

**Table S1. QUESTIONNAIRE**

**1. IDENTIFICATION**

| No  | QUESTIONS AND ANSWERS  |
|-----|--|
| 1.1 | Date: /_____/_____/____  |
| 1.2 | Start: /_____/_____/ End: /_____/_____/  |
| 1.3 | GPS coordinates of the concession: Latitude:_____<br>; Longitude_____; Altitude_____ |
| 1.4 | Identification No. of the questionnaire  |
| 1.5 | Investigator_____ Name   |
| 1.6 | Village/City: _____  |
| 1.7 | Commune _____  |
| 1.8 | Department _____   |
| 1.9 | Région_____  |

**2. GENERAL INFORMATION**

2-1 Respondent's First and Last Name: /\_\_\_\_

2-2 Relationship with the head of household: /\_\_\_\_\_/

1=head of household 2=Wife 3=Spouse 4=Brother 5=Sister 6=Father 7=Mother 8=Son  
9=Daughter 10=Nephew 11=Niece 12=Uncle 13=Aunt 14=Cousin 15=Cousin 16=Grandfather  
17=Grandmother 18=Other (specify)

2-3 Age of head of household: /\_\_\_\_\_/

2-4 Gender of Head of Household: /\_\_\_\_\_/

2-5 Marital status of head of household: /\_\_\_\_\_/

2-6 Type of education of the head of household: /\_\_\_\_\_

2-7 If French or Arabic, Level of education of the head of household If the answer is 2 or 4: \_\_\_\_/

2-8 Highest level of education attained in the household /\_\_\_\_\_ /

0=None 1= Primary, 2=College 3= Secondary, 4= University, 5= Other (Specify)

2-9 How many people are in your household?

2-10 Number of young men aged 0 to 15 in the household / \_\_\_\_\_

2-11 Number of young women aged 0-15 in the household / \_\_\_\_\_

2-12 Number of adult men aged 15 to 65 in the household / \_\_\_\_\_

2-13 Number of adult women aged 15-65 in the household / \_\_\_\_\_

2-14 Number of men aged 65 and over in the household / \_\_\_\_\_

2-15 Number of women aged 65 and over in the household / \_\_\_\_\_

2-16 Number of years of agricultural experience of the Head of Household? / \_\_\_\_\_

2-17 Main sources of household income / \_\_\_\_\_

1= Agriculture 2= Processing 3= Trade 4= Livestock 5= money transfer 6=Other (Specify)

### 3. FIELD INFORMATION

3-1 Number of fields in possession in 2020: /\_\_\_\_\_/

3-2 Number of fields exploited in 2020: /\_\_\_\_\_/

#### 3-3 INFORMATION ON THE FIELDS EXPLOITED IN 2020

| Field number | Main culture (Code 1) | Cowpea cultivation<br>1= Yes<br>2= No | Distance from village(km) | Distance from the urban market (km) | Distance from main road (km) | Who makes decisions about this field?<br><br>Code 0 | Total area in ha | Area developed | Cropping system (Code 4) | Soil fertility level (according to farmer) (Code2) | Method of land acquisition (Code3) | If rental, amount of payment per year | Land tenure system (Code 5) |
|--------------|-----------------------|---------------------------------------|---------------------------|-------------------------------------|------------------------------|---|------------------|----------------|--------------------------|--|------------------------------------|---------------------------------------|-----------------------------|
| 1            |                       |                                       |                           |                                     |                              |   |                  |                |                          |  |                                    |                                       |                             |
| 2            |                       |                                       |                           |                                     |                              |   |                  |                |                          |  |                                    |                                       |                             |
| 3            |                       |                                       |                           |                                     |                              |   |                  |                |                          |  |                                    |                                       |                             |

