. This may be a different person for each parcel.

Note: A parcel can have one or more cultivated or uncultivated fields.

Q1: Record a unique description of the parcel. This must be unique in order to use the description to identify the parcel in future household visits.

Q4: To use a parcel as collateral means that the household uses the parcel as a guarantee that they will repay a loan from the bank or other source. If the household fails to repay the loan, then the bank or individual who lent the household the money can take the land. If anyone in the household has the right to sell the parcel *or* use it as collateral, enter “1”. If not, enter “2”.

Q5: Enter the household roster ID of up to two household members who can sell the parcel or use it for collateral. You may enter up to 2 people. If only 1 person can sell or use the parcel as collateral, leave the second column blank.

Q9: Ask the respondent the distance in kilometers from the parcel to the respondent’s home, to the nearest road appropriate for cars (may be paved or unpaved), and to the market. Ask them to estimate if they are unsure. If the respondent gives distances in minutes required for walking, assume that it takes approximately 10 min to walk a kilometer (therefore, 15 min would be 1.5 km.)

Q10: Ask the respondent to count the number of fields within the parcel.

PP5. Field Roster

This section collects data on all fields on all parcels owned or cultivated by the household. The respondent should be the best informed on the field. This may be a different person for each field.

The parcel ID will be repeated for each field within that parcel. For example, if parcel 1 has 3 fields and parcel 2 has 2 fields, the IDs would look like this:

Parcel ID	Field ID
1	1
1	2
1	3
2	1
2	2

Q1: Record a unique description of the field. This must be unique in order to use the description to identify the field in future household visits.

Q3: This is a very important question – be careful when recording the response.

First, ask the respondent to estimate the size of the field. The respondent may use any of the units listed on the questionnaire. **Do not prompt him to use a certain unit**, simply ask the question and let the respondent provide the unit. Record two digits to the right of the decimal point. Enter the code for the unit used in the “UNIT” column.

Later, you will measure the field with GPS but this question should be asked first so that the measurement does not influence the farmer’s answer. **Do not influence the farmer’s response in any way**, even though you may have a better sense of the area.

Q4: Ask the respondent how many of the units are in one hectare. For example, if the respondent says the area of his field is 3 timad, ask him how many timad are in one hectare. If the respondent is unsure, ask them to provide his/her best estimate. If the respondent insists that he/she does not know, enter “9999”.

Q6: Ask the respondent the question as it is written in the questionnaire. Record the ID of the primary decision maker for the field.

Q8: You may enter up to two household member IDs. If there is only one person who is consulted by the primary decision maker of the field, enter the ID in the first column and leave the second column blank. If the field is rented out or given out for free, ask who in the household makes the decision to rent/give out.

Q10: Ask the respondent if any maize is currently grown on the field. Mark with “1” if any maize is grown – it may be pure stand or intercropped.

Q12: Ask the respondent how many times the field was tilled or plowed this agricultural season. Tilling takes place before planting.

Q13: Ask the respondent if the field has been cultivated every year for the last 10 years. If the field was not cultivated every year for the last 10 years, mark “No”. If the respondent doesn’t know, enter “Don’t Know”.

Q15: This question asks how much time has passed since the beginning of the most recent fallow period. For example, if today is the year 2005 EC and the last time the field was fallow was in 2000 EC, you would enter “5” for question 13. The response must be in number of years.

Q16: This question asks for the duration of time the field was left fallow most recently. For example, if the field was last left fallow in 2000 EC for 2 years, you would enter “2”. The response must be in years.

PP6. Field Details

This section asks more detailed questions about all cultivated fields. Remember, it is important not to influence the farmer’s response even if you know the answer better. The respondent should be the best informed about the particular field. If the respondent is unsure about the answer to some of the questions, encourage them to provide their best estimate unless there is someone else in the household who is better able to answer the question.

Q3: Ask the respondent about the slope of the field. Is it flat, with moderate slope, or with steep slope?

Q4: Show the respondent Figure A, the paper with photos of different slopes. Ask them to point to the photo in which the slope is the most similar to the field. Explain that the respondent should only be looking at the slope, not at other factors such as crop type, soils, etc. Record the code of the photo selected. Figure A is found in Annex V.

Q5: Read the answer choices to the respondent. Sandy soil is “light”, whereas clay soil is “heavy”. Clay soils are good for making bricks. Sandy soils are too loose to make good bricks. If the respondent is unsure, encourage them to provide their best estimate.

Q6: This question asks about the color of the soil. The enumerator should record the answer of the respondent.

Q7: The soil quality refers to the fertility of the soil. Good soils are fertile and can grow and sustain a large harvest. Poor soils are difficult to grow large harvests. Fair soils rank in between good and poor soils.

Q8: Ask the respondent to describe the method used to determine soil fertility/quality. In most cases soil quality will be based on “own experience”.

Q10: Erosion refers to the loss of topsoil from rain, wind, animals or people. Indicate yes if all or some of the field is suffering from erosion.

Q12: Ask the respondent if he is using any methods to prevent erosion on the field.

Q13: Ask the respondent about the main method used to protect the field from erosion and record the code.

Q14: Ask the respondent if any fertilizer was used on the field. This includes chemical fertilizer and organic fertilizer such as manure and compost.

Questions 15-33 ask about the use of various types of fertilizer. All questions are asked at the field level. Make sure the answers are only for the fertilizer used and purchased on that particular field. All quantities must be recorded in kilograms (kg). If less than 1 kg was used, use decimals (for example, if half a kg was used, mark 0.50). Some questions ask about the purchase of fertilizer. For these questions, include purchases made with cash and on credit during this agricultural season.

Q34: This question asks about household labor related to land preparation, planting, ridging, weeding, fertilizing and other pre-harvest activities. Include all household members who were involved in these pre-harvest activities on this field.

For each household member who participated in pre-harvest activities on this field, complete the following:

Household member ID: record the household member ID from the household roster

Weeks: record the number of weeks that this household member engaged in pre-harvest agriculture activities

Average number of working days in a week: ask how many days on average this household member spent on the pre-harvest agriculture activities in this field during those weeks. For example, if a person worked an average of 3 days per week for 4 weeks, the response to this question would be “3”.

Average number of working hours in a day: ask how many hours on average this household member spent on the pre-harvest agriculture activities in this field during those days. For example, if a person worked an average of 5 hours per day, 3 days per week, for a total of 4 weeks, the response to this question would be “5”.

Q35: This question asks about the hired labor for pre-harvest activities such as land preparation, planting, ridging, weeding, and fertilizing. The laborers are broken up into three groups: men, women, and children under 15. For each group, complete the following:

Number of laborers: Ask the number of hired laborers in the group (men, women, or children) that worked on this field for pre-harvest activities in the current agriculture season.

Total Person Days: Ask the number of days these laborers spent on pre-harvest activities in this field in the current agriculture season. This should be the total number of person days. For example, if 2 men

worked on the field and they each worked 5 days, the total number of days would be 10. If, for example, 2 men worked on the field but one worked 3 days and one worked 5 days, the total would be 8 days.

