
# Integrative Management Options for Sustainable Agricultural Production and Livelihoods of Smallholders in the Dryland of Southwestern Burkina Faso

## Session 1: Agricultural Livelihood Choice Analysis and Future planning

December 2016

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Workshop report

# "Integrative Management Options for Sustainable Agricultural Production and Livelihoods of Smallholders in Southwestern Burkina Faso"

## Session on "Agricultural Livelihood Choice Analysis and Future Planning"

**Place and date:** Dano/ Pontieba, Ioba Province, Burkina Faso, 10-12 October 2016

**Project partners:** Boundia Thiombiano, Polytechnic University of Bobo-Dioulasso
Grégoire Meylan, USYS TdLab, ETH Zurich,
Quang Bao Le, CRP Dryland Systems, ICARDA,

# Abbreviations

| | |
|---|---|
| CRP-DS: | CGIAR Research Program on Dryland Systems |
| USYS TdLab: | Transdisciplinarity Lab at the Environmental Sciences Department, ETH Zurich |
| ICARDA: | International Center for Agricultural Research in Dry Areas |
| PUBD: | Polytechnic University of Bobo-Dioulasso |
| UB: | University of Bobo |
| ALS: | Agricultural Livelihood System |

# Part 1. Objectives, Organizers and Participants

## Objectives

The workshop aimed at supporting farmer's self-exploration of sustainable management options for better agricultural livelihoods in the dryland of Southwestern Burkina Faso. The village of Pontieba was selected as a case area as the precedent studies of CRP-DS and PUBD results good quantitative data and results. The objectives were specifically for different agricultural livelihoods system types and gender groups to:

1) Identify significant affecting factors of crop choice and sustainable nutrient management practices adoption as well as affecting direction and weight.
2) Plan agricultural livelihood portfolio for the next 5-10 years
3) Prioritize management practices needed to be improved for each key livelihood components

## Co-Organizers

- Swiss Federal Institute of Technology (ETH) Zurich, through the Environmental Systems Science Transdisciplinary Lab (DSYS TdLab)
- Polytechnic University of Bobo-Dioulasso (UPB), via Institute of Rural Development (IDR)
- International Center for Agricultural Research in Dry Areas (ICARDA), through the Program Management Unit (PMU) of CGIAR Research Program on Dryland Systems (CRP-DS)

## Facilitators

Drs. Boundia A. Thiombiano and Meylan Grégoire

## Preparatory work

Based on the overall systems research strategy of CRP-DS, Dr. Quang Bao Le gave a provisional structure of the workshop program. The workshop agenda was finalized by a

preparatory meeting held in Ouagadougou among Dr. Boundia Alexandre Thiombiano (CRP-DS consultant from PUBD), and Dr. Gregoire Meylan (USYS TdLab at ETH Zurich), M.Sc. Student and field assistant from PUBD and UB (Picture 1). Dr. Quang Bao Le of CRP-DS participated to the meeting through Skype conferencing.

**Picture 1**. Preparatory meeting in Ouagadougou, Burkina Faso. Note: From left to right: Drs. Gregoire Meylan and Boundia Alexandre Thiombiano, Palamangui Onadja (field assistant from University of Bobo), Bintou Zon (M.Sc. Student from University of Bobo).

## Workshop agenda

| Time | Activity |
|---|---|
| **Day 1 (10 October 2016)** | |
| 08:00 – 08:30 | • Registration (use the Table of Participants) |
| 08:30 – 09:20 | • Presentation of previous research results (selected from Thiombiano' dissertation and CRP-DS research report) (Boundia Thiombiano)<br>• Questions and Answers |
| 09:20 – 09:30 | • Taking formal workshop photos |
| 09:30 – 10:00 | • Coffee/Tea break |
| 10:00 – 12:15 | Individual ALS group exercises for weighting significant factors affecting crop choices:<br>1. Explanation of the exercise (Boundia Thiombiano) (15 min)<br>2. Weighting factors affecting land use choices: each ALS group works on 3 exercises of 3 crop choices (maize, rice, groundnut) (60 min) |

| | |
|---|---|
| | 3. Weighting factors affecting nutrient use adoptions: each ALS group works on 3 exercises of 3 nutrient use adoption (mineral fertilizer, organic fertilizer, mineral-organic combined fertilizer) (60 min)<br>(note: background document: Report 2016, Task 2) |
| 12:15 – 13:30 | • Lunch break |
| 13:30 – 15:00 | Combined, but gender-specific, group exercises for weighting significant factors affecting:<br>1. Weighting factors affecting land use choices: each gender group works on 3 exercises of 3 crop choices (maize, rice, groundnut) (45 min)<br>2. Weighting factors affecting nutrient use adoption: each gender group works on 3 exercises of 3 nutrient use adoption (mineral fertilizer, organic fertilizer, mineral-organic combined fertilizer) (45 min) |
| 15:00 – 15:30 | • Coffee/Tea break |
| 15:30 – 17:00 | Combined group exercises for weighting significant factors affecting:<br>1. Weighting factors affecting land use choices: the combined group works on 3 exercises of 3 crop choices (maize, rice, groundnut) (45 min)<br>2. Weighting factors affecting nutrient use adoption: the combined gender group works on 3 exercises of 3 nutrient use adoption (mineral fertilizer, organic fertilizer, mineral-organic combined fertilizer) (45 min) |
| **Day 2 (11 October 2016)** | |
| 08:00 – 08:30 | • Introduction to Day 2: Future planning by farmers (Boundia) |
| 08:30 – 9:45 | Individual ALS group exercises for prioritizing livelihood options among the livelihood portfolio*:<br>• Explanation of the exercise (Boundia Thiombiano) (15 min)<br>• Each ALS group works to <u>imagine</u> their livelihood portfolio in the next 5-10 year (30 min)<br>(* livelihood portfolio = a list of all possible livelihood activities at a particular level of aggregation. E.g.: Maize production + rice production + groundnut production + cotton production + millet/sorghum production + poultry production + cattle production + trading + etc.)<br>• Each ALS group <u>weights</u> livelihood activities in the portfolio in proportion with the degree they would like to invest on (30 min) |
| 09:45 – 10:15 | • Coffee/Tea break |
| 10:15 – 11:15 | Individual ALS group exercises for prioritizing livelihood options among the livelihood portfolio (continued):<br>• Each ALS group identified <u>constraints</u> and <u>opportunities</u> for the livelihood activities they like to invest on (30 min)<br>• Each ALS group identified <u>key non-farmer stakeholders</u> and <u>expected roles</u> in each livelihood activities (30 min) |
| 11:15 – 12:15 | Combined gender-specific group exercises for prioritizing livelihood options among the livelihood portfolio (continued):<br>• Each gender group <u>weights</u> livelihood activities in the portfolio in proportion with the degree they would like to invest on (20 min)<br>• Each ALS group identified <u>constraints</u> and <u>opportunities (technical, institutional, market)</u> for the livelihood activities they like to invest on (20 min)<br>• Each ALS group identified <u>key non-farmer stakeholders</u> and <u>expected roles</u> in each livelihood activities (20 min) |
| 12:15 – 13:30 | • Lunch break |