**Code 0:** 1= Head of household 2= Other Man 3=Woman 4= Both 5= Child 6=Other

**Code 1** (crop code): 1 = maize, 2 =, cassava, 3 = millet, 4 = sorghum, 5 = rice, 6 = groundnut, 7 = cowpea, 8 = onion, 9 = tomato, 10 = sweet potato, 11 = sesame, 12 = potatoes, 13 = cotton, 14 = yam, 15 = watermelon, 16 = other (specify)

**Code 2** (soil fertility code): 1 = rich, 2 = medium, 3 = poor

**Code 3** (land code) 1 = inherited, 2 = purchase, 3 = gift (permanent transfer), 4 = loan (temporary transfer to a counterpart), 5 = rent (temporary transfer), 6 = sharecropping, 7 = other (define and describe this type of mandate)

**Code 4** (code for the cropping system): 1 = Irrigated perimeter 2 = Rainfed earth 3 = Shallow bottom

**Code 5** (land system code): 0= No title 1 = land title 2 = Assignment 3 = Co-owner 4 = Other (Specify)

#### 4. Cowpea field crop system

4-1 information on cultivation operations carried out in 2020

| Cowpea field number | Soil preparation                   |                                 |                       | Sowing methods (Code 4) | Weeding methods (Code 5) | Soil fertilization method    |                              | Disease/Pest Management   |                          |                          | Harvesting operations  |                         |                     |                        | Post-harvest operations (activities carried out between harvest and marketing) (Code 13) |
|---------------------|------------------------------------|---------------------------------|-----------------------|-------------------------|--------------------------|------------------------------|------------------------------|---------------------------|--------------------------|--------------------------|------------------------|-------------------------|---------------------|------------------------|--|
|                     | Soil preparation activity (code 1) | Type of equipment used (code 2) | Methods used (code 3) |                         |                          | Types of fertilizer (code 6) | Application methods (code 7) | Diseases / pests (code 8) | Control Methods (Code 9) | Equipment used (code 10) | Methods used (code 11) | Material used (code 12) | Harvested area (ha) | Quantity harvested (T) |  |
| 1                   |                                    |                                 |                       |                         |                          |                              |                              |                           |                          |                          |                        |                         |                     |                        |  |
| 2                   |                                    |                                 |                       |                         |                          |                              |                              |                           |                          |                          |                        |                         |                     |                        |  |
| 3                   |                                    |                                 |                       |                         |                          |                              |                              |                           |                          |                          |                        |                         |                     |                        |  |

Code 1: (Soil preparation) 1 = Clearing/Cleaning, 2 = ploughing, 3 = other

Code 2 (equipment used in the preparation of the earth?) 1 = hoe/daba/Hilaire 2 = animal traction, 3 = tractors, 4 = other (specify)

Code 3: (method) 1 = Brulis, 2 = Manual cleaning, 3 = flat ploughing, 4 = Billonnage;

Code 4: 1 = In-line sowing/transplanting 2 = staggered 3 = on the fly

Code 5: 1 = Only Manual 2 = Only Herbicide, 3 = Herbicide + Manual, 4 = Other (Specify)

Code 6: 1 = No fertilizer, 2 = organic fertilizer, 3 = chemical fertilizers;

Code 7: 1 = Burial, 2 = on the fly, 3 = Localized, 4 = Sprayed (Foliar Application), 5= Other (Specify).

Code 8: 1 = disease, 2 = pests;

Code 9: 1 = mechanical method, 2 = cultivation methods; 3 = chemical method; 4 = biological method; 5 = MPI; 6 = Other to be specified;

Code 10: 1 = Sprayer, 2 = Protective net 3 = Trap 4 = Scarecrow 5 No equipment 6= Other (Specify);

Code 11: 1 = manual, 2 = mechanical, 3 = Other to be specified;

Code 12: 1 = No equipment, 2 = Machete, 3 = machine 4 = Sickle 5 = Pickaxe 6 = Knife 7 = Others to be specified

Code 13: 1=Threshing, 2=Picking, 3=Drying 4=sorting, 5=Transport, 6=Storage, 7=Packaging, 8=Other to be specified