Daily Wage per Person: Record the amount that the household paid to each person for one day of work for the pre-harvest activities on this field. This should be recorded in birr. If payment was made in-kind, estimate the value in birr.

Note: *The question on wages above was changed during fieldwork training to read “Total Wages Paid per Day”, not per person, to be consistent with the Ethiopia Rural Socioeconomic Survey (ERSS). The CAPI program asked for total wages per day, not daily wage per person.*

Q36: This question asks about the laborers used for pre-harvest activities that were used free of charge or as exchange laborers. These laborers are broken up into three groups: men, women, and children under 15. For each group, complete the following:

Number of laborers: Ask the number of hired laborers in the group (men, women, or children) that worked on this field for pre-harvest activities in the current agriculture season.

Total Person Days: Ask the number of days these laborers spent on pre-harvest activities in this field in the current agriculture season. This should be the total number of person days. For example, if 2 men worked on the field and they each worked 5 days, the total number of days would be 10. If, for example, 2 men worked on the field but one worked 3 days and one worked 5 days, the total would be 8 days.

PP7. Crop Details

This section collects detailed crop information for all cultivated fields. All crops on each of the cultivated fields should be listed. The respondent should be the best informed.

The parcel ID will be repeated for each field within that parcel. Also, the parcel and field ID will be repeated for each crop grown on the field. Below is an example: Parcel 1 has 3 fields. The first field is pure stand maize. The second field on parcel 1 grows both wheat and barley. The third field on parcel 1 grows maize, field peas, and sorghum.

This should be completed as below for all parcels and fields cultivated by the household.

PARCEL ID	FIELD ID	CROP ID	1. What crop(s) are planted on [FIELD] in this current agricultural season? LIST EACH CROP GROWN ON EACH FIELD. USE CROP CODES IN MANUAL.		2. When do you expect to harvest [CROP]? MONTH AND YEAR IN EC	
			CROP NAME	CROP CODE	MONTH	4-DIGIT YEAR
			1	1	1	Maize
1	2	1	Wheat	8	04	2006
1	2	2	Barley	1	04	2006
1	3	1	Maize	2	02	2006
1	3	2	Field Peas	15	01	2006
1	3	3	Sorghum	6	02	2006
2	1	1	Teff	7	03	2006

Q1: Ask the respondent to list all the crops grown on all cultivated fields and list them as in the example above.

Q2: Ask the respondent when they expect to harvest the crop on that field. Enter the month and year in Ethiopian Calendar. For example, if the harvest is expected September 2005, you would enter “01” in the “MONTH” column and “2005” in the “YEAR” column. If the crop is a tree or permanent crop which is harvested throughout the year, enter “99”.

Q3: If the field is pure stand, mark “1”. If the field was mixed or intercropped, mark “2”.

Q4: This question relates to mixed crop fields only. Indicate what percent of the field is covered with the named crop. For example, if on one field you have 60% maize and 40% beans, you would enter “60” on the line for maize and “40” on the line for beans.

Questions 5-8 ask about the use of pesticides, herbicides and fungicides. When asking the respondent about the use of these products, make sure to read the question exactly as it appears on the questionnaire so the respondent knows that we are only asking about products used on this particular field for this particular crop.

Q10: If there were multiple causes for the crop damage, ask the farmer to indicate the primary cause of damage.

Q11: Ask the farmer to estimate the percentage of damage to the specific crop on that field. For example, if 20% of the teff on field 2 was damaged, you would record “20”.

Q12: Seeds only qualify as “improved” if they were used for the first time this season. “Improved, Recycled” seeds are improved seeds which have been recycled only one time. If the seeds have been recycled more than one time, they are considered “traditional”. If the crop is a tree crop that was planted before this season, use code 4.

Q14: Enter the quantity of seed used for the specific crop on the specific field. You may enter the quantity in KG, grams, or both. Remember, 1 KG = 1000 grams.

PP8. Field Selection

This section is used to select 2 fields for detailed testing. The fields selected here will be measured with GPS, compass and rope, and clinometers. Soil samples will also be collected from these two fields. **Crop-cutting will be conducted on pure stand maize fields only.**

Two fields will be selected randomly. The first field will be selected only from the pure stand maize fields. The second field will be selected from all remaining fields. If the household does not have any pure stand maize fields, two fields will be selected from the full list of fields. **You will need Random Number Table #1 in order to complete this section.**

THE CAPI PROGRAM WILL AUTOMATICALLY COMPLETE QUESTIONS 1-5. If you are using a paper questionnaire due to technical problems with the CAPI device, follow the instructions below.

First, complete questions 1 & 2. List all cultivated parcels and fields **using the same ID codes** as used in section PP5: Field Roster.

After listing all cultivated parcel and field IDs, complete questions 3, 4, and 5 for each. Question 6 should not be completed until questions 3-5 are answered for all fields.

Q3: If any maize is grown on the field, either pure stand or intercropped, enter “1”. If there is no maize on the field, enter “2”. If there is no maize, you will not answer questions 4 or 5.

Q4: If the field is pure stand, enter “1”. If there is more than one crop on the field, enter “2”.

Q5: All pure stand maize fields will be marked with a “1”. This indicates that the field is eligible for crop-cutting.

Q6: Only after completing questions 3-5 for *all* cultivated fields should you move on to question 6.

To answer question 6 you will need to have your random number table with you. Remember, two fields will be selected in total. If the household has any fields with pure stand maize, one field will be randomly selected from these pure stand maize fields.

On the left of the screen you will see a serial number. This serial number is what you will match to the random number table.

First, we select a pure stand maize field. Look at Random Number Table #1. Select the first number (reading left to right) that matches the serial number of one of the eligible crop-cutting fields. We will measure the area and slope, collect soil samples, and conduct crop cutting on this field. Note: if there is only one pure stand maize field in the household, we will select that field by default.

Second, we select another field from all remaining fields, regardless of crop and crop-pattern. On the same random number table #1, cross out the number of the first selected field. Now, look for the first number that matches the serial number of one of the fields. You must not select the same field as the first selection.

If there are no pure stand maize fields in the household, select two fields using the same method as described above but without consideration for the crop-cutting eligibility. In this case, no crop-cutting will be conducted for this household but two fields will still be selected for soil testing and area measurement.

In question 6, mark the two selected fields with “1” and all other fields with “2”. There must be no more than two fields marked with “1”. If the household only has one cultivated field, you will only have one field selected.

Here is an example:

First we list all the cultivated fields using the same ID numbers as in section PP5.

