**SIAC Activity 1.1: Testing the Effectiveness of Methodologies for Tracking the Uptake and Adoption of Improved Varieties:**

**Pilot Study: Cassava in Ghana**

**Proposed Study Design**

Draft (MSU, July 3, 2013)

O**bjective:**

To pilot test and validate alternate approaches to collect variety-specific adoption data against a reliable benchmark to determine which method/approach is the most cost-effective (i.e., which method provides a given level of accuracy at the least cost). The idea is to come up with ‘lessons learned’ and recommendations on methods / approaches that can be used in scaling up the collection and assembly of diffusion data on improved varieties.

**Methodology:**

Testing and validating alternate approaches to collect variety-specific adoption data requires two things: 1) Defining alternate approaches to collect variety-specific adoption data; and 2) Defining a ‘reliable benchmark’ against which the alternate approaches will be evaluated. Each of these steps is elaborated below.

*Defining alternate approaches:*

This study will test the effectiveness of the following four **household-based methods** of tracking varietal adoption for cassava.

1. Method A: Elicitation from farmers by asking him/her the names of varieties planted and some basic questions for each variety planted
2. Method B: Farmer elicitation on varietal characteristics by showing a series of photographs (or actual plants). This information will be later used by the analyst to identify varieties based on morphological characteristic data.
3. Method C: A trained enumerator recording observations on varietal characteristics by visiting the field. This information will be later used by the analyst to identify varieties based on morphological characteristic data.
4. Method D: Enumerator taking photos of the plant in the field for latter identification by experts (i.e., breeders)

The protocol associated with each of these methods is described in Annex 1.

*Defining reliable benchmark:*

The accuracy of adoption estimates derived from the above four methods will be evaluated against the varietal identification established through ‘DNA fingerprinting’ of samples collected from the farmers’ field. This will involve the following steps and partners (and tentative costs).

Step 1: Establish a panel or library of DNA fingerprints and a catalogue of morphological characteristics: The Ghana Crop Research Institute (CRI) will collect samples of 18 improved cassava varieties they maintain *in situ* (and are currently in use in Ghana), plus some popular traditional (farmer) varieties to come up with enough sample to fill up one plate (with 95 samples) for DNA fingerprinting and cataloguing the morphological characteristics using module Z (which is the same module to be implemented during the field survey). The plant DNA will be extracted by CRI and sent to Cornell University for DNA fingerprinting analysis. The data on morphological characteristics for each variety included in DNA analysis will be submitted by CRI to MSU in a simple excel file (to be provided by MSU).

Step 2: Collect the samples (plant tissue) for DNA fingerprinting corresponding to each data points where household-based variety-specific adoption information based on alternate methods (1-4) will be collected. The sample collection will be done as part of the household survey to be implemented by local teams put together by the Crop Research Institute (CRI), Agricultural Innovation Consult, and IITA. The collected tissue samples will be shipped to IITA for DNA extraction and further shipped to Cornell for fingerprinting.

**Research Design**

The plan is to conduct this study in 3 major cassava growing Regions of Ghana. A local team led by Dr. Dankyi (socio economist) and Dr. Joe Manu (Cassava breeder) will put together survey teams (enumerators, experts) to implement data and sample collection to achieve the following scope of work:

Scope of the survey:

1. Geographic coverage:  3 major cassava growing regions (Brong-Ahafo, Ashanti and Eastern)
   1. Sample size and sample selection ***(to be finalized)***: The survey will include 500 cassava growers to be selected using a two-stage cluster random sampling method. First districts meeting a certain cassava area or production threshold will be identified as the sampling frame. In the first stage, X number of districts from each Region that meet the area / production threshold will be selected and in the second stage 33-34 villages per Region from across these districts will be randomly selected. Five cassava farmers from each village will be selected based on the criterion of having cassava fields in proximity to the village (to minimize the time and cost involved in doing the field modules).
2. Content:
   1. HH level Questionnaire with sections on HH level characteristics, farm characteristics, two modules on cassava varietal identification with variety-level questions on preferences, use, like/dislike characteristics, etc. Draft version of the Questionnaire to be used is included in Annex 2.
   2. Field level Questionnaire with one module – to be completed by the trained enumerator based on observations during the field visit. See draft questionnaire in Annex 3.
   3. During the field visit, the enumerator will take photos of the cassava plant and GPS coordinates as per the protocol to be established by the cassava experts.
   4. Sample collection: Collection of two leaf samples of each representative variety (that was recorded in the HH level questionnaire) in the field as per the protocol to be established. The enumerator/expert may collect additional samples of cassava plants that appear to be natural variation of the same variety identified by the farmer. In this scenario the field level module (i.e., points b and c) will be completed for each additional sample and given appropriate codes to distinguish them from samples corresponding to those ‘varieties’ reported by the farmers.
   5. The cassava modules to be administered for the plot/field that has the most number of cassava varieties that the farmer grows
3. Assembling and storing the cassava sample at a ‘central location’ and shipping it to IITA in regular batches (once certain numbers are collected)
4. Assembling the photos (with proper identification labels) in a data folder; assembling a panel of experts (cassava breeders) at the end and asking them to identify varieties based on the morphological characteristics (using only photos).
5. Data entry, data cleaning, and delivery of the clean data and a field report (on survey experience) to MSU. The data will include HH level questionnaire data, field level data, and results of the expert consultation using the photos.