#### 4-4 Cowpea production system

#### 4-5 Cowpea variety grown last season and other type of information (2020)

| Fields | Plot no | Cowpea variety (Code 1) | Type of maturity<br>1= short cycle,<br>2= long cycle<br>3= intermediate,<br>4= No id | Main source of information (Code 2) | How long have you been using this variety ? (An) | Source of variety (Code 4) | Area (Ha) | Quantity used for sowing (Kg) | Unit price (FCFA/kg) | Quantity harvested (kg) | Associated culture (if mixed) (Code 5) | Proportion of cowpea in the association (in percentage) |
|--------|---------|-------------------------|--|-------------------------------------|--|----------------------------|-----------|-------------------------------|----------------------|-------------------------|--|---|
| 1      | 1       |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        | 2       |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        |         |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        |         |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
| 2      | 1       |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        | 2       |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        |         |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        |         |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
| 3      | 1       |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        | 2       |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        |         |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |
|        |         |                         |  |                                     |  |                            |           |                               |                      |                         |  |   |

Code1=Cowpea variety: 1= local, 2= Improved, 3= Don't know

| Fields | Speculation | If cowpea, Which variety | NP K (kg ) | SSP/TSP (phosphate)(kg) | Urea (kg ) | Organic fertilizer (kg) | Herbicides (liters) | Insecticides (liters) | Other inputs (specific) |
|--------|-------------|--------------------------|------------|-------------------------|------------|-------------------------|---------------------|-----------------------|-------------------------|
|--------|-------------|--------------------------|------------|-------------------------|------------|-------------------------|---------------------|-----------------------|-------------------------|



|   |   |               |  |  |  |  |  |  |  |
|---|---|---------------|--|--|--|--|--|--|--|
|   |   | sown<br>Code1 |  |  |  |  |  |  |  |
| 1 | 1   |               |  |  |  |  |  |  |  |
|   | 2   |               |  |  |  |  |  |  |  |
|   |   |               |  |  |  |  |  |  |  |
|   |   |               |  |  |  |  |  |  |  |
| 2 | 1   |               |  |  |  |  |  |  |  |
|   | 2   |               |  |  |  |  |  |  |  |
|   |   |               |  |  |  |  |  |  |  |
|   |   |               |  |  |  |  |  |  |  |
| 3 | 1   |               |  |  |  |  |  |  |  |
|   | 2   |               |  |  |  |  |  |  |  |
|   |   |               |  |  |  |  |  |  |  |
|   |   |               |  |  |  |  |  |  |  |
|   | <b>Indicate the unit<br/>price (FCFA)</b> |               |  |  |  |  |  |  |  |

Code1=Rice variety:1= local, 2= Improved, 3= Don't know

## 7. Production and production management

### 7-1 Production and distribution of production

| Cultivated<br>Speculations<br>(Code) | Table<br>1<br>field<br>code | Harvest<br>in local<br>units<br>(boots,<br>bags,<br>carts,...)<br>number | Estimated<br>number<br>harvested<br>in kg | Seed<br>share<br>(kg) | Estimated<br>number<br>of kilos<br>stored<br>(kg) | Estimated<br>number<br>of kilos<br>consumed<br>(kg) | Share<br>left or<br>donated<br>and<br>Zakat<br>(kg) | Share<br>left for<br>livestock<br>feed<br>(kg) | Share<br>reimbursed<br>for inputs<br>(kg) | Damage /<br>Loss /<br>Theft /<br>Other? (kg) | Marketed<br>Share<br>(kg) | Total<br>revenue<br>for the<br>Marketed<br>share |
|--------------------------------------|-----------------------------|--|---|-----------------------|---|---|---|--|---|--|---------------------------|--|
|                                      |                             |  |   |                       |   |   |   |  |   |  |                           |  |
|                                      |                             |  |   |                       |   |   |   |  |   |  |                           |  |
|                                      |                             |  |   |                       |   |   |   |  |   |  |                           |  |
|                                      |                             |  |   |                       |   |   |   |  |   |  |                           |  |
|                                      |                             |  |   |                       |   |   |   |  |   |  |                           |  |
|                                      |                             |  |   |                       |   |   |   |  |   |  |                           |  |
|                                      |                             |  |   |                       |   |   |   |  |   |  |                           |  |