SERIAL NUMBER	ROSTER		CROP-CUTTING ELIGIBILITY		
	1. PARCEL ID	2. FIELD ID	3. IS MAIZE GROWN ON THIS FIELD? Yes...1 No...2 (►Q6)	4. IS THIS FIELD PURESTAND? Yes...1 No...2 (►Q6)	5. FIELD IS ELIGIBLE FOR CROP-CUTTING, MARK WITH "1"
1	1	1	1	2	
2	1	2	2		
3	1	3	2		
4	1	4	1	2	
5	2	1	2		
6	3	1	1	1	1
7	3	2	2		
8	4	1	2		
9	4	2	1	1	1
10	4	3	2		
11	4	4	2		

This household has two fields that are pure stand maize. Only these two fields, with serial numbers 6 and 9 are eligible for crop-cutting. Next, we will select one of these two eligible fields for testing.

This is Random Number Table #1 for this household: 5 7 12 1 16 3 8 **9**

To select the maize field we look for the first number in the table that matches the serial number of the eligible fields. In this example, the only eligible fields are 6 and 9. The first number that matches is number 9 – this will be selected for testing and crop-cutting.

Next, we select the second field for testing from all remaining fields, regardless of crop. Looking at the random number table we see that 5 is the first number that matches the serial number of one of the fields. This field will be selected for testing.

5 7 12 1 16 3 8 ~~9~~

The last thing we do in this section is answer question 6. Only the two selected fields will be marked with “1”. All other fields will be marked with “2” as below:

SERIAL NUMBER	ROSTER		CROP-CUTTING ELIGIBILITY			SELECTION
	1. PARCEL ID	2. FIELD ID	3. IS MAIZE GROWN ON THIS FIELD? Yes...1 No...2 (►Q6)	4. IS THIS FIELD PURESTAND ? Yes...1 No...2 (►Q6)	5. HAS FIELD ALREADY BEEN HARVESTED ? Yes...1 No...2	6. IS FIELD SELECTED FOR TESTING? REFER TO RANDOM NUMBER TABLE FOR THIS HOUSEHOLD Yes...1 No...2
1	1	1	1	2		2
2	1	2	2			2
3	1	3	2			2
4	1	4	1	2		2
5	2	1	2			1
6	3	1	1	1	2	2
7	3	2	2			2
8	4	1	2			2
9	4	2	1	1	2	1
10	4	3	2			2
11	4	4	2			2

The remaining sections of the post-planting questionnaire will only ask questions related to the selected fields.

PP9. In-Field Measurement

This section will be completed for each of the selected fields. Section PP9.1 will be for the first field and section PP9.2 will be for the second field. The questions in PP9.1 and PP9.2 are exactly the same. The enumerator will answer all questions in this section. A member of the household, preferably the person best informed about the field, must show the enumerator the field boundaries.

This section includes the following activities:

- Compass and rope area measurement
- GPS area measurement
- GPS coordinates
- Slope measurement with clinometer
- Demarcation of crop-cutting area
- Soil sample collection

Before reviewing each of the questions in the In-Field Measurement section, instructions for each of the measurements is provided.

COMPASS AND ROPE AREA MEASUREMENT

There are three common ways to measure field size for farm households – use of rope and compass, use of a GPS device and farmer self-reported field size. The compass-and-rope method of measuring field size is the objective measurement of land size usually referred to as the gold standard. To conduct the compass-and-rope measurement, the **enumerator** and the **Crop Farmer/Crop Farm Manager** should first walk along the edges of the field to identify the boundary and obstacles. The enumerator will need assistance from a local guide. It is best to have a team of three (3) people if possible.

The materials that you will need for use in this exercise are:

- In-Field Measurement Questionnaire (on CAPI)
- Prismatic Compass
- Ranging Poles (3)
- Measuring Tape
- Writing Materials e.g. Pen, Pencil, etc.
- Pre-printed scratch paper
- Excel compass and rope area calculation program

In-Field Measurement Questionnaire: This is designed for recording field measurement via the compass-and-rope method as well as GPS units, soil sample details and crop-cutting area information.

Prismatic Compass: This is a device used for capturing geographic bearings in degrees (0°). The model type of this device has a flip cover with a pinhole through which the bearing is read.

Ranging Poles: The minimum number of poles required is three (3). The first pole should be erected (positioned) at the **starting point (position A)**. **This first pole must not be moved until the measurement is complete.** The second pole should be positioned at first bend point (position B). The third pole should be stationed at the second bend (position C). Both the 2nd and 3rd poles can be removed after use and put in the positions of measuring distance and degree between the following two interval-points, until arrival at original position A.

Measuring Tape: This is a distance-measuring instrument marked in metric-units (segments).

Writing Materials: These materials can include pen, pencil, etc.

Pre-printed scratch paper: The enumerator will be given scratch paper to record the compass and rope measurements on paper before entering them in the In-Field Measurement Questionnaire. Only measurements with less than 5% closing error will be recorded in the In-Field Measurement Questionnaire.

Compass and Rope Area Calculation Program: This is a program in Excel for computing field area and closing error after capturing distance measurements (meters) and bearings (degree) of a plot. This program is downloaded on your CAPI tablet.

Procedure For Area Measurement Using Compass And Rope

The enumerator will need the assistance of a field guide. A team consisting of 3 persons is preferred, so if possible, a household member or supervisor may assist. Two persons are needed to hold the edges of the measuring tape respectively and take the bearing and distance measurements, while a 3rd person may ensure that the tape is held straight by clearing any obstacle/obstruction in the way.

1. Walk around the field with a household member, preferably the farmer of the field, to determine the field boundaries and clear any obstacles.
2. Enter the time you are starting in the In-Field Measurement Questionnaire, question 3. This should be the time *after* you have completed step 1 above.
3. Identify your starting point and call it **point A**. Point A should be the northwest corner of the field. Firmly plant one ranging pole at point A and proceed clockwise around the field to the next corner. This is point B and the second ranging pole should be placed at that point. At this stage, a person is stationed at both point A and B. Facing each other with the ranging poles in front, the person at point A should use the compass to line up the pole at point B and look through the pinhole to take reading. This reading should be recorded on the scratch paper in the column marked '**Front Bearing**' on the row for point A-B on the form.
4. Now extend the measuring tape from point A to point B with the zero mark held against pole A. When the tape is held straight and taut, read the distance to B and enter this figure in meters in the column marked '**Distance**' on the row for point A-B. You should record 2 decimal places (for example, 15.27m).
5. Now, the team member at point A moves (leaving the pole in position) to point B and lines the compass up with the pole at point A and take reading. Record this reading in the column marked '**Back Bearing**' on the line for point A-B on the scratch paper.
6. Take the 3rd ranging pole and place it at the next corner of the plot after point B: this is point C. Proceed to measure the front compass bearing, the distance and the back bearing from B to C in the same way

that you measured them from point A to point B. Enter the results in the appropriate columns for the line marked B-C on the scratch paper. When you are done with the side B-C, remove the pole at point B and take it to the next corner after C: this is point D. Continue in this way from point to point (corner to corner) until you have returned once again to point A, the corner where you started.