| | |
|---|---|
| 13:30 – 15:00 | Individual ALS group exercises for prioritizing management practices needed to be improved for each key livelihood components:<br>• Explanation of the exercise (Boundia Thiombiano) (15 min)<br>• Each ALS group works to identify concrete management practices needing improvement for each livelihood components (Crop: Maize production + rice production + groundnut production + cotton production + millet/sorghum production; Livestock: poultry production + cattle production; Non-farm: trading + etc.) (40 min)<br>• Each ALS group identified technical, institutional and market constraints, key non-farmer stakeholders and expected roles in each management practices targeted (35 min) |
| 15:00 – 15:30 | • Coffee/Tea break |
| 15:30 – 16:30: | Combined gender-specific group exercises for prioritizing management practices needed to be improved for each key livelihood components:<br>• Each gender group works to identify concrete management practices needing improvement for each livelihood components (Crop: Maize production + rice production + groundnut production + cotton production + millet/sorghum production; Livestock: poultry production + cattle production; Non-farm: trading + etc.) (30 min)<br>• Each gender group identified technical, institutional and market constraints, key non-farmer stakeholders and expected roles in each management practices targeted (30 min) |
| **Day 3 (12 October 2016)** | |
| 09:00 – 09:30 | Introduction to Day 3: Problem identification and brainstorming of improvements (Soft Systems Methodology) (Grégoire Meylan) |
| 09:30 – 10:30 | Step 1: Expression of problem situation (3 individual ALS groups)<br>• First individual rich picture (20 min)<br>• Overall rich picture as group work (40 min) |
| 10:30 – 11:00 | • Coffee/Tea break |
| 11:00 – 12:30 | Step 2 (3 individual ALS groups):<br>• Brainstorming of possible improvements (1h30) |
| 12:30 – 13:45 | • Lunch break |
| 13:45 – 14:45 | Step 1: Expression of problem situation (combined all)<br>• First individual rich picture (20 min)<br>• Overall rich picture as group work (40 min) |
| 14:45 – 15:15 | • Coffee/Tea break |
| 15:15 – 16:15 | Step 2 (all combined):<br>• Brainstorming of possible improvements (1h) |
| 16:15 – 17:00 | Wrap-up and good bye |

## Participants

- **Farmers:** they were selected amongst farmers surveyed by Thiombiano and Le (2015) in the village of Pontieba. For each of the three Agricultural Livelihood System types they identified, the 5 closest farms to their group centre (Euclidian distance in K-means cluster analysis) were selected.
- **Village leaders:** One village leader was invited per each of the six villages of the Ioba province (including Pontieba) were Dr Boundia Alexandre Thiombiano conducted his PhD fieldwork under the supervision of Dr Quang Bao Le.
- **Stakeholders in agricultural and rural development**: Extension service agents, West African Science Service Center on Climate Change and Adapted Land Use (WASCAL), and the Centre Agricole Polycalent de Matourkou (Agricultural extension training school) were invited.

### Table 2. List of participants

| Order no. | Name | Gender | E-mail (if applicable) | Village / Organization | ALS group of famers |
|---|---|---|---|---|---|
| 1 | BARRO Hamadou | Male | barro.h@wacal.org | WASCAL | NA |
| 2 | Dr. OUEDRAGO Denis | Male | denisorel@gmail.com | CAP-M | NA |
| 3 | Dr. MEYLAN Gregoire | Male | g.meylan@usys.ethz.ch | ETH Zurich | NA |
| 4 | SOME Lemale | Male | +226 76001521 | Pontieba | NA |
| 5 | SOME Z. Patrice | Male | +226 70576295 | Lofing | NA |
| 6 | SOME Athanase | Male | +226 75564248 | Dibaou | NA |
| 7 | SOMDA Odile | Female | +226 60859942 | Pontieba | 2 |
| 8 | SOME J. Christelle | Female | +226 63617176 | Pontieba | 2 |
| 9 | DABIRE K. Désiré | Male | +226 63646728 | Pontieba | NA |
| 10 | DABIRE Raymond | Male | No contact | Pontieba | 3 |
| 11 | DABIRE Jean-Daniel | Male | No contact | Pontieba | 3 |
| 12 | SOME Etienne | Male | No contact | Pontieba | 1 |
| 13 | SOMDA Laurentin | Male | +226 60798049 | Pontieba | 3 |

| | | | | | |
|---|---|---|---|---|---|
| 14 | SOME Bernadette | Female | +226 77377663 | Pontieba | 3 |
| 15 | SOME Ivette | Female | +226 64390117 | Pontieba | 1 |
| 16 | HIEN Marie-Clovis | Female | +226 76442688 | Pontieba | 2 |
| 17 | BELEMOU Issa | Male | +226 71230044 | DPAAH-Ioba | NA |
| 18 | KONE Harouna | Male | +226 76644868 | Babora | NA |
| 19 | SOMDA Wenceslas | Male | +226 74039098 | Pontieba | NA |
| 20 | SOME Gadine | Female | No contact | Pontieba | 2 |
| 21 | DABIRE Blaise | Male | No contact | Pontieba | 1 |
| 22 | SOME Martin | Male | No contact | Pontieba | 1 |
| 23 | SOME Rene | Male | No contact | Pontieba | 3 |
| 24 | SOME Mikael | Male | No contact | Pontieba | 2 |
| 25 | KAMBOULE Saturnin | Male | No contact | Pontieba | 1 |
| 26 | SOME Pobelteye | Male | +226 73644559 | Kolinka | NA |
| 27 | SOMDA Nagnewine | Male | +226 72470982 | Kolinka | NA |
| 28 | SAWADOGO Moussa | Male | Moussava16@yahoo.fr | CAP-M | NA |
| 29 | ONADJA Palamangui | Male | palamanguio@gmail.com | UPB | NA |
| 30 | ZON Bintou | Female | bintouzon@gmail.com | UPB | NA |
| 31 | Dr. THIOMBIANO Boundia Alexandre | Male | boundia@gmail.com | UPB | NA |

Note: NA = Non-applicable indicates stakeholder other than farmers targeted for work-shop exercises

(A)

(B)

(C)

Picture 2. Family picture

## Overview of workshop approach and interactions

The workshop started the first day with the presentation of previous key research results selected from Thiombiano' PhD dissertation and CRP-DS research reports in Ioba Province and the village of Pontieba. Questions were asked by farmers as well as by stakeholders. The questions revolved around the sustainable solutions to address nutrient depletion and ensure high food crop productivity. From discussions it was pointed out that farmers need to implement integrated management options based on on-farm resources. After this panel session came groups exercises described in the next sections. These exercises consisted of the identification by farmers of significant socio-ecological variables affecting crop choice, sustainable nutrient management practices adoption. They also planned their future livelihood activities and identified sustainable management practices to be prioritized for better livelihoods.