Code: 1= Irrigated rice, 2=Rainfed rice, 3=Maize, 4=Sorghum 5= Millet, 6=Cowpea, 7=Groundnut, 8=Market gardening, 9=Other  
(specify)

### 7-2 Information on transport costs

| Indicators               | Cost in FCFA / Kg |
|--------------------------|-------------------|
| Transport of inputs      |                   |
| Transport of the product |                   |

7-3 Indicate the main criteria that determine your choices of the 3 main varieties grown on your first three plots

| Characteristics                                | Local<br>variety<br>(1= Yes,<br>2= No) | Improved<br>variety<br>(1= Yes, 2=<br>No) |
|--|--|---|
| Affordable seed prices                         |  |   |
| Producer preferences                           |  |   |
| Insect tolerant                                |  |   |
| Disease tolerant                               |  |   |
| Weed tolerant                                  |  |   |
| Drought tolerant                               |  |   |
| Early ripening / drought escape                |  |   |
| High efficiency                                |  |   |
| Savings for Inputs                             |  |   |
| Seed availability                              |  |   |
| Premium high price on the market (high demand) |  |   |
| Suitable for conservation                      |  |   |
| Good performance under low soil fertility      |  |   |
| Performance under low soil moisture            |  |   |
| Taste  |  |   |
| Politics                                       |  |   |

7-4 Do you pay taxes on the sale of cowpea (TAX) /\_\_\_//1=Yes 2=No

7-5 If so, what are the different taxes you pay?

| Types of taxes  | Where do you pay taxes?<br>1 = Road; 2 = market; 3 = Other (LIEUTAX) | How much product is taxed? (Kg)<br>(QUANTTOMTAX) | Total amount of tax paid?<br>(MONTAXFRQ) |
|---|--|--|--|
| Packaging taxes<br>(TAXCONDT)                         |  |  |  |
| Market taxes (Right of place and store)<br>(TAXMAGAZ) |  |  |  |
| Other taxes<br>(lister) (AUTRTAX)                     |  |  |  |

## 8. Information on diseases and pests

8-1 What are the main pests and diseases usually found in cowpea fields?

| Type of pests and/or diseases | 1= Yes ; 2= No | Part of the plant affected<br>1=shoot, 2=stem 3=seed | Control methods<br>1= Chemical, 2= biological, 3=cultural, 4=Integrated, 5= Bio-pesticide, | Source information on methods<br>(Code 1) | Effectiveness of the method<br>(Code 2) | Methodological constraints<br><b>Code 3</b> |
|-------------------------------|----------------|--|--|---|---|---|
|                               |                |  |  |   |   |   |

|               |  |  |                     |  |  |  |
|---------------|--|--|---------------------|--|--|--|
|               |  |  | 6= None,<br>7=other |  |  |  |
| Grasshoppers  |  |  |                     |  |  |  |
| Termites      |  |  |                     |  |  |  |
| Rodents       |  |  |                     |  |  |  |
| Birds         |  |  |                     |  |  |  |
| Rod drillers  |  |  |                     |  |  |  |
| Striga        |  |  |                     |  |  |  |
| bacterial and |  |  |                     |  |  |  |
| fungal        |  |  |                     |  |  |  |
| Other to      |  |  |                     |  |  |  |
| préciser_____ |  |  |                     |  |  |  |
| —             |  |  |                     |  |  |  |

Code 1: 1=farmers' organization, 2=research/extension officer, 3=Friends, 4=media, 5=Other(to be specified);