7. Make sure all your readings are entered on the scratch paper.
8. Finally, this data should be entered into the area measurement program for the computation of field area, perimeter, and closing error. **If the closing error is 5% or more, then this indicates that the measurement was not done properly and the field must be re-measured.** If the closing error is less than 5%, you will go on to answer questions 4-9 on the In-Field Measurement Questionnaire. To use the Excel program:
 - a. On the CAPI tablet, open the file called "Area of Polygon Final.xlsx"
 - b. Delete any data found in the first three columns of the table. **The table must be empty before you begin calculating the area of a new field.**
 - c. Enter the front bearing, back bearing and distance (in meters) for all sides of the field into the table as seen below. The program will automatically calculate the perimeter, area, and closing error but do not record the numbers until you have entered all sides in the table.
 - d. If the closing error is less than 5%, go ahead with completing the in-field measurement questionnaire. If the closing error is 5% or more, the field will need to be re-measured. Remember, the difference between the front bearing and the back bearing should be near 180 degrees. If you check this as you are measuring the field, you will likely complete the first measurement with a low closing error.

Instructions: Enter values in Front bearing and Distance. The computations are on the right in RED						
When finished, delete entries under Front Bearing and Distance						
Front Bearing	Back Bearing	Distance		Perimeter (m)	Area (m ²)	Closing Error (%)
124.0	305.0	12.3				
59.0	242.0	27.8				
134.0	310.0	14.3				
219.0	39.0	13.1				
211.0	32.0	7.1				
250.0	70.0	18.6				
327.0	147.0	25.7		118.9	623.2	3.1

GPS AREA MEASUREMENT AND COORDINATES

A GPS uses the information from satellites to find the geographical position on the earth surface by longitude and latitude. The position is found by a continuous measurement of the time a satellite signal takes to reach your GPS from a satellite in the sky. With clear signals from at least 4 satellites, the GPS is able to calculate the geographical position with a sufficient accuracy. The better sight to a large part of the sky a GPS has, the more signals and clearer signals are received. Shadows of buildings and even large trees should be avoided while using the GPS in the field.

Device Overview



①	Zoom keys
②	Back key
③	Thumb Stick™
④	Menu key
⑤	⏻ Backlight key



⑥	Mini-USB port (under weather cap)
⑦	Battery cover
⑧	Battery cover locking ring
⑨	Mounting spine

Using the eTrex Keys

- Move the Thumb Stick up, down, left, and right to highlight menu selections or to move around the map.
- Press the center of the Thumb Stick to select the highlighted item.
- Press back to move back one step in the menu structure.
- Press **menu** to display a list of commonly-used functions for the current page. Press **menu** twice to access the main menu from any page.
- Press ▲ and ▼ to zoom in and out on the map.

BEFORE calculating the area with the GPS:

- 1) Complete all other sections of the Post-Planting Questionnaire, including section PP5: Field Roster in which you obtain the respondent's self-estimates of the areas of each of their fields. The In-Field Measurement section is the last section of the post-planting questionnaire.
- 2) Walk around the field with the respondent in order to determine the field boundaries. Clear any obstructions that may block your path, so that you have a clear, unobstructed path around the boundary of the field. This should have been completed prior to the compass and rope measurement.
- 3) Mark your **starting point** with a ranging pole so you can identify the point when you return. The starting point should be the northwest corner of the field, the same point where you started with the compass and rope measurement.
- 4) Wait for the device to fix on at least **4** satellites.
- 5) To preserve the battery, set the backlighting on the GPS as low as possible. To do this, do the following:
 - a) While the device is on, click the power button once (do not hold it).

- b) Move the Thumb Stick to the left to decrease the backlighting. You should decrease the backlight as much as possible in order to save the batteries.
- c) Exit this page by pressing the BACK button.

Procedure For Area Measurement Using GPS

1. Enter the time you are starting in the In-Field Measurement Questionnaire, question 12.
2. Proceed to the start of the field where you have marked it with a ranging pole.
3. Turn on the GPS device by holding the power button until an image appears on screen. The GPS will then seek to acquire satellite signals. This may take up to 3 minutes. From the main menu, navigate to highlight SATELLITE and press the Thumb Stick. The green and blue bars at the bottom of the screen show the satellites that have been found. Wait until **at least 4 satellites** have been acquired.

On the left side, you will see the GPS accuracy in meters. This number will fluctuate as satellites are acquired. **Wait until this number is steady before moving on.**

4. Press the MENU button twice to return to the main menu. You may also push the BACK button repeatedly until you arrive at the main menu. Select the AREA CALCULATION page by highlighting and clicking the center of the Thumb Stick.
5. START will appear on the screen. When you are ready to begin, click the Thumb Stick. Now the GPS has started recording the track. You will see CALCULATE on the screen (NOTE: do NOT click this until you are finished).
6. Walk slowly clockwise around the perimeter of the field. You should hold the GPS flat in your hand and stretch your hand slightly forward. You **MUST** walk on the edge of the field (NOT a meter outside the plot). At every corner, you **MUST** stop for 5 seconds (counting slowly 1001, 1002, 1003, 1004, and 1005) and then continue walking. You **MUST** walk all the way around the field until you have returned to the location of the ranging pole, with the GPS facing the direction in which it started the area calculation.
7. When you reach the ranging pole, CALCULATE should still be seen on the screen. Click CALCULATE by pressing the Thumb Stick. The GPS will display the area measurement directly in SQUARE METERS. You should then record the results with TWO decimals. If the area is not displayed, it means you have not clicked the Thumb Stick straight. You must press the back button until you see CALCULATE on the screen and then press the Thumb Stick again.
8. Save the track you have just recorded by highlighting SAVE TRACK and pressing the Thumb Stick. Delete the default track name and enter the name as "HHID-ParcelID-FieldID". For example, if the HHID is 1234 and the parcel ID is 02 and the field ID is 01, enter the track name as 1234-02-01. Highlight DONE and press the Thumb Stick.

9. To review the track, view the outline on the map, or determine the distance of the perimeter, return to the main menu and navigate to the TRACK MANAGER. Press the Thumb Stick. Highlight the track you would like to review and press the Thumb Stick. From there, select VIEW MAP. This will show you the length of the perimeter in meters (called “distance”).
10. Turn off the GPS device by holding the power button.

Procedure For Saving Waypoints (Coordinates) Using GPS

1. For Field GPS Coordinates:

- a) Stand at the start of the field where you have marked it with a stick or ranging pole. This should be the northwest corner and the same point you used for the area measurement.
- b) Press the MENU button two times to arrive at the main menu.
- c) Highlight MARK WAYPOINT and press the Thumb Stick. The coordinates will be listed under the heading “Location”. Record these on the questionnaire.
- d) Rename the waypoint to match the “HHID-ParcelID-FieldID”. Use the Thumb Stick to highlight the waypoint name which is located at the top of the page next to the flag icon. Press the Thumb Stick, delete the number that is filled in automatically and enter the “HHID-ParcelID-FieldID”. For example, if the HHID is 1234 and the parcel ID is 02 and the field ID is 01, enter the waypoint name as 1234-02-01. Click DONE when you have entered the name.
- e) Click DONE again to return to the main menu.