**Timeline:** October-December 2013

**Annex 1: Protocol for Implementing the Four Methods of Tracking**

**Varietal Adoption in Cassava**

The protocol to implement this study is still a work in progress and will be finalized in consultation with study partners (IITA, CRI and AI) and during enumerator training and pilot testing. However, below we describe each of the Methods in its current draft stage.

**METHOD A: Elicitation from the farmer**

**This Method consists of:**

1. **Implementing Section X, questions X11 – X16.**

This Section collects information from the farmer on cassava varieties he/she planted in one cassava field during the time of the interview. This be integrated in the HH level survey instrument as proposed in the draft survey instrument in Annex 2.

**METHOD B: Elicitation on the characteristics of varieties based on photographs or actual plant**

**This Method consists of:**

1. **Implementing Section Y**

This Section requires good quality photos of varieties showing different morphological characteristics and asking the farmer to identify the characteristic (e.g., color, size, shape) that best match with the characteristics of the variety he/she is growing.

1. **Matching the characteristic data from Section Y with the variety specific characteristics (as catalogued by the cassava breeder) after the survey is completed.**

This will require interpretation of data by the analyst in consultation (?) with the breeder and determining which variety that data point represents based on the information provided in Section Y.

**METHOD C: Elicitation on the characteristics of varieties based on observation of cassava plant in the field**

**This Method consists of:**

1. **Implementing Section Z – field level survey instrument**

This Section requires the enumerator recording different morphological characteristics based on his/her observation of a plant specimen selected for this module. The protocol for selecting the plant specimen for module Z will include:

1. Visiting the field that was identified in Module X and asking the farmer to show/identify different cassava varieties he/she is growing in that field that were listed in Section X
2. Enumerator selecting one plant representative of each variety
3. Enumerator recording the morphological data for that selected plant in Section Z
4. **Matching the characteristic data from Section Z with the variety specific characteristics (as catalogued by the cassava breeder) after the survey is completed.**

This will require interpretation of data by the analyst in consultation (?) with the breeder and determining which variety that data point represents based on the information provided in Section Z.

**METHOD D: Identification of varieties by experts (i.e., breeders) based on photographs**

**This Method consists of:**

1. **Taking photographs of the cassava plant in the field as per the instructions included in Section Z.**

The enumerator will take photographs of the cassava plant selected for Method C. A protocol to record and identify each photo with the correct farmer, field and variety data point will be developed.

1. **Consultation with cassava experts/breeders to identify cassava varieties.**

An expert elicitation meeting will be convened after the end of the survey to seek their opinion on varietal identification based only on the photographs.

**Annex 2**

**Draft Questionnaire—HH Level Survey Instrument**

**Testing the effectiveness of methodologies for tracking the uptake and adoption of improved varieties of Cassava in Ghana**

**Household-level Questionnaire, 2013**

***INSTRUCTIONS****: Please ask to speak to the person* ***primarily responsible for CASSAVA production decisions****. If this person is not available, please record the reason for this absence in your notepad and find other farmer from the list to interview. If this person is available, read the CONSENT STATEMENT and if he/she agrees to be interviewed, begin the interview.*

**CONSENT STATEMENT**

Hello, my name is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**and my colleagues with me today are**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. We are assisting the Crop Research Institute (CRI) from Ghana and Michigan State University (MSU) from the U.S. in conducting a study on the adoption of cassava varieties in Ghana. I would like to ask you some general questions related to your background/experience, your family and your farming practices, and about the cassava varieties you are currently growing on your farm. We would also like to visit with you one of the fields in which you are growing cassava and take some photographs of the plants and collect some leaf samples. The **information you provide and the samples we collect** will be used to determine the best method to collect and track varietal adoption data for cassava in Ghana and elsewhere.

The interview part of this study will take 30-45 minutes and the field visit will take another 30-45 minutes of your time. Your participation is voluntary. Your refusal to participate or to withdraw from the study carries no penalty or loss of any benefits. You are free to not answer any of the questions I will ask. However, your answers will be valuable for the research we are conducting. All information provided by you will be kept confidential. Your privacy will be protected to the maximum extent allowable by law.

If you have any questions or concerns about your participation in this study, please contact Professor Mywish Maredia at Michigan State University, 89 Agriculture Hall, East Lansing, MI 48824, USA, phone (517) 353-6602, e-mail [maredia@msu.edu](mailto:maredia@msu.edu) or, Dr. Joe Manu-Aduening at CRI, Kumasi, phone 51-60389, email [jmaduening@cropsresearch.org](mailto:jmaduening@cropsresearch.org).

Do you have any questions about this study?

**<*Enumerator: pause and respond to any questions raised, then continue with the following statement*>**

By continuing this interview, you indicate your willingness to **voluntarily** participate in the study.