Code 2: 1=Very effective, 2=effective, 3=not effective, 4=Other (to be specified)

Code 3: 1=Difficult to implement, 2=Expensive, 3=Not enough manpower, 4= Not adapted to our practices, 5= Other (specify)

## 9. Information on storage methods used

9-1 Do you store your cowpea? / \_\_\_\_\_/ 1 = Yes 2 = No

9-2 For each of the methods you use, please indicate the storage techniques for each line):

| Storage Techniques | Names of the technique<br>(Code 1) | Source of information<br>(code 2) | Loss rate (%) | Methodological constraints<br>Code 4 |
|--------------------|------------------------------------|-----------------------------------|---------------|--------------------------------------|
| Technique 1        |                                    |                                   |               |                                      |

|                |  |  |  |  |
|----------------|--|--|--|--|
| Technique<br>2 |  |  |  |  |
| Technique<br>3 |  |  |  |  |

Code 1: 1 = traditional attics, 2 = metal silos, 3 = bags, 4 = metal drums, 5 = shops, 6 = ash, 7 = cans, 8 = tent, 9 = Other (to be specified)

Code 2: 1 = farmers' organization, 2 = Research / Extension Officer, 3 = Friends, 4 = media, 5 = Other (to be specified)

Code 3: 1 = Very effective, 2 = effective, 3 = not effective, 4 = Other (to be specified)

**Code 4:** 1=*Difficult to implement*, 2=*Expensive*, 3=*Not enough manpower*, 4= *Not adapted to our practices*, 5=*Other (specify)*

## 12. Information on the sale of cowpeas

12-1. Are you used to selling your cowpea? / \_\_\_\_\_/ 1 Yes 2 No

12-2. If so, what proportion of production is sold? / \_\_\_\_\_/ %

12-3. When do you sell your cowpea

| PERIODS                           | Type of sale<br>Code 0 | Average<br>selling price<br>(Kg/FCFA) | Place of sale<br>Code 1 | Buyer<br>Code 2 |
|-----------------------------------|------------------------|---------------------------------------|-------------------------|-----------------|
| Shortly after harvest             |                        |                                       |                         |                 |
| First quarter after<br>harvest    |                        |                                       |                         |                 |
| Second quarter after<br>harvest   |                        |                                       |                         |                 |
| Just before sowing<br>(next year) |                        |                                       |                         |                 |

Code 0: 1=Individual 2= Collective

Code 1: 1=Field edge, 2=local market, 3=Urban market 4=in other regions

Code 2: 1=Wholesaler, 2=Bana-bana, 3=Retailer, 4=Transformer, 5=Consumer, 6=Other

12-4 For the last 5 years please provide the following information for cowpea

|                                  | 2016 | 2017 | 2018 | 2019 | 2020 |
|----------------------------------|------|------|------|------|------|
| Name varieties                   |      |      |      |      |      |
| Quantity sold (convert to<br>kg) |      |      |      |      |      |
| Quality (code 1)                 |      |      |      |      |      |
| Price / kg (in FCFA)             |      |      |      |      |      |
| To whom was it<br>sold? (code3)  |      |      |      |      |      |

Code 0: 1 = Local variety 2 = improved variety

Code 1: 1 = better quality (without damage due to runaway or insect attacks); 2 = average quality (with damage due to slide fugue or insect attacks); 3 = poor quality (with high damage due to runaway or insect attacks);

Code 3: 1 = traders; 2 = consumers; 3 = Transformers; 4 = NGOs / public bodies; 5 = other (specify)

. 12-4-1 Who sets the prices for the cowpea you sold? /\_\_\_\_\_/

1 = Market, 2 = Myself, 3 = Buyer, 4 = Government, 5 = Other (specify)

. 12-4-2 If the prices were set by you, how did you determine them? /\_\_\_\_\_/

1 = NA (not applicable) 2 = I used prices in neighboring markets; 3 = I used the prices published in the newspapers