2. For Household GPS Coordinates:

- a) Stand outside the Northwest Corner of the house.
- b) Press the MENU button two times to arrive at the main menu.
- c) Highlight MARK WAYPOINT and press the Thumb Stick. The coordinates will be listed under the heading “Location”. Record these on the paper form.
- d) Rename the waypoint to match the “HHID”. Use the Thumb Stick to highlight the waypoint name which is located at the top of the page next to the flag icon. Press the Thumb Stick, delete the number that is filled in automatically and enter the HHID as it appears on the questionnaire. Click DONE when you have entered the HHID.
- e) Click DONE again to return to the main menu.

CLINOMETER

The compass used for compass and rope area measurement also functions as a clinometer. The clinometer is used to measure the slope of the field, from the lowest point to the highest point. To measure the slope of the field, follow the instructions below.

- a) Twist the circle dial so West ("W") is at the top, directly under the green line and sighting hole.
- b) Open the compass completely so the mirror and the base are in a straight line. Turn the compass so the mirror is pointing away from you.
- c) Hold the compass so that it is parallel with the slope of the field. You should not stand at the lowest or highest point of the field. Rather, you should stand in a place where you can see both the lowest and highest points at the same time.
- d) The **black** arrow will always point down and point to the red numbers on the back of the compass. When the edge of the compass is lined up parallel to the slope of the field, read the red number that the black arrow is pointing to. Note: each red tick mark is 2 degrees.
- e) Record the slope in degrees in the questionnaire.

CROP CUTTING

Crop cutting is a method that allows us to estimate the quantity of production of an entire field by measuring a small randomly selected section of that field, and then using this information in conjunction with the area of the entire field to estimate the total production quantity. Crop cutting is normally considered the gold standard for measuring crop production. We will be conducting crop-cutting on each of the pure stand maize fields that are selected for testing in order to serve as our measure for the 'true' production. It is therefore very important that you follow the instructions carefully. You will need the assistance of the **Crop Farmer** to conduct this exercise.

Crop-Cutting is only conducted on the pure stand maize fields that were selected for testing in section PP8: Field Selection. There will likely be only 1 field with crop-cutting per household but there may be up to 2 fields.

There are three aspects to this exercise – the first is conducted with the post-planting questionnaire and the last two are conducted at the time of harvest:

- 1) The first aspect is the selection of a random 4m x 4m crop cutting area within the field. Using rope, the 4mx4m area will be divided into four 2mx2m squares. This area will be selected using the random number table. This will take place as part of the post-planting questionnaire.
- 2) The second aspect of this exercise is the harvesting of the maize once it is ready for harvest. This should be done at a time that is convenient for the farmer. **It is very important that the farmer does not harvest the land before you arrive** – therefore, please coordinate with the farmer to learn the time at which he would like to harvest, and be sure to arrive without delay. The local kebele officer will also be in contact with the team supervisor about the time of the harvest.
- 3) The third aspect is the drying of the crop. The maize will be weighed fresh at the time of harvest and then again later when the maize is dry.

The materials that you will need for use in this exercise are:

- In-Field Measurement Questionnaire & Crop-cutting Form (both on CAPI tablet)
- Prismatic Compass
- Sticks (4) for Area Demarcation
- Measuring Tape
- Rope (30+ meters)
- Writing Materials, e.g. Pen, Pencil, etc.
- Analog Weighing Scale
- Digital Weighing Scale (with batteries)

In-Field Measurement Questionnaire & Crop-cutting Form: The In-Field Measurement Questionnaire will be completed when the crop-cutting area is demarcated. The crop-cutting form will be completed when the area is harvested and the crop is weighed fresh and dry.

Prismatic Compass: This is a device used for capturing geographic bearings in degrees (0°). The model type of this device has a flip cover with a pinhole through which the bearing is read.

Sticks: These will be used to mark the four corners of the area selected for crop cutting.

Measuring Tape: This is a distance-measuring instrument marked in metric-units (segments), which will be used for measuring the length of each side of the crop cutting area, as well as to determine the location of the area in the field.

Writing Materials: These materials can include pen, pencil, etc.

Procedure For Crop Cutting

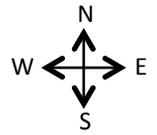
We will be conducting crop cutting on a 4m x 4m section of the maize field, or 16 square meters. However, we will divide the 4mx4m area into four 2mx2m squares (also called quadrants) and record the harvest of each quadrant separately. Here, we describe in further detail each of the four main aspects to the crop cutting exercise.

1) Crop Cutting Area Selection:

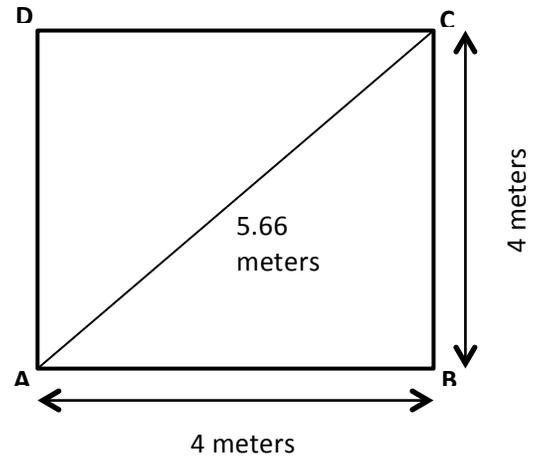
- a. Use Random Number Table #2 to identify the corner from which you will start. Use the first number in the random number table that matches one of the corners of the field. The corner in which you started the area measurement, the northwest corner, is corner #1. Corner #2 is the next corner of the field, moving around the field clockwise.
- b. Measure the distance of the two sides along the selected corner with the measuring tape. Identify which is the longer side and which is the shorter side.
- c. Take the bearing from the start corner down the shorter side. Note this in your notebook.
- d. Use the Random Number Table #3 provided for this household. The first number should be the number of meters that you will walk along the length of the longer side of the field. If the first number is larger than the length of the side, choose the next random number (and so on, until you find a number that is less than the length of the side). For example, if the length of the longer side is 25 meters and the first random number in the list is 28, move on to the next number.
- e. Beginning at your starting point and continuing along the longer side of the field, walk the number of meters indicated by your random number.
- f. Turn into the field so that your bearing is the same as the bearing you measured down the shorter side of the field. This means you will be entering the field parallel to the shorter side. Choose the next random number from Random Number Table #3 that is shorter than the length of the shorter side and walk the number of meters indicated by this second random number. You should be walking in a direction that is parallel to the shorter edge of the field. Walk in a straight line. Try not to veer to the right or left to avoid shrubs or wet spots.
- g. The corner of the crop cutting area is located where your foot lands on the last step: this is point A.

