SEED SYSTEM SECURITY ASSESSMENT IN SOUTHEAST KASAÏ & KASAÏ-CENTRAL, DRC

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ACKNOWLEDGEMENTS

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ACRONYMS

ACF	Action Contre la Faim
ADRA	Adventist Development and Relief Agency
CMD	Cassava Mosaic Disease
COPROSEM	Provincial Seed Council (Conseil Provincial Semencier)
CRS	Catholic Relief Services
DRC	Democratic Republic of Congo
GAINS	Graduating to Sustainable Agriculture, Income, Nutrition and Food Security
Ha	Hectare
HH	Household
INERA	National Institute of Agricultural Studies and Research
Kg	Kilogram
MC	Mercy Corps
NGO	Non-Governmental Organization
QDS	Quality-Declared Seed
RFSA	Resilience Food Security Activity
SENAFIC	National Service of Fertilizers and Related Inputs
SENASEM	National Seed Service
SNV	National Extension Service
SSSA	Seed System Security Assessment
UNAPSCO	Union Nationale de Producteurs de Semence Congo
UNILU	University of Lubumbashi

EXECUTIVE SUMMARY

This report presents the results of a Seed System Security Assessment (SSSA) in the provinces of Kasaï and Kasaï-Central in the Democratic Republic of Congo. This assessment focused on 11 health districts: Ndjoko-Mpunda, Kitangua, Kalonda-Ouest, Kanzala, Kamonia (Kasai Province), Kamuesha, Dibaya, Lubondaie, Yangala, Masuika, Luiza (Kasai-Central Province). This SSSA was conducted in July and August of 2024, and it focuses on Season B (January to June) of 2024 and the upcoming Season A (late August to January) of 2024/25.

The research team did not find acute seed insecurity that requires an emergency response or an immediate seed distribution. The team did, however, find chronic seed insecurity issues. Most of the improved varieties in Kasaï and Kasaï-Central were developed 20-30 years ago. Farmers have access to a very limited number of varieties, with only a few different varieties available for each crop. Seed quality itself may be low as farmers tend to buy bin-run seed at the local market and the vendors tend to not separate out different varieties. 'Bin-run seed' is essentially the same product as the grain for sale in the market. The only difference is that bin-run seed may have been cleaned and larger grains selected. Apart from that, this 'seed' has no real distinction from grain. There may be a variety name, but no real check on whether it is true to type. Many farmers are aware of varietal differences, and they reported that their seed quality is very poor. The decline of local diamond industry and the Kamuina Nsapu conflict (2016-2019) resulted in the dislocation of some farmers from their agricultural heritage, which could help explain some farmers' disregard for varietal differences. Direct seed distributions of purportedly certified seed in the zone are potentially exacerbating the chronic seed insecurity issues by increasing the quantity of counterfeit seed. Here 'counterfeit' refers to seed that is deemed to be quality because it has been certified but the certification process is suspect and does not follow generally agreed upon standards (ISTA) or best practices in terms of lot sizes, sampling frames, and traceability / custodial linkages to foundation seed.

As one central intervention to improve varietal quality, research and development interventions should create a platform that brings together breeders and farmers to help develop and identify new varieties that meet male and female farmer needs. Demonstration trials in farmer-realistic conditions can help verify local adaptation and farmer acceptance. After the farmer-led selection of new varieties, local means of sustainable seed multiplication need to be promoted, and far-reaching dissemination channels (preferably sale) need to be catalyzed to help move new varieties in the hands of farmers, on a sustainable basis. All these efforts should help increase farmers' appreciation of improved varieties and address multiple issues linked to the chronic seed insecurity found across the Kasaï and Kasaï-Central provinces.

Contextual Findings

- Excessive rainfall events, prolonged droughts, and high temperatures have a negative impact on crops.

- Cassava is essential for food security and climate change resilience, as it can withstand prolonged periods of drought. Cassava can survive drought better than the rest of farmers' current crops.
- Kasaï and Kasaï-Central farmers struggle with poor soil fertility. Their slash-and-burn practices do not sustainably improve soil fertility. Poor soil fertility is often linked with low input use and extensive (versus intensive) agricultural practices, preventing improved varieties from attaining their yield potentials.
- Farmers have limited knowledge of seed management. Open-pollinated maize, self-pollinated legumes, and cassava cuttings enable farmers to re-plant seed over several seasons. However, farmers have limited knowledge of proper procedures for seed selection, drying, handling, and storage to maintain the quality of harvested grain to be used as seed in subsequent seasons. They also require guidance on how frequently they must purchase seed and to recognize deterioration of seed quality over time. These skills can also improve farmer purchases of seed through kinship networks and markets.
- Cassava and maize are important for household incomes.
- Crops are frequently attacked by insects, affecting production and storage. Storage losses are highest for maize and cowpea, with average losses of 28%. Production losses are highest for cowpea (insects) and cassava (CMD).
- The decline of the diamond industry has led to many people to return to agricultural livelihoods, but many of them do not have the same experience and knowledge as lifelong farmers.
- The Kamuina-Nsapu conflict was a recent and major social upheaval, which also reduced the availability of good seeds.
- Women farmers and female-headed households face much greater challenges than men and male-headed households. Men can appropriate their wives' harvest to pay the brideprice of an additional wife.

Acute Seed Security Findings

Agricultural production is currently higher than previous seasons for smallholder farmers in Kasaï and Kasaï-Central. Farmers generally planted more than normal in season B 2024, they had good yields, and they plan to plant more than normal again for season A 2024/25.

- Kasaï farmers planted 21% more than normal last season (season B) and they intend to plant 52% more than normal next season (season A). Maize and cassava were the main crops driving this increase.
- Kasaï-Central farmers planted 1% more than normal last season (season B) and they intend to plant 22% more than normal next season (season A).
- Production across crops was up 16% (both provinces combined) for the current season B compared to the normal season B.
- Male and female-headed households both planted 16% more than normal in season B, 2024. For season A 2024/25, female-headed households intend to plant 50% more than normal and male-headed households intend to plant 41% more than normal.

For the overall findings, no signs of acute seed insecurity were observed.

Chronic Seed Security Findings

The main reasons for seed insecurity were chronic in nature.

- Farmers do not have sufficient access to improved varieties.
- Farmers tend to buy bin-run seed (grain) that has low germination rates.
- Agro-dealers and seed companies are almost non-existent in the study region.
- Local seed producers who multiply local varieties were not observed, and those multiplying improved varieties do so on a small scale. It is not clear that current seed producers are multiplying varieties that are productive and appreciated by farmers.
- Farmers can access improved varieties mainly through direct aid distributions – and not ongoing delivery channels. Respondents obtained 93% of their new varieties via direct seed aid distributions.
- The seed systems are static. There is very little innovation in terms of choice of seed sources, quality of seed, or seed varieties.
- Counterfeit seed is problematic, mainly for maize; this erodes farmers' appreciation of certified seed, making it harder to implement market-based solutions.
- By most accounts, the seed available to farmers generally has very poor physical and deteriorating genetic quality, and a narrow range of variety diversity.

Recommendations

1. Work with national breeders, farmers, traders, local research stations, and farmer representatives to (1) jointly identify productive and farmer-acceptable varieties, and (2) speed up the identification and deployment of farmer preferred varieties by strengthening and formalizing collaboration on a crop specific basis, increasing farmer / trader / consumer role in varietal identification.
2. Support replicated demonstration plots in the target villages so farmers can evaluate high-quality seed and new varieties under their own, realistic farming conditions.
3. Identify and support seed production models that multiply seeds near or on-site to make accepted varieties and good quality seed more available. Models need to be cost-effective and geared towards farmers, not institutional buyers.
4. Identify diffusion and delivery models that can reach the range of smallholder farmers. This includes options such as small seed packets, last-mile delivery options, and seed fairs and vouchers.
5. Train farmers (refresh their understanding) on how to select for seed quality and how to manage seed / planting material. Remind farmers on field-based best practices for seed selection of maize, cowpea, and cassava, including postharvest handling and storage which can improve seed viability / physiological status of seed / planting material.
6. Address the high rate of storage losses with PICS bags or other proper storage techniques. This might also help address the problem of farmers selling grain when the price is low and rebuying grain when the price is high – due to storage challenges. Hermetic storage

technology requires a specific set of activities and must go beyond 'procure and disseminate PICS bags'

7. Address poor soil fertility by promoting non-laborious sustainable soil management practices, like leaving more residues or obtaining/composting more manure or household scraps. Interventions should include Integrated Soil Fertility Management (ISFM) and erosion reduction for the maize, cowpea, and cassava cropping system.
8. Focus training programs on the lead farmers. Ensure that the community associates the training with the "cutting edge" practices. Local seed production requires disciplined agricultural practices. Raising the ceiling of the best local farmers is conducive to local quality seed production, which they can exchange with neighbors.
9. Organize provincial-wide coordination meetings involving the Provincial Ministry of Agriculture, SENASEM, INERA, FAO, IITA and NGOs working in the agricultural sector to elaborate Provincial Seed System Development Strategies for Kasai and Kasai Central.
10. Provincial seed system development strategies should integrate gender-responsive principles, recognizing the roles of women as seed users and producers. These strategies should address women's differentiated needs through accessible channels, affordable quality seeds, and targeted interventions that enhance knowledge, skills, and access to resources.

SECTION I. INTRODUCTION

Rationale for the Assessment

This Seed System Security Assessment (SSSA) was conducted in Kasaï and Kasaï-Central. Farmers in these two regions benefit from two agricultural seasons per year. The main rainy season (Season A) goes from late August to January. The smaller rainy season (Season B) goes from January to June. The agricultural off-season is June to August. This SSSA was conducted in July and August of 2024, and it focuses on Season B of 2024 and the upcoming Season A (ending January 2025). The respondents of household surveys and the key informants provided information on the quantity and quality of the seed planted in Season B (2024), and they forecasted the quantity of seed they intend to plant for the upcoming rainy season (Season A, 2024/25).

The SSSA was conducted in the Kasaï and Kasaï-Central provinces because:

- This is where three large-scale RFSA projects are focusing their activities. These three RFSA projects are in their early start-up phases.
- Residents of Kasaï and Kasaï-Central are still recovering from the Kamuina-Nsapu conflict and the decline of the diamond industry.

- Kasaï and Kasaï-Central provinces have been historically neglected by development interventions, and they are vulnerable to a range of shocks and stresses.

Report Structure

This report is divided in six sections, including this introduction. Section II covers the background and key concepts of an SSSA. Section III reviews the general methodology and the range of survey tools of an SSSA. Section III also discusses the specific methodological features of this SSSA, including the justification for the site selection and the demographics of the respondents. Section IV describes the agro-ecological and social contexts as well as information on formal breeding programs and the seed sector background in Kasaï and Kasaï-Central. Section V presents the field findings around seed systems in these two territories. This section is divided into two main components: acute seed insecurity and chronic seed insecurity. This section is based on 1,126 quantitative household surveys of smallholder farmers, 8 focus group discussions, and 82 key informant interviews in the formal and informal seed systems. Section VI provides recommendations to strengthen the seed systems in Kasaï and Kasaï-Central. Section VII is references; section VIII is additional tables disaggregated by RFSA zone.

SECTION II. BACKGROUND TO SEED SYSTEM SECURITY ASSESSMENTS

Seed systems are a crucial component of agricultural productivity, resilience, and food security. Understanding seed security is essential for evaluating how well a farming community can sustain its agricultural output in regions that face climatic variability, economic insecurity, or social upheavals. In this section, we will explore the core concepts, dimensions, and types of seed insecurity, providing a comprehensive framework for assessing and understanding seed systems.

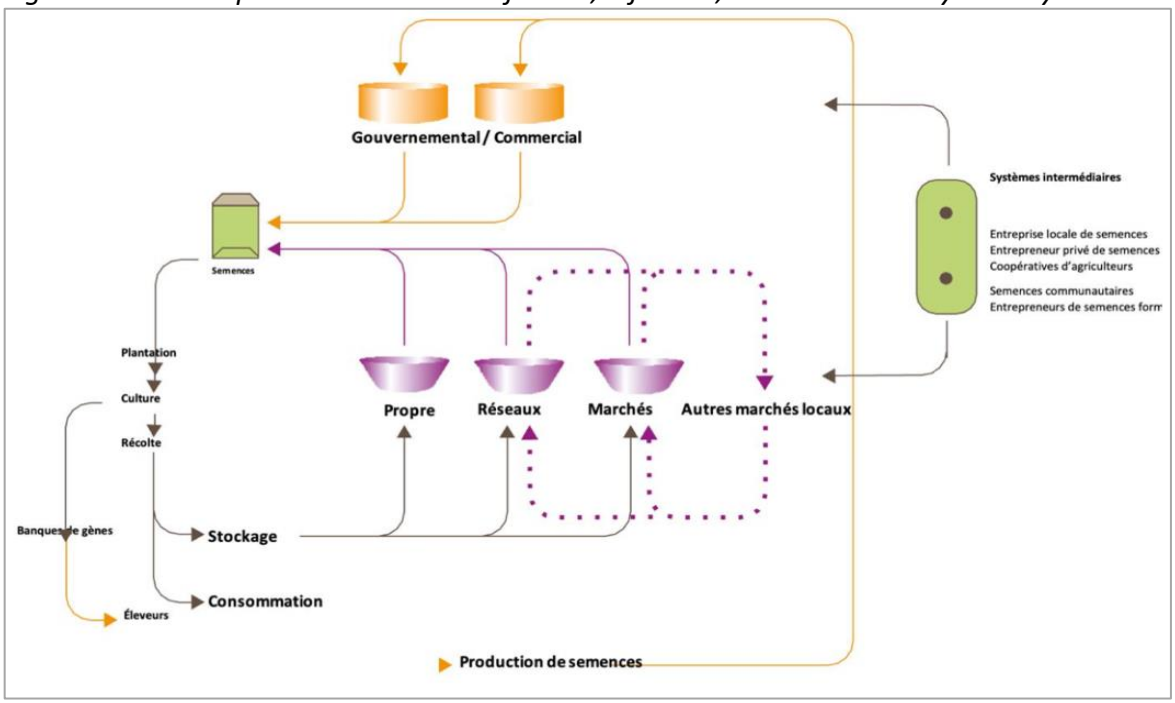
Seed System Overview

Seed system is divided into three essential sub-systems:

- **The Formal Seed System –** This sub-system develops and distributes improved varieties and high-quality seed. The improved varieties are typically bred at national research institutions and subsequently multiplied by certified seed producers. A department of the national government manages the certification process for certified seed, and the seeds are marketed by commercial entities. Improved varieties are also produced as quality-declared seed (QDS).
- **The Informal Seed System –** This sub-system accounts for the production, exchange, marketing and general procurement of mainly local varieties. It may also include improved varieties which have moved into local systems. Seeds in this informal system are sourced from local markets, farmer exchanges, and stored reserves from farmers' previous harvests. The informal system is the primary source of approximately 90% of seeds for farmers in the Global South. Identifying seeds in this system can be challenging as they are often sold as grain.
- **The Intermediary Seed System –** This sub-system consists of small-scale enterprises that operate between the formal and informal systems. The intermediary system facilitates the transfer of seeds between the formal and informal systems. One example of an intermediary seed system actor is farmer associations trained by NGOs to carefully produce clean planting materials for crops like sweet potatoes or cassava.

These three sub-systems are closely connected. Improved varieties are usually developed by scientists, multiplied by certified seed producers, and sold by seed companies. Once farmers obtain certified seeds, they enter the informal system where farmers grow, trade, and sell them locally. The informal system is mainly made up of local varieties adapted to local conditions, but improved varieties also flow through it. Seeds that move through this informal system can lose quality due to outcrossing, traditional farming practices, poor storage, and other factors.

Figure 1: Farmers procure seed via the formal, informal, and intermediary seed systems



Source: SeedSystem 2023. Seed Security Assessment. Great South (Grand Sud) Madagascar. July 2023

This image shows the channels through which farmers procure seed. Stored stocks, exchange with friends/family/neighbors, and purchase through local grain markets constitute "informal" channels, while commercial seed companies, government or research outlets, and relief supplies constitute formal channels. This image was adapted from Almekinders and Louwaars (1999) and Sperling (2023).

The Concept of Seed Security

Seed security is attained when agricultural households can access adequate quantities of quality seed before the planting period. Seed security is comprised of four main components: availability, accessibility, seed quality (health), and varietal quality (see Table 1).

Table 1. The necessary components of seed security

Component	Description
Available	Availability means that sufficient quantities of seed are physically present in a region when farmers need them. This dimension assesses whether enough seed is present within the community or can be brought in from outside sources in time for planting. Seed availability depends on the effectiveness of seed distribution networks as well as on seed production.
Accessible	Accessibility is determined by the farmers' capacity to obtain seed, via their economic or social capital. This dimension examines the financial resources of farmers, the functioning of local markets, and the presence of social networks that allow for seed exchange. Accessibility is closely linked to broader socio-economic conditions and can be influenced by factors such as market prices, income levels, and social cohesion. In contexts of poverty or social marginalization, access can be severely constrained, leading to seed insecurity.
Seed Health / Quality	Seed health quality refers to the physical, physiological, and sanitary quality of seed and entails the seeds' germination rate, purity, and freedom from disease. Poor-quality seed can result in reduced yields, making it a critical component of seed security assessments.
Varietal Quality	Varietal quality refers to the genetic suitability of seeds to local agro-ecological contexts and the farmers' preferences. Varietal quality means that varieties satisfy female and male farmers' marketing, processing, cooking, and consumption preferences.

A secure seed system is critical for ensuring food security, as it allows farmers to maintain and even improve agricultural productivity, despite potential challenges such as climatic variability, economic shifts, or conflict. The seed security framework enables development practitioners and donors to reflect on the resilience and sustainability of all the seed systems farmers may use.

Acute and Chronic Seed Insecurity

Seed insecurity can be classified into two broad categories: acute and chronic.

Acute seed insecurity is the result of sudden shocks – such as natural disasters, conflict, or economic collapse – which disrupt the availability and access to quality seed in the short term. These events can lead to immediate and widespread seed shortages. In response to acute seed insecurity, development and humanitarian interventions work to ensure that quality seed is available and accessible amongst the affected populations.

Chronic Seed Insecurity, on the other hand, is a long-term condition often linked to systemic issues such as poverty, marginalization, environmental degradation, and ineffective or counterproductive seed policies. In cases of chronic seed insecurity, farmers consistently lack access to quality seed, leading to reduced agricultural production and increased vulnerability to shocks and stresses. Addressing chronic seed insecurity requires sustained efforts to improve all seed systems farmers' use, enhance market access, and promote resilient agricultural practices.

Acute and chronic seed insecurity can overlap, complicating this distinction. For example, farmers in a chronically stressed seed system that lacks innovative germplasm could be impacted by an acute stressor (such as regional conflict), causing them to lose their fields and

their stored stocks, thus exasperating chronically poor seed quality. On the other hand, a flood is an acute stress to seed security, but if floods occur frequently enough, they can become a chronic stress on the seed system.