**NOTES**

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| *\*Sentences in “italics” are instructions for the enumerator* | | |
| \*ID = Identification | \*HH = Household | \*NGO = Non-government Organization |
| \*sp = Specify / provide details | \*m.a.s.l. = meters above sea level |  |

**A. Respondent’s general information and family’s socioeconomic characteristics**

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| --- | --- | --- | --- | --- |
| *I would like to start by asking you some general questions regarding you and your household. Then, I would like to ask you questions about your current (2013) cassava production, and the assets and resources your HH owns.* | | | | |
| **A1**. Date of the Interview: \_\_\_\_\_\_\_ / \_\_\_\_\_\_\_ / \_**2013**\_  A1a. Month A1b. Day A1c. Year | | **A2**. Enumerator name: | **A3**. Supervisor name: | **A4**. Region: |
| **A5**. District: | **A6**. Village name:  **A7.** Village ID number: | **A8**. Household number: | **A9**. Household ID (*combine A7 and A8*):  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  (***Write this ID at the top of each page***) | |
|  | | | | |
| **A10**. Does your HH currently grow cassava in any fields?  \_\_\_\_\_\_\_\_\_  [1] YES => *Continue with the interview*  [2] NO => *Give thanks to the producer and end the interview* | | **A11**. Location of the home:  Latitude (°, ‘, “): \_\_\_\_\_\_ , \_\_\_\_\_\_ , \_\_\_\_\_\_ Longitude (°, ‘, “): \_\_\_\_\_\_ , \_\_\_\_\_\_ , \_\_\_\_\_\_  A11a. ° A11b. ‘ A11c. “ A11d. ° A11e. ‘ A11f. “ | | |
| **A12**. Name of the respondent:    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  A12a. First Name A12b. Last Name  **A13** Respondent’s relation to the head of the HH: \_\_\_\_\_\_\_\_\_  [1] Self **>A15**  [3] Son/Daughter  [2] Spouse [99] Other (specify): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | **A14.1** Gender of the Head of the Household: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  [1] Male [2] Female  **A14.2** Education of the Head of the HH (years with formal education completed) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **A14.3** Is the Head of the HH married? [1] Yes [2] No **> A15** \_\_\_\_\_\_\_\_\_  **A14.4** If married, education of the Spouse (years with formal education completed) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |

***Enumerator****: the following questions all relate to the person you are interviewing (i.e., the respondent).*

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| **A15** | **A16** | **A17** | **A18** | **A19** | **A20a** | **A20b** | **A20c** | **A21a** | | **A21b** | | **A21c** | | **A21d** | **A21e** | **A21f** |
| Gender of the respon-dent  [1] Male  [2] Female | Age of respon-dent  (years) | Education of the respondent (years with formal education completed)  (years) | How long have you been **living** in this village?  (years) | How long have you been **growing cassava**?  (years) | How many **people** belong to this household today (i.e., number of people that eat all their meals together)?  *(Include the respondent)* | | | How many **people** in your household are in the following **age group**?  (*Write the number in each group. The sum across all groups should equal the total in A20c*) | | | | | | | | |
| Male | Female | Total | 0-5 | 6-10 | | 11-17 | | 18-40 | | 41-65 | >65 |
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**Section A cont’d**

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| **A22a** | **A22b** | **A22c** | **A23a** | **A23b** | **A23c** | **A24a** | **A24b** | **A24c** | **A25a** | **A25b** | **A25c** |
| In this **last season**, what were the three most important crops on your household’s farm in terms of **total area planted**?  (*See codes below*) | | | In this **past year** **(2012)**, what were the three most important crops for your household in terms of the **amount produced for your own consumption as food**?  (*See codes below*) | | | In this **last season**, what were the three most important crops on your household’s farm in terms of **purchased inputs applied**?  (*See codes right*) | | | In this **last season**, what were the three most important crops on your household’s farm in terms of **total family labor devoted**?  (*See codes right*) | | |
| First | Second | Third | First | Second | Third |  |  |  |  |  | Total |
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| **Codes for A22a-A25c:**  [1] Cassava  [2] Maize  [3] Yam | [4] Oil palm  [5] Cotton  [6] Tobacco  [7] Cowpea | [8] Soybeans  [9] Sorghum  [10] Cocoa  [11] Potatoes | [12] Sweet potatoes  [13] Rice  [14] Groundnuts  [15] Millet | [16] Vegetables (e.g. tomatoes, pepper, onions)  [17] Fruits (e.g. mango, papaya, pineapple)  [88] Not applicable (no more crops grown)  [99] Other (specify in corresponding space) |

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| **A26a** | **A26b** | **A26c** | **A27a** | **A27b** | **A27c** | **A27d** | **A27e** | **A28** | **A29** |  | **Codes for A26a-c:** |
| What material is your house […] made of  (*See codes right*) | | | Does your home have […]  [1] YES  [2] NO | | | | | How many **hectares** of land does your HH **own**? | How many **hectares** of land did your HH **rent to others this past season?** |  | [1] Wood  [2] Compacted mud/ clay  [3] Cement  [4] Stone  [5] Dirt  [6] Metal  [7] Straw  [8] Tile  [99] Other (specify in corresponding space) |
| Walls | Floor | Roof | Well | Latrine | Bathroom | Running water | Electricity |  |
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| **A30** | **A31a** | **A31b** | **A31c** | **A32** | **A33** | **A34** |  | **Codes for A31a-c:** | |
| How many **hectares** did your HH **rent from others this past season**? | Which were the three major **sources of income** for your HH **in the past 12 months**?  (*See codes right*) | | | In a typical year, what share of your HH **income** comes from cassava sales?  [0] Zero—I don’t sell cassava  [1] Less than 10%  [2] Between 10% and one quarter  [3] Between quarter and half  [4] More than half | **How far** is your house from the nearest **market**?  (km) | In the last 12 months, how many times did you come in contact with an agricultural extension agent or a researcher either individually or in a group setting? |  | [1] Field crop sales (e.g., maize, rice, cassava)  [2] Horticulture crop sales (e.g., fruits and veg)  [3] Cocoa and oil palm sales  [4] Dairy product sales  [5] Livestock sales for meat  [6] Other agricultural sales (specify) | [7] Renting/leasing land or farm equipment  [8] Wages/salaries from agricultural labor  [9] Wage/salaries from outside agriculture (e.g. gov’t. job, teacher, bank clerk)  [10] Commerce (sale of products)  [11] Remittances  [99] Other non-agricultural activities (specify) |
| Highest | Second | Third |  |
|  |  |  |  |  |  |  |  |