4 = I used the prices advertised on the radio 5 = Use of production costs used 6 = Market Information System 7 = other (specify)

Breeding

|              |   |   |  |   |  |  |                      |
|--------------|---|---|--|---|--|--|----------------------|
| [ANI<br>MAL] | Own<br>yourself<br>[ANIMAL<br>]<br>in your<br>household<br>?<br><i>SI O GO<br/>TO THE A<br/>NIMAL<br/>NEXT<br/>SI I GO<br/>TO C04<br/>1 =Yes<br/>2 = No</i> | To<br>whom<br>belongs<br>to these<br>[ANIM<br>AL]?<br><i>0 =<br/>Female<br/>1 =<br/>Male<br/>2 =<br/>Both</i> | How<br>many<br>from<br>[ANI<br>MAL]<br>You<br>in<br>stock?<br><i>Put the<br/>numbe<br/>r</i> | What you are<br>looking for<br>serves the<br>[ANIMAL]?<br><i>CHOISISSEZ 2<br/>OPTIONS<br/>1=Pulling force<br/>2=Social status<br/>3=Sale of<br/>surplus<br/>4 =Consumption<br/>5=Cultural<br/>reasons/<br/>Traditional<br/>6=Other, specify</i> | Do<br>you<br>use<br>cowpe<br>a fane<br>for fee<br>ding<br>[ANI<br>MAL] | How<br>many [ANIM<br>ALS] have you<br>sold in the last<br>12 months? | Aver<br>age<br>price |
|--------------|---|---|--|---|--|--|----------------------|



|         |                       |  |  |                         |  |  |  |  |
|---------|-----------------------|--|--|-------------------------|--|--|--|--|
|         | <i>0 = Don't know</i> |  |  | <i>Choose 2 options</i> |  |  |  |  |
| Cattle  |                       |  |  |                         |  |  |  |  |
| Sheep   |                       |  |  |                         |  |  |  |  |
| Goats   |                       |  |  |                         |  |  |  |  |
| Poultry |                       |  |  |                         |  |  |  |  |

#### 12-5. Group sales and other group activities

6-1 Is the head of the family a member of an association? / \_\_\_\_\_ 1=Yes 2=No more  
3= Never

12-5-1. If you produce, process, or sell your products in cooperation with other farmers or have a contract with traders, please fill in the following table

| <b>Attributes</b>  | <b>Groups</b> (This information is for each group) |
|--|--|
| Group Name (Association)   |  |
| Main activity of the group (Code 0)                                  |  |
| Number of male family members in this group                          |  |
| Number of male female family members in this group                   |  |
| Frequency of meetings per year                                       |  |
| Do you have a contract between the group and the traders? Yes=1 No=0 |  |

|  |  |
|--|--|
| If so, what type of contract?<br><br>Code 1: 1 = signed contract<br>2 =informal / word of mouth<br>3 = other (specify) |  |
|--|--|

Code 0 (Main activity): 1 = Production 2 = Processing 3 = Marketing 4 = Production and processing 5 = Production and marketing

6 = Processing and marketing 7 = Production, processing and marketing of 8 = Other (to be specified)

### 13. Information on by-products sold

13-1 By-products used or sold since the beginning of wintering until now

| Type        | Estimated quantity (in bag) | What use by the members of the house? | If sale, Give the approximate value of the total amount sold? | Place of sale<br>Code 1 |
|-------------|-----------------------------|---------------------------------------|---|-------------------------|
| Peanut fane |                             |                                       |   |                         |
| Cowpea stem |                             |                                       |   |                         |
| Cowpea fane |                             |                                       |   |                         |

Code: 0=None 1=Sale 2=Livestock 3= Soil fertilization 4=Habitat manufacturing 5= Energy 6= Other

Code 1: 1=Field edge, 2=local market, 3=Urban market 4=in other regions