A farmer achieves seed security when all essential components – availability, accessibility, seed quality, and variety quality – are sufficiently met. Typically, cases of seed insecurity involve deficiencies in one or two of these essential components. Instances where farmers are insecure in all four components are relatively rare. A primary objective of an SSSA is to determine which exact seed security problem (or problems) farmers encounter. By identifying which essential component(s) is problematic, an SSSA can accurately diagnose the nature of seed insecurity and provide targeted recommendations. These recommendations are specifically tailored to address the idiosyncratic characteristics of seed insecurity zone by zone. Table 2 gives an indication of the broad types of responses that might be suitable for specific seed security problems.

Table 2. Types of seed insecurity and broadly appropriate responses

Constraint on seed security	**Potential short-term responses**	**Potential longer-term responses**
Availability	Direct distribution of seed	Rarely occurs. Support development of seed production and commercial enterprises
Access	Cash disbursement, Seed fairs with vouchers or cash, Local procurement and distribution	Poverty-reduction programs, e.g., support for the development of agro-enterprises and other ways to generate income
Seed Health/Quality	Distribution of healthy or treated seed	Programs to address production or storage constraints (e.g., to reduce postharvest deterioration)
Varietal Quality	Seed vouchers and fairs or direct seed distributions, focsuing on varieties specifically adapted to the intervention zones	Participatory plant breeding to identify adapted and acceptable varieties

SECTION III. METHODOLOGY

Survey Tools and Sample Sizes

The SSSA examines the performance of seed systems, identifies their weaknesses, and explores sustainable ways to strengthen them. In this SSSA, the research team started by conducting background research via a document review of existing reports and information. The team subsequently gathered information on the supply and demand of seed by interviewing key actors in the seed sector, including farmers, seed producers, seed traders, agro-enterprises, grain dealers at the local market, government actors, and NGOs. The research team conducted 1,126 household interviews, 8 focus group discussions with male and female farmers, and 82 key informant interviews with stakeholders in the seed system. This SSSA was conducted in July and August 2024, in the off-season between season B and season A. In the individual surveys, farmers were asked about where they procured their seed for last season (season B, 2024) and where they will procure their seed for next season (season A, 2024/25). To analyze the data, the assessment incorporated a mix of qualitative and quantitative methods, including T-tests and chi-square, and more general statistical analysis. This holistic approach to analyzing the seed system ensures a comprehensive understanding of seed security constraints.

Table 3: Investigative methods used in this 2024 SSSA in Kasaï and Kasaï-Central

Type of Investigation	Number of Interviews
FAO (Offices)	2
NGOs	3
INERA	3
National breeders	3
SENASEM	4
Focus Group Mixed	4
Focus Group Women	4
Large Traders	9
Grain/Local Seed Vendors	12
Agro-processers	12
Government Authorities	12
Seed Producers	22
Household Surveys	1,126

Site Selection

This SSSA was conducted in the project zones of three USAID-funded programs: GAINS, Tudienzele and Tudituale (see Table 4). Tudienzele means “let's work together for ourselves” or “let's solve our own problems” in the Tshiluba language. Tudituale means “soyons autonomes” or “let’s be self-reliant” in the Tshiluba language. GAINS is an acronym for Graduating to

Sustainable Agriculture, Income, Nutrition and food Security. GAINS also has a Tshiluba name "Tuya Kumpala" (let us advance together). The target zones for GAINS and Tudienzele are in the same province (Kasaï) and the households share many similarities, while the target zones for Tudituale are in a neighboring province (Kasaï-Central), see Figure 2. When relevant, the data from the CRS zones will be analyzed separately.

Table 4. Implementing NGOs and their project zones for the SSSA

NGO	Project	Province	Territories	Health Zones
Mercy Corps	GAINS	Kasaï	Luebo, Kamonia	Ndjoko Punda, Kitangua, Kalonda West, Nyanga
ADRA	Tudienzele	Kasaï	Kamonia	Kanzala, Kamonia, Kamuesha
CRS	Tudituale	Kasaï-Central	Dibaya, Luiza	Dibaya, Lubondaie, Yangala, Masuika, Luiza

Another SSSA was conducted in 2017 in Miabi and Thsilundu, which is less than 100 kilometers east of Dibaya and Masuika respectively, but much farther from Kamonia and Luebo. Miabi and Thsilundu have different market access, via Mbuji Mayi. Nevertheless, the target zones of this 2024 SSSA and the 2017 SSSA are roughly contiguous. This 2024 SSSA incorporates results from the 2017 SSSA to gain a better understanding of broader changes over time.

Figure 2. Map of the Tudituale, Tudienzele, and GAINS intervention zones: Luebo, Kamonia, Luiza, Dibaya

The health zones for this investigation were selected based on the following criteria:

1. Participation in one of the three RFSAs: the SSSA targeted health zones that participated in either the GAINS, Tudienzele, or Tudituale RFSA.
2. Agro-ecologically representative: the health zones were representative of the agro-ecological characteristics of the region.

Once the health zones were identified, the implementing partners identified villages based on the following criteria:

1. Isolation and vulnerability: the partners selected villages that were more remote as well as villages that were less remote. Remote rural areas are generally more susceptible to shocks and stresses due to their distance from government and agribusiness services.
2. Participation in a RFSA: the partners selected villages that participated in the RFSA interventions and villages that are not participating in the RFSAs.
3. Logistical feasibility: the partners selected villages that they could feasibly reach in a rapid assessment.

Stakeholders across the sites were selected using specific criteria and methodologies:

- **Household Survey –** Respondents were chosen randomly, starting from the village center and moving outward, selecting every other household. A total of 1,126 farmers from 11 health zones and 51 villages participated in the survey.
- **Community Focus Group –** The research team asked community leaders in 4 villages to gather 30–50 men and women for a mixed focus group discussion; 133 farmers participated in these 4 focus groups (73 males and 80 females).
- **Women's Focus Group –** The research team requested community leaders to mobilize 20–30 women for this focus group. A total of 128 female farmers from four villages participated in these focus group discussions.
- **Government Personnel –** At least one government authority was interviewed in each of the 11 health zones. These included representatives from district and sub-district level governments as well as village authorities.
- **Seed Producers –** The research team interviewed every seed producer that they found.
- **Agro-Enterprises –** The survey could not identify any agro-dealers in the study zone.
- **Large Seed/Grain Traders –** The research team could not find large seed traders. They searched for large grain traders in local markets, favoring the selection of large grain traders that sold more than one kind of grain.
- **NGOs –** The research team identified and interviewed NGOs involved in the seed system in Kasaï and Kasaï-Central.
- **Grain/local seed Traders in Local Markets –** Vendors of grain/local seed were found in local markets, including those selling from permanent shops and weekly market stalls. At least one vendor was interviewed in each of the 11 health zones.

Respondent Demographics

The goal of an SSSA is to strengthen the functioning of seed systems farmers use so that smallholders have better access to quality seed and varieties. Consequently, household surveys with smallholder farmers constitute the majority of the survey work. A relatively large sample was interviewed.

Table 5. Characteristics of the 1,126 surveyed households

Feature	Description	% Sample
Type of HH	Adult headed Child headed Grandparent headed	95% 1% 4%
Sex of HH head	Male Female	47% 53%
Average age of HH head	Age	42
Average size of HH	# of people	7
Migration Status	Resident Displaced	97% 3%
Area Cultivated	< 0.5 ha 0.5 – 1 ha 1 – 2 ha > 2 ha	33% 53% 13% 1%

The respondents were selected at random. As Table 5 shows, most households were headed by adults and by residents. Polygamous marriage practices explain the large number of female-headed households. Polygamous men typically spend most of their time in a single household. Their other wives (where the husband does not spend much time) self-identify as the head of household, as long as their husband is not sitting next to them when they are asked.

SECTION IV: THE CONTEXT – AGRO-ECOLOGICAL, SOCIAL, FORMAL BREEDING AND SEED SECTOR BACKGROUND

The Agro-ecological context

The Kasaï and Kasaï-Central provinces, located in the central region of the DRC, are characterized by complex agro-ecological systems that present both opportunities and challenges for agricultural production. Both provinces are situated in the Western Congolian Forest–Savanna Mosaic climate zone (Huntley, 2023). Benefiting from roughly 1,200 millimeters of rain per year, Kasaï and Kasaï-Central have two agricultural seasons per year: Season A from mid-August to mid-January and Season B from January to June. Farmers in the two provinces grow food and cash crops, including maize, cassava, groundnuts, beans, and cowpea. Cassava and maize are the main staple crops. Cassava is especially valued for its resilience to poor soil conditions and variable rainfall. In addition to staple crops, farmers in the region also cultivate a variety of vegetables, including tomatoes, onions, and amaranth, which are important for household nutrition and income generation. The forested areas surrounding villages also provide non-timber forest products such as fruits, nuts, medicinal plants, and bushmeat, which are crucial for the livelihoods of local communities.

The two rainy seasons provide opportunities to grow a variety of crops, but also present challenges due to the risk of drought, floods, and soil erosion during periods of intense rain. An increase in rainfall variability associated with climate change has led to unpredictable growing conditions, making traditional farming practices increasingly unreliable. In focus group discussions, farmers repeatedly mentioned that a prolonged dry spell early in the rainy season has been occurring more often in recent decades. They said that these dry spells often dry out their seedlings and force them to replant.

The region's soils are generally sandy and ferrallitic. These soils are often acidic and low in nutrients, particularly phosphorus and nitrogen, which are critical for plant growth. The infertile soils make them more conducive to cassava production (which tolerates poor soils) than maize production (which requires more soil fertility). Building up soil organic matter (by fallowing fields and incorporating agricultural residues) is critical to sustainably increasing production. High levels of soil organic matter also increase the water-holding capacity of soils, enabling crops to better tolerate dry spells during the agricultural season. However, farmers generally practice swidden agriculture (slash-and-burn), which depletes soil organic matter and soil nutrients, leading to reduced agricultural productivity. Additionally, the topography of the region, with its rolling hills and valleys, contributes to soil erosion, especially in areas where vegetation cover has been slashed and burned away.

Table 6 shows that the 1,126 respondents of this SSSA in Kasaï and Kasaï-Central generally do not add amendments to their soil. Their main reasons for not applying chemical fertilizer or organic fertilizer (manure or compost) were unavailability, not knowing about it, and believing they did not need it. Table 7 shows that these main reasons for not applying soil amendments did not differ among male and female-headed households. However, their reasons for not applying chemical fertilizer were generally different from their reasons for not applying organic fertilizer. According to the farmers' stated reasons, chemical fertilizer was less available, and they knew less about it, compared to organic fertilizer. The roughly one third of farmers who stated that they did not know about applying manure/compost to their fields to restore soil fertility is unexpected. Applying manure to fields is an extremely common agricultural practice throughout the world. In discussions amongst the research team, the local experts believed this answer (I don't know about it) was a catch-all for: I don't do it/it's not part of my practice/I don't think about it.

Table 6. Respondents' use of soil ammendments in Season B, 2024 (N=1,126)

Farmers	% who applied chemical fertilizer	% who applied manure/compost
Kasaï Province	0%	25%
Kasaï-Central Province	0%	4%
Male-headed households in both Provinces	0%	19%
Female-headed households in both Provinces	0%	23%

Table 7. Respondents' main reasons for not applying chemical and organic fertilizer in season B, 2024.

Main reason for not applying soil ammendments	Male-headed households		Female-headed households	
	Chemical fertilizer (N=530)	Compost or Manure (N=432)	Chemical fertilizer (N=592)	Compost or Manure (N=457)
It's not available	31%	26%	44%	18%
I don't know about it	48%	30%	47%	36%
I don't need it (soil is fertile)	17%	33%	6%	31%

However, poor soil fertility remains highly problematic; slash-and-burn practices do not sustainably improve the farmers' soil fertility. Poor soil fertility is often linked with low input use and extensive (versus intensive) agricultural practices, preventing improved varieties from attaining their yield potentials. Improving soil fertility works hand in hand with promoting improved varieties and making agriculture a more productive and prosperous activity. With proper soil management and improved agricultural practices, agricultural production could be the engine of development for both provinces. However, Kasaï and Kasaï-Central currently import food because farmers are unable to produce enough to feed their own populations, and the gap between domestic supply and demand continues to grow (Kakpo et al., 2023).

The vast majority of farmers are engaged in unmechanized subsistence farming on a small plot of land. Table 8 shows that female-headed households generally have smaller plots than male-headed households. The concentration of land ownership explains the high percentage of male

and female-headed households farming less than one hectare. Many farmers must rent land to obtain access to small plots of land. They generally pay a rental fee (US$ 20-60/ha) to the landowner, *and* they give the landowner 10% of their harvest. Most respondents farm small plots of land with rudimentary tools, usually a hoe, a machete, and an axe. The use of high-performance agricultural inputs such as seeds or cuttings of improved varieties, pesticides, and chemical fertilizers is very limited. The lack of agricultural extension services means that farmers have little access to the knowledge and technologies needed to improve their farming practices. Farmers also add very little value to their crops through local processing. Due to low agricultural productivity, vulnerable populations in the two provinces are often unable to access sufficient amounts of nutritious food during the lean season.

Table 8. Access to arable land among male and female-headed households in Kasaï and Kasaï-Central (from SSSA data)

Head of Household	N	<0.5 ha	0.5 - < 1 ha	1-2 ha	>2 ha
Male	527	27%	59%	13%	1%
Female	592	38%	48%	13%	1%

In sum, climatic variability, poor soil fertility, swidden agriculture, and traditional agricultural practices hinder more intensive agricultural practices (including the adoption of improved varieties), which prevents adequate food security in Kasaï and Kasaï-Central. However, these are not the only problems facing farmers in these two provinces. If farmers were able to generate a surplus by increasing their soil fertility and adopting improved varieties/agricultural practices, they would still face difficulties exporting produce to consumption centers because of poorly functioning agricultural markets and bad roads.

Agricultural Production in Kasaï and Kasaï-Central

Farmers in the Kasaï and Kasaï-Central provinces grow a diversity of crops but rely primarily on maize and cassava. Table 9 shows that the crop profiles of households across the three project zones are similar. Maize and cassava are the dominant crops in both provinces. In Kasaï-Central, peanuts can be reasonably included in the list of dominant crops, with 68% of the surveyed households. This table seems to suggest that peanuts and cowpea could serve a similar purpose for the households – in the zones where farmers grow more peanuts, they grow less cowpea (Tudituale and GAINS sites), and in the zones where they grow more cowpea, they grow less peanuts (Tudienzele sites). In focus group surveys across all three project zones, farmers mentioned that they sell large portions of their cowpea and peanuts. Some key crop differences are the lack of millet production in the Tudituale project zone and the lack of bean production in the GAINS project zone (see Table 9).

Table 9. Percent of farmers growing the major crops in season B, 2024 in the three project zones

Crop	Kasaï		Kasaï-Central
	Kanzala Kamonia Kamuesha	Ndjoko Punda Kitangua Kalonda West	Dibaya Lubondaie Yangala Masuika Luiza
	Tudienzele (N=655)	GAINS (N=240)	Tudituale (N=231)
Maize	97%	90%	89%
Cassava	89%	85%	71%
Peanuts	34%	52%	68%
Cowpea	41%	28%	22%
Beans	8%	0%	36%
Millet	9%	19%	0%
Rice	2%	5%	3%

In focus group discussions in Kasaï and Kasaï-Central, farmers reported that they sell between a third and two thirds of the maize production and a little less of their cassava production. The amount of maize and cassava that households sell depends on their consumption needs. Table 10 shows the importance of these crops for consumption and income. It also shows how little value (transformation) they add to their production before selling it. See Box 1 (below) for a description of agro-processors found in Kasaï and Kasaï-Central. In focus group discussions, farmers also reported that the quantity of maize and cassava that they plant is generally increasing because these two crops are major sources of food and revenue, and cassava is more resistant to the climatic instability associated with climate change. They said their production of groundnuts is decreasing because of the high price of seed and the difficulty of acquiring them.

Table 10: The Diversity of Crop Production in Kasaï and Kasaï-Central

Crop	Importance for consumption	Importance for income	Transformation
Maize	High	High	Flour (fufu), alcohol
Cassava	High	High	Flour (fufu), alcohol
Millet	High	Medium	Alcohol
Peanuts	Medium	Medium	None
Cowpeas	Medium	Medium	
Beans	High	Low	
Sweet potato	Medium	Low	
Rice	Medium	High	
Bambara nut	High	High	
Squash	Medium	Medium	
Tomatoes, onions, cabbage	Medium	High	

In focus group discussions and individual interviews, the farmers mentioned pest issues with cassava and cowpea production. They said that insects attack their cowpea when there is a lot of rain during the flowering period. As a result, their cowpea production is generally higher in Season B, due to the lower levels of rainfall. They also said that they struggle with CMD in their cassava production. These findings align with other reports that have also observed high rates

of CMD for cassava (Muengula-Manyi et al., 2012; Tata-Hangy et al., 2007) and insect damage for cowpea (Kasongo Ntita & Kasonga Kabeya, 2015) in Kasaï and Kasaï-Central.

Box 1. Agro-Processors

The research team found many agro-processors in the research zone and interviewed 12 of them. The team came across two main types of agro-processors. The first type of agro-processors purchased maize, millet or cassava, transform it into alcohol, and sell the value-added product. They second type did not buy raw agricultural materials, transform them, and sell them for a higher prices. They provided milling services to the farmers to turn their maize and cassava into flour.

The alcohol producers procured raw materials from three sources: their own production, the production of their friends/family/neighbors, and the local market. They sold their final product to retailers in nearby towns and to individual customers in their own villages. They sell coke bottles full of alcohol for 2,500 franc to individual buyers. They also sell 5 liter drums to retailer for 9,000 franc and 5 liter drums.

The maize and cassava millers provide milling services for a fee. They charge 4,000 franc per 10 kilograms, and they keep the byproducts. The main struggles mentioned by these agro-processors include:

- Irregular flow of clients
- Lack of fuel, far distance to travel to obtain fuel.
- Family members request free milling services

The agro-processors interviewed by the research team reported that they processed an average of 2,400 kg of cassava and 3,000 kg of maize during the first 9 months of the year.

Social Upheavals Disrupting Agricultural Production

The two provinces have also experienced two major social upheavals in the last decade: the Kamuina-Nsapu conflict and the decline of the diamond industry. In August 2016, a conflict between Kamuina-Nsapu militia groups and the national army in Kasaï-Central and Kasaï Oriental forced 1.6 million people to flee their homes and farms. A CRS assessment in 2019 revealed that roughly half the population in Kasaï-Central were severely food insecure. In focus group discussions and individual interviews, farmers in both provinces reported that they fled the area during the Kamuina-Nsapu conflict and returned to the region after the conflict in a position of poverty and social vulnerability. They had lost family members and their homes. Their social networks – a key source of resilience to shocks and stresses – were irreparably damaged. They also lost agricultural equipment and their saved stocks of seed.

The slow and continuous decline of the diamond industry is another social upheaval that farmers in Kasaï and Kasaï-Central have faced. Since the liberalization of artisanal diamond mining in 1982, a large portion of the working population in Kasaï had been attracted to this activity, lured by the possibility of large payouts. However, artisanal diamond production has experienced a persistent decline in the two provinces since 2010. In focus group discussions and individual interviews with farmers, many respondents indicated that they stopped mining diamonds and started farming because artisanal diamond mining was no longer productive enough to meet household needs. Artisanal diamond miners who have only recently started

farming have not yet built up the same agricultural expertise as farmers who have been engaged in agricultural production their whole lives. These recent converts to agriculture may not be as productive and efficient as their neighbors.