2) **Crop Cutting Section Demarcation:**

a. At point A, insert the first stick firmly into the ground, then turn your face to east and read 90 degrees from the compass. In this direction, starting from point A, measure 4 meters and insert the second stick firmly into the ground. The point at which the stick is posted is Point B in the example to the right.



b. At point B, turn your face to north and read 360 degrees or 0 degrees from the compass. In this direction, starting from point B, measure 4 meters and insert firmly the third stick on the ground. The point at which the stick is posted is Point C in the example.

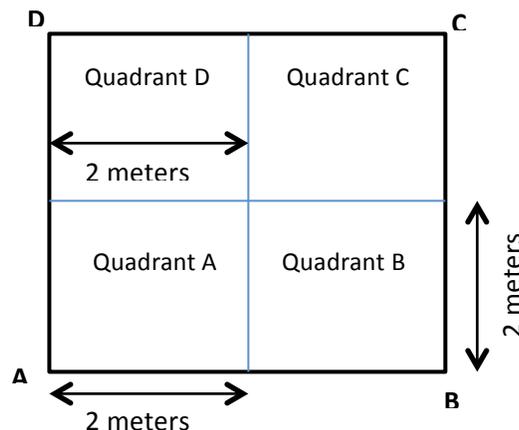


c. At point C, turn your face to west and read 270 degrees from the compass. In this direction, starting from point C, measure 4 meters and insert the fourth stick firmly into the ground. The point at which the stick is posted is Point D in the example.

d. At point D, turn your face to south and read 180 degrees from the compass. In this direction, starting from point D, measure 4 meters to the stick at point A. If you do not arrive at point A in 4 meters, check for any bearing or measurement error. In order to make sure that the plot is 4m x 4m, check to make sure that the diagonal line (Line AC) is 5.66 meters.

Note: If the random numbers obtained from the random table for long and short sides of the field do not fall in the crop field area, drop both random numbers and start over again. Each time when one or both of the random numbers fail to fall in the field, drop both and start again until both random numbers fall on the field.

e. The last step is to divide the 4m x 4m plot into 4 equal quadrants. Measure 2m from each corner and enter a new stick. These new sticks will mark the middle of the rope on each side. Next, tie a piece of rope between the new sticks so that there are four (4) equal quadrants as in the example below. These four quadrants will be called quadrant A, B, C, and D. **When conducting the harvest, you will need to keep the crop from each quadrant separate.**



3) Harvest of Demarcated Section – Completed at the time of harvest

- a. With the consent of the farmer, harvest all of the maize contained within the demarcated plot area, keeping the crop from each quadrant separate. Once separated, the grain should be weighed carefully using the analog and digital scales, and the data recorded in the In-Field Measurement section of the Post-Planting Questionnaire. Remember, the crop from each quadrant **must** be weighed separately.
- b. The enumerator will dry the crop until the dry weight is constant (may be around 15 days) and then take the dry weight using both the analog and digital scales. Remember, the crop from each quadrant must be weighed separately.
- c. Return the grain to the farmer, thanking him for his assistance.

SOIL SAMPLING – See Annex III

Detailed instructions on collecting soil samples are found in Annex III.

Detailed Question Instructions

Questions 1 and 2: Enter the parcel ID and Field ID of the selected fields. In Section 9.1, enter the ID of the first selected field. In Section 9.2, enter the details of the second selected field.

Q3: Record the time you begin working on the compass and rope measurement. You should do this **after** you have walked around the field boundary with a household member. Use the Ethiopian clock.

Before completing questions 4-9 you need to first conduct the compass and rope measurement and record the bearings and distances on the scratch paper provided. When you finish, enter the bearings and distances in the Excel program to confirm the closing error. If the closing error is 5% or more, you must re-measure the field. Once you have completed a measurement with less than 5% closing error, proceed with questions 4-9.

Questions 4-6: Enter the perimeter, area, and closing error calculated in the Excel program. If you had to re-measure the area because the closing error was too large, enter the numbers for the final area measurement only. For instructions on using the excel program, see point 8 on page 26.

Questions 7-9: Copy the points (for example, from A to B, B to C, C to D, etc.), front bearings, back bearings, and distances from your scratch paper. These should be from the final area measurement that has less than 5% closing error.

Q7: Points. This denotes the clockwise direction of movement along a boundary from a **Point** marked with a **ranging pole** to another **Point** marked with another **ranging pole**. The two sub-columns for these points (**From** and **To**) should be listed in alphabetical order from **A** to **Z**, until the final point, which should be the same as the starting point (i.e. Point A).

From: This serves as a **starting point** (first position of the erected ranging pole) of the walking direction at the edge of a plot.

To: This serves as a **stopping over point** (the next position of another erected ranging pole) while walking along the edge of a plot, usually at a bend location.

Q8: This space is where you should record the compass bearing **in degree**, based on your readings of the compass between points (as discussed above on pages 24-26). The readings should be done using the compass device for both **Front** and **Back** respectively. The compass device should be held in a straight line between the two erected poles that are facing each other before reading the **degree** on the device.

Front: Record the **bearing (degree) reading from the starting point A to point B.**

Back: Record the **bearing (degree) reading from point B back to starting point A.**

NOTE: These should be done for all interval-points recorded in degrees according to the arrangement of the points in alphabetical order.

Q9: Record the distance in metres between the two points recorded in the row. Include 2 digits to the right of the decimal. For example, 12.37 (meters).

Q10: Enter the total number of compass and rope measurements required to achieve less than 5% measurement error. If you had less than 5% on your first measurement, you will enter “1”. If, for example, your first measurement had a closing error of 5.5% and you re-measured and got 3%, you would enter “2”.

Q11: Record the time you finish answering Q10. Use the Ethiopian clock.

Questions 12-20 are related to GPS measurement. For instructions on using the GPS, refer to page 27 above. Remember to wait for the device to acquire *at least* 4 satellites! This may take 3-5 minutes. As you wait, you will acquire more satellites and improve the accuracy of the device.

Q12: Enter the time you begin working with the GPS. Use the Ethiopian clock.

Q13: Enter the accuracy in meters, as provided on the left side of the “**Satellite**” page of the GPS unit.

Q14: Count the number of satellites acquired by the GPS devices, as provided on the “**Satellite**” page of the GPS unit. Remember to count the green and blue satellite bars but *not the white ones*.

Q15: Enter the elevation as seen on the “**Satellite**” page of the GPS unit.

Q16: Record the area as calculated by the GPS unit. This area should be recorded in square meters, to two decimal places. The method for conducting area measurement using a GPS unit is discussed above on page 27 of this manual.

NOTE: Be sure to save the track on the GPS unit at this point. Enter the name as “**HHID-ParcelID-FieldID**”. For example, if the Household ID is 1234 and the parcel ID is 02 and the field ID is 01, save the track as 1234-02-01.

Q17: Record the perimeter as calculated by the unit. This perimeter should be recorded in meters, to two decimal places. You will find the perimeter on the TRACK MANAGER page on the GPS unit (see page 28, points 8 and 9, for more information).