The workshop was planned for the exercises to be implemented by each ALS type, gender group (Men and women) and all groups together. However due to some challenge we were not able to implement Whole group exercise for all activities, gender-based exercises

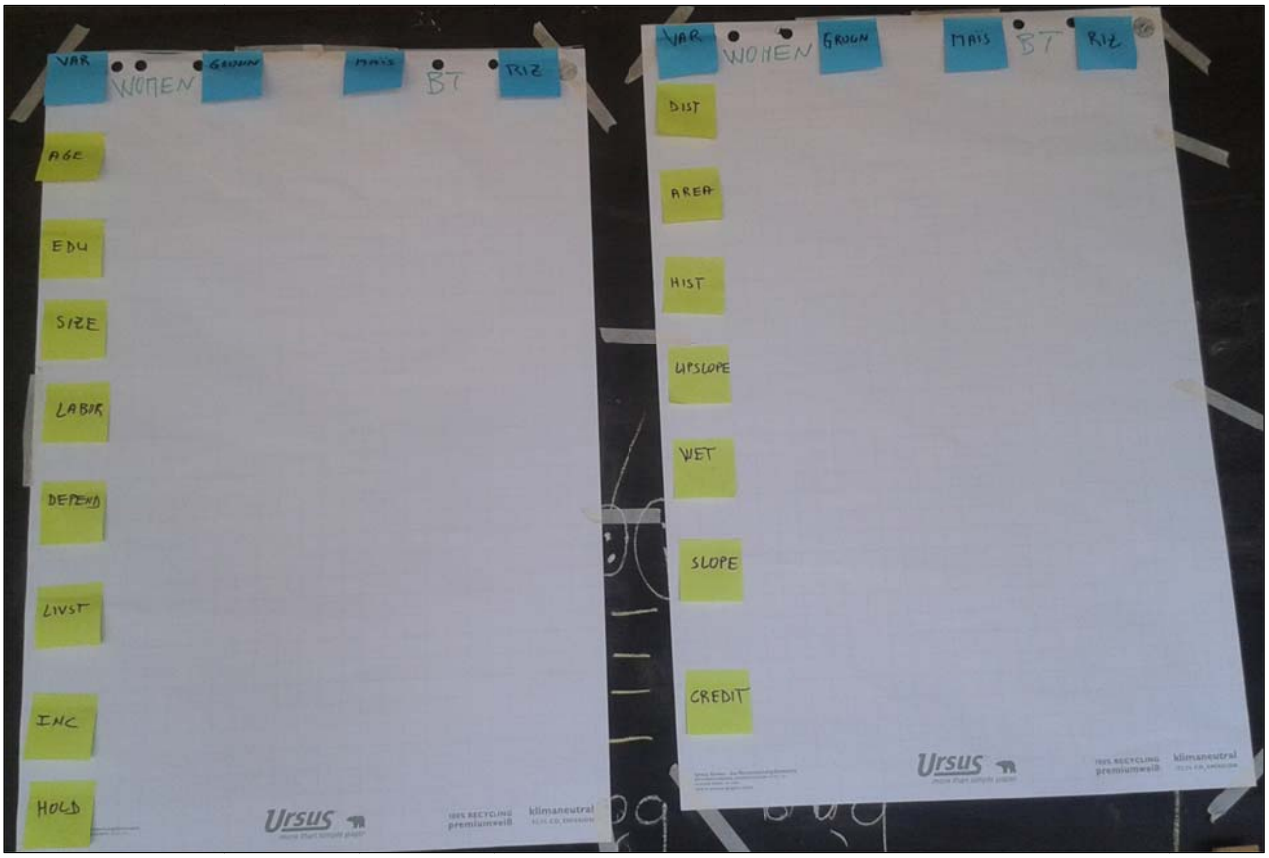
were done only for crop choice and fertilizer adoption (mineral, organic, and combined mineral-organic). The gender-based exercises were not done for the livelihood portfolio planning. These challenges were:

1. The translation into local language, making the exercise take more than the planned 30mn
2. The keen interest of farmers to be given to speak freely about their livelihoods and their future. They reported this was the first time to be given the opportunity of such exercise. So they wanted to discuss a lot. We had many time to recall the necessity of being short.
3. We initially planned 3 days but we finally spent 3 and half days. Given the period (harvest time) farmers were busy and we did not want to abuse of their time.

# Part 2. Participatory identification and weighting of significant factors affecting crop choices by farmers

## Process description

The exercises in this section are based on the research findings of Thiombiano and Le (2016) who analysed socio-ecological factors affecting crop choice and sustainable nutrient practices adoption in the village of Pontieba using econometric methods. The set of explanatory variables used by Thiombiano and Le (2016) were first listed in a flipchart and explained to the farmers (Picture 3). The exercise consisted in asking farmers (group responses) to (1) identify variables significantly affecting crop choice and sustainable nutrient management practices adoption (yes or no), (2) give the affecting direction (-/+) and (3) weight the significant factors on a scale of 1 to 10. For weighing it was agreed to use 10 stones to be placed in a plastic dish (Picture 4). The number of stones placed in the dish equals to the scale chosen for the variable from 1 to 10. The exercise was done (picture 5) separately for (1) each of the 3 ALS types (Men and Women) and gender-based (2) for Men (all ALS types combined) and (3) Women (all ALS types combined).




**Picture 3.** Flipchart listing explanatory variables

**Picture 4**. Dishes for weighing variables significantly affecting crop choice and sustainable nutrient management practices adoption. *Note: The pink dish is used for negative affecting variables and the bleu dish is used for weighing positive affective variables.*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OUI + 10
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(A)


(B)

**Picture 5.** A completed flipchart for variables affecting crop choice by women group. *Note. First column gives list of explanatory variables and the other columns give alternative crop choice to sorghum/millet. The orange colour indicates no significant effect. The light green colour indicates significant effect with direction (+/-) and numbers indicate variable weight.*

## Results for crops choice with sorghum/millet as reference case

The results for the crop choice showed a different affecting pattern compared to the econometric analysis findings by Thiombiano and Le (2016) . Factors that were no significant factors from econometric analysis were estimated by farmers to be factors significantly affecting their crop choice (Annexes 1-3). The affecting direction and amplitude varied as well. For instance, for ALS type 1 (see annexes 1a-c) socio economic characteristics such as Age of household for groundnuts crops, Tropical Livestock Unit per person for rice crop, Household size, Dependency ratio for maize crop were estimated by farmers to be factors significantly affecting crop choice while there were not significant for econometric analysis. That also concerned plot characteristic like the variable Slope length which was not significant according to econometric results but was estimated significant by farmers for groundnuts crop choice. The similar results were found for ALS type 2 and 3 (see annexes 2 and 3) for the tree food crops (Groundnuts, Rice and Maize). The variables such as Tropical Livestock Unit per person, Total farm land holdings (HHOLDINGS) and Plot distance from homestead were not significant from econometric analysis but were estimated to be significant by farmers of ALS 2 for groundnuts crop choice. Beside variables that were not found significant from econometric analyse but estimated significant by the participatory assessment, the two methods converged to show variables significant in both case or all crops (see annexe 1-3).