Conflict and the decline of the local diamond industry have significantly impacted the region's agricultural sector. To cope with the challenges facing rural households, farmers in Kasaï and Kasaï-Central have established a variety of social-protection mechanisms to secure their living conditions in an uncertain environment. They produce food collectively (family farms), and they have farmer associations, mutual solidarity groups, tontines, and production and marketing cooperatives. Familial, ethnic, and religious ties remain central elements in the constitution of these social structures. These different organizations constitute a dynamic social world that strives to meet the challenges they face in a context of weak government services. However, focus groups discussions revealed that the farmer associations generally did not provide much support to their members. For example, they did not organize bulk purchases of agricultural inputs (seed, fertilizer, pesticides) or organize bulk sales of their members' harvests in order to improve their bargaining power in the market.

Gender Context

"As women, we find it difficult to farm large areas, especially for our staple crops such as cassava, maize, beans, and groundnuts, which require a lot of hard work. What's more, we lack easy access to land, which we rent at 50,000 Franc [US$ 18] per quarter hectare" – Women in Masuika health district in a focus group discussion.

Gendered power dynamics in rural villages in Kasaï and Kasaï-Central are rooted in traditional norms that have evolved over generations. These power dynamics shape household decision-making processes, access to resources, and the distribution of labor, which in turn impact agricultural productivity, food security, and overall community development. Understanding the unequal gender dynamics is crucial to improving the livelihoods and seed security of rural populations in Kasaï.

Agricultural production is organized at household level, and rural households in these two provinces are generally patriarchal. The husband defaults as the head of the household and he controls the household's collective plot. The main crops (maize, cassava, beans, and groundnuts) are grown on collective household plots. The head of the household controls the production and the harvest of the collective plot. He decides which crops to grow, which varieties to plant, production practices, when to harvest, how to store the harvest, how much of the harvest to sell, and how to spend the income. His wives can express their opinions to the head of the household on all these matters, but the husband makes the final decision. In general, men control the household's financial resources and women manage household affairs. Women often oversee the household's day-to-day expenses, but their spending and decisions are subject to the man's supervision.

The largest barriers for female farmers are social. The women participating in the focus groups said that they need to find ways to take control of their lives and make decisions about their livelihoods. Women generally do not inherit arable land, they rarely acquire formal rights to land, and when they do, it is often a small plot. In focus groups at the various data collection sites, women reported that the land allocated to them is woefully small compared to that controlled by men. Women also have less access to agricultural equipment and inputs, including quality seed. Older widows with adult sons have easier access to credit, because their sons can often provide collateral for their loans. For younger women (and older women without consenting sons), they generally only access credit through local moneylenders who charge high interest rates of up to 50%. As a result, younger women often rely on informal savings groups or borrow from family members to finance their productive activities, which limits their capacity to invest in improved seeds and other inputs that could enhance productivity.

Polygamy is frequent in Kasaï, where a men can marry up to six wives. Wives are considered part of a man's wealth, and a husband controls his wives' production. Polygamous heads of household reported that their wives are a source of strength and production, and having many wives is a form of financial guarantee. As mentioned in the Demographics subsection, polygamous men typically spend most of their time in a single household. Their other wives self-identify as the head of household. However, these female heads of household are still subject to their husband's control. The husband has the right to take as much of her harvest as he sees fit. He can sell that harvest to meet the financial needs of another wife or to pay for a bride price to obtain an additional wife. It has been reported that wives in the research zone refrain from resisting their husband's control out of fear of corporal punishment. In women's focus groups, women said that many households are led by women because the men struggle with alcohol abuse. The women maintained that many husbands get drunk with the money from their wives' agricultural labor. The women said that men carefully control their wives' maize production and harvests because the men can use maize for alcohol production. The women said that regardless of what the men claim, a woman is responsible for providing for the family's needs in 80% of the households. In these focus group discussions, the women also said that households headed by women face much more difficulties than those headed by men.

Female farmers in Kasaï have developed various coping strategies to navigate these social constraints. In focus groups, women reported that cassava is often sold by women, and they use this income to finance school fees for their children. The women reported difficulty accessing pure seed, because they eat and sell their grain, and have nothing left by the next season. But they always have more cassava in the fields, and cassava stems are freely exchanged among friends and family. They do not face access issues accessing planting materials for cassava. In terms of the women's social organization as a coping mechanism, women's savings groups, known locally as "tontines," provide a platform for pooling resources and accessing small loans, which can be used to finance agricultural activities or start small enterprises. Additionally, women's groups play a crucial role in knowledge-sharing and collective action.

Legal Context: Seed Policy

DRC's national government approved a seed sector policy framework through ministerial decree No042/CAB/MIN AGRI/2006/02/09 in 2006. However, almost 20 years later, the parliament has still not approved it. "Unlike other countries in the region, the DRC does not have a national seed strategy or plan" (Asanzi, et al. 2017). A robust private seed sector requires a stable and clearly defined regulatory structure. The lack of a national seed law has created an ambiguous legal terrain that is not conducive to seed companies or adequate regulation of the seed sector (Templer et al., 2022). As a result, the presence of counterfeit seed has only increased in the DRC and the formal seed sector has failed to acquire a foothold in the seed system (Mabaya et al., 2019; USAID, 2019).

Plant Breeding and Seed Structures Background

Formal Breeding of Improved Varieties Available in Kasaï and Kasaï-Central

The National Institute of Agricultural Studies and Research (INERA) was established in 1933 under King Leopold III's colonial authority, and it is currently an arm of the DRC's Ministry of Scientific Research and Technological Innovation. INERA occupies a crucial role in the development and dissemination of agricultural technologies that aim to improve productivity, enhance food security, and promote sustainable agricultural practices throughout the DRC. INERA has a broad mandate that includes the development, production, and conservation of improved varieties, the development of improved soil management practices, and the development of improved pest management practices. INERA's main responsibility is the development and production of new varieties for many crops, including maize, cassava, rice, beans, and peanuts. Through its network of research stations across the DRC, INERA's has released high-yielding and disease-resistant varieties that are adapted to the local agro-ecological conditions throughout the DRC. These varieties are included in the National Seed Catalog, making them potentially available for distribution to farmers across the country. INERA's mandate is to provide foundation seed to certified seed producers on a continual basis. Table 11 shows the production of the two INERA stations serving Kasaï and Kasaï Central provinces over the last two years.

Table 11. Production of foundation seed, by variety, at two INERA stations serving Kasaï and Kasaï-Central

Crop	Variety	2024 (Season B)		2023 (Total)	
		INERA Kiyaka	INERA Bena Longo	INERA Kiyaka	INERA Bena Longo
Rice (Kg)	Nerica 16	150			
	NL17	655		1,050	
	Nerica 15	60			
	Nerica 9	50			
	Nerica 10	40			
	Irat 112	500	150		148
	Nerica 7	64		540	
	Lienge	2,309		1,283	
	IR 47	27		209	
	Giza 182	33			
	Nerica 4	1,240		800	
Maize (Kg)	Samaru	4,100		10,500	
	Mudishi 3	5,500		9,100	
	Muinaki 2			500	
	SYN 13		28,000		10,000
Peanut (Kg)	Lunungu	2,200		5 620	
	Lusekele	35			
	JL24	40			
Cowpea (Kg)	Kiesse	2,600		6,200	
	Diamant & Geense		9		9
Cassava (meters)	Lumonu	220,000	260,000	625,000	100,000
	Mugoli	150,000			
	Ilona	180,000			
	Zizila	60	350	219,000	370
	Obama			6	
	Sadis				

INERA faces major challenges because the DRC is a vast and ecologically diverse country, requiring its dedicated scientists to develop varieties and agricultural practices that are tailored to a variety of climatic zones, soil types, and cropping systems. INERA faces additional constraints due to inadequate funding, outdated infrastructure, and limited human resources (Asanzi, et al., 2017). At present, there are 19 plant breeders working at the Kiyaka station and 22 research staff of which 17 are plant breeders at the Bena Longo station serving Kasaï province. The Ngandadjika station in Kasaï Central has 5 plant breeders on staff. These constraints have hindered the institute's ability to fully achieve its mandate. Key informants pointed out that the seed systems in Kasaï and Kasaï-Central lack new germplasm. Key informants in Kasaï and Kasaï-Central claimed that the genetic quality of the breeder seed at INERA has also degraded over the decades, and INERA needs to clean up these varieties. Our interviews with INERA personnel at two research stations revealed that INERA's stations are underfunded. They generally only produce foundation seed when development institutions put in large orders and pre-finance the production, paying roughly half in advance and the rest upon delivery. According to key informants and other reports on DRC's seed systems (Asanzi, et

al., 2017), national breeders are not producing enough new varieties; there is a lack of innovation in Kasaï and Kasaï-Central.

The INERA Ngandajika station is the plant breeding structure that serves farmers in Kasaï-Central. The INERA Kiyaka station and the INERA Bena Longo station are the plant breeding structures that serve farmers in Kasaï. The staff at INERA's Kiyaka and Bena Longo stations reported that they breed new varieties for multiple crops, including maize, cassava, rice, peanuts, cowpea, common beans, banana, yam, cacao, and coffee. They said that they generally only produce foundation seed for development institutions that can pre-finance their orders because they are underfunded. They do not have the resources to produce foundation seed on their own, and they said that the foundation seed they do produce is at risk of rapidly deteriorating because they do not have the adequate seed storage infrastructure. They did say that certified seed producers occasionally arrive at their station to purchase leftover quantities of foundation seed, after the development institutions collected their orders. These stations are remote and difficult to access. INERA Kiyaka station is especially difficult to access because a bridge on the road to the station has collapsed, so those who wish to visit the station must take a long detour on a poorly maintained dirt road.

SENASEM

The National Seed Service (SENASEM) operates within the Department of Production and Plant Protection in the DRC's Ministry of Agriculture. SENASEM is the governing body responsible for the regulation, quality control, and certification of seed in the DRC. SENASEM's seed certification process includes the inspection of fields where seed is produced and the rigorous testing of germination rates, purity, and disease resistance. Seed certification is crucial for guaranteeing the performance of seeds and for protecting farmers from the risks associated with planting low-quality seed. SENASEM's seed certification plays a key role in ensuring that Congolese farmers have access to high-quality, certified seeds that improve agricultural productivity.

However, SENASEM faces significant challenges in fulfilling its mandate. The agency is often constrained by limited financial and human resources. In Kasaï province there are 5 SENASEM seed inspectors and 7 inspectors at SENASEM in Kasaï Central province. These challenges are particularly consequential for farmers in rural areas where access to certified seeds is limited. According to The African Seed Access Index (TASAI) Country Report for the DRC (Asanzi, et al. 2017), "Fake seed in the DRC thrives because the government does not monitor the activities in the seed sector effectively: seed is not inspected adequately at the different stages (production, packaging and marketing), and seed sales to the relief market are not tracked carefully enough." In another zone, the National Union of Seed Producers of the Congo (UNAPSCO) accused SENASEM of certifying fraudulent seed. In 2018, the Ministry of Agriculture commissioned a study to investigate the accusations. The Ministry's Mission de Verification des Informations sur la Piratage de Semences dans le Nord-Kivu acknowledged that this was not the first of these accusations and concluded that SENASEM did not follow proper procedures in the certification of seed.

Despite these obstacles, SENASEM's work is crucial to the development of a robust and resilient agricultural system in the DRC. SENASEM can ensure that the seeds available to farmers are of the highest quality, genetically pure, and well-suited to the diverse agro-ecological conditions of the DRC. Ongoing efforts to strengthen SENASEM's capacity are essential for the continued improvement of seed quality and agricultural productivity in the DRC.

Informal and Formal (Certified) Seed Producers

The team leaders interviewed 22 formal and informal seed producers in Kasaï and Kasaï-Central (see Table 12). The formal seed producers were all selling their certified seed to the FAO and NGOs who in turn delivered it to farmers as seed aid. The ramifications of this seed aid will be discussed in the following section. Most of this certified seed that certified seed producers sold to FAO and NGOs was maize, and a smaller portion was cowpea, beans, and mucuna (velvet bean). These formal seed producers claimed to obtain foundation seed of improved varieties from INERA, thus selling R1 and R2. These formal seed producers said that they wanted to sell their seed directly to farmers, but the farmers were not interested in paying the higher price for certified seed. The team leaders also found a few informal seed producers in the rural areas of the research zone. For the most part, these informal seed producers were producing and selling improved varieties that had been distributed by NGOs and the FAO years ago and had since degenerated. They seemed not to be multiplying local varieties or maintaining their seed quality. The informal seed producers maintained a market by claiming to sell seed that has a higher genetic and physical quality than the *tout venant* ("coming from anywhere''); bin-run seed) from the market. A very small percentage of farmers in the research zone procured seed from these local seed producers.

The formal and informal seed producers generally lacked equipment for cleaning, sorting, drying, packing, and proper storage to safely conserve their seed. Both groups of seed producers also stated that their major problem is that the local population does not appreciate the value of their varieties. Both groups articulated that their seed produces higher yields and demonstrates greater pest resistance compared to the *tout venant* that the farmers buy at the local market. However, the certified and quality seed producers do not work to prove this claim to the farmers. They do not have local demonstration plots to show the farmers the advantages of their seed. Key informants in the seed systems also reported that both groups of seed producers were not properly following the SENASEM protocols for seed production. Table 12 summarizes some basic data on the 22 seed producers found within the SSSA zones: number, varieties multiplied, amounts, and buyers. Note that Table 12 is organized by crop (not seed producer), and most of the 22 seed producers who were interviewed produce seed for more than one crop.

Table 12. Seed producers found by the research team in Kasaï and Kasaï-Centra (N=22)

Crop	Certified Seed				Quality Seed			
	Producers	KGs	Varieties	Buyer	Producers	KGs	Varieties	Buyer
Maize	7	72,650	Mudishi-1 Kasaï-1 QPM-3	FAO & NGOs	15	36,523	QPM-3 Kayikubuku Locale Kasaï-1 Mudishi-1 Samaru	Farmers & NGOs
Cassava	4	37,500	Zizila Mbakana Ilona	FAO & NGOs	3	43,800	Zizila Local	Farmers & NGOs
Cowpea	3	12,220	Diamant H36	FAO & NGOs	7	1,016	Kiese Kalowa Muenyi "Cowpea" H36	Farmers & NGOs
Makuna	3	10,000	Puriens	FAO & NGOs	0	0	-	Farmers & NGOs
Peanut	3	3,140	A65 G-17	FAO & NGOs	2	105	Locale Muzembe	Farmers & NGOs
Soybeans	3	745	Imperial	FAO & NGOs	1	272	Sapro	Farmers & NGOs
Total		**136,225**	**12**			**81,716**	**15**	

The formal seed producers were mostly local NGOs engaged in agricultural activities who saw the financial opportunity to produce seed for the FAO and international NGOs, and a few farmer associations who were supported by NGO projects. The local NGOs producing seed leverage their relationships in rural communities to obtain land for seed production, and they leverage their capacity to collaborate with development institutions to maintain contracts for certified seed production. These local NGOs/certified seed producers said that their main challenge is the lack of farmer demand for their seed and the lack of access to credit to expand their business. Some of them also reported that they have not been adequately trained to produce certified seed. They said they would appreciate more training in seed production.

The NGOs and the FAO do not follow the same protocols for procuring seed from the certified seed producers. NGOs typically agree to buy seed from certified seed producers as long as the seed producer can provide the proper documentation showing that SENASEM certified the seed. Key informants from the FAO reported that they had difficulty ensuring the quality of the certified seed, even when the seed producers had the proper documentation from SENASEM. It appears some of the certified seed producers were not purchasing foundation seed or R1 from INERA. Rather than producing R1 or R2 seed for sale, they were selling seed that was more

degenerated. Some of the certified seed producers reported that the foundation seed that they acquired from INERA was of low quality, with a germination rate of less than 50%. According to a key informant, INERA has been known to purchase seed from certified seed producers and use it to produce foundation seed. It has also been reported that certified seed producers in the DRC often do not follow the necessary agricultural practices for seed production, which also reduces the quality of their seed. In individual interviews, farmers also said that the certified seed that they receive via direct distributions can be poor quality seed. “Fake seed is a significant problem affecting the seed industry in the DRC” (Asanzi et al., 2017). The FAO has aimed to solve this problem by monitoring the foundation seed production at INERA, purchasing and delivering this foundation seed to their certified seed producers, and then monitoring the seed production practices of the seed producers. In effect, the FAO has decided that the only way they can ensure the quality of certified seed in the DRC is to carefully follow every step of the seed production. This speaks volumes about the quality of certified seed that is not carefully monitored by the FAO.

Many of the key informants who were interviewed for this research said that seed producers are given the opportunity to fulfill large orders from NGOs, but they often lack the capacity to fulfill these orders. Consequently, they do not necessarily procure foundation seed or R1 from INERA, and they do not follow the rigorous agricultural practices necessary for seed production. However, they are still able to certify their seed by bribing underpaid government agents. Numerous actors in the seed systems said that the certified seed is not necessarily high-quality seed. According to The African Seed Access Index (TASAI) Country Report for the DRC (Asanzi, et al. 2017), the direct distributions of NGOs and other development actors are a major source of fake seed because “seed producers who do not have sufficient capacity to produce quality-certified seed often resort to selling grain as seed.”

The FAO regional offices in Kasaï and Kasaï-Central reported that not enough certified seed is produced in the two provinces, a reality which forced them to source a significant portion of their seed in Kikwit, or as far away as Kinshasa. The FAO and NGOs provide this seed aid and source their seed from certified seed producers in Kasaï, Kasaï-Central, and other provinces of the DRC.

Table 13. Recent Seed distributions in Kasaï and Kasaï-Central

Organisation	Zone/ Province	Maize		Cowpea		Peanut	
		Variety	Kg	Variety	Kg	Variety	Kg
KASAÎ VERT/FAO	Mweka / Kasai	Mudishi 3, QPM 3	105,000	Diamant, Kiese, H36	70,000	JL24, JL17	70,000
ASSIC/FAO	Lubundai / Kasaï Central	Mudishi 3, QPM 3	105,000	Diamant, Kiese, H36	70,000	JL24, JL17	70,000
APROBES/FAO	Tshimbu Lu / Kasaï Central	Mudishi 3, QPM 3	105,000	Diamant, Kiese, H36	70,000	JL24, JL17	70,000
CEP/FAO	Bunkonde / Kasaï Central	Mudishi 3, QPM 3	105,000	Diamant, Kiese, H36	70,000	JL24, JL17	70,000
ACF	Kamuesha / Kasaï Central	Mudishi 3, QPM 3	29,960	Kiese	14,980	-	-
ADRA	Kasaï	QPM 3, Kasaï 1	189,018	Kiese, H36	90,420	-	-
Total			**638,978**		**385,400**		**280,000**

In focus group discussions and individual interviews, the farmers mentioned the informal seed producers but not the formal (certified) seed producers. They reported that they do have access to the quality seed produced by local seed producers, but their seed production is limited – quality seed is available only in small quantities. Many of the farmers in the focus groups also mentioned that the quality seed producers were only producing "local varieties". However, as shown in Table 12, the quality seed producers in Kasaï and Kasaï-Central reported that they mostly produce improved varieties (which is degenerated because the quality seed producers do not obtain foundation seed or R1 from INERA). It appears that when farmers talk about their local varieties, they are often referring to degenerated seed that was released by INERA years (or even decades) ago. For farmers in Kasaï and Kasaï-Central, "local varieties" are a mix of local varieties and degenerated seed of improved varieties.