**X. Cassava Varieties Planted in One Cassava Field**

*Now I would like to ask you about the field in which you are growing the* ***most number of cassava varieties***

**X0.** First tell me, in how many fields are you or anyone in your household currently growing cassava? [\_\_\_\_\_\_\_\_\_\_] ***<if the response is 1, skip to X2>***

**X1.** In which field are you planting the most number of varieties of cassava? ***<if all the fields have same number of varieties, then ask the farmer to identify a field that is closest to the village. Write down a short descriptor for this field such as a unique location, landmark, direction from the village, etc. and tell the respondent that this will be referred as the ‘cassava field’ in this survey and will be visited later on>*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **X2** | **X3** | **X4a** | **X4b** | **X5** | **X6a** | | | **X6b** | | **X6c** | **X6d** | **X7** |
| How long does it normally take you to walk from your house to this cassava field  *(Note the response in minutes)* | What is the ownership status of this field?  [1] Own with title  [2] Own but no title  [3] Rented-in  [4] Other (specify) | What is the size (area) of this field? *(farmer estimate)*  *(Specify the unit, for e.g., hectare, acres, etc.)* | | Is cassava inter-cropped on this field?  [1] YES  [2] NO => *Go to X8* | **If YES**, crops associated with?  (*List up to four crops in the descending order of area planted; i.e. start with biggest*) | | | | | | | What proportion of this field is planted to **cassava?**  [1] 25% or less  [2] One-third  [3] 50%  [4] Two-thirds  [5] 75% or more |
| [1] Maize  [2] Sorghum  [3] Millet | [4] Rice  [5] Cocoa  [6] Groundnut | | | [7] Cowpea  [8] Yam  [9] Oil palm | | [88] No more crops  [99] Other (sp.) |
| Area | Unit | 1st | | 2nd | | 3rd | | 4th |
| *minutes* |  |  |  |  |  | |  | |  | |  |  |

***X8: Enumerator: Please note the time before continuing this module (hh:mm) X8.1\_\_\_\_\_\_\_:X8.2\_\_\_\_\_\_\_***

***INSTRUCTIONS: Read the following to the farmer*:** NowI would like to ask you about the cassava varieties you are currently growing on this field. If you have planted more than one variety of cassava, please tell me about the varieties you are growing on this field in the order of importance (variety with biggest area first).

***Enumerator: Please use one row for each variety the farmer is growing on this field***

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| **X9** | **X10** | **X11** | **X12** | **X13** | **X14** | **X15a** | **X15b** | **X16** |
| How many varieties are you currently growing on this field? | Variety ID  *(The number of rows for the remaining questions should match the number in X9)* | Name of the Variety planted on this field  *(As reported by the farmer)*  *(Writelegibly; for post-coding)*  [97] Don’t know | What proportion of the **cassava area in this field** is planted with this variety (give a rough estimate)?  ***<Total across all rows should equal 100>*** | Is this variety a local or an improved variety?  [1] Local, traditional or native  [2] Improved  [97] Don’t know | Year when you first planted this variety on your farm  YYYY  [97] more than 10 years ago, but don’t remember the exact year | Source of first and current season’s planting material  [1] Saved from own harvest  [2] Purchased from the market  [3] Purchased from other farmers  [4] Provided free by other farmers  [5] From NGOs /government  [6] From a research institute  [97] Don’t remember/ Don’t know  [99] Other (specify): | | When was the last time you acquired (from outside your farm) the planting material of this variety for use on your farm?  *Indicate number of years prior to 2013* |
| First planting material | Current season |
|  | **V1** |  |  |  |  |  |  |  |
|  | **V2** |  |  |  |  |  |  |  |
| **V3** |  |  |  |  |  |  |  |
| **V4** |  |  |  |  |  |  |  |
| **V5** |  |  |  |  |  |  |  |
| **V6** |  |  |  |  |  |  |  |
| **V7** |  |  |  |  |  |  |  |

***X17: Enumerator: Please note the time before continuing this module (hh:mm) X17.1\_\_\_\_\_\_\_:X17.2\_\_\_\_\_\_\_\_***