Q18: Record the coordinates for the GPS location of the field and save the waypoint in the GPS device, based on the instructions provided on page 29 of this manual. The coordinates should be recorded from the corner at which you began the GPS area measurement, which should be the northwest corner. When you record the field coordinates, be sure that you list “N” North on the top line, and “E” EAST on the second line. It is very hard to correct if errors are made here.

Note: You should create and save a waypoint here with the name “HHID-ParcelID-FieldID”.

Q19: Indicate the degree to which there are trees shading the field. There may be no tree cover, partial tree cover, or heavy tree cover. This question is asked because tree cover may influence GPS precision.

Q20: This question is for the enumerators and should not be read to the respondents. Please check the box that best reflects the weather conditions at the time when you measured the field. This is because certain types of weather conditions can affect the accuracy of GPS measurements. Use the table below as a guide.

Q21: Enter the time you complete GPS activities. Use the Ethiopian clock.

Questions 22-25 are for the enumerators that were given an alternate device for area measurement. Very few enumerators will have an alternate device. Detailed instructions on using the alternate device are found in Annex IV on page 43.

Q22: If you were given an alternate device, enter “1”.

For questions 23-24, use the “GPS Status & Tool” application.

Q23: When you are not using the alternate device it should be in sleep mode (not shut down). When you open the “GPS Status & Toolbox” application, you will see a note that says “Looking for GPS location...” in the center of the screen. This means that the device is searching for satellites. Count the number of seconds it takes for the device to acquire satellites from the moment you open the application. Record the number of seconds in Q23.

Descriptive Picture	Weather Condition	Survey Response Code	Definition
	Clear/Sunny	1	No opaque (not transparent) clouds in the sky.
	Mostly Clear	2	1/8 th to 2/8 th of the sky is covered with opaque (not transparent) clouds.
	Partly Cloudy	3	3/8 th to 4/8 th of the sky is covered with opaque (not transparent) clouds.
	Mostly Cloudy	4	5/8 th to 7/8 th of the sky is covered with opaque (not transparent) clouds.
	Completely Cloudy	5	The sky is completely covered by clouds.
	Rainy	6	The sky is completely covered by clouds and there is precipitation.

Q24: Enter the plot coordinates you see using “GPS Status & Toolbox” application on the alternate device. The coordinates **must** be taken from the same location as the coordinates taken with the Garmin GPS.

Q25: Using the “**Distance and Area Measurement**” application on the alternate device, measure the area and perimeter of the field. Make sure the area is measured in square meters and the perimeter is reported in meters. Detailed instructions are found in Annex IV on page 43.

Q26: Use the clinometer to measure the slope of the field, from the lowest point to the highest point. Record the reading in degrees. See page 30 for instructions on using the clinometers.

Q27: If the selected field is a pure stand maize field, select “1”. If the selected field is not a pure stand maize field, select “2”.

Questions 28-33 are for crop-cutting plots only.

Q28. Using Random Number Table #2, identify the starting corner. This will be the first number in the random number table that corresponds to one of the corners of the field. Enter the number of the corner selected in question 28.

Q29: Enter the compass bearing read down the shorter side of the field.

Q30: Enter the length of the longer side of the field from the starting corner in meters.

Q31: Enter the length of the shorter side of the field from the starting corner in meters.

Q32: Using Random Number Table #3, identify the first number that is less than the length of the longer side of the field. This is the distance you will walk down the long side of the field. Enter the number in question 32.

Q33: Using Random Number Table #3, identify the first number that is less than the length of the shorter side of the field. This is the distance you will walk into the field, parallel to the shorter side. Enter the number in question 33.

SOIL SAMPLING

Record the date the sample is collected using the Ethiopian Calendar.

Q34: Record the time you begin working on the soil collection.

Q35: Indicate the color of the soil based on enumerator observation.

Q37: Enter the ribbon size in mm for the top soil in 37.A and for the subsoil in 37.B.

Q38: Indicate the texture of the top soil in 38.A and for the subsoil in 38.B. If the soil is not smooth or gritty, mark “neither”.

Q39: Write the name of the two dominant tree or shrub species on the field. You may use the local name.

Crop-Cutting Form

This form will only be administered to households that had pure stand maize fields. If the household did not have any pure stand maize fields and, therefore, no fields for crop-cutting, you will not complete this form. The crop-cutting form will be administered when the maize is ready for harvest.

The timing will depend on each individual household and may be very different in different parts of the country.

During the first household visit you will ask the farmer when they expect to harvest the field. This will give you an estimate of when you will need to return to the field. A kebele officer will also notify the Supervisor when the maize harvest is ready to be cut.

The crop-cutting form will be completed over two to visits. First, the enumerator will harvest the crops from the crop-cutting area and record the fresh weight. The teams will then need to **dry the crop until the dry weight is constant from one day to the next (may be around 15 days)** and record the dry weight. After the dry weight is recorded, the crop is returned to the farmer. It is important that the enumerator keeps track of which household the crop comes from and does not mix crops from multiple households.

The instructions for completing the form are below. For detailed instructions on conducting the crop-cutting, see pages 31-33 above.

Questions 1-10: Enter the identification codes as in the household list form and post-planting questionnaire.

Enter the Parcel ID, Field ID and Field Description of the selected fields from the enumerator household list form.

Q12: The enumerator should complete question 12 based on the notes made on the Enumerator Household List Form. If the field is a pure stand maize field, mark “1” and continue with the crop-cutting activities.

Q13: Enumerator observation: was any of the crop-cutting area was harvested before you arrive. Enter “1” if there was even partial harvest from the area before you arrived for crop-cutting.

Q14: Enter the percentage of the 4m x 4m crop-cutting area that was harvested before you arrived for crop cutting. For example, if a quarter of the maize was already harvested, enter 25.

Q15: Enter the date you harvest the crop-cutting area and take the fresh weight.

Q16: Using the **analog scale** record the weight of the fresh crop from each quadrant. Remember to keep the crop from each 2mx2m quadrant separate even during the drying phase. You should label the bags with the household ID, parcel ID, field ID and quadrant ID in order to keep track. To record in kilogram (KG), enter the weight in the KILO column. To record in grams, enter in the GRAM column. Remember, there are 1000 grams in 1 kilogram. NOTE: Make sure the scale is calibrated so that it balances at “0” with the base plate.

Q17: Using the **digital scale** record the fresh weight in kilogram for each quadrant. Enter the number with three decimals (for example, 6.758). The digital scale only measures up to 8 kilograms (8000 grams) at one time. If you have more than 8 kilograms from one quadrant you will need to split up the harvest and take multiple measurements.

Q18: Note if there was any damage to the maize that was visible at the time of harvest. If the field showed no damage, mark “2” and move to the second field. If that is the only field in the household, you may move to the next household. You will need to take the maize with you and dry it until the dry weight is constant from day to day before conducting the dry weight. Note that this question is answered by the enumerator, not the farmer.