The farmers did not mention certified seed producers as a source of seed during the focus group discussions. This is likely a result of the seed delivery mechanisms of NGOs and the FAO. In individual interviews, farmers stated that when they receive seed distributions, they are not informed about the producers of this certified seed, the variety, or given other key information (like possible management needs). They said that seed is distributed to them in a bucket. In cases where the farmers are impressed with certified seed and willing to buy more of it, they still face barriers because they do not know who produced the seed or where they can buy it.

Unlike the certified seed producers, the informal seed producers were often local farmer associations that originally received some support from a large-scale development project that enabled them to produce quality seed for their members and their fellow community members. The project typically provided some training in the proper techniques for seed production, seed treatment, and seed conservation. The project also typically provided these farmer associations with some agricultural equipment and R1 certified seed. These informal seed producers continued producing grain/local seed for their community even after the project ended.

However, they generally do not go back to the source to get R1 certified seed from INERA or certified seed producers. They produce grain/local seed from their own harvests, leading to the degeneration of their product. These informal seed producers were generally starting with degenerated seed of improved varieties released by INERA, and they were generally not maintaining the varietal quality of local varieties. Local enterprises that emerge out of the market (like the local agro-processors that were interviewed) appear more responsive or purposeful, they have a plan, a business that reliably breaks even and sometimes accumulates capital. However, some of these local seed producers that emerged out of projects might be just trying to hang on until the next project comes along with support for rural enterprises. These two groups may be hard to distinguish from the outside, but their practical differences can be critical. The local seed producers that emerged from projects did not seem to be doing much to maintain the quality of their varieties for their customers. They did not discuss rudimentary selection/cleaning of the varieties they sold. They seemed to be producing R4 and above, riding out the remaining genetic quality of their last free distribution of foundation seed or R1. Market-emergent local seed producers are often more aware/intentional about maintaining the quality of their variety. They are more likely to mention their preoccupation with varietal degradation and what they do to forestall its inevitable arrival. A market-driven seed enterprise succeeds or fails based on the varietal quality of their seed.

Unlike the certified seed producers, some of the informal seed producers sell their grain/local seed directly to the farmers. They reported that one of their main challenges is that the demand for their seed falls as the quality of their seed degenerates. Other informal seed producers originally sold their product directly to the project that trained them, and they often reported their main challenge is that the project ended, and they lost their best source of revenue. Development projects face many challenges when trying to support nascent enterprises without creating dependence; it is not an easy needle to thread. In another example, one of the informal seed producers said: “As we are under the responsibility of [the project], we still depend on them because the foundation seed is very expensive.” Other informal seed producers said that the INERA research stations are too far away, preventing them from acquiring more foundation seed. Some of the informal seed producers appeared to function in a hybrid capacity of community association and seed company. For example, when asked about their future projects for their seed enterprise, one of the informal seed producers reported: “We would like to pay for metal sheet [roofing] for each member of the group in order to have good houses in the community.” These informal seed producers / farmer associations also reported that they benefit from their group cohesion, enabling them to reduce the labor burden associated with the fastidious practices of quality seed production.

For the informal producers, the problem is that they are multiplying degenerated seed that have lost varietal quality, and they need more training on quality seed production. For the certified seed producers, many informants said that they are cutting corners and not following proper seed production protocols, but they are still able to certify their seed. There is a need to improve localized seed production in terms of the varieties multiplied, the seed quality standards, and the basic business models. Better seed also must reach farmer clients on a routine basis, and not just the FAO and NGOs.

Formal and informal seed producers can be found in Kasaï and Kasaï-Central because of the support provided by NGOs and the FAO. Both groups of seed producers receive ongoing support in one form or another from the NGOs and FAO. Both groups produce seed that is not necessarily high physical and varietal quality, and both groups struggle with the lack of farmer demand for their seed. Nevertheless, they appear committed to seed production and they are confident that their product produces higher yields than the *tout venant* that farmers buy at the local markets, but they need more training, they need to be more concerned with seed quality, and they need to be more focused on farmer-clients and less focused on NGO-clients.

SECTION V: FIELD FINDINGS IN KASAÏ AND KASAÏ-CENTRAL

The data collection for this SSSA took place in July and August of 2024. At this time, the farmers were potentially 2-4 weeks away from planting, depending on the unpredictable arrival of the first major rains that kick-off Season A. They had been preparing their fields (slashing, burning, and turning the soil), and procuring seeds from their various sources.

An SSSA focuses on two core themes. It analyses the short-term, acute seed security situation for season B, 2024 (January – June) and season A, 2024-25 (mid-August – January). Additionally, an SSSA considers medium-term trends, including chronic seed security issues and development opportunities.

Acute Seed Security Findings

The short-term assessment of seed security focused on how and where farmers sourced their seed for seasons B 2024 and A in 2024/25. Did they plant the "normal" amount of seed and planting material in the last season (season B), and how did they evaluate their seed security for the upcoming season (season A)? Assessing multiple consecutive seasons is critical to understanding seed system stability and resilience.

This section presents field findings on seed security across all three project sites as they were sufficiently similar to be considered as one unit of analysis. The analysis treated the three sites separately when the data from the different project sites differed significantly.

The Farmers' Seed Sources and Quantities for Season B, 2024

Table 14 and Figure 3 present the sources and quantities of seed planted by farmers during season B, 2024. The data is displayed in both table and graph formats to clearly illustrate the relative usage of each source and the amount of seed used.

In season B, the major sources of seed for farmers in Kasaï and Kasaï-Central was saved stock and the local market – 88% of the seed that farmers plant came from the informal system, including 36% from the local market. Table 14 shows that saved stock was an especially important source for seed for cassava (57%) and maize (36%), while the procurement of seed from the local market was most prevalent for rice (63% of seed), beans (60%), peanuts (56%), cowpea (37%), and maize (34%). In focus group discussions, farmers said that they only source small amounts of seed from their social networks, and this seed is often poor physical quality (low germination rates) and poor varietal quality (poorly performing varieties). Table 14 shows that farmers sourced only 13% of their seed last season from their social networks. Agro-dealers, private seed companies, and seed producers are noticeably absent from the list of the farmers' sources of seed. Other research of the DRC seed systems has also concluded that agro-dealers are non-existent in some zones (Asanzi, et al., 2017). In this investigation, 9 teams

surveyed 51 villages and towns. The 9 team leaders searched all these towns for seed producers and agro-dealers. They did not find any agro-dealers or private seed companies. They did not even find the vendors who sell small packets of vegetable seeds. While there are numerous possible reasons that could explain the lack of agro-dealers and private seed companies in Kasaï and Kasaï-Central, the large quantities of free seed do not help actors in the private sector who try to sell seed. Table 14 shows that 11% of the seed the farmers procured last season was from the direct distributions of NGOs and the FAO.

Table 14. Farmers' seed sources for Kasaï and Kasaï-Central for season B, 2024 (N=1,126)

Crop	KG Planted	Saved Stock	Friends / Family / Neighbors	Local Market	FAO / NGOs
Maize	12,518	36%	14%	34%	15%
Cassava	5,383	57%	20%	11%	9%
Peanuts	5,260	30%	7%	56%	2%
Cowpea	2,384	23%	8%	37%	28%
Beans	1,435	23%	7%	60%	11%
Millet	954	46%	17%	34%	0%
Rice	608	27%	11%	63%	0%
Onions	160	2%	1%	94%	3%
Sorghum	50	20%	8%	46%	26%
Soybeans	44	41%	21%	39%	0%
TOTAL	**28,796**	**37%**	**13%**	**36%**	**11%**

Cassava cuttings were adjusted to a 'relative seed weight' using the method described in the footnote (below).[1] Table 14 shows that the total kilograms of maize planted (12,518) is more than double the kilograms of cassava planted (5,383) for the last season, but that does not mean that maize fields were twice as large as cassava fields. Maize is an annual crop while cassava is a perennial crop that remains in the field for 2-3 years. While farmers replanted the entirety of their maize fields last season, they only replanted a portion of their cassava fields last season. While the relative seed weight of cassava is half of the relative seed weight of maize, farmers reported that the size of their maize and cassava fields were similar.

Figures 3 and 4 (below) more clearly show the differences in sources for the main crops. Cassava is distinct from the other crops because it is a perennial crop. In focus group discussions and individual interviews, respondents reported that they typically cut stems out of their existing fields and directly plant them in new cassava fields. If they did not have a good

[1] NOTE: Cassava cuttings were adjusted to a 'relative seed weight' using the following method: The total hectares of maize was calculated using a seed rate of 25kg/ha. The total hectares of cassava were calculated using a planting rate of 12 cuttings/kg and 5,000 cuttings/ha. INERA recommends farmers plant 25cm cuttings (12 cuttings/kg) at a rate of 2,500 cutting/ha, but many farmers use longer cuttings and many farmers also plant more than one cutting per pocket. After discussions with farmers and Congolese agronomists, we estimated 12 cuttings/kg and 5,000 cuttings/ha. Using this planting rate, kilograms of cassava planted were calculated as a function of the percentage of hectares planted. For example, if 250 kg of maize and 1,000 kg of cassava were planted, that translates 10 hectares of maize and 2.4 hectares of cassava; 2.4 hectares is 24% of 10 hectares. Thus, the relative seed weight of cassava would be 24% of the 250 kg of maize, which equals 60 kg. The number of instances that the 1,126 respondents mentioned planting maize or cassava (weighted by the average number of hectares planted) was used to validate the estimation. Nevertheless, this method can only provide a rough proxy of relative seed weight for cassava.

selection of stems in their own fields, they could obtain stems from their social networks. The 20% that comes from their social network is mostly exchanged/gifted as a non-financial transaction. Among all crops sourced from friends, family, or neighbors, 77% was exchanged in the gift economy.

Figure 3. Farmers' seed sources for Kasaï and Kasaï-Central for season B, 2024 (N=1,126), organized by source

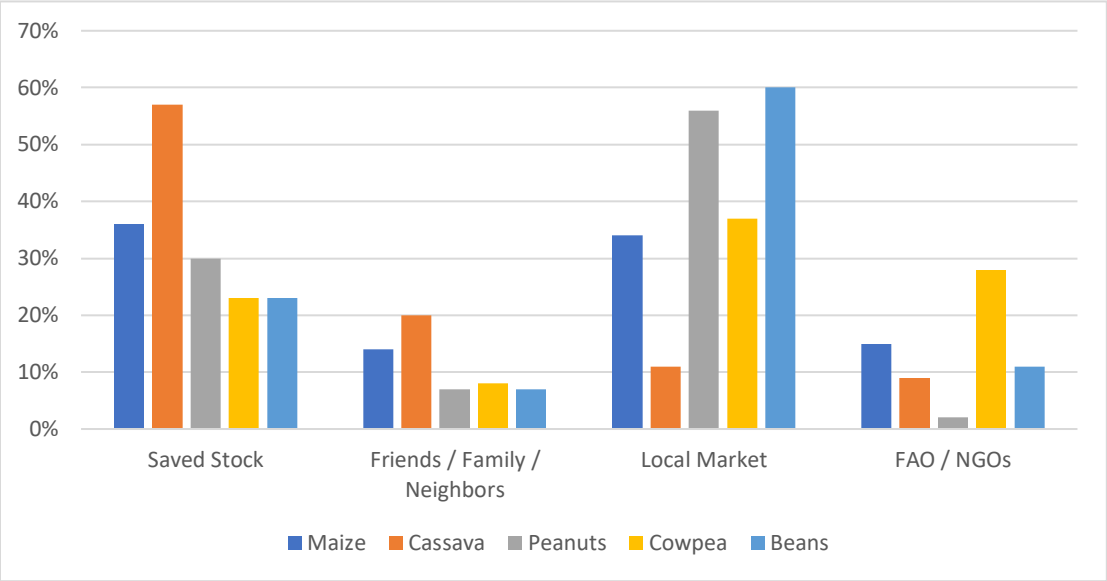
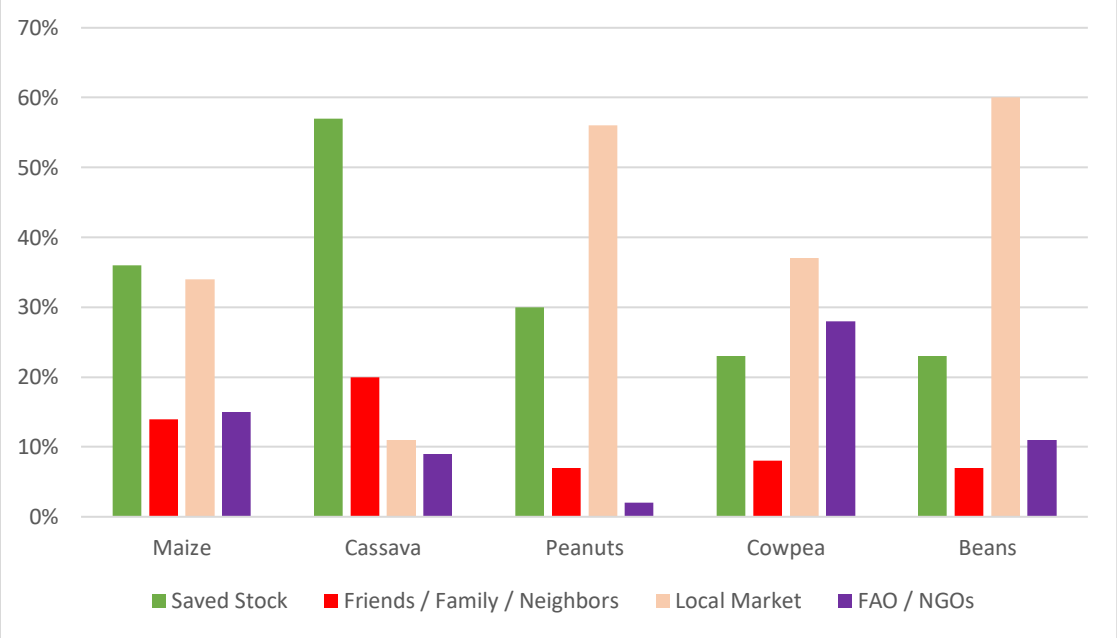


Figure 4. Farmers' seed sources for Kasaï and Kasaï-Central for season B, 2024 (N=1,126), organized by crop



These results on where farmers procured seed varied a little between Kasaï and Kasaï-Central (see Tables 15 and 16 below). Households in the two provinces sourced their seed from their saved stock and their social networks to a similar extent. However, households in Kasaï-Central received 13% less free seed from directs distributions and they sourced 10% more seed from the local market. Thus, it appears that direct distributions of free seed generally reduced the amount of seed that farmers buy from the local market.

Table 15. Farmers' seed sources for Kasaï-Central for season B, 2024 (N = 231 households)

Crop	KG Planted	Saved Stock	Friends / Family / Neighbors	Local Market	FAO / NGOs
Maize	1,943	40%	10%	45%	2%
Peanuts	1,878	40%	6%	53%	0%
Cassava	1,175	66%	22%	4%	1%
Beans	889	20%	9%	68%	4%
Cowpea	425	28%	9%	52%	5%
Rice	72	32%	1%	56%	0%
	6,382	**41%**	**11%**	**44%**	**2%**

Table 16. Seed sources for Kasaï for season B, 2024 (N=895 households)

Crop	KG Planted	Saved Stock	Friends / Family / Neighbors	Local Market	FAO / NGOs
Maize	10,578	36%	15%	32%	17%
Cassava	4,202	55%	20%	13%	12%
Peanut	3,382	25%	8%	58%	3%
Cowpea	2,086	20%	7%	35%	34%
Millet	954	46%	17%	34%	0%
Rice	536	27%	12%	64%	0%
Beans	411	35%	5%	35%	24%
	22,149	**37%**	**14%**	**34%**	**15%**

These results on where farmers procured seed also varied a little between male and female-headed households (see Tables 17 and 18 below). The only statistically significant difference is that 531 male-headed households planted more than double the amount of rice and beans than 594 female-headed households.

Table 17. Seed sources among female-headed households for season B, 2024 (N=594 households)

Crop	KG Planted	Saved Stock	Friends / Family / Neighbors	Local Market	FAO / NGOs
Maize	5,666	34%	15%	35%	14%
Cassava	2,676	54%	23%	10%	9%
Peanut	2,173	23%	7%	65%	3%
Cowpea	1,224	22%	6%	34%	32%
Millet	553	48%	15%	37%	0%
Rice	360	19%	18%	52%	13%
Beans	173	28%	29%	53%	0%
	12,825	**35%**	**15%**	**35%**	**12%**

Table 18. Seed sources among male-headed households for season B, 2024 (N=531 households)

Crop	KG Planted	Saved Stock	Friends / Family / Neighbors	Local Market	FAO / NGOs
Maize	6,866	38%	13%	33%	15%
Cassava	2,707	60%	17%	12%	10%
Peanut	3,112	35%	8%	49%	1%
Cowpea	1,376	23%	9%	40%	25%
Millet	401	44%	19%	30%	0%
Rice	859	25%	2%	63%	10%
Beans	435	27%	4%	67%	0%
	15,756	**39%**	**12%**	**36%**	**11%**

Overall Production Trends

In the focus group surveys, farmers discussed their agricultural production over the last three seasons. They said that they have experienced bumper crops for their main two staple crops (maize and cassava) for these last three seasons (Table 19). They have not been so lucky with beans and cowpea, mostly because of poor quality seed.

Table 19. Farmers' analysis of the last three seasons (N = 133 farmers in 6 focus groups)

Main Crops	Saison B 2024	Saison A 2023	Saison B 2023
Maize	Good	Good	Good
Cassava	Good	Good	Good
Beans	Poor Poor quality seed	Good	Average
Cowpea	Poor Poor quality seed, poor germination rates, dry spell in the rainy season, insects	Poor Poor quality seed	Poor Poor quality seed
Millet	Good	Average	Good

In the household surveys, farmers were methodically asked about their sources of seed for each of their three main crops last season (season B, 2024), and they were also asked about their

production levels. Table 20 shows that most farmers indicated that their production was good last season.

Table 20. Farmers' analysis of their production for season B, 2024 (N = 3,312 sources of seed)

Crop	Good	Average	Poor
Maize	81%	17%	2%
Cassava	82%	15%	3%
Cowpea	82%	13%	4%
Peanuts	75%	23%	3%
Beans	71%	22%	6%
Millet	82%	15%	3%

According to Tables 19 and 20, farmers reported that their bean and cowpea production was poor when they were together in a focus group, but they reported that their production was good during individual surveys. Nevertheless, they consistently reported that the production of their two main crops (maize and cassava) was good last season.