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| **X10** | **X11** | **X18a** | **X18b** | **X19** | **X20a** | **X20b** | | **X20c** | | **X21a** | **X21b** | **X21c** | **X22** |
| Variety ID | Name of the Variety planted on this field  (as reported by the farmer)  *(Copy from previous page, X11)* | Have you planted this variety on any other field on your farm?  [1] Yes  [2] No  [3] I did not plant cassava on any other field | Have you shared the planting materials of this variety with others in the past?  [1] Yes  [2] No  [97] Don’t remember | What do you mainly use this variety of cassava for?  Need types of different uses  [1] Mainly for making fufu  [2] Mainly for making gari  [3] Mainly for frying or boiling  [4] Mainly for home processing into flour  [5] Mainly to sell for industrial processing  [6] Mainly as animal feed  [7] Mainly to sell as fresh produce  [99] Other uses (specify) | What do you **LIKE** the most about this variety?  *(List up to three features in the descending order of importance)*  [1] Poundability  [2] Taste  [3] Root size  [4] Root color  [5] Fast cooking  [6] Fast maturing  [7] Resistant to pest and diseases  [8] Stores for a long time after harvest  [9] High yielding (i.e., it yields larger and more number of roots per plant)  [88] Not applicable (no more features I like)  [98] Other cooking/processing quality (specify)  [99] Other agronomic characteristic (specify) | | | | | What do you **NOT LIKE** about this variety?  *(List up to three features in the descending order of importance)*  [1] Does not pound well  [2] Taste  [3] Root size  [4] Root color  [5] Slow cooking  [6] Late maturing  [7] Susceptible to pest and diseases  [8] Does not store for a long time after harvest  [9] Low yielding (i.e., it yields smaller and less number of roots per plant)  [88] Not applicable (no more features I dislike)  [98] Other cooking/processing quality (specify)  [99] Other agronomic characteristic (specify) | | | In the last five years, have you increased, decreased or not changed the area planted to this variety on your farm?  [1] Increased  [2] Decreased  [3] Same  [97] Don’t know |
| Most Like | | Second | | Third | Most Dislike | Second | Third |  |
| **V1** |  |  |  |  |  | |  | |  |  |  |  |  |
| **V2** |  |  |  |  |  | |  | |  |  |  |  |  |
| **V3** |  |  |  |  |  | |  | |  |  |  |  |  |
| **V4** |  |  |  |  |  | |  | |  |  |  |  |  |
| **V5** |  |  |  |  |  | |  | |  |  |  |  |  |
| **V6** |  |  |  |  |  | |  | |  |  |  |  |  |
| **V7** |  |  |  |  |  | |  | |  |  |  |  |  |

X22: Other than the varieties listed above (in X11), have you planted any other cassava varieties on any other fields on your farm? \_\_\_\_\_\_\_

[1]Yes [2]No *>X24* [98] Not applicable as there are no other fields in which cassava is planted *>X24*

X23. **If Yes**, please give the names of these other varieties and indicate if it is a local or an improved variety:

X23.1. Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X23.2: Is it local or improved? \_\_\_\_\_\_ [1] Local [2] Improved [97] Don’t know

X23.3. Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X23.4: Is it local or improved? \_\_\_\_\_\_ [1] Local [2] Improved [97] Don’t know

X23.5 Name:.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X23.6: Is it local or improved? \_\_\_\_\_\_ [1] Local [2] Improved [97] Don’t know

X24. Were you growing any other cassava varieties in the past that you are not planting anymore? [1]Yes [2]No *>X26 \_\_\_\_\_\_\_\_\_\_*

X25. If Yes, please give the names of these varieties that you are not growing anymore, indicate if it was a local or an improved variety, and reason for discontinuing:

Codes for reason:

1= Lack of planting material

2= Did not have desired qualities

99=Other (specify)

X25.1. Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X25.2: Was it local or improved? \_\_\_\_\_\_ [1] Local [2] Improved [97] Don’t know X25.3. Reason \_\_\_\_\_\_

X25.4. Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X25.5: Was it local or improved? \_\_\_\_\_\_ [1] Local [2] Improved [97] Don’t know X25.6. Reason \_\_\_\_\_\_

X25.7 Name:.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X25.8: Was it local or improved? \_\_\_\_\_\_ [1] Local [2] Improved [97] Don’t know X25.9. Reason \_\_\_\_\_\_

X26. What is the maximum amount of money you would be willing to pay for a variety that has the desired qualities and

is enough for planting the field described in X1? \_\_\_\_\_\_\_\_\_\_\_\_\_ Ghanaian Cedis

**Section Y: Characterization of Cassava Varieties in One Cassava Field**

***INSTRUCTIONS: Read the following to the farmer*:***Now**I would like to ask you about the characteristics of each of the cassava varieties planted on the cassava field identified earlier in the same order as listed in the previous Section*.