The gender affected crop choice by farmers. As shown by annexe 4-5, gender-specific affecting factors were found for crop choice. For example the age and the education years of the household head were estimated to be positively affecting groundnuts crop choice by men. Meaning for men that farmers will likely chose to grow groundnuts instead of sorghum/millet when they are more educated and old. But for women these two variables have not significant effects on the decision to choice groundnuts instead of sorghum/millet.

# Part 3: Participatory identification and weighing of variables significantly affecting sustainable nutrient management practices adoption

## Process description

The exercise followed the same approach like in the case of crop choice. Farmers were asked (group responses) to (1) identify variables significantly affecting separate mineral fertilizer, separate organic fertilizer and combined mineral-organic fertilizer adoption, (yes or no), (2) give the affecting direction (-/+) and (3) weight the significant factors on a scale of 1 to 10. The exercise was done separately for (1) each of the 3 ALS types (Men and Women) and gender-based (2) for Men (all ALS types combined) and (3) Women (all ALS types combined).

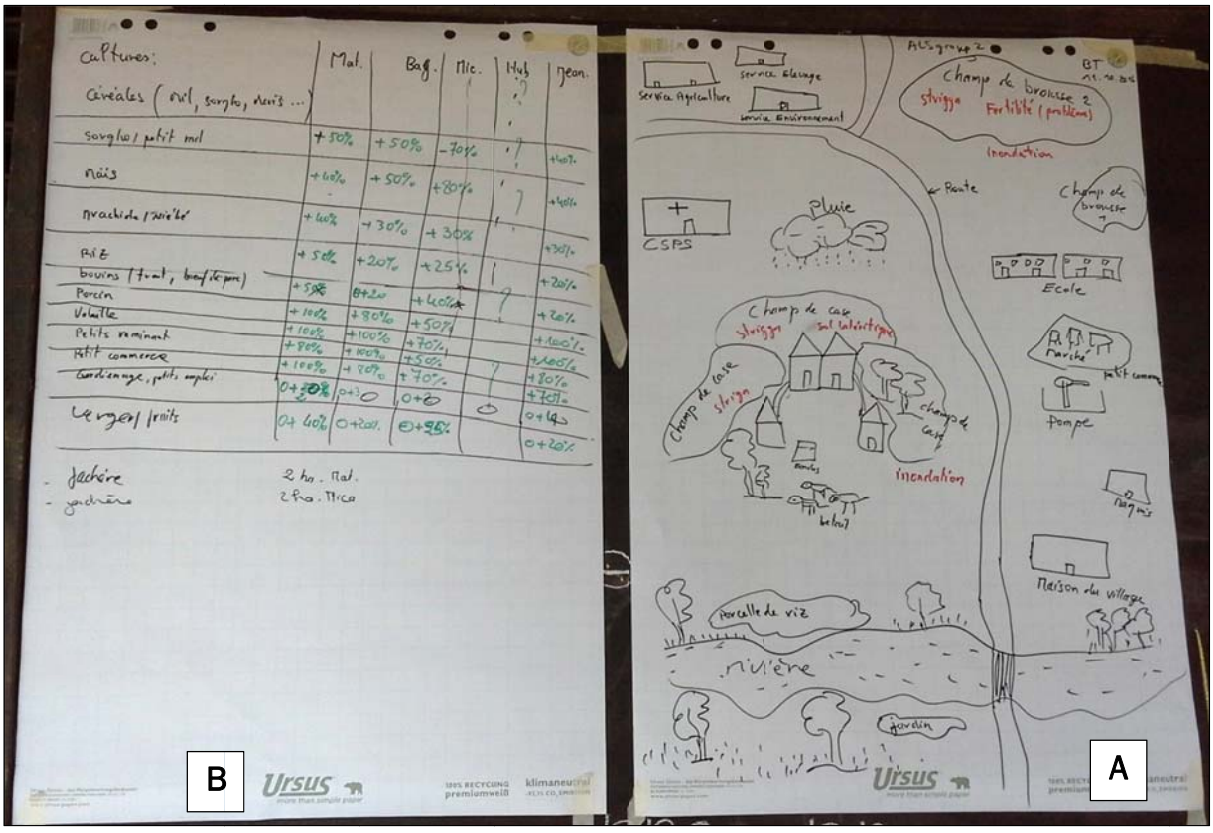
## Results for mineral, organic and combined mineral-organic fertilizer adoption

The results of fertilizer adoption are shown in annexes 6-11. The findings showed variation between econometric results and participatory assessment by farmers of the different agricultural livelihood system (ALS) types. The drivers of fertilizer adoption according to famers were both households and plot characteristics. ALS type specific affecting factors were founds for mineral (e.g. Age of households head and Plot size), organic (e.g. annual gross income, Plot wetness index and access to credit) and combined mineral-organic (e.g. Age of households head, Plot size and Slope length) fertilizer. Gender effect was also observed for all the three fertilizer types (see annexes 7a-b, 9a-b and 11a-b).

# Part 4: Future planning and prioritization of farm agricultural livelihood options among the livelihood portofolio

## Process description

The livelihood of farmers from each agricultural livelihood system type comprises on-farm and off-farm activities forming a livelihood portfolio. This portfolio may evolve in medium and long term given environmental, institutional and socio-economic context. In this section, farmers were first asked to sketch their farm and its environment (picture 6A). Thereafter they were asked to list main activities characterizing the livelihood portfolio of their ALS type. In a last step they were asked to indicate how they intend (planning) to change the composition and weight of each component of the portfolio in the next 5-10 years. Each of the five members of the ALS type gave his intended planning and the results were averaged per ALS type to obtain the intended planning of the whole ALS type.




**Picture 6.** Sketch of livelihood portfolio by ALS 2. *Note: A shows sketch of harm and its environment. B show main components of livelihood portfolio*

## Results for the livelihood portfolio planning by different ALS types

The results for the livelihood portfolio planning are presented in Table 3-5. The ALS type which is poor will likely reduce cereals (sorghum/millet and rice) by more than 50% and increase poultry (+41%), pork fattening (+ 20%) and cotton (+30%). This indicates the conversion of the ALS type from subsistence to market oriented livelihood for the next 5-10 years. In the mean while the ALS type 2 which is medium income livelihood system and livestock-based, intends to keep the orientation with the strengthening of poultry and pork fattening and petty trade which corresponds to livelihood diversification unto off-farm income. The ALS type 3, better-off farms cotton and livestock-based will likely significantly reduce cotton cropping to increase cereals, legume and poultry production. The increase of legume while decreasing cotton cropping may corresponds to sustainable soil management strategy through the use of nitrogen-fixing crops giving that the reduction of cotton crops means less access to mineral fertilizer credit.

**Table 3. Future planning of livelihood portfolio by ALS type 1**

| *Livelihood portfolio* | *Farm 1* | *Farm 2* | *Farm 3* | *Farm 4* | *Farm 5* | *Average* |
|---|---|---|---|---|---|---|
| Cotton | 0 | +100 | 0 | +50 | 0 | +30 |
| Sorghum/millet | -50 | -50 | -50 | -50 | -50 | -50 |
| Maize | +50 | +100 | -50 | +0 | -50 | +10 |
| Groundnuts/cowpea | -75 | +100 | -50 | -80 | -50 | -31 |
| Rice | -75 | -50 | -50 | -50 | -50 | -55 |
| Cattle | +100 | NA | NA | NA | NA | +20 |
| Pork | +0 | +50 | NA | NA | +50 | +20 |
| Poultry | +50 | +50 | +30 | +50 | +25 | +41 |
| Petty trade | -50 | +50 | -75 | -50 | +50 | -15 |
| Off-farm employment | 0 | 0 | 0 | 0 | 0 | 0 |
| Small ruminant (Goat and sheep) | -25 | +4 | +6 | -50 | +50 | -3 |

Note: NA means Not Applicable indicating the farmer do not practice or do not intend to practice

**Table 4. Future planning of livelihood portfolio by ALS type 2**

| *Livelihood portfolio* | *Farm 1* | *Farm 2* | *Farm 3* | *Farm 4* | *Farm 5* | *Average* |
|---|---|---|---|---|---|---|
| Cotton | 0 | 0 | 0 | 0 | 0 | 0 |
| Sorghum/millet | +50 | +50 | -70 | +50 | +40 | +24 |
| Maize | +40 | +50 | +80 | +40 | +40 | +50 |
| Groundnuts/cowpea | +40 | +30 | +30 | +100 | +30 | +46 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rice | +50 | +20 | +25 | +40 | +20 | +31 |
| Cattle | +50 | 0+2 | +40 | +50 | +20 | +32 |
| Pork | +100 | +80 | +50 | +50 | +100 | +76 |
| Poultry | +100 | +100 | +70 | +100 | +100 | +94 |
| Petty trade | +100 | +80 | +70 | +70 | +70 | +78 |
| Off-farm employ-ment | +2 | 0 + 3 | 0+2 | +20 | 0 + 4 | +11 |
| Small ruminant (Goat and sheep) | +80 | +100 | +50 | +30 | +80 | +68 |
| Fruits trees | 0 + 40 | 0 + 20 | 0 + 25 | 0 + 50 | 0 + 20 | 0+31 |

Table 5. Future planning of livelihood portfolio by ALS type 3

| Livelihood portfolio | Farm 1 | Farm 2 | Farm 3 | Farm 4 | Farm 5 | Average |
|---|---|---|---|---|---|---|
| Cotton | -70 | -60 | -60 | -60 | -70 | -64 |
| Sorghum/millet | +100 | +80 | +90 | +90 | +90 | +90 |
| Maize | +100 | +90 | +100 | +100 | +100 | +98 |
| Groundnuts/cowpea | +100 | +100 | +100 | +100 | +100 | +100 |
| Rice | -50 | -60 | -70 | -60 | -90 | -66 |
| Cattle | +30 | -60 | -50 | -60 | -80 | -44 |
| Pork | -50 | -50 | +100 | +100 | +100 | +40 |
| Poultry | +100 | +100 | -40 | -50 | -70 | +8 |
| Petty trade | +70 | +60 | +60 | +60 | +70 | +64 |
| Off-farm employ-ment | NA | NA | NA | NA | NA | NA |
| Small ruminant (Goat and sheep) | +100 | +100 | +100 | +100 | +100 | +100 |

# Part 5: Prioritizing management practices needed to be improved for each key livelihood components

## Process description

From the composition of the livelihood portfolio, farmers were asked to select the five key activities by order of importance (ranking). We asked farmers to indicate how they will invest in these activities in the next 5-10 years if they were given 500 000 FCFA. They afterward listed management practices needed to improve each activity.

## Results for Prioritizing management practices needed to be improved for each key livelihood components

The ranking and future planning of the five more important livelihood portfolio components showed that Poor agricultural livelihood system type (ALS type 1) will rely mostly on livestock (poultry and pork fattening) in the next 5-10 years (Table 6a). This is understandable as these species have a short production cycle and require relatively less investment while being relatively easy to sell compared to cattle, sheep or goat. Maize which the main subsistence crop in the region occupies the third position. These productions (poultry, pork and maize) face mainly technical constraints (Table 6b) such feeds and health care availability, poor equipment and rainfall variability. Market constraints are mainly price fluctuation. Few opportunities are available to farmers for developing these activities. Farmers support the idea that extension service as well as private sector (Traders) is the main external actors who could significantly help improving the situation through the provision of feeds, health care and price supporting interventions (Table 6c).

**Table 6a . Livelihood activity prioritization by ALS type 1**

| Rank | Livelihood portfolio component | Future planning<br><br>*(Money invested from 500,000 FCFA)* | Share of available budget (%) |
|---|---|---|---|
| 1 | Poultry | 150,000 | 30 |
| 2 | Pork fattening | 150,000 | 30 |
| 3 | Maize | 75,000 | 15 |
| 4 | Petty trade (shop tenancy, selling local beer, cakes, etc.) | 75,000 | 15 |
| 5 | Beans | 50,000 | 10 |

**Table 6b. Identification of constraints and opportunities (technical, institutional, market) for the livelihood activities ALS type 1 would like to invest on**

| Livelihood portofolio component | Constraints / opportunities | Technical | Institutional/Cultural | Market |
|---|---|---|---|---|
| Poultry | Constraints | 1. Feeds<br>2. Health care<br>3. High mortality rate | None | Price fluctuation (30-40%) |
| | Opportunities | 1. Poultry manure<br>2. Auto-consumption | Social events (sacrifices, celebration, etc.) | Social events in the village |
| Pork fattening | Constraints | 1. Feeds<br>2. Equipment (habitat)<br>3. Health care | | |
| | Opportunities | Manure | Pork consumption during traditional events/celebrations | Relatively high demand |
| Maize | Constraints | 1. Lack of equipment (animal traction)<br>2. Low access to mineral fertilizer (availability and cost)<br>3. Low availability of compost<br>4. Rainfall shortage | None | 1. Low price for farmer<br>2. Prices set by buyers |
| | Opportunities | Crop residues recycling | Important staple food | Food cash crop |
| Petty trade (shop tenancy, selling local beer, cakes, etc.) | Constraints | Scarcity of firewood | Non access to credit | Credit sales non-refunded |
| | Opportunities | None | None | Proximity with the town, Dano |
| Beans | Constraints | 1. Lack of equipment<br>2. Low access to mineral fertilizer (availability and cost)<br>3. Insufficient labour | None | 1. Low price for farmer<br>2. Prices set by buyers |
| | Opportunities | Residues used for livestock feeding | None | None |

**Table 6c. Identification by ALS type 1 of key non-farmer stakeholders and expected roles in each livelihood activities they would like to invest on**

| *Livelihood portfolio component* | *Non-farmer stakeholder* | *Expected roles* |
|---|---|---|
| Poultry | 1. Extension service<br>2. Buyers | 1. Provide adequate health care<br>2. Feeds supply<br>3. Ensure good prices to farmers |
| Pork fattening | 3. Extension service<br>4. Buyers | 4. Provide adequate health care<br>5. Feeds supply<br>6. Ensure good prices to farmers |
| Maize | 1. Extension services<br>2. Traders (buyers) | 1. Supply mineral fertilizers<br>2. Ensure good prices to farmers |
| Petty trade *(shop tenancy, selling local beer, cakes, etc.)* | 1. Traders<br>2. Clients | 1. Ensure regularly supply of goods<br>2. Ensure cash payment rather than credit |
| Beans | 1. Traders<br>2. Restaurant<br>3. Extension services | 1. Develop the transformation of beans (agro-industries)<br>2. Ensure good prices to farmers<br>3. Supply with mineral fertilizers |

On the contrary to ALS type 1, the medium income ALS type 2 placed sorghum/millet (30% of future investment), Maize (20% of future investment) and Poultry (20% of future investment) on the top of livelihood portfolio (Table 7a). If maize is the main subsistence crop, sorghum is an important food cash crop used for local beer making. This ensures a relatively stable price to sorghum. Poultry is easy to sell for solving small issue (e.g. health, schooling, and social events). Technical constraints such rainfall variability, weeds and soil fertility decline were identified as main issues for sorghum/millet and maize production (Table 7b). Institutional constraints exist such as the lack of information on improved seeds and sources of micro finances (credit access). Price fluctuation is limited to maize. Poultry production faces the recurrent issue of feeds and health care availability. Farmers of ALS type perceive that the main external actor that can contribute to significantly improving the situation is extension services which are expected to provide technical support and information on funding sources.

Table 7a. Livelihood activity prioritization by ALS type 2

| Rank | Livelihood portfolio component | Future planning<br><br>*(Money invested over a budget of 500,000 FCFA)* | Share of available budget (%) |
|---|---|---|---|
| 1 | Sorghum/Millet | 150,000 | 30 |
| 2 | Maize | 100,000 | 20 |
| 3 | Poultry | 100,000 | 20 |
| 4 | Petty trade (shop tenancy, selling local beer, cakes, etc.) | 100,000 | 20 |
| 5 | Pork fattening | 50,000 | 10 |

**Table 7b. Identification of constraints and opportunities (technical, institutional, market) for the livelihood activities ALS type 2 would like to invest on**

| Livelihood portfolio component | Constraints / opportunities | Technical | Institutional/Cultural | Market |
|---|---|---|---|---|
| Sorghum/Millet | Constraints | 1. Rainfall variability<br>2. Weeds (*Striga hermonthica*)<br>3. Low soil fertility<br>4. Floods<br>5. difficulties for identifying suitable crops per available soils | 1. Lack of information about improved seeds<br>2. Lack of information on available credits sources | None |
| | Opportunities | None | | |
| Maize | Constraints | 1. Rainfall variability<br>2. Low soil fertility<br>3. Floods<br>4. difficulties for identifying suitable crops per available soils<br>5. Low equipment<br>6. Low access to mineral fertilizers (costly) | 1. Lack of information on available credits sources<br>2. Low access to improved seeds | Price fluctuations |
| | Opportunities | Recycling of crop residues | None | None |
| Poultry | Constraints | 1. High mortality<br>2. Feeds<br>3. Health care (availability and cost)<br>4. Inadequate policies (*drugs packaging is not adapted to the need of farmers who usually have small number of poultry while drugs are packaged for big number of poultry*) | Low access to information | None |
| | Opportunities | Proximity of the village with extension service | Social events driving the demand | High demand for local poultry |
| Petty trade (shop tenancy, selling local beer, cakes, etc.) | Constraints | 1. Scarcity of firewood<br>2. Low demand (small village) | Barriers to importation of goods from neighboring countries | Credits sales and low reimbursement rate |

| | | | | |
|---|---|---|---|---|
| | Opportunities | Relatively high demand for some product like local beer | None | None |
| Pork fattening | Constraints | 1. Low equipment<br>2. Health care (availability, cost)<br>3. Low financial resources | 1. Low access to credit: the issue of the guarantee | 2. Selling conditions (transportation, low prices) |
| | Opportunities | None | None | None |

**Table 7c. Identification by ALS type 2 of key non-farmer stakeholders and expected roles in each livelihood activities they would like to invest on**

| *Livelihood portfolio component* | *Non-farmer stakeholder* | *Expected roles* |
|---|---|---|
| Sorghum/Millet | 1. God (believes)<br>2. Extension services | 1. God can grant more rains<br>2. Extension services can help for capacity building on soil fertility management and weeds management<br>3. Extension services can contribute to making information available about sources of credit access |
| Maize | 1. God (believes)<br>2. Extension services | 1. God can grant more rains<br>2. Extension services : capacity building on soil fertility management and weeds management, access to improved seeds, access to equipment |
| Poultry | 1. Extension services | 1. Capacity building on health care |
| Petty trade *(shop tenancy, selling local beer, cakes, etc.)* | 1. Municipality | 1. Better organization of petty trade sells in the village. For instance the women use to prepare local beer per quartier by turn so that there is no overwhelming offer compared to the demand. Nowadays nobody cares about the enforcement of these rules. Women sell local beer all over the village at the same time with no organization leading to a high offer causing |

| | | |
|---|---|---|
| | | poor sells<br>2. The municipality can also help villagers setting commonly managed wood slots (planted trees for wood)<br>3. Promotion of energy saving technologies |
| Pork fattening | 1. NGOs<br>2. State<br>3. Extension services | 1. Help better organize farmers to improve their negotiation power with traders<br>2. Training on animal health care<br>3. Subsidies<br>4. Credit system |

The results showed that the prioritization of livelihood portfolio components by better-off ALS type (ALS type 3) was similar to the ranking by ALS type 2. Sorghum/millet (food cash crop), Maize (subsistence crop) and Groundnuts (cash crop) were placed on the top of the ranking followed by poultry. The intended planning allocated 40% of available resources to sorghum/millet, 20% to maize and 20% to poultry. Groundnuts which occupy the 3rd position in the ranking were allocated 10% of the resources.

Table 8a. Livelihood activity prioritization by ALS type 3

| Rank | Livelihood portfolio component | Future planning<br><br>*(Money invested over a budget of 500,000 FCFA)* | Share of available budget (%) |
|---|---|---|---|
| 1 | Sorghum/Millet | 200,000 | 40 |
| 2 | Maize | 100,000 | 20 |
| 3 | Groundnuts | 50,000 | 10 |
| 4 | Poultry | 100,000 | 20 |
| 5 | Petty trade *(shop tenancy, selling local beer, cakes, etc.)* | 50,000 | 10 |

Table 8b. Identification of constraints and opportunities (technical, institutional, market) for the livelihood activities ALS type 3 would like to invest on

| Livelihood portfolio component | Constraints / opportunities | Technical | Institution-al/Cultural | Market |
|---|---|---|---|---|
| Sorghum /Millet | Constraints | 1. Weeds (*Striga hermon-thica*)<br>2. Loss of soil fertility<br>3. Rainfall variability | None | None |
| | Opportunities | Extension services providing capacity building on the use of organic fertilizer and stone bunds | None | Demand exists (easy to sell) |
| Maize | Constraints | 1. Low access to mineral and organic fertilizers<br>2. Rainfall variability<br>3. Low soil fertility<br>4. Labour shortage<br>5. Low equipment | None | Prices fluctuation |
| | Opportunities | 1. Use of organic fertilizer re-duce weeds effects<br>2. Extension services provid-ing capacity building on the use of organic fertilizer and stone bunds | Fertilizer subsidy | None |
| Groundnuts | Constraints | 1. Rainfall variability<br>2. Labour shortage | None | Prices fluctuation |
| | Opportunities | Extension services providing capacity building on the use of organic fertilizer and stone bunds | None | None |
| Poultry | Constraints | 1. Diseases<br>2. Low access to health care | None | Prices fluctuation |

| | | | | |
|---|---|---|---|---|
| | Opportunities | None | Proximity with extension services | None |
| Petty trade *(shop tenancy, selling local beer, cakes, etc.)* | Constraints | None | None | 1. Credit sales non-refunded<br>2. Competition |
| | Opportunities | None | Existence of micro-finances | Demand in the village |

**Table 8c. Identification by ALS type 3 of key non-farmer stakeholders and expected roles in each livelihood activities they would like to invest on**

| *Livelihood portfolio component* | *Non-farmer stakeholder* | *Expected roles* |
|---|---|---|
| Sorghum/Millet | Extension services | Capacity building |
| Maize | Extension services | Capacity building |
| Groundnuts | Government | Price control |
| Poultry | Extension services | Capacity building in health by farmers |
| Petty trade *(shop tenancy, selling local beer, cakes, etc.)* | Clients | Cash purchase instead of credit |

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Thiombiano, B.A., Le, Q.B., 2016. Smallholder agricultural livelihood type-specific behavior analyses for better targeting adoption of sustainable land management: A demonstrative case analysis in Pontieba, south-western Burkina Faso Food security and better livelihoods for rural dryland communities CGIAR Research Program on Dryland Systems (ICARDA), Amman, Jordan, p. 35.

# Annexes

## Factors affecting crop choices by different ALS types

### Annexe 1a: Identification by ALS type 1 of factors affecting groundnuts choice versus sorghum or millet as base case

| Variables list | Significance (*Yes/No*) | Direction (*+/-*) | Weight (*1 to 10*) |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 9 |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 10 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | Yes | | |
| Access to credit ($H_{CREDIT}$) | No | - | 10 |

### Annexe 1b: Identification by ALS type 1 of factors affecting rice choice versus sorghum or millet as base case

| Variables list | Significance (*Yes/No*) | Direction (*+/-*) | Weight (*1 to 10*) |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 10 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 10 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 10 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

## Annexe 1c: Identification by ALS type 1 of factors affecting maize choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 9 |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | Yes | + | 10 |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 8 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 10 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | + | 9 |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | Yes | - | 8 |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | + | 9 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 8 |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | Yes | - | 10 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

## Annexe 2a: Identification by ALS type 2 of factors affecting groundnuts choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | Yes | - | 3 |
| Household labour ($H_{LABOUR}$) | Yes | - | 5 |
| Dependency ratio ($H_{DEPEND}$) | Yes | - | 7 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 5 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | + | 4 |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 10 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 10 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 10 |
| Plot wetness index ($P_{WETNESS}$) | Yes | - | 10 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 10 |
| Access to credit ($H_{CREDIT}$) | Yes | - | 7 |

## Annex 2b: Identification by ALS type 2 of factors affecting rice choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | Yes | - | 6 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 5 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 5 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 7 |
| Access to credit ($H_{CREDIT}$) | Yes | - | 8 |

## Annex 2c: Identification by ALS type 2 of factors affecting maize choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 10 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 10 |
| Plot wetness index ($P_{WETNESS}$) | Yes | - | 10 |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | No | | |

## Annex 3a: Identification by ALS type 3 of factors affecting groundnuts choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 6 |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | Yes | - | 7 |
| Household labour ($H_{LABOUR}$) | Yes | + | 8 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 8 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | + | 6 |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 7 |
| Plot size ($P_{AREA}$) | Yes | - | 8 |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | + | 8 |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 7 |
| Slope length of the plot ($P_{LS}$) | Yes | + | 8 |
| Access to credit ($H_{CREDIT}$) | No | | |

## Annexe 3b: Identification by ALS type 3 of factors affecting rice choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | Yes | + | 8 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | Yes | + | 7 |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 8 |
| Slope length of the plot ($P_{LS}$) | Yes | + | 7 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 9 |

## Annexe 3c: Identification by ALS type 3 of factors affecting maize choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | Yes | + | 8 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 9 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | + | 7 |
| Plot size ($P_{AREA}$) | Yes | + | 8 |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | + | 8 |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 7 |
| Slope length of the plot ($P_{LS}$) | Yes | + | 6 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 8 |

## Factors affecting crop choices by women and men groups

### Annexe 4a: Identification by women of factors affecting groundnuts choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | Yes | - | 6 |
| Dependency ratio ($H_{DEPEND}$) | Yes | - | 10 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | Yes | - | 10 |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 10 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 10 |
| Plot wetness index ($P_{WETNESS}$) | Yes | - | 10 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 10 |
| Access to credit ($H_{CREDIT}$) | No | | |

### Annexe 4b: Identification by women of factors affecting rice choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | - | 5 |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | Yes | - | 4 |
| Household labour ($H_{LABOUR}$) | Yes | - | 10 |
| Dependency ratio ($H_{DEPEND}$) | Yes | - | 9 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 6 |
| Plot size ($P_{AREA}$) | Yes | - | 10 |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | + | 10 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 8 |
| Plot wetness index ($P_{WETNESS}$) | Yes | - | 10 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 10 |
| Access to credit ($H_{CREDIT}$) | No | | |

## Annexe 4c: Identification by women of factors affecting maize choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 8 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | + | 10 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 10 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 10 |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | No | | |

## Annexe 5a: Identification by men of factors affecting groundnuts choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 3 |
| Household head education years ($H_{HEDUYR}$) | Yes | + | 8 |
| Household size ($H_{SIZE}$) | Yes | - | 10 |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 10 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 7 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | Yes | - | 10 |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | Yes | - | 10 |
| Access to credit ($H_{CREDIT}$) | Yes | - | 10 |

## Annexe 5b: Identification by men of factors affecting rice choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 3 |
| Household head education years ($H_{HEDUYR}$) | Yes | + | 8 |
| Household size ($H_{SIZE}$) | Yes | - | 8 |
| Household labour ($H_{LABOUR}$) | Yes | + | 8 |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 10 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 7 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | Yes | - | 10 |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 10 |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | Yes | - | 10 |
| Access to credit ($H_{CREDIT}$) | Ye | - | 3 |