At the time of data collection, the farmers were preparing to plant for Season A of 2024/25. The surveyors asked them where they plan to source their seeds for next season (see Table 21). Even after a good year, they were still planning on sourcing 16% of their seed from NGOs and the FAO. Direct distributions should be done with care as they have potential to promote farmer dependency on aid. In one focus group discussion, the farmers said that the key constraints in their production system are unpredictable rainfall and poor-quality seed, and the main opportunities in their production system are the arrival of NGOs and their distributions of food and seed. They did not say that their main opportunities were improved production practices, better seed, or more robust markets; they said it was more aid.

Table 21. Farmers' sources for seed for the next season, season A, 2024/25 (N = 1,126)

Crop	Saved Stock	Friends / Family / Neighbors	Local Market	ONG/FAO
Maize	48%	7%	30%	15%
Cassava	70%	12%	6%	12%
Cowpea	26%	9%	34%	28%
Peanuts	28%	4%	50%	16%
Beans	37%	6%	49%	9%
Rice	40%	6%	52%	2%
Millet	62%	5%	30%	1%
Total	**40%**	**6%**	**37%**	**16%**

The local market is an important source of seed for the farmers in Kasaï and Kasaï-Central. The farmers sourced 36% of their seed at the local market last season (season B, 2024) and they will source 37% of their seed at the local market next season (season A, 2024/25). Their reliance on the market seems stable. However, interviews with large traders showed that the price of grain is higher going into next season (season A, 2024/25) than it was going into last season (season B, 2024), see Table 22. Interviews with the large traders are important because they supply the local markets. The large traders said that the price was higher because of inflation and because

season B (January – June) is not as productive as season A (Mid-August – January). Thus, there is generally a lower supply after season B compared to season A. Nevertheless, compared to the "normal" season B, this last season B was a good year, and the farmers have more access to seed for this upcoming agricultural season.

Table 22. Number of large traders who said the price of grain/stems going into the next season (season A) would be less, same, or more than the prices before the last season (seaon B) (N=11)

Crop	Less	Same	More	% Change in cost
Maize	3		9	+39%
Peanuts		3	4	+10%
Cowpea	1	2	2	+33%
Beanes			2	+31%
Cassava			1	+33%

Based on the data in this subsection, the farmers in Kasaï and Kasaï-Central are not suffering from acute seed stress. Farmers have adequate access to grain for planting as seed. They use their good grain harvest to sow more land. The farmers are coming off a good agricultural season. There is no acute seed insecurity. The situation is stable. Kakpo et al. (2023) also found that agricultural production in Kasaï and Kasaï-Central has been steadily rising (even if this may be from a overall modest production level).

Acute Seed Stress in Kasaï and Kasaï-Central: Overall

We found no acute seed stress in this analysis. We base this conclusion on a combination of qualitative and quantitative surveys with the farmers. In the household surveys, the 1,126 farmer respondents overall said that they were planting 16% more than last season. So, the message overall is a positive one

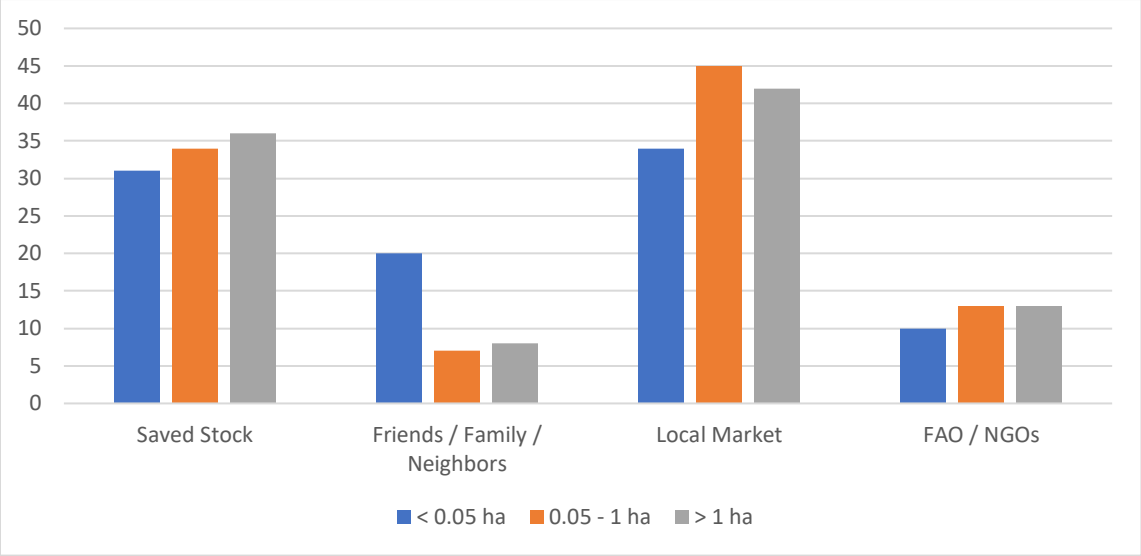
The most vulnerable farmers with the least access to land seem also to be on a positive trend. In fact, households with less access to land were more likely to plant more last season and next season (see Table 23).

Table 23. Percentage of households who planted more than normal in Season B, 2024, and who will plant more than normal in season A, 2024/25 (N=3,312 sources of seed)

Farm area (ha)	N	Planted more than normal last season	Will plant more than normal next season
< 0.5	367	39%	38%
0.5 - 1.0	596	37%	37%
>1	157	30%	30%

Farmers with less land planted more because they benefited from a bumper harvest and a windfall of seed aid. But the farmers with less land also relied more on their social networks for obtaining seed (see Figure 5). Vulnerable farmers are more likely to rely on solidarity networks for support.

Figure 5. Sources of all seed among farmers with variable access to land



Despite these overall positive trends, there was variation by crop type and it is always useful to look at specific reasons that farmers were planting more or less.

Reasons Farmers Planted MORE – All Crop Instances

Farmers' specific reasons for planting more seed focused mostly on the availability of seed. "More seed available due to good harvest" and "More seed available due to free seed" were the two most mentioned reasons for planting more (see Table 24). Other major reasons included having more access to land, being in good health, and more access to labor.

Table 24. Reasons farmers provided for planting more seed than normal in Season B, 2024 (N=1,179)

Reasons	All households (%)	Male-headed households (%)	Female-headed households (%)
Seed related			
More seed available due to good harvest	20	18	22
More seed available due to free seed	18	17	18
More money to buy seed or seed price low	8	8	9
NON-SEED FACTORS OF PRODUCTION			
Good/increased labor	8	7	9
Feeling strong/healthy	10	9	12
Have more land/more fertile land	12	14	10
OTHER PRIORITIES/STRATEGIES			
Changed crop profiles or priority to certain crops	9	9	9

When the data are disaggregated by project zone, we see that the farmers mentioned different reasons for planting more. The farmers in the GAINS zone planted roughly 20% more than normal last season, and their main reason was that they had more seed available after a good harvest. The farmers in CRS's zone are the only farmers who did not plant significantly more than normal (only 1% more seed than normal). However, amongst the farmers who did plant more than normal, the main reason they planted more was "more access to land." In ADRA's project zone, 70% of farmers received seed aid last season, and (unsurprisingly) that was their main mentioned reason for planting more than normal. Table 25 shows that more access to seed (from bumper harvests or seed aid) boosted agricultural production in the short term.

Table 25. Main reasons why households planted more in season B, 2024, disaggregated by project zone (N=1,179)

NGO	Territories	% more than normal planted last season	% who received seed aid	Main reason for planting more
GAINS	Ndjoko Punda, Kitangua, Kalonda Ouest	22%	17%	More seed available from good harvest
Tudienzele	Kanzala, Kamonia, Kamuesha	20%	70%	More seed available from distributions
Tudituale	Dibaya, Lubondaie, Yangala, Masuika, Luiza	1%	20%	More access to land

Reasons Farmers Planted LESS – All Crop Instances

There were also important cases of farmers planting less than normal. Table 26 lists the reasons in detail. While there was a large range of reasons why farmers plant less, health problems featured prominently. However, the main reason was lack of money: they did not have the money to buy seed. Seed was available – but they lacked the resources to acquire it.

Table 26. Reasons why households planted less in season B, 2024

Reasons	All households (%)	Male-headed households (%)	Female-headed households (%)
Seed related			
No seed available in market	4	4	5
No seed/cuttings available from neighbors	6	6	5
No money to buy seed/poor finances or seed too high	37	39	36
Seed available is poor quality or the variety is not liked	4	4	4
NON-SEED FACTORS OF PRODUCTION			
No/insufficient labor	7	7	6
Illness/health problems	18	15	20
No/insufficient land or land not sufficiently fertile	7	6	7
Poor weather/rainfall	5	7	4
OTHER PRIORITIES/STRATEGIES			
Changing Crop priorities or changing agricultural practices	4	5	2

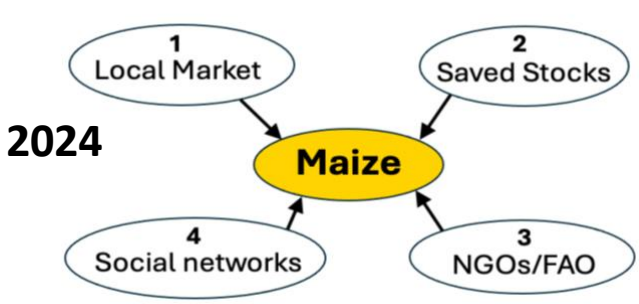
Chronic Seed Security Findings

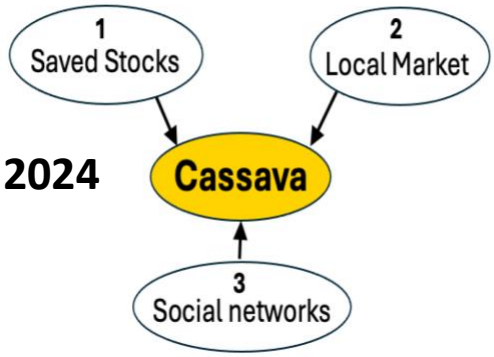
An SSSA also investigates chronic seed security by exploring broader, systemic trends. To investigate chronic seed security, the research team conducted market analyses and community-level assessments. For the community level assessments, the research team used various methods, including community focus groups, women's focus groups, and key informant interviews with farmer leaders, government officials, business leaders, and NGO staff. For the market analyses, the team interviewed market vendors of grain/local seed, large seed/grain traders, and seed producers. These diverse approaches enabled cross-verification and provided insights into medium-term trends. This section will discuss medium-term trends, highlighting emerging opportunities and persistent challenges associated with seed insecurity.

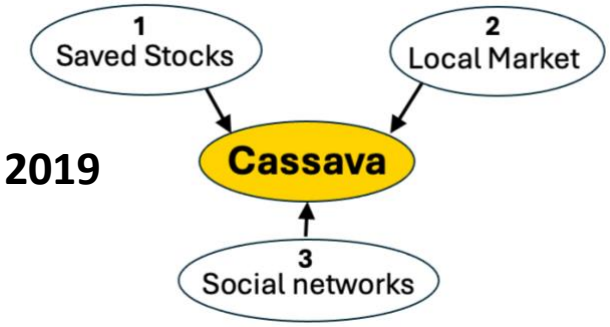
Trends in Seed Sources

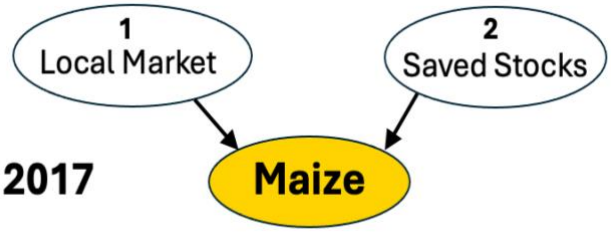
During focus group discussions, farmers reported that their sources of seeds have not evolved in the last 5 years. Their main sources of maize, cassava, and cowpea seed were saved stock, local markets, social networks, and the FAO/NGOs 5 years ago, just as they are today. They generally reported that the only difference is that the importance of NGOs has risen from least important, to third most important (ahead of their social networks). The 2017 SSSA found this same lack of dynamism: “when questioning was opened in all three communities where community group interviews took place, farmers could not list any crop where there had been major changes in seed sourcing in the five-year period.” Figure 6 presents the data from this SSSA and the 2017 SSSA in Kasai, showing a longer evolution of trends in seed sources. Figure 6 (below) shows that the local market has become a more important source of seed. However, in general Figure 6 shows stagnant seed systems that are becoming more dependent on free seed. NGOs and the FAO have become a more important source of maize seed over the last 12 years. For cassava on the other hand, the local market has become a more important source of planting material. The absence of agro-dealers, private seed companies, and seed producers is very apparent in Figure 6. The farmers’ only access to improved varieties and certified seed is through direct distributions from NGOs and the FAO. The consequences of having no agro-dealers, seed companies, local seed producers multiplying varieties that farmers want (whether local or modern), or strong farmer associations can be hard to convey. When we take a step back and consider what it would be like to be a farmer trying to improve their production when all these forms of support are just not available, it is a daunting prospect.

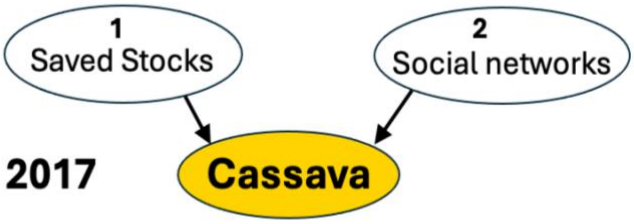
Figure 6: Seed sources for respondents in Kasaï and Kasaï-Central in 2024 and 2019, juxtaposed with results from a 2017 SSSA which shows seed sources for respondents in Kasaï in 2017 and 2012.

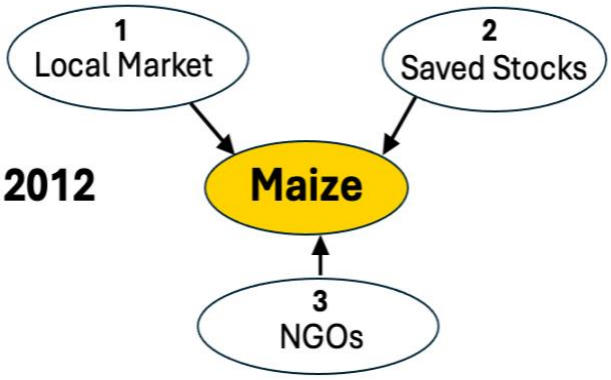


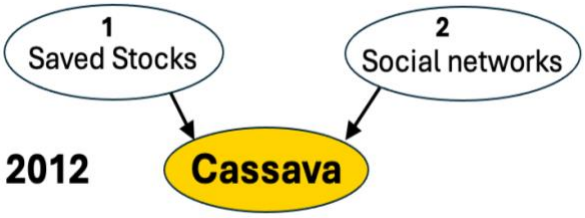












Seed Quality and Seed Procurement Practices in Kasaï and Kasaï-Central

By most accounts, the physical and varietal quality of seeds in Kasaï and Kasaï-Central is poor. In focus group discussions and individual interviews, many farmers said that their seed is poor physical and varietal quality. They said that their seed has poor germination rates (poor physical quality), and they often plant two to three seeds per pocket. They also said that they are not able to access improved varieties for all the crops that they farm. Other reports on the seed systems in Kasaï have arrived at similar conclusions:

> *Most of the improved varieties promoted by the Ministry of Agriculture and distributed by relief organizations were developed over 30 years ago. The number of varieties available to and planted by farmers is extremely limited, with 2-3 different varieties of each crop available to farmers. Those organizations involved in seed development, introduction, multiplication, and diffusion in Kasaï-Central need to make newer, appropriate varieties available to farmers* (Walters, et al., 2023).

In the focus group discussions and the qualitative interviews, the respondents reported they go to the market to purchase bin-run seed (*tout venant*). The *tout-venant* seed has low varietal quality and poor seed health. They said that they buy *tout-venant* for planting and for consumption, with a single purchase; they sort out the higher quality grain for planting, but it has low germination rates (they plant 2-3 seeds per pocket) and unknown genetic qualities. Some of the farmers indicated that they do not distinguish between the varieties when obtaining seed. They said they only distinguish varieties by color. They go to the market to buy "yellow maize" or "white maize" and "yellow cassava" or "white cassava". In a qualitative interview, a farmer leader in the Kakondo village (in Kamonia health district) said: "Before the projects came, we didn't know about these different varieties of cassava. All our cassava was the same. We didn't go to other villages to search for other varieties. We farmed what we had. For maize, it's the same. Before the projects came, we had just a few local varieties, like QPM-3." QPM-3 is an improved variety that was released by INERA decades ago. Another farmer in the region said: "When we buy QPM-3, Sumaro, or a local variety at the market, we don't know what we are getting, they are all mixed up… [For peanuts,] we don't know which local variety we plant. They are the red peanuts." In development analyses (like this one), one should tread carefully with crude stereotypes of ignorant farmers. Farmers are savvy, they have been known to tell development actors what we want to hear so they can receive more aid/attention from development interventions (Beck, 2016). Some of our respondents may have been pretending to have a crude understanding of varieties so they could portray themselves as highly suitable targets of development interventions.

A farmer shows their two "varieties" of maize: yellow and white.

The other possibility is that many farmers in the Kasaï and Kasaï-Central are new to agriculture (Box 2). The diamond industry in the region has been slowly declining. Many

of these farmers have spent their adult lives mining for diamonds. They may have grown up around agriculture in rural communities, but agriculture is not their vocation. What is normally an unbroken line of deeply rooted agricultural knowledge passed from one generation to the next may not hold for many farmers in Kasaï and Kasaï-Central – the agricultural way of life was interrupted by the diamond industry. Many of the farmers that we interviewed only recently returned to agriculture. The Kamuina Nsapu conflict also created social upheaval that may have temporarily unmoored some folks from their agricultural way of life. In focus group discussions, farmers said that their fields were destroyed during the Kamuina Nsapu conflict, causing them to lose access to their local varieties and good seed.

Box 2. Farmers without deep agricultural roots, in their own words.

"*We dug for diamonds for 20 years. Then war broke out in 2016, 2017. We became refugees. We fled to Angola. We came back in 2018. And when we came back, we had too many expenses. We needed to feed our children and pay for their school fees, and it was too hard to find diamonds, so we started farming... [For maize] I farmed the tout venant from the market for 2 years, then a project came [in 2020] and brought us new varieties. So, I abandoned the tout venant and now I only farm their varieties. The yields are bigger. Then the next year, the project brought cassava and cowpea seed. So I stopped farming the local varieties of cassava and cowpea. I farm what they give me. The yields are bigger.*"

Abandoning local varieties for the new varieties provided by development interventions is extremely risky, and it is incongruent with the risk aversion that is readily apparent in typical smallholder farmers around the world. How much of this farmer's story is the true account from a recent convert to agriculture, and how much is the well-practiced narrative that attracts more aid to their villages? State extension agents participated in the data collection; they said that these farmers were exaggerating their ignorance of varietal difference and their willingness to abandon their local varieties in order to show their appreciation and attract more seed aid from NGO projects. The farmers see one project come to their village and skip over a neighboring village, and the next project go to a neighboring village but not theirs, and they do not understand why. It is hard to blame them for trying to attract aid and free seed to their villages by controlling their messaging to the NGOs.