***Y0: Enumerator: Please note the time before continuing this module (hh:mm) Y0.1\_\_\_\_\_\_\_:Y0.2\_\_\_\_\_\_\_***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **X10** | **Y1** | **Y2** | **Y3** | **Y4** | **Y5** | **Y6** | **Y7** | | **Y8** | **Y9** | **Y10** | **Y11** |
| Variety ID | Please tell me the characteristics of *[variety]* you would observe **THREE** months after planting?  ***Show pictures or sample plant*** | | Please tell me the characteristics of *[variety]* you would observe **SIX** months after planting?  ***Show pictures or sample plant*** | | | Please tell me the characteristics of *[variety]* you would observe at **MATURITY** or **NINE** months after planting?  ***Show pictures or sample plant*** | | | | | | |
| Color of apical leaves  [3] Light green  [5] Dark green  [7] Purplish green  [9] Purple | Pubescence of apical leaves  [0] Absent  [1] Present | Petiole color  [1] Yellowish-green  [2] Green  [3] Reddish-green  [5] Greenish-red  [7] Red  [9] Purple | Leaf color  [3] Light green  [5] Dark green  [7] Purple green  [9] Purple | Shape of central leaflet  ***Note the code number on the selected picture*** | Color of stem  [3] Orange  [4] Greeny-yellowish  [5] Golden  [6] Light brown  [7] Silver  [8] Gray  [9] Dark brown | | Growth habit of stem  [1] Straight  [2] Zig zag | Root Shape  [1] Conical  [2] Conical-cylindrical  [3] Cylindrical  [4] Irregular | Root color (outer skin)  [1] White or cream  [2] Yellow  [3] Light brown  [4] Dark brown | Root color (inner skin)  [1] White or cream  [2] Yellow  [3] Pink  [4] Purple | Color of root pulp  [1] White  [2] Cream  [3] Yellow  [4] Orange [5] Pink |
| **V1** |  |  |  |  |  |  | |  |  |  |  |  |
| **V2** |  |  |  |  |  |  | |  |  |  |  |  |
| **V3** |  |  |  |  |  |  | |  |  |  |  |  |
| **V4** |  |  |  |  |  |  | |  |  |  |  |  |
| **V5** |  |  |  |  |  |  | |  |  |  |  |  |
| **V6** |  |  |  |  |  |  | |  |  |  |  |  |
| **V7** |  |  |  |  |  |  | |  |  |  |  |  |

***Y12: Enumerator: Please note the time you FINISH this module (hh:mm) Y12.1\_\_\_\_\_\_\_:Y12.2\_\_\_\_\_\_\_***

**B. Agricultural information and cassava crop management**

*Now I would like to ask you several questions related to your agricultural production and the management of the cassava crop*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **B1** | **B2** | **B3** | **B4a** | **B4b** | **B4c** | **B5** | **B6** |
| In these **past 12 months**, did you obtain **agricultural credit** for your crop production (all crops)?  [1] YES  [2] NO => ***Go to B3*** | **If YES**, did you use part or all of this credit in the **cassava crop**?  [1] YES, all  [2] YES, partly  [3] NO | In these **past 12 months**, did you obtain any **agricultural inputs through a government or an NGO program**?  [1] YES  [2] NO | In general, where do you obtain **agriculture-related** **information** (e.g. new varieties, production technologies)?  *(List up to three sources)*  [0] I never seek information  [1] Other farmer  [2] Local input stores  [3] Gov’t. Extension Agent  [4] NGOs  [5] Radio / television / newspaper  [6] Ag Research Institute (e.g.,CRI)  [88] Not applicable (no more sources)  [99] Other (specify) | | | If you have a **stress** **affecting your cassava** crop (e.g, pests, diseases), **whom do you ask for advice** on how to manage this stress?  *(List the MAJOR source)*  [0] I never ask for advice  [1] There is no-one I could ask for advice  [2] Other farmer  [3] Local input stores  [4] Gov’t. Extension Agent  [5] NGOs  [6] I contact a research institute (e.g. CRI)  [99] Other (specify) | In general, who is the **person responsible for selling** the **cassava** surpluses?  [0] I never sell  [1] Self  [2] Spouse  [3] Self & Spouse  [4] Son/Daughter  [5] Other relative  [6] Other non-relative |
| Primary | Second | Third |
|  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **B7** | **B8** | **B9** | **B10** | **B11** | **B12** | **B13** |
| In general, **where do you sell** your **cassava** surpluses?  [0] I never sell  [1] In the field  [2] At home  [3] Local market  [4] Other markets | In general, do you seek **price information** when you are planning to sell your cassava surpluses?  [1] YES  [2] NO => ***Go to B10*** | **If YES**, what is the main source of price information?  [1] Other farmer  [2] Local input store  [3] Local market  [4] Gov’t. Extension Agent  [5] NGOs  [6] Radio / television / newspaper  [7] The person whom I sell to  [99] Other (specify) | In general, when you sell your cassava surpluses, are you able to **negotiate the price** with your buyer?  [1] YES  [2] NO, I never sell  [3] NO, I cannot negotiate price | In a typical year, what share of your HH annual cassava **consumption** is satisfied by your own production?  [1] A quarter or less  [2] Between one quarter and half  [3] Between half and three quarters  [4] More than three quarters but less than 100%  [5] 100% (I don’t buy cassava for home consumption) | In general, what is the **main pest** affecting your current cassava crop?  (NEED TO LIST PESTS) | What is the main limitation to increase your **cassava production**?  [1] Poor quality of soils  [2] Cannot apply fertilizer  [3] Cannot control pests/diseases  [4] Cannot control weeds  [5] I depend on rains  [6] Varieties I use have low yields  [7] Labor constraint  [8] I cannot get enough planting materials for the varieties I want  [9] I have no access to more land  [99] Other (specify) |
|  |  |  |  |  |  |  |

**Section C: Food Consumption (dietary diversity) and Ownership of Assets and Livestock**

***INSTRUCTIONS: Read the following to the farmer*:***Before we end this interview, I would like to ask you about the types of foods you ate yesterday and any animals and durable goods you own.*