Q19: Estimate the percentage of damage to the maize within the crop-cutting area only. For example, if one quarter of the maize in the 4mx4m was damaged, you would enter “25”. Note that this question is answered by the enumerator, not the farmer.

AFTER DRYING THE MAIZE UNTIL THE WEIGHT IS CONSTANT FROM ONE DAY TO THE NEXT DAY, COMPLETE QUESTIONS 20-22 AND RETURN THE MAIZE TO THE FARMER.

Q20: Enter the date you are weighing the dry crop.

Q21: Weigh the dry crop using the **analog scale**. Make sure that the quadrants match the quadrants that were weighed fresh. For example, make sure that the bag indicated as quadrant A in questions 15 and 16 is the same bag that is indicated as quadrant A in questions 20 and 21.

Q22: Using the **digital scale** record the dry weight in kilogram for each quadrant. Record the value with 3 decimals (for example, 5.546).

Annex I: Education Codes

Level of Education	CODE	Description of Educational Status
A. Based on both curriculums		
K.G	00	K.G, 0 grade (preparatory), nursery, or 1 st grade – cannot read and write
1 st	01	Completed 1 st grade – can read and write or cannot read and write
2 nd	02	Completed 2 nd grade – can read and write or cannot read and write
3 rd	03	Completed 3 rd grade – can read and write or cannot read and write
4 th	04	Completed 4 th grade – can read and write or cannot read and write
5 th	05	Completed 5 th grade
6 th	06	Completed 6 th grade
7 th	07	Completed 7 th grade
8 th	08	Completed 8 th grade
B. Based on previous curriculum		
9 th	09	Completed 9 th grade
12 th	12	Completed 12 th grade and has taken the ESLC exam – passed the exam or did not pass
Certificate	13	Completed grade 12+1
Teacher training	14	Completed Teacher Training Certificate
1 st year college	15	Completed 12+1 years for diploma or above course
2 nd year college	16	Completed 12+2 years for diploma or above program
Diploma	17	Completed diploma course
3 rd year	18	Completed 3 rd year course
B.A / B.Sc. etc.	19	Completed a bachelor degree program (non-specialized) including MD
Above B.A/B.Sc.	20	Postgraduate diploma, M.A, Ph.D., MPhil, etc.
C. Based on the new curriculum		
9 th	21	Completed 9 th grade
10 th	22	Completed 10 th grade, passed the exam or not
11 th preparatory	23	Completed 11 th grade
12 th preparatory	24	Completed 12 th grade
Certificate (10+1)	25	Completed certificate in 10+1 vocational and technical course
10+2 or not	26	Completed 1 year course in 10+2 or level 2 vocational and technical course
Certificate 10+2	27	Completed certificate in 10+2 vocational and technical course
10+3 course	28	Completed 1 year in 10+3 or level 3 vocational and technical course
10+3 course	29	Completed 2 years in 10+3 or level 3 vocational and technical course
Diploma	30	Completed diploma in 10+3 or level 3 vocational and technical course
1 st year college	31	Completed 1 year course in bachelor degree or level 4 program
2 nd year college	32	Completed 2 years in bachelor degree or level 4 program
3 rd year and above college course	33	Completed 3 years or more in bachelor program but did not complete bachelor degree
Bachelor degree	34	Completed bachelor degree or level 4
Above bachelor degree /above	35	Completed bachelor degree and attending level 5 or 1 year postgraduate degree/M.L/PhD

Annex II: Crop Codes

Crop Code	Crop Name	Crop Code	Crop Name	Crop Code	Crop Name
1	BARLEY	41	APPLES	81	RUE
2	MAIZE	42	BANANAS	82	GISHITA
3	MILLET	43	GRAPES	83	WATERMELON
4	OATS	44	LEMONS	84	AVOCADOS
5	RICE	45	MANDARINS	85	GRAZING LAND
6	SORGHUM	46	MANGOS	86	FALLOW LAND
7	TEFF	47	ORANGES	89	FOREST LAND
8	WHEAT	48	PAPAYA	97	PIJAPIN
9	ROMAN	49	PINAPPLES	98	OTHER ROOT CROPS
10	CASSAVA	50	CITRON	99	OTHER LAND
11	CHICK PEAS	51	BEER ROOT	100	NL20F
12	HARICOT BEANS	52	CABBAGE	101	WECHINO
13	HORSE BEANS	53	CARROT	103	WEPAL
14	LENTILS	54	CAULIFLOWER	104	KEENKECH
15	FIELD PEAS	55	GARLIC	105	BUYA
16	VETCH	56	KALE	106	DATES
17	GIBTO	57	LETTUCE	107	ACHINO
18	SOYA BEANS	58	ONION	108	AMBOSHIKA
19	CACTUS	59	GREEN PEPPER	109	SISAL
20	FENNEL	60	POTATOES	110	GIRAMTA
21	CASTOR BEANS	61	PUMPKINS	111	COMTATIE
22	COTTON SEED	62	SWEET POTATO	112	KAZMIR
23	LINSEED	63	TOMATOES	113	STRAWBERRY
24	GROUND NUTS	64	GODERE	114	SHIFERAW
25	NUEG	65	GUAVA	115	OTHER FRUITS
26	RAPE SEED	66	PEACH	116	TIMIZ KIMEM
27	SESAME	67	MUSTARD	117	OTHER SPICES
28	SUNFLOWER	68	FETO	118	OTHER PULSES
29	MEGO	69	SPINACH	119	OTHER OIL SEED
30	SAVORY	70	GREEN BEANS	120	OTHER CEREAL
31	BLACK CUMIN	71	CHAT	121	OTHER CASH CROPS
32	BLACK PEPPER	72	COFFEE	122	OTHERS
33	CARDAMON	73	COTTON	123	OTHER VEGETABLE
34	CHILIES	74	ENSET		
35	CINNAMON	75	GESHO		
36	FENUGREEK	76	SUGAR CANE		
37	GINGER	77	TEA		
38	RED PEPPER	78	TOBACCO		
39	TUMERIC	79	CORIANDER		
40	WHITE LUMIN	80	SACRED BASIL		

Annex III: Soil Sampling Instructions

SEPARATE DOCUMENT PROVIDED TO ENUMERATORS

To measure the area and perimeter, use the **Distance and Area Measurement** application as follows:

1. On the home screen, touch the icon that looks like this:



2. Next, set the distance to measure in meters and the area to measure in square meters. The “logging” should be set to Auto.
3. Stand at the point where you started the compass and rope and the GPS area measurement.
4. While standing at the starting corner, press start and walk around the boundary of the field the same way you did with the Garmin GPS.
5. When you return to the starting corner, press stop.
6. Record the area and perimeter in the questionnaire:



ANNEX V. FIGURE A: FIELD SLOPE

Ask the respondent which slope is most similar to the field. Do not consider the type of crop, only the slope.



Annex VI: Historical Events Calendar

IN AMHARIC MANUAL ONLY