However, not all farmers Kasaï and Kasaï-Central are new to agriculture. During focus group discussion, some farmers said that a major problem with the local market is that the varieties are all mixed and sold as *tout venant*. They would like vendors in the local market to separate local seed by variety and conduct germination tests. For these farmers, the local market vendors are the cause of the *tout venant* problem. In individual interviews, some farmers demonstrated in-depth knowledge of their local varieties and the improved varieties delivered by farmers. However, several key informants said that the "local varieties" are degraded versions of improved varieties that were released long ago. For example, the farmers refer to Djibouti as a local variety of maize, but it is actually a degraded version of QPM-3. Nevertheless, the majority of the informants believed their local varieties were in fact local, and here are some of the farmers' descriptions of their local varieties.

CASSAVA

- **Chipata** – produces a large yield but the tubers have a bitter taste. They must be soaked for 2-3 days before drying to reduce the bitterness. The leaves are too hard, and they attract flies. We do not know what the flies do to the leaves, but we do not like it. When the leaves are cooked, they turn into the color of dirt, and the cooking oil does not appear. Thus, it is called: the cassava that chases husbands away.
- **Tijansenge** – produces a large yield but tubers have a bitter taste; they must be soaked for 2-3 days. Flies attack the leaves in some fields but not others, do not understand why, maybe it is a function of soil fertility. The leaves do not have a good taste.
- **Kabena** – the tubers are not bitter; the leaves have a good taste. The tubers are edible without soaking for 2-3 days. Produces a good harvest, no real disadvantages.
- **Kapasu** – the tubers are not bitter, vulnerable to disease
- **Mukungulu** – bitter tubers, must be soaked 2-3 days. The leaves have a good taste. Quick to mature (8 months), produces small tubers 3 months after planting.
- **Mujel** – two kinds of Mujel, one has bitter tubers and the other has tubers that are not bitter.
- **Kautchu** – Produces leaves for consumption even during the dry season but does not produce tubers.

MAIZE

- **Kaikubuku** – Yellow grain. It produces large amounts of grain but requires fertile soils and large amounts of weeding. Can produce well in sandy soil (when fertile).
- **Tukunjimba "the pigeon"** – Yellow grain. Early maturing variety (3 months). Requires fertile soils and large amounts of weeding. Can produce well in sandy soil.
- **Lembojoko** – White grain. Easy to pound. It produces large grains, and large amounts of flour, but requires fertile soil. Does not produce well in sandy soils.
- **Djibouti** – White grain. The grain is hard; it cannot be pounded by hand, it must be processed at a mill. Can be stored for 6 months without the insects producing significant storage losses. It produces a good amount of flour, and you can use a lower ratio of maize to cassava to make fufu and the fufu will still congeal. But it does not fill you up. Does not grow well in sandy soil.
- "*Yellow maize sells better in our market; 70-90% of our maize is yellow. When people cannot afford maize, they make fufu with cassava only, and it has a whiter color. The problem with white maize is that other people will think you are too poor to put maize in your fufu*."

PEANUT

- **Batchamba** – red grains, sprawling runners, early maturing (3 months). Produces good harvest but is vulnerable to disease.
- **Muzembe** – yellow grains. It tastes good. Produces a good harvest if the soil is fertile but is vulnerable to disease in infertile soils.
- **Bimbele** – Yellow grains. The best tasting peanut, sweet. Large grains. Requires a large amount of weeding. 4-month production cycle.
- **Katabi** – Small grains, does not produce well in sandy soil.
- **Basala** – Early maturing (3 months)

Many farmers in Kasaï and Kasaï-Central are sensitive to seed quality, and they are eager to obtain access to higher-quality seed. In focus group discussions, the farmers said that the degraded quality of their seed is particularly problematic because they do not have much access to arable land (many must rent land for US$ 20-60/ha and 10% of their harvest). Consequently, they do not have the luxury of practicing extensive agriculture. They must farm intensively on their small plots of land, which should make them more eager to adopt new/improved varieties. They said that the improved varieties that they access (through seed distributions) produce good yields and they are well-adapted to their needs, but they do not have sufficient access to new varieties. They are eager for higher-quality seed that will produce higher yields on their limited parcels of accessible land.

Kasaï and Kasaï-Central contains a diversity of farmers, some are highly sophisticated farmers with deep agricultural roots, others are recent converts to the agricultural vocation. This diversity of farmers is highly pertinent to the seed system because the farmers' knowledge and practices constitute its fundamental structure – 88% of the seed that farmers plant comes from the informal (local) system. The remaining 12% is certified seed from the formal seed system, but it is distributed to the farmers for free by NGOs and the FAO.

The farmers' agricultural practices and knowledge is where the demand for varietal improvements and better seed emerges. This demand is what will ultimately drives a sustainable market-based approach to improving the seed system. However, the farmers in Kasaï are not monolithic, and neither is their demand for improved varieties and better seed. The great challenge for development interventions operating in Kasaï and Kasaï-Central is creating and implementing interventions that will support this diversity of farmers in their daily struggle to lift themselves out of poverty. The great challenge for GAINS, Tudienzele, and Tudituale is to strengthen the seed systems in ways that are based on the diversity of practices and knowledge of a diverse groups of farmers.

The Local Market in Kasaï and Kasaï-Central

The research team surveyed 12 vendors of grain/local seed in local markets; half of them reported that they do search specific varieties to sell to farmers. When they indicated which varieties they sell, many said: yellow maize or white maize. Many of them seemed to

distinguish varieties only by the color of the grain. Figure 6 shows that farmers consistently indicated that the local market was the most important source of maize seed. Figure 6 also shows that the local market has become a more important source of cassava planting material. Table 14 and Figure 3 (above) also show that farmers rely more heavily on the local market for maize, peanuts, and cowpea. While they can cut cassava stems directly from their fields (or obtain stems from neighbors' fields), they must store their maize, peanut, and cowpea seed between agricultural seasons. But this presents a real challenge for farmers in Kasaï and Kasaï-Central because of high storage losses. They cannot store their maize, peanut, and cowpea seed for the entire offseason without incurring heavy storage losses; 52% of the respondents reported that their household experienced storage losses in the last dry season (see Box 3). Less than 1% of respondents indicated that their household uses chemical products to reduce storage loss. Given the total lack of proper storage practices, a reasonable interpretation of this data is that the other 48% did not experience storage loss because they sold their harvest before storage losses occurred.

The local market and saved stocks are closely related sources for the typical household because they sell grain in the local market after the harvest and buy grain/local seed from the local market as the agricultural campaign approaches. In focus group discussions and individual interviews, farmers reported that they sell between a third and two thirds of their maize and cassava in the local market, depending on the number of mouths they must feed and their immediate financial needs. Months later, these same farmers would turn around and buy grain/seed in the local market. Much of the seed that the survey team found at the local market was *tout venant* (bin-run seed). The farmers reported that they often purchase the *tout venant* at the local market and sort out the grain of good physical quality for planting. Maize is their

Box 3. Storage losses lead to selling low and buying high

Depending on the household consumption needs and their immediate cash needs after the harvest, farmers sold anywhere between one to two thirds of their maize production just after they harvest (when the price is low – 3,500 franc/kg). These same farmers turn around and buy maize grain in the local market before the planting season (when the prices are much higher – 6,000 franc/kd). They then sort out the good grain for planting and consume the rest. The time value of money drives the tendency of farmers not to store but to sell at harvest, while those who do store experience high storage losses. Hence, farmers tend to sell their harvest when prices are low and then end up buying when the prices are higher. In focus group discussions, the farmers repeatedly mentioned the insects that destroy their stored stocks (see Table 27). In other words, the costs incurred by storage losses are greater than the cost of selling their grain for a lower price and buying grain for a higher price. This creates opportunity for development interventions. If the cost of materials for more secure storage is less than the losses from selling low and buying high, farmers who can afford to not sell at harvest time should be open to investing in this improved practice.

Table 27. The respondents' reported storage losses

Crop	N	Average losses (%)	Average losses in male-headed households (%)	Average losses in female-headed households (%)
Maize	441	27	26	28
Cassava	220	22	23	20
Peanut	172	19	18	19
Cowpea	137	28	24	30
Beans	106	21	20	23

main staple crop, a third of their seed comes from the local market, and our data suggests that a major portion of that third is low quality *tout venant* seed.

Table 28 shows that the local vendors are very aware that they are selling grain/local seed to their clients. This table indicates that the aggregate of farmers in Kasaï (lifetime farmers and the recent converts) are more interested in the physical quality of the seed than the varietal quality. Compared to the average from 10 other SSSAs on the continent, the vendors in the research zone maintain the physical quality of their seed at a higher rate than the average and the varietal quality of their seed at a lower rate than the average. Focusing on the red text at the bottom of Table 28, we see that the vendors have special storage conditions, and they sort out waste and bad grain at above average rates. Focusing on the purple text at the top of Table 28, we see that the vendors keep varieties pure and buy high-quality seed from specific growers at a significantly lower than average rate. Furthermore, when these vendors reported that they "keep varieties pure" some indicated that they mean that they separated the seed by color, not variety. We also asked these vendors what their farmer clients ask for when purchasing grain/local seed, and we saw this same attention to the physical quality of seed: 100% of the seed vendors reported that their farmer clients search for clean seed without debris.

Table 28. Local market vendors treatment of grain/local seed (N=12)

Activity	Kasaï and Kasaï-Central	Average from 10 other SSSAs in Africa
Number of traders	12	211
Get grain in specific regions believed to have grain that is well adapted to the local area	63%	80%
Seek out specific varieties to buy (which can be planted	68%	75%
Buy from specific growers who are known for high-quality seed	16%	48%
Keep varieties pure	47%	73%
Keep freshly harvested stock apart	68%	71%
Grade stock (which grain/ which seed)	39%	39%
Do germination tests	32%	10%
Have special storage conditions (for seed viability)	74%	45%
Sort out waste (pebbles, dirt, etc.)	95%	71%
Sort out bad grain that is broken, discolored, or immature	90%	65%
Sell seed and grain separately at different prices	53%	43%

These results capture the aggregate of farmers' demand for grain/local seed, which includes lead farmers who have been farming their whole lives, and the recent converts who have been mining diamonds for decades. This data appears to say that both groups are very interested in the physical quality of seed when they go to the market, but not all of them are as interested in the varietal quality of the seed. When the market vendors mix varieties and you have no way to distinguish varieties and no uniformity from the vendors, the focus on physical quality and impurities is logical. Numerous vendors, farmers, and key informants said that for the two most important crops (maize and cassava), the farmers distinguish varieties only by color: yellow maize or white maize and yellow cassava or white cassava. This was also confirmed in focus group discussions and individual surveys. Many farmers go to the market, buy the *tout venant*, sort out the high-quality grain for planting, and consume the rest. Given the importance of local markets, efforts to strengthen them should be actively explored (see Box 4).

Box 4: Collaborating with market traders to improve seed (genetic) quality in Kasai Oriental

Seed interventions should focus more effort on the local markets because local market vendors and large traders supply roughly 37% of the farmers' seed. Large traders could be an excellent entry point to gradually improving seed quality in the major market channels.

- Seed/grain traders could play an important role in improving the overall seed quality if they adopted procedures for separating varieties. This could reduce the amount of seed that is sold as bin-run seed ("*tout venant*" in local parlance) at the local markets.
- Seed/grain traders could serve as key partners in distributing improved varieties, especially in isolated areas that are underserved by formal seed markets. Seed interventions could experiment with models that link formal seed suppliers with informal seed/grain traders and sell small packets of certified seed.
- Seed/grain traders could also become key sources of information on improved varieties' performance, availability, and cost. Because traders operate even in remote communities, equipping them with up-to-date seed information could raise the farmers' appreciation of improved varieties.

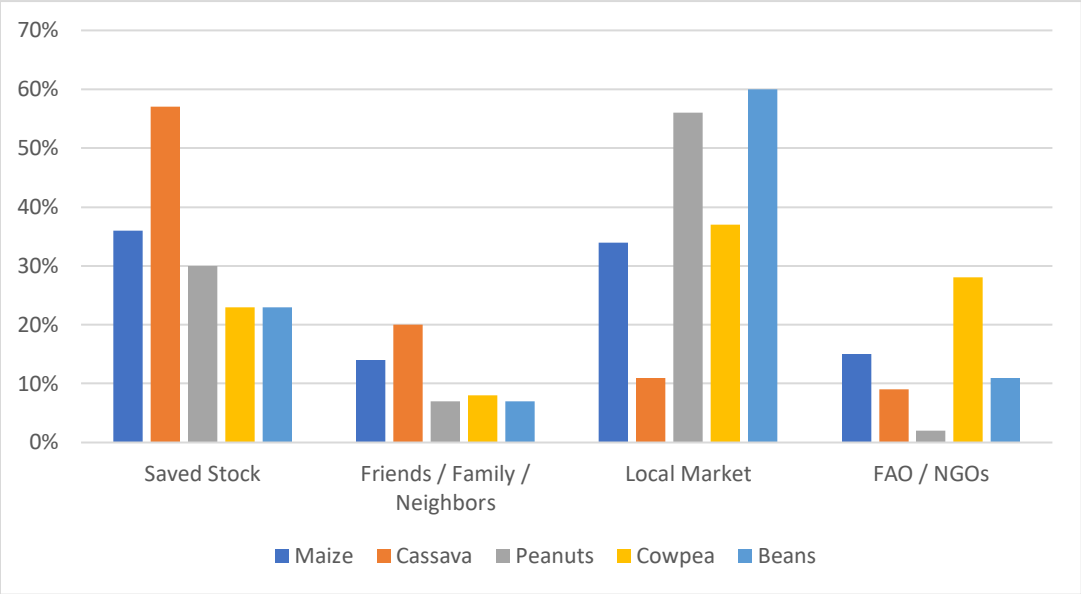
(Adapted from Sperling and McGuire 2010)

In summary, some farmers go to the local market to buy local varieties and improved varieties, while other farmers appear to go to the local market to purchase *tout venant* and then they sort out grain/local seed with good physical quality.

Direct Seed Distributions (Seed Aid)

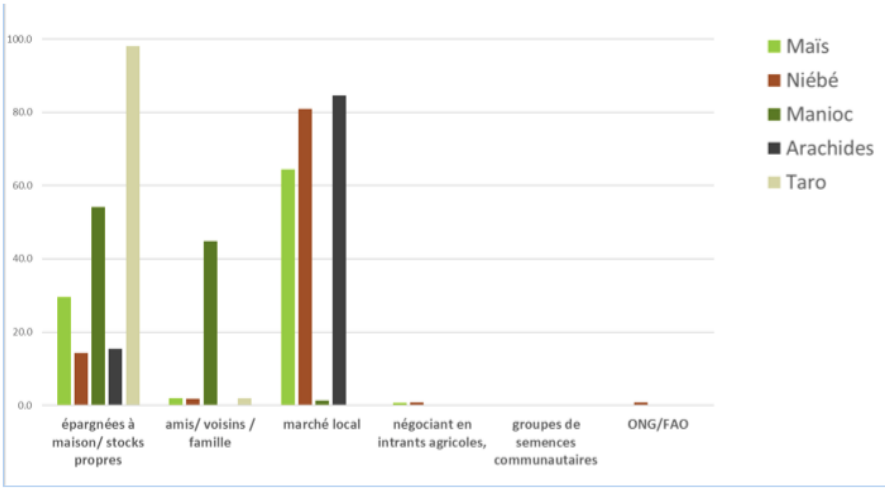
The local market and their social networks often provide seed with low physical and varietal quality, and agro-dealers and private seed companies are non-existent. Direct seed distributions are another notable source of seed for farmers. Recall Figure 2 (below), farmers in Kasaï and Kasaï-Central obtained 11% of their seed from direct distributions (FAO/NGOs).

Figure 2. Farmers' seed sources for Kasaï and Kasaï-Central for season B, 2024 (N=1126)



The results of the 2017 SSSA in Kasaï Oriental show how seed systems functioned before the distributions became so prominent (see Figure 7). At that time, the farmers relied more on the local market. The arrival of seed aid appears to reduce farmers' purchase of seed in the local markets.

Figure 7. Farmers' seed sources for Kasaï in 2017 (N=177)



Returning to this 2024 SSSA data, we compared farmers who did and did not receive seed aid last season, and we find **this same pattern**. Fifty-one percent of the surveyed household received seed aid last season and 49% did not. Table 29 shows that the respondents who did not receive seed aid generally relied more on the local market. For example, farmers who did *not* receive seed aid procured 44% of their maize seed from the local market and farmers who *did* receive seed aid procured 21% of their maize seed from the local market. Thus, farmers

who did not receive seed aid procured +23% more of their maize seed from the local market. On the other hand, farmers who received seed aid procured 28% of their maize seed from direct distributions (so the difference is expressed as -28% in Table 29). Table 29 shows that when seed is distributed for free, households buy less seed.

Table 29. Percent difference in seed sources for Kasaï households (in season B, 2024) who did NOT receive seed aid in the last 5 years (N=895)

Crop	Saved Stock	friend / family / neighbors	Local Market	FAO / NGO
Maize	-4%	+5%	+23%	-28%
Cassava	+8%	+5%	+6%	-19%
Beans	+3%	+10%	+20%	-33%
Cowpea	+2%	+3%	+32%	-54%

The farmers reported that they planted more than normal last season (season B, 2024) because they are coming off a good harvest and they received seed aid (see Tables 24 and 25). However, further calculations reveal that direct distributions generally did not lead households to plant more of a given crop last season. Households that received seed aid planted roughly the same amount as the households that did not receive seed aid (see Table 30). One could argue that farmers who did not receive seed aid were forced to plant more seed because they were planting degenerated bin-run seed from the local market, which has lower germination rates and lower yields compared to the improved seed from the FAO and NGOs. However, state extension agents, NGO agronomists, and field agents stated that farmers do not change their planting practices when they receive seed aid. According to these local experts, the farmers plant 2-3 seeds per pocket regardless of the source. Smallholders are notoriously risk averse. Several key informants, including farmer respondents, stated that the certified seed that the farmers receive through direct distributions can also have low germination rates, which could help explain why risk-averse smallholders plant 2-3 seeds per pocket with certified seed as well. Or maybe they are so habituated to low germination rates, that planting 2-3 seeds per pocket is a hard habit to break.

Table 30. Total kg planted per 100 households in Kasaï province in season B, 2024 among farmers who did and did not receive seed aid

Crop	Total kg planted among respondents who received seed aid	Total kg planted among respondents who did NOT receive seed aid
Maize	1,152	1,237
Peanuts	294	488
Cowpea	216	222
Beans	79	39

Table 31 shows that FAO and NGOs provided seed aid to farmer respondents with one hectare or less in 82% of seed distribution cases ((155+288)/538). However, Table 31 also shows that seed aid was distributed to a higher percentage of farmers with more than one hectare. Because 93% of the respondents' new varieties came from direct aid distributions (see Figure 8 below), farmers with more than one hectare also obtained slightly more access to new

varieties. Nevertheless, 83% of the respondents who obtained a new variety had one hectare or less ((154+291)/534).