**C1**. Tell me, if there was any festival, feast, celebration in which you or your family participated yesterday? [1] Yes [2] No |\_\_\_\_\_|

**C2**. Now please tell me about the types of foods you or anyone else in your household ate **YESTERDAY** during the day or at night:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Did you eat...?** | **[1] Yes**  **[2] No** |  | **Did you eat…?** | **[1] Yes**  **[2] No** |  | **Did you eat…?** | **[1] Yes**  **[2] No** |
| 1. Any foods made from cereal grains (e.g., maize, wheat, rice, sorghum, millet)? |  |  | e. Any beef, pork, lamb, goat, chicken, other birds, meat of animals, liver, kidney, heart, or other organ meats? |  |  | j. Any cheese, yogurt, milk or other milk products? |  |
| 1. Any cassava, yam, potatoes, sweet potatoes or any other foods made from roots or tubers? |  |  | f. Any fresh or dried fish or shellfish? |  |  | k. Any foods made with oil, fat, or butter? |  |
| 1. Any vegetables? |  |  | g. Any eggs? |  |  | m. Any sugar or honey? |  |
| d. Any fruits? |  |  | h. Any foods made from cowpea, beans, groundnut, peas, lentils, or nuts? |  |  | n. Any other foods, such as condiments, coffee, tea? |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **C3** | **C4** | **C5** | **C6** | **C7** | **C8** | **C9** | **C10** | **C11** | **C12** | **C13** | **C14** | **C15** | **C16** | **C17** | | **C18** | **C19** | **C20** |
| **How many** of the following **animals** does your household currently own?  (*If none, write zero*) | | | | | | | **How many** of the following assets does your household currently own?  (*For each item, write a number. If none, write zero*) | | | | | | | | | | | |
| Horses | Cows | Goats | Sheep | Donkeys | Pigs | Oxen | Bicycles | Motor-cycles | Cars or trucks | Tractors | Carts (animal drawn) | Animal plows | Backpack sprayer | Tele-visions | Radios | | Mobile phones | Computers |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |

***Thank you very much for answering my questions***

***As part of this survey we would now like to visit the cassava field and take some photographs of the cassava plants***

***and collect some leaf samples***

*(INSTRUCTION: Ask the respondent if he/she is available to accompany you to the field at this time. If not set up a time to visit the field later in the day)*

**Annex 3**

**Draft Questionnaire—Field Level Survey Instrument**

**Characterization of Cassava Varieties in One Cassava Field -– Field Level Survey Instrument, 2013**

***Protocol for completing Section Z****:*

1. This Module should be completed by the Enumerator by visiting with the farmer to the cassava field identified in Section X and Y
2. Record **the GPS coordinates** of the field
3. Ask the farmers to identify plants representing each of the varieties listed in Section X (X11) (see footnote on this step)
4. Randomly select a plant representing each variety and ask the farmer about the planting date of that selected plant (record this in Z5 and Z6)
5. Complete Section Z, which involves recording the plant characteristics **by the Enumerator** through observation
6. Take photographs of the selected plant as indicated in Section Z (see the protocol below).
7. Collect two leaf samples from the selected plant
8. Photographs and leaf samples should be labeled with appropriate identifier information that includes HH id (A8) and Variety id (X10) and Variety name (X11)

***Footnote for step c:*** *If the enumerator observes variations in visible morphological characteristics (e.g., color of the leaf, stem, petiole, branching habit, etc.) within the group of plants identified by the farmer as belonging to the same ‘variety,’ then the enumerator should implement Section Z and collect samples for each distinct variation he/she observes in the field. In this scenario, the entries in Section Z, the photographs, and the collected samples should be labeled as “<variety name> 1”, “<variety name> 2”, etc. The information on variations within the same variety should be recorded in the second half of the table, in the section labeled ‘Observed variations in varieties’.*

***Protocol for taking Photos:***

1. *For each variety identified in Section Z (or its variation), write on a piece of paper the household id (A8), variety id (X10) and variety name (X11).*
2. *For a given variety, before taking the photos of different plant characteristics as indicated in Section Z, take a photo of the page with variety identification.*
3. *Take all the photos for a given variety before going to the plant specimen representing the next variety.*
4. *Follow Steps b and c for each variety to be recorded in Section Z, including the “Variations of Varieties.”*

**Section Z. Field Level Survey**

***INSTRUCTION: Record the following information. Note that information on identifiers (name of the region, district, village and HH id) should match the information in Section A.***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Z1**. Date of the field visit: \_\_\_\_\_\_\_ / \_\_\_\_\_\_\_ / \_**2013**\_  Z1a. Month Z1b. Day Z1c. Year | | **Z2**. Enumerator name: | **A4**. Region: | **A5**. District: |
| **A6.1**. Village name:  **A6.2.** Village ID number: | **A8**. Household ID:  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  (***Write this ID at the top of each page***) | **Z3**. Location of the field (GPS Coordinates)  Latitude (°, ‘, “): \_\_\_\_\_\_ , \_\_\_\_\_\_ , \_\_\_\_\_\_ Longitude (°, ‘, “): \_\_\_\_\_\_ , \_\_\_\_\_\_ , \_\_\_\_\_\_  Z3a. ° Z3b. ‘ Z3c. “ Z3d. ° Z3e. ‘ Z3f. “ | | |