## Annexe 5c: Identification by men of factors affecting maize choice versus sorghum or millet as base case

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 3 |
| Household head education years ($H_{HEDUYR}$) | Yes | + | 8 |
| Household size ($H_{SIZE}$) | Yes | - | 8 |
| Household labour ($H_{LABOUR}$) | Yes | + | 8 |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 10 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 7 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | Yes | - | 10 |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 10 |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | Yes | + | 7 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 9 |

## Results for mineral fertilizer adoption

### Annexe 6a: Identification by ALS type 1 of factors affecting mineral fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 8 |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | Yes | + | 10 |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 10 |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 9 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 3 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 3 |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

### Annexe 6b: Identification by ALS type 2 of factors affecting mineral fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 4 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 5 |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | + | 7 |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 4 |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 5 |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | Yes | + | 7 |

## Annexe 6c: Identification by ALS type 3 of factors affecting mineral fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | Yes | + | 6 |
| Household size ($H_{SIZE}$) | Yes | - | 7 |
| Household labour ($H_{LABOUR}$) | Yes | + | 8 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 7 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 6 |
| Plot size ($P_{AREA}$) | Yes | + | 8 |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 8 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 9 |
| Slope length of the plot ($P_{LS}$) | Yes | + | 9 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 8 |

## Annexe 7a: Identification by women of factors affecting mineral fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 5 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 8 |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | + | 10 |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

## Annexe 7b: Identification by men of factors affecting mineral fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 10 |
| Household head education years ($H_{HEDUYR}$) | Yes | + | 10 |
| Household size ($H_{SIZE}$) | Yes | + | 10 |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 10 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | - | 6 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 8 |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | - | 5 |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 4 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 8 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 6 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

## Results for organic fertilizer adoption

### Annexe 8a: Identification by ALS type 1 of factors affecting organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 8 |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | Yes | + | 10 |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 10 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 10 |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 9 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 3 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 3 |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

### Annexe 8b: Identification by ALS type 2 of factors affecting organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | - | 5 |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 4 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 7 |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | Yes | - | 4 |
| Access to credit ($H_{CREDIT}$) | No | | |

Annexe 8c: Identification by ALS type 3 of factors affecting organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | Yes | + | 7 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 8 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 8 |
| Plot size ($P_{AREA}$) | Yes | + | 6 |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | + | 7 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 5 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 6 |
| Slope length of the plot ($P_{LS}$) | Yes | + | 7 |
| Access to credit ($H_{CREDIT}$) | No | | |

Annexe 9a: Identification by women of factors affecting organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 10 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 10 |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | Yes | + | 8 |

## Annexe 9b: Identification by men of factors affecting organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 10 |
| Household head education years ($H_{HEDUYR}$) | Yes | + | 10 |
| Household size ($H_{SIZE}$) | Yes | + | 10 |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 10 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 8 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | - | 7 |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | - | 5 |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 5 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 4 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 8 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 6 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

## Results for combined mineral-organic fertilizer adoption

### Annexe 10a: Identification by ALS type 1 of factors affecting combined mineral-organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 8 |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | Yes | + | 10 |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 5 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 10 |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 9 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 3 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 3 |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

### Annexe 10b: Identification by ALS type 2 of factors affecting combined mineral-organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 4 |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 3 |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 2 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | - | 3 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 2 |
| Plot wetness index ($P_{WETNESS}$) | Yes | - | 2 |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | No | | |

## Annexe 10c: Identification by ALS type 3 of factors affecting combined mineral-organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | Yes | + | 7 |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | Yes | + | 8 |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | + | 8 |
| Plot size ($P_{AREA}$) | Yes | + | 7 |
| Previous crop on the plot ($P_{CROPHIST}$) | Yes | + | 7 |
| Plot upslope ($P_{UPSLOPE}$) | Yes | + | 6 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 8 |
| Slope length of the plot ($P_{LS}$) | Yes | + | 8 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 8 |

## Annexe 11a: Identification by women of factors affecting combined mineral-organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | No | | |
| Household head education years ($H_{HEDUYR}$) | No | | |
| Household size ($H_{SIZE}$) | No | | |
| Household labour ($H_{LABOUR}$) | No | | |
| Dependency ratio ($H_{DEPEND}$) | No | | |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | Yes | + | 5 |
| Total farm land holdings ($H_{HOLDINGS}$) | No | | |
| Plot distance from homestead ($P_{DHOUSE}$) | No | | |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | No | | |
| Plot wetness index ($P_{WETNESS}$) | No | | |
| Slope length of the plot ($P_{LS}$) | No | | |
| Access to credit ($H_{CREDIT}$) | Yes | + | 5 |

Annexe 11b: Identification by men of factors affecting combined mineral-organic fertilizer adoption

| Variables list | Significance *(Yes/No)* | Direction *(+/-)* | Weight *(1 to 10)* |
|---|---|---|---|
| Age of household head ($H_{HEADAGE}$) | Yes | + | 10 |
| Household head education years ($H_{HEDUYR}$) | Yes | + | 10 |
| Household size ($H_{SIZE}$) | Yes | + | 10 |
| Household labour ($H_{LABOUR}$) | Yes | + | 10 |
| Dependency ratio ($H_{DEPEND}$) | Yes | + | 10 |
| Tropical Livestock Unit per person ($H_{TLUCP}$) | No | | |
| Annual gross income per person ($H_{GROSSINCCP}$) | No | | |
| Total farm land holdings ($H_{HOLDINGS}$) | Yes | - | 5 |
| Plot distance from homestead ($P_{DHOUSE}$) | Yes | - | 4 |
| Plot size ($P_{AREA}$) | No | | |
| Previous crop on the plot ($P_{CROPHIST}$) | No | | |
| Plot upslope ($P_{UPSLOPE}$) | Yes | - | 4 |
| Plot wetness index ($P_{WETNESS}$) | Yes | + | 8 |
| Slope length of the plot ($P_{LS}$) | Yes | - | 6 |
| Access to credit ($H_{CREDIT}$) | Yes | + | 10 |

Annexe 12: Presentation of previous research

Annexe 13: Discussion during presentation of previous research

Annexe 14: Discussion during presentation of previous research

Annexe 15: Discussion during presentation of previous research

Annexe 16: Coffee break during presentation of previous research

Annexe 17: Group discussion, ALS type 1. Note: 5 farmers, 1 translator and Dr Grégoire Meylan

Annexe 18: Group discussion, ALS type 2. Note: 5 farmers, 1 translator, the M.Sc student and Dr Boundia Alexandre Thiombiano

Annexe 19: Group discussion, ALS type 3. Note: 5 farmers and M. Palamangui Onadja (Field helper from UPB)

Annexe 20: Group discussion

Annexe 21: Group session, female group

Annexe 22: Group session, male group

Annexe 23: Wrap-up session

Annexe 24: Wrap-up session

Annexe 25: Wrap-up session

Annexe 26: Field visit. Note: Sorghum and cotton plots

## Annexe 27: Field visit

CGIAR

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