Table 31. Percent of households that received seed aid and obtained new varieties in the last 5 years (N=1106)

Farm area (ha)	N	# of housholds who received seed aid in the last 5 years	% of households who received seed aid in the last 5 years	# of households who obtained a new variety in the last 5 years	% of households who obtained a new variety in the last 5 years
< 0.5	362	155	43%	154	43%
0.5 - 1.0	587	288	49%	291	50%
>1	157	95	61%	89	57%
Total N		538		534	

In conclusion, seed aid did not appear to lead farmers to plant more seed overall, but it did lead farmers to buy less seed in the local market. This conclusion makes sense because farmers in Kasaï and Kasaï-Central are not experiencing acute seed insecurity. As shown in the previous section: the farmers already have enough seed in relation to the other resources they can marshal. Farmers in Kasaï and Kasaï-Central often have limited access to additional land and labor, which also may constrain farmers' capacity to plant more seed after receipt of a seed distribution.

Seed aid not only delivers seed, but also injects higher quality seed into the seed systems because development interventions purchase certified seed of improved varieties for their direct distributions. The next sub-section will discuss the farmers' access to new varieties.

New Varieties

In the household survey, farmers were asked how many times they accessed a new variety in the last five years. A new variety does not necessarily mean an improved variety. For example, if a farmer obtained a new local variety for the first time in the market last year, that counts as a new variety in the last 5 years, because it is new to her. If a farmer obtained an improved variety from a seed distribution, but she had obtained this same improved variety 10 years ago, then this variety would *not* be new to her in the last 5 years. This question explores innovation in the seed system, regardless of whether the new variety is a local variety or an improved variety.

Poor varietal quality is a chronic problem for farmers in Kasaï and Kasaï-Central. Among the 570 respondents who did not receive seed aid in the last 5 years, only 7% obtained a new variety in the last 5 years. The 2017 SSSA data show the same result. Seed aid was almost non-existent in 2017 (see Figure 7), and only 4-12% of their respondents had obtained a new variety in the previous 5 years (2017-2012). Without seed aid, there is very little new germplasm available to the farmers – 7% is woefully inadequate. The local farmers need access to new varieties in order to sustainably increase yields and lift themselves out of poverty. The farmers (women

especially) need access to improved varieties because they can only access small plots of land, so they need to increase production. Independent of seed aid, the seed systems in Kasaï and Kasaï-Central are failing the farmers.

The 2024 SSSA data show that 51 percent of respondents received seed aid in the last 5 years, and 48 percent of respondents received a new variety (mostly via seed aid) in the last 5 years. The results from this current SSSA (on the left in Figure 8) show that during the last 5 years, 93% of the respondents' new varieties came from seed distributions, 4% from the local market, and 1% from social networks. Although seed aid generally did not lead farmers to plant more seed, seed aid did improve farmers' access to new and improved varieties, at least on a one-off basis.

Figure 8. Sources of new varieties over the last five years, surveyed in 2024 and 2017 (N=1126)

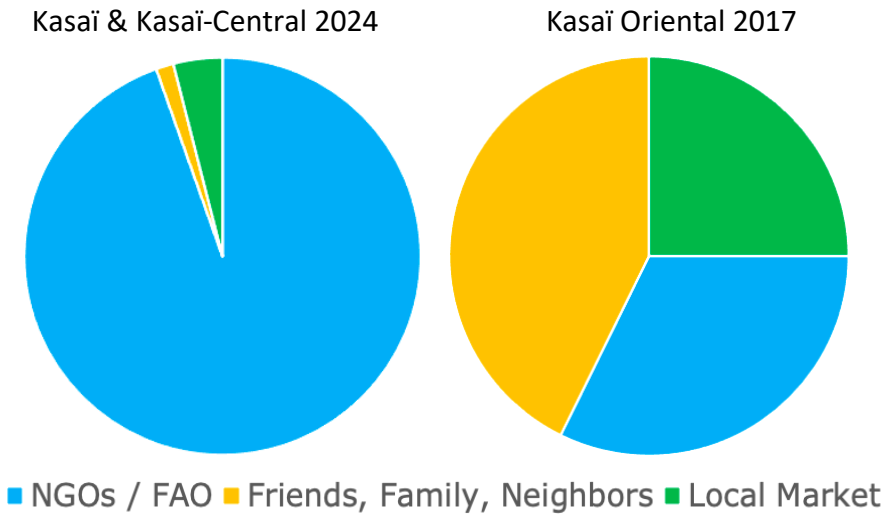


Table 32. Sources of new varieties over the last five years, surveyed in 2024 and 2017 (N=1126 for 2024 and N=177 for 2017)

SSSA	NGOs/FAO	Friends, Family, Neighbors	Local Market
Kasaï & Kasaï-Central 2024	93%	4%	2%
Kasaï Oriental 2017	36%	40%	24%

Tables 32 and 33 show the direct link between seed aid and access to new varieties in the current seed system. When respondents in Kasaï Oriental were asked this same question in 2017, 40% of the respondents' new varieties came from friends/family/neighbors and 24% came from the market. However, only 4-12% obtained a new variety in the previous 5 years (woefully inadequate). The seed systems in Kasaï and Kasaï-Central are so moribund that seed aid appears to be the only reliable source of new varieties for the local farmers. Farmers are generally not accessing new varieties through sustainable market-driven sources or social networks, and seed aid does not last forever.

Table 33. The link between seed aid and access to new varieties in season B, 2024

Respondents	Kasaï (N=895)	Kasaï-Central (N=231)	Male-headed households (N=531)	Female-headed households (N=594)
% who received seed aid in the last 5 years	56%	21%	48%	50%
% who obtained a new variety in the last 5 years	55%	21%	47%	49%

More seed distributions are not the correct response to a chronic stress in seed quality. Direct seed distributions have been occurring in this zone for years (see Table 13, Section IV), and the physical and varietal quality of seed remains highly problematic. At the very least, one can safely argue that direct aid distributions are not resolving the chronic seed quality issue in Kasaï and Kasaï-Central. A holistic approach that includes other types of seed activities is needed to deal with chronic seed insecurity.

One could go further and argue that seed distributions are also a contributing cause of chronically poor seed quality in the zone, as they hinder nascent local markets for improved varieties and certified seed. Furthermore, large orders for certified seed from development institutions can create unintended results. They divert seed towards institutional buyers and not farmer-clients. Remember (from section IV) that there is a signficant lack of certified seed in the SSSA zones – partly due to the business of seed aid and partly due to the lack of seed producers with the skills and access to germplasm to produce good seed for farmer clients on an ongoing basis. Also, there is no evidence (determined by statistical analysis) that seed aid helped recipients to plant more of a crop last season (Season B, 2024).

Conclusions

The farmers in Kasaï and Kasaï-Central obtain seeds and planting materials through both formal and informal systems. They save seeds from their own harvests, exchange seeds with neighbors, and purchase seeds from local markets. This range of procurement strategies is key to the resilience of their seed systems. However, the seed systems lack market-driven innovation. For the most part, the farmers only access new varieties via free seed distributions from NGOs and the FAO (and they have no choice in variety). The private sector actors (agro-dealers, seed companies, local seed producers that emerged independent of aid) are not existent. For an ambitious farmer trying to meet her family's needs by improving her production on a small parcel of rented land, this lack of private-sector support can be a deeply felt need.

The seed systems in Kasaï and Kasaï-Central are characterized by chronic seed insecurity, not acute seed insecurity. The chronic stresses include a lack of:

- Genetic and physical seed quality

- High quality seed availability in any significant quantity
- Delivery mechanisms to reach the smallholders
- Information for farmers on improved practices and options

There are not enough new varieties in the system – the improved varieties that farmers access were released 20-30 years ago. Also, the farmers can access only small amounts of these improved varieties through direct aid distributions—not on an ongoing basis. Agro-dealers and private seed companies are non-existent in the SSSA regions surveyed. The big challenge for the three RFSA projects is to develop more sustainable market-driven pathways for farmers to access quality seed and new varieties (see Box 5). In addition to these pathways, building the relationships, linkages, and communication between seed multipliers, SENASEM and INERA is crucial. Identification of seed multipliers that are approved by SENASEM and linking them with INERA to establish channels for distribution of basic seed, and strengthening the relationships

BOX 5 : Introducing New Varieties In Crisis Periods? Key advice for caution and reducing risks

Farmers are eager to access and evaluate new varieties. Humanitarian crises can be perceived as opportunities to introduce new varieties via emergency seed distributions. However, introducing new varieties in crisis can be highly problematic. Small farmers experience increased levels of risk during a crisis. External interventions should first do no harm. While formal sector varieties are referred to as 'improved', and the quality of seed is certified, these varieties often yield poorly in many smallholder cropping systems because they are not adapted to local agro-ecological conditions.

Befor a new variety introduction can be considered in periods of crisis, development interventions must:

1. Collaborate with agricultural communities and other key stakeholders to select possible new varieties. Is there sufficient evidence that the new varieties:
   - are adapted to the specific agro-ecological zones?
   - meet farmers' acceptability criteria (harvest and post harvest for subsistence and market use)?
   - can be successfully used under farmers' own management conditions (e.g. without fertilizer)?

2. Design introductions to minimize risk and maximize farmers' informed choice.
   - Offer 'test size' packets: introductions should be small-scale.
   - Give farmers choices: to use the variety or not. And if possible, put several varieties on offer.
   - Provide sufficient accompanying information to allow farmers to make variety choices and management decisions (planting time, levels of input use, crop associations).

3. Build in explicit monitoring and evaluation of new varieties: are they performing? For whom? Where?

4. Count on a multi-year process.
   - Can the new introductions be successfully integrated into stressed farming systems?
   - If yes, is further fine-tuning needed?

These are necessary steps to successfully supporting farmers during a crisis. New varieties may bring gains and help alleviate a crisis, but they can also introduce risk.

Adapted from: Seed Aid for Seed Security, Advice For Practitioners. (https://seedsystem.org/wp-content/uploads/2014/03/PB5.pdf)

between seed multipliers, input suppliers/traders and farmers will facilitate increased access to quality seed of improved varieties.

SECTION VI: RECOMMENDATIONS

The findings above are derived from the three RFSA zones. Below is a set of recommendations that apply generally to the three RFSA projects to improve seed system security in their intervention areas and the provinces where they operate. The next step would be for each RFSA team to develop concrete action plans according to specific findings from their intervention zones, as well as on partner priorities, skills, and feasibility.

While considering the following recommendations, recall the core principles of seed systems: seed security is achieved when farmers have access to sufficient amounts of good quality seed and varieties.

Improve The Varietal Quality

1. As one central intervention to improve varietal quality, research and development interventions should create a platform that brings together breeders and farmers to help develop and identify new varieties that meet male and female farmer needs. Demonstration trials in farmer-realistic conditions can help verify local adaptation and farmer acceptance. The RFSAs should support replicated demonstration plots in the target villages so farmers can evaluate high-quality seed and new varieties under their own, realistic farming conditions. After the farmer-led selection of new varieties, local means of sustainable seed multiplication need to be promoted, and far-reaching dissemination channels (preferably sale) need to be catalyzed to help move new varieties in the hands of farmers, on a sustainable basis (recommendation below). All these multiple efforts should help increase farmers' appreciation of improved varieties and address multiple issues linked to the chronic seed insecurity found across the Kasai and Kasai-central region.

2. Seed breeders should design replicated demonstration plots and supply new varieties for these demonstrations, the farmers can manage the trials, and the RFSA's can organize and finance these replicated demonstration plots. Platforms established by RFSAs or their subcontractors should also train the farmers in seed production practices and proper seed preservation. The farmers in the target villages where these demonstrations take place can learn to produce high-quality grain/local seed. This would be a decentralized way of facilitating access to new varieties, and it would produce numerous benefits that address the chronic lack of genetic quality in Kasaï and Kasaï-Central. The participating farmers would see first-hand the benefits of improved varieties, they would come to appreciate the value of improved varieties, they would learn improved production practices, and they would obtain high-quality seed.

   The RFSA's could build on the Farmer Field School model or other organizational innovations to implement these replicated demonstration plots with new varieties. These programs should

also focus on providing farmers with more information about new varieties and market channels where they are available. These recommendations are not novel. The three RFSA's already conduct similar activities. In focus group discussions and individual interviews, respondents in Kanzala said that they appreciated a very similar program that ADRA implements with cassava. In collaboration with the project participants, ADRA manages demonstration plots that produces Zizila, an improved variety of cassava that is resistant to Cassava Mosaic Disease (CMD). Mercy Corps also has a similar activity to that they implement in collaboration with IITA. Furthermore, this recommendation has been made by Asanzi (2017):

More investment in variety development: The DRC has only eighteen active plant breeders, and most of them are not well-supported. There is an urgent need to increase investment in crop breeding programs at the public institutions – UNILU and INERA – to improve the quantity and quality of varieties for the four focus crops and to complement these efforts by greater collaboration with international agricultural research institutions like CIMMYT (maize), Africa Rice (rice), IITA (beans and soya beans). In addition, INERA and UNILU should collaborate with domestic agricultural research programs to increase the local pool of breeding material.

To start working on these recommendations, RFSA programs could organize a preliminary meeting bringing together key actors in seed production for each of the targeted crops, including INERA, SENASEM, SNV, SENAFIC, provincial agricultural authorities, seed producers, and farmer leaders. Together, they can organize the replicated demonstration plots. The demonstration plots should not be too complex. They should include two or three new varieties, and one of the farmers' local varieties for the comparison. These demonstration plots provide an excellent base to layer in training on improved agricultural practices and seed production practices. This recommendation was written in collaboration with national breeders of maize, cassava, and cowpea. They are willing to design the demonstration plots and provide the necessary high-quality seed of new varieties. They said that they do have new varieties in mind that can be trialed.

Identify Effective decentralized seed production models

3. The seed systems in Kasaï and Kasaï-Central could greatly benefit from decentralized seed production that effectively reaches smallholders. The RFSAs should identify and support seed production models that multiply near or on site to make accepted varieties and good quality seed more available. Past interventions in the provinces have trained farmer associations to become local seed producers. These informal seed producers were discussed at length in Section IV. They require further training in seed production. This approach can include further training groups of seed entrepreneurs in seed production and marketing. These seed entrepreneurs could also be trained to develop their own demonstration plots to promote their seed. They need to complete the transition to sustainable business entities, rather than waiting for the next project to support them. RFSAs should identify and select the farmer associations that are already producing seed and train them so that they can effectively produce local seed in a decentralized manner. Their production must be oriented toward other farmers in their community and surrounding communities, not solely institutional buyers. These local seed producers may produce local varieties or improved varieties, whatever serves the local

farmers' needs. They may need greater linkages with INERA stations and a durable plan to purchase quality base seed for local production, rather than re-multiplying degenerated seed as they currently tend to do. These local seed producers also need support elaborating viable business plans that do not rely on more support from NGOs. Once these local seed producers have oriented their business toward farmer clients (and not NGO-clients), they will be forced to intensely focus on seed quality, otherwise their farmer clients will stop buying their seed and they will go out of business. This intense focus on quality could help them to obtain foundation/R1 seed from INERA.

Promote Market-Driven Solutions

4. Identify diffusion and delivery models that can reach the range of smallholder farmers. This includes options such as small seed packets, last-mile delivery options, and seed fairs and vouchers:
    - Small packets – Work with certified seed producers to produce small packets of certified seed (50-100g) that are locally available. These packets should be modest (i.e about the cost of a cup of tea).
    - Last mile delivery – Make links between the seed producers and existing shops in the villages or use a model like CRS's Private Service Provider (PSP) program that trains people in villages to provide pro-social services (like selling high-quality seed) to their communities.
    - Seed fairs and vouchers – Conduct seed fairs where local seed producers can sell their seed directly to farmers. If there is concern that the farmers will be unwilling or unable to buy seed at the seed fair with their own money, provide the farmers with seed vouchers that the seed producers can redeem for cash.
    - Build linkages between seed producers and traders with established customers to promote the availability of improved seed in local markets. Farmers are accustomed to buying seed (grain) from local market traders. Strengthening trader capacity to identify new and improved varieties, and obtain quality seed from seed multipliers will enhance farmer access to quality seed.
    - Strengthen farmer demand for seeds through demonstration plots implemented by NGOs and local organizations and Farmer Field Schools work through lead farmer networks, access to credit, or advances of seeds. To raise awareness in communities, partner radio stations will produce and broadcast programs on the benefits of certified seed and how to access them.

If development institutions cannot avoid direct distributions, they should make sure the participant farmers know the variety they are distributing and the seed producers that produced the seed. This would enable interested farmers to buy more seed if they are impressed with the results. Farmers need more information about new varieties and market channels where they are available. One of the key informants at SENASEM had another idea to improve the linkage between seed demand and supply through direct distributions: habituate the farmers to pay for high-quality seed by requiring them to pay for 5% of the distributed seed. If direct distributions continue, then farmers

could be required to pay an increasing percentage of the value that they received (5% in year one, 10% in year two, etc.)

Train Farmers in Seed Management

5. Train farmers (refresh their understanding) on how to select for seed quality and how to manage seed/planting material. Remind farmers The findings of this SSSA indicate that (1) there are new farmers who have recently converted to the agricultural livelihood, and (2) farmers are not adequately identifying and managing their seed. When they do obtain new varieties and high-quality seed, they recycle this seed for 3-5 years (and even longer in many cases). Thus, interventions should remind on field-based best practices for seed selection of maize, cowpea, and cassava, including postharvest handling and storage which can improve seed viability/physiological status of seed/planting material.

Reduce Postharvest Losses

6. Address the high rate of storage losses. Implementing partners might closely evaluate and then promote PICs bags, storage chemicals, local vessels and a range of proper storage techniques. The storage losses for maize and cowpea warrant a brief follow up study to look at post-harvest practices and losses for both crops in order to identify best practices and areas to address loss. Hermetic storage technology (recycled plastic bottles, plastic bags, and jerry can for grains) has proven to be an effective way to reduce postharvest loss but requires a specific set of activities and must go beyond 'procure and disseminate PICS bags, and farmers and seed producer associations require specific training on how to use PICs bags which may include proper drying before grains/legumes are stored in the bag, maintain the hermetic seal (do not open the bag before seeds will be used), maintain good storage practices where PICs bags will be stored . BHA/USAID has identified best practices for hermetic storage and supply chain promotion. RFSAs should continue activities that promote good post-harvest production practices such as: timing of harvest, proper handling drying threshing/shelling, improved on-farm storage practices, cleaning, sorting, and primary processing. Additional practices include insect and vertebrate pest management, construction/purchase of improved storage vessels or facilities, and proper storage management processes. The cost of these practices for farmers needs to be couched in terms of the costs associated with selling grain for low prices at the time of harvest and buying grain back at high prices at the time of sowing. To catalyze adoption, implementing partners need to show farmers that proper storage techniques would enable them to save money.

Improve Soil Fertility Practices

7. Address poor soil fertility. Improving the farmers' long-term soil fertility will increase their annual production, enhance their resilience to climate change (by increasing their soil's water-holding capacity), and enable their improved varieties to produce higher yields. Farmers are not incentivized to buy high-quality seed when they do not benefit from higher yields. For high quality seed to reach its yield potential, it must be planted in fertile soils.