Z4. How far is this field from the nearest paved road? ***(Enumerator estimate; if the field is next to the road write 0)***

**Z4a**. **Distance** \_\_\_\_\_\_\_\_\_\_\_ **Z4b. Unit** [1] Feet [2] km \_\_\_\_\_\_\_\_\_\_

X9. Number of varieties the farmer has reported he/she is growing on this field? (copy from X9): \_\_\_\_\_\_\_\_\_ ***(list these varieties on the next page in the same order as recorded in Section X, question X11).***

***AFTER COMPLETING THE INFORMATION, TAKE A PHOTO OF THIS TABLE BEFORE CONTINUING SECTION Z.***

***Household Id: \_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***Enumerator: Please use one row for each variety the farmer is growing on this field***

*Z5****: Enumerator:*** *Please note the time you start this module, (hh:mm) Z5.1\_\_\_\_\_:Z5.2\_\_\_\_\_*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **X10** | **X11** | **Z6.1** | **Z6.2** | **Z7** | **Z8** | **Z9** | **Z10** | **Z11** | **Z12** | **Z13** | **Z14** |
| Variety ID | Name of the Variety  *Write legibly*  *The varieties should be listed in the same order as in X11. If this module is completed for plants representing natural variations, record them under “Variations of Varieties” and label the variety as <variety name 1>, <variety name 2>, etc.* | ***Select a plant identified by the farmer as representing the variety in X11 (avoid border plants) and record the following characteristics of the plant representing each variety planted on this Field. Take photos as noted below per the protocol established.*** | | | | | | | | | |
| Planting date  *(Ask the farmer)*  MM | YY | | Color of apical leaves  [3] Light green  [5] Dark green  [7] Purplish green  [9] Purple  [99] Not observable due to Plant age (too old)  ***If observable, take photo*** | Pubescence of apical leaves  [0] Absent  [1] Present  [99] Not observable due to Plant age (too old)  ***If observable, take photo*** | Petiole color  [1] Yellowish-green  [2] Green  [3] Reddish-green  [5] Greenish-red  [7] Red  [9] Purple  ***Take photo*** | Leaf color  [3] Light green  [5] Dark green  [7] Purple green  [9] Purple  ***Take photo*** | Shape of central leaflet  ***Note the code number from the picture*** | Color of stem  [3] Orange  [4] Greeny-yellowish  [5] Golden  [6] Light brown  [7] Silver  [8] Gray  [9] Dark brown  ***Take photo*** | Growth habit of stem  [1] Straight  [2] Zig zag | Branching height  [0] No branching or generally unbranched  [1] Low branching (less than 1/3 of total plant)  [2] High branching (above 2/3 of total height)  ***Take photo*** |
| **V1** |  |  |  |  |  |  |  |  |  |  |  |
| **V2** |  |  |  |  |  |  |  |  |  |  |  |
| **V3** |  |  |  |  |  |  |  |  |  |  |  |
| **V4** |  |  |  |  |  |  |  |  |  |  |  |
| **V5** |  |  |  |  |  |  |  |  |  |  |  |
| **V6** |  |  |  |  |  |  |  |  |  |  |  |
| **V7** |  |  |  |  |  |  |  |  |  |  |  |
| **Observed Variations in Varieties:** | | | | | | | | | | | |
| **V11** |  |  |  |  |  |  |  |  |  |  |  |
| **V12** |  |  |  |  |  |  |  |  |  |  |  |
| **V13** |  |  |  |  |  |  |  |  |  |  |  |
| **V14** |  |  |  |  |  |  |  |  |  |  |  |
| **V15** |  |  |  |  |  |  |  |  |  |  |  |

***Household Id: \_\_\_\_\_\_\_\_\_\_\_\_\_\_***

**Section Z (Cont’d)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **X10** | **X11** | **Z15** | **Z16** | **Z17** | **Z18** |
| Variety ID | Name of the Variety  *Write legibly*  *Copy from the previous page.* | ***Uproot the cassava from the selected plant and record the following observations*** | | | |
| Root Shape  [1] Conical  [2] Conical-cylindrical  [3] Cylindrical  [4] Irregular  ***Take Photo*** | Root color (outer skin)  [1] White or cream  [2] Yellow  [3] Light brown  [4] Dark brown | Root color (inner skin)  [1] White or cream  [2] Yellow  [3] Pink  [4] Purple  ***Take Photo*** | Color of root pulp  [1] White  [2] Cream  [3] Yellow  [4] Orange  [5] Pink  ***Take Photo*** |
| **V1** |  |  |  |  |  |
| **V2** |  |  |  |  |  |
| **V3** |  |  |  |  |  |
| **V4** |  |  |  |  |  |
| **V5** |  |  |  |  |  |
| **V6** |  |  |  |  |  |
| **V7** |  |  |  |  |  |
| **Observed Variations in Varieties:** | | | | | |
| **V11** |  |  |  |  |  |
| **V12** |  |  |  |  |  |
| **V13** |  |  |  |  |  |
| **V14** |  |  |  |  |  |
| **V15** |  |  |  |  |  |
| **V16** |  |  |  |  |  |

***Z19: Enumerator: Please note the time you FINISH this module (hh:mm) Z19.1\_\_\_\_\_:Z19.2\_\_\_\_\_***