Demonstrations of the benefits of leaving crop residues in the fields, cover cropping and green manuring, intercropping with nitrogen-fixing legumes, and erosion control methods are valuable activities. Interventions should include Integrated Soil Fertility Management (ISFM) and erosion reduction for the maize, cowpea, and cassava cropping system. Issues related to crop spacing, relay cropping and rotations, intercropping models, and field set-up (horizontal to the slope) all contribute to promoting soil fertility and erosion control. INERA has also been conducting innovative soil fertility trials that investigate the incorporation of nitrogen-fixing crops (mucuna and tithonia). The scale and scope of the soil fertility challenges in RFSA zones warrant a working group to share best practices and on-going work on ISFM.

However, these demonstrations and training programs are unlikely to change farmers' behaviors if they are not fairly compared to swidden (slash-and-burn) agricultural practices. The vast majority of Congolese farmers use swidden practices for good reason: farming is grueling work, and swidden clears fields and releases nutrients into the soil with minimal labor inputs. Demonstrations of more sustainable soil fertility practices that do not directly address labor issues are unlikely to convince farmers to change their agricultural practices. Demonstrations of sustainable soil fertility practices must include honest calculations labor costs and long-term advantages. Development programs should focus on non- or less-laborious soil fertility practices, like leaving crop residues in fields -- removing topsoil by hand, hand digging terraces into a mountain side, and then reapplying the topsoil is a very laborious soil management practice.

Focus training programs on lead farmers

8. The community should associate agricultural training and enhanced agricultural practices with improved household livelihoods and community economic development. Local seed production requires more attention to detail, thoughtfulness and sophistication. Seed producers must learn how to carefully guard the quality (stable characteristics) of one or several varieties, despite the unending pressures to change because of open pollination. Given the lack of local seed production, raising the ceiling of the best local farmers is conducive to local quality seed production, which they can exchange with neighbors. "Focus interventions on recent converts to agriculture" is not a recommendation of this report for two main reasons. One, while it is reasonable to assume this kind of farmer exists out there, the proportion of the population was not discovered. Two, focusing on the newest farmers brings the conversation down. Agricultural training in Kasaï and Kasaï-Central should challenge farmers and aspire to raise the bar.

9. In order to help address chronic seed system insecurity, the RFSA organizations should organize annual or bi-annual provincial-wide coordination meetings (one in Kasai Province and one in Kasai Central Province) involving the Provincial Ministry of Agriculture, SENASEM, INERA, FAO, IITA, other NGOs working in the agricultural sector, and key private sector actors, to elaborate, and subsequently coordinate the implementation of, provincial

seed system development strategies.

Comprehensive provincial strategies should be steeped in the premise that 'seed security' and 'food security' are complementary. Developing the seed system to increase the utilization of seeds of improved varieties will, together with appropriate agronomic practices, increase crop production and productivity.

The strategies should stimulate the creation of a market-led, multi-sector seed system, with an emphasis on research, extension services, and private sector involvement, which will enable all farmers (women, men, and youth) to access seed of improved varieties at the right quality, quantity, time, and price. Private sector involvement will also include expansion of local and regional seed suppliers and access to working capital loans that enable them to stock new varieties in response to farmer demand.

10. **Gender Equality in Seed Systems** Women are key stakeholders in both food and market systems, of which seed systems are an integral part. Provincial seed system development strategies should integrate gender-responsive principles, recognizing the roles of women as seed users and producers. These strategies should address women's differentiated needs through accessible channels, affordable quality seeds, and targeted interventions that enhance knowledge, skills, and access to resources. Equal involvement of both women and men in seed system decisions, along with support for women entrepreneurs and legal assistance for land rights, should be prioritized to ensure women's inclusion and empowerment in agriculture.

To empower women farmers as key stakeholders in seed markets, RFSA partners should broaden efforts to promote women's access to resources and participation in decision-making, while also engaging service providers, extension agents, community leaders, and husbands in addressing barriers women face, such as limited information, mobility, and access to social networks.

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SECTION VIII: APPENDIX – ADDITIONAL TABLES DISAGGREGATED BY PROJECT ZONE

Respondents' sources of seed for season B, 2024

Tudienzele (N=655)

Crop	Saved Stock (%)	Friends / Family / Neighbors (%)	Local Market (%)	FAO / NGOs (%)
Maize	38	12	26	23
Cassava	53	17	12	17
Peanut	21	5	60	4
Cowpea	21	8	30	40
Millets	34	2	37	28
Beans	39	13	44	0
Rice	28	19	58	0

GAINS (N=240)

Crop	Saved Stock (%)	Friends / Family / Neighbors (%)	Local Market (%)	FAO / NGOs (%)
Maize	30	21	44	4
Cassava	57	26	15	1
Peanut	30	13	54	1
Cowpea	24	6	53	1
Millets	52	20	25	0
Beans	-	-	-	-
Rice	25	1	74	0

Tudituale (N=231)

Crop	Saved Stock (%)	Friends / Family / Neighbors (%)	Local Market (%)	FAO / NGOs (%)
Maize	40	10	45	2
Cassava	66	22	4	1
Peanut	40	6	53	0
Cowpea	28	9	52	5
Millets	-	-	-	-
Beans	20	9	68	4
Rice	32	1	56	0

Respondents' sources of seed for season A, 2024/25

Tudienzele (N=655)

Crop	Saved Stock (%)	Friends / Family / Neighbors (%)	Local Market (%)	FAO / NGOs (%)
Maize	50	6	25	18
Cassava	72	8	6	13
Peanut	22	4	54	16
Cowpea	28	10	31	28
Millets	53	7	38	2
Beans	53	4	32	18
Rice	34	10	51	4

GAINS (N=240)

Crop	Saved Stock (%)	Friends / Family / Neighbors (%)	Local Market (%)	FAO / NGOs (%)
Maize	41	8	34	18
Cassava	56	16	9	20
Peanut	12	2	53	33
Cowpea	20	2	43	35
Millets	76	2	18	0
Beans	-	-	-	-
Rice	68	0	32	0

Tudituale (N=231)

Crop	Saved Stock (%)	Friends / Family / Neighbors (%)	Local Market (%)	FAO / NGOs (%)
Maize	53	9	36	2
Cassava	83	18	4	0
Peanut	50	7	44	0
Cowpea	39	9	47	5
Millets	-	-	-	-
Beans	38	6	54	2
Rice	59	1	40	0

Reasons respondents planted *LESS* than normal in season B, 2024

Tudienzele (N=748)

Reasons	N	%
SEED- RELATED (or indirectly linked to seeds)		
Seed availability		
No seed available in market	27	4%
No seed/cuttings available from neighbors	51	7%
Seed access		
No money to buy seed/poor finances or seed too high	284	38%
Seed quality		
Seed available is not good quality or the variety is not liked	35	5%
Sub-total: seed-related	**397**	**53%**
NON-SEED FACTORS OF PRODUCTION		
No/insufficient labor	51	7%
Illness/health problems	104	14%
No/insufficient land or land not appropriate/sufficiently fertile	33	4%
Lack of tools/tractor/ other machinery to farm	21	3%
Plant pests/diseases make production not possible	23	3%
Animals/predator make production not possible	21	3%
Lack (availability) of other inputs: controlled water supply/irrigation or fertilizer	3	0%
Poor weather/rainfall	56	7%
Insecurity (e.g. theft)	17	2%
Sub-total: Factors of Production	**329**	**44%**
OTHER PRIORITIES/STRATEGIES		
Markets for crop or crop products not well-developed	1	0%
Other priorities than agriculture (e.g. have shop)	1	0%
Changing Crop priorities or changing agricultural practices	16	2%
Low quality of non-seed agricultural inputs (herbicides, pesticides, insecticides, etc.)	0	0%
High cost of NON-seed inputs	0	0%
Sub-total: Other priorities/strategies	**18**	**3%**

GAINS (N=283)

Reasons	N	%
SEED- RELATED (or indirectly linked to seeds)		
Seed availability		
No seed available in market	27	10%
No seed/cuttings available from neighbors	16	6%
Seed access		
No money to buy seed/poor finances or seed too high	98	35%
Seed quality		
Seed available is not good quality or the variety is not liked	11	4%
Sub-total: seed-related	**152**	**54%**
NON-SEED FACTORS OF PRODUCTION		
No/insufficient labor	16	6%
Illness/health problems	65	23%
No/insufficient land or land not appropriate/sufficiently fertile	25	9%
Lack of tools/tractor/ other machinery to farm	6	2%
Plant pests/diseases make production not possible	4	1%
Animals/predator make production not possible	0	0%
Lack (availability) of other inputs: controlled water supply/irrigation or fertilizer	0	0%
Poor weather/rainfall	9	3%
Insecurity (e.g. theft)	2	1%
Sub-total: Factors of Production	**127**	**45%**
OTHER PRIORITIES/STRATEGIES		
Markets for crop or crop products not well-developed	0	0%
Other priorities than agriculture (e.g. have shop)	0	0%
Changing Crop priorities or changing agricultural practices	2	1%
Low quality of non-seed agricultural inputs (herbicides, pesticides, insecticides, etc.)	0	0%
High cost of NON-seed inputs	0	0%
Sub-total: Other priorities/strategies	**2**	**1%**

Tudituale (N=277)

Reasons	N	%
SEED- RELATED (or indirectly linked to seeds)		
Seed availability		
No seed available in market	0	0%
No seed/cuttings available from neighbors	5	2%
Seed access		
No money to buy seed/poor finances or seed too high	103	37%
Seed quality		
Seed available is not good quality or the variety is not liked	10	4%
Sub-total: seed-related	**118**	**43%**
NON-SEED FACTORS OF PRODUCTION		
No/insufficient labor	19	7%
Illness/health problems	60	22%
No/insufficient land or land not appropriate/sufficiently fertile	29	10%
Lack of tools/tractor/ other machinery to farm	0	0%
Plant pests/diseases make production not possible	12	4%
Animals/predator make production not possible	0	0%
Lack (availability) of other inputs: controlled water supply/irrigation or fertilizer	0	0%
Poor weather/rainfall	6	2%
Insecurity (e.g. theft)	0	0%
Sub-total: Factors of Production	**126**	**45%**
OTHER PRIORITIES/STRATEGIES		
Markets for crop or crop products not well-developed	1	0%
Other priorities than agriculture (e.g. have shop)	0	0%
Changing Crop priorities or changing agricultural practices	32	12%
Low quality of non-seed agricultural inputs (herbicides, pesticides, insecticides, etc.)	0	0%
High cost of NON-seed inputs	0	0%
Sub-total: Other priorities/strategies	**33**	**12%**

Reasons respondents planted *MORE* than normal in season B, 2024

Tudienzele (N=705)

Reasons	N	%
SEED- RELATED (or indirectly linked to seeds)		
Seed availability		
More seed available due to good harvest	134	19%
More seed available due to free seed	156	22%
Seed access		
More money to buy seed or seed price low	48	7%
got credit or coupon to buy seed	8	1%
Seed quality		
Have especially good seed or good variety	21	3%
Sub-total: seed-related	**367**	**52%**
NON-SEED FACTORS OF PRODUCTION		
Good/increased labor	70	10%
Feeling strong/healthy	79	11%
Have more land/more fertile land	72	10%
Have tools/tractor, other machinery to help farm	5	1%
Have access to irrigation, fertilizer or other inputs (for example, stakes)	4	1%
Good weather/rainfall	12	2%
Good security (peace has arrived; less theft)	14	2%
Sub-total: Factors of Production	**256**	**36%**
OTHER PRIORITIES/STRATEGIES		
seeking enhanced income/ well-developed or new markets for crop or crop products	5	1%
seeking food security / have decided to give more priority to agriculture	10	1%
changed crop profiles or priority to certain crops	54	8%
re-sowing due to stress (e.g. poor soils/ low germination rate)	0	0%
Other	0	0%
Sub-total: Other priorities/strategies	**69**	**10%**

GAINS (N=259)

Reasons	N	%
SEED- RELATED (or indirectly linked to seeds)		
Seed availability		
More seed available due to good harvest	72	28%
More seed available due to free seed	30	12%
Seed access		
More money to buy seed or seed price low	30	12%
got credit or coupon to buy seed	1	0%
Seed quality		
Have especially good seed or good variety	3	1%
Sub-total: seed-related	136	53%
NON-SEED FACTORS OF PRODUCTION		
Good/increased labor	20	8%
Feeling strong/healthy	40	15%
Have more land/more fertile land	29	11%
Have tools/tractor, other machinery to help farm	0	0%
Have access to irrigation, fertilizer or other inputs (for example, stakes)	0	0%
Good weather/rainfall	5	2%
Good security (peace has arrived; less theft)	7	3%
Sub-total: Factors of Production	101	39%
OTHER PRIORITIES/STRATEGIES		
seeking enhanced income/ well-developed or new markets for crop or crop products	11	4%
seeking food security / have decided to give more priority to agriculture	1	0%
changed crop profiles or priority to certain crops	0	0%
re-sowing due to stress (e.g. poor soils/ low germination rate)	1	0%
Other	0	0%
Sub-total: Other priorities/strategies	13	5%

Tudituale (N=215)

Reasons	N	%
SEED- RELATED (or indirectly linked to seeds)		
Seed availability		
More seed available due to good harvest	29	13%
More seed available due to free seed	22	10%
Seed access		
More money to buy seed or seed price low	18	8%
got credit or coupon to buy seed	0	0%
Seed quality		
Have especially good seed or good variety	18	8%
Sub-total: seed-related	**87**	**40%**
NON-SEED FACTORS OF PRODUCTION		
Good/increased labor	5	2%
Feeling strong/healthy	4	2%
Have more land/more fertile land	43	20%
Have tools/tractor, other machinery to help farm	0	0%
Have access to irrigation, fertilizer or other inputs (for example, stakes)	0	0%
Good weather/rainfall	0	0%
Good security (peace has arrived; less theft)	0	0%
Sub-total: Factors of Production	**52**	**24%**
OTHER PRIORITIES/STRATEGIES		
seeking enhanced income/ well-developed or new markets for crop or crop products	18	8%
seeking food security / have decided to give more priority to agriculture	5	2%
changed crop profiles or priority to certain crops	50	23%
re-sowing due to stress (e.g. poor soils/ low germination rate)	1	0%
Other	0	0%
Sub-total: Other priorities/strategies	**74**	**34%**

Reasons for not using mineral fertilizer

Tudienzele

Reason	Season B, 2024		Season A, 2024/25	
	N	%	N	%
Not available	261	40%	229	37%
Not necessary (fertile soils)	59	9%	79	13%
Too expensive	6	1%	20	3%
I do not know how to use them	309	47%	252	40%
They are not profitable for me	6	1%	11	2%
Not allowed to use them	4	1%	23	4%
Lack equipment to make use (e.g. sprayer)	0	0%	6	1%
Use integrated/ biological methods	3	0%	2	0%
Toxic / noxious	1	0%	1	0%
Other	2	0%	0	0%
Total	651		623	

GAINS

Reason	Season B, 2024		Season A, 2024/25	
	N	%	N	%
Not available	128	53%	111	47%
Not necessary (fertile soils)	10	4%	18	8%
Too expensive	3	1%	8	3%
I do not know how to use them	91	38%	91	38%
They are not profitable for me	1	0%	2	1%
Not allowed to use them	5	2%	6	3%
Lack equipment to make use (e.g. sprayer)	2	1%	1	0%
Use integrated/ biological methods	0	0%	0	0%
Toxic / noxious	0	0%	0	0%
Other	0	0%	0	0%
Total	240		237	

Tudituale

Reason	Season B, 2024		Season A, 2024/25	
	N	%	N	%
Not available	33	14%	33	14%
Not necessary (fertile soils)	57	25%	59	26%
Too expensive	2	1%	2	1%
I do not know how to use them	131	57%	129	56%
They are not profitable for me	2	1%	2	1%
Not allowed to use them	4	2%	4	2%
Lack equipment to make use (e.g. sprayer)	0	0%	0	0%
Use integrated/ biological methods	0	0%	0	0%
Toxic / noxious	1	0%	1	0%
Other	0	0%	0	0%
Total	230		230	

Reasons for not using organic fertilizer (manure/compost)

Tudienzele

Reason	Season B, 2024		Season A, 2024/25	
	N	%	N	%
Not available	108	25%	93	23%
Not necessary (fertile soils)	89	21%	93	23%
Too expensive	6	1%	12	3%
I do not know how to use them	132	31%	133	32%
They are not profitable for me	39	9%	38	9%
Not allowed to use them	27	6%	24	6%
Lack equipment to make use (e.g. sprayer)	4	1%	1	0%
Use integrated/ biological methods	12	3%	12	3%
Toxic / noxious	0	0%	0	0%
Other	7	2%	6	1%
Total	424		412	

GAINS

Reason	Season B, 2024		Season A, 2024/25	
	N	%	N	%
Not available	62	26%	48	20%
Not necessary (fertile soils)	93	39%	83	35%
Too expensive	13	5%	6	3%
I do not know how to use them	70	29%	102	43%
They are not profitable for me	1	0%	0	0%
Not allowed to use them	0	0%	0	0%
Lack equipment to make use (e.g. sprayer)	1	0%	0	0%
Use integrated/ biological methods	0	0%	0	0%
Toxic / noxious	0	0%	0	0%
Other	0	0%	0	0%
Total	240		239	

Tudituale

Reason	Season B, 2024		Season A, 2024/25	
	N	%	N	%
Not available	24	11%	23	11%
Not necessary (fertile soils)	101	46%	100	46%
Too expensive	0	0%	0	0%
I do not know how to use them	88	40%	89	41%
They are not profitable for me	0	0%	1	0%
Not allowed to use them	3	1%	3	1%
Lack equipment to make use (e.g. sprayer)	0	0%	0	0%
Use integrated/ biological methods	2	1%	2	1%
Toxic / noxious	0	0%	0	0%
Other	0	0%	0	0%
Total	218	100%	218	100%

Obtained a new variety in the last 5 years

Project	Number of households	Obtained a new variety in past 5 years? (%)		# of varieties received in past 5 years			
		Yes	No	Mean	Std Dev	Min	Max
Tudienzele	648	69%	31%	2.7	1.05	1	6
GAINS	240	17%	83%	2.1	0.67	1	3
Tudituale	231	21%	79%	2.0	0.74	1	3

Received seed aid in the last 5 years

Project	Number of farmers	Seed aid in last 5 yrs? (%)		# of times seed aid obtained among recipients			
		Yes	No	Mean	Std Dev	Min	Max
Tudienzele	646	70%	30%	2.5	0.85	1	6
GAINS	236	17%	83%	1.5	0.51	1	2
Tudituale	230	21%	79%	1.9	0.76	1	3

Percent of seed devoted to each crop in season B, 2024, for all three project zones

Crop	< 0.05 ha N=367	0.05 - 1 ha N=595	> 1 ha N=157	Male-headed households	Female-headed households
Maize	46%	42%	43%	44%	44%
Cassava	15%	21%	18%	17%	21%
Peanut	21%	17%	18%	20%	17%
Cowpea	8%	10%	6%	9%	10%
Beans	2%	5%	7%	5%	3%
Millet	6%	2%	1%	3